STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B1	B71

REV DATE:
INITIAL:

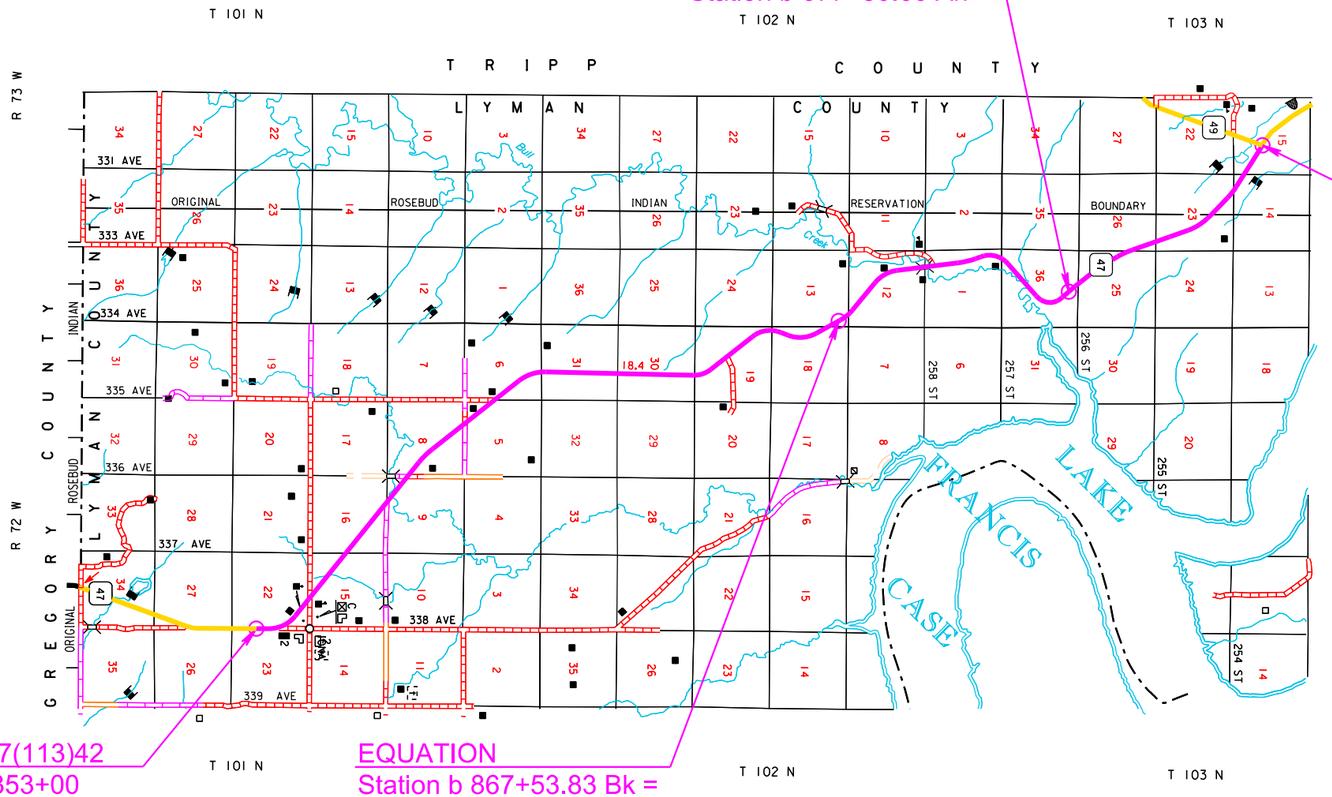
FOR BIDDING PURPOSES ONLY

SECTION B: GRADING PLANS

INDEX OF SHEETS

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

EQUATION
Station 677+72.41 Bk =
Station b 677+80.60 Ah



BEGIN P 0047(113)42
Station 505+75
Located 1,944.57' North and 2,019.34' West of the southeast corner of Section 15 - Township 103 North - Range 73 West of the 5th PM
MRM 58.00 + 0.039

END P 0047(113)42
Station c 1353+00
Located 1,482.63' North and 3' West of the southeast corner of Section 22 - Township 101 North - Range 72 West of the 5th PM
MRM 41.00 + 0.996

EQUATION
Station b 867+53.83 Bk =
Station c 865+98.20 Ah

Plotting Date:

File - ...\B01_Section B_Title Sheet.dgn

REV DATE: 2024-12-03
INITIAL: BCS

FOR BIDDING PURPOSES ONLY

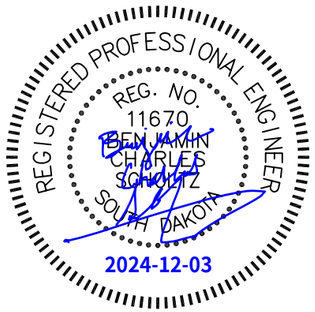
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B2	B71

SECTION B ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
004E0030	Maintenance of Traffic Diversion(s)	Lump Sum	LS
004E0050	Remove Traffic Diversion(s)	Lump Sum	LS
009E0010	Mobilization	Lump Sum	LS
009E3200	Construction Staking	Lump Sum	LS
009E3301	Engineer Directed Surveying/Staking	40.0	Hour
009E4200	Construction Schedule, Category II	Lump Sum	LS
100E0100	Clearing	Lump Sum	LS
110E0500	Remove Pipe Culvert	1,070	Ft
110E0510	Remove Pipe End Section	46	Each
110E0600	Remove Fence	2,933	Ft
110E1010	Remove Asphalt Concrete Pavement	3,001.0	SqYd
110E7500	Remove Pipe for Reset	8	Ft
110E7510	Remove Pipe End Section for Reset	4	Each
120E0010	Unclassified Excavation	20,878	CuYd
120E0600	Contractor Furnished Borrow Excavation	13,000	CuYd
120E1000	Muck Excavation	1,000	CuYd
120E2000	Undercutting	742	CuYd
120E4100	Reprofiling Ditch	12.0	Sta
120E6100	Water for Embankment	156.0	MGal
250E0020	Incidental Work, Grading	Lump Sum	LS
260E3010	Gravel Surfacing	877.0	Ton
260E6000	Granular Material, Furnish	351.4	Ton
421E0100	Pipe Culvert Undercut	283	CuYd
430E0700	Precast Concrete Headwall for Drain	1	Each
450E0122	18" RCP Class 2, Furnish	152	Ft
450E0130	18" RCP, Install	152	Ft
450E0142	24" RCP Class 2, Furnish	246	Ft
450E0150	24" RCP, Install	246	Ft
450E0182	36" RCP Class 2, Furnish	16	Ft
450E0190	36" RCP, Install	16	Ft
450E0192	42" RCP Class 2, Furnish	8	Ft
450E0200	42" RCP, Install	8	Ft
450E0242	72" RCP Class 2, Furnish	200	Ft
450E0250	72" RCP, Install	200	Ft
450E2008	18" RCP Flared End, Furnish	25	Each
450E2009	18" RCP Flared End, Install	25	Each
450E2016	24" RCP Flared End, Furnish	3	Each
450E2017	24" RCP Flared End, Install	3	Each
450E2024	30" RCP Flared End, Furnish	4	Each
450E2025	30" RCP Flared End, Install	4	Each
450E2028	36" RCP Flared End, Furnish	2	Each
450E2029	36" RCP Flared End, Install	2	Each
450E2032	42" RCP Flared End, Furnish	1	Each

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
450E2033	42" RCP Flared End, Install	1	Each
450E2052	72" RCP Flared End, Furnish	4	Each
450E2053	72" RCP Flared End, Install	4	Each
450E4520	48" RCP Arch Flared End, Furnish	2	Each
450E4521	48" RCP Arch Flared End, Install	2	Each
450E4699	Tie Bolts for RCP	364	Each
450E4768	24" CMP 14 Gauge, Furnish	66	Ft
450E4770	24" CMP, Install	66	Ft
450E5015	24" CMP Elbow, Furnish	1	Each
450E5016	24" CMP Elbow, Install	1	Each
450E5211	18" CMP Flared End, Furnish	1	Each
450E5212	18" CMP Flared End, Install	1	Each
450E5215	24" CMP Flared End, Furnish	3	Each
450E5216	24" CMP Flared End, Install	3	Each
450E5219	30" CMP Flared End, Furnish	2	Each
450E5220	30" CMP Flared End, Install	2	Each
450E7624	24" Steel Pipe, Furnish	212	Ft
450E7630	30" Steel Pipe, Furnish	192	Ft
450E8014	24" RCP to CMP Transition, Furnish	1	Each
450E8015	24" Pipe Transition, Install	1	Each
450E8300	Culvert Joint Cleaning	3,588.0	Ft
450E8305	Repair Culvert Joint	3,588.0	Ft
450E8310	Chemical Grout Void Fill	935.0	Gal
* 450E8900	Cleanout Pipe Culvert	10	Each
450E9000	Reset Pipe	8	Ft
450E9001	Reset Pipe End Section	4	Each
451E5124	Bore and Jack 24" Pipe	212	Ft
451E5130	Bore and Jack 30" Pipe	192	Ft
462E0250	Cellular Grout	35.9	CuYd
464E0100	Controlled Density Fill	58.0	CuYd
600E0300	Type III Field Laboratory	1	Each
620E0020	Type 2 Right-of-Way Fence	2,745	Ft
620E0515	Type 1A Temporary Fence	2,238	Ft
620E0520	Type 2 Temporary Fence	102	Ft
620E1020	2 Post Panel	35	Each
632E2510	Type 2 Object Marker Back to Back	66	Each
680E0204	4" Perforated PVC Drain Pipe with Sleeve	40	Ft
680E0224	4" PVC Outlet Pipe	10	Ft
680E2500	Porous Backfill	13.0	Ton
700E0210	Class B Riprap	1,615.5	Ton
720E1010	PVC Coated Bank and Channel Protection Gabion	15.0	CuYd
831E0110	Type B Drainage Fabric	7,929	SqYd
831E0300	Reinforcement Fabric (MSE)	461	SqYd

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
831E0400	Impermeable Plastic Membrane	20	SqYd
831E1010	Geogrid Reinforcement	1,150	SqYd
900E1080	Orange Plastic Safety Fence	800	Ft



* Denotes Non-Participating

GRADING OPERATIONS

For embankment soil with an optimum moisture of 20% or greater, the Density Specifications (Percent of Maximum Dry Density) will be 92% to 98% and the Moisture Specification (Percent of Optimum Moisture) will be -2% to +3%.

Estimated application rate of water for compaction is 15 gallon per cubic yard of embankment.

Shrinkage: Embankment +20%

Generally, all shallow inlet and outlet ditches as noted on the plan sheets will be cut with a 10-foot wide bottom with 5:1 backslopes. However, the Engineer may direct the Contractor to adjust the ditch width for proper alignment with the drainage structure.

Temporary fence and/or permanent fence will be placed ahead of the grading operation unless otherwise directed by the Engineer.

TYPE III FIELD LABORATORY

The lab will be equipped with an internet connection such as DSL, cable modem, or other approved service. The internet connection will be provided with a multi-port wireless router. The internet connection will be a minimum speed of 5 Mbps unless limited by job location and approved by the DOT. Prior to installing the wireless router, the Contractor will submit the wireless router's technical data to the Area Office to check for compatibility with the state's computer equipment. The internet connection is intended for state personnel usage only. The Contractor's personnel are prohibited from using the internet connection unless pre-approved by the Project Engineer. These items will be incidental to the contract unit price per each for "Type III Field Laboratory".

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 Engineer to determine modifications that will be necessary to avoid utility impacts.

WORK LIMITS

Due to land-use restrictions with State and Federal Agencies, no easements beyond the existing Right-of-Way were obtained for the Box Culvert installation at STA b712+62.

All work needed to complete the installation of the box culvert must be performed within the existing State Highway right-of-way. The Contractor will be allowed to stage materials, equipment, and personnel within the closed section of roadway when performing work at this site.

A quantity of 800 feet of Orange Plastic Safety Fence has been included in the plans for the Contractor to install along the existing Right-of-Way boundary at this project site to define the Work Limits.

Upon completion of work at this site, all materials and equipment must be removed from the closed section of the highway right-of-way prior to opening to traffic, as approved by the Engineer.

TABLE OF FULL-DEPTH ASPHALT CONCRETE PAVEMENT REMOVAL

From (STA)	To (STA)	Quantity (SqYd)	Purpose
583+45	584+50	384	Pipe Culvert Replacement
b712+40	b713+20	287	Box Culvert Installation
b788+20	b788+96	200	Bridge Approach Thickened Surfacing
b791+04	b791+79	200	
b821+80	b823+02	430	Pipe Culvert Replacement
b838+15	b839+65	586	Base Course Reinforcement
b839+74	b839+76	8	Cutoff Drain
c997+80	c999+08	471	Pipe Culvert Replacement
c1121+36	c1122+52	435	Box Culvert Installation
	TOTAL	**3,001**	

Sawcutting of any asphalt surfacing for the excavation and removal of existing pipe culverts and roadway subgrade stabilization will be incidental to the various contract items pertaining to these excavations.

TRAFFIC DIVERSION

The traffic diversion is located at Sta c1122+54±. The traffic diversion will be constructed according to Section 4.5 A of the Specifications. Installation and removal of the traffic diversion will meet all requirements as set forth in the South Dakota Surface Water Quality Standards.

The traffic diversion located at Station c1122+54± will be constructed according to the geometric layouts shown in the plans with the temporary drainage structure provided in the following table. The temporary structure sizes are designed to pass the design flood frequency flows without overtopping the traffic diversion grade, to minimize potential upstream flooding, and are sized to meet FEMA (Federal Emergency Management Agency) requirements where applicable. The structure will be placed at the flowline elevation and location as stated in the "Table of Temporary Drainage Structures in Traffic Diversions". If the Contractor proposes to use a different size drainage structure and/or a different geometric layout for the temporary diversion, the proposal must be submitted to the Engineer during the project preconstruction meeting. This information will be forwarded to the DOT Hydraulics Office for review. Construction of the traffic diversion will not be allowed until approval of the proposal is obtained from the Hydraulics Office.

Table of Temporary Drainage Structures in Traffic Diversions

Detour Option	Traffic Diversion Crossing	Design Flood $Q_{2\text{-YR}}$ (cfs)	Inlet Flowline Elev. (ft)	Diversion Crossing Slope (ft/ft)	Diversion Overflow Elev. (ft)	$HW_{2\text{-YR}}$ Elev. (ft)	$HW_{100\text{-YR}}$ Elev. (ft)
1	1-60" CMP	33	1736.14	0.0044	1752.3	1738.8	1753.2
2	2-42" CMP	33	1736.14	0.0044	1752.3	1738.5	1753.3
Existing	----------	-----	----------	----------	----------	1737.9	1740.8

* The flowline elevation is at the inlet of the traffic diversion.

Costs to provide temporary drainage structures will be incidental to the contract lump sum price for "Maintenance of Traffic Diversion".

Traffic diversions in waterways will be constructed such that any material placed below the ordinary high water elevation will conform to the requirements of class B riprap. Type B drainage fabric will be placed under the riprap and under any diversion embankment that is placed in a wetland as shown in the construction plans. Type B drainage fabric will also be placed underneath riprap on slope for filtration and above riprap. A portion or all of the quantity of riprap used in the traffic diversion is included in the quantity for "Class B Riprap" as shown in the Section E-Structures estimate of quantities. If the quantity of riprap for the permanent installation at the structure is less than the quantity needed at the traffic diversion, then the additional quantity of riprap is included in the quantity for "Class B Riprap" in the Section B-Grading estimate of quantities. At the Contractor's discretion, the riprap used for the traffic diversion may be reused as riprap for the structure and all costs incurred to place and remove the riprap at the traffic diversion and subsequently place the riprap at the structure will be incidental to the contract unit price per ton for "Class B Riprap". If the Contractor elects not to reuse the riprap from the traffic diversion or if there is surplus riprap after the traffic diversion riprap is reused, the Contractor can retain ownership of the riprap or waste the riprap at a site as approved by the Project Engineer. The traffic diversions will be built in close conformity to the plan gradeline. Unless otherwise shown in the plans, the traffic diversions will be removed such that the original ground surface contours and elevations are restored and the hydraulic capacity of the waterway is maintained. The removal will be done in such a manner that there is minimal disturbance to the channel bed.

The removed traffic diversion embankment will be used in the mainline embankment unless otherwise approved by the Engineer.

Traffic Diversion Excavation as shown on the plans profile sheets is the excavation required to construct the traffic diversion portion that is located inside the mainline cross section work limits. The Traffic Diversion Excavation quantity is included in the mainline excavation quantity in the Table of Excavation Quantities by Balances and in the Table of Unclassified Excavation.

Traffic Diversion Borrow, as shown on the plans profile sheets, is obtained from the mainline excavation from outside of the traffic diversion cross section work limits. The Traffic Diversion Borrow quantity is included in the mainline excavation quantity in the Table of Excavation Quantities by Balances and in the Table of Unclassified Excavation.

Added Traffic Diversion Excavation as shown on the plans profile sheets is the excavation required to construct the traffic diversion portion that is located outside the mainline cross section work limits. The Added Traffic Diversion Excavation quantity is added to the unclassified excavation quantity in the Table of Unclassified Excavation.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-11-01

TABLE OF TRAFFIC DIVERSION RIPRAP AND DRAINAGE FABRIC

Station	L/R	Ordinary High Water Elevation	Traffic Diversion Riprip (Ton)	Section E Class B Riprap (Ton)	Section B Class B Riprap (Ton)	Type B Drainage Fabric (SqYd)
c1122+66	L	1739.0'	1615.5	47.1	1568.4	7880
	Totals	1739.0'	1615.5	47.1	1568.4	7880

UNCLASSIFIED EXCAVATION

Plan quantities will be the basis of payment for Unclassified Excavation.

Excavation required to complete pipe culvert repairs, box culvert replacements, base course reinforcement, cutoff drain, and approach work at Str. No. 43-422-370, including surfacing removal will be paid for at the contract unit price per cubic yard for Unclassified Excavation.

TABLE OF UNCLASSIFIED EXCAVATION

	(CuYd)
Exc. for Deep Pipe Removal & RCBC Installation	19,529
Undercutting	742
Added Traffic Diversion Excavation	91
Base Course Reinforcement Excavation	407
Bridge Approach Work Excavation	109
Total	20,878

PROCEDURES FOR DETERMINING UNCLASSIFIED EXCAVATION QUANTITY

When plan quantities are used for payment, the Unclassified Excavation quantity will be used for final payment and the plans quantity of Topsoil and salvaged surfacing items listed in the Table of Unclassified Excavation will not be adjusted according to field measurements.

The following paragraphs are general earthwork information and information in regard to computing the Unclassified Excavation quantity when final cross sections are taken in the field:

Unstable Material Excavation is anticipated at various locations. However, the extents of unstable material are not known. Excavation of unstable material will be classified as Unclassified Excavation or Muck Excavation, as determined by the Engineer. When finaling a project, the Unstable Material Excavation quantity will be added to the associated Excavation quantity to compute both the Unclassified Excavation and Muck Excavation quantity.

The Excavation quantities from individual balances and the Table of Unclassified Excavation have been reduced by the volume of in place surfacing that will be removed and/or salvaged.

FULL DEPTH ROADWAY EXCAVATIONS

Asphalt concrete pavement identified for removal in locations for full-depth excavation (such as box culvert replacements, open-cut pipe culvert replacements, and base course reinforcement locations, etc.) will not be salvaged and will become property of the Contractor for disposal at a suitable location in accordance with Environmental Commitment H and Section 110 of the Standard Specifications. All costs for equipment, material and labor necessary to remove and dispose of the asphalt surfacing will be incidental to the contract unit price per square yard for “Remove Asphalt Concrete Pavement”.

Existing aggregate base course remaining beneath the asphalt roadway surfacing will be excavated in conjunction with the remaining trench excavation work. Excavation of this base course material is accounted for with the Unclassified Excavation quantities above. The base course may be salvaged and utilized for re-establishment of the roadway subgrade in accordance with Section 120 of the Standard Specifications.

BASE COURSE REINFORCEMENT

Mainline has been distorted by inslope slumping around SD47 Station 838+50 (MRM 51.75). This work must be completed prior to beginning cold milling on the project.

The Contractor must correct the mainline profile by removing the existing surfacing and reconstructing the subgrade from Station 838+15 to Station 839+65. After the asphalt, base course, and excess subgrade soil have been removed, the Contractor must undercut the subgrade 2.5 feet. The undercut will be tapered at 4:1 at each end of the excavation resulting in a full depth excavation from Station 838+35 to Station 839+45. The Contractor must reconstruct the subgrade and replace the surfacing section in accordance with the applicable typical section. Removal of the existing roadway surfacing and base material will be paid for at the contract unit per cubic yard for “Unclassified Excavation”. Excavation, replacement, and compaction of the additional undercut, as specified above, will be paid for at the contract unit price per cubic yard for “Undercutting”. An estimated quantity of 742 Cubic Yards is included in the plans for “undercutting” at this location.

The new base course portion of the surfacing section will be reinforced with geogrid from Station 838+15 to Station 839+65. After the subgrade has been rebuilt to grade, 4 inches of base course will be placed and compacted in preparation for geogrid replacement. Placement of biaxial geogrid will be followed by 12 inches of base course then placement of an additional layer of biaxial geogrid will be followed by the remaining 8 inches of base course. Install base course and geogrid according to the Installation Procedure.

BASE COURSE REINFORCEMENT (continued)

Installation Procedure

1. Level and compact the first lift of granular material.
2. Remove any protrusions that might damage the geogrid prior to placing the geogrid.
3. The geogrid can be rolled out parallel to the centerline. The geogrid may be cut and realigned to prevent the propagation of wrinkles as the geogrid is unrolled.
4. All seams in the geogrid will be overlapped at least 2 feet and shingled as to prevent granular material being forced between the geogrid layers.
5. No equipment will be allowed on the geogrid. The geogrid must be backfilled with a minimum of 4 inches of granular material before equipment will be allowed to operate over the grid reinforced area.
6. The geogrid should be kept as taut as possible prior to backfilling.
7. Damaged areas may be repaired by placing additional geogrid over the damaged area. The geogrid patch will cover the damaged area plus 2 feet minimum in all directions as directed by the Engineer.
8. Granular material will be dumped at least 20 feet behind the leading edge of the fill and pushed into place with a loader or dozer.
9. Granular material will be placed in 4-inch max lifts and compacted per the Specified Density Method.

Geogrid Specification:

The geogrid will be a biaxial grid of single layer construction. Vibratory welded, integrally formed, or woven and coated geogrids will be acceptable. Grids with laser welded grid junctions will be allowed. The geogrid will be certified by the supplier to meet the following specifications prior to installation:

Property	Test	MARV
Wide Width Strip Tensile Stength (Ultimate)	ASTM D6637	850 lb/ft MD and XD

Approximately 1,150 square yards (150’x30’x2’) of Geogrid will be required. Geogrid will be paid for at the contract unit price per square yard. Payment quantities will be based on area covered plus 15%. Overlaps are accounted for by the additional 15%. Payment will be full compensation for furnishing and installing the geogrid only.

MUCK EXCAVATION

Muck Excavation may be required for this project. The Engineer will determine which locations will require muck excavation in accordance with Section 120 of the Specifications.

A quantity of 1,000 cubic yards of muck excavation is included in the estimate of quantities for use where it is determined to be needed as the Engineer determines, in accordance with Section 120.3 A.1 of the Specifications. The quantity will be adjusted or eliminated by construction change order, depending on field conditions.

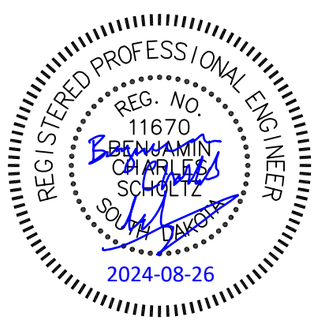
Muck excavation consists of the removal of highly organic and/or highly saturated material from the designated areas shown on the cross sections. Highly organic muck material will not be used in the embankment but may be used as topsoil. Non-organic muck material may be used as embankment outside of the fill subgrade shoulder if it is properly handled and dried prior to placement in the embankment.

CONTRACTOR FURNISHED BORROW EXCAVATION

The Contractor will provide a suitable site for Contractor furnished borrow excavation material. The Contractor is responsible for obtaining all required permits and clearances for the borrow site. The borrow material will be approved by the Engineer. The plans quantity for “Contractor Furnished Borrow Excavation” as shown in the Estimate of Quantities will be the basis of payment for this item.

Contractor Furnished Borrow is identified for placement for temporary embankment for the Highway Diversion near STA c1122+00.

Restoration of the Contractor furnished borrow excavation site will be the responsibility of the Contractor.



REPROFILING DITCH

Reprofiling ditches will consist of minor grading to establish positive drainage toward and away from culvert pipes within the right-of-way and temporary easements.

All work necessary to reshape ditches and drainage channels to support positive drainage toward and away from pipe culverts including labor, equipment, and incidentals will be incidental to the contract unit price per Station for “Reprofiling Ditch”.

Any waste material resulting from the reprofiling of ditches may be utilized for the restoration of embankments or topsoil replacement as approved by the Engineer.

TABLE OF REPROFILING DITCH

Station	L/R	Quantity (Ft)	Quantity (Sta)
741+54	R	100	1.00
745+67	L	100	1.00
	R	100	1.00
808+65	L	100	1.00
	R	100	1.00
1113+63	R	50	0.50
1240+32	L	150	1.50
1311+81	L	50	0.50
	R	50	0.50
1312+25	L	200	2.00
	R	200	2.00
	Total:	1,200	12.00

EXCAVATION FOR DEEP PIPE AND BOX CULVERT REMOVAL

Included in the quantity of “Unclassified Excavation” are 21,321 cubic yards of excavation for removal of deep pipes and installation of reinforced box culverts. Deep pipes and box culverts are existing mainline pipes or box culverts at depths of 10 feet or greater (measured from the flow line to the lowest elevation of either the existing ground line, undercut line, or bottom of removed or salvaged surfacing).

All work necessary to excavate and backfill the deep pipes and box culverts including labor, equipment, and incidentals will be incidental to the contract unit price per cubic yard for “Unclassified Excavation”. Payment for deep pipe and box culvert excavation will be based only on plans quantity and measurement of these excavation quantities during construction will not be performed.

The excavation quantities for deep pipes and box culverts are not included with the earthwork balance quantities on the plans profile sheets. The quantities computed for excavation of the deep pipes and box culverts are based on the limits shown in the drawing below. The drawing shows a box culvert for illustration purposes only; the limits are similar for a pipe.

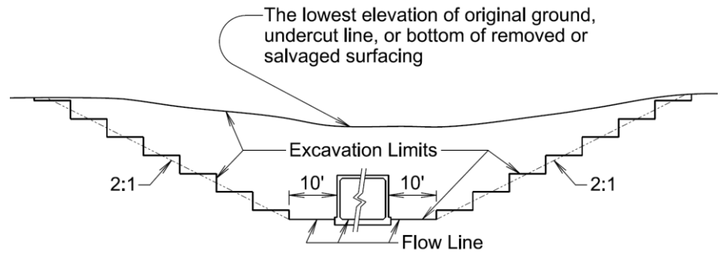


TABLE OF EXCAVATION FOR DEEP PIPE AND BOX CULVERT REMOVAL

Station	Type	Quantity (CuYd)
583+92	24” RCP	2,578
712+80	13’X8’ RCBC	1,792
822+44	72” RCP (Dual)	4,311
998+44	24” RCP & 24” CMP	8,308
1121+94	9’X9 RCBC	4,332
	Total:	21,321

* The excavation quantity includes excavation for the installation of the new RCBCS at Stations 712+80 & 1121+94.

PIPE CULVERT UNDERCUT

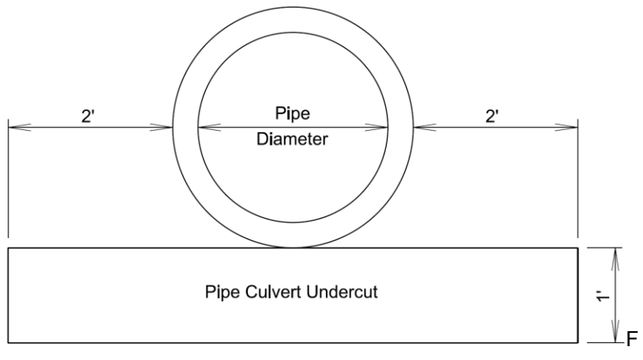
The table includes undercut for 36 inch and larger pipe culverts. The depth of undercut is an estimate and the actual depth necessary will be determined during construction. Pipes listed may or may not require undercutting and pipes not listed may require undercutting. The Engineer will determine which pipe will be undercut in accordance with Section 421 of the Specifications.

Station	Undercut Depth (Ft)	Pipe Culvert Undercut (CuYd)
822+46 (Dual)	2	192.8
1100+00	1	4.6
1264+28	1	5.0
	Total:	202.4

Granular material may be required for backfilling the pipe culvert undercut areas where site conditions warrant. Granular material will conform to the gradation requirements in Section 421.2.A of the Specifications and will be paid for at the contract unit price per ton for “Granular Material”. A quantity of 351.4 tons of granular material is included in the estimate of quantities for use where it is determined to be needed. The quantity will be adjusted or eliminated by construction change order, depending on field conditions.

The table below contains the rate for one-foot depth of pipe culvert undercut per foot of pipe length and should be used as an aid in determining the actual amount of undercut to be performed during construction. The table is derived from the drawing below and conforms to the Specifications. When calculating pipe culvert undercut, the length of pipe ends should be included in the overall pipe length.

Pipe Diameter (In)	Round Pipe Undercut Rate for 1’ Depth (CuYd/Ft)	Arch Pipe Undercut Rate for 1’ Depth (CuYd/Ft)
24	0.2407	0.2577
30	0.2623	0.2847
36	0.2840	0.3110
42	0.3056	0.3337
48	0.3272	0.3596
54	0.3488	0.3827
60	0.3704	0.4105
66	0.3920	---
72	0.4136	0.4630
78	0.4352	---
84	0.4568	0.5123
90	0.4784	---



PIPE EXTENSIONS

For pipe extensions that are outside the new surface shoulder as shown in the typical sections, acceptance tests in the lower one-half and upper one-half of pipe 48” or less in diameter may be performed by visual inspection to the satisfaction of the Engineer. All other MSTR pipe density testing requirements will apply.

INCIDENTAL WORK, GRADING

The Contractor will ensure excess in place granular material is removed at locations (end of project, bridges, intersecting roads and entrances) to achieve the required elevation for the placement of the asphalt concrete. Payment for the removal of excess in place granular material will be incidental to the contract lump sum price for “Incidental Work, Grading”.

Removal of all pipe culvert segments and end sections will be incidental to the contract lump sum price for “Incidental Work, Grading”.

Removal of miscellaneous debris consisting of large pieces of concrete and wood placed for erosion control at STA 808+65, Rt will be incidental to the contract lump sum price for “Incidental Work, Grading” These materials will not be salvaged and will become property of the Contractor for disposal at a suitable location in accordance with Environmental Commitment H and Section 110 of the Standard Specifications.

CUTOFF DRAIN – STA, 839+75

A cutoff drain will be installed in conjunction with the proposed grading and resurfacing. The cutoff drain will be installed perpendicular to centerline across both lanes at Station 839+75.

The cutoff drain will be installed after the reinforced base course section is constructed and prior to cold milling on the project. The cutoff drain will be installed in a trench 2 feet wide by 3 feet deep. The trench will be graded to maintain a minimum of .01 ft/ft or 1% drop to the outlet headwall. Once the trench is excavated, place Impermeable Plastic Membrane on the trench bottom and against the downgrade side of the trench the entire width of the finished subgrade surface. The membrane will ultimately extend upward through the base course overlying the subgrade. The membrane will be folded, not cut, to fit against the bottom and the downgrade side of the trench. This may be done by rolling out the membrane perpendicular to centerline, folding the membrane into the trench, and cutting off the excess membrane from the top of the trench after backfilling.

After the membrane is placed into the trench, place 4” Perforated PVC Drain Pipe with a filter fabric drain sleeve in the center of the trench bottom. Using SDR solvent weld PVC coupling, connect 4” PVC Outlet Pipe to the end of the Perforated PVC Drain Pipe and place in the center of the unlined trench. The outlet pipe will daylight at a headwall placed above the ditch bottom to provide positive drainage from the outlet and blend into the inslope. The depth of the trench may be adjusted to maintain the minimum grade needed to maintain positive drainage and proper placement of the headwall. Backfill the trench containing the 4” Perforated PVC Drain Pipe with Porous Backfill and 12” of Base Course. The remainder of the trench from the edge of the subgrade top to the headwall will be backfilled with compacted soil.

The 4” diameter Perforated PVC Drain Pipe will be SDR 35 Solvent Weld PVC Pipe conforming to ASTM D3034. The 4” diameter PVC Outlet Pipe will be Schedule 40 PVC conforming to ASTM D1785 designated as PVC 1120, PVC 1220, or PVC 2120. Pipe sections will be connected using a PVC Solvent Cement conforming to ASTM D2564. The Drain Sleeve will conform to ASTM D6707.

It will be the Contractor's responsibility to determine the amount of Pipe, Plastic Membrane, and Porous Backfill required to be installed at the Cutoff Drain. Excavation and asphalt concrete pavement removal required for installation of the cutoff drain will be incidental to the contract unit price per cubic yard for “Unclassified Excavation”. All costs to furnish and install Precast Headwalls, 4” Perforated PVC Drain Pipe with Filter Fabric Drain Sleeve, 4” PVC Outlet Pipe, Impermeable Plastic Membrane and Porous Backfill will be in accordance with the contract unit prices pertaining to the various contract items.

Estimate of Quantities:

Impermeable Plastic Membrane	20 SqYd
4 inch Perforated PVC Drain Pipe w/ Filter Fabric Drain Sleeve	40 Ft
4 inch PVC Outlet Pipe	10 Ft
Porous Backfill	13 Ton
Headwalls (See Standard Plate No. 430.50)	1 Each

Care must be taken to ensure that the drainage tubing is not damaged during construction.

The outlet headwall will be cleared of topsoil, straw, or other debris after seeding operations have been completed. The as-built headwall location will be recorded and submitted to the Engineer. The headwall location will be identified by GPS coordinates and Station and Offset. The headwall location will be cataloged in the Winner Area office for future reference in post-construction maintenance.

Drain locations and depths given are based on the information available to the Geotechnical Engineering Activity. The actual field conditions may require that adjustments be made by the Engineer during construction to provide for sufficient drainage. The Geotechnical Engineering Activity will be available for onsite assistance if necessary.

STR. NO. 43-422-370 BRIDGE APPROACH

The new asphalt concrete section at the bridge approaches will have a depth of 6”. In order to construct the new surfacing flush with the top of the bridge and to provide depth for additional asphalt concrete it will be necessary to remove the existing base course to the limits shown in the plans. A layer of Reinforcement Fabric (MSE) will be placed at the bottom of the cut prior to backfilling with granular material. Removal of existing asphalt at this location, including the existing base course, will be paid for at plan quantity at the contract unit price per cubic yard for “Unclassified Excavation”. Refer to Section F for additional information.

Approximately 250 square yards (75’x26’) of Reinforced Fabric (MSE) will be required. Reinforced Fabric (MSE) will be paid for at the contract unit price per square yard. Payment quantities will be based on area covered plus 15. Overlaps are accounted for by the additional 15%. Payment will be full compensation for furnishing and installing the Reinforced Fabric only.

Any damage to the bridges will be at the Contractor's expense.

Reinforcement Fabric (MSE) Specification:
The fabric will conform to Section 831 of the Specifications. The fabric will be on the Approved Products List for this material or will be certified by the supplier to meet this specification prior to installation.

Fabric will be paid for at the contract unit price per square yard for Reinforcement Fabric (MSE). Payment quantities will be based on area covered plus 15%. Overlaps are accounted for by the additional 15%. Payment will be full compensation for furnishing and installed fabric only. Granular backfill materials will be paid for under a separate bid item.

Installation Procedure:

After removal of all required material, the Engineer will inspect the subgrade. The top of the subgrade will be prepared by smoothing the surface of the subgrade to minimize any ruts, ridges, and depressions. Any rocks or other protrusions will be removed prior to placement of Reinforcement Fabric (MSE).

The fabric will be placed as taut as possible with minimal wrinkles. Placement will be done so that subsequent granular material does not shove, wrinkle, or distort the in-place fabric. The fabric will be overlapped a minimum of 2 feet. The overlaps will be shingled in a manner that assures granular material will not be forced under the fabric during backfill operations.

The fabric may be held in place with small piles of granular material or staples. No traffic or equipment will be allowed on the uncovered fabric.

Granular material will be dumped at least 20 feet behind the leading edge of the backfill and pushed into place with a loader or dozer from the covered areas to the uncovered areas. Granular material will be placed in 4” max lifts and compacted by the Specified Density Method.

CORRUGATED METAL PIPE (STATION 998+44)

Corrugated metal pipes will have 2 ⅔-inch x ½-inch corrugations for 42-inch and smaller round pipe and 48-inch and smaller arch pipe unless otherwise stated in the plans. Corrugated metal pipes will have 3-inch x 1-inch or 5-inch x 1-inch corrugations for 48-inch and larger round pipe and 54-inch and larger arch pipe unless otherwise stated in the plans.

Areas within the project have soils that are highly corrosive to steel. The corrugated metal pipe downspout at 998+44 will be polymer coated 14 gauge steel as specified in the Table of Pipe Quantities. Any required connection bands, elbows, tees, crosses, wyes, reducers, and transitions will also be polymer coated. The connection bands will be 24 inches wide. All polymer coated corrugated metal pipe and components will be in conformance with AASHTO M245. Riveted pipe will not be allowed.

All damage to the polymer coating will be repaired in accordance with the manufacturer's recommendations prior to installation of the pipe.

All costs associated with the polymer coating including repair of polymer coating will be incidental to the corresponding CMP contract items.

Metal pipe end sections connected to polymer coated CMP will be aluminum-coated (Type 2) in accordance with AASHTO M36 as specified in the Table of Pipe Quantities. All costs associated for gauge, coating, and connections will be incidental to the corresponding CMP End Section contract items.

PIPE NOTES

The Contractor is responsible for verifying the size of each pipe prior to ordering any pipe end sections. The Contractor will obtain the approval of the Engineer before ordering any pipe.

Pipe culverts and end sections that are removed and not reset will become the property of the Contractor. Pipe culverts and end sections will be disposed of as per the waste disposal site notes and will not be in view from the project upon completion of the project.

Refer to the "Pipe and Erosion Repair Table" for work associated at each site.

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 (In)	Round Pipe Circumference per Joint (Ft)	Arch Pipe Circumference per Joint (Ft)
36	9.4	
42	11.0	11.0
48	12.6	15.3
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:

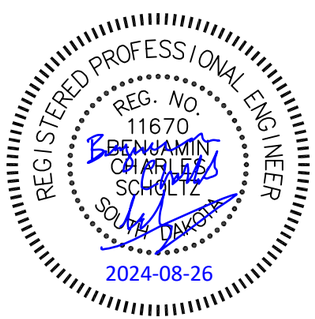
GEL FOAM II (Saturated Oakum Rope Joint Packing) as manufactured by Green Mountain International, LLC or equal.

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 joint
s). 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.

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.

CONTROLLED DENSITY FILL FOR PIPE

Controlled density fill will be in conformance with Section 464 of the Specifications.

The controlled density fill will be placed between the pipes from the base of pipe elevation to the haunch of the pipes and extend to the end of the end section.

TABLE OF CONTROLLED DENSITY FILL FOR PIPE

Station		Quantity (CuYd)
822+46		58
	Total:	58

CELLULAR GROUT

The Contractor will submit a proposed grouting procedure to the Engineer at least two weeks prior to beginning this work.

Bulkheads will be constructed at each end of the pipe. Each bulkhead will be constructed to withstand the pressure of the grouting operation. The bulkhead will extend from the end of the existing pipe inward a minimum depth of 18 inches and will be free from leaks.

Pressure grouting will be done to ensure all the voids are filled including all breaks or holes in and around the existing pipe.

The grout will be a cellular grout (grout with pre-generated foam) with a minimum 28-day compressive strength of 100 pounds per square inch. If water is not present within the pipe a low-density grout with a minimum of 30 pounds per cubic foot wet density may be used. When it is not possible to dewater the existing pipe, a high-density grout with a minimum of 70 pounds per cubic foot will be used which may include approved sand. The foaming agent used will meet the requirements of ASTM C869 when tested in accordance with ASTM C796.

Both of the cellular grout mix designs will be submitted to the SDDOT Concrete Engineer for approval prior to use. The mix design submittal will include the base cement slurry mix per cubic yard, expansion factor from the foaming agent, and the cellular grout wet density (pounds per cubic foot).

The Contractor will install a bypass valve adjacent to the location where the pressure grouting hose is attached for obtaining samples to be checked for wet density. The wet density of the cellular grout will be checked by the

Contractor to verify the proper minimum wet density before the cellular grout filling operations begin and at a minimum once every two hours during production. The SDDOT will document the results of the density checks.

Cellular grout will be wasted until the cellular grout meets the minimum wet density required; however, if 0.5 cubic yards or more of base cement slurry is wasted trying to meet density requirements, then that quantity will not be included for payment.

If grout holes are utilized, cylindrical wooden plugs or other approved plugs will be inserted to plug holes until the grout has set. After the plugs are removed the holes will be filled with concrete.

The quantity of cellular grout was estimated based on volume of the existing pipe and voids outside the existing pipe.

The quantity of base cement slurry ordered will be approved by the Engineer. The quantity of base cement slurry needed will be calculated to the nearest tenth of a cubic yard using the approved mix design, expansion factor of the foaming agent, and estimated amount of cellular grout. The quantity for payment to the nearest tenth of a cubic yard of “Cellular Grout” is a calculated quantity based on the amount of base cement slurry used on the project to the nearest tenth of a cubic yard, expansion factor of the foaming agent, and approved mix design.

All costs for furnishing and installing the cellular grout including bulkhead construction, inlet bevel construction, and incidentals necessary to satisfactorily complete the work will be included in the contract unit price per cubic yard for “Cellular Grout”.

TABLE OF CELLULAR GROUT

Station		Quantity (CuYd)
939+04		21.8
981+66		14.1
	Total:	35.9

The quantity at each location includes an additional 15% to account for void volume outside the existing pipe.

REINFORCED CONCRETE PIPE

High sulfate levels will be encountered on this project. The type of cement will be either a Type V or a Type II with 20% to 25% Class F Modified Fly Ash substituted for cement in accordance with Section 605 of the Specifications. The Water/Cementitious material ratio will not exceed 0.45 as defined in Section 460.3 C of the Specifications. The mix will be as per the fabricator's design; however, minimum compressive strength will not be less than 4500 psi at 28 days. The pipe must be marked in an acceptable way to designate meeting requirements for sulfate resistance.

CONCRETE PIPE CONNECTIONS

Pipe connections to existing pipes, manholes, junction boxes, and drop inlets will be done by breaking a hole into the existing structure and inserting the pipe. A concrete collar will then be poured around the pipe in the area of the connection.

When it is not possible to use a normal pipe joint (male-female ends), connections to existing pipe will be made by placing a 2’ wide by 6" thick M6 concrete collar around the outside of the connection. The concrete collar will be reinforced with 6x6 W2.9 x W2.9 wire mesh.

All costs for constructing the concrete collars including materials and labor will be incidental to the contract unit price per foot for the corresponding pipe contract item.

EMBANKMENT ADJACENT TO CULVERTS

The earth embankment adjacent to the existing pipe ends will be removed prior to removing the pipe end and upon completion of the pipe end installation, the earth embankment will be replaced adjacent to the culvert.

Additional quantity of Contractor Furnished Borrow Excavation has been included in the estimate of quantities to provide for material needed for the restoration of scour and eroded areas surrounding the ends of culverts identified for pipe and/or end treatment replacements.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-11-01

BORE AND JACK STEEL PIPE

The Contractor will install steel pipe at stations 939+40 and 981+81 by boring and jacking the pipe through the existing highway embankment. The pipe will be installed by boring and jacking methods as specified herein unless an alternate plan is submitted in writing and approved by the Engineer.

As shown on the appropriate pipe cross section, some excavation of the existing roadway embankment is anticipated in order to reduce the length of the bore and jack pipe installation.

Steel pipe for boring and jacking will meet or exceed the requirements of ASTM A53 Grade B, ASTM A139 Grade B or ASTM A252 Grade 2. Hydrostatic testing will not be required for this application. The pipe will be required to have the minimum wall thickness as shown in the following table:

Pipe Diameter	Wall Thickness
48" & below	1/2"
54"	5/8"
60"	5/8"
66"	3/4"
72"	3/4"

The exterior of the steel pipe will be coated with a fusion bonded epoxy coating and an abrasion resistant overcoat or a two-component coal tar epoxy. The coal tar will meet the requirements of Sherwin-Williams Targuard, Tnemec Hi-Build Tneme-Tar, or an approved equal. Applications of the coatings will be in conformance with the manufacturer's recommendations.

The pipe joints will be welded by a certified welder in accordance with Section 410.3 D of the Specifications. After the welding has been completed, the exposed area will be coated with 3M Scotchkote Liquid Epoxy 328 or a two-component coal tar epoxy meeting the requirements of Sherwin-Williams Targuard, Tnemec Hi-Build Tneme-Tar, or an approved equal.

The jacking pit will be constructed of sufficient size to accommodate equipment and workmen. The pit walls will be sloped or shored to comply with all applicable State and Federal regulations. The Contractor will be responsible for the design of the pit floor and jacking thrust restraint wall to carry the cyclic loads and thrust applied by the Contractor's operation. Water will not be allowed to accumulate in the jacking pit. All components of the jacking pit will be removed after installation of the pipe unless otherwise allowed by the Engineer.

The pipe will be pushed into position from a jacking pit with hydraulic jacks while simultaneously excavating at the forward end of the pipe. Each pipe section will be jacked from the jacking pit as the excavation at the boring head progresses so that the excavation is supported by the boring head or the pipe at all points.

Jacking thrust will be applied to the pipe by means of a yoke or frame designed to distribute the thrust uniformly around the pipe joint. The thrust will be applied to the pipe joint only in the location and only to the maximum force recommended by the pipe manufacturer. The pipe will be jacked into place without visible damage to the pipe or joint.

The boring head excavation will be circular with a maximum diameter equal to the outside diameter of the jacking pipe plus 1 inch. The Contractor will take whatever corrective action is necessary to prevent running, flowing, or squeezing ground conditions at the cutting face from causing large voids or significant loss of soil that may cause surface settlement.

The Contractor will control the alignment and grade of the pipe installation to meet the following tolerances:

1. Maximum horizontal deviation from plan shown alignment will be less than 0.15% of pipe length from the downstream end of pipe to the point of measurement.

2. Maximum vertical deviation from plan shown alignment will be less than 0.075% of pipe length from the downstream end of pipe to the point of measurement.

All material excavated by the boring head for the pipe installation will be disposed of by the Contractor. The excavated material from the boring pit will be used as backfill for the pit and compacted into place to the satisfaction of the Engineer.

Steel casing will be installed horizontally through up to 225' of embankment. The pipe will be placed through an approximate 15'-20' vertical depth of silt clay material. The parent formation from which the embankment material was excavated consists of shale and may contain minor sandstone and concretions. Large boulders are not anticipated to be encountered within the bore and jack envelope.

Installation of CMP ends on the steel pipe will require the placement of a minimum of 2 welded stops at each pipe end to prevent the end from slipping off the steel pipe. The location and size will be determined in the field by the Engineer and installed by a certified welder. Stops will be coated with a coal tar epoxy. All costs, including labor and materials for the installation of the stops will be incidental to the contract unit price per foot for the corresponding steel pipe furnish contract item. Alternative methods of attachment may be allowed with the approval of the Engineer.

Payment for furnishing the pipe will be incidental to the contract unit price per foot for the corresponding steel pipe furnish contract item.

All costs involved with boring and jacking the pipe including labor, equipment, welding, materials, disposal of waste material, constructing and backfilling the jacking pit, and excavating and backfilling the roadway embankment will be incidental to the contract unit price per foot for the corresponding bore and jack pipe contract item.

STEEL PIPE

Steel pipe will meet the same requirements, including pipe specifications, welding and coal tar epoxy coating as the steel pipe used in the bore and jack installation.

TABLE OF PVC COATED BANK AND CHANNEL PROTECTION GABIONS AND DRAINAGE FABRIC

Station	L/R	PVC Coated Bank and Channel Protection Gabion (CuYd)	Type B Drainage Fabric (SqYd)
583+92	R	4.5	15
808+65	R	6.0	19
997+74	R	4.5	15
	Total	15	49

TABLE OF RIPRAP AND DRAINAGE FABRIC

Station	L/R	Class B Riprap (Ton)	Type B Drainage Fabric (SqYd)
1122+66	L	1615.5	7880

TEMPORARY FENCE

The Contractor will verify the location of the temporary fence with the landowner prior to installation of the fence.

BRACE PANELS FOR ROW FENCE

The E-Z Brace or an approved equal may be utilized as an alternate horizontal brace in the brace panels if approved by the Engineer. The E-Z Brace will be attached to each wood post utilizing two 5/16" x 3" lag screws. Holes of appropriate diameter, based on wood post condition, will be drilled before placement of lag screws. The following is the contact regarding the E-Z Brace:

Charlie Mack
Macksteel E-Z Braces
415 20th Ave. SE.
Watertown, SD 57201
605-882-2177

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

REV DATE: 2024-11-01
INITIAL: BCS

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B12	B71

PIPE AND EROSION REPAIR TABLE

Station				554+15		555+16		574+54		583+92		584+02		585+25		671+75		678+50	
MRM				57.00+0.142		57.00+0.138		56.00+0.751		56.00+0.568		56.00+0.568		56.00+0.553		54.00+0.917		54.00+0.793	
Structure Description				18" RCP		Cattle Pass		18" CMP		24" RCP		18" CMP		Cattle Pass		18" RCP		18" RCP	
End Treatment				Flared				Flared		Flared						Flared		Flared	
Work Description				Install (1) 18" RCP End Section (R) Install 18" - 24' RCP and (1) 18" RCP End Section (L)		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		Install (1) 18" CMP Flared End		Install 24" - 138' RCP and (2) 24" RCP Flared Ends and Bank and Channel Protection Gabions (4.5 CY) & Type B Drainage Fabric (15 SqYd) at 93 'R		Take out 18" - 140' CMP and (2) 18" End Sections		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		(L) Install 18" - 8' RCP and (1) 18" RCP Flared End (R) Install 18" - 8' RCP and (1) 18" RCP Flared End		(L) Install 18" - 8' RCP and (1) 18" RCP Flared End (R) Install 18" - 8' RCP and (1) 18" RCP Flared End	
Bid Item	**Bid Item Description**	**Unit**	**SubTotal**	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
250E0020	Remove Pipe Culvert (Incidental Work, Grading)	(Ft)	**1070**	24								140				8	8	8	8
250E0020	Remove Pipe End Section (Incidental Work, Grading)	(Each)	**46**	1	1				1			1	1			1	1	1	1
110E7500	Remove Pipe for Reset	(Ft)	**8**																
110E7510	Remove Pipe End Section for Reset	(Each)	**4**																
120E0010	Unclassified Excavation	(CuYd)	**19529**							2578									
421E0110	Pipe Culvert Undercut	(CuYd)	**282.8**							36.2									
430E0700	Precast Concrete Headwall for Drain	Each	**1**																
450E0130	18" RCP, Install	(Ft)	**152**	24												8	8	8	8
450E0150	24" RCP, Install	(Ft)	**246**							138									
450E0190	36" RCP, Install	(Ft)	**16**																
450E0200	42" RCP, Install	(Ft)	**8**																
450E0250	72" RCP, Install	(Ft)	**200**																
450E2008	18" RCP Flared End, Furnish	(Each)	**25**	1	1											1	1	1	1
450E2009	18" RCP Flared End, Install	(Each)	**25**	1	1											1	1	1	1
450E2016	24" RCP Flared End, Furnish	(Each)	**3**							1	1								
450E2017	24" RCP Flared End, Install	(Each)	**3**							1	1								
450E2024	30" RCP Flared End, Furnish	(Each)	**4**																
450E2025	30" RCP Flared End, Install	(Each)	**4**																
450E2028	36" RCP Flared End, Furnish	(Each)	**2**																
450E2029	36" RCP Flared End, Install	(Each)	**2**																
450E2032	42" RCP Flared End, Furnish	(Each)	**1**																
450E2033	42" RCP Flared End, Install	(Each)	**1**																
450E2052	72" RCP Flared End, Furnish	(Each)	**4**																
450E2053	72" RCP Flared End, Install	(Each)	**4**																
450E4520	48" RCP Arch Flared End, Furnish	(Each)	**2**																
450E4521	48" RCP Arch Flared End, Install	(Each)	**2**																
450E4699	Tie Bolts for RCP	(Each)	**364**			20								22					
450E4768	24" CMP 14 Gauge. Furnish	(Ft)	**66**																
450E4770	24" CMP, Install	(Ft)	**66**																
450E5015	24" CMP Elbow, Furnish	(Each)	**1**																
450E5016	24" CMP Elbow, Install	(Each)	**1**																
450E5211	18" CMP Flared End, Furnish	(Each)	**1**						1										
450E5212	18" CMP Flared End, Install	(Each)	**1**						1										
450E5215	24" CMP Flared End, Furnish	(Each)	**3**																
450E5216	24" CMP Flared End, Install	(Each)	**3**																
450E5219	30" CMP Flared End, Furnish	(Each)	**2**																
450E5220	30" CMP Flared End, Install	(Each)	**2**																
450E7624	24" Steel Pipe, Furnish	(Ft)	**212**																
450E7630	30" Steel Pipe, Furnish	(Ft)	**192**																
450E8014	24" RCP to CMP Transition, Furnish	(Each)	**1**																
450E8015	24" Pipe Transition, Install	(Each)	**1**																
450E8300	Culvert Joint Cleaning	(Ft)	**3588**			211								232					
450E8305	Repair Culvert Joint	(Ft)	**3588**			211								232					
450E8310	Chemical Grout Void Fill	(Gal)	**935**			55								60					
450E8900	Cleanout Pipe Culvert	(Each)	**10**			1													
450E9000	Reset Pipe	(Ft)	**8**																
450E9001	Reset Pipe End Section	(Each)	**4**																
451E5124	Bore and Jack 24" Pipe	(Ft)	**212**																
451E5130	Bore and Jack 30" Pipe	(Ft)	**192**																
462E0250	Cellular Grout	(CuYd)	**35.9**																
464E0100	Controlled Density Fill	(CuYd)	**58**																
632E2510	Type 2 Object Marker Back to Back	(Each)	**66**	1	1				1	1	1					1	1	1	1
680E0204	4" Perforated PVC Drain Pipe with Sleeve	(Ft)	**40**																
680E0224	4" PVC Outlet Pipe	(Ft)	**10**																
680E2500	Porous Backfill	(Ton)	**13**																
720E1010	PVC Coated Bank and Channel Protection Gabion	(CuYd)	**15**								4.5								
831E0110	Type B Drainage Fabric	(SqYd)	**49**								15								
831E0400	Impermeable Plasic Membrane	(SqYd)	**20**																

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHMITZ
SOUTH DAKOTA
2024-11-01

REV DATE: 2024-11-01
INITIAL: BCS

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B13	B71

Station				700+10		712+80		741+54		745+70.70		749+03		752+54		761+00		767+98	
MRM				54.00+0.377		54.00+0.119		53.00+0.581		53.00+0.458		53.00+0.452		53.00+0.383		53.00+0.220		53.00+0.076	
Structure Description				Cattle Pass		13'x8' RCBC		18" RCP		24" RCP Arch		36" RCP		Cattle Pass		18" RCP		30 RCP	
End Treatment								Flared		Flared		Flared				Flared		Flared	
Work Description				4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		Install 13'x8'x112' RCBC (See Section E)		Install 18" - 8' RCP and (1) 18" RCP End Section		Clean Out Culvert; Reprofile Ditch with 100' Each Side of Culvert		Install (1) 36" RCP End Section		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		(L) Install (1) 18" RCP End Section (R) Install (1) 18" RCP End Section		(L) Install (1) 30" RCP End Section (R) Install (1) 30" RCP End Section Pipe Joint Repair and Void Grouting	
Bid Item	**Bid Item Description**	**Unit**	**SubTotal**	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
250E0020	Remove Pipe Culvert (Incidental Work, Grading)	(Ft)	**1070**			112		8											
250E0020	Remove Pipe End Section (Incidental Work, Grading)	(Each)	**46**					1								1	1	1	1
110E7500	Remove Pipe for Reset	(Ft)	**8**																
110E7510	Remove Pipe End Section for Reset	(Each)	**4**																
120E0010	Unclassified Excavation	(CuYd)	**19529**																
421E0110	Pipe Culvert Undercut	(CuYd)	**282.8**																
430E0700	Precast Concrete Headwall for Drain	Each	**1**																
450E0130	18" RCP, Install	(Ft)	**152**					8											
450E0150	24" RCP, Install	(Ft)	**246**																
450E0190	36" RCP, Install	(Ft)	**16**																
450E0200	42" RCP, Install	(Ft)	**8**																
450E0250	72" RCP, Install	(Ft)	**200**																
450E2008	18" RCP Flared End, Furnish	(Each)	**25**					1								1	1		
450E2009	18" RCP Flared End, Install	(Each)	**25**					1								1	1		
450E2016	24" RCP Flared End, Furnish	(Each)	**3**																
450E2017	24" RCP Flared End, Install	(Each)	**3**																
450E2024	30" RCP Flared End, Furnish	(Each)	**4**															1	1
450E2025	30" RCP Flared End, Install	(Each)	**4**															1	1
450E2028	36" RCP Flared End, Furnish	(Each)	**2**																
450E2029	36" RCP Flared End, Install	(Each)	**2**																
450E2032	42" RCP Flared End, Furnish	(Each)	**1**																
450E2033	42" RCP Flared End, Install	(Each)	**1**																
450E2052	72" RCP Flared End, Furnish	(Each)	**4**																
450E2053	72" RCP Flared End, Install	(Each)	**4**																
450E4520	48" RCP Arch Flared End, Furnish	(Each)	**2**																
450E4521	48" RCP Arch Flared End, Install	(Each)	**2**																
450E4699	Tie Bolts for RCP	(Each)	**364**	22										22				20	
450E4768	24" CMP 14 Gauge. Furnish	(Ft)	**66**																
450E4770	24" CMP, Install	(Ft)	**66**																
450E5015	24" CMP Elbow, Furnish	(Each)	**1**																
450E5016	24" CMP Elbow, Install	(Each)	**1**																
450E5211	18" CMP Flared End, Furnish	(Each)	**1**																
450E5212	18" CMP Flared End, Install	(Each)	**1**																
450E5215	24" CMP Flared End, Furnish	(Each)	**3**																
450E5216	24" CMP Flared End, Install	(Each)	**3**																
450E5219	30" CMP Flared End, Furnish	(Each)	**2**																
450E5220	30" CMP Flared End, Install	(Each)	**2**																
450E7624	24" Steel Pipe, Furnish	(Ft)	**212**																
450E7630	30" Steel Pipe, Furnish	(Ft)	**192**																
450E8014	24" RCP to CMP Transition, Furnish	(Each)	**1**																
450E8015	24" Pipe Transition, Install	(Each)	**1**																
450E8300	Culvert Joint Cleaning	(Ft)	**3588**	232										232				78	
450E8305	Repair Culvert Joint	(Ft)	**3588**	232										232				78	
450E8310	Chemical Grout Void Fill	(Gal)	**935**	60										60				20	
450E8900	Cleanout Pipe Culvert	(Each)	**10**							1		1							
450E9000	Reset Pipe	(Ft)	**8**																
450E9001	Reset Pipe End Section	(Each)	**4**																
451E5124	Bore and Jack 24" Pipe	(Ft)	**212**																
451E5130	Bore and Jack 30" Pipe	(Ft)	**192**																
462E0250	Cellular Grout	(CuYd)	**35.9**																
464E0100	Controlled Density Fill	(CuYd)	**58**																
632E2510	Type 2 Object Marker Back to Back	(Each)	**66**			2	2	1					1			1	1	1	1
680E0204	4" Perforated PVC Drain Pipe with Sleeve	(Ft)	**40**																
680E0224	4" PVC Outlet Pipe	(Ft)	**10**																
680E2500	Porous Backfill	(Ton)	**13**																
720E1010	PVC Coated Bank and Channel Protection Gabion	(CuYd)	**15**																
831E0110	Type B Drainage Fabric	(SqYd)	**49**																
831E0400	Impermeable Plasic Membrane	(SqYd)	**20**																

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHMITZ
SOUTH DAKOTA
2024-11-01

REV DATE: 2024-11-01
INITIAL: RCS

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B14	B71

Station				778+05		808+65		811+98		822+46		839+75		900+00		910+30	
MRM				52.00+0.939		52.00+0.326		52.00+0.257		52.00+0.077				50.00+0.568		50.00+0.370	
Structure Description				48" RCP Arch		30" RCP		Cattle Pass		72" RCP		4" Cutoff Drain		Cattle Pass		18" RCP	
End Treatment				Flared		Flared				Flared							
Work Description				(L) Install (1) 48" RCP Arch End Section (R) Install (1) 48" RCP Arch End Section Pipe Joint Repair and Void Grouting		(L) Install (1) 30" RCP End Section (R) Install (1) 30" RCP End Section and Install Bank and Channel Protection Gabions (6.0 CY) & Type B Drainage Fabric (19 SY)		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		(259 ac) Skewed 6" RHF Install Dual 72" - 100' RCP and (4) 72" RCP Flared Ends (Spaced 10.0 ft C to C Controlled Density Fill)		Install 4" - 40' PVC Cutoff Drain and 4" - 10' PVC Outlet Pipe		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		(L) Install 18" - 8' and (1) 18" RCP End Section (R) Install 18" - 8' and (1) 18" RCP End Section	
Bid Item	**Bid Item Description**	**Unit**	**SubTotal**	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
250E0020	Remove Pipe Culvert (Incidental Work, Grading)	(Ft)	**1070**							137	142					8	8
250E0020	Remove Pipe End Section (Incidental Work, Grading)	(Each)	**46**	1	1	1	1			2	2					1	1
110E7500	Remove Pipe for Reset	(Ft)	**8**														
110E7510	Remove Pipe End Section for Reset	(Each)	**4**														
120E0010	Unclassified Excavation	(CuYd)	**19529**							4311							
421E0110	Pipe Culvert Undercut	(CuYd)	**282.8**							96.4	96.4						
430E0700	Precast Concrete Headwall for Drain	Each	**1**									1					
450E0130	18" RCP, Install	(Ft)	**152**													8	8
450E0150	24" RCP, Install	(Ft)	**246**														
450E0190	36" RCP, Install	(Ft)	**16**														
450E0200	42" RCP, Install	(Ft)	**8**														
450E0250	72" RCP, Install	(Ft)	**200**							100	100						
450E2008	18" RCP Flared End, Furnish	(Each)	**25**													1	1
450E2009	18" RCP Flared End, Install	(Each)	**25**													1	1
450E2016	24" RCP Flared End, Furnish	(Each)	**3**														
450E2017	24" RCP Flared End, Install	(Each)	**3**														
450E2024	30" RCP Flared End, Furnish	(Each)	**4**			1	1										
450E2025	30" RCP Flared End, Install	(Each)	**4**			1	1										
450E2028	36" RCP Flared End, Furnish	(Each)	**2**														
450E2029	36" RCP Flared End, Install	(Each)	**2**														
450E2032	42" RCP Flared End, Furnish	(Each)	**1**														
450E2033	42" RCP Flared End, Install	(Each)	**1**														
450E2052	72" RCP Flared End, Furnish	(Each)	**4**							2	2						
450E2053	72" RCP Flared End, Install	(Each)	**4**							2	2						
450E4520	48" RCP Arch Flared End, Furnish	(Each)	**2**	1	1												
450E4521	48" RCP Arch Flared End, Install	(Each)	**2**	1	1												
450E4699	Tie Bolts for RCP	(Each)	**364**	12				22						22			
450E4768	24" CMP 14 Gauge. Furnish	(Ft)	**66**														
450E4770	24" CMP, Install	(Ft)	**66**														
450E5015	24" CMP Elbow, Furnish	(Each)	**1**														
450E5016	24" CMP Elbow, Install	(Each)	**1**														
450E5211	18" CMP Flared End, Furnish	(Each)	**1**														
450E5212	18" CMP Flared End, Install	(Each)	**1**														
450E5215	24" CMP Flared End, Furnish	(Each)	**3**														
450E5216	24" CMP Flared End, Install	(Each)	**3**														
450E5219	30" CMP Flared End, Furnish	(Each)	**2**														
450E5220	30" CMP Flared End, Install	(Each)	**2**														
450E7624	24" Steel Pipe, Furnish	(Ft)	**212**														
450E7630	30" Steel Pipe, Furnish	(Ft)	**192**														
450E8014	24" RCP to CMP Transition, Furnish	(Each)	**1**														
450E8015	24" Pipe Transition, Install	(Each)	**1**														
450E8300	Culvert Joint Cleaning	(Ft)	**3588**	62				232						232			
450E8305	Repair Culvert Joint	(Ft)	**3588**	62				232						232			
450E8310	Chemical Grout Void Fill	(Gal)	**935**	20				60						60			
450E8900	Cleanout Pipe Culvert	(Each)	**10**													1	
450E9000	Reset Pipe	(Ft)	**8**														
450E9001	Reset Pipe End Section	(Each)	**4**														
451E5124	Bore and Jack 24" Pipe	(Ft)	**212**														
451E5130	Bore and Jack 30" Pipe	(Ft)	**192**														
462E0250	Cellular Grout	(CuYd)	**35.9**														
464E0100	Controlled Density Fill	(CuYd)	**58**							58							
632E2510	Type 2 Object Marker Back to Back	(Each)	**66**	1	1	1	1			4	4					1	1
680E0204	4" Perforated PVC Drain Pipe with Sleeve	(Ft)	**40**									40					
680E0224	4" PVC Outlet Pipe	(Ft)	**10**									10					
680E2500	Porous Backfill	(Ton)	**13**									13					
720E1010	PVC Coated Bank and Channel Protection Gabion	(CuYd)	**15**				6										
831E0110	Type B Drainage Fabric	(SqYd)	**49**				19										
831E0400	Impermeable Plasic Membrane	(SqYd)	**20**									20					

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLZ
SOUTH DAKOTA
2024-11-01

REV DATE: 2024-11-01
INITIAL: RCS

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B15	B71

Station				937+55		939+04		939+40		967+51		969+32		973+46		981+66		981+81		997+74	
MRM				49.00+0.858		49.00+0.823		49.00+0.823		49.00+0.295		49.00+0.253		49.00+0.174		49.00+.022		49.00+0.022		48.00+0.702	
Structure Description				Cattle Pass		24" CMP		30" Steel Pipe		Cattle Pass		18" RCP		18" RCP		18" RCP		24" Steel Pipe		24" RCP & 24" CMP	
End Treatment																					
Work Description				4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		Plug 162' of 24" CMP with Cellular Grout (18.8 CuYd)		(2 ac) Skewed 56° RHF Bore and Jack 30" - 192' Steel Pipe and (2) 30" Flared Ends		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		(L) Install 18" - 8' RCP and (1) 18" RCP End Section (R) Install 18" - 8' RCP and (1) 18" RCP End Section		Reset 18" - 8' RCP (1 Section) and (1) 18" RCP End Section (1 ea)		Plug 186' of 18" RCP with Cellular Grout (12.2 CuYd)		(12 ac) Skewed 40° RHF Bore and Jack 24" - 212' Steel Pipe and (2) 24" Flared Ends		Install Bank and Channel Protection Gabions (4.5 CY) & Type B Drainage Fabric (15 SY)	
Bid Item	**Bid Item Description**	**Unit**	**SubTotal**	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
250E0020	Remove Pipe Culvert (Incidental Work, Grading)	(Ft)	**1070**			48	24					8	8			24	40				
250E0020	Remove Pipe End Section (Incidental Work, Grading)	(Each)	**46**			1	1					1	1				1				
110E7500	Remove Pipe for Reset	(Ft)	**8**												8						
110E7510	Remove Pipe End Section for Reset	(Each)	**4**												1						
120E0010	Unclassified Excavation	(CuYd)	**19529**																		
421E0110	Pipe Culvert Undercut	(CuYd)	**282.8**																		
430E0700	Precast Concrete Headwall for Drain	Each	**1**																		
450E0130	18" RCP, Install	(Ft)	**152**									8	8								
450E0150	24" RCP, Install	(Ft)	**246**																		
450E0190	36" RCP, Install	(Ft)	**16**																		
450E0200	42" RCP, Install	(Ft)	**8**																		
450E0250	72" RCP, Install	(Ft)	**200**																		
450E2008	18" RCP Flared End, Furnish	(Each)	**25**									1	1								
450E2009	18" RCP Flared End, Install	(Each)	**25**									1	1								
450E2016	24" RCP Flared End, Furnish	(Each)	**3**																		
450E2017	24" RCP Flared End, Install	(Each)	**3**																		
450E2024	30" RCP Flared End, Furnish	(Each)	**4**																		
450E2025	30" RCP Flared End, Install	(Each)	**4**																		
450E2028	36" RCP Flared End, Furnish	(Each)	**2**																		
450E2029	36" RCP Flared End, Install	(Each)	**2**																		
450E2032	42" RCP Flared End, Furnish	(Each)	**1**																		
450E2033	42" RCP Flared End, Install	(Each)	**1**																		
450E2052	72" RCP Flared End, Furnish	(Each)	**4**																		
450E2053	72" RCP Flared End, Install	(Each)	**4**																		
450E4520	48" RCP Arch Flared End, Furnish	(Each)	**2**																		
450E4521	48" RCP Arch Flared End, Install	(Each)	**2**																		
450E4699	Tie Bolts for RCP	(Each)	**364**	22						26											
450E4768	24" CMP 14 Gauge. Furnish	(Ft)	**66**																		
450E4770	24" CMP, Install	(Ft)	**66**																		
450E5015	24" CMP Elbow, Furnish	(Each)	**1**																		
450E5016	24" CMP Elbow, Install	(Each)	**1**																		
450E5211	18" CMP Flared End, Furnish	(Each)	**1**																		
450E5212	18" CMP Flared End, Install	(Each)	**1**																		
450E5215	24" CMP Flared End, Furnish	(Each)	**3**															1	1		
450E5216	24" CMP Flared End, Install	(Each)	**3**															1	1		
450E5219	30" CMP Flared End, Furnish	(Each)	**2**					1	1												
450E5220	30" CMP Flared End, Install	(Each)	**2**					1	1												
450E7624	24" Steel Pipe, Furnish	(Ft)	**212**															212			
450E7630	30" Steel Pipe, Furnish	(Ft)	**192**					192													
450E8014	24" RCP to CMP Transition, Furnish	(Each)	**1**																		
450E8015	24" Pipe Transition, Install	(Each)	**1**																		
450E8300	Culvert Joint Cleaning	(Ft)	**3588**	232						275											
450E8305	Repair Culvert Joint	(Ft)	**3588**	232						275											
450E8310	Chemical Grout Void Fill	(Gal)	**935**	60						70											
450E8900	Cleanout Pipe Culvert	(Each)	**10**									1									
450E9000	Reset Pipe	(Ft)	**8**												8						
450E9001	Reset Pipe End Section	(Each)	**4**												1						
451E5124	Bore and Jack 24" Pipe	(Ft)	**212**															212			
451E5130	Bore and Jack 30" Pipe	(Ft)	**192**					192													
462E0250	Cellular Grout	(CuYd)	**35.9**			21.8										14.1					
464E0100	Controlled Density Fill	(CuYd)	**58**																		
632E2510	Type 2 Object Marker Back to Back	(Each)	**66**					1	1			1	1	1	1			1	1		
680E0204	4" Perforated PVC Drain Pipe with Sleeve	(Ft)	**40**																		
680E0224	4" PVC Outlet Pipe	(Ft)	**10**																		
680E2500	Porous Backfill	(Ton)	**13**																		
720E1010	PVC Coated Bank and Channel Protection Gabion	(CuYd)	**15**																		4.5
831E0110	Type B Drainage Fabric	(SqYd)	**49**																		15
831E0400	Impermeable Plasic Membrane	(SqYd)	**20**																		

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLZ
SOUTH DAKOTA
2024-11-01

REV DATE: 2024-11-01
INITIAL: RCS

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B16	B71

Station				998+44		1026+34		1042+82		1049+33		1066+40		1078+36		1100+00		1101+34	
MRM				48.00+0.702		48.00+0.179		47.00+0.882		47.00+0.742		47.00+0.420		47.00+0.193		46.00+0.788		46.00+0.760	
Structure Description				24" RCP & 24" CMP		Cattle Pass		Cattle Pass		18" RCP		18" RCP		18" RCP		36" RCP		Cattle Pass	
End Treatment										Flared		Flared		Flared		Flared			
Work Description				(6 ac) Skewed 50 LHF Install 24" - 108' RCP (1) RCP Flared End (1) RCP to CMP Transition 24" - 66' CMP (1) CMP Elbow and (1) CMP Flared End		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting and (L) Reset (1) 4'x6' RCP Flared End (R) Reset (1) 4'x6' RCP Flared End		(L) Install (1) 18" RCP Flared End (R) Install (1) 18" RCP Flared End		(L) Install (1) 18" RCP End Section (R) Install (1) 18" RCP End Section		(L) Install 18" - 16' RCP and (1) 18" RCP End Section (R) Install 18" - 8' RCP and (1) 18" RCP End Section		(L) Install 36" - 8' RCP and (1) 36" RCP End Section (R) Install 36" - 8' RCP and (1) 36" RCP End Section		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting	
Bid Item	**Bid Item Description**	**Unit**	**SubTotal**	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
250E0020	Remove Pipe Culvert (Incidental Work, Grading)	(Ft)	**1070**	100										16	8	8	8		
250E0020	Remove Pipe End Section (Incidental Work, Grading)	(Each)	**46**	1	1					1	1	1	1	1	1	1	1		
110E7500	Remove Pipe for Reset	(Ft)	**8**																
110E7510	Remove Pipe End Section for Reset	(Each)	**4**					1	1										
120E0010	Unclassified Excavation	(CuYd)	**19529**	8308															
421E0110	Pipe Culvert Undercut	(CuYd)	**282.8**	44.2												4.6			
430E0700	Precast Concrete Headwall for Drain	Each	**1**																
450E0130	18" RCP, Install	(Ft)	**152**											16	8				
450E0150	24" RCP, Install	(Ft)	**246**	108															
450E0190	36" RCP, Install	(Ft)	**16**													8	8		
450E0200	42" RCP, Install	(Ft)	**8**																
450E0250	72" RCP, Install	(Ft)	**200**																
450E2008	18" RCP Flared End, Furnish	(Each)	**25**							1	1	1	1	1	1				
450E2009	18" RCP Flared End, Install	(Each)	**25**							1	1	1	1	1	1				
450E2016	24" RCP Flared End, Furnish	(Each)	**3**	1															
450E2017	24" RCP Flared End, Install	(Each)	**3**	1															
450E2024	30" RCP Flared End, Furnish	(Each)	**4**																
450E2025	30" RCP Flared End, Install	(Each)	**4**																
450E2028	36" RCP Flared End, Furnish	(Each)	**2**													1	1		
450E2029	36" RCP Flared End, Install	(Each)	**2**													1	1		
450E2032	42" RCP Flared End, Furnish	(Each)	**1**																
450E2033	42" RCP Flared End, Install	(Each)	**1**																
450E2052	72" RCP Flared End, Furnish	(Each)	**4**																
450E2053	72" RCP Flared End, Install	(Each)	**4**																
450E4520	48" RCP Arch Flared End, Furnish	(Each)	**2**																
450E4521	48" RCP Arch Flared End, Install	(Each)	**2**																
450E4699	Tie Bolts for RCP	(Each)	**364**			18		16										18	
450E4768	24" CMP 14 Gauge. Furnish	(Ft)	**66**		66														
450E4770	24" CMP, Install	(Ft)	**66**		66														
450E5015	24" CMP Elbow, Furnish	(Each)	**1**		1														
450E5016	24" CMP Elbow, Install	(Each)	**1**		1														
450E5211	18" CMP Flared End, Furnish	(Each)	**1**																
450E5212	18" CMP Flared End, Install	(Each)	**1**																
450E5215	24" CMP Flared End, Furnish	(Each)	**3**	1															
450E5216	24" CMP Flared End, Install	(Each)	**3**	1															
450E5219	30" CMP Flared End, Furnish	(Each)	**2**																
450E5220	30" CMP Flared End, Install	(Each)	**2**																
450E7624	24" Steel Pipe, Furnish	(Ft)	**212**																
450E7630	30" Steel Pipe, Furnish	(Ft)	**192**																
450E8014	24" RCP to CMP Transition, Furnish	(Each)	**1**	1															
450E8015	24" Pipe Transition, Install	(Each)	**1**	1															
450E8300	Culvert Joint Cleaning	(Ft)	**3588**			190		169										190	
450E8305	Repair Culvert Joint	(Ft)	**3588**			190		169										190	
450E8310	Chemical Grout Void Fill	(Gal)	**935**			50		45										50	
450E8900	Cleanout Pipe Culvert	(Each)	**10**											1		1			
450E9000	Reset Pipe	(Ft)	**8**																
450E9001	Reset Pipe End Section	(Each)	**4**					1	1										
451E5124	Bore and Jack 24" Pipe	(Ft)	**212**																
451E5130	Bore and Jack 30" Pipe	(Ft)	**192**																
462E0250	Cellular Grout	(CuYd)	**35.9**																
464E0100	Controlled Density Fill	(CuYd)	**58**																
632E2510	Type 2 Object Marker Back to Back	(Each)	**66**	1	1			2	2	1	1	1	1	1	1	1	1		
680E0204	4" Perforated PVC Drain Pipe with Sleeve	(Ft)	**40**																
680E0224	4" PVC Outlet Pipe	(Ft)	**10**																
680E2500	Porous Backfill	(Ton)	**13**																
720E1010	PVC Coated Bank and Channel Protection Gabion	(CuYd)	**15**																
831E0110	Type B Drainage Fabric	(SqYd)	**49**																
831E0400	Impermeable Plasic Membrane	(SqYd)	**20**																

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLZ
SOUTH DAKOTA
2024-11-01

REV DATE: 2024-11-01
INITIAL: BCS

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B17	B71

Station				1113+63		1121+94		1187+50		1240+32		1243+45		1264+28		1284+23		1286+20		1302+21	
MRM				46.00+0.526		46.00+0.370		45.00+0.148		44.00+0.145		44.00+0.178		43.00+0.684		43.00+0.303		43.00+0.256		42.00+0.931	
Structure Description				18" RCP		9'x9' RCBC		Cattle Pass		18" RCP		Cattle Pass		42" RCP		Cattle Pass		60" RCP		18" RCP	
End Treatment				Flared						Flared				Flared						Flared	
Work Description				(L) Install 18" - 8' RCP and (1) 18" RCP End Section (R) Install 18" - 8' RCP and (1) 18" RCP End Section		Install 9'x9'x136' - 9" RCBC (See Section E)		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		(L) Install 18" - 8' RCP and (1) 18" RCP Flared End (R) Install 18" - 8' RCP and (1) 18" RCP Flared End		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		(L) Install 42" - 8' RCP and (1) 42" RCP Flared End		4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		(L) Reset (1) 60" RCP End Section		(L) Install (1) 18" RCP Flared End (R) Install (1) 18" RCP Flared End	
Bid Item	**Bid Item Description**	**Unit**	**SubTotal**	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right
250E0020	Remove Pipe Culvert (Incidental Work, Grading)	(Ft)	**1070**	8	8	127				8	8			8							
250E0020	Remove Pipe End Section (Incidental Work, Grading)	(Each)	**46**	1	1					1	1			1						1	1
110E7500	Remove Pipe for Reset	(Ft)	**8**																		
110E7510	Remove Pipe End Section for Reset	(Each)	**4**															1			
120E0010	Unclassified Excavation	(CuYd)	**19529**			4332															
421E0110	Pipe Culvert Undercut	(CuYd)	**282.8**											5							
430E0700	Precast Concrete Headwall for Drain	Each	**1**																		
450E0130	18" RCP, Install	(Ft)	**152**	8	8					8	8										
450E0150	24" RCP, Install	(Ft)	**246**																		
450E0190	36" RCP, Install	(Ft)	**16**																		
450E0200	42" RCP, Install	(Ft)	**8**											8							
450E0250	72" RCP, Install	(Ft)	**200**																		
450E2008	18" RCP Flared End, Furnish	(Each)	**25**	1	1					1	1									1	1
450E2009	18" RCP Flared End, Install	(Each)	**25**	1	1					1	1									1	1
450E2016	24" RCP Flared End, Furnish	(Each)	**3**																		
450E2017	24" RCP Flared End, Install	(Each)	**3**																		
450E2024	30" RCP Flared End, Furnish	(Each)	**4**																		
450E2025	30" RCP Flared End, Install	(Each)	**4**																		
450E2028	36" RCP Flared End, Furnish	(Each)	**2**																		
450E2029	36" RCP Flared End, Install	(Each)	**2**																		
450E2032	42" RCP Flared End, Furnish	(Each)	**1**											1							
450E2033	42" RCP Flared End, Install	(Each)	**1**											1							
450E2052	72" RCP Flared End, Furnish	(Each)	**4**																		
450E2053	72" RCP Flared End, Install	(Each)	**4**																		
450E4520	48" RCP Arch Flared End, Furnish	(Each)	**2**																		
450E4521	48" RCP Arch Flared End, Install	(Each)	**2**																		
450E4699	Tie Bolts for RCP	(Each)	**364**					22				18				16					
450E4768	24" CMP 14 Gauge. Furnish	(Ft)	**66**																		
450E4770	24" CMP, Install	(Ft)	**66**																		
450E5015	24" CMP Elbow, Furnish	(Each)	**1**																		
450E5016	24" CMP Elbow, Install	(Each)	**1**																		
450E5211	18" CMP Flared End, Furnish	(Each)	**1**																		
450E5212	18" CMP Flared End, Install	(Each)	**1**																		
450E5215	24" CMP Flared End, Furnish	(Each)	**3**																		
450E5216	24" CMP Flared End, Install	(Each)	**3**																		
450E5219	30" CMP Flared End, Furnish	(Each)	**2**																		
450E5220	30" CMP Flared End, Install	(Each)	**2**																		
450E7624	24" Steel Pipe, Furnish	(Ft)	**212**																		
450E7630	30" Steel Pipe, Furnish	(Ft)	**192**																		
450E8014	24" RCP to CMP Transition, Furnish	(Each)	**1**																		
450E8015	24" Pipe Transition, Install	(Each)	**1**																		
450E8300	Culvert Joint Cleaning	(Ft)	**3588**					232				190				169					
450E8305	Repair Culvert Joint	(Ft)	**3588**					232				190				169					
450E8310	Chemical Grout Void Fill	(Gal)	**935**					60				50				45					
450E8900	Cleanout Pipe Culvert	(Each)	**10**	1						1				1							
450E9000	Reset Pipe	(Ft)	**8**																		
450E9001	Reset Pipe End Section	(Each)	**4**															1			
451E5124	Bore and Jack 24" Pipe	(Ft)	**212**																		
451E5130	Bore and Jack 30" Pipe	(Ft)	**192**																		
462E0250	Cellular Grout	(CuYd)	**35.9**																		
464E0100	Controlled Density Fill	(CuYd)	**58**																		
632E2510	Type 2 Object Marker Back to Back	(Each)	**66**	1	1	2	2			1	1			1						1	1
680E0204	4" Perforated PVC Drain Pipe with Sleeve	(Ft)	**40**																		
680E0224	4" PVC Outlet Pipe	(Ft)	**10**																		
680E2500	Porous Backfill	(Ton)	**13**																		
720E1010	PVC Coated Bank and Channel Protection Gabion	(CuYd)	**15**																		
831E0110	Type B Drainage Fabric	(SqYd)	**49**																		
831E0400	Impermeable Plasic Membrane	(SqYd)	**20**																		

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHMITZ
SOUTH DAKOTA
2024-11-01

Station				1311+81		1312+25	
MRM				42.00+0.789		42.00+0.773	
Structure Description				Cattle Pass		Cattle Pass	
End Treatment							
Work Description				4' x 6' Cattle Pass Pipe Joint Repair and Void Grouting		2 - 54" RCP Pipe Joint Repair and Void Grouting	
Bid Item	**Bid Item Description**	**Unit**	**SubTotal**	Left	Right	Left	Right
250E0020	Remove Pipe Culvert (Incidental Work, Grading)	(Ft)	**1070**				
250E0020	Remove Pipe End Section (Incidental Work, Grading)	(Each)	**46**				
110E7500	Remove Pipe for Reset	(Ft)	**8**				
110E7510	Remove Pipe End Section for Reset	(Each)	**4**				
120E0010	Unclassified Excavation	(CuYd)	**19529**				
421E0110	Pipe Culvert Undercut	(CuYd)	**282.8**				
430E0700	Precast Concrete Headwall for Drain	Each	**1**				
450E0130	18" RCP, Install	(Ft)	**152**				
450E0150	24" RCP, Install	(Ft)	**246**				
450E0190	36" RCP, Install	(Ft)	**16**				
450E0200	42" RCP, Install	(Ft)	**8**				
450E0250	72" RCP, Install	(Ft)	**200**				
450E2008	18" RCP Flared End, Furnish	(Each)	**25**				
450E2009	18" RCP Flared End, Install	(Each)	**25**				
450E2016	24" RCP Flared End, Furnish	(Each)	**3**				
450E2017	24" RCP Flared End, Install	(Each)	**3**				
450E2024	30" RCP Flared End, Furnish	(Each)	**4**				
450E2025	30" RCP Flared End, Install	(Each)	**4**				
450E2028	36" RCP Flared End, Furnish	(Each)	**2**				
450E2029	36" RCP Flared End, Install	(Each)	**2**				
450E2032	42" RCP Flared End, Furnish	(Each)	**1**				
450E2033	42" RCP Flared End, Install	(Each)	**1**				
450E2052	72" RCP Flared End, Furnish	(Each)	**4**				
450E2053	72" RCP Flared End, Install	(Each)	**4**				
450E4520	48" RCP Arch Flared End, Furnish	(Each)	**2**				
450E4521	48" RCP Arch Flared End, Install	(Each)	**2**				
450E4699	Tie Bolts for RCP	(Each)	**364**	18		28	
450E4768	24" CMP 14 Gauge. Furnish	(Ft)	**66**				
450E4770	24" CMP, Install	(Ft)	**66**				
450E5015	24" CMP Elbow, Furnish	(Each)	**1**				
450E5016	24" CMP Elbow, Install	(Each)	**1**				
450E5211	18" CMP Flared End, Furnish	(Each)	**1**				
450E5212	18" CMP Flared End, Install	(Each)	**1**				
450E5215	24" CMP Flared End, Furnish	(Each)	**3**				
450E5216	24" CMP Flared End, Install	(Each)	**3**				
450E5219	30" CMP Flared End, Furnish	(Each)	**2**				
450E5220	30" CMP Flared End, Install	(Each)	**2**				
450E7624	24" Steel Pipe, Furnish	(Ft)	**212**				
450E7630	30" Steel Pipe, Furnish	(Ft)	**192**				
450E8014	24" RCP to CMP Transition, Furnish	(Each)	**1**				
450E8015	24" Pipe Transition, Install	(Each)	**1**				
450E8300	Culvert Joint Cleaning	(Ft)	**3588**	190		240	
450E8305	Repair Culvert Joint	(Ft)	**3588**	190		240	
450E8310	Chemical Grout Void Fill	(Gal)	**935**	50		60	
450E8900	Cleanout Pipe Culvert	(Each)	**10**				
450E9000	Reset Pipe	(Ft)	**8**				
450E9001	Reset Pipe End Section	(Each)	**4**				
451E5124	Bore and Jack 24" Pipe	(Ft)	**212**				
451E5130	Bore and Jack 30" Pipe	(Ft)	**192**				
462E0250	Cellular Grout	(CuYd)	**35.9**				
464E0100	Controlled Density Fill	(CuYd)	**58**				
632E2510	Type 2 Object Marker Back to Back	(Each)	**66**				
680E0204	4" Perforated PVC Drain Pipe with Sleeve	(Ft)	**40**				
680E0224	4" PVC Outlet Pipe	(Ft)	**10**				
680E2500	Porous Backfill	(Ton)	**13**				
720E1010	PVC Coated Bank and Channel Protection Gabion	(CuYd)	**15**				
831E0110	Type B Drainage Fabric	(SqYd)	**49**				
831E0400	Impermeable Plasic Membrane	(SqYd)	**20**				

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLZ
SOUTH DAKOTA
2024-11-01

FENCE QUANTITIES

Station to Station		Side (L/R)	Remove Fence (Ft)	Temporary Fence			Right-of-Way Fence	Post Panels
				Orange Plastic Safety Fence (Ft)	Type 1A (Ft)	Type 2 (Ft)	Type 2 (Ft)	2 Post Panel (Each)
583+42	584+44	R	102			102	101	2
711+50	713+70	L	220	400			220	2
710+00	713+70	R	373	400			373	3
822+02	823+00	R	98		98		100	2
937+72	939+89	L	217		217		217	2
938+86	940+86	R	200		200		200	2
969+04	969+44	L	40		40		43	2
969+10	969+65	R	55		55		53	2
980+00	982+00	L	200		200		200	2
981+72	983+72	R	200		200		200	2
997+16	998+16	R	100		100		101	2
1118+90	1125+50	L	660		660		712	10
1120+75	1125+43	R	468		468		225	2
TOTALS:			**2,933**	**800**	**2,238**	**102**	**2,745**	**35**

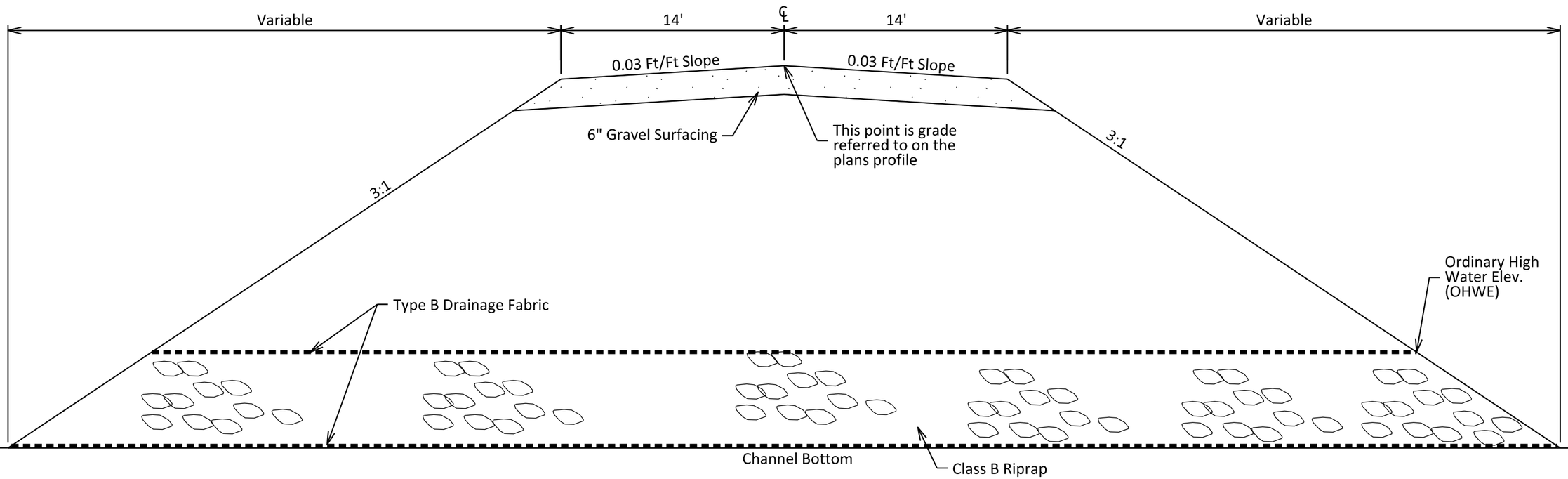
Post Sequence: Fence will be constructed using alternate wood and steel posts unless otherwise noted.

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B20	

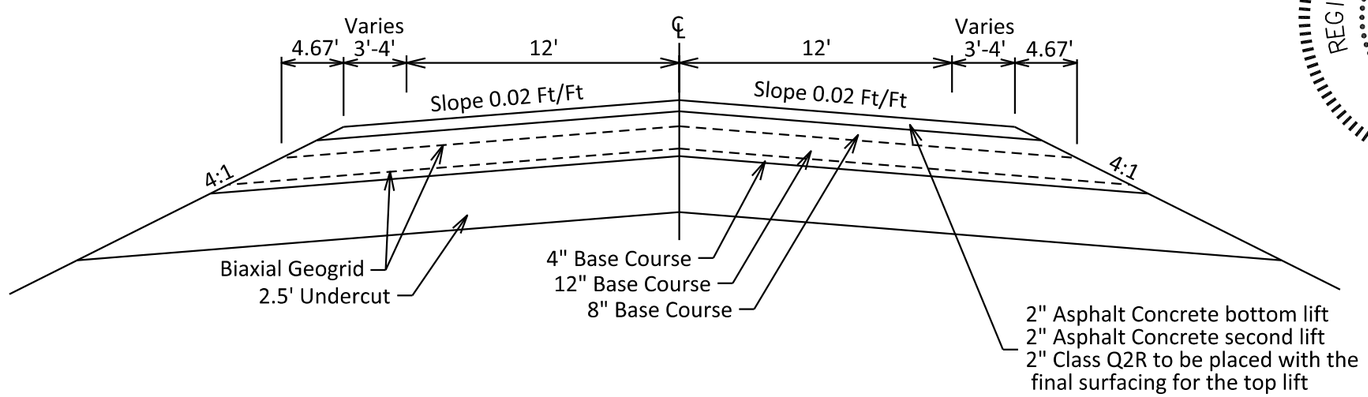
Plotting Date: 08-26-2024 REV DATE:
INITIAL:

TYPICAL SECTIONS

TRAFFIC DIVERSION
1117+55.40 to 1126+32.58 (200+00.00 to 209+28.42 Diversion)
(OHWE 1739.0)



SD47
838+15.00 to 839+65.00
(Reinforced Base Course)



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

Plot Scale - 1:6.66665
Plotting Date:
Plotted From - BSCHOLTZ
File - ...\B20_Typical Sections.dgn

HORIZONTAL ALIGNMENT DATA

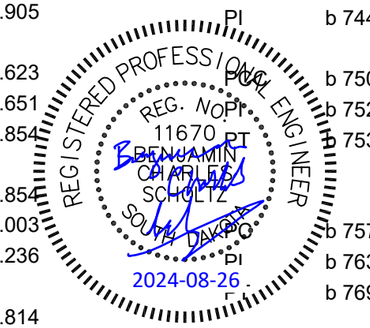
FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B21	B71

Plotting Date: 8/26/2024

SD47

Type	Station			Northing	Easting
POB	505+75.49			507207.155	2175103.572
		TL=3,344.51	S 58° 30' 48" E		
PC	539+20.00			505460.322	2177955.640
PI	544+17.32	R = 5,000.00	Delta = 11° 21' 38" R	505200.571	2178379.738
PT	549+11.38			504862.370	2178744.360
		TL=1,601.50	S 47° 09' 11" E		
PI	565+12.88			503773.279	2179918.537
		TL=356.32	S 44° 21' 43" E		
PC	568+69.21			503518.530	2180167.675
PI	576+67.69	R = 3,820.00	Delta = 23° 36' 46" R	502947.662	2180725.970
PT	584+43.52			502200.964	2181008.857
		TL=1,383.23	S 20° 44' 57" E		
PI	598+26.75			500907.446	2181498.905
		TL=2,699.02	S 20° 08' 57" E		
PC	625+25.77			498373.612	2182428.623
PI	627+11.64	R = 5,729.58	Delta = 3° 42' 58" L	498199.113	2182492.651
PCC	628+97.39			498029.130	2182567.854
PCC	628+97.39			498029.130	2182567.854
PI	632+70.97	R = 5,729.58	Delta = 7° 27' 40" L	497687.486	2182719.003
PT	636+43.50			497368.361	2182913.236
		TL=1,141.68	S 31° 19' 36" E		
PC	647+85.18			496393.122	2183506.814
PI	651+95.30	R = 5,729.58	Delta = 8° 11' 18" L	496042.790	2183720.042
PT	656+04.02			495726.400	2183980.995
		TL=1,076.98	S 39° 30' 54" E		
PI	666+81.00			494895.558	2184666.252
		TL=483.70	S 39° 30' 54" E		
PC	671+64.70			494522.403	2184974.021
PI	674+54.99	R = 11,459.16	Delta = 2° 54' 08" L	494298.460	2185158.724
PT	677+45.15			494084.156	2185354.529
EQNBK	677+72.41			494064.029	2185372.919
EQNAHD	b 677+80.60			494064.029	2185372.919
		TL=605.23	S 42° 25' 02" E		
PC	b 683+58.56			493637.346	2185762.769
PI	b 685+59.88	R = 1529.14	Delta = 15° 00' 00" R	493488.725	2185898.561
PCC	b 687+58.89			493310.022	2185991.259
PCC	b 687+58.89			493310.022	2185991.259
PI	b 694+20.48	R = 1145.92	Delta = 59° 59' 59" R	492722.743	2186295.900



Type	Station			Northing	Easting
PCC	b 699+58.88			492165.276	2185939.624
PI	b 701+60.20	R = 1529.14	Delta = 15° 00' 00" R	491995.644	2185831.214
PT	b 703+59.21			491859.852	2185682.593
		TL =2924.27	S 47° 34' 57" W		
PC	b 732+83.48			489887.351	2183523.753
PI	b 734+17.00	R = 2183.087	Delta = 7° 00' 00" L	489797.285	2183425.180
PCC	b 735+50.20			489695.879	2183338.317
PCC	b 735+50.20			489695.879	2183338.317
PI	b 736+75.31	R = 1637.022	Delta = 8° 44' 81" L	489600.858	2183256.925
PCC	b 737+99.94			489494.571	2183190.918
PI	b 744+85.71			488912.001	2182829.126
		R = 1637.02	Delta = 45° 27' 32" L		
PCC	b 750+98.77			488245.508	2182990.582
PI	b 752+32.29	R = 2183.07	Delta = 7° 00' 00" L	488115.739	2183022.019
PT	b 753+65.48			487990.767	2183069.036
		TL = 350.25	S 20° 37' 03" E		
PCC	b 757+15.73			487662.953	2183192.367
PI	b 763+44.60	R = 5729.58	Delta = 12° 31' 38" R	487074.356	2183413.812
	b 769+68.46			486451.739	2183502.316
		TL = 4225.93	S 8° 05' 25" E		
PC	b 811+94.39			482267.869	2184097.043
PI	b 821+03.78	R = 2291.83	Delta = 43° 17' 10" L	481367.529	2184225.024
PT	b 829+25.83			480799.885	2184935.496
		TL = 2454.52	S 51° 22' 35" E		
PC	b 853+80.35			479267.771	2186853.123
PI	b 855+14.22	R = 267.54	Delta = 5° 21' 03" L	479184.210	2186957.710
PCC	b 856+47.90			479091.260	2187054.049
PCC	b 856+47.90			479091.260	2187054.049
PI	b 860+60.51	R = 2864.79	Delta = 16° 23' 89" R	478804.765	2187350.988
PT	b 864+67.49			478446.117	2187555.006
EQNBK	b 867+53.83			478197.229	2187696.588
EQNAHD	c 865+98.20			477657.070	2188003.860
		TL = 907.78	S 29° 38' 01" E		
PI	c 872+19.64				
		TL = 998.93	S 29° 38' 01" E		
PC	c 882+18.57			476788.799	2188497.782
PI	c 892+76.56	R = 2294.831	Delta = 49° 33' 35" R	475869.182	2189020.911

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. South Zone (NAD 83/11); epoch 2010.00
Geoid 2A; SF = 0.9998286712

HORIZONTAL ALIGNMENT DATA

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B22	B71

Plotting Date: 8/26/2024

Type	Station			Northing	Easting
PT	c 902+00.96			474874.524	2188660.337
		TL = 526.22	S 19° 55' 34" W		
PC	c 907+27.17			474379.811	2188480.998
PI	c 908+60.64	R = 2546.804	Delta = 6° 00' 00" L	474254.329	2188435.510
PCC	c 909+93.87			474124.780	2188403.387
PCC	c 909+93.87			474124.780	2188403.387
PI	c 912+07.21	R = 1909.86	Delta = 12° 44' 51" L	473917.709	2188352.04
PCC	c 914+18.79			473704.414	2188347.654
PCC	c 914+18.79			472620.804	2188658.067
PI	c 920+08.66	R = 1909.86	Delta = 34° 19' 37" L	473114.673	2188335.522
PCC	c 925+63.02			472620.804	2188658.067
PCC	c 925+63.02			472620.804	2188658.067
PI	c 926+96.50	R = 2546.85	Delta = 6° 00' 00" L	472509.053	2188731.051
PT	c 928+29.73			472405.543	2188815.316
		TL = 3587.38	S 39° 08' 54" W		
PC	c 964+17.10			469623.486	2191080.139
PI	c 971+03.74	R = 1909.86	Delta = 39° 32' 57" R	469090.991	2191513.633
PT	c 977+35.41			468404.373	2191508.829
		TL=5207.51	S 0° 24' 03" W		
PI	c1029+42.92			463196.988	2191472.398
		TL=4907.50	S 0° 24' 03" W		
PC	c1078+50.41			458289.613	2191438.067
PI	c1088+76.94	R = 2864.79	Delta = 39° 25' 40" L	457263.113	2191430.885
PT	c1098+21.80			456465.656	2192077.273
		TL=7550.70	S 39° 10' 45" E		
PC	c1173+72.50			450612.555	2196847.417
PI	c1180+27.97	R = 5800.00	Delta = 12° 53' 43" L	450104.456	2197261.506
PT	c1186+77.89			449701.586	2197778.544
		TL=7978.88	S 52° 04' 29" E		
PI	c1266+56.77			444797.494	2204072.380
		TL=4102.95	S 52° 04' 29" E		
PI	c1307+59.72			442275.679	2207308.839
		TL=1482.58	S 52° 04' 29" E		
PC	c1322+42.30			441364.433	2208478.319
PI	c1333+45.39	R = 2291.83	Delta = 51° 24' 15" R	440686.438	2209348.447
PT	c1342+98.47			439583.427	2209361.355
		TL=631.83	S 0° 40' 14" E		
PI	c1349+30.30			438951.636	2209368.749
		TL=227.99	S 0° 40' 14" E		

Type	Station			Northing	Easting
POE	c1351+58.30			438723.661	2209371.417

DIV_101

Type	Station			Northing	Easting
PC	200+00.00			454966.784	2193298.820
PI	201+19.42	R = 400.00	Delta = 33° 14' 47" L	454874.212	2193374.264
PRC	202+32.10			454838.153	2193488.112
PRC	202+32.10			454838.153	2193488.112
PI	204+94.32	R = 400.00	Delta =66° 29' 34" R	454758.979	2193738.090
PRC	206+96.31			454498.168	2193765.193
PRC	206+96.31			454498.168	2193765.193
PI	208+15.73	R = 400.00	Delta = 33° 14' 47" L	454379.386	2193777.536
PT	209+28.42			454286.813	2193852.981

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. South Zone (NAD 83/11); epoch 2010.00
Geoid 2A; SF = 0.9998286712

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B23	B71

Plotting Date: 8/26/2024

CONTROL DATA

FOR BIDDING PURPOSES ONLY

Point	Description	Northing	Easting	Elevation
47 039.36	NGS HARN	425404.847	2206690.246	1828.91
CP 1	5/8" X 5' REBAR	437584.627	2209733.178	1971.09
CP 2	5/8" X 5' REBAR	478327.242	2187559.836	1611.63
CP 1A	5/8" X 5' REBAR	452723.866	2195697.229	1830.47
CP 1B	5/8" X 5' REBAR	455925.961	2192425.033	1771.10
NAIL	LANDSCAPE SPIKE (TEMPORARY)	466648.250	2191700.783	1780.44
CP 2B	5/8" X 5' REBAR	492281.066	2185922.278	1387.46
CP 3	5/8" X 5' REBAR	499234.928	2181937.458	1681.47

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. South Zone (NAD 83/11); epoch 2010.00 Geoid 2A; SF = 0.9998286712.

The elevations shown on this control data table are based on NAD 83

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

LEGEND

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B24	B71

REV DATE:
INITIAL:

Plotting Date:

- Anchor
- Antenna
- Approach
- Assumed Corner
- Azimuth Marker
- BBQ Grill/ Fireplace
- Bearing Tree
- Bench Mark
- Box Culvert
- Bridge
- Brush/Hedge
- Buildings
- Bulk Tank
- Cattle Guard
- Cemetery
- Centerline
- Cistern
- Clothes Line
- Concrete Symbol
- Control Point
- Creek Edge
- Curb/Gutter
- Curb
- Dam Grade/Dike/Levee
- Deck Edge
- Ditch Block
- Doorway Threshold
- Drainage Profile
- Drop Inlet
- Edge Of Asphalt
- Edge Of Concrete
- Edge Of Gravel
- Edge Of Other
- Edge Of Shoulder
- Electric Transformer/Power Junction Box
- Fence Barbwire
- Fence Chainlink
- Fence Electric
- Fence Miscellaneous
- Fence Rock
- Fence Snow
- Fence Wood
- Fence Woven
- Fire Hydrant
- Flag Pole
- Flower Bed
- Gas Valve Or Meter
- Gas Pump Island
- Grain Bin
- Guardrail
- Gutter
- Guy Pole
- Haystack
- Highway ROW Marker
- Interstate Close Gate
- Iron Pin
- Irrigation Ditch
- Lake Edge
- Lawn Sprinkler
- Mailbox
- Manhole Electric
- Manhole Gas
- Manhole Miscellaneous
- Manhole Sanitary Sewer
- Manhole Storm Sewer
- Manhole Telephone
- Manhole Water
- Merry-Go-Round
- Microwave Radio Tower
- Miscellaneous Line
- Miscellaneous Property Corner
- Miscellaneous Post
- Overhang Or Encroachment
- Overhead Utility Line — OH —
- Parking Meter
- Pedestrian Push Button Pole
- Pipe With End Section
- Pipe With Headwall
- Pipe Without End Section
- Playground Slide
- Playground Swing
- Power And Light Pole
- Power And Telephone Pole
- Power Meter
- Power Pole
- Power Pole And Transformer
- Power Tower Structure
- Propane Tank
- Property Pipe
- Property Pipe With Cap
- Property Stone
- Public Telephone
- Railroad Crossing Signal
- Railroad Milepost Marker
- Railroad Profile
- Railroad ROW Marker
- Railroad Signs
- Railroad Switch
- Railroad Track
- Railroad Trestle
- Rebar
- Rebar With Cap
- Reference Mark
- Retaining Wall
- Riprap
- River Edge
- Rock And Wire Baskets
- Rockpiles
- Satellite Dish
- Septic Tank
- Shrub Tree
- Sidewalk
- Sign Face
- Sign Post
- Slough Or Marsh
- Spring
- Stream Gauge
- Street Marker
- Subsurface Utility Exploration Test Hole
- Telephone Fiber Optics — T/F —
- Telephone Junction Box
- Telephone Pole
- Television Cable Jct Box
- Television Tower
- Test Wells/Bore Holes
- Traffic Sign Double Face
- Traffic Sign One Post
- Traffic Sign Two Post
- Traffic Signal
- Trash Barrel
- Tree Belt
- Tree Coniferous
- Tree Deciduous
- Tree Stumps
- Triangulation Station
- Underground Electric Line — P —
- Underground Gas Line — G —
- Underground High Pressure Gas Line — HG —
- Underground Sanitary Sewer — S —
- Underground Storm Sewer — S —
- Underground Tank
- Underground Telephone Line — T —
- Underground Television Cable — TV —
- Underground Water Line — W —
- Water Fountain
- Water Hydrant
- Water Meter
- Water Tower
- Water Valve
- Water Well
- Weir Rock
- Windmill
- Wingwall
- Witness Corner

- State and National Line
- County Line
- Section Line
- Quarter Line
- Sixteenth Line
- Property Line
- Construction Line
- ROW Line
- New ROW Line
- Cut and Fill Limits
- Control of Access
- New Control of Access
- Proposed ROW (After Property Disposal)

- Drainage Arrow

- Remove Concrete Pavement
- Remove Concrete Driveway Pavement
- Remove Asphalt Concrete Pavement
- Remove Concrete Sidewalk
- Remove Concrete Median Pavement
- Remove Concrete Curb and/or Gutter

- Detectable Warning
- Pedestrian Push Button Pole and 30" x 48" Clear Space with 1.5% slope

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B25	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

554+15 R
Take Out (1) 18" RCP End Section

554+15 L
Take Out 18"-24' RCP
and (1) 18" RCP End Section

554+15 R
Install (1) 18" RCP End Section

554+15 L
Install 18"-24' RCP
and (1) 18" RCP End Section

554+15
4' x 6' Cattle Pass
Pipe Joint Repair
and Void Grouting

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

Sec 14 - T103N - R73W

BEGIN P 0047(113)42
SD Highway 47
Station 505+75

505+75
510+00
515+00
520+00
Present SD Hwy 47
525+00
530+00
535+00

Sec 14 - T103N - R73W

Section Line

Sec 23 - T103N - R73W

Former Boundary Rosebud Indian Reservation

Government Lot 5

Government Lot 1

Gov't Lot 6

535+00
540+00
545+00
550+00
150'
555+00
Present SD Hwy 47
560+00
565+00

PI 544+17.32
N 505200.57
E 2178379.74
Del 11°21'38" R
Dc 1°08'45"
T 497.32'
L 991.38'
R 5000.00'

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B26	B71

REV DATE: 2024-11-18
INITIAL: BRM

FOR BIDDING PURPOSES ONLY

574+54 R
Take Out (1) 18" CMP End Section

574+54 R
Install (1) 18" CMP Flared End

584+02
Take Out 18"-140' CMP
and (2) 18" End Sections

583+92
Install 24"-138' RCP
and (2) 24" RCP Flared Ends

583+92 - 93 R
Install Bank and Channel
Protection Gabions (4.5 CY)
& Type B Drainage Fabric (15 SqYd)

585+25
4' x 6' Cattle Pass
Pipe Joint Repair
and Void Grouting

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-11-19

Government Lot 2

E1/2 SE1/4

565+00
570+00
575+00
580+00
585+00
590+00
595+00

150'

T/F

2 PP
2 PP

583+42 R
Begin Type 2 Fence

584+44 R
End Type 2 Fence

583+42-78' & 129'
583+77-78' & 106.00'
584+08-78' & 106.00'
584+44-78' & 129'

Present SD Hwy 47

1/4 Line

PI 576+67.69
N 502947.66
E 2180725.97
Del 23°36'46" R
Dc 1°30'00"
T 798.49'
L 1574.31'
R 3820.00'

Lenny Wolcott, a/k/a Lenny H. Wolcott, and Imogene Wolcott

Lots 3,4 and E1/2SE1/4 of Section 23 - Township 103 North - Range 73 West of the 5th P.M., subject to Lot H-1 as shown by 3 of Plats on page 53 except Lot 1 of Wolcott Ranch Addition

Parcel 1
0.02 ac. Permanent Easement
(834 sq ft), more or less

Government Lot 3

Sec 23 - T103N - R73W

Gov't Lot 6

Former Boundary Rosebud Indian Reservation

1/16 Line

Government Lot 4

Surfacing Removal Limits

Parcel 1
583+42 to 584+44 R
Temporary Easement containing
0.1 ac, more or less

Plotting Date:

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B27	B71

REV DATE:
INITIAL:

Plotting Date:

Sec 25 - T103N - R73W

E1/2 SE1/4

NW1/4

Section Line

33'

Present SD Hwy 47

595+00 600+00 605+00 610+00 615+00 620+00

150' 150'

T/R

Sec 23 - T103N - R73W

1/16 Line

Government Lot 4

Section Line

E1/2 NE1/4

Sec 26 - T103N - R73W

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B28	B71

REV DATE:
INITIAL:

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

Sec 25 - T103N - R73W

NW1/4

SW1/4

1/4 Line

R.O.W. Line

Section Line

33'

T/L

620+00

625+00

630+00

635+00

640+00

645+00

650+00

150'

R.O.W. Line

PI 627+11.64
N 498199.11
E 2182492.65
Del 3°42'58" L
Dc 1°00'00"
T 185.88'
L 371.62'
R 5729.58'

E1/2 NE1/4

PI 632+70.97
N 497687.49
E 2182719.00
Del 7°27'40" L
Dc 1°00'00"
T 373.59'
L 746.12'
R 5729.58'

Sec 26 - T103N - R73W

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B29	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

671+75 L
Take Out 18"-8' RCP
and (1) 18" RCP Flared End

671+75 L
Install 18"-8' RCP
and (1) 18" RCP Flared End

b 678+50 L
Take Out 18"-8' RCP
and (1) 18" RCP Flared End

b 678+50 L
Install 18"-8' RCP
and (1) 18" RCP Flared End

671+75 R
Take Out 18"-8' RCP
and (1) 18" RCP Flared End

671+75 R
Install 18"-8' RCP
and (1) 18" RCP Flared End

b 678+50 R
Take Out 18"-8' RCP
and (1) 18" RCP Flared End

b 678+50 R
Install 18"-8' RCP
and (1) 18" RCP Flared End

Sec 25 - T103N - R73W

SW1/4

R.O.W. Line

650+00

655+00

Present SD Hwy 47

660+00

665+00

670+00

675+00

150'

EQNBK677+72.41
EQNAHDb 677+80.00

Present SD Hwy 47

R.O.W. Line

33'

33'

33'

33'

1/4 Line

Section Line

NW1/4

Sec 36 - T103N - R73W

PI 651+95.30
N 496042.79
E 2183720.04
Del 8°11'18" L
Dc 1°00'00"
T 410.12'
L 818.84'
R 5729.58'

PI 674+54.98
N 494298.46
E 2185158.72
Del 2°54'08" L
Dc 0°30'00"
T 290.29'
L 580.45'
R 11459.16'

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHLITZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B30	B71

FOR BIDDING PURPOSES ONLY

REV DATE:
INITIAL:

b 700+10
4' x 6' Cattle Pass
Pipe Joint Repair
and Void Grouting

E1/2 E1/2 SW1/4 NE1/4

1/16 Line

b 685+00

b 690+00

b 695+00

150'

b 700+00

PI b 694+20.48
N 492722.74
E 2186295.90
Del 59°59'59" R
Dc 5°00'00"
T 661.59'
L 1199.99'
R 1145.92'

PI b 685+59.88
N 493488.72
E 2185898.56
Del 15°00'00" R
Dc 3°44'49"
T 201.31'
L 400.33'
R 1529.14'

Sec 36 - T103N - R73W

PI b 701+60.20
N 491995.64
E 2185831.21
Del 15°00'00" R
Dc 3°44'49"
T 201.31'
L 400.33'
R 1529.14'

1/4 Line

NW1/4 SE1/4

b 705+00

Present SD Hwy 47

150'

b 711+50 L
Begin Type 2 Fence

b 710+00

2 PP

b 710+00 R
Begin Type 2 Fence

EQNBKb 677+72.41
EQNAHDb 677+80.00

675+00

Present SD Hwy 47

1/16 Line

1/4 Line

NW1/4

E1/2 NE1/4 Si

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

Surfacing Removal Limits

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B31	B71

FOR BIDDING PURPOSES ONLY

REV DATE: 2024-11-01
INITIAL: BCS

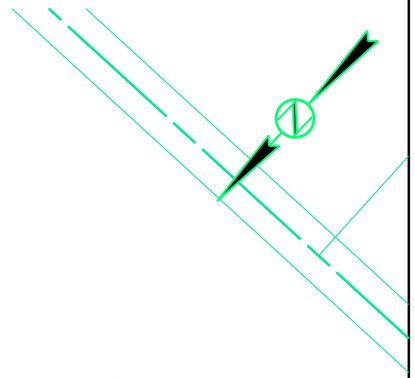
b 712+68
Take Out 96" - 132' CMP
(Incidental Work, Grading)

b 712+80
Install 13'x8'x112' RCBC
(DA = 4.30 sq mi)
(See Section E)

State of South Dakota
(Department of Game, Fish & Parks)

The E1/2 NE1/4 SW1/4
of Section 36 - Township 103 North -
Range 73 West of the 5th P.M.

Parcel A1
(omitted Parcel)



Sec 36 - T103N - R73W

1/4 Line
1/256 Line
1/16 Line
1/64 Line
Tributary to
Bull Creek
NW1/4 SE1/4
N1/2 NE1/4 SE1/4 SW1/4
b 711+50 L
Begin Type 2 Fence
b 713+70 L
End Type 2 Fence
T/F
Present SD Hwy 47
2 PP
b 705+00
150'
b 710+00
b 715+00
b 720+00
b 725+00
b 730+00
b 710+00 R
Begin Type 2 Fence
b 713+70 R
End Type 2 Fence
E1/2 NE1/4 SW1/4
SW1/4

Plotting Date:

Surfacing Removal Limits

REGISTERED PROFESSIONAL ENGINEER
REG. NO.
11670
BENJAMIN
CHARLES
SCHULTZ
SOUTH DAKOTA
2024-11-01

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B32	B71

FOR BIDDING PURPOSES ONLY

REV DATE:
INITIAL:

b 741+54 L
Take Out 18"-8' RCP
and (1) 18" RCP End Section

b 741+54 L
Install 18"-8' RCP
and (1) 18" RCP End Section

b 749+03 R
Take Out (1) 36" RCP End Section

b 749+03 R
Install (1) 36" RCP End Section

b 752+32 R
4' x 6' Cattle Pass
Pipe Joint Repair
and Void Grouting

Government Lot 3

Sec 36 - T103N - R73W

Sec 1 - T102N - R73W

S1/2 NW1/4

1/16 Line

Present SD Hwy 47

b 730+00

b 735+00

b 740+00

b 745+00

b 750+00

b 755+00

b 760+00

150'

150'

33'

33'

33'

33'

33'

Government Lot 4

SW1/4

Section Line

Section Line

Section Line

PI b 734+17.00
N 489797.29
E 2183425.18
Del 7°00'00" L
Dc 2°37'28"
T 133.52'
L 266.71'
R 2183.09'

PI b 736+75.31
N 489600.86
E 2183256.92
Del 8°44'28" L
Dc 3°30'00"
T 125.12'
L 249.74'
R 1637.02'

PI b 744+85.71
N 488912.00
E 2182829.13
Del 45°27'32" L
Dc 3°30'00"
T 685.77'
L 1298.83'
R 1637.02'

PI b 752+32.29
N 488115.74
E 2183022.02
Del 7°00'00" L
Dc 2°37'28"
T 133.52'
L 266.71'
R 2183.07'

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B33	B71

REV DATE:
INITIAL:

b 761+00 L
Take Out (1) 18" RCP End Section

b 761+00 R
Take Out (1) 18" RCP End Section

b 761+00 L
Install (1) 18" RCP End Section

b 761+00 R
Install (1) 18" RCP End Section

b 767+98 L
Take Out (1) 30" RCP End Section

b 767+98 R
Take Out (1) 30" RCP End Section

b 767+98 L
Install (1) 30" RCP End Section

b 767+98 R
Install (1) 30" RCP End Section

b 767+98
Pipe Joint Repair and Void Grouting

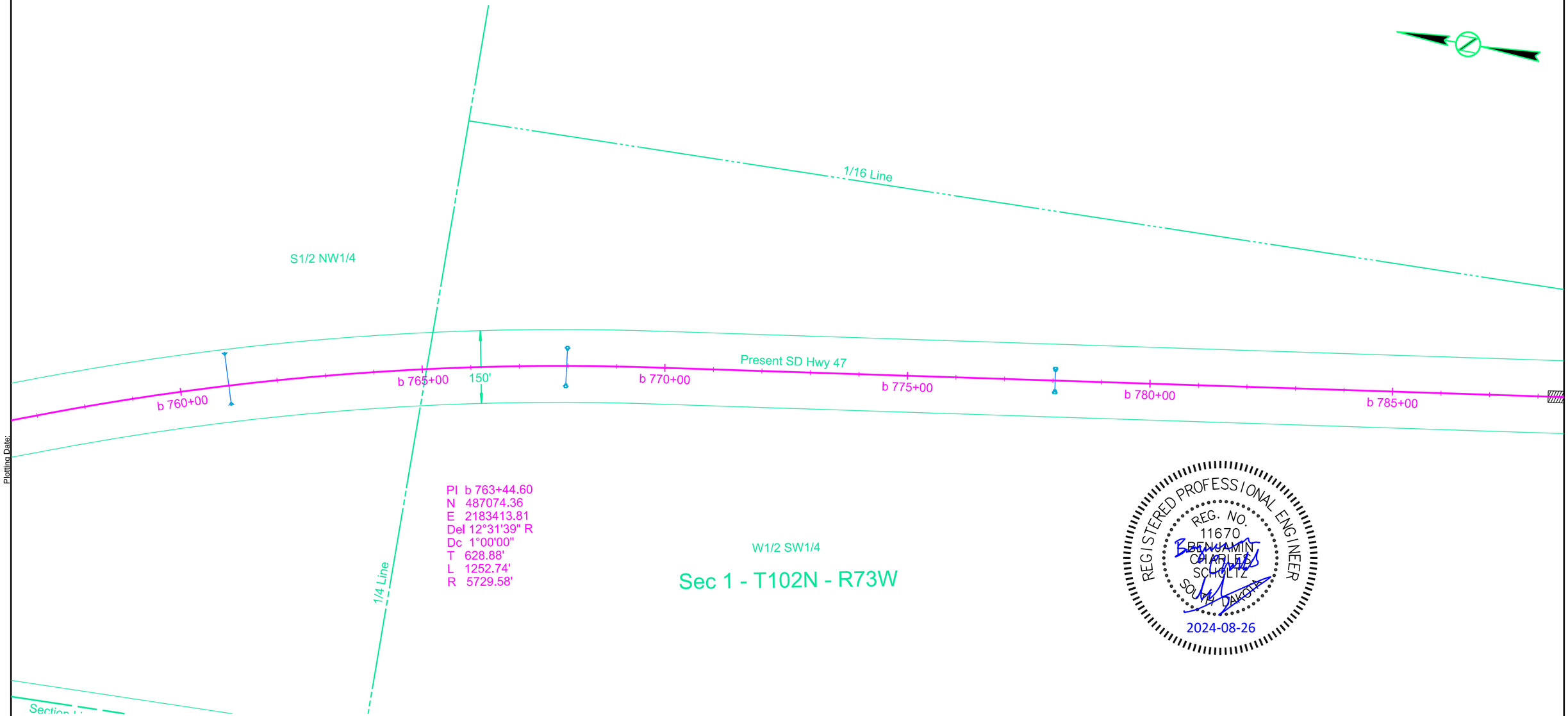
b 778+05 L
Take Out (1) 48" RCP Arch End Section

b 778+05 R
Take Out (1) 48" RCP Arch End Section

b 778+05 L
Install (1) 48" RCP Arch End Section

b 778+05 R
Install (1) 48" RCP Arch End Section

b 778+05
Pipe Joint Repair and Void Grouting



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B34	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

b 808+65 L
Take Out (1) 30" RCP End Section

b 808+65 R
Take Out (1) 30" RCP End Section

b 808+65 L
Install (1) 30" RCP End Section

b 808+65 R
Install Bank and Channel
Protection Gabions (6.0 CY)
& Type B Drainage Fabric (19 SY)
and (1) 30" RCP End Section

E1/2 NW1/4

1/16 Line

33'
33'

Cutoff

150'

Present SD Hwy 47

150'

b 785+00

b 790+00

b 795+00

b 800+00

b 805+00

b 810+00

33'
33'

W1/2 SW1/4

Section Line

W1/2 NW1/4

Sec 12 - T102N - R73W

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

Surfacing Removal Limits

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B35	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

b 811+98
4' x 6' Cattle Pass
Pipe Joint Repair
and Void Grouting

b 822+44
Take Out 72"-137' RCP
Take Out 72"-142' RCP
and (4) 72" RCP End Sections

b 822+46 (259 ac)
Skewed 6° RHF
Install Dual 72"-100' RCP
and (4) 72" RCP Flared Ends
(Spaced 10.0 ft C to C
Controlled Density Fill)

b 839+75
Install Cutoff Drain,
4"-40' Perforated PVC,
4"-10' PVC, and (1) Precast Concrete Headwall

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

E1/2 NW1/4

PI b 821+03.78
N 481367.53
E 2184225.02
Del 43°17'10" L
Dc 2°30'00"
T 909.39'
L 1731.44'
R 2291.83'

E1/2 SW1/4

Terence Hickey & Sheree Hickey

The E1/2 SW1/4 of
Section 12 - Township 102 North -
Range 73 West of the 5th P.M., except
Lot H-1, Lot PE1 and Lot PE2 therein

Parcel A2

SE1/4

b 810+00
b 815+00
b 820+00
b 825+00
b 830+00
b 835+00
b 840+00
150'
Present SD Hwy 47
T/F
HO
W
2 PP
b 822+02 R
Begin Type 2 Fence
b 823+00 R
End Type 2 Fence
b 822+02-75' & 125'
b 823+00-75' & 125'
Drainage Easement

W1/2 NW1/4
NW1/4 SW1/4
1/4 Line
1/16 Line
E1/2 SW1/4

Sec 12 - T102N - R73W

Surfacing Removal Limits

Parcel A2
b 822+02 to b 823+00 R
Temporary Easement containing
0.1 ac, more or less

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B36	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

b 839+75
Install 4"-40' Perforated PVC Drain Pipe
and 4"-10' PVC Outlet Pipe
and 1 Precast Concrete Headwall

Sec 12 - T102N - R73W

SE1/4

Present SD Hwy 47

b 840+00

b 845+00

b 850+00

b 855+00

150'

b 860+00

Present SD Hwy 47

b 865+00 EQNAHDc 865+98.20

EQNBKb 867+53.83

Drainage Easement

Drainage Easement

Section Line

Section Line

1/4 Line

33'

PI b 855+14.22
N 479184.21
E 2186957.71
Del 5°21'03" R
Dc 2°00'00"
T 133.87'
L 267.54'
R 2864.79'

NW1/4

PI b 860+60.51
N 478804.76
E 2187350.99
Del 16°23'31" R
Dc 2°00'00"
T 412.62'
L 819.60'
R 2864.79'

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

Sec 13 - T102N - R73W

Surfacing Removal Limits

Plotting Date:

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B37	B71

REV DATE:
INITIAL:

Plotting Date:

Sec 18 - T102N - R72W

Government Lot 1

Government Lot 2

Section Line

1/16 Line

EQUATION
b 867+53.83 Bk =
c 865+98.20 Ah

Present SD Hwy 47

b 865+00

EQNBKb 867+53.83
EQNAHDc 865+98.20

c 870+00

c 875+00

c 880+00

c 885+00

c 890+00

33'

150'

PI c 892+76.56
N 475869.18
E 2189020.91
Del 49°33'35" R
Dc 2°30'00"
T 1058.00'
L 1982.39'
R 2291.83'

Government Lot 3

1/4 Line

Sec 13 - T102N - R73W

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA

2024-08-26

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B38	B71

FOR BIDDING PURPOSES ONLY

REV DATE:
INITIAL:

c 900+00
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

c 910+30 L
Take Out 18"-8' RCP
and (1) 18" RCP End Section

c 910+30 R
Take Out 18"-8' RCP
and (1) 18" RCP End Section

c 910+30 L
Install 18"-8' RCP
and (1) 18" RCP End Section

c 910+30 R
Install 18"-8' RCP
and (1) 18" RCP End Section

1/16 Line

Sec 18 - T102N - R72W

Sec 19 - T102N - R72W

PI c 892+76.56
N 475869.18
E 2189020.91
Del 49°33'35" R
Dc 2°30'00"
T 1058.00'
L 1982.39'
R 2291.83'

Government Lot 4

Government Lot 1

c 890+00
c 895+00
c 900+00
c 905+00
c 910+00
c 915+00
c 920+00

Present SD Hwy 47

33'
33'
150'
150'

Section Line
33'
33'
33'
33'
33'

Government Lot 3

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

PI c 908+60.64
N 474254.33
E 2188435.51
Del 6°00'00" L
Dc 2°14'59"
T 133.47'
L 266.70'
R 2546.80'

PI c 912+07.21
N 473917.71
E 2188352.04
Del 12°44'51" L
Dc 3°00'00"
T 213.34'
L 424.92'
R 1909.86'

Section Line

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B39	B71

FOR BIDDING PURPOSES ONLY

REV DATE:
INITIAL:

c 937+55
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

c 939+04 L
Take out 24"- 48' RCP
(6 Sections)
and End Section

c 939+04 R
Take out 24"- 24' RCP
(3 Sections)
and End Section

c 939+04
Plug 162' of 24" CMP
with Cellular Grout (18.8 CuYd)

c 939+04 L 0.2 ac
Skewed 56° RHF
Bore and Jack 30" - 192' Steel Pipe
and (2) 30" Flared Ends

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

40 Bar Ranch, LLC

That portion of the NW1/4 lying east of SD Highway 47 of
Section 19 - Township 102 North - Range 72 West of the 5th P.M.

Parcel 2
0.03 ac. Permanent Easement
(1,361 sq ft), more or less

1/16 Line

Sec 19 - T102N - R72W

E1/2 NW1/4

c 937+66-75' & 197'
c 938+70-75.00'
c 938+51-104.00'
c 938+75-121.00'
c 939+07-75.00'
c 939+83-75' & 197'

c 939+83 L
End Type 2 Fence

c 937+66 L
Begin Type 2 Fence

OH
2 PP
OH
2 PP
OH

150'

c 940+00
2 PP
2 PP
W
W
W

c 940+86 R
End Type 2 Fence

c 938+86 R
Begin Type 2 Fence

1/16 Line

c 938+86-75' & 175'
c 940+86-75' & 175'

1/4 Line

c 945+00

Government Lot 1

Present SD Hwy 47

c 915+00
c 920+00
c 925+00
c 930+00
c 935+00

33'
33'
150'

PI c 920+08.66
N 473114.67
E 2188335.52
Del 34°19'37" L
Dc 3°00'00"
T 589.87'
L 1144.23'
R 1909.86'

Government Lot 2

PI c 926+96.50
N 472509.05
E 2188731.05
Del 6°00'00" L
Dc 2°14'59"
T 133.47'
L 266.70'
R 2546.85'

James E. Baumgartner & Randy Baumgartner

The E1/2NW1/4 lying west of SD Highway 47
of Section 19 - Township 102 North - Range 72 West
of the 5th P.M.

Parcel A3

Parcel 2
c 937+66 to c 939+83 L
Temporary Easement containing
0.6 ac, more or less

Parcel A3
c 938+86 to c 940+86 R
Temporary Easement containing
0.5 ac, more or less

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B40	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

c 967+51
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

c 969+32 L
Take Out 18"-8' RCP
and (1) 18" RCP End Section

c 969+32 R
Take Out 18"-8' RCP
and (1) 18" RCP End Section

c 969+32 L
Install 18"-8' RCP
and (1) 18" RCP End Section

c 969+32 R
Install 18"-8' RCP
and (1) 18" RCP End Section

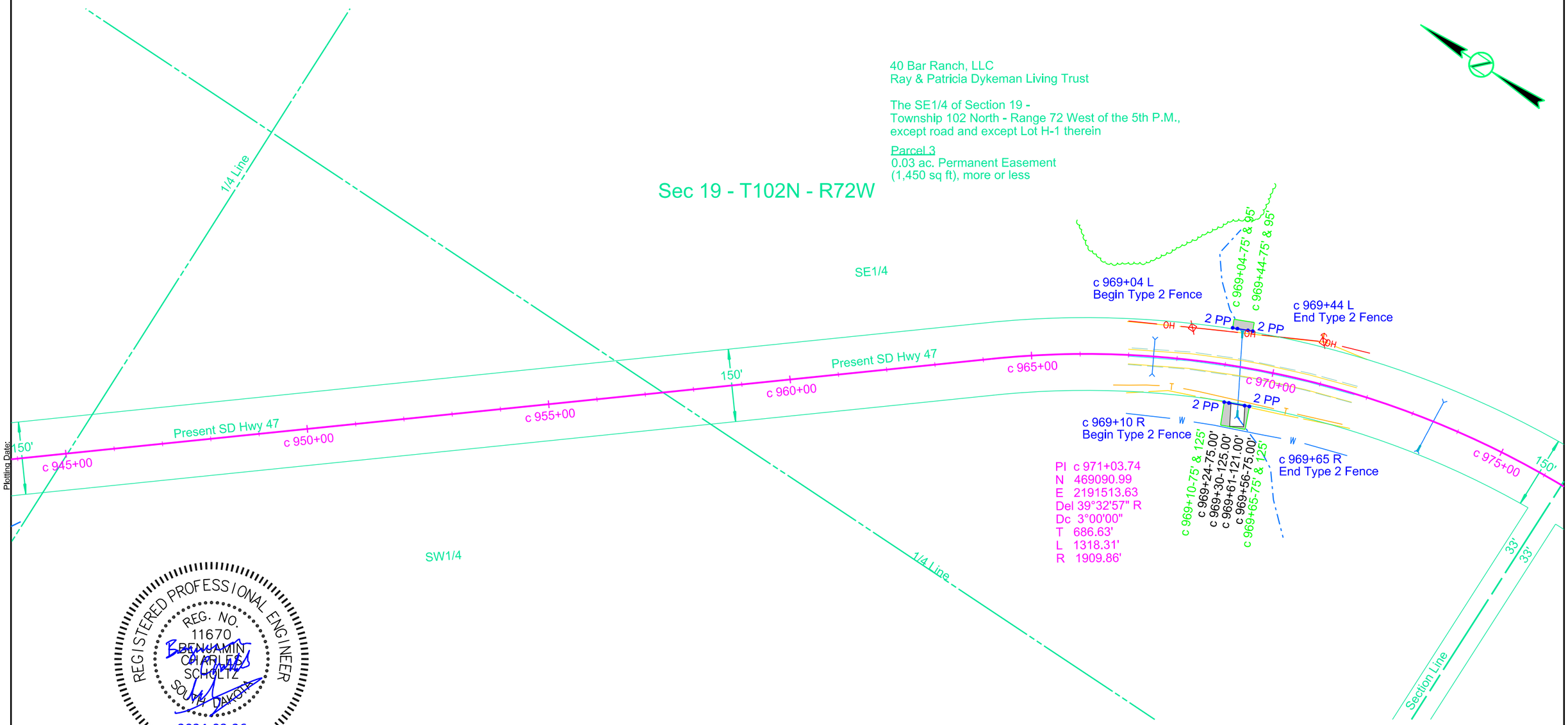
c 969+46 R
Reset 18"-8' RCP (1 Section)
and (1) 18" RCP End Section (1 ea)

40 Bar Ranch, LLC
Ray & Patricia Dykeman Living Trust

The SE1/4 of Section 19 -
Township 102 North - Range 72 West of the 5th P.M.,
except road and except Lot H-1 therein

Parcel 3
0.03 ac. Permanent Easement
(1,450 sq ft), more or less

Sec 19 - T102N - R72W



REGISTERED PROFESSIONAL ENGINEER
REG. NO.
11670
BENJAMIN
CHARLES
SCHULTZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

Parcel 3
c 969+04 to c 969+44 L
Temporary Easement containing
0.1 ac, more or less

Parcel 3
c 969+10 to c 969+65 R
Temporary Easement containing
0.1 ac, more or less

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B41	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

c 981+66 L
Take out 18"- 24' RCP
(3 Sections)

c 981+66 R
Take out 18"- 40' RCP
(5 Sections)
and End Section

c 981+66
Plug 186' of 18" RCP
with Cellular Grout (12.2 CuYd)

c 981+81 (12 ac)
Skewed 40° RHF
Bore and Jack 24"-212' Steel Pipe
and (2) 24" Flared Ends

c 998+44
Take Out 18"-100' RCP
and (2) 18" RCP End Sections

c 998+44 (6 ac)
Skewed 50° LHF
Install 24" - 108' RCP
(1) RCP Flared End
(1) RCP to CMP Transition
24" - 66' CMP
(1) CMP Elbow
and (1) CMP Flared End

c 997+74 R
Install Bank and Channel
Protection Gabions (4.5 CY)
& Type B Drainage Fabric (15 SY)

Sec 19
- T102N -
R72W

Theresa B. Young
Helen A. Vanorny Living Trust &
Robert Vanorny Living Trust

The N1/2 NE1/4 of Section 30 -
Township 102 North - Range 72 West
of the 5th P.M., except road and except
Lot H-1 therein

Parcel 4
0.03 ac. Permanent Easement
(1,296 sq ft), more or less

Sec 30 - T102N - R72W

40 Bar Ranch, LLC &
Ray & Patricia Dykeman Living Trust

The S1/2 NE1/4 of Section 30 -
Township 102 North - Range 72 West
of the 5th P.M., except Lot H-1 therein

Parcel 5
0.04 ac. Permanent Easement
(1,926 sq ft), more or less

1/4 Line

c 980+00-75' & 168'

c 982+00-75' & 168'

c 980+00 L
Begin Type 2 Fence

c 982+00 L
End Type 2 Fence

33'

33'

150'

OH

2 PP

Present SD Hwy 47

c 975+00

c 980+00

c 985+00

c 990+00

c 995+00

c 1000+00

c 981+72 R
Begin Type 2 Fence

c 983+72 R
End Type 2 Fence

c 997+16 R
Begin Type 2 Fence

c 998+16 R
End Type 2 Fence

c 981+72-75' & 176'

c 982+47-75.00' & 100.00'

c 982+99-75.00' & 100.00'

c 983+72-75' & 176'

c 997+16-75' & 125'

c 997+37-75.00' & 105.00'

c 998+01-75.00' & 105.00'

c 998+16-75' & 125'

Section Line

1/16 Line

S1/2 NE1/4

SE

REGISTERED PROFESSIONAL ENGINEER
REG. NO.
11670
BENJAMIN
CHARLES
SCHOLTZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

Surfacing Removal Limits

Parcel 4
c 980+00 to c 982+00 L
Temporary Easement containing
0.4 ac, more or less

Parcel 4
c 981+72 to c 983+72 R
Temporary Easement containing
0.4 ac, more or less

Parcel 5
c 997+16 to c 998+16 R
Temporary Easement containing
0.1 ac, more or less

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B42	B71

REV DATE:
INITIAL:

Sec 30 - T102N - R72W

1/4 Line

OH OH

150'

Present SD Hwy 47

c 1000+00 c 1005+00 c 1010+00 c 1015+00 c 1020+00 c 1025+00

2 PP 2 PP

c 998+16 R
End Type 2 Fence

ce

Plotting Date:

c 997+16-75' & 125'

c 997+37-75.00' & 105.00'
c 998+01-75.00' & 105.00'

c 998+16-75' & 125'

S1/2 NE1/4

1/4 Line

SE1/4

SE1/4

Surfacing Removal Limits

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B43	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

c 1026+34
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

c 1042+82
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

c 1042+82 L
Remove (1) 4'x6' RCP Flared End
For Reset

c 1042+82 R
Remove (1) 4'x6' RCP Flared End
For Reset

c 1042+82 L
Reset (1) 4'x6' RCP Flared End

c 1042+82 R
Reset (1) 4'x6' RCP Flared End

Sec 30 - T102N - R72W

Sec 31 - T102N - R72W

33'
33'
150'

Present SD Hwy 47

c 1025+00
c 1030+00
c 1035+00
c 1040+00
c 1045+00
c 1050+00

Plotting Date:

Section Line

SE1/4

NE1/4

SE1/4

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B44	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

c 1049+33 L
Take Out (1) 18" RCP End Section

c 1049+33 L
Install (1) 18" RCP Flared End

c 1049+33 R
Take Out (1) 18" RCP End Section

c 1049+33 R
Install (1) 18" RCP Flared End

c 1066+40 L
Take Out (1) 18" RCP End Section

c 1066+40
Install (1) 18" RCP End Section

c 1066+40 R
Take Out (1) 18" RCP End Section

c 1066+40 R
Install (1) 18" RCP End Section

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

Sec 31 - T102N - R72W

150'

Present SD Hwy 47

c 1050+00 c 1055+00 c 1060+00 c 1065+00 c 1070+00 c 1075+00

SE1/4

1/4 Line

SE1/4

1/4 Line

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B45	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

c 1078+36 L
Take Out 18"-16' RCP
and (1) 18" RCP End Section

c 1078+36 R
Take Out 18"-8' RCP
and (1) 18" RCP End Section

c 1078+36 L
Install 18"-16' RCP
and (1) 18" RCP End Section

c 1078+36 R
Install 18"-8' RCP
and (1) 18" RCP End Section

c 1100+00 L
Take Out 36"-8' RCP
and (1) 36" RCP End Section

c 1100+00 R
Take Out 36"-8' RCP
and (1) 36" RCP End Section

c 1100+00 L
Install 36"-8' RCP
and (1) 36" RCP End Section

c 1100+00 R
Install 36"-8' RCP
and (1) 36" RCP End Section

c 1101+00
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

Sec 31-T102N-R72W

Sec 6-T101N-R72W

1/16 Line

1/16 Line

Government Lot 1

Government Lot 2

c 1075+00

c 1080+00

c 1085+00

c 1090+00

c 1095+00

c 1100+00

c 1105+00

Present SD Hwy 47

150'

150'

33'

33'

33'

33'

Section Line

SE1/4

S1/2 NE1/4

PI c 1088+76.94
N 457263.11
E 2191430.89
Del 39°25'40" L
Dc 2°00'00"
T 1026.53'
L 1971.39'
R 2864.79'

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B46	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

c 1113+63 L
Take Out 18"-8' RCP
and (1) 18" RCP End Section

c 1113+63 R
Take Out 18"-8' RCP
and (1) 18" RCP End Section

c 1113+63 L
Install 18"-8' RCP
and (1) 18" RCP End Section

c 1113+63 R
Install 18"-8' RCP
and (1) 18" RCP End Section

c 1121+94
Take Out 120" - 127' CMP
(Incidental Work, Grading)

c 1122+03
Install 9'x9'x136'-9" RCBC
(DA = 1.62 sq mi)
(See Section E)

Tammi Onigkeit
Angela Stas
Chad Christensen

The SW1/4 of Section 5 - Township 101 North - Range 72 West of the 5th P.M., except Lot H-1 therein

Parcel 6
0.03 ac. Permanent Easement
(1,248 sq ft), more or less

Sec 5-T101N-R72W

Section Line

1/4 Line

S1/2 NE1/4

SW1/4

c 1118+90 L
Begin Type 2 Fence

c 1121+30-195'

c 1121+72-75.00' & 101.00'

c 1122+20-75.00' & 101.00'

c 1123+32-195'

c 1125+50-75'

DIV 01
PI 208+15.73
N 454379.39
E 2193777.54
Del 33°14'47" L
Dc 14°19'26"
T 119.42'
L 232.10'
R 400.00'

205+00

200+00

209+28

150'

2 PP

8-2 PP

c 1125+50 L
End Type 2 Fence

33'

OH

W

T

c 1105+00

c 1110+00

c 1115+00

c 1120+00

c 1125+00

c 1130+00

Present SD Hwy 47

c 1120+75 R
Begin Type 2 Fence

c 1120+76-75'

c 1123+00-75' & 125'

c.1121+38-125'

c 1125+43 R
End Type 2 Fence

DIV 01
PI 201+19.42
N 454874.21
E 2193374.26
Del 33°14'47" L
Dc 14°19'26"
T 119.42'
L 232.10'
R 400.00'

DIV 01
PI 204+94.32
N 454758.98
E 2193738.09
Del 66°29'34"R
Dc 14°19'26"
T 262.22'
L 464.21'
R 400.00'

Sec 6-T101N-R72W

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHULTZ
SOUTH DAKOTA
2024-08-26

Surfacing Removal Limits

Parcel 6
c 1118+90 to c 1125+50 L
Temporary Easement containing
1.2 ac, more or less

Parcel 6
c 1120+76 to c 1123+00 R
Temporary Easement containing
0.2 ac, more or less

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B47	B71

FOR BIDDING PURPOSES ONLY

Plotting Date: 08-26-2024

Mainline SD47

1790 1780 1770 1760 1750 1740 1730 1720 1710

c 1105+00 c 1110+00 c 1115+00 c 1120+00 c 1125+00 c 1130+00 c 1135+00

PVI c 1122+06
Elev 1757.47

L 67.66ft
G1 -0.2541%
G2 2.2661%
K 27

PVI c 1123+22
Elev 1758.68

-0.2541% 2.2661%

PVI c 1122+63
Elev 1757.33

1758.17

Q_x = 273 cfs
A_x = 19 sq ft
V_x = 14.1 fps
Q_x = 273 cfs
Q_{100} = 498 cfs
Q_{OT} = >Q100 cfs
V_{max} = 15.8 fps

Traffic Diversion
MRM 46.00+0.370

1780 1770 1760 1750 1740 1730 1720 1710 1700 1690

200+00 205+00 210+00

PVC 204+13.78
Elev 1752.40

PVT 205+13.78
Elev 1752.76

-2.2250% 2.9476%

PVI 201+09
Elev 1759.19

L 100.00ft
G1 -2.2250%
G2 2.9476%
K 19

PVI 204+04
Elev 1751.28

PVI 208+23
Elev 1761.87

1757.15 1754.93 1752.70 1752.40 1755.30 1758.25 1761.19

REGISTERED PROFESSIONAL ENGINEER
REG. NO.
11670
BENJAMIN
CHARLES
SCHOLTZ
SOUTH DAKOTA
2024-08-26

Plot Scale - 1:200

Plotted From - BSCHOLTZ

File - ...\B47 STAv 200+00_Hwy Diversion

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B48	B71

REV DATE:
INITIAL:

Sec 5-T101N-R72W

SW1/4

NW1/4

1/4 Line

33'

33'

33'

33'

-50 L
be 2 Fence

Present SD Hwy 47

c 1130+00

c 1135+00

c 1140+00

150'

c 1145+00

150'

c 1150+00

c 1155+00

Plotting Date:

33'

33'

Section Line

NW1/4

Sec 8 - T101N - R72W

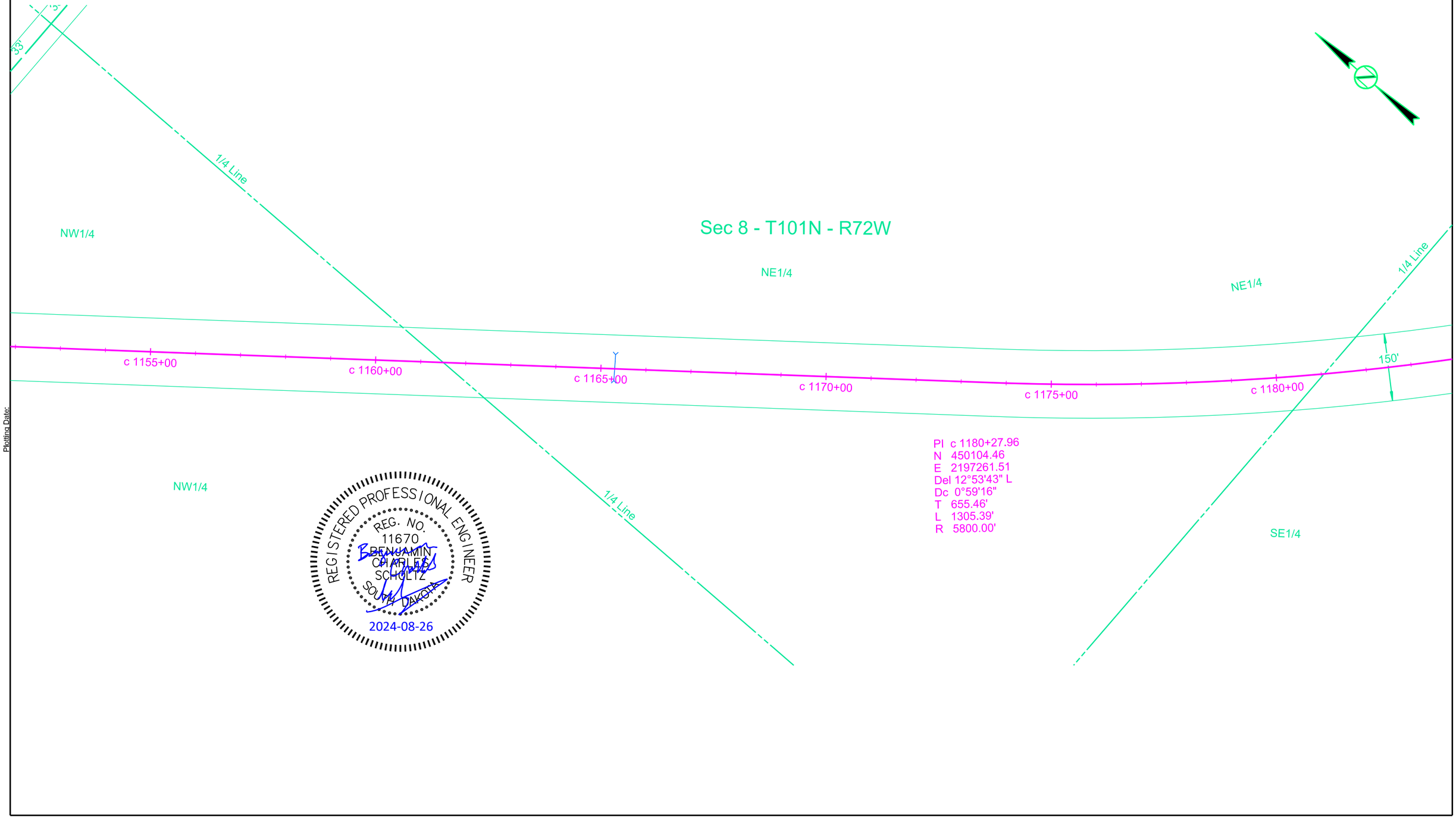
REGISTERED PROFESSIONAL ENGINEER
REG. NO.
11670
BENJAMIN
CHARLES
SCHOLTZ
SOUTH DAKOTA
2024-08-26

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B49	B71

REV DATE:
INITIAL:

Plotting Date:



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B50	B71

FOR BIDDING PURPOSES ONLY

REV DATE:
INITIAL:

c 1187+50
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

Sec 8 - T101N - R72W

Sec 9 - T101N - R72W

NE1/4

1/4 Line

Section Line

SW1/4

150'

150'

Present SD Hwy 47

c 1180+00

c 1185+00

c 1190+00

c 1195+00

c 1200+00

c 1205+00

PI c 1180+27.96
N 450104.46
E 2197261.51
Del 12°53'43" L
Dc 0°59'16"
T 655.46'
L 1305.39'
R 5800.00'

SE1/4

SE1/4

REGISTERED PROFESSIONAL ENGINEER
REG. NO.
11670
BENJAMIN
CHARLES
SCHOLTZ
SOUTH DAKOTA
2024-08-26

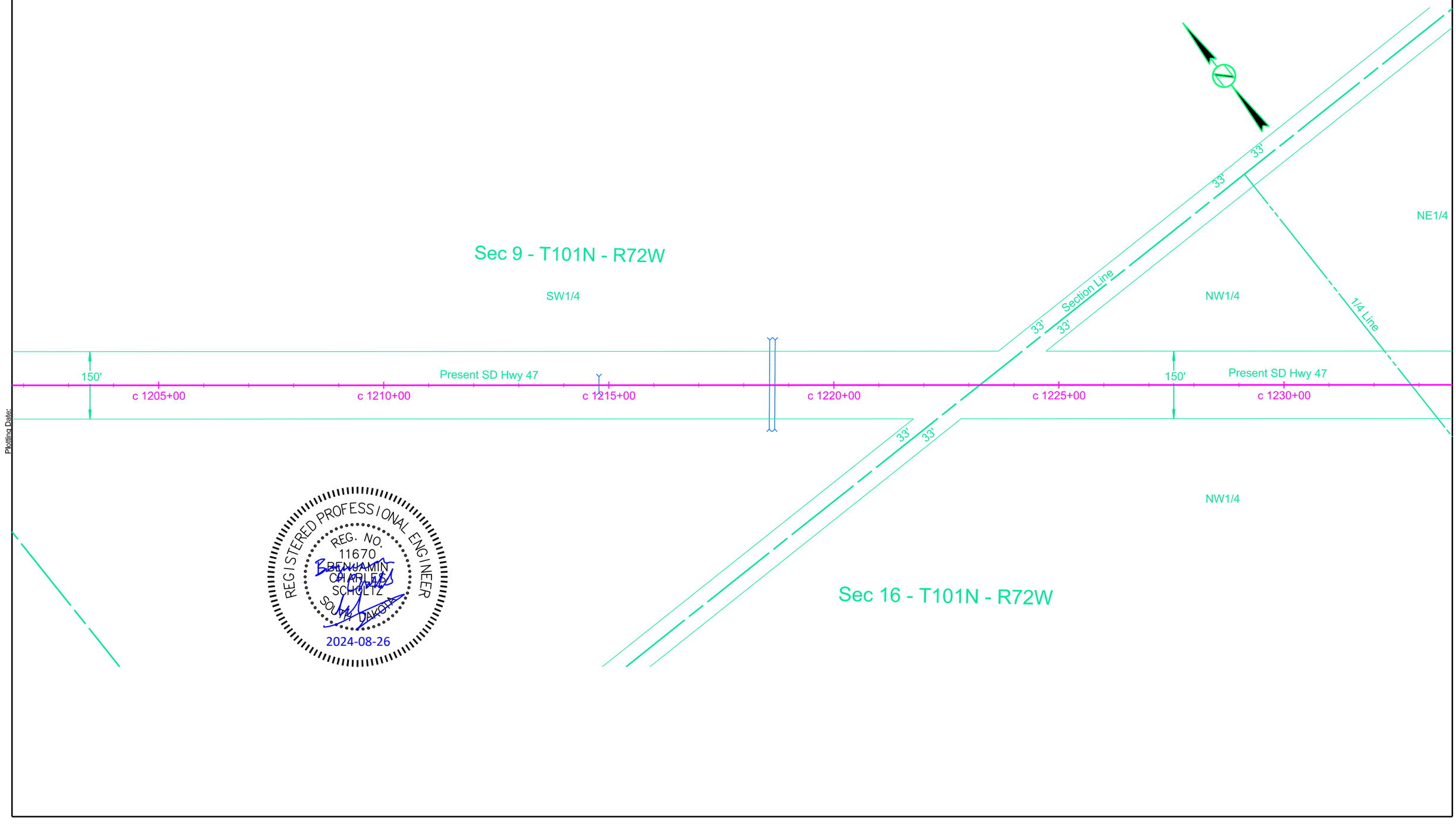
Plotting Date:

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B51	B71

REV DATE:
INITIAL:

Plotting Date:



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B52	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

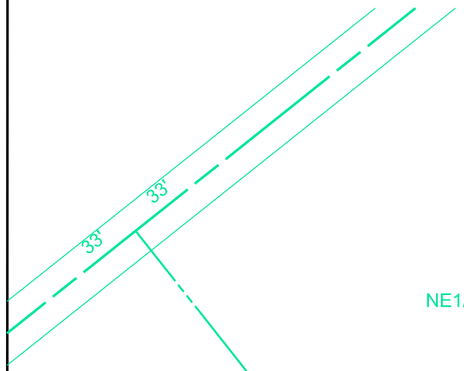
c 1240+32 L
Take Out 18"-8' RCP
and (1) 18" RCP Flared End

c 1240+32 R
Take Out 18"-8' RCP
and (1) 18" RCP Flared End

c 1240+32 L
Install 18"-8' RCP
and (1) 18" RCP Flared End

c 1240+32 R
Install 18"-8' RCP
and (1) 18" RCP Flared End

c 1243+45
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting



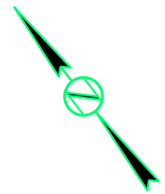
NE1/4

NW1/4

1/4 Line

Sec 16 - T101N - R72W

NE1/4



50'

Present SD Hwy 47

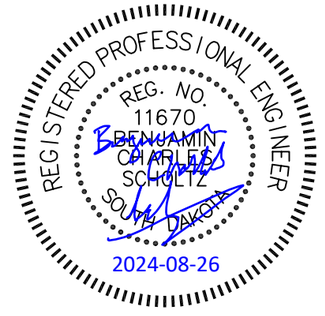
c 1230+00 c 1235+00 c 1240+00 c 1245+00 c 1250+00 c 1255+00

Present SD Hwy 47

NW1/4

1/4 Line

Sec 16 - T101N - R72W



Plotting Date:

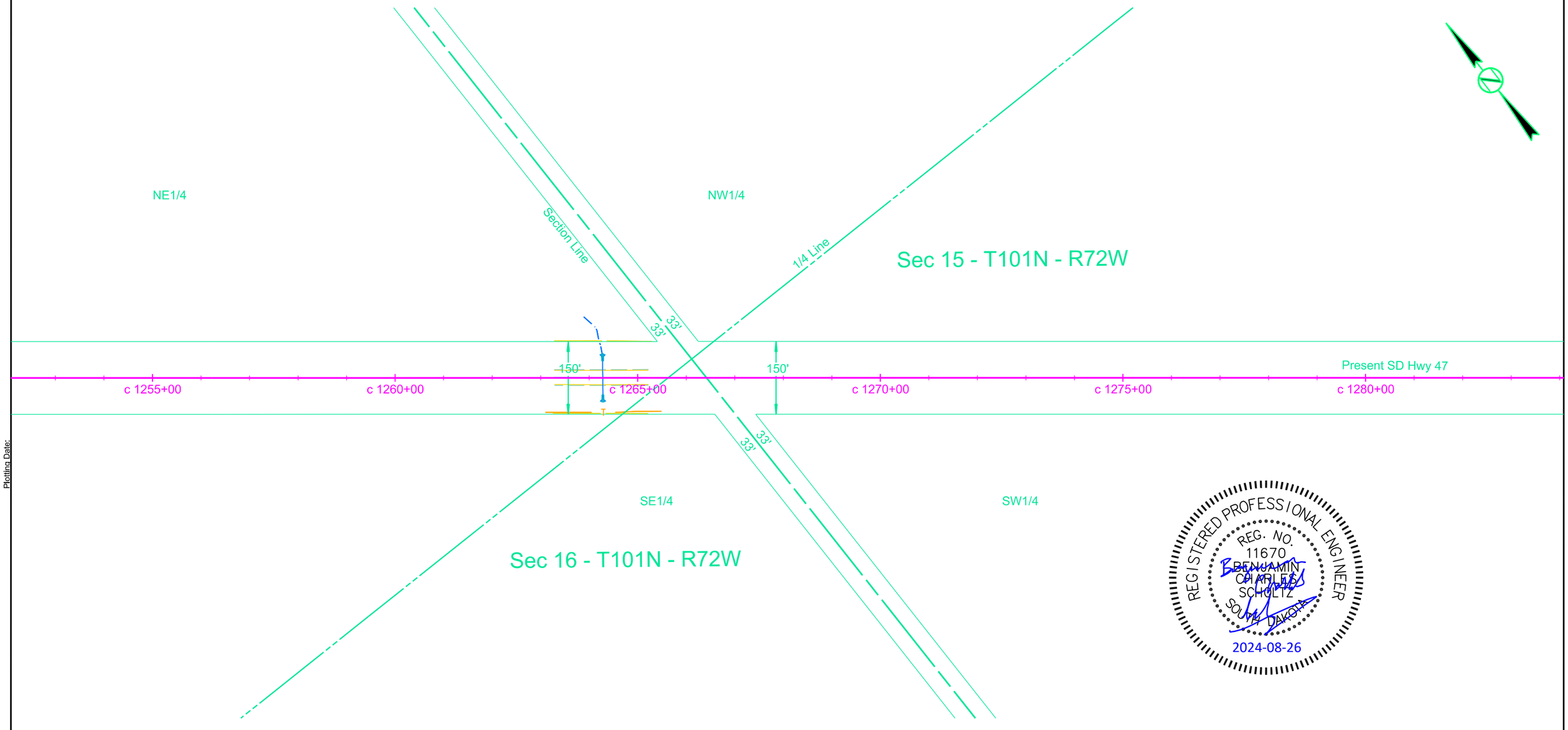
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B53	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

c 1264+28 L
Take Out 42"-8' RCP
and (1) 42" RCP Flared End

c 1264+28 L
Install 42"-8' RCP
and (1) 42" RCP Flared End



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B54	B71

REV DATE:
INITIAL:

FOR BIDDING PURPOSES ONLY

c 1284+23
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

c 1286+20 L
Reset (1) 60" RCP End Section

c 1286+20 L
Remove (1) 60" RCP End Section
For Reset

c 1302+21 L
Take Out (1) 18" RCP End Section

c 1302+21 R
Take Out (1) 18" RCP End Section

c 1302+21 L
Install (1) 18" RCP Flared End

c 1302+21 R
Install (1) 18" RCP Flared End

Sec 15 - T101N - R72W

SE1/4

1/4 Line

Present SD Hwy 47

c 1280+00 c 1285+00 c 1290+00 c 1295+00 c 1300+00 c 1305+00

Present SD Hwy 47

150'

33'

33'

Section Line

1/4 Line

SW1/4

Sec 22 - T101N - R72W

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B55	B71

FOR BIDDING PURPOSES ONLY

REV DATE:
INITIAL:

c 1311+81
4'x6' Cattle Pass
Pipe Joint Repair
and Void Grouting

c 1312+25
2 - 54" RCP
Pipe Joint Repair
and Void Grouting
(DA = 522 ac)

Sec 15 - T101N - R72W

Sec 22 - T101N - R72W

PI c 1333+45.39
N 440686.44
E 2209348.45
Del 51°24'15" R
Dc 2°30'00"
T 1103.09'
L 2056.17'
R 2291.83'

SE1/4

NE1/4

Section Line

Section Line

33'

33'

33'

33'

150'

150'

Present SD Hwy 47

t SD Hwy 47

c 1305+00

c 1310+00

c 1315+00

c 1320+00

c 1325+00

c 1330+00

c 1335+00

REGISTERED PROFESSIONAL ENGINEER
REG. NO.
11670
BENJAMIN
CHARLES
SCHOLTZ
SOUTH DAKOTA

2024-08-26

Plotting Date:

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B56	B71

FOR BIDDING PURPOSES ONLY

REV DATE:
INITIAL:

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-08-26

Plotting Date:

Sec. 23 - T101N - R72W

NW1/4

N1/2 SW1/4

S1/2 SW1/4

Section Line

33'

33'

150'

END P 0047(113)42
SD Highway 47
Station c 1353+00

c 1330+00
c 1335+00
c 1340+00
c 1345+00
c 1350+00
c 1355+00
c 1360+00

150'

200'

200'

NE1/4

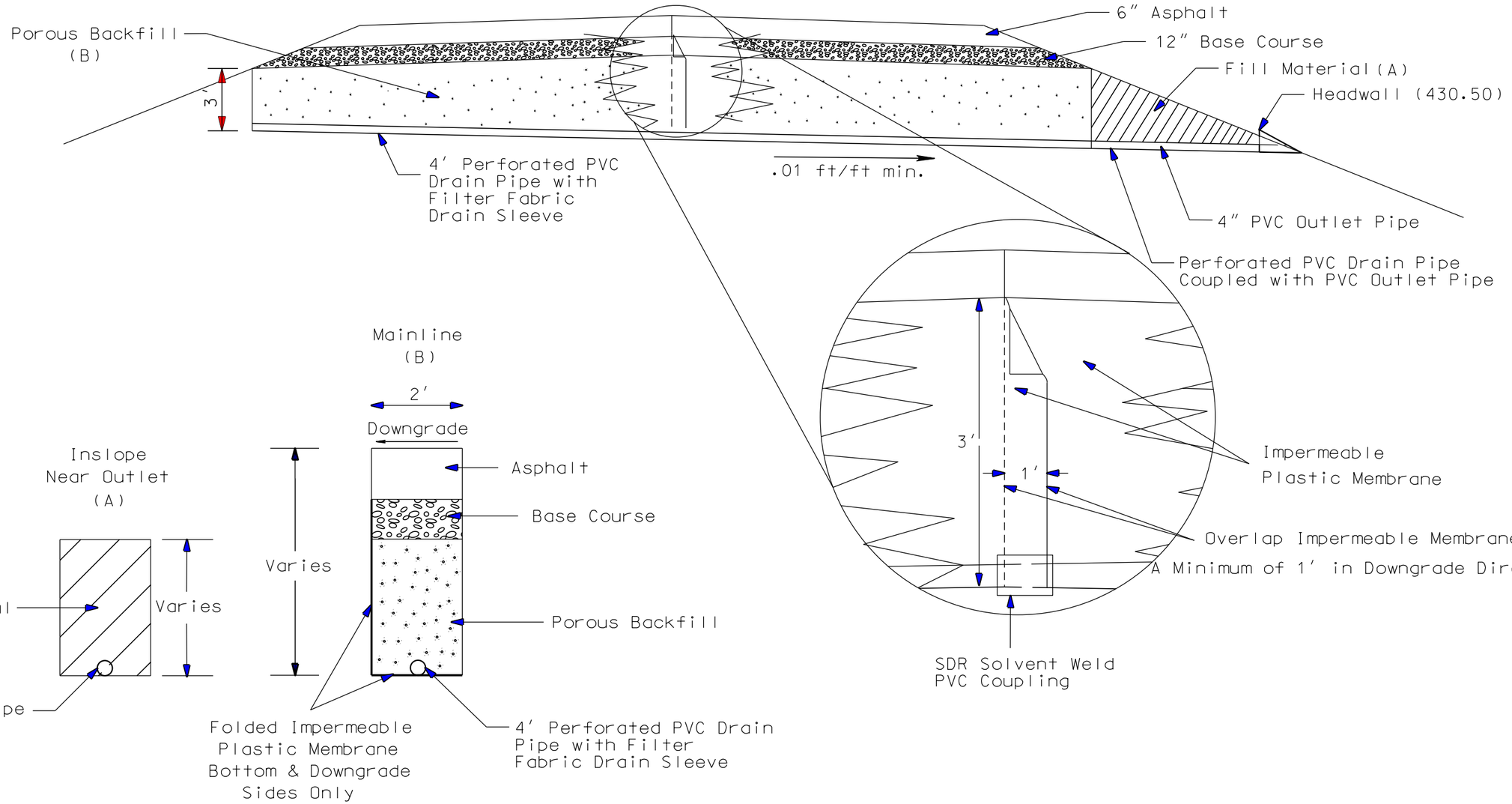
1/4 Line

SE1/4

PI c 1333+45.39
N 440686.44
E 2209348.45
Del 51°24'15" R
Dc 2°30'00"
T 1103.09'
L 2056.17'
R 2291.83'

Sec 22 - T101N - R72W

Typical Cutoff Drain Installation



4″ Perforated PVC Drain Pipe shall be SDR 35 perforated solvent weld PCV pipe conforming to ASTM D3034.

4″ PVC Outlet Pipe shall be schedule 40 PVC pipe conforming to ASTM D1785 designated as PVC 1120, PVC 1220, or PVC 2120.

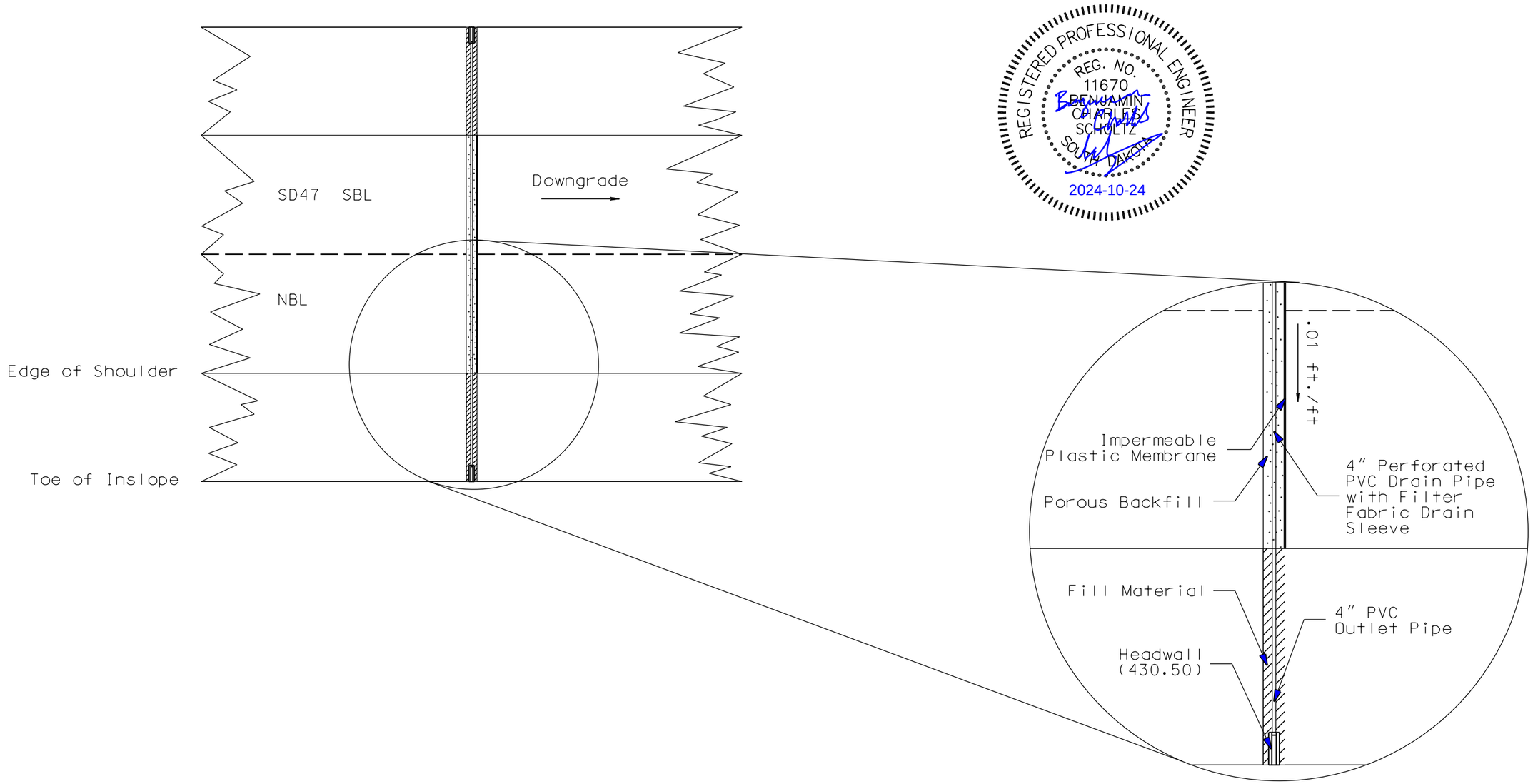
REV DATE: 9/30/2024
INITIAL: BRM

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B58	B71

Plotting Date: 10-18-2024

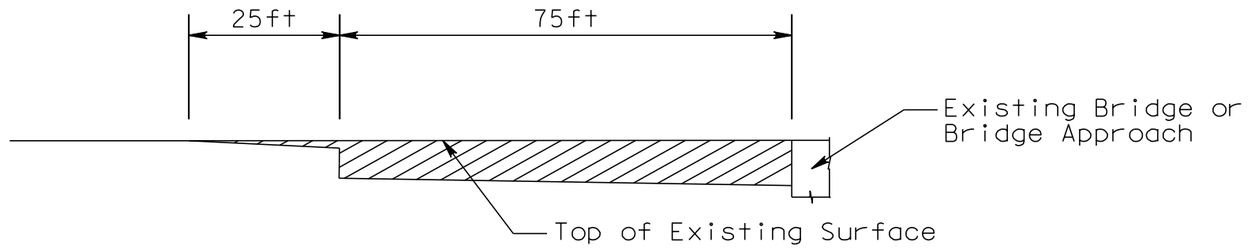
Typical Cutoff Drain Installation



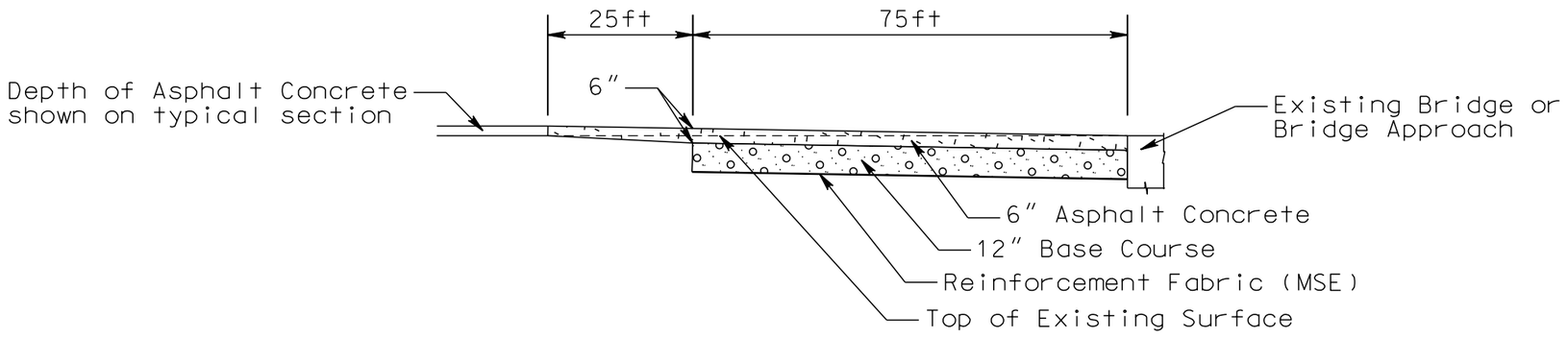
REGISTERED PROFESSIONAL ENGINEER
REG. NO. 11670
BENJAMIN CHARLES SCHOLTZ
SOUTH DAKOTA
2024-10-24

Plot Scale - 1:200
Plotting Date:
Plotted From - BSCHOLTZ
File - ...\B58_Special Detail_Cutoff Drain_02.dgn

DETAIL FOR BRIDGE APPROACH



Area to be cut out at bridge,
Tapers to daylight at 100'.
Typical at both ends of bridge.

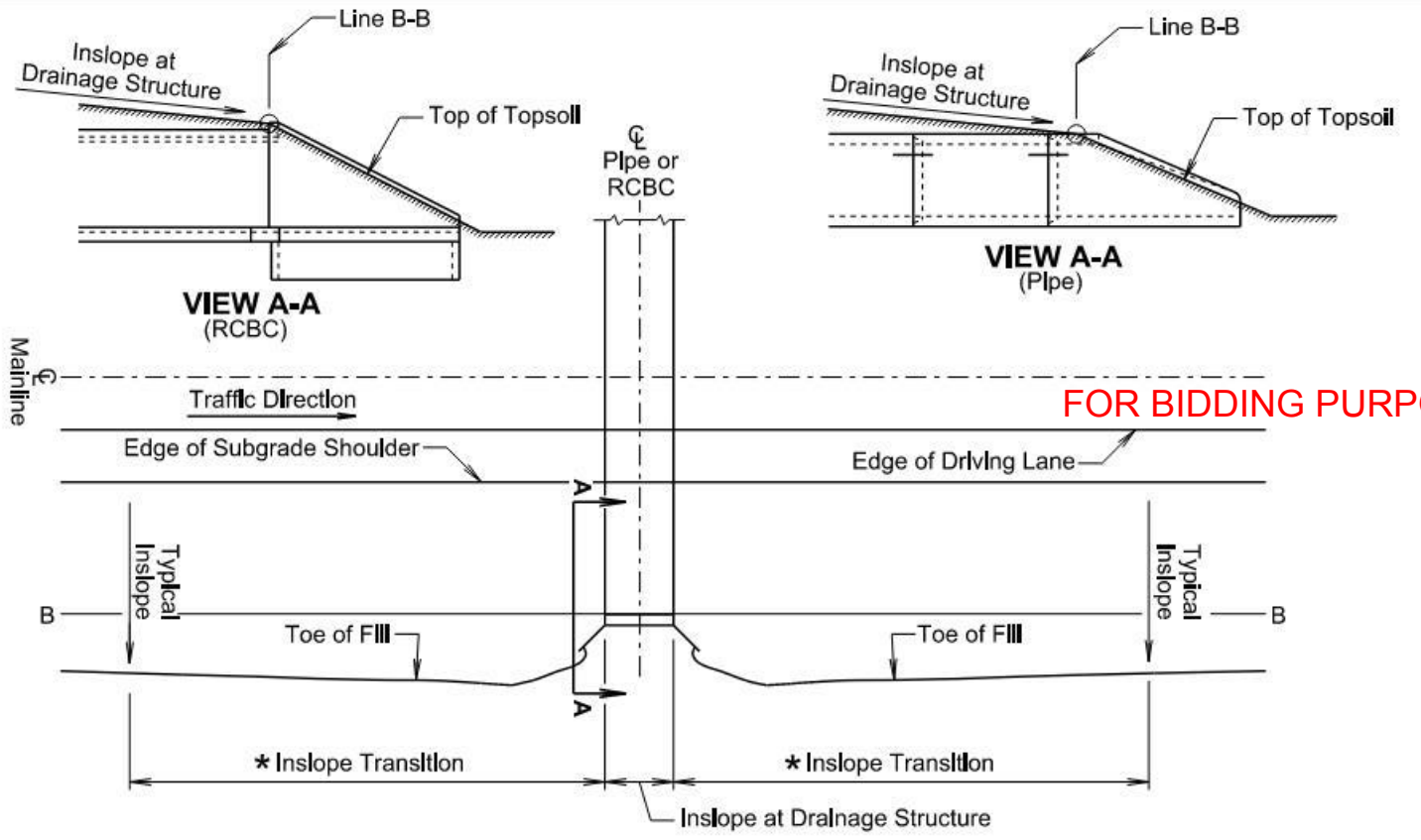


NOTES REGARDING BRIDGE APPROACHES

In order to construct the new surface flush with the top of the bridge and to provide depth for additional asphalt concrete, it will be necessary to cut out the existing base course to the limits shown on the layout above. The excavated material will be wasted as directed by the Engineer.

Any damage to the bridges will be repaired at the Contractor's expense.Contact the Bridge Construction Engineer for repair details.

See Table of Additional Quantities.



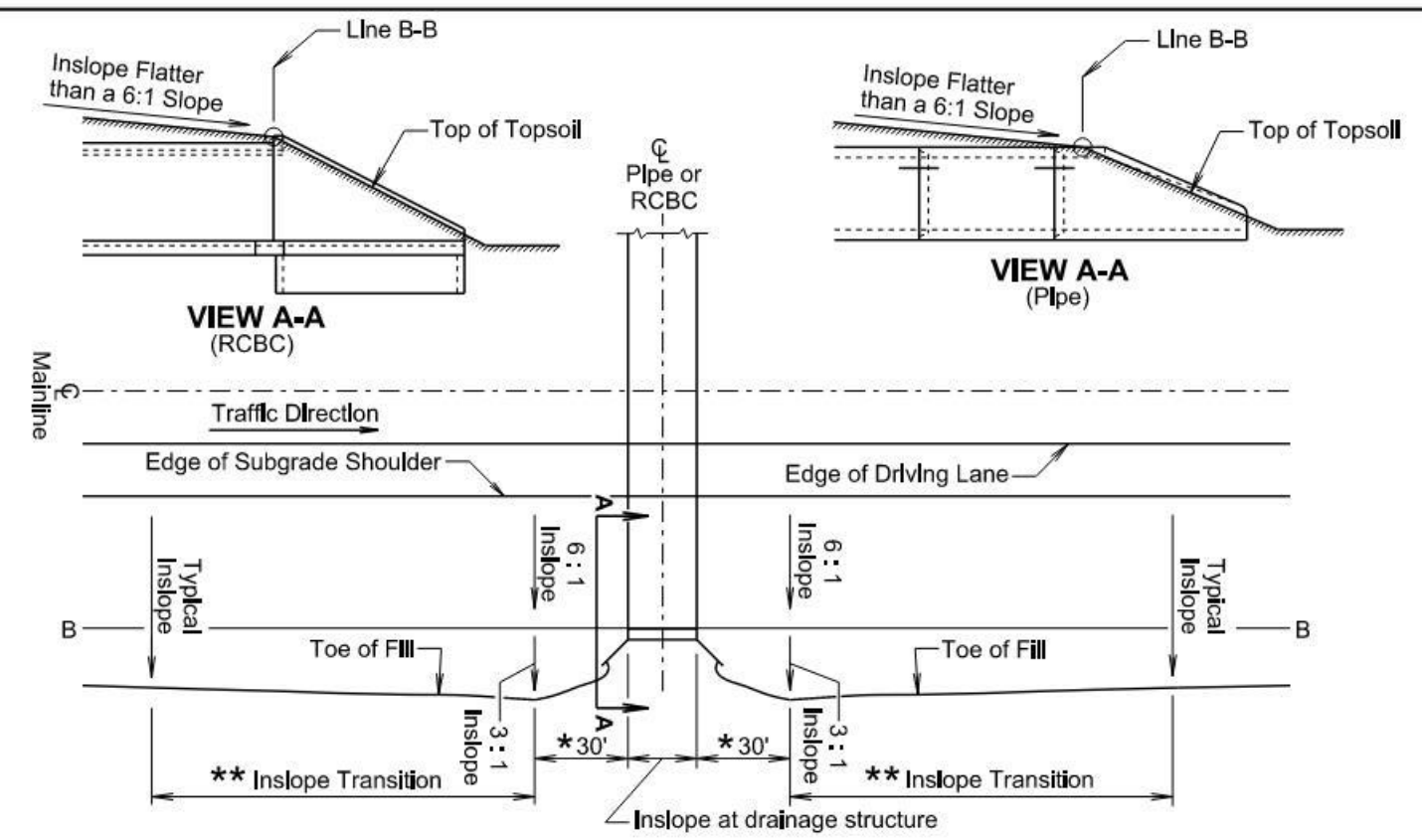
TYPE 1 INSLOPE TRANSITION

GENERAL NOTES:

This Type 1 Inslope Transition is used when the specified inslope at the drainage structure is flatter than the typical inslope and the inslope at the drainage structure is between a 4:1 slope and 6:1 slope.

Line B-B represents the clear zone line, the location where soil intercepts the parapet on an RCBC, the location where the soil intercepts the top of the pipe adjacent to the opening of the pipe end section, or may represent a change in slope.

* Transition from the typical inslope to the inslope at the drainage structure. Within the clear zone (area from edge of subgrade shoulder to line B-B) use 100' length for each 1:1 slope change. Example: transition from a 4:1 to a 6:1 would require a 200' length transition. The typical inslope outside of the clear zone will be transitioned gradually to the slope necessary adjacent to the RCBC wing wall or pipe culvert end section within the transition length necessary for the transition within the clear zone.



TYPE 2 INSLOPE TRANSITION

GENERAL NOTES:

This Type 2 Inslope Transition is used when the specified inslope at the pipe or RCBC is flatter than a 6:1 slope.

Line B-B represents the clear zone line, the location where soil intercepts the parapet on an RCBC, the location where the soil intercepts the top of the pipe adjacent to the opening of the pipe end section, or may represent a change in slope.

* Transition from inslope at drainage structure to a 6 : 1 inslope and 3:1 inslope.

** Transition from typical inslope to the inslopes adjacent to the drainage structure. Within the clear zone (area from edge of subgrade shoulder to line B-B) use 100' length for each 1:1 slope change. Example: transition from a 4:1 to a 6:1 would require a 200' length transition. The typical inslope outside of the clear zone will be transitioned to a 3:1 inslope within the transition length necessary for the transition within the clear zone.

Published Date: 2025

SDDOT

INSLOPE TRANSITIONS AT PIPE CULVERTS OR REINFORCED CONCRETE BOX CULVERTS

PLATE NUMBER 120.05

Sheet 1 of 2

Sheet 2 of 2

September 14, 2018

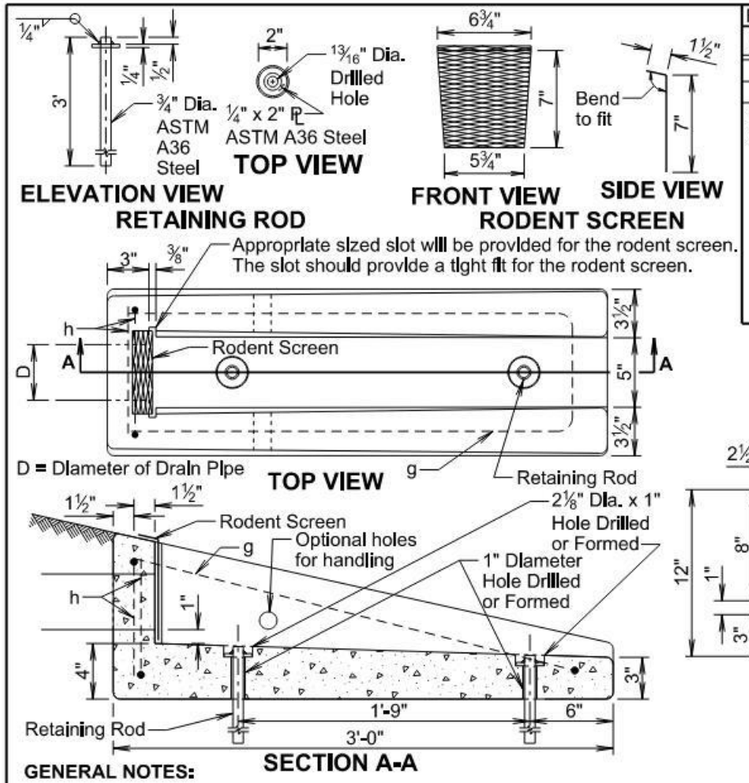
STATE OF SOUTH DAKOTA

PROJECT P 0047(113)42

SHEET B60

TOTAL SHEETS B71

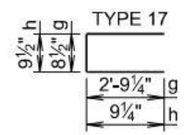
Plotting Date: 8/26/2024



REINFORCING SCHEDULE				
MK.	No.	Size	Length	Type
g	1	4	6'-3"	17
h	2	4	2'-4"	17

NOTE: All dimensions are out to out of bars.

Bending Details



GENERAL NOTES:

The concrete will be Class M6. The concrete will conform to the requirements of Section 462 of the Specifications. It is estimated that each unit weighs approximately 210 pounds.

All reinforcing steel will conform to ASTM A615, Grade 60 and will be epoxy coated. The reinforcing steel will be securely retained to prevent displacement during placement of concrete. It is estimated that 7.3 pounds of reinforcing steel is required for each unit.

The pipe will be placed in the concrete headwall with the pipe end flush with the concrete surface adjacent to the rodent screen.

The rodent screen will be galvanized 13 Ga. steel with a diamond shaped flattened mesh pattern. The size will be ½". The size refers to the measurement across the smallest diamond shaped opening measured from the centers of the wires.

The retaining rod will be galvanized in accordance with ASTM A123 after all shop welding has been completed.

The drawing indicates using ½" fillets; however, ¾" chamfers may be substituted for the ½" fillets.

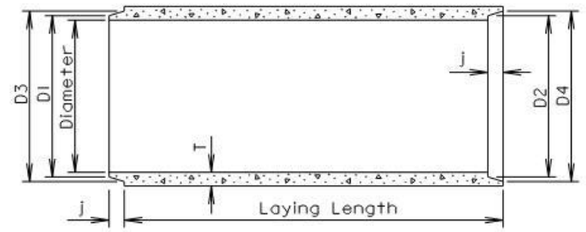
All costs for furnishing and installing the concrete headwall including equipment, labor, and materials including concrete, reinforcing steel, retaining rods, and rodent screen will be incidental to the contract unit price per each for "Precast Concrete Headwall for Drain".

November 19, 2021

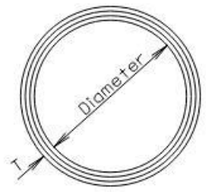
Published Date: 2025	SDDOT	PRECAST CONCRETE HEADWALL FOR DRAIN	PLATE NUMBER 430.50
			Sheet 1 of 1

TOLERANCES IN DIMENSIONS

Diameter: ±1.5% for 24" Dia. or less and ±1% or ⅜" whichever is more for 27" Dia. or greater.
Diameters at joints: ± 3/16" for 30" Dia. or less and ± ¼" for 36" or greater.
Length of joint (j): ± ¼".
Wall thickness (T): not less than design T by more than 5% or 3/16", whichever is greater.
Laying length: shall not underrun by more than ½".



LONGITUDINAL SECTION



END VIEW

GENERAL NOTES:

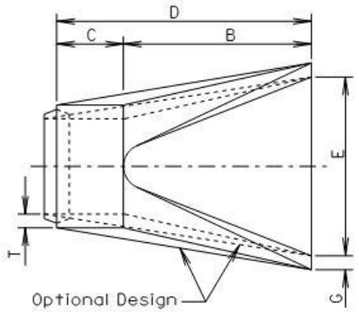
Construction of R. C. P. shall conform to the requirements of Section 990 of the Specifications.

Not more than 2 four-foot sections shall be permitted near the ends of any culvert. Four-foot lengths shall be used only to secure the required length of culvert.

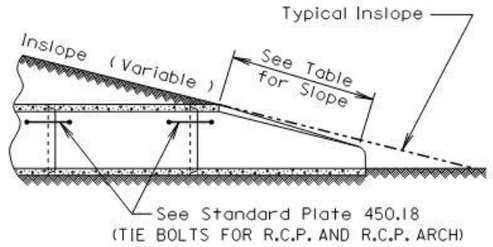
Diam. (in.)	Approx. Wt. /Ft. (lb.)	T (in.)	J (in.)	D1 (in.)	D2 (in.)	D3 (in.)	D4 (in.)
12	92	2	1¾	13¼	13⅝	13⅞	14¼
15	127	2¼	2	16½	16⅞	17¼	17⅝
18	168	2½	2¼	19⅝	20	20⅜	20¾
21	214	2¾	2½	22⅞	23¼	23¾	24⅛
24	265	3	2¾	26	26⅜	27	27⅜
27	322	3¼	3	29¼	29⅝	30¼	30⅝
30	384	3½	3¼	32⅜	32¾	33½	33⅞
36	524	4	3¾	38¾	39¼	40	40½
42	685	4½	4	45⅛	45⅝	46½	47
48	867	5	4½	51½	52	53	53½
54	1070	5½	4½	57⅞	58⅜	59⅜	59⅞
60	1296	6	5	64¼	64¾	66	66½
66	1542	6½	5½	70⅝	71⅛	72½	73
72	1810	7	6	77	77½	79	79½
78	2098	7½	6½	83⅜	83⅞	85⅝	86⅛
84	2410	8	7	89¾	90¼	92⅛	92⅝
90	2740	8½	7	95¾	96¼	98⅛	98⅜
96	2950	9	7	102⅛	102⅝	104½	105
102	3075	9½	7½	109	109½	111½	112
108	3870	10	7½	115½	116	118	118½

June 26, 2015

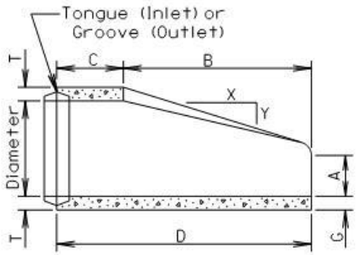
Published Date: 2025	SDDOT	REINFORCED CONCRETE PIPE	PLATE NUMBER 450.01
			Sheet 1 of 1



TOP VIEW



SLOPE DETAIL

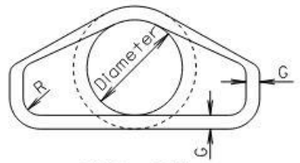


LONGITUDINAL SECTION

GENERAL NOTES:

Lengths of concrete pipe shown on plan sheets are between flared ends only.

Construction of R.C.P. Flared End shall conform to the requirements of Section 990 of the Specifications.

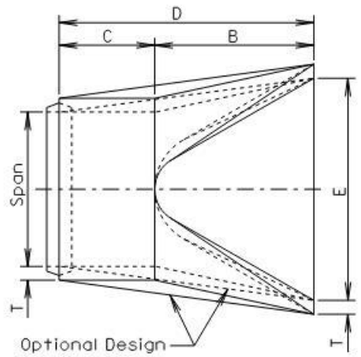


END VIEW

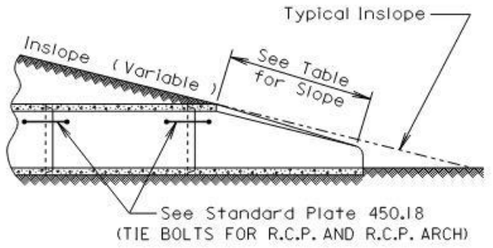
Dia. (in.)	Approx. Wt. of Section (lbs.)	Approx. Slope (X to Y)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	G (in.)	R (in.)
12	530	2.4:1	2	4	24	48 7/8	72 7/8	24	2	1 1/2
15	740	2.4:1	2 1/4	6	27	46	73	30	2 1/4	1 1/2
18	990	2.3:1	2 1/2	9	27	46	73	36	2 1/2	1 1/2
21	1280	2.4:1	2 3/4	9	36	37 1/2	73 1/2	42	2 3/4	1 1/2
24	1520	2.5:1	3	9 1/2	43 1/2	30	73 1/2	48	3	1 1/2
27	1930	2.5:1	3 1/4	10 1/2	49 1/2	24	73 1/2	54	3 1/4	1 1/2
30	2190	2.5:1	3 1/2	12	54	19 3/4	73 3/4	60	3 1/2	1 1/2
36	4100	2.5:1	4	15	63	34 3/4	97 3/4	72	4	1 1/2
42	5380	2.5:1	4 1/2	21	63	35	98	78	4 1/2	1 1/2
48	6550	2.5:1	5	24	72	26	98	84	5	1 1/2
54	8240	2:1	5 1/2	27	65	33 1/4	98 1/4	90	5 1/2	1 1/2
60	8730	1.9:1	6	35	60	39	99	96	5	1 1/2
66	10710	1.7:1	6 1/2	30	72	27	99	102	5 1/2	1 1/2
72	12520	1.8:1	7	36	78	21	99	108	6	1 1/2
78	14770	1.8:1	7 1/2	36	90	21	111	114	6 1/2	1 1/2
84	18160	1.6:1	8	36	90 1/2	21	111 1/2	120	6 1/2	1 1/2
90	20900	1.5:1	8 1/2	41	87 1/2	24	111 1/2	132	6 1/2	6

June 26, 2015

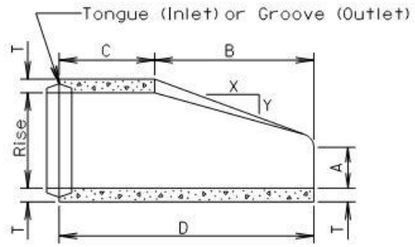
Published Date: 2025	SDDOT	R. C. P. FLARED ENDS	PLATE NUMBER 450.10
			Sheet 1 of 1



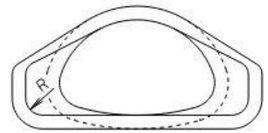
TOP VIEW



SLOPE DETAIL



LONGITUDINAL SECTION



END VIEW

GENERAL NOTES:

Lengths of concrete pipe shown on plan sheets are between flared ends only.

Construction of R. C. P. Arch Flared End shall conform to the requirements of Section 990 of the Specifications.

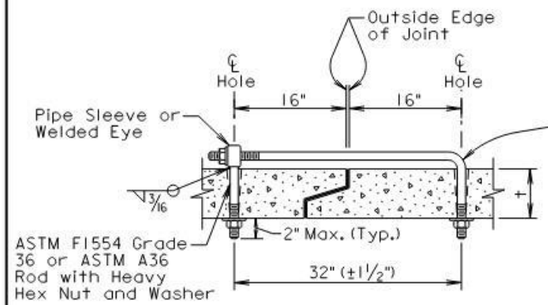
* Size (in.)	Approximate Weight of Section (lbs.)	Rise (in.)	Span (in.)	Slope (X:Y)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	R (in.)
18	1100	13 1/2	22	3:1	2 1/2	7	27	45	72	36	2
24	1750	18	28 1/2	3:1	3 1/2	8 1/2	39	33	72	48	3
30	3300	22 1/2	36 1/4	3:1	4	9 1/2	50	46	96	60	3
36	4350	26 5/8	43 3/4	3:1	4 1/2	1 1 1/8	60	36	96	72	6
42	5250	31 5/16	51 1/8	3:1	4 1/2	15 13/16	60	36	96	78	6
48	6400	36	58 1/2	3:1	5	21	60	36	96	84	6
54	7850	40	65	3:1	5 1/2	25 1/2	60	36	96	90	6
60	9500	45	73 1/2	3:1	6	31	60	36	96	96	6
72	13550	54	88	2:1	7	31	60	39	99	120	6
84	17950	62	102	2:1	8	28 1/2	83	19	102	144	6

*Equivalent Diameter of Circular R. C. P.

June 26, 2015

Published Date: 2025	SDDOT	R. C. P. ARCH FLARED ENDS	PLATE NUMBER 450.11
			Sheet 1 of 1

Wall "t" (in.)	Rod Dia. (in.)	Pipe Sleeve Dia. (nominal)
≤ 3¼	⅝	¾
3½-6½	¾	1
≥ 7	1	1¼



ADJUSTABLE EYE BOLT TIE

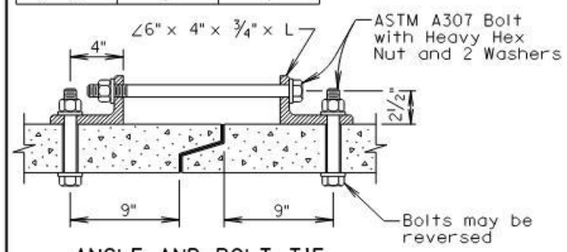
GENERAL NOTES:

Tie bolts shall conform to ASTM F1554 Grade 36 or ASTM A36. Nuts shall be heavy hex conforming to ASTM A563. Washers shall conform to ASTM F436.

Pipe Sleeve shall conform to ASTM A500 or A53, Grade B.

Galvanize adjustible eye bolt tie assembly in accordance with ASTM A153.

Pipe Dia. (in.)	"L" (in.)	Bolt Dia. (in.)
≤ 48	4	¾
> 48	6	1



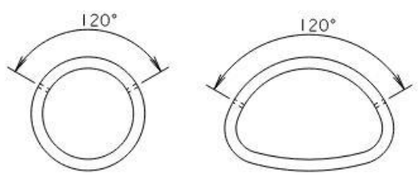
ANGLE AND BOLT TIE

GENERAL NOTES:

Angles shall conform to ASTM A36.

Bolts shall conform to ASTM A307. Nuts shall be heavy hex conforming to ASTM A563. Washers shall conform to ASTM F436.

Galvanize angles, bolts, nuts, and washers in accordance with ASTM A153.



END VIEW "CIRCULAR"

END VIEW "ARCH"

GENERAL NOTES:

In lieu of the tie bolts detailed above other types of tie bolt connections may be installed as approved by the Office of Bridge Design.

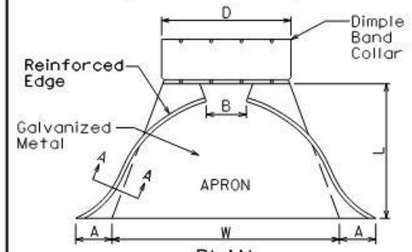
All pipe sections of R.C.P. and R.C.P. Arch shall be tied with tie bolts except for pipe located between drop inlets, manholes, and junction boxes. All pipe sections of pipes that only enter or exit drop inlets, manhole, and junction boxes shall be tied with tie bolts.

There will be no separate measurement or payment for the tie bolts. The cost for furnishing and installing the tie bolts shall be incidental to the contract unit price per foot for the corresponding bid item for R.C.P. or R.C.P. Arch.

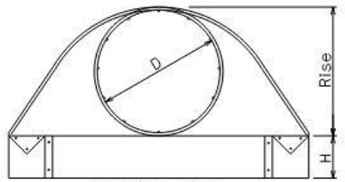
February 28, 2013

Published Date: 2025	SDDOT	TIE BOLTS FOR R.C.P. AND R.C.P. ARCH	PLATE NUMBER 450.18
			Sheet 1 of 1

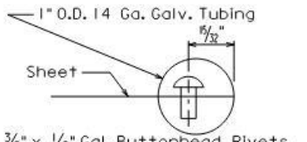
Alternate Type Connector Sections may be used with approval of the Engineer.



PLAN



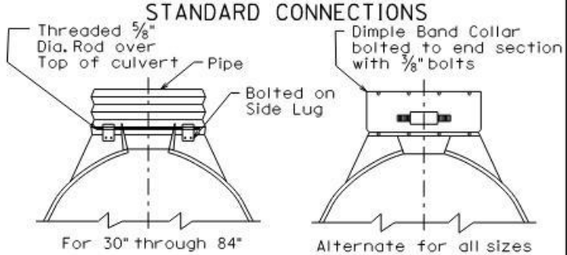
ELEVATION



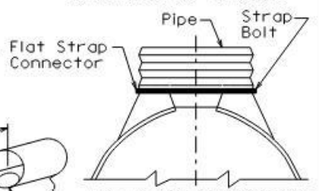
TUBING ATTACHMENT DETAILS SECTION A-A

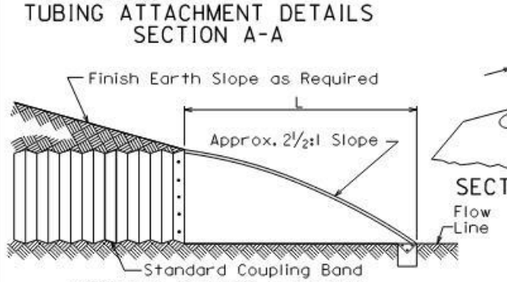
Dia. D (in.)	Ga.	DIMENSIONS (in.) A	B	H	L	W	Approx. Slope	Body
12	16	6	6	6	21	24	2½:1	1 Pc.
15	16	7	8	6	26	30	2½:1	1 Pc.
18	16	8	10	6	31	36	2½:1	1 Pc.
21	16	9	12	6	36	42	2½:1	1 Pc.
24	16	10	13	6	41	48	2½:1	1 Pc.
30	14	12	16	8	46	60	2½:1	1 Pc.
36	14	14	19	9	51	72	2½:1	2 Pc.
42	12	16	22	11	60	84	2½:1	2 Pc.
48	12	18	27	12	69	90	2¼:1	2 Pc.
54	12	18	30	12	78	102	2:1	3 Pc.
60	12	18	33	12	84	114	1¾:1	3 Pc.
66	12	18	36	12	87	120	1½:1	3 Pc.
72	12	18	39	12	87	126	1⅓:1	3 Pc.
78	12	18	42	12	87	132	1¼:1	3 Pc.
84	12	18	45	12	87	138	1⅙:1	3 Pc.

STANDARD CONNECTIONS

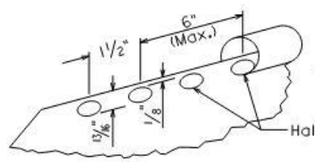


NOTE:
Tubing is slipped over the sheet and rivets or lugs prior to forming operations of the apron.





TYPICAL CROSS-SECTION



SECTION A-A (alternate)

SECTION A-A (alternate)

GENERAL NOTES:

All 3 pc. bodies shall have 12 Ga. sides and 10 Ga. center panels. Width of center panels shall be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams tightly joined by ⅜" Dia. galvanized rivets or bolts.

For 60" through 84" sizes, reinforced edges shall be supplemented with galvanized stiffener angles. The angles will be 2" x 2" x ¼" for 60" through 72" diameters and 2½" x 2½" x ¼" for 78" and 84" diameters. The angles shall be attached by ⅜" diameter galvanized nuts and bolts.

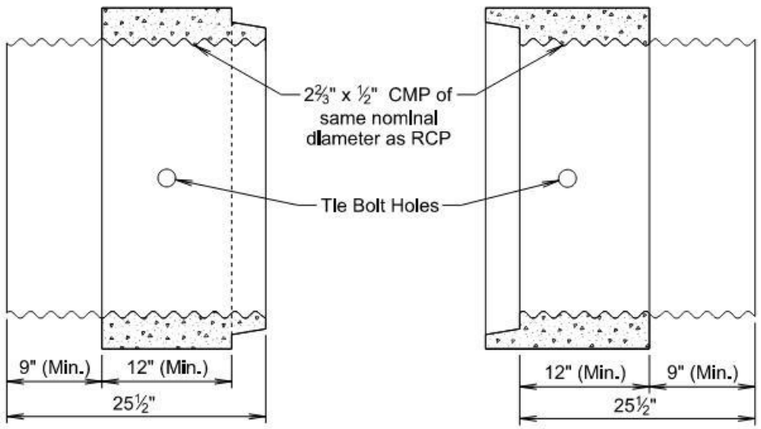
Rivets and Bolts shall be ⅜" Dia. Min. for 10 Ga. and 12 Ga. sheet, and 5/16" Dia. Min. for 14 Ga. and 16 Ga. sheets. Tighten nuts with torque wrench to 25 lbs. torque.

March 31, 2000

Published Date: 2025	SDDOT	C.M.P. FLARED ENDS	PLATE NUMBER 450.35
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B64	B71

Plotting Date: 8/26/2024



INLET
(CMP to RCP Transition)

OUTLET
(RCP to CMP Transition)

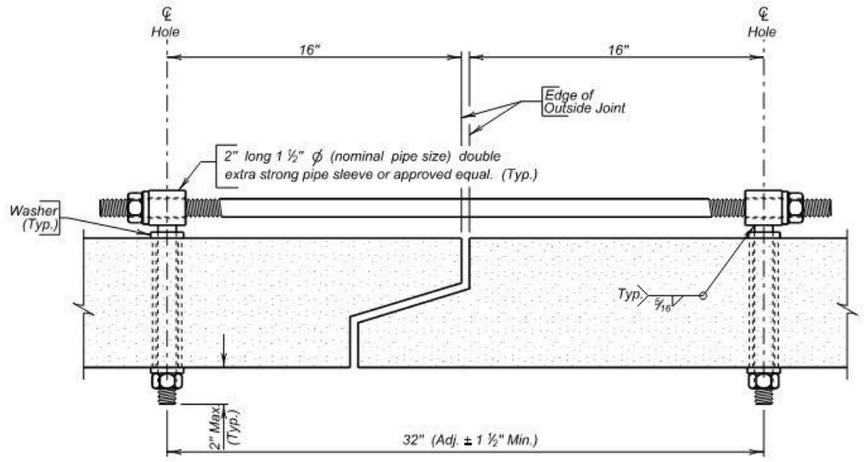
GENERAL NOTE:

Arch pipe transitions will be fabricated similar to the round transition shown above.

All pipe transitions will be precast as shown. Alternate designs other than shown will need to be approved by the Engineer.

November 19, 2022

Published Date: 2025	SDDOT	C.M.P. TO R.C.P. TRANSITION AND R.C.P. TO C.M.P. TRANSITION	PLATE NUMBER 450.50
			Sheet 1 of 1



TIE BOLT ASSEMBLY

GENERAL NOTES:

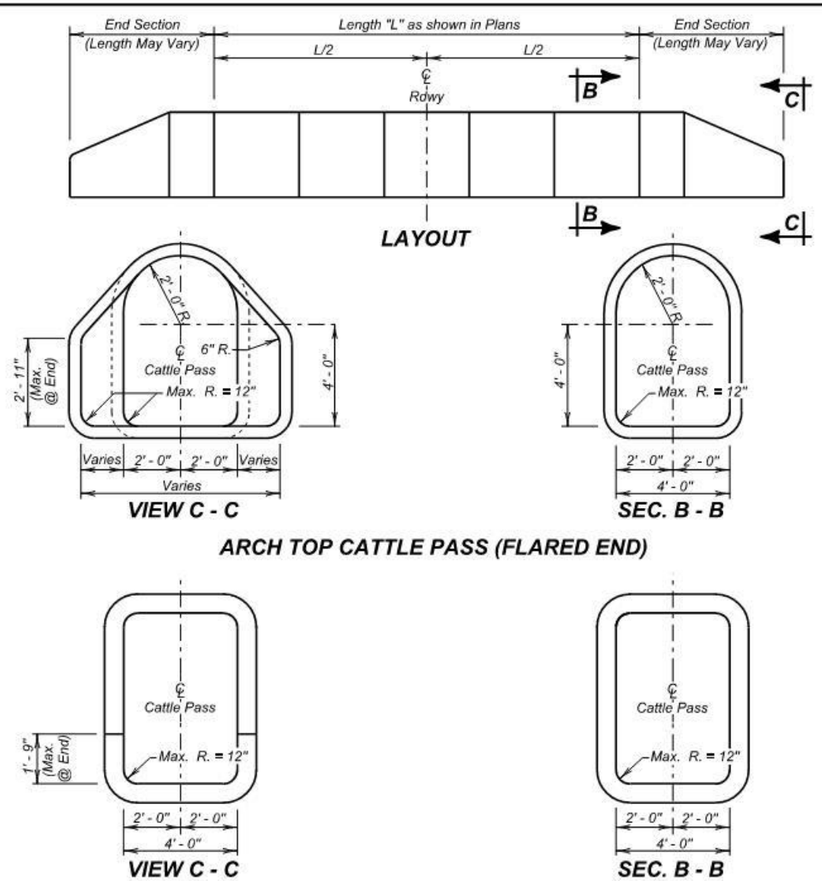
1. *All holes for tie bolts shall be cast-in-place,16 inches from outside edge of joint. Cast in inserts or sleeves, if used, shall be made of a corrosion resistant material.*
2. *Ties shall be 1 inch ϕ and conform to the requirements of ASTM A36, ASTM A307, or ASTM F1554, Gr. 36. Nuts shall be heavy hex in conformance with ASTM A563. Washers shall conform to ASTM F436, Type 1. The welded pipe sleeve shall conform to ASTM A53, Grade B.*
3. *Welding and weld inspection shall be in conformance with AWS/ANSI D1.1 - (Current Year) Structural Welding Code - Steel.*
4. *Tie Bolt Assembly shall be galvanized in accordance with ASTM A153 or ASTM F2329 as applicable.*
5. *Tie Bolt Assembly details may vary from that shown, but alternate tie bolt assemblies are subject to testing to demonstrate equal strength. Submit details, through proper channels, to the Office of Bridge Design for approval.*
6. *All costs for furnishing and installing the precast box culvert tie bolt assembly shall be incidental to the contract unit price per Foot for "Precast Concrete Box Culvert, Furnish".*

March 21, 2016

Published Date: 2025	SDDOT	PRECAST BOX CULVERT TIE BOLT ASSEMBLY DETAILS	PLATE NUMBER 560.01
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B65	B71

Plotting Date: 8/26/2024

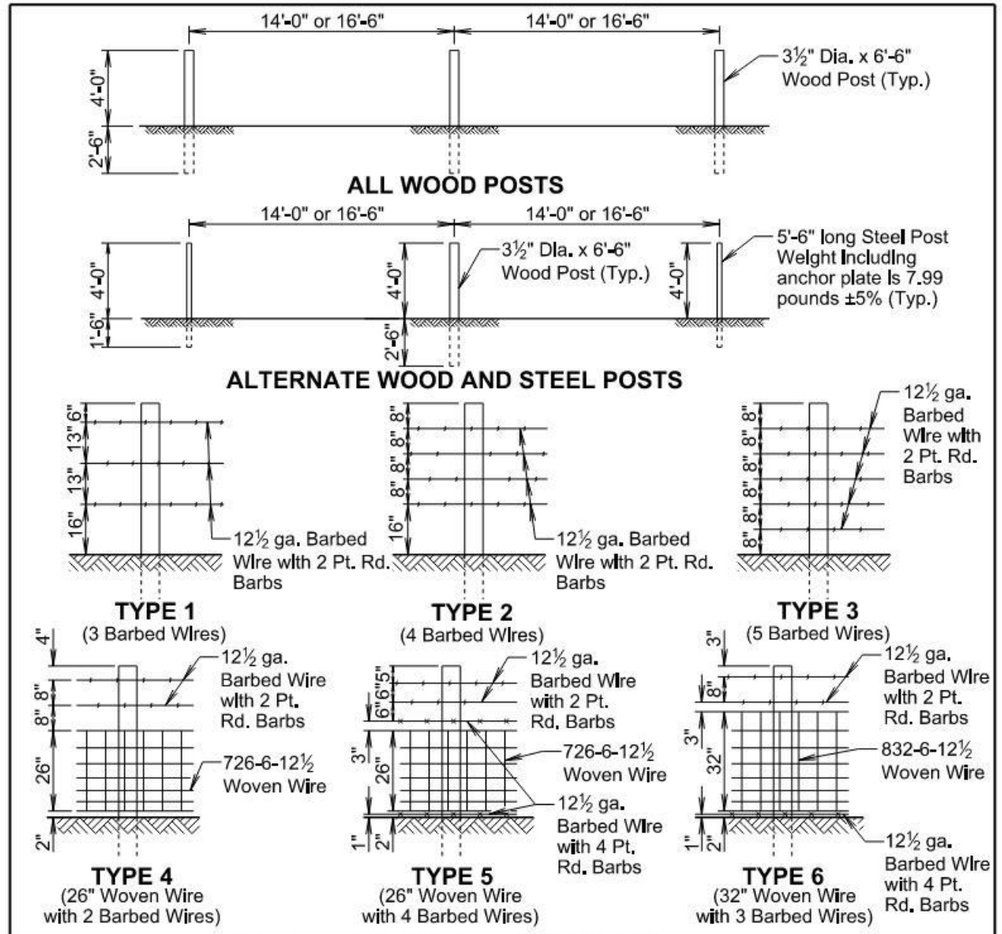


GENERAL NOTES:

1. Unless otherwise specified elsewhere in the plans, cattle pass may be either cast-in-place or precast. For cast-in-place cattle pass details, see Standard Plate 560.32.
2. Precast cattle pass shall be on the current approved list available through proper channels from the SDDOT Office Of Bridge Design. To qualify for addition to the approved list, submit a checked design, done by South Dakota Registered Professional Engineers, and shop plans to the Office of Bridge Design for approval. Design shall be in accordance with the current edition of the AASHTO LRFD Bridge Design Specifications.
3. The provisions of Sections 450 and 990 of the Specifications pertaining to Reinforced Concrete Pipe shall apply to the furnishing and installing of the precast cattle pass.
4. Shapes other than that shown will be allowed. Submit details to the Office of Bridge Design for approval.
5. Minimum section length shall be 4 feet.
6. Lift holes shall be plugged with a grout in conformance with Section 460.2 K. of the Specifications.
7. Each section shall be tied to adjacent sections with tie bolts conforming to Standard Plate 560.01.
8. All costs associated with furnishing and installing the cattle pass, whether cast-in-place or precast, shall be incidental to the corresponding furnish and install bid items for "4' x 6' Reinforced Concrete Cattle Pass" and "4' x 6' Reinforced Concrete Cattle Pass End Section".

June 26, 2015

Published Date: 2025	SDDOT	PRECAST 4'X 6' CATTLE PASS	PLATE NUMBER 560.30
			Sheet 1 of 1



TYPE OF FENCE		LINE POST SPACING	BARBED WIRE		WOVEN WIRE
TYPE	DESCRIPTION		WIRE GAGE	NUMBER AND SHAPE OF BARBS	STYLE OR DESIGN NO.
1	3 Barbed Wlres	16'-6"	12½	2 Polnt Round	—
2	4 Barbed Wires	16'-6"	12½	2 Point Round	—
3	5 Barbed Wires	16'-6"	12½	2 Point Round	—
4	26" Woven Wire wlth 2 Barbed Wlres	14'-0"	12½	2 Point Round	726-6-12½
5	26" Woven Wire wlth 4 Barbed Wlres	14'-0"	12½	2 wlres wlth 2 Pt. Rd, 2 wlres wlth 4 Pt. Rd.	726-6-12½
6	32" Woven Wire wlth 3 Barbed Wlres	14'-0"	12½	2 wlres wlth 2 Pt. Rd. 1 wlre wlth 4 Pt. Rd.	832-6-12½

GENERAL NOTES:

Fence types deslgnated on the plans that are followed by the letter S will have smooth (barbless) wlres.

When type 5S or 6S ls deslgnated the bottom wire may be barbed, smooth, or left off.

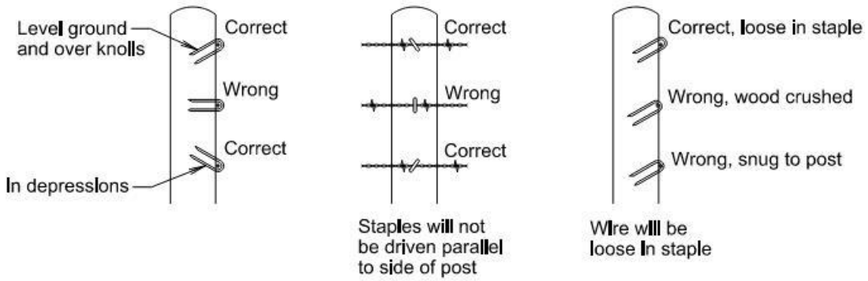
All degrees of curvature stated for fence are at centerllne of roadway.

June 26, 2019

Published Date: 2025	SDDOT	RIGHT-OF-WAY FENCE	PLATE NUMBER 620.01
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B66	B71

Plotting Date: 8/26/2024



STAPLE INSTALLATION

GENERAL NOTES:

The Right-of-Way fence will consist of barbed wire or a combination of woven wire and barbed wire. The barbed wire and/or woven wire will be fastened to all wood posts or fastened to alternating wood and steel posts. Only wood posts will be used for brace panels. Gates will be of the type designated in the plans or as otherwise directed by the Engineer. Fence will be constructed conforming to the details on the standard plates and in the plans unless otherwise directed by the Engineer.

Right-of-Way fence on Interstate Projects will be constructed one foot within the Interstate Right-of-Way lines except at bridge openings, cattle passes, and as otherwise directed by the Engineer.

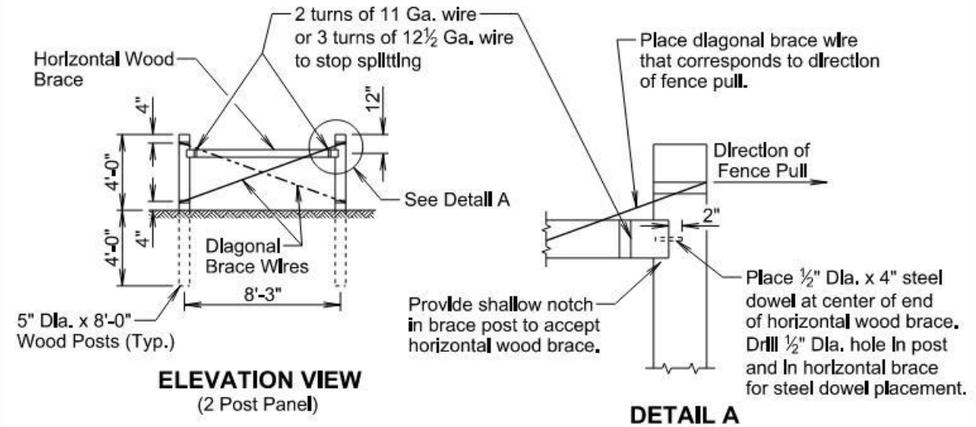
Right-of-Way fence other than on Interstate Projects will be constructed within one foot of the Right-of-Way on the Landowner's side except at bridge openings, cattle passes, and as otherwise directed by the Engineer.

Barbs will be fabricated from zinc coated 14 ga. wire. Two point barbs will be wrapped twice around one main strand at four-inch spacings and the four point barbs will be interlocked and wrapped around both main strands at five-inch spacings.

The gages of wire and wood post lengths and sizes are the minimum acceptable unless otherwise specified in the plans. The tolerances for steel posts will be as stated in AASHTO M281. Woven wire will conform to design and specifications of ASTM A116 and barbed wire will conform to ASTM A121.

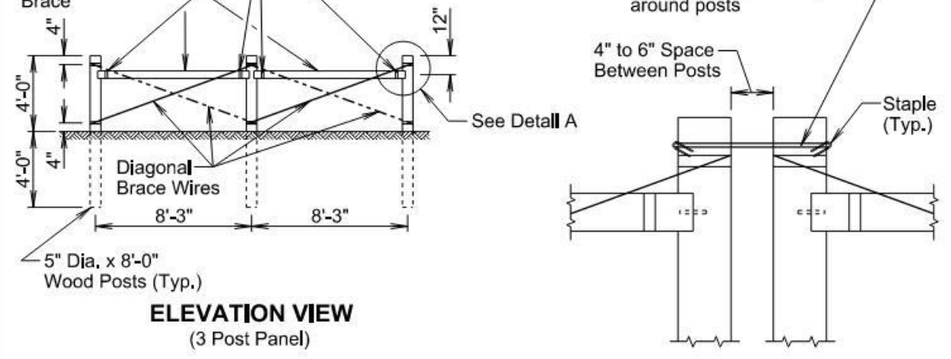
June 26, 2019

Published Date: 2025	SDDOT	STAPLE INSTALLATION AND GENERAL RIGHT-OF-WAY FENCE NOTES	PLATE NUMBER 620.02
			Sheet 1 of 1



ELEVATION VIEW
(2 Post Panel)

DETAIL A



ELEVATION VIEW
(3 Post Panel)

DETAIL B

GENERAL NOTES:

Two Post Panels will be installed at least every 1320' between corners.

Two Post Panels will be installed at any sharp vertical angle crest points and as directed by the Engineer.

Horizontal wood braces will consist of 4" dia. x 8' wood posts or rough 4" x 4" x 8' timbers.

Diagonal brace wires will be fabricated with 4 strands of 9 Ga. galvanized wire twisted tight. The diagonal brace wires will be installed in accordance with the direction of the fence pull. Two diagonal brace wires are required if fence pull is in both directions.

March 31, 2024

Published Date: 2025	SDDOT	BRACE PANELS AND APPLICATIONS OF BRACE PANELS	PLATE NUMBER 620.03
			Sheet 1 of 3

SPACING OF 2 POST PANELS WITHIN CURVES	
RADIUS OF CURVE	SPACING OF 2 POST PANEL
Greater than 1800 Ft.	** 1320'
Less than 1800 Ft.	**At P.C., P.T., and at every 1320' between P.C. and P.T.

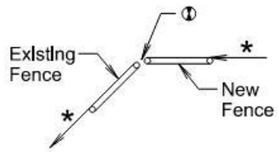
** Fence lengths greater than 1320' and less than 2640' place 2 Post Panel approximately at midpoint.

① See Detail B on Sheet 1 of 3.

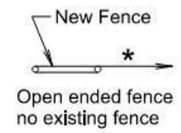
GENERAL NOTE:

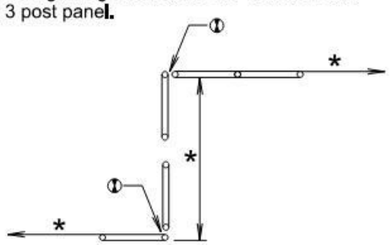
All radius of curvature stated for fence are at centerline of roadway.

If fence length is less than 600' to next corner use a 2 post panel.
* If fence length is greater than 600' to next corner use a 3 post panel.

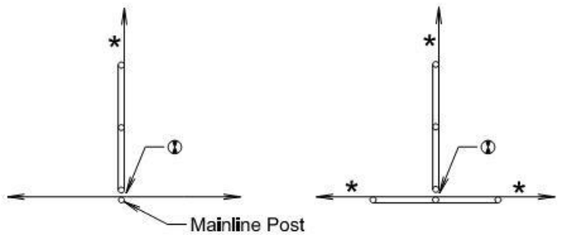


BEGIN OR END FENCE
(Where new fence ties into existing fence)

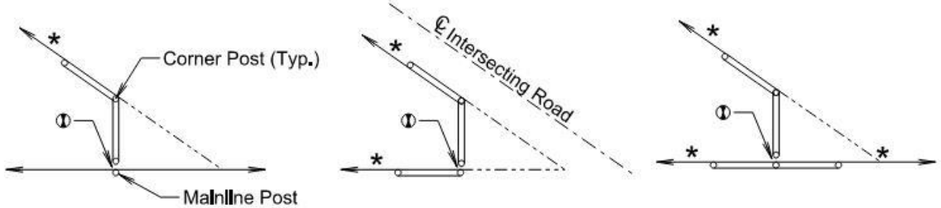




SHORT JOGS IN FENCE



CROSS FENCE



SHARP ANGLES IN CROSS FENCE

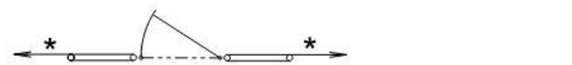
Additional fence panel is NOT required when an angle in the mainline fence is 10° and less.

Additional fence panel is required when an angle in the mainline fence is greater than 10°.

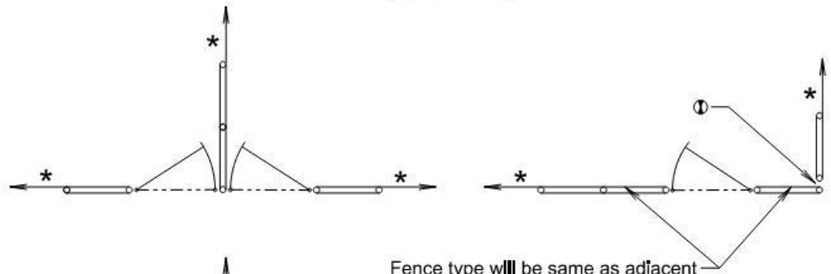
ANGLES IN MAINLINE FENCE

March 31, 2024

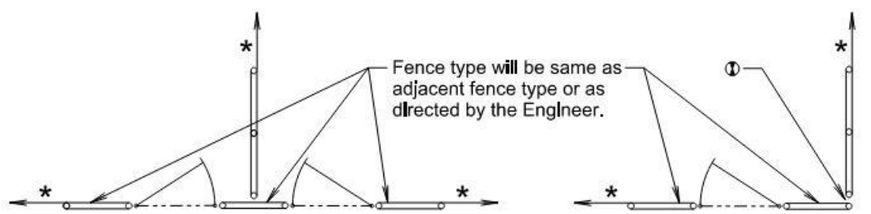
Published Date: 2025	SDDOT	BRACE PANELS AND APPLICATIONS OF BRACE PANELS	PLATE NUMBER 620.03
			Sheet 2 of 3



ENTRANCE
(Not on corner)



Fence type will be same as adjacent fence type or as directed by the Engineer.



DOUBLE ENTRANCES

ENTRANCES AT CORNERS

GATES

* If fence length is less than 600' to next corner use a 2 post panel.
If fence length is greater than 600' to next corner use a 3 post panel.

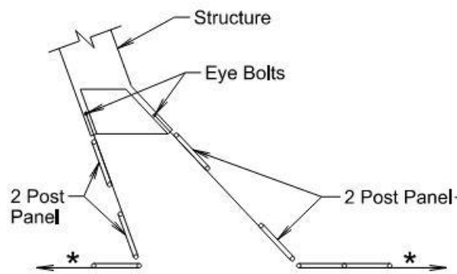
① See Detail B on Sheet 1 of 3.

March 31, 2024

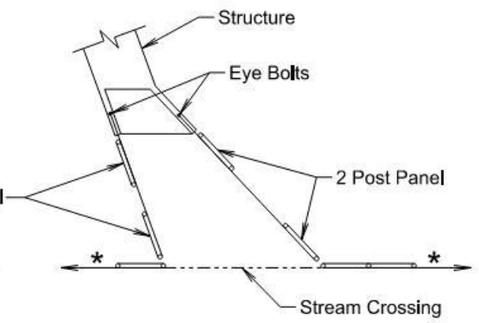
Published Date: 2025	SDDOT	BRACE PANELS AND APPLICATIONS OF BRACE PANELS	PLATE NUMBER 620.03
			Sheet 3 of 3

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B68	B71

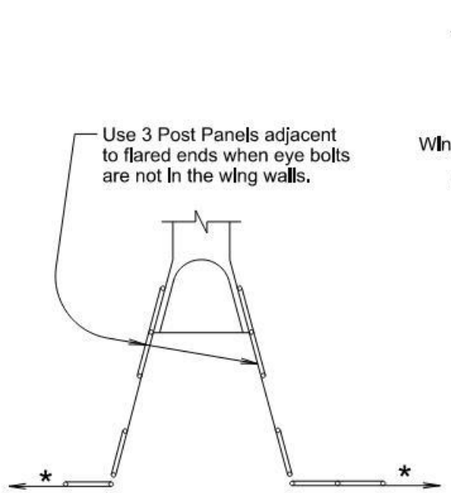
Plotting Date: 8/26/2024



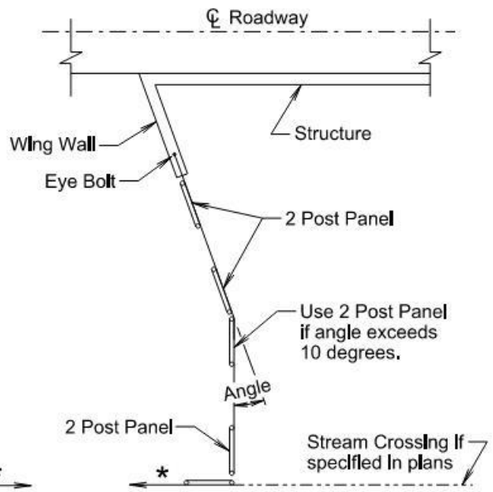
R.C. BOX CULVERT OR CATTLE PASS



STRUCTURE WITH STREAM CROSSING FENCE



R.C. BOX CULVERT OR CATTLE PASS

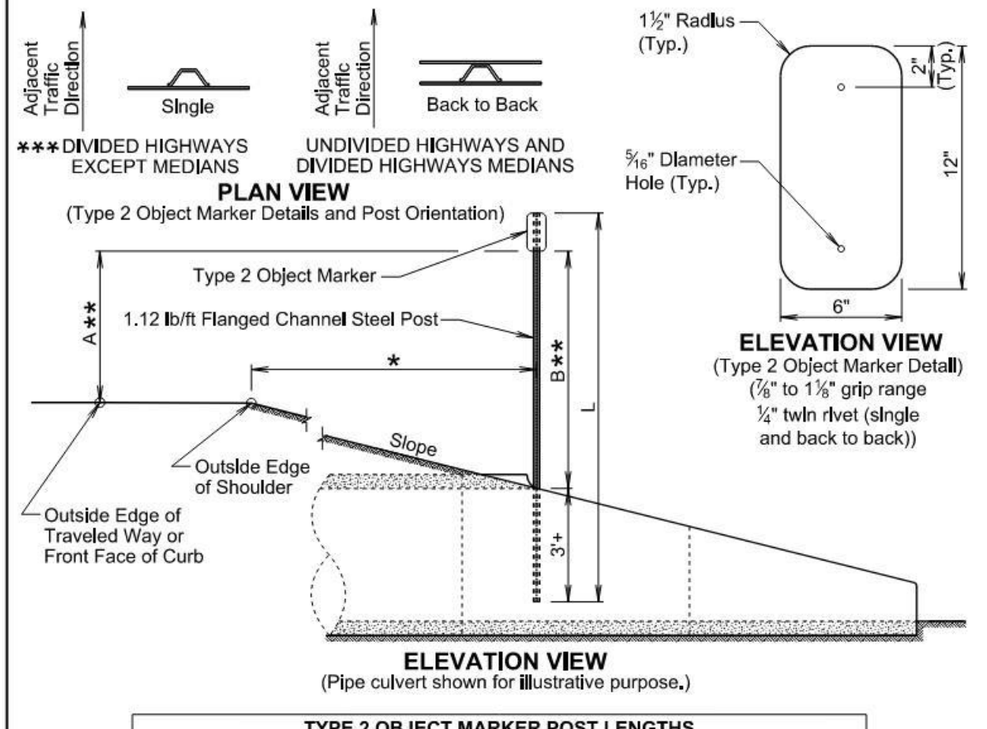


BRIDGE

* If fence length is less than 600' to next corner use a 2 post panel.
If fence length is greater than 600' use a 3 post panel.

June 26, 2019

Published Date: 2025	SDDOT	BRACE PANEL APPLICATIONS AT STRUCTURES	PLATE NUMBER 620.04
			Sheet 1 of 1



TYPE 2 OBJECT MARKER POST LENGTHS

OFFSET (*)		1'	2'	3'	4'	5'	6'	7'	8'	Greater Than 8'
		POST LENGTH (L)								
SLOPE	3:1	8'-6"	8'-9"	9'-3"	9'-6"	9'-9"	10'-3"	10'-6"	10'-9"	8'-0"
	4:1	8'-6"	8'-9"	9'-0"	9'-3"	9'-9"	9'-9"	10'-0"	10'-3"	8'-0"
	5:1	8'-3"	8'-6"	8'-9"	9'-0"	9'-3"	9'-3"	9'-6"	9'-9"	8'-0"
	6:1	8'-3"	8'-6"	8'-9"	8'-9"	9'-0"	9'-3"	9'-3"	9'-6"	8'-0"

GENERAL NOTES:

*** The type 2 object marker may be installed back to back when specified in the plans.

Post Length L was calculated based on a shoulder width of 6 feet at a crosslope of 4 percent and L was rounded up to the nearest 3 inches.

** Dimension A is 4 feet when the Offset * is 8 feet and less. Dimension B is 4 feet when Offset * is greater than 8 feet.

The type 2 object marker and the 1.12 lb/ft flanged channel steel post will be in conformance with Specifications Section 982.2 J.

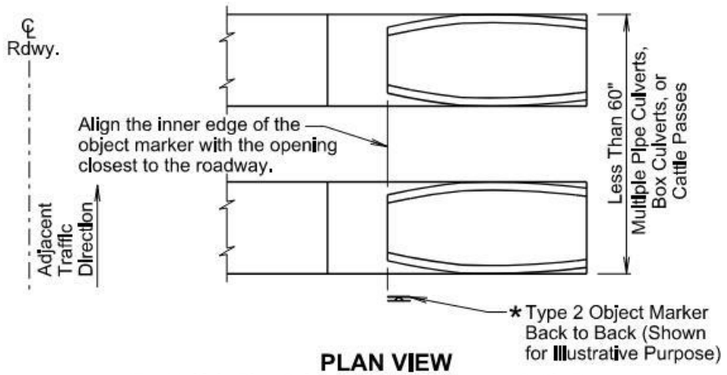
Payment for the type 2 object marker will be in conformance with Specification Section 632.5 B.

December 23, 2019

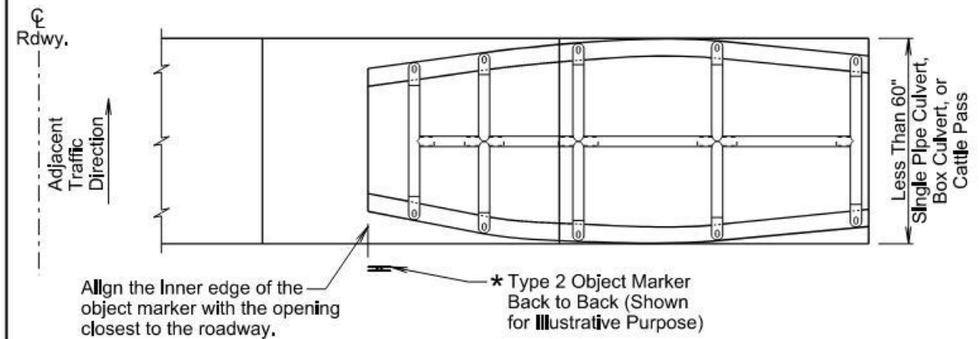
Published Date: 2025	SDDOT	TYPE 2 OBJECT MARKER (DIRECT DRIVE)	PLATE NUMBER 632.01
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B69	B71

Plotting Date: 8/26/2024



PLAN VIEW
(For Multiple Pipe Culverts, Box Culverts, and Cattle Passes)
(Pipe culverts shown for illustrative purpose.)
(Embankment is not shown.)



PLAN VIEW
(For Single Pipe Culvert, Box Culvert, and Cattle Pass)
(Pipe culvert shown for illustrative purpose.)
(Embankment is not shown.)

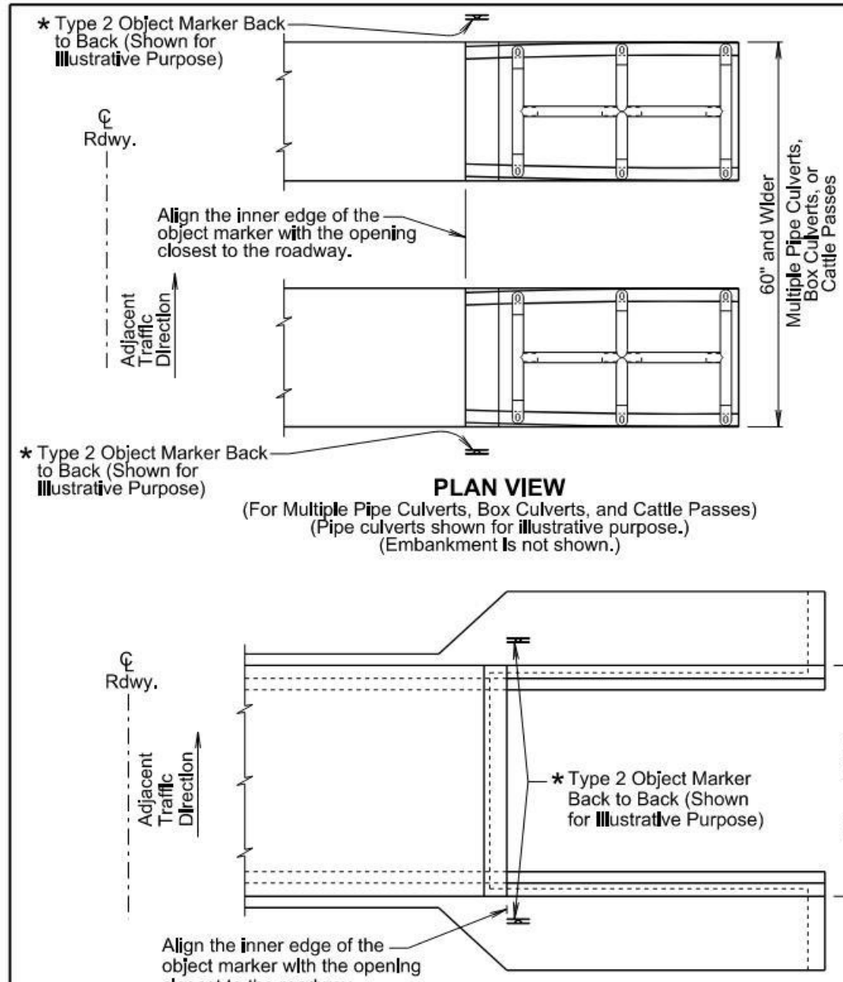
GENERAL NOTES:

This standard plate will be used in conjunction with standard plate 632.01.

* The type 2 object markers will be installed at the locations shown above. The type 2 object markers, single faced or back to back, will be as specified in the plans.

December 23, 2019

Published Date: 2025	SDDOT	TYPE 2 OBJECT MARKER AT PIPE CULVERTS, BOX CULVERTS, AND CATTLE PASSES (Less than 60" Overall Width)	PLATE NUMBER 632.03 Sheet 1 of 1



PLAN VIEW
(For Multiple Pipe Culverts, Box Culverts, and Cattle Passes)
(Pipe culverts shown for illustrative purpose.)
(Embankment is not shown.)

PLAN VIEW
(For Single Pipe Culvert, Box Culvert, and Cattle Pass)
(Box culvert shown for illustrative purpose.)
(Embankment is not shown.)

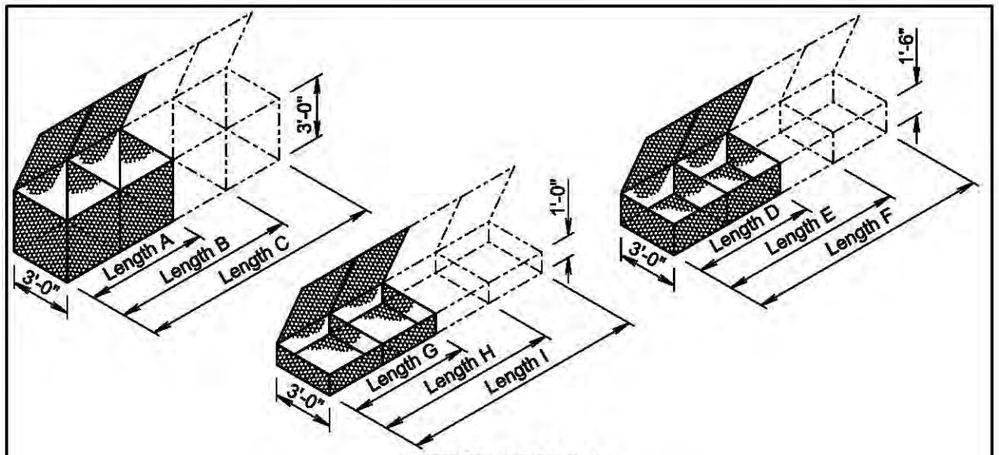
GENERAL NOTES:

This standard plate will be used in conjunction with standard plate 632.01.

* The type 2 object markers will be installed at the locations shown above. The type 2 object markers, single faced or back to back, will be as specified in the plans.

December 23, 2019

Published Date: 2025	SDDOT	TYPE 2 OBJECT MARKER AT PIPE CULVERTS, BOX CULVERTS, AND CATTLE PASSES (60" and Greater Overall Width)	PLATE NUMBER 632.04 Sheet 1 of 1



GABION DETAILS

STANDARD SIZES					
SIZE	LENGTH	WIDTH	HEIGHT	NUMBER OF CELLS	CAPACITY (Cu. Yd.)
A	6'-0"	3'-0"	3'-0"	2	2.0
B	9'-0"	3'-0"	3'-0"	3	3.0
C	12'-0"	3'-0"	3'-0"	4	4.0
D	6'-0"	3'-0"	1'-6"	2	1.0
E	9'-0"	3'-0"	1'-6"	3	1.5
F	12'-0"	3'-0"	1'-6"	4	2.0
G	6'-0"	3'-0"	1'-0"	2	0.7
H	9'-0"	3'-0"	1'-0"	3	1.0
I	12'-0"	3'-0"	1'-0"	4	1.3

GENERAL NOTES: Above dimensions subject to mill tolerances.

Lacing and internal connecting wire will be 0.0866 inch diameter steel wire ASTM A641, Class 3 soft temper measured after galvanizing and for PVC coated gabions will be 0.0866 inch diameter steel wire measured after galvanizing but before PVC coating.

The lacing procedure is as follows:

1. Cut a length of lacing wire approximately 1½ times the distance to be laced but not exceeding 5 feet.
2. Secure the wire terminal at the corner by looping and twisting.
3. Proceed lacing with alternating single and double loops at a spacing not to exceed 6 inches.
4. Securely fasten the other lacing wire terminal.

Wire lacing or interlocking type fasteners will be used for gabion assembly and final construction of gabion structures. Interlocking fasteners for galvanized gabions will be high tensile 0.120 inch diameter galvanized steel wire measured after galvanizing. The galvanizing will conform to ASTM A641-92, Class 3 coating. Fasteners will also be in accordance with ASTM A764, Class II, Type III.

Interlocking fasteners for PVC coated gabions will be high tensile 0.120 inch diameter stainless steel wire conforming to ASTM A313, Type 302, Class 1. The spacing of the interlocking fasteners during all phases of assembly and construction will not exceed 6 inches.

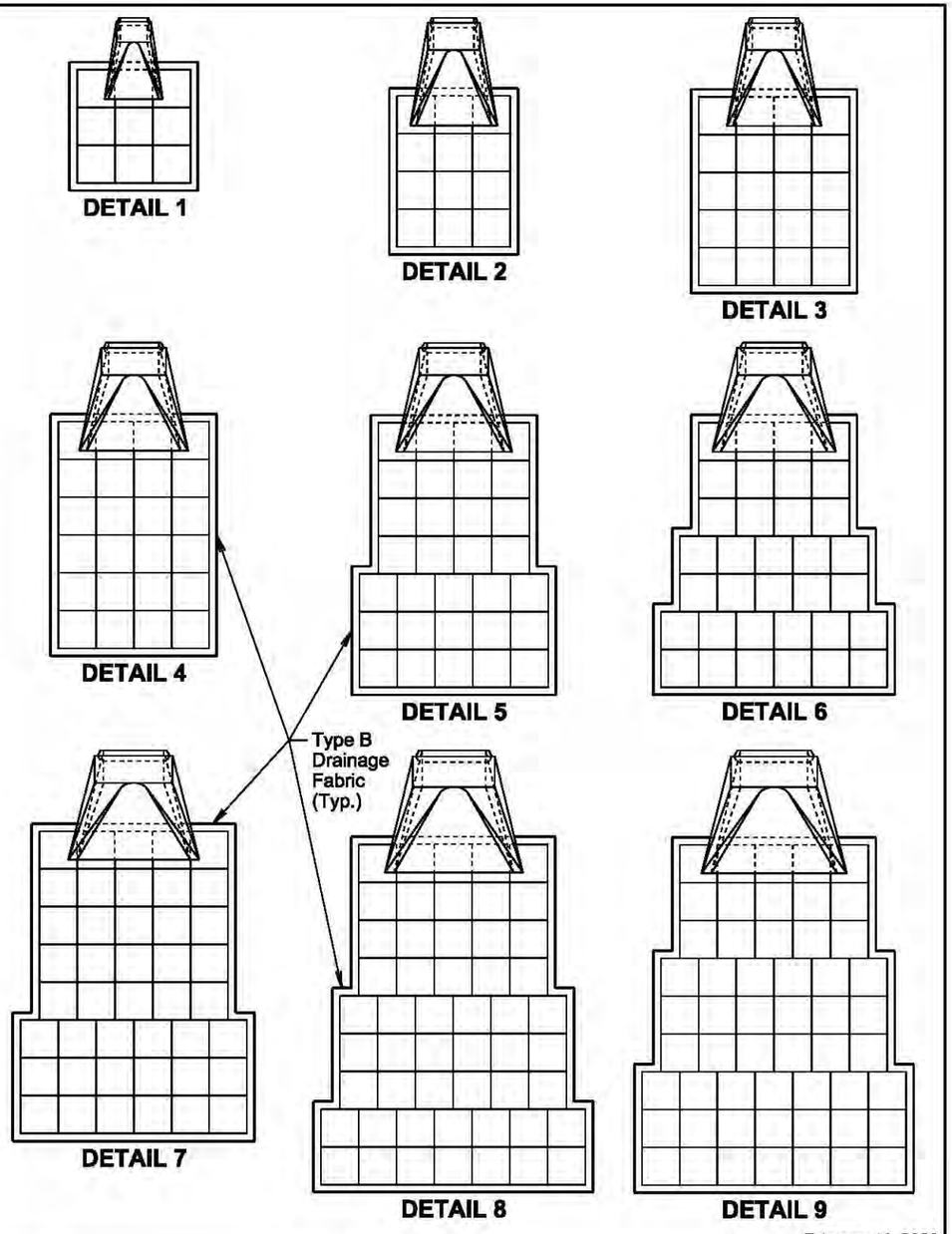
All fasteners will be placed where the mesh weaves around the selvage wire at the vertical and horizontal joints.

February 14, 2020

Published Date: 2025	SDDOT	***BANK AND CHANNEL PROTECTION GABIONS***	***PLATE NUMBER*** *720.01*
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0047(113)42	B71	B71

Plotting Date: 8/26/2024



February 14, 2020

Published Date: 2025	SDDOT	BANK AND CHANNEL PROTECTION GABION PLACEMENT UNDER PIPE END SECTIONS	PLATE NUMBER 720.03 Sheet 1 of 2

	* ESTIMATED QUANTITIES			
	Detail	Pipe Diameter (Inches)	Gabion (Cu. Yd.)	Type B Drainage Fabric (Sq. Yd.)
RCP, RCP Arch, CMP, and CMP Arch	1	12, 18, and 24	4.5	15
	2	30 and 36	6.0	19
	3	42	10.0	29
	4	48 and 54	12.0	34
	5	60	15.5	43
	6	66	17.0	47
	7	72	21.5	57
	8	78	26.0	68
	9	84	27.0	70

GENERAL NOTES:

Gabions at outlets of CMP and RCP will be placed under the end section a distance of 2 feet from the outlet end. For CMP end section installations, the upper fabric of the gabions will be modified to accommodate the metal end section as approved by the Engineer.

* Gabion and type B drainage fabric quantities on this standard plate are based on standard gabion sizes D, E, and F as depicted on standard plate 720.01.

Type B drainage fabric will be placed under the gabions and around the exterior sides (perimeter) of the gabions as approved by the Engineer. The type B drainage fabric will be in conformance with Section 831 of the Specifications. Measurement and payment of the type B drainage fabric will be in conformance with Section 720 of the Specifications.

February 14, 2020

Published Date: 2025	SDDOT	BANK AND CHANNEL PROTECTION GABION PLACEMENT UNDER PIPE END SECTIONS	PLATE NUMBER 720.03 Sheet 2 of 2