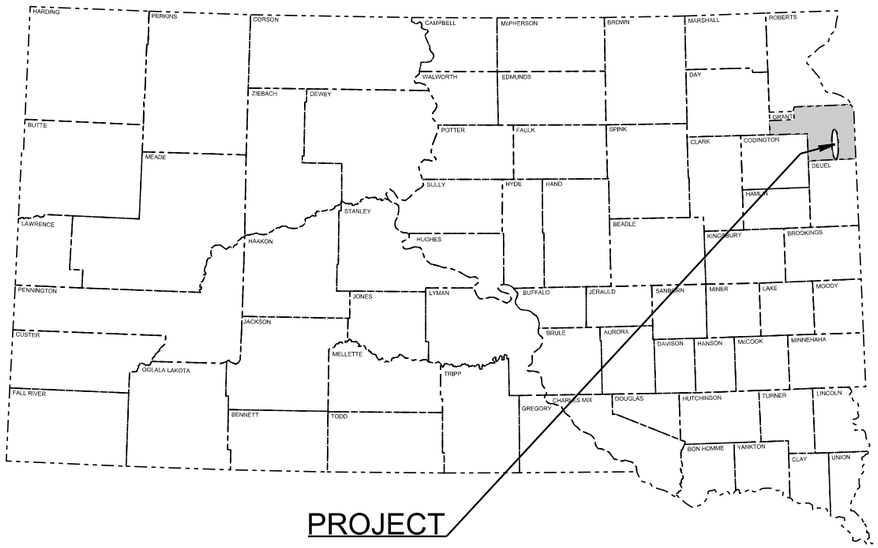


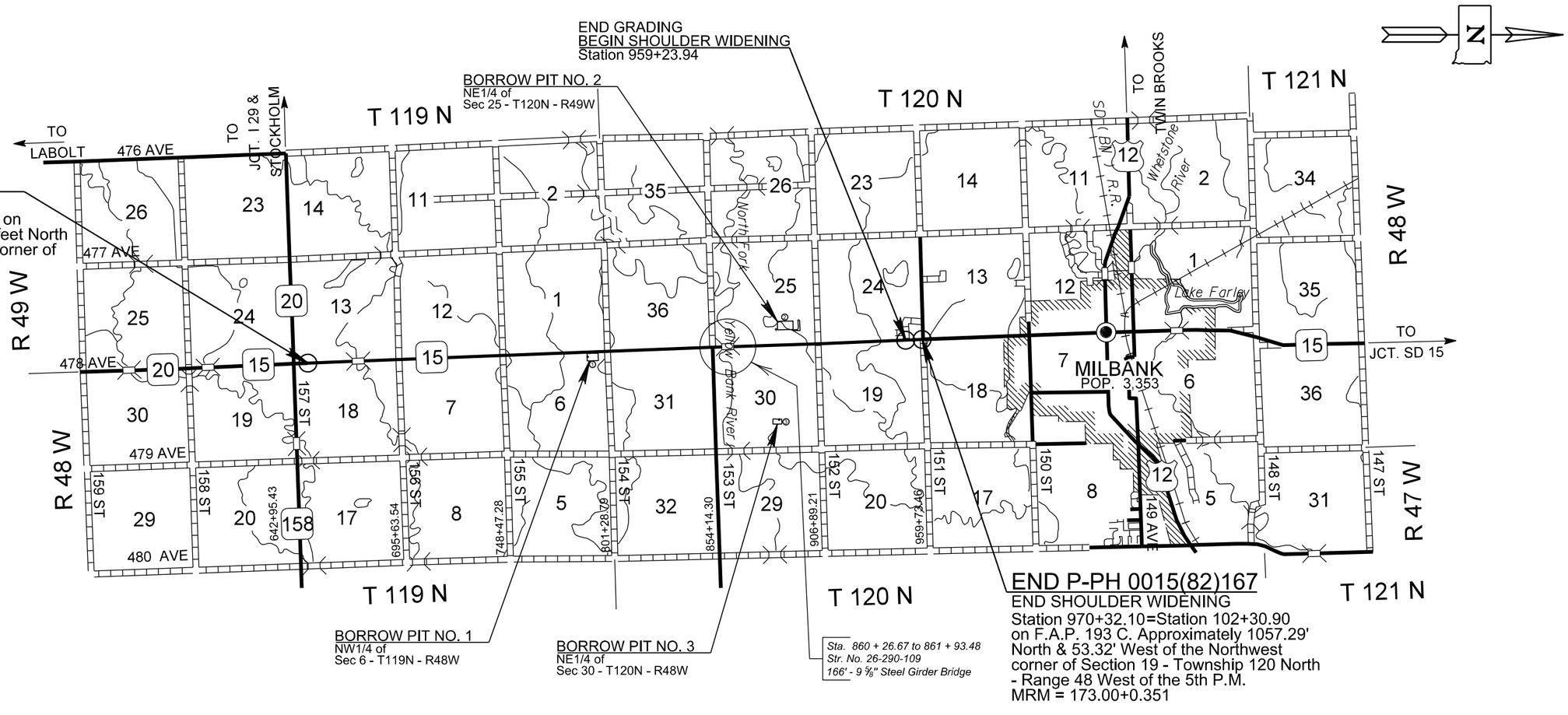
STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED

PROJECT P-PH 0015(82)167
SD HIGHWAY 15
GRANT COUNTY

STRUCTURAL STEEL

PCN 08U8

INDEX OF SHEETS -



STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-PH 0015(82)167	2	8

SECTION E – ESTIMATE OF STRUCTURE QUANTITIES

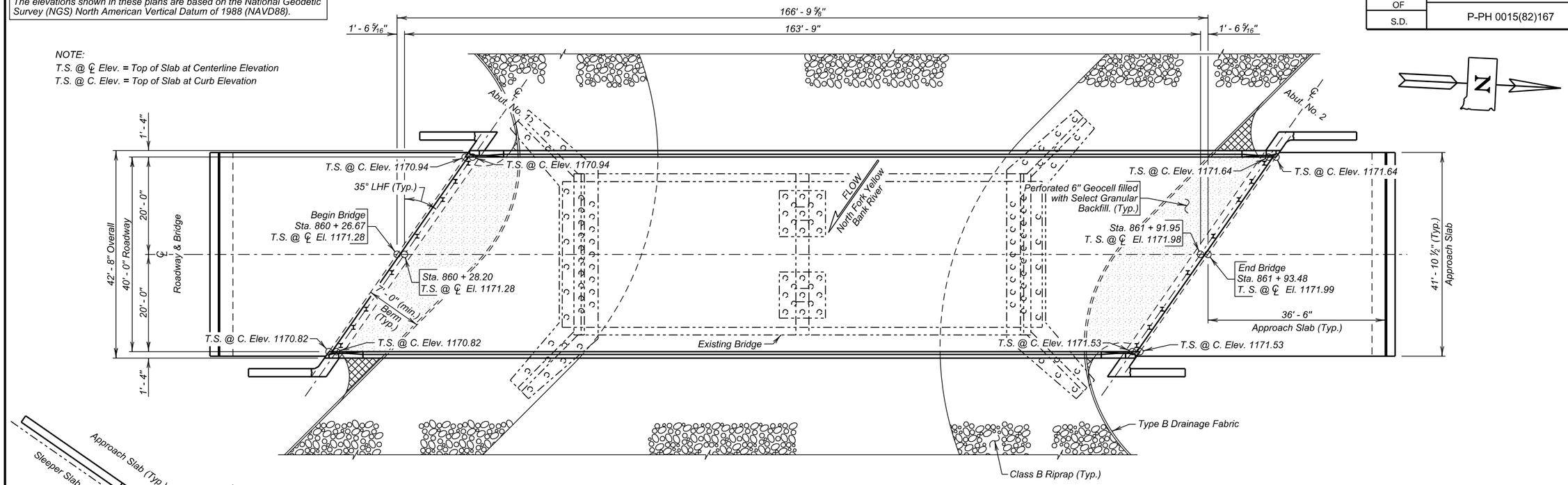
Str. No. 26-290-109

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
410E0025	Structural Steel, Furnish	Lump Sum	LS

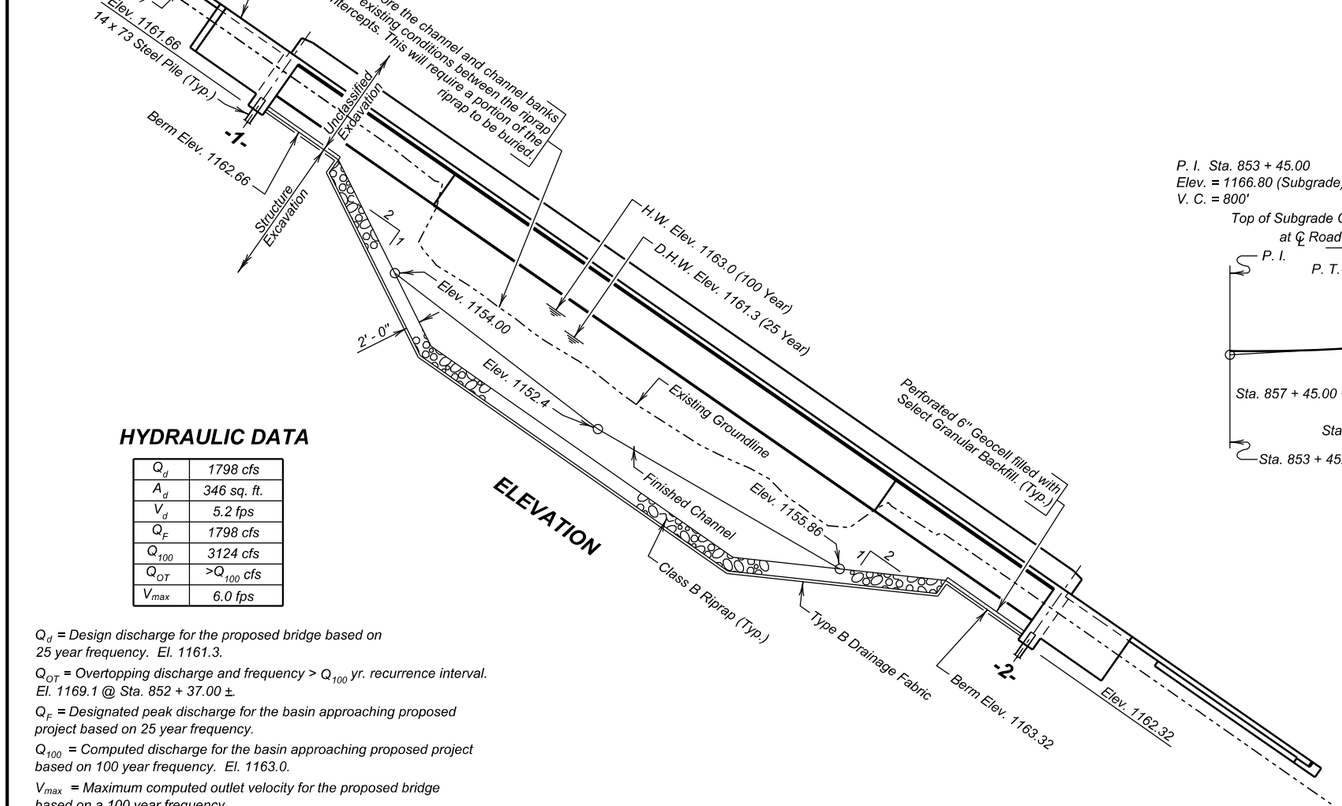
The elevations shown in these plans are based on the National Geodetic Survey (NGS) North American Vertical Datum of 1988 (NAVD88).

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-PH 0015(82)167	3	8

NOTE:
T.S. @ ℄ Elev. = Top of Slab at Centerline Elevation
T.S. @ C. Elev. = Top of Slab at Curb Elevation



PLAN



ELEVATION

HYDRAULIC DATA

Q_d	1798 cfs
A_d	346 sq. ft.
V_d	5.2 fps
Q_F	1798 cfs
Q_{100}	3124 cfs
Q_{OT}	>Q_{100} cfs
V_{max}	6.0 fps

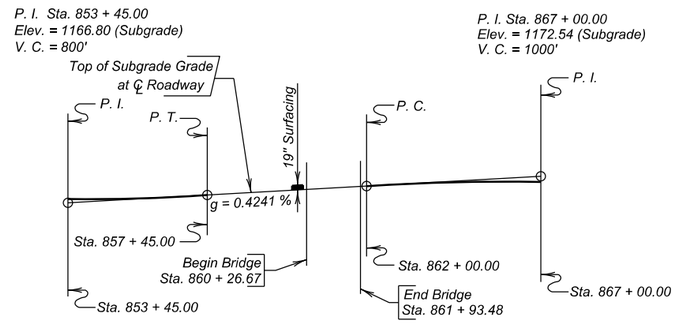
Q_d = Design discharge for the proposed bridge based on 25 year frequency. El. 1161.3.

Q_{OT} = Overtopping discharge and frequency > Q_{100} yr. recurrence interval. El. 1169.1 @ Sta. 852 + 37.00 ±.

Q_F = Designated peak discharge for the basin approaching proposed project based on 25 year frequency.

Q_{100} = Computed discharge for the basin approaching proposed project based on 100 year frequency. El. 1163.0.

V_{max} = Maximum computed outlet velocity for the proposed bridge based on a 100 year frequency.



GRADELINE DATA

-X071-
INDEX OF BRIDGE SHEETS -

GENERAL DRAWING

FOR

166' - 9 5/8" STEEL GIRDER BRIDGE

40' - 0" ROADWAY — 35° LHF SKEW
OVER NORTH FORK — SEC. 25/30-T120N-R48W
YELLOW BANK RIVER — P-PH 0015(82)167
STA. 860 + 26.67 TO STA. 861 + 93.48 — HL-93
STR. NO. 26-290-109
PCN 08U8

GRANT COUNTY

S. D. DEPT. OF TRANSPORTATION

OCTOBER 2021

-X071-

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

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	SK	MG	Steve A Johnson BRIDGE ENGINEER
GRNT08U8	08U8GA01		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-PH 0015(82)167	4	8

ESTIMATE OF STRUCTURE QUANTITIES

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

Δ For informational purposes only, the estimated weight of the structural steel is 344,124 pounds.

BRIDGE SPECIFICATIONS

1. Design Specifications: AASHTO LRFD Bridge Design Specifications, 9th Edition.
2. Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, 2015 Edition and required Provisions, Supplemental Specifications and Special Provisions as included in the Proposal.
3. All welding and welding inspections will be in conformance with the latest edition of AASHTO/AWS D1.5/D1.5M Bridge Welding Code unless noted otherwise in the plans.

BRIDGE DESIGN LOADING

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

DESIGN MATERIAL STRENGTHS

Structural Steel (ASTM A709 Gr. 50WT3) f_y = 50,000 psi

FIELD BOLTED GIRDER SPLICES

1. Steel for splice and filler plates will conform to ASTM A709 Gr. 50WT3
2. Payment for furnishing splice plates and bolts for girder splices will be incidental to the contract lump sum price for Structural Steel, Furnish.

CONNECTION OF GIRDER TO PILE

1. Steel for the bearing plates will conform to ASTM 709 Gr. 50.
2. Payment for furnishing the bearing plates will be incidental to the contract lump sum price for Structural Steel, Furnish.

TAX LIABILITY

The SD Department of Transportation is a South Dakota sales tax-exempt government entity. Therefore, a Certificate of Exemption will be provided to the successful bidding party which excuses the party from paying sales tax on the materials being furnished to the SDDOT. It is the responsibility of bidding parties to contact the SD Department of Revenue @ 1-800-829-9188 to determine tax licensure requirements. A South Dakota Contractors Excise Tax License is not required for this pre-purchase contract as it is not considered a reality improvement.

GIRDERS

1. Structural steel will conform to ASTM A709 Gr. 50WT3. Shear connectors will conform to Section 7.3 Type B of the Bridge Welding Code.
2. Bolts, nuts, and washers will conform to ASTM F3125, Grade A325, Type 3.
3. Shear Connectors will be provided but, not installed. Shear Connectors shown are for information only and will be field welded to the girders under future contract.
4. All butt-welded girder splices will be ultrasonically inspected.
5. The cost of welding and weld inspection will be incidental to the contract lump sum price for Structural Steel, Furnish.
6. See Diaphragm Details for notes concerning diaphragms.
7. Structural steel used in all girder web plates, girder flanges, and girder splice plates will comply with the Charpy-V-Notch toughness requirements set forth in Section 970 of the Construction Specifications. Material greater than 1 1/2 inches in thickness will require frequency (P) testing in lieu of heat lot (H) testing.
8. Dead Load camber will be cut into the girder webs. Do not induce or correct camber in the plate girders by local heating without prior approval from the Engineer.
9. The shear connector that will be attached to the girder will be 7/8-inch diameter x 5 inches long and will conform to ASTM 108, Gr. 1015, 1018, or 1020. The connector will meet the following minimum mechanical property requirements for Type B studs,

Tensile	60 ksi
Yield Strength	60 ksi
Elongation	20%
Reduction of Area	50%

BOLT TESTING

The certified mill test reports for all bolts used on the project will include the test results for all the testing specified in section 972.2 D of the Construction 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 to notify the bolt supplier of these requirements.

WELDING AND WELD INSPECTION

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

DELIVERY OF STRUCTURAL STEEL

1. All structural steel will be delivered to the job site. Refer to the Special Provision for Contract Time for the storage and delivery timeframe requirements. The contact person regarding delivery arrangements is Watertown Area Engineer, Matthew Brey at (605) 882-5166.
2. All cost involved with the transportation of the structural steel to job site will be included in the lump sum price for Structural Steel, Furnish.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES

FOR

166' - 9 5/8" STEEL GIRDER BRIDGE

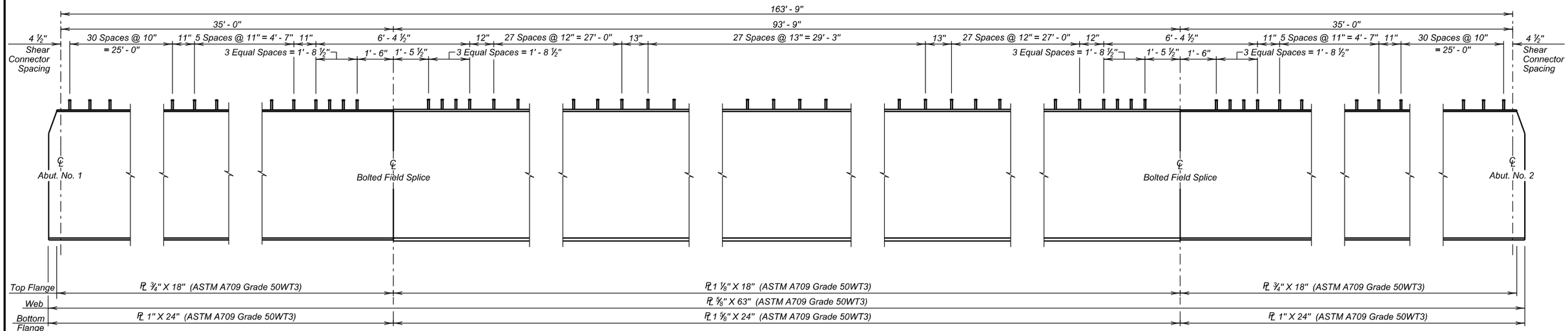
STR. NO. 26-290-109

OCTOBER 2021

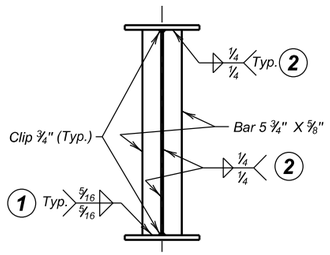
2 OF 6

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	SK	RP	Steve A Johnson BRIDGE ENGINEER
GRNT08U8	08U8GA02		

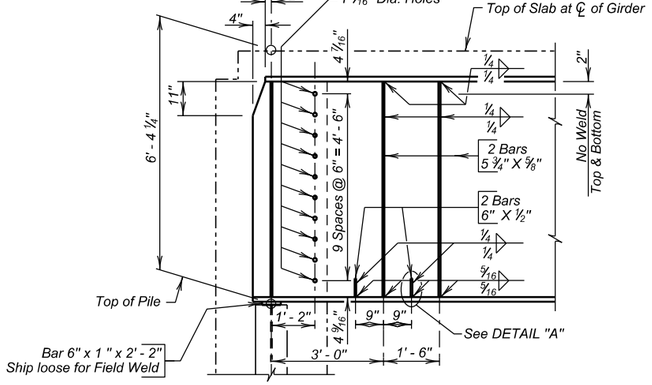
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-PH 0015(82)167	5	8



GIRDER LAYOUT

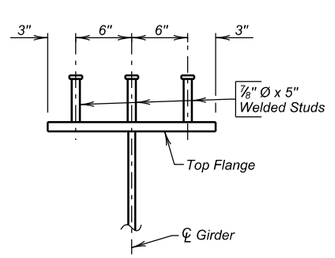


END VIEW



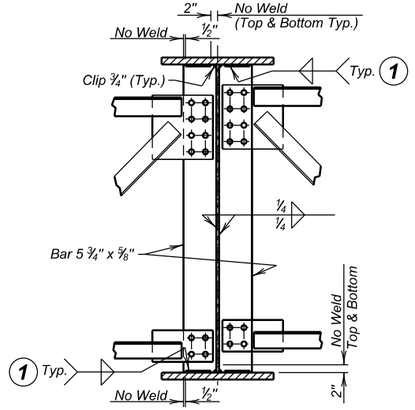
TYPICAL SECTION AT ABUTMENTS

(Parallel to ℄ Girders)



SHEAR CONNECTOR DETAILS

Welded Stud Shear Connectors are spaced as shown on Girder Layout. Shear Connectors will be field install and are shown here for informational purposes only.
522 Shear Connectors per Girder.



DETAILS OF STIFFENERS AT INTERMEDIATE DIAPHRAGMS

(Interior Girder shown)

NOTES:

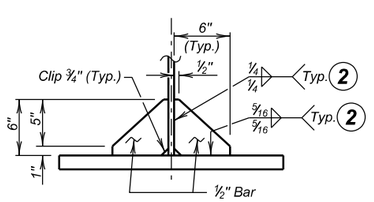
1. *See DIAPHRAGM DETAILS Sheet for Diaphragm Details.*
2. *See FRAMING DIAGRAM, CAMBER, AND ERECTION DATA Sheet for spacing of Diaphragms, Stiffeners, and Girder Camber.*
3. *All dimensions shown are horizontal or vertical.*
4. *All Stiffeners and Girder Ends shall be made normal to flanges, except bearing stiffeners at abutments shall be vertical.*
5. *Stiffeners to have tight fit top and bottom.*
6. *Dimensions shown are for steel temperature of 45° F.*
7. *See Special Provision for shear stud field installation.*

(1) *NOTE: All fillet welds attaching diaphragm or bearing stiffeners to girder flanges, shall terminate ½" 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.*

(2) *NOTE: All fillet welds shall terminate ½" from edge of stiffner, edge of flange, or clip as appropriate, except weld from clip to edge of stiffener at top flange.*

FLANGE TO WEB WELDS

Flange Thickness	Fillet Welds
¾"	¾"
1"	5/16"
1 ⅛"	5/16"
1 ⅜"	5/16"



DETAIL "A"

GIRDER LAYOUT AND DETAILS

FOR

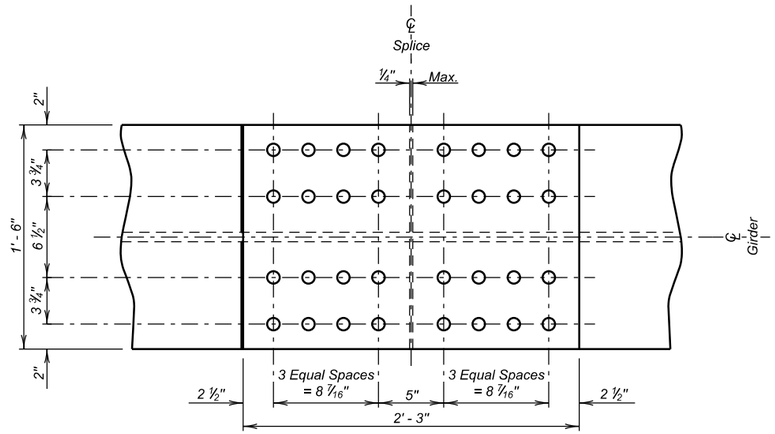
166' - 9 ⅝" STEEL GIRDER BRIDGE

40' - 0" ROADWAY OVER NORTH FORK YELLOW BANK RIVER
35° LHF SKEW
SEC. 25/30-T120N-R48W
P-PH 0015(82)167
STA. 860 + 26.67 TO STA. 861 + 93.48
HL-93
STR. NO. 26-290-109

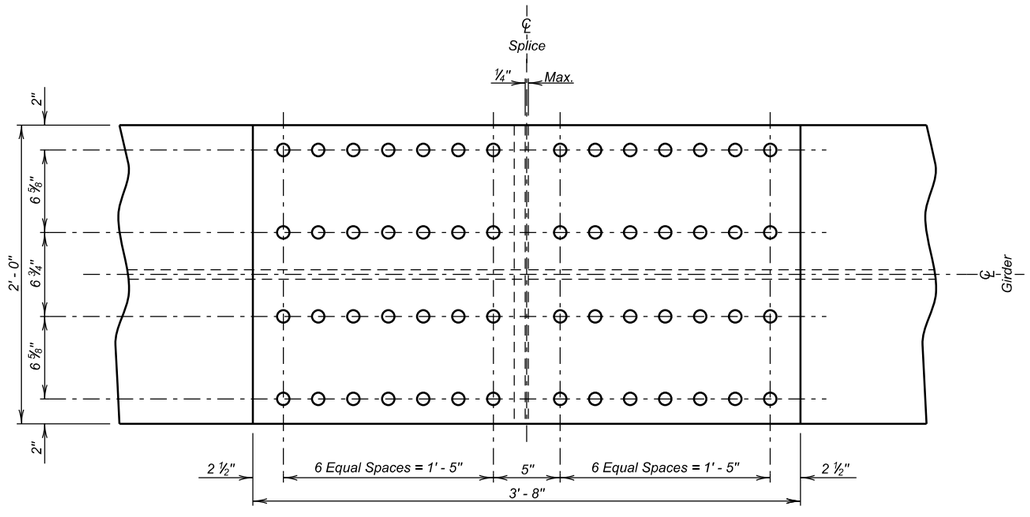
GRANT COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2021

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	SK	MG	BRIDGE ENGINEER
GRNT08U8	08U8GA03		

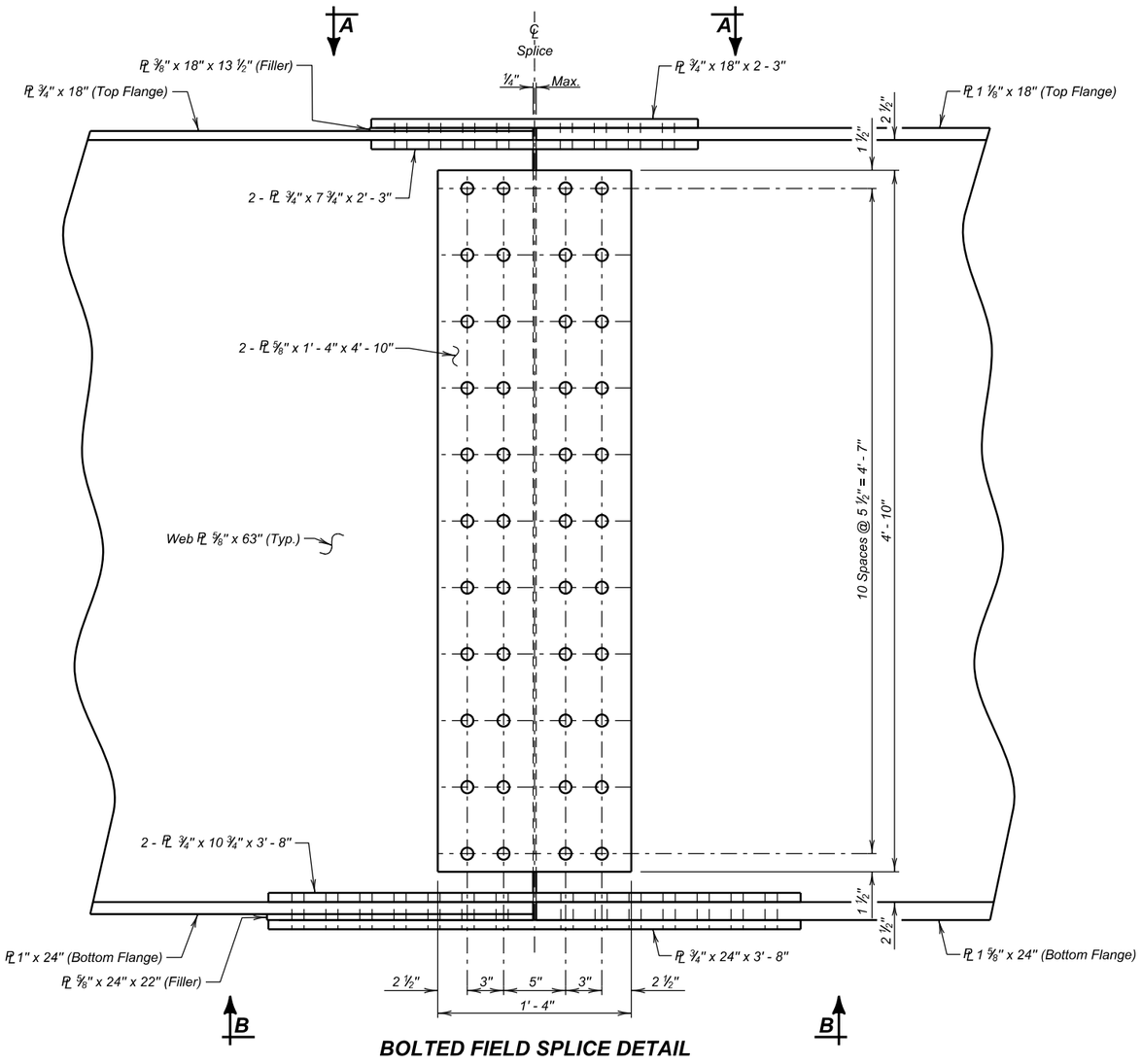
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-PH 0015(82)167	6	8



VIEW A - A
(Top Flange)



VIEW B - B
(Bottom Flange)



BOLTED FIELD SPLICE DETAIL

NOTE:
All bolts in splices shall be ⅞" Ø High Strength Bolts conforming to ASTM Specifications F3125 Grade A325, Type 3. The bolts will be the heavy semi-finished hexagon nut and hardened washer. (See DIAPHRAGM DETAILS sheet for Direct Tension Indicator Detail.)

BOLTED SPLICE DETAILS

FOR

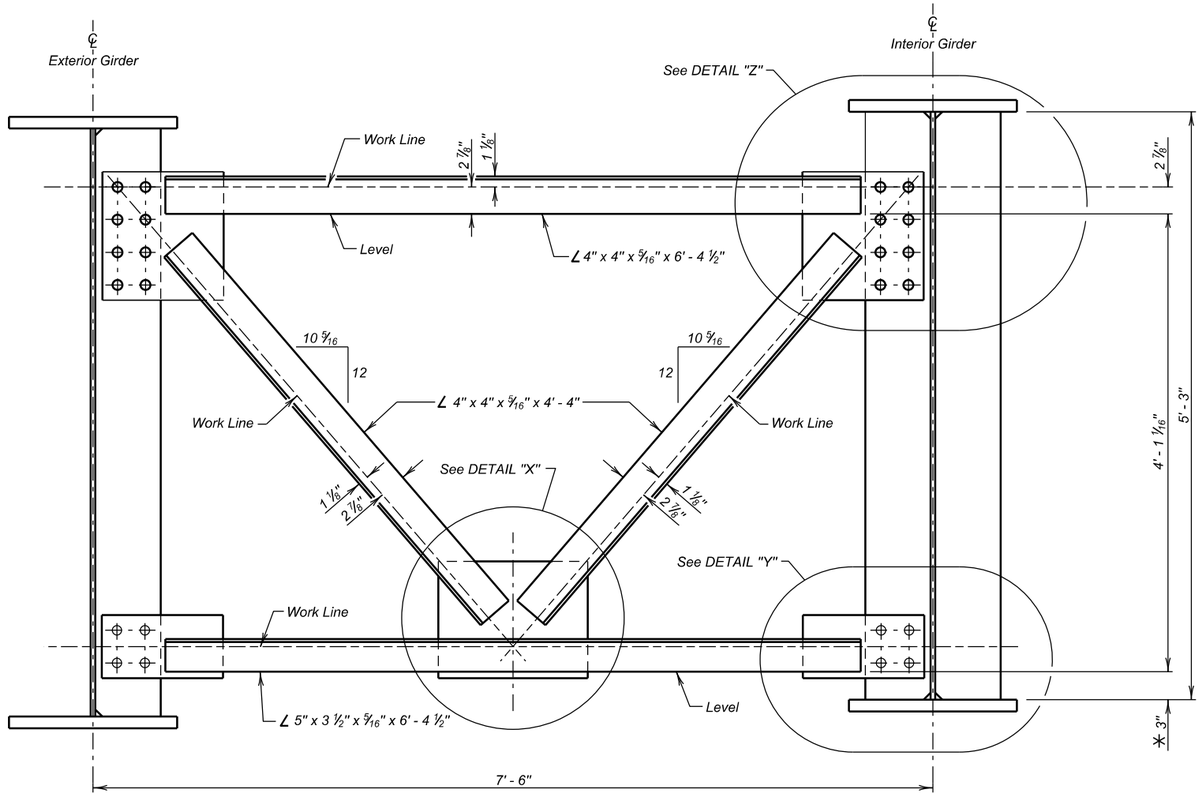
166' - 9 ⅝" STEEL GIRDER BRIDGE

40' - 0" ROADWAY — 35° LHF SKEW
OVER NORTH FORK — SEC. 25/30-T120N-R48W
YELLOW BANK RIVER — P-PH 0015(82)167
STA. 860 + 26.67 TO STA. 861 + 93.48 — HL-93
STR. NO. 26-290-109

GRANT COUNTY
S. D. DEPT. OF TRANSPORTATION
OCTOBER 2021

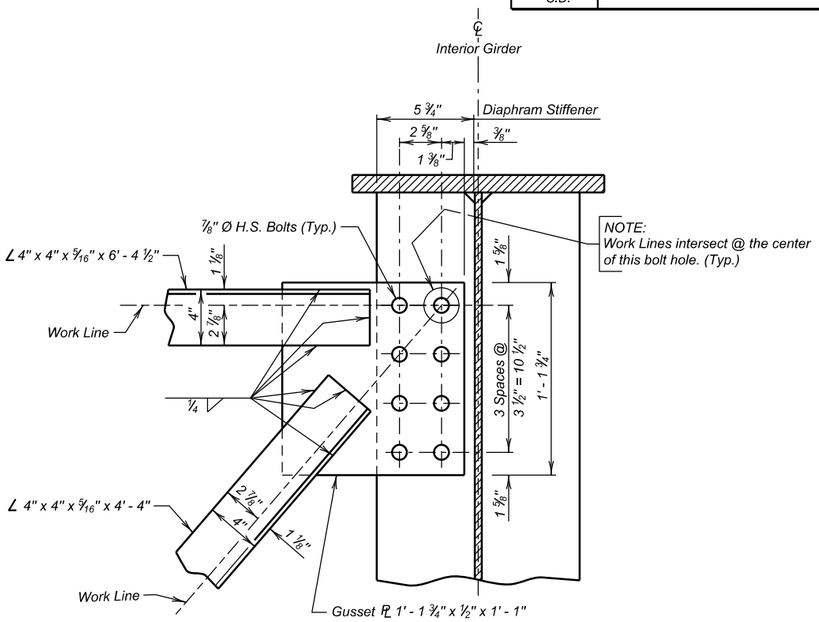
DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	SK	MG	Steve A Johnson BRIDGE ENGINEER
GRNT08U8	08U8GA04		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-PH 0015(82)167	7	8

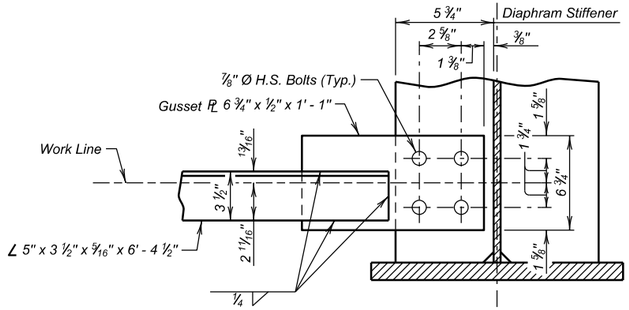


DIAPHRAGM DETAIL
(Weight of One Unit = 313 lbs.)

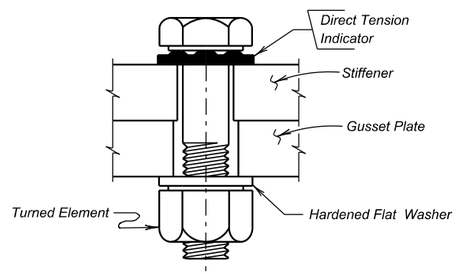
* 3" above high girder in each bay



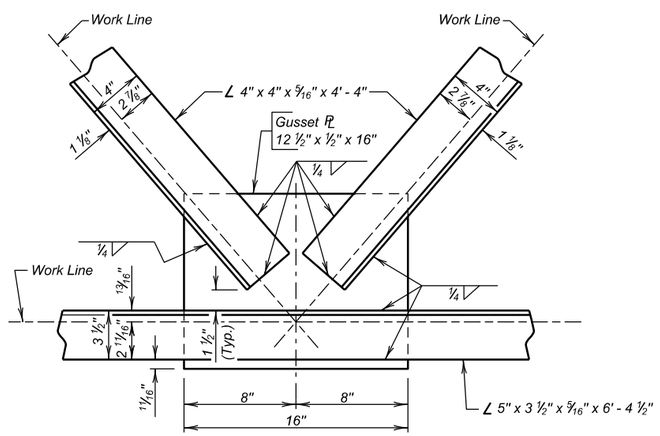
DETAIL "Z"



DETAIL "Y"



DIRECT TENSION INDICATOR DETAIL



DETAIL "X"

GENERAL NOTES

1. The Steel Diaphragms are included in the quantity for Structural Steel.
2. Use 1 1/16" Ø bolt holes in the 1/2" gusset plates. Use 15/16" Ø bolt holes in the stiffener plates.
3. Install bolt heads on the side of the connection with the 15/16" Ø bolt holes. Install direct tension indicators under the bolt heads.
4. The 7/8" High Strength bolts, nuts, and washers will conform to ASTM Specification F-3125 Grade A325, Type 3. The bolts will be the heavy hexagon head structural type with heavy semi-finished hexagon nut and hardened washer.
5. Terminate all welds 1/2" from the edges of the gusset plates.

DIAPHRAGM DETAILS

FOR

166' - 9 5/8" STEEL GIRDER BRIDGE

40' - 0" ROADWAY	35° LHF SKEW
OVER NORTH FORK	SEC. 25/30-T120N-R48W
YELLOW BANK RIVER	P-PH 0015(82)167
STA. 860 + 26.67 TO STA. 861 + 93.48	HL-93
STR. NO. 26-290-109	

GRANT COUNTY

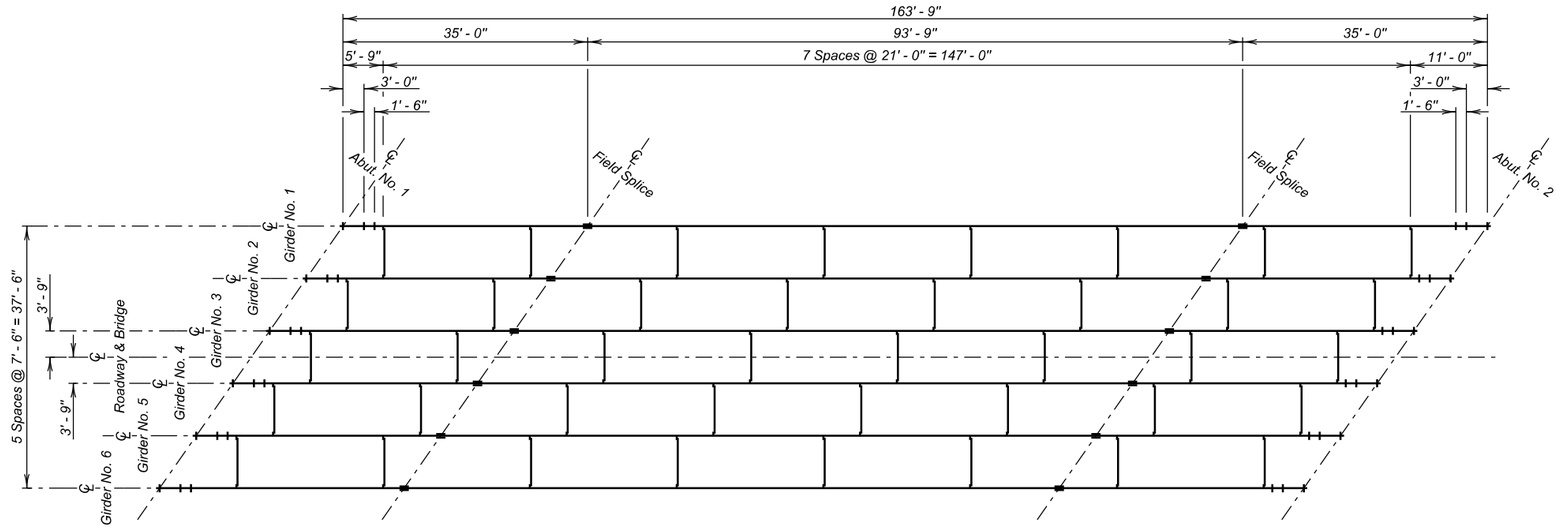
S. D. DEPT. OF TRANSPORTATION

JUNE 2020

5 OF 6

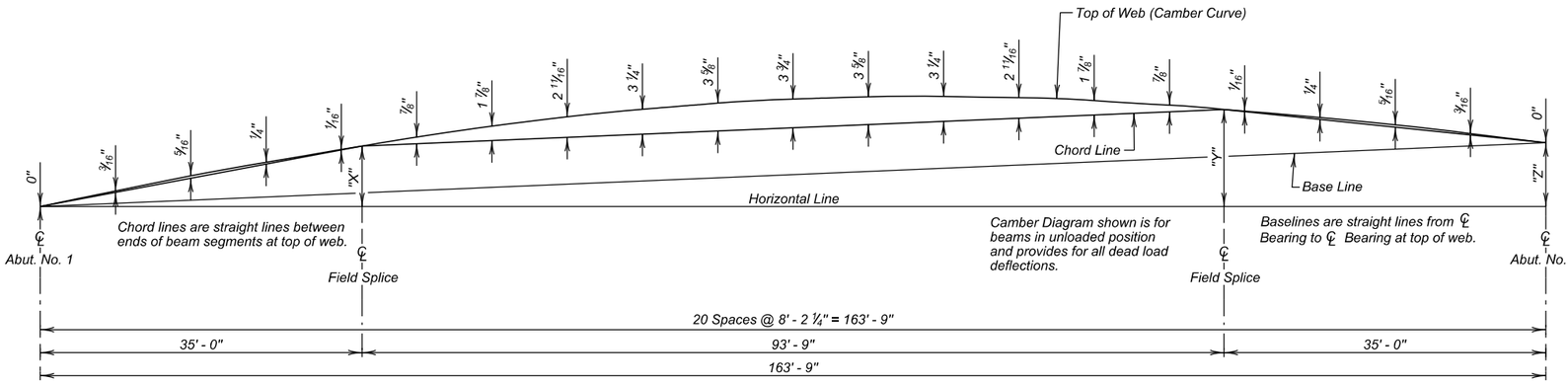
DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	SK	MG	Steve A Johnson BRIDGE ENGINEER
GRNT08U8	08U8GA05		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	P-PH 0015(82)167	8	8



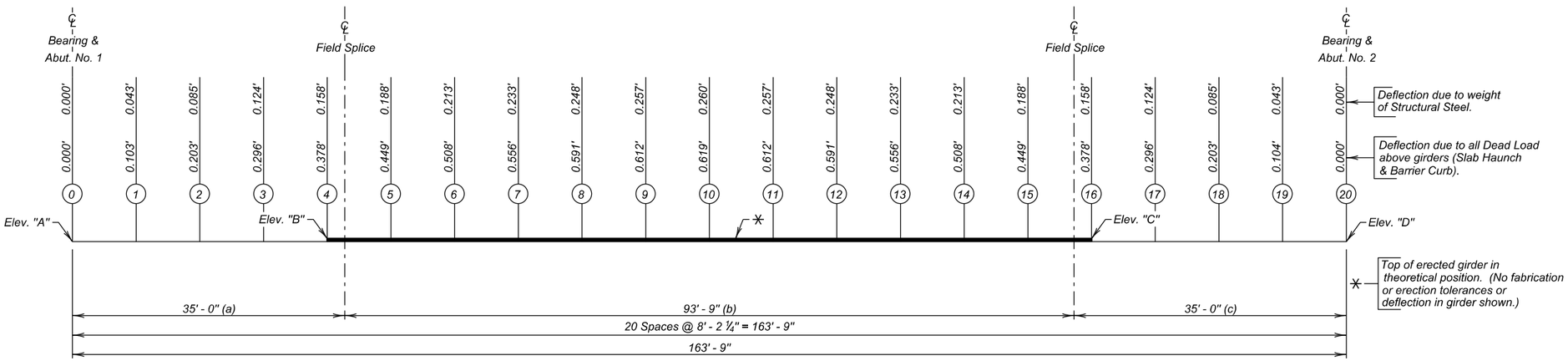
FRAMING DIAGRAM

Girder No.	CAMBER DIMENSIONS		
	"X"	"Y"	"Z"
1	0.714'	1.111	0.694'
2	0.714'	1.111	0.694'
3	0.714'	1.111	0.694'
4	0.714'	1.111	0.694'
5	0.714'	1.111	0.694'
6	0.714'	1.111	0.694'



CAMBER CUTTING DIAGRAM

(Cut camber into webs of all girders as shown)



GIRDER ERECTION 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 ERECTION ELEVATIONS AND SLOPES

Girder No.	ELEVATIONS (Top of Girder)				SLOPES (%)		
	"A"	"B"	"C"	"D"	a	b	c
1	1170.088	1170.667	1171.064	1170.783	1.652	0.424	-0.804
2	1170.216	1170.794	1171.192	1170.911	1.652	0.424	-0.804
3	1170.344	1170.922	1171.319	1171.038	1.652	0.424	-0.804
4	1170.322	1170.900	1171.297	1171.016	1.652	0.424	-0.804
5	1170.149	1170.727	1171.125	1171.844	1.652	0.424	-0.804
6	1170.977	1170.555	1170.952	1171.672	1.652	0.424	-0.804

FRAMING DIAGRAM, CAMBER, & ERECTION DATA

FOR

166' - 9 5/8" STEEL GIRDER BRIDGE

40' - 0" ROADWAY — 35° LHF SKEW
OVER NORTH FORK — SEC. 25/30-T120N-R48W
YELLOW BANK RIVER — P-PH 0015(82)167
STA. 860 + 26.67 TO STA. 861 + 93.48 — HL-93
STR. NO. 26-290-109

GRANT COUNTY
S. D. DEPT. OF TRANSPORTATION
JUNE 2020

6 OF 6

DESIGNED BY	CK. DES. BY	DRAFTED BY	
RP	SK	MG	Steven A. Johnson BRIDGE ENGINEER
GRNT08U8	08U8GA06		