

SECTION 06 17 53
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Forest and Paper Association (AF&PA): National Design Specification for Wood Construction.
2. American Lumber Standards Committee's Board of Review (ALSC).
3. American Society of Mechanical Engineers (ASME):
 - a. B18.2.1, Square and Hex Bolts and Screws (Inch Series).
 - b. B18.6.1, Wood Screws (Inch Series).
4. American Wood Preservers' Association (AWPA): C20, Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
5. ASTM International (ASTM):
 - a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - b. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - c. A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.
 - d. A563, Standard Specification for Carbon and Alloy Steel Nuts.
 - e. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - f. A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - g. A879/A879M, Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface.
 - h. F1667, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
6. International Code Council Evaluation Service (ICC): ESR 1539, Power-Driven Staples and Nails for Use in All Types of Building Construction.
7. Truss Plate Institute (TPI):
 - a. TPI 1, National Design Standard for Metal Plate Connected Wood Truss Construction.
 - b. BCSI 1, Building Component Safety Information – Guide to Good Practice for Handling, Installing, Restraining and Bracing of Metal Plate Connected Wood Trusses.
8. U.S. Department of Commerce (DOC): PS 20, American Softwood Lumber Standard.

1.02 DEFINITIONS

- A. DOC: Department of Commerce.
- B. Prefabricated Wood Truss: Planar structural unit consisting of metal-plate-connected members that are fabricated from dimensional lumber, and have been cut and assembled prior to delivery to Site.
- C. TPI: Truss Plate Institute.

1.03 SUBMITTALS

A. Action Submittals:

1. Show species and stress grades of lumber, dimensions, camber, spacing of trusses in building, connector types, detail of connectors, and bracing requirements. Include elevation view drawings of trusses of sufficient scale to show details of construction, configuration, chord and web member sizes, panel point dimensions, and chord extensions.
2. Product data for lumber, metal connector plates, hardware, fabrication process, and fasteners.
3. Wood treatment data on chemical treatment and finish treatment of material.
4. Calculations:
 - a. Complete design, including stress and deflection calculations, for trusses, truss members, and connections for design load and equipment weight as indicated, plus construction loads applied by Contractor's operations.
 - b. Check of truss chord bending stresses for concentrated loads applied between panel points.
 - c. Design drawings and structural calculations stamped by Registered Professional Engineer valid in same state as Project.
5. Plan view layout of trusses and bridging.
6. Connection and bearing details. Special truss reinforcing and connections for supported items, such as monorails and mechanical equipment.
7. Bridging member sizes and connection details.

B. Informational Submittals:

1. Manufacturer's instructions for handling, erection, and bracing of wood trusses.
2. Certificates:
 - a. Manufacturer's Certificate of Compliance, in accordance with Section 01 67 00, Product Requirements.

- b. Certification by fire-retardant treatment plant that treatment complies with AWPAC20 and fire-retardant formulation is approved for use with metal connector plates for truss exposure.
- 3. Fabricator's qualifications.

1.04 QUALITY ASSURANCE

A. Qualifications:

- 1. Connector Plate Manufacturer: Member of TPI and complies with TPI quality control procedures for manufacture of connector plates published in TPI 1.
- 2. Registered Professional Engineer: Legally authorized to practice in jurisdiction where Project is located and experienced in providing engineering services that include design of installed wood trusses similar to those of this Project.
- 3. Fabricator: Written documentation of experience prefabricating wood trusses similar to those of this Project and participation in a recognized quality assurance program, including inspection by TPI.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses with care and comply with manufacturer's instructions and TPI recommendations to avoid damage from bending, overturning, or other causes which trusses are not designed to withstand.
- B. Clearly identify trusses with warning tags and stickers attached as necessary for truss erector to properly identify, orient, and position during installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Comply with requirements and recommendations of the following TPI publications:
 - 1. TPI 1 Design Specification for Metal Plate Connected Wood Trusses.
 - 2. BCSI 1, Building Component Safety Information – Guide to Good Practice for Handling, Installing, Restraining and Bracing of Metal Plate Connected Wood Trusses.
- B. Design trusses to suit conditions shown on the Drawings and to meet local building codes.

2.02 LUMBER

- A. Factory mark each piece of lumber with type, grade, mill, and grading agency.
- B. Use lumber complying with DOC PS 20 and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- C. Dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 to comply with the following:
 - 1. Moisture Content: Seasoned, with 19 percent maximum moisture content at time of dressing and shipment for sizes 2 inches or less in nominal thickness.
 - 2. Species and grade that complies with the following for species group as defined in AF&PA "National Design Specification for Wood Construction," for extreme fiber stress in bending "Fb" for single and repetitive members, and for modulus of elasticity "E":
 - a. Chord Members: Use DFL or SP No. 1 or No. 2 grade.
 - b. Web Members: Use DFL or SP No. 2.

2.03 CONNECTOR PLATES

- A. Manufacturers:
 - 1. Alpine Engineered Products, Pompano Beach, FL.
 - 2. Or equal.
- B. Physical Characteristics:
 - 1. Hot-Dip Galvanized Steel Sheet: Structural steel sheet complying with ASTM A653/A653M, Grade 33; zinc coated by hot-dip process to comply with ASTM A653/A653M, Coating Designation G60; minimum coated metal thickness not less than 0.036 inch.
 - 2. Electrolytic Zinc-Coated Steel Sheet: Structural steel sheet complying with ASTM A653/A653M, Grade 33; zinc coated by electro-deposition to comply with ASTM A879/A879M, Coating Designation 80Z; with minimum coated metal thickness not less than 0.047 inch.
- C. Functional Characteristics: None.
- D. Performance Characteristics: None.

2.04 FASTENERS

A. General:

1. General: Where truss members are exposed to weather or to high relative humidities, furnish fasteners with a hot-dip zinc coating in accordance with ASTM A153/A153M or Type 316 stainless steel fasteners in accordance with ASTM A276.

B. Nails, Spikes, Staples:

1. Physical Characteristics: None.
2. Functional Characteristics: None.
3. Performance Characteristics: ASTM F1667.

C. Power Driven Fasteners:

1. Physical Characteristics: None.
2. Functional Characteristics: None.
3. Performance Characteristics: ESR 1539.

D. Wood Screws:

1. Physical Characteristics: None.
2. Functional Characteristics: None.
3. Performance Characteristics: ASME B18.6.1.

E. Wood Screws for Wood Construction Connectors:

1. Manufacturers:
 - a. Simpson Strong-Tie Co. (SD), Pleasanton, CA.
 - b. Or equal.
2. Physical Characteristics: Galvanized steel screw with 1/4-inch diameter hex head and 0.37-inch diameter integrated washer.
3. Functional Characteristics: None.
4. Performance Characteristics: Galvanized coating shall meet ASTM B695 Class 55. Minimum required allowable shear capacity is 105 pounds and 173 pounds for withdrawal capacity for Douglas Fir/Southern Pine (DF/SP) lumber.

F. Lag Bolts:

1. Physical Characteristics: None.
2. Functional Characteristics: None.
3. Performance Characteristics: ASME B18.2.1.

G. Bolts:

1. Physical Characteristics: None.
2. Functional Characteristics: None.
3. Performance Characteristics: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and flat washers.

H. Wood Construction Connector Angle:

1. Manufacturers:
 - a. Simpson Strong-Tie Co. (GA2), Pleasanton, CA.
 - b. Or equal.
2. Physical Characteristics: 18-gauge minimum galvanized steel angle with embossed bend section. Each angle shall allow for three 9-inch by 1-1/2-inch screws in each leg of angle minimum.
3. Functional Characteristics: None.
4. Performance Characteristics: Minimum required allowable lateral capacity of angle is 695 pounds in the direction of the length of the angle and 370 pounds of uplift for Douglas Fir/Southern Pine (DF/SP) lumber.

I. Wood Construction Connector Skewable Angle:

1. Manufacturers:
 - a. Simpson Strong-Tie Co. (LS70), Pleasanton, CA.
 - b. Or equal.
2. Physical Characteristics: 18-gauge minimum galvanized field adjustable steel angle. Each angle shall allow for five 0.148-inch by 1-1/2-inch fasteners in each leg of angle minimum.
3. Functional Characteristics: None.
4. Performance Characteristics: Minimum required allowable lateral capacity of angle is 645 pounds in direction of the length of the angle for Douglas Fir/Southern Pine (DF/SP) lumber.

2.05 METAL FRAMING ANCHORS

- A. Galvanized Steel Sheet: Structural steel sheet, Grade 33, ASTM A653/A653M zinc-coated by hot-dip process on continuous lines prior to fabrication to comply with ASTM A653/A653M, Coating Designation G60.

2.06 FIRE-RETARDANT PRESSURE TREATMENT

- A. Manufacturers and Products: Wolmanized Wood, Arch Wood Protection, Smyrna, GA; Dricon.
- B. Physical Characteristics: None.

- C. Functional Characteristics: None.
- D. Performance Characteristics:
 - 1. General:
 - a. Pressure impregnate lumber with fire-retardant chemicals to comply with AWPAC20 for treatment.
 - b. Identify “fire-retardant-treated wood” with appropriate classification marking of Underwriters Laboratories, Inc.
 - c. Testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Interior Type A:
 - a. For interior locations use fire-retardant chemical formulation that produces treated lumber with the following properties present after installation:
 - 1) Bending strength, stiffness, and fastener holding capacities shall meet or exceed values published by manufacturer of chemical formulation of treated wood products.
 - 2) No other form of degradation occurs due to acid hydrolysis or other causes related to manufacture and treatment.
 - 3) No corrosion of metal connector plates, metal framing anchors, and fasteners results from their contact with treated wood.
- E. Inspect each piece of treated lumber after drying and discard damaged or defective pieces.
- F. Fire-retardant treated members used in trusses shall be redried to 19 percent moisture content after treatment.

2.07 FABRICATION

- A. Verify dimensions of supporting structures at Site prior to fabrication.
- B. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints with wood-to-wood bearing in assembled units.
- C. Fabricate metal connector plates to size, configuration, and thickness required to withstand design loadings.
- D. Fabricate and assemble truss members to design configuration shown on the Drawings, with joints closely fitted to comply with tolerances specified in TPI 1.
- E. Connect truss members by means of metal connector plates and securely fasten to each side of wood members.

- F. If lumber defects, such as wane or knots, occur in connector plate area, up-size connector plate so as not to reduce effective number of teeth in truss member.
- G. Excessive splitting of truss wood members by connector plate teeth is not acceptable.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Erect and brace trusses to comply with TPI BCSI 1.
- B. Follow manufacturer's instructions for handling and erection.
- C. Erect trusses with plane of truss webs vertical, plumb, and parallel to each other.
- D. Exercise care to keep out-of-plane bending of trusses to minimum. Install temporary horizontal- and cross-bracing to hold trusses until permanent bracing is installed.
- E. Anchor trusses securely at bearing points.
- F. Install permanent bracing and related components prior to application of loads to trusses. Tighten loose connectors. Restrict construction loads to prevent overstressing of truss members. Do not cut or remove truss members.
- G. Fasten securely to wall framing and other structural components. Brace, block, and bridge as soon as possible after placement.
- H. Install uplift anchors at bearing points to adequately secure trusses against wind uplift on roof trusses.
- I. Solid block truss ends.
- J. Trusses shall not be altered, cut, or modified in any way without written approval of truss fabricator.
- K. Where trusses do not fit, return to fabricator, and replace with trusses of correct size. Do not alter configuration of trusses in field.

3.02 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan in Supplement located at end of Section 01 45 33, Special Inspection, Observation, and Testing. Contractor responsibilities and related information

are included in Section 01 45 33, Special Inspection, Observation, and Testing.

- B. Contractor-Furnished Quality Control: Inspect and test as required in Section 01 40 00, Quality Requirements.

END OF SECTION

