

## SECTION 13 34 19 – PRE-ENGINEERED BUILDINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-I Specification sections apply to work specified in this section.

#### 1.2 DESCRIPTION OF WORK:

- A. Extent of pre-engineered buildings work is shown on drawings.
- B. Type is rigid frame with interior column metal building of nominal width, length, wall height and roof pitch indicated.
- C. Manufacturer's standard components may be used, providing components, accessories, and complete structure conform to architectural design appearance shown and to specified requirements.
- D. Concrete floor and foundations and installations of anchor bolts are specified in Division 3.

#### 1.3 QUALITY ASSURANCE:

- A. Design Criteria:
  - 1. For structural steel members, comply with AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings:.
  - 2. For light gage steel members, comply with AISI "Specification for the Design of Cold-Formed Steel Structural Members".
  - 3. Design primary and secondary members and covering for applicable loads and combination of loads in accordance with Metal Building Manufacturer's Association (MBMA) "Recommended Design Practices Manual".
  - 4. For welded connections, comply with AWS "Structural Welding Code".
- B. Design Loads: Basic design loads, as well as auxiliary and collateral loads, are indicated on drawings. Drift is H/100 for walls supporting metal sheet panel. Where walls support full or partial height brick or CMU veneer, the drift limit shall be restricted to H/600. For reinforced, exterior CMU walls, the drift limit shall be restricted to H/200. Allowable seismic drift shall be per the building code of jurisdiction.
- C. Design each member to withstand stresses resulting from combinations of loads that produce maximum percentage of actual to allowable stress in that member, as prescribed in MBMA "Recommended Design Practices Manual".

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- D. Fabrication Criteria: Provide prefabricated metal buildings as produced by a manufacturer who is regularly engaged in fabrication and erection of pre-engineered metal structures of type and quality indicated.
  - E. Design sizes of prefabricated components and necessary field connections required for erection to permit easy assembly and disassembly. Fabricate components in such manner that once assembled they may be disassembled, repackaged and reassembled with a minimum amount of labor and maximum salvageability.
  - F. Clearly and legibly mark each piece and part of assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.

#### 1.4 SUBMITTALS:

- A. Product Data: Submit manufacturers product information, specifications and installation instructions for building components and accessories.
- B. Shop Drawings: Submit complete erection drawings showing anchor bolts settings, sidewall, endwall, and roof framing, transverse cross sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components.
- C. Certification: Submit written Certification prepared and signed by a Professional Engineer, registered to practice in the State where building is to be erected, verifying that building design meets indicated loading requirements and codes of authorities having jurisdiction.
- D. Samples: Submit samples of the following. Engineer's review will be for color and texture only. Compliance with other requirements is responsibility of Contractor.
  - 1. 12" long by actual width of roofing and siding panels, with required finishes.
  - 2. Fasteners for application of roofing and siding panels.
  - 3. Sealants and closures.
- E. Maintenance Stock: Furnish at least 5% excess over required amount of nuts, bolts, screws, washers, and other required fasteners for each building. Pack in cartons and store on site where directed.

#### 1.5 DELIVERY, STORAGE AND HANDLING:

- A. 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. Store metal sheets or panels so that water accumulations will drain freely. Do not store sheets or panels in contact with other materials which might cause staining.

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## PART 2 - PRODUCTS

### 2.1 MATERIALS:

- A. Hot-Rolled Structural Shapes: ASTM A 992 Grade 50.
- B. Tubing or Pipe: ASTM A 500, Grade B; ASTM A 501; or ASTM A 53.
- C. Members Fabricated from Plate or Bar Stock: 42,000 psi minimum yield strength; ASTM A 529, A 570, or A 572.
- D. Galvanized Steel Sheet: ASTM A 446 with G 90 coating; "Class" to suit building manufacturer's standards.

### 2.2 STRUCTURAL FRAMING COMPONENTS:

- A. Rigid Frames: Hot rolled structural steel. Factory welded and shop painted built-up "I" shape or open web rigid frame consisting of tapered or parallel flange beams and tapered columns. Furnish complete with attachment plates, bearing plates, and splice members. Factory drilled for bolted field assembly.
- B. Length of span and spacing of frames as indicated except slight variations acceptable to meet manufacturer's standard.
- C. End Wall Columns: Factory welded, built-up "I" shape hot rolled structural steel. Shop painted.
- D. Wind Bracing: Adjustable, threaded steel rods, 1/2" diameter minimum; ASTM A 36 or A 572, Grade D. (No Cable Bracing) (Portal Frames will be allowed).
- E. Secondary Framing: Purlins, eave struts, end wall beams, flange and sag bracing; minimum 16 ga. rolled formed sections. Shop painted.
- F. Base channel, sill angle, end wall structural members (except columns and beams), purlin spacers; minimum 14 ga. cold formed steel, galvanized.
- G. Bolts ASTM A 307 or A 325 as necessary for design loads and connection details. Shop painted, except provide zinc- or cadmium-plated units when in direct contact with panels.
- H. Fabrication: Shop fabricate to the indicated size and section, complete with base plates, bearing plates, and other plates as required for erection, welded in place, and with all required holes for anchoring or connections shop drilled or punches to template dimensions.
- I. Shop connection power riveted, bolted, or welded.
- J. Field connections bolted.

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- K. Shop Painting: Clean surfaces to be primed of loose mill scale, rust, dirt, oil, grease, and other matter precluding paint bond. Follow procedures of SSPC-SP3 for power tool cleaning, SSPC-SP7 for brush-off blast cleaning, and SSPC-SPI for solvent cleaning.
  - L. Prime structural steel primary and secondary framing members with manufacturer's standard rust-inhibitive primer having over 50% rust-inhibitive pigment, such as red-lead mixed pigment alkyd varnish (FS TT-P-86, Type II) or zinc chromate iron-oxide alkyd (TT-P-636).
  - M. Prime galvanized members, after phosphoric acid pretreatment, with zinc dust-zinc oxide primer (FS TT-P-641).

## 2.3 ROOFING AND SIDING:

- A. General: Provide roofing and siding sheets formed to general profile or configuration as indicated. Provide flashings, closers, fillers, metal expansion joints, ridge covers, fascias, and other sheet metal accessories, factory formed of same material and finish as roofing and siding.
- B. Steel Sheets: Either zinc coated complying the ASTM A 446, Grade C with G 90 coating, or aluminum coated complying with ASTM A 463, Drawing Quality with TI-40 coating.
  - 1. Metal thickness not less than 24 ga. unless noted differently.
- C. Sheet Panel Fasteners: Manufacturer's standard system of self- tapping screws, bolts and nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.
- D. Provide metal-backed neoprene washers under heads of fasteners bearing on weather side of panels.
- E. Use zinc or cadmium plated fasteners for exterior application and galvanized or cadmium plated fasteners for interior applications.
- F. Locate and space fastenings for true vertical and horizontal alignment. Use proper type fastening tools to obtain controlled uniform compression for positive seal without rupture of neoprene washer.
- G. Provide fasteners with heads matching color of roofing or siding sheets by means of plastic caps or factory applied coating.
- H. Flexible Closure Strips: Closed-cell, expanded cellular rubber, self-extinguishing, cut or pre-molded to match corrugation configuration of roofing and siding sheets. Provide where indicated and necessary to ensure weather tight construction.
- I. Sealing Tape: 100% solids, pressure sensitive grey polyisobutylene compound tape with release paper backing. Not less than 1/2" wide and 1/8" thick, non-sag, nontoxic, non-staining and permanently elastic.

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- J. Joint Sealant: One-part elastomeric; polyurethane, polysulfide, or silicone rubber as recommended by building manufacturer.
  - K. Siding Panels: Shall be Manufacturers Standard Configuration with Kynar 500 finish on galvanized steel siding panels.
  - L. Roofing: All prefinished roofing shall be manufacturer's standard configuration standing seam with nominal 3" rib and 24" net coverage. Furnish with concealed clips and fasteners. All panels shall have galvalume finish.
  - M. The exposed surfaces of all wall panels, flashing and trim shall be color coated.
  - N. The coating system shall have the exterior side finished with an extended life, fluoropolymer coating utilizing "Kynar 500 Resin" or equal. This coating shall be applied over a G-90 galvanized steel coating. Surfaces shall be properly prepared and primed, then coated and oven-baked to cure. Panels shall be coated prior to roll forming.
  - O. For roofing and exterior siding, apply finish coat as specified above on exterior facing and apply manufacturer's standard wash coat on reverse side.

#### 2.4 SHEET METAL ACCESSORIES:

- A. General: Unless otherwise indicated, provide coated steel accessories with coated steel roofing and siding; aluminum accessories with aluminum roofing and siding.
- B. Gutters: Furnish gutters designed and sized in accordance with SMACNA "Architectural Sheet Metal Manual" 6<sup>th</sup> Edition, for the rainfall intensity inches/hour for a five minute duration for storms which should be exceeded only once in 10 years for the area where the building is erected. Gutters shall be formed in sections not less than 8 ft. in length, complete with end pieces, outlet tubes, and special pieces that may be required. Join sections with riveted and soldered or sealed joints. Unless otherwise indicated, provide expansion- type slip joint at center of runs. Furnish gutter supports spaced at 36" o.c., constructed of same metal as gutters. Provide standard bronze, copper, or aluminum wire ball strainers at each outlet. Finish to match roof fascia and rake, "Kynar 500". Slope gutters to drain.
- C. Downspouts: Furnish downspouts designed and sized in accordance with SMACNA "Architectural Sheet Metal Manual" 6<sup>th</sup> Edition, for the rainfall intensity inches/hour for a five minute duration for storms which should be exceeded only once in 10 years for the area where the building is erected. Downspouts shall be formed in sections approximately 10 ft. long, complete with elbows and offsets. Join sections with minimum 1- 1/2" telescoping joints. Provide fasteners for top, bottom, and 5' o.c. intermediately between, designed to securely hold downspouts not less than 1" away from walls. Finish to match trim "Kynar 500."
- D. Provide bird screens of 1/2" x 1/2" galvanized steel or expanded diamond mesh.

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## 2.5 METAL BUILDING INSULATION:

- A. Insulation shall be blanket-type, fiberglass with vapor barrier facing, suitable for application to walls and roof of metal buildings. Thickness as indicated on drawings.
- B. The insulation shall be made of long and fine fiber fiberglass, evenly distributed and of uniform density, bonded with phenolic thermo-settings resins. Product shall be CertainTeed Metal Building Insulation 202-96 or equal, with a UL Fire Hazard classification of 25/50. Standard insulation designations, nominal thicknesses as indicated on drawings.
- C. Vapor barrier facing shall be vinyl reinforced polyester (VRP) film (3 mil approximate thickness) and shall have an Underwriters Laboratories flame spread rate of 25 or less \* and a smoke developed rating of 50 or less. Water vapor transmission value is 1.00 perms for vinyl film facing and .02 perms for VRP facing. Color of facing material shall be white, and width shall be 78 inches so as to provide a 3-inch tab projecting beyond each side of the fiberglass blanket.
- D. Blanket type insulation shall be installed on roof and/or walls between exterior panels and secondary framing members (purlins and girts). Tabs on facing material shall be lapped, and taped with pressure sensitive vinyl to match insulation COLOR.

## PART 3 - EXECUTION

### 3.1 ERECTION:

- A. Framing: Erect structural framing true to line, level and 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 a non-shrinking grout to obtain uniform bearing and to maintain a level base line elevation. Moist cure grout for not less than 7 days after placement.
- B. 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.
- C. Bracing: Provide diagonal rod or angle bracing in both roof and sidewalls as indicated.
- D. Movement resisting frames may be used in lieu of sidewall rod bracing, to suit manufacturer's standards.
- E. Where diaphragm strength of roof or wall covering is adequate to resist wind forces, rod or other forms of bracing will not be required.
- F. Framed Openings: Provide shapes of proper design and size to reinforce opening and to carry loads and vibrations imposed, including equipment furnished under mechanical or electrical work. Securely attach to building structural frame.

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### 3.2 ROOFING AND SIDING:

- A. General: Arrange and nest sidelap joints so that prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line. Protect factory finishes from damage.
- B. Provide weather seal under ridge cap; flash and seal roof panels at eave and rake with rubber, neoprene, or other closures to exclude weather.
- C. Roof Sheets: Provide sealant tape at lapped joints of ribbed or fluted roof sheets, and between roof sheeting and protruding equipment, vents and accessories. Apply sealant tape continuous to clean, dry surface of weather side of fastenings on end laps and on sidelaps of corrugated or nesting type, ribbed or fluted panels and elsewhere to make weatherproof to driving rains.
- D. Wall Sheets: Apply elastomeric sealant continuous between metal base channel (sill angle) and concrete and elsewhere as necessary for waterproofing. Handle and apply sealant and back-up in accordance with sealant manufacturer's recommendations.
- E. Align bottoms of wall panels and fasten panels with blind rivets, bolts, or self-tapping screws. Fasten flashings, trim around openings, etc. with self-tapping screws; fasten window and door frames with machine screws or bolts. When building height requires two rows of panels at gable ends, align lap of gable panels over wall panels at eave height.
- F. Install screw fasteners with power tool having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- G. Sheet Metal Accessories: Install gutters, downspouts, ventilators and other sheet metal accessories in accordance with manufacturer's recommendations for positive anchorage to building and weathertight mounting. Adjust operating mechanism for precise operation.
- H. Align horizontal laps with adjacent roofing and siding panels.
- I. Seal intermediate end laps and side laps of translucent panels with translucent mastic.
- J. Clean panels in accordance with manufacturer's instructions.

### 3.3 METAL BUILDING INSULATION:

- A. Apply insulation units to substrate complying with manufacturer's recommendations. Insulation shall be dry, tight and free of wrinkles or sags. All joints shall be lapped a minimum of 3" and taped with pressure sensitive vinyl to match insulation color.
- B. Dissimilar Materials: Where aluminum surfaces come in contact with ferrous metal or other incompatible materials, keep aluminum surfaces from direct contact by applications to the other material as follows:

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1. One coat of zinc chromate primer, FS TT-P-645, followed by two coats of aluminum paint, SSPC-Paint 101.
  2. In lieu of 2 coats of aluminum paint, apply one coat of high-build bituminous paint, SSPC-Paint 12, applied to a thickness of 1/16" over zinc chromate primer.

3.4 WARRANTY:

- A. Metal building warranty is to be manufacturer's 20-year guaranteed weather tight.

END OF SECTION 13 34 19



