

**Tennessee Department of Transportation  
Division of Materials and Tests**

**Requirements For Shop Inspections of Structural Steel Beams (SOP 6-2)**

Purpose- The purpose of the document is to establish the guidelines for the inspection of structural steel beams.

Background- The Materials and Tests (M&T) Division Inspection of Structural Steel Beams Standard Operating Procedure (SOP) is to be followed for the inspection of structural steel beams intended to be utilized for the Tennessee Department of Transportation (TDOT) or for TDOT affiliated projects. It shall be used in conjunction with the following documents when applicable in order of priority:

- TDOT Project Specific Proposal Contract
- TDOT Approved Shop Drawing(s)
- TDOT Standard Drawing(s)
- TDOT Project Plan(s)
- TDOT Standard/Supplemental Specifications (Specifications)
- TDOT Standard Operating Procedure(s) (SOP)

**1. Initial Producer Qualification Requirements**

For initial approval, the Producer shall submit, at a minimum, to the M&T Division in a letter or to [TDOT.SteelMTR@tn.gov](mailto:TDOT.SteelMTR@tn.gov):

- Proof of national certification – American Institute of Steel Construction (AISC)
- Most recent plant inspection report completed by the certifying agency
- Formal response to each deficiency noted by the certifying agency
- Product request with detailed list of products to be produced
- Standard/Alternate Drawings, Plans, or Specifications to be used
- TDOT specific Quality System Manual (QSM)
- Proof of Quality Control personnel certifications

1.1 All producers of structural steel beams to be supplied on TDOT projects shall be certified by the approved National Quality Control Program: AISC

All producers shall provide written consent to the certifying agency allowing all plant inspection documentation to be forwarded to TDOT immediately after the inspection is complete.

1.2 Producers shall request, from M&T, approval for products to be supplied to TDOT projects. This request should contain a detailed list of the products that will be produced in accordance with Section 602 of the Specifications. Correspondences should be sent to [TDOT.SteelMTR@tn.gov](mailto:TDOT.SteelMTR@tn.gov).

- 1.3 All structural steel beam products shall be manufactured in accordance with the dimensions and details shown in the following:
- TDOT Project Specific Proposal Contract
  - TDOT Standard/Supplemental Specifications (Specifications)
  - TDOT Standard Operating Procedure(s)
  - TDOT Standard Drawing(s)
  - Approved Shop Drawing(s)
  - Producer's approved alternate drawing to the Standard Drawing(s)
    - Once approval is given for alternate drawings stamped by a Professional Engineer licensed in the State of Tennessee will be valid until a change is made to the Standard Drawing(s). All alternate drawings are to be submitted to Structures Division and will then be sent to the Design Division for review prior to producing a product.
  - Contract Plan(s)
  - AASHTO/ASTM Specifications

## **2. Producer Facility and Equipment Requirements**

- 2.1 All fabrication facilities shall hold the following certifications where applicable as detailed in Section 602.04.A of the Specifications in accordance with the (AISC) Certification Program for Structural Steel Fabricators:
- Intermediate Bridges, with applicable bearing/metal component training
  - Advanced Bridges, with applicable bearing/metal component training
- 2.2 All fabrication facilities shall be capable of producing steel beams as detailed in the Plans in accordance with Section 602.05.A in the Specifications.
- 2.3 All fabrication facilities shall comply with the material handling detailed in Section 602.05 of the Specifications.

## **3. Quality Acceptance/Assurance by Certification**

- 3.1 Quality Assurance Inspector Requirements
- The Inspector representing TDOT shall be certified through the American Welding Society (AWS) Certified Welding Inspector (CWI) and be experienced in all phases of the materials, workmanship, procedures, equipment, and apparatus involved in the work to be performed. The inspection shall be performed by an AWS CWI qualified and certified in accordance with provisions of AWS QC1: Standard for Qualification and Certification of Welding Inspectors.
  - The Inspector shall notify the M&T and Structures Divisions of all inspections, examinations, etc.
  - The Inspector shall be thoroughly familiar with documentation applicable to the work, in which they are assigned to inspect.

## 4. Verification Program

### 4.1 Mill Inspection

- Mill inspection will be waived with a certified or notarized mill test report from the fabricator. The Inspector shall verify the Mill Test Reports and reject any material not meeting the following requirements specified on the mill test report:

- Physical
- Chemical
- Impact

A copy of the mill cert will be submitted, with the final acceptance documentation, to M&T Division for verification.

### 4.2 Fabrication Shop Inspection

- Inspectors shall be competent with:
  - The Terms of the Contract Document
  - Time of Delivery
  - Order of Shipments
  - Work performed in the shop
  - Condition of Materials
  - Quality of Work
  - Procedures and Techniques
    - Shearing and Flame Cutting
    - Edge Preparation of Welded Joints
    - Size, Dimension, and Alignment of the Structure
    - Ensure the reaming or drilling of holes and match marking
    - Ensure the camber of girders and beam
    - Ensure that reaming templates are properly set up
- Welders Requirements
  - Verify the Certification
  - Review Quality of work
  - Welding and Materials
    - Classification of Welding Electrodes, Wires, and Fluxes
    - Storage of Welding Materials
    - Welding Procedure
- Testing
  - Non-Destructive Testing (NDT) of Weld Joints
  - Contract Pre-Qualification
  - Paint and Surface Preparation
- Ultrasonic Testing (UT) – if applicable  
In addition to the NDT called for in the contract, additional ultrasonic inspection may be called for at locations designated by the M&T Division or representative. This additional UT testing for purposes of quality assurance,

shall be performed by an American Society for Nondestructive Testing (ASNT) Level II personnel. The results of this inspection shall be submitted to the M&T Division within forty-eight (48) hours of test completion unless otherwise specified in the contract language. This additional testing will only be performed if specifically called for in the contract.

- Inspection Stamp – All approved material leaving the fabrication plant shall be stamped with:
  - Inspecting Agency's Logo and Seal
  - Inspector(s) AWS certification number
  - Fabricator's CWI Stamp

## **5. Quality Control Requirements**

### **5.1 Quality Control Plan (QCP)**

The Producer shall develop and accurately maintain a QCP. The QCP shall be submitted to M&T annually and/or following updates to the plan. The QCP shall include, but is not limited to:

- An Organization Chart
  - Including Quality Control personnel contact information
- Buy America Statement
  - All applicable materials in accordance with SOP 1-8: Build America, Buy America (BABA) Requirements
- List of all material suppliers and their location
- Quality Control testing procedures
- Detailed marking for TDOT products

### **5.2 Quality Control Personnel**

- Each fabrication facility shall have an individual responsible for the quality production of the steel beams/products. This individual shall have authority to make necessary adjustments, reject materials, cease production, or reject products when the quality of the product is in question.
- Technicians and other individuals who conduct sampling and testing for quality control must be certified through both the AISC and AWS CWI training programs.

### **5.3 Quality Control of Materials**

- All fabrication facilities shall comply with the material handling detailed in Section(s) 602.05 and 908 of the Specifications.

### **5.4 Quality Control Documentation**

- The fabrication facility shall keep daily reports documenting each product made that day and the number made. The fabrication facility shall maintain this information for a minimum of five (5) years. All documents are subject to review by the Department.

## 6. Reporting

- 6.1 Producer's Certification – Each shipment to the project site must be accompanied with a report certifying the work completed in the fabrication of the steel member. Successive reports shall include the percentage of steel fabrication work that has been completed and shipped to the project site. Reports used for certification/acceptance purposes must include the following items:
- Project Number
  - County
  - Structure Number
  - Weight of steel member(s)
  - Heat Number(s) of all steel used to fabricate members
- 6.2 Final Inspection Report – After project completion and acceptance, the Inspector shall submit a final report as a signed .pdf. The report shall include the following information:
- County
  - Project Number(s)
  - Contract Number
  - Project Description
  - Names of Fabricator
  - Name of the Inspection Agency
  - All certifications associated to the contract
  - Inspector's Electronic Signature
  - Applicable supporting shall include:
    - Fabrication Work Sheets
    - Girder and Beam Reports
    - Miscellaneous Material Reports
    - Girder Materials Reports
    - Heat No. ID Sketches (From the Fabricator)
    - Mill Test Report Forms with accompanying numbered Mill Test Reports
    - All NDT Reports
    - Inspectors' qualifications
    - Additional information: Letters, sketches, non-conformance reports, important notes, etc.
- 6.3 The final report shall be submitted to [TDOT.SteelMTR@tn.gov](mailto:TDOT.SteelMTR@tn.gov).

## Appendix A: Quality Assurance Checklist for Steel Beam Fabrication

Ensure that reports used for certification purposes include:

- Project Number
- County
- Structure Number
- Description of the project
- Description of each steel member
- Piece Number/Designation
- Weight of steel member(s)
- Heat Number(s) of all steel used to fabricate members
- Successive reports shall include the percentage of steel fabrication work that has been completed and shipped to the project site
- Any other information required per the contract

Ensure that the following items have fulfilled requirements:

- Dimensions
  - Ensure that the quality control personnel measured and retained all data related to the dimensions
  - Ensure that all dimensions are within the specified tolerances per the shop drawings/ standard drawings
- Welding
  - Ensure all welders are American Welding Society (AWS) Certified Welding Inspector (CWI) certified
  - Ensure NDT Test Results are available (if applicable per the contract)
- Surface Preparation
- Painting