

SECTION 601 TIMBER STRUCTURES

601.01 Description. This work consists of furnishing, treating, and constructing timber structures of treated, untreated, and structural glue-laminated (glulam) timber.

MATERIALS.

601.02 Structural Lumber and Timber. The lumber and timber shall be dense quality long leaf or short leaf southern yellow pine or close-grained Douglas fir conforming to the requirements of AASHTO M 168. The grade of structural lumber and timber shall be as shown on the Plans. Unless otherwise specified, the timber shall be cut square and surfaced on four sides.

601.03 Glue-Laminated Timber.

- a. *General.* Glulam lumber shall be kiln-dried Douglas fir or southern pine meeting the engineering properties, such as bending stress, shear, and modulus of elasticity, as stated on the Plans and the standards of ANSI/AITC A190.1. All members shall be bonded with an exterior "Wet-Use" adhesive conforming to Voluntary product Standard PS 56-73 of the U.S. Department of Commerce, NIST.
- b. *Decks.* All milling and glue lamination shall be performed prior to treating. Planing shall be done on one side only. The top of the deck shall be left rough to ensure proper bonding with bituminous material.

The deck panel manufacturer shall have experience in manufacturing glue-laminated wood bridge members, and a qualified licensee of the American Institute of Timber Construction (AITC).

- c. *Members.* Glulam timber members manufactured for the Department' s bridges shall bear a custom quality product mark as specified in ANSI/AITC A190.1. A certificate of material conformance shall be provided to the Engineer upon delivery of the member to the Project.

601.04 Treatment. Preservative treatment of timber shall conform to the requirements of Section 814 and the requirements of the AASHTO Standard Specifications for Highway Bridges

601.05 Inspection. The timber, and the operation of treatment, will be inspected at the treating plant, both before and after treating, and all acceptable timber will be marked with the Department' s standard hammer mark. All timber shall also be subject to inspection at the site of the work. If the timber is found defective, it shall be subject to rejection.

601.06 Structural Steel. Structural steel shall conform to the requirements covering carbon shapes, plates, and bars of structural quality for use in the construction of bridges. Carbon shapes, plates, and bars shall be completely galvanized according to AASHTO M 111. Thickness Grade 85 shall be used. For further material requirements refer to Section 826.

601.07 Hardware. Machine bolts, drift pins, dowels, nuts, washers, lag screws, and nails shall conform to the requirements of ASTM A 307.

Machine bolts shall have square heads and nuts, unless otherwise specified. Nails shall be cut or round wire of standard form. Spikes shall be cut or wire spikes, or boat spikes, as specified.

Nails, spikes, bolts, dowels, washers, rods, plates, and lag screws shall be completely galvanized according to the requirements of AASHTO M 232.

For glulam timber, the fabricator shall provide all steel connections and all hardware for joining wood members to each other and to the substructure. All hardware shall be galvanized mild steel AASHTO M 270/M 270M. Washers may be cast iron or malleable iron.

601.08 Working Drawings. Working drawings shall be submitted in accordance with [Subsection 105.04](#).

CONSTRUCTION METHODS.

601.09 Storing and Handling. All lumber and timber on the site of the work shall be stacked to prevent warping. Untreated material shall be open stacked at least 120 (300 mm) above the ground surface, and so piled as to shed water. Material shall be protected from the weather by suitable covering. Treated timber shall be carefully handled, without sudden dropping, breaking of outer fibers, bruising, or penetrating the surface with tools. Treated timber, other than piling, shall be handled with rope slings. Canthooks, peaveys, pikepoles, or hooks shall not be used. Treated timber shall be close stacked. The ground under and in the vicinity of all stacks shall be cleared of weeds and rubbish.

All bridge lumber shall be delivered and stored above grade on wooden blocks. Members shall be well supported and be leveled to avoid warping. When stacking, measures shall be taken to permit air to circulate around all four sides of each member.

601.10 Workmanship. All framing shall be true and exact. Unless otherwise specified, heads of nails and spikes shall be driven flush with the surface of the wood. Deep hammer marks in wood surfaces, splitting due to nailing, or spiking shall be considered evidence of poor quality of work and will be sufficient cause for removal of the workers causing them.

601.11 Cutting and Framing. All lumber and timber shall be accurately cut and framed to a close fit in such a manner that the joints have an even bearing over all contact surfaces. No shimming will be permitted in making joints, nor will open joints be accepted. All cutting and framing of treated timber shall be done before treatment insofar as is practicable.

All cuts and abrasions in creosote treated timbers glulam timber shall be treated shall be carefully trimmed, and then covered with two applications of a mixture of 60% creosote oil and 40% roofing pitch, or brush coated with at least two applications of hot creosote oil and covered with hot roofing pitch. The creosote oil shall be heated sufficiently to secure deep penetration but shall not be heated to the boiling point.

All cuts and abrasions in CCA treated timbers shall receive one brush application of the CCA solution used in the treatment process.

601.12 Holes for Bolts, Dowels, Rods, and Lag Screws. Bolt holes shall be treated with creosote oil-tar or CCA solution as applicable, by means of an approved device that applies the creosote oil-tar or CCA solution to the inside of the hole. Any unfilled holes shall be treated in the same manner and then shall be plugged with creosoted or CCA treated plugs.

Holes for round driftbolts or dowels shall be bored with a bit 1/160 (1.6 mm) less in diameter than the bolt or dowel to be used. The diameter of the holes for square driftbolts or dowels shall be equal to the least dimension of the bolt or dowel.

Holes for machine bolts shall be bored with a bit of the same diameter as the bolt.

Holes for lag screws shall be bored with a bit not larger than the body of the screw at the base of the thread.

A washer, of the size and type specified, shall be used under all bolt heads and nuts which would otherwise come in contact with the wood.

All bolts shall be thoroughly checked after the nuts have been finally tightened.

601.13 Countersinking. Countersinking shall be done wherever smooth faces are required. Recesses formed for countersinking shall be treated with material as specified in Subsection 601.12 and as approved by the Engineer.

601.14 Caps. Timber caps shall be placed to secure an even and uniform bearing over the tops of the supporting posts or piles and to secure an even alignment of their ends. All pile caps shall be secured in the manner shown on the Plans.

601.15 Bracing. The ends of bracing shall be bolted through the pile, post, or cap as shown on the Plans. Intermediate intersections shall be bolted as shown on the Plans.

601.16 Stringers. Stringers shall be sized at bearings and shall be placed in position so that knots near edges are in the top portion of the stringers, except over continuous supports.

Outside stringers may have butt joints, but interior stringers shall be lapped to take bearings over the full width of the floor beam or cap at each end.

Cross-bridging between stringers shall be neatly and accurately framed and securely toenailed with at least two nails in each end.

601.17 Method of Measurement. The quantity of structural lumber and timber will be measured by the thousand feet, board measure (cubic meter). The quantity will be determined from actual widths and thicknesses and the actual lengths of the pieces in the finished and accepted structure.

The quantity of glue-laminated timber deck will be measured by the square foot (square meter). The quantity will be determined from the actual length and width of the finished deck completed and accepted.

The quantity of glue-laminated timber used for other members of the structure as specified on the Plans will be measured by the thousand feet, board measure (cubic meter).

601.18 Basis of Payment. The quantity of timber will be paid for at the Contract unit price per thousand feet, board measure (cubic meter). Price and payment will constitute full compensation for furnishing all materials; for applying preservative treatment when required; for placing all material including hardware; for the replacement of all defective materials; and for all labor, equipment, tools, and incidentals required to complete the work.

The quantity of glue-laminated timber deck will be paid for at the Contract unit price per square foot (square meter). The quantity of glue-laminated timber used for other members of the structure will be paid for at the Contract unit price per thousand feet, board measure (cubic meter). Price and payment will constitute full compensation for furnishing and placing all materials, including hardware; for fabricating glue-laminated timber decks and members; for applying preservative treatment; and for all labor, equipment, tools, and incidentals required to complete the work.