The Contractor shall assume the cost of additional ultrasonic or magnetic-particle testing above the 25 percent rate to determine the extent of weld defects and to check corrected work. The rate for this extra testing will be $75 per hour for the Inspector, equipment, travel, and subsistence.

If the Contractor is equipped with satisfactory ultrasonic or magnetic-particle inspection equipment, the Contractor may test the Work corrected in the shop at no additional expense to the Department, but the Engineer will interpret the ultrasonic and magnetic-particle inspection.

## 501.5 Payment

This work will be paid for at the Contract Price per pound (kilogram) of structural steel or per Lump Sum, each complete in place. The Contract Price for structural steel includes the costs of labor and equipment and the direct or incidental costs of furnishing easy access for inspection and testing.

Payment will be made under:

| | | |
|---|---|---|
| Item No. 501 | Structural steel, Bridge No._____ | Per lump sum |
| Item No. 501 | Structural steel | Per lb (kg) |
| Item No. 501 | Structural steel-swaybracing | Per lb (kg |

### 501.5.01 Adjustments

**A. Payment Conditions**

The cost of steel joints and metal bearing assemblies used in structures with no structural steel Pay Item shall be included in the Contract Price for superstructure concrete, unless otherwise shown on the Plans.

When authorized changes are made, the Lump Sum payment will be adjusted on a negotiated basis.

On projects with multiple bridges, payments will be applied on an individual bridge basis.

Upon satisfactory completion of the erecting, bolting, and welding of structural steel for the bridge, 95 percent of the Contract Price, either per Lump Sum Basis or per pound (kilogram) basis, will be included for payment on the next statement.

Steel spans are considered satisfactorily erected when they are placed in their final positions on the substructure, properly spaced, and anchored down. Bolting is considered satisfactorily complete when defective welds are repaired and found satisfactory by additional inspection.

Upon satisfactory completion of field painting, the remaining 5 percent of the Contract Price will be included for payment on the next statement.

Material allowance payments of structural steel will be determined and paid for in accordance with the requirements of Section 109.

# Section 502—Timber Structures

## 502.1 General Description

This work consists of constructing timber bridges and other timber structures complete in place.

### 502.1.01 Definitions

General Provisions 101 through 150.

### 502.1.02 Related References

**A. Standard Specifications**

Section 501—Steel Structures

Section 520—Piling

Section 645—Repair of Galvanized Coatings

Section 852—Miscellaneous Steel Materials

**B. Referenced Documents**

AWPA Standard M4, "Standard for the Care of Preservative Treated Wood Products"

### 502.1.03 Submittals

General Provisions 101 through 150.

## 502.2 Materials

All materials shall meet the requirements of the following Specifications:

| Material* | Section |
|---|---|
| Lumber and Timber | 860 |
| Piling and Round Timber | 861 |
| Preservative Treatment of Timber Products | 863 |
| Miscellaneous Metals | 858 |
| Structural Steel | 851 |
| Plain Cotton Duck | 881 |
| Miscellaneous Steel Materials | 852 |
| Paint | 870 |
| *Insofar as practicable, all cutting, framing, and boring of treated timber shall be done before treatment. | |

**A. Miscellaneous Hardware**

Galvanize the following items according to Subsection 852.2.04.B.3, "Galvanizing":

- Bolts
- Nuts
- Washers
- All hardware including (but not limited to) special couplings, dowels, and spikes

Repair damaged galvanized coatings according to Section 645.

Nails may be black or galvanized.

**B. Structural Purposes and Grades**

Lumber and timber meeting the requirements given in Table 1 of Section 860, "Lumber and Timber", shall be used for the structural purposes shown therein.

### 502.2.01 Delivery, Storage, and Handling

**A. Handling Timber**

Handle timber carefully without dropping it, breaking the outer fibers, bruising it, or piercing it with tools.

Handle timber with non-metallic slings.

**B. Storing Materials**

Place all stored material in well-drained locations and keep these locations free from weeds and rubbish.

Comply with the following material-specific storage guidelines:

1. Untreated Timber and Piling
   Store untreated materials as follows:
   a. Open stack the materials at least 12 in (300 mm) above the ground.
   b. Pile the materials so water can run off them to prevent warping.
   c. Protect the materials with durable waterproof covering approved by the Engineer.
2. Treated Timber and Piling
   Close stack treated materials at least 12 in (300 mm) above the ground and pile them to prevent warping.

3. Timber After Fabrication

   Store this timber so the members do not change dimensions before they are assembled.

4. Hardware and Miscellaneous Metal

   Place metal material in covered storage and protect it from rust and other damage.

## 502.3 Construction Requirements

General Provisions 101 through 150.

### 502.3.01 Personnel

General Provisions 101 through 150.

### 502.3.02 Equipment

General Provisions 101 through 150.

### 502.3.03 Preparation

General Provisions 101 through 150.

### 502.3.04 Fabrication

General Provisions 101 through 150.

### 502.3.05 Construction

**A. Making Field Repairs and Applying Treatments and Coatings**

Make field repairs and apply treatments and coatings as follows:

1. Repair and Apply Treatments to Treated Timber

   Carefully trim cuts and abrasions in creosoted timber or piles and treat them with either of the following:

   - Two hot applications of 60 percent creosote oil mixed with 40 percent roofing pitch
   - Two thorough brush coats of hot creosote oil followed by a covering of hot roofing pitch

   For field treatment of other preservatives, see AWPA Standard M4 entitled, "Standard for the Care of Preservative Treated Wood Products."

   a. Bolt Holes

      Treat bolt holes with creosote oil using an approved, manufacturer-recommended, pressure bolt hole treater.

      After the treatment, plug unfilled holes with creosoted plugs.

   b. Temporary Holes

      When the approved use of temporary forms or braces results in nail or spike holes in treated timbers or piles, fill these holes by driving galvanized nails or spikes flush with the surface or by plugging as specified in Subsection 502.3.05.A.1.a, "Bolt Holes."

   c. Countersunk Holes

      Treat these holes with hot creosote oil before placing the bolts. After placing the bolts, fill the holes with hot roofing pitch.

2. Apply Treatment to Pile Heads

   See Subsection 520.3.05.J, "Repair and Treat Timber Piling," step 5.

**B. Framing**

Cut and frame lumber and timber to a close fit so the joints will have an even bearing over the entire contact surface. The Department does not permit shimming or open joints.

Match-mark timbers requiring an exact fit.

1. Meet Workmanship Requirements

   Ensure that workmanship meets the following standards:

   a. Nails and Spikes

      Drive nails and spikes hard enough to set their heads flush with wooden surfaces. Replace bent nails or spikes.

      The Department considers deep hammer marks on wooden surfaces poor workmanship. The Department may reject the work with these characteristics.

b. Steel Plates and Structural Shapes

Workmanship on steel plates and structural shapes shall meet the requirements of Section 501.

2. Drill Holes for Bolts, Dowels, Rods, and Lag Screws

Drill holes with the following diameters to receive these hardware items

| Hardware | Hole Diameter |
|---|---|
| Round drift bolts and dowels | 1/16 in (2 mm) smaller than the diameter of the hardware |
| Square drift bolts and dowels | Same as the smallest dimension of the hardware |
| Machine bolts | Same as the diameter of the hardware |
| Rods | 1/16 in (2 mm) larger than the diameter of the hardware |
| Lag Screws | No larger than the body of the screw at the base of the thread |

Countersink holes wherever smooth faces are required.

3. Use Bolts and Washers

Use washers of the size and type specified on the Plans under bolt heads and nuts to prevent them from contacting the wood.

After completely adjusting the nuts, do the following:

a. Cut the excess length off of bolts projecting more than 1 in (25 mm) beyond the nuts.

b. Burr the bolt threads.

c. Coat the bolt ends with galvanizing repair compound according to Section 645.

**C. Constructing Timber Substructures**

Construct the timber substructure as follows:

1. **Drive the Pile Bents.** See Subsection 520.3.05.E, "Drive Piling."
2. **Place the Caps.** Place timber caps so the bearing on their supports is evenly secured and their ends are evenly aligned. Drift bolt the caps to piles and posts.
3. **Bolt the Bracing.** Bolt timber braces where they intersect with piles and posts.

**D. Constructing Timber Superstructures**

Construct the timber superstructure as follows:

1. **Install Stringers.** Install stringers using these guidelines:
   - Where stringers bear over the width of floor beams and caps, size the stringers to a uniform grade.
   - Ensure that lapped ends of treated stringers contact each other.
   - Neatly and accurately frame cross-bridging between stringers.
   - Securely toenail the cross bridging by driving at least two nails in each end.
2. **Lay Single Plank Floors.** Lay these floors using these guidelines:
   - Lay planks with the adjacent planks drawn together tightly.
     Lay the plank so the thickness of adjacent planks varies by no more than 1/16 in (2 mm).
   - Spike each plank to each joist or nailing strip using at least two spikes.
     The spike length shall be at least 3 in (75 mm) greater than the thickness of the planks.
   - Carefully grade the plank thickness.
3. **Lay Laminated or Strip Floors.** Lay these floors using these guidelines:
   - Dress strips to a uniform thickness of no more than 3 in (75 mm) and to a uniform width when specified on the Plans.
   - Place strips on the edge and at right angles to the roadway center line.
   - Spike each strip to the adjacent strip at 2 ft (600 mm) intervals by staggering succeeding spike locations 8 in (200 mm) from preceding locations.
     Ensure that the spike length is sufficient to pass through two strips and at least halfway into the third.
   - Toenail strips to the stringers with 20 d (4 mm) nails.

Instead of toenailing, the Contractor may drive spikes vertically through the strip if they penetrate the stringer at least 3 in (75 mm).

4. **Frame and Erect Hub Guards and Railings.** Accurately frame and erect hub guards, scupper blocks, joist blocks, and railings to true line and grade. Use these guidelines when erecting hub guards and railings:
    - Dress hub guards, scupper blocks, railings, and rail posts on all four sides.
    - Securely spike the scupper blocks in place.
    - Bolt the hub guards through the scupper blocks, floor planks, and, if required, through the outside joists or nailing pieces.
    - Lay hub guards in sections at least 12 ft (3.7 m) long.

### 502.3.06 Quality Acceptance

General Provisions 101 through 150.

### 502.3.07 Contractor Warranty and Maintenance

General Provisions 101 through 150.

## 502.4 Measurement

**A. Structural Metal**

Plates and structural shapes required on the Plans will be measured for payment as specified on the Plans only when set up as a Specified Pay Item. Measurement will then be made as provided in Subsection 501.4, "Measurement," and the cost shall not be included in the Contract prices for lumber and timber.

Otherwise, no separate measurement for payment will be made, and the cost shall be included in the Contract prices for lumber and timber.

**B. Lumber and Timber**

Lumber and timber will be measured per thousand feet(cubic meter) board measure (MBM). Quantities in the structure will be computed based upon nominal sizes and the actual length in place.

### 502.4.01 Limits

**A. Timber Piling**

Timber piling shall be furnished, driven, and measured as a Pay Item under Section 520 unless otherwise specified.

**B. Splices**

No additional measurement will be made for splices except for overlaps shown on the Plans.

**C. Hardware**

No separate measurement for payment will be made for items such as the following:

- U-bolts
- V-bolts
- Oval head bolts
- Special couplings
- Bolts
- Nuts
- Washers
- Dowels
- Nails
- Spikes
- Other hardware.

The cost of these items shall be included in the Contract Unit Price bid for timber.

## 502.5 Payment

**A. Structural Metal**

The quantity of structural metal (determined as described below in Subsection 502.4.A "Structural Metal", will be paid at the Contract Price according to Subsection 501.5, "Payment" for Steel Structures.

**B. Lumber and Timber**

Lumber and timber will be paid for at the Contract Unit Price bid per thousand feet board measure (MBM) (cubic meter), complete in place and accepted. The payment will be full compensation for material, labor, and equipment necessary to complete the Work as shown on the Plans and as described in this Specification. Payment includes incidentals and all costs, both direct and indirect.

Payment will be made under:

| | | |
|---|---|---|
| Item No. 502 | Bridge timber (untreated) | Per MBM (cubic meter) |
| Item No. 502 | Bridge timber (treated) | Per MBM (cubic meter) |

### 502.5.01 Adjustments

General Provisions 101 through 150.

# Section 504—Twenty-Four Hour Accelerated Strength Concrete

## 504.1 General Description

This work consists of manufacturing and placing accelerated strength concrete designed to produce a compressive strength of 2,500 psi (17 MPa) within 24 hours.

Except as modified in this Specification, the provisions of Section 500 shall apply to concrete produced and placed under this Specification.

### 504.1.01 Definitions

General Provisions 101 through 150.

### 504.1.02 Related References

**A. Standard Specifications**

Section 109—Measurement and Payment

Section 500—Concrete Structures

**B. Referenced Documents**

AASHTO M 194, Type E, Table I

### 504.1.03 Submittals

**A. Approve Chemical Admixture for Concrete**

Ensure that the manufacturer submits an affidavit that the chemical admixture for concrete meets the requirements of AASHTO M 194, Type E, Table I.

**B. Establish Concrete Mix Proportions**

Choose one of the following two procedures for establishing concrete mix proportions for concrete placed under this Specification.

Notify the Engineer of the chosen procedure at least 45 days before placing the concrete.

1. Concrete Mix Proportions Established by the Contractor

   The Contractor may propose specific concrete mix design proportions for concrete placed under this Specification. In this case, the Contractor shall meet these requirements:

   a. Ensure that all materials are from approved sources or from materials stored or stockpiled at the site.