**TIMBER BRIDGE DECK ON STEEL BEAMS (DRAFT)**

**Description**

Work consists of furnishing and installing a timber deck system and timber bridge rail system on steel I-beams, with the required hardware and in accordance with the plans and special provisions.

The timber deck system consists of deck boards, beam nailers, edge nailers, moisture control flashing membranes, deck waterproofing membrane, drip edges, and connection hardware and fasteners.

The timber bridge rail system consists of retaining strips, waterproofing membrane under retaining strips, rails, posts, wheel curbs and blocks, and beam post blocks.

The Contractor shall provide all tools and equipment, materials, and any incidentals necessary to complete the timber bridge superstructure on steel beams.

The contractor shall be responsible for fulfilling all applicable requirements of the NCDOT *Standard Specifications* dated January 2024, except as otherwise specified herein.

**Materials**

Timber

Use No. 1 Dense Southern Pine treated timber and lumber meeting the requirements of Section 1082 of the *Standard Specifications*.

Hardware

All timber bolt connection hardware shall meet the requirements of Section 1074 of the *Standard Specifications* and the grades and descriptions shown below. All bolting hardware including bolts, washers, nuts, etc. shall be hot dipped galvanized.

Heavy hex bolts: ASTM A307B

Heavy hex nuts: ASTM A563A or A1942H

Washers: Round plate, ¼” thickness

Carriage bolts: ASTM A307A Timber dome head

Ogee Washers: ASTM A48 cast iron

All screw connection hardware shall be strength hardened, flat head structural screws with a minimum shank diameter of 0.275”. The screws shall be coated with an ICC-ES AC257 code approved coating rated for use in treated lumber.

Flashing/Waterproofing

Moisture control flashing membrane placed on tops of beam flanges, edge nailers, and beam nailers shall be self-adhering high-density polyethylene (HDPE). For material and installation requirements see the *Timber Bridge Flashing Membrane* Special Provision.

Metal drip edge shall be 22 gauge (minimum) aluminum, flat surface and fastened with a compatible metal nails to prevent corrosion.

For bridge deck waterproofing membrane see the *Timber Bridge Deck Waterproofing Membrane* Special Provision.

Field applied preservative treatment for cut and drilled faces of lumber shall be bituminous asphalt-based roofing cement, copper naphthenate paste or approved equal.

Accessories

Linear delineators for the timber bridge rail system shall be rectangular, aluminum backed, high-intensity fluorescent yellow reflective sheeting. Size and color: 4” height (min.) x 34” width (max.).

Structural Steel

Structural steel for rolled steel I-beams, diaphragms, and connector plates shall be AASHTO M270 Grade 50 and painted with System 1 or galvanized in accordance with the *Structural Steel Shop Coatings Program* and Section 442-8 of the *Standard Specifications.*

Confirm availability of steel shape I-beam prior to construction. Contact Structures Management Unit if steel shape I-beams stated on construction plans are not available.

Bearings

Structural steel for bearing sole plates shall be AASHTO M270 Grade 50 and hot dipped galvanized in accordance with the *Structural Steel Shop Coatings Program* and Section 442-8 of the *Standard Specifications.*

Coating application for all structural steel shall not be performed until all shop fabrication including cutting, drilling, and welding has been completed.

Elastomeric bearings shall be Grade 50 durometer and in accordance with Section 1079-2 of the *Standard Specifications*.

**Method Of Construction**

Erect I-beams on elastomeric bearings and the sole plates shall have natural mill camber up.

Install flashing membrane on the top flange of steel I-beams before bolting beam and edge nailers to the top flange. The flashing membrane width shall be the same width as the top flange plus two (2) inches, to overhang and wrap down the sides of the flange by one (1) inch and placed for the full length of the beam.

Bolt beam and edge nailers to top flange and apply flashing membrane on the top of the beam and edge nailers prior to placing the timber deck. The flashing membrane width shall be the same width as the nailer plus two (2) inches to overhang and wrap down the sides of the nailer one (1) inch each side.

With structural screws, fasten timber bridge deck boards to beam and edge nailers as shown in the plans.

Cut, bevel, drill and countersink, and otherwise fabricate lumber in accordance with the plans. Set all materials accurately to required elevation and lines, with members plumb, true and accurately cut and fitted. Perform cutting and drilling in a manner that allows for the collection of all debris and proper disposal.

Treat surfaces of lumber that have been exposed from cutting or drilling with an approved field applied preservative. For drilled holes apply the preservative prior to bolt installation.

Final in-service deck boards shall be full length lumber with no splices permitted unless otherwise shown in the plans.

Attach metal drip edge along sides of timber bridge deck, locating rail post locations to be notched as necessary.

Apply the timber deck waterproofing membrane over the complete deck surface prior to installing the timber bridge rail system.

Attach retaining strip, wheel blocks, wheel guards and railing posts as shown in the plans, then attach timber rails to rail posts.

Timber bridge rails shall be installed with delineators attached to the bridge end rail posts and horizontal rails as detailed in the plans. For installation of permanent timber rails well in advance of placement of asphalt wearing surface, install bridge deck waterproofing membrane under the retaining strip with a minimum 6” projection for membrane lapping.

**Measurement and Payment**

No measurement and payment for the following items in this Special Provision: elastomeric bearings; structural steel for I-beams, connector plates, diaphragms, and sole plates. Such items shall be measured and paid for elsewhere in the contract and in accordance with any applicable Special Provisions and the *Standard Specifications*.

*Timber Bridge Deck System* will be paid for by the lump sum price bid and will be full compensation for furnishing and installing the timber bridge deck system including all labor, tools, equipment, lumber, hardware, flashing membranes, metal drip edge, timber deck waterproofing membranes; and all drilling, cutting, bolting and screw fastening; furnishing and field applying wood preservatives; and all other incidentals required in the completed and accepted work.

*Timber Bridge Rail System* will be paid for by the linear feet bid price and will be full compensation for furnishing and installing the timber bridge rail system including all labor, tools, equipment, lumber, hardware; and all drilling, cutting, bolting and screw fastening; furnishing and field applying wood preservatives; furnishing and installing delineators; and all other incidentals required in the completed and accepted work.

Payment will be made under:

| **Pay Item** | **Pay Unit** |
| --- | --- |
| Timber Bridge Deck System | Lump Sum |
| Timber Bridge Rail System | Linear Feet |
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