DESIGNER NOTES

*The full text of this Special Provision as presented below is written as a Heading to be used within a Lump Sum item, such as Item 995.01, for a bridge construction project that uses prefabricated tubular steel trusses as its superstructure. The Designer shall provide the required information in those locations highlighted in yellow.*

*DELETE ALL DESIGNER NOTES, AND REMOVE HIGHLIGHTING PRIOR TO SUBMITTAL*

**PREFABRICATED TUBULAR STEEL TRUSS SUPERSTRUCTURE**

**DESIGN**

The Contractor shall submit design computations for the prefabricated HSS tubular steel truss to the Engineer for review and approval. The computations shall be prepared in accordance with the latest AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges for the prescribed pedestrian load and HXX *(Designer to specify truck from the AASHTO Guide Specifications)* truck. Equestrian Load shall not be considered in the design.

Two independent sets of design computations shall be submitted for approval. To expedite the review and approval process, submissions containing computer computations shall include electronic copies of the actual input and output files. The design computations shall consider all loadings as are appropriate for each stage of fabrication, shipment, construction, and upon completion. Design computations and shop drawings shall be prepared by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts.

**FABRICATION**

1. All HSS Structural Tubes shall conform to the requirements of ASTM A1085 Grade A (50 ksi yield strength) with Supplemental Requirement S1 Heat Treatment and shall be hot-dipped galvanized, with best practices to limit heat related cracking in the corners, and painted in accordance with the Special Provisions below.
2. The shop drawings shall indicate Fracture Critical Members (FCM). The AASHTO/AWS Fracture Control Plan of Non redundant Members contained in AASHTO/AWS D1.5, Section 12, shall be applied to tubular members (HSS members), where required by AASHTO LRFD Articles 6.6.2 and C6.6.2.
3. All welding and preparation and assembly of material for welding of non-FCM tubular steel members shall conform to t the latest edition of the ANSI/AWS D1.1 Structural Steel Welding Code. Only low hydrogen filler metal shall be used.
4. All welding and preparation and assembly of material for welding of FCM designated tubular steel members shall conform to the latest edition of the ANSI/AWS D1.1 Structural Steel Welding Code and the latest ANSI/AASHTO/AWS D1.5 Bridge Welding Code as indicated below:

* ASTM A1085 shall be added to those standards listed in Article 12.4.1 of AASHTO/AWS D1.5.
* For the purpose of determining preheat and interpass temperatures, the values for AASHTO M270M/M 270 or ASTM A709 Grade 50 shall be used.
* For the purposes of Charpy V-notch requirements of the filler metal, the filler material shall be treated as M270 and conform to the requirements of AASHTO/AWS D1.5 Table 12.1.
* Welding details for cyclically loaded tubular members specified by ANSI/AWS D1.1 shall be used.
* All welds require qualification using AWS D1.1 Clause 9, Part C.

1. All welds shall be tested as follows:

* 100% of all CJP welds for FCM members shall be tested with UT in accordance with AASHTO/AWS D1.5.
* 100% of all CJP welds in tension or reversal of stress for non-FCM members shall be tested with UT in accordance with AASHTO/AWS D1.5.
* 25% of all CJP welds in compression shall be tested with UT in accordance with AASHTO/AWS D1.5.
* 10% of all PJP and fillet weld joining primary members shall be MT in accordance with AASHTO/AWS D1.5.
* All repair welds of FCM members shall be tested in accordance with Clause 12 of AASHTO/AWS D1.5.

1. Fabricator of prefabricated steel truss bridge shall be certified by American Institute of Steel Construction (AISC) Quality Certification Program for Intermediate Bridges and shall be a MassDOT approved Fabricator.
2. All non-HSS Structural Steel shall conform to AASHTO M 270, Grade 50, and shall be hot-dipped galvanized and painted in conformance with the Special Provisions below.
3. Bolts shall conform to the ASTM F3125 Grade A325. Nuts and Washers shall be as recommended by A3125 and shall be hot-dip galvanized or mechanically galvanized and painted in accordance with the Special Provisions below.

**COATING OVER GALVANIZING**

General

Surface preparation and application of the coating system shall be completed within 14 calendar days of galvanizing.

Surface Cleaning

All galvanized pieces shall be visually inspected to determine the cleanliness of the surface. All visible soluble contaminants shall be removed from galvanized surface by solvent cleaning in accordance with SSPC SP-1. All material shall be checked for wet storage stain. Wet storage stain shall be removed prior to abrasive blasting in accordance with SSPC SP-16 Appendix A. Prior to surface preparation of the galvanized surfaces all components shall have a finish that is reasonably smooth and uniform. The surface shall be free of sharp spikes, thick edges, lumps and edge tears and meet the requirements of ASTM A123 section 6.2

Surface Preparation

The surface shall be abrasive blast cleaned immediately before painting. Surfaces to be painted shall be blast cleaned in accordance with requirements of SSPC SP16 “Brush-off Blast Cleaning Non-Ferrous Metals” producing a minimum surface profile of 1 mil. Blast profile shall be measured in accordance with ASTM D4417 Method B.

The thickness of the galvanizing shall be checked before and after the completion of abrasive blasting using SSPC PA-2 to confirm that prepared surfaces still have the minimum thickness requirements of AASHTO M111 or AASHTO M232 as applicable. Surface preparation shall not loosen, cause flaking or disbonding of the galvanized surface. Unacceptable thickness and damage shall be cause for rejection of the entire piece. Surfaces unacceptable after abrasive blasting and approved for repair shall be repaired in accordance with ASTM A780.

Surface preparation of approved repair areas shall be done in accordance with SSPC SP-10 or SP-11. Repairs to the galvanized surface in excess of one percent of the total surface area of the piece being repaired are not allowed. The repair coating shall be a zinc rich primer as specified by the coating manufacturer compatible with the coating system approved.

Application

Coating shall be applied within six hours after surface preparation has been completed and accepted.

The Contractor shall take all necessary measures to ensure that prepared parts are kept clean and not exposed to dirt, dust, grease, or oil while being handled or staged prior to application of the coating.

Final acceptance of the coating system will occur at the jobsite after erection of the coated items, and after all required repairs have been completed.

The coating system shall consist of a polyamide epoxy and a catalyzed aliphatic urethane. All coating shall be applied in accordance with the MassDOT specifications and the coating manufacturer’s product datasheet.

**ERECTION**

1. Complete erection and maintenance instructions shall be provided by the Fabricator.
2. Contractor shall be responsible for the final erection of the structure.
3. A qualified Professional Engineer, registered in the Commonwealth of Massachusetts, from the fabricator, shall be made available to advise the Contractor on site during erection for at least two (2) days.
4. Trusses too long to be shipped in one piece shall be supplied in two or three pieces that must be field connected with bolts before erection. Field connections shall be made in strict accordance with the plans and written instructions supplied with each truss bridge. All field connections of the trusses must be supervised by a qualified Professional Engineer registered in the Commonwealth of Massachusetts.
5. The Contractor shall be responsible for field touch-up of any galvanized coating and paint that is damaged during shipping and erection.

The Contractor shall prepare and submit a plan indicating his/her proposed erection procedures and methods to be used including equipment, tools, crane capacity and location, schedule of operations, methods of utility protection, etc., to the Engineer for approval. The requirements for equipment and all procedures utilized shall be in conformance with Subsection 960. of the Standard Specification, and AASHTO LRFD Bridge Construction Specifications. The Erection procedures and any necessary calculations and drawings shall be stamped by a Professional Engineer, registered in the Commonwealth of Massachusetts, certifying that all structural members are suitably braced and supported throughout the erection process. The erection may not commence until the Engineer has given written approval.

**CERTIFICATION**

Fabricator shall certify the following:

1. All welding shall be completed by certified welders. Copies of certification reports shall be made available on request.
2. All welding procedures and welding materials shall be in compliance with ANSI/AWS D1.1 Structural Steel Welding Code or ANSI/AASHTO/ AWS D1.5M/D1.5 BRIDGE WELDING CODE as appropriate, published by the American Welding Society.
3. All welds shall be visually inspected by qualified inspectors for size, continuity, absence of defects, etc., during the fabrication process.
4. All HSS Structural Tubes shall conform to the requirements of ASTM 1085 including Supplemental Requirement S1 and shall be hot-dipped galvanized and painted as noted above.
5. All non-HSS Structural Steel shall conform to AASHTO M 270 grade 50, and shall be hot-dipped galvanized and painted as noted above.
6. All connection bolts shall be ASTM F3125 grade A325 hot-dip galvanized high strength bolts.
7. The fabricator's facility shall be open for inspection by The Department or his/her designated representative at any time during process of manufacture.

**METHOD OF MEASUREMENT AND BASIS OF PAYMENT***this section to be used only if the Prefabricated Tubular Steel Truss is to be paid for as unit price item, otherwise delete this whole section*

Bridge No. X-XX-XXX (XXX) will be considered as a single complete unit and no separate measurement will be made.

Payment for prefabricated tubular steel truss bridge will be at the contract unit price per one Lump Sum installed and accepted by the Engineer which price shall include, cast in place reinforced concrete abutments and wingwalls, steel tubular trusses, floor system, concrete deck, wood safety fence, protective screens, bearing devices, labor, tools and equipment necessary for furnishing and erecting the bridge and any other items considered incidental to complete the work.

**BASIS FOR PARTIAL PAYMENT** *this section to be used only if the Prefabricated Tubular Steel Truss is part of a Lump Sum Item, otherwise delete this whole section*

At the time of bid, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 995. as well as his/her total bridge structure Lump Sum cost for Bridge No. X-XX-XXX (XXX). The bridge Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Engineer for the individual bridge components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 995. and no further compensation will be allowed.

The schedule on the proposal form applies only to Bridge No. X-XX-XXX (XXX). Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.