SPECIFICATIONS,
CONTRACT DOCUMENTS
AND DRAWINGS

FOR

AVOYELLES PARISH
RECREATION AND EDUCATION COMPLEX

AVOYELLES PARISH POLICE JURY
(OWNER)

PRESIDENT
DARRELL WILEY

VICE PRESIDENT
JACOB COCO

POLICE JURORS
DARRELL SAMPSON
CLYDE BENSON
MARK BORREL
TRAVIS FRANKS
MCKINLEY KELLER
SAM PEARCE
ALLEN THOMAS

JANUARY 2026

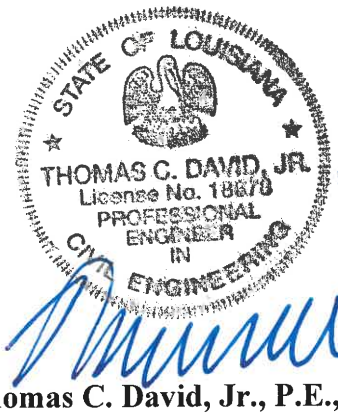
VOLUME 2 OF 2
(ADDITIVE ALTERNATE NO. 1 AND NO. 2)

PAN AMERICAN ENGINEERS, LLC
1717 JACKSON STREET
ALEXANDRIA, LOUISIANA 71301
318-473-2100 PHONE
PAE JOB NOS. 12719

The following Contract Documents and Technical Specifications have been prepared under my direct supervision and guidance for Avoyelles Parish Police Jury in conjunction with the Plans and for the explicit use by the Owner and Contractors for the bidding and construction of the project:

AVOYELLES PARISH POLICE JURY

AVOYELLES PARISH
RECREATION AND EDUCATION COMPLEX



Thomas C. David, Jr., P.E., P.L.S.
CIVIL ENGINEER

Pan American Engineers, LLC
2025

AVOYELLES PARISH POLICE JURY

AVOYELLES PARISH
RECREATION AND EDUCATION COMPLEX

ADDITIVE ALTERNATE NO. 1
TECHNICAL SPECIFICATIONS

ARCHITECTURAL TABLE OF CONTENTS

SECTION 033000 - CAST-IN-PLACE CONCRETE (BUILDINGS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 312000 "Earthwork (Under Buildings)" for drainage fill under slabs-on-grade.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

1.4 QUALITY ASSURANCE

A. 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."

B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated. Testing Agency shall be employed by the Contractor.

1. Testing laboratory technician must be present during all concrete placement operations.

1.5 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

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

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

C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

D. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

E. 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."

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I or Type III.
2. Fly Ash: Refer to Structural Drawings.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: in accordance with ACI 318.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do 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.

E. Water: ASTM C 94/C 94M and potable.

2.5 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

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

a. Barrier-Bac; Inteplast Group, Ltd.; VB-350.
b. Fortifiber Building Systems Group; Moistop Ultra 15.
c. Grace Construction Products; W.R. Grace & Co. -- Conn.; Florprufe 120.
d. Raven Industries, Inc; Vapor Block 15.
e. Stego Industries, LLC; Stego Wrap 15 mil Class A.
f. W. R. Meadows, Inc; Perminator 15 mil.
g. Or approved equal.

2.6 CURING MATERIALS

A. Evaporation Retarder (if necessary): Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

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

a. Euclid Chemical Company (The); an RPM company; Eucobar.
b. L&M Construction Chemicals, Inc; E-CON.
c. Sika Corporation; Caltexol CIMFILM.
d. Or approved equal.

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

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

D. Water: Potable.

E. Clear Sealer/Densifier: Certified by curing compound manufacturer to not interfere with bonding of floor covering.

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

a. BASF Corporation; Construction Systems; Kure-N-Seal 30.
b. Euclid Chemical Company (The); an RPM company; Euco Diamond Hard.

c. L&M Construction Chemicals, Inc; Sealhard.
d. Or approved equal.

F. Clear, Waterborne Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

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

a. BASF Corporation; Construction Systems; MasterKure CC 200 WB.
b. Euclid Chemical Company (The); an RPM company; Diamond Clear VOX.
c. L&M Construction Chemicals, Inc; Dress & Seal WB.
d. Or approved equal.

2.7 RELATED MATERIALS

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

2.8 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.

B. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.9 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: 3500 psi as indicated at 28 days.
2. Maximum W/C Ratio: 0.48.
3. Slump Limit: 5 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.10 FABRICATING REINFORCEMENT

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

2.11 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.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

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

C. Chamfer or tool exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does 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.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3.7 FINISHING FORMED SURFACES

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

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

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

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or 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: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 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. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. 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. Coordinate required final finish with Architect before application.

3.9 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h 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 remainder of curing period.

D. 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.

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.
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 does 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.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

A. Contractor shall notify the Architect and Program Manager 48 hours prior to any concrete pour greater than 10 cu. Yds.

B. Special Inspections: Contractor will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete masonry units.
   2. Clay face brick.
   3. Building (common) brick.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type and color of exposed masonry unit and colored mortar.

C. Material Certificates: For each type and size of product.

1.3 QUALITY ASSURANCE

A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
   1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high.

1.4 FIELD CONDITIONS

A. 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. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, 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. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 STANDARD 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.

B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.

C. CMUs: ASTM C 90.
   1. Density Classification: Lightweight unless otherwise indicated.

2.3 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
   1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
   2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with ASTM C 652.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Acme Brick, modular velour brick, or comparable products by one of the following:
      a. Boral.
      b. Other prior approved manufacturers.
         1) NOTE: Brick samples of matching colors to the Basis-of-Design Products must be submitted for review prior to bid in accordance with Section 012513.
         2)
   2. Grade: SW.
   3. Color/Texture:
      a. Color #1: Soldier Course color selected from manufacturer's standard colors.
      b. Color #2: Field color. Match the brick backstops per Civil specifications.
   4. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."

5. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing according to ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet (3 m).
6. Size (Actual Dimensions): 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 7-5/8 inches (194 mm) long.

C. Building (Common) Brick: ASTM C 62, Grade MW or SW.
1. Size: Match size of face brick.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C 207, Type N for brick veneer, Type S for all load-bearing masonry.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.

E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.

F. Aggregate for Mortar: ASTM C 144.
1.
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.

I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

J. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
1. Interior Walls: Mill- galvanized carbon steel.

2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
4. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
5. Wire Size for Veneer Tab Ties: 0.148-inch (3.77-mm) diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
7. Provide in lengths of not less than 10 feet (3 m).

C. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

2.6 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.

B. 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. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide.
1. Wire: Fabricate from 3/16-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire.

D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.35-mm-) diameter, hot-dip galvanized-steel wire.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire.

E. 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- (2.66-mm-) thick steel sheet, galvanized after fabrication
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire.

F. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) 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.

G. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
   1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.
   2.

H. Adjustable Masonry-Veneer Anchors:
   1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf (445-N) load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch (1.5 mm).
   2. Fabricate wire ties from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire unless otherwise indicated.

2.7 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 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.
   a. Basis-of-Design Product: Subject to compliance with requirements, provide Mortar Net Solutions ; Mortar Net Weep Vents. or a comparable product by one of the following:
      1) Advanced Building Products Inc.
      2) CavClear/Archovations, Inc.
      3) Keene Building Products.

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Mortar Net Solutions ; Mortar Net with Insect Barrier. or a comparable product by one of the following:
      a. Advanced Building Products Inc.
      b. CavClear/Archovations, Inc.
      c. Hohmann & Barnard, Inc.

   2. Configuration: Provide one of the following:
      a. Strips, full depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.
      b. Strips, not less than 3/4 inch (19 mm) thick and 10 inches (250 mm) high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

2.8 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.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide PROSOCO, Inc ; Sure Klean® 600. or a comparable product by one of the following:
      a. Diedrich Technologies, Inc.; a Hohmann & Barnard company.
      b. EaCo Chem, Inc.

2.9 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 or masonry cement 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. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. 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. Non-load bearing masonry (brick and split-face veneer):
      a. Type: ASTM C 270, Type “N”.
      b. Proportions: 1 part cement, 1 part hydrated lime and 6 parts sand to provide a compressive strength of 750 psi in 28 days. Do not use calcium chloride.
   2. Load bearing structural masonry (CMU):
      a. Type: ASTM C 270, Type “S”.
      b. Proportions: 1 part cement, 1/2 part hydrated lime and 4-1/2 parts sand to provide a compressive strength of 1800 psi in 28 days. Do not use calcium chloride.

D. Pigmented Mortar: Use colored cement product.
   1. Pigments shall not exceed 10 percent of portland cement by weight.
   2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
   3. Mix to match Architect's sample.
   4. Application: Use pigmented mortar for exposed mortar joints with the following units:
      a. Decorative CMUs.
      b. Clay face brick.
      c.

d.

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 TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
   2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
   3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

F. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.
   1. Application: Use epoxy pointing mortar for exposed mortar joints with the following units:
      a. Pre-faced CMUs.
      b. Glazed structural clay facing tile.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. 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.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
   2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
   3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) 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 (6 mm in 3 m), or 1/2-inch (12-mm) 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 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) 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 (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.3 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; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

E. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow brick and CMUs as follows:
1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid masonry units and hollow brick 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.

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

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 COMPOSITE MASONRY

A. Bond wythes of composite masonry together as follows:
   1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
      a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
      b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement.

B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.

C. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with mortar at exterior walls, except cavity walls.

D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.

E. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
   1. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.

3.6 CAVITY WALLS

A. Bond wythes of cavity walls together [using one of the following methods] [as follows]:
   1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
      a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
      b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement.
      c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement 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. Parge cavity face of backup wythe in a single coat approximately 3/8 inch (10 mm) thick. Trowel face of parge coat smooth.

3.7 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
   1. Space reinforcement not more than 16 inches (406 mm) o.c.
   2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

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 1/2 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 (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.9 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, 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 (200 mm), and through inner wythe to within 1/2 inch (13 mm) 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 (50 mm) on interior face.
   3. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.

4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
5. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

C. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.
2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

D. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.10 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 that of other loads that may be placed on them during construction.

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

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 TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 12.67 ft. (3.86 m).

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Inspection and Testing Lab services shall be in accordance with Section 014523.

3.12 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. 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.
3. Protect adjacent surfaces from contact with cleaner.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.13 MASONRY WASTE DISPOSAL

A. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.

1.2 ACTION SUBMITTALS

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

B. Design Calculations: Verify specified sizes, gauges, spacing of members and connections to meet design criteria and manufacturer’s requirements for supported materials. Show methods and practices used in installation.

1.3 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Clark Dietrich Building Systems; cold-formed metal framing, or a comparable product by one of the following:

1. Marino\WARE.
2. Nuconsteel, A Nucor Company.
3. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

B. Fire-Resistance Ratings (if required): Comply with ASTM E 119; testing by a qualified 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: ST33H.
2. Coating: G60, A60, AZ50, or GF30.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 33.
2. Coating: G60.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs (CSJ), of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 43 mills (18 ga.) 33 ksi, or as indicated.
2. Flange Width: 1-5/8 inches, or as indicated.
3. Flange Depth: 8” at exterior walls.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.

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. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

2.5 MISCELLANEOUS FRAMING MEMBERS

A. General: Of 22 gauge to 16 gauge galvanized steel, ASTM A446, Grade D, G60 minimum.

B. Framing and Furring Members: Provide miscellaneous shaped framing members in the sizes and configurations indicated (includes but is not necessarily limited to):

1. Hat-shaped furring channels as detailed, gauge as indicated, galvanized finish.
2. Various size Cee and Zee-shaped members, gauge as indicated, where indicated at exterior framing conditions, galvanized or shop primed finish.
3. Miscellaneous bent angles, shapes and plates, gauge as indicated, galvanized finish.

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.

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, or mechanically deposition according to ASTM B 695, Class 50.

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. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

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

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

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: [SSPC-Paint 20 or MIL-P-21035B] [ASTM A 780].

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

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

D. 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.

E. 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.

PART 3 - EXECUTION

3.1 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.

3.2 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 cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

D. Install framing members in one-piece lengths.

E. 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.

F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

G. Install insulation, specified in Section 072100 "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.

H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

I. 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.

3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches, or as indicated.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

a. Install solid blocking at centers indicated.

2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 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.

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 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Miscellaneous steel framing and supports.
   2. Angle counter frames.
   3. Angle bench brackets.
   4. Stair and ramp handrails/guardrails.

B. Products furnished under this Section, and installed by others, include the following:
   1. Loose steel lintels.
   2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
   3. Manufactured stair nosings at exterior concrete stairs.

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 METALS

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.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

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

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

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

2.2 FASTENERS

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

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

C. Post-Installed Anchors: [Torque-controlled expansion anchors] [or] [chemical anchors].
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
   2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.3 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting," Section 099123 Interior Painting," and Section 099600 "High-Performance Coatings."

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. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

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

E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

G. 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.

H. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. 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.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

2.5 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.

2.6 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Galvanize loose steel lintels located in exterior walls.

2.7 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

2.8 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.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
   1. Shop prime with primers specified in Section 099113 "Exterior Painting" unless zinc-rich primer is indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
   1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   3. Items Indicated to Receive Primers Specified in Section 099600 "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.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 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.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Wood furring and grounds.
4. Wood sleepers.
5. Plywood backing panels.

1.2 SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Post-installed anchors.
7. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Grade lumber 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. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.

B. Framing Other Than Non-Load-Bearing Partitions: No. 2 grade.

1. Species:
   a. Southern pine; SPIB.
   b. Spruce-pine-fir; NLGA.
   c. Douglas fir-south; WWPA.
   d. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.4 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. Furring.
4. Grounds.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

C. Concealed Boards: 19 percent maximum moisture content of the following species and grades:

1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
2. Eastern softwoods; No. 2 Common grade; NeLMA.
3. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.6 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall 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.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES or AC193 as appropriate for the substrate.

2.7 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.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate [**furring,**]nailers, blocking, [**grounds,**]and similar supports to comply with requirements for attaching other construction.

C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

D. Do not splice structural members between supports unless otherwise indicated.

E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. ICC-ES evaluation report for fastener.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wall sheathing.
   2. Roof sheathing.
   3. Sheathing joint and penetration treatment.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

A. Preservative-Treated Plywood Sheathing: DOC PS 1, Exterior Exposure 1 sheathing.
   1. Thickness: Nominal ½ inch and ¾ inch where noted on the Drawings.

2.2 ROOF SHEATHING

A. Plywood Sheathing: DOC PS 1, Exterior Exposure 1 sheathing.
   1. Thickness: Nominal 5/8 inch thick, or as noted on the 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 roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Paper-Surfaced Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants."

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. Coordinate wall and roof 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.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

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 and Roof Sheathing:
      a. Nail or staple to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
      b. Screw to cold-formed metal framing.
      c. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 061600

SECTION 061700 - WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

A. Work included: Provide wood trusses where shown on the Drawings, as specified herein, and as needed for a complete and proper installation.

1.3 QUALITY ASSURANCE

A. Comply with N.F.P.A. National Design Specification and with TPI standards including "Quality Control Manual", "Commentary and Recommendations for Bracing Wood Trusses" and the following:

1. Truss Plate Institute (TPI) "Design Specifications for Metal Plate Connected Wood Trusses".
2. TPI – HIB 91 – “Handling, Installing and Bracing” Metal Plate Connected Wood Trusses.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00.

B. Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
3. Shop Drawings, bearing the stamp of a Professional Engineer licensed to practice in the State of Louisiana, showing species, sizes, and stress grades of lumber proposed to be used; pitch, span, camber configuration, and spacing of trusses; connector type, thickness, size, location, and design value; and bearing details;
4. Manufacturer's recommended installation procedures.

1.5 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 66 00.

1.6 PROJECT CONDITIONS

A. Field Measurements: Check spans by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

1. Rogers Manufacturing Corporation
2. Others as approved by Engineer

2.2 WOOD TRUSSES

A. Design:

1. Provide truss design with loading as required to meet all national, state, and local code requirements. This shall include "International Building Code" Current Edition. For this project it is MANDATORY THAT ALL TOP AND BOTTOM TRUSS CHORDS BE 2x6 MATERIAL. 2x4 TOP AND BOTTOM CHORD TRUSSES ARE NOT ACCEPTABLE.

B. Fabrication:

1. Prefabricate in strict accordance with the Shop Drawings and other data approve by the Engineer.

2.3 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, a selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
B. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approve by the Engineer, anchoring all components firmly into position for long life under hard use.

1. Hoist the trusses into position with proper bracing secured at designated lifting points.
2. Exercise care to keep out-of-place bending of trusses to a minimum.
3. Install a temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing is installed.
4. Install permanent bracing and related components prior to application of loads to trusses.
5. Tighten loose connections.
6. Restrict construction loads to prevent overstressing of truss members.
7. Do not cut or remove truss members.

END OF SECTION 061700

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior standing and running trim.
   2. Interior plywood ceilings.

1.2 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 INTERIOR ARCHITECTURAL WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Grade: Economy.

B. Wood Species: C Grade Southern Yellow Pine (SYP) or Poplar.

2.3 INTERIOR PLYWOOD CEILINGS

A. Plywood Type: Exterior, Grade A-C.

B. Thickness: 19/32 inch (15.1 mm).

C. Face Species: Southern pine or Douglas fir.

D. Pattern: Plain. Provide Vee groove at plywood joints and stagger sheets.

E. Surface: Smooth, sanded face.

2.4 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.
   1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
   2. Wood Moisture Content: 8 to 13 percent.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before installation, condition interior architectural woodwork to average prevailing humidity conditions in installation areas.

B. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.

C. Install interior architectural woodwork level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.

F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches (2400 mm) long except where shorter single-length pieces are necessary.
   1. Scarf running joints and stagger in adjacent and related members.
   2. Fill gaps, if any, between trim and wall with latex sealant, painted to match wall.
   3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).

G. Plywood Siding: Stagger joints of adjacent sheets. Rout a slight vee groove at all panel joints.
   1. Install panels with edges over framing or blocking.
   2. Nail at 6 inches (150 mm) o.c. at panel perimeter and 12 inches (300 mm) o.c. at intermediate supports unless manufacturer recommends closer spacing.
   3. Leave 1/16-inch (1.5-mm) gap between adjacent panels and 1/8-inch (3-mm) gap at perimeter, openings, and horizontal joints unless otherwise recommended by panel manufacturer.
   4. Seal butt joints at inside and outside corners and at trim locations.
   5. Apply trim as indicated. Countersink nail heads, fill flush, and sand filler.

6. Conceal fasteners to greatest practical extent by countersinking and filling, or by concealing with applied trim as detailed.

END OF SECTION 064023

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:

1. Section 123623.13 "Plastic-Laminate-Clad Countertops."

1.2 SUBMITTALS

A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Plastic laminates, for each color, pattern, and surface finish.
2. Thermoset decorative panels, for each color, pattern, and surface finish.

1.3 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET FABRICATORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Mardel Products Company, 294 Industrial Blvd., Mansura, LA 71350, (318) 253-7730.
2. River Rouge Millwork, LLC, 6505 Masonic Dr., Alexandria, LA 71301, (318) 416-8602.
3. Bayou Wood Products, 1315 Hwy. 15, West Monroe, LA 71291, (318) 397-0000.
4. Other prior approved acceptable millwork/casework manufacturers.

2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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

B. Grade: Custom.

C. Type of Construction: Face frame.

D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Abet Laminati, Inc.
    b. Formica Corporation.
    c. Pionite: a Panolam Industries International, Inc. brand.
    d. Wilsonart International Holdings, Inc.
    e. Nevamar brand.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS (0.048 inch) thick.
2. Postformed Surfaces: Grade HGP (0.039 inch) thick.
3. Vertical Surfaces: Grade VGS (0.028 inch) thick.
4. Pattern Direction: As indicated.

G. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.

H. Edgebanding for Thermoset Decorative Panels: PVC or polyester edgebanding matching thermoset decorative panels.

I. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels.

J. 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 laminate manufacturer's full range in the following categories:

    a. Solid colors, matte finish.
    b. Solid colors with core same color as surface, matte finish.
    c. Wood grains, matte finish.
    d. Patterns, matte finish.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: not to exceed 8 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
3. Softwood Plywood: DOC PS 1, medium-density overlay.
4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Refer to Section 123623.13 – PLASTIC-LAMINATE-CLAD COUNTERTOPS for Countertop specifications.

2.5 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware (Descriptive Specification)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening minimum.

C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.

D. Catches: Magnetic catches, BHMA A156.9, B03141.

E. Tall Cabinet Door Catches: Hafele Elbow Catch, Item # 245.74.200, spring-loaded, chrome plated.

F. Shelf Rests: BHMA A156.9, B04013; nylon or metal, two-pin type with shelf hold-down clip.

G. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted; full-extension type; epoxy-coated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated or epoxy-coated steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
6. For file drawers, provide 3-part progressive opening slide, full-extension Grade 1HD-100. Also provide body-mounted molded rails for hanging file system for legal or letter size system as required. Cutting or machining of body/face is not permitted.

7. For computer keyboard shelves, provide Grade 1HD-100.
8. For paper storage drawers, provide Grade 1HD-200.

H. Aluminum Slides for Sliding Glass Doors: BHMA A156.9, B07063.

I. Door Locks: BHMA A156.11, E07121.

J. Drawer Locks: BHMA A156.11, E07041.

K. Door and Drawer Silencers: BHMA A156.16, L03011.

L. Grommets:

1. 2 ½ inch diameter plastic, with flip-top tab in cap, equal to Model No. EDP3 as manufactured by Doug Mockett & Company, Inc., color as selected from manufacturer's standard colors.
2. Provide for all locations where electrical, telephone and computer data wiring need to pass through tops whether shown or not.

M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630 (US26D finish).

2.6 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: PVA.

1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.7 FABRICATION

A. Complete fabrication, including assembly and hardware application, 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.

B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

C. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Install cabinets 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.

C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails[**or finishing screws**] for exposed fastening, countersunk and filled flush with woodwork.

E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips, or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

END OF SECTION 064116

SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Cold-applied, emulsified-asphalt dampproofing.

1.2 SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise indicated.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Basis-of-Design Product: Subject to compliance with requirements, provide BASF Corp. - Construction Chemicals ; MasterSeal 610, or a comparable product by one of the following:
   1. Euclid Chemical Company (The); an RPM company.
   2. Mar-flex Waterproofing & Building Products.
   3. W. R. Meadows, Inc.

B. Brush, Roller and Spray Coats: ASTM D 1227, Type III, Class 1.

2.3 AUXILIARY MATERIALS

A. 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/D 1668M, Type I.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless otherwise 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 (150 mm) over outside face of footing.
   1. Extend dampproofing 12 inches (300 mm) 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 indicated as "reinforced," by embedding an 8-inch- (200-mm-) 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. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch (6 mm) onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
   1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
   2. Lap dampproofing at least 1/4 inch (6 mm) onto shelf angles supporting veneer.

D. Where dampproofing interior face of above-grade, exterior concrete and masonry walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

3.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Masonry Backup for Brick Veneer Assemblies: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).

B. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).

END OF SECTION 071113

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rigid cavity wall insulation board.
2. Glass-fiber blanket.
3. Mineral wood blankets.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Product test reports.

C. Research reports.

PART 2 - PRODUCTS

2.1 RIGID CAVITY WALL INSULATION BOARD

A. Extruded Polystyrene (XPS) Rigid Foam Insulation: ASTM C 578, Type X; with maximum flame-spread and smoke-developed indexes of 10 and 175, respectively, per ASTM E 84.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Owens Corning FOAMULAR 150 extruded polystyrene (XPS) rigid foam insulation, or a comparable product by one of the following:

a. DuPont (Styrofoam Brand Cavitymate).
b. Kingspan (GG25-LG).

B. Physical Properties:

1. Thickness: 1 inch.
2. LTTR Value (minimum) per inch: 5.0, ASTM C 518.
3. Compressive Strength: 15 psi minimum, ASTM D 1621.
4. Flexural Strength: 40 psi minimum, ASTM C 203.
5. Water Absorption: 0.3, ASTM C 272.
6. Water Vapor Permeance: 1.5, ASTM E 96.
7. Flame Spread: 10, ASTM E 84.
8. Smoke Developed: 175, ASTM E 84.

2.2 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

C. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

END OF SECTION 072100

SECTION 072119 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Open-cell spray polyurethane foam with ignition barrier.
   2. Foamed-in-place masonry insulation.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Product test reports.

C. Research reports.

PART 2 - PRODUCTS

2.1 OPEN-CELL SPRAY POLYURETHANE FOAM

A. Open-Cell Spray Polyurethane Foam: Spray-applied polyurethane foam using water as a blowing agent. Minimum density of 0.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 3.4 deg F x h x sq. ft./Btu at 75 deg F.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Huntsman Building Solutions FOAM-LOK 500 with DC315 intumescent coating, or a comparable product by one of the following:
      a. Johns Manville, JM Corbond Open-Cell with No-Burn Plus ThB intumescent coating.
   2. 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: 25 or less.
      b. Smoke-Developed Index: 450 or less.
   3. Thermal Barrier Protection: Provide intumescent coating listed and tested as an approved 15-minute thermal barrier over the spray-applied foam insulation, installed at the coverage and dry film thickness required by the foam manufacturer's ICC-ES evaluation report for use in accessible attics and interior roof assemblies, in accordance with IBC 2021 §2603.4 and NFPA 275.

2.2 FOAMED-IN-PLACE MASONRY WALL INSULATION

A. Plastic Injected Foam Insulation: Injected 3-part polymer foamed-in-place plastic insulation consisting of a proprietary dry powder resin mixed with a catalyst and foamed with nitrogen or compressed air.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Polymaster, R501 Foam, as manufactured by Polymaster, 10523 Lexington Dr., Knoxville, TN 37932, or a comparable product by one of the following:
      a. Tailored Chemical Products, Core-Fill 500 TM.
      b. Thermal Corporation of America, Thermco Foam.
      c. Other prior approved manufacturers and products.
   2. Minimum Performance Standards:
      a. Thermal Performance: ASTM C 1363: 8” CMU at 105 pcf meets R-value of 11.05.
      b. Surface-Burning Characteristics: ASTM E 84: Flame-Spread Index: 25 or less; Smoke-Developed Index: 450 or less.
      c. Combustion Characteristics: Must be noncombustible, Class A.
      d. Thermal Values: “R” Value of 4.63/inch @ 25 degrees F mean; ASTM C 518.
      e. Sound Abatement: ASTM E 413, ASTM E 90: “STC” Rating of 52 and a minimum rating of 44 for 3.5” cavity wall assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Open Cell Spray Polyurethane Foam:
   1. Spray insulation to envelop entire area to be insulated and fill voids.
   2. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.

C. Foamed-In-Place Masonry Wall Insulation:
   1. Fill all open cells and voids in hollow concrete masonry walls where shown on drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" holes drilled into every vertical column of block cells (every 8" on center) beginning at an approximate height of four (4) feet from finished floor level. Drill into mortar joints, NOT face of block. Repeat this procedure at an approximate height of ten (10) feet above the first horizontal row of holes (or as needed) until the void is completely filled. Patch holes with mortar and score to resemble existing surface.

END OF SECTION 072119

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Building paper.
   2. Building wrap.

1.2 SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Paper: ASTM D 226, Type 1 (No. 30 asphalt-saturated organic felt), unperforated.

B. 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. Basis-of-Design Product: Subject to compliance with requirements, provide DuPont Building Innovations: E. I. du Pont de Nemours and Company; Tyvek CommercialWrap or a comparable product by one of the following:
      a. Dow Chemical Company (The).
      b. Raven Industries, Inc.

   2. Water-Vapor Permeance: Not less than 20 perms (1150 ng/Pa x s x sq. m) per ASTM E 96/E 96M, Desiccant Method (Procedure A).
   3. Flame Propagation Test: Materials and construction shall be as tested according to NFPA 285.

C. Building-Wrap Tape & Flashing: 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 sheathing with water-resistive barrier as follows:
   1. Cut back barrier 1/2 inch (13 mm) 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 (100-mm) overlap unless otherwise indicated.

B. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.

C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.
1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

END OF SECTION 072500

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Standing-seam metal roof panels.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.4 WARRANTY

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

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

B. Weathertightness Warranty (Standing Seam Roof System): Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration, ASTM E 1680: Maximum 0.09 cfm/sq. ft. (0.457 L/s per sq. m) at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 12 lbf/sq. ft. (575 Pa).

D. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

F. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof 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.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide MBCI; a division of NCI Group, Inc.; SuperLok, 16” wide panel, or a comparable product by one of the following:

a. Architectural Metal Systems Loc Seam 360, 16” wide with intermediate ribs.
b. McElroy Metal, Inc. 238T, 16” wide with intermediate ribs.

2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

a. Nominal Thickness: 24 gauge.

b. Exterior Finish: Signature 300 (Kynar).
c. Color: As selected by Architect from manufacturer's full range.

3. Clips: Two-piece low floating clip as recommended by manufacturer.

a. Material: Manufacturer’s recommended clip, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

4. Joint Type: Double folded.
5. Panel Coverage: 16 inches (406 mm).
6. Panel Height: 2.0 inches (51 mm) minimum.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) 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 ridges, 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- (25-mm-) 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, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match roof fascia and rake trim.

E. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch (1.2-mm) nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch- (1.52-mm-) nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.

F. Panel Fasteners: Self-tapping screws designed to withstand design loads.

G. 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; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

A. General: Fabricate and finish metal 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. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Panels and Accessories:

1. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621[, meeting solar reflectance index requirements].
2. Basis of Design: MBCI, Signature 300.

B. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 THERMAL INSULATION INSTALLATION

A. Insulation system is specified in Section 072116. Install system per manufacturer’s instructions.

3.3 METAL PANEL INSTALLATION

A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
4. Watertight Installation:

    a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

C. 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.

3.4 CLEANING AND PROTECTION

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

END OF SECTION 074113.16

SECTION 074213.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concealed fastener metal wall panels.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.4 WARRANTY

A. Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
   1. Wind Loads: As indicated on Drawings.
   2. Other Design Loads: As indicated on Drawings.
   3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

2.2 CONCEALED-FASTENER METAL WALL PANELS

A. General: Provide factory-formed metal 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: Metal wall panel consisting of formed metal sheet with vertical edges, flat panel surface and two intermediate stiffening beads symmetrically placed between panel joints, installed by fastening female flange of panel to substrate, and inserting male edge of next panel into female slot of panel.
   1. Basis of Design: MBCI, FW120-2 with Beads Panel**,** www.mbci.com/pbr.html.
   2. Coverage Width: 12 inches.
   3. Major Rib Spacing: 12 inches on center.
   4. Panel Depth: 1-1/2 inch (and 1” with some manufacturers).
   5. Nominal Coated Thickness: 0.022 inch/26 gage, or 0.028 inch/24 gage.
   6. Panel Surface: Smooth.
   7. Exterior Finish: Fluoropolymer system equal to KYNAR 500.
   8. Color: As selected by Architect from manufacturer's standard colors.
   9. Other Acceptable Manufacturers:
      a. McElroy Metal, Inc.: FW Series Panel with stiffening beads.
      b. ACI: SWP-12 Panel with stiffening beads.
      c. Petersen Aluminum Corporation: PAC-CLAD Flush Soffit Panel with stiffening beads.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) 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- (25-mm-) 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; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
   2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
   3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

A. General: Fabricate and finish metal 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. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Panels and Accessories:
   1. Two-Coat Fluoropolymer: 0.2 – 0.3 mil primer with 0.7 – 0.8 mil, 70 percent PVDF resin by weight in color coat.
   2. Basis of Design: MBCI, Signature 300.
   3. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 METAL PANEL INSTALLATION

A. Concealed-Fastener Formed Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
   1. Fasten metal panels to supports with fasteners at each location indicated on approved shop drawings, at spacing and with fasteners recommended by manufacturer. Fasten panel to support structure through leading flange. Snap-fit back flange of subsequent panel into secured flange of previous panel. Where indicated, fasten panels together through flush-fitted panel sides.

B. Installation (General):
   1. Cut panels in field where required using manufacturer's recommended methods.
   2. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by metal panel manufacturer.
   3. Attach panel flashing trim pieces to supports using recommended fasteners and joint sealers.

C. Joint Sealers: Install liquid sealants where indicated and where required for weatherproof performance of metal panel assemblies.
   1. Seal panel base assembly, openings, panel head joints, and perimeter joints using joint sealers indicated in manufacturer's instructions.
   2. Seal perimeter joints between window and door openings and adjacent panels using elastomeric joint sealer.
   3. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

D. 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 (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

F. 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 are permanently watertight.

3.3 CLEANING

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

END OF SECTION 074213.13

SECTION 074293 - SOFFIT PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes metal soffit panels.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

1.3 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 20 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 panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
   1. Wind Loads: As indicated on Drawings.
   2. Other Design Loads: As indicated on Drawings.
   3. Deflection Limits: For wind loads, no greater than 1/120 of the span.

B. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed 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 Metal Soffit Panels: Solid panels formed with vertical panel edges and intermediate stiffening “pencil” ribs symmetrically spaced between panel edges; with flush joint between panels.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide MBCI; a division of NCI Group, Inc., Artisan L12 with Beads, or a comparable product by one of the following:
      a. McElroy Metals, Marquee-Lok, 12” panel with pencil ribs, 24 ga.
      b. Pac-Clad, Flush Soffit, 12” panel with stiffener ribs, 24 ga.
      c. Other prior approved products.

   2. Material: Same material and finish as metal roof panels.
   3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
      a. Nominal Thickness: 24 gauge.
      b. Exterior Finish: Two-coat fluoropolymer (Signature 300).
      c. Color: As selected by Architect from manufacturer's full range.
   4. Panel Coverage: 12 inches (305 mm).
   5. Panel Height: 1.0 inch (25 mm).

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) 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, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
   1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) 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. 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 types 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; 1/8 inch (3 mm) thick.
   2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
   3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

A. General: Fabricate and finish metal 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. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Panels and Accessories:
   1. Two-Coat Fluoropolymer: 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.
   2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.
   1. Soffit Framing: Anchor wood stripping to supports, as required to comply with requirements for assemblies indicated.

3.2 METAL PANEL INSTALLATION

A. Metal Soffit Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
   1. 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.
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.

B. 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 (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

D. 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 are permanently watertight.

3.3 CLEANING

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

END OF SECTION 074293

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed low-slope roof sheet metal fabrications.
2. Formed roof-drainage sheet metal fabrications.
3. Formed wall sheet metal fabrications.
4. Flexible PVC flashing sheet.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Distinguish between shop- and field-assembled work.
3. Include identification of finish for each item.
4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.

C. Samples: For each exposed product and for each color and texture specified.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockup of typical roof gutter, including fascia trim, approximately 12” long.

1.4 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: Minimum 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

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

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.

1. Nonpatinated Exposed Finish: Mill.
2. Prepatinated Copper-Sheet Finish: Dark brown, prepatinated according to ASTM B 882.

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.

1. As-Milled Finish: Mill.
2. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
3. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

    a. Color: If applicable, as selected by Architect from standard anodic colors.

4. Exposed Coil-Coated Finish:

    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.

5. Color: As selected by Architect from manufacturer's full range.

D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; 2D (dull, cold rolled) finish.

E. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. 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. Equal to KYNAR 500.

2. Color: As selected by Architect from manufacturer's full range. Note: Use the same product and finish as supplied by the manufacturer of adjacent metal panels.

2.3 FLEXIBLE PVC FLASHING SHEET (Cavity Wall Spandrel Flashing)

A. Vinyl Sheet Flashing: Flexible sheet flashings of 30 mils thickness especially formulated from virgin polyvinyl chloride with plasticizers and other modifiers to remain flexible and waterproof in concealed masonry applications, black in color and in thickness indicated below.

1. Basis-of-Design Product: Subject to compliance with requirements, provide York Manufacturing, Wasco Seal Type 30 (.030”), 33 oz. per sq. yd. Elastomeric Sheeting, or a comparable product by one of the following:

a. Afco Products Inc., Vi-Seal Plastic Flashing.
b. B. F. Goodrich Co., BFG Vinyl Water Barrier.
c. Sandell Manufacturing Co., Nuflex.

2. Adhesive for Flashing: Of type recommended by manufacturer of flashing material for use indicated.

2.4 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

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

a. Carlisle Coatings & Waterproofing Inc; CCW WIP 300HT.
b. Grace Construction Products; W.R. Grace & Co. -- Conn.; Grace Ice and Water Shield HT.
c. Owens Corning; WeatherLock Metal High Temperature Underlayment.

2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

2.5 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

2. Fasteners for Zinc-Coated (Galvanized) and/or Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead with maximum lead content of 0.2 percent.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

2.6 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch-long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Hanger Style: As indicated on drawings.
2. Fabricate from the following materials:

a. Galvanized Steel: 0.022 inch thick.
b. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing Fascia Cap: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates.

1. Fabricate from the Following Materials:

a. Galvanized Steel: 0.028 inch thick.
b. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

B. Base Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.028 inch thick.
2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

C. Counterflashing: Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.
2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

D. Roof-Penetration Flashing: Fabricate from the following materials:

1. Galvanized Steel: 0.028 inch thick.
2. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

2.9 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:

1. Galvanized Steel: 0.022 inch thick.
2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, 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 and edges with roller. Cover underlayment within 14 days.

3.2 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.

4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic-coated steel and aluminum sheet.
2. Do not use torches for soldering.
3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
4. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
5. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 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.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Mildew-resistant joint sealants.
5. Latex joint sealants.

1.2 SUBMITTALS

A. Product Data: For each joint-sealant product, along with test reports.

B. Samples: For each kind and color of joint sealant required.

1.3 WARRANTY

A. Warrant the work specified herein for two years against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials or workmanship.

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

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall be experienced in building sealant installation whose work has resulted in a record of successful performance.

B. Source Limitations: If at all possible, obtain each type of building sealant through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

a. Dow Corning Corporation; DOW CORNING® 786 SILICONE SEALANT -.
b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
c. Tremco Incorporated; Tremsil 200.

B. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

a. Dow Corning Corporation; DOW CORNING® 758 SILICONE WEATHER BARRIER SEALANT.
b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS2350.
c. Sherwin-Williams Company (The); Silicone Rubber All Purpose Sealant.

2.3 URETHANE JOINT SEALANTS

A. Urethane, M, NS, 25, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Use NT.

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

a. BASF Corporation; Construction Systems; MasterSeal NP 2 (Pre-2014: Sonolastic NP2).
b. Sherwin-Williams Company (The); Stampede-2NS.

2.4 ACRYLIC LATEX MILDEW RESISTANT JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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

a. Pecora Corporation; AC-20.
b. Sherwin-Williams Company (The); 950A Siliconized Acrylic Latex Caulk, White.
c. Tremco Incorporated; Tremflex 834.

2.5 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, [Type C (closed-cell material with a surface skin)] [Type O (open-cell material)] [Type B (bicellular material with a surface skin)] [or any of the preceding types, 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.

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

a. BASF Corporation; Construction Systems; MasterSeal 920 & 921(Pre-2014: Sonolastic Backer Rod).
b. Construction Foam Products; a division of Nomaco, Inc.; SOF Bi-Cellular, HBR Closed Cell, OCFoam Open Cell as required by condition.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 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.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 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 laitance and form-release agents from concrete.
2. 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.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. 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.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. 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.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 CLEANING

A. Clean adjacent surfaces of sealant as work progresses, using solvent or cleaning agents recommended by manufacturer. Avoid staining sealant or adjacent surfaces. Leave all finished work in a neat, clean condition.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Amweld International, LLC.
   2. Ceco Door; ASSA ABLOY.
   3. Curries Company; ASSA ABLOY.
   4. Mesker Door Inc.
   5. MPI Group, LLC (The).
   6. North American Door Corp.
   7. Philipp Manufacturing Co (The).
   8. Premier Products, Inc.
   9. Republic Doors and Frames.
   10. Steelcraft; an Allegion brand.

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-Lite 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. 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: Rust-resistant treated cold-rolled steel sheet, minimum thickness of 0.042 inch.
      d. Edge Construction: Model 1, Full Flush with joints sealed, ground smooth and filled.
      e. Core: Mineral board or other non-combustible core fill material. Provide steel stiffener channels welded to face sheets.
   3. Frames:
      a. Materials: Rust-resistant steel sheet, minimum thickness of 0.053 inch.
      b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
      c. Construction: Full profile welded.
   4. Exposed Finish: Factory primer applied and baked-on over rust-resistant steel, using the Bonderite or Parkerizing systems.

2.4 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. [At locations indicated in the Door and Frame Schedule] <Insert locations>.
   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: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A60 coating.
      d. Edge Construction: Model 1, Full Flush with joints sealed, ground smooth and filled.
      e. Core: Polyurethane foamed in-place to achieve an R-11 value.
   3. Frames:
      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
      b. Construction: Full profile welded.
   4. Exposed Finish: Fabricate from galvanized steel. Prime welds with Galvacron. Factory primer applied and baked-on over rust-resistant steel, using the Bonderite or Parkerizing systems.

2.5 BORROWED LITES

A. Hollow-metal frames of rust-resistant steel sheet, minimum thickness of 0.053 inch. Exposed finish shall be factory primer applied and baked-on over rust-resistant steel, using the Bonderite or Parkerizing systems.

B. Construction: Full profile welded.

2.6 FRAME ANCHORS

A. Jamb Anchors:
   1. Masonry Type: 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.
   2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
   3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
   4. Post-installed 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 0.053 inch, and as follows:
   1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
   2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.7 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: From corrosion-resistant materials.

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).

I. Glazing: Section 088000 "Glazing."

2.8 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for 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. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints, grind smooth and fill all edges of doors against water penetration.
   2. Astragals (if required): Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

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. Sidelite 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.
      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. Compression Type: Not less than two anchors in each frame.
      d. Post-installed 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.

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. 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.

E. 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.

2.9 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard baked-on primer using the Bonderite or Parkerizing system.
1. Shop Primer: SDI A250.10.

2.10 ACCESSORIES

A. Louvers: Provide sightproof louvers for interior doors, where indicated, which comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
1. Fire-Rated Automatic Louvers (if required): Movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.

B. Mullions and Transom Bars: Join to adjacent members by welding and grinding smooth.

C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, 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.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
    a. Floor anchors may be set with power-actuated fasteners instead of post-installed 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 post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. 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.

B. 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: 5/8 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.
3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

C. Glazing: Comply with installation requirements in Section 088000 "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.

3.2 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 081113

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Anodized Aluminum Counter Doors.

B. Related Requirements:
   1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.2 SUBMITTALS

A. Product Data: For each type and size of coiling counter door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
   1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.

C. Samples: For each exposed product and for each color and texture specified.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years of experience in the fabrication and installation of security closures.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.4 DELIVERY, STORAGE, AND HANDLING

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

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.5 PROJECT CONDITIONS

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

1.6 COORDINATION

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

1.7 WARRANTY

A. Warranty: Manufacturer’s limited door warranty for 2 years for all parts and components.

PART 2 - PRODUCTS

2.1 COUNTER DOOR ASSEMBLY

A. Counter Door: Aluminum coiling counter door formed with curtain of interlocking metal slats.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. C.H.I. Overhead Doors, Inc.; Model 6544 Aluminum Counter Doors.
      b. Cookson Company; Model CD8-1 Aluminum Counter Doors.
      c. Cornell Iron Works, Inc; Model ESC-10 Aluminum Counter Doors.
      d. Overhead Door Corporation; Series 652 Aluminum Counter Doors.

B. Operation Cycles: Door components and operators capable of operating for not less than 20,000.

C. Door Curtain Material: Aluminum.

D. Door Curtain Slats: Flat profile slats of between 1 ¼” and 1 ½” center-to-center height. Endlocks attached to alternate slats to maintain curtain alignment and prevent lateral slat movement.

E. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated aluminum extrusion and finished to match door.

F. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

G. Hood: Aluminum.
   1. Mounting: Face of wall.

H. Sill Configuration: No sill.

I. Locking Devices: Equip door with two point dead locks with mortise cylinder.

J. Manual Door Operator: Push-up operation.

K. Curtain Accessories: Equip door with push/pull handles.

L. Door Finish:
1. Aluminum Finish: Clear anodized.
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate coiling counter-door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.3 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.4 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
1. Lock Cylinders: Cylinders standard with manufacturer and keyed to building keying system.
2. Keys: Three for each cylinder.

2.5 CURTAIN ACCESSORIES

A. Astragal: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

2.6 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of cold-rolled steel plate.

2.7 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

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

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

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

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

F. Install perimeter trim and closures.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

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

3.6 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION 083313

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior storefront façade and window framing.
   2. Exterior manual-swing entrance doors and door-frame units.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples: For each exposed finish required.

D. 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.

E. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified Louisiana licensed professional engineer responsible for their preparation.

F. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.

G. Product test reports.

H. Maintenance data.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Product Options: 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.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. 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.

B. Structural Loads:
   1. Wind Loads: As indicated on Drawings.

C. 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.
   a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

D. 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**] <**Insert number**> seconds.

E. 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 1.57 lbf/sq. ft..
      b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft..

F. 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..

G. Energy Performance: Certify and label energy performance according to NFRC as follows:
   1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.47 (low-e) or 0.61 (clear) Btu/sq. ft. x h x deg F as determined according to NFRC 100.
   2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
   3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 45 as determined according to NFRC 500.

H. 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.

2.2 MANUFACTURERS

A. Products Basis of Design:

1. Kawneer North America; an Alcoa company; TRIFAB VG 451T Storefront System and 500 Wide Stile Entrance System.

B. Provide equivalent products from the following manufacturers:
1. Manko.
2. Oldcastle BuildingEnvelope™.
3. United States Aluminum.

2.3 STOREFRONT FRAMING (TRIFAB VG 451T Storefront)

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: Center Glazed where indicated on the Drawings.
4. Finish: Clear anodic finish.
5. Fabrication Method: Field-fabricated stick system.

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. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 ENTRANCE DOOR SYSTEM (500 Wide Stile Entrance System)

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
1. Door Construction: nominal 2-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: Medium stile; 5 inch nominal width at vertical stiles and top rail. 6½ inch or optional 10 inch bottom rail as scheduled on the Drawings.
3. Glazing Stops and Gaskets: Manufacturer's standard, snap-on, extruded-aluminum stops and preformed gaskets.
   a. Provide non-removable glazing stops on outside of door.

B. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

C. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule 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 products equivalent in function and comparable in quality to named products.
2. Sequence of Operation (if required): 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 and not more than 15 lbf to open the door to its minimum required width.
   b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

D. 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. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

E. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame. Clear anodized finish.

F. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

G. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

H. Panic Exit Devices (Concealed Vertical Rod Exit Device): BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

I. Cylinders: As specified in Section 087100 "Door Hardware."

J. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

K. Operating Trim: BHMA A156.6. Match Kawneer Type CFN pulls.

L. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

M. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

N. Weather Stripping: Manufacturer's standard replaceable components.

O. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

P. Silencers: BHMA A156.16, Grade 1.

Q. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.5 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

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

C. Glazing Sealants: As recommended by manufacturer.

2.6 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:
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.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. 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.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight installation.
   1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
   2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
   3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
   4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
   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 Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

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 FIELD QUALITY CONTROL

A. Field Quality-Control: Provide periodic site visit by manufacturer’s field service representative.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 084113

SECTION 087100 - DOOR HARDWARE

PART 1 - **GENERAL**

1.01 SUMMARY

A. Section includes:

1. Hardware for wood, aluminum, hollow metal, and miscellaneous doors as noted.
2. Hardware for fire-rated doors.
3. Thresholds.
4. Smoke and draft control seals.
5. Weatherstripping and gasketing.

B. Related Sections:

1. Section 06 20 00 - Finish Carpentry: Wood door frames.
2. Section 08 11 13 - Hollow Metal Doors and Frames.
3. Section 08 14 16 - Flush Wood Doors.
4. Section 08 42 29 - Sliding Glass Doors
5. Section 08 43 13 - Aluminum-Framed Storefronts:

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.

C. DHI (H&S) - Sequence and Format for the Hardware Schedule 2019.

D. DHI (KSN) - Keying Systems and Nomenclature 2019.

E. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames 2004.

F. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors 1993; also in WDHS-1/WDHS-5 Series, 1996.

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

H. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.

K. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.

M. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.

N. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

B. Sequence installation to ensure facility services connections are achieved in an orderly and expeditious manner.

C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by affected installers and the following:

1. Architect.
2. Hardware Supplier’s Architectural Hardware Consultant (AHC).
3. Hardware Installer.
4. Owner's Security Consultant.

D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

E. Keying Requirements Meeting:

1. Schedule meeting at project site prior to Contractor occupancy.
2. Attendance Required:
   a. Contractor.
   b. Owner.
   c. Hardware Supplier’s Architectural Hardware Consultant (AHC).
   d. Door Hardware Installer.
   e. Owner's Security Consultant.
   f. Cylinder Manufacturer’s Keying Consultant
3. Agenda:
   a. Establish keying requirements.
   b. Verify locksets and locking hardware are functionally correct for project requirements.
   c. Verify that keying and programming complies with project requirements.
   d. Establish keying submittal schedule and update requirements.
4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
   a. Access control requirements.
   b. Key control system requirements.
5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
6. Deliver established keying requirements to manufacturers.

1.04 SUBMITTALS

A. See Division 1 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

C. Shop Drawings - Door Hardware Schedule: A detailed listing that includes each item of hardware to be installed on each door.

1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
2. Comply with DHI (H&S) using door numbering scheme and hardware set numbers as indicated in Contract Documents.
    a. Submit in vertical format.
3. List groups and suffixes in proper sequence.
4. Include complete description for each door listed.
5. Include manufacturers and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
6. Include account of abbreviations and symbols used in schedule.

D. Shop Drawings - Electrified Door Hardware: Include diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:

1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and/or Electrified Hardware Consultant (EHC).
2. Elevations: Include front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
3. Diagrams: Include point-to-point wiring diagrams that show each device in door opening system with related colored wire connections to each device.

E. Samples for Verification:

1. If requested, submit one (1) sample of any hardware items illustrating style, color, and finish.
2. Architect will return full-size samples to Contractor.
3. Include product description with samples.

F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

G. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1. Bitting List: List of combinations as furnished.

H. Keying Schedule:

1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

I. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.

1. See Division 1 - Product Requirements, for additional provisions.
2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.05 QUALITY ASSURANCE

A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.

B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.

C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.07 WARRANTY

A. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.

1. Closers: Thirty Five, minimum.
2. Exit Devices: Five years, minimum.
3. Locksets and Cylinders: Five years, minimum.
4. Other Hardware: Two years, minimum.
5. Where the manufacturer’s standard warranty does not meet the above requirements, provide a letter of compliance from the manufacturer or the manufacturer’s representative for the owner’s use.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Door Pulls and Push Plates:

1. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.

C. Closers:

1. Provide door closer on each exterior door, unless otherwise indicated.
2. Provide door closer on each fire-rated and smoke-rated door.

D. Thresholds:

1. Exterior Applications: Provide at each exterior door, unless otherwise indicated.

E. Smoke and Draft Control Seals:

1. Provide gasketing for smoke and draft control doors (Indicated as "S" on Drawings) that complies with local codes, requirements of assemblies tested in accordance with UL 1784.

F. Weatherstripping and Gasketing:

1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
2. Provide door bottom sweep on each exterior door, unless otherwise indicated.
3. Fabricate as continuous gasketing, do not cut or notch gasketing material.

G. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.

H. Fasteners:

1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide wall grip inserts for hollow wall construction.
5. Fire-Resistance-Rated Applications: Comply with NFPA 80.
6. Concealed Fasteners: Do not use through or sex bolt type fasteners on door panel sides indicated as concealed fastener locations, unless otherwise indicated or required per manufacturer's testing requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Provide door hardware products that comply with the following requirements:

1. Applicable provisions of federal, state, and local codes.
   a. ICC (IBC).
   b. NFPA 101.
   c. Local codes as required.

2. Accessibility: ADA Standards and ICC A117.1.
3. Fire-Resistance-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
4. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
5. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
6. Regulatory and Operational Requirements:
   a. Provide hardware for all openings, whether specified or not, in compliance with NFPA Standard No. 80, proper operation and local building code requirements. Where required, provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels. Label hardware, as required, for compliance with pressure testing criteria as dictated in IBC.
   b. Provide hardware which meets or exceeds handicap accessibility per local building code requirements. Conform to the Americans with Disabilities Act (ADA) of 1990 as amended by the D.O.J. September 15, 2010, as adopted by the Authority Having Jurisdiction (AHJ).
   c. At smoke partition doors, verify with local jurisdiction that doors specified with gaskets and latching do not need to be self-closing. Refer to hardware sets and provide door closers if required.

7. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

2.03 HINGES

A. Manufacturers:

1. Listed in Door Hardware Schedule: Best
2. Substitutions: Hager, Ives
3. Continuous hinges are as manufactured by Best. Equal products by ABH or Select are acceptable Properties:

B. Butt Hinges: As applicable to each item specified.

1. Standard Weight Hinges: Minimum of two (2) permanently lubricated non-detachable bearings.
2. Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings on heavy weight hinges.
3. Template screw hole locations.
4. Pins: Easily seated, non-rising pins.
5. UL 10C listed for fire-resistance-rated doors.

C. Continuous Hinges: As applicable to each item specified.

1. Geared Continuous Hinges: As applicable to each item specified.
   a. Non-handed.

b. UL 10C listed for fire-resistance-rated doors.
c. Sufficient size to permit door to swing 180 degrees

D. Finishes: See Door Hardware Schedule.

E. Grades:

1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
2. Continuous Hinges: Comply with BHMA A156.26, Grade 1.

F. Types:

1. Butt Hinges: Include full mortise hinges.
2. Continuous Hinges: Include geared hinges.

G. Options: As applicable to each item specified.

H. Quantities:

1. Butt Hinges: Three (3) hinges per leaves up to 90 inches in height. Add one (1) for each additional 30 inches in height or fraction thereof.
   a. Hinge weight and size unless otherwise indicated in hardware sets:
      1) For doors up to 36 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.134 inch and a minimum of 4-1/2 inches in height.
      2) For doors from 36 inches wide up to 42 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.145 inch and a minimum of 4-1/2 inches in height.
      3) For doors from 42 inches wide up to 48 inches wide and up to 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 5 inches in height.
      4) For doors greater than 1-3/4 inches thick provide hinges with a minimum thickness of 0.180 inch and a minimum of 5 inches in height.

2. Continuous Hinges: One per door leaf.

I. Applications: At swinging doors.

1. Provide non-removable pins at out-swinging exterior doors.

J. Products:

1. Butt Hinges:
   a. Concealed or Exposed bearing, five (5) knuckle.
   b. Plain Bearing, Five (5) Knuckle.

2. Continuous Hinges:
   a. Aluminum geared hinges:

2.04 BOLTS

A. Manufacturers:

1. Listed in Door Hardware Schedule: Trimco

2. Substitutions: DCI, Ives

B. Properties:

1. Flush Bolts:
   a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
   b. Manual Flush Bolts: Manually latching upon closing of door leaf.
      1) Bolt Throw: 3/4 inch, minimum.
      2) Provide manual flush bolts where allowed by code.

C. Options:

1. Extension Bolts: In leading edge of door, one bolt into floor, one bolt into top of frame.

D. Products:

1. Manual and Automatic flush bolts as required.

2.05 LOCK CYLINDERS

A. Manufacturers:

1. Listed in Door Hardware Schedule: Best
2. Substitutions: Per Division 1

B. Properties:

1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
   a. Provide cylinders from same manufacturer as locking device.
   b. Provide cams and/or tailpieces as required for locking devices.
   c. Provide cylinders with appropriate format interchangeable cores where indicated.

C. Material:

1. Manufacturer's standard corrosion-resistant brass alloy.

D. Products:

1. Rim/mortise

2.06 KEYS AND CORES

A. Manufacturers:

1. Best: Continuation of existing system.
2. Substitutions: Per Division 1 – MUST BE COMPATIBLE WITH EXISTING KEY SYSTEM.

B. Properties: Complying with guidelines of BHMA A156.28.

1. Provide small format interchangeable core.
2. Provide keying information in compliance with DHI (KSN) standards.

3. Keying Schedule: Arrange for a keying meeting, with Architect, Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements.
4. Keying: Master keyed.
   a. Contractor to coordinate all hardware delivery schedules and end user key meetings.
5. Include construction keying and control keying with removable core cylinders.
6. Do not make brass construction cores and construction control and operating keys a part of Owner's permanent keying system, nor furnish in the same keyway (or key section) as Owner, permanent keying system.
7. Key to new keying system.
8. Supply keys in following quantities:
   a. Master Keys: 4 each.
   b. Construction Keys: 10 each.
   c. Construction Control Keys: 2 each.
   d. Control Keys: 2 each.
   e. Change Keys: 2 each for each keyed core.
   f. Spare Cylinder Cores: 10 each
9. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
10. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
11. Installation of permanent cores to be done by owner. Return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

2.07 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers:

1. Listed in Door Hardware Schedule: Best 9K
2. Substitutions: Schlage ND, Corbin CL3100
3. Single occupancy restrooms have Best 45H mortise locks with visual occupancy indicators:

B. Properties:
   1. Mechanical Locks:
      a. Fitting modified ANSI A115.2 door preparation.
      b. Door Thickness Fit: 1-3/8 inches to 2-1/4 inches thick doors.
      c. Construction: Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
         1) Through-bolted anti-rotational studs.
      d. Bored Hole: 2-1/8 inch diameter.
      e. Backset: 2-3/8 inches unless otherwise indicated.
      f. Latch: Single piece tail-piece construction.
         1) Latchbolt Throw: 1/2 inch, minimum.
      g. Cylinders:
         1) Cylinder Core Types: Locks capable of supporting manufacturers' cores, as applicable.
      h. Lever Trim:
         1) Style: See Door Hardware Schedule.

C. Finishes: See Door Hardware Schedule.

1. Core Faces: Match finish of lockset.

D. Material: Manufacturer's standard for specified lock.

2.08 EXIT DEVICES

A. Manufacturers:
   a. Listed in Door Hardware Schedule: Precision 2000
   b. Substitutions: Von Duprin 98/99, Corbin Russwin ED5000

B. Properties:

1. Touchpads: "T" style metal touchpads and rail assemblies with matching chassis covers end caps.
2. Latch Bolts: Stainless steel deadlocking with 3/4 inch projection using latch bolt.
3. Cylinder: Include where cylinder dogging or locking trim is indicated.
4. Strike as recommended by manufacturer for application indicated.
5. Sound dampening on touch bar.
6. Dogging:
   a. Non-Fire-Resistance-Rated Devices: Manual dogging feature UNO
   b. Fire-Resistance-Rated Devices: Manual dogging not permitted.

7. Handing: Field-reversible.

C. Grades: Complying with BHMA A156.3, Grade 1.

D. Standards Compliance:

1. Provide UL (DIR) listed exit device assemblies for fire-resistance-rated doors.
2. Comply with UL 10C.

E. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

2.09 DOOR PULLS AND PUSH PLATES

A. Manufacturers:

1. Listed in Door Hardware Schedule: Trimco
2. Substitutions: Rockwood, Ives

B. Properties:

1. Pull Type: Straight, unless otherwise indicated.
2. Push Plate Type: Flat, with square corners, unless otherwise indicated.

C. Grades: Comply with BHMA A156.6.

D. Material: Stainless steel, unless otherwise indicated.

E. Products:

1. Push-Pull Systems.

2.10 CLOSERS

A. Manufacturers:
   a. Listed in Door Hardware Schedule: Best EHD9016
   b. Substitutions: LCN 4040XP, Corbin DC8000

B. Properties:

1. Surface Mounted Closers: Manufacturer's standard.
   a. Construction: Cast iron.
   b. Covers:
      1) Type: Standard for product selected.
         a) Full.
      2) Material: Plastic.
      3) Finish: Painted.

C. Grades:

1. Closers: Comply with BHMA A156.4, Grade 1.
   a. Underwriters Laboratories Compliance:
   b. Testing Standards Compliance: Meeting requirements of UL 10C for positive pressure.

D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

E. Types:

1. Rack-and-pinion, surface-mounted. 1-1/2 inches minimum bore.

F. Installation:

1. Mounting: Includes surface mounted installations.
2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
3. At outswinging exterior doors, mount closer on interior side of door.
4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order when automatic flush bolts are used.

2.11 PROTECTION PLATES

A. Manufacturers:

1. Listed in Door Hardware Schedule: Trimco
2. Substitutions: Don Jo, Ives

B. Properties:

1. Plates:
   a. Kick Plates: Provide along bottom edge of push side of every wood door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
   b. Mop Plates: Similar construction, provide as specified.
   c. Edges: Beveled, on four (4) unless otherwise indicated.

2. Provide UL fire rated stamp/sticker where required.

C. Grades: Comply with BHMA A156.6.

D. Material: As indicated for each item by BHMA material and finish designation.

1. Metal Properties: Stainless steel.

E. Installation:

1. Fasteners: Countersunk screw fasteners

2.12 STOPS AND HOLDERS

A. Manufacturers:

1. Listed in Door Hardware Schedule: Trimco
2. Substitutions: Ives, Don Jo

B. General: Provide overhead stop/holder when wall or floor stop is not feasible.

C. Grades:

1. Door Holders, Wall Bumpers, and Floor Stops: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.

D. Material: Base metal as indicated for each item by BHMA material and finish designation.

E. Types:

1. Wall Bumpers: Bumper, concave, wall stop.
2. Floor Stops: Provide with rubber bumper floor stop, heavy duty as specified.

F. Installation:

1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.

2.13 THRESHOLDS

A. Manufacturers:

1. Listed in Door Hardware Schedule: National Guard
2. Substitutions: Reese, Zero

B. Properties:

1. Threshold Surface: Fluted horizontal grooves across full width.

C. Grades: Thresholds: Comply with BHMA A156.21.

D. Types: As applicable to project conditions. Provide barrier-free type at every location where specified.

2.14 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:

1. Listed in Door Hardware Schedule: National Guard
2. Substitutions: Reese, Zero

B. Grades: Comply with BHMA A156.22.

C. Products:

1. Weatherstripping: See Door Hardware Schedule.
2. Door Bottom Seals:
   a. Door Sweeps: See Door Hardware Schedule.
   b. Door Shoes: See Door Hardware Schedule.

2.15 MISCELLANEOUS ITEMS

A. Manufacturers:

1. Listed in Door Hardware Schedule: Trimco
2. Substitutions: Ives, Don Jo

B. Properties:

1. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
   a. Single Door: Provide three on strike jamb of frame.
   b. Pair of Doors: Provide two on head of frame, one for each door at latch side.
   c. Material: Rubber, gray color.

2. Where aluminum frames include a gasket system, delete silencers.

2.16 FINISHES

A. Finishes: Provide door hardware of same finish, unless otherwise indicated.

1. Finish: 630; satin stainless steel. 652; satin chromium plated with steel base material, 626, satin chromium plated with brass/bronze base material and 689; aluminum painted, with any base material.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, 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. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Install hardware using the manufacturer’s fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use “Riv-Nuts” or similar products.

C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.

D. Install hardware for smoke and draft control doors in accordance with NFPA 105.

E. Use templates provided by hardware item manufacturer.

F. Do not install surface mounted items until application of finishes to substrate are fully completed.

G. Wash down masonry walls and complete painting or staining of doors and frames.

H. Complete finish flooring prior to installation of thresholds.

I. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.

1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
2. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
3. Mounting heights in compliance with operational and ADA Standards:

J. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

K. Include in installation for existing doors and frames any necessary field modification and field preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and fasteners for mounting new hardware and to cover existing door and frame preparations.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Division 1 - Quality Requirements.

B. Provide an Architectural Hardware Consultant (AHC) to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.04 ADJUSTING

A. Adjust work under provisions of Division 1 – Execution and Closeout Requirements.

B. 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 can 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.

C. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.05 CLEANING

A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

B. Clean adjacent surfaces soiled by hardware installation activities.

C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

D. See Division 1 - Construction Waste Management and Disposal, for additional requirements.

3.06 PROTECTION

A. Protect finished Work under provisions of Division 1 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

3.07 MAINTENANCE

A. Approximately six months after the acceptance of hardware in each area, the hardware installer shall:

1. Return to the project and re-adjust every item of hardware to restore proper function of doors and hardware.
2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.

3. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units.
4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware and submit to the Architect.

3.08 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Manufacturers:

Abbreviation	Name	
BE	Best Access Systems	Locks, Cylinders, Hinges, Closers, Wiring Components
KN	Knox	Lock Boxes
NA	National Guard	Gaskets, Thresholds
PR	Precision	Exit Devices, Electrical Components
GJ	Glynn Johnson	Overhead Stops
RC	RCI	Power Supplies
TK	Telkee	Key Cabinet
TR	Trimco	Door Stops, Flush Bolts, Flat Goods

Hardware Group No. H-1

For use on Door #(s): A101

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFG
3		HINGES	FBB191 4.5" x 4.5" NRP	630	BE
1		LOCKSET	9K3-7-R-15D	626	BE
1		CLOSER	EHD9016 SDS90	689	BE
1		WEATHERSTRIP	705EV Head & Jambs		NGP
1		DOOR SWEEP	200 NA		NGP
1		SADDLE THRESHOLD	896V		NGP

Hardware Group No. H-2

For use on Door #(s): A102, A103

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFG
3		HINGES	FBB191 4.5" x 4.5" NRP	652	BE
1		DEADBOLT	8T3-7-S-STK	626	BE
1		PUSH PLATE	1001-9	630	TR
1		PULL PLATE	1018-3	630	TR
1		CLOSER	EHD9016 SDS90	689	BE
1		KICK PLATE	K0050 12" x 2" LDW B4E CS	630	TR
1		WEATHERSTRIP	705EV Head & Jambs		NGP
1		DOOR SWEEP	200 NA		NGP
1		THRESHOLD	896V		NGP

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Glass for windows doors interior borrowed lites and storefront framing.
   2. Glazing sealants and accessories.

1.2 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 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 (300 mm) square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.4 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: Five 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: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. AGC Glass Company North America, Inc.
   2. Guardian Glass; SunGuard.
   3. Oldcastle BuildingEnvelope™.
   4. Pilkington North America.
   5. Other prior approved manufacturers.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E 1300.
   1. Design Wind Pressures: As indicated on Drawings.
   2. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
   3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

C. 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. 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 (W/sq. m x K).
   2. 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.
   3. 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. GANA 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 or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS GENERAL (apply as scheduled on the Drawings)

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

C. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

D. Heat-Strengthened Float Glass: ASTM C 1048, 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.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
1. Sealing System: Dual seals.

2.6 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.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Bostik, Inc.
b. Dow Corning Corporation.
c. GE Construction Sealants; Momentive Performance Materials Inc.
d. Pecora Corporation.
e. Sika Corporation.
f. Tremco Incorporated.

2.7 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 C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. 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.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 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 (1270 mm).

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.

3.2 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. Apply heel bead of elastomeric sealant.

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.

3.3 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.

3.4 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.

3.5 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.

3.6 MONOLITHIC GLASS SCHEDULE (apply as scheduled on the Drawings)

A. Glass Type : Clear float glass.
   1. Minimum Thickness: ¼" nominal, or as indicated on the Drawings.

B. Glass Type : Clear fully tempered float glass.
   1. Minimum Thickness: ¼" nominal, or as indicated on the Drawings.
   2. Safety glazing required.

C. Glass Type : Tinted fully tempered float glass.
   1. Tint Color: As indicated on the Drawings.
   2. Minimum Thickness: ¼" nominal, or as indicated on the Drawings.
   3. Safety glazing required.

3.7 INSULATING GLASS SCHEDULE

A. Glass Type : Low-E-coated, tinted insulating glass.
   1. Overall Unit Thickness: 1 inch at Storefront Systems and Aluminum Windows.
   2. Minimum Thickness of Each Glass Lite: ¼" nominal.
   3. Outdoor Lite: Tinted fully tempered float glass.
   4. Tint Color: As indicated on the Drawings.
   5. Interspace Content: Argon.
   6. Indoor Lite: Clear fully tempered float glass.
   7. Low-E Coating: Pyrolytic or sputtered on second or third surface.
   8. Safety glazing as required by application.
   9. END OF SECTION 088000

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fixed, extruded-aluminum louvers.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For louvers and accessories.

C. Samples: For each type of metal finish required.

D. Product Test Reports: Based on tests performed according to AMCA 500-L.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on a uniform pressure of 25 lbf/sq. ft., acting inward or outward.

2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal, Drainable-Blade Louver:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Industrial Louvers Inc.; Fixed, Extruded Model #455-XP Aluminum, Horizontal, Drainable Blade Louvers. or a comparable product by one of the following:

a. Airolite Company, LLC (The).
b. Construction Specialties, Inc.
c. Nystrom, Inc.
d. Reliable Products, Inc.

2. Louver Depth: 4 inches at typical louver, narrow depth at round porthole louvers.

3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.

4. Mullion Type: Exposed.

5. Louver Performance Ratings:

   a. Free Area: Not less than 8.0 sq. ft. for 48-inch-wide by 48-inch-high louver.
   b. Point of Beginning Water Penetration: Not less than 950 fpm.
   c. Air Performance: Not more than 0.10-inch wg static pressure drop at 800-fpm free-area intake velocity.

2.3 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.

2. Screening Type: Bird screening at drainable blade types

B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.

C. Louver Screening for Aluminum Louvers:

1. Bird Screening: Aluminum, 1/2-inch-square mesh, 0.063-inch wire.
2. Insect Screening: Aluminum, 18 x 14 mesh wire.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.

2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

3. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 FABRICATION

A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.6 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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

A. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 089119

SECTION 093013 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Ceramic mosaic tile.
   2. Glazed wall or base tile.
   3. Waterproof membrane.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Samples:
   1. Each type and composition of tile and for each color and finish required.

1.3 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 2 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Company specializing in performing the work of this section with minimum two years' experience.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide Standard-grade 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/ A118/ A136.1, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

A. Ceramic Tile Type CT-1: Glazed wall tile (Sanitary Cove Base).
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Dal-tile Semi-Gloss, or comparable product by one of the following:
      a. American Olean Color Story Wall
      b. Prior approved equals.
   2. Module Size: Nominal 4¼ inches by 4¼ inches as shown on the Drawings.
   3. Face Size Variation: Rectified.
   4. Thickness: 5/16 inch.
   5. Face: Plain with modified square edges.
   6. Finish: Bright, opaque glaze.
   7. Tile Color and Pattern: As selected by Architect from manufacturer's full range, 75% Price Group 2, 25% Price Group 3.
   8. Grout Color: As selected by Architect from manufacturer's full range.
   9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
      a. Base: Coved, module size 4¼ by 4¼ as scheduled on the Drawings.
      b. External Corners: Surface bullnose, same size as adjoining flat tile.
      c. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.
      d. Top Cap: Surface bullnose.

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
   1. Non-Ceramic Trim: style and dimensions to suit application, for seating using tile mortar or adhesive: use in the following locations:
      a. Transition between rubber floor and ceramic tile, Schluter SCHIENE AE60 (verify heights), or approved equal, in height as required. Stain anodized aluminum.
      b. Transition between LVT and ceramic tile, Schluter RENO-U AEU35 (verify heights), or approved equal, in height as required. Stain anodized aluminum.

2.4 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Latex-Portland Cement Waterproof Mortar: Flexible, waterproof mortar consisting of cement-based mix and latex additive.

C. Waterproofing and Tile-Setting Adhesive: One-part, fluid-applied product intended for use as both waterproofing and tile-setting adhesive in a two-step process.

2.5 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

B. Dry-Set Portland Cement Mortar (Thinset): ANSI A118.1.
   1. For wall applications, provide nonsagging mortar.

C. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.
   1. Provide prepackaged, dry-mortar mix to which only water must be added at Project site.
   2. For wall applications, provide nonsagging mortar.

D. Dry Set Mortar for Large and Heavy Tile (LHT Mortar): ANSI A118
   1. For Large Format Tiles with at least one side greater than 15”.
   2. Not to be used in truing or leveling underlying substrates or the work of other but to install tile per ANSI A108.5.

E. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.

F. Organic Adhesive: ANSI A136.1, Type I.

2.6 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.

B. Standard Cement Grout: ANSI A118.6.

C. High-Performance Tile Grout: ANSI A118.7.

D. Water-Cleanable Epoxy Grout: ANSI A118.3.

E. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.7 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. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

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 concrete substrates for tile floors installed with bonded mortar bed and thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

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 thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer. Patch all damaged mortar bed substrates where existing tile has been removed with compatible patching compound.

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 (1:50) 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 2015" 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.
   1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
      a. Tile floors in wet areas.
      b. Tile floors consisting of tiles 12x24 or larger.
      c. Tile floors consisting of rib-backed tiles.

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.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
   1. Ceramic Mosaic Tile: 1/8 inch.
   2. Glazed Wall Tile: 1/16 inch.
   3. Porcelain Tile: 1/8 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. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

K. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

L. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

M. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

3.4 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Wall Installations:
   1. Ceramic Tile Installation: Concrete Masonry, TCNA W223-23.
      a. Ceramic Tile Type: CT-1.
      b. Mortar: Dry-Set or Latex Portland Cement mortar.
      c. Grout: Water-Cleanable Epoxy Grout
      d.
      e. END OF SECTION 093013

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient base.
   2. Resilient molding accessories.

1.2 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.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Burke Mercer Flooring Products, or comparable product by one of the following:
   1. Armstrong World Industries, Inc.
   2. Flexco.
   3. Johnsonite; A Tarkett Company.
   4. Roppe Corporation, USA.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
   1. Group: I (solid, homogeneous)
   2. Style and Location:
      a. Style A, Straight: Provide in areas with carpet.
      b. Style B, Cove: Provide in areas with resilient flooring.
      c. Style C, Butt to: Provide in areas indicated.

C. Thickness: 0.125 inch.

D. Height: 4 inches as indicated on Drawings.

E. Lengths: Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

H. Colors: As selected by Architect from full range of industry colors.

2.2 VINYL OR RUBBER MOLDING ACCESSORY

A. Basis-of-Design Product: Subject to compliance with requirements, provide Burke Mercer Flooring Products, or comparable product by one of the following:
1. Armstrong World Industries, Inc.
2. Flexco.
3. Johnsonite; A Tarkett Company.
4. Roppe Corporation, USA.

B. Description: Rubber cap for cove carpet, cap for cove resilient flooring, carpet edge for glue-down applications, nosing for carpet, nosing for resilient flooring, reducer strip for resilient flooring, joiner for tile and carpet, and transition strips.

C. Profile and Dimensions: As indicated on drawings.

D. Locations: Provide rubber molding accessories as required by condition.

E. 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 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 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. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) 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 (76 mm) in length.
      a. Miter or cope corners to minimize open joints.

3.3 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.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096723 - FLUID APPLIED RESINOUS FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. High-performance coatings including the following:
   1. Cleaners and patch/repair specialty products.
   2. Seal-Krete high performance flooring systems.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 07 90 00 - Joint Sealants.

1.3 REFERENCES

A. ASTM F 1869: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

B. ASTM F 2170: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

C. SSPC: The Society for Protective Coatings:
   1. SSPC-SP 1 - Solvent Cleaning.
   2. SSPC-SP 2 - Hand Tool Cleaning.
   3. SSPC-SP 3 - Power Tool Cleaning.
   4. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.

D. ICRI: International Concrete Repair Institute
   1. CSP Concrete Surface Preparation Standards

E. Safety Data Sheets: Per manufacturer's SDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.

1.4 DEFINITIONS

A. LEED as used in this Section refers to Leadership in Energy and Environmental Design. Products listed meet LEED criteria for environmentally safe interior primers, paints and coatings.

B. VOC as used in this Section refers to Volatile Organic Compounds found in primers, paints, sealers and stains. The level of VOCs appears after each product listed in the Schedule in grams per liter (g/L).

C. Rust-Oleum Seal-Krete High Performance Systems are referred to as SKHP.

1.5 SUBMITTALS

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

B. Coordinate with Section 01 30 00 - Administrative Requirements.

C. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Submit descriptive data and specific recommendations for mixing, application, curing including any precautions of special handling instructions required to comply with the Occupational Safety and Health Act.
   2. Prepare instructions and recommendations.
   3. Submit storage and handling requirements and recommendations.

D. Selection Samples: For each finish product specified, submit maximum of three samples, 6 inches by 6 inches for each color and type of coating available from manufacturer's full range.

E. Verification Samples: For each finish product specified, submit maximum of three samples, 6 inches by 6 inches for each color and type of coating as specified.

F. Maintenance Literature: Submit two copies of manufacturer's maintenance recommendations.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Materials used in the floor surfacing shall be the products of a single manufacturer.

B. Installer Qualifications:
1. Installer shall be acceptable to Architect and manufacturer.
2. Installation shall be performed by an applicator with a minimum of 3 years experience in work of similar nature and scope. Installer shall be approved by the manufacturer of the floor surfacing materials. The Contractor shall furnish a written statement from the manufacturer that the installer is acceptable.
3. Contractor shall have proven experience with specified system.

C. Certification:
1. Manufacturer shall furnish statement attesting that materials meet specification requirements.
2. Manufacturer shall furnish properly labeled material and Technical/Safety Data Sheets which comply with current state and federal requirements.

D. Pre-Construction Meeting:
1. Pre-job meeting between Contractor, Architect, and installer shall be held to discuss concrete substrate, location of joints and/or saw cuts to minimize sub-floor cracking.

E. Mock-Up: Provide an installed mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
2. Mock-up size shall not be less than 50 square feet.
3. Acceptable mock-up to be standard of quality for installed work.
4. Unacceptable installed work to be removed and replaced or refinished until acceptable.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information:
1. Product name and type (description).
2. Application and use instructions.
3. Surface preparation.
4. VOC content.
5. Environmental issues.
6. Batch date.
7. Color number.

B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.

D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.8 PROJECT CONDITIONS

A. Maintain the ambient room and floor temperature at 60 degree F (15 degrees C) or above for a period extending from 72 hours before or per manufacturer's technical data sheet, during and after floor installation. Concrete to receive surfacing shall have cured for at least 28 days and be free of all curing compounds.

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

C. When using polyureas or moisture cured urethane products, pay special attention to humidity levels. At higher humidity levels, these products will have a shorter working time.

1.9 WARRANTY

A. The technical data and suggestions of use are correct to the best of our knowledge, and offered in good faith. The statements of this specification do not constitute a warranty, expressed, or implied, as to the performance of these products. As conditions and use of our materials are beyond our control, we can guarantee these products only to conform to our standards of quality, and our liability, if any, will be limited to replacement of defective materials. All technical information is subject to change without notice.

B. Special written project warranties may be issued on a request basis at the discretion of the Rust-Oleum Corporation Technical and Legal Departments and would not be contained within this specification document.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Subject to compliance with requirements, provide Rust-Oleum®, Seal-Krete HP Poly Shell 8000 Polyaspartic Decorative Flake Double Lift System High Performance Flooring; Email:; Web:https://www.rustoleum.com, or a comparable flooring system by one of the following:

1. Stonhard Stonetec ERF
2. Armor-Poxy ArmorClad Full Flake Broadcast

B. Specification and product questions should be directed to Rust-Oleum Technical Service at technicalservice@rustoleum.com.

C. Requests for substitutions will be considered in accordance with provisions of Section 012513.

2.2 CLEANERS AND PATCH/REPAIR SPECIALTY PRODUCTS

A. Patch/Repair Products:
1. Rust-Oleum Seal-Krete HP Fast Cure Concrete Repair.
2. Rust-Oleum Concrete Saver Flexible Joint Sealant.

B. Moisture Mitigating Vapor Barriers (Optional if required by testing):
1. Rust-Oleum Seal-Krete HP Vapor Shell Epoxy.
   a. Use for up to 25 lbs MVT

2.3 SEAL-KRETE HIGH PERFORMANCE FLOOR SYSTEMS (SKHP)

A. High Performance Floor Systems (SKHP):
1. Rust-Oleum Seal-Krete HP Poly Shell 8000 Polyaspartic Decorative Flake Double Lift System.
a. Primer: RO SKHP Poly Shell 8000 tinted and applied at 10-12 mils DFT. Broadcast decorative flake to rejection.
b. Base Coat: RO SKHP Poly Shell 8000 tinted and applied at 10-12 mils DFT. Broadcast decorative flake to rejection.
c. Grout Coat: RO SKHP Poly Shell 8000 Clear and applied at 10-12 mils DFT.
d. Seal Coat: RO SKHP Poly Shell 8000 Clear applied at 8-10 mils DFT.

PART 3 EXECUTION

3.1 EXAMINATION

A. The Contractor shall review the product manufacturer's special instructions for surface preparation, application, temperature, re-coat times, and product limitations.

B. The Contractor shall review product health and safety precautions listed by the manufacturer.

C. The Contractor shall be responsible for enforcing on site health and safety requirements associated with the Work.

D. Ensure that surfaces to receive coating are dry immediately prior to application.

E. Ensure that moisture-retaining substrates to receive coating have moisture content within tolerances allowed by coating manufacturer.

F. Examine areas to receive coatings for:
1. Concrete surfaces shall be in sound condition and properly prepared prior to flooring system installation.
2. Defects in existing work that affect proper execution of coating work.
3. Deviations beyond allowable tolerances for the concrete slab work.

G. Correct conditions that could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

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

3.2 SURFACE PREPARATION

A. All cleaning and surface preparations specified herein are minimums. Prepare substrate to receive coating in accordance with manufacturer's recommendations.

B. All surfaces to be coated shall be free of cracks, pits, fins, projections, or other imperfections that would interfere with the formation of a uniform, unbroken coating film.

C. Substrate shall be free of dirt, waxes, curing agents, and other foreign materials prior to mechanical surface preparation.

D. New concrete shall have cured for a minimum 30 days prior to coating application. If a cure and seal agent was added to the concrete or applied after initial cure, the concrete must be abrasive blast cleaned or mechanically abraded to remove the sealer and expose fresh concrete.

E. Acceptable Substrates:
   1. Level tolerance: Concrete sub-floor shall be level with a maximum variation from level of 1/4 inch (6 mm) in 10 feet (3048 mm). Any irregularity of the surface requiring patching and/or leveling shall be done using material approved by the manufacturer.
   2. Concrete floor shall have a steel trowel finish.
   3. Concrete shall be cured a minimum of 28 days. No curing agents shall be used in areas to receive coating.
   4. Concrete slab shall have an efficient moisture barrier of minimum 10 mils (.2540 mm) placed directly under the concrete slab. Do not use vapor barrier manufactured with recycled content. Testing shall be done to verify that the moisture vapor emission rate of the slab does not exceed that as recommended by the manufacturer at time of installation of the epoxy coating flooring. Moisture vapor emission and moisture content testing shall conform with the requirements of ASTM F 1869 (Calcium Chloride Test) and ASTM F 2170 (Relative Humidity Probe Test). If test results show excessive levels of moisture content or vapor emission rate above that recommended by the manufacturer, apply manufacturer's recommended moisture vapor emission control material.
   5. Saw cutting of control joints shall be done between 12 and 24 hours after placement of the structural concrete.

F. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.

G. Concrete surfaces shall be mechanically abraded, or abrasive blast cleaned to remove all laitance to provide a uniform surface profile with a profile depth recommended by the fluid applied resinous system selected per ICRI CSP Standards. **ICRI CSP Level required for this project is CSP-2.** Contact Manufacturer's technical service department for specific surface preparation questions.

H. The coating contractor is to examine the substrate to determine if it is in satisfactory condition to receive the specified floor system. Obtain coating contractor's written report listing conditions detrimental to performance of work in this specification. Do not proceed with the application of specified floor coating until unsatisfactory conditions have been corrected.

3.3 MIXING AND THINNING

A. Mixing:
   1. The base component and activator must be combined with power mixing. Hand mixing is not adequate.
   2. Scrape out the container of the activator to transfer as much material as possible.
   3. Use a suitable mixing blade which will not entrain air. Mix at 500-750 RPM for 1-3 minutes.
   4. Application must begin as soon as the material has been completely mixed.

B. Thinning: Thinning is not required. Do not thin.

3.4 APPLICATION

A. Weather Conditions:
   1. Apply when air and surface temperatures are between 60-80 degrees F (15-27

degrees C) and surface temperature is at least 5 degrees F (3 degrees C) above the dew point.
2. The relative humidity should not be greater than 85 percent.

B. Coating Application:
1. Do not attempt to work out of the container. Immediately after mixing material, pour out the activated material in a long thin stripe across the top of the work section of floor. Use only the material that flows naturally out of the container.
2. Do not scrape out the container of activated material or turn buckets upside down on floor to drain. Doing so may result with transfer of un-activated material to the floor which will result with soft spots in the coating.
3. Install in accordance with manufacturer's instructions.
4. Locate all flexible joints required.
5. Provide accessories necessary for complete installation.

C. Protection of Surfaces:
1. The Coating Contractor shall be responsible for protecting all adjacent surfaces from spills, drips, or any other form of coating damage.
2. The coating contractor and its subcontractors shall be responsible for removing spots or repairing damaged surfaces to the satisfaction of the Architect.

3.5 CLEAN-UP

A. Clean-up shall be done to remove all spills, drips, overspray, or other unwanted coating from all surfaces not intended to be coated.

B. All used rags, brushes, roller covers, and other application related materials shall be removed from the work site and disposed in a proper manner and in accordance with local waste regulations.

C. All equipment, staging, ladders, and other contractor materials brought onto the jobsite by the contractor shall be remove at the conclusion of the job in a timely manner.

3.6 PROTECTION

A. Protect installed products until completion of project.

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

END OF SECTION

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates as included in the Drawings.
   1. Concrete.
   2. Concrete masonry units (CMU).
   3. Steel.
   4. Galvanized metal.
   5. Aluminum (not anodized or otherwise coated).
   6. Wood.
   7. Exterior gypsum board.

B. Related Requirements:
   1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
   2. Section 099600 "High-Performance Coatings" for special-use coatings.
   3. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
   4. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.3 SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. 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.

C. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.5 QUALITY ASSURANCE

A. 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. (9 sq. m).
      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.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture’s label with the following information:
   1. Product name and type (description).

2. Batch date.
3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
1. Benjamin Moore & Co.
2. Duron, Inc.
3. Glidden Professional, Division of PPG Architectural Finishes, Inc.
4. M.A.B. Paints.
5. PPG Architectural Finishes, Inc.
6. Other prior approved manufacturers.

B. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

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: Provide materials that comply with VOC limits of authorities having jurisdiction.

C. Colors: As selected by Architect from manufacturer's full range.
   1. 20 percent of surface area will be painted with deep tones.

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. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
   1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Masonry (Clay and CMU): 12 percent.
      c. Wood: 15 percent.
      d. Portland Cement Plaster: 12 percent.
      e. Gypsum Board: 12 percent.
   2. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
   3. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Existing Steel, Unprimed Steel or Incompatible Coatings: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. 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.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of steel window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats at deep colors with the same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6

3.7 EXTERIOR PAINTING SCHEDULE

A. Concrete, Portland Cement Plaster (Stucco), Cementitious Siding, Nontraffic Surfaces:
   1. Latex System:
      a. Prime Coat: Primer sealer, latex, exterior: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
      b. Intermediate Coat: Latex, exterior, matching topcoat.
      c. Topcoat: Latex, exterior, low-sheen: S-W A-100 Exterior Latex Flat, A6 Series or Low Sheen, A12 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
   2. Latex Aggregate/Latex System:
      a. Prime Coat: Block Filler, Latex, Interior/Exterior: S-W Loxon Block Surfacer, A24W200, at 50 to 100 sq. ft. per gal (1.2 to 2.4 sq. m per l).
      b. Topcoat: Latex, exterior flat, fine, medium or coarse texture as selected: S-W UltraCrete Textured Masonry Topcoat, A44-800 Series, at 50 to 80 sq ft./gal. 50 to 100 sq. ft. per gal.

B. CMU Substrates:
   1. Latex System:
      a. Block Filler: Block filler, latex, interior/exterior: S-W PrepRite Block Filler, B25W25, at 75 to 125 sq. ft. per gal (1.8 to 3.1 sq. m per l).
      b. Intermediate Coat: Latex, exterior, matching topcoat.
      c. Topcoat: Latex, exterior, satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

C. Ferrous Metal, Galvanized-Metal, and Aluminum Substrates:
   1. Water-Based Light Industrial Coating System:
      a. Prime Coat: Primer, water-based, anti-corrosive for metal: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, 5.0 to 10.0 mils wet, 2.0 to 4.0 mils dry. Spot prime any damaged shop primer if steel is already shop primed.
      b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
      c. Topcoat: Light industrial coating, exterior, water based, semi-gloss: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.

D. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.
   1. Latex System:
      a. Prime Coat: Primer, latex for exterior wood.

a. Intermediate Coat: Latex, exterior, matching topcoat.
b. Topcoat: Latex, exterior, satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
c.

E.

F. Exterior Gypsum Board Substrates:
1. Latex System:
a. Prime Coat: Primer, bonding, water-based: S-W PrepRite ProBlock Latex Primer/Sealer.
b. Intermediate Coat: Latex, exterior, matching topcoat.
c. Topcoat: Latex, exterior, satin: S-W A-100 Exterior Latex Satin, A82 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates as included in the Drawings.
   1. Concrete.
   2. Clay masonry.
   3. Concrete masonry units (CMU).
   4. Steel.
   5. Cast iron.
   6. Galvanized metal.
   7. Aluminum (not anodized or otherwise coated).
   8. Wood.
   9. Gypsum board.
   10. Plaster.
   11. Cotton or canvas insulation covering.

B. Related Requirements:
   1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
   2. Section 099600 "High-Performance Coatings" for high-performance and special-use coatings.
   3. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
   4. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.2 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

1.3 SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
   1. Submit Samples on rigid backing, 8 inches (200 mm) 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.

C. 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.

D. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.5 QUALITY ASSURANCE

A. 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. (9 sq. m).
      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.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:
1. Product name and type (description).
2. Batch date.
3. Color number.
4. VOC content.
5. Environmental handling requirements.
6. Surface preparation requirements.
7. Application instructions.

B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Lead Paint: It is not expected that lead paint will be encountered in the Work.
1. If suspected lead paint is encountered, do not disturb; immediately notify Architect and Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
1. Benjamin Moore & Co.
2. Duron, Inc.
3. Glidden Professional, Division of PPG Architectural Finishes, Inc.
4. PPG Architectural Finishes, Inc.

5. Pratt & Lambert.
6. Other prior approved manufacturers.

B. Source Limitations: Obtain paint materials from single source from single listed manufacturer.
1. Manufacturer's designations listed on a separate color schedule are for color reference only and do not indicate prior approval.

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. 20 percent of surface area will be painted with deep tones.

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. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

B. Substrate Conditions:
1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
a. Concrete: 12 percent.
b. Masonry (Clay and CMU): 12 percent.
c. Wood: 15 percent.
d. Gypsum Board: 12 percent.
e. Plaster: 12 percent.
2. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
3. Plaster Substrates: Verify that plaster is fully cured.
4. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

C. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
   1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.

E. 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.

F. Existing Steel, Unprimed Steel or Incompatible Coatings: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."
   3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
   4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. 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.

H. 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.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.

2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat at deep colors with a lighter shade of the topcoat to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in occupied spaces:
a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.
2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces and Clay Masonry:
   1. Latex System:
      a. Prime Coat: Primer sealer, latex, interior: S-W Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
      b. Intermediate Coat: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66 Series.
      c. Topcoat: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66 Series, at 6.0-10.0 mils wet, 2.5-4.0 mils dry per coat.

B. CMU Substrates:
   1. Latex System:
      a. Block Filler: S-W Heavy Duty Block Filler, B42W46, 18.0-34.0 mils wet, 10.0-18.0 mils dry.
      b. Intermediate Coat: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66 Series.
      c. Topcoat: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66 Series, at 6.0-10.0 mils wet, 2.5-4.0 mils dry per coat.

C. Metal Substrates (Aluminum, Steel, Galvanized Steel):
   1. Alkyd System (Water Based):

a. Prime Coat: Primer, rust-inhibitive, water based: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
b. Intermediate Coat: Water-based acrylic, interior, matching topcoat.
c. Topcoat: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series or Gloss Coating, B66-660 Series, at 2.5 to 4.0 mils dry, per coat.

D. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.
1. Latex System:
a. Prime Coat: Primer sealer, latex, interior: S-W Premium Wall & Wood Primer, B28W08111, at 4.0 mils wet, 1.8 mils dry.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66-650 Series, at 6.0-12.0 mils wet, 2.1-4.2 mils dry, per coat.

E. Gypsum Board, Plaster and Spray-Texture Ceiling Substrates:
1. Latex System:
a. Prime Coat: Primer, latex, interior: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
b. Intermediate Coat: Latex, interior, matching topcoat.
c. Topcoat: S-W Pro Industrial DTM Acrylic Semi-Gloss, B66 Series, at 6.0-10.0 mils wet, 2.5-4.0 mils dry, per coat.

END OF SECTION 099123

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:
   1. Exterior Substrates:
      a. Shop primed steel.
      b. Galvanized metal.

1.2 SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples: For each type of coating system and in each color and gloss of topcoat indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Tnemec Inc.; high performance coating systems, or comparable products by one of the following:
   1. Benjamin Moore & Co.
   2. Devoe Paint Company; Akzo Nobel.
   3. Dulux (formerly ICI Paints); a brand of AkzoNobel.
   4. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide product listed in the Exterior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:
   1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

3. Products shall be of same manufacturer for each coat in a coating system.

B. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and CMUs): 12 percent.
4. Wood: 15 percent.
5. Gypsum Board: 12 percent.
6. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. The contractor shall provide a test sample of the proposed primer coat on a section of shop-primed steel to verify proper adhesion of coating system to the primed substrate.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.
1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations.

B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Shop-Primed Steel Substrates (Exposed Building Structure & Miscellaneous Metal Surfaces):
   1. Pigmented Polyurethane over High-Build Epoxy Primer:
      a. Prime Coat: Tnemec Series 135 Chembuild modified epoxy primer, DFT 4.0 to 6.0 mils, tinted slightly lighter than finish topcoat.
      b. Topcoat: Tnemec Series 1075U Endura-Shield II semi-gloss, acrylic polyurethane, DFT 3.0 to 5.0 mils.

B. Galvanized-Metal Substrates (Hot-Dipped Handrails/Guardrails):
   1. Fluoropolymer over High-Build Epoxy Primer:
      a. Prime Coat: Tnemec Series 66 Hi-Build Epoxoline epoxy primer, DFT 2.0 to 3.0 mils, tinted slightly lighter than finish topcoat.
      b. Topcoat: Tnemec Series 1071 Fluoronar semi-gloss, high-solids fluoropolymer, DFT 2.5 to 3.0 mils.

END OF SECTION 099600

SECTION 101416 - PLAQUES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plaques.

1.2 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 others, and accessories.
   3. Show message list, typestyles, graphic elements, and layout for each plaque.

C. Samples: For each exposed product and for each color and texture specified.

D. Plaque Schedule (if more than one plaque): Use same designations specified or indicated on Drawings or in a plaque or sign schedule.

E. Sample warranty.

F. Maintenance data.

1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

1.4 ALLOWANCE

A. Plaque Allowance: Contractor shall provide an allowance of **$3,000** in his bid for one (1) building plaque. Installation cost shall be borne by the Contractor outside the allowance amount.

PART 2 - PRODUCTS

2.1 PLAQUES

A. Cast Plaque: Plaque with background texture, border, 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, provide Gemini Incorporated; cast aluminum plaques, or a comparable product by one of the following:
      a. A.R.K. Ramos.
      b. Metallic Arts.
      c. Southwell Company (The).

2. Plaque Material: Cast aluminum.
3. Plaque Thickness: ¾".
4. Finish: Integral Aluminum Finish: Manufacturer's standard horizontal brushed grain aluminum.
5. Background Texture: Leatherette.
6. Integrally Cast Border Style: Plain bevel, brushed.
7. Mounting: Rosette-head through fasteners.

2.2 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 concealed fasteners and anchors unless indicated to be exposed.
   2. For exterior exposure, furnish nonferrous-metal devices to match plaque finish as recommended by manufacturer, unless otherwise indicated.
   3. Exposed Metal-Fastener Components, General:
      a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
   4. 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.
      b. Through Fasteners: Exposed metal fasteners matching plaque finish, with type of head indicated, installed in predrilled holes.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 FABRICATION

A. General: Provide manufacturer's standard plaques according to requirements indicated.
   1. 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.
   2. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
   3. Provide rebates, lugs, and brackets 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.
   4. 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.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted plaques to suit plaque construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
   1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match plaque-background color unless otherwise indicated.
   2. Stainless-Steel Brackets: Factory finish brackets to match plaque background finish unless otherwise indicated.

PART 3 - EXECUTION

3.1 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.
   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.

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: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
   2. Through Fasteners: Drill holes in substrate using predrilled holes in plaque as template. Countersink holes in plaque if required. Place plaque in position and flush to surface. Install through fasteners and tighten.
   3. Brackets: Remove loose debris from substrate surface and install bracket supports in position so that plaque is correctly located and aligned.
   4. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of plaque and of suitable quantity to support weight of plaque after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as plaque is applied and to prevent visibility of cured adhesive at plaque edges. Place plaque in position, and push to engage adhesive. Temporarily support plaque in position until adhesive fully sets.

C. Remove temporary protective coverings and strippable films as plaques are installed.

END OF SECTION 101416

SECTION 101423.16 - ROOM-IDENTIFICATION PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes room-identification signs that are directly attached to the building.

B. Related Requirements:

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For room-identification signs.
   1. Include fabrication and installation details and attachments to other work.
   2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
   3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.

C. Samples: For each exposed product and for each color and texture specified.

1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

2.2 ROOM-IDENTIFICATION SIGNS

A. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Best Sign Systems, Inc.; HC300 ADA Series Graphic Blast room identification signage, or a comparable product by one of the following:

a. ASI Sign Systems, Inc.
b. Clarke Systems.
c. Mohawk Sign Systems.

B. Fabrication:
1. HC 300 ADA System with a four-in-one construction style having the following characteristics:
a. Tactile characters/symbols shall be raised 1/32 inch from sign plate face. Signs shall be of one-piece construction; added-on and/or engraved characters are unacceptable.
b. Text shall be accompanied by Grade 2 braille.
c. 3/8" wide, 1/32" raised perimeter border with 1/8" inside radius typical.
d. All letters, numbers and/or symbols shall contrast with their background – either light characters on a dark background or dark characters on a light background. Characters and background shall have matte finish.

C. Interior Signage:
1. Plaque material shall consist of melamine plastic laminate, approximately 1/8" thick (1/4" thick for slot signs), with background painted a contrasting color and rated non-static, fire-retardant and self-extinguishing. Plastic laminate will be impervious to most acids, alkalies, alcohol, solvents, abrasives and boiling water.
2. Lettering style shall be Standard Medium, upper case, or other sans serif or simple serif typeface.
3. Sizes of letters and numbers shall be as follows:
a. Room numbers shall be 5/8" high.
b. Lettering for room usage and directional identification shall be 5/8" high.
c. Lettering for restroom identification shall be 5/8" high, corresponding symbols shall be 3" high.
4. Letters and numbers shall be centered on sign.
5. Grade 2 braille shall be placed directly below last line of letters or numbers, except for room number signs, where they shall be placed directly behind the last number.
6. Square corners.

D. Sign Size:
1. Restroom signs shall be 6" x 8".

E. Sign Schedule:
1. Provide the following types of interior room identification signs where shown on the drawings:
a. Pictogram

F. Accessories:
1. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape with adhesive on both sides.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to the accessibility standard.
   3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Mounting Methods:
   1. 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.
   2. Signs located on glass substrates shall be furnished with a matching size blank sign on the opposite side of the glass to hide the mounting tape.

C. Remove any temporary protective coverings and strippable films as signs are installed.

END OF SECTION 101423.16

SECTION 102113.17 - PHENOLIC-CORE TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachment details.

C. Color samples for phenolic panel material.

D. Product certificates.

E. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. 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: 25 or less.
   2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 PHENOLIC-CORE TOILET COMPARTMENTS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Columbia Partitions, Series 72833, Class B Fire Rated Solid Phenolic Toilet Compartments, or a comparable product by one of the following:
   1. ASI Accurate Partitions.
   2. AMPCO by AJW.

B. Toilet-Enclosure Style: Overhead braced.

C. Urinal-Screen Style: Floor anchored and wall braced.

D. Door, Panel, Screen, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately

laminated), and with eased and polished edges. Provide minimum 3/4-inch- (19-mm-) thick doors and divider panels and minimum 1-inch- (13-mm-) thick pilasters.

E. Pilaster Shoes: Formed from stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.

F. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe matching that on the pilaster.

G. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's heavy duty design; extruded aluminum.

H. Phenolic-Panel Finish:
1. Facing Sheet Finish: One color and pattern in each room.
2. Color and Pattern: As selected by Architect from manufacturer's full range, with manufacturer's standard dark color core.
3. Edge Color: Manufacturer's standard.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's heavy-duty stainless steel operating hardware and accessories. Provide continuous hinges at all doors.
1. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's heavy duty continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, 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 compatible with related materials.

2.4 FABRICATION

A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at bottoms of posts. Provide shoes at posts to conceal anchorage.

D. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. 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 (13 mm).
      b. Panels and Walls: 1 inch (25 mm).
   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.

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 to return doors to fully closed position.

END OF SECTION 102113.17

SECTION 102800 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Public-use shower room accessories.
3. Private-use bathroom accessories.
4. Custodial accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Maintenance data.

1.3 WARRANTY

A. Manufacturer's Standard Sample Warranty.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PUBLIC-USE TOILET, BATH & CUSTODIAL ACCESSORIES

A. Product Manufacturers:

1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide Bobrick Washroom Equipment, Inc. and other specific product call-outs, or a comparable product by one of the following:

a. American Specialties, Inc.
b. Bradley Corporation.
c. Other prior approved manufacturers.

B. Grab Bar Set GB1 (1 – 42” & 1 – 36” Grab Bar Set):

1. Bobrick Series 5806, length as scheduled.
2. Mounting: Flanges with concealed fasteners.
3. Material and Finish: Stainless steel, 0.05 inch (1.3 mm) thick, No. 4 finish (satin).
4. Outside Diameter: 1-1/4 inches (32 mm).

C. Mirror Unit M1:

1. Bobrick Model 165 (18 x 36)
2. Frame: Stainless-steel channel.

    a. Corners: Manufacturer's standard.

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

    a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: 18” wide x 36” high.

D. Coat Hook CH1:

1. Bobrick Model B-682.
2. Description: Single-prong Hat and Coat Hook unit.
3. Material and Finish: Stainless steel, No. 7 finish (polished).

E. Mop and Broom Holder MR:

1. Bobrick Model B223 x 24.
2. Description: Unit with mop holders.
3. Length: 24 inches.
4. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, Type 304 finish (satin).

F. Towel Dispenser T1:

1. Bobrick Model B-2621.
2. Description: Surface-Mounted, 200 C-fold or 275 multifold capacity paper towel dispenser; 18-8, Type 304, heavy-gauge stainless steel. All-welded construction. Exposed surfaces have satin finish.
3. Manual Knob Latch.

G. Towel Dispenser/Waste Receptacle Combo T2:

1. Bobrick Model B-3942.
2. Description: Semi-Recessed 12-gallon (45.4-L) capacity receptacle which locks into recessed cabinet.
3. Cabinet: 18-8, Type 304, heavy-gauge stainless steel. All-welded construction. Exposed surfaces have satin finish.
4. Flange: 18-8, Type 304, 22-gauge (0.8 mm) thick stainless steel with satin finish. Seamless construction.
5. Waste Receptacle: 18-8, Type 304, 22-gauge (0.8 mm) stainless steel with satin finish. Hemmed edges for safe handling.
6. Lock: Tumbler lock keyed to other washroom accessories.

H. Toilet Paper Holder TP1:

1. Bobrick Model B-2890.
2. Description: Surfaced-Mounted Jumbo Toilet Tissue Dispenser, Satin Finish, One Roll.
3. Lock: Tumbler lock keyed to other washroom accessories.

I. Soap Dispenser SD1: Furnished by Owner, installed by Contractor in this Contract.

2.3 FABRICATION

A. 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 according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

END OF SECTION 102800

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Warranty: Sample of special warranty.

C. Operation and maintenance data.

1.3 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide JL Industries, Inc.; a division of the Activar Construction Products Group; Cosmic 5 lb., 3A-40BC Multipurpose Chemical Type extinguisher, or a comparable product by one of the following:
      a. Kidde Residential and Commercial Division.
      b. Larsens Manufacturing Company.
   2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type: UL-rated 5 lb. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's heavy duty steel cylinder with metal valve and siphon tube, O-ring seal, replaceable valve stem seal, visual pressure gauge, pull pin and upright squeeze grip. Factory powder-coated RED finish. For Class A, B & C fires.
   1. Model Identification and UL Rating: COSMIC 5E; 3A-40BC.
   2. Mounting Bracket at Surface Mounted Extinguishers: Manufacturer’s standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers scheduled.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers in cabinets or with mounting brackets as scheduled in locations indicated and in compliance with requirements of authorities having jurisdiction.
   1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 123623.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic-laminate-clad countertops.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For plastic-laminate-clad countertops.

C. Samples: Plastic laminates in each type, color, pattern, and surface finish required.

PART 2 - PRODUCTS

2.1 FABRICATORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Bayou Wood Products, 1315 Hwy. 15, West Monroe, LA 71291, (318) 397-0000.
   2. Other prior approved acceptable millwork/casework manufacturers.

2.2 PLASTIC-LAMINATE-CLAD COUNTERTOPS

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

B. Grade: Custom.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Abet Laminati, Inc.
      b. Formica Corporation.
      c. Pionite: a Panolam Industries International, Inc. brand.
      d. Wilsonart International Holdings, Inc.
      e. Nevamar brand.

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, matte finish.
      b. Solid colors with core same color as surface, matte finish.
      c. Wood grains, matte finish with grain running parallel to length of countertop.
      d. Patterns, matte finish.

E. Edge Treatment: Same as laminate cladding on horizontal surfaces.

F. Core Material: Min. 45 lb. density Particleboard made with exterior glue.

G. Core Material at Sinks: Particleboard made with exterior glue.

H. Core Thickness: 3/4 inch (19 mm).

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
   1. Wood Moisture Content: 8 percent maximum.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.
   1. MDF: Medium-density fiberboard, ANSI A208.2, Grade 130.
   2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
   3. Softwood Plywood: DOC PS 1.

2.4 ACCESSORIES

A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
   1. Outside Diameter: 2 inches (51 mm).
   2. Color: Black,

2.5 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: As selected by fabricator to comply with requirements.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch (25 mm) over base cabinets. Ease edges to radius indicated for the following:
   1. Solid-Wood (Lumber) Members: 1/16 inch (1.5 mm) unless otherwise indicated.

B. 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.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grade: Install countertops to comply with same grade as item to be installed.

B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
   1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately, and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
   2. Seal edges of cutouts by saturating with varnish.

C. 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.
   1. Secure field joints in countertops with concealed clamping devices located within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches (3-mm-in-2400-mm) variation from a straight, level plane.
   2. Secure backsplashes to walls with adhesive.
   3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

F. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches (1220 mm) o.c. Remove protection at Substantial Completion.

END OF SECTION 123623.13

OWNER	AVOYELLES PARISH POLICE JURY
PROJECT	RECREATIONAL & EDUCATIONAL COMPLEX (PHASE 1) 5197 HIGHWAY 115 BUNKIE LOUISIANA 71322

YWA PROJECT NO:

GUTH PN 25-203 (33-7370)

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OWNER	AVOYELLES PARISH POLICE JURY
PROJECT	RECREATIONAL & EDUCATIONAL COMPLEX (PHASE 1) 5197 HIGHWAY 115 BUNKIE LOUISIANA 71322

YWA PROJECT NO:

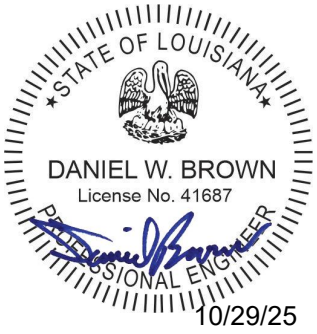
GUTH PN 25-203 (33-7370)

SEALS

SPECIFICATION DIVISIONS/SECTIONS PREPARED UNDER MY RESPONSIBLE SUPERVISION:
DIVISION 22 PLUMBING
DIVISION 23 HEATING, VENTILATION & AIR CONDITIONING

JOHN WILSON, P.E.
MECHANICAL ENGINEER – LA LICENSE 19008

SPECIFICATION DIVISIONS/SECTIONS PREPARED UNDER MY RESPONSIBLE SUPERVISION:
DIVISION 26 ELECTRICAL



DANIEL BROWN, P.E.
ELECTRICAL ENGINEER – LA LICENSE 41687

SECTION 220100

PART 1 - GENERAL

1.1 Related Documents:

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

1.2 Summary:

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems

2. Dielectric fittings

3. Flexible connectors

4. Sleeves

5. Escutcheons

6. Grout

7. Mechanical demolition

8. Equipment installation requirements common to equipment sections

9. Painting and finishing

10. Supports and anchorages

11. Access panels

12. Anti-huffing devices

1.3 Definitions:

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete in every respect and ready for the intended use, as applicable in each instance.

I. "Inspect": The term "inspect" or "inspection: when used to describe observation of the Contractor's Work by the Engineer shall mean an endeavor to guard the Owner against defects and deficiencies in the Work and to determine, in general, if the Work is being performed in a manner such that, when completed, it will be in accordance with the Contract Documents.

J. Wiring: the term "wiring" shall include providing raceway, conductors, and cable in accordance with the requirements of Division 26.

K. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.

2. PVC: Polyvinyl chloride plastic.

L. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.

2. NBR: Acrylonitrile-butadiene rubber.

1.4 Submittals:

A. Product Data: For the following:

1. Dielectric fittings.

2. Escutcheons.

B. Shop Drawings: Detail fabrication and installation for metal supports and anchorage for mechanical materials and equipment.

1.5 Quality Assurance:

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Equipment Selection: Equipment of higher electrical characteristics, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are appropriately modified. The Contractor will be responsible for any added costs for such modifications. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

C. Drawings: The Mechanical Drawings show the general arrangement of piping, equipment, and appurtenances, and shall be followed as closely as actual building construction and the work of other trades will permit. The Mechanical work shall conform to the requirements shown on all the Drawings. Because of the small scale of the Mechanical Drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Contractor shall investigate the structural and finish conditions and other building components affecting the work and shall arrange his work accordingly, providing such offsets, fittings, and accessories as may be required to meet such conditions. No extras will be approved for required additional offsets and fittings. Any offsets or additional fittings required to coordinate mechanical systems with existing conditions and other trades, or that are necessary for the complete installation of the system, including modifications to shop or off-site fabricated piping and/or ductwork, all shall be provided by the Contractor at no additional cost to the Owner.

D. Codes and Standards: comply with the following codes. Comply with the latest edition except where indicated otherwise or a specific edition is required by the authority having jurisdiction:

1. International Building Code
2. International Fuel Gas Code
3. International Mechanical Code
4. International Plumbing Code with Louisiana Amendments
5. Louisiana State Energy Code
6. NFPA 54, 70, 72, 90A, 90B, and 101
7. All applicable local codes

1.6 Delivery, Storage, and Handling:

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.7 Coordination:

A. Coordinate mechanical equipment installation with other building components and existing conditions.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate connection of mechanical systems with exterior underground utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Costs for all utility connections shall be the Contractor's responsibility, including any connections made by the utility company.

F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces.

G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and other concealment.

PART 2 - PRODUCTS

2.1 Manufacturers:

A. Manufacturers: Subject to compliance with requirements, provide products by firms regularly engaged in the manufacture of products required, whose products have been in satisfactory use in similar service.

2.2 Pipe, Tube, and Fittings:

A. Refer to individual Division 22 and 23 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 Joining Materials:

A. Refer to individual Division 22 and 23 Piping Sections and "Pipe and Fitting Material Schedule" on the Drawings for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BAg1, silver alloy.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.

2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

3. PVC to ABS Piping Transition: ASTM D 3138.

I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.4 Dielectric Fittings:

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, flanged, solder-joint, plain, or weld-neck end connections that match piping system materials and isolate joined dissimilar metals to prevent galvanic action and stop corrosion.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 degrees F (107 degrees C).

2.5 Sleeves:

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.6 Escutcheons:

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Plate, Stamped-Steel Type: With concealed hinge, spring clips, and chrome-plated finish.

E. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.7 Grout:

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

2.8 Access Panels:

A. Access Panels (Toilet and Bath Rooms): Flush stainless steel, 180 degrees door with concealed hinges, key-actuated lock, frame and flexible anchor straps.

B. Access Panels (Elsewhere): Flush metal hinged access panel and frame (type as required for surface encountered), prime coat finish, and key actuated cylinder lock.

C. Access Panels: Minimum size 12-inch x 12-inch. Locate over device to be serviced.

2.9 Anti Huffing Devices:

A. Provide locking access port caps for all outdoor equipment containing refrigerant. Caps shall be tamper resistant and secured to prevent unauthorized access.

PART 3 - EXECUTION

3.1 Mechanical Demolition:

A. Refer to Division 1 Sections, "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 Piping Systems – Common Requirements:

A. Install piping according to the following requirements and Division 22 and 23 Sections specifying piping systems.

B. Install components with pressure rating equal to or greater than system operating pressure.

C. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

D. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.

E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

F. Install couplings according to manufacturer's written instructions.

G. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

H. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

I. Install all buried water piping, regardless of content, a minimum of 12 inches below and 12 inches laterally from any buried electrical line. Whether in conduit or

direct buried cable, this requirement shall apply regardless of voltage of the electrical line.

J. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

K. Install piping to permit valve servicing.

L. Install piping at indicated slopes.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Pulled-tee, extruded-tee, thread-o-let, weld-o-let, and mitered elbow connections are not acceptable, unless specifically indicated otherwise. Provide manufactured tee and elbow fittings.

P. Install tees with removable threaded cleanout plugs at each change in direction in all condensate drain piping.

Q. Select system components with pressure rating equal to or greater than system operating pressure.

R. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

b. Chrome-Plated Piping: Cast-brass type with chrome-plated finish, split-casing for existing piping, and one-piece for new piping.

c. Insulated and Bare Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.

d. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.

S. Sleeves are not required for core-drilled holes.

T. Permanent sleeves are not required for holes formed by removable PE sleeves.

U. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).

b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating interior walls.

c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 7 Section, "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with grout.

4. Seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

V. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section, "Through-Penetration Firestop Systems" for materials.

W. Verify final equipment locations for roughing-in.

3.3 Piping Joint Construction:

A. Join pipe and fittings according to the following requirements, Division 22 and 23 Sections, and Schedules on the Drawings, specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.

3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

4. PVC Nonpressure Piping: Join according to ASTM D 2855.

5. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Non-Pressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.4 Piping Connections:

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 Equipment Installation – Common Requirements:

A. Manufacturer's Installation and Operating Instructions: All equipment and material shall be installed and operated in strict accord with manufacturer's "Installation and Operating Instructions." The manufacturer's installation instructions shall become part of this Specification, and shall take precedence over and/or supplement any Specification herein and as shown and/or described on plans. All individual items of equipment and components thereof shall be 100 percent accessible for repair, removal, or replacement without functional impairment or dismantling of any adjoining major surfaces or assemblies.

B. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment to allow right of way for piping installed at required slope.

F. Cut and drill floors, roofs, walls, partitions, ceilings, and other surfaces as required to permit installation of mechanical piping, ducts, and equipment. Perform cutting by skilled mechanics of trades involved.

G. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

H. Electrical Work: Wherever equipment requiring electrical power connection is specified, all wiring shall be furnished and installed under Division 26 of the Specifications. Starting switches, protective devices, and other means for the operation and control of equipment shall be furnished under the various Division 22 and 23 Sections, and installed and electrically connected complete under Division 26 unless otherwise specifically noted, except that control devices that are installed in or on ducts, piping, or mechanical equipment shall be mounted under Divisions 22 and 23. If equipment is furnished requiring power wiring different from that indicated on the Electrical Drawings, the Contractor furnishing the equipment shall be responsible for any required revisions and pay any additional costs connected therewith. Wiring revisions shall be submitted to the Architect for approval prior to installation.

1. Contractors furnishing items to be wired shall provide adequate wiring diagrams.

2. Temperature control wiring shall be furnished and installed in raceway under Division 23 according to the requirements of Division 26, specifically Section, "Conductors and Cables," and Section, "Raceways and Boxes."

3.6 Earthwork:

A. Refer to Division 2 Section, "Earthwork" for excavation, trenching and backfilling.

3.7 Painting:

A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Section, "Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.8 Erection of Metal Supports and Anchorages:

A. Refer to Division 5 Section, "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.9 Erection of Wood Supports and Anchorages:

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.10 Grouting:

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.11 Miscellaneous:

A. Services: Provide gas, water, sanitary sewer, and services as indicated.

B. The Contractor shall, before submitting a proposal, verify the location, depth, size, and pressure or grade of existing main gas, water and sewer lines to which he is to make connections for services to the building and shall include in his bid the cost of any required revisions. If for any reason conditions appear that will adversely affect the proper installation and operation of the systems, such conditions shall be reported to the Architect in writing for his decision ten days prior to bid date. All connection charges, cutting and patching of paving, etc. required for connection to utility lines, including those provided by the utility company, shall be paid for or provided by the Contractor. Make provisions for metering as indicated and as required by the serving utilities. Locations of plumbing lines and point of service entrance are shown in accordance with data provided by various departments of city and/or utility companies involved. The points of connection to the utility lines are approximate only and shall be verified by each bidder. Each bidder shall include adequate funds in his bid price to cover all cost of connections to utility lines regardless of exact location, or those who make the connection, and shall hold the Owner harmless as to additional costs or extras regarding utility connections.

C. Sewage Backwater Valves: Where the flood level rims of plumbing fixtures are below the elevation of the manhole cover of the next upstream manhole in the public sewer, such fixtures shall be protected by a backwater valve installed in the building drain, branch of the building drain or horizontal branch serving such fixtures, regardless of whether indicated on the Drawings or not. Plumbing fixtures that have flood level rims above the elevation of the manhole cover of the next upstream manhole in the public sewer shall not discharge through a backwater valve. Where such conditions are found to exist, revise piping as required to install backwater valves. Submit proposed revisions to the Architect for approval. Use of floor drains with integral backwater valves is acceptable where flood level elevations involve only floor drains and do not involve fixtures with flood level rims above the finished floor. Backwater valves shall be accessible.

D. Access Panels: Provide access panels as indicated. In addition, provide access panels for each concealed item requiring service or adjustment that would otherwise be inaccessible whether shown or not. Access panel locations shown on drawings are approximate. Exact location shall be verified with the Architect prior to installation.

Deliver access panels to trade responsible for finish surfaces in which access panels are to be installed.

E. Refrigerant Circuit Access Caps: Provide tamper resistant-locking type caps at each piece of outdoor equipment.

- END OF SECTION -

SECTION 22 02 00

PART 1 - GENERAL

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

1.2 Summary: This Section includes basic requirements for factory-installed and field-installed motors.

A. Related Sections include the following:

1. Division 22 and 23 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.

1.3 Submittals:

A. Product Data for Field-Installed Motors: For each type and size of motor, provide nameplate data and ratings; mounting arrangements; size, type, and location of winding terminations; conduit entry and ground lug locations; and information on coatings or finishes.

B. Operation and Maintenance Data: For field-installed motors to include in emergency, operation, and maintenance manuals.

1.4 Quality Assurance:

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 Coordination: Coordinate features of motors, installed units, and accessory devices. Provide motors that are:

A. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.

B. Matched to torque and horsepower requirements of the load.

C. Matched to ratings and characteristics of supply circuit and required control sequence.

PART 2 - PRODUCTS

2.1 Motor Characteristics:

A. Motors 1/2 HP and Larger: Three phase.

B. Motors Smaller Than 1/2 HP: Single phase.

C. Frequency Rating: 60 Hz.

D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.

E. Duty: Continuous duty at ambient temperature of 105 degrees F (40 degrees C) and at altitude of 3300 feet (1005 meters) above sea level.

F. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

G. Enclosure: Open drip-proof, unless otherwise indicated.

2.2 Polyphase Motors:

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Energy-Efficient Design: All motors.

1. Comply with Louisiana Energy Code.

2. Comply with EPACT.

C. Stator: Copper windings, unless otherwise indicated.

1. Multispeed motors shall have separate winding for each speed.

D. Rotor: Squirrel cage, unless otherwise indicated.

E. Bearings: Double-shielded, pre-lubricated ball bearings suitable for radial and thrust loading.

F. Temperature Rise: Match insulation rating, unless otherwise indicated.

G. Insulation: Class F, unless otherwise indicated.

2.3 Polyphase Motors With Additional Requirements:

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Designed with critical vibration frequencies outside operating range of controller output.

2. Temperature Rise: Matched to rating for Class B insulation.

3. Insulation: Class H.

4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

5. Comply with MG1-31.

2.4 Single-Phase Motors:

A. Type: One of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.

B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.

C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, pre-lubricated-sleeve type for other single-phase motors.

PART 3 - EXECUTION

3.1 Motor Installation: Anchor each motor assembly to base, adjustable rails, or other support, arranged and sized according to manufacturer's written instructions. Attach by bolting. Level and align with load transfer link.

3.2 Field Quality Control: Prepare for acceptance tests as follows:

A. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.

B. Test interlocks and control features for proper operation.

C. Verify that current in each phase is within nameplate rating.

3.3 Cleaning:

A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean motors, on completion of installation, according to manufacturer's written instructions.

- END OF SECTION -

SECTION - 220500

PART 1 - GENERAL

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

1.2 Summary: This Section includes hangers and supports for mechanical system piping and equipment.

1.3 Definitions:

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 Submittals:

A. Product Data: For each type of pipe hanger, channel support system component, and thermal-hanger shield insert indicated.

B. Welding Certificates: Copies of certificates for welding procedures and operators.

1.5 Quality Assurance:

A. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 Manufacturers: Firms regularly engaged in manufacture of supports and hangers, of types and sizes required, whose products have been in satisfactory use in similar service.

2.2 Manufactured Units:

A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.

1. Nonmetallic Coatings: On hangers for electrolytic protection where hangers are in direct contact with copper tubing.

2.3 Miscellaneous Materials:

A. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 Hanger and Support Applications:

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

D. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN15 to DN750).

E. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500).

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN20 to DN500), if longer ends are required for riser clamps.

F. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.

2. Steel Clevises (MSS Type 14): For 120 to 450 degrees F (49 to 232 degrees C) piping installations.

3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

G. Building Attachments: Except as otherwise indicated, provide factory-fabricated building attachments complying with ANSI/MSS SP-58, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.

H. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:

I. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.

J. Thermal-Hanger Shield Inserts:

1. Description: 100 psig (690 kPa) minimum, compressive-strength insulation insert encased in sheet metal shield.

2. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.

3. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.

4. For Hangers and Clamped Systems: Insert and shield shall cover entire circumference of pipe.

5. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

3.2 Hanger and Support Installation:

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. All hangers for equipment and piping are to be supported from building structure even if structural enhancements to roof support is required.

B. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.

C. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

D. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

E. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

F. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

G. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

H. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

I. Support vertical piping at each floor and roof.

J. Insulated Piping: Comply with the following:

1. All hangers and supports shall be external of insulation.

2. Install MSS SP-58, Type 40 protective shields on all insulated piping. Shields shall span arc of 180 degrees.

3. Shield Dimensions for Pipe: Not less than the following:

a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.

b. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.

c. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.

d. NPS 8 to NPS 14 (DN200 to DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.

3.3 Equipment Supports: Fabricate structural-steel stands to suspend equipment from structure above or to support equipment above floor.

3.4 Metal Fabrication:

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

B. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and 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. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

C. Any vertical structural members required to form overhead attachments for hangers or equipment supports shall be located adjacent to walls and any horizontal members be adjacent to the roof structure.

3.5 Adjusting:

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 Painting:

A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 Sections.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint.

- END OF SECTION -

SECTION 220553

PART 1 - GENERAL

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

1.2 Summary: This Section includes mechanical identification materials and devices.

1.3 Submittals:

A. Product Data: For identification materials and devices.

B. Samples: Of color, lettering style, and graphic representation required for each identification material and device.

1.4 Quality Assurance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems" for lettering size, length of color field, colors, and viewing angles of identification devices.

1.5 Sequencing and Scheduling: Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

PART 2 - PRODUCTS

2.1 Identifying Devices and Labels:

A. General: Products specified are for applications referenced in other Division 22 and 23 Sections. If more than single type is specified for listed applications, selection is Installer's option.

B. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.

2. Location: Accessible and visible.

C. Snap-On Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.

D. Pipes with OD, Including Insulation, Less Than 6 Inches (150 mm): Full-band pipe markers, extending 360 degrees around pipe at each location.

E. Pipes with OD, Including Insulation, 6 Inches (150 mm) and Larger: Either full-band or strip-type pipe markers, at least 3 times letter height and of length required for label.

F. Lettering: Manufacturer's standard preprinted captions as selected by Engineer.

1. Arrows: Either integrally with piping system service lettering, to accommodate both directions, or as separate unit, on each pipe marker to indicate direction of flow.

G. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive, vinyl tape, at least 3 mils (0.08 mm) thick.

1. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.

2. Color: Comply with ASME A13.1, unless otherwise indicated.

H. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.

1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.

2. Thickness: 1/16 inch (2 mm), for units up to 20 sq. in. (130 sq. cm) or 8 inches (200 mm) in length, and 1/8 inch (3 mm) for larger units.

3. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

I. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:

1. Green: Cooling equipment and components.

2. Yellow: Heating equipment and components.

3. Brown: Energy reclamation equipment and components.

4. Blue: Equipment and components that do not meet criteria above.

5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.

6. Terminology: Match schedules as closely as possible. Include the following:

a. Name and plan number.

b. Equipment service.

c. Design capacity.

d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.

7. Size: 2-1/2 by 4 inches (65 by 100 mm) for control devices and valves; 4-1/2 by 6 inches (115 by 150 mm) for equipment.

J. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of mechanical systems and equipment.

1. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

PART 3 - EXECUTION

3.1 Labeling and Identifying Piping Systems:

A. Install pipe markers on each system. Include arrows showing normal direction of flow.

B. Marker Type: Plastic markers, with application systems.

C. Fasten markers on pipes and insulated pipes smaller than 6 inches (150 mm) OD by one of following methods:

1. Snap-on application of pre-tensioned, semi-rigid plastic pipe marker.

D. Fasten markers on pipes and insulated pipes 6 inches (150 mm) in diameter and larger by one of following methods:

1. Laminated or bonded application of pipe marker to pipe or insulation.

2. Taped to pipe or insulation with color-coded plastic adhesive tape, not less than 1-1/2 inches (40 mm) wide, lapped a minimum of 3 inches (75 mm) at both ends of pipe marker, and covering full circumference of pipe.

3. Strapped to pipe or insulation with manufacturer's standard stainless-steel bands.

E. Locate pipe markers and color bands where piping is exposed; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations according to the following:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs. Mark each pipe at branch, where flow pattern is not obvious.

3. Near penetrations through walls, floors, ceilings, or nonaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. Spaced at a maximum of 50-foot (15-meters) intervals along each run. Reduce intervals to 25 feet (7.5 meters) in areas of congested piping and equipment.

3.2 Equipment Signs and Markers:

A. Install engraved plastic-laminate signs or equipment markers on or near each major item of mechanical equipment. Include signs for the following general categories of equipment:

1. Split system air conditioning units (inside and outside units)

2. Fans/power ventilators

3.3 Adjusting and Cleaning:

A. Relocate mechanical identification materials and devices that have become visually blocked by work of this or other Divisions.

B. Clean faces of identification devices and glass frames of valve charts.

- END OF SECTION -

SECTION 220719

PART 1 - GENERAL

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

1.2 Summary: This Section includes preformed, rigid and flexible pipe insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

A. Related Sections include the following:

1. Division 23 Section, "Duct Insulation" for insulation for ducts and plenums.

2. Division 22 Section, "Hangers and Supports for plumbing and HVAC" for pipe insulation shields and protection saddles.

1.3 Submittals:

A. Product Data: Identify thermal conductivity, thickness, and jackets, for each type of product indicated.

B. Installer Certificates: Signed by the Contractor certifying that installers comply with requirements.

1.4 Quality Assurance:

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

1.5 Delivery, Storage, and Handling:

A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

1.6 Coordination:

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

B. Coordinate clearance requirements with piping Installer for insulation application.

C. Coordinate installation and testing of steam or electric heat tracing.

1.7 Scheduling: Schedule insulation application after testing piping systems. Insulation application may begin on segments of piping that have satisfactory test results.

PART 2 - PRODUCTS

2.1 Manufacturers: Subject to compliance with requirements, manufacturers regularly engaged in the manufacture of piping insulation products of the types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

2.2 Insulation Materials:

A. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

1. Preformed Pipe Insulation: Comply with ASTM C 547, Type 1, with factory-applied, all-purpose, vapor-retarder jacket.

2. Blanket Insulation: Comply with ASTM C 553, Type II, without facing.

3. Fire-Resistant Adhesive: Comply with MIL-A-3316C in the following classes and grades:

a. Class 1, Grade A for bonding glass cloth and tape to unfaced glass-fiber insulation, for sealing edges of glass-fiber insulation, and for bonding lagging cloth to unfaced glass-fiber insulation.

b. Class 2, Grade A for bonding glass-fiber insulation to metal surfaces.

4. Vapor-Retarder Mastics: Fire- and water-resistant, vapor-retarder mastic for indoor applications. Comply with MIL-C-19565C, Type II.

5. Mineral-Fiber Insulating Cements: Comply with ASTM C 195.

6. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

B. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Adhesive: As recommended by insulation material manufacturer.

2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.

2.3 Field-Applied Jackets:

A. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils (0.5 mm) thick; pre-curled ready for shop or field cutting and installing.

1. Adhesive: As recommended by insulation material manufacturer.

2. PVC Jacket Color: White or gray.

B. Standard PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- (0.5 mm-) thick, high-impact, ultraviolet-resistant PVC.

1. Shapes: 45 and 90 degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.

2. Adhesive: As recommended by insulation material manufacturer.

2.4 Accessories and Attachments:

A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, pre-sized a minimum of 8 oz./sq. yd. (270 g/sq. m).

1. Tape Width: 4 inches (100 mm).

B. Bands: 3/4 inch (19 mm) wide, in one of the following materials compatible with jacket:

1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch (0.5 mm) thick.

C. Wire: 0.080 inch (2.0 mm), nickel-copper alloy; 0.062 inch (1.6 mm), soft-annealed, stainless steel; or 0.062 inch (1.6 mm), soft-annealed, galvanized steel.

2.5 Vapor Retarders:

A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 Examination:

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

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

3.2 Preparation:

A. Surface Preparation: Clean and dry pipe and fitting surfaces. Remove materials that will adversely affect insulation application.

3.3 General Application Requirements:

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping, including fittings, valves, and specialties.

B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each piping system.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs.

E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

F. Seal joints and seams with vapor-retarder mastic.

G. Keep insulation materials dry during application and finishing.

H. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

I.Apply insulation with the least number of joints practical.

J. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.

K. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic.

1. Apply insulation continuously through hangers and around anchor attachments.

2. Install insert materials and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.

3. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.

L. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

M. Apply adhesives and mastics at the manufacturer's recommended coverage rate.

N. Apply insulation with integral jackets as follows:

1. Pull jacket tight and smooth.

2. Circumferential Joints: Cover with 3 inch- (75 mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip and spaced 4 inches (100 mm) o.c.

3. Longitudinal Seams: Overlap jacket seams at least 1-1/2 inches (40 mm). Apply insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches (100 mm) o.c.

a. Exception: Do not staple longitudinal laps on insulation having a vapor retarder.

4. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to flanges, unions, valves, and fittings.

5. At penetrations in jackets for thermometers and pressure gages, fill and seal voids with vapor-retarder mastic.

O. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.

P. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions.

3.4 Mineral-Fiber Insulation Application:

A. Apply insulation to straight pipes and tubes as follows:

1. Secure each layer of preformed pipe insulation to pipe with wire, tape, or bands without deforming insulation materials.

2. Where vapor retarders are indicated, seal longitudinal seams and end joints with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15 to 20 feet (4.5 to 6 m) to form a vapor retarder between pipe insulation segments.

3. For insulation with factory-applied jackets with vapor retarders, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by the insulation material manufacturer and seal with vapor-retarder mastic.

B. Apply insulation to flanges as follows:

1. Apply preformed pipe insulation to outer diameter of pipe flange.

2. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.

4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

C. Apply insulation to fittings and elbows as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

2. When premolded insulation elbows and fittings are not available, apply mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.

3. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

D. Apply insulation to valves and specialties as follows:

1. Apply premolded insulation sections of the same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.

2. When premolded insulation sections are not available, apply glass-fiber blanket insulation to valve body to thickness equal to adjoining pipe insulation. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to stainer basket without disturbing insulation.

3. Apply insulation to flanges as specified for flange insulation application.

4. Apply canvas jacket material with manufacturer's recommended adhesive, overlapping seams at least 1 inch (25 mm), and seal joints with vapor-retarder mastic.

3.5 Flexible Elastomeric Thermal Insulation Application:

A. Apply insulation to straight pipes and tubes as follows:

1. Follow manufacturer's written instructions for applying insulation.

2. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

B. Apply insulation to fittings and elbows as follows:

1. Apply mitered sections of pipe insulation.

2. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3.6 Field-Applied Jacket Application: Apply PVC jacket over all piping, fittings, valves, flanges, etc. located in equipment rooms and mechanical rooms, up to an elevation of 6'-0" above the finished floor of the space. Apply with 1 inch (25 mm) overlap at longitudinal seams and end joints. Seal with manufacturers' recommended adhesive.

3.7 Piping System Applications:

A. Insulation materials and thicknesses are specified in schedules at the end of this Section.

B. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:

1. Flexible connectors.

2. Vibration-control devices.

3.8 Field Quality Control:

A. Insulation applications will be considered defective if sample inspection reveals noncompliance with requirements. Remove defective Work and replace with new materials according to these Specifications.

B. Reinstall insulation and covers on fittings and valves if required to be uncovered for inspection according to these Specifications.

3.9 Insulation Application Schedule, General:

A. Refer to insulation application schedules for required insulation materials, vapor retarders, and field-applied jackets.

B. Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements.

3.10 Interior Insulation Application Schedule:

A. This application schedule is for interior insulation inside the building.

B. Service: Domestic cold water.

1. Operating Temperature: 35 to 60 deg F (2 to 15 deg C).

2. Insulation Material: Mineral fiber.

3. Insulation Thickness: Apply the following insulation thicknesses:

a. Copper Pipe, 1 Inch and Smaller: 1/2 inch.

b. Copper Pipe, 1-1/4 Inches and Larger: 1 inch.

4. Field-Applied Jacket: PVC for exposed piping in Equipment Rooms.

5. Vapor Retarder Required: Yes.

6. Finish: None.

C. Service: Domestic hot water and hot water return.

1. Operating Temperature: 60 to 140 deg F (15 to 60 deg C).

2. Insulation Material: Mineral fiber.

3. Insulation Thickness: Apply the following thicknesses:

a. Runouts up to 2 Inches and less than 12 Foot length: 1/2 inch.

b. 2 Inches size and less: 1 inch.

c. 2-1/2 Inches size and larger: 1-1/2 inches.

4. Field-Applied Jacket: PVC for exposed piping in Mechanical Rooms.

5. Vapor Retarder Required: No.

6. Finish: None.

D. Service: Condensate drain piping.

1. Operating Temperature: 35 to 75 deg F (2 to 24 deg C).

2. Insulation Material: Flexible elastomeric.

3. Insulation Thickness: 3/4 inch.

4. Field-Applied Jacket: None.

5. Vapor Retarder Required: Yes.

6. Finish: None.

E. Service: Refrigerant suction and vapor piping.

1. Operating Temperature: 35 to 50 deg F (2 to 10 deg C).

2. Insulation Material: Flexible elastomeric.

3. Insulation Thickness: 3/4 inch.

4. Finish: None.

F. Service: Exposed sanitary drains and domestic water supplies and stops for fixtures for the disabled.

1. Insulate and jacket with factory insulation and white PVC jacket kit conforming to ADA and equivalent to Truebro “Handi Lav-Guard”, McGuire Manufacturing Co. “ProWrap”, or approved equivalent.

3.11 Exterior Insulation Application Schedule:

A. This application schedule is for aboveground insulation outside the building.

B. Service: Refrigerant suction and vapor.

1. Operating Temperature: 35 to 50 deg F (2 to 10 deg C).

2. Insulation Material: Flexible elastomeric.

3. Insulation Thickness: 3/4 inch.

4. Finish: Painted with two coats of ultraviolet-protective coating.

- END OF SECTION -

SECTION 221116

PART 1 - GENERAL

1.1 Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 Description of Work:

A. Extent of domestic water piping systems work is indicated on the Drawings and schedules and by requirements of this Section.

B. Applications for domestic water piping systems include the following:

1. Domestic cold-water piping.

2. Domestic hot-water piping.

C. Refer to appropriate Division 22 and 23 Sections for insulation required in connection with domestic water piping; not work of this Section.

D. Trenching and backfill required in conjunction with exterior water piping is specified in applicable Division 2 Sections and is included as work of this Section.

1.3 Quality Assurance:

A. Manufacturers: Firms regularly engaged in manufacture of domestic water piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service.

B. Plumbing Code Compliance: Comply with applicable portions of governing Plumbing Code pertaining to plumbing materials, construction, and installation of products.

1.4 Submittals:

A. Product Data: Submit manufacturer's data for domestic water piping systems, materials, and products.

PART 2 - PRODUCTS

2.1 Domestic Water Piping Materials and Products:

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated and scheduled. Where not indicated or scheduled, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in domestic water piping systems. Where more than one type of material or product is indicated, selection is Installer's option.

2.2 Basic Identification:

A. General: Provide identification complying with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the following listing:

1. Water Service: Underground-type plastic line markers.

2.3 Basic Pipe. Tube, and Fittings:

A. General: Provide pipe, tube, and fittings complying with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the schedule on the Drawings.

2.4 Basic Hangers and Supports:

A. General: Provide hangers and supports complying with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

2.5 Basic Valves:

A. Ball Valves – 2 Inches (DN50) and Smaller: MSS SP-110, Class 150, 600 psi (4140 kPa) CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2 inch (DN15) valves and smaller and conventional port for 3/4 inch (DN20) valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded end connections.

1. Operator: Vinyl-covered steel lever handle.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

a. Milwaukee, BA100.

b. Appollo, #70-100.

c. Hammond, #8501.

d. Nibco, #585.

B. Gate Valves 2-1/2 Inches and Larger:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

a. Crane #461.

b. Jenkins #7326.

c. Nibco #F-619.

d. Hammond #1R1138.

2.6 Special Valves:

A. General: Special valves required for domestic water piping systems include the following types:

1. Interior Hose Bibb: 3/4 inch angle sill faucet, polished chrome plated, fixed wheel handle, and with vacuum breaker.

2. Exterior Sillcocks: 3/4 inch size, non-freeze type with anti-siphon backflow preventer and brass casing:

a. Wade: Model 8600.

b. Josam: Model Z-1321.

3. Exterior Sillcocks: For locations where wall thickness will not permit non-freeze sillcock and piping to be fully concealed, provide mild climate type with integral backflow preventer.

a. Wade: Model 8600MT.

b. Zurn: Model Z-1333.

2.7 Trap Seal Primer Valves:

A. Supply-Type Trap Seal Primer Valves: ASSE 1018, water-supply-fed type, with the following characteristics. Provide where a trap primer is required by code or is shown on the Drawings.

1. Manufacturers: Precision Plumbing Products, Inc.

2. 125-psig (860-kPa) minimum working pressure.

3. Bronze body with atmospheric-vented drain chamber.

4. Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.

5. Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.

6. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.8 Drain Valves:

A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 (DN 20) ball valve, rated for 400-psig (2760-kPa) minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

1. Inlet: Threaded or solder joint.

2. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.

2.9 Water Hammer Arrestors:

A. General: ASSE 1010 or PDI-WH 201, piston type with pressurized metal-tube cushioning chamber. Sizes indicated are based on ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

1. Manufacturers:

a. Josam Co.

b. Precision Plumbing Products, Inc.

c. Sioux Chief Manufacturing Co., Inc.

d. Zurn Industries, Inc.; Wilkins Div.

2.10 Backflow Preventers:

A. General: Provide reduced pressure, principle backflow preventers consisting of assembly, including shutoff valves on inlet and outlet and strainer on inlet. Backflow preventers shall include test cocks and pressure-differential relief valve located between two positive seating check valves and drain. Construct in accordance with ASSE Standard 1013. Include air gap and elbow for drain.

B. Manufacturer: Subject to compliance with requirements, provide backflow preventers of one of the following:

1. Febco, 825 Series

2. Hersey, "Aergap" Series

3. Orion, BRP

4. Watts, 009 Series

PART 3 - EXECUTION

3.1 Excavation: Excavating, trenching, and backfilling are specified in Division 2 Section, "Earthwork."

3.2 Installation of Domestic Water Piping:

A. General: Install water distribution piping in accordance with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC Systems."

3.3 Installation of Piping Specialties:

A. Water Hammer Arresters: Install in upright position, in locations and of sizes in accordance with PDI Standard WH-201, and elsewhere as indicated.

B. Trap Seal Primer Valves: Install trap seal primer valves with outlet pitched down toward drain tap a minimum of 1 percent and connect to floor drain, trap or inlet fitting. Adjust valve for proper flow.

C. Install wood blocking reinforcement for wall mounting and recessed type plumbing specialties.

D. Install individual ball type shutoff valve in water supply to trap seal primer valve and install minimum 12 inches x 12 inches access panel over valve and trap primer.

3.4 Installation of Hangers and Supports: Install hangers and supports in accordance with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

3.5 Equipment Connections:

A. Piping Runouts to Fixtures: Provide hot and cold-water piping runouts to fixtures of sizes indicated, but in no case smaller than required by governing Plumbing Code.

B. Rough-in and connect all equipment, including kitchen equipment, including any interconnecting piping. Provide stops at each item. Rough-in in accord with equipment suppliers rough-in drawings. Provide all water piping work required for equipment installation, adjust, and leave in operation according to manufacturer's recommendations.

3.6 Installation of Backflow Preventers:

A. Install backflow preventers where indicated and where required by International Plumbing Code or Louisiana Amendments. Locate in same room as equipment being protected. Pipe relief outlet to nearest floor drain. Include (soft disc) check valve ahead of the installation to lock in the downstream pressure as not to affect the operation pressure differential between the supply and downstream of the first check in the backflow preventer. Provide aboveground insulated enclosure where indicated.

3.7 Field Quality Control:

A. Test water and hot water piping throughout hydrostatically at 150 p.s.i.g. (four hours).

B. Repair or replace domestic water piping as required to eliminate leaks and retest as specified to demonstrate compliance.

C. Sterilization: Sterilize all water lines in strict accordance with State Board of Health requirements. After flushing out, obtain approval of water sample analysis from State Board of Health and submit to Architect.

- END OF SECTION -

SECTION 22 13 16

PART 1 - GENERAL

1.1 Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 Description of Work:

A. Extent of soil, waste, and vent piping system work is indicated on Drawings and Schedules, and by requirements of this Section.

B. Trenching and backfilling required in conjunction with underground drain piping is specified in applicable Division 2 Sections and is included as work of this Section.

1.3 Quality Assurance:

A. Manufacturers: Firms regularly engaged in manufacture of piping products of types, materials, and sizes required, whose products have been in satisfactory use in similar service.

B. Plumbing Code Compliance: Comply with applicable portions of governing Plumbing Code pertaining to plumbing materials, construction, and installation of products.

C. ANSI Compliance: Comply with applicable American National Standards pertaining to products and installation of soil, waste, and vent piping systems.

D. PDI Compliance: Comply with applicable Plumbing and Drainage Institute Standards pertaining to products and installation of soil, waste, and vent piping systems.

1.4 Submittals:

A. Product Data: Submit manufacturer's data for soil, waste, and vent piping systems materials and products.

PART 2 - PRODUCTS

2.1 Soil Waste and Vent Piping Materials and Products:

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil, waste, and vent piping systems. Where more than one type of materials or product is indicated, selection is Installer's option.

2.2 Basic Pipe, Tube and Fittings:

A. General: Provide pipe, tube, and fittings complying with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," in accordance with the Schedule on the Drawings.

2.3 Basic Hangers and Supports:

A. General: Provide hangers and supports complying with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

2.4 Drainage Piping Products:

A. General: Provide factory-fabricated drainage piping products of size and type indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations.

B. Cleanout Plugs: Cast-bronze or brass, threaded, countersunk head.

C. Floor Cleanouts: Cast-iron body and frame; cleanout plug; adjustable round top as follows:

1. Nickel-Bronze Top: Manufacturers standard cast unit of the pattern indicated:

a. Pattern: Exposed rim type, with recess to receive 1/8 inch thick resilient floor finish where applicable.

b. Pattern: Exposed rim type, with recess to receive 1 inch thick terrazzo floor finish where applicable.

c. Pattern: Exposed flush type, standard non-slip scored or abrasive finish.

d. Carpet Marker: Include approximately 1-1/4 inches diameter carpet marker for cleanouts that occur in carpeted areas.

D. Wall Cleanouts: Cast-iron body adaptable to pipe with cast-bronze or brass cleanout plug; stainless steel cover including screws.

E. Flashing: As approved by metal roof manufacturer.

PART 3 - EXECUTION

3.1 Installation of Soil, Waste and Vent Above Ground Piping:

A. General: Install soil, waste, and vent piping in accordance with Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC," and with governing Plumbing Code.

B. Flashing: Flash all vent penetrations through roofs as approved by roof manufacturer. Offset vents where necessary to provide 2 feet – 0 inches minimum clearance from other flashing such as outside walls, curbs, etc. All flashing shall be as approved by roofing manufacturer.

3.2 Installation of Building Drain Piping:

A. General: Install underground building drains as indicated and in accordance with governing Plumbing Code. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag-in-line and pull past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.

B. Install soil, waste and vent piping pitched to drain at minimum slope of 1/4 inch per foot (2 percent) for piping 3 inches and smaller, and 1/8 inch per foot (1 percent) for piping 4 inches and larger.

3.3 Installation of Hangers and Supports: Install hangers and supports in accordance with Division 22 Section, "Hangers and Supports for Plumbing and HVAC."

3.4 Installation of Drainage Piping Products:

A. Cleanouts: Install in sanitary aboveground piping and sanitary building drain piping as indicated, as required by governing Plumbing Code; and at each change in direction of piping greater than 45 degrees; at minimum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers for concealed piping, select type to match adjacent building finish. Cleanouts shall be same size as pipe up to 4 inches and not less than 4 inches for larger pipe. All cleanouts shall be accessible. All cleanouts shall be opened, cleaned, and greased after all concrete work is completed.

1. Outside cleanouts shall be brought up flush with finish grade or paving. Where at grade, they shall be set in 14 inches x 14 inches x 5 inches concrete pads.

2. Inside cleanouts shall be brought up flush with floors and provided with cleanout covers or in wall with wall cleanout cover.

3.5 Equipment Connections:

A. Piping Runouts to Fixtures: Provide soil and waste piping runouts to equipment, plumbing fixtures, and drains with approved trap of sizes indicated; but in no case smaller than required by governing Plumbing Code. Comply with equipment manufacturer's instructions where not indicated otherwise.

B. Rough-in and connect all kitchen equipment, including any interconnecting piping. Provide waste piping to drains and any required traps or fittings. Rough-in in accord with equipment suppliers rough-in drawings. Provide all waste and vent piping work required for equipment installation, adjust, and leave in operation according to manufacturer's recommendation.

3.6 Piping Tests: Test soil, waste, and vent piping system in accordance with requirements of governing Plumbing Code, but not less than 10 foot head water test.

- END OF SECTION -

SECTION 223300

PART 1 – GENERAL

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

1.2 Summary: This Section includes the following for domestic water systems:

A. Light commercial, electric water heaters.

B. Compression Tanks.

C. Accessories.

1.3 Submittals:

A. Product Data: For each type and size of water heater. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

B. Maintenance Data: For water heaters to include in maintenance manuals specified in Division 01.

1.4 Quality Assurance:

A. Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 Warranty:

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include storage tanks.

2. Warranty Period: From date of Substantial Completion:

a. Storage Tanks: 10 years.

PART 2 – PRODUCTS

2.1 Manufacturers: Subject to compliance with requirements, provide products by one of the following:

A. Light Commercial, Storage, Electric Water Heaters:

1. A.O. Smith: Model DEN, DEL.

2. State Industries: Model PCE.

3. Bradford White: LD30.

B. Drain Pan Units:

1. Safety: W. H. Safety Products, Inc.

2.2 Light-Commercial, Storage, Electric Water Heaters:

A. Description: Comply with UL 174 or UL 1453, and listed by Manufacturer for commercial applications.

B. Storage Tank Construction: ASME-code steel with 150-psig (1035-kPa) working-pressure rating.

1. Tappings: Factory fabricated of materials compatible with tank for piping connections, relief valve, pressure gage, thermometer, drain, anode rod, and controls as required. Attach tappings to tank before testing and labeling. Include ASME B1.20.1, pipe thread.

2. Interior Finish: Materials and thicknesses complying with NSF 61, barrier materials for potable-water tank linings. Extend finish into and through tank fittings and outlets.

3. Insulation: Comply with ASHRAE 90.1. Surround entire storage tank except connections and controls.

4. Jacket: Steel, with enameled finish.

C. Heating Elements: Two electric, Screw-in, Immersion type.

1. Temperature Control: Adjustable thermostat with wiring arrangement for non-simultaneous operation.

2. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.

D. Drain Valve: ASSE 1005, corrosion-resistant metal, factory installed.

E. Anode Rod: Factory installed; magnesium.

F. Dip Tube: Factory installed. Not required if cold-water inlet is near bottom of storage tank.

G. Special Requirement: NSF 5 construction.

2.3 Compression Tanks:

A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.

1. Manufacturers:

   a. AMTROL Inc.

   b. Armstrong Pumps, Inc.

   c. Smith, A. O.; Aqua-Air Div.

   d. State Industries, Inc.

   e. Taco, Inc.

   f. Watts Regulator Co.

   g. Wessels Co.

2. Construction:

   a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.

   b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.

   c. Air-Charging Valve: Factory installed.

3. Capacity and Characteristics:

   a. Working-Pressure Rating: 150 psig (1035 kPa).

   b. Capacity Acceptable: As indicated on the Drawings.

2.4 Water Heater Accessories:

A. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.

B. Vacuum Relief Valves: Comply with ASME PTC 25.3. Furnish for installation in piping.

   1. Exception: Omit if water heater has integral vacuum-relieving device.

C. Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of water heater and include drain outlet not less than NPS 3/4 (DN20).

D. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE 90.1 or ASHRAE 90.2.

PART 3 – EXECUTION

3.1 Water Heater Installation:

A. Install water heaters, level and plumb, according to Layout Drawings, original design, and referenced standards. Maintain Manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

B. Install temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend relief valve outlet with water piping in continuous downward pitch and discharge onto closest floor drain or into open drain as directed.

C. Install vacuum relief valves in cold-water-inlet piping.

D. Install water heater drain piping as indirect waste to spill into open drains or over floor drains.

E. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.

F. Install compression tank.

G. Fill water heaters with water.

H. Charge compression tank with air.

3.2 Connections:

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to water heater to allow service and maintenance.

C. Connect hot- and cold-water piping with shutoff valves and unions.

D. Make connections with dielectric fittings where piping is made of dissimilar metal.

E. Electrical Connections: Power wiring and disconnect switches are specified in Division 26 Sections. Arrange wiring to allow unit service.

F. Ground equipment:

1. Tighten electrical connectors and terminals according to Manufacturer's published torque-tightening values. If Manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 Field Quality Control: In addition to Manufacturer's written installation and startup checks, perform the following:

A. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Verify that piping system tests are complete.

C. Check for piping connection leaks.

D. Check for clear relief valve inlets, outlets, and drain piping.

E. Check operation of circulators.

F. Test operation of safety controls, relief valves, and devices.

G. Energize electric circuits.

H. Adjust operating controls.

I. Adjust hot-water-outlet temperature settings. Do not set above 140 degrees F (60 degrees C) unless piping system application requires higher temperature.

3.4 Demonstration:

A. Train Owner's maintenance personnel to adjust, operate, and maintain water heaters.

1. Review data in maintenance manuals.

- END OF SECTION -

SECTION 224213

PART 1 - GENERAL

1.1 Related Documents: Drawings and General provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.2 Description of Work:

A. Extent of plumbing fixtures and trim work is indicated by Drawings and Schedules, and by requirements of this Section.

B. Types of plumbing fixtures required for the project are indicated by the Drawings and Schedules.

C. Refer to Division 22 Sections for domestic water piping systems used in conjunction with plumbing fixtures; not work of this Section.

D. Refer to Division 22 Sections for soil and waste piping systems used in conjunction with plumbing fixtures; not work of this Section.

1.3 Quality Assurance:

A. Manufacturers: Provide products by one of the manufacturers listed in the Schedule on the Drawings or approved equivalent.

B. Plumbing Fixture Standards: Comply with applicable portions of governing Plumbing Code pertaining to materials and installation of plumbing fixtures.

C. Regulatory Requirements: Comply with requirements of CABO A117.1, "Accessible and Usable Buildings and Facilities;" Public Law 90-480, "Architectural Barriers Act;" and Public Law 101-336, "Americans with Disabilities Act;" regarding plumbing fixtures for physically handicapped people.

D. PDI Compliance: Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.

1.4 Submittals:

A. Product Data: Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished, roughing-in dimensioned drawings, templates for cutting substrates, fixture carriers, and installation instructions.

B. Maintenance Data: Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in maintenance manual.

1.5 Product Delivery, Storage and Handling:

A. Deliver plumbing fixtures individually wrapped in factory-fabricated containers.

B. Handle plumbing fixtures carefully to prevent breakage, chipping, and scoring the fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

PART 2 - PRODUCTS

2.1 Plumbing Fixtures:

A. General: Provide factory-fabricated fixtures of type, style, and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.

2.2 Materials:

A. General: Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration, or other surface imperfections on finished units are not acceptable.

B. Where fittings, trim and accessories are exposed or semi-exposed, provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.

C. Stainless Steel Sheets: Type 302/304, hardest workable temper.

1. Finishes: No. 4, bright, directional polish on exposed surfaces.

D. Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes, and specks; glaze exposed surfaces.

2.3 Plumbing Fittings, Trim and Accessories:

A. P-Traps: Include removable P-traps where drains are indicated for direct connection to drainage system.

B. Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations and within cabinets, provide chrome plated cast-brass escutcheons with set screw.

C. Aerators: Provide aerators of types approved by Health Departments having jurisdiction.

D. Comply with additional fixture requirements contained in fixture schedule on drawings.

E. Floor Drains: Provide drains equivalent to that scheduled on drawings. Provide minimum top size of 5 inches for 2 inches size, 6 inches for 3 inches size, and 10 inches for 4 inches size. Include clamping ring for drains in waterproofed membrane floors. Provide drains with water passage size not smaller than outlet size.

F. Trap Primer Valves: Refer to Division 22 Section, "Domestic Water Piping."

PART 3 - EXECUTION

3.1 Inspection and Preparation:

A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the governing Plumbing Code pertaining to installation of plumbing fixtures.

C. Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within all construction so as to be rigid and not subject to pull or push movement. Secure with bolts full size of hanger drilling, through-wall where practicable, with back plates.

D. Provide deep seal P-trap at each floor drain. In waterproofed, membrane floors, secure waterproofing with clamping ring.

3.2 Clean and Protect:

A. Clean plumbing fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during the remainder of the construction period.

3.3 Field Quality Control:

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. Test floor drains for free flow. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect. Remove cracked or dented units and replace with new units.

- END OF SECTION -

SECTION 230593

PART 1 – GENERAL

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

1.2 Description of Work:

A. The extent of test-adjust-balance (TAB) work is indicated by the requirements of this Section, and also by Drawings and Schedules, and is defined to include, but is not necessarily limited to, air distribution systems, and associated equipment and apparatus of HVAC work. The work consists of setting speed and volume (flow) adjusting facilities provided for the systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to the work as required by the Contract Documents.

B. The component types of testing, adjusting and balancing specified in this Section includes the following as applied to HVAC equipment:

1. Mini-Split Heat Pumps Units

2. Power Ventilators/Fans

1.3 Quality Assurance:

A. Installer: A TAB firm with at least 3 years of successful test-adjust-balance experience on projects with testing and balancing requirements similar to those required for this project who is not the Installer of system to be tested and is otherwise independent of the project.

B. NEBB Compliance (Option): Comply with NEBB's "Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems" as applicable to HVAC air distribution systems and associated equipment and apparatus.

C. AABC Compliance (Option): Comply with AABC's Pub. No. 12173, "National Standards for Field Measurements and Instrumentation, Total System Balanced", as applicable to HVAC air and hydronic distribution system and associated equipment and apparatus.

D. Industry Standards: Comply with ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) recommendations pertaining to measurements, instruments and testing, adjusting, and balancing, except as otherwise indicated.

1.4 Submittals:

A. Submit certified test report signed by the Test and Balance Supervisor who performed the TAB work.

B. Include identification and types of instruments used and their most recent calibration date with submission of final test report.

1.5 Job Conditions:

A. Do not proceed with testing, adjusting, and balancing work until the work to be TAB'ed has been completed and is operable. Ensure that there is no latent residual work still to be completed.

B. Do not proceed until the work scheduled for TAB'ing is clean and free from debris, dirt, and discarded building materials.

PART 2 – PRODUCTS

2.1 Patching Materials:

A. Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housing which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.

B. At Tester's option, plastic plugs with retainers may be used to patch drilled holes in ductwork and housings.

2.2 Test Instruments:

A. Utilize test instruments and equipment for the TAB work required, of the type, precision, and capacity as recommended in the following TAB standards:

1. NEBB's Procedural Standards for Testing-Adjusting-Balancing of Environmental Systems.

2. AABC's National Standards for Field Measurements and Instrumentation, Total Balance System.

PART 3 – EXECUTION

3.1 General:

A. Tester must examine the installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Notify the Contractor in writing of conditions detrimental to the proper completion of the test-adjust-balance work.

B. Do not proceed with the TAB work until unsatisfactory conditions have been corrected in a manner acceptable to the Tester.

C. Test, adjust and balance the environmental systems and components, as indicated, in accordance with the procedures outlined in applicable standards. In addition perform the following:

1. Test all safety devices for proper operation.

2. Adjust gas burners and gas inputs per Manufacturer's recommendations.

3. Calibrate temperature control systems and adjust heat anticipators per Manufacturer's recommendations.

4. Test smoke detector as recommended by Manufacturer.

D. Test, adjust and balance system during the summer for air conditioning systems and during winter for heating systems, including at least a period of operation at outside conditions within 5ºF wet bulb temperature of maximum summer design condition, and within 10ºF dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring the final temperatures then take the final temperature readings when the seasonal operation does permit.

E. Prepare report of test results, including instrumentation calibration reports, in format recommended by the applicable standards. In addition certify that safety devices have been checked and are operating properly, that gas inputs and gas burners have been adjusted in accord with manufacturer's recommendations that temperature control systems have been calibrated and are operating properly, that smoke detector is operating properly, and that heat anticipators have been adjusted in accord with manufacturer's recommendations.

F. Patch holes in insulation, ductwork, and housings, which have been cut or drilled for test purposes, in a manner recommended by the original Installer.

G. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.

H. Prepare a report of recommendations for correcting unsatisfactory HVAC performances when system cannot be successfully balanced.

I. Retest, adjust, and balance system subsequent to significant system modifications or if report is unsatisfactory, and resubmit test results. Repeat until satisfactory results are obtained.

- END OF SECTION -

SECTION 232303

PART 1 – GENERAL

1.1 Related Documents:

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

B. Section 23 63 15 Mini-Split System Heat Pump Units.

1.2 Summary: This Section includes refrigerant piping used for air-conditioning applications:

A. Refrigerant pipes and fittings.

B. Refrigerant valves and specialties.

C. Refrigerants.

1.3 Performance Requirements:

A. Line Test Pressure for Refrigerant:

1. Suction Lines for Air-Conditioning Applications: 300 psig (2068 kPa).

2. Suction Lines for Heat-Pump Applications: 535 psig (3689 kPa).

3. Hot-Gas and Liquid Lines: 535 psig (3689 kPa).

1.4 Action Submittals:

A. Product Data: For each type of copper tube, valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:

1. Copper tube and fittings

2. Thermostatic expansion valves.

3. Isolation service valves.

4. Solenoid valves.

5. Hot-gas bypass valves.

6. Bypass filters.

7. Filter dryers.

8. Strainers.

9. Pressure-regulating valves.

B. Shop Drawings: Provide a scaled coordination drawings of refrigerant piping and specialties, including pipe, tube, and fittings, sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall, roof and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment. Include vertical distances, expansion loops and obstacles requiring risers or dips,

1. Shop Drawing Scale: 1/4 inch equals 1 foot (1:48).

2. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

C. Piping System Tests, to be submitted to Owner and Architect prior to equipment start up:

1. Piping System Vacuum test results (12 hour minimum).

2. Piping System Pressure test results (24 hour minimum).

1.5 Information Submittals:

A. Welding certificates.

B. Field quality-control test reports.

1.6 Closeout Submittals:

A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

B. Piping Test Reports: Include copies of test reports previously submitted.

C. As Built Drawings: Update scaled coordination drawings provided under 1.4.B. Include accurate equipment locations, vertical distances, pipe sizes, Y-branch, branch selector box, and isolation valve locations.

D. Warranty certificates.

1.7 Warranty:

A. Mechanical contractor shall provide a labor warranty for a period of five (5) years from the date of project turnover. Warranty shall cover the repair of refrigerant leaks, defects in piping or workmanship, replacement of failed components, and any lost refrigerant, during the warranty period.

B. Any time a refrigerant leak is repaired, or the refrigerant system is opened for replacement of components:

1. Existing refrigerant shall be weighed out and noted.

2. After repairs are made, the entire system shall be pressure and vacuum tested to manufacturer’s specifications.

3. After system passes pressure and vacuum tests, system shall be charged with virgin refrigerant to the manufacturer's specifications (total system charge).

C. Warranty excludes routine maintenance.

1.8 Quality Assurance:

A. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

B. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."

C. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.9 Product Storage and Handling:

A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.10 Coordination:

A. Coordinate size and location of concrete pads and, equipment supports.

PART 2 – PRODUCTS

2.1 Copper Tube and Fittings:

A. Hard Copper Tube:

1. ASTM B 280, Type ACR.

2. Manufactured in straight length hard tube.

3. Plugged and charged with Nitrogen.

4. B-280/B-819 cleanliness requirement.

B. Soft Copper Tube:

1. Commercial grade refrigerant tubing (ASTM B-743 and ASTM B-88)

2. No. C1222000 DHP (phosphorus deoxidized, high residual phosphorus)

C. Wrought-Copper Fittings:

1. ASME B16.22.

2. Use long radius elbows only.

D. Wrought-Copper Unions: ASME B16.22.

E. Wye branches and Headers: Provided by equipment manufacturer.

F. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

G. Brazing Filler Metals: AWS A5.8, Type BCuP-5; 15% silver content, 5% phosphorus content.

H. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.

2. End Connections: Socket ends.

3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.

4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).

5. Maximum Operating Temperature: 250 deg F (121 deg C).

I. Flexible Connectors:

1. Body: Stainless-steel bellows with woven, flexible, stainless-steel-wire-reinforced protective jacket

2. End Connections:

a. NPS 2 (DN 50) and Smaller: With threaded-end connections.

b. NPS 2-1/2 (DN 65) and Larger: With flanged-end connections.

3. Offset Performance: Capable of minimum 3/4-inch (20-mm) misalignment in minimum 7-inch- (180-mm-) long assembly.

4. Pressure Rating: Factory test at minimum 500 psig (3450 kPa).

5. Maximum Operating Temperature: 250 deg F (121 deg C).

2.2 Valves and Specialties:

A. Service Valves:

1. Body: Forged brass with brass cap including key end to remove core.

2. Core: Removable ball-type check valve with stainless-steel spring.

3. Seat: Polytetrafluoroethylene.

4. End Connections: Copper spring.

5. Working Pressure Rating: 500 psig (3450 kPa).

B. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.

1. Body and Bonnet: Plated steel.

2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.

3. Seat: Polytetrafluoroethylene.

4. End Connections: Threaded.

5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and 24-V ac coil.

6. Working Pressure Rating: 400 psig (2760 kPa).

7. Maximum Operating Temperature: 240 deg F (116 deg C).

8. Manual operator.

C. Straight-Type Strainers:

1. Body: Welded steel with corrosion-resistant coating.

2. Screen: 100-mesh stainless steel.

3. End Connections: Socket or flare.

4. Working Pressure Rating: 500 psig (3450 kPa).

5. Maximum Operating Temperature: 275 deg F (135 deg C).

D. Moisture/Liquid Indicators:

1. Body: Forged brass.

2. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.

3. Indicator: Color coded to show moisture content in ppm.

4. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.

5. End Connections: Socket or flare.

6. Working Pressure Rating: 500 psig (3450 kPa).

7. Maximum Operating Temperature: 240 deg F (116 deg C).

E. Replaceable-Core Filter Dryers: Comply with ARI 730.

1. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.

2. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.

3. Desiccant Media: Activated alumina.

4. Designed for reverse flow (for heat-pump applications).

5. End Connections: Socket.

6. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.

7. Maximum Pressure Loss: 2 psig (14 kPa).

8. Working Pressure Rating: 500 psig (3450 kPa).

9. Maximum Operating Temperature: 240 deg F (116 deg C).

10. Locking mechanism to prevent huffing.

2.3 Refrigerants:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Atofina Chemicals, Inc.

2. DuPont Company; Fluorochemicals Div.

3. Honeywell, Inc.; Genetron Refrigerants.

4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-32

PART 3 – EXECUTION

3.1 Piping Applications for Refrigerant:

A. Variable Refrigerant Volume (VRV) Systems:

1. Suction Lines NPS 4 (DN 100) and Smaller for VRV Applications: Copper, Type ACR, hard drawn tubing and wrought-copper fittings with brazed joints.

2. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump/Heat-Recovery VRV Applications: Copper, Type ACR, hard drawn tubing and wrought-copper fittings with brazed joints.

3. Suction and Liquid lines between branch selector boxes and evaporator units may be commercial grade soft copper tubing (ASTM B-743 and ASTM B-88) with wrought-copper fittings and brazed joints.

4. Safety-Relief-Valve Discharge Piping: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

B. Non Variable Refrigerant Volume Systems:

1. Suction Lines NPS 4 (DN 100) and Smaller for Conventional Air-Conditioning Applications: Copper, Type L, drawn-temper tubing and wrought-copper fittings with soldered joints.

2. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed.

3. Safety-Relief-Valve Discharge Piping: Copper, Type L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed joints.

3.2 Valve and Specialty Applicatons:

A. Install service valve in liquid, hot gas, and suction line at each outdoor unit frame with Schrader port oriented towards outdoor unit access.

B. Bypass filter assembly:

1. Locations: Install in suction line and liquid line between outdoor unit and building piping system.

a. Suction: Replaceable core filter assembly

b. Liquid: Filter -Drier assembly

2. Install a full-size, three-valve bypass filter assembly.

a. At startup, and as required, valve refrigerant to flow through the filter assembly with filter media installed.

b. After two (2) weeks of continuous operation after startup, valve refrigerant to bypass the filter assembly. Contractor shall evacuate and weigh refrigerant in bypass and remove replaceable core filter media. At the time of removal, the equipment manufacturer's representative shall inspect filter with the contractor on site. Upon manufactures representative's acceptance, contractor shall leave filter media removed and shall evacuate bypass suction assembly to under 500 microns, break vacuum with R-410A refrigerant, and charge bypass so standing pressure is equal to that of main piping. If filter cleanliness is not accepted by the manufacturer's representative, the process shall be repeated, at a time interval dictated by the representative, until acceptance at no cost to the Owner.

C. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.

D. Install thermostatic expansion valves as close as possible to distributors on evaporators.

1. Install valve so diaphragm case is warmer than bulb.

2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.

3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.

E. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.

F. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.

G. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:

1. Solenoid valves.

2. Thermostatic expansion valves.

3. Hot-gas bypass valves.

4. Compressor.

H. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor.

I. Install flexible connectors at compressors.

3.3 Piping Installation:

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

B. Install refrigerant piping according to ASHRAE 15.

C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping adjacent to machines to allow service and maintenance.

G. Install piping plumb/level, free of sags and bends.

H. Install fittings for changes in direction and branch connections. All wye fittings and headers are to be installed plumb/level either horizontal or vertical and be supported.

I. Oil traps:

1. Oil traps shall be installed at the outdoor unit frame where required by the manufacturer.

2. Oil traps shall not be installed in other parts of the piping system except where approved by the equipment manufacturer.

J. Select system components with pressure rating equal to or greater than system operating pressure.

K. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

L. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.

M. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

N. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.

2. Install horizontal suction lines with a uniform slope downward to compressor.

3. Install traps and double risers to entrain oil in vertical runs.

4. Liquid lines may be installed level.

O. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb. Protect isolation valves from heat damage by wrapping with a wet rag.

P. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

Q. Piping expansion shall be taken into account and where required, expansion loops shall be installed per manufacturer’s installation documentation. Piping supports shall allow piping and insulation to move freely to accommodate expansion and contraction.

R. Install saddle or other means at piping supports to allow the pipe and insulation to move linearly in the support.

S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section - Basic Mechanical Material and Methods.

3.4 Pipe Joint Construction:

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.

D. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."

1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.

2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.

F. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.

G. Welded Joints: Construct joints according to AWS D10.12/D10.12M.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.5 Hangers and Supports:

A. Hanger, support, and anchor products are specified in Section "Hangers and Supports for Plumbing and HVAC."

B. Install the following pipe attachments:

1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.

2. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.

3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.

4. Spring hangers to support vertical runs.

5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.

C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).

2. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).

3. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).

4. NPS 1-1/4 (DN 32): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).

5. NPS 1-1/2 (DN 40): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).

6. NPS 2 (DN 50): Maximum span, 96 inches (2400 mm); minimum rod size, 3/8 inch (9.5 mm).

7. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2700 mm); minimum rod size, 3/8 inch (9.5 mm).

8. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).

9. NPS 4 (DN 100): Maximum span, 12 feet (3.7 m); minimum rod size, 1/2 inch (13 mm).

D. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (9.5 mm).

2. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 3/8 inch (9.5 mm).

3. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 3/8 inch (9.5 mm).

4. NPS 4 (DN 100): Maximum span, 14 feet (4.3 m); minimum rod size, 1/2 inch (13 mm).

E. Support multi-floor vertical runs at least at each floor.

3.6 Field Quality Control:

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections by installing contractor:

1. Comply with ASME B31.5, Chapter VI.

2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.

3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

a. Perform vacuum test. System shall maintain specified vacuum for 12 hours minimum.

b. Fill system with nitrogen to the required test pressure.

c. System shall maintain test pressure at the manifold gage throughout duration of test (24 hours minimum).

d. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.

e. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

C. Tests and inspections by Factory Authorized service representative:

1. Onsite review of all equipment and piping and identify deficiencies to the installing contractor and engineer.

D. Pressure Test Reports:

1. Submit to the owner/architect the following test reports.

a. Vacuum Test reports of all piping systems.

1) Identify piping system by unit designation.

2) Indicate piping description (supply, suction, hot gas, etc.), location.

3) Indicate test start time/date and vacuum reading.

4) Indicate test final time/date and vacuum reading.

5) Include installer's signature as well as manufacturer's authorized representative's signature.

6) Provide photographic documentation of each system vacuum report (starting and final gauge readings with time and date).

7) Owner and/or Architect reserve the right to witness testing. Contractor shall provide minimum 48 hours advance notice to Owner and Architect prior to testing. If contractor fails to provide notice the Owner and/or Architect may require retesting of all systems.

b. Pressure test reports of all piping systems.

1) Identify piping system by unit designation.

2) Indicate piping description (supply, suction, hot gas, etc.), location.

3) Indicate test start time/date and pressure reading.

4) Indicate test final time/date and pressure reading.

5) Include installer's signature as well as manufacturer's authorized representative's signature.

6) Provide photographic documentation of each system pressure test report (starting and final gauge readings with time and date).

7) Owner and/or Architect reserve the right to witness testing. Contractor shall provide minimum 48 hours advance notice to Owner and Architect prior to

testing. If contractor fails to provide notice the Owner and/or Architect may require retesting of all systems.

3.7 System Charging:

A. A factory authorized service company shall charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.

2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers (67 Pa). If vacuum holds for 12 hours, system is ready for charging.

3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig (14 kPa).

4. Charge system with a new filter-dryer core in charging line.

5. Provide all refrigerant gas and oil required to properly charge the system.

3.8 Adjusting:

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.

2. Verify that compressor oil level is correct.

3. Open compressor suction and discharge valves.

4. Open refrigerant valves except bypass valves that are used for other purposes.

5. Check open compressor-motor alignment and verify lubrication for motors and bearings.

E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

- END OF SECTION -

SECTION 232400

PART 1 – GENERAL

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

1.2 Summary: This Section includes piping for drain lines and condensate drain piping.

A. Related Sections include the following:

1. Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC" for general piping materials and installation requirements.

2. Division 22 Section, "Hangers and Supports for Plumbing and HVAC" for pipe supports, product descriptions, and installation requirements. Hanger and support spacing is specified in this Section.

1.3 Coordination:

A. Coordinate layout and installation of drain piping and suspension system components with other construction, including natural gas piping system.

B. Coordinate piping installation with roof curbs, equipment supports, and roof penetrations.

PART 2 – PRODUCTS

2.1 Piping Materials:

A. General: Refer to Piping and Fitting Material Schedule on the drawings for applications of pipe and fitting materials.

PART 3 – EXECUTION

3.1 Piping Installations:

A. Refer to Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC" for basic piping installation requirements.

B. Install drains, consisting of a tee fitting, threaded nipple with threaded cap for system cleanout. Provide cleanout at each change in direction and at connection to unit.

C. Install piping at a uniform grade of 0.2 percent downward in direction of flow.

D. Increase/reduce pipe sizes using eccentric reducer fitting installed with level side down.

E. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe.

3.2 Hangers and Supports:

A. Supports are specified in Division 22 Section, "Hangers and Supports for Plumbing and HVAC".

B. Install supports for steel piping with the following maximum spacing and with continuous slope from unit connection to drain line termination.

1. NPS 3/4 (DN 20): Maximum span, 5 feet (1.5 m).

2. NPS 1 (DN 25): Maximum span, 6 feet (1.8 m).

3. NPS 1-1/2 (DN 40): Maximum span, 8 feet (2.4 m).

4. NPS 2 (DN 50): Maximum span, 8 feet (2.4 m).

5. NPS 2-1/2 (DN 65): Maximum span, 9 feet (2.7 m).

6. NPS 3 (DN 80): Maximum span, 10 feet (3 m).

3.3 Pipe Joint Construction:

A. Refer to Division 22 Section, "Basic Mechanical Materials and Methods for Plumbing and HVAC" and schedule on the drawings for joint construction requirements for soldered and brazed joints in copper tubing.

3.4 Terminal Equipment Connections:

A. Size for piping connections shall be same as for equipment connections. Increase pipe size at connection as indicated on drawings.

3.5 Cleaning:

A. Flush drain piping systems with clean water.

- END OF SECTION -

SECTION 233113

PART 1 – GENERAL

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

1.2 Summary: This Section includes metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 7 to plus 10 inch wg (minus 1750 to plus 2500 Pa). Metal ducts include the following:

A. Rectangular ducts and fittings.

1.3 System Description:

A. Duct system design, as indicated, has been used to select size and type of air moving and distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

B. Ducts shall be single-wall except where indicated to be double-wall on the Drawings.

1.4 Submittals:

A. Shop Drawings: CAD-generated and drawn to 1/4 inch equals 1 foot (1:50) scale. Show fabrication and installation details for metal ducts.

1. Duct layout indicating sizes and pressure classes.

2. Elevations of top and bottom of ducts.

3. Fittings.

4. Reinforcement and spacing.

5. Seam and joint construction.

6. Penetrations through fire-rated and other partitions.

7. Equipment installation based on equipment being used on Project.

8. Duct accessories, including access doors and panels.

9. Hangers and supports, including methods for duct and building attachment.

B. Field quality-control test reports.

1.5 Quality Assurance:

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Codes and Standards:

1. SMACNA Standards: "HVAC Duct Construction Standards, Metal and Flexible."

2. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."

3. International Mechanical Code.

PART 2 – PRODUCTS

2.1 Sheet Metal Materials:

A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G60 (Z180) coating designation and G90 for ducts located on building exterior. Ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, matte finish for exposed ducts.

D. Stainless Steel: ASTM A 480/A 480M, Type 304, and having a No. 2D finish for concealed ducts and No. 4 finish for exposed ducts.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

F. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.2 Sealant Materials:

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

B. Joint and Seam Tape: 2 inches (50 mm) wide; glass-fiber-reinforced fabric.

C. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

D. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.3 Hangers and Supports:

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.

2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.

1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.

3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.

2.4 Rectangular Duct Fabrication:

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.

2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, joint reinforcement and gasket material.

1. Ductmate industries, inc.

2. Lindab, Inc.

C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.

1. Duct Size: Maximum 30 inches (750 mm) wide and up to 2 inch wg (500 Pa) pressure class.

2. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.

D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches (480 mm) and larger and 0.0359 inch (0.9 mm) thick or less, with more than 10 sq. feet (0.93 sq. meter) of nonbraced panel area unless ducts are lined.

PART 3 – EXECUTION

3.1 Duct Applications:

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Exhaust Ducts (Negative Pressure): 2 inch wg (500 Pa).

3.2 Duct Installation:

A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install round and flat-oval ducts in lengths not less than 12 feet (3.7 meters) unless interrupted by fittings.

C. Install ducts with fewest possible joints.

D. Install fabricated fittings for changes in directions, size, and shape and for connections.

E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches (300 mm), with a minimum of 3 screws in each coupling.

F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Exposed supply air/return air duct shall be sealed from dust and debris during storage and after installation.

I. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

J. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

K. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

L. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

M. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

N. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches (38 mm).

O. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section 23 33 00, "Ductwork Accessories."

P. Roofs: Where ducts are located on roofs, provide G90 sheet metal shields over top and vertical sides of all duct joints. Solder all seams in joint shields and seal to exterior duct layer for watertight ductwork. Provide roof supports as indicated.

Q. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."

R. Install factory fabricated ducts per the manufacturer’s installation instructions.

3.3 Seam and Joint Sealing:

A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.

1. For pressure classes lower than 2 inch wg (500 Pa), seal transverse joints.

B. Seal and test ducts before external insulation is applied.

C. Test ducts in accordance with SMACNA. Make necessary repairs to sustain test pressure with not more than 5 percent leakage.

3.4 Hanging and Supporting:

A. Support horizontal ducts within 24 inches (600 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.

B. Support vertical ducts at maximum intervals of 16 feet (5 meters) and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.5 Connections:

A. Make connections to equipment with flexible connectors according to Division 23 Section 23 33 00, "Ductwork Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

- END OF SECTION -

SECTION 233423

PART 1 – GENERAL

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

1.2 Summary: This Section includes the following:

A. Ceiling mounted ventilators

1.3 Submittals:

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated.

B. Maintenance Data: For power ventilators to include in maintenance manuals specified in Division 01.

1.4 Quality Assurance:

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.

C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

1.5 Extra Materials:

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit.

PART 2 – PRODUCTS

2.1 Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equivalent:

1. Ceiling Mounted Ventilators:

1. Acme; Model V

2. Loren Cook Company; Model GC

3. Greenheck Fan Corp.; Model SP, CSP

4. Twin City Fan Comopanies; Model T, TL

5. Penn Barry Zephyr Series

2.2 Ceiling-Mounted Ventilators:

A. Description: Centrifugal fans designed for installing in ceiling or wall or for concealed in-line applications.

B. Housing: Steel, lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Painted steel or aluminum, louvered or egg-crate grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Accessories:

1. Variable-Speed Controller: Solid-state control mounted on fan housing to reduce speed from 100 percent to less than 50 percent.

2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.

3. Motion Sensor: Motion detector with adjustable shutoff timer.

4. Isolation: Rubber-in-shear vibration isolators.

5. Manufacturer's standard roof jack or wall cap, and transition fittings.

2.3 Motors:

A. Manufacturer's standard, electrically commutated.

1. Provide speed control switch for balancing.

2.4 Source Quality Control:

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 – EXECUTION

3.1 Installation:

A. Install power ventilators level and plumb.

B. Install units with clearances for service and maintenance.

C. Suspend ceiling mounted ventilators from structure with hanger rods and vibration isolators.

3.2 Connections:

A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories.

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment. Refer to Division 26 Section 260526, "Grounding and Bonding".

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

3.3 Field Quality Control:

A. Equipment Startup Checks:

1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors and starters.

3. Verify that cleaning and adjusting are complete.

4. Verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation.

5. Verify lubrication for bearings and other moving parts.

B. Starting Procedures:

1. Energize motor.

2. Measure and record motor voltage and amperage.

C. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

D. Refer to Division 23 Section, "Testing, Adjusting, and Balancing," for testing, adjusting, and balancing procedures.

E. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.4 Cleaning:

A. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.

B. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

- END OF SECTION -

SECTION 236315

PART 1 – GENERAL

1.1 Related Documents:

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

B. Section 23 23 03 Refrigerant Piping.

C. Section 23 24 00 Condensate Drain Piping.

1.2 Summary: This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed wall and are not connected to ducts.

1.3 Submittals:

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For mini split-system heat pump units to include in emergency, operation, and maintenance manuals.

D. Warranty: Special warranty specified in this Section.

1.4 Quality Assurance:

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 1 Sections.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

D. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

E. Units shall be designed to operate with HCFC-free refrigerants.

1.5 Coordination:

A. Coordinate size and location of concrete bases for units. Concrete, reinforcement, and formwork are specified in Division 3 Sections.

1.6 Warranty:

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

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

1.7 Extra Materials:

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set of filters for each unit.

PART 2 – PRODUCTS

2.1 Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:

		Indoor Unit	Outdoor Unit
1.	Daikin: Model	FAQ	RZQ
2.	LG	LSN	LSU
3.	Mitsubishi:	MSYG Series	MUZ Series

2.2 Wall-Mounting, Evaporator-Fan Components:

A. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.

D. Fan: Direct drive, centrifugal fan.

E. Fan Motors: Comply with requirements in Division 22 Section 22 02 00, "Motors."

1. Special Motor Features: Multi-tapped, multi-speed with internal thermal protection and permanent lubrication.

F. Filters: Permanent, cleanable.

2.3 Air-Cooled, Compressor-Condenser Components:

A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

1. Compressor Type: Reciprocating or scroll.

2. Refrigerant: Pre-charged.

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.

D. Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.

E. Fan: Aluminum-propeller type, directly connected to motor.

F. Motor: Permanently lubricated, with integral thermal-overload protection.

G. Low Ambient Kit: Permits operation down to 45 degrees F (7 degrees C).

2.4 Accessories:

A. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.

2. 24-hour time control of system stop and start.

3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.

4. Fan-speed selection, including auto setting.

B. Automatic-reset timer to prevent rapid cycling of compressor.

C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

D. Refrigerant Circuit Access Parts: Locking type-tamper resistant.

PART 3 – EXECUTION

3.1 Installation:

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install ground-mounting, compressor-condenser components on 4 inch (100 mm) thick, reinforced concrete base; 4 inches (100 mm) larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 3 Sections. Coordinate anchor installation with concrete base.

D. Install ground-mounting, compressor-condenser components on polyethylene mounting base.

E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 Connections:

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to unit to allow service and maintenance.

C. Ground equipment according to Division 26 Specifications.

D. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.

3.3 Field Quality Control:

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

3.4 Startup Service:

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 Demonstration:

A. Train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 1.

- END OF SECTION -

SECTION 260000 - GENERAL PROVISIONS

PART 1 - GENERAL

1.1 SCOPE

A. The electrical portion of this project includes all labor, materials, equipment, etc., required to provide the complete electrical work to fulfill the intent of the Contract Documents.

1.2 RELATED DOCUMENTS

A. All applicable provisions of Division 0 and 1 govern work under this division. Refer to these articles in the specifications for additional information.

B. All work shall be in compliance with the currently enforced edition of the applicable state, national, and local ordinance and building codes, and the National Electric Code. No additional compensation shall be granted for work which must be changed as a result of the work not originally complying with the codes and standards. etc.

C. Refer to each section for additional applicable codes and reference standards.

1.3 FEES, PERMITS AND TAXES

A. This Contractor is responsible for all inspection fees and permits required by local authorities having jurisdiction. The Contractor is also responsible for all taxes levied for labor and materials associated with the electrical portion of the work. After completion of the work, a certificate of final inspection shall be provided showing approval from the local Electrical Inspector.

B. This contractor is responsible for any fees, charges or installation costs charged by the local utility for the new electrical service provided.

1.4 SUBMITTALS

A. Submittals shall be provided for all items indicated. Product data shall be from published manufacturer's data. Data shall include enough information so that the Engineer can verify compliance with codes, standards, and the contract documents. Submittal shall not contain data that is not relevant to the equipment being submitted. The data shall be highlighted by arrows, underlining, etc. broad, general data, is not acceptable. Data shall be presented at one time, in a neatly bound and organized manner.

B. The contractor shall provide and maintain at the site a set of prints which accurately represent the actual installation of all work under this Division. Any changes in sizes, locations, dimensions, etc. shall be shown. Changes in circuitry shall be clearly and completely indicated as the work progresses.

C. At the completion of the Project, a set of marked-up drawings, including DIMENSIONED, location of all underground conduit shall be provided to the owner.

1.5 OPERATING AND MAINTENANCE MANUALS AND INSTRUCTIONS

A. Operating and Maintenance Data includes printed information, such as manufacturer's installation instructions, manufacturer’s service manuals, manufacturer’s lubrication charts, standard wiring diagrams, and a parts list including the price of each item.

B. Mark each copy to show applicable choices and options. Where printed Operating and Maintenance Data includes information on several products that are not required, mark copies to indicate the applicable information.

C. Do not submit Operating and Maintenance Data until compliance with requirements of the Contract Documents has been confirmed.

D. Submittals: Submit 3 copies of each required submittal. The Engineer will return the copies marked with action taken and corrections or modifications required. Unless resubmittal is requested, the submittal may serve as the final submittal.

1.6 PRIOR APPROVAL

A. The contractor shall submit a list of proposed substitutions to the Engineer. All proposed substitutions shall be in writing to the Engineer, at least, seven (7) calendar days prior to bid opening. The submittal will list the proposed substitutions from published manufacturer’s data, which cover the applicable features of the submitted equipment. Any approvals shall be issued in writing.

1.7 GUARANTEE

A. The contractor shall fully guarantee the installation against defects in materials and workmanship which may occur under normal usage for a period of one year after owner’s acceptance. Defects shall be promptly remedied at no cost to the owner. This guarantee is in addition to, and not a limit to, any other guarantees or warranties.

1.8 DEFINITIONS. The following words and phases are defined:

A. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.

B. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Architect/Engineer, requested by the Architect/Engineer, and similar phrases.

C. "Approved": The term "approved," when used in conjunction with the Architect's/Engineer□s action on the Contractor's submittals, applications, and requests, is limited to the Architect's/Engineer□s duties and responsibilities as stated in the Conditions of the Contract.

D. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

E. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

F. "Install": The term "install" describes operations at the Project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

G. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

H. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform

I. "Project site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

J. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.9 INSPECTION OF THE SITE

A. The drawings are prepared from the most accurate information available. However, the contractor shall, prior to placing any bids, visit the site to verify existing conditions, proposed conduit routings, etc.

B. All proposals shall take these existing conditions and any speculated revisions needed into account. The contractor shall be fully responsible for his bid regardless of any additional site information which may be uncovered after a contract is signed.

1.10 CONSTRUCTION SAFETY

A. The plans and specifications do not include items necessary for the contractor to insure the safety of his personnel on the project construction site. Construction site safety for the project is the responsibility of the contractor. Reference other sections of these specifications for any additional information.

1.11 DAMAGE

A. The contractor shall be held accountable to repair, at no additional cost, any damage to existing wiring, piping, or other materials and equipment intended to remain.

1.12 DRAWINGS AND SPECIFICATIONS

A. Should be considered as complimentary to each other. What is required by one shall be binding as if required by both. If conflicts between plans and specifications are found, the Engineer shall be contacted to secure clarification, prior to bidding. The contractor shall verify all dimensions and existing conditions.

1.13 MANUFACTURER'S DRAWINGS AND DATA

A. Submit Shop Drawings for approval, for all items indicated below.

1. Panelboards
2. Disconnect Switches
3. Lighting
4. Lighting Contactors

B. Provide O&M Manuals i.a.w, Paragraph 1.5, for all items indicated below.

1. Panelboards
2. Lighting Contactors

PART 2 - EXECUTION

2.1 WORKMANSHIP

A. All work shall be done in a professional and complete manner by experienced craftsmen. Unsatisfactory workmanship shall be duly noted and corrected at the contractors expense.

B. Only new materials shall be used, unless otherwise indicated on plan or prior approved.

2.2 MANUFACTURER'S INSTALLATION INSTRUCTIONS

A. All equipment shall be installed in accordance with manufacturer s installation instructions.

2.3 PROTECTION OF EQUIPMENT

A. The contractor shall provide protection of stored material and installed equipment against dirt, rust, moisture, and abuse from other trades. Where tarps or other cover is used, provide air circulation to prevent condensate build up. No materials or equipment shall be stored directly on the ground.

2.4 CONFLICTS, INTERFERENCES AND COORDINATION BETWEEN TRADES

A. Coordinate work so as to conform with the progress of the work of others. The drawings are only intended to indicate the extent, general location and arrangement, of conduit systems and equipment. Any questions regarding the information given on the plans shall be directed to the Engineer for clarification. The contractor shall refer to other sections of the specifications and other drawings such as structural, mechanical, etc., in order to eliminate conflicts when laying out his work. The contractor shall be responsible for the proper coordination of the electrical work with the installations under other Divisions for clearances, etc. Any changes required to avoid interferences shall be submitted to the Architect for approval and shall be made, as approved, without additional cost.

B. Code requirements shall have precedence over plans or specifications in the event of a conflict. If a discrepancy or conflict exists between specifications and drawings, drawings shall take precedence over specifications except as pertaining to quality. Manufacturer's installation instructions shall govern the installation of all equipment.

C. Control wiring, schematics, or logic shown on plan is only intended to show the general intent. Such plans are not to be considered shop drawings. The contractor is responsible for determining and

coordinating the detailed requirements, including but not limited to wiring, to interface systems and provide a fully functional system which follows the intent.

D. The contractor shall coordinate with equipment suppliers for any requirements specific to the equipment provided which may not be shown on the plans or given in the specifications. The contractor shall include the provision and installation of such requirements in his bid. The contractor shall coordinate with equipment suppliers, prior to bid, to determine what ancillary equipment is or is not provided with the equipment, such as lugs, terminal blocks, etc.

E. Equipment requiring set grades or elevations and piping has precedence over conduit, boxes, etc. as to location.

F. The contractor shall coordinate with other equipment providers to insure correct operation of the equipment, such as, phase rotation, interlocking, accessibility, etc.

G. Low voltage temperature control systems for HVAC systems including controls, relays, time clocks, wiring and devices will be furnished and wired under Division 23. 120Vac wiring required in support of HVAC and other mechanical/plumbing systems shall be furnished and wired under Division 26.

H. The contractor shall examine the Architectural plans for the location of suitable openings and aisles for the passage of equipment to be installed under this Division. The contractor shall be responsible for having suitable openings and aisles left open until his equipment has been properly installed.

I. Except as otherwise noted, it shall be understood that the indication and/or description of any item, in the drawings or specifications, or both, carries with it the instruction to furnish and install the item, regardless of whether or not this instruction is explicitly stated as part of the indication or description.

J. It shall be understood that the plans are not intended to indicate exact raceway routings. Determination as to the routing shall be made in consideration of structural conditions and interferences with other trades or by terminal locations on apparatus.

K. The right is reserved to make reasonable changes in locations of equipment indicated in Drawings prior to installation without an increase in the contract cost.

L. The drawings and specifications do not undertake to indicate every item required to produce a complete and properly operating installation. Material, equipment or labor not indicated, but which can be reasonably inferred to be necessary for a complete installation shall be provided.

2.5 CUTTING AND PATCHING

A. Every effort shall be made to build-in the work as the job progresses. As required, cutting and patching for the installation of sleeves, conduits, equipment, etc., shall be coordinated with the General Contractor. Do not cut any structural element without written permission from the Structural Engineer.

2.6 EQUIPMENT CONNECTIONS

A. The contractor shall make final connection of all required services to all equipment items furnished, including that provided by others or by the owner. Equipment shall be left in a ready to operate state.

2.7 FLASHING AND WATERPROOFING

A. Any building penetrations to outside shall be flashed, as required, to prevent leaks.

END OF SECTION 260000

SECTION 260500 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SCOPE

A. Work of this section includes specification of the following:

Wire and connectors.
Wiring and control devices.
Electrical identification.
Concrete equipment bases.
Firestopping
Cutting and patching for electrical construction.
Touchup painting.

1.2 QUALITY ASSURANCE

A. Provide electrical components, devices, and accessories specified in this section that are UL listed and labeled as defined in NFPA 70, Article 100.

B. The materials and methods used for all electrical components, devices, and accessories specified in this section shall comply with NFPA 70.

1.3 COORDINATION

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

C. Coordinate electrical service connections to components furnished by utility companies.

1. Coordinate installation and connection of exterior underground utilities and services, including provision for electricity-metering components.
2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

D. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

E. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

F. Verify characteristics, sizes, and ratings, of motors actually supplied prior to providing starter, overload protection and branch circuit wiring.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Wire/Cable
   a. Anaconda
   b. American Wire and Cable
   c. Southwire
   d. Okonite Company

2. Wire/Cable Connectors

   Split-Bolt Connectors
   a. Appleton
   b. Crouse-Hinds
   c. Teledyne

   Solderless Pressure Connectors
   a. Burndy
   b. Thomas and Betts
   c. AMP

   Spring Wire Connectors
   a. Burndy
   b. Thomas and Betts
   c. Teledyne

   Compression Connectors
   a. Burndy
   b. Crouse-Hinds
   c. Teledyne

B. All wire sizes specified shall be i.a.w. American Wire Gauge (AWG) designations.

C. Conductors, No. 10 awg and smaller shall be solid or stranded copper. Larger than 10 awg shall be stranded copper. Copper clad conductors are not permitted.

D. Conductors shall be copper with not less than 95% conductivity.

E. Insulation for power conductors shall be type THW or THHN, rated 600 volts, rated 75 deg. C minimum. Conductor insulation for feeders size 1/0 and larger may be type RHW moisture and heat resistant rubber. Conductor insulation shall have the manufacturers name, type insulation and conductor size imprinted on the jacket at regular intervals. Branch circuit conductors sizes #6 awg and smaller may be type TW. For conductors wired in fluorescent light fixture cable runs use type RHH or THHN insulation rated 90 deg. C.

F. Conductor phasing shall be as follows. From left to right, the first bus in each panel shall be Phase ‘A’, middle bus ‘B’, and right bus ‘C’.

G. Insulation shall be color coded as required by NFPA 70, 210-5. Color coding shall be consistent throughout the project. Use white conductors only for circuit neutrals. When unable to provide a white conductor, the neutral shall be identified at switches, panelboards, junction boxes, etc. with white tape or paint. Equipment grounds shall be green. Isolated equipment grounds shall be green with yellow stripe.

H. All materials used for wire connections and splices shall be of the size, ampacity, material type, and class suitable for the service.

I. Provide wire and cable terminations made with UL-listed one-piece, compression deforming type, solderless high conductivity copper or copper alloy terminal lugs as follows:

1. Terminal lugs shall have hole sizes and spacing i.a.w. NEMA standards.
2. Terminal lugs on wire sizes 3/0 and smaller shall be single hole, single compression type. Wire and cable No. 6 awg and smaller may be terminated on mechanical type connections or terminal strips integral with the equipment or wiring device. The mechanical connector and terminal strip shall be UL-listed copper, either tubular type with a pressure plate or screw type with a wire clamp. The screw shall not directly compress the conductors.
3. Terminal lugs for use on wire sizes 4/0 and larger shall be two-hole, long barrel, double compression type.

J. In general, there shall be no splices from the power source to the load without written approval from the Engineer. If written approval is given, provide splices and taps which are made with solderless copper compression deforming connectors and which bear the UL label. All splices and taps shall be made in accordance with the manufacturer□s written instructions.

1. A solid barrel crimped connector shall be used for splices and taps on wire sizes No. 8 AWG and smaller.
2. A solid barrel compression connector or bolting solid barrel terminal lugs shall be used for splices and taps on wire sizes No. 6 AWG and larger.

K. Connection to motors, solenoids and other devices with integral leads sized No. 4 AWG and smaller (including all current transformers) shall be made with ring-type pressure connectors. Provide connectors bolted together and taped with oil-resistant electrical tape. Soldered or insulation piercing type connectors shall not be used. No connection shall be inside a conduit fitting.

2.2 ELECTRICAL IDENTIFICATION

A. Underground warning tape shall be a permanent, bright-colored, continuous-printed, vinyl tape with the following features:

1. Not less than 6 inches wide by 4 mils thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.

B. Wire markers shall be a vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

C. Engraved-Plastic labels, signs, and instruction plates shall be a melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.

D. Nameplates and signs fasteners shall be self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

E. The service entrance panelboard shall be labeled “Service Entrance”, i.a.w., NFPA 70, Section 230-70(b).

2.3 UTILITY COMPANY METERING

A. Where required, current-transformer cabinets shall comply with the requirements of electrical power utility company. Meter base is to be furnished by the utility company. Verify all metering requirements with the providing utility prior to bid.

2.4 CONCRETE BASES

A. All concrete forms and reinforcement materials shall conform to requirements specified in Division 3 Section "Cast-in-Place Concrete."

B. Concrete used shall be have a 3000-psi, 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."

2.5 TOUCHUP PAINT

A. Equipment touch-up paint shall be selected to match the installed equipment finish. For galvanized surfaces, a zinc-rich paint recommended by the equipment manufacturer shall be used.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Materials and components shall be installed level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.

C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required. Wire and cable routing indicated on the Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.

D. Branch circuit wiring is generally sized not to exceed a two-percent voltage drop, but in no case shall exceed a three-percent voltage drop.

3.2 WIRING INSTALLATION

A. Install wiring in a conduit raceway with conductors of the types and sizes as shown on the drawings and specified in these specifications. Where no type or size is given install conductors as required by code.

B. From panels extend a complete system of wiring to all fixtures, motors, devices, and other equipment. Employ multi-wire circuits as indicated. Connect circuits to panelboards to give an evenly balanced load. Secure approval for any departure from the circuit arrangement as shown.

C. Numerals shown on the drawing □home-runs□ indicate the circuit arrangement. Cross marks on branch circuit runs indicate the number of conductors required. Where no cross marks are shown, two conductors are indicated.

D. All home runs shall be 12 (twelve) awg or larger as indicated. Provide 10 (ten) awg where home runs exceed 60 feet in length. No wire smaller than #12 is permitted serving lighting or outlets.

E. Do not pull conductors until the entire conduit system is complete and the building is □in the dry□. Use only UL approved lubricants to facilitate conductor pulling.

F. Furnish all switches, connections, branch circuits, wiring, etc. to HVAC equipment, as needed, to provide a complete power wiring system. Install and connect 120 Vac control devices which are to be included in power wiring.

G. Furnish raceway, backboxes, wiring, connections, etc. for all equipment and systems furnished under this or other section(s) of these specifications, or by Owner, for a complete installation i.a.w. suppliers and manufacturers instructions. All equipment shall be connected ready for operation, i.a.w, detailed wiring diagrams furnished by the equipment manufacturer and in cooperation with the respective subcontractor or Owner. Provide receptacles to match equipment furnished plugs.

H. Install wiring at outlets with a minimum of 8" of slack conductor.

I. Install pre-finished cord sets where connection with an attachment plug is indicated or specified, or use attachment plug with suitable strain relief clamps.

J. Solderless pressure connectors with insulating covers shall be used for copper conductor splices and taps, No. 8 awg and smaller.

K. Insulation on approved splices and taps for wire sizes No. 8 AWG and smaller shall consist of:

1. Half-lapped layers of all weather pvc tape installed to a thickness equivalent to the conductor insulation. Or
2. An insulation system consisting of a heat shrink or cold shrink system properly sized for the application.

L. Insulation on approved splices and taps for wire sizes No. 6 AWG and larger shall consist of:

1. A minimum of three half-lapped layers of yellow, varnished cambric tape and three half-lapped layers of all weather pvc tape. An electrically insulating putty may be used over irregular shapes prior to application of the tape.
2. An insulation system consisting of a heat shrink or cold shrink system properly sized for the application.

3.3 IDENTIFICATION MATERIALS AND DEVICES

A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.

C. Clean surfaces before applying self-adhesive identification products.

D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.

E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.

F. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

G. Panel schedules for existing branch circuit panel boards shall be updated for all circuit changes.

H. Label raceway branch circuit junction boxes as to the panel(s) and circuit number(s) from which the circuit(s) originates. Use machine printed, pressure sensitive, abrasion resistant label tape on the faceplate and wiremarkers or tags within the box.

I. Provide engraved nameplates to identify all electrical distribution and control equipment and loads served. Letter height shall be 1/8 inch for individual switches and loads served, 1/4 inch for distribution and control equipment identification.

J. Panelboards, switchboards and motor control centers shall have 1/4 inch letter engraved nameplates to identify with the equipment designation, 1/8 inch lettering to identify the voltage rating and source.

K. Provide an engraved nameplate with 1/8 lettering to identify the conductor color coding scheme at each panelboard and switchboard. Mount on the interior of the door if so equipped, otherwise on the back of the trim.

3.4 UTILITY COMPANY EQUIPMENT

A. Install equipment according to utility company's requirements. Provide grounding and empty conduits as required by utility company.

3.5 CONCRETE BASES

A. Construct concrete bases of dimensions specified by the utility company for supporting the distribution transformer. At a minimum, the pad should be not less than 4 inches larger, in both directions, than supported transformer. Follow transformer or other supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.6 FIRESTOPPING

A. Penetrations of fire rated floor and wall assemblies shall be sealed with firestop material appropriate to achieve the designated fire resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7.

3.7 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.8 REFINISHING AND TOUCHUP PAINTING

A. The following procedure should be used for refinishing and/or touch-up needed:

1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260500

SECTION 260526 - GROUNDING & BONDING

PART 1 - GENERAL

1.1 SCOPE

A. This Section includes grounding of electrical systems and equipment and basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.2 RELATED DOCUMENTS

A. Referenced standards include:

NFPA 70 - National Electric Code
OSHA 1910 - Standards for General Industry
ANSI/IEEE 81 - Guide for Measuring Earth Resitivity. Ground Impedence, and Earth Surface Potentials of a Ground System

1.3 QUALITY ASSURANCE

A. Provide electrical components, devices, and accessories specified in this section that are UL listed and labeled as defined in NFPA 70, Article 100.

B. Grounding rod resistance shall be 10 ohms or less.

C. Grounding system to be tested i.a.w. ANSI/IEEE Std 81 using the “two-point” method.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Rod Electrode
   a. A.B. Chance
   b. Copperweld Bimetallics Div
   c. National Ground Rod

2. Mechanical Connectors
   a. O.Z. Gedney
   b. Burndy
   c. Thomas & Betts, Electrical

3. Exothermic Connections
   a. Caldweld
   b. Thermoweld

2.2 GROUNDING AND BONDING PRODUCTS

A. Where types, sizes, ratings, and quantities indicated are in excess of National Electrical Code (NEC) requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

2.3 WIRE AND CABLE GROUNDING CONDUCTORS

A. Wire and cable grounding conductors shall conform to NEC Table 8, except as otherwise indicated.

B. All equipment grounding conductors shall be insulated with green color insulation.

C. Grounding-electrode conductors shall be stranded copper cable.

2.4 MISCELLANEOUS CONDUCTORS

A. Where required, braided bonding jumpers shall be a copper tape, braided No. 30 AWG bare copper wire, terminated with copper ferrules. Bonding straps shall be soft copper, 0.05 inch thick and 2 (two) inches wide.

2.5 CONNECTOR PRODUCTS

A. Pressure type connectors shall be of a high-conductivity-plated design.

B. Bolted Clamps shall be heavy-duty type.

C. Exothermic-welded connections shall be as provided in kit form and selected per manufacturer's written instructions for specific types, sizes, and combinations of conductors and connected items.

2.6 GROUNDING ELECTRODES

A. Grounding rods shall be a copper-clad steel of the size indicated on the drawings.

PART 3 - EXECUTION

2.7 APPLICATION

A. Equipment grounding conductors shall be installed to comply with NEC Article 250. Where types, sizes, and quantities of equipment grounding conductors, are more than required by NEC use the more stringent requirements.

1. Install insulated equipment grounding conductor with circuit conductors for the items below in addition to those required by Code:
    a. Feeders and branch circuits.
    b. Lighting circuits.
    c. Receptacle circuits.

d. Flexible raceway runs.
e. Armored and metal-clad cable runs.
f. Single phase motor or appliance branch circuits.
g. Three phase motor or appliance branch circuits.

2. Install a separate equipment grounding conductor to each electric water heater, heat-tracing assembly, and antifrost heating cable. Bond conductor to heater units, piping, connected equipment, and components.

3. Ground metal pole supporting outdoor lighting fixture to a grounding electrode in addition to separate equipment grounding conductor run with supply branch circuit.

B. Exothermic welded connections shall be used for all underground connections or connections to structural steel

C. Equipment grounding conductor connections will be made with bolted pressure clamps.

D. Install an insulated equipment grounding conductor connected to the receptacle grounding terminal for all isolated grounding receptacle circuits. Isolate grounding conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

E. As noted on the plans, for designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate equipment grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.

F. Install an equipment grounding conductor to air duct-mounted electrical devices operating at 120 V and more, including air cleaners and heaters. Bond conductor to each unit and to air duct.

G. Provide grounding and installation for telephone equipment i.a.w., NFPA 70, Section 800.

2.8 INSTALLATION

A. Ground electrical systems and equipment according to NEC requirements, except where Drawings or Specifications exceed NEC requirements.

1. Drive ground rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated. Verify that final backfill and compaction has been completed prior to driving ground rods.
2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding conductors shall be routed along the shortest and straightest paths possible, except as otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. For underground grounding conductors, use bare copper wire buried at least 24 inches below grade.

D. Provide insulated copper grounding conductors, in conduit, from building□s main service

equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end. Use braided-type bonding jumpers to electrically bypass water meters.

2.9 CONNECTIONS

A. Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.

B. Use exothermic-welded connections for connections to structural steel and for underground connections. Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Equipment grounding-wire terminations for No. 8 awg and larger, use pressure-type grounding lugs. No. 10 awg and smaller grounding conductors may be terminated with winged pressure-type connectors.

1. Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

D. Where metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors, except as otherwise indicated.

E. Where insulated grounding conductors are connected to grounding rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

F. Measure the ground resistance of each rod. A maximum of 10 ohms, unless otherwise indicated, or less to be provided. If ground resistance is not 10 ohms or less, drive additional rods to obtain the required resistance. Paralleled ground rod spacing shall be as recommended in IEEE 142, Grounding of Industrial and Commercial Power Systems.

G. All test and measurement data shall be provided to the Engineer for review.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. Thomas & Betts Corporation.
d. Unistrut; Tyco International, Ltd.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Hilti Inc.
2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
3) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1) Cooper B-Line, Inc.; a division of Cooper Industries.
2) Hilti Inc.
3) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete”

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SCOPE

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1. Raceways include the following:
   a. EMT - Electrical Metallic Tubing
   b. FMC - Flexible Metal Conduit
   c. LFMC - Liquid Tight Flexible Metal Conduit
   d. PVC - PVC coated, Rigid Steel Conduit
   e. RNC - Rigid Non-metallic Conduit
   f. RSG - Rigid Steel Galvanized Conduit

2. Boxes, enclosures, and cabinets include the following:
   a. Device boxes.
   b. Outlet boxes.
   c. Pull and junction boxes.
   d. Cabinets and hinged-cover enclosures.

1.2 RELATED DOCUMENTS

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

B. Referenced standards include:

NFPA 70 - National Electric Code
ANSI C80.1 - American National Standard, Rigid Steel Galvanized Conduit
ANSI C80.3 - American National Standard, Electrical Metallic Tubing
OSHA 1910 - Standards for General Industry
NEMA FB1 - National Electrical Manufacturers Assoc., fittings
NEMA TC 3 - PVC fittings

1.3 COORDINATION

A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

B. Field verify measurements.

C. Verify routing and termination locations of conduit prior to rough-in.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Metal Conduit and Tubing:
   a. Allied Tube and Conduit
   b. Triangle
   c. Wheatland
   d. Anaconda (flexible conduit)

2. Nonmetallic Conduit and Tubing:
   a. Carlon
   b. Robroy
   c. Anaconda

3. Conduit Bodies and Fittings:
   a. Crouse-Hinds
   b. Appleton
   c. O-Z/Gedney

4. Fire Rated Fittings:
   a. Crouse-Hinds
   b. O-Z/Gedney
   c. Appleton

5. Expansion/Deflection Fittings:
   a. Crouse-Hinds
   b. O-Z/Gedney
   c. Appleton

6. Cable Trough/Wireway
   a. B-Line
   b. Wiremold
   c. Hoffman
   d. Hammond

7. Boxes, Enclosures, and Cabinets:
   a. Crouse-Hinds
   b. Hoffman
   c. B-Line
   d. Robroy

2.2 METAL CONDUIT AND TUBING

A. EMT and Fittings

1. All electrical metallic tubing shall comply with the latest revision of ANSI C80.3.

2. Electrical metallic tubing (EMT) shall be galvanized steel and shall be used for all indoor concealed or exposed work, unless otherwise noted. Connectors and couplings shall be threadless compression type.

B. FMC

1. Flexible metal conduit shall be used for final connections to motors. Conduit shall be of an interlocked steel construction.

C. LFMC

1. Liquid tight flexible metal conduit shall be used in wet locations for final connections to motors and other equipment subject to vibration. Preference given to neoprene jacketed Seal-tite by Anaconda or equal.

D. PVC

1. PVC coated rigid steel conduit shall be used for all transitions from below grade to 18 (eighteen) inches above the finished grade or floor.

E. RSG

1. All rigid steel galvanized conduit shall comply with the latest revision of ANSI C80.1.

2. Rigid steel galvanized conduit shall be used for all exterior exposed work, unless otherwise noted. Rigid steel galvanized conduit shall be used in all NEC, classified, hazardous locations whether interior or exterior.

F. Fittings

1. All fittings shall comply with the requirements of NEMA FB 1, standard for conduit fittings, cast metal boxes, and conduit bodies. All fittings used shall be compatible with the conduit and tubing materials used.

2.3 NONMETALLIC CONDUIT

A. RNC

1. Unless otherwise noted, all rigid nonmetallic conduit shall be schedule 40 PVC complying with NEMA TC 3 standards.

2. RNC shall be used for underground cable runs, unless otherwise noted. Provide schedule 80 PVC where underneath roadways and drives subject to vehicle traffic.

B. Fittings

1. Unless otherwise noted, all fittings used with nonmetallic conduit shall be schedule 40 PVC complying with NEMA TC 3 standards. The fittings used shall be compatible with conduit size and type.

2.4 OUTLET AND DEVICE BOXES

A. Metal Boxes

1. Provide galvanized steel metal boxes sized to accommodate devices and conductors as per NEC Art. 370 at each outlet location indicated on the drawings or as required. Boxes shall be a minimum of 1.5" deep, of metal a minimum of 1/16" thick.

2. Boxes used with exposed conduit should be a four-inch square utility box.

3. The owner reserves the right to make adjustments to the location of outlet boxes prior to rough-in.

4. Sizes and configuration of boxes shall be as required for the intended service. The boxes shall conform to and be applied, i.a.w, NEC requirements. Supports, gaskets, extension rings, etc. shall be provided where required.

5. Gang type boxes shall be used where multiple wiring devices are located together.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Minimum Raceway Size: 1/2-inch trade size. Homeruns shall be 3/4" minimum.

C. Conceal conduit and EMT, unless otherwise indicated, within finished walls, CMU walls, ceilings, and floors, except in equipment room. Do not run conduit in **cavity** of exterior wall with brick exteriors.

D. Keep raceways at least 12 inches away from hot-water pipes. Install horizontal raceway runs above water piping.

E. Install raceways level and square and at proper elevations. Provide adequate headroom.

F. Complete raceway installation before starting conductor installation.

G. All conduits, concealed or exposed, shall be supported and substantially fastened to structural members at intervals of not more than 8 (eight) feet. Attach supporting devices with screws, bolts, expansion sleeves or other workmanlike means appropriate to the surface. Boxes which are not embedded in masonry or concrete shall be fastened to the structure in the same manner as for conduits.

H. Use temporary closures to prevent foreign matter from entering raceways.

I. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab. Where conduits emerge from the ground or slab, provide a rigid steel adapter, elbow and conduit. Slope conduits to drain away from the building. All metal conduits installed underground shall be PVC coated. PVC coated rigid steel conduit shall be used within five feet from foundation walls.

J. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

K. Use raceway fittings compatible with raceways and suitable for use and location.

L. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

M. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, and leave at least 1-inch concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Run conduit larger than 1-inch trade size parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Transition from nonmetallic tubing to rigid steel conduit before rising above floor.

N. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.
2. Make bends in parallel or banked runs from same centerline. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

O. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
2. Use insulating bushings to protect conductors.

P. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box. Provide bushings on ends where auxiliary system conduit raceway is stubbed out into furred space, adjacent to backboard, etc.

Q. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

R. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

S. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to the above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.

T. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver- operated, threaded flush plugs flush with floor for future equipment connections.

U. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all

motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

V. Provide galvanized sheet metal pull boxes with screw type cover, as required, to avoid excessive runs or bends between outlets.

W. Grade all raceway away from service entrance equipment to prevent water damage.

X. Provide expansion fittings in all conduits crossing an expansion joint. Fitting shall be OZ type □EX□ for rigid metal conduit or schedule 40 pvc. Fitting shall be OZ type □TX□ for EMT. Metallic conduit not containing a grounding conductor shall have OZ type □BJ□ bonding jumpers installed across expansion joints. Provide expansion fittings for PVC conduit runs over 150 feet, or outdoors or in areas or runs subject to temperature variations over 75 degrees F, and as recommended by the manufacturer.

Y. Grouped raceways shall be supported with galvanized steel channel assemblies equal to Kindorf B-909 and single bolt straps equal to Kindorf C-105. Raceway supports shall be spaced within 2 (two) feet of termination and/or connection and 8 (eight) feet on center for rigid steel, and EMT conduit. RNC shall be supported i.a.w. NFPA 70, 347-8. FNMC shall be supported within 12 (twelve) inches of termination/connection and 4.5 (four and one-half) feet on center.

Z. The drawings indicate approximate locations only. Determine the exact location on site in consideration of all structural and architectural conditions.

AA. Provide and install □low point drains□ in all above grade, outdoor raceway. Provide and install breather drains in the bottom of outdoor control panels. As much as possible, route conduits into the bottom of control panels.

BB. All phase conductors and, where used, the grounded conductor, and all equipment grounding conductors shall be grouped together in a single raceway. Where multiple phase conductors are run in parallel, separate conduits shall be run to contain one set of all phase conductors, neutral (if used) and the equipment grounding conductor.

CC. Where underground conduits stub-up through concrete equipment pad “blocked out” windows, after curing blocks, fill the block-out window with gravel to 1” of the top and cap with mortar. Caulk all entrances and around the mortar.

3.3 PROTECTION

A. Provide final protection and maintain conditions, in a manner that ensures coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.4 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 260533

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

C. Comply with ANSI Z535.4 for safety signs and labels.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.4 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.

3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.

C. Tag: Type ID:

1. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 5 mils (0.125 mm).
3. Foil Core Thickness: 0.35 mil (0.00889 mm).

2.5 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 10 by 14 inches (250 by 360 mm).

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.

G. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

a. Color shall be factory applied**.**
b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

H. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

I. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Install underground-line warning tape for both direct-buried cables and cables in raceway.

J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels Baked-enamel warning signs.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.
b. Controls with external control power connections.

K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting,

control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

    a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be **engraved**, laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Switchboards.
    e. Enclosed switches.
    f. Contactors.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following lighting control devices:

1. Time switches.
2. Photoelectric switches.
3. Indoor occupancy sensors.
4. Lighting contactors.

1.2 DEFINITIONS

A. LED: Light-emitting diode.

B. PIR: Passive infrared.

1.3 SUBMITTALS

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

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: UL listed and labeled as defined in NFPA 70, Article 100, and marked for intended use.

1.5 COORDINATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Grasslin Controls Corporation; a GE Industrial Systems Company.
2. Intermatic, Inc.
3. Leviton Mfg. Company Inc.
4. Lithonia Lighting; Acuity Lighting Group, Inc.
5. Paragon Electric Co.; Invensys Climate Controls.
6. Square D; Schneider Electric.
7. TORK.

B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.

1. Contact Configuration: DPDT
2. Contact Rating: 30-A inductive or resistive, 240-V ac or as otherwise noted on the plans.
3. Program: 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
4. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
5. Astronomic Time: All channels.
6. Battery Backup: For schedules and time clock.

C. Electromechanical-Dial Time Switches: Type complying with UL 917.

1. Contact Configuration: DPDT
2. Contact Rating: 30-A inductive or resistive, 240-V ac or as otherwise noted on the plans.
3. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
4. Astronomic time dial.
5. Eight-Day Program: Uniquely programmable for each weekday and holidays.
6. Skip-a-day mode.
7. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Area Lighting Research, Inc.; Tyco Electronics.
2. Grasslin Controls Corporation; a GE Industrial Systems Company.
3. Intermatic, Inc.
4. Lithonia Lighting; Acuity Lighting Group, Inc.
5. Novitas, Inc.
6. Paragon Electric Co.; Invensys Climate Controls.
7. Square D; Schneider Electric.
8. TORK.

B. Description: Solid state, with DPST dry contacts rated to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range**,** and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.
2. Time Delay: 15-second minimum, to prevent false operation.
3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

2.3 INDOOR OCCUPANCY SENSORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hubbell Lighting.
2. Leviton Mfg. Company Inc.
3. Lithonia Lighting; Acuity Lighting Group, Inc.
4. Novitas, Inc.
5. Sensor Switch, Inc.
6. TORK.

B. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
4. Mounting:

    a. Sensor: Suitable for mounting in any position on a standard outlet box.
    b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
6. Bypass Switch: Override the on function in case of sensor failure.
7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lx); keep lighting off when selected lighting level is present.

C. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.

1. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm).
2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
3. Detection Coverage (Corridor): Detect occupancy within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling.

D. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

2.4 LIGHTING CONTACTORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allen-Bradley/Rockwell Automation.
2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
3. Eaton Electrical Inc.; Cutler-Hammer Products.
4. GE Industrial Systems; Total Lighting Control.
5. Hubbell Lighting.
6. Lithonia Lighting; Acuity Lighting Group, Inc.
7. Square D; Schneider Electric.

B. Description: Electrically operated and mechanically held, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 CONTACTOR INSTALLATION

A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

A. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

B. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.

C. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring.

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
2. Operational Test: Verify operation of each lighting control device, and adjust time delays.

B. Lighting control devices that fail tests and inspections are defective work.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION 260923

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SCOPE

1. This Section includes lighting and power panelboards and associated auxiliary equipment rated 600 V and less for the following types:

   Lighting and appliance branch - circuit panelboards
   Distribution panelboards

1.2 SUBMITTALS

1. Submit product data for each type of panelboard, accessory item, and component specified.

2. Submit shop drawings for panelboards. Include dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:

   1. Enclosure type with details.
   2. Bus configuration and current ratings.
   3. Short-circuit current rating of panelboard.
   4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.
   5. Wiring Diagrams: Details of schematic diagram including control wiring and differentiating between manufacturer-installed and field-installed wiring.

3. Submit panelboard schedules for installed panelboards after load balancing.

1.3 QUALITY ASSURANCE

1. Provide products specified in this Section that are UL listed and labeled as defined in NFPA 70, Article 100.

2. Acceptable manufacturers shall be companies regularly engaged in the design, manufacture, and testing of panelboards for electrical use and shall have been producing such products for at least five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Acceptable manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Cutler-Hammer
   2. General Electric
   3. Square D

2.2 PANELBOARD FABRICATION

1. Enclosures: Surface-mounted cabinet.

    1) Rated for environmental conditions at installed location.

        a) Indoor Dry and Clean Locations: NEMA 250, Type 1.
        b) Outdoor Locations: NEMA 250, Type 3R.
        c) Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
        d) Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

    2) Front: Dead front, secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
    3) Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
    4) Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
    5) Finishes:

        a) Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
        b) Back Boxes: Steel. Same finish as panels and trim.

2. The directory frame shall be metal with a transparent protective cover, mounted inside each panelboard door.

3. The panelboard bus shall be hard drawn copper of 98 percent conductivity with compression type main and neutral lugs. Panelboard shall have a full-capacity neutral bus.

4. The equipment ground bus will be adequate for feeder and branch-circuit equipment ground conductors and be bonded to the box.

5. Unless otherwise noted or indicated on the drawings, only panelboards listed as approved for service entrance equipment use with a main disconnect shall be used as a service entrance panel.

6. Minimum rating of panelboards shall be 10,000 AIC rms sym. Refer to the drawings for higher rating requirements. Refer to the drawings for panel bus ratings.

7. Panelboards shall have provisions for at least the number of branch-circuits as indicated on the drawing panel schedules. Circuits will be filled with circuit breakers, at least, as indicated on the panel schedule.

8. The panelboard box shall be fabricated of code gauge, galvanized sheet steel i.a.w. UL standards. The box shall have standard knockouts on the enclosure.

9. The front shall be fabricated of sheet steel and finished with a baked on gray enamel over a rust inhibitor. Panelboards shall have a full hinged cover. Doors shall have flush type cylinder locks and catches. Panelboard locks shall be master keyed, with two keys furnished for each panelboard.

10. Incoming mains location: Top and bottom.

11. Conductor Connectors: Suitable for use with conductor material and sizes.

(i) Material: Hard-drawn copper, 98 percent conductivity.
(ii) Main and Neutral Lugs: Compression type.
(iii) Ground Lugs and Bus-Configured Terminators: Compression type.
(iv) Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
(v) Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
(vi) Gutter-Tap Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

2.3 CIRCUIT BREAKERS

1. Circuit breakers shall be bolt-on type full module, with quick-make and quick-break toggle action mechanism. Trip indication shall be shown by breaker handle taking position between on and off. All multiple pole services shall be common trip with a single handle. Circuit breakers shall be replaceable without disturbing adjacent units.

2. Circuit breakers shall be fully rated with an interrupting rating equal to that of the panelboard to which they are installed.

3. Circuit breakers will be of the same manufacturer as the panelboard installed.

4. Circuit breakers shall have mechanical compression connections.

5. Single pole circuit breakers serving fluorescent lighting loads shall have the SWD marking.

6. Circuit breakers serving air conditioning branch loads shall be UL listed as HACR type.

7. All circuit breakers shall be of the same manufacturer as the panelboard to which they are installed.

PART 3 - EXECUTION

3.1 INSTALLATION

1. Panelboards shall be installed at 72 inches above finished floor to the top of the trim, unless otherwise indicated.

2. Panelboards shall be mounted plumb and rigid without distortion of box. Mount flush panelboards uniformly flush with wall finish.

3. Type the circuit directory to indicate installed circuit loads after balancing panelboard loads. Install the typed directory in the panelboard.

4. Install filler plates in unused spaces.

5. Wiring shall be neatly arranged in panelboard gutters.

6. For flush mount panelboards, stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

7. Set field-adjustable circuit breaker trip ranges.

3.2 IDENTIFICATION

1. Label each panelboard with engraved laminated-plastic or metal nameplates mounted with corrosion-resistant screws.

3.3 GROUNDING

1. Make equipment grounding connections for panelboards as indicated, i.a.w, NEC. Provide ground continuity to main electrical ground bus.

3.4 CONNECTIONS

1. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 TESTING

1. Make insulation-resistance tests of each panelboard bus, component, and connecting supply, feeder, and control circuits.

   Panelboard bus insulation tests shall consist of a 1000 volt □megger□ test, phase-to-phase and each phase-to-ground, each test shall be held for a minimum of one minute. Minimum acceptable insulation resistance shall be 500 megohms. Test results shall be corrected for temperature deviations from a 20 deg C standard. Provide test results to Owner and Engineer.

2. Make continuity tests of each circuit.

3. Measure steady-state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase load within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SCOPE

A. Work of this section includes specification of the following:
   1. Receptacles
   2. Switches
   3. Wall Plates

1.2 SUBMITTALS

A. Submit product data on the switches, receptacles, and wall plates to be used.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   1. Wiring Devices:
      a. Arrow
      b. Hubbell
      c. Leviton

2.2 RECEPTACLES

A. Receptacles shall be specification grade, duplex type, rated 20 amp, 120 volt service, unless otherwise noted. Receptacles shall be of the straight-blade design, NEMA configuration 5-20R. Receptacles of critical branch circuits shall be red.

   Hubbell 5351, Arrow-Hart 5351, or Leviton 5351: 125 V single convenience receptacle
   Hubbell 5352, Arrow-Hart 5352, or Leviton 5352: 125 V duplex convenienc receptacle

B. GFCI receptacles may be a feed-through, as needed to protect downstream receptacles on the same circuit. The duplex receptacle configuration shall be NEMA 5-20R. Weatherproof enclosures shall be provided as indicated on the drawings. Receptacle shall have an integral ground fault circuit interrupter.

   Hubbell GF5362, Arrow-Hart GF5342, or Leviton 6899: 125 V GFCI duplex receptacle.

C. All receptacles shall have plaster ears and grounding straps.

D. Unless otherwise noted by Owner and/or Architect, all receptacles shall be ivory in color with stainless steel cover plate. Each like receptacle on the project shall be of the same manufacturer and catalog number.

2.3 SWITCHES

A. All toggle switches will be specification grade, quiet type snap switches, rated for 20 amp, 120/277 volt service. At a minimum, side screw terminals shall be provided.

Hubbell HBL1221, Arrow-Hart 1991, Leviton 1221: Single pole toggle switch.
Hubbell HBL1222, Arrow-Hart 1992, Leviton 1222: Double pole toggle switch.
Hubbell HBL1223, Arrow-Hart 1993, Leviton 1223: Three-way toggle switch.
Hubbell HBL1224, Arrow-Hart 1994, Leviton 1224: Four-way toggle switch.

B. Unless otherwise noted by Owner and/or Architect, all switches shall be ivory in color with stainless steel cover plate. Each like switch on the project shall be of the same manufacturer and catalog number.

C. Fluorescent dimmer switches shall be compatible with dimmer ballast. Dimmer/Ballast combination shall be capable of consistent dimming down to no more than 5% of full brightness.

2.4 WALL PLATES

A. Single, gang, and combination type wall plates will be used as needed with each corresponding wiring device.

B. Each wall plate will be of a matching color to the wiring device attached. The plate will be secured with metal, matching color headed screws. Provide stainless steel plate unless otherwise noted by Owner and/or Architect.

C. Where weatherproof devices are noted, provide IN-USE type with clear cover. Equal to Pass & Seymour WIUC10-CL (for single gang applications)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all wiring devices and assemblies plumb and secure.

B. Install all wall plates when painting is complete.

C. Install all wiring devices by connection to screw terminals only. Connection to pressure terminals is not acceptable.

D. Use single plates of proper gang where more than one device occurs. Furnish blank plates on outlets for future use.

E. Unless otherwise noted, install wall devices vertically so that all devices of any given height will exactly align. Plates must be plumb and true with all four edges in continuous contact with the wall surface. Do not install devices until plastering or other wall covering work is complete.

F. Protect wiring devices during painting.

G. Wiring devices and other equipment shall, unless otherwise noted, be mounted with respect to indicated surfaces as follows: Note – verify all device mounting heights with Architect prior to

rough-in. Architectural/ADA requirements take precedence over that given here in the event of any discrepancies.

Receptacles:	18” AFF or 6" above working surface
Switches:	48" AFF or as otherwise required for ADA compliance
Telephone outlets:	same as receptacles
Computer network outlets:	same as receptacles
Thermostats:	48" AFF or as otherwise required for ADA compliance

All dimensions to centerline of the device box.

H. Wiring device grounding terminals shall be connected to the branch-circuit equipment grounding conductor.

I. GFCI receptacles will be functionally tested according to the manufacturers instructions. Record of the test shall be provided to the owner.

J. All emergency system receptacles shall be marked as to the panelboard and circuit number from which it originates.

K. Install all switches with the □OFF□ position down.

L. Install receptacles with grounding pole on top.

M. Coordinate exact location of all wiring devices with owner/architect prior to rough-in.

END OF SECTION 262726

SECTION 262816 - DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 SCOPE

A. This Section includes individually mounted switches used as an equipment disconnect.

1.2 RELATED DOCUMENTS

A. Referenced standards include:

NFPA 70 - National Electric Code
OSHA 1910 - Standards for General Industry
ANSI/UL 198C - High-Intensity Capacity Fuses: Current Limiting Types
ANSI/UL 198E - Class R Fuses

1.3 SUBMITTALS

A. Submit product data and shop drawings for the fused disconnect specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering disconnect switches and circuit breakers that may be incorporated into the Work include, but are not limited to, the following:

1. Molded Case Circuit Breaker:
   a. General Electric
   b. Square D
   c. Cutler-Hammer
   d. Siemens

2. Fusible Switches:
   a. General Electric
   b. Square D
   c. Cutler-Hammer
   d. Siemens

2.2 DISCONNECT SWITCHES

A. Fusible Switch Assemblies: Switch shall be heavy-duty, quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. The handle shall be lockable and interlocked with the cover in the CLOSED position to prevent opening with the switch in the ON position. Fuse clips shall be designed to accept Class R fuses.

B. Non-fusible Switch Assemblies: Switch shall be heavy-duty, quick-make, quick-break load interrupter enclosed knife switch with externally operable handle. The handle shall be lockable and interlocked with the cover in the CLOSED position to prevent opening with the switch in the ON position.

C. Operation of the handle shall disconnect all three poles.

2.3 FUSES

A. Fuses 600 amps and less shall be ANSI/UL 198E, Class RK1, RK5, size as indicated, dual element, current limiting, time delay.

B. Interrupting rating shall be 200,000 amps rms symmetrical.

C. Acceptable manufacturers: Bussman, Gould, Reliance Co.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The location indicated for each disconnect is approximate. Coordinate with the protected equipment's installer for the exact location. Install i.a.w. manufacturer's written instructions.

B. Install disconnect switches level and plumb.

C. Install all wiring between disconnect switches, and equipment so as to make a complete and functional installation.

D. Provide grounding i.a.w. NEC requirements.

E. Label the disconnect with the distribution panel name and circuit number feeding the switch. Labeling shall comply with the applicable requirements of Section 260500.

END OF SECTION 262816

SECTION 265119 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior solid-state luminaires that use LED technology.
2. Lighting fixture supports.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
    a. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

1.4 QUALITY ASSURANCE

A. Provide luminaires from a single manufacturer for each luminaire type.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.6 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Recessed Fixtures: Comply with NEMA LE 4.

C. CRI of minimum 80 CCT of 3500 K.

D. Rated L70 life of 50,000 hours for the entire fixture assembly, including driver.

E. Lamps dimmable from 100 percent to 1 percent of maximum light output.

F. Internal driver.

2.2 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:
1. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

D. Housings:

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.

b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI for all luminaires.

2.3 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.4 LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

B. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm)

C. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

D. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

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 luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls
2. Do not attach luminaires directly to gypsum board.

G. Suspended Luminaire Support:
1. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
2. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and [tubing or rod] [wire support] for suspension for each unit length of luminaire chassis, including one at each end.
3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

H. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 265119

SECTION 265619 – LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior solid state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire-mounted photoelectric relays.
3. Poles and accessories.

B. Related Sections include the following:

1. Division 26 Section "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.

1.2 DEFINITIONS

A. CRI: Color-rendering index.

B. CCT: Correlated color temperature

C. Luminaire: Complete lighting fixture, including ballast housing if provided.

D. Lumen: Measured output of lamp and luminaire, or both.

1.3 SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
2. Details of attaching luminaires and accessories.
3. Details of installation and construction.
4. Luminaire materials.
5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.
6. Photoelectric relays.
7. LED Driver, including energy-efficiency data.
8. LEDs, including life, output, and energy-efficiency data.
9. Materials, dimensions, and finishes of poles.
10. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.

B. Field quality-control test reports.

C. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: UL listed and labeled as defined in NFPA 70, Article 100, and marked for intended use.

B. Comply with IEEE C2, "National Electrical Safety Code."

C. Comply with NFPA 70.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
3. Warranty Period for Color Retention: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In Lighting Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:

2.2 LUMINAIRES, GENERAL REQUIREMENTS

A. Luminaires shall comply with UL 1598 and be UL listed and labeled for installation in wet locations.

B. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

N. CRI of minimum 70. CCT of 4000 K

O. L70 lamp life of 50,000hours.

P. Internal driver.

Q. Nominal Operating Voltage: 120 V ac

R. Lamp Rating: Lamp marked for outdoor use

S. Source Limitations: Obtain luminaires from single source from a single manufacturer.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Install lamps in each luminaire.

B. Fasten luminaire to indicated structural supports.

C. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources.

3.2 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

1. Verify operation of photoelectric controls.

END OF SECTION 265619

Pan American Engineers, LLC
2025

AVOYELLES PARISH POLICE JURY

AVOYELLES PARISH
RECREATION AND EDUCATION COMPLEX

ADDITIVE ALTERNATE NO. 2
TECHNICAL SPECIFICATIONS

AVOYELLES PARISH POLICE JURY

AVOYELLES PARISH
RECREATION AND EDUCATION COMPLEX

DIVISION 12 – FURNISHINGS

Section 12605 - ANGLE FRAME BLEACHERS

SECTION 12605

ANGLE FRAME BLEACHERS

PART 1 - GENERAL

1.1 System Description:

A. Design and fabrication of Frame-Type Bleacher

1.2 Quality Assurance:

A. Manufacturer: Southern Bleacher Company, P. O. Box One, Graham, Texas 76450; (800) 433-0912

B. Manufacturer Qualifications: Manufacturer must have ten years of experience in the manufacture of bleachers and grandstands; AISC certified; welders must be AWS certified.

C. Source Quality Control: Mill Test Certification.

1.3 Building Codes:

A. Owner to confirm the national code and the version which applies to project for inclusion in specifications.

1.4 Warranty:

A. Southern Bleacher warrants its Frame-Type Bleacher to be free from defect in material and workmanship in the course of manufacturing for a period of one (1) year beginning at Date of Substantial Completion for Projects installed by Southern Bleacher's certified installation subcontractors, or beginning at Date of Initial Delivery of Product for Projects installed by others. This warranty excludes defects resulting from abnormal use, accidental or intentional damage, or any occurrences beyond Southern Bleacher’s control.

PART 2 - PRODUCTS

2.1 Bleacher Manufacturer:

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide non-elevated, angle frame bleachers by Southern Bleacher Company, P. O. Box One, Graham, TX 76450; (800) 433-0912, or comparable products by one of the following:

1. Sturdisteel.

2. Other prior approved manufacturers.

2.2 Frame-Type Bleachers

A. Product Description:

1. Silver Edition 5 Row, Non-Elevated Frame-Type Bleachers (27' Length):
   a. Rise and Depth Dimensions: Vertical rise and horizontal depth per row: 8 inches x 24 inches. Seat is 17 inches above its respective tread.
   b. Framework: Prefabricated angle bleacher frames are spaced at 6-foot (max.) intervals and connected by crossbraces.
   c. Seats: Nominal 2 x 10 anodized aluminum plank with 2 x 10 anodized end caps.
   d. Treads: Two nominal 2 x 11 mill aluminum planks with 2 x 11 anodized end caps.
   e. Risers: Nominal 1 x 6-1/2 anodized aluminum riser plank beginning at Row 2; two 1 x 6-1/2 aluminum riser plank on top row.
   f. Guardrailing: Two lines of aluminum rail with chain link 42 inches above seat on both sides of bleacher and across back of bleacher.
   g. Aisle: Aisle to be provided with 34" high handrail and intermediate rail at approximately 22" above tread. Handrails with rounded ends are discontinuous to allow access to seating through a 24" wide space. Aluminum tread nosing of contrasting color on aisle steps.
2. Wheelchair Area:
   a. Wheelchair areas with adjacent companion seats to be provided as shown on the Drawings.

B. Materials/Finishes:

1. Framework:
   a. Galvanized Steel: Structural fabrication with ASTM-A529 steel. Shop connections are seal welded. After fabrication, all steel is hot-dipped galvanized to ASTM-A123 specification.

2. Extruded Aluminum:
   a. Seat Planks, Riser Planks, Step Risers: Extruded aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II, and a wall thickness of .094".
   b. Tread Planks: Extruded aluminum alloy 6063-T6, mill finish and wall thickness of .094".

3. Accessories:
   a. Channel End Caps: Aluminum alloy 6063-T6, clear anodized 204R1, AA-M10C22A31, Class II.
   b. Hardware:
      (1) Bolts, Nuts: Galvanized or plated.
      (2) Hold-Down Clip Assembly: Aluminum alloy 6061-T6.
   c. Guardrailing: Anodized aluminum rail 1-5/8" O.D. with galvanized chain link.
   d. Crossbraces: Extruded aluminum angle alloy 6061-T6, mill finish.
   e. Aisle Nose: Aluminum alloy, 6063-T6, black powder-coat finish.

D. Fabrication:

1. Design Load:
   a. Live Load: 100 psf gross horizontal projection
   b. Lateral Sway Load: 24 plf seat plank
   c. Perpendicular Sway Load: 10 plf seat plank
   d. Live Load of Seat and Tread Plank: 120 plf
   e. Guardrail: 100 plf vertical and 50 plf horizontal.

2. All connections made in shop to be shop welded.
   a. Manufactured by certified welders conforming to AWS Standards.

PART 3 - EXECUTION

3.1 Installation:

A. Install bleacher unit in accordance with manufacturer's installation procedures.

B. Anchor bleacher unit securely to flat, level concrete walk/slab.

- END OF SECTION -