

# **SECTION 05440- PRE-ENGINEERED COLD-FORMED METAL ROOF AND FLOOR TRUSSES**

## **PART 1 GENERAL**

### **1.01 SUMMARY**

- A. Section includes pre-engineered, pre-fabricated cold formed steel framing elements. Work includes:
  - 1. Cold formed steel open web floor trusses.
  - 2. Cold formed steel roof trusses.
  - 3. Anchorage, bracing and bridging.
- B. Related work
  - 1. Drywall attachment
  - 2. Roofing, fascia, soffit

### **1.02 REFERENCES**

- A. Reference standards:
  - 1. ASTM A653/A653M-97 "Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvanealed) by the Hot Dip Process." ASTM A780-93a "Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings."
  - 2. American Welding Society (AWS) AWS D1.1 "Structural Welding Code - Steel." AWS D1.3 "Structural Welding Code - Sheet Steel."

### **1.03 PERFORMANCE REQUIREMENTS**

- A. AISI "Specifications": Cold-formed steel truss members and components shall be engineered in accordance with AISI's "Specification for the Design of Cold-Formed Steel Structural Members, (1996 Edition)."
- B. Structural Performance: Design, engineer, fabricate, and erect cold-formed steel trusses to withstand specified design loads within limits and under conditions required.
  - 1. Design Loads: As specified.
  - 2. Deflections: Live load deflection meeting the following (unless otherwise specified):
    - a. Floor Trusses: Vertical deflection less than or equal to 1/360 of the span.
    - b. Roof Trusses: Vertical deflection less than or equal to 1/240 of the span.
  - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F (67 deg C).

### **1.04 SUBMITTALS**

- A. Submit manufacturer's product data and installation instructions for each type of cold-formed steel framing and accessory required.
- B. Submit drawings showing member type, configuration, location, spacing, size and thickness of members, method of attachment to supporting members, method of connecting member to member, erection details, supplemental bracing, strapping, splices, bridging, and other accessories and details required for proper installation.
- C. Submit detailed floor truss and roof truss layouts.
- D. Submit truss drawings, sealed and signed by a qualified registered Professional Engineer, verifying ability to meet local code and design requirements.

Include:

- 1. Description of design criteria.

2. Engineering analysis depicting member stresses and truss deflection.
3. Truss member sizes and gauges and connections at truss joints.
4. Top chord, Bottom chord and Web bracing requirements.

### **1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Fabrication shall be performed by an experienced cold-formed steel truss fabricator with not less than three satisfactory experiences designing and fabricating cold-formed steel truss systems equal in material, design, and extent to the systems required for this Project.
  1. Cold Formed steel truss system installation shall be performed by an experienced installer approved by the steel truss system fabricator.
- B. Welding Standards: Comply with applicable provisions of AWS D1.1 “Structural Welding Code—Steel” and AWS D1.3 “Structural Welding Code—Sheet Steel.”
  1. Qualify welding processes and welding operators in accordance with AWS “Standard Qualification Procedure.”

### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in manufacturer’s unopened containers or bundles, fully identified by manufacturer's name, job name, and truss number. Exercise care to avoid damage during unloading, storing and erection.
- B. Recommended storage of trusses shall occur on blocking, pallets, platforms or other supports off the ground or in an upright position sufficiently braced to avoid damage from excessive bending.
- C. Protect trusses and accessories from corrosion, damage and deterioration when stored at job site.

### **1.07 PROJECT CONDITIONS**

- A. During construction, adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one truss or group of trusses.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Manufacturer: *METALITE TRUSS SYSTEMS OF FL  
MILLENNIUM STEEL.*

### **2.02 COMPONENTS**

- A. System components: *(Cold-formed steel floor truss and roof truss components provided by the manufacturer, as specified in the Contract Documents)* .
- B. Provide manufacturer’s standard steel truss members, bracing, bridging, blocking, reinforcements, fasteners and accessories with each type of steel framing required, as recommended by the manufacturer for the applications indicated and as needed to provide a complete cold- formed steel truss system unless otherwise noted in the contract or proposal accepted.

### **2.03 MATERIALS**

- A. Materials:
  1. All component gauges: Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength of 33,000 psi, or as specified by the Truss Designer.
  2. Bracing, bridging and blocking members: Fabricate components of commercial quality steel sheet per

ASTM A653 for with a minimum yield strength of 33,000 psi.

B. Cold formed steel truss components: Provide sizes, shapes and thicknesses (gauge/mm) indicated. Cold-formed steel thicknesses shall be stated in "minimum uncoated thicknesses."

1. Minimum Uncoated-Steel Thickness: 22 ga.,  
0.0269 inch (0.68 mm).
2. Minimum Uncoated-Steel Thickness: 20 ga.,  
0.0329 inch (0.83 mm).
3. Minimum Uncoated-Steel Thickness: 18 ga.,  
0.0428 inch (1.11 mm).
4. Minimum Uncoated-Steel Thickness: 16 ga.,  
0.0538 inch (1.37 mm).
5. Minimum Uncoated-Steel Thickness: 14 ga.,  
0.0677 inch (1.72 mm).

C. Finish: Provide components with protective coating complying with ASTM A924, minimum G60 coating, or equal, unless otherwise noted.

D. Fastenings:

1. Manufacturer recommended self-drilling, self-tapping screws with corrosion-resistant finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection, as specified by the Truss Designer.
2. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 1/8" thick.
3. Other fasteners as accepted by truss engineer.

## **2.04 FABRICATION**

A.1. Fabricate truss assemblies in jig templates plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.1. Fabricate truss assemblies in jig templates.

2. Cut truss members by sawing or shearing or plasma cutting (torch cutting not allowed).

3. Fasten cold-formed steel truss members by welding or screw fastening, or other methods as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to cold-formed steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

B. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to avoid member and connection overstress.

C. Fabrication Tolerances: Fabricate trusses to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

A. Examine structure, substrates and installation conditions.

Do not proceed with cold-formed steel truss installation until unsatisfactory conditions have been corrected.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

### **3.02 INSTALLATION, GENERAL**

A. General:

1. Erection of trusses, including proper handling, safety precautions, temporary bracing and other safeguards or

procedures are the responsibility of the Contractor and contractor's installer.

2. Exercise care and provide erection bracing required to prevent toppling or dominoing of trusses during erection.
- B. Erect trusses with plane of truss webs vertical and parallel to each other, and locate at the design spacings as indicated on the construction design documents.
  - C. Provide proper lifting equipment suited to sizes and types of trusses required, applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.
  - D. Members, components, and connection plates shall be straight and free of defects.
  - E. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings.  
Anchor trusses securely at bearing points.
  - F. Install roof framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.
    1. Cutting, notching, and drilling of truss members, components, and connections shall be prohibited, unless approved by the truss engineer.
    2. Fasten cold-formed steel roof framing by welding or screw fastening, as standard with fabricator.
      - a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      - b. Locate mechanical fasteners and install according to cold-formed roof framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
      - c. Install roof framing in one-piece lengths, unless splice connections are indicated.
      - d. Provide temporary bracing and leave in place until trusses are permanently stabilized.
  - G. Erection Tolerances: Install trusses to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:
    - a. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### **3.03 OPEN WEB FLOOR TRUSS INSTALLATION**

- A. Install perimeter joist track or belly band sized to match trusses. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated or as recommended by the manufacturer.
- B. Install trusses bearing on supporting framing, level, straight, and plumb, adjust to final position, brace, and reinforce. Install trusses over supporting framing with a minimum end bearing of 1-1/2 inches (38mm), or per manufacturer.
- C. Space trusses not more than 2 inches (51 mm) from abutting walls, and as follows:
  1. Truss Spacing: 12 inches (305 mm).
  2. Truss Spacing: 16 inches (406 mm).
  3. Truss Spacing: 24 inches (610 mm).
  4. Truss Spacing: As indicated.
- D. Frame openings per manufacturer's shop drawings.. E. Install bridging at each end of trusses and at intervals indicated. Fasten bridging at each truss intersection as follows:
  1. Bridging: Cold-rolled steel channel, fastened to bottom flange of trusses.
  2. Bridging: Flat, steel-sheet straps of width and thickness indicated, fastened to bottom flange of trusses.
  3. Bridging: Combination of flat, steel-sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of trusses and secure solid blocking to joist webs.
- F. Secure trusses to load-bearing interior walls to prevent lateral movement of bottom flange.

### **3.04 ROOF TRUSS INSTALLATION**

- A. Install, bridge, and brace trusses according to manufacturer's recommendations and requirements of this Section.
- B. Space trusses as follows:
  1. Truss Spacing: 16 inches (406 mm).

2. Truss Spacing: 24 inches (610 mm).
  3. Truss Spacing: 32 inches (813 mm).
  4. Truss Spacing; 48 inches (1220 mm).
- C. Do not alter, cut, or remove truss members or connections of trusses.
  - D. Erect trusses with plane of truss webs plumb and parallel to each other. Align, and accurately position at spacings indicated.
  - E. Erect trusses without damaging truss members or connections.
  - F. On steel-framed walls, align truss bottom chords with load-bearing studs or continuously reinforce track to transfer loads to structure.
  - G. Anchor trusses securely at all bearing points.
  - H. Install continuous bridging and permanent truss bracing per truss design requirements..
  - I. Install necessary roof cross and diagonal bracing per design professional recommendations.

### **3.05 REPAIRS AND PROTECTION**

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.
- B. Physical Repairs: Damaged chords, webs, or complete trusses shall be repaired or replaced as directed and approved by a Registered Professional Engineer. Any altered or replaced members must be approved by the truss engineer.