SECTION 04 43 13
STONE MASONRY VENEER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Anchored cut stone veneer at exterior walls.
B. Metal anchors and accessories for anchored veneer.
C. Setting mortar.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work:
B. Section 04 20 00 - Unit Masonry: Through-wall flashing.
C. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.4 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2023.
B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
C. ASTM C97/C97M - Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone; 09.
D. ASTM C119 - Standard Terminology Relating to Dimension Stone; 2022.
E. ASTM C170 - Standard Test Method for Compressive Strength of Dimension Stone; 2017.
F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
G. ASTM C568/C568M - Standard Specification for Limestone Dimension Stone; 2022.
H. ASTM C1528/C1528M - Standard Guide for Selection of Dimension Stone; 2020.
I. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.
J. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

1.5 ADMINISTRATIVE REQUIREMENTS

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

1.6 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Provide details and calculations for stone anchorage system for each back-up wall substrate accounting for stud spacing and stone size and format. Details and calculations

shall be stamped by the Professional Structural Engineer.

C. Samples: Submit two stone samples illustrating minimum and maximum stone sizes, color range, texture, and markings.
D. Samples: Submit mortar color samples.
E. Stone Fabricator's Qualification Statement.

1.7 QUALITY ASSURANCE

A. All limestone to be sourced from a single quarry operation to ensure quality and consistency of materials.
B. Designer Qualifications: Perform design of stone anchorage system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in TEXAS.
C. Stone Fabricator Qualifications: Company specializing in fabricating cut stone with minimum ten years of documented experience.
D. Installer Qualifications: Company specializing in performing work of the type required by this section, with minimum five years of documented experience.

1.8 MOCK-UP

A. Construct stone wall mock-up, ____ feet (____ m) long by ____ feet (____ m) wide; include stone anchor accessories, corner condition, and typical control joint in mock-up.
B. See Section 01 40 00 - Quality Requirements for additional requirements.
C. Locate where directed.
D. Mock-up may not remain as part of the Work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect stone from discoloration during storage on site.
B. Provide ventilation to prevent condensation from forming on stone.

1.10 FIELD CONDITIONS

A. Cold Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.
B. Maintain materials and ambient air at minimum of 40 degrees F (5 degrees C) prior to, during, and for 48 hours after completion of work.

1.11 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.
B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.
C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Stone Quarriers/ Suppliers:

1. A.J. Brauer Stone: www.ajbrauer.com.
2. Apache Stone Quarry, LLC: https://apache-stone.com/.
3. Espinoza Stone, Inc.: espinozastone.com.
4. Mezger Enterprises Ltd: www.mezger.com/#sle.
5. Salado: www.saladousa.com.
6. Substitutions: See Section 01 60 00 - Product Requirements.

B. Stone Masonry Reinforcement and Accessories - Anchored Veneer:
1. Hohmann & Barnard, Inc: www.h-b.com/#sle.
2. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 STONE

A. Stone, General: See recommendations in ASTM C1528/C1528M.
B. Oolitic Limestone: Lueders Limestone; complying with ASTM C568/C568M Classification II - Medium Density.
1. Characteristics:
a. Water absorption: Maximum 9.0 percent, tested to ASTM C97/C97M.
b. Specific gravity: 2.067, tested to ASTM C97/C97M.
c. Density: Minimum 110 pounds per cubic foot (1762 kg/cu m), tested to ASTM C97/C97M.
d. Modulus of rupture: Minimum 400 PSI (2.76 MPa), tested to ASTM C99.
e. Compressive strength: Minimum 1800 PSI (12.41 MPa), tested to ASTM C170.
f. Flexural strength: Minimum 500 psi (3.49 MPa), tested to ASTM C880.
2. Color: Austin Creme.
3. Surface Finish: Rock-Faced and Honed; as described in ASTM C119 and ASTM C1528/C1528M.

2.3 MORTAR APPLICATIONS

A. At Contractor's option, mortar may be field-mixed from packaged dry materials or made from factory premixed dry materials with addition of water only.
B. Mortar Color: Natural gray unless otherwise indicated.
C. Setting Bed Mortars: Setting bed used to adhere stone veneer units to scratch coat mortar or to bondable concrete or concrete masonry.
1. Site-Mixed: ASTM C270, Type S, using the Proportion Method as specified in Section 04 05 11.
2. Prepackaged/Preblended: ASTM C1714/C1714M, Type S.
D. Pointing Mortars: Pointing or grouting mortars used to fill the joints between individual stone veneer units once the setting bed mortar has sufficiently cured.
1. Site-Mixed: ASTM C270, Type N or Type S, using the Proportion Method as specified in Section 04 05 11.
2. Prepackaged/Preblended: ASTM C1714/C1714M, Type N or Type S.

2.4 MORTAR MIXES

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
1. Type: Type S.
2. Color: Mineral pigments added as required to produce approved color sample.
B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

C. Mixing: Use mechanical batch mixer and comply with referenced standards.

2.5 ACCESSORIES - ANCHORED VENEER

A. Wall Ties: Provide engineered veneer anchor system, based on stone module size and stud spacing. Anchor system shall be stainless steel complying with ASTM A580/A580M or ASTM A666.
B. Other Anchors in Direct Contact with Stone: ASTM A666 Type 304, stainless steel, of sizes and configurations required for support of stone and applicable superimposed loads.
C. Flashings: See Section 04 20 00.
D. Back Coating:
   1. Bituminous.
E. Cleaning Solution: Type that will not harm stone, joint materials, or adjacent surfaces.

2.6 STONE FABRICATION - ANCHORED VENEER

A. Nominal Thickness: 4 inch (100 mm).
B. Nominal Face Size: Varying sizes as shown on the Drawings.
C. Pattern and Coursing: Ashlar pattern as shown on the Drawings.
D. Fabricate for 3/8 inch (10 mm) beds and joints.
E. Bed and Joint Surfaces:
   1. Cut or sawn full square for full thickness of unit.
F. Backs: Rough or split.
G. Exposed Ends: Chopped.
H. Slope exposed top surfaces of stone and horizontal sill surfaces for shedding water.
I. Cut drip slot in bottom surface of work projecting more than 1/2 inch (13 mm) over curtain wall or storefront frame. Size slot not less than 3/8 inch (10 mm) wide and 1/4 inch (6 mm) deep for full width of projection.

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION - ANCHORED VENEER

A. Establish lines, levels, and coursing. Protect from disturbance.
B. Clean stone prior to installation. Do not use wire brushes or implements that mark or damage exposed surfaces.
C. Coat surfaces below grade, or in contact with mortar intended to fill the cavity, with back coating material. Allow coating to cure.

3.3 INSTALLATION - ANCHORED VENEER

A. Install flashings of longest practical length and seal watertight to back-up. Lap end joints minimum 6 inches (150 mm) and seal watertight.
B. Size stone units to fit opening dimensions and perimeter conditions.
C. Wet absorptive stone in preparation for placement to minimize moisture suction from mortar.
D. Arrange stone pattern to provide color uniformity and minimize visual variations , and provide a uniform blend of stone unit sizes.
E. Arrange stone coursing in pattern as reviewed in shop drawings and with consistent joint width.
F. Set stone in full mortar setting bed to fully support stone over bearing surface. Use setting buttons or shims to maintain correct joint width.

3.4 INSTALLATION - MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
B. Extend metal flashings through exterior face of stone and terminate in an angled drip with hemmed edge.
C. Terminate flashing up 16 inches (406 mm) minimum on vertical surface of backing:
    1. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer's directions.
    2. Anchor vertical leg of flashing into backing with a termination bar and sealant.
D. Lap end joints of flashings at least 8 inches (200 mm), minimum, and seal watertight with flashing sealant/adhesive.

3.5 CONTROL AND EXPANSION JOINTS

A. Form joints as detailed on drawings.
B. Locate control joints where indicated on drawings and with a maximum joint spacing not to exceed 20 feet.

3.6 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.
B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
C. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet (6 mm in 3 m) and 1/2 inch in 20 feet (13 mm in 6 m) or more.
D. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
E. Maximum Variation from Level Coursing: 1/8 inch in 3 feet (3 mm in 1 m) and 1/4 inch in 10 feet (6 mm in 3 m); 1/2 inch in 30 feet (13 mm in 9 m).
F. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet (3 mm in 1 m).

3.7 CLEANING

A. Remove excess mortar as work progresses, and upon completion of work.
B. Replace defective mortar. Match adjacent work.
C. Clean soiled surfaces with cleaning solution.
D. Use non-metallic tools in cleaning operations.

3.8 PROTECTION

A. During temporary storage on site, at the end of working day, and during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

END OF SECTION

SECTION 04 72 00
CAST STONE MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architectural cast stone. To match stone masonry texture, sheen and color.
B. Units required are:
   1. Exterior wall units, including lintels and sills.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENT

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work:
B. Section 04 43 13 - Stone Masonry Veneer: Installation of cast stone in conjunction with masonry.
C. Section 07 92 00 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.4 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.
D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
E. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
F. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
G. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
H. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
I. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2021.
J. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
K. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Test results of cast stone components made previously by the manufacturer.
C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
D. Verification Samples: Pieces of actual cast stone components not less than 6 inches (152 mm) square, illustrating range of color and texture to be anticipated in components furnished for the project.
E. Source Quality Control Test Reports.
F. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
   2. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

1.7 MOCK-UPs

A. Provide full size cast stone components for installation in mock-up of exterior wall.
B. See Section 01 40 00 - Quality Requirements for additional requirements.
   1. Approved mock-up will become standard for appearance and workmanship.
   2. Remove mock-up not incorporated into the work and dispose of debris.

1.8 DELIVERY, STORAGE, AND HANDLING

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

1.9 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.
B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.

C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Architectural Cast Stone:
1. Any current producer member of the Architectural Precast Association.
2. Any current producer member of the Cast Stone Institute.
3. Advanced Architectural Stone (AAS): www.advancedarchitecturalstone.com
4. Continental Cast Stone Manufacturing, Inc.: www.continentalcaststone.com.
5. Stromberg Architectural Products Inc: www.strombergarchitectural.com
6. Substitutions: See Section 01 25 00 and Section 01 60 00. Refer also to the article in PART 1 above titled “AVAILABLE MANUFACTURERS”.

2.2 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C1364.
1. Note: Dry tamped cast stone is not acceptable. No exceptions.
2. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
3. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
4. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
5. Color: Selected by Architect from manufacturer's full range.
6. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).
2. Unless otherwise indicated on drawings, provide:
a. Wash or slope of 1:12 on exterior horizontal surfaces.
b. Drips on projecting components, wherever possible.
c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.
1. Pieces More than 24 inches (610 mm) in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.3 MATERIALS

A. Portland Cement: ASTM C150/C150M.
1. For Units: Type I, white or gray as required to match Architect 's sample.
2. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.
E. Admixtures: ASTM C494/C494M.

F. Water: Potable.
G. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed bars, galvanized.
   1. Galvanized in accordance with ASTM A767/A767M, Class I.
H. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized.
I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
J. Mortar: Portland cement-lime, ASTM C270 Type N ; do not use masonry cement.
K. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.4 SOURCE QUALITY CONTROL

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

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.
B. Do not field cut or alter stone components without approval from Architect.
C. Do not use pry bars or other equipment that could damage stone.
D. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 43 13.
E. Mechanically anchor cast stone units indicated; set remainder in mortar.
F. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.3 TOLERANCES

A. Joints: Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.
   1. Leave the following joints open for sealant:
      a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
      b. Joints in projecting units.
      c. Joints between rigidly anchored units, including soffits, panels, and column covers.
      d. Joints below lugged sills and stair treads.
      e. Joints below ledge and relieving angles.

f. Joints labeled "expansion joint".

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

3.4 REPAIR

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet (6 m).
1. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
2. Repair methods and results subject to Architect 's approval.

3.5 CLEANING

A. Keep cast stone components clean as work progresses.

3.6 PROTECTION

A. Protect completed work from damage.
B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

SECTION 07 41 13
METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal roof panel system of preformed steel panels.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work.
B. Section 07 21 16 - Pre-Engineered Building Blanket Insulation.
C. Section 07 42 13 - Metal Wall Panels: Preformed wall panels.
D. Section 07 92 00 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.
E. Section 13 34 19 - Metal Building Systems.

1.4 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2023.
D. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.
E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
F. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2017).
G. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2023.
H. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.

3. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.
   2. Include structural analysis signed and sealed by qualified structural engineer, indicating compliance of roofing system to specified loading conditions.

D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches (305 mm) square, representing actual roofing metal, thickness, profile, color, and texture.
   1. Include typical panel joint in sample.
   2. Include typical fastening detail.

F. Buy American Certification: Upon delivery of product, provide notarized original of TxDOT Form 1818 (aka Form D-9-USA-1) with the proper attachments for verification of compliance.

G. Test Reports: Indicate compliance of metal roofing system to specified requirements.

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

1.6 QUALITY ASSURANCE

A. Buy America: Manufacturer shall provide products complying with the latest provisions of Buy America as listed at 23 CFR 635.410. For steel and iron materials, all manufacturing processes, including application of a coating, must occur in the United States.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.8 FIELD CONDITIONS

A. Do not install metal roof panels, underlayment or sealants when surface, ambient air, or wind chill temperatures are below 45 degrees F (7 degrees C).

1.9 WARRANTY

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

B. Finish Warranty: Provide 5-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

C. Special Warranty: Provide 2-year warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

1.10 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.

B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.
C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Structural Metal Roof Panel Manufacturers:
   1. Basis of Design: Berridge Manufacturing Company; Double-Lock Zee-Lock Panel: www.berridge.com/#sle.
B. Other Acceptable Manufacturers; Metal Roof Panels:
   1. ATAS International, Inc: www.atas.com/#sle.
   2. MBCI, a Cornerstone Building Brands Company: www.mbci.com/#sle.
   3. McElroy Metal: www.mcelroy.com
C. Substitutions: See Section 01 25 00 and Section 01 60 00. Refer also to the article in PART 1 above titled “AVAILABLE MANUFACTURERS”.

2.2 PERFORMANCE REQUIREMENTS

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
   1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
      a. Dead and Live Loads: As indicated on the Structural Drawings.
   2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
   3. Wind Uplift: Class 90 wind uplift resistance of UL 580.
   4. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F (56 degrees C).

2.3 STRUCTURAL METAL ROOF PANELS

A. General: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
B. Structural Metal Panels: Factory-formed panels with factory-applied finish.
   1. Steel Panels:
      a. Aluminum-zinc alloy-coated SS (structural steel) sheet complying with ASTM A792/A792M; minimum AZ50 (AZM150) coating.
      b. Steel Thickness: Minimum 22 gauge, 0.03 inch (0.76 mm).
   2. Profile: Standing seam, with minimum 2-inch (51 mm) seam height; concealed fastener system for field seaming with special tool.
   3. Length: Maximum possible length to minimize lapped joints.
   4. Width: Maximum panel coverage of 16 inches (406 mm).

5. Basis of Design: Berridge Manufacturing Company; Double-Lock Zee-Lock Panel: www.berridge.com/#sle.

2.4 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.5 FABRICATION

A. Panels: Provide factory or field fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.6 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss as indicated on drawings.

2.7 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Sealants:

1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

D. Underlayment: Self-adhering polymer modified asphalt sheet complying with ASTM D1970/D1970M, with strippable release film and top surface of woven polypropylene sheet.

1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
2. Sheet Thickness: 22 mils, 0.022 inch (0.55 mm), minimum.
3. Water Vapor Permeance: 0.1 perm (5.72 ng/Pa s sq m), maximum, when tested in accordance with ASTM E96/E96M using Desiccant Method (Method A).
4. Products:
   a. Henry Company; Blueskin PE200HT: www.henry.com/#sle.
   b. Carlisle WIP Products; WIP 300HT: www.carlislewipproducts.com
   c. GCP; Grace Ice & Water Shield HT: https://gcpat.com.
   d. Owens Corning; TITANIUM PSU-30: www.owenscorning.com.
   e. Substitutions: See Section 01 6000 - Product Requirements.
      1) See article in PART 1 above entitled "Available Manufacturers".

PART 3 EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure that completed roof will be free of leaks.
B. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.
C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.
D. At locations where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.3 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.
    1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
    2. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.
B. Accessories: Install necessary components that are required for complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
C. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.
    1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by panel manufacturer.

3.4 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
B. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.5 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 07 42 13
METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured metal panels for exterior wall panels, with related flashings and accessory components.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work.
B. Section 05 40 00 - Cold-Formed Metal Framing: Wall panel substrate.
C. Section 07 21 00 - Thermal Insulation.
D. Section 07 92 00 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.
E. Section 09 54 23 - Linear Metal Ceilings: Metal soffit panel, Type **SP1**.
F. Section 13 34 19 - Metal Building Systems .

1.4 REFERENCE STANDARDS – Compliance with these standards is a requirement of the Work

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
B. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2023.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
   1. Physical characteristics of components shown on shop drawings.
   2. Storage and handling requirements and recommendations.
   3. Installation instructions and recommendations.
C. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.
D. Samples: Submit two samples of wall panel and soffit panel, 12 inches (305 mm) long by actual panel width illustrating finish color, sheen, and texture.
E. Manufacturer's qualification statement.
F. Installer's qualification statement.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum three years of documented experience and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
B. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
C. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
D. Prevent contact with materials that may cause discoloration or staining of products.

1.8 FIELD CONDITIONS

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

1.9 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Finish Warranty: Provide 15-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.
C. Special Warranty: Provide 2-year warranty covering water tightness and integrity of seals of metal wall panels. Complete forms in Owner's name and register with warrantor.

1.10 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.
B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.
C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal Wall Panels - Exposed Fasteners:
   1. ATAS International, Inc: www.atas.com/#sle.
   2. Berridge Manufacturing Company: www.berridge.com/#sle.
   3. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
   4. Substitutions: See Section 01 25 00 and Section 01 60 00. Refer also to the article in PART 1 above titled “AVAILABLE MANUFACTURERS”.
B. Metal Wall Panels - Concealed Fasteners:

1. ATAS International, Inc: www.atas.com/#sle.
2. Berridge Manufacturing Company: www.berridge.com/#sle.
3. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
4. Substitutions: See Section 01 25 00 and Section 01 60 00. Refer also to the article in PART 1 above titled “AVAILABLE MANUFACTURERS”.

2.2 METAL WALL PANEL SYSTEM

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
   2. Design Pressure: In accordance with applicable codes.
   3. Maximum Allowable Deflection of Panel: L/180 for length(L) of span.
   4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
   5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
   6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
   7. Corners: Factory-fabricated in one continuous piece with minimum 2-inch (51 mm) returns.

B. Exterior Wall Panels:
   1. Fasteners: Concealed.
   2. Profile: Vertical.
   3. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
   4. Material: Precoated steel sheet, 22 gauge, 0.0299 inch (0.76 mm) minimum thickness.
   5. Panel Coverage: 12 inches (305 mm).
   6. Color: Premium Wood Finish as indicated on drawings.
   7. Basis of Design Product: Berridge Manufacturing Company; FW-12 Panel: www.berridge.com.

C. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

D. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

E. Anchors: Galvanized steel.

2.3 MATERIALS

A. Precoated Steel Sheet: Aluminum-zinc alloy-coated steel sheet, ASTM A792/A792M, Commercial Steel (CS)) or Forming Steel (FS), with AZ50/AZM150 coating; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

B. Select materials with surface flatness, smoothness, and lack of surface blemishes where exposed to view in finished system.

2.4 FINISHES

A. Applications:
   1. Exposed Surface Finish at "Painted" Panels: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over manufacturer's recommended primer.

2. Exposed Surface Finish at "Wood Look" Panels: Manufacturer's powder coating system.
3. Panel Backside Finish: Panel manufacturer's standard siliconized polyester wash coat.

B. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss as indicated on drawings.

C. Powder Coating System for Premium Wood Finishes: Polyurethane powder coat with ink based wood grain patterns sublimated into the base powder effectively tattooing the powder. Combined effect shall create all the aesthetic aspects of real wood.

2.5 ACCESSORIES

A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
B. Concealed Sealants: Non-curing butyl sealant or tape sealant, see Section 07 92 00
C. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
E. Field Touch-up Paint: As recommended by panel manufacturer.
F. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that building framing members are ready to receive panels.
B. Verify air barrier, see Section 07 27 00, has been installed over wall panel substrate; see Section 05 40 00.

3.2 PREPARATION

A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane, and spaced at intervals indicated.

3.3 INSTALLATION

A. Install panels on walls and soffits in accordance with manufacturer's instructions.
B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint; allow to dry prior to wall panel installation.
C. Fasten panels to structural supports; aligned, level, and plumb.
D. Locate joints over supports.
E. Lap panel ends 2 inches (51 mm), minimum.
F. Provide expansion and control joints where indicated.
G. Use concealed fasteners unless otherwise indicated by Architect.
H. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.4 TOLERANCES

A. Offset From True Alignment Between Adjacent Members Abutting or In Line: 1/16 inch (1.6 mm), maximum.
B. Variation from Plane or Location As Indicated on Drawings: 1/4 inch (6.4 mm), maximum.

3.5 CLEANING

A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
B. Remove site cuttings from finish surfaces.
C. Remove protective material from wall panel surfaces.
D. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

3.6 PROTECTION

A. Protect metal wall panels until completion of project.
B. Touch-up, repair, or replace damaged wall panels or accessories before Date of Substantial Completion.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.
B. Fire-rated hollow metal doors and frames.
C. Thermally insulated hollow metal doors with frames.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work:
B. Section 05 50 00 - Metal Fabrications: Additional structural support at each jamb at all door openings greater than a nominal three (3) foot wide door.
C. Section 08 71 00 - Door Hardware.
D. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
E. Section 09 91 13 - Exterior Painting: Field painting.
F. Section 09 91 23 - Interior Painting: Field painting.

1.4 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.
B. ASCE: American Society of Civil Engineers.
C. HMMA: Hollow Metal Manufacturers Association.
D. NFPA: National Fire Protection Association.
E. SDI: Steel Door Institute.
F. UL: Underwriters Laboratories.

1.5 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.
C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.
E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
H. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.
I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
J. ITS (DIR) - Directory of Listed Products; Current Edition.
K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
M. NAAMM HMMA 840 - Guide Specifications for Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2024.
N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.
O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2025.
P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.
Q. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
R. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.
S. TAS - 2012 Texas Accessibility Standards (TAS); 2012.
T. UL (DIR) - Online Certifications Directory; Current Edition.
U. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with requirements for hardware, access control, electrical, power supplies and low voltage in Contract Documents.
B. Pre-installation Meeting: Convene one week before starting work of this section. Contractor is to invite Owner/ Operator, Architect, Manufacturer Representative and related sub-contractors.
    1. Review preparation, installation procedures and accessories required for a complete assembly installation, including items: not limited to life safety fire rating requirements, security, access control, glazing, keying, owner furnished items (if any), conduit and wiring related issues.

1.7 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
C. Shop Drawings: Provide project specific details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements. Show interface of floor anchorage and opening threshold.
    1. *Provide details for additional structural support at each jamb at all door openings and cased openings greater than a nominal three (3) foot wide door.*
D. Samples: Submit two samples of metal, 2 by 2 inches (51 by 51 mm) in size, showing factory finishes, colors, and surface texture.
E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: https://steeldoor.org/sdi-certified/#sle.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
C. Maintain at project site copies of reference standards relating to installation of products specified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

1.10 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.
B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.
C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide steel doors and steel frames from an SDI Certified manufacturer.
B. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com.
   3. Fleming Door Products, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   4. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
   5. Steelcraft, an Allegion brand: www.allegion.com/#sle.
   6. Substitutions: See Section 01 60 00 - Product Requirements. Refer also to the article in PART 1 above titled “AVAILABLE MANUFACTURERS”.

2.2 PERFORMANCE REQUIREMENTS

A. When metal and non-metal Fire Rated doors are provided for existing frames, verify that frame and all hardware have an equivalent fire rating. Similarly verify compliance with requirements for all opening elements at smoke barrier partitions.
B. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.

2. Accessibility: Comply with TAS, ICC A117.1 and ADA Standards.
3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
4. Door Edge Profile: Manufacturers standard for application indicated.
5. Typical Door Face Sheets: Flush.
6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.3 HOLLOW METAL DOORS

A. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 3 - Extra Heavy-duty.
b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Opaque Door Assembly U-Value: 0.37 maximum, including frame, when tested in accordance with NFRC 100.
4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
5. Weatherstripping: Refer to Section 08 71 00.
6. Door Finish: Factory primed and field finished.

B. Interior Doors, Non-Fire-Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 3 - Extra Heavy-duty.
b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.

C. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 3 - Extra Heavy-duty.
b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model 1 - Full Flush.
d. Door Face Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").

a. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
b. Provide units listed and labeled by UL (DIR) or ITS (DIR).
c. Attach fire rating label to each fire rated unit.

3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.

2.4 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
B. Frame Finish: Factory primed and field finished.
C. Exterior Door Frames: full profile, thermally broken, as required to comply with thermal performance requirements found in energy performance criteria, located on code data sheet..
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating, minimum.
   2. Frame Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
   3. Weatherstripping: Separate, see Section 08 71 00.
D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Frame Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
E. Door Frames, Fire-Rated: Full profile/continuously welded type.
   1. Fire Rating: Same as door, labeled.
   2. Frame Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
F. Exterior Frames in Metal-Framed Walls: Provide an extended return and back bend on exterior side of frame for air barrier attachment. Refer to the drawings for dimensions.
G. Frames Wider than 36 inches (915 mm): Reinforce with steel channel fitted tightly into frame head, flush with top. Anchor at floor and at structure above, making account for expansion and contraction.

2.5 FRAME ANCHORS

A. Jamb Anchors:
   1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
   2. Quantity: Minimum of three anchors per jamb. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
B. Floor (Base) Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
   1. For wall conditions that do not allow for the use of a floor anchor, an additional jamb anchor shall be provided.

2.6 VIEW WINDOW FRAMES

A. View Window Frames and Tempered, Laminated, Leaded, Safety, and Fire Rated glazing as required at each location: Provide frames to match door frames. Refer also to the ACCESSORIES article below for additional glazing information at the "Door Window Frames" paragraph.
B. Refer to the Window Types schedule in the drawings.

2.7 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.8 ACCESSORIES

A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
   1. Size: As indicated on drawings.
   2. Frame Material: 16 gauge, 0.053 inch (1.3 mm), or thickness as required for fire and/or smoke rating, galvanized steel, , with finish to match door.
   3. Glazing: 1/4 inch (6.4 mm) thick, tempered glass, in compliance with requirements of authorities having jurisdiction.
      a. Tint: Clear.

B. Window location above finished floor (AFF) shall comply with TAS and ADA Standards for accessibility requirements.

C. Glazing: As specified in Section 08 80 00, factory installed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.2 PREPARATION

A. Provide additional structural support at each jamb at all door openings greater than a nominal three (3) foot wide door.

B. Vision glass fixed windows at doors. Important TAS & ADA Compliance Note:
   1. Critical dimension for final in-place location of the bottom of the GLASS is a maximum 43 inches (1090 mm) above the finished floor (AFF), not from the bottom of the door and not to the frame of the window. The dimension is from Finished Floor to the bottom edge of the visible glass. No exceptions.

3.3 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Install door hardware as specified in Section 08 71 00.

E. *Provide additional structural support at each jamb at all door openings and cased openings greater than a nominal three (3) foot wide door.*

F. Comply with glazing installation requirements of Section 08 80 00.

G. Coordinate installation of electrical connections to electrical hardware items.

H. Touch up damaged factory finishes.

3.4 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

C. Comply with TAS and ADA Standards for accessibility requirements.

3.5 ADJUSTING

A. Adjust for smooth and balanced door movement.

3.6 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Exterior coiling doors.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work:
B. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
C. Section 08 71 00 - Door Hardware: Cylinder cores and keys.

1.4 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Provide general construction, electrical equipment, and component connections and details.
C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
D. Samples: Submit two slats, 6 inch (150 mm) in size illustrating shape, color and finish texture.
E. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
F. Manufacturer's qualification statement.
G. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.
H. Specimen warranty.

1.6 QUALITY ASSURANCE

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

1.7 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Manufacturer Warranty: Provide 2-year manufacturer warranty for roller shaft counterbalance assembly. Complete forms in Owner's name and register with manufacturer.
C. Provide three year manufacturer warranty for electric motor.

1.8 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.
B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.
C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Exterior Overhead Coiling Metal Doors:
1. Basis of Design: The Cookson Company; ESD20: www.cooksondoor.com/#sle.
2. Cornell Iron Works, Inc: www.cornelliron.com/#sle.
3. Overhead Door Corporation: www.overheaddoor.com/#sle.
4. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.
5. Substitutions: See Section 01 60 00 - Product Requirements. Refer also to the article in PART 1 above titled “AVAILABLE MANUFACTURERS”.

2.2 COILING DOORS

A. Exterior Coiling Doors, Type **OH**: Steel slat curtain.
1. Capable of withstanding positive and negative wind loads of 20 psf (940 Pa) without undue deflection or damage to components.
2. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 8.0 (RSI-value of 1.4).
3. Nominal Slat Size: 3 inches (75 mm) wide x required length.
4. Finish: Factory powder coat, custom color.
5. Guide, Angles: Galvanized steel.
6. Hood Enclosure: As indicated on drawings; galvanized steel.
7. Manual hand chain lift operation.
8. Mounting: As indicated on drawings.

2.3 MATERIALS

A. Metal Curtain Construction: Interlocking slats.
1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.

3. Steel Slats: Minimum thickness, 20 gauge, 0.04 inch (1.01 mm); ASTM A653/A653M galvanized steel sheet.

B. Guide Construction: Continuous, of profile to retain door in place, mounting brackets of same metal.

C. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
1. Hot-dip galvanized in compliance with ASTM A123/A123M.
2. Powder coated.

D. Hood Enclosure and Trim: Form sheet metal hood to entirely enclose coiled curtain and operating mechanisms. Internally reinforced to maintain rigidity and shape. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face.
1. Minimum thickness; ___ gauge, ___ inch (___ mm).
2. Painted finish to match door interior..

E. Lock Hardware:
1. Cylindrical Locking Mechanism: Latchset lock cylinder, specified in Section 08 71 00.
2. Latching Mechanism: Inside mounted, adjustable keeper, spring activated latch bar feature to keep in locked or retracted position.
3. Manual Chain Lift: Provide padlockable chain keeper on guide.

F. Manual Chain Hoist: Provide chain hoist operator with endless steel chain, chain pocket wheel and guard, geared reduction unit, and chain keeper secured to guide. Chain hoist to include integral brake mechanism that will immediately stop upward or downward travel and maintain the door in a stationary position when the hand chain is released by the user.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.
B. Verify that electrical services have been installed and are accessible.
C. Verify that door opening is plumb, header is level, and dimensions are correct.
D. Notify Architect of any unacceptable conditions or varying dimensions.
E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.2 INSTALLATION

A. Install units 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. Install enclosure and perimeter trim.

3.3 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.
B. Maximum Variation From Plumb: 1/16 inch (1.6 mm).
C. Maximum Variation From Level: 1/16 inch (1.6 mm).
D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet (3.2 mm per 3 m) straight edge.

3.4 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean installed components.
B. Remove labels and visible markings.

END OF SECTION

SECTION 08 43 13
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.
B. Aluminum doors and frames.
C. Weatherstripping.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work:
B. Section 07 27 26 - Fluid-Applied Membrane Air Barrier: Sealing framing to water-resistive barrier installed on adjacent construction.
C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.
D. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
E. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.4 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.
B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
F. 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.
G. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.6 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required. Include project specific details which show the connection/continuity of the storefront assembly with the adjacent systems forming part of the air, water, and thermal control layers of the building.
   1. Use the same designations indicated on the drawings and coordinate with the door schedule, hardware schedule, and glazing schedule.
D. Samples: Submit two samples 10 x 10 inches (____x____ mm) in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
F. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
G. Manufacturer's qualification statement.
H. Installer's qualification statement.
I. Specimen warranty.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience and approved by manufacturer.

1.8 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Construct storefront mock-up as part of the exterior assembly mock-up.
C. Locate where directed.
D. Mock-up may not remain as part of work.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.
B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
C. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

1.12 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.

B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.

C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Aluminum-Framed Storefronts:

1. Kawneer North America: www.kawneer.com/#sle.
2. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com/#sle.
3. YKK AP America, Inc: www.ykkap.com/commercial/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements. Refer also to the article in PART 1 titled “AVAILABLE MANUFACTURERS”.

2.2 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

A. Center-Set Style, Thermally-Broken:

1. Basis of Design: Kawneer North America; Series TriFab VersaGlaze 451T.
2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep (51 mm wide by 114 mm deep).

2.3 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING AT INTERIOR

A. Center-Set Style:

1. Basis of Design: Kawneer TriFab VG 450.
2. Vertical Mullion Dimensions: 1-3/4 inches wide by 4-1/2 inches deep (44 mm wide by 114 mm deep).

2.4 BASIS OF DESIGN -- SWINGING DOORS

A. Medium Stile, Monolithic Glazing:

1. Basis of Design: Kawneer 350 Swing Door, Medium stile.
2. 3-1/2 inch (89 mm) vertical face dimension.
3. Thickness: 1-3/4 inches (43 mm).

B. Medium Stile, Insulating Glazing, Thermally-Broken:

1. Basis of Design: Kawneer Insulclad 360 Swing Door, Medium stile.
2. 4-1/16 inch (103.2 mm) vertical face dimension.
3. Thickness: 2-1/4 inches (57.1 mm).

2.5 ALUMINUM-FRAMED STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.

1. Glazing Rabbet: For 1 inch (25 mm) insulating glazing.

2. Finish: Superior performing organic coatings.
   a. Factory finish all surfaces that will be exposed in completed assemblies.
   b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf (75 Pa) pressure difference.

2.6 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Glazing Stops: Flush.

2.7 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).
B. Fasteners: Stainless steel.
C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.8 FINISHES

A. Superior Performing Organic Coatings System: Manufacturer's standard multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch (0.030 mm).

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.
B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.2 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Provide alignment attachments and shims to permanently fasten system to building structure.
D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
E. Provide thermal isolation where components penetrate or disrupt building insulation.
F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
I. Set thresholds in bed of sealant and secure.
J. Install hardware using templates provided.
    1. See Section 08 71 00 for hardware installation requirements.
K. Install glass using glazing method required to achieve performance criteria; see Section 08 80 00.
L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.
B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

3.4 FIELD QUALITY CONTROL

A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.
B. See Section 01 40 00 - Quality Requirements for general testing and inspection requirements.
C. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
    1. Perform a minimum of two tests in each designated area as indicated on drawings.
    2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
D. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.5 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.
B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.

3.6 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 45 23
FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fiberglass reinforced plastic (FRP) sandwich panel system and accessories.
   1. Wall panel system.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work:
B. Section 07 27 26 - Fluid-Applied Membrane Air Barrier: Sealing perimeter frame to weather barrier installed on adjacent construction.
C. Section 07 92 00 - Joint Sealants: Sealing joints between perimeter frame and adjacent construction.

1.4 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.
B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
F. ASTM C297/C297M - Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions; 2016.
G. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.
H. ASTM D1002 - Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal); 2010 (Reapproved 2019).
I. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials; 2012 (Reapproved 2020).
J. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2023.

K. ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 2022.
L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.
M. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
N. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).
O. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).
P. ASTM E972 - Standard Test Method for Solar Photometric Transmittance of Sheet Materials Using Sunlight; 1996 (Reapproved 2021).
Q. ASTM E2707 - Standard Test Method for Determining Fire Penetration of Exterior Wall Assemblies Using a Direct Flame Impingement Exposure; 2015.
R. ICC-ES AC05 - Acceptance Criteria for Sandwich Panel Adhesives; 2009, with Editorial Revision (2020).
S. ICC-ES AC177 - Acceptance Criteria for Translucent Fiberglass Reinforced Plastic (FRP) Faced Panel Wall, Roof and Skylight Systems; 2014, with Editorial Revision (2018).
T. ISO/IEC 17065 - Conformity Assessment - Requirements for Bodies Certifying Products, Processes and Services; 2012.
U. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
V. NFRC 201 - Procedure for Interim Standard Test Method for Measuring the Solar Heat Gain Coefficient of Fenestration Systems Using Calorimetry Hot Box Methods; Current Edition.
W. NFRC 202 - Procedure for Determining Translucent Fenestration Product Visible Transmittance at Normal Incidence; Current Edition.
X. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
Y. UL 972 - Standard for Burglary Resisting Glazing Material; Current Edition, Including All Revisions.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data: Include construction details, material descriptions, profiles, span analysis data, and component finishes.
C. Shop Drawings: Include plans, elevations, and details.
D. Samples:
   1. For each exposed finish required, matching thickness and material indicated for this work with size of 7 by 12 inches (178 by 305 mm).
E. Test Reports: Include the following product test reports from qualified independent testing agency indicating that each type and class of panel system complies with performance requirements indicated, based on comprehensive testing of these products. Reports completed for previous projects are also acceptable when for current manufacturer and relating to products used on this project.
   1. ICC-ES Acceptance Criteria; ICC-ES AC177.
   2. Flame Spread and Smoke Developed Index; UL 723.
   3. Rate and/or Extent and Time of Burning; ASTM D635.
   4. Color Difference; ASTM D2244.

5. Burglary Resisting Glazing; UL 972.
6. Bond Tensile Strength of Sandwich Construction; ASTM C297/C297M.
7. Bond Shear Strength; ASTM D1002.
8. Panel Beam Bending Strength; ASTM E72.
9. Panel U-factor; NFRC 100.
10. Visible Light Transmittance (VLT), Translucent; NFRC 202 or ASTM E972.
11. Solar Heat Gain Coefficient (SHGC); NFRC 201 calculation.
12. Condensation Resistance Factor; AAMA 1503.
13. Air Leakage; ASTM E283/E283M.
14. Structural Performance; ASTM E330/E330M.
15. Water Penetration; ASTM E331.
16. Fire Penetration of Exterior Wall Assemblies; ASTM E2707.
17. Daylight Modeling Report.

F. Installation Instructions: Special installation requirements.
G. Manufacturer's qualification statement.
H. Installer's qualification statement.
I. Warranty Documentation: Manufacturer's sample warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufactured material and products by company continuously and regularly employed in manufacture of specified materials for period of at least ten consecutive years, and with documented evidence of those materials being satisfactorily used on at least six projects of similar size, scope, and location, and at least three of these projects having been in successful use for ten years or longer.
   1. Listed panel system by certification agency complying with ISO/IEC 17065, that requires quality control inspections and fire, structural, and water infiltration testing of sandwich panel systems by accredited testing agency.
   2. Conduct quality control inspections at least once each year that include manufacturing facilities, sandwich panel components, and production sandwich panels to ensure product complies with ICC-ES AC177 requirements.

B. Installer Qualifications: Experienced installer that has been installing Kalwall panel systems for at least two consecutive years and that also provides documented evidence of satisfactory completion of projects of similar size, scope, and type.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver panel system, components and materials in manufacturer’s standard protective packaging.
B. Store panels on long edge above ground, blocked and under cover in accordance with manufacturer’s storage and handling instructions.
C. Handle products in accordance with manufacturer's written instructions.

1.8 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
B. Provide manufacturer's and installer's written warranties agreeing to repair or replace panel system that fails in material or workmanship within one-year after Date of Delivery. Failure of material or workmanship includes deterioration of finish on metal in excess of normal weathering; defects in accessories, insulated and translucent sandwich panels, and other components of this work.
C. Extended Panel Warranty:

1. Provide 10-year limited warranty from Date of Delivery covering delamination affecting structural strength, noticeable surface fiber exposure of exterior panel face, and abnormal color change of exterior face sheet.
2. Provide 20-year limited warranty from Date of Delivery against external exposure of reinforcing glass fibers.

D. Extended Manufacturer's Factory-Applied Finish Warranty: 10 years from Date of Delivery.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fiberglass-Sandwich-Panel Assemblies Manufacturers:
1. Basis of Design: Kalwall Corporation: www.kalwall.com/#sle.

2.2 PERFORMANCE REQUIREMENTS

A. Manufacturer responsible for configuration and fabrication of complete panel system.
B. Structural Wall Loads: Provide system capable of handling the following loads:
1. Refer to the Structural Drawings.
2. Allowable Deflection Ratio: L/60, maximum.
C. Air Leakage: Limit to allowable air leakage through panel system assembly with pressure difference across assembly at 6.24 psf (300 Pa) in accordance with ASTM E283/E283M.
D. Water Leakage: None, when measured in accordance with ASTM E331 at test-pressure difference of 15 psf (730 Pa).
E. Structural Performance Testing by Uniform Static Air Pressure Difference: Comply with ASTM E330/E330M.
F. Panel Beam Bending Strength: Less than 1.9 inch (48.3 mm) deflection at 30 psf (1.44 kPa) loading and 10 ft (3.05 m) span without supporting frame in accordance with ASTM E72 test method.
G. Exterior Face Sheet Strength: Uniform in strength and impenetrable by handheld pencil and as follows:
1. Ball Impact Test: Pass, based on repelling impact without fracture or tear by at least 70 ft lbf (95 Nm) from 3-1/4 inch (82.6 mm) diameter 5 lb (2.3 kg) free-falling ball in accordance with UL 972 testing.
H. Fire Penetration Resistance of Wall Assembly: Panels comply with conditions of acceptance in accordance with ASTM E2707.
1. Absence of flame penetration through wall assembly at any time.
2. Absence of glowing combustion on interior surface of assembly at end of 60-minute observation period.
3. Absence of flame, glow, and smoke when test is terminated prior to completion of 60-minute observation period.
I. Condensation Resistance Factor (CRF): Minimum of 80 when measured in accordance with AAMA 1503 on bond line of thermally broken panels with translucent insulation.
J. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 110 degrees F (43 degrees C) over 12-hour period without causing detrimental effect to system components.

2.3 COMPONENTS

A. Wall System: Sandwich panels of fiberglass-reinforced-plastic (FRP), translucent face sheets laminated to grid core with mechanically interlocking I-beams and straight adhesive bonding line that covers entire width of I-beam having neat, sharp edge, and protection of exterior face sheet provided with integral, embedded-glass erosion barrier.

1. Panel Width: As indicated on drawings.
2. Panel Length: As indicated on drawings.
3. 2-3/4 inches (70 mm) Thick, Thermally Broken Composite I-Beam Grid Core: Thermoset fiberglass composite having I-beam grid core of 6063-T6 or 6005-T5 alloy and temper complying with ASTM B221 (ASTM B221M), with provisions for mechanical interlocking of muntin-mullion and perimeter, with minimum I-beam width of 1/2 inch (12.7 mm) and minimum I-beam thermal break of 1 inch (25.4 mm); poured and debridged thermal break is not permitted.
   a. Panel Type: Flat.
   b. Panel Fill Insulation:
      1) Air gap only.
   c. Thermal Transmittance (U-factor) of FRP Sandwich Panel: 0.53 (3.01), when tested in accordance with NFRC 100.
   d. FRP Face Sheet Color: Exterior - Crystal/Interior - White.
   e. Visible Light Transmission (VLT): For face sheet combination indicated and the following panel fill material, when tested in accordance with NFRC 202 or ASTM E972.
      1) Air Gap: 37 percent.
   f. Solar Heat Gain Coefficient (SHGC): When tested in accordance with NFRC 201 at 0 degrees F (minus 18 degrees C) on cold side for face sheet combination indicated and following panel fill material.
      1) Air Gap: 0.44, nominal.
   g. Grid Core Pattern:
      1) Ladder: 8 inches (200 mm), wide.

B. Face Sheets:
   1. Translucent Face Sheets: Fabricated using glass fiber reinforced thermoset resins, and formulated specifically for architectural use.
      a. Use of thermoplastic, e.g., polycarbonate and acrylic, for face sheets is not permitted.
      b. Deformation, deflection, or dripping of face sheets upon exposure to fire is not permitted.
   2. Exterior Face Sheet:
      a. Thickness: As required for system characteristics indicated; 0.070 inch (1.778 mm), minimum.
      b. Color as indicated under system description.
      c. Color Stability: Color of exterior face sheet to not change color more than three CIE Units DELTA E in accordance with ASTM D2244 after 5 years outdoors in South Florida weathering facing south; color stability not affected by abrasion or scratching.
   3. Interior Face Sheet:
      a. Thickness: As required for system characteristics indicated; 0.045 inch (1.143 mm), minimum.
      b. Provide exposed surface of interior face sheets with following flame spread index (FSI) and smoke developed index (SDI) in compliance with ASTM E84 or UL 723.
         1) Class B: Flame spread index (FSI) of 50 or less and smoke developed index (SDI) of 250 or less.
      c. Provide Class CC1 face sheets with burning extent of 1 inch (25.4 mm) or less when tested in accordance with ASTM D635.

C. Laminate Adhesive: Provided for adhering translucent panel face sheets to grid core; heat and pressure resistant resin-type adhesive for use with structural sandwich panels and designed for at least 25 years of field use, and complying with testing requirements of ICC-ES AC05.

1. Tensile Strength: At least 750 psi (5.17 MPa) when panel assembly is tested in accordance with ASTM C297/C297M test method after two exposures to six cycles each of accelerated aging conditions complying with ASTM D1037.
2. Shear Strength: Panel adhesive complying with ASTM D1002 upon exposure to the following conditions:
   a. Exposed to 50 percent Relative Humidity (RH) at 68 degrees F (20 degrees C), minimum shear strength of 540 psi (3,723 kPa).
   b. Exposed to temperature of 182 degrees F (83 degrees C), minimum shear strength of 100 psi (689 kPa).
   c. Exposed to accelerated aging complying with ASTM D1037, minimum shear strength of 800 psi (5.52 MPa), tested at room temperature.
   d. Exposed to accelerated aging complying with ASTM D1037, minimum shear strength of 250 psi (1.72 MPa), tested at 182 degrees F (83 degrees C).

2.4 PERIMETER CLOSURE SYSTEM

A. Closure Aluminum Clamp-Tite Installation System:
   1. Standard wall system consisting of extruded aluminum having 6063-T5 or 6063-T6 alloy and temper in compliance with ASTM B221 (ASTM B221M), and clamp-tite screw type closure system.
B. Water-Resistive Barriers: To suit application, nonbleeding and nonstaining; see Section 07 27 26.
C. Sealant for Within Translucent Assembly: As required by manufacturer; see Section 07 92 00.
D. Sealing Tape: Manufacturer's standard; factory applied to closure system under controlled conditions.
E. Fasteners: Stainless steel 300 Series screws for aluminum closures; excluding final fasteners to building.

2.5 FINISHES

A. High-Performance Organic Coatings: Manufacturer's factory-applied finish that complies with performance requirements of AAMA 2604; multiple coats, thermally cured fluoropolymer system.
   1. Color: As selected by Architect from manufacturer's custom line.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify substrates, supporting structure, and installation conditions.
B. Verify dimensions, tolerances, and method of attachment with other work.
C. Do not proceed with panel installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Metal Protection:
   1. At locations where aluminum contacts dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape as recommended by manufacturer for this purpose.
   2. At locations where aluminum contacts concrete, masonry, or pressure treated wood, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by manufacturer.

3.3 INSTALLATION

A. Install panels within assembly in accordance with manufacturer's fabrication drawings and written installation instructions.
   1. Anchor component parts securely in place using permanent mechanical attachment system.
   2. Allow for thermal and mechanical movement of assembly components.
   3. Seal aluminum clamp-tite installation system as indicated on manufacturer’s fabrication drawings and written installation instructions.

B. Install joint sealants at perimeter joints and within panel assembly in accordance with manufacturer's fabrication drawings and written installation instructions; see Section 07 92 00.

3.4 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Provide independent inspection.
C. Water Leakage Test: Test representative section of installed assembly in accordance with AAMA 501.2.
   1. Test area location as indicated on drawings.
   2. Repair or replace work that does not pass testing or that is damaged by testing and retest work.

3.5 CLEANING

A. Remove protective material from prefinished aluminum surfaces.
B. Wash down interior and exterior surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths; remove dirt from corners and wipe surfaces clean.

3.6 PROTECTION

A. Protect finished work from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Insulating glass units, Types **IG-1**, **IG-2**, and **IG-3**.
B. Glazing units, Types **S-1** and **S-2**.
C. Glass coatings.
D. Glazing compounds.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work:
B. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
C. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
D. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly.

1.4 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).
C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).
E. ASTM C1036 - Standard Specification for Flat Glass; 2021.
F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.
H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.
J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
L. GANA (GM) - GANA Glazing Manual; 2022.
M. GANA (SM) - GANA Sealant Manual; 2008.
N. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.

O. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
P. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.6 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
D. Shop Drawings: Provide glazing schedule.
E. Samples: Submit two samples 4 by 4 inch (100 by 100 mm) in size of glass units.
F. Samples: Submit 4 inch (100 mm) long bead of glazing sealant, color as selected.
G. Certificate: Certify that products of this section meet or exceed specified requirements.
H. Manufacturer's qualification statement.
I. Installer's qualification statement.
J. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) and GANA (GM) for glazing installation methods. Maintain one copy on site.
B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience and approved by manufacturer.
D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.8 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Provide mock-up of exterior curtain wall including glass.
C. Locate where directed.
D. Mock-ups may not remain as part of the Work.

1.9 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.10 WARRANTY

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

B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

1.11 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.
B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.
C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Float Glass Manufacturers:
   1. Guardian Glass, LLC: www.guardianglass.com/#sle.
   2. Pilkington North America Inc: www.pilkington.com/na/#sle.
   3. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
   4. Substitutions: See Section 01 25 00 and Section 01 60 00. Refer also to the article in PART 1 above titled “AVAILABLE MANUFACTURERS”.

2.2 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with ASCE 7.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   4. Glass thicknesses listed are minimum.
B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
   1. In conjunction with weather barrier related materials described in other sections, as follows:
   2. To utilize inner pane of multiple pane insulating glass units for continuity of vapor retarder and/or air barrier seal.
C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

2.3 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
   3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
   4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
   5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
   2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch (0.762 mm) thick, minimum.

2.4 INSULATING GLASS UNITS

A. Manufacturers:
   1. Glass: Any of the manufacturers specified for float glass.

B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

C. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
   4. Spacer Color: Black.
   5. Edge Seal:
      a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
   6. Color: Black.
   7. Purge interpane space with dry air, hermetically sealed.

D. Insulating Glass Units, Type **IG-1**: Vision glass, double glazed, safety glazing.
   1. Applications:
      a. Glazed lites in exterior doors.
      b. Glazed sidelights and panels next to doors.
      c. Other locations indicated on drawings.
   2. Space between lites filled with air.
   3. Outboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
      a. Tint: As selected by Architect.
      b. Coating: Low-E (passive type), on #2 surface.
   4. Inboard Lite: Fully tempered float glass, 1/4 inch (6.4 mm) thick, minimum.
      a. Tint: Clear.
   5. Total Thickness: 1 inch (25.4 mm).
   6. Glazing Method: Dry glazing method, gasket glazing (SSG).

E. Insulating Glass Units, Type **IG-2**: Vision glass, double glazed.
   1. Applications: Exterior glazing unless otherwise indicated.
   2. Space between lites filled with air.

3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Tint: As selected by Architect.
   b. Coating: Low-E (passive type), on #2 surface.
4. Metal edge spacer.
5. Inboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Tint: Clear.
6. Total Thickness: 1 inch (25.4 mm).
7. Glazing Method: Dry glazing method, gasket glazing.

F. Insulating Glass Units, Type **IG-3**: Spandrel glazing.
1. Applications: Exterior spandrel glazing unless otherwise indicated.
2. Space between lites filled with air.
3. Outboard Lite: Heat-strengthened float glass, 1/4 inch (6.4 mm) thick, minimum.
   a. Tint: Same as on vision units.
   b. Coating: Same as on vision units, on #2 surface.
4. Inboard Lite: Heat-strengthened float glass, 1/4 inch (6.4 mm) thick.
   a. Tint: Clear.
   b. Opacifier: Elastomeric coating, on #4 surface.
   c. Opacifier Color: As selected by Architect.
5. Total Thickness: 1 inch (25.4 mm).
6. Glazing Method: Dry glazing method, gasket glazing.

2.5 GLAZING UNITS

A. Monolithic Safety Glazing, Type **S-1**: Non-fire-rated.
1. Applications:
   a. Glazed lites in doors, except fire doors.
   b. Other locations required by applicable federal, state, and local codes and regulations.
   c. Other locations indicated on drawings.
2. Glass Type: Fully tempered safety glass as specified.
3. Tint: Clear.
4. Thickness: 1/4 inch (6.4 mm), minimum, or thicker if necessary to meet design requirements.
5. Glazing Method: Dry glazing method, gasket glazing.

B. Monolithic Interior Vision Glazing, Type **S-2**:
1. Applications: Interior glazing unless otherwise indicated.
2. Glass Type: Annealed float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch (6.4 mm), minimum, or thicker if necessary to meet design requirements.
5. Glazing Method: Dry glazing method, gasket glazing.

2.6 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.

B. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
B. Verify that the minimum required face and edge clearances are being provided.
C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.3 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, and paint.

3.4 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.5 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.
B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
C. Monitor and report installation procedures and unacceptable conditions.

3.6 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
C. Remove nonpermanent labels immediately after glazing installation is complete.
D. Clean glass and adjacent surfaces after sealants are fully cured.
E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.7 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.
B. Field application of paints.
C. Scope: Finish all exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Exposed surfaces of steel lintels and ledge angles.
   2. Mechanical and Electrical:
      a. On the roof and outdoors, paint equipment exposed to weather or to view.
D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Non-metallic roofing and flashing.
   6. Stainless steel, anodized aluminum.
   7. Natural stone.
   8. Floors, unless specifically indicated.
   9. Brick, architectural concrete, cast stone, integrally colored concrete masonry units.
   10. Glass.
   11. Concealed pipes, ducts, and conduits.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. Other Specification Sections throughout all Divisions of the Project Manual are directly applicable to this Section. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project. Refer also to Section 01 11 13 - Work Covered By Contract Documents for an expanded and explanatory version of the "RELATED DOCUMENTS" and for additional Project requirements.

1.3 RELATED REQUIREMENTS

A. This list of sections below is applicable but not all inclusive. See other sections as required for the completion of the Work. The following documents include related requirements for the Work of this section and every other section affected by the Work:
B. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
C. Section 09 91 23 - Interior Painting.

1.4 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.5 REFERENCE STANDARDS - Compliance with these standards is a requirement of the Work

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2024.

B. ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test; 2022.
C. PDCA Industry Standards - Painting and Decorating Contractors of America - PDCA Industry Standards; Current Edition.
D. PDCA Standard P1 - Touch-Up Painting and Damage Repair: Financial Responsibility and Definition of a Properly Painted Surface (Painting and Decorating Contractors of America); 2013.
E. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
F. SSPC-SP 2 - Hand Tool Cleaning; 2018.
G. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning; 2006.

1.6 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. Product characteristics by manufacturers printed data including the following:
      a. Vehicle Type.
      b. Top Coat Sheen.
      c. Minimum Film Thickness per coat in mils, wet (WFT) and dry (DFT).
      d. Minimum Percentage of Volume Solids.
      e. Pencil Hardness per ASTM D3363.
      f. VOC in g/L.
      g. Other redeeming feature(s).
   3. PDS - Product Data Sheet.
   4. SDS - Safety Data Sheet.
   5. EDS - Environmental Data Sheet.
   6. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   7. Manufacturer's installation instructions.
C. Manufacturer's Instructions: Indicate special surface preparation procedures.
D. Applicator's Qualification Statement.
E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: Unopened 1 gallon (4 L) of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years experience and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.9 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
D. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

1.10 AVAILABLE MANUFACTURERS

A. Refer to Section 01 25 00 - Substitution Procedures and Section 01 60 00 - Product Requirements for limitations, requirements, forms, and procedures for proposing substitutions.
B. Substitution, when and where permitted: Whenever substitutions are to be considered, the product(s) referenced by the manufacturer listed, forms the Basis of Design (BOD). The Contractor at their option may propose an alternate manufacturer as an equal. However, if an equal is proposed, the Contractor shall provide product data from the specified manufacturer & product(s) as well as equivalent product data from the proposed manufacturer for a comparison, review, and determination of acceptance (review or rejection) by the Architect.
C. If any accepted substitute changes the requirements of the current design in any way, the changes shall be fully covered by the Contractor at no additional cost to the Owner or Architect and shall not add time to the project.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
    1. If a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
B. Paints:
    1. Base Manufacturer: Sherwin-Williams Company (SW or S-W); www.sherwin-williams.com.
    2. Behr Process Corporation, (Be) : www.behr.com/#sle.
    3. Coronado Paints (CP), manufactured by Benjamin Moore & Co.: www.coronadopaint.com.
    4. PPG Paints, (PPG): www.ppgpaints.com/#sle.
C. Primer Sealers: Same manufacturer as top coats.
D. Substitutions: See Section 01 25 00 and Section 01 60 00. Refer also to the article in PART 1 above titled “AVAILABLE MANUFACTURERS”.

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

B. The preparation, application, finish (and inspection) work consistent with the PDCA Industry Standards shall be followed. The work of this project shall include a properly painted/stained/coated surface. This shall include the substrate, substrate preparation, manufacturer recommended environmental conditions, recommended primer/sealer and finish coatings applications, protection of finishes and touch-up of damaged coatings after substantial completion.
   1. A “properly painted/stained/coated surface” for the Work of this project is defined by PDCA Standard P1 as "uniform in appearance, color, texture, hiding and sheen. It is also free of foreign material, lumps, skins, runs, sags, holidays, misses, or insufficient coverage. It is also a surface free of drips, spatters, spills or overspray caused by the painting and decorating contractor’s work force or similar and additional damage caused by others prior to completion of this project.”
   2. Per PDCA Standard P1, in order to determine whether a surface has been “properly painted/stained/coated” it shall be examined without magnification at a distance of thirty-nine (39) inches or one (1) meter, or more, under finished lighting conditions and from a normal viewing position.
   3. The Architect and/or Owner shall determine the adequacy and acceptance of the work.

C. Volatile Organic Compound (VOC) Content: Comply with Section 01 61 16.

D. Flammability: Comply with applicable code for surface burning characteristics.

E. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

F. Colors: As indicated in Color Schedule.
   1. Refer to Types **PT-1** thru **PT-7** on the Finish Legend for paint colors.
   2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.3 PAINT SYSTEMS - EXTERIOR

A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete and concrete masonry units without integral color.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Exterior Latex.
      a. Products:
         1) Sherwin-Williams Loxon XP Exterior.
   3. Primer: As recommended by top coat manufacturer for specific substrate.

B. E-OP-HD-DTHeavy Duty Door,Trim, and Structural Steel: For surfaces subject to either frequent contact by occupants or requiring high-performance protection; including metals, steel, and galvanized steel:
   1. Heavy duty applications include doors, door frames, railings, AESS, and other metal items and surfaces indicated to be painted.
   2. Two top coats and one coat primer.

3. Top Coats: Aliphatic, Acrylic Polyurethane Enamel.
   a. Basis of Design Product:
      1) Sherwin-Williams Hi-Solids Polyurethane 100.
   b. Sheen: Semi-Gloss.
4. Primer: As recommended by top coat manufacturer for specific substrate. Verify.
   a. For use over Steel and Galvanized Steel: SW Pro Industrial Pro-Cryl Primer, B73 series.
   b. Provide primer over existing coated & uncoated surfaces, including shop primed coatings.
      1) Primers shall be tested and verified to be appropriate for compatibility and bridging of new or existing surfaces to new top coating.
   c. Primers over existing coated & uncoated surfaces surfaces, including shop primed coatings, shall be tested and verified to be appropriate for compatibility and bridging of existing surfaces to new top coating.

2.4 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
B. Patching Material: Latex filler.
C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
C. Test shop-applied primer for compatibility with subsequent cover materials.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.
B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
D. Seal surfaces that might cause bleed through or staining of topcoat.
E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
F. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
   2. Prepare surface according to SSPC-SP 2.
G. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning in accordance with SSPC-SP 6/NACE No.3. Protect from corrosion until coated.
H. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
B. Apply products in accordance with manufacturer's written instructions.
C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
D. Apply each coat to uniform appearance.
E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.5 PROTECTION

A. Protect finishes until completion of project.
B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION