

7. **Pipe.** The weight will be computed from the dimensions shown on the Plans and the nominal weights of the pipe and fittings.
  8. **Sheet Metal.** The weight will be computed from the smallest rectangular area from which the developed surface can be cut.
- C. **Lump Sum Basis.** When Structural Steel is measured and paid for on a “Lump Sum” basis, it includes all Structural Steel required under this Section and will not be modified unless design Plan changes are ordered by the Engineer. The following conditions will apply to the lump sum basis:
1. The estimated weight of Structural Steel computed according to Section 616.04 B will be shown on the Plans. If any change in design is made which effects the weight of material furnished, payment for the additional Structural Steel required as a result of the change will be made at a unit price per pound. This unit price will be obtained by dividing the Lump Sum bid for Structural Steel by the total estimated weight of Structural Steel shown on the Plans. Reduction in weight due to changes in design will be made at the same calculated rate, and will be deducted from payments due.
  2. Prospective Bidders shall verify the estimated weight of Structural Steel before submitting a bid. Adjustments other than for authorized changes will not be made in the Lump Sum bid even though actual weight may deviate from the stated estimated weight.

#### 616.05 BASIS OF PAYMENT.

Payment will be made at the Contract Unit Price as follows:

<b>Pay Item</b>	<b>Pay Unit</b>
Structural Carbon Steel AASHTO 270 Grade 36	Pounds
High Strength Low-Alloy Columbium Vanadium Steel AASHTO 270 Grade 50	Pounds
High Strength Low-Alloy Structural Steel with 50,000 psi Minimum Yield Point to 4 inch Thick AASHTO 270 Grade 50 W	Pounds
Castings	Pounds
Pipe	Pounds
Sheet Metal	Pounds
Structural Steel	Lump Sum

This payment will be full compensation for all labor, equipment, and materials necessary to complete the work.

## SECTION 618 TIMBER STRUCTURES

#### 618.01 DESCRIPTION.

This work consists of constructing timber structures.

**618.02 MATERIALS.**

Materials shall meet the following:

<b>Item</b>	<b>Section</b>
Timber	844.01
Timber Connectors	844.02 A
Timber Preservatives	846
Timber Treatment	846
Hardware	844.02 B
Paint	852

Structural glued laminated timber shall meet U.S. Product Standard PS 56-73 for Structural Glued Laminated Timber. The term “structural glued laminated timber” as employed in PS 56-73 is an engineered, stress-rated product of a timber laminating plant, comprising assemblies of suitably selected and prepared wood laminations securely bonded together with adhesives. The grain of all laminations is approximately parallel longitudinally. The separate laminations may not exceed 2 inches (.051 m) in net thickness. They may be comprised of pieces which are end-joined to form any length, or of pieces placed or glued edge to edge to make wider ones, or of pieces bent to curved form during gluing.

**618.03 CONSTRUCTION REQUIREMENTS.**

- A. **General.** All timber shall be stored to shed water and to prevent distortion and warping. Untreated timber shall be open stacked. Treated timber shall be closed stacked.

All timber shall be handled without splitting or damaging the surface and edges. Treated timber shall be handled without breaking through the surface penetrated by the treatment.

All cutting, framing, and boring of treated timber shall be done before treatment.

Timber to be included in the finished structure shall not be used for temporary falsework, staging, etc.

Temporary bolting, spiking, or nailing shall not be used on treated timber.

- B. **Fabrication.** All lumber and timber shall be accurately cut and framed to a close fit so the joints have an even bearing over the entire contact surfaces. Joints shall not be shimmed nor shall open joints be used.

The size of holes bored in untreated timber shall be as follows:

1. Round drift bolts or dowels – 1/16 inch less in diameter than the size of the drift bolt or dowel.
2. Square drift bolts or dowels – diameter of the hole equal to the side dimension of the drift bolt or dowel.
3. Bolts – same diameter as the bolt.

4. Rods – 1/16 inch greater than the diameter of the rod.
5. Lag screw shank – same as the nominal size of the lag screw.
6. Lag screw thread – same diameter as the body of the screw at the base of the thread.

All holes in timber before treatment shall be 1/16 inch larger than specified above.

All cuts or abrasions in treated timber, after having been carefully trimmed, shall be given 3 applications of hot creosote oil and covered with roofing pitch.

All holes in untreated timber (except handrails) and treated timber shall be treated with hot creosote oil so all of the hole surface is thoroughly coated with the oil. Treating shall be done before inserting or driving bolts, lag screws, rods, and drift pins. All unfilled holes, after being treated with creosote oil, shall be filled with tight-fitting creosoted plugs.

All stringers shall be sized to a uniform depth at bearings. Dapping or sizing shall be done on the better edge of the piece, placing this edge downward.

Bolts shall be the sizes specified and long enough to extend completely through the nuts. Extra washers shall not be used on bolts that are too long, and galvanized bolts shall not be rethreaded. Bolts, dowels, etc. which are not galvanized shall be given 2 coats of iron oxide paint before installation.

Nails and spikes shall be driven so the heads are flush with the surface of the wood without leaving hammer marks.

Grooves for split ring timber connectors shall be accurately cut. Other timber connectors shall be embedded in the timber by pressure alone. Mauls, sledges, etc. for embedding the connectors shall not be used.

- C. **Excavation.** All excavation for placing timber abutments and mud sills, concrete pedestals for bents, and bents shall be done before the piles are driven. This excavation will not be measured for payment.
- D. **Erection.** Piles in any one bent shall be selected by size to avoid bending or distortion of the sway bracing. Cutoffs shall be accurately made to assure full bearing between the caps and piles of a bent. Tops of piles shall not be shimmed.

Mud sills for framed bents shall be firmly and evenly bedded to solid bearing and tamped in place.

Concrete pedestals to support framed bents shall be smoothly finished so the sills or posts have an even bearing.

Sills shall have true and even bearing on mud sills, piles, or pedestals. All earth shall be removed from contact with sills so there is free air circulation.

Posts shall be framed true and shall have full bearing on both sills and 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.

Planks in floors shall be securely spiked to each stringer with two 6-inch spikes for 3-inch plank, and two 7-inch spikes for 4-inch plank. Planks in walls shall be securely spiked to each pile or post with two 7-inch spikes for 3-inch plank.

In 2-inch laminated floors, each 2-inch strip shall be nailed to the adjacent strip with 40 d spikes placed 24 inches center to center and staggered 8 inches with the spikes in the adjacent strip. In 3-inch laminated floors, each 3-inch strip shall be nailed to the adjacent strip with 50 d spikes spaced 18 inches center to center and staggered 9 inches with the spikes in the adjacent strip. In addition, each strip shall be toe-nailed to every second stringer with a 16 d nail, the nailing of successive strips being staggered so the spacing of the nails along each stringer shall be 2 times the thickness of one strip.

Floor plank and strips less than 8 feet in length shall not be used. Where it is necessary to use more than one length of floor plank or strip for transverse flooring, the joints between ends of plank or strip shall be made over a joist or stringer. Splices shall be staggered and shall not occur over a common joist or stringer closer than every fourth plank or strip.

All backing plank shall be nailed to each stringer or pile with two 7-inch spikes.

If splitting is observed while nailing superstructure or substructure elements, a small pilot hole shall be bored for each spike.

Metal parts, except hardware, shall be given one coat of shop paint; and after erection, 2 coats of field paint.

- E. **Salvaging Timber for Reuse.** All timber to be reused from an existing bridge shall be removed, cleaned of all nails, spikes, bolts and foreign material, and stored without damage. Timber material that is damaged or lost shall be replaced at the Contractor's expense.

All bolt and nail holes in reused timber shall be treated with creosote, and unused holes filled with creosoted plugs. Cuts and abrasions in reused timber shall be carefully trimmed and given 3 applications of hot creosote and covered with hot tar.

- F. **Painting.** Timber shall not be painted.

- G. **Backfilling.** Backfilling shall meet Section 210.

#### **618.04 METHOD OF MEASUREMENT.**

Quantities of various items in completed and accepted structures will be measured for payment according to the Contract for the pay items, and in the terms of the prescribed units for those items. Only accepted work will be included and the dimensions will be those shown or authorized in writing by the Engineer.

On timber bridges, all metal items and incidental non-metallic items will not be measured and paid for directly, but will be included in the Contract prices for the pay items listed in the Contract.

- A. **Untreated and Treated Timber.** The unit of measure for Untreated Timber and Treated Timber will be the Thousand Feet Board Measure (MBM), and the

amount to be paid for will be the actual number of (MBM) in the completed and accepted structure computed as follows: actual sizes of full sawn timber and nominal sizes of dressed timber will be used. The length used will be the nearest commercial (multiples of 2 feet) lengths from which the representative pieces can be cut; except for pieces less than 10 feet in length, the lengths used will be the nearest commercial lengths, not exceeding 24 feet, from which the pieces can be cut in multiples.

- B. Glued Laminated Stringers and Glued Laminated Deck Panels.** The unit of measure for Glued Laminated Stringers and Glued Laminated Deck Panels will be the number, "Each," of the size and length designated in the Contract.
- C. Treated Timber Structure and Untreated Timber Structure.** When the Proposal Form stipulates payment will be made for Treated Timber Structure and Untreated Timber Structure on a Lump Sum basis, all labor, materials, equipment, etc., except piling, necessary to complete the work shall be included in the Lump Sum bid. Piling will be measured and paid for as specified in Section 622.

#### **618.05 BASIS OF PAYMENT.**

Payment will be made at the Contract Unit Price as follows:

<b>Pay Item</b>	<b>Pay Unit</b>
Untreated Timber	MBM
Treated Timber	MBM
Glued Laminated Stringers	Each
Glued Laminated Deck Panels	Each
Treated Timber Structure	Lump Sum
Untreated Timber Structure	Lump Sum

This payment will be full compensation for all labor, equipment, and materials necessary to complete the work.

## **SECTION 622 PILING**

#### **622.01 DESCRIPTION.**

This work consists of furnishing and driving piles, including test piles.

#### **622.02 MATERIALS.**

Material shall meet the following: