

August 14, 2013

**ATTENTION ALL REQUEST FOR BID (RFB) HOLDERS**

**RFB NO. 313072- ADDENDUM NO. 3**

**ALLIANT ENERGY CENTER PAVILIONS**

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**BIDS DUE:** THURSDAY, AUGUST 22, 2013, 2:00 PM. DUE DATE AND TIME ARE NOT CHANGED BY THIS ADDENDUM.

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This Addendum is issued to modify, explain or clarify the original Request for Bid (RFB) and is hereby made a part of the RFB. Please attach this Addendum to the RFB. **Bidders must acknowledge all Addenda on the Bid Form.**

**PLEASE MAKE THE FOLLOWING CHANGES:**

- 1. Section 13 34 19 – Metal Building Systems**
  - A. Page 2, Item 1.5, add Paragraph 8 to describe lateral deflection. See revised Section 13 34 19 which is attached to this addendum.
  - B. Page 9, Item 2.4, Wall Panel Systems, revise the requirements for gauge and finish. See revised Section 13 34 19 which is attached to this addendum.
  - C. Page 9, Item 2.5, Liner Panel, revise the specifications as shown on revised Section 13 34 19 which is attached to this addendum.
  - D. Page 10, Item 2.7, delete this item. [HM doors and frames not by this section.]
  - E. Page 14, Item 2.11, delete this item. [HM doors and frames not by this section.]
  - F. Page 16, Item 2.12.I, add Paragraph 2 to describes location of snow guards. See revised Section 13 34 19 which is attached to this addendum.
  - G. Page 22, Item 3.8, delete this item. [HM doors and frames are not by this section.]
- 2. Sheet A201F**
  - A. 5/A201E, at note to describe Alternate #5, add: “Omit the rigid foam insulation on the interior face of concrete walls above grade and omit the metal liner panel.”
- 3. Wall Sections and Details**
  - A. On all wall sections and details depicting pre-engineered metal building systems, where the words “code minimum” is used to describe the thermal insulation, the insulation shall be as follows:
    - a. Roof of Area B:
      - i. Option 1: Combination of thermal blocks and blanket insulation (including vapor barrier) sufficient to achieve an R-value of 22.8, such as “Superblock System” by VP Buildings, or
      - ii. Option 2: Standard thermal blocks on top of purlins and blanket insulation between purlins (including vapor barrier) in a total thickness sufficient to achieve an overall system R-value of 22.8.

- b. Walls of Area B: R-19 blanket insulation (including vapor barrier).
- c. Roof of Areas C and D: R-11 blanket insulation (including vapor barrier).
- d. Walls of Areas C and D: R-11 blanket insulation (including vapor barrier).

**4. Sheet M202D and Detail 9/M301**

- A. Clarification: the vertical elements called out as “fan discharge baffles” are provided by the HVAC contractor.

**5. Sheet A507**

- A. 2/A507, clarification: the vertical column of structural steel tube frame is attached to the concrete pier per Detail 13/S800. Visible surfaces of the structural steel tube frame are to be field painted after installation.

**6. Sheet A507 and A508**

- A. Where drawings call out to provide “standing seam fascia panel” or similar wording, the vertical metal panel shall be a standing seam concealed-fastener panel with minimum 1-inch high seams, similar to “SS-12” panel from VP Buildings. Color shall match standing seam roof.
- B. Where drawings call out to provide “soffit panel” or similar wording, the metal panel shall be a concealed-fastener panel with flush joints, similar to “FP-12” panel from VP Buildings. Base material shall be 24 guage and color shall match standing seam roof.

**7. Sheet A508**

- A. 2/A508, revise the detail in the mechanical equipment area as shown on Sheet RD3.1 which is attached to this addendum. Except for revisions noted on Sheet RD3.1, the remainder of the detail is not changed.

**8. Sheets A201B, A201C, and A201D**

- A. Clarification: at rooms 129, 129A, 130, 132, 132A, 133, 149, 149A, and 150, the upper portion of all partitions is to be provided as pre-engineered metal building construction per Section 1/A507.

**9. Sheet A506**

- A. 3/A506, clarification: on Grid Line 32, this section occurs between Grid Lines AA and DD and is to be provided as pre-engineered metal building construction. Material called out as ribbed metal panel is PNL-2.

**10. Sheet A501**

- A. 2/A501, clarifications
  - a. The elevation of top of PEMB steel frame at Grid Lines B and G is 122'-0”
  - b. The roof slope between Grid Lines D and H is 1:12.
  - c. The roof slope between Grid Lines A and E is ¼:12

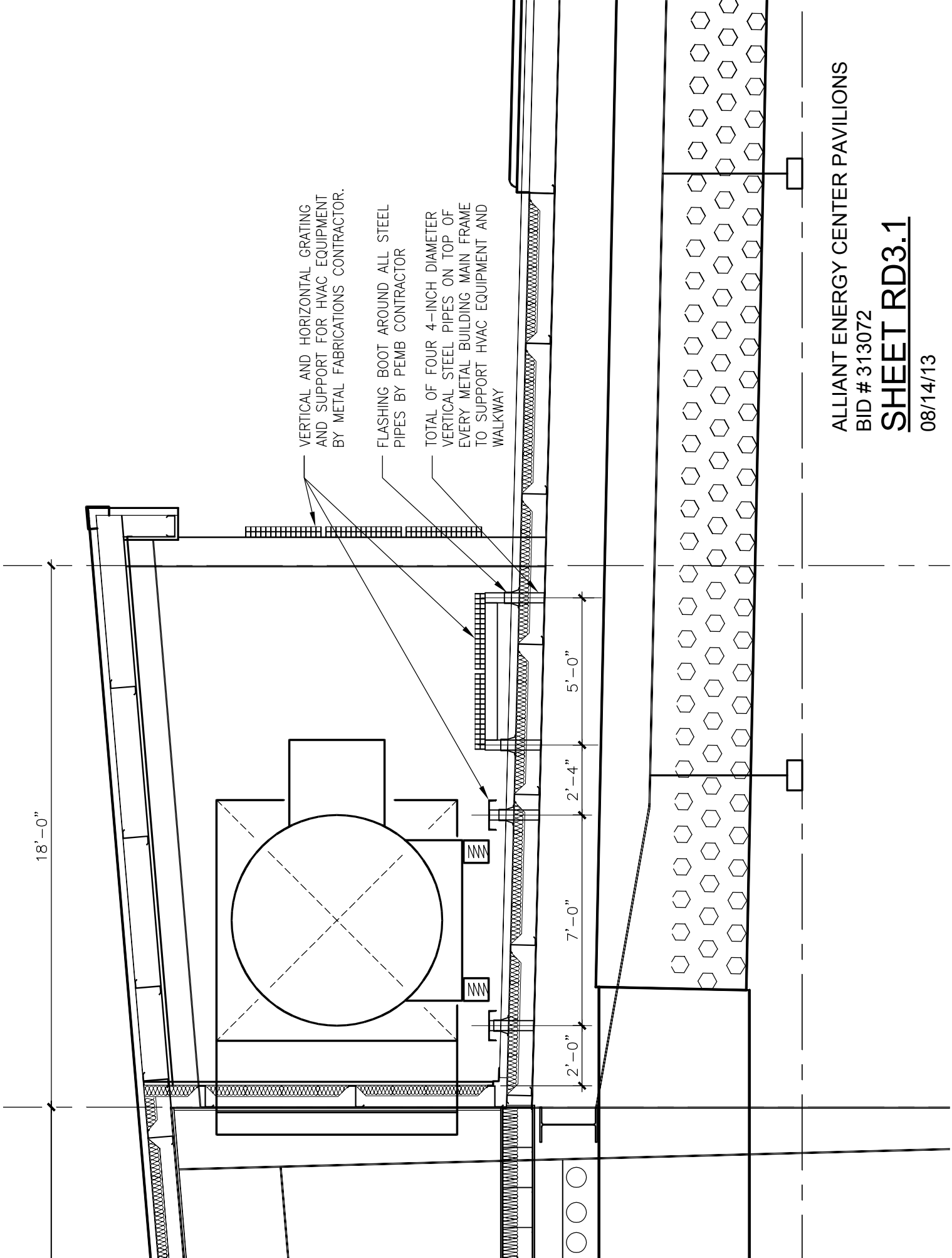
If any additional information about this Addendum is needed, please call J. Eric Urtes, AIA at 608/266-4798 [urtes.eric@countyofdane.com](mailto:urtes.eric@countyofdane.com).

Sincerely,  
*J. Eric Urtes, AIA*  
Project Manager

Enclosures:

Sheet RD3.1, 8½ x 11 dated 08/14/13

Section 13 34 19, 23 pages dated 08/14/13



ALLIANT ENERGY CENTER PAVILIONS  
 BID # 313072  
**SHEET RD3.1**  
 08/14/13

## **SECTION 13 34 19 - METAL BUILDING SYSTEMS**

### **PART 1 - GENERAL**

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes metal building systems that consist of integrated sets of mutually dependent components including structural framing, roof panels, wall panels, doors and frames, and accessories.
- B. Related Sections include the following:
  - 1. Division 3 Section "Cast-in-Place Concrete" for concrete foundations, slabs, and anchor-bolt installation.
  - 2. Division 5 Section "Structural Metal Framing"
  - 3. Division 8 Section for coordination of hardware not included in this scope.
  - 4. Division 8 Section "Hollow metal Doors and Frames."
  - 5. Division 8 Section "Overhead Coiling Doors."
  - 6. Division 8 Section "Sectional Overhead Doors."

#### 1.3 DEFINITIONS

- A. Bay: Dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension from centerline of first interior main frame measured normal to end wall (outside face of end-wall girt) for end bays.
- B. Building Length: Dimension of the building measured perpendicular to main framing from end wall to end wall (outside face of girt to outside face of girt).
- C. Building Width: Dimension of the building measured parallel to main framing from sidewall to sidewall (outside face of girt to outside face of girt).
- D. Clear Span: Distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame or knee).
- E. Eave Height: Vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).

#### 1.4 SYSTEM DESCRIPTION

- A. General: Provide a complete, integrated set of manufacturer's mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior. Include primary and secondary framing, roof and wall panels, insulation, and accessories complying with requirements indicated.
  - 1. Provide metal building system of size and with spacings, slopes, and spans indicated on Drawings.

## 1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal building systems capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Engineer metal building systems according to procedures in MBMA's "Metal Building Systems Manual."
  - 2. Design Loads: As indicated on Drawings.
  - 3. Collateral Loads: Include additional dead loads other than the weight of metal building system for permanent items such as sprinklers, mechanical systems, electrical systems, and ceilings.
  - 4. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations as required by applicable codes.
  - 5. Deflection Limits: Engineer assemblies to withstand design loads with deflections no greater than the following:
    - a. Purlins and Rafters: Vertical deflection of 1/180 the span.
    - b. Girts: Horizontal deflection of 1/180 of the span.
    - c. Metal Roof Panels: Vertical deflection of 1/180 of the span.
    - d. Metal Wall Panels: Horizontal deflection of 1/180 of the span.
  - 6. Design secondary framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.
  - 7. Provide metal panel assemblies capable of withstanding the effects of loads and stresses indicated, based on testing according to ASTM E 1592.
  - 8. Lateral deflection: design primary structure for a maximum horizontal deflection of height/90, and design primary structure for a maximum of 1 inch of horizontal movement at the top of the concrete walls.
- B. Seismic Performance: Design and engineer metal building systems capable of withstanding the effects of earthquake motions determined according to applicable codes.
- C. Thermal Movements: Provide metal panel systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components,

failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- D. Thermal Performance: Provide insulated metal panel assemblies with the following maximum U-factors and minimum R-values for opaque elements when tested according to ASTM C 1363 or ASTM C 518 as indicated on Drawings.
- E. Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft.
- F. Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at static-air-pressure difference of [6.24 lbf/sq. ft.
- G. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft.
- H. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.
- I. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

## 1.6 SUBMITTALS

- A. Product Data: Submit metal building system manufacturer's product information, specifications, and installation instructions for building components and accessories.
- B. Erection Drawings: Submit metal building system manufacturer's erection drawings, including plans, elevations, sections, and details, indicating roof framing, transverse cross-sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components.
  - 1. For installed products 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: Submit anchor-bolt plans before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
  - 3. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
- C. Certification: Submit written "Certificate of design and manufacturing conformance" prepared and signed by a Professional Engineer, registered to practice in Wisconsin

verifying that the metal building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.

1. Certification shall reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end-use categories, governing code bodies, including year, and load applications.
- D. Color chart for Initial Selection: For each type of building component with factory-applied color finish.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of minimum 6" x 6" size.
- F. Warranties: Special warranties specified in this Section.

#### 1.7 QUALITY ASSURANCE

- A. Erector Qualifications: An experienced erector 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. Structural Steel: Comply with AISC's "Specification for Structural Steel Buildings-- Allowable Stress Design, Plastic Design," or AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- C. Cold-Formed Steel: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members," or AISI's "Load and Resistance Factor Design Specification for Steel Structural Members," for design requirements and allowable stresses.
- D. Fire-Resistance Ratings: Where indicated, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  1. Combustion Characteristics: ASTM E 136.
  2. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
  3. Metal panels shall be identified with appropriate markings of applicable testing and inspecting agency.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.



- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness and with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

## 1.9 COORDINATION

- A. 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."
- B. Coordinate installation of accessories which are specified in Division 7 Section "Roof Accessories."
- C. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

## 1.10 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam, metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
  - 1. Warranty Period: 20 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed below. No other manufacturers will be considered unless approved in advance by the Architect.
  - 1. American Buildings Company.
  - 2. Butler Manufacturing Company.
  - 3. Nucor Building Systems
  - 4. VP Buildings, Inc.

## 2.2 STRUCTURAL-FRAMING MATERIALS

- A. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50.
- B. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M; unless ASTM A 572/A 572M, Grade 50 or ASTM A 529/A 529M, Grade 50 required for plate in main building components.
- D. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
- F. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70; or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80, or High-Strength Low Alloy Steel (HSLAS), Grades 45 through 70.
- G. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
  - 1. Finish: Plain.
- H. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
  - 1. Finish: Plain.
  - 2. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with splined ends.
    - a. Finish: Plain.
- I. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.

- J. Unheaded Anchor Rods: ASTM F 1554, Grade 36, ASTM A 36, ASTM A 307, Grade A or ASTM A 572/A 572M, Grade 50, as required by design.
1. Configuration: Straight.
  2. Nuts: ASTM A 563 hex carbon steel.
  3. Plate Washers: ASTM A 36 carbon steel.
  4. Washers: ASTM F 436 hardened carbon steel.
  5. Finish: Plain.
- K. Headed Anchor Rods: ASTM F 1554, Grade 36 or ASTM A 307, Grade A, straight.
1. Nuts: ASTM A 563 hex carbon steel.
  2. Plate Washers: ASTM A 36 carbon steel.
  3. Washers: ASTM F 436 hardened carbon steel.
  4. Finish: Plain.
- L. Threaded Rods: ASTM A 193; ASTM A 572, Grade 50; ASTM A 36; ASTM A 307, Grade A; any as required by design.
1. Nuts: ASTM A 563 hex carbon steel.
  2. Washers: ASTM F 436 hardened steel.
  3. Finish: Plain.
- M. Primer: SSPC-Paint 15, Type I, red oxide.

## 2.3 METAL ROOF SYSTEM

- A. Basis of design: manufacturer's standard standing seam roof system.
1. Seams shall be designed for field assembly using a seaming machine that is provided by the PEMB manufacturer.
- B. Roof System Design:
1. Design roof panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
  2. Design roof paneling system to support design live, snow, and wind loads.
  3. Endwall Trim and Roof Transition Flashings: Allow roof panels to move relative to wall panels and/or parapets as roof expands and contracts with temperature changes.
- C. Roof System Performance Testing:
1. UL Wind Uplift Classification Rating, UL 580: Class 90.
  2. Structural Performance Under Uniform Static Air Pressure Difference: Test roof system in accordance with ASTM E 1592.
- D. Roof Panels:

1. Factory roll-formed, 24 inches wide, with 2 major corrugations, 2 inches high (2-3/4 inches including seam), 24 inches on center.
2. Flat of the Panel: Cross flutes 6 inches on center, perpendicular to major corrugations in entire length of panel to reduce wind noise.
3. Variable Width Panels:
  - a. For roof lengths not evenly divisible by the 2'-0" panel width, factory-manufactured variable-width (9-inch, 12-inch, 15-inch, 18-inch, and 21-inch-wide) panels shall be used to ensure modular, weathertight roof installation.
  - b. Supply maximum possible panel lengths.
4. Panel Material and Finish:
  - a. 24-gauge steel coated both sides with layer of Galvalume aluminum-zinc alloy (approximately 55 percent aluminum, 45 percent zinc) applied by continuous hot-dip method.
  - b. Minimum 0.55-ounce coated weight per square foot as determined by triple-spot test, ASTM A 792.
5. Use panels of maximum possible lengths to minimize end laps.
6. Extend eave panels beyond structural line of sidewalls.
7. Factory punch panels at panel end to match factory-punched holes in eave structural member.
8. Panel End Splices: Factory punched and factory notched.
9. Panel End Laps: Locate directly over, but not fastened to, a supporting secondary roof structural member and be staggered, to avoid 4-panel lap-splice condition.
10. End Laps: Floating. Allows roof panels to expand and contract with roof panel temperature changes.
11. Self-Drilling Fasteners: Not permitted in weathering membrane of roof system.
12. Ridge Assembly:
  - a. Design ridge assembly to allow roof panels to move lengthwise with expansion and contraction as roof panel temperature changes.
  - b. Factory punch parts for correct field assembly.
  - c. Install panel closures and interior reinforcing straps to seal panel ends at ridge.
  - d. Do not expose attachment fasteners on weather side.
  - e. Use lock seam plug to seal lock seam portion of panel.
  - f. High-Tensile Steel Ridge Cover: Span from panel closure to panel closure and flex as roof system expands and contracts.

## 2.4 WALL PANEL SYSTEMS

- A. Basis of design:
  1. "Panel Rib Wall" panel by Varco Pruden, or equal by other manufacturers.

- B. Wall System Design: Design wall panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
- C. Wall Panels:
1. Roll-formed panels, 3 feet wide, 26 gauge steel.
  2. Major Rib Spacing: 12 inches on center.
  3. Rib Height: 1 1/4 inches.
  4. One piece from base to building eave.
  5. Finish:
    - a. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA standard and with coating and resin manufacturers' written instructions
    - b. Metal panels, PNL-2 & PNL-3: provide custom metallic color to match Architect's sample.
- D. Fasteners:
1. Fasteners: Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with nylon or polypropylene washer.
  2. Fastener Locations: Indicated on erection drawings furnished by metal building system manufacturer.
  3. Exposed Fasteners: Factory painted to match wall color.

## 2.5 LINER PANEL SYSTEMS

- A. System Design: Design wall panels in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
- B. Tapered-Rib-Profile, Metal Liner Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
1. Material: 28 gauge steel
    - a. Exterior Finish: Acrylic enamel.
    - b. Color: Manufacturer's standard white.
  2. Major-Rib Spacing: 6 to 12 inches.
  3. Panel Coverage: 36 inches
  4. Panel Height: 1 inch nominal.

C. Fasteners:

1. Exposed Fasteners: Provide factory painted to match panel color.

## 2.6 THERMAL INSULATION FOR FIELD-ASSEMBLED METAL PANELS

A. Metal Building Insulation: Owens-Corning Fiberglas "Certified R", NAIMA 202, or equal, with flame-spread index of 25 or less.

B. Roof and Wall Insulation Facing: PSK Standard Duty (WMP-10)

1. 0.0015-inch-thick, UV-stabilized, white metalized polypropylene laminated to 14-pound Kraft paper, reinforced with glass-fiber scrim.
2. Adhere facing to fiberglass blanket.
3. Assembly of Insulation Blanket and Facing:
  - a. Flame Spread Rating: Less than 25.
  - b. UL Label: Submit as specified in Submittals article of this section.
  - c. Perm Rating: 0.02.

C. Retainer Strips: 0.019-inch-thick, formed, galvanized steel or PVC retainer clips colored to match insulation facing.

D. Insulation support for full depth roof insulation: Insul Basket or equal.

E. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

## 2.7 MISCELLANEOUS MATERIALS

A. Metal Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
2. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

## 2.8 FABRICATION, GENERAL

A. General: Design components and field connections required for erection to permit easy assembly.

1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.

2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual": Chapter IV, Section 9, "Fabrication and Erection Tolerances."
  - C. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
    1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

## 2.9 STRUCTURAL FRAMING

- A. General:
  1. Primary Framing: Shop fabricate framing components to indicated size and section with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
    - a. Make shop connections by welding or by using high-strength bolts.
    - b. Join flanges to webs of built-up members by a continuous submerged arc-welding process.
    - c. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
    - d. Weld clips to frames for attaching secondary framing members.
    - e. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary structural members with specified primer after fabrication.
  2. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, 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.
    - a. Make shop connections by welding or by using non-high-strength bolts.
    - b. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary structural members with specified primer after fabrication.
- B. Primary Framing: Manufacturer's standard structural primary framing system, designed to withstand required loads and specified requirements. Primary framing includes

transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
    - a. Slight variations in span and spacing may be acceptable if necessary to meet manufacturer's standard, as approved by Architect.
  2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
- C. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch.
  2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; with minimum thickness of 0.0598 inch; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
- D. Secondary Framing: Manufacturer's standard secondary framing members, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Fabricate framing from cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet prepainted with coil coating, unless otherwise indicated, to comply with the following:
1. Purlins: C- or Z-shaped sections; fabricated from minimum 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes; minimum 2-1/2-inch-wide flanges.
    - a. Depth: As indicated on Drawings or as required to comply with system performance requirements
  2. Purlins: Where indicated, provide steel joists of depths indicated.
  3. Girts: C- or Z-shaped sections; fabricated from minimum 0.0598-inch-thick steel sheet, built-up steel plates, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees to flange and with minimum 2-1/2-inch-wide flanges.
    - a. Depth: As indicated on Drawings or as required to comply with system performance requirements
    - b. Eave Struts: Unequal-flange, C-shaped sections; fabricated from 0.0598-inch thick steel sheet, built-up steel plates, or structural-steel shapes; to provide adequate backup for metal panels.



4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary frame flanges.
  5. Base or Sill Angles: Minimum 3-by-2-by-0.0598-inch zinc-coated (galvanized) steel sheet.
  6. Purlin and Girt Clips: Minimum 0.0598-inch-thick, steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
  7. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from minimum 0.0598-inch-thick, structural-steel sheet.
  8. Framing for Openings: Channel shapes; fabricated from minimum 0.0598-inch-thick, cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings, and head, jamb, and sill of other openings.
  9. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- E. Bracing: Provide adjustable wind bracing as follows:
1. Bracing: Provide wind bracing using any method specified below, at manufacturer's option.
  2. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
  3. Cable: ASTM A 475, 1/4-inch diameter, extra-high-strength grade, Class B zinc-coated, 7-strand steel; with threaded end anchors.
  4. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
  5. Rigid Portal Frames: Fabricate from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
- F. Bolts: Provide plain finish bolts for structural-framing components that are primed or finish painted. Provide galvanized bolts for structural-framing components that are galvanized.
- G. Factory-Primed Finish: Apply specified primer immediately after cleaning and pretreating.
1. Prime primary, secondary, and end-wall structural-framing members to a minimum dry film thickness of 1 mil.
    - a. Prime secondary steel framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil on each side.
  2. Prime galvanized members with specified primer, after phosphoric acid pretreatment.

## 2.10 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
- B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
  2. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
  3. Cleats: Manufacturer's standard, mechanically seamed.
  4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
  6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1 inch standoff; fabricated from extruded polystyrene.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
  2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- D. Flashing and Trim: Formed from material to match wall panels, in color selected by Architect from full range of manufacturer's standard colors.

1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
- E. Gutters: Formed from material to match wall panels, in color selected by Architect from full range of manufacturer's standard colors. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters; spaced maximum of 36 inches o.c.
  2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
- F. Downspouts: Formed from material to match wall panels, in color selected by Architect from full range of manufacturer's standard colors. Fabricate in minimum 10-foot long sections, complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters
- G. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- H. Skylights (Unit Price item):
1. Provide Unit skylight specifically designed to interface with roof panel ribs with the following features:
    - a. Size: Nominal 2 feet wide (to bridge rib spacing) x 10 feet long.
    - b. Heavy duty prismatic double domes of impact-resistant, UV resistant modified acrylic plastic.
    - c. Self flashing curb to fit roof panel ribs.
    - d. Water diverter detailing on up-slope end.
    - e. Thermally broken frame.
    - f. High performance silicone seals from dome to curb.
    - g. Detailed for roof insulation tie-in.
- I. Snow Guards:
2. Basis-of-Design Product: Subject to compliance with requirements, provide "Sno Gem Original" as manufactured by Sno Gem, Inc., 4800 Metalmaster Way, McHenry, IL, 60050; or comparable product by one of the following:
    - a. Alpine SnowGuards; a division of Vermont Slate & Copper Services, Inc.
    - b. Berger Building Products.
    - c. PMC Industries, Inc.
    - d. Roofers Edge.
    - e. Sieger Snow Guards Inc.

- f. SnoGuard.
- g. TRA-MAGE, Inc.
- h. Zaleski Snow-Guards for Roofs, Inc.
- i. Architect pre-approved equal.

3. Location:

- a. Provide snow guards on the roof of Building E only.
- b. Provide three rows of snow guards parallel to the low edge of the roof @ 12" o.c. horizontally between ribs of metal roof.
- c. Locate the first row 24 inches from roof edge. Locate two additional rows @ 10 feet o.c.

## 2.11 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **PART 3 - EXECUTION**

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with erection only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.
- B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place, unless otherwise indicated.

### 3.3 ERECTION OF STRUCTURAL FRAMING

- A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.

- B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.
- C. Set structural framing accurately 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: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.
- F. Primary Framing and End Walls: Erect framing true to line, level, plumb, rigid, and secure. Level baseplates 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. Moist cure grout for not less than seven days after placement.
  - 1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
- a. Joint Type: Snug tightened or pretensioned.
- G. Secondary Framing: Erect framing true to line, level, plumb, rigid, and secure. Fasten secondary framing to primary framing using clips with field connections using non-high-strength bolts.
  - 1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
  - 2. Locate and space wall girts to suit openings such as doors and windows.
  - 3. Locate canopy framing as indicated.
  - 4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

- H. Steel Joists: Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications, Load Tables, and Weight Tables for Steel Joists and Joist Girders," joist manufacturer's written recommendations, and requirements in this Section.
1. Before installation, splice joists delivered to Project site in more than one piece.
  2. Space, adjust, and align joists accurately in location before permanently fastening.
  3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  4. Bolt joists to supporting steel framework using carbon-steel bolts, unless otherwise indicated.
  5. Bolt joists to supporting steel framework using high-strength structural bolts, unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
  6. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
- I. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
1. Tighten rod and cable bracing to avoid sag.
  2. Locate interior end-bay bracing only where indicated.
- J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

### 3.4 METAL PANEL INSTALLATION, GENERAL

- A. Examination: Examine primary and secondary framing to verify that structural panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
1. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before metal panel installation.
- B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.

- a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
  - 2. Install metal panels perpendicular to structural supports, unless otherwise indicated.
  - 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
  - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  - 6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- C. Lap-Seam Metal Panels: Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or metal panels. Install screws in predrilled holes.
- 1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal panel manufacturer.
- 1. Seal metal panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal panel manufacturer.
  - 2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

### 3.5 METAL ROOF PANEL INSTALLATION

- A. General: Provide metal roof panels of full length from eave to ridge, unless otherwise indicated or restricted by shipping limitations.
  - 1. Install ridge caps as metal roof panel work proceeds.
  - 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

- B. Field-Assembled, Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
  2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
  3. Seamed Joint: Crimp standing seams with manufacturer-provided motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
  4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Pre-drill panels for fasteners.
  5. Provide metal closures at eaves, peaks, and rakes.

### 3.6 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
  2. Shim or otherwise plumb substrates receiving metal wall panels.
  3. When two rows of metal panels are required, lap panels 4 inches minimum.
  4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
  5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.
  6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  7. Install screw fasteners in pre-drilled holes.
  8. Install flashing and trim as metal wall panel work proceeds.
  9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated, or if not indicated, as necessary for waterproofing.
  10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws.
  11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Field-Assembled, Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.
1. Field-Insulated Assemblies: Install thermal insulation as specified. Install metal liner panels over insulation on interior side of girts at locations indicated. Fasten with exposed fasteners as recommended by manufacturer.



### 3.7 THERMAL INSULATION INSTALLATION FOR FIELD-ASSEMBLED METAL PANELS

- A. General: Install insulation concurrently with metal wall panel installation, in thickness indicated to cover entire wall, according to manufacturer's written instructions.
  - 1. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
  - 2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
  - 3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths with both sets of facing tabs sealed to provide a complete vapor retarder.
  - 4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation with both sets of facing tabs sealed to provide a complete vapor retarder.
  
- B. Blanket Roof Insulation: Comply with the following installation method:
  - 1. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder facing tabs up and over purlin, overlapping adjoining facing of next insulation course maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
  - 2. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
  - 3. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
  
- C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by metal wall panels fastened to secondary framing.
  - 1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.

### 3.8 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
  - 2. Install components for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

3. Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed 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 without excessive oil canning, buckling, and tool marks and 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 and to result in waterproof and weather-resistant performance.
  2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 4 feet o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
1. Provide elbows at base of downspouts to direct water away from building.
  2. Tie downspouts to underground drainage system if indicated on Drawings.
- E. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.
- F. Snow guards: attach snow guards to roof surface with adhesive as recommended by manufacturer.

### 3.9 ADJUSTING

- A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.
- B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

### 3.10 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing and accessories.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 9 painting Sections.
- D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
  - 1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. Doors and Frames: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

END SECTION 13 34 19