

SECTION 05 44 00 (formerly 05425)

PRE-ENGINEERED, PRE-FABRICATED COLD-FORMED STEEL ROOF & FLOOR TRUSSES

PART 1 GENERAL

1.1 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 Sections
 - 1. Section 05 30 00 – Metal Decking
 - 2. Section 05 40 00 – Cold-Formed Steel Framing

1.2 REFERENCES

- A. Reference standards:
 - 1. ASTM:
 - a. ASTM A1003/A1003M *“Standard Specification for Steel Sheet, Carbon, Metallic and nonmetallic-Coated for Cold-Formed Framing Members”*
 - b. ASTM A780-93a *“Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.”*
 - 2. American Welding Society (AWS)
 - a. AWS D1.1 *“Structural Welding Code - Steel.”*
 - b. AWS D1.3 *“Structural Welding Code - Sheet Steel.”*
 - 3. Structural Building Components Association - Cold-Formed Steel Building Component Safety Information (CFSBCSI)
 - 4. American Iron and Steel Institute, North American Specification for the Design of Cold-Formed Steel Structural Members, 2012 – AISI S100-2012
 - 5. American Iron and Steel Institute Standard for Cold-Formed Steel Framing-AISI S240-15

1.3 PERFORMANCE REQUIREMENTS

- A. AISI “Specifications”: Calculate structural characteristics of cold-formed steel truss members according to American Iron and Steel Institute “North American Specification for the Design of Cold-Formed Steel Structural Members, 2012 – AISI S100-2012
- B. Structural Performance: Design, 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. Roof Trusses: Vertical deflection less than or equal to Length/240.
 - b. Floor Trusses: Vertical deflection less than or equal to Length/480.
 - 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).

1.4 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of cold-formed steel framing and accessory required.
- B. Submit detailed floor truss and roof truss layouts indicating placement of trusses.
- C. Submit individual truss drawings, sealed and signed by a qualified registered Professional Engineer, verifying accordance with local building code and design requirements.
 - Include:
 - 1. Description of design criteria.
 - 2. Engineering analysis depicting member stresses and truss deflection.
 - 3. Truss member type, sizes and thickness and connections at truss joints.
 - 4. Truss support reactions.
 - 5. Top chord, Bottom chord and Web bracing requirements.
- D. Submit "The Works" (by Aegis Metal Framing) final roof and floor plan drawings sealed and signed by a qualified registered Professional Engineer depicting final installed truss assembly.
 - Include:
 - 1. All truss to truss connections
 - 2. All truss to structure (bearing) connections
 - 3. Plan and details for the location of all permanent lateral and diagonal bracing and/or blocking required in the top chord, web, and bottom chord planes. (Diaphragms excluded)

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Fabrication shall be performed in a quality controlled manufacturing environment by a cold-formed steel truss fabricator with experience fabricating cold-formed steel trusses equal in material, design, and scope to the trusses required for this Project.
 - 1. Installation of cold-formed steel truss roof or floor assembly shall be performed by an installer with experience installing cold-formed steel trusses equal in material, design and scope to the trusses required for this Project.
- 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."

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's unopened containers or bundles, fully identified by name, brand, type and grade. Exercise care to avoid damage during unloading, storing and erection.
- B. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.
- C. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

1.7 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Ultra-Span® Truss Manufacturer. Contact Aegis Metal Framing, a division of MiTek® USA at 1-866-902-3447, or visit www.aegismetalfaming.com. A list of fabricators that supply this state are:

Superior Truss and Panel Inc.	219-938-8300
Engineered Steel Products	636-745-3705
Trigon Steel Components, Inc.	616-834-0506
Rehkemper and Son Inc.	618-526-2269
Stark Steel	800-947-2258

2.2 COMPONENTS

- A. System components: Aegis Metal Framing ULTRA-SPAN® cold-formed steel roof truss and floor truss components.
- 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 roof or floor assembly.

2.3 MATERIALS

- A. Materials:
 - 1. For all chord and web members: Fabricate components of structural quality steel sheet per ASTM A1003 with a minimum yield strength of 50,000 psi.
 - 2. Bracing, bridging and blocking members: Fabricate components of commercial quality steel sheet per ASTM A1003 with a minimum yield strength of 33,000 psi.
- B. Ultra-Span steel truss components: Provide sizes, shapes and material thickness indicated.
 - 1. Design Uncoated-Steel Thickness: 0.0350 inch (0.89 mm)
 - 2. Design Uncoated-Steel Thickness: 0.0460 inch (1.17 mm)
 - 3. Design Uncoated-Steel Thickness: 0.0570 inch (1.45 mm)
 - 2. Design Uncoated-Steel Thickness: 0.0730 inch (1.85 mm)
 - 3. Design Uncoated-Steel Thickness: 0.0970 inch (2.46 mm)
- C. Finish: Provide components with protective zinc coating complying with ASTM A1003, minimum G60 coating.
- D. Fastenings:

1. Manufacturer recommended self-drilling screws with corrosion-resistant plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.
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.

2.4 FABRICATION

- A. Factory fabricate cold-formed steel trusses 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.
 3. Fasten cold-formed steel truss members by screw fastening, or other methods as standard with fabricator.
 - a. 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 the truss as necessary to minimize member and connection stresses. Refer to SBCA - CFSDCSI.
- C. Fabrication Tolerances:
 1. Overall Length: Fabricate each cold-formed steel truss to the maximum allowable tolerance as follows:
 - a. Truss length up to 30 ft – 1/2" tolerance
 - b. Truss length over 30 ft – 3/4" tolerance
 2. Overall Height: Fabricate each cold-formed steel truss to the maximum allowable tolerance as follows:
 - a. Truss height up to 5 ft – 1/4" tolerance
 - b. Truss height over 5 ft – 1/2" tolerance

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION, GENERAL

- A. General:
 1. Erection of trusses, including proper handling, safety precautions, installation bracing and other safeguards or procedures is the responsibility of the Contractor and Contractor's installer. Refer to SBCA – CFSDCSI, or contact qualified registered Professional Engineer.

2. Exercise care and provide installation bracing required to prevent collapse of trusses during erection and prior to installing permanent bracing system.
- B. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.
 - C. Provide proper lifting equipment, including spreader bar, 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. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings. Anchor trusses securely at bearing points.
 - E. Install trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.
 1. DO NOT cut truss members without prior approval of truss engineer.
 2. Fasten cold-formed steel trusses to supports by screw fastening, welding or other methods, 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 truss manufacturer's instructions with screw penetrating joined members by not less than three exposed screw threads.
 3. Install trusses in one-piece lengths, unless splice connections are indicated.
 4. Provide installation bracing and leave in place until trusses are permanently braced/restrained.

3.3 ROOF TRUSS INSTALLATION

- A. Install trusses per installation documents provided for in Section 1.4 (D)
- B. Space trusses per sealed truss drawings.
- C. Do not alter, cut, or remove truss members or connections of truss members.
- D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacing indicated.
- E. Erection Tolerances:
 1. Limit overall bow or bow in any chord member to the lesser of $L/200$ or 2 inches. L equal to length of truss or member.
 2. Limit out-of-plane plumb to the lesser of $L/50$ or 2 inches. L equal to the height of the truss.
 3. 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.
- F. Erect trusses without damaging truss members or connections.

- G. Anchor trusses securely at all points of support, per installation documents provided for in Section 1.4 (D)
- H. Install all continuous bridging and permanent truss bracing per installation documents provided for in Section 1.4 (D).
- I. Perform all truss to truss connections per installation documents provided for in Section 1.4 (D).

3.4 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 spacing indicated or as recommended by the manufacturer.
- B. Install trusses bearing on supporting framing, level, straight, and plumb.
 - 1. Install trusses over supporting framing with a minimum end bearing of 1-1/2 inches (38mm).
- C. Space trusses per sealed truss drawings.
- D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists where indicated.
- E. Install bridging and permanent bracing per installation documents provided for in Section 1.4 (D).
- F. Anchor trusses securely at all points of support per installation documents provided for in Section 1.4 (D)
- H. Install miscellaneous truss framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable floor truss assembly.

3.5 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 A780 and the manufacturer's instructions.

END OF SECTION