**SECTION 06175**

**SHOP-FABRICATED WOOD TRUSSES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

A. This Section includes the following:

1. Parallel-chord roof trusses, top-chord bearing.

2. Parallel-chord roof trusses, bottom-chord bearing.

3. Top Chord pitched roof trusses.

4. Girder trusses.

5. Parallel-chord floor trusses, top-chord bearing.

6. Parallel-chord floor trusses, bottom-chord bearing.

7. Truss accessories.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 6 Section "Rough Carpentry" for roof and floor sheathing of structural-use panels and dimension lumber for supplementary framing and permanent bracing.

**1.03 DEFINITIONS**

A. Metal-plate-connected wood trusses include planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

**1.04 PERFORMANCE REQUIREMENTS**

A. Structural Performance: Engineer, fabricate, and erect metal-plate-connected wood trusses to withstand design loads within limits and under conditions required.

1. Design Loads: As indicated on the drawings..

2. Design trusses to withstand design loads without deflections greater than the following:

a. Roof Trusses: Vertical deflection of 1/240 of span due to total load.

b. Roof Trusses: Vertical deflection of 1/360 of span due to total load at vaulted ceilings.

c. Floor Trusses: Vertical deflection of 1/360 of span due to live load.

B. Engineering Responsibility: Engage a fabricator who uses a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for metal-plate-connected wood trusses.

**1.05 SUBMITTALS**

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for lumber, metal-plate connectors, metal framing connectors, bolts, and fasteners.

C. Shop Drawings detailing location, pitch, span, camber, configuration, and spacing for each type of truss required; species, sizes, and stress grades of lumber to be used; splice details; type, size, material, finish, design values, and orientation and location of metal connector plates; and bearing details.

1. To the extent truss design considerations are indicated as fabricator's responsibility, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

2. Include truss Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.

D. Product certificates signed by officer of truss fabricating firm certifying that metal-plate-connected wood trusses supplied for Project comply with specified requirements and Shop Drawings.

E. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

F. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

G. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee (ALSC) Board of Review.

HI. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.

1. Metal-plate connectors.

2. Metal framing connectors.

**1.06 QUALITY ASSURANCE**

A. Installer Qualifications: Engage an experienced Installer who has completed wood truss installation similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator's Qualifications: Engage a firm that complies with the following requirements for quality control and is experienced in fabricating metal-plate-connected wood trusses similar to those indicated for this Project and with a record of successful in-service performance:

1. Fabricator participates in a recognized quality-assurance program that involves inspection by SPIB; Timber Products Inspection, Inc.; Truss Plate Institute (TPI); or other independent inspecting and testing agency acceptable to Architect and authorities having jurisdiction.

C. Comply with applicable requirements and recommendations of the following publications:

1. ANSI/TP1 1, "National Design Standard for Metal-Plate-Connected Wood Truss Construction."

2. TPI HIB "Commentary and Recommendations for Handling Installing & Bracing Metal Plate Connected Wood Trusses."

3. TPI DSB "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."

D. Metal-Plate Connector Manufacturer's Qualifications: A manufacturer that is a member of TPI and that complies with TPI quality-control procedures for manufacture of connector plates published in ANSI/TPI 1.

E. Single-Source Responsibility for Connector Plates: Provide metal connector plates from one source and by a single manufacturer.

F. Wood Structural Design Standard: Comply with applicable requirements of AFPA's "National Design Specification for Wood Construction" and its "Supplement."

G. Single-Source Engineering Responsibility: Provide trusses engineered by metal-plate connector manufacturer to support superimposed dead and live loads indicated, with design approved and certified by a qualified professional engineer.

H. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated that have resulted in installing metal-plate-connected wood trusses similar to those indicated for this Project and with a record of successful in-service performance.

**1.07 DELIVERY, STORAGE, AND HANDLING**

A. Handle and store trusses with care and comply with manufacturer's written instructions and TPI recommendations to avoid damage and lateral bending.

B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

**1.8 SEQUENCING AND SCHEDULING**

A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Metal Connector Plates:

a. Alpine Engineered Products, Inc.

b. Computrus, Inc.

c. Mitek Industries, Inc.

d. Robbins Manufacturing Company.

e. Tee-Lok Corporation.

f. Truswal Systems Corporation.

2. Metal Framing Anchors:

a. Cleveland Steel Specialty Co.

b. Harlen Metal Products, Inc.

c. Silver Metal Products, Inc.

d. Simpson Strong-Tie Company, Inc.

e. Southeastern Metals Manufacturing Co., Inc.

f. United Steel Products Co.

**2.02 DIMENSION LUMBER**

A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.

B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.

2. NLGA - National Lumber Grades Authority (Canadian).

3. SPIB - Southern Pine Inspection Bureau.

4. WCLIB - West Coast Lumber Inspection Bureau.

5. WWPA - Western Wood Products Association.

C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

D. Provide dressed lumber, S4S, manufactured to actual sizes required by DOC PS 20 for moisture content specified, to comply with requirements indicated below:

1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

2. Provide lumber with 15 percent maximum moisture content at time of dressing.

E. Grade and Species: Provide dimension lumber of any species for truss chord and web members, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AFPA's "National Design Specification for Wood Construction" and its "Supplement."

.

**2.03 METAL CONNECTOR PLATES**

A. General: Fabricate connector plates from metal complying with requirements indicated below.

B. Hot-Dip Galvanized Steel Sheet: Structural-quality steel sheet, zinc coated by hot-dip process complying with ASTM A 653, G60 (ASTM A 653M, Z180) coating designation; Grade 33 and not less than 0.0359 inch (0.91 mm) thick.

C. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591 (ASTM A 591M), structural-(physical) quality steel sheet, zinc coated by electrodeposition; 33,000-psi (230-MPa) minimum yield strength, coating class C, and not less than 0.0474 inch (1.20 mm) thick.

D. Aluminum-Zinc Alloy-Coated Steel Sheet: Structural-(physical) quality steel sheet, aluminum-zinc alloy-coated by hot-dip process complying with ASTM A 792, AZ50 (ASTM A 792M, AZ150) coating designation; Grade 33 and not less than 0.0359 inch (0.91 mm) thick.

E. Stainless-Steel Sheet: ASTM A 666, Type 304 or 316, chromium nickel steel sheet; 33,000-psi (230-MPa) minimum yield strength and not less than 0.035 inch (0.89 mm) thick.

**2.04 FASTENERS**

A. General: Provide fasteners of size and type indicated that comply with requirements specified below for material and manufacture.

1. Where truss members are exposed to weather or to high relative humidities, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of stainless steel, Type 304 or 316.

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Lag Bolts and Screws: ASME B18.2.1 (ASME B18.2.3.8M).

F. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

**2.05 METAL FRAMING ANCHORS**

A. General: Provide metal framing anchors of structural capacity, type, size, metal, and finish indicated that comply with requirements specified, including the following:

1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for this Project.

2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 (ASTM A 653M, Z180) coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

C. Stainless-Steel Sheet: ASTM A 666, Type 304 or 316, chromium nickel steel sheet; 33,000-psi (230-MPa) minimum yield strength.

**2.06 MISCELLANEOUS MATERIALS**

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

B. Protective Coatings: Provide one of the following coating systems:

1. SSPC-Paint 22, epoxy-polyamide primer.

2. SSPC-Paint 16, coal-tar epoxy-polyamide black or dark red paint.

3. SSPC-Paint 27 and SSPC-Paint 12, basic zinc chromate-vinyl butyral wash primer and cold-applied asphalt mastic.

**2.07 FABRICATION**

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to size, configuration, thickness, and anchorage details required to withstand design loadings for types of joint designs indicated.

C. Assemble truss members in design configuration indicated using jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances of ANSI/TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances of ANSI/TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously into both sides of wood members by air or hydraulic press.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

A. Do not install wood trusses until supporting construction is in place and is braced and secured.

B. Before installing, splice trusses delivered to Project site in more than one piece.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to recommendations of TPI and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space, adjust, and align trusses in location before permanently fastening and as follows:

1. Truss Spacing: 24 inches (610 mm) o.c. unless otherwise indicated on the drawings.

G. Anchor trusses securely at all bearing points using metal framing anchors. Install fasteners through each fastener hole in metal framing anchor according to manufacturer's fastening schedules and written instructions.

H. Securely connect each truss ply required for forming built-up girder trusses.

1. Anchor trusses to girder trusses as indicated.

I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

1. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

J. Install wood trusses within installation tolerances of ANSI/TPI 1.

K. Do not cut or remove truss members.

L. Return wood trusses that are damaged or do not meet requirements to fabricator and replace with trusses that do meet requirements.

1. Do not alter trusses in the field.

**3.02 REPAIRS AND PROTECTION**

A. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

RETAIN BELOW IF AN ADDED CORROSION-RESISTANT COATING OF EMBEDDED-METAL CONNECTOR PLATES IS REQUIRED.

B. Protective Coating: Clean and prepare exposed surfaces of embedded-metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.

1. Apply materials to provide minimum dry film thickness recommended by manufacturer of coating system.

**END OF SECTION 061753**