

**ITEM 564.8001--11 - PREFABRICATED PEDESTRIAN - BICYCLE BRIDGE
SUPERSTRUCTURE**

DESCRIPTION

This work shall consist of furnishing and installing the pedestrian bridge superstructure in accordance with the contract documents and as directed by the Engineer. Under this item the Contractor is responsible for designing, detailing, fabricating and installing prefabricated bridge superstructure in the configuration and geometry and at the location indicated on the Contract Plans. This includes the bridge deck, railings, joints, bearings and fencing. The Contractor's attention is directed to §106-01, Source of Supply, and §106-02, Quality Requirements, with regard to advising the Department of the sources of the proposed materials.

The Contractor is hereby advised that compliance with the requirements of this specification is likely to necessitate modifications to the standard design and configurations of the prefabricated bridge superstructures offered as stock items by various firms. The Contractor is responsible for all errors of detailing, fabrication and the correct fitting of structural steel members.

Examine Contract Documents for requirements that affect work of this Section. The contract plans may require specific deck types, railing, galvanizing, painting, or other details. Where this specification indicates "or as specified in the contract plans", this does not indicate a choice. It indicates that the contract plans control.

MATERIALS

All materials for this work shall meet the requirements of the New York State Steel Construction Manual (SCM), NYSDOT Standard Specifications Construction and Materials, and modifications made herein.

Manufacturers offering prefabricated superstructures which meet the basic geometric requirements indicated on the Contract Plans (span, width and camber) must, as a minimum, be AISC certified for major steel bridge structures. Qualified pedestrian bridge superstructure suppliers must have at least 5 years experience fabricating this type of structure.

Prefabricated bridge superstructure material shall conform to the following requirements:

Concrete for Bridge Decks, Class HP	§501
Steel Reinforcement	§556
Paint	§708-01
Paint (on galvanized surface)	§708-06
Galvanizing	§719-01
Structural Steel	§715-01
High Strength Bolts, Nuts and Washers	§715-14
Permanent Corrugated Metal Forms for Bridge Slabs	§736-01
High Strength Bolts, Nuts and Washers	ASTM A325 M
Posts for Fencing	ASTM A500, Grade B
Structural Steel Shapes: thickness (minimum) 8 mm	ASTM A588 M or as specified in contract plans
Structural Steel Plate	ASTM A709 Grade 345W.

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Structural Tubing: thickness (minimum) 6 mm	ASTM A847 M (weathering) ASTM A 500, Grade B (painted)
Weld Material for welding tubes:	SCM and ANSI/AWS D1.1
Weld Material for plate steel	SCM and ANSI/AWS D1.5
Anchor Bolts	Bearings §716 §723-60

Any material which will be exposed to view shall be smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. If such blemishes are found they shall be removed by grinding, or a combination of welding and grinding. Provide finished surfaces of members exposed in the final structure which are free of markings, burrs and other defects. All steel members shall be hot-dip galvanized. All tubular members shall be galvanized inside and out.

Certified copies of test results conducted by the manufacturer shall be furnished to the Deputy Chief Engineer Structures (DCES) in accordance with the requirements of subsection 715-01, Structural Steel.

Properly mark and match-mark materials for field assembly. Fabricate for a delivery sequence which will expedite erection and minimize field handling of materials. Where finishing is required, complete assembly, including welding of units, before the start of finishing operations.

DESIGN:

In addition to pedestrian live load, the bridge shall be designed for an M-9 vehicle. A vehicle impact allowance is not required. Deflection limits due to this vehicle shall not be considered.”

A professional engineer shall be engaged to design and detail the prefabricated bridge superstructure. These services shall include any required consultation for interpreting the plans and for the resolution of problems which may arise during the performance of the work.

All design and details shall be in conformance with the current New York State Department of Transportation Standard Specifications for Highway Bridges (Standard Specifications), including current Interim Specifications, the AASHTO Guide Specification for Design of Pedestrian Bridges, the Americans with Disabilities Act, and the current SCM. The live load shall be as per the AASHTO Guide Specification for Design of Pedestrian Bridges or as shown on the contract plans. When designing a concrete deck, do not consider any forms to be part of the reinforcement. Reinforcing steel in deck slabs shall be either epoxy coated or galvanized. When structural steel is to be unpainted, weathering (A847 M) steel shall be used.

Span length and clear width between curbs and/or face of rails shall be as indicated on the Contract Plans. The superstructure depth from the bridge deck surface to bottom of steel shall be configured to maintain the minimum vertical clearance indicated on the contract plans. All members of the vertical trusses (top and bottom chords, verticals, and diagonals) shall be fabricated from square and/or rectangular steel tubing.

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Vertical truss members shall be perpendicular to the bottom chord after the bridge is erected and the truss has deflected under all dead load or as specified in the contract plans. When the collection of water inside a structural tube is a possibility, either during construction or during service, the tube shall be provided with a drain hole at its lowest point.

When concrete bridge decks are used, cover to top steel reinforcing shall be a minimum of 50 mm or as shown on the contract plans.

Allowable fatigue stress ranges for steel members shall be determined from Article 10.3 of the Standard Specifications, except that the allowable fatigue stress ranges for Redundant Load Path structures may be used, regardless of the actual degree of member redundancy. Avoid fatigue sensitive details and eliminate out of plane bending details. All field connections for the truss and floor system shall be through the use of high strength bolts, except that the connection of the truss to the bearings shall utilize fillet welds. The minimum fillet weld for the truss to bearing connection shall be 8 mm.

Bolted field splices shall be designed as per Section 10.18 of the NYSDOT Standard Specifications for Highway Bridges and the NYS Steel Construction Manual. Splices are to be designed as slip-critical connections using Class A surface conditions.

Oversize holes are not permitted in primary member splices. Oversize holes may be used in one ply of secondary members.

Welded tubular connections shall be designed in accordance with the Structural Welding Code - ANSI/AWS D1.1. When gusset plates are welded to tubular members the tube shall be oriented such that a weld will not be made over the seam in the tube. Slotted tubes with all-around welding of gusset plate will not be permitted.

Pedestrian and bicycle railing systems shall be designed as per AASHTO Design Specifications for bicycle railings. Railing heights shall be a minimum of 1.067 m or as specified in the contract plans.

Bearings shall be designed in accordance with AASHTO specifications and in accordance with the New York State Bridge Manual and supplied in accordance to the Standard Specifications Section 565. Electrometric Bearings are the preferred bearing type as they require the least amount of maintenance. When Steel Sliding Bearings with Teflon or stainless steel sliding surfaces are used, details shall be shown in the shop drawings and submitted to the DCES for approval.

Anchor bolts shall be designed to resist all longitudinal, horizontal, and uplift forces present under the standard AASHTO load cases, transferred by the superstructure to the supporting foundations.

Anchor bolts may be either drilled or cast-in-place.

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Anchor bolts shall be fully threaded A449 bolts, set a minimum of 152 mm into the concrete when cast-in-place with a plate or embedded 12 inches when drilled and grouted into place.

Slotted holes in masonry base plates are allowed only at expansion bearings.

A deck joint system capable of handling the design expansion must be designed and supplied by the bridge manufacturer. The bridge shall be cambered to account for the full dead load as well as the vertical curve.”

DESIGN CALCULATIONS:

The design shall be in accordance with the AASHTO Guide Specifications for Design of Pedestrian Bridges, dated August 1997. Structural design of the bridge shall be performed by or under the direct supervision of a Professional Engineer licensed in New York State.

Two copies of design calculations shall be submitted concurrently with the shop drawings for review by the DCES. The calculations shall include, but not be limited to, the following:

- Analysis and code check with appropriate member connectivity and end conditions. A diagram showing joint coordinates and member indices shall be included.
- Half-thru truss or u-frame stiffness checks (when design does not include top lateral bracing).
- Member forces and stress checks.
- Deflection checks.
- End post and floorbeam design checks.
- Wind bracing design.
- Welded connection design.
- Bolted field splice design (when used).
- Bearing and anchor bolt design.
- Railing system design.
- Vibration design check including fundamental frequency calculations.

SHOP DRAWINGS:

Shop drawings shall be submitted in accordance with Section 2 of the SCM. Electronic submittals shall be in accordance with SCM Section 202.5.

The DCES comments will be indicated on the returned copies. Should the proposed design not be approved, the reasons will be indicated with the return of the material. The Contractor shall then submit a revised design and drawings for approval, subject to the same terms as the first submission. Resubmission will not be considered legitimate reason to request an extension of time under Subsection 108-04, Extension of Time.

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Shop drawings shall be furnished in archival format in accordance with Section 202.2 of the Steel Construction Manual. All work shall be done in accordance with the approved working drawings. The Contractor shall have approved working drawings prior to the start of any superstructure fabrication. The Contractor shall bear all cost damages which may result from the ordering of any materials or equipment, or the use of any preparatory labor prior to the start of any to the approval of the design and working drawings.

All connections shall be clearly shown, in detail, on shop drawings. The connection details shown on the drawings shall be consistent with the end condition assumptions made in the design. Any substitutions to the details shown in the contract plans shall be submitted to the DCES for review prior to shop drawing submission. Submitted substitutions must be clearly identified and noted as such. Reviewed substitutions, modifications and necessary changes in related portions of the work shall be coordinated by the fabricator and shall be accomplished at no additional cost to the State.

Provide drawings, templates and directions for installation and setting of anchor bolts and bearing plate assemblies to be installed by others. Each prefabricated bridge superstructure shall include all hardware necessary for complete installation including bearing devices and joint systems.

INSPECTION:

Personnel from the New York State Department of Transportation Metals Engineering Unit will hold a prefabrication conference at the fabrication plant. An inspector, from an inspection agency assigned by the state, will be in attendance. During fabrication the inspector will make visits to the plant and will generally perform inspection prior to material shipment. The inspector will submit his written determinations of the work to the DCES. These determinations will be taken into account at the time of field inspection at the project site. All work done while the inspector is refused access to the fabrication plant will be cause for automatic rejection. All material shipped to the project site will be subject to inspection by the Engineer-in-Charge. All material furnished for this work will be accepted at the work site only when accompanied by the Manufacturer's certification that all material used and all fabrication work done, meets the requirements of this specification.

FABRICATION:

The Fabricator shall be AISC certified, Category 1. The ordering of material, preparation of base metal for fabrication, shop assembly, including welding and testing of all structural steel and other metal parts shall conform to the requirements of the SCM. Welders for plate and shape fabrication shall be qualified in accordance to the SCM Section 8. Welders shall be qualified in accordance with AWS D1.1, pertaining to procedures involving tubular steel. The qualifying test shall have been within the last three years, and witnessed by an independent third party.

UT inspection will be required in accordance with the following provisions: Butt welds subject to tensile stress in bridge chords consisting of tubular members will be subject to ultrasonic inspection and shall meet the quality requirements in the SCM, Section 17. UT shall be

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performed using a transducer which is appropriate for testing the corners of the square tubing.

The transducer to be used should be listed in the UT procedure which shall be submitted to the DCES for review and approval prior to any UT testing. UT inspection shall also be performed on 25% of the compression chord butt splices for members consisting of tube, plate, or shapes. RT inspection will be required in accordance with the following provisions: Butt welds subject to tension in bridge chords which are fabricated from plates or shapes shall be radiographically tested and shall meet the quality requirements of the SCM, Section 16.

Transversely loaded partial penetration groove welds are not allowed.

Bridges which are not galvanized or painted shall be sandblasted to SSPC SP6 after fabrication. When structural steel is to be painted, paint shall be applied in accordance with Standard Specifications Section 572.

ERECTION DRAWINGS:

Erection drawings shall be submitted according to the NYSSCM Section 204 and shall be submitted a minimum of 30 days prior to erection.

CONSTRUCTION DETAILS

When the structure is delivered and prior to any erection work being performed, the Engineer-in-Charge (EIC) will inspect and approve the bridge superstructure. Bridge superstructures not approved by the EIC shall be removed from the work site and replaced with a superstructure acceptable to the EIC at no additional cost to the State. Transportation, storage, and erection of the bridge superstructure shall conform to the requirements of the SCM Section 14.

Establish required leveling and plumbing measurements at mean operating temperature of structure. Make allowances for the difference between temperature at time of erection and mean temperature at which the structure will be when in service. Where parts cannot be assembled or fitted properly as a result of errors in fabrication or of deformation due to handling or transportation, such condition shall be immediately reported to the DCES along with the proposed method of correction. The straightening of bends or warps shall be done in conformance with the SCM. Bent or damaged heat treated parts will be rejected.

A representative of the manufacturer of the prefabricated structure shall be present when the bridge is delivered and installation commences to ensure proper installation. The manufacturer will provide detailed, written instructions in the proper lifting and splicing procedures.”

METHOD OF MEASUREMENT

This work will be measured as number of each Prefabricated Pedestrian-Bicycle Bridge Superstructure satisfactorily furnished and installed and accepted by the engineer.

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BASIS OF PAYMENT

General: The unit price bid for each Prefabricated Pedestrian-Bicycle Bridge Superstructure shall include the cost of furnishing all engineering, labor, materials, paint, and equipment necessary to satisfactorily complete the work. The price bid shall also include, but not limited to, transportation and storage of materials; bolting and welding both in the shop and in the field.

Additional work: The requirements of Subsection 564-5.02, Additional Work, shall apply with the following modification:

Where the phrase “price bid for structural steel” appears, it shall be replaced by “price bid for Prefabricated Pedestrian-Bicycle Superstructure”.

Note: nn denotes serialized pay item.