

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	085-471 079-471	1	8

STATE OF SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
PLANS FOR PROPOSED
PROJECT 085-471 & 079-471
U.S. HIGHWAY 85
S.D. HIGHWAY 79
BUTTE COUNTY
CULVERT JOINT SEALING AND VOID FILLING
 PCN i6x8 & i6x9



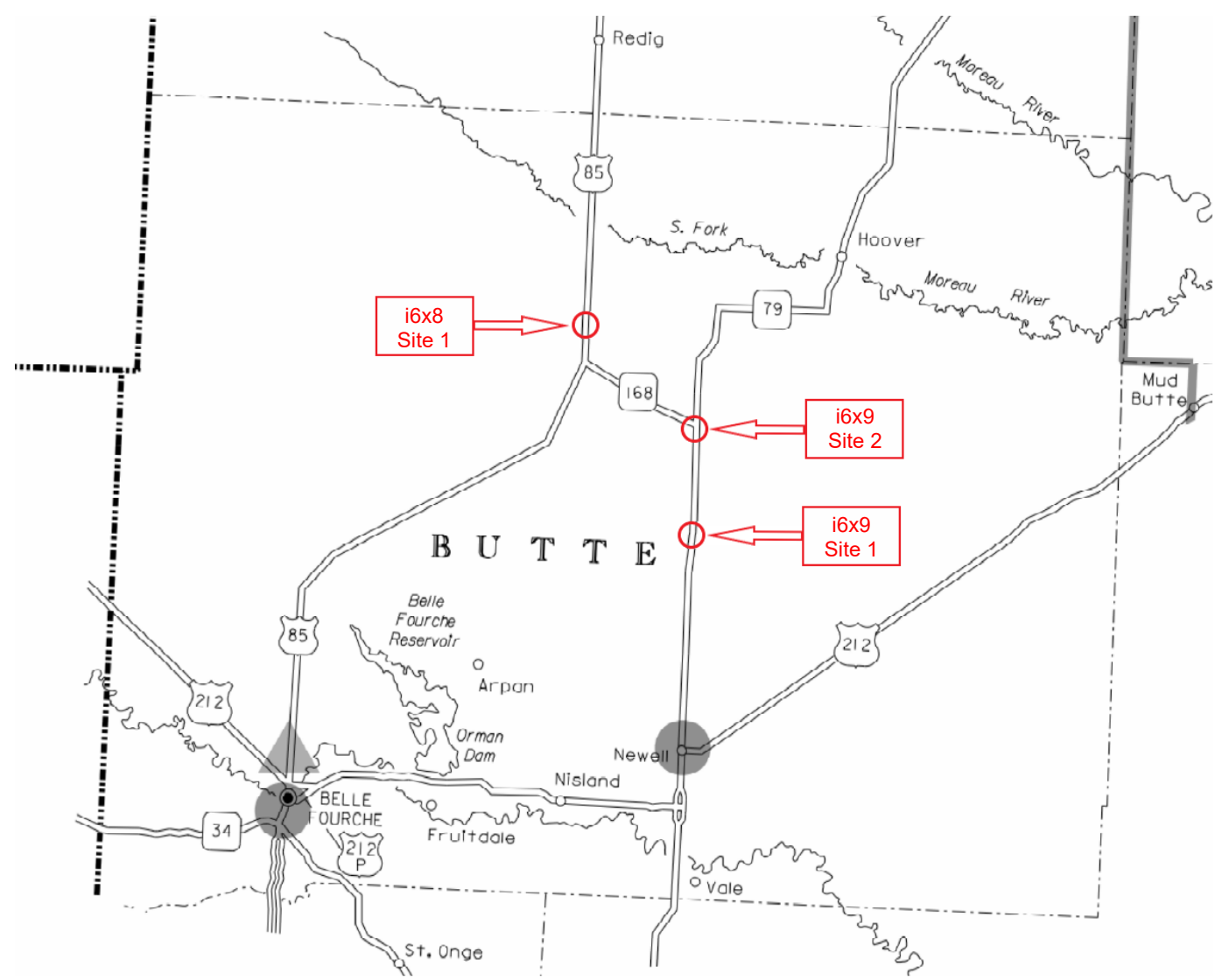
Project

INDEX OF SHEETS

Sheet 1	Title Sheet and Layout Map
Sheet 2	Estimate of Quantities and Environmental Commitments
Sheet 3	Table of Culvert Repairs
Sheet 3	Table of Traffic Control
Sheet 4-6	Plan Notes
Sheet 7-8	Standard Plates

PCN i6x8
 Site 1 – US85 @ MRM 89.00 + 0.39 – Culvert # 3042

PCN i6x9
 Site 1 – SD79 @ MRM 144.00 + 0.36 – Culvert # 260
 Site 2 – SD79 @ MRM 150.00 + 0.30 – Culvert # 644



STORM WATER PERMIT
 (NONE REQUIRED)

ESTIMATE OF QUANTITIES AND ENVIRONMENTAL COMMITMENTS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	085-471 079-471	2	8

Estimate of Quantities

PCN i6x8 US 85

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
450E4699	Tie Bolts for RCP	32	Each
450E8300	Culvert Joint Cleaning	96	Ft
450E8305	Culvert Joint Repair	96	Ft
450E8310	Chemical Grout Void Fill	250	Gal
634E0010	Flagging	24	Hour
634E0110	Traffic Control Signs	178	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS

PCN i6x9 SD 79

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
450E4699	Tie Bolts for RCP	72	Each
450E8300	Culvert Joint Cleaning	252	Ft
450E8305	Culvert Joint Repair	252	Ft
450E8310	Chemical Grout Void Fill	500	Gal
634E0010	Flagging	48	Hour
634E0110	Traffic Control Signs	356	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS

SPECIFICATIONS

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

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 B: FEDERALLY THREATENED, ENDANGERED, AND PROTECTED SPECIES

COMMITMENT B2: WHOOPING CRANE

The Whooping Crane is a spring and fall migratory bird in South Dakota that is about 5 feet tall and typically stops on wetlands, rivers, and agricultural lands along their migration route. An adult Whooping Crane is white with a red crown and a long, dark, pointed bill. Immature Whooping Cranes are cinnamon brown. While in flight, their long necks are kept straight and their long dark legs trail behind. Adult Whooping Cranes' black wing tips are visible during flight.

Action Taken/Required:

Harassment or other measures to cause the Whooping Crane to leave the site is a violation of the Endangered Species Act. If a Whooping Crane is sighted roosting in the vicinity of the project, borrow pits, or staging areas associated with the project, cease construction activities in the affected area until the Whooping Crane departs and immediately contact the Project Engineer. The Project Engineer will contact the Environmental Office so that the sighting can be reported to USFWS

COMMITMENT C: WATER SOURCE

The Contractor will not withdraw water with equipment previously used outside the State of South Dakota or previously used in aquatic invasive species (AIS) positive waters within South Dakota without prior approval from the SDDOT Environmental Office. To prevent and control the introduction and spread of invasive species into the project vicinity, all equipment will be power washed with hot water (≥140 °F) and completely dried for a minimum of 7 days prior to subsequent use. South Dakota administrative rule 41:10:04:02 forbids the possession and transport of AIS; therefore, all attached dirt, mud, debris, and vegetation must be removed and all compartments and tanks capable of holding standing water must be drained. This includes, but is not limited to, all equipment, pumps, lines, hoses and holding tanks.

Action Taken/Required:

The Contractor will obtain the necessary permits from the regulatory agencies such as the South Dakota Department of Agriculture and Natural Resources (DANR) and the United States Army Corps of Engineers (USACE) prior to water extraction activities.

Additional information and mapping of water sources impacted by Aquatic Invasive Species in South Dakota can be accessed at:

< <http://sdleastwanted.com/maps/default.aspx> >

< [South Dakota Administrative Rule 41:10:04 Aquatic Invasive Species: https://sdlegislature.gov/rules/DisplayRule.aspx?Rule=41:10:04](https://sdlegislature.gov/rules/DisplayRule.aspx?Rule=41:10:04) >

COMMITMENT E: STORM WATER

Construction activities constitute less than 1 acre of disturbance.

Action Taken/Required:

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

TABLE OF MAINLINE PIPE CULVERT REPAIRS

Site No.	Culvert #	MRM	+ Displacement	In Place Culvert Size	Number of Culvert Joints	Culvert Joint Cleaning	Repair Culvert Joint	Chemical Grout Void Fill	Tie Bolt for RCP	Approximate Water Level in Culvert	Approximate Debris Level in Culvert	Repair Comments
				(Ft)	(Each)	(Ft)	(Ft)	(Gal)	(Each)			
i6x8 US 85, From SD 168 Intersection to Redig												
1	3042	89	0.39	6x6 CIP Box Culvert	4	96	96	250	32	Dry in October 2022	Minimal In October 2022	Tie all 4 untied joints. Clean all 4 joints and seal all 4 joints. Chemical Grout Void Fill all 4 joints.
				i6x8 Total		96	96	250	32			
i6x9 SD 79, From Newell to Hoover												
1	260	144	0.36	7x7 CIP Box Culvert	5	140	140	350	40	Dry in October 2022	Minimal In October 2022	Tie all 5 untied joints. Clean all 5 joints and seal all 5 joints. Chemical Grout Void Fill all 5 joints.
2	644	150	0.3	7x7 CIP Box Culvert	4	112	112	150	32	Dry in October 2022	Minimal In October 2022	Tie all 4 untied joints. Clean all 4 joints and seal all 4 joints. Chemical Grout Void Fill all 4 joints.
				i6x9 Total		252	252	500	72			

PCN i6x8 TABLE OF TRAFFIC CONTROL SIGNS

SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
W20-1	ROAD WORK AHEAD	4	48" x 48"	16.0	64.0
W20-4	ONE LANE ROAD AHEAD	2	48" x 48"	16.0	32.0
W20-7	FLAGGER (symbol)	2	48" x 48"	16.0	32.0
W21-5	SHOULDER WORK	2	48" x 48"	16.0	32.0
G20-2	END ROAD WORK	4	36" x 18"	4.5	18.0
CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT					178.0

PCN i6x9 TABLE OF TRAFFIC CONTROL SIGNS

SIGN CODE	SIGN DESCRIPTION	CONVENTIONAL ROAD			
		NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
W20-1	ROAD WORK AHEAD	8	48" x 48"	16.0	128.0
W20-4	ONE LANE ROAD AHEAD	4	48" x 48"	16.0	64.0
W20-7	FLAGGER (symbol)	4	48" x 48"	16.0	64.0
W21-5	SHOULDER WORK	4	48" x 48"	16.0	64.0
G20-2	END ROAD WORK	8	36" x 18"	4.5	36.0
CONVENTIONAL ROAD TRAFFIC CONTROL SIGNS SQFT					356.0

SCOPE OF WORK

Work in this project involves cleaning and sealing of joints between CIP box culvert sections and void filling.

UTILITIES

Utilities are not planned to be affected on this project. 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.

SEQUENCE OF OPERATIONS

The Contractor will submit to the Project Engineer a minimum of one week prior to the preconstruction meeting a detailed plan of how the pipe culvert repair will be staged. The plan will show how the Contractor will maintain traffic at each pipe culvert site, where equipment is to be stored, and the total length of the works space if a lane of traffic needs to be closed to traffic. These plans will be approved by the Project Engineer prior to starting work on the pipe culvert repair.

TRAFFIC CONTROL

The roadways will remain open to traffic at all times.

On a 2 lane roadway, one lane of traffic may be closed during work hours, with traffic control being handled with the use of Flaggers as per Standard Plate 634.23. If work can safely be performed from the shoulder of the roadway or beyond the shoulder, traffic control will be as per Standard Plate 634.03.

Flaggers and FLAGGER symbol signs will be in place when work activities or equipment present a hazard to workers, through traffic, or encroaches into driving lanes open to traffic.

Traffic control devices will be placed beyond the surfaced edge of the roadway when not in use.

Removing, relocating, covering, salvaging and resetting of existing traffic control devices, including delineation, will be the responsibility of the Contractor. Cost of this work will be incidental to the various contract items unless otherwise specified in the plans. Delineators and signs damaged or lost will be replaced by the Contractor at no cost to the State.

Work activities during non-daylight hours are subject to prior approval.

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.

The bottom of signs on portable or temporary supports will not be less than seven feet above the pavement in urban areas and one foot above the pavement in rural areas. Portable sign supports may be used as long as the duration is less than 3 days. If the duration is more than 3 days the signs will be on fixed location, ground mounted, breakaway supports.

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.

All fixed location signs, sign posts, and breakaway bases will be removed within 7 calendar days following pavement marking.

Traffic will be maintained on the driving lanes. Use of the shoulder as a driving lane will not be permitted. Any damage to the shoulder due to rerouted traffic or Contractor's equipment will be repaired at no expense to the Department.

The Contractor will accommodate vehicles up to 16 feet wide through the work area at all times.

TRAFFIC CONTROL SIGNS

Sufficient traffic control devices have been included in these plans to sign two workspaces as per Standard Plate 634.03 and two workspaces as per Standard Plate 634.23.

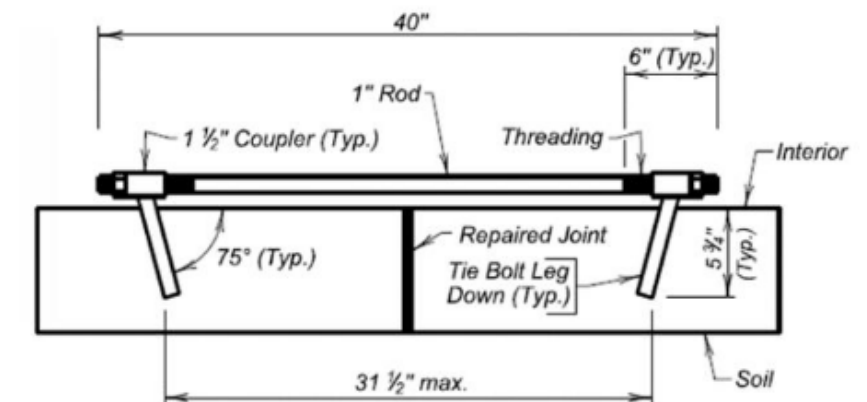
FLAGGING

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

TIE BOLTS FOR REINFORCED CONCRETE BOX CULVERT

Joints for the concrete box culverts, as listed in the Table of Mainline Pipe Culvert Repairs will have tie bolts installed on the inside of the culvert. The Contractor will drill holes at an angle as to cause the legs of the tie bolt to bind against the outside face of the hole upon tie bolt tightening. Bending of the tie bolt legs may need to be done in order to achieve this. Prior to inserting the tie bolt the Contractor will fill the hole with epoxy resin. The epoxy resin mixture will be of a type for bonding steel to hardened concrete and will conform to AASHTO M235 Type IV, (Equivalent to ASTM C881, Type IV). The Contractor will allow the resin to properly set-up prior to the final tightening of the tie bolts.

Cost for drilling tie bolt holes, epoxy resin, connections, and furnishing and installing the tie bolts for reinforced concrete pipe and cattle pass will be incidental to the contract unit price per each for TIE BOLTS FOR RCP.



REINFORCED CONCRETE PIPE JOINT REPAIR AND VOID GROUTING

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	085-471 079-471	5	8

REINFORCED CONCRETE PIPE JOINT REPAIR AND VOID GROUTING

The Contractor will provide a notarized statement, from the Manufacturer, that the products used for culvert joint repair meet the specified requirements, along with the Manufacturer's current product specification and installation instructions.

The Contractor will be an Approved Contractor of the Manufacturer of the specified product and will provide written certification from the Manufacturer attesting to their Approved Contractor status.

All product documentation and Contractor submittals must be submitted to the Engineer prior to or at the preconstruction conference. The Contractor must have the Engineer's approval prior to commencing any of this work.

The Contractor will follow the Manufacturer's installation instructions and specifications throughout the repair process

Temperature of the specified products is critical from the point of pumping to the point of injection. All polyurethanes react faster at higher temperatures. Drum heaters and heated hoses are required when ambient or ground temperatures are below 70 degrees Fahrenheit. The optimum hose temperature will vary with the weather conditions and the particular job site conditions with the minimum hose temperature being 75 degrees Fahrenheit and the maximum hose temperature being 95 degrees Fahrenheit and the drum temperature not to exceed 90 degrees Fahrenheit.

The Contractor will provide worker and inspector safety protective gear in accordance with the manufacturer, including but not limited to chemical goggles, face shields, eye wash system and NBR gloves.

The Contractor will provide safe storage and handling of materials prior to delivery and at the project site. All material installation, handling and storage will be in accordance with the Manufacturer's recommendations.

The Contractor will visit the project to determine the extent of culvert joints to be cleaned and filled, prior to bidding.

Culvert Joint Cleaning and Repair Culvert Joint quantities will be based upon the following table showing circumference of joints based upon culvert size and shape.

Pipe Diameter	Round Pipe Circumference per Joint	Arch Pipe Circumference per Joint
(In)	(Ft)	(Ft)
36	9.4	
42	11.0	11.0
48	12.6	
54	14.1	
60	15.7	
66	17.3	
72	18.8	19.0
78	20.4	
84	22.0	

CULVERT JOINT CLEANING

This work will consist of cleaning of the culvert joints, washing the entire culvert and joints with a high-pressure washer, and if needed, wire brush cleaning of each joint to be repaired as directed by the Engineer. The entire culvert will be clean and dry and most notably the specified joints will be thoroughly cleaned to the satisfaction of the Engineer using a power washer with water pressure of at least 2500 psi. The culvert must be in a clean condition so that no deleterious material is trapped in the joints that are being repaired. The Contractor will dispose of all debris removed from the culverts during the cleaning operation as approved by the Engineer.

All costs for equipment, material and labor for the culvert joint cleaning work will be incidental to the contract unit price per foot for Culvert Joint Cleaning. Culvert Pipe Cleaning will be measured to the nearest 0.1 foot of joint which is cleaned for joint repair.

REPAIR CULVERT JOINT

The culvert joints will be repaired in accordance with the Chemical Grout Manufacturer's directions to prevent future infiltration/exfiltration of soils and water and to keep the chemical grout from expanding back into the structure during injection.

The culvert joint will be repaired with a sealant comprised of water reactive hydrophilic polyurethane resin and dry oil free oakum. All grout will be injected under such pressure so as not to damage the existing drainage structure or roadway structure.

The Contractor will submit to the Engineer for approval a detailed procedure for the installation of the polyurethane grout.

The work will include, but is not limited to sealing each pipe joint with a hydrophilic polyurethane grout meeting the following specifications:

GEL FOAM II (Saturated Oakum Rope Joint Packing) as manufactured by Green Mountain International, LLC or equal.

ULTRA (Single Component Grout for Joint Injection) as manufactured by Green Mountain International, LLC or equal.

Excess grout and oakum will be trimmed from the interior face of the joint prior to applying the UV Protection (Gel Coat). The epoxy gel coat compound will be as recommended by the Manufacturer for both surface sealing and protecting the hydrophilic grout from UV exposure. The epoxy gel compound will be mixed and handled in accordance with the Manufacturer's recommendations and will meet the following requirements:

Epoxy gel sealant compounds manufactured by Green Mountain Grouts, LLC or equal.

All costs for all equipment, material and labor required to complete the work will be incidental to the contract unit price per foot for Repair Culvert Joint. Completion of the work includes initial saturated oakum rope packing of each joint, follow up injection of grout into the back side of each joint, trimming the excess grout and oakum from the interior face of the joint, application of the epoxy gel coat and site clean-up. Payment will be made per 0.1 foot of culvert joint repaired.

DUAL COMPONENT CHEMICAL GROUT FOR VOID FILLING

The external voids surrounding the culvert will be filled with an injected high expansion chemical grout compound. Holes will be strategically drilled as required and grout injected throughout the structure to effectively fill all voids that have developed outside of the structure due to the infiltration of external soils and materials into the culvert and "piping" (water running outside and under the structure due to separated joints). It is the Contractor's responsibility to locate reinforcing bars and conduit prior to drilling any grout holes. All grout will be injected under such pressure so as not to damage the existing drainage structure or roadway structure. All joints will be appropriately cleaned and sealed, with appropriate recommended cure time, prior to the injection of the void grouting. After completion of the void filling, all holes will be properly sealed.

The typical method consists of placing a layer of chemical grout behind or around the structure. The Contractor will submit for approval by the Engineer a detailed grouting plan showing the spacing, orientation and depth of the grout holes, as well as type of polyurethane grout to be used, range of gel times, equipment, mixing procedures, recommended injection pressure, technique for monitoring grout travel and any other pertinent information. The grouting plan should address the prevention of overfilling and prevention of damage to structures or roadway. The Contractor will submit this detailed procedure for the installation of the expansion grout to the Engineer for approval. The holes are drilled with a rotary percussion hammer drill using a sharp masonry bit with a minimum diameter of 3/8 inch to a maximum diameter of 5/8 inch. Care must be taken to prevent holes from causing damage to reinforcing bars or utility conduits. Drilled holes should be vacuumed and flushed. Use injection grout and methods as recommended by Manufacturer.

Injection can be monitored by either applicator's visual inspection or by pumping a specific amount of injection grout into each hole. The work will start at the inlet end of the pipe and proceed downstream to the outlet. Inject bottom row every other hole. When material appears at the adjacent port, discontinue injection at entry port and begin injection at the adjacent port. Continue injection process section by section from bottom of pipe to top of pipe in a continuous manner to next pipe section. Injection pressure will vary from 200 psi to 3000 psi depending on the width of the joint, thickness of the structure, and condition of the concrete.

The Contractor must supply the Engineer with three (3) prior job references of projects where they have successfully injected urethane resin for subgrade void filling applications, or soil stabilization.

REINFORCED CONCRETE PIPE JOINT REPAIR AND VOID GROUTING

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	085-471 079-471	6	8

DUAL COMPONENT CHEMICAL GROUT FOR VOID FILLING (CONTINUED)

- In lieu of three (3) prior job references the Contractor will:
- a) Obtain hands on training from the supplier on the installation procedures,
and
 - b) Have the supplier on site to provide training to Contractor's staff. Supplier will be present for at least two complete pipe culvert repairs and until the Engineer is satisfied that Contractor's staff is competent in performing this work.

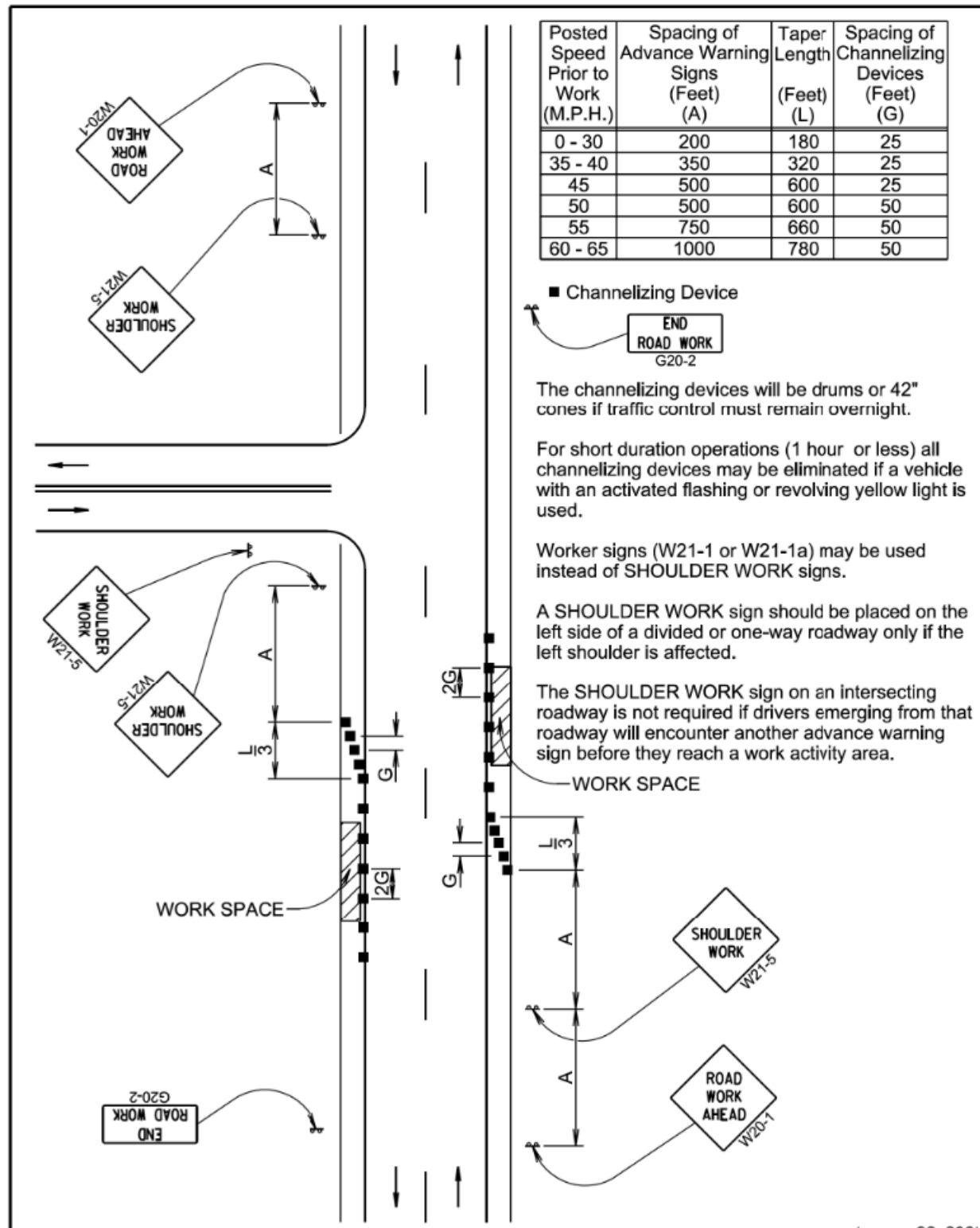
The chemical grout will be a dual component hydrophobic polyurethane grout compound which is non-flammable and non-toxic when cured.

The chemical grout mixture will have expansion properties listed in the data sheets of greater than eighteen (18) times its original volume and cure to rigid closed cell polyurethane foam. The grout will expand to fill any voids and must bond to the exterior surface of the structure. The chemical grout will be Mountain Grout U 4.0 dual component polyurethane grouts as manufactured by Green Mountain International LLC or equal.

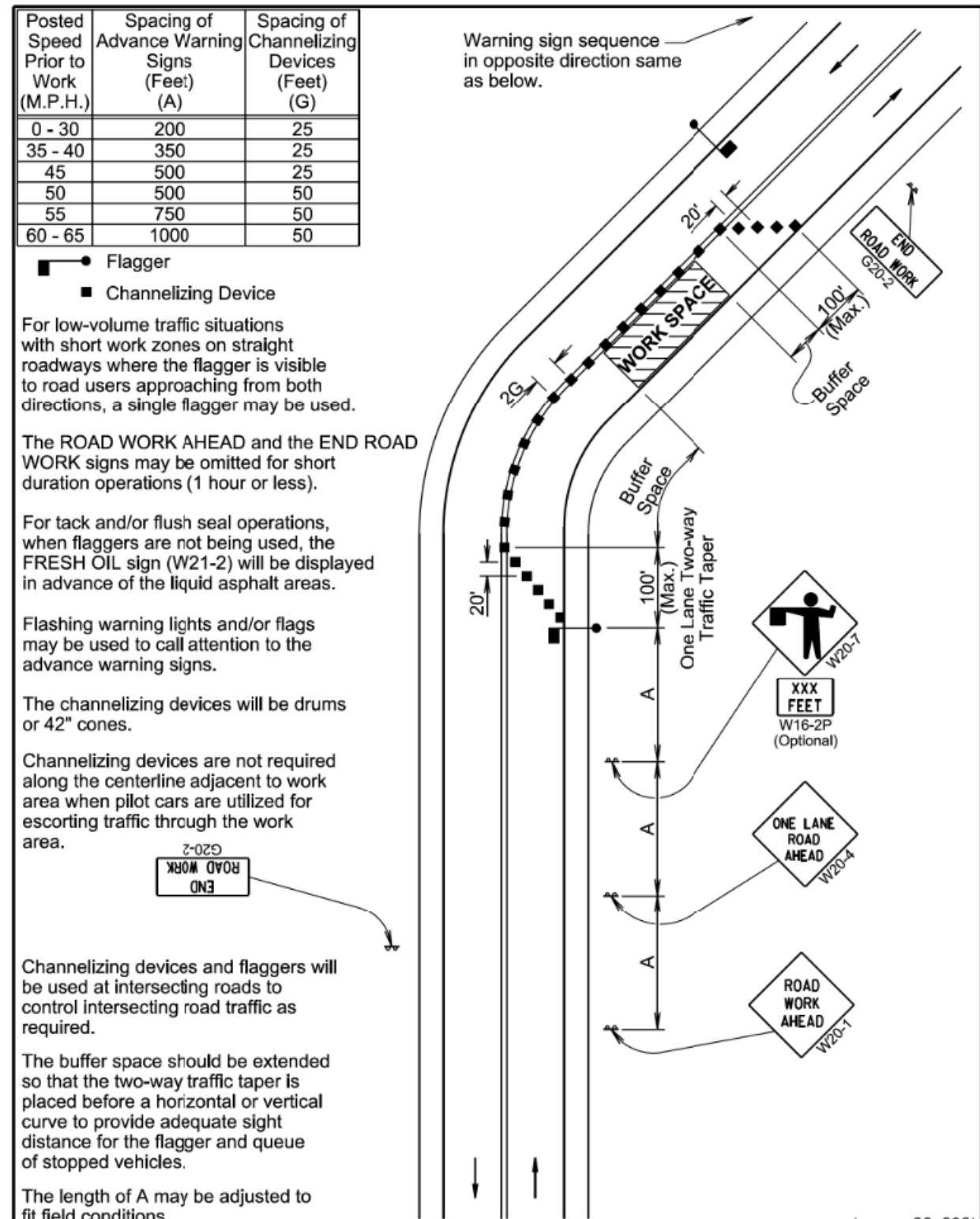
All costs for equipment, material, and labor required to fill external voids surrounding the culvert will be incidental to the contract unit price per gallon for Chemical Grout Void Fill. Any overfilling of voids that results in damage to overlying pavement, highway user ride quality, or drainage structure integrity will be corrected and paid for by the Contractor. All corrections will be approved by the Engineer. Payment will be to the 0.1 gallon of chemical grout used, prior to expansion of the material.

A calibrated metering device will be used to measure the chemical grout and to assure proper mixing ratio of components.

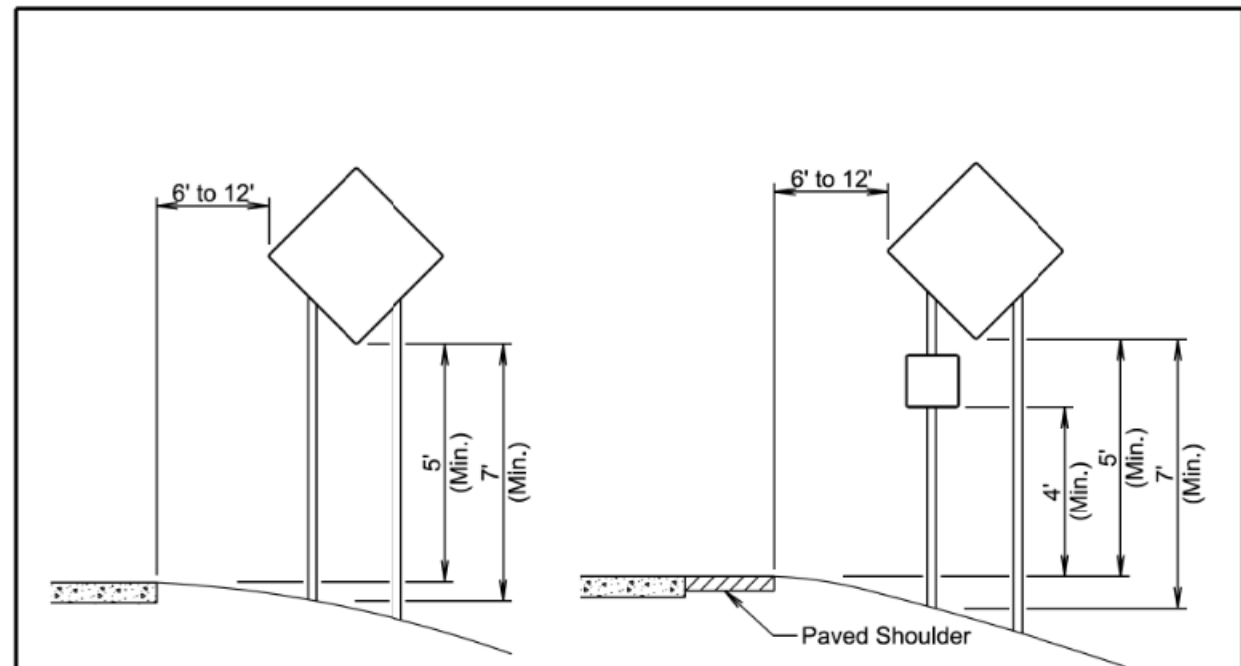
After the grout cures, excess material will be removed flush with the pipe interior wall and the pipe left clean.



January 22, 2021

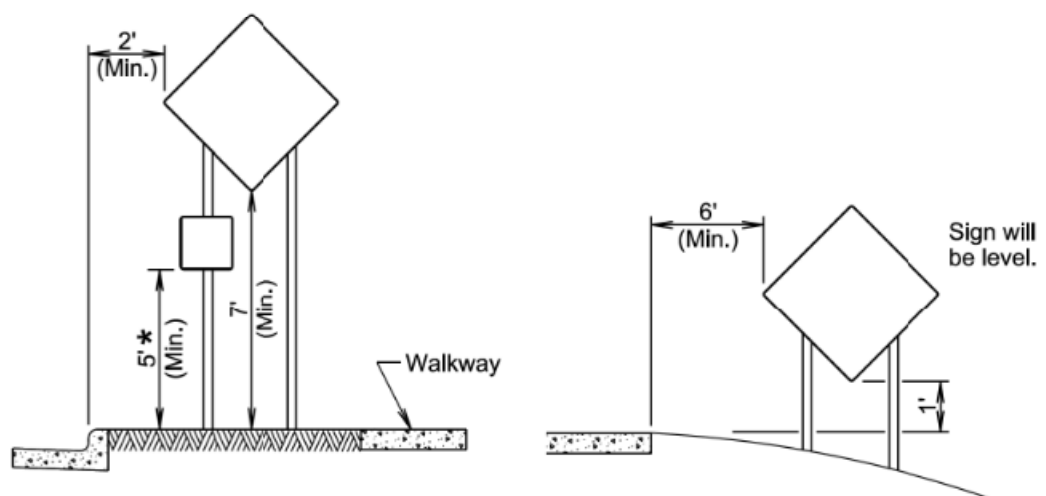


January 22, 2021



RURAL DISTRICT

RURAL DISTRICT WITH SUPPLEMENTAL PLATE



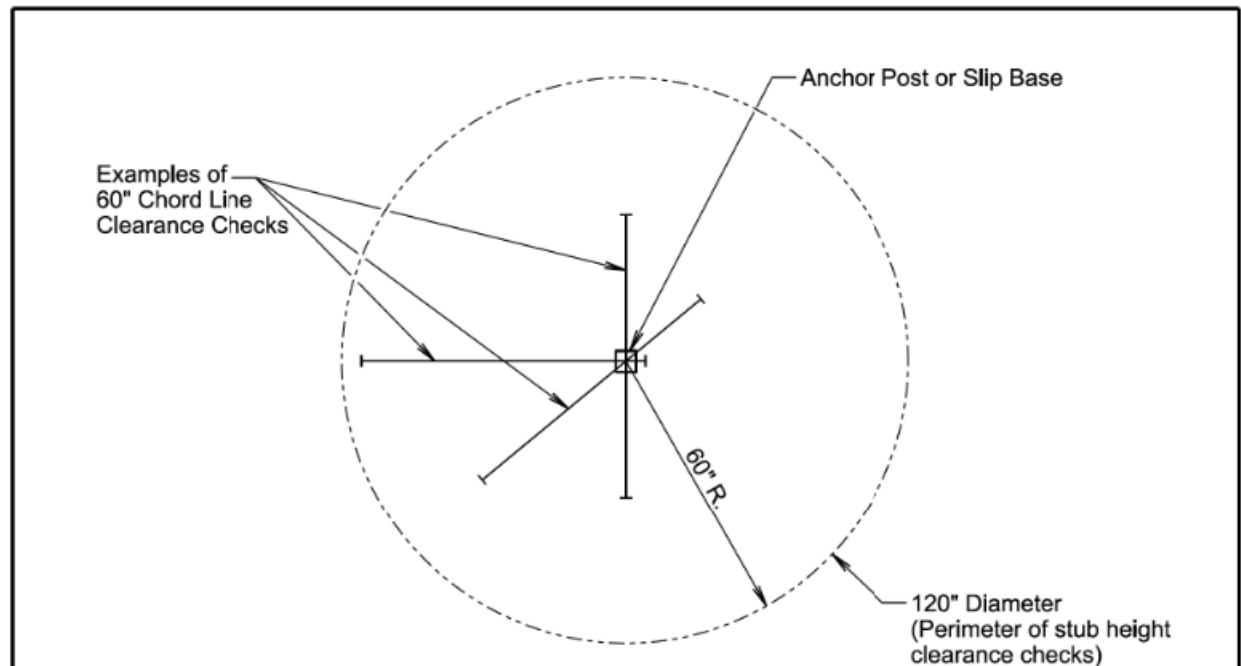
URBAN DISTRICT

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

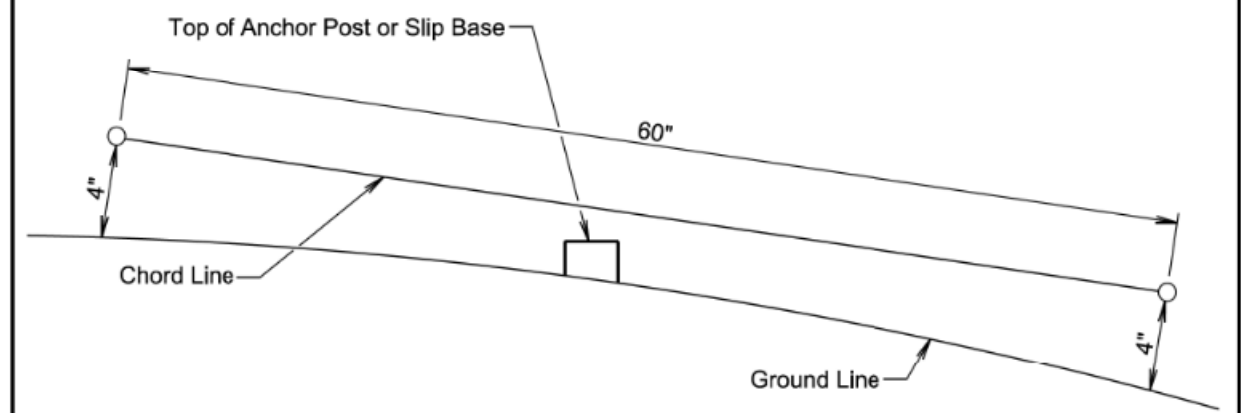
* If the bottom of supplemental plate is mounted lower than 7 feet above a pedestrian walkway, the supplemental plate should not project more than 4" into the pedestrian facility.

January 22, 2021

Published Date: 2nd Qtr. 2022	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 WILL 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 will 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.

January 22, 2021

Published Date: 2nd Qtr. 2022	S D D O T	BREAKAWAY SUPPORT STUB CLEARANCE	PLATE NUMBER 634.99
			Sheet 1 of 1