Special Specification 5086
Pre-Engineered Metal Building / Canopy

1. DESCRIPTION

1.1. SCOPE

The extent of Pre-Engineered Metal Building is shown on the drawings, including: Pre-engineered metal building, complete with primary and secondary roof framing, rigid frame with straight columns, bracing, anchor bolts, metal panel roofing, siding, and metal soffit panels. Metal fascia, gutter and downspouts, rake and eave trim, flashings, fasteners, accessories, electrical & lighting systems associated with building and inspection pit, and all miscellaneous components are required for a complete building as shown on the drawings.

Contractor to provide completed engineering, fabrication and erection of the pre-fabricated metal building as shown on drawings.

1.2. RELATED WORK SPECIFIED ELSEWHERE

- Item 416, “Drilled Shaft Foundations,”
- Item 420 ,”Concrete Substructures,”
- Item 421,”Hydraulic Cement Concrete,”
- Item 440, “Reinforcement for Concrete,” and
- Item 442,”Metal for Structures.”

1.3. REGULATORY REQUIREMENTS, ABBREVIATIONS AND DEFINITIONS

1.3.1. The most recent edition of the following regulations is applicable to this Specification:

- International Building Code (IBC),
- American Society for Testing and Materials (ASTM),
- American Institute of Steel Construction (AISC),
- Metal Building Manufacturer's Association (MBMA),
- American Iron and Steel Institute (AISI),
- American Welding Society (AWS),
- Underwriter’s Laboratory (UL),
- The Society for Protective Coatings (SSPC) ,
- National Electrical Code (NEC), and
- Canadian Standards Association (CSA).

1.3.2. Miscellaneous abbreviations and definitions:

- Ethylene-Propylene-Diene-Monomer (EPDM)
- Ethylene Propylene Terpolymer (EPT)
- Polyvinyl Chloride (PVC)

1.4. SYSTEM DESCRIPTION

- Rigid frame with straight columns and roof beams and gable roof;
- Bay Spacing: Per plans;
- Primary Framing: Rigid frame of rafter beams and columns, and lateral bracing;
- Secondary Framing: Purlins, girts, eave struts, sill supports, clips and other items detailed;

- Wall System: Preformed metal panels of vertical profile, with sub-girt framing/anchorage assembly, and accessory components;
- Roof System: Preformed metal panels of upslope standing seam profile, with sub-girt framing/anchorage assembly, and accessory components;
- Roof Slope: Per plans;
- Anchor bolts as engineered and specified by the building manufacturer; and
- Electrical and Lighting: Per plans.

1.5. **DESIGN REQUIREMENTS**

Design members to withstand dead load, applicable snow load, and design loads due to lateral forces calculated in accordance with International Building Code (IBC), 2021, design load schedule and loads imposed by industrial equipment and mechanical, electrical systems.

Structural Framing: Design primary and secondary structural members and exterior covering materials for applicable load combinations in accordance with the Metal Building Manufacturer's Association's (MBMA) "Design Practices Manual." Primary structural frames must be designed as pinned - based frames. Lateral drift of primary frames must be limited to the eave height (in inches) / 240.

Structural Steel: For the design of structural steel members, comply with the requirements of the American Institute of Steel Construction (AISC) "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" for design requirements and allowable stresses. Total load deflections must be limited to L / 240.

Light Gage Steel: For the design of light gage steel members, comply with the requirements of the American Iron and Steel Institute's (AISI) "Specification for the Design of Cold Formed steel Structural Members" and "Design of Light Gage Steel Diaphragms" for design requirements and allowable stresses. Total load deflections must be limited to L / 240.

For welded connections, comply with the American Welding Society's (AWS) "Standard Code for Arc and Gas Welding in Building Construction" for welding procedures.

Tolerances: Fabrication must conform to the fabrication tolerances published in the MBMA "Common Industry Practices".

1.5.1. **Design Loads:** Basic design loads, as well as collateral loads, are as specified.

- Basic design loads include, in addition to dead load, live load and lateral load.
- Collateral loads include additional dead loads over and above the weight of the metal building system such as mechanical and electrical systems.
- Design each member to withstand stresses resulting from combinations of loads that produce the maximum allowable stresses in that member as prescribed in MBMA's "Design Practices Manual" Section 9 of Design Practices.

Design members to withstand Underwriter’s Laboratory (UL) 580 - Uplift Resistance, Uplift Class 90 as tested by the Building Manufacturer.

Exterior wall and roof system must withstand imposed loads with maximum allowable deflection of span: L/240.

Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 150 Degrees F (65.6 Degrees C).

1.6. **SUBMITTALS FOR REVIEW**

1.6.1. **Submittals:** Provide four (4) copies of product data and shop drawings for review by Structural Engineer of Record. Provide required re-submittals if original submittals are not approved.

Submit all required shop drawings and product data to the Engineer with reasonable promptness and in an orderly sequence so as to cause no delay in the work. No extension of time will be allowed because of failure to properly coordinate and sequence submittals. Contractor's responsibility for deviations or errors and omissions in submittals is not relieved by Engineer review. All work must ultimately comply with the contract documents unless Engineer gives specific written acceptance of specific deviations.

1.6.2. **Product Data:** Provide data on profiles, component dimensions, fasteners and structural properties.

1.6.3. **Shop Drawings:** Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, loads, and all associated items; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, method or installation; framing anchor bolt settings, sizes, and locations from datum and foundations loads; indicate welded connections with AWS A2.0 welding symbols; indicate net weld length; all design loads. Provide drawings and calculations sealed and signed by a professional engineer licensed in the State of Texas.

Obtain the metal building system components, including structural framing, wall and roof covering and accessory components, from one source from a single manufacturer, as a complete system.

1.6.4. **Samples:** Submit three samples of pre-finished and finished metal panels for each color selected, 12 x 12-in. (305 x 305 mm) in size illustrating color and texture of finish; fasteners, sealants and closers.

1.6.5. **Electrical and Lighting:** Submit three copies of manufacturer's specifications for luminaires and mounting types.

1.7. **SUBMITTALS FOR INFORMATION**

1.7.1. **Manufacturer's Instructions:** Indicate preparation requirements, anchor bolt placement and accessories.

1.7.2. **Erection Drawings:** Indicate members by label, assembly sequence, and temporary erection bracing.

1.8. **SUBMITTALS FOR CLOSEOUT**

1.8.1. **Project Record Documents:** Record actual locations of concealed components and utilities.

Upon completion of erection submit written Certification prepared and signed by the design Professional Engineer, qualified herein, attesting to his/her field verification of the erection being in accordance with his/her shop drawings.

Provide warranties as specified. Warranties must not limit length of time for remedy of damages Owner may have by legal statute. Contractor, supplier, or installer responsible for performance of warranty must sign warranties.

1.9. **QUALITY ASSURANCE**

Perform Work in accordance with AISC - Quality Certification Program Category MB. MBMA - Metal Building Systems Manual and MBMA - Low Rise Building Systems Manual. Maintain one copy on site.

1.9.1. **Manufacturer Qualifications:** Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

1.9.2. **Erector Qualifications:** Company specializing in performing the work of this Section with minimum five years documented experience and approved by manufacturer.

Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Texas.

1.10. **DELIVERY, STORAGE AND HANDLING**

Delivery and receipt of materials must be in accordance with the MBMA "Common Industry Practices."

Deliver and store prefabricated components, sheets, panels and other manufactured items so they will not be damaged or deformed.

Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather tight ventilated covering. Cover metal sheets or panels so that water accumulations will drain freely. Do not store sheets or panels in contact with other materials that might cause staining. Elevate one of stored metal sheets and panels so as to positively drain water and prevent "white" rust.

1.11. **REGULATORY REQUIREMENTS**

- Conform to IBC for submission of design calculations, reviewed shop and erection drawings; and
- Cooperate with regulatory agency or authority and provide data as required.

1.12. **PRE-INSTALLATION MEETING**

Convene one week before starting work of this Specification.

1.13. **WARRANTY**

1.13.1. **Manufacturer's Warranty:** Preprinted written warranty published by individual manufacturer for the specified product and specifically endorsed by the manufacturer to the Owner.

Furnish 20-year manufacturer warranty for sheet metal roofing against structural failure, corrosion, and water penetration.

Furnish 20-year manufacturer warranty for pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking or fading.

2. MATERIALS

2.1. **MANUFACTURERS - BUILDING SYSTEM**

2.1.1. Manufacturers:

- Butler Manufacturing Co,
- M.B.C.I, and
- Other acceptable manufacturers offering equivalent products.

2.2. **MATERIALS - FRAMING**

- Structural Steel Members: ASTM A36/A36M or A529/A529M,
- Structural Tubing: ASTM A500, Grade B,
- Pipe: ASTM A53 Grade B,
- Plate or Bar Stock: ASTM A529/A529M,
- Cold Forming Members: ASTM A1008 Grade 50 or ASTM A1011 Grade 50 galvanized to ASTM A653 G90 designation,

- Anchor Bolts: ASTM A307, galvanized to ASTM A153,
- Bolts, Nuts and Washers: ASTM F3125 Grade A325, galvanized to ASTM A153,
- Welding Materials: AWS D1.1, type required for materials being welded,
- Primer: SSPC 20, Red oxide, and
- Grout: ASTM C1107, Non-shrink type, premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents, capable of developing minimum compressive strength of 2400 psi (17 MPa) in two days and 7000 psi (48 MPa) in 28 days.

2.3. **DESIGN LOADS**

- Live load, snow load, earthquake load and wind load will be as specified by the IBC-2021;
- Dead load will be a minimum of 15 psf Collateral loads and weight of the structural elements;
- Live load will be a minimum of 20 psf;
- Snow load will be a minimum of 5 psf;
- Wind speed will be a minimum of 115-MPH, per IBC 2021; and
- Roof panels will carry an UL wind uplift classification of 90.

2.3.1. **Roof Covering:** 50 psf or a 200 pound concentrated load located at center of maximum roof panel span.

2.3.2. **Auxiliary Loads:**

- Concentrated Loads: See mechanical and electrical, carefully coordinate and accommodate all items.
- Provide support beams in addition to the roof purlins to support loads greater than 500 pounds.

2.4. **DESIGN OF PRIMARY FRAMING**

In the design of primary framing members, wind pressures must be calculated in accordance with IBC, wind speed 115 MPH. Primary frames must be designed with pinned bases.

2.5. **BASIC DESIGN WIND PRESSURE (Wall Components, girts and wall panels):**

- Wind Speed: 115 MPH, and
- Wind pressures on parts and portions must be calculated in accordance with the MBMA “Design and practices Manual.”

2.6. **DESIGN LOAD COMBINATIONS**

2.6.1. **Dead/Live/Lateral:** Loading combinations of dead load, live load and lateral loads must be in accordance with MBMA recommendations, Section 9 of Design Practices.

2.7. **MATERIALS - WALL LINER AND ROOF SYSTEM**

- Sheet Steel Stock: ASTM A1008 Grade 80 or ASTM A1011 Grade 80 galvanized to ASTM A653 G90 designation;
- Joint Seal Gaskets: Manufacturer’s standard E.P.D.M. type;
- Fasteners: Manufacturer's standard type, galvanized to ASTM A153 Class C, finish to match adjacent surfaces when exterior exposed;
- Bituminous Paint: Asphaltic type;
- Sealant: Non-staining, elastomeric, skinning;
- Profile Closure: Manufacturer's Standard to match and seal voids of wall panels and roof panels; E.P.T. or E.P.D.M. type; and
- Trim, Closure Pieces, Caps, Flashings, Rain Water Diverter, Fascias, Infills, and Accessories: Same material, thickness and finish as exterior sheets; brake formed to require profiles.

2.8. **FABRICATION - FRAMING**

- Fabricate members in accordance with AISC Specification for plate, bar, tube or rolled structural shapes; and
- Anchor Bolts: Formed with bent or straight shank, assembled with template for casting into concrete.

2.9. **FRAMING MEMBER THICKNESS (MINIMUMS)**

- Cold-Formed Primary Framing Members: 14 gage,
- Cold-Formed Secondary Framing Members: 16 gage,
- Intermediate Pipe Columns: 3/16".,
- Webs of Welded Built-up Members: 1/8",
- Flanges of Welded Built-Up Members: 3/16", and
- Bracing Rods: 1/2 " diameter.

2.10. **TYPICAL FRAMING COMPONENTS**

2.10.1. Rigid Frames and Wind Unit Frames:

- Fabricate rigid frames from hot-rolled structural steel. Provide built-up "I-Beam" shape rigid frames consisting of parallel flanged beams. Provide frames factory welded and shop painted. Furnish frames complete with attachment plates, bearing plates and splice members. Factory drill frames for bolted field assembly; and
- Provide length of span and spacing of frames as indicated. Slight variations in length of span and frame spacing may be acceptable if necessary to meet manufacturer's standard.

2.10.2. **Bearing End Frames:** Consist of columns at the building corners and a continuous rafter beam supported by the end wall columns.

2.10.3. **End Wall Columns:** 8 in. min. deep cold-formed "C" sections or welded built-up "I" shapes.

2.10.4. **Purlins and Girts:** Roll-Formed "Z" sections or open web joists, depth as required.

2.10.5. **Eave Struts:** "C" sections formed so as to provide adequate backup for both roof and wall panels at the building eaves.

2.10.6. **Wind Bracing (When required):**

- Method: Diagonal rod bracing in both roof and sidewalls as required by calculations;
- Reinforcing: Double roof purlins, inter-connected by diaphragms, in between the rigid frames at all points of attachment of diagonal roof bracing; and
- Provide temporary bracing during erection of structure.

2.10.7. **Wind Bracing Omission:** Permissible where the diaphragm strength of the roof covering is adequate to resist the lateral forces. Diaphragm action must not be assumed for standing seam roof system.

2.10.8. **Flange Bracing:** Inside flange of all rigid frames must be braced laterally by angles connected to the flange and web of the frame and to the web of the purlin or girt so that the allowable compressive stress is adequate for any combination of loading.

2.10.9. **Bolts:** ASTM F3125 Grade A325 bolts tightened by the calibrated wrench method must have a hardened washer under the element (nut and bolt head) turned in tightening.

2.11. **FABRICATION - WALL AND ROOF SYSTEMS**

- Siding**:** Minimum .0239 in. (.6 mm) metal thickness, R profile, 1 1/4 in. (32 mm) deep, lapped edges; 36 in. (.91 m) coverage. Color to be selected by Owner.

- Roofing: Minimum .0239 in. (.6mm) metal thickness, standing seam profile, male/female edges; 18 in. (.6 m) coverage. Color to be selected by Owner.
- Liner: Minimum .0239 in. (.6 mm) metal thickness V crimped perforated, Profile L12B male/female edges; 12 in. (305 mm) coverage.
- Soffit Panels: Minimum .0239 in. (.6 mm) metal thickness V crimped profile, L12B un-perforated; 12 in. (305 mm) coverage.
- Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet; minimum .0598 in. (1.5 mm) thickness.
- Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed shop cut and factory mitered to required angles. Back brace mitered internal corners with .0239 in. (.6 mm) thick sheet.
- Expansion Joints: Same material and finish as adjacent material where exposed, (.0359) in. (.91mm) thick, manufacturer's standard brake formed Infill type, of profile to suit system.
- Flashings, Closure Pieces, Fascia, Infills, Caps, and accessories: Same material and finish as adjacent material, profile to suit system or formed as detailed.

2.11.1. **Fasteners:** To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

- Washers: Neoprene,
- Pop Rivets: Aluminum, and
- Self Tap Screws, Bolts: Galvanized .

2.11.2. **Panel Anchors/Clips:** Designed for locking into seams; with movable tabs to allow expansion and contraction.

2.12. **WEATHER-SEAL SCREWS**

- Type: No. 12-14 self-drilling or self-tapping, and
- Screw Shank: Carbon steel, plated with 0.0003" zinc or cadmium.

2.12.1. Washers: Recessed into head; neoprene, EPDM, PVC.

- Head: 3/8" (9.5 mm) hex drive, and
- Head Cap: Zamak alloy or stainless steel.

2.12.2. Paint Finish:

- Required, except, on unpainted panels.
- Color to match panels, and
- Paint durability to match panels.

2.13. **SEALER**

2.13.1. **Locations:** Sidelaps, endlaps and flashing. In addition, seal to abutting construction to make a water and airtight seal.

2.13.2. **Material:**

- General Description: Fiber-filled, pressure sensitive tape, non-asphaltic, non-shrinking, non-drying, and non-toxic and must have superior adhesion metals, plastics and painted surfaces at temperatures from 30 Degrees to +160 Degrees F. The material must have a flashpoint of at least 300 Degrees F, and must not flow at 200 Degrees F.
- Minimum Specification: Equal to Gov. Spec. No. MIL-C-18969, Type II, Class B.
- Size: 1/2" x 3/32" or 1" x 1/8".

2.14. **FLASHING AND TRIM**

- Locations: At the rake, corners and eaves; at framed openings and whenever necessary to provide weather tightness and finished appearance;
- Ridge Panel: Formed to match the slope and profile or adjoining panels; and
- Material Finish: Match wall panels.

2.15. **CLOSURES (PROFILE)**

Solid or closed cell, preformed Ethylene-Propylene-Diene-Monomer (EPDM) or Ethylene Propylene Terpolymer (EPT) color gray, matching the profile.

2.16. **FABRICATION GUTTERS AND DOWNSPOUTS**

- Fabricate of same material and finish as roofing metal;
- Form gutters and downspouts of profile and size to collect and remove water. Fabricate with connection pieces;
- Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints not to exceed 50 ft. (15 m) spacing; and
- Fabricate support straps of same material and finish as roofing metal, color as selected by Owner.

2.17. **FINISHES**

Paint and Coating Materials will comply with performance requirements of the federal specifications indicated. Unless specifically indicated otherwise, compliance with compositional requirements of federal specifications indicated is not required.

Shop Primer for Ferrous Metal will be fast-curing, lead-free, universal primer, selected by the manufacturer for resistance to normal atmospheric corrosion, compatibility with finish paint systems, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure. Comply with FS TT-P-645.

Shop Primer for Galvanized Metal Surfaces will be zinc dust-zinc oxide primer selected by the manufacturer for compatibility with substrate. Comply with FS TT-P641.

Finish Coats for Exposed Primary or Secondary Steel Framing Members: Two coats equal to PPG Silicon Alkyd Finished Coatings 97-480 plus pigmentation. Total dry mill thickness of finish coats will be 3 mils minimum. Refer to TxDOT Standard Specification, Item 446.

2.17.1. Factory Applied Finishes and Coatings for Galvanized Steel Sheet Metals:

- Sheet metal will be G-90 hot dipped galvanized steel of the specified gauges, prepared and coated prior to fabrication of panels and shapes;
- Sheet steel will be given a controlled complex oxide chemical conversion treatment and then precision coat prior to fabrication of panels and shapes;
- Exterior Wall and Roof Panel Surface Finish: Coatings will be manufacturer's standard color system utilizing Kynar 500 Finish with 20-year warranty;
- Roof Finish and Weather Tightness: Coatings will be Kynar 500 Finish. 20 year warranty for finish and weather tightness. 100% Warranty for 1st 2 years and prorated thereafter;
- Interior Wall and Roof Panel Surface Finish: Coatings will be manufacturer's standard color system utilizing Kynar 500 Finish with 20-year warranty;
- All finishes will be factory applied under precision conditions; and
- Owner will make all color selections. Submit sample board.

3. CONSTRUCTION METHODS

3.1. EXAMINATION

Verify that drilled shaft footings, electrical utilities, and placed anchors are in correct position.

3.2. ERECTION

- Erect framing in accordance with AISC Specification;
- Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated;
- Set column base plates with non-shrink grout to achieve full plate bearing;
- Do not field cut or alter structural members without approval from the Engineer; and
- After erection, prime welds, abrasions, and surfaces not shop primed.

3.3. ERECTION - PURLINS AND GIRTS

Provide rake or gable purlins with tight fitting closure channels and fascias.

Locate and space wall girts to suit door and window arrangements and heights.

Secure purlins and girts to structural framing and hold rigidly to a straight line by sag rods.

Purlins under steel roof decking to receive single ply roofing must be spaced a maximum of 5 ft. on centers or as shown on drawings.

3.4. ERECTION - BRACING

Provide diagonal rod or angle bracing in both roof and sidewalls as required.

Movement resisting frames may be used in lieu of sidewall rod bracing, to suit manufacturer's standards.

Where diaphragm strength of roof coverage is adequate to resist lateral forces, rod or other forms of bracing may be omitted.

3.5. ERECTION - EQUIPMENT FRAMING

Provide steel angles and bent plates to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to building structural frame.

3.6. ERECTION - WALL AND ROOFING SYSTEM

- Install in accordance with manufacturer's instructions;
- Exercise care when cutting pre-finished material to ensure cuttings do not remain on finish surface;
- Fasten cladding system to structural supports, aligned level and plumb;
- Locate end laps over supports. End laps minimum 6 in.es (152 mm). Place side laps over bearing;
- Provide expansion joints where indicated;
- Use concealed fasteners at roof; and
- Use exposed fasteners at walls.

3.6.1. **Structural Standing Seam Metal Roof Panels:** Factory formed, pre-finished metal roofing panel system.

3.6.1.1. Roof panels to be equal to and conform to the following criteria:

- Type: Butler Manufacturing Co. - VSR, or MBCI - Battenlock, Smooth Flat Panel,
- Style: Concealed Fasteners,
- Profile: Flat Panel,
- Gauge/Galv.: Minimum 22 gauge, G90,
- Interior and Exterior Finish: Kynar 500 Coating System with 20-year warranty. Ten (10) years water tightness warranty,
- Color: Selected by owner,
- Panel Length: Full panel from ridge to eave, and
- Panel Width: 16" nominal.

3.6.1.2. Ridge assembly will be designed to allow roof panels to move lengthwise for thermal expansion and contraction.

3.6.2. **Sidewall Panels:** Continuous from eave line to below the column base plated.

3.6.2.1. Wall panels will be equal to and conform to the following criteria:

- Type: Butler Rib II Wall System by Butler Manufacturing Co.
- Style: Exposed Fasteners, Neoprene Gasketed.
- Profile: Four Major and Two Minor Corrugations per 36" panel.
- Gauge/Galv: Minimum 24 gauge, G90.
- Interior and Exterior Finish: Kynar 500 Coating System with 20-year warranty. Ten (10) years water tightness warranty.
- Color: Selected by owner.
- Panel Length: Full panel from eave to base.
- Panel Width: 36" nominal.

3.6.2.2. Ridge assembly will be designed to support design loads and carry a UL Class 90 Rating.

3.6.3. **Roof Laps:** Before securing, roof panels must be sealed with a continuous ribbon of tape sealer, unless the optional anti-capillary groove is specified.

3.6.4. **Roof Fastenings:**

- Roof panels must be secured to purlins with expansion clips.
- At end laps of rib sheets the maximum spacing must be attached to each side of the major rib.

3.6.5. **Wall Fastenings:**

- Wall panels must be secured to girts with No. 12 self-drilling galvanized or cadmium plated steel screws, with minimum length 1-1/4" for structural, ¾" for stitch work.
- At the end laps of rib sheets, the maximum spacing must be 6 in. (152 mm).
- At the end laps of "Hi-Rib" panels the fasteners must be attached each side of the major rib.
- At the side laps of "A" panels No. 10 sheet metal screws must be placed a maximum of 18 in.es (457 mm) on center.

3.6.6. Install sealant and gaskets to prevent weather penetration.

3.7. **ERECTION – GUTTER AND DOWNSPOUT**

- Rigidly support and secure components. Joint lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- Apply bituminous paint on surfaces in contact with cementitious materials.
- Slope gutters minimum 1/8 in./ft (3 mm/m).

3.8. **INSTALLATION LINER PANELS**

3.8.1. Inspection:

- Check supporting member for correct layout and alignment;
- Verify that surfaces to receive liner panels are free of debris; and
- Secure panels without warp or deflection.

3.8.2. Installation:

- Install liner panels and accessories in accordance with the manufacturer's instructions;
- Do not stretch or compress panel side-lap interlocks; and
- Secure panels without warp or deflection.

3.9. **INSTALLATION - ACCESSORIES**

- Install accessories in accordance with manufacturer's instruction; and
- Seal wall and roof accessories watertight and weather tight with sealant.

3.10. **TOLERANCES**

- Framing Members: 1/8 in. (3 mm) from plumb; and
- Framing Siding and Roofing: 1/8 in. (3 mm) from true position.

3.11. **ELECTRICAL AND LIGHTING**

- Install all pertinent items per National Electrical Code (NEC); and
- Install all pertinent items in a neat and workmanlike manner.
- Install all pertinent items per applicable requirements of the TXDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges.

4. MEASUREMENT

This item will be measured by the Lump Sum.

5. PAYMENT

The work performed and materials furnished and measured as provided under "Measurement" will be paid for at the unit price bid for "Pre-Engineered Metal Building/Canopy. This price is full compensation for all labor, tools, and equipment, testing requirements, any appurtenances, and incidentals, and all materials furnished as outlined and detailed in the plan notes, specifications and associated drawings for a complete in-place building/inspection canopy.