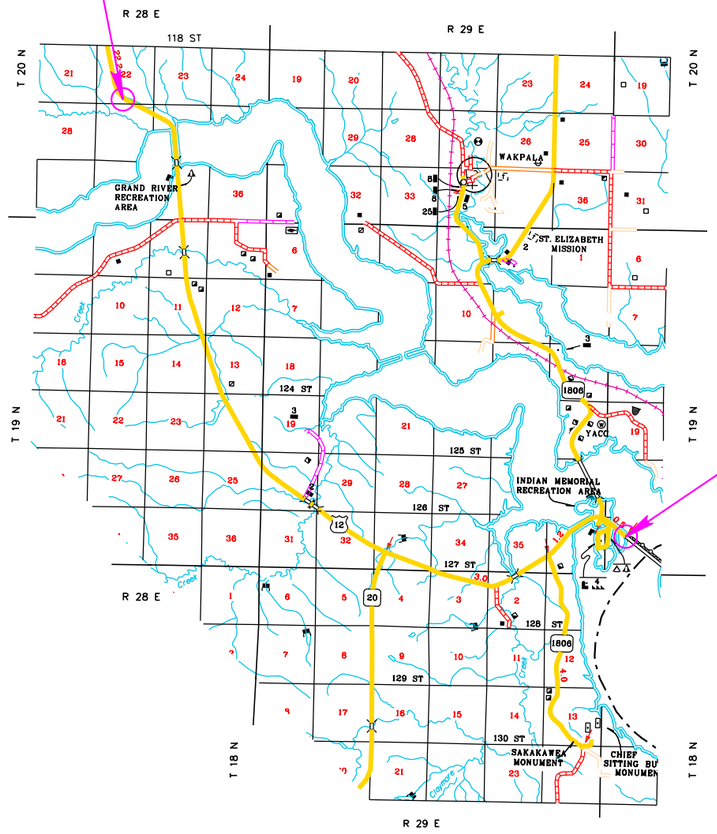
SECTION B: GRADING PLANS

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B1	B85

Plotting Date: 6/25/2024 _____

BEGIN NH 0012(230)171
US 12 - 05TY
STATION 176+72.2



END NH 0012(230)171
US 12 - 05TY
STATION c 268+01.75

INDEX OF SHEETS

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:200
Plotted From - evanwolf
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SECTION B: GRADING PLANS

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B2	B85

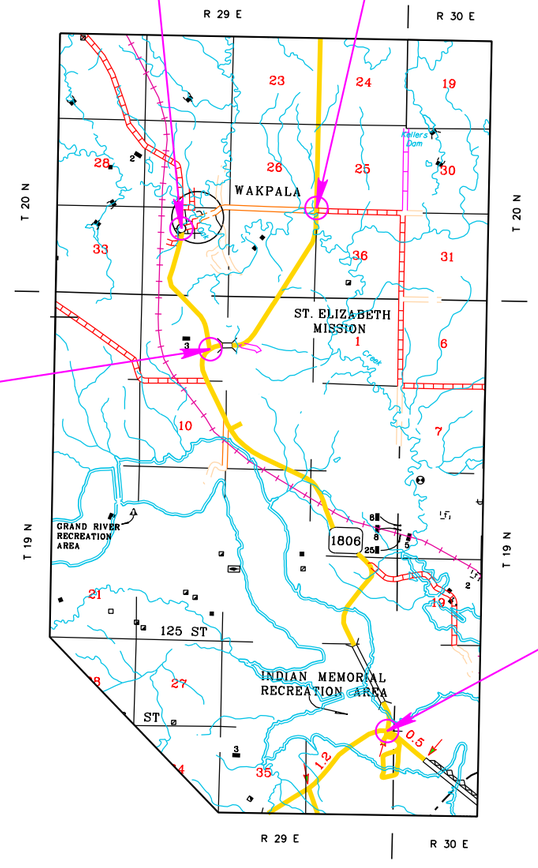
Plotting Date: 6/21/2024 _____

BEGIN 1806(20)370
SD 1806 P - 06E0
STATION 0+00

BEGIN P 1806(19)364
SD 1806 - 06A1
SATION 749+64.10

END P 1806(20)370
SD 1806 P - 06E0
STATION 87+91.22

END P 1806(19)364
SD 1806 - 06A1
STATION c 0+00



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

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File - ...\titleB_06E0_06A1.dgn

SECTION B: GRADING PLANS

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B3	B85

Plotting Date: 6/21/2024 _____

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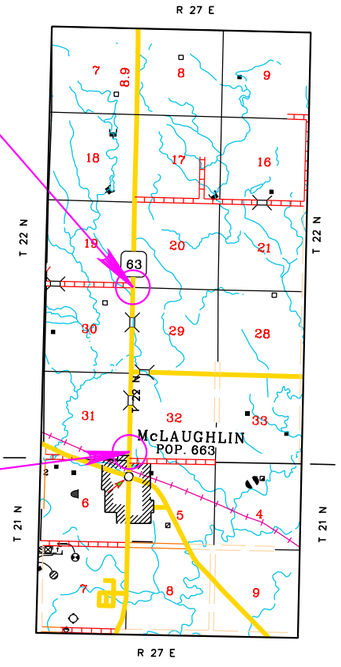
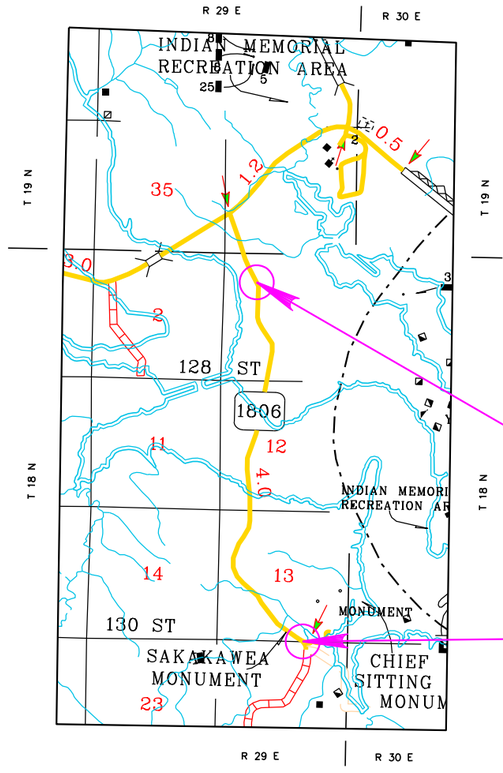
SD 63 - 07CD
STATION 390+50.00

BEGIN P 0063(59)252
SD 63 - 07CD
STATION 288+47.00





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SD 1806 - 06RC
STATION 69+11.74

END P 1806(22)359
SD 1806 - 06RC
STATION b 229+74.50

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:200
Plotted From - evanwolf
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SECTION B ESTIMATE OF QUANTITIES

05TY-Section B

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
009E3210	Construction Staking	15.015	Mile
009E3250	Miscellaneous Staking	15.015	Mile
009E3280	Slope Staking	0.528	Mile
009E3301	Engineer Directed Surveying/Staking	50.0	Hour
009E4200	Construction Schedule, Category II	Lump Sum	LS
110E0135	Remove Delineator	7	Each
110E0500	Remove Pipe Culvert	46	Ft
110E0510	Remove Pipe End Section	19	Each
110E0595	Remove Cattle Pass End Section	6	Each
110E0600	Remove Fence	61	Ft
110E0730	Remove Beam Guardrail	1,400.0	Ft
110E7500	Remove Pipe for Reset	392	Ft
110E7510	Remove Pipe End Section for Reset	40	Each
120E0600	Contractor Furnished Borrow	16,432	CuYd
120E6100	Water for Embankment	249.2	MGal
250E0020	Incidental Work, Grading	Lump Sum	LS
450E0143	24" RCP Class 3, Furnish	8	Ft
450E0150	24" RCP, Install	8	Ft
450E0203	48" RCP Class 3, Furnish	8	Ft
450E0210	48" RCP, Install	8	Ft
450E0213	54" RCP Class 3, Furnish	8	Ft
450E0220	54" RCP, Install	8	Ft
450E2008	18" RCP Flared End, Furnish	8	Each
450E2009	18" RCP Flared End, Install	8	Each
450E2028	36" RCP Flared End, Furnish	2	Each
450E2029	36" RCP Flared End, Install	2	Each
450E2036	48" RCP Flared End, Furnish	2	Each
450E2037	48" RCP Flared End, Install	2	Each
450E2040	54" RCP Flared End, Furnish	3	Each
450E2041	54" RCP Flared End, Install	3	Each
450E2200	24" RCP Sloped End, Furnish	7	Each
450E2201	24" RCP Sloped End, Install	7	Each
450E4768	24" CMP 14 Gauge, Furnish	30	Ft
450E4770	24" CMP, Install	30	Ft
450E5310	24" CMP Sloped End, Furnish	2	Each
450E5311	24" CMP Sloped End, Install	2	Each
* 450E8900	Cleanout Pipe Culvert	16	Each
450E9000	Reset Pipe	392	Ft
450E9001	Reset Pipe End Section	40	Each
462E0250	Cellular Grout	164.4	CuYd
620E0020	Type 2 Right-of-Way Fence	61	Ft
620E0520	Type 2 Temporary Fence	140	Ft

*** - Denotes Non-Participating**

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
620E1020	2 Post Panel	2	Each
630E0500	Type 1 MGS	650.0	Ft
630E1500	Type 1 Guardrail Transition	10	Each
630E2017	MGS MASH Flared End Terminal	10	Each
632E2510	Type 2 Object Marker Back to Back	97	Each
700E0210	Class B Riprap	37.3	Ton
720E1010	PVC Coated Bank and Channel Protection Gabion	54.0	CuYd
831E0110	Type B Drainage Fabric	214	SqYd

06RC-Section B

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
009E3210	Construction Staking	3.554	Mile
009E3230	Grade Staking	0.106	Mile
009E3250	Miscellaneous Staking	3.554	Mile
009E3280	Slope Staking	0.106	Mile
009E3301	Engineer Directed Surveying/Staking	25.0	Hour
009E4200	Construction Schedule, Category II	Lump Sum	LS
110E0500	Remove Pipe Culvert	226	Ft
110E0510	Remove Pipe End Section	7	Each
110E0600	Remove Fence	687	Ft
120E0010	Unclassified Excavation	18,143	CuYd
120E0600	Contractor Furnished Borrow	19,054	CuYd
120E6100	Water for Embankment	308.7	MGal
250E0020	Incidental Work, Grading	Lump Sum	LS
450E0143	24" RCP Class 3, Furnish	186	Ft
450E0150	24" RCP, Install	186	Ft
450E2200	24" RCP Sloped End, Furnish	4	Each
450E2201	24" RCP Sloped End, Install	4	Each
450E4768	24" CMP 14 Gauge, Furnish	50	Ft
450E4770	24" CMP, Install	50	Ft
450E5015	24" CMP Elbow, Furnish	4	Each
450E5016	24" CMP Elbow, Install	4	Each
450E5306	18" CMP Sloped End, Furnish	1	Each
450E5307	18" CMP Sloped End, Install	1	Each
450E5310	24" CMP Sloped End, Furnish	2	Each
450E5311	24" CMP Sloped End, Install	2	Each
450E8014	24" RCP to CMP Transition, Furnish	2	Each
450E8015	24" Pipe Transition, Install	2	Each
* 450E8900	Cleanout Pipe Culvert	5	Each
620E0020	Type 2 Right-of-Way Fence	687	Ft
620E0520	Type 2 Temporary Fence	1,244	Ft
620E1020	2 Post Panel	8	Each
632E2510	Type 2 Object Marker Back to Back	18	Each
680E0224	4" PVC Outlet Pipe	100	Ft
680E0440	4" Slotted Corrugated Polyethylene Drainage Tubing	280	Ft
680E2000	Concrete Headwall for Underdrain	1	Each
680E2500	Porous Backfill	118.0	Ton
720E1010	PVC Coated Bank and Channel Protection Gabion	9.0	CuYd
831E0110	Type B Drainage Fabric	30	SqYd

*** - Denotes Non-Participating**

06E0-Section B

Revised: 10/24/24 BAF

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
009E3210	Construction Staking	1.665	Mile
009E3250	Miscellaneous Staking	1.665	Mile
009E3301	Engineer Directed Surveying/Staking	25.0	Hour
009E4200	Construction Schedule, Category II	Lump Sum	LS
110E0135	Remove Delineator	5	Each
110E0510	Remove Pipe End Section	1	Each
110E0600	Remove Fence	88	Ft
110E7500	Remove Pipe for Reset	40	Ft
110E7510	Remove Pipe End Section for Reset	3	Each
250E0020	Incidental Work, Grading	Lump Sum	LS
450E2028	36" RCP Flared End, Furnish	1	Each
450E2029	36" RCP Flared End, Install	1	Each
450E8300	Culvert Joint Cleaning	198.0	Ft
450E8305	Repair Culvert Joint	198.0	Ft
450E8310	Chemical Grout Void Fill	12.0	Gal
* 450E8900	Cleanout Pipe Culvert	9	Each
450E9000	Reset Pipe	40	Ft
450E9001	Reset Pipe End Section	3	Each
620E0020	Type 2 Right-of-Way Fence	88	Ft
620E0520	Type 2 Temporary Fence	312	Ft
620E1020	2 Post Panel	4	Each
632E2510	Type 2 Object Marker Back to Back	30	Each

*** - Denotes Non-Participating**

07CD-Section B

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
009E3210	Construction Staking	3.731	Mile
009E3250	Miscellaneous Staking	0.100	Mile
009E3301	Engineer Directed Surveying/Staking	25.0	Hour
009E4200	Construction Schedule, Category II	Lump Sum	LS
110E0730	Remove Beam Guardrail	910.0	Ft
120E0600	Contractor Furnished Borrow	140	CuYd
250E0020	Incidental Work, Grading	Lump Sum	LS
* 450E8900	Cleanout Pipe Culvert	8	Each
630E0500	Type 1 MGS	362.5	Ft
630E1500	Type 1 Guardrail Transition	8	Each
630E2017	MGS MASH Flared End Terminal	8	Each
632E2510	Type 2 Object Marker Back to Back	12	Each

*** - Denotes Non-Participating**

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOPCZYNSKI
SOUTH DAKOTA
10/24/24

06A1-Section B

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
009E3210	Construction Staking	6.859	Mile
009E3230	Grade Staking	0.316	Mile
009E3250	Miscellaneous Staking	6.859	Mile
009E3280	Slope Staking	0.316	Mile
009E3301	Engineer Directed Surveying/Staking	25.0	Hour
009E4200	Construction Schedule, Category II	Lump Sum	LS
110E0135	Remove Delineator	4	Each
110E0500	Remove Pipe Culvert	82	Ft
110E0510	Remove Pipe End Section	11	Each
110E0600	Remove Fence	88	Ft
110E0730	Remove Beam Guardrail	1,040.0	Ft
110E7510	Remove Pipe End Section for Reset	1	Each
120E0010	Unclassified Excavation	13,054	CuYd
120E0600	Contractor Furnished Borrow	10,035	CuYd
120E2000	Undercutting	6,252	CuYd
120E6100	Water for Embankment	149.4	MGal
250E0020	Incidental Work, Grading	Lump Sum	LS
270E0112	Salvage Granular Material	1,313.0	Ton
450E0143	24" RCP Class 3, Furnish	60	Ft
450E0150	24" RCP, Install	60	Ft
450E0183	36" RCP Class 3, Furnish	100	Ft
450E0190	36" RCP, Install	100	Ft
450E2028	36" RCP Flared End, Furnish	4	Each
450E2029	36" RCP Flared End, Install	4	Each
450E2200	24" RCP Sloped End, Furnish	3	Each
450E2201	24" RCP Sloped End, Install	3	Each
450E4600	24" RCP Arch Sloped End, Furnish	1	Each
450E4601	24" RCP Arch Sloped End, Install	1	Each
450E4758	18" CMP 14 Gauge, Furnish	64	Ft
450E4760	18" CMP, Install	64	Ft
450E5310	24" CMP Sloped End, Furnish	5	Each
450E5311	24" CMP Sloped End, Install	5	Each
450E5406	18" CMP Safety End, Furnish	2	Each
450E5407	18" CMP Safety End, Install	2	Each
450E8300	Culvert Joint Cleaning	240.0	Ft
450E8305	Repair Culvert Joint	240.0	Ft
450E8310	Chemical Grout Void Fill	12.0	Gal
* 450E8900	Cleanout Pipe Culvert	22	Each
450E9001	Reset Pipe End Section	1	Each
462E0250	Cellular Grout	30.2	CuYd
464E0100	Controlled Density Fill	17.2	CuYd
620E0020	Type 2 Right-of-Way Fence	88	Ft
620E0520	Type 2 Temporary Fence	233	Ft
620E1020	2 Post Panel	4	Each
630E0500	Type 1 MGS	300.0	Ft
630E1500	Type 1 Guardrail Transition	12	Each
630E2017	MGS MASH Flared End Terminal	12	Each
632E2510	Type 2 Object Marker Back to Back	53	Each
720E1010	PVC Coated Bank and Channel Protection Gabion	16.5	CuYd
831E0110	Type B Drainage Fabric	53	SqYd
831E1010	Geogrid Reinforcement	4,034	SqYd

*** - Denotes Non-Participating**

GRADING OPERATIONS

Water for Embankment is estimated at the rate of 15 gallons of water per cubic yard of Embankment minus waste. The estimated quantity of Water for Embankment is 249.2 MGal for 05TY, 149.4 MGal for 06A1, and 308.7 MGal for 06RC. All costs associated will be incidental to the contract unit price per MGal of "Water for embankment".

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

Special ditch grade and other sections of the roadway different than the typical sections will be constructed to the limits shown ion the cross sections. If significant changed to the cross sections are necessary during construction, the Engineer will contact the Designer for the proposed change.

A copy of the surfacing/ Subgrade investigation for these projects is available from the Pierre Region and Mobridge Area offices.

TABLE OF EXCAVATION QUANTITIES BY BALANCES

06RC	Total Excavation (CuYd)	Contractor Furnished Borrow Exc. (CuYd)
Landslide Repair and Underdrain Installation	18143	19054
06RC Total	18143	19054

06A1	Excavation (CuYd)	Undercut (CuYd)	Contractor Furnished Borrow Exc. (CuYd)	Total Excavation (CuYd)
Grading at Guardrail Locations			165	
Heave Repair MRM 367.300 to MRM 367.545	5369	5069	7732	10438
Base Course Reinforcement MRM 369.817 to MRM 369.873	1433	1183	2063	2616
06A1 Total	6802	6252	9960	13054

SHRINKAGE FACTOR: Embankment +20%.

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.

Utilities are not planned to be affected on this project. If utilities are identified near the improvement area through the SD One Call Process as required by South Dakota Codified Law 49-7A and Administrative Rule Article 20:25, the Contractor will contact the Engineer to determine modifications that will be necessary to avoid utility impacts.

A potential waterline at MRM 370.00+0.530 on SD 1806 was identified. The Contractor must utilize One-Call as per Section 5.6 of the Specifications to avoid any utility conflicts.

PROCEDURES FOR DETERMINING UNCLASSIFIED EXCAVATION QUANTITY

Unclassified Excavation will not be measured but will be paid for as plans quantity. Removal and replacement of the topsoil will not be measured but will be paid for at the contract lump sum price for Remove and Replace Topsoil.

The Excavation quantities from individual balances and the table above have been reduced by the volume of in place concrete pavement and asphalt pavement that will be removed.

TABLE OF UNCLASSIFIED EXCAVATION

06A1	(CuYd)
Excavation	6802
Undercut	6252
Total	13054

06RC	(CuYd)
Excavation	18143
Total	18143

REGISTERED PROFESSIONAL ENGINEER
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SOUTH DAKOTA
10/24/24

SALVAGE GRANULAR MATERIAL

In the heave repair areas, the Contractor will be required to salvage enough existing granular base material to provide for a 6" lift of temporary surfacing which will be utilized until the placing the asphalt concrete surfacing for the project. The temporary surfacing is estimated to require 1313 tons of salvaged material. Costs associated with salvaging and stockpiling the material for use as temporary surfacing is incidental to the contract unit price per ton for "Salvage Granular Material".

UNDERCUTTING

The undercut depth for the Heave Repair and Base Course Reinforcement areas will be 3 feet.

The plan shown quantity will be the basis of payment. However, if there are additional areas of undercut other than what is shown in the plans, the Engineer will direct removal of these areas and the additional areas will be measured according to the Engineer.

TABLE OF UNDERCUTTING

06A1

MRM	to	MRM	Quantity
367.300		367.550	5069
369.817		369.873	1183
		Total	6252

HEAVE REPAIR

06A1

From MRM 367.300 to MRM 367.550 the earthen subgrade will be undercut 3 feet below the earthen subgrade surface at the heave areas specified in the table below. The undercut material or other suitable material, as directed by the Engineer, will then be replaced, and compacted to the density specified for the section being constructed. The undercut will utilize a 10:1 taper from the top of the subgrade to the bottom of the undercut.

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.

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

TABLE OF CONTRACTOR FURNISHED BORROW

05TY

Location	(CuYd)
Inslope Flattening	14578
US12/SD20 Turn Lane Widening	1537
US12/SD1806 Turn Lane Widening	148
Pipe Work	121
Grading at Guardrail Locations	48
05TY Total	16432

06A1

Location	(CuYd)
Grading at Guardrail Locations	240
Heave Repair MRM 367.300 to MRM 367.545	7732
Base Course Reinforcement MRM 369.817 to MRM 369.873	2063
06A1 Total	10035

06RC

Location	(CuYd)
Landslide Repair and Underdrain Installation	19054
06RC Total	19054

07CD

Location	(CuYd)
Grading at Guardrail Locations	140
07CD Total	140

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

05TY Station	Type of Work	Quantity (CuYd)
a 177+75	Plug Cattle Pass	40
a 242+00	Plug Cattle Pass	62.2
b 27+25	Plug Cattle Pass	62.2
	05TY Total:	**164.4**
06A1		
845+35	Fill Pipe	30.2
	06A1 Total	30.2

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

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

06A1 Station	Quantity (CuYd)
751+99	17.2
06A1 Total:	17.2

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

Station/ MRM	L/R	PVC Coated Bank and Channel Protection Gabion (CuYd)	Type B Drainage Fabric (SqYd)
05TY			
a 114+28	R	4.5	15
a 262+75	R	6.0	19
a 292+80	R	4.5	15
a 296+06	R	4.5	15
a 342+65	R	6.0	19
a 384+07	R	4.5	15
a 403+87	L	12.0	34
b 104+43	R	12.0	34
05TY Total		54.0	166
06A1			
MRM 370.00+0.067	R	4.5	15
MRM 369.00+0.860	R	6.0	19
MRM 366.00+0.444	L	6.0	19
06A1 Total		16.5	53
06RC			
b 38+16	L	4.5	15
b 46+24	L	4.5	15
06RC Total		9.0	30

CORRUGATED METAL PIPE

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. Corrugated metal pipe in these areas 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.

MAINLINE CROSS PIPE REPLACEMENT

Pipe culverts will be installed in accordance with the following notes and as shown on the Pipe Installation Detail.

This work will be completed prior to beginning cold milling on the project. Pipe replacements will be completed half-width at a time to maintain traffic.

After the existing pipe has been removed, the new pipe culvert will be undercut to a minimum depth one 1 foot. The depth of undercut is an estimate and the actual depth necessary will be determined during construction. The Engineer will determine how much undercut will be done in accordance with Section 421 of the specifications but will not reduce the undercut to less that 1 foot in depth.

Select fill material for backfilling the undercut will conform to the gradation requirements of Base Course in Section 882. If groundwater is encountered during construction, the select fill material for backfilling the undercut area and Class B bedding will conform to the gradation requirements of Section 421.2 A. until backfill placement is above the groundwater level. The Engineer will process a CCO to provide for compensation to the Contractor for the added cost of the changed material. All other requirements of Section 421 will apply.

Pipe Culverts will be bedded in accordance with Section 450.3 F.2, Class B Bedding with the following exceptions. The excavated area will extend 2 feet from the outermost diameter on both sides of the pipe with the back of the excavated area being sloped 2:1 upward to the top of the roadway surface. Select fill material for Class B Bedding will conform to the gradation requirements of Base Course in section 882.

After the minimum testing requirements of M.S.T.R. Section 4.1F.3.a.1 (SDDOT Materials Manual) have been met, the minimum density testing requirements will be one test per zone. Each zone from the top of the pipe to the top of the subgrade will be 2 feet in depth. Moisture testing will remain as per M.S.T.R.

The remainder of the pipe culvert excavation will be backfilled with soils taken from the pipe removal excavation or other suitable material as approved by the Engineer. The Backfill with be benched into 2:1 excavation slope. Compaction of the backfill material will be governed by the Specified Density Method.

After the new pipe has been backfilled to the top of the subgrade, a 12" depth of Base Course and 5" (2-2.5" lifts) depth of asphalt concrete composite will be placed as a patch matching the existing asphalt concrete.

All costs to remove and dispose of asphalt concrete pavement, including full depth saw cutting of the asphalt concrete pavement, will be incidental to the contract until price per square yard to Remove Asphalt Concrete Pavement (See Section F). All excavation necessary for Class B Bedding and the pipe installation will be incidental to the contract unit price per foot for the corresponding pipe installation contract items. Pipe culvert undercut is not anticipated.

The select fill material used for backfilling the pipe culvert undercut and the Class B bedding will be paid for at the contract unit price per ton for Base Course. The 3" layer of bedding material to form the cradle in the pipe foundation will be incidental to the corresponding pipe installation contract items. The cost for asphalt concrete composite installed over the pipe replacement will be paid for at the contract unit price per ton for Asphalt Concrete Composite.

REINFORCED CONCRETE PIPE

High sulfate levels are likely to be encountered on this project. The type of cement will be either a Type II or a Type V 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.

INSLOPE TRANSITIONS

Inslope transitions will be required at various pipe locations. Refer to Standard Plate 120.05 for details.

REMOVE & RESET PIPE

The Contractor will tie each section of pipe to the adjacent sections with tie bolts conforming to Standard Plate 450.18. All costs for drilling holes, furnishing, and installing the tie bolt assembly will be incidental to the corresponding pipe bid item.

Existing tie bolts, if any, may be salvaged and reused if condition is acceptable to the Engineer.

INCIDENTAL WORK, GRADING

PCN/Station	L/R	Remarks
06A1/845+30	R	Remove Ditch Block
05TY, 06A1, 06RC, 06E0 & 07CD	L/R	Minor grading to reestablish drainage – See Pipe Table

TEMPORARY EXCAVATION FOR PIPE REPLACEMENT

A temporary 2:1 excavation slope will be required at Station a 114+52 for the replace 30' CMP. The temporary slope will become unstable over the long-term. However, the slope should remain globally stable over the short-term during construction if measures are taken to divert runoff away from the slope and construction activities are sequenced to minimize the amount of time the temporary slope is left exposed and unsupported. Regular monitoring of the temporary slope is required during construction. If the temporary slope becomes unstable, excavation will cease, and the slope will be evaluated by the Engineer.

TABLE OF RIPRAP

05TY

Station	L/R	Class B Riprap Quantity (Ton)	Type B Drainage Fabric (SqYd)
b 28+13	L	37.3	48
05TY Totals		37.3	48

GENERAL GEOLOGY

Materials that will be encountered consist of the Pierre Shale and Pierre Shale derived embankment. The South Dakota Geologic Survey describes the Pierre Shale formation as outlined below:

The Pierre Shale consists of blue-gray, fissile to blocky shale with persistent beds of bentonite, black organic shale, and light-brown chalky shale. Contains minor sandstone, conglomerate, and abundant carbonate and ferruginous concretions.

CLASSIFICATION OF EXCAVATION

Most of the material encountered should be able to be excavated using conventional methods associated with normal Unclassified Excavation. All materials encountered during the construction of this project, regardless of their nature or the manner in which they are excavated, will be considered Unclassified Excavation.

BASE COURSE REINFORCEMENT

Mainline has been distorted by landslide activity around SD 1806 MRM 369.845. This work will be completed prior to beginning cold milling on the project.

Correct the mainline profile by removing the existing surfacing and reconstructing the subgrade from MRM 369.812± to MRM 369.878±. After the asphalt and base course has been removed, undercut the subgrade 3 feet. The undercut will be tapered at 10:1 at each end of the excavation resulting in a full depth excavation from MRM 369.817± to MRM 369.873±. Reconstruct the subgrade and replace the surfacing section.

The base course portion of the surfacing section will be reinforced with geogrid from MRM 369.812± to MRM 369.878± (350 feet). After the subgrade has been rebuilt, 4 inches of base course will be placed and compacted in preparation for geogrid placement. Place biaxial geogrid followed by 8 inches of base course. Place an additional layer of biaxial geogrid followed by the remaining 8 inches of base course. Install base course and geogrid according to the Installation Procedure.

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 to prevent granular material being forced between the geogrid layers.
5) No equipment will be allowed directly on geogrid. The Geogrid must be backfilled with a minimum of 4 inches of granular material before equipment will be allowed to operate the grid from 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 maximum lifts and compacted as per the Specified Density Method.

Geogrid Specification

The Geogrid will be biaxial grid of single layer constriction. Vibratory welded, integrally formed or woven and coated geogrids will be acceptable. Grids with laser welded junctions will not be allowed. The geogrid will be certified by the supplier to meet the following specification prior to installation:

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

Approximately 4,034 square yards of Geogrid will be required. Geogrid will be Paid for at the contract unit price per square yard. Payment quantities will be based on the area covered plus 15%. Overlaps are accounted for by the additional 15%. Payment will be full compensation for furnishing and installing the geogrid only. Granular backfill materials will be paid for under a different item.

LANDSLIDE DEBRIS EXCAVATION (PCN 06RC)

Landslide Debris Excavation will be required at the locations shown on the cross sections. It is anticipated that most of the excavated Landslide Debris can be used in the construction of embankment. The Landslide Debris Excavation limits will not exceed those shown on the cross sections unless directed by the Engineer. A temporary 1.5:1 backslope is required to excavate the Landslide Debris and reconstruct the inslopes. The temporary slope will be unstable over the long-term. However, the slope should remain globally stable over the short-term during construction if measures are taken to divert runoff away from the slope and construction activities are sequenced to minimize the amount of time the temporary backslope is left exposed and unsupported. Regular monitoring of the temporary slope is required during construction. If the temporary slope becomes unstable, excavation will cease, and the slope will be evaluated by the Engineer.

Landslide Debris Excavation will be paid for as Unclassified Excavation.

UNDERDRAINS (PCN 06RC)

An underdrain will be required to capture water from local seeps and improve subgrade and embankment foundation conditions. The underdrain will be installed as per the following:

An underdrain will be installed at the toe of the temporary Landslide Debris Excavation slope from Station b 25+20±to Station b 28+00±. The underdrain will consist of 4-inch Slotted Corrugated Polyethylene Tubing placed in a 2-foot-wide by 3-foot-deep trench backfilled with 3 feet of Porous Backfill. The underdrain will outlet through 100 feet of 4-inch PVC Outlet Pipe placed in a 2-foot-wide trench of variable depth backfilled with soil. The underdrain outlet pipe will tee into the underdrain at Station b 25+95±and daylight at an Outlet Headwall at approximately Station b 26+05, 219' Rt. as directed by the Engineer.

Estimate of Quantities:

4-inch Corrugated Slotted Polyethylene Tubing	280 feet
4-inch PVC Outlet Pipe	100 feet
Porous Backfill	118 ton
Headwalls (See Standard Plate No. 680.01)	1 each

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10/9/24

UNDERDRAIN CONSTRUCTION (PCN 06RC)

The 4-inch PVC Outlet Pipe will be Schedule 40 PVC Pipe conforming to ASTM D1785 designed as PVC 1120, PVC 1220, or PVC 2120. Pipe sections will be connected using a PVC Solvent Cement conforming to ASTM D2564. All labor, tools, equipment, and incidentals necessary for the installation of the PVC Outlet Pipe will be incidental to the contract unit price per foot for 4-inch PVC Outlet Pipe.

Care will be taken to ensure that the underdrain and outlet pipes are not damaged during construction. Sufficient cover material is to be placed over the pipes before compaction equipment is allowed over the underdrain system. Damaged pipe will be replaced by the Contractor at no additional cost to the Department.

The underdrain locations are given based on the best information available to the Geotechnical Engineering Activity. 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.

Underdrain trenches will be graded to maintain a minimum of .01ft/ft. or 1% drop from beginning to outlet. The Contractor will ensure all segments of the drainage tubing and outlet pipe are positively connected and remain soil tight during installation of the underdrain system.

Underdrain 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. Each headwall location will be identified by GPS coordinated and Station and Offset. The headwall location will be cataloged in the Mobridge Area office for reference in post construction maintenance.

EMBANKMENT CONSTRUCTION (PCN 06RC)

Embankment construction will not begin until all compressible materials have been excavated from the embankment footprint to the satisfaction of the Engineer. A suitable embankment foundation consists of compacted soil which does not pump, rut, or otherwise displace when traveled over with construction equipment. Each embankment will be benched into the existing slopes in accordance with Section 120.3.B.2 of the Specifications.

REINFORCED CONCRETE PIPE JOINT REPAIR AND VOID GROUTING

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

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

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

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

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

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

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

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

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

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

CULVERT JOINT CLEANING

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

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

REPAIR CULVERT JOINT

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

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

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

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

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

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

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

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

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

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REINFORCED CONCRETE PIPE JOINT REPAIR AND VOID GROUTING (CONTINUED)

DUAL COMPONENT CHEMICAL GROUT FOR VOID FILLING

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

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

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

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

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.

TEMPORARY FENCE

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

REMOVE OBJECT MARKERS

At locations shown in the Table for Mainline Culvert Work, where Object Markers will be removed, cost for removing the existing Object Markers will be paid for the contract unit price per each for Remove Delineator.

TABLE OF FENCE QUANTITIES

Station to Station	Side (L/R)	Remove Fence	Right-of-Way Fence	Fence Panel	Temporary Fence
			Type 2	2 Post	Type 2
		Ft	Ft	Each	Ft
05TY					
a 165+95 to a 166+56	R	61	61	2	140
05TY Total:		**61**	**61**	**2**	**140**
06A1					
845+53 to 845+68	L	16	16	2	233
845+77 to 846+26	L	72	72	2	
06A1 Total:		**88**	**88**	**4**	**233**
06E0					
66+42 to 66+87	R	45	45	2	158
66+44 to 66+87	L	43	43	2	154
06E0 Total:		**88**	**88**	**4**	**312**
06RC					
b 24+24 to b 30+50	R	515	515	4	1014
b 37+74 to b 38+56	L	82	82	2	115
b 45+79 to b 46+69	L	90	90	2	115
06RC Total:		**687**	**687**	**8**	**1244**

TABLE OF GUARDRAIL

Location	Remove Beam Guardrail (Ft)	Type 1 MGS (Ft)	Type 1 Guardrail Transition (Ft)	MGS MASH Flared End Terminal (Each)
05TY				
Structure No. 16-665-200 (05TY)				
Structure Lt.	250	137.5	2	2
Structure Rt.	250	87.5	2	2
Structure No. 16-666-216 (05TY)				
Structure Lt.	300	137.5	2	2
Structure Rt.	300	137.5	2	2
Structure No. 65-000-020 (05TY)				
Structure Lt.	300	150	2	2
05TY Total:	**1400**	**650**	**10**	**10**
07CD				
Structure No. 16-580-084 (07CD)				
Structure Lt.	225	100	2	2
Structure Rt.	225	87.5	2	2
Structure No. 16-580-075 (07CD)				
Structure Lt.	230	87.5	2	2
Structure Rt.	230	87.5	2	2
07CD Total:	**910**	**362.5**	**8**	**8**
06A1				
Structure No. 16-737-253 (06A1)				
Structure Lt.	160	50	2	2
Structure Rt.	160	50	2	2
Structure No. 16-732-234 (06A1)				
Structure Lt.	200	50	2	2
Structure Rt.	200	50	2	2
Structure No. 16-720-217 (06A1)				
Structure Lt.	160	50	2	2
Structure Rt.	160	50	2	2
06A1 Total:	**1040**	**300**	**12**	**12**

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B12	B85

Revised: 10/8/24 EJW

TABLE OF CONSTRUCTION STAKING FOR PROJECTS NH 0012(230)171, P 1806(19)364, P 1806(20)370, P 1806(22)359, & P 0063(59)252
(See Special Provision for Contractor Staking)

Roadway and Description	Begin Station	End Station	Number of Lanes	Length (Ft)	Length (Mile)	Lane Factor	*Sets of Stakes	Construction Staking Quantity (Mile)	Slope Staking Quantity (Mile)	**Grade Staking Quantity (Mile)	Misc. Staking Quantity (Mile)
				05TY							
US 12 (2 Lanes AC Pavement)	176+72	249+37	2	7265	1.376	1	0	1.376			1.376
US 12 (2 Lanes AC Pavement)	254+93	278+05	2	2313	0.438	1	0	0.438			0.438
US 12 (3 Lanes AC Pavement)	a 0+00	a 17+00	3	1700	0.322	1.5	0	0.483			0.483
US 12 (4 Lanes AC Pavement)	a 17+00	a 30+00	4	1300	0.246	2	0	0.492			0.492
US 12 (3 Lanes AC Pavement)	a 30+00	a 47+00	3	1,700	0.322	1.5	0	0.483			0.483
US 12 (2 Lanes AC Pavement)	a 47+00	a 55+28	2	828	0.157	1	0	0.157			0.157
US 12 (2 Lanes AC Pavement)	a 57+12	a 64+00	2	688	0.130	1	0	0.130			0.130
US 12 (3 Lanes AC Pavement)	a 64+00	a 79+00	3	1,500	0.284	1.5	0	0.426			0.426
US 12 (4 Lanes AC Pavement)	a 79+00	a 97+00	4	1800	0.341	2	0	0.682			0.682
US 12 (3 Lanes AC Pavement)	a 97+00	a 119+00	3	2200	0.417	1.5	0	0.625			0.625
US 12 (2 Lanes AC Pavement)	a 119+00	a 218+00	2	9900	1.875	1	0	1.875			1.875
US 12 (3 Lanes AC Pavement)	a 218+00	a 242+00	3	2400	0.455	1.5	0	0.682			0.682
US 12 (2 Lanes AC Pavement)	a 242+00	a 262+00	2	2000	0.379	1	0	0.379			0.379
US 12 (3 Lanes AC Pavement)	a 262+00	a 299+50	3	3750	0.710	1.5	0	1.065			1.065
US 12 (2 Lanes AC Pavement)	a 299+50	a 327+17	2	2767	0.524	1	0	0.524			0.524
US 12 (2 Lanes AC Pavement)	a 328+63	a 339+00	2	37	0.007	1	0	0.007			0.007
US 12 (3 Lanes AC Pavement)	a 339+00	a 404+48.8	3	6548.8	1.240	1.5	0	1.860			1.860
US 12 (4 Lanes AC Pavement)	b 20+40	b 23+71	4	331	0.063	2	0	0.125			0.125
US 12 (2 Lanes AC Pavement)	b 23+71	b 82+00	2	5829	1.104	1	0	1.104			1.104
US 12 (3 Lanes AC Pavement)	b 82+00	b 115+78	3	3378	0.640	1.5	0	0.960			0.960
US 12 (2 Lanes AC Pavement)	b 208+31	b 240+05	2	3174	0.601	1	0	0.601			0.601
US 12 (3 Lanes AC Pavement)	b 240+05	b 253+09	3	1304	0.247	1.5	0	0.370			0.370
US 12 (2 Lanes AC Pavement)	b 253+09	b 262+02	2	893	0.169	1	0	0.169			0.169
US 12/SD 20 Intersection Widening	a 397+86	b 34+65		2088			0		0.395		
US 12/SD 1806 Intersection Widening	b 238+00	b 245+00		700			0		0.133		
							05TY Subtotals:	15.015	0.528		15.015
				06A1							
SD1806 (2 Lanes AC Pavement)	749+64.10	c 0+00	2	36217.95	6.859	1		6.859			6.859
Heave Repair	1018+13	1031+33		1320		1	1		0.250	0.250	
Base Course Reinforcement	885+25	881+76		349		1	1		0.066	0.066	
							06A1 Subtotals:	6.859	0.316	0.316	6.859
				06RC							
SD1806 (2 Lanes AC Pavement)	67+11.74	b 229+74.50	2	18763.44	3.554	1		3.554			3.554
Landslide Repair	b 24+40	b 30+00		560		1	1		0.106	0.106	
							06RC Subtotals:	3.554	0.106	0.106	3.554
				06E0							
SD1806P (2 Lanes AC Pavement)	0+00	87+91.22	2	8791.22	1.665	1		1.665			1.665
							06E0 Subtotals:	1.665			1.665
				07CD							
SD63 (2 Lanes AC Pavement)	288+47	390+50	2	9850.89	1.866	1		1.866			1.866
							07CD Subtotals:	1.866			1.866
							Total:	28.959	0.950	0.422	28.959

* 1 = Top of Granular Material Blue Top Stakes Only (Asphalt Concrete Pavement)

** Grade Staking Quantity = (Length) x (Lane Factor) x (Sets of Stakes)

REGISTERED PROFESSIONAL ENGINEER
REG. No. 5601
PAUL A. KNOFCZYNSKI
DATE 10/9/24

TABLE OF PIPE QUANTITIES

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B13	B85

05TY

Culvert #	HWY	MRM	Disp	Station	Side	Per Original Plans		Remove for Reset		Reset		Remove			Pipe				Sloped End Sections		Flared End Sections				Cleanout Pipe Culvert	Cellular Grout	Contractor Furnished Borrow	B&C Protection Gabions	Class B Riprap	Type B Drainage Fabric	Incidental Work, Grading	Obj. Marker		Repair Comments
						In Place Culvert Size and Type	End Type	Pipe	End Section	Pipe	End Section	Pipe	End Section	Cattle Pass End Section	24"CMP	24" RCP	48" RCP	54" RCP	24" CMP	24" RCP	18" RCP	36" RCP	48" RCP	54" RCP								Remove Delineator	New Back to Back	
								(Ft)	(Each)	(Ft)	(Each)	(Ft)	(Each)	(Each)	(Ft)	(Ft)	(Ft)	(Ft)	(Each)	(Each)	(Each)	(Each)	(Each)	(Each)	(Each)	(CuYd)	(CuYd)	(CuYd)		(SqYd)	(LS)	(Each)	(Each)	
48	US 12	172	0.003	811+20	Lt	24" CMP	Flared																									1	1	
					Rt		Flared																									1	1	
49	US 12	172	0.003	180+97	Lt	18" RCP	Flared	8	1	8	1																			X		1	
					Rt		Flared						1								1												1	
50	US 12	172	0.061	183+98	Lt	18" RCP	Flared		1		1																						1	
					Rt		Flared						1								1												1	
51	US 12	172	0.132	188+00	Lt	18" RCP	Flared						1								1				1								1	
					Rt		Flared	24		24			1								1												1	
52	US 12	172	0.316	197+55	Lt	18" RCP	Flared						1								1												1	
					Rt		Flared														1												1	
53	US 12	172	0.389	201+60	Lt	24" RCP	Flared	8		8			1							1												1	
					Rt		Flared	16		16			1							1												1	
54	US 12	172	0.482	206+27	Lt	24" RCP	Flared	8		8			1							1												1	
					Rt		Flared	16		16			1							1												1	
55	US 12	172	0.681	217+10	Lt	7' x 7' RCBC	Flared																		1							1	2	
					Rt		Flared																		1							1	2	
56	US 12	174	0.062	a 12+00	Lt	24" RCP	Flared		1		1																						1	
					Rt		Flared		1		1																						1	
57	US 12	174	0.591	a 40+00	Lt	18" RCP	Flared		1		1																						1	
					Rt		Flared		1		1																						1	
58	US 12	175	0.130	a 67+72	Lt	30" RCP	Flared		1		1																				X		1	Right reset FES and re-grade around to achieve drainage
					Rt		Flared	8	1	8	1																						1	
59	US 12	175	0.239	a 73+00	Lt	18" RCP	Flared		1		1																				X		1	Reset FES and re-grade to achieve drainage
					Rt		Flared		1		1																						1	
60	US 12	175	0.853	a 105+75	Lt	18" RCP	Flared	8	1	8	1														1								1	
					Rt		Flared	8	1	8	1														1								1	
61	US 12	176	0.039	a 114+28	Lt	24" CMP	Flared																										1	
					Rt		Flared					30	1		30				1								4.5		15				1	
62	US 12	176	0.210	a 124+00	Lt	24" RCP	Flared	8	1	8	1																						1	
					Rt		Flared	8	1	8	1																						1	
63	US 12	176	0.434	a 135+00	Lt	7' x 7' RCBC	Wingwalls																										2	
					Rt		Wingwalls																										2	
64	US 12	176	0.933	a 161+55	Lt	24" RCP	Flared	8	1	8	1																						1	
					Rt		Flared	8	1	8	1																						1	
65	US 12	177	0.027	a 165+90	Lt	24" RCP	Flared		1		1																						1	
					Rt		Flared	16		16			1							1													1	
66	US 12	177	0.245	a 177+50	Lt	24" RCP	Flared		1		1																						1	
					Rt		Flared		1		1																						1	
67	US 12	177	0.252	a 177+75	Lt	4'x6' RCP	Flared							1												40	22							Plug Cattle Pass
					Rt		Flared							1																				
PROJECT 05TY SUBTOTALS								152	19	152	19	30	11	2	30	0	0	0	1	5	6	0	0	0	5	40	22	4.5		15	0	4	42	

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

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FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B14	B85

05TY

Culvert #	HWY	MRM	Disp	Station	Side	Per Original Plans		Remove for Reset		Reset		Remove			Pipe				Sloped End Sections		Flared End Sections				Cleanout Pipe Culvert	Cellular Grout	Contractor Furnished Borrow	B&C Protection Gabions	Class B Riprap	Type B Drainage Fabric	Incidental Work, Grading	Obj. Marker		Repair Comments
						In Place Culvert Size and Type	End Type	Pipe	End Section	Pipe	End Section	Pipe	End Section	Cattle Pass End Section	24"CMP	24" RCP	48" RCP	54" RCP	24" CMP	24" RCP	18" RCP	36" RCP	48" RCP	54" RCP								Remove Delineator	New Back to Back	
								(Ft)	(Each)	(Ft)	(Each)	(Ft)	(Each)	(Each)	(Ft)	(Ft)	(Ft)	(Ft)	(Each)	(Each)	(Each)	(Each)	(Each)	(Each)	(Each)	(CuYd)	(CuYd)	(CuYd)		(SqYd)	(LS)	(Each)	(Each)	
68	US 12	177	0.378	a 185+65	Lt	24" RCP	Flared	8	1	8	1																					1	
					Rt		Flared	8	1	8	1																					1	
69	US 12	177	0.534	a 194+00	Lt	24" RCP	Flared																										
					Rt		Flared	16		16			1							1												1	
70	US 12	177	0.742	a 205+20	Lt	24" RCP	Flared	16	1	16	1																					1	
					Rt		Flared	8	1	8	1																					1	
71	US 12	177	0.983	a 216+00	Lt	42" RCP	Flared		1		1																					2	
					Rt		Flared		1		1																					2	
72	US 12	178	0.439	a 241+91	Lt	36" RCP	Flared	32	1	32	1																						
					Rt		Flared		1		1																						
73	US 12	178	0.451	a 242+00	Lt	4'x6' RCP	Flared							1												62.2	42						Plug Cattle Pass
					Rt		Flared							1																			
74	US 12	178	0.529	a 245+00	Lt	24" CMP	Flared																										
					Rt		Flared																									1	
75	US 12	178	0.879	a 262+75	Lt	36" RCP	None	8		8			1									1										2	
					Rt		None						1									1					6.0		19			2	
76	US 12	179	0.012	a 267+15	Lt	24" CMP	Flared																									1	
					Rt		Flared																									1	
77	US 12	179	0.370	a 287+56	Lt	24" CMP	Flared						1						1													1	
					Rt		Flared																										
78	US 12	179	0.491	a 292+80	Lt	24" CMP	Flared																									1	
					Rt		Flared																				4.5		15				
79	US 12	179	0.591	a 298+06	Lt	24" CMP	Flared																		1							1	
					Rt		Flared		1		1																4.5		15				
80	US 12	179	0.659	a 301+75	Lt	24" CMP	Flared																							X		1	Left regrade around FES.
					Rt		Flared																		1							1	
81	US 12	179	0.729	a 306+35	Lt	24" RCP	Flared	8	1	8	1																					1	
					Rt		Flared																		1							1	
82	US 12	179	0.945	a 316+70	Lt	Twin 9' x 7' RCBC	Wingwalls																								1	2	
					Rt		Wingwalls																								1	2	
83	US 12	180.08	0.255	a 342+65	Lt	30" RCP	Flared		1		1																			X		1	LT reset FES and regrade
					Rt		Flared	8	1	8	1																6.0		19				
84	US 12	180.08	0.425	a 351+50	Lt	24" CMP	Flared																									1	
					Rt		Flared																									1	
85	US 12	180.08	0.578	a 359+75	Lt	24" CMP	Flared																									1	
					Rt		Flared																		1								
86	US 12	180.08	0.589	a 363+85	Lt	24" CMP	Flared																										
					Rt		Flared																										
87	US 12	180.08	0.639	a 366+50	Lt	24" RCP	Flared	16	1	16	1														1							1	
					Rt		Flared	16	1	16	1														1							1	
PROJECT 05TY SUBTOTALS								**144**	**14**	**144**	**14**	**0**	**4**	**2**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**2**	**0**	**0**	**6**	**62.2**	**42**	**21**		**68**	**0**	**2**	**33**	

REGISTERED PROFESSIONAL ENGINEER
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PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

TABLE OF PIPE QUANTITIES

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B15	B85

05TY

Culvert #	HWY	MRM	Disp	Station	Side	Per Original Plans		Remove for Reset		Reset		Remove			Pipe				Sloped End Sections		Flared End Sections				Cleanout Pipe Culvert	Cellular Grout	Contractor Furnished Borrow	B&C Protection Gabions	Class B Riprap	Type B Drainage Fabric	Incidental Work, Grading	Obj. Marker		Repair Comments
						In Place Culvert Size and Type	End Type	Pipe	End Section	Pipe	End Section	Pipe	End Section	Cattle Pass End Section	24"CMP	24" RCP	48" RCP	54" RCP	24" CMP	24" RCP	18" RCP	36" RCP	48" RCP	54" RCP								Remove Delineator	New Back to Back	
								(Ft)	(Each)	(Ft)	(Each)	(Ft)	(Each)	(Each)	(Ft)	(Ft)	(Ft)	(Ft)	(Each)	(Each)	(Each)	(Each)	(Each)	(Each)	(Each)	(CuYd)	(CuYd)	(CuYd)		(SqYd)	(LS)	(Each)	(Each)	
88	US 12	180.08	0.865	a 375+00	Lt	24" RCP	Flared		1		1													1								1	
					Rt		Flared	8	1	8	1													1								1	
89	US 12	181	0.132	a 384+07	Lt	24" CMP	Flared																	1						X		1	
					Rt		Flared		1		1																4.5		15	X		1	
90	US 12	181.52	0.014	a 403+87	Lt	54" RCP	Flared	24		24			1											1								2	
					Rt		Flared	24	1	24	1																12.0		34			2	
91	US 12	181.52	0.088	b 27+25	Lt	4'x6' RCP	Flared							1											62.2	42							Plug Cattle Pass
					Rt		Flared							1																			
92	US 12	181.52	0.197	b 29+10	Lt	54" RCP	None											8						1		15		37.3	48	X		1	Extend Pipe For Roadway Widening
					Rt		None	8		8														1						X		1	
93	US 12	182	0.056	b 50+50	Lt	18" RCP	Flared		1		1																					1	
					Rt		Flared	8	1	8	1																					1	
94	US 12	182	0.096	b 57+50	Lt	18" RCP	Flared	16		16			1								1											1	
					Rt		Flared						1								1											1	
95	US 12	182	0.358	b 71+15	Lt	48" RCP	None	8		8													1									2	
					Rt		None					8					8						1							X		2	
96	US 12	182	0.553	b 82+00	Lt	30" RCP	Flared																								1	1	
					Rt		Flared																									1	
97	US 12	182	1.000	b 104+43	Lt	54" RCP	Flared																	1						X			
					Rt		Flared		1		1																12.0		34	X			
98	US 12	183	0.055	b 108+65	Lt	24" RCP	None																	1								1	
					Rt		None					8	1				8			1												1	
PROJECT 05TY SUBTOTALS								**96**	**7**	**96**	**7**	**16**	**4**	**2**	**0**	**8**	**8**	**8**	**0**	**1**	**2**	**0**	**2**	**3**	**5**	**62.2**	**57**	**28.5**	**37.3**	**131**	**LS**	**1**	**22**	
PROJECT 05TY TOTALS								**392**	**40**	**392**	**40**	**46**	**19**	**6**	**30**	**8**	**8**	**8**	**2**	**7**	**8**	**2**	**2**	**3**	**16**	**164.4**	**121**	**54**	**37.3**	**214**	**LS**	**7**	**97**	

REGISTERED PROFESSIONAL ENGINEER
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TABLE OF PIPE QUANTITIES

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B16	B85

06A1

Culvert #	HWY	MRM	Disp	Station	Side	Per Original Plans: In Place Culvert Size and Type	Per Original Plans: End Type	Remove for Reset: End Section (Each)	Reset: End Section (Each)	Remove: Pipe (Ft)	Remove: End Section (Each)	Pipe: 18"CMP (Ft)	Pipe: 24" RCP (Ft)	Pipe: 36" RCP (Ft)	Sloped End: 24" CMP (Each)	Sloped End: 24" RCP (Each)	Sloped End: 24" RCP Arch (Each)	Safety Ends: 18" CMP (Each)	Flared End Section: 36" RCP (Each)	Cleanout Pipe Culvert (Each)	Cellular Grout (CuYd)	B&C Protection Gabion (CuYd)	Type B Drainage Fabric (SqYd)	Controlled Density Fill (CuYd)	Cleanout Culvert Joint (Ft)	Repair Culvert Joint (Ft)	Chemical Grout Void Fill (Gal)	Incidental Work, Grading (LS)	Obj. Marker: Remove Delineator (Each)	Obj. Marker: New Back to Back (Each)	Repair Comments
14	1806	372	0.255	751+96	Lt	54" CMP Arch	Flared			74	1			50					2					17.2						2	
					Rt		Flared				1			50					2												2	
15	1806	371	0.916	770+00	Lt	24" CMP	Flared													1											1	
					Rt		Flared													1											1	
16	1806	371	0.805	775+85	Lt	24" CMP	Flared																						X		1	
					Rt		Flared																								1	
17	1806	371	0.425	797+00	Lt	24" CMP	Flared				1				1																	
					Rt		Flared				1				1																	
18	1806	371	0.390	797+00	Lt	24" CMP	Flared				1				1																1	
					Rt		Flared				1				1																1	
19	1806	371	0.372	799+70	Lt	60" CMP	Flared																								2	
					Rt		Flared																								2	
20	1806	371	0.350	800+84	Lt	24" CMP	Flared													1											1	
					Rt		Flared																									
21	1806	371	0.308	803+00	Lt	5'x7' RCP	Flared																		240	240	12			2	Cattlepass Joint Repair, Expansion foam/fill joints with sealant. See notes.
					Rt		Flared																							2	
22	1806	371	0.287	804+25	Lt	24" CMP	Flared				1				1															1	
					Rt		Flared													1										1	
23	1806	371	0.140	812+00	Lt	24" CMP	Flared																							1	
					Rt		Flared													1										1	
24	1806	370.35	0.522	826+00	Lt	24" CMP	Flared																								
					Rt		Flared													1										1	
25	1806	370.35	0.384	833+50	Lt	24" CMP	Flared													1										1	
					Rt		Flared													1										1	
26	1806	370.35	0.180	846+33 to 846+74	Lt	18" CMP	Sloped					64						2												1	
					Rt		Sloped																							1	
26	1806	370.35	0.180	846+51	Lt	24" RCP	Sloped						30			1														1	
					Rt		Sloped						30			1														1	
26	1806	370.35	0.180	845+35	Lt	18" RCP	Flared			8	2										30.2							X	1		
					Rt		Flared																					X	1		
PROJECT 06A1 SUBTOTALS								0	0	82	9	64	60	100	5	2	0	2	4	8	30.2	0	0	17.2	240	240	12	LS	2	30	

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B17	B85

06A1

Culvert #	HWY	MRM	Disp	Station	Side	Per Original Plans		Remove for Reset	Reset	Remove		Pipe			Sloped End			Safety Ends	Flared End Section	Cleanout Pipe Culvert	Cellular Grout	B&C Protection Gabion	Type B Drainage Fabric	Controlled Density Fill	Cleanout Culvert Joint	Repair Culvert Joint	Chemical Grout Void Fill	Incidental Work, Grading	Obj. Marker		Repair Comments
						In Place Culvert Size and Type	End Type	End Section	End Section	Pipe	End Section	18"CMP	24" RCP	36" RCP	24" CMP	24" RCP	24" RCP Arch	18" CMP	36" RCP										Remove Delineator	New Back to Back	
								(Each)	(Each)	(Ft)	(Each)	(Ft)	(Ft)	(Ft)	(Each)	(Each)	(Each)	(Each)	(Each)	(Each)	(CuYd)	(CuYd)	(SqYd)	(CuYd)	(Ft)	(Ft)	(Gal)	(LS)	(Each)	(Each)	
27	1806	370	0.067		Lt	24" RCP	None																							1	Right Install scour protection and re-grade around FES.
					Rt		None															4.5	15					X			
28	1806	369	0.860		Lt	36" CMP	Flared													1										2	Right install scour protection around outlet end.
					Rt		None															6.0	19					X		1	
29	1806	369	0.704	a 687+46	Lt	24" RCP	None													1										1	
					Rt		None													1										1	
30	1806	369	0.229		Lt	48" RCP	Flared													1									1	2	
					Rt		Flared																						1	2	
31	1806	369	0.044	a 923+00	Lt	24" RCP	Flared													1										1	
					Rt		Flared																							1	
32	1806	368	0.500	a 950+00	Lt	24" RCP Arch	Flared													1										1	
					Rt		Flared													1										1	
33	1806	368	0.191	a 965+00	Lt	24" RCP Arch	Flared													1										1	
					Rt		Flared				1						1			1										1	
34	1806	367.64	0.172	a 988+35	Lt	24" RCP	Flared				1					1														1	
					Rt		Flared																							1	
35	1806	366	0.444	b 1076+23	Lt	30" CMP	Flared													1		6.0	19					X			Left end section install scour protection and re-grade for proper drainage. FES are located past fence line.
					Rt		Flared													1											
36	1806	366.00	0.293	b 1068+26	Lt	24" CMP	Flared																							1	
					Rt		Flared																								
37	1806	365.72	0.266	b 1084+80	Lt	18" RCP	Flared													1										1	
					Rt		Flared																							1	
38	1806	365.72	0.057	b 1095+25	Lt	24" RCP	Flared	1	1											1								X		1	Regrade left outlet
					Rt		Flared													1										1	
PROJECT 06A1 SUBTOTALS								**1**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**14**	**0**	**16.5**	**53**	**0**	**0**	**0**	**0**	**LS**	**2**	**23**	
PROJECT 06A1 TOTALS								**1**	**1**	**82**	**11**	**64**	**60**	**100**	**5**	**3**	**1**	**2**	**4**	**22**	**30.2**	**16.5**	**53**	**17.2**	**240**	**240**	**12**	**LS**	**4**	**53**	

TABLE OF PIPE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B18	B85

06RC

Culvert #	HWY	MRM	Disp	Station	Side	Per Original Plans		Remove		Pipe		Sloped Ends			24" CMP Elbow	24" RCP to CMP Transition	Cleanout Pipe Culvert	B&C Protection Gabion	Type B Drainage Fabric	Incidental Work, Grading	Back to Back Object Marker	Repair Comments
						In Place Culvert Size and Type	End Type	Pipe	End Section	24"CMP	24" RCP	18" CMP	24" CMP	24" RCP								
								(Ft)	(Each)	(Ft)	(Ft)	(Each)	(Each)	(Each)	(Each)	(Each)	(Each)	(CuYd)	(SqYd)	(LS)	(Each)	
6	1806	359.75	0.057		Lt	24" CMP	Flared										1				1	
					Rt		Flared										1				1	
7	1806	360	0.411		Lt	18" CMP	Flared										1				1	
					Rt		Flared		1			1									1	
8	1806	360	0.600	a 184+20	Lt	24" CMP	Flared	62	1		27			1							1	Replace with 24" RCP
					Rt		Flared		1		33			1							1	
9	1806	361	0.120		Lt	24" CMP	Flared														1	Re-grade around right FES.
					Rt		Flared													X	1	
10	1806	361	0.574		Lt	24" CMP	Flared														1	
					Rt		Flared														1	
11	1806	361	0.924		Lt	78"x60" CMP	Sloped										1			X	2	Re-grade left outlet
					Rt		Sloped										1				2	
12	1806	362	0.712	b 38+16	Lt	18" CMP	Flared	82	1	26	24		1		2	1		4.5	15		1	Remove and Replace Pipe
					Rt		Flared		1		38			1							1	
13	1806	362	0.866	b 46+24	Lt	18" CMP	Flared	82	1	24	39		1		2	1		4.5	15		1	Remove and Replace Pipe
					Rt		Flared		1		25			1							1	
PROJECT 06RC TOTALS								**226**	**7**	**50**	**186**	**1**	**2**	**4**	**4**	**2**	**5**	**9**	**30**	**LS**	**18**	

TABLE OF PIPE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B19	B85

06E0

Culvert #	HWY	MRM	Disp	Station	Side	Per Original Plans		Remove for Reset		Reset		Remove	Flared End Section	Cleanout Pipe Culvert	Incidental Work, Grading	Cleanout Culvert Joints	Repair Culvert Joint	Chemical Grout Void Fill	Obj. Marker		Repair Comments
						In Place Culvert Size and Type	End Type	Pipe	End Section	Pipe	End Section	End Section	36" RCP						Remove	New Back to Back	
								(Ft)	(Each)	(Ft)	(Each)	(Each)	(Each)	(Each)	(LS)	(Ft)	(Ft)		(Each)	(Each)	
39	1806P	370.13	0.076	83+50±	Lt	72" RCP	Flared							1							Cleanout pipe
					Rt		Flared							1							
40	1806P	370.13	0.133	80+80±	Lt	30" RCP	Flared							1						1	
					Rt		Flared													1	
41	1806P	370.13	0.401	66+65	Lt	84" RCP	Flared									198	198	12		2	See notes, Expansion foam/fill joints with sealant
					Rt		Flared													2	
42	1806P	370.13	0.665	54+00	Lt	36" RCP	Flared							1						2	
					Rt		Flared							1						2	
43	1806P	370.13	0.869	42+00	Lt	36" RCP	Flared	8	1	8	1								1	2	
					Rt		Flared					1	1						1	2	
44	1806P	371.00	0.119	36+00	Lt	36" RCP	Flared	16	1	16	1								1	2	
					Rt		Flared	16	1	16	1								1	2	
45	1806P	371.00	0.171	32+67	Lt	36" RCP	Flared													2	
					Rt		Flared												1	2	
46	1806P	371.00	0.448	18+80	Lt	2-30" RCP Arch	Flared							1	X					2	Regrade to achieve drainage
					Rt		Flared							1	X					2	
47	1806P	371.00	0.751	2+68	Lt	2-36" RCP Arch	Flared							1	X					2	Cleanout and re-grade around both ends.
					Rt		Flared							1	X					2	
PROJECT 06E0 TOTALS								**40**	**3**	**40**	**3**	**1**	**1**	**9**	**LS**	**198**	**198**	**12**	**5**	**30**	

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
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TABLE OF PIPE QUANTITIES

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B20	B85

07CD

Culvert #	HWY	MRM	Disp	Station	Side	Per Original Plans: In Place Culvert Size and Type	Per Original Plans: End Type	Cleanout Pipe Culvert (Each)	Incidental Work, Grading (LS)	Obj. Marker: New Back to Back (Each)	Repair Comments
1	063	252	0.606	424+00	Lt	24" RCP	Flared	1		1	
					Rt		Flared	1		1	
2	063	252.78	0.139	412+60	Lt	24" RCP	Flared	1		1	
					Rt		Flared	1		1	
3	063	253	0.104	397+70	Lt	24" CMP	Flared			1	RT re-grade side of pipe flow line for adequate drainage.
					Rt		Flared		1	1	
4	063	253	0.47	378+10	Lt	24" RCP	Flared	1		1	
					Rt		Flared	1		1	
5	063	253.6	0.151	363+00	Lt	36" RCP	Flared	1		2	
					Rt		Flared	1		2	
PROJECT 07CD TOTALS								**8**	**LS**	**12**	

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TYPICAL GRADING SECTION

Section 2 (Reversed) to 5
Section 5 to 6 (See Section F)
US Hwy 12

Sta. a 397+86 to Sta. b 36+76
Grading Section

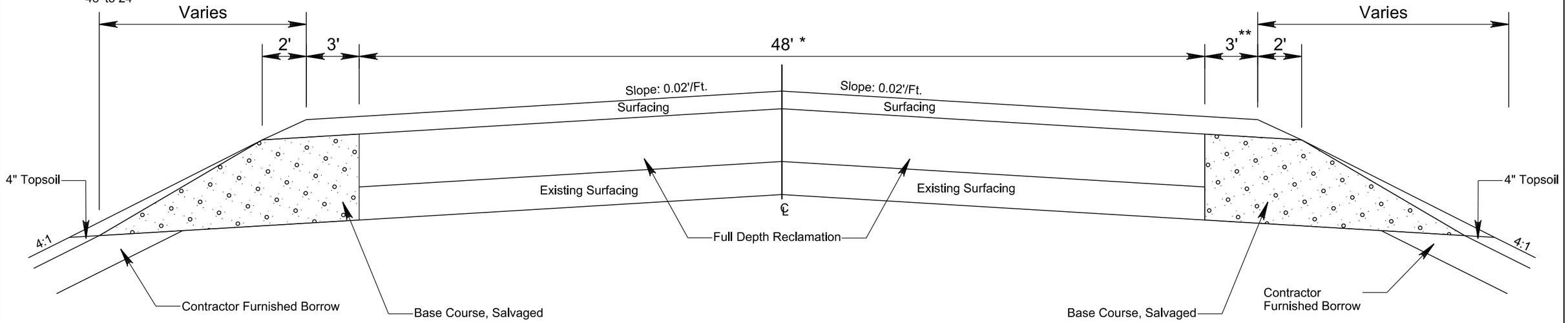
Transitions:

Sta. a 397+86 to Sta. b 20+92
* 24' to 48'

Sta. b 23+71 to Sta. b 36+76
* 48' to 24'

Shoulder Width:

Sta. a 397+86 to Sta. a 400+34
** 15.5' to 3'

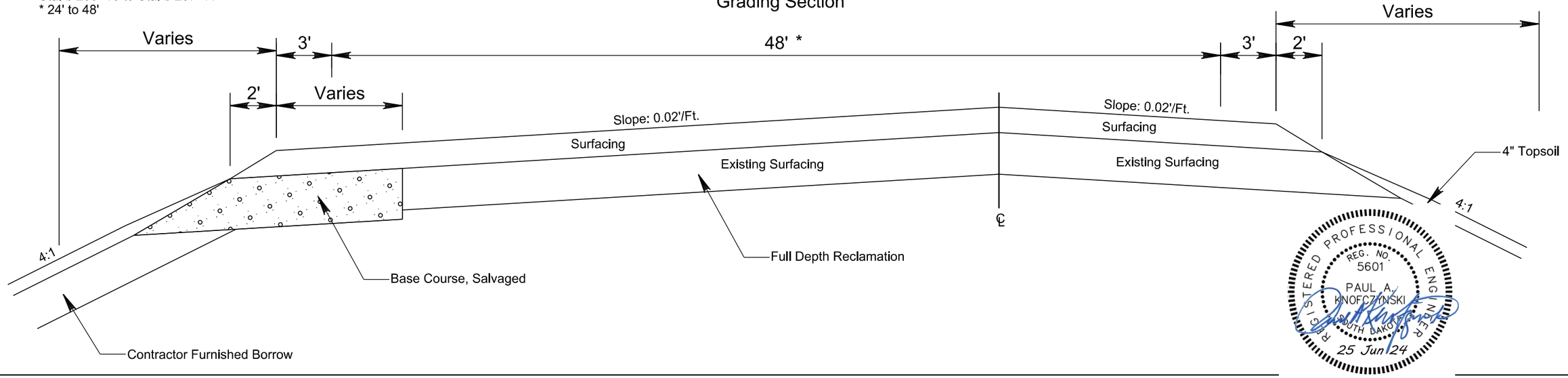


Sections 6 to 8
US Hwy 12

Sta. b 233+10 to Sta. b 245+00
Grading Section

Transitions:

Sta. b 233+10 to Sta. b 237+77
* 24' to 48'



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
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SOUTH DAKOTA
25 Jun 24

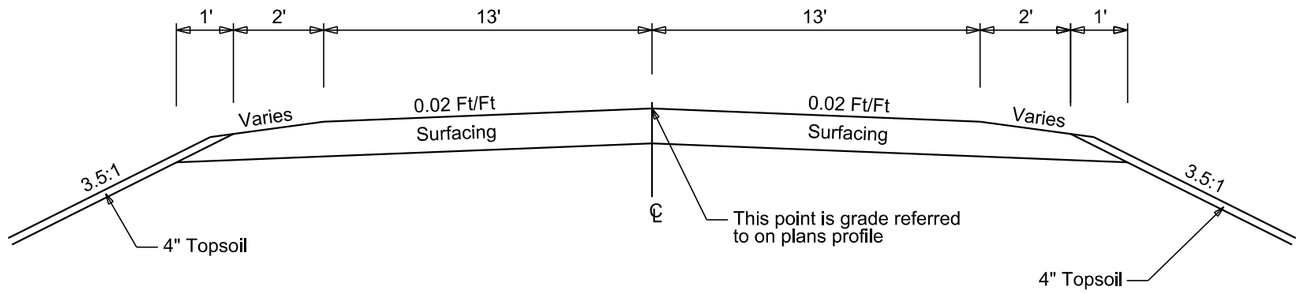
Plot Scale - 1:200
Plotted From - sydneymarczak
File - ...\Section B\Gradingtyp.dgn

TYPICAL GRADING SECTION

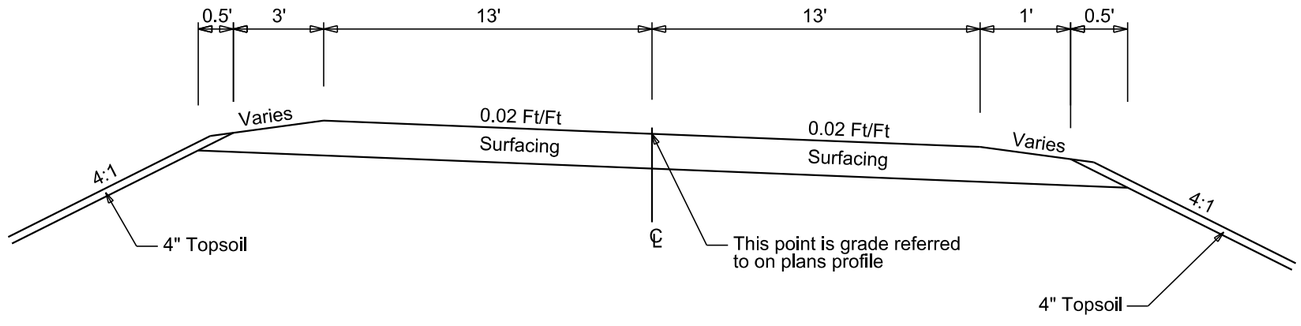
KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B22	B85

Plotting Date: 6/20/2024 _____

06A1 MRM 372 Pipe
751+81 to 752+17



06A1 MRM 370 Pipe
845+23 to 845+47
846+39 to 846+63



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:200

Plotted From - sydneymarczak

File - ...\Sections\Section B\typ.dgn

TYPICAL GRADING SECTION

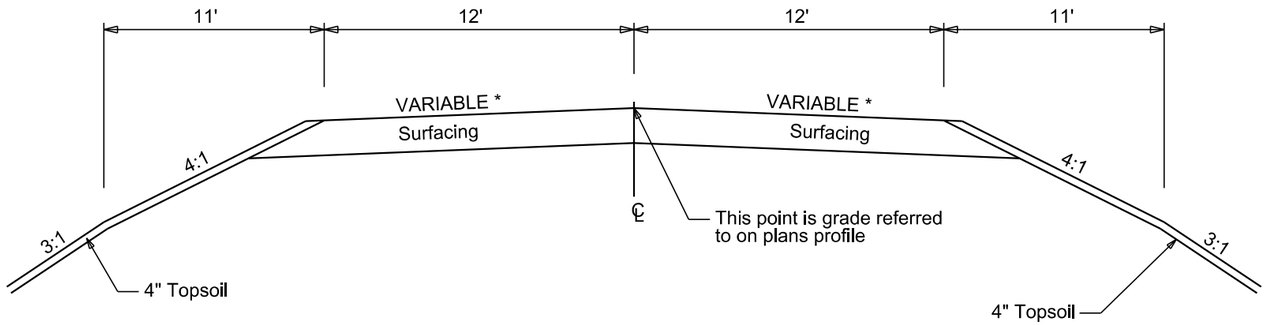
FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B23	B85

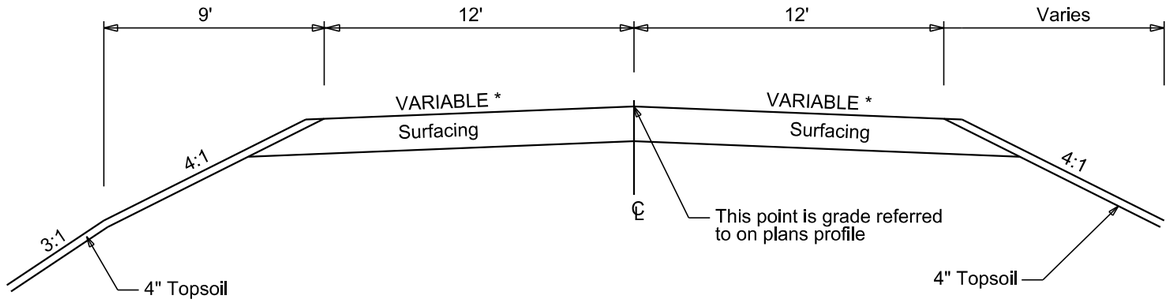
Plotting Date: 6/20/2024 _____

* Match Existing

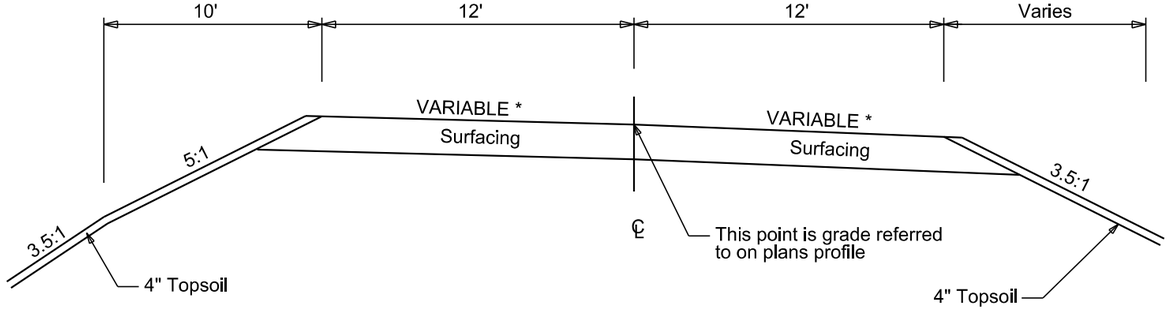
06RC MRM 362 Pipe (N)
b 46+04 to b 46+44



06RC MRM 362 Pipe (S)
b 37+95 to b 38+35



06RC MRM 360 Pipe
a 184+20 to a 184+35



Plot Scale - 1:200

Plotted From - sydneymarczak

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HORIZONTAL ALIGNMENT DATA

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B24	B85

PCN 05TY – NH 0012(230)171

05TY_Mainline

Type	STATION			Northing	Easting
POB	a 0+00.00			664275.869	1805251.712
		TL= 2671.97	S 5°30'39" E		
PI	a 26+71.97			661616.251	1805508.317
		TL= 2848.19	S 5°31'41" E		
PI	a 55+20.16			658781.303	1805782.687
		TL= 2803.50	S 5°31'10" E		
PC	a 83+23.66			655990.799	1806052.333
PI	a 92+28.86	R = 7610.81	Delta = 13°33'55" L	655089.845	1806139.851
PT	a 101+25.59			654234.553	1806436.249
		TL= 8194.09	S 19°04'07" E		
PC	a 183+19.68			646490.088	1809113.270
PI	a 191+18.32	R = 8681.71	Delta = 10°30'43" L	645735.562	1809375.027
PT	a 199+12.48			645041.454	1809770.046
		TL= 6319.15	S 29°44'36" E		
PI	a 262+31.62			639554.819	1812905.079
		TL= 331.80	S 30°29'16" E		
PC	a 265+63.42			639268.899	1813073.417
PI	a 270+32.44	R = 2830.65	Delta = 18°48'58" L	638873.885	1813326.293
PT	a 274+93.02			638581.542	1813693.061
		TL= 293.77	S 53°15'32" E		
PI	a 277+86.79			638405.808	1813928.473
		TL= 4915.42	S 54°21'03" E		
PI	a 327+02.21			635540.998	1817922.746
		TL= 4798.87	S 54°20'10" E		
PC	a 375+01.09			632743.116	1821821.599
PI	a 384+96.90	R = 7643.89	Delta = 14°50'42" L	632162.258	1822630.463
PT	a 394+81.57			631808.023	1823561.147
		TL= 948.34	S 69°18'40" E		
PI	a 404+29.91			631472.978	1824448.335
		TL= 125.12	S 69°19'39" E		
	Equation: a 404+80.80 Bk. = b 20+40.00 Ah.				
PI	b 21+46.23			631428.808	1824565.396
		TL= 4867.23	S 69°14'47" E		
PI	b 70+13.46			629704.114	1829116.806
		TL= 883.34	S 69°17'14" E		
PI	b 78+99.80			631158.471	1825280.338
		TL=4102.88	S 69°14'20" E		
PC	b 120+02.68			629704.114	1829116.806
PI	b 127+05.80	R= 11165.91	Delta = 7°12'23" L	629453.433	1829773.717
PT	b 134+07.06			629287.136	1830456.885
		TL= 3183.70	S 76°21'41" E		
POE	165+90.75			628536.432	1833550.808
	US12 & SD 1806 Intersection				
POB	b 230+00.00			634507.313	1842825.558
		TL= 327.13	N 59°56'05" E		
PI	b 233+27.13			634671.201	1843108.674
		TL= 134.85	N 61°48'42" E		
PI	b 234+61.98			634734.901	1843227.532
		TL= 142.67	N 62°02'44" E		
PI	b 236+04.65			634801.781	1843353.557
		TL=150.58	N 65°12'02" E		
PI	b 237+55.23			634864.941	1843490.251
		TL= 147.68	N 69°59'13" E		
PC	b 239+02.91			634915.482	1843629.012
PI	b 243+12.86	R= 1157.33	Delta= 39°00'37" R	635031.663	1844022.153
PT	b 246+90.89			634874.474	1844400.769
		TL= 152.55	S 64°31'26" E		
PI	b 248+43.44			634808.855	1844538.489
		TL= 196.16	S 59°01'41" E		
POE	b 250+39.58			634707.921	1844706.657

PCN 06RC – P 1806(22)359

06RC_MRM 360

Type	Station			Northing	Easting
POB	a 178+54.10			617592.107	1839955.693
		TL= 167.13	S 32°08'24" W		
PC	a 180+21.23			617450.588	1839866.780
PI	a 188+18.04	R = 820.00	Delta = 88°21'22" L	616775.892	1839442.889
PT	a 192+85.76			616332.821	1840105.147
		TL= 168.34	S 56°12'58" E		
POE	a 194+54.10			616239.213	1840245.062

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HORIZONTAL ALIGNMENT DATA

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B25	B85

06RC_MRM 362

Type	Station			Northing	Easting
POB	b 5+71.60			624693.996	1841138.048
		TL= 810.00	N 11°12'13" E		
PC	b 13+81.60			625488.564	1841295.431
PI	b 17+28.16	R = 992.00	Delta = 38°30'48" L	625828.511	1841362.765
PT	b 20+48.41			626136.437	1841203.768
		TL= 873.99	N 27°18'35" W		
PC	b 29+22.41			626913.016	1840802.780
PI	b 31+88.70	R = 940.00	Delta = 31°38'03" R	627149.630	1840680.604
PT	b 34+41.40			627415.167	1840700.683
		TL= 633.04	N 4°19'28" E		
PC	b 40+74.44			628046.405	1840748.417
PI	b 43+76.72	R = 987.00	Delta = 34°03'22" L	628347.830	1840771.211
PT	b 46+61.10			628610.322	1840621.296
		TL= 838.89	N 29°43'54" W		
POE	b 55+00.00			629338.778	1840205.257

PCN 06A1 – P 1806(19)364

06A1_Mainline

Type	Station			Northing	Easting
POB	740+00.00			667593.128	1839548.802
		TL= 1504.55	S 0°20'58" W		
PC	755+04.55			666088.605	1839539.624
PI	765+79.31	R = 3803.80	Delta = 31°33'19" R	665013.862	1839533.067
PT	775+99.47			664101.466	1838965.045
		TL= 6170.08	S 31°54'17" W		
PC	837+69.55			658863.512	1835704.097
PI	844+78.76	R = 1270.18	Delta = 58°21'13" R	658261.449	1835329.276
PT	850+63.18			658264.647	1834620.079
		TL= 309.72	N 89°44'30" W		
PI	853+72.90			658266.044	1834310.361
		TL= 511.48	N 89°25'31" W		
PC	858+84.38			658271.173	1833798.905
PI	877+50.95	R = 1146.53	Delta = 116°52'47" L	658289.892	1831932.433
PT	882+23.23			656616.615	1832759.604
		TL= 3363.48	S 26°18'18" E		
PC	915+86.71			653601.433	1834250.136
PI	932+42.49	R = 4568.87	Delta = 39°50'29" L	652117.118	1834983.895
PT	947+63.74			651447.524	1836498.239
		TL= 2664.55	S 66°08'48" E		
PC	974+28.29			650369.986	1838935.187
PI	979+65.91	R = 1913.74	Delta = 31°23'00" R	650152.570	1839426.891
PT	984+76.52			649710.901	1839733.439
		TL= 596.74	S 34°45'48" E		
PC	990+73.26			649220.670	1840073.692
PI	993+20.46	R = 1148.09	Delta = 24°18'07" R	649017.594	1840214.641
PT	995+60.22			648774.506	1840259.525
EBK	995+62.08			648772.679	1840259.862
EAH	a 996+13.12			648772.679	1840259.862
		TL= 517.86	S 10°27'41" E		
PC	a 1001+29.12			648265.252	1840353.554
PI	a 1003+10.75	R = 1001.95	Delta = 20°32'56" L	648086.648	1840386.532
PT	a 1004+88.47			647930.983	1840480.103
		TL= 1495.30	S 31°00'37" E		
PC	a 1019+83.77			646649.396	1841250.468
PI	a 1023+46.70	R = 1910.05	Delta = 21°31'01" L	646338.338	1841437.446
EBK	a 1026+99.76			646118.340	1841724.436
EAH	b 1027+58.02			646118.340	1841724.436
PT	b 1027+59.34			646117.538	1841725.482
		TL= 1304.54	S 52°31'38" E		
PC	b 1040+63.88			645323.875	1842760.823
PI	b 1050+51.46	R = 952.26	Delta = 92°05'10" R	644723.048	1843544.608
PT	b 1055+94.36			643961.654	1842915.648
		TL= 1696.11	S 39°33'32" W		
PC	b 1072+90.47			642654.002	1841835.444
PI	b 1082+47.91	R = 1447.22	Delta = 66°58'30" L	641915.845	1841225.680
PT	b 1089+82.17			641065.940	1841666.531
EBK	b 1098+83.01			640266.279	1842081.319
EAH	c 58+48.00			640266.279	1842081.319
		TL= 901.12	S 27°24'58" E		
POE	c 58+48.29			640266.026	1842081.451

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SOUTH DAKOTA
25 Jun 24

HORIZONTAL ALIGNMENT DATA

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B26	B85

PCN 06E0 – P 1806(20)370

06E0_Mainline

Type	Station			Northing	Easting
POB	0+00.00			665998.021	1831263.516
		TL= 724.67	S 7°45'13" E		
PC	7+24.67			665279.980	1831361.281
PI	9+36.81	R = 1126.00	Delta = 21°20'21" R	665069.779	1831389.902
PT	11+44.03			664863.575	1831340.070
		TL= 2397.16	S 13°35'08" W		
PC	35+41.19			662533.488	1830776.984
PI	40+72.20	R = 963.00	Delta = 57°44'46" L	662017.332	1830652.250
PT	45+11.76			661636.388	1831022.191
		TL= 1969.78	S 44°09'38" E		
PC	64+81.54			660223.285	1832394.477
PI	70+50.75	R = 1906.50	Delta = 33°14'51" R	659814.936	1832791.031
PT	75+87.84			659256.018	1832898.793
		TL= 1204.34	S 10°54'47" E		
POE	87+92.17			658073.459	1833126.795

PCN 07CD – P 0063(59)251

07CD_Mainline

Type	Station			Northing	Easting
POB	272+30.70			723758.823	1761787.625
		TL= 1018.46	N 0°50'36" E		
PC	282+46.16			724777.173	1761802.613
PI	287+94.68	R = 27133.53	Delta = 2°18'13" R	725322.638	1761810.641
PT	293+40.06			725867.340	1761840.587
		TL= 363.43	N 3°08'48" E		
PC	297+03.49			726230.223	1761860.537
PI	304+37.33	R = 22553.68	Delta = 3°43'38" L	726962.950	1761900.820
PT	311+70.64			727696.744	1761893.387
		TL= 799.61	N 0°34'49" W		
PI	319+70.25			728496.311	1761885.287
		TL= 571.63	N 0°27'27" W		
PC	325+41.88			729067.921	1761880.722
PI	333+24.80	R = 101833.36	Delta = 0°52'52" R	729850.820	1761874.470
PT	341+07.69			730633.723	1761880.257
		TL= 1245.08	N 0°25'24" E		
PI	353+52.77			731878.769	1761889.459
		TL= 1466.40	N 0°22'21" E		
PI	368+19.18			733345.140	1761898.992
		TL= 2230.82	N 0°22'41" E		
POE	390+50.00			735575.914	1761913.714

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SOUTH DAKOTA
24 June 24

CONTROL DATA

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B27	B85

POINT	DESCRIPTION	NORTHING	EASTING	ELEVATION
CP 1		621600.4800	1869421.9500	1776.09
CP 2		628391.1350	1851848.7270	1676.51
CP 3		621600.4800	1869421.9500	1776.09
CP 4		633617.4960	1846036.2430	1631.07
CP 5		633712.1560	1846061.8680	1631.91
CP 6		633986.0470	1846450.1420	1598.68
CP 7		636058.5870	1844166.4560	1627.80
CP 8		636289.8490	1844231.3210	1629.22
CP 9		636493.1000	1843982.1290	1626.91
CP 10		636615.5560	1843918.2360	1625.17
CP 11		636693.4200	1843890.6280	1624.80
CP 12	Corps Brass Cap	640311.7270	1841983.8700	1636.70
CP 14		640422.7490	1841978.8810	1632.97
CP 15		640671.5200	1841800.2550	1635.06
CP 16		641421.0450	1841476.4080	1674.55
CP 17		648670.6200	1840249.2550	1706.78
CP 18		648728.1550	1840238.9120	1712.68
CP 19	T bar cap 6a	658743.7310	1835535.1050	1690.24
CP 20		633549.4370	1841400.5630	1627.91
CP 21		632637.0460	1840645.8230	1659.97
CP 22		631749.7620	1839935.8190	1697.82
CP 23		631077.8890	1839619.3210	1720.74
CP 24		630558.0180	1838019.0020	1738.57
CP 25		629650.2870	1836563.2630	1634.73
CP 26		629350.4530	1836002.4370	1615.26
CP 27		628473.8210	1833394.2750	1718.96
CP 28		631529.4670	1824579.3980	1763.04
CP 29		651100.1450	1807415.9250	1671.89
CP 30		655222.0620	1806067.7890	1792.70
CP 31		661680.8900	1805343.1050	1766.69
CP 32		666435.5800	1805090.5220	1640.36
CP 33		730823.0470	1761809.5590	2002.48
CP 34		731404.5460	1744420.5030	2028.91
CP 35		738021.4380	1761766.2200	2030.80
CP 36		740621.9630	1761781.7450	2039.52
CP 37		741463.3200	1762038.4600	2040.31
CP 38		742673.5510	1762046.6300	2032.68
CP 39		743705.2040	1762091.8900	2036.08
CP 40		744667.9820	1761813.0500	2036.61
CP 41		745956.5010	1761817.5400	2055.97

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. North Zone NAD 83; Geoid 18 (Conus); SF = 0.998992938

The elevations shown on this sheet are based on NAVD 88.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

LEGEND

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B28	B85

Plotting Date: 4/16/2024

- 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

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B29	B85

Plotting Date: 6/20/2024 _____

FOR BIDDING PURPOSES ONLY

a 114+28
Retain 24"-166' CMP
Skewed 20° RHF
& 1 End Section

a 114+54 R
Take Out 24"-30' CMP
& 1 End Section

a 114+54 R
Install 24"-30' CMP
& 1-Sloped End Section

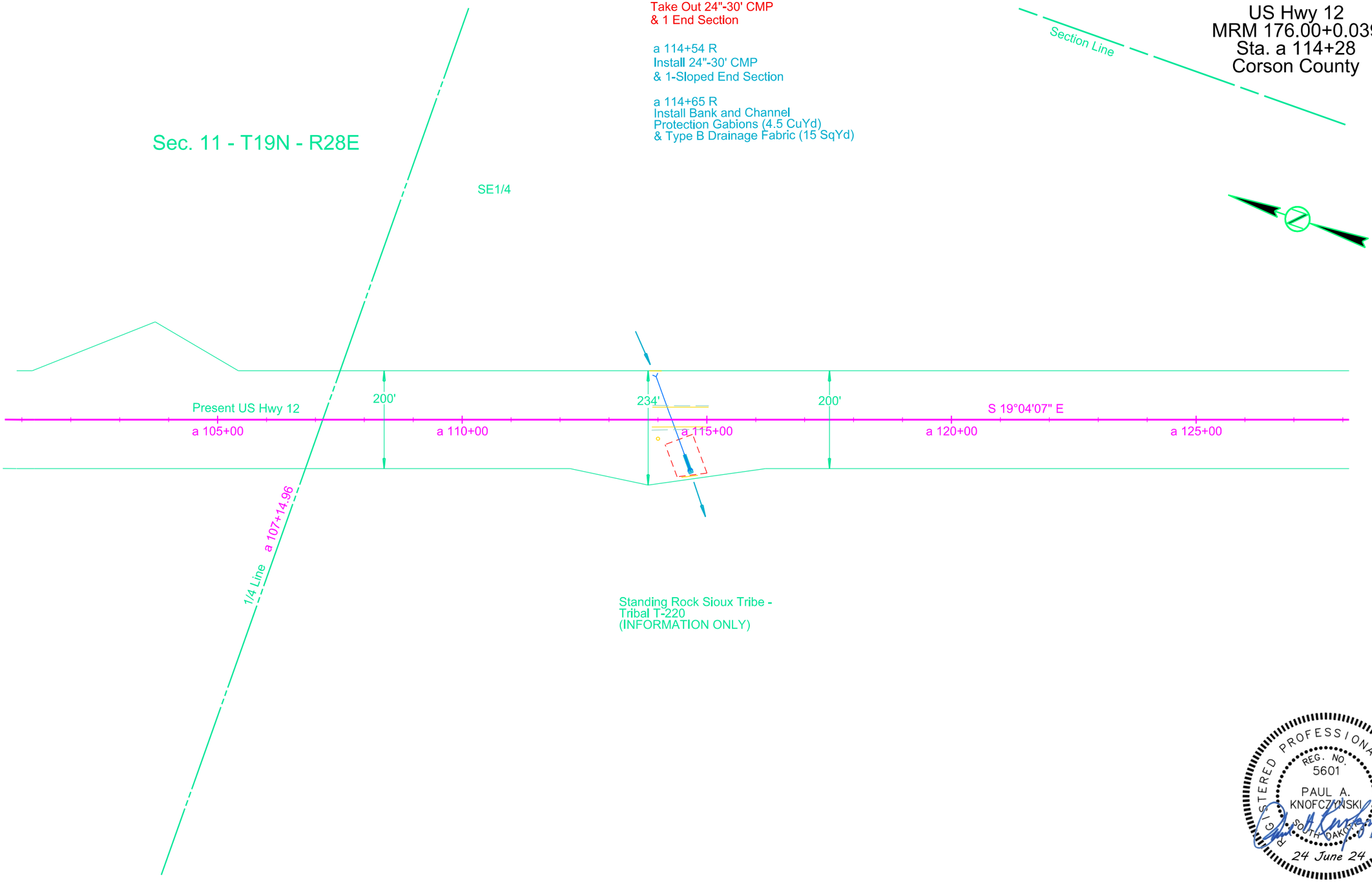
a 114+65 R
Install Bank and Channel
Protection Gabions (4.5 CuYd)
& Type B Drainage Fabric (15 SqYd)

US Hwy 12
MRM 176.00+0.039
Sta. a 114+28
Corson County

Section Line

Sec. 11 - T19N - R28E

SE1/4



Standing Rock Sioux Tribe -
Tribal T-220
(INFORMATION ONLY)

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:200

Plotted From - sydneymarczak

File - ...\051Y_a111.dgn

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B30	B85

Plotting Date: 6/20/2024

US Hwy 12
MRM 177.00+0.027
Sta. a 165+90
Corson County

a 165+49 L
Remove 24"-1 End Section
for Reset

a 165+49 L
Reset 24"-1 End Section

a 165+90
Retain 24"-227' RCP
Skewed 20° RHF
& 1 End Section

a 166+28 R
Remove 24"-16' RCP
for Reset

a 166+28 R
Reset 24"-16' RCP

a 166+33 R
Take out 24"-1 End Section

a 166+33 R
Install 24"-1 RCP Sloped
End Section

Sec. 13 - T19N - R28E

NW1/4

a 163+20.31

1/4 Line

233'

200'

Present US Hwy 12

S 19°04'07"E

a 155+00 | a 160+00 | a 165+00 | a 170+00 | a 175+00 | a 180+00

a 166+56 R
End Type 2 Fence

2PP 2PP

a 165+95 R
Begin Type 2 Fence

a 165+94.42-100.00'
a 166+21-149'
a 166+56.32-100.00'
a 166+65-133'

Block Out Station at a 166+30 R
a 166+15.00-100.00'
a 166+27.28-133.08'
a 166+38.47-100.00'
a 166+47.90-125.42'

SW1/4

Section Line

Standing Rock Sioux Tribe -
Allotment 234

SW1/4 of Section 13 - Township 19 North -
Range 28 East of the 6th P.M.

Parcel 1
0.02 ac, R.O.W.
(686 sq ft) more or less.

Parcel 1
a 165+94.42 to a 166+65 R
Temporary Easement containing
0.1 ac, more or less

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:200

Plotted From - sydneymarczak

File - ...\051Y_a163.dgn

FOR BIDDING PURPOSES ONLY

Sta 27+10
Remove 2 Cattle Pass
End Sections

Sta 27+10
Plug Existing Cattle Pass
with Cellular Grout (62.2 CuYd)

b 27+10
Place Contractor Furnished
Borrow Excavation Material to
Shape Inslope (42 CuYd)

b 28+96
Retain 54"-165' RCP
& 1 Flared End

b 29+46 R
Remove 54"-8' RCP
for Reset

b 28+40 L
Install 54"-8' RCP
& 1 Flared End

b 28+13 L
Install Class B Riprap
(Riprap Dimensions 20' X 12' X 3' - 37.3 Tons)
and Type B Drainage Fabric
(48 SqYd)

b 28+33 L
Place Contractor Furnished
Borrow Excavation Material to Fill
Hole Under Pipe Inlet (15 CuYd)

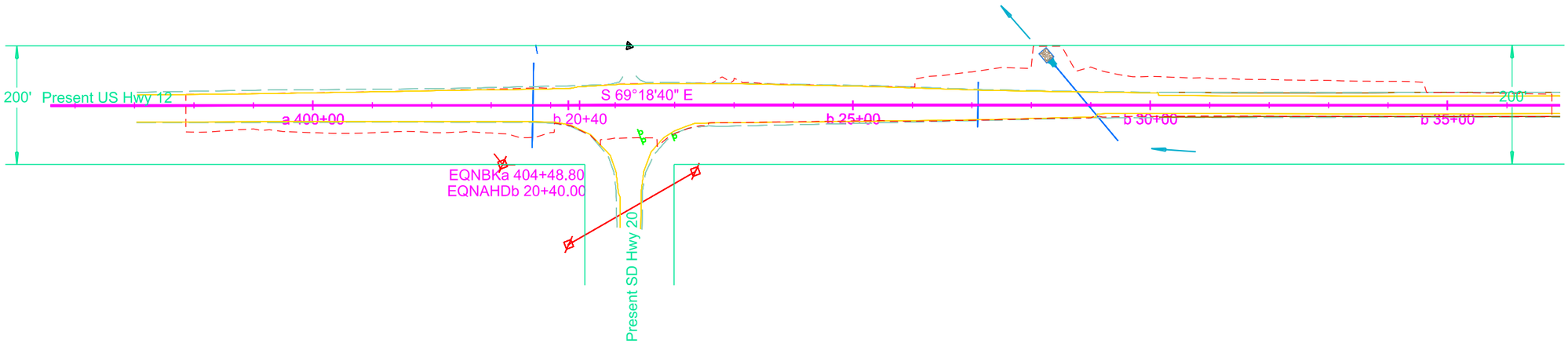
b 29+46 R
Reset 54"-8' RCP

b 29+46 R
Install 1-54" RCP Flared End

US Hwy 12
Corson County

Sec 33. - T19 - R29

SW1/4

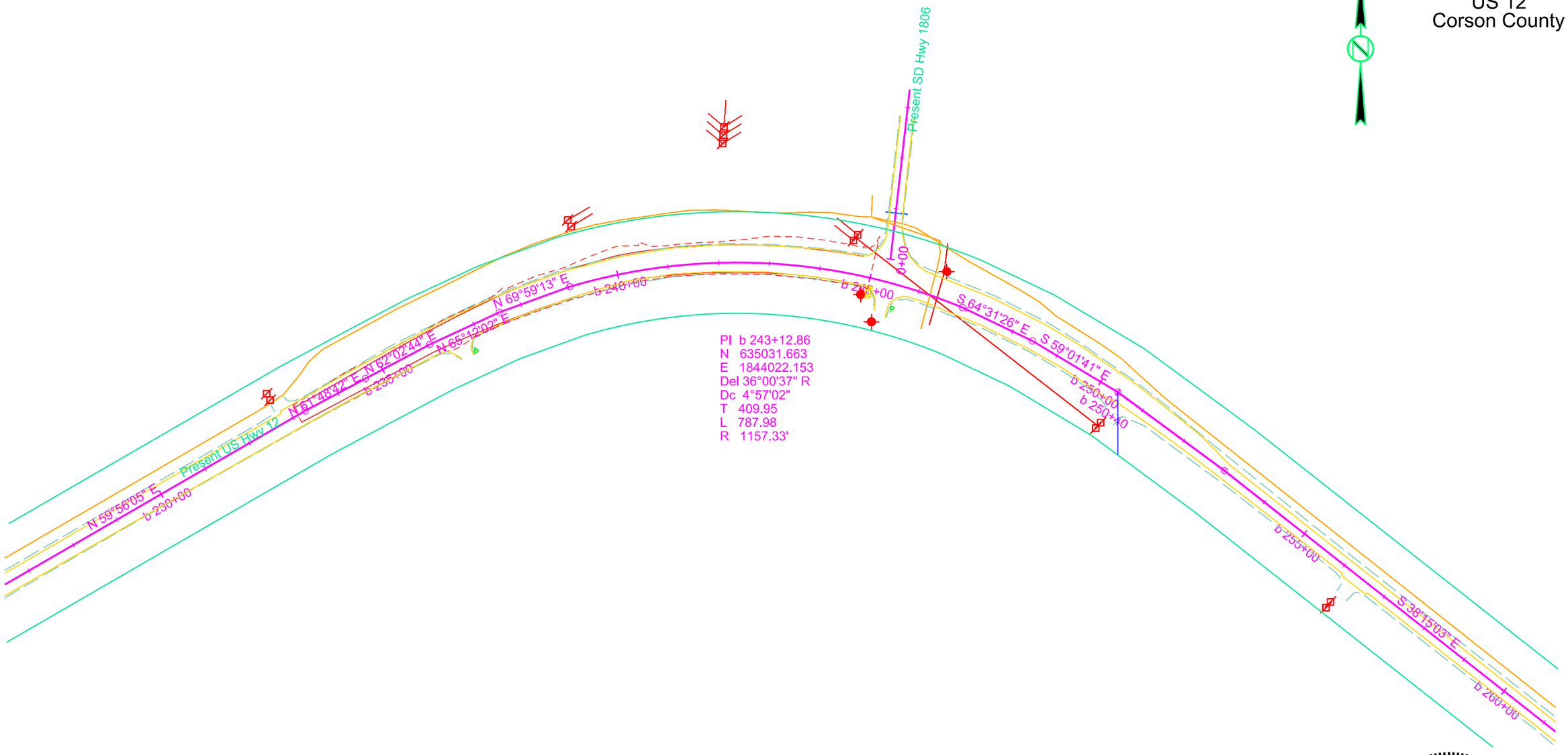


REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

FOR BIDDING PURPOSES ONLY

Sta. b 233+10 to b 245+00
Place Contractor Furnished Borrow
For Roadway Widening (148 CuYd)

US 12
Corson County



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B33	B85

Plotting Date: 6/20/2024 _____

FOR BIDDING PURPOSES ONLY

751+99
Take Out 54"-74' CMP Arch
& 2 End Sections

751+99
Install Twin 36"-50' RCP
Skewed 25° LHF
& 4 Flared Ends
(Spaced 6.7 ft C to C
Controlled Density Fill)
(17.2 CuYd)

SD Hwy 1806
MRM 372.00+0.255
Sta. 751+96
Corson County

Sec. 36 - T20N - R29E

Section Line

Thomas L. Anderberg,
Jason Thomas Anderberg,
and Thomas Tigh Anderberg
(INFORMATION ONLY)

NW1/4

S 00°20'58" W

Present SD Hwy 1806

150'

150'

740+00

745+00

750+00

755+00

Section Line

758+29.80

760+00

765+00

Ruth A. Fischer
(INFORMATION ONLY)

NE1/4

750+03.63

Sec. 35 - T20N - R29E

749+69.20

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:200

Plotted From - sydneymarczak

File - ...\06A1_749.dgn

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B34	B85

Plotting Date: 6/20/2024 _____

FOR BIDDING PURPOSES ONLY

Plot Scale - 1:200

SD Hwy 1806
MRM 370.00+0.530
Sta. 846+51
Corson County

845+30 R
Remove Ditch Block
(Incidental Work, Grading)

845+35
Take Out 4' of Existing 24" CMP
and End Sections of Both Ends of
Existing 24" CMP
Fill Remaining Pipe with Cellular Grout
(30.2 CuYd±)

846+39-24' R to 846+66-31' L
Install 24"-60' RCP
Skewed 13° LHF
& 2-Sloped End Sections

846+33-47' L to 846+74-49' L
Install 18"-64' CMP
& 2-Safety End Sections

846+40 R
Install Ditch Block

United States Army Corps
of Engineers
(INFORMATION ONLY)

1/4 Line

SW1/4

PI 844+78.76
N 658261.45
E 1835329.28
Del 58°21'13" R
Dc 4°30'39"
T 709.20'
L 1293.63'
R 1270.18'

N 89°25'31" W

855+00

850+00

845+00

840+00

835+00

830+00

Present SD Hwy 1806

S 31°54'17" W

150'

150'

855+15.28

840+52.53

See Inset A

846+56-128'

846+25.03-75.02'

846+08-162'

845+51.17-75.03'

Sec. 2- T19N - R29E

United States Army Corps
of Engineers
(INFORMATION ONLY)

The Chapter of Calvary
Cathedral

SW1/4, except US take and except
NW1/4 SE1/4 SE1/4 NW1/4 NE1/4 SW1/4 and
SW1/4 NE1/4 SE1/4 NW1/4 NE1/4 SW1/4 and
except N1/2 SW1/4 NE1/4 SW1/4, and
W1/2 NW1/4 SE1/4 NE1/4 SW1/4 and
SE1/4 NE1/4 NE1/4 SW1/4, and
E1/2 NE1/4 SW1/4 NW1/4 NE1/4 SW1/4, and
West 11 feet of SW1/4 NE1/4 NE1/4 SW1/4,
and except Lot H-1 of Section 2 - Township 19
North - Range 29 East of B.H.M.

Parcel A1

Parcel A1
845+51.17 to 846+56 L
Temporary Easement containing
0.1 ac, more or less

REGISTERED PROFESSIONAL ENGINEER
REG. No. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Inset A

2PP
846+26 L
End Type 2 Fence

2-2PP

845+68 L
End Type 2 Fence

2PP

2PP

845+53 L
Begin Type 2 Fence

2-2PP

2PP

845+77 L
Begin Type 2 Fence

Plotted From - sydneymarczak

File - ...\06A1_843.dgn

24" RCP - MRM 370.00+0.530 - Cross Pipe

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B35	B85

Plotting Date: 6/20/2024 _____

Plot Scale - 1:40

1680
1675
1670
1665
1660
1655
1650
1645
1640
1635
1630
1625
1620
1615
1610
1605

845+08
42' R
Elev 1666.86

845+49
41' R
Elev 1663.67

845+99
43' R
Elev 1662.31

846+28
44' R
Elev 1659.91

847+02
44' L
Elev 1658.57

-5.8277%

-5.1181%

-8.6792%

FL (24" RCP)
846+39
24' R
1659.66

FL (24" RCP)
846+66
31' L
1659.07

846+39-24' R to 846+66-31' L
Install 24"-60' RCP
& 2-Sloped End Sections

0+00
1+00
2+00
3+00
4+00
5+00

REGISTERED PROFESSIONAL ENGINEER
REG. No. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plotted From - sydneymarczak

File - ...\06A1_843v1.dgn

18" RCP - MRM 370.00+0.530 - Approach Pipe

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B36	B85

Plotting Date: 6/20/2024 _____

Plot Scale - 1:40

1685
1680
1675
1670
1665
1660
1655
1650
1645
1640
1635
1630
1625
1620
1615
1610
1605

845+36
43' L
Elev 1668.23

845+68
49' L
Elev 1666.81

-4.1594%

FL (18" CMP)
846+74
49' L
1666.38

-6.6667%

FL (18" CMP)
846+33
47' L
1662.39

846+39
47' L
Elev 1661.95

-10.0000%

846+78
45' L
Elev 1658.96

-1.0000%

847+04
44' L
Elev 1658.57

846+33-47' L to 846+74-49' L
Install 18"-64' CMP
& 2-Safety End Sections

0+00
1+00
2+00
3+00
4+00
5+00

1668.07
1667.24
1666.17
1664.84
1663.50
1662.17
1660.28
1658.89
1658.69

844

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plotted From - sydneymarczak

File - ...\06A1_843v2.dgn

FOR BIDDING PURPOSES ONLY

66+65
Retain 204'-60" RCP
& 2 End Sections

66+65-102' L to 66+65-102' R
Cleanout Joints for Joint Sealing (198 Ft)

66+65-102' L to 66+65-102' R
Seal Culvert Joints (198 Ft)

SD 1806P
MRM 370.00+0.531
Sta. 66+65
Corson County

United States Army Corps
of Engineers

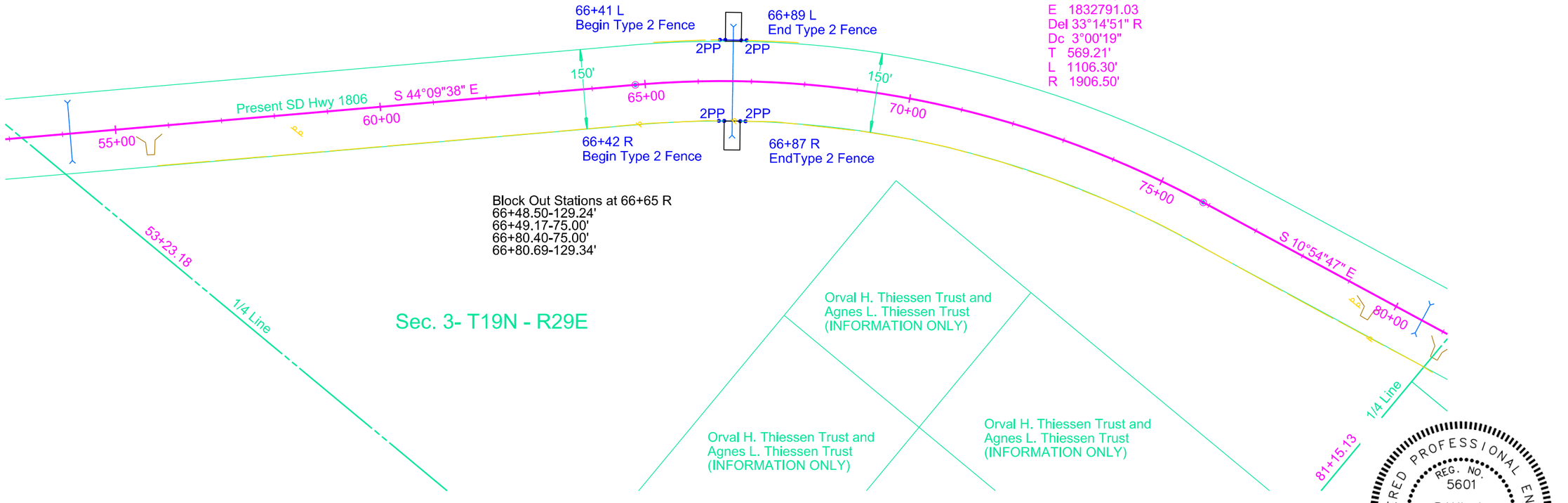
NE1/4 except S1/2NW1/4SW1/4 NE1/4,
SW1/4NE1/4SW1/4 NE1/4, SW1/4SW1/4NE1/4,
W1/2SE1/4SW1/4NE1/4, and except highway
right of way of Section 3 - Township 19 North -
Range 29 East of B.H.M.

Parcel 2
0.08 ac, Permanent Easement
(3259 sq ft) more or less.

NE1/4

Block Out Stations at 66+65 L
66+50.82-75.00'
66+51.36-129.38'
66+79.45-129.29'
66+79.69-75.00'

PI 70+50.75
N 659814.94
E 1832791.03
Del 33°14'51" R
Dc 3°00'19"
T 569.21'
L 1106.30'
R 1906.50'



Block Out Stations at 66+65 R
66+48.50-129.24'
66+49.17-75.00'
66+80.40-75.00'
66+80.69-129.34'

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B38	B85

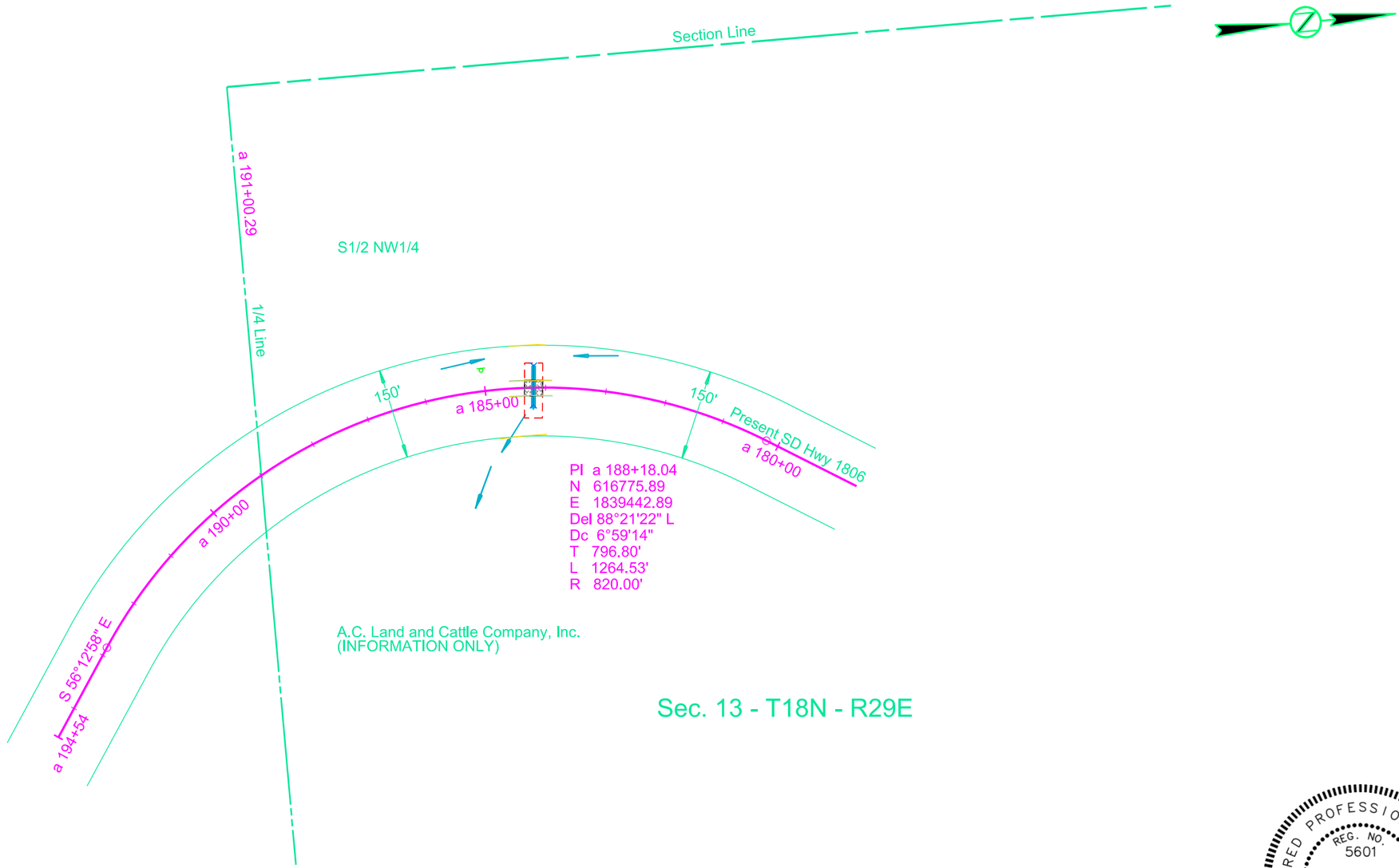
Plotting Date: 6/20/2024 _____

FOR BIDDING PURPOSES ONLY

a 184+20
Take Out 24" CMP-62'
& 2 End Sections

a 184+20
Install 24"-60' RCP
& 2-Sloped End Sections

SD Hwy 1806
MRM 360.00+0.600
Sta. a 184+20
Corson County



Sec. 13 - T18N - R29E

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:200

Plotted From - sydneymarczak

File - ...\06RC_a181.dgn

b 25+14-129' R to b 27+94-99' R
Install 280'-4" Slotted Corrugated Polyethylene Tubing

b 25+94-120' R to b 26+05-219' R
Install 100'-4" PVC Pipe and 1-Concrete Headwall for Underdrain

b 25+14-129' R to b 27+94-99' R
Install 118 Tons Porous Backfill

b 25+94-120' R to b 26+05-219' R
Install 22.2 CuYd Contractor Furnish Borrow

b 24+32 R to b 30+34 R
Landslide Repair

b 38+16
Take Out 18" CMP-82' & 2 End Sections

b 38+16
Install 24"-62' RCP
Install 24"-26' CMP (10' & 16')
& 1-RCP Sloped End Section
& 1-RCP to CMP Transition
& 2-20° Elbows
& 1-CMP Sloped End Section

b 38+16 L
Install PVC Coated Bank and Channel Protection Gabions (4.5 CuYd)
& Type B Drainage Fabric (15 SqYd)

b 46+24
Take Out 18" - 82' CMP & 2 End Sections

b 46+24
Install 24"-64' RCP
Install 24"-24' CMP (10' & 14')
& 1-RCP Sloped End
& 1 RCP to CMP Transition
& 2-20° Elbows
& 1-CMP Sloped End

b 46+24 L
Install PVC Coated Bank and Channel Protection Gabions (4.5 CuYd)
& Type B Drainage Fabric (15 SqYd)

SD Hwy 1806
MRM 362.00+0.453
Sta. b 24+50
Corson County

SD Hwy 1806
MRM 362.00+0.712
Sta. b 38+16
Corson County

SD Hwy 1806
MRM 362.00+0.866
Sta. b 46+24
Corson County

Darrel W. Smith

SW1/4 of Section 1 - Township 18 North - Range 29 East of B.H.M except U.S. Government taking

Parcel 3
2.55 ac, Permanent Easement (110873 sq ft) more or less.

SW1/4

PI 31+88.70
N 627149.63
E 1840680.60
Del 31°38'03" R
Dc 6°05'43"
T 266.30'
L 518.99'
R 940.00'

1/4 Line

b 32+03.58

Darrel W. Smith

NW1/4 of Section 1 - Township 18 North - Range 29 East of B.H.M except U.S. Government taking

Parcel A2

b 30+50 R
End Type 2 Fence

b 24+24 R
Begin Type 2 Fence

b 37+74 L
Begin Type 2 Fence

b 38+56 L
End Type 2 Fence

b 45+79 L
Begin Type 2 Fence

b 46+69 L
End Type 2 Fence

Present SD Hwy 1806

N 27°18'35" W

N 4°19'28" E

N 29°43'54" W

b 25+00

b 30+00

b 35+00

b 40+00

b 45+00

b 50+00

150'

154'

2PP

2-2PP

b 24+24.22-75.00'

b 24+24.22-99.13'

b 25+04.23-241.37'

b 26+46.58-226.11'

b 28+11.82-75.00'

b 28+62.05-287.35'

b 29+22.41-75.00'

b 29+35.99-345.30'

b 30+44.98-75.00'

b 30+51.04-371.64'

b 37+74.41-75.00 & 90'

b 38+56.41-75.00 & 90'

b 45+79.27-75.00 & 91'

b 46+69.40-75.00 & 90'

PI b 43+76.72
N 628347.83
E 1840771.21
Del 34°03'22" L
Dc 5°48'18"
T 302.29'
L 586.67'
R 987.00'

NW1/4

Sec. 01 - T18N - R29E

United States Army Corps of Engineers
(INFORMATION ONLY)

Parcel A2
b 37+74.41 to b 38+56.41 L
Temporary Easement containing
0.1 ac, more or less

Parcel A2
b 45+79.27 to b 46+69.40 R
Temporary Easement containing
0.1 ac, more or less

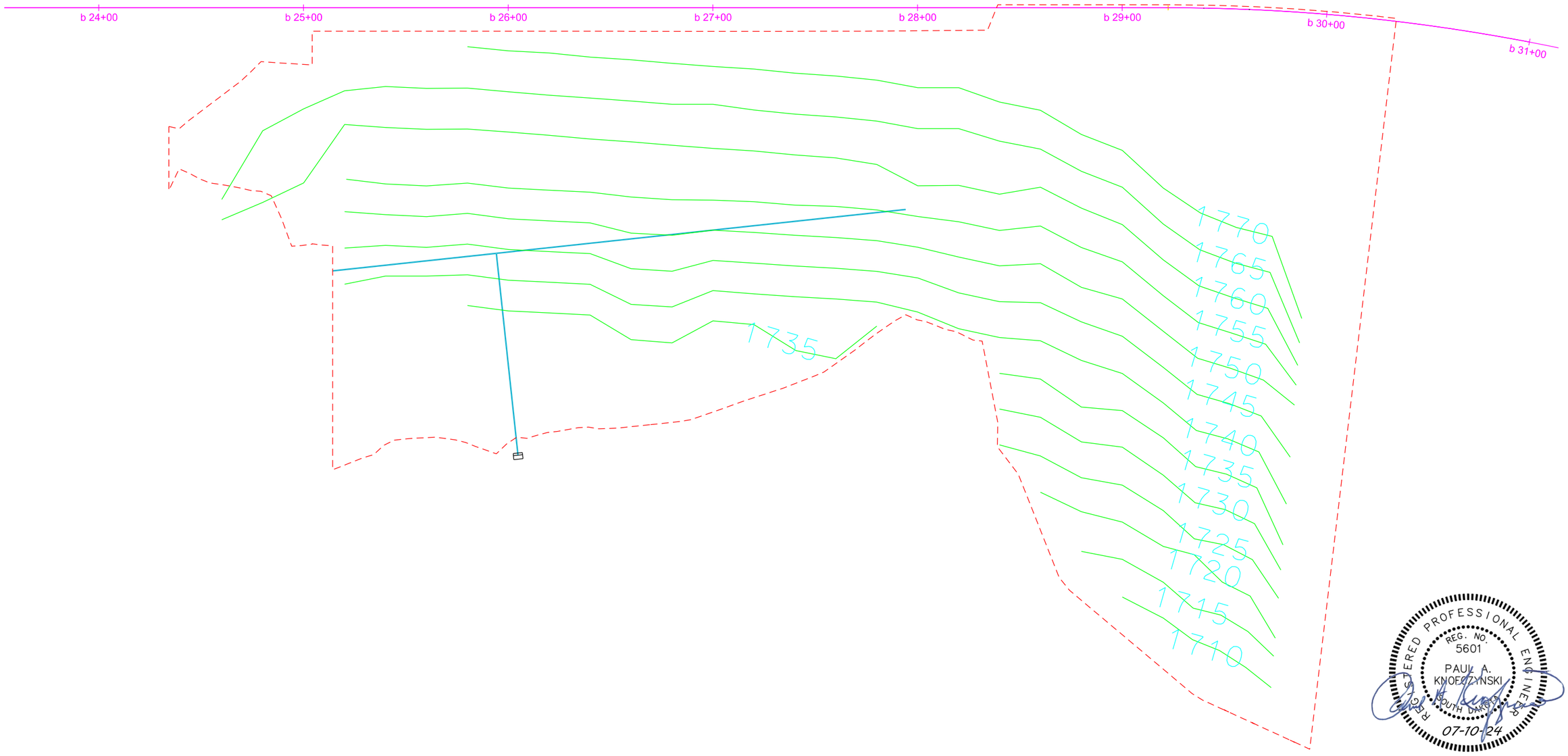
REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOEPFLYNSKI
SOUTH DAKOTA
07-10-24

PROPOSED LANDSLIDE CONTOURS
Scale: 1"=50'

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B40	B85

Rev 7-9-24 EW Plotting Date: 7/9/2024 _____



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOEZYNSKI
SOUTH DAKOTA
07-10-24

Plot Scale - 1:50
Plotted From - evanwolf
File - ...\Section B\LS_Contours.dgn

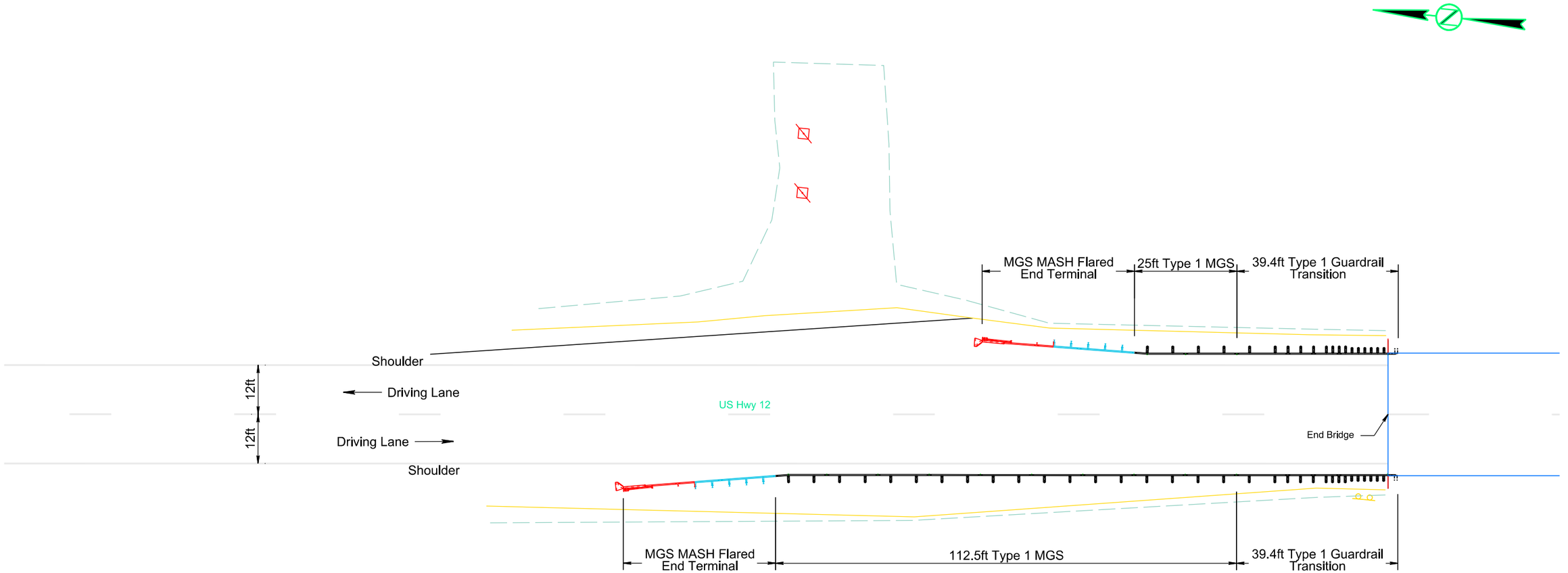
GUARDRAIL LAYOUT

Structure No. 16-665-200
US Hwy 12
MRM 173.40

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B41	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	250
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	137.5
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

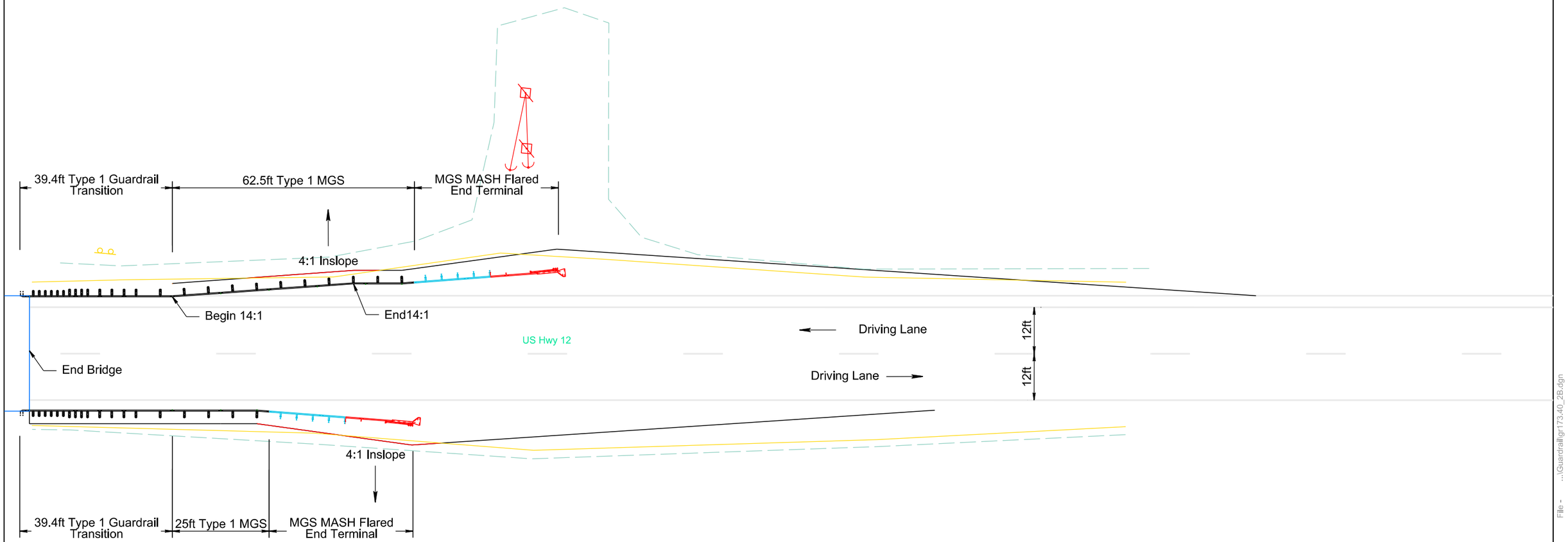
GUARDRAIL LAYOUT

Structure No. 16-665-200
US Hwy 12
MRM 173.40

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B42	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	250
Contractor Furnished Borrow	CuYd	10
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	87.5
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\gr173.40_2B.dgn

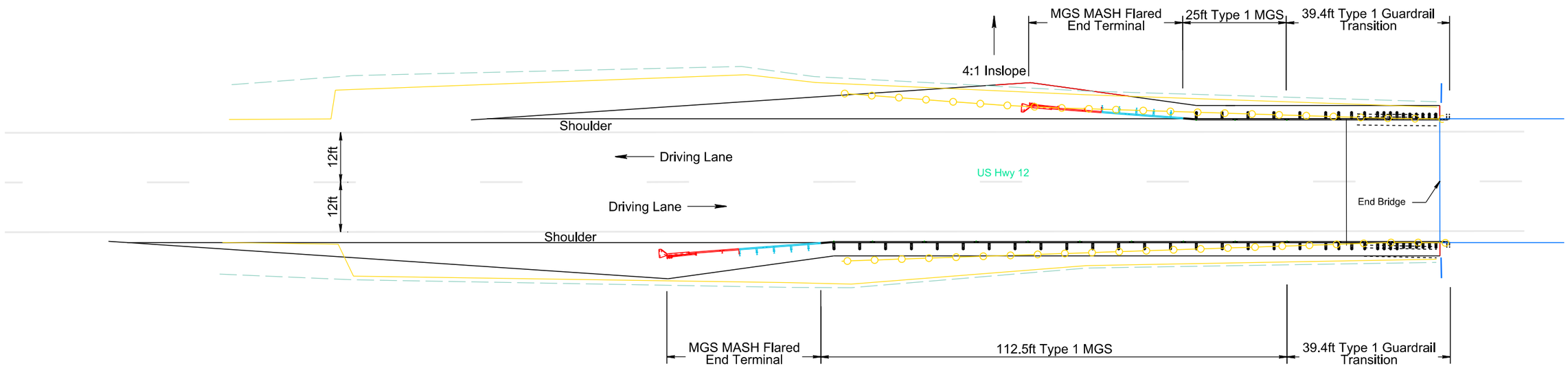
GUARDRAIL LAYOUT

Structure No. 16-666-216
US Hwy 12
MRM 174.92

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B43	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	**UNIT**	**QUANTITY**
Remove Beam Guardrail	Ft	300
Contractor Furnished Borrow	CuYd	5
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	137.5
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\gr174.92_1B.dgn

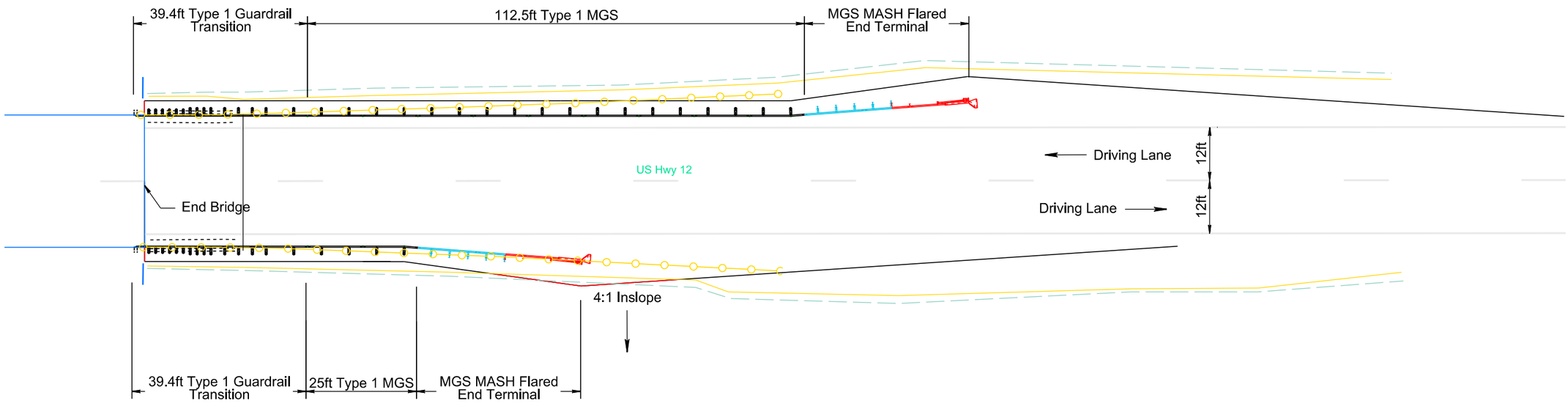
GUARDRAIL LAYOUT

Structure No. 16-666-216
US Hwy 12
MRM 174.92

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B44	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	300
Contractor Furnished Borrow	CuYd	8
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	137.5
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\gr174.92_2B.dgn

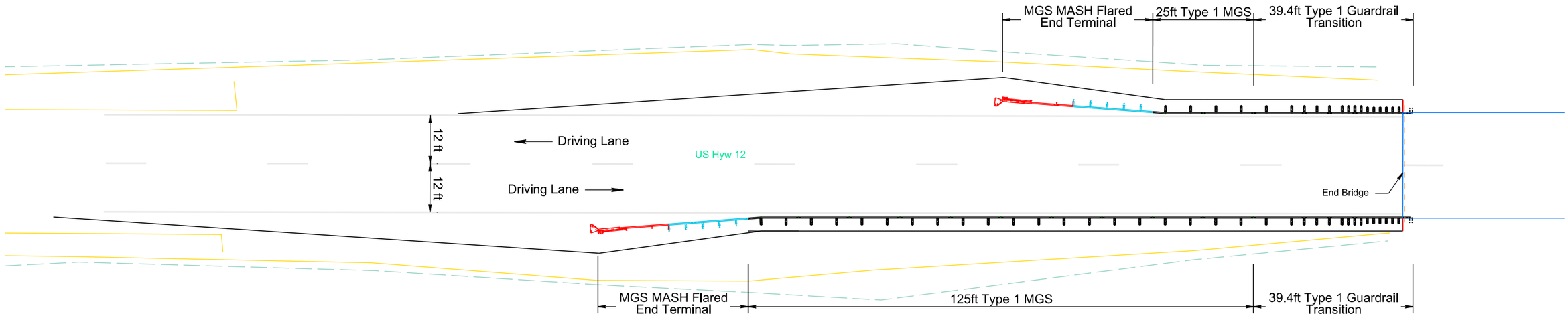
GUARDRAIL LAYOUT

Structure No. 65-000-020
US Hwy 12
MRM 186.185

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B45	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	300
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	150
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. No. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\gr186.165B.dgn

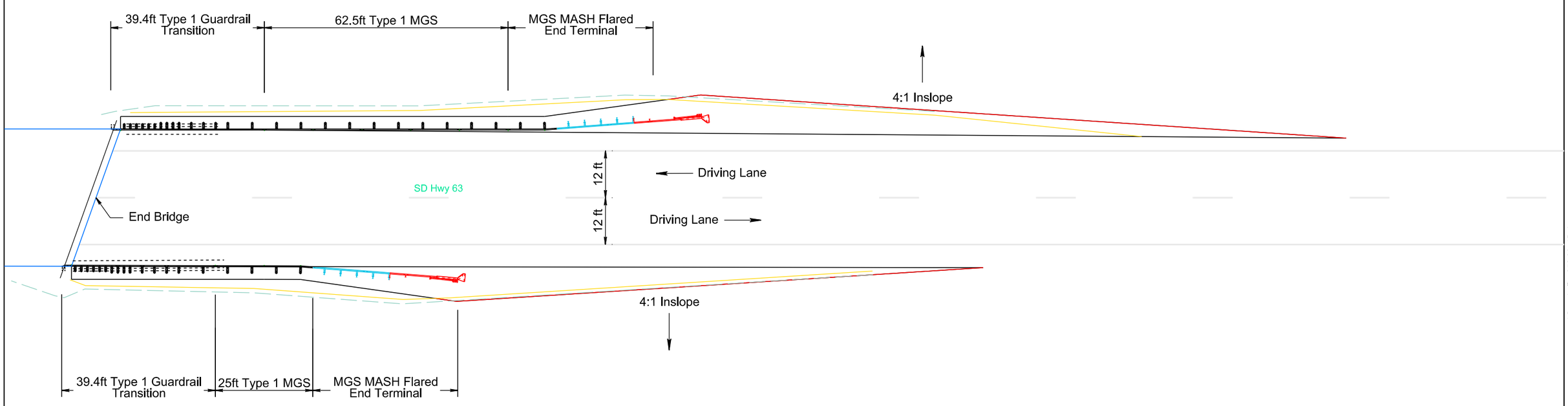
GUARDRAIL LAYOUT

FOR BIDDING PURPOSES ONLY

Structure No. 16-580-084
SD Hwy 63
MRM 252.80

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B46	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	**UNIT**	**QUANTITY**
Remove Beam Guardrail	Ft	225
Contractor Furnished Borrow	CuYd	20
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	87.5
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\gr252.80_1B.dgn

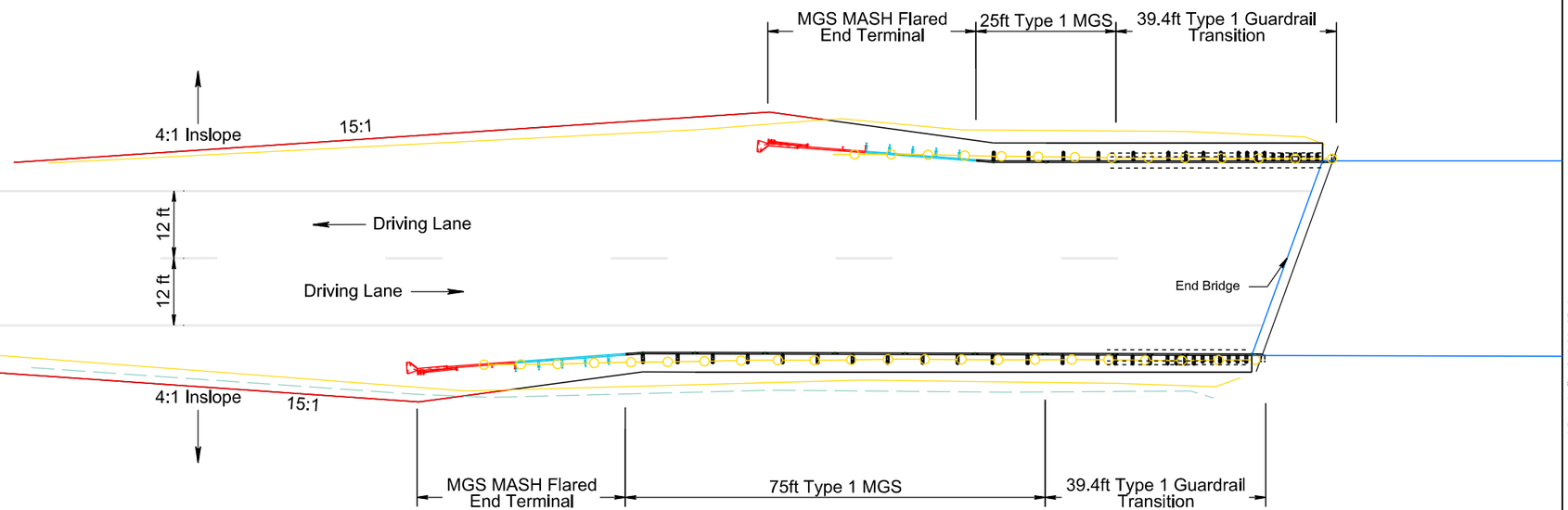
GUARDRAIL LAYOUT

Structure No. 16-580-084
SD Hwy 63
MRM 252.80

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B47	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	225
Contractor Furnished Borrow	CuYd	20
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	100
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

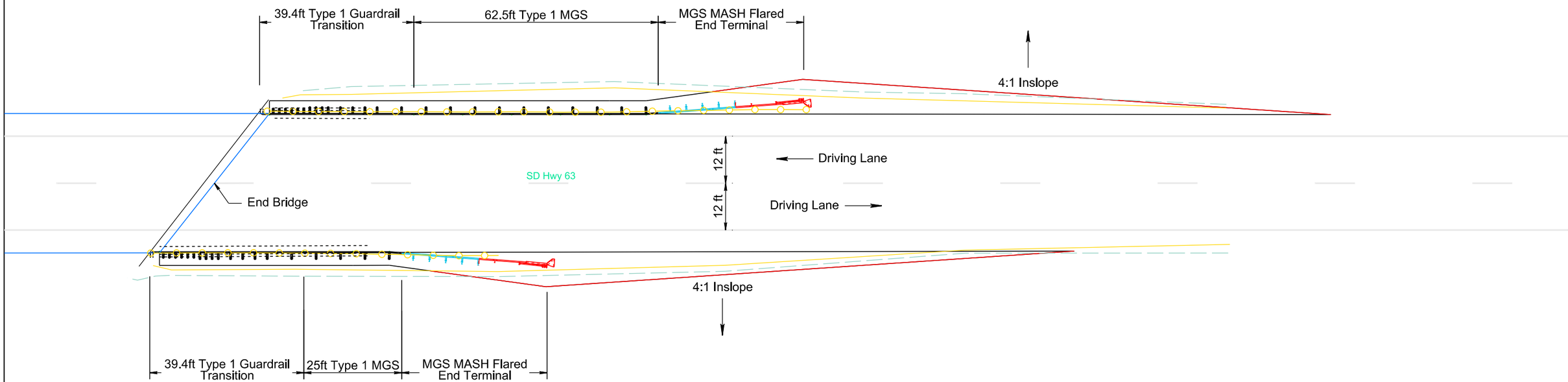
GUARDRAIL LAYOUT

Structure No. 16-580-075
SD Hwy 63
MRM 253.60

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B48	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	230
Contractor Furnished Borrow	CuYd	50
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	87.5
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\gr253.60_1B.dgn

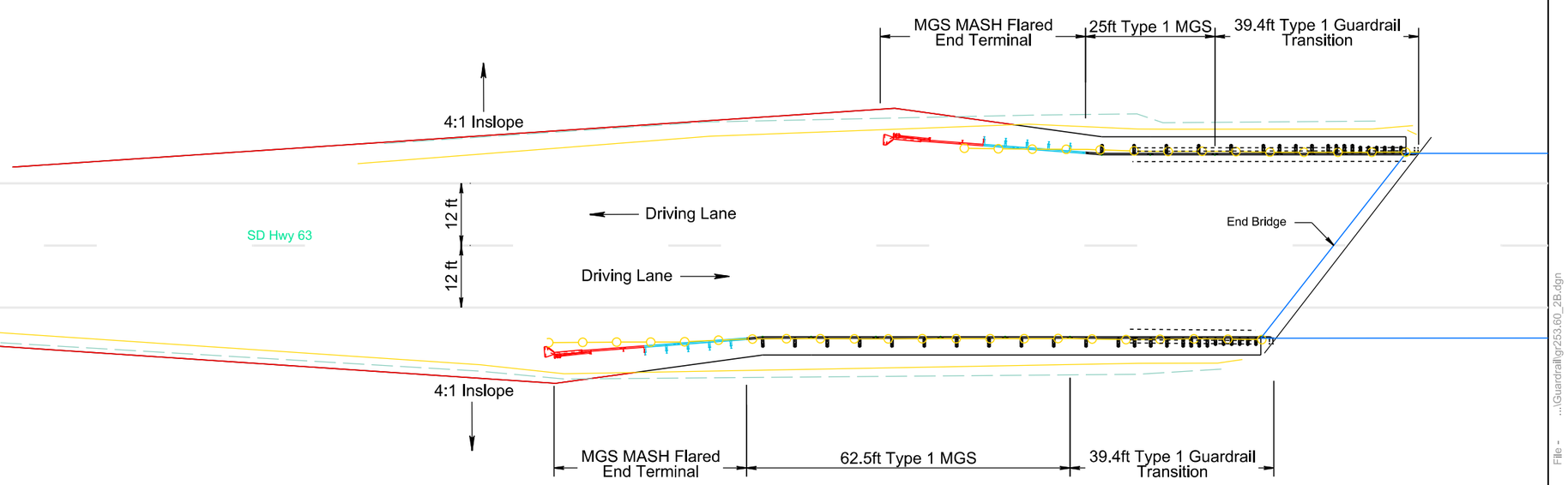
GUARDRAIL LAYOUT

Structure No. 16-580-075
SD Hwy 63
MRM 253.60

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B49	B85

Plotting Date: 6/20/2024



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	230
Contractor Furnished Borrow	CuYd	50
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	87.5
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\tg\253.60_2B.dgn

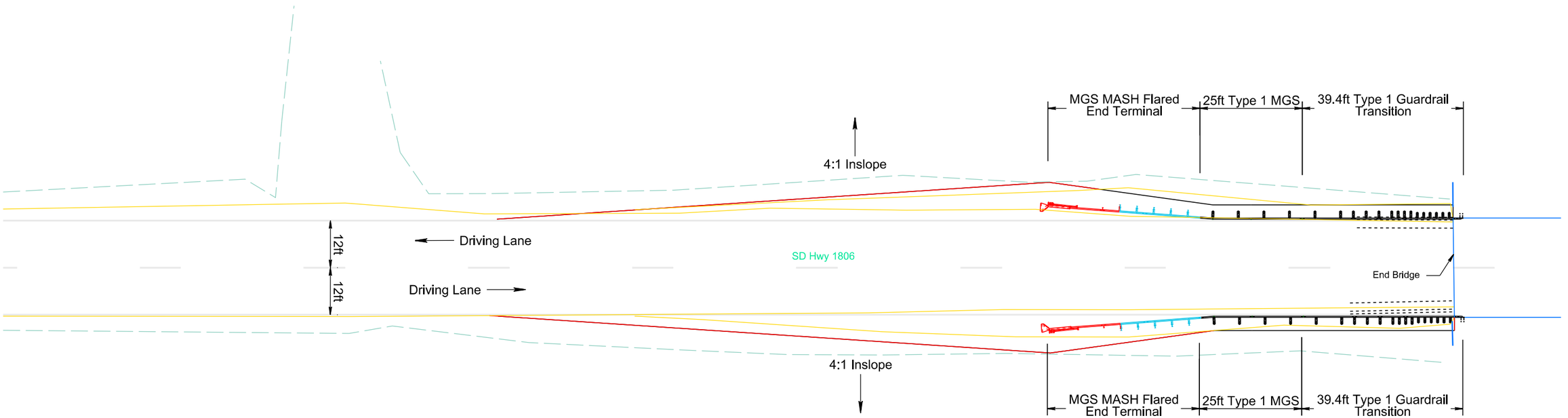
GUARDRAIL LAYOUT

Structure No. 16-737-253
SD Hwy 1806
MRM 365.72

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B50	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	160
Contractor Furnished Borrow	CuYd	44
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	50
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\gr365.72_1B.dgn

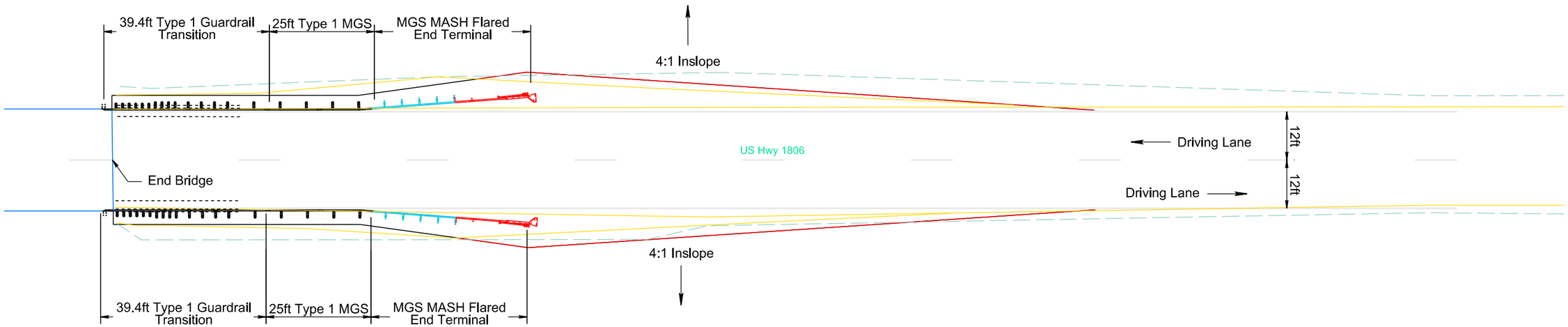
GUARDRAIL LAYOUT

Structure No. 16-737-253
SD Hwy 1806
MRM 365.72

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B51	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	160
Contractor Furnished Borrow	CuYd	44
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	50
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrailtg\365.72_2B.dgn

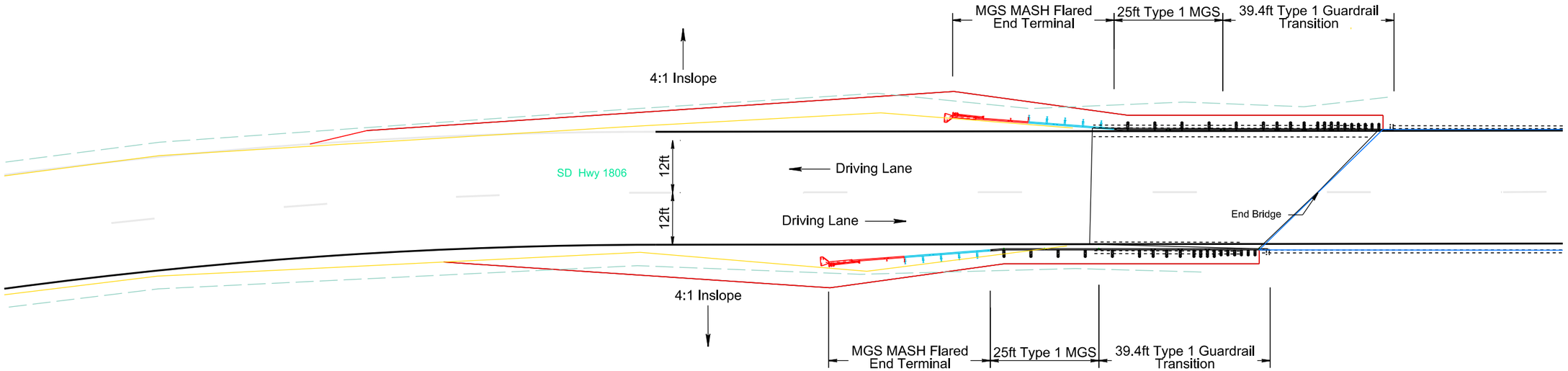
GUARDRAIL LAYOUT

Structure No. 16-732-234
SD Hwy 1806
MRM 367.64

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B52	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	200
Contractor Furnished Borrow	CuYd	50
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	50
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\tg\367.64_1B.dgn

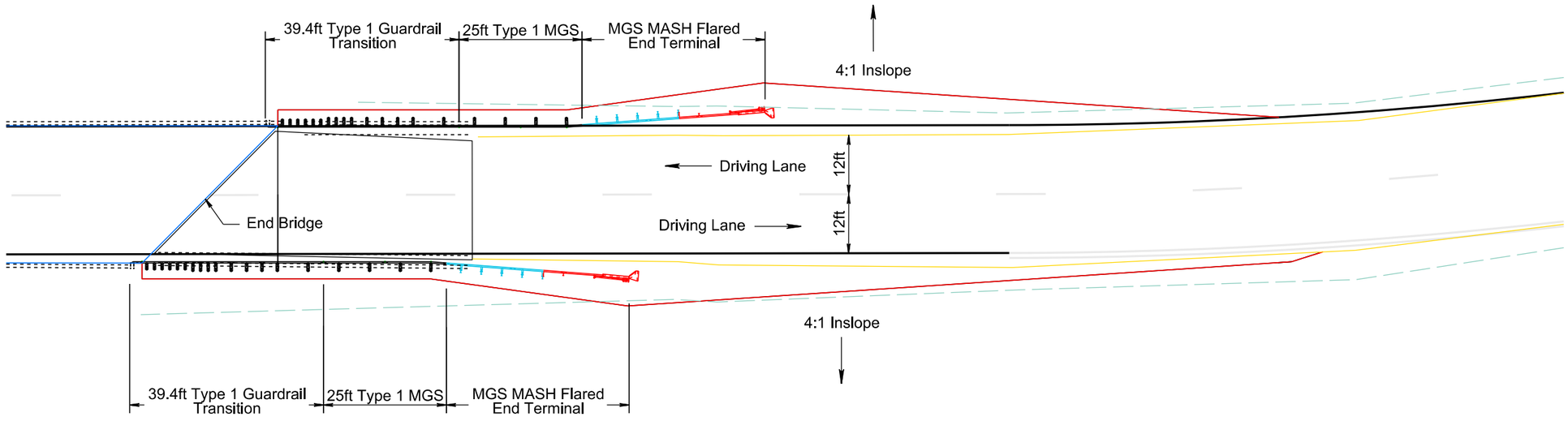
GUARDRAIL LAYOUT

Structure No. 16-732-234
SD Hwy 1806
MRM 367.64

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B53	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES

ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	200
Contractor Furnished Borrow	CuYd	22
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	50
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:25
Plotted From - sydneymarczak
File - ...\Guardrail\gr367.64_2B.dgn

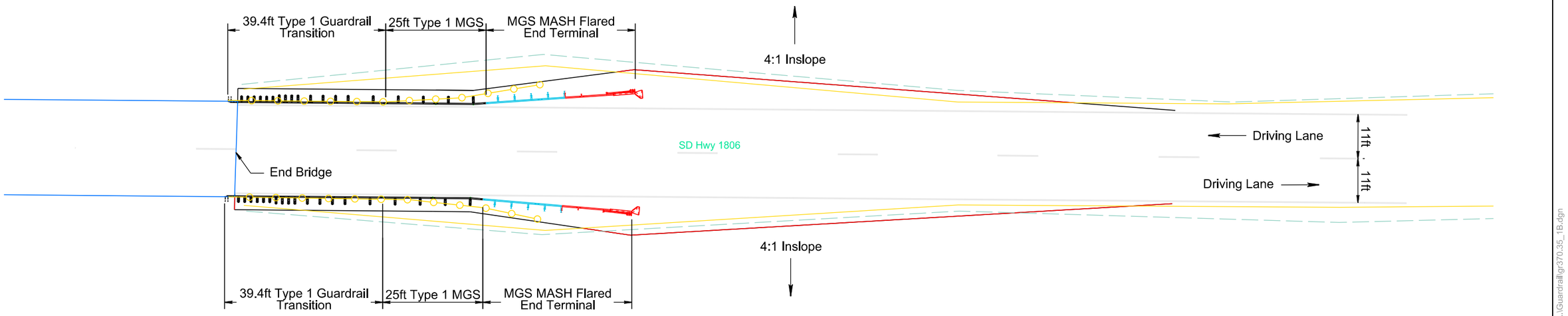
GUARDRAIL LAYOUT

Structure No. 16-720-217
SD Hwy 1806
MRM 370.35

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B54	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	UNIT	QUANTITY
Remove Beam Guardrail	Ft	160
Contractor Furnished Borrow	CuYd	30
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	50
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\gr370.35_1B.dgn

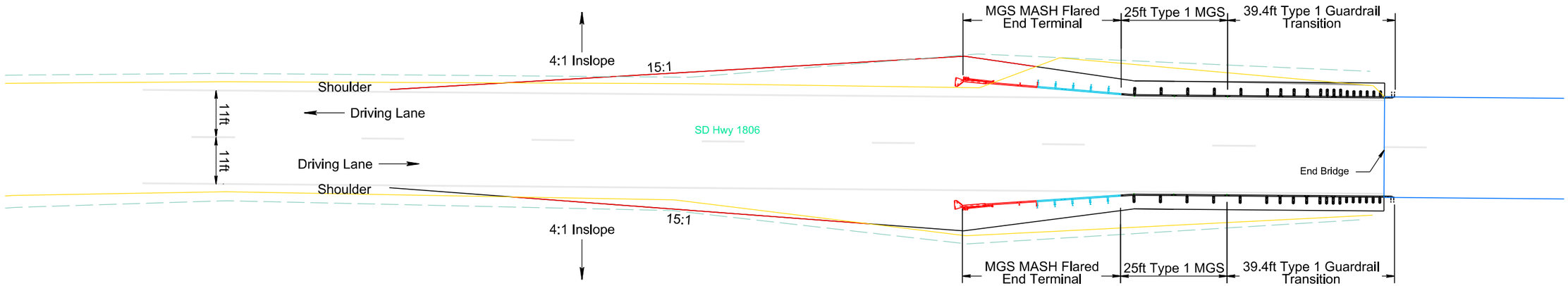
GUARDRAIL LAYOUT

Structure No. 16-720-217
SD 1806 North of US 12
MRM 370.35

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B55	B85

Plotting Date: 6/20/2024 _____



ESTIMATED QUANTITIES		
ITEM	**UNIT**	**QUANTITY**
Remove Beam Guardrail	Ft	160
Contractor Furnished Borrow	CuYd	50
Remove and Replace Topsoil	LS	LUMP SUM
Type 1 MGS	Ft	50
Type 1 Guardrail Transition	Each	2
MGS MASH Flared End Termnal	Each	2

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
24 June 24

Plot Scale - 1:25.1048
Plotted From - sydneymarczak
File - ...\Guardrail\g370.35_2B.dgn

Plot Scale - 1:9.375
Plotted From - sydneymarczak

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B56	B85

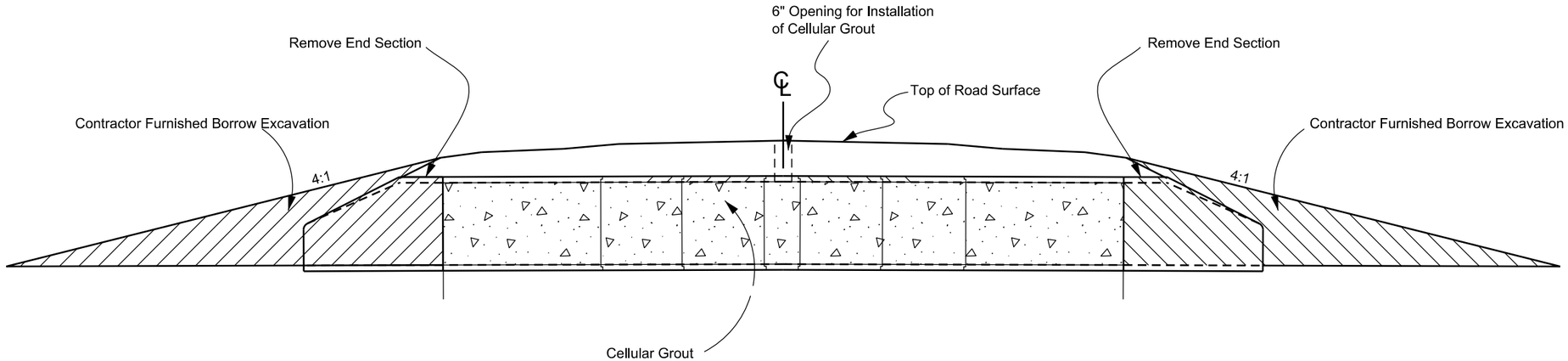
Plotting Date: 6/20/2024 Revised By: EJW 9/29/2021

FOR BIDDING PURPOSES ONLY

LAYOUT FOR PLUGGING EXISTING RC CATTLE PASS

See Table of Pipe Quantities for Locations to be Plugged

CELLULAR GROUT



NOTE:

- Contractor will match the existing roadway inslope to the satisfaction of the Engineer.
- Refer to plan notes for plugging the remaining void throughout the cattle pass.
- Refer to the plans for quantities.

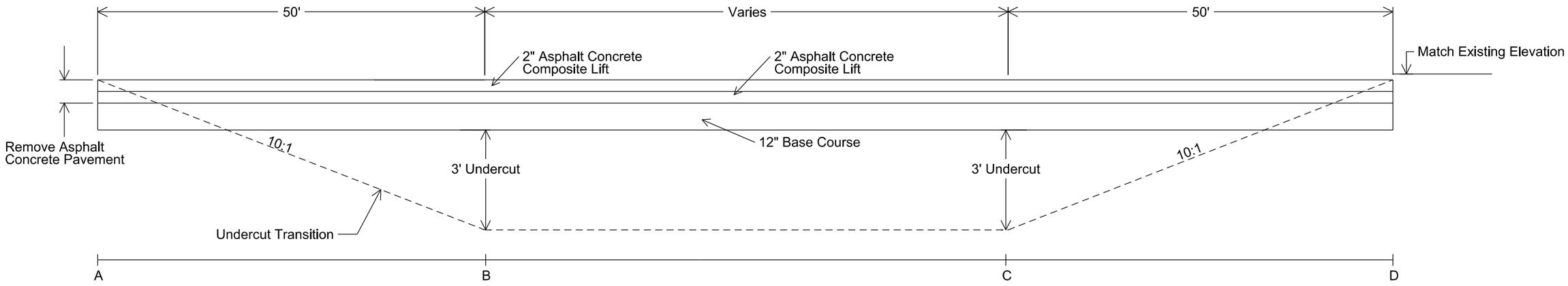
REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

File - ...\Cattle Pass Details.dgn

FOR BIDDING PURPOSES ONLY

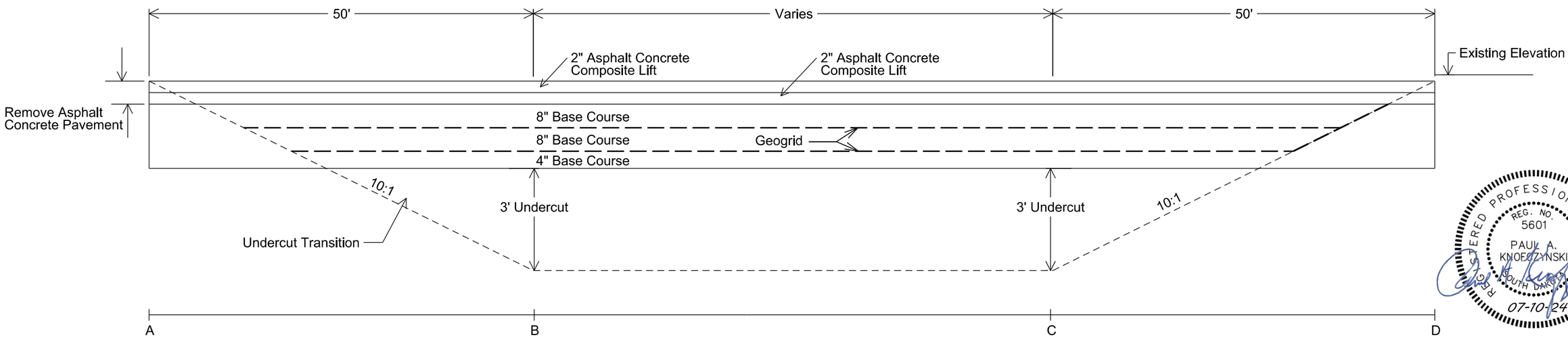
HEAVE REPAIR

SD1806
06A1
MRM 367.300± to MRM 367.550±
Sta. a 1018+13± Sta. b 1031+33±



BASE COURSE REINFORCEMENT

MRM 369.812± to MRM 369.878±
Sta. 885+25 to Sta. 881+76



Heave Repair				
	A	B	C	D
MRM	367.290	367.300	367.550	367.560
Base Course Reinforcement				
MRM	369.802	369.812	369.878	369.888

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOEZYNSKI
SOUTH DAKOTA
07-10-24

DRAWING NOT TO SCALE

Plot Scale - 1:26.6667
Plotted From - evanwolf
File - ...\Section FI\Heave Repair.dgn

BASE COURSE REINFORCEMENT

FOR BIDDING PURPOSES ONLY

KLJ	STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
		NH 0012(230)171...+	B58	B85

Plotting Date: 6/20/2024

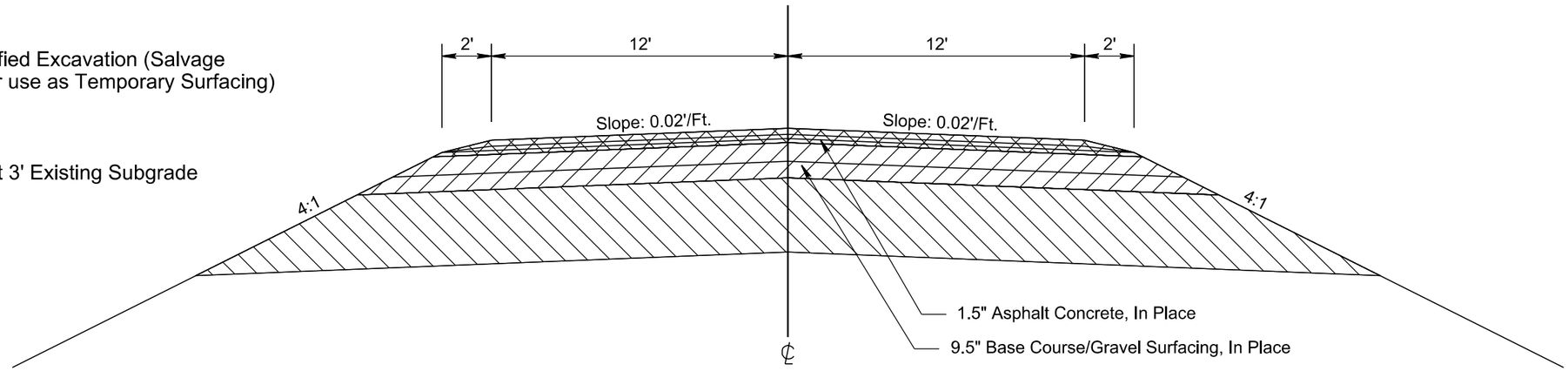
SD1806
06A1

Remove Asphalt Concrete Pavement

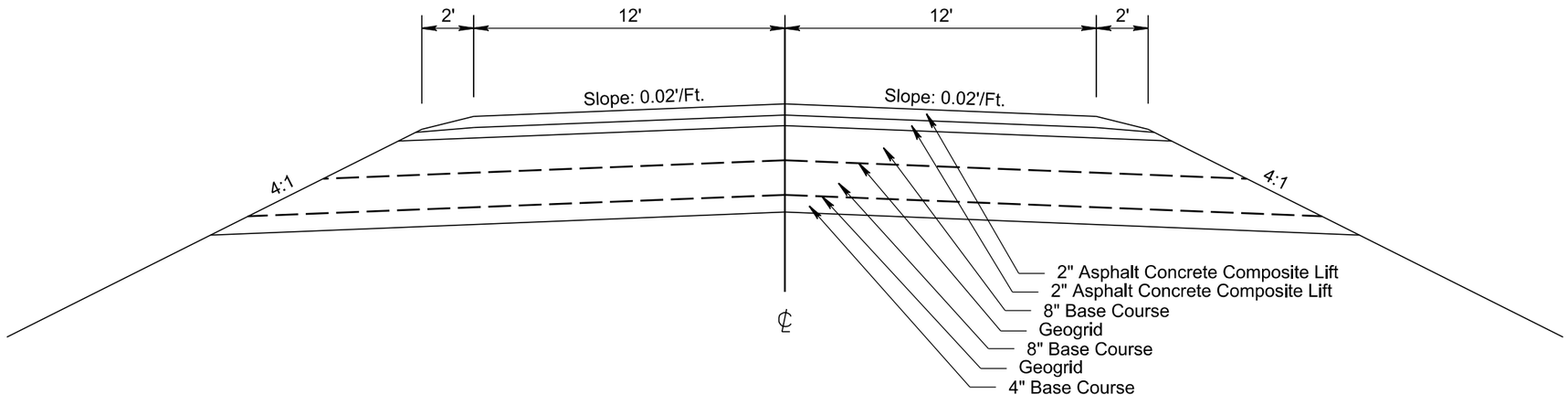
Unclassified Excavation (Salvage top 5" for use as Temporary Surfacing)

Undercut 3' Existing Subgrade

MRM 369.812± to MRM 369.878±



MRM 369.812± to MRM 369.878±



* This Detail does not show the ultimate resurfacing section which will include Cold Milling Asphalt Concrete and the 2" Class Q3R Asphalt Concrete overlay that will be accomplished after the heave repair has been completed.

REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOFCZYNSKI
SOUTH DAKOTA
25 Jun 24

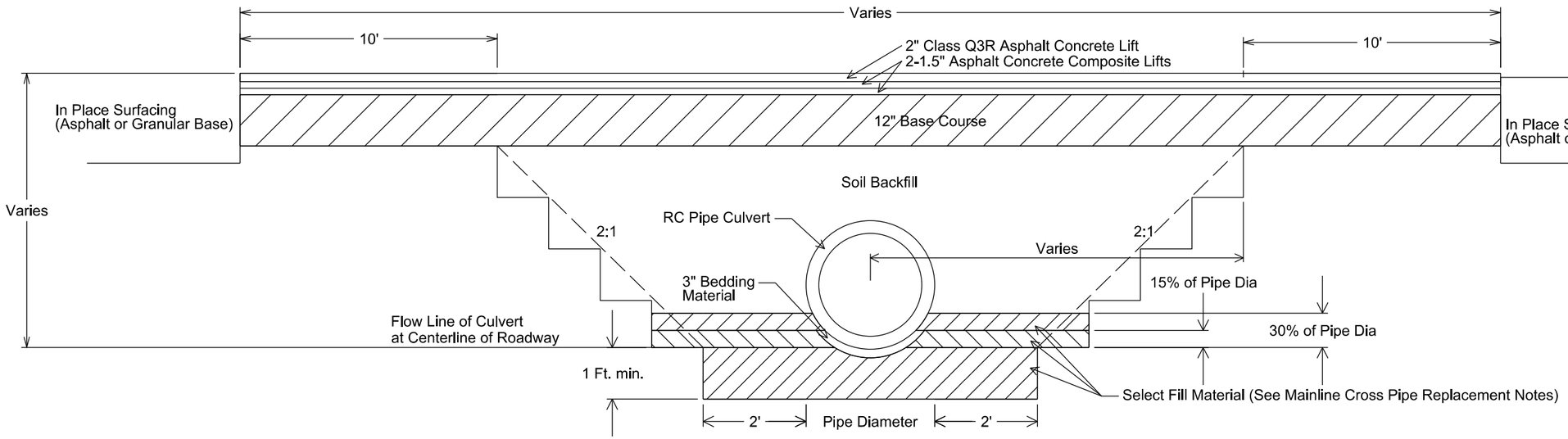
Plot Scale - 1:26.6667

Plotted From - sydneymarczak

File - ...\Section F\Heave Repair.dgn

FOR BIDDING PURPOSES ONLY

CULVERT REPLACEMENT DETAIL



REGISTERED PROFESSIONAL ENGINEER
REG. NO. 5601
PAUL A. KNOERZYNSKI
SOUTH DAKOTA
07-10-24

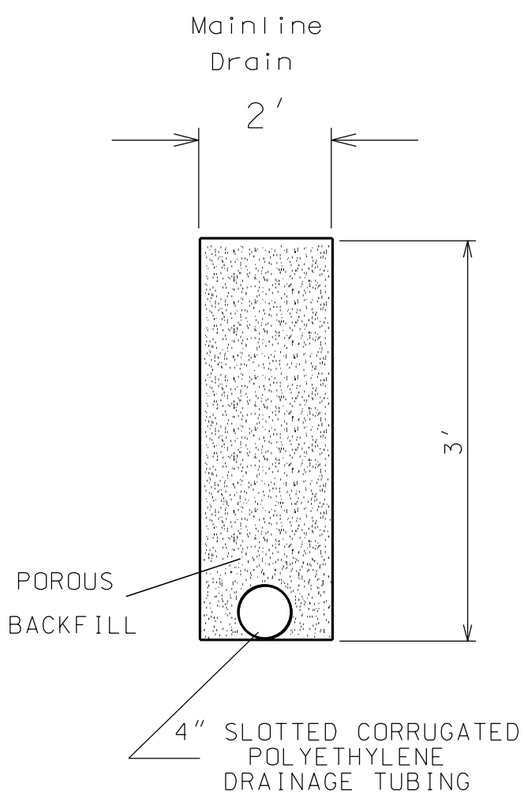
* This Detail does not show the ultimate resurfacing section which will include Cold Milling Asphalt Concrete and the Class Q3R Asphalt Concrete Surfacing that will be accomplished after the culvert replacement has been completed.

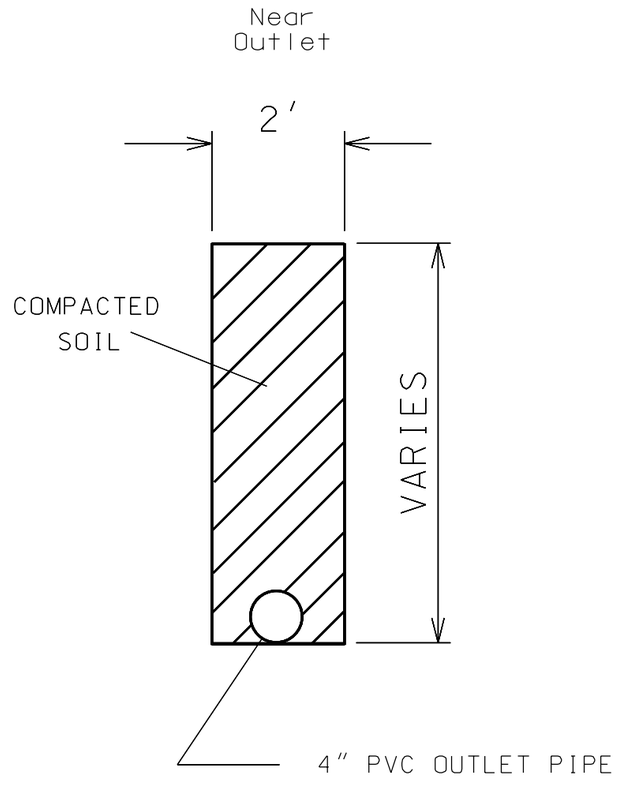
DRAWING NOT TO SCALE

Plotting Date: 6/20/2024 _____

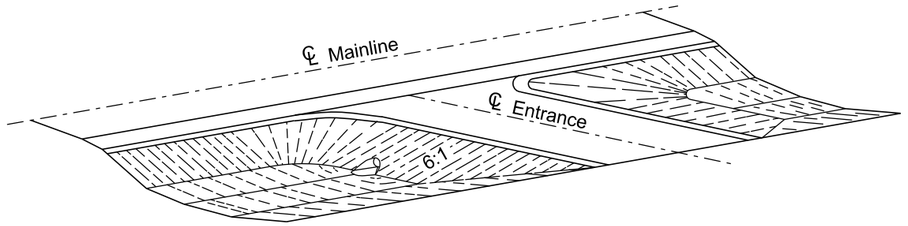
TYPICAL UNDERDRAIN INSTALLATION

SDI806 Underdrain

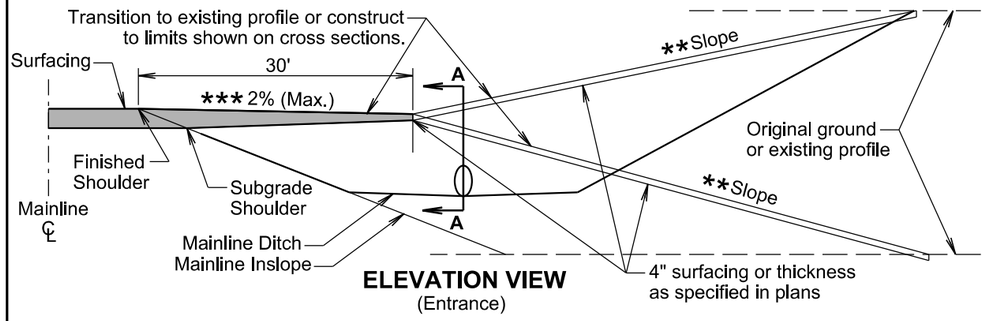




UNDERDRAINS WILL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 680 OF THE SPECIFICATIONS



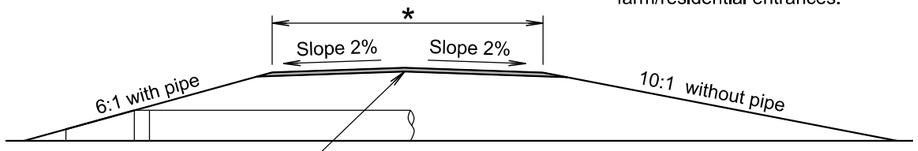
PERSPECTIVE OF ENTRANCE



ELEVATION VIEW
(Entrance)

*** 2% When on the inside of superelevation and 0% or flat when on outside of superelevation.

** Entrance maximum slope is typically 10:1 for field entrances and 15:1 for farm/residential entrances.



SECTION A-A
(Entrance and Intersecting Road)

* The finished surfacing width is stated elsewhere in the plans. The subgrade width is 4' wider than the finished surfacing width unless stated otherwise in the plans.

GENERAL NOTES:

The ditch section shown above in the perspective view is only for illustrative purpose.

The elevation view above is typical for either a ditch cut or fill section. Entrances that vary from above should be specified in the plans.

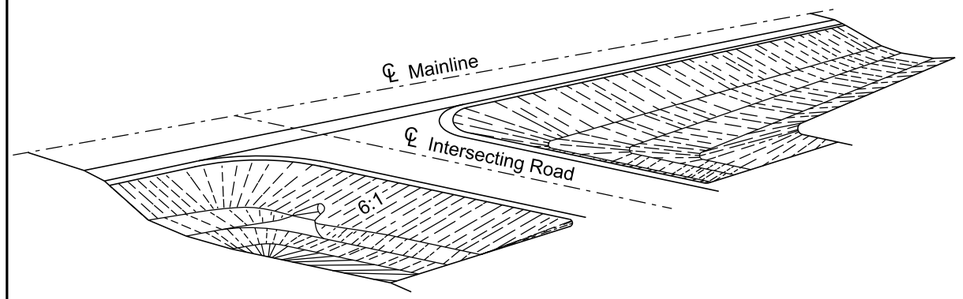
Pipe length will be adjusted if necessary during construction to obtain the 6:1 slope. For grading projects, the pipe length is estimated typically using a 4" thickness of surfacing directly over the subgrade above the pipe.

The transition area between the mainline inslope and the entrance or intersecting road inslope will be rounded to eliminate an abrupt transition.

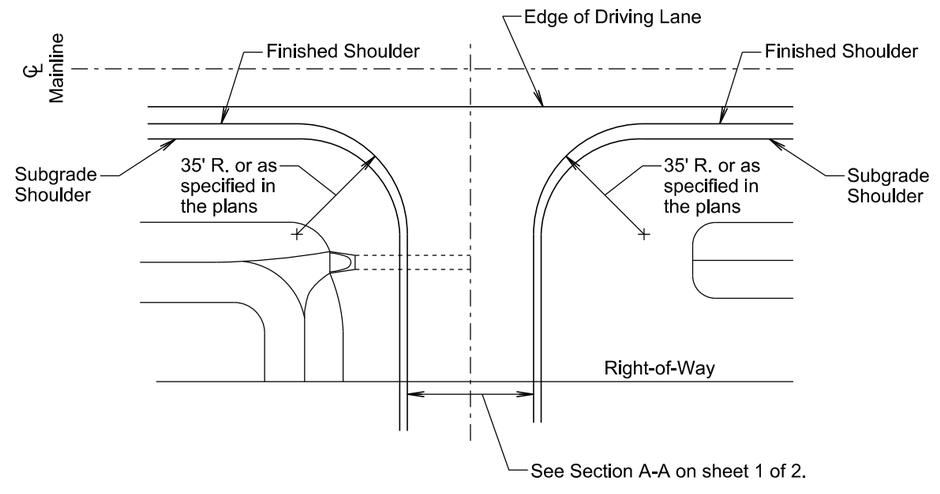
The turning radii will be 35' for intersecting roads and entrances unless stated otherwise in the plans.

November 19, 2021

Published Date: 2025	SDDOT	INTERSECTING ROADS AND ENTRANCES	PLATE NUMBER 120.01
			Sheet 1 of 2



PERSPECTIVE OF INTERSECTING ROAD



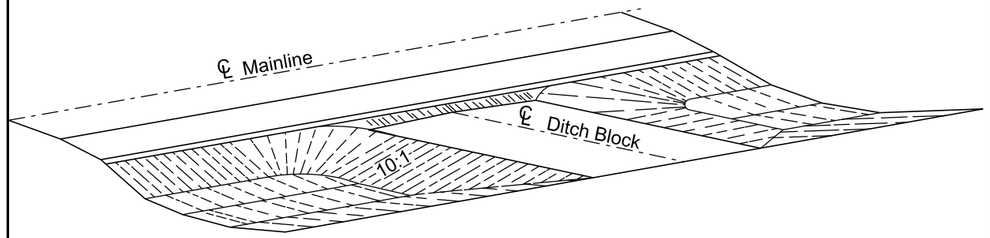
PLAN VIEW

GENERAL NOTES:

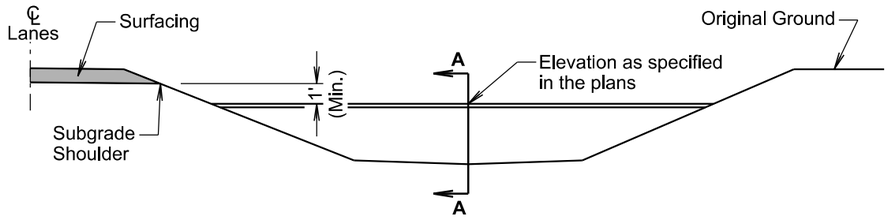
The 6:1 or 10:1 intersecting road inslope will transition to the existing intersecting road inslope near the right-of-way or at a location as determined by the Engineer.

November 19, 2021

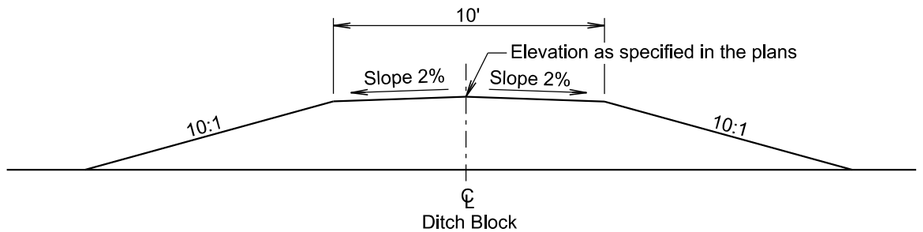
Published Date: 2025	SDDOT	INTERSECTING ROADS AND ENTRANCES	PLATE NUMBER 120.01
			Sheet 2 of 2



PERSPECTIVE OF DITCH BLOCK



ELEVATION VIEW



SECTION A-A

GENERAL NOTES:

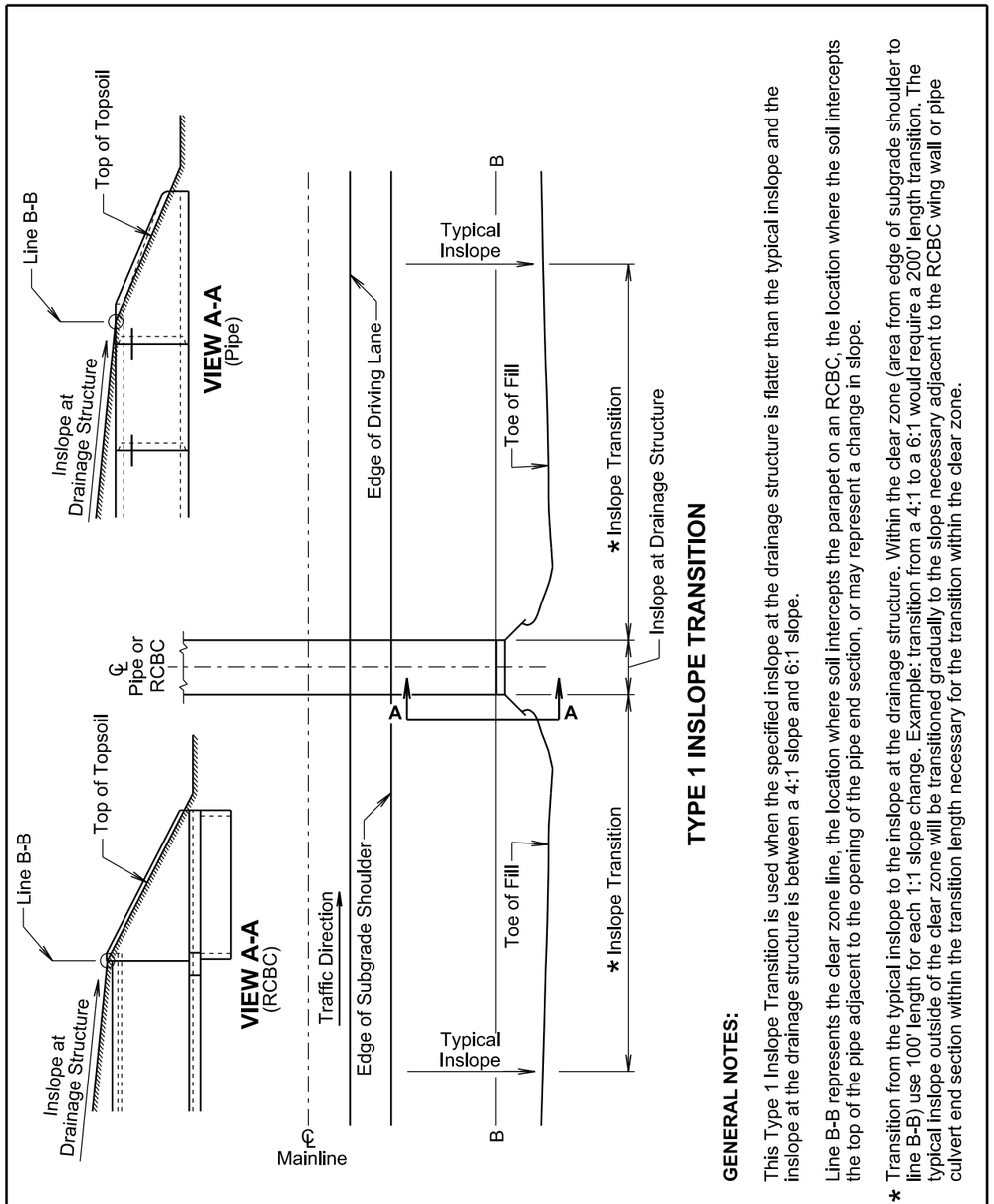
The ditch section shown above in the perspective and elevation view is only for illustrative purpose.

The inslopes of the ditch block will be 10:1 or as specified in the plans.

The transition area between the mainline inslope and the ditch block inslope will be rounded to eliminate an abrupt transition.

September 14, 2018

Published Date: 2025	SDDOT	DITCH BLOCK	PLATE NUMBER 120.02
			Sheet 1 of 1



TYPE 1 INSLOPE TRANSITION

GENERAL NOTES:

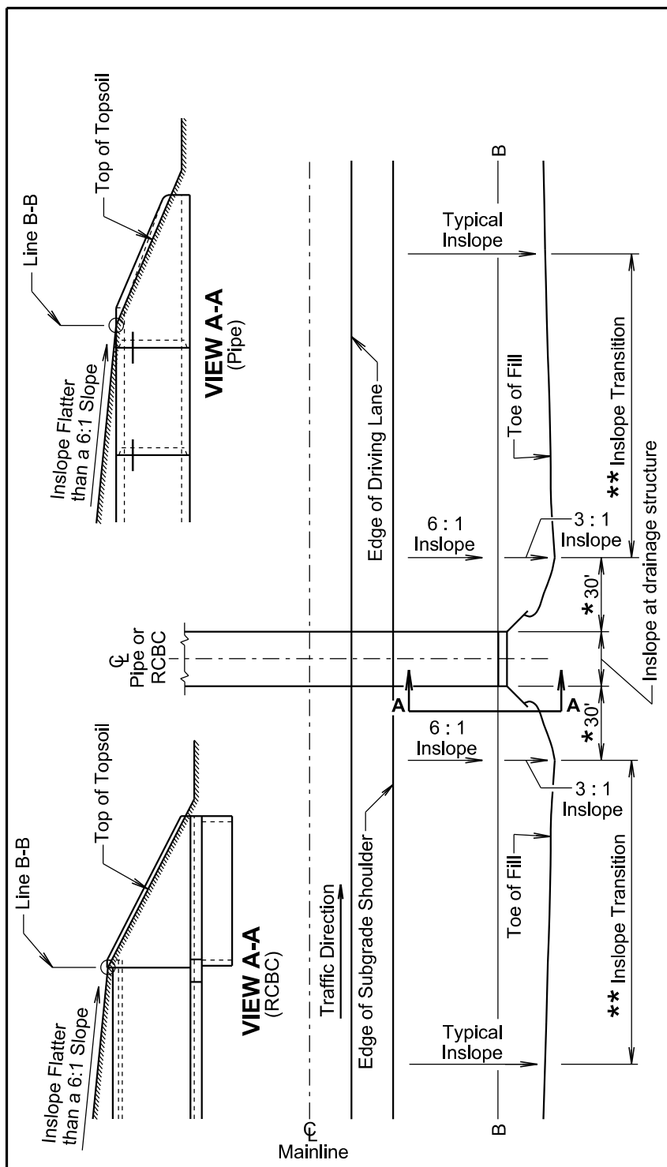
This Type 1 Inslope Transition is used when the specified inslope at the drainage structure is flatter than the typical inslope and the inslope at the drainage structure is between a 4:1 slope and 6:1 slope. Do not use for slopes steeper than 4:1 or flatter than 6:1 slope.

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.

September 14, 2018

Published Date: 2025	SDDOT	INSLOPE TRANSITIONS AT PIPE CULVERTS OR REINFORCED CONCRETE BOX CULVERTS	PLATE NUMBER 120.05
			Sheet 1 of 2



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.

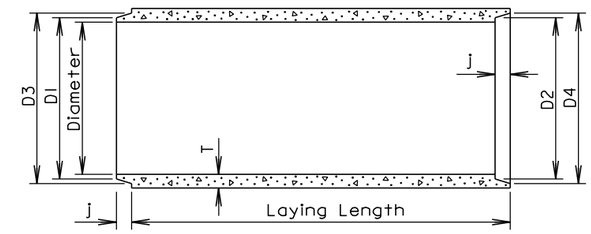
** Transition from typical inslope to the inslopes adjacent to the drainage structure. Within the clear zone (area from edge of subgrade shoulder to line B-B) use 100' length for each 1:1 slope change. Example: transition from a 4:1 to a 6:1 would require a 200' length transition. The typical inslope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

September 14, 2018

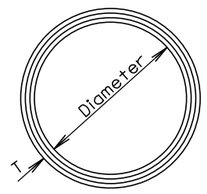
Published Date: 2025	SDDOT	INSLOPE TRANSITIONS AT PIPE CULVERTS OR REINFORCED CONCRETE BOX CULVERTS	PLATE NUMBER 120.05
			Sheet 2 of 2

TOLERANCES IN DIMENSIONS

Diameter: ±1.5% for 24" Dia. or less and ±1% or 3/8" whichever is more for 27" Dia. or greater.
Diameters at joints: ± 3/16" for 30" Dia. or less and ± 1/4" for 36" or greater.
Length of joint (j): ± 1/4".
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 1/2".



LONGITUDINAL SECTION



END VIEW

GENERAL NOTES:

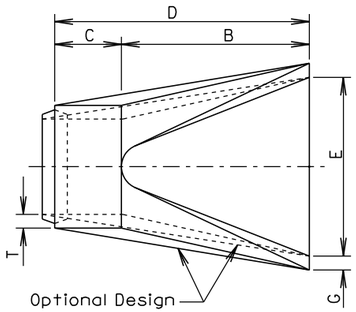
Construction of R.C.P. shall conform to the requirements of Section 990 of the Specifications.

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.

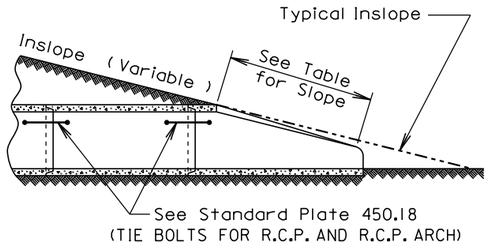
Diam. (in.)	Approx. Wt. /Ft. (lb.)	T (in.)	J (in.)	D1 (in.)	D2 (in.)	D3 (in.)	D4 (in.)
12	92	2	1 3/4	13 1/4	13 5/8	13 7/8	14 1/4
15	127	2 1/4	2	16 1/2	16 7/8	17 1/4	17 5/8
18	168	2 1/2	2 1/4	19 5/8	20	20 3/8	20 3/4
21	214	2 3/4	2 1/2	22 7/8	23 1/4	23 3/4	24 1/8
24	265	3	2 3/4	26	26 3/8	27	27 3/8
27	322	3 1/4	3	29 1/4	29 5/8	30 1/4	30 5/8
30	384	3 1/2	3 1/4	32 3/8	32 3/4	33 1/2	33 7/8
36	524	4	3 3/4	38 3/4	39 1/4	40	40 1/2
42	685	4 1/2	4	45 1/8	45 5/8	46 1/2	47
48	867	5	4 1/2	51 1/2	52	53	53 1/2
54	1070	5 1/2	4 1/2	57 7/8	58 3/8	59 3/8	59 7/8
60	1296	6	5	64 1/4	64 3/4	66	66 1/2
66	1542	6 1/2	5 1/2	70 5/8	71 1/8	72 1/2	73
72	1810	7	6	77	77 1/2	79	79 1/2
78	2098	7 1/2	6 1/2	83 3/8	83 7/8	85 5/8	86 1/8
84	2410	8	7	89 3/4	90 1/4	92 1/8	92 5/8
90	2740	8 1/2	7	95 3/4	96 1/4	98 1/8	98 5/8
96	2950	9	7	102 1/8	102 5/8	104 1/2	105
102	3075	9 1/2	7 1/2	109	109 1/2	111 1/2	112
108	3870	10	7 1/2	115 1/2	116	118	118 1/2

June 26, 2015

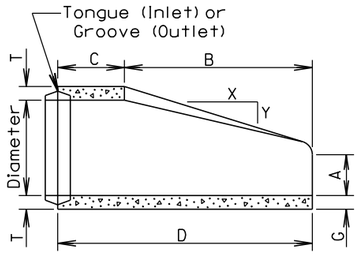
Published Date: 2025	SDDOT	REINFORCED CONCRETE PIPE	PLATE NUMBER 450.01
			Sheet 1 of 1



TOP VIEW



SLOPE DETAIL

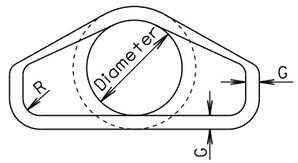


LONGITUDINAL SECTION

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.

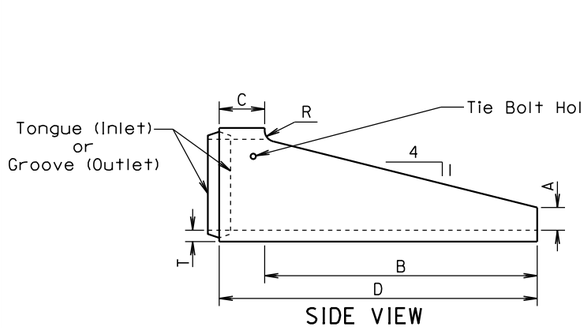


END VIEW

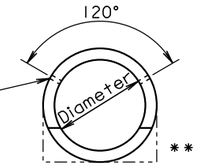
Dia. (in.)	Approx. Wt. of Section (lbs.)	Approx. Slope (X to Y)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	G (in.)	R (in.)
12	530	2.4: 1	2	4	24	48 7/8	72 7/8	24	2	1 1/2
15	740	2.4: 1	2 1/4	6	27	46	73	30	2 1/4	1 1/2
18	990	2.3: 1	2 1/2	9	27	46	73	36	2 1/2	1 1/2
21	1280	2.4: 1	2 3/4	9	36	37 1/2	73 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

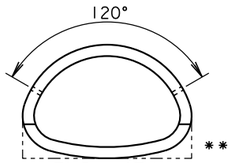
Published Date: 2025	SDDOT	R. C. P. FLARED ENDS	PLATE NUMBER 450.10
			Sheet 1 of 1



SIDE VIEW



END VIEW
"CIRCULAR"



END VIEW
"ARCH"

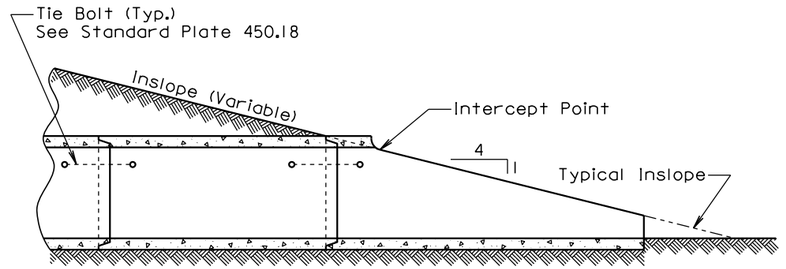
Dia. (in.)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	R (in.)
FOR CIRCULAR PIPE						
24	3	6	72	12	84	3
30	3 1/2	7 1/2	90	12	102	3 1/2
FOR ARCH PIPE						
* 24	3	6	48	12	60	3
* 30	3 1/2	7 1/2	60	12	72	3 1/2
* 36	4 1/2	8 5/8	66	30	96	0
* 42	4 1/2	10	77 1/4	18 3/4	96	0

ALTERNATE

Dia. (in.)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	R (in.)
FOR CIRCULAR PIPE						
24	3	9	72	12	84	0
30	3 1/2	11	90	12	102	0
FOR ARCH PIPE						
* 24	3	9	48	12	60	0
* 30	3 1/2	11	60	12	72	0

* Equivalent Diameter of Circular R.C.P.

** Acceptable Flat Bottom Alternate.



SECTION
(Along Centerline of Pipe)

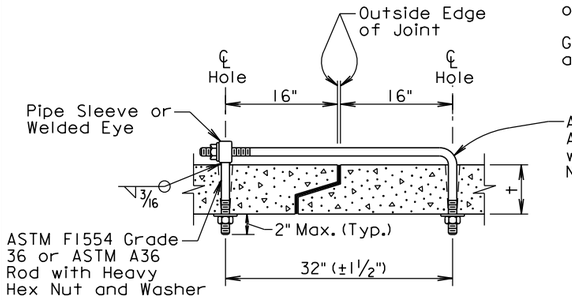
GENERAL NOTE:

The length of concrete pipe shown in the construction plans is between sloped ends.

September 22, 2006

Published Date: 2025	SDDOT	R. C. P. SLOPED ENDS	PLATE NUMBER 450.13
			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

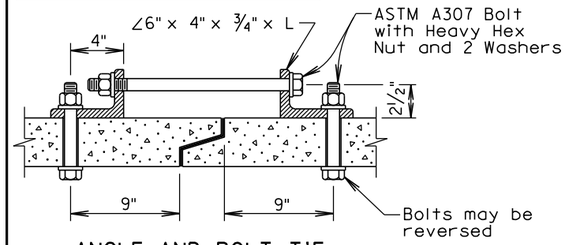
GENERAL NOTES:

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



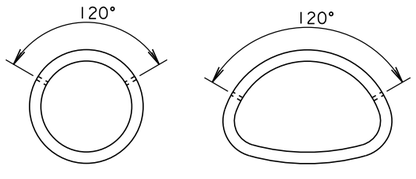
ANGLE AND BOLT TIE

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:

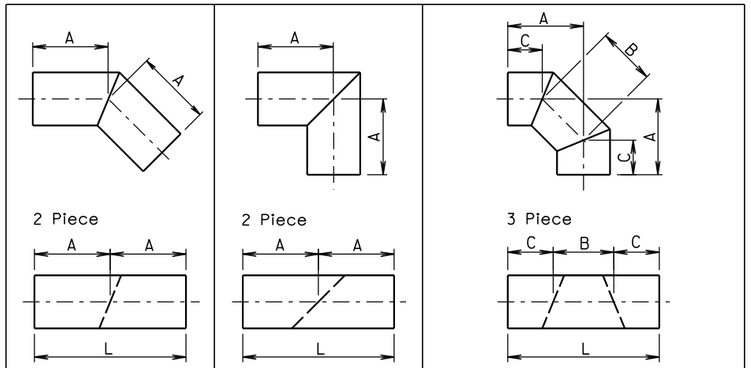
In lieu of the tie bolts detailed above other types of tie bolt connections may be installed as approved by the Office of Bridge Design.

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



Diameter	A	L	Diameter	A	L	Diameter	A	B	C	L
Inches	Feet	Feet	Inches	Feet	Feet	Inches	Inches			Feet
12	1	2	12	2	4	12	25½	11	18½	4
15	1	2	15	2	4	15	26½	12	18	4
18	1	2	18	2	4	18	27	14	17	4
21	2	4	21	2	4	21	27	15	16½	4
24	2	4	24	2	4	24	27½	16	16	4
27	2	4	27	2	4	27	27½	17	15½	4
30	2	4	30	3	6	30	40	19	26½	6
33	2	4	33	3	6	33	40	20	26	6
36	2	4	36	3	6	36	40½	21	25½	6
42	2	4	42	3	6	42	41	23	24½	6
48	2	4	48	4	8	48	53½	26	35	8
54	3	6	54	4	8	54	54	28	34	8
60	3	6	60	4	8	60	54½	31	32½	8
66	3	6	66	4	8	66	54	33	31½	8
72	3	6	72	5	10	72	67½	36	42	10
78	3	6	78	5	10	78	68	39	40½	10
84	3	6	84	5	10	84	68½	41	39½	10
90	3	6	90	6	12	90	70	46	37	10
96	3	6	96	6	12	96	82	46	49	12

FABRICATED ELBOW LENGTHS FOR ALL CORRUGATIONS

GENERAL NOTES:

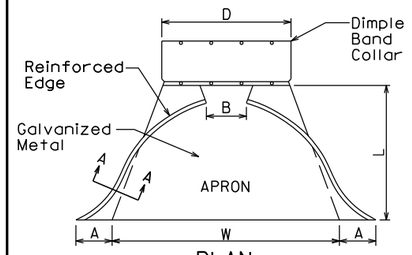
All dimensions shown are nominal.

L = Linear Feet of C.M.P. required to fabricate fitting.

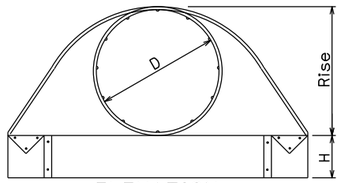
June 26, 2001

Published Date: 2025	SDDOT	C.M.P. FABRICATED LENGTHS FOR ELBOWS	PLATE NUMBER 450.32
			Sheet 1 of 1

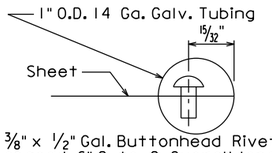
Alternate Type Connector Sections may be used with approval of the Engineer.



PLAN

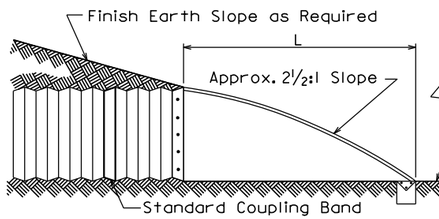


ELEVATION



3/8" x 1/2" Gal. Buttonhead Rivets spaced 6" C. to C. Overall length of rivets=0.78"

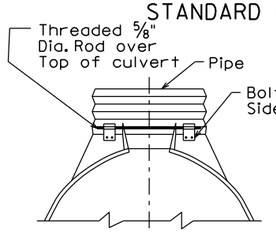
TUBING ATTACHMENT DETAILS
SECTION A-A



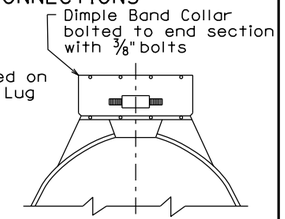
TYPICAL CROSS-SECTION

Dia. D (in.)	Ga.	DIMENSIONS (in.) A	B	H	L	W	Approx. Slope	Body
12	16	6	6	6	21	24	2 1/2:1	1 Pc.
15	16	7	8	6	26	30	2 1/2:1	1 Pc.
18	16	8	10	6	31	36	2 1/2:1	1 Pc.
21	16	9	12	6	36	42	2 1/2:1	1 Pc.
24	16	10	13	6	41	48	2 1/2:1	1 Pc.
30	14	12	16	8	46	60	2 1/2:1	1 Pc.
36	14	14	19	9	51	72	2 1/2:1	2 Pc.
42	12	16	22	11	60	84	2 1/2:1	2 Pc.
48	12	18	27	12	69	90	2 1/4:1	2 Pc.
54	12	18	30	12	78	102	2:1	3 Pc.
60	12	18	33	12	84	114	1 3/4:1	3 Pc.
66	12	18	36	12	87	120	1 1/2:1	3 Pc.
72	12	18	39	12	87	126	1 1/3:1	3 Pc.
78	12	18	42	12	87	132	1 1/4:1	3 Pc.
84	12	18	45	12	87	138	1 1/6:1	3 Pc.

STANDARD CONNECTIONS

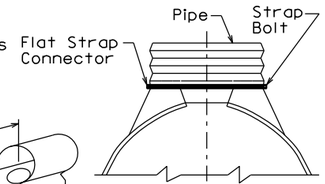


For 30" through 84"

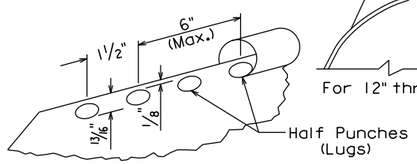


Alternate for all sizes

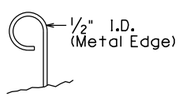
NOTE:
Tubing is slipped over the sheet and rivets or lugs prior to forming operations of the apron.



For 12" through 24" only



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 3/8" Dia. galvanized rivets or bolts.

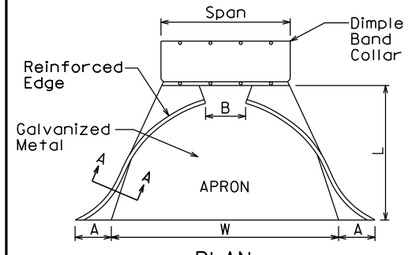
For 60" through 84" sizes, reinforced edges shall be supplemented with galvanized stiffener angles. The angles will be 2" x 2" x 1/4" for 60" through 72" diameters and 2 1/2" x 2 1/2" x 1/4" for 78" and 84" diameters. The angles shall be attached by 3/8" diameter galvanized nuts and bolts.

Rivets and Bolts shall be 3/8" 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.

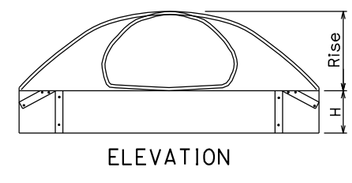
March 31, 2000

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

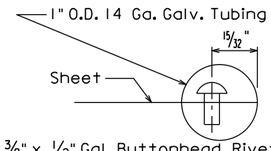
Alternate Type Connector Sections may be used with approval of the Engineer.



PLAN

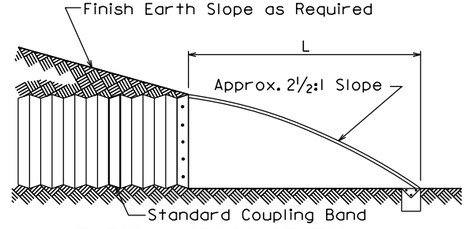


ELEVATION



3/8" x 1/2" Gal. Buttonhead Rivets spaced 6" C. to C. Overall length of rivets=0.78"

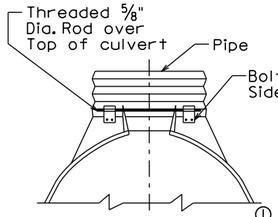
TUBING ATTACHMENT DETAILS
SECTION A-A



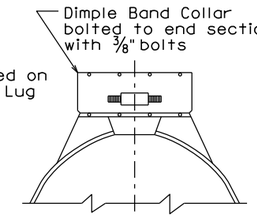
TYPICAL CROSS-SECTION

Span x Rise (in.)x(in.)	Equiv. Dia. (in.)	Ga.	APPROX. DIMENSIONS (in.) A	B	H	L	W	Approx. Slope	Body
17x13	15	16	7	9	6	19	30	2 1/2:1	1 Pc.
21x15	18	16	7	10	6	23	36	2 1/2:1	1 Pc.
24x18	21	16	8	12	6	28	42	2 1/2:1	1 Pc.
28x20	24	16	9	14	6	32	48	2 1/2:1	1 Pc.
35x24	30	14	10	16	6	39	60	2 1/2:1	1 Pc.
42x29	36	14	12	18	8	46	75	2 1/2:1	1 Pc.
49x33	42	12	13	21	9	53	85	2 1/2:1	2 Pc.
57x38	48	12	16	26	12	63	90	2 1/2:1	2 Pc.
64x43	54	12	18	30	12	70	102	2 1/4:1	2 Pc.
71x47	60	12	18	33	12	77	114	2 1/4:1	3 Pc.
77x52	66	12	18	36	12	77	126	2:1	3 Pc.
83x57	72	12	18	39	12	77	133	2:1	3 Pc.

STANDARD CONNECTIONS



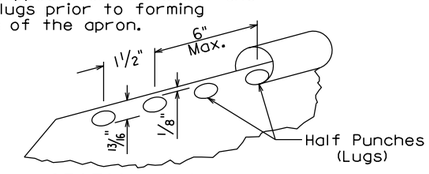
For 17"x13" through 83"x57" ①



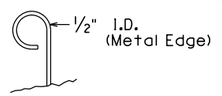
Alternate for all sizes

① For 17" through 28" span pipe-arches a flat strap connector may be used in place of the rod connection. Strap connector shall be 1" wide, 12 ga. strap with standard 6" long x 1/2" dia. bond bolt and nut.

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



SECTION A-A (alternate)



SECTION A-A (alternate)

GENERAL NOTES:

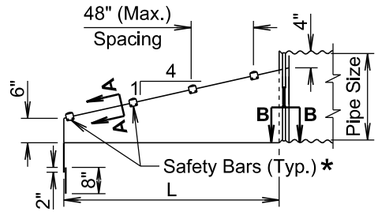
All 3 pc. bodies shall have 12 Ga. sides and 10 Ga. center panels. Width of center panels shall be greater than 20% of the pipe periphery. Multiple panel bodies shall have lap seams tightly joined by 3/8" Dia. galvanized rivets or bolts.

For 77" x 52" and 83" x 57" sizes, reinforced edges shall be supplemented with galvanized stiffener angles. The angles will be 2" x 2" x 1/4" for both the 77" x 52" size and the 83" x 57" size. The angles shall be attached by 3/8" Dia. galvanized nuts and bolts.

Rivets and Bolts shall be 3/8" 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.

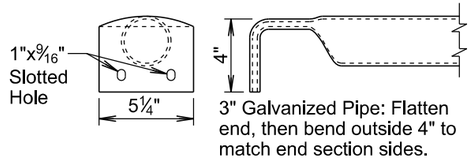
March 31, 2000

Published Date: 2025	SDDOT	C.M.P. ARCH FLARED ENDS	PLATE NUMBER 450.36
			Sheet 1 of 1



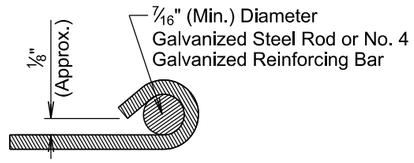
* Number of bars required will vary depending on the length of the end section.

ELEVATION VIEW

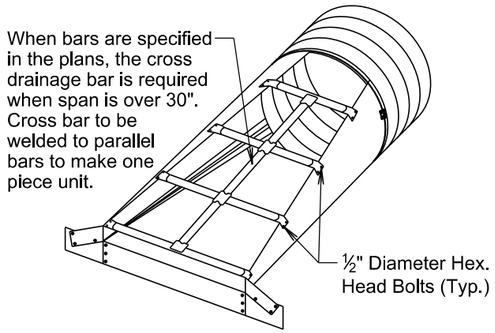


3" Galvanized Pipe: Flatten end, then bend outside 4" to match end section sides.

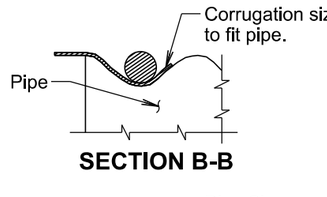
DETAIL OF SAFETY BARS



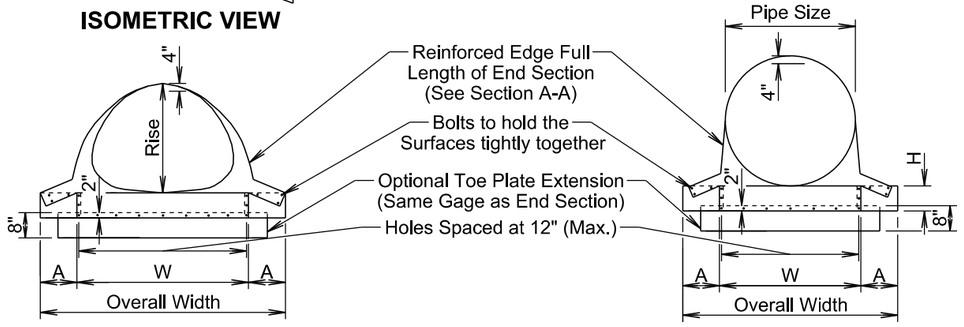
SECTION A-A



ISOMETRIC VIEW

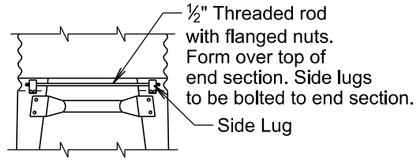


SECTION B-B



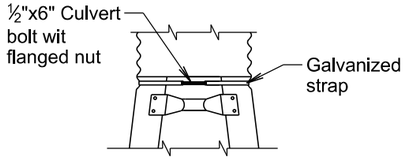
FRONT VIEW

FRONT VIEW



TYPE #2 CONNECTOR DETAIL

(For 30" and Larger)
(For 21"x15" and Larger)



TYPE #1 CONNECTOR DETAIL

(For 15" Through 24")

August 31, 2022

Published Date: 2025	SDDOT	C.M.P. SLOPED ENDS	PLATE NUMBER 450.37
			Sheet 1 of 2

ARCH C.M.P. SLOPED ENDS

Equiv. Dia. (Inch)	(Inches) Span	Rise	(Min.) Thick. Inch	Gage	Dimensions (Inches) A	H	W	L Dimensions Overall Width	Slope	Length (Inch)
18	21	15	.064	16	8	6	27	43	4:1	20
21	24	18	.064	16	8	6	30	46	4:1	32
24	28	20	.064	16	8	6	34	50	4:1	40
30	35	24	.079	14	12	9	41	65	4:1	56
36	42	29	.109	12	12	9	48	72	4:1	76
42	49	33	.109	12	16	12	55	87	4:1	92
48	57	38	.109	12	16	12	63	95	4:1	112
54	64	43	.109	12	16	12	70	102	4:1	132
60	71	47	.109	12	16	12	77	109	4:1	148
72	83	57	.109	12	16	12	89	121	4:1	188

CIRCULAR C.M.P. SLOPED ENDS

Pipe Dia. (Inch)	(Min.) Thick. Inch	Gage	Dimensions (Inches) A	H	W	Overall Width	L Dimensions Slope	Length (Inch)
15	.064	16	8	6	21	37	4:1	20
18	.064	16	8	6	24	40	4:1	32
21	.064	16	8	6	27	43	4:1	44
24	.064	16	8	6	30	46	4:1	56
30	.109	12	12	9	36	60	4:1	80
36	.109	12	12	9	42	66	4:1	104
42	.109	12	16	12	48	80	4:1	128
48	.109	12	16	12	54	86	4:1	152
54	.109	12	16	12	60	92	4:1	176
60	.109	12	16	12	66	98	4:1	200

GENERAL NOTES:

Safety bars will be provided when specified in the plans.

Sloped ends will be fabricated from galvanized steel and will conform to the requirements of the Specifications.

Safety bars will be fabricated from steel schedule 40 pipe in conformance with ASTM A53, grade B or HSS 3.5x.216 in conformance with ASTM A500, grade B.

Slotted holes for safety bar attachment will be provided for all end sections.

Attachment to circular pipes 15" through 24" diameter will be made with Type #1 straps. All other sizes will be attached with Type #2 rods and lugs.

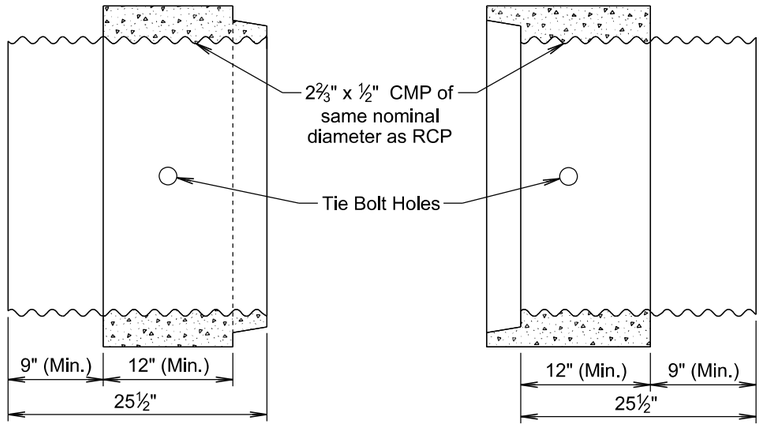
When stated in the plans, optional toe plate extension will be punched and bolted to end section apron lip with ⅜" diameter galvanized bolts. Steel for toe plate extension will be same gauge as end section. Dimensions will be overall width less 6" by 8" high.

Installation will be performed in accordance with the Specifications.

Cost of all work and materials required for fabrication and installation of sloped ends will be incidental to the bid items for the various sizes of sloped ends.

August 31, 2022

Published Date: 2025	SDDOT	C.M.P. SLOPED ENDS	PLATE NUMBER 450.37
			Sheet 2 of 2



INLET
(CMP to RCP Transition)

OUTLET
(RCP to CMP Transition)

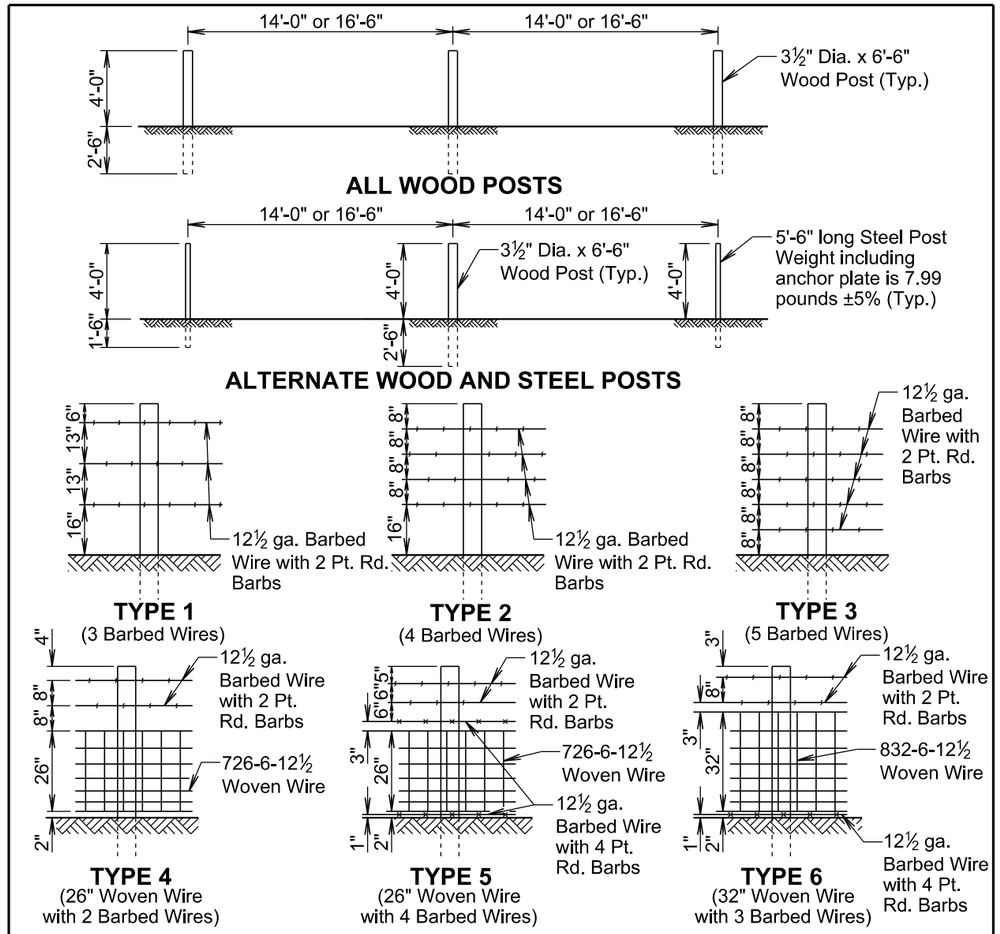
GENERAL NOTE:

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



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 Wires	16'-6"	12½	2 Point 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 with 2 Barbed Wires	14'-0"	12½	2 Point Round	726-6-12½
5	26" Woven Wire with 4 Barbed Wires	14'-0"	12½	2 wires with 2 Pt. Rd. 2 wires with 4 Pt. Rd.	726-6-12½
6	32" Woven Wire with 3 Barbed Wires	14'-0"	12½	2 wires with 2 Pt. Rd. 1 wire with 4 Pt. Rd.	832-6-12½

GENERAL NOTES:

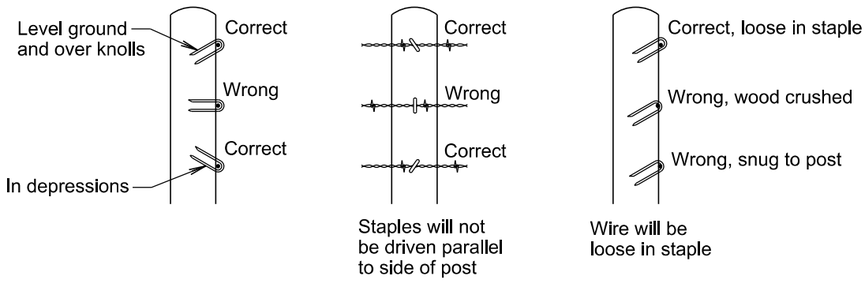
Fence types designated on the plans that are followed by the letter S will have smooth (barbless) wires.

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

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

June 26, 2019

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



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.

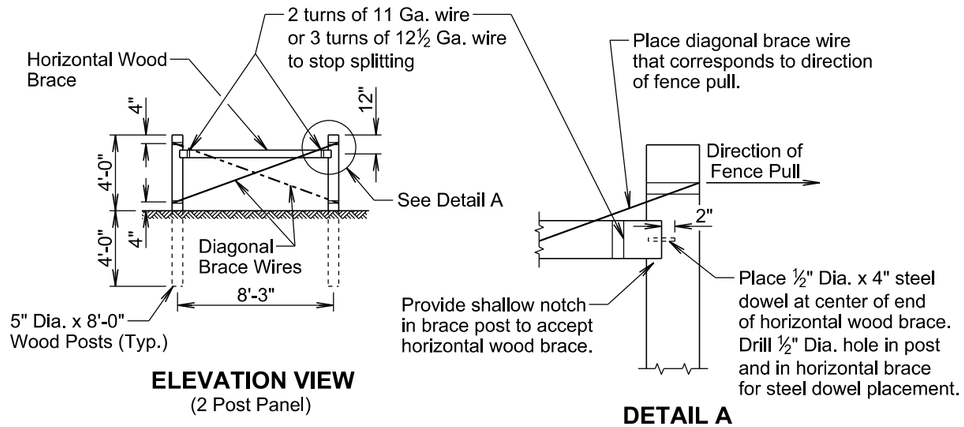
Right-of-Way fence other than on Interstate Projects will be constructed within one foot of the Right-of-Way on the Landowner's side except at bridge openings, cattle passes, and as otherwise directed by the Engineer.

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.

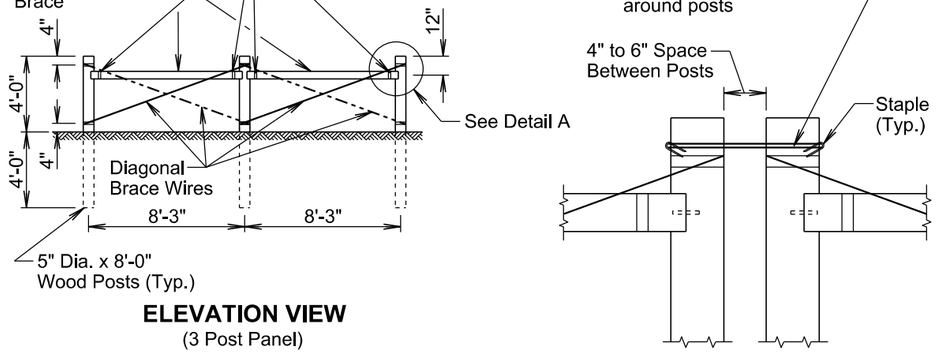
June 26, 2019

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.

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			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.

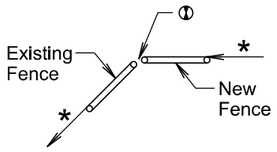
** Fence lengths greater than 1320' and less than 2640' place 2 Post Panel approximately at midpoint.

① See Detail B on Sheet 1 of 3.

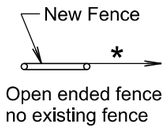
GENERAL NOTE:

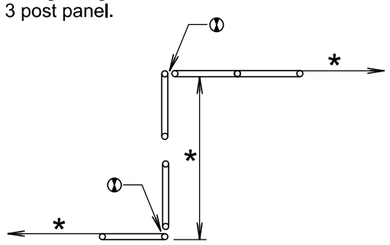
All radius of curvature stated for fence are at centerline of roadway.

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.

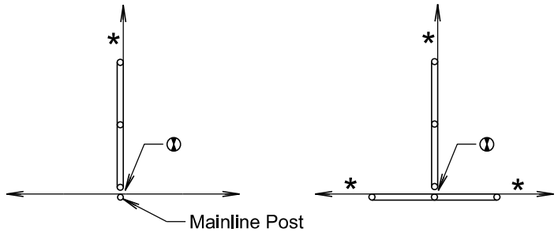


BEGIN OR END FENCE
(Where new fence ties into existing fence)

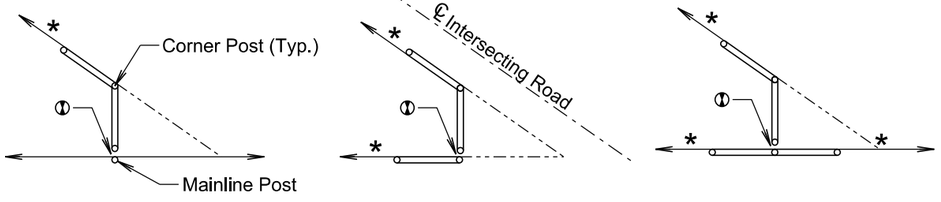




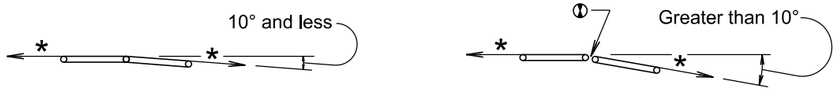
SHORT JOGS IN FENCE



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

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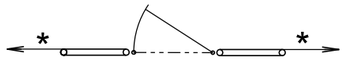
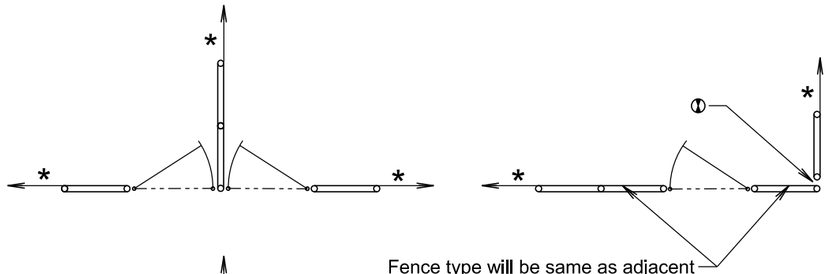
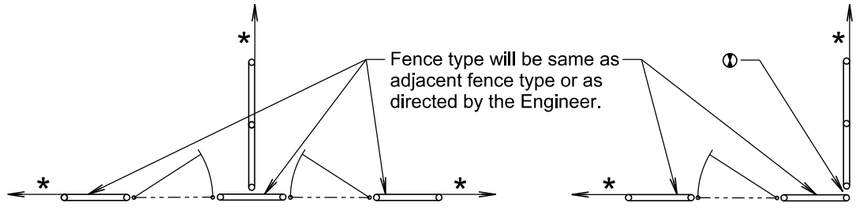


ENTRANCE
(Not on corner)



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.

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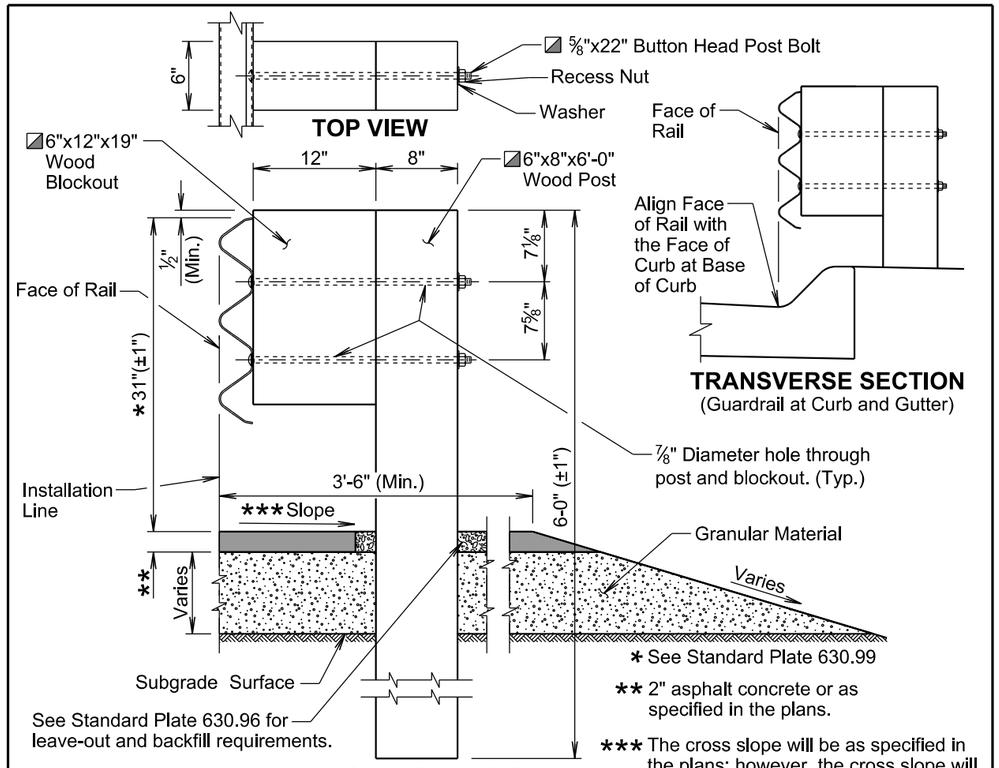
			Sheet 3 of 3

FOR BIDDING PURPOSES ONLY

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B71	B85



TRANSVERSE SECTION

GENERAL NOTES:

Asphalt concrete will be the same type used elsewhere on the project or will be as specified in the plans. If asphalt concrete is not specified in the plans, the asphalt concrete will conform to the Specifications for "Asphalt Concrete Composite."

Granular material will be the same type used elsewhere on the project or will be as specified in the plans. If granular material type is not specified in the plans, the material will conform to the Specifications for "Base Course". The granular material will be placed the same thickness as the mainline surfacing or as specified in the plans.

Topsoil is not shown in the transverse section drawing.

☑ The post and blockout illustrated above is typical for single thrie beam guardrail. When other variations of posts and blockouts are specified on other standard plates (e.g. transitions) then the posts and blockouts will be as specified on the other standard plates or as specified in the plans.

Slots in the rails will be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plasma cutter is not allowed. The slot edges will be smooth and free of burrs or notches.

The top of post and top of block will have a true square cut. The top of block will be a maximum of ±½ inch from the top of the post.

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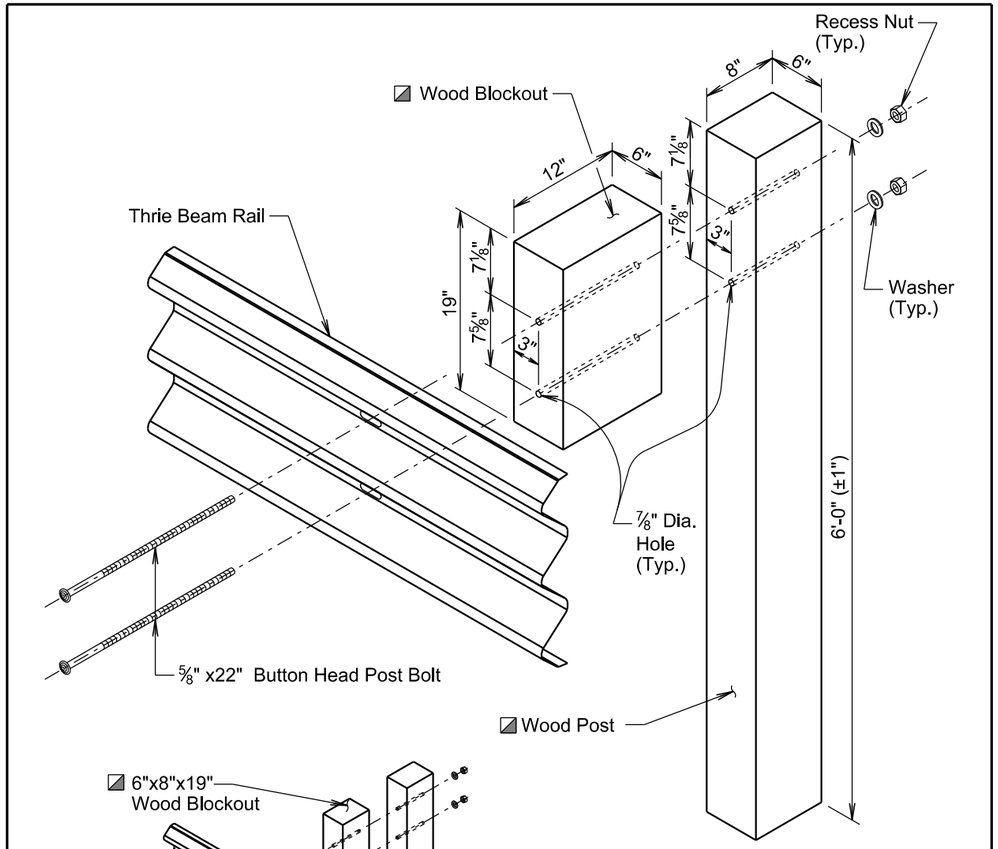
			Sheet 1 of 5



EXPANDED ISOMETRIC VIEW AT MIDSPAN OF THRIE BEAM GUARDRAIL

EXPANDED ISOMETRIC VIEW OF DOUBLE (NESTED) THRIE BEAM GUARDRAIL AT MIDSPAN
(For Information Only, Not to Scale)

☑ For single thrie beam guardrail use 6"x12"x19" wood blockout, ⅝"x22" button head post bolt, and 6"x8"x6'-0" wood post. For double (nested) thrie beam guardrail use 6"x8"x19" wood blockout, ⅝"x18" button head post bolt, and 6"x8"x7'-0" wood post.

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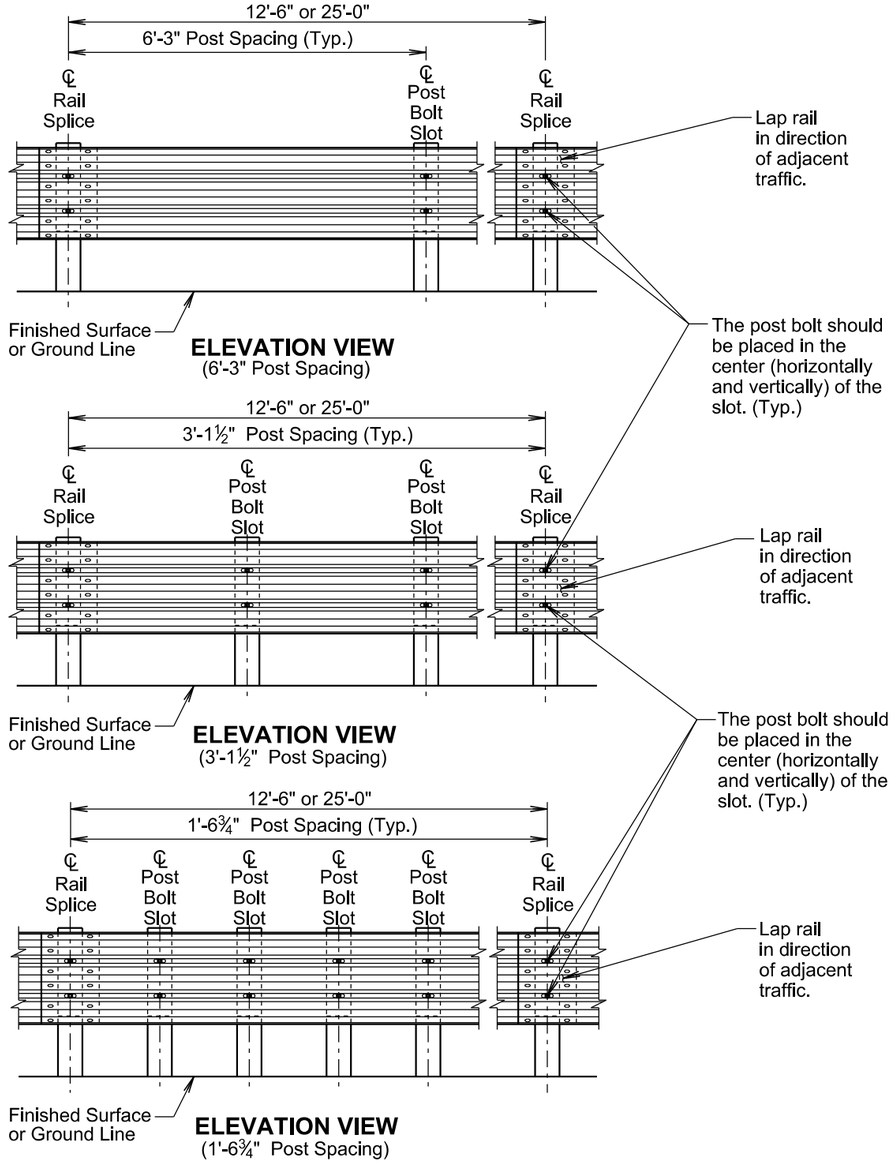
Published Date: 2025	SDDOT	THRIE BEAM GUARDRAIL	PLATE NUMBER 630.01
			Sheet 2 of 5



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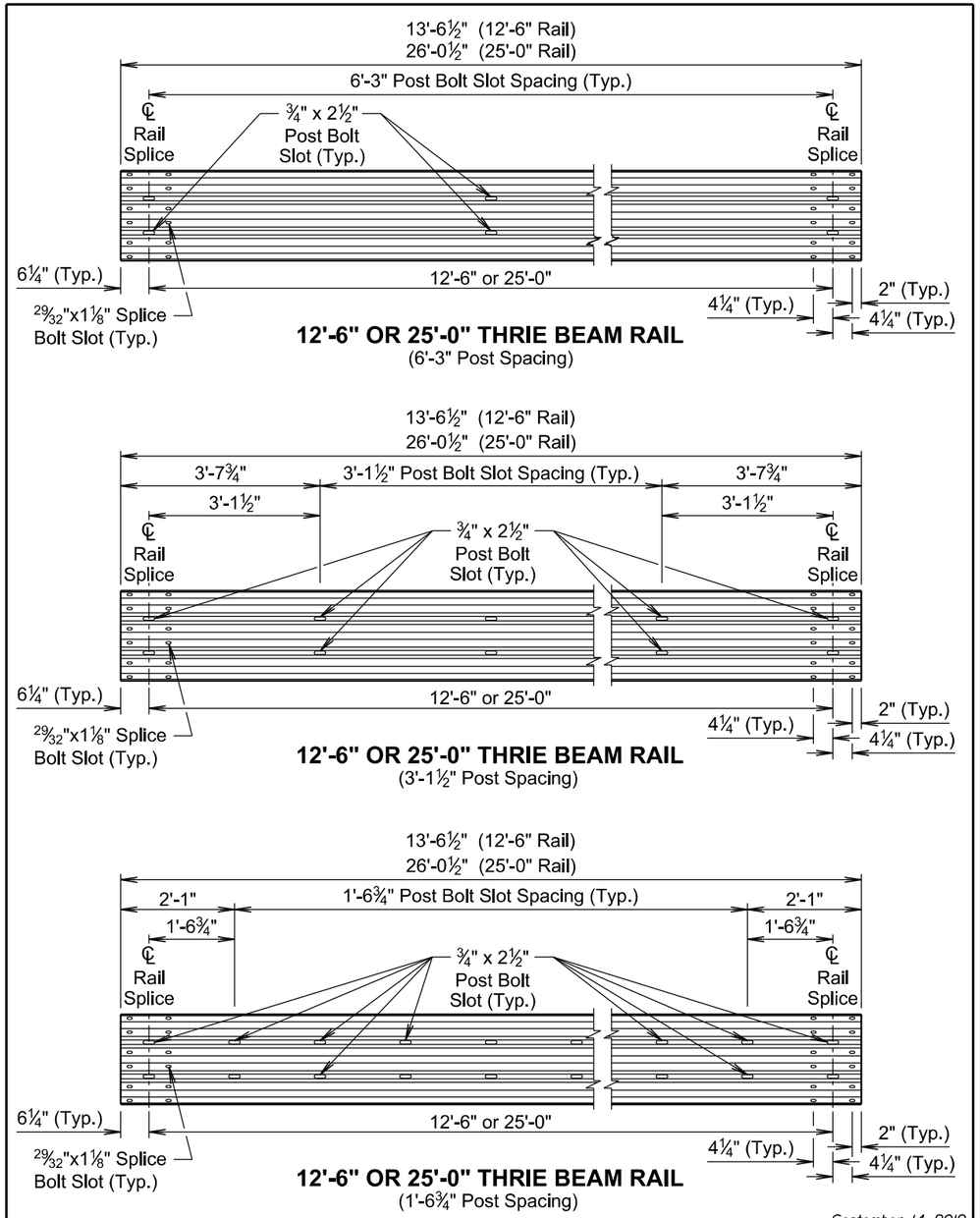
Published Date: 2025	SDDOT	THRIE BEAM GUARDRAIL	PLATE NUMBER 630.01
			Sheet 3 of 5



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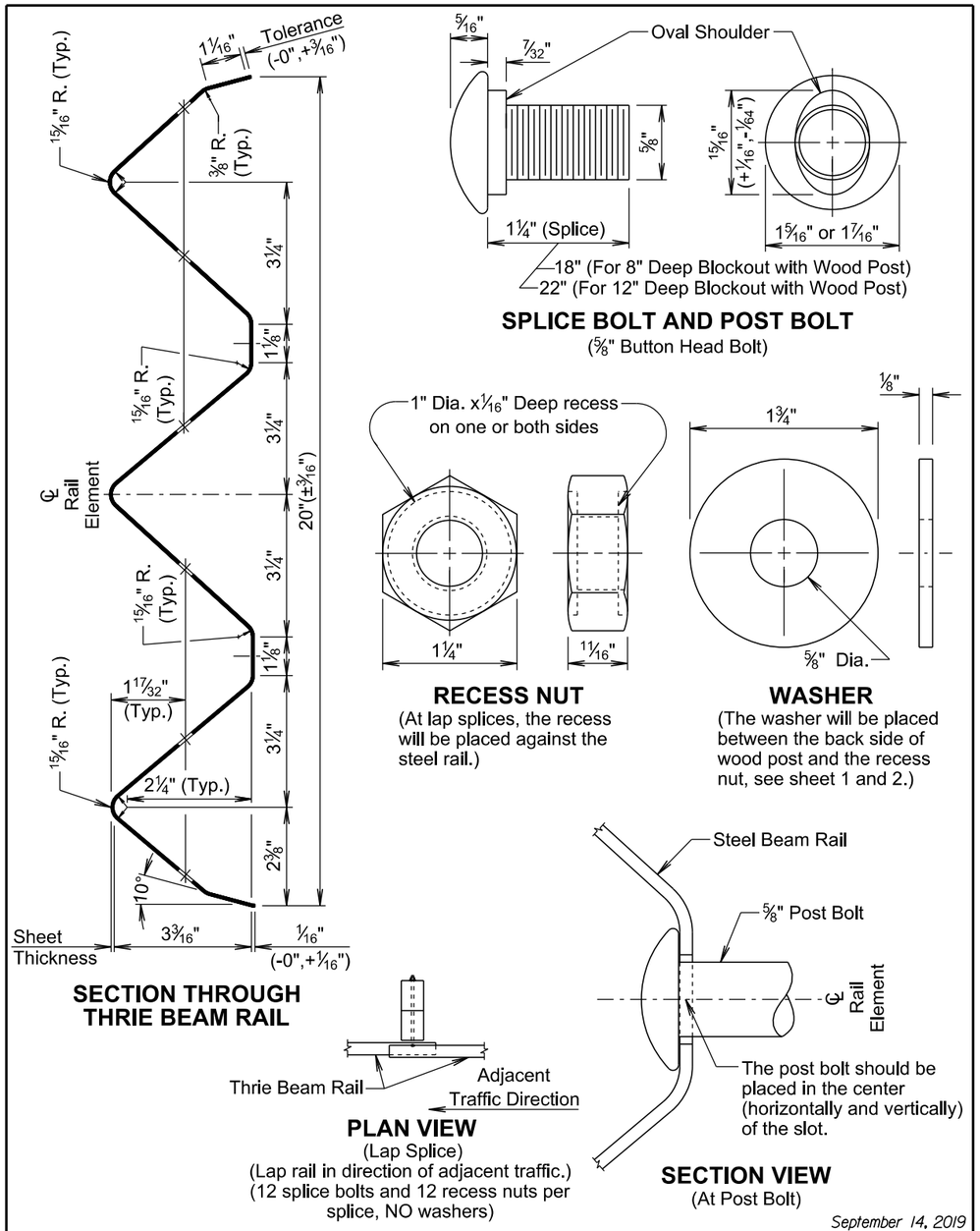
Published Date: 2025	SDDOT	THRIE BEAM GUARDRAIL	PLATE NUMBER 630.01
			Sheet 4 of 5



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Published Date: 2025	SDDOT	THRIE BEAM GUARDRAIL	PLATE NUMBER 630.01
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TYPE AND DETAILS OF MGS

Type of MGS	W Beam Rail Single or Double (Nested)	Blockout Size	Blockout Material	Post Size	Post Material	Post Spacing
1	Single	6"x12"x14"	Wood	6"x8"x6'-0"	Wood	6'-3"
1C	Single	6"x12"x14"	Wood	6"x8"x7'-6"	Wood	6'-3"
2	Single	6"x12"x14"	Wood	6"x8"x6'-0"	Wood	3'-1½"
3	Single	6"x12"x14"	Wood	6"x8"x6'-0"	Wood	1'-6¾"
4	Double	6"x12"x14"	Wood	6"x8"x6'-0"	Wood	6'-3"

STANDARD PLATE REFERENCE

Type of MGS	See Standard Plate(s)
1	630.20, 630.22
1C	630.20, 630.25
2	630.20
3	630.20
4	630.20

GENERAL NOTES:

Asphalt concrete will be the same type used elsewhere on the project or will be as specified in the plans. If asphalt concrete is not specified in the plans, the asphalt concrete will conform to the Specifications for "Asphalt Concrete Composite".

Granular material will be the same type used elsewhere on the project or will be as specified in the plans. If granular material type is not specified in the plans, the material will conform to the Specifications for "Base Course". The granular material will be placed the same thickness as the mainline surfacing or as specified in the plans.

Topsoil is not shown in the transverse section drawing on sheet 2 of 6.

All W beam rail will be Type 1 and Class A (12 Ga.) unless specified otherwise in the plans.

W beam rail section lengths may be 12'-6" and/or 25'-0". The combination of section lengths used will be compatible with the total length of rail per site as shown in the plans.

Slots in the rails will be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plasma cutter is not allowed. The slot edges will be smooth and free of burrs or notches.

All costs for constructing the MGS including labor, equipment, and materials including all posts, blockouts, steel beam rail, and hardware will be incidental to the contract unit price per foot for the respective MGS contract item.

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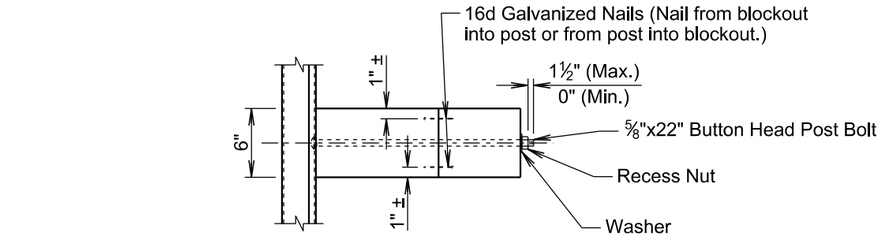
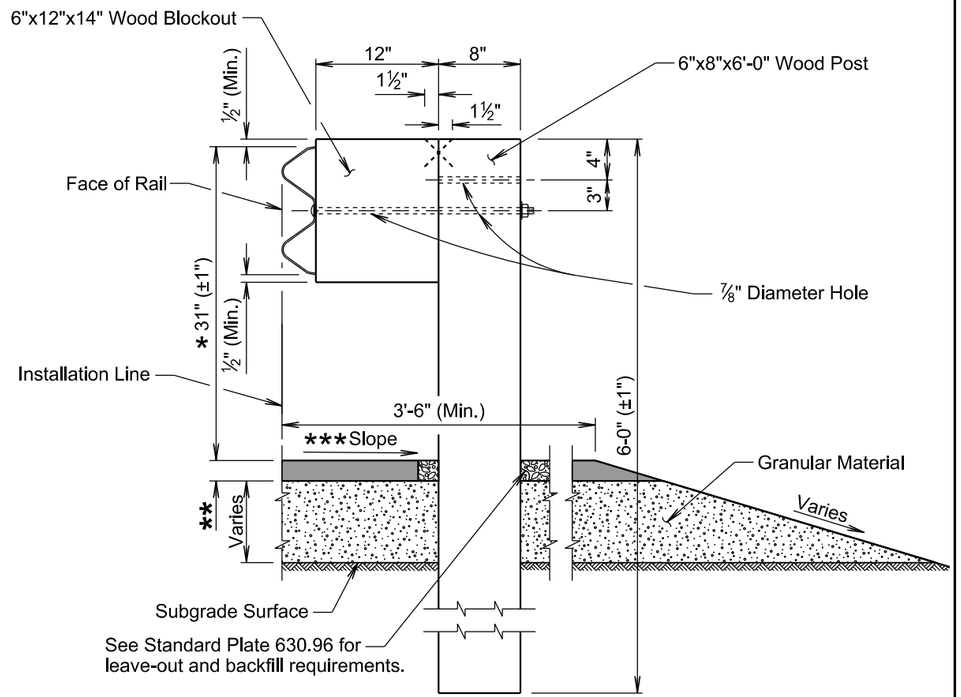
Published Date: 2025	SDDOT	MIDWEST GUARDRAIL SYSTEM (MGS)	PLATE NUMBER 630.20
			Sheet 1 of 6



TOP VIEW
(Type 1, 2, or 3 MGS Installation)



TRANSVERSE SECTION
(Type 1, 2, or 3 MGS Installation)

* See Standard Plate 630.99

** 2" asphalt concrete or as specified in the plans.

*** The cross slope will be as specified in the plans; however, the cross slope will not be steeper than a 10:1 slope.

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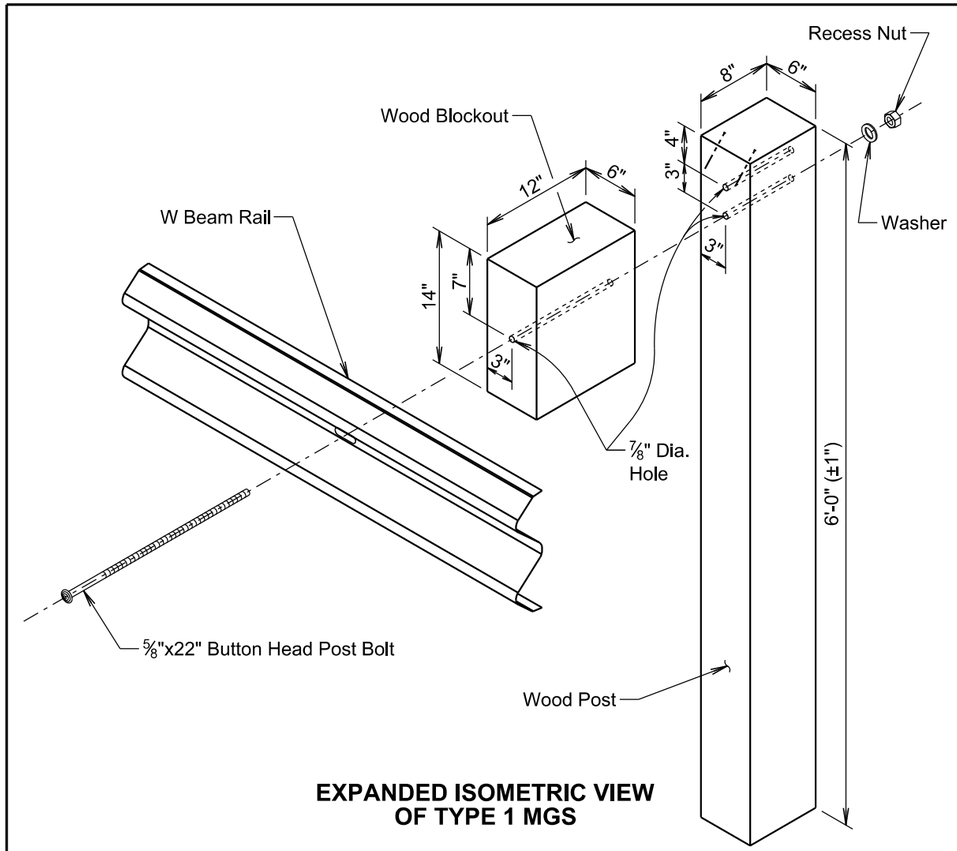
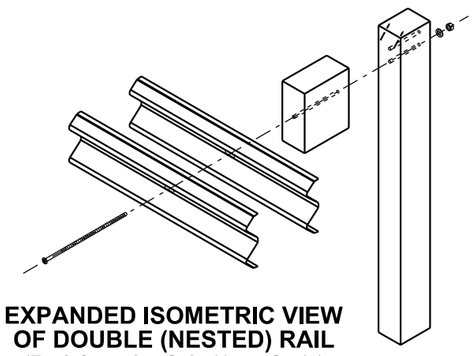
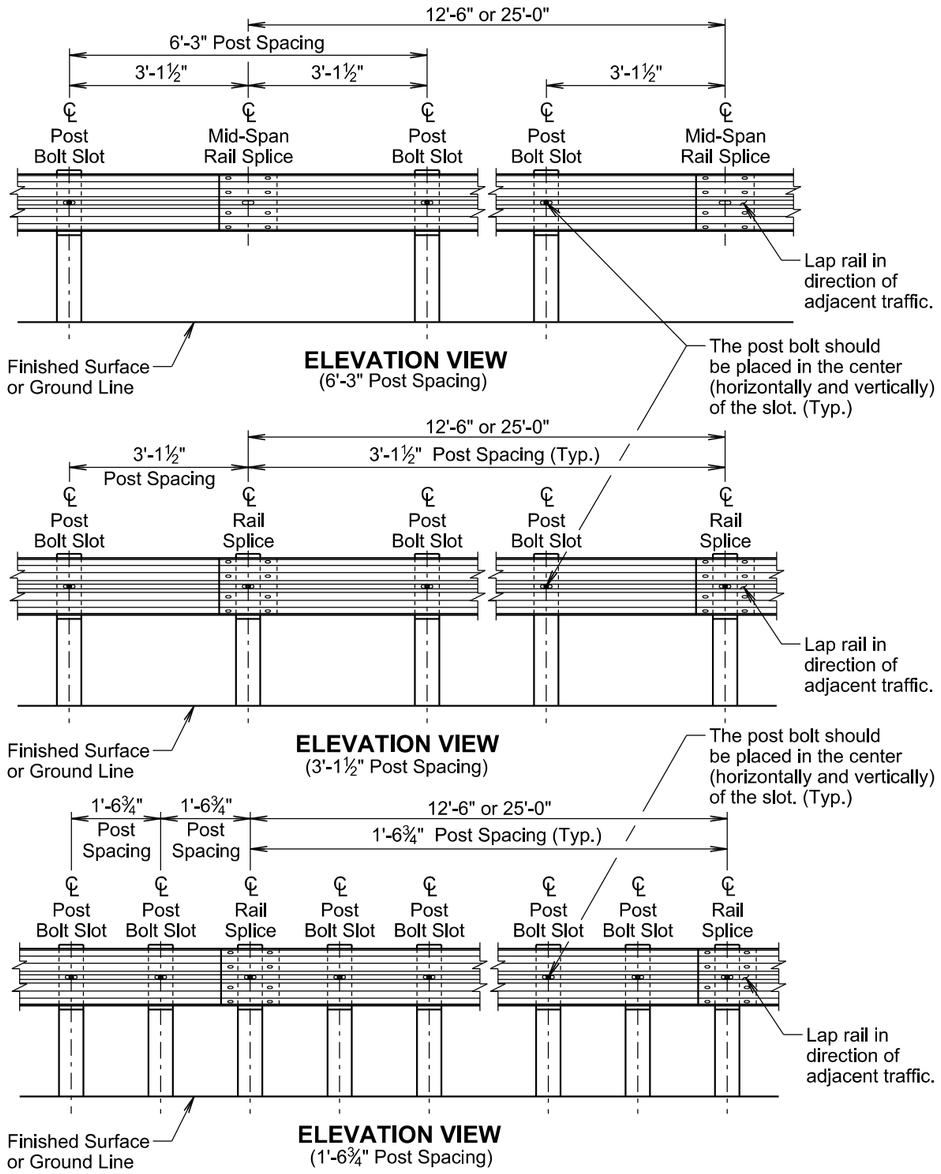


EXPANDED ISOMETRIC VIEW OF TYPE 1 MGS



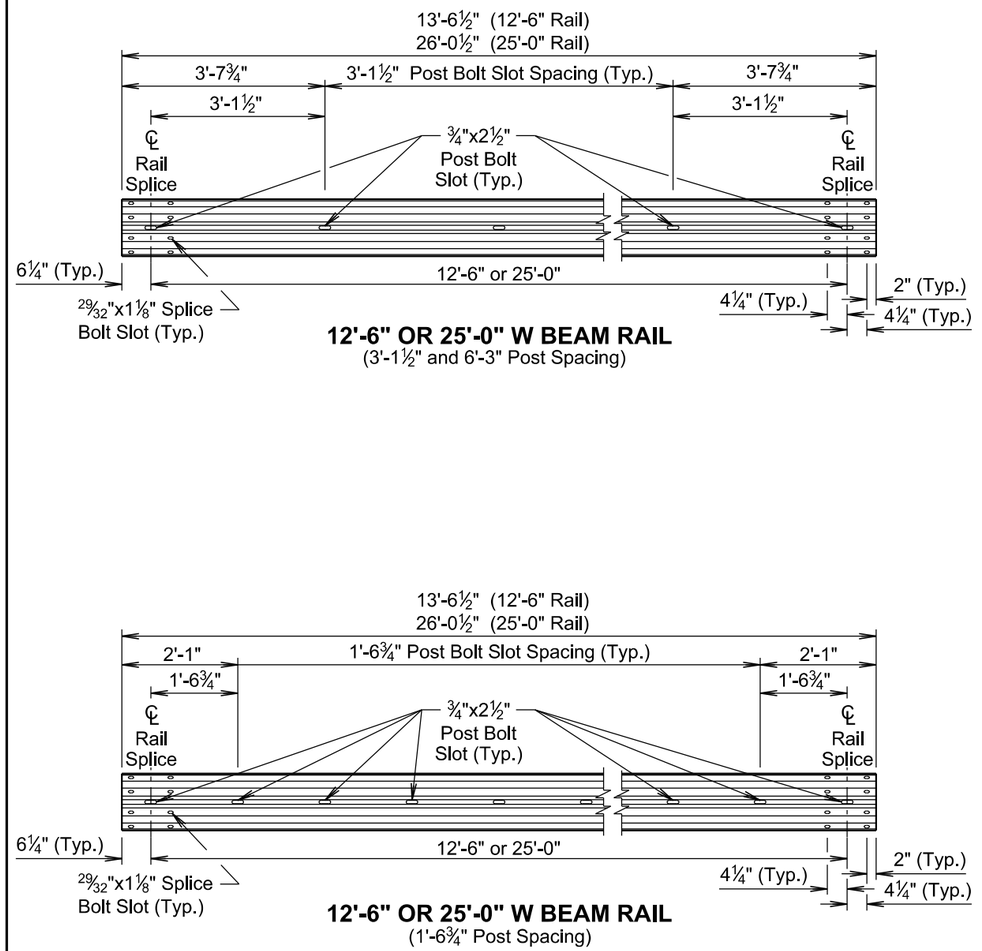
EXPANDED ISOMETRIC VIEW OF DOUBLE (NESTED) RAIL
(For Information Only, Not to Scale)

September 14, 2019



September 14, 2019

Published Date: 2025	SDDOT	MIDWEST GUARDRAIL SYSTEM (MGS)	PLATE NUMBER 630.20
			Sheet 4 of 6

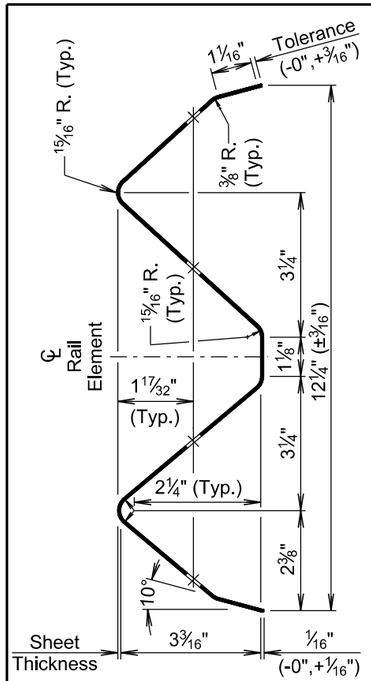


September 14, 2019

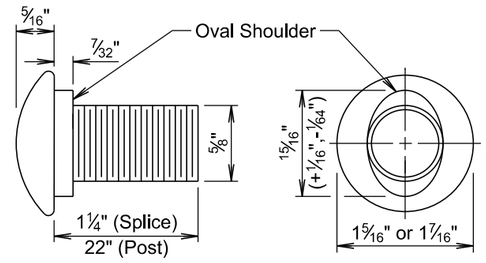
Published Date: 2025	SDDOT	MIDWEST GUARDRAIL SYSTEM (MGS)	PLATE NUMBER 630.20
			Sheet 5 of 6

FOR BIDDING PURPOSES ONLY

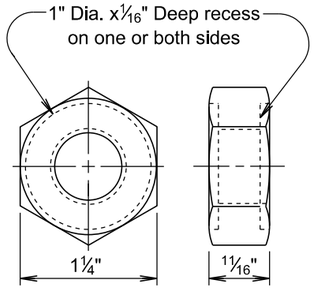
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	NH 0012(230)171...+	B76	B85



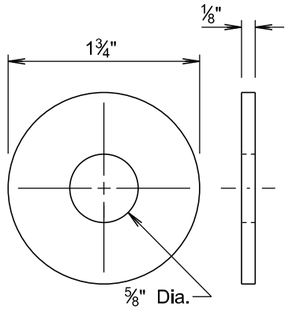
SECTION THROUGH W BEAM RAIL



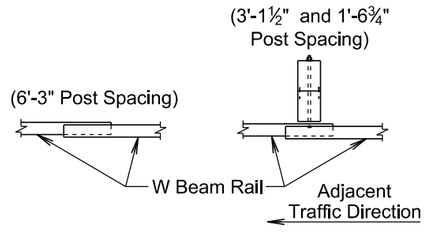
SPLICE BOLT AND POST BOLT
(5/8" Button Head Bolt)



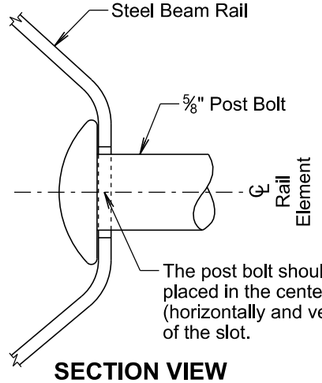
RECESS NUT
(At lap splices, the recess will be placed against the steel rail.)



WASHER
(The washer will be placed between the back side of wood post and the recess nut, see sheet 2 and 3.)



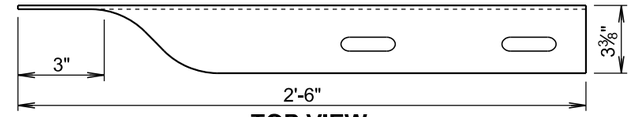
PLAN VIEW
(Lap Splice)
(Lap rail in direction of adjacent traffic.)
(8 splice bolts and 8 recess nuts per splice, NO washers)



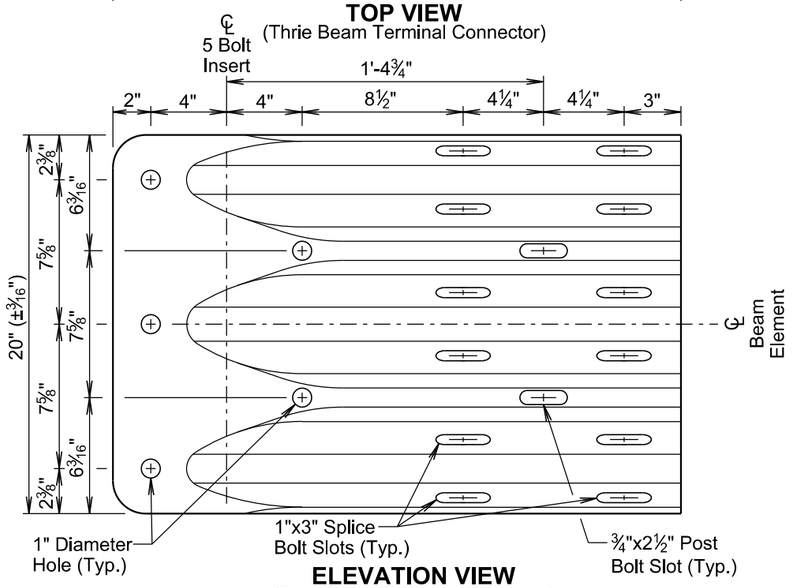
SECTION VIEW
(At Post Bolt)

September 14, 2019

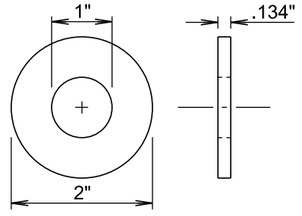
Published Date: 2025	SDDOT	MIDWEST GUARDRAIL SYSTEM (MGS)	PLATE NUMBER 630.20
			Sheet 6 of 6



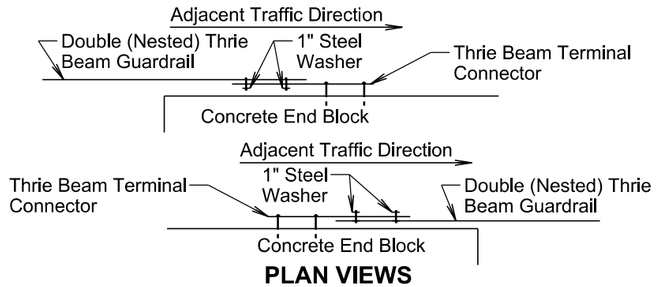
TOP VIEW
(Thrie Beam Terminal Connector)



ELEVATION VIEW
(Thrie Beam Terminal Connector)



1" STEEL WASHER
(12 washers required)



PLAN VIEWS
(Typical Locations of 1" Steel Washers)
(Washers are required at these lap splices)

GENERAL NOTES:

Thrie Beam Terminal Connectors will be 10 gauge.

When the thrie beam terminal connector is used to connect the rail to the bridge or concrete end block, 1" steel washers will be used at the lap splice and the washers will be in direct contact with the 3" slots of the thrie beam terminal connector. See the drawings above for the typical locations of the 1" steel washers.

There will be no separate payment for furnishing and installing the thrie beam terminal connector. All costs for furnishing and installing the thrie beam terminal connector will be incidental to the contract unit price of the respective guardrail item it is attached to.

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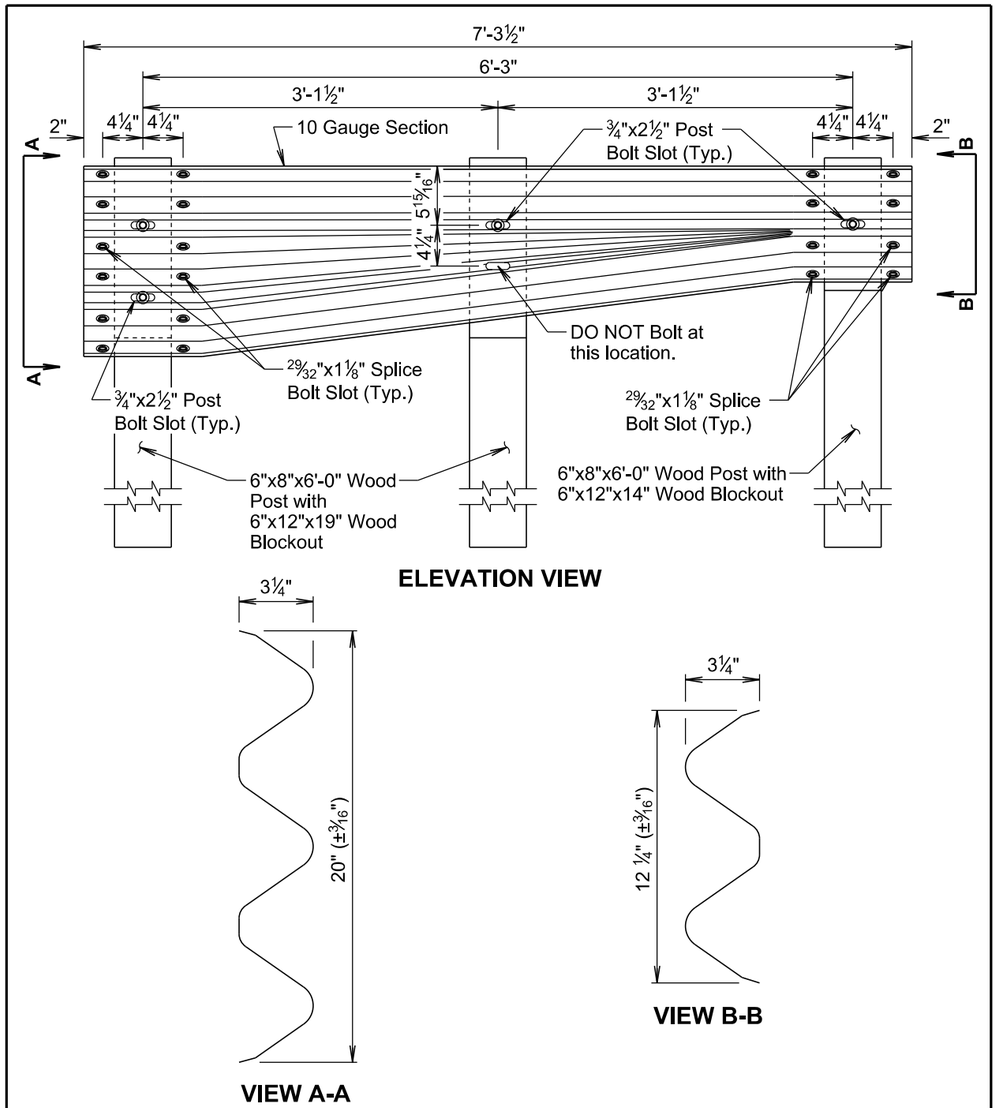
Published Date: 2025	SDDOT	THRIE BEAM TERMINAL CONNECTOR	PLATE NUMBER 630.47
			Sheet 1 of 1



GENERAL NOTES:

All costs for furnishing and installing the asymmetrical W beam to thrie beam guardrail transition including labor, equipment, and materials including two posts, two blocks, asymmetrical W beam to thrie beam transition section, and hardware will be incidental to the contract unit price per each for the corresponding guardrail transition contract item.

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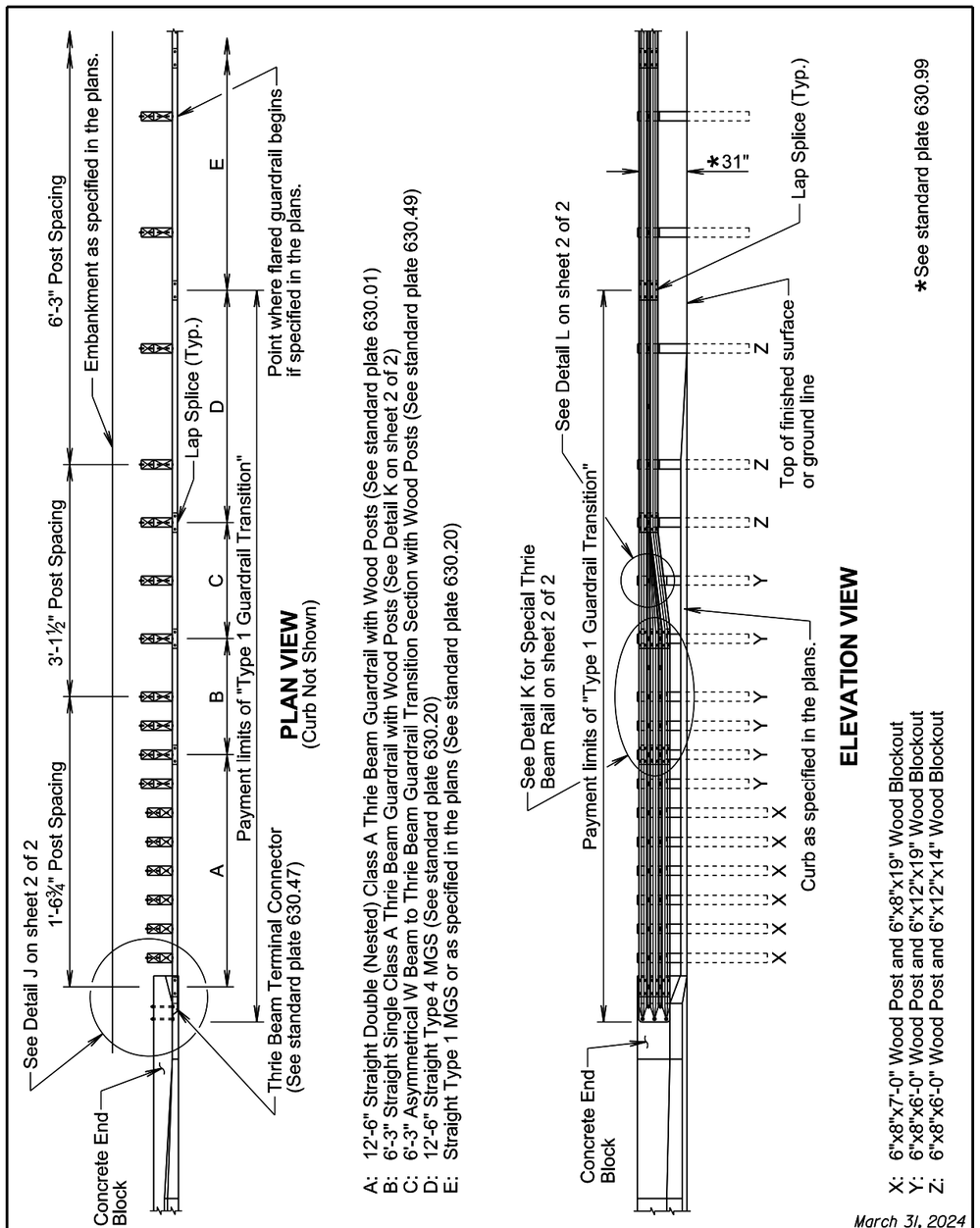
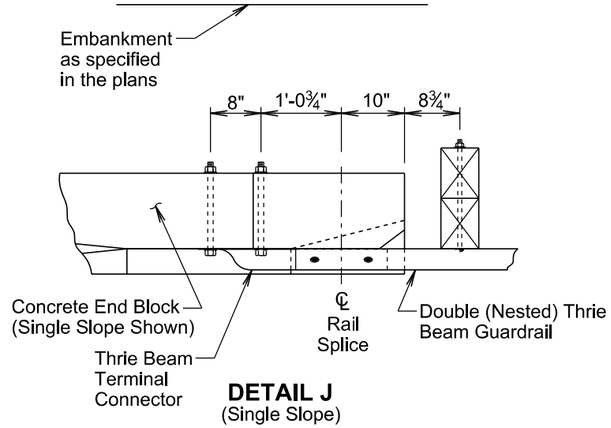
Published Date: 2025	SDDOT	ASYMMETRICAL W BEAM TO THRIE BEAM GUARDRAIL TRANSITION SECTION	PLATE NUMBER 630.49
			Sheet 1 of 1

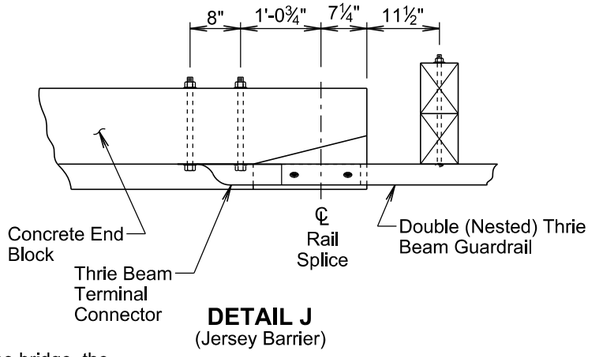


March 31, 2024

Published Date: 2025	SDDOT	TYPE 1 GUARDRAIL TRANSITION (CONCRETE END BLOCK TO MIDWEST GUARDRAIL SYSTEM (MGS))	PLATE NUMBER 630.50
			Sheet 1 of 3

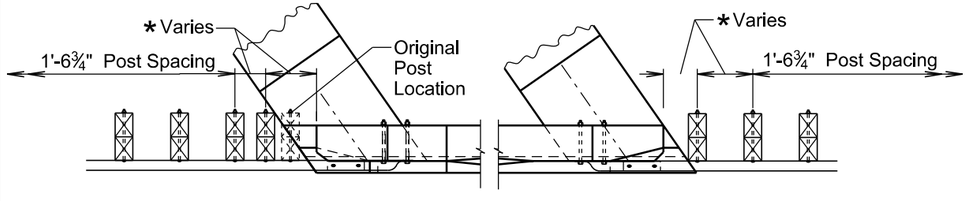


DETAIL J
(Single Slope)



DETAIL J
(Jersey Barrier)

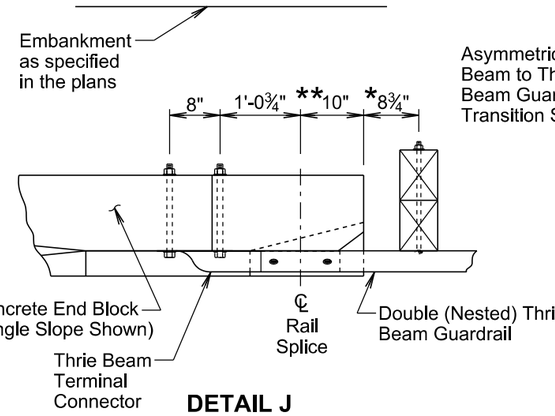
*Due to the skew of the bridge, the placement of the first "X" post and blockout will need to be moved from the original location. It will need to be installed as close as possible to the wingwall provided that the second "X" post and blockout is located in it's original location.



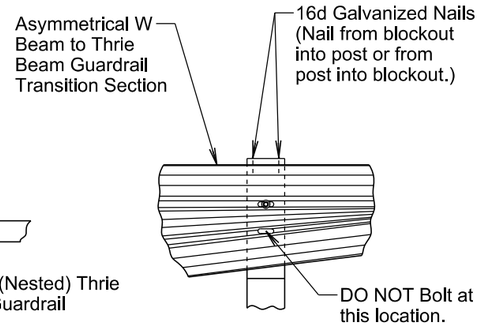
DETAIL J
(Skewed Bridge)

March 31, 2024

Published Date: 2025	SDDOT	TYPE 1 GUARDRAIL TRANSITION (CONCRETE END BLOCK TO MIDWEST GUARDRAIL SYSTEM (MGS))	PLATE NUMBER 630.50
			Sheet 2 of 3

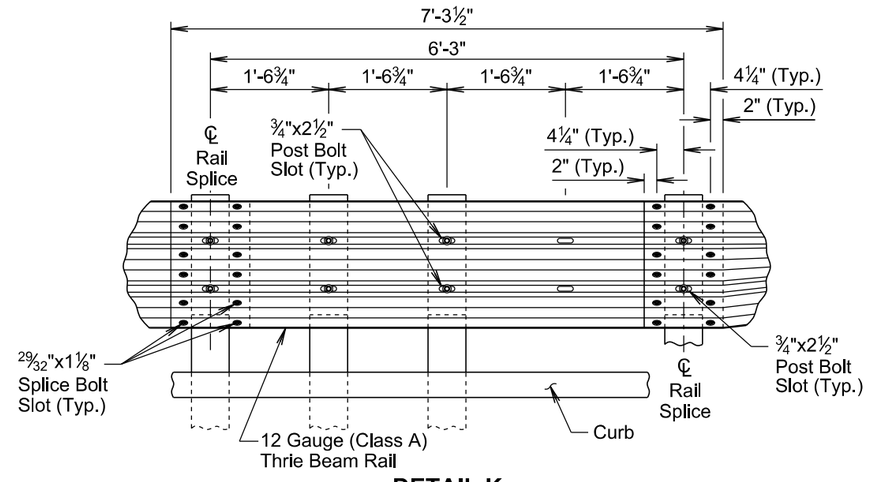


DETAIL J



DETAIL L

Jersey Barrier Dimensions are **7¼" and *11½"



DETAIL K
(Special Thrie Beam Rail)

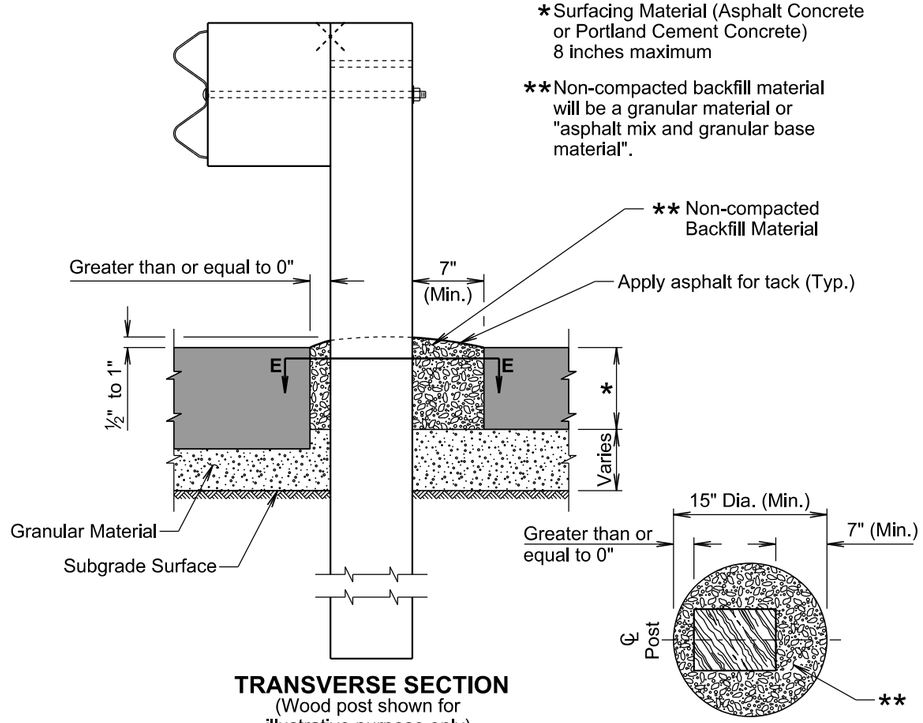
GENERAL NOTES:

Throughout the type 1 guardrail transition, slots in the rails will be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plasma cutter is not allowed. The slot edges will be smooth and free of burrs or notches.

All costs for furnishing and installing the type 1 guardrail transition including labor, equipment, and materials which includes all rail sections, posts and blockouts, hardware, and incidentals will be included in the contract unit price per each for "Type 1 Guardrail Transition".

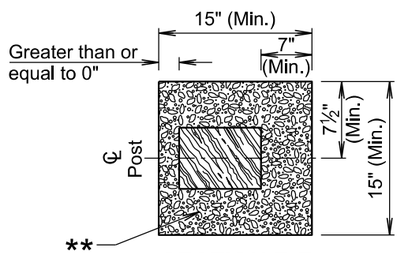
March 31, 2024

Published Date: 2025	SDDOT	TYPE 1 GUARDRAIL TRANSITION (CONCRETE END BLOCK TO MIDWEST GUARDRAIL SYSTEM (MGS))	PLATE NUMBER 630.50
			Sheet 3 of 3



TRANSVERSE SECTION
(Wood post shown for illustrative purpose only)

SECTION E-E
(Round option for leave-out and backfill limits)
(Wood post shown for illustrative purpose only)



SECTION E-E
(Square option for leave-out and backfill limits)
(Wood post shown for illustrative purpose only)

GENERAL NOTES:

The leave-out limits may be increased to accommodate construction equipment and tolerances.

When posts are installed in augured or dug holes, the backfill material will be compacted to the bottom of the pavement surfacing material to the satisfaction of the Engineer. The backfill material for the thickness of the pavement surfacing material will be non-compacted.

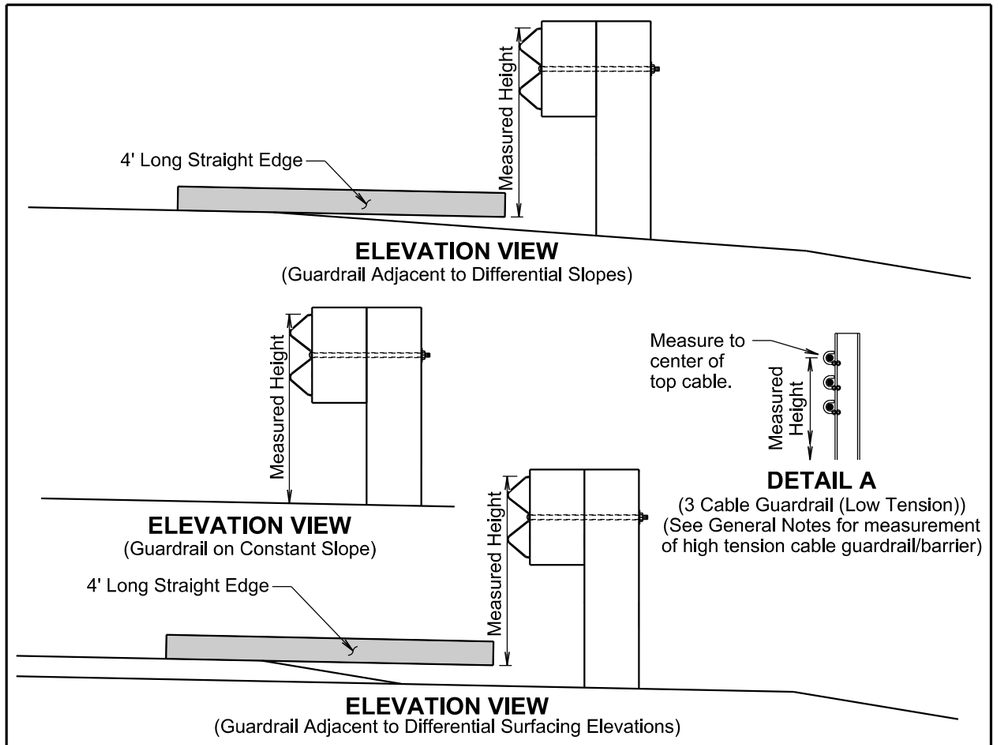
The backfill material will be mounded ½ inch to 1 inch above the top of the adjacent surfacing as illustrated above.

Asphalt for tack will be applied to the surface of the backfill material at the rate of 0.15 to 0.20 gallons per square yard.

All costs for constructing the leave-out including labor, equipment, and materials which includes the backfill material and tack coat will be incidental to the contract unit price for the respective guardrail contract item.

November 19, 2021

Published Date: 2025	SDDOT	GUARDRAIL POST INSTALLED IN ASPHALT CONCRETE OR PORTLAND CEMENT CONCRETE	PLATE NUMBER 630.96
			Sheet 1 of 1

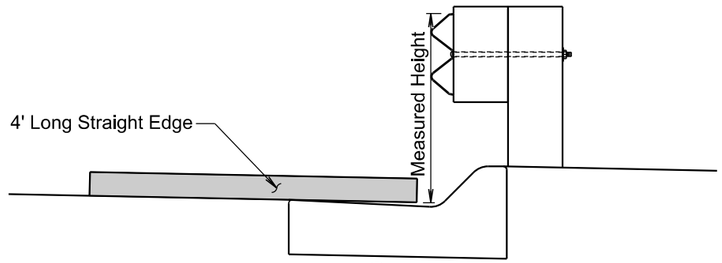


ELEVATION VIEW
(Guardrail Adjacent to Differential Slopes)

ELEVATION VIEW
(Guardrail on Constant Slope)

DETAIL A
(3 Cable Guardrail (Low Tension))
(See General Notes for measurement of high tension cable guardrail/barrier)

ELEVATION VIEW
(Guardrail Adjacent to Differential Surfacing Elevations)



ELEVATION VIEW
(Guardrail at Curb and Gutter)

GENERAL NOTES:

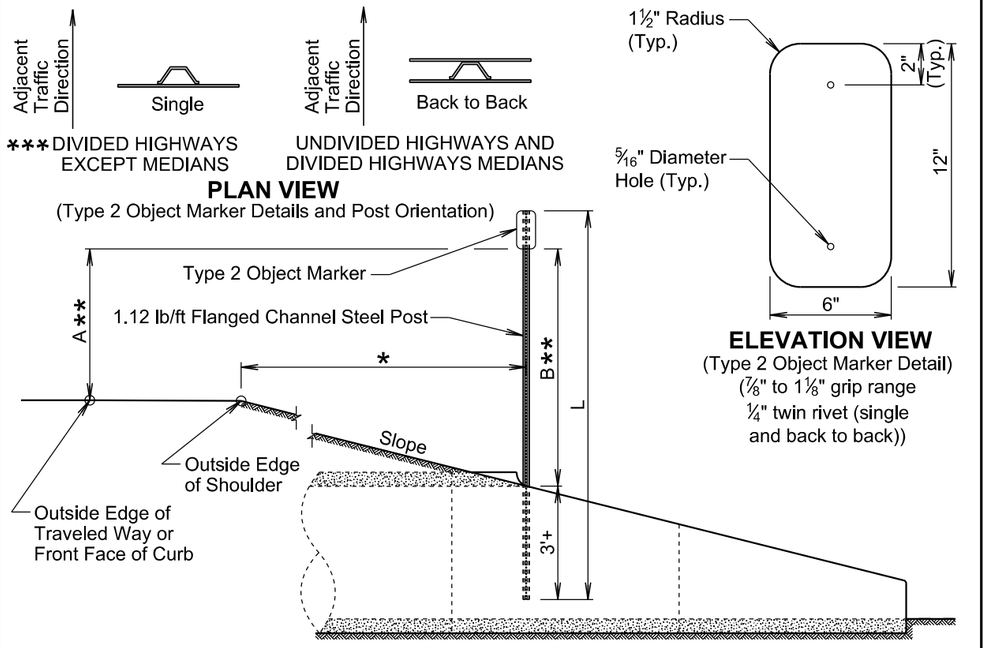
The W Beam guardrail shown is for illustrative purpose. The guardrail height for all types of guardrail systems except for high tension cable guardrail/barrier will be measured in accordance with this standard plate.

When measuring height of 3 cable guardrail (low tension) the height will be measured to the center of the top cable. See Detail A.

The height of high tension cable guardrail/barrier will be measured in accordance with the Manufacturer's installation instructions.

September 14, 2019

Published Date: 2025	SDDOT	MEASURING GUARDRAIL HEIGHT	PLATE NUMBER 630.99
			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.

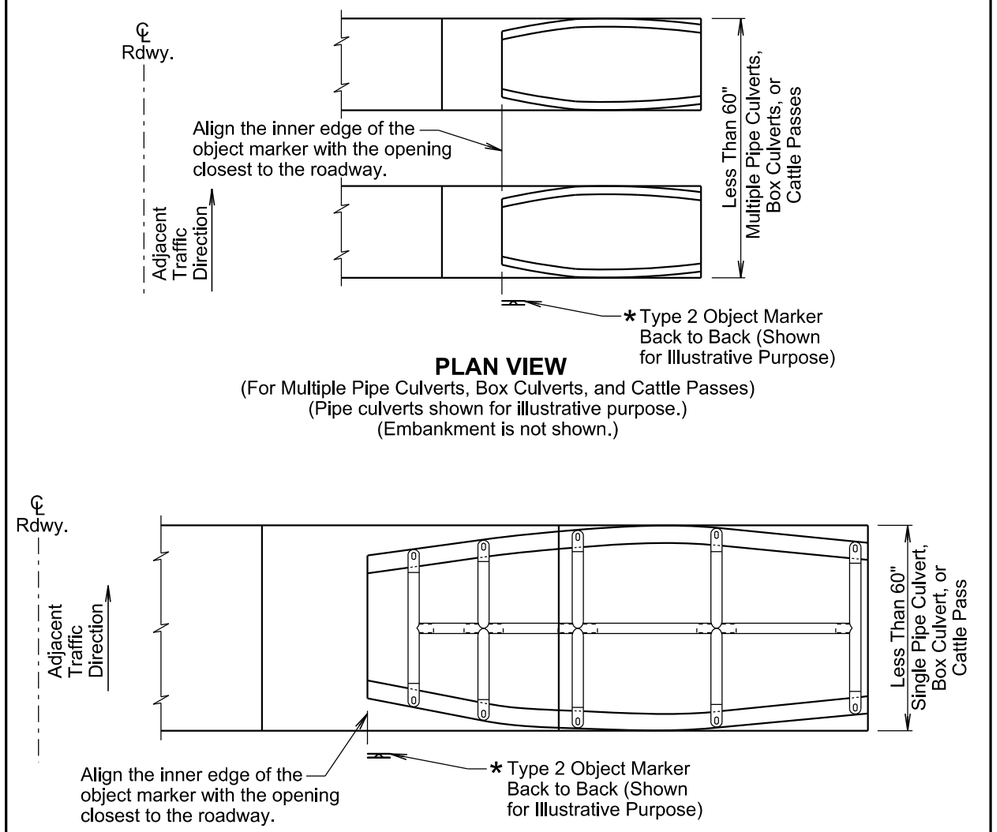
** Dimension A is 4 feet when the Offset * is 8 feet and less. Dimension B is 4 feet when Offset * is greater than 8 feet.

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



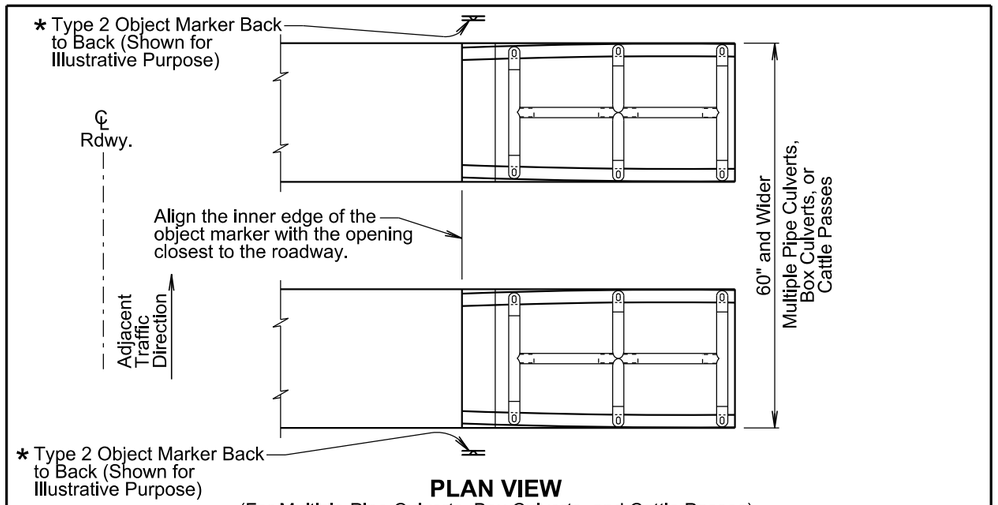
GENERAL NOTES:

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

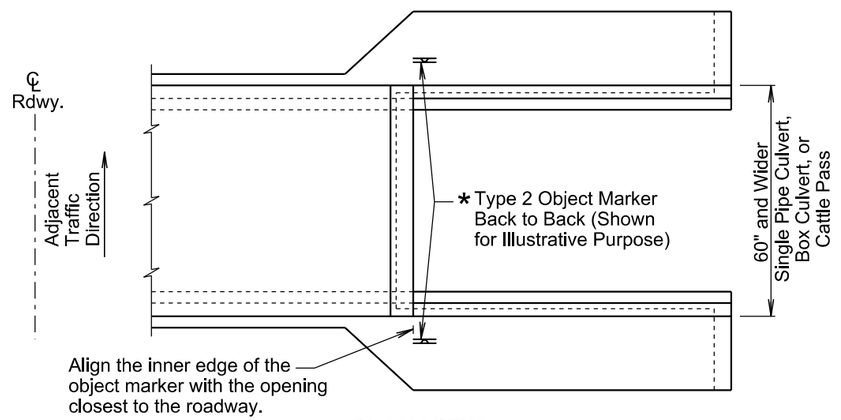
* The type 2 object markers will be installed at the locations shown above. The type 2 object markers, single faced or back to back, will be as specified in the plans.

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.)

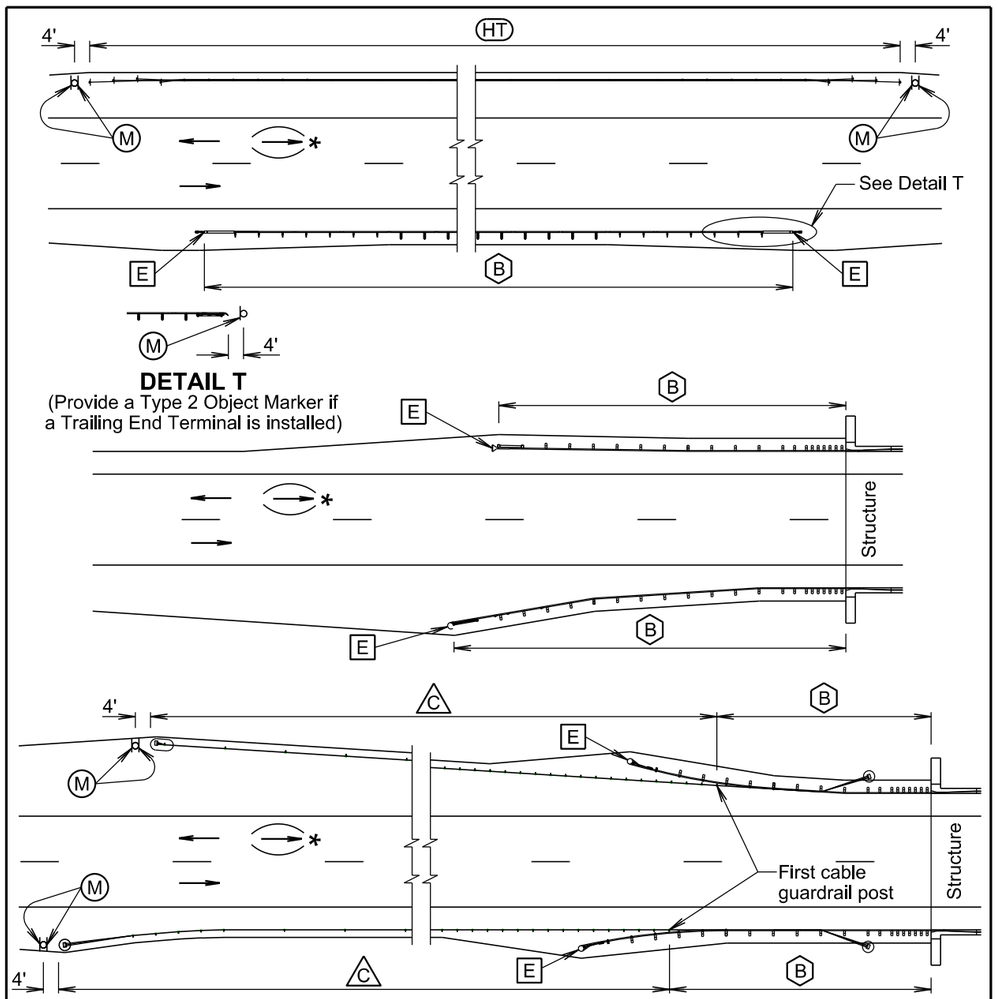
GENERAL NOTES:

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



DETAIL T
(Provide a Type 2 Object Marker if a Trailing End Terminal is installed)

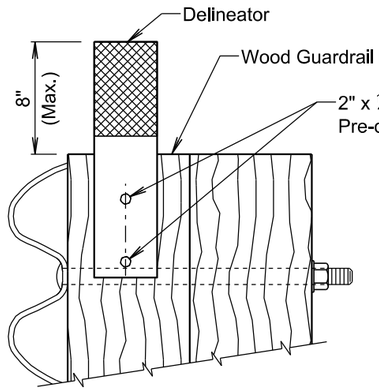
PLAN VIEW
(Typical Guardrail Layouts)

(B) Steel Beam Guardrail Delineation
(HT) High Tension Cable Guardrail Delineation
[E] Guardrail End Terminal Object Marker
(M) Type 2 Object Marker
△C 3 Cable Guardrail (Low Tension) Delineation

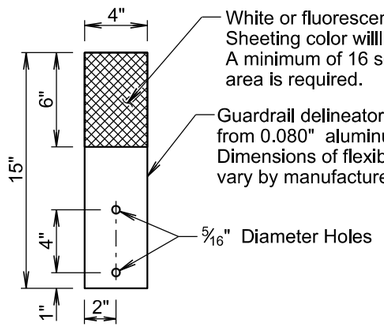
* For two-way traffic, install delineation at the opposite end of structure the same as shown. Back-to-back delineation is required for two-way traffic, single-sided delineation for one-way traffic.

March 31, 2024

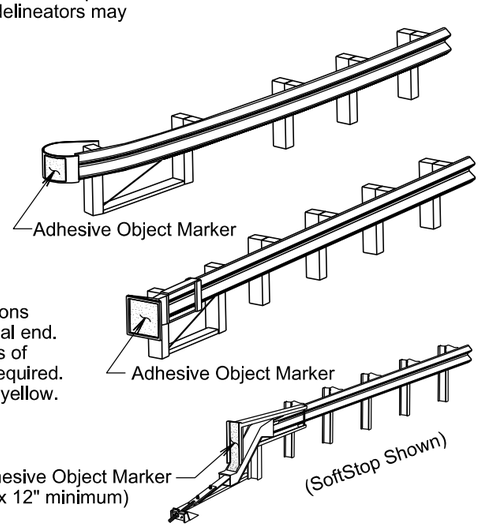
Published Date: 2025	SDDOT	DELINEATION OF GUARDRAIL	PLATE NUMBER 632.40 Sheet 1 of 4

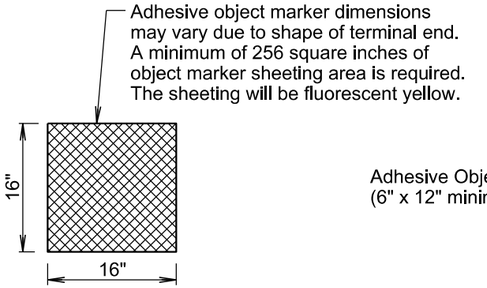


(B) STEEL BEAM GUARDRAIL DELINEATION



DELINEATOR
(For Steel Beam Guardrail)



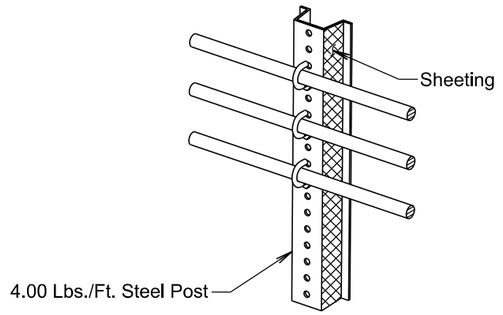


(E) GUARDRAIL END TERMINAL OBJECT MARKER

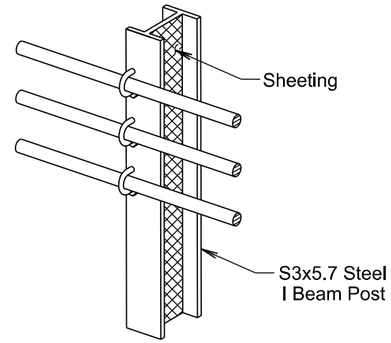
ADHESIVE OBJECT MARKER

March 31, 2024

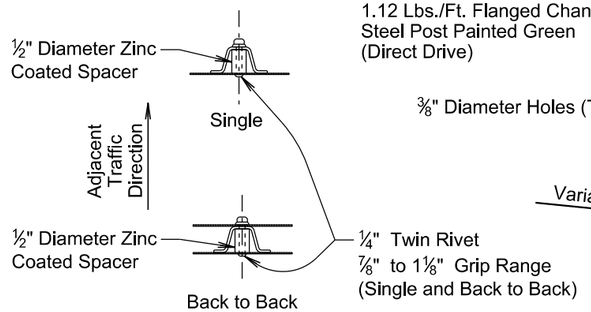
Published Date: 2025	SDDOT	*DELINEATION GUARDRAIL*	*PLATE NUMBER* 632.40
			Sheet 2 of 4



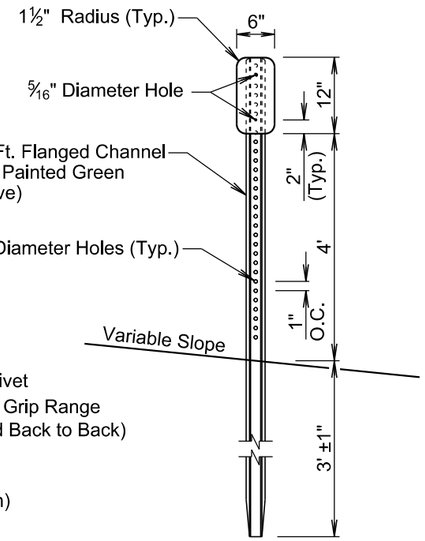
(C) 3 CABLE GUARDRAIL (LOW TENSION) DELINEATION



(C) 3 CABLE GUARDRAIL (LOW TENSION) DELINEATION



PLAN VIEW
(Type 2 Object Marker Details and Post Orientation)



ELEVATION VIEW
(M) (Type 2 Object Marker)
(For Marking 3 Cable Guardrail (Low Tension) Anchor, High Tension Cable Guardrail Anchor, and Trailing End Terminal)

March 31, 2024

Published Date: 2025	SDDOT	*DELINEATION OF GUARDRAIL*	*PLATE NUMBER* 632.40
			Sheet 3 of 4

GENERAL NOTES:

The delineation of high tension cable guardrail will be reflective sheeting placed back to back on every third post cap or cable spacer. Maximum spacing of delineation will not exceed 35 feet. The sheeting will be type XI in conformance with ASTM D4956. The color of the reflective sheeting will be the same as the nearest pavement marking.

The delineators for steel beam guardrail and sheeting on 3 cable guardrail (low tension) posts will be covered with a minimum of 16 square inches of reflective sheeting. The reflective sheeting will be type XI in conformance with ASTM D4956. Along two-way roadways the sheeting will be on both sides of the delineators and guardrail posts and will be white in color. For one-way roadways the sheeting will only be required on the side facing traffic and the color will be the same as the nearest pavement marking, yellow on the left side of the roadway and white on the right side.

When steel beam guardrail is attached to a bridge the first delineator will be attached to the post nearest the bridge.

At bridges with guardrail less than 200 feet in length, a minimum of 4 delineators will be placed in addition to the end terminal yellow object marker. The spacing between the delineators will be approximately one third of the length of the guardrail.

At bridges with guardrail 200 feet and greater in length, including bridges that have steel beam guardrail transitioning to 3 cable guardrail (low tension), the delineators will be placed at a spacing of approximately 50 feet. Delineation will extend throughout the length of the guardrail system.

Steel beam guardrail that is not attached to a bridge and is less than 200 feet in length, a minimum of 4 delineators will be placed in addition to the end terminal yellow object markers. The spacing between the delineators will be approximately one third of the length of the guardrail.

Steel beam guardrail that is not attached to a bridge and is 200 feet and greater in length, including steel beam guardrail transitioning to 3 cable guardrail (low tension), the delineators will be placed at a spacing of approximately 50 feet. Delineation will extend throughout the length of the guardrail system.

All costs for furnishing and installing single or back to back guardrail delineation on 3 cable guardrail and steel beam guardrail will be included in the contract unit price per each for "Guardrail Delineator".

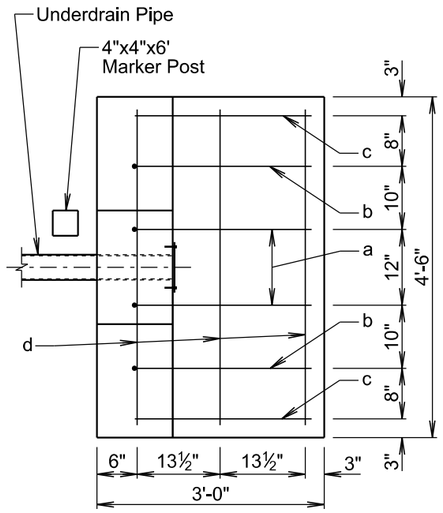
All costs for furnishing and installing the reflective sheeting on the cable spacers or post caps for the high tension cable guardrail will be incidental to the respective high tension cable guardrail contract item.

An adhesive object marker will be placed on the end of the W beam guardrail or MGS end terminal. The adhesive object marker dimensions may vary due to the shape of the terminal end. A minimum of 256 square inches of object marker reflective sheeting area is required on end terminals with sufficient surface area. Other end terminals (SoftStop) will require an adhesive object marker with a minimum size of 6" x 12". The reflective sheeting will be fluorescent yellow type XI sheeting in conformance with ASTM D4956. All costs for furnishing and installing the adhesive object marker will be incidental to various contract items.

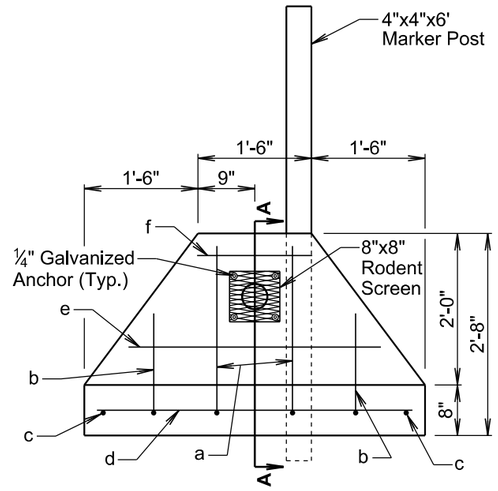
A type 2 object marker will be placed adjacent to the 3 cable guardrail (low tension) anchor, high tension cable guardrail anchor, and trailing end terminal at the location noted on sheet 1 of this standard plate. The type 2 object marker (6" x 12") will have fluorescent yellow type XI sheeting in conformance with ASTM D4956. All costs for furnishing and installing the type 2 object marker including the steel post, 6" x 12" reflective panel, and hardware will be included in the contract unit price per each for "Type 2 Object Marker" for single-sided and "Type 2 Object Marker Back to Back" for back to back type 2 object markers.

March 31, 2024

Published Date: 2025	SDDOT	**DELINEATION OF GUARDRAIL**	PLATE NUMBER 632.40 Sheet 4 of 4



PLAN VIEW



ELEVATION VIEW

GENERAL NOTES:

The concrete will be Class M6. The concrete will conform to the requirements of Section 462 of the Specifications except the minimum curing time will be 72 hours. It is estimated that 0.55 cubic yards of concrete is required for each unit.

Four cast-in-place or drilled-in ¼" galvanized anchors will be placed in the headwall. Each galvanized anchor will be placed approximately 1" from the outside corner of the rodent screen. It is preferred that the anchor location be centered at an opening in the rodent screen.

All reinforcing steel will conform to ASTM A615, Grade 60. It is estimated that 25.7 pounds of reinforcing steel is required for each unit.

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

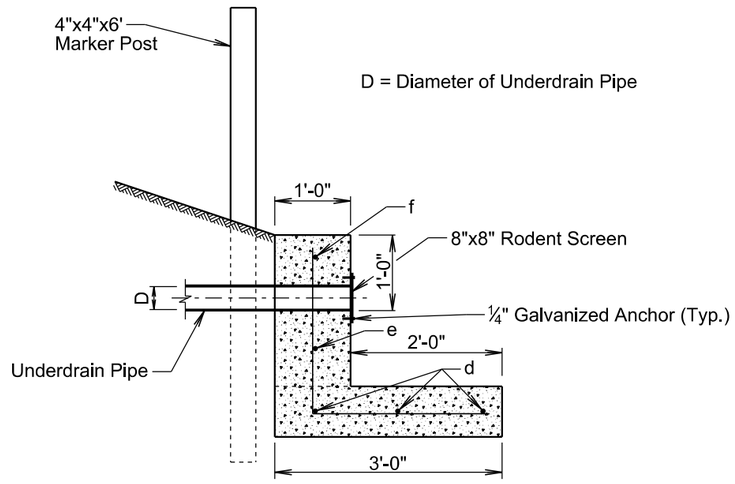
The 8"x8" rodent screen will be galvanized 13 Ga. steel with a diamond shaped flattened mesh pattern. The size will be ½". The size refers to the measurement across the smallest diamond shaped opening measured from the centers of the wires. The rodent screen will be centered about the hole in the headwall and fastened to the headwall with the appropriate bolts or nuts with washers.

A 4"x4"x6' marker post will be placed at the approximate location as depicted in the above drawings for each concrete headwall. The marker post will project 3'± above the ground line. The marker post will be cedar or treated with a wood preservative and will be painted with two coats of white paint.

All costs for furnishing and installing the concrete headwall including equipment, labor, and materials including concrete, reinforcing steel, rodent screen, anchors, and marker post will be incidental to the contract unit price per each for "Concrete Headwall for Underdrain".

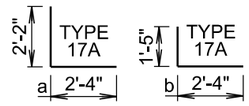
December 23, 2019

Published Date: 2025	SDDOT	**CONCRETE HEADWALL FOR UNDERDRAIN**	PLATE NUMBER 680.01 Sheet 1 of 2



SECTION A-A

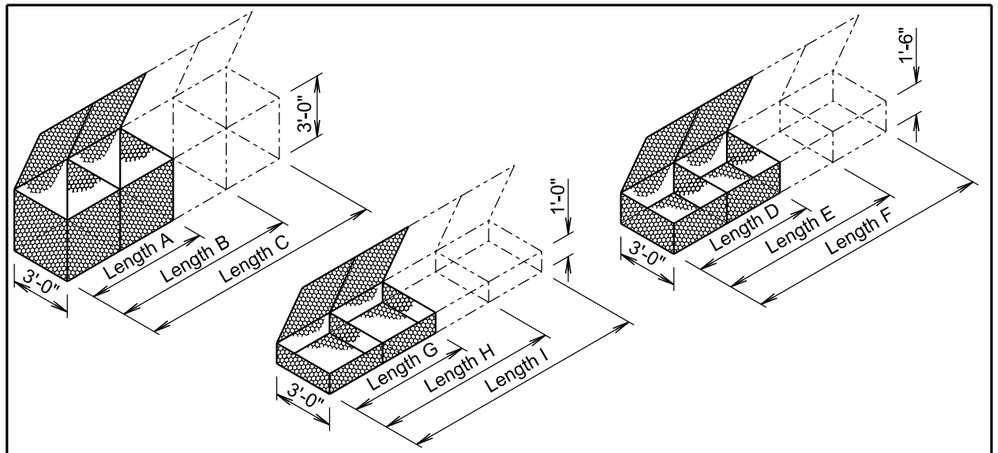
REINFORCING SCHEDULE					
MK.	No.	Size	Length	Type	Bending Details
a	2	4	4'-6"	17A	
b	2	4	3'-9"	17A	
c	2	4	2'-4"	Str.	
d	3	4	4'-2"	Str.	
e	1	4	3'-4"	Str.	
f	1	4	1'-6"	Str.	



NOTE:
All dimensions are out to out of bars.

December 23, 2019

Published Date: 2025	SDDOT	CONCRETE HEADWALL FOR UNDERDRAIN	PLATE NUMBER 680.01
			Sheet 2 of 2



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.

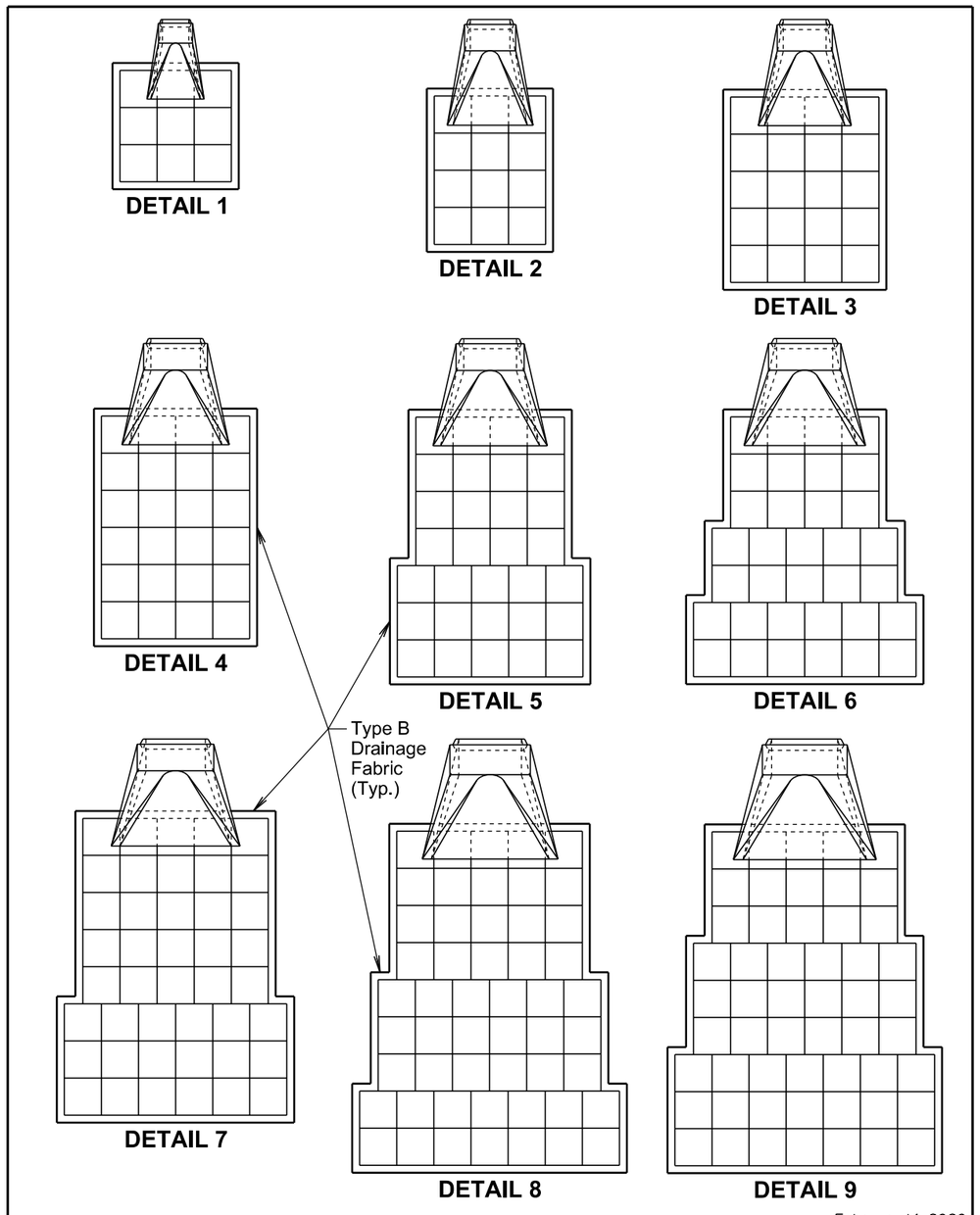
Wire lacing or interlocking type fasteners will be used for gabion assembly and final construction of gabion structures. Interlocking fasteners for galvanized gabions will be high tensile 0.120 inch diameter galvanized steel wire measured after galvanizing. The galvanizing will conform to ASTM A641-92, 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



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