SECTION 13 34 19

PRE-ENGINEERED METAL BUILDING

PART 1 - GENERAL

1.01 Section Includes

A. Structural steel main building frames and secondary framing including purlins and girts, engineered and fabricated by the building systems supplier.

B. Insulated steel wall and roof system including soffits and gutters and downspouts.

1.02 Related Sections

A. Section 03 31 00 - Concrete, Forms and Reinforcement.

B. Section 07 21 16 - Metal Building Insulation.

C. Section 08 11 13 – Hollow Metal Doors and Frames.

D. Section 08 36 00 – Sectional Overhead Doors.

1.03 References

A. AISC 360 - Specification for Structural Steel Buildings, 3005.

B. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

C. ASTM A325 - Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

D. ASTM A475 - Specification for Zinc-Coated Steel Wire Strand.

E. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

F. ASTM A529 - Specification for High-Strength Carbon-Manganese Steel of Structural Quality.

G. ASTM A572 - Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.

H. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

I. ASTM A792 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

J. ASTM A1011 - Specification for Steel Sheet and Strip Hot Rolled Carbon, Structural High Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.

K. ASTM C665 - Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

L. AWS A2.4 - Standard Welding Symbols.

M. AWS D1.1 - Structural Welding Code - Steel.

N. AWS D1.3 - Structural Welding Code - Sheet Steel.

O. MBMA Low Rise Building Systems Manual, 2006.

P. NAIMA 202 - Standard for Flexible Fiberglass Insulation Systems in Metal Buildings, 2000.

1.04 System Description

A. Rigid frame single span.

B. Bay Spacing: As shown on the Drawings.

C. Roof Slope As indicated on Plans.

D. Primary Framing: Rigid frame of rafter beams and columns, intermediate columns end wall columns.

E. Secondary Framing: Purlins, girts, eave struts, flange bracing, and other items detailed.

F. Lateral Bracing: Horizontal loads not resisted by main frame action shall be resisted by cable or rod in the sidewall. Cable, rod, or portal frame in the endwall. Cable or rod in the roof.

G. Wall System: Preformed steel panels of vertical profile, with sub-girt framing/anchorage assembly, insulation, liner sheets, and accessory components.

H. Expandable Endwall Framing: Full frame with end posts where indicated.

I. Liner Panel:

J. Roof System: Preformed metal panels of upslope profile, with sub-girt framing/anchorage assembly, insulation, liner sheets, and accessory components.

1.05 Design Requirements

A. The building shall be designed by the Manufacturer as a complete system. Members and connections not indicated on the drawings shall be the responsibility of the Manufacturer and/or Contractor. All components of the system shall be supplied or specified by the same manufacturer.

B. Members to withstand building system dead loads, roof snow load, live, collateral loads, wind loads, building use (occupancy) category, and seismic loads. All loads shall be as required by the Wisconsin Commercial Building Code. All loads shall be proportioned and applied in accordance with the MBMA Low Rise Building Systems Manual.

C. Deflections shall be limited as follows:
   1. Primary Framing:
      a. L/180 for roof snow load
      b. H/120 for 10-year wind load
   2. Secondary Framing:
      a. Roof Framing for Gravity Load: L/150 for dead load + roof snow load; but not less than that required to maintain positive drainage for the greater of dead load + 1/2 roof snow load or dead load + 5 psf
   3. Wall and Roof Framing for Wind Load: L/120 for 10-year wind load.
   4. Sheeting: L/180 for roof snow load (but not less than 20 psf) where L is the span of the element between support points, and H is the eve height of the building. For 10-year wind values, use 75% of the 50-year wind pressure.

D. Assemble to permit movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects, when subject to a temperature range normal to the locality of the building location.

E. This facility shall be structurally designed as an essential facility.

1.06 Submittals

A. Submit anchor bolt placement plan.

B. Product Data: Provide data on profiles, component dimensions, fasteners, insulation and accessories.

C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, and loads; 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 foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

D. Samples: Submit samples of pre-coated metal panels showing full color range available.

E. Manufacturer's Installation Instructions: Indicate preparation requirements and assembly sequence.

1.07 Quality Assurance

A. Fabricate structural steel members in accordance with MBMA Metal Building Systems Manual, and, for items not covered, AISC - Specification for Structural Steel Buildings.

1.08 Qualifications

A. Design structural components, develop shop drawings, and perform shop and sitework under direct supervision of a Professional Structural Engineer experienced in design of this work.
   1. Design Engineer Qualification: Licensed in the State in which the Project is located.
   2. Conform to applicable code for submission of design calculations and reviewed shop and erection drawings as required for acquiring permits.
   3. Cooperated with regulatory agency or authority and provide data as requested.

B. Perform work in accordance with AISC 360 and MBMA Low Rise Building Systems Manual. Maintain one copy at site.

C. Erector shall have specialized experience in the erection of steel building systems for a period of at least three years.

1.09 Regulatory Requirements

A. Conform to applicable Wisconsin code for submission of design calculations.

B. Cooperate with regulatory agency or authority and provide data as requested.

1.10 Field Measurements

A. Metal building contractor shall verify that the field measurements are as indicated on erection drawings.

1.11 Warranty

A. Correct defective work within a five year period after the date of Substantial Completion.

B. Provide a twenty-year manufacturer warranty:

1. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturer's

A. Following is a list of acceptable manufacturers:
   1. Butler Manufacturing Company, www.butlermfg.com.
   2. Ceco Building Systems, www.cecobuildings.com.
   3. Chief Buildings, www.chiefbuildings.com.
   4. Kirby Building Systems, www.kirbybuildingsystems.com.
   5. Nucor Building Systems, nucorbuildingsystems.com.
   6. VP Buildings, www.vp.com.
   7. Or equal.

2.02 Materials - Primary Framing

A. Primary structural framing shall refer to the Primary Frames (transverse rigid frames and lean-to rafters/columns), expandable and non-expandable End Frames (rafters/corner posts/end posts). Wind/Seismic Bracing, and Crane Systems.

B. Hot Rolled Structural Steel Members:
   1. W Shapes: ASTM A529, Grade 50.
   2. Other Shapes: ASTM A572, Grade 50.

C. Sheet, Plate, Strip Mill Plate, Plate Coils and Flat Bar Stock: ASTM A-572, Grade 50; ASTM A-529, Grade50; OR ASTM A-1011-HSLAS, Grade 50 Class 1 as appropriate.

D. Interior Columns (Pipe or Tube): ASTM A500, Grade B.

E. Cold Formed Members: ASTM 1101, Grade 55 or ASTM 1101 HSLAS, Grade 55, Class 1.

F. Bracing Rods: ASTM A529, Grade 50.

G. Cables: Zinc coated steel wire (7 strands), ASTM A-475 EHS, Class A.

2.03 Secondary Framing

A. Secondary structural framing shall refer to purlins, girts, eave struts, base members, flange bracing, gable angles, clips and other miscellaneous structural parts.

B. Purlins, girts, eave struts, base members and gable angles: Cold-formed from steel, ASTM specification A-1011, SS, Grade 55 or ASTM A-1011-HSLAS, Grade 55, Class 1.

C. All other miscellaneous secondary members shall have a minimum yield strength of 36,000 psi

2.04 Connections

A. All field connections shall be bolted unless otherwise indicated.

B. Primary Bolted Connections: High strength bolts, ASTM A325.

C. Secondary Bolted Connections: Machine bolts, ASTM A307, unless ASTM A325 bolts are required by design.

D. Nuts:

1. Machine Bolts: ASTM A563, Grade A, Hex.
2. High Strength ASTM A-563, Grade C, Heavy Hex.

E. Washers: Cast Iron Slope Washers, ASTM A48, Class 30B.

2.05 Materials - Roof

A. Sheet Steel Stock: ASTM A792, aluminum-zinc alloy Coating Designation AZ55, Grade 50.

B. Insulation: Wall Insulation: See Section 07 21 16.10.

C. Minimum 24 gauge, UL 90 rated, mechanical seam edges, and 16 inch coverage.

D. Soffit Panels: Minimum 26 gauge, flat profile, perforated for ventilation.

E. Closures: Manufacturer's standard type.

F. Fasteners: Concealed (Exposed fasteners are not acceptable). Size to maintain load and weather tightness requirements.

G. Roof Panel Surfaces:
1. Exterior Surface: Pre-coated steel of Kynar 500® or Hylar® 70% fluoropolymer coating; .
   a. Roof Color: Standard of Quality to match is *Ash Grey with White trim* as manufactured by McElroy Metals, Bossier City, LA.
2. Interior Surface: Pre-coated steel with wash coat of manufacturer's standard finish.

2.06 Materials - Walls

A. Sheet Steel Stock: ASTM A792, aluminum-zinc alloy Coating Designation AZ55, Grade 50.

B. Wall Insulation: See Section 07 21 16.10.

C. Siding:
1. Vee Rib Panel: 36-inch wide net coverage with a V-groove pattern creating 1-1/4-inch reveals with major corrugations spaced 12" on center.
2. Minimum 26 gauge.

D. Liner: Minimum 26 gauge metal thickness, ¾-inch ribs at 6" on center lapped edges. (See drawings for height of liner panels).

E. Closures: Manufacturer's standard type.

F. Fasteners: Concealed. (Exposed fasteners are not acceptable).

G. Wall Panel Surfaces:
1. Exterior Surface: Pre-coated steel of Kynar 500® or Hylar® 70% fluoropolymer coating;
   a. Color: Standard of Quality to match is *Ash Grey with White trim* as manufactured by McElroy Metals, Bossier City, LA
2. Interior Surface: Pre-coated steel with wash coat of manufacturer's standard finish.

2.07 Materials - Flashing and Trim

A. Flashings, Internal and External Corners, Closure Pieces, Fascia, and Caps: Same material and finish as adjacent material, profile to suit system. Color as selected from manufacturer's standard colors.

B. Form flashing and trim sections in maximum possible lengths. Hem exposed edges.

2.08 Materials - Sealants

A. Sealants for side laps, end laps, accessories, etc. shall be a preformed, butyl rubber based compound. The material shall be non-hardening, non-shrinking and non-corrosive and shall have excellent adhesion to metals, painted surfaces and plastics at temperatures from -30°F to 160°F. These sealants shall be in tape mastic form, of shape and size recommended by metal building manufacturer for various applications, and shall have paper backing for easy handling.

B. Tube sealants shall be used to supplement tape mastic sealants and shall be applied in locations indicated by erection instructions. Tube sealant shall be a synthetic, elastomer-based material which becomes tack-free in less than 2 hours at 75°F but retains flexibility.

2.09 Materials - Accessories

A. Ventilator: Continuous ridge.

B. Provide Framing for openings.

C. Curbs for HVAC equipment, skylights, hatches, etc. shall be compatible with steel roof panel and sealed against water penetration in accordance with building manufacturer's instructions. Curbs shall accommodate the expansion and contraction movement of standing seam roofs.

2.10 Fabrication - Framing

A. Fabricate members in accordance with AISC Specification for plate, bar, tube, or rolled shapes.

B. Fabricate cold-formed members in accordance with MBMA Low Rise Building Systems Manual.

C. Anchor bolts: Formed with bent shank, assembled with template for casting into concrete.

D. Provide framing for all openings in walls and roof.

2.11 Gutters and Downspouts

A. Gutters: Galvanized steel sheet, ASTM A653.
   1. Style: K-style.
   2. Thickness: 24 gauge.
   3. Size: Minimum 6 inch.

B. Downspouts: Galvanized steel, ASTM A653.
   1. Style: Plain square.
   2. Thickness: 24 gauge.
   3. Size: 4”x5”.

C. End Caps: Galvanized steel sheet, ASTM A653, 24 gauge.

D. Elbows: Galvanized steel sheet, ASTM A653, 24 gauge.

E. Finish: Kynar 500® or Hylar® 70% fluoropolymer coating; color as selected by Owner from manufacturer’s standard colors.

F. Downspout Anchors: Provide types required to suit project requirements.

G. Gutter Hangers and Anchors: Galvanized steel. Provide types required to suit project requirements.

2.12 Snow Guards

A. Standard of Quality: Products is based *Sno Barricade Bar System* as manufactured by Sno-Gem, McHenry, IL.
   1. Finish: Kynar Coating.
   2. Color: to be selected from Manufacturer's standard color pallete to match adjacent metal roof color.
   3. Accessories: Barricade plate
   4. Attachment type:
      a. Clamp-on to standing seam

PART 3 - EXECUTION

3.01 Examination

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position and properly squared.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Erection - Framing

A. Erect framing in accordance with MBMA Low Rise Building Systems Manual and AISC 360 and the approved shop drawings.

B. Use templates for accurate setting of anchor bolts. Level bearing plate area with steel wedges or shims. Set column base plates with non-shrink grout to achieve full plate bearing.

C. Erect building frame true and level with vertical members plumb and bracing properly installed. Maintain structural stability of frame during erection.

D. Ream holes requiring enlargement to admit bolts. Burned holes for bolted connections are not permitted without written approval by designer. Burned holes to be reamed.

E. Tighten bolts and nuts in accordance with AISC Manual of Steel Construction, Specification for Structural Joints ASTM A325 or A490 bolts. For primary connections and tighten to snug tight condition unless otherwise noted by manufacturer. For pre-tensioned joints tighten by turn-of-the-nut method. For secondary connections tighten to snug tight condition unless noted otherwise by manufacturer.

F. The erector shall furnish temporary guys and bracing where needed for squaring, plumbing, and securing the structural framing against loads, such as wind loads acting on the exposed framing and seismic forces, as well as loads due to erection and erection operation, but not including loads resulting from the performance of work by others. Bracing furnished by the manufacturer for the metal building system cannot be assumed to be adequate during erection and are not to be used to pull frames into plumb condition.

G. Do not field cut or modify structural members without approval of the metal building manufacturer.

H. After erection, erector to prime welds, abrasions, and surfaces not shop primed or needing touch-up.

3.03 Erection - Wall and Roofing Systems

A. Install all wall and roofing systems in accordance with manufacturer's instructions and details.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, using proper fasteners aligned level and plumb.

D. Set purlins and girts at right angle and bolt to appropriate clips. Attach to clips as required to satisfy design loads and as shown on drawings.

E. Place Standing Seam Roof panels at right angle to purlins. Attach with sliding concealed clip where expansion and contraction must be accounted for. Lap panel ends as recommended by manufacturer's standard and panel notch. Place end laps above purlin with backup plate and cinch strap so panel end-lap fasteners do not penetrate purlin.

3.04 Erection - Gutters, Downspouts

A. Install gutters using appropriate hangers to allow normal expansion and contraction.

B. All gutters shall be in continuous length for each elevation (run).

C. Gutters shall be installed for northern climates.

D. Install sealants to clean dry surfaces only without skips or voids.

E. Downspouts shall be connected to storm sewer system.

3.05 Installation - Accessories

A. Install door frames, doors, overhead doors, and windows in accordance with manufacturer's instructions.

B. All roof and wall accessories to be installed weathertight.

3.06 Tolerances

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

END OF SECTION