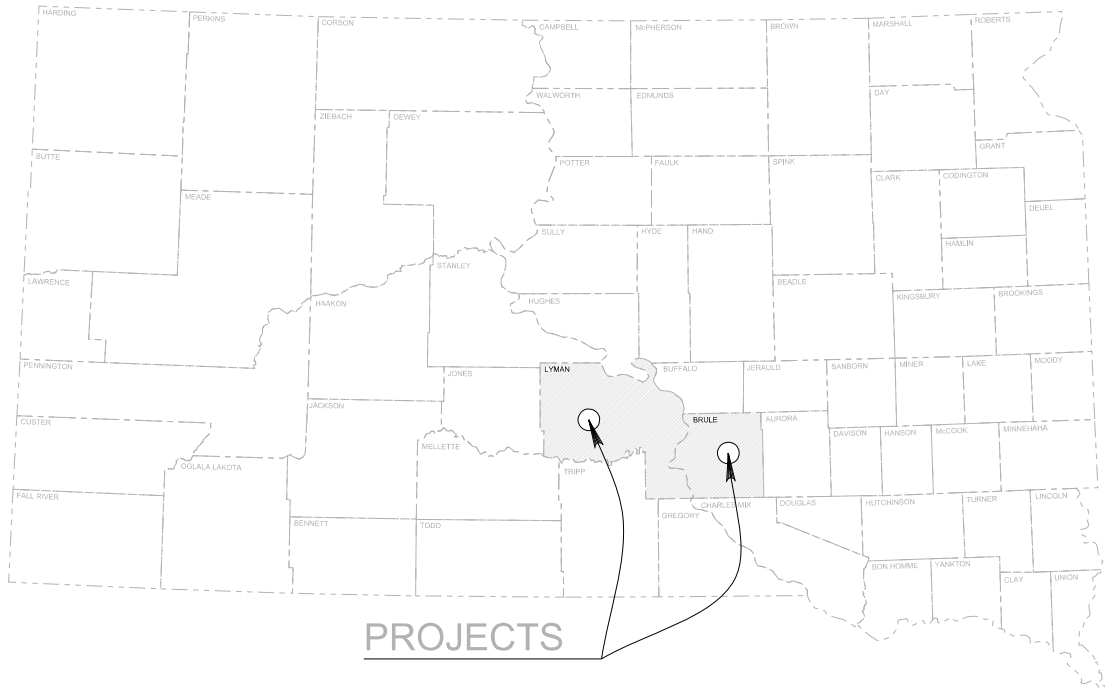


PLOT SCALE - 1"=200'

PLOTTED FROM - TRM1INT15



STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
PLANS FOR PROPOSED

**PROJECTS 090E-288 & 090W-368**  
**SD HIGHWAY 45 (OVER INTERSTATE 90)**  
**INTERSTATE 90 (OVER US HIGHWAY 183)**  
**BRULE & LYMAN COUNTIES**

GIRDER REPAIR & STRIP SEAL REPAIR  
PCN I65F & I65E

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090E-288 & 090W-368	1	52

Plotting Date: 01/25/2021

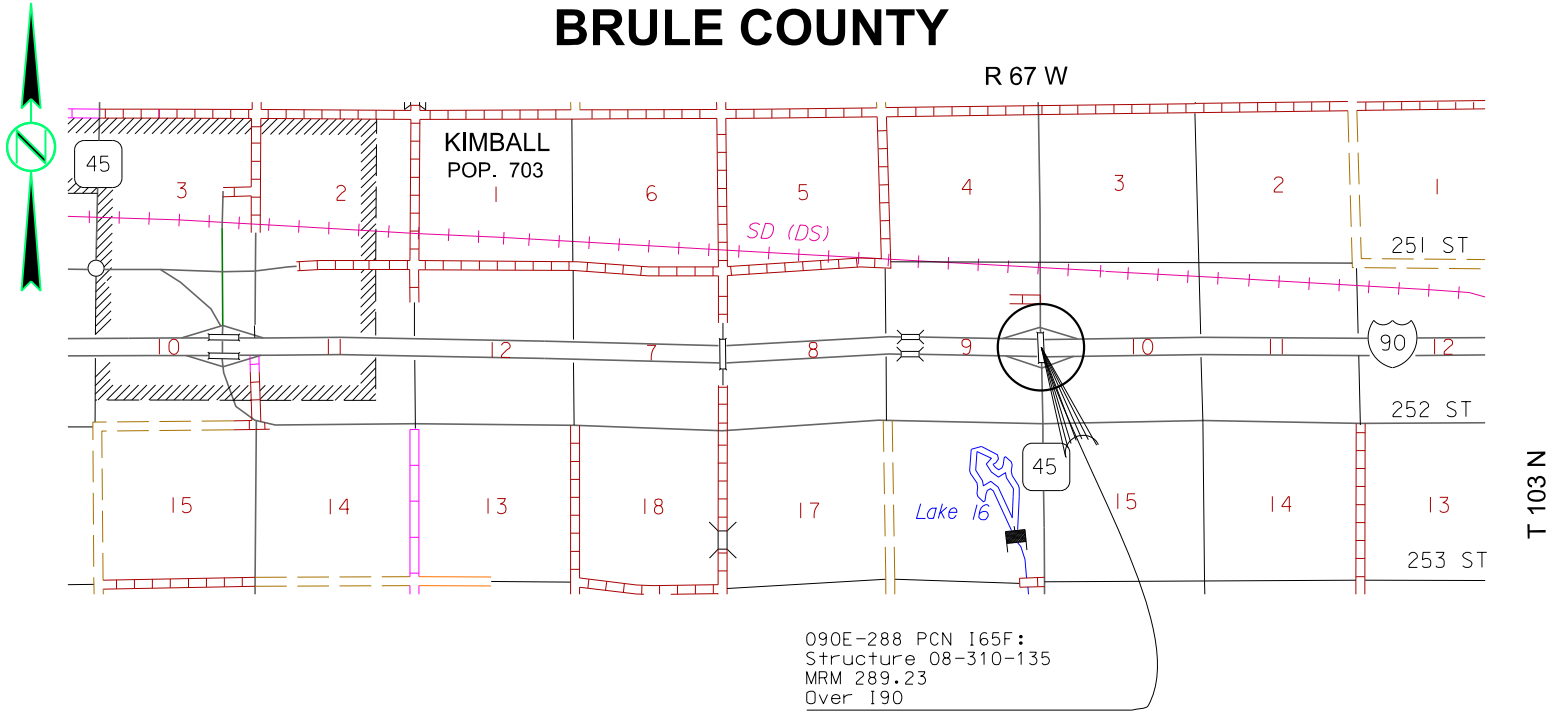
INDEX OF SHEETS

Sheet 1:	Title Sheet
Sheets 2-3:	Estimate of Quantities and Environmental Commitments
Sheet 4:	Traffic Control Notes
Sheet 5:	Traffic Control Sign Tables
Sheets 6-25:	Structure 08-310-135 Plans
Sheets 26-40:	Structure 43-160-205 Plans
Sheets 41-47:	Structure 43-160-206 Plans
Sheets 48-52:	Standard Plates

PLOT NAME - 1

FILE - ...\\TITLE\_165F\_163E.DGN

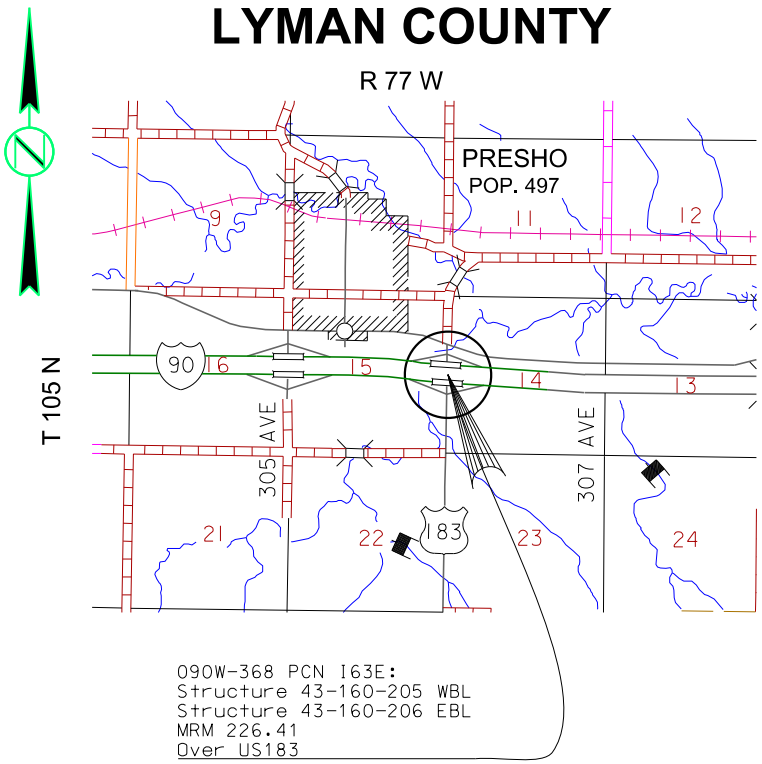
**BRULE COUNTY**



DESIGN DESIGNATION		
ROUTE	SD45	I90E
ADT(2019)	902	4,053
ADT(2039)	1,035	4,665
DHV	119	772
D	51%	50%
T DHV	12%	11.7%
T ADT	26.4%	25.7%
V	65 MPH	80 MPH

**STORM WATER PERMIT**  
(None required)

**LYMAN COUNTY**



DESIGN DESIGNATION			
ROUTE	I90W	I90E	US183
ADT(2019)	3,709	3,709	600
ADT(2039)	4,543	4,543	1,000
DHV	804	804	118
D	51%	51%	50%
T DHV	10.6%	10.6%	9.4%
T ADT	23.3%	23.3%	20.7%
V	80 MPH	80 MPH	65 MPH

ESTIMATE OF QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090E-288 & 090W-368	2	52

PCN I65F:

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
634E0010	Flagging	40.0	Hour
634E0110	Traffic Control Signs	278.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	1	Each
634E0330	Temporary Raised Pavement Markers	1,920	Ft
634E0420	Type C Advance Warning Arrow Board	1	Each
634E0525	Linear Delineation System Panel, Barrier Mounted	104	Each
634E0700	Traffic Control Movable Concrete Barrier	52	Each
634E0750	Temporary Concrete Barrier End Protection	1	Each
634E0755	Remove and Reset Temporary Concrete Barrier End Protection	2	Each
634E0760	Temporary Concrete Barrier End Protection Module Set or Repair Kit	1	Each
634E1260	Truck/Trailer Mounted Attenuator	1	Each

Structure 08-310-135:

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS
410E0320	Bolted Girder Splice	2	Each
410E0325	Remove and Replace Bolt Assembly	1	Each
410E0354	Remove and Replace Web and Flange	1	Each
410E0365	Remove and Replace Transverse Stiffener	6	Each
410E0380	Remove and Replace Steel Diaphragm	1	Each
410E0385	Repair Steel Diaphragm	1	Each
410E0410	Stud Shear Connector	1	Each
410E0508	Field Weld	1,157	In
410E0512	Grind Weld	14	In
410E0515	Drill Hole in Existing Steel	1	Each
410E0520	Surface Grinding of Structural Steel	206	SqIn
410E0550	Jack Superstructure, Steel Girder Bridge	Lump Sum	LS
410E3010	Magnetic Particle Weld Inspection	7,678	In
410E3020	Ultrasonic Weld Inspection	161	In
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	6,816	SqIn
412E0100	Bridge Repainting, Class I	Lump Sum	LS
412E0500	Paint Residue Containment	Lump Sum	LS
460E0070	Class A45 Concrete, Bridge Repair	1.2	CuYd
460E0300	Breakout Structural Concrete	1.2	CuYd
460E0650	Roadway Canopy	Lump Sum	LS
480E5000	Galvanic Anode	2	Each
491E0007	Two Coat Bridge Deck Polymer High Friction Chip Seal	2.0	SqYd
491E0120	Bridge Deck Grinding	2.0	SqYd

PCN I63E:

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
634E0010	Flagging	60.0	Hour
634E0110	Traffic Control Signs	440.0	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0275	Type 3 Barricade	1	Each
634E0330	Temporary Raised Pavement Markers	1,920	Ft
634E0420	Type C Advance Warning Arrow Board	1	Each
634E1260	Truck/Trailer Mounted Attenuator	1	Each

Structure 43-160-205:

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS
410E0350	Remove and Replace Web	2	Each
410E0365	Remove and Replace Transverse Stiffener	4	Each
410E0380	Remove and Replace Steel Diaphragm	1	Each
410E0410	Stud Shear Connector	8	Each
410E0508	Field Weld	858	In
410E0512	Grind Weld	24	In
410E0515	Drill Hole in Existing Steel	1	Each
410E0520	Surface Grinding of Structural Steel	192	SqIn
410E3010	Magnetic Particle Weld Inspection	6,124	In
410E3020	Ultrasonic Weld Inspection	305	In
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	5,184	SqIn
412E0100	Bridge Repainting, Class I	Lump Sum	LS
412E0500	Paint Residue Containment	Lump Sum	LS
460E0070	Class A45 Concrete, Bridge Repair	0.3	CuYd
460E0300	Breakout Structural Concrete	1.0	CuYd
460E0650	Roadway Canopy	Lump Sum	LS
460E8100	Repair Underside of Bridge Deck	4	SqFt
480E5000	Galvanic Anode	6	Each

Structure 43-160-206:

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
410E2300	Strip Seal Expansion Joint	3.0	Ft
410E2310	Strip Seal Gland	40.8	Ft
460E0070	Class A45 Concrete, Bridge Repair	0.1	CuYd
460E0300	Breakout Structural Concrete	0.1	CuYd

SPECIFICATIONS

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

UTILITIES

The Contractor will contact the involved utility companies through South Dakota One Call (1-800-781-7474) prior to starting work. It will be the responsibility of the Contractor to coordinate work with the utility owners to avoid damage to existing facilities.

If utilities are identified near the improvement area through the SD One Call Process as required by South Dakota Codified Law 49-7A and Administrative Rule Article 20:25, the Contractor will contact the Project Engineer to determine modifications that will be necessary to avoid utility impacts.

# ENVIRONMENTAL COMMITMENTS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090E-288 & 090W-368	3	52

## ENVIRONMENTAL COMMITMENTS

The SDDOT is committed to protecting the environment and uses Environmental Commitments as a communication tool for the Engineer and Contractor to ensure that attention is given to avoid, minimize, and/or mitigate an environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency with permitting authority can delay a project if identified 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. During construction, the Project Engineer will verify that the Contractor has met Environmental Commitment requirements. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office.

Additional guidance on SDDOT's Environmental Commitments can be accessed through the Environmental Procedures Manual found at: <<https://dot.sd.gov/media/documents/EnvironmentalProceduresManual.pdf>>

For questions regarding change orders in the field that may have an effect on an Environmental Commitment, the Project Engineer will contact the Environmental Engineer at 605-773-3180 or 605-773-4336 to determine whether an environmental analysis and/or resource agency coordination is necessary.

Once construction is complete, the Project Engineer will review all environmental commitments for the project and document their completion.

## COMMITMENT H: WASTE DISPOSAL SITE

The Contractor will 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) will 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) will 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 Environmental Office and the Project Engineer.

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

1. Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials will be buried in a trench separate from wood debris. The final cover over the construction and/or demolition debris will consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the Public ROW will be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor will control the access to waste disposal sites not within the Public ROW with 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 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.

Cost 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) will be incidental to the various contract items.

## COMMITMENT I: HISTORIC PRESERVATION OFFICE CLEARANCES

State Historic Preservation Office (SHPO or THPO) concurrence has not been obtained for this project.

### Action Taken/Required:

All earth disturbing activities require a cultural resource review prior to scheduling the pre-construction meeting. 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 will arrange and pay for a record search and when necessary, a cultural resource survey. 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 if the site was previously surveyed; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor will provide ARC with the following: a topographical map or aerial view in 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 will submit the cultural resources survey report to SDDOT Environmental Office, 700 East Broadway Avenue, Pierre, SD 57501-2586. 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.

In the event of an inadvertent discovery of human remains, funerary objects, or if evidence of cultural resources is identified during project construction activities, then such activities within 100 feet of the inadvertent discovery will immediately cease and the Project Engineer will be immediately notified. The Project Engineer will contact the SDDOT Environmental Office, who will contact the appropriate SHPO/THPO within 48 hours of the discovery to determine an appropriate course of action.

The Contractor is responsible 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 will not utilize a site known or suspected of having contaminated soil or water. The Contractor will provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

**SEQUENCE OF OPERATIONS**

The Contractor will submit a sequence of operations for approval two weeks prior to the preconstruction meeting.

Operations for PCN I65F will be conducted with two lane divided lane closures.

Operations for PCN I63E will be conducted with two-way traffic lane closures.

**GENERAL TRAFFIC CONTROL**

Existing traffic control on SD45 for PCN I65F will remain in place until the work is complete.

Existing guide, route, informational logo, regulatory, and warning signs will be temporarily reset and maintained during construction. Removing, relocating, covering, salvaging, and resetting of existing traffic control devices, including delineation, will be the responsibility of the Contractor. Cost for this work will be incidental to the contract unit prices for the various items unless otherwise specified in the plans. Any delineators and signs damaged or lost will be replaced by the Contractor at no cost to the State.

All temporary traffic control sign locations will be set in the field by the Contractor and verified by the Engineer prior to installation.

All construction operations will be conducted in the general direction of traffic movement.

If there is a discrepancy between the traffic control plans, standard plates, and the MUTCD, whichever is more stringent will be used, as determined by the Engineer.

Unless otherwise stated in these plans, work will not be allowed during hours of darkness.

Traffic Control Signs, as shown in the Estimate of Quantities, are estimates. Contractor's operation may require adjustments in quantities, either more or less. Payment will be for those signs actually ordered by the Engineer and used.

Fixed location signing placed more than 4 calendar days prior to the start of construction will be covered or laid down until the time of construction. The covers must be approved by the Engineer prior to installation. The cost of materials, labor, and equipment necessary to complete this work will be incidental to other contract items. No separate payment will be made.

**TRAFFIC CONTROL SIGNS**

Sufficient traffic control devices have been included in these plans to sign two interstate mainline closures and one two lane highway lane closure.

**FLAGGING AND PILOT CAR OPERATIONS**

Operations will be conducted so that the traveling public will not have to wait longer than 15 minutes at the flagger station.

It is required that the flaggers and pilot car operators be able to communicate with one another. If an emergency vehicle needs to pass through the project, the Contractor will be required to expedite traffic movement. Cost associated with this will be incidental to the contract unit price per hour for Flagging.

**TEMPORARY RAISED PAVEMENT MARKERS**

Temporary raised pavement markers will be used for marking edge lines, lane lines, and centerlines. Temporary raised pavement markers will be used on all new permanent surfacing sections of roadway and on existing surfacing where temporary marking locations are different than existing marking locations, unless noted or as directed by the Engineer.

Temporary raised pavement markers will be attached to the roadway surface with a flexible non-permanent bituminous adhesive capable of being removed from the roadway surface or with an adhesive approved by the Engineer.

Cost to furnish, install, replace if necessary, and remove the markers will be incidental to the contract unit price per foot for Temporary Raised Pavement Markers.

**WORK ZONE SPEED REDUCTION**

The Department is required to obtain a speed reduction resolution prior to the installation of any SPEED LIMIT (R2-1) signs shown on standard plate 634.63. To provide adequate time for the resolution to be enacted, the Contractor will inform the Engineer a minimum of 3 weeks prior to the scheduled installation of any work zone speed reduction signs on the project. The information provided by the Contractor will include the anticipated date of sign installation, the newly reduced speed limit, the location of the work zone, and the anticipated completion date of work requiring the speed reduction.

**TRUCK/TRAILER MOUNTED ATTENUATOR – I63E**

The Contractor will furnish truck or trailer mounted attenuator(s) to be used for the duration of the project. Truck or trailer mounted attenuators (TMAs) will meet the crashworthy requirements of NCHRP 350 or MASH Test Level 3. TMAs will be used and maintained in accordance with the manufacturers' recommendations.

The TMAs should be utilized on the project where workers and/or equipment are working next to the centerline of the roadway with live traffic in the adjacent lane, or as directed by the Engineer. The TMAs will be removed from the roadway at the end of each working day. The TMAs will remain the property of the Contractor at the end of the project.

The TMAs will be paid for at the contract unit price per each for Truck/Trailer Mounted Attenuator. Payment will be full compensation for furnishing, maintaining, relocating and removing as many times as required by the Engineer and the Contractor's operations.

In the event a TMA is hit while in service, the manufacturer will assess the TMA and make a recommendation as to whether it can be repaired or needs to be replaced. The Department will reimburse the Contractor for repairs as documented by invoices or pay for another TMA to be deployed to the project as needed.

**TRAFFIC CONTROL MOVABLE CONCRETE BARRIER – I65F**

52 traffic control movable concrete barrier shall be obtained from the Department of Transportation Kimball Maintenance Yard, located 1 mile north of Kimball on SD45 hauled, used on the project, and returned to the Kimball Maintenance Yard upon completion of the project.

Traffic control movable concrete barriers shall be in place while girder repairs are occurring or when vehicles/equipment is required to be stationary on I90.

Cost to pick up the traffic control movable concrete barrier from the Kimball Maintenance Yard, place barriers for traffic control, and return the traffic control movable barrier to the yard shall be paid for at the contract unit price for Traffic Control Movable Concrete Barrier. No additional payment will be made for shifting barriers between lane closures.

**TEMPORARY CONCRETE BARRIER END PROTECTION – I65F**

The Contractor shall furnish crash tested and approved end protection on movable concrete barrier installed on this project. End protection shall be installed parallel to the roadway and a minimum of two traffic control movable concrete barrier shall be installed in line with and behind the end protection. The end protection shall be attached to the traffic control movable concrete barrier as specified by the manufacturer.

Costs for furnishing, installing, maintaining, and removing the end protection will be paid for at the contract unit price per each for Temporary Concrete Barrier End Protection. The concrete Barrier End Protection shall meet the requirements of TL3 for NCHRP 350 or MASH.

The Contractor will be required to have immediately available replacement parts for the end protection. The Contractor will be expected to repair the end protection within 24 hours after impact or damage.

A total of 2 Remove and Reset Temporary Concrete Barrier End Protection have been included in the plans. Additional Remove and Reset Temporary Concrete Barrier End Protection must be approved by the Engineer prior to payment.

Cost for replacement modules shall be paid for at the contract unit price per each for Temporary Concrete Barrier End Protection Module Set or Repair Kit.

**LINEAR DELINEATION SYSTEM PANEL, BARRIER MOUNTED – I65F**

The white linear delineation system panels on the barrier used shall be replaced. The linear delineation system panel shall be 34 inches long and 6 inches in height and be constructed of aluminum formed into a shape to provide retroreflective properties across a wide range of angles. It shall be sheeted with ASTM D4956 Type XI sheeting. The panels shall be evenly spaced, with the top of the panel 4 inches below the top of the barrier. Installation shall be as per the manufacturer's recommendation using stainless steel inserts and bolts. This will allow for easy removal for replacement of damaged panels or to replace with an alternate color.

Two delineation panels have been included for each movable concrete barrier.

Replacement of damaged linear delineation system panels shall be furnished and replaced by the Contractor. Cost associated with furnishing, installing, and maintaining the linear delineation system shall be included in the contract unit price per each for Linear Delineation System Panel, Barrier Mounted.



INCIDENTS

An incident is an emergency road user occurrence, a natural disaster, or other unplanned event that affects or impedes the normal flow of traffic such as a crash, hazardous materials spill, or other event.

The Contractor will set up a meeting prior to start of work to plan and coordinate responses to an incident. The Contractor will invite the Department of Transportation, the South Dakota Highway Patrol, the Lincoln County Sheriff and local emergency response entities to the meeting.

Emergency vehicle access through the project will be considered and discussed at the meeting.

The Contractor may be required to modify messages on portable changeable message signs or relocate portable changeable message signs, and to provide flaggers to direct or detour traffic. The Contractor should be prepared to relocate advance warning signs if determined to be necessary for a major traffic incident lasting more than two hours. Fixed location ground mounted signs may be covered, and additional portable signs provided.

No additional payment will be made for the modification of portable changeable message sign messages or the relocation of portable changeable message signs. Cost for the relocation of an advance warning sign due to an incident will be 50% of the designated sign rate. Flaggers will be paid for at the contract unit price per hour for Flagging.

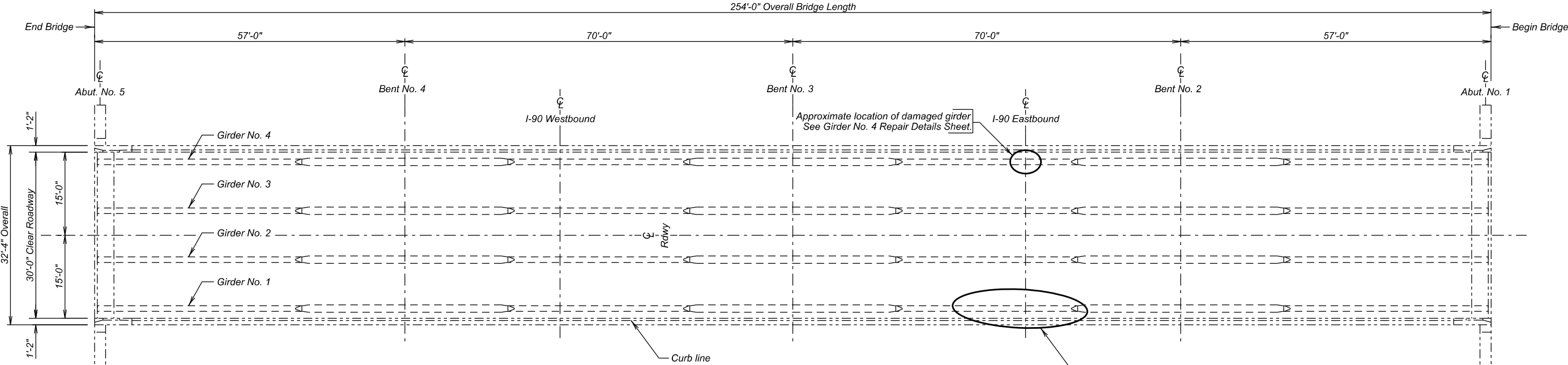
I65F - ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS

SIGN CODE	SIGN DESCRIPTION	EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R2-1	SPEED LIMIT 45	2	36" x 48"	12.0	24.0
R2-1	SPEED LIMIT 65	3	36" x 48"	12.0	36.0
R2-1	SPEED LIMIT 80	1	36" x 48"	12.0	12.0
R2-6aP	FINES DOUBLE (plaque)	1	36" x 24"	6.0	6.0
W1-3	REVERSE TURN (L or R)	2	48" x 48"	16.0	32.0
W3-5	SPEED REDUCTION AHEAD (45 MPH)	1	48" x 48"	16.0	16.0
W3-5	SPEED REDUCTION AHEAD (65 MPH)	2	48" x 48"	16.0	32.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)	2	48" x 48"	16.0	32.0
W20-1	ROAD WORK AHEAD	2	48" x 48"	16.0	32.0
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	1	48" x 24"	8.0	8.0
		EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT 278.0			

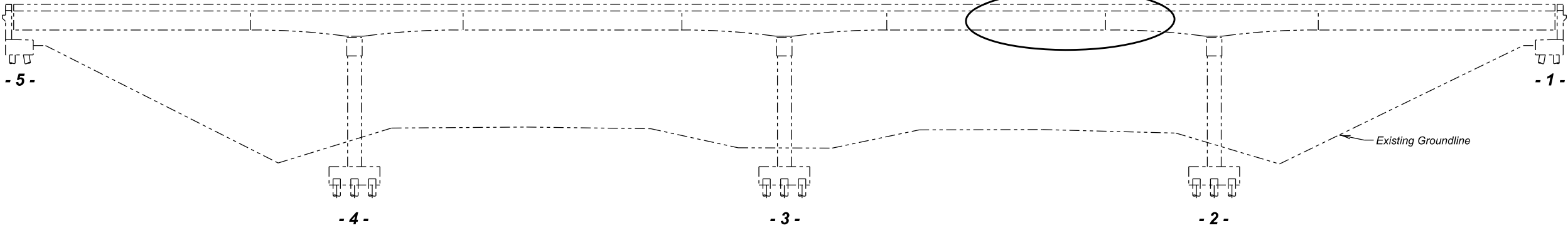
I63E - ITEMIZED LIST FOR TRAFFIC CONTROL SIGNS

SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD				EXPRESSWAY / INTERSTATE			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
R2-1	SPEED LIMIT 45		24" x 30"	5.0		2	36" x 48"	12.0	24.0
R2-1	SPEED LIMIT 65		24" x 30"	5.0		3	36" x 48"	12.0	36.0
R2-1	SPEED LIMIT 80		24" x 30"	5.0		1	36" x 48"	12.0	12.0
R2-6aP	FINES DOUBLE (plaque)		24" x 18"	3.0		1	36" x 24"	6.0	6.0
W3-5	SPEED REDUCTION AHEAD (45 MPH)		48" x 48"	16.0		1	48" x 48"	16.0	16.0
W3-5	SPEED REDUCTION AHEAD (65 MPH)		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W4-2	LEFT or RIGHT LANE ENDS (symbol)		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W20-1	ROAD WORK AHEAD	4	48" x 48"	16.0	64.0	2	48" x 48"	16.0	32.0
W20-4	ONE LANE ROAD AHEAD	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
W20-5	LEFT or RIGHT LANE CLOSED AHEAD		48" x 48"	16.0		2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	4	48" x 48"	16.0	64.0		48" x 48"	16.0	
W21-5	SHOULDER WORK	2	48" x 48"	16.0	32.0		48" x 48"	16.0	
G20-2	END ROAD WORK	4	36" x 18"	4.5	18.0	1	48" x 24"	8.0	8.0
		CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT 210.0				EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS SQFT 230.0			

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090E-288	6	52



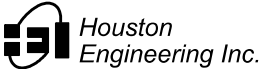
PLAN



ELEVATION

INDEX OF BRIDGE SHEETS -

- Sheet No. 1 - Layout for Girder Repair
- Sheet No. 2 - Estimate of Structure Quantities and Notes
- Sheet Nos. 3 thru 8 - Notes (Continued)
- Sheet No. 9 - Girder No. 1 Repair Details (A)
- Sheet No. 10 - Girder No. 1 Repair Details (B)
- Sheet No. 11 - Girder No. 1 Repair Details (C)
- Sheet No. 12 - Girder No. 1 Repair Details (D)
- Sheet No. 13 - Girder No. 1 Repair Details (E)
- Sheet No. 14 - Bolted Splice Repair Details (A)
- Sheet No. 15 - Bolted Splice Repair Details (B)
- Sheet No. 16 - Girder No. 4 Repair Details
- Sheet Nos. 17 thru 20 - Original Construction Plans



LAYOUT FOR GIRDER REPAIR  
FOR  
254'-0" CONT. COMP. GIRDER BRIDGE  
30'-0" ROADWAY 0° SKEW  
OVER I90 SEC. 9-10-T103N-R67W  
STR. NO. 08-310-135 090 E-288  
PCN I65F  
BRULE COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

-X271-

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------

ESTIMATE OF STRUCTURE QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT	REMARKS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS	
410E0320	Bolted Girder Splice	2	Each	
410E0325	Remove and Replace Bolt Assembly	1	Each	
410E0354	Remove and Replace Web and Flange	1	Each	
410E0365	Remove and Replace Transverse Stiffener	6	Each	
410E0380	Remove and Replace Steel Diaphragm	1	Each	
410E0385	Repair Steel Diaphragm	1	Each	
410E0410	Stud Shear Connector	1	Each	See Special Provision
410E0508	Field Weld	1,157	In	
410E0512	Grind Weld	14	In	
410E0515	Drill Hole in Existing Steel	1	Each	
410E0520	Surface Grinding of Structural Steel	206	SqIn	
410E0550	Jack Superstructure, Steel Girder Bridge	Lump Sum	LS	
410E3010	Magnetic Particle Weld Inspection	7,678	In	
410E3020	Ultrasonic Weld Inspection	161	In	
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	6,816	SqIn	
412E0100	Bridge Repainting, Class I	Lump Sum	LS	
460E0070	Class A45 Concrete, Bridge Repair	1.2	CuYd	
460E0300	Breakout Structural Concrete	1.2	CuYd	
412E0500	Paint Residue Containment	Lump Sum	LS	
460E0650	Roadway Canopy	Lump Sum	LS	
480E5000	Galvanic Anode	2	Each	
491E0007	Two Coat Bridge Deck Polymer Chip Seal	2	SqYd	
491E0120	Bridge Deck Grinding	2	SqYd	

SPECIFICATIONS

1. Design Specifications: AASHTO Standard Specifications for Highway Bridges 17th Edition using Load Factor 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 because of 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 five 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 and are provided as information only. 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 410.3A of the Construction Specifications.

GENERAL CONSTRUCTION

1. Welder certification shall be in accordance with Section 410.3D of the Construction Specifications.
2. The new steel web plates, flange plates, and flange splice plates shall be ASTM A709 Gr. 36 T2. The new steel stiffener plates, and diaphragm plates shall be ASTM A709 Gr. 36.

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 employees of the hazards of lead exposure.

SCOPE OF BRIDGE WORK

All work on this structure shall be accomplished under traffic with the traffic control as shown elsewhere in the plans.

1. Remove and capture all loose concrete on the underside of the bridge deck adjacent to Girder G1 to prevent any pieces from falling into traffic during the repair process. This shall not be done directly over traffic.
2. Identify and mark all yield lines, yielded zones, and surface nicks and gouges.
3. Grind surface nicks and gouges.
4. Clean and prepare area to be tested as specified by the Bridge Welding Code and these notes.
5. Nondestructive test fillet welds, crack tips and potential crack tips at the locations indicated in the plans.

6. Repair crack tips and weld flaws found by nondestructive testing prior to heat straightening. No heat straightening shall be performed until the nondestructive testing is complete and any necessary repairs are done for the member to be straightened.
7. Heat straighten damaged girder G1 and G4 including bottom flanges, web, and transverse stiffeners.
8. Perform nondestructive testing required after heat straightening and perform any repairs required.
9. Remove and replace the plan specified damaged diaphragms.
10. Remove and replace the plan specified damaged stiffeners.
11. Install the temporary girder supports at the plan specified locations and remove and replace damaged web and flange sections of girder G1.
12. Perform nondestructive testing required after repairs.
13. Repair crack tips, and weld flaws found by nondestructive testing after repairs.
14. Place prime coat on area to be spliced and install bolted splice.
15. Perform Bridge Deck Grinding
16. Install canopy and breakout and repair portion of the bridge deck.
17. Clean the bridge deck surface with abrasive blasting
18. Place the Two Coat Bridge Deck Polymer Chip Seal
19. Prepare and paint work affected areas and new structural steel.

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 WPSs for this project shall be submitted on Form O-2, from Annex O of the Bridge Welding Code, to the Bridge Construction Engineer for approval at least 2 weeks prior to construction.



ESTIMATE OF STRUCTURE QUANTITIES AND NOTES  
FOR

254'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 08-310-135

October 2020



FIELD WELDING PROCEDURES (CONTINUED)

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 pre-heat and interpass temperature shall be 320 degrees F for welds to the 11/16" 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.
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. 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 +10°, -5° 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 AND 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 determining crack tip locations 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), required cleaning, preparation, and inspection shall be done in accordance with Clause 6 of the Bridge Welding Code. Existing paint shall be removed from the steel surfaces that require NDT. Power tools used for cleaning shall be in accordance with SSPC-3. The MT inspection shall be performed by the yoke method using half-wave rectified direct or alternating current. MT inspection results shall be reported on Form O-7 of Annex O and UT results shall be reported on Form F-4 of Annex F of the Bridge Welding Code.
3.

The Contractor shall identify and mark all yield zones, yield lines, and associated damage and provide this information to the Engineer prior to the initiation of heat straightening and testing by either visual inspection or measurements.
4.

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 notes on Repairs for NDT Determined Flaws. Repairs shall be made prior to any heat straightening.
5.

As a minimum, the existing fillet welds shall be inspected as noted below. 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.

Girder 1:

- a.

Visually Inspect 100% of the existing fillet welds in the deformed and damaged area. The deformed length is estimated to be 35 feet.
- b.

MT test the top and bottom flange to web weld, on both sides of the web, a minimum of 12" beyond any yielded girder zones for an estimated 1,680 inches.
- c.

MT test both sides of the stiffener to web weld and both sides top and bottom of the stiffener to flange welds at the diaphragms to be removed and replaced. This includes the diaphragm stiffeners on each end of the diaphragm and the outside transverse stiffener for and estimated 384 inches.
- d.

On the transverse stiffeners to be heat straightened or have welds removed and replaced, MT test the stiffener welds to web top, bottom, and both sides of the stiffener for an estimated 288 inches.
- e.

In the area of web and flange replacement, MT test an area extending 6" on all sides of the removal area on each face for an estimated 3,408 square inches.

Girder 4:

- a.

Visually Inspect 100% of the existing fillet welds in the deformed and damaged area. The deformed length is estimated to be 18 feet.
- b.

MT test the top and bottom flange to web weld, on both sides of the web, a minimum of 12" beyond any yielded girder zones for an estimated 864 inches.
6.

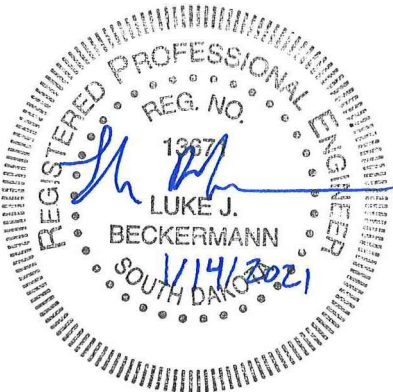
The above listed quantities and areas are provided as an estimate based on field documentation of the damage. If any other areas are identified as having potential flaws or require heat straightened these areas shall be tested as directed by the Engineer.
7.

After heat straightening, the areas listed above shall be retested to ensure no additional cracks have developed. The estimated weld length and area for re-testing is 3,216 inches and 3,408 square inches.
8.

New fillet welds of primary members (between web and flange) 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. Rejected 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 424 inches.
9.

All other new fillet welds shall be 100% visually inspected and 20% 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. Rejected 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 199 inches.
10.

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. Rejected 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 UT inspection is 161 inches.



NOTES (CONTINUED)  
FOR

254'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 08-310-135

October 2020



**WELD INSPECTION AND NONDESTRUCTIVE TESTING (NDT)**  
**(CONTINUED)**

11. The plans listed quantity for nondestructive testing inspection is only an estimate. Magnetic Particle Weld Inspection and Ultrasonic Weld Inspection will be measured to the nearest inch. Magnetic Particle Weld Inspection, Impact Damage Repair will be measured to the nearest inch and area computed to the nearest square inch. Measurement shall be approved by the Bridge Construction Engineer.
12. All costs including labor, equipment, cleaning, 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.
13. All costs including labor, cleaning, paint removal, equipment, and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location in the areas to be removed and replaced shall be incidental to the contract unit price per square inch for Magnetic Particle Weld Inspection, Impact Damage Repair.
14. All costs to remove the paint and clean all fillet welds to be nondestructive 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.
15. All costs including labor, cleaning, 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.

**REPAIRS FOR NDT DETERMINED FLAWS**

1. Repair options for weld defects and crack tips shall be determined by the Bridge Construction Engineer. Two potential repair options are:
- a. Drill 1" diameter hole in all crack tips.
  - 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 holes in the web shall be incidental to the contract unit 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**

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

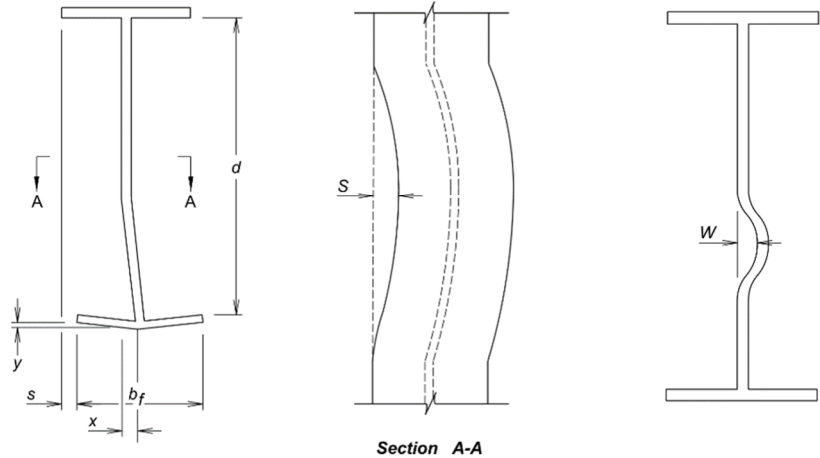
Judd Holt  
International Straightening Incorporated  
901 E. Bristol Drive  
Bismarck, ND 58501  
Telephone: (701) 223-5972 or (701) 751-1683  
Fax: (701) 751-1683  
E-mail: [isisteel@gmail.com](mailto:isisteel@gmail.com)  
Website: [www.steelstraightening.com](http://www.steelstraightening.com)

Darryl Thomas  
Flame On, Inc.  
12632 Wagner Road  
Monroe, WA 98272  
Telephone: (425) 397-7039  
Fax: (425) 397-7002  
Cellular: (425) 501-9855  
E-mail: [d.thomas@flameon.com](mailto:d.thomas@flameon.com)  
Website: [www.flameoninc.com](http://www.flameoninc.com)

2. 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 Area Office for approval of the Bridge Construction Engineer. See Weld Inspection & Nondestructive Testing notes elsewhere in these plans.
3. 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. No cutting torch heads are permitted.

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

4. 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
5. Material should be heated in a single pass and shall be allowed to air cool to below 250°F prior to re-heating.
6. Hot Mechanical Straightening and Hot Working will **NOT** be allowed.
7. Jacks used to aide heat straightening shall be placed so that forces are relieved as straightening occurs during cooling. Jacking shall be limited so that the maximum bending moment in the heated zone is less than 50% of the plastic moment capacity of the member or 50% of yield for local forces. The yield of the material is 36 ksi.
8. The final dimensions of heat straightened structural members shall conform to the following tolerances:



d = original depth of web  
bf = original width of flange  
X = final displacement of web ≤ maximum of d/100 or 1/4"  
Y = final displacement of edge of flange ≤ 1/4"  
W = maximum final local deformation in web ≤ 1/4"  
S = sweep of flange from original edge of flange ≤ 1/2" over 20 ft

NOTES (CONTINUED)

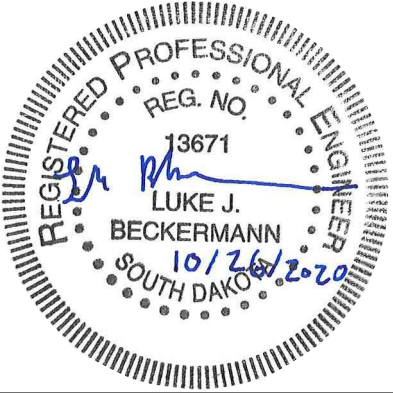
FOR

254'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 08-310-135

October 2020

4 OF 20



HEAT STRAIGHTENING (CONTINUED)

9. 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).

JACKING SUPERSTRUCTURE

1. Vertical Jacks shall be used to support the girder on both sides of splice No. 2 at the plan specified locations, until the web and flange replacement is complete. The jacking points and loads shall be as shown in plans.
2. The vertical jacks shall have a lock nut for mechanical load holding with hydraulic pressure released.
3. The jacks shall include calibrated gauges, which indicate jack load.
4. Each 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.
5. Caution shall be exercised when transferring the girder reactions to and from the jacks to ensure 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.
6. The Contractor shall be required to submit a detailed jacking plan, approved and stamped by a Professional Engineer registered with the State of South Dakota. The jacking procedure shall be submitted 30 days prior to the start of work for the 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.
6. 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 AND FLANGE SECTIONS

1. Cut and remove the portions of the web, flange, and weld as shown on the plans by the air carbon arc process or plasma cutting. Weld removal shall be air carbon arc gouging. 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 and flange shall be disposed of by the Contractor.
2. The web sections shall be replaced and welded as shown in the plan details.
3. Holes in existing flange and in splice plates on the existing side of the splice shall be drilled with the entire bolted splice, flange section, and web section held securely in place by use of clamps or other devices; no tack welds will be allowed to hold splice plates. New holes shall be a maximum 1/16" larger than the diameter of the bolt. It will be permitted to use one of the splice plates (either the top or bottom) as a template.
4. During the removal and replacement procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).

5. All labor, equipment, materials, welding, and any incidentals necessary to remove and replace the damaged portions of the web and flange shall be incidental to the contract unit price per each for Remove and Replace Web and Flange.

REPAIR STEEL DIAPHRAGM

1. A portion of the existing diaphragm shown in the plans shall be removed prior to heat straightening and nondestructive testing. Removed diaphragm portion shall not be reused and shall be disposed of by the Contractor. After all heat straightening is complete, the diaphragm will be repaired.
2. Cutting of the existing diaphragm shall be accomplished using the air carbon arc process or plasma cutting. Weld removal shall be air carbon arc gouging.
3. Extreme care shall be exercised during the weld removal and cutting process so that no damage to the surrounding metal occurs. Any damage to the surrounding metal caused by the weld removal and/or cutting process shall be repaired by the Contractor to the satisfaction of the Engineer at no cost.
4. During the repair procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).
5. Grind all surfaces cut with air carbon arc process to remove high carbon deposits, provide a smooth finish, and radius all edges to accept paint.
6. All costs including equipment, material and labor to remove a portion of the steel diaphragm and to repair the steel diaphragm shall be incidental to the contract unit price per each for Repair Steel Diaphragm.

REMOVE AND REPLACE DIAPHRAGMS

1. The existing diaphragm and diaphragm stiffeners shown in the plans shall be removed prior to heat straightening and nondestructive testing. Removed diaphragm portion shall not be reused and shall be disposed of by the Contractor.
2. Cutting of the existing diaphragm and diaphragm stiffener shall be accomplished using the air carbon arc process or plasma cutting. Weld removal shall be by air carbon arc gouging.
3. The diaphragm and diaphragm stiffener shall be replaced and welded as shown in the plans, after the web repairs and heat straightening are complete.
4. During the removal and replacement procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).
5. All labor, materials, and equipment necessary to remove and replace the diaphragms and diaphragm stiffeners as shown on the Plans will be incidental to the contract unit price per each for Remove and Replace Steel Diaphragm.

REMOVE AND REPLACE DAMAGED WELDS

1. The damaged welds shown in the plans shall be replaced by grinding damaged weld and re-welding. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. Re-welding shall in accordance with the Bridge Welding Code.
2. All repaired welds shall be checked by non-destructive (MT) testing, see Weld Inspection & Nondestructive Testing (NDT) notes. Repair options for the defects found by the non-destructive testing shall be determined by the Bridge Construction Engineer.
3. All costs associated with grinding the damaged welds including all materials, equipment and labor shall be incidental to the contract unit price per inch for Grind Weld.
4. All costs associated with re-welding the transverse stiffener welds including all materials, equipment and labor shall be incidental to the contract unit price per inch for Field Weld.

REMOVAL OF SURFACE NICKS AND GOUGES

1. Grind the bottom flange of girder G1 as directed by the Engineer, to remove all sharp edges from surface nicks and gouges created by vehicle impact. The amount of material removed shall be kept at the absolute minimum necessary to remove the sharp edges and to minimize the section reduction of the existing structural members. Grinding shall be longitudinal. Transverse grinding will not be allowed. The grinding shall be done prior to heat straightening the girder.
2. All surface nicks and gouges shall be checked by non-destructive MT testing after grinding; see Weld Inspection & Nondestructive Testing (NDT) note. Repair options for the defects found by the nondestructive testing shall be determined by the Bridge Construction Engineer.
3. The quantity provided for Surface Grinding of Structural Steel is an estimate. The payment quantity will be per square inch as determined by the Engineer. This item may not be encountered and could be removed from the plans.
4. All costs associated with removing sharp edges from surface nicks and gouges including all materials, equipment and labor shall be incidental to the contract unit price per square inch for Surface Grinding of Structural Steel.



NOTES (CONTINUED)

FOR

254'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 08-310-135

October 2020

5 OF 20

DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
---------------------	---------------------	------------------



FIELD BOLTED GIRDER SPLICES

1. The new flange section shall be bolted to the existing flanges according to the details in the plans. Bolts to be used shall be 7/8" diameter ASTM F3125 Grade A325. Each bolt shall be supplied with a hardened heavy hex nut, 1 hardened washer and 1 direct tension indicator. Follow the High Strength Bolt requirements shown In Section 410 of the Construction Specifications.

2. Shim plates shall conform to ASTM A709, Grade 36, except material less than 1/4" in thickness may be ASTM A570, Grade D.

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. Direct tension indicators shall be installed under the bolt head and the nut shall be the turned element.

4. Any misalignments of the existing flanges at the splice locations will require shim plates between the flanges and the splice plates. The quantity, size, and location of shim plates shall be such that complete contact between the flanges and splice plates occurs to minimize any warpage that may result from bolt tightening. The thickness of the shim plates shall be maximized such that a minimum number of shim plates are required. Details for the shim plates shall be included in the shop plans.

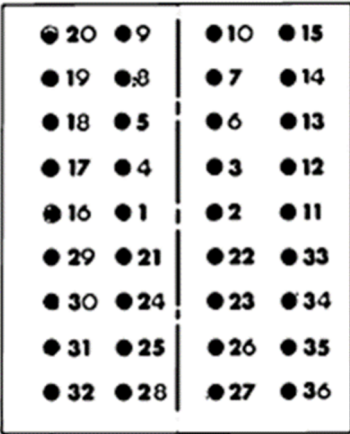
5. Contact surfaces of the bolted connections shall be clean and free from all oil, paint with exception of a primer in accordance with 411.3 B.3 of the Construction Specification, lacquer, and other coatings. Commercial blast cleaning of the steel-to-steel contact areas shall be done to SSPC SP 6 finish.

6. The Contractor shall have the following options for drilling holes in splice plates, flanges and shims:

Shop drill the splice plate for each flange splice with undersize holes of 3/16" less than nominal bolt diameters and use as templates for field drilling through the flange and remaining splice and shim plates. Field drilling shall be done with all splice components securely held in the proper position. The contractor may elect to use a single field drilling operation in which case holes shall be drilled to a maximum of 1/16" larger than the bolt's nominal diameter. As an alternate, the contractor may elect to first subdrill and then subsequently ream the assembled splice connection to a final maximum diameter of 1/16" larger than the nominal bolt diameter. Regardless of the contractor's preferred field drilling procedure, the splice shall be disassembled and all burrs and cuttings removed prior to assemble of the splice.

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

8. The splice bolts shall be tightened in a pattern that starts at the center of the splice and progresses outward in all directions. A suggested bolting sequence is shown below.



9. Bolted girder splices will be measured by each assembly furnished and accepted complete in place. The combination of shims, and flange splice at the same location on a girder constitutes a splice. Bolted girder splices measured as provided above, will be paid for at the contract price per each for Bolted Girder Splice. Such payment shall be full compensation for all material, labor, equipment, tools and incidentals necessary to satisfactorily complete this work.

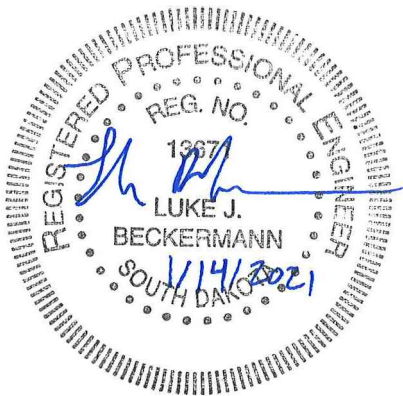
CONCRETE BREAKOUT

1. The existing deck shall be broken out to the limits shown on the plans. Breakout limits shall be defined with a 3/4" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. All existing reinforcing steel that will be exposed is scheduled for reuse and shall be cleaned and straightened to the satisfaction of the Engineer. Care shall be taken not to damage the reinforcing steel during concrete breakout. Any reinforcing steel that is damaged during concrete breakout shall be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.
2. No more than 3' of the existing deck, measured in the longitudinal direction of the bridge, shall be broken out at one time.

3. Extreme care shall be used during concrete breakout to prevent nicks, gouges, scratches, or damage to existing structural steel components to be reused. Prior to deck removal, the limits of the girder top flanges shall be marked on top of the bridge deck. The Contractor shall not be allowed to use any impact type breakout equipment larger than power driven hand tools for slab removal within six inches of the actual limits of the top flange. At no time shall the use of any breakout method that will nick, gouge, or scratch the flange, or any other structural steel component to be reused, be allowed. If any nicks, gouges, scratches, or other damage occurs, the Office of Bridge Design shall be immediately notified. All damage shall be repaired by the Contractor as recommended by the Office of Bridge Design. All costs involved in repairing any damage, including any non-destructive testing that may be required, shall be at the expense of the Contractor. Any shear connectors damaged due to the Contractor's operation shall be repaired by the Contractor at no cost to the Department. Any shear connectors which have failed in service shall be replaced with 7/8" diameter x 4" end welded stud shear connectors for all girders and will be paid for at the contract unit price per each for Stud Shear Connector.
4. All broken out concrete, discarded reinforcing bars and expansion devices shall be disposed of by the Contractor. Any disposal of discarded material shall be in accordance with the Environmental Commitments.
5. The contract unit price per cubic yard for Breakout Structural Concrete shall include breaking out concrete, cleaning and straightening existing reinforcing steel, and disposal of all broken out material. All broken out concrete and other discarded material shall become the property of the Contractor and shall be disposed of on a site obtained by the Contractor and approved by the Engineer. See the Environmental Commitment notes.

BRIDGE DECK GRINDING

1. Perform Bridge Deck Grinding in accordance with Section 491 of the Construction Specifications.



NOTES (CONTINUED)

FOR

254'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 08-310-135

October 2020

6 OF 20

DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
---------------------	---------------------	------------------

ROADWAY CANOPY

- The Contractor shall construct a rigid canopy above the interstate under the structure. The canopy is intended to capture smaller debris and not act as safety net for falling deck sections. As such, no traffic shall be allowed under an area of active deck removal even with the canopy in place. The exception is traffic will be allowed under the canopy if the only removal occurring is using hand tools and chipping hammers. The canopy is an added safeguard and does not relieve the Contractor of any responsibility for the safety of the public. The canopy shall meet the following minimum requirements.
  - The entire system shall be above the bottom of the girders.
  - Attachments shall not be made to the girders using welding.
  - The canopy shall be of a design and material which can adequately capture and contain falling debris as selected by the Contractor and approved by the Engineer.
  - The canopy shall cover the affected work area.
  - The erection of the canopy shall be completed in a manner which will cause the least inconvenience to the traveling public.
- The Contractor shall submit a detailed Demolition Plan, 30 days prior to any bridge deck removal. This Demolition Plan shall include all canopy details, bridge deck breakout details, a sequence of traffic control, and a sequence of bridge deck removal.
- The Roadway Canopy shall be paid for at the contract lump sum price of Roadway Canopy. This payment shall include all construction, maintenance, and removal of the Roadway Canopy.

GALVANIC ANODE

- The Contractor shall furnish and place galvanic anodes in the concrete repair areas specified in this plan set.
- The galvanic anodes shall be supplied as one of the following:
  - Galvashield XP2  
Vector Corrosion Technologies  
65114 140<sup>th</sup> Ave.  
Wabasha, MN 55981  
Phone: (507) 259-2481  
Website: [www.vector-corrosion.com](http://www.vector-corrosion.com)
  - Sentinel Silver  
Euclid Chemical Company  
19218 Redwood Road  
Cleveland, OH 44110  
Phone: (800) 321-7628  
Website: [www.euclidchemical.com](http://www.euclidchemical.com)

- Sika FerroGard 670  
Sika Corporation US  
201 Polito Avenue  
Lyndhurst, NJ 07071  
Phone: (800) 933-7452  
Website: <http://usa.sika.com>
- The anodes shall be placed in accordance with manufacturer's recommendations and as approved by the Engineer. The anodes have not been shown on the drawings. The Contractor shall provide shop drawings of the galvanic anode installation including locations of the individual anodes to the Office of Bridge Design.
  - The anodes shall be placed with a minimum ¾" cover and shall be set in embedding mortar per the manufacturer's recommendations. The anodes shall be fully encased in the concrete repair material. Where adequate cover does not exist, a concrete pocket shall be chipped out behind the anode to provide sufficient cover. The Contractor may need to chip around the reinforcing bar locally at the anode installation to make the electrical connection. The reinforcing steel at the connection location shall be cleaned per the manufacturer's recommendations to provide sufficient electrical connection and mechanical bond.
  - The electrical continuity of the electrical connections and reinforcing steel shall be confirmed per the manufacturer's recommendations.
  - The Contractor shall provide manufacturer's product literature and installation instructions to the Engineer 10 days prior to installation.
  - All costs associated with placing anodes including labor, equipment, materials and incidentals shall be included in the contract unit price per each for Galvanic Anode.

CLASS A45 CONCRETE, BRIDGE REPAIR

The type of cement, concrete strength requirements, aggregate requirements, slump and air requirements for the contract item Class A45 Concrete, Bridge Repair shall conform to the requirements of Section 460 of the Construction Specifications for A45 concrete used in bridge decks.

STUD SHEAR CONNECTOR

- Prior to welding of the studs to the existing girders, the top surfaces of the existing girders that are to have studs welded on shall be clean of dirt, rust and any other foreign matter.
- The shear connectors that will be attached to the existing girders shall be 7/8" diameter x 4 inches long and shall conform to ASTM A108, Grade 1015, 1018, or 1020. The connector shall meet the following minimum mechanical property requirements for type B studs:

Tensile Strength	60ksi
Yield Strength	50ksi
Elongation	20%
Reduction of area	50%
- The shear connectors shall be installed in accordance with the Special Provision for Shear Connector Field Installation (Per Each).

AIR CARBON ARC CUTTING AND GOUGING

- All removal of diaphragms and welds called for by the plans shall be accomplished using the air carbon arc process unless noted otherwise. Plasma cutting will also 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.
- 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.
- 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.
- 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.
- 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.

TWO COAT BRIDGE DECK POLYMER CHIP SEAL

- Edges of the Two Coat Bridge Deck Polymer Chip Seal area to be removed and replaced will be saw cut to ensure a clean edge. The removal of the polymer chip seal will be included in the contract unit price per Cubic Yard of Breakout Structural Concrete.

PAINT RESIDUE REMOVAL AND CONTAINMENT

- Paint removal on the existing bridge shall be in accordance with Section 412 of the Construction Specifications, except as modified by these notes.
- The Contractor shall plan his operation to prevent releases of lead-containing material and other particulate matter into the surrounding air, water, and onto the ground, slope protection, and pavement. The Contractor shall be responsible for any corrective actions should a spill occur.

NOTES (CONTINUED)

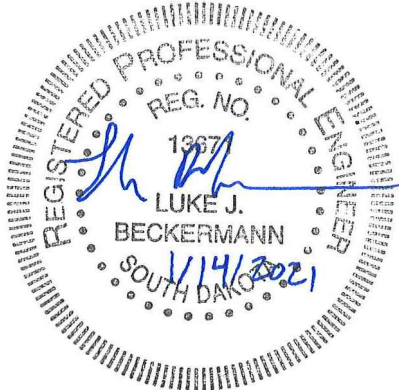
FOR

254'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 08-310-135

October 2020

7 OF 20





STATE OF	PROJECT	SHEET NO	TOTAL SHEETS
S.D.	090E-288	13	52

**PAINT RESIDUE REMOVAL AND CONTAINMENT (CONTINUED)**

3. Collect all visible paint particles and blasting residue containing paint at the end of each workday from the work area. Inspect outside the containment and collect any paint particles or blasting residue that escaped the work area. Collect waste material by manual means, vacuum, or another method approved by the Engineer. Do not use air pressure or streaming water to assist in the waste collection process that could disperse the waste material.
4. In the event of a spill or inadvertent release, the Contractor shall immediately stop work, notify the Engineer, and report the release to the South Dakota Department of Environmental and Natural Resources (DENR). The Contractor shall be responsible for completing a spill reporting form and for all costs associated with appropriate corrective actions.

To report a release or spill, call DENR at (605) 773-3296 during regular office hours (8 a.m. to 5 p.m., Central Time). To report the release after hours, on weekends or holidays, call State Radio Communication at (605) 773-3231. Reporting the release to DENT does not meet any obligation for reporting to other state, local, or federal agencies. Therefore, the Contractor must also contact local authorities to determine the local reporting requirements for releases. DENR recommends that spills also be reported to the National Response Center at (800) 424-8802.

**BRIDGE REPAINTING, CLASS I**

1. All work affected areas and all new structural steel shall be painted in accordance with Section 412 of the Construction Specifications.
2. The intent at the heat straightened & repaired areas is to paint the entire girder surface for a distance of 6" outside of the outer edges of the heat straightening. The finished girder shall have a uniform paint appearance as approved by the Engineer. For informational purposes, the approximate total area under this item of repair is 641 square feet. The actual work affected area will only be known after all the nondestructive testing and heat straightening is complete.



NOTES (CONTINUED)

FOR

254'-0" CONT. COMP. GIRDER BRIDGE

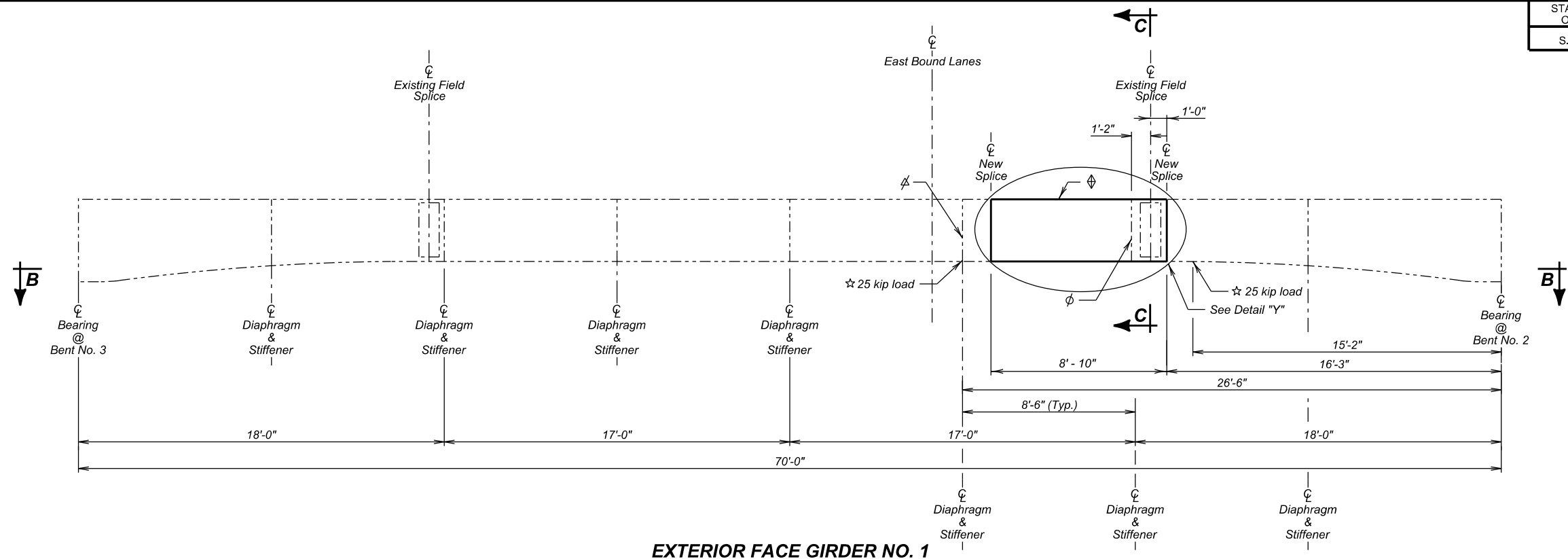
Str. No. 08-310-135

October 2020

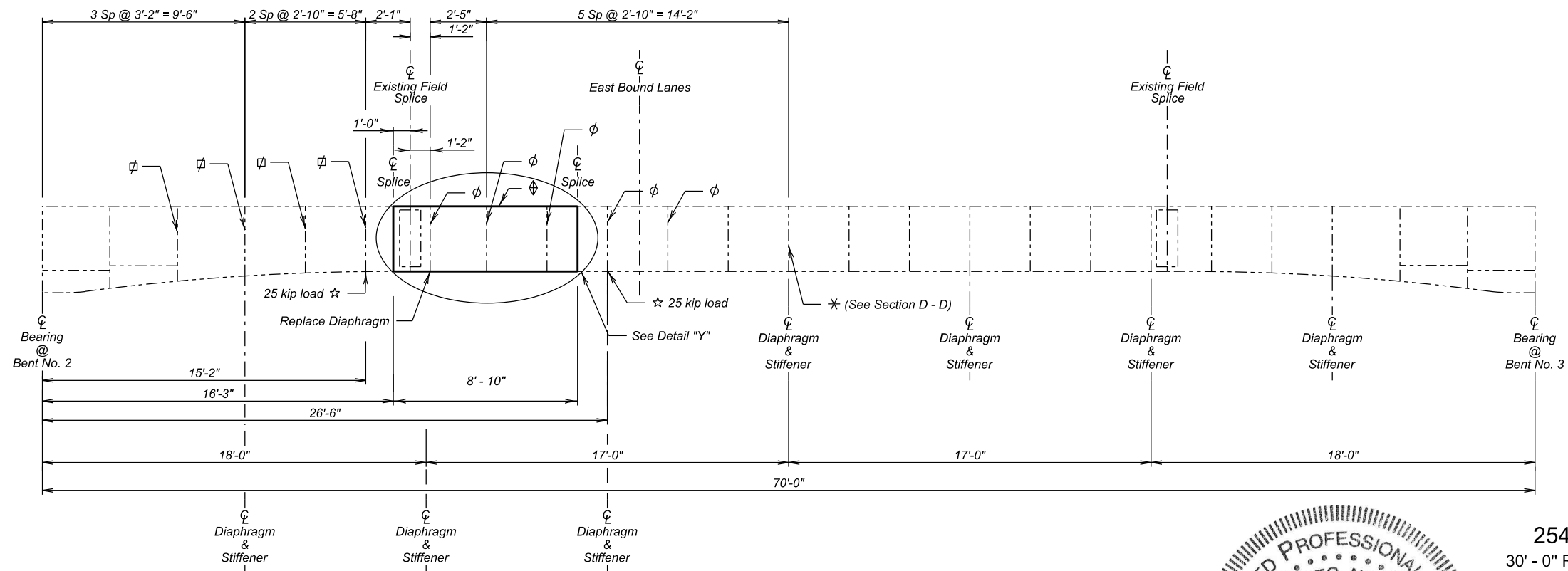
8 OF 20

DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
---------------------	---------------------	------------------

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090E-288	14	52



EXTERIOR FACE GIRDER NO. 1



INTERIOR FACE GIRDER NO. 1

- Heat Straighten Stiffener
- Replace Stiffener
- Repair Portion of Bridge Deck
- Temporary Jacking & Girder Support
- Repair Steel Diaphragm
- Test / Repair Stiffener Welds

GIRDER NO. 1 REPAIR DETAILS (A)

FOR

254' - 0" CONT. COMP. GIRDER BRIDGE

30' - 0" ROADWAY

0° SKEW

OVER I90

SEC. 9/10-T103N-R67W

STR. NO. 08-310-135

090 E-288

BRULE COUNTY

S. D. DEPT. OF TRANSPORTATION

SEPTEMBER 2020

9 OF 20

NOTES:

Girder web and bottom flange shall be heat straightened as necessary.

Concrete deck not shown for clarity.

Section B-B located on Sheet No. 10 of 20

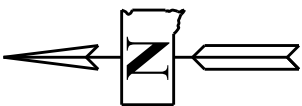
Section C-C located on Sheet No. 12 of 20

Section D-D located on Sheet No. 13 of 20

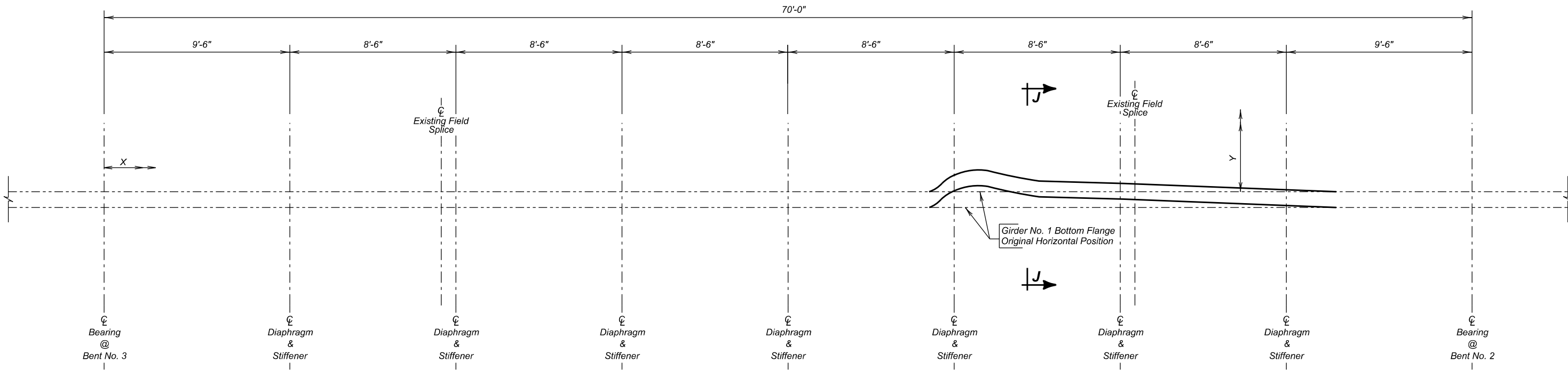
Detail "Y" located on Sheet No. 11 of 20



DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------

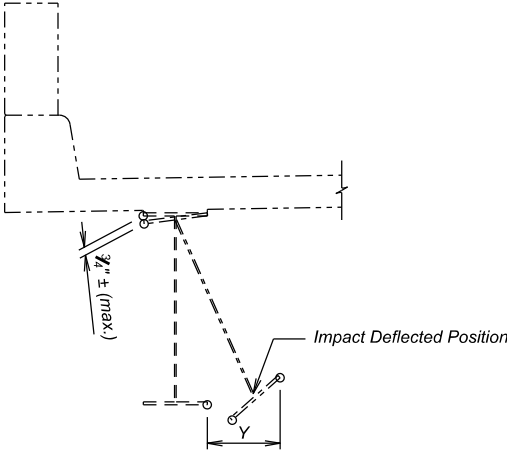


STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090E-288	15	52



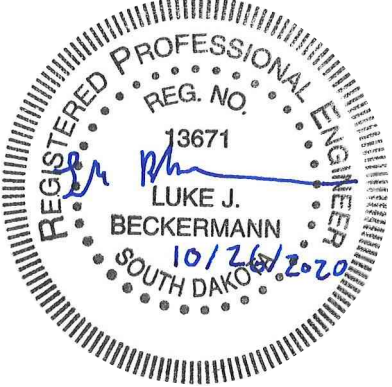
SECTION B-B  
GIRDER NO. 1 - BOTTOM FLANGE

**NOTE:**  
Heat Straighten Girder No. 1 Bottom Flange.  
See Notes.



SECTION J-J  
(Shown at X Measurements)

GIRDER NO. 1 HORIZONTAL IMPACTS DEFLECTED POSITION MEASUREMENTS	
X	Y
35'-0"	0"
43'-6"	15 1/4"
45'-2"	19 1/4"
46'-10"	18 1/2"
52'-0"	9 1/2"
60'-6"	5 1/2"
70'-0"	0"

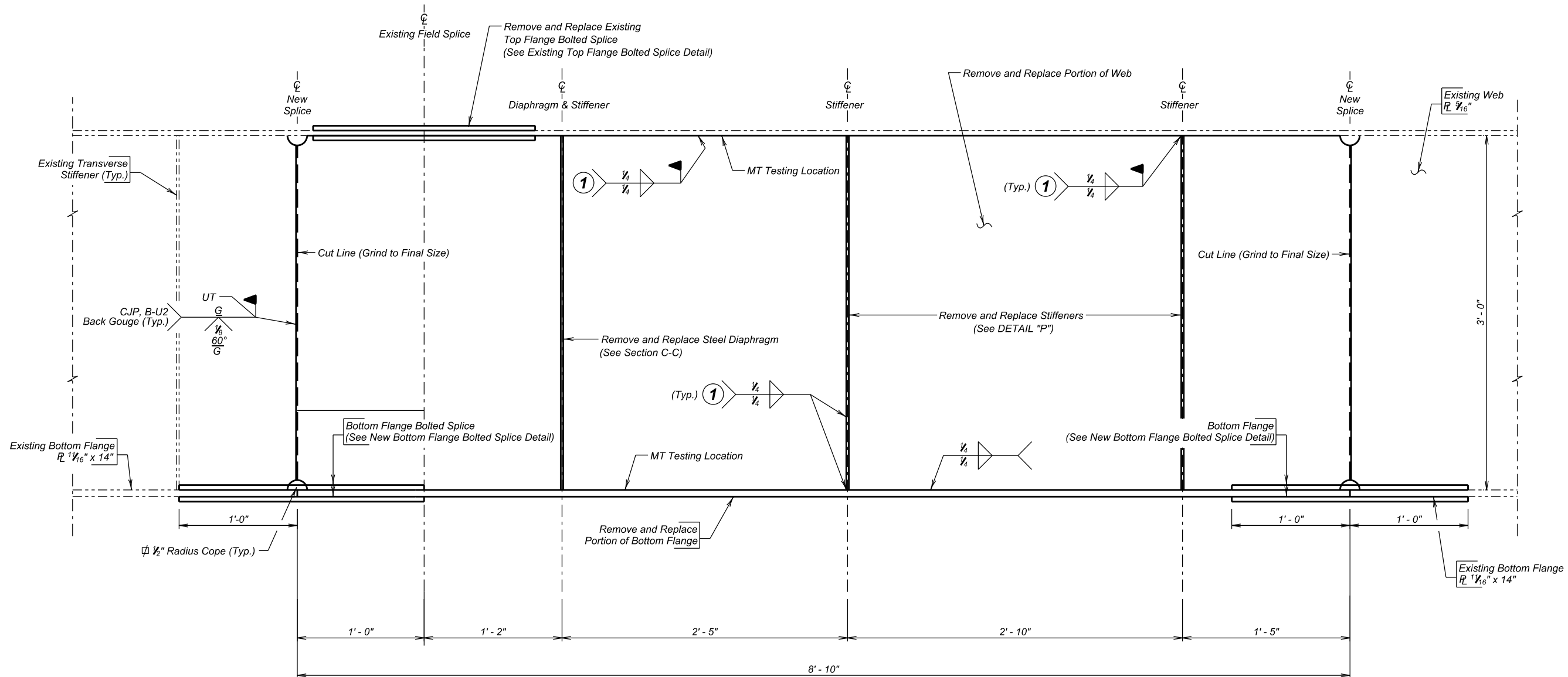


GIRDER NO. 1 REPAIR DETAILS (B)  
FOR  
254' - 0" CONT. COMP. GIRDER BRIDGE  
30' - 0" ROADWAY  
OVER I90  
STR. NO. 08-310-135  
0° SKEW  
SEC. 9/10-T103N-R67W  
090 E-288

BRULE COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090E-288	16	52



**DETAIL "Y"**  
(Interior Girder No. 1)

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.

1 All fillet welds attaching web to flange and stiffeners to girder flanges and webs shall terminate 1/2" from edge of stiffener, flange, stiffener clip or cope, whichever is applicable.

**NOTE:**

Section C-C located on Sheet 12 of 20

Detail "P" located on Sheet 12 of 20



GIRDER NO. 1 REPAIR DETAILS (C)  
FOR

**254' - 0" CONT. COMP. GIRDER BRIDGE**  
30' - 0" ROADWAY OVER I90  
STR. NO. 08-310-135  
0° SKEW  
SEC. 9/10-T103N-R67W  
090 E-288

BRULE COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

11 OF 20

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------

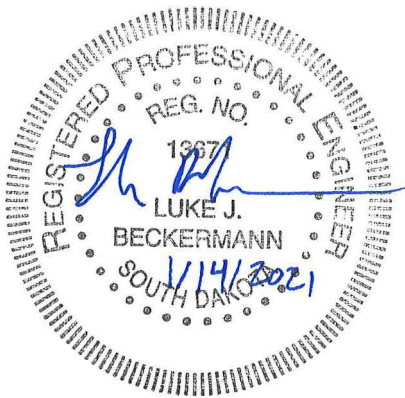


ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove & Replace Web and Flange	Each	1
Remove & Replace Transverse Stiffener	Each	6
Remove & Replace Steel Diaphragm	Each	1
Stud Shear Connector	Each	1
Field Weld	In.	1135
Grind Weld	In.	14
Class A45 Concrete, Bridge Repair	Cu. Yd.	1.1
Breakout Structural Concrete	Cu. Yd.	1.1
Galvanize Anode	Each	2

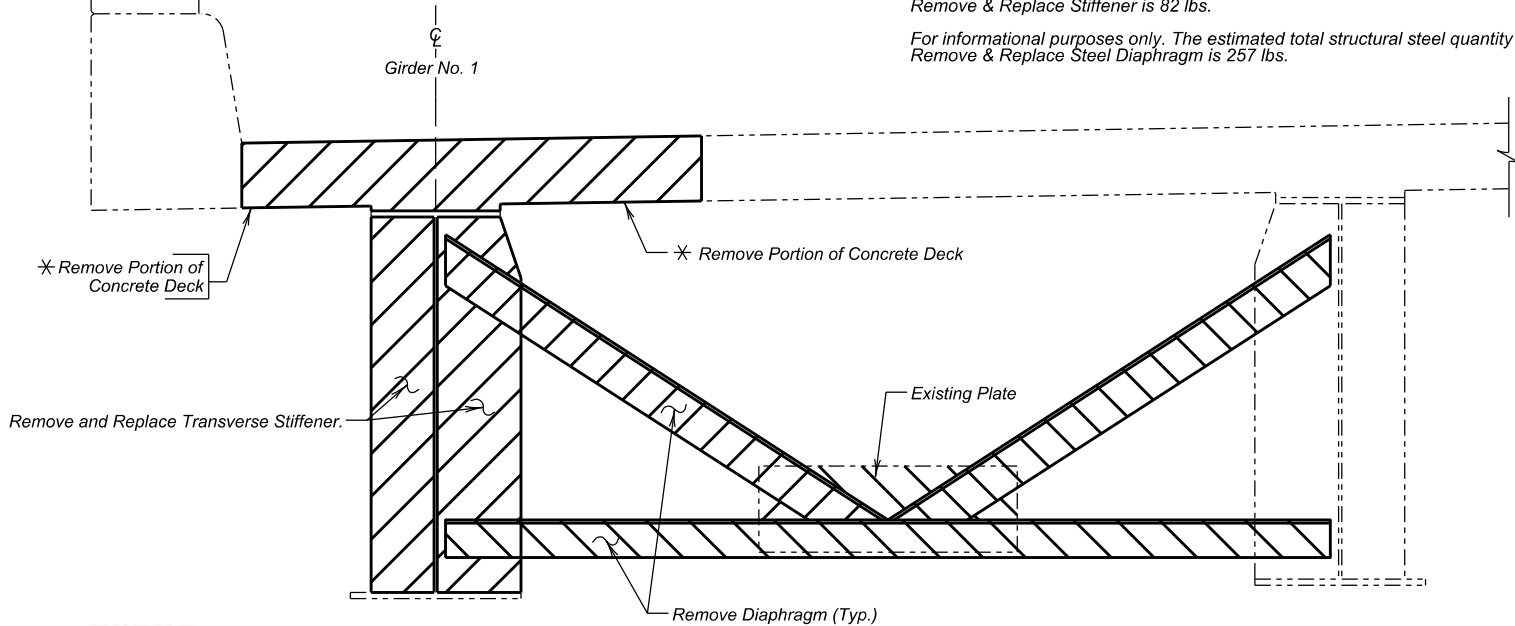
For informational purposes only. The estimated total structural steel quantity for Remove & Replace Web Flange is 650 lbs.

For informational purposes only. The estimated total structural steel quantity for Remove & Replace Stiffener is 82 lbs.

For informational purposes only. The estimated total structural steel quantity for Remove & Replace Steel Diaphragm is 257 lbs.



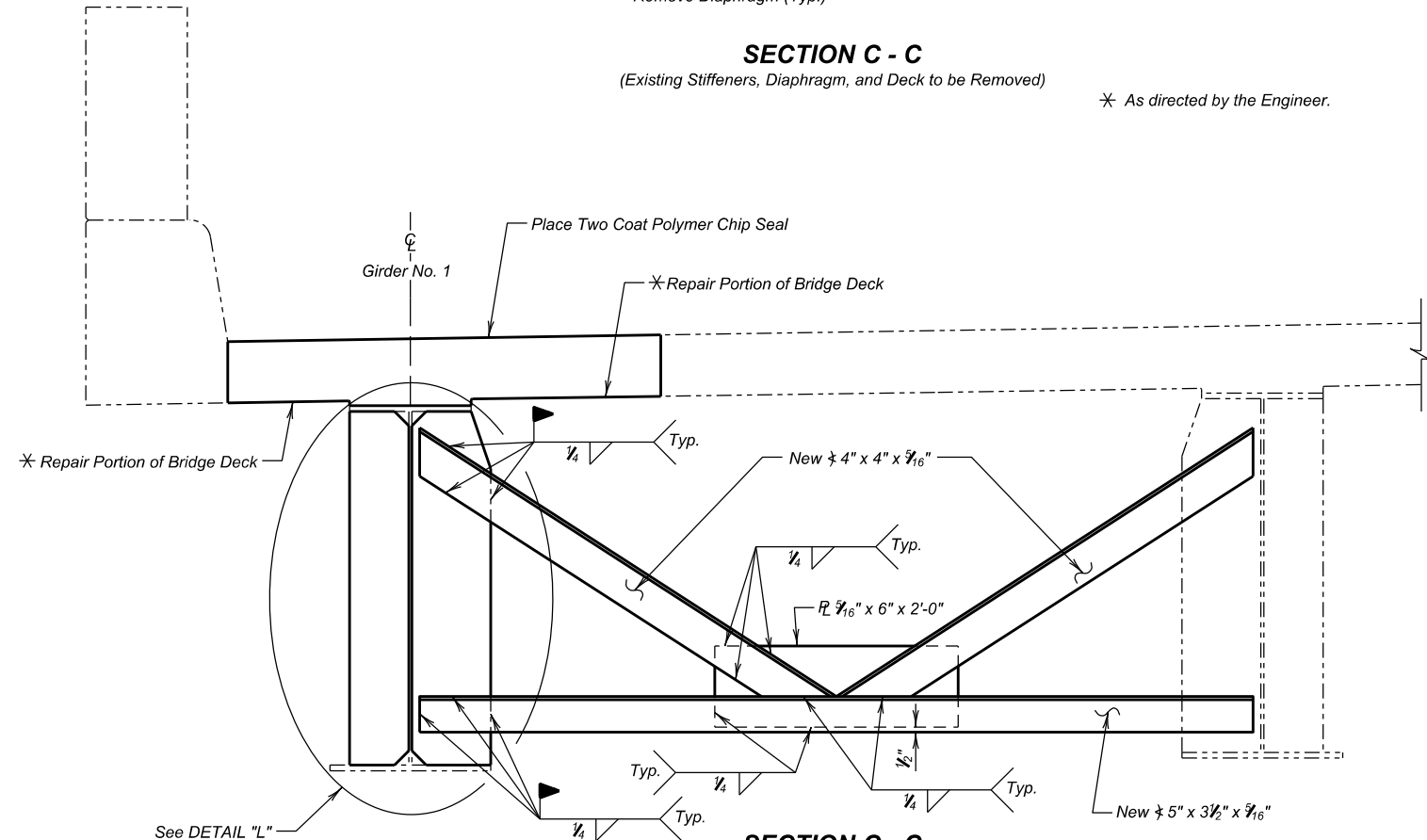
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090E-288	17	52



**SECTION C - C**

(Existing Stiffeners, Diaphragm, and Deck to be Removed)

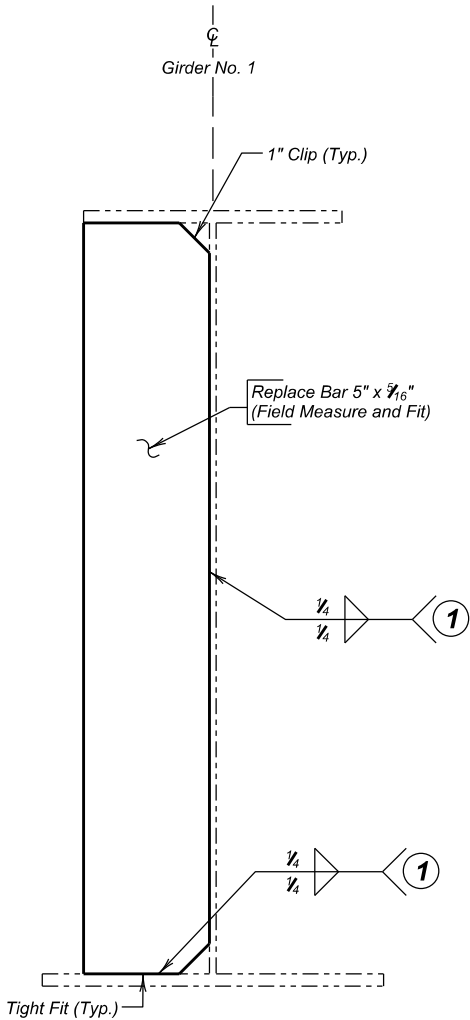
✱ As directed by the Engineer.



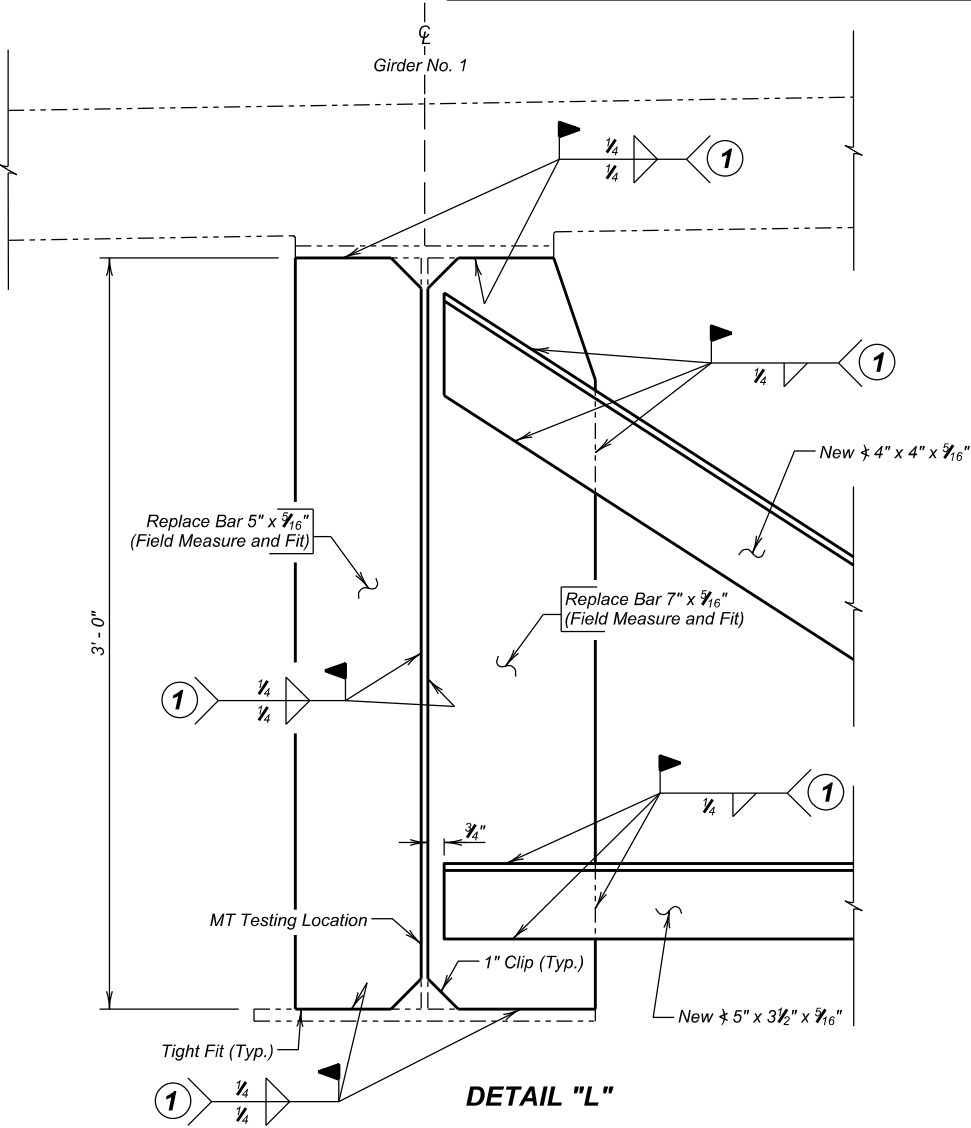
**SECTION C - C**

(New Stiffeners, Diaphragm, and Deck)

Area to be Removed



**DETAIL "P"**



**DETAIL "L"**

1 All fillet welds attaching web to flange and stiffeners to girder flanges and webs shall terminate 1/2" from edge of stiffener, flange, stiffener clip or cope, whichever is applicable.

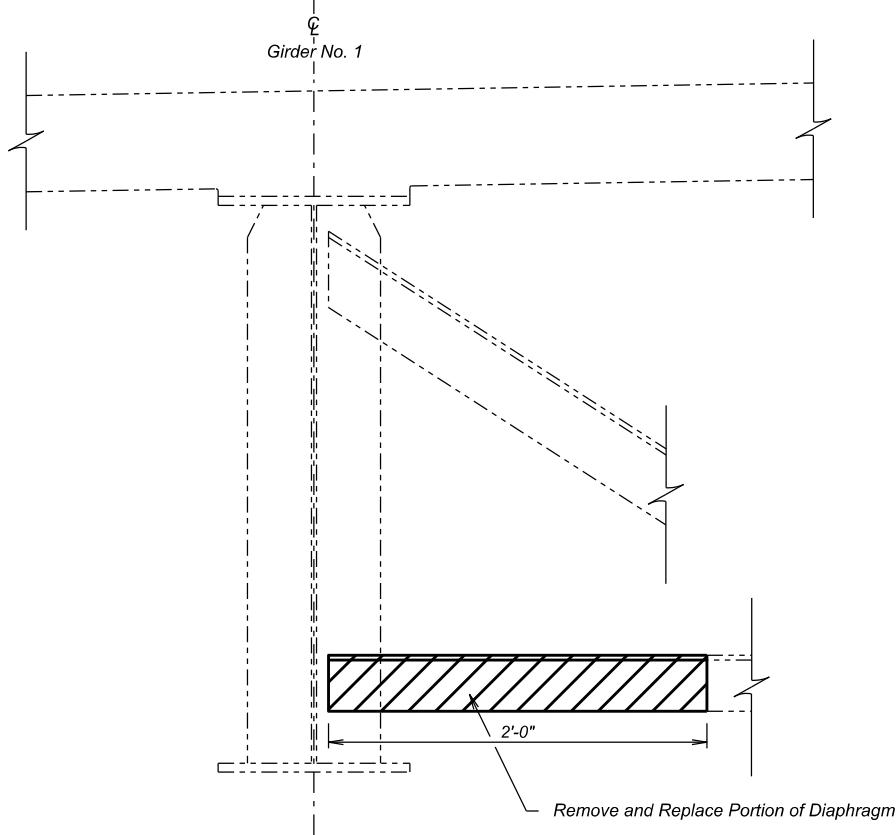
GIRDER NO. 1 REPAIR DETAILS (D)  
FOR  
254' - 0" CONT. COMP. GIRDER BRIDGE  
30' - 0" ROADWAY  
OVER I90  
STR. NO. 08-310-135  
0° SKEW  
SEC. 9/10-T103N-R67W  
090 E-288

BRULE COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

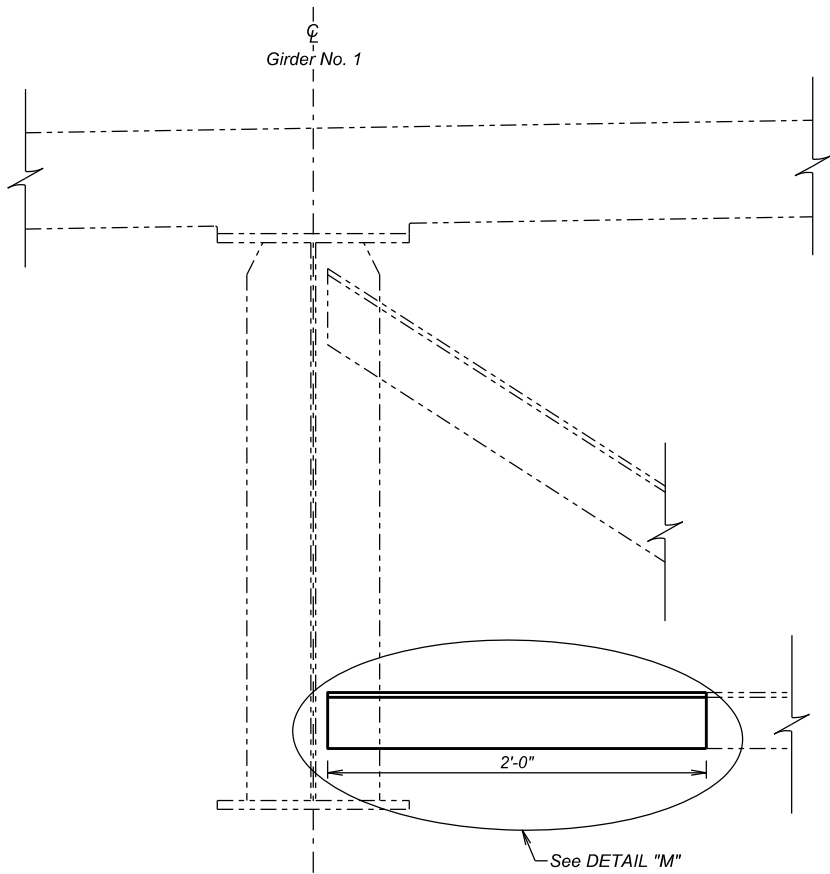
12 OF 20

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------

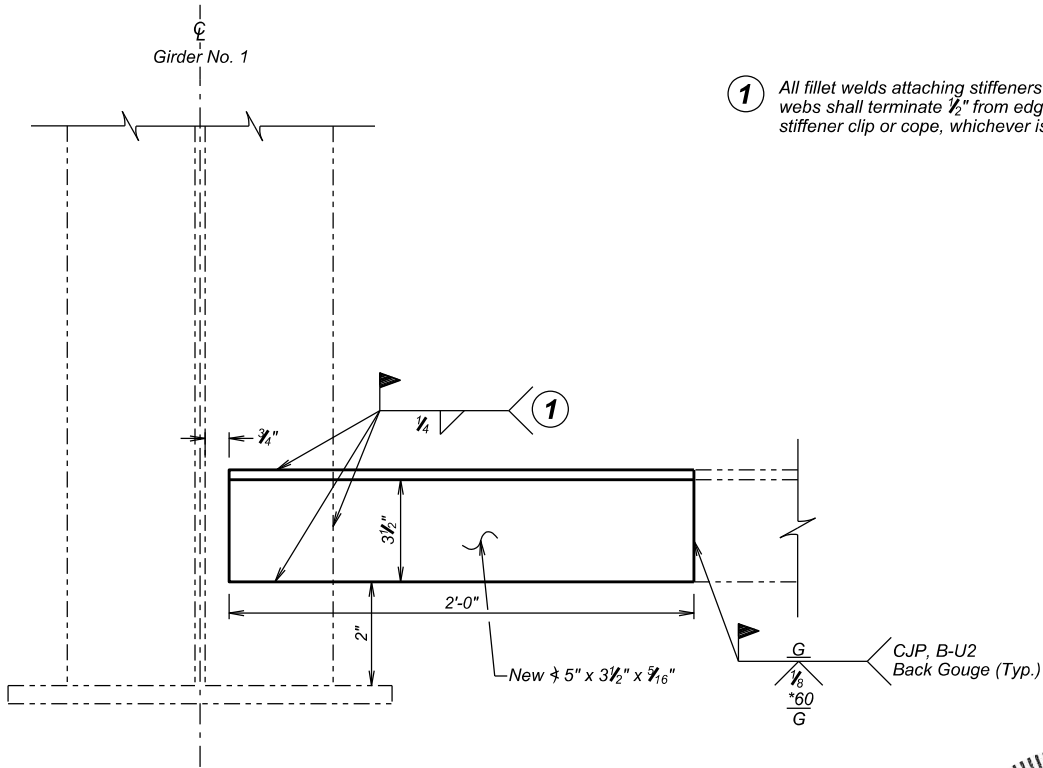
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090E-288	18	52



**SECTION D - D**  
(Existing Stiffeners, and Diaphragm)



**SECTION D - D**  
(New Portion of Diaphragm)



**DETAIL "M"**  
(New Partial Diaphragm)



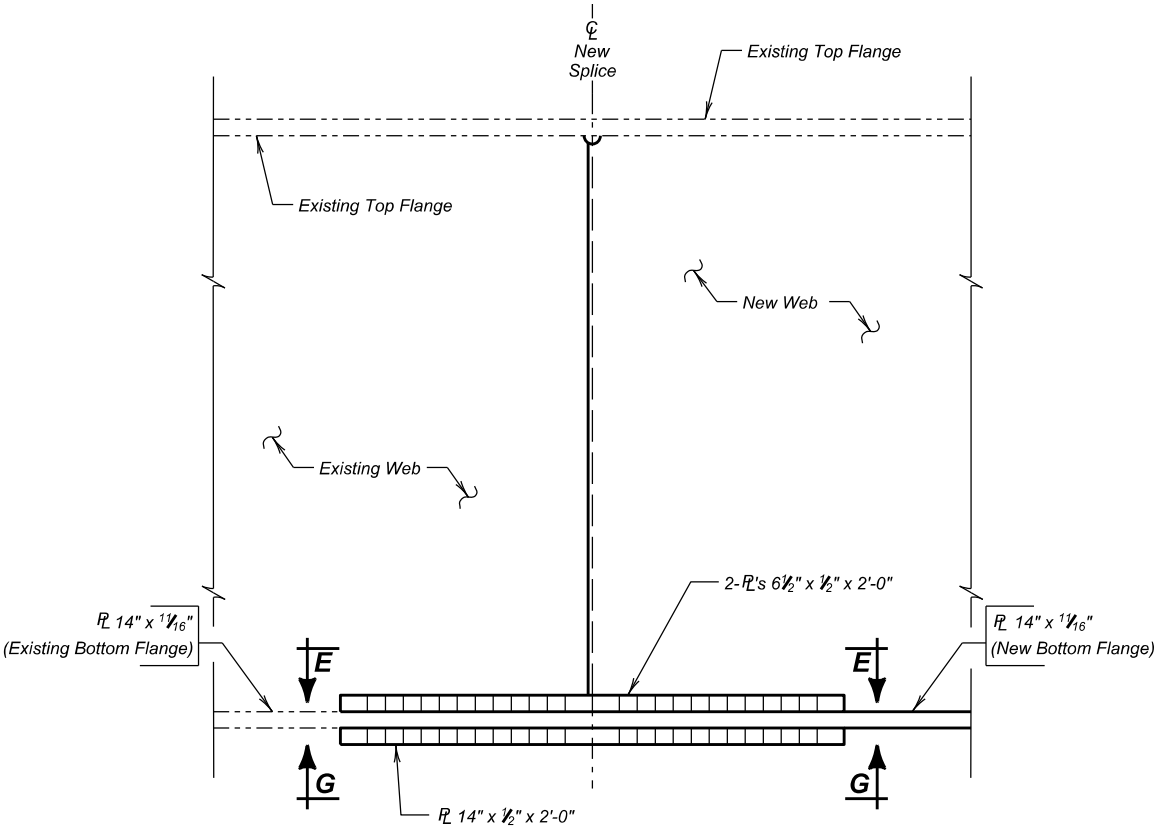
ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Repair Steel Diaphragm	Each	1
Field Weld	Ln.	22

For informational purposes only. The estimated total structural steel quantity for Repair Steel Diaphragm is 18 lbs.

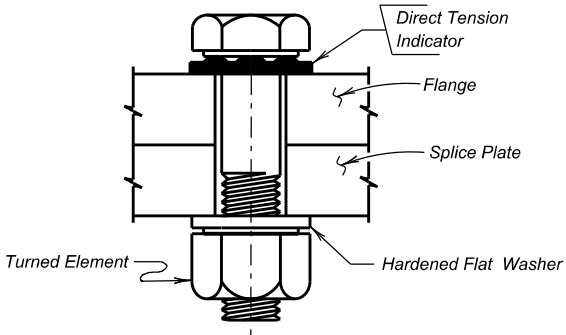
GIRDER NO. 1 REPAIR DETAILS (E)  
FOR  
254' - 0" CONT. COMP. GIRDER BRIDGE  
30' - 0" ROADWAY  
OVER I90  
STR. NO. 08-310-135  
0° SKEW  
SEC. 9/10-T103N-R67W  
090 E-288

BRULE COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

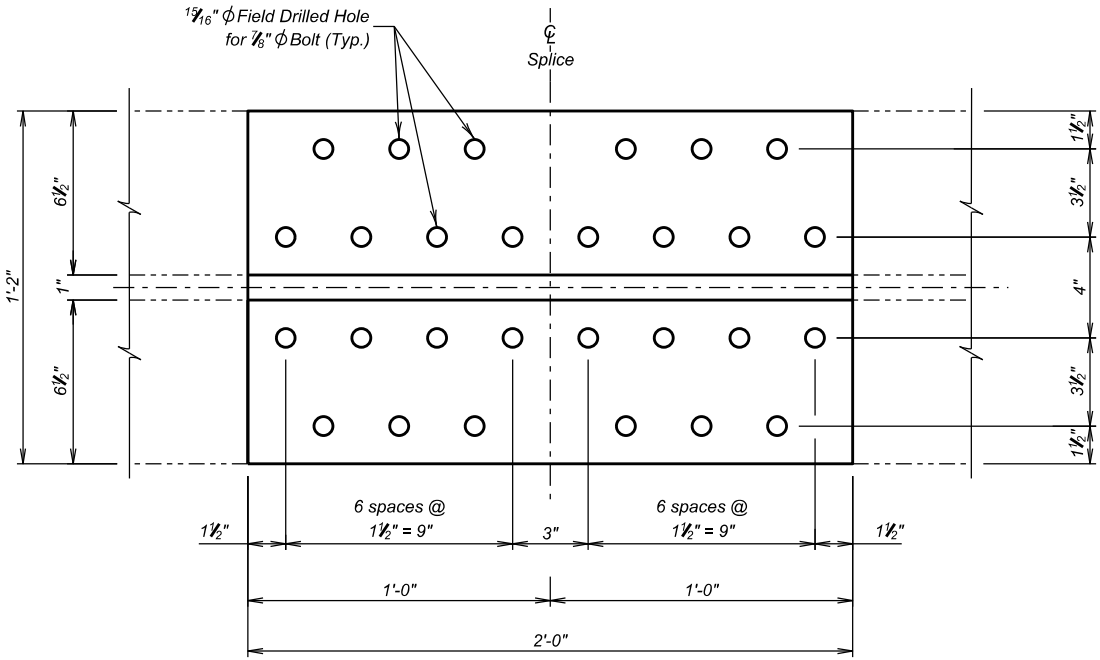
DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------



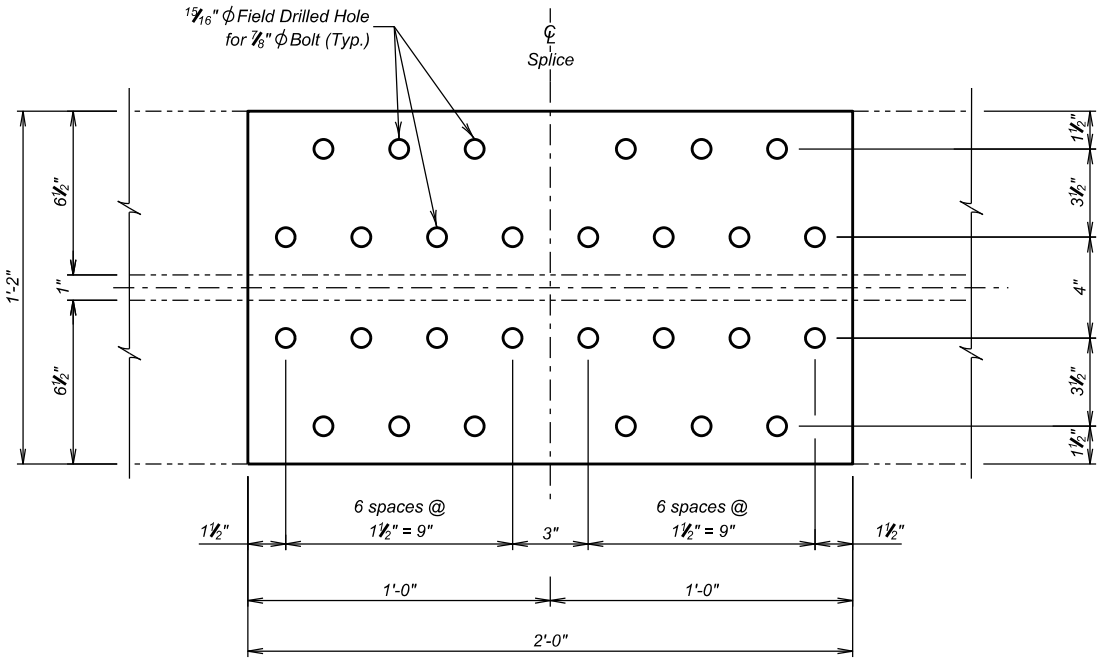
NEW BOTTOM FLANGE BOLTED SPLICE DETAIL  
ELEVATION ~ EXTERIOR GIRDER



DIRECT TENSION INDICATOR  
DETAIL



VIEW E - E



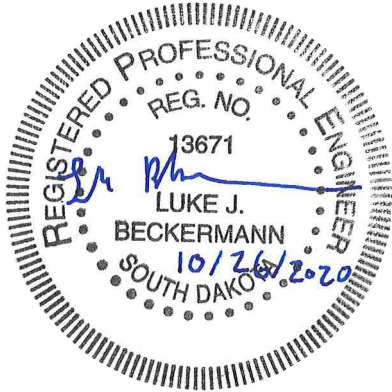
VIEW G - G

NOTES:

All Bolts shall be 7/8\"/>

For informational purposes only, the estimated total structural steel quantity for Bolted Field Splice including plates, bolts, nuts, and washers is 124 lbs each.

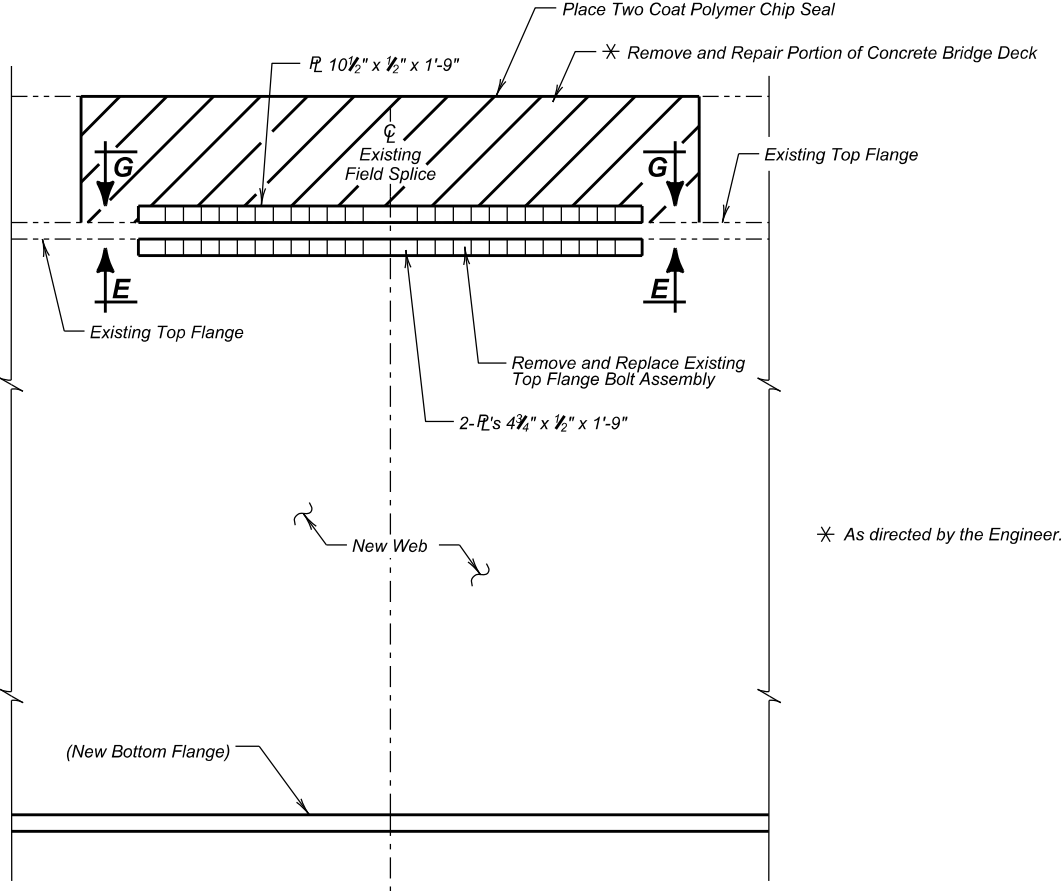
ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Bolted Girder Splice	Each	2



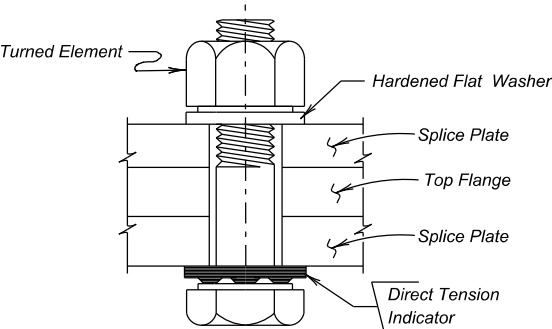
BOLTED SPLICE REPAIR DETAILS (A)  
FOR

254' - 0" CONT. COMP. GIRDER BRIDGE  
30' - 0" ROADWAY  
OVER I90  
STR. NO. 08-310-135  
0° SKEW  
SEC. 9/10-T103N-R67W  
090 E-288

BRULE COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020



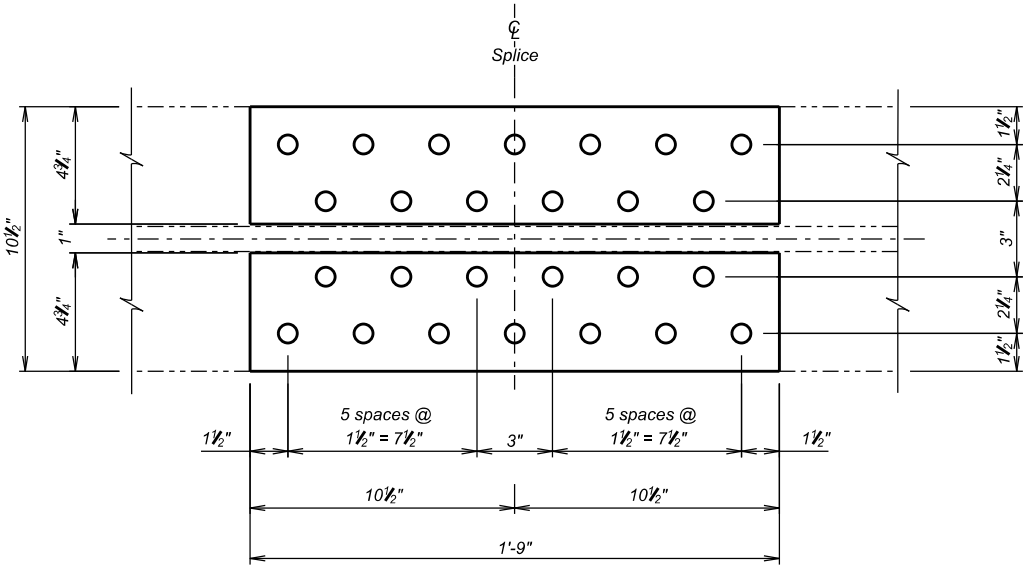
EXISTING TOP FLANGE BOLTED SPLICE DETAIL  
ELEVATION ~ EXTERIOR GIRDER



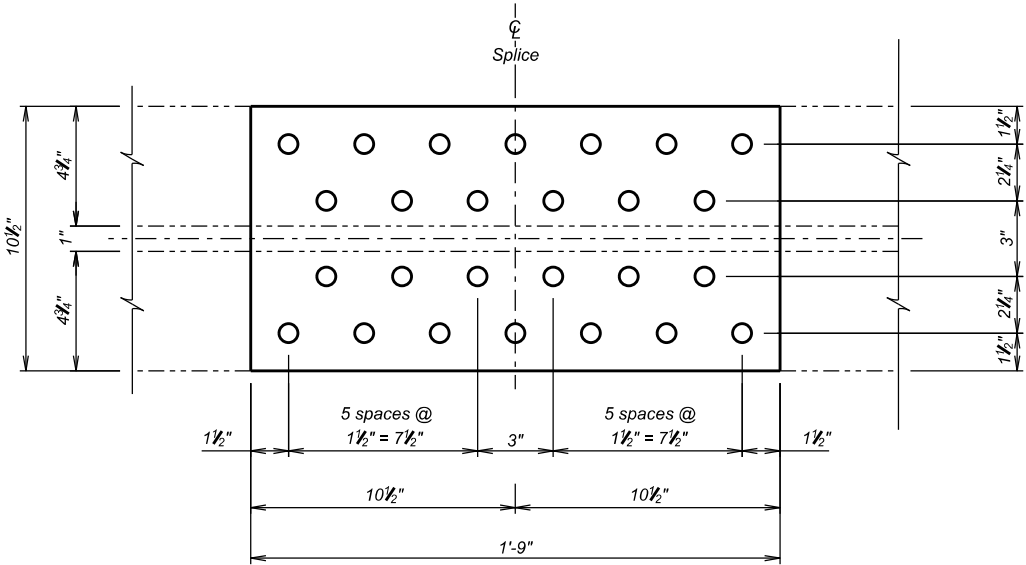
DIRECT TENSION INDICATOR  
DETAIL

NOTES:

- Replace all bolts on top flange splice as indicated.
- No live load shall be on the bridge during bolt removal and replacement.
- Bolt removal and replacement will be paid for as Remove and Replace Bolt Assembly.
- Bolts, nuts, and washers shall conform to ASTM F3125, Grade A325.
- Bolts in flange splices shall be placed with the heads down.
- For informational purposes only, the estimated total structural steel quantity for Remove and Replace Bolt Assembly including plates, bolts, nuts, and washers is 85 lbs each.

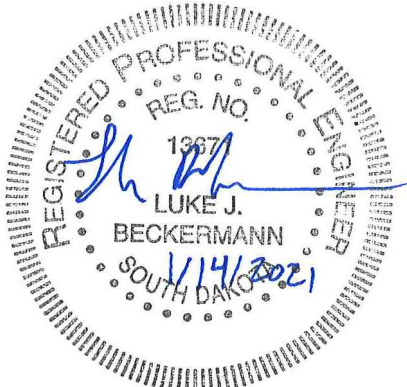


VIEW E - E



VIEW G - G

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove and Replace Bolt Assembly	Each	1
Breakout Structural Concrete	Cu. Yd.	0.1
Class A45 Concrete, Bridge Repair	Cu. Yd.	0.1
Galvanize Anode	Each	1



BOLTED SPLICE REPAIR DETAILS (B)

FOR

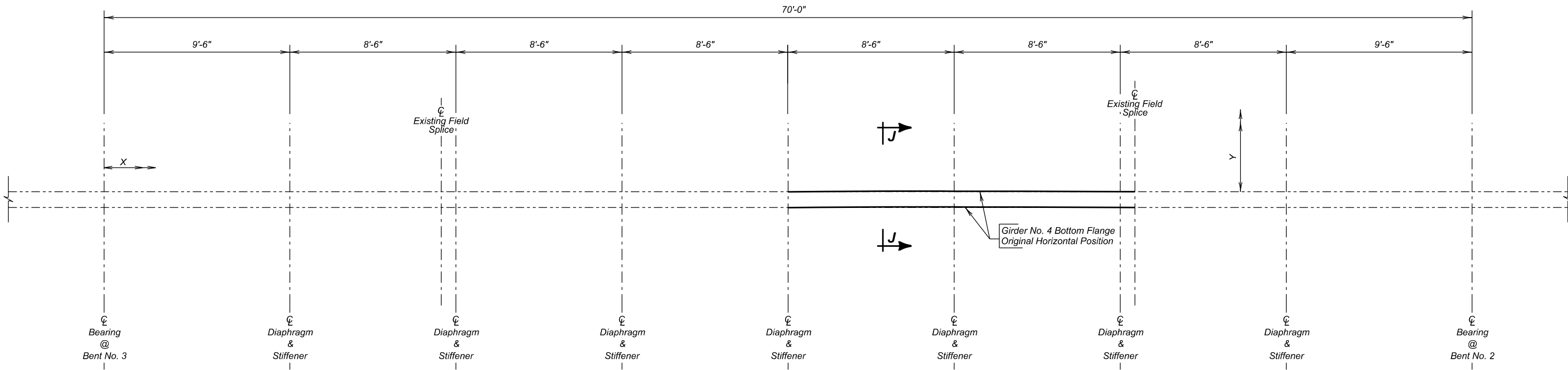
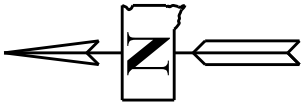
254' - 0" CONT. COMP. GIRDER BRIDGE  
30' - 0" ROADWAY  
OVER I90  
STR. NO. 08-310-135

0° SKEW  
SEC. 9/10-T103N-R67W  
090 E-288

BRULE COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

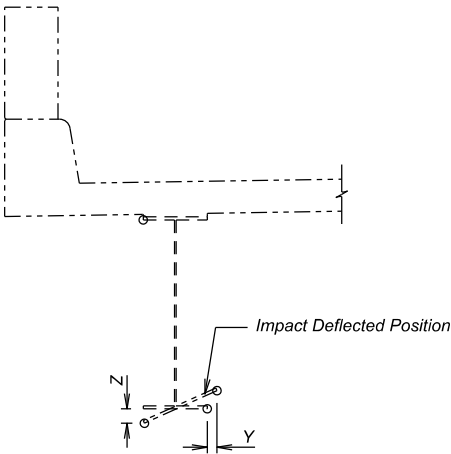
15 OF 20





GIRDER NO. 4 - BOTTOM FLANGE

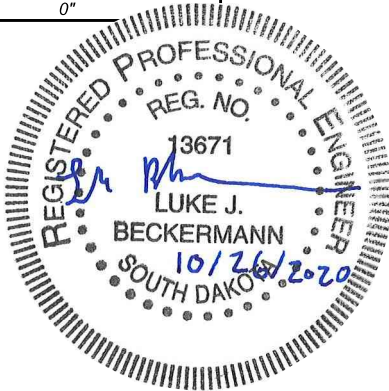
**NOTE:**  
Heat Straighten Girder No. 4 Bottom Flange, See Notes.



SECTION J-J  
(Shown at X Measurements)

GIRDER NO. 4 HORIZONTAL IMPACTS DEFLECTED POSITION MEASUREMENTS	
X	Y
35'-0"	0"
41'-4 <sup>3</sup> / <sub>4</sub> "	1/2"
52'-9"	0"

GIRDER NO. 4 VERTICAL IMPACTS DEFLECTED POSITION MEASUREMENTS	
X	Z
35'-0"	0"
41'-4 <sup>3</sup> / <sub>4</sub> "	1/2"
52'-9"	0"



GIRDER NO. 4 REPAIR DETAILS  
FOR  
254' - 0" CONT. COMP. GIRDER BRIDGE  
30' - 0" ROADWAY OVER I90  
STR. NO. 08-310-135  
0° SKEW  
SEC. 9/10-T103N-R67W  
090 E-288

BRULE COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

# INDEX OF BRIDGE SHEETS —

Sheet No. 1 - General Drawing and Quantities.  
 Sheet No. 2 - Subsurface Investigations.  
 Sheet No. 3 - Erection Data.  
 Sheet No. 4 - Details for Std. Reinf. Conc. Sill. N4-WP-252-30  
 Sheet No. 5 - Details for Std. Reinf. Conc. Bent. CB-252-30-00 (8-30-62)  
 Sheet No. 6 - Superstructure Details N4 CWG-252-30-00-1-3 (6-27-62)  
 Sheet No. 7 - Superstructure Details N4 CWG-252-30-00-2-3  
 Sheet No. 8 - Superstructure Details N4 CWG-252-30-00-3-3 (8-30-62)  
 Sheet No. 9 - Standard Railing and Drain Details N4-R-252-30-00-4-3 (8-30-62)  
 Sheet No. 10 - Details of Bolted Field Splice. CWG-252-30-B5

B.M. No. 15 El. 1688.15  
 Iron pin in fence line  
 500' Lt. Sta. 273+33

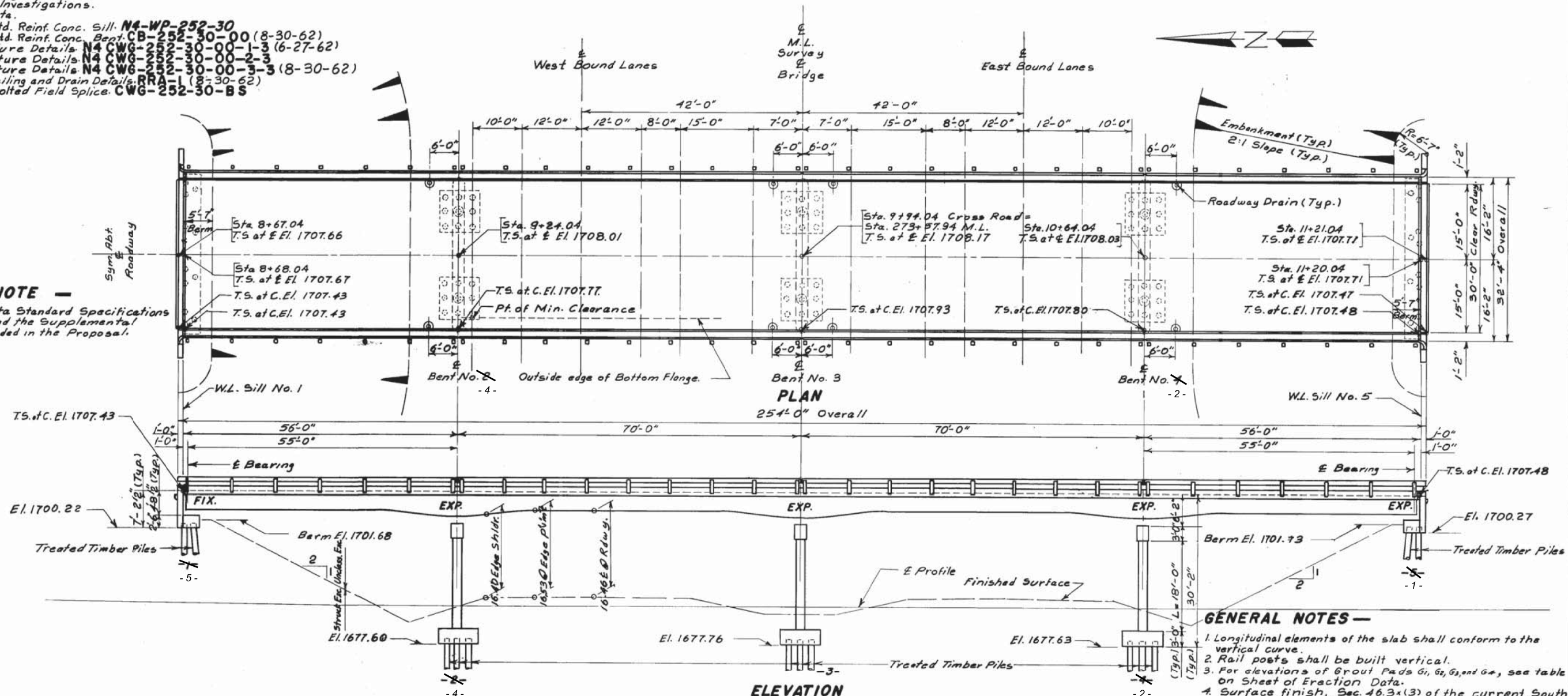
NOTE:  
 T.S. @ E.L. = Top of Slab at Centerline Roadway Elevation.  
 T.S. @ C.E.L. = Top of Slab at Curb Elevation.

B.M. No. 13 A El. 1683.54  
 Iron pin in concrete  
 400' Rt. Sta. 273+33

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090E-288	22	52

## SPECIFICATION NOTE —

Use current South Dakota Standard Specifications for Roads and Bridges, and the Supplemental Specifications as included in the Proposal.



## GENERAL NOTES —

1. Longitudinal elements of the slab shall conform to the vertical curve.
2. Rail posts shall be built vertical.
3. For elevations of Grout Pads G1, G2, G3, and G4, see table on Sheet of Erection Data.
4. Surface finish, Sec. 46.3(3) of the current South Dakota Standard Specifications, shall also include such portions of the structure which are visible from any traveled lane.
5. Place roadway drains as shown in PLAN (8-Reg'd)

## ORIGINAL CONSTRUCTION PLANS

STR. NO. 08-310-135

GENERAL DRAWING AND QUANTITIES

FOR

254'-0" CONT. COMP. GIRDER VIADUCT

30'-0" ROADWAY

OVER I.S. NO. 90 STA. 273+57.94 SEC. 9/10-T103N-R67W

STA. 8+67.04 TO 11+21.04

I 90-6(II)289

Str. No. 08-310-135

BRULE COUNTY

SOUTH DAKOTA

H20-S16-44

DEPARTMENT OF HIGHWAYS

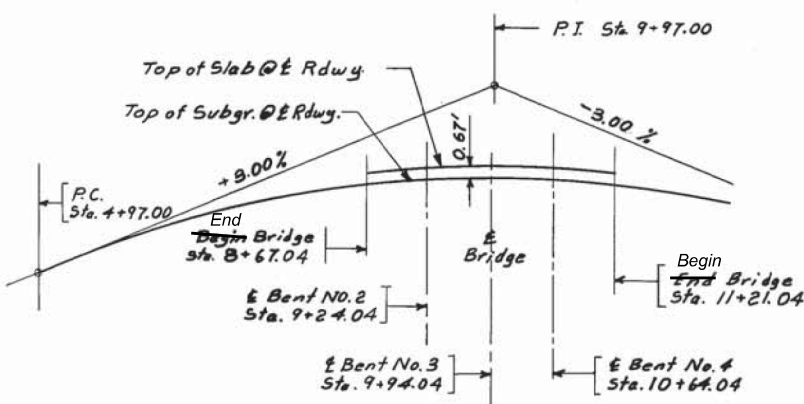
OCT. 1962

17 OF 20

-X771-

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
	R.K.	L.G. & H.A.	<i>[Signature]</i> BRIDGE ENGINEER

P.I. Sta. 9+97.00  
 El. 1715.00  
 V.C. 1000'

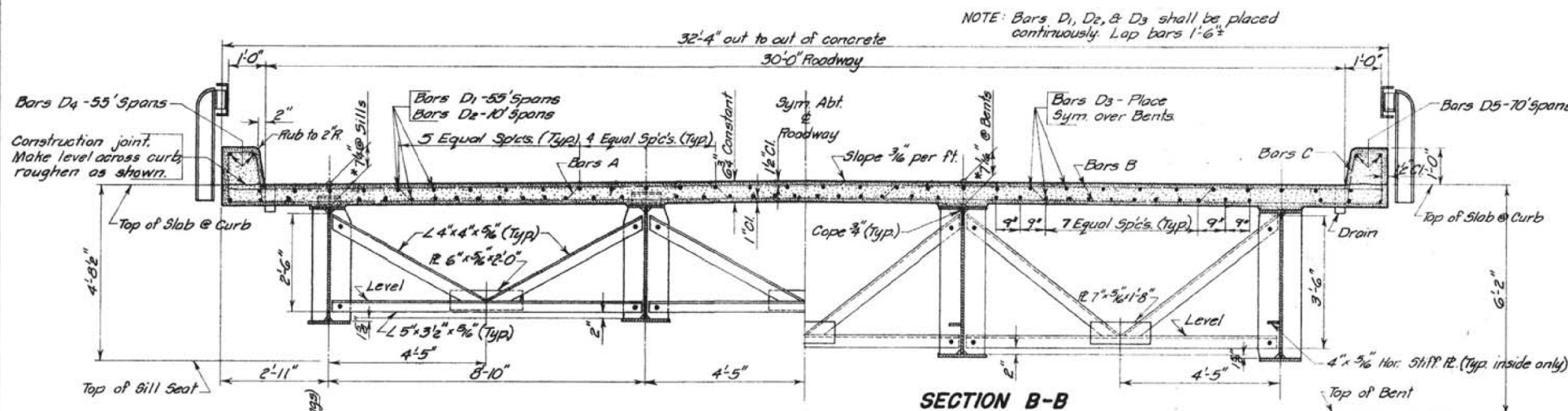
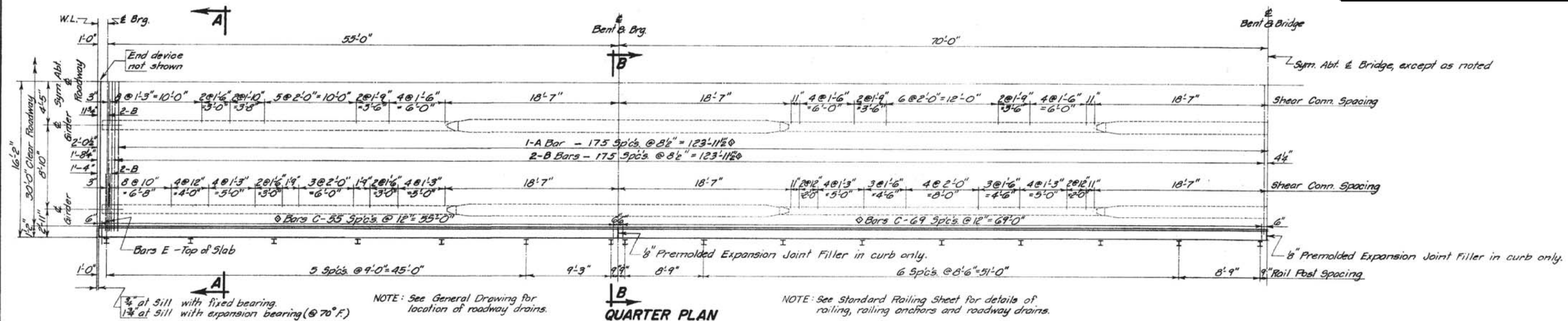


## SUBGRADE CURVE DATA

ESTIMATED QUANTITIES									
ITEM	CL "A" Conc. Cu. Yds.	Steel - lbs. Reinf. Struct.	Type "A" Steel Railing Lin. Ft.	Timber Piles - Lin. Ft. Treated	Excavation - Cu. Yds. Struct. Unclose.				
Superstr. - 252'-0" Cont. Comp. Unit	91.8	58,830	132,730	510.3					
Substr. - Sill No. 1	23.2	2,205	830	11055-605 1060-60	15				
Substr. Bent No. 2, 3, and 4	87.9	20,270		51030-1530 3035-105	215				
Substr. Sill No. 5	23.2	2,205	845	11055-605 1060-60	15				
Totals	325.2	83,510	134,105	510.3	2,740	245			

Δ All Unclassified Excavations to be done by others.  
 Δ One Treated Timber Test Pile shall be driven at Sill No. 1 and 5 and Bent No. 2, 3, and 4 before remaining piles are ordered.  
 PILE NOTE: Piles driven at Sills No. 1 and 5, including Test Piles, shall obtain their full bearing (24 Tons) in the natural ground below the new embankments, elevations 1685.7 ± and 1685.1 ± respectively. Pre-bored holes thru the fill are required, and shall have a minimum diameter 2" larger than the nominal diameter (3" from the butt) of the pile.

ITEM	CL "A" Conc. Cu. Yds.	Steel - lbs. Reinf. Struct.	Type "A" Steel Railing Lin. Ft.	Timber Piles - Lin. Ft. Treated	Excavation - Cu. Yds. Struct. Unclose.
Superstr. - 252'-0" Cont. Comp. Unit	91.8	58,830	132,730	510.3	
Substr. - Sill No. 1	23.2	2,205	830	11055-605 1060-60	15
Substr. Bent No. 2, 3, and 4	87.9	20,270		51030-1530 3035-105	215
Substr. Sill No. 5	23.2	2,205	845	11055-605 1060-60	15
Totals	325.2	83,510	134,105	510.3	2,740



Mk.	No.	Size	Length	Type	Bending Details
A	551	5	33'-0"	15	
B	712	5	32'-0"	Str.	
C	504	4	5'-3"	T1	
D1	143	5	37'-0"	Str.	
D2	148	5	33'-0"	Str.	
D3	222	5	40'-0"	Str.	
D4	16	5	28'-9"	Str.	
D5	16	5	35'-9"	Str.	
E	8	6	6'-0"	Str.	

NOTE: All dimensions are out to out of bars.

ITEM	UNIT	QUANTITY
Class II Concrete	Cu. Yds.	191.8
Reinforcing Steel	Lbs.	58,830
Structural Steel	Lbs.	136,730
Type RPA-1 Steel Railing	Lt. Ft.	510.3

Applies only if fixed bearings are at Sill #1 or Sill #5. If fixed bearings are located on any of the bents, deduct 165 lbs. from this quantity. See General Drawing for location of fixed bearings.

# ORIGINAL CONSTRUCTION PLANS

STR. NO. 08-310-135

## SUPERSTRUCTURE DETAILS

FOR

## STANDARD 252'-0" CONTINUOUS WELDED PLATE GIRDER UNIT

COMPOSITE SECTION

30'-0" ROADWAY

4-SPAN UNIT

SOUTH DAKOTA

DEPARTMENT OF HIGHWAYS

AUG. 1961

18 OF 20

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED

Re-Steel Revised 6-27-62

N4 CWG-252-30-00-1-3

## CHANNEL SHEAR CONNECTOR

## WELDED STUD SHEAR CONNECTORS

### DETAILS FOR SHEAR CONNECTORS

Channel or welded stud shear connectors are spaced as shown above in Quarter Plan. The Contractor may substitute a row of 3/8" 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 the girders facing in the directions as shown on Girder Layout.

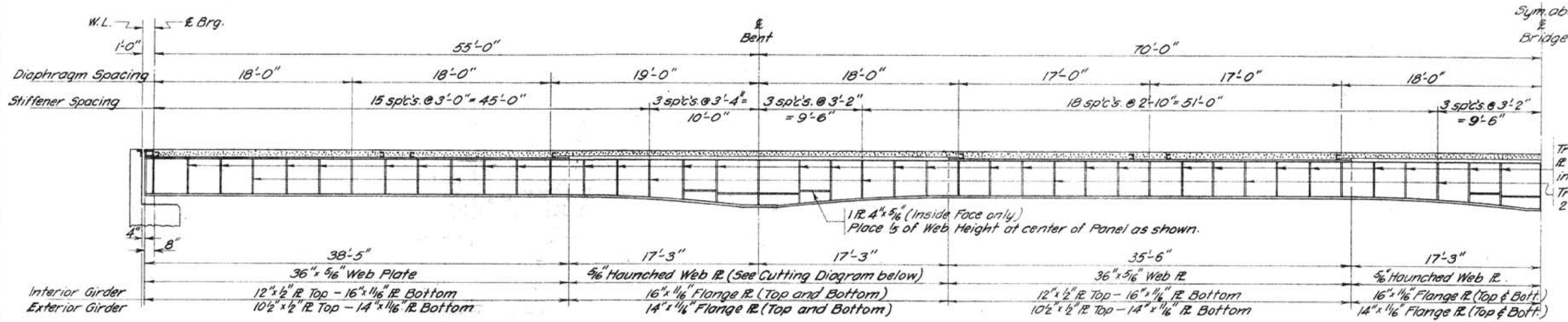
### CONCRETE PLACING NOTES—

The concrete slab may be placed in one continuous pour. However, if the Contractor deems it advisable to use construction joints, a plan showing type of joint and pouring procedure, shall be submitted to the BRIDGE DIVISION for approval. The curb shall be poured after all of the slab has been poured.

## DETAIL "X"

## DIAPHRAGMS





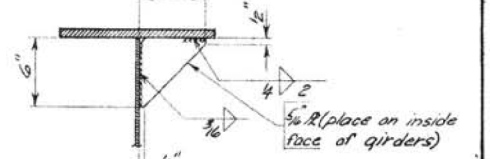
NOTE: When stiffener plates are used on one side only they shall be attached to the outstanding leg of the compression flange as shown in Detail "Y".

**DETAIL "Y"**

Transv. Interm. Stiff. R 5"x5/8" Place on inside face only.

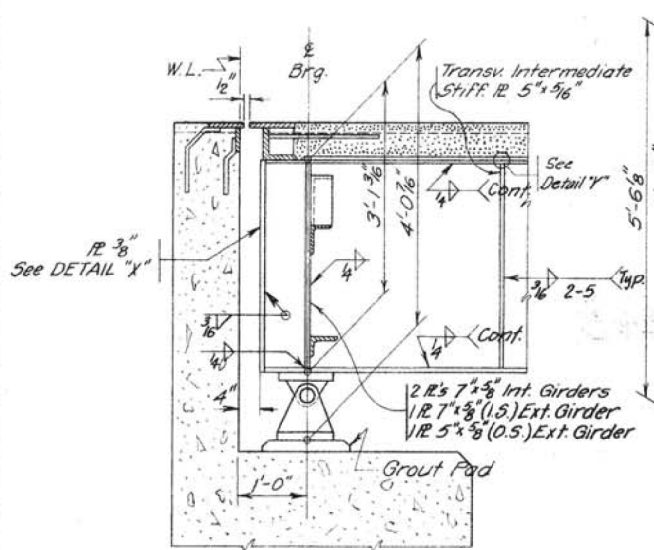
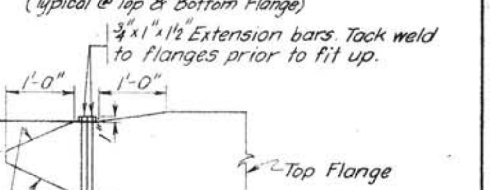
Transv. Interm. Stiff. 2-R 5"x5/8".

Bottom Flange shall be considered compression flange at haunched section between field splices. Top flange shall be considered compression flange in all other sections.

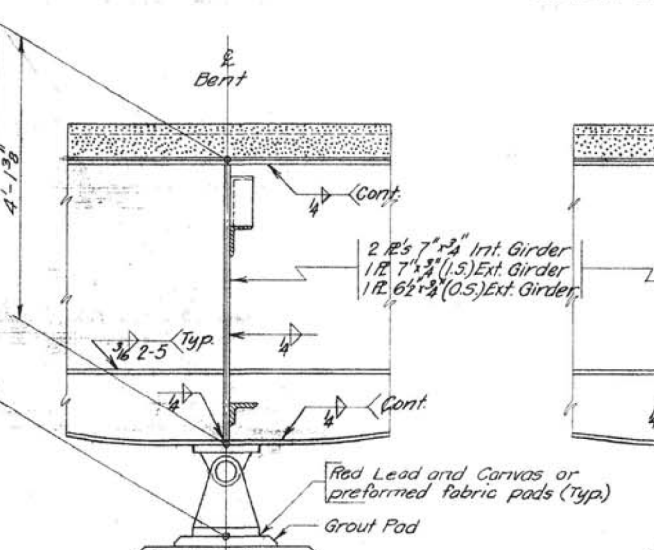


**DETAIL "D"**

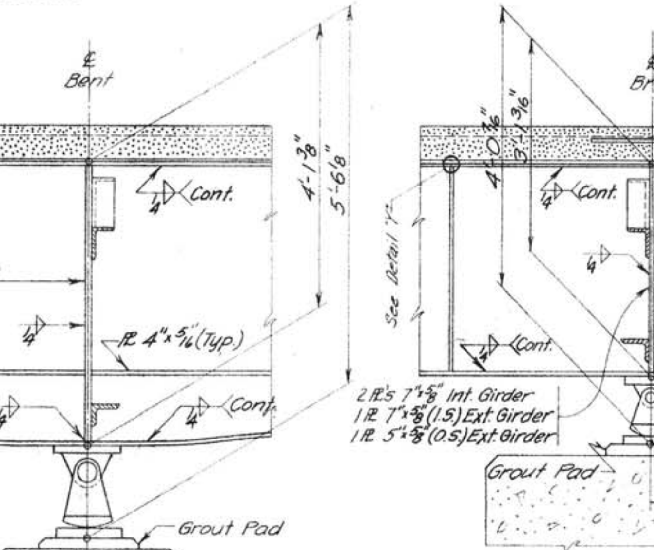
NOTE: Other transverse stiffeners are as noted in Sections below and as detailed on Rdwy. Section.



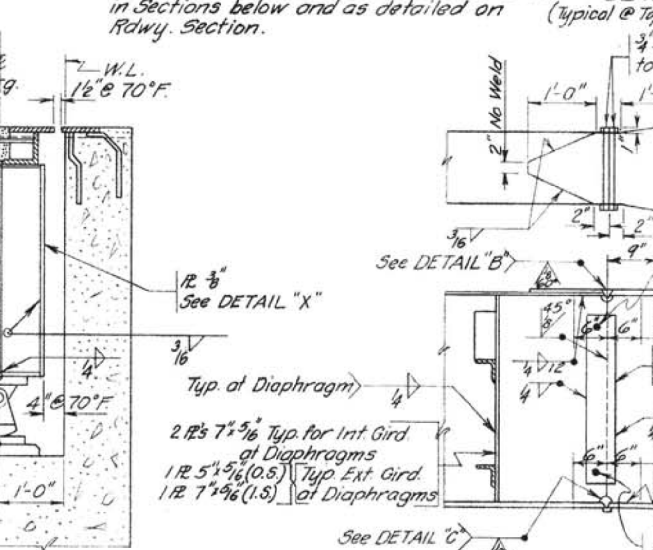
**SILL SECTION  
FIXED SHOE**



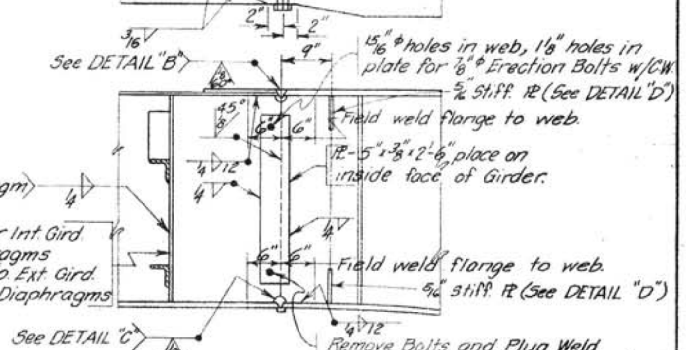
**BENT SECTION  
FIXED SHOE**



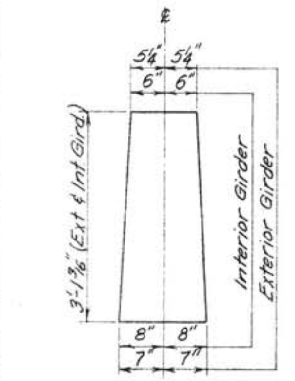
**BENT SECTION  
ROCKER SHOE**



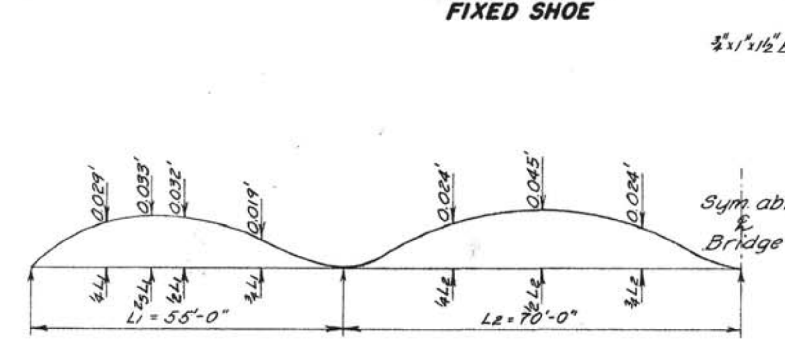
**SILL SECTION  
ROCKER SHOE**



**TYPICAL FIELD SPLICE**



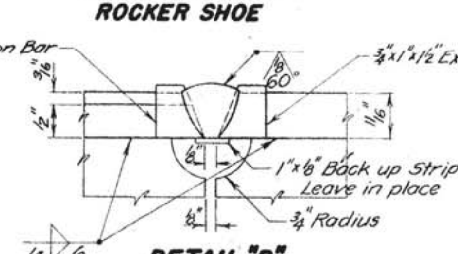
**DETAIL "X"  
END PLATE**



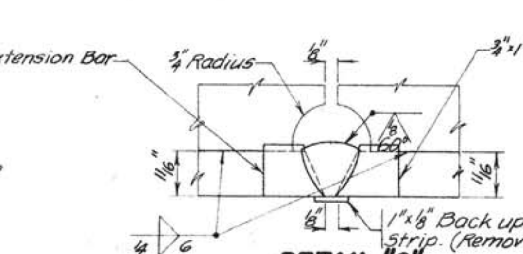
**D.L. DEFLECTION DIAGRAM**

**NOTE—**

The D.L. Deflection Diagram shown shall be used to determine the depth of haunch required at interior points. Elevations at top of Girders shall be established after the Girders, with diaphragms, have been erected and welded, but prior to pouring of Slab. Girders shall not be supported by construction shoring while elevations are established. The depth of haunch required at any interior point equals (+) the proposed top of slab minus (-) the elevation of top of Girder, minus (-) slab thickness (6 3/4") plus (+) Dead Load Deflection.



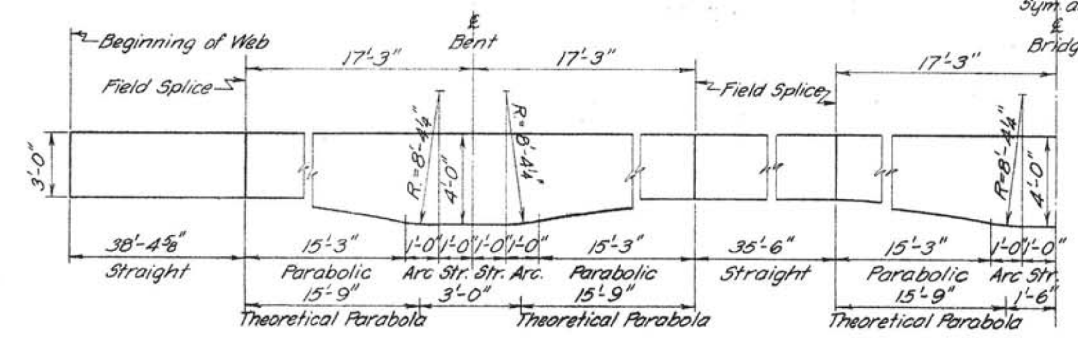
**DETAIL "B"**



**DETAIL "C"**

**NOTE—**

All welds on flange shall start and stop on Extension Bars. The bars shall be of mild steel. After weld is completed, Extension Bars shall be burned off flush.



**WEB CUTTING DIAGRAM**

**ORIGINAL CONSTRUCTION PLANS**

STR. NO. 08-310-135

**SUPERSTRUCTURE DETAILS**

**FOR**

**STANDARD 252'-0" CONTINUOUS**

**WELDED PLATE GIRDER UNIT**

**COMPOSITE SECTION**

**30'-0" ROADWAY**

**4 SPAN UNIT**

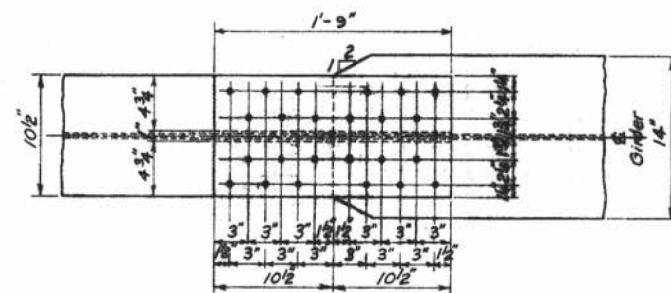
**SOUTH DAKOTA**

**DEPARTMENT OF HIGHWAYS**

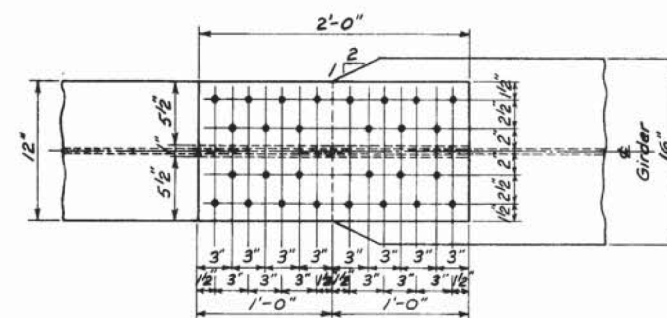
**AUG. 1961**

DESIGNED BY	DTS	CHECKED BY	B.D.M.	APPROVED	W. Schmitt
				BRIDGE ENGINEER	

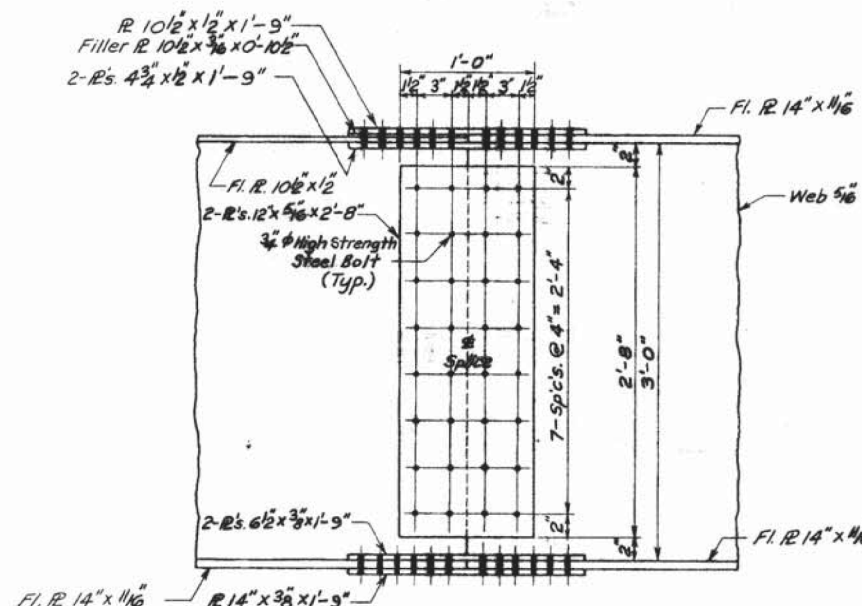
NA CWC-252-30-00-0-3



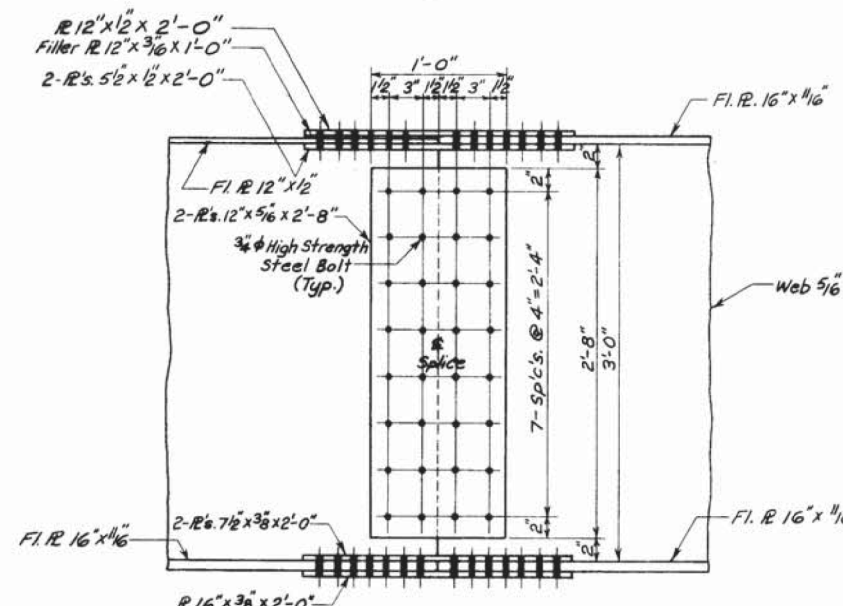
TOP VIEW



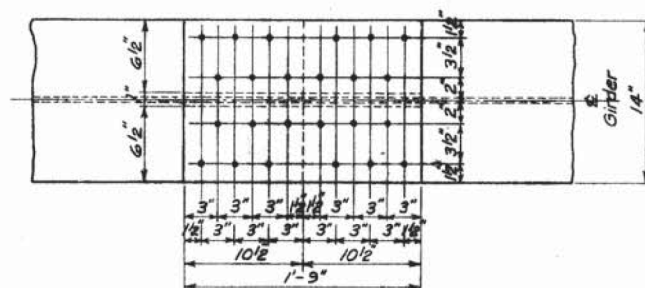
TOP VIEW



ELEVATION OF SPLICE

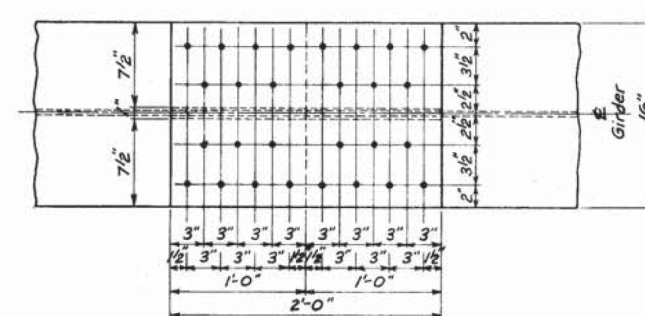


ELEVATION OF SPLICE



BOTTOM VIEW

TYPICAL BOLTED SPLICE  
EXTERIOR GIRDER



BOTTOM VIEW

TYPICAL BOLTED SPLICE  
INTERIOR GIRDER

### GENERAL NOTES—

- All bolts shall be 3/4"  $\phi$  high-strength (A.S.T.M. A325) with two hardened washers.
- Holes for 3/4"  $\phi$  high-strength bolts shall be subpunched reamed and splice plates match-marked after assembling as provided in Section 41.3 of South Dakota Standard Specifications for Roads and Bridges.
- Steel for splice plates and fill plates shall conform to A.S.T.M. A7 structural carbon steel, or A.S.T.M. A373 steel for welding.
- 3/4"  $\phi$  high-strength bolts shall be tightened to a minimum tension of 28,400 lbs. Tightening shall be done with properly calibrated wrenches or by the "turn-of-nut" method as provided in Section 41.3 nnn of South Dakota Standard Specifications for Roads and Bridges.
- All bolts in flange splices shall be placed with head down.
- Bolts in web splices of exterior girders shall be placed with heads on exterior face of girders.
- Triangular plates shown welded to flange and web near girder ends at welded splices shall be omitted when bolted splices are used.
- Clip ends of intermediate stiffeners, if necessary, to clear flange splice plates.
- If an intermediate stiffener is located in area of web splice plate, the intermediate stiffener may be shifted to clear.
- If shear connectors are located in area of flange splice plates, shear connectors may be shifted and re-spaced to clear.
- Any re-spacing or shifting of intermediate stiffeners and/or shear connectors shall be noted on the shop Plans for approval by the ENGINEER.
- When the Contractor elects to use the alternate bolted splice, the weight of necessary bolts and plates will not be measured for payment. See Special Provisions.

### ORIGINAL CONSTRUCTION PLANS

STR. NO. 08-310-135

### DETAILS OF BOLTED FIELD SPLICE FOR

### STANDARD 252'-0" CONTINUOUS WELDED PLATE GIRDER UNIT

COMPOSITE SECTION

30'-0" ROADWAY

4-SPAN UNIT

SOUTH DAKOTA H20-S16-44

DEPARTMENT OF HIGHWAYS

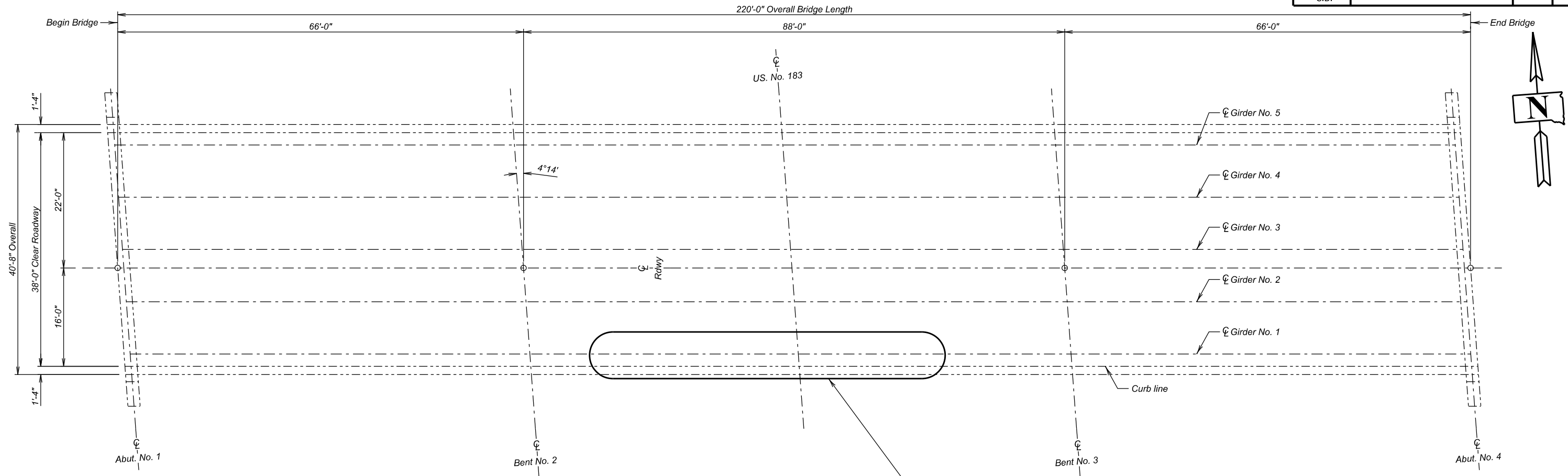
SEPTEMBER 1962

20 OF 20

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
	KMM	ASF	<i>[Signature]</i>

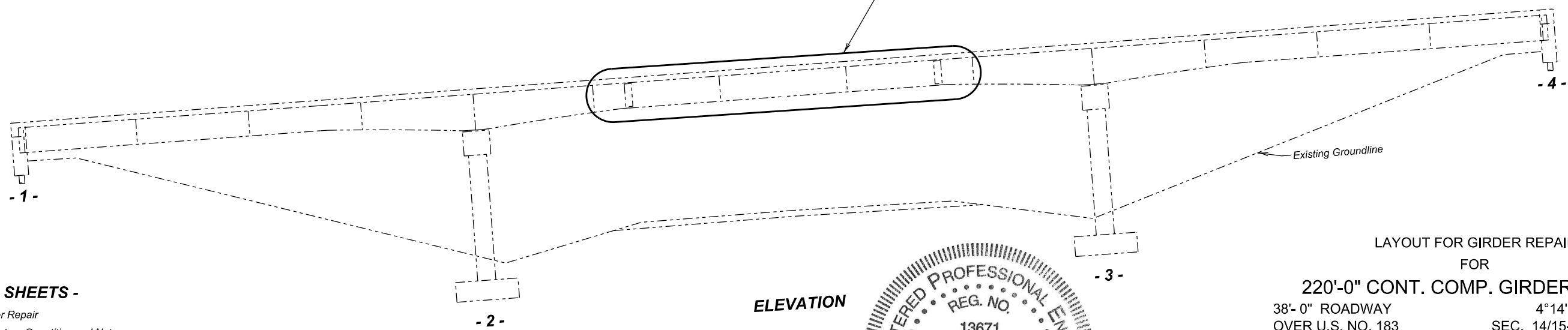
BRIDGE ENGINEER

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090E-288	26	52



PLAN

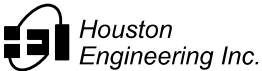
Approximate locations of damaged girder, diaphragms, & stiffeners  
See Girder No. 1 Repair Details Sheets



ELEVATION

INDEX OF BRIDGE SHEETS -

- Sheet No. 1 - Layout for Girder Repair
- Sheet No. 2 - Estimate of Structure Quantities and Notes
- Sheet Nos. 3 thru 7 - Notes (Continued)
- Sheet No. 8 - Girder No. 1 Repair Details (A)
- Sheet No. 9 - Girder No. 1 Repair Details (B)
- Sheet No. 10 - Girder No. 1 Repair Details (C)
- Sheet No. 11 - Girder No. 1 Repair Details (D)
- Sheet No. 12 - Girder No. 1 Repair Details (E)
- Sheet Nos. 13 thru 15 - Original Construction Plans



LAYOUT FOR GIRDER REPAIR  
FOR  
220'-0" CONT. COMP. GIRDER BRIDGE  
38'-0" ROADWAY 4°14' SKEW R.H.F.  
OVER U.S. NO. 183 SEC. 14/15-T105N-R77W  
STR. NO. 43-160-205 090 W-368  
PCN I63E & PCN I67Q  
LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

-X271-

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------



ESTIMATE OF STRUCTURE QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT	REMARKS
410E0250	Heat Straighten Steel Member(s)	Lump Sum	LS	
410E0350	Remove and Replace Web	2	Each	
410E0365	Remove and Replace Transverse Stiffener	4	Each	
410E0380	Remove and Replace Steel Diaphragm	1	Each	
410E0410	Stud Shear Connector	8	Each	See Special Provision
410E0508	Field Weld	858	In	
410E0512	Grind Weld	24	In	
410E0515	Drill Hole in Existing Steel	1	Each	
410E0520	Surface Grinding of Structural Steel	192	SqIn	
410E3010	Magnetic Particle Weld Inspection	6,124	In	
410E3020	Ultrasonic Weld Inspection	305	In	
410E3030	Magnetic Particle Weld Inspection, Impact Damage Repair	5,184	SqIn	
412E0100	Bridge Repainting, Class I	Lump Sum	LS	
412E0500	Paint Residue Containment	Lump Sum	LS	
460E0070	Class A45 Concrete, Bridge Repair	0.3	CuYd	
460E0300	Breakout Structural Concrete	0.3	CuYd	
460E0650	Roadway Canopy	Lump Sum	LS	
460E8100	Repair Underside of Bridge Deck	4	SqFt	
480E5000	Galvanic Anode	6	Each	

SPECIFICATIONS

- Design Specifications: AASHTO Standard Specifications for Highway Bridges 17th Edition using Load Factor Design.
- 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.
- 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 because of 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 five 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 and are provided as information only. 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 410.3A of the Construction Specifications.

GENERAL CONSTRUCTION

- Welder certification shall be in accordance with Section 410.3D of the Construction Specifications.
- The new steel web plates shall be ASTM A709 Gr. 36 T2. The new steel stiffener plates, and diaphragm plates shall be ASTM A709 Gr. 36.

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 employees of the hazards of lead exposure.

SCOPE OF BRIDGE WORK

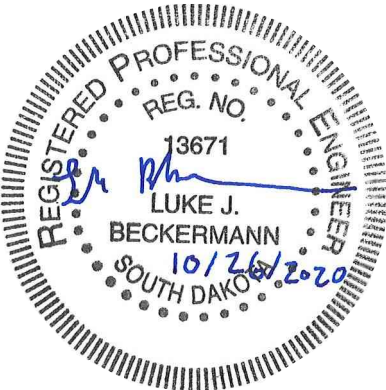
All work on this structure shall be accomplished under traffic with the traffic control as shown elsewhere in the plans.

- Remove and capture all loose concrete on the underside of the bridge deck adjacent to Girder G1 to prevent any pieces from falling into traffic during the repair process. This shall not be done directly over traffic.
- Identify and mark all yield lines, yielded zones, and surface nicks and gouges.
- Grind surface nicks and gouges.
- Clean and prepare area to be tested as specified by the Bridge Welding Code and these notes.
- Nondestructive test fillet welds, crack tips and potential crack tips at the locations indicated in the plans.
- Repair crack tips and weld flaws found by nondestructive testing prior to heat straightening. No heat straightening shall be performed until the nondestructive testing is complete and any necessary repairs are done for the member to be straightened.
- Heat straighten damaged girder G1 including bottom flanges, web, and transverse stiffeners.
- Perform nondestructive testing required after heat straightening and perform any repairs required.

- Remove and replace the plan specified damaged stiffeners.
- Remove and replace damaged web sections of girder G1.
- Remove and replace the plan specified portion of diaphragm on girder G1.
- Perform nondestructive testing required after repairs.
- Repair crack tips, and weld flaws found by nondestructive testing after repairs.
- Install canopy and breakout and repair portions of the bridge deck.
- Prepare and paint work affected areas and new structural steel.

FIELD WELDING PROCEDURES

- 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 WPSs for this project shall be submitted on Form O-2, from Annex O of the Bridge Welding Code, to the Bridge Construction Engineer for approval at least 2 weeks prior to construction.
- 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.
- Preheat will be required. Preheat and interpass temperature requirements shall be in accordance with Clause 4.2 of the Bridge Welding Code. The minimum pre-heat and interpass temperature shall be 320 degrees F for welds to the 1" and 1/2" 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.



ESTIMATE OF STRUCTURE QUANTITIES AND NOTES

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

2 OF 15

DESIGNED BY: LJB	CK. DES. BY: JLM	DRAWN BY: KHC
---------------------	---------------------	------------------



FIELD WELDING PROCEDURES (CONTINUED)

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.
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. 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 +10°, -5° 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 AND 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 determining crack tip locations 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), required cleaning, preparation, and inspection shall be done in accordance with Clause 6 of the Bridge Welding Code. Existing paint shall be removed from the steel surfaces that require NDT. Power tools used for cleaning shall be in accordance with SSPC-3. The MT inspection shall be performed by the yoke method using half-wave rectified direct or alternating current. MT inspection results shall be reported on Form O-7 of Annex O and UT results shall be reported on Form F-4 of Annex F of the Bridge Welding Code.
3. The Contractor shall identify and mark all yield zones, yield lines, and associated damage and provide this information to the Engineer prior to the initiation of heat straightening and testing by either visual inspection or measurements.

4. 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 notes on Repairs for NDT Determined Flaws. Repairs shall be made prior to any heat straightening.
5. As a minimum, the existing fillet welds shall be inspected as noted below. 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.

Girder 1:

- a. Visually Inspect 100% of the existing fillet welds in the deformed and damaged area. The deformed length is estimated to be 44 feet.
- b. MT test the top and bottom flange to web weld, on both sides of the web, a minimum of 12" beyond any yielded girder zones for an estimated 2,112 inches.
- c. MT test both sides of the stiffener to web weld and both sides top and bottom of the stiffener to flange welds at the diaphragms to be repaired. This includes the diaphragm stiffeners on each end of the diaphragm and the outside transverse stiffener for an estimated 320 inches.
- d. On the transverse stiffeners to be heat straightened or have welds removed and replaced, MT test the stiffener welds to web top, bottom, and both sides of the stiffener for an estimated 992 inches.
- e. In the area of web removal and replacement, MT test an area extending 6" on all sides of the removal area on each face for an estimated 2,592 square inches.
6. The above listed quantities and areas are provided as an estimate based on field documentation of the damage. If any other areas are identified as having potential flaws or require heat straightened these areas shall be tested as directed by the Engineer.
7. After heat straightening, the areas listed above shall be retested to ensure no additional cracks have developed. The estimated weld length and area for re-testing is 2,844 inches and 2,592 square inches.
8. New fillet welds of primary members (between web and flange) 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. Rejected 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 156 inches.

9. All other new fillet welds shall be 100% visually inspected and 20% 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. Rejected 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 79 inches.
10. 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. Rejected 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 UT inspection is 305 inches.
11. The plans listed quantity for nondestructive testing inspection is only an estimate. Magnetic Particle Weld Inspection and Ultrasonic Weld Inspection will be measured to the nearest inch. Magnetic Particle Weld Inspection, Impact Damage Repair will be measured to the nearest inch and area computed to the nearest square inch. Measurement shall be approved by the Bridge Construction Engineer.
12. All costs including labor, equipment, cleaning, 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.
13. All costs including labor, cleaning, paint removal, equipment, and any incidentals necessary to perform the visual inspection, magnetic particle inspection and crack tip location in the areas to be removed and replaced shall be incidental to the contract unit price per square inch for Magnetic Particle Weld Inspection, Impact Damage Repair.
14. All costs to remove the paint and clean all fillet welds to be nondestructive 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.
15. All costs including labor, cleaning, 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.



NOTES (CONTINUED)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

3 OF 15

DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
---------------------	---------------------	------------------

REPAIRS FOR NDT DETERMINED FLAWS

- Repair options for weld defects and crack tips shall be determined by the Bridge Construction Engineer. Two potential repair options are:
  - Drill 1" diameter hole in all crack tips.
  - 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.
- All labor, equipment, materials and incidentals necessary to drill holes in the web shall be incidental to the contract unit price per each for Drill Hole in Existing Steel.
- 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.
- 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.
- 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 and only the following contractors are allowed to do this work. 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](mailto:isisteel@gmail.com)  
Website: [www.steelstraightening.com](http://www.steelstraightening.com)

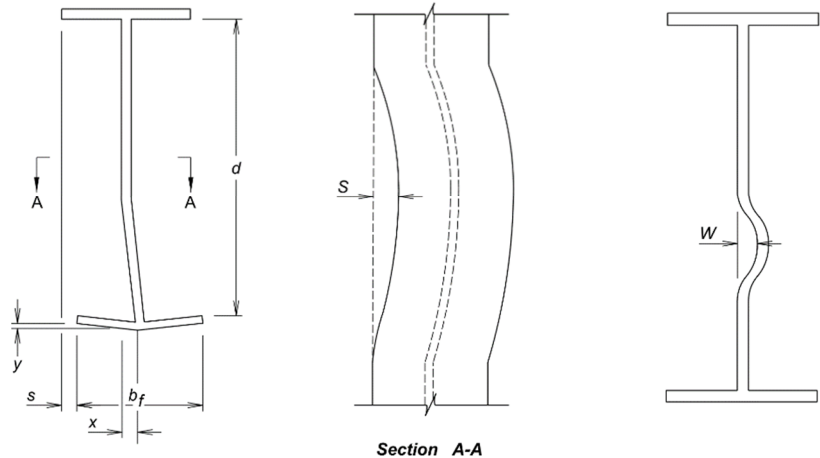
Darryl Thomas  
Flame On, Inc.  
12632 Wagner Road  
Monroe, WA 98272  
Telephone: (425) 397-7039  
Fax: (425) 397-7002  
Cellular: (425) 501-9855  
E-mail: [d.thomas@flameon.com](mailto:d.thomas@flameon.com)  
Website: [www.flameoninc.com](http://www.flameoninc.com)
- Heat Straightening requires nondestructive 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 Area Office for approval of the Bridge Construction Engineer. See Weld Inspection & Nondestructive Testing notes elsewhere in these plans.

- 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. No cutting torch heads are permitted.

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

- 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.
  - Temperature sensitive crayons
  - Pyrometer
  - 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.
- Hot Mechanical Straightening and Hot Working will **NOT** be allowed.
- Jacks used to aide heat straightening shall be placed so that forces are relieved as straightening occurs during cooling. Jacking shall be limited so that the maximum bending moment in the heated zone is less than 50% of the plastic moment capacity of the member or 50% of yield for local forces. The yield of the material is 36 ksi.

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



d = original depth of web  
bf = original width of flange  
X = final displacement of web ≤ maximum of d/100 or 1/4"  
Y = final displacement of edge of flange ≤ 1/4 "  
W = maximum final local deformation in web ≤ 1/4"  
S = sweep of flange from original edge of flange ≤ 1/2" over 20 ft

- 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).

REMOVE AND REPLACE WEB SECTIONS

- Cut and remove the portions of the web and weld as shown on the plans by the air carbon arc process or plasma cutting. 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.
- The web sections shall be replaced and welded as shown in the plan details.
- During the removal and replacement procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).



NOTES (CONTINUED)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

4

OF

15



REMOVE AND REPLACE WEB SECTIONS (CONTINUED)

4. All labor, equipment, materials, welding, and any incidentals necessary to remove and replace the damaged portions of the web shall be incidental to the contract unit price per each for Remove and Replace Web.

REPAIR STEEL DIAPHRAGM

1. A portion of the existing diaphragm shown in the plans shall be removed prior to heat straightening and nondestructive testing. Removed diaphragm portion shall not be reused and shall be disposed of by the Contractor. After all heat straightening is complete, the diaphragm will be repaired.
2. Cutting of the existing diaphragm shall be accomplished using the air carbon arc process or plasma cutting. Weld removal shall be air carbon arc gouging.
3. Extreme care shall be exercised during the weld removal and cutting process so that no damage to the surrounding metal occurs. Any damage to the surrounding metal caused by the weld removal and/or cutting process shall be repaired by the Contractor to the satisfaction of the Engineer at no cost.
4. During the repair procedure, additional nondestructive testing may be required. See notes regarding Weld Inspection & Nondestructive Testing (NDT).
5. Grind all surfaces cut with air carbon arc process to remove high carbon deposits, provide a smooth finish, and radius all edges to accept paint.
6. All costs including equipment, material and labor to remove a portion of the steel diaphragm and to repair the steel diaphragm shall be incidental to the contract unit price per each for Repair Steel Diaphragm.

REMOVE AND REPLACE DAMAGED WELDS

1. The damaged welds shown in the plans shall be replaced by grinding damaged weld and re-welding. Grinding shall be in the longitudinal direction. Transverse grinding will not be allowed. Re-welding shall in accordance with the Bridge Welding Code.
2. All repaired welds shall be checked by non-destructive (MT) testing, see Weld Inspection & Nondestructive Testing (NDT) notes. Repair options for the defects found by the non-destructive testing shall be determined by the Bridge Construction Engineer.
3. All costs associated with grinding the damaged welds including all materials, equipment and labor shall be incidental to the contract unit price per inch for Grind Weld.
4. All costs associated with re-welding the transverse stiffener welds including all materials, equipment and labor shall be incidental to the contract unit price per inch for Field Weld.

REMOVAL OF SURFACE NICKS AND GOUGES

1. Grind the bottom flange of girder G1 as directed by the Engineer, to remove all sharp edges from surface nicks and gouges created by vehicle impact. The amount of material removed shall be kept at the absolute minimum necessary to remove the sharp edges and to minimize the section reduction of the existing structural members. Grinding shall be longitudinal. Transverse grinding will not be allowed. The grinding shall be done prior to heat straightening the girder.
2. All surface nicks and gouges shall be checked by non-destructive MT testing after grinding; see Weld Inspection & Nondestructive Testing (NDT) note. Repair options for the defects found by the nondestructive testing shall be determined by the Bridge Construction Engineer.
3. The quantity provided for Surface Grinding of Structural Steel is an estimate. The payment quantity will be per square inch as determined by the Engineer. This item may not be encountered and could be removed from the plans.
4. All costs associated with removing sharp edges from surface nicks and gouges including all materials, equipment and labor shall be incidental to the contract unit price per square inch for Surface Grinding of Structural Steel.

REPAIR UNDER SIDE OF BRIDGE DECK

1. This work shall consist of breaking out and patching of a portion of the underside of the bridge deck.
2. The underside of the existing deck shall be broken out as directed by the Engineer. Breakout limits shall be defined with a ¾" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. All existing reinforcing steel that will be exposed is scheduled for reuse and shall be cleaned and straightened to the satisfaction of the Engineer. Care shall be taken not to damage the reinforcing steel during concrete breakout. Any reinforcing steel that is damaged during concrete breakout shall be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.
3. Extreme care shall be used during concrete breakout to prevent nicks, gouges, scratches, or damage to existing structural steel components to be reused. The Contractor shall not be allowed to use any impact type removal breakout equipment larger than power driven hand tools for within six inches of the top flange of the girder. In the event, any nicks, gouges, scratches, or other damage occurs, the Office of Bridge Design shall be immediately notified. All damage shall be repaired by the Contractor as recommended by the Office of Bridge Design. All costs involved in repairing any damage, including any non-destructive testing that may be required, shall be at the expense of the Contractor.

4. All broken out concrete and other removed material shall be disposed of by the Contractor. Disposal of discarded material shall be in accordance with the Environmental Commitments shown elsewhere in the plans.
5. Concrete used in vertical patching applications where forms are not practical shall consist of one of the following products, or equal as approved by the Office of Bridge Design.
- a. HD 25 VO  
Dayton Superior  
1125 Byers Road  
Miamisburg, OH 45342  
Phone: (800) 745-3700  
Web site: [www.daytonsuperior.com](http://www.daytonsuperior.com)
- b. MasterEmaco N400RS  
BASF Building Systems  
889 Valley Park Drive  
Shakopee, MN 55379  
Phone: (800) 433-9517  
Web site: [www.buildingsystems.basf.com](http://www.buildingsystems.basf.com)
- c. Meadow-Patch 20  
W.R.Meadows, Inc.  
P.O. Box 338  
Hampshire, IL 60140-0338  
Phone: (847) 214-2100  
Web site: [www.wrmeadows.com](http://www.wrmeadows.com)
- d. Speed Crete Red Line  
The Euclid Chemical Company  
19218 Redwood Rd.  
Cleveland, OH 44110  
Phone: (800) 321-7628  
Web site: [www.euclidchemical.com](http://www.euclidchemical.com)
6. The concrete repair material shall be applied and cured as recommended by the Manufacturer and as approved by the Engineer.



NOTES (CONTINUED)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

5

OF

15

REPAIR UNDER SIDE OF BRIDGE DECK (CONTINUED)

- 7. During placement and curing time recommended by the Manufacturer of the patching material all vehicular traffic on the lane open for travel shall be stopped by flaggers before entering onto the bridge and then allowed to proceed at a maximum of 5 MPH. To safely slow traffic to cross the bridge during the deck curing period two advance flaggers may be required.
- 8. All cost associated with the repair including breaking out the portion of the existing concrete deck, furnishing and placing vertical repair material, labor, equipment, materials and any incidentals necessary and complete the work shall be per the contract unit price per square foot for Repair Under Side of Bridge Deck.
- 9. For information purposes only, the estimated total quantities for concrete breakout and patching material is 0.3 CuYd and 0.3 CuYd respectively.

CONCRETE BREAKOUT

- 1. The existing deck shall be broken out to the limits shown on the plans. Breakout limits shall be defined with a 3/4" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. All existing reinforcing steel that will be exposed is scheduled for reuse and shall be cleaned and straightened to the satisfaction of the Engineer. Care shall be taken not to damage the reinforcing steel during concrete breakout. Any reinforcing steel that is damaged during concrete breakout shall be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.
- 2. Extreme care shall be used during concrete breakout to prevent nicks, gouges, scratches, or damage to existing structural steel components to be reused. Prior to deck removal, the limits of the girder top flanges shall be marked on top of the bridge deck. The Contractor shall not be allowed to use any impact type breakout equipment larger than power driven hand tools for slab removal within six inches of the actual limits of the top flange. At no time shall the use of any breakout method that will nick, gouge, or scratch the flange, or any other structural steel component to be reused, be allowed. If any nicks, gouges, scratches, or other damage occurs, the Office of Bridge Design shall be immediately notified. All damage shall be repaired by the Contractor as recommended by the Office of Bridge Design. All costs involved in repairing any damage, including any non-destructive testing that may be required, shall be at the expense of the Contractor. Any shear connectors damaged due to the Contractor's operation shall be repaired by the Contractor at no cost to the Department. Any shear connectors which have failed in service shall be replaced with 7/8" diameter x 4" end welded stud shear connectors for all girders and will be paid for at the contract unit price per each for Stud Shear Connector.
- 3. All broken out concrete, discarded reinforcing bars and expansion devices shall be disposed of by the Contractor. Any disposal of discarded material shall be in accordance with the Environmental Commitments.

- 4. The contract unit price per cubic yard for Breakout Structural Concrete shall include breaking out concrete, cleaning and straightening existing reinforcing steel, and disposal of all broken out material. All broken out concrete and other discarded material shall become the property of the Contractor and shall be disposed of on a site obtained by the Contractor and approved by the Engineer. See the Environmental Commitment notes.

ROADWAY CANOPY

- 1. The Contractor shall construct a rigid canopy above the roadway under the structure. The canopy is intended to capture smaller debris and not act as safety net for falling deck sections. As such, no traffic shall be allowed under an area of active deck removal even with the canopy in place. The exception is traffic will be allowed under the canopy if the only removal occurring is using hand tools and chipping hammers. The canopy is an added safeguard and does not relieve the Contractor of any responsibility for the safety of the public. The canopy shall meet the following minimum requirements.
  - a. The entire system shall be above the bottom of the girders.
  - b. Attachments shall not be made to the girders using welding.
  - c. The canopy shall be of a design and material which can adequately capture and contain falling debris as selected by the Contractor and approved by the Engineer.
  - d. The canopy shall be constructed for an entire span before any breakout can occur in that span.
  - e. The erection of the canopy shall be completed in a manner which will cause the least inconvenience to the traveling public.
- 2. The Contractor shall submit a detailed Demolition Plan, 30 days prior to any bridge deck removal. This Demolition Plan shall include all canopy details, bridge deck breakout details, a sequence of traffic control, and a sequence of bridge deck removal.
- 3. The Roadway Canopy shall be paid for at the contract lump sum price of Roadway Canopy. This payment shall include all construction, maintenance, and removal of the Roadway Canopy.

GALVANIC ANODE

- 1. The Contractor shall furnish and place galvanic anodes in the concrete repair areas specified in this plan set.
- 2. The galvanic anodes shall be supplied as one of the following:
  - a. Galvashield XP2  
Vector Corrosion Technologies  
65114 140th Ave.  
Wabasha, MN 55981  
Phone: (507) 259-2481  
Website: [www.vector-corrosion.com](http://www.vector-corrosion.com)

- b. Sentinel Silver  
Euclid Chemical Company  
19218 Redwood Road  
Cleveland, OH 44110  
Phone: (800) 321-7628  
Website: [www.euclidchemical.com](http://www.euclidchemical.com)
- c. Sika FerroGard 670  
Sika Corporation US  
201 Polito Avenue  
Lyndhurst, NJ 07071  
Phone: (800) 933-7452  
Website: <http://usa.sika.com>
- 3. The anodes shall be placed in accordance with manufacturer's recommendations and as approved by the Engineer. The anodes have not been shown on the drawings. The Contractor shall provide shop drawings of the galvanic anode installation including locations of the individual anodes to the Office of Bridge Design.
- 4. The anodes shall be placed with a minimum 3/4" cover and shall be set in embedding mortar per the manufacturer's recommendations. The anodes shall be fully encased in the concrete repair material. Where adequate cover does not exist, a concrete pocket shall be chipped out behind the anode to provide sufficient cover. The Contractor may need to chip around the reinforcing bar locally at the anode installation to make the electrical connection. The reinforcing steel at the connection location shall be cleaned per the manufacturer's recommendations to provide sufficient electrical connection and mechanical bond.
- 5. The electrical continuity of the electrical connections and reinforcing steel shall be confirmed per the manufacturer's recommendations.
- 6. The Contractor shall provide manufacturer's product literature and installation instructions to the Engineer 10 days prior to installation.
- 7. All costs associated with placing anodes including labor, equipment, materials and incidentals shall be included in the contract unit price per each for Galvanic Anode.

CLASS A45 CONCRETE, BRIDGE REPAIR

The type of cement, concrete strength requirements, aggregate requirements, slump and air requirements for the contract item Class A45 Concrete, Bridge Repair shall conform to the requirements of Section 460 of the Construction Specifications for A45 concrete used in bridge decks.



NOTES (CONTINUED)

FOR

220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

October 2020

6 OF 15

DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
---------------------	---------------------	------------------



STATE OF	PROJECT	SHEET NO	TOTAL SHEETS
S.D.	090W-368	32	52

STUD SHEAR CONNECTOR

- 1. Prior to welding of the studs to the existing girders, the top surfaces of the existing girders that are to have studs welded on shall be clean of dirt, rust and any other foreign matter.
- 2. The shear connectors that will be attached to the existing girders shall be 7/8" diameter x 4 inches long and shall conform to ASTM A108, Grade 1015, 1018, or 1020. The connector shall meet the following minimum mechanical property requirements for type B studs:

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

- 3. The shear connectors shall be installed in accordance with the Special Provision for Shear Connector Field Installation (Per Each).

AIR CARBON ARC CUTTING AND GOUGING

- 1. All removal of welds called for by the plans shall be accomplished using the air carbon arc process unless noted otherwise. Plasma cutting will also 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.

PAINT RESIDUE REMOVAL AND CONTAINMENT

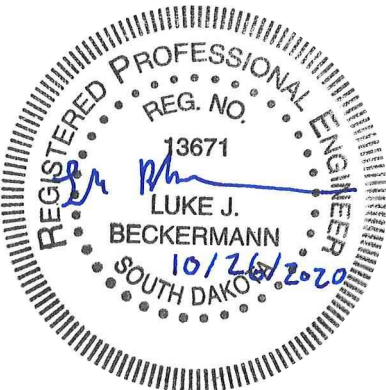
- 1. Paint removal on the existing bridge shall be in accordance with Section 412 of the Construction Specifications, except as modified by these notes.
- 2. The Contractor shall plan his operation to prevent releases of lead-containing material and other particulate matter into the surrounding air, water, and onto the ground, slope protection, and pavement. The Contractor shall be responsible for any corrective actions should a spill occur.

- 3. Collect all visible paint particles and blasting residue containing paint at the end of each workday from the work area. Inspect outside the containment and collect any paint particles or blasting residue that escaped the work area. Collect waste material by manual means, vacuum, or another method approved by the Engineer. Do not use air pressure or streaming water to assist in the waste collection process that could disperse the waste material.
- 4. In the event of a spill or inadvertent release, the Contractor shall immediately stop work, notify the Engineer, and report the release to the South Dakota Department of Environmental and Natural Resources (DENR). The Contractor shall be responsible for completing a spill reporting form and for all costs associated with appropriate corrective actions.

To report a release or spill, call DENR at (605) 773-3296 during regular office hours (8 a.m. to 5 p.m., Central Time). To report the release after hours, on weekends or holidays, call State Radio Communication at (605) 773-3231. Reporting the release to DENT does not meet any obligation for reporting to other state, local, or federal agencies. Therefore, the Contractor must also contact local authorities to determine the local reporting requirements for releases. DENR recommends that spills also be reported to the National Response Center at (800) 424-8802.

BRIDGE REPAINTING, CLASS I

- 1. All work affected areas and all new structural steel shall be painted in accordance with Section 412 of the Construction Specifications.
- 2. The intent at the heat straightened & repaired areas is to paint the entire girder surface for a distance of 6" outside of the outer edges of the heat straightening. The finished girder shall have a uniform paint appearance as approved by the Engineer. For informational purposes, the approximate total area under this item of repair is 564 square feet. The actual work affected area will only be known after all the nondestructive testing and heat straightening is complete.



NOTES (CONTINUED)

FOR

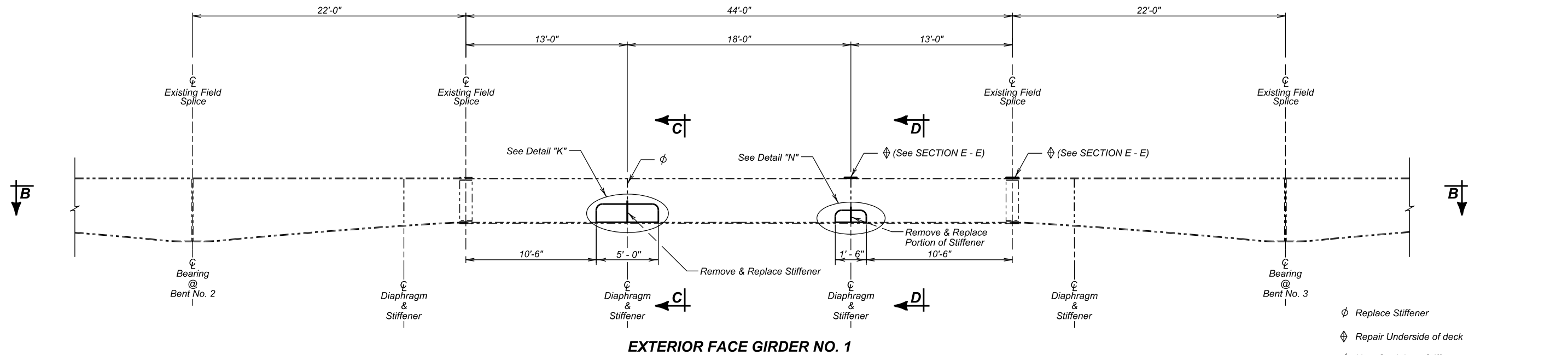
220'-0" CONT. COMP. GIRDER BRIDGE

Str. No. 43-160-205

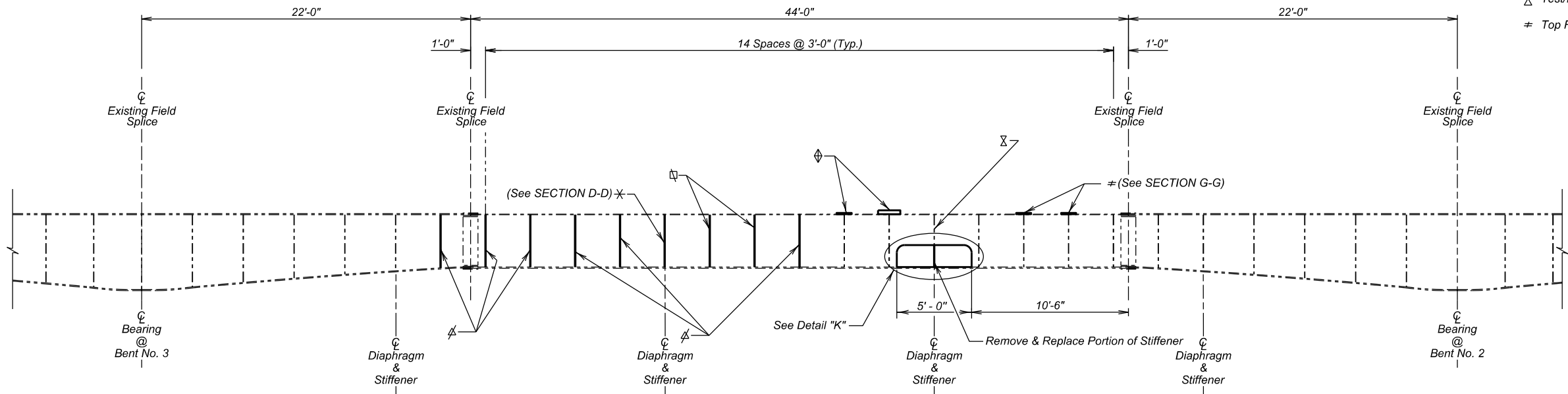
October 2020 7 OF 15

DESIGNED BY: LJB	DK. DES. BY: JLM	DRAWN BY: KHC
---------------------	---------------------	------------------

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090W-368	33	52



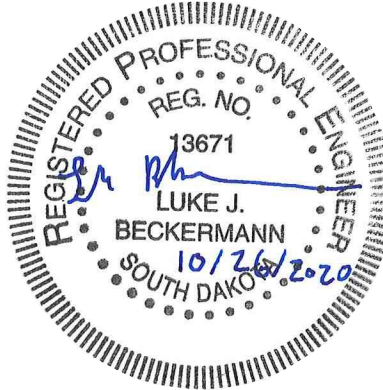
EXTERIOR FACE GIRDER NO. 1



INTERIOR FACE GIRDER NO. 1

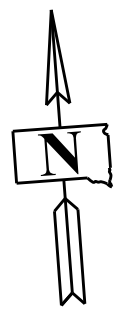
**NOTES:**

Girder web and bottom flange shall be heat straightened as necessary.  
Concrete deck not shown for clarity.  
Section B-B located on Sheet No. 9 of 15  
Section C-C located on Sheet No. 10 of 15  
Section D-D located on Sheet No. 11 of 15  
Section E-E located on Sheet No. 12 of 15  
Section G-G located on Sheet No. 12 of 15  
Detail "K" located on Sheet No. 10 of 15  
Detail "N" located on Sheet No. 11 of 15

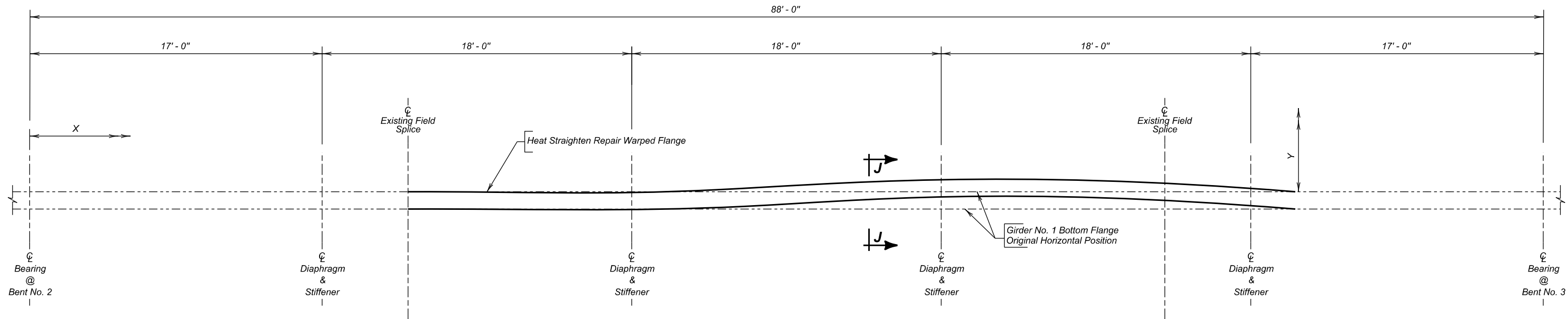


GIRDER NO. 1 REPAIR DETAILS (A)  
FOR  
220'-0" CONT. COMP. GIRDER BRIDGE  
38'-0" ROADWAY 4°14' SKEW R.H.F.  
OVER U.S. NO. 183 SEC. 14/15-T105N-R77W  
STR. NO. 43-160-205 090 W-368  
LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------

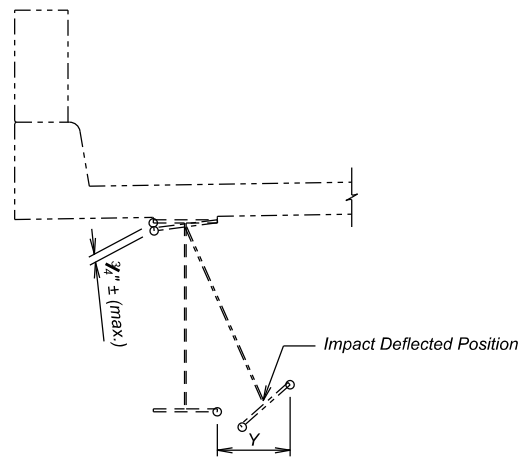


STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090W-368	34	52



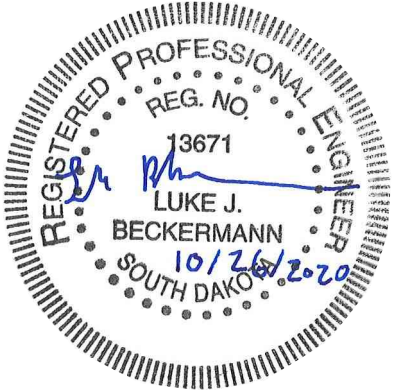
SECTION B-B  
GIRDER NO. 1 - BOTTOM FLANGE

**NOTE:**  
Heat Straighten Girder No. 1 Bottom Flange, Web, and Stiffeners. See Notes.



SECTION J-J  
(Shown at X Measurements)

GIRDER NO. 1 HORIZONTAL IMPACTS DEFLECTED POSITION MEASUREMENTS	
X	Y
22'-0"	0"
29'-0"	-1/2"
37'-0"	0"
51'-6"	+8 3/4"
58'-7"	0"



GIRDER NO. 1 REPAIR DETAILS (B)  
FOR  
220'-0" CONT. COMP. GIRDER BRIDGE  
38'-0" ROADWAY 4°14' SKEW R.H.F.  
OVER U.S. NO. 183 SEC. 14/15-T105N-R77W  
STR. NO. 43-160-205 090 W-368  
LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

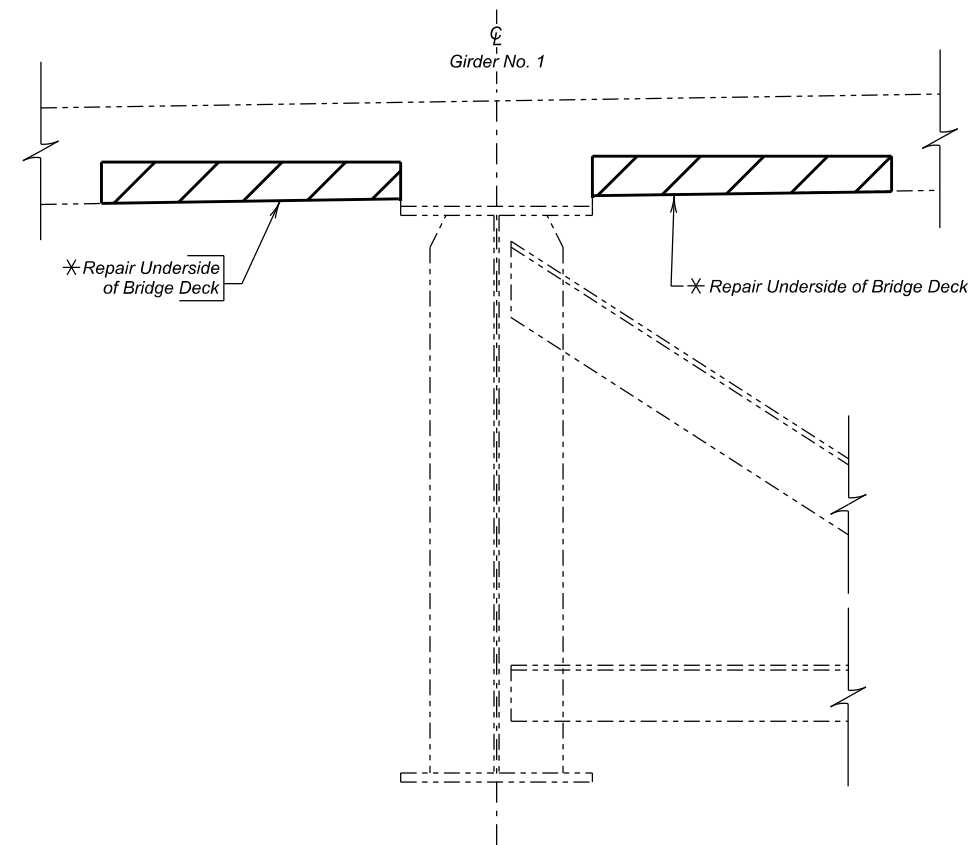
DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------







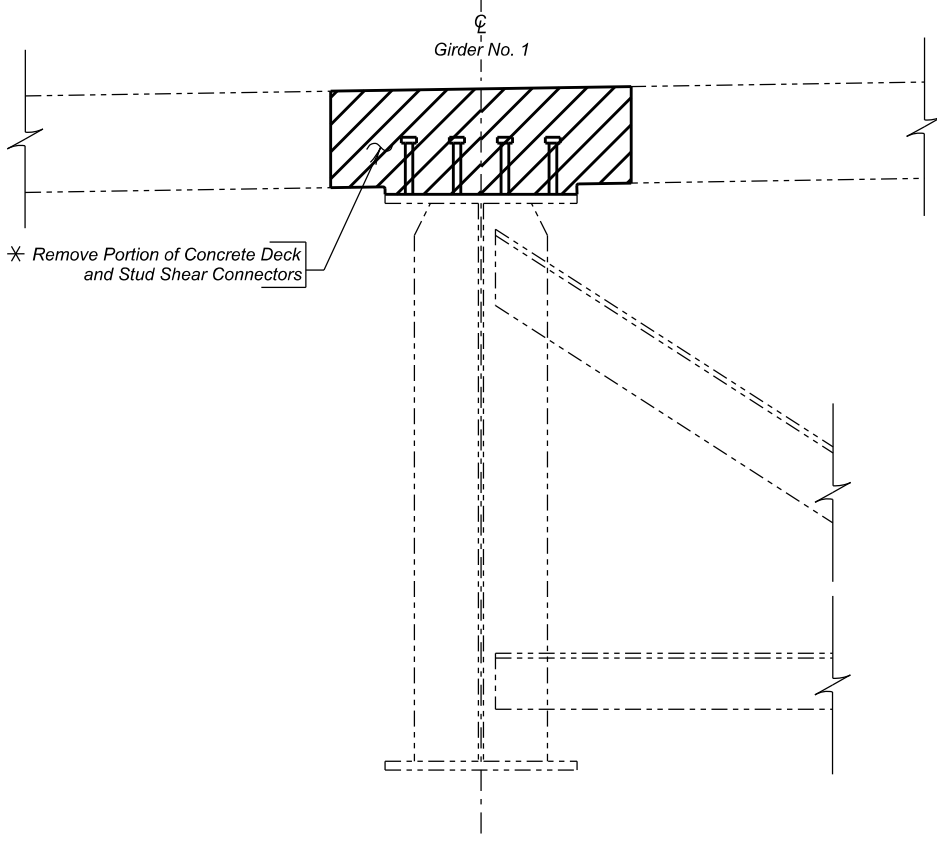
STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090W-368	37	52



SECTION E - E

(Existing Deck to be Removed)

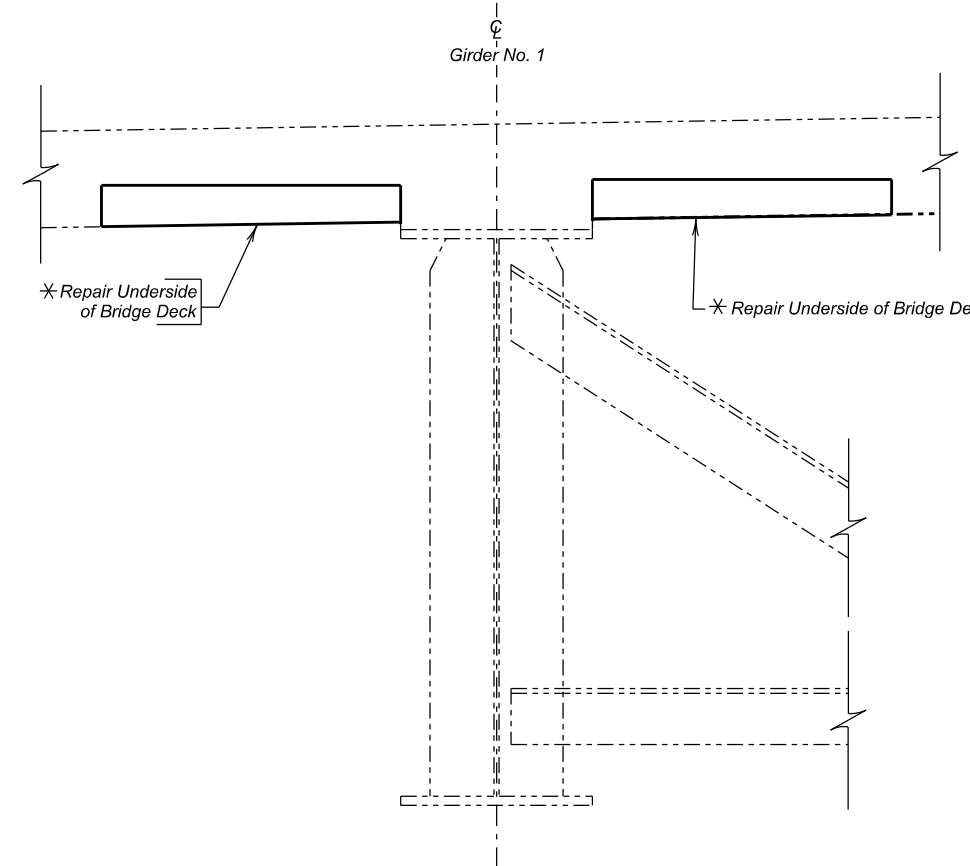
✱ As directed by the Engineer.



SECTION G - G

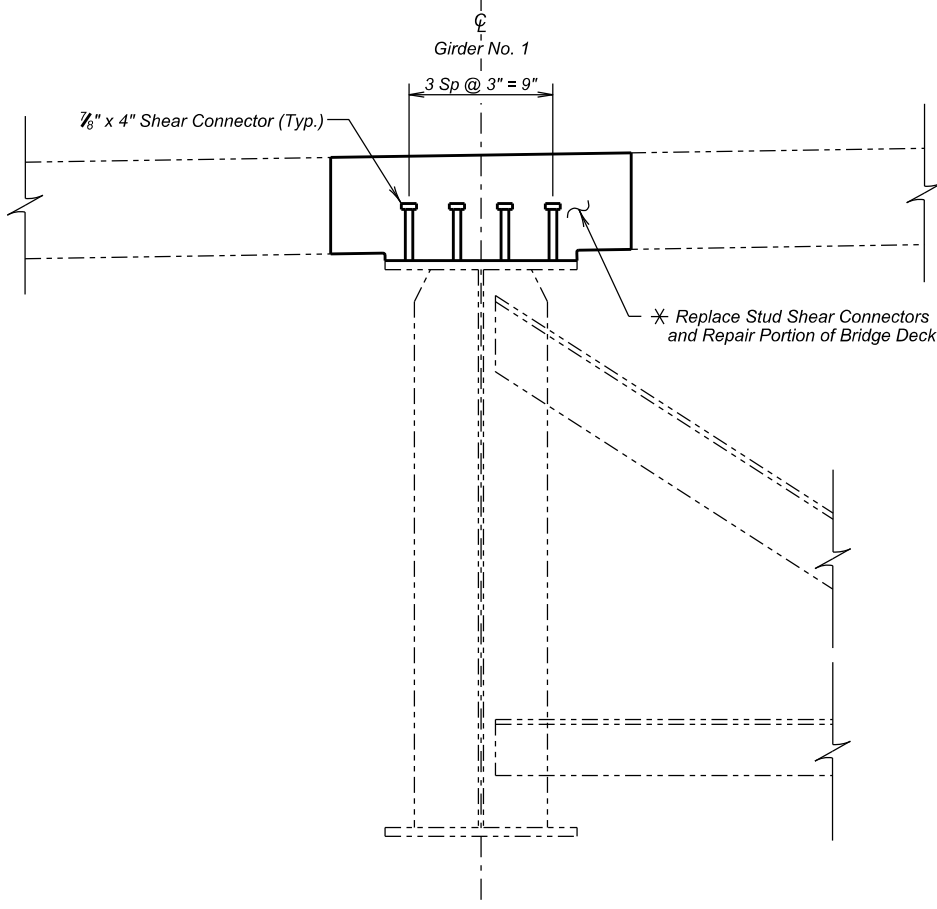
(Existing Deck to be Removed)

✱ As directed by the Engineer.



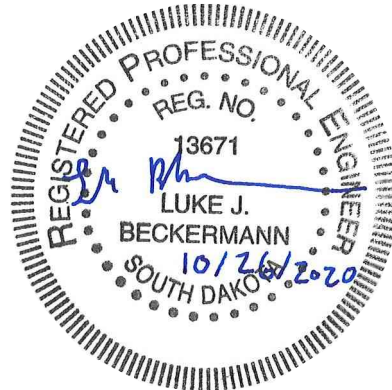
SECTION E - E

(New Deck)



SECTION G - G

(New Deck)



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Stud Shear Connector	Each	8
Breakout Structural Concrete	Cu. Yd.	0.3
Class A45 Concrete, Bridge Repair	Cu. Yd.	0.3
Repair Underside of Bridge Deck	Sq. Ft.	6
Galvanic Anode	Each	6

Note: Repair Underside of Bridge Deck includes removal and all repair to the underside of the bridge deck.

Full depth deck removal and repair are included in the bid items Breakout Structural Concrete and Class A45 Concrete, Bridge Repair, respectively.

GIRDER NO. 1 REPAIR DETAILS (E)  
FOR  
220'-0" CONT. COMP. GIRDER BRIDGE  
38'-0" ROADWAY 4°14' SKEW R.H.F.  
OVER U.S. NO. 183 SEC. 14/15-T105N-R77W  
STR. NO. 43-160-205 090 W-368

LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
SEPTEMBER 2020

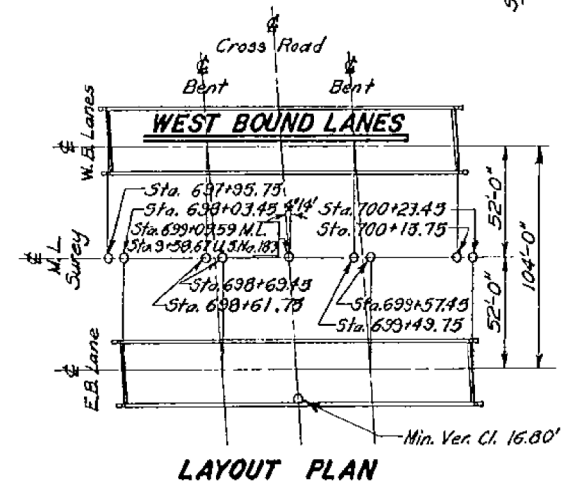
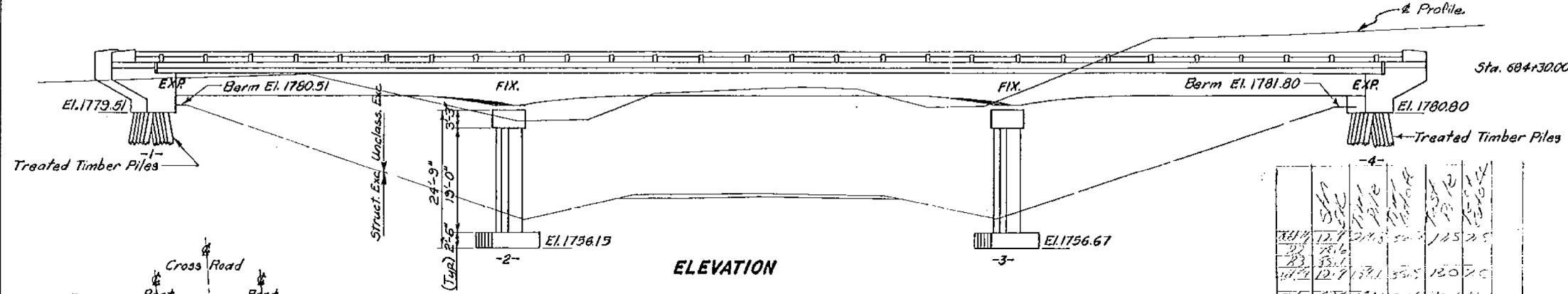
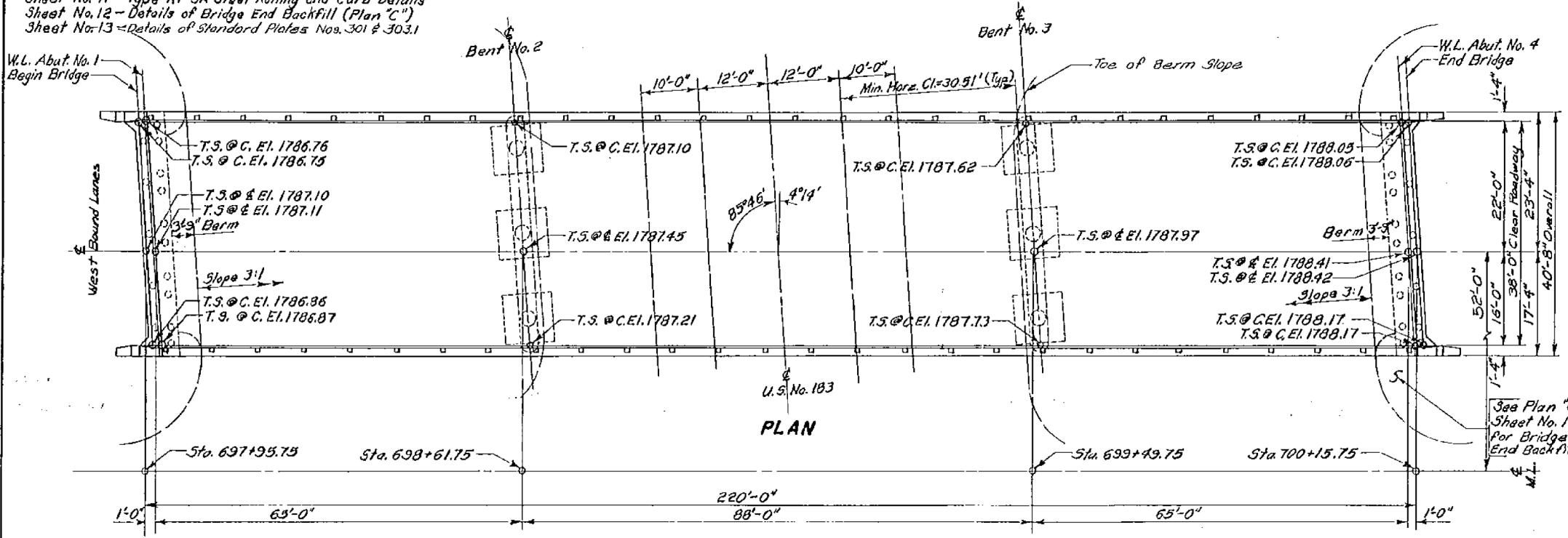
DESIGNED BY LJB	CK. DES. BY JLM	DRAFTED BY KHC	BRIDGE ENGINEER
--------------------	--------------------	-------------------	-----------------

-X271-  
**INDEX OF BRIDGE SHEETS.**  
Sheet No. 1 - General Drawing and Quantities  
Sheet No. 2 - Subsurface Investigations  
Sheet No. 3 - Abutment Details  
Sheet No. 4 - Abutment Details  
Sheet No. 5 - Bent Details  
Sheet No. 6 - Slab and Diaphragm Details  
Sheet No. 7 - Girder Layout and Details  
Sheet No. 8 - Framing Diagram and Erection Data  
Sheet No. 9 - Details of Field Splice and Bearings  
Sheet No. 10 - End Device Details  
Sheet No. 11 - Type RT-3A Steel Railing and Curb Details  
Sheet No. 12 - Details of Bridge End Backfill (Plan "C")  
Sheet No. 13 - Details of Standard Plates Nos. 301 & 303.1

B.M. # 37 Elev. 1753.41  
Rebar & Guards  
200' Lt. Sta. 690+00

B.M. # 38 Elev. 1791.41  
Rebar & Guards  
200' Lt. Sta. 700+00

NOTE:-  
T.S. @ C. El. = Top of Slab at Curb Elevation  
T.S. @ E. El. = Top of Slab at Roadway Elevation



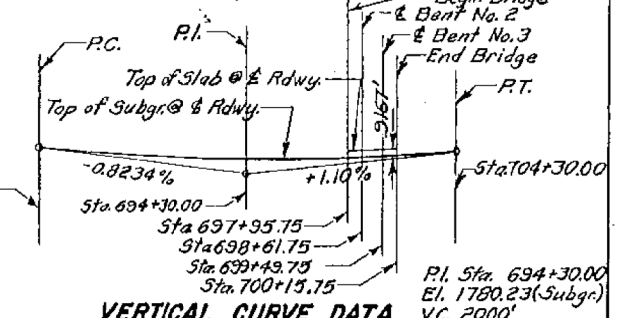
ESTIMATED QUANTITIES									
Bid Item No.	40005	40505	40555	40165	40705	40710	10410	10405	
ITEM	El. A' Conc.	Steel - Lbs.	Type RT-3A Steel Railing - Lin. Ft.	Treated Timber Piles - Lin. Ft.	Piles - Lin. Ft.	Excavation - Cu. Yds.	Bridge End Backfill - Cu. Yds.	* Lump Sum	
Superstructure	285.6	99815	158.815	450.3					
Abutment No. 1	341	3,930	110		16 @ 16' = 256'	1 @ 20' = 20'	13		
Bent No. 2	46.7	3,195					88		
Bent No. 3	46.7	3,195					91		
Abutment No. 4	341	3,930	110		16 @ 16' = 256'	1 @ 20' = 20'	13		
Totals	3072	86,265	159,035	450.3	512'	40'	205		* Lump Sum

One Treated Timber Test Pile shall be driven at Abutment No. 1 and No. 4 before the remaining piles are ordered.  
For Information Only - The approximate volume of granular backfill will be 180 Cu. Yds. in place, and the length of the 6" x 6" perforated metal pipe will be 136 feet total for both Abutments.

**SPECIFICATION NOTE.**  
Use South Dakota Standard Specifications for Roads and Bridges, 1963 Edition, approved as Standard Sept. 21, 1964, and Required Provisions, Supplemental Specifications and/or Special Provisions, as included in the Proposal. All concrete shall be Class A (Type II Cement) with air entrainment.

**GENERAL NOTES.**  
1. Design Specifications: A.A.S.H.O. Specifications for Highway Bridges, 1965 with Interim Specifications for 1966 and 1967.  
2. See NOTES on Sheets No. 1 thru No. 13.  
3. Longitudinal elements of the slab shall conform to the vertical curve.  
4. Rail Posts and End Blocks shall be built normal to grade.  
5. All Reinforcing Steel shall conform to A.S.T.M. Specifications A305 and A15, Intermediate Grade.  
6. Design Loading: HS20-44 A.A.S.H.O. and Alternate Loading, as designated in P.R.M. 20-4, Section 4c.  
7. The contractor shall have sufficient pile splice material on hand before pile driving is started. See Standard Plate No. 303.1 for splice details.  
8. Standard Plates referred to in these plans are the plates printed on Sheet No. 13 of 13 of these plans and are not intended to be referred to the Standard Plates Manual.  
9. In the event Pile Splice are used, see Std. Plate 301

**EXCAVATION NOTES.**  
1. Footing for Bent No. 2 and No. 3 shall be cast upon solid undisturbed shale and carried into same to the elevation shown. Limits of shale excavation, below top of footings, shall be bound as nearly as practicable by the neat lines as shown in details of footings for Bents No. 2 and No. 3 on sheet No. 5 of 13.  
2. Shale shall develop a minimum bearing value of 4 tons per sq. ft. If the bearing value is less than 4 tons per sq. ft. at elevations shown, communicate with the BRIDGE SECTION.  
3. Final footing elevations for Bents No. 2 and 3 shall be established before ordering column reinforcing steel for the respective Bents. If final footing elevations must differ from those shown, communicate with BRIDGE SECTION.



ORIGINAL CONSTRUCTION PLANS  
STR. NO. 43-160-205  
(WEST BOUND LANES)  
GENERAL DRAWING AND QUANTITIES  
FOR

**220'-0" CONT. COMP. GIRDER BRIDGE**  
38'-0" ROADWAY 4'14" SKEW R.H.R.  
OVER U.S. NO. 183 SEC. 14/18-T105N-R77W  
STA. 697+95.75 TO 700+15.75 190-5(25) 222  
Sta. No. 43-160-205 LYMAN COUNTY

SOUTH DAKOTA  
DEPARTMENT OF HIGHWAYS  
NOV. 1968 13 OF 15

PLANS BY  
BRIDGE SEC., S. DAK. DEPT. HWYS.

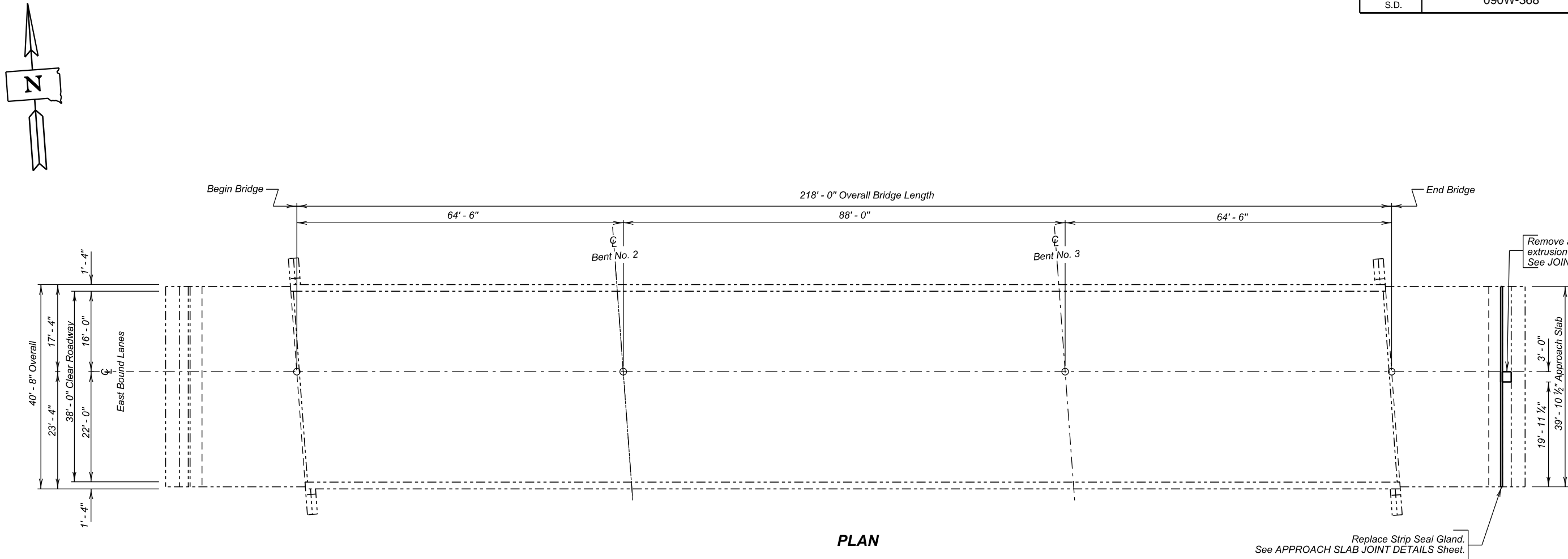
DESIGNED BY  
DRAWN BY  
CHECKED BY  
APPROVED







STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090W-368	41	52



<b>INDEX OF BRIDGE SHEETS -</b>
Sheet No. 1 - Layout For Upgrade
Sheet No. 2 - Estimate of Structure Quantities and Notes
Sheet No. 3 - Joint Repair
Sheet No. 4 - Approach Slab Joint Details
Sheet No. 5 thru 7 - Original Construction Plans

(EAST BOUND LANES)  
LAYOUT FOR UPGRADE  
FOR  
218' - 0" CONTINUOUS COMP. GIRDER BRIDGE  
38' - 0" ROADWAY  
OVER U.S. NO. 183  
STR. NO. 43-160-206  
PCN i63E

4°14' R.H.F. SKEW  
SEC. 14/15-T105N-R77W  
090 W-368

LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
DECEMBER 2020

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090W-368	42	52

ESTIMATE OF STRUCTURE QUANTITIES

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
410E2300	Strip Seal Expansion Joint	3.0	Ft
410E2310	Strip Seal Gland	40.8	Ft
460E0070	Class A45 Concrete, Bridge Repair	0.1	CuYd
460E0300	Breakout Structural Concrete	0.1	CuYd

SPECIFICATIONS

1. 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.
2. All Welding and Welding Inspection will be in conformance with the latest edition of the AASHTO/AWS D1.5M/D1.5 Bridge Welding Code.

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 and are provided as information only. 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.

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 two weeks prior to the pre-construction meeting.

1. Breakout concrete and remove damaged portion of the strip seal on sleeper slab.
2. Install new portion of the strip seal extrusion and repair concrete on approach slab.
3. Replace the strip seal gland for the first phase of construction.
4. Switch traffic and replace the strip seal gland for the second phase of construction.

CONCRETE BREAKOUT

1. The existing sleeper slab will be broken out to the limits shown on the plans. Breakout limits will be defined with a 3/4" deep sawcut (unless specified otherwise in these plans), where practical, as approved by the Engineer. All existing reinforcing steel that will be exposed is scheduled for reuse and will be cleaned and straightened to the satisfaction of the Engineer. Care will be taken not to damage the reinforcing steel during concrete breakout. Any reinforcing steel that is damaged during concrete breakout will be replaced or repaired, as approved by the Engineer, by the Contractor at no cost to the Department.
2. All broken out concrete and discarded steel extrusion will be disposed of by the Contractor. Any disposal of discarded material will be in accordance with the Environmental Commitments.
3. The contract unit price per cubic yard for Breakout Structural Concrete will include breaking out concrete, cleaning and straightening existing reinforcing steel, and disposal of all broken out material. All broken out concrete and other discarded material will become the property of the Contractor and will be disposed of on a site obtained by the Contractor and approved by the Engineer. See the Environmental Commitment notes.

CLASS A45 CONCRETE, BRIDGE REPAIR


The type of cement, concrete strength requirements, aggregate requirements, slump and air requirements for the contract item Class A45 Concrete, Bridge Repair will conform to the requirements of Section 460 of the Construction Specifications for A45 concrete used in approach sleeper slabs.

ESTIMATE OF STRUCTURE QUANTITIES AND NOTES  
FOR  
218' -0" CONTINUOUS COMP. GIRDER BRIDGE

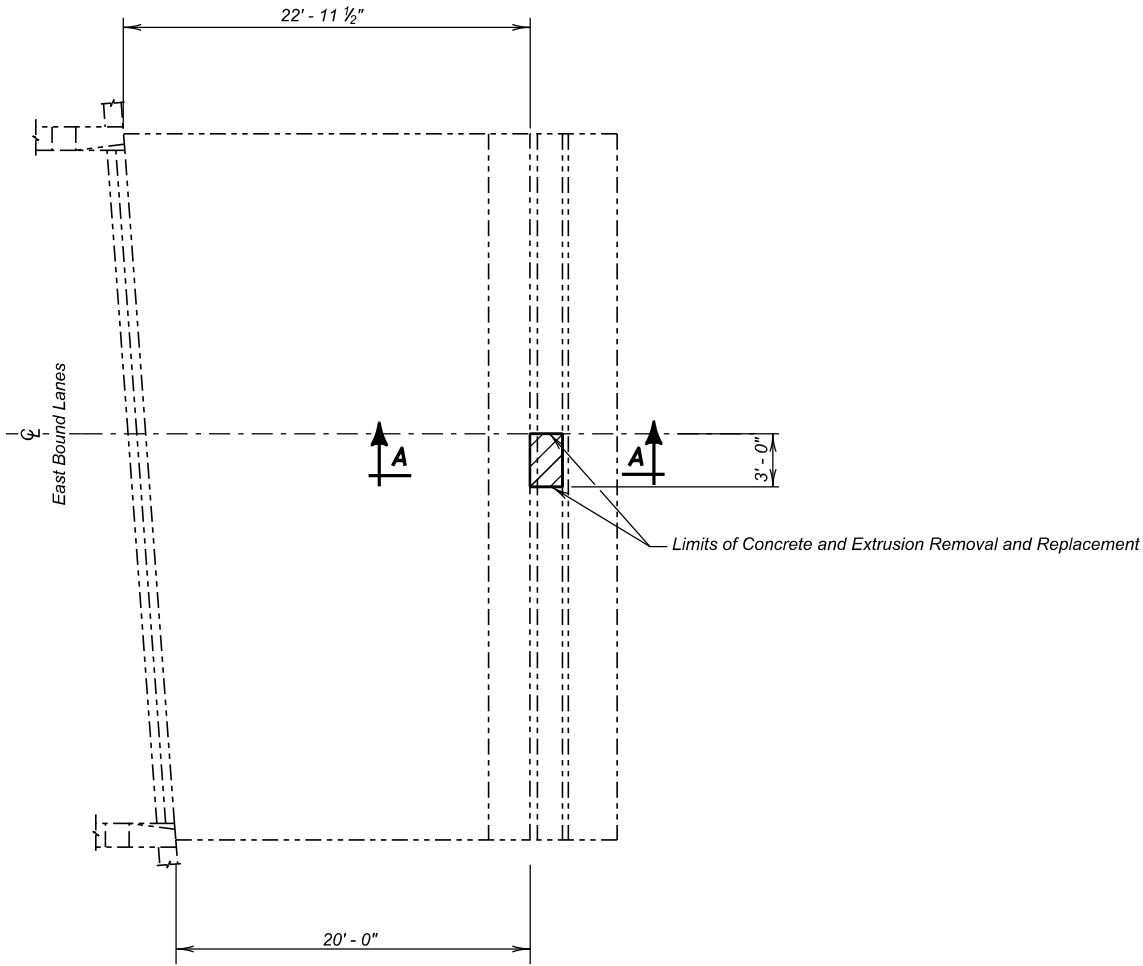
STR. NO. 43-160-206090 W-368

LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
DECEMBER 2020

2 OF 7

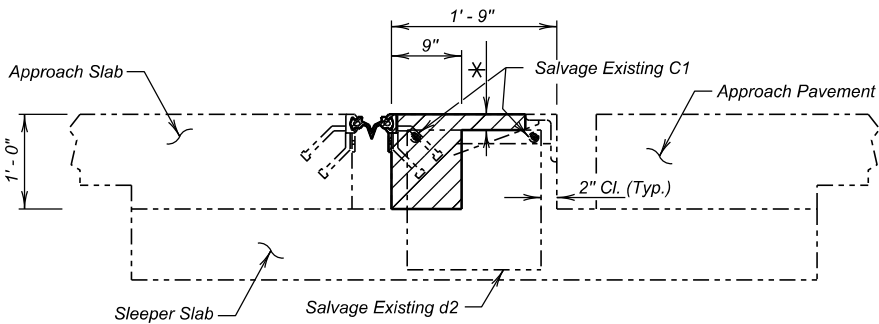
DESIGNED BY TJM LYMNI63E	CK. DES. BY SI I63EB02	DRAFTED BY TJM	 BRIDGE ENGINEER
--------------------------------	------------------------------	-------------------	--



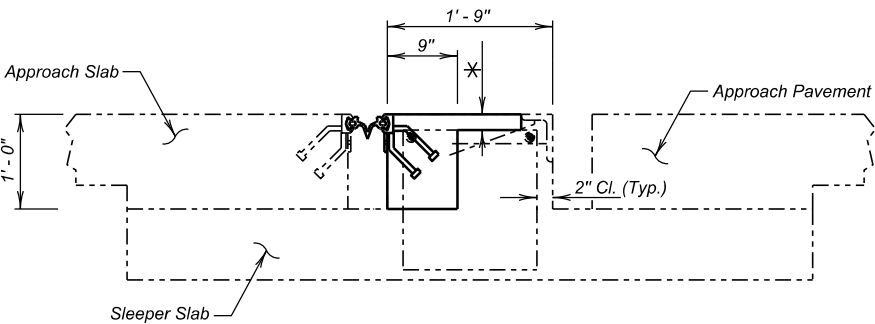


PLAN

ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Breakout Structural Concrete	CuYd	0.1
Class A45 Concrete, Bridge Repair	CuYd	0.1



SECTION A - A  
(Sleeper Slab - Breakout)



SECTION A - A  
(Sleeper Slab - Repaired)

\* Breakout on the top of the sleeper slab will be of sufficient depth to remove delaminated concrete or a minimum depth to expose half a bar diameter of the top mat of reinforcing steel. The estimated quantity for breakout and repair is based on this depth being 2 1/2\"/>

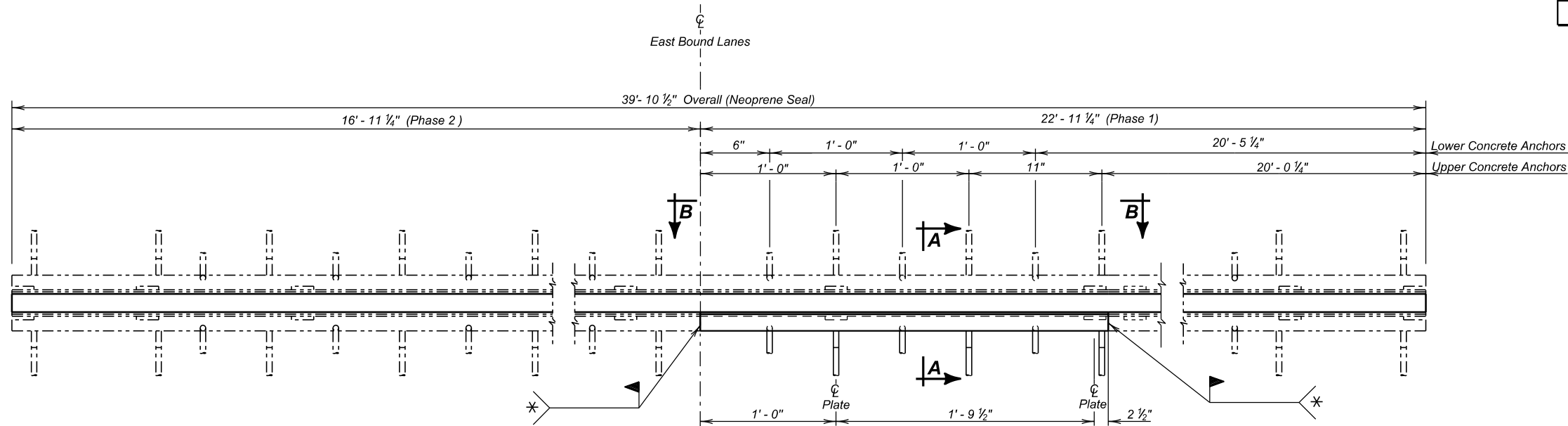
 Shaded areas indicate limits of concrete breakout.

(EAST BOUND LANES)  
JOINT REPAIR  
FOR

218' - 0" CONTINUOUS COMP. GIRDER BRIDGE  
38' - 0" ROADWAY  
OVER U.S. NO. 183  
STR. NO. 43-160-206

4°14' R.H.F. SKEW  
SEC. 14/15-T105N-R77W  
090 W-368

LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
DECEMBER 2020



TEMP.	DIMENSION "X"
30°	2 1/2"
40°	2 3/8"
50°	2 1/4"
60°	2 1/8"
70°	2"
80°	1 7/8"
90°	1 3/4"

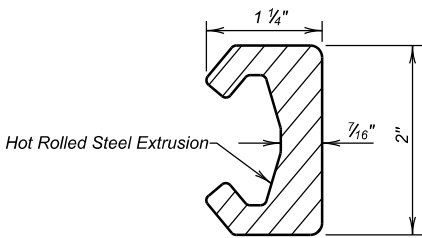
PLAN OF STRIP SEAL

GENERAL NOTES:

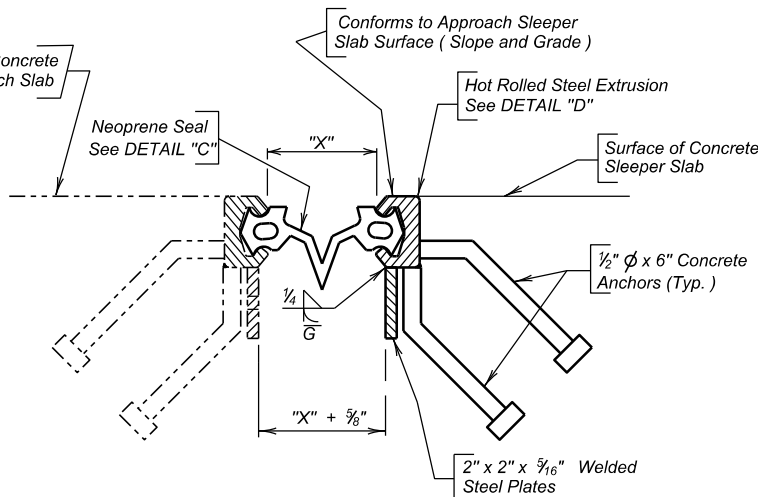
- Materials for the Steel Extrusion shall conform to ASTM-A36, A242 or A588. Materials for the 2" x 2" x 5/16" welded steel plates will conform to ASTM-A36. Material for the 1/2" diameter x 6" Concrete Anchors will conform to Type A steel studs of Clause 7 of the latest edition of the ANSI/AWS D1.5 Bridge Welding Code.
- Material for the neoprene seal will conform to ASTM D2628 modified to omit the recovery test. No splices will be permitted in the neoprene seal.
- The lubricant-adhesive used to install the neoprene seal will conform to the requirements of ASTM D4070. The neoprene seal and the lubricant adhesive should be supplied or recommended by the same source as they must be compatible.
- The installation of the neoprene seal will be as recommended by its Manufacturer and approved by the Engineer, but in general shall be as follows: The neoprene seal will be installed and bonded to the steel extrusion with a high-solids lubricant adhesive. The neoprene surfaces will be roughened with a wire brush before the application of the lubricant adhesive. The neoprene seal may be installed either prior to or after the time the steel extrusions are concreted in the approach slabs. The steel extrusion will be dry, clean, free from dirt, grease and contaminants at the time the neoprene seal is installed.
- No welds will be permitted in the internal section of the extrusion where the neoprene seal is located. Weld details will be shown on the shop plans for approval by the Engineer. Welding will be in accordance with latest edition of the ANSI/AWS D1.1 Structural Welding Code-Steel. Galvanize the steel extrusions and anything welded to them after all welding is completed. They will be galvanized in accordance with AASHTOM111 (ASTM A123). If welded splices are used subsequent to galvanizing, the weld details and the procedures for preparing the surface for welding and repairing the galvanizing after welding shall be included with the shop plans. Repair of galvanizing will be by the zinc-based solder method in conformance with ASTM A780.
- The thickness and shape of the neoprene seal may vary from the sketch shown (Detail "C" on this sheet) according to the manufacturer's design; however, the wedge lugs must properly fit the groove in the steel extrusion. Before installation, the shop plans of the proposed neoprene seal showing the fixed dimensions, thickness of neoprene seal, and dimensions pertinent to the fit of the neoprene seal in the steel extrusion will be submitted to and approved by the Engineer.
- Since a portion of the steel extrusion is existing, the repaired portion must conform to D. S. Brown shape SSA2.
- The Strip Seal Expansion Joint supplier will submit a detailed gland installation procedure with the shop plans.
- The cost of welding will be included in the unit cost for Strip Seal Expansion Joint.
- The neoprene seal shall be of sufficient length such that a minimum length of 6" shall extend beyond each end of the steel extrusions.
- The Strip Seal Expansion Joint will be measured in linear feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The Strip Seal Expansion Joint will be paid for at the contract unit price per linear foot complete in place. Payment for this item will be full compensation for furnishing all the required materials in place, inclusive of labor, equipment and incidentals necessary to complete the work in accordance with plans and the foregoing specifications.
- The Strip Seal Gland will be measured in linear feet to the nearest one-tenth foot. Measurement will be the length of the steel extrusion plus 6-inches on each end. The cost of removing and disposing of the existing strip seal gland, and furnishing and installing the new strip seal will be included in the contract unit price for Strip Seal Gland.



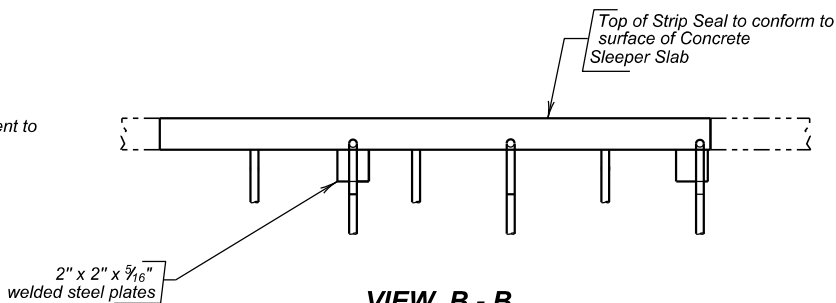
DETAIL "C"  
Neoprene Seal will have a  
3" movement capability.



DETAIL "D"



SEC. A - A



VIEW B - B  
(gland not shown)

ESTIMATED QUANTITIES			
ITEM	UNIT	QUANTITY	
		Phase I	Phase 2
Strip Seal Expansion Joint	Ft	3.0	—
Strip Seal Gland	Ft	23.4	17.4

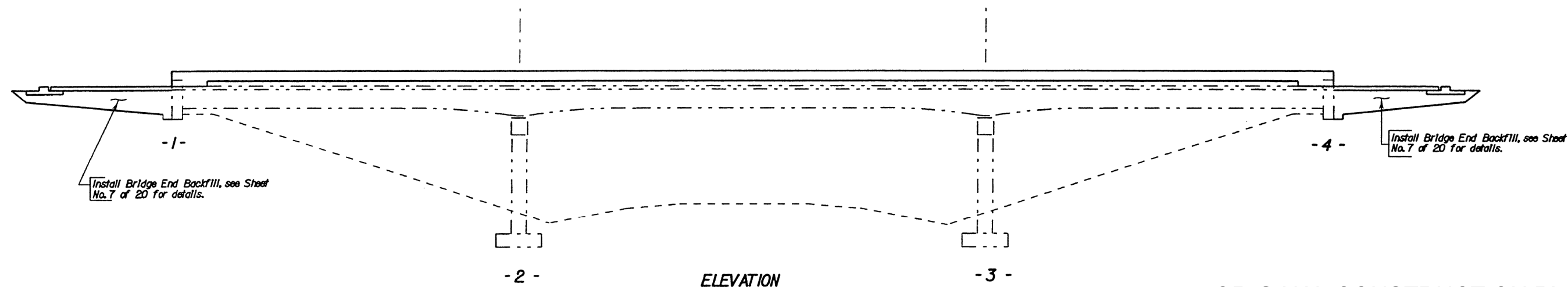
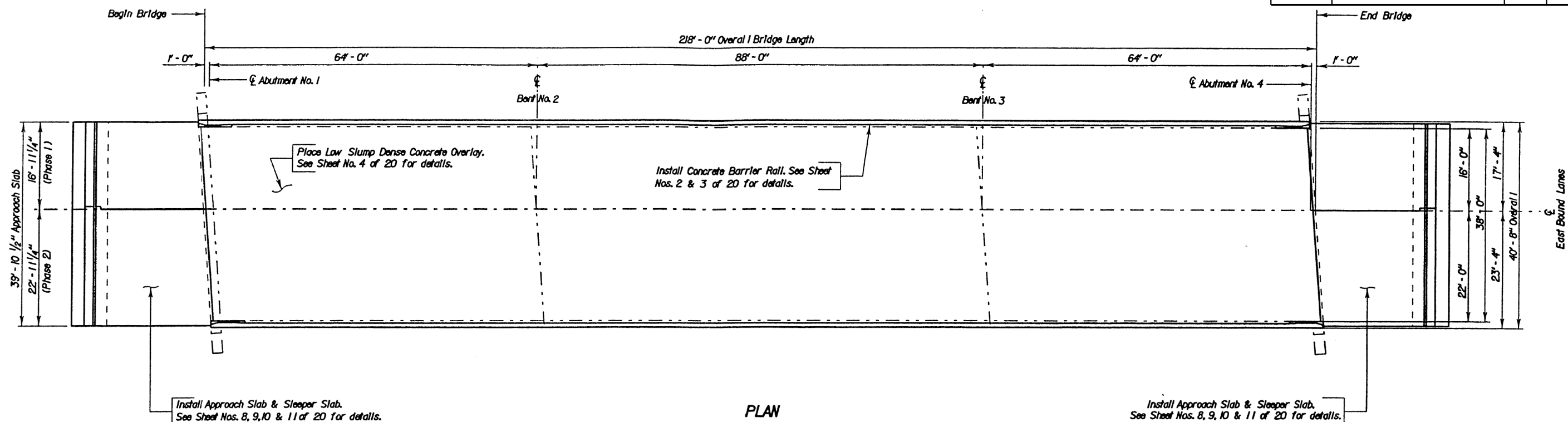
(EAST BOUND LANES)  
APPROACH SLAB JOINT DETAILS  
FOR

218' - 0" CONTINUOUS COMP. GIRDER BRIDGE  
38' - 0" ROADWAY  
OVER U.S. NO. 183  
STR. NO. 43-160-206

4°14' R.H.F. SKEW  
SEC. 14/15-T105N-R77W  
090 W-368

LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
DECEMBER 2020

STATE OF	PROJECT	SHEET NO.	TOTAL SHEETS
S.D.	090W-368	45	52



# INDEX OF BRIDGE SHEETS-

- Sheet No. 1 - Layout for Upgrading
- Sheet No. 2 - Bridge Rail Modification Details
- Sheet No. 3 - Bridge Rail Modification Details (Continued)
- Sheet No. 4 - Deck Profiles for Low Slump Dense Concrete Overlay
- Sheet No. 5 - As-Built Elevation Survey
- Sheet No. 6 - As-Built Elevation Survey (Continued)
- Sheet No. 7 - Details of MSE Bridge End Backfill
- Sheet No. 8 - Approach Slab Layout
- Sheet No. 9 - Details of Approach Slab Adjacent to Abutment No. 1
- Sheet No. 10 - Details of Approach Slab Adjacent to Abutment No. 4
- Sheet No. 11 - Details of Approach Slab Adjacent to Abutments
- Sheet No. 12 - Details of Approach Slab Joint
- Sheet No. 13 - Details of Standard Plate Nos. 460.10 & 630.70
- Sheet Nos. 14 through 20 - Original Construction Plans

THE CONTRACTOR HAS THE OPTION OF BUILDING THE APPROACH SLABS FOR THE FULL WIDTH OF THE ROADWAY AT ONE TIME OR BUILDING THE APPROACH SLABS IN TWO PHASES USING THE PLAN SHOWN OPTIONAL CONSTRUCTION JOINT. ALL REFERENCES TO PHASE 1 AND PHASE 2 CONSTRUCTION ARE GIVEN IN THE EVENT THE CONTRACTOR ELECTS TO BUILD THE APPROACH SLABS IN TWO PHASES.

## ORIGINAL CONSTRUCTION PLANS

( EAST BOUND LANES )  
LAYOUT FOR UPGRADING

218' - 0" CONT. COMP. GIRDER BRIDGE  
38'-0" ROADWAY 4° 14' SKEW R. H. F.  
STR. NO. 43-160-206 SEC. 14/15-T105N-R77W  
OVER US 183 IM 90-5(66) 187

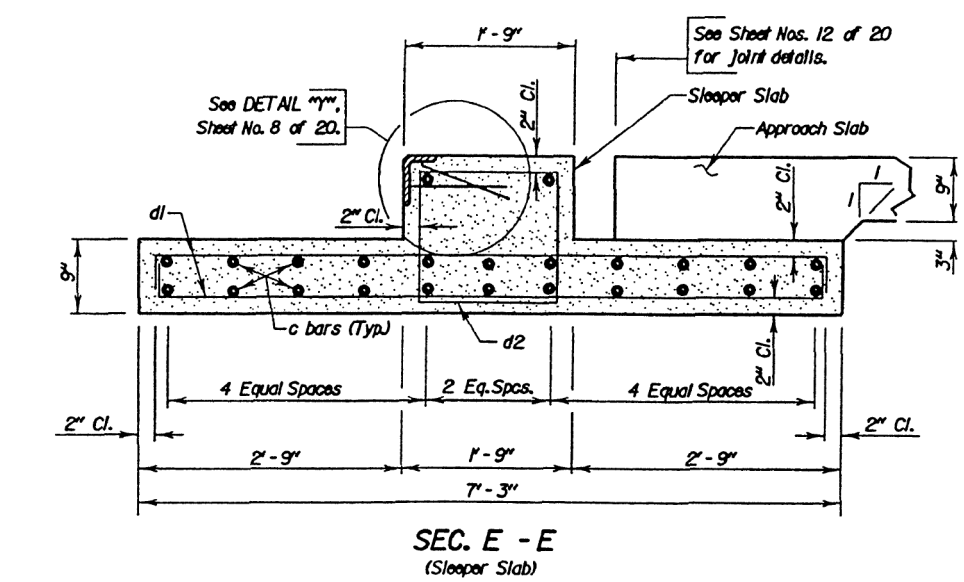
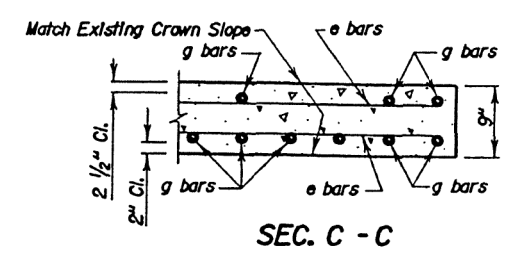
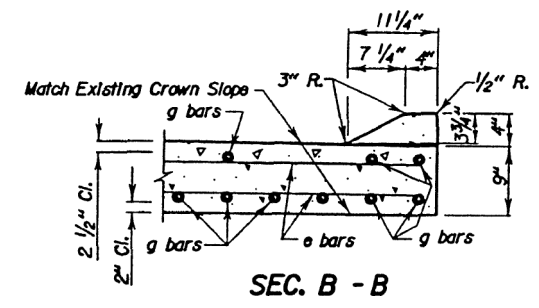
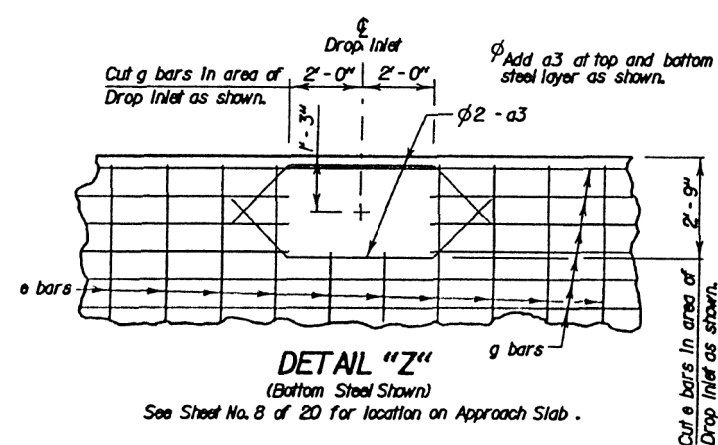
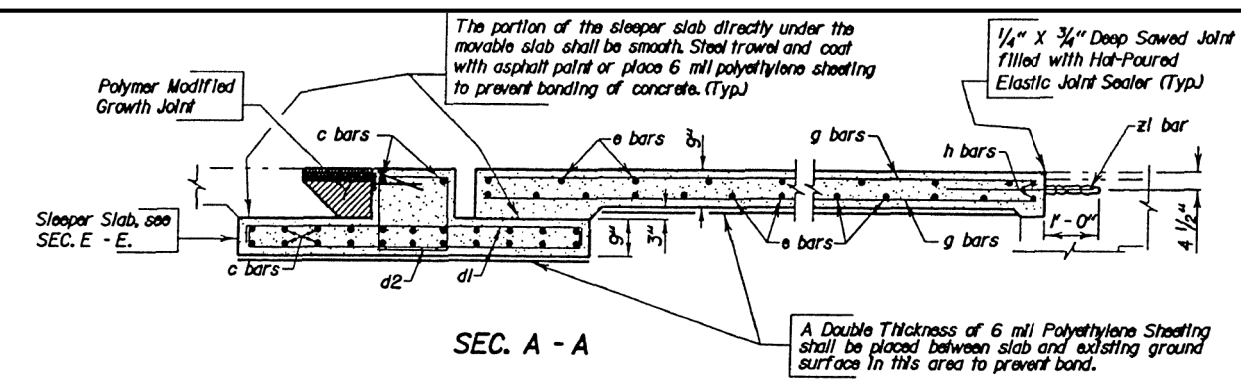
LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
NOVEMBER 1999

5 OF 7

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

DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
EJA	EJA	CJD	
LYMN3013	3013EE01		John C. Cole BRIDGE ENGINEER





REINFORCING SCHEDULE (For Two Approach and Sleeper Slabs)									
PHASE 1					PHASE 2				
Mk.	No.	Size	Length	Type	Mk.	No.	Size	Length	Type
Bending Details									
a3	4	4	7'-4"	19A	a3	4	4	7'-4"	19A
d1	68	4	7'-9"	2	d1	92	4	7'-9"	2
d2	34	4	6'-3"	T2	d2	46	4	6'-3"	T2
e1	42	6	19'-8"	Str.	e6	42	6	22'-6"	Str.
e2	1	6	18'-8"	Str.	e7	1	6	12'-9"	Str.
e3	1	6	7'-2"	Str.	e10	29	4	22'-6"	Str.
e4	1	6	1'-6"	Str.	e11	1	6	8'-3"	Str.
e5	29	4	19'-8"	Str.	e12	1	4	8'-3"	Str.
e8	1	4	12'-8"	Str.	e13	1	6	2'-6"	Str.
e9	1	4	7'-2"	Str.	e14	1	4	12'-3"	Str.
g1	2	8	22'-5"	Str.	g1	2	8	22'-5"	Str.
g3	16	8	4'-6"	Str.	g2	22	8	4'-3"	Str.
g4	2	8	19'-6"	Str.	g4	2	8	19'-6"	Str.
g6	16	8	4'-7"	Str.	g5	22	8	4'-9"	Str.
g8	2	4	22'-5"	Str.	g8	2	4	22'-5"	Str.
g11	5	4	4'-6"	Str.	g9	7	4	4'-2"	Str.
g12	2	4	19'-6"	Str.	g10	1	4	2'-4"	Str.
g15	1	4	2'-9"	Str.	g12	2	4	19'-6"	Str.
g16	5	4	4'-8"	Str.	g13	7	4	4'-8"	Str.
g17	1	4	2'-3"	Str.	g14	1	4	2'-8"	Str.
h1	4	6	18'-9"	Str.	h2	4	6	2'-6"	Str.
z1	22	6	4'-0"	Str.	z1	30	6	4'-0"	Str.
g7	22	6	6'-0"	Str.	g7	22	6	6'-0"	Str.

Note -  
All Dimensions are out to out of bars.  
All Bars to be Epoxy Coated.  
Δ Dowels  
\* Cut Bars

Type 2

Type T2

Type 19A

THE CONTRACTOR HAS THE OPTION OF BUILDING THE APPROACH SLABS FOR THE FULL WIDTH OF THE ROADWAY AT ONE TIME OR BUILDING THE APPROACH SLABS IN TWO PHASES USING THE PLAN SHOWN. OPTIONAL CONSTRUCTION JOINT. ALL REFERENCES TO PHASE 1 AND PHASE 2 CONSTRUCTION ARE GIVEN IN THE EVENT THE CONTRACTOR ELECTS TO BUILD THE APPROACH SLABS IN TWO PHASES.

ESTIMATED QUANTITIES (For Two Approach and Sleeper Slabs)			
ITEM	UNIT	PHASE 1 QUANTITY	PHASE 2 QUANTITY
1. Concrete In Approach Slabs	S.Y.	82.5	112.0
2. Epoxy Coated Re Steel In Approach Slabs	S.Y.	27.3	37.0
3. Concrete In Sleeper Slabs	Each	22	30
4. Epoxy Coated Re Steel In Sleeper Slabs			
5. Structural Steel In Armor Assembly			
6. Polyethylene Sheeting			

1. Concrete In Approach Slabs: 22.0 Cu.Yd.

2. Epoxy Coated Re Steel In Approach Slabs: 607.8 Lb.

3. Concrete In Sleeper Slabs: 9.0 Cu.Yd.

4. Epoxy Coated Re Steel In Sleeper Slabs: 149.4 Lb.

5. Structural Steel In Armor Assembly: 845 Lb.

6. Polyethylene Sheeting: 189 Sq.Yd.

PHASE 1: 132 Lb.

PHASE 2: 180 Lb.

ORIGINAL CONSTRUCTION PLANS

( EAST BOUND LANES )

DETAILS OF APPROACH SLAB ADJACENT TO ABUTMENTS FOR

218' - 0" CONT. COMP. GIRDER BRIDGE

38'-0" ROADWAY 4° 14' SKEW R. H. F.

STR. NO. 43-160-206 SEC. 14/15-T105N-R77W

OVER US 183 IM 90-5(66) 187

LYMAN COUNTY

S. D. DEPT. OF TRANSPORTATION

NOVEMBER 1999

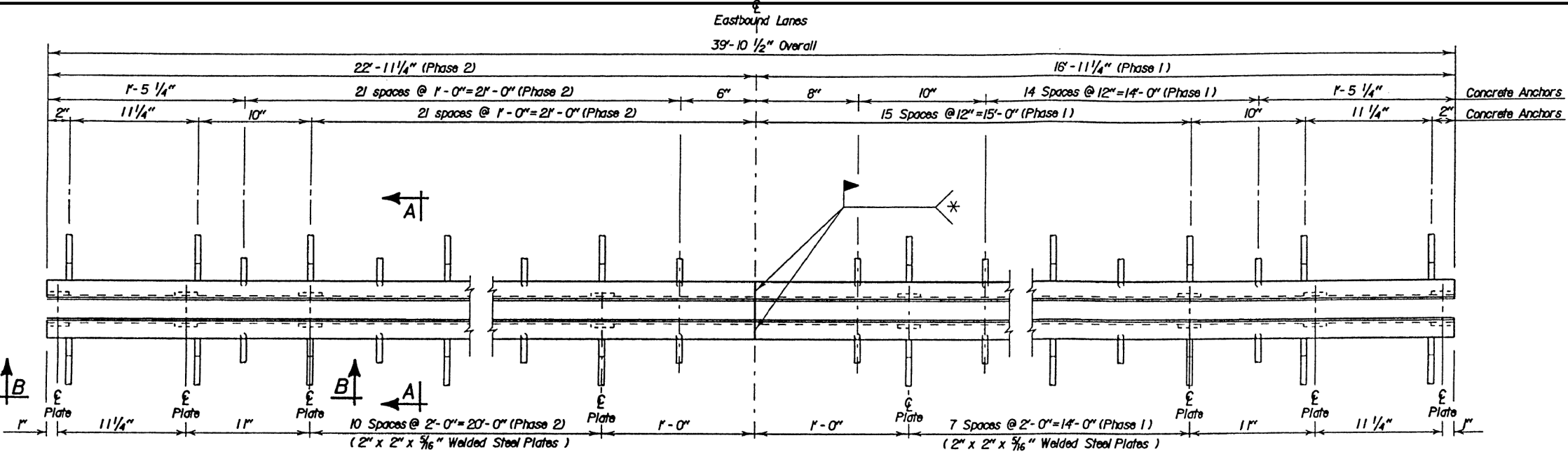
DESIGNED BY  
EJA

DRAWN BY  
SLG

CHECKED BY  
CJD

APPROVED  
John C. C. C.

6 OF 7



PLAN OF STRIP SEAL  
(Neoprene Seal not shown)

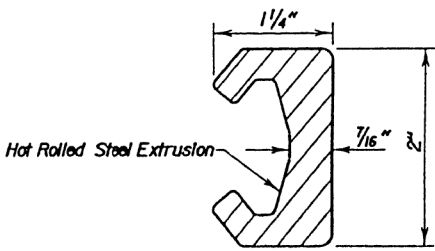
TEMP.	DIMENSION "X"
30°	2 1/2"
40°	2 3/8"
50°	2 1/4"
60°	2 1/8"
70°	2"
80°	1 7/8"
90°	1 3/4"

GENERAL NOTES:

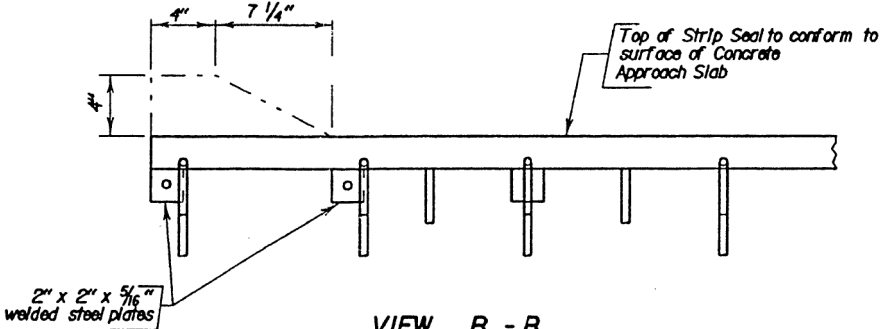
- Materials for the Steel Extrusion shall conform to ASTM-A36, A242 or A588. Materials for the 2" x 2" x 5/16" welded steel plates shall conform to ASTM-A36. Material for the 1/2" diameter x 6" Concrete Anchors shall conform to Type A steel studs of Section 7 of the latest edition of the ANSI/AWS D1.1 Structural Welding Code-Steel.
- Material for the neoprene seal shall conform to ASTM D2628 modified to omit the recovery test. No splices will be permitted in the neoprene seal.
- The lubricant-adhesive used to install the neoprene seal shall conform to the requirements of ASTM D4070. The neoprene seal and the lubricant adhesive should be supplied or recommended by the same source as they must be compatible.
- The installation of the neoprene seal shall be as recommended by its Manufacturer and approved by the Engineer, but in general shall be as follows: The neoprene seal shall be installed and bonded to the steel extrusion with a high-solids lubricant adhesive. The neoprene surfaces shall be roughened with a wire brush before the application of the lubricant adhesive. The neoprene seal may be installed either prior to or after the time the steel extrusions are concreted in the approach slabs. The steel extrusion shall be dry, clean, free from dirt, grease and contaminants at the time the neoprene seal is installed.
- Due to the length of the steel extrusions, splices are permitted. No welds shall be permitted in the internal section of the extrusion where the neoprene seal is located. Weld details shall be shown on the shop plans for approval by the Engineer. Welding shall be in accordance with latest edition of the ANSI/AWS D1.1 Structural Welding Code-Steel. Galvanize the steel extrusions and anything welded to them after all welding is completed. They shall be galvanized in accordance with AASHTO M111 (ASTM A123). If welded splices are used subsequent to galvanizing, the weld details and the procedures for preparing the surface for welding and repainting the galvanizing after welding shall be included with the shop plans.
- The thickness and shape of the neoprene seal may vary from the sketch shown (Detail "C" on this sheet) according to the manufacturer's design; however, the wedge lugs must properly fit the groove in the steel extrusion. Before installation, the shop plans of the proposed neoprene seal showing the fixed dimensions, thickness of neoprene seal, and dimensions pertinent to the fit of the neoprene seal in the steel extrusion shall be submitted to and approved by the Engineer.
- Since the configuration and dimensions of the steel extrusion may vary according to each manufacturer's design, they need not conform exactly to that shown in Detail "D", however, any deviations from the plan shown configuration or dimensions must be approved by the Office of Bridge Design.
- The Strip Seal Expansion Joint supplier shall submit a detailed gland installation procedure with the shop plans.
- The cost of welding shall be included in the unit cost for Strip Seal Expansion Joint.
- The neoprene seal shall be of sufficient length such that a minimum length of 6" shall extend beyond each end of the steel extrusions.
- The Strip Seal Expansion Joint will be measured in linear feet to the nearest one-tenth foot, complete in place. Measurement will be made of the overall horizontal length. The Strip Seal Expansion Joint will be paid for at the contract unit price per linear foot complete in place. Payment for this item shall be full compensation for furnishing all the required materials in place, inclusive of labor, equipment and incidentals necessary to complete the work in accordance with plans and the foregoing specifications.
- Due to phased construction, the steel extrusion shall be spliced in the field at the location shown above. The Weld Details and the procedures for preparing the surface for welding and repainting the galvanizing after welding shall be included with the shop plans.



DETAIL "C"  
Neoprene Seal shall have a  
3" movement capability.

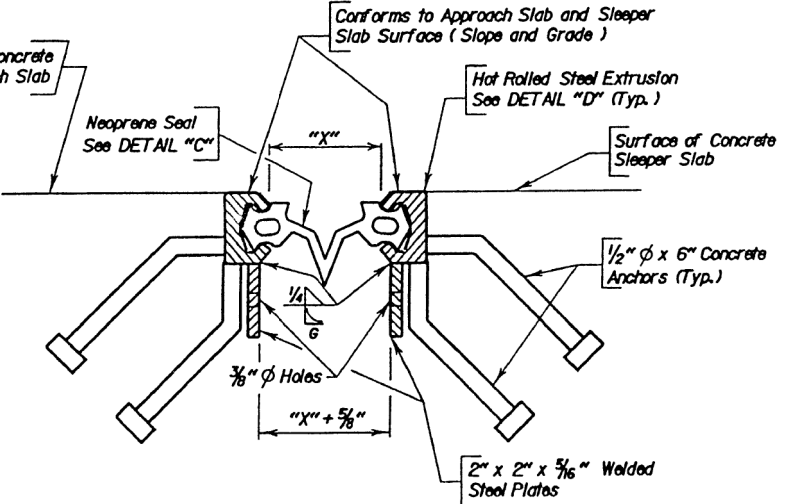


DETAIL "D"



VIEW B - B

ESTIMATED QUANTITIES			
ITEM	UNIT	PHASE 1 QUANTITY	PHASE 2 QUANTITY
Strip Seal Expansion Joint	L.F.	33.9	48.9



SEC. A - A  
ORIGINAL CONSTRUCTION PLANS

THE CONTRACTOR HAS THE OPTION OF BUILDING THE APPROACH SLABS FOR THE FULL WIDTH OF THE ROADWAY AT ONE TIME OR BUILDING THE APPROACH SLABS IN TWO PHASES USING THE PLAN SHOWN OPTIONAL CONSTRUCTION JOINT. ALL REFERENCES TO PHASE 1 AND PHASE 2 CONSTRUCTION ARE GIVEN IN THE EVENT THE CONTRACTOR ELECTS TO BUILD THE APPROACH SLABS IN TWO PHASES.

( EAST BOUND LANES )  
APPROACH SLAB JOINT DETAILS FOR  
218' - 0" CONT. COMP. GIRDER BRIDGE  
38'-0" ROADWAY 4° 14' SKEW R. H. F.  
STR. NO. 43-160-206 SEC. 14/15-T105N-R77W  
OVER US 183 IM 90-5(66) 187

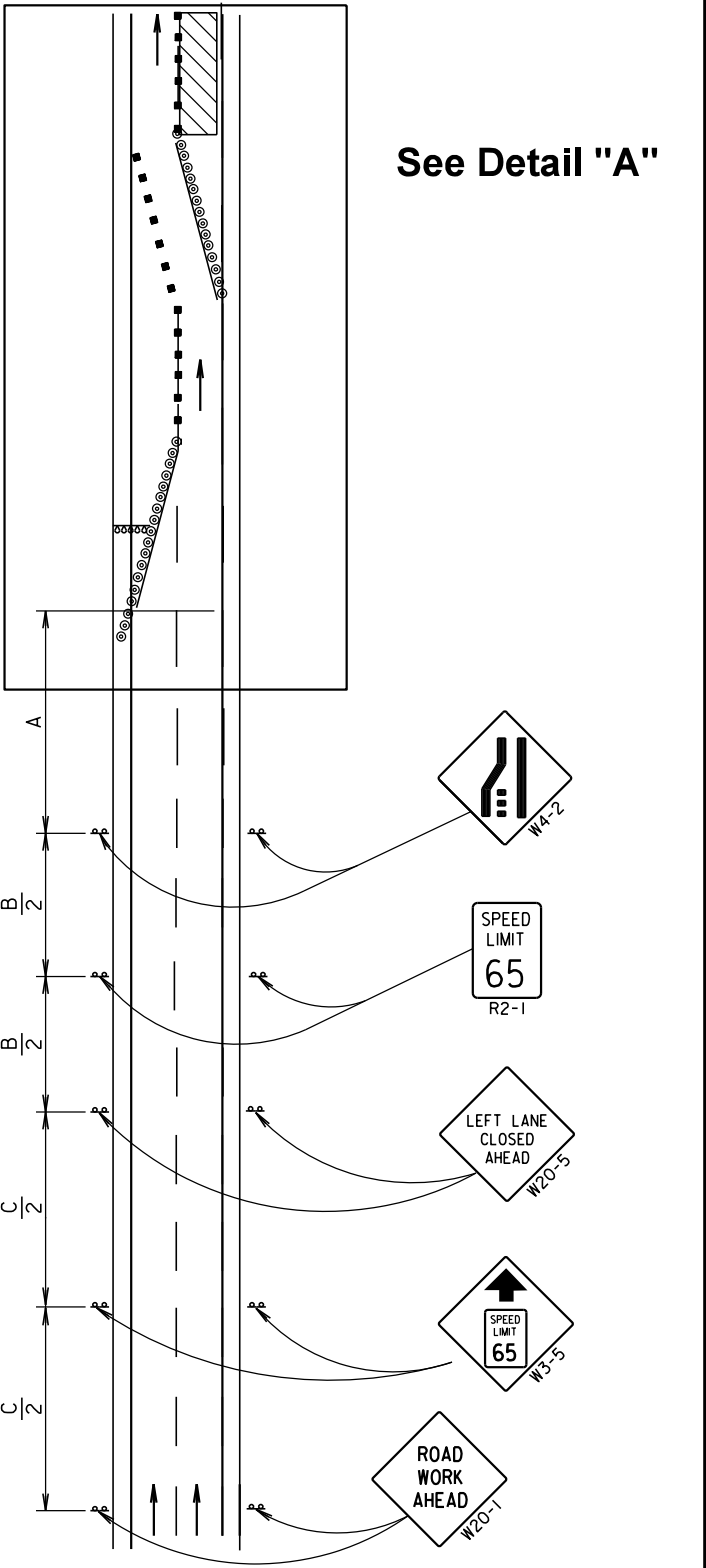
LYMAN COUNTY  
S. D. DEPT. OF TRANSPORTATION  
NOVEMBER 1999

WORK ZONE SPEED REDUCTION  
DRIVING LANE CLOSURE AND LANE  
SHIFT WITHOUT BARRIER

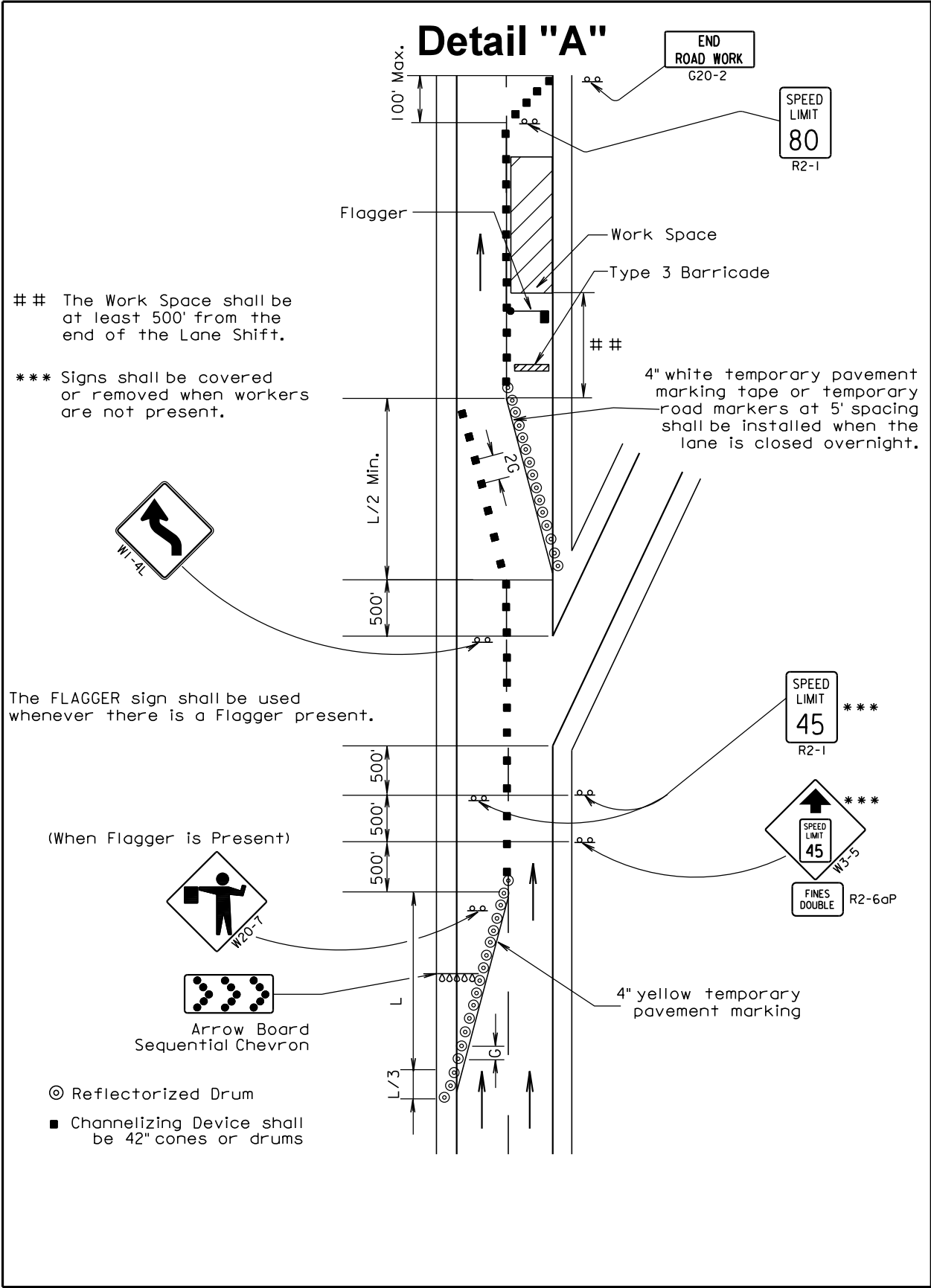
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-368 & 090E-288	48	52

Plotting Date: 11/23/2020

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (Feet) (L)	Spacing of Advanced Warning Signs (Feet) (A) (B) (C)		
0 - 30	25	180	200		
35 - 40	25	320	350		
45	25	600	500		
50 - 55	50	660	750		
60 - 65	50	780	1000		
70 - 80	50	1125	1000	1500	2640



See Detail "A"



## The Work Space shall be at least 500' from the end of the Lane Shift.

\*\*\* Signs shall be covered or removed when workers are not present.

The FLAGGER sign shall be used whenever there is a Flagger present.

(When Flagger is Present)

◎ Reflectorized Drum

■ Channelizing Device shall be 42" cones or drums

Detail "A"

END  
ROAD WORK  
G20-2

SPEED  
LIMIT  
80  
R2-1

SPEED  
LIMIT  
45  
R2-1

SPEED  
LIMIT  
45  
W3-5  
FINES  
DOUBLE  
R2-6aP

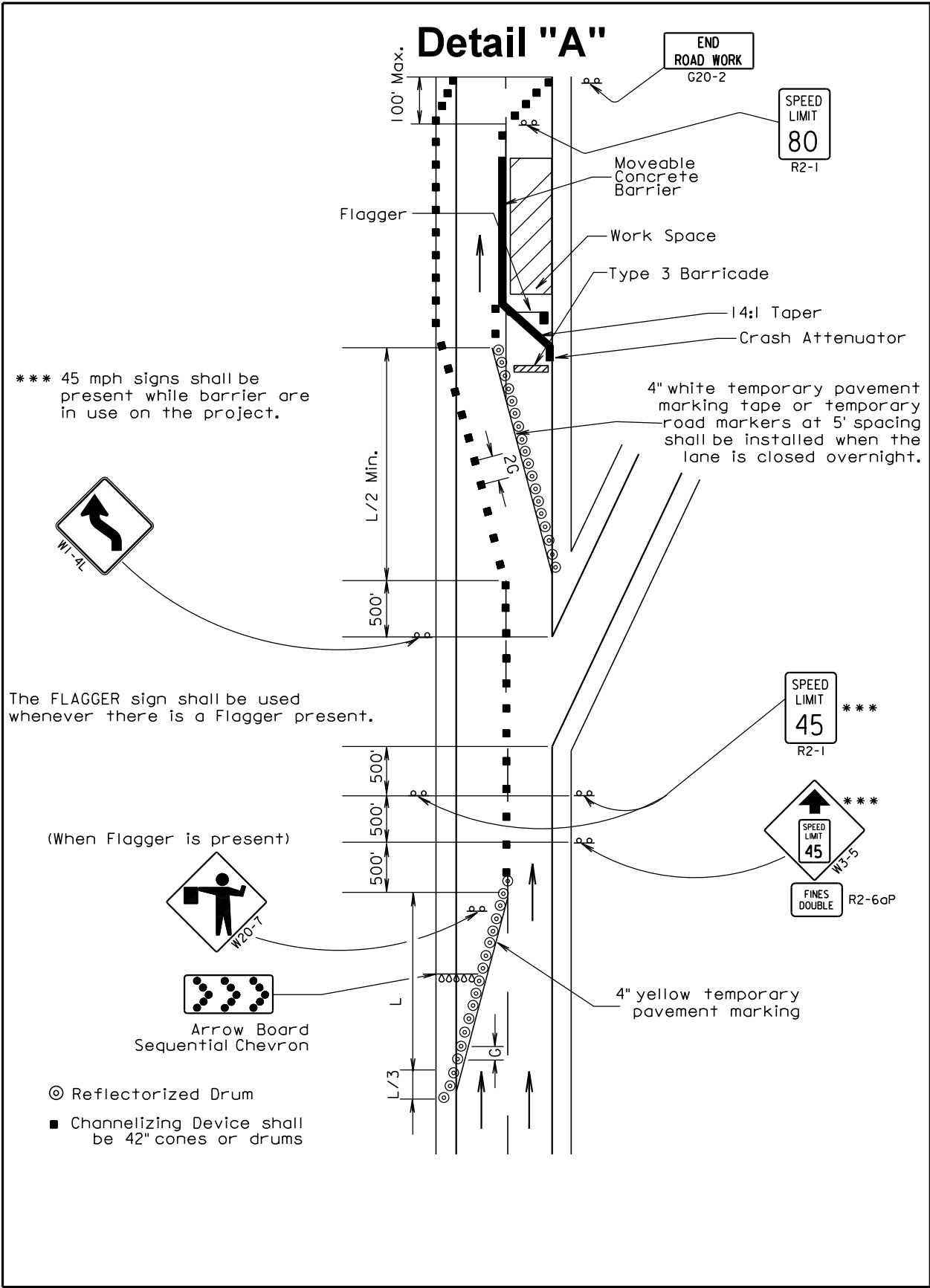
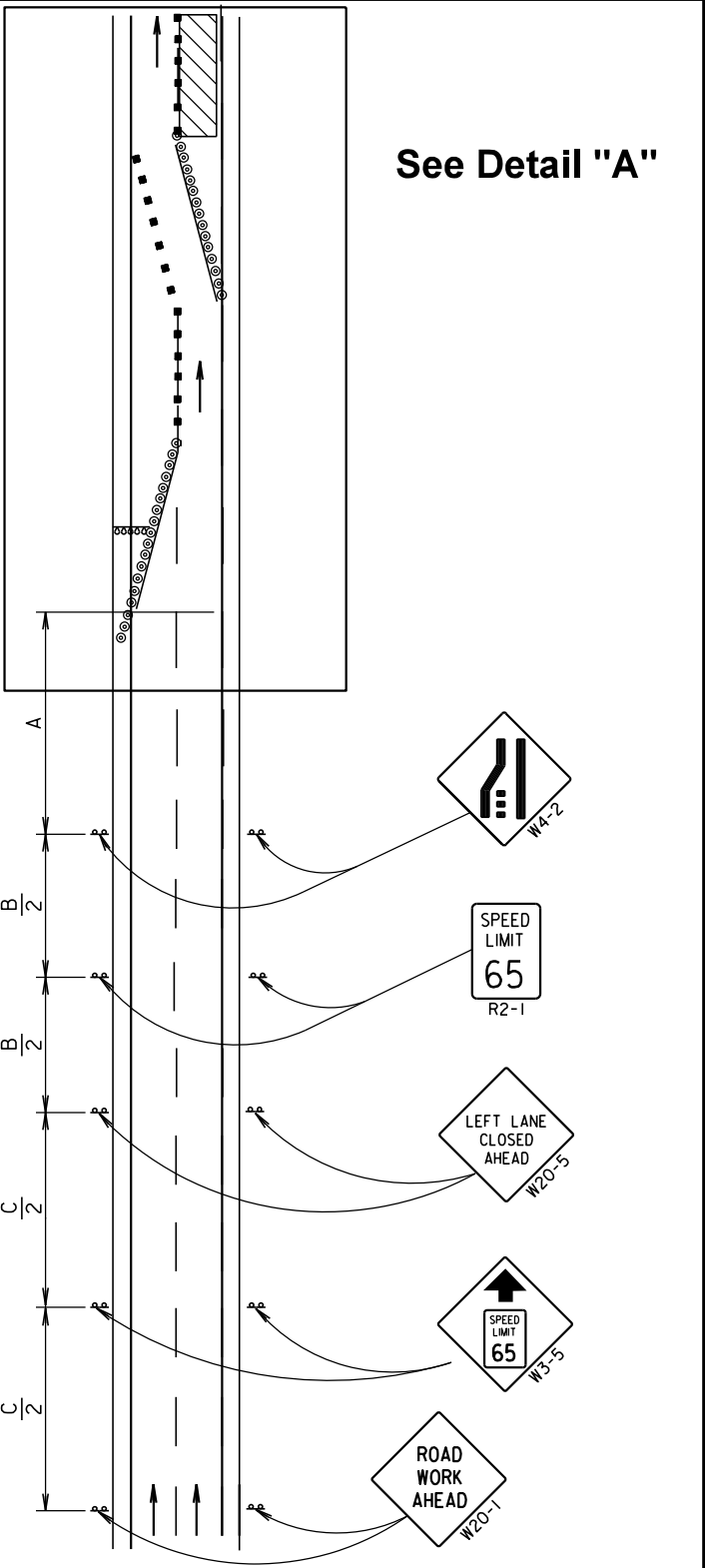


WORK ZONE SPEED REDUCTION,  
DRIVING LANE CLOSURE AND LANE  
SHIFT WITH BARRIER ON CENTERLINE

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	090W-368 & 090E-288	49	52

Plotting Date: 11/23/2020

Posted Speed Prior to Work (M.P.H.)	Spacing of Channelizing Devices (Feet) (G)	Taper Length (Feet) (L)	Spacing of Advanced Warning Signs (Feet) (A) (B) (C)		
0 - 30	25	180	200		
35 - 40	25	320	350		
45	25	600	500		
50 - 55	50	660	750		
60 - 65	50	780	1000		
70 - 80	50	1125	1000	1500	2640



Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45	500	600	25
50	500	600	50
55	750	660	50
60 - 65	1000	780	50

■ Channelizing Device

END ROAD WORK G20-2

The channelizing devices shall be drums or 42" cones if traffic control must remain overnight.

For short duration operations (1 hour or less) all channelizing devices may be eliminated if a vehicle with an activated flashing or revolving yellow light is used.

Worker signs (W21-1 or W21-1a) may be used instead of SHOULDER WORK signs.

A SHOULDER WORK sign should be placed on the left side of a divided or one-way roadway only if the left shoulder is affected.

The SHOULDER WORK sign on an intersecting roadway is not required if drivers emerging from that roadway will encounter another advance warning sign before they reach a work activity area.

WORK SPACE

SHOULDER WORK W21-5

ROAD WORK AHEAD W20-1

END ROAD WORK G20-2

June 3, 2016

**SDOT**

**GUIDES FOR TRAFFIC CONTROL DEVICES  
WORK ON SHOULDERS**

PLATE NUMBER  
634.03

Published Date: 4th Qtr. 2020

Sheet 1 of 1

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	25
35 - 40	350	25
45	500	25
50	500	50
55	750	50
60 - 65	1000	50

■ Flagger

■ Channelizing Device

For low-volume traffic situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger may be used.

The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short duration operations (1 hour or less).

For tack and/or flush seal operations, when flaggers are not being used, the FRESH OIL sign (W21-2) shall be displayed in advance of the liquid asphalt areas.

Flashing warning lights and/or flags may be used to call attention to the advance warning signs.

The channelizing devices shall be drums or 42" cones.

Channelizing devices are not required along the centerline adjacent to work area when pilot cars are utilized for escorting traffic through the work area.

Channelizing devices and flaggers shall be used at intersecting roads to control intersecting road traffic as required.

The buffer space should be extended so that the two-way traffic taper is placed before a horizontal or vertical curve to provide adequate sight distance for the flagger and queue of stopped vehicles.

The length of A may be adjusted to fit field conditions.

Warning sign sequence in opposite direction same as below.

WORK SPACE

END ROAD WORK G20-2

ROAD WORK AHEAD W20-1

ONE LANE ROAD AHEAD W20-4

XXX FEET W16-2P (Optional)

W20-1

W20-4

W16-2P

One Lane Two-way Traffic Taper

Buffer Space

100' (Max.)

20'

20'

June 3, 2016

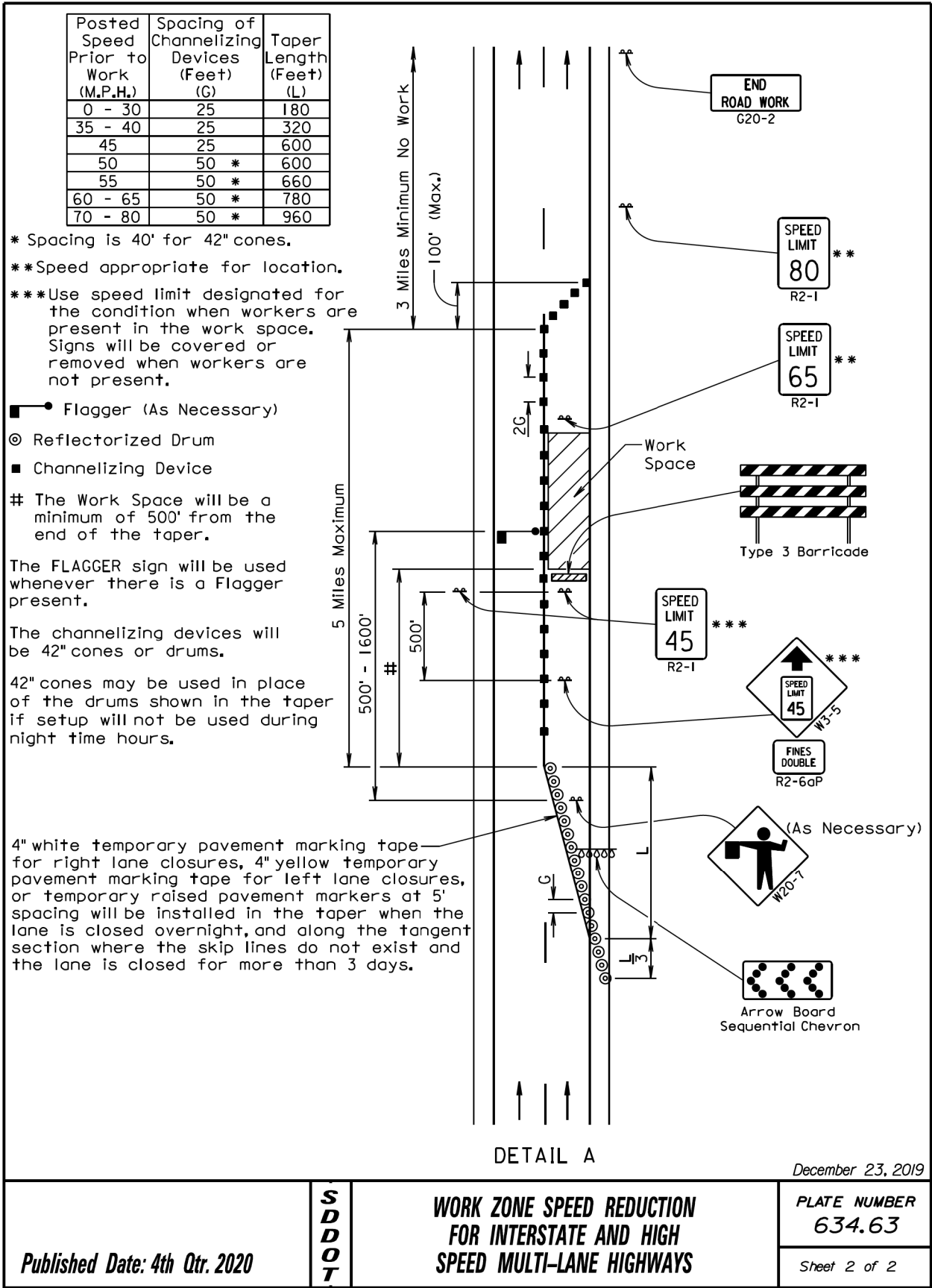
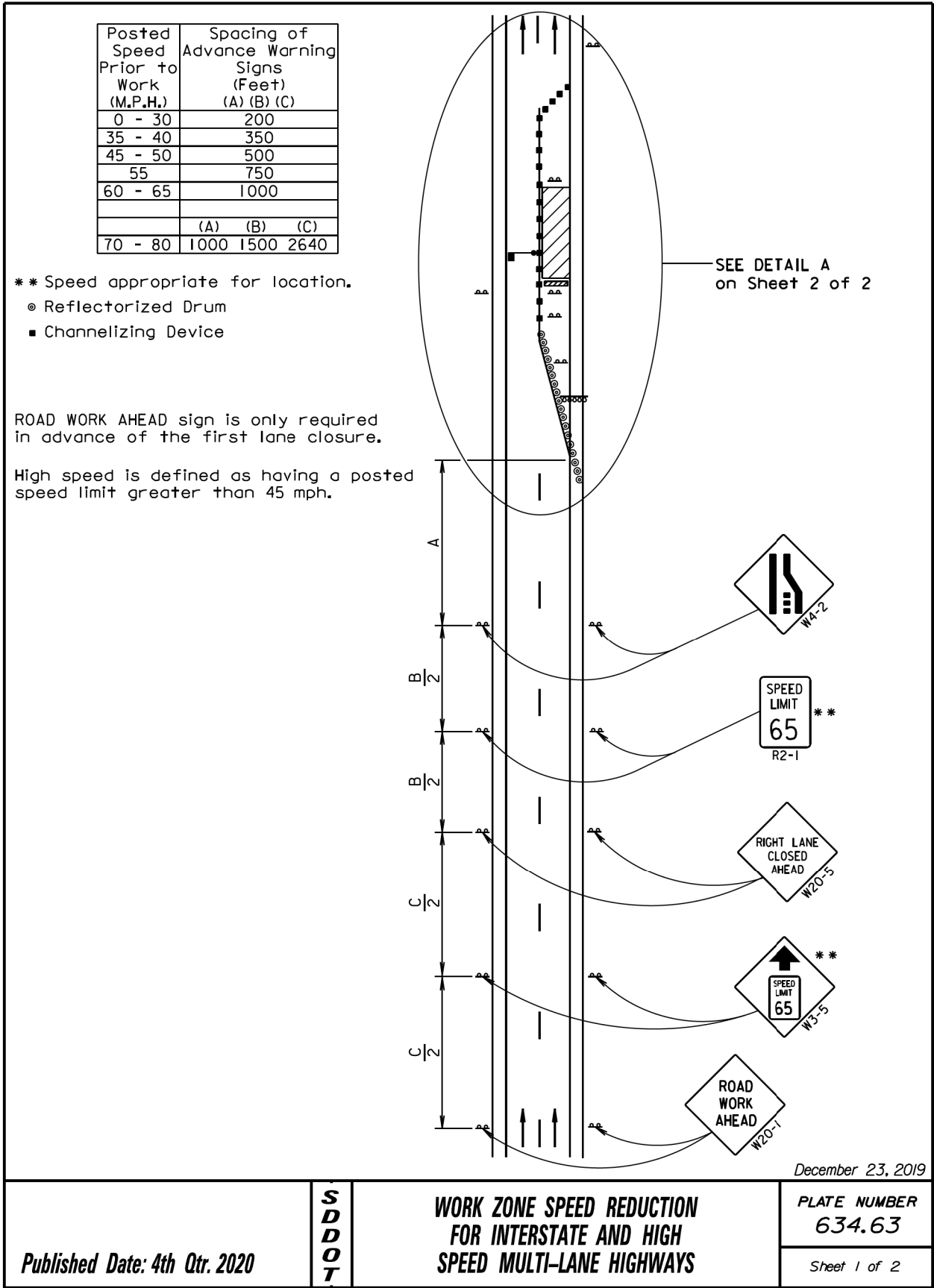
**SDOT**

**GUIDES FOR TRAFFIC CONTROL DEVICES  
LANE CLOSURE WITH FLAGGER PROVIDED**

PLATE NUMBER  
634.23

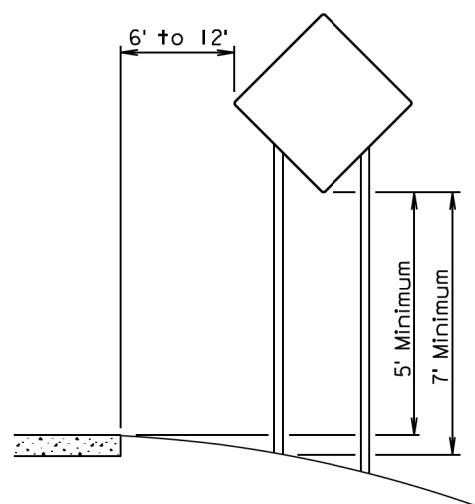
Published Date: 4th Qtr. 2020

Sheet 1 of 1

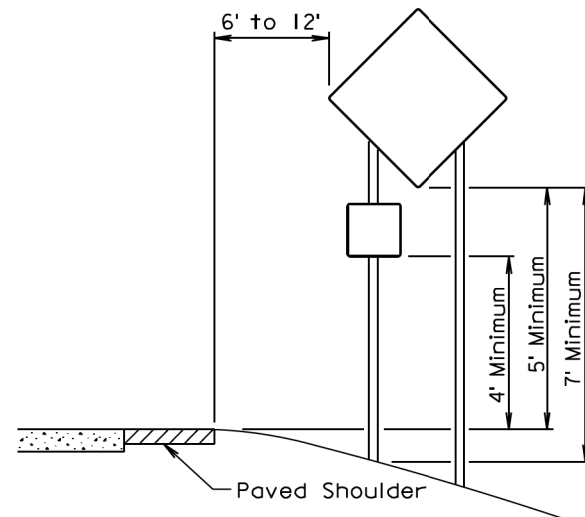


STATE OF SOUTH DAKOTA	PROJECT 090W-368 & 090E-288	SHEET 52	TOTAL SHEETS 52
-----------------------------	--------------------------------	-------------	-----------------------

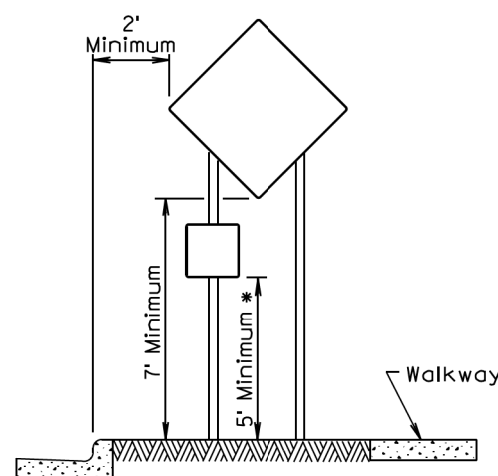
Plotting Date: 11/23/2020



RURAL DISTRICT

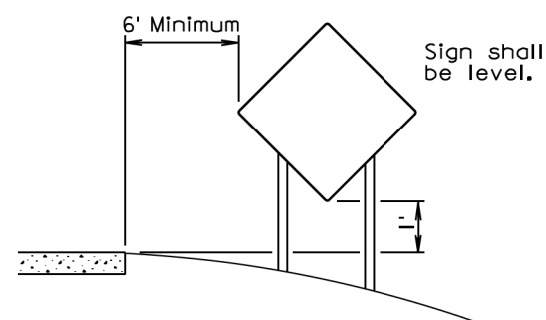


RURAL DISTRICT WITH  
SUPPLEMENTAL PLATE



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.

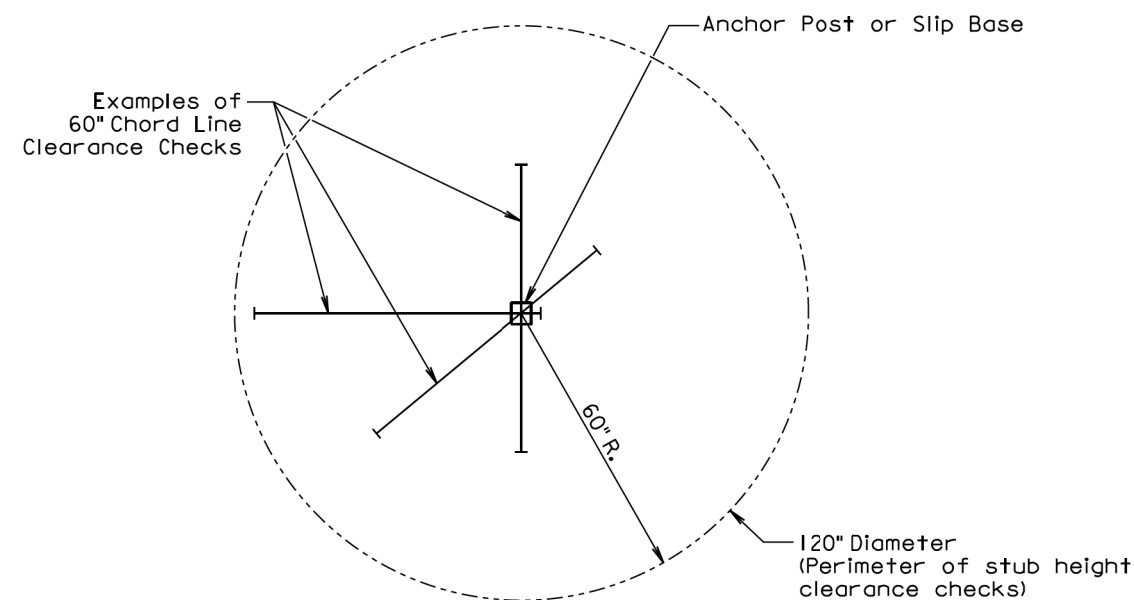


RURAL DISTRICT  
3 DAY MAXIMUM

(Not applicable to regulatory signs)

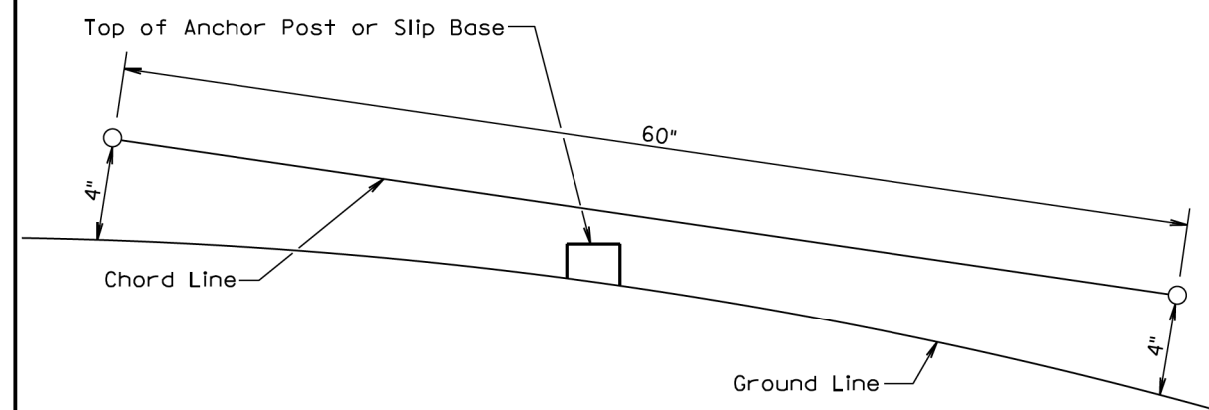
September 22, 2014

Published Date: 4th Qtr. 2020	S D D O T	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: 4th Qtr. 2020	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1