CERTIFICATION PROGRAMS

Mock Exercise Instructions for Fabricators of Advanced Bridges

1. Scope

For applicability, refer to the *Supplemental Requirements for Bridge Fabricators (SBR, IBR, ABR)* and the Governing Requirements for Certification Programs. Participants/Applicants seeking the Fracture Control endorsement shall also comply with the *Supplemental Requirements for Fracture Control Endorsement (FCE)*.

This exercise will require fabrication of a horizontally curved trapezoidal tub girder to demonstrate the knowledge, skills, and capability to produce fabricated steel to the quality required for Advanced Bridges (ABR) or Advanced Bridges with the Fracture Control Endorsement (FCE).

2. Document Requirements

In addition to the required documents listed in the Supplemental Program Requirements, the fabricator shall have the following documents available for review during the site audit:

a. Valid SAW Welding Procedure Specifications (WPSs) with supporting Procedure Qualification Records (PQRs) in compliance with the current AASHTO/AWS D1.5 Bridge Welding Code to be used for web-to-flange welds and CJP welds (see 4.1.a). **WPSs that do not have the required supporting PQRs (complete with test results) shall be considered invalid and unfit for use in this mock exercise.**

b. Valid Fracture Critical SAW WPS and PQR for Participants/Applicants seeking the FCE. Fracture Critical **WPSs that do not have the required supporting PQRs shall be considered invalid and unfit for use in the FCE portion of this mock exercise.**

c. FCAW, SMAW, or GMAW-C may be used for all other welding with a valid AASHTO/AWS D1.5 WPS and PQR.

d. Current Welder Qualification Test Records (WQTR) for all processes and positions to be used in the exercise in compliance with AASHTO/AWS D1.5, Clause 7 and Clause 12, as applicable.

e. Material Test Reports (MTRs) for materials used. (These may be examples of MTRs.)

f. Purchase orders for materials used. (This may be an example of a P.O. with all required information.)

g. Girder and splice plate shipping marks and match-marking scheme.

3. Drawings and Materials

a. Detailed shop fabrication drawings and a general note sheet are provided for a horizontally curved trapezoidal tub girder.

b. Steel for this exercise is designated ASTM A709, Grade 50, but the actual material used for the mock exercise may be any available weldable grade material.

c. High-Strength bolt assemblies consisting of ASTM F3125 Grade A325, Type 1 bolts with A563 Grade C Nuts and F436-1 washers are required as shown on the shop drawings.

d. AWS welding electrodes shall be of the E70 series in conformance with the D1.5 Bridge welding code for the base metals to be welded.

4. Assembly Instructions

The mock exercise shall be fabricated in compliance with the instructions and information listed below.

4.1 Girder Assembly and Fabrication Instructions:

a. The top flange butt-joint CJP weld splice and all web-to-flange welding shall utilize the SAW process.

b. FCAW, SMAW, GMAW-C, or other AASHTO/AWS D1.5-approved welding processes may be used for all other welding in this exercise.

c. Bolts shall be installed as shown on the shop drawings. All connections are considered slip-critical with Class B faying surfaces. Bolt threads shall be excluded from the shear plane.

d. For Participants/Applicants seeking the Fracture Control endorsement, the top flange CJP butt-joint weld shall be considered Fracture Critical.

See Table 1 for a description of activities to be completed prior to the site audit and those that are to be observed during the site audit.

5. Dimensional Tolerances

Dimensional tolerances shall comply with AASHTO/AWS D1.5 unless otherwise noted.

6. Inspection and NDT

a. Visual inspection and NDT may begin immediately after welds have cooled to ambient temperature. Additional cooling periods for NDT shall not be required for Fracture Critical welds.

b. Visual inspection and NDT shall be performed in compliance with the current

AASHTO/AWS D1.5 Bridge Welding Code. The web-to-bottom flange fillet welds shall be considered in tension. For Participants/Applicants seeking the Fracture Control endorsement, the top flange butt-joint CJP weld shall be considered Fracture Critical.

c. See Table 1 for a description of activities to be completed prior to the site audit and those that are to be observed during the site audit. The applicant's typical project documentation and records, including, but not limited to, contract review, detailing, RFIs (if any), purchase orders, fabrication, and inspection/NDT records, shall be made available for the onsite auditor to review.

7. General Requirements

All aspects of this exercise shall be performed in compliance with the applicant's quality management system (QMS). This includes, but is not limited to, contract review, detailing, purchasing, fabrication, and inspection.

a. During the site audit, the personnel responsible for and performing the work shall demonstrate the understanding necessary to effectively implement the requirements of the latest editions of the applicable codes and standards.

b. The Auditor shall not perform any inspections, direct any work, or provide instruction. The auditor may request alternate sequences in agreement with the auditee to meet unforeseen on-site conditions.

c. The auditor is present to observe the process and the auditee's application of the Program requirements and their QMS.

d. **All fabrication of the mock exercise shall be performed by fabricator employees of the facility seeking ABR certification.** Verification of the mock girder fabrication shall be provided by videos or a sequence of fabrication photos, which shall be made available to the auditor.

e. All welding shall be in compliance with valid AASHTO/AWS D1.5 WPSs accompanied by supporting PQRs for all the welds required in this mock exercise. PQRs must be performed by the fabricator employees of the facility seeking ABR certification in compliance with AASHTO/AWS D1.5.

f. The applicant's typical project documentation and records, including but not limited to contract review, detailing, RFIs (if any), purchase orders, fabrication and inspection records, shall be made available for the onsite auditor to review. RFIs shall be submitted to certification@aisc.org.

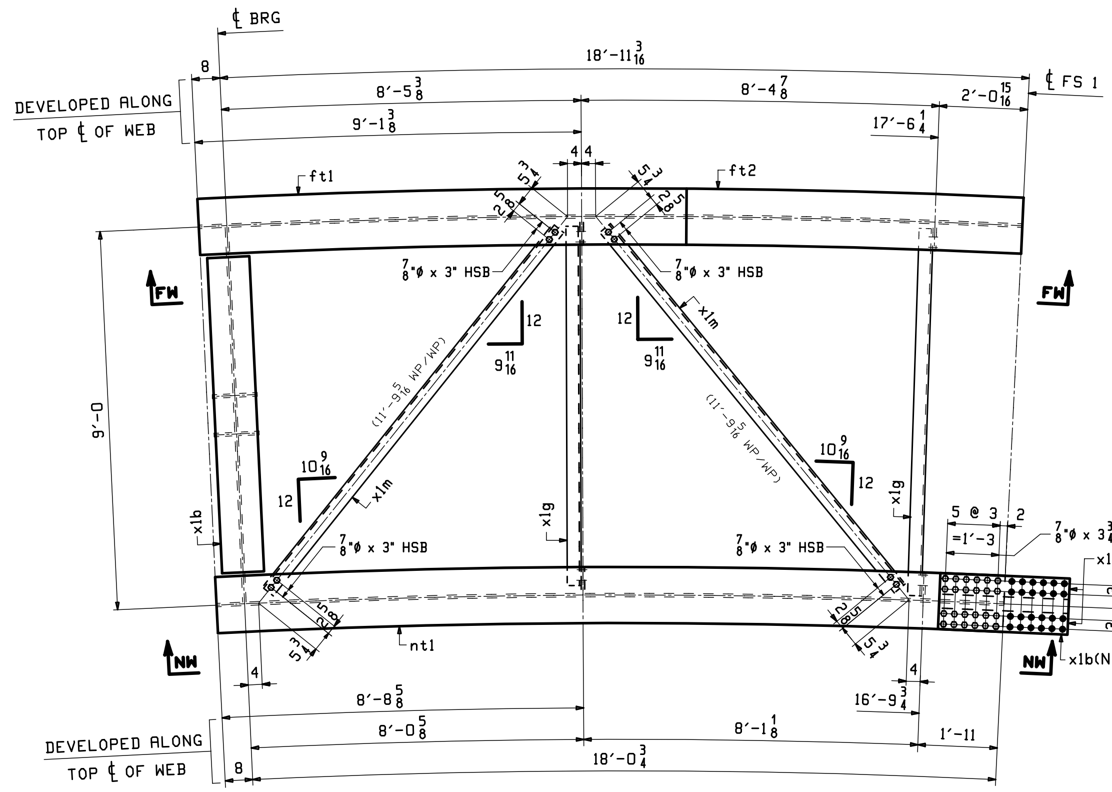
TABLE 1 - Sequencing of Fabrication, Inspection, and Audit Activities

#	Fabrication Activity	Inspection Instructions	Audit Activities

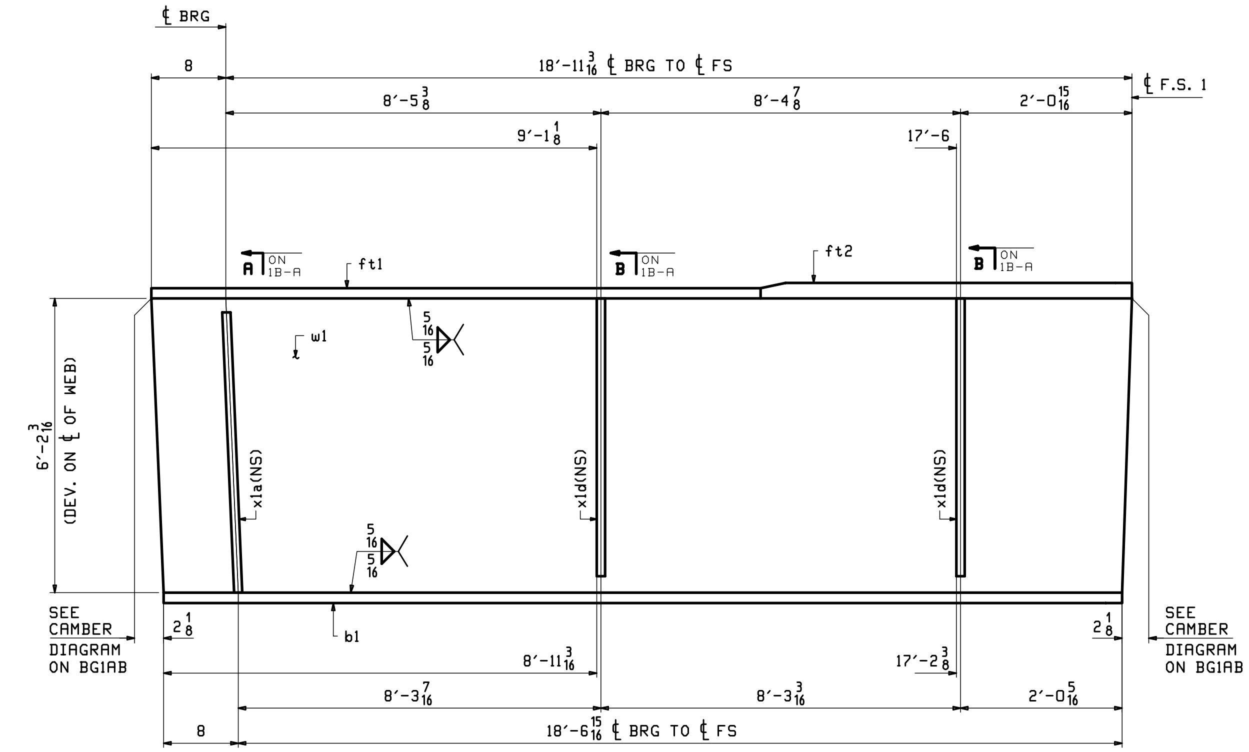
1	Top Flange shop transition splice - CJP groove weld See 6.b for FC weld.	The top flange butt-joint weld must be completed prior to the start of the on-site audit. Visual inspection and NDT shall be performed in compliance with the current AASHTO/AWS D1.5 Bridge Welding Code.	The on-site auditor shall observe the completed butt-joint weld. Witnessing of NDT is not required. The fabricator's QC, inspection, and NDT records shall be made available for the on-site auditor to review.
2	Web to Top Flange - SAW Fillet welds	The two web-to-top flange welds must be completed prior to the site audit. Visual inspection and NDT shall be performed in compliance with AASHTO/AWS D1.5.	The on-site auditor shall observe the two completed web-to-top flange welds. Witness of NDT is not required. The fabricator's QC, inspection, and NDT records shall be made available for the on-site auditor to review.
3	Web-to-Bottom Flange - SAW Fillet welds	The two web-to-bottom flange welds must be completed prior to the site audit. Visual inspection and NDT shall be performed in compliance with AASHTO/AWS D1.5.	The on-site auditor shall observe the completed fillet welds. Witness of NDT is not required. The fabricator's QC, inspection, and NDT records shall be made available for the on-site auditor to review.
4	Stiffener Fitting and Welding	Stiffeners shall be welded prior to the site audit. Visual inspection and NDT shall be performed in compliance with AASHTO/AWS D1.5.	The on-site auditor shall observe the completed fillet welds. Witness of NDT is not required. The fabricator's QC, inspection, and NDT records shall be made available for the on-site auditor to review.

5	Camber and Sweep Verification	QC personnel shall record required camber and sweep measurements.	The on-site auditor shall observe recorded camber measurements. The fabricator's QC records shall be made available for the on-site auditor to review.
6	Bolted field splice (Splice Plates)	The field splice connection shall be drilled prior to the on-site audit. Verify that splice plates are tied to their specific location in the bolted connection using the match-marking procedure.	The on-site auditor shall observe match-marking and placement of the splice plates in compliance with the Fabricator's documented procedure.
7	Pre-installation verification (PIV)	The PIV demonstration shall be performed in compliance with RCSC and the fabricator's documented procedure.	The on-site auditor shall observe the pre-installation verification demonstration. Records shall be made available for the on-site auditor to review.
8	Rotational Capacity (Rocap) Testing	Rocap Testing shall be performed in compliance with ASTM F3125 and the fabricator's documented procedure.	The on-site auditor shall observe Rocap Testing. Records shall be made available for the on-site auditor to review.
9	Bolt installation	Pretensioned bolt installation using the turn of the nut method in compliance with RCSC shall be performed at the time of the audit.	The on-site auditor shall observe bolt installation. The fabricator's QC and inspection records shall be made available for the on-site auditor to review.

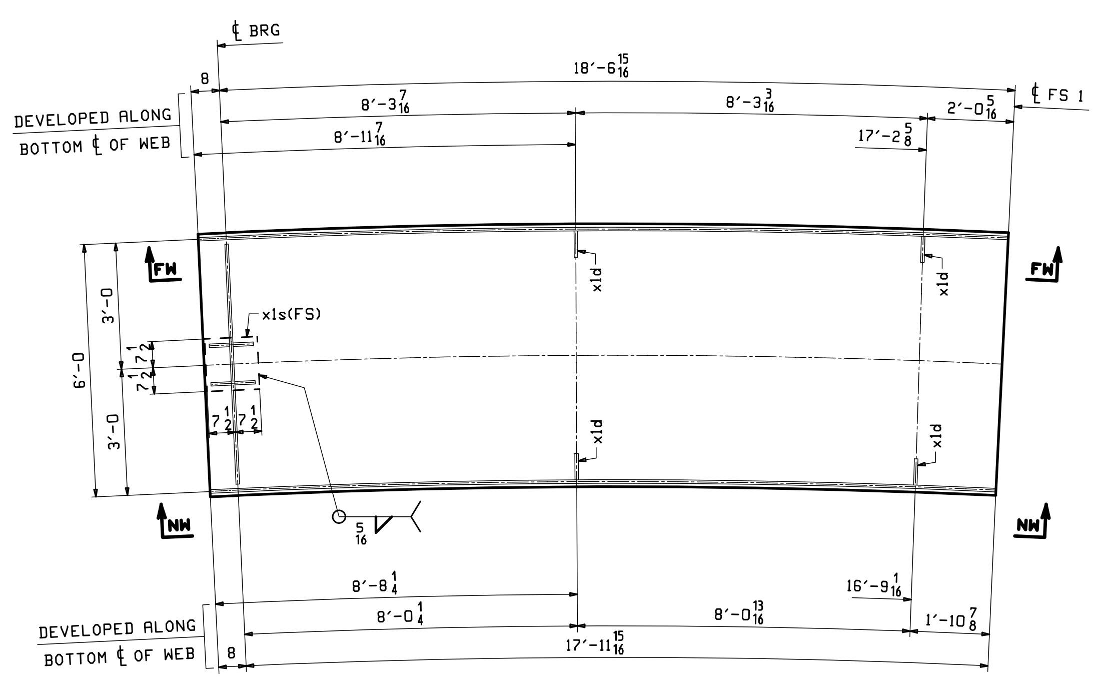
10	Final Inspection	All required inspections shall be performed in compliance with the fabricator's QMS and the current AASHTO/AWS D1.5 Bridge Welding Code.	The Fabricator's QC and inspection records, including NDT reports, shall be made available for the on-site auditor to review. NDT not completed prior to the site audit will be written as a Corrective Action Request (CAR). Completed test records will be submitted as evidence to complete the CAR.



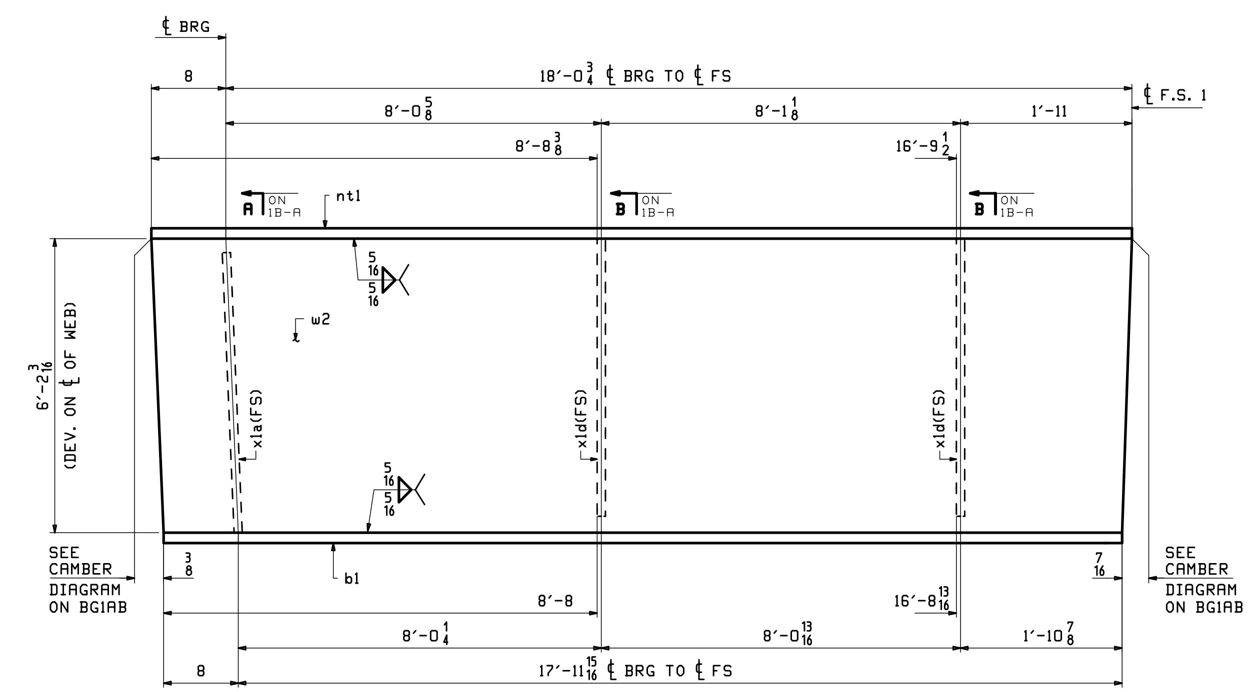
PLAN VIEW @ TOP OF WEB



SECT FW-FW FAR WEB DEV.



PLAN VIEW @ BTM OF WEB



VIEW NW-NW NEAR WEB DEV.

ONE ~ BOX GIRDER ~ 1G1A

NOTES:
1. FOR GIRDER STANDARD DETAILS SEE SHEET X1-A.
2. FOR CAMBER DIAGRAM & WEB CUTTING DIAGRAM SEE SHEET BG1AB-A.
3. FOR FLANGE CUTTING DIAGRAM SEE SHEET BG1B-A.
4. FOR GENERAL NOTES, SURFACE PREP SEE DWG GN1-A.
5. HOLES IN SPLICE PLATES SHALL BE PRE-DRILLED.
   ENDS OF GIRDERS SHALL BR DRILLED FROM SOLID
   USING SPLICE PLATES AS A TEMPLATE.

WORK THIS DWG. WITH 1B-A.

REV:	DATE:	DESCRIPTION:	DET / CHK
△			
△			

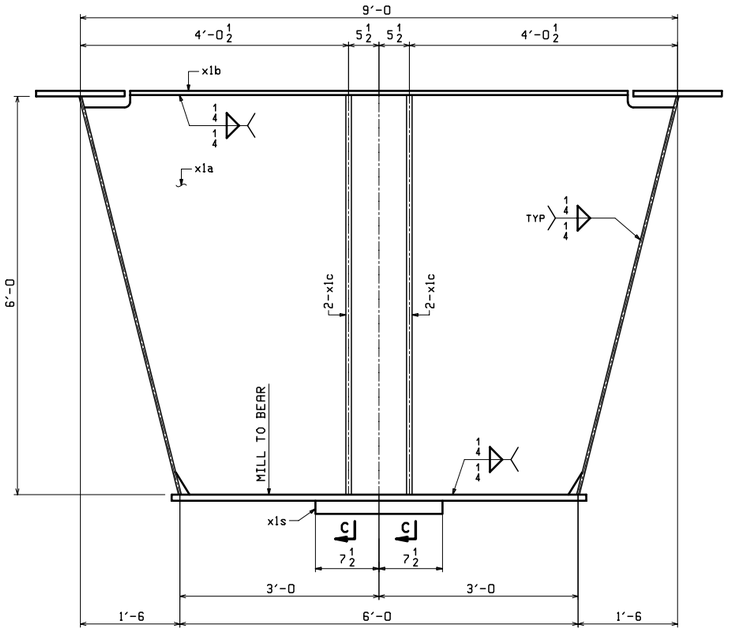
MATERIAL:	HOLES:	BOLTS:	PAINT:
A709-50 (UN)	15/16φ (UN)	AS NOTED	NONE

BOX GIRDER PLAN & ELEVATION ~ 1G1A

AISC ADVANCED BRIDGE (ABR)
TUB GIRDER MOCK UP
EXERCISE - APPLICANT

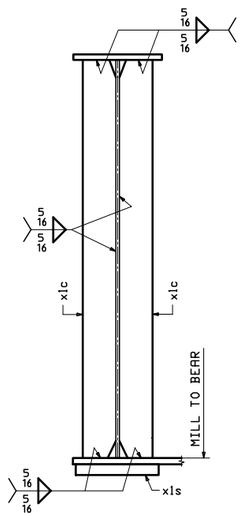
DWG: 1AB-A

TENSOR 3980



SECTION - A

LOOKING DOWNSTATION @ CL ABUT



SECT C

SHIPT NO.	REQ'D NO.	REQ'D MARK	MADE UP OF NO.	PC. MK.	SIZE	LENGTH	REMARKS	ITEM	ORD.	WT.
	1	1G1A			BOX GIRDER					14498
			1	w1	PL 1/2 x 75 15/16	19'-7 3/16	A709-50	1 4		2532
			1	w2	PL 1/2 x 74 11/16	19'-0 3/4	A709-50	1 6		2422
			1	ft1	PL 1x16	11'-7 3/16	A709-50	1 12		632
			1	ft2	PL 1 1/2 x16	8'-0	A709-50	1 8		653
			1	nt1	PL 1x16	18'-8 3/4	A709-50	1 10		1020
			1	bf1	PL 3/4 x75	19'-2 7/8	A709-50	1 2		3683
			1	x1a	PL 5/8 x72 1/4	8'-10 1/2	A709-50	2 6		1364
			1	x1b	PL 3/4 x12	7'-6	A709-50	2 8		230
			4	x1c	PL 1x6	6'-0 1/4	A709-50	2 7		123
			4	x1d	PL 1/2 x7 3/4	5'-10 5/8	A709-50	2 17		78
			2	x1f	PL 1/2 x14	1'-2	A709-50	2 16		28
			2	x1g	L 4x4x 1/2	8'-6 1/2	A709-50	2 14		109
			4	x1k	L 4x4x 1/2	5'-4 13/16	A709-50	2 15		69
			2	x1m	L 4x4x 1/2	11'-0 13/16	A709-50	2 11		141
			1	x1n	PL 5/8 x16	3'-1	A709-50	2 2		105
			2	x1p	PL 3/4 x6	3'-1	A709-50	2 3		47
			1	x1s	PL 1x15	1'-3	A709-50 SOLE PL	2 18		64
					SHOP BOLTS		NOTHING ADDED			
			24		7/8 ø HSB	2 1/4	A325-1	3 2		0.80
			8		7/8 ø HSB	3	A325-1	3 4		0.80
			24		7/8 ø HSB	3 3/4	A325-1	3 9		0.80
			56		7/8 ø HSW		F436-1	3 25		0.07
			56		7/8 ø HHN		536	3 26		0.30

SECTION - B

WORK THIS DWG. WITH 1AB-A.

REV:	DATE:	DESCRIPTION:	DET / CHK
△			
△			

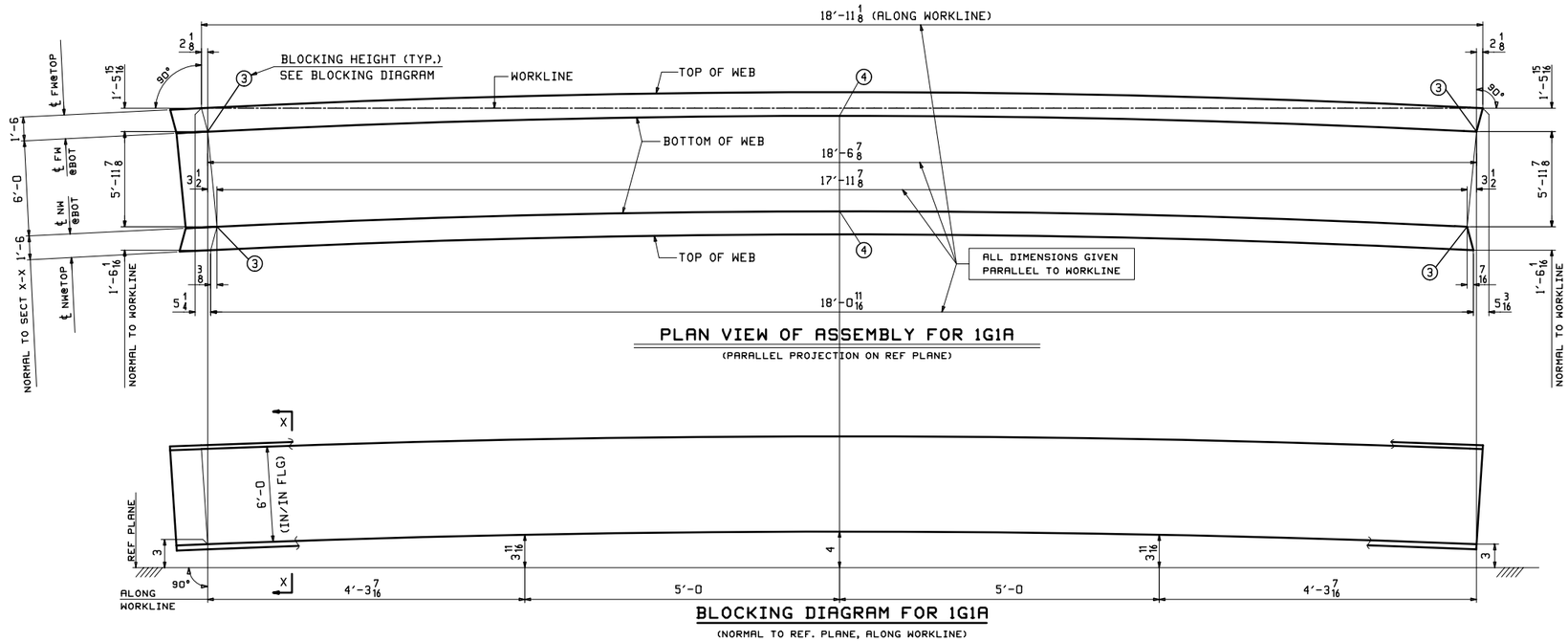
MATERIAL:	HOLES:	BOLTS:	PAINT:
A709-50 (UN)	15/16ø (UN)	AS NOTED	NONE

BOX GIRDER SECTION & BILL - 1G1A

AISC ADVANCED BRIDGE (ABR)
TUB GIRDER MOCK UP
EXERCISE - APPLICANT

DWG: 1B-A

TENSOR 3980

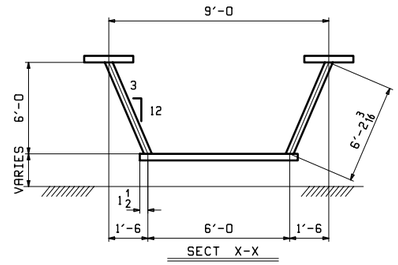


PLAN VIEW OF ASSEMBLY FOR 1G1A

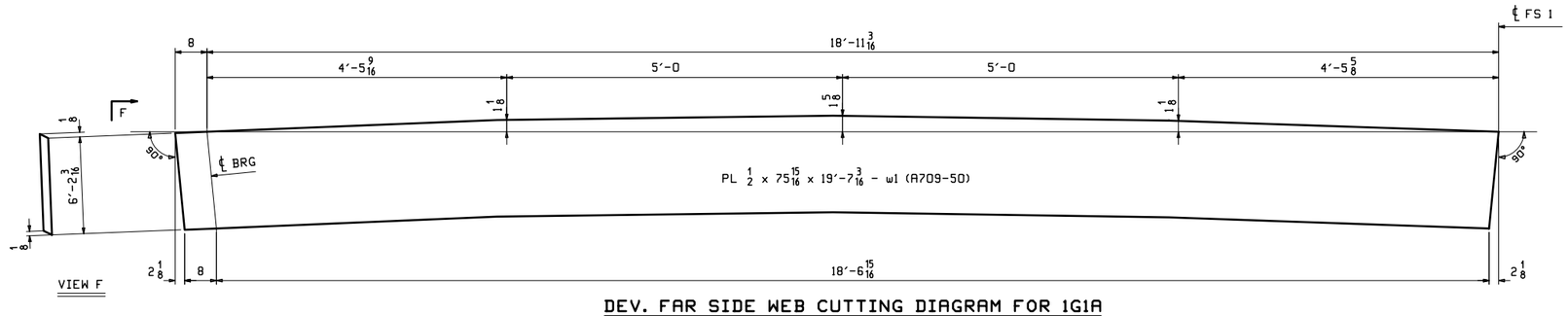
(PARALLEL PROJECTION ON REF PLANE)

BLOCKING DIAGRAM FOR 1G1A

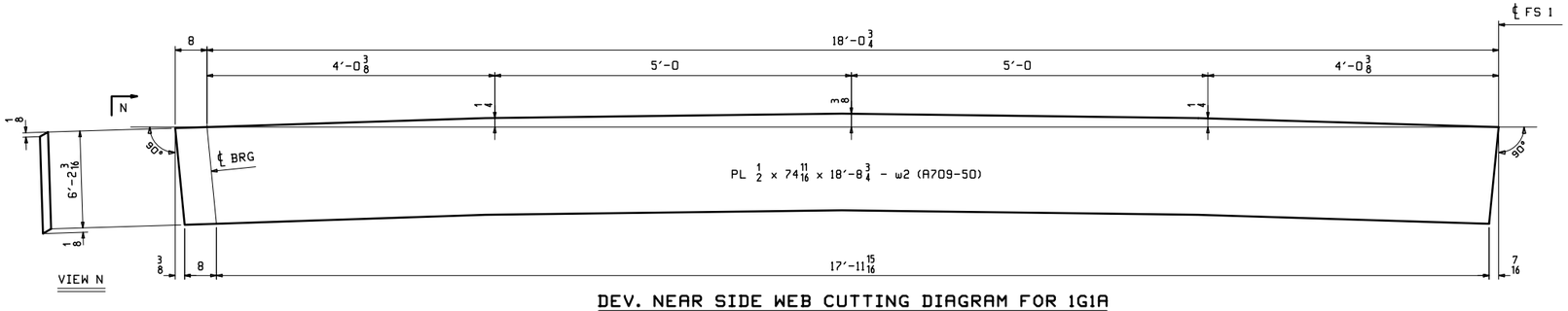
(NORMAL TO REF. PLANE, ALONG WORKLINE)



SECT X-X



DEV. FAR SIDE WEB CUTTING DIAGRAM FOR 1G1A



DEV. NEAR SIDE WEB CUTTING DIAGRAM FOR 1G1A

NOTES:

1. FOR GENERAL NOTES SEE DRAWING GN1-A.

WORK THIS SHEET WITH SHEET BG1B-A

REV:	DATE:	DESCRIPTION:	DET / CHK
△			
△			

MATERIAL:	HOLES:	BOLTS:	PAINT:
A709-50 (UN)	15/16Ø (UN)	AS NOTED	NONE

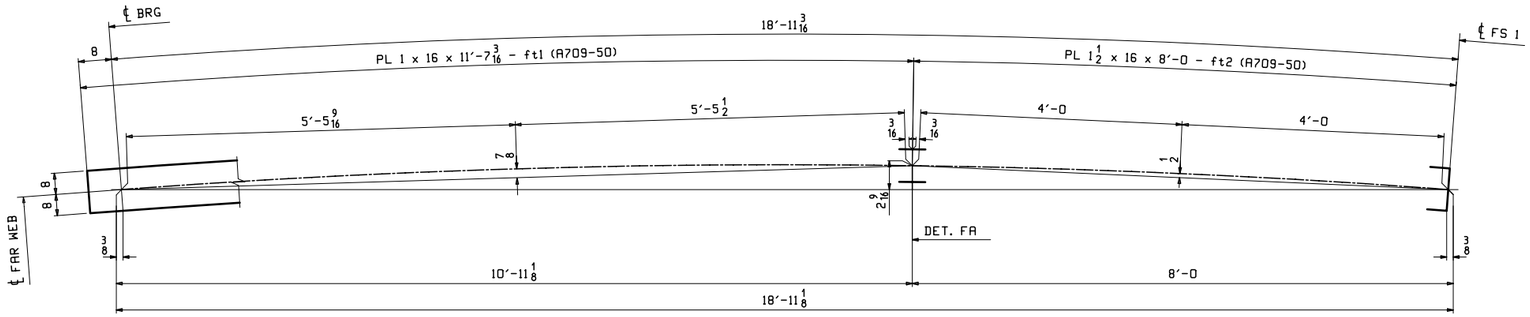
BOX GIRDER CAMBER DIAGRAM - 1G1A

AISC ADVANCED BRIDGE (ABR)
TUB GIRDER MOCK UP
EXERCISE - APPLICANT

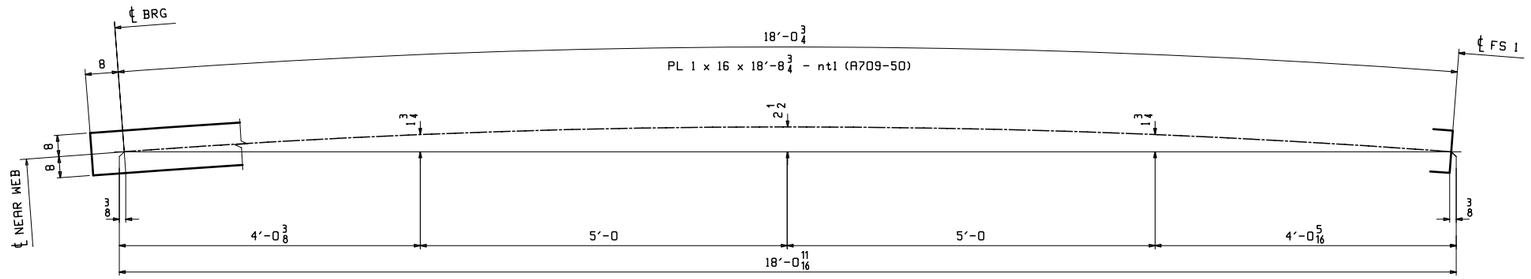
DWG: BG1AB-A

TENSOR 3980

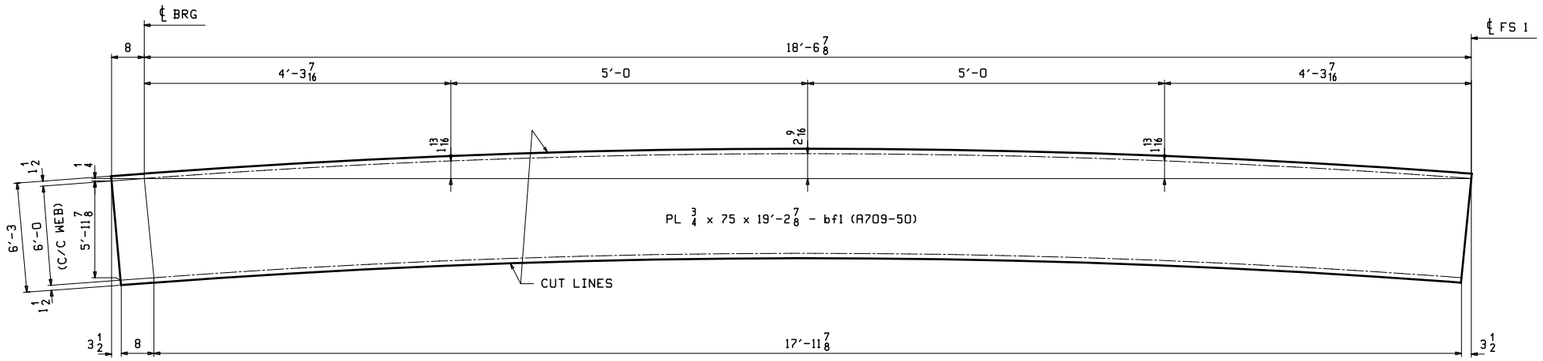
Tue, May 30, 2023 03:12:43 PM - C:\Users\jake\3980\BG1AB-A R4.0.dwg



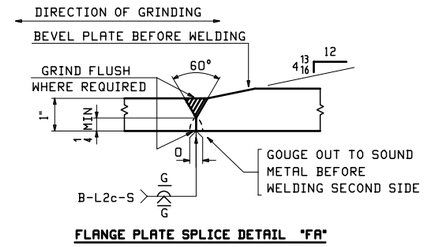
FAR TOP FLG CUTTING DIAGRAM FOR 1G1A



NEAR TOP FLG CUTTING DIAGRAM FOR 1G1A



BOTTOM FLG PLATE CUTTING DIAGRAM FOR 1G1A



FLANGE PLATE SPLICE DETAIL "FA"

NOTES:
- FOR GENERAL NOTES & WELDING DETAILS SEE SHEET GN1-A.

REV:	DATE:	DESCRIPTION:	DET	CHK
△				
△				

MATERIAL:	HOLES:	BOLTS:	PAINT:
A709-50 (UN)	15/16ø (UN)	AS NOTED	NONE

BOX GIRDER FLANGE CUTTING - 1G1A

AISC ADVANCED BRIDGE (ABR)
TUB GIRDER MOCK UP
EXERCISE - APPLICANT

DWG: BG1B-A

WORK THIS SHEET WITH SHEET BG1AB-A

TENSOR 3980

GENERAL SHOP NOTES

CONSTRUCTION SPECIFICATIONS

1. AISC CODE OF STANDARD PRACTICE.

MATERIAL SPECIFICATIONS

1. ALL MATERIAL SHALL BE ASTM A709 GRADE 50 (UN).

2. HIGH STRENGTH BOLTS SHALL BE ASTM F3125 GRADE 325, TYPE 1 WITH A563 GRADE C NUTS AND F436-1 WASHERS.

FABRICATION

1. ALL HOLES SHALL BE PUNCHED OR DRILLED FULL SIZE U.N.

2. ALL CONNECTIONS SHALL BE SLIP-CRITICAL WITH CLASS B FAYING SURFACES. BOLT THREADS SHALL BE EXCLUDED FROM THE SHEAR PLANE.

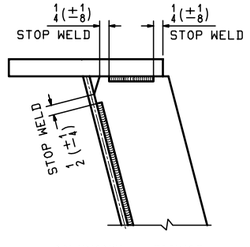
WELDING & WELD PROCEDURE

1. TERMINATE STIFFENER FILLET WELDS PER DETAIL "WT1" OR "WT2", THIS SHEET.

2. ALL WELDING ELECTRODES SHALL BE OF E70XXM SERIES TO CONFORM TO AWS D1.5 LATEST STANDARDS

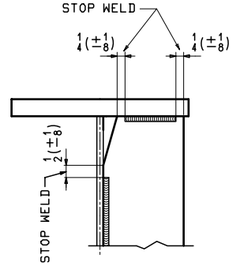
CLEANING

1. ALL STEEL TO BE BLAST CLEANED TO SSPC-SP10 (NEAR WHITE FINISH)



DETAIL "WT1"

@ GIRDER STIFFENERS



DETAIL "WT2"

@ DIAPHRAGM STIFFENERS

REV:	DATE:	DESCRIPTION:	DET / CHK
△			
△			

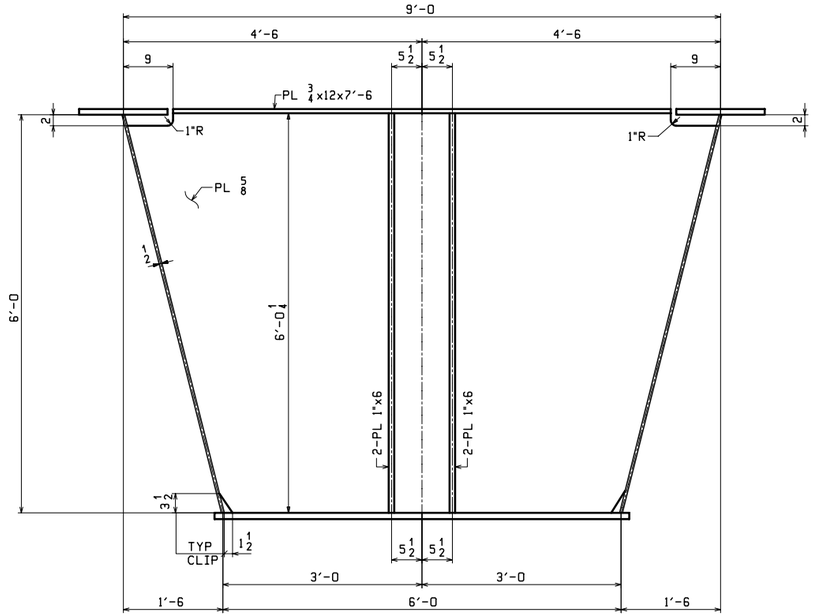
MATERIAL:	HOLES:	BOLTS:	PAINT:
A709-50 (UN)	15/16Ø (UN)	AS NOTED	NONE

GENERAL NOTES

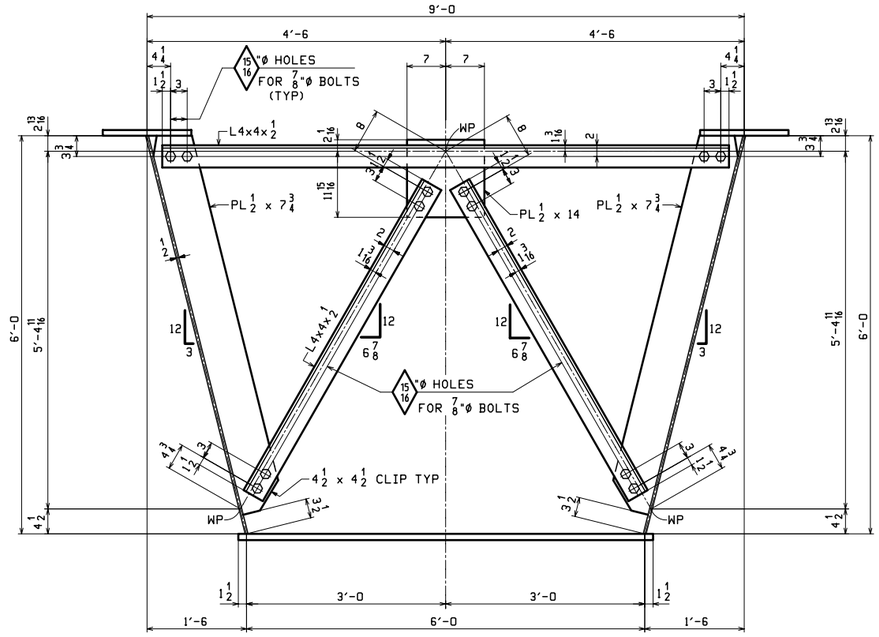
AISC ADVANCED BRIDGE (ABR)
TUB GIRDER MOCK UP
EXERCISE - APPLICANT

DWG: GN1-A

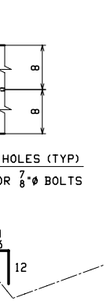
TENSOR 398D



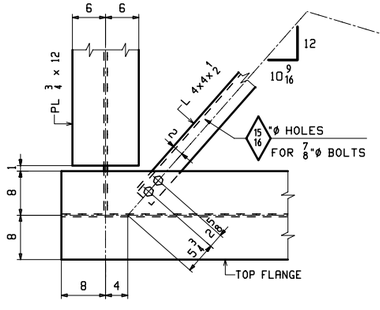
INTERIOR END DIAPHRAGM



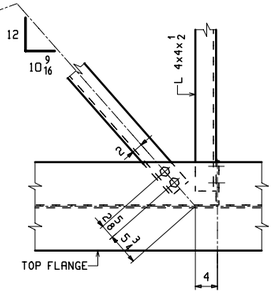
INTERIOR INTERMEDIATE CROSSFRAME
LOOKING UPSTATION



INTERMEDIATE LATERAL BRACING



END LATERAL BRACING



RIGHT END LATERAL BRACING

REV:	DATE:	DESCRIPTION:	DET	CHK
△				
△				

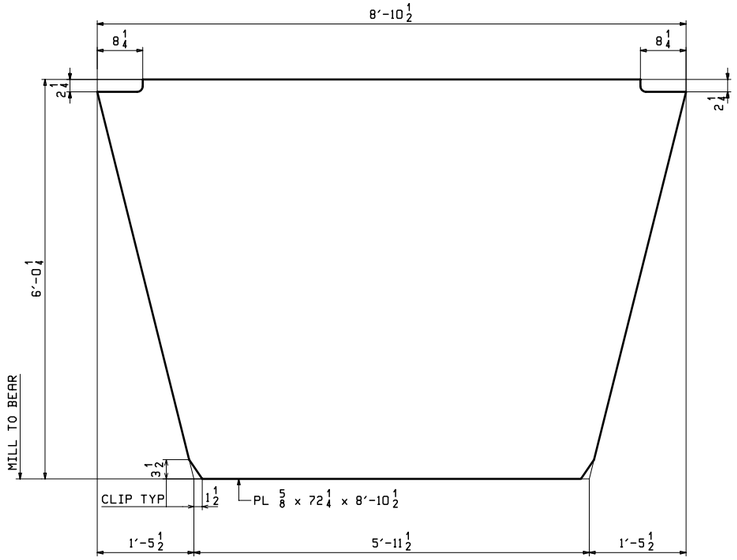
MATERIAL:	HOLES:	BOLTS:	PAINT:
A709-50 (UN)	15/16Ø (UN)	AS NOTED	NONE

TYPICAL DETAIL LAYOUTS

AISC ADVANCED BRIDGE (ABR)
TUB GIRDER MOCK UP
EXERCISE - APPLICANT

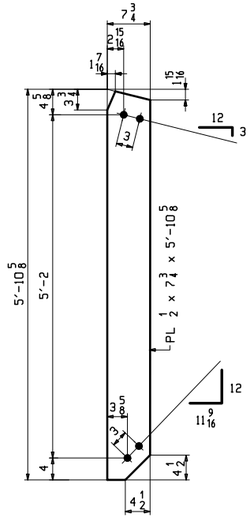
DWG: TD1-A

TENSOR 398D

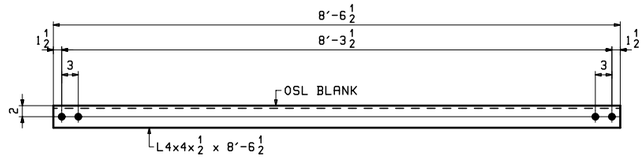


ONE ~ END DIAPH WEB ~ x1a

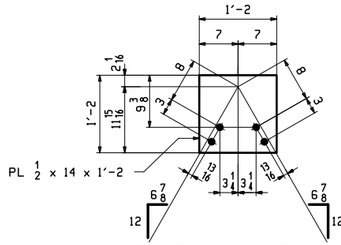
4 ~ BRG STIFF ~ x1c



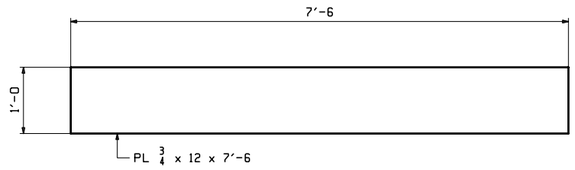
4 ~ CONN PLATE ~ x1d



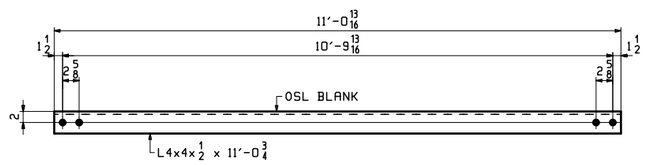
2 ~ CF STRUTS ~ x1g



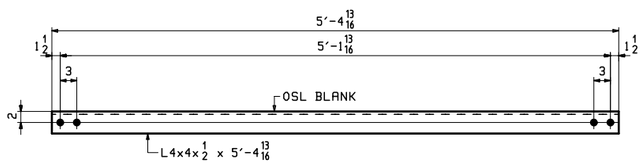
2 ~ CENTER GUSSET ~ x1f



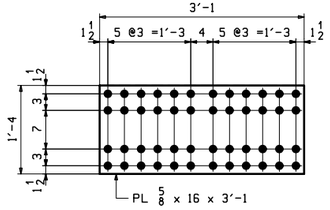
ONE ~ TOP FLG PLATE ~ x1b



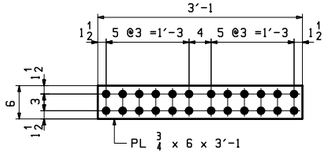
2 ~ LATERAL BRACE ~ x1m



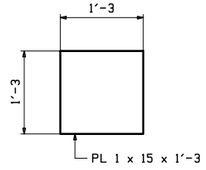
4 ~ CF DIAGONAL ~ x1k



ONE ~ TOP SPLICE PLATE ~ x1n



2 ~ TOP SPLICE PLATE ~ x1p



ONE ~ SOLE PLATE ~ x1s

NOTES:
1. FOR GENERAL NOTES SEE SHEET GN1.

REV:	DATE:	DESCRIPTION:	DET / CHK
△			
△			

MATERIAL:	HOLES:	BOLTS:	PAINT:
A709-50 (UN)	15/16Ø (UN)	AS NOTED	NONE

GIRDER STANDARDS

AISC ADVANCED BRIDGE (ABR)
TUB GIRDER MOCK UP
EXERCISE - APPLICANT

DWG: X1-A

TENSOR 398D