



SECTION 13120 - Pre-Engineered Structure

METAL CANOPY SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Freestanding, pre-engineered metal canopies including structural steel framing, metal roof panels, metal soffit deck panels, aluminum composite fascia panels, accessories and trim, and concrete foundation design.

1.2 RELATED SECTIONS

- A. Section 03300 – Cast-In-Place Concrete: Concrete Island and curbing.
- B. Section 05500 – Metal Fabrications.
- C. Section 07900 – Joint Sealants.
- D. Division 15 – Plumbing: Plumbing services and connections.
- E. Division 16 Electrical: Electrical Wiring and connections.

1.3 REFERENCES

- A. ASTM International (ASTM)
 - 1. ASTM E2950 – 14 – Standard Specification for Metal Canopy Systems
 - 2. ASTM A36/A36M – Specification for Carbon Structural Steel
 - 3. ASTM A325/A325M – Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
- B. American Institute of Steel Construction, Inc. (AISC): AISC 303 – Code of Standard Practice for Steel Buildings and Bridges.
- C. American Society of Civil Engineers (ASCE): ASCE 7 – Minimum Design Loads for Buildings and Other Structures
- D. American Welding Society (AWS): AWS D1.1 – Structural Welding Codes
- E. American Concrete Institute (ACI): ACI 318 – Building Code Requirements for Structural Concrete and Commentary.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide a complete metal overhead canopy system, manufacturer's standard mutually dependent components and assemblies that form a metal overhead canopy system. The metal overhead canopy system must be capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure. Include primary and secondary framing, roof and wall panels, and accessories complying with requirements indicated, including those in this Article. Provide the design for concrete foundations to be installed by the General Contractor.
 - 1. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, port land cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and with a 30-minute working time. Shrinkage-Resistant Grout to be provided and installed by the General Contractor.
- B. Metal Overhead Canopy System Design: Of size, spacing, slope, and spans indicated, and as follows:

1. Frame Type: Fixed Base Cantilevered Steel Tube Columns
 2. Clear Height: as indicated by nominal height on Drawings.
 3. Support Locations: as indicated on drawings.
 4. Roof System: Manufacturer's standard lap-seam roof panels.
 5. Secondary Frame Type: Manufacturer's standard.
- C. Structural Performance: Provide metal canopy systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Design Loads: As indicated on the drawings.
 2. Live Loads: See drawings
 3. Wind Loads: Include horizontal loads induced by a basic wind speed as required for the location of the project and per building code in effect for the project.
 4. Collateral Loads: Include additional dead loads other than the weight of overhead canopy system for permanent items.
 5. Load Combinations: Design metal canopy systems to withstand the most critical effects of load factors and load combinations.
 6. Deflection Limits: Based on Manufacturer standards
- D. Seismic Performance: Design and engineer metal canopy systems capable of withstanding the effects of earthquake motions determined according to the building code in effect for this Project.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of the following metal canopy system components:
1. Structural-framing system.
 2. Roof panels.
 3. Fascia panels
 4. Drainage System
- B. Shop Drawings: For the following overhead canopy system components. Include plans, elevations, sections and details.
1. For installed components indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Anchor-Bolt Plans: Include location, diameter, and projection of anchor bolts required to attach metal canopy to foundation.
 3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 4. Roof Layout Drawings: Show layouts of panels on support framing, details of edge conditions, joints, panel profiles, corners, custom profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work.
 5. Concrete footing details.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of the following products with factory-applied color finishes:

1. Deck panels.
 2. Fascia Panels
- D. Product Certificates: Signed by manufacturers of metal canopy systems certifying that products furnished comply with requirements.
1. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
 - a. Name and location of Project.
 - b. Name of manufacturer.
 - c. Overhead Canopy dimensions, including width, length, and height.
 - d. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 - e. Governing building code and year of edition.
 - f. Design Loads: Include dead load, roof live load, roof snow load, wind loads/speeds and exposure and seismic design category.
 - g. Building-Use Category: Indicate category of building use and its effect on load importance factors.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, must have an annual audit and review of their quality assurance program, and other information specified.
- F. Warranties: Submit warranty documents specified herein.

1.6 QUALITY ASSURANCE

- A. Erector Qualifications: An erector with a minimum of five years of experienced who has specialized in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal canopy systems that are similar to those indicated for this Project in material, design, and extent.
- C. Manufacturer Qualifications: A minimum of twenty five years of experienced in manufacturing overhead canopy systems similar to those indicated for this Project and with a record of successful in-service performance.
1. Manufacturer to have an annual audit of its quality assurance program.
 2. Engineering Responsibility: Engineering analysis by a qualified professional engineer.
- D. Welding: Qualified procedures and certified welding personnel according to the following:
1. Welding shall be in accordance to AWS D1.1, "Structural Welding Code Steel".
 2. Steel Shop connections shall be welded and field connections shall be bolted (Unless otherwise noted in the drawings). Shop welds may be changed to field welds with the approval of the project engineer.
 3. Slag shall be cleaned from welds and prime painted with rust-inhibitive primer.

- E. Source Limitations: Obtain pre-engineered metal canopy through one source from a single manufacturer who shall manufacture and install the canopy.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package roof and wall panels for protection during transportation and handling.
- B. Handling: Unload, store, and erect roof and wall panels to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather tight and ventilated covering. Store roof and wall panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit roof and fascia panel installation to be performed according to manufacturer's written instructions and warranty requirements.
- B. Coordinate size and location of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."
- C. Field Measurements: The Contractor shall verify locations and elevations of footings relative to finish grade prior to fabrication of columns and other canopy components.
 - 1. Established Dimensions: The Contractor will, where field measurements cannot be made, establish dimensions and proceed with fabrications of metal canopy without field measurements. Contractor is responsible to coordinate footer locations and elevations with any interferences with or attachments to abutting structures.
- D. Site Conditions: Must meet manufacturer's Required Job Site Conditions for Installation.
 - 1. Anchor bolts must be installed per erection drawings. Footings need to be free of debris and anchor bolt threads undamaged
 - 2. All work surfaces must be even with no exposed product lines.

1.9 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights. Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
 - 1. Warranty Period: One year from date of Substantial Completion.
- B. Special Warranty on Panels: Written warranty, executed by manufacturer agreeing to repair or replace roof and fascia panels that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: One year from date of Substantial Completion.
- C. Special Warranty on Panel Finishes: Written warranty, signed by manufacturer agreeing to repair finish or replace metal panels that show evidence of deterioration of factory-applied

finishes within specified warranty period. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking peeling, and loss of film integrity.

1. Warranty Period for Roof Panels: 10 years from date of Substantial Completion.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturer's: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. TFC - A division of Centurion Industries, Inc. 1107 North Taylor Road; Garrett, IN 46738; (260) 357-6665; TFC@centurionind.com; www.TFCCanopy.com

- B. Substitutions: None Permitted.

2.2 MATERIALS

- A. Structural-Steel Shapes: ASTM A 992/A 992M 50.0 ksi minimum yield strength.
- B. Steel Plate, Bar, or Strip: ASTM A 529/A 529M; 50.0 ksi minimum yield strength.
- C. Structural square HSS tube steel: A500 grade B; 46.0 ksi minimum yield strength.
- D. Structural round HSS tube steel: A500 grade B; 42.0 ksi minimum yield strength
- E. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Grade 40, with G60 (Z180) coating designation.
- F. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M and the following requirements:
 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Grade 40, with G60 (Z180) coating designation.
- G. High-Strength bolt assemblies: ASTM A 325/ASTM A 325M, Type 1.
 1. Finish: Uncoated.
- H. Anchor Rod assemblies: ASTM F1554, Grade 55.
 1. Finish: Uncoated.
- I. Primers: As selected by manufacturer for resistance to normal atmospheric corrosion, compatibility with finish paint systems, capability to provide a sound foundation for field-applied topcoats as follows:
 1. Primer: Manufacturer's standard, lead- and chromate-free, non-photochemically reactive, rust-inhibiting primer.

2.3 DECK MATERIALS

- A. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot dip process and pre-painted with polyester paint and compatible primer on the face side

and wash coat on the back side by the coil-coating process to comply with ASTM A 755/A 755M and the following requirements:

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G60 (Z180) coating designation; Grade 50.
2. Surface: Smooth, flat, mill finish.

2.4 FABRICATION, GENERAL

- A. General: Design components and field connections required for erection to permit easy assembly and disassembly.
 1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 2. Fabricate framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Cold-formed members shall be free of cracks, tears, and ruptures.
- B. Primary Framing: Shop-fabricate framing components to indicated size and section with base plates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 1. Make shop connections by welding or by using high-strength bolts.
 2. Brace compression flange of primary framing by angles connected between frame web and purlin or girt, so flange compressive strength is within allowable limits for any combination of loadings.
 3. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.
- C. Secondary Framing: Shop-fabricate framing components to indicated size and section by roll forming or break-forming, with base plates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
 1. Make shop connections by welding or by using non-high-strength bolts.
 2. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime secondary structural members with specified primer after fabrication.

2.6 STRUCTURAL FRAMING

- A. Canopy Framing: Manufacturer's standard structural-framing system, designed to withstand required loads, fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.
- B. Bracing: Provide lateral bracing as follows:
 1. Fixed-Base Columns: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.

2.7 ROOF PANELS

- A. 20 gauge x 16" wide x 3" smooth or embossed steel panels.
- B. Roof Panel Accessories: Provide components required for a complete roof panel assembly including trim, coping, corner units, clips, seam covers, battens, flashings, gutters, sealants,

fillers, closure strips, and similar items. Match materials and finishes of roof panels, unless otherwise indicated.

- C. Panels shall have a finish side coated with a full coat of Silicone Modified Polyester (SMP) paint baked on over a polyester primer. Reverse side shall be protected by a white wash coat baked on over a polyester primer.

2.8 COMPOSITE METAL FASCIA PANELS

- A. Manufacturer: Mitsubishi Chemical America, Inc., Composite Materials Division.

- 1. Contact: 401 Volvo Parkway, Chesapeake, VA 23320; Telephone (800)422-7270; Fax: (757) 436-1896; E-mail: info@alpolic.com; www.Alpolic-usa.com.

- B. Proprietary Product: ALPOLIC Composite Metal Panels.

- 1. Standard Core ALPOLIC Composite Metal Panels.

- C. Substitutions: No substitutions permitted.

- D. Composite metal fascia panel materials.

- 1. Composite Metal Panels:

- a. Core: Thermoplastic material that meets performance characteristics specified when fabricated into composite assembly.
 - b. Face Sheets: Aluminum alloy 3105 H14, 0.020 inch (0.51mm) thick and as follows: [Choose coil or spray as applicable to quantity].
 - i. Coil coated with a fluropolmer paint finish that meets or exceeds values expressed in AAMA 2605 where relevant to coil coatings.
 - c. Bond Integrity: Tested for resistance to delamination as follows:
 - i. Bond Strength (ASTM C297): 1500 psi (10.3 MPa) Minimum.
 - ii. Peel Strength (ASTM D1781): 22 in-lb/in (100 N-m/m) Minimum.
 - iii. No degradation in bond performance after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
 - d. Fire Performance:
 - i. Flame spread (ASTM E84): 5 Maximum.
 - ii. Smoke Developed (ASTM E84): 15 Maximum.
 - iii. Comply with UL 879
 - iv. V-O Rating: Comply with UL94.

- 2. Production Tolerances:

- a. Width: +/- 0.04 inch/3 feet (1mm/m).
 - b. Length: +/- 0.04 inch/3 feet (1mm/m).
 - c. Thickness 3mm panel: +/- 0.008 inch (0.2mm).
 - d. Bow: Maximum 0.5% Length or width.
 - e. Squareness: Maximum 0.2 inch (5.1mm).
 - f. Edges of sheets shall be square and trimmed with no displacement of aluminum sheets or protrusion of core material.

3. Panel Thickness: 3mm
- E. Composite metal fascia panels accessories
1. General: Provide fabricator's standard accessories, including fasteners, clips, anchorage devices and attachments.
 2. Attach fascia panel to structural frame with a cold formed channel.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances, including oil, grease, rolling compounds, incompatible primers, and loose mill scale that impair bond of erection materials.
- B. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

3.2 ERECTION OF STRUCTURAL STEEL

- A. Erect metal canopy system according to manufacturer's written instructions and erection drawings.
- B. Do not field cut, drill, or alter structural members without written approval from metal canopy system manufacturer's professional engineer.
- C. Set structural framing in locations and to elevations indicated and according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.
- D. Base plates and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting base plates and bearing plates. Clean bottom surface of base plates and bearing plates.
 1. Set base plates and bearing plates for structural members on leveling nuts.
 2. Tighten anchor bolts after supported members have been positioned and plumbed.
 3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure. Shrinkage-Resistant Grout to be provided and installed by the General Contractor.
 - a. Comply with manufacturer's written instructions for proprietary grout materials.
- E. Align and adjust framing members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Make adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure.
 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- F. Primary Framing: Erect framing true to line, level, plumb, rigid, and secure. Level base plates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation.
 1. Make field connections using high-strength bolts. Tighten bolts by turn-of-the-nut method.

- G. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips, non-high-strength bolts, and or screws as indicated on manufacturers erection drawings.
- H. Bracing: Install bracing in roof where indicated on manufacturers erection drawings.

3.3 ROOF PANEL INSTALLATION

- A. General: Provide roof panels of full length when possible.
 - 1. Field cutting by torch is not permitted.
 - 2. Rigidly fasten eave end of roof panels and allow ridge end free movement due to thermal expansion and contraction.
 - 3. Flash and seal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self drilling and tapping screws.
 - 4. Install screw fasteners with power tools having controlled torque adjusted to tighten without damaging screw threads, or panels.
 - 5. Use manufacturer supplied fasteners for exterior applications
 - 6. Locate and space fastenings in true vertical and horizontal alignment.
- B. Deck Panels: Fasten roof panels to purlins with clip system that requires no "Thru Panel" fasteners.
 - 1. "Deck Clips" must be tested and rated to meet the most critical effects of load factors and load combinations.

3.4 ACCESSORY INSTALLATION

- A. General: Install gutters, downspouts, and other accessories according to manufacturer's written instructions, with positive anchorage and weather tight mounting. Coordinate installation with flashings and other components.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions. Provide for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 1. Install exposed flashing and trim that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates resulting in waterproof and weather-resistant performance.
 - 2. Separations: Separate metal from incompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.

3.5 COMPOSITE METAL FASCIA PANELS INSTALLATION

- A. General: Install aluminum composite panels, and other accessories according to manufacturer's written instructions.
 - 1. Install panels plumb, level and true, in compliance with fabricator's recommendations.
 - 2. Anchor panels securely in place, in accordance with fabricator's approved shop drawings.
 - 3. Comply with fabricator's instructions for installation of concealed fasteners and with provisions of Section 07900 for installation of joint sealants.
 - 4. Installation Tolerances: Maximum deviation from horizontal and vertical alignment of installed panels: .025 inch in 20 feet (6.4mm in 6.1m), noncumulative.

3.6 ERECTION AND LOCATION TOLERANCES

- A. Structural-Steel Erection Tolerances: Comply with erection tolerance limits of AISC 303-05, "Code of Standard Practice for Steel Buildings and Bridges."

3.7 CLEANING AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean, prepare, and prime or re-prime welds, bolted connections, and abraded surfaces of prime-painted primary and secondary framing, accessories, and bearing plates.
 - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
 - 2. Apply compatible primer of same type as shop primer used on adjacent surfaces.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded surfaces of shop-painted primary and secondary framing, accessories, and bearing plates are included in Division 9 Section "Painting."
- C. Roof and Wall Panels: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.
 - 1. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION