

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
 - 1. Division 01 Section "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Division 01 Section "Execution" for cutting and patching procedures.
 - 3. Division 01 Section "Cutting and Patching" for cutting and patching requirements.

1.3 DEFINITIONS

- A. Remove: Carefully detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor to legally dispose off site.

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- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

- 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.
- C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- D. Predemolition Photographs or Video: Submit before Work begins.
- E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- F. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

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1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition areas. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
 - 1. Roofing Membrane: 2nd floor roof is Carlisle 30-year warranty expiring on August 14, 2041. 3rd floor roof is John Mansville 30-year warranty expiring on August 2049.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

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- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Engage a professional engineer to 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 selective building demolition operations.
 - 1. Perform regular surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Contractor shall arrange to shut off indicated services/systems as required by the performance of the work.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

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- f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- C. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PROTECTION

- A. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain fire watch during and for at least 4 hours after flame-cutting operations.
 - 6. Maintain adequate ventilation when using cutting torches.

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7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials legally and promptly.
 11. Do not perform demolition in a manner that leaves demolished material in soils around building.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's designated storage area.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."
- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 07 Section "Thermoplastic Polyolefin (TPO) Roofing" for new roofing requirements.

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1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system (where required) down to substrate.
- F. Windows: Remove glazing units from framing prior to removing window framing. Do not break existing glass during demolition operations.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION 02 41 19

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 Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes 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. Concrete toppings.
5. Ramps, sidewalks, stairs, and curbs.
6. Retaining walls.
7. Equipment pads and bases.
8. Detectable/tactile warning surface tile.
9. Other cast-in-place concrete as indicated on the Drawings.

- B. Related Sections:

1. Division 03 Section "Hydraulic Cement Underlayment" for self leveling underlayment below floor coverings.
2. Division 05 Section "Structural Steel Framing" for steel and anchor bolts.
3. Division 07 Section "Thermal Insulation" for perimeter insulation.
4. Division 07 Section "Bituminous Dampproofing" for dampproofing installed on below-grade concrete.
5. Division 07 Section "Water Repellents" for water repellents installed on exterior concrete.
6. Division 07 Section "Joint Sealants" for sealants used in conjunction with interior and exterior concrete work, and water repellent applications to exterior concrete.
7. Division 09 Sections for application of finish materials/systems to concrete surfaces.
8. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement; subject to compliance with requirements.
- B. Water/Cement Ratio (W/CM): The ratio by weight of water to cementitious material.

1.4 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division

01 Section "Unit Prices". Unit Prices are inclusive of all labor, materials, overhead and profit per unit of work indicated.

1.5 ALLOWANCES

- A. Work included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this section itemized on the Bid Form. The cost of these quantities shall be computed using the Unit Prices stated on the Bid Form. The work listed is in addition to that required to complete the work of the Contract and, consequently, the sum therefore may be deducted from the Contract amount if the corresponding work is not required by actual conditions encountered.

1.6 ACTION 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. Admixtures:
 - 1. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
- D. Steel Reinforcement Shop Drawings: Comply with ACI SP-066. Include 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.
- E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
 - 1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
 - 2. For exposed vertical concrete walls, indicate dimensions and form tie locations.
 - 3. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.
 - a. Location of construction joints is subject to approval of the Architect.
 - 4. Indicate location of waterstops.
 - 5. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.
- F. Joint Layout Drawing: Indicate proposed construction joints, contraction joints, isolation joints, and saw-cut joints, required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.
- G. Samples: For vapor retarder.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Professional Engineer, Installer, ready-mixed manufacturer, and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials and aggregates.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Curing compounds.
 - 6. Floor and slab treatments.
 - 7. Bonding agents.
 - 8. Adhesives.
 - 9. Vapor retarders.
 - 10. Semirigid joint filler.
 - 11. Joint-filler strips.
 - 12. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Portland cement.
 - 2. Aggregates.
 - 3. Admixtures.
- E. Field quality-control reports from testing agency.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work 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.
- B. Ready-Mixed Concrete 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. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.
- D. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program. Laboratory testing agency supervisor shall be ACI-certified concrete laboratory testing technician, Grade II.

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- E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- G. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete,"
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - 3. ACI 318 "Building Code Requirements for Reinforced Concrete."

1.9 PREINSTALLATION MEETINGS:

- A. Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Advise Architect, Structural Engineer and Civil Engineer of meeting schedule. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Ready-mix concrete manufacturer.
 - c. Concrete subcontractor.
 - d. Testing and inspection agency identified in Part 3 Section in Field Quality Control.
 - 2. Review specification requirements, 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, joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.
 - 3. Inspect project conditions.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301
- B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 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:

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- a. APA HDO (high-density overlay).
 - b. APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
 - c. APA Plyform Class 1, B-B or better; mill oiled and edge sealed.
- B. Concealed Surface Form-Facing Material: Plywood, lumber, metal, plastic, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
 - 1. The use of trimmed excavating for concrete forming is permitted for footings only.
- C. 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.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Laticrete International, Inc., "L&M™ DEBOND."
 - b. Euclid Chemical Company, an RPM company, "Formshield Pure."
 - c. W.R. Meadows, Inc.; "Duogard N.E."
- D. 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 to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from deformed bars, assembled with clips.
- C. Deformed-Steel Wire: ASTM A 496/A 496M.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burns.
- 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. For slabs-on-grade, use supports with sand plates or horizontal runners where wetted base material will not support chair legs.

2.4 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 or Type III.
 - 2. Flyash, pozzolan, slag or silica fume are not permitted in any design mix.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter; crushed stone, processed from natural rock or stone, with maximum size between 3/4" and 1-1/2", and with a minimum size Number 4.
 - 2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps, or other deleterious substances. Hard and durable particles varying from fine to particles passing a 3/8" screen, of which at least 12% shall pass a 50-mesh screen. Dune sand, bank-run sand and manufactured sand shall not be used.
 - 3. Local aggregates not complying with ASTM C 33, but which have shown by special test or actual service to produce concrete of adequate strength and durability, may be used when acceptable to the Architect.
 - 4. For exposed interior surfaces, do not use fine or coarse aggregates that contain substrates that cause spalling.
- C. Water: ASTM C 94/C 94M and potable.
- D. Volatile Organic Compounds (VOC's): No product used shall contain a level of VOC's exceeding the limits established by the EPA in 40 CFR Part 59.

2.5 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Use of calcium chloride is not permitted.
- B. Air-Entraining Admixture: ASTM C 260.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company; "Air-Mix."
 - b. GCP Applied Technologies Inc.; "Darex AEA" or "Daravair."
 - c. Master Builders Solutions; "MasterAir-AE90."
 - d. Sika Corporation; "Sika AER."
- C. 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. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

- D. 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.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Euclid Chemical Company; "EUCON BCN".
- b. GCP Applied Technologies Inc.; W. R. Grace & Co.; "DCI."
- c. Master Builders Solutions; "MasterLife CI 30."
- d. Sika Corporation; "Sika CNI."

2.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E 1745, Class A, except with maximum water-vapor permeance of .006 per ASTM E154. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. W.R. Meadows, Inc.; "Perminator 15 mil."
- b. Raven Industries, Inc.; "Vapor Block VB15."
- c. Reef Industries, Inc.; "Griffolyn® 15 mil."
- d. Stego Industries, LLC; "Stego® Wrap 15-mil Vapor Barrier."

2.7 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces for use on interior floor surfaces indicated as exposed concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Curecrete Distribution Inc.; "Ashford Formula."
- b. Laticrete International, Inc.; "L&M™ Seal Hard."
- c. W. R. Meadows, Inc.; "LIQUI-HARD."

2.8 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

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

- C. Water: Potable, complying with ASTM C 1602/C 1602M

- D. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C 309, Type 1, Class B, certified by manufacturer to be compatible with clear penetrating water repellent for use at exterior concrete and all areas receiving a clear penetrating water repellent.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Laticrete International, Inc.; "L&M Cure R™."
- b. W. R. Meadows, Inc.; "1100-CLEAR."

- E. Clear, Waterborne, Membrane-Forming, Non-Dissipating Curing Compound: ASTM C 309, Type 1, Class B, minimum 30% solids nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering for use on concrete to receive tile, carpet and other specified flooring. Do not use on concrete receiving a specialty coating, cementitious topping or clear penetrating water repellent.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Laticrete International, Inc.; "L&M™ Dress & Seal WB 30™."
- b. W. R. Meadows, Inc.; "Vocomp-30."

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

1. Products: Subject to compliance with requirements, provide the following product or an equal product of another manufacturer that meets or exceeds the properties of the following product:

- a. W.R. Meadows, Inc.; "Fibre Expansion Joint."

- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types I and II, non-load bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4" x 3/4" minimum.

- E. Grout: Pre-mixed, non-shrink grout complying with ASTM C 1107, Grade C:

1. Products subject to compliance with requirements, provide one of the following:

- a. Euclid Chemical Company (The), an RPM company; "NS Grout."
- b. Laticrete International, Inc.; "L&M™ Duragrout™."
- c. W.R. Meadows, Inc.; "588-10K."

2.10 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.
- 2. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
- 3. Adjustment to Concrete Mixtures: Mixture design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the Owner and as accepted by the Architect. Laboratory test data for revised mix design and strength results shall be submitted to and accepted by the Architect before using in the work.

- B. Materials Not Permitted: The following materials, or any combination of materials are not permitted to be incorporated in concrete mixtures:
1. Fly Ash.
 2. Pozzolan.
 3. Ground Granulated Blast Furnace Slag.
 4. Silica Fume.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions for prevailing climatic conditions at the time of placement. Adjust quantities and type of admixtures as required to maintain quality control. Reduction in cement content is not permitted. Do not use admixtures not specified or approved.
1. Use water-reducing or high-range water-reducing 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.
 5. Use air-entraining admixture in exterior exposed concrete. Add air-entraining admixture at manufacturer's prescribed rate and in accordance with ACI 318.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, Foundation Walls, etc.: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3500 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 3 inches or 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture.
 4. Air Content: 5.5 percent, plus or minus 1 percent at point of delivery.
- B. Curbs, Sidewalks, Stairs, Site Concrete, etc.: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4500 psi at 28 days.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd.
 - a. For concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than Portland cement according to ACI 301 requirements.
 3. Slump Limit: 3 inches.
 4. Air Content: 5.5 percent, plus or minus 1 percent at point of delivery.
- C. Suspended Slabs: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4500 psi at 28 days.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd.
 3. Slump Limit: 3 inches.
 4. Air Content: 3 percent maximum.

2.12 FABRICATING REINFORCEMENT

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

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

2.14 DETECTABLE/TACTILE WARNING SURFACE TILE

- A. Vitrified Polymer Composite (VPC) Cast-in-Place Warning Surface Tile.
 - 1. Compliant with PennDOT RC67M and Pub 408 specifications and ADA Accessibility Guidelines (ADAAG) Section 4.29.
 - 2. Provide a DWS product from a manufacturer listed in PennDOT's Bulletin 15 meeting the requirements of the American with Disabilities Act Accessibility Guidelines (ADAAG). Provide certification as specified in Section 106.03(b)3.
 - 3. Size: 24- x 48- inch unless otherwise indicated.
 - 4. Surface: Slip-resistant truncated domes. Dome size and spacing as indicated on PennDOT's Standard Drawing RC-67M.
 - 5. Color: Color as selected by the Architect from the manufacturer's full range.
 - 6. Warranty: Tiles shall be guaranteed in writing for a period of five (5) years from date of Substantial Completion. The guarantee includes defective work, breakage, deformation, fading and loosening of tiles.
- B. Joint Sealing Materials
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Silicone Joint Sealing Material: Low modulus, nonsag-silicone, sealing material in a nonacid-curing, one part formulation.
 - b. Rubberized Joint Sealing Material: ASTM D 6690, Type I or II.
 - c. Preformed Neoprene Compression Seals and Strip Seals and Lubricant Adhesive: AASHTO M 220, ASTM D 3542.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide all labor, materials, and equipment to construct and complete all cast-in-place concrete work, according to all drawings and details, together with any other work specified herein.
 - 1. Contractor shall verify all measurements, lines, connections, methods and materials, and clarify with the Architect all discrepancies before proceeding with the work.

2. Include all appliances, scaffoldings, runways, shorings, forms, reinforcing steel, welded wire fabric, all reinforcing accessories, vapor retarder under slabs on ground, expansion joints, control joints, water stops, and other specialties.
3. All concrete shall be reinforced. Where reinforcement is not called for on the plans or schedules, minimum reinforcement shall be provided in accordance with ACI 318. Minimum temperatures for reinforcement shall be provided in all slabs in accordance with ACI 318.
4. Verification of Conditions:
 - a. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
 - b. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
 1. Daily access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
 4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 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, and to comply with the Surface Finish designations specified herein.
- C. Limit concrete surface irregularities, designated by ACI 117 as follows:
 1. Surface Finish – 1.0: ACI 117 Class D, 1-inch for rough-formed finished surfaces.
 2. Surface Finish – 2.0: ACI 117, Class B, 1/4 inch for coarse-textured surfaces to receive plaster or stucco.
 3. Surface Finish – 3.0: ACI 117, Class A, 1/8 inch for exposed smooth-formed finished surfaces exposed to view.
- D. Construct forms tight enough to prevent loss of concrete mortar, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Minimize joints and symmetrically align all joints in forms.
- E. Construct 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. Do not use rust-stained steel form-facing material.

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- 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 unless indicated otherwise.
- 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. Construction and Movement Joints:
 - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
 - 1. Do not allow excess form-coating materials to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 - 2. Coat steel forms with a non-staining, manufactured form-release agent to protect against rusting. Rust-stained steel formwork is not acceptable.

3.4 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.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
 - 3. Clean embedded items immediately prior to concrete placement.

3.5 REMOVING AND REUSING FORMS

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

3.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
 2. Face laps away from exposed direction of concrete pour.
 3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
 4. Lap joints 6 inches and seal with manufacturer's recommended tape.
 5. Terminate vapor retarder at the top of floor slabs, sealing entire perimeter to floor slabs, or foundation walls.
 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
 7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.7 INSTALLATION OF STEEL REINFORCEMENT

- A. 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. Do not use reinforcement having any of the following defects:
1. Bar lengths, depth, or bends exceeding the specified fabricating tolerances.
 2. Bends or kinks not indicated on the drawings or required for the work.
 3. Bars with cross-section reduced due to excessive rust or other causes.
- D. 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. Minimum concrete coverage for reinforcement:

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- a. Footings, 3-inches.
 - b. Walls, 2-inches.
 - c. Interior slabs, 2-inches.
 - d. Exterior slabs 2-inches.
- E. Reinforce all concrete in accordance with indicated schedules, notes and details indicated on the Drawings.
 - 1. Where reinforcement is not on the Drawings, walls shall be reinforced as follows:
 - a. Up to 8-inches walls: #4 at 10-inches E.W. in center.
 - b. 8-inches up to 12-inches walls: #4 at 8-inches E.W. in center.
 - c. 12-inches walls and over: #4 at 12-inches E.W., E.F.
 - d. Provide #4 at 8-inches spacing dowels from main walls to secondary walls. Provide #4 at 12-inches spacing corner bars – all outside corners of walls. Provide two #4 at 5'-0-inch each corner of openings in concrete floors and walls.
 - e. Replace area of steel interrupted by openings in concrete walls with 1/2 of the area on each side of the opening. Reinforcing to extend full length of span or height in the short directions and clear span plus 6-feet in the long direction of the walls. Provide a minimum of two #6 bars bottom, two #5 bars top, #4 ties at 12-inches and #4 bars at 12-inches H.E.F. over openings in concrete walls.
- F. Lap all horizontal reinforcing steel 48 bar diameters.
- G. Perform all cutting of reinforcing steel where the reinforcing steel interferes with Plumbing, Electrical, and other trades, and where reinforcing steel cannot be moved. Reinforcing steel that is cut shall be replaced as directed by the Architect at the Contractor's expense.
- H. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated
- I. Conduits or pipes shall be spaced not closer than three (3) diameters on center, and shall be so placed as to avoid changing the locations of the reinforcement from that shown on the Drawings.
- J. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- K. 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.

3.8 JOINTS

- A. Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern or lay out and concrete placement sequence.
 - 1. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 2. 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.
 - 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.

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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. Control 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. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- 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 or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 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.
 4. Remove plastic caps for application of sealants as required.
- 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.

3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items and vapor retarder is complete and that required inspections have been performed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
 3. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.
- B. Notify Architect and schedule testing and inspection agencies a minimum of 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
1. Do not add water to concrete after adding high-range water-reducing admixtures.
- 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.
1. If a section cannot be placed continuously, provide construction joints as indicated.

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2. Deposit concrete to avoid segregation.
 3. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 4. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. 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.
 6. 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 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 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. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 4. Do not use retarding admixtures unless otherwise accepted in mix designs submitted to the Architect for acceptability.

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. Patch voids larger than 1 inch wide and 1/2-inch deep. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to 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. Patch voids larger than 1/2-inch wide by 1/2-inch deep. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 1. Apply to concrete surfaces exposed to view, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces:
 1. 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.
 2. 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, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish:
 1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
 2. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
 3. Apply scratch finish to surfaces indicated to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish:
 1. When bleed water sheen has disappeared and concrete has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats.
 2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
 3. 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:
 1. After applying float finish, apply first troweling and consolidate concrete by power-driven trowel.
 2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
 3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 4. Do not add water to concrete surface.

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5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3%.
 6. Apply a trowel finish to surfaces 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.
 7. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 1. Coordinate required final finish with Architect before application.
 2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated and where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, 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.
 2. Coordinate required final finish with Architect before application.

3.12 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to 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.
1. Cut joints in curbs at ten feet (10') on center with alternate joints provided with 1/2-inch thick expansion (isolation) strips, except where the curbs adjoin concrete walks in which case they shall have cut and expansion (isolation) joints to coincide with the adjacent walks.
- C. Exterior Walks and Slabs: Exterior walks and slabs shall have scored joints, tooled to a depth of one-fifth (1/5) of the slab thickness. Where joints are not indicated on the Drawings, provide scored joints of approximately 25 square foot blocks but not larger than 30 square feet.
1. Isolation and Expansion Joints: Provide 1/2-inch thick premolded expansion (isolation) joint filler in walks and slabs. Consult with Architect prior to pouring. Expansion joints shall be a maximum of twenty-five feet (25') apart and continuous against all building walls, concrete curbs and similar vertical surfaces. Recess top edge of filler 1/2-inch to allow for sealing of joints.
- D. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases to height indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 3. Minimum Compressive Strength: 3500 psi at 28 days.
 4. Install dowel rods to connect concrete base to concrete floor.

5. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 6. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
 7. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.
- E. Reinforced Masonry: Provide concrete grout for reinforced masonry where indicated on Drawings and as scheduled.

3.13 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Comply with ACI 301 and ACI 306.1 for cold-weather protection during curing.
 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
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 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, 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. Removal: 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 APPLICATION OF LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatments on interior floor surfaces indicated as finished exposed concrete according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than three days' old but no earlier than recommended by the manufacturer.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
 - 4. Rinse with water; remove excess material until surface is dry.
 - 5. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.15 JOINT FILLING

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

3.16 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved or directed by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
 - a. Limit cut depth to 3/4 inch.
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact with patching mortar before bonding agent has dried.
 - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface.
 - a. Correct low and high areas.
 - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing defects including spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar.
 - a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
 - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - b. Feather edges to match adjacent floor elevations.

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6. Correct other low areas scheduled to remain exposed with a repair topping.
 - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
 - b. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
 - a. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around.
 - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - c. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate.
 - d. Place, compact, and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
 8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
 - a. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles.
 - b. Dampen cleaned concrete surfaces and apply bonding agent.
 - c. Place patching mortar before bonding agent has dried.
 - d. Compact patching mortar and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17 DETECTABLE/TACTILE WARNING SURFACE TILE INSTALLATION

- A. Install detectable/tactile warning surface tile in accordance with manufacturer's instructions and to comply with Pennsylvania Department of Motor Vehicle regulations, Americans with Disabilities Act Guidelines, International Building Code, and local authorities having jurisdiction.
- B. Immediately after placement, the tile elevation shall be checked to adjacent concrete. The elevation and slope shall be set consistent with contract drawings to permit water drainage to curb. Ensure that the field surface of the tile is flush with the surrounding concrete and back of curb so that no ponding is possible on the tile at the back side of curb.
- C. While concrete is workable, a 3/8 inch radius edging tool shall be used to create a finished edge of concrete, then a steel trowel shall be used to finish the concrete around the tile's perimeter, flush to the field level of the tile.
- D. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.
- E. Clean tactile tiles not more than four (4) days prior to date scheduled for inspection intended to establish date of Substantial Completion in each area of project. Clean tactile tile by method specified by tile manufacturer.

3.18 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor shall engage a qualified testing and inspecting agency to witness concrete placement and to perform tests and inspections and to submit reports.
1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- C. Inspections:
1. Observe concrete placement and confirm no water is added on-site.
 2. Inspect formwork for shape, location, and dimensions of the concrete member(s) being formed.
 3. Steel reinforcement placement.
 4. Steel reinforcement welding.
 5. Headed bolts and studs.
 6. Verification of use of required design mixture.
 7. Concrete placement, including conveying and depositing.
 8. Curing procedures and maintenance of curing temperature.
 9. 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 in accordance with ASTM C 172/C 172M 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., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

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- 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.
2. Slump: ASTM C 143/C 143M;
 - a. 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.
 - b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete:
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M:
 - a. One test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. 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, initial cure, and field cure three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M:
 - a. Test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. 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.
8. 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, if specified compressive strength is 5000 psi or no compressive strength test value is less than 10 percent of specified compressive strength if greater than 5000 psi.
9. 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.
10. Additional Tests:
 - a. 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.
 - b. 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.

- 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 Section 1.6.6.3.
 11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing and promptly report test results to Architect.

3.19 PROTECTION

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
 2. Diaper hydraulic equipment used over concrete surfaces.
 3. Prohibit vehicles from interior concrete slabs.
 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
 5. Prohibit placement of steel items on concrete surfaces.
 6. Prohibit use of acids or acidic detergents over concrete surfaces.
 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
 8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03 30 00

SECTION 03 54 16 - HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Polymer-modified, self-leveling, hydraulic cement underlayment for application below interior floor coverings.

1.3 ALLOWANCES

- A. Work included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this Section as itemized on the Bid Form. The cost of these quantities shall be computed using Unit Prices stated on the Bid Form. The work of the Allowance is in addition to that required to complete the Work of the Contract. Subsequently, the sum or any unused portion thereof, shall be deducted from the Contract if the corresponding work is not required by actual conditions encountered.

1.4 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the Project. Unit Price descriptions, requirements, and units of work are enumerated in Division 01 Section "Unit Prices." Unit Prices are inclusive of labor, materials, overhead, and profit per unit of work indicated.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans indicating substrates, locations, and average anticipated depths of underlayment based on field survey of substrate conditions.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.

C. Test Reports:

1. For fire-resistant ratings, from a qualified testing agency.

1.7 QUALITY ASSURANCE

- A. Product Compatibility: Manufacturers of underlayment and floor-covering systems shall certify in writing that products are compatible.
- B. Installer Qualifications: Installer shall be approved by manufacturer for application of underlayment products required for this Project.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
 1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.
- B. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 HYDRAULIC CEMENT UNDERLAYMENTS

- A. Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in minimum uniform thickness of 1/8-inch to 1/4-inch and that can be feathered at edges to match adjacent floor elevations.
 1. Basis of Design: Subject to compliance with requirements, hydraulic cement underlayment incorporated into the project shall be based on systems as follows:
 - a. ARDEX Americas; "V 1000™" or "V 1200™" or MAPEI; "Ultraplan 1 Plus" or "Ultraplan M20 Plus" for use to level subfloor to comply with flooring manufacturer's requirements and for use on all new and existing surfaces to receive new flooring unless noted otherwise.
 - b. ARDEX Americas; "K15®" or MAPEI; "Ultraplan 1 Plus", with aggregate in gang bathrooms where tile is being removed. Assume for building an average thickness of 1-inch.

HYDRAULIC CEMENT UNDERLAYMENT

2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturers, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. Custom Building Products.
 - b. Laticrete International, Inc.
 - c. Master Builders Solutions.
 3. Cement Binder: ASTM C150/C150M, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C219.
 4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C109/C109M.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.
1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F.
- D. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- F. Corrosion-Resistant Coating: Recommended in writing by underlayment manufacturer for metal substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance of the Work.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.

HYDRAULIC CEMENT UNDERLAYMENT

1. Moisture Testing: Perform tests so that each test area does not exceed 500 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test, ASTM F1869: Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours. Comply with manufacturer's requirements if they are more stringent.
- C. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.
 1. Install underlayment reinforcement recommended in writing by manufacturer.
- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 INSTALLATION

- A. Mix and install underlayment components according to manufacturer's written instructions.
 1. Close areas to traffic during underlayment application and for time period after installation recommended in writing by manufacturer.
 2. Coordinate installation of components to provide optimum adhesion to substrate and between coats.
 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Install underlayment to produce uniform, level surface with feathered edges to match adjacent floor elevations as follows:
 1. Install underlayment at all irregularities, depressions, etc. and as required by flooring manufacturer's requirements on all new concrete surfaces indicated to receive flooring.
 2. Install underlayment at all irregularities, depressions, etc. and as required by flooring manufacturer's requirements on all existing concrete surfaces indicated to receive new flooring. Contractor shall review areas that require underlayment prior to installation and shall document and track quantities of material used for allowance accounting.
 3. Install underlayment on all existing concrete surfaces indicated to receive new flooring.
 4. Final layer shall be installed without aggregate to produce surface.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

HYDRAULIC CEMENT UNDERLAYMENT

3.4 INSTALLATION TOLERANCES

- A. Finish and measure surface, so gap at any point between gypsum cement underlayment surface and an unlevelled, freestanding, 10-foot-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch and 1/16 inch in 2 feet.

3.5 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 03 54 16

SECTION 04 01 20 – MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Repairing masonry, including replacing damaged units.
 - 2. Cleaning exposed masonry surfaces.
 - 3. Repointing mortar joints.
- B. Related Sections include the following:
 - 1. Division 04 Section "Unit Masonry" for new Masonry units required for repairs and new work.
 - 2. Division 07 Section "Water Repellents" for water repellents applied to masonry.
 - 3. Division 07 Section "Joint Sealants" for sealing joints in restored masonry.

1.3 DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi.
- B. Medium-Pressure Spray: 400 to 800 psi.
- C. High-Pressure Spray: 800 to 1200 psi.

1.4 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division 01 Section "Unit Prices." Unit Prices are inclusive of all labor, materials, overhead and profit per unit of work indicated.

1.5 ALLOWANCES

- A. Work Included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this section itemized on the Bid Form. The cost of these quantities shall be computed using the Unit Prices stated on the Bid Form. The work listed is in addition to that required to complete the work of the Contract and, consequently, the sum therefore may be deducted from the Contract amount if the corresponding work is not required by actual conditions encountered.

1.6 ACTION SUBMITTALS

- A. Product Data: For each product indicated. Include recommendations for application and use. Include test reports and certifications substantiating that products comply with requirements.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Cleaning Program: Indicate cleaning process, including protection of surrounding materials on building and Project site, and control of runoff during operations. Describe in detail the materials, methods, and equipment to be used.
 - 1. If materials and methods other than those indicated are proposed for cleaning work, provide a written description, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.9 QUALITY ASSURANCE

- A. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 50 feet away by Architect. Perform additional paint and stain removal, general cleaning, and spot cleaning of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.
- B. Restoration Specialist: Engage an experienced masonry restoration and cleaning firm that has completed work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
 - 1. At Contractor's option, the work may be divided between two specialist firms: one for cleaning work and one for repair work.
 - 2. Field Supervision: Require restoration specialist firms to maintain an experienced full-time supervisor on the Project site during times that masonry restoration and cleaning are in progress.
 - 3. Restoration Work Qualifications: Persons who are experienced in restoration work of types they will be performing.
- C. Chemical-Cleaner Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- D. Source of Materials: Obtain materials for masonry restoration from a single source for each type of material required (cmu, cement, sand, etc.) to ensure a match of quality, color, pattern, and texture.

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- E. Mockups: Prepare field samples for restoration methods and cleaning procedures to demonstrate aesthetic effects and qualities of materials and execution. Use materials and methods proposed for completed Work and prepare samples under same weather conditions to be expected during remainder of Work.
 - 1. Locate mockups on the building where directed by Architect.
 - 2. Masonry Repair: Prepare sample panels of size indicated for each type of masonry material indicated to be patched, rebuilt, or replaced. Erect sample panels into an existing wall, unless otherwise indicated, to demonstrate the quality of materials and workmanship.
 - 3. Cleaning: Prepare sample approximately 25 sq. ft. in area for each type of masonry and surface condition.
 - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions, unless cleaners and methods are known to have a deleterious effect.
 - b. Allow a waiting period of not less than 7 days after completion of sample cleaning to permit a study of sample panels for negative reactions.
 - 4. Repointing: Prepare 2 separate sample areas approximately 36 inches high by 36 inches wide for each type of repointing required; 1 for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints.
 - 5. Notify Owner 7 days in advance of the dates and times when samples will be prepared.
 - 6. Obtain approval of mockups before starting the remainder of masonry restoration and cleaning.
 - 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy-duty cartons.
- B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.
- C. Store cementitious materials off the ground, under cover, and in a dry location.
- D. Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.
- E. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

1.11 PROJECT CONDITIONS

- A. Do not repoint mortar joints or repair masonry unless air temperature is between 40 and 80 deg F and will remain so for at least 48 hours after completion of Work.
- B. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing:
 - 1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.

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2. When mean daily air temperature is between 25 and 40 deg F, cover completed Work with weather-resistant, insulating blankets for 48 hours after repair and pointing.
 3. When mean daily air temperature is below 25 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after repair and pointing.
- C. Hot-Weather Requirements: Protect restoration work when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 90 deg F and above.
- D. Clean masonry surfaces only when air temperature is 40 deg F and above and will remain so for at least 7 days after completion of cleaning.
- E. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Immediately remove grout and mortar in contact with exposed masonry and other surfaces.
- F. Protect sills, ledges, and projections from mortar droppings.

PART 2 - PRODUCTS

2.1 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
- B. Basis of Design: Subject to compliance with requirements, Masonry Cleaners incorporated into the project shall be based on products as follows:
1. Alkaline Prewash Cleaner: ProSoCo, Inc.; "Sure Klean 766 Prewash."
 2. Cleaners for Exterior Decorative Masonry Units: ProSoCo, Inc.; "Burnished Custom Masonry Cleaner."
 3. Liquid Strippable Masking Agent: ProSoCo, Inc.; "Sure Klean Acid Stop."
- C. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
1. Diedrich Technologies, Inc.
 2. EaCo Chem, Inc.

2.2 MASONRY REPAIR ANCHORS

- A. Products: Subject to compliance with requirements, provide masonry repair anchors as follows:
1. Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of a 1/4-inch-diameter, Type 304 stainless steel rod with brass expanding shells at each end and a water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on other end.

- a. Dur-O-Wal, Inc.; "Mechanical Repair Anchors."
 - b. Hohmann & Barnard, Inc.; "#521 RA-B Repair/Restoration Anchor."
2. Spiral Type: Spiral anchors flexible in plane of veneer but rigid perpendicular to plane of veneer. Type 304 stainless steel spiral rods designed to anchor to backing and veneer.
 - a. Dur-O-Wal, Inc.; "Dur-O-Flex."
 - b. Heckman Building Products, Inc.; "#391 Spiro Remedial Tie."

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Aggregate for Mortar: ASTM C 144, unless otherwise indicated.
 1. Colored-Mortar Aggregate: Natural or manufactured sand selected to produce mortar color indicated.
 2. For pointing mortar, provide sand with rounded edges.
 3. Match size, texture, and gradation of existing mortar as closely as possible.
- D. Water: Clean and potable.

2.4 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
 1. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1 to 2 hours. Add remaining water in small portions until reaching mortar of the desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
- B. Colored Mortar: Produce mortar of color required by using selected ingredients. Do not adjust proportions without approval.
 1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C. Do not use admixtures of any kind in mortar, unless otherwise indicated.
- D. Mortar Proportions: Mix mortar materials in the following proportions:
 1. Pointing Mortar for CMU Units: 1 part Portland cement, 2 parts lime, and 6 parts colored- or natural-mortar aggregate.
 - a. Add mortar pigments to produce mortar colors required.
- E. Rebuilding Mortar: Comply with ASTM C 270, Proportion Specification, Type N, unless otherwise indicated; with cementitious material content limited to Portland cement and lime.

2.5 CLEANING MATERIALS

- A. Water for Cleaning: Clean, potable, free of soils, acids, alkalis, salts, and organic matter.
- B. Hot Water: Heat water to a temperature of 140 to 160 deg F.
- C. Brushes: Fiber bristles only.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Comply with chemical cleaner manufacturer's written instructions for protecting building surfaces against damage from exposure to their products.
- B. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from injury resulting from masonry restoration work.
 - 1. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be injured by such contact.
 - 2. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 - 3. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 - 4. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
 - 5. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles that must remain in operation during course of masonry restoration work.
- C. Protect adjacent surfaces from contact with chemical cleaners by covering them with a liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces.
- D. Coordinate masonry restoration and cleaning with circulation patterns at Project site. Circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Plan and execute the work accordingly.

3.2 SEQUENCING AND SCHEDULING

- A. Order replacement materials at the earliest possible date to avoid delaying completion of the Work.
- B. Perform masonry restoration work in the following sequence:
 - 1. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 - 2. Clean masonry surfaces.
 - 3. Where water repellants, specified in Division 07, are to be used on or near masonry work, delay application of these chemicals until after pointing.
 - 4. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
 - 5. Repair masonry, including replacing existing masonry with new masonry materials.
 - 6. Rake out mortar from joints to be repointed.

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7. Point mortar and sealant joints.
 8. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
 9. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 10. Clean masonry surfaces.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to comply with "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with "Repointing Masonry" Article.

3.3 REMOVAL AND REPLACEMENT

- A. Carefully remove by hand, at locations indicated, masonry units that are damaged, spalled, or deteriorated. Cut out full units from joint to joint and in a manner to permit replacement with full-size units without damaging surrounding masonry, flashing, weeps, etc.
- B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- C. Salvage as many whole, undamaged CMU units as possible.
- D. Remove mortar, loose particles, and soil from salvaged masonry by cleaning with brushes and water. Store CMU units for reuse.
- E. Clean remaining masonry at edges of removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- F. Install new or salvaged masonry to replace removed masonry. Fit replacement units into bonding and coursing pattern of existing masonry. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
- G. Lay replacement units with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Use wetting methods as required in Division 04 Section "Unit Masonry". Maintain joint width for replacement units to match existing units.
 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing masonry.
 2. Rake out mortar used for laying units before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry.

3.4 REANCHORING VENEERS

- A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Install at not more than 16 inches o.c. vertically and 32 inches o.c. horizontally, unless otherwise indicated. Install at locations to avoid penetrating flashing.
- B. Recess anchors at least 5/8 inch from surface of mortar joint and fill recess with pointing mortar.

3.5 REPOINTING MASONRY

- A. Rake out joints as follows:

MASONRY RESTORATION AND CLEANING

1. Rake out mortar from joints to depths equal to 2-1/2 times their widths, but not less than 1/2 inch or not less than that required to expose sound, unweathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace damaged masonry units.
 - a. Cut out old mortar by hand with a chisel and mallet, unless otherwise indicated.
 - b. Do not use power-operated grinders without written approval based on submission by Contractor of a satisfactory quality-control program and demonstrated ability of operators to use tools without damaging masonry. Quality-control program shall include provisions for supervising performance and preventing damage due to worker fatigue.

B. Point joints as follows:

1. Rinse masonry-joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at the time of pointing, excess water has evaporated or run off and joint surfaces are damp but free of standing water.
2. Apply the first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Compact each layer thoroughly and allow it to become thumbprint hard before applying the next layer.
3. After joints have been filled to a uniform depth, place remaining pointing mortar in 3 layers with first and second layers each filling about two-fifths of joint depth; third layer, the remaining one-fifth. Fully compact each layer and allow to become thumbprint hard before applying next layer. On slightly recess final layer from face. Take care not to spread mortar over edges onto exposed masonry surfaces or to featheredge mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in a damp condition for at least 72 hours.
6. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.6 CLEANING MASONRY, GENERAL

- A. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other. Work from bottom to top of the building for each scaffold drop.
- B. Use only those cleaning methods indicated for each masonry material and location.
 1. Use natural-fiber brushes only.
 2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
 - a. Equip units with pressure gages.
 3. For chemical cleaner spray application, use a low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with a cone-shaped spray tip.
 4. For water spray application, use a fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
 5. For high-pressure water spray application, use a fan-shaped spray tip that disperses water at an angle of at least 40 degrees.

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6. For heated water spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
 7. For steam application, use a steam generator capable of delivering live steam at nozzle.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
- D. Water Application Methods: Where water application methods are indicated, comply with the following:
1. Spray Applications: Spray apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume, and equipment. Unless otherwise indicated, hold spray nozzle at least 6 inches from surface of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.
- E. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical cleaner manufacturer's written instructions; use brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
1. Spray Application: Apply chemical cleaners at pressures not exceeding 50 psi, unless otherwise indicated.
 2. Reapplying Chemical Cleaners: Do not apply chemical cleaners to same masonry surfaces more than twice. If additional cleaning is required, use a steam wash.
- F. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting.

3.7 CLEANING MASONRY

- A. Cold-Water Wash: Clean masonry with cold water applied as follows:
1. Low-pressure spray.
- B. Non Acidic-Liquid Chemical Cleaning:
1. Wet masonry with cold water applied by low-pressure spray.
 2. Apply cleaner to masonry. Let cleaner remain on surface for period indicated below:
 - a. As recommended by chemical cleaner manufacturer.
 - b. 2 to 3 minutes.
 3. Rinse with cold water to remove chemicals and soil.
 - a. Apply rinse by low-pressure spray.
 4. Repeat cleaning procedure above where required to produce the cleaning effect established by mockup. Do not apply more than twice.

3.8 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use stiff-nylon or -fiber brushes and clean water, spray applied at a low pressure.

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- B. Do not use metal scrapers or brushes.
- C. Do not use acidic or alkaline cleaners.

END OF SECTION 04 01 20

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Masonry lintels.
4. Mortar and grout.
5. Steel reinforcing bars.
6. Masonry joint reinforcement.
7. Ties and anchors.
8. Embedded flashing.
9. Miscellaneous masonry accessories.

B. Related Sections:

1. Division 05 Section "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
2. Division 05 Section "Metal Fabrications" for furnishing steel lintels and shelf angles for unit masonry.
3. Division 06 Section "Rough Carpentry" for wood nailers built into masonry.
4. Division 07 Section "Bituminous Dampproofing."
5. Division 07 Section "Water Repellents" for water repellents applied to unit masonry.
6. Division 07 Section "Thermal Insulation" for cavity wall insulation.
7. Division 07 Section "Joint Sealants" for sealants used as part of masonry assemblies.

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

1. Steel lintels and shelf angles for unit masonry, furnished under Division 05 Section "Metal Fabrications."
2. Fabricated metal frames and supports for overhead doors furnished under Division 05 Section "Metal Fabrications."
3. Wood nailers and blocking built into unit masonry specified in Division 06 Section "Rough Carpentry."
4. Hollow-metal frames in unit masonry openings, furnished under Division 08 Section "Hollow Metal Doors and Frames."

1.3 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division 01 Section "Unit Prices". Unit Prices are inclusive of all labor, materials, overhead and profit per unit of work indicated.

1.4 DEFINITIONS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement. "Show elevations of reinforced walls.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
 - 1. Decorative CMUs, in the form of small-scale units.
 - 2. Colored mortar.
 - 3. Weep vents.
- D. Samples for Verification: For each type and color of the following:
 - 1. Decorative CMUs.
 - 2. Colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.6 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For firms indicated in "Quality Assurance Article."
- C. Material Certificates: For each type and size of the following:
 - 1. Masonry units.

- a. Include material test reports substantiating compliance with requirements.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Independent testing agency acceptable to the authorities having jurisdiction, qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with TMS 402 and TMS 602 unless modified by requirements in the Contract Documents.
- E. Preconstruction Testing Service: The contractor or manufacturer shall engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by the contractor or manufacturer. Retesting of materials failing to meet specified requirements shall be done at contractor's expense.
 - 1. Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.
 - 2. Mortar Test: For mortar properties per ASTM C 270.
 - 3. Grout Test: For compressive strength per ASTM C 1019.

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements, including Special Unit Masonry Project Tolerances.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
 - 1. Comply with cold-weather construction requirements contained in TMS 602 and as follows:
 - a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 100 deg F.
 - b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 100 deg F. Heat grout materials to produce grout temperatures between 40 and 100 deg F. Maintain mortar and grout above freezing until used in masonry.
 - c. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 100 deg F. Heat grout materials to produce grout temperatures between 40 and 100 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F if grouting. Use heat on both sides of walls under construction.
 - d. 20 deg F and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 100 deg F. Heat grout materials to produce grout temperatures between 40 and 100 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 deg F within the enclosures.

2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection:
 - a. 40 to 25 deg F: Cover masonry with a weather-resistant membrane for 48 hours after construction.
 - b. 25 to 20 deg F: Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. Install wind breaks when wind velocity exceeds 15 mi./h.
 - c. 20 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 48 hours after construction.
 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.
 2. Do not apply mortar to substrates with temperatures of 100 deg F and above.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- C. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide bullnose units for all outside corners unless otherwise indicated.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where indicated.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) ACM Chemistries; "RainBloc."
 - 2) BASF Aktiengesellschaft; "Rheopel Plus."
 - 3) ACP Applied Technologies.; "Dry-Block."
- C. Concrete Masonry Units (CMUs): ASTM C 90.
 1. Unit shall conform to ASTM C 90. $f_m = 2,000$ psi.
 2. Density Classification: Normal weight
 3. Size (Width): Manufactured to dimensions $3/8$ inch less than nominal dimensions.
 4. Exposed Faces: Provide uniform texture type, aggregate size and mix ratio adjusted to provide an extremely fine smooth face texture free of fissures, voids and other defects.
 5. Products: Subject to compliance with requirements, provide concrete masonry units from one of the following manufacturers:
 - a. Fizzano Brothers Concrete Products, Inc.
 - b. Keystone Concrete Block & Supply Co., Inc.
 - c. Standard Concrete.
 - d. Terre Hill Concrete Products.
 - e. York Building Products.
- D. Decorative CMUs: ASTM C 90.
 1. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - a. Nitterhouse Masonry Products.
 - b. Anchor Block Company.
 - c. EP Henry Corporation.
 - d. Fizzano Brothers Concrete Products, Inc.
 - e. Trenwyth, an Oldcastle Company.
 - f. Beavertown Block Co.
 2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
 3. Density Classification: Normal weight.
 4. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph and as indicated on the Drawings.
 - a. Provide custom units to match existing 8-inch x 16-inch fluted split face units.
 5. Colors and Textures: Match existing.

2.3 MASONRY LINTELS

- A. Masonry Lintels: Prefabricated masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing.
 - 1. Where exposed to interior finished spaces, provide masonry lintels in lengths that match vertical coursing and simulate masonry joints to match adjacent masonry joints.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color selected to match existing mortar.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Davis Colors; "True Tone Mortar Colors."
 - b. Lanxess Corporation; "Bayferrox Iron Oxide Pigments."
 - c. Solomon Colors, Inc.; "SGS Mortar Colors."
- E. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Colored Portland Cement-Lime Mix:
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Capital Materials Corporation; "Riverton Portland Cement Lime Custom Color."
 - 2) Holcim (US) Inc.; "Rainbow Mortamix Custom Color Cement/Lime."
 - 3) Lafarge North America Inc.; "Eaglebond Portland & Lime."
 - 4) Lehigh Cement Company; "Lehigh Custom Color Portland/Lime Cement."
 - 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 - 3. Pigments shall not exceed 10 percent of portland cement by weight.
- F. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- G. Aggregate for Grout: ASTM C 404.

- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); "Accelguard 80."
 - b. Grace Construction Products, W. R. Grace & Co. - Conn.; "Morset."
 - c. Sonneborn Products, BASF Aktiengesellschaft; "Trimix-NCA."
- I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent by same manufacturer.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ACM Chemistries; "RainBloc for Mortar."
 - b. BASF Aktiengesellschaft; "Rheopel Mortar Admixture."
 - c. Grace Construction Products, W. R. Grace & Co. - Conn.; "Dry-Block Mortar Admixture."
- J. Water: Potable.

2.5 REINFORCEMENT

- A. Basis of Design: Subject to compliance with requirements, Masonry Joint Reinforcement incorporated into the project shall be based on products manufactured as follows:
 - a. Single Wythe Wall: Hohmann & Barnard, Inc.; "#120 Truss Mesh."
 - b. Multi Wythe Wall: Hohmann & Barnard, Inc.; "#280 DUBL Loop-Lok™ Ladder Reinforcement."
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from other manufacturers that meet or exceed the published data of the specified Basis of Design product.
- C. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior and Exterior Walls: Hot-dip galvanized, carbon steel.
 - 2. Wire Size for Side Rods: 0.148-inch diameter.
 - 3. Wire Size for Cross Rods: 0.148-inch diameter.
 - 4. Wire Size for Veneer Ties: 0.148-inch diameter.
 - 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 - 6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- D. Masonry Joint Reinforcement for Single-Wythe Masonry: Truss type with single pair of side rods.
- E. Masonry Joint Reinforcement for Multiwythe Masonry:
 - 1. Adjustable (two-piece) type, Ladder design, with one side rod at each face shell of backing wythe and with separate adjustable ties with adjustable loop connections having a maximum adjustment of 2-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2.6 TIES AND ANCHORS

- A. Basis of Design: Subject to compliance with requirements, Ties and Anchors incorporated into the project shall be based on products as manufactured by as follows, in sizes as required by project conditions:
1. Masonry to Column Anchors: Hohmann & Barnard, Inc.; "#301W – Column Web Tie."
 2. Masonry to Steel Beam Anchors: Hohmann & Barnard, Inc.; "#363 Flexible Gripstay Anchors."
 3. Masonry to Masonry Wall Ties: Hohmann & Barnard, Inc.; "MWT-Mesh Wall Tie."
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from other manufacturers that meet or exceed the published data of the specified Basis of Design product.
- C. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 zinc coating.
 3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- E. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units.
 2. Where wythes do not align or are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
 3. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire.
- F. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.105-inch- thick, steel sheet, galvanized after fabrication.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch-diameter, hot-dip galvanized steel wire.
- G. Partition Top Anchors: 0.105-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- H. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
- I. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch- thick steel sheet, galvanized after fabrication.
3. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.187-inch- diameter, hot-dip galvanized-steel wire unless otherwise indicated.

2.7 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.8 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Requirements are specified in Division 07 Section "Sheet Metal Flashing and Trim."
 1. Stainless Steel-Laminated Flashing: 3 oz/sq.ft. stainless steel core with polymer fabric laminated to one stainless steel face with non-asphalt adhesive.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) York Manufacturing, Inc.; "Multi-Flash SS."
 - 2) STS Coatings, Inc.; "Gorilla Flash Stainless Fabric."
 - b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by the flashing manufacturer.
 2. Metal Drip Edge: 3 inch wide with ½-inch, 30 degree hemmed drip, Type 304 or 316 stainless steel drip plate edge with continuous 1/8-inch strip of factory installed compressible foam.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hohmann & Barnard, Inc.; "DP-FTS" and "DP-FTS-LB."
- B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep/Vent Products: Use the following unless otherwise indicated:
 - 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Advanced Building Products Inc.; "Mortar Maze Weep Vent."
 - 2) Blok-Lok Limited; "Cell-Vent."
 - 3) Dayton Superior Corporation, "Dur-O-Wal Division; Cell Vents."
 - 4) Heckmann Building Products Inc.; "No. 85 Cell Vent."
 - 5) Hohmann & Barnard, Inc.; "Quadro-Vent."
 - 6) Wire-Bond; "Cell Vent."
- E. Column Separation Material: Continuous cellulose column wrap material as follows:
 - 1. Williams Products, Inc.; "Column Boxboard."

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
- B. Basis of Design: Subject to compliance with requirements, Masonry Cleaners incorporated into the project shall be based on products as follows:
 - 1. Cleaners for Exterior Decorative Masonry Units: ProSoCo, Inc.; "Burnished Custom Masonry Cleaner."
- C. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - 1. Diedrich Technologies, Inc.
 - 2. EaCo Chem, Inc.

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced masonry, use Type S.
 - 3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type S.
 - 4. For interior non-load-bearing partitions, Type S.
- C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required.
 - 1. Pigments shall not exceed 10 percent of portland cement by weight.
 - 2. Pigments shall not exceed 5 percent of masonry cement by weight.
 - 3. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - 1. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
 - a. Decorative CMUs.
- E. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - 2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Do not install unit masonry that is defective, damaged, cracked or has chipped corners. Remove and replace any unit masonry that contain these issues.
- F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- G. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
 - 1. Tooth new masonry units into existing masonry units.
- H. Do not wet CMUs.

3.3 SPECIAL UNIT MASONRY PROJECT TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/4 inch or minus 1/8 inch.
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/4 inch.
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/8 inch in a story height or 1/4 inch total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 5 feet or 1/4 inch maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than 3/16 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
 - 5. For lines and surfaces do not vary from straight by more than 3/16 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
 - 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 3/16 inch in 10 feet, or 1/2 inch maximum.

C. Joints:

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

- D. Masonry installations that do not conform to the Special Unit Masonry Tolerances indicated above shall be removed and reinstalled.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond, unless noted otherwise on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Decorative Concrete Masonry Units: Prior to installation, obtain manufacturer's installation and protection requirements.
- E. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- F. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- G. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- H. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- I. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- J. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
1. Install compressible filler in joint between top of partition and underside of structure above.

2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
5. In accordance with the Special Unit Masonry Project Tolerances listed in this Section.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. Masonry joints above ceilings shall be struck flush starting two masonry courses above ceiling.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:

1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use truss-type reinforcement extending across both wythes.
 - b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement.
 - c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with to allow for differential movement regardless of whether bed joints align.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 MASONRY JOINT REINFORCEMENT

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

3.8 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
 - 1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.9 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
 - 1. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 2. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.10 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
- C. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

- D. Control Joint Spacings: If location of control (vertical movement) joints is not shown, place vertical joints at not more than 25'-0" center-to-center spacing; locate joints at columns when spacing exceeds 20'-0". Verify location of all control joints with Architect.

3.11 LINTELS

- A. Install steel lintels where indicated and above all openings in masonry walls including above all metal frames (unless scheduled to be framed with metal studs and gypsum board/veneer plaster); above all wall openings, passages, windows, metal louvers, grilles, elevator doors, roll up shutters, etc.; above all HVAC ducts passing through masonry walls, return air openings, etc. (Refer to HVAC drawings for locations); above all built-in items, (cabinet heaters, convectors, louvers, fans, access panels, fire extinguisher cabinets, plumbing valve cabinets, hose cabinets, recessed electric panels, etc.); and in addition to locations noted or shown on the Drawings.
- B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels when approved in advance by the Architect.
- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.12 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weeps in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches on interior face.
 - 3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 - 4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2-inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 - 1. Use specified vent products to form weeps.
 - 2. Space vents 16 inches o.c. unless otherwise indicated.
- E. Install vents in head joints in exterior wythes at spacing indicated. Use specified vent products to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.13 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height and as follows:

- a. Do not exceed the following pour heights for fine grout:

- 1) For minimum widths of grout spaces of $\frac{3}{4}$ inch or for minimum grout space of hollow unit cells of 1-1/2 by 2 inches, pour height of 12 inches.
- 2) For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2 by 3 inches, pour height of 60 inches.
- 3) For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 12 feet.
- 4) For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 24 feet.

- b. Do not exceed the following pour heights for coarse grout:

- 1) For minimum widths of grout spaces of 1-1/2 inches or for minimum grout space of hollow unit cells of 1-1/2 by 3 inches, pour height of 12 inches.
- 2) For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 60 inches.
- 3) For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 12 feet.
- 4) For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 4 inches, pour height of 24 feet.

- c. Provide cleanout holes at least 3 inches in least dimension for grout pours over 60 inches in height.

- 1) Provide cleanout holes at each vertical reinforcing bar.
- 2) At solid grouted masonry, provide cleanout holes at not more than 32 inches o.c.

3.14 REPAIRING, POINTING, CLEANING, AND PROTECTION

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units or installations out of compliance with the Special Unit Masonry Project Tolerances indicated in this Section. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
 - 1. Contractor shall identify and replace units noted above as part of their quality control program. Architect reserves the right to back charge Contractor for their time to identify masonry units if Contractor fails to identify and replace non-compliant installations.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
- E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.15 MASONRY WASTE DISPOSAL

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

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END OF SECTION 04 20 00

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Structural steel.
- 2. Grout.

- B. Related Sections:

- 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
- 2. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
- 3. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
- 4. Division 09 Section "Painting and Finishing" for exposed structural steel framing.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame indicated on Drawings and as described by ANSI/AISC 303.

1.4 ALLOWANCES

- A. Work Included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this section itemized on the Bid Form. The cost of this work shall be computed based upon the scope indicated on the Drawings. The work listed is in addition to that required to complete the work of the Contract and, consequently, the sum therefore may be deducted from the Contract amount if the corresponding work is not required by actual conditions encountered.

1.5 ACTION 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.

STRUCTURAL STEEL FRAMING

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 5. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Steel Elevation Drawings: Provide top of steel elevations for all structural steel, steel joist and miscellaneous steel.
1. Use structural steel framing plans for steel elevation drawings.
 2. Indicate top of steel height for each structural element.
 3. Where steel is sloped, provide high point and low point.
 4. Indicate depth of each section, joist or miscellaneous element.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer, fabricator, professional engineer, and testing agency.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Nonshrink grout.
- F. Source quality-control reports.
- G. Field quality control and special inspection reports from testing agency.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator who is thoroughly familiar with AISC's quality requirements for structural steel fabrication.
- B. Installer Qualifications: A qualified installer who is thoroughly familiar with AISC requirements for steel erection and has completed no less than five (5) projects of similar size and scope within the last three years.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

- D. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified to perform the testing indicated.
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Meeting: Conduct meeting at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.9 COORDINATION

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

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M arade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M and ASTM A 572/A 572M, Grade 50.
- B. Channels, Angles, Shapes: ASTM A 36/A 36M and ASTM A 572/A 572M, Grade 50.
- C. Plate and Bar: ASTM A 36/A 36M and ASTM A 572/A 572M, Grade 50.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Corrosion-Resisting (weathering) Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Type E or S.
- G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.
 - 1. Location: Exterior.
 - 2. Finish: Hot-dip zinc coating.
 - 3. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.
- C. Unheaded Anchor Bolts: ASTM A 572/A 572M, Grade 50 and ASTM A 36/A 36M.
 - 1. Configuration: Straight or hooked.
 - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 5. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

2.3 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- B. Galvanizing-Steel Primer: MPI#26.
 - 1. Etching Cleaner: MPI#25, for galvanized steel.
 - 2. Galvanizing Repair Paint: ASTM A780/A780M.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Co.; "Hi-Flow Grout."
 - b. Laticrete; "L&M Crystex."
 - c. Master Builders; "Masterflow 928."

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
 - 6. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
 - 1. Holes through columns or beams, larger than 2" diameter, are to be reinforced with steel plate each side to replace the strength.
 - 2. All bolted connections are to be made using high strength bolts of min. ¾" diameter.
- 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 2, "Hand Tool Cleaning or SSPC-SP 3, "Power Tool Cleaning."
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
 - 4. Provide holes in beams for bolted field connections required to properly support wood nailers, wood blocking, angles, etc., of other trades.

G. Reinforcing: Provide the following reinforcing:

1. Provide a minimum of four web stiffeners in all beams supporting columns.
2. Angle hangers where required but not noted shall be a minimum of 3 x 3 x 3/8" angles.
3. Provide all necessary bent steel plate closures, clip angles, bolts, anchor bolts, etc., as shown or required to complete the job.

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 unless otherwise indicated.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. All welds shall be 1/4" minimum Fillet unless noted otherwise.
2. All welding shall be performed by an AWS-certified welder.
3. Provide all necessary erection bolts to properly support members for field welding. Remove temporary bolts if they interfere with the finished job.
4. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

C. Masonry Bearing Plates: Provide bearing plates and 2-1/2-in. on center anchor bolts under the ends of all beams bearing on masonry. Unless noted otherwise on structural drawings, bearing plates are to be 8 x 3/8-inch x 12 inches.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces to be high-strength bolted, slip-critical connections.
4. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2.
2. SSPC-SP 3.

C. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 2.0 mils.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

STRUCTURAL STEEL FRAMING

1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize exterior lintels and shelf angles and attached to structural-steel frame and exposed exterior structural steel framing.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Contractor shall 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 inspected and 10%, or not less than two (2) bolts will be tested, according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection of all welds, 10% of shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 1. Ultrasonic Inspection: ASTM E 164.
- E. In addition to visual inspection of all shear connectors, 10% of shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
- B. Base Plates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Anchor Bolts: Furnish anchor bolts, steel plates, and other connectors required for securing structural steel to foundations, walls, and other in-place work.
 - 1. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.
- E. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- F. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- G. Splice members only where approved by Architect and Engineer.
- H. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

STRUCTURAL STEEL FRAMING

- I. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff 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 in ANSI/AISC 303 for mill material.
 - 4. Verify that weld sizes, fabrication sequence, and equipment used for 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 welds to smooth profile. Dress exposed welds.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- C. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures:
 - a. Ultrasonic Inspection: ASTM E 164.
- D. Shear Stud Connectors: In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
- E. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents. Additional testing and inspection, at Contractor's expense, shall be performed to determine compliance of deficient work.

3.6 REPAIRS AND PROTECTION

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

END OF SECTION 05 12 00

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Roof deck.

- B. Related Requirements:

- 1. Division 03 Section "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
 - 2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
 - 3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
 - 4. Division 09 Section "Painting and Finishing" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

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

- B. Shop Drawings:

- 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
 - 2. For steel deck indicated to comply with certain design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for its preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Data:

- 1. Manufacturer's specifications and installation instructions for each product specified. Include manufacturer's certification as may be required to show compliance with these specifications. Indicate by transmittal form that a copy of each instruction has been distributed to the Installer.

- B. Welding certificates.

- C. Product Certificates: For each type of steel deck signed by steel deck manufacturer certifying compliance with requirements.

- D. Field quality-control reports from testing agency.
- E. Code Compliance: Provide documentation demonstrating compliance with the version of the International Building Code in effect for the Project and as acceptable to the authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed steel deck 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.
- B. Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of steel deck similar to this project in material, design, and extent and that have a record of successful in-service performance.
- C. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck in AISI 5100. "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. 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's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Canam Steel Corporation.
 - 2. New Millennium; A Steel Dynamics Company.
 - 3. Epic Metals Corporation.
 - 4. Marlyn Steel Decks, Inc.

5. Nucor Vulcraft.
 6. Roof Deck, Inc.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 zinc coating.
 2. Deck Profile: Type WR, wide rib.
 3. Profile Depth: 1-1/2 inches.
 4. Design Uncoated-Steel Thickness: As indicated.
 5. Span Condition: As indicated.
 6. Side Laps: Overlapped.

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. 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. 10 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, not less than 0.0359-inch 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, of same material and finish as deck, and of thickness and profile 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. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- I. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and sloped recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- J. Galvanizing Repair Paint: ASTM A 780 or SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.
- K. 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. Notify Contractor in writing on unsatisfactory conditions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according in accordance with SDI C, SDI NC, and SDI RD, as applicable; 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. Do not place deck panels on concrete until concrete has cured.
- E. 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.
- F. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
 - 1. Deck panels shall be installed to span a minimum of three supports.
- G. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- H. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
 - 1. Deck around openings 6" to 12" in size, reinforce by means of flat galvanized steel sheet placed over opening on top of floor decking and fusion welded to surface of deck. Provide 0.0478-inch-thick steel sheet of same quality as deck units at least 12" wider and longer than opening. Space welds at each corner and not more than 12" o.c. along each side.
 - 2. Deck openings from 15" wide to 30" wide, and are not supported by structural members reinforced by welding a 1"x1-1/4" steel angle to underside of deck at right angles to deck ribs. Extend angle 3 ribs beyond each side of opening and weld to bottom surface of each rib. Reinforce opening side parallel to deck ribs with a 12" wide, 0.0359-inch-thick steel sheet placed on top surface of decking, welded at each corner and at 12" o.c. along each side. Side reinforcing may be omitted when a roof sump pan is to be installed over the opening 12" wider and longer than the opening. Provide welds at each corner and spaced not more than 12" o.c. along each side.
- I. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- J. Exposed Steel Deck: Paint shop-primed steel deck in the field in accordance with Division 09 Section "Painting and Finishing" requirements.

K. Steel Deck Material:

1. Galvanized Steel Sheet: Provide at all locations where steel deck is concealed from view by fixed ceiling or soffit.

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 long, and as follows:

1. Weld Diameter: 5/8 inch, 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 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.
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, and as follows:

1. Fasten with a minimum of 1-1/2-inch- long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld.

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 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.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

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

D. Remove and replace work that does not comply with specified requirements.

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

3.5 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 "Painting and Finishing."
- C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Division 09 Section "Painting and Finishing".
- D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 31 00

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Miscellaneous framing.

- B. Related Requirements:

- 1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
 - 2. Division 06 Section "Sheathing" for gypsum sheathing applied to exterior framing.
 - 3. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.

- B. Shop Drawings:

- 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; 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.

- C. Delegated-Design Submittal:

- 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Shop drawings for special components and installations not fully dimensioned or detailed in manufacturer's product data.

1.4 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.

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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.

- D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.
- E. Code Compliance: Provide documentation demonstrating compliance with the version of the International Building Code in effect for the Project and as acceptable to the authorities having jurisdiction.
- F. Field quality control reports from testing agency.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed cold-formed metal framing 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.
- B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- C. Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation of cold-formed metal framing similar to this project in material, design, and extent and that has a record of successful in-service performance.
- D. 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.
- E. 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."

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, provide products based upon products manufactured as follows:
1. ClarkDietrich Building Systems.

- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from another manufacturer that meets or exceeds the published data of the specified Basis of Design product.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated.
 - 2. Design framing systems to provide for movement of framing 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.
 - 3. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1 inch.
 - 4. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Design Standards:
 - 1. Floor and Roof Systems: AISI S210.
 - 2. Wall Studs: AISI S211.
 - 3. Headers: AISI S212.
 - 4. Lateral Design: AISI S213.
- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- E. 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's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

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

2.4 EXTERIOR 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: 0.0329 inch.
 - 2. Flange Width: 1-5/8 inches unless noted otherwise.
 - 3. Section Properties: As determined by delegated design process.
- 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: 0.0329 inch.
 - 2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. 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 through positive mechanical attachment to stud web and structure.

2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch
 - 2. Flange Width: 1-5/8 inches minimum unless noted otherwise.
 - 3. Section Properties: As determined by delegated design process.

2.6 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. Gusset plates.
 - 7. Stud kickers and knee braces.
 - 8. Joist hangers and end closures.
 - 9. Hole reinforcing plates.
 - 10. Backer plates.

2.7 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 hex-headed bolts, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. 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.
- E. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.
- B. 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/C 1107M, with fluid consistency and 30-minute working time.
- C. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.9 FABRICATION

- A. Fabricate cold-formed steel 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 steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - 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 and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Report unsatisfactory conditions to Contractor in writing.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 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. Bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel 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.

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2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - 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 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 joints with cold-formed steel 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 approved or standard punched openings.
- J. Erection Tolerances: 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.

3.4 FIELD QUALITY CONTROL

- A. Testing: Contractor shall 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.

3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

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- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel framing, door frames and supports for overhead doors.
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. Steel shapes for supporting elevator door sills.
5. Loose bearing and leveling plates for applications where they are not specified in other Sections.

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

1. Loose steel lintels for all masonry wall penetrations.
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.
4. Rough hardware.

C. Related Sections:

1. Division 03 Section "Cast-in-Place 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 "Modular Ramp Assemblies."
5. Division 05 Section "Pipe and Tube Railings."
6. Division 09 Section "Painting & Finishing."

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the required structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 2. Paint products.
 3. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.5 INFORMATIONAL SUBMITTALS

- A. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units without causing delay in the work.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. 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."

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

1.8 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. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- 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.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; 0.079-inch nominal thickness.
 - 3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, structural steel, Grade 33; 0.0677-inch minimum thickness; hot-dip galvanized after fabrication.

2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

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, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

METAL FABRICATIONS

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; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.
- C. 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.
- D. Machine Screws: ASME B18.6.3.
- E. Lag Screws: ASME B18.2.1.
- F. Wood Screws: Flat head, ASME B18.6.1.
- G. Plain Washers: Round, ASME B18.22.1.
- H. Lock Washers: Helical, spring type, ASME B18.21.1.
- I. 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.
- J. Post-Installed Anchors: Torque-controlled expansion anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- K. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. 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.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

- E. 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.
- F. 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 3500 psi.

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 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 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.
- 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, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.
- J. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.

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. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches wide by 1/4 inch thick by 8 inches long at 24 inches o.c., unless otherwise indicated.
- C. Galvanize miscellaneous framing and supports at exterior locations and where indicated.

2.8 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.

2.9 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.

2.10 LOOSE STEEL LINTELS

- A. Provide steel lintels above all openings in masonry walls and brick veneer including above all metal frames (unless scheduled to be framed with metal studs and gypsum board/veneer plaster); above all wall openings, passages, windows, metal louvers, grilles, etc.; above all HVAC ducts passing through masonry walls, return air openings, etc. (Refer to HVAC drawings for locations); above all built-in items, (cabinet heaters, convectors, louvers, fans, access panels, fire extinguisher cabinets, plumbing valve cabinets, hose cabinets, recessed electric panels, etc.) in addition to those noted/shown on the plans, wall sections and details.
- B. 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.

- C. 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 unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls.

2.11 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.

2.12 ROUGH HARDWARE

- A. Furnish bent, or otherwise custom fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 06 Sections.
- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.13 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.

2.14 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.
- 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.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.
- B. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 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.

3.3 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.

3.4 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.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 05 51 20 – MODULAR RAMP ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Modular Metal Ramps, including ramps, posts, guards, and railings.

1.3 COORDINATION

- A. Coordinate installation of anchorages for modular ramp assemblies. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation
 - 2. Storage
 - 3. Installation
- B. Shop Drawings: Drawings showing plans, elevations, sections and details of components. Show member sizes and part identification, fasteners, anchor requirements, fittings and evidence of compliance with structural performance requirements.
- C. Delegated Design Submittal: For ramps, landings, railings, and guards, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.5 ACTION SUBMITTALS

- A. Qualifications Data: For professional engineer's experience with providing delegated design engineering services of the kind indicated, including documentation that engineer is licensed in the State in which Project is located.

- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY SUBMITTALS

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification.
 - 1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
 - 2. Protect steel members and packaged materials from corrosion and deterioration.
 - 3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.
 - a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, provide Ramp Assemblies by one of the following:
 - 1. American Access, Inc.
 - 2. EZ – Access, Division of Homecare Products, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Ramps: Ramps shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load on Ramps and Landings: 100 lbf/sq. ft.
 - 2. Concentrated Load on Ramps and Landings: 400 lbf applied on an area of 1 sq. ft.
- B. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - 2. Infill of Guards:

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
 - b. Design shall conform to ADA Standards for Accessibility Design and applicable local codes and standards.
 - c. Corrosion Resistance: Separate incompatible materials to prevent galvanic corrosion.
 - d. Seismic Performance of Stairs: Metal stairs withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1) Component Importance Factor: As indicated on Drawings.

2.3 METALS

- A. Extruded aluminum Bars, Rods, Wire, Shapes and Tubes shall be 6063-T6 alloy and temper with a minimum ultimate tensile strength of 22,000 psi. Comply with ASTM B 221.
- B. Sheet and Plate Aluminum: ASTM B 209; 5005 alloy.
- C. Extruded Aluminum-Alloy Structural Pipe and Tube. Comply with ASTM B 429.
- D. Mechanical Fasteners: Aluminum, stainless steel, or other non-corrosive materials compatible with aluminum members, trim, hardware, anchors, and other components of the modular system.

2.4 FASTENERS

- A. General: Provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5 where built into exterior walls.
 1. Select fasteners for type, grade, and class required.
- B. Fasteners for Anchoring Railings and Guards to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings and guards to other types of construction indicated and capable of withstanding design loads.
- C. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
 1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs.
- E. Post-Installed Anchors: Torque-controlled expansion 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 E488/E488M, conducted by a qualified independent testing agency.
 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Group 2 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 FABRICATION

- A. Provide complete modular ramp assemblies, including framing, hangers, railings, clips, brackets, bearing plates, and other components necessary to support and anchor ramps, landings, and legs on supporting structure.
- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Service Class, unless more stringent requirements are indicated.
- C. Finish: Polyester Powder Coat; color selected from manufacturer's full range of colors.

2.6 FABRICATION

- A. All components shall be universal so that system can be easily relocated and assembled into many different configurations.
- B. Ramp and Landing Sections: Ramp sections shall be fabricated to the configuration indicated on drawings for ramps, landings, and field conditions where ramp assembly is to be located.
 - 1. Walking surface shall be continuous, without gaps and traffic surfaces provided with slip resistant surface.
 - 2. Ramps shall be provided with have a wheelchair guard 3 inches plus or minus 1 inch from decking surface.
- C. Legs: Fabricated from standard aluminum shapes and plate.
 - 1. Lengths as required to fit site conditions.
 - 2. Provide with minimum 4-inch by 4-inch plates unless conditions required a larger size.
 - 3. Legs/posts for ramps and landings and shall be adjustable for height and slope adjustments.
 - 4. Design to be independent each side, perpendicular to the ground and allow for adjustment without additional foundation systems.
 - 5. Legs shall not protrude outside the footprint of the walking surface.
- D. Handrail and Guardrail: Fabricated of aluminum tubing and fittings.
 - 1. Handrail shall have a maximum outside diameter of 1.5 inches.
 - 2. Handrail gripping surface shall be smooth and continuous throughout ramp sections, steps, and landings.
 - 3. Guardrails shall form a protective barrier of a minimum of 42 inches high and designed such that a 4-inch sphere cannot pass through any opening.
 - 4. Pickets, balusters shall be minimum aluminum 3/4-inch by 3/4-inch at maximum 4 inches o.c.
 - 5. Inside handrail to be attached to guardrail 34 inches to 38 inches above walking surface.
- E. Fabrication:
 - 1. All components shall be universal so that system can be easily relocated and assembled into many different configurations.
 - 2. Fit and shop assemble components in largest practical sizes for delivery to site.
 - 3. Fabricate components with joints tightly fitted and secured. Furnish connectors and sleeves to accommodate site assembly and installation.
 - 4. Exposed Mechanical Fastenings: Screws or bolts shall be unobtrusively located; consistent with design of component, except where specifically noted otherwise.
 - 5. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, and flush. Ease exposed edges to small uniform radius
 - 6. Accurately form components to suit stairs and landings, to each other and to building structure as applicable.

PART 3 - EXECUTION

3.1 INSTALLING MODULAR RAMP ASSEMBLIES

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing modular ramp assemblies to in-place construction.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing modular ramp assemblies. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Install modular ramp assemblies in accordance with manufacturer's requirements.
- E. Touch up damaged finishes in accordance with manufacturer's requirements. Clean modular ramp assembly prior to Substantial Completion.

END OF SECTION 05 51 20

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Aluminum pipe and tube railings.

1.3 COORDINATION

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

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Product data for internally illuminated railings.
 - 3. Railing brackets.
 - 4. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
- D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- D. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

- A. 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."
- B. Professional Engineer Qualifications: The Contractor shall engage a professional engineer who is legally qualified to practice in jurisdiction where project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installation of handrails and railings that are similar to those indicated for this project in material, design, and extent.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

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

1.9 COORDINATION AND SCHEDULING

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Guards:
 - a. Uniform load of 50 lbf/lineal ft. in accordance with ASCE 7.
 - b. Concentrated load of 200 lbs in accordance with ASCE 7.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F.

2.2 METALS, GENERAL

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

2.3 ALUMINUM RAILINGS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- C. Extruded Bars and Tubing: ASTM B221, Alloy 6063-T5/T52.
- D. Extruded Structural Pipe and Round Tubing: ASTM B429/B429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
- E. Drawn Seamless Tubing: ASTM B210/B210M, Alloy 6063-T832.

2.4 FASTENERS

A. General: Provide the following:

1. Aluminum Railing Components: Type 304 stainless steel fasteners.
2. Dissimilar Metal Railing Components: Type 316 stainless steel fasteners.
3. Finished exposed fasteners to match appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
2. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

C. Intermediate Coats and Topcoats: Provide products that comply with Division 09 Section "Painting and Finishing."

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

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

2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate and locate in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Railings: Fabricate railings with welded connections except as otherwise indicated, and to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings and anchorage, but not less than that needed to withstand indicated loads.
 - 1. Posts: 1-1/2-inch round posts.
 - 2. Mesh Infill: Woven wire mesh in aluminum channel frames. Orient wire mesh with diamonds vertical.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use qualified welders (AWS D1.1/D1.1M) and perform welding in fabrication shop.
 - 2. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 3. Obtain fusion without undercut or overlap.
 - 4. Remove flux immediately.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds; no evidence of a welded joint.
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- K. Form Changes in Direction as Follows:
 - 1. By flush bends.
- L. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

- M. Close exposed ends of railing members with prefabricated end fittings.
- N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- Q. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.7 ALUMINUM FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 2 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Fit exposed connections together to form tight, hairline joints.
 - 2. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 3. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 4. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components only where welded connections are infeasible and have been approved by Architect. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

- A. Use compatible sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with anchoring material flush with adjacent surface.
- C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING RAILINGS

- A. Attach railings to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- B. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section "Painting and Finishing."

3.7 PROTECTION

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

END OF SECTION 05 52 13

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Rooftop equipment bases and support curbs.
 - 2. Wood blocking and nailers.
 - 3. Plywood backing panels.
- B. Related Requirements:
 - 1. Division 06 Section "Sheathing."

1.3 DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. SPIB: The Southern Pine Inspection Bureau.
 - 4. WCLIB: West Coast Lumber Inspection Bureau.
 - 5. WWPA: Western Wood Products Association.

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.

2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 1. Use treatment that does not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items that are part of a fire-resistive assembly and as otherwise required by applicable building code(s).

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber and any of the following species:
 1. Hem-fir; WCLIB or WWPA.
 2. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:
 1. Hem-fir or hem-fir (north); Standard or No. 3 Common grade; NLGA, WCLIB, or WWPA.

- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.6 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- B. Provide other materials, not specifically described, but required for a complete and proper installation.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- C. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- D. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
- F. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

END OF SECTION 06 10 00

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Sheathing joint and penetration treatment.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for plywood backing panels.
 - 2. Division 07 Section "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- B. Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

- A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exposure 1, Structural I sheathing.
 - 1. Span Rating: Not less than 32/16.
 - 2. Nominal Thickness: As indicated on Drawings.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- D. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.
- H. Install sheathing in accordance with manufacturer's requirements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall Sheathing:

- a. Screw to cold-formed metal framing.
- b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 06 16 00

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic laminate-clad countertops and other plastic laminate fabrications.
 - 2. Simulated stone, including [solid polymer] and [quartz] countertops and other simulated stone fabrications.
 - 3. Miscellaneous finished carpentry.
 - 4. Shop finishing of finished carpentry.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
 - 2. Division 09 Section "Painting and Finishing" for priming, backpriming and staining of interior finish carpentry.
 - 3. Division 12 Section "Plastic-Laminate-Faced Casework" for stock-designed cabinets and accessories.

1.3 DEFINITIONS

- A. MDO: Plywood with a medium-density overlay on the face.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, details of joints, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show direction of veining, grain, or other directional patterns.
 - 4. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural cabinets.
 - 5. Apply AWI Quality Control Program label to Shop Drawings.

- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures. Provide complete sample box with all colors and patterns from price ranges specified included for selection.
- D. Samples for Verification:
 - 1. For each species and cut of lumber and panel products with transparent, non-transparent or non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.
 - 2. Exposed cabinet hardware.
 - 3. Plastic laminate, Solid Polymer, and Quartz for each type, color, pattern, and surface finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For each type of product.
- C. Quality Standard: AWI Certified manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finish carpentry to include in maintenance manuals. Include product data for use and care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm experienced in successfully producing finished carpentry similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- C. Installer Qualifications: Arrange for installation of finished carpentry by a firm that can demonstrate successful experience in installing finished carpentry and solid surfacing items similar in type and quality to those required for this project.
- D. AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI) except as otherwise indicated.

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site:
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.9 DELIVERY, STORAGE, AND HANDLING

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

1.10 FIELD CONDITIONS

- A. Field Measurements: Where finish carpentry is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.
 - 1. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with manufacture of woodwork without field measurements. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.
- B. Established Dimensions: Where countertops and assemblies are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- D. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and the following grading rules:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
 - 2. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
 - 3. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
 - 4. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."
 - 5. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
 - 6. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

- B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
 - 1. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- C. Softwood Plywood: DOC PS 1.
- D. Hardboard: AHA A135.4.
- E. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.
- F. Particleboard: ANSI A208.1, Grade M-2 made with binder containing no urea-formaldehyde resin.

2.2 INTERIOR TRIM

- A. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
 - 1. Species and Grade: Red oak; NHLA.
 - 2. Maximum Moisture Content: 10 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Gluing for Width: Use for lumber trim wider than 6 inches.
 - 5. Veneered Material: Use for lumber trim wider than 6 inches.
 - 6. Face Surface: Surfaced (smooth).
 - 7. Matching: Selected for compatible grain and color.
- B. Lumber Trim for Opaque Finish (Painted Finish):
 - 1. Species and Grade: Eastern white pine, Finish or 1 Common; NeLMA or NLGA.
 - 2. Species and Grade: B Finish; NHLA.
 - 3. Maximum Moisture Content: 15 percent.
 - 4. Finger Jointing: Not allowed.
 - 5. Face Surface: Surfaced (smooth).
- C. Hardwood Moldings for Transparent Finish (Stain or Clear Finish): WMMPA HWM 2, N-grade wood moldings made to patterns included in WMMPA HWM 1.
 - 1. Species: Red oak.
 - 2. Maximum Moisture Content: 9 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Matching: Selected for compatible grain and color.
- D. Plastic Laminate Trim:
 - 1. Plastic laminate as specified in this Section.
- E. Simulated Stone Trim:
 - 1. Solid Polymer-Surface Material and Quartz as specified in this Section.

2.3 PLASTIC-LAMINATE COUNTERTOPS AND ASSEMBLIES

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.

- B. Grade: Premium.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGP.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corporation.
 - b. Pionite; a Panolam Industries International, Inc. brand.
 - c. Wilsonart LLC.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect from manufacturer's full range in the following categories:
 - a. Solid colors.
 - b. Wood grains.
 - c. Patterns.
 - 2. Grain Direction: Parallel to cabinet fronts.
 - 3. A maximum of 10 laminates will be selected.
- E. Edge Treatment: Same as laminate cladding on horizontal surfaces, applied before top material.
- F. Outside Corner Treatment: 2-inch radius.
- G. Core Material: Particleboard.
- H. Core Thickness: 1-1/4 inch.
- I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.
- J. Wood Materials
 - 1. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
 - 2. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - a. Particleboard: ANSI A208.1. Density 45#-48#, 3-ply ASTM DD1037-91A, Grade M-2.
- K. Accessories
 - 1. Grommets for Cable Passage through Countertops: 3-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
- L. Fabrication
 - 1. Sand wood lightly to remove raised grain on exposed surfaces before fabrication.
 - 2. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Provide continuous drip groove on under-surface ½ inch from the edge. Ease edges to radius indicated for the following:

- a. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
3. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - a. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

2.4 SIMULATED STONE COUNTERTOPS AND FABRICATIONS

A. Solid Polymer-Surface-Material Countertops and Fabrications:

1. Fabrications: As indicated on Drawings.
2. Fabrication: Fabricate in one piece with shop-applied edges unless otherwise indicated. Comply with solid polymer-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

B. Quartz Countertops and Fabrications:

1. Configuration: Provide countertops with the following front and backsplash style:
 - a. Front: Straight, slightly eased at top as indicated on Drawings.
 - b. Backsplash: Straight, slightly eased at corner.
 - c. Endsplash: Matching backsplash.
 - d. Other Fabrications: As indicated on Drawings.
2. Countertops: 3/4-inch-thick, quartz with front edge built up with same material.
3. Backsplashes: 3/4-inch-thick, quartz.
4. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - a. Fabricate with loose backsplashes for field assembly.

C. Countertop Materials:

1. Plywood: Exterior softwood plywood complying with DOC PS1, Grade C-C Plugged, touch sanded.
2. Solid Polymer Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Avonite Surfaces; a brand of Aristech Surfaces LLC.
 - 2) DuPont (Corian); DuPont de Nemours, Inc.
 - 3) Formica Corporation.
 - 4) Meganite Inc.
 - 5) Wilsonart LLC.

- b. Type: Provide Standard Type or Veneer Type made from material complying with requirements for Standard Type, as indicated unless Special Purpose Type is indicated.
 - c. Colors and Patterns: As selected by Architect from manufacturer's full range equal to E.I. DuPont de Nemours and Company's Price Groups 1-4. For purposes of bidding, Price Group 4 shall be included in the Bid. A credit shall be provided should a lesser price group be selected.
- 3. Quartz: Solid sheet consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cambria.
 - 2) DuPont (Corian Quartz); DuPont de Nemours, Inc.
 - 3) Meganite Inc.
 - 4) Wilsonart LLC.
 - b. Colors and Patterns: As selected by Architect from manufacturer's full range equal to DuPont & Company's Price Groups 1-2. For purposes of bidding, Price Group 2 shall be included in the bid. A credit shall be provided should a lesser price group be selected.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- C. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
- D. Prefabricated, factory-finished, heavy-duty countertop support brackets equal to Universal Heavy-Duty Commercial Support Bracket by Iron Supports. Unless otherwise indicated, provide 18-inch long by 12-inch high brackets mounted as recommended by manufacturer for indicated applications.

2.6 FABRICATION

- A. Back out or kerf backs of the following members except those with ends exposed in finished work:
 - 1. Interior standing and running trim except shoe and crown molds.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius unless noted otherwise.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.
- C. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by countertop Installer for anchoring countertops. Furnish installers of other work with Drawings or templates showing locations of these items.

3.3 CONSTRUCTION TOLERANCES FOR COUNTERTOPS

- A. Variation from Level: Do not exceed 1/8 inch in 96 inches, 1/4 inch maximum.
- B. Variation in Joint Width: Do not vary joint thickness more than one-fourth of nominal joint width.
- C. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch difference between planes of adjacent units.
- D. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.
- B. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Coordinate finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.5 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 2. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.6 COUNTERTOP AND FABRICATION INSTALLATION

- A. Plastic Laminate Countertop and Fabrication Installation
 1. Grade: Install countertops to comply with same grade as item to be installed.
 2. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - a. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
 3. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - a. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
 4. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
 5. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 6. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - a. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - b. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

B. Simulated Stone Countertops and Fabrications Installation:

1. Install countertops and fabrications level to a tolerance of 1/8 inch in 8 feet.
2. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - a. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - b. Seal edges of cutouts in particleboard subtops by saturating with varnish.

3.7 ADJUSTING

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

3.8 CLEANING

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

3.9 PROTECTION

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

END OF SECTION 06 20 00

SECTION 06 64 00 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Factory-laminated plastic sheet paneling (FRP).
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for wood furring for installing plastic paneling.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

2.2 FACTORY-LAMINATED PLASTIC SHEET PANELING

- A. Factory-Laminated Glass-Fiber-Reinforced Plastic Paneling (FRP): Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319, laminated to water-resistant gypsum board. Panels shall be USDA accepted for incidental food contact.
 - 1. Basis of Design: Subject to compliance with requirements, factory-laminated-glass-fiber-reinforced plastic paneling incorporated into the project shall be based on products as follows:
 - a. Marlite; "Laminated FRP".

2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. Crane Composites, Inc.
 - b. Fiber-Tech Industries, Inc.
3. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E84. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
4. Glass-Fiber-Reinforced Plastic Panel Nominal Thickness: Not less than 0.09 inch.
5. Surface Finish: Molded pebble texture.
6. Color: As selected by Architect from manufacturer's full range.
7. Water-Resistant Gypsum Board: ASTM C1396/C1396M or ASTM C1178/C1178M, 5/8 inch, Type X, with water-resistant core and surfaces.

2.3 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard two-piece, snap-on vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 1. Color: Match panels.
- B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.
- D. Adhesive: As recommended by plastic paneling manufacturer.
- E. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.

- B. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- C. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- D. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels so that trimmed panels at corners are not less than 12 inches wide.
 - 1. Mark plumb lines on substrate at trim accessory and panel joint locations for accurate installation.
 - 2. Locate trim accessories and panel joints to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.
 - 1. Drill oversized fastener holes in panels and center fasteners in holes.
 - 2. Apply sealant to fastener holes before installing fasteners.
- C. Install factory-laminated panels using concealed mounting splines in panel joints.
- D. Install trim accessories with adhesive.
- E. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- F. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- G. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
- H. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 06 64 00

SECTION 07 01 50 - PREPARATION FOR REROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Full tear-off of roof areas indicated.

- B. Related Requirements:

- 1. Division 01 Section "Summary" for use of the premises and phasing requirements.
 - 2. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for reroofing preparation.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.
- B. Full Roof Tear-Off: Removal of existing roofing system from deck.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, sections, and details.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
 - 1. Include certificate that Installer is approved by warrantor of existing roofing system.
- B. Fastener pull-out test report.
- C. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces, that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning roofing removal. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.7 PREINSTALLATION MEETINGS

- A. Reroofing Conference: Conduct conference at Project site.
 - 1. Meet with Owner; Architect; Owner's Representative; roofing system manufacturer's representative; roofing Installer, including project manager, superintendent, and foreman; and installers whose work interfaces with or affects reroofing, including installers of roof deck, roof accessories, and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing system tear-off and replacement, including, but not limited to, the following:
 - a. Reroofing preparation, including roofing system manufacturer's written instructions.
 - b. Temporary protection requirements for existing roofing system components that are to remain.
 - c. Existing roof drains and roof drainage during each stage of reroofing, and roof-drain plugging and plug removal.
 - d. Construction schedule and availability of materials, Installer's personnel, equipment, and facilities needed to avoid delays.
 - e. Existing roof deck conditions requiring notification of Architect.
 - f. Existing roof deck removal procedures and Owner notifications.
 - g. Condition and acceptance of existing roof deck and base flashing substrate for reuse.
 - h. Base flashings, special roofing details, drainage, penetrations, equipment curbs, and condition of other construction that affect reroofing.
 - i. Existing HVAC systems.
 - j. Existing fire-suppression, -protection, and -alarm and -detection systems.
 - k. Governing regulations and requirements for insurance and certificates if applicable.
 - l. Existing conditions that may require notification of Architect before proceeding.

1.8 FIELD CONDITIONS

- A. Existing Roofing System: TPO.
- B. Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so Owner's operations are not disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
 - 1. Coordinate work activities daily with Owner so Owner can place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
- C. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- D. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- E. Conditions existing at time of inspection for bidding are maintained by Owner as far as practical.

- F. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.

1. Remove only as much roofing in one day as can be made watertight in the same day.

1.9 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during reroofing, by methods and with materials so as not to void existing roofing system warranty. Notify warrantor before proceeding.

1. Notify warrantor of existing roofing system on completion of reroofing, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 TEMPORARY PROTECTION MATERIALS

- A. Expanded Polystyrene (EPS) Insulation: ASTM C 578.
- B. Plywood: DOC PS1, Grade CD Exposure 1.
- C. OSB: DOC PS2, Exposure 1.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Shut off rooftop utilities and service piping before beginning the Work.
- B. Test existing roof drains to verify that they are not blocked or restricted. Immediately notify Architect of any blockages or restrictions.
- C. Protect existing roofing system that is not to be reroofed.
 1. Loosely lay 1-inch-minimum thick, extruded 25 psi, polystyrene (XPS) insulation over existing roofing in areas indicated. Loosely lay 15/32-inch (12-mm) plywood or OSB panels over EPS. Extend EPS past edges of plywood or OSB panels a minimum of 1 inch (25 mm).
 2. Limit traffic and material storage to areas of existing roofing that have been protected.
 3. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
- D. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- E. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

3.2 ROOF TEAR-OFF

- A. Full Roof Tear-Off: Remove existing roofing and other roofing system components down to the deck.
 - 1. Remove roof insulation.

3.3 DECK PREPARATION

- A. Inspect deck after tear-off of roofing system.
- B. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 or by pouring 1 pint (0.5 L) of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if moisture condenses under plastic sheet or if asphalt test sample foams or can be easily and cleanly stripped after cooling.
- C. If broken or loose fasteners that secure deck panels to one another or to structure are observed, or if deck appears or feels inadequately attached, immediately notify Architect. Do not proceed with installation until directed by Architect.
- D. Provide additional deck securement as indicated on Drawings.

3.4 INFILL MATERIALS INSTALLATION

- A. Immediately after roof tear-off, and inspection and repair, if needed, of deck, fill in tear-off areas to match existing roofing system construction.
- B. Install new roofing patch over roof infill area. If new roofing is installed the same day tear-off is made, roofing patch is not required.

3.5 DISPOSAL

- A. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 - 1. Storage or sale of demolished items or materials on-site is not permitted.
- B. Transport and legally dispose of demolished materials off Owner's property.

END OF SECTION 07 01 50

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Cold-applied, emulsified-asphalt dampproofing.
- B. Related Requirements:
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete placement curing and finishing.
 - 2. Division 04 Section "Unit Masonry" for masonry walls.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experience Installer who has completed bituminous dampproofing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Single-Source Responsibility: Obtain primary dampproofing materials and primers from one source and by a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

1.5 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site in conjunction with air barriers.

BITUMINOUS DAMPPROOFING

1. Review dampproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.
 2. Inspect project conditions.
- B. Preinstallation conference shall be held in conjunction with the Preinstallation conferences for other building envelope materials in order to coordinate the transitions of each material to ensure a continuous air barrier is maintained within the building envelope. Contractor shall review the requirements of the International Energy Conservation Code section C402.5 during the meeting.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide auxiliary materials recommended in writing by manufacturer of primary materials.
- B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Henry Company; "Henry® 785 Asphalt Emulsion Damp Proofing – Trowel Grade."
 2. Karnak Corporation; "920 Fibered Emulsion Mastic (Trowel-Grade)."
 3. W. R. Meadows, Inc.; "Sealmastic Type III."
- B. Trowel Coats: ASTM D 1227, Type II, Class 1, not requiring a protection course other than clean, drainable crushed stone.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- D. Patching Compound: Epoxy or latex-modified repair mortar or asbestos-free fibered mastic of type recommended in writing by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.
 - 1. Extend dampproofing 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.
- C. Install bituminous cant strips (2"x2") and similar accessories as shown and as recommended by material manufacturer even if not indicated on Drawings or specified.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations: Apply one trowel coat at not less than 7 gal/100 sq. ft.
- B. Unparged Masonry Foundation Walls: Apply primer and one trowel coat at not less than 7 gal/100 sq. ft.

3.5 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 11 13

SECTION 07 19 00 - WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes penetrating water-repellent treatments for the following vertical and horizontal surfaces:
 - 1. Concrete unit masonry.
 - 2. Concrete.
- B. Related Sections:
 - 1. Division 04 Section "Unit Masonry" for integral water-repellent admixture for unit masonry assemblies.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Water repellents shall meet performance requirements indicated without failure due to defective manufacture, fabrication, or installation.
 - 1. Water Repellents: Comply with performance requirements specified, as determined by testing on manufacturer's standard substrate assemblies representing those indicated for this Project.
- B. Water Absorption: Minimum 80 percent reduction of water absorption after 24 hours in comparison of treated and untreated specimens.
 - 1. Concrete Masonry Units: ASTM C 140.
- C. Water-Vapor Transmission: Comply with one or both of the following:
 - 1. Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, according to ASTM E 96/E 96M.
 - 2. Minimum 80 percent water-vapor transmission in comparison of treated and untreated specimens, according to ASTM D 1653.
- D. Water Penetration and Leakage through Masonry: Minimum 90 percent reduction in leakage rate in comparison of treated and untreated specimens, according to ASTM E 514.
- E. Durability: Maximum 5 percent loss of water-repellent properties after 2500 hours of weathering according to ASTM G 154 in comparison to water-repellent-treated specimens before weathering.
- F. Chloride-Ion Intrusion in Concrete: NCHRP Report 244, Series II tests.
 - 1. Reduction of Water Absorption: 80 percent.

2. Reduction in Chloride Content: 80 percent.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 1. Include manufacturer's printed statement of VOC content.
 2. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Applicator.
- B. Product Certificates: For each type of water repellent, from manufacturer.
- C. Substrate Applicability: Provide letter from manufacturer indicating the water repellent to be applied is the proper product for the type of substrate indicated.
- D. Field quality-control reports.
- E. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: An employer of workers trained and approved by manufacturer.
- B. Mockups: Apply water repellent to each type of substrate required.
 1. Locate each test application as directed by Architect.
 2. Size: 25 sq. ft.
 3. Final approval by Architect of water-repellent application will be from test applications.

1.7 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 1. Review specification requirements.
 2. Review installation procedures.
 3. Inspect project conditions.

1.8 PROJECT CONDITIONS

- A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
 1. Concrete surfaces and mortar have cured for not less than 28 days.
 2. Building has been closed in for not less than 30 days before treating wall assemblies.
 3. Ambient temperature is above 50 deg F and below 95 deg F and will remain so for 24 hours.

4. Substrate is not frozen and substrate-surface temperature is above 50 deg F and below 100 deg F.
5. Rain or snow is not predicted within 24 hours.
6. Not less than 24 hours have passed since surfaces were last wet.
7. Windy conditions do not exist that might cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair and replace materials that fail to maintain water repellency specified in "Performance Requirements" Article within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PENETRATING WATER REPELLENTS

- A. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blend with 400 g/L or less of VOCs.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. For vertical porous concrete masonry unit applications:

- 1) Master Builders Solutions; "MasterProtect® H 185".
- 2) Laticrete; L&M "Aquapel Plus."
- 3) Sherwin Williams; "Loxon 40% Silane Water Repellent."

- b. For horizontal concrete surface applications:

- 1) Master Builders Solutions; "Master Protector® H 400".
- 2) Laticrete; L&M "Aquapel Plus."
- 3) Sherwin Williams; "Loxon 40% Silane Water Repellent."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements and conditions affecting performance of the Work.

1. Verify that surfaces are clean and dry according to water-repellent manufacturer's requirements. Check moisture content in three representative locations by method recommended by manufacturer.
2. Inspect for previously applied treatments that may inhibit penetration or performance of water repellents.
3. Verify that there is no efflorescence or other removable residues that would be trapped beneath the application of water repellent.

4. Verify that required repairs are complete, cured, and dry before applying water repellent.

- B. Test pH level according to water-repellent manufacturer's written instructions to ensure chemical bond to silica-containing or siliceous minerals.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cleaning: Before application of water repellent, clean substrate of substances that could impair penetration or performance of product according to water-repellent manufacturer's written instructions.
 - B. Protect adjoining work, including mortar and sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live vegetation.
 - C. Coordination with Mortar Joints: Do not apply water repellent until pointing mortar for joints adjacent to surfaces receiving water-repellent treatment has been installed and cured.
 - D. Coordination with Sealant Joints: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those required.

3.3 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
- B. Apply a heavy-saturation coating of water repellent, on surfaces indicated for treatment, using low pressure spray with a fan-type spray nozzle to the point of saturation. Apply coating in dual passes of uniform, overlapping strokes. Remove excess material; do not allow material to puddle beyond saturation. Comply with manufacturer's written instructions for application procedure unless otherwise indicated.
- C. Apply a second saturation coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.4 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Correct damage to work of other trades caused by water-repellent application, as approved by Architect.
- B. Comply with manufacturer's written cleaning instructions.

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END OF SECTION 07 19 00

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Glass-fiber blanket insulation.
2. Mineral-wool blanket insulation.
3. Spray polyurethane foam sealant.

- B. Related Requirements:

1. Division 07 Section "Thermoplastic-Polyolefin (TPO) Roofing" for insulation specified as part of roofing construction.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:

1. Glass-fiber blanket insulation.
2. Mineral-wool blanket insulation.
3. Spray polyurethane foam sealant.

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

- A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.

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- c. Knauf Insulation.
 - d. Owens Corning.
 - 2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
 - 3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
 - 4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- B. Glass-Fiber Blanket Insulation, Reinforced-Foil Faced: ASTM C665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.
 - d. Owens Corning.
 - 2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 MINERAL-WOOL BLANKET INSULATION

- A. Mineral-Wool Blanket Insulation, Unfaced: ASTM C665, Type IA (blankets without membrane facing); consisting of fibers; passing ASTM E136 for combustion characteristics.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Rockwool International.
 - c. Thermafiber, Inc.; an Owens Corning company.
 - 2. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
 - 3. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
 - 4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.3 SPRAY POLYURETHANE FOAM SEALANT

- A. Spray Polyurethane Foam Sealant: ASTM C 518 and as follows:
- 1. Products: Subject to compliance with requirements, provide the following:
 - a. Type A – Dow Corporation; "Great Stuff Pro Gaps and Cracks Insulating Foam Sealant."
 - b. Type B – Dow Corporation; "Froth Pak Foam Sealant."
 - c. Type C – Dow Corporation; "Great Stuff Pro Window and Door Insulating Foam Sealant."

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION, GENERAL

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

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 - 5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls: Set units with facing placed toward interior of construction.
 - b. Interior Walls: Set units with facing placed toward areas of high humidity.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
 - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.
 - a. Spray Polyurethane Insulation Schedule:
 - 1) Type A – Use in all joints and cracks in exterior building envelope from 1/4-inch wide up to 2-inches wide.

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- 2) Type B – Use in all joints in exterior building envelope 2-inches wide and greater.
- 3) Type C – Use at all framed door and window openings.

b. Joints Included:

- 1) Roof penetrations.
- 2) Wall penetrations.
- 3) Wall/floor junctions.
- 4) Wall/roof junctions.
- 5) Expansion joints.
- 6) Window and door frames.
- 7) Locations where insulation is discontinued due to construction technique.
- 8) Other cracks and gaps over 1/4-inch wide.

C. Thermal Surface Barriers:

1. Apply thermal surface barrier in accordance with manufacturer's written instructions and to comply with requirements.
2. Use equipment and techniques best suited for substrate and type of material applied as recommended by coating manufacturer.
3. Apply to prepared surfaces as soon as practical after preparation and before subsequent surface soiling or deterioration.
4. Apply to provide a complete barrier where indicated on the Drawing.

3.4 PROTECTION

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

END OF SECTION 07 21 00

SECTION 07 24 13 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Exterior insulation and finish system (EIFS) applied over substrates as indicated on the Drawings.

B. Related Sections:

- 1. Division 06 Section "Sheathing" for sheathing and weather-resistant sheathing paper.
- 2. Division 07 Section "Joint Sealants" for sealing joints in EIFS with elastomeric joint sealants.

1.3 SYSTEM DESCRIPTION

- A. Class PB EIFS: A non-load-bearing, exterior wall cladding system that consists of an insulation board attached adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

1.4 PERFORMANCE REQUIREMENTS

A. EIFS Performance: Comply with the following:

- 1. Bond Integrity: Free from bond failure within EIFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
- 2. Weathertightness: Resistant to water penetration from exterior into EIFS and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of EIFS and assemblies behind it, including substrates, supporting wall construction, and interior finish.

B. Class PB EIFS: Provide EIFS having physical properties and structural performance that comply with the following:

- 1. Abrasion Resistance: Sample consisting of 1-inch- thick EIFS mounted on 1/2-inch- thick gypsum board; cured for a minimum of 28 days; and showing no cracking, checking, or loss of film integrity after exposure to 528 quarts of sand when tested per ASTM D 968, Method A.
- 2. Absorption-Freeze Resistance: No visible deleterious effects and negligible weight loss after 60 cycles per EIMA 101.01.

3. Accelerated Weathering: Five samples per ICC-ES AC219 showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, delamination, or other characteristics that might affect performance as a wall cladding after testing for 2000 hours when viewed under 5 times magnification per ASTM G 153 or ASTM G 155.
4. Freeze-Thaw: No surface changes, cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination, or indications of delamination between components when viewed under 5 times magnification after 10 cycles per ICC-ES AC219.
5. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch clean glass substrate, cured for 28 days, and showing no growth when tested per ASTM D 3273 and evaluated according to ASTM D 3274.
6. Salt-Spray Resistance: No deleterious affects when tested according to ICC-ES AC219.
7. Tensile Adhesion: No failure in the EIFS, adhesive, base coat, or finish coat when tested per ICC-ES AC219.
8. Water Penetration: Sample consisting of 1-inch- thick EIFS mounted on 1/2-inch-thick gypsum board, cured for 28 days, and showing no water penetration into the plane of the base coat to expanded-polystyrene board interface of the test specimen after 15 minutes at 6.24 lbf/sq. ft. of air pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per EIMA 101.02.
9. Water Resistance: Three samples, each consisting of 1-inch- thick EIFS mounted on 1/2-inch-thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination after testing for 14 days per ASTM D 2247.
10. Wind-Driven-Rain Resistance: Resist wind-driven rain according to ICC-ES AC219.
11. Impact Resistance: Sample consisting of 1-inch- thick EIFS when constructed, conditioned, and tested per EIMA 101.86; and meeting or exceeding the following:
 - a. Medium Impact Resistance: 50 to 89 inch-lb.
 - b. Ultra-High Impact Resistance: More than 150 inch-lb.
12. Structural Performance Testing: EIFS assembly and components shall comply with ICC-ES AC219 when tested per ASTM E 330.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type and component of EIFS indicated.
- B. Shop Drawings: For EIFS. Include plans, elevations, sections, details of components, details of penetration and termination, flashing details, joint locations and configurations, fastening and anchorage details including mechanical fasteners, and connections and attachments to other work.
- C. Samples for Initial Selection: For each type of finish-coat color and texture indicated.
 1. Include similar Samples of joint sealants and exposed accessories involving color selection.
- D. Samples for Verification: 24-inch- square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including custom trim, each profile, an aesthetic reveal, a typical control joint filled with sealant of color selected.
 1. Include sealants and exposed accessory Samples to verify color selected.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.

- B. Manufacturer Certificates: Signed by manufacturers certifying that EIFS and joint sealants comply with requirements.
- C. Product Certificates: From EIFS manufacturer, certifying compatibility of EIFS and accessory materials with Project materials that connect to or that come in contact with the air barrier.
- D. Compatibility and Adhesion Test Reports: For joint sealants from sealant manufacturer indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- E. Field quality-control reports and special inspection reports.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For EIFS to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.
 - 1. Fabricator/Erector Qualifications: Certified in writing by EIFS manufacturer as qualified to fabricate and erect manufacturer's prefabricated panel system using skilled and trained workers.
- B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution and set quality standards for fabrication and installation.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Air Leakage Rates: Air leakage rates shall meet the requirements of the International Energy Conservation Code section C402.5.

1.9 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference meetings Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

- B. Preinstallation conference shall be held in conjunction with the Preinstallation conferences for other building envelope materials in order to coordinate the transitions of each material to ensure a continuous air barrier is maintained within the building envelope. Contractor shall review the requirements of the International Energy Conservation Code section C402.5 during the meeting.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
 - 1. Stack insulation board flat and off the ground.
 - 2. Protect plastic insulation 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.

1.11 PROJECT CONDITIONS

- A. Weather Limitations: Maintain ambient temperatures above 40 deg F for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1.12 COORDINATION

- A. Coordinate installation of EIFS with related Work specified in other Sections to ensure that wall assemblies, including sheathing, flashing, trim, joint sealants, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind flashing and barrier coating of EIFS.

1.13 WARRANTY

- A. Provide manufacturer's standard 3 year material guarantee for exterior insulation and finish system; effective from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, Polymer Based Exterior Insulation and Finish System (EIFS) incorporated into the project shall be based on systems as follows:
 - 1. LaHabra® Pebbletex® classic PB Wall System.

- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product and can match the Basis of Design's range of color selection:

1. Dryvit, part of Tremco CPG.
2. Sto Corp.

2.2 MATERIALS

- A. Compatibility: Provide adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by EIFS manufacturer for Project.
- B. Primer/Sealer: EIFS manufacturer's standard substrate conditioner designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.
- C. Flexible-Membrane Flashing: Cold-applied, fully self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
- D. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate and complying with one of the following:
1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, and polymer-based adhesive specified for base coat.
- E. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I; EIFS manufacturer's requirements; and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
1. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
 2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E 84.
 3. Dimensions: Provide insulation boards not more than 24 by 48 inches and in thickness indicated, but not more than 4 inches thick or less than thickness allowed by ASTM C 1397.
 4. Foam Shapes: Provide with profiles and dimensions indicated on Drawings.
- F. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per ASTM E 2098; complying with ASTM D 578 and the following:
1. Intermediate-Impact Reinforcing Mesh: Not less than 10 oz./sq. yd.
 2. Heavy-Duty Reinforcing Mesh: Not less than 20 oz./sq. yd.
- G. Base-Coat Materials: EIFS manufacturer's standard mixture complying with the following:
1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.

- H. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation complying with the following:
 - 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
- I. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- J. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance complying with the following:
 - 1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
 - 2. Colors: As selected by Architect from Basis of Design manufacturer's full range.
- K. Water: Potable.
- L. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:
 - 1. For attachment to steel studs from 0.033 to 0.112 inch in thickness, provide steel drill screws complying with ASTM C 954.
 - 2. For attachment to light-gage steel framing members not less than 0.0179 inch in thickness, provide steel drill screws complying with ASTM C 1002.
 - 3. For attachment to wood framing members and plywood sheathing, provide steel drill screws complying with ASTM C 1002, Type W.
 - 4. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.
 - 5. For attachment, provide manufacturer's standard fasteners suitable for substrate.
- M. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard Cell Class for use intended, and ASTM C 1063.
 - 1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - 3. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
 - 4. Window Sill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.

2.3 ELASTOMERIC SEALANTS

- A. Elastomeric Sealant Products: Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in ASTM C 1481 and with requirements in Division 07 Section "Joint Sealants" for products corresponding to description indicated below:
 - 1. Multicomponent, nonsag urethane sealant.
 - 2. Single-component, nonsag, neutral-curing silicone sealant.
- B. Preformed Foam Sealant Products: Provide sealant compatible with adjacent materials and complying with requirements in Division 07 Section "Joint Sealants."
- C. Sealant Color: As selected by Architect from manufacturer's full range.

2.4 MIXING

- A. General: Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

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 EIFS.
- B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Begin coating application only after surfaces are dry.
 - 2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.
- C. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.

1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

3.3 EIFS INSTALLATION, GENERAL

- A. Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

3.4 SUBSTRATE PROTECTION APPLICATION

- A. Primer/Sealer: Apply over gypsum sheathing substrates to protect substrates from degradation and where required by EIFS manufacturer for improving adhesion of insulation to substrate.
- B. Waterproof Adhesive/Base Coat: Apply over sloped surfaces and window sills to protect substrates from degradation.
- C. Flexible-Membrane Flashing: Install over weather-resistive barrier, applied and lapped to shed water; seal at openings, penetrations, terminations, and where indicated by EIFS manufacturer's written instructions to protect wall assembly from degradation. Prime substrates, if required, and install flashing to comply with EIFS manufacturer's written instructions and details.

3.5 TRIM INSTALLATION

- A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at window sills, and elsewhere as indicated, according to EIFS manufacturer's written instructions. Coordinate with installation of insulation.
 1. Drip Screed/Track: Use at bottom edges of EIFS unless otherwise indicated.
 2. Window Sill Flashing: Use at windows unless otherwise indicated.
 3. Expansion Joint: Use where indicated on Drawings.
 4. Casing Bead: Use at other locations.

3.6 INSULATION INSTALLATION

- A. Board Insulation: Adhesively and mechanically attach insulation to substrate in compliance with ASTM C 1397, EIFS manufacturer's written instructions, and the following:
 1. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to sheathing unless EIFS manufacturer's written instructions specify using primer/sealer with ribbon-and-dab method. Apply adhesive to a thickness of not less than 1/4 inch for factory mixed and not less than 3/8 inch for field mixed, measured from surface of insulation before placement.
 2. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
 3. Allow adhered insulation to remain undisturbed for period recommended by EIFS manufacturer, but not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
 4. Mechanically attach insulation to substrate by method complying with EIFS manufacturer's written instructions. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:

- a. Steel Framing: 5/16 inch.
 - b. Concrete and Masonry: 1 inch.
5. Apply insulation over dry substrates in courses with long edges of boards oriented horizontally.
6. Begin first course of insulation from a level base line and work upward.
 - a. Where trim is used, begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
7. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings and not less than 4 inches from aesthetic reveals.
 - a. Adhesive Attachment: Offset joints of insulation not less than 6 inches from horizontal and 4 inches from vertical joints in sheathing.
 - b. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
8. Interlock ends at internal and external corners.
9. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
10. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
11. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/16 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch.
12. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch.
13. Install foam shapes and attach to structure.
14. Interrupt insulation for expansion joints where indicated.
15. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
16. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
17. After installing insulation and before applying reinforcing mesh, fully wrap board edges with strip reinforcing mesh. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face unless otherwise indicated on Drawings.
18. Treat exposed edges of insulation as follows:
 - a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
 - b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
 - c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
19. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS protective-coating lamina.

B. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:

1. At expansion joints in substrates behind EIFS.
2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
3. Where wall height or building shape changes.
4. Where EIFS manufacturer requires joints in long continuous elevations.

3.7 BASE-COAT INSTALLATION

A. Base Coat: Apply to exposed surfaces of insulation and foam shapes in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch dry-coat thickness.

B. Reinforcing Mesh: Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.

1. Intermediate-impact reinforcing mesh at locations above 12'-0" above grade.
2. Heavy-duty reinforcing mesh at locations below 12'-0" above grade and as indicated on Drawings.

C. Double-Layer Reinforcing Mesh Application: At all locations, apply second base coat and second layer of intermediate-impact reinforcing mesh, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions in same manner as first application. Do not apply until first base coat has cured.

D. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- wide strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.

1. At aesthetic reveals, apply strip reinforcing mesh not less than 8 inches wide.
2. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.

E. Foam Shapes: Fully embed reinforcing mesh in base coat.

F. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application except without reinforcing mesh. Do not apply until first base coat has cured.

3.8 FINISH-COAT INSTALLATION

A. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.

B. Finish Coat: Apply over dry base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.

1. Texture: As selected by Architect from manufacturer's full range.

C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

3.9 INSTALLATION OF JOINT SEALANTS

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Joint Sealants" and in ASTM C 1481.
 - 1. Apply joint sealants after base coat has cured but before applying finish coat.
 - 2. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
 - 3. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
 - 4. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
 - 5. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.

3.10 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 07 24 13

SECTION 07 25 00 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Building wrap.
- B. Related Requirements:
 - 1. Division 06 Section "Sheathing" for sheathing joint and penetration treatment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.
- B. Shop Drawings for Weather Barriers:
 - 1. Show locations and extent of weather barriers. Include details for substrate cracks and joints, counterflashing, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 2. Include details of installation and accessory materials.
 - 3. Include connections to and continuity with aluminum and hollow metal doors, curtain wall assemblies, windows, and fiberglass-sandwich-panel assemblies.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, provide one of the following:

WEATHER BARRIERS

- a. Dow Chemical Company (The); Styrofoam Weathermate Housewrap.
 - b. Pactiv, Inc.; GreenGuard Max.
 - c. Raven Industries Inc.; Fortress Pro Weather Protective Barrier.
 - d. Reemay, Inc.; Typar HouseWrap.
 2. Water-Vapor Permeance: Not less than 20 perms per ASTM E 96/E 96M, Desiccant Method (Procedure A).
 3. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg when tested according to ASTM E 2178.
 4. Allowable UV Exposure Time: Not less than three months.
- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
 2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.
- C. Building Wrap: Comply with manufacturer's written instructions.
1. Seal seams, edges, fasteners, and penetrations with tape.
 2. Extend into jambs of openings and seal corners with tape.

END OF SECTION 07 25 00

SECTION 07 42 13 - METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Concealed-fastener, lap-seam metal wall panels.
 - 2. Concealed-fastener, lap-seam metal soffit panels.
- B. Related Sections:
 - 1. Division 04 Section "Unit Masonry."
 - 2. Division 05 Section "Cold-Formed Metal Framing."
 - 3. Division 06 Section "Rough Carpentry" for nailers and blocking.
 - 4. Division 06 Section "Sheathing" for wall sheathing.

1.3 DEFINITION

- A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight wall system.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure of 30 lbf/sq. ft., acting inward or outward.
 - 2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/240 of the span.

- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.

- 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Anchorage systems.
 - c. Coordination with wall-mounted equipment.

- C. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.

- 1. Include similar Samples of trim and accessories involving color selection.

- D. Delegated-Design Submittal: For metal wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installer and professional engineer.
 - 1. Submit identification of at least three (3) projects of similar scope and complexity along with contract information for the architect, owner, and general contractor. Installer shall have three (3) years minimum experience in application of similar products. Installer shall be rated at the highest level by manufacturer.
- B. Field quality-control reports.
- C. Maintenance Data: For metal wall panels to include in maintenance manuals.
- D. Warranties: Sample of special warranties.

1.7 PREINSTALLATION MEETINGS

- A. Preinstallation Meetings: Conduct meetings at Project site.

1. Meet with representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review specification requirements.
4. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
5. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
6. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal wall panel assembly during and after installation.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- C. Source Limitations: Obtain each type of metal wall panel from single source from single manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

1.10 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication, and indicate measurements on Shop Drawings.

1.11 COORDINATION

- A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.

- 1. Failures include, but are not limited to, the following:

- a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.

- 2. Warranty Period: Five years from date of Substantial Completion.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

- 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

- 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Metallic-Coated Aluminum Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

- 1. Aluminum Sheet: Coil coated sheet A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
 - 2. Thickness: .040".
 - 3. Surface: Smooth, flat finish.
 - 4. Exposed Coil-Coated Finish:

- a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish selected from manufacturer's full range of standard colors based on color range by ATAS International, containing not less than 70 percent PVDF resin by weight in both color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- 5. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and flat pan between panel edges; with flush joint between panels.
 - 1. Basis-of-Design: Subject to compliance with requirements, Metal Wall Panels incorporated into the project shall be based on systems as follows:
 - a. ATAS International, Inc.; "Opaline OPW Panel."
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - a. AEP-Span.
 - b. Carlisle Metal Products.
 - c. Englert, Inc.
 - d. Elevate™.
 - e. MBCI; Div. of NCI Building Systems.
 - f. Merchant & Evans.
 - g. Petersen Aluminum Corporation.
 - 3. Material: .040 Aluminum sheet.
 - a. Exterior Finish: 2-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.
 - 4. Panel Coverage: 4 1/2-inches.
 - 5. Panel Height: .75 inches.
 - 6. Reveal: .5 inches
 - 7. Installation: Over solid substrate.

2.3 METAL SOFFIT PANELS

- A. General: Provide factory-formed metal wall panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
- B. Manufacturers: Same as Wall Panels except Basis of Design is as listed below.
- C. Flush-Profile Metal Soffit Panels: Solid panels formed with flush face and tight seam panel edges.
 - 1. Basis of Design: Subject to compliance with requirements, provide products by metal roof manufacturer based on ATAS International, Inc.; "Opaline OPF Panel."
 - 2. Material: .040 Aluminum sheet.
 - a. Exterior Finish: 2-coat fluoropolymer.
 - b. Color: As selected by Architect from manufacturer's full range.

3. Panel Coverage: 8 inches.
4. Panel Height: 0.75 inch.
5. Installation: Over open framing.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam, or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 FABRICATION

- A. Fabricate and finish metal wall panels and accessories at the factory by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weather-resistant seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - a. Minimum Length: 12'-0".
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer and rivet joints for additional strength when necessary.
 - 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - 3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
 - 4. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

- B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Framing: Install base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Commence metal wall panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.
 - 2. Shim or otherwise plumb substrates receiving metal wall panels.
 - 3. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
 - 4. Install screw fasteners in predrilled holes.
 - 5. Locate and space fasteners in uniform vertical and horizontal alignment.
 - 6. Install flashing and trim as metal wall panel work proceeds.
 - 7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 8. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
 - 9. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 10. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
 - 11. Engage manufacturer's representative to visit the site on at least three occasions during construction.
- B. Fasteners:
 - 1. Aluminum Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.

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4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
- E. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated or those recommended by metal panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 METAL SOFFIT PANEL INSTALLATION

- A. In addition to complying with requirements of "Metal Wall Panel Installation, General" Article, install metal soffit panels to comply with the requirements of this article.
- B. Metal Soffit Panels: Provide metal soffit panels full length of soffits. Install panels perpendicular to support framing.
1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

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- B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Adhered thermoplastic polyolefin (TPO) roofing system.
 - 2. Self-adhering, thermoplastic polyolefin (TPO) roofing system.
 - 3. Roof insulation.
 - 4. Cover board.
 - 5. Walkways.
- B. Section includes installation of sound-absorbing insulation strips in ribs of roof deck. Sound-absorbing insulation strips are furnished under Division 05 Section "Steel Decking."
- C. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
 - 2. Division 07 Section "Roof Specialties" for roof edge flashings, roof drains, and counterflashings.
 - 3. Division 07 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
 - 1. Layout and thickness of insulation.
 - 2. Base flashings and membrane termination details.
 - 3. Flashing details at penetrations.
 - 4. Tapered insulation layout, thickness, and slopes.
 - 5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
 - 6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Samples for Verification: For the following products:

1. Roof membrane and flashings, of color required.
2. Walkway pads or rolls, of color required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer. Provide documentation on manufacturer's letterhead immediately after submission of Bid indicating compliance with manufacturer's ratings indicated in "Quality Assurance" section of this specification.
- B. Manufacturer Certificates:
1. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Executed project warranties.
- C. For work affecting existing roofing to remain, a certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. Installer shall be rated as follows by the roofing manufacturer:
1. Elevate™: Quality Incidence Rating (QIR) of 1.0 or less for the last three calendar years.
 2. Carlisle: Inspection rating of 9.75 or higher.
 3. Johns Manville: Peak Advantage contractor with a Quality Multiplier rating greater than 1.

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Roofing Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

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3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 5. Review structural loading limitations of roof deck during and after roofing.
 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
 7. Review governing regulations and requirements for insurance and certificates if applicable.
 8. Review temporary protection requirements for roofing system during and after installation.
 9. Review roof observation and repair procedures after roofing installation.
 10. Review interim and final inspection requirements.
- B. Preinstallation conference shall be held in conjunction with the Preinstallation conferences for other building envelope materials in order to coordinate the transitions of each material to ensure a continuous air barrier is maintained within the building envelope. Contractor shall review the requirements of the International Energy Conservation Code section C402.5 during the meeting.
- 1.9 DELIVERY, STORAGE, AND HANDLING
- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.
- 1.10 FIELD CONDITIONS
- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- 1.11 WARRANTY
- A. Special Manufacturer's Warranty: Manufacturer's total roofing system warranty in which the manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, vapor retarder, and other components of roofing system.
 2. Warranty Period: 30 years from date of Substantial Completion.
 3. Wind Speed: 72 mph at roof level.

- B. Special Installer's Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, roof insulation, fasteners, cover boards, and walkway products, and certifying that damaged building materials such as ceiling tiles, gypsum board, painted finishes, etc., damaged by roof leaks will be restored or replaced to the satisfaction of the Owner for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.
1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
 2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

- A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced, TPO sheet (self-adhering at Contractor's option).
- B. Basis of Design: Subject to compliance with requirements, Thermoplastic Polyolefin Roofing incorporated into the project shall be based on products as follows:
1. Elevate; (Contractor's option) "Ultra Ply TPO" or "Ultra Ply TPO" "SA".
- C. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec Incorporated.
 - b. GAF.
 - c. Johns Manville.

2. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer who the manufacturer will warrant as part of the roofing system warranty.
3. Thickness: 80 mils, nominal.
4. Exposed Face Color: Gray.

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils (min.) thick, minimum, of same color as TPO sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Bonding Adhesive: Manufacturer's standard.
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- F. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by TPO roof membrane manufacturer.
- B. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 2, Grade 2, coated glass-fiber mat facer on both major surfaces.
 1. Basis of Design: Subject to compliance with requirements, Polyisocyanurate Board Insulation incorporated into the project shall be based on products as follows:
 - a. Elevate; "ISOGARD CG Insulation."
 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. Carlisle SynTec Incorporated.
 - b. GAF.
 - c. Johns Manville.

3. Compressive Strength: 20 psi.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch.
3. Slope:
 - a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
 - b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.5 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.

C. Cover Board: Subject to compliance with requirements, Coated Glass-Faced High Density Polyisocyanurate Board as follows:

1. Coated Glass-Faced High Density Polyisocyanurate Board: ASTM C1289 Type II, Class 4, Grade 1, 1/2-inch-thick polyisocyanurate, with a minimum compressive strength of 80 psi.

a. Basis of Design: Subject to compliance with requirements, Coated Glass Fiber High Density Polyisocyanurate Board incorporated into the project shall be based on products as follows:

- 1) Elevate; "ISOgard HD."

b. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.

- 1) Carlisle SynTec Incorporated.
- 2) GAF.
- 3) Johns Manville.

2.6 WALKWAYS

A. Crossgrip Walkways: Factory-formed, heavy-duty, split-resisting walkway pads with directional ribs.

1. Basis of Design: Subject to compliance with requirements, crossgrip walkway incorporated into the project shall be based on products as follows:

- a. Elevate; "X-Tred Walkway Pad."

2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the listed roof manufacturers that meet or exceed the design and published data of the specified Basis of Design product.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system in strict accordance with roofing system manufacturer's written instructions and warranty requirements.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.
- C. Install roof membrane and auxiliary materials to tie in to existing roofing to maintain and/or provide weathertightness of transition and to not void warranty for existing roofing system.

3.4 INSTALLATION OF INSULATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday. Install a night seal sufficient to seal and divert water from seam between new and existing roof at the end of each workday.
- B. Comply with roofing system and roof insulation manufacturer's written instructions for installing roof insulation.
- C. Installation Over Metal Decking:
 - 1. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows and with long joints continuous at right angle to flutes of decking.

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- a. Locate end joints over crests of decking.
 - b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that water flow is unrestricted.
 - e. Fill gaps exceeding 1/4 inch with insulation.
 - f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation. Trim insulation and fill gaps as indicated for base insulation layer.
 - a. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.

3.5 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 3. Cut and fit cover board tight to nailers, projections, and penetrations.

3.6 INSTALLATION OF ADHERED ROOFING

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- G. Apply roof membrane with side laps shingled with slope of roof deck where possible.

- H. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 - 2. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.7 INSTALLATION OF SELF-ADHERING ROOFING

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer.
 - 1. Stagger end laps.
- E. Fold roof membrane to expose half of sheet width's bottom surface.
 - 1. Remove release liner on exposed half of sheet.
 - 2. Roll roof membrane over substrate while avoiding wrinkles.
- F. Fold remaining half of roof membrane to expose bottom surface.
 - 1. Remove release liner on exposed half of sheet.
 - 2. Roll roof membrane over substrate while avoiding wrinkles.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity.
 - 2. Apply lap sealant to seal cut edges of roof membrane and flashing sheet.
 - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.8 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.9 INSTALLATION OF WALKWAYS

- A. Walkways:
 - 1. Install walkways at the following locations:
 - a. Perimeter of each rooftop unit.
 - b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
 - c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
 - d. Top and bottom of each roof access ladder.
 - e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
 - f. Locations indicated on Drawings.
 - g. As required by roof membrane manufacturer's warranty requirements.
 - 2. Provide 6-inch clearance between adjoining pads.
 - 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

- A. Seams shall be probed daily by roofer. Repair seams not continuous immediately.
- B. Interim Roof Inspections: Arrange for roofing system manufacturer's technical personnel to inspect roofing as installation is ongoing. Interim inspections shall occur no less than every three weeks.
 - 1. Provide inspection reports to Architect.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
 - 1. Notify Architect 48 hours in advance of inspection
- D. Bubbles, wrinkles, cheeking, etc., will not be accepted. These areas shall be removed and replaced at no additional cost to the Owner.
- E. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, shall be performed to determine if replaced or additional work complies with specified requirements.

3.11 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Do not allow construction materials to be stored or staged on the finished roof.

END OF SECTION 07 54 23

SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof-edge specialties.
 - 2. Roof drains.
 - 3. Reglets and counterflashings.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Division 07 Section "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.
 - 3. Division 07 Section "Thermoplastic Polyolefin (TPO) Roofing" for system requirements, including warranty.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof specialties.
 - 1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
 - 2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
 - 3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
 - 4. Detail termination points and assemblies, including fixed points.
 - 5. Include details of special conditions.
- C. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.
- D. Samples for Verification:
 - 1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class and SPRI ES-1 tested to specified design pressure.

1.7 PRE-INSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site in conjunction with the Roofing Pre-Installation Conference.
 - 1. Meet with Owner's Representative, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
 - 2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.
 - 4. Review specification requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.
- B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Division 07 Section "Thermoplastic Polyolefin (TPO) Roofing".

- B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. Special Warranty for Wind Performance: Manufacturer's standard form in which manufacturer agrees to repair or replace roof specialties that are damaged from wind.
 - 1. Warranty Period: As indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. FM Approvals' Listing: Manufacture and install roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.
- C. SPRI Wind Design Standard: Manufacture and install roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:
 - 1. Design Pressure: 190 lbs/ft².
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 ROOF-EDGE SPECIALTIES

- A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet Insert dimension and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure single-ply roof membrane. Provide matching corner units.
 - 1. Basis-of-Design: Subject to compliance with requirements, Fascias incorporated into the project shall be based on products/systems as detailed on drawings as follows:
 - a. Metal Era, Inc.; "Anchor Tite Fascia".

- 1) "Standard Fascia": .040 inch thick.
2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. Hickman Company, W.P.
 - b. Roofing manufacturer.
3. Formed Aluminum Sheet Fascia Covers: Aluminum sheet:
 - a. Surface: Smooth, flat finish.
 - b. Finish: Two-coat fluoropolymer.
 - c. Color: As selected by Architect from manufacturer's full range.
4. Corners: Factory mitered and continuously welded.
5. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
6. Special Fabrications: Radiussed sections.
7. Fascia Accessories: Fascia extenders with continuous hold-down cleats.
8. Size: As indicated on drawings.
9. Wind Warranty: 30 year, 200 mph.

2.3 ROOF DRAINS

- A. Basis of Design: Subject to compliance with requirements, Roof Drains incorporated into the project shall be based on products as follows:
 1. Jay R. Smith Manufacturing Company; "1015 Roof Drain with Adjustable Extension."
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design products.
 1. Wade.
 2. Josam Company.
 3. Zurn Industries.
- C. Roof Drains: Manufactured of cast iron with flashing clamp, underdeck clamp, sump receiver, and aluminum dome with extensions required for insulation thickness indicated on Drawings.

2.4 COUNTERFLASHINGS

- A. Basis of Design: Subject to compliance with requirements, Reglets and Counterflashings incorporated into the project shall be based on products as follows:
 1. Cheyney Flashing Company, Inc.; "RL Quick Lock (snap-lock) Receiver Flashing and Cap Flashing" or equal to interface with existing through-wall flashing system(s).
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 1. Fry Reglet Corporation.
 2. Hickman Company, W.P.

3. Hohmann & Barnard, Inc.
 4. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
- C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets and compress against base flashings with joints lapped, from the following exposed metal:
1. Stainless Steel: 0.019 inch thick.
- D. Accessories:
1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
 2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.5 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.6 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
1. Thermal Stability: ASTM D 1970/D 1970M; stable after testing at 240 deg F.
 2. Low-Temperature Flexibility: ASTM D 1970/D 1970M; passes after testing at minus 20 deg F.
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing; "CCW WIP 300 HT."
 - b. Grace Construction Products, a unit of W.R. Grace & Co.; "Grace Ice and Water Shield HT."
 - c. Henry Company; "Blueskin PE200 HT."

2.7 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- B. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Coil-Coated Aluminum Sheet Finishes:
 - 1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

3.3 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 - 3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 - 4. Torch cutting of roof specialties is not permitted.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 - 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
 - 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.4 ROOF-EDGE SPECIALTIES INSTALLATION

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 ROOF DRAIN INSTALLATION

- A. Roof Drains: Install roof drains in roof deck where indicated. Install flashing clamp, underdeck clamp and sump receiver and other accessories required for a complete installation in accordance with roof manufacturer's requirements.

3.6 COUNTERFLASHING INSTALLATION

- A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.
- B. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings. Rivet counterflashing to prohibit counterflashing from sliding out of base flashing.

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 71 00

SECTION 07 81 00 - APPLIED FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes sprayed fire-resistive materials (SFRM).
- B. Related Sections:
 - 1. Division 05 Section "Structural Steel Framing."
 - 2. Division 05 Section "Steel Decking."
 - 3. Division 05 Section "Metal Fabrication."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Framing plans, schedules, or both, indicating the following:
 - 1. Extent of fireproofing for each construction and fire-resistance rating.
 - 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
 - 4. Treatment of fireproofing after application.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: From Applied Fireproofing manufacturer, certifying compatibility of applied fireproofing and accessory materials with Project materials that connect to or that come in contact with applied fireproofing.
- C. Evaluation Reports: For fireproofing, from ICC-ES.
- D. Preconstruction Test Reports: For fireproofing.
- E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.
- B. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 44 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. SFRM: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.

1. Basis of Design: Subject to compliance with requirements, Spray Fire-Resistive Materials incorporated into the project shall be based on products/systems as follows:
 - a. GCP a Saint-Gobain Company; "Monokote MK-6-Series."
2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - a. Isolatek International.
 - b. The Schundler Company.
3. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E 736.
4. Density: Not less than 15 lb/cu. ft. as specified in the approved fire-resistance design, according to ASTM E 605.
5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch.
6. Combustion Characteristics: ASTM E 136.
7. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 5 or less.
 - b. Smoke-Developed Index: 5 or less.
8. Compressive Strength: Minimum 10 lbf/sq. in. according to ASTM E 761.
9. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
10. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
11. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
12. Air Erosion: Maximum weight loss of in 24 hours according to ASTM E 859.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:
 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E 736.
- C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

- E. Sealer: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:
 - 1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
 - 2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
- B. Verify that concrete work on steel deck has been completed before beginning fireproofing work.
- C. Verify that roof construction, installation of roof-top HVAC equipment, and other related work is complete before beginning fireproofing work.
- D. Conduct tests according to fireproofing manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.
- E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.
- B. Clean substrates of substances that could impair bond of fireproofing.
- C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

3.3 APPLICATION

- A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

- C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
 - 1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
- D. Metal Decks:
 - 1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, has been completed.
 - 2. Do not apply fireproofing to underside of metal roof deck until roofing has been completed; prohibit roof traffic during application and drying of fireproofing.
- E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
- F. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
- G. Extend fireproofing in full thickness over entire area of each substrate to be protected.
- H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
- I. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.
- J. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
- K. Cure fireproofing according to fireproofing manufacturer's written recommendations.
- L. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- M. Finishes: Where indicated, apply fireproofing to produce the following finishes:
 - 1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
 - 2. Spray-Textured Finish: Finish left as spray applied with no further treatment.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor shall engage a qualified special inspector to perform the following special inspections:
 - 1. Test and inspect as required by the IBC, 1704.10.

APPLIED FIRE PROTECTION

- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Fireproofing will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
 - 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.
- C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.
- D. Repair fireproofing damaged by other work before concealing it with other construction.
- E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 07 81 00

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.

- B. Related Sections:

- 1. Division 07 Section "Joint Firestopping" for joints in or between fire-resistance-rated construction.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
 - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

PENETRATION FIRESTOPPING

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

1.7 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site in conjunction with fire-resistive joint systems and insulation preinstallation conference:
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Nelson Firestop Products, a brand of Emerson Industrial Automation.
 - d. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

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- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

PENETRATION FIRESTOPPING

- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Contractor shall schedule the Authority Having Jurisdiction to perform inspections of installed penetration fireproofing.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after installations comply with requirements.

3.5 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 07 84 13

SECTION 07 84 43 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Joints in or between fire-resistance-rated constructions.
- B. Related Requirements:
 - 1. Division 07 Section "Penetration Firestopping" for penetrations in fire-resistance-rated walls, and horizontal assemblies.
 - 2. Division 09 Section "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
 - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review specification requirements.
2. Review installation procedures.
3. Inspect project conditions.

1.7 QUALITY ASSURANCE

1.8 Installer Qualifications: Firm experienced in installing joint firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.10 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Nelson Firestop; a brand of Emerson Industrial Automation.
 - d. Roxul Inc.
 - e. Thermafiber, Inc.; an Owens Corning company.
 - f. Tremco, Inc.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- D. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

2.3 SAFING INSULATION

- A. Mineral Wood Loose Fill Insulation: ASTM E 136 with maximum flame spread and smoke developed indexes of 0; ASTM E 84 and density of 4.0 pcf.
 - 1. Basis of Design: Subject to compliance with requirements, Safing Insulation incorporated into the project shall be based on products as manufactured as follows:
 - a. Thermafiber by Owens-Corning; "Safing Insulation."
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from manufacturers that meet or exceed the published data of the specified Basis of Design product.
- B. Safing Clips: Z-Shaped galvanized steel clips formed from 1 inch wide strips of 20 gauge galvanized steel; 3 inches high with 2 inch and 3 inch upper and lower horizontal legs. See specific UL or OPL/Intertek design to verify if safing clips are required.
- C. Backer / Reinforcement Member: Thermafiber Impasse T-Bar or other light gauge steel channel or angle approved by the primary manufacturer. Place horizontally at the safe-off line to support the curtain wall insulation to prevent bowing of curtain wall insulation caused by compression fitting of the Safing insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Contractor shall engage the Authority Having Jurisdiction to perform inspections.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07 84 43

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Nonstaining silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Mildew-resistant joint sealants.
 - 4. Latex joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- B. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

- B. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specifications.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Consumer Solutions; "DOWSIL 790".
 - b. Sika Corporation; "Sikasil WS-290 FPS".
 - c. Pecora Corporation; "890 NST".
 - d. Tremco Incorporated; "Spectrem 1".
2. Joint Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
3. Joint Locations:
 - a. Control joints in unit masonry.
 - b. Joints between metal panels and flashings.
 - c. Joints between different materials listed above.

2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C920, Type S, Grade P, Class 25, Uses T and NT.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Master Builders Solutions; "MasterSeal SL 1".
 - b. Pecora Corporation; "NR-201".
 - c. Polymeric Systems, Inc; "Flexiprene 952".
 - d. Sherwin-Williams Company (The); "Loxon S1".
 - e. Sika Corporation US; "Sikaflex-1c SL".
 2. Joint Sealant Application: Exterior joints in horizontal traffic surfaces.
 3. Joint Locations:
 - a. Joints in exterior cast-in-place concrete slabs.
- B. Urethane, M, NS, 50, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Use NT.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Pecora Corporation; "Dynatrol II".
 - b. Tremco Incorporated; "Dymeric 240".
 - c. Sherwin Williams; "Loxon NS2".
 2. Joint Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 3. Joint Locations:
 - a. Joints in exterior insulation and finish systems.
 - b. Joints between metal wall panels.
 - c. Joints between materials listed above.

2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; "786-M White".
 - b. GE Silicones; "SCS1700 Sanitary".
 - c. Sika Corporation U.S.; "Bondaflex Sil 100 WF".
 - d. Pecora Corporation; "898 NST".
 - e. Sherwin Williams Company (The); "White Lightning Silicone All Purpose Sealant".
 - f. Tremco Incorporated; "Tremsil 200".
 2. Joint Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 3. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors and counters.
 - b. Tile control and expansion joints in toilet rooms, showers, kitchens, and serving areas.
 - c. Other joints in similar conditions noted above.

2.5 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Master Builders Solutions; "MasterSeal NP520".
 - b. Pecora Corporation; "AC-20".
 - c. Sherwin-Williams Company (The); "950A Siliconized Acrylic Latex Caulk".
 - d. Tremco Incorporated; "Tremflex 834".
 - e. Sherwin Williams; "SherMax Acrylic".
 2. Joint Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 3. Joint Locations:
 - a. Control joints on exposed surfaces of walls.
 - b. Perimeter joints between interior wall surfaces and frames of doors, windows, and other openings.

2.6 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) and as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Glazed surfaces of ceramic tile.

JOINT SEALANTS

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00

SECTION 07 95 00 - EXPANSION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior expansion control systems.
2. Exterior wall expansion control systems.

B. Related Requirements:

1. Division 04 Section "Unit Masonry."
2. Division 07 Section "Fire-Resistive Joint Systems" for liquid-applied joint sealants in fire-resistive building joints.
3. Division 07 Section "Joint Sealants" for liquid-applied joint sealants and for elastomeric sealants without metal frames.
4. Division 09 Section "Gypsum Board" and "Non-Structural Metal Framing" for gypsum board assemblies.
5. Division 09 Section "Acoustical Panel Ceilings."

1.3 ACTION SUBMITTALS

- A. Shop Drawings: For each expansion control system specified. Include plans, elevations, sections, details, splices, blockout requirement, attachments to other work, and line diagrams showing entire route of each expansion control system. Where expansion control systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- B. Samples: For each exposed expansion control system and for each color and texture specified, full width by 6 inches long in size.
- C. Product Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 1. Manufacturer and model number for each expansion control system.
 2. Expansion control system location cross-referenced to Drawings.
 3. Nominal joint width.
 4. Movement capability.
 5. Classification as thermal or seismic.
 6. Materials, colors, and finishes.
 7. Product options.
 8. Fire-resistance ratings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each fire barrier provided as part of an expansion control system, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. General: Provide expansion control systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
 - 1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where expansion control systems change direction or abut other materials.
 - 2. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion control systems.
- B. Coordination: Coordinate installation of exterior wall and soffit expansion control systems with roof expansion control systems to ensure that wall transitions are watertight. Roof expansion joint assemblies are specified elsewhere.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Where indicated, provide expansion control systems with fire barriers identical to those of systems tested for fire resistance per UL 2079 or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling systems shall be subjected to hose stream testing.
- B. Seismic Performance: Expansion control systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."

2.3 INTERIOR EXPANSION CONTROL SYSTEMS

- A. Basis-of-Design: Subject to compliance with requirements, Interior Expansion Control Systems incorporated into the project shall be based on products/systems as follows:
 - 1. MM Systems Corporation.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - 1. Architectural Art Mfg., Inc.; Division of Pittcon Industries.
 - 2. Balco, Inc.
 - 3. Construction Specialties.

4. InPro Architectural Products.
- C. Source Limitations: Obtain expansion control systems from single source from single manufacturer.
- D. Floor and Wall Expansion Joints:
1. Basis-of-Design Product: MM Systems Corporation as follows:
 - a. Floor-to-Floor Joint Systems: "FSS" series for various floor coverings.
 - b. Floor-to-Wall Joint Systems: "FSS" series for various floor coverings.
 - c. Wall-to-Wall Joint Systems: "FSWP."
 - d. Wall-to-Wall Corner Joint Systems: "FSWPL"
 2. Design Criteria:
 - a. Nominal Joint Width: 2 inches.
 - b. Load Capacity: Heavy-duty.
 - c. Fire-Resistance Rating: Provide expansion control system and fire-barrier assembly with a rating not less than that of adjacent construction.
 3. Type: Center plate.
 - a. Cover-Plate Design: Plain.
 - 1) Cover-Plate Recess Depth at Floor Expansion Joint: As required to accommodate adjacent flooring.
 - b. Metal: Aluminum.
 - 1) Finish: Manufacturer's standard.
 - c. Seal Material: Manufacturer's standard.
 - 1) Color: As selected by Architect from manufacturer's full range.
- E. Ceiling Expansion Joints:
1. Basis-of-Design Product: MM Systems Corporation as follows:
 - a. Wall-to-Ceiling Joint Systems: "VSG."
 - b. Ceiling-to-Ceiling Joint Systems: "VSGL."
 2. Design Criteria:
 - a. Nominal Joint Width: 2 inches.
 - b. Fire-Resistance Rating: Provide expansion control system and fire-barrier assembly with a rating not less than that of adjacent construction.
 3. Type: Elastomeric seal.
 - a. Metal: Aluminum.
 - 1) Finish: Manufacturer's standard.
 - b. Seal Material: Manufacturer's standard.

2.4 MATERIALS

- A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, Alloy 6061-T6 for sheet and plate.
 - 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304 for plates, sheet, and strips.
 - 1. Remove tool and die marks and stretch lines or blend into finish.
- C. Elastomeric Seals: ASTM E 1783; preformed elastomeric membranes or extrusions to be installed in metal frames.
- D. Compression Seals: ASTM E 1612; preformed elastomeric extrusions having an internal baffle system and designed to function under compression.
- E. Cellular Foam Seals: Extruded, compressible foam designed to function under compression.
- F. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to meet performance criteria for required fire-resistance rating.
- G. Moisture Barrier: Flexible elastomeric material, PVC, minimum 30 mils thick.
- H. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
- I. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Mill finish.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.7 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run grain of directional finishes with long dimension of each piece.
 - 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 3. Directional Satin Finish: No. 4.
- C. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces where expansion control systems will be installed for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to expansion control system manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion control systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion control systems.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion control systems and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion control systems.
 - 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper expansion control system installation and performance.
 - 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - 4. Repair or grout blockout as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
 - 5. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.

6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 1. Provide in continuous lengths for straight sections.
 2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer to both frame interfaces before installing compression seals.
- E. Foam Seals: Install with adhesive recommended by manufacturer.
- F. Epoxy-Bonded Seals: Pressurize seal for time period and to pressure recommended by manufacturer. Do not overpressurize.
- G. Terminate exposed ends of expansion control systems with field- or factory-fabricated termination devices.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion control systems. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION 07 95 00

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 Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes hollow-metal doors, frames and accessories.
- B. Related Requirements:
 - 1. Division 04 Section "Unit Masonry" for anchoring and grouting hollow metal frames set in masonry construction.
 - 2. Division 08 Section "Door Hardware" for door hardware for hollow-metal doors.
 - 3. Division 08 Section "Flush Wood Doors."
 - 4. Division 08 Section "Glazing" for glass view panels in hollow metal doors, sidelights in hollow metal frames, and borrowed lite window assemblies.
 - 5. Division 09 Section "Painting and Finishing" for finishing.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.

HOLLOW METAL DOORS AND FRAMES

6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.7 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
1. Review specification requirements.
 2. Review installation procedures.
 3. Inspect project conditions.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ceco Door; AADG, Inc.; Assa Abloy.
 2. Curries; AADG, Inc.; Assa Abloy.
 3. Republic Doors and Frames; an Allegion brand.
 4. Steelcraft; an Allegion brand.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
 - d. Edge Construction: Model 2, Seamless.
 - e. Core: Polystyrene.
 - 3. Frames:
 - a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
 - b. Construction: Full profile welded.
 - 4. Exposed Finish: Prime.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
 - d. Edge Construction: Model 2, Seamless.
 - e. Core: Steel stiffened.

HOLLOW METAL DOORS AND FRAMES

- f. Insulation: Manufacturer's standard.
- 3. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
 - b. Construction: Full profile welded.
- 4. Exposed Finish: Prime.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

HOLLOW METAL DOORS AND FRAMES

- I. Glazing: Comply with requirements in Division 08 Section "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.7 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 metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 - 1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches apart. Spot weld to face sheets no more than 5 inches o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.
 - 2. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
 - 3. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches.
 - 4. Top Edge Closures: Close top edges of doors with inverted closures, except provide flush closures at exterior doors of same material as face sheets.
 - 5. Bottom Edge Closures: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets.
 - 6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - 7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- C. Hollow-Metal Frames: 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.
 - 1. 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.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 - 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

HOLLOW METAL DOORS AND FRAMES

- b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 - 6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of hollow-metal work.
 - 5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.9 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 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

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 SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

HOLLOW METAL DOORS AND FRAMES

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Steel Doors:
 - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
 - c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
 - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow-metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Division 08 Section "Glazing" for glass view panels in flush wood doors.
2. Division 08 Section "Hollow Metal Doors and Frames" for door frames.
3. Division 08 Section "Door Hardware" for door hardware for flush wood doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction, louvers, trim for openings, and factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 1. Dimensions and locations of blocking.
 2. Dimensions and locations of mortises and holes for hardware.
 3. Dimensions and locations of cutouts.
 4. Undercuts.
 5. Requirements for veneer matching.
 6. Doors to be factory finished and finish requirements.
 7. Fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors. Provide full color selection and actual finish samples on wood species specified as selected by Architect from full selection.
- D. Samples for Verification:
 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
 2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
 - a. Provide Samples for each species of veneer and solid lumber required.

- b. Provide Samples for each color, texture, and pattern of plastic laminate required.
 - c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
- 3. Louver blade and frame sections, 6 inches long, for each material and finish specified.
- 4. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and the temperature and relative humidity have been stabilized and will be maintained in accordance with manufacturer's requirements.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Forte Opening Solutions Manhattan Door Corporation.
 - 2. VT Industries, Inc.
- B. Source Limitations: Obtain flush wood doors indicated to be blueprint matched with paneling and wood paneling from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
- B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - 2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 4. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208. Grade LD-2.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.
 - b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - c. 5-inch midrail blocking, in doors indicated to have exit devices.
 - d. 5-inch x 18 inch lock blocks.
 - 3. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch midrail blocking, in doors indicated to have armor plates.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium.
2. Species: Red oak.
3. Cut: Plain sliced (flat sliced).
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Exposed Vertical and Top Edges: Same species as faces - edge Type A.
8. Construction: Five (5) plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
9. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Metal Frames for Light Openings in Fire-Rated Doors: 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.

1. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, with baked-enamel- or powder-coated finish.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with NFPA 80 requirements for fire-rated doors.

- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 - 1. Fabricate door and transom panels with full-width, solid-lumber, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

2.6 FACTORY FINISHING

- A. Factory finish doors where indicated in schedules or on Drawings as factory finished.
- B. Transparent Finish:
 - 1. Type: TR-6 catalyzed polyurethane.
 - 2. Staining: As selected by Architect from manufacturer's full range to match existing door veneer finish.
 - 3. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.

2. Install smoke- and draft-control doors according to NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames for walls and ceilings.
- B. Related Requirements:
 - 1. Division 03 Section "Cast-in-Place Concrete" for blocking out openings for access doors and frames in corridors.
 - 2. Division 04 Section "Unit Masonry" for anchoring and grouting access door frames set in masonry construction.
 - 3. Division 09 Section "Gypsum Board Assemblies" for openings in gypsum board walls.

1.3 ALLOWANCES

- A. Work Included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this section itemized on the Bid Form. The cost of this work shall be computed based upon the scope indicated in this Section. The work listed is in addition to that required to complete the work of the Contract and, consequently, the sum therefore may be deducted from the Contract amount if the corresponding work is not required by actual conditions encountered.
- B. Actual sizes and quantities furnished are in addition to those shown on the Drawings or required by other trades, and may be adjusted by the Architect as required to suite project requirements.
- C. Doors not required shall be credited to the Owner as a deduct to the Contract. Contractor shall not procure access doors and frames without Architect's approval. Contractor shall anticipate multiple orders.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Babcock-Davis.
 2. J. L. Industries, Inc.; Activar Construction Products Group.
 3. Karp Associates, Inc.
 4. Larsen's Manufacturing Company.
 5. Nystrom, Inc.
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Flush Access Doors with Exposed Flanges:
1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 2. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
 - a. Finish: Factory prime.
 3. Frame Material: Same material, thickness, and finish as door.
 4. Hinges: Manufacturer's standard.
 5. Hardware: Provide one cylinder lock per access door to match keyway selected by Owner.
- D. Fire-Rated, Flush Access Doors with Exposed Flanges:
1. Assembly Description: Fabricate door to fit flush to frame, uninsulated. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
 2. Fire-Resistance Rating: Not less than that of adjacent construction.
 3. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
 - a. Finish: Factory prime.
 4. Frame Material: Same material, thickness, and finish as door.
 5. Hinges: Manufacturer's standard.
 6. Hardware: Provide one cylinder lock per access door to match keyway selected by Owner.

E. Hardware:

1. Latch: Cam latch operated by screwdriver.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- E. Frame Anchors: Same type as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 - 2. Provide mounting holes in frames for attachment of units to metal or wood framing.
 - 3. Provide mounting holes in frame for attachment of masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

3.4 ACCESS DOOR SCHEDULE

- A. Provide access doors as indicated on the Drawings.
- B. The following access doors are in excess of those indicated elsewhere and shall be included in the allowances for the project.
 1. Flush access doors with exposed flanges:
 - a. (6) 16" x 16" access doors for gypsum board assemblies.
 - b. (6) 18" x 18" access doors for masonry assemblies.
 2. Fire-rated flush access doors with exposed flanges:
 - a. (4) 16" x 16" access doors for gypsum board assemblies.
 - b. (4) 18" x 18" access doors for masonry assemblies.

END OF SECTION 08 31 13

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Storefront framing for window walls.
3. Exterior and interior manual-swing entrance doors and door-frame units.

B. Related Requirements:

1. Division 04 Section "Unit Masonry" for anchoring aluminum-framed entrances and storefronts set in masonry construction.
2. Division 07 Section "Joint Sealants."
3. Division 08 Section "Glazing" for glazing requirements.
4. Division 08 Section "Door Hardware" for door hardware requirements.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Initial Selection: For units with factory-applied color finishes.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
 - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.
- B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum-framed entrances and storefronts similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance. Installer shall be acceptable to aluminum-framed entrances and storefront manufacturer for installation of units required for this Project.
- B. Design Criteria: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Water penetration through fixed glazing and framing areas.
 - d. Failure of operating components.
 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Subject to compliance with requirements, Aluminum Entrances and Storefronts incorporated into the project shall be based on systems as follows:
1. Kawneer Company, Inc.:
 - a. Exterior Storefront Framing: "TriFab VG 451T."
 - b. Wide Stile Entrances: "500 Standard Entrance."
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product and are in compliance with the requirements of this section.
1. Apogee Architectural Metals.
 2. YKK AP America Inc.
- C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including accessories from single manufacturer. Glazing and framing panels may be supplied from other manufacturers in accordance with the Specifications and that are acceptable to the aluminum-framed entrance and storefront manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Code Compliance: Comply with requirements of International Building Code and International Energy Compliance Code.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
 - 1. Wind Loads: Uniform pressure (velocity pressure) of 30 lbf/sq.ft., acting inward and outward.
 - a. Basic Wind Speed: 120 mph.
 - b. Importance Factor: 1.15.
 - c. Exposure Category: B.
- D. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
- E. Structural: Test according to ASTM E 330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
 - 1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
 - 2. Entrance Doors:
 - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.

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- b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
 - G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
 - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
 - H. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
 - 1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
 - 2. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
 - I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
 - 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.
 - c. Interior Ambient-Air Temperature: 75 deg F.
- 2.3 EXTERIOR FRAMING
- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Thermally broken.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Front.
 - 4. Finish: High Performance Organic Finish.
 - B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
 - C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
 - D. Materials:
 - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B 209.
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - d. Structural Profiles: ASTM B 308/B 308M.

2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: As indicated.
 - 3. Glazing Stops and Gaskets: Snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Division 08 Section "Door Hardware."
- B. General: Provide heavy-duty entrance door hardware and entrance door hardware sets indicated in door and frame schedule and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.
 - 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 - 3. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion.
 - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
- D. Panic Exit Devices: As specified in Division 08 Section "Door Hardware".
- E. Door Push and Pull: Kawneer "CP-11" Push Bar and "CO-9" Pull where push or pull are not indicated in Division 08 Section "Door Hardware."
- F. Cylinders: As specified in Division 08 Section "Door Hardware."
- G. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- H. Closers: As specified in Division 08 Section "Door Hardware".
- I. Weather Stripping: Manufacturer's standard replaceable components.
 - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

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- 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- J. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- K. Silencers: BHMA A156.16, Grade 1.
- L. Thresholds: As specified in Division 08 Section "Door Hardware".

2.6 GLAZING

- A. Glazing: Comply with Division 08 Section "Glazing."
- B. Glazing Gaskets: Comply with Division 08 Section "Glazing."
- C. Glazing Sealants: Comply with Division 08 Section "Glazing."

2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.
- E. Framing: Provide manufacturer's standard extruded sills, adapters, corners, trim, receivers, etc., as indicated on Drawings.

2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:

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1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Physical and thermal isolation of glazing from framing members.
 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 5. Provisions for field replacement of glazing from interior for vision glass and exterior for glazing or metal panels.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At exterior doors, provide compression weather stripping at fixed stops.
 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 2. At exterior doors, provide weather sweeps applied to door bottoms.
- F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. General:

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1. Comply with manufacturer's written instructions.
 2. Do not install damaged components.
 3. Fit joints to produce hairline joints free of burrs and distortion.
 4. Rigidly secure nonmovement joints.
 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Division 08 Section "Glazing."
- F. Install weatherseal sealant according to Division 07 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

END OF SECTION 08 41 13

SECTION 08 56 53 - SECURITY WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fixed, transaction security windows.

1.3 COORDINATION

- A. Coordinate installation of anchorages for security windows. 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 adjacent construction. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for window units.
- B. Shop Drawings: For security windows.
 - 1. Include plans, elevations, sections, and attachments to other work.
 - 2. Glazing details.
 - 3. Details of deal tray, transaction counter, and speaking aperture.
- C. Samples for Initial Selection: For frame members with factory-applied color finishes.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Pack security windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.
- B. Label security window packaging with drawing designation.
- C. Store crated security windows on raised blocks to prevent moisture damage.

1.7 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 FIXED, TRANSACTION SECURITY WINDOWS

- A. Provide fixed, framed transaction windows with speaking aperture and deal tray that allows the transfer of currency and documents.
 - 1. Basis of Design: Subject to compliance with requirements, fixed, transaction security windows incorporated into the project shall be based on systems as follows:
 - a. Insulgard Security Products; "AVT Bullet Resisting Transaction Window" with "Round Stainless Steel Bullet Resistant Speak Thru".
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. Armortex.
 - b. Chicago Bullet Proof Systems.
 - c. National Bullet Proof, Inc.
 - d. Overly Door Company.
- B. Ballistic Resistance: Level 3 for complete system in accordance with UL 752.
- C. Framing: Perimeter framing, mullions, and glazing stops shall be bullet-resistant extruded aluminum.
 - 1. Finish: Organic finish.
- D. Size: 60" x 42".
- E. Sill: Formed from stainless steel and designed for glazing.
 - 1. Transaction Counter: Stainless steel, with integral deal tray centered in opening.
- F. Glazing: Bullet-resistant, glass-clad polycarbonate glazing in accordance with ballistic threat level indicated.

2.2 FABRICATION

- A. General: Fabricate security windows to provide a complete system for assembly of components and anchorage of window units.
 - 1. Provide units that are reglazable from the secure side without dismantling the nonsecure side of framing.
 - 2. Prepare security windows for glazing unless preglazing at the factory is indicated.
- B. Framing: Miter or cope corners the full depth of framing; weld and dress smooth.
 - 1. Fabricate framing with manufacturer's standard, internal opaque armoring in thicknesses required for security windows to comply with ballistics-resistance performance indicated.
- C. Glazing Stops: Finish glazing stops to match security window framing.
 - 1. Secure-Side (Exterior) Glazing Stops: Welded or integral to framing.
 - 2. Nonsecure-Side (Interior) Glazing Stops: Removable, coordinated with glazing indicated.
- D. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- F. Factory-cut openings in glazing for speaking apertures.

2.3 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.4 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 50 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.5 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run grain of directional finishes with long dimension of each piece.

2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of security windows.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations of security window connections before security window installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of security windows.
- D. Inspect built-in and cast-in anchor installations, before installing security windows, to verify that anchor installations comply with requirements. Prepare inspection reports.
 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare anchor inspection reports.
- E. For glazing materials whose orientation is critical for performance, verify installation orientation.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other security window anchors whose installation is specified in other Sections.
 1. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.

3.3 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing security windows to in-place construction. Include threaded fasteners for inserts, security fasteners, and other connectors.
- B. Fasteners: Install security windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners in stainless-steel materials.
- C. Sealants: Comply with requirements in Division 07 Section "Joint Sealants" for installing sealants, fillers, and gaskets.

SECURITY WINDOWS

1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction unless otherwise indicated.
 2. Seal frame perimeter with sealant to provide weathertight construction unless otherwise indicated.
- D. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.4 FIELD QUALITY CONTROL

- A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

3.5 CLEANING AND PROTECTION

- A. Clean surfaces promptly after installation of security windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.
- B. Clean glass of preglazed security windows promptly after installation.
- C. Provide temporary protection to ensure that security windows are without damage at time of Substantial Completion.

END OF SECTION 08 56 53

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Door hardware for swinging doors.
2. Door hardware for other doors to the extent indicated.
3. Cylinders for door hardware specified in other sections.

B. Related Sections:

1. Division 08 Section "Hollow Metal Doors and Frames".
2. Division 08 Section "Flush Wood Doors".
3. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
4. Division 28 Section "Intrusion Detection System" for detection devices installed at door openings and provided as part of an intrusion-detection system.
5. Division 28 Section "Fire Alarm and Detection System" for connections to building fire-alarm system.

C. Mechanical and Electronic Finish Hardware

1. Furnish, deliver, and coordinate all mechanical and electronic finish hardware as indicated, specified and required. Include all hardware under this Section that is not specified in other Sections, whether or not such hardware is scheduled herein, and include all trim, attachments and fastenings specified or required for proper and complete installation for given application. Items of hardware (not limited to mounting accessories required by door or frame details and required to properly install hardware and have it function properly and in conjunction with specified interacting hardware) not definitely specified herein and necessary for completion of the Work shall be provided. Such items shall be of type and quality suitable to the service required and comparable to adjacent hardware. Where size and shape of member is such as to prevent the use of types specified, hardware shall be furnished of suitable types having as nearly as practicable the same operation and quality as the type specified.
2. Review electrified hardware with Owner's existing systems to ensure compatibility. Visit Owner's existing facilities as required and coordinate with Electrical Contractor.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
 1. Provide complete manufacturer's catalog cuts for each item scheduled.

- B. Shop Drawings: Details of electrified door hardware, indicating the following:
1. Wiring Diagrams: For power, signal, and control wiring and including the following:
 - a. Details of interface of electrified door hardware and building safety and security systems.
 - b. Schematic diagram of systems that interface with electrified door hardware.
 - c. Point-to-point wiring.
 - d. Risers.
 - e. Elevations of doors controlled by electrified door hardware.
 2. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
- C. Samples for Initial Selection: For plastic protective trim units in each finish, color, and texture required for each type of trim unit indicated.
- D. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 2. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents, in vertical format (horizontal format will not be reviewed).
 3. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, swing, quantity, function, and finish of each door hardware product.
 - d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - e. Fastenings and other pertinent information.
 - f. Explanation of abbreviations, symbols, and codes contained in schedule.
 - g. Mounting locations for door hardware.
 - h. List of related door devices specified in other Sections for each door and frame.
- E. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For electrified door hardware, from the manufacturer.
1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.

- C. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- D. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

- A. Independent Architectural Hardware Consultant report of door hardware deficiencies.
- B. Manufacturer's data for each piece of hardware.
- C. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- D. Installation instructions for each piece of hardware for each door.
- E. Bitting Lists for all keys.
- F. Complete set of wiring diagrams for each door with door number indicated.
- G. Final, as-built copy of hardware and keying schedule.
- H. Warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 - 1. Warehousing Facilities: In Project's vicinity.
 - 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 - 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Independent Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
 - 1. For door hardware, an Architectural Hardware Consultant (AHC) who is also an Electrified Hardware Consultant (EHC).
 - 2. The supplier and/or installer shall not act as the (AHC).
- C. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.
- E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

DOOR HARDWARE

- F. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- G. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 - 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- H. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and a representative of the Door Hardware Manufacturer. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2. Preliminary key system schematic diagram.
 - 3. Requirements for key control system.
 - 4. Requirements for access control.
 - 5. Address for delivery of keys.

1.7 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site with suppliers, Independent Hardware Consultant, Owner's Representative and Manufacturer's Representative, in conjunction with preinstallation conference for wood and aluminum doors.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Confirm electrified hardware is compatible with Owner's existing access control systems and components and compatible with new systems to be installed by the Electrical Contractor.
 - 3. Inspect and discuss preparatory work performed by other trades.
 - 4. Inspect and discuss electrical roughing-in for electrified door hardware.
 - 5. Review sequence of operation for each type of electrified door hardware.
 - 6. Review required testing, inspecting, and certifying procedures.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.9 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with the Owner.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.
- F. Phased Construction: Where lead times may compromise procurement of hardware required for initial phase(s) completion, submit hardware schedule for initial phase(s) in advance of the complete hardware submittal and obtain hardware for initial phases to not adversely affect the project schedule. The cost for multiple deliveries should be included in the bid.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - a. Exit Devices: Five years from date of Substantial Completion.
 - b. Manual Closers: Five years from date of Substantial Completion.
 - c. Locksets: Ten years from date of Substantial Completion.

1.11 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

- B. Follow-Up Services: The hardware installer shall confirm, in writing, the operation of all door hardware is within tolerances prior to the General Contractor requesting Substantial Completion. In addition to warranty service required for issues realized post-occupancy during the warranty period, the installer shall re-review the operation of all door hardware ten months after Substantial Completion and shall make all adjustments required.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
- C. Basis of Design: Hardware scheduled in Part 3 "Door Hardware Schedule" shall be considered the Basis of Design product. Acceptable manufacturers listed in this Part shall provide products that meet or exceed the published data of the Basis of Design product where their product is provided in lieu of the Basis of Design product.

2.2 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. IVES Hardware; an Allegion company.
 - c. McKinney Products Company; an ASSA ABLOY Group company.
 - d. Stanley Commercial Hardware; a dormakaba company.

2.3 CONTINUOUS HINGES

- A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch- thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

- B. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. IVES Hardware; an Allegion company.
 - c. McKinney Products Company; an ASSA ABLOY Group company.
 - d. Stanley Commercial Hardware; a dormakaba company.

2.4 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors.
- C. Lock Backset: 2-3/4 inches, unless otherwise indicated.
- D. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
- E. Cylindrical Locks: BHMA A156.2; Security Grade 1; stamped steel case with steel or brass parts; Series 4000.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Best; a dormakaba company.
 - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - c. Schlage Commercial Lock Division; an Allegion company.

2.5 ELECTROMECHANICAL LOCKS

- A. Electromechanical Locks: BHMA A156.23; Grade 1; motor or solenoid driven; mortise latchbolt; with strike that suits frame.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Best; a dormakaba company.
 - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - c. Schlage Commercial Lock Division; an Allegion company.

2.6 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
- b. Precision; a dormakaba company.
- c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
- d. Stanley Commercial; a dormakaba company
- e. Von Duprin; an Allegion company.

2.7 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. SARGENT Manufacturing Company; an ASSA ABLOY Group company; Signature Series, removable core master key system. Coordinate with the Owner's existing masterkey system. No substitutions permitted.
- B. High-Security Lock Cylinders: BHMA A156.30; Grade 1; Type M, mechanical; permanent cores that are removable; face finished to match lockset.
- C. Construction Cores: Provide construction cores that are replaceable by permanent cores.

2.8 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. IVES Hardware; an Allegion company.
 - b. Rockwood; an ASSA ABLOY Group company.
 - c. Hager.
 - d. National Guard Products.
- B. Astragals: BHMA A156.22.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - c. Reese Enterprises, Inc.
 - d. National Guard Products.

2.9 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force. Mounting plates, drop plates, brackets, conversion kits, etc., required for a complete installation shall be provided for a complete installation.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DORMA Architectural Hardware; a dormakaba company.
 - b. LCN Closers; an Allegion company.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.10 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Glynn-Johnson; an Allegion company.
 - b. Rockwood; an ASSA ABLOY Group company.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - d. Rixon Specialty Door Controls; an ASSA ABLOY Group company.
 - e. National Guard Products.

2.11 DOOR SILENCERS

A. Door Silencers: BHMA A 156.16; rubber door silencer.

1. Basis of Design: Subject to compliance with requirements, Door Silencers incorporated into the project shall be based on products as follows:
 - a. Rockwood Manufacturing Company, an ASSA ABLOY Group company; "608".
2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. IVES Hardware, an Allegion Company.
 - b. Hager Company.

2.12 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. National Guard Products, Inc.
 - c. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - d. Reese Enterprises, Inc.
 - e. Zero International; an Allegion brand.

2.13 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. National Guard Products, Inc.
 - c. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - d. Reese Enterprises, Inc.
 - e. Zero International; an Allegion brand

2.14 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. IVES Hardware; an Allegion company.
 - b. Hager Companies.
 - c. National Guard Products, Inc.
 - d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - e. Reese Enterprises, Inc.
 - f. Zero International; an Allegion brand

2.15 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. Rockwood; an ASSA ABLOY Group company.
 - c. Stanley Commercial Hardware; a dormakaba company.
 - d. Allegion.

2.16 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. Existing System:
 - a. Master key or grand master key (RD Keyway) locks to Owner's Sargent Signature Series existing system that shall match Owner's existing keyway. The Main Office (RB-AA Keyway), Reading Crest (RB-AD Keyway), and all exterior doors each have their own keyway.

B. Keys: Brass.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."
2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Four.
 - b. Master Keys: Six.
 - c. Control Keys: Two

2.17 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware or is indicated as a required use of through bolts. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt. Where through bolts are utilized, provide finish-threaded caps to fully conceal nuts.
 - a. Steel through bolts required at the following locations (no exceptions):
 - 1) Door closers at all locations.
 2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames
 - 2) Strike plates to frames.
 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

DOOR HARDWARE

5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
6. Self-drilling "Tek" type screws are not acceptable. Use only fasteners supplied by hardware manufacturer.
7. Where it is not possible to reinforce substrate adequately for screws, use through-bolts with sleeves or use sex bolts.
 - a. Do not use where head or nut would be exposed on face of door, unless specifically indicated or made necessary by other requirements.
 - b. Finish exposed heads and nuts the same as hardware on that side of the door.
8. Use expansion shield anchors in concrete and masonry.

2.18 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's 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. Do not install surface-mounted items until finishes have been completed on substrates involved.
1. Use manufacturers supplied installation templates.
 2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
1. Replace construction cores with permanent cores as indicated in keying schedule.
- E. Closers:
1. Install door closer mounting brackets, arms, plates, and miscellaneous equipment as necessary to mount all door closers inside room, or out of corridor at every instance where a door closer is specified. No door closers (nor parts, nor accessories of) shall be visible from corridor side unless Architect has authorized specific and formal approval for that mounting application, and has clear understanding closer is visible through lite, and has approved such.
 2. Install top jamb mounted units where hardware schedule lists closer functions that are not available in regular arm mounting configurations.
 3. Thru-bolt all closers to doors with sex bolts. Install aluminum spacers for all 5th and 6th bolts at arm connections to metal head frames, and notify frame suppliers to install reinforcing plates to receive all bolts including 5th and 6th bolts.
 4. Where any portion of the back of the closer is visible through glazing, a finish closure panel shall be installed.
- F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
1. Configuration: Provide one power supply for each door opening with electrified door hardware.
- G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants." Provide Tampin expansion bolts at all thresholds.
- H. Stops: Provide wall stops for doors unless floor or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- I. Door Silencers: Furnish at all hollow metal and wood frames. Each door leaf shall be supplied with three (3) bumpers each side. Do not provide on doors with sound seals or on exterior doors.

DOOR HARDWARE

- J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame. All exterior doors shall be installed with a complete set of gasketing (including thresholds, sweeps, seals, astragals, and drips) whether specifically scheduled or not. Where gasketing provided shows evidence of being insufficient, new gaskets shall be provided at no additional cost
- K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- M. Primed Hardware: Paint factory-primed hardware in accordance with Division 09 Section "Painting & Finishing."
- N. Electrified Hardware: Where electrified hardware is not compatible with existing and new access control systems, Contractor shall replace non-compatible components with compatible components at no cost to the Owner.
 - 1. Compatibility includes existing proximity devices used by the Owner.

3.4 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.
 - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Prior to Occupancy Adjustment: Adjust door closers to overcome air pressure produced by HVAC systems. If HVAC pressure, whether negative or positive, negates proper operation or function of any closing or latching device, or inhibits manufacturer's intended performance (in any manner), supplier shall inform the GC in writing that type of hardware cannot operate nor function as manufacturer has designed and tested due to HVAC condition.
- C. Post Occupancy Adjustment: Review operation of door hardware six to eight weeks after Substantial Completion in the presence of the Owner's Representative. Adjust hardware as required to ensure proper operation.
 - 1. Contractor will be required to re-visit site to adjust hardware omitted from onsite review.

3.5 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Contractor shall engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - 1. Independent Architectural Hardware Consultant shall inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.
 - 2. Prior to Substantial Completion, Contractor shall correct deficiencies noted in Independent Architectural Hardware Consultant report and re-engage Consultant to review corrected work.

DOOR HARDWARE

3. Where Project work occurs in phases, a report shall be prepared for each phase by this Consultant prior to Substantial Completion of each phase. A final complete report shall be furnished by the Consultant to confirm that all items for all phases have been corrected to comply with Project requirements.

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.8 HARDWARE MANUFACTURER LEGEND

<u>Symbol</u>	<u>Manufacturer</u>
MK	McKinney
PE	Pemko
RO	Rockwood
SA	Sargent
SC	Securitron
SE	Sentrol

3.9 DOOR HARDWARE SCHEDULE

		<u>MARK 1</u>	
Door 002 A			HM DR X HM FR
MK	Hinges	T4A3386 X NRP	US10B
SA	Exit Device	10-16-8976 ETL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 CPSH	US10B
PE	Threshold	2005 10BET	AL
PE	Drip Cap	346D	AL
PE	Frame Seals	303DS	AL
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE
SC	Power Transfer	EL-CEPT	—
MK	Frame Cable	QC-C1500	—
MK	Door Cable	QC-C300	—
SE	Door Position Switch	1076D-G	—
SC	Power Supply	AQD2	—

Note: Valid card electronically retracts latch bolt or key mechanically retracts latch bolt. Free egress at all times. In event of power loss, door remains locked. Furnish point-to-point wiring diagram and schematic door elevation.

DOOR HARDWARE

MARK 2

Doors 107A A, 116 A, 117 A, 132 B,
132L A

WD DR X HM FR

MK	Hinges	TA2714 X NRP	US10B
SA	Lockset	10-63-10XG71 LL	US10B
SA	Cylinder	10-6300	US10B
RO	Wallstop	406 X wall anchor	US10BE
SC	Power Transfer	EL-CEPT	—
MK	Frame Cable	QC-C1500	—
MK	Door Cable	QC-C300	—
SC	Power Supply	AQD2	—

Note: Valid card electronically retracts latch bolt or key mechanically retracts latch bolt. Free egress at all times. In event of power loss, door remains locked. Furnish point-to-point wiring diagram and schematic door elevation.

MARK 3

Doors 110 A, 110J A

EX WD DR X EX HM FR

SC	Elec. Strike	MUNL X STK-1	US10B
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Note: Valid card electronically retracts latch bolt or key mechanically retracts latch bolt. Free egress at all times. In event of power loss, door remains locked. Furnish point-to-point wiring diagram and schematic door elevation.

MARK 4

Doors 111 A, 111 B, 221 A, 221 B

WD DR X HM FR

MK	Hinges	T4A3786	US10B
SA	Lockset	10-63-10XG37 LL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 CPSH	US10B
RO	Wallstop	406 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE

MARK 5

Door 113 A

AL DR X AL FR

MK	Hinges	T4A3386 X NRP	US10B
SA	Exit Device	10-16-8976 ETL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 CPSH	US10B
PE	Threshold	2005 10BET	AL
PE	Drip Cap	346D	AL
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE
—	Frame seals/sweep	(by Aluminum door supplier)	US10B
SC	Power Transfer	EL-CEPT	—
MK	Frame Cable	QC-C1500	—
MK	Door Cable	QC-C300	—
SE	Door Position Switch	1076D-G	—
SC	Power Supply	AQD2	—

Note: Valid card electronically retracts latch bolt or key mechanically retracts latch bolt. Free egress at all times. In event of power loss, door remains locked. Furnish point-to-point wiring diagram and schematic door elevation.

DOOR HARDWARE

MARK 6

Doors 116 B, 116 C

WD DR X HM FR

MK	Hinges	T4A3786	US10B
SA	Lockset	10-63-10XG05 LL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 CPSH	US10B
RO	Wallstop	406 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE

MARK 7

Doors C120 A

2-HOUR RATED
(Replace Active Leaf Exit Device)

EX WD DR X EX HM FR

SA	Exit Device	12-63-NB8774 ETL X 306 Aux. Control	US10B
SA	Cylinder	10-6300	US10B
SC	Power Transfer	TSB-C	—
MK	Frame Cable	QC-C1500	—
MK	Door Cable	QC-C300	—
SC	Power Supply	AQD2	—

MARK 8

Doors 120 A, 121 A, 122 A, 123 A, 124 A, 125 A, 126 A, 127 A, 313 A

WD DR X HM FR

MK	Hinges	T4A3786	US10B
SA	Lockset	10-63-10XG05 LL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 PED	US10B
RO	Wallstop	409 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE

MARK 9

Door 120A A

1-HOUR RATED

WD DR X HM FR

MK	Hinges	TA2714	US10B
SA	Latchset	10XU65 LL X V33	US10B
SA	OH Closer	351 O	US10B
RO	Wallstop	409 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE

MARK 10

Door 120C A

2-HOUR RATED

WD DR X HM FR

MK	Hinges	TA2714	US10B
SA	Lockset	10-63-10XG04 LL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 O	US10B
RO	Wallstop	406 X wall anchor	US10BE

DOOR HARDWARE

MARK 11

Doors 121A A, 122A A, 123A A, 124A A,
125A A, 126A A, 127A A, 311 B, 311 C

WD DR X HM FR

MK	Hinges	T4A3786	US10B
SA	Latchset	10XU15 LL	US10B
RO	Wallstop	406 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE

MARK 12

Doors 130B A, 132N A

WD DR X HM FR

MK	Hinges	TA2714	US10B
SA	Latchset	10XU65 LL X V33	US10B
SA	OH Closer	351 O	US10B
RO	Wallstop	406 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE

MARK 13

Doors 132B A, 132C A, 132D A, 132E A,
132F A, 132G A, 132J A, 132K A,
132M A, 314 A, 314 B, 315 A, 315 B

WD DR X HM FR

MK	Hinges	T4A3786	US10B
SA	Lockset	10-63-10XG05 LL	US10B
SA	Cylinder	10-6300	US10B
RO	Wallstop	409 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE

MARK 14

Doors 233A A, 234A A

WD DR X HM FR

MK	Hinges	TA2714	US10B
SA	Lockset	10-63-10XG05 LL	US10B
SA	Cylinder	10-6300	US10B
RO	Wallstop	406 X wall anchor	US10BE

MARK 15

Doors 301 A, 302 A, 303 A

1-HOUR RATED

WD DR X HM FR

MK	Hinges	TA2714	US10B
SA	Latchset	10-63-10XU15 LL	US10B
SA	OH Closer	351-UO	US10B
RO	Wallstop	406 X wall anchor	US10BE

MARK 16

Door 311 F

WD DR X HM FR

MK	Hinges	T4A3786	US10B
SA	Latchset	10XU65 LL X V33	US10B
RO	Wallstop	409 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE

DOOR HARDWARE

		<u>MARK 17</u>	
Doors 311 A, 312 A, 316 A		1-HOUR RATED	WD DR X HM FR
MK	Hinges	T4A3786	US10B
SA	Lockset	10-63-10XG71 LL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 PED	US10B
RO	Wallstop	406 X wall anchor	US10BE
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE
SC	Power Transfer	EL-CEPT	—
MK	Frame Cable	QC-C1500	—
MK	Door Cable	QC-C300	—
SC	Power Supply	AQD2	—

Note: Valid card electronically retracts latch bolt or key mechanically retracts latch bolt. Free egress at all times. In event of power loss, door remains locked. Furnish point-to-point wiring diagram and schematic door elevation.

		<u>MARK 18</u>	
Doors 311 D, 311 E			WD DR X HM FR
MK	Hinges	TA2714	US10B
SA	OH Stops	590 H	US10BE
RO	Flush Pulls	BF97L X TORX	US10BE
RO	HD Magnetic Catch	901 X BRS	—

		<u>MARK 19</u>	
Doors 306 A, 316A A			WD DR X HM FR
MK	Hinges	TA2714	US10B
SA	Lockset	10-63-10XG04 LL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Stop	590 H	US10BE

		<u>MARK 20</u>	
Doors S-B A, S-D A		2-HOUR RATED	HM DR X EX HM FR
MK	Hinges	MCK-HG305 X EPT (cutout)	US32D
SA	Lockset	10-63-10XG71 LL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 CPS	US10B
SC	Power Transfer	EL-CEPT	—
MK	Frame Cable	QC-C1500	—
MK	Door Cable	QC-C300	—
SC	Power Supply	AQD2	—

Note: Valid card electronically retracts latch bolt or key mechanically retracts latch bolt. Free egress at all times. In event of power loss, door remains locked. Furnish point-to-point wiring diagram and schematic door elevation.

DOOR HARDWARE

MARK 21

Door S-E E

HM DR X HM FR

MK	Hinges	MCK-HG305 X EPT	US32D
SA	Exit Device	10-16-8976 ETL	US10B
SA	Cylinder	10-6300	US10B
SA	OH Closer	351 CPSH	US10B
PE	Threshold	200510BET	AL
PE	Drip Cap	346D	AL
PE	Frame Seals	303DS	AL
RO	Kickplate	K1050 x 8" h. x dr. width	US10BE
SC	Power Transfer	EL-CEPT	—
MK	Frame Cable	QC-C1500	—
MK	Door Cable	QC-C300	—
SC	Door Position Switch	1076D-G	—
SC	Power Supply	AQD2	—

Note: Valid card electronically retracts latch bolt or key mechanically retracts latch bolt. Free egress at all times. In event of power loss, door remains locked. Furnish point-to-point wiring diagram and schematic door elevation.

MARK 22

Door 104 B

HM DR X HM FR

MK	Hinges	T4A3386	US32D
SA	Lockset	10-63-10XG05 LL	US26D
SA	Cylinder	10-6300	US26D
SA	OH Stop	590 H	US26D
PE	Threshold	2005AT	AL
PE	Frame Seals	303AS	AL

MARK 23

Door 100F A

EX WD DR X EX HM FR

PE	Threshold	270D	AL
PE	Door Bottom	412DPKL	AL
PE	Frame Seals	303DS	AL

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass for windows, doors, and interior borrowed lites.
 - 2. Glazing sealants and accessories.
- B. Related Requirements:
 - 1. Division 08 Section "Fire-Rated Glazing."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.
- C. Interspace: Space between lites of an insulating-glass unit.
- D. IBC: International Building Code.
- E. Sealed Insulating Glass Unit Surfaces:
 - 1. Surface 1: Exterior surface of outer lite.
 - 2. Surface 2: Interspace-facing surface of outer lite.
 - 3. Surface 3: Interspace-facing surface of inner lite.
 - 4. Surface 4: Interior surface of inner lite.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For glass.
- C. Product Test Reports: For insulating glass and glazing sealants, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are familiar with the National Glass Association's Certified Glass Installer Program and who have completed glazing similar in material, design and extent indicated for the Project with a record of successful in-service performance.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.
 - 3. Review project conditions.
 - 4. Review specification requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.11 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- D. Installer's Warranty: Installer agrees to replace glass products that exhibit damage, leaks or deterioration of glass or glazing products that are not covered by manufacturer's warranty. Installer shall also agree to provide labor for all manufacturers' warranties indicated above.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, glazing incorporated into the project shall be based on products manufactured by:
 - 1. Pilkington; North America; NSG Group
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - 1. AGC Glass Company North America, Inc.
 - 2. Cardinal Glass Industries, Inc.
 - 3. Saint-Gobain Glass Corp.
 - 4. Vitro Architectural Glass.
- C. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
 - 1. Obtain tinted glass from single source from single manufacturer.
- D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E1300.
 - 1. Design Wind Pressures:
 - a. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - 1) Wind Design Data: As indicated on Drawings.
 - 2. Design Snow Loads: As indicated on Drawings.
- C. Windborne-Debris Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 1 for basic protection.
- D. Safety Glazing: Where safety glazing is indicated or required by code, provide glazing that complies with 16 CFR 1201, Category II.

- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
1. Minimum Glass Thickness for Exterior Lites: 6 mm.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

- B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- C. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- D. Silicone-Coated Spandrel Glass: ASTM C1048, Type I, Condition C, Quality-Q3.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, opaque coating incorporated into the Project shall be based on products as follows:
 - a. ICD High Performance Coatings; "Opaci-Coat 300."
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis-of-Design manufacturer, Contractor may provide products from another manufacturer that meet or exceed the published data of the specified Basis-of-Design product.
 - 3. Coating Color: As selected by Architect from manufacturer's full range.

2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.
 - 1. Sealing System: Dual seal, with polyisobutylene and silicone primary and secondary sealants.
 - 2. Perimeter Spacer: Aluminum with mill or clear anodic finish.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cardinal Glass Industries
 - 2) Pilkington North America; NSG Group.
 - 3) Technoform Glass Insulation of North America.
 - 4) Thermix; a brand of Ensinger USA.
 - 5) Viracon
 - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.

B. Glazing Sealant:

1. Neutral-Curing Silicone Glazing Sealant, Class 100/50 complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) GE Construction Sealants; Momentive Performance Materials Inc.
 - 2) Pecora Corporation.
 - 3) Sika Corporation.
 - 4) The Dow Chemical Company.
 - 5) Tremco Incorporated.

2.8 GLAZING TAPES

- ### A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

2.9 MISCELLANEOUS GLAZING MATERIALS

- ### A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- ### B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- ### C. Setting Blocks:
1. Type recommended in writing by sealant or glass manufacturer with a Shore A durometer hardness of 85, plus or minus 5.

D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness recommended in writing by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks:

1. Silicone with a Shore A durometer hardness per manufacturer's written instructions.

2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.

- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 GLASS SCHEDULE

- A. Clear Tempered Glazing (CT): Clear fully tempered float glass.
 - 1. Minimum Thickness: 6 mm.
 - 2. Safety glazing required.
- B. Clear Laminated Glazing (CL): Clear laminated glass with two plies of clear annealed float glass.
 - 1. Minimum Thickness of Each Glass Ply: 3 mm.
 - 2. Interlayer Thickness: 0.030 inch.
- C. Clear Insulating Glass Type (CI): Low-E -coated, Clear Insulating Glass
 - 1. Basis-of-Design Product: Pilkington North America; "Solar-E™" outer lite and "Energy Advantage™" inner lite.
 - 2. Overall Unit Thickness: 1 inch.
 - 3. Minimum Thickness of Each Glass Lite: 6 mm.
 - 4. Outdoor Lite: Heat-strengthened float glass.
 - 5. Interspace Content: Argon.
 - 6. Indoor Lite: Annealed float glass.
 - 7. Winter Nighttime U-Factor: 0.26 maximum.
 - 8. Summer Daytime U-Factor: 0.21 maximum.
 - 9. Visible Light Transmittance: 49 percent minimum.
 - 10. Solar Heat Gain Coefficient: 0.41 maximum.
- D. Clear Insulated Glazing (CLI): Low-E-coated, clear laminated insulating glass.
 - 1. Basis-of-Design Product: Pilkington North America; "Solar-E" outer lite and "Energy Alternative" inner lite.
 - 2. Overall Unit Thickness: 1 inch.
 - 3. Minimum Thickness of Each Glass Lite: 6 mm.
 - 4. Outdoor Lite: Clear laminated (CL) glass with two plies of clear annealed float glass
 - 5. Interspace Content: Argon.
 - 6. Indoor Lite: Heat-strengthened or fully tempered (where safety glass is required) float glass.
 - 7. Low-E Coating: Pyrolytic on second and fourth surfaces.
 - 8. Winter Nighttime U-Factor: 0.23 maximum.
 - 9. Summer Daytime U-Factor: 0.22 maximum.
 - 10. Visible Light Transmittance: 49 percent minimum.
 - 11. Solar Heat Gain Coefficient: 0.41 maximum.

- E. Spandrel Insulated (SI) Glazing: Silicone-coated, insulating spandrel glass.
1. Coating Color: As selected by Architect from manufacturer's full range.
 2. Overall Unit Thickness: 1 inch.
 3. Minimum Thickness of Each Glass Lite: 6 mm.
 4. Outdoor Lite: Heat-strengthened or fully tempered (where safety glass is required) float glass.
 5. Interspace Content: Argon.
 6. Indoor Lite: Annealed float glass.
 7. Coating Location: Fourth surface.

END OF SECTION 08 80 00

SECTION 08 88 13 - FIRE-RATED GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-protection-rated glazing installed in fire-rated doors.

1.3 DEFINITIONS

- A. Fire-Protection-Rated Glazing: Glazing that prevents spread of fire and smoke and complies with requirements for rated openings; incapable of blocking radiant heat
- B. Fire-Resistance-Rated Glazing: Glazing that prevents spread of fire and smoke and radiant heat and complies with requirements for rated walls and rated openings; capable of blocking radiant heat
- C. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- D. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Certificates: For each type of glass and glazing product.
- C. Glass Samples: For each type of glass product; 12 inches square.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers.

- B. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are familiar with the NGA's Certified Glass Installer Program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during the remainder of the construction period.

1.10 WARRANTY

- A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

- 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
- B. Safety Glazing Labeling: Permanently mark glazing with certification label of the SGCC, or another certification agency acceptable to the authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.4 GLASS PRODUCTS

- A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer unless fire-protection or fire-resistance rating is based on another product.
 - 2. Interlayer Thickness: Provide thickness as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.

2.5 FIRE-PROTECTION-RATED GLAZING

- A. General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing in accordance with NFPA 257 or UL 9, including hose-stream test, and shall comply with NFPA 80.
 - 1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from hose-stream test.
- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether glazing has passed hose-stream test; whether glazing meets 450 deg F temperature-rise limitation; and fire-resistance rating in minutes.
- C. Fire-Protection-Rated Laminated Glass with Intumescent Interlayer: Laminated glass made from multiple plies of uncoated, clear float glass; with intumescent interlayers; complying with 16 CFR 1201, Category II.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. McGrory Glass, Inc.
 - b. Technical Glass Products; an Allegion brand.
 - c. Vetrotech Saint-Gobain North America Inc.

2.6 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.

FIRE-RATED GLAZING

- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
- C. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.8 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.

FIRE-RATED GLAZING

- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.

- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 88 13

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
 - 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

- B. Related Requirements:

- 1. Division 05 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98, IAS Accreditation Criteria for Inspection Agencies.
- B. Manufacturer's Certification: Submit manufacturer's certification of product compliance with codes and standards along with product literature and data sheets for specified products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. Design framing systems in accordance with AISI 5220, "North American Specification for the Design of Cold-Formed Steel Framing – Nonstructural Members," unless otherwise indicated.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: Comply with ASTM C 645; roll-formed from hot-dipped galvanized steel; complying with ASTM A 1003/A 1003M and ASTM A 653/A 653M G40 (Z120) or having a coating that provides equivalent corrosion resistance. A40 galvanized products are not acceptable.
- B. Studs and Runners: ASTM C 645. Use either steel studs and runners or "EQ" Equivalent Gauge steel studs and runners where required for STC indicated.
 - 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0329 inch (20 gauge).
 - b. Depth: As indicated on Drawings.
 - 2. Dimpled Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0269 inch (22 gauge).
 - b. Depth: As indicated on Drawings.
 - 3. Basis of Design: Subject to compliance with requirements, provide products based on products as manufactured by:
 - a. ClarkDietrich Building Systems.
 - 4. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from another manufacturer that meet or exceed the published data of the specified Basis of Design manufacturer.
- C. Slip-Type Head Joints: Where indicated, provide the following:
 - 1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection and drift of structure above; in thickness not less than indicated for studs, in width to accommodate depth of studs, and with all accessory parts required for a complete installation.
 - a. Basis of Design: Subject to compliance with requirements, Deflection Track incorporated into the project shall be based on products as follows:
 - 1) ClarkDietrich Building Systems; "Max Trak 2D."
 - b. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from another manufacturer that meet or exceed the published data of the specified Basis of Design product.
- D. Firestop Tracks: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection and drift of structure above while maintaining continuity of fire-resistance-rated assembly indicated by use of an intumescent material adhered to runner; in thickness not less than indicated for studs and in width to accommodate depth of studs and with all accessory parts required.

NON-STRUCTURAL METAL FRAMING

1. Basis of Design: Subject to compliance with requirements, Firestop Track incorporated into the project, shall be based on products as follows:
 - 1) ClarkDietrich Building Systems; "Blaze Frame DSL 2" and "Blaze Frame Deck Plugs".
 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from another manufacturer that meet or exceed the published data of the specified Basis of Design product.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.0296 inch.
 2. Depth: As indicated on Drawings.
- F. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
- G. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: As indicated on Drawings.
 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- 2.3 SUSPENSION SYSTEMS
- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- B. Hanger Attachments to Concrete:
1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
 - a. Type: Postinstalled, expansion anchor.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length required.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges.
1. Depth: 2 inches.
- F. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.

NON-STRUCTURAL METAL FRAMING

2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0296 inch.
 - b. Depth: As indicated on Drawings.
 3. "EQ" Equivalent Gauge Steel Studs and Runners: ASTM C 645.
 4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: 0.0296 inch.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; Drywall Grid System.
 - c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
 2. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

NON-STRUCTURAL METAL FRAMING

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 5. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- E. Direct Furring:
1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c.
 2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

NON-STRUCTURAL METAL FRAMING

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.
- B. Related Requirements:
 - 1. Division 04 Section "Unit Masonry" for installation at masonry walls.
 - 2. Division 07 Section "Joint Sealants."
 - 3. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
 - 4. Division 09 Section "Painting and Finishing."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. Moisture- and Mold-Resistant Assemblies: Provide and install moisture- and mold-resistant glass-mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C 1396 and ASTM C 1658 where indicated on Drawings and in all locations which might be subject to moisture exposure during construction.

2.2 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers for the following products listed:
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
 1. Thickness: 5/8 inch unless indicated a 1/2 inch on the drawings.
 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
 3. Fire Rated: Type X where required for fire rating.
 4. Products:
 - a. Georgia Pacific Gypsum; "Fireguard Gypsum Board".
 - b. American Gypsum; "FireBloc Type X Gypsum Wallboard."
 - c. CertainTeed Corporation; "Type X Gypsum Board."
 - d. National Gypsum Company; "Gold Bond BRAND Fire-Shield Gypsum Board."
 - e. USG Corporation; "SHEETROCK Brand FIRECODE Core Gypsum Panels."
 5. Locations: Soffits, etc., not noted to be another gypsum board product elsewhere in this section or on the Drawings.
- C. Gypsum Ceiling Board: ASTM C 1396/C 1396M, Sag-resistant.
 1. Thickness: 1/2 inch, unless indicated otherwise.
 2. Long Edges: Tapered.
 3. Products:
 - a. Georgia Pacific Gypsum; "Tough Rock CD Ceiling Board".
 - b. American Gypsum; "Interior Ceiling Board."
 - c. CertainTeed Corporation; "Interior Ceiling Gypsum Board."
 - d. National Gypsum Company; "Gold Bond BRAND High Strength Ceiling Gypsum Board."
 - e. USG Corporation; "SHEETROCK Brand Interior Gypsum Ceiling Board."
 4. Locations: Ceilings indicated to be gypsum board.

- D. Abuse-Resistant Gypsum Board: ASTM C 1396, C 1629, D 4977, D 5420, and E 695.
1. Thickness: 5/8 inch, unless noted otherwise
 2. Paper Face: None.
 3. Long Edges: Tapered.
 4. Fire Rated: Type X where required for fire rating.
 5. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
 6. Products:
 - a. CertainTeed Corporation; Extreme Abuse Resistant Drywall with M2Tech."
 - b. Georgia Pacific Gypsum; "Tough Rock Abuse-Guard."
 - c. National Gypsum Company; "Gold Bond BRAND Hi-Abuse XP Gypsum Board."
 - d. USG Corporation; "SHEETROCK Brand Mold Tough AR."
 7. Locations: All walls, soffits, etc., in corridors, administration offices, and general use spaces such as therapy rooms, cafeteria, etc. and as indicated on Drawings.
- E. Impact-Resistant Gypsum Board: ASTM C 1396, C 1629, D 4977, D 5420, and E 695.
1. Thickness: 5/8 inch, unless noted otherwise
 2. Paper Face: None.
 3. Long Edges: Tapered.
 4. Fire Rated: Type X where required for fire rating.
 5. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
 6. Products:
 - a. CertainTeed Corporation; Extreme Impact Resistant Drywall with M2Tech."
 - b. National Gypsum Company; "Gold Bond BRAND Hi-Impact XP Gypsum Board."
 - c. USG Corporation; "SHEETROCK Brand Mold Tough VHI Panels."
 7. Locations: Classrooms, motor room, classroom corridor(s), and as indicated on drawings.
- F. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. Thickness: 1/2 inch, regular type, 5/8 inch, Type X, where required for fire-resistance rating.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
 4. Products:
 - a. Georgia Pacific Gypsum; "Tough Rock Fireguard Mold Guard".
 - b. American Gypsum; "M-Bloc with Mold and Moisture Resistance."
 - c. CertainTeed Corporation; "M2Tech Moisture and Mold Resistant Gypsum Board."
 - d. National Gypsum Company; "Gold Bond BRAND XP Gypsum Board."
 - e. USG Corporation; "SHEETROCK Brand Mold Tough Gypsum Panels."
 5. Locations: Toilet Rooms, Sinks, Janitor, and as indicated on Drawings.
- G. Glass-Mat, Water-Resistant Tile Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
1. Thickness: 1/2 inch regular type; 5/8 inch Type X where required for fire resistance rating.
 2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
 3. Products:

- a. Georgia-Pacific Gypsum LLC; "DensShield Tile Backer."
- b. American Gypsum; "Aqua Block Gypsum Wallboard."
- c. CertainTeed Corporation; "Glas Roc Tile Backer."
- d. MAPEI "Mapeguard Board."
- e. National Gypsum Company; "Gold Bond BRAND e² XP Tile Backer."
- f. USG Corporation; "Aqua-Tough Interior Panels."

4. Locations: Toilet Rooms, bathrooms, indicated to have ceramic tile on gypsum board.

2.3 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. Expansion (control) joint.
 - f. Curved-Edge Cornerbead: With notched or flexible flanges.

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. 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.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- D. Thermal Insulation: As specified in Division 07 Section "Insulation."
- E. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Single-Layer Application:
 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- B. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- C. Curved Surfaces:
 1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 INSTALLATION OF TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Tile Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. Bullnose Bead: Use where indicated.
 - 3. LC-Bead: Use where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
 - 4. L-Bead: Use where edge trim can only be installed after gypsum panels are installed.
 - 5. Curved-Edge Cornerbead: Use at curved openings.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 3: For concealed areas of fire-resistive-rated assemblies, sound rated assemblies, areas receiving heavy-textured finish.
 - 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Division 09 Section "Painting & Finishing."
 - 5. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in Division 09 Section "Painting & Finishing."
 - b. On moisture- and mold-resistant gypsum board scheduled to be painted.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 29 00

SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Glazed wall tile.
 - 2. Metal edge strips.
- B. Related Requirements:
 - 1. Division 06 Section "Finish Carpentry" for solid polymer thresholds.
 - 2. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 3. Division 09 Section "Gypsum Board" for tile backing panels.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile." C. Module Size: Actual tile size plus joint width indicated.
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory for each color and finish required.
4. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Warranty: Special Warranty.

1. Provide letter certifying substrate, setting materials, and grout are compatible with specified warranty.

C. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

D. Product Certificates: For each type of product.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer has successfully completed similar installations and can demonstrate knowledge of the requirements of ANSI 108, ANSI 118, ANSI 136, ANSI 137, and current Tile Council of North America requirements. Provide references for five (5) similar projects completed in the last three (3) years.

1.8 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site with setting material representative and Architect.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.
2. Review pattern layout.
3. Review specification requirements.
4. Inspect project conditions.

5. Review floor protection measures to be implemented after installation.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.11 WARRANTY

- A. Special Warranty: Provide a complete system warranty for ceramic tile installation to be free of setting material failure that causes cracks or deterioration in ceramic tile system.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.3 TILE PRODUCTS

- A. Ceramic Tile Type: Glazed wall tile.
 - 1. Basis of Design: Subject to compliance with requirements, Glazed Wall Tile incorporated into the project shall be based on products as follows:
 - a. Dal- Tile; "Semi-Gloss" "Classic."
 - 1) Field Color: Price Groups 1, 2, and 3.
 - 2) Accent Colors: Price Groups 1, 2, and 3. Assume 20% of tile to be accent for bidding purposes and up to two accent colors.
 - 2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. American Olean; a division of Dal-Tile Corporation.
 - 3. Module Size: 4 by 4-inches, 6 by 3 inches, or 6 by 6 inches.
 - 4. Face Size Variation: Rectified.
 - 5. Thickness: 5/16 inch.
 - 6. Face: Plain with cushion edges.
 - 7. Grout Color: As selected by Architect from manufacturer's full range.
 - 8. Mounting: Factory, back mounted.
 - 9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes selected from manufacturer's standard shapes.

2.4 SETTING MATERIALS

- A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ARDEX Americas.
 - b. Custom Building Products.

- c. Laticrete International, Inc.
- d. MAPEI Corporation.
- e. Summitville Tiles, Inc.

- 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
- 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.5 GROUT MATERIALS

A. High-Performance Tile Grout: ANSI A118.7.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ARDEX Americas; "ARDEX FL Rapid Set, Flexible, Sanded Grout."
 - b. Custom Building Products; "Prism."
 - c. Laticrete International, Inc; "Perma Color."
 - d. MAPEI Corporation; "Ultracolor Plus FA."
 - e. Summitville Tiles, Inc.
- 2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.

2.6 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
- C. Metal Edge Strips: Angle or L-shaped, height to match tile, metallic or combination of metal and PVC or neoprene base, designed specifically for wall applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 - 1. Basis-of-Design Schluter; "DESIGNBASE – SL"
 - a. Corners:
 - 1) Provide with matching inside corners.
 - 2) Provide with matching outside corners.
 - 3) Provide with matching connectors.
 - 4) Provide with matching end caps.
 - 5) Provide with matching Sealing Lip.
 - 2. Material and Finish:
 - a. AEEB – Anodized Aluminum with Brushed Stainless-Steel appearance.
 - b. Height: Height as required.

3. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Blanke Corporation.
 - b. Ceramic Tool Company, Inc.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.7 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Glazed Wall Tile: 1/16 inch.
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

CERAMIC TILING

- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.5 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.6 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Wall Installations, Metal Studs or Furring:
 - 1. Ceramic Tile Installation: TCNA W245; thinset mortar on glass-mat, water-resistant gypsum backer board over vapor-retarder membrane.
 - a. Ceramic Tile Type: Glazed wall tile.
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.

END OF SECTION 09 30 13

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Related Requirements:
 - 1. Division 09 Section "Acoustical Insulation and Sealants."

1.3 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division 01 Section "Unit Prices". Unit Prices are inclusive of all labor, materials, overhead and profit per unit of work indicated.

1.4 ALLOWANCES

- A. Work Included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this section itemized on the Bid Form. The cost of these quantities shall be computed using the Unit Prices stated on the Bid Form. The work listed is in addition to that required to complete the work of the Contract and, consequently, the sum therefore may be deducted from the Contract amount if the corresponding work is not required by actual conditions encountered.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, minimum 6 inches in size of specified acoustical panel and 8 inch long samples of moldings and suspension systems.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Manufacturer's certification that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material shall carry an approved independent laboratory classification.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.9 QUALITY ASSURANCE

- A. Source Limitations: Obtain each set of linear metal pans and suspension systems from one source with resources to provide products of consistent quality in appearance, physical properties, and performance.
- B. Surface-Burning Characteristics: Complying with ASTM E 1264 for Class A materials, as determined by testing identical products according to ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical ceiling area as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Installer Qualifications: Firm with not less than 3 years of successful experience in installation of acoustical ceilings similar to requirements for this project and has a successful record of installation in accordance with the manufacturer's installation requirements.

1.10 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages that indicate UL classification on product label. Store acoustical panels, suspension-system components and accessories in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.12 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.13 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace acoustical panel ceiling components that fail in materials or workmanship within the specified warranty period:
 - 1. Failures include, but are not limited to, the following:
 - a. Acoustical panels that sag, warp or growth of mold or mildew on panels to resist antimicrobial growth.
 - b. Grid: Rust and manufacturer's defects.
 - 2. Warranty Period: As indicated for each product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.
- C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Comply with requirements from UL's "Fire Resistance Directory".

2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.

ACOUSTICAL PANEL CEILINGS

- B. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
- D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
- E. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.3 ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers in the following sections:
- B. Mineral Fiber – Type 1: Provide panels complying with ASTM E 1264 as follows:
 - 1. Material: Wet Formed Mineral Fiber; Type III, Form 2, Pattern C E.
 - 2. Texture: Medium.
 - 3. Finish: Factory-applied Latex paint.
 - 4. Edge Profile: Square, Lay-in.
 - 5. Thickness: 5/8".
 - 6. Color: White.
 - 7. Light Reflectance: .85
 - 8. Noise Reduction Coefficient: .55
 - 9. Warranty Period: 10 years.
 - 10. Products:
 - a. Armstrong: Fine Fissured - "1728/1729" (non-fire-resistance rated), "1830/1831" (fire-resistance rated).
 - b. CertainTeed: Fine Fissured - "Vantage 10 "HFF-157/HHF-197" (non-fire-resistance rated), "PFF157/PFF197" (fire-resistance-rated).
 - c. USG: Radar SQ Clima Plus-"2210/2410" (non-fire-resistance rated), "2215/2415" (fire-resistance rated).
- C. Mineral Fiber – Type 2: Provide panels complying with ASTM E 1264 as follows:
 - 1. Material: Wet Formed Mineral Fiber; Type IV, Form 2, Pattern E.
 - 2. Texture: Fine.
 - 3. Finish: Factory-applied Latex paint.
 - 4. Edge Profile: Square, Lay-in.
 - 5. Thickness: 1".
 - 6. Color: White.
 - 7. Light Reflectance: .87.
 - 8. Noise Reduction Coefficient: .80.
 - 9. Warranty Period: 10 years.
 - 10. Products:
 - a. Armstrong: Ultima High NRC; "1940/1943."
 - b. USG: Mars Clima Plus High NRC; "86100/86300."

ACOUSTICAL PANEL CEILINGS

- D. Vinyl-Faced Gypsum Board – Type 3: Provide panels complying with ASTM E 1264, Type XX, as follows:
1. Material: Gypsum core with vinyl face.
 2. Finish: Factory-adhered, scrubbable.
 3. Edge Profile: Square, Lay-in.
 4. Thickness: 1/2-inch.
 5. Color: White.
 6. Light Reflectance: .78.
 7. CAC: 34 (2 x 2) and 36 (2 x 4).
 8. Warranty Period: 10 years.
 9. Products:
 - a. Armstrong: Vinylclad.
 - b. CertainTeed: Vinylrock™.
 - c. National Gypsum: Gridstone®.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.

2.5 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Armstrong World Industries, Inc.
 2. CertainTeed Corp.
 3. Rockfon.
 4. USG Interiors, Inc.; Subsidiary of USG Corporation.
- B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges. Main beams and cross tees shall have rotary stitching.
1. Structural Classification: Heavy-duty system.
 2. Fire-Rated: Where fire rating is indicated on Drawings.
 3. Face Design: Flat, flush.
 4. Cap Material: Steel cold-rolled sheet.
 5. Cap Finish: Painted white to match ceiling tile.
 6. Warranty: 10 years.

2.6 METAL EDGE TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.; "Axiom Classic."
 - 2. USG Interiors, Inc.; Subsidiary of USG Corporation; "Compasso Elite."
 - 3. CertainTeed, Inc.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
- C. Trim Accessories: Provide Manufacturer's premanufactured outside corner pieces for use at bullnose masonry gypsum board assemblies.
 - 1. Color and finish: As selected by Architect from manufacturer's full standard line of colors and finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.
- B. Coordination: Perform the following prior to installing ceiling grid:
 - 1. Review reflected ceiling plans, lighting plans, ductwork plans, sprinkler shop drawings, electrical systems plans, coordination drawings, and other applicable project drawings prior to installing ceilings.
 - 2. Confirm ceiling elevations and main runner locations with all Contractors with work located in or above the ceiling.
 - 3. Report any conflicts promptly to the Architect in writing.
 - 4. Proceed with grid installation only after all conflicts have been resolved. Conflicts realized during installation will require removal and reinstallation of the ceiling grid at the Contractors expense.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. 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 and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, 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.
 - 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 and 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, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 7. Do not attach hangers to steel deck tabs.
 - 8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - 9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 - 10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. After installation of suspension-system, acoustical panels shall not be installed until after Architect has performed above ceiling inspection and all deficiencies have been rectified. Acoustical ceiling panels installed prior to this shall be removed at the Contractors expense.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. Install hold-down clips in areas with fire-resistance rated ceilings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.
 - 2. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.
- G. Install premanufactured outside corner pieces neatly and securely on all outside corners at masonry and gypsum wallboard assemblies. Inside corners shall be accurately and cleanly mitered and securely connected.

ACOUSTICAL PANEL CEILINGS

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.
- B. Related Sections:
 - 1. Division 03 Section "Hydraulic Cement Underlayment" for leveling compound.

1.3 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of the work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division 01 Section "Unit Prices". Unit Prices are inclusive of all labor, materials, overhead and profit per unit of work indicated.

1.4 ALLOWANCES

- A. Work included in the Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this Section as itemized on the Bid Form. The cost of these quantities shall be computed using Unit Prices stated on the Bid Form. The Work of the Allowance is in addition to that required to complete the Work of the Contract. Subsequently, the sum or any unused portion thereof, shall be deducted from the Contract if the corresponding work is not required by actual conditions encountered.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

RESILIENT BASE AND ACCESSORIES

- E. Product Schedule: For resilient base and accessory products.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Flexco.
 - 2. Johnsonite; a Tarkett company.
 - 3. Roppe Corporation, USA.
 - 4. Mannington Mills, Inc.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
 - 1. Style:
 - a. Cove.
- C. Thickness: 0.125 inch.
 - 1. Height: 4-1/2 inches.

- D. Lengths: Coils in manufacturer's standard length.
- E. Outside Corners: Job formed or preformed.
- F. Inside Corners: Job formed or preformed.
- G. Colors: As selected by Architect from full range of industry colors.

2.2 VINYL MOLDING ACCESSORIES

- A. Basis of Design: Subject to compliance with requirements, Vinyl Molding Accessories incorporated into the project shall be based on references of model numbers and in Description section below on products by:
 - 1. Roppe Corporation.
 - a. Carpet to Tile Transition: Roppe #177.
 - b. Carpet Reducer: Roppe #169.
 - c. Tile Reducer: Roppe #172.
 - d. Tile to Tile (dissimilar materials): Roppe #154.
 - e. Uneven Flooring Transition: Roppe Subfloor Leveler.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - 1. Flexco.
 - 2. Johnsonite; A Tarkett Company.
 - 3. Mannington Mills, Inc.
- C. Profile: As indicated.
- D. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

RESILIENT BASE AND ACCESSORIES

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 09 65 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Homogenous vinyl floor tile (HVT).
 - 2. Luxury vinyl floor tile (LVT).
- B. Related Sections:
 - 1. Division 02 Section "Selective Demolition" for removing existing floor coverings.
 - 2. Division 03 Section "Hydraulic Cement Underlayment" for leveling compound.

1.3 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division 01 Section "Unit Prices". Unit Prices are inclusive of all labor, materials, overhead and profit per unit of work indicated.

1.4 ALLOWANCES

- A. Work included in the Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this Section as itemized on the Bid Form. The cost of these quantities shall be computed using Unit Prices stated on the Bid Form. The Work of the Allowance is in addition to that required to complete the Work of the Contract. Subsequently, the sum or any unused portion thereof, shall be deducted from the Contract if the corresponding work is not required by actual conditions encountered.

1.5 ALTERNATE BIDS

- A. "Access – Wood, Abstracts, or Stone" LVT manufactured by Mannington Mills, Inc. is included in the Base Bid. Provide alternate price for the change in cost to provide the alternate products in the space provided on the Bid Form for items of work as scheduled hereinafter, and in accordance with the following requirements:
 - 1. All work to be performed under accepted alternate prices shall conform to the applicable Contract Documents, and shall include all work in connection with or consequent to the alternate price work to produce a complete installation.

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2. Alternate prices shall be all inclusive of the cost of materials, work and profit, supervision, administration and any and all other costs in connection therewith for work in place and accepted or omitted as the case may be, and shall hold for the same period as the bid.
 3. Coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by the accepted Alternate is complete and fully integrated into the project. All costs to modify or adjust the adjacent work of other trades for a complete installation shall be included in the Alternate Bid.
 4. Refer to Division 1 Section "Alternates" for additional information and requirements for Alternate Bids.
- B. "Creative Terrain" HVT by Mohawk Group is included in the Base Bid. Provide alternate price for the change in cost to provide the alternate products in the space provided on the Bid Form for items of work as scheduled hereinafter, and in accordance with the following requirements:
1. All work to be performed under accepted alternate prices shall conform to the applicable Contract Documents, and shall include all work in connection with or consequent to the alternate price work to produce a complete installation.
 2. Alternate prices shall be all inclusive of the cost of materials, work and profit, supervision, administration and any and all other costs in connection therewith for work in place and accepted or omitted as the case may be, and shall hold for the same period as the bid.
 3. Coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by the accepted Alternate is complete and fully integrated into the project. All costs to modify or adjust the adjacent work of other trades for a complete installation shall be included in the Alternate Bid.
 4. Refer to Division 1 Section "Alternates" for additional information and requirements for Alternate Bids.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 1. Show details of special patterns.
- C. Samples for Initial Selection: For each type of floor tile indicated.
- D. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.11 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review concrete slab moisture content.
 - 3. Confirm specification requirements for floor flatness conform to project requirements on new concrete slabs and review floor leveler installation on existing concrete slabs.
 - 4. Review installation procedures.
 - 5. Review project schedule.
 - 6. Review floor protection measures to be implemented after installation.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.13 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 HOMOGENOUS VINYL FLOOR TILE (HVT)

- A. Products: Subject to compliance with requirements, Homogenous Vinyl Floor Tile incorporated into the project shall be based on products as follows:
 - 1. Base Bid: Mohawk Group; "Creative Terrain."
 - 2. Alternate No. A971: Patcraft; "Numix."
- B. Tile Standard: ASTM F 1700.
 - 1. Class: Class I, Homogenous vinyl tile.
 - 2. Type: A, smooth surface.
- C. Thickness: 3 mm minimum.
- D. Size: 17.7 inches x 17.7 inches up to 36 inches x 36 inches.
- E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 LUXURY VINYL FLOOR TILE (LVT)

- A. Products: Subject to compliance with requirements, luxury vinyl floor tile incorporated into the project shall be based on products as follows:
 - 1. Base Bid: "Access – Wood, Abstracts, or Stone" by Mannington Mills, Inc.
 - 2. Alternate A951: "Level Set Collection LVT – Natural Woodgrains & Stones" by Interface.
 - 3. Alternate A952: "Hot and Heavy – Grown Up, Secoya, and Bolder" by Mohawk Group.
- B. Tile Standard:
 - 1. Class: Class III, printed film vinyl tile.
 - 2. Type: B, embossed surface.
- C. Thickness: Minimum 4.5 mm with a 22 mil wear layer.
- D. Size: Planks and squares as available within specified lines.
- E. Colors and Patterns: As selected by Architect from full range of industry colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings, marks, dyes, paints, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound as specified in Division 03 Section "Hydraulic Cement Underlayment"; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

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1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern) and in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient tile flooring with paper-type roll goods acceptable to manufacturer until Substantial Completion.

END OF SECTION 09 65 19

SECTION 09 67 23 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes resinous flooring systems.

1.3 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the project. Unit Price descriptions, requirements, and units of work are enumerated in Division 01 Section "Unit Prices." Unit Prices are inclusive of all labor, materials, overhead, and profit per unit of work indicated.

1.4 ALLOWANCES

- A. Work included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this Section as itemized on the Bid Form. The cost of these quantities shall be computed using Unit Prices stated on the Bid Form. The Work of the Allowance is in addition to that required to complete the Work of the Contract. Subsequently, the sum or any unused portion thereof, shall be deducted from the Contract if the corresponding work is not required by actual conditions encountered.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include manufacturer's technical data, application instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection: For each type of exposed finish required.
- C. Samples for Verification: For each resinous flooring system required, 6 inches square, applied to a rigid backing by Installer for this Project.

1.6 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- B. Material Certificates: For each resinous flooring component, from manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated. Installer should provide letter from manufacturer stating that they have been in business for at least 5 years and listing 5 projects in the last 2 years of similar scope. For each project provide: project name, location, date of installation, contact information, size of project, and manufacturer of materials with system information.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 96-inch-square floor area selected by Architect.
 - a. Include 96-inch length of integral cove base with inside and outside corner.
 - 2. Simulate finished lighting conditions for Architect's review of mockups.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Review rags and waste from storage areas daily.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for 24 hours after application unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.

2.2 RESINOUS FLOORING

- A. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, and resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.
 - 1. Basis of Design: Subject to compliance with requirements, Resinous Flooring incorporated into the Project shall be based on systems as follows:
 - a. Sherwin Williams Company; Resuflor Deco Flake BC.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - 1. Key Resin Company; Key Chip – 100 Flooring.
- C. System Characteristics:
 - 1. Color and Pattern: As selected by Architect from manufacturer's full range.
 - 2. Wearing Surface: Textured for slip resistance.
 - 3. Overall System Thickness: Minimum 50-60 nominal thickness.
- D. Primer: Type recommended by resinous flooring manufacturer for substrate and resinous flooring system indicated. Basis of Design Product: "Resuprime 3579."
- E. Patching and Fill Material: Resinous product by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- F. Joint Filler Material: Compatible, flexible polyurea joint filler by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- G. Body Coats:
 - 1. Basis of Design Product: Subject to compliance with requirements, provide "Resuflor 3746."
 - 2. Resin: Epoxy and binder resin.
 - 3. Number of Coats: One.
 - 4. Thickness of Coats: Minimum recommended by manufacturer.
 - 5. Aggregates: Vinyl flakes.
- H. Vinyl Chips: Manufacturer's standard blended vinyl chips.
 - 1. Basis of Design Product: Decorative Flakes G750 or 6755.
- I. Topcoats: Grout or Seal coats.

RESINOUS FLOORING

1. Basis of Design Product: Subject to compliance with requirements, provide Resufloor 3746 grout coat and "Resutile 4686" seal coat.
 2. Resin: Aliphatic Polyurethane enamel.
 3. Formulation Description: High solids, non-yellowing, and scuff and abrasion resistant.
 4. Type: Clear.
 5. Number of Coats: Grout and seal coats as recommended by manufacturer.
 6. Thickness: Minimum recommended by manufacturer.
- J. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested according to test methods indicated:
1. Adhesion: 300 psi according to ACI 503R.
 2. Flexural Strength: 10,000 psi according to ASTM C 580.
 3. Abrasion Resistance: 63 mgs lost according to ASTM D 4060 after 1,000 cycles.
 4. Impact Resistance: MIL-D-3134J, passing direct, inch pound greater than 160, and passing reverse, inch pound greater than 80.

2.3 MATERIALS

- A. VOC Content of Resinous Flooring: Provide resinous flooring systems, for use inside the weatherproofing system, that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Resinous Flooring: 100 g/L.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
1. Roughen concrete substrates as follows:
 - a. Prepare surfaces with an apparatus that abrades the concrete surface (shot-blast or diamond grinder as required), and removes all remnants of existing flooring systems, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - b. Comply with ASTM C 811 requirements unless manufacturer's written instructions are more stringent.
 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written instructions.
 3. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.

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- a. Calcium Chloride Test: Perform anhydrous calcium chloride test per ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs. of water/1000 sq. ft. in 24 hours. Perform tests so that each test area does not exceed 1000 sq. ft. and perform 3 tests for the first 1000 sq. ft. and one additional test for every additional 1000 sq. ft.
 - b. In-Situ Probe Test: Perform relative-humidity test using in-situ probes per ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative-humidity-level measurement.
 4. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
 - C. Inspection: Prior to commencing Work, thoroughly examine all underlying and adjoining work, surfaces and conditions upon which Work is in any way dependent for perfect results. Report all conditions which affect Work. No "waiver of responsibility" for incomplete, inadequate or defective underlaying and adjoining work, surfaces and conditions will be considered, unless notice of such unsatisfactory conditions has been filed and agreed to in writing before Work begins. Commencement of Work constitutes acceptance of surfaces.
 - D. Surface Preparation: Remove all surface contamination, loose or weakly adherent particles, laitance, grease, oil, curing compounds, paint, dust and debris by blast track method or approved mechanical means (acid etch not allowed). If surface is questionable, try a test patch. Create a minimum surface profile for the system specified in accordance with the methods described in ICRI No. 03732 to achieve profile numbers as follows:
 1. Thin and medium films, 10 to 40 mils CSP-3 to CSP-5
 - E. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
 1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.
 - F. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
 - G. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
 - H. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written instructions.
- 3.2 APPLICATION
- A. Install resinous floor over properly prepared concrete surface in strict accordance with the manufacturer's directions.
 1. Install the primer and/or base coats over thoroughly cleaned and prepared concrete.
 2. Install topcoat over flooring after excess aggregate has been removed.
 3. Maintain a slab temperature of 60°F to 80°F for 24 hours minimum before applying floor topping, or as instructed by manufacturer.

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- B. Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - 3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- C. Primer: Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- 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, and topcoating of cove base. Round internal and external corners.
 - 1. Integral Cove Base: 4 inches high.
- E. Body Coats: Apply body coats in thickness indicated for flooring system.
 - 1. Vinyl Chips: Broadcast vinyl chips at rate recommended by manufacturer and, after resin is cured, remove excess aggregates to provide surface texture indicated.
- F. Topcoats: Apply topcoats in number indicated for flooring system and at spreading rates recommended in writing by manufacturer and to produce wearing surface indicated.

3.3 PROTECTION

- A. Cleaning: Upon completion of the Work, clean up and remove from the premises surplus materials, tools, appliances, empty cans, cartons and rubbish resulting from the Work. Clean off all spattering and drippings, and all resulting stains.
- B. Protection: Protect Work in accordance with manufacturer's directions from damage and wear during the remainder of the construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
- C. Contractor shall insure that coating is protected from any traffic until it is fully cured to the satisfaction of the coating manufacturer.

END OF SECTION 09 67 23

SECTION 09 68 10 - CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes modular carpet tile (modular) and walk-off carpet tile (modular).
- B. Related Requirements:
 - 1. Division 02 Section "Selective Demolition" for removing existing floor coverings.
 - 2. Division 03 Section "Hydraulic Cement Underlayment" for floor leveling underlayment.
 - 3. Division 09 Sections "Resilient Base and Accessories" and "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet.

1.3 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of the work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division 01 Section "Unit Prices". Unit Prices are inclusive of all labor, materials, overhead and profit per unit of work indicated.

1.4 ALTERNATE BIDS

- A. "Rough" and "Tumble" Collections carpet as manufactured by Mannington is included in the Base Bid. Provide alternate prices for the change in cost to provide the alternate manufacturers products in the space provided on the Bid Form for items of work as scheduled hereinafter, and in accordance with the following requirements.
 - 1. All work to be performed under accepted alternate prices shall conform to the applicable Contract Documents and shall include all work in connection with or consequent to the alternate price work to produce a complete installation.
 - 2. Alternate prices shall be all inclusive of the cost of materials, work and profit, supervision, administration and any and all other costs in connection therewith for work in place and accepted or omitted as the case may be and shall hold for the same period as the bid.
 - 3. Coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by the accepted Alternate is complete and fully integrated into the project. All costs to modify or adjust the adjacent work of other trades for a complete installation shall be included in the Alternate Bid.
 - 4. Refer to Division 01 Section "Alternates" for additional information and requirements for Alternate Bids.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Samples for Initial Selection: For each type of carpet.
 - 1. Provide manufacturer's pattern binder for carpet lines specified.
- C. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
- D. Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 2 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.9 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review concrete slab moisture content.
 - 3. Confirm specification requirements for floor flatness conform to project requirements on new concrete slabs and review floor leveler installation on existing concrete slabs.
 - 4. Review installation procedures.

5. Review patterns and locations for mockup.
6. Review project schedule.
7. Review floor protection measures to be implemented after installation.

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II or Master II certification level.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

1.12 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.13 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE (MODULAR)

- A. Products: Subject to compliance with requirements, the following products shall be incorporated into the project as indicated on the Carpet Schedule:

1. "Rough" and "Tumble", Rough and Tumble collection carpet tile by Mannington Commercial.

- | | | |
|----|--------------------|-----------------------|
| a. | Pile Construction: | Patterned Loop |
| b. | Face fiber: | Type 6 Nylon |
| c. | Density: | 6,697 |
| d. | Pile Thickness: | 0.086 inch |
| e. | Yarn Weight: | 16 02/yd2 |
| f. | Backing: | Infinity® 2 Modular |
| g. | Size: | 12-inches x 36-inches |

2. "Puppy Love", Heartbeats, collection carpet tile by Interface.

- | | | |
|----|--------------------|-----------------------------|
| a. | Pile Construction: | Tufted Textured Loop |
| b. | Face fiber: | 100% recycled content Nylon |
| c. | Density: | 8,550 02/yd3 |
| d. | Pile Thickness: | 0.08 inch |
| e. | Yarn Weight: | 19 02/yd2 |
| f. | Backing: | GlasBac™ |
| g. | Size: | 50 cm x 50 cm |

3. "Thematic Thread", Textural Effects Plank, collection carpet tile by Mohawk Group.

- | | | |
|----|--------------------|---------------------------------|
| a. | Pile Construction: | Textured Patterned Loop |
| b. | Face fiber: | Duracolor® Tricor Premium Nylon |
| c. | Density: | 7,578 |
| d. | Pile Thickness: | 0.095 inch |
| e. | Yarn Weight: | 20 02/ yd2 |
| f. | Backing: | EcoFlex One |
| g. | Size: | 12 inches x 36 inches |

2.2 WALK-OFF CARPET (MODULAR)

- A. Products: Subject to compliance with requirements, the following products shall be incorporated into the project as indicated on the Carpet Schedule:

1. "Recoarse II", Liaison II Entryway collection walk-off carpet tiles by Mannington

- | | | |
|----|---------------------|-------------------------|
| a. | Pile Construction: | Textured patterned loop |
| b. | Face fiber: | Type 6,6 Nylon |
| c. | Average Density: | 7,354 |
| d. | Pile Thickness: | .186 inches |
| e. | Tufted Yarn Weight: | 38 oz/sq. yd. |
| f. | Backing: | Infinity RE Modular |
| g. | Size: | 24"x24" |

2. "SR999", Step Repeat collection walk-off carpet tiles by Interface
 - a. Pile Construction: Tufted texture loop
 - b. Face fiber: Type 6 Nylon
 - c. Density: 7,654
 - d. Pile Thickness: .147 inches
 - e. Backing: Glas Bac
 - f. Size: 50 cm x 50 cm
3. "Step In Style II", Tuff Stuff II collection walk-off carpet tiles by Mohawk Group
 - a. Pile Construction: Tufted
 - b. Face fiber: Duracolor Nylon
 - c. Density: 7,448
 - d. Pile Thickness: .203 inches
 - e. Tufted Yarn Weight: 38 oz/sq.yd.
 - f. Backing: EcoFlex ICT
 - g. Size: 24"x24"

2.3 CARPET SCHEDULE

- A. Base Bid:
 1. Carpet Tile (Modular): "Rough and Tumble Collection" by Mannington
 2. Walk-Off Carpet (Modular): "Recoarse II" by Mannington
- B. Alternate A961: Carpet by Interface
 1. Carpet Tile (Modular): "Puppy Love, Heartbeats" by Interface
 2. Walk-Off Carpet (Modular): "Step Repeat Collection" by Interface
- C. Alternate A962: Carpet by Mohawk
 1. Carpet Tile (Modular): "Thematic Thread, Textural Effects Collection" by Mohawk Group
 2. Walk-Off Carpet (Modular): "Step in Style II" by Mohawk Group

2.4 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer in accordance with Division 03 Section "Hydraulic Cement Underlayment."
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended by carpet manufacturer for releasable installation.
- C. Transition Strips: Resilient material of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints and as indicated in Division 09 Section "Resilient Base and Accessories."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.
- B. Examine carpet for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet.
- B. Use trowelable leveling and patching compounds as specified in Division 03 Section "Hydraulic Cement Underlayment", according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 CARPET TILE INSTALLATION

- A. General: Comply with CRI's "CRI 104", Section 10, "Carpet Tile" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders or as directed by Owner or Architect.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 09 68 10

SECTION 09 84 33 - SOUND-ABSORBING ROOM COMPONENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes shop-fabricated, sound absorbing panel units tested for acoustical performance, including:
 - 1. Fabric-Wrapped, wood fiber acoustical wall panels.
- B. Related Sections:
 - 1. Division 01 Section "Coordination Drawings" for requirements to coordinate the work of this Section with the construction elements indicated as "Coordination Drawing Content" and as required by the other Prime Contractors for the Project Coordination Drawings.
 - 2. Division 06 Section "Rough Carpentry" for wood blocking at sound absorbing room components.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For sound-absorbing room component. Include mounting devices and details; details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge and core materials.
 - 1. Include elevations showing panel sizes and direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing from sound-absorbing room component manufacturer's full range.
- D. Samples for Verification: For the following products, prepared on Samples of size indicated below:
 - 1. Fabric: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 - 2. Panel Edge: 12-inch- long Sample(s) showing each edge profile, corner, and finish.
 - 3. Core Material: 12-inch- square Sample at corner.

SOUND-ABSORBING ROOM COMPONENTS

4. Mounting Devices: Full-size Samples.
5. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Electrical outlets, switches and thermostats.
 2. Items penetrating or covered by fabric-wrapped wall panels including the following:
 - a. Speakers.
 - b. Alarms.
 - c. Access panels.
 - d. Clocks.
 - e. Receptacles.
 - f. Wall-mounted phones.
- B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sound-absorbing room components to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal recommendations.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fabric: For each fabric, color, and pattern installed, provide length equal to 2 percent of amount installed, but no fewer than 10 yards.

1.8 QUALITY ASSURANCE

- A. Source Limitations: Obtain sound-absorbing room components from single source from single manufacturer.
- B. Fire-Test-Response Characteristics: Provide sound-absorbing room components meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

1.9 PREINSTALLATION CONFERENCE

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

SOUND-ABSORBING ROOM COMPONENTS

1. Review specification requirements.
2. Review installation procedures.
3. Inspect project conditions.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and sound-absorbing room components manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.11 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install sound-absorbing room components until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install sound-absorbing room components until a permanent level of lighting is provided on surfaces to receive the units.
- C. Field Measurements: Verify locations of sound-absorbing room components and actual dimensions of openings and penetrations by field measurements before fabrication.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sound-absorbing room components that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOUND-ABSORBING ROOM COMPONENTS, GENERAL

- A. Core Materials:
 1. Wood Fiber Board: Wood fibers bonded with inorganic hydraulic cement.
 2. Glass-Fiber Board: ASTM C 612, Type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

SOUND-ABSORBING ROOM COMPONENTS

- B. Facing Material: Fabric from same dye lot; color and pattern as selected by Architect from manufacturer's full range.
- C. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:
 - 1. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of unit and the other part to substrate, designed to permit unit removal.

2.2 FABRIC-WRAPPED WOOD FIBER ACOUSTICAL WALL PANELS

- A. Basis-of-Design: Subject to compliance with requirements, Wood Fiber Acoustical Wall Panels incorporated into the project shall be based on products as follows:
 - 1. Tectum, Inc.; "Fabri-Tough Wall Panels."
- B. Wood Fiber Acoustical Wall Panel: Manufacturer's standard panel construction consisting of wood fibers bonded with inorganic hydraulic cement.
 - 1. Mounting: "C-20" type mounting method with 1-inch fiberglass insulation infill between furring.
 - 2. Core: Cementitious-fiber board.
 - 3. Edge Profile: Kerfed with fabric wrapped to kerf.
 - 4. Acoustical Performance: Panel Type 2000 sound absorption NRC of .94 according to ASTM C 423 for Type A mounting according to ASTM E 795.
 - 5. Nominal Overall Panel Thickness: 1 inch.
 - 6. Panel Width: As indicated on Drawings.
 - 7. Panel Height: As indicated on Drawings.
 - 8. Fabric: Fabri-Tough with flame spread of 25 or less per ASTM E 84. Fabric color selected by Architect from manufacturer's full range.

2.3 FABRICATION

- A. General: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Square Corners: Tailor corners.
 - 2. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
- C. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
 - 1. Thickness.
 - 2. Edge straightness.

3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of sound-absorbing room components.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install sound-absorbing room components in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with sound-absorbing wall unit manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align and level fabric pattern and grain among adjacent units.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch.
- B. Variation of Panel Joints from Hairline: Not more than 1/16 inch wide.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 09 84 33

SECTION 09 84 53 – ALUMINUM WINDOW PARTITION CLOSURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes aluminum window partition closure trim that provides sound transmission control.
- B. Related Requirements:
 - 1. Division 07 Section "Joint Sealants" for joint sealants.
 - 2. Division 08 Section "Aluminum Framed Entrances and Storefronts" for aluminum storefront construction.
 - 3. Division 09 Section "Non-Structural Metal Framing" for interior wall construction.
 - 4. Division 09 Section "Gypsum Board" for interior wall construction.

1.3 ACTION SUBMITTALS

- A. Product Data: Include manufacturer's technical data and brochures for each type of specified component required, including detail drawings, and installation instructions.
- B. Shop Drawings:
 - 1. Include typical dimensions, sizes, thickness, alloys, tempers, finishes, joining, attachments, and relationship of adjoining work.
- C. Samples: For each exposed product and each color.
 - 1. Size: 12 inches.

1.4 DELIVERY, STORAGE & HANDLING

- A. All materials shall be protected to prevent damage from other trades.
- B. Store accessories inside a well-ventilated area, away from uncured concrete and masonry, and protected from the weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design: Subject to compliance with requirements, Aluminum Window Wall Partition Closure incorporated into the project shall be based on systems as follows:
 - 1. Gordon Interior Specialties; "MULLION MATE."
- B. Acceptable Manufacturers: None.

2.2 ALUMINUM WINDOW PARTITION CLOSURE

- A. General: Pre-assembled, spring loaded aluminum window partition closures shall provide a tight fit for vertical junctures of partitions and aluminum window walls, finished to match aluminum mullions.
 - 1. Furnish units of sufficient length and depth as indicated on drawings
- B. Aluminum Extrusions: 6063-T5.
- C. Finish: Dark Bronze.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examination: Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify field measurements and block-out dimensions are as shown on shop drawings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Apply continuous bead of acoustical sealant to the surface that will be in contact with the drywall edge.
- B. Install aluminum window partition closure in accordance with manufacturer's requirements.
- C. Apply sealant at joints of dissimilar materials as desired.

3.3 CLEANING

- A. After work is complete in adjacent areas, clean exposed surfaces with suitable cleaner that will not harm or attack the finish.

3.4 PROTECTION

- A. Protect aluminum window partition closure from damage during installation, general construction activities, and until Substantial Completion.

END OF SECTION 09 84 53

SECTION 09 91 00 – PAINTING AND FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on substrates.
- B. Related Requirements:
 - 1. Requirements for preparing, priming, painting, and finishing are included throughout the specifications. All specification sections shall be reviewed for painting and finishing requirements.
 - 2. Division 05 Section "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.

1.3 DEFINITIONS

- A. Gloss Level 1 (Matte Flat Finish): Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2 (Velvet-Like Flat Finish): Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3 (Eggshell Finish): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4 (Satin Finish): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5 (Semi-Gloss Finish): 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6 (Gloss Finish): 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7 (High-Gloss Finish): More than 85 units at 60 degrees, according to ASTM D 523.

1.4 UNIT PRICES

- A. Specific work of this section is itemized as Unit Prices on the Bid Form to add or deduct specific units of work to the project. Unit Price descriptions, requirements and units of work are enumerated in Division 01 Section "Unit Prices." Unit Prices are inclusive of all labor, materials, overhead, and profit per unit of work indicated.

1.5 ALLOWANCES

- A. Work Included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this section itemized on the Bid Form. The cost of these quantities shall be computed using the Unit Prices stated on the Bid Form. The work listed is in addition to that required to complete the work of the Contract and, consequently, the sum therefore may be deducted from the Contract amount if the corresponding work is not required by actual conditions encountered.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
1. Submit manufacturer's standard "fan deck" of colors.
 2. Architect will request Samples for Verification after receipt of manufacturer's "fan deck."
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
1. Submit Samples on rigid backing, 8 inches square.
 2. Step coats on Samples to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
 5. Architect will furnish color schedule approximately 10 weeks after receipt of samples and other color-dependent submittals of other specification sections.
- D. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. VOC content.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 10 percent, but not less than 5 gal. of each material and color applied.

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site.
1. Review specification requirements.
 2. Review installation procedures, including review of proper preparation of existing wall surfaces as indicated in the MPI Maintenance & Repainting Manual.
 3. Inspect project conditions, including existing wall surfaces which require cleaning and spackling as part of the work.

1.9 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.
- B. Single-Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.
- C. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue with manufacturer's data.
 - 2. Remove rags and waste from storage areas daily.
 - 3. Protect product from freezing.

1.11 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in rain, snow, fog, mist, or when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Where moisture is present, the general contractor shall provide the necessary ventilation to establish appropriate condition. Should the surface be too dry for the product application, the painting contractor shall provide the necessary methods to establish the appropriate conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. The Sherwin Williams Company (SW).
2. PPG PAINTS Architectural Coatings (PPG).

2.2 PAINT, GENERAL

- A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.

- C. Colors: As selected by Architect from manufacturer's full range.

1. Exterior Work: A maximum of 4 different colors will be used, with variations for trim, doors, miscellaneous work, and metal work.
2. Interior Work: A maximum of 8 different pigmented colors will be used, with variations for trim, wall surfaces, wainscots, and graphics.
3. Dark Tones: A maximum of 4 dark tones will be used as accent colors for the interior.

- D. Multiple Colors: Each room or space may have walls of more than one color. The right is reserved to vary the color after the first coat.

- E. Color Guarantee: Painting Contractor shall guarantee all in-place paint and stain colors to match colors selected. Obtain copies of standard color charts used, and be certain all in-place paint and stain colors closely match selected colors. Surfaces which fail to pass color inspection shall be repainted at no additional cost to Owner.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. General: All areas listed in the Room Finish Schedule as receiving paint (i.e. walls, ceilings, etc.) shall be inclusive of all non-factory finished surfaces. All costs of preparation, cleaning, protection, priming, finishing, cleaning, etc. shall be included for all surfaces (wall, trim, moldings, frames, etc.) and materials (metal, wood, CMU, plaster, gypsum board, etc.) unless specifically noted otherwise. All work shall be in accordance with these Specifications and instructions in the Contract Documents.
- B. Comply with manufacturer's written instructions and recommendations in "MPI Manual" and "Maintenance & Repainting Manual" as applicable to substrates indicated.
- C. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- D. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
 - 2. Clean existing surfaces of residue and miscellaneous applied finishes to provide a properly prepared surface to receive new finish.
 - 3. Spackle holes, depressions and imperfections on existing gypsum board, concrete and plaster surfaces as recommended by manufacturer to provide a uniform surface to receive new finish.

PAINTING AND FINISHING

- E. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- F. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- G. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- H. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- J. Aluminum Substrates: Remove loose surface oxidation.
- K. Wood Substrates for Painting:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- L. Wood Substrates for Staining and Finishing:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
 - 3. Sand surfaces that will be exposed to view and dust off.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and according to recommendations in "MPI Manual."
 - 1. Materials shall be applied with roller or brush, except that spraying will be permitted for items such as mechanical equipment, grilles, or similar items. Mask off adjoining areas not receiving a spray finish against overspray.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on existing surfaces painted previously or on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

- a. Spot prime where required or provide alternative preparation product as recommended by manufacturer.
- B. Apply stains and finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 1. Use applicators and techniques suited for finish and substrate indicated.
 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. If, in the opinion of the Architect, adequate block filler, primer, paint or coating coverage is not provided, Contractor shall apply additional coats to satisfy Architect, at no additional cost to the Owner.
- D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. Apply paints, stains and finishes to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- F. Paint exposed surfaces whether or not colors are designated in "schedules", except where natural finish of materials is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas. If color or finish is not designated, Architect will select these from standard colors available for materials systems specified.
- G. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint all new and existing mechanical and electrical work where exposed in occupied spaces including, but not limited to:
 - a. Equipment not prefinished.
 - b. Uninsulated metal piping, except chrome finished.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Electrical conduit, boxes, raceways and trays.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Other items as directed by Architect.
 2. Mechanical and electrical items to be painted shall be finished the color(s) of the adjacent surface unless noted otherwise. Any questions regarding the color(s) to be provided shall be submitted to the Architect for clarification.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
 - a. Color: SW 6991 "Black Magic".
- H. Painting Frames: Hollow metal shall be painted different colors on each side of the door (split frames) unless indicated otherwise.

I. Painting Glazed Tile and Masonry Surfaces:

1. Contractor shall mechanically abrade all glazed tile and glazed CMU surfaces to receive painted finish and shall thoroughly clean to remove all dirt, dust, wax, cleaners, and any other contaminants from the tile/CMU and grout/mortar. Allow to dry prior to applying paint system.
2. Prior to application, Contractor and painter shall apply a test sample of the primer (min. area 2' x 2') over properly prepared surface. Contractor, along with paint representative, shall perform an adhesion test to ensure adhesion prior to complete application.
3. Report in writing to the Architect the results of the test before completing the job and provide written confirmation from paint system manufacturer that results are satisfactory. Do not proceed with application of paint until written certification has been accepted by the Architect.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 PAINTING AND FINISHING SCHEDULE

A. Concrete and Masonry Substrates

1. Interior, Latex, Non-Traffic Surfaces: Gloss Level 3
 - a. SW Filler (masonry): PrepRite Block Filler (B25W25)
Primer (concrete): Loxon Masonry Primer
1st coat: ProMar 200 Zero VOC
2nd coat: ProMar 200 Zero VOC

PAINTING AND FINISHING

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|----|-----|-----------------------|--|
| b. | PPG | Filler (masonry): | SPEEDHIDE Hi Fill Latex Block Filler 6-15X1 Series |
| | | Primer (concrete): | SEAL GRIP Acrylic Universal Primer 17-921 Series |
| | | 1 st coat: | SPEEDHIDE Zero 6-5310 Series |
| | | 2 nd coat: | SPEEDHIDE Zero 6-5310 Series |

B. Metal Substrates:

1. Interior, Ferrous Metals, Latex: Gloss Level 5

- | | | | |
|----|-----|-----------------------|---|
| a. | SW | Primer*: | DTM Primer / Finish |
| | | 1 st coat: | DTM Acrylic Finish |
| | | 2 nd coat: | DTM Acrylic Finish |
| b. | PPG | Primer*: | Pitt Tech Plus DTM Industrial Primer 4020 |
| | | 1 st coat: | Pitt Tech Plus EP DTM Acrylic Semi-Gloss 90-1610 Series |
| | | 2 nd coat: | Pitt Tech Plus EP DTM Acrylic Semi-Gloss 90-1610 Series |

*Spot prime where metals are shop coated or primed

2. Interior, Ferrous Metals, Dryfall, Latex: Gloss Level 1

- | | | | |
|----|-----|-----------------------|--|
| a. | SW | Primer*: | Pro-Cryl Universal Primer |
| | | 1 st coat: | Waterborne Acrylic Dryfall |
| | | 2 nd coat: | Waterborne Acrylic Dryfall |
| b. | PPG | Primer*: | Pitt Tech Plus DTM Industrial Primer 4020 |
| | | 1 st coat: | SPEEDHIDE® SUPER TECH® Interior Dry-Fog Flat Latex G-725XI |
| | | 2 nd coat: | SPEEDHIDE® SUPER TECH® Interior Dry-Fog Flat Latex G-725XI |

*Spot prime where metals are shop coated or primed

3. Exterior, Ferrous Metals, Latex Paint Over Alkyd Primer System: Gloss Level 5

- | | | | |
|----|-----|-----------------------|---|
| a. | SW | Primer: | Kem Bond Alkyd Primer |
| | | 1 st coat: | ProIndustrial DTM Acrylic Finish |
| | | 2 nd coat: | ProIndustrial DTM Acrylic Finish |
| b. | PPG | Primer: | Multi-Purpose Tank and Structural Primer 4160 |
| | | 1 st coat: | Pitt Tech Plus EP DTM Acrylic Semi-Gloss 90-1610 Series |
| | | 2 nd coat: | Pitt Tech Plus EP DTM Acrylic Semi-Gloss 90-1610 Series |

4. Non-Ferrous Metals, (Galvanized), Latex: Gloss Level 5

- | | | | |
|----|----|-----------------------|----------------------------------|
| a. | SW | Primer: | DTM Primer / Finish |
| | | 1 st coat: | ProIndustrial DTM Acrylic Finish |
| | | 2 nd coat: | ProIndustrial DTM Acrylic Finish |

PAINTING AND FINISHING

- | | | | |
|----|-----|-----------------------|---|
| b. | PPG | Primer: | Multi-Purpose Tank and Structural Primer 4160 |
| | | 1 st coat: | Pitt Tech Plus EP DTM Acrylic Semi-Gloss 90-1610 Series |
| | | 2 nd coat: | Pitt Tech Plus EP DTM Acrylic Semi-Gloss 90-1610 Series |

C. Wood Substrates:

1. Interior, Latex Paint System: Gloss Level 5

- | | | | |
|----|-----|-----------------------|--|
| a. | SW | Primer: | ProMar 200 Zero VOC Primer |
| | | 1 st coat: | ProMar 200 Zero VOC |
| | | 2 nd coat: | ProMar 200 Zero VOC |
| b. | PPG | Primer: | SEAL GRIP Universal Primer 17-921 Series |
| | | 1 st coat: | SPEEDHIDE Zero 6-5510 |
| | | 2 nd coat: | SPEEDHIDE Zero 6-5510 |

2. Interior, Polyurethane Coating System (Natural): Gloss Level 4

- | | | | |
|----|-----|-----------------------|--|
| a. | SW | Wood Filler: | Wood Filler |
| | | 1 st coat: | MinWax Fast Drying Polyurethane (gloss, semi-gloss or satin) |
| | | 2 nd coat: | MinWax Fast Drying Polyurethane (gloss, semi-gloss or satin) |
| b. | PPG | Wood Filler: | Varathane Wood Filler |
| | | 1 st coat: | Varathane Interior Oil-Based Polyurethane |
| | | 2 nd coat: | Varathane Interior Oil-Based Polyurethane |

3. Interior, Polyurethane Stain Coating System: Gloss Level 4

- | | | | |
|----|-----|-----------------------|--|
| a. | SW | Wood Filler: | Wood Filler |
| | | 1 st coat: | MinWax Performance Series Wood Stain 250 VOC |
| | | 2 nd coat: | MinWax Fast Drying Polyurethane (gloss, semi-gloss or satin) |
| | | 3 rd coat: | MinWax Fast Drying Polyurethane (gloss, semi-gloss or satin) |
| b. | PPG | Wood Filler: | Varathane Wood Filler |
| | | 1 st coat: | Varathane Premium Fast Dry Wood Stain |
| | | 2 nd coat: | Varathane Interior Oil-Based Polyurethane |
| | | 3 rd coat: | Varathane Interior Oil-Based Polyurethane |

D. Gypsum Board and Plaster Substrates:

1. Interior, Latex Paint System: Gloss Level 3

- | | | | |
|----|-----|-----------------------|--------------------------------|
| a. | SW | Primer: | ProMar 200 Zero VOC Primer |
| | | 1 st coat: | ProMar 200 Zero VOC |
| | | 2 nd coat: | ProMar 200 Zero VOC |
| b. | PPG | Primer: | SPEEDHIDE Zero Primer 6-4900XI |
| | | 1 st coat: | SPEEDHIDE Zero 6-5310 Series |
| | | 2 nd coat: | SPEEDHIDE Zero 6-5310 Series |

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END OF SECTION 09 91 00

SECTION 10 11 00 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Markerboards.
 - 2. Tackboards.

1.3 DEFINITIONS

- A. Tackboard: Framed or unframed, tackable, visual display board assembly.
- B. Visual Display Board Assembly: Visual display surface that is factory fabricated into composite panel form, either with or without a perimeter frame; includes chalkboards, markerboards, and tackboards.
- C. Visual Display Surface: Surfaces that are used to convey information visually, including surfaces of chalkboards, markerboards, tackboards, and surfacing materials that are not fabricated into composite panel form but are applied directly to walls.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for visual display surfaces.
 - 1. Include rated capacities, operating characteristics, electrical characteristics and individual panel weights for sliding visual display units.
 - 2. Include computer system requirements for electronic markerboards.
- B. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of panel joints.
 - 2. Include sections of typical trim members.
- C. Samples for Initial Selection: For each type of visual display surface indicated, for units with factory-applied color finishes, and as follows:
 - 1. Actual sections of porcelain-enamel face sheet.
 - 2. Include accessory Samples to verify color selected.
- D. Product Schedule: For visual display surfaces. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Warranties: Sample of special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For visual display surfaces to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of motor-operated, sliding visual display units required for this Project.
- B. Source Limitations: Obtain visual display surfaces from single source from single manufacturer.
- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 Insert value or less.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-built visual display surfaces, including factory-applied trim where indicated, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.
- B. Store visual display surfaces vertically with packing materials between each unit.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display surfaces until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with visual display surfaces by field measurements before fabrication.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.10 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 2. Warranty Period: 50 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Visual Display Units: Subject to compliance with requirements, provide markerboard assemblies and tackboard assemblies accessories and support materials by one of the following manufacturers:
1. Aywon.
 2. Claridge Products.
 3. Platinum Visual Solutions.
 4. PolyVision Corporation.
- B. Porcelain-Enamel Face Sheet: ASTM A 424, enameling-grade steel, uncoated thickness indicated; with exposed face and edges coated with primer, 1.7-to-2.5-mil- thick ground coat, and color cover coat; and with concealed face coated with primer and 1.7-to-2.5-mil- thick ground coat.
1. Gloss-Finish Cover Coat: Gloss as indicated; dry-erase markers wipe clean with dry cloth or standard eraser. Minimum 3.0-to-4.0-mil- thick cover coat. Cover and ground coats shall be fused to steel at manufacturer's standard firing temperatures but not less than 1475 deg F.
 - a. Products: Subject to compliance with requirements, provide the following:
 - 1) PolyVision Corporation, a Steelcase Company; e³ ceramicsteel Markerboard.
- C. Plastic-Impregnated Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.
- D. Hardboard: ANSI A135.4, tempered.
- E. Particleboard: ANSI A208.1, Grade M-1.
- F. Fiberboard: ASTM C 208.
- G. Extruded Aluminum: ASTM B 221, Alloy 6063.

2.2 TACKBOARD ASSEMBLIES

- A. Vinyl-Fabric-Faced Tackboard: 1/4-inch- thick, vinyl-fabric-faced cork sheet factory laminated to 1/4-inch-thick particleboard backing.

2.3 MARKERBOARD AND TACKBOARD ACCESSORIES

- A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- thick, extruded aluminum; 1-inch-1-1/2 inch wide.
- B. Chalktray: Manufacturer's standard, continuous, extended under adjacent tackboards, unless indicated otherwise.
 - 1. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.
- C. Map Rail: Provide the following accessories:
 - 1. Display Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches wide.
 - 2. End Stops: Located at each end of map rail.
 - 3. Map Hooks: Two map hooks for every 48 inches of map rail or fraction thereof.
 - 4. Flag Holder: One for each room.
 - 5. Paper Holder: Extruded aluminum; designed to hold paper by clamping action.

2.4 FABRICATION

- A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.
- B. Visual Display Boards: Factory assemble visual display boards unless otherwise indicated.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.
- C. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.
 - 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
 - 2. Provide manufacturer's standard vertical-joint spline system between abutting sections of markerboards.
 - 3. Provide manufacturer's standard mullion trim at joints between markerboards and tackboards of combination units.
 - 4. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
- D. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of motor-operated, sliding visual display units.
- C. Examine walls and partitions for proper preparation and backing for visual display surfaces.
- D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair the performance of and affect the smooth, finished surfaces of visual display boards, including dirt, mold, and mildew.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.
 - 1. Prime wall surfaces indicated to receive direct-applied, visual display tack wall panels and as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - 2. Prepare substrates indicated to receive visual display wall covering as required by manufacturer's written instructions to achieve a smooth, dry, clean, structurally sound surface that is uniform in color.
 - a. Moisture Content: Maximum of 4 percent when tested with an electronic moisture meter.

VISUAL DISPLAY SURFACES

- b. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer.
- c. Painted Surfaces: Treat areas susceptible to pigment bleeding.

3.3 INSTALLATION, GENERAL

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, review mounting heights with Architect. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

3.4 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY BOARDS AND ASSEMBLIES

- A. Visual Display Boards: Attach visual display boards to wall surfaces with egg-size adhesive gobs at 16 inches o.c., horizontally and vertically.
- B. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.
 - 1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.
 - a. Attach chalktrays to boards with fasteners at not more than 12 inches o.c.

3.5 INSTALLATION OF TACKSTRIPS

- A. Tackstrips: Install rails in locations and at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with fasteners at not more than 16 inches o.c.
 - 1. Mounting Height: As indicated on Drawings.

3.6 CLEANING AND PROTECTION

- A. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display surfaces after installation and cleaning.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated, sliding visual display units.

END OF SECTION 10 11 00

SECTION 10 14 16 - PLAQUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes metal plaques.
- B. Related Requirements:
 - 1. Division 10 Section "Panel Signage" for plaques or signs similar to metal plaques, with or without frames, except that they are made of materials other than solid metal.
 - 2. Division 22 Section "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 3. Division 23 Section "Identification for HVAC Systems" for labels, tags, and nameplates for HVAC systems and equipment.
 - 4. Division 26 Section "Electrical Identification" for labels, tags, and nameplates for electrical equipment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plaques.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show plaque mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show typestyles, graphic elements and layout for each plaque at least half size.
- C. Samples for Initial Selection: For each type of plaque, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For plaques to include in maintenance manuals.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLAQUES

- A. Cast Plaque: Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A.R.K. Ramos.
 - b. Gemini Signage; Gemini, Inc.
 - c. Matthews International Corporation: Bronze Division.
 - d. Metallic Arts.
 - e. Southwell Company (The).
 - 2. Plaque Material: Cast aluminum.
 - 3. Plaque Thickness: 0.25 inch, minimum.
 - 4. Size: 30"x42".
 - 5. Finishes:
 - a. Integral Aluminum Finish: Black or pebble texture.
 - b. Overcoat: Manufacturer's standard baked-on clear coating.
 - 6. Background Texture: Pebble.
 - 7. Integrally Cast Border Style: Double-raised line border.
 - 8. Mounting: Rosette through fasteners.
 - 9. Text and Typeface: Typeface shall be "Times New Roman" and text shall be selected by Architect from manufacturer's full range and variable content.

2.2 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, alloy and temper recommended by plaque manufacturer for casting process used and for type of use and finish indicated.
- B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use rosette anchors to match existing plaques.
 - 2. Plaque Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque unless otherwise indicated.

2.4 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
 - 1. Preassemble plaques in the shop to greatest extent possible. Disassemble plaques only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
 - 6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.5 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that plaque-support surfaces are within tolerances to accommodate plaques without gaps or irregularities between backs of plaques and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
 - 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
- B. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Install wood blocking inside wall sufficient for supporting full weight of plaque.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as plaques are installed.
- C. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 16

SECTION 10 14 23 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Panel signs.
- B. Related Requirements:
 - 1. Division 14 Section "Hydraulic Elevators Rehabilitation" for code-required conveying equipment signage.
 - 2. Division 22 Section "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 3. Division 23 Section "Identification for HVAC Systems" for labels, tags, and nameplates for HVAC systems and equipment.
 - 4. Division 26 Section "Electrical Identification" for labels, tags, and nameplates for electrical equipment.
 - 5. Division 26 Section "Lighting" for illuminated, self-luminous, and photoluminescent exit sign units.

1.3 ALLOWANCES

- A. Work Included in Base Bid: The Contractor shall include in the space provided on the Bid Form, the allowances for work of this section itemized on the Bid Form. The cost of this work shall be computed based upon the scope indicated on the Drawings. The work listed is in addition to that required to complete the work of the Contract and, consequently, the sum therefore may be deducted from the Contract amount if the corresponding work is not required by actual conditions encountered.

1.4 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.5 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Panel Signs: Full-size Sample.
- E. Product Schedule: For panel signs. Use same designations indicated on Drawings or specified.

1.7 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL SIGNS

- A. Panel Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Basis-of-Design Product: Subject to compliance with requirements, Panel Signs incorporated into the project shall be based on products as follows:
 - a. Mohawk Sign Systems, Inc.; "200A Sand Carved" Series.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 1. APCO Graphics, Inc.
 2. ASI Sign Systems, Inc.
 3. Best Sign Systems, Inc.
 4. Bunting Graphics, Inc.
 5. inpro Corporation.
 6. Mohawk Sign Systems.
 7. Nelson-Harkins Industries.
- C. Solid-Sheet Sign: Sandblasted, plastic laminate with contrasting core color as follows:
 1. All signs shall be manufactured by sandblasting sign face to a depth of 1/32-inch for tactile characters and Grade 2 braille. Laminated or applied letters, characters, or braille are not acceptable.
 2. All text shall be accompanied by Grade 2 braille which shall be separated from the corresponding raised characters or symbols to comply with prevailing regulations. Accurate Grade 2 braille translation shall be provided by signage manufacturer.
 3. All text, characters, symbols, etc. shall contrast with their background, either light characters on a dark background or dark characters on a light background. Characters and background shall have a non-glare finish.
 4. Sign panel material shall be melamine plastic laminate, minimum 1/8-inch thick with contrasting core color. Melamine shall be non-static, fire-retardant and self-extinguishing and shall be impervious to acids, alkalis, alcohol, solvents, abrasives and boiling water.
- D. Sign-Panel Perimeter: Finish edges smooth.
 1. Edge Condition: Square cut.
 2. Corner Condition in Elevation: Square.
- E. Mounting: Manufacturer's standard method for substrates indicated with countersunk flathead stainless steel torx fasteners and two-face tape as indicated on drawings.
- F. Text and Typeface: Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color.
 1. Font: Helvetica medium.
- G. Flatness Tolerance: Sign shall remain flat or uniformly curved under installed conditions as indicated on Drawings and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.2 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:
 1. For exterior exposure, furnish stainless-steel devices unless otherwise indicated or located on glass.

2. Exposed Metal-Fastener Components, General:

- a. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant slots.
- B. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

2.3 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
- B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- C. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
 - 1. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function.

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

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

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

- B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.
- C. Mounting Methods:
 - 1. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 - 2. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
- D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23

SECTION 10 14 29 – ILLUMINATED EXTERIOR SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Internally illuminated exterior signs.
- B. Related Requirements:
 - 1. Division 26 Sections for electrical service and connections for illuminated signage.

1.3 DEFINITIONS

- A. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.4 COORDINATION

- A. Furnish templates and tolerance information for placement of sign-anchorage devices embedded in permanent construction by other installers.
- B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signage.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Provide color rendering of signage.
 - 3. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 4. Show graphic elements and layout for each sign at least 1-1/2" = 1'-0".
 - 5. Show locations of electrical service connections.
 - 6. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
- D. Delegated-Design Submittal: For signs indicated in "Performance Requirements" Article.

ILLUMINATED EXTERIOR SIGNAGE

1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Tools: Two set(s) of specialty tools for assembling signs and replacing variable sign components.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of graphic image.
 - c. Separation or delamination of sheet materials and components.
 2. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Division 1 Section "Quality Requirements," to design sign structure and anchorage of illuminated exterior signs according to structural performance requirements.

ILLUMINATED EXTERIOR SIGNAGE

- B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.
 - 1. Uniform Wind Load: As indicated on Drawings.
- C. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 INTERNALLY ILLUMINATED EXTERIOR SIGNS

- A. Internally Illuminated Exterior Sign: Sign with smooth, uniform surfaces and support assembly; with graphics and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by sign fabricator that has produced similar type of internally illuminated exterior signs.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. A.R.K Ramos Signage Systems.
 - b. Green Sign Company, Inc.
 - c. Impact Signs, Inc.
 - 3. Illuminated Sign: Backlighted construction with LED lighting including transformers, insulators, and other accessories for operability, with provision for servicing and concealing connections to building electrical system. Use tight or sealed joint construction to prevent unintentional light leakage. Space lamps apart from each other and away from sign surfaces as needed to illuminate evenly.
 - a. Power: As indicated on electrical Drawings.
 - b. Weeps: Provide weep holes to drain water at lowest part of exterior signs.
 - 4. Solid-Sheet Sign Panels: Acrylic sheet with finish specified in "Sign-Panel-Face Finish and Applied Graphics" Subparagraph and as follows:
 - a. Thickness: 0.125 inch.
 - b. Surface-Applied Graphics: Applied translucent vinyl film to cut out characters and graphics.
 - c. Inset, Cutout Characters: Sign face routed to receive push-through acrylic graphics projecting 1/2-inch from the sign panel.
 - 5. Hollow-Box Sign Frame: Entire perimeter framed with formed-aluminum sheet or extruded-aluminum, hollow-box-type frame with vertical edges attached to supports with aluminum fittings. Close top and bottom edges of panels with manufacturer's standard welded seams.
 - a. Hollow-Box Depth: 2-inch depth preferred. Maximum depth of 3 inches.
 - b. Receiving Shelf: Aluminum, 1/4-inch thick.
 - c. Backing Panel: Aluminum, 1/8-inch thick.
 - d. Frame Reinforcing: Aluminum tube, 1-inch square.
 - e. Finish and Color: As selected by Architect from manufacturer's full range.

2.3 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- C. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated on Drawings and suitable for exterior applications.
- D. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish nonferrous-metal or stainless-steel devices unless otherwise indicated.
 - 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant, Allen-head, spanner-head or one-way-head slots unless otherwise indicated.
 - 4. Inserts: Furnish inserts to be set by other installers into concrete or masonry work.
- B. 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 AC01 or ICC-ES AC193 as appropriate for the substrate.
 - 1. Uses: Securing signs with imposed loads to structure.
 - 2. Type: Torque-controlled, expansion anchor or adhesive anchor.
- C. Power-Actuated Anchors: 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.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Anchoring Materials:
 - 1. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
 - 2. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

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

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in locations concealed from view after final assembly.
 - 2. Mill joints to tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
 - 4. Conceal fasteners and anchors unless indicated to be exposed; locate exposed fasteners where they will be inconspicuous.
 - 5. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs.
- C. Verify that anchorage devices embedded in permanent construction are correctly sized and located to accommodate signs.

ILLUMINATED EXTERIOR SIGNAGE

- D. Verify that electrical service is correctly sized and located to accommodate signs.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using installation methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign components are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 29

SECTION 10 21 13 – PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid plastic-polymer toilet compartments configured as follows:
 - a. Toilet enclosures.
 - b. Entrance screens.
 - c. Urinal screens.
- B. Related Sections:
 - 1. Division 06 Section "Rough Carpentry" for wood blocking to anchor partition supports.
 - 2. Division 10 Section "Toilet Accessories" for toilet tissue dispensers, grab bars, and similar accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of centerlines of toilet fixtures.
- C. Samples for Initial Selection: Actual material samples for each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for units, prepared on 6-inch-square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Samples of special warranties.

PLASTIC TOILET COMPARTMENTS

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 WARRANTY

- A. Installer Warranty: Installer agrees to repair or replace components of plastic toilet compartments that have failed, have become loose or do not operate properly within the specified warranty period.

- 1. Warranty Period: Three years from date of substantial completion.

- B. Manufacturer's Warranty: Manufacturer agrees to replace components that have failed in accordance with the manufacturer's published warranty for the Owner to install.

- 1. Warranty Period: Fifteen years from date of shipping.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

- B. Coordination: Furnish inserts and anchorages which must be built into other work for installation of toilet compartments and related items. Coordinate delivery with other work to avoid delay.

- 1. Provide locations for wood blocking to be installed per manufacturer's requirements.

PART 2 - PRODUCTS

2.1 SOLID PLASTIC TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. ASI Global Partitions, Inc.
 - 2. Bobrick Washroom Equipment.
 - 3. Bradley Corporation; Mills Partitions.
 - 4. General Partitions Mfg. Corp,
 - 5. Scranton Products.

- B. Toilet-Enclosure Style: Floor anchored.

- C. Entrance-Screen Style: Floor anchored.

- D. Urinal-Screen Style: Floor anchored.

- E. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

- 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - 2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.

PLASTIC TOILET COMPARTMENTS

3. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.
- F. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- G. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.
- H. Brackets (Fittings):
 1. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum.

2.2 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, operating hardware and accessories.
 1. Material: Clear-anodized aluminum.
 2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees. Provide gravity type, spring-action cam type, or concealed torsion rod type to suit manufacturer's standards.
 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors and entrance-screen doors.
 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.3 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Stainless-Steel Castings: ASTM A 743/A 743M.

2.4 FABRICATION

- A. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

PLASTIC TOILET COMPARTMENTS

- B. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.
- C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Confirm blocking is installed where required by manufacturer. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10 21 13

SECTION 10 26 13 – CORNER GUARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Corner guards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
 - 1. Corner Guards: 12 inches long. Include example top caps.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of corner guard product to include in maintenance manuals.
 - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 84-inch- long units.

2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store corner guards in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 2. Keep plastic materials out of direct sunlight.
 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
 - a. Store corner-guard covers in a vertical position.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
 - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall- and door-protection products from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 450 or less.

2.3 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

1. Basis of Design: Subject to compliance with requirements, Corner Guards incorporated into the project shall be based on products as follows:
 - a. IPC Door and Wall Protection Systems; Division of InPro Corporation; "Surface-Mount Corner Guard Model 160."
2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product and are in compliance with the requirements of this section.
 - a. Construction Specialties, Inc.
 - b. Korogard Wall Protection Systems; a Division of RJF International Corporation.
3. Cover: Extruded rigid plastic, minimum 0.078-inch wall thickness; as follows:
 - a. Profile: Nominal 2-inch-long leg and 1/4-inch corner radius.
 - b. Height: 8 feet.
 - c. Color and Texture: As selected by Architect from manufacturer's full range.
4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
5. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.4 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.

2.5 FABRICATION

- A. Fabricate corner guards according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

2.6 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine walls to which corner guards will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing corner guards.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install corner guards according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install corner guards in locations and at mounting heights indicated on Drawings.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
 - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
 - 2. Adjust end and top caps as required to ensure tight seams.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.

END OF SECTION 10 26 13

SECTION 10 26 23 – ABUSE-RESISTANT WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Abuse-resistant wall panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For each type of abuse-resistant wall panels showing locations and extent.
 - 1. Include plans, elevations, sections, and attachment details.
- C. Samples for Initial Selection: For abuse-resistant wall panels indicated, in each color and texture specified.
 - 1. Include Samples of accent strips and accessories to verify color selection.
- D. Samples for Verification: For each type of exposed finish prepared on Samples of size indicated below:
 - 1. Abuse-Resistant Wall Panels: 6 by 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of abuse-resistant wall panel product to include in maintenance manuals.
 - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

ABUSE-RESISTANT WALL PANELS

1.6 PRE-INSTALLATION MEETINGS

- A. Pre-Installation Conference: Conduct conference at project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store abuse-resistant wall panels in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 - 2. Keep plastic materials out of direct sunlight.
 - 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
 - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain abuse-resistant wall panel products from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.3 ABUSE-RESISTANT WALL PANELS

- A. Abuse-Resistant Sheet Wall Panels: Fabricated from semirigid, plastic sheet wall-covering material.

ABUSE-RESISTANT WALL PANELS

1. Basis of Design: Subject to compliance with requirements, Abuse-Resistant Wall Panels incorporated into the project shall be based on systems as follows:
 - a. InPro Corporation; "Palladium" panels and 3D Trim.
2. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product.
 - a. Construction Specialties, Inc.
3. Size: As indicated.
4. Sheet Thickness: 0.060 inch.
5. Color and Texture: As selected by Architect from manufacturer's full range.
6. Height: Wainscot as indicated on Drawings.
7. Trim and Joint Moldings: Laminated rigid plastic of varying depths of 3/8-inch, 1/2-inch and 5/8-inch, that matches or complements wall covering color.
8. Mounting: Adhesive.

2.4 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Adhesive: As recommended by protection product manufacturer.

2.5 FABRICATION

- A. Fabricate abuse-resistant wall panels according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.6 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

ABUSE-RESISTANT WALL PANELS

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

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing abuse-resistant wall panels.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install abuse-resistant wall panels according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Accessories: Provide trim, joint moldings, and other accessories required for a complete installation.
- C. Abuse-Resistant Wall Panels: Install top and edge moldings, corners, and divider bars as required for a complete installation.
- D. Door-Frame Protectors: Install on both door jams.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 10 26 23

SECTION 10 28 00 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Washroom and shower room accessories.
- B. Owner-Furnished Material: Paper towel dispensers, toilet tissue dispensers, and soap dispensers.
- C. Related Sections:
 - 1. Division 22 Section "Plumbing Fixtures."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation that are specified for this job.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.7 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.8 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 TOILET ROOM AND SHOWER ROOM ACCESSORIES

- A. Basis-of-Design: Subject to compliance with requirements, Toilet Room and Shower Accessories incorporated into the project shall be based on products as follows:
 - 1. Bradley Corporation.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:
 - 1. AJW Architectural Products.
 - 2. ASI American Specialties, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
- C. Accessories: As indicated on the Drawings.

2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.
- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Frame Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:
 - 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 system for mounting mirror units that will permit rigid, tamperproof, and theft-proof 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.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories and Owner-supplied accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a concentrated load of at least 250 lbf in any direction and at any point, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 00

SECTION 10 51 13 - METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Knocked-down lockers.

- B. Related Sections:

- 1. Division 06 Section "Rough Carpentry" for wood blocking for mounting items requiring anchorage.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of metal locker.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.

- B. Shop Drawings: For metal lockers.

- 1. Include plans, elevations, sections, details, and attachments to other work specific to the project.
 - 2. Show locker trim and accessories.
 - 3. Include locker identification system and numbering sequence.

- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.

- D. Samples for Verification: For the following products, in manufacturer's standard size:

- 1. Lockers and equipment.
 - 2. Locker benches.

- E. Product Schedule: For lockers. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.7 FIELD CONDITIONS

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

1.8 COORDINATION

- A. Coordinate sizes and locations of concrete and concrete masonry bases for metal lockers.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal lockers, locker benches, and accessories from single source from single locker manufacturer.
 - 1. Obtain locks from single lock manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

2.3 KNOCKED-DOWN LOCKERS

- A. Basis-of-Design: Subject to compliance with requirements, Knocked-Down Lockers incorporated into the project shall be based on products/systems as manufactured by:
 - 1. Republic Storage Systems, LLC; "Quiet Locker" Series.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product and are in compliance with the requirements of this section:

1. List Industries.
 2. Lyon, LLC.
 3. Penco Products, Inc.
 4. Art Metal Products.
- C. Doors: One piece; fabricated from 0.060-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 2. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch nominal-thickness steel sheet; welded to inner face of doors.
 3. Door Style: Vented panel as follows:
 - a. Louvered Vents: No fewer than six louver openings at top and bottom for single-tier and three louver openings at top and bottom for double-tier.
- D. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch nominal thickness, with single bend at sides.
 2. Backs and Sides: 0.024-inch nominal thickness, with full-height, double-flanged connections.
 3. Shelves: 0.024-inch nominal thickness, with double bend at front and single bend at sides and back.
 4. Exposed Ends: Form exposed ends of non-recessed lockers at minimum 0.060 inch steel.
- E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
 2. Frame Vents: Fabricate face frames with vents.
- F. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.
- G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.105-inch nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.

METAL LOCKERS

- b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- H. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high. Number lockers in sequence as directed by Owner. Attach plates to each locker door, near top, centered, with at least two fasteners of same finish as number plate.
- I. Hooks: Manufacturer's standard ball-pointed type hooks, aluminum or steel; zinc plated.
- J. Continuous Sloping Tops: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch nominal-thickness steel sheet.
 - 1. Closures: Vertical-end type.
 - 2. Sloping-top corner fillers, mitered.
- K. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
- L. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
- M. Boxed End Panels: Fabricated from 0.060-inch nominal-thickness steel sheet.
- N. Center Dividers: Fabricated from 0.024-inch nominal-thickness steel sheet.
- O. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - 2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with A60 zinc-iron, alloy (galvannealed) coating designation.
- P. Finish: Baked enamel.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.4 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.
- C. Equipment: Provide each locker with an identification plate and the following equipment:
 - 1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.

METAL LOCKERS

- D. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for nominal assembly at Project site.
- E. Accessible Lockers: Fabricate as follows:
 - 1. Locate bottom shelf no lower than 15 inches above the floor.
 - 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
- F. Continuous Base: Formed into channel or zee profile for stiffness, and fabricated in lengths as long as practical to enclose base and base ends of metal lockers; finished to match lockers.
- G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
 - 1. Sloping-top corner fillers, mitered.
- H. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.
- I. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- J. Boxed End Panels: Fabricated with 1-inch- wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.
- K. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- L. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.5 ACCESSORIES

- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install lockers level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers and to floor.
- B. Knocked-Down Lockers: Assemble with standard fasteners, with no exposed fasteners on door faces or face frames.
- C. Equipment:
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
 - b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.
- D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach recess trim to recessed metal lockers with concealed clips.
 - 2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
 - 3. Attach sloping-top units to metal lockers, with closures at exposed ends.
 - 4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
 - 5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

3.3 METAL LOCKER SCHEDULE

- A. Metal Locker:
 - 1. Type: Knocked down lockers.
 - 2. Size: 12-inches wide; 18-inches deep, 6-feet-0-inches high.
 - 3. Tiers: Single.

3.4 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

3.5 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

METAL LOCKERS

- B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 51 13

SECTION 11 40 00 – FOOD SERVICE EQUIPMENT

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. Provide all material, labor, equipment and services required to execute and complete all items of work relating to the food service equipment, both existing and new, all as required to make the resulting facility a fully functional and reliable operating unit in accordance with this Specification. All food service equipment shall be furnished as specified, delivered prepaid, unloaded and uncrated, assembled with all components and accessories connected within the equipment, set-in-place in proper location as indicated on the drawings, leveled and fastened to the wall, ceiling or floor as required, left ready for final utility connections. The work shall include:
 - 1. To prevent extended warehousing of all food service equipment, no pre-ordering of equipment is permitted; schedule ordering of the equipment so that warehousing of the equipment shall not be required for longer than 60 days prior to delivery to the site for installation.
 - 2. All food service equipment shall have a manufacturer extended warranty covering parts and labor for a period of two years which shall take effect only after acceptance and beneficial use by the District. All labor shall be performed by a factory authorized and qualified representative.
 - 3. A "complete and thorough" demonstration and start-up for each item of equipment must be conducted by a qualified manufacturer representative in the use, sanitation and maintenance of the equipment.
- B. Furnishing scheduled items of custom fabricated food service equipment as specified utilizing a food service equipment fabricator listed with the National Sanitation Foundation (NSF) for custom equipment fabrication.
- C. Delivery of food service equipment in factory fabricated containers designed to protect equipment and finish until final installation. Delivery of food service equipment shall be coordinated with the construction schedule. If necessary, delivery of the food service equipment shall be by means other than common carrier to expedite delivery and to maintain project schedule.
- D. Warehousing of the food service equipment in a bonded warehouse and re-delivery of the food service equipment from the storage facility to the project site or arrangement for secured storage at the project site to assure availability of the food service equipment to maintain project schedule.
- E. Field installation of the food service equipment including buy out equipment at the project site including on site receiving and unloading, uncrating from packing containers, conveyance of the food service equipment from the receiving area to the installation location, erection and assembly of the food service equipment including field welding and polishing of sub assemblies and installation of fixtures and components and setting in place in final location.

FOOD SERVICE EQUIPMENT

- F. Removal and disposal of discontinued items of food service equipment not to be reused including costs for transport and scrapping. This shall include pump-down and reclaim of refrigerant and fire system propellant and disposal costs of all refrigeration systems as required. Utility disconnection and termination of utility services shall be provided by the Plumbing, Electrical and Mechanical (HVAC) Trades.
- G. Removal and disposal of discontinued items of food service equipment not to be reused including costs for transport and scrapping. This shall include pump-down and reclaim of refrigerant and disposal costs of all refrigeration systems as required. Utility disconnection and termination of utility services shall be provided by the Plumbing, Electrical and Mechanical (HVAC) Trades.
- H. Removal, cleaning, servicing, reassemble and reinstallation of items of food service equipment to be reused including warehousing and transportation costs for scheduled items of food service equipment to be refurbished off-site or to be temporarily stored off-site. This shall include pump-down and reclaim of refrigerant and disposal costs of all refrigeration systems as required. Utility disconnection and termination of discontinued services and modification or preparation or relocated utility services shall be provided by the Plumbing, Electrical and Mechanical (HVAC) Trades.
- I. Removal, cleaning, servicing, crating and delivery including costs for transport of items of food service equipment to be reused in an alternate location. This shall include pump-down and reclaim of refrigerant and disposal costs of all refrigeration systems as required. Utility disconnection and termination of utility services shall be provided by the Plumbing, Electrical and Mechanical (HVAC) Trades.
- J. Removal and disposal of all packing material.
- K. All costs for special tools, crane rental or usage cost or rigging as may be required for delivery or installation of the food service equipment.
- L. All work is to be performed by skilled labor utilizing the proper Trades having respective jurisdiction thereto. All work shall be performed at hours required to maintain consistent work schedules with all other Trades without additional cost.
- M. Preparation of dimensioned utility rough-in floor plans coordinated with the Contract Documents and site conditions and the food service equipment manufacturers' utility connection points for all food service equipment.
- N. Assist in the preparation of "chalk-line" mark-up of utility rough-in locations on the building floor at the job site.
- O. Take complete financial responsibility for any and all additional expenses resulting from incomplete or inaccurate rough-in drawings or instructions for the final rough-in dimensioning at the job site.
- P. Provide complete manufacturers' and fabricator shop drawings of all related items of food service equipment.
- Q. Provide competent on site supervision for the coordination of work and to assist and supervise the erection, assembly and installation of the food service equipment, this shall include any moving, shifting or disassembly of the food service equipment to enable work to be performed free of obstruction.
- R. Attend all job conferences and meetings.
- S. Maintaining coordination and control over the form, fit, function and utility requirements of all food service equipment, from placement of purchase orders through Final Acceptance.

- T. Provide competent on-site final testing, demonstration and instruction in the use and service of all items of food service equipment in the form of a qualified manufacturer's representative for each item of food service equipment.
- U. Providing access to the custom equipment fabricator's shop for inspection of construction and materials used at any time during the progress of fabrication.
- V. Field verification of all measurements at the project site prior to the fabrication of custom fabricated and buy-out equipment and correct any deviation from the dimensions indicated on any plans and shop drawing which may affect the final form or fit of any item of food service equipment as a result of final building conditions and actual field dimensions.
- W. All food service equipment shall conform to field verified dimensions and to the finished building conditions with edges scribed and sealed to wall surfaces, fitting to and around building obstructions. All joints, seams or surfaces shall be fully sealed with General Electric or equivalent clear silicone sealer.
- X. Field verification of delivery access into and through the building to the final equipment location including access and clearance through hallways, doorways and elevators (cab size and weight restrictions); furnish food service equipment in sections or sub-assemblies as required for access.
- Y. Keeping the premise free from accumulation of waste material and rubbish caused by his work. At the completion of each workday all waste material and rubbish must be removed and all areas swept broom clean.
- Z. Physical damage to equipment, building or previous work completed or in the process of completion shall be repaired or replaced.
- AA. Furnish as part of and affixed to the food service equipment, accessories, components and fixtures furnished standard with the equipment as specified or listed as an option and shall include the following:
 - 1. PLUMBING ACCESSORIES: Pop-up, lever or basket type waste outlets, tailpieces, standing or connected overflows, faucets and spray units, vacuum breakers, shut-off and control valves and fittings.
 - 2. STEAM AND GAS ACCESSORIES: Steam supply valves, thermostats, pressure reducing and regulating valves, shut-off and control valves, temperature and pressure gauges, copper steam coils or injector assemblies, traps and fittings
 - 3. ELECTRICAL ACCESSORIES: Terminal blocks, conduit, wiring, signal and pilot lamps, on-off and control switches, control panels, magnetic contactor assemblies, heating elements, junction boxes, outlet boxes and receptacles and cord and plug sets.
 - 4. REFRIGERATION ACCESSORIES: Copper insulated refrigeration tubing, valves, fittings, hangers, high and low pressure control switches, solenoid valves, evaporator coils, expansion valves, condensing units and condensate evaporators.
- BB. All built-in accessories, components and fixtures shall be factory installed at the time of fabrication and shall comply with all applicable codes and regulations.
- CC. Furnish and install copper insulated refrigeration lines from compressor location to evaporator coils and expansion valves for all refrigeration units and ice makers with remote or refrigeration systems other than self-contained.
- DD. Furnish and install flexible stainless steel gas flue tubing from exhaust collar on gas hot water booster heater terminating at the exhaust vent connection at the vent extension or condensate hood.
- EE. Furnish 14 gauge galvanized steel welded roof curbs for all refrigeration condensing unit stands and exhaust fans and supply fan make-up air units including setting-in-place and securing to the building roof.

- FF. Furnish and install in exhaust hood, plenum, duct and surface fire protection system. Entire system shall be furnished and installed in compliance with UL Standard 1254, UL Standard 300, NFPA 96 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17A-27. The manufacturer of the fire suppression system shall be ISO 9001 registered. The entire installation must conform to ADA (American Disabilities Act) latest edition. The system shall be an automatic fire suppression system using a wet chemical agent for grease related fires. The system shall be the pre-engineered type having minimum and maximum guidelines established by the manufacturer and listed by Underwriters Laboratories (UL). The system shall be installed and serviced by certified personnel trained by the manufacturer. Provide as part of fire system, mechanically operated gas supply line shut-off valve to interrupt gas supply to all gas operated cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.
- GG. Furnish and install remote and self-contained refrigeration system complete with Copeland condensing unit and insulated copper refrigeration lines charged with R404A refrigerant. Condensing unit shall be interconnected to a low profile, high velocity evaporator coil. Refrigeration system shall include all fittings, valves, switches, controls and all related components to comprise a complete operating unit of sufficient BTU capacity to maintain automatic operation of 35 degree F product temperature in coolers and -10 degree F product temperature in freezers. Refrigeration system provided with outdoor remote air cooled condensing unit shall be provided with winterized controls (low ambient package) including crankcase heater, line dryers and head pressure control unless specified as part of a pre-assembled refrigeration rack system. Refrigeration lines to be run within any slab or floor shall be either hard copper or soft copper if run within conduit.
- HH. All electrical wiring, plumbing lines, gas lines (except exposed threaded pipe gas manifolds at cooking appliances), steam lines and refrigeration lines shall be concealed in the floor, walls or above the finished ceiling in an acceptable manner and in compliance with all applicable codes. Where it is impractical to run lines within the floor, walls or above the finished ceiling, lines shall be enclosed in a stainless steel (or alternate "smooth and cleanable" approved material) with appropriate access for service or replacement. In situations of an island arrangement or where equipment is not situated with access to a wall surface, lines must be installed in the floor in an approved manner including in-ground conduit for refrigeration and beverage lines. In no case shall any lines be "exposed".
- II. Furnish materials and install all interconnecting wiring as required for the food service equipment, except for exhaust ventilation and fire suppression systems. This shall include inter-wiring of control panels furnished as a part of a fixture or appliance, on-off switches for light fixtures furnished as a part of a fixture or appliance, inter-wiring of control devices to motors furnished as a part of a fixture or appliance, time clock circuits for freezers from remote condensing unit to evaporator coil, heated pressure relief ports in walk-in freezer, electrical receptacles furnished as a part of a fixture or appliance, light fixtures in exhaust hoods and walk-in refrigeration to on-off switches and conduit junction boxes, ceiling mounted heat lamps to remote wall switch and inter-wiring of food waste disposer from control device to disposer motor as required to complete the installation of the food service equipment.
- JJ. Furnish materials and install heat tracing tape to all condensate lines within walk-in freezer; insulate entire heat tracing tape with foam pipe insulation.
- KK. Furnish materials and install all interconnecting plumbing as required for the food service equipment, except for exhaust ventilation and fire suppression systems. This shall include faucets, drains, drains with connected overflow, shut-off valves, vacuum breakers, flow or pressure control valves, gauges, bleeder tubes, piping from disposer control device to disposer cone and disposer body inlets and piping for steam operated equipment from boiler take-off valve at steam generator to steam inlet connection at appliance as required to complete the installation of the food service equipment.
- LL. Furnish materials and install insulated copper interconnecting piping between the dishmachine and the hot water booster heater, this shall include the installation of pressure and temperature gauges, strainer and shock absorber in the hot water supply line to the booster heater.

- MM. Furnish materials and install insulated copper interconnecting piping between the dishmachine and the hot water booster heater, this shall include the installation of pressure and temperature gauges, strainer and shock absorber in the hot water supply line to the booster heater.
- NN. Furnish and install water filter assemblies, sized and of the proper type to accommodate the water flow rate and "particulate" requirement of the food service equipment; this shall include all combi and bake ovens, steam cookers, proofing cabinets, ice makers, coffee brewing equipment and soda and beverage dispensing equipment.
- OO. Furnish and install copper condensate lines in walk-in refrigeration from evaporator coil to waste receptor.
- PP. Furnish and install gas supply shut-off valve at each gas manifold connection and furnish and install flexible gas hose connectors to each shut-off valve and to each cooking appliance.
- QQ. Furnish materials and install interconnecting chrome plated exposed piping for hose reel and hose bibs including installation of check valves and vacuum breaker in supply line; this shall include chrome plated bleeder outlet if required by local health department regulations or local plumbing codes.

1.3 WORK BY THE ELECTRICAL TRADE

- A. Rough-in utility connections including proper voltage, phase and amperage required to satisfactorily operate all items of food service equipment.
- B. Final connection of the food service equipment from the rough-in location to the connection point on all food service equipment and necessary connection points.
- C. All electrical components for the exhaust and supply ventilation system (including condensate hoods and pant leg vent systems) including, electrical disconnects, starters, exhaust fan on-off switch with indicator lights located in kitchen and supply fan controller with indicator lights located in kitchen and dishroom.
- D. Furnishing and installation of all accessories, components and fixtures other than those specified as part of the food service equipment, to include but not be limited to, electrical circuit breakers or fuses, electrical receptacles, disconnect switches, on-off switches or other fittings and appurtenances that are required to connect the food service equipment in accordance with manufacturer's instructions and result in proper operation.
- E. Utility disconnection and termination of discontinued services of existing food service equipment to be terminated.
- F. Furnishing and installing electrical plug and cord sets where not furnished as part of the appliance.
- G. Electrical contractors or shunt-trip circuit breakers to interrupt electrical power to all electrically operated food service cooking appliances.
- H. In-floor, flush mounted, waterproof electrical receptacles of type and capacity to match plug and cord sets for all mobile food service counter equipment.
- I. Ceiling mounted, retractable drop cords to accommodate food service equipment in an island arrangement, of the type and capacity to match plug and cord sets of the food service appliances.

FOOD SERVICE EQUIPMENT

- J. Furnishing materials and installation of all interconnecting wiring as required for the food service exhaust ventilation and fire suppression systems; this shall include wiring of electrically operated gas supply shut-off valves for fire suppression systems, fire suppression system wiring to building fire alarm, heat detector electrical detection device to automatically start supply and exhaust fans and exhaust hood light fixtures to remote wall switch.

1.4 WORK BY THE PLUMBING TRADE

- A. Rough-in utility connections including gas, steam, hot and cold water and floor receptors and drains in proper sizes, pressures and quantities required to satisfactorily operate all items of food service equipment.
- B. Final connection of the food service equipment from the rough-in location to the connection point on all food service equipment and necessary outlets.
- C. Furnishing and installation of all accessories, components and fixtures other than those specified as part of the food service equipment, to include but not be limited to stop cocks, traps, pipe, shut-off valves, pressure reducing valves or other fittings and appurtenances that are required to connect the food service equipment in accordance with manufacturer's instructions and result in proper operation.
- D. Furnishing and installing chrome plated indirect waste outlet piping for food service equipment, from the waste outlet connection on the food service equipment to the building waste receptacle (floor sink, etc.).
- E. Flushing and sanitizing of lines before making final connections to the food service equipment.
- F. Grease interceptors for food service equipment in capacity and size as required by code.
- G. Furnish and install exposed threaded gas manifold piping for all cooking appliances and welded in-wall gas manifold piping.
- H. Install gas shut-off valve supplied as part of the fire suppression system in the gas supply line in an exposed and accessible location.

1.5 WORK BY THE MECHANICAL TRADE

- A. Supply and exhaust ventilation for indoor refrigeration condensing units based on 750 cfm for each air cooled compressor horsepower and 250 cfm for each water cooled compressor horsepower.
- B. Exhaust ventilation for condensate applications including fully welded 18 gauge stainless steel or 12 gauge aluminum liquid tight ductwork pitched toward source to prevent leaking, fan and start-stop switch with indicator lights located in the dishroom.
- C. Exhaust hood exhaust ventilation system including roof top mounted "utility set" type up-blast centrifugal fan with backward incline wheel, adjustable sheaves, vibration mounts and bird screen at discharge end; fan shall be rated at 14 sones or less and shall be UL 710 listed; roof curb, exhaust ductwork constructed of a minimum 16 gauge galvanized steel or 18 gauge stainless steel, fully welded liquid tight with clean-outs at every major bend and in 20 foot intervals; ductwork shall not exceed a three to one aspect ratio, connection to exhaust fan shall include a UL listed and rated vibration eliminator and ductwork shall be insulated with all prevailing codes.

- D. Exhaust hood supply ventilation system including roof top mounted UL listed supply fan with vibration mounts, adjustable sheaves, roof curb, bird screen at intake end, maintainable filtration system, and gas or electric heated supply air heater (supply air heater heat incoming supply air below a 65 degree F ambient temperature) and 22 gauge galvanized steel ductwork.
- E. Disconnection and termination of discontinued ductwork of existing exhaust or condensate hoods to be terminated or relocated, and modification or preparation of exhaust system for existing exhaust or condensate hoods to be relocated at the new location.

1.6 WORK BY THE CONSTRUCTION TRADE

- A. Masonry bases, floor curbs, structural pads, floor depressions, roof curbs, flues and fireproof duct shafts or enclosures.
- B. Conduit for beverage lines (PVC if embedded in concrete or smooth aluminum if exposed) with 24" radius sweep bends and 24" x 24" pull boxes every 100 lineal feet or three turns including sleeves any through walls, floors and ceilings.
- C. Sleeves and openings through wall, floors and ceilings for passage of refrigeration lines.
- D. Wall blocking or reinforcing to adequately support wall mounted food service equipment or fixtures; provide 3/4" thick exterior grade plywood backing for wood stud applications and 16 gauge steel backing for metal stud applications.
- E. Stainless steel or FPR wall paneling behind all mop receptors, dishtables and pot / utensil washing sinks.
- F. Installation of floor pans in floor depression with floor pans set flush and finished watertight around entire perimeter at juncture with floor surface.
- G. Conduit for refrigeration lines (PVC if embedded in concrete or smooth aluminum if exposed) with 24" radius sweep bends including sleeves any through walls, floors and ceiling.

1.7 WORK BY THE ROOFING TRADE

- A. Roof penetrations properly sealed and flashed to prevent water penetration.

1.8 BIDDING INSTRUCTIONS AND QUALIFICATION OF BIDDER

- A. The primary items of food service equipment described in this specification are considered the basis of the bid. Only "equal" items listed as part of this specification will be considered and must meet the conditions of the base bid item; this shall include all materials and material finishes, fabrication methods, electrical, plumbing, and mechanical components, electrical control devices, hardware, accessories and options, exactly as specified without exception. It will be the full and complete responsibility of the Food Service Equipment Contractor to pay any and all costs incurred in adapting any other "equal" item to the mechanical, electrical, exhaust ventilation or structural systems of the building including any other cost increase incurred as a result of engineering changes to the mechanical, electrical, exhaust ventilation, architectural, structural or food service drawings. The contract is to be awarded as follows:

- 1. The competence and responsibility of the bidder.

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2. An itemized cost breakdown of each scheduled item of food service equipment is required, as specified, in order that the District may, at his option, delete any item or supply any portion thereof, or increase the quantity of any item without affecting the cost quoted for the remaining items. "Pre-approved" substituted items must be submitted as an add or deduct alternate in addition to the base bid.
 3. The District is not obligated to accept the lowest or any other bid. The award of the contract and choice of the food service equipment Contractor shall be at the District's discretion.
- B. Each bidder shall be responsible to visit the project site of the proposed work and fully acquaint himself with conditions as they exist.
- C. Each bidder is responsible to attend any pre-bid meeting as required by the District.
- D. Each bidder shall be responsible to examine and review the contract document drawings and specifications. Should the bidder find during examination of the drawings and specifications any discrepancies, omissions, ambiguities, or conflicts in or among the contract documents or shall be in doubt as to their meaning, the District shall be notified no later than four working days prior to bid opening for clarification.
- E. The failure or omission by any bidder to receive or examine any form, instrument or document or to visit the project site shall in no way relieve him from obligation with respect to his bid. No claims for any extras will be allowed due to unintentional errors, conflicts, or omissions in the contract documents drawings or specifications.

1.9 SUBMITTALS

- A. Product Data: For each buy-out item of food service equipment indicated. Include manufacturer's model number and accessories and requirements for access and maintenance clearances, water and drainage, power or fuel and service connections including roughing-in dimensions
- B. Shop Drawings: For food service equipment not manufactured as standard production and catalog items by manufacturers. Shop drawings shall include the following information:
1. Dimensioned rough-in plans scaled at 1/4"=1'-0" accurately locating connection points and indicating utility data for all mechanical, electrical and supply and exhaust ventilation requirements.
 2. Dimensioned plans scaled at 1/2"=1'-0" accurately locating and indicating the finished size of masonry bases, floor depressions in structural slabs, stub walls, curbs and finished openings for pass-thru equipment.
 3. Dimensioned plans scaled at 1/4"=1'-0" accurately locating conduit and pull boxes for beverage and refrigeration lines including floor, wall and ceiling penetrations and termination points.
 4. Dimensioned plans and detailed drawings of all custom fabricated food service equipment scaled at 3/4"=1'-0" for plan and elevation views and 1-1/2"=1'-0" for sectional views.
- C. Copies of original maintenance and repair manuals including a list of all authorized service agencies responsible for each item of food service equipment.

1.10 QUALITY ASSURANCE

- A. Manufacturer's qualifications shall include a firm that has regularly engaged in the manufacturing of food service equipment of the same type, capacity, performance and size as specified and whose products have been in similar service for not less than five years.

- B. Custom fabricator qualifications for custom food service equipment shall include a skilled sheet metal shop with a minimum of five years' experience in custom sheet metal food service equipment fabrication of similar type as specified. All custom food service equipment shall be fabricated at the same shop.
- C. Installer's qualifications shall include a firm with at least three years of successful installation experience on projects with a similar scope to that as required for this project.
- D. Food service equipment dealers' qualifications shall include a firm which is regularly engaged in the purchasing of food service equipment as is a manufacturer authorized agent of the specified equipment for not less than five years. The dealer shall also employ a full time project management staff to oversee the purchase of the equipment in compliance with the specifications, coordinate the form and fit of the equipment to the project site conditions, attend all project meetings, coordinate shop drawing review, coordinate installation with the Trades, coordinate factory training and address all issues as they relate to the satisfactory completion of the facility in compliance with the specifications and related documentation.
- E. Codes and Standards: All food service equipment furnished and installed under this specification shall be manufactured in strict compliance with the following publications or the current or revised related publication as well as all state, national and local codes and agencies having jurisdiction over same:
 - 1. National Electrical Manufacturer Association NEMA
 - a. ICS-77 Industrial Controls and Systems
 - 2. National Electrical Manufacturer Association NEMA
 - a. ICS-77 Industrial Controls and Systems
 - b. 17.4 Local Application System
 - c. 17.13 Water Sprinkler Systems
 - d. 96-76 Installation of Equipment for the Removal of Smoke and Grease Laden Vapors for Commercial Cooking Equipment
 - 3. National Sanitation Foundation NSF
 - a. 11 76 Food Service Equipment
 - b. 4 73 Commercial Cooking and Warming Equipment
 - c. C-2-72 Special Equipment and/or Devices
 - 4. National Electrical Manufacturer Association NEMA
 - a. 57-78 Electric Lighting Fixtures
 - b. 197-78 Commercial Electric Cooking Appliances
 - c. 300 Fire Extinguishing Systems
- F. All food service equipment shall be manufactured in strict compliance with standards as set forth by the National Sanitation Foundation (NSF) including fabrication of custom built equipment and shall be listed with same and shall bear their seal. Any item of food service equipment lacking the NSF seal will be rejected.
- G. All electrically operated food service equipment shall be constructed in strict compliance with standards as set forth by the Underwriters Laboratories (UL) and shall utilize approved components and assemblies and shall bear the label thereof.
- H. Custom fabricated food service equipment shall be constructed to the standards as set forth by the National Association of Food Equipment Manufacturers (NAFEM).

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- I. All refrigeration equipment and all pressurized vessels shall be constructed, approved, inspected, registered and stamped and installed in strict compliance with the American Society of Mechanical Engineers (ASME), state and local codes for Unfired Pressure Vessels and all other agencies having jurisdiction thereof.
- J. All gas operated food service equipment shall be fabricated in strict compliance with standards as set forth by the Underwriter Laboratory (UL) and shall be listed with same and shall bear their seal.
- K. Steam operated equipment shall be fabricated and installed in accordance with Pennsylvania Department of Labor and Industry standards.
- L. Product Options: Drawings indicate food service equipment based on the specific products indicated. Other manufacturers' equipment with equivalent size and performance characteristics may be considered.
- M. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Review methods and procedures related to food service equipment including, but not limited to the following:
 - 1. Review access requirements for equipment delivery.
 - 2. Review equipment storage and security requirements.
 - 3. Inspect and discuss condition of substrate and other preparatory work performed by other Trades.
 - 4. Review structural loading limitations.
 - 5. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.

1.11 DELIVERY, STORAGE AND HANDLING

- A. Deliver food service equipment as factory-assembled units with protective crating and covering.
- B. Store food service equipment in original protective crating and covering and in a dry location.

1.12 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions of food service equipment installation areas by field measurements before equipment fabrication and indicate measurements on Shop Drawings and Coordination Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.13 COORDINATION

- A. Coordinate equipment layout and installation with other work including light fixtures, HVAC equipment and fire-suppression system components.
- B. Coordinate location and requirements of service-utility connections.
- C. Coordinate size, location and requirements of concrete bases, positive slopes to drains, floor depressions and insulated floors. Concrete, reinforcement and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete".
- D. Coordinate installation of roof curbs, equipment supports and roof penetrations, as specified in Division 7 Section "Roof Accessories".

1.14 WARRANTIES

- A. General Warranty: The special warranty specified in this Article shall not deprive the District of other rights the District may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
- B. All buy-out food service equipment herein specified shall have all parts and labor warranted in writing, from the date of Final Acceptance by the District against defective parts, materials, workmanship and design for a period of time as stated within the manufacturers standard published warranty, but no less than two years.
- C. All custom fabricated food service equipment shall be warranted as stated above except for a period of two years.
- D. Refrigeration equipment shall include start-up and two year parts and labor warranty on the entire refrigeration system and manufacturers five year parts warranty on hermetic scroll and semi-hermetic sealed compressors.
- E. Existing equipment refurbished for reuse shall be warranted in writing, against defective parts, materials and labor as stated above but for a period of 90 days.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

- A. Stainless steel shall be type 302 or type 304 extra low carbon non-magnetic austenitic 18% chrome, 8% nickel alloy steel. Gauges shall be U.S. Standard of Thickness set forth below:

GAUGE	THICKNESS	GAUGE	THICKNESS
10	.1346	16	.0598
11	.1196	18	.0478
12	.1046	20	.0359
14	.0747	22	.0299

- B. All sheets shall be of maximum length to permit fabrication from one sheet. All thickness must meet the above gauge thickness within tolerances set forth by the ANSI after polishing. Finished sheets exceeding these tolerances shall be rejected as not meeting this Specification.
- C. Galvaneal steel shall be ARMCO steel or an approved grade of copper bearing steel shall be properly primed, degreased and finished with two coats of synthetic aluminum bronze.
- D. Structural steel members used for framing, consisting of angles, bands, bars and channels shall be ductile in quality, free of hard spots, runs, checks, cracks and other surface defects and shall be smooth galvanized by the hot dip process with all surplus removed, free of runs, blisters, excess splatter and uncoated spots or patches.

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- E. White metal shall consist of corrosion resistant metal containing not less than 21% nickel. All castings shall be rough ground, polished and buffed to a bright luster and shall be free from pit marks, runs, checks, burrs and other imperfections.
- F. Stainless steel pipe and tubing shall be seamless or welded of gauge specified and of true roundness. Seamless tubing shall be thoroughly and correctly annealed and ground smooth. Welded tubing shall be thoroughly heat treated and properly quenched to eliminate carbide precipitation, drawn true to size and roundness and polished to match stainless steel sheets.
- G. Welding shall be of the electric submerged or concealed arc type, heliarc wherever practical. Where welding rods are required they shall be of the same composition as materials to be joined coated with a non-carbonaceous flux.
- H. Plastic Laminate: Complying with NEMA LD 3 and NSF 35 requirements; NSF certified for end-use application indicated; 0.050 inch (1.27 mm) thick, smooth texture and easily cleanable.
 - 1. Color: As selected by Architect from manufacturer's full range of colors.
- I. Plywood and Lumber: Close grain exterior grade mahogany or birch plywood.
- J. Sealant: ASTM C 920; Type S, Grade NS, Class 25, Use NT. Provide elastomeric sealant NSF certified for end-use application indicated. Provide sealant that when cured and washed meets requirements of Food and Drug Administration's 21 CFR, Section 177.2600 for use in areas that come in contact with food.
 - 1. Color: As selected by Architect from manufacturer's full range of colors.
 - 2. Backer Rod: Closed-cell polyethylene in diameter larger than joint width.
- K. Plastic: Except for plastic laminate, provide plastic materials and components complying with NSF 51.
- L. Sound Dampening: NSF-certified, non-absorbent, hard drying, sound-deadening coating. Provide coating compounded for permanent adhesion to metal in 1/8-inch (3-mm) thickness that does not chip, flake or blister.
- M. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene or PVC that is nontoxic, stable, odorless, nonabsorbent and unaffected by exposure to foods and cleaning compounds.

2.2 ACCESSORIES

- A. Cabinet Hardware: Provide NSF-certified stainless steel hardware for equipment items as indicated.
- B. Casters: NSF-certified standard-duty stainless-steel swivel stem casters with 5-inch (125-mm) diameter wheels, polyurethane tires with 1-inch (25-mm) tread width and 300-lb (90-kg) load capacity per caster. Provide brakes on 2 casters per unit.

2.3 FABRICATION, GENERAL

- A. All welds shall be strong and ductile, nonporous, free of pits and cracks. Parts which are to be welded shall be homogeneous, of a like color and finish to adjoining material. Excess metal and carbide precipitation shall be ground off, finished smooth and polished. Unexposed welds shall be pacified to prevent attrition. Brazed or soldered joints are unacceptable. Where galvanizing has been damaged due to the welding or grinding process, these areas shall be galvawelded to replace finish

- B. All exposed surfaces of the food service equipment shall be free from bolts, screws and rivet fastenings. Wherever bolts are required they shall be of similar composition and finish as the metal to which they are applied.
- C. Wherever practical all food service equipment and fixtures shall be factory or shop fabricated of one-piece construction, shipped to the project site as one unit completely assembled.
- D. Items of food service equipment or fixtures too large to enter or transverse the building to the installation location in one assembly shall be constructed in sections and shall be furnished with field joints. Where field joints are necessary, all adjoining exposed surfaces shall be field welded at the project site as specified above for welding. Where conditions make welded field joints impractical, each sub-assembly shall be fabricated with off-set draw angles welded to the underside of each adjoining top surface and drawn together to a "hairline" seam with 1/4"-20 stainless steel bolts with lock washers and chrome plated acorn nuts. Bolted field joints will be permitted only where specifically shown on Drawings or specified for a particular item.
- E. Wherever shear edges occur they shall be free of burrs, fins or irregular projections and shall be finished to prevent cutting or laceration when the hand is drawn over such shear edges. Brake bends shall be free of undue and where such bends do mar the uniform surface appearance of the material, such marks shall be removed by suitable grinding, polishing and finishing. In no case where miters or bullnose corners occur is overlapping materials acceptable.

2.4 GENERAL FRABRICATION STANDARDS

A. TOPS:

- 1. Tops shall be fabricated of 14 gauge stainless steel unless otherwise specified. All edges shall be bullnose or formed as specified with all joints butt-edged and electrically welded, ground smooth and polished so no evidence of welding will appear. Soldered corners to achieve round corner construction will not be accepted.
- 2. Tops adjacent to walls, columns or other equipment shall be turned up integrally into a backsplash as specified. All interior corners shall be coved on a $\frac{3}{4}$ " radius, both horizontally and vertically, forming spherical corners. Ends of backsplashes shall be fully enclosed to the low point of the top edge, fully welded, ground smooth and polished.

B. SUPPORT FRAMING

- 1. Around the entire perimeter on the underside of all tops and set back 1" from the down-turned edge shall be a fully welded frame assembly fabricated of 1-1/2" x 1-1/2" x 1/8" stainless steel angle iron or material as specified. Provide intermediate cross bracing fabricated of the same material as the angle framing and fully weld to perimeter frame on centers not to exceed 24". Tack weld the entire frame assembly to the underside of the top surface.
- 2. Open base tables shall be provided with leg mounting channels for weld anchoring leg gussets and shall be fabricated of 1" x 4" x 1" 12 gauge stainless steel or material as specified fully welded at each end of frame and at intervals not to exceed 6'-0".
- 3. Cabinet base tables and counters shall be provided with triangular corner gusset plates for weld anchoring counter type legs and shall be fabricated of 12 gauge stainless steel fully welded at each corner of table or counter body and at intervals not to exceed 6'-0".
- 4. Freestanding sinks and Bain Maries shall be provided with triangular corner gusset plates for weld anchoring leg gussets and shall be fabricated of 12 gauge stainless steel, fully welded at each corner of sink or Bain Marie bottom and at intervals not to exceed 6'-0".

C. LEGS AND ADJUSTABLE BULLET FEET

1. Legs shall be constructed of 1-5/8" diameter 16 gauge stainless steel tubing. Each leg shall be swaged and tapered at the bottom. Fasten each leg to a 3-1/2" high conical shaped die-formed stainless steel gusset equivalent to Component Hardware A20-0206. Provide each leg with stainless steel adjustable foot insert equivalent to Component Hardware A10-0852.
2. Cabinet base tables and counters shall be provided with 6" high conical shaped die-formed stainless steel equipment leg with stainless steel adjustable round foot insert equivalent to Component Hardware A72-0811.

D. CROSSRAILS

1. Provide all open base tables and freestanding sinks and bain Maries with 1-1/4" diameter 16 gauge stainless steel tubular cross railing running between legs at a point 10" above the finished floor. Cross railing shall be continuously welded to legs, filleted, ground smooth and polished to provide a smooth coved radius with leg surface.
2. Where cross railing abuts cabinet base fixtures, cross railing shall be concealed bolt anchored to same utilizing stainless steel hardware.

E. UNDERSHELVES

1. Provide solid fixed undershelf, constructed of 16 gauge stainless steel. Front edge shall be turned down 1" at 90 degrees and returned 1/2" at 45 degrees. Rear and ends shall be turned up 2" high on a 90 degree angle, interior corners coved on 3/4" radius.

F. DRAWERS

1. Provide drawer pan constructed of 14 gauge stainless steel with inside corners coved on a 3/4" radius. Drawer front face shall be double pan type constructed of 16 gauge stainless steel with inner pan set into outer pan and welded in place. Drawer front shall be set into and shall be removable from a 14 gauge stainless steel, channel shaped drawer cradle. Drawer suspension slides shall be secured to drawer frame assembly and shall be Component Hardware S52 series full extension type with 14 gauge stainless steel slides with stainless steel ball bearing wheels having a load capacity of 200 pounds. Provide hard rubber bumper drawer stops. Drawer suspension guides shall be fastened to 18 gauge stainless steel housing which is suspended from the angle framing under the table top. Provide drawer fronts with full grip recessed stainless steel flush pull handles.
2. Stainless steel drawer enclosure cabinet with quantity of drawers as specified with cabinet body fabricated of 18 gauge stainless steel, wrap around construction. The backs of front stiles shall be closed with tight fitting channel sections of 18 gauge stainless steel, welded in place, and closed on top and bottom. Drawer suspension slides shall be secured to drawer frame assembly and shall be Component Hardware S52 series full extension type with 14 gauge stainless steel slides with stainless steel ball bearing wheels having a load capacity of 200 pounds. Provide hard rubber bumper drawer stops. Provide drawer fronts with full grip recessed stainless steel flush pull handles.

G. CABINET BASES

1. Cabinet body shall be fabricated of 18 gauge stainless steel wrap around construction. The backs of front stiles shall be closed with tight fitting channel sections of 18 gauge stainless steel, welded in place and closed on top and bottom.

2. Cabinet base shelves shall be fixed bottom and intermediate fabricated of 18 gauge stainless steel. Front edge shall be turned down 1 1/2" at 90 degrees, returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" at 90 degrees with interior corners coved on a 3/4" radius. Shelf shall be weld anchored to cabinet body. Bottom shelf shall be fabricated flush with front mullions with fully welded facing junctures presenting seamless construction. Fixed intermediate shelves shall be designed similar to bottom shelf except front edge shall be set behind vertical mullions and fully welded thereto.

H. SLIDING DOORS

1. Sliding doors shall be double pan type constructed of 16 gauge stainless steel with inner pan set into outer pan and welded in place. Doors shall have welded internally 1" x 4" x 1" 14 gauge stainless steel hat type reinforcing channels. Doors shall be fitted with full grip, recessed type stainless steel flush pull handles. Provide 16 gauge stainless steel angle door stops welded to door. Provide hard rubber door stops. Provide each door with two, 1 3/8" diameter stainless steel ball bearing sheaves fastened to 1" x 1/8" thick stainless steel bar stock hangers welded to top corners of each door for suspending on overhead door channel track. Provide hangers with stainless steel removable locks to prevent doors from jumping track during operation while permitting ease of removal. Fabricate overhead track of 14 gauge stainless steel and weld to cabinet body. Provide bottom of doors with nylon door guides secured to bottom shelf. Guides shall not interfere with door removal.

I. HINGED DOORS

1. Hinged doors shall be double pan type constructed of 16 gauge stainless steel with inner pan set into outer pan and welded in place. Hinges shall be stainless steel cam action pin type fastened by means of counter sunk flat head stainless steel screws staggered on centers and tapped into 1/4" thick stainless steel bar stock welded behind door jamb. Doors shall be removable from hinges without the use of tools. Doors shall be held closed by permanent magnet closure devices. Doors shall be fitted with a full grip recessed type stainless steel flush pull handles. Provide hard rubber door stop bumpers.

J. SINKS

1. Sinks shall be fabricated of 14 gauge stainless steel with all interior corners coved on a 3/4" radius both horizontally and vertically forming spherical corners.
2. Exposed edges of sink shall be finished with a 1 1/2" diameter 180 degree rolled edge, rear and sides adjacent to adjoining surfaces shall have a backsplash turned up 10" high at a 90 degree angle on a 3/4" radius and turned back 2 1/2" on a 45 degree angle, then down 1/2" at 90 degrees along back.
3. Multiple sink compartments shall be divided with double wall 14 gauge stainless steel partitions 1" wide rounded on top and all corners at a 3/4" radius. Finish bottom, back and front with 14 gauge stainless steel to form one continuous sink with no overlapping joints or open spaces between sink compartments.
4. Integral drainboards shall be constructed of 14 gauge stainless steel. The front portion shall continue the 1 1/2" diameter 180 degree rolled rim of the sink bowl on a continuous level horizontal plane. The surface of the drainboard shall be pitched from 2 1/2" at the end away from the sink to 3" at the sink bowl. Sink and drainboard backsplash shall be continuous and level on the horizontal plane. All interior corners both vertical and horizontal shall be coved on a 3/4" radius. Drainboards shall be reinforced with 1" x 4" x 1", 12 gauge stainless steel "hat" channels extending front to rear tack welded to underside of drainboard for weld anchoring leg gussets.
5. Provide crossrails extending front to rear between legs, crossrails shall not extend along rear at sink to prevent interference with plumbing.
6. Built-in sink compartments shall be fabricated as an integral part of fixture with sink fully welded with adjacent top, weld ground smooth and polished.

K. MILLWORK

1. Millwork fabricator shop shall be a certified participant in AWI's Quality Certification Program (QCP) to standard "Premium" construction.
2. Tops shall be fabricated of 3/4" thick 5-7 ply BW marine grade plywood build up to a 1 1/2" thickness. All plastic laminate finished edges shall be applied prior to the surface laminate. Provide cross bracing around entire perimeter below tops and above all interior dividers to minimize deflection from equipment. Tops shall be fabricated in sections as large as possible to minimize field seams. Field seams shall be assembled utilizing TB-2 yellow glue. The bottom surfaces of all tops must be sealed with gray cabinet liner to comply with Board of Health requirements. Cut-outs for drop-in equipment shall be cut in the shop and with all edges sealed. All drop-in equipment shall be pre-fitted in top prior to delivery to the job site. All drop-in equipment shall be sealed with General Electric or equivalent clear silicon sealer after installation. Hardwood edges shall be applied prior to surface laminate. All hardwood to match for color and grain. Edges to be chamfered and finished as specified. Solid surface tops shall receive full plywood substrate with 3/4" x 3" batons for proper air space. All tops shall be prepared for installation of sneeze guards including additional blocking and / or cutouts.
3. All cabinet base and interiors shall be fabricated of 3/4" thick 5-7 ply marine grade plywood with high-pressure laminate finish. Recessed toe base shall be 6" high fabricated of 3/4" thick 5-7 ply marine grade plywood with 16 gauge stainless steel finish. Shelf pilasters to be recessed type 250WH with 253WH locking clips. Cabinet backs shall be fabricated of 1/4" thick MELA-MDF board. Cabinet ends to be dadoed for back and bottom and notched to receive aprons and kicks. Butt or dowel construction will not be acceptable. Cabinets shall be assembled with TB-2 yellow glue with screws and staples. Cabinets with finished backs shall be fabricated of 3/4" thick 5-7 marine grade plywood with high-pressure laminate finish. Cabinets over 48" in length shall have interior dividers. Dividers shall be dadoed into the bottom and notched for aprons. Dividers shall be notched as required for equipment. Aprons shall be large enough to conceal drop-in equipment and also to house control panels. Cabinet bases shall be fabricated in sections as large as possible to minimize field seams.
4. Doors shall be fabricated of 3/4" thick MDF board with high-pressure laminate finish and shall be furnished with three BLUM 75M5580 or 75M5680 European style concealed hinges. Door pulls shall be Hafele 116.39.437. Locks where required shall be cam style, keyed alike. Doors shall not exceed 27" in width and shall be of equal size.
5. Drawers shall be constructed of 3/8" thick birchwood with dove tail joinery. Drawer slides shall be Accuride 150 lb. full extension type with stainless steel ball bearing hardware.
6. Applied wood fascia panels and doors shall be stile and rail design. Panels to be recessed or raised as specified. All wood to be select for color and grain. Finish shall match stock color samples or custom to match furnished sample. All panels and doors to be equally sized per cabinet. Provide full wood louvered panels as required for equipment requiring air circulation. Finish all wood with stain followed by single coat of sealer. After sealer, apply one layer of Armourcote conversion varnish approved for use in food service with 55% gloss.

L. SOLID AND HARD SURFACE MATERIAL ("CORIAN" / "ZODIAK")

1. Provide counter top, tray slide, etc. of approved solid surface material. Material shall be fabricated and assembled per manufacturers approved methods utilizing a factory authorized and certified fabricator and installer. The edges of the top shall be formed as indicated on the food service and architectural detail drawings, routed and finished as directed. Openings shall have radius corners and shall be reinforced with additional material. Where drop-in appliances are to set on tops, the fixture shall be furnished with a 3/4" thick marine grade plywood sub-top fabricated with a perimeter frame extending through the opening in the top preventing the appliance from setting directly on the solid surface material and allowing the sub-top to distribute the weight of the appliance. Where heated appliances are to set on the top the sub-top is to be fabricated as above to prevent heat from being in direct contact with the solid surface top; additional fiberboard insulation material is to be provided where transfer of radiated heat will contact any solid surface material

M. PAINTING

1. Galvanized steel shall be cleaned and degreased with mineral spirits, primed with a minimum of two coats of primer and spray finished with a minimum of two coats of gray epoxy enamel paint

N. LAMINATED PLASTIC

1. All exposed surfaces shall be faced with 1/16" thick high pressure plastic laminate in color and pattern as specified.
2. All unexposed surfaces shall be faced with .020 or .030 gray thermoset decorative overlay.
3. Where the plastic laminate is to be bonded to removable or fixed panels the panels shall be fabricated of 3/4" thick close grain marine grade mahogany or birch plywood with surfaces bonded with waterproof glue.
4. Where the plastic laminate is to be bonded directly to the metal facing of a cabinet base table or counter, surfaces shall be bonded with contact adhesive.

O. CLOSURE TRIM

1. Provide closure trim pieces fabricated of 16 gauge stainless steel or of material and finish as specified, trim shall be one piece constructions furnished to seal both horizontal and vertical junctures and openings

2.5 STAINLESS STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal products" for recommendations relative to applying and designating finishes.
1. Remove or blend tool and die marks and stretch lines into finish.
 2. Grind and polish surfaces to produce uniform directional textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- B. Concealed Surfaces: Minimum of 80 grit finish.
- C. Exposed Surfaces: No. 4 finish (bright, directional polish) of 180 grit.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- E. Protect mechanical finishes on exposed surfaces from damage by applying a strippable temporary protective covering before shipment.

2.6 STANDARDS FOR EXISTING EQUIPMENT

- A. The food service equipment contractor shall examine each item of food service equipment specified as existing to be reused prior to his submission of his bid to ascertain proper fit and alignment in its proposed location, inspect for any physical damage and to determine the present operational performance and condition of each item or any component thereof and submit to the Owner as part of his bid the extent of repairs or replacement parts, required to recondition the entire unit for satisfactory operation.
- B. The food service equipment contractor shall disassemble each existing item to be reused, clean, service and recondition including any transport for reconditioning if required at any service agency or shop, redeliver or relocate at the project site to the new location, set-in-place, align and secure in its new

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location and assemble any fixtures, components and sub-assemblies, left ready for final utility connections by the Trades.

1. Cleaning of the food service equipment shall include a thorough scrapping and steam cleaning to remove scale and all foreign material.
 2. Repainting of all fabricated and buy-out items having worn or scarred exposed surfaces that are not stainless steel materials. Repainting shall be a minimum of two coats of original paint or touched-up as required.
 3. Repair any damage incurred during relocation or transit such as dents, cracks or broken welds.
 4. Replacement of door gaskets and seals and realignment for proper operation.
 5. Replace non-functioning condensate evaporators in refrigerators.
 6. Replacement of broken door hinges, drawer slide assemblies, door and drawer handles, door pans or lock assemblies.
 7. Servicing and cleaning of all condensing units, (vacuum and comb), evaporator coils, expansion valves, etc. setting and adjusting of all temperature controls to maintain normal operating temperature and charging of the refrigeration system with proper refrigerant. Refrigeration systems to be re-used shall be recharged with proper refrigerant or converted to an acceptable code compliant refrigerant.
 8. Replace or repair all plumbing components as required including faucets and waste outlets with fixtures of similar type and manufacturer.
 9. Pump-down of all refrigeration systems to be discontinued or relocated and re-claiming and disposal of all refrigerant and toxic materials as necessary.
- C. The following work shall be included as part of this contract on specified items or as required by the Owner or as determined or recommended as necessary during the site inspection.
1. Repair or replacement of all materials or parts to correct any gas, steam or electrically operated cooking appliance including power generation devices such as boilers and related mechanical and electrical heating and control components and devices.
 2. Remove, sharpen and reinstall all cutting blades on all cutting machinery including slicers, food cutters and food choppers.
 3. Recondition and lubricate electric motors and transmission devices, replacing worn or damaged gears, drive belts, etc. and repacking or replacing oil with proper type as recommended by the manufacturer.
 4. Inspecting, cleaning and upgrading of exhaust ventilation systems including fire protection systems and components. Exhaust hood shall be steam cleaned and chemically treated to remove all traces of grease and foreign material, painted exhaust hoods shall be primed and repainted with a minimum of two coats of primer and fire resistant paint, filters shall be replaced with grease extractor type filters to match design air volume requirements and fusible links shall be replaced with proper heat values. Fire system shall be inspected and recharged to full operational condition. Fire system nozzles and related piping and fittings shall be relocated and reworked to accommodate the new equipment arrangement with nozzle heads replaced as required. All ductwork shall be inspected to assure compliance with present codes and statutes with all ductwork thoroughly cleaned. Air movement shall be measured for proper air quantities and velocities and conditions corrected to meet proper requirements. All conditions of the existing exhaust ventilation and fire protection system shall be in compliance with all current prevailing codes, statutes and NFPA requirements.
- D. All nameplates are to be left completely legible.
- E. Existing equipment to be reused shall have all utilities disconnected, terminated, or capped-off by the Plumbing, Electrical and Mechanical (HVAC) Trades.
- F. Plumbing, Electrical and Mechanical (HVAC) Trades shall provide all mechanical, electrical and HVAC services as required and provide final connection to same at the new site location.

- G. Final determination and verification of Plumbing, Electrical and Mechanical (HVAC) requirements for all existing food service equipment to be reused is the responsibility of the Mechanical and Electrical Engineer. Provisions for relocated utility requirements shall conform to current codes and statutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions with Installer for compliance with requirements for installation tolerances, service-utility connections and other conditions affecting installation and performance of food service equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Examine roughing-in for piping, mechanical and electrical systems to verify actual locations of connections before installation

3.2 INSTALLATION

- A. Set each item of fixed food service equipment securely in place, level and adjust to correct height. Anchor to supporting surface where required for sustained operation and use without shifting or dislocation. Provide concealed anchoring where possible. Adjust work surfaces to a level tolerance of 1/16" maximum offset and slope drainage surfaces at 1/16" per foot.
- B. Complete field assembly of field joints by welding or bolting utilizing the method as indicated with the fixture. Grind all field welds smooth and polish. Set and trim all gaskets to be installed as part of field assembly.
- C. Treat enclosed spaces that are inaccessible after food service equipment installation by covering all horizontal surfaces with powdered borax at a rate of 4 ounces per square foot.
- D. Provide closure trim pieces fabricated of 16 gauge stainless steel or of material and finish as specified, trim shall be one piece construction furnished to seal both horizontal and vertical junctures and openings where the conditions given below occur:
 - 1. Food service equipment is installed into wall openings. Trim shall apply to both sides of wall opening with all corners fully welded, ground smooth and polished.
 - 2. Two or more items of food service equipment are butted together.
 - 3. Food service equipment is installed against wall, columns other equipment resulting in a gap or juncture exceeding 1/4" in width.
 - 4. An open gap of any size between the juncture or joint between adjoining items of food service equipment, wall or column surfaces which might result in the penetration or collection of grease or vermin.
- E. Provide cut-outs and openings in food service equipment as required to extend plumbing, electric, steam or gas lines through the food service equipment either for interconnection of utility lines or final connection.
- F. Seal around each item of food service equipment with sealant for gaps or spaces less than 1/4" in width and with stainless steel trim for gaps or spaces exceeding 1/4" in width. Closure strips shall conform to the shape and size of the surfaces or juncture to be sealed and shall be neatly scribed for a tight fit.

3.3 PROTECTION AND CLEANING

- A. Provide final protection and maintain conditions in a manner acceptable to District, Manufacturer and Installer that ensure food service equipment is without damage or deterioration at the time of Substantial Completion.
- B. After completion of the food service equipment installation and completion of other major work in the food service area remove protective coverings and clean and sanitize all food service equipment both internally and externally. Restore exposed and semi-exposed finished to remove abrasions or other surface damage, polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

3.4 COMMISSIONING

- A. Delay start-up of the food service equipment until utility services have been installed, completed and tested, balanced and adjusted for pressure and voltage, and until water and steam lines have been treated and cleaned for sanitation. Before start-up of the food service equipment lubricate in accordance with manufacturer's instructions.
 - 1. Coordinate food service equipment startup with service-utility testing, balancing and adjustments. Do not operate steam lines before they have been cleaned and sanitized.
- B. Provide on-site demonstration and formal technical training by the manufacturer's technical representative for each item of food service equipment as required to instruct the District and its personnel in the safe operation and sanitation and maintenance of the food service equipment.
- C. Test each item of food service equipment for proper operation.
 - 1. Repair or replace equipment that is defective in operation including units that operate below required capacity or that operate with excessive noise or vibration.
 - 2. Test refrigeration equipment's ability to maintain specified operating temperature under heavy-use conditions. Repair or replace equipment that does not maintain specified operating temperature.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 4. Test motors and rotating equipment for proper rotation and lubricate moving parts according to manufacturer's written instructions.
 - 5. Test water, drain, gas, steam, oil, refrigerant and liquid-carrying components for leaks. Repair or replace leaking components.
 - 6. Train District's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing and preventive maintenance for each food service equipment item.
 - 7. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Contract Closeout".
 - 8. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data".
 - 9. Schedule training with District through Construction Manager with at least seven days advance notice.

3.5 SCHEDULE OF EQUIPMENT

- A. Equipment Schedule: Refer to all Contract Documents pertaining to the food service areas. Equipment itemized along with brands and model numbers and salient features establish the standard for construction, operation and engineering criteria.

- B. Equipment indicated below is intended to establish the standard of quality of the food service equipment. Alternate "Equal" products by other manufacturers may be considered if equivalent in design, performance, durability and function.
- C. This document is the intellectual property of Corsi Associates and as such use by any other entity is prohibited.

ITEM #01 HAND SINK
Quantity: Two (2)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: HSAP-14-ADA-FAW
Options: 318496 Paper towel dispenser (2)
 300602 Soap dispenser (2)
 307120 Wrist handles (2)
 -LRS Left and right side splashes (2)
Sup Info: Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.

Construction Trade shall provide wall blocking as required for mounting.

Foodservice Equipment Contractor to verify soap dispenser and paper towel dispenser type with the Owner.

ITEM #02 TRASH RECEPTACLE
Quantity: Two (2)
Manufacturer: Rubbermaid
Model: FG354060GRAY
Options: FG267360GRAY lid (2)

ITEM #03 FOOD WASTE DISPOSER
Quantity: One (1)
Manufacturer: Salvajor / In-Sinkerator
Model: 300-CA-ARSS-LD-PP
Options: 18CC 18" cone

 980105 Mounting bracket
 PP PP-type control panel with mounted solenoid valve
 DP Dejamming prong
Sup Info: Food Service Kitchen Equipment Contractor shall furnish and install interconnecting piping and all components or parts as required by disposer manufacturer or as supplied as part of disposer in accordance with the manufacturer instructions.

Food Service Kitchen Equipment Contractor shall furnish and install all interconnecting wiring as required between disposer motor and control device.

Mount to control panel to wall or mounting bracket with stainless steel mounting hardware of proper type for application.

Construction Trade shall reinforce wall as required to support weight of control panel while in use.

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ITEM #04 POT RACK, WALL MOUNT
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: WSP1236
Options: 300696 Additional pot hooks (3)
Sup Info: Includes (3) double pronged pot hooks.

Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.

Construction Trade shall provide wall blocking as required for mounting.

ITEM #05 SOILED DISHTABLE, CORNER WITH THREE COMP SINK
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: Size and shape as per plan
Construction: Top shall be fabricated of 14 gauge stainless steel. Exposed edges shall be 3" high turned up on a 3/4" radius terminating into a 1-1/2" diameter 180 degree rolled edge. Provide back-splash along adjoining surfaces with top turned up integrally 10" high on a 3/4" radius at a 90 degree angle, turned back 2-1/2" on a 45 degree angle and down 1/2" on a 45 degree angle. Where the dishtable top enters the dish machine, backsplash and top shall be turned down into the mouth of the dishmachine and fastened thereto in a watertight manner as recommended by the manufacturer of the dishmachine.

Provide dishtable top with three 20" long x 28" wide x 14" deep sink compartments fabricated of 14 gauge stainless steel with all interior corners coved on a 3/4" radius, both horizontally and vertically forming spherical corners. Each sink compartment shall be divided with 1" wide double wall 14 gauge stainless steel partitions rounded to a 3/4" radius on top and all corners. Finish bottom, back and front with 14 gauge stainless steel apron to form one continuous sink with no overlapping joints or open spaces between sink compartments.

Pre-rinse sink shall be fabricated of 14 gauge stainless steel with interior corners coved on a 3/4" radius and constructed integrally with dishtable top. Locate pre-rinse sink 1" from the inside roll of the dishtable front edge. Sink size shall be 20" long x 20" wide x 10" deep.

Furnish and install three Component Hardware D50-7215 lever type drain assemblies with connected overflow, stainless steel lever support brackets and stainless steel flat strainer plate.

Punch backsplash and provide two T&S Brass & Bronze Works B-231 faucets with aerator.

Provide each sink compartment with 14 gauge stainless steel flush fitting cover with finger hole.

Provide sink cover holder.

Sink shall have 12 gauge stainless steel formed corner gussets tack welded to underside of sink compartment for weld anchoring leg gusset.

Provide 1-1/4" diameter 16 gauge stainless steel crossrails extending front to rear between legs, crossrails shall not extend along rear at sink to prevent interference with plumbing.

Dishtable base adjacent to dishmachine shall be open.

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Mount on leg assembly constructed of 1-5/8" diameter 16 gauge stainless steel tubing. Each leg shall be provided with a stainless steel bullet shaped adjustable foot. Fasten each leg to a 3-1/2" high stainless steel conical shaped die-formed gusset fully welded to leg mounting channel.

ITEM #06 POT RACK, WALL MOUNT
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: WSP1260
Options: 300696 Additional pot hooks (3)
Sup Info: Includes (3) double pronged pot hooks.

Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.

Construction Trade shall provide wall blocking as required for mounting.

ITEM #07 WAREWASHER
Quantity: One (1)
Manufacturer: Insinger / Hobart / Champion
Model: CX20
Options: Water pressure regulator
 Electric immersion tank heat, 6kw
 Single point connection
 Shock arrestor
 Drain tempering system

ITEM #07.1 CONDENSATE HOOD
Quantity: One (1)
Manufacturer: Captive Aire / Accurex
Model: Size and shape per plan
Construction: Furnish and install condensate hood.

Entire condensate ventilation system shall be constructed in compliance with UL, NSF and any prevailing statutes and codes.

Fabricate entire hood of 18 gauge 304 stainless steel fully welded watertight construction.

Provide stainless steel welded hanger mounting clips with threaded stainless steel hanger and structural ceiling providing necessary angles and channels and utilizing stainless steel mounting hardware.

Mechanical (HVAC) Trade shall provide stainless steel welded ductwork (horizontal duct runs shall be pitched back toward condensate hood) and fan to comprise a complete condensate exhaust system.

Electrical Trade shall install fan switch with indicator lights located on dish machine and inter-wire to fan.

Furnish and install plastic drain tubing from nipple on bleeder drain outlet to soiled dishtable top surface.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Furnish and install 18 gauge 304 stainless steel wall panels extending from the bottom of the rear of the exhaust hood to the upper edge of the baseboard molding and extending along the full length of all wall surfaces. Wall panel sections shall be fitted with ½" wide off-set seams at intermediate joints to allow panel sections to fit tightly against the wall and to result in watertight seams. Secure wall panels to building wall with wall panel adhesive of proper type for wall construction. Seal end seams with General Electric or equivalent clear silicone sealer.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #08 WIRE SHELVING
Quantity: One (1)
Manufacturer: Metro / Eagle group / Quantum
Model: PR2454NK3 (5)
Options: 74UPK3 Posts (4)
 5MP Casters (2)
 5MPB Casters (2)
Sup Info: Assemble into five tier shelving units, locate bottom shelf 12" above floor.

ITEM #09 EXHAUST HOOD
Quantity: One (1)
Manufacturer: Captive Aire / Accurex
Model: Size and shape as per plan
Construction: Furnish and install exhaust hood.

Entire exhaust ventilation system shall be constructed in compliance with UL, NSF, NFPA, IMC 2018 (including automatic start-up of the exhaust upon activation of any cooking appliance) and any prevailing statutes and codes.

Hood shall be 9'-0" long constructed in one section of 18 gauge 304 stainless steel with all seams continuously welded, ground smooth and polished. Hood mounted utility cabinet shall be 1'. Provide a full compliment of stainless steel "high efficiency" Captrate Solo baffle type grease extractors.

Furnish remote bulb thermostat with watertight hardware and install in either the exhaust plenum of the hood or in the exhaust duct. Provide NEMA 3 control panel box with hinged front cover complete with exhaust fan contactors wired to an adjustable thermostat control, field wiring terminal strip and on-off switch.

Provide 18 gauge 304 stainless steel supply and exhaust duct collar.

Provide stainless steel threaded hanger rods complete with stainless steel mounting hardware for securing to structural ceiling.

Mechanical (HVAC) Trade shall furnish and install a complete exhaust air handling system including exhaust fan and controller, fan start-stop switch with status lights, 16 gauge insulated welded ductwork from exhaust collar on exhaust hood to fan, hinged roof curb with grease trough and removable grease container.

Mechanical (HVAC) Trade shall install exhaust hood heat detector(s) in exhaust hoods with multiple exhaust collars in the exhaust duct just after the point of the pant leg juncture; this includes punching of the required hole in the duct and installation of the heat detector and fitting.

Electrical Trade shall furnish and install interconnecting wiring between fan motors, controllers and switches.

Electrical Trade shall furnish and install inter-wiring of cooking appliance start-up inter-lock device and the exhaust ventilation system and wire per the manufacturer's instructions and per applicable codes.

Furnish four (4) UL listed vapor-proof recessed LED light fixtures wired to a common on-off switch with stainless steel cover plate located on the wall adjacent to the exhaust ventilator.

Electrical Trade shall furnish materials and inter-wire light fixtures to wall mounted utility cabinet.

Mechanical (HVAC) Trade shall furnish and install INVERTER DUTY THREE PHASE exhaust fan and controller.

Mechanical (HVAC) Trade shall furnish fans set compatible with variable frequency drive specification.

Electrical Trade shall furnish and install Interconnecting wiring of the system between the exhaust hood sensors, remote frequency drive unit and exhaust fan motors.

Furnish and install 18 gauge stainless steel ceiling closure panels extending from the top of the exhaust ventilator to the finished ceiling. Panels shall be removable without the use of tools for access.

Furnish and install 18 gauge 304 stainless steel wall panels extending from the bottom of the rear of the exhaust hood to the upper edge of the baseboard molding and extending along the full length of all wall surfaces. Wall panel sections shall be fitted with 1/2" wide off-set seams at intermediate joints to allow panel sections to fit tightly against the wall and to result in watertight seams. Secure wall panels to building wall with wall panel adhesive of proper type for wall construction. Seal end seams with General Electric or equivalent clear silicone sealer.

Electrical Trade shall provide the inter-wiring between the control enclosure, fire system and exhaust fans and variable frequency drives and duct riser temperature switch.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #09.1

HOOD CONTROL PANEL

Quantity:

One (1)

Manufacturer:

Captive Aire / Accurex

Model:

Size and shape per plan

Sup Info:

Furnish 18 gauge stainless steel utility and fire system enclosure cabinet with hinged access doors for both hood and fire system controls and fire suppression tanks. System shall be listed by ETL (UL 508A) NSF, NFPA, IMC 2018 and any prevailing statutes or codes including automatic shut-down of all cooking appliances per code section 44 of NFPA 17-27. Cabinet may be freestanding wall type or integral with exhaust hood as shown on the contract drawings. Furnish stainless steel mounting hardware of proper type for wall construction for wall mounted cabinet.

Furnish and install variable volume motor control center with variable frequency drive, input / output processor and keypad enclosed within a stainless steel utility cabinet for remote mounting. System shall include, but not be limited to, electronic variable volume motor starters with thermal overload, input / output processors, control keypad, temperature and optic sensors and plug and play cables. Temperature sensor shall be mounted in the exhaust duct collar; optic sensor shall be mounted inside the ends of the hood with air purge units mounted on top.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #09.2

FIRE PROTECTION SYSTEM

Quantity:

One (1)

Manufacturer:

Captive Aire

Model:

TANK

Sup Info:

Furnish and install in exhaust hood, plenum and surface fire protection system.

TANK Fire Suppression is a pre-engineered, stored-pressure wet chemical solutionextinguishing system.

TANK Fire Suppression System shall be UL & ULC listed in accordance with UL300, UL1254, ULCORD-C1254.6.

Microprocessor-based control board shall be ETL Listed to UL Standard 864 and CAN/ULC-S527-11.

TANK Fire Suppression System intended for installation and for use in accordance withthe National Fire Protection Association Standards:

1. Wet Chemical Extinguishing Systems, NFPA 17A
 2. National Electrical Code, NFPA 70
 3. National Fire Alarm & Signaling Code, NFPA 72
- New York City and FDNY approved under COA# 5870.
- California State Fire Marshal (CFSM), Listing No. 7085-2199:0502.

A pre-engineered, fixed pipe, automatic wet chemical agent fire suppression system forprotection of all hazard areas associated with cooking operations, including exhaust hoods, plenums, ductwork, and cooking appliances.

Exhaust hood fire system components to be factory installed.

Cylinder and Valve Assembly

1. The cylinders shall have a tin-nickel alloy plated brass valve with pressure gauge.
2. Wet chemical agent shall be contained in one or more stored pressure DOT/TC rated steel cylinder and valve assemblies.
3. Each cylinder is factory-filled with liquid fire suppressant and pressurized to 200 PSIGat 70°F.

Distribution Nozzles

4. Nozzles shall be located to protect the exhaust ducts, plenums, and all cooking appliances requiring protection.

5. All nozzles shall be equipped with a metal blow off cap. The cap prevents contamination from entering the pipe network and is designed to pop-off upon system discharge, allowing agent to flow to the protected hazard area.
6. All nozzles shall incorporate a stamped part number to easily identify nozzle type.

Distribution System

7. The distribution system shall consist of Copper, Schedule 40 black iron, chrome-plated or stainless-steel pipe and fittings. All exposed piping and fittings must be chrome-plated or stainless steel.
8. Fittings shall be minimum class 150. Galvanized fittings shall not be used.

Suppression System

9. The system control equipment shall be capable of all functions associated with automatically and manually discharging the wet chemical agent from all cylinder and valve assemblies, including automatic shutdown of the heat source or fuel and electrical power to all protected areas upon system discharge.
10. Liquid Fire Suppressant shall be Aqueous Potassium Carbonate (APC).
11. All mechanical components of the actuator kit shall be enclosed.
12. The actuator kit shall be capable of automatic or manual activation means.
13. Supervisory Pressure Switch added to monitor operating system pressure.
14. For manual activation, an electrically operated manual release shall be used to actuate the system manually.
15. For automatic activation, the system will be activated by a Firestat (heat) detector.

Electrical

16. Electrical Division to provide shunt trip breakers at main power panel, or disconnects, as designated by the Electrical Engineer; interconnection provided at hood control panel for the signal to shut down all electricity in and under the exhaust hood. Shunt trips/disconnects to accomplish shut off of electricity in the event of fire system activation by others.
17. Printed circuit board with microprocessor-based controller that provides all the necessary monitoring, timing, and supervision functions required for the reliable operation of the fire system.
18. Independent supervised loops incorporate redundancy and fault detection.
19. Real-time cloud-based monitoring connection provided with system by ownership.
20. Primary power supply, with battery backup for power loss.
21. All wiring must be in accordance to NFPA 70 and the Authority Having Jurisdiction (AHJ).
22. Electric gas valve provided for equipment below exhaust hood. Coordinate size and installation with Plumbing Division.
23. All wiring is to be in accordance with the applicable manufacturer's instructions for the fire alarm control panel, gas shut-off valve, manual reset relay, and contractor supplied shut-off devices.

As part of this item, provide wall mounted type K handheld portable fire extinguisher, placard, and mounting bracket as required in the immediate vicinity of each cooking area, per NFPA-96 and NFPA-10. Additional fire extinguishers as required in the kitchen area are to be specified by the Architect and provided by the General Contractor.

Inter-wiring of the fire system to the exhaust hood shall be furnished and installed by the Electrical Trade.

FOOD SERVICE EQUIPMENT

Provide as part of fire system, electrically operated gas supply line shut-off valve (two required for "loop" gas service) to interrupt gas supply to all gas operated cooking appliances. Gas valve shall be provided with manual reset to prevent gas flow to pilot devices on appliances prior to restart.

Provide one remote manual pull station to actuate fire system in the event of a fire.

Plumbing Trade shall install gas shut-off valve(s) in gas supply line.

Electrical Trade shall inter-wire gas shut-off valve(s) to fire system.

Electrical Trade shall furnish and install electric shunt-trip circuit breakers or electric shut-off contactors to interrupt electric power to all electrically operated cooking appliances.

Provide dry contacts in fire system to interface with building fire alarm system as required, electrical tie-in shall be the responsibility of the Electrical Trade.

Provide as part of fire system, start-up testing of the fire system as required by local fire codes. Subsequent testing of the fire system for a period of one year after start-up shall be included as part of this contract.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

Install in accordance with manufacturer's instructions, drawings, written specifications, manufacturer's installation manual, and all applicable building codes.

Six-month and twelve-month inspections, servicing, and replacement of components as per NFPA 96 to be provided by the General Contractor or Owner.

Refer to latest approved Engineering Drawings for engineering data and design methods and features which shall take precedence to this specification.

ITEM #10 CLEAN DISHTABLE
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: CDTR-60-14/3

ITEM #11 SHELF, WALL MOUNT
Quantity: Two (2)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: WS1248-14/3
Sup Info: Furnish stainless steel mounting hardware of proper type for wall construction and to sustain weight while in use.

Construction Trade shall provide wall blocking as required for mounting.

ITEM #12 WORK TABLE, STAINLESS TOP
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco

FOOD SERVICE EQUIPMENT

Model: T3672SE-BS
Options: E36A All welded construction
E59 Undershelf upgrade
YCORSI-502971-MOD Drawer
E22 Weld in sink bowl (2)
341189 Twist handle drain (2)
-TB Twist bracket (2)
351585 Sink cover (2)
E47 Sink cover holder

ITEM #13 RANGE, GAS
Quantity: One (1)
Manufacturer: Garland / Vulcan / Imperial
Model: G48-4G24LL
Options: Stainless sides and back
Rear gas connection
Stainless steel manifold covers
Manifold end caps
Thermostatically controlled griddle (2)
Swivel casters with polyurethane tires and front locking brakes
2670200 Gas pressure regulator
M34SD Backguard flue riser
Dormont 1675KIT48PS gas hose kit
Sup Info: Plumbing Trade shall install disconnect at wall connection and to cooking appliance per manufacturer's instructions.

Foodservice Equipment Contractor shall provide and secure restraining cable between wall and equipment.

ITEM #14 FLATWARE & TRAY CART
Quantity: One (1)
Manufacturer: Duke / LTI / Delfield
Model: TTS-32SS

ITEM #15 WORK TABLE, ENCLOSED BASE, HINGED DOORS
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: Custom
Options: Size and shape per plan.

Top shall be fabricated of 14 gauge stainless steel. Exposed edges shall be rolled down 2" diameter at 180 degrees. Provide backsplash along adjoining surfaces with top turned up integrally 6" high on a 3/4" radius at a 90 degree angle, turned back 1" on a 90 degree angle and down 1/2" on a 90 degree angle.

Cabinet body shall be fabricated of 18 gauge stainless steel wrap around construction. The backs of front stiles shall be closed with tight fitting channel sections of 18 gauge stainless steel, welded in place and closed on top and bottom.

Provide provisions for Item #16 drop-in hand sink.

Provide counter base below sink with stainless steel apron with recess for lever waste handle. Below apron provide stainless steel, double pan hinged access door with stainless steel recessed handle. Base below sink shall have bottom and rear open for passage of plumbing lines.

Provide remainder of cabinet base with open fixed bottom and intermediate fabricated shelves fabricated of 18 gauge stainless steel. Front edge shall be turned down 1-1/2" at 90 degrees, returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" at 90 degrees with interior corners coved on a 3/4" radius. Shelf shall be weld anchored to cabinet body. Bottom shelf shall be fabricated flush with front mullions with fully welded facing junctures presenting seamless construction. Fixed intermediate shelves shall be designed similar to bottom shelf except front edge shall be set behind vertical mullions and fully welded thereto.

Mount on counter type stainless steel conical shaped die-formed legs with stainless steel, bullet shaped adjustable foot fully welded to leg mounting channel.

- ITEM #16 HAND SINK, DROP-IN
Quantity: One (1)
Manufacturer: Eagle Group / John Boos / Advance Tabco
Model: SR10-14-5-1
Options: Faucet hole punched on 4" centers, standard
 Standard faucet
 Left and right side splashes
 Paper towel dispenser
 Soap dispenser
Sup Info: Foodservice Equipment Contractor to verify soap dispenser and paper towel dispenser type with the Owner.
- ITEM #17 FRONT SERVING COUNTER
Quantity: One (1)
Manufacturer: Duke / LTI / Delfield
Model: Size and shape as per plan
Construction: Provide counter top of approved solid surface quartz material. Material shall be fabricated and assembled per manufacturer's approved methods utilizing a factory authorized and certified fabricator and installer. The front edge of the top shall be formed as indicated on the food service and architectural detail drawings routed and finished as directed. Openings shall have radius corners and shall be reinforced with additional material. Where drop-in appliances are to set on the top the fixture shall be furnished with a 3/4" thick 5-7 ply marine grade BW plywood sub-top. Where heated appliances are to set on the top the sub-top is to be insulated from the drop-in appliance with hard fiberboard insulation to prevent heat from being in direct contact with the solid surface top. All drop-in equipment shall be pre-fitted in top prior to delivery to the job site. All drop-in equipment shall be sealed with General Electric clear silicon sealer after installation.

Provide exposed front and sides of counter with 3/4" thick 5-7 ply marine grade plywood with laminated plastic finish and 14 gauge stainless steel angle mop guards extending along the bottom of each panel and secured to the underside of the panel. Counter end panels shall be fabricated of stainless steel.

Counter base shall be fabricated of 18 gauge stainless steel wrap around type construction. Provide stainless steel fully welded channel frame around the entire perimeter of the counter top with intermediate cross bracing extending front to rear on centers not to exceed 24" to support top. Provide interior of counter base with solid fixed open bottom and intermediate shelves constructed of 16 gauge stainless steel unless specified otherwise. The front edge of each shelf shall be turned down 2" at 90 degrees and returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" high on a 90 degree angle, interior corners coved on 3/4" radius.

All appliances and components to be furnished as built-in equipment as part of the counter shall be factory installed per the manufacturers instructions, all electrical wiring and components shall conform to UL and shall be installed in accordance with the National Electric Code with all wiring extended to a junction box connection point in counter base with all wires tagged and identified.

Provide provisions for Item #18 undercounter refrigerator.

Provide provisions for Item #19 mobile warming cabinet.

Provide provisions for Item #20 heated zone merchandiser.

Provide provisions for Item #21 heated stone shelves.

Provide provisions for Item #22 sneeze guard.

Provide provisions for Item #23 soup well.

Furnish die-raised utility chases through the cabinet body and openings with plastic grommets in the solid surface material counter top for passage of plumbing and utility lines.

Mount counter assembly on 12 gauge stainless steel triangular leg gusset mounting channels on centers not to exceed 48" in length and fully welded to the cabinet body. Mount counter assembly on 6" high 1 5/8" diameter 16 gauge stainless steel tubular legs with stainless steel adjustable bullet feet fully weld legs to mounting gussets. Provide 6" high recessed toe base on customers side and exposed ends fabricated of 3/4" thick 5-7 ply marine grade plywood faced with 14 gauge stainless steel.

Make factory preparation of the top and underbracing and supervise field installation of sneeze guards. Extend any wiring for display and heat lights to a junction box in counter base with all wiring tagged and identified.

ITEM #18	UNDERCOUNTER REFRIGERATOR
Quantity:	One (1)
Manufacturer:	Continental / True / Traulsen
Model:	UC48SN
Options:	Stainless steel interior Field reversible doors Exterior mounted digital thermometer Automatic condensate evaporator Swivel casters with polyurethane tires and front locking brakes Plug and cord set 10' cord

ITEM #19	HEATED CABINET, MOBILE
Quantity:	One (1)
Manufacturer:	Metro / Cres Cor / Winston
Model:	HBCW8-AS-UC
Options:	Hinging per plan Adjustable pan slides Exterior mounted digital thermometer Plug and cord set 2" casters

ITEM #20	HEATED ZONE MERCHANDISER
Quantity:	One (1)

FOOD SERVICE EQUIPMENT

Manufacturer: Hatco / Merco / APW Wyott
Model: HZMH-30D
Options: BLACK Black, designer color
Architect/owner to select/verify final finish

ITEM #21 HEATED STONE SHELVES
Quantity: One (1)
Manufacturer: Hatco / Merco / APW Wyott
Model: GRSSB-3618
Options: BLACK Black, designer color
Architect/owner to select/verify final finish

ITEM #22 SNEEZE GUARD ASSEMBLY
Quantity: One (1)
Manufacturer: PMG / Versaguard
Model: FM2R-A
Options: Size and shape as per plan
Stainless steel tubing
Finish: Brushed aluminum
3/8" Tempered glass
1" radius corner
End Panels
GRNM Hatco, narrow max watt heat lamp & Ultra-Slim LED lights 4000k
Remote infinite switch
Millwork undercounter mount

ITEM #23 SOUP WELL, DROP-IN
Quantity: One (1)
Manufacturer: Wells / Hatco / APW Wyott
Model: SS-10TDU

ITEM #24 WIRE SHELVING
Quantity: One (1)
Manufacturer: Metro / Eagle group / Quantum
Model: PR1860NK3 (5)
Options: 74UPK3 Posts (4)
5MP Casters (2)
5MPB Casters (2)
Sup Info: Assemble into five tier shelving units, locate bottom shelf 12" above floor.

ITEM #25 WIRE SHELVING
Quantity: Two (2)
Manufacturer: Metro / Eagle group / Quantum
Model: PR1836NK3 (10)
Options: 74UPK3 Posts (8)
5MP Casters (4)
5MPB Casters (4)
Sup Info: Assemble into five tier shelving units, locate bottom shelf 12" above floor.

ITEM #26 TRASH RECEPTACLE
Quantity: Two (2)
Manufacturer: Rubbermaid
Model: FG265500GRAY
Options: FG265400GRAY Container lid (2)
FG264043BLA Dolly (2)

ITEM #27 WIRE SHELVING
Quantity: One (1)
Manufacturer: Metro / Eagle group / Quantum
Model: PR2436NK3 (5)
Options: 74UPK3 Posts (4)
 5MP Casters (2)
 5MPB Casters (2)
Sup Info: Assemble into five tier shelving units, locate bottom shelf 12" above floor.

ITEM #28 OPEN COUNTER
Quantity: One (1)
Manufacturer: Duke / LTI / Atlas
Model: Size and shape per plan
Construction: Furnish counter top with approved solid surface material. Material shall be fabricated and assembled per manufacturer's approved methods utilizing a factory authorized and certified fabricator and installer. The front edge of the top shall be formed as indicated on the food service and architectural detail drawings routed and finished as directed. Openings shall have radius corners and shall be reinforced with additional material.

Solid surface material shall be fabricated and assembled per manufacturers approved methods by a factory authorized fabricator utilizing factory trained and certified personnel. The solid surface material top shall be set over a sub-top fabricated of $\frac{3}{4}$ " thick 5-7 ply marine grade plywood. of radiated heat from contact any solid surface material.

Provide counter front with $\frac{3}{4}$ " thick 5-7 ply marine grade plywood with laminated plastic finish and 14 gauge stainless steel angle mop guards extending along the bottom of each panel and secured to the underside of the panel. Counter end panels shall be fabricated of stainless steel.

Counter base shall be fabricated of 18 gauge stainless steel wrap around type construction enclosed on the front with hinged doors. Provide 14 gauge stainless steel angle mop guards extending along the bottom of each door and secured to the underside of the door. Provide doors with chrome plated cylinder locks. Provide stainless steel fully welded channel frame around the entire perimeter of the counter top with intermediate cross bracing extending front to rear on centers not to exceed 24" to support top. Provide interior of counter base with solid fixed open bottom and intermediate shelves constructed of 16 gauge stainless steel unless specified otherwise. The front edge of each shelf shall be turned down 2" at 90 degrees and returned 1/2" at 90 degrees. Rear and ends shall be turned up 2" high on a 90 degree angle, interior corners coved on 3/4" radius.

Mount counter assembly on 12 gauge stainless steel triangular leg gusset mounting channels on centers not to exceed 48" in length and fully welded to the cabinet body. Mount counter assembly on 6" high 1 5/8" diameter 16 gauge stainless steel tubular legs with stainless steel adjustable bullet feet fully weld legs to mounting gussets. Provide 6" high recessed toe base on customers side and exposed ends fabricated of $\frac{3}{4}$ " thick 5-7 ply marine grade plywood faced with 14 gauge stainless steel.

ITEM #29 MICROWAVE
Quantity: One (1)
Manufacturer: Panasonic / ACP
Model: NE-1054F

ITEM #30 P.O.S. SYSTEM

FOOD SERVICE EQUIPMENT

Quantity:	One (1)
Sup Info:	Not in Foodservice Equipment contract, furnished by the Owner.
ITEM #X-01	EXISTING EXHAUST HOOD
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; to be removed.
ITEM #X-03	EXISTING CONVECTION STEAMER
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; to be removed.
ITEM #X-04	EXISTING 6-BURNER RANGE
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; to be removed.
ITEM #X-05	EXISTING WORK TABLE
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; to be removed.
ITEM #X-06	EXISTING SANDWICH PREP REFRIGERATOR
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.
ITEM #X-07	EXISTING WORK TABLE
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; to be removed.
ITEM #X-08	EXISTING WORK TABLE
Quantity:	One (1)
Sup Info:	Modify to include casters w/brakes
	Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.
ITEM #X-09	EXISTING HAND SINK
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.
ITEM #X-10	EXISTING MIXER
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.
ITEM #X-11	EXISTING WIRE SHELVING
Quantity:	One (1)
Sup Info:	Refer to Specification Section 2.6, Standards for Existing Equipment; to be removed.
ITEM #X-12	EXISTING WIRE SHELVING
Quantity:	One (1)

FOOD SERVICE EQUIPMENT

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; to be removed.

ITEM #X-13 EXISTING REACH-IN REFRIGERATOR

Quantity: One (1)

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.

ITEM #X-14 EXISTING REACH-IN FREEZER

Quantity: One (1)

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.

ITEM #X-15 EXISTING POPCORN MACHINE

Quantity: One (1)

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.

ITEM #X-16 EXISTING WARMING DISPLAY CASE

Quantity: One (1)

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.

ITEM #X-17 EXISTING PANINI MAKER

Quantity: One (1)

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.

ITEM #X-18 EXISTING ICE MAKER W/ BIN

Quantity: One (1)

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.

ITEM #X-19 EXISTING DISPLAY REFRIGERATOR

Quantity: One (1)

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; survey the existing item of equipment to be reused to determine the extent of reconditioning or repairs necessary to place equipment in proper working order.

ITEM #X-20 EXISTING P.O.S. SYSTEM

Quantity: One (1)

Sup Info: Refer to Specification Section 2.6, Standards for Existing Equipment; to be removed.

END OF SECTION 11 40 00

SECTION 12 24 13 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Manually operated roller shades with single rollers with double rollers.

- B. Related Requirements:

- 1. Division 06 Section "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
 - 2. Division 07 Section "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations. Include project specific mounting details.

- C. Samples: For each exposed product and for each color and texture specified, 10 inches long.

- D. Roller-Shade Schedule: Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Certificates: For each type of shadeband material, signed by product manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, Roller Window Shades incorporated into the project shall be based on products as manufactured by Mecho Shade Systems, Inc.:
 - 1. Manual Shades: "Mecho/5."
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design manufacturer, Contractor may provide products from the following manufacturers that meet or exceed the published data of the specified Basis of Design product:

1. Draper Inc.
2. Hunter Douglas Contract.
3. Lutron Electronics Co., Inc.

C. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Nickel-plated metal.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.

B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of inside face of shade.
2. Direction of Shadeband Roll: Regular, from back of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

D. Shadebands:

1. Shadeband Material: Light-filtering fabric.
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.

E. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 3 inches.
2. Endcap Covers: To cover exposed endcaps.
3. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 - 1. Source: Roller-shade manufacturer.
 - 2. Type: PVC-coated polyester.
 - 3. Weave: Basketweave.
 - 4. Roll Width: As indicated on Drawings.
 - 5. Openness Factor: 1 percent.
 - 6. Color: As selected by Architect from manufacturer's full range.
- C. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.
 - 1. Source: Roller-shade manufacturer.
 - 2. Type: Fiberglass with acrylic backing.
 - 3. Thickness: .012".
 - 4. Weight: .81 lbs/sy.
 - 5. Roll Width: As indicated on Drawings.
 - 6. Color: As selected by Architect from manufacturer's full range.

2.4 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:
 - 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 ROLLER-SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass.
Allow clearances for window operation hardware.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 12 24 13

SECTION 12 32 16 - PLASTIC-LAMINATE-FACED CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes plastic-laminate-faced cabinets and accessories of stock design and modified as indicated.
- B. Related Requirements:
 - 1. Division 06 Section "Rough Carpentry" for wood blocking for anchoring casework.
 - 2. Division 06 Section "Finish Carpentry" for "plastic-laminate-clad countertops" and for "simulated stone countertops".
 - 3. Division 09 Section "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring casework.
 - 4. Division 09 Section "Resilient Base and Accessories" for resilient base applied to plastic-laminate-faced casework.
 - 5. Division 22 Sections for sinks installed in plastic laminate-faced casework.

1.3 ALTERNATE BIDS

- A. Plastic-Laminate-Faced Casework as manufactured by Stevens Industries, Inc. is included in the Base Bid. Provide alternate prices for the change in cost to provide the alternate manufacturers products in the space provided on the Bid Form for items of work as scheduled hereinafter, and in accordance with the following requirements:
 - 1. All work to be performed under accepted alternate prices shall conform to the applicable Contract Documents, and shall include all work in connection with or consequent to the alternate price work to produce a complete installation. Work associated with countertops in rooms with plastic-laminate-faced casework shall be considered part of the Alternate Bid Series.
 - 2. Alternate prices shall be all inclusive of the cost of materials, work and profit, supervision, administration, and any and all other costs in connection therewith for work in place and accepted or omitted as the case may be, and shall hold for the same period as the bid.
 - 3. Coordinate related work and modify or adjust adjacent work as necessary to ensure that work affected by the accepted Alternate is complete and fully integrated into the project. All costs to modify or adjust the adjacent work of other trades for a complete installation shall be included in the Alternate Bid.

1.4 DEFINITIONS

- A. Definitions in the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" apply to the work of this Section.

1.5 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details, including field joints and filler panels. Indicate manufacturer's catalog numbers for casework.
- C. Keying Schedule: Include schematic keying diagram and index each key set to unique designations that are coordinated with the Contract Documents.
- D. Samples for Initial Selection: For cabinet finishes.
- E. Samples for Verification: 8-by-10-inch Samples for each type of finish.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Quality Standard: AWI Certified manufacturer.
- C. Sample Warranty: For special warranty.

1.8 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review specification requirements.
 - 2. Review installation procedures.
 - 3. Inspect project conditions.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Field Conditions" Article.
- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating or adequate temporary controls are in place to maintain temperature and relative humidity at occupancy levels during the remainder of the construction period. Maintain temperature and relative humidity during the remainder of the construction period in range recommended for Project location by the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of components or other failures of glue bond.
 - b. Warping of components.
 - c. Failure of operating hardware.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Subject to compliance with requirements, Plastic-Laminate-Faced Casework incorporated into the project based on products as manufactured as follows:
 - 1. Stevens Industries, Inc.; "1200 Series" and items scheduled on the Drawings.
- B. Alternate Bid Manufacturers: The alternate bid manufacturers listed shall provide products in accordance with this section and products that meet the minimum standards of quality of the Basis of Design manufacturer's specified product. Provide Plastic-Laminate-Faced Casework from the following manufacturers as included in Alternate Series A1200.
 - 1. Base Bid: Stevens Advantage Furnishings.
 - 2. Alt. No. A1201: Case Systems.
 - 3. Alt. No. A1202: TMI Systems Design Corporation.
- C. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.2 CASEWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.
 - 1. Grade: Premium.
- B. Product Designations: Drawings indicate sizes, configurations, and finish materials of manufactured plastic-laminate-faced cabinets by referencing basis of design manufacturer's catalog numbers. Alternate bid manufacturers' casework shall be of equal or approximate sizes, door and drawer configurations, same finish materials, and comply with the Specifications.

2.3 CASEWORK

- A. Design:
 - 1. Flush overlay.
- B. Grain Direction for Wood Grain Plastic Laminate:
 - 1. Vertical on doors, horizontal on drawer fronts.
 - 2. Lengthwise on face frame members.
 - 3. Vertical on end panels.
 - 4. Side to side on bottoms and tops of units.
 - 5. Vertical on knee-space panels.
 - 6. Horizontal on aprons.
- C. Exposed Materials:
 - 1. Plastic Laminate: Grade HGS.
 - a. Colors and Patterns: As selected by Architect from manufacturer's full range.
 - 2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.
- D. Semiexposed Materials:
 - 1. Plastic Laminate: Grade VGS unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
 - a. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.
 - 2. Hardboard: Use only for cabinet backs where exterior side of back is not exposed.
 - 3. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.
- E. Concealed Materials:
 - 1. Solid Wood: Any hardwood or softwood species, with no defects affecting strength or utility.
 - 2. Plywood: Hardwood plywood.
 - 3. Plastic Laminate: Grade BKL.
 - 4. Particleboard.
 - 5. MDF.

2.4 MATERIALS

- A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
- B. Hardwood Plywood: HPVA HP-1, particleboard core except where veneer core is indicated.
- C. Softwood Plywood: DOC PS 1.
- D. Particleboard: ANSI A208.1, Grade M-2.
- E. MDF: ANSI A208.2, Grade 130.
- F. Hardboard: ANSI A135.4, Class 1 Tempered.
- G. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
- H. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.
- I. Glass for Glazed Doors: Clear laminated tempered glass complying with ASTM C 1172, Kind LT, Condition A, Type I, Class I, Quality-Q3; with two plies not less than 3.0 mm thick and with clear, polyvinyl butyral interlayer.

2.5 COLORS AND FINISHES

- A. Plastic-Laminate Colors, Patterns, and Finishes: As selected by Architect from plastic-laminate manufacturer's full range in the following categories:
 - 1. Solid colors.
 - 2. Wood grains.
 - 3. Patterns.
- B. PVC Edgebanding Color: As selected from casework manufacturer's full range.
- C. A maximum of 10 laminates will be selected and a maximum of 4 edgebands will be selected.

2.6 FABRICATION

- A. Construction: Provide plastic-laminate laboratory casework of the following minimum construction unless noted otherwise:
 - 1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch- thick particleboard.
 - 2. Sink Bases: 3/4-inch – thick plywood.
 - 3. Shelves: 3/4-inch- thick particleboard up to 36 inches in length and 1-inch-thick particleboard for shelves 36 inches and longer.
 - 4. Exposed Backs of Cabinets: 1/2-inch- thick particleboard or MDF.
 - 5. Backs of Cabinets: 1/4-inch MDF.
 - 6. Mounting Frames: 3/4-inch- thick particleboard with a minimum of two dowel pins per frame end joint.
 - 7. Boxes (toe kicks): 3/4-inch exterior grade plywood.
 - 8. Glazed Door Frames: 3/4-inch, one-piece panel with cutout for insertion of glass pane, held in place with extruded two trim mounting with removable back bead.

9. Drawer Fronts: 3/4-inch- thick particleboard.
10. Drawer Sides and Backs: 1/2-inch- thick particleboard.
11. Drawer Bottoms: 1/4-inch MDF glued and dadoed into front, back, and sides of drawers.

- B. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

2.7 CASEWORK HARDWARE AND ACCESSORIES

- A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard finish, commercial-quality, heavy-duty hardware.

1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.
2. Color and finish to be selected from manufacturer's full range of colors and finishes.

- B. Butt Hinges: Steel, semiconcealed, five-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide two hinges for doors less than 48 inches high, and provide three hinges for doors more than 48 inches high.

- C. Pulls: Solid wire pulls, fastened from back with two screws. For sliding doors, provide recessed stainless-steel or chrome-plated flush pulls. Provide two pulls for drawers more than 24 inches wide.

- D. Door Catches: Nylon-roller spring catch. Provide two catches on doors more than 48 inches high.

- E. Drawer Slides: BHMA A156.9, Type B05091.

1. Standard Duty (Grade 1): Side mounted and extending under bottom edge of drawer; full-extension type; epoxy-coated steel with polymer rollers.
2. Box Drawer Slides: Grade 1HD-100, for drawers not more than 6 inches high and 24 inches wide.
3. File Drawer Slides: Grade 1HD-100, for drawers more than 6 inches high or 24 inches wide.

- F. Drawer and Hinged Door Locks: Cylindrical (cam) type, five-pin tumbler or deadbolt type, 6 tumbler, brass with chrome-plated finish, and complying with BHMA A156.11, Grade 1.

1. Provide a minimum of two keys per lock and six master keys.
2. Provide locks on all doors and drawers.
3. Keying: Key locks alike within each room, key each room the same unless otherwise noted.

- G. Sliding-Door Hardware Sets: Injection-molded clear polycarbonate with integral lock tabs to secure shelf.

1. Adjustment Spacing: 1-1/4 inches.
2. Loading Capacity: 200 lbs per support.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 CASEWORK INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Install casework level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch.
- E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
- F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 CLEANING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 12 32 16

SECTION 12 54 15 – DINING FACILITIES FURNITURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Dining chairs.
 - 2. Dining tables.
 - 3. High top chairs.
 - 4. Restaurant booths.

1.3 ACTION SUBMITTALS

- A. Product Data: For each furniture item, provide the following information:
 - 1. Manufacturer and model number.
 - 2. Physical dimensions.
 - 3. Submit written data on physical characteristics, load bearing capabilities and durability.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and mounting and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Detail fabrication and assembly if required in the field for installation.
- C. Samples: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish and fabric for each piece of furniture.
 - 1. Finish Samples: Submit 6-inch by 6-inch samples of wood, laminate, or metal finishes.
 - 2. Upholstery Samples: Submit full-size manufacturer's memo samples of each specified fabric or vinyl upholstery, showing color and texture.
 - 3. Samples for Initial Selection: For cabinet finishes.
 - 4. Samples for Verification: 8-inch by 10-inch Samples for each type of finish.

1.4 INFORMATIONAL SUBMITTALS

- A. Test and Evaluation Reports.
 - 1. Material test reports.
 - 2. Product test reports.
 - 3. Research reports.

DINING FACILITIES FURNITURE

- B. Source Quality-Control Submittals:
 - 1. Source quality-control reports.

- C. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance contracts.
- B. Operation and maintenance data.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer's Qualifications: Company (material producer) with not less than 5 years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section.
 - 2. Installer's Qualifications: Company approved by furniture manufacturer that specializes in furniture installation with not less than 3 years of experience in installation similar to those required for this Project.
 - 3. Single Source Responsibility: Provide material produced by a single manufacturer for all dining furniture.

1.7 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components of dining furniture that fail(s) in materials or workmanship within specified warranty period.
 - 1. Warranty Period: One (1) year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, dining facility furniture incorporated into the project shall be based on the following products:
 - 1. Dining Chairs: model #RFC-ERAT-477 as manufactured by Restaurant Furniture.
 - 2. Dining Tables: model #RFC-REVER-TT-OW-SET as manufactured by Restaurant Furniture.
 - 3. High Top Chairs: model #RFC-ERAT-477BS as manufactured by Restaurant Furniture.
 - 4. Restaurant Booth Tables: model #RFC-REVER-TT-OW-SET as manufactured by Restaurant Furniture.
 - 5. Restaurant Booths: model RFC-BT-NK-W as manufactured by Restaurant Furniture.
- B. Acceptable Manufacturers: Subject to compliance with requirements, in lieu of the Basis of Design products, Contractor may provide products from a manufacturer that meet or exceed the published data of the specified Basis of Design products. All products shall be single-sourced and manufactured in the United States.

2.2 DINING FURNITURE

A. Dining Chairs:

1. Construction: Welded steel frame with curved/molded wood seatback and seat.
2. Frame: Heavy-duty, fully welded steel frame with epoxy powder coated finish.
3. Seat and back: Solid wood with a hardwood veneer and durable factory finish.
4. Glides: Provide manufacturer's standard non-marring floor glides suitable and compatible with specified luxury vinyl tile flooring.
5. Weight capacity: 500 lbs.
6. Dimensions:
 - a. Height: 33 inches.
 - b. Depth: 20 inches.
 - c. Width: 21 inches.
 - d. Seat size: 17 1/2 inches x 15 inches.
7. Color and finish: As selected by Architect from full range of available colors and finishes for wood and metal components.

B. Dining Tables:

1. Construction: Welded steel frame with durable laminate top.
2. Base: Heavy-duty, fully welded steel base/column with epoxy powder coated finish.
3. Tops: Decorative high-pressure laminate on minimum 1-1/8-inch-thick particle core top with T-mold edge.
4. Glides: Provide manufacturer's standard non-marring floor glides suitable and compatible with specified luxury vinyl tile flooring.
5. Dimensions:
 - a. Height: 30 inches.
 - b. Diameter: 42 inches and 60 inches as indicated on Drawings.
6. Color and finish: As selected by Architect from full range of available colors and finishes for laminate, T-mold edging, and metal base.

C. High Top Chairs:

1. Construction: Welded steel frame with curved/molded wood seatback and seat and integrated footrest that is integral part of the frame.
2. Frame: Heavy-duty, fully welded steel frame with epoxy powder coated finish.
3. Seat and back: Solid wood with a hardwood veneer and durable factory finish.
4. Glides: Provide manufacturer's standard non-marring floor glides suitable and compatible with specified luxury vinyl tile flooring.
5. Weight capacity: 500 lbs.
6. Dimensions:
 - a. Height: 46 inches.
 - b. Depth: 18 inches.
 - c. Width: 20 inches.
7. Color and finish: As selected by Architect from full range of available colors and finishes for wood and metal components.

DINING FACILITIES FURNITURE

D. Restaurant Booth Table:

1. Construction: Welded steel frame with curved/molded wood seatback and seat.
2. Base: Heavy-duty, fully welded steel base/column with epoxy powder coated finish.
3. Tops: Decorative high-pressure laminate on minimum 1-1/8-inch-thick particle core top with T-mold edge.
4. Glides: Provide manufacturer's standard non-marring floor glides suitable and compatible with specified luxury vinyl tile flooring.
5. Dimensions:
 - a. Height: 33 inches.
 - b. Length: 48 inches.
 - c. Width: 30 inches.
6. Color and finish: As selected by Architect from full range of available colors and finishes for laminate, T-mold edging, and metal base.

E. Restaurant Booth:

1. Construction: Heavy-duty, wood base with padded seat and back.
2. Base: Enclosed, heavy-duty, kiln-dried hardwood or plywood construction with integrated leveling glides that are concealed from view.
3. Padding: High-density foam with commercial-grade upholstery.
4. Features: Provide with head roll. Welt cord, crumb strip, and laminated top and end caps.
5. Dimensions:
 - a. Height: 33 inches.
 - b. Length: 48 inches.
6. Color and finish: As selected by Architect from full range of available colors and finishes for exposed wood surfaces, laminates, and fabric for seat and seatback.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation of dining furniture, examine all areas and conditions where the furniture will be installed.
- B. Verify that all furniture components, including size and finish, are those specified before installing.
- C. Report any conditions that might adversely affect installation or performance to the Architect. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install furniture in strict accordance with the manufacturer's instructions and approved shop drawings.
- B. Positioning: Locate furniture as indicated on the furniture layout drawings.

- C. Anchorage: Securely anchor all fixed seating (booths) to the building structure, coordinating with adjacent construction. Ensure all bracing and blocking are in place prior to installation.
- D. Leveling: Adjust all leveling glides on tables and freestanding seating to ensure stable and level positioning.

3.3 CLEANING

- A. At the completion of the installation, remove all protective packaging and leave the furniture surfaces clean and free of blemishes. Dispose of all packaging and materials remaining from the installation.

3.4 PROTECTION

- A. Protect furniture against damage during remainder of construction period. Contractor shall provide additional protection directed by the Architect or Owner at no additional cost as deemed necessary to ensure that furniture will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 12 54 15

SECTION 14 21 23.71 – HYDRAULIC ELEVATOR REHABILITATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes rehabilitation of the existing hydraulic passenger elevator for a complete working system and shall include the furnishing of all labor, materials, tools, equipment, and services required to provide a complete elevator modernization and upgrade. The existing car is intended to be maintained apart from replacing the car controller, flooring, and doors and hoistway entrances.
- B. "Work" as specified herein and as indicated on the Drawings.
- C. Related Requirements:
 - 1. Division 09 Section "Resilient Tile Flooring" for new LVT flooring in elevator car.
 - 2. Electrical Drawings and Division 26, 27, and 28 Sections for telephone service for elevators, for connection to elevator controllers, remote monitoring of elevator, fire alarm requirements, etc.

1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.
- B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.4 STIPULATION

- A. Elevator supplier/installer is responsible for the requirements set forth in this Section, and for coordinating the elevator rehabilitation in a manner that maintains the Project schedule (including the elevator being approved for use by all regulatory authorities having jurisdiction, prior to Substantial Completion of the phase in which this work occurs).

1.5 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include Product Data for car enclosures, hoistway entrances, and operation, control, and signal systems.

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B. Shop Drawings:

1. Provide project specific drawings that indicate all spaces adjacent to elevator, including walls, floors, pit, and roof, showing the actual thickness of materials and relevant details. Include plans, elevations, sections, and large-scale details indicating service at each landing, coordination with building structure, relationships with other construction, and locations of equipment. Drawings shall not be stock details.
2. Include large-scale layout of car-control station.
3. Identify requirements associated with the Basis of Design products. Where an acceptable manufacturer's products is provided, identify all deviations from the Basis of Design products in writing and coordinate all revisions required and confirm the same in writing.
4. Indicate electrical, power, communication, and fire protection requirements.
5. Car and hoistway doors, operating equipment and all signal and operating equipment.

C. Samples for Initial Selection: For finishes involving color selection.

D. Samples for Verification: For hoistway door and frame, and signal equipment finishes; 3-inch-square Samples of sheet materials; and 4-inch lengths of running trim members.

E. A complete set of approved drawings, signed and sealed by the elevator supplier and installer.

F. Filing for and obtaining all permits and warranties from regulatory authorities having jurisdiction.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Supplier Certificates: Signed by elevator supplier/installer certifying that hoistway, pit, and machine room layout and dimensions, as indicated on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

C. Owner/Operation Manuals: Contractor shall submit operation and maintenance manuals for approval. After Owner approval and prior to the beginning of acceptance testing, approved manuals shall be provided by the Contractor, in accordance with Division 01 requirements. The manuals shall include the following:

1. Equipment and components, descriptive literature.
2. Performance data and model numbers.
3. Installation instructions.
4. Operating instructions.
5. Maintenance, lubrication and repair instructions.
6. Troubleshooting techniques.
7. Spare parts lists and current price lists.
8. Detailed, record and as-built drawings.
9. Detailed, as-built, one line, wiring diagrams. Provide one (1) complete set per manual.
10. Field test reports.
11. Complete set of contract software.
12. Six (6) keys for each new key-operated device that is provided.
13. Diagnostic tools configured to perform at all levels.

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14. The contractor shall provide certification, in writing and signed by an officer of the organization, that the owner of the elevators shall be provided with copies of any and all information, correspondence, bulletins, newsletters, manuals, techniques, procedures, drawings, sketches and any other documents related to maintenance, safety, operations, design changes, modifications, retrofits, etc., which relate to any part, component, equipment, system, subsystem or material and services applicable to the elevators provided.
 15. The aforementioned shall be provided as it pertains to the original installation and for a period of ten (10) years after Substantial Completion.
 16. The reference material shall be provided within thirty (30) days of publication or internal distribution by the manufacturer. The material, even if labeled PROPRIETARY, shall be delivered to the Owner without prejudice or delay and at no additional cost.
- D. Machine Room: Provide complete set of "As-Built" field wiring and straight line wiring diagrams showing all electrical circuits in the hoistway as well as the machine room. These diagrams shall be laminated and provided in each elevator machine room as directed.
- E. Sample Warranty: For special warranty.
- F. Schedule: Provide milestones required for elevator to be installed and approved in accordance with the project schedule.
- G. Maintenance Service Agreement conforming to the requirements of this Section.
- 1.7 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
1. Submit manufacturer's or Installer's standard operation and maintenance manual, according to ASME A17.1/CSA B44, including diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- C. Maintenance Service Agreement: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one-year (12 months) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.
- D. Diagnostics and Spare Parts: Prior to Substantial Completion, the Contractor shall provide items listed which shall become the Owner's property.
1. All diagnostics shall be integral with the microprocessor control equipment provided. All levels of diagnostics shall be available, at no additional cost, for the complete maintenance of all aspects of the control and dispatch system. All such systems shall be free from secret codes and decaying circuits that must be periodically reprogrammed by the manufacturer.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator equipment manufacturer or an authorized representative who is trained and approved by equipment manufacturer who has at least 10 years of successful experience with the installation of similar elevators and is within 40 miles of the Project site. Installer shall guarantee, in writing, a minimum response time for any emergency call of 60 minutes or less. No exceptions.

1.9 PRE-INSTALLATION MEETINGS

- A. Initial Coordination Conference: Conduct conference at project site prior to installation of elevator pit foundations.
 - 1. Meet with Owner, Elevator Supplier/Installer, and Contractors.
 - 2. Review approved project specific shop drawings.
 - 3. Review specification requirements.
 - 4. Review Project schedule. Elevator manufacturer shall provide milestones required to meet the schedule and Substantial Completion requirements.
 - 5. Identify all regulatory requirements relevant to the construction of electrical, communications, and life safety systems to be installed as part of the Work.
- B. Pre-Installation Conference: Conduct conference at project site no less than one month prior to scheduled installation date for elevator.
 - 1. Meet with Owner, Elevator Supplier/Installer, and Contractors.
 - 2. Confirm all construction is in compliance with manufacturer's requirements and regulatory requirements. Identify all issues in writing.
 - 3. Confirm initial schedule provided will be maintained. Identify measures to be taken by elevator manufacturer to mitigate time lost (night and weekend work, etc.) if elevator does not ship in accordance with schedule or if elevator contractor delays installation from initial schedule.
 - 4. Review elevator staging and installation requirements. Identify any concerns with installation.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.11 COORDINATION

- A. Coordinate installation of inserts, sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, inserts, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of work specified in other Sections that relates to elevators rehabilitation including fire protection, electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.
- C. Coordinate requirements of all regulatory agencies having jurisdiction.

1.12 WARRANTY

- A. Warranty: Elevator equipment supplier and manufacturers agree to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Any defective work (labor and material) shall be repaired or replaced at no additional cost to the Owner.
 - 3. Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Only products of individuals, firms or corporations regularly engaged in upgrading and/or replacing similar elevators that have been in continuous operation for a period of not less than ten (10) years will be permitted. Contractor shall have an office within forty (40) miles of the Project. There shall be no logos or contractors/manufacture's identification or nameplates within the elevator car or hallways.
- B. Should a conflict exist between the specifications, drawings or field conditions, the Contractor shall submit details of such conflicts at least seven (7) days prior to submitting a bid. No deviations are allowed without prior written approval. Any substitutions to the specified product must be presented prior to the submission of a bid and with the understanding that no substitutions will be allowed after contract award.
- C. Controller Manufacturers:
 - 1. G.A.L. Galaxy
 - 2. Motion Control Engineering (MCE)
 - 3. Virginia Controls
- D. Signal Manufacturers
 - 1. Elevator Products Corporation (EPCO)
 - 2. G.A.L. Galaxy
 - 3. Innovation Industries
 - 4. MAD Elevator, Inc.
- E. Machine Manufacturers
 - 1. Hollister-Whitney
- F. Pump Unit
 - 1. Minnesota Elevator Inc. (MEI)

G. Door Equipment

1. G.A.L. Galaxy.
2. Doors (car and hoistway):
 - a. Columbia Elevator.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with current ASME A17.1/CSA B44 and governing PA Elevator Code. In the event of any discrepancy between codes, manufacturer shall confirm which requirement governs the installation. Manufacturers shall be prepared to provide for the more stringent requirements.
- B. Accessibility Requirements: Comply with requirements for accessible elevators in the United States Access Board's ADA-ABA Accessibility Guidelines and with current edition of ICC A117.1.
- C. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 and in accordance with the standards set forth in the PA Elevator Code.
- D. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator seismic requirements in ASME A17.1/CSA B44.

2.3 ELEVATORS

- A. Elevator System, General: Non-proprietary standard elevator systems. Unless otherwise indicated, standard components shall be used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description:
 1. Machine Type: Holed-Hydraulic:
 2. Rated Load: Verify existing properties and provide equipment necessary to maintain capacities.
 3. Rated Speed: Match existing.
 4. Security Features: Keyswitch operation at all call stations not currently served with card readers which shall be retained.
 5. Car Interior:
 - a. Remove existing flooring and provide new resilient tile floor.
 6. Hoistway Entrances:
 - a. Width: Existing to remain.
 - b. Height: Existing to remain.
 - c. Type: Single-speed side sliding.
 - d. Sills: Aluminum.
 7. Hall Fixtures: Satin stainless steel, No. 4 finish.
 8. Power: 480 Volt, 3-phase.

9. Additional Requirements:

- a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.

2.4 SYSTEMS AND COMPONENTS

- A. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 1. Pump is submersible type with submersible squirrel-cage induction motor, and suspended inside oil tank from vibration isolation mounts.
 2. Motor: The motor shall be solid-state starting, variable-voltage motor control, and shall be of a design especially adapted to electro-hydraulic requirements. Motor H.P. 25, with 480-volt, 3 phase reduced voltage starter.
- B. Hydraulic Silencers: System has hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
- C. Piping: Size type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
 1. Cylinder units are connected with dielectric couplings.
- D. Hydraulic Fluid:
 1. Hydraulic Fluid, Manufacturer's Standard: Elevator manufacturer's standard fire-resistant fluid with additives as needed to prevent oxidation of fluid, corrosion of cylinder and other components, and other adverse effects.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.
- F. Car Frame and Platform: Welded steel units.
- G. Guides: Polymer-coated, nonlubricated sliding guides or sliding guides with guide-rail lubricators. Provide guides at top and bottom of car frame.

2.5 OPERATION SYSTEMS

- A. General: Provide non-proprietary microprocessor operation systems as required to provide type of operation indicated.
- B. Non-Proprietary Microprocessor Control
 1. Activation by keyswitch, card reader, or hall button shall bring car to corresponding landing. After car stops in response to hall call, a time relay shall render car inoperative from hall controls, for a predetermined interval. Presentation of card-to-card reader or activation by keyswitch at the landing where the car is standing shall cause the door to open.
 2. The following features shall be incorporated into the control system:
 - a. Heavy Up Incoming Traffic
 - b. Heavy Down Traffic
 - c. Two Way Traffic Conditions
 - d. Delayed Car Feature

- e. Adjustable Door Dwell Time
 - f. Fire Service Phase I & II
 - g. Anti-Nuisance Operation
 - h. Load Weighing Bypass
 - i. Nudging
 - j. Hoistway access top and bottom
 - k. Security features to include car and hall call lockouts
 - l. Voice Annunciation
 - 3. Car and hoistway doors shall open automatically when car stops in response to a car or hall call.
 - 4. Doors shall close after a predetermined interval after opening unless closing is interrupted by car door reversal device or door open button in car.
 - 5. Fire Service Control shall override any Special Service Operation.
- C. Security features shall not affect emergency firefighters' service.
- 1. Keyswitch Operation: System uses keyswitches in lieu of hall push-button stations to authorize calls. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers.
 - a. Master keyswitch shall permit operation by hall buttons or by keyswitch only.
- D. Independent Service: Provide controls to remove elevator from normal operation and provide control of the elevator from car buttons only. Car shall travel at contract speed and shall not respond to corridor calls.
- E. Car Top Operation: Provide new inspection and maintenance control station mounted on cartop. Station shall include up and down buttons, inspection operation button, stop switch, GFI duplex outlet, work light and guard along with audible and visual signal to comply with fire service control.
- F. Emergency Recall Operation (Fire Service): Provide equipment and operation per applicable Code requirements. Provide a three-position key switch, marked "RESET-OFF-ON", at the main fire egress lobby. Any additional switches for control panels of alternate recall floors are to be two-position, marked "OFF-ON". All elevators shall be provided with Phase II operation. Contractor shall provide relays, wiring, and terminal strips to receive signals from ionization detectors.
- G. Emergency Car Lighting and Alarm System: Unit shall provide emergency light in car upon failure or interruption of normal car lighting. Emergency lighting unit shall provide a minimum illumination of 0.2 foot-candle at 4 feet above car floor approximately one (1) foot in front of car operating panel for not less than 4 hours. Battery shall be 6-volt minimum, sealed rechargeable lead acid or equal. Battery charger shall be capable of restoring battery to full charge within sixteen (16) hours after resumption of normal power. Provide an external means for testing battery, lamps, and alarm bell.
- H. Door Hold Operation: Provide controls and a button within operating panel, which shall hold the doors open for an adjustable period of 30 to 90 seconds.
- 1. The following shall resume normal door operation:
 - a. Activation of door close button.
 - b. Activation of any floor button within the elevator.
 - c. Expiration of time period.

2.6 OPERATION PERFORMANCE

- A. The control system shall provide smooth acceleration and deceleration with 1/8" leveling accuracy at all landings, from no load to full rated load in the elevator, under normal or unloading conditions. The self-leveling shall, within its zone, be entirely automatic and independent of the operating device and shall correct for overtravel and undertravel. The car shall remain at the landing irrespective of load. Clearance between the car sill and the hoistway landing shall not exceed 1-1/4 inch.
- B. The door open time for elevators is not to be less than 3.0 fps.
- C. The door close time shall be based on the Code requirements with a door delay feature. The door delay is the minimum acceptable time from notification that a car is answering a call (lantern and audible signal) until the doors of the car start to close. Time shall be calculated by the following equation:
 - 1. $T = D/(1.5\text{ft/s})$
 - 2. T = Total time in seconds.
 - 3. D = Distance from a point in the lobby sixty (60) inches directly in front of the hall station to the centerline of the door opening.
- D. Car Call: The minimum acceptable time for doors to remain fully open shall not be less than 5 seconds.
- E. The speed of the elevator shall not vary +/- 5% under loading conditions.
- F. Elevators shall be statically and dynamically balanced. With empty car, maximum pressure on any roller guide shall not exceed ten (10) pounds, with the elevator located at any point in the hoistway.
- G. Prior to final acceptance and prior to the termination of the maintenance period, the elevators shall be adjusted as required to meet performance requirements.

2.7 HOISTWAY EQUIPMENT

- A. Guide Rails: Existing guide rails are to be retained. The rails and brackets are to be examined and re-secured as necessary. The machine surface of the rails is to be thoroughly cleaned. All rail joints shall be filed smooth and the alignment checked and adjusted as necessary to within 1/8" top to bottom and face-to-face. The unmachined portion of the rails are to be cleaned and painted.

2.8 DOOR REOPENING DEVICES

- A. Infrared Array: Provide 3D door reopening device as stated below, with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.
- B. Door Operator: New GAL MOVFR II closed loop operator. Door operator shall be adjusted as required to comply with manufacturer's performance requirements. Car header, drive arm, linkage, clutch, gate switch, and all necessary hardware shall be replaced. Heavy-duty master, close loop electric power door operator to automatically open and close the car and hoistway doors shall be provided. The doors shall be capable of smooth and quiet operation without slam or shock.
 - 1. Opening speed shall not be less than 3.0 f.p.s.
 - 2. Hoistway doors shall be automatically closed by an auxiliary closing device if car leaves the landing zone.
 - 3. In case of power interruption, it shall be possible to manually operate car and hoistway doors from inside the cab.

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4. Door Protection:
 - a. Electronic Detector Screen: Provide 3D electronic door edge device, which projects an infrared curtain of light guarding the door opening. Arrange to reopen doors if one beam of the curtain is penetrated. Unit shall have Transmitters and Receivers spaced at a minimum distance to provide the maximum amount of protection within the height of the doorway. Systems which have the availability to turn Off or On individual zones within the curtain are not permitted.
 5. Differential door timing feature: Provide adjustable timers to vary the time that the doors remain open in response to a car or hall call. The doors shall remain open for one second in response to a car call and five to eight seconds for a hall call. This time shall be reduced to 2 seconds if door detection is interrupted. The doors shall remain open as long as passengers are crossing the threshold.
 6. Nudging: When doors are prevented from closing for 20 seconds due to failure of the light ray or obstruction, the doors shall close at reduced speed and a buzzer shall sound.
- C. Car Door Contacts: Electrical contacts shall prevent the operation of the elevator by normal operating devices unless car doors are closed or within tolerances allowed by Code.

2.9 EXISTING CAR ENCLOSURES

- A. Car Frame: Retain existing. All components shall be checked and secured.
- B. Platform: Retain existing. Secure or replace any loose or missing hardware. Mitigate all areas of rust and paint with rust inhibiting enamel to match treated area.
- C. Toe Guards: Replace with new to meet code. Paint with two (2) coats of black enamel and stencil elevator number six (6) inches in height.
- D. Tracks, Hangers, and Header: New GAL
- E. Floor Covering: Remove existing flooring, thoroughly clean and prepare subfloor. Repair any areas of the subfloor that are damaged. Install new slip and chemical resistant rubber floor tiles with raised circular pattern. Color selected by Owner.
- F. Passenger Elevator Car Enclosure: Reuse existing. Paint car top, crosshead, and any bare steel with two (2) coats of rust inhibiting black enamel. Stencil elevator number on car top and crosshead. Furnish and install new cab fan.
- G. Provide new car door panels with satin stainless steel, No. 4 finish.
- H. Cab Interiors:
 1. Wall Panels: Existing to remain except as modified for new control panel.
 2. Ceilings: Grid Ceiling with stainless steel frame, translucent panels, and new LED lighting.
 3. Handrails: Existing to remain.
 4. Front returns, transom, and columns: Existing to remain.

2.10 EXISTING HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
 - 1. Fire-Protection Rating: 2 hours.
- C. Fastenings of all entrance equipment shall be inspected and secured.
- D. Sills shall be inspected, cleaned, and polished.
- E. Retain door panels and provided new SEES enforcer gibs. Doors shall be provided with new rubber bumpers.
- F. Existing fascia, dust covers, hanger covers and hoistway toe guards are to be retained. Replace any missing components. All equipment shall be cleaned, inspected and reinforced. Any missing components are to be provided with new compatible products. All equipment required to be painted with black enamel. Six (6) inch high numerals designating the appropriate floor shall be stenciled at six (6) foot intervals.
- G. Existing stainless steel frame assembly and frame wraps to remain at all stops.
- H. Provide new die cast jamb markings on the sides of each entrance frame and mounted sixty (60) inches from the finish floor in compliance with current accessibility standards. Each marking shall be a minimum of two (2) inch high numerals with Braille.
- I. All door tracks, hangers, interlocks, and closers shall be replaced with new GAL equipment. Strut angles and headers may be retained. Clean and mitigate any rust and treat with rust inhibiting paint.
- J. The car and hoistway doors shall be confirmed or corrected so that the doors cannot be opened more than four (4) inches from within the car when the car is outside the unlocking zone in accordance with ANSI A.17.1.
- K. New door stops and rubber bumpers shall be mounted to the top and bottom of each strut angle in order to cushion and limit extreme travel of the door panels.

2.11 SIGNAL EQUIPMENT

- A. General: Provide new car-call buttons that light when activated and remain lit until call has been fulfilled. Provide buttons and lighted elements illuminated with LEDs. All devices shall be vandal-resistant.
- B. Car-Control Stations: Provide new recessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.
 - 1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille.
 - 2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.

3. Panels shall have illuminating pushbuttons numbered to conform to floors served. Buttons shall light to show registration and extinguish when car stops in response to a call. Buttons shall be raised 1/8 inch above the faceplate. Panel shall include an alarm bell button, DOOR OPEN and DOOR CLOSE button. All operating controls shall be located no higher than 48 inches above the car floor and 35" for alarm button. Provide Phase II emergency fire service switch, fire jewel and ADA telephone. Provide oversized panel if necessary due to the size of the existing cutout.
 - a. Braille designations shall be die cast and flush with inconspicuous mechanical mounting.
 - b. The plaques shall have numerals and background in a finish selected by the architect/owner.
4. Fire Service Phase I & II requirements using the key acceptable to local authorities having jurisdiction.
5. Provide within panel a service cabinet with a locked flush hinged door and integral certificate frame.
 - a. Certificate Frame shall have durable Plexiglas window and be accessible from backside of locked door. Minimum window size to be 7" wide by 3" high.
 - b. Cabinet shall contain the following key switch type controls:
 - 1) A light switch
 - 2) Two speed fan switch
 - 3) Inspection switch, conforming with the ANSI Code
 - 4) Independent service switch.
 - 5) A duplex 110-volt, A.C. convenience outlet
 - 6) Fire Service keyswitch
 - 7) Two (2) spare switches
 - 8) Hoistway Access Enable
 - 9) Emergency Light Test
6. Engrave the car operating panels with the following:
 - a. No Smoking. Minimum one (1) inch high lettering
 - b. In Case of Fire Do Not Use Elevator
 - c. Elevator Number: Minimum one (1) inch high lettering
 - d. Elevator Capacity: Minimum one (1) inch high lettering
 - e. Firefighters Operating Instructions. Minimum 1/8 inch high lettering.
- C. Provide hoistway access top and bottom. Card reader shall be mounted in location approved by the Owner.
- D. Any fixtures not used and not covered by other work included in the scope shall be covered with a stainless steel #4 plate.
- E. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System shall be contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
 1. Telephone System: Provide new ADA compliant hands free telephone integral with the car operating panel.
 2. Provide engraved emergency instructions above the activation button. Instructions in braille shall be provide below the engraved instructions.

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3. Provide a visual indication that consists of a jewel that illuminates once the master station has received a call. Instructions under the visual indicator or within the lighted jewel shall read: "WHEN FLASHING HELP IS ON THE WAY".
 4. Provide two-way communication between the elevator car and the elevator machine room.
 5. Provide wiring from car to telephone terminal box in elevator machine room.
- F. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.
- G. Hall Call Stations: Card readers and keyswitches as noted elsewhere in this Section.
- H. Hall Position Indicators: Provide new illuminated, digital-display-type position indicator, located above hoistway entrance at first and second floors. Provide units with flat faceplate and with body of unit recessed in wall.
1. Reuse or modify existing back-box for new indicators.
- I. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.12 FINISH MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, commercial steel, Type B, exposed, matte finish.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, commercial steel, Type B, pickled.
- C. Stainless-Steel Sheet: ASTM A240/A240M, Type 304.
- D. Stainless-Steel Bars: ASTM A276, Type 304.
- E. Aluminum Extrusions: ASTM B221, Alloy 6063.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Contractor shall examine elevator areas for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Contractor shall correct unsatisfactory conditions prior to proceeding with installation.

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- D. Contractor shall verify dimensions of supporting structure at the site by accurate field measurements. The work shall be accurately fabricated and fitted to the structure. The contractor shall confirm through review of drawings and field observations that the clearances and the alignments are proper for the installation of this work.
- E. Contractor shall coordinate work with the work of other trades and provide items to be placed during the installation at the proper time to avoid delays in the overall work. Use contractor's benchmarks where necessary.
- F. Contractor shall review the existing electrical system and verify all conditions for proper installation of this work. Contractor shall verify the size of all feeders and related equipment and furnish all equipment for proper operation. The contractor shall be responsible for furnishing any electrical changes or upgrades required.
- G. Contractor shall perform a full load emergency power test as outlined in the A17.1 Safety Code for Elevators. The test shall also include a full load, full speed run in both directions. The test results shall include observations, amperage draws, and any pertinent results, and shall be drafted in a report for review by the Owner. Testing shall be performed prior to the modernization and within 60 days of the Notice to Proceed.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- F. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.
- G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- H. Locate hall signal equipment for elevators as follows unless otherwise indicated:
 - 1. Place hall lanterns either above or beside each hoistway entrance.
 - 2. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
 - 1. Schedule tests and inspections to be performed ahead of substantial completion date for the elevator work.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.
- C. General:
 - 1. Perform all tests required by Codes and as required by authorities having jurisdiction.
 - 2. Provide labor, materials, equipment and connections.
 - 3. All test results shall be documented and submitted for approval.
 - 4. Repair or replace defective work as required.
 - 5. Pay for restoring or replacing damaged work due to tests.
- D. Final Inspection: When all work is completed, and tested to the satisfaction of the Contractor, the Contractor shall notify the Owner in writing that the elevators are ready for final inspection and acceptance test. A testing and inspection date shall be scheduled by the elevator contractor with the appropriate governing authority(s). Proper operation of every part of the elevator system and compliance with contract requirements, including compliance with all requirements of applicable Codes, shall be demonstrated to the Owner. Contractor shall furnish all test instruments, weights, and materials, required at the time of final inspection. The following tests shall be made at the time of final inspection:
 - 1. Test Period: The elevator shall be subjected to a test for a period of one-hour continuous run, with full-specified load in the car. During the test run, the car shall be stopped at all floors in both directions of travel for a standing period of 10 seconds per floor.
 - 2. Speed Load Tests: The actual speed of the elevator car shall be determined in both directions of travel with full contract load and with no load in the elevator car. Speed shall be determined by a tachometer. The actual measured speed of elevator car with full load shall be within 5% of rated speed. The maximum difference in actual measured speeds obtained under the various conditions outlined between the "UP" and the "DOWN" directions shall be checked.
 - 3. Floor-to-floor times with no load in the car, balanced load and full carload shall be checked.
 - 4. Car Leveling Tests: Elevator car leveling devices shall be tested for accuracy of landing at all floors with no load in car, balanced load in car, and with a full load in car, in both directions of travel. Accuracy of floor landing plus or minus 3 inch shall be determined both before and after the full-load run test.
 - 5. Insulation Resistance Tests: The complete wiring systems of the elevator shall be free from short circuits and grounds, and the insulation resistance shall be determined by use of a "Megger." Conductors shall have an insulation resistance of not less than one megohm between each conductor and ground and between each conductor and all other conductors.
- E. Final Systems Tests for Smoke Detection/Elevator Recall, Power Loss and Security Operation: After work is completed, conduct a final test of entire system.

HYDRAULIC ELEVATOR REHABILITATION

- F. Reinspection: If any equipment is found to be inoperable, insufficient, damaged, or defective, or if the performance of the elevator does not conform to the requirements of the contract specifications or applicable codes, no approval or acceptance of elevators shall be issued until all defects have been corrected. When the repairs and adjustments have been completed and the discrepancies corrected, the Owner shall be notified and the elevator shall be reinspected. Rejected elevators shall not be used until they have been reinspected and approved. All costs associated with inspection and any reinspections are the responsibility of the Contractor.
- G. The elevator hoistway, pits and equipment rooms shall be thoroughly cleaned. All elevator equipment located with the hoistway and machine room, along with machine room floor shall be painted with two coats of deck enamel after all adjusting is completed. Provide dielectric matting around all controllers.

3.4 PERMITS

- A. The Contractor shall be required to secure all permits, including but not limited to PA Labor & Industry's Elevator Division, required for the Project locality and will be required to provide the operating certificate(s) as a condition of Substantial Completion.

3.5 MAINTENANCE SERVICE

- A. Full Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
- B. Full Maintenance Service: Preventive maintenance examinations shall be every other week for adjustment, greasing, oiling and parts replacement due to normal elevator usage. Provided a minimum of two (2) mechanic hours (work is on site and does not include travel and office time), per month, exclusively for preventive maintenance tasks. Provide unlimited regular time and twenty-four (24) hour emergency call back service, including travel time, at no additional cost.
- C. All maintenance activities shall be performed in accordance with the procedures set forth in the approved maintenance manual. Each month, the contractor shall submit a written detailed breakdown of all activities occurring in the previous month. In addition the reports are to be provided in an electronic format acceptable to the owner.
- D. Preventive Maintenance Service:
 - 1. No less than monthly, adjust, lubricate, clean and when conditions warrant, repair or replace the following items and all other mechanical or electrical equipment:
 - a. Controller equipment: All components including all relays, solid state components, resistors, condensers, a/c units, transformers, contacts, leads, computer devices, selector switches, mechanical or electrical driving equipment, coils, magnet frames, contact switch assemblies, springs, solenoids, resistance grids, hoistway vanes, magnets and inductors.
 - b. Hoistway door interlocks or locks and contacts, hoistway door hangers, tracks, bottom door gibs, cams, rollers and auxiliary door closing devices for power operated doors.
 - c. Hoistway limit switches, slowdown switches, leveling switches and associated cams, vanes and electronic components.
 - d. Guide shoes assemblies including rollers.
 - e. Automatic power operated door operators, door protective devices, car door hangers, tracks and car door contacts.

- f. Elevator control wiring in hoistway and machine room.
 - g. Car safety mechanism and load weighing equipment.
 - h. Fixture contacts, pushbuttons, key switches, locks, lamps and sockets or button stations (car and hall), hall lanterns, position indicators (car and hall), direction indicators.
 - i. The guide rails shall be kept dry and free of rust.
 - j. The ADA/emergency telephone.
 - k. Examine all safety devices and governors, and conduct an annual no load test and full speed test of safety mechanism, overhead speed governors, car and counterweight buffers. The car balance shall be checked and governor set. If required, the governor shall be calibrated and sealed for proper tripping speed. All tests shall be performed in accordance with the provisions of the American National Standard, Safety Code for Elevators and Escalators (ANSI/ASME A17.2), current edition.
 - 2. All replacement parts shall be new Original Equipment Manufacturer (OEM) parts specifically designed for the elevators on which they are to be used. All old parts must be returned to the Owner upon completion of repairs if requested by the owner. If OEM parts are not available, an aftermarket replacement to the owner shall be provided. If a part can be repaired, refurbished, manufactured, or rewound by a vendor or company that provides service to the elevator industry, the part is not considered obsolete, and as such, the contractor will not be compensated.
 - 3. The Contractor shall furnish and use lubricants as recommended by the original manufacturer of the equipment or a manufacturer-approved equal.
 - 4. The Contractor shall be responsible for keeping the exterior of the elevator machinery and any other parts of the equipment, painted with heat resistant enamel and presentable at all times.
 - 5. The Contractor shall maintain all elevator equipment within enclosures, pits, and machine rooms. Contractor work space shall be kept clean and orderly, free of dirt, dust and debris. Pits and machine spaces shall be kept dry and clean. Contractor shall be responsible for disposal of all waste in accordance with local, state and federal requirements.
 - 6. All work shall be performed during regular working hours, except for emergency callback service. Emergency calls shall be answered at all hours of the day or night and responded to within one (1) hour during normal working hours and within two (2) hours at all other times without any additional cost to the owner.
 - 7. The Contractor shall supply and install any and all control system software upgrades at no additional charge, for the term of the maintenance agreement.
 - 8. Owner may terminate this maintenance coverage for convenience, in whole or in part, by thirty (30) days written notice to the contractor specifying the extent to which performance of services is terminated and the date upon which such termination becomes effective.
- E. Maintenance Responsibility:
- 1. The Contractor shall keep the elevator maintained to operate at the original contract speed, keeping the original performance times, including acceleration and retardation as designed and installed by the manufacturer. The door operation shall be adjusted as required to maintain door opening and door closing times, within legal limits
 - 2. The Owner reserves the right to make inspections and tests as and when deemed advisable. If it is found that the elevator and associated equipment are deficient either electrically or mechanically, the Contractor shall be notified of these deficiencies in writing, and it shall be its responsibility to make corrections within thirty (30) days after receipt of such notice. In the event deficiencies have not been corrected within thirty (30) days, the Owner may terminate the contract and employ a Contractor to make the corrections at the Contractor's expense.
- F. Approximately six (6) months prior to the end of the warranty maintenance period, the Owner shall make a thorough inspection of the elevator. Contractor shall be responsible to assist the owner with field personnel responsible for normal maintenance procedures. At the conclusion of this inspection, the Owner shall give the Contractor written notice of any deficiencies found. The Contractor shall be responsible for correction of these deficiencies within thirty (30) days after receipt of such notice.

3.6 ADJUSTING AND CLEANING

- A. All equipment shall be adjusted prior to final testing and acceptance.
- B. Paint exposed work soiled or damaged during installation. Any part of the building that was damaged, altered, or removed as part of this modernization, must be repaired or replaced to the owner's satisfaction. Repair to match adjoining work prior to final acceptance.

3.7 DEMONSTRATION

- A. The Contractor shall train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).
- B. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.
- C. For bidding purposes, assume up to four (4) hours of on-site demonstration. Any un-needed hours shall be converted to maintenance and service as indicated herein.

END OF SECTION 14 21 23