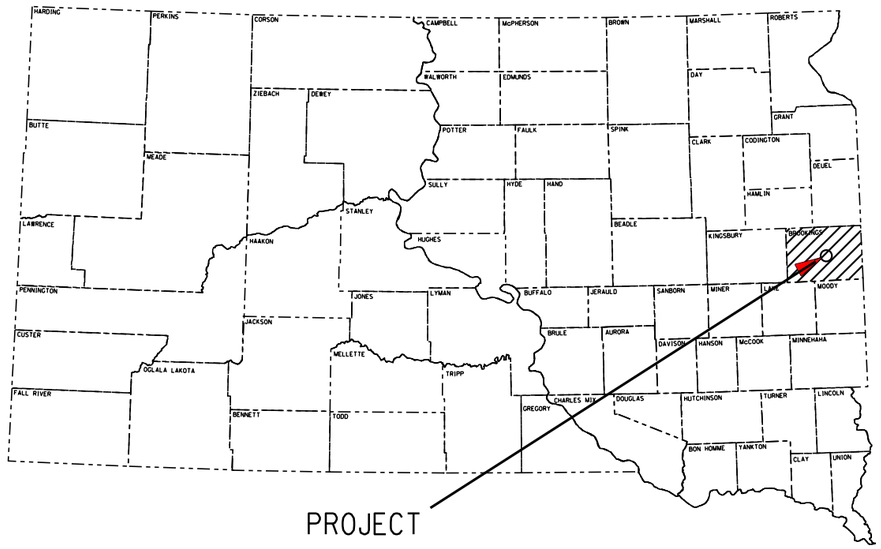


STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED

PROJECT 014 W-168
US HIGHWAY 14 W
BROOKINGS COUNTY

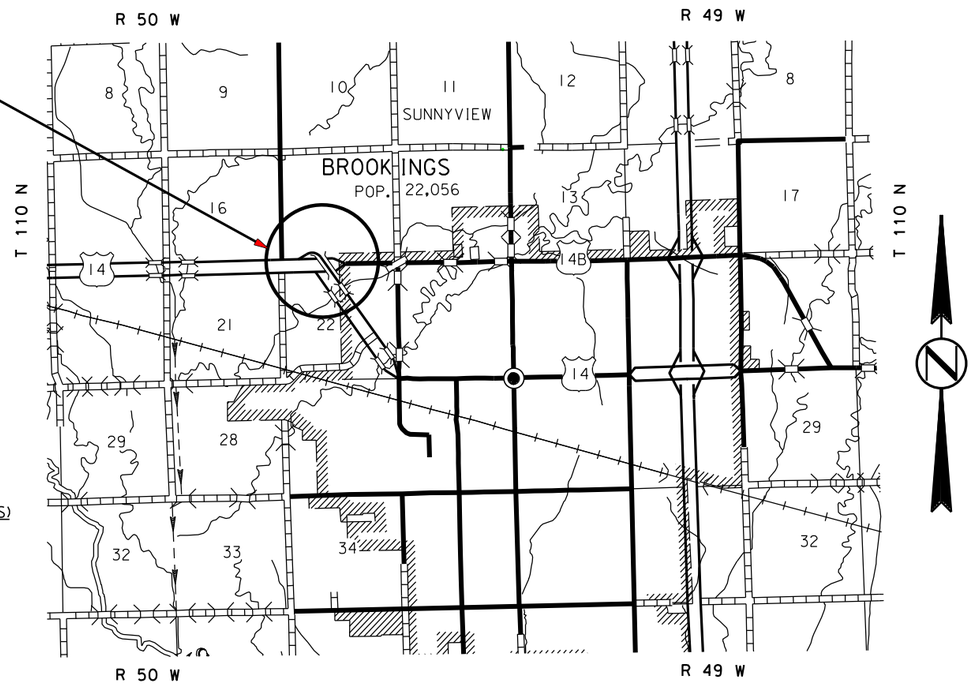
Overheight Vehicle Impact Repair
PCN 147R

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	014 W-168	1	26

Plotting Date: 07/27/2016

INDEX OF SHEETS

Str. No. 06-154-150
US-14W MRM 418.23



DESIGN DESIGNATION - WEST BOUND

ADT (2015)	1917
ADT (2035)	2536
DHV	408
D	50%
T DHV	2.2%
T ADT	4.8%
V	55 MPH

DESIGN DESIGNATION - EAST BOUND(BYPASS)

ADT (2015)	3802
ADT (2035)	5030
DHV	810
D	50%
T DHV	4.2%
T ADT	9.3%
V	55 MPH

STORM WATER PERMIT
None Required

ESTIMATE OF QUANTITIES AND ENVIRONMENTAL COMMITMENTS

ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
250E0030	Incidental Work, Structure	Lump Sum	LS
410E0030	Structural Steel, Miscellaneous	Lump Sum	LS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS
410E0350	Remove and Replace Web	1	Each
410E0508	Field Weld	20	In
410E0512	Grind Weld	20	In
410E0515	Drill Hole in Existing Steel	1	Each
410E0550	Jack Superstructure, Steel Girder Bridge	Lump Sum	LS
410E3010	Magnetic Particle Weld Inspection	2,446	In
410E3020	Ultrasonic Weld Inspection	88	In
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	360	SqIn
412E0100	Bridge Repainting, Class I	Lump Sum	LS
634E0010	Flagging	5.0	Hour
634E0110	Traffic Control Signs	187.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0280	Type 3 Barricade, 8' Single Sided	11	Each
634E0330	Temporary Raised Pavement Markers	780	Ft
634E0420	Type C Advance Warning Arrow Board	1	Each

SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

ENVIRONMENTAL COMMITMENTS

An Environmental Commitment is a measure that SDDOT commits to implement in order to avoid, minimize, and/or mitigate a real or potential environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency mentioned below with permitting authority can influence a project if perceived environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor's primary contact regarding matters associated with these commitments will be the Project Engineer. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office. The environmental commitments associated with this project are as follows:

COMMITMENT B: FEDERALLY THREATENED, ENDANGERED, AND PROTECTED SPECIES

COMMITMENT B4: BALD EAGLE

Bald eagles are known to occur in this area.

Action Taken/Required:

If a nest is observed within one mile of the project site, notify the Project Engineer immediately so that he/she can consult with the Environmental Office for an appropriate course of action.

COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

Action Taken/Required:

At a minimum and regardless of project size, appropriate erosion and sediment control measures must be installed to control the discharge of pollutants from the construction site.

COMMITMENT H: WASTE DISPOSAL SITE

The Contractor shall furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the Public ROW.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) shall not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements shall apply:

1. Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials shall be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris shall consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the Public ROW shall be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor shall control the access to waste disposal sites not within the Public ROW through the use of fences, gates, and placement of a sign or signs at the entrance to the site stating "No Dumping Allowed".

2. Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) shall be incidental to the various contract items.

COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

The SDDOT has obtained concurrence with the State Historical Preservation Office (SHPO or THPO) for all work included within the project limits and all department designated sources and designated option material sources, stockpile sites, storage areas, and waste sites provided within the plans.

Action Taken/Required:

All earth disturbing activities not designated within the plans require review of cultural resources impacts. This work includes, but is not limited to: Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas.

The Contractor shall arrange and pay for a cultural resource survey and/or records search. The Contractor has the option to contact the state Archaeological Research Center (ARC) at 605-394-1936 or another qualified archaeologist, to obtain either a records search or a cultural resources survey. A record search might be sufficient for review; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor shall provide ARC with the following: a topographical map or aerial view on which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that artifacts have not been found on the site.

The Contractor shall submit the records search or cultural resources survey report and if the location of the site is within the current geographical or historic boundaries of any South Dakota reservation to SDDOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3180). SDDOT will submit the information to the appropriate SHPO/THPO. Allow **30 Days** from the date this information is submitted to the Environmental Engineer for SHPO/THPO review.

If evidence for cultural resources is uncovered during project construction activities, then such activities shall cease and the Project Engineer shall be immediately notified. The Project Engineer will contact the SDDOT Environmental Engineer in order to determine an appropriate course of action.

SHPO/THPO review does not relieve the Contractor of the responsibility for obtaining any additional permits and clearances for Contractor furnished material sources, material processing sites, stockpile sites, storage areas, plant sites, and waste areas that affect wetlands, threatened and endangered species, or waterways. The Contractor shall provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

SEQUENCE OF OPERATIONS & TRAFFIC CONTROL

The following sequence of operations will be followed unless an alternate sequence is submitted in writing to the Area Engineer two weeks prior to the preconstruction meeting and approved.

Highway 14 Bypass

1. Install traffic control devices to close eastbound traffic on the Bypass.
2. Complete bridge superstructure repair work while lanes are closed
    a. *See GENERAL MAINTENANCE OF TRAFFIC Below
3. Remove Traffic Control devices.

GENERAL MAINTENANCE OF TRAFFIC

The western half of the bridge is presently closed to traffic. The traffic control devices closing the west half of the bridge, which are owned by the SDDOT, shall remain in place until the bridge is repaired.

Once bridge repairs are completed, the SDDOT traffic control devices shall be removed and stockpiled at the SDDOT Brookings Maintenance Yard located at 2131 34th Ave, Brookings, SD. The Contractor shall work with the Engineer to determine the exact location where materials shall be stockpiled.

The SDDOT traffic control devices shall be removed prior to winter, even if bridge painting is not completed during the 2016 construction season.

In order to facilitate repairs, the east bound lanes of US14 Bypass shall be closed while bridge repairs are underway. Should the Contractor not be able to complete the bridge painting during the 2016 construction season, the Contractor will need to complete the bridge painting while maintaining one lane of traffic in the east bound lanes of the US14 Bypass.

The lane closure on US14 Eastbound lane shall only be in place when bridge repair work is actively taking place. If bridge repair operations cease for more than 3 calendar days, the lane closure shall be removed until such time as bridge repair activities are scheduled to actively resume

A 16’ lane of travel must be maintained on the east bound lanes of US14 Bypass if one lane of travel is open to traffic.

Flagger(s) will be required where work activities and/or equipment may encroach into a lane open to traffic.

It will not be an option to cross traffic over to the opposing set of lanes.

Temporary Raised Pavement Markings have been included in the estimate of quantities for us as indicated on Standard Plate 634.64.

REMOVE PAVEMENT MARKINGS

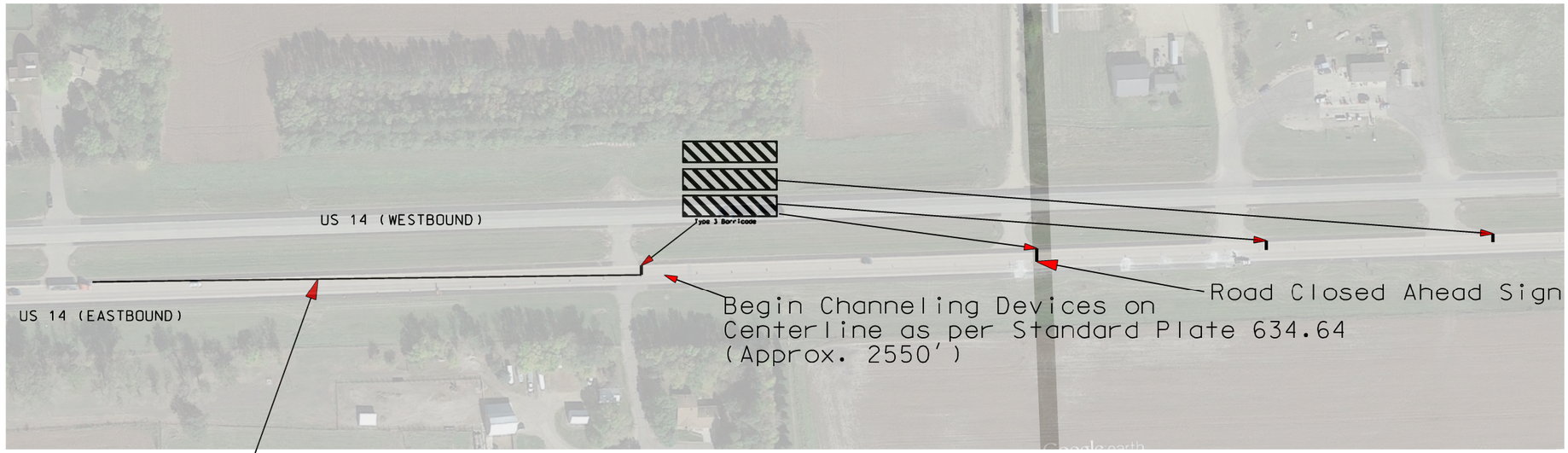
Pavement markings that conflict with the temporary traffic control or temporary pavement markings shall be removed by a means that is nondestructive to the surfacing. Payment for this work shall be incidental to the contract lump sum price for TRAFFIC CONTROL, MISCELLANEOUS.

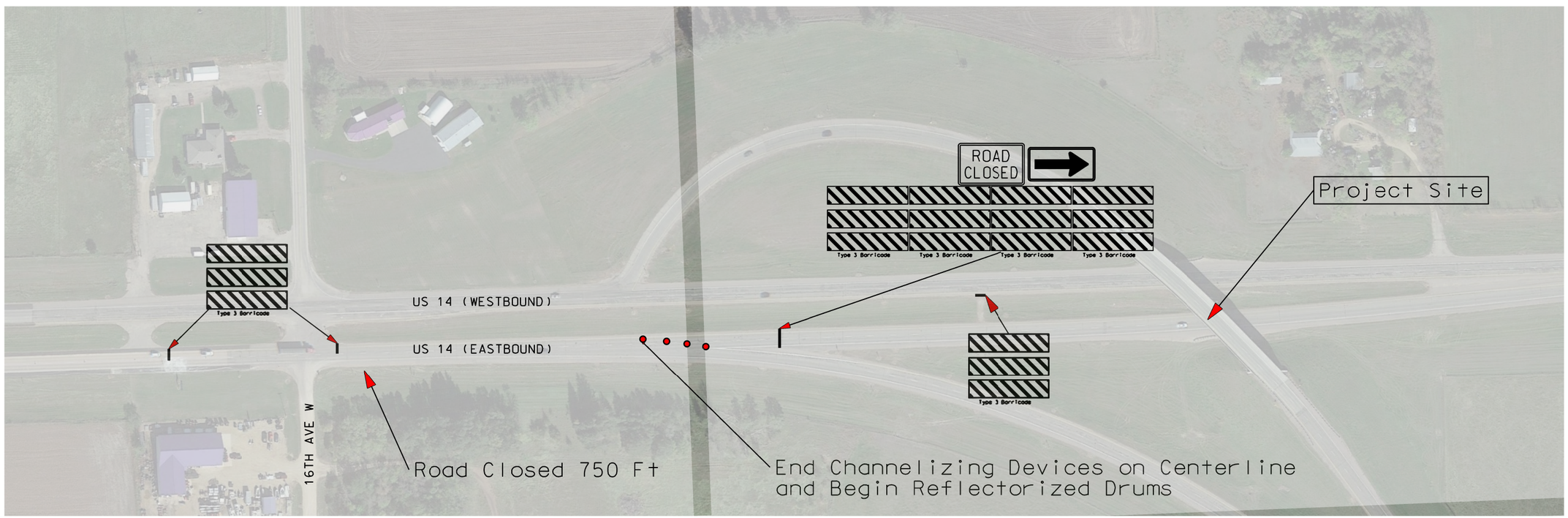
PLOT SCALE - 1:200
PLOTTED FROM - TRAB10200
PLOT NAME - 2
FILE - ...\147R TRAFFIC CONTROL.DGN

STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	014W-168	4	26

Plotting Date: 07/27/2016

TRAFFIC CONTROL DETAIL





STATE OF SOUTH DAKOTA	PROJECT	SHEET NO.	TOTAL SHEETS
	014 W-168	5	26

ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS

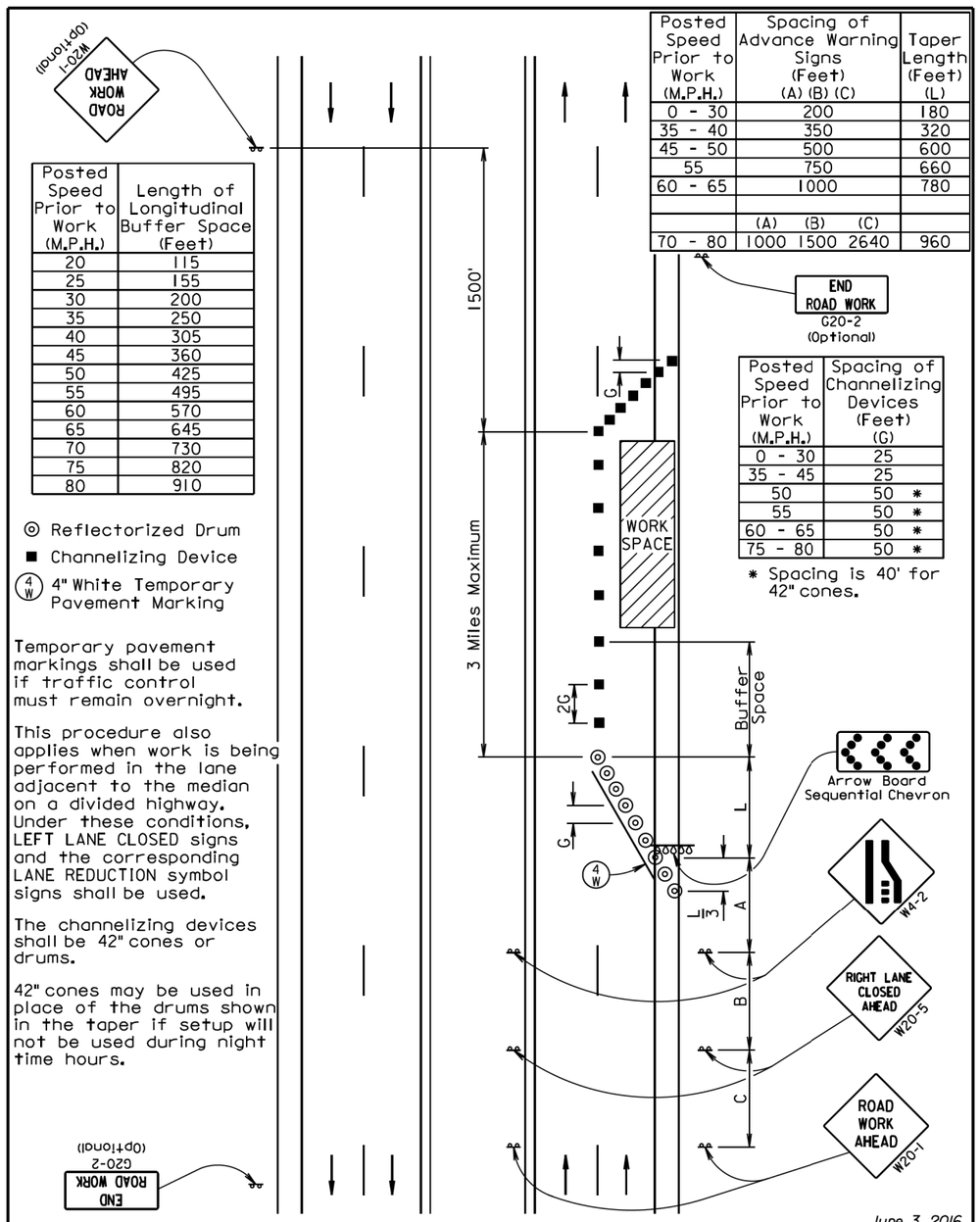
		CONVENTIONAL ROAD			
SIGN CODE	SIGN DESCRIPTION	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R11-2	ROAD CLOSED	1	48" x 30"	10.0	10.0
W1-6	LARGE ARROW (one direction)	1	48" x 24"	8.0	8.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)	2	48" x 48"	16.0	32.0
W20-1	ROAD WORK AHEAD	3	48" x 48"	16.0	48.0
W20-3	ROAD CLOSED 750 FT	1	48" x 48"	16.0	16.0
W20-3	ROAD CLOSED AHEAD	1	48" x 48"	16.0	16.0
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	1	48" x 48"	16.0	16.0
G20-2	END ROAD WORK	2	36" x 18"	4.5	9.0
		CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT			187.0

TYPE 3 BARRICADES

ITEM DESCRIPTION	QUANTITY
Type 3 Barricade, 8' Single Sided	11 Each

ARROW BOARDS

ITEM DESCRIPTION	QUANTITY
Type C Advance Warning Arrow Board	1 Each



Posted Speed Prior to Work (M.P.H.)	Length of Longitudinal Buffer Space (Feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

◎ Reflectorized Drum

■ Channelizing Device

(4 W) 4" White Temporary Pavement Marking

Temporary pavement markings shall be used if traffic control must remain overnight.

This procedure also applies when work is being performed in the lane adjacent to the median on a divided highway. Under these conditions, LEFT LANE CLOSED signs and the corresponding LANE REDUCTION symbol signs shall be used.

The channelizing devices shall be 42" cones or drums.

42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

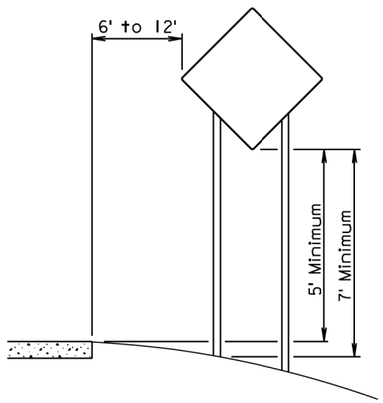
Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A) (B) (C)	Taper Length (Feet) (L)
0 - 30	200	180
35 - 40	350	320
45 - 50	500	600
55	750	660
60 - 65	1000	780
	(A) (B) (C)	
70 - 80	1000 1500 2640	960

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	25
35 - 45	25
50	50 *
55	50 *
60 - 65	50 *
75 - 80	50 *

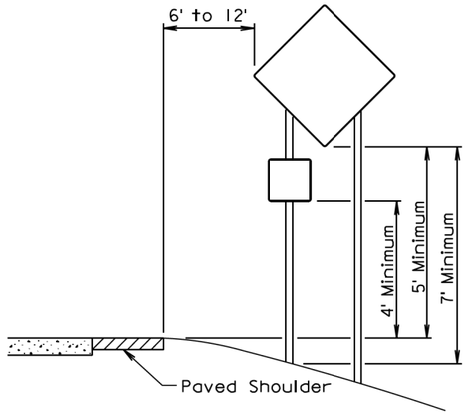
* Spacing is 40' for 42" cones.

June 3, 2016

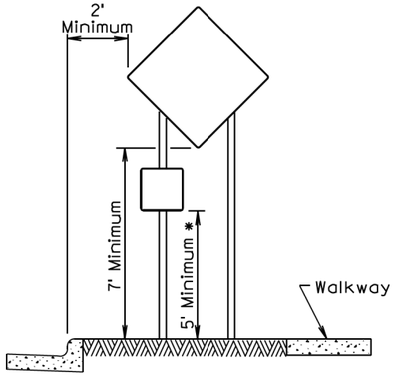
Published Date: 3rd Qtr. 2016	SDDOT	GUIDES FOR TRAFFIC CONTROL DEVICES LANE CLOSURE WITHOUT BARRIER	PLATE NUMBER 634.64
			Sheet 1 of 1



RURAL DISTRICT

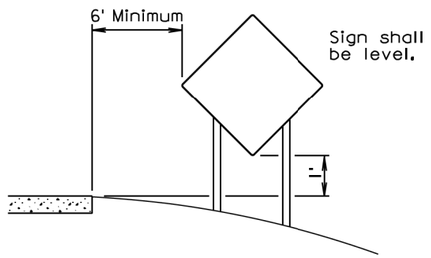


RURAL DISTRICT WITH SUPPLEMENTAL PLATE



URBAN DISTRICT

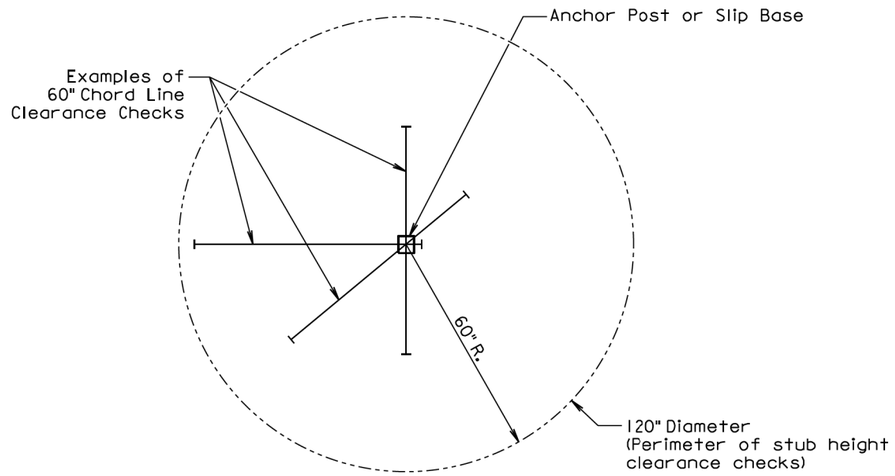
* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.



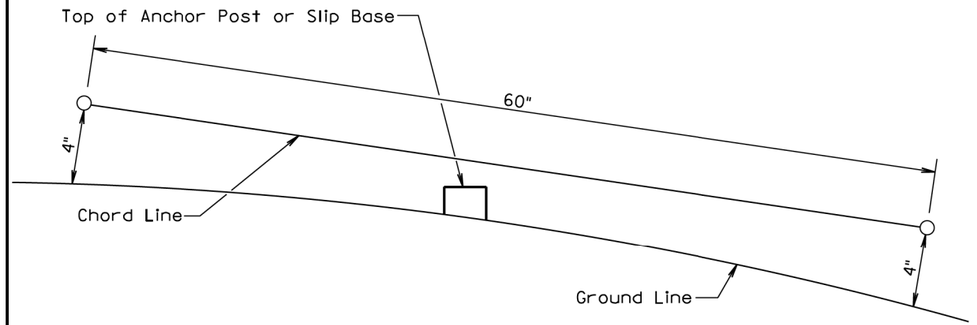
RURAL DISTRICT
3 DAY MAXIMUM
(Not applicable to regulatory signs)

September 22,2014

Published Date: 3rd Qtr. 2016	SDDOT	CRASHWORTHY SIGN SUPPORTS (Typical Construction Signing)	PLATE NUMBER 634.85
			Sheet 1 of 1



PLAN VIEW
(Examples of stub height clearance checks)



ELEVATION VIEW

GENERAL NOTES:

The top of anchor posts and slip bases SHALL NOT extend above a 60" chord line within a 120" diameter circle around the post with ends 4" above the ground.

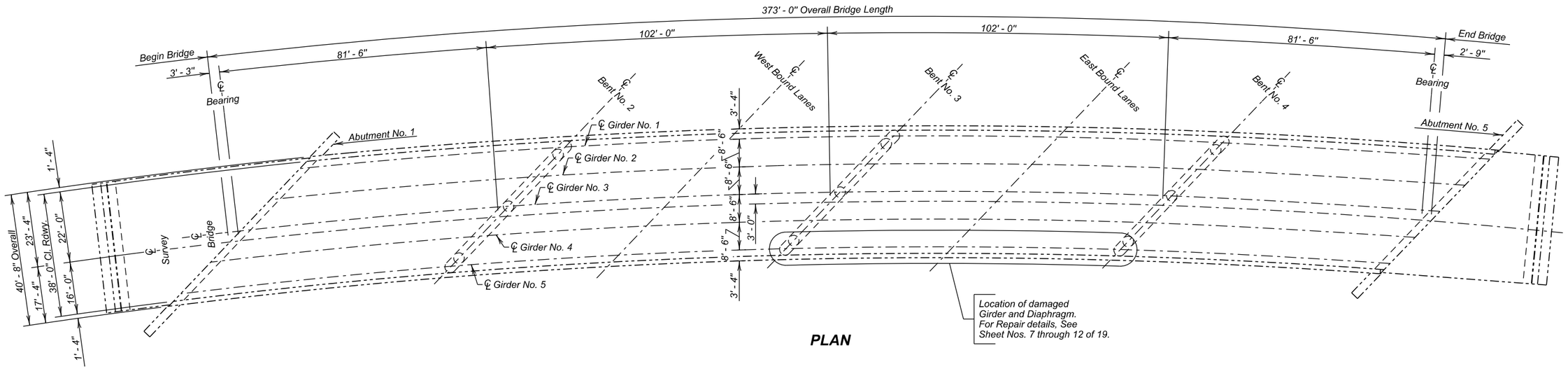
At locations where there is curb and gutter adjacent to the breakaway sign support, the stub height shall be a maximum of 4" above the ground line at the localized area adjacent to the breakaway support stub.

The 4" stub height clearance is not necessary for U-channel lap splices where the support is designed to yield (bend) at the base.

July 1, 2005

Published Date: 3rd Qtr. 2016	SDDOT	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W-168	8	26



PLAN

INDEX OF BRIDGE SHEETS -

LAYOUT FOR UPGRADING

FOR

373' - 0" CONT. COMP.,
HORIZ. CURVED, GIRDER BRIDGE

38' - 0" ROADWAY
OVER HWY 14
STR. NO. 06-154-150
PCN I47R

3°- 00' HORIZ. CURVE
SEC. 15-T110N-R50W
014 W-168

BROOKINGS COUNTY

S. D. DEPT. OF TRANSPORTATION

JULY 2016

1 OF 19

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

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS	MM	KR	Steve A Johnson BRIDGE ENGINEER
BROKI47R	I47RRA01		

ESTIMATE OF STRUCTURE QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
250E0030	Incidental Work, Structure	Lump Sum	LS
410E0030	Structural Steel, Miscellaneous	Lump Sum	LS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS
410E0350	Remove and Replace Web	1	Each
410E0508	Field Weld	20	In
410E0512	Grind Weld	20	In
410E0515	Drill Hole in Existing Steel	1	Each
410E0550	Jack Superstructure, Steel Girder Bridge	Lump Sum	LS
410E3010	Magnetic Particle Weld Inspection	2446	In
410E3020	Ultrasonic Weld Inspection	88	In
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	360	SqIn
412E0120	Bridge Repainting, Class I	Lump Sum	LS

SPECIFICATIONS

1. Design Specifications: AASHTO Standard Specifications for Highway Bridges 17th Edition using Working Stress Design.

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 Inspection shall be in conformance with the AASHTO/AWS Bridge Welding Code D1.5M/D1.5:2015 unless otherwise noted in this plan set.

PRE-CONSTRUCTION MEETING

A pre-construction meeting is required prior to beginning the repair work. The purpose of the meeting is to review the plans and procedures due to the specialty work involved. At a minimum, a representative from the Contractor and all Subcontractors shall attend this meeting along with Department personnel from the Area Office and Bridge Office. The contractor must notify the Bridge Construction Engineer and the Area Office at least three days prior to the meeting.

DETAILS AND DIMENSIONS OF EXISTING BRIDGE

All details and dimensions of the existing bridge, contained in these plans, are based on the original construction plans and shop plans. It is the Contractor's responsibility to inspect and verify the actual field conditions and any necessary as-built dimensions affecting the satisfactory completion of the work required for this project.

SHOP PLANS

Shop plans shall be required as specified by Section 410.3 A. of the Construction Specifications

GENERAL CONSTRUCTION

1. Welder certification shall be in accordance with section 410.3 D of the Standard Specifications.

2. The web plates, stiffener plates and flange splice plates shall be ASTM A709 Gr. 36 T2.

NOTICE - LEAD BASED PAINT

Be advised that the paint on the steel surfaces of the existing structure is a paint containing lead. The Contractor should plan his/her operations accordingly, and inform his/her employees of the hazards of lead exposure.

SCOPE OF BRIDGE WORK & SEQUENCE OF OPERATIONS

All work on this structure shall be accomplished with the traffic control shown in the plans. Alternate sequence of operations may be submitted by the Contractor for approval by the Engineer a minimum of two weeks prior to the pre-construction meeting.

1. No traffic shall be allowed above girder during any welding, web removal, heat straightening or bolted splice replacement.

2. Nondestructively Test fillet welds, groove welds, crack tips and potential crack tips at the locations shown in the plans prior to heat straightening.

3. Repair crack tips and weld flaws found by Nondestructive Testing prior to heat straightening.

4. Heat straighten damaged girder G5 including web and bottom flange.

5. Nondestructively Test fillet welds, groove welds, crack tips and potential crack tips at the locations shown in the plans after heat straightening.

6. Repair crack tips and weld flaws found by Nondestructive Testing after heat straightening.

7. Remove and replace the plan specified damaged horizontal members on G5.

8. Install jacking frame, remove bottom flange splice plate, and remove and replace web according to plans at G5.

9. Remove and replace only the bolts in the web splice at G5.

10. Paint all work affected area in Fall of 2016 or Spring of 2017.

FIELD WELDING PROCEDURES

1. Approved Welding Procedure Specifications (WPS) will be required for this project, using the Shielded Metal Arc Welding (SMAW) process and an approved E7018 electrode from Table 4.1 of the Bridge Welding Code. The proposed WPS's for this project shall be submitted on Form N-2, from Annex N of the Bridge Welding Code, to the Bridge Construction Engineer for approval at least 2 weeks prior to construction.

2. Preparation of the base metal prior to welding shall be in accordance with Clause 3 of the Bridge Welding Code. Existing paint shall be removed a distance of 2 inches from each side of the weld.

3. Preheat will be required. Preheat and interpass temperature requirements shall be in accordance with Clause 4.2 of the Bridge Welding Code. The minimum preheat and interpass temperature shall be 320 degrees F for welds to the 1" and 1 3/8" girder flanges and 300 degrees F for welds to the 5/16" girder web as determined from Annex G of the Bridge Welding Code for high restraint conditions. Temperature indicating crayons shall be the minimum acceptable method for monitoring preheat and interpass temperatures.

4. SMAW electrode atmospheric exposure requirements shall comply with Clause 4.5 of the Bridge Welding Code. Electrodes shall be purchased in hermetically sealed containers. If the container shows evidence of damage, the electrodes shall be dried in a drying oven for at least one hour at temperatures between 700 and 800 degrees F before they are used. Immediately after opening a hermetically sealed container or removal of the electrodes from a drying oven, electrodes shall be stored in ovens at a temperature of at least 250 degrees F. Electrodes exposed to the atmosphere upon removal from drying or storage ovens or hermetically sealed containers shall be used within four hours maximum or redried at 450 to 550 degrees F for two hours minimum. Electrodes exposed to the atmosphere for periods less than four hours may be returned to a storage oven and maintained at a minimum of 250 degrees F for a minimum of four hours before reissue. Electrodes shall be redried no more than one time. Electrodes which have been wet shall not be used.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES

FOR

373' - 0" CONT. COMP HORIZ.
CURVED GIRDER BRIDGE

STR. NO. 06-154-150

JULY 2016

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS	MM	MM	Steve A Johnson BRIDGE ENGINEER
BROKI47R	I47RMA02		

FIELD WELDING PROCEDURES - CONTINUED

5. All welds shall be cleaned in accordance with Clause 3.11 of the Bridge Welding Code. Completed welds and adjacent areas shall be cleaned of all weld splatter, slag, smoke and heat affected paint. No intermittent or “stitch” welds will be allowed.

6. E7018 electrodes shall be used for tack welds. The size of tack welds shall not be greater than 5/16”. Tack welds shall be positioned so they will be incorporated into, and re-melted by, the final weld. This applies to run-off tabs also. Tack welds shall be thoroughly cleaned prior to any weld placement.

7. Groove joint fit-up tolerances shall be +1/16”, -1/8” for root opening and +10º, -5º for the bevel angle for Joint Designation B-U2 as per Clause 3.3.4 of the Bridge Welding Code. The removal dimensions of the damaged web material and the dimensions of the new web plates shall be closely controlled to achieve the specified fit-up tolerances. All groove welds shall be ground to a flush contour. Grinding shall be longitudinal. Transverse grinding will not be allowed.

WELD INSPECTION & NONDESTRUCTIVE TESTING (NDT)

1. The Contractor shall be responsible for retaining a qualified Testing Agency to perform Visual, Magnetic Particle (MT), and Ultrasonic (UT) inspection of existing and new welds and to locate existing and potential crack tips. Inspectors performing Visual, MT and UT inspection and crack tip location shall be certified in accordance with Section 410.3.D of the Construction Specifications. The Contractor shall submit the Testing Agency to the Department at the Preconstruction meeting for approval by the Bridge Construction Engineer.

2. All Nondestructive Testing (NDT) and inspection shall be done in accordance with Clause 6 of the Bridge Welding Code. The MT inspection shall be performed by the yoke method using half-wave rectified direct or alternating current. Existing paint shall be removed from the steel surfaces that require NDT. MT inspection results shall be reported on Form N-7 of Annex L and UT results shall be reported on Form F-4 of Annex F of the Bridge Welding Code.

3. The existing fillet welds noted below shall be 100% visually inspected and 100% magnetic particle inspected. In addition, all of the structural steel elements in the length of girder shown in the heat straightening zone of the plans shall be visually inspected for possible cracks. Defects shall be clearly marked on the girder in accordance with the Bridge Welding Code and a written record of the defects shall be given to the Engineer for transmittal to the Bridge Construction Engineer. Any suspected cracks shall be verified by magnetic particle inspection with the crack tips located. Crack tip locations shall be clearly marked on the girder and a written record of the crack tip location shall be given to the Engineer for transmittal to the Bridge Construction Engineer. Notify the Bridge Construction Engineer if any cracks or crack tips are located in the girder flange. Testing for defects and crack tips shall be made prior to any heat straightening. Repair options for the defects and crack tips shall be determined by the Bridge Construction Engineer—see note on REPAIRS FOR NDT DETERMINED FLAWS. Repairs shall be made prior to any heat straightening.

4. Existing web and fillet weld MT testing locations

   Girder 5:

   a. Test the bottom flange to web weld on both sides of the web in the area being heat straightened for an estimated 1344 linear inches.

   b. Test both affected diaphragm stiffeners and k-brace welds to web and to top flange on both sides of stiffeners to be replaced as well as all welds on the k-brace for an estimated 526 linear inches.

   c. In the area of web replacement, test 6 inches outside the removal limits, on both side of the web, for an estimated 360 square inches of web area. This is an estimate and may be adjusted in the field as approved by the Bridge Construction Engineer.

   d. Test the stitch welds in the top and bottom 12” of the diaphragm intermediate stiffener welds to web on both sides of stiffeners to be heat straightened for an estimated 576 linear inches.

5. After heat straightening, secondary cracks that may develop will require MT weld inspection. The areas listed above shall be retested to ensure no additional cracks have developed. The estimated weld length and area for re-testing is 2446 linear inches and 288 square inches.

6. New fillet welds shall be 100% visually inspected and 100% magnetic particle inspected. Based on the results of the magnetic particle and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed fillet welds and any recommended repairs. Rejectable defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs are complete. The estimated length for MT inspection is 64 linear inches.

7. New groove welds shall be 100% visually inspected and 100% ultrasonically tested. Based on the results of the ultrasonic and visual inspection, the Bridge Construction Engineer will determine the acceptability of the completed groove welds and any recommended repairs. Rejectable defects in new welds shall be repaired in accordance with the Bridge Welding Code. Repaired welds shall be re-inspected after all repairs and complete. The estimated length for UT inspection is 36 linear inches.

8. All costs including labor, equipment and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location shall be incidental to the contract unit price per inch for MAGNETIC PARTICLE WELD INSPECTION.

9. All costs including labor, equipment and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location in the area of web replacement, 6 inches outside the removal limits shall be incidental to the contract unit price per square inch for MAGNETIC PARTICLE WELD INSPECTION, IMPACT DAMAGE REPAIR.

10. All costs to remove the paint and clean all fillet welds to be non destructive tested and remove the paint and clean all visible or potential crack tip locations shall be incidental to the contract unit price per inch for MAGNETIC PARTICLE WELD INSPECTION or contract unit price per square inch for MAGNETIC PARTICLE WELD INSPECTION, IMPACT DAMAGE REPAIR.

11. All costs including labor, equipment and any incidentals necessary to perform the visual inspection and ultrasonic inspection of groove welds shall be incidental to the contract unit price per inch for ULTRASONIC WELD INSPECTION.

12. The total plans quantity for MT and UT weld inspection is only an estimate. The weld inspection will be measured and paid for as MAGNETIC PARTICLE WELD INSPECTION; MAGNETIC PARTICLE WELD INSPECTION, IMPACT DAMAGE REPAIR; or ULTRASONIC WELD INSPECTION.

NOTES (CONTINUED)

FOR

373' - 0" CONT. COMP. HORIZ.
CURVED GIRDER BRIDGE

STR. NO. 06-154-150

JULY 2016

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS BROKI47R	MM I47RMA03	MM	Steve A Johnson BRIDGE ENGINEER

REPAIRS FOR NDT DETERMINED FLAWS

1. Repair options for weld defects and crack tips shall be determined by the Bridge Construction Engineer. Two repair options are:

   a. Drill all crack tips in the web to 1" diameter.

   b. Repair fillet weld defects by removing the weld with the air carbon arc process and then grinding flush. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. The repair shall then be re-welded in accordance with the Bridge Welding Code.

2. All labor, equipment, materials and incidentals necessary to drill 1" diameter holes in the web shall be incidental to the contract price per each for DRILL HOLE IN EXISTING STEEL.

3. All labor, equipment, materials and incidentals necessary including air carbon arc removal and grinding of welds shall be incidental to the contract unit price per inch for GRIND WELD.

4. All labor, equipment, materials and incidentals necessary to re-weld the repair shall be incidental to the contract unit price per inch for FIELD WELD.

5. Other repair options shall be at the discretion of the Bridge Construction Engineer.

HEAT STRAIGHTENING

This Contract includes heat straightening of steel girders including bottom flange, web, transverse stiffeners and diaphragms. Heat straightening is considered specialty work for which only the following contractors are allowed. Contact:

Judd Holt
International Straightening Incorporated
901 E. Bristol Drive
Bismarck, ND 58501
Telephone (701) 223-5972 or (701) 751-1683
Fax (701) 751-1683
E-mail isisteel@gmail.com
www.steelstraightening.com

Darryl Thomas
Flame On, Inc.
4415 Tom Marks Road
Snohomish, WA 98290
Telephone (425) 397-7039
Fax (425) 397-7002
Cellular (425) 501-9855
www.flameoninc.com

1. Heat Straightening requires nondestructive testing of both new and existing welds. The Contractor shall use a qualified testing agency subject to the approval by the Bridge Construction Engineer. The Contractor shall submit the testing agency to the Department at the Preconstruction meeting for approval by the Bridge Construction Engineer. See Weld Inspection & Nondestructive Testing notes elsewhere in these plans.

2. The equipment used for heat straightening shall be an oxygen-fuel combination. The fuel shall be propane or acetylene. The application of heat shall be by single or multiple orifice tips only. The size of the tip shall be proportional to the thickness of the heated material. As a guide, the following table shows the recommended tip sizes.

Steel Thickness (in)	Orifice Type	Size
< 1/4	Single	3
3/8	Single	4
1/2	Single	5
5/8	Single	7
3/4	Single	8
1	Single Rosebud	8 3
2	Single Rosebud	8 4
3	Rosebud	5
>4	Rosebud	5

3. The temperature of all steel during heat straightening shall not exceed 1,200°F. The Contractor shall use one or more of the following methods for verifying temperatures during heat straightening:

   a. Temperature sensitive crayons

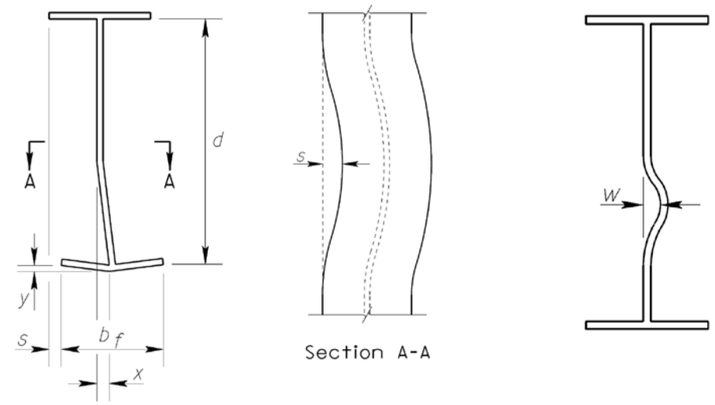
   b. Pyrometer

   c. Infrared non-contact thermometer

   Material should be heated in a single pass and shall be allowed to air cool to below 250°F prior to re-heating.

4. Hot Mechanical Straightening and Hot Working will NOT be allowed.

5. The final dimensions of heat straightened structural members shall conform to the following tolerances:



d = original depth of web
b_f = original width of flange

x = final displacement of web ≤ maximum of $\frac{d}{100}$ or ¼"
y = final displacement of edge of flange ≤ ¼"
w = maximum final local deformation in web ≤ ¼"
s = sweep of flange from original edge of flange ≤ ½" over 20 ft

6. All labor, materials, equipment, and any incidentals necessary to perform the required heat straightening shall be incidental to the contract lump sum price for HEAT STRAIGHTEN STEEL MEMBER(S).

NOTES (CONTINUED)
FOR
373' - 0" CONT. COMP. HORIZ CURVED GIRDER BRIDGE
STR. NO. 06-154-150
JULY 2016

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS BROKI47R	MM I47RMA04	MM	Steve A Johnson BRIDGE ENGINEER

JACKING SUPERSTRUCTURE

1. The vertical Jack shall be used to support girder G5 at the plan specified location until the splice plate replacement is complete. The intent is to transfer the dead load to the jack during the splice plate replacement while keeping the vertical movement to the minimum amount necessary as approved by the Engineer.

2. The vertical jack shall have a lock nut for mechanical load holding with hydraulic pressure released.

3. The vertical jack shall be able to support a reaction of 70 kips each for the entire time when the splice plate is being replaced. The jack shall have a bearing plate at both ends of sufficient area and thickness to limit the bearing stress on the loaded areas of concrete to not more than 1,600 psi, asphalt to not more than 2,000 psf and to limit the bearing stress on the loaded area of steel to not more than 20,000 psi.

4. Caution shall be exercised when transferring the girder reactions to and from the jack to insure that no damage to any of the existing structural components will occur due to the jacking procedure. Any damage to any of the structural components of the bridge caused by the jacking procedure will be repaired as approved by the Engineer at no cost to the Department.

5. The jack shall be limited to the location shown by the plan sheets. Traffic above the girder being supported shall be stopped when the hydraulic system of the jack is carrying the girder reaction. Traffic above that girder will be allowed to resume under the traffic control shown on the plans only after the bolted splice has been replaced. The jack is not designed to carry a live load reaction so absolutely no live load will be placed at any time on the jacks.

6. The contractor is required to submit a detailed jacking plan. This shall be submitted by a registered SD engineer. The jacking procedure shall be submitted 30 days prior to the start of work for approval by the Office of Bridge Design. Included in this procedure will be the type, number, positioning, temporary supports, size, and method of synchronization between multiple jacks.

7. All costs for materials, labor, equipment and incidentals necessary to perform the vertical jacking as shown by these plans shall be included in the contract lump sum price for “Jack Superstructure, Steel Girder Bridge”.

REMOVE AND REPLACE WEB SECTION

1. Cut and remove the portions of the web as shown on the plans by the air carbon arc process guided by a template. The air carbon arc process shall also be used to remove the web to bottom flange welds. All cut edges shall be ground smooth to their final size in preparation for welding. Grinding shall be longitudinal. Transverse grinding will not be allowed. The removed portions of the web shall be disposed of by the Contractor.

2. The web sections shall be replaced and welded as shown in the plan details.

3. During the removal and replacement procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).

4. All labor, equipment, materials, welding and any incidentals necessary to repair the damaged portions of the web shall be incidental to the contract unit price per each for REMOVE AND REPLACE WEB.

FIELD BOLTED GIRDER SPLICE

1. This work shall consist of replacing bolts located within the heat straightening limits of web at G5 and replacing bolts located in the bottom flange plates of G5 as shown in the plans. Existing plates in the bottom flange of G5 shall be salvaged.

2. Bolts shall be ¾” diameter ASTM F3125. Each bolt shall be supplied with a heavy hex nut, 1 hardened washer and 1 direct tension indicator.

3. High strength bolts, nuts, washers and direct tension indicators shall be stored in such a manner that they will be kept clean and free from any rust or foreign material.

6. Contact surfaces of the bolted connections shall be clean and free from all oil and paint. Commercial blast cleaning of the steel-to-steel contact areas shall be done to SSPC SP 6 finish.

8. Bolts in flanges shall be placed with heads down.

9. Bolts in web splices of exterior girders shall be placed with heads on exterior face of girders.

10. All costs associated with replacing the splice bolts, including all materials, labor, equipment and incidentals shall be incidental to the contract lump sum price for “Structural Steel, Miscellaneous’.

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 to notify the bolt supplier of these requirements.

INCIDENTAL WORK, STRUCTURE

The following shall all be considered INCIDENTAL WORK, STRUCTURE:

1. Work affected areas on G1 and G5 shall be solvent cleaned to SSPC SP-1 prior to any other work being done on the structure.

2. All power tool cleaning performed by the Contractor in preparation for Nondestructive Testing. Power tool cleaning shall be in accordance with SSPC SP-3.

3. All materials, labor, equipment, and any incidentals necessary to perform all that is described in the notes above shall be incidental to the contract Lump Sum price for “INCIDENTAL WORK, STRUCTURE.”

NOTES (CONTINUED)

FOR

373' - 0" CONT. COMP. HORIZ.
CURVED GIRDER BRIDGE

STR. NO. 06-154-150

JULY 2016

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS BROKI47R	MM I47RMA05	MM	Steven A. Johnson BRIDGE ENGINEER

AIR CARBON ARC CUTTING AND GOUGING

1. All removal of web sections, transverse stiffeners, diaphragm gusset plates, and welds called for by the plans shall be accomplished using the air carbon arc process unless noted otherwise. Plasma cutting will be allowed. If the contractor plans to use plasma cutting the Bridge Construction Engineer shall be notified and will provide the Contractor with additional requirements for this cutting method.

2. Before any air carbon arc cutting or gouging begins, lay out all cut lines on the steel surfaces using a marker that will be visible during the cutting process.

3. When grinding to a specified shape or dimension is required after air carbon arc cutting, lay out the shape on the steel surface with a visible marker and grind to the layout line. Air carbon arc gouging shall be done using DC, electrode positive.

4. Extreme care shall be exercised during the cutting or gouging process so that absolutely no damage (such as nicks, gouges, splattering) to the surrounding metal occurs. Any damage caused by the air carbon arc process shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the Department.

5. Grind all surfaces cut or gouged with the air carbon arc process to remove high carbon deposits, provide a smooth finish, and prepare metal for welding and/or to accept paint.

BRIDGE REPAINTING, CLASS I

1. All new and existing structural steel in work affected areas, shall be painted. The exact area to be painted will not be known until all heat straightening is completed. The intent in the heat straightened area is to paint the entire girder surface for a distance of 6 inches outside of the outer edges of the heat straightening. The finished girder in the heat straightened area shall have a uniform paint appearance as approved by the Engineer. The work affected areas outside of the heat straightening, web removal, or bolted splice replacement shall be painted for a distance of six inches on all sides. For informational purposes, the approximate total area under this item of repair is 425 square feet. The actual work affected area will only be known after all of the nondestructive testing and heat straightening is complete.

2. All work affected areas and all new structural steel shall be painted in accordance with Section 412 of the Standard Specifications and in accordance with SSPC Standard PA1.

3. Paint color

   Top Coat - The paint color shall be an approved green color to match the existing paint. Prior to ordering the paint, a paint chip of the green color shall be submitted to the Department for color approval.

   Primer or Intermediate Coats - Colors shall sharply contrast with each other and with the top coat.

NOTES (CONTINUED)

FOR

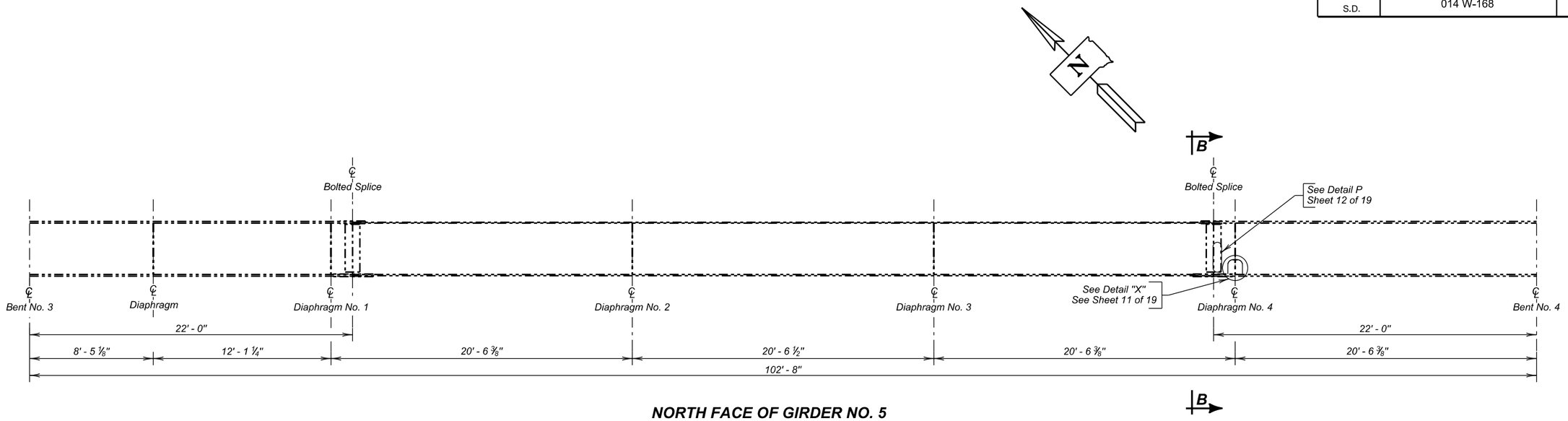
373' - 0" CONT. COMP. HORIZ
CURVED GIRDER BRIDGE

STR. NO. 06-154-150

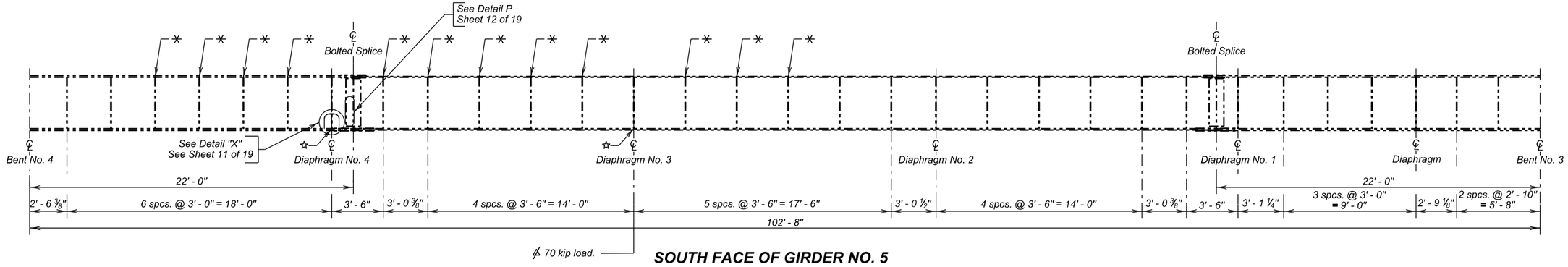
JULY 2016

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS BROKI47R	MM I47RMA06	MM	Steve A Johnson BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W-168	14	26



NORTH FACE OF GIRDER NO. 5



SOUTH FACE OF GIRDER NO. 5

NOTE -

Concrete deck not shown for clarity.

- *Heat Straighten Intermediate Stiffener*
- *Replace Portion of Diaphram & Heat Straighten Diaphragm Stiffener*
- *Temporary Jacking and Girder Support*

GIRDER NO. 5 REPAIR DETAILS

FOR

373' - 0" CONT. COMP.,
HORIZ. CURVED, GIRDER BRIDGE

38' - 0" ROADWAY
OVER HWY 14
STR. NO. 06-154-150

3°- 00' HORIZ. CURVE
SEC. 15-T110N-R50W
014 W-168

BROOKINGS COUNTY

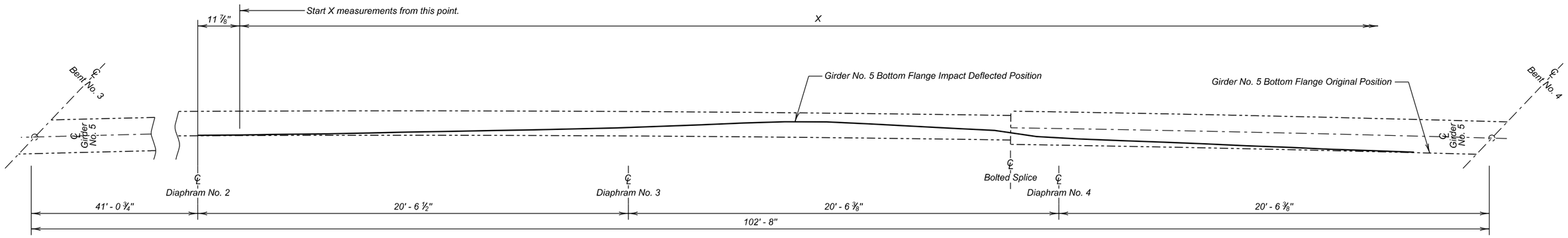
S. D. DEPT. OF TRANSPORTATION

JULY 2016

7 OF 19

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS	MM	KR	Steve A Johnson BRIDGE ENGINEER
BROKI47R	I47RRA07		

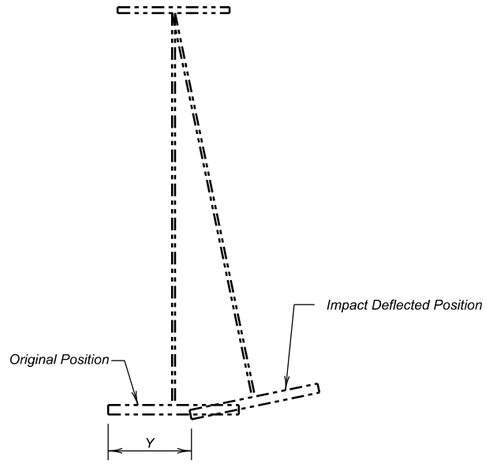
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W-168	15	26



PLAN

Girder No. 5 - Bottom Flange

GIRDER NO. 5 IMPACT DEFLECTED POSITION MEASUREMENTS	
X±	Y±
0' - 0"	0"
2' - 0"	3/16"
4' - 0"	3/16"
6' - 0"	3/4"
8' - 0"	1 3/16"
10' - 0"	1 3/4"
12' - 0"	2 3/16"
14' - 0"	2 11/16"
16' - 0"	3 1/8"
18' - 0"	3 7/8"
20' - 0"	4 9/16"
22' - 0"	5 1/2"
24' - 0"	6 3/8"
26' - 0"	7 13/16"
28' - 0"	8 13/16"
30' - 0"	8 7/8"
32' - 0"	8 1/16"
34' - 0"	7 1/8"
36' - 0"	6 1/8"
38' - 0"	5 1/4"
40' - 0"	4 5/8"
42' - 0"	3 11/16"
44' - 0"	3 3/16"
46' - 0"	2 3/4"
48' - 0"	2 3/16"
50' - 0"	1 11/16"
52' - 0"	1 5/16"
54' - 0"	3/4"
56' - 0"	3/16"
58' - 0"	1/4"



TYPICAL SECTION

(Shown at X measurements)

GIRDER NO. 5 REPAIR DETAILS (CONTINUED)

FOR

373' - 0" CONT. COMP.,
HORIZ. CURVED, GIRDER BRIDGE

38' - 0" ROADWAY
OVER HWY 14
STR. NO. 06-154-150

3°- 00' HORIZ. CURVE
SEC. 15-T110N-R50W
014 W-168

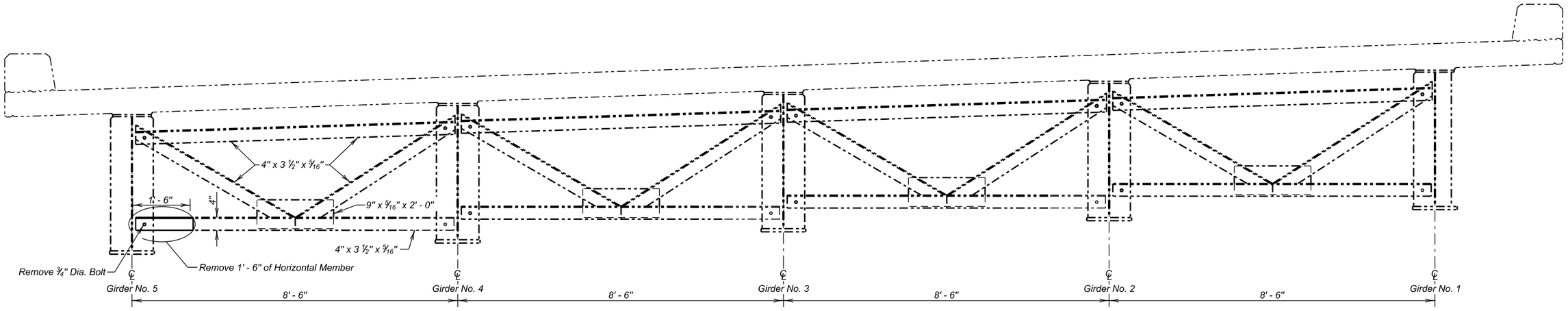
BROOKINGS COUNTY

S. D. DEPT. OF TRANSPORTATION

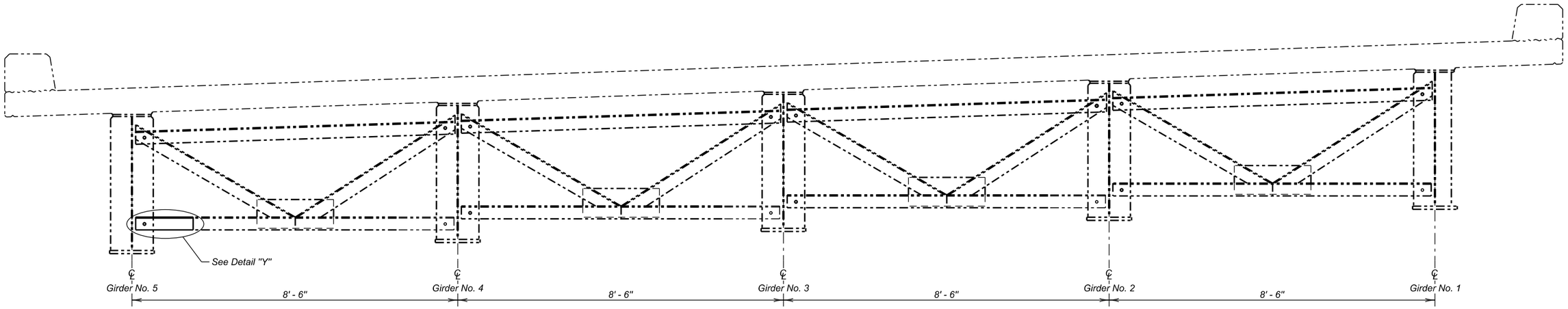
JULY 2016

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS	MM	KR	Steve A Johnson BRIDGE ENGINEER
BROKI47R	I47RRA08		

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W-168	16	26



SECTION B - B
(Existing Diaphragm Stiffener)



SECTION B - B
(New Diaphragm Stiffener)

GIRDER NO. 5 DIAPHRAGM
REMOVAL AND REPAIR DETAILS

FOR

373' - 0" CONT. COMP.,
HORIZ. CURVED, GIRDER BRIDGE

38' - 0" ROADWAY
OVER HWY 14
STR. NO. 06-154-150

3°- 00' HORIZ. CURVE
SEC. 15-T110N-R50W
014 W-168

BROOKINGS COUNTY

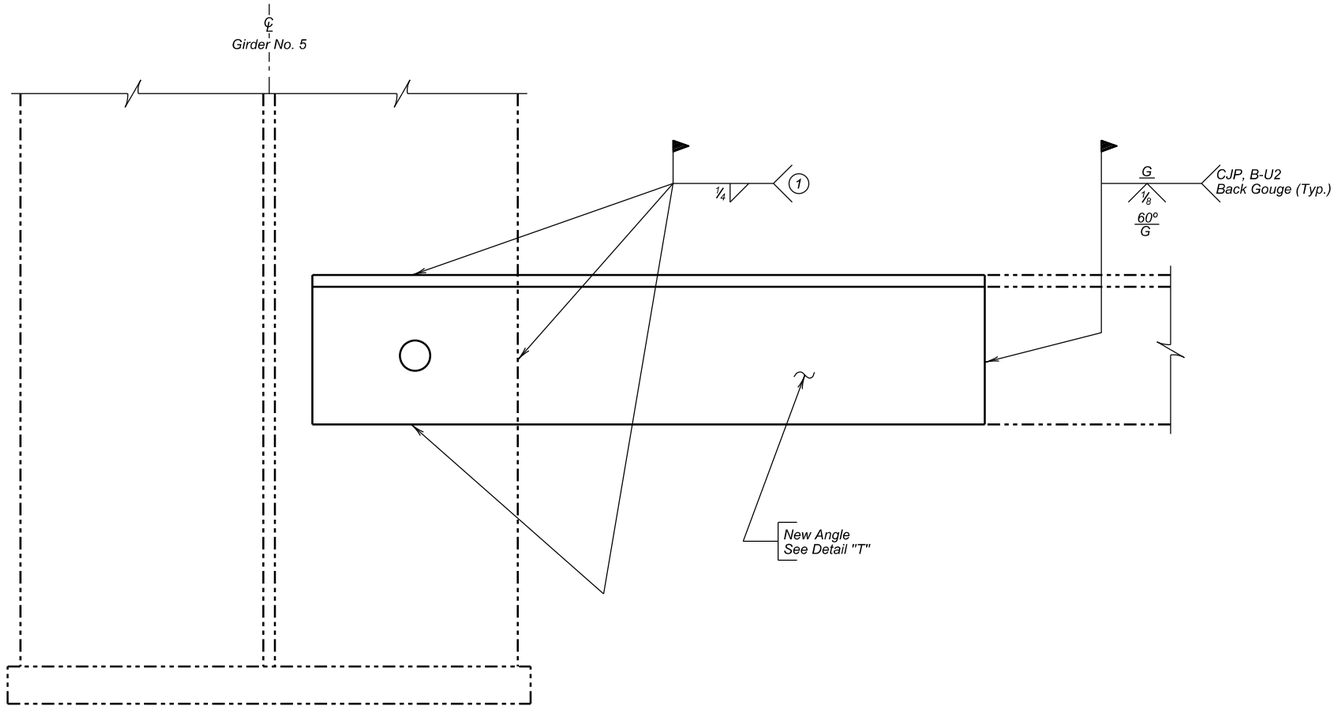
S. D. DEPT. OF TRANSPORTATION

JULY 2016

9 OF 19

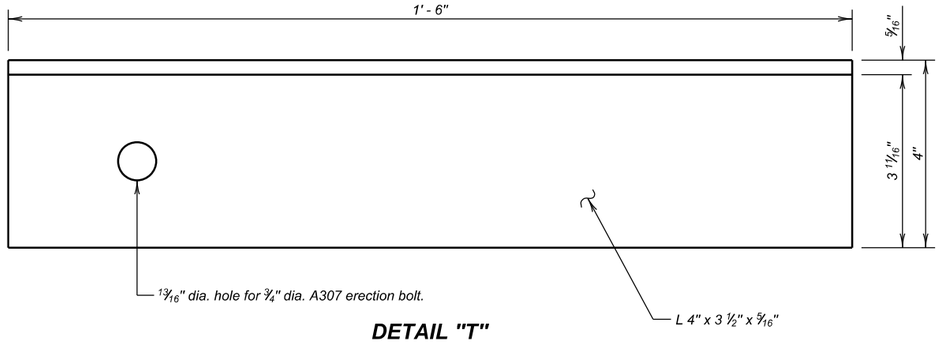
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS BROKI47R	MM I47RRA09	KR	Steve A Johnson BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W-168	17	26



DETAIL "Y"

1 *All fillet welds shall terminate ½" from edge of angle.*



DETAIL "T"

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
℄ Structural Steel, Miscellaneous	Lump Sum	LS

℄ *For informational purposes only, the estimated weight of the structural steel is 11.6 pounds.*

GIRDER NO. 5 DIAPHRAGM REPAIR DETAILS

FOR

373' - 0" CONT. COMP.,
HORIZ. CURVED, GIRDER BRIDGE

38' - 0" ROADWAY
OVER HWY 14
STR. NO. 06-154-150

3°- 00' HORIZ. CURVE
SEC. 15-T110N-R50W
014 W-168

BROOKINGS COUNTY

S. D. DEPT. OF TRANSPORTATION

JULY 2016

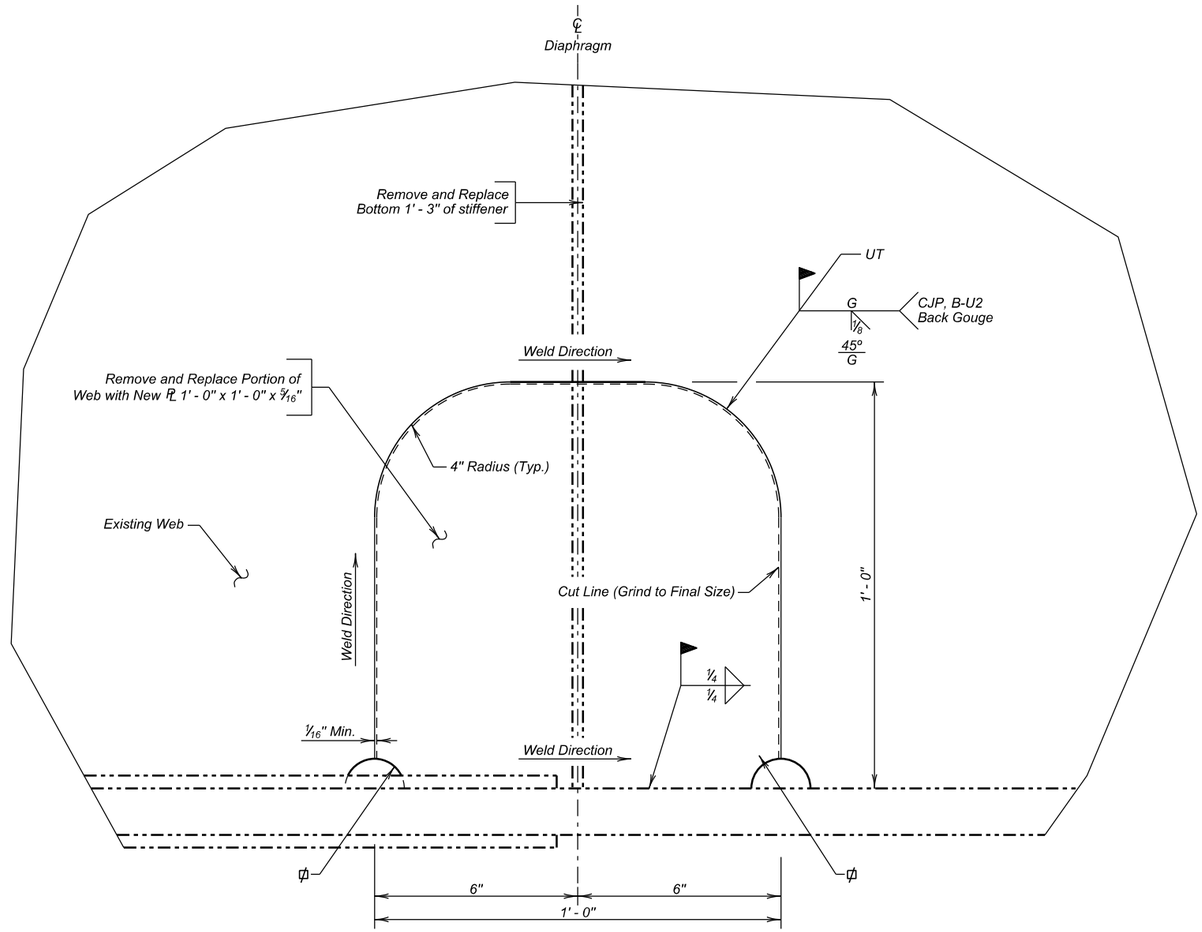
10 OF 19

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS BROKI47R	MM I47RRA10	KR	Steve A Johnson BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W-168	18	26

℄ *Using the Air Carbon Arc or Plasma Cutting Process, cut a 7/8" radius cope in the web prior to cutting the remainder of the web section out. After the new web section has been welded into place, resize the cope to a 1" radius by grinding the cut surface ensuring the weld tips are ground out. The finished surface shall be smooth.*

Bottom flange splice plate must be removed in order to replace web. Remove top of bottom flange plates one at atime only. Remove the top of bottom flange plate on side of the web, reinstall the plate using new 7/8" Dia. ASTM F3125 bolts and repeat for the other side of the web. No Traffic shall be allowed above this girder while the bolted splice plate is removed.



DETAIL "X"

ESTIMATED QUANTITIES			
	ITEM	UNIT	QUANTITY
℄	Remove and Replace Web	Each	1

℄ *For informational purposes only, the estimated weight of the structural steel is 260 pounds.*

GIRDER NO. 5 WEB REPAIR DETAILS

FOR

373' - 0" CONT. COMP.,
HORIZ. CURVED, GIRDER BRIDGE

38' - 0" ROADWAY — 3°- 00' HORIZ. CURVE
OVER HWY 14 — SEC. 15-T110N-R50W
STR. NO. 06-154-150 — 014 W-168

BROOKINGS COUNTY

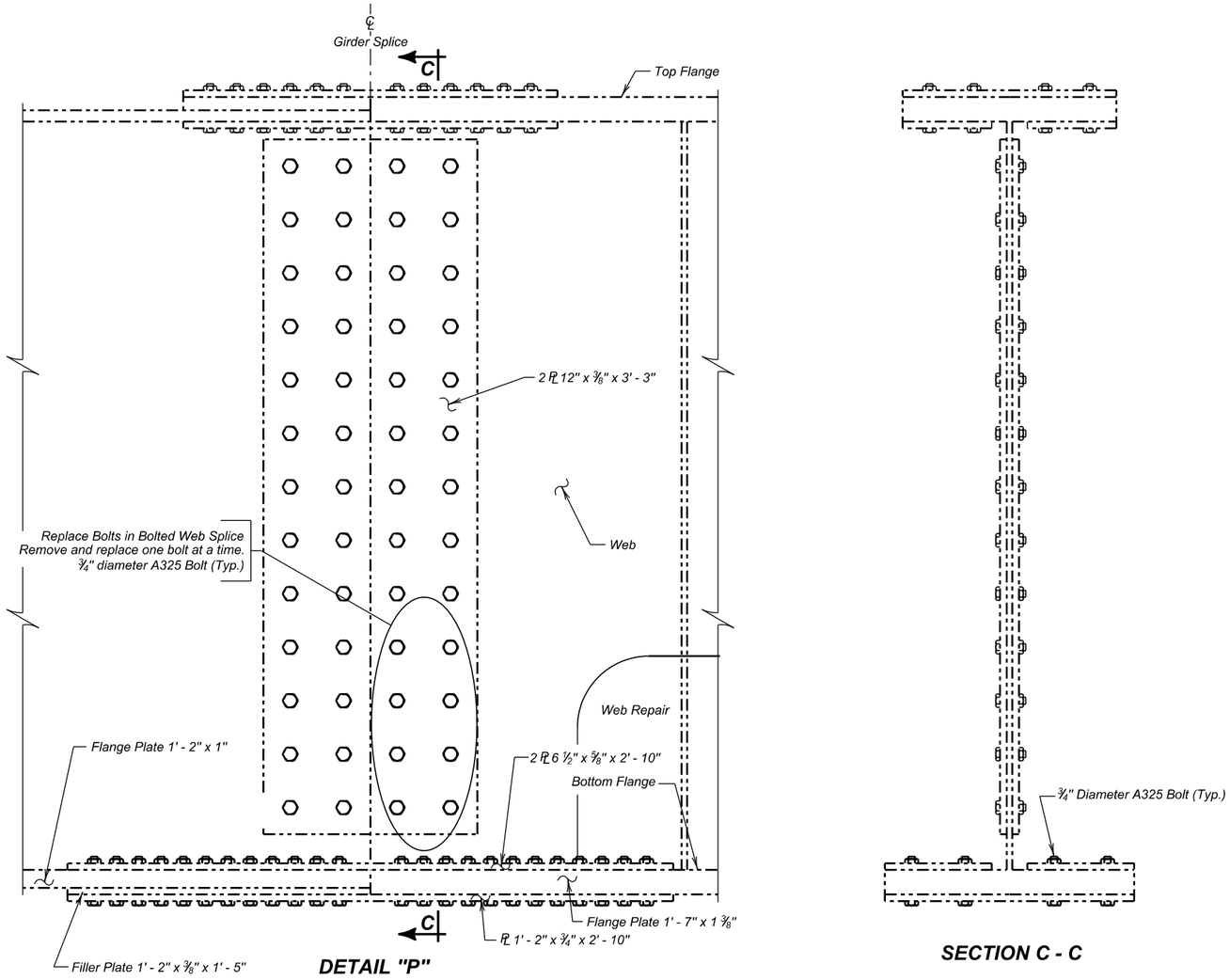
S. D. DEPT. OF TRANSPORTATION

JULY 2016

11 OF 19

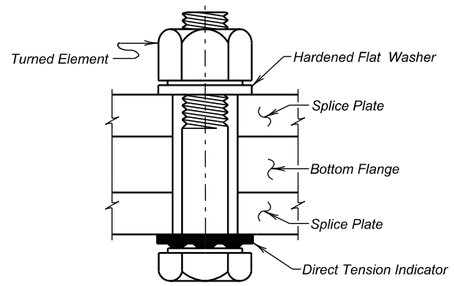
DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS	MM	KR	Steve A Johnson
BROKI47R	I47RRA11		BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W-168	19	26

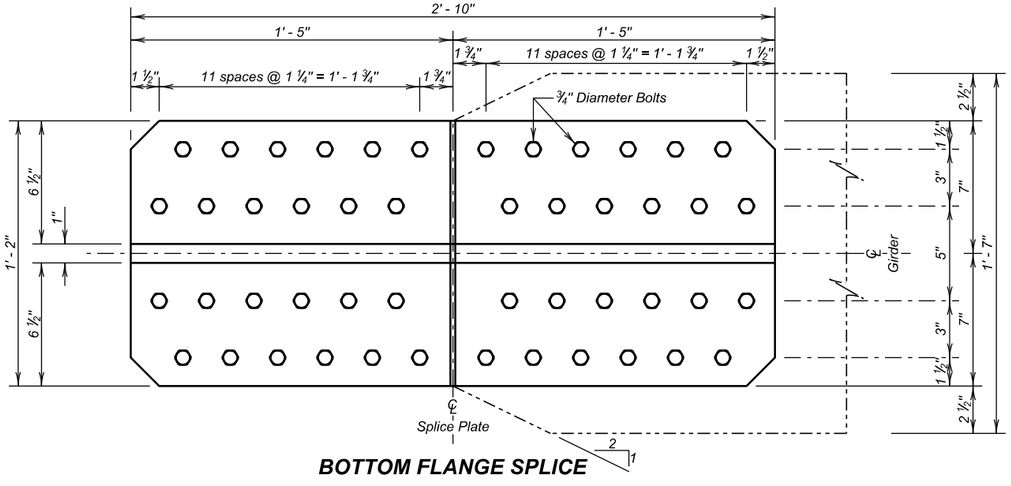


DETAIL "P"

SECTION C - C



DIRECT TENSION INDICATOR DETAIL



BOTTOM FLANGE SPLICE

ESTIMATED QUANTITIES		
ITEM	***UNIT***	***QUANTITY***
⁂ *Incidental Work, Structure*	*Lump Sum*	*LS*

⁂ *For informational purposes only, the estimated weight of the structural steel is 4 pounds.*

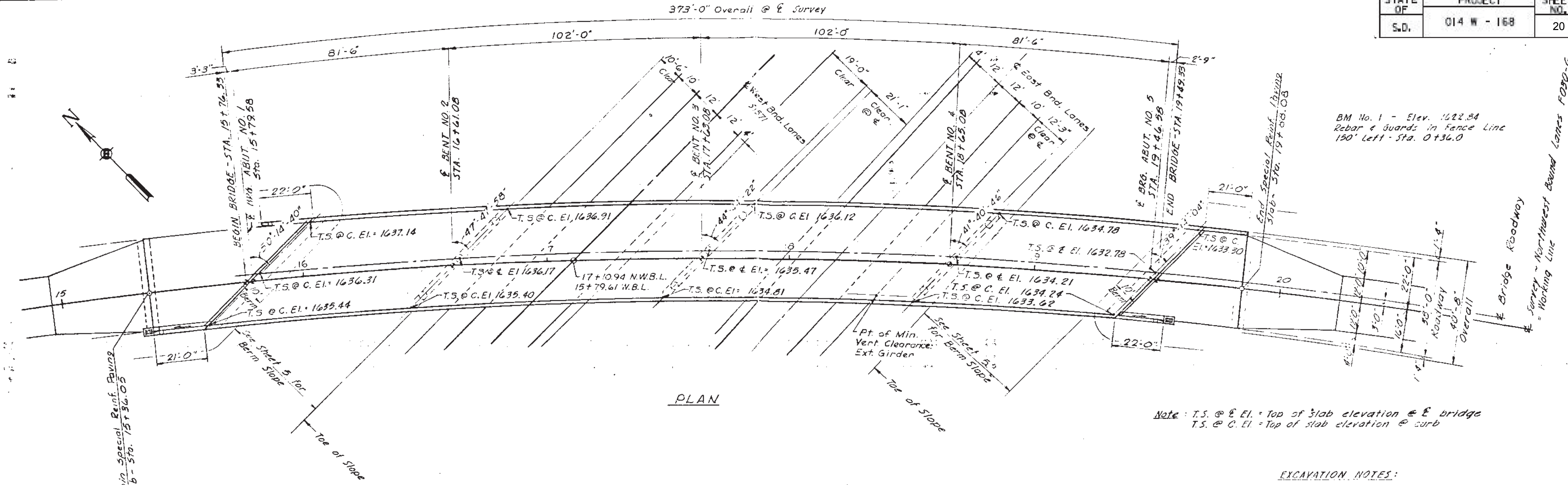
GIRDER NO. 5 SPLICE BOLTS REPLACEMENT DETAILS
FOR
373' - 0" CONT. COMP.,
HORIZ. CURVED, GIRDER BRIDGE

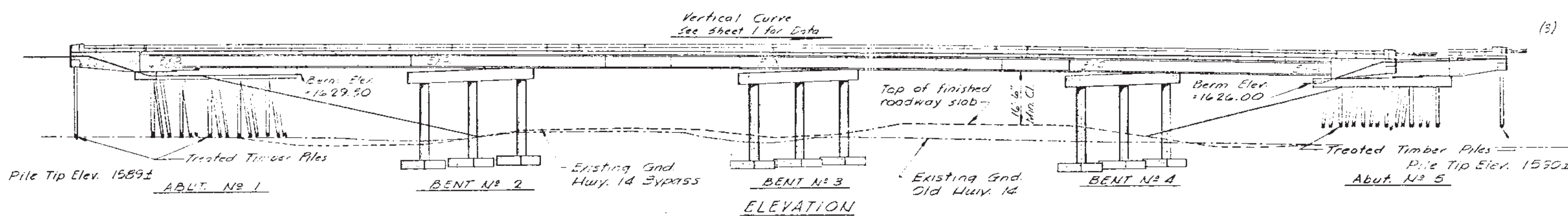
38' - 0" ROADWAY
OVER HWY 14
STR. NO. 06-154-150

3°- 00' HORIZ. CURVE
SEC. 15-T110N-R50W
014 W-168

BROOKINGS COUNTY
S. D. DEPT. OF TRANSPORTATION
JULY 2016

DESIGNED BY	CK. DES. BY	DRAFTED BY	
BWS	MM	KR	Steve A Johnson BRIDGE ENGINEER
BROKI47R	I47RRA12		





EXCAVATION NOTES:

(1) Footings for Bents No. 2, 3 & 4 shall be cast upon solid, undisturbed, silty clays and carried into same to the elevations shown.

(2) Bearing soil shall develop a minimum bearing value of 4½ Tons per sq. ft. If the bearing value is less than 4½ Tons per sq. ft. at the elevations shown, communicate with the BRIDGE SECTION.

(3) Final footing elevations for Bents No. 2, 3 & 4 shall be established before ordering column reinforcing steel for the respective bents. If the final footing elevations must differ from those shown, communicate with the BRIDGE SECTION.

ESTIMATED QUANTITIES

Item	Concrete Class "A"	Steel Reinf.	Steel Struct.*	RT-3 Steel Railing	Timber Piles Treated	Timber Piles Test**	Struct. Exc.	[illegible]	C.M.P. [illegible]	12" [illegible] Pipe	[illegible]	Anchor Assembly [illegible]
	Cu. Yds.	Lbs.	Lbs.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Each
Superstructure 373'-0" Cont. Unit	197.[illegible]	102,[illegible]	384,6[illegible]0	735								
Abutment No 1	64.[illegible]	5,7[illegible]	1[illegible]	37	570	40	3[illegible]	[illegible].1	18[illegible]	[illegible]	2	1
Bent No 2	77.5	[illegible]					55					
Bent No 3	75.[illegible]	[illegible]					[illegible]					
Bent No 4	7[illegible].5	[illegible]					[illegible]					
Abutment No 5	[illegible]	[illegible]	[illegible]	37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2

* Includes [illegible] lbs. structural steel for [illegible] for plate girders (to be cambered [illegible]) [illegible] flange method, and [illegible],350 lbs. all remaining structural steel.

** [illegible] treated timber test piles shall [illegible] at Abuts. No. 1 & No. 5 [illegible] remaining piles are ordered.

PILE NOTES

(1) Prebore piling through the fill embankment to natural ground line.

(2) Piling shall develop a minimum bearing value of 24 tons per pile.

(3) Prebored holes for piles shall be backfilled with granular material acceptable to the ENGINEER and compacted as specified by the ENGINEER. The cost of granular material in place shall be included in the unit price bid for the piles.

ORIGINAL CONSTRUCTION PLANS

GENERAL DRAWINGS AND QUANTITIES FOR 373'-0" CONT. COMP., HORIZ. CURVED, GIRDER VIADUCT

GRADE SEPARATION — SEC. 15 - T. 110 N., R. 50 W.
38'-0" ROADWAY — 3°-00' HORIZONTAL CURVE

U.S. HWY. NO. 14 - F030-6(3) - STA. 17+10.94 N.W.B. LANES
BROOKINGS CITY BYPASS - S1571(1) - STA. 15+79.61 W.B. LANES

STR. NO. 06-154-150 — BROOKINGS COUNTY, SOUTH DAKOTA

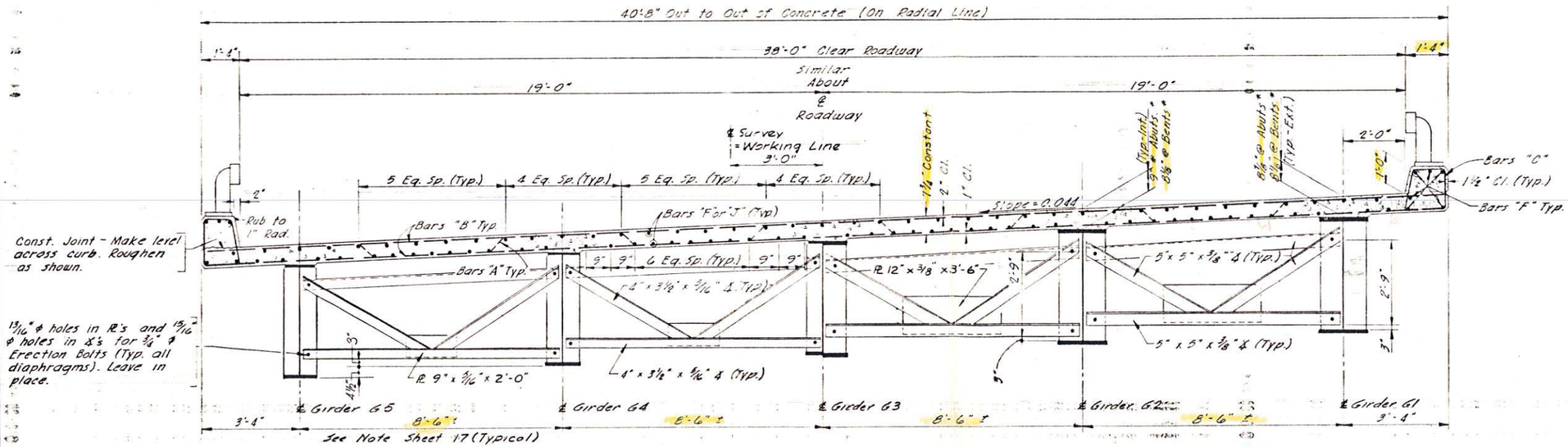
PREPARED BY:
J.T. BANNER & ASSOC. INC.
CONSULTING ENGINEERS
BROOKINGS, S. DAKOTA
DECEMBER 1967

HS 20-44

13 OF 19

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
[illegible]	G.W.K.	F.J.R.	BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W - 168	21	26

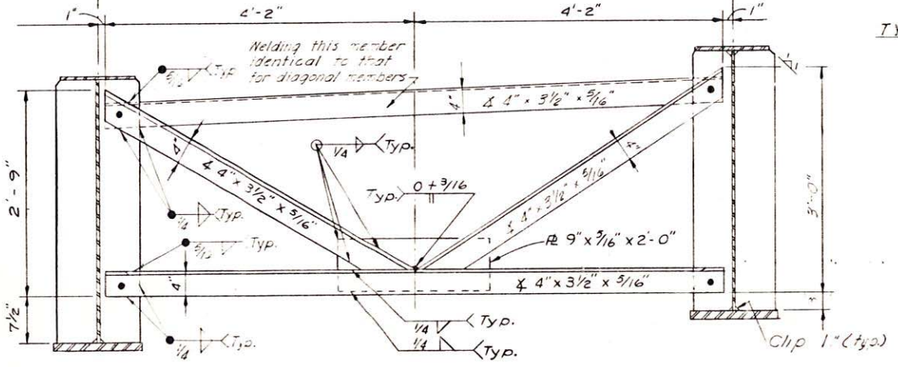


At Center of Span & Bents (Type I Diaphragms)

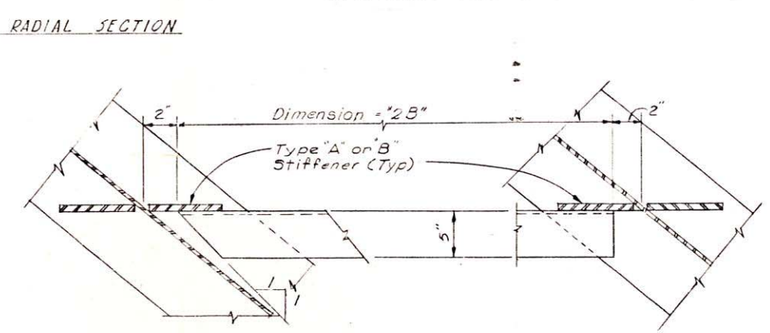
At Abutments (Type II Diaphragm)

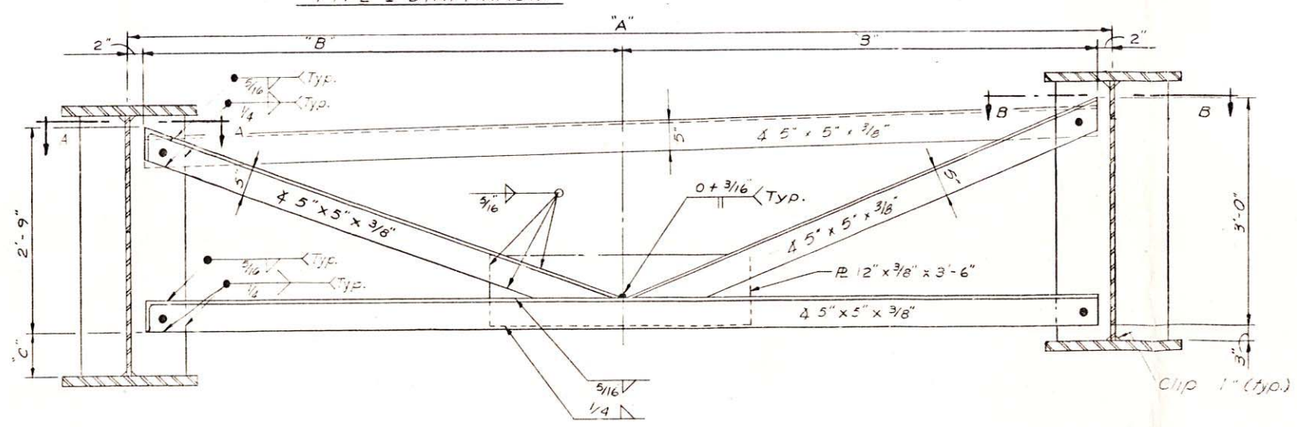
* Dimensions @ ℄ Bearings. At other points along the girders, this dimension shall be computed as shown on Erection Data Sheet.

TYPICAL RADIAL SECTION



TYPE I DIAPHRAGM





TYPE II DIAPHRAGM

TYPE II DIAPHRAGM VARIABLE DIMENSIONS

Dimension / Diaph. @	A	B	C
Abut. Nº 1	13'-3½"	6'-5¾"	0'-7⅝"
Abut. Nº 6	10'-11¾"	5'-2⅞"	0'-5⅞"

SUPERSTRUCTURE NOTES

1. Design Specifications: A.A.S.H.O. Specifications for Highway Bridges, 1965.
2. Design Loading: HS 20-44 A.A.S.H.O.
   Unit Stresses: Reinf. Steel f_s = 20,000 p.s.i., Conc. f'_c = 4000 p.s.i. f_c = 1250 p.s.i. for deck slab.
3. Structural Steel members shall conform to A.S.T.M. - A36 steel. Steel produced under other specifications, but shown to possess the chemical and physical properties of A-36 steel will be accepted for use where the latter is specified.
4. Structural steel for bearings shall conform to A.S.T.M. - A36, except as shown.
5. Cost of welding shall be included in the unit price bid for structural steel.
6. Cost of canvas and red lead on preformed fabric pads under bearing plates shall be included in the unit price bid for structural steel.
7. Copper alloy bearing plates shall be as specified on bearing sheet. The weight of these plates shall be computed as structural steel and included in that bid item.
8. Butt welded girder splices, shop or field, shall be radiographically inspected.
9. All reinforcing steel bars shall conform to A.S.T.M. specifications A305 and A15 Intermediate Grade.
10. All exposed concrete edges shall be chamfered 1" unless otherwise noted.
11. See Railing sheet for details of handrails and curb.
12. Erection bolts left in place at diaphragms shall be included in the structural steel quantity for payment.
13. The cost of painting shall be included in the unit price bid for structural steel.
14. Fillet welds shall be subjected to magnetic particle inspection as specified in the Supplemental Specifications for steel structures, dated June 29, 1963
15. Structural steel shall be painted with one shop coat of Red Lead Paint (A.A.S.H.O. designation M72 Type I) or Red Lead Iron Oxide Paint (A.A.S.H.O. designation M72 Type III) and shall be field painted with one coat of gray paint followed by a coat of green paint in accordance with Special Provisions.
16. The girders shall be curved to fit the horizontal radii shown and shall be curved by the cut flange method. The cost for curving the girders shall be included in the unit price bid for structural steel.

ORIGINAL CONSTRUCTION PLANS

SLAB & DIAPHRAGM DETAILS FOR 373'-0" CONT. COMP., HORIZ. CURVED, GIRDER VIADUCT

GRADE SEPARATION
38'-0" ROADWAY

SEC. 15 - T. 110 N., R 50 W.
3°-00' HORIZONTAL CURVE

U.S. HWY. NO. 14 - FC 30 - 6(3) - STA. 17+10.94 N.W.B. LANES
BROOKINGS CITY BYPASS - S 157(1) - STA. 15+79.61 W.B. LANES

BROOKINGS COUNTY
SOUTH DAKOTA

STR. NO. 06-154-150

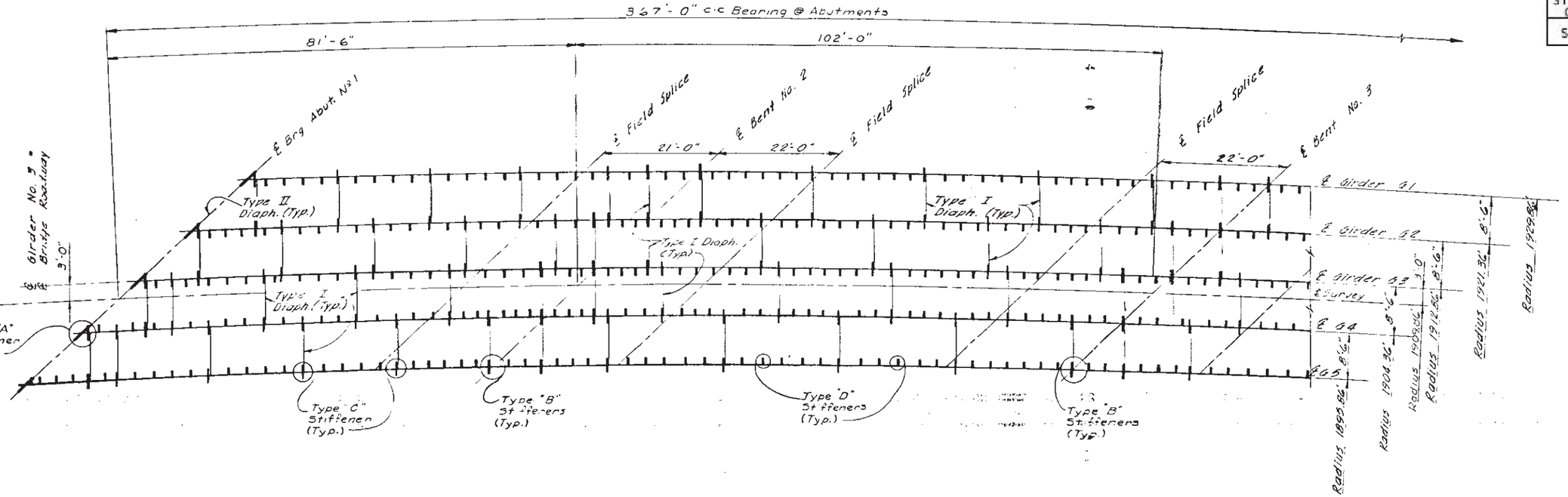
PREPARED BY:
J. T. BANNER & ASSOC. INC.
CONSULTING ENGINEERS
BROOKINGS, S. DAKOTA
DECEMBER 1967

HS 20-44

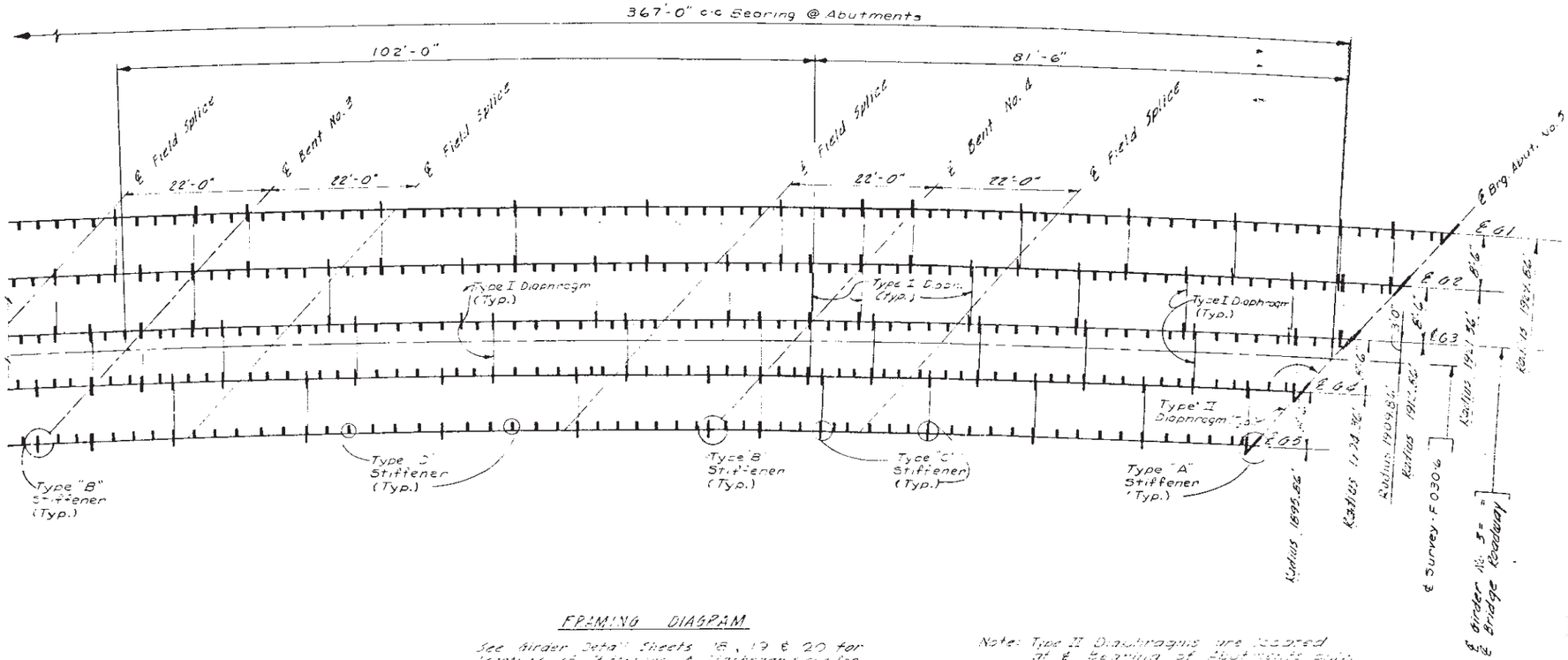
14 OF 19

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
K.G.M.	H.A.S.	F.J.R.	BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W - 168	22	26



Note: Girders are laid out for 8'-6" spacing at ℄ Abutments & Bents. Spacing at Mid-Span will vary slightly.



FRAMING DIAGRAM

See Girder Data Sheets 18, 19 & 20 for locations of Stiffeners & Diaphragms and for Girder Dimensions

Note: Type II Diaphragms are located at ℄ Bearing at Abutments only. All other Diaphragms are Type I. Stiffeners at ℄ Brg. Abutments are Type "A" Stiffeners, at ℄ Brg. Bents are Type "B". At ℄ Piers are all other Diaphragms are Type "D" Intermediate Stiffeners are Type "D"

ORIGINAL CONSTRUCTION PLANS

GIRDER LAYOUT FOR 373'-0" CONT. COMP., HORIZ. CURVED, GIRDER VIADUCT

GRADE SEPARATION
38'-0" ROADWAY

SEC. 15 - T. 110 N., R. 50 W.
3°-00' HORIZONTAL CURVE

U.S. HWY. NO. 14 - F 030 - 6(3) - STA. 17+10.94 N.W.B. LANES
BROOKINGS CITY BYPASS - S 1571(1) - STA. 15+79.61 W.B. LANES

BROOKINGS COUNTY
SOUTH DAKOTA

STR. NO. 06-154-150

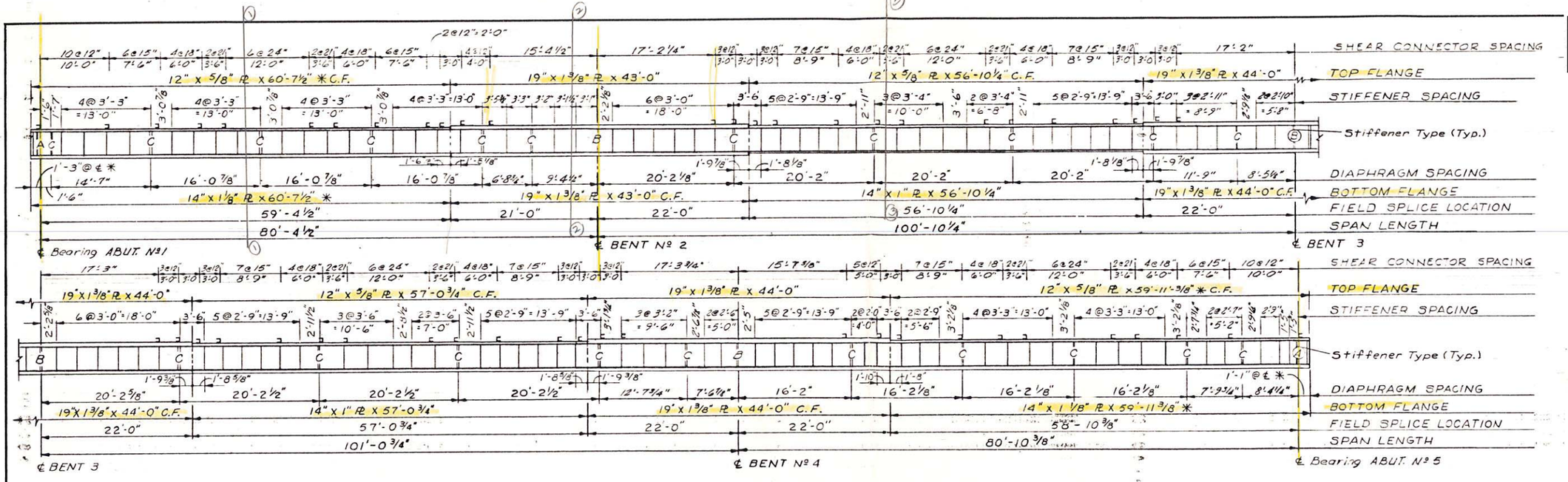
PREPARED BY
J.T. BANNER & ASSOC. INC.
CONSULTING ENGINEERS
BROOKINGS S. DAKOTA
DECEMBER 1967

HS 20-44

15 OF 19

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
[illegible]	[illegible]	[illegible]	BRIDGE ENGINEER

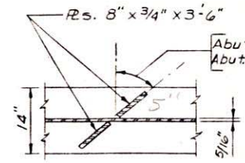
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 N - 168	23	26



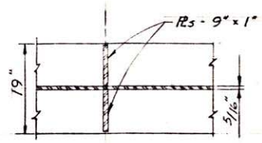
GIRDER G-1 LAYOUT

(Web ℞ 42" x 5/16" Constant)
Horizontal Curve Radius = 1929.86'

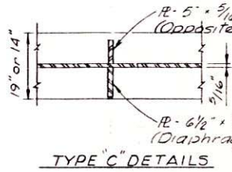
Notes: (1.) Stiffeners are type D unless noted. (Typ.)
(2.) Type D stiffeners near face only.
(3.) For dimensions marked with ✳ see Girder Details @ Abuts. sheet 20.
(4.) See Stiffener Details this sheet.
(5.) Plates marked C.F. = Compression Flange



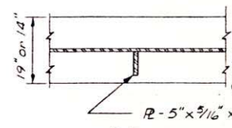
TYPE "A" DETAILS



TYPE "B" DETAILS



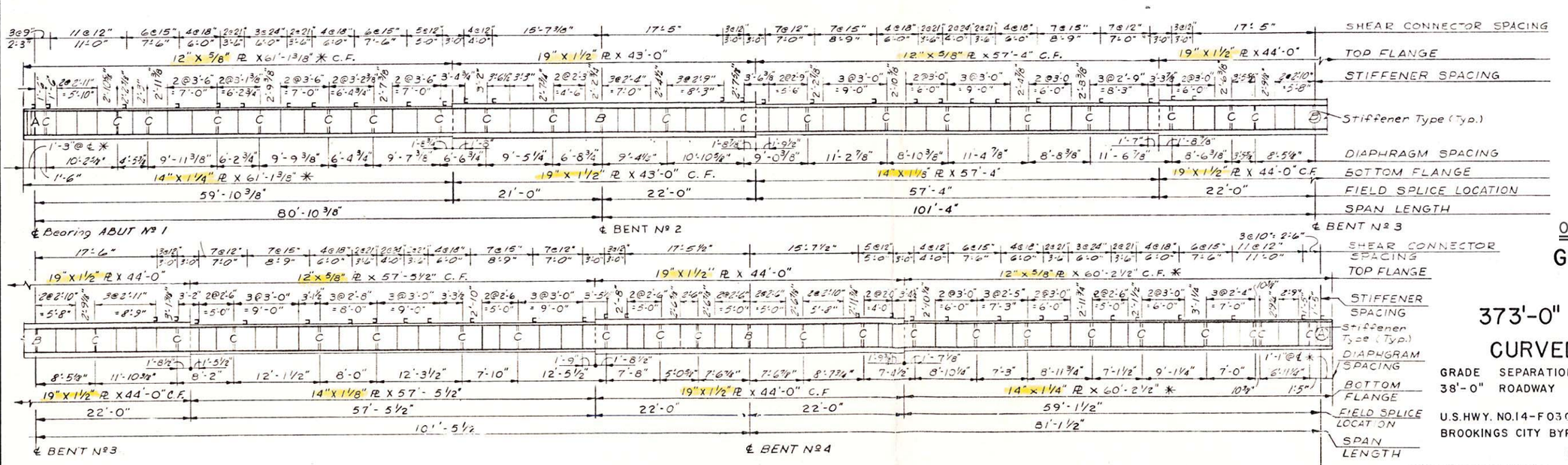
TYPE "C" DETAILS



TYPE "D" DETAILS

STIFFENER ℞ DETAILS

All stiffeners shall be made normal to flanges.



GIRDER G-2 LAYOUT

(Web ℞ 42" x 5/16" Constant)
Horizontal Curve Radius = 1921.36'

Notes: (1.) Stiffeners are type D unless noted. (Typ.)
(2.) Type D stiffeners near face only.
(3.) For Dimensions marked with ✳ see Girder Details @ Abuts., sheet 20.
(4.) See Stiffener Details this sheet.
(5.) Plate marked C.F. = Compression Flange

ORIGINAL CONSTRUCTION PLANS

GIRDER DETAILS
FOR
373'-0" CONT. COMP. HORIZ. CURVED, GIRDER VIADUCT

GRADE SEPARATION
38'-0" ROADWAY

SEC. 15 - T. 110 N., R. 50 W.
3°-00' HORIZONTAL CURVE

U.S. HWY. NO. 14-F030-6(3) - STA. 17+10.94 N.W.B. LANES
BROOKINGS CITY BYPASS - S1571(1) - STA. 15+79.61 W.B. LANES

BROOKINGS COUNTY
SOUTH DAKOTA

STR. NO. 06-154-150

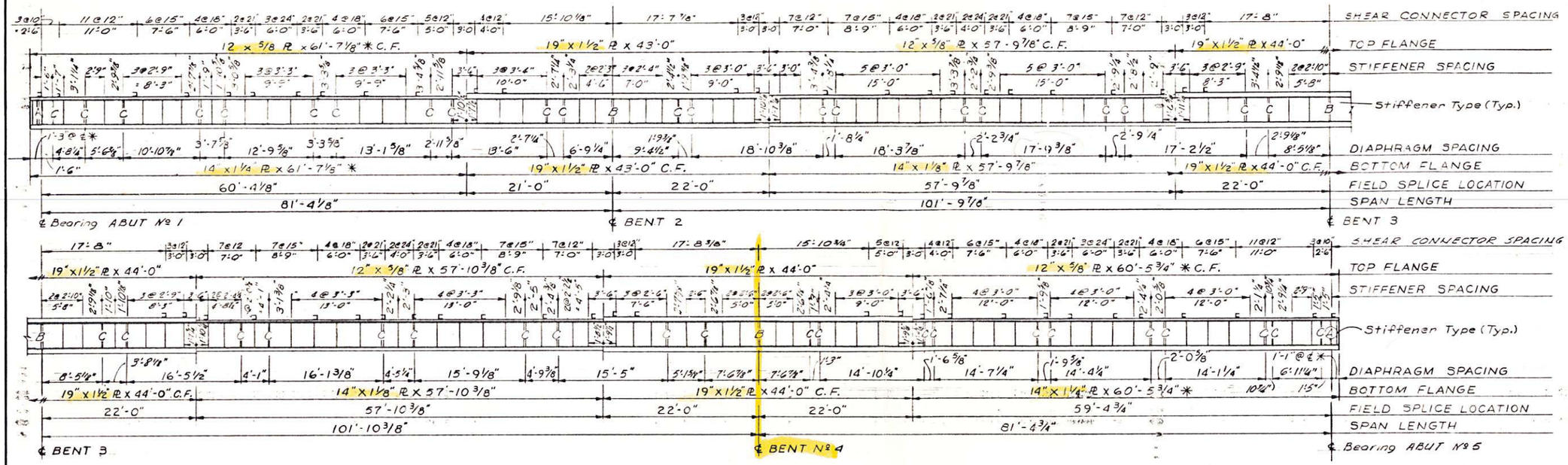
PREPARED BY:
J.T BANNER & ASSOC. INC.
CONSULTING ENGINEERS
BROOKINGS, S. DAKOTA
DECEMBER 1967

HS 20-44

16 OF 19

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
K.G.M.	H.A.S.	F.J.R.	BRIDGE ENGINEER

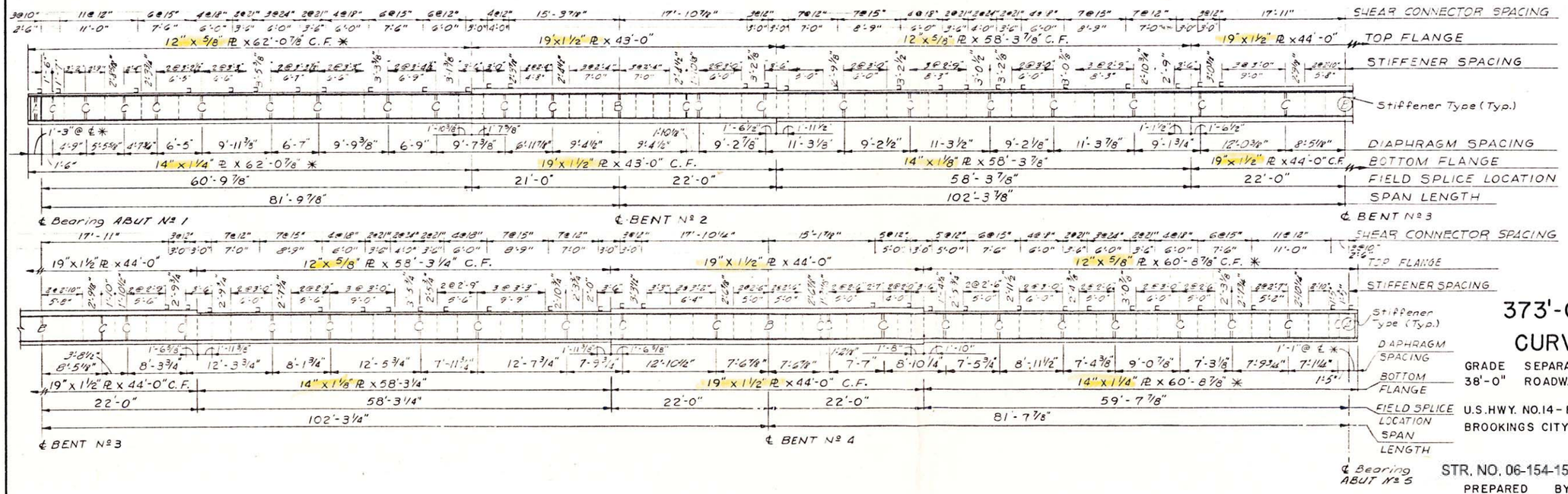
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W - 168	24	26



GIRDER G-3 LAYOUT

(Web PL 42" x 5/16" Constant)
Horizontal Curve Radius = 1912.86'

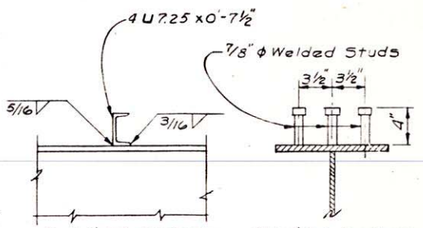
Notes: (1) Stiffeners are Type D unless noted (typ)
(2) Type D stiffeners near face only
(3) For dimensions marked with *, see Girder Details @ Abuts., sheet 20.
(4) See stiffener Details, sheet 18.
(5) Plates marked C.F. = Compression Flange



GIRDER G-4 LAYOUT

(Web = 42" x 5/16" ℄ Constant)
Horizontal Curve Radius = 1904.36'

Notes: (1) Stiffeners are Type D unless noted (Typ.)
(2) Type D stiffeners far side only
(3) For dimensions marked with *, see Girder Details @ Abuts., sheet 20.
(4) See stiffener details sheet 18.
(5.) Plates marked C.F. = Compression Flange



DETAILS FOR SHEAR CONNECTORS

Channel or Welded stud connectors are spaced as shown on Girder Layout.

The Contractor may substitute a row of 7/8" ϕ welded studs for each channel shear connector as shown.

Shear connectors will be paid for as structural steel based on the weight of channels, regardless of type of connector used.

Channels shall be placed on girders facing the directions as shown on Girder Layouts.

ORIGINAL CONSTRUCTION PLANS

GIRDER DETAILS FOR 373'-0" CONT. COMP., HORIZ. CURVED, GIRDER VIADUCT

GRADE SEPARATION — SEC. 15 - T. 110 N., R. 50 W.
38'-0" ROADWAY — 3°-00' HORIZONTAL CURVE

U.S. HWY. NO. 14 - F030-6(3) - STA. 17+10.94 N.W.B. LANES
BROOKINGS CITY BYPASS - S157(1) - STA. 15+79.61 W.B. LANES

BROOKINGS COUNTY
SOUTH DAKOTA

STR. NO. 06-154-150

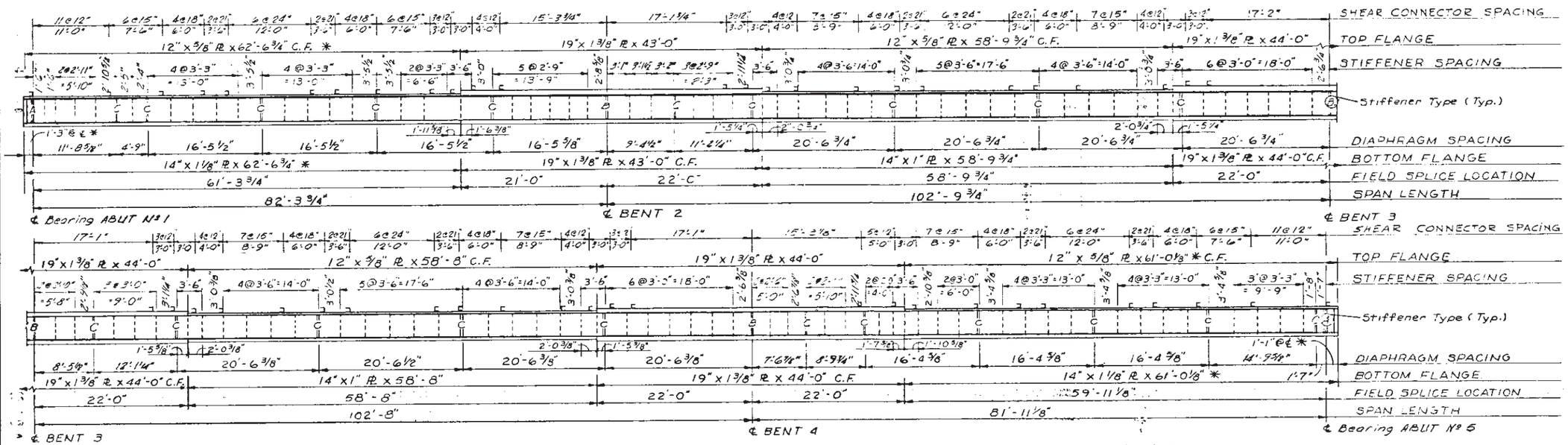
PREPARED BY:
J.T. BANNER & ASSOC. INC.
CONSULTING ENGINEERS
BROOKINGS, S. DAKOTA
DECEMBER 1967

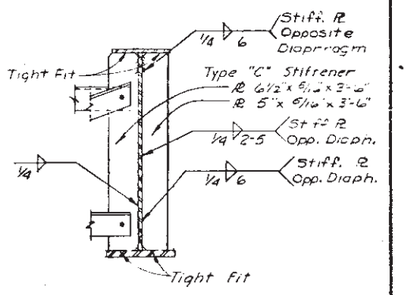
HS 20-44

17 OF 19

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
K.G.M.	G.M.K.	F.J.R.	BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W - 168	25	26



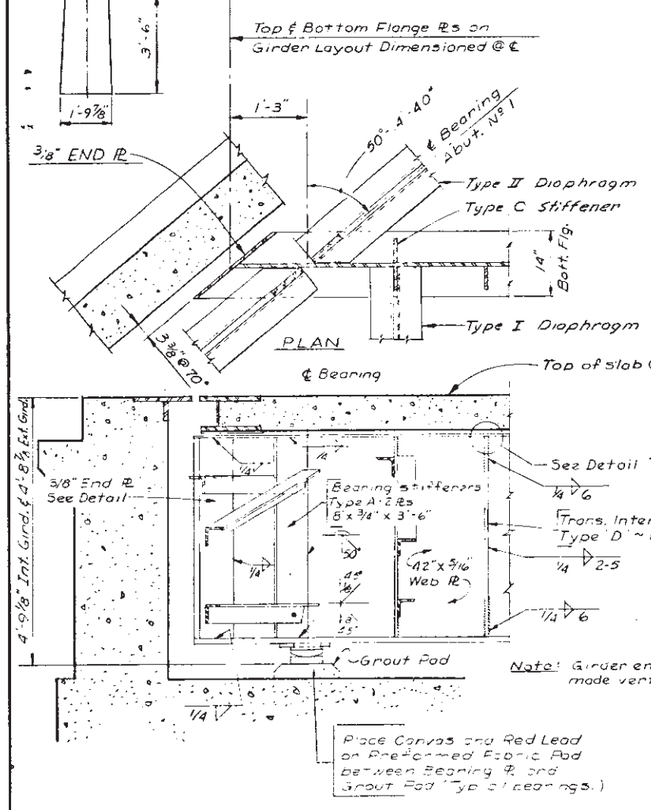


TYPICAL STIFFENER DETAILS AT DIAPHRAGMS (TYPE I)

Note: (1.) Stiffeners are type D unless noted (typ.).
(2.) Type D stiffeners for side only.
(3.) For dimensions marked with *, see Girder Details @ Abuts, this sheet.
(4.) See Stiffener Details, Sheet 18.
(5.) Plates marked C.F. = Compression Flange

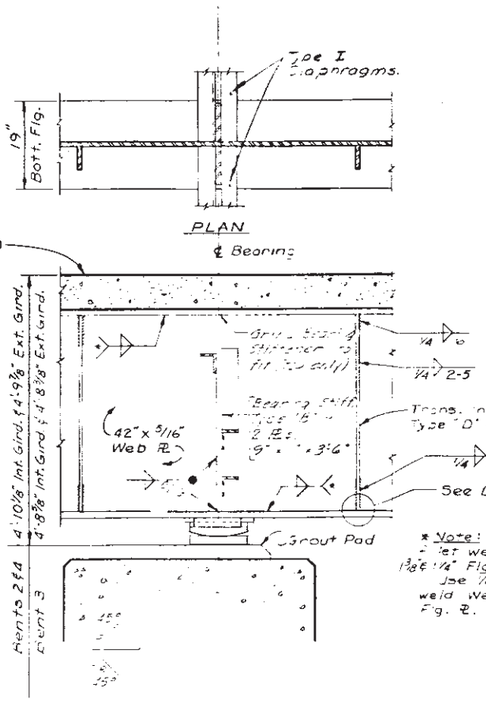
GIRDER G-5 LAYOUT

(Web R = 42" x 5/16" Constant)
Horizontal Curve Radius = 1895.86'



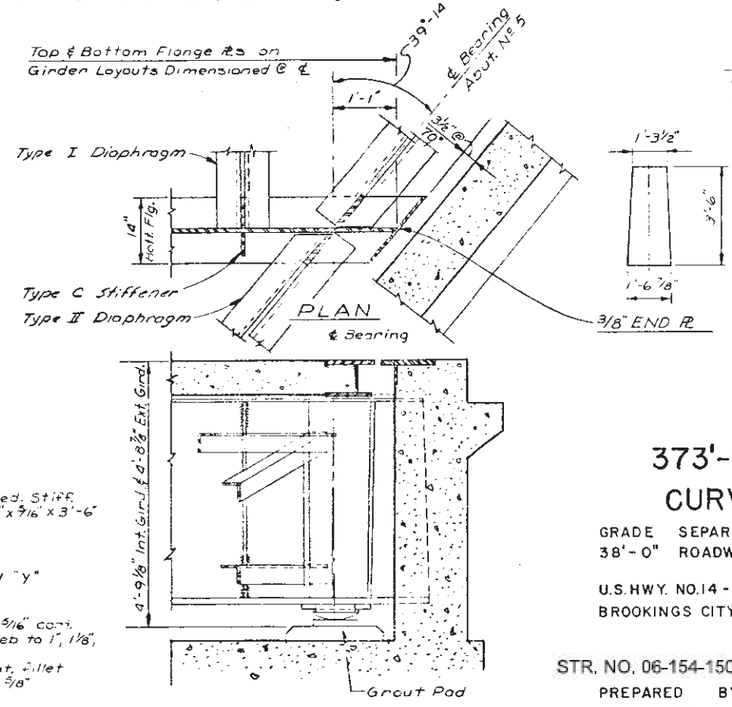
Note: Girder ends shall be made vertical.

TYP. GIRDER DETAILS ABUT. No. 1

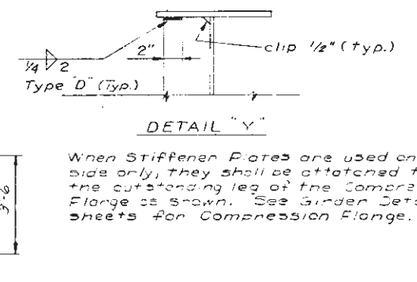


* Note: Use 5/16" cont. fillet weld - Web to 1", 1 1/8", 1 3/8" Flg. Rs. Use 1/4" cont. fillet weld Web to 5/8" Flg. R.

TYP. GIRDER DETAILS-BENTS
Bents 2 & 4 Shown; Bent 3 Similar as noted.



TYP. GIRDER DETAILS ABUT. No. 5



DETAIL "Y"

When Stiffener Plates are used on one side only, they shall be attatched to the outstanding leg of the Compression Flange as shown. See Girder Detail sheets for Compression Flange.

ORIGINAL CONSTRUCTION PLANS

GIRDER DETAILS FOR 373'-0" CONT. COMP., HORIZ. CURVED, GIRDER VIADUCT

GRADE SEPARATION
38'-0" ROADWAY

SEC. 15 - T. 110 N., R. 50 W.
3°-00' HORIZONTAL CURVE

U.S. HWY. NO. 14 - F030-6(3) - STA. 17+10.94 N.W.B. LANES
BROOKINGS CITY BYPASS - S1571(1) - STA. 15+79.61 W.B. LANES

STR. NO. 06-154-150

BROOKINGS SOUTH
COUNTY DAKOTA

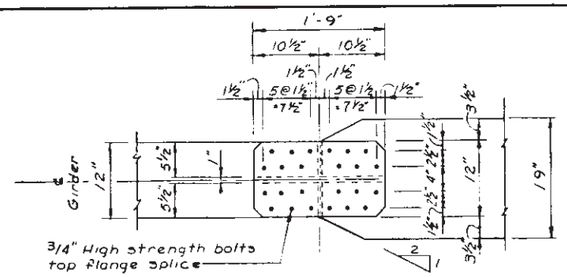
PREPARED BY:
J.T. BANNER & ASSOC. INC.
CONSULTING ENGINEERS
BROOKINGS, S. DAKOTA
DECEMBER 1967

HS 20-44

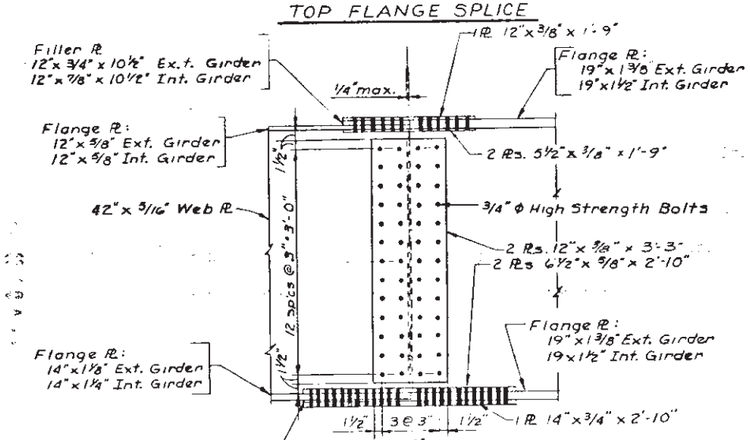
18 OF 19

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
K.G.M.	M.P.S.	F.J.R.	BRIDGE ENGINEER

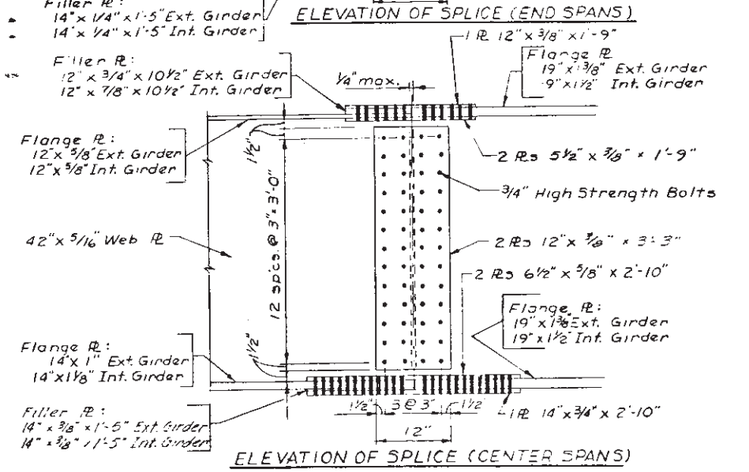
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	014 W - 168	26	26



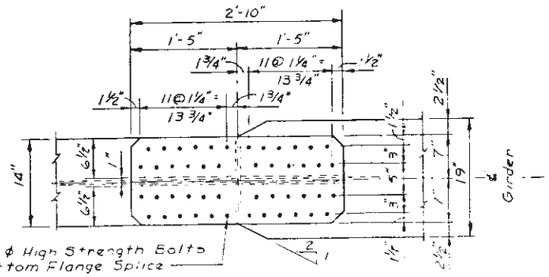
TOP FLANGE SPLICE



ELEVATION OF SPLICE (END SPANS)



ELEVATION OF SPLICE (CENTER SPANS)



BOTTOM FLANGE SPLICE

GENERAL NOTES FOR BOLTED FIELD SPLICE

1. All bolts shall be 3/4" ϕ.
2. Bolts, nuts, and washers shall conform to requirements of A.S.T.M. Specifications A325. Bolts shall have heavy head and one hardened washer. Hardened washer to be assembled under the turned element.
3. Holes for 3/4ϕ high strength bolts shall be subpunched and reamed or drilled and splice plates match-marked after assembling as provided in Section 410.3 of South Dakota Standard Specifications for Roads and Bridges.
4. Contact surfaces of splices shall be free of all oil or paint.
5. Steel for splice plates and filler plates shall conform to A.S.T.M. A36 Steel.
6. 3/4" ϕ high strength bolts shall be tightened to a minimum tension of 28,400 Lbs. Tightening shall be done with properly calibrated wrench or by the "turn of the nut" method as provided in Section 2.10.20 of the A.A.S.H.O. Specifications.
7. Bolts in flange splices shall be placed with heads down.
8. Bolts in web splices of exterior girders shall be placed with heads on exterior face of girders.
9. High strength bolts, nuts and washers shall be stored in such a manner that they will be kept free from any rust or foreign material which will cause erratic torque wrench readings when checked with a bolt tension calibrator.
10. Cut ends of intermediate stiffners as necessary to clear flange splice plates.
11. All splice plate, filler plates, bolts, nuts and washers to be included in and paid for as "Structural Steel."

ORIGINAL CONSTRUCTION PLANS

FIELD SPLICE DETAILS FOR 373'-0" CONT. COMP. HORIZ. CURVED, GIRDER VIADUCT

GRADE SEPARATION
38'-0" ROADWAY

SEC. 15 - T. 110 N. R. 50 W.
3°-00' HORIZONTAL CURVE

U.S. HWY. NO. 14 - F030-6(3) - STA. 17+10.94 N.W.B. LANES
BROOKINGS CITY BYPASS - S157(1) - STA. 15+79.61 W.B. LANES

BROOKINGS COUNTY
STR. NO. 06-154-150 SOUTH DAKOTA

PREPARED BY:
J.T. BANNER & ASSOC. INC.
CONSULTING ENGINEERS
BROOKINGS, S. DAKOTA
DECEMBER 1967

HS 20-44

19 OF 19

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
K.G.M.	M.A.S.	F.J.R.	BRIDGE ENGINEER