

# Mock-up Bridge Girder Instructions

## For applicants to the AISC Certification Program for Steel Bridge Fabricators

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These instructions apply in addition to the Requirements of the AISC Certification Program for Steel Bridge Fabricators. When required to complete a mock-up bridge girder, the fabricator shall create a general note sheet, girder detail, and shop assembly drawings and then build a mock-up bridge girder. Shop and assembly drawings shall be prepared and submitted to for the documentation audit prior to the scheduling of an on-site audit. Representative Mill Test Reports, Certificates of Compliance, and other applicable documentation specific to the mock-up bridge girder will be required at the time of the on-site audit.

The personnel responsible for and performing the work will demonstrate understanding necessary for effective implementation of the requirements of codes and standards. All aspects of this exercise shall be performed in accordance with AASHTO/AWS D1.5.

The exercise will include producing drawings of a typical bridge girder and the actual fabrication of a mock-up bridge girder to demonstrate fabrication knowledge and skills. The exercise will include the following features:

- 1 Create a shop assembly drawing of a two span bridge. The length of each span is 90 feet. The elevation of the left abutment is set at 0 feet. The elevation of the pier is +3 feet and the elevation of the right abutment is +2 feet. The bridge is five girders long consisting of two end girders, one girder over the pier and an additional girder in each span between the end girder and the pier girder. The assembly drawing shall include information normally used by a drilling crew to layout the girders to check for proper positioning prior to drilling the splices or checking the fit of the splices for field welding. The assembly drawing will be submitted to QMC for review prior to fabrication of the mock-up bridge girder.
- 2 Create a detailed shop fabrication drawing and a general note sheet for the girder at the left abutment. This will be the mock-up bridge girder. It shall be at least 10 feet in length. The web shall be a minimum of 40 inches in height. The detailed shop fabrication drawing and general note sheet will be submitted to QMC for review prior to fabrication.
- 3 For this exercise, the mock-up bridge girder will be detailed and fabricated in accordance with the general notes and hold points included below.
  - 3.1 Material: The assembly and detail drawing will show all flanges and webs and splice plates using ASTM A709, Grade 50; Stiffeners shall be ASTM A709, Grade 36 minimum. The actual material used for the fabrication exercise is the fabricator's choice (i.e., any available weldable grade material may be used for the fabrication of the mock-up bridge girder).
  - 3.2 Bottom Flange and lower half of web are considered to be in tension. Regardless of the actual camber detailed on the assembly drawing, the mock-up bridge girder detail shall include a camber of 1/2 inch.
  - 3.3 Preparation is required on one end of the girder for a welded field splice in accordance with AASHTO/AWS D1.5.
  - 3.4 The bottom and top flange will be detailed of material no less than 1 inch thick and 12 inches in width.
  - 3.5 The bottom flange will include a full penetration butt weld splice that meets the requirements of AASHTO/AWS D1.5. Plate material may be the same thickness on each side of the bottom flange splice. The detail drawing will identify the joint design chosen from AASHTO/AWS D1.5.
  - 3.6 The top flange will be detailed to include a material thickness transition of at least 1/2 inch. The top flange will include a full penetration butt weld splice and meet the transition requirements of AASHTO/AWS D1.5.
  - 3.7 The web material thickness shall be no less than 3/8 inch. The web will include a full penetration butt weld splice where the material is the same thickness and meets the requirements of AASHTO/AWS D1.5.
  - 3.8 Web to top flange welds will be detailed as 3/8 inch fillet welds regardless of the plate thickness chosen for this exercise.
  - 3.9 The web to bottom flange weld will be detailed as a full penetration weld, meeting the requirements of AASHTO/AWS D1.5.
  - 3.10 Detail two full length intermediate stiffeners that are at least 3/8 inch thick. The stiffeners shall be placed at approximately the mid-point of the girder, one on each side of the web. One stiffener shall be 90 degrees to the web and the other shall be 60 degrees to the web. One stiffener shall

have a mill to bear condition at the bottom flange. All stiffener welding shall be 1/4 inch minimum fillet weld.

- 3.11 At the end of the girder opposite the welded field splice preparation, a bolted field splice shall be prepared for either the top or bottom flange with a minimum of 12 holes in the flange for 7/8 inch diameter, ASTM A325 bolts. The splice plates shall be a minimum of 1/2 inch thick and include both top and bottom plates with a 3/16 inch shim.

### General Notes:

- Welding (except tacking) of the web and flanges shall be performed by the SAW process in accordance with AASHTO/AWS D1.5.
- Welding (except tacking) of the stiffeners will be performed using the FCAW or SAW process in accordance with AASHTO/AWS D1.5.
- SAW welds shall be performed in accordance with a valid WPS accompanied by a PQR (complete with test results) that is performed by the fabricator in accordance with AASHTO/AWS D1.5. The WPS will meet the requirements of the FCP if the Fracture Critical Endorsement is sought.
- FCAW welds shall be performed in accordance with a valid WPS accompanied by a PQR (complete with test results) that is performed by the fabricator in accordance with AASHTO/AWS D1.5. The WPS will meet the requirements of the FCP if the Fracture Critical Endorsement is sought.
- The auditee will perform intermediate and final inspection at the time of the audit and present visual inspection reports and NDE reports.
- The auditor will not perform any inspections, direct work or provide instruction. The auditor may request alternate sequences in agreement with the auditee to meet unforeseen on-site conditions. The auditor is present to observe process and the application of requirements by the auditee.

### References:

AASHTO/AWS D1.5, *Bridge Welding Code*  
 AASHTO/NSBA Steel Bridge Collaboration G1.3, *Shop Detail Drawing Presentation Guidelines*  
 FHWA Report FHWA-SA-91-031, *High Strength Bolts for Bridges, Appendix A1, "Procedure for Performing Rotational Capacity Tests."*  
 RCSC, *Specification for Structural Joints Using ASTM A325 or A490 Bolts*

### Requirements for AISC Certification Program for Steel Bridge Fabricators Standard for Steel Bridges

Knowledge and Skill Demonstrated (mock-up feature)	Fabrication and Inspection Instructions	S	U	Hold Points (NB, General Note f.)
Full penetration butt splice RT NDE (Bottom Flange)	The bottom flange splice shall be welded prior to the on-site audit. Bottom Flange weld shall be 100% RT. Radiographic test results shall be available at the beginning of the on-site audit.			None
Full penetration butt splice with transition UT NDE VT NDE (Top Flange)	The top Flange weld preparation and tacking shall be completed prior to the start of the on-site audit. Top flange full penetration butt weld to be 100% UT.			The on-site auditor will observe the joint preparation and fit up and make observations of the root pass and at other points throughout the welding process as determined during the on site audit. On-site auditor to witness UT.
Full penetration butt splice UT NDE (Web)	The web splice weld and UT shall be completed prior to the on-site audit. The accompanying UT results shall be available during the on-site audit.			None
Fillet Weld (Top Flange to Web)	The top flange to web welds shall be 100% MT for the length of the girder.			The fit up, tacking and welding of the web to the top flange fillet welds will be witnessed by the QMC Auditor. On-site auditor to witness the MT.

Full penetration weld UT NDE (Bottom Flange to Web)	Perform the full length of the weld with exception of a section 8" to 12" from the right end of the girder prior to the on-site audit. The weld pass terminations will be <i>cascaded</i> to illustrate the weld pass sequencing. 100% UT the weld for a length of 2 feet from one end and have the accompanying UT report available.		None
Mill to bear fitting Fillet welding (Stiffeners)	The stiffeners shall not be welded prior to the on-site audit. Use SAW or FCAW to weld the stiffeners.		The fit up, tacking and welding of the stiffeners shall be witnessed by on-site auditor.
Match marking (Splice plates)	Fabricate splice plates for a flange. Assure that the splice plates are tied to their specific location in the assembly by the use of a match marking procedure.		The bolting operation shall be witnessed by the on-site auditor.
Fastener assembly validation Pretension joint bolt installation (Bolted field splice)	Splice plates will be ready for drilling prior to the on-site audit. All fitting, drilling and assembly will be done at the time of the audit.		The on-site auditor will witness a demonstration of the Rotational Capacity (RC) test and proper pretensioned joint installation of ASTM A325 bolts.
Camber and lay down assembly procedure	QA/QC and shop fitters plus supervision shall demonstrate an understanding of the measurements required and have a recording form created to record camber readings.		The auditor will witness personnel making a camber measurement on the girder. The auditor will verify that your firm has the space for the lay down to occur for typical size bridge girders.
Final inspection	A final Quality Control inspection will be performed by the fabricator at the time of the audit. All Inspection and NDE reports will be required at that time.		Final Quality Control Inspection will be witnessed by the QMC auditor as requested.