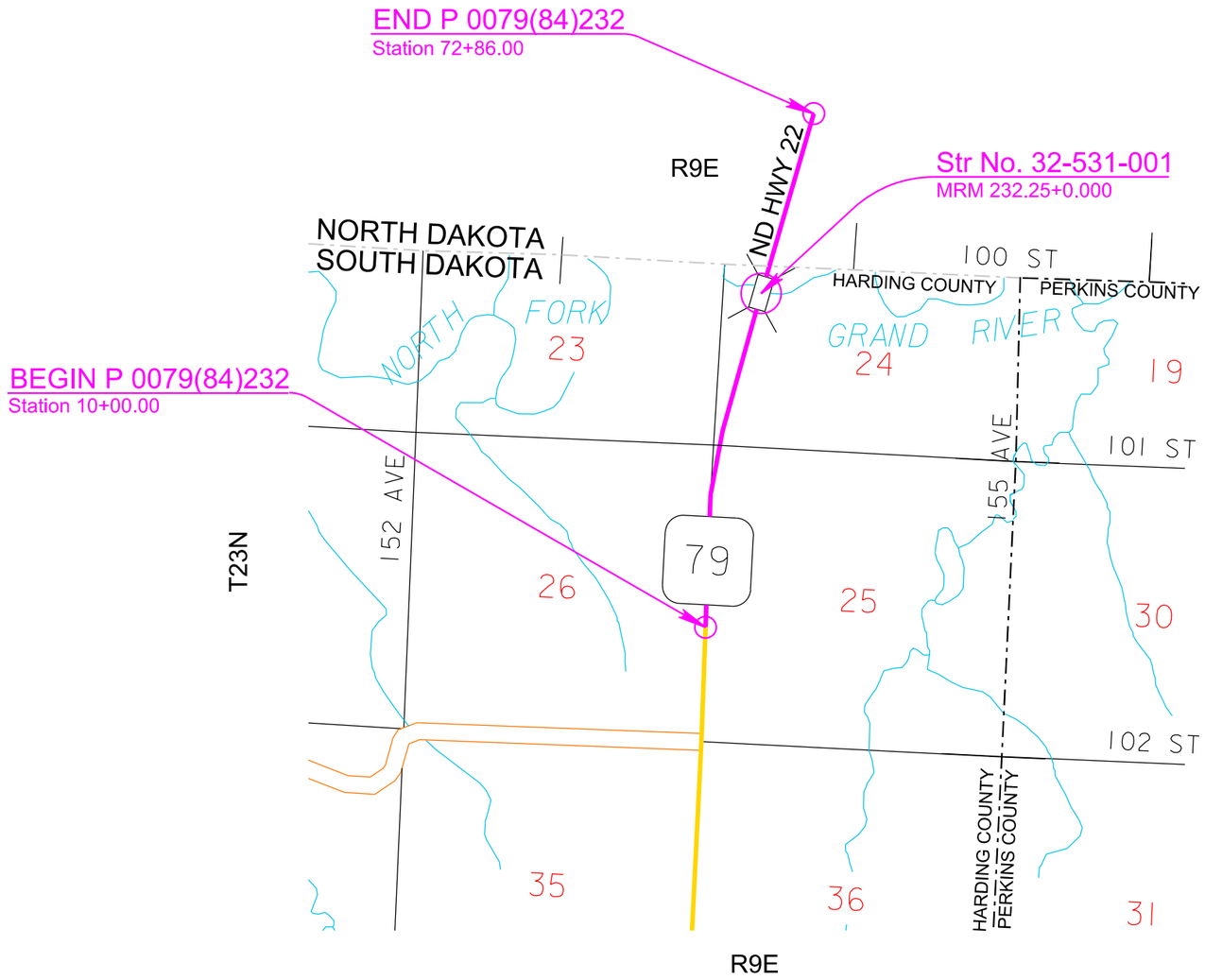
SECTION B: GRADING PLANS

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B1	B49

Plotting Date: 09/23/2024

INDEX OF SHEETS



STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B2	B49

Plotting Date: 10/16/2024

Revised 10-16-2024 RWB

SECTION B ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
009E3220	Reestablish Right-of-Way and Property Corner	28	Each
009E3225	Reestablish Public Land Survey System Corner	3	Each
009E3230	Grade Staking	1.190	Mile
009E3245	Final Cross Section Survey	1.190	Mile
009E3250	Miscellaneous Staking	1.190	Mile
009E3280	Slope Staking	1.190	Mile
009E3290	Structure Staking	1	Each
009E3301	Engineer Directed Surveying/Staking	40.0	Hour
110E0600	Remove Fence	11,689	Ft
110E0730	Remove Beam Guardrail	436.0	Ft
110E1020	Remove Asphalt Concrete Pavement	2,315.1	CuYd
120E0010	Unclassified Excavation	129,457	CuYd
120E0500	Option Borrow Excavation	34,000	CuYd
120E0600	Contractor Furnished Borrow	29,515	CuYd
120E2000	Undercutting	12,097	CuYd
120E6100	Water for Embankment	1,220.9	MGal
250E0020	Incidental Work, Grading	Lump Sum	LS
421E0100	Pipe Culvert Undercut	88	CuYd
450E0122	18" RCP Class 2, Furnish	34	Ft
450E0130	18" RCP, Install	34	Ft
450E0142	24" RCP Class 2, Furnish	146	Ft
450E0150	24" RCP, Install	146	Ft
450E0163	30" RCP Class 3, Furnish	134	Ft
450E0170	30" RCP, Install	134	Ft
450E0193	42" RCP Class 3, Furnish	156	Ft
450E0200	42" RCP, Install	156	Ft
450E2032	42" RCP Flared End, Furnish	2	Each
450E2033	42" RCP Flared End, Install	2	Each
450E2200	24" RCP Sloped End, Furnish	2	Each
450E2201	24" RCP Sloped End, Install	2	Each
450E2204	30" RCP Sloped End, Furnish	2	Each
450E2205	30" RCP Sloped End, Install	2	Each
450E4758	18" CMP 14 Gauge, Furnish	56	Ft
450E4759	18" CMP 16 Gauge, Furnish	130	Ft
450E4760	18" CMP, Install	186	Ft
450E5010	18" CMP Elbow, Furnish	2	Each
450E5011	18" CMP Elbow, Install	2	Each
450E5211	18" CMP Flared End, Furnish	1	Each
450E5212	18" CMP Flared End, Install	1	Each
450E5406	18" CMP Safety End, Furnish	4	Each
450E5407	18" CMP Safety End, Install	4	Each
450E5539	36" CMP Arch 16 Gauge, Furnish	96	Ft
450E5540	36" CMP Arch, Install	96	Ft
450E5814	36" CMP Arch Flared End, Furnish	4	Each
450E5815	36" CMP Arch Flared End, Install	4	Each
462E0100	Class M6 Concrete	2.3	CuYd
464E0100	Controlled Density Fill	7.7	CuYd
480E0100	Reinforcing Steel	354	Lb
600E0300	Type III Field Laboratory	1	Each
620E0020	Type 2 Right-of-Way Fence	8,291	Ft
620E0040	Type 4 Right-of-Way Fence	3,430	Ft
620E0510	Type 1 Temporary Fence	11,618	Ft
620E1020	2 Post Panel	36	Each
620E1030	3 Post Panel	15	Each
630E0500	Type 1 MGS	550.0	Ft
630E1500	Type 1 Guardrail Transition	4	Each
630E2017	MGS MASH Flared End Terminal	4	Each
670E0200	Type A Frame and Grate	2	Each
670E5400	Precast Drop Inlet Collar	2	Each
720E1010	PVC Coated Bank and Channel Protection Gabion	25.0	CuYd
831E0110	Type B Drainage Fabric	78	SqYd

GRADING OPERATIONS

Water for Embankment is estimated at the rate of 10 gallons of water per cubic yard of Embankment minus Waste.

The estimated cubic yards of excavation and/or embankment required to construct outlet ditches, ditch blocks, and approaches are included in the earthwork balance notes on the profile sheets.

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

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

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

While free water was not encountered in the proposed soil borings at the time of the investigation (May 2022), seasonal changes in moisture may affect water levels during construction. The Contractor is advised that groundwater may be encountered in isolated areas that may affect excavation procedures during construction. The Contractor is also encouraged to review the soil borings shown in the cross sections for additional information.

The Contractor is alerted that the soil boring at Station 19+00 encountered material from 10.0 to 14.0 feet with an optimum moisture greater than 25%. As per Section 120.3 a of the Specifications, soil with an optimum moisture greater than 25% will not be allowed within the new bridge berm embankment. Review the soils blocks and boring shown in the cross sections to determine the location of this material.

TYPE III FIELD LABORATORY

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

UTILITIES

The Contractor will be aware that the existing utilities shown in the plans were surveyed prior to the design of this project and might have been relocated or replaced by a new utility facility prior to construction of this project, might be relocated or replaced by a new utility facility during the construction of this project, or might not require adjustment and may remain in its current location. The Contractor will contact each utility owner and confirm the status of all existing and new utility facilities. The utility contact information is provided elsewhere in the plans or bidding documents.

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

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

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B3	B49

Plotting Date: 09/23/2024

SHRINKAGE FACTOR: Embankment +35%

TABLE OF EXCAVATION QUANTITIES BY BALANCES

Station to	Station	Excavation (CuYd)	* Undercut (CuYd)	* Option Borrow Exc. (CuYd)	* Contractor Furnished Borrow Exc. (CuYd)	Total Excavation (CuYd)	** Waste (CuYd)	** Dead Haul (CuYdSta)	** Option Borrow Haul (CuYdSta)	** Haul (CuYdSta)
10+00	25+00	20019	3792	2570	0	26381	9587	64300	25900	16100
25+00	52+00	56642	3014	31430	5782	96868	26106	785800	418400	67400
52+00	72+86	17599	5291	0	23733	46623	12088	0	0	507
	Totals:	94260	12097	34000	29515	169872	47781	850100	444300	84007

* The quantities for these items are in the Estimate of Quantities under their respective contract items.
** The quantities for these items are for information only.

TABLE OF UNCLASSIFIED EXCAVATION

	(CuYd)
Excavation	94260
Undercut	12097
Topsoil	16161
Exc. for Deep Pipe Removal	6939
Total	129457

PROCEDURES FOR DETERMINING UNCLASSIFIED EXCAVATION QUANTITY

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

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

The Unstable Material Excavation quantity is included in the Excavation quantity listed in the Table of Unclassified Excavation. When finaling a project, the Unstable Material Excavation quantity will be added to the Excavation quantity to compute the Unclassified Excavation quantity.

The Topsoil quantity in the Table of Unclassified Excavation is an estimate. When finaling a project, the total quantity of field measured Topsoil will be used in place of the estimated Topsoil quantity. The quantity of Topsoil from the cuts will be paid for twice as Unclassified Excavation, as it will be in both the Excavation and Topsoil quantities. This will be full compensation for Excavation, which includes necessary undercutting to provide space for placement of topsoil.

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

The volume of in place Asphalt Surfacing removed will NOT be paid for as Unclassified Excavation.

TABLE OF OPTION BORROW EXCAVATION

	(CuYd)
Option Borrow Excavation	34000
Topsoil in Option Borrow Pits	875
Total:	34875

HAUL

Included in the Table of Excavation Quantities by Balances are Dead Haul, Option Borrow Haul, and Haul. They are not pay items and are for informational purposes only. Haul was not estimated for moving Contractor Furnished Borrow Excavation. The mass haul diagram is available as part of the bid package for use in figuring this haul.

Dead Haul: Estimated quantity (CuYdSta) for moving borrow excavation material or option borrow excavation material from the borrow or option borrow site to the centerline mainline station listed in the Table of Borrow Pits.

Option Borrow Haul: Estimated quantity (CuYdSta) for moving option borrow excavation material from the centerline mainline station listed in the Table of Borrow Pits to the locations where it is needed throughout the earthwork balance.

Haul: Estimated quantity (CuYdSta) for moving unclassified excavation material to the locations where it is needed throughout the earthwork balance.

For Purpose of Extra Haul Computations:

Average Haul = (Haul + Out-of-Balance Haul)/Unclassified Excavation = 84007/129457 = 0.6 Sta.

Average Option Borrow Haul = (Option Borrow Haul + Dead Haul)/Total Option Borrow Excavation = (444300+850100)/34000 = 38.1 Sta.

Compensation for “Extra Haul” will not be made for haul distances less than 5 stations. When payment for “Extra Haul” is authorized, the distance used for “Extra Haul” calculations will be that in excess of 5 stations.

WASTE EXCAVATION

The quantity of waste in the Table of Excavation Quantities by Balances that is muck excavation or excess excavated material will be disposed of at a Contractor furnished site acceptable to the Engineer.

UNDERCUTTING

In all cut sections the earthen subgrade will be undercut 2 feet below the earthen subgrade surface. 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.

Shallow embankment sections, fills less than 2 feet in height measured at the finished subgrade shoulders, will be undercut to ensure a minimum 2 foot height of earth embankment for the entire width of roadbed. The upper 6 inches of undercut material that consists of topsoil with a high humus content will be used as topsoil, placed in the fill slopes outside the shoulders of the earthen subgrade, or placed in the lower portion (below 4 foot depth) in fills which are greater than 4 feet in height. The remaining undercut soil and soil obtained from adjacent excavation (excluding the upper 6 inches) will then be replaced and compacted to the density specified for the section being constructed.

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 LOCATIONS RURAL

Station	to	Station
10+00		52+00
53+50		73+00

UNSTABLE MATERIAL EXCAVATION

The areas of unstable material excavation are drawn on the cross sections with a normal depth of 2 feet. The estimated quantity of 4532 cubic yards of unstable material excavation will be paid for at the contract unit price per cubic yard for “Unclassified Excavation”.

All areas designated as Unstable will be excavated. The unstable material excavated on this project will be placed outside the subgrade shoulder in fill sections or stockpiled and used as topsoil.

Field measurement of unstable material excavation will not be made. However, if there are additional areas of unstable material excavation 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 UNSTABLE MATERIAL EXCAVATION

Station	to	Station	L/R	Depth (Ft)	Quantity (CuYd)
22+00		23+00	R	2	304
31+00		37+25	R	2	2198
48+00		51+36	R	2	1022
53+96		56+00	R	2	1008
				Total:	4532

TABLE OF OPTION BORROW PITS

Site	Station	Dead Haul Distance (Sta)	Option Borrow Exc. (CuYd)	Dead Haul (CuYdSta)
1	25+00	4	34000	850100
		Totals:	34000	850100

Stations in the above table are not pit locations, but stations where the borrow is interjected into the earthwork balance for haul calculations.

The quantities listed in the above table for Dead Haul are for information only. The Dead Haul quantities are also included in the Table of Excavation Quantities by Balances.

The quantities listed in the above table for Option Borrow Excavation are also included in the Table of Excavation Quantities by Balances.

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.

REMOVE ASPHALT CONCRETE PAVEMENT

The Los Angeles Abrasion Loss value on the aggregate used for the in-place asphalt concrete was 21. This value was obtained from testing during construction of the in-place asphalt concrete.

An estimated 2315.1 Cubic Yards of the in-place asphalt concrete surfacing will be removed from the existing highway according to the in-place surfacing typical sections and become the property of the Contractor for disposal.

The quantity of removed asphalt material is estimated from the in-place surfacing typical sections. This estimated quantity is not included in the unclassified excavation quantities.

EXCAVATION FOR DEEP PIPE REMOVAL

Included in the quantity of “Unclassified Excavation” are 6939 cubic yards of excavation for removal of deep pipes. Deep pipes are existing mainline pipes at depths of 10 feet or greater (measured from the flow line to the lowest elevation of either the existing ground line, undercut line, or bottom of removed or salvaged surfacing).

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

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

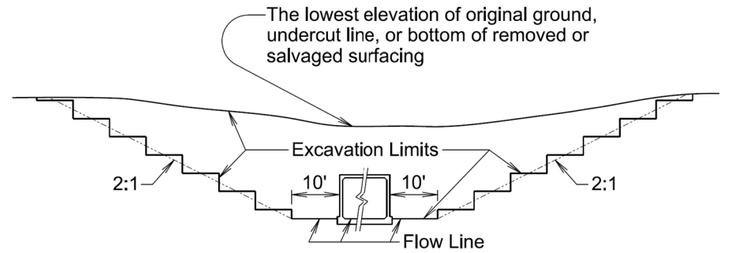


TABLE OF EXCAVATION FOR DEEP PIPE REMOVAL

Station	Type	Quantity (CuYd)
15+32	Pipe	2218
22+90	Pipe	2018
37+17	Pipe	2703
	Total:	6939

PIPE CULVERT UNDERCUT

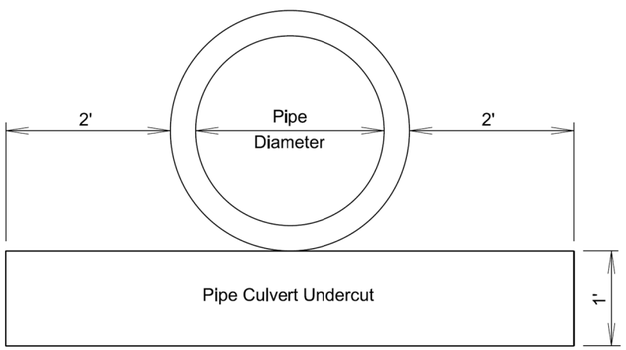
The table includes undercut for 36 inch and larger pipe culverts. The depth of undercut is an estimate and the actual depth necessary will be determined during construction. Pipes listed may or may not require undercutting and pipes not listed may require undercutting. The Engineer will determine which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

Station	Undercut Depth (Ft)	Pipe Culvert Undercut (CuYd)
37+17	1	53
70+56-72' L	1	35
	Total:	88

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

Storm sewer and approach pipes do not require undercutting unless specified otherwise in these plans.

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



INCIDENTAL WORK, GRADING

Station	L/R	Remarks
15+28		Take Out 24"-120' RCP
22+90		Take Out 24"-124' RCP
37+17		Take Out 30"-128' RCP
46+66-102'	L	Take Out 18"-54' RCP
46+67-7'	L	Take Out 18"-58' RCP
70+52-65'	L	Take Out 24"-64' RCP
70+54-79'	L	Take Out 24"-60' CMP

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.

The gauge of the corrugated metal ends will match the thickest gauge of corrugated metal pipe it is connected to.

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

PIPE FOR APPROACHES

Class 2 reinforced concrete pipe, high density polyethylene pipe, polypropylene pipe (will be in conformance with AASHTO M330), or steel reinforced polyethylene pipe may be substituted for corrugated metal pipe at approaches at no additional cost to the State.

If corrugated metal pipes are provided, the pipes will be as specified in the CORRUGATED METAL PIPE note.

If high density polyethylene pipe, polypropylene pipe (will be in conformance with AASHTO M330), or steel reinforced polyethylene pipe are provided, then the end sections will be metal, be compatible, and conform to the type of end section as shown in the plans.

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.

Controlled density fill between metal pipes will require the pipes to be anchored to resist floating. Anchoring methods will be determined by the Contractor and approved by the Engineer. Payment for anchoring the pipes will be incidental to the pipe installation contract item.

TABLE OF CONTROLLED DENSITY FILL FOR PIPE

Station	Quantity (CuYd)
70+56-72' L	7.68
Total:	7.7

CONCRETE PIPE CONNECTIONS

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

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

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

PIPE COVER

The earthen subgrade cover for some pipe installations is less than one foot. The Contractor will take the necessary precautions to ensure the structural properties of the pipes are not damaged after installation and prior to the placement of final surfacing. Any additional costs for preventing damage to these pipes will be incidental to the contract unit price per foot for the corresponding pipe installation contract item.

DROP INLETS

Where drop inlets are constructed within areas of curb and gutter, the Contractor will construct weep holes of at least 3 inches in diameter in the drop inlet walls. The weep holes will be constructed at the same elevation as the adjacent top of the earthen subgrade and will be maintained clean and open at all times until the permanent surfacing is placed. The drop inlets will be covered throughout construction operations as necessary with an Engineer approved cover to provide safe travel for motorists and to prevent materials from entering the storm sewer system. After the permanent surfacing has been placed, the Contractor will seal the weep holes with grout and remove all debris from the drop inlet. All costs involved with the coverings, weep holes, and removing debris from the drop inlets will be incidental to the contract unit prices for the components of the drop inlets.

The plan shown quantities of the drop inlet components such as Class M6 Concrete, Reinforcing Steel, Type A Frame and Grate, and Precast Drop Inlet Collar will be the basis of payment for these items.

If additions or reductions to the number of drop inlets are ordered by the Engineer, payment for the components required to construct the drop inlets will be made at the contract unit prices for the components of the drop inlets.

TABLE OF DROP INLETS AND QUANTITIES

Station	L / R	Drop Inlet Size	Drop Inlet Type	Class M6 Concrete (CuYd)	Reinf. Steel (Lb)	Precast Drop Inlet Collar (Each)	Frame and Grate/Lid Type
53+76	L	2'x3'	B	1.02	157	1	A
53+76	R	2'x3'	B	1.29	197	1	A
			Totals:	2.31	354	2	

Total Type A Frame and Grate 2

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

Station	L/R	PVC Coated Bank and Channel Protection Gabion (CuYd)	Type B Drainage Fabric (SqYd)
15+32	L	6.0	19
22+90	L	4.5	15
37+17	L	10.0	29
53+76	R	4.5	15
	Totals:	25.0	78

TEMPORARY FENCE

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

BRACE PANELS FOR ROW FENCE

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

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

GENERAL GEOLOGY

The Cannonball Formation and Ludlow Formation underlies the project areas. Near the Grand River the Ludlow Formation is covered by a varying thickness of Quaternary Terrace and Quaternary Alluvial deposits. The South Dakota Geological Survey describes the formations that will be encountered on the project as outlined below:

Quaternary Alluvium deposits consist of clay to boulder sized clasts with locally abundant organic material.

Quaternary Terrace deposits consist of clay to boulder sized clasts deposited as pediments, paleochannels, and terrace fills of former flood plains. Terrace deposits overly the Ludlow Formation from Station 48+00± to Station 50+00±.

The *Ludlow Formation* consists of white, tan, yellow, and gray cross-bedded, fine to medium grained, silty sandstone interbedded with locally bentonitic, gray siltstone, claystone, and sandy to silty claystone. Characterized by uranium bearing lignite beds and "clinker" beds formed by burning coal beds. The Ludlow Formation may be encountered from Station 20+00± to Station 48+00±.

The *Cannonball Formation* consists of gray and tan siltstone, sandy to silty claystone, fine-grained, calcareous, clayey to silty sandstone, and abundant round to lenticular carbonate concretions. The project alignment traverses the Cannonball Formation from Station 10+00± to Station 20+00±.

CLASSIFICATION OF EXCAVATION

Some cut sections may encounter thicker beds of sandstone, siltstone, and claystone ledge rock. Since the durability of these rock units can vary with the degree of weathering, extra effort may be required to complete the excavation. Most of the material encountered should be able to be excavated using conventional methods associated with normal Unclassified Excavation. Blasting is not anticipated.

TABLE OF GUARDRAIL

Location	Remove Beam Guardrail (Ft)	Type 1 MGS (Ft)	Type 1 Guardrail Transition (Each)	MGS MASH Flared End Terminal (Each)
50+27-37' L to 51+60-37' L	134			
50+77-69' L to 51+60-68' L	84			
53+72-38' L to 54+55-36' L	84			
53+72-69' L to 55+05-70' L	134			
Structure No. 32-531-001				
Begin Bridge Lt.		112.5	1	1
Begin Bridge Rt.		162.5	1	1
End Bridge Lt.		162.5	1	1
End Bridge Rt.		112.5	1	1
Totals:	436	550	4	4

TABLE OF SUPERELEVATION

Station	to	Station		
10+00		10+10.40	-	Normal Crown Section
10+10.40		11+72.40	-	Superelevation Transition
11+72.40		24+54.35	-	5780' Radius Curve Right 0.034'/' Superelevation Rate Point of Rotation at Centerline
24+54.35		26+16.35	-	Superelevation Transition
26+16.35		54+51.80	-	Normal Crown Section
54+51.80		56+13.80	-	Superelevation Transition
56+13.80		69+01.22	-	5780' Radius Curve Left 0.034'/' Superelevation Rate Point of Rotation at Centerline
69+01.22		70+63.22	-	Superelevation Transition
70+63.22		72+86	-	Normal Crown Section

PUBLIC LANDS SURVEY SYSTEM, RIGHT OF WAY, AND PROPERTY CORNERS

The Contractor will have a Land Surveyor, licensed in the State of South Dakota, to set, reestablish or verify public land survey system (PLSS) corners, right of way (ROW) corners, and property corners as directed by the appropriate SDDOT Region Land Surveyor. It is estimated that 3 PLSS corners and 28 ROW and property corners will be set, reestablished, or verified for this project. The Contractor's Land Surveyor, under the direction of the Region Land Surveyor, will set, reestablish, or verify all corner monuments after surfacing and fencing operations are completed in accordance with the PUBLIC LANDS SURVEY SYSTEM CORNERS section and the RIGHT OF WAY AND PROPERTY CORNERS section in Chapter 8 of the SDDOT Survey Manual.

< https://dot.sd.gov/doing-business/engineering/design-services/surveyors >

All costs associated with furnishing and installing PLSS caps, rebar, and all other materials associated with setting, reestablishing, or verifying PLSS, ROW corners, and property corners in accordance with the SDDOT Survey Manual will be incidental to the contract unit price per each for "Reestablish Public Land Survey System Corner" and/or "Reestablish Right-of-Way and Property Corner".

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B8	B49

Plotting Date: 09/23/2024

TABLE OF CONSTRUCTION STAKING FOR PROJECT P 0079(84)232

(See Special Provision for Contractor Staking)

					Grade Staking								
Roadway and Description	Begin Station	End Station	Number of Lanes	Length (Ft)	Length (Mile)	Lane Factor	*Sets of Stakes	**Grade Staking Quantity (Mile)	Miscellaneous Staking Quantity (Mile)	Slope Staking Quantity (Mile)	Final Cross Section Survey Quantity (Mile)	Structure Staking Quantity (Each)
US 79 (2 Lanes AC Pavement)	10+00	72+86	2	6286	1.19	1	1	1.190	1.190	1.190	1.190	
US 79 (Bridge over the North Grand River)	51+60.27	53+71.86										1
							Totals:	1.190	1.190	1.190	1.190	1

* 1 = Blue Top Stakes Only (Asphalt Concrete Pavement)
2 = Blue Top and Paving Hub Stakes (PCC Pavement)

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

PIPE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B9	B49

Plotting Date: 09/23/2024

Station	Offset (L/R)	Pipes Requiring Polymer Coating	Reinforced Concrete										Corrugated Metal															
			Circular				Circular Sloped End			Circular Flared End			Circular		Arch		Circular Safety End			Circular Flared End			Arch Flared End			Circular Elbow		
			18" Cl. 2	24" Cl. 2	30" Cl. 3	42" Cl. 3	24"	30"			42"		18" 14 Ga	18" 16 Ga	36" 16 Ga			18"			18"			36"			18" 15°	
			Ft	Ft	Ft	Ft	Each	Each			Each		Ft	Ft	Ft			Each			Each			Each			Each	
15+32					134			2																				
22+90				146			2																					
37+17						156					2																	
46+61-58'	L													64				2										
46+61-49'	R													66				2										
53+76-17.44' L to 53+76-17.44'	R		34																									
53+76-17.44' R to 78.8' R		YES											56								1					2		
70+56-72'	L														96									4				
Total:			34	146	134	156	2	2			2		56	130	96			4			1			4			2	

FENCE QUANTITIES

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B10	B49

Plotting Date: 09/23/2024

Station to Station		Side (L/R)	Right-of-Way Fence Type 2 (Ft)	Right-of-Way Fence Type 4 (Ft)	Temporary Fence Type 1 (Ft)		Post Panels 2 Post Panel (Each)	Post Panels 3 Post Panel (Each)	Gates N.A.B.I. Barbed Wire Gate (Each)	Remove Fence (Ft)				
Tie into Gate L	23+30	L		1556	1556		2	1	1	1581				
23+30	51+60	L	2971		3031		7	4	1	2916				
53+72	56+80	L	405		434		4			353				
56+80	61+42	L		525	470		4	2		506				
10+00	23+31	R		1349	1346		7	2		1398				
23+75	51+60	R	2891		2963		5	3	1	2929				
51+60	53+72	R								231				
53+72	57+41	R	450		455		3	1		400				
57+41	70+16	R	1574		1363		4	2	1	1375				
TOTALS:			8291	3430	11618		36	15	4	11689				

Post Type and Sequence:

Right-of-way fence will be constructed using alternate wood and steel posts except as noted.

Plot Scale - 1:200

Plotted From - TRPR18163

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B11	B49

Plotting Date: 09/23/2024 Revised 9/12/2024 NJF

PIT INFORMATION SHEET
BORROW

SW1/4 SW1/4 Sec. 24 - T 23 N - R 9 E

PIT NO. Option Borrow 01

PROJECT NO. P 0079(84)232, PCN 06TD COUNTY Harding

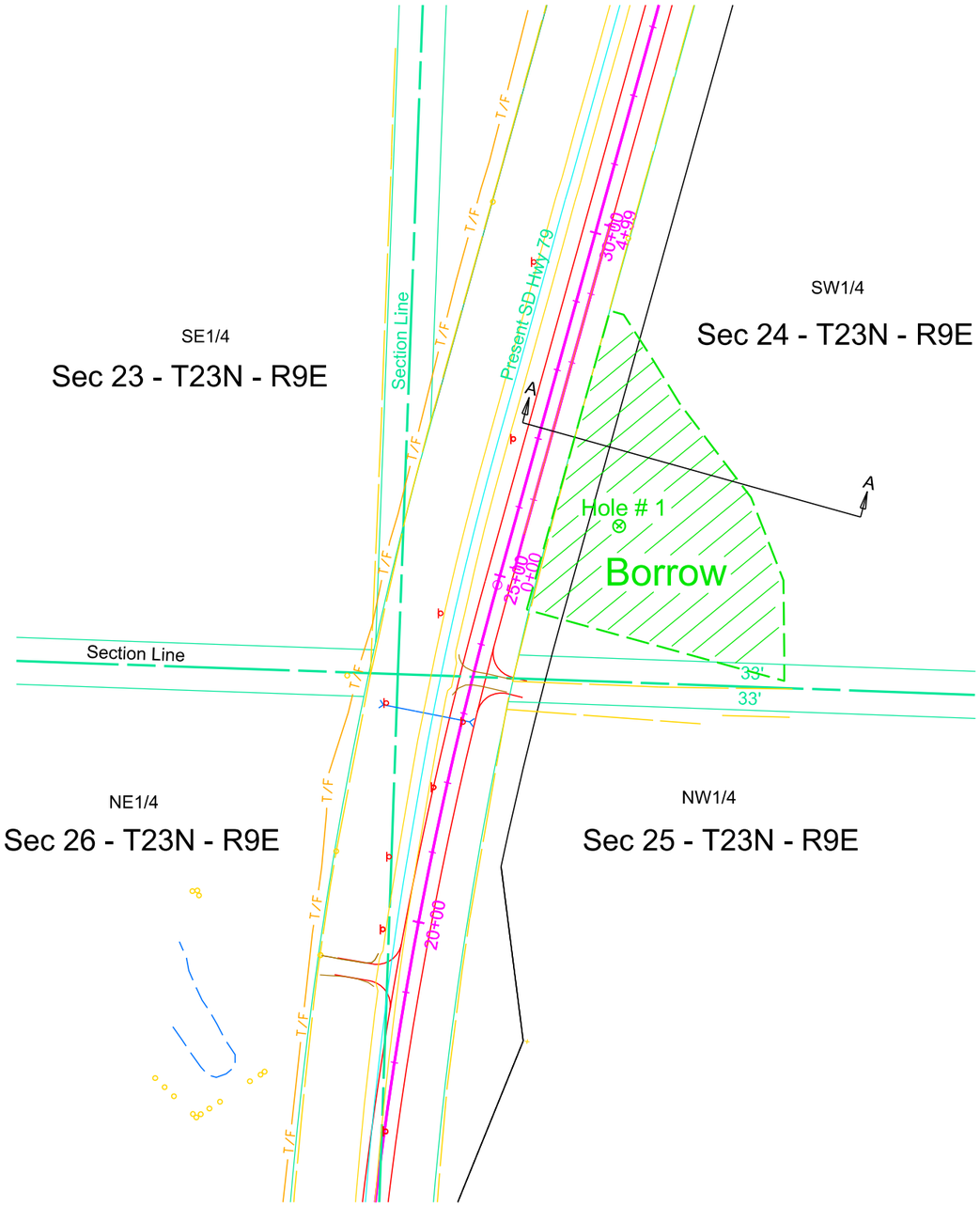
LOCATION Part of SW 1/4 SEC. 24 TOWNSHIP 23N RANGE 9E

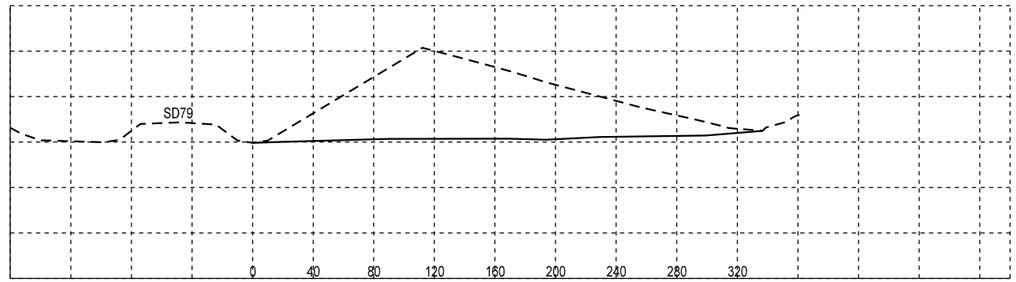
PIT OWNER Timothy & Sandra Ketterling ADDRESS Heil, ND

AVERAGE DEPTH OF MATERIAL 7.7 Ft. AVERAGE DEPTH OF TOPSOIL 4 Inches

MATERIAL AVAILABLE 34,000 CU. YARDS. ESTIMATED CU. YARDS OF TOPSOIL 875

400 ft. DEADHAUL TO STATION 25+00





SECTION A-A

LAB ANALYSIS

HOLE #	1	1	1	1	1	1		
DEPTH	0.5-5.0	5.0-10.0	10.0-15.0	15.0-20.0	20.0-25.0	25.0-30.0		
wt. cu. ft.	73.1	69.5	68.8	67.7	65.5	71.1		
% passing 3/8	100.0	100.0	100.0	100.0	100.0	100.0		
% passing #4	100.0	100.0	100.0	100.0	100.0	100.0		
% passing #10	99.7	100.0	100.0	100.0	100.0	100.0		
% coarse sand	3.6	0.5	0.1	0.5	1.8	0.2		
% fine sand	46.2	49.6	44.6	42.0	35.2	54.2		
% silt	21.9	15.7	15.0	17.3	20.8	23.4		
% clay	28.1	34.2	40.2	40.2	42.2	22.2		
% passing #40	96.2	99.5	99.9	99.5	98.2	99.8		
% passing #200	50.0	49.9	55.2	57.5	94.1	45.6		
% coarse & fine sand	49.7	50.1	44.8	42.5	37.0	54.4		
liquid limit	33	40	48	47	51	0		
liquid plastic limit	19	18	18	20	23	0		
P.I.	14	22	30	27	27	NP		
texture classification	Clay Sand	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Clay Sand		
HRB	A-6	A-6	A-7-6	A-7-6	A-7-6	A-4		

100 ft

STANDARD PIT INFORMATION SHEET

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

Plot Scale - 1:200

Plotted From - TRPP18163

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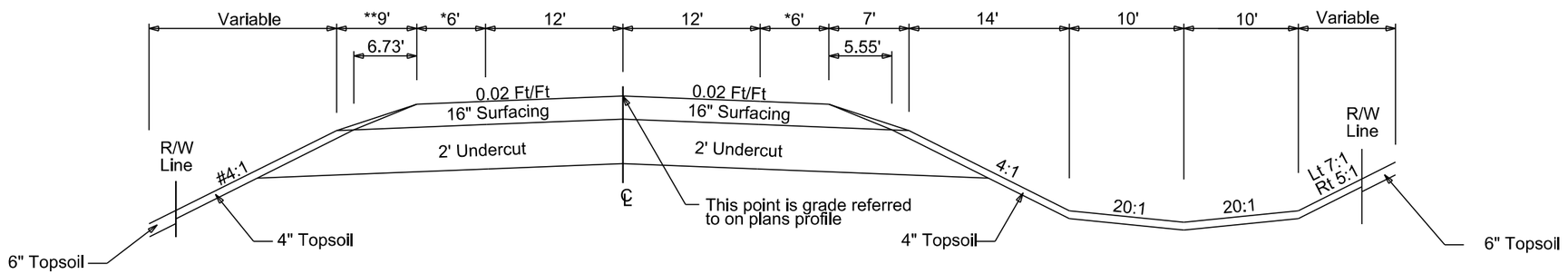
TYPICAL GRADING SECTION

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B12	B49

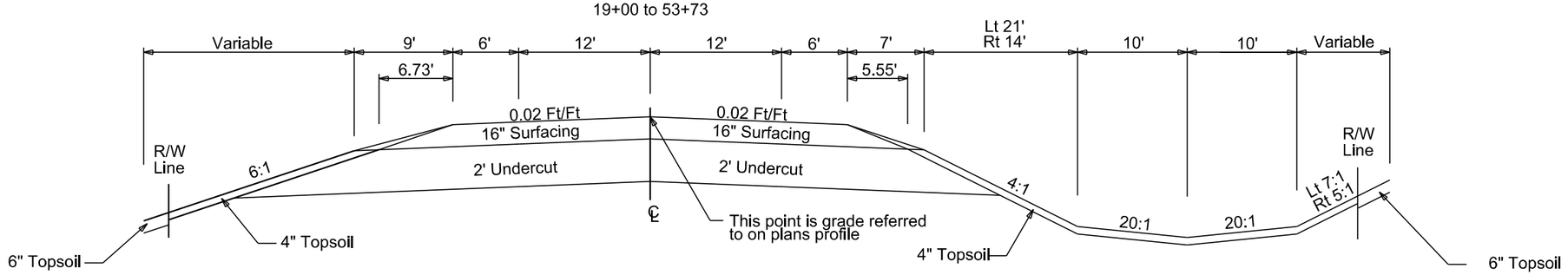
Plotting Date: 09/23/2024

10+00 to 19+00

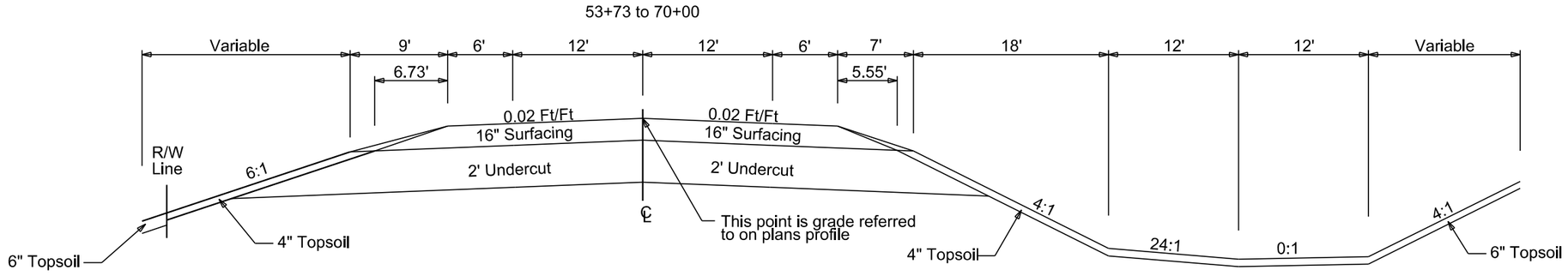


*Transition 2' to 6': 10+00 to 10+50
**Transition 7' to 9': 10+00 to 10+50
#Transition 4:1 to 6:1: 17+00 to 19+00

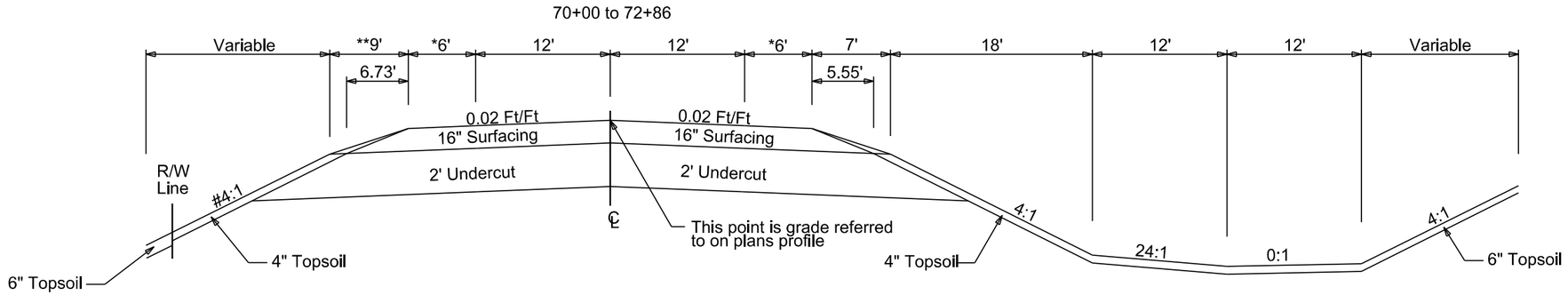
19+00 to 53+73



53+73 to 70+00



70+00 to 72+86



*Transition 6' to 4': 72+36 to 72+86
**Transition 9' to 7': 72+36 to 72+86
#Transition 6:1 to 4:1: 68+00 to 70+00

HORIZONTAL ALIGNMENT DATA

MAINLINE

Type	Station			Northing	Easting
POB	10+00.00			779141.046	1214625.112
		TL= 140.00	N 2°13'35" E		
PC	11+40.00			779280.941	1214630.551
PI	18+16.44	R = 5780.00	Delta = 13°21'00" R	779956.867	1214656.829
PT	24+86.75			780608.461	1214838.467
		TL= 3094.53	N 15°34'35" E		
PC	55+81.28			783589.338	1215669.417
PI	62+60.61	R = 5780.00	Delta = 13°24'24" L	784243.723	1215851.834
PT	69+33.74			784922.572	1215877.553
		TL= 366.26	N 2°10'11" E		
POE	73+00.00			785288.567	1215891.419

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. North Zone (NAD 83/11); epoch 2010.00; Geoid 12B; SF = 0.99991070

CONTROL DATA

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B14	B49

Plotting Date: 09/23/2024

HORIZONTAL AND VERTICAL CONTROL POINTS						
POINT	**STATION**	**OFFSET**	**DESCRIPTION**	**NORTHING**	**EASTING**	**ELEVATION**
CP 1	69+85.96	97.87' R	1" ALUM CAP	784971.041	1215977.366	2603.06
CP 2	OFF	PROJECT	1" ALUM CAP	778236.271	1214523.201	2740.95

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. North Zone (NAD 83/11); epoch 2010.00
Geoid 12B; SF = 0.99991070
The elevations shown on this sheet are based on NAVD 88.

LEGEND

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B15	B49

Plotting Date: 09/23/2024

- Anchor
- Antenna
- Approach
- Assumed Corner
- Azimuth Marker
- BBQ Grill/ Fireplace
- Bearing Tree
- Bench Mark
- Box Culvert
- Bridge
- Brush
- Buildings
- Bulk Tank
- Cattle Guard
- Cemetery
- Centerline
- Cistern
- Clothes Line
- Commercial Sign Double Face
- Commercial Sign One Post
- Commercial Sign Overhead
- Commercial Sign Two Post
- 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
- Guide Sign One Post
- Guide Sign Two Post
- Gutter
- Guy Pole
- Haystack
- Hedge
- 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
- Regulatory Sign One Post
- Regulatory Sign Two Post
- 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 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 —
- Warning Sign One Post
- Warning Sign Two Post
- 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

Plot Scale - 1:200

Plotted From - TRPR18163

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B16	B49

Plotting Date: 09/23/2024

15+28
Take Out 24"-120' RCP
(Incidental Work, Grading)

15+32 (27 ac)
Install 30"-134' RCP
(CL3-134')
& 2 Sloped Ends

15+32 L
Install Bank and Channel
Protection Gabions (6.0 CuYd)
and Type B Drainage Fabric
(19 SqYd)

22+90
Take Out 24"-124' RCP
(Incidental Work, Grading)

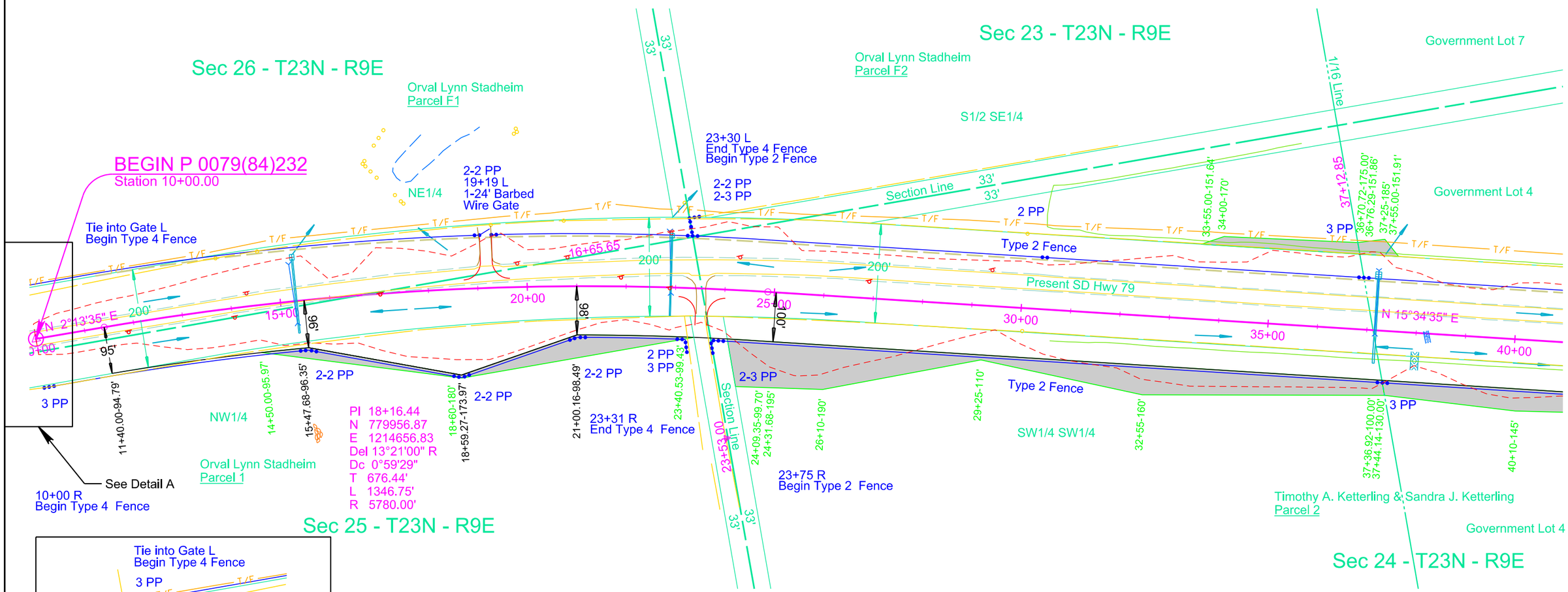
22+90 (16 ac)
Install 24"-146' RCP
& 2 Sloped Ends

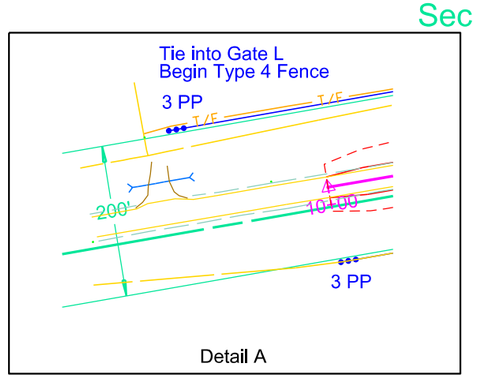
22+90 L
Install Bank and Channel
Protection Gabions (4.5 CY)
and Type B Drainage Fabric
(15 Sq Yd)

37+17
Take Out 30"-128' RCP
(Incidental Work, Grading)

37+17 (79 ac)
Install 42"-156' RCP
(CL3-156')
& 2 Flared Ends

37+17 L
Install Bank and Channel
Protection Gabions (10.0 CuYd)
and Type B Drainage Fabric
(29 SqYd)





Detail A

Parcel 1
14+50.00 to 23+40.53 R
Temporary Easement containing
0.4 ac, more or less

Parcel 2
24+09.35 to 51+80.00 R
Temporary Easement containing
2.4 ac, more or less

Parcel 2
33+55.00 to 37+55.00 L
Temporary Easement containing
0.2 ac, more or less

Plot Scale - 1:200

Plotted From - TRPR18163

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B17	B49

Plotting Date: 09/23/2024

EXC	20019	EMB	8648		
UNDERCUT	3792	35.0%	3027	11675	
OPTION BORROW	2570	UNDERCUT	3792		
TOTAL	26381	35.0%	1327	5119	
		WASTE		9587	
		TOTAL		26381	

Haul	16,100	C Y Sta
Option Borrow Haul	25,900	C Y Sta
Dead Haul	64,300	C Y Sta

Waste is excess excavated material from existing roadway.

10+00
Begin Work

25+00

38+00 R
Ditch Block
Elev 2646.5

PVI 10+00
Elev 2711.25

19+19 L
24' Ent

23+54 R
24' Ent

L 800.00ft
G1 -3.9157%
G2 -0.7094%
K 250

-3.9157%

-0.7094%

RDG -0.6250%

RDG 1.0448%

LDG 6.1067%

RDG -1.6537%

LDG -1.5800%

LDG -7.9889%

RDG 6.0625%

LDG 2.3077%

PVI 14+39
Elev 2694.06

FL 2683.6
FL 2679.6

Q_{35} =26.25 cfs
EL.= 2685.60

LDGPI 17+00
Elev 2677.50

LDGPI 18+50
Elev 2686.66

RDGPI 15+00
Elev 2683.00

RDGPI 15+32
Elev 2682.80

RDGPI 18+00
Elev 2685.60

LDGPI 21+50
Elev 2682.84

LDGPI 22+00
Elev 2682.05

LDGPI 22+90
Elev 2674.86

RDGPI 22+90
Elev 2677.50

FL 2677.4
FL 2675.4

RDGPI 23+54
Elev 2681.38

LDGPI 25+50
Elev 2680.86

LDGPI 28+00
Elev 2677.14

PVI 29+98
Elev 2683.00

LDG -2.3420%

LDG -8.2925%

LDGPI 31+33
Elev 2669.34

L 1000.00ft
G1 -0.7094%
G2 -3.8485%
K 319

-3.8485%

RDG -1.7773%

LDG -2.9400%

LDG -1.9403%

RDG 5.4217%

LDG 4.0226%

RDGPI 32+50
Elev 2649.30

LDGPI 34+00
Elev 2647.20

LDGPI 36+50
Elev 2639.85

LDGPI 38+50
Elev 2643.90

LDGPI 37+17
Elev 2638.55

RDGPI 37+17
Elev 2641.00

RDGPI 38+00
Elev 2645.50

FL 2642.6
FL 2639.4

Q_{54} =90.57 cfs
EL.= 2646.50

2785 2780 2770 2760 2750 2740 2730 2720 2710 2700 2690 2680 2670 2660 2650 2640 2630 2620 2610 2600

2711.25 2707.41 2703.94 2700.87 2698.20 2695.93 2694.06 2692.60 2691.53 2690.79 2690.08 2689.37 2688.66 2687.95 2687.24 2686.53 2685.66 2684.47 2682.97 2681.16 2679.03 2676.59 2673.83 2670.76 2667.38 2663.68 2659.83 2655.98 2652.14 2648.29 2644.44

10+00 15+00 20+00 25+00 30+00 35+00 40+00

Plot Scale - 1:200

Plotted From - TRPR18163

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B18	B49

Plotting Date: 09/23/2024

46+66-102' L
Take Out 18"- 54' RCP
(Incidental Work, Grading)

46+67-7' L
Take Out 18"- 58' RCP
(Incidental Work, Grading)

53+37 L to 54+66 L
Retain Riprap

46+61-58' L (2 ac)
Install 18"-64' CMP
& 2 Safety Ends

46+61-49' R (3 ac)
Install 18"-66' CMP
& 2 Safety Ends

Remove Guardrail
at Following Locations:
50+27-37' L to 51+60-38' L
50+77-69' L to 51+60-68' L
53+72-38' L to 54+55-36' L
53+72-68' L to 55+05-70' L

53+76-17.44' L to 53+76-17.44' R
Install 18"-34' RCP
(Between Drop Inlets)

53+76-17.44' R to 78.8' R
Install 18"-56' CMP (16' & 8' & 32')
And 2-15.0°Elbows
& 1 CMP Flared End
(Between Drop Inlet and Outlet)

53+76 R
Install Bank and Channel
Protection Gabions (4.5 CuYd)
and Type B Drainage Fabric
(15 SqYd)

51+68.42 to 53+64.42
Install 196'-0" Prestr. Girder Bridge
DA=604 sq. mi.
(See Section E)

53+76-17.44' L
Install 2'x3' Type B Drop Inlet
with 6" Concrete Collar
and Type A Frame and Grate
Top Wall Elev. 2613.92
Floor Elev. 2610.26

53+76-17.44' R
Install 2'x3' Type B Drop Inlet
with 6" Concrete Collar
and Type A Frame and Grate
Top Wall Elev. 2613.92
Floor Elev. 2608.89

51+60.27-53.34' L to 53+71.86-53.21' L
Take Out 211' 7" Bridge
(Incidental Work, Structure)

Section Line
33'
33'
ADAMS COUNTY
HARDING COUNTY
53+72 L
Begin Type 2 Fence
51+60 L
End Type 2 Fence
53+22.27-152.96' & 276'
54+86.27-153.07' & 276'
46+25.00-152.49' & 170'
46+93.00-152.54' & 170'
Government Lot 4
2-2 PP
46+61 L
1-24' Barbed
Wire Gate
Type 2 Fence
N 15°34'35" E
Present SD Hwy 79
40+00
45+00
50+00
100'
2-2 PP
3 PP
3-2 PP
Type 2 Fence
40+10 - 145'
2-2 PP
46+61 R
1-24' Barbed
Wire Gate
3-2 PP
51+60 R
End Type 2 Fence
51+80.00-100.00' & 105'
North Fork Grand River
53+45.00-100.00'
3-2 PP
55+45-130'
56+20.00-100.13'
53+72 R
Begin Type 2 Fence
Government Lot 3
Timothy A. Ketterling & Sandra J. Ketterling
Parcel 2
Government Lot 4
Sec 24 - T23N - R9E
57+13.89
33'
56+80 L
End Type 2 Fence
Begin Type 4 Fence
2-2 PP
2-3 PP
3 PP
200'
100'
55+00
57+35.51-102.09'
1/16 Line
57+41 R
End Type 2 Fence
Begin Type 2 Fence
61+42 L
End Type 4 Fence
2-2 PP
Present ND Hwy 22
60+00
65+00
PI 62+60.61
N 784243.72
E 1215851.83
Del 13°24'24" L
Dc 0°59'29"
T 679.34'
L 1352.47'
R 5780.00'
Orval L. Stadheim
W1/2 SE1/4
E1/2 SE1/4
Timothy A. Ketterling & Sandra J. Ketterling
Sec 32 - T129N - R98W
2 PP
2-2 PP
68+07 R
1-40' Barbed
Wire Gate
2 PP
2-3 PP
3 PP
70+16 R
End Type 2 Fence
70+00
N 2°10'11" E
200'
100'
NORTH DAKOTA
SOUTH DAKOTA

Parcel 2
46+25.00 to 46+93.00 L
Temporary Easement containing
0.1 ac, more or less

Parcel 2
53+45.00 to 56+20.00 R
Temporary Easement containing
0.1 ac, more or less

Plot Scale - 1:200
Plotted From - TRPR18163
File - U:\rdp\jh\hard06TD\040.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B19	B49

Plotting Date: 09/23/2024

	EXC	56642	EMB	49402	
	UNDERCUT	3014	35.0%	17291	66693
	OPTION BORROW	31430	UNDERCUT	3014	
	CONTRACTOR FURNISHED BORROW	5782	35.0%	1055	4069
	TOTAL	96868	WASTE		26106
			TOTAL		96868

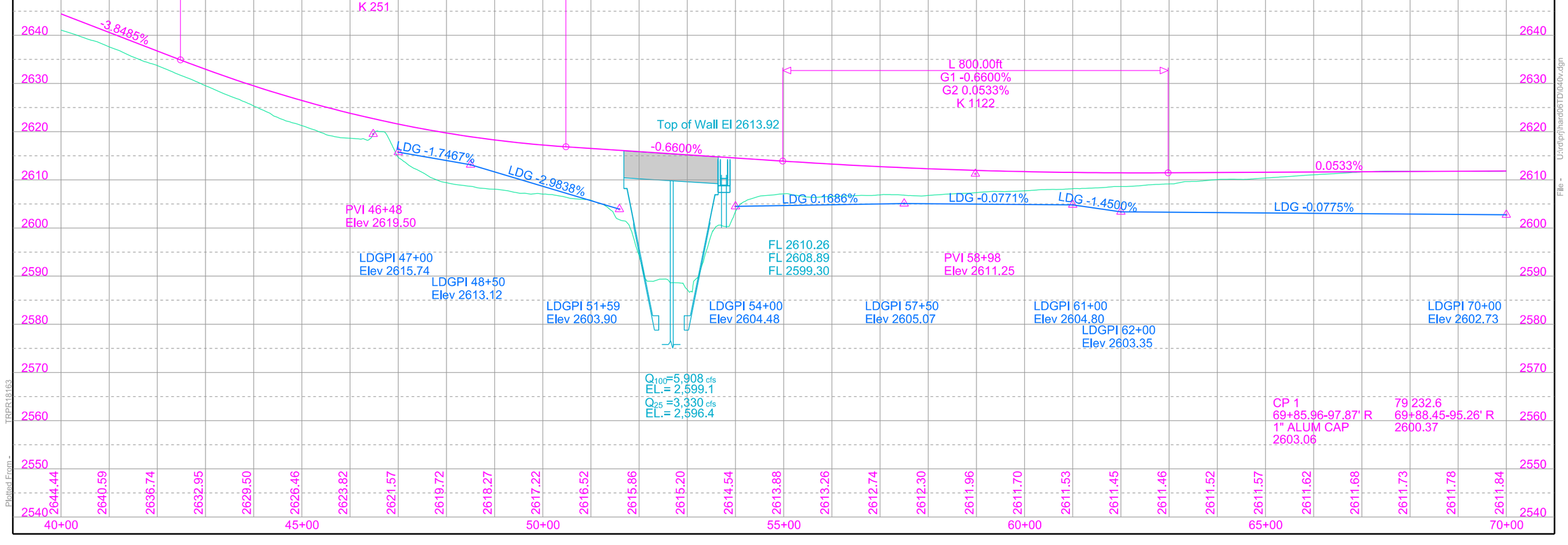
Haul 67,400 C Y Sta
Option Borrow Haul 418,400 C Y Sta
Dead Haul 785,800 C Y Sta

Waste is excess excavated material from existing roadway.

	EXC	17599	EMB	20290	
	UNDERCUT	5291	35.0%	7102	27392
	CONTRACTOR FURNISHED BORROW	23733	UNDERCUT	5291	
	TOTAL	46623	35.0%	1852	7143
			WASTE		12088
			TOTAL		46623

Haul 507 C Y Sta

Waste is excess excavated material from existing roadway.



Plot Scale - 1:200

Plotted From - TRPR18163

File - U:\rdir\pr\hard06TD\040v.dgn

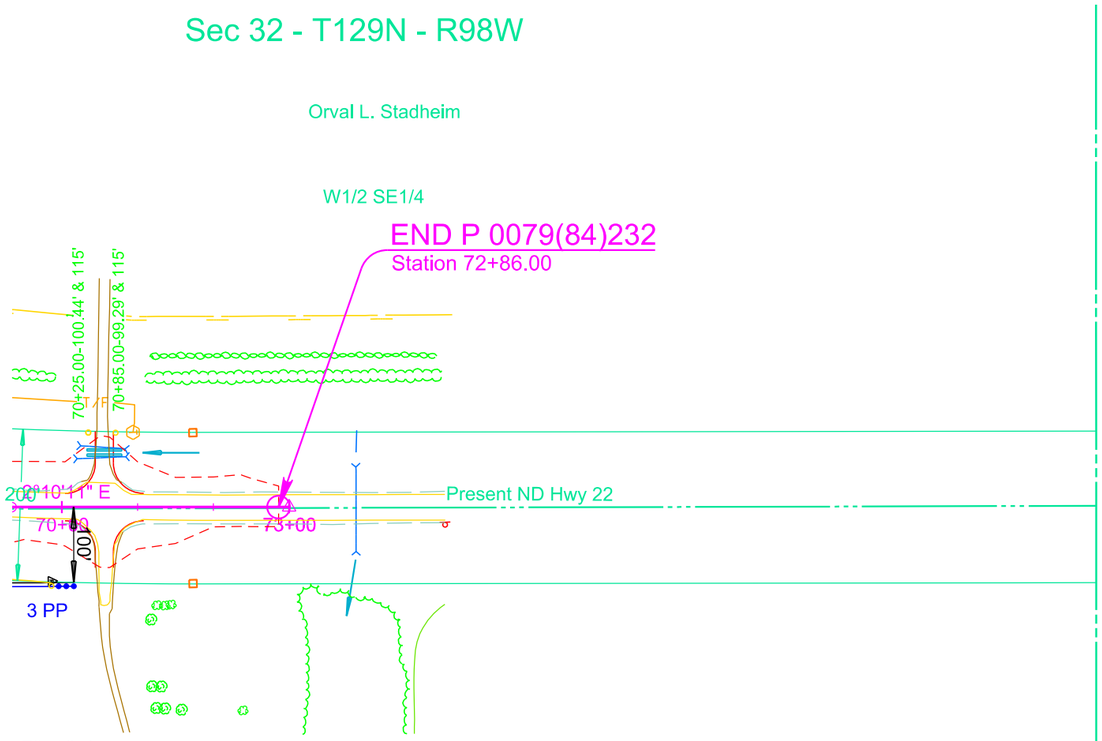
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B20	B49

Plotting Date: 09/23/2024

70+54-79' L
Take Out 24"-60' CMP
(Incidental Work, Grading)

70+52-65' L
Take Out 24"-64' RCP
(Incidental Work, Grading)

70+56-72' L (1 ac)
Install Twin 36"-48' CMP Arch
with Controlled Density Fill
(Spaced 8.3' C to C)
& 4 Flared Ends



Plot Scale - 1:200

Plotted From - TRPR18163

File - U:\d\prj\hardd061TD\070.dgn

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B21	B49

Plotting Date: 09/23/2024

Plot Scale - 1:200

2750
2740
2730
2720
2710
2700
2690
2680
2670
2660
2650
2640
2630
2620
2610
2600
2590
2580
2570

72+86
End Work

70+56 L
24' Ent

70+56 R
24' Ent

PVI 72+86
Elev 2611.99

0.0533%

LDG 0.6700%

LDGPI 71+00
Elev 2603.40

2611.84
2611.89
2611.94

70+00
73+00

TRPP18163

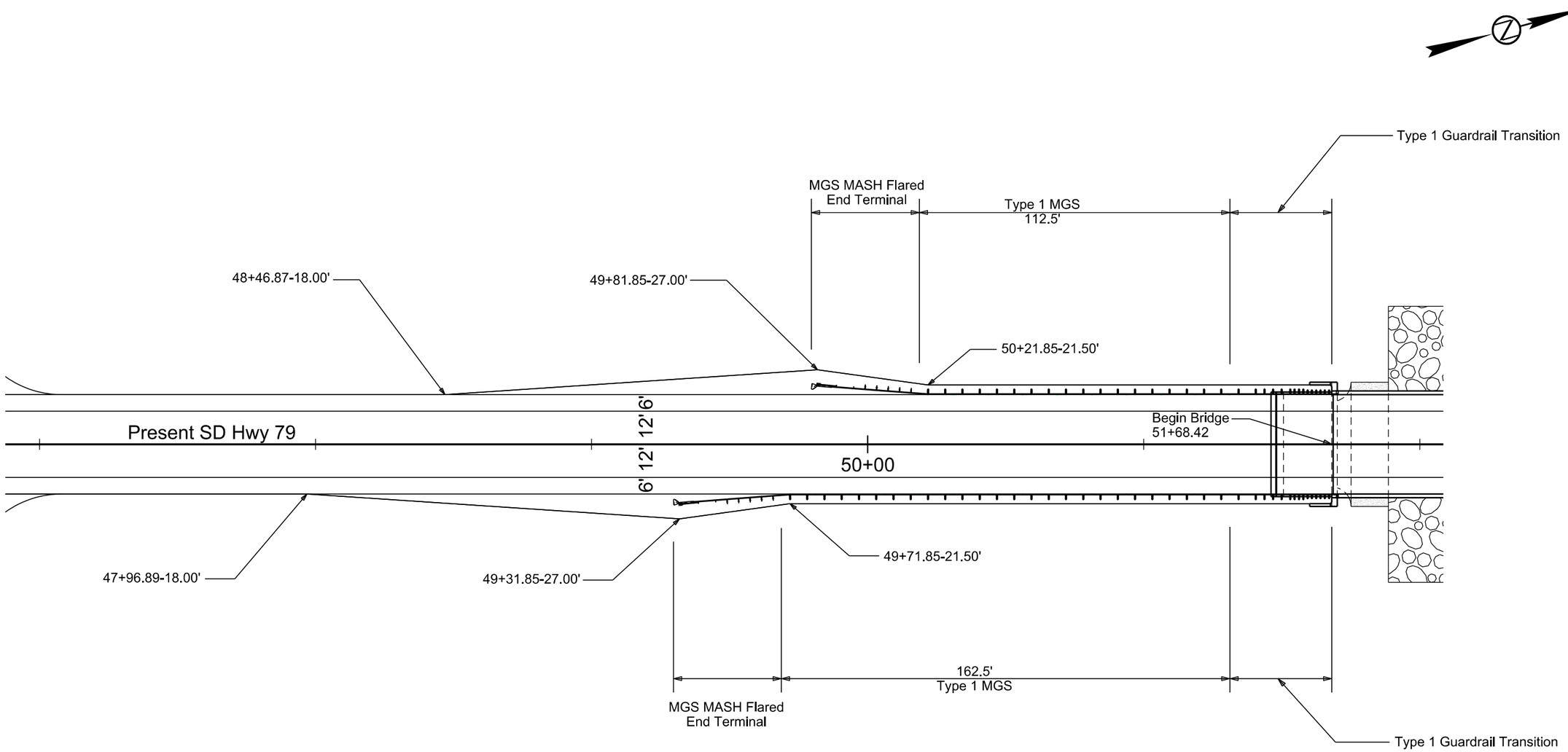
Plotted From -

File - U:\rdprj\hardd6\TD1070v.dgn

GUARDRAIL LAYOUT

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B22	B49

Plotting Date: 09/23/2024



Plot Scale - 1:40

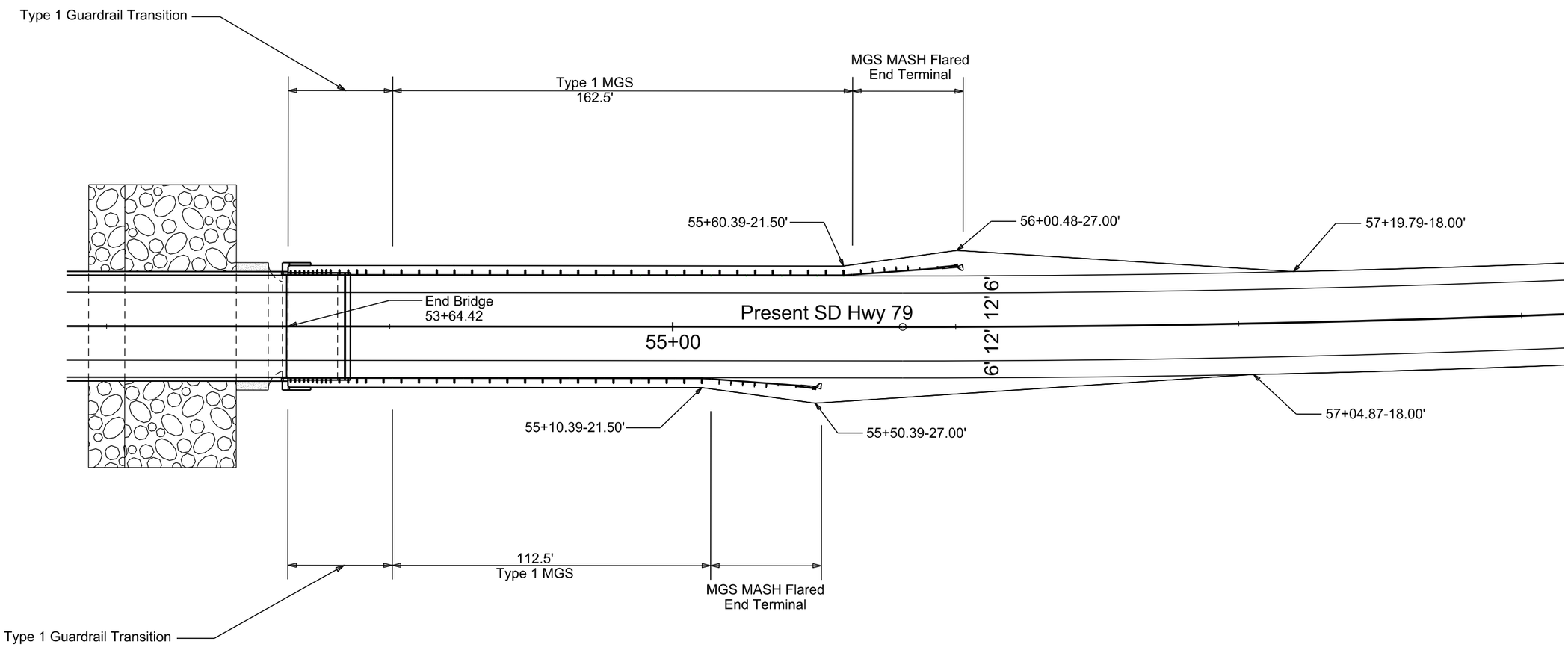
Plotted From - TRPR18163

File - U:\rdp\hard06TD\047gr.dgn

GUARDRAIL LAYOUT

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B23	B49

Plotting Date: 09/23/2024



Plot Scale - 1:40

Plotted From - TRPR18163

File - U:\rdplrj\hard06TDI053gr.dgn

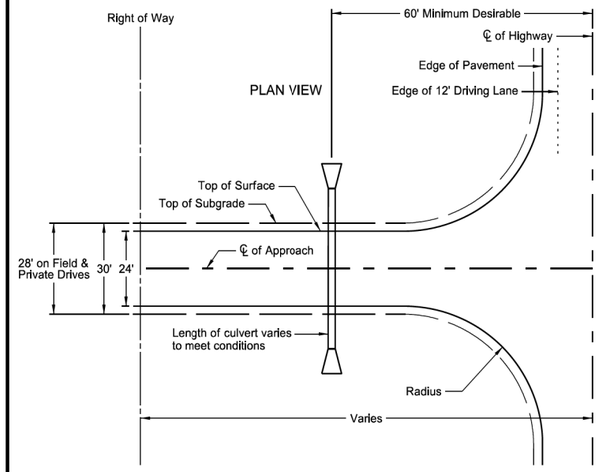
Entrance at Station 70+56 R & L

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B24	B49

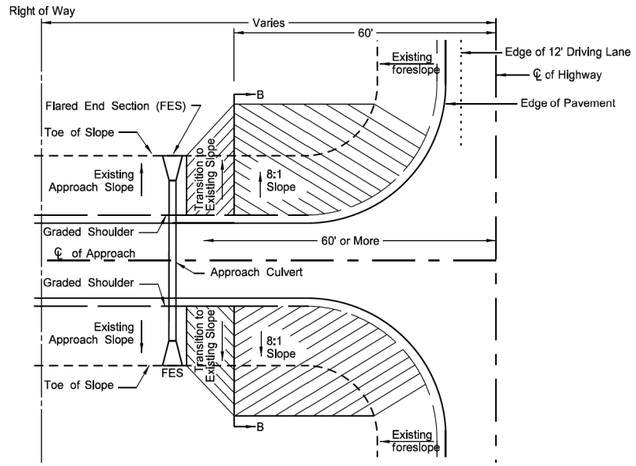
Plotting Date: 09/23/2024

D-203-8

STANDARD RURAL APPROACHES

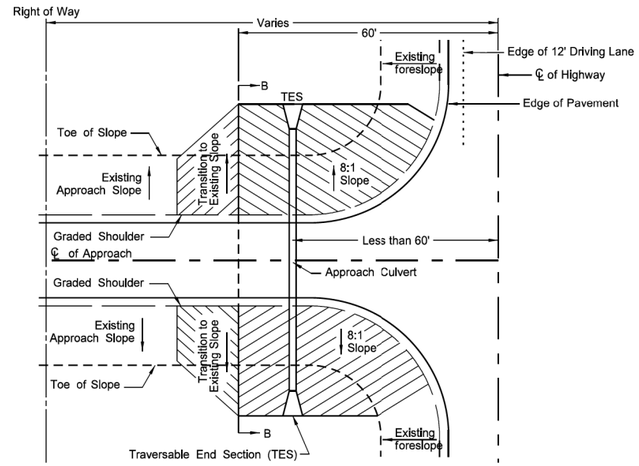


APPROACH INSLOPES



CASE 1

APPROACH PIPE LOCATED
60' OR MORE FROM ℄

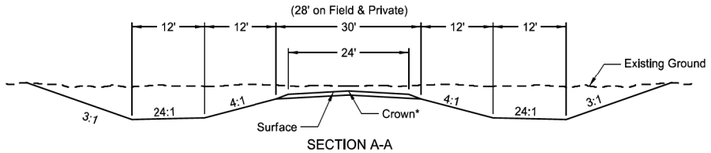


CASE 2

APPROACH PIPE LOCATED
LESS THAN 60' FROM ℄

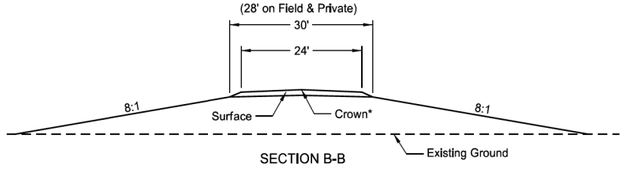
CRITERIA FOR RURAL APPROACH TYPES

	Field Drives	Private Drives	Low Volume Public Roads
Radius	R=40 ft	R=40 ft	R=50 ft
Maximum Grade	10%	7%	7%
Storage Platform	24 ft	24 ft	50 ft
Vertical Curve Length	10 ft	10 ft	Varies (Min. 20 mph)

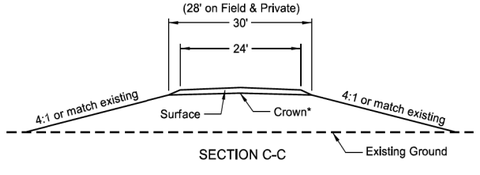


SECTION A-A

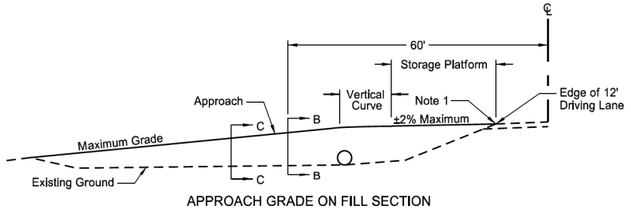
*2.1% crown for paved surface
*3.0% crown for gravel surface



SECTION B-B



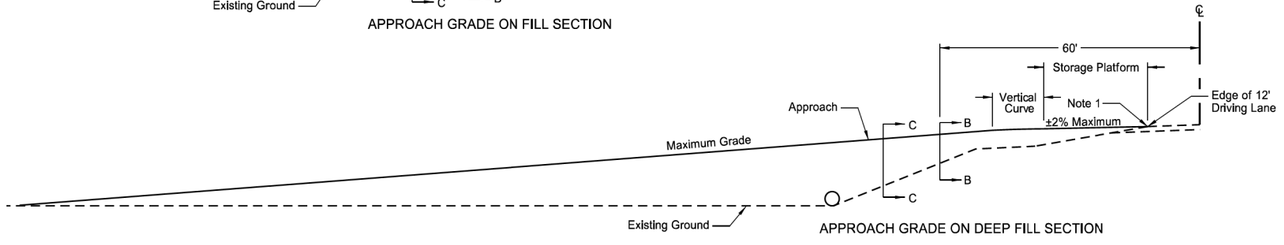
SECTION C-C



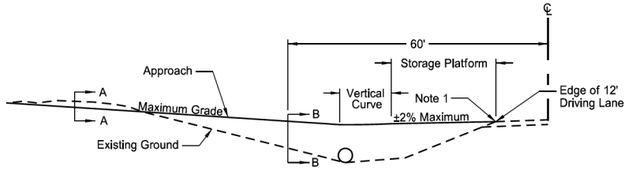
APPROACH GRADE ON FILL SECTION

NOTES:

1. 5% Max Rollover between approach storage platform and highway.



APPROACH GRADE ON DEEP FILL SECTION



APPROACH GRADE ON CUT SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-25-14	
REVISIONS	
DATE	CHANGE
6-30-2017	Revised Radius, Storage Platform, Inslope dimensions, and Note 1.
10-25-2019	Changed "Inslope" to "Foreslope".

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683, on 10/25/19 and the original document is stored at the North Dakota Department of Transportation

Plot Scale - 1:200

Plotted From - TPPR18163

File - ...\Special Detail 70+56 Ent.dgn

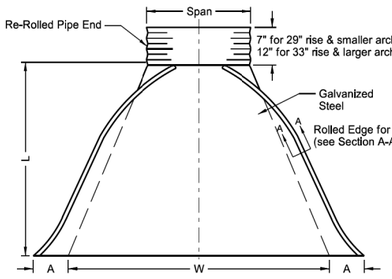
Pipes at Station 70+56-72' L

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B25	B49

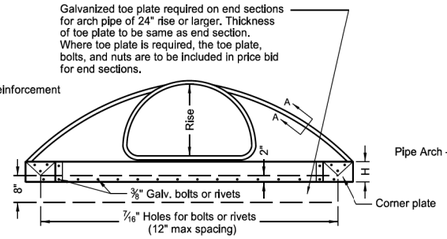
Plotting Date: 09/23/2024

CORRUGATED STEEL PIPE ARCH CULVERTS AND END SECTIONS

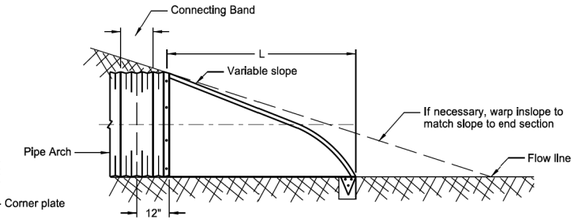
D-714-5



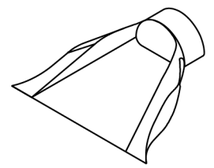
PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)



PERSPECTIVE VIEW

PIPE ARCH DIMENSION SPAN	PIPE ARCH DIMENSION RISE	GALV. THICK.	END SECTION DIMENSIONS A	B	H	L	W	APPROX. SLOPE	BODY
IN	IN	IN	IN	IN	IN	IN	IN	RATE	PIECE
17	13	0.064	7	9	6	19	30	2½:1	1
21	15	0.064	7	10	6	23	36	2½:1	1
24	18	0.064	8	12	6	28	42	2½:1	1
28	20	0.064	9	14	6	32	48	2½:1	1
35	24	0.079	10	16	6	39	60	2½:1	1 or 2
42	29	0.079	12	18	8	46	75	2½:1	1 or 2
49	33	0.109	13	21	9	53	85	2½:1	2
57	38	0.109	18	26	12	63	90	2½:1	2
64	43	0.109	18	30	12	70	102	2¼:1	2
• 71	47	0.109	18	33	12	77	114	2¼:1	3
• 77	52	0.109	18	36	12	77	126	2:1	3
• 83	57	0.109	18	39	12	77	138	2:1	3

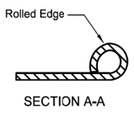
① Applicable to equivalent sizes of 3"x1" corrugations.

• These sizes have 0.109" sides and 0.138" center panels.

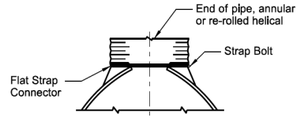
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

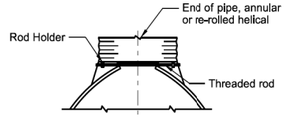
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



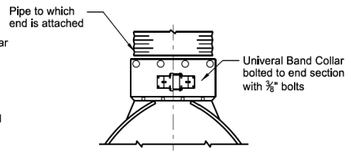
SECTION A-A



TYPE #1
For arch pipes with 20" rise & smaller



TYPE #2
For arch pipes with 24" thru 38" rise



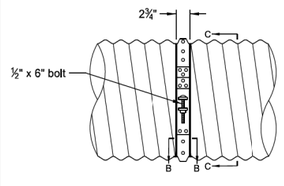
TYPE #3
For all arch pipe sizes

2⅔" x ½" CORRUGATIONS SPAN	RISE	EQUIV PIPE DIA.
IN	IN	IN
17	13	15
21	15	18
24	18	21
28	20	24
35	24	30
42	29	36
49	33	42
57	38	48
64	43	54
71	47	60
77	52	66
83	57	72

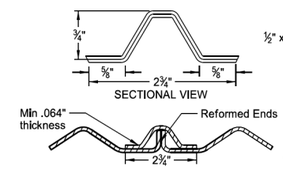
3" x 1" CORRUGATIONS SPAN	RISE	EQUIV PIPE DIA.
IN	IN	IN
53	41	48
60	46	54
66	51	60
73	55	66
81	59	72
87	63	78
95	67	84
103	71	90
112	75	96
117	79	102
128	83	108
137	87	114
142	91	120

For pipe arches use the same width band as for circular pipe of equal periphery.

COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	ARCH PIPE RISE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	13" - 38"	2¾"	.064"
Annular Band	2⅔" x ½"	13" - 57"	12"	.052"
	3" x 1"	41" - 91"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	13" - 57"	10½"	.052"
		63" - 67"	10½"	.079"
	3" x 1" Rerolled End	41" - 91"	10½"	.052"
	5" x 1" Rerolled End	41" - 91"	12"	.064"

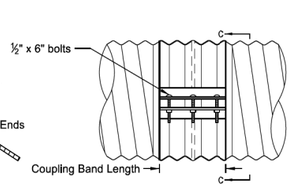


SIDE VIEW

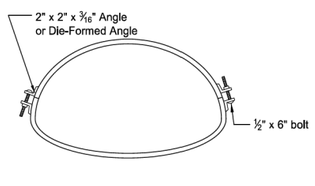


SECTIONAL VIEW
SECTION B-B

HAT BAND FOR FLANGED END PIPE

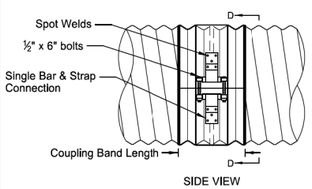


SIDE VIEW

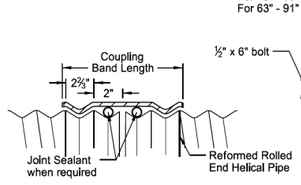


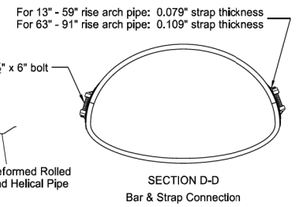
SECTION C-C
Angle Connection

ANNULAR BAND



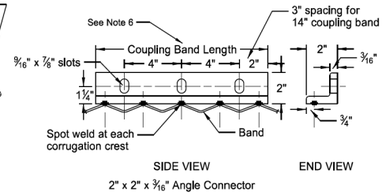
SIDE VIEW





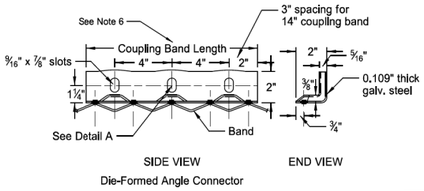
SECTION D-D
Bar & Strap Connection

HUGGER COUPLING BAND



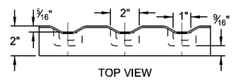
SIDE VIEW END VIEW

2" x 2" x 3/16" Angle Connector

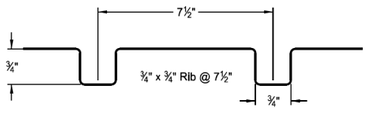


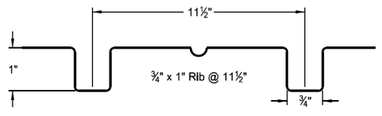
SIDE VIEW END VIEW

Die-Formed Angle Connector

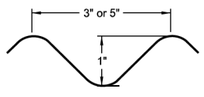


TOP VIEW
Die-Formed Angle Connector

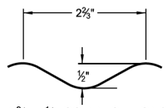




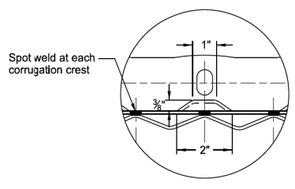
SPIRAL RIB CORRUGATIONS



3" x 1" CORRUGATIONS or
5" x 1" CORRUGATIONS



2⅔" x ½" CORRUGATIONS



Detail A

NOTES:

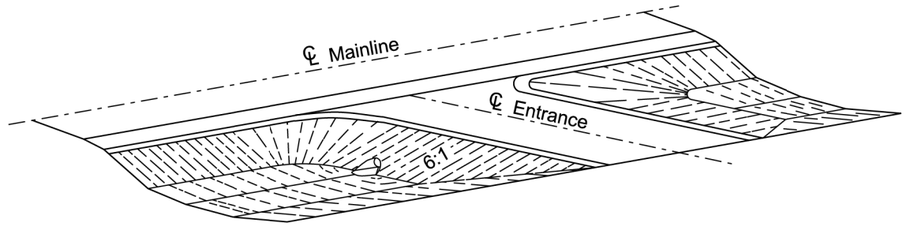
1. Pipe and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" ¼" galv. angle for 77"x52" and 83"x57" sizes. Angles to be attached by galv. ⅜" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Coupling bands shall be two-piece for all arch pipes.
4. ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
5. Coupling bands wider than 14" may be used if a minimum of four ½" bolts with maximum spacing of 5½" are used for the connection
6. Length of spot welds shall be minimum ½".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-16-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail
09-18-19	Added Perspective View Detail

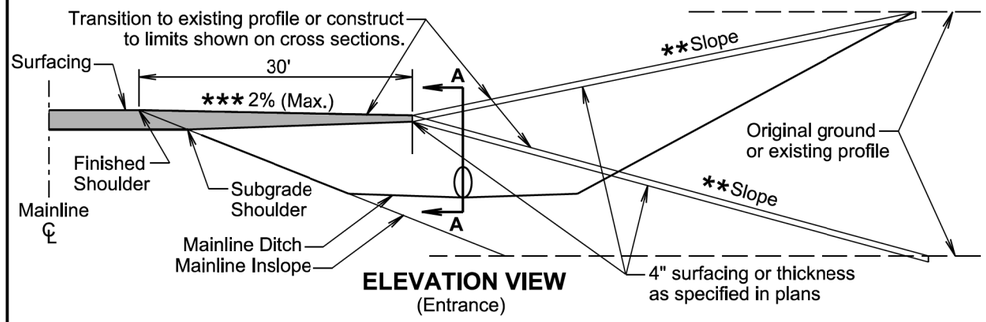
This document was originally issued and sealed by Jon Ketterling Registration Number PE- 4684, on 9/18/19 and the original document is stored at the North Dakota Department of Transportation

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B26	B49

Plotting Date: 09/23/2024



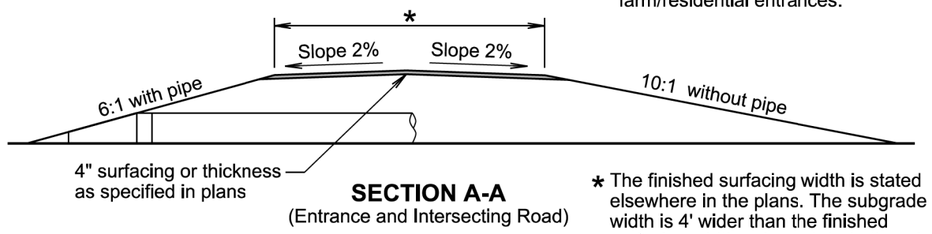
PERSPECTIVE OF ENTRANCE



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.

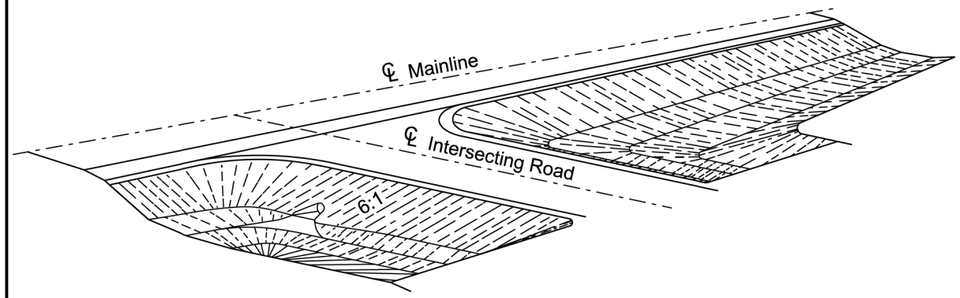
Pipe length will be adjusted if necessary during construction to obtain the 6:1 slope. For grading projects, the pipe length is estimated typically using a 4" thickness of surfacing directly over the subgrade above the pipe.

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

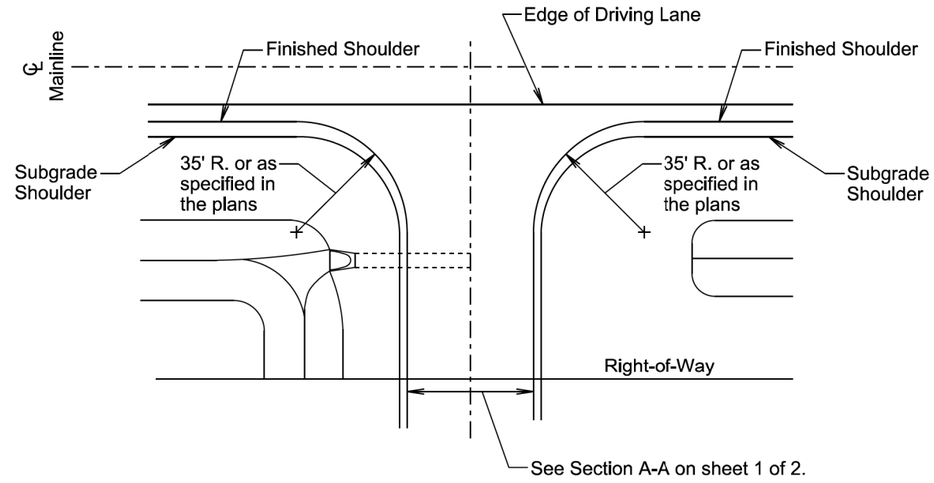
The turning radii will be 35' for intersecting roads and entrances unless stated otherwise in the plans.

November 19, 2021

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



PERSPECTIVE OF INTERSECTING ROAD



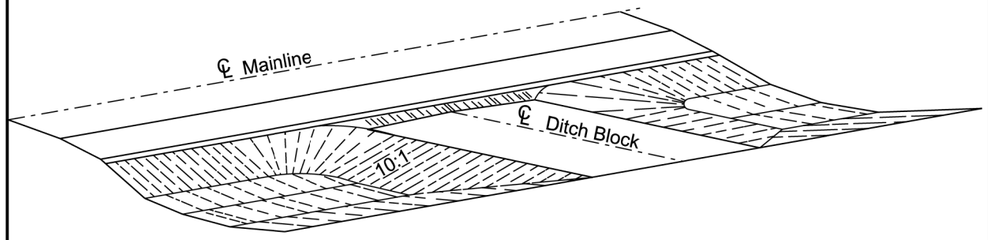
PLAN VIEW

GENERAL NOTES:

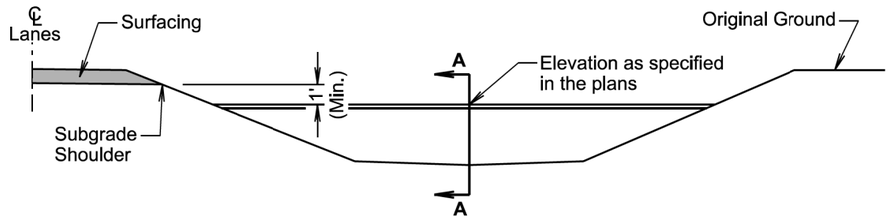
The 6:1 or 10:1 intersecting road inslope will transition to the existing intersecting road inslope near the right-of-way or at a location as determined by the Engineer.

November 19, 2021

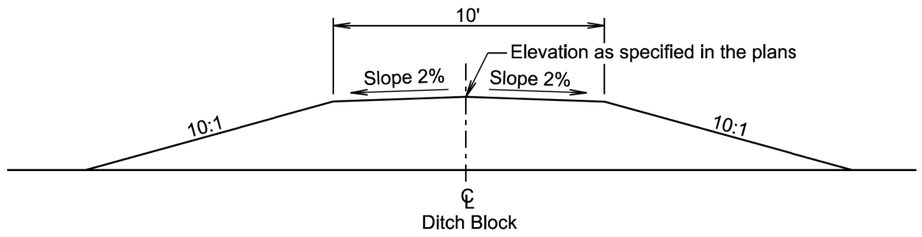
Published Date: 2025	SDDOT	INTERSECTING ROADS AND ENTRANCES	PLATE NUMBER 120.01
			Sheet 2 of 2



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.

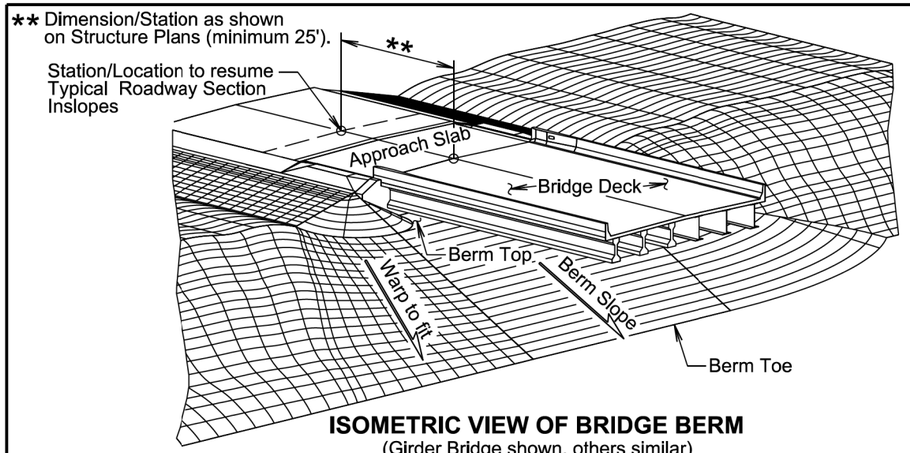
The inslopes of the ditch block will be 10:1 or as specified in the plans.

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

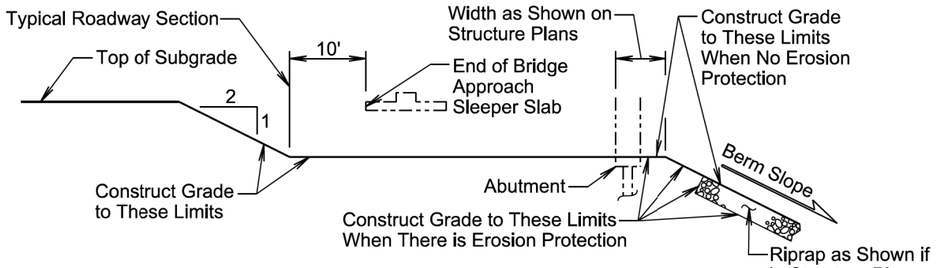
September 14, 2018

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

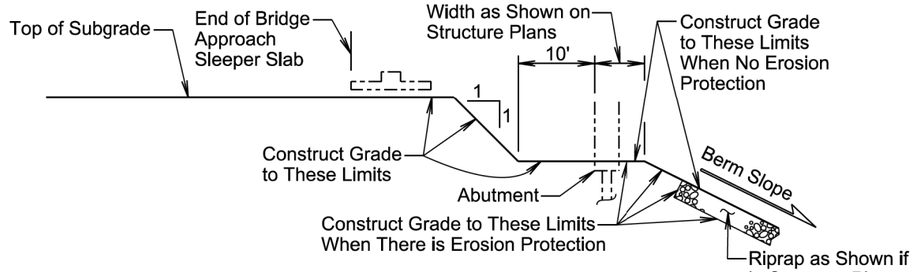
** Dimension/Station as shown on Structure Plans (minimum 25').



ISOMETRIC VIEW OF BRIDGE BERM
(Girder Bridge shown, others similar)



TYPICAL GRADING PROFILE AT BRIDGE BERM
(Normal to ℄ Abutment at ℄ Roadway)



TYPICAL GRADING PROFILE AT BRIDGE BERM
(Normal to ℄ Abutment at ℄ Roadway)

GENERAL NOTES:

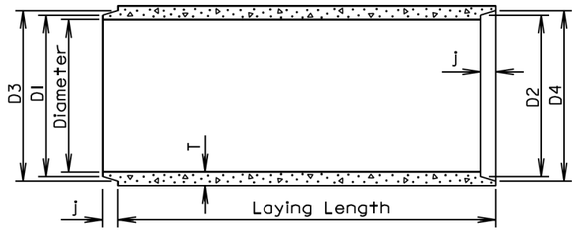
The bridge berm elevation and slope will be as shown in the Structure Plans.
See Structure Plans to determine which grading profile to use.

January 22, 2021

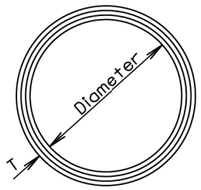
Published Date: 2025	SDDOT	***BRIDGE BERM (NONPROJECTING EMBANKMENT)***	***PLATE NUMBER*** *120.10*
			Sheet 1 of 1

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:

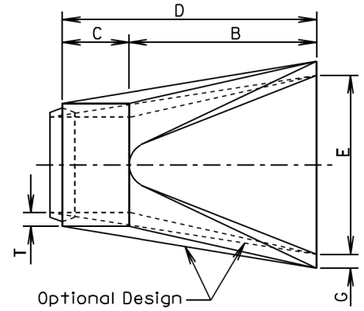
Construction of R. C. P. shall conform to the requirements of Section 990 of the Specifications.

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.

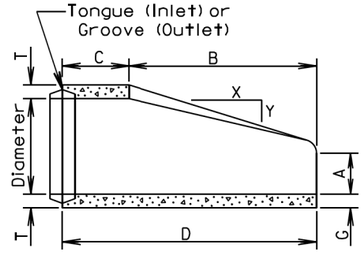
Diam. (in.)	Approx. Wt. /Ft. (lb.)	T (in.)	J (in.)	D1 (in.)	D2 (in.)	D3 (in.)	D4 (in.)
12	92	2	1 3/4	13 1/4	13 5/8	13 7/8	14 1/4
15	127	2 1/4	2	16 1/2	16 7/8	17 1/4	17 5/8
18	168	2 1/2	2 1/4	19 5/8	20	20 3/8	20 3/4
21	214	2 3/4	2 1/2	22 7/8	23 1/4	23 3/4	24 1/8
24	265	3	2 3/4	26	26 3/8	27	27 3/8
27	322	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

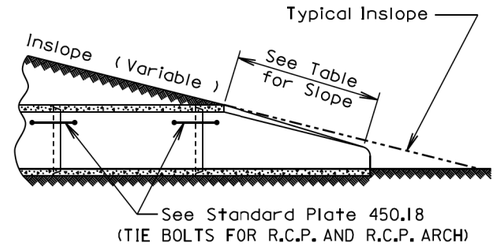
Published Date: 2025	SDDOT	REINFORCED CONCRETE PIPE	PLATE NUMBER 450.01
			Sheet 1 of 1



TOP VIEW



LONGITUDINAL SECTION

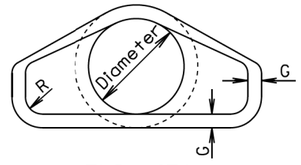


SLOPE DETAIL

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.

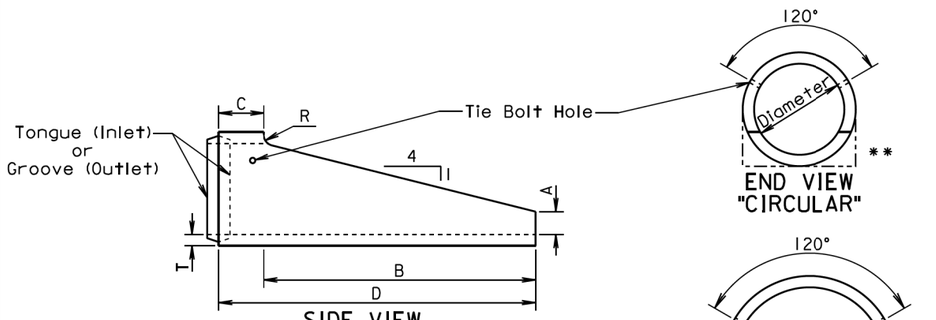


END VIEW

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



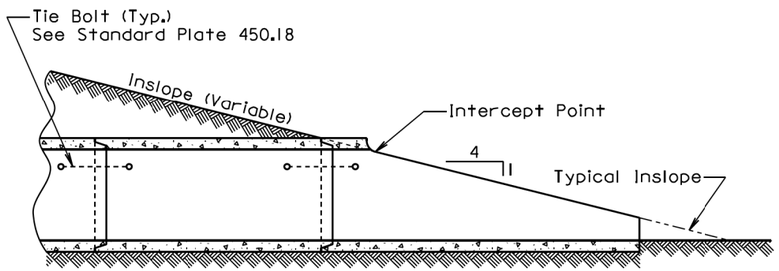
Dia. (in.)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	R (in.)
FOR CIRCULAR PIPE						
24	3	6	72	12	84	3
30	3½	7½	90	12	102	3½
FOR ARCH PIPE						
* 24	3	6	48	12	60	3
* 30	3½	7½	60	12	72	3½
* 36	4½	8⅝	66	30	96	0
* 42	4½	10	77¼	18¾	96	0

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	3½	11	90	12	102	0
FOR ARCH PIPE						
* 24	3	9	48	12	60	0
* 30	3½	11	60	12	72	0

* Equivalent Diameter of Circular R.C.P.

** Acceptable Flat Bottom Alternate.



SECTION
(Along Centerline of Pipe)

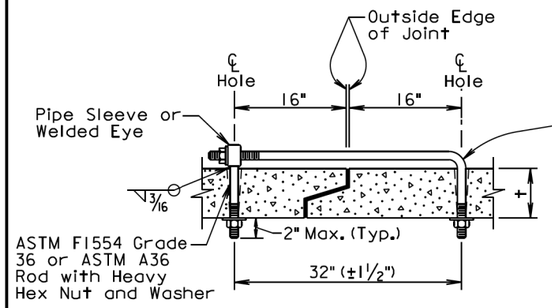
GENERAL NOTE:

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

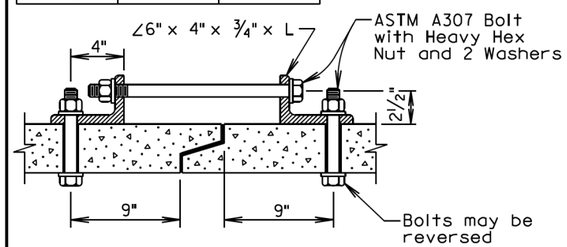
GENERAL NOTES:

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



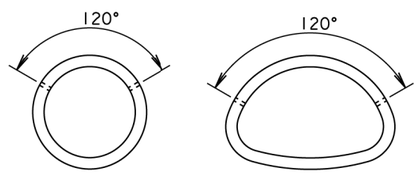
ANGLE AND BOLT TIE

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:

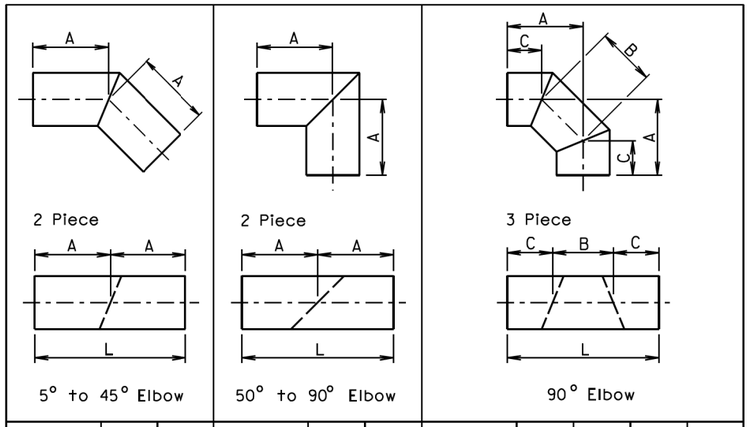
In lieu of the tie bolts detailed above other types of tie bolt connections may be installed as approved by the Office of Bridge Design.

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:

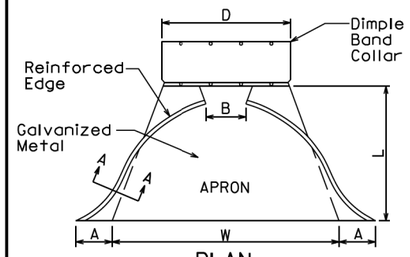
All dimensions shown are nominal.

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

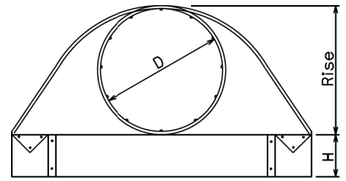
June 26, 2001

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

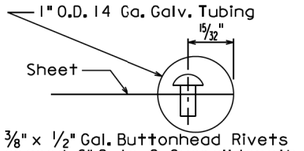
Alternate Type Connector Sections may be used with approval of the Engineer.



PLAN

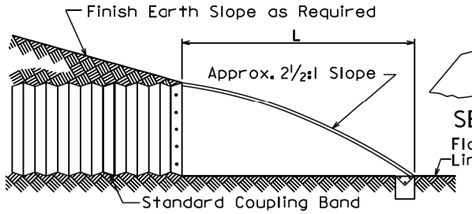


ELEVATION



⅜" x ½" Gal. Buttonhead Rivets spaced 6" C. to C. Overall length of rivets=0.78"

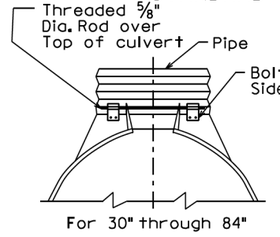
TUBING ATTACHMENT DETAILS
SECTION A-A



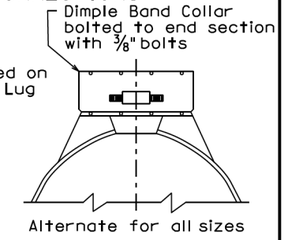
TYPICAL CROSS-SECTION

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

STANDARD CONNECTIONS

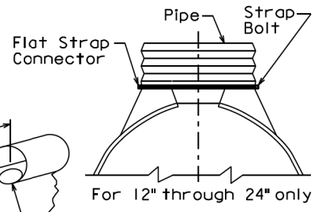


For 30" through 84"

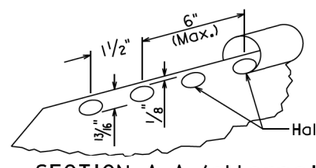


Alternate for all sizes

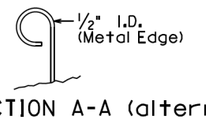
NOTE:
Tubing is slipped over the sheet and rivets or lugs prior to forming operations of the apron.



For 12" through 24" only



SECTION A-A (alternate)



SECTION A-A (alternate)

GENERAL NOTES:

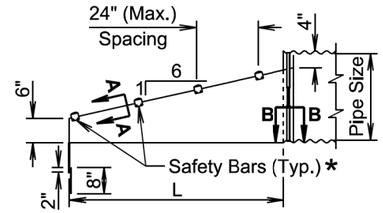
All 3 pc. bodies shall have 12 Ga. sides and 10 Ga. center panels. Width of center panels shall be greater than 20% of the pipe periphery. Multiple panel bodies to have lap seams tightly joined by ⅜" Dia. galvanized rivets or bolts.

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

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

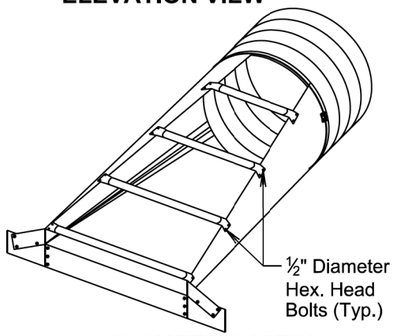
March 31, 2000

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

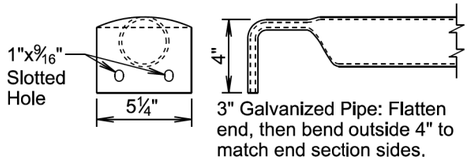


*Number of bars required will vary depending on the length of the end section.

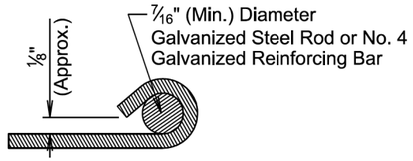
ELEVATION VIEW



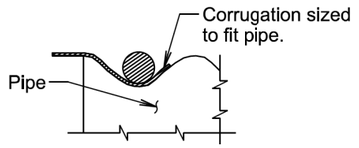
ISOMETRIC VIEW



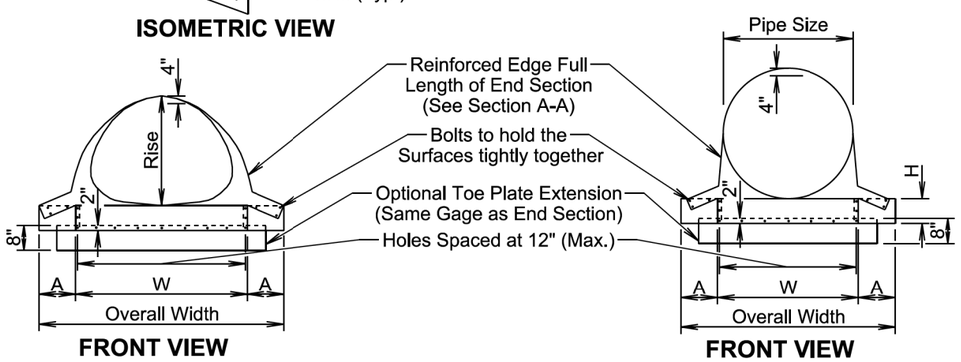
DETAIL OF SAFETY BARS



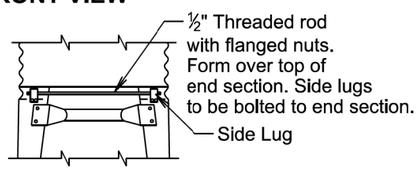
SECTION A-A



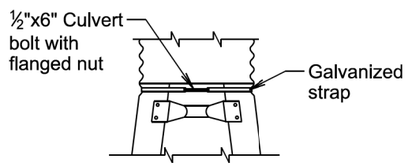
SECTION B-B



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. SAFETY ENDS	PLATE NUMBER 450.38
			Sheet 1 of 2

ARCH C.M.P. SAFETY ENDS

Equlv. 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	6:1	30
21	24	18	.064	16	8	6	30	46	6:1	48
24	28	20	.064	16	8	6	34	50	6:1	60
30	35	24	.079	14	12	9	41	65	6:1	84
36	42	29	.109	12	12	9	48	72	6:1	114
42	49	33	.109	12	16	12	55	87	6:1	138
48	57	38	.109	12	16	12	63	95	6:1	168
54	64	43	.109	12	16	12	70	102	6:1	198
60	71	47	.109	12	16	12	77	109	6:1	222
72	83	57	.109	12	16	12	89	121	6:1	282

CIRCULAR C.M.P. SAFETY 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	6:1	30
18	.064	16	8	6	24	40	6:1	48
21	.064	16	8	6	27	43	6:1	66
24	.064	16	8	6	30	46	6:1	84
30	.109	12	12	9	36	60	6:1	120
36	.109	12	12	9	42	66	6:1	156
42	.109	12	16	12	48	80	6:1	192
48	.109	12	16	12	54	86	6:1	228
54	.109	12	16	12	60	92	6:1	264
60	.109	12	16	12	66	98	6:1	300

GENERAL NOTES:

Safety bars will be provided when specified in the plans.

Safety ends will be fabricated from galvanized steel conforming 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.

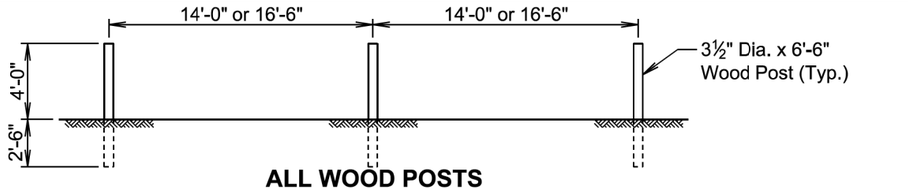
When stated in the plans, optional toe plate extension will be punched and bolted to end section apron lip with ⅜" diameter galvanized bolts. Steel for toe plate extension will be same gauge as end section. Dimensions will be overall width less 6" by 8" high.

Installation will be performed in accordance with the Specifications.

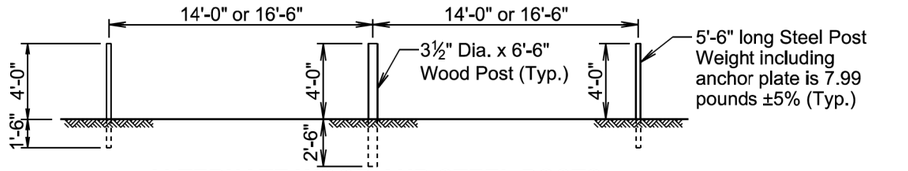
Cost of all work and materials required for fabrication and installation of safety ends will be incidental to the bid items for the various sizes of safety ends.

August 31, 2022

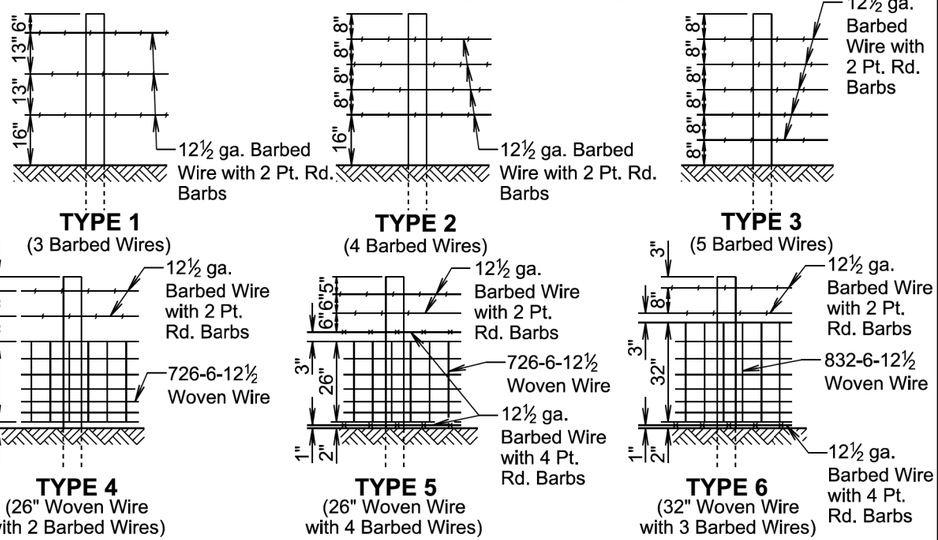
Published Date: 2025	SDDOT	C.M.P. SAFETY ENDS	PLATE NUMBER 450.38
			Sheet 2 of 2



ALL WOOD POSTS



ALTERNATE WOOD AND STEEL POSTS



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:

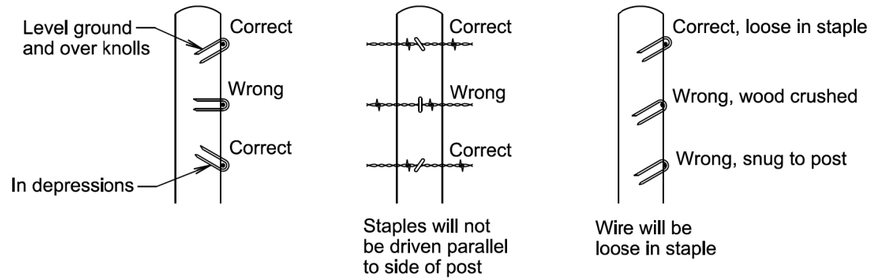
Fence types designated on the plans that are followed by the letter S will have smooth (barbless) wires.

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.

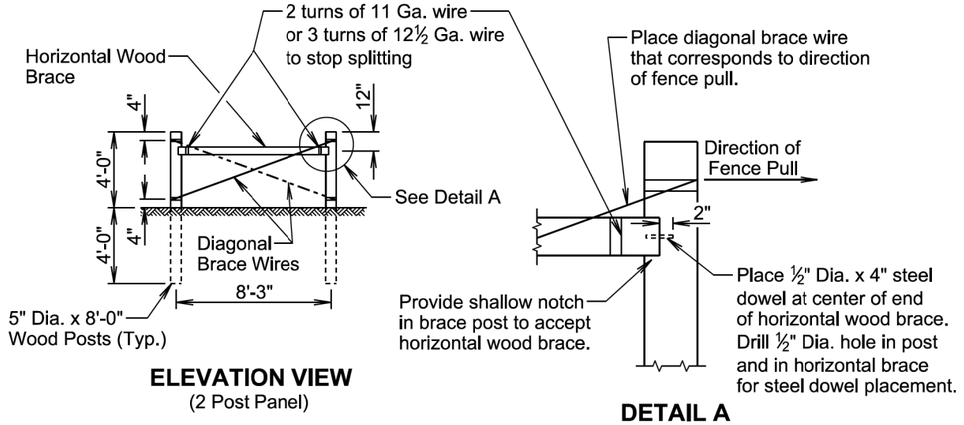
The gages of wire and wood post lengths and sizes are the minimum acceptable unless otherwise specified in the plans. The tolerances for steel posts will be as stated in AASHTO M281. Woven wire will conform to design and specifications of ASTM A116 and barbed wire will conform to ASTM A121.

June 26, 2019

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

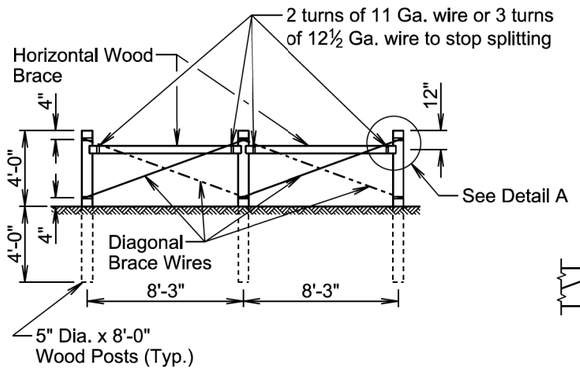
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B33	B49

Plotting Date: 09/23/2024

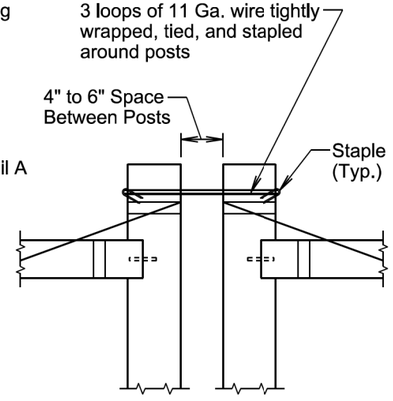


ELEVATION VIEW
(2 Post Panel)

DETAIL A



ELEVATION VIEW
(3 Post Panel)



DETAIL B

GENERAL NOTES:

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

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

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

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

March 31, 2024

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

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

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

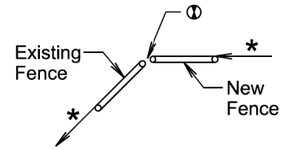
① See Detail B on Sheet 1 of 3.

GENERAL NOTE:

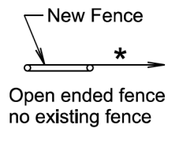
All radius of curvature stated for fence are at centerline of roadway.

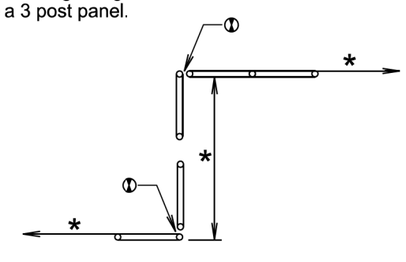
If fence length is less than 600' to next corner use a 2 post panel.

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

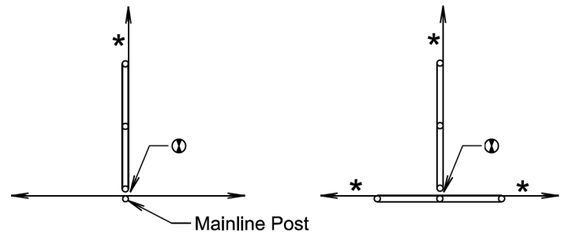


BEGIN OR END FENCE
(Where new fence ties into existing fence)

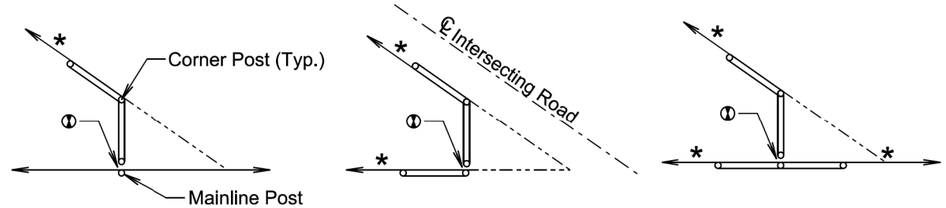




SHORT JOGS IN FENCE



CROSS FENCE



SHARP ANGLES IN CROSS FENCE

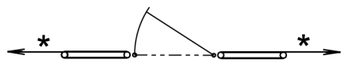
Additional fence panel is NOT required when an angle in the mainline fence is 10° and less.

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

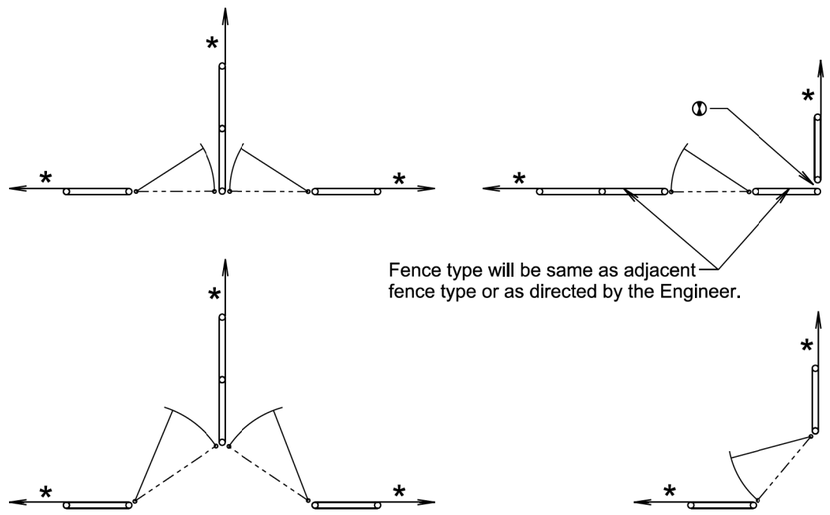
ANGLES IN MAINLINE FENCE

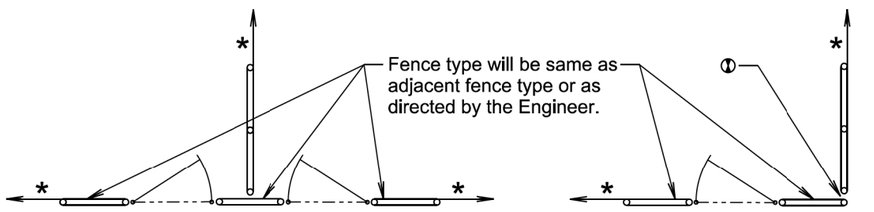
March 31, 2024

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



ENTRANCE
(Not on corner)





DOUBLE ENTRANCES **ENTRANCES AT CORNERS**

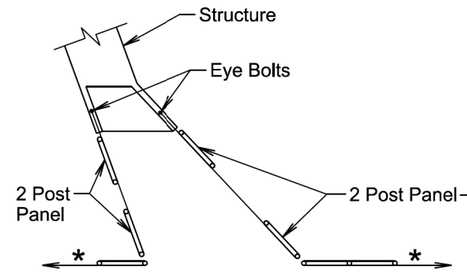
GATES

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

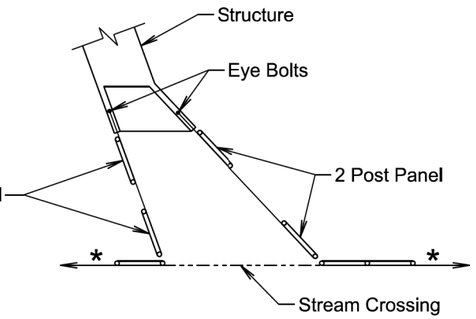
① See Detail B on Sheet 1 of 3.

March 31, 2024

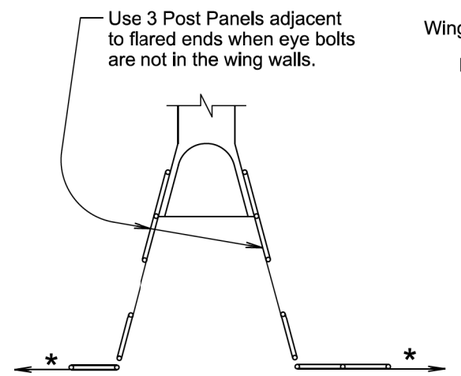
Published Date: 2025	SDDOT	BRACE PANELS AND APPLICATIONS OF BRACE PANELS	PLATE NUMBER 620.03
			Sheet 3 of 3



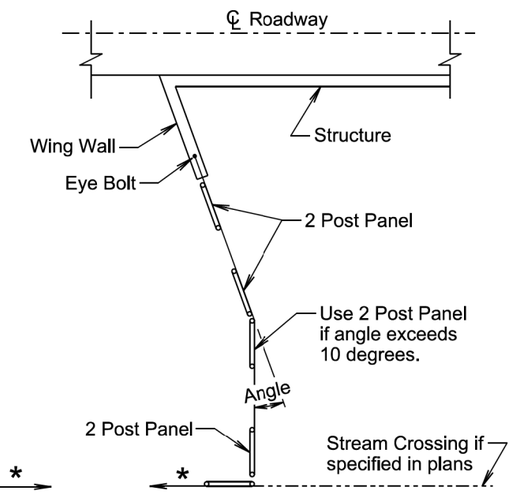
R.C. BOX CULVERT OR CATTLE PASS



STRUCTURE WITH STREAM CROSSING FENCE



R.C. BOX CULVERT OR CATTLE PASS

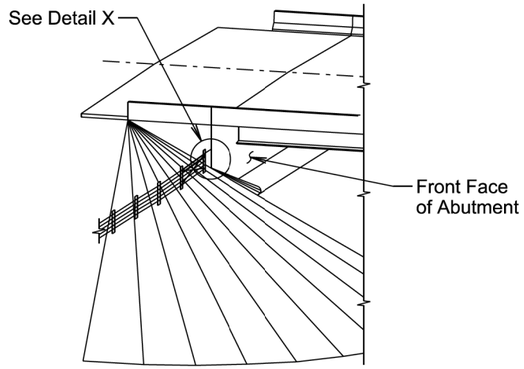


BRIDGE

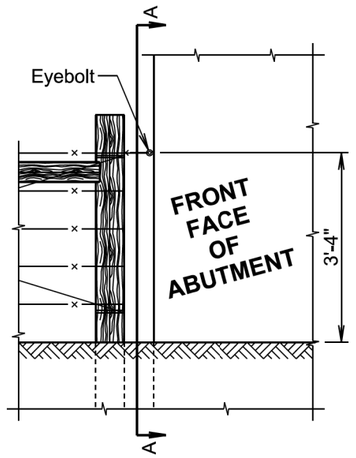
* If fence length is less than 600' to next corner use a 2 post panel.
If fence length is greater than 600' use a 3 post panel.

June 26, 2019

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



DETAILS FOR FENCE ANCHORS



DETAIL X

GENERAL NOTES:

The fence and post details shown are for illustrative purpose only. The fence will be as specified elsewhere in the plans.

Eyebolts will be placed on all of the bridge abutment wings.

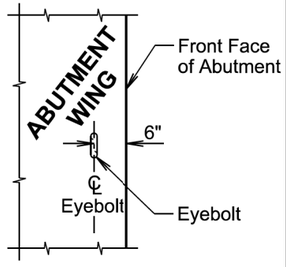
Eyebolts will be ⅝ inch diameter with 6 inches minimum length and will conform to ASTM A307.

Eyebolts will be galvanized in accordance with AASHTO M232 (ASTM A153).

Eyebolts will be installed after abutment wings are backfilled and berm construction is complete. Drill-in and epoxy eyebolts into abutment such that the eye of the bolt is flush with the concrete surface.

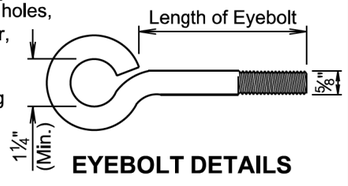
The epoxy resin mixture will be of a type for bonding steel to hardened concrete and will conform to AASHTO M235 Type IV, Grade 3 (Equivalent to ASTM C881, Type IV, Grade 3).

The diameter of the drilled holes will not be less than ⅛ inch greater, nor more than ⅜ inch greater than the diameter of the eyebolts or as per Manufacturer's recommendations. The drilled holes will be blown out with compressed air using a device that will reach the back of the hole to be sure that all debris or loose material has been removed prior to epoxy injection.



VIEW A-A

Mix epoxy resin as recommended by the Manufacturer and apply by an injection method as approved by the Engineer. Beginning at the back of the drilled holes, fill the holes ⅓ to ½ full of epoxy, or as recommended by the Manufacturer, prior to insertion of the eyebolts. Care will be taken to prevent epoxy from flowing out of the horizontal holes prior to eyebolt insertion. Rotate the eyebolt during installation to eliminate voids and ensure complete bonding of the bolt. Insertion of the eyebolts by the dipping or painting method will not be allowed.



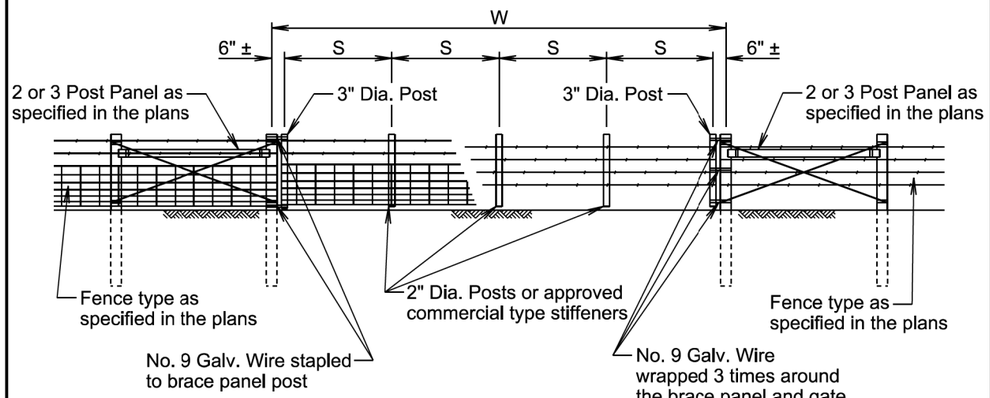
EYEBOLT DETAILS

Loads will not be applied to the epoxy grouted eyebolts until the epoxy resin has had sufficient time to cure as specified by the epoxy resin manufacturer.

The cost for furnishing and installing the eyebolts will be incidental to various contract items.

November 19, 2020

Published Date: 2025	SDDOT	FENCE ANCHORS FOR BRIDGE ABUTMENTS (SWEPT BACK WINGS)	PLATE NUMBER 620.19
			Sheet 1 of 1



ELEVATION VIEW

W Gate Width (Ft.)	S Post Spacing
16	3 @ 5'-0" ±
20	4 @ 4'-9" ±
24	4 @ 5'-9" ±
30	5 @ 5'-10" ±
40	6 @ 6'-6" ±

GENERAL NOTES:

Creosote treatment of the gate posts will not be accepted.

The type of fencing in the gate will be of the same type as specified for the adjacent Right-of-Way fence.

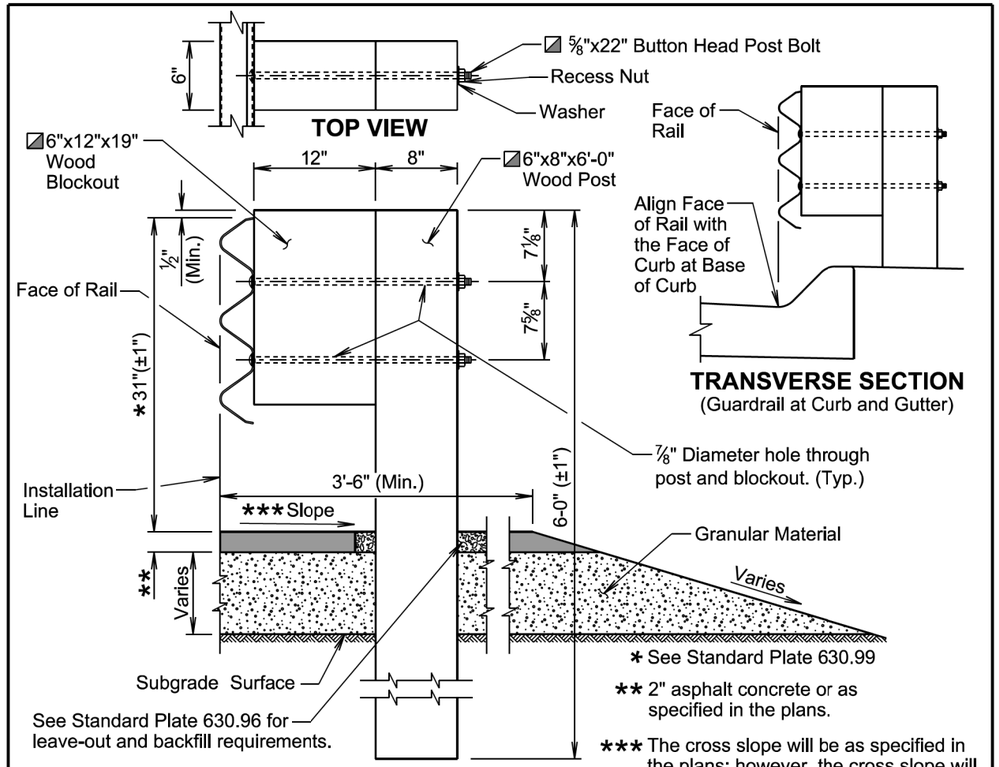
All costs for furnishing and constructing the wire gate(s) will be incidental to the contract unit price per foot for the respective Right-of-Way fence contract item.

June 26, 2019

Published Date: 2025	SDDOT	WIRE GATES	PLATE NUMBER 620.20
			Sheet 1 of 1

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B36	B49

Plotting Date: 09/23/2024



* 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.

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.

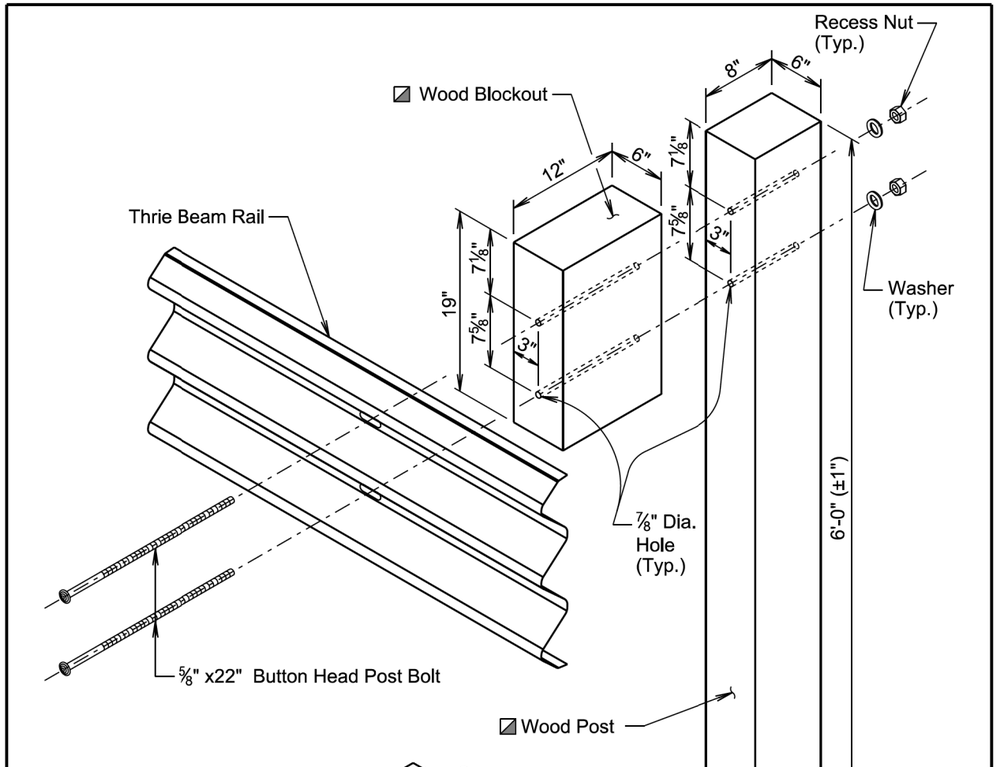
⧄ The post and blockout illustrated above is typical for single thrie beam guardrail. When other variations of posts and blockouts are specified on other standard plates (e.g. transitions) then the posts and blockouts will be as specified on the other standard plates or as specified in the plans.

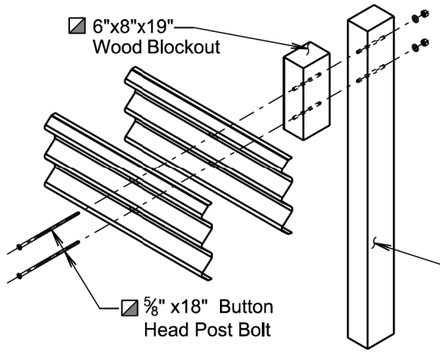
Slots in the rails will be provided as specified in the plans and by the manufacturer. A drilled hole through the rail is not allowed as a replacement for a slot. If the Contractor must create a slot, a cutting torch or plasma cutter is not allowed. The slot edges will be smooth and free of burrs or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

September 14, 2019

Published Date: 2025	SDDOT	THRIE BEAM GUARDRAIL	PLATE NUMBER 630.01
			Sheet 1 of 5





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

EXPANDED ISOMETRIC VIEW AT MIDSPAN OF THRIE BEAM GUARDRAIL

⧄ 6"x8"x7'-0" Wood Post

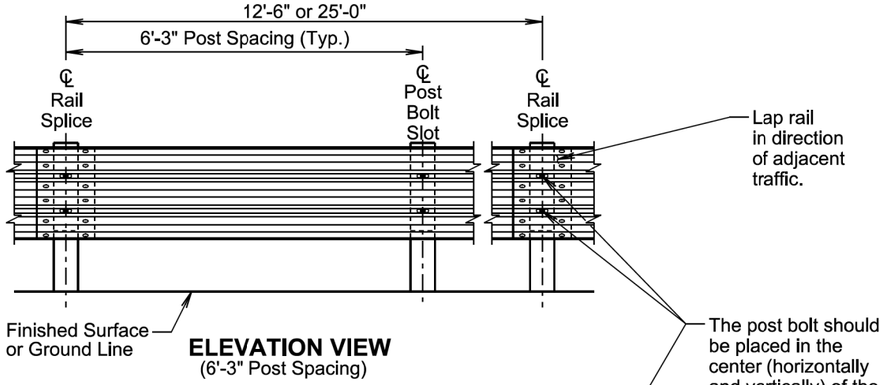
⧄ For single thrie beam guardrail use 6"x12"x19" wood blockout, ⅝"x22" button head post bolt, and 6"x8"x6'-0" wood post. For double (nested) thrie beam guardrail use 6"x8"x19" wood blockout, ⅝"x18" button head post bolt, and 6"x8"x7'-0" wood post.

September 14, 2019

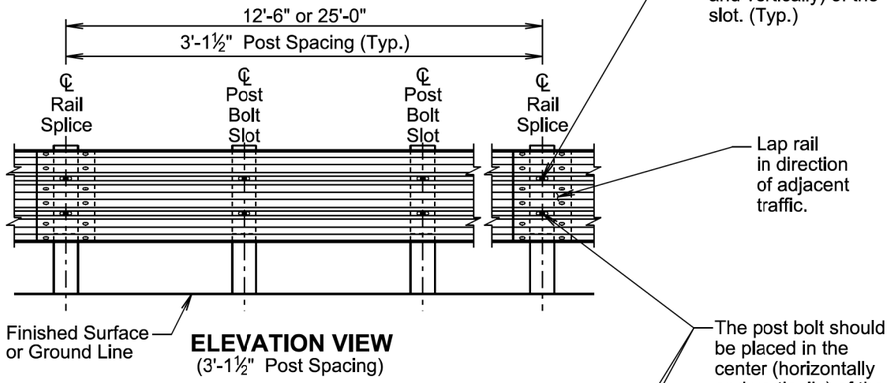
Published Date: 2025	SDDOT	THRIE BEAM GUARDRAIL	PLATE NUMBER 630.01
			Sheet 2 of 5

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B37	B49

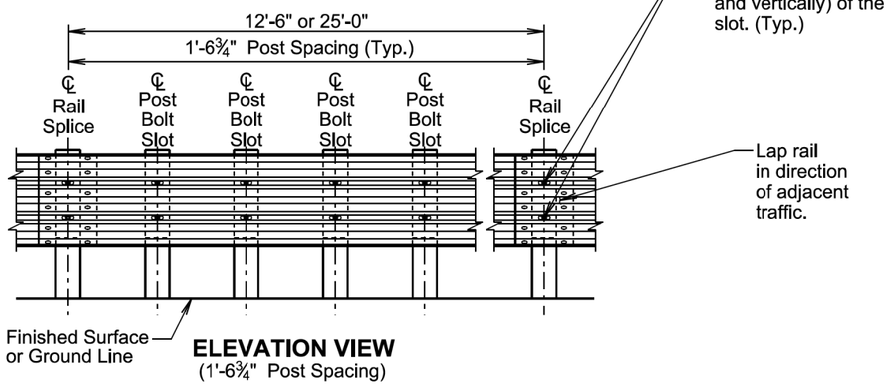
Plotting Date: 09/23/2024



ELEVATION VIEW
(6'-3" Post Spacing)



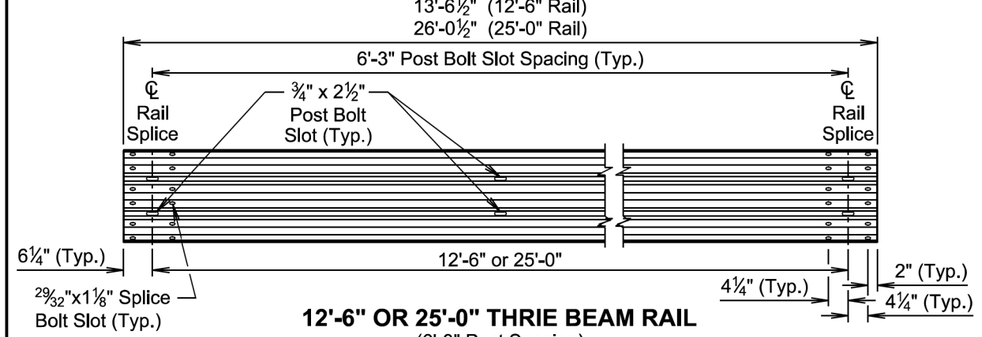
ELEVATION VIEW
(3'-1½" Post Spacing)



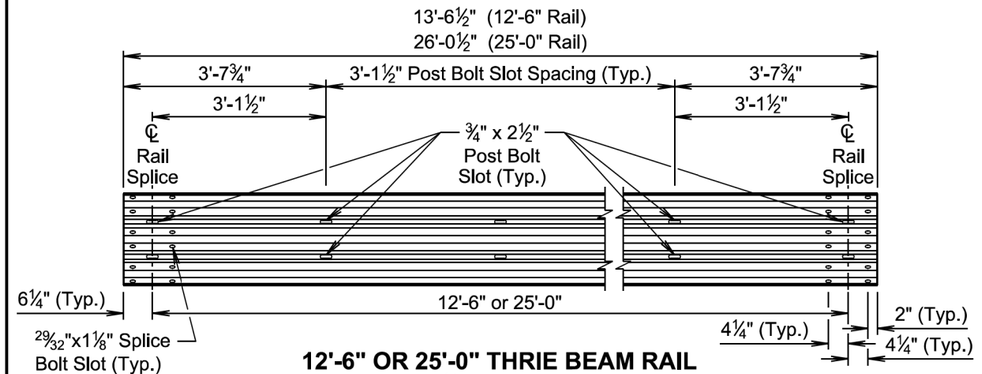
ELEVATION VIEW
(1'-6¾" Post Spacing)

September 14, 2019

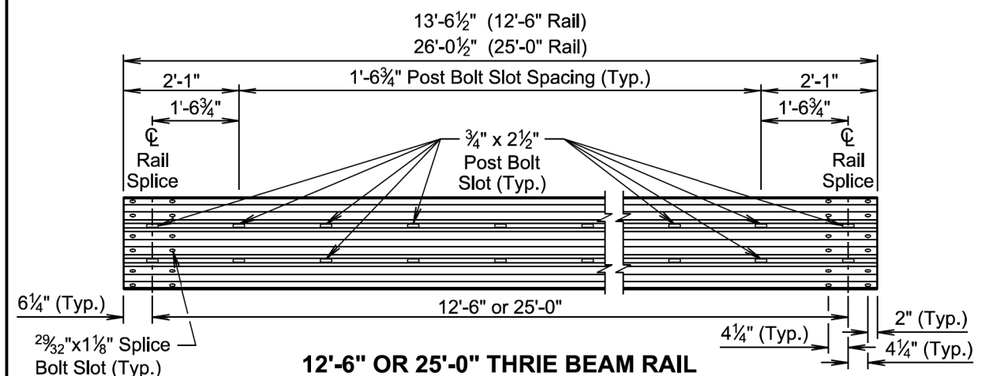
Published Date: 2025	SDDOT	THRIE BEAM GUARDRAIL	PLATE NUMBER 630.01
			Sheet 3 of 5



12'-6" OR 25'-0" THRIE BEAM RAIL
(6'-3" Post Spacing)



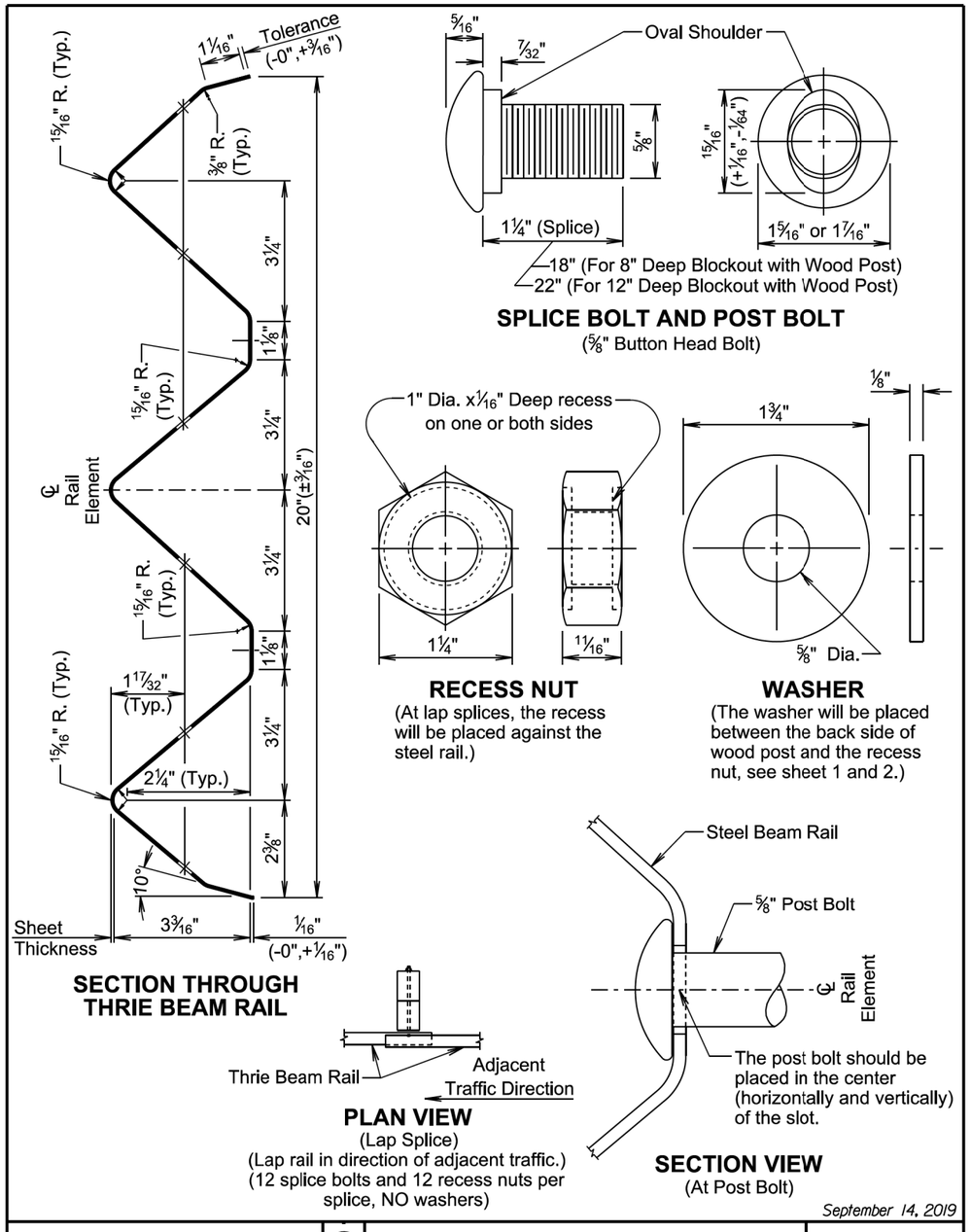
12'-6" OR 25'-0" THRIE BEAM RAIL
(3'-1½" Post Spacing)



12'-6" OR 25'-0" THRIE BEAM RAIL
(1'-6¾" Post Spacing)

September 14, 2019

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



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 1 and 2.)

SECTION THROUGH THRIE BEAM RAIL

PLAN VIEW
(Lap Splice)
(Lap rail in direction of adjacent traffic.)
(12 splice bolts and 12 recess nuts per splice, NO washers)

SECTION VIEW
(At Post Bolt)

September 14, 2019

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

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.

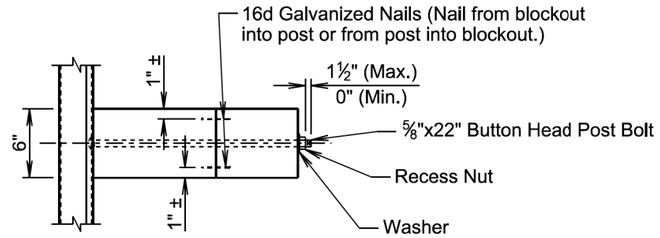
W beam rail section lengths may be 12'-6" and/or 25'-0". The combination of section lengths used will be compatible with the total length of rail per site as shown in the plans.

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.

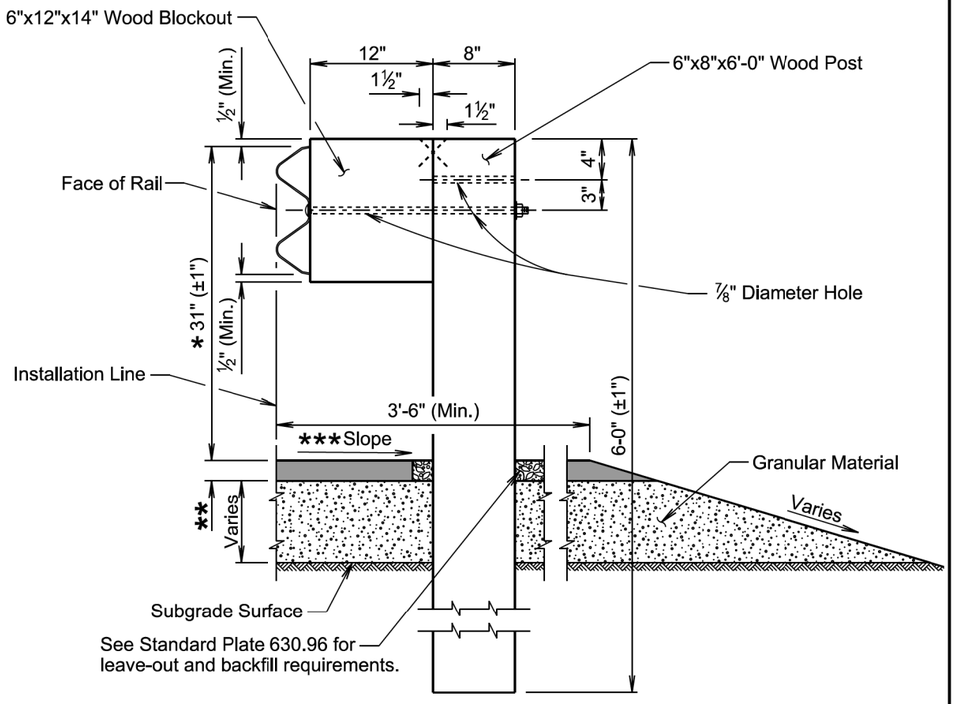
All costs for constructing the MGS including labor, equipment, and materials including all posts, blockouts, steel beam rail, and hardware will be incidental to the contract unit price per foot for the respective MGS contract item.

September 14, 2019

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)

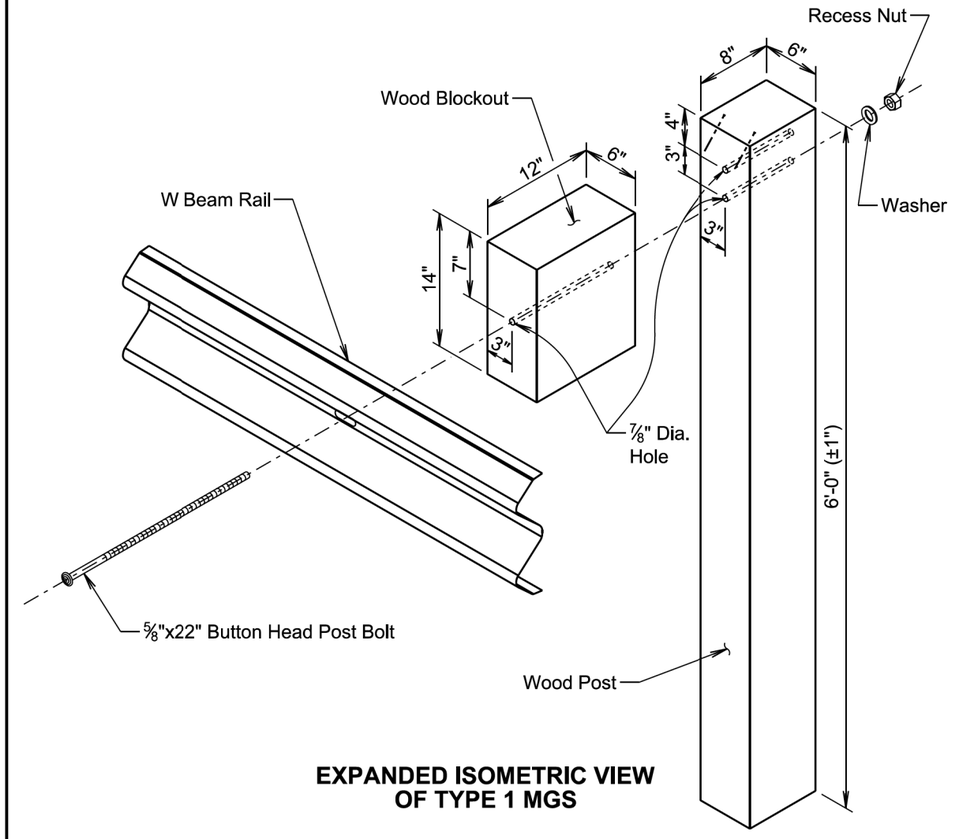
* See Standard Plate 630.99

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

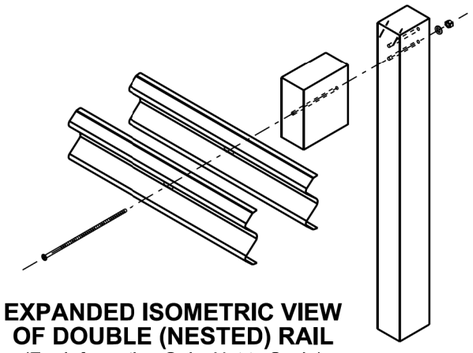
*** The cross slope will be as specified in the plans; however, the cross slope will not be steeper than a 10:1 slope.

September 14, 2019

Published Date: 2025	SDDOT	MIDWEST GUARDRAIL SYSTEM (MGS)	PLATE NUMBER 630.20
			Sheet 2 of 6



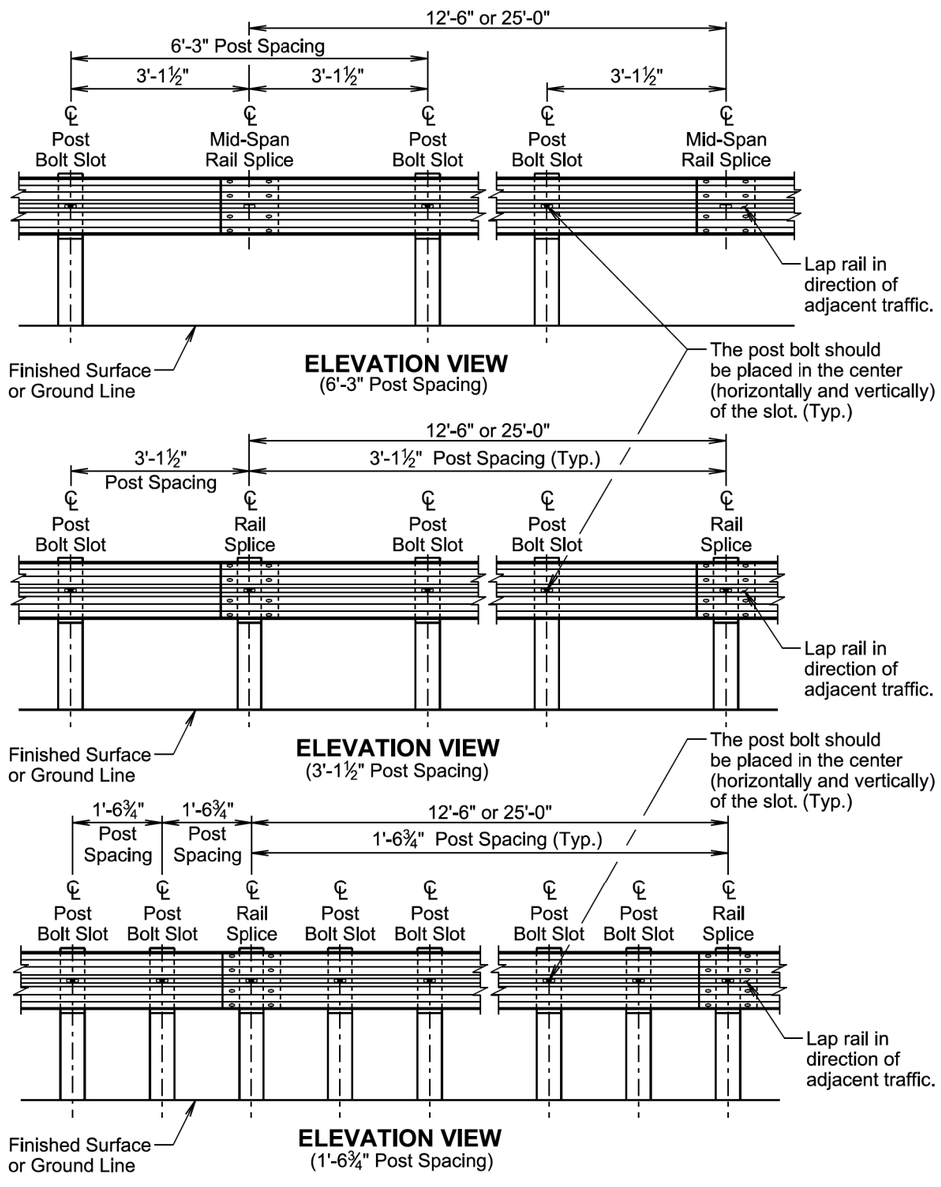
EXPANDED ISOMETRIC VIEW OF TYPE 1 MGS



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

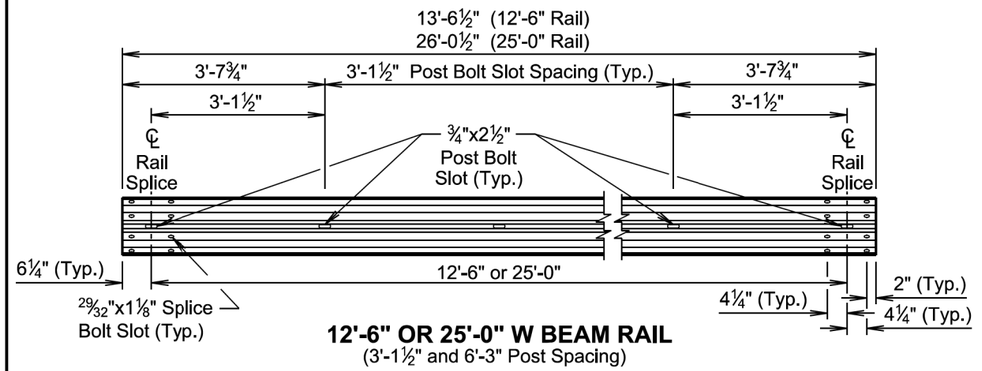
September 14, 2019

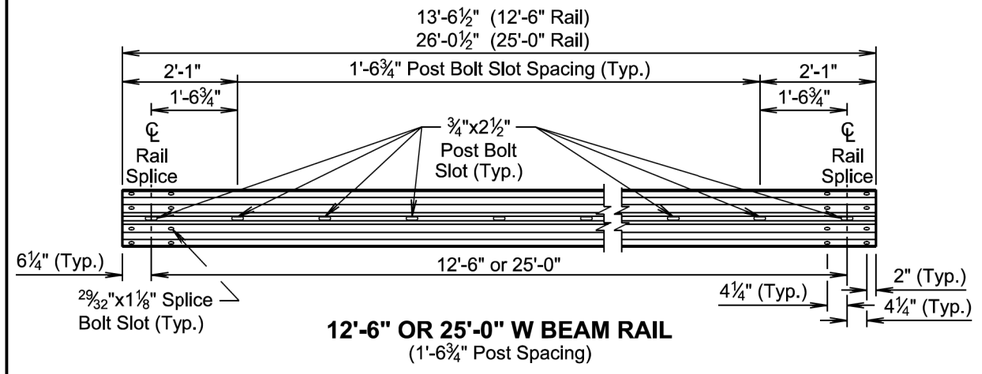
Published Date: 2025	SDDOT	MIDWEST GUARDRAIL SYSTEM (MGS)	PLATE NUMBER 630.20
			Sheet 3 of 6



September 14, 2019

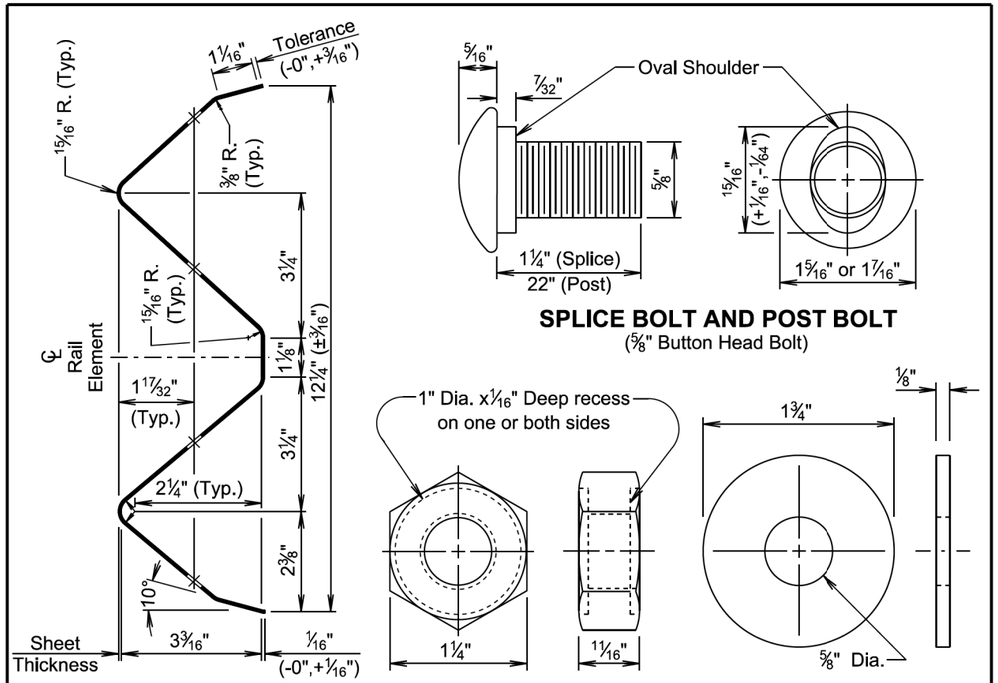
Published Date: 2025	SDDOT	MIDWEST GUARDRAIL SYSTEM (MGS)	PLATE NUMBER 630.20
			Sheet 4 of 6





September 14, 2019

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

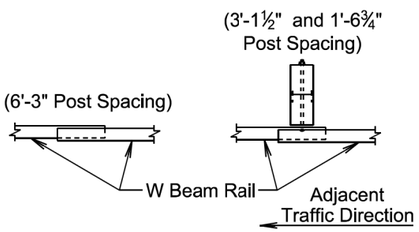


SECTION THROUGH W BEAM RAIL

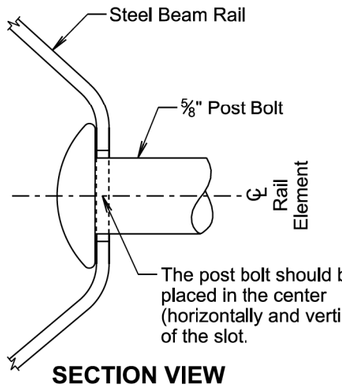
SPLICE BOLT AND POST BOLT
(5/8" Button Head Bolt)

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.)



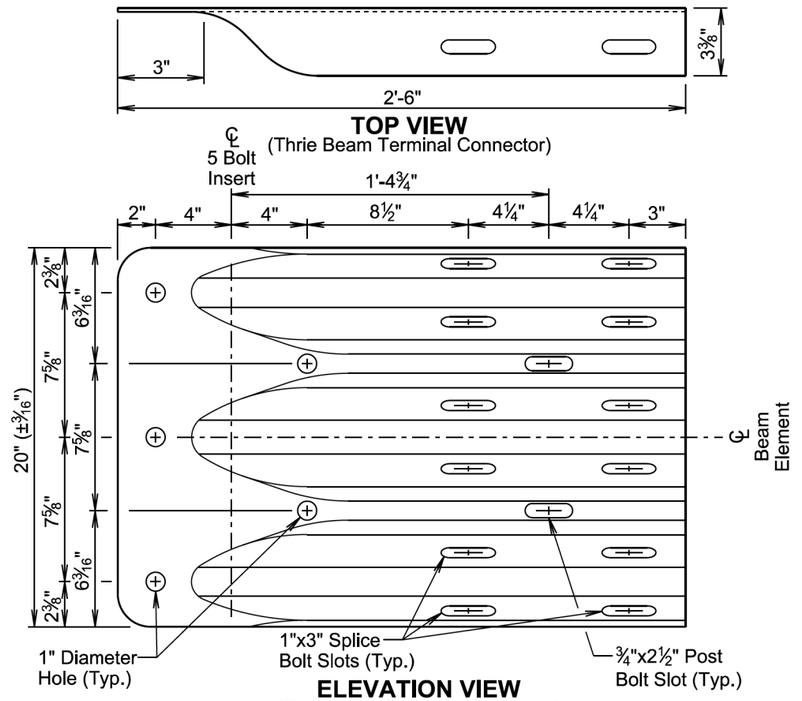
PLAN VIEW
(Lap Splice)
(Lap rail in direction of adjacent traffic.)
(8 splice bolts and 8 recess nuts per splice, NO washers)



SECTION VIEW
(At Post Bolt)

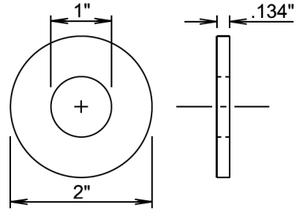
September 14, 2019

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

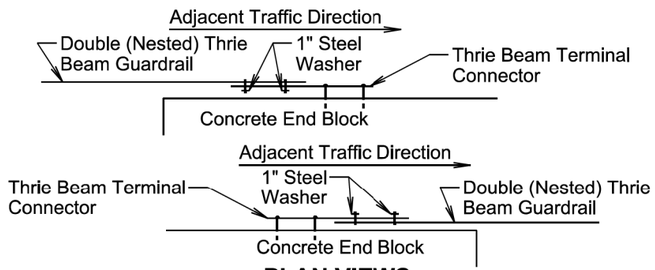


TOP VIEW
(Thrie Beam Terminal Connector)

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:

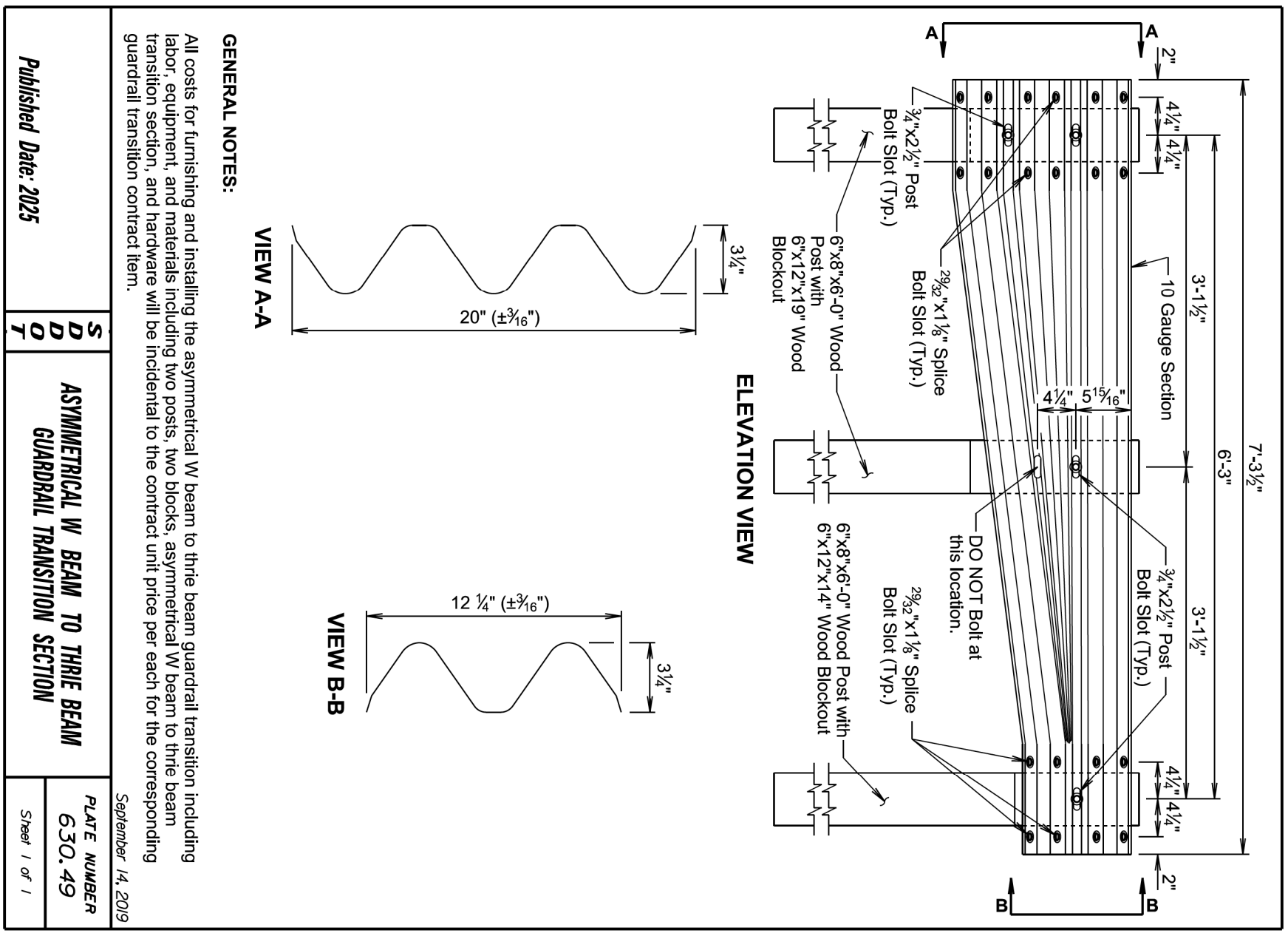
Thrie Beam Terminal Connectors will be 10 gauge.

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.

September 14, 2019

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



ELEVATION VIEW

VIEW A-A

VIEW B-B

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.

September 14, 2019

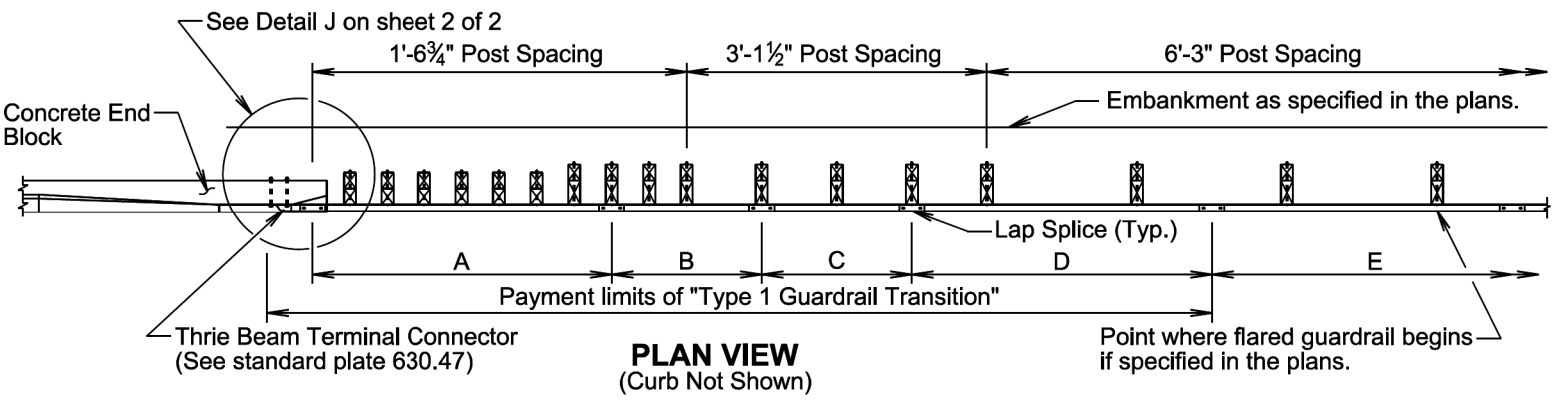
PLATE NUMBER 630.49

Sheet 1 of 1

ASYMMETRICAL W BEAM TO THRIE BEAM GUARDRAIL TRANSITION SECTION

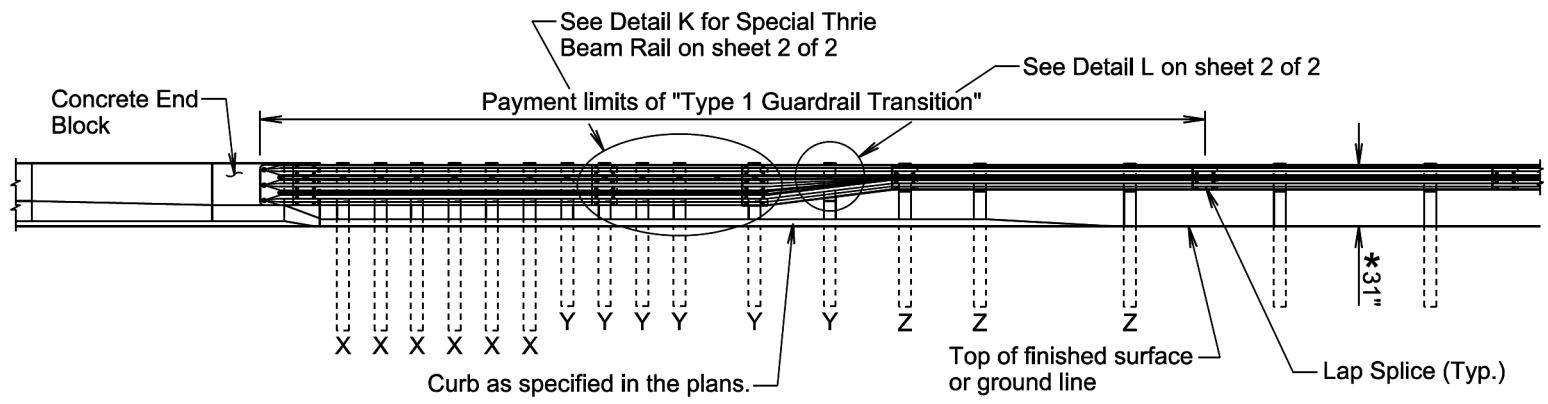
SDDOT

Published Date: 2025



PLAN VIEW
(Curb Not Shown)

A: 12'-6" Straight Double (Nested) Class A Thrie Beam Guardrail with Wood Posts (See standard plate 630.01)
B: 6'-3" Straight Single Class A Thrie Beam Guardrail with Wood Posts (See Detail K on sheet 2 of 2)
C: 6'-3" Asymmetrical W Beam to Thrie Beam Guardrail Transition Section with Wood Posts (See standard plate 630.49)
D: 12'-6" Straight Type 4 MGS (See standard plate 630.20)
E: Straight Type 1 MGS or as specified in the plans (See standard plate 630.20)



ELEVATION VIEW

X: 6"x8"x7'-0" Wood Post and 6"x8"x19" Wood Blockout
Y: 6"x8"x6'-0" Wood Post and 6"x12"x19" Wood Blockout
Z: 6"x8"x6'-0" Wood Post and 6"x12"x14" Wood Blockout

*See standard plate 630.99

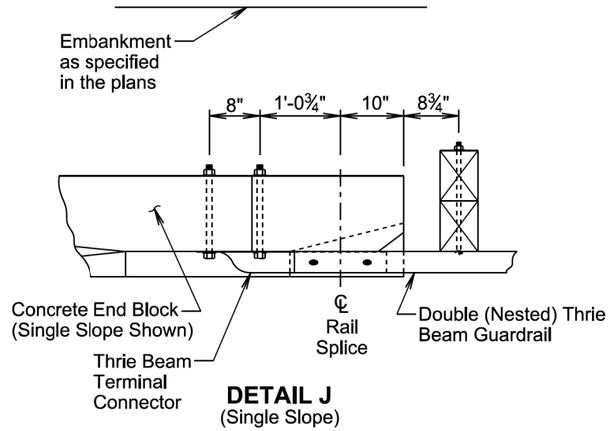
March 31, 2024

PLATE NUMBER 630.50

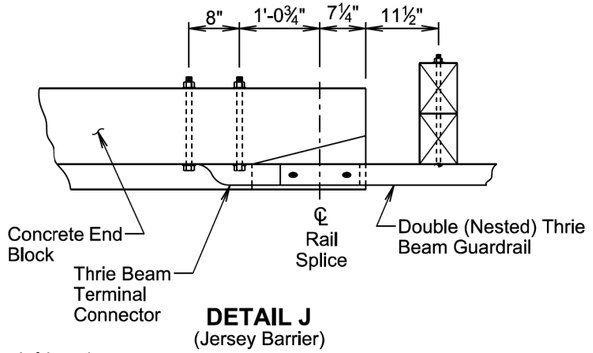
Sheet 1 of 3

TYPE 1 GUARDRAIL TRANSITION (CONCRETE END BLOCK TO MIDWEST GUARDRAIL SYSTEM (MGS))

SDDOT

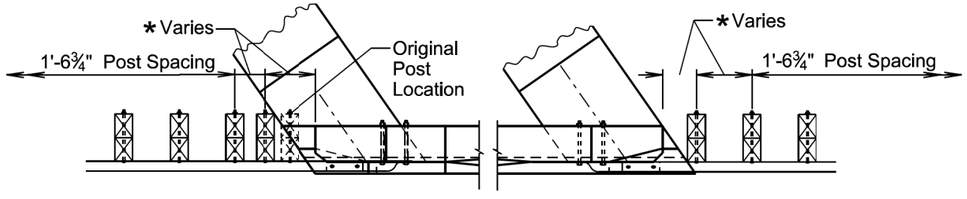


DETAIL J
(Single Slope)



DETAIL J
(Jersey Barrier)

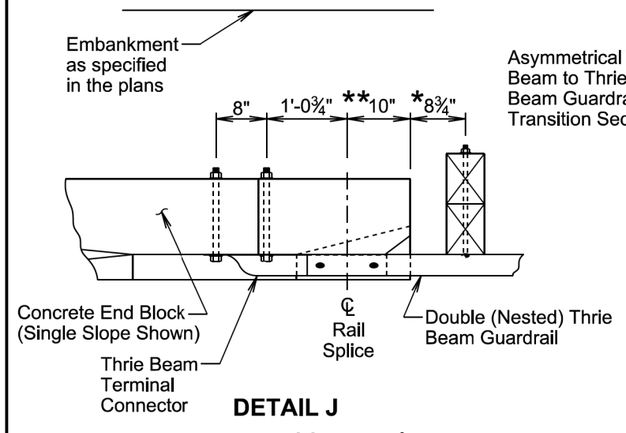
*Due to the skew of the bridge, the placement of the first "X" post and blockout will need to be moved from the original location. It will need to be installed as close as possible to the wingwall provided that the second "X" post and blockout is located in it's original location.



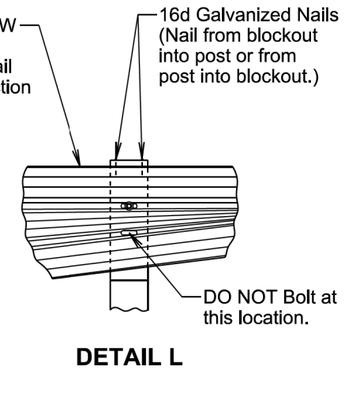
DETAIL J
(Skewed Bridge)

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

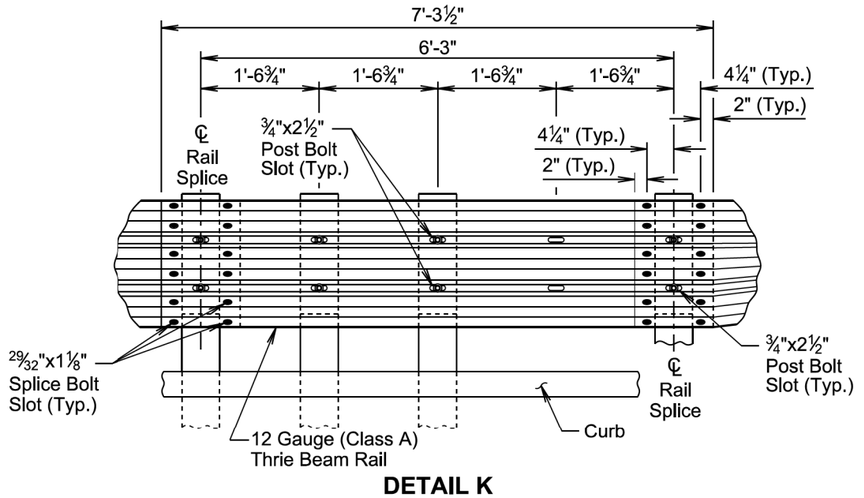


DETAIL J



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.

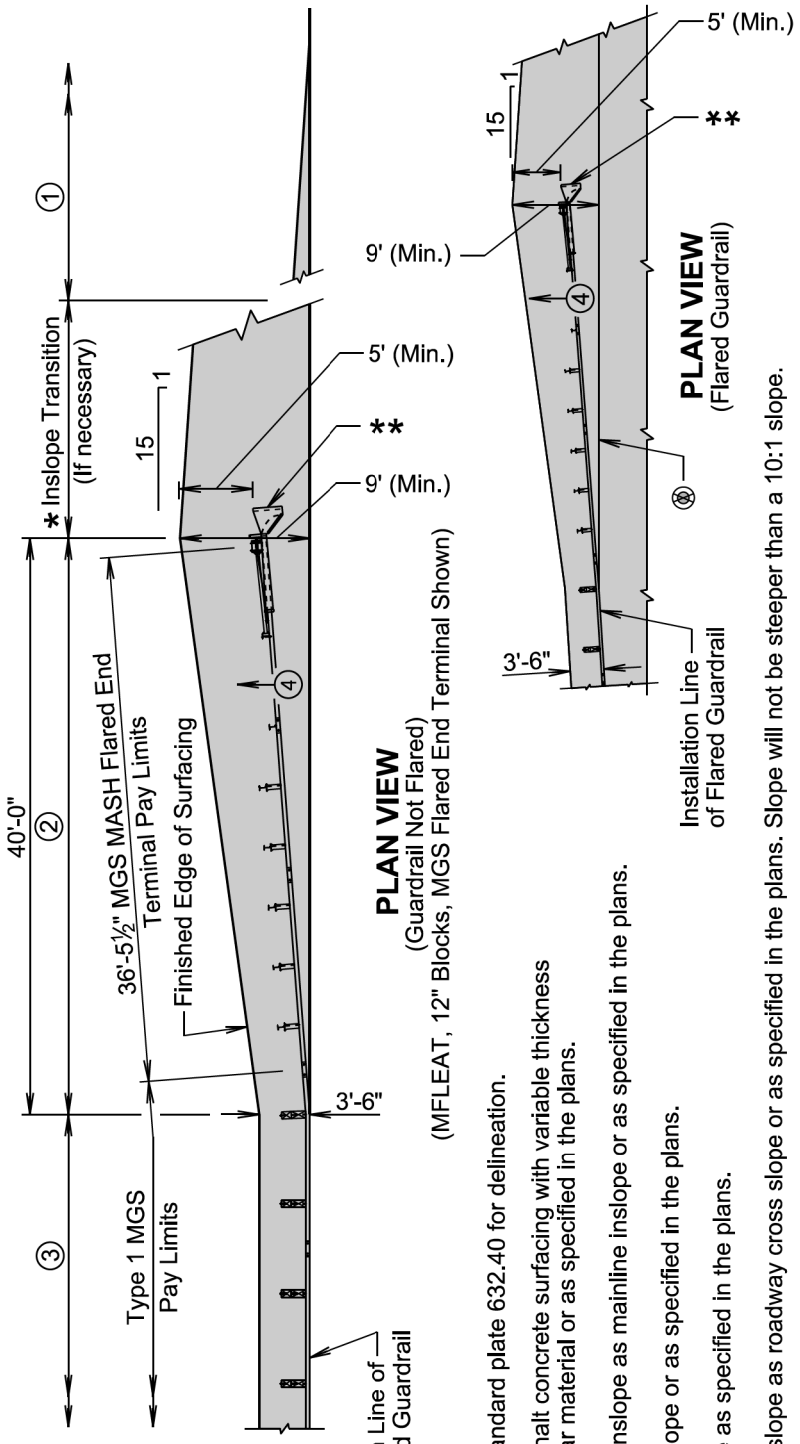
All costs for furnishing and installing the type 1 guardrail transition including labor, equipment, and materials which includes all rail sections, posts and blockouts, hardware, and incidentals will be included in the contract unit price per each for "Type 1 Guardrail Transition".

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

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B44	B49

Plotting Date: 09/23/2024



** See standard plate 632.40 for delineation.

□ 2" Asphalt concrete surfacing with variable thickness granular material or as specified in the plans.

① Same inslope as mainline inslope or as specified in the plans.

② 4:1 inslope or as specified in the plans.

③ Inslope as specified in the plans.

④ Same slope as roadway cross slope or as specified in the plans.

GENERAL NOTES:

The flared guardrail end terminals above are for illustrative purpose only.

* The length of inslope transition varies with the amount of change between inslopes. The length of the transition will change 100 feet for every whole number change in the inslope. For Example: If the inslope changes from a 5:1 to a 4:1 the length of the inslope transition would be 200 feet. If the inslope changes from a 6:1 to a 4:1 the length of the inslope transition would be 200 feet.

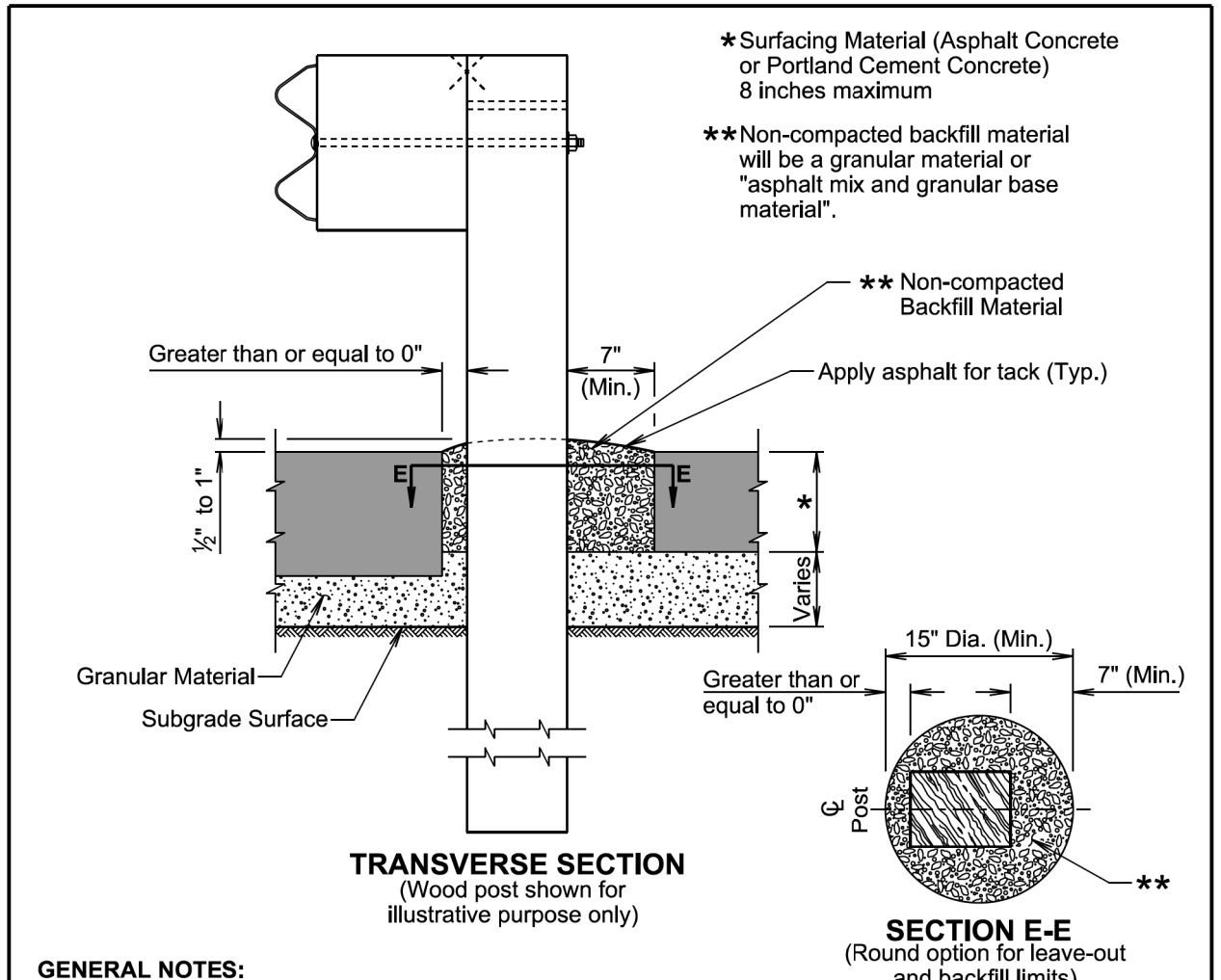
Ⓡ The installation reference line for flared guardrail end terminals will always be parallel to the roadway.

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.

June 26, 2019

Published Date: 2025	SDDOT	EMBANKMENT, SURFACING, AND PAYMENT LIMITS FOR MGS MASH FLARED END TERMINAL	PLATE NUMBER 630.87 Sheet 1 of 1



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.

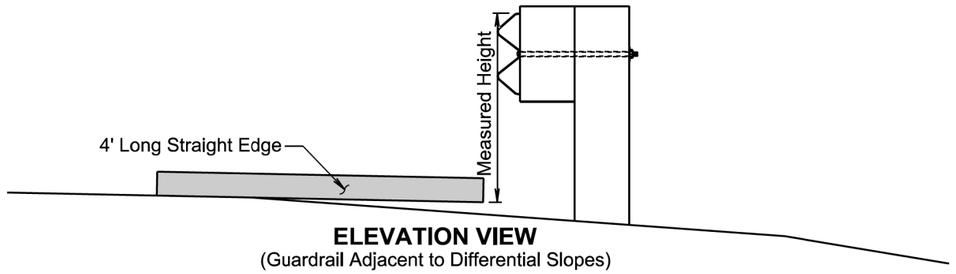
The backfill material will be mounded ½ inch to 1 inch above the top of the adjacent surfacing as illustrated above.

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.

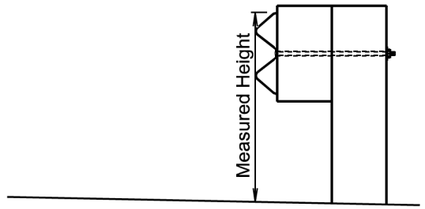
All costs for constructing the leave-out including labor, equipment, and materials which includes the backfill material and tack coat will be incidental to the contract unit price for the respective guardrail contract item.

November 19, 2021

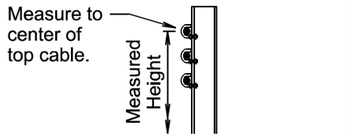
Published Date: 2025	SDDOT	GUARDRAIL POST INSTALLED IN ASPHALT CONCRETE OR PORTLAND CEMENT CONCRETE	PLATE NUMBER 630.96 Sheet 1 of 1



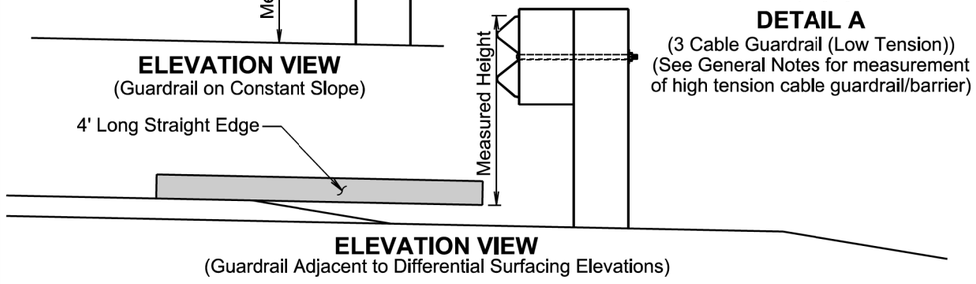
ELEVATION VIEW
(Guardrail Adjacent to Differential Slopes)



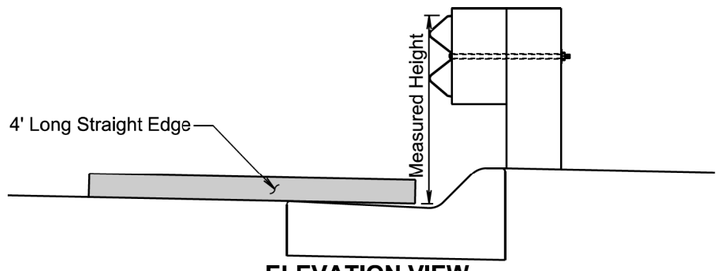
ELEVATION VIEW
(Guardrail on Constant Slope)



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:

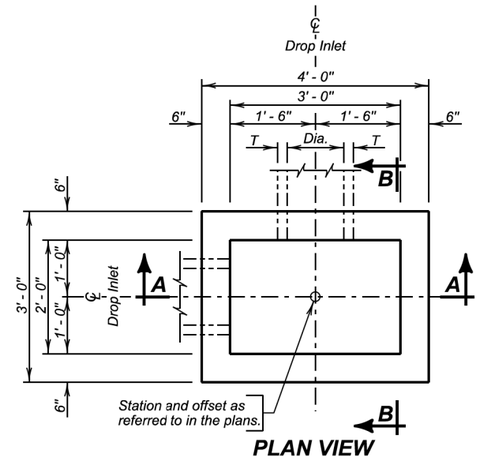
The W Beam guardrail shown is for illustrative purpose. The guardrail height for all types of guardrail systems except for high tension cable guardrail/barrier will be measured in accordance with this standard plate.

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

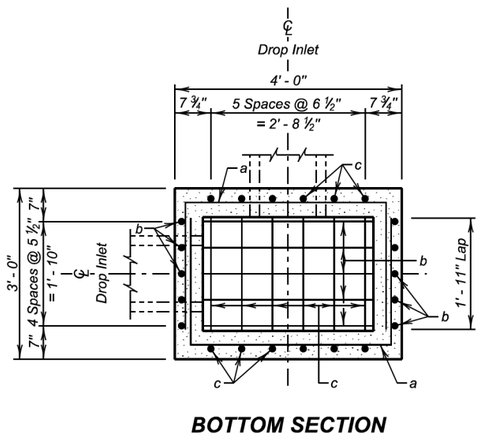
The height of high tension cable guardrail/barrier will be measured in accordance with the Manufacturer's installation instructions.

September 14, 2019

Published Date: 2025	SDDOT	MEASURING GUARDRAIL HEIGHT	PLATE NUMBER 630.99 Sheet 1 of 1



PLAN VIEW



BOTTOM SECTION

ESTIMATED QUANTITIES

ITEM	UNIT	CONSTANT QUANTITY	VARIABLE QUANTITY
⚹ Class M6 Concrete	Cu. Yd.	0.26	0.22H
Reinforcing Steel	Lb.	51.19	28.97H
Frame and Grate Assembly	Each	1	———

DROP INLETS FOR 12" TO 24" DIAMETER PIPE

SPECIFICATIONS

Design Specifications: AASHTO LRFD Bridge Design Specifications, 2012 Edition.

Construction Specifications: South Dakota Standard Specifications for Roads and Bridges, Current Edition and required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

GENERAL NOTES:

Design Live Load: HL-93. No construction loading in excess of legal load was considered.

Reinforcing steel shall conform to ASTM A615 grade 60. The d bars shall be lapped 12 inches with the b and c bars. Cut and bend reinforcing steel as required to place pipe(s) through the drop inlet wall.

Drop inlet may be precast. If precast drop inlet details differ from this standard plate, submit a checked design done by a SD registered P.E. and shop plans to the Office of Bridge Design for approval.

⚹ Reduce total quantities of concrete by the amount of concrete displaced by the pipe(s). The total quantity of concrete shall be computed to the nearest hundredth of a cubic yard. The total quantity of reinforcing steel shall be computed to the nearest pound.

Drop inlet shown may be modified by the addition or omission of connecting pipes as noted elsewhere in the plans. All pipes entering drop inlet must fit between the inside face of walls and shall not enter through the corners.

Maximum R.C.P. diameter shall not exceed 18 inches on the 2-foot wide side and shall not exceed 24 inches (24 inches for R.C. arch) on the 3-foot wide side of the drop inlet.

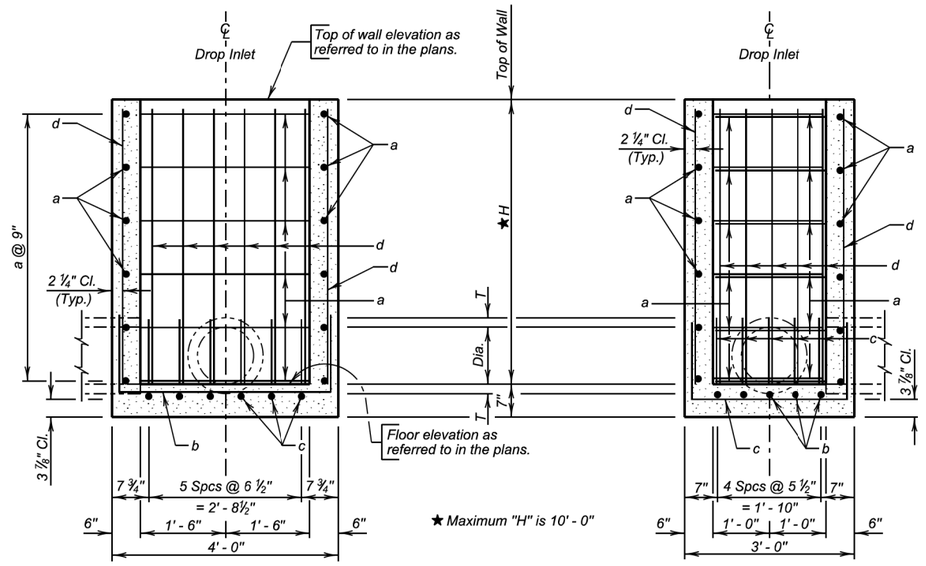
The dimension of H is in feet. Maximum H is 10 feet.

PIPE DISPLACEMENT REDUCTIONS

	Diameter (Inches)	Wall T (Inches)	Class M6 Concrete (Cu. Yd.)
R.C.P.	12	2	0.03
	15	2 ¼	0.04
	18	2 ½	0.05
	24	3	0.09
R.C. ARCH	18	2 ½	0.05
	24	3 ½	0.09

March 31, 2024

Published Date: 2025	SDDOT	2' X 3' TYPE B REINFORCED CONCRETE DROP INLET	PLATE NUMBER 670.01 Sheet 1 of 2

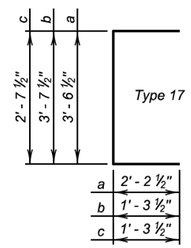


SEC. A - A **SEC. B - B**

REINFORCING SCHEDULE

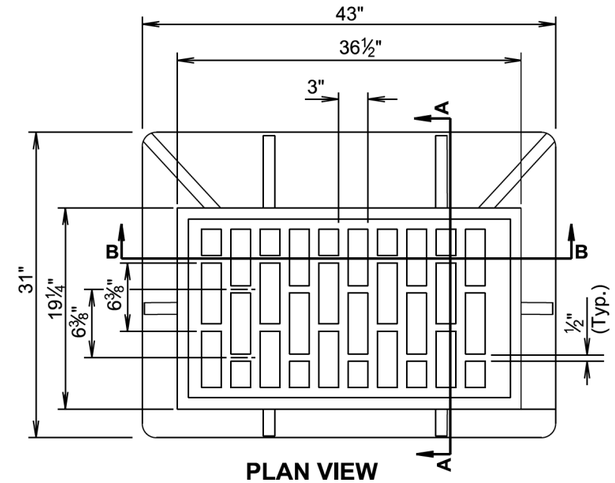
Mk.	No.	Size	Length	Type	Bending Details
a	2.67H	4	8' - 0"	17	
b	5	5	6' - 3"	17	
c	6	4	5' - 3"	17	
d	22	4	H - 2"	Str.	

NOTE:
All dimensions are out to out of bars.

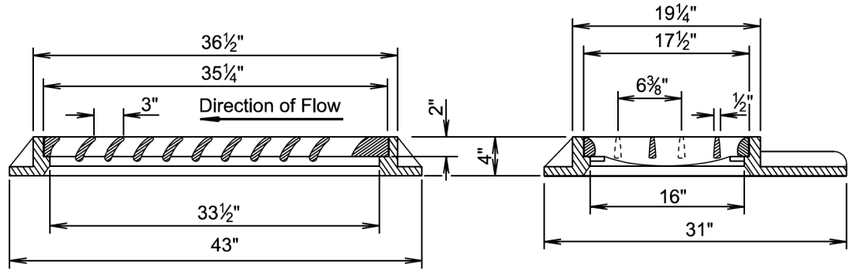


March 31, 2024

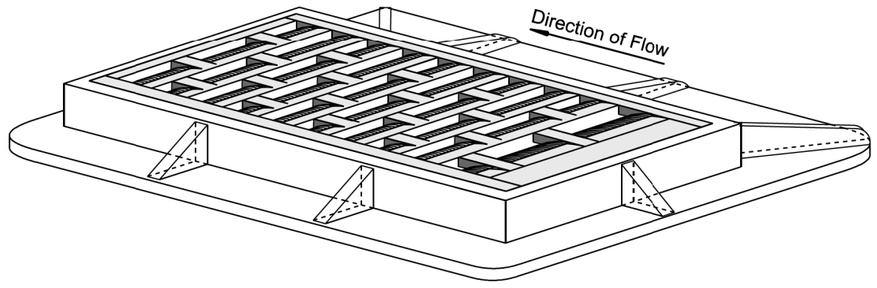
Published Date: 2025	SDDOT	2'X 3' TYPE B REINFORCED CONCRETE DROP INLET	PLATE NUMBER 670.01
			Sheet 2 of 2



PLAN VIEW



SECTION B-B **SECTION A-A**



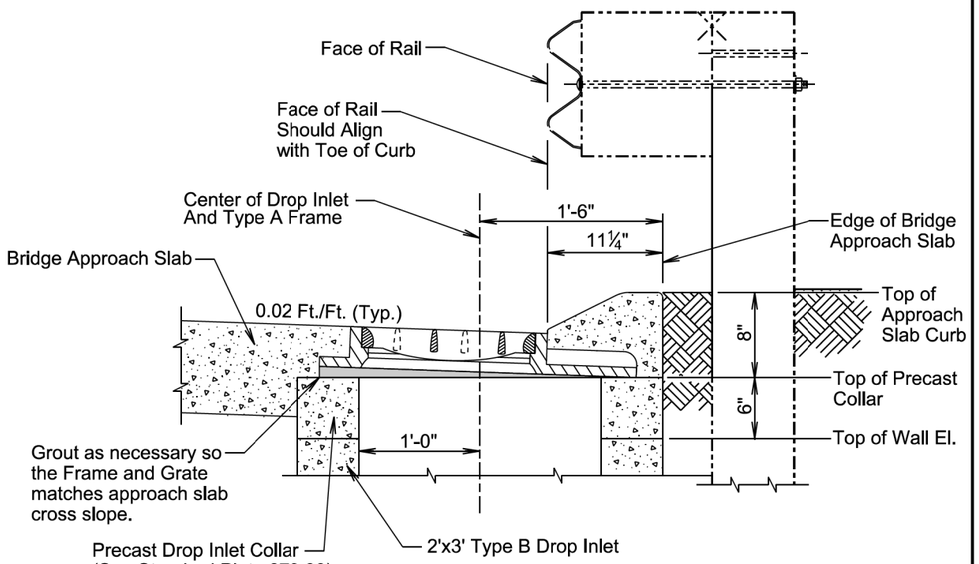
ISOMETRIC VIEW

March 31, 2024

Published Date: 2025	SDDOT	TYPE A FRAME AND GRATE	PLATE NUMBER 670.78
			Sheet 1 of 2

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B47	B49

Plotting Date: 09/23/2024



ELEVATION VIEW

(Installation of Type A Frame and Grate in Bridge Approach Slab)

GENERAL NOTES:

The product dimensions may vary from those shown on the standard plate depending on the manufacturer. Grate size and configuration will be similar to the standard plate for hydraulic capacity and bicycle safety. Any variation in dimensions will be approved by the Engineer and the type A frame and grate will be from a manufacturer on the approved products list.

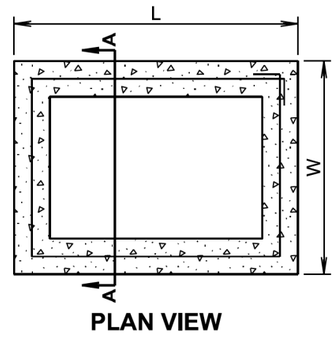
Design load for the grate will meet the requirements of AASHTO HL-93.

The type A frame and grate will be installed on a 2'x3' type B drop inlet.

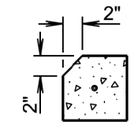
The direction of flow is shown for illustrative purpose only. The grate will be installed to intercept the direction of flow.

March 31, 2024

Published Date: 2025	SDDOT	***TYPE A FRAME AND GRATE***	***PLATE NUMBER 670.78*** *Sheet 2 of 2*

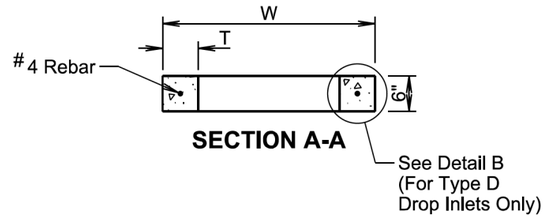


PLAN VIEW



For Type D Drop Inlets only:
Use Precast Drop Inlet Collar with
2" chamfer on L sides only.

DETAIL B



SECTION A-A

INFORMATIONAL QUANTITIES					
FRAME AND GRATE TYPE	L (Ft-in)	W (Ft-in)	T (in)	CLASS M6 CONCRETE (CuYd)	REINFORCING STEEL (Lb)
TYPE A, B, and E	4'-0"	3'-0"	6	0.11	9
TYPE C	5'-0"	4'-0"	6	0.15	11
TYPE D	4'-0"	2'-6"	6	0.10	8

GENERAL NOTES:

All reinforcing steel will conform to ASTM A615, Grade 60.

The ½" diameter bar will lap 6"± and will be centered in the concrete.

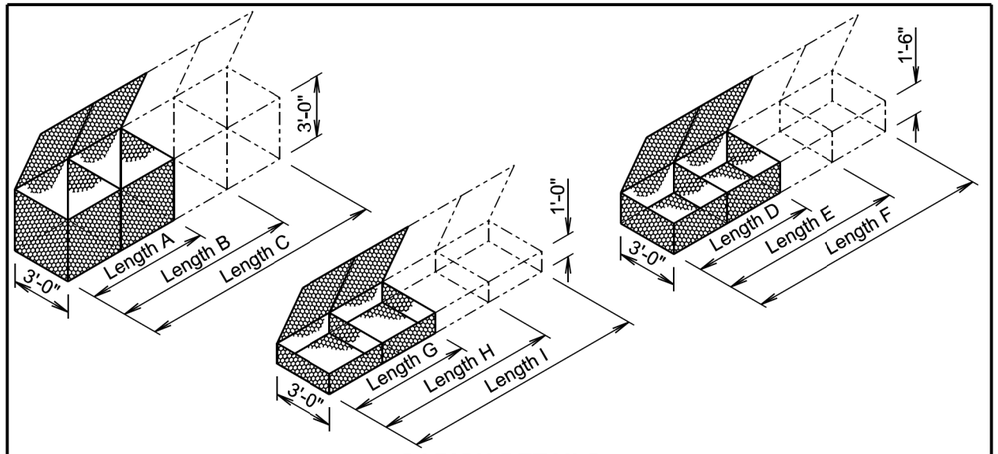
The cost of furnishing and installing Precast Drop Inlet Collars, including labor, materials, and incidentals will be incidental to the contract unit price per Each for "Precast Drop Inlet Collar".

June 1, 2022

Published Date: 2025	SDDOT	***PRECAST DROP INLET COLLAR***	***PLATE NUMBER 670.99*** *Sheet 1 of 1*

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	P 0079(84)232	B48	B49

Plotting Date: 09/23/2024



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

Above dimensions subject to mill tolerances.

GENERAL NOTES:

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.

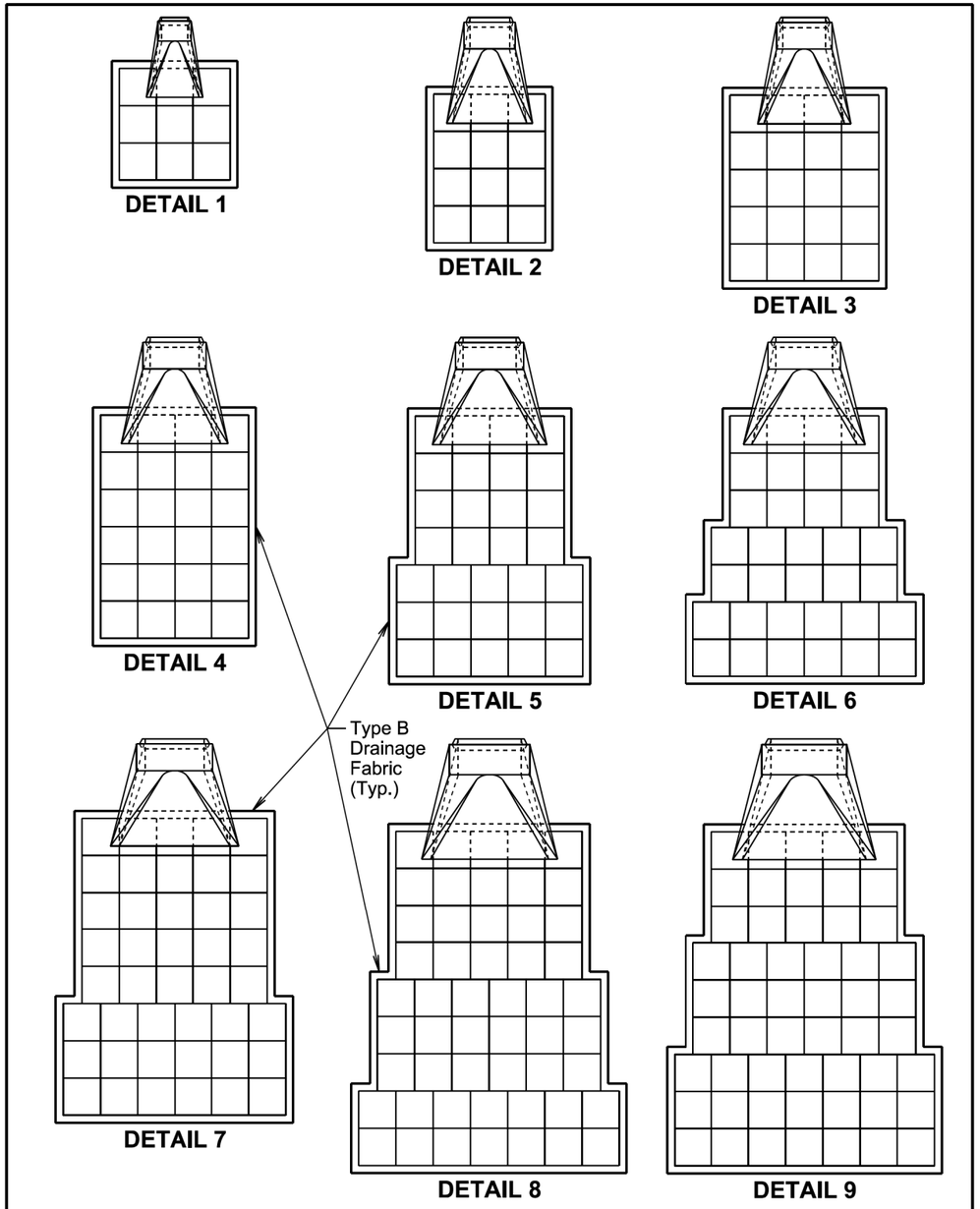
Wire lacing or interlocking type fasteners will be used for gabion assembly and final construction of gabion structures. Interlocking fasteners for galvanized gabions will be high tensile 0.120 inch diameter galvanized steel wire measured after galvanizing. The galvanizing will conform to ASTM A641-92,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

Plot Scale - 1:200

Plotted From - TRPR18163

File - ...\hard06TD\Std\PlatesSection8.dgn

	* 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