

**PROJECT
LOCATION**

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED
PROJECT NO. IM 0909(80)397
INTERSTATE 90 EBL & WBL
& SD HIGHWAY 115
MINNEHAHA COUNTY

STRUCTURAL STEEL
PCN 043V

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	1	20

INDEX OF SHEETS

- Sheet 1 - Title Sheet
- Sheet 2 - Estimate of Quantities
- Sheet 3 to 20 - Structural Steel Details

BEGIN IM 0909(80)397 (I-90)

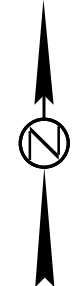
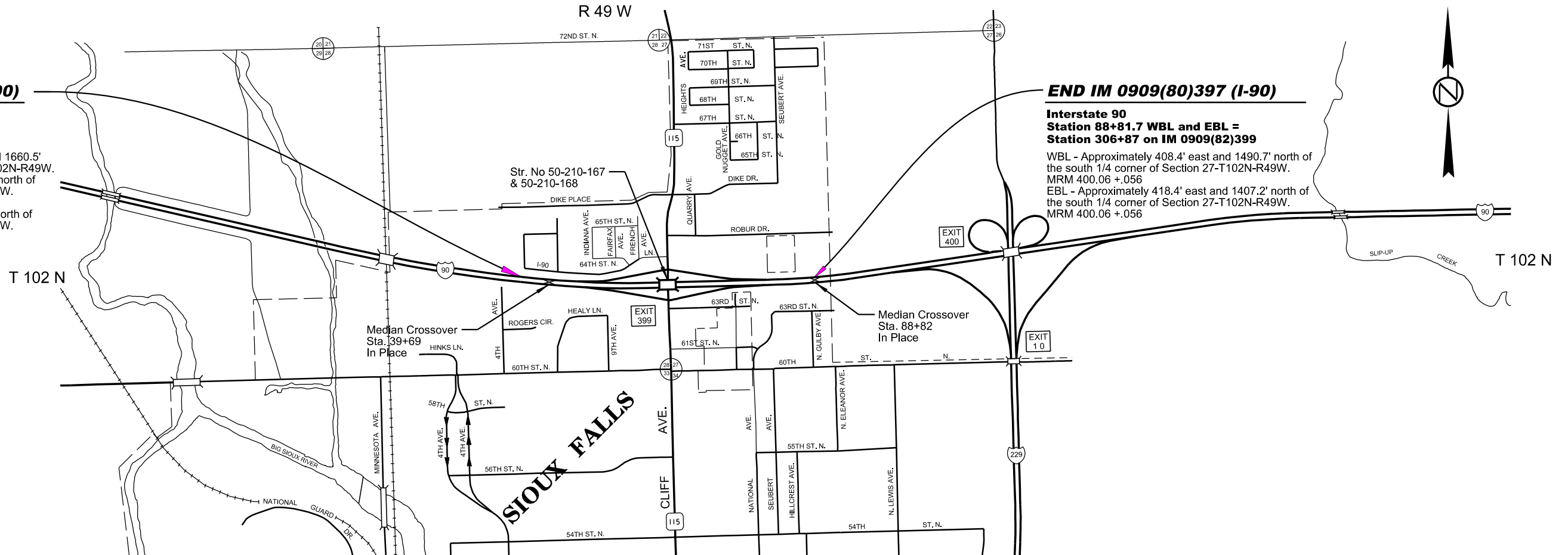
Interstate 90
Station 29+03.8 WB On Ramp
Station 34+82 WBL and EBL

WB On Ramp - Approximately 262.7' west and 1660.5' north of the south 1/4 corner of Section 28-T102N-R49W.
WBL - Approximately 306.5' east and 1566.2' north of the south 1/4 corner of Section 28-T102N-R49W.
MRM 399.00 +.100
EBL - Approximately 295.4' east and 1482.9' north of the south 1/4 corner of Section 28-T102N-R49W.
MRM 399.00 +.100

END IM 0909(80)397 (I-90)

Interstate 90
Station 88+81.7 WBL and EBL =
Station 306+87 on IM 0909(82)399

WBL - Approximately 408.4' east and 1490.7' north of the south 1/4 corner of Section 27-T102N-R49W.
MRM 400.06 +.056
EBL - Approximately 418.4' east and 1407.2' north of the south 1/4 corner of Section 27-T102N-R49W.
MRM 400.06 +.056



SIoux FALLS

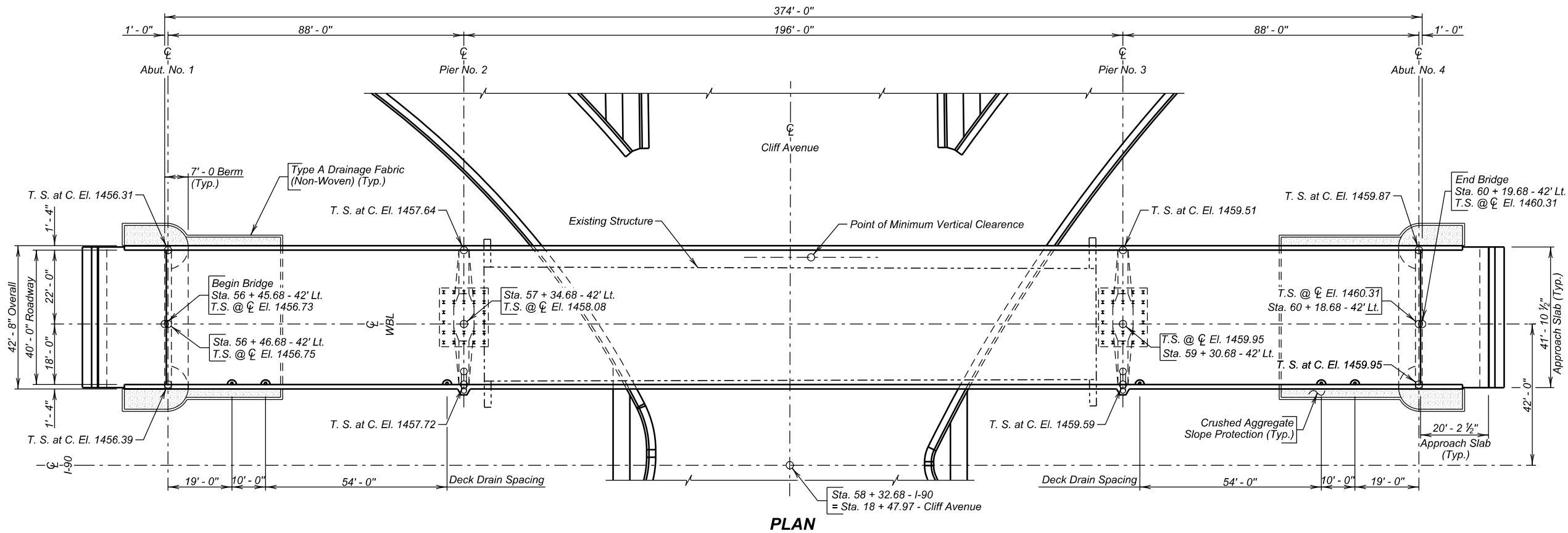
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	2	20

ESTIMATE OF QUANTITIES

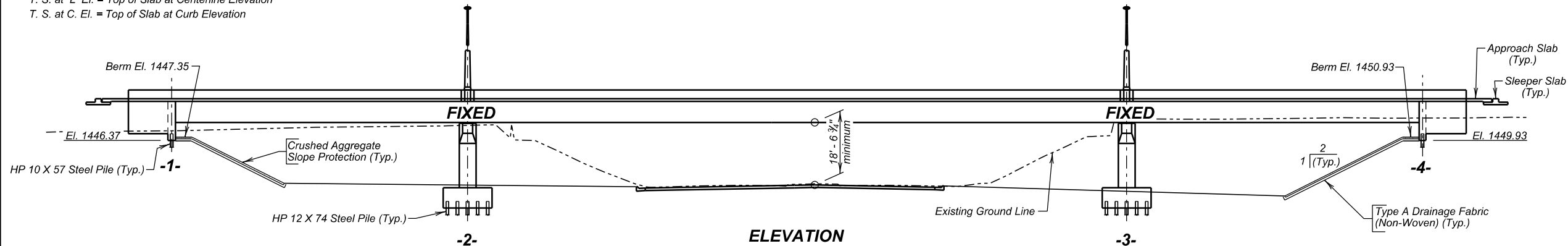
Bid Item Number	Item	Quantity	Unit
410E0025	Structural Steel, Furnish	Lump Sum	LS
411E0100	Bridge Painting	Lump Sum	LS

The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

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S.D.	IM 0909(80)397	3	20

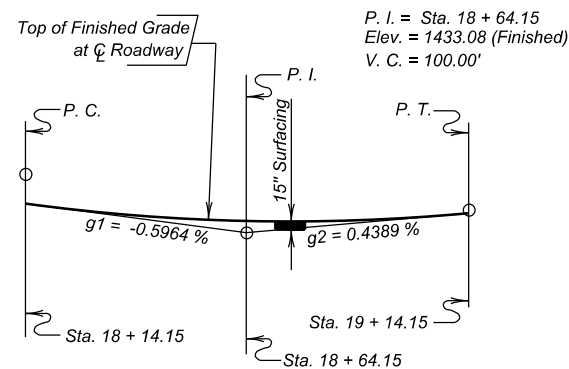


NOTE:
 T. S. at \varnothing El. = Top of Slab at Centerline Elevation
 T. S. at C. El. = Top of Slab at Curb Elevation

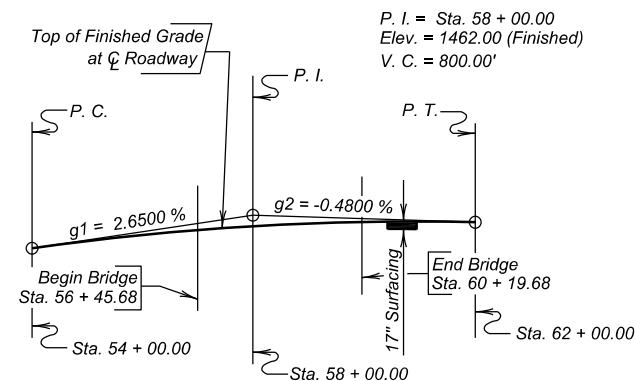


**-X271-
 INDEX OF BRIDGE SHEETS -**

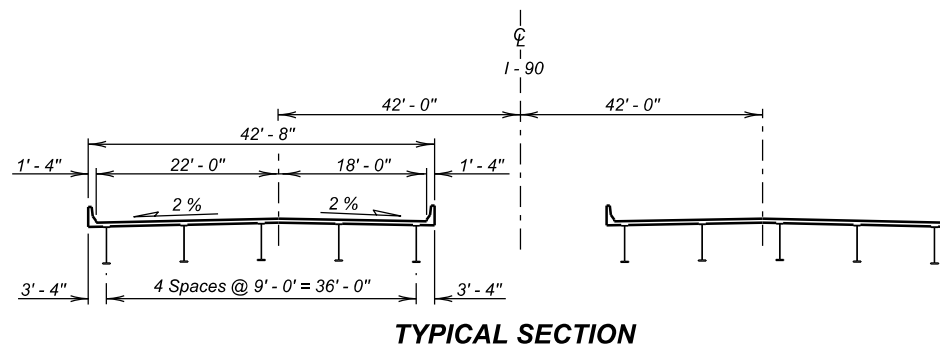
- Sheet No. 1 - General Drawing
- Sheet No. 2 - Estimate of Structure Quantities and Notes
- Sheet No. 3 - End Block, Barrier Curb, & Deck Drain Details
- Sheet No. 4 - Girder Layout Details
- Sheet No. 5 - Diaphragm Details
- Sheet No. 6 - Framing Diagram, Camber, & Erection Data
- Sheet No. 7 - Details of Bolted Field Splices & Bearings
- Sheet No. 8 - Signal Bracket Details (A)
- Sheet No. 9 - Signal Bracket Details (B)



VERTICAL CURVE DATA
 (Cliff Avenue)



VERTICAL CURVE DATA
 (I - 90)



TYPICAL SECTION

**GENERAL DRAWING
 FOR
 WESTBOUND LANES**

374' - 0" CONT. COMP. GIRDER BRIDGE
 40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW
 SEC. 27/28-T102N-R49W
 STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
 STR. NO. 50-210-167 HL-93
 PCN 043V

MINNEHAHA COUNTY
 S. D. DEPT. OF TRANSPORTATION

JULY 2011

1 OF 9

PLANS BY:
 OFFICE OF BRIDGE DESIGN, SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

DESIGNED BY DC/PW MINN043V	DRAWN BY GW/MG 043VGI01	CHECKED BY PW/DC	<i>Kevin N. Coeden</i> BRIDGE ENGINEER
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ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Δ Structural Steel, Furnish	Lump Sum	LS	
≠ Bridge Painting	Lump Sum	LS	

Δ For informational purposes only, the estimated weight of the structural steel is 541,783 pounds.
 ≠ For informational purposes only, the estimated area to be painted is 6,675 sq. ft.

SPECIFICATIONS FOR BRIDGE

- Design Specifications: AASHTO LRFD Bridge Design Specifications, 2010 Edition with 2010 Interims.
- Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2004 Edition and required provisions, supplemental specifications and/or special provisions as included in the proposal.

BRIDGE DESIGN LOADING

- AASHTO HL-93.
- Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS

Structural Steel (ASTM A709 Gr. 36T2) $f_y = 36,000$ psi
 Structural Steel (ASTM A709 Gr. 50T2) $f_y = 50,000$ psi

CONNECTION OF GIRDER TO PILE

- Steel for the bearing plates shall conform to ASTM A709 Gr. 50.
- Payment for furnishing the bearing plates shall be incidental to the contract lump sum price for Structural Steel, Furnish.

PIERS

All Swedge Bolts shall be 1 1/2" diameter x 2'-6" F1554, Grade 55 bolts with heavy hex nut and cut washer (listed with structural steel in Superstructure quantities). A minimum of 20% of the embedded bolt surface shall be covered with deformations whose radial dimensions are 15% to 20% of the bolt diameter.

GIRDERS

- Structural Steel shall conform to ASTM A709 Gr. 50WT2. Angles in the diaphragms shall conform to ASTM A588 Grade 50. Shear connectors shall conform to Section 7.3 Type B. of the AASHTO/AWS D1.5 Bridge Welding Code.
- Do not install Shear Connectors. Shear Connectors shown are for information only and will be field welded to the girders under future contract.
- All butt welded girder splices shall be ultrasonically inspected. See notes regarding Welding and Weld inspection.
- Cost of welding and weld inspection shall be included in the lump sum bid for Structural Steel, Furnish.

- The exterior face and bottom of the bottom flange of the exterior girders shall be painted in accordance with Section 411 of the South Dakota Standard Specifications. The top coat shall be an approved brown (Federal Standard 595B Color 30045) to match the weathering color of the steel.
- See diaphragm details for notes concerning diaphragms.
- Structural Steel used in all girder web plates, girder flanges, and girder splice plates shall comply with the Charpy-V-Notch toughness requirements set forth in Section 971 of the South Dakota Standard Specifications. Material greater than 1 1/2 inches in thickness shall require frequency (P) testing in lieu of heat lot (H) testing. See Girder Layout for location of tension and stress reversal areas of girder flanges.
- Dead Load camber shall be cut into the girder webs.

BEARINGS

- All steel for the bearings shall conform to ASTM A709, Gr. 50.
- The pre-formed fabric pads shall be composed of multiple layers of 8 ounce cotton duck impregnated and bonded with high quality natural rubber or of equivalent and equally suitable materials compressed into resilient pads of uniform thickness, after compression and vulcanizing. The finished pads shall withstand compression loads perpendicular to the plane of the laminations of not less than 10,000 pounds per square inch without detrimental reduction in thickness or extrusion.
- The bearing plates shall be shop painted with 3 mils of inorganic zinc primer in accordance with Section 411 of the South Dakota Standard Specifications. No top coat of polyurethane will be applied.
- Tolerances and surface finish for Rocker Plates shall be as follows:

Convex Radius Dimension	+0.000 mm - 0.010"
Surface Finish, Machined Surfaces	125 RMS or Better
Surface Finish, Other Surfaces	230 RMS or Better
- Payment for furnishing the bearings, including the pre-formed fabric pads under the bearing plates and painting, shall be included in the lump sum bid for Structural Steel, Furnish.

FIELD BOLTED GIRDER SPLICES

- Steel for splice and filler plates shall conform to ASTM A709 Gr. 50WT2
- Bolt threads are required to be excluded from shear planes.
- Payment for furnishing splice plates and bolts for girder splices shall be incidental to the Contract Lump sum bid price for Structural Steel, Furnish.

DECK DRAINS

The fabricator shall drill holes in the web for the 1/2 inch diameter ASTM A325 bolts as detailed on the End Block, Barrier Curb, and Deck Drain Details sheet. The holes shall not be drilled more than 1/16 inch larger than the bolt's nominal diameter.

WELDING AND WELD INSPECTION

Main members referred to in Section 6.7 Nondestructive Testing of Bridge Welding Code are identified as follows: Girder webs, girder flanges, and bearing stiffeners. Ultrasonic testing of groove welds shall be used in lieu of radiography. See girder layout for stress categories and their locations along the girder.

SIGNAL BRACKETS

- Steel for plates and bars shall conform to ASTM A709 Gr. 36. Shear connectors shall conform to Section 7.3 Type B of the ANSI/AASHTO/AWS D1.5 Bridge Welding Code. Pipe shall conform to ASTM A53 Grade B.
- Brackets and/or bracket components shall be painted in accordance with Section 411 of the SD Standard Specifications. The finish coat of paint color shall be brown as approved by the Engineer and shall match the color of the exterior girders.
- Payment for painting and furnishing the signal brackets shall be incidental to the contract lump sum price for Structural Steel, Furnish.

BOLT TESTING

The certified mill test reports for all bolts used on the project shall include the test results for all of the testing specified in section 972.2.D of the South Dakota Standard Specifications. Some of these tests are supplemental tests that must be requested at the time the bolts are ordered. It is the responsibility of the Contractor/Fabricator to notify the bolt supplier of these requirements.

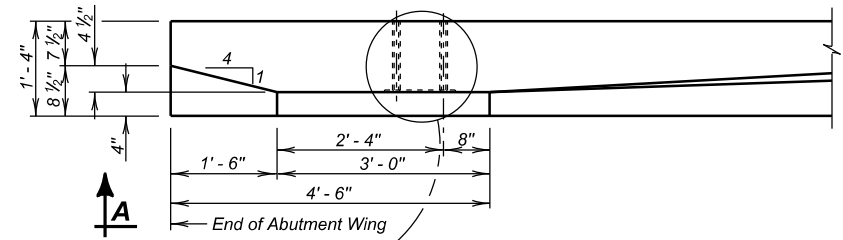
DELIVERY OF STRUCTURAL STEEL

- All structural steel shall be delivered to the job site.
- Contact the Department of Transportation's Sioux Falls Area Office for approximate delivery dates.
- All costs involved with the transportation of the structural steel to the job site shall be included in the contract lump sum price for Structural Steel, Furnish.

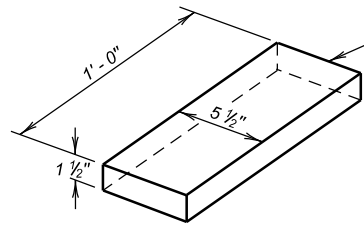
ESTIMATE OF STRUCTURE QUANTITIES AND NOTES FOR (WEST BOUND LANES)

374'-0" CONT. COMP. GIRDER BRIDGE
 Str. No. 50-210-167
 FEBRUARY 2012

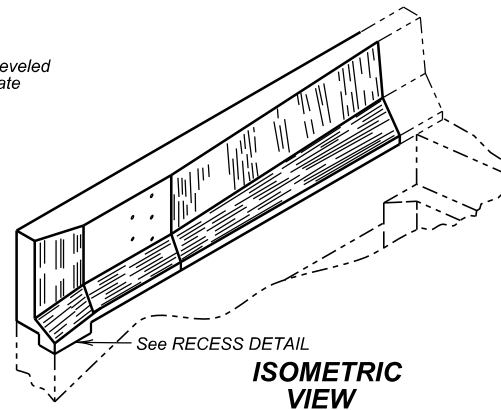
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
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PART PLAN

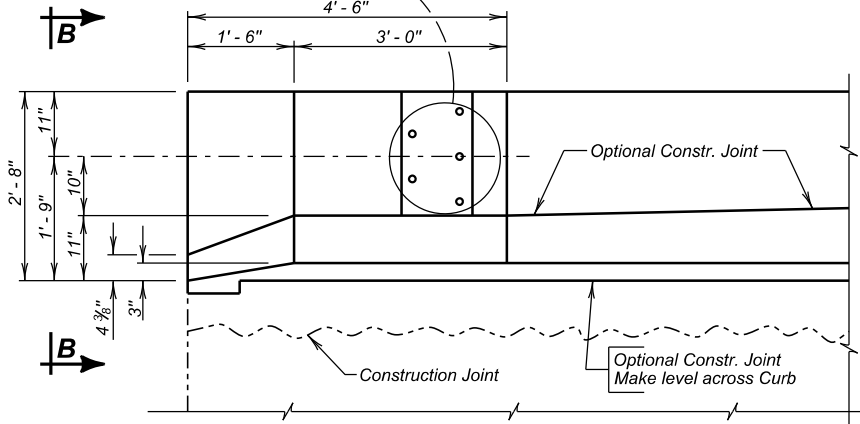


RECESS DETAIL

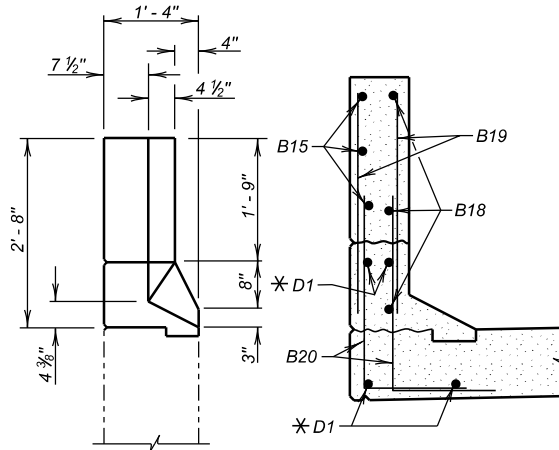


ISOMETRIC VIEW

NOTE: THE DECK DRAINS AND ASSOCIATED HARDWARE ARE NOT PART OF THIS CONTRACT. DETAILS ARE PROVIDED SO THAT HOLES CAN BE PROVIDED IN THE GIRDER WEB AT THE APPROPRIATE DECK DRAIN LOCATIONS.

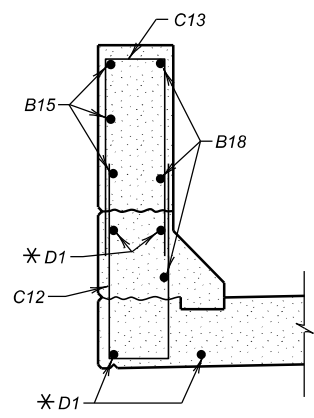


VIEW A - A

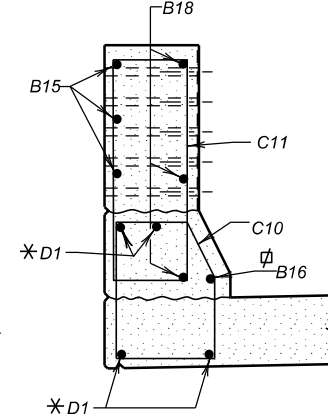


VIEW B - B

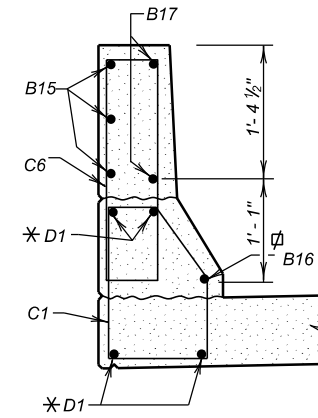
SEC. C - C



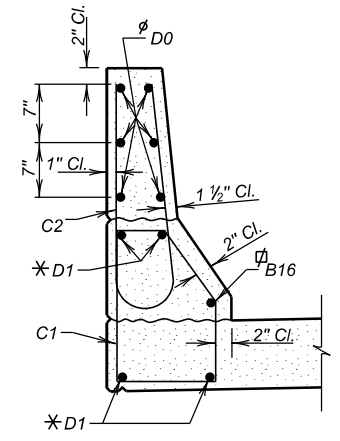
SEC. D - D



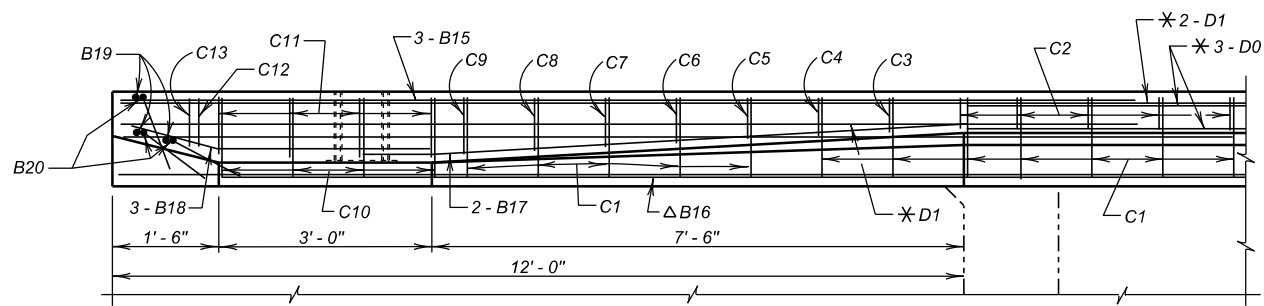
SEC. E - E



SEC. F - F

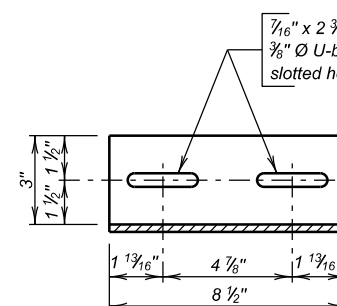


SEC. G - G

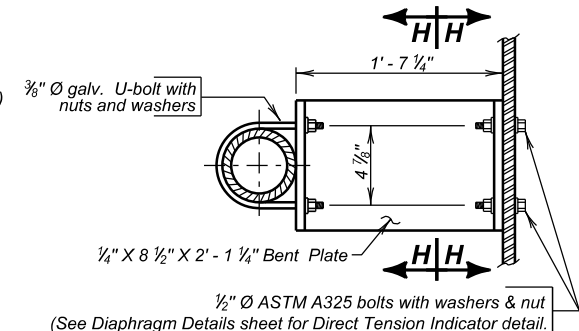


PLAN

phi Min. Lap = 2'-4"
 * Min. Lap = 2'-2"
 phi Min. Lap = 1'-0"



SEC. H - H



SEC. J - J

NOTE: The connection between the drop tube and web of girder shall be made prior to the placing of the deck slab. See General Drawing for spacing of deck drains and note sheets for notes regarding deck drains.

END BLOCK, BARRIER CURB, & DECK DRAIN DETAILS

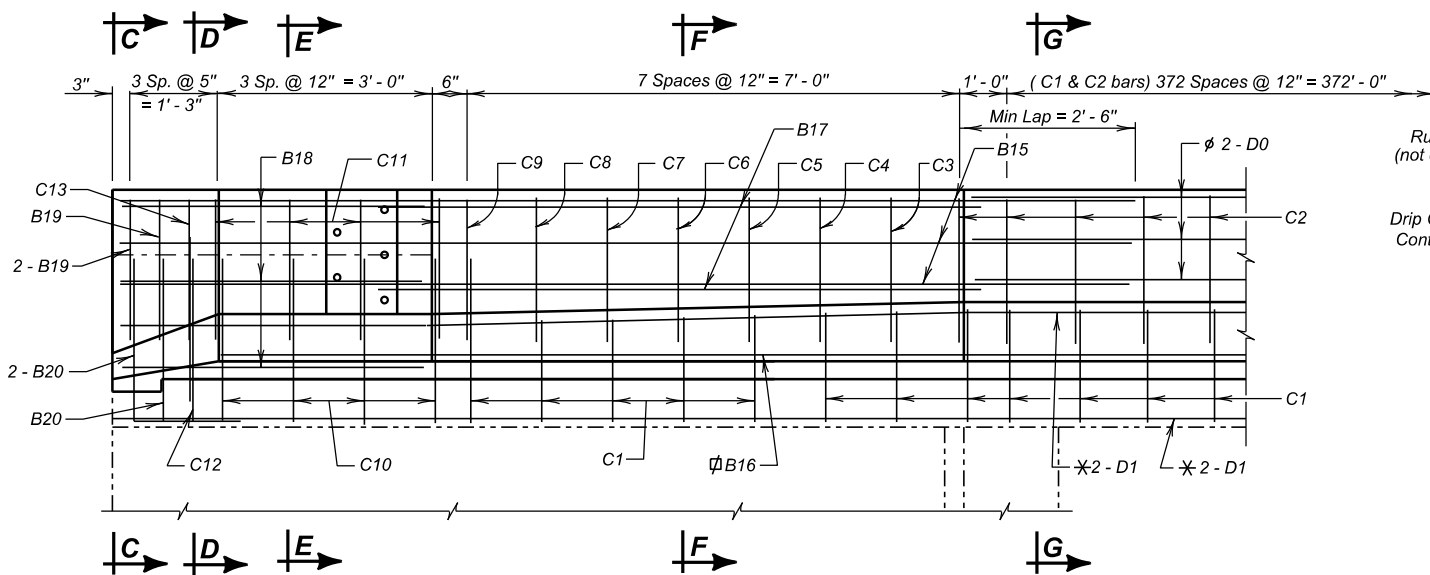
FOR
WESTBOUND LANES

374' - 0" CONT. COMP. GIRDER BRIDGE
 40' - 0" ROADWAY 0° SKEW
 OVER CLIFF AVE. SEC. 27/28-T102N-R49W
 STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
 STR. NO. 50-210-167 HL-93

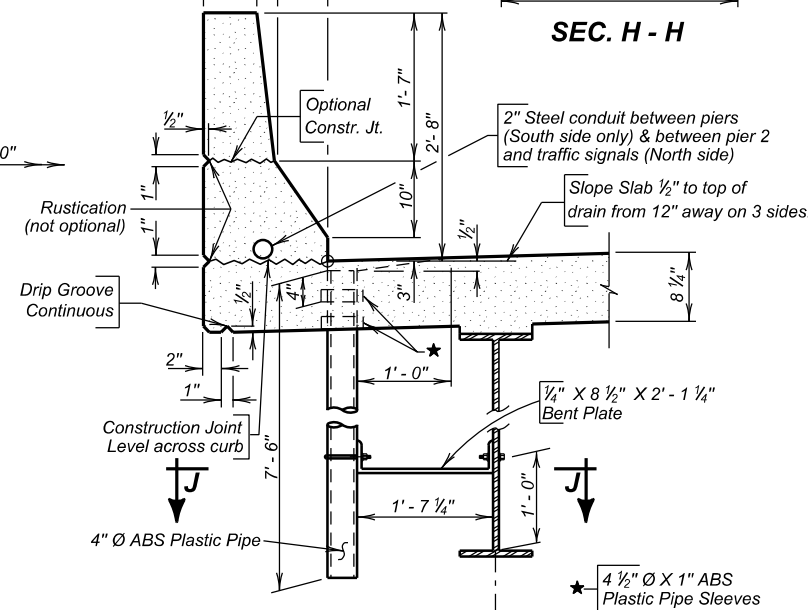
MINNEHAHA COUNTY
 S. D. DEPT. OF TRANSPORTATION

JULY 2011

3 OF 9

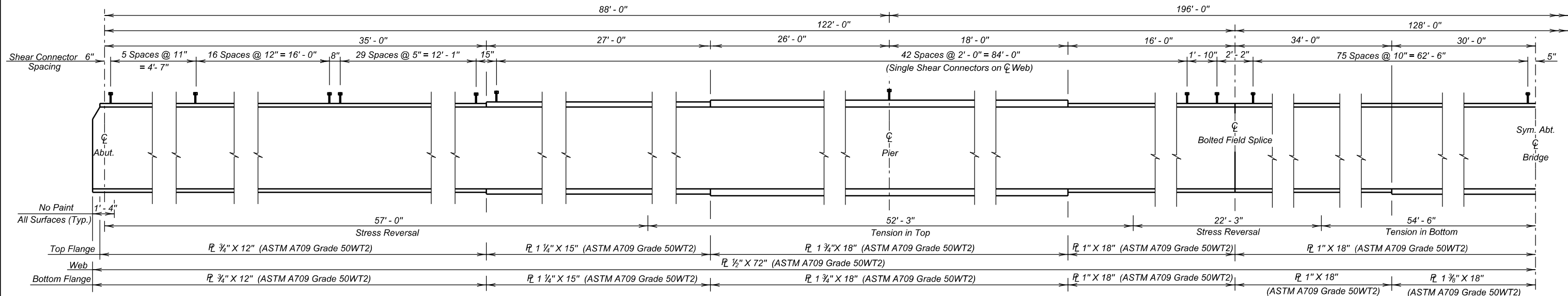


ELEVATION



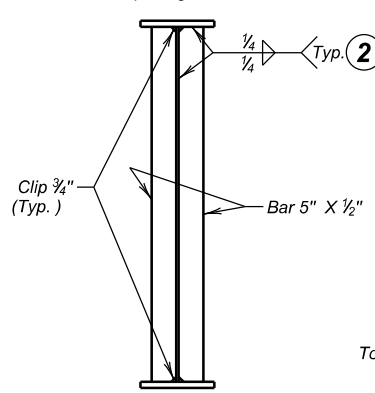
DRAIN AND BARRIER DETAILS

DESIGNED BY DC/PW MINN043V	DRAWN BY MG 043VGI03	CHECKED BY DC/PW	Kevin N. Coeden BRIDGE ENGINEER
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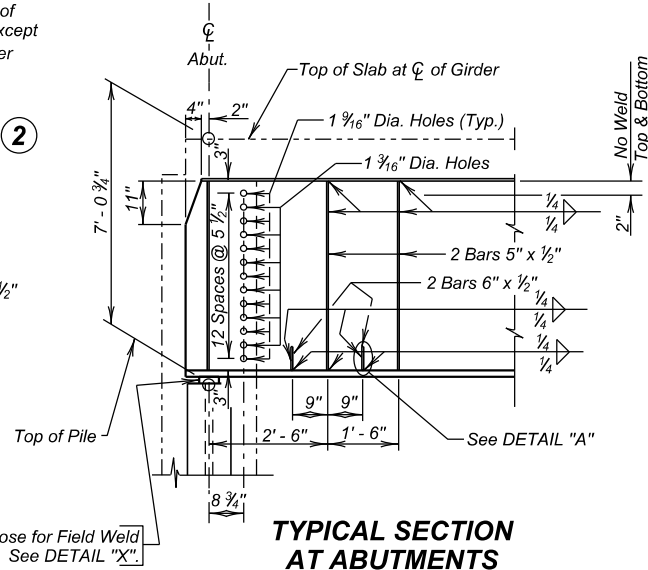
GIRDER LAYOUT

NOTE: All fillet welds shall terminate 1/2" from edge of stiffener, edge of flange, or clip as appropriate, except weld from clip to edge of stiffener at top flange.

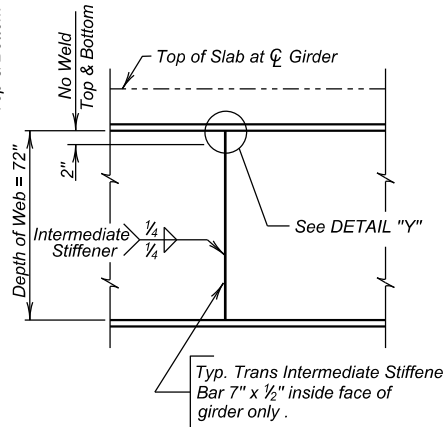


END VIEW

Bar 6" x 1" x 1'-2" Ship loose for Field Weld See DETAIL "X".

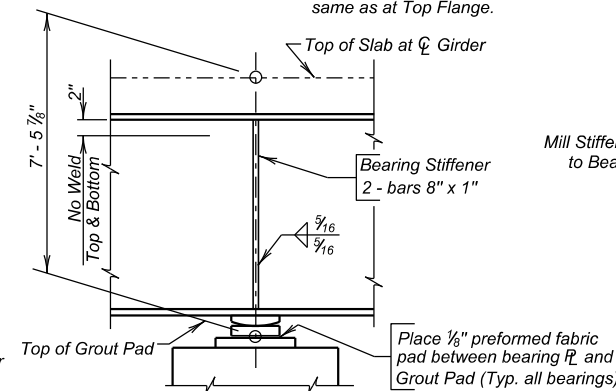


TYPICAL SECTION AT ABUTMENTS

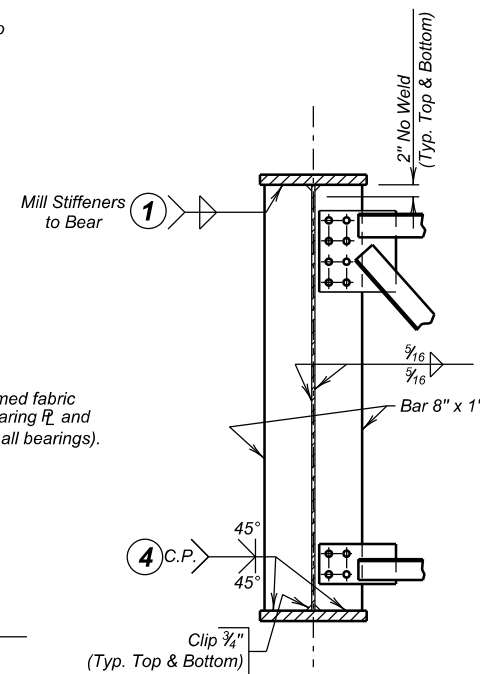


TYPICAL SECTION AT INTERMEDIATE STIFFENER

NOTE: Alternately, Mill Stiffeners to Bear & use 5/16" Fillet Weld, same as at Top Flange.

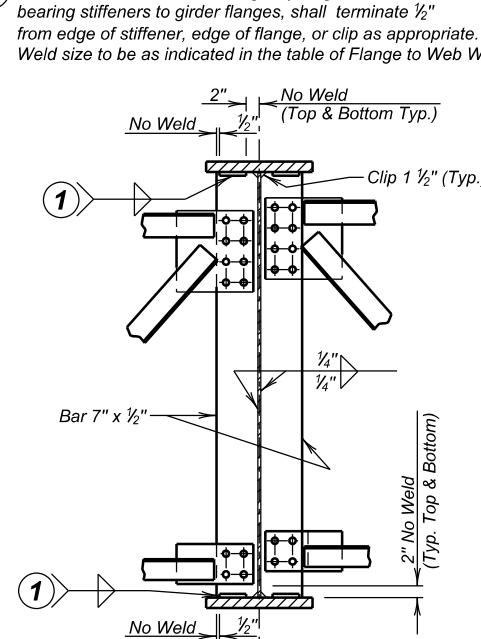


TYPICAL SECTION AT PIERS
(Diaphragm not shown)



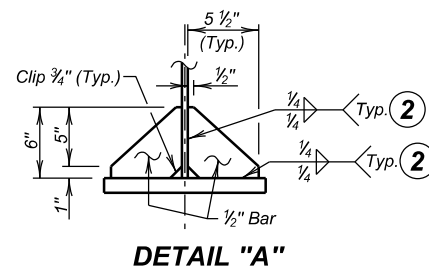
DETAILS OF STIFFENERS AT CENTRAL BEARINGS
(Exterior Girder shown)

NOTE: All fillet welds attaching diaphragm or bearing stiffeners to girder flanges, shall terminate 1/2" from edge of stiffener, edge of flange, or clip as appropriate. Weld size to be as indicated in the table of Flange to Web Welds.

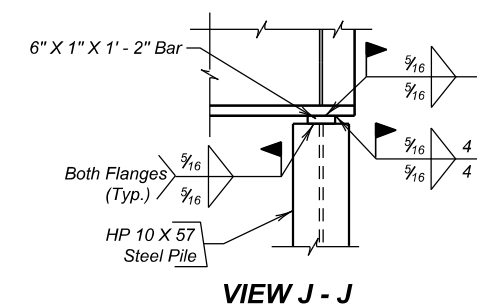


DETAILS OF STIFFENERS AT INTERMEDIATE DIAPHRAGMS
(See DETAIL "W" on DIAPHRAGM DETAILS sheet.)
(Interior Girder shown)

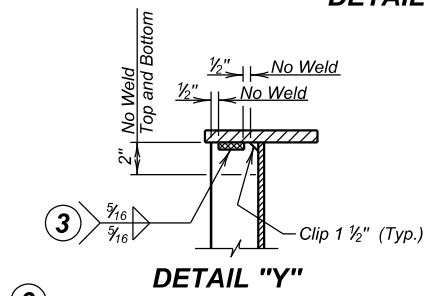
FLANGE TO WEB WELDS	
Flange Thickness	Fillet Welds
3/4"	1/4"
1 3/4"	5/16"
1 1/4"	3/8"
1 3/8"	5/16"
1"	5/16"



DETAIL "A"

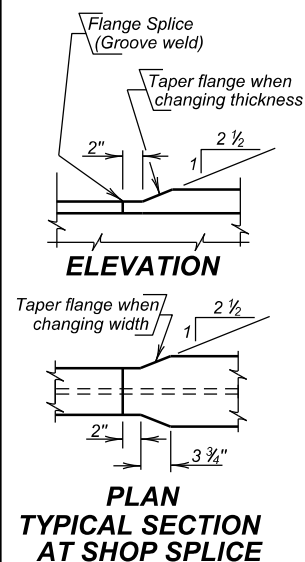


VIEW J - J



DETAIL "Y"

NOTE: Transverse Intermediate Stiffeners shall be welded to the compression flange as shown in DETAIL "Y". In zones of stress reversal the Transverse Intermediate Stiffener shall not be attached to either flange. Ends of Stiffeners not welded shall fit tight. See Girder Layout above for location of tension flange and zones of stress reversal.



TYPICAL SECTION AT SHOP SPLICE

SHEAR CONNECTOR DETAILS
Welded Stud Shear Connectors are spaced as shown on Girder Layout. Shear Connectors will be field installed and are shown here for informational purposes only.

NOTES:

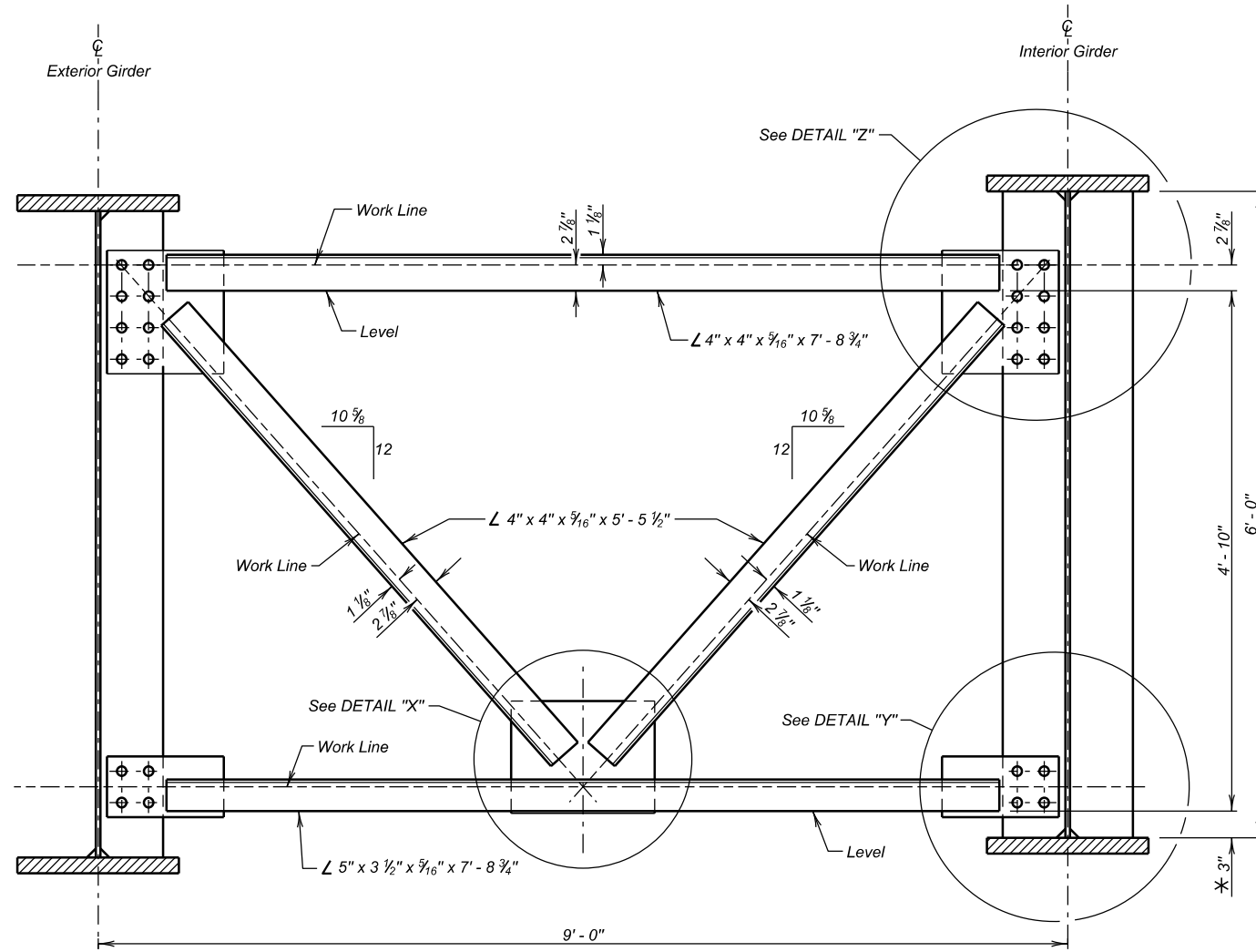
- See DIAPHRAGM DETAILS Sheet for Diaphragm Details.
- See FRAMING DIAGRAM, CAMBER, AND ERECTION DATA Sheet for spacing of Diaphragms, Stiffeners, and Girder Camber.
- All dimensions shown are horizontal or vertical.
- All Stiffeners and Girder Ends shall be made normal to flanges, except bearing stiffeners at pier & abutments shall be vertical.
- Stiffeners to have tight fit top and bottom.
- Dimensions shown are for steel temperature of 45° F.
- See Deck Drain Details & Signal Bracket Details Sheets.

374' - 0" CONT. COMP. GIRDER BRIDGE
40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW
SEC. 27/28-T102N-R49W
STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
STR. NO. 50-210-167 HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION

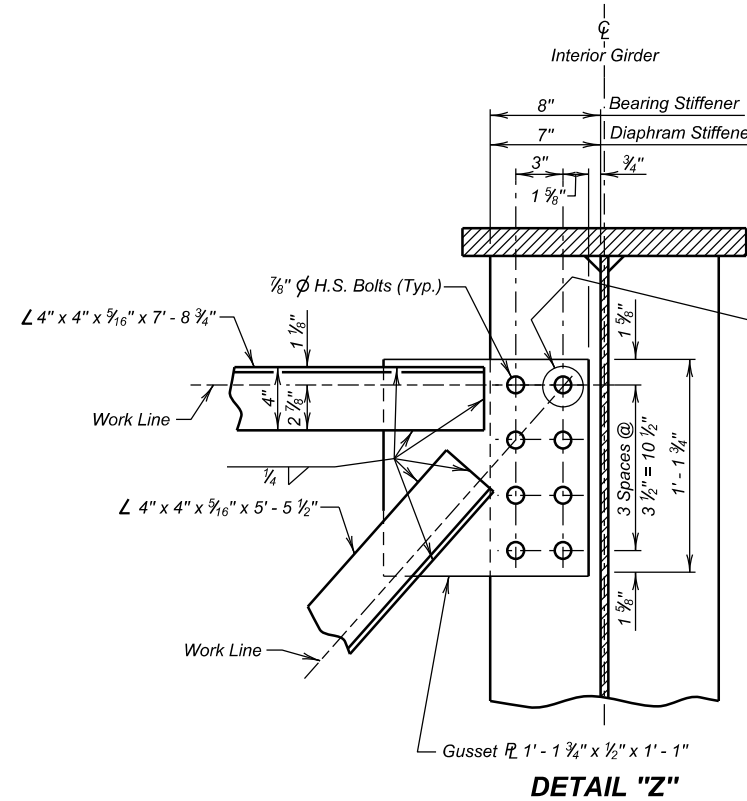
JULY 2011

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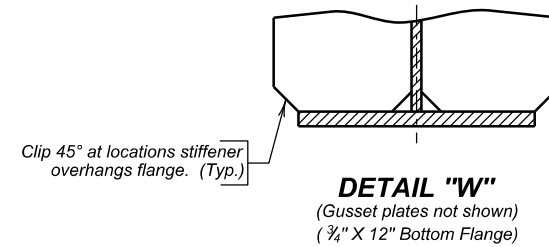
DIAPHRAGM DETAIL
(Weight of One Unit = 352 lbs.)

* 3" above high girder in each bay.

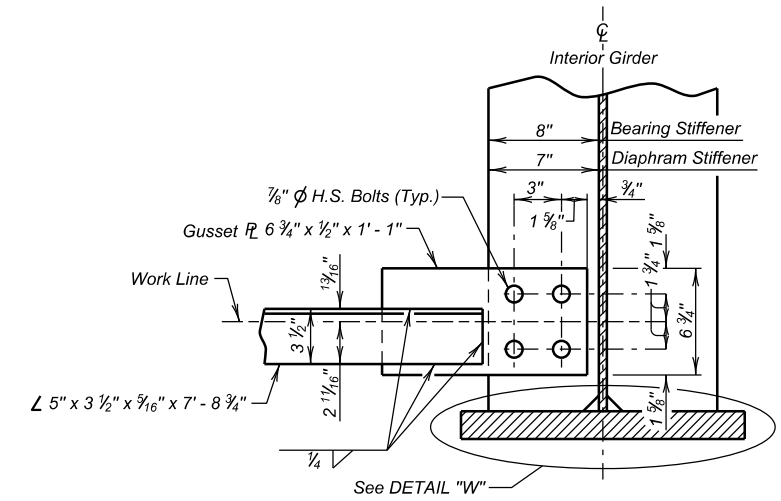


NOTE:
Work Lines intersect @ the center of this bolt hole. (Typ.)

DETAIL "Z"



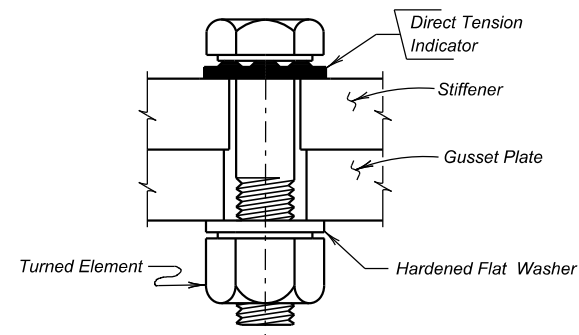
DETAIL "W"
(Gusset plates not shown)
(3/4" X 12" Bottom Flange)



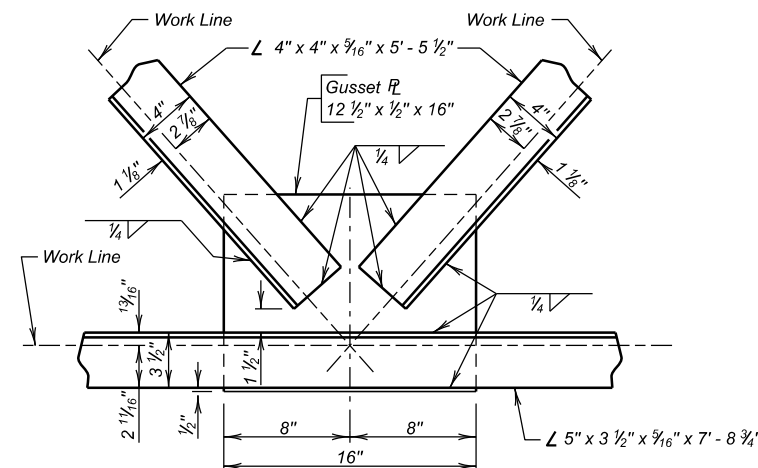
DETAIL "Y"

GENERAL NOTES

1. The estimated weight of the Steel Diaphragms is included in the quantity for Structural Steel, Furnish and the estimated area of painting is included in the quantity for Bridge Painting, both shown for informational purposes on ESTIMATE OF STRUCTURE QUANTITIES AND NOTES Sheet.
2. Use 1/16" diameter bolt holes in the 1/2" gusset plates. Use 5/16" diameter bolt holes in the stiffener plates.
3. Install bolt heads on the side of the connection with the 15/16" diameter bolt holes. Install direct tension indicators under the bolt heads.
4. The 7/8" High Strength bolts, nuts, and washers shall conform to ASTM Specification A-325. The bolts shall be the heavy hexagon head structural type with heavy semi-finished hexagon nut and hardened washer.
5. Terminate all welds 3/8" from the edges of the gusset plates.



DIRECT TENSION INDICATOR DETAIL



DETAIL "X"

DIAPHRAGM DETAILS FOR WESTBOUND LANES

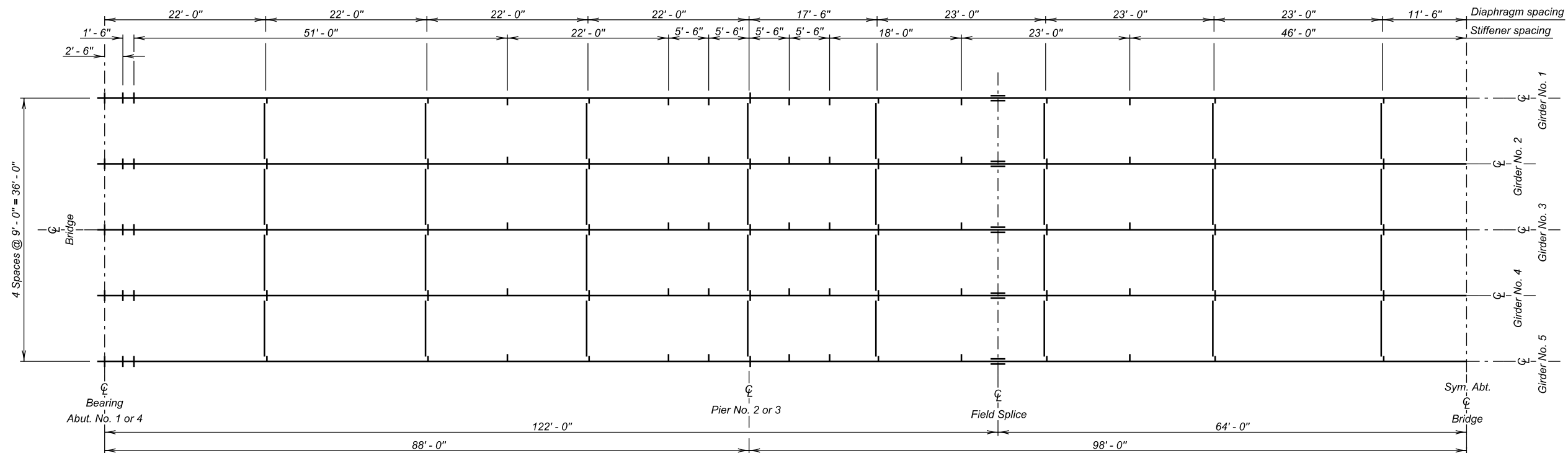
374' - 0" CONT. COMP. GIRDER BRIDGE
40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW
SEC. 27/28-T102N-R49W
STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
STR. NO. 50-210-167 HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION

JULY 2011

5 OF 9

DESIGNED BY DC/PW MINN043V	DRAWN BY MG 043VGI05	CHECKED BY DC/PW	Kevin N. Coeden BRIDGE ENGINEER
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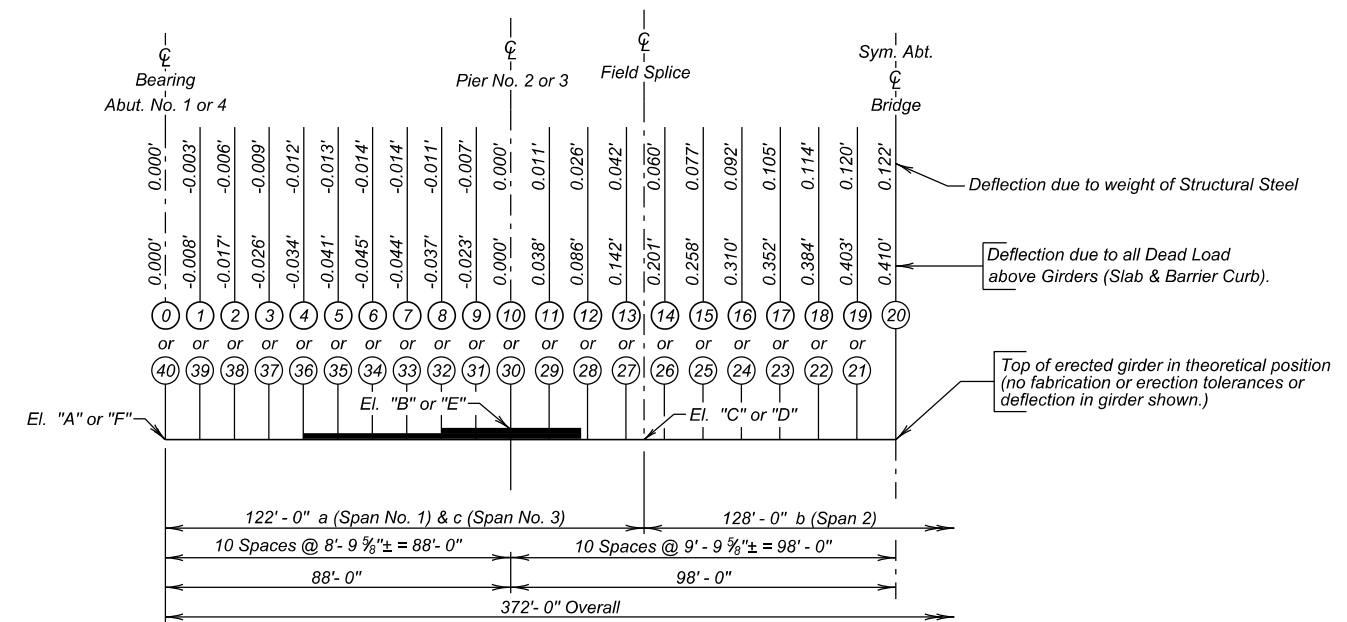


FRAMING DIAGRAM

NOTE-

These elevations and slopes occur at a time after girder erection is completed but prior to any placement of concrete. Slopes shown are an imaginary straight line between points at beam ends and are (+) towards increasing stations.

Girder No.	ELEVATIONS (Top of Girder)					SLOPES (%)		
	"A"	"B"	"C"	"D"	"E"	a	b	c
1	1455.492	1456.907	1457.447	1458.672	1458.783	1.602	0.957	0.091
2	1455.672	1457.087	1457.627	1458.852	1458.963	1.602	0.957	0.091
3	1455.852	1457.267	1457.807	1459.032	1459.143	1.602	0.957	0.091
4	1455.752	1457.167	1457.707	1458.932	1459.043	1.602	0.957	0.091
5	1455.572	1456.987	1457.527	1458.752	1458.863	1.602	0.957	0.091

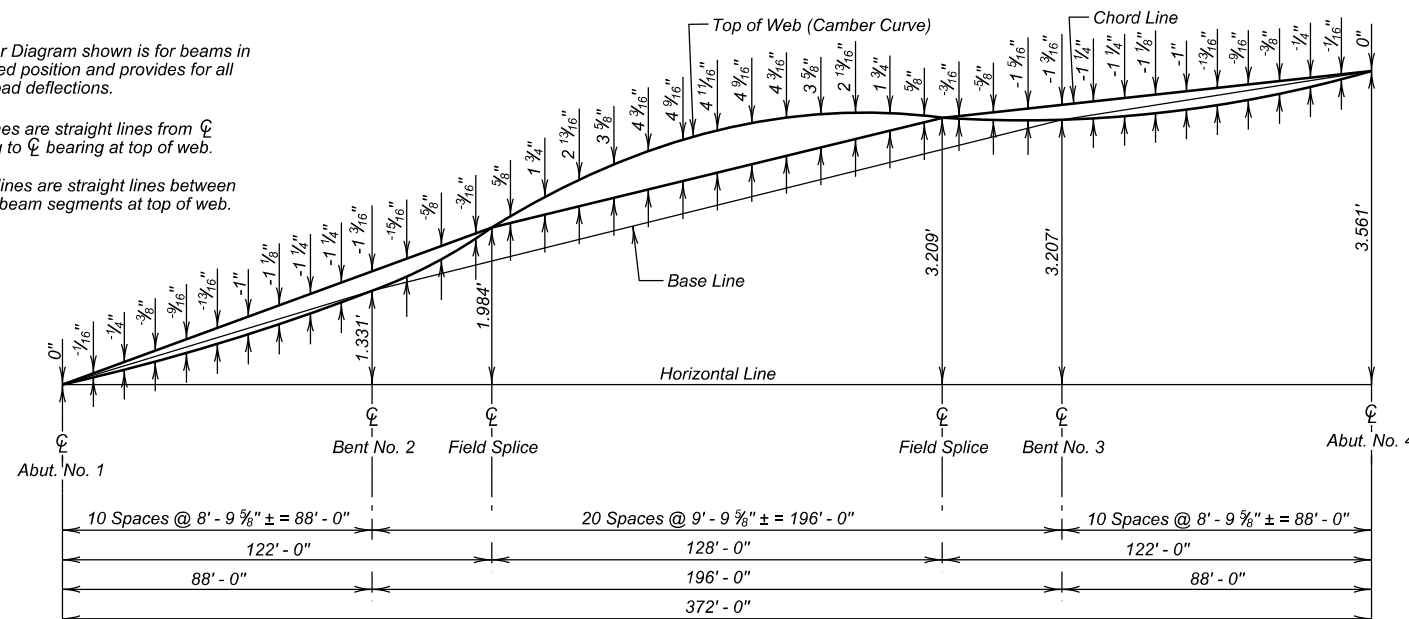


GIRDER ERECTION DIAGRAM

Camber Diagram shown is for beams in unloaded position and provides for all dead load deflections.

Baselines are straight lines from bearing to bearing at top of web.

Chord lines are straight lines between end of beam segments at top of web.



CAMBER CUTTING DIAGRAM
(Cut camber into webs of all girders as shown)

FRAMING DIAGRAM, CAMBER & ERECTION DATA

FOR

WESTBOUND LANES

374' - 0" CONT. COMP. GIRDER BRIDGE

40' - 0" ROADWAY
OVER CLIFF AVE.
STA. 56 + 45.68 TO STA. 60 + 19.68
STR. NO. 50-210-167

0° SKEW
SEC. 27/28-T102N-R49W
IM 0909(80)397
HL-93

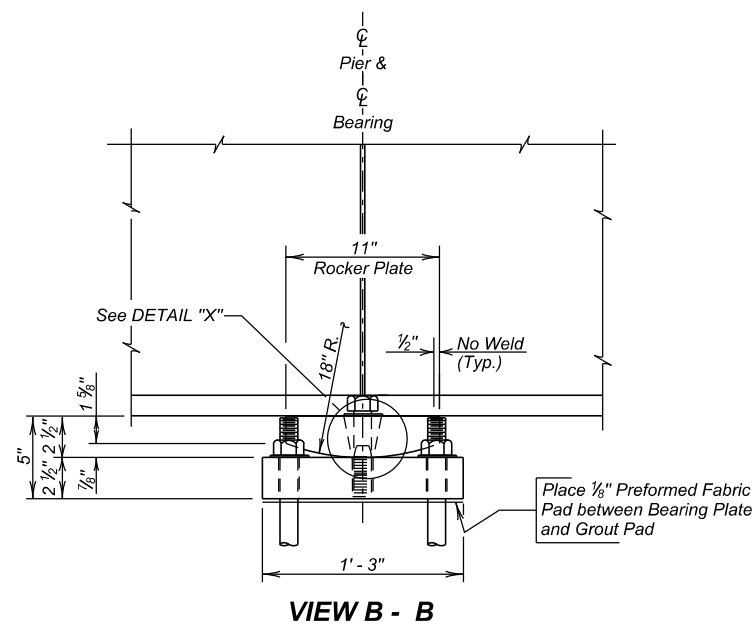
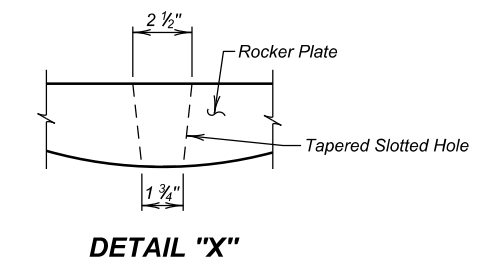
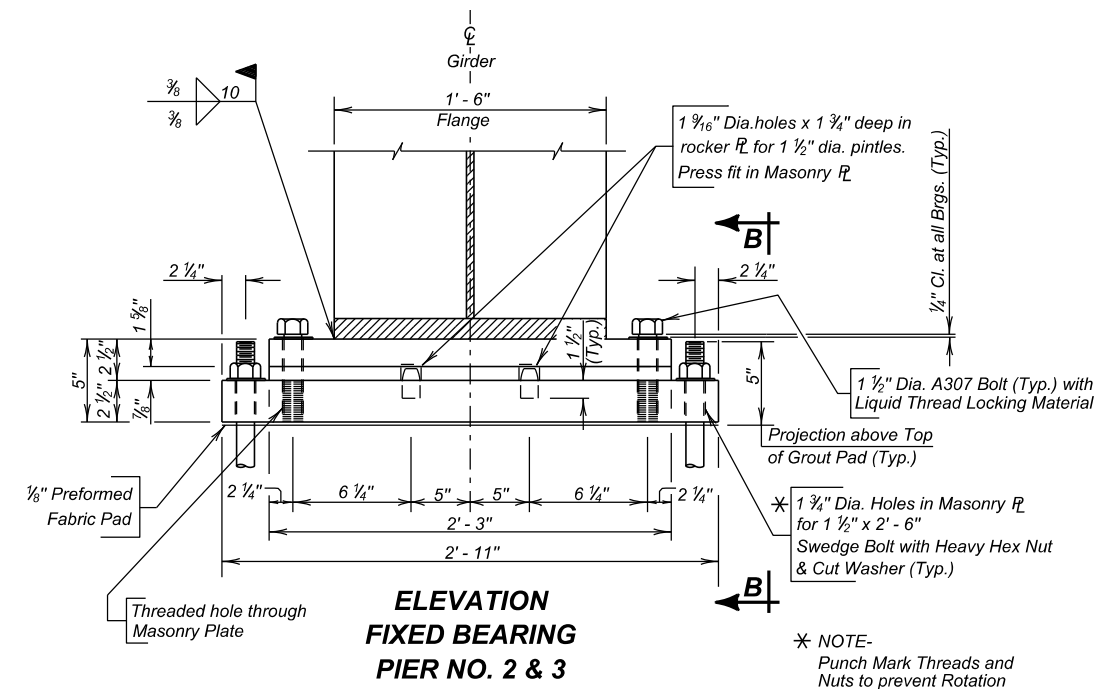
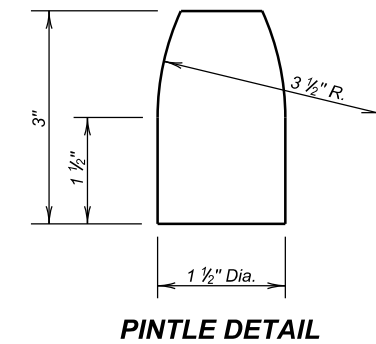
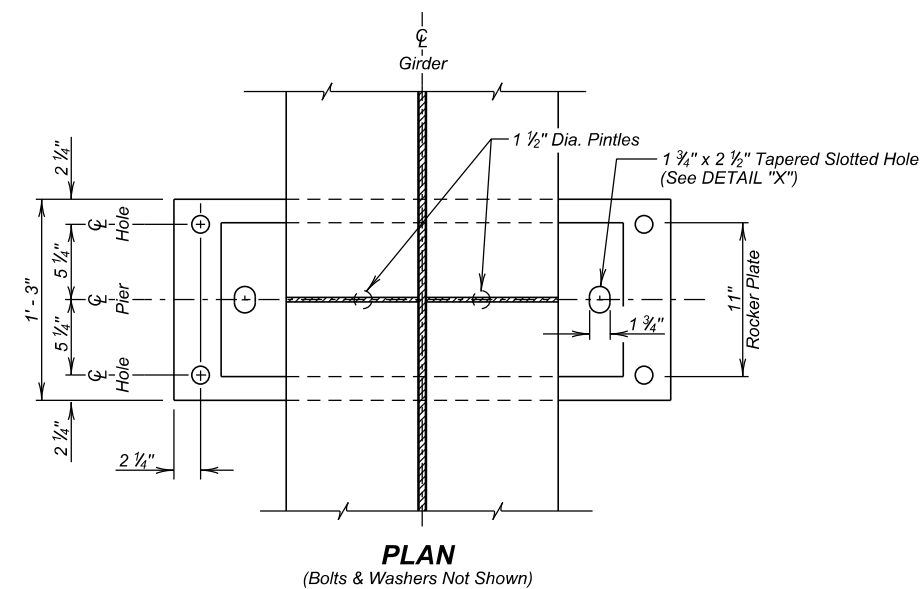
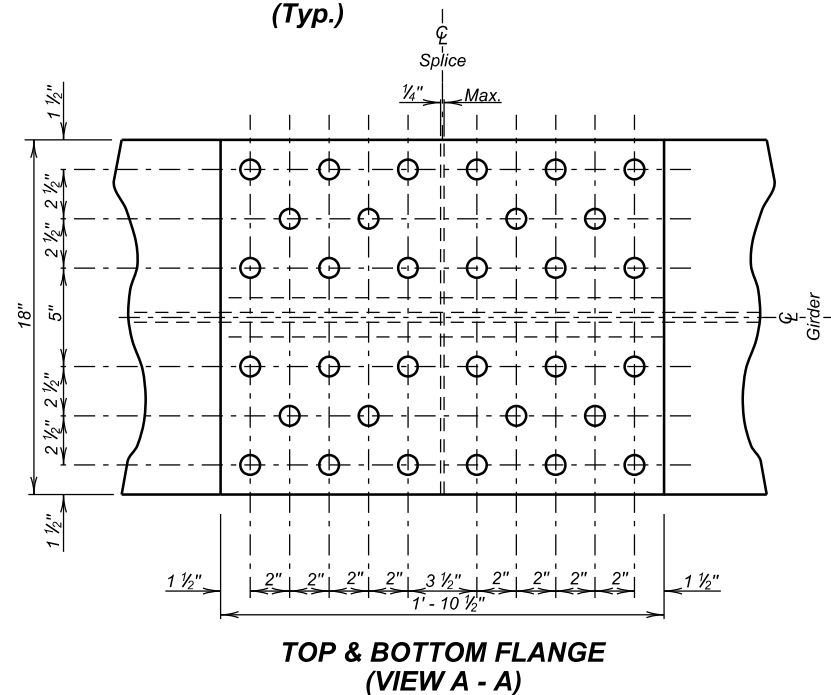
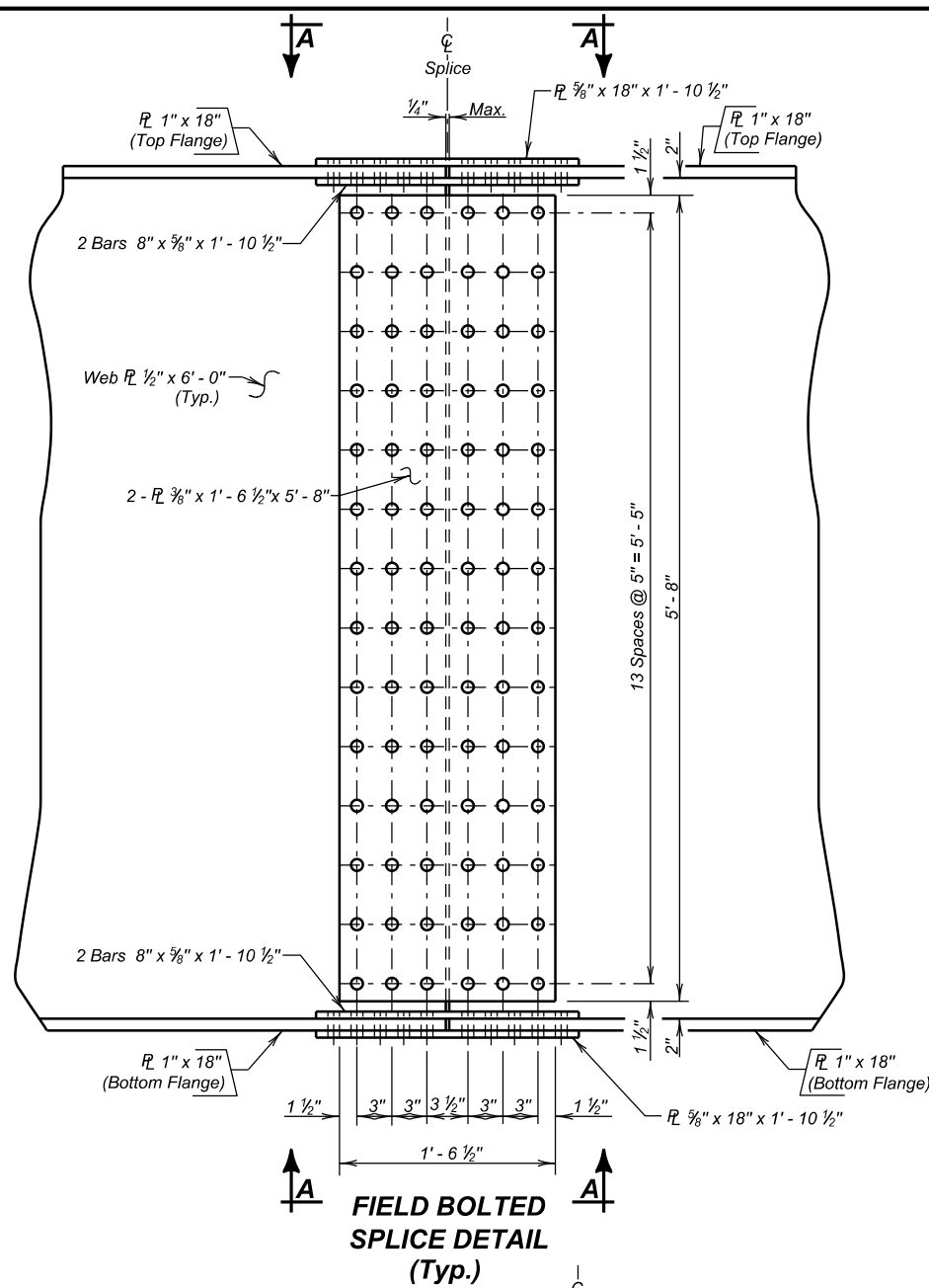
MINNEHAHA COUNTY

S. D. DEPT. OF TRANSPORTATION

JULY 2011

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	9	20

NOTE:
All bolts in splices shall be 7/8" A325 High Strength Bolts. (See DIAPHRAGM DETAILS sheet for Direct Tension Indicator Detail.)



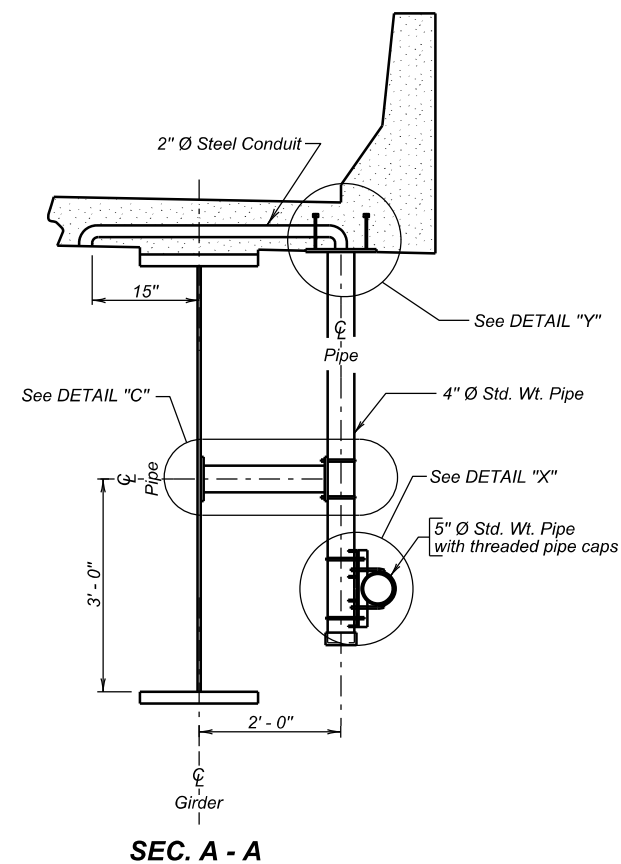
DETAILS OF BOLTED FIELD SPLICES & BEARINGS
FOR
WESTBOUND LANES
374' - 0" CONT. COMP. GIRDER BRIDGE
40' - 0" ROADWAY
OVER CLIFF AVE.
STA. 56 + 45.68 TO STA. 60 + 19.68
STR. NO. 50-210-167

0° SKEW
SEC. 27/28-T102N-R49W
IM 0909(80)397
HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
JULY 2011

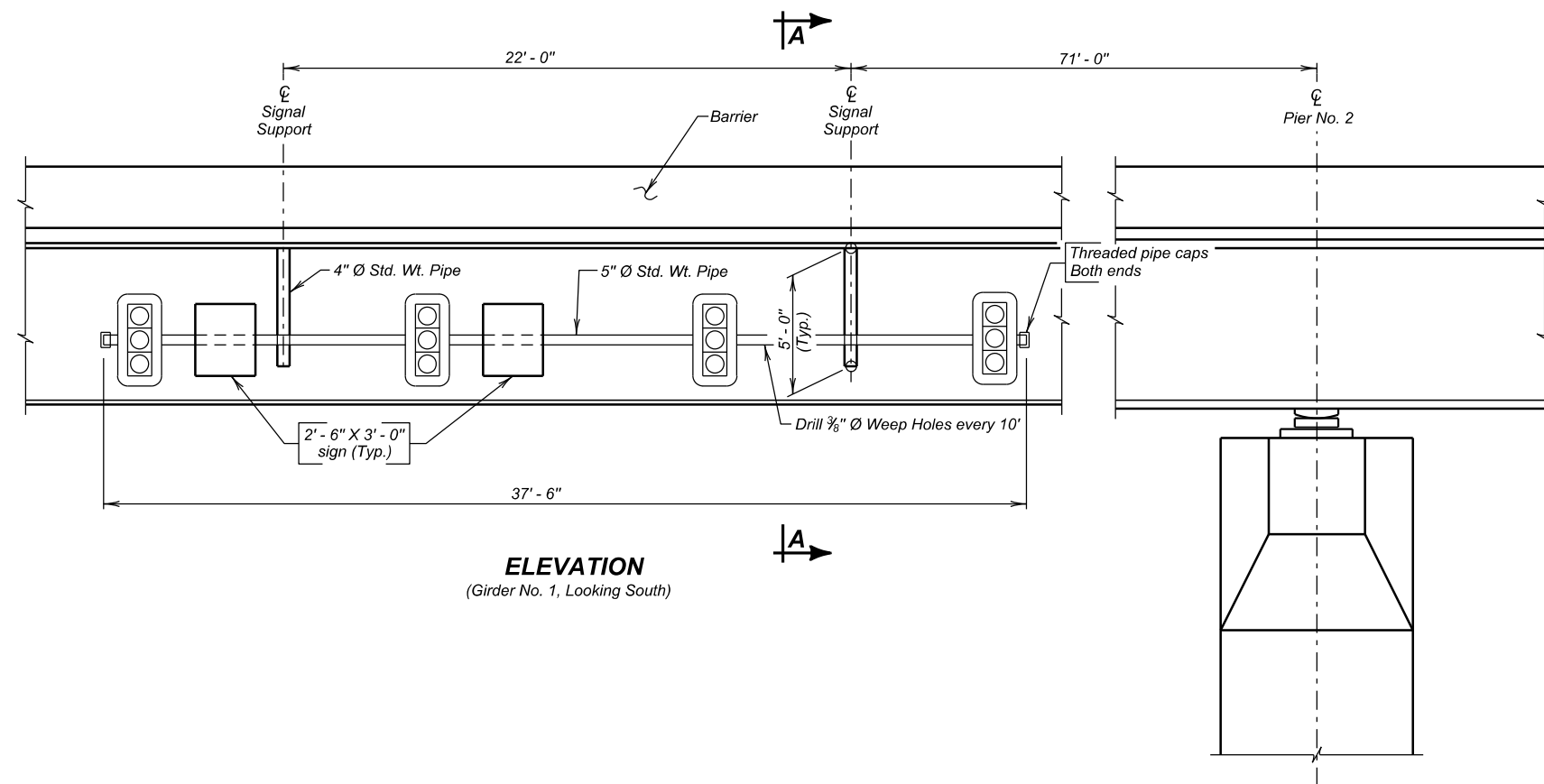
DESIGNED BY DC/PW MINN043V	DRAWN BY GW/MG 043VGI07	CHECKED BY DC/PW	Kevin N. Coeden BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	10	20



SEC. A - A

NOTE:
Use this sheet in conjunction with SIGNAL BRACKET DETAILS (B).



ELEVATION
(Girder No. 1, Looking South)

NOTES:

1. Signals and Signs shown for information only.
2. For Informational purposes only, the estimated weight of Structural Steel, Furnish is 833 lbs.

SIGNAL BRACKET DETAILS (A)

FOR

WESTBOUND LANES

374' - 0" CONT. COMP. GIRDER BRIDGE

40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW
SEC. 27/28-T102N-R49W
STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
STR. NO. 50-210-167 HL-93

MINNEHAHA COUNTY

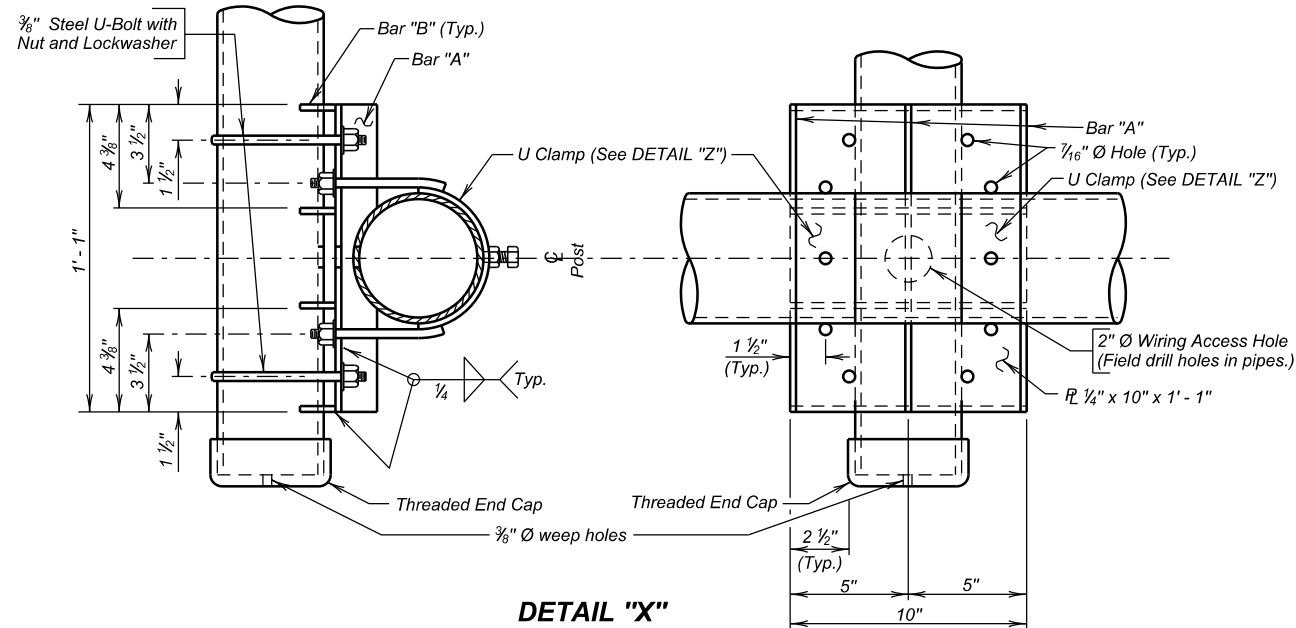
S. D. DEPT. OF TRANSPORTATION

JULY 2011

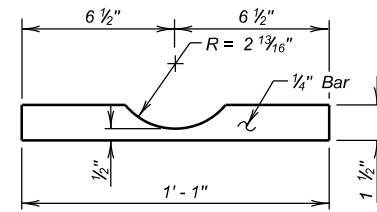
8 OF 9

DESIGNED BY DC/PW MINN043V	DRAWN BY GW 043VGI08	CHECKED BY DC/PW	<i>Kevin N. Coeden</i> BRIDGE ENGINEER
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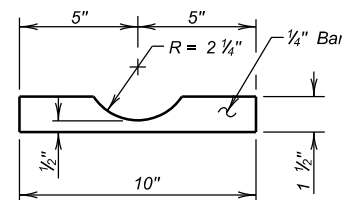
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	11	20



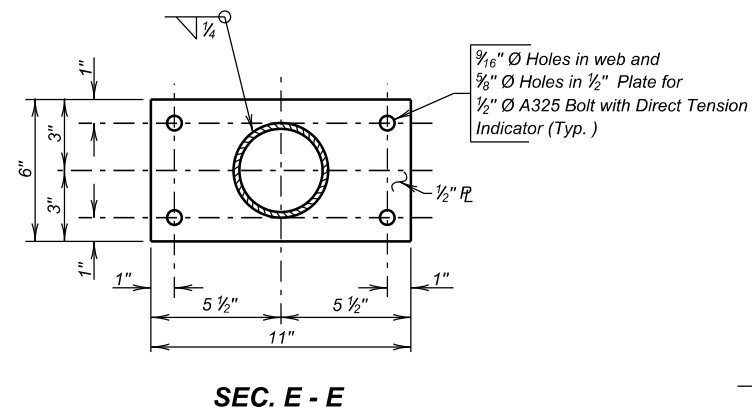
DETAIL "X"



BAR "A"

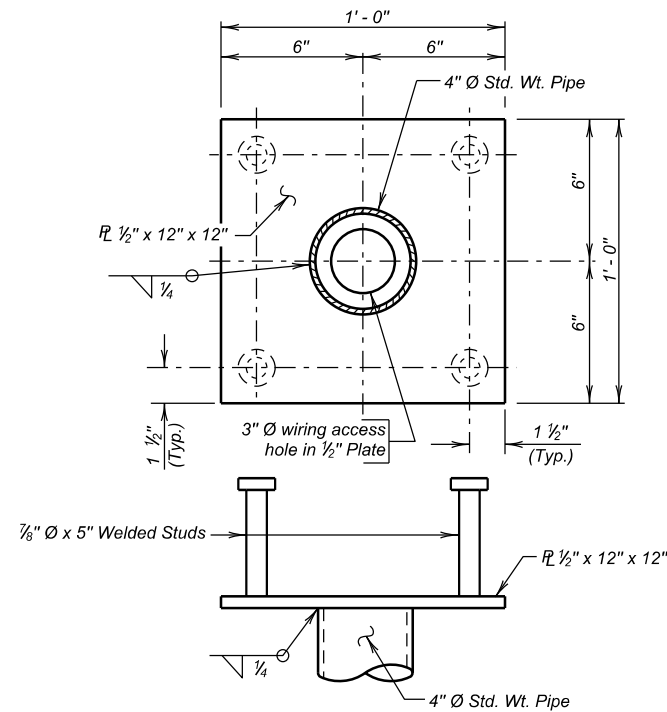


BAR "B"



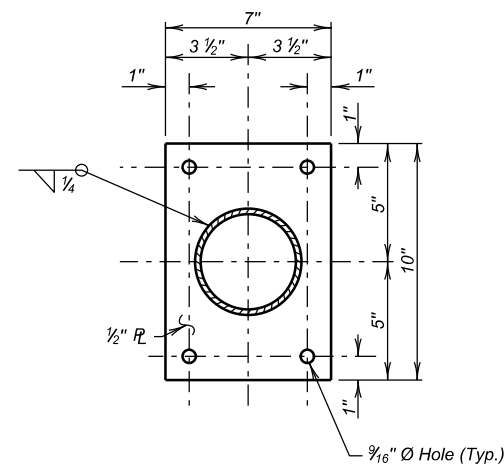
SEC. E - E

1/16" Ø Holes in web and 5/8" Ø Holes in 1/2" Plate for 1/2" Ø A325 Bolt with Direct Tension Indicator (Typ.)

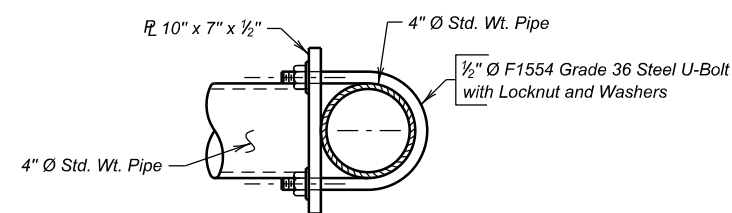


DETAIL "Y"

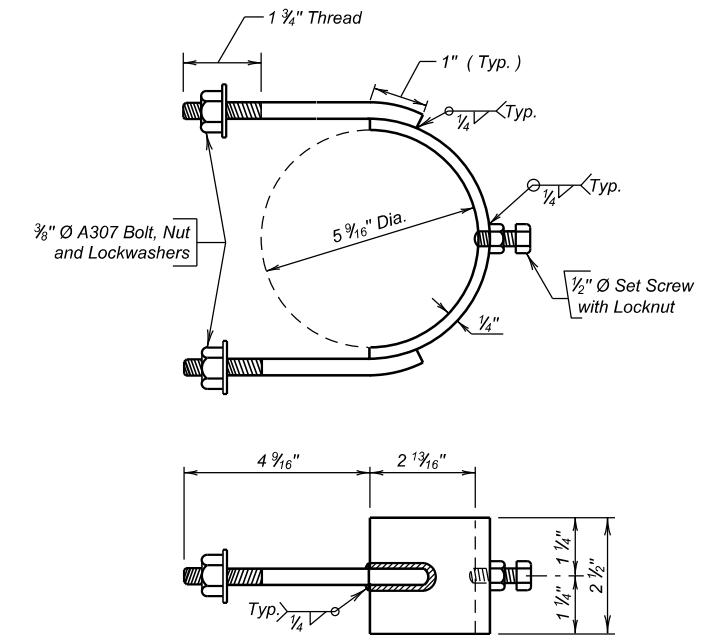
NOTE: Use this sheet in conjunction with SIGNAL BRACKET DETAILS (A).



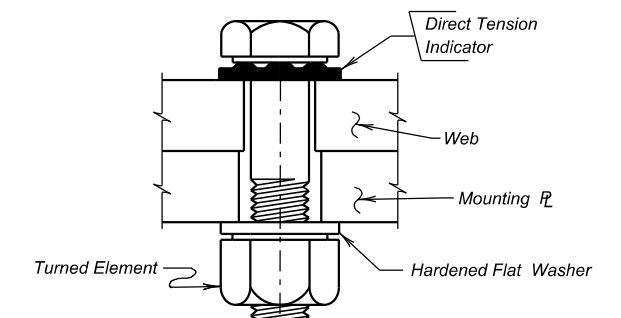
SEC. D - D



SEC. C - C



DETAIL "Z"



DIRECT TENSION INDICATOR DETAIL

SIGNAL BRACKET DETAILS (B)

FOR

WESTBOUND LANES

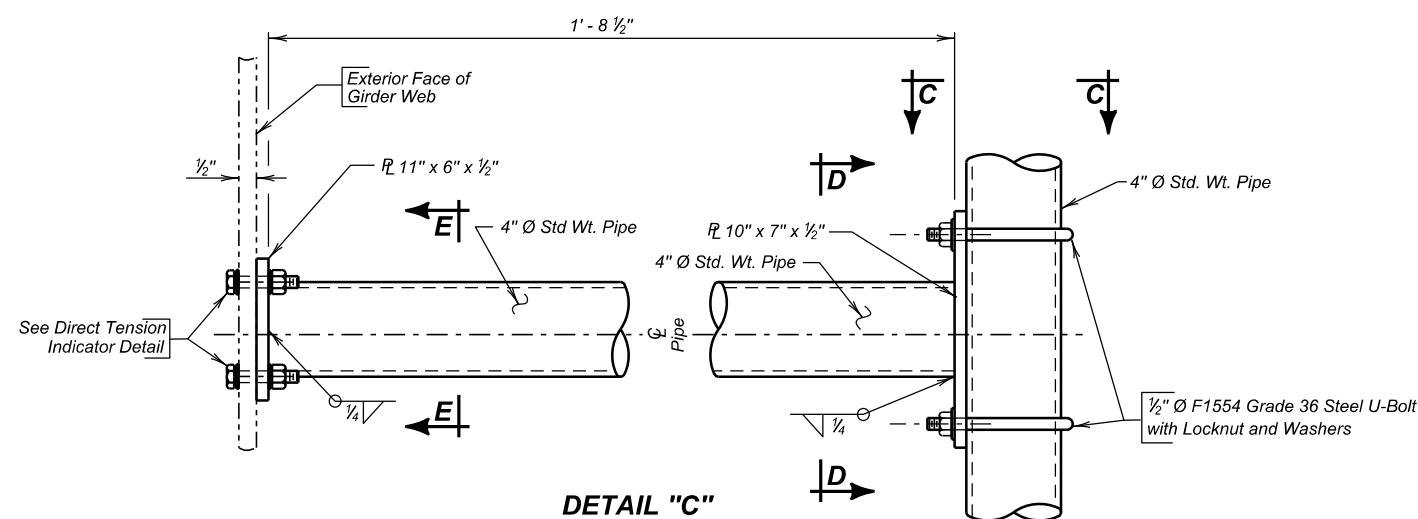
374' - 0" CONT. COMP. GIRDER BRIDGE

40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW
 STA. 56 + 45.68 TO STA. 60 + 19.68 SEC. 27/28-T102N-R49W
 STR. NO. 50-210-167 IM 0909(80)397 HL-93

MINNEHAHA COUNTY

S. D. DEPT. OF TRANSPORTATION

JULY 2011

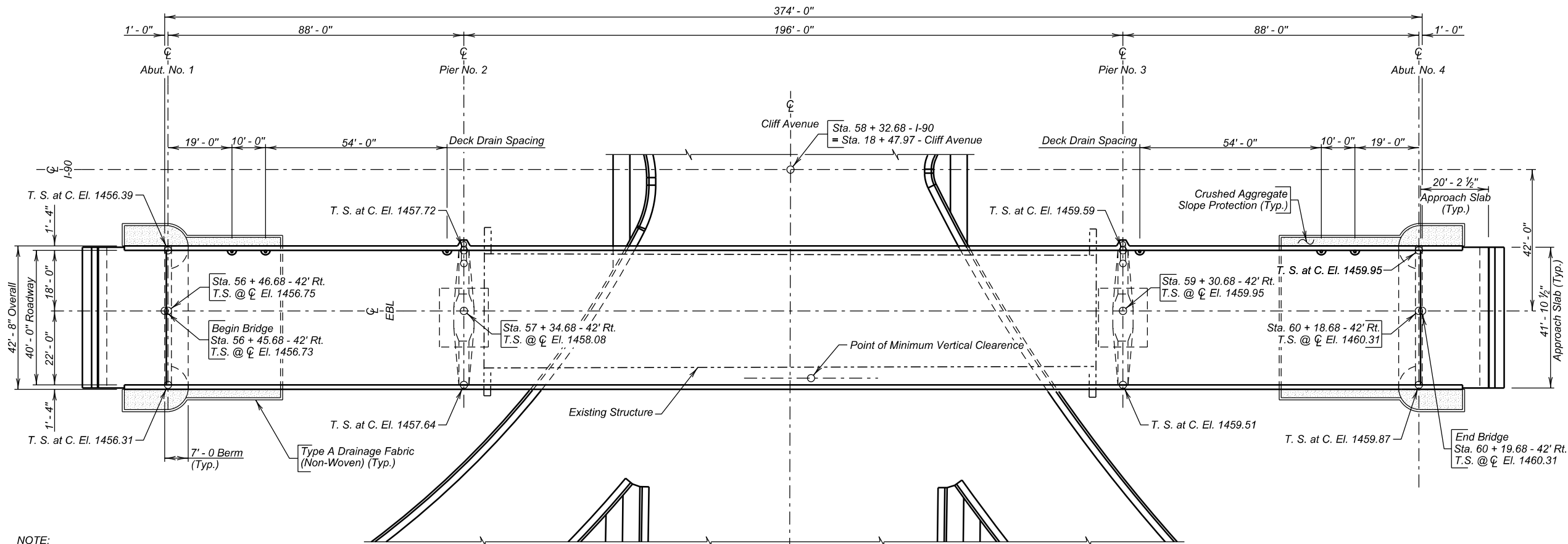


DETAIL "C"

DESIGNED BY DC/PW MINN043V	DRAWN BY GW 043VGI09	CHECKED BY DC/PW	Kevin N. Coeden BRIDGE ENGINEER
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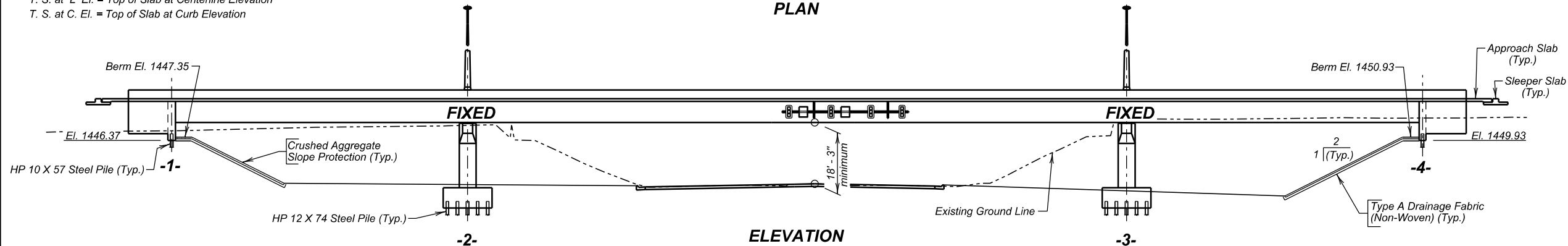
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	12	20

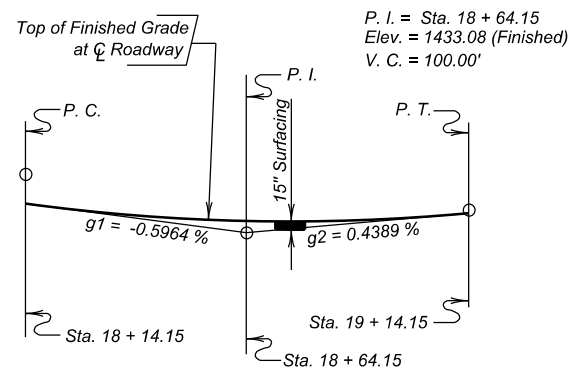


NOTE:
 T. S. at \odot El. = Top of Slab at Centerline Elevation
 T. S. at C. El. = Top of Slab at Curb Elevation

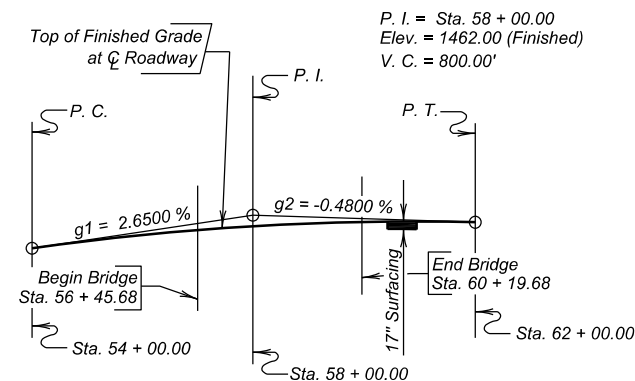
PLAN



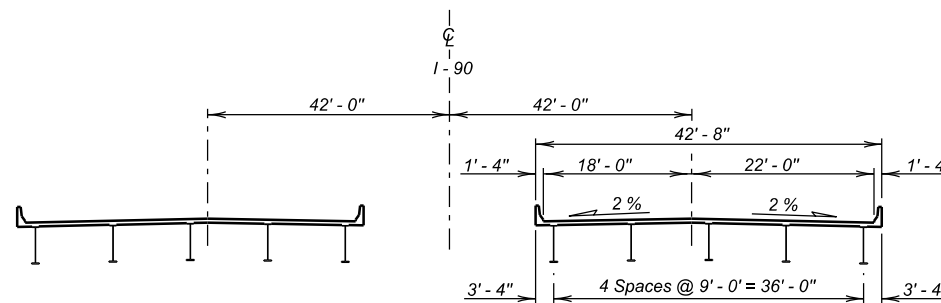
ELEVATION



VERTICAL CURVE DATA
(Cliff Avenue)



VERTICAL CURVE DATA
(I-90)



TYPICAL SECTION

**-X271-
INDEX OF BRIDGE SHEETS -**

- Sheet No. 1 - General Drawing
- Sheet No. 2 - Estimate of Structure Quantities and Notes
- Sheet No. 3 - End Block, Barrier Curb, & Deck Drain Details
- Sheet No. 4 - Girder Layout Details
- Sheet No. 5 - Diaphragm Details
- Sheet No. 6 - Framing Diagram, Camber, & Erection Data
- Sheet No. 7 - Details of Bolted Field Splices & Bearings
- Sheet No. 8 - Signal Bracket Details (A)
- Sheet No. 9 - Signal Bracket Details (B)

**GENERAL DRAWING
FOR
EASTBOUND LANES**

374' - 0" CONT. COMP. GIRDER BRIDGE

40' - 0" ROADWAY
 OVER CLIFF AVE.
 STA. 56 + 45.68 TO STA. 60 + 19.86
 STR. NO. 50-210-168
 PCN 043V

SEC. 27/28-T102N-R49W
 0° SKEW
 IM 0909(80)397
 HL-93

MINNEHAHA COUNTY
 S. D. DEPT. OF TRANSPORTATION

JULY 2011

1 OF 9

-X271-

PLANS BY:
 OFFICE OF BRIDGE DESIGN, SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

DESIGNED BY DC/PW MINN043V	DRAWN BY GW/MG 043VGJ01	CHECKED BY PW/DC	<i>Kevin N. Coeden</i> BRIDGE ENGINEER
----------------------------------	-------------------------------	---------------------	---

ESTIMATE OF STRUCTURE QUANTITIES

DESCRIPTION	QUANTITY	UNIT	REMARKS
Δ Structural Steel, Furnish	Lump Sum	LS	
≠ Bridge Painting	Lump Sum	LS	

Δ For informational purposes only, the estimated weight of the structural steel is 541,783 pounds.
 ≠ For informational purposes only, the estimated area to be painted is 6,675 sq. ft.

SPECIFICATIONS FOR BRIDGE

- Design Specifications: AASHTO LRFD Bridge Design Specifications, 2010 Edition with 2010 Interims.
- Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2004 Edition and required provisions, supplemental specifications and/or special provisions as included in the proposal.

BRIDGE DESIGN LOADING

- AASHTO HL-93.
- Dead Load includes 22 psf for future wearing surface on the roadway.

DESIGN MATERIAL STRENGTHS

Structural Steel (ASTM A709 Gr. 36T2) $f_y = 36,000$ psi
 Structural Steel (ASTM A709 Gr. 50T2) $f_y = 50,000$ psi

CONNECTION OF GIRDER TO PILE

- Steel for the bearing plates shall conform to ASTM A709 Gr. 50.
- Payment for furnishing the bearing plates shall be incidental to the contract lump sum price for Structural Steel, Furnish.

PIERS

All Swedge Bolts shall be 1 1/2" diameter x 2'-6" F1554, Grade 55 bolts with heavy hex nut and cut washer (listed with structural steel in Superstructure quantities). A minimum of 20% of the embedded bolt surface shall be covered with deformations whose radial dimensions are 15% to 20% of the bolt diameter.

GIRDERS

- Structural Steel shall conform to ASTM A709 Gr. 50WT2. Angles in the diaphragms shall conform to ASTM A588 Grade 50. Shear connectors shall conform to Section 7.3 Type B. of the AASHTO/AWS D1.5 Bridge Welding Code.
- Do not install Shear Connectors. Shear Connectors shown are for information only and will be field welded to the girders under future contract.
- All butt welded girder splices shall be ultrasonically inspected. See notes regarding Welding and Weld inspection.
- Cost of welding and weld inspection shall be included in the lump sum bid for Structural Steel, Furnish.

- The exterior face and bottom of the bottom flange of the exterior girders shall be painted in accordance with Section 411 of the South Dakota Standard Specifications. The top coat shall be an approved brown (Federal Standard 595B Color 30045) to match the weathering color of the steel.
- See diaphragm details for notes concerning diaphragms.
- Structural Steel used in all girder web plates, girder flanges, and girder splice plates shall comply with the Charpy-V-Notch toughness requirements set forth in Section 971 of the South Dakota Standard Specifications. Material greater than 1 1/2 inches in thickness shall require frequency (P) testing in lieu of heat lot (H) testing. See Girder Layout for location of tension and stress reversal areas of girder flanges.
- Dead Load camber shall be cut into the girder webs.

BEARINGS

- All steel for the bearings shall conform to ASTM A709, Gr. 50.
- The pre-formed fabric pads shall be composed of multiple layers of 8 ounce cotton duck impregnated and bonded with high quality natural rubber or of equivalent and equally suitable materials compressed into resilient pads of uniform thickness, after compression and vulcanizing. The finished pads shall withstand compression loads perpendicular to the plane of the laminations of not less than 10,000 pounds per square inch without detrimental reduction in thickness or extrusion.
- The bearing plates shall be shop painted with 3 mils of inorganic zinc primer in accordance with Section 411 of the South Dakota Standard Specifications. No top coat of polyurethane will be applied.
- Tolerances and surface finish for Rocker Plates shall be as follows:

Convex Radius Dimension	+0.000 mm - 0.010"
Surface Finish, Machined Surfaces	125 RMS or Better
Surface Finish, Other Surfaces	230 RMS or Better
- Payment for furnishing the bearings, including the pre-formed fabric pads under the bearing plates and painting, shall be included in the lump sum bid for Structural Steel, Furnish.

FIELD BOLTED GIRDER SPLICES

- Steel for splice and filler plates shall conform to ASTM A709 Gr. 50WT2
- Bolt threads are required to be excluded from shear planes.
- Payment for furnishing splice plates and bolts for girder splices shall be incidental to the Contract Lump sum bid price for Structural Steel, Furnish.

DECK DRAINS

The fabricator shall drill holes in the web for the 1/2 inch diameter ASTM A325 bolts as detailed on the End Block, Barrier Curb, and Deck Drain Details sheet. The holes shall not be drilled more than 1/16 inch larger than the bolt's nominal diameter.

WELDING AND WELD INSPECTION

Main members referred to in Section 6.7 Nondestructive Testing of Bridge Welding Code are identified as follows: Girder webs, girder flanges, and bearing stiffeners. Ultrasonic testing of groove welds shall be used in lieu of radiography. See girder layout for stress categories and their locations along the girder.

SIGNAL BRACKETS

- Steel for plates and bars shall conform to ASTM A709 Gr. 36. Shear connectors shall conform to Section 7.3 Type B of the ANSI/AASHTO/AWS D1.5 Bridge Welding Code. Pipe shall conform to ASTM A53 Grade B.
- Brackets and/or bracket components shall be painted in accordance with Section 411 of the SD Standard Specifications. The finish coat of paint color shall be brown as approved by the Engineer and shall match the color of the exterior girders.
- Payment for painting and furnishing the signal brackets shall be incidental to the contract lump sum price for Structural Steel, Furnish.

BOLT TESTING

The certified mill test reports for all bolts used on the project shall include the test results for all of the testing specified in section 972.2.D of the South Dakota Standard Specifications. Some of these tests are supplemental tests that must be requested at the time the bolts are ordered. It is the responsibility of the Contractor/Fabricator to notify the bolt supplier of these requirements.

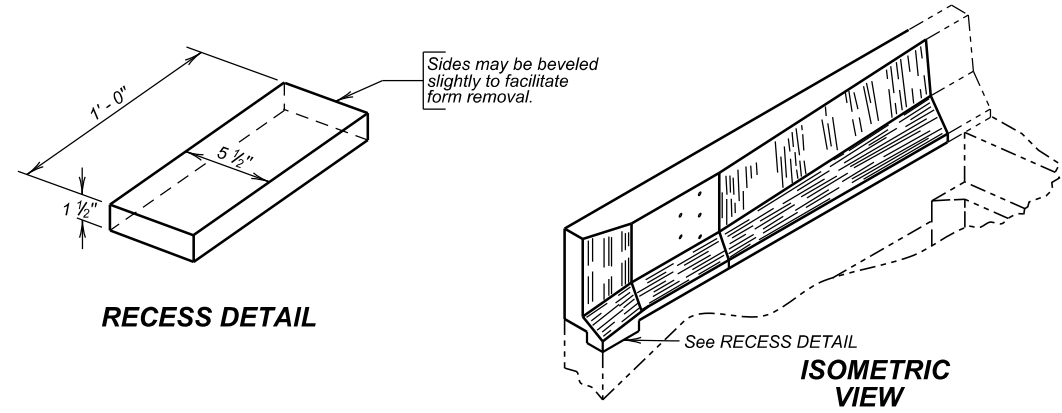
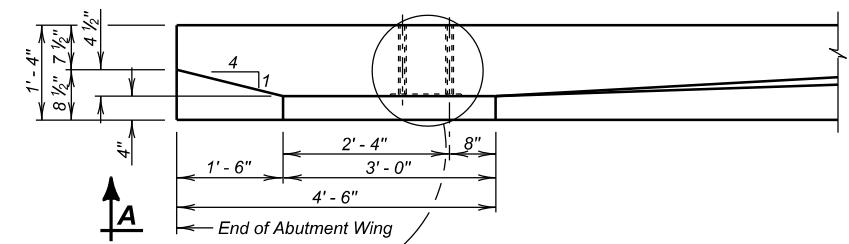
DELIVERY OF STRUCTURAL STEEL

- All structural steel shall be delivered to the job site.
- Contact the Department of Transportation's Sioux Falls Area Office for approximate delivery dates.
- All costs involved with the transportation of the structural steel to the job site shall be included in the contract lump sum price for Structural Steel, Furnish.

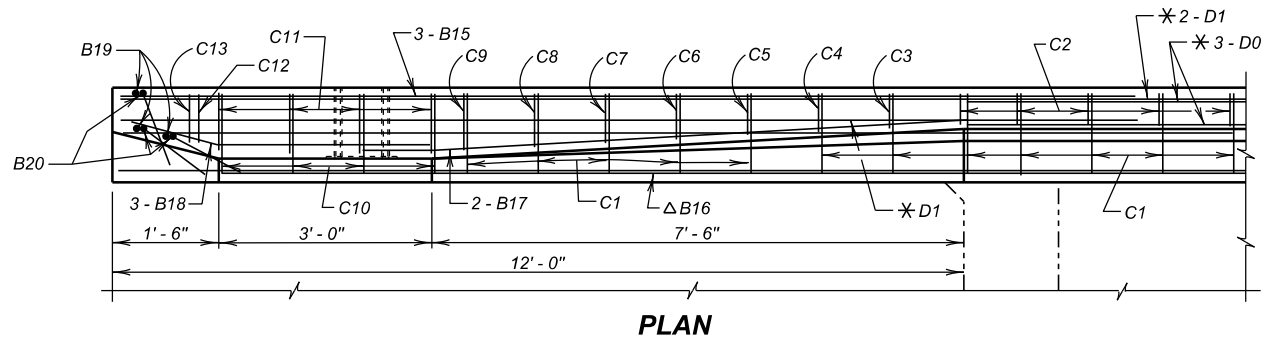
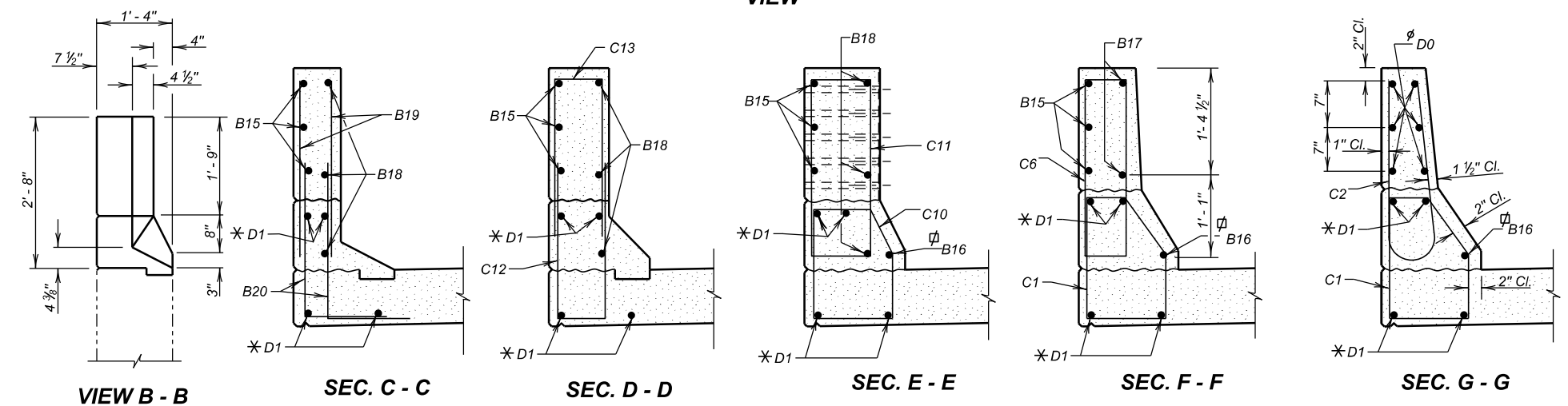
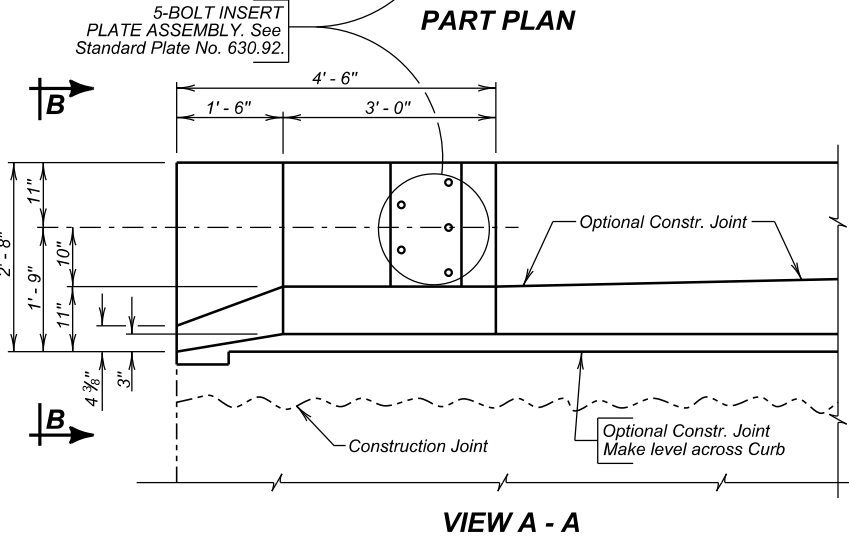
ESTIMATE OF STRUCTURE QUANTITIES AND NOTES FOR (EAST BOUND LANES)

374'-0" CONT. COMP. GIRDER BRIDGE
 Str. No. 50-210-168
 FEBRUARY 2012

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	14	20



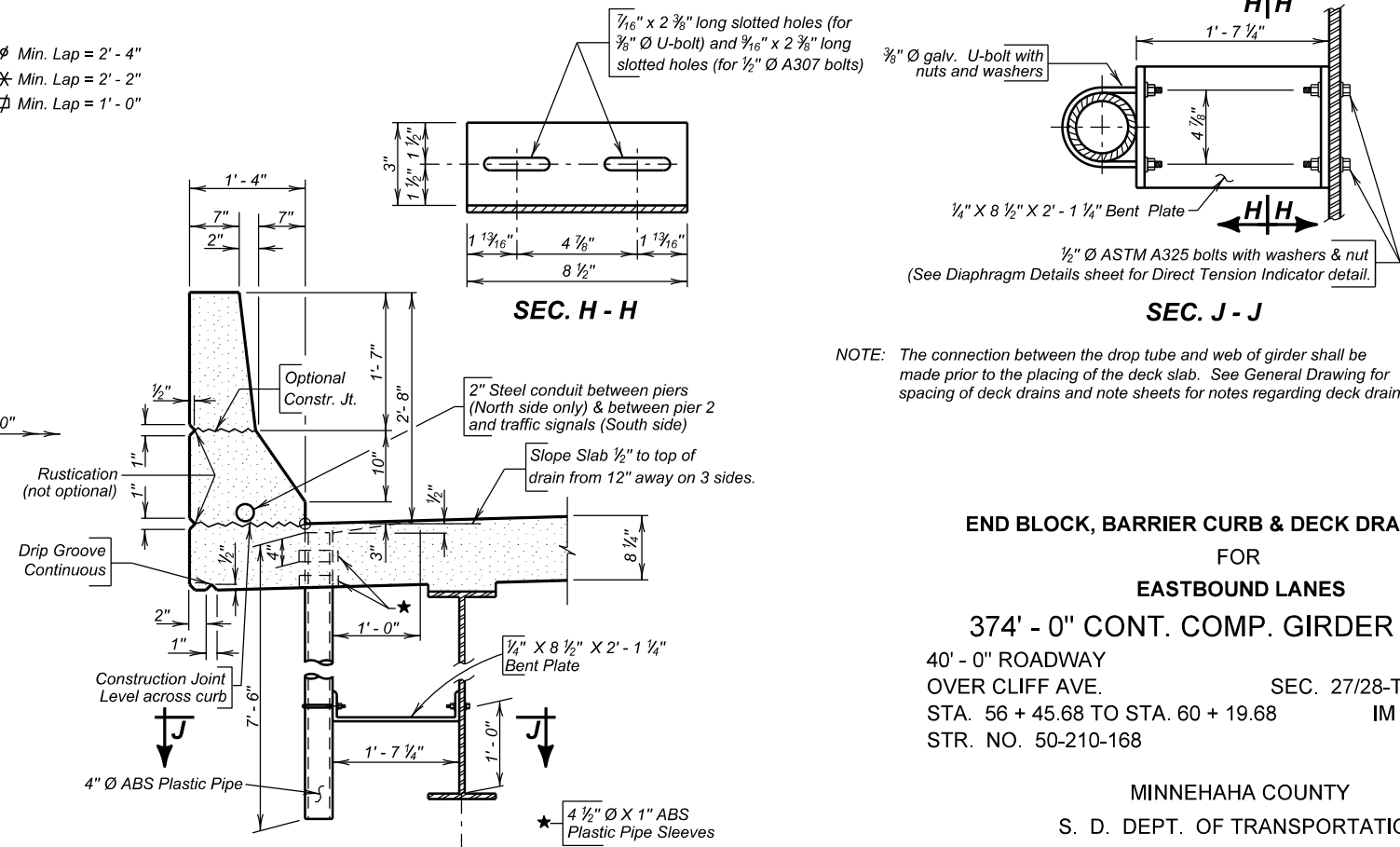
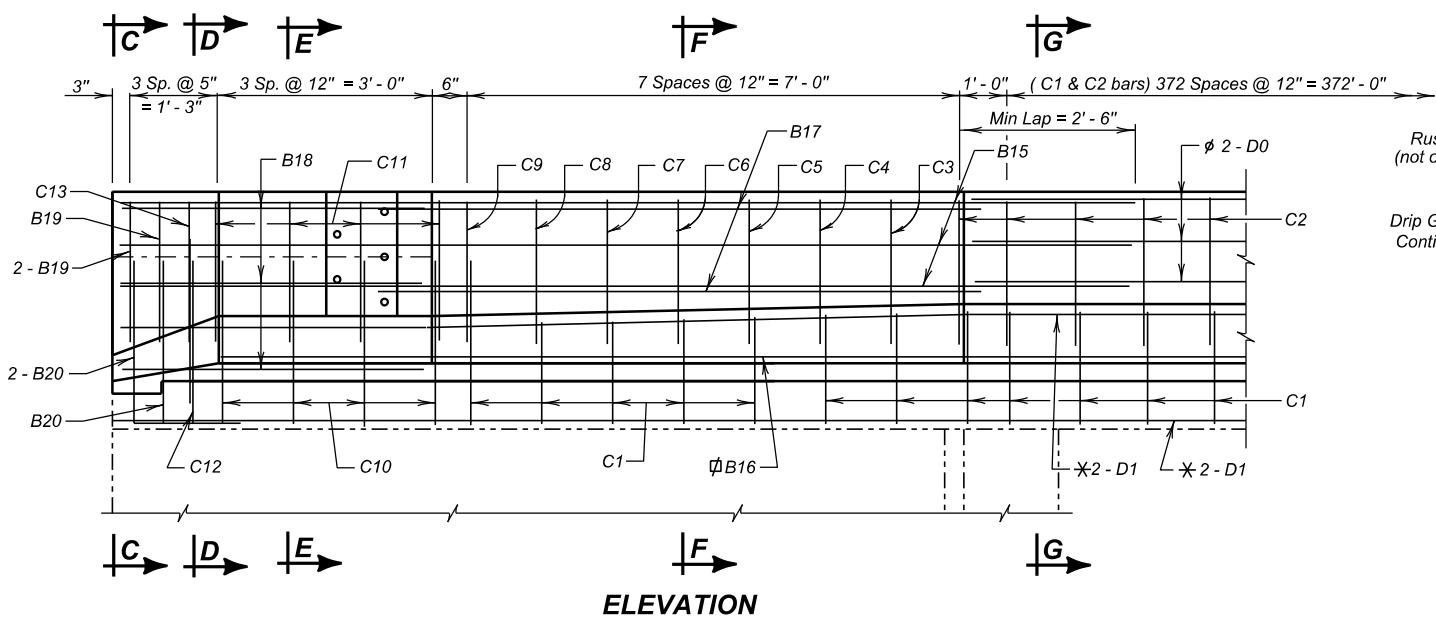
NOTE: THE DECK DRAINS AND ASSOCIATED HARDWARE ARE NOT PART OF THIS CONTRACT. DETAILS ARE PROVIDED SO THAT HOLES CAN BE PROVIDED IN THE GIRDER WEB AT THE APPROPRIATE DECK DRAIN LOCATIONS.



∅ Min. Lap = 2' - 4"

* Min. Lap = 2' - 2"

∅ Min. Lap = 1' - 0"



NOTE: The connection between the drop tube and web of girder shall be made prior to the placing of the deck slab. See General Drawing for spacing of deck drains and note sheets for notes regarding deck drains.

END BLOCK, BARRIER CURB & DECK DRAIN DETAILS FOR EASTBOUND LANES

374' - 0" CONT. COMP. GIRDER BRIDGE

40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW

SEC. 27/28-T102N-R49W

STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397

STR. NO. 50-210-168 HL-93

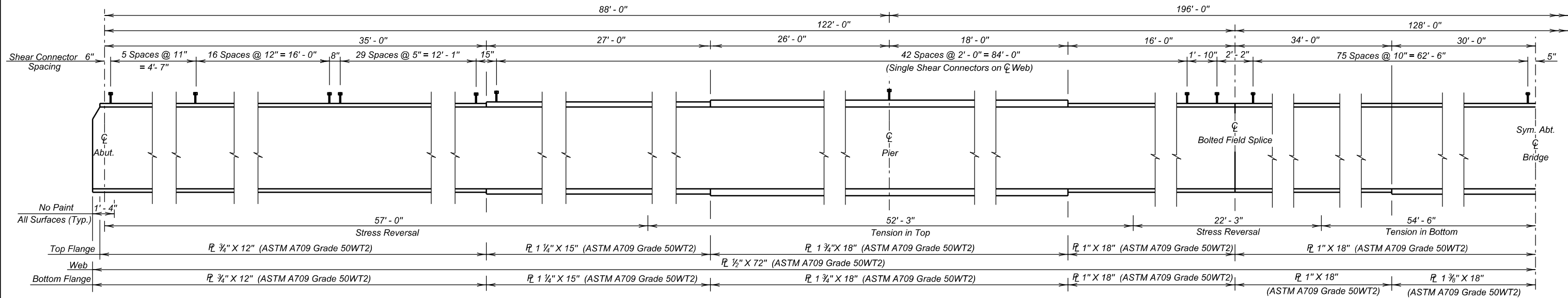
MINNEHAHA COUNTY

S. D. DEPT. OF TRANSPORTATION

JULY 2011

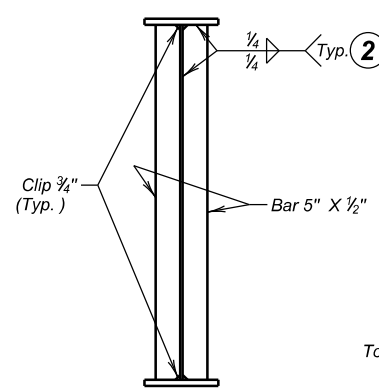
3 OF 9

DESIGNED BY DC/PW MINN043V	DRAWN BY MG 043VGJ03	CHECKED BY DC/PW	Kevin N. Coeden BRIDGE ENGINEER
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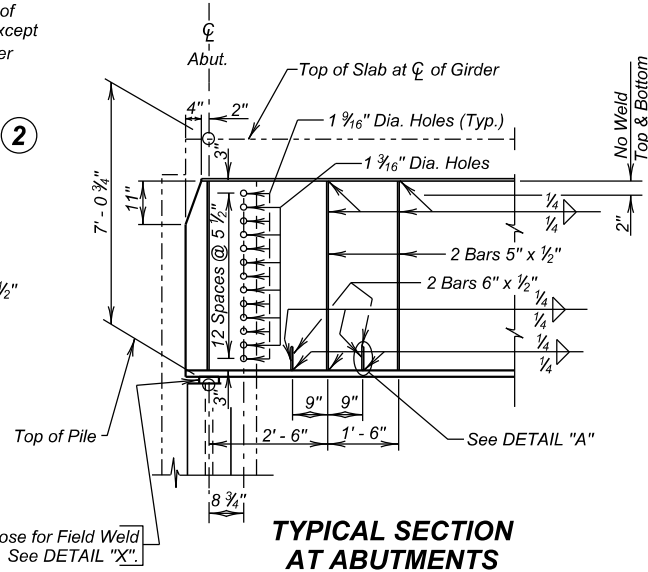
GIRDER LAYOUT

NOTE: All fillet welds shall terminate 1/2" from edge of stiffener, edge of flange, or clip as appropriate, except weld from clip to edge of stiffener at top flange.

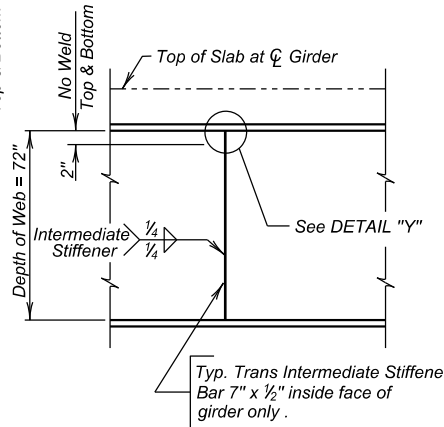


END VIEW

Bar 6" x 1" x 1'-2" Ship loose for Field Weld See DETAIL "X".

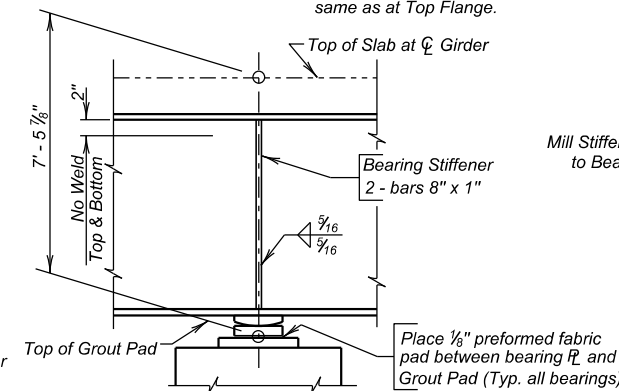


TYPICAL SECTION AT ABUTMENTS



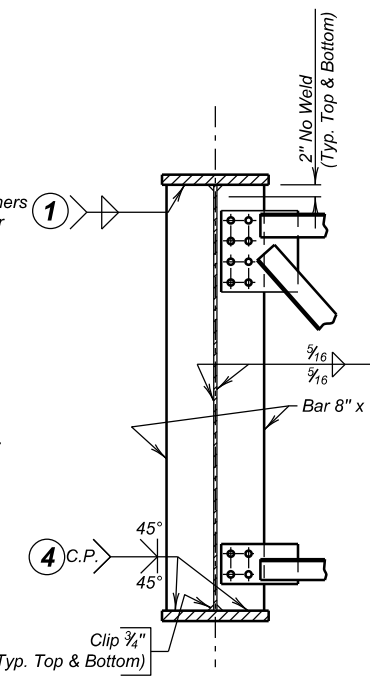
TYPICAL SECTION AT INTERMEDIATE STIFFENER

NOTE: All fillet welds attaching diaphragm or bearing stiffeners to girder flanges, shall terminate 1/2" from edge of stiffener, edge of flange, or clip as appropriate. Weld size to be as indicated in the table of Flange to Web Welds.



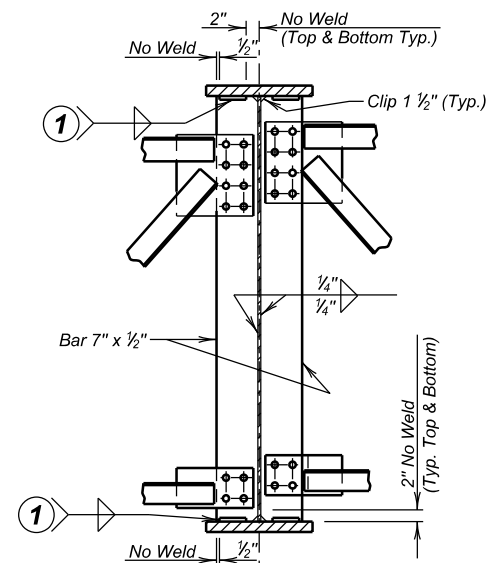
TYPICAL SECTION AT PIERS
(Diaphragm not shown)

Mill Stiffeners to Bear



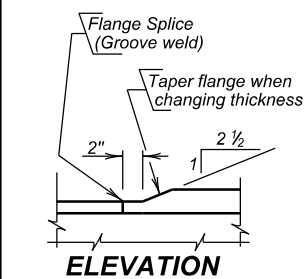
DETAILS OF STIFFENERS AT BEARINGS
(Exterior Girder shown)

NOTE: All fillet welds attaching diaphragm or bearing stiffeners to girder flanges, shall terminate 1/2" from edge of stiffener, edge of flange, or clip as appropriate. Weld size to be as indicated in the table of Flange to Web Welds.

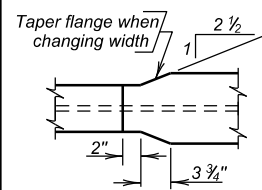


DETAILS OF STIFFENERS AT INTERMEDIATE DIAPHRAGMS
(See DETAIL "W" on DIAPHRAGM DETAILS sheet.)
(Interior Girder shown)

FLANGE TO WEB WELDS	
Flange Thickness	Fillet Welds
3/4"	1/4"
1 3/4"	5/16"
1 1/4"	3/8"
1 3/8"	5/16"
1"	5/16"

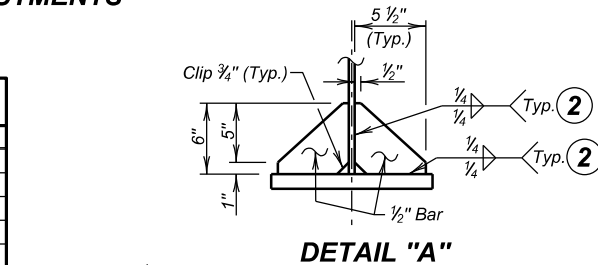


ELEVATION

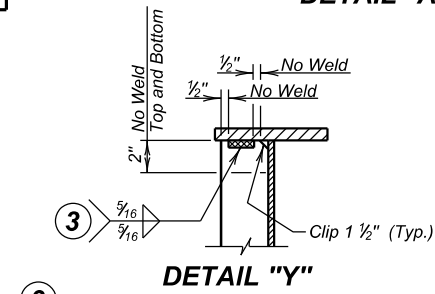


PLAN TYPICAL SECTION AT SHOP SPLICE

SHEAR CONNECTOR DETAILS
Welded Stud Shear Connectors are spaced as shown on Girder Layout. Shear Connectors will be field installed and are shown here for informational purposes only.

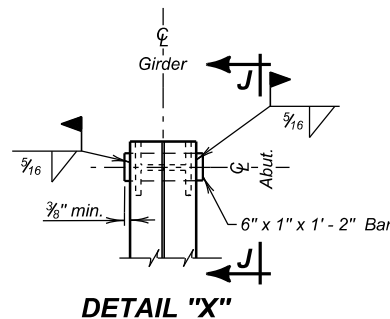


DETAIL "A"

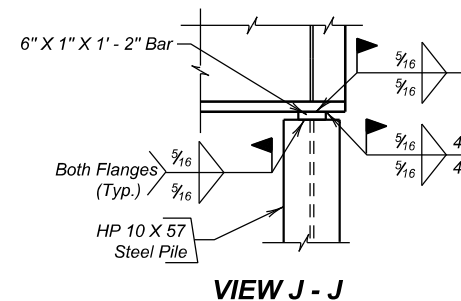


DETAIL "Y"

NOTE: Transverse Intermediate Stiffeners shall be welded to the compression flange as shown in DETAIL "Y". In zones of stress reversal the Transverse Intermediate Stiffener shall not be attached to either flange. Ends of Stiffeners not welded shall fit tight. See Girder Layout above for location of tension flange and zones of stress reversal.



DETAIL "X"



VIEW J - J

NOTES:

- See DIAPHRAGM DETAILS Sheet for Diaphragm Details.
- See FRAMING DIAGRAM, CAMBER, AND ERECTION DATA Sheet for spacing of Diaphragms, Stiffeners, and Girder Camber.
- All dimensions shown are horizontal or vertical.
- All Stiffeners and Girder Ends shall be made normal to flanges, except bearing stiffeners at pier & abutments shall be vertical.
- Stiffeners to have tight fit top and bottom.
- Dimensions shown are for steel temperature of 45° F.
- See Deck Drain Details & Signal Bracket Details Sheets.

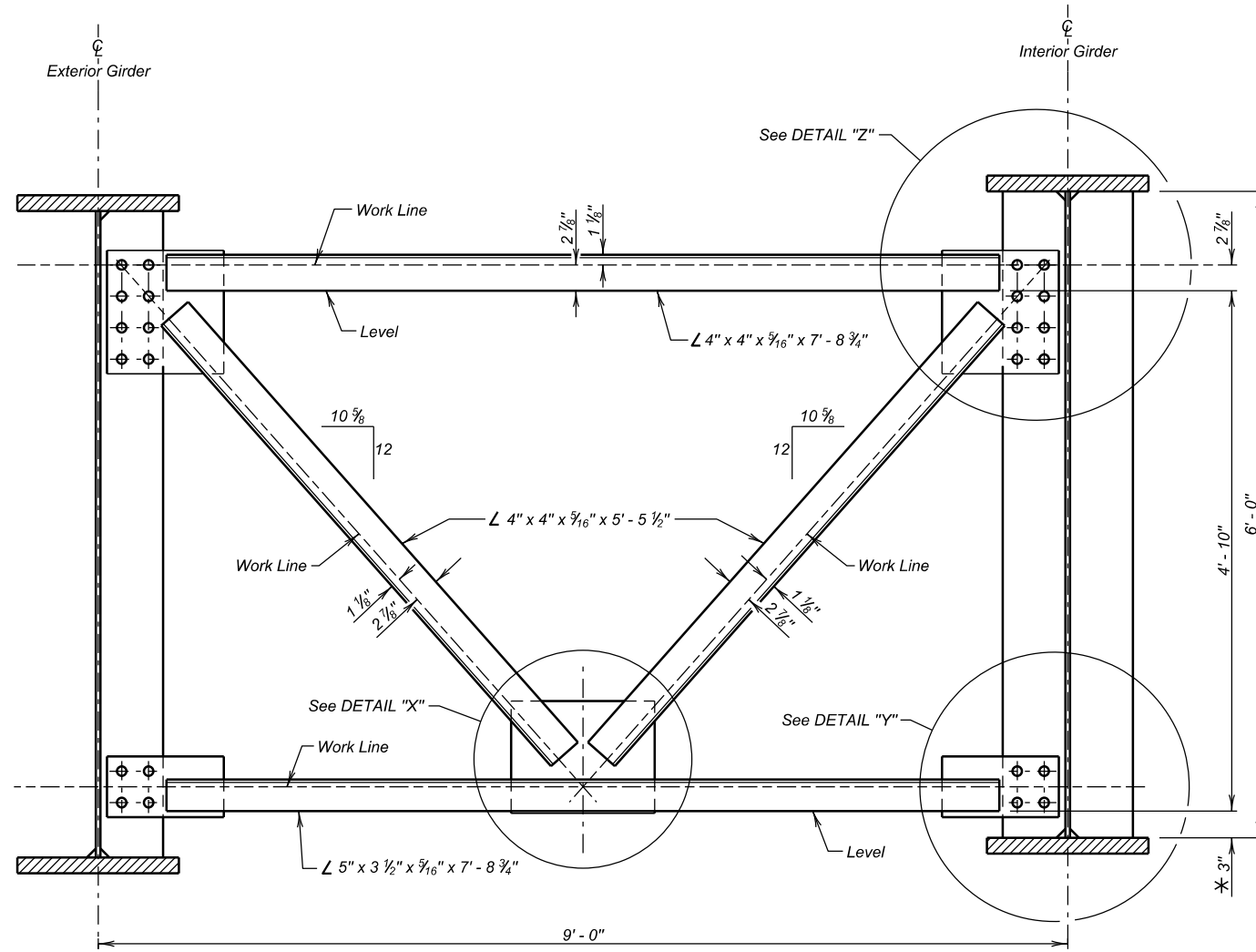
374' - 0" CONT. COMP. GIRDER BRIDGE
40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW
SEC. 27/28-T102N-R49W
STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
STR. NO. 50-210-167 HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION

JULY 2011

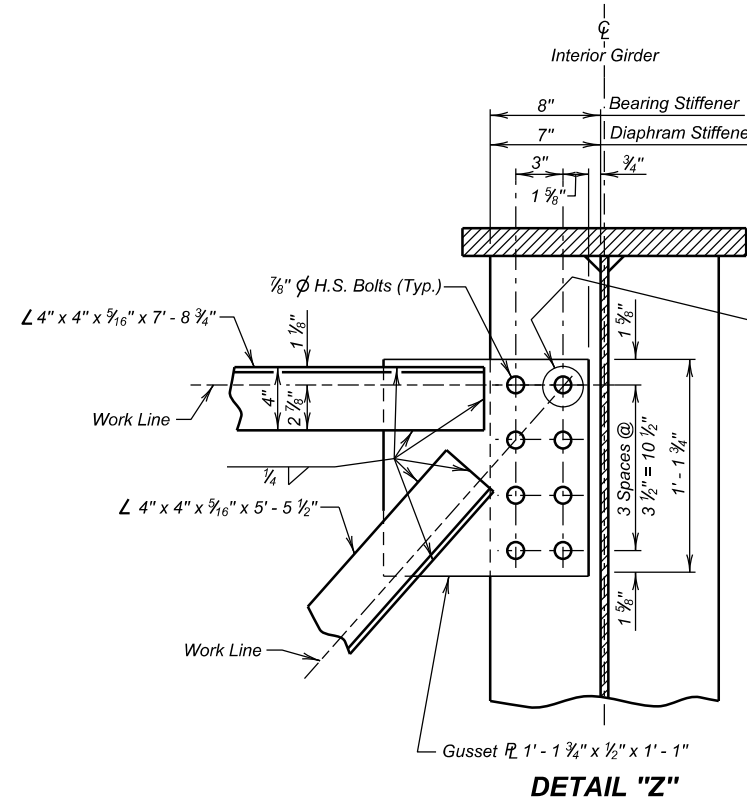
4 OF 9

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	16	20



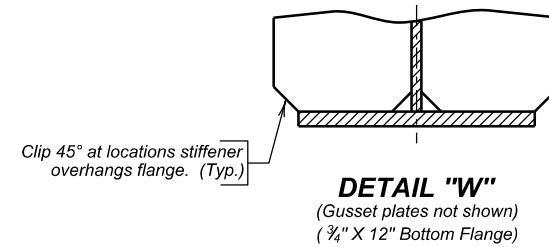
DIAPHRAGM DETAIL
(Weight of One Unit = 352 lbs.)

* 3" above high girder in each bay.

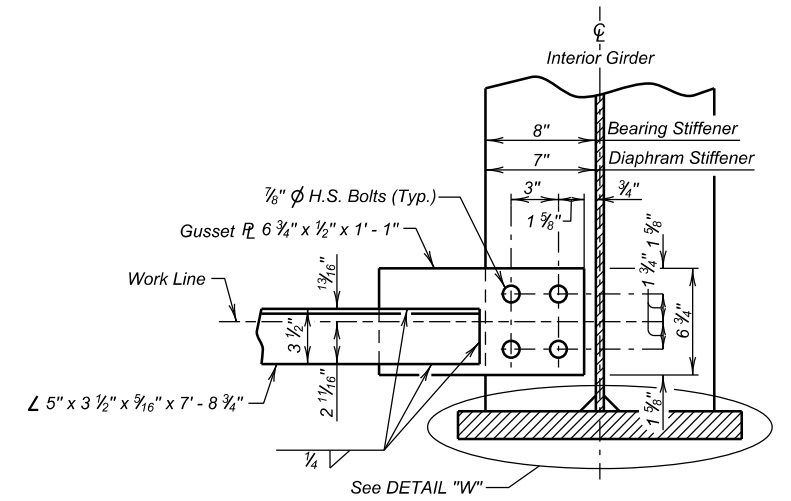


NOTE:
Work Lines intersect @ the center of this bolt hole.

DETAIL "Z"



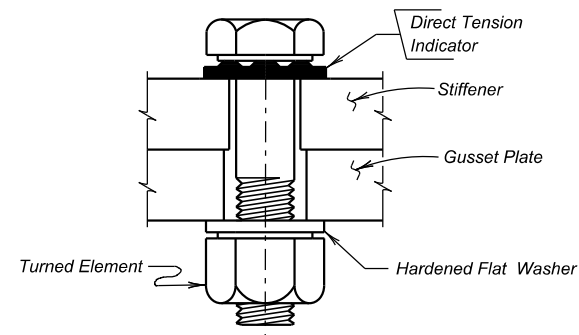
DETAIL "W"
(Gusset plates not shown)
(3/4" X 12" Bottom Flange)



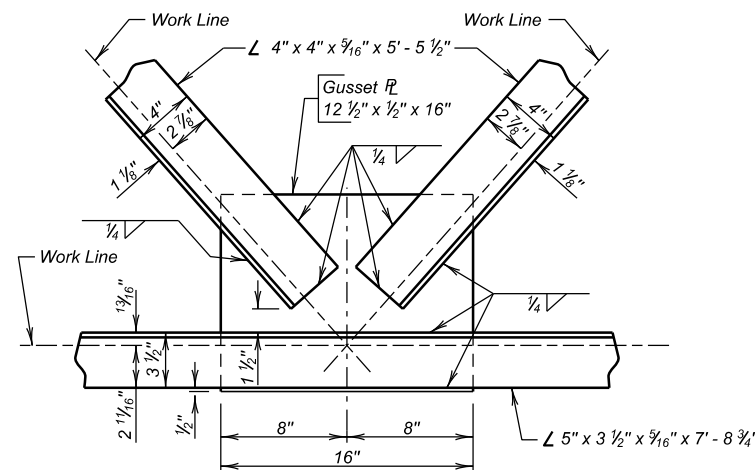
DETAIL "Y"

GENERAL NOTES

1. The estimated weight of the Steel Diaphragms is included in the quantity for Structural Steel, Furnish and the estimated area of painting is included in the quantity for Bridge Painting, both shown for informational purposes on ESTIMATE OF STRUCTURE QUANTITIES AND NOTES Sheet.
2. Use 1/16" diameter bolt holes in the 1/2" gusset plates. Use 5/16" diameter bolt holes in the stiffener plates.
3. Install bolt heads on the side of the connection with the 15/16" diameter bolt holes. Install direct tension indicators under the bolt heads.
4. The 7/8" High Strength bolts, nuts, and washers shall conform to ASTM Specification A-325. The bolts shall be the heavy hexagon head structural type with heavy semi-finished hexagon nut and hardened washer.
5. Terminate all welds 3/8" from the edges of the gusset plates.



DIRECT TENSION INDICATOR DETAIL



DETAIL "X"

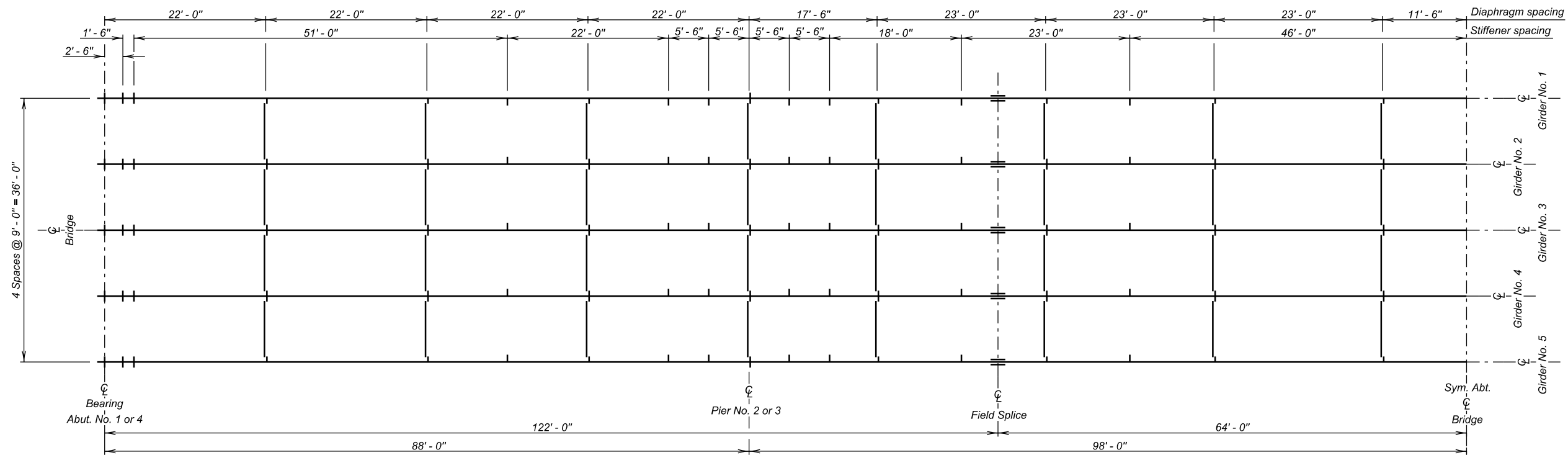
DIAPHRAGM DETAILS FOR EASTBOUND LANES

374' - 0" CONT. COMP. GIRDER BRIDGE
40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW
SEC. 27/28-T102N-R49W
STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
STR. NO. 50-210-168 HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION

JULY 2011

DESIGNED BY DC/PW MINN043V	DRAWN BY MG 043VGJ05	CHECKED BY DC/PW	Kevin N. Coeden BRIDGE ENGINEER
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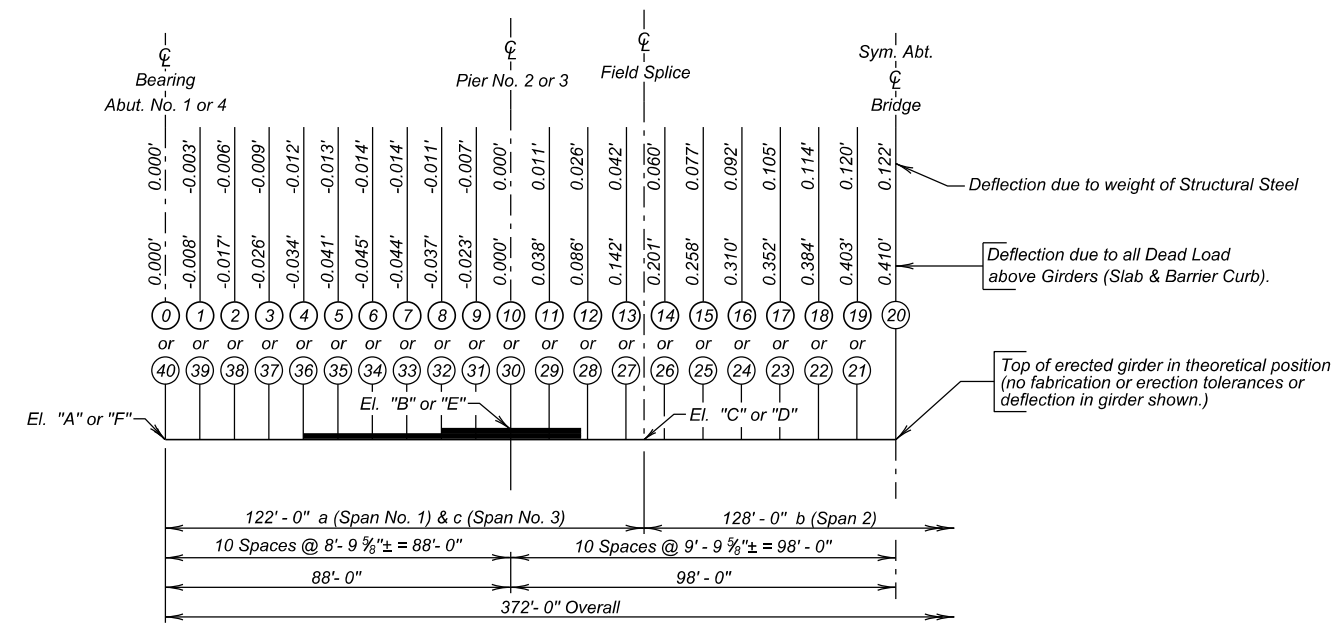


FRAMING DIAGRAM

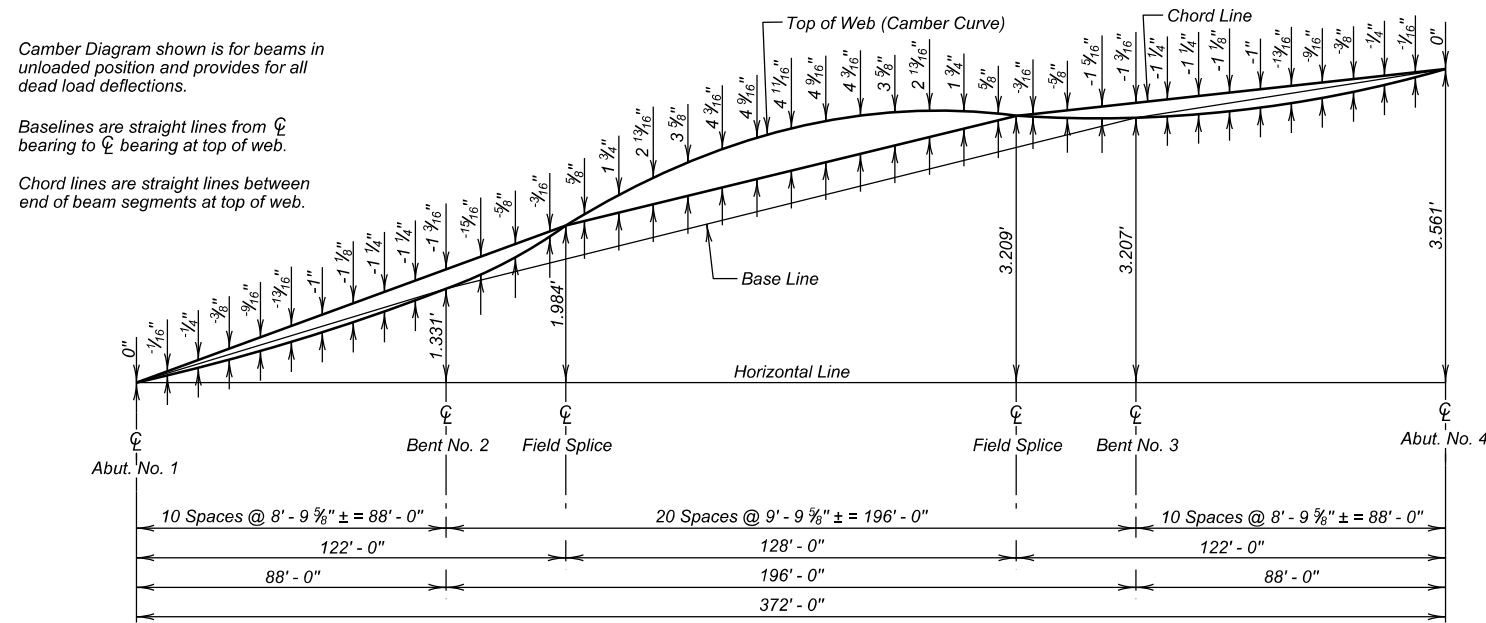
NOTE-

These elevations and slopes occur at a time after girder erection is completed but prior to any placement of concrete. Slopes shown are an imaginary straight line between points at beam ends and are (+) towards increasing stations.

Girder No.	ELEVATIONS (Top of Girder)					SLOPES (%)		
	"A"	"B"	"C"	"D"	"E"	a	b	c
1	1455.572	1456.987	1457.527	1458.752	1458.863	1.602	0.957	0.091
2	1455.752	1457.167	1457.707	1458.932	1459.043	1.602	0.957	0.091
3	1455.852	1457.267	1457.807	1459.032	1459.143	1.602	0.957	0.091
4	1455.672	1457.087	1457.627	1458.852	1458.963	1.602	0.957	0.091
5	1455.492	1456.907	1457.447	1458.672	1458.783	1.602	0.957	0.091



GIRDER ERECTION DIAGRAM



CAMBER CUTTING DIAGRAM
(Cut camber into webs of all girders as shown)

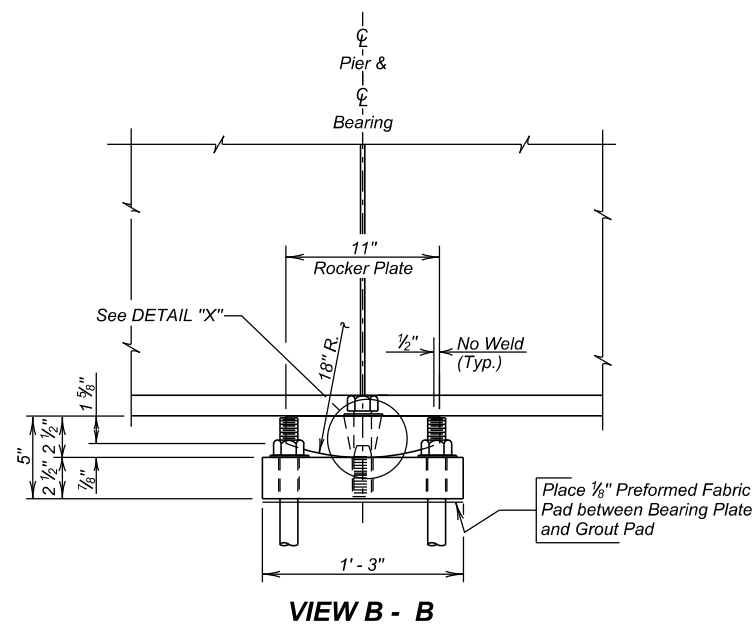
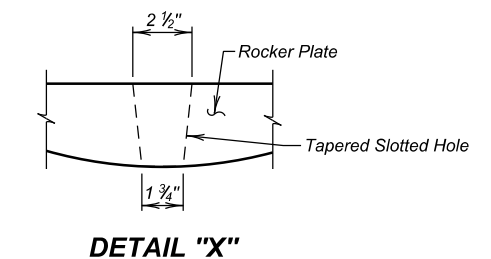
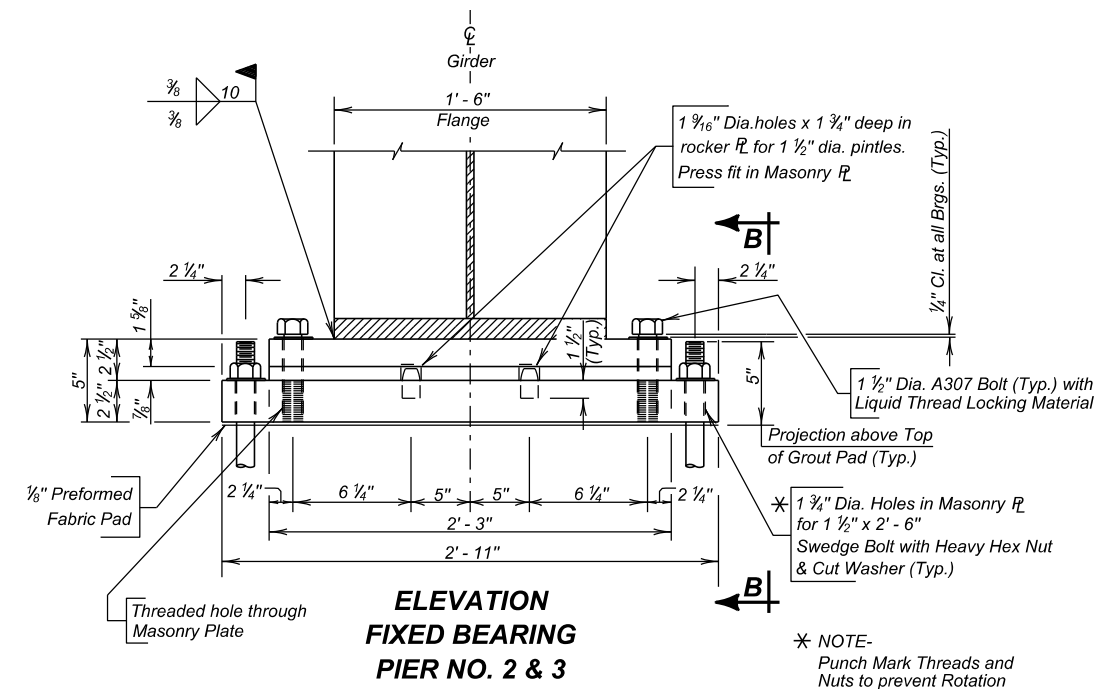
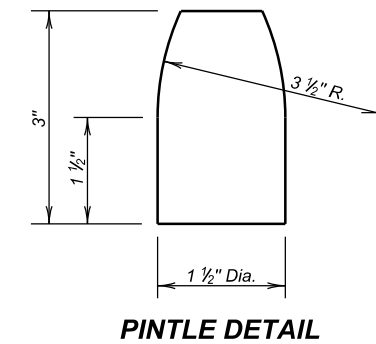
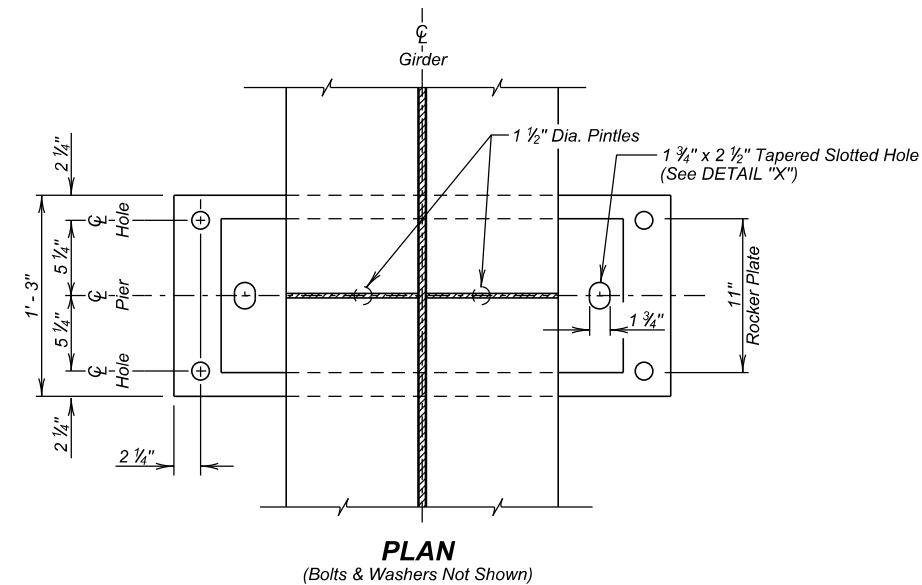
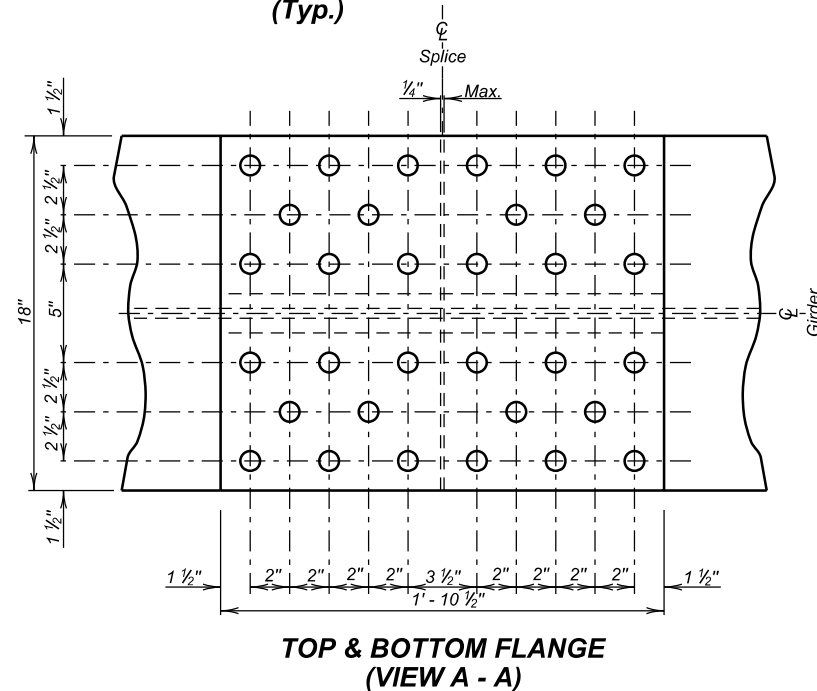
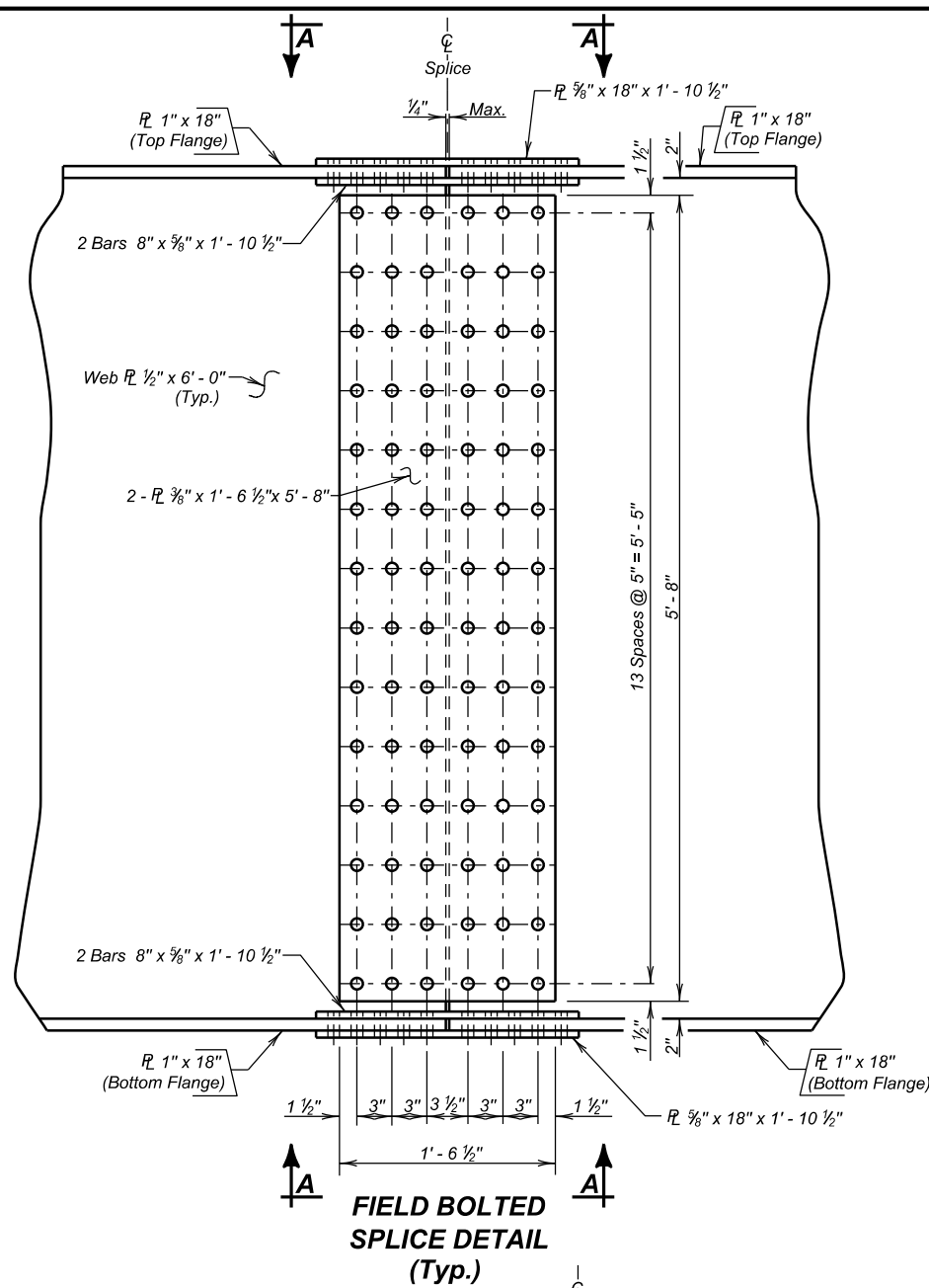
FRAMING DIAGRAM, CAMBER & ERECTION DATA
FOR
EASTBOUND LANES
374' - 0" CONT. COMP. GIRDER BRIDGE
40' - 0" ROADWAY
OVER CLIFF AVE.
STA. 56 + 45.68 TO STA. 60 + 19.68
STR. NO. 50-210-168

0° SKEW
SEC. 27/28-T102N-R49W
IM 0909(80)397
HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
JULY 2011

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	18	20

NOTE:
All bolts in splices shall be 7/8" A325 High Strength Bolts. (See DIAPHRAGM DETAILS sheet for Direct Tension Indicator Detail.)

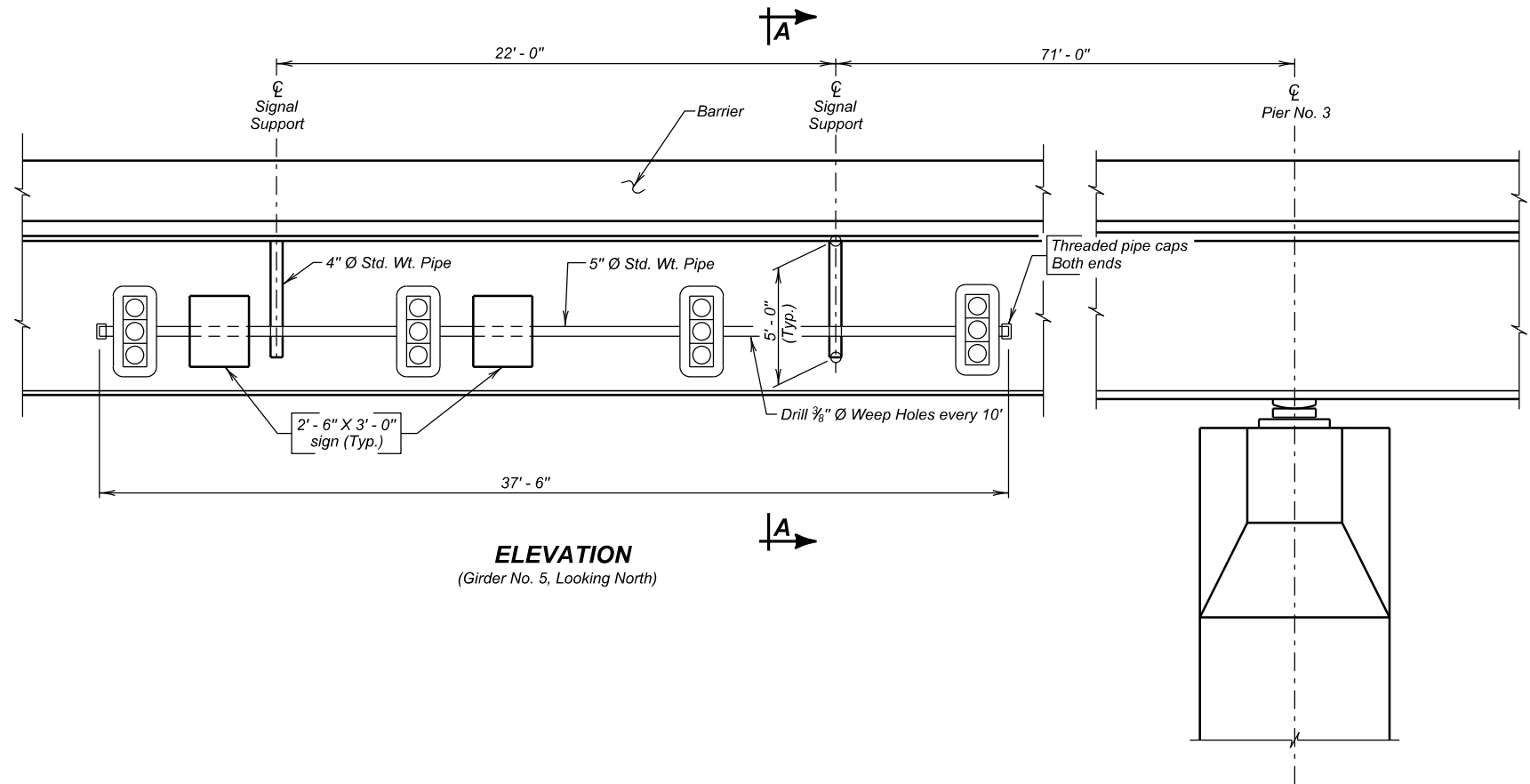
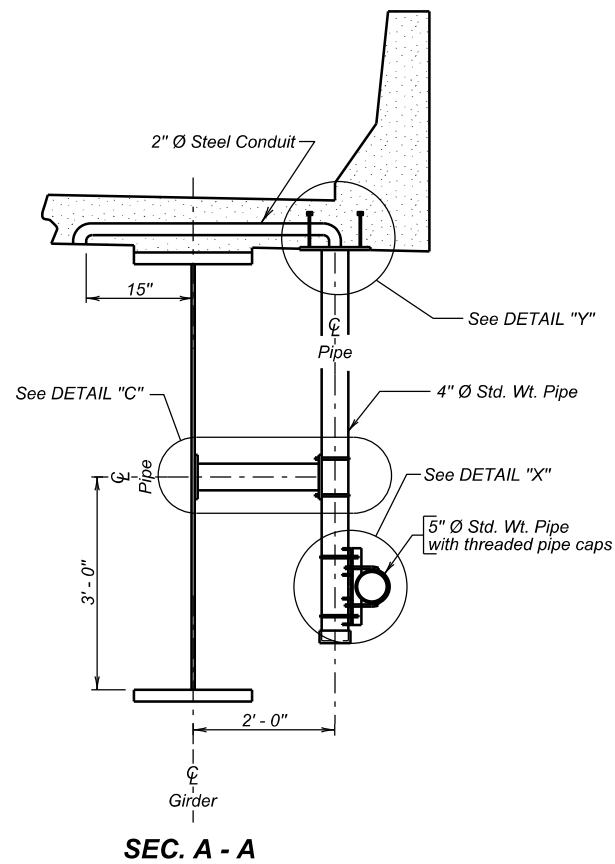


DETAILS OF BOLTED FIELD SPLICES & BEARINGS
FOR
EASTBOUND LANES
374' - 0" CONT. COMP. GIRDER BRIDGE
40' - 0" ROADWAY 0° SKEW
OVER CLIFF AVE. SEC. 27/28-T102N-R49W
STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
STR. NO. 50-210-168 HL-93

MINNEHAHA COUNTY
S. D. DEPT. OF TRANSPORTATION
JULY 2011

DESIGNED BY DC/PW MINN043V	DRAWN BY GW/MG 043VGJ07	CHECKED BY DC/PW	Kevin N. Boeden BRIDGE ENGINEER
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STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	19	20



ELEVATION
(Girder No. 5, Looking North)

NOTE:
Use this sheet in conjunction with SIGNAL BRACKET DETAILS (B).

NOTES:

1. Signals and Signs shown for information only.
2. For Informational purposes only, the estimated weight of Structural Steel, Furnish is 833 lbs.

SIGNAL BRACKET DETAILS (A)

FOR

EASTBOUND LANES

374' - 0" CONT. COMP. GIRDER BRIDGE

40' - 0" ROADWAY OVER CLIFF AVE. 0° SKEW
SEC. 27/28-T102N-R49W
STA. 56 + 45.68 TO STA. 60 + 19.68 IM 0909(80)397
STR. NO. 50-210-168 HL-93

MINNEHAHA COUNTY

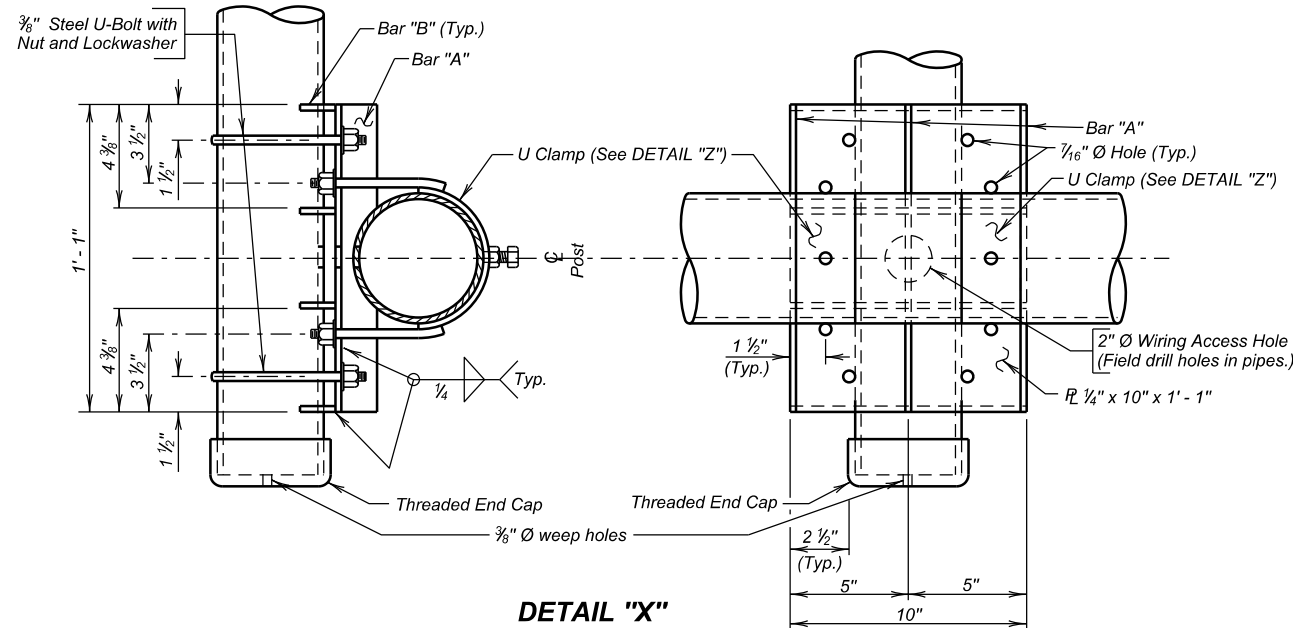
S. D. DEPT. OF TRANSPORTATION

JULY 2011

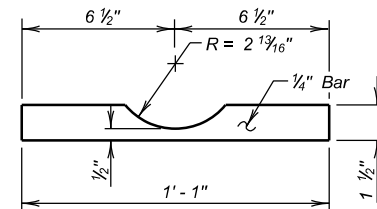
8 OF 9

DESIGNED BY DC/PW MINN043V	DRAWN BY GW 043VGJ08	CHECKED BY DC/PW	<i>Kevin N. Coeden</i> BRIDGE ENGINEER
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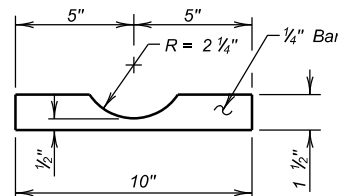
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	IM 0909(80)397	20	20



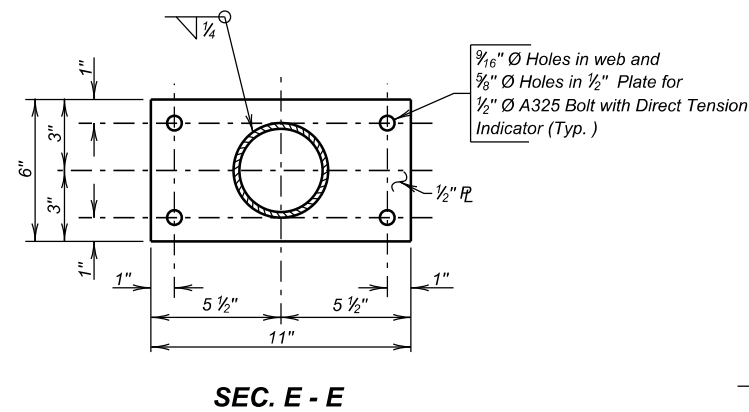
DETAIL "X"



BAR "A"

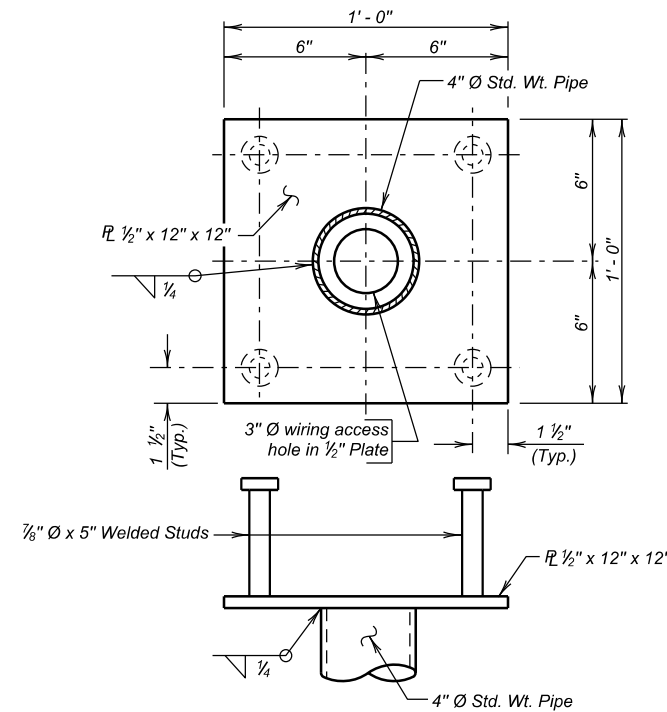


BAR "B"



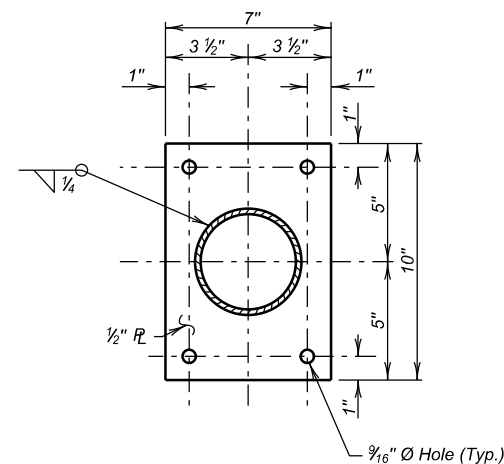
SEC. E - E

1/16" Ø Holes in web and
3/8" Ø Holes in 1/2" Plate for
1/2" Ø A325 Bolt with Direct Tension
Indicator (Typ.)

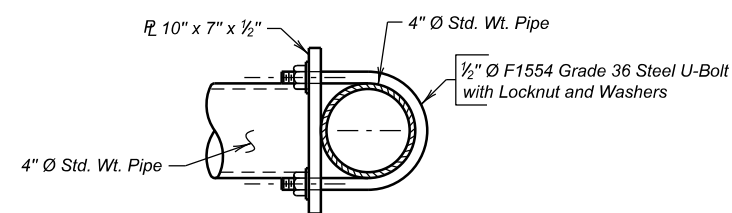


DETAIL "Y"

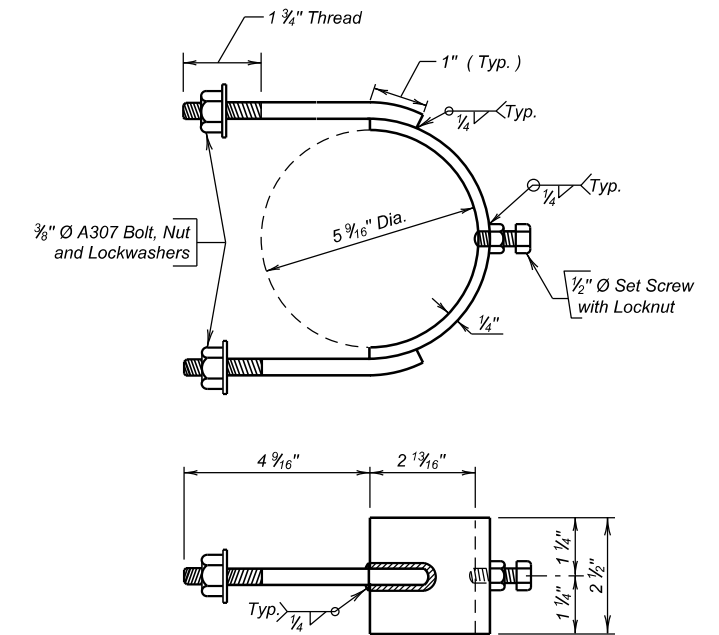
NOTE:
Use this sheet in conjunction with SIGNAL BRACKET DETAILS (A).



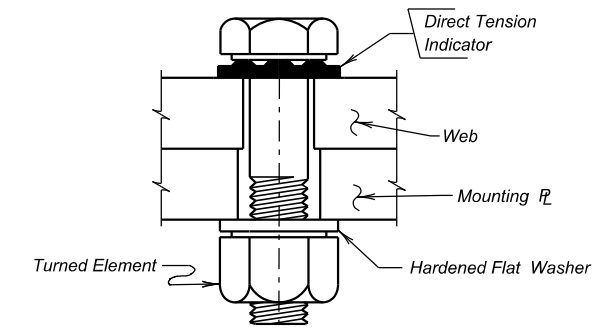
SEC. D - D



SEC. C - C



DETAIL "Z"



DIRECT TENSION INDICATOR
DETAIL

SIGNAL BRACKET DETAILS (B)

FOR

EASTBOUND LANES

374' - 0" CONT. COMP. GIRDER BRIDGE

40' - 0" ROADWAY

0° SKEW

OVER CLIFF AVE.

SEC. 27/28-T102N-R49W

STA. 56 + 45.68 TO STA. 60 + 19.68

IM 0909(80)397

STR. NO. 50-210-168

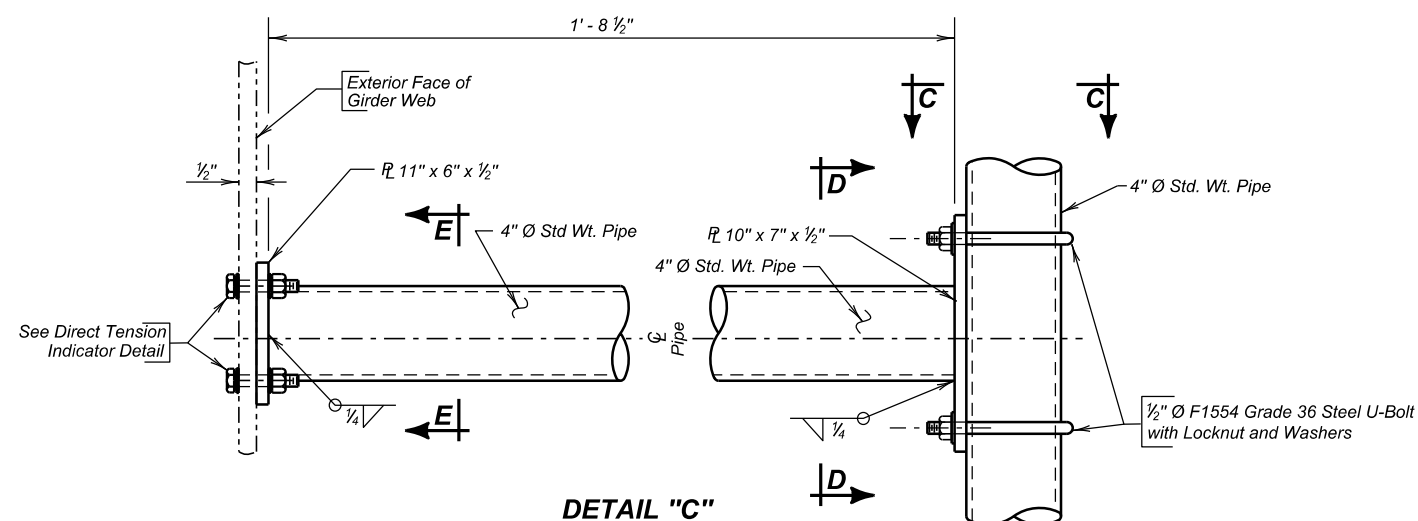
HL-93

MINNEHAHA COUNTY

S. D. DEPT. OF TRANSPORTATION

JULY 2011

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DETAIL "C"

DESIGNED BY DC/PW MINN043V	DRAWN BY GW 043VGJ09	CHECKED BY DC/PW	Kevin N. Coeden BRIDGE ENGINEER
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