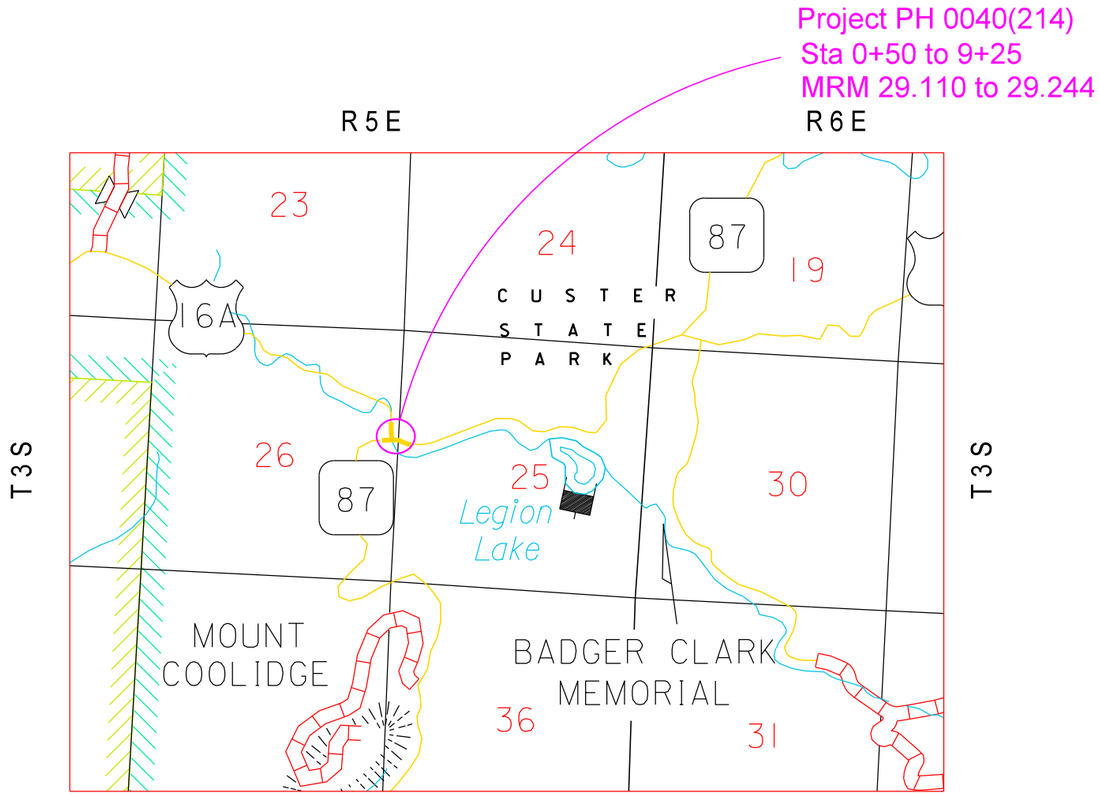
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(214)	B1	B15

Plotting Date: 10/23/2015

Section B: Grading Plans

INDEX OF SHEETS



Plot Scale - 1:200

Plotted From - trrc11951

PLOT NAME - ...\TITLEB.DGN

FILE - ...\PROJECTS\0040PH00214\PLANS\TITLEB.DGN

SECTION B ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
100E0100	Clearing	Lump Sum	LS
120E1000	Muck Excavation	90	CuYd
120E1100	Unclassified/Rock Excavation	8,473	CuYd
120E2000	Undercutting	3,049	CuYd
120E6100	Water for Embankment	110.0	MGal
250E0020	Incidental Work, Grading	Lump Sum	LS
270E0040	Salvage and Stockpile Asphalt Mix and Granular Base Material	1,041.0	Ton
421E0100	Pipe Culvert Undercut	95	CuYd
450E0162	30" RCP Class 2, Furnish	272	Ft
450E0170	30" RCP, Install	272	Ft
450E2204	30" RCP Sloped End, Furnish	4	Each
450E2205	30" RCP Sloped End, Install	4	Each
450E3032	36" RCP Arch Class 2, Furnish	76	Ft
450E3040	36" RCP Arch, Install	76	Ft
450E4606	36" RCP Arch Sloped End, Furnish	2	Each
450E4607	36" RCP Arch Sloped End, Install	2	Each
462E0100	Class M6 Concrete	2.2	CuYd
464E0100	Controlled Density Fill	38.0	CuYd
480E0100	Reinforcing Steel	289	Lb
670E2200	Type C Frame and Grate	2	Each
720E1015	Bank and Channel Protection Gabion	16.0	CuYd
831E0110	Type B Drainage Fabric	50	SqYd

CLEARING AND DISPOSAL OF TIMBER

The merchantable material on the project shall become the property of the Contractor and removed.

Merchantable timber shall be defined as any species of tree that is 8” in diameter, 5’ above the ground.

Temporary decking locations outside the construction limits shall be approved by Custer State Park.

Slash and non-merchantable timber shall be disposed of by chipping, burning, or burying. All residue from chipping or burning shall be buried. Burial pits shall be at locations approved by Custer State Park. The Contractor shall follow the prescribed burning provisions of the Fire Plan in his/her preparation for and conduction of all burning operations. The location of slash piles and all other aspects of slash disposal by burning must be approved in advance by Custer State Park.

UTILITIES

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

GRADING OPERATIONS

Water for Embankment is estimated at the rate of 15 gallons of water per cubic yard of Embankment.

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(s) shall be constructed to the limits shown on the cross sections. If significant changes to the cross sections are necessary during construction, the Engineer shall contact the Designer for the proposed change.

Generally, all shallow inlet and outlet ditches as noted on the plan sheets shall 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.

CLASSIFICATION OF EXCAVATION

Rock will be encountered within the project limits. All materials except those classified as Muck Excavation encountered during the construction of this project, regardless of their nature or the manner in which they are excavated, will be considered Unclassified/Rock Excavation.

It is anticipated that blasting will be required to complete the excavation from Station 2+75± to Station 9+25±, Lt. The excavation consists of a varying amount of colluvium over Metaquartzite. For informational purposes only, it is estimated that 80% of the required excavation from Station 2+75± to Station 4+25± and 50% of the excavation from Station 4+25± to Station 9+25± will consist of large boulders and inplace Metaquartzite that may require blasting to excavate.

Prospective bidders are encouraged to review the Geology Report completed by the SDDOT Geotechnical Engineering Activity as well as observe the project conditions in the field. The Geology Report is available for review at the Rapid City Region and Custer Area Offices.

TABLE OF UNCLASSIFIED EXCAVATION/ROCK EXCAVATION

Excavation		4265
Undercutting		3049
Topsoil		608
Salvaged Asphalt Mix and Granular Base Material (from cut sections)		0
Salvaged Asphalt Mix and Granular Base Material (from fill sections)		551
	Total	8473

PROCEDURES FOR DETERMINING UNCLASSIFIED EXCAVATION/ ROCK QUANTITY

When plan quantities are used for payment, the Unclassified Excavation/ Rock Excavation quantity shall be used for final payment.

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

The Topsoil quantity in the Table of Unclassified Excavation is an estimate. When finaling a project, the total quantity of field measured Topsoil shall 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.

Salvaged Asphalt Mix and Granular Base Material shall be paid for once as Unclassified Excavation. As shown in the Table of Unclassified Excavation, the estimated quantity of 551 cubic yards of Salvaged Asphalt Mix and Granular Base Material from fill sections or old roads shall be added to the Excavation quantity to determine the Unclassified Excavation quantity. When finaling a project, the quantities of Salvaged Asphalt Mix and Granular Base Material from fill sections and old roads will not be adjusted according to field measurements. The quantity of Salvaged Asphalt Mix and Granular Base Material from cut sections will not be added to the Excavation quantity as it is already in the cuts on the final cross sections.

UNDERCUTTING

In all cut sections the earthen subgrade shall be undercut 1 foot below the earthen subgrade surface. The undercut material or other suitable material, as directed by the Engineer, shall then be replaced and compacted to the density specified for the section being constructed.

Shallow embankment sections, fills less than 1 foot in height measured at the finished subgrade shoulders, shall be undercut to ensure a minimum 1 foot height of earth embankment for the entire width of roadbed. The upper portion of the undercut material that consists of topsoil with a high humus content shall be used as topsoil or placed in the fill slopes outside the shoulders of the earthen subgrade.

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 shall direct removal of these areas and the additional areas will be measured according to the Engineer.

BLASTING OPERATIONS

The Contractor shall exercise utmost care so as not to endanger life or property while using explosives.

Before any drilling operations in preparation for blasting are started, the Contractor shall furnish the Engineer a detailed plan of operations showing the method proposed for the prevention of damage. In order to ensure adequate protection, the plan may be modified to meet the conditions that may develop. The Contractor shall also consider the location of adjacent structures in preparation of this plan.

Blasting operations shall be conducted under the most careful supervision. Ordinarily only light shooting shall be permitted. In using explosives, the Contractor shall adopt precautions that will prevent damage to surrounding objects. The Contractor shall use suitable mats or other approved means to smother the blasts as directed by the Engineer. Nothing herein shall release the Contractor from full responsibility for damage or injury resulting from the use of explosives.

When using explosives, the Contractor shall adopt precautions which will prevent damage to landscape features and other surrounding objects, and which will prevent the scattering of rocks, stumps or other debris outside the finished roadway slopes. When directed by the Engineer, trees within an area designated to be cleared shall be left as protective screen for surrounding vegetation during blasting operations. Trees left as a protective screen shall be removed and disposed of after blasting has been completed.

A. BLASTING CONSULTANT

The Contractor shall retain a recognized blasting consultant to assist in the blast and pre-shear design. The blast design shall include both the controlled and production blasting. The consultant shall be an expert in the field of drilling and blasting who derives his primary source of income from providing education in an institution of higher education and/or specialized blasting and/or blasting consultant services. The consultant shall not be an employee of the Contractor, explosives manufacturer, or explosives distributor.

B. SCALING OF ROCK SLOPES

No loose rocks shall be left on shot or ripped and dozed rock slopes. Loose or detached rock shall be removed from the slopes as the depth of the cut progresses. Any rock protrusions on the slopes shall be removed with the use of equipment or light blasting as the slope is developed.

MUCK EXCAVATION

The areas of muck excavation are drawn on the cross sections with a normal depth of 3 feet. The estimated quantity of 90 cubic yards of muck excavation shall be paid for at the contract unit price per cubic yard for “Muck Excavation”.

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

Field measurement of muck excavation will not be made unless the Engineer orders additional excavation, or when the Engineer determines, in accordance with Section 120.3 A.1. of the Specifications, that the classification of excavation be changed.

If the areas designated as muck excavation can be removed with similar equipment and procedures as used for unclassified excavation, the material shall be measured and paid for as “Unclassified Excavation”.

TABLE OF MUCK EXCAVATION

Sta. to	Sta.	L/R	Depth	Quantity
			(Ft)	(CuYd)
8+00	8+25	R	3	90
			Total:	**90**

SALVAGE AND STOCKPILE ASPHALT MIX AND GRANULAR BASE MATERIAL

An estimated 1041 tons (551 Cubic Yards) of asphalt mix and granular base material shall be salvaged from the entire length of the existing highway and stockpiled at a site furnished by the Contractor and satisfactory to the Engineer.

The estimated thickness of the existing asphalt mix and granular base material to salvage is 6”

The quantity of salvage asphalt mix and granular base material may vary from the plans. No adjustment will be made to the contract unit price for variations of the quantity of “Salvage and Stockpile Asphalt Mix and Granular Base Material.”

It is estimated that there are 63 cubic yards of salvageable material per station. This rate was used to compute the unclassified excavation quantities. The rate of salvageable material is based on a 34 foot width.

TABLE OF PIPE CULVERT UNDERCUT

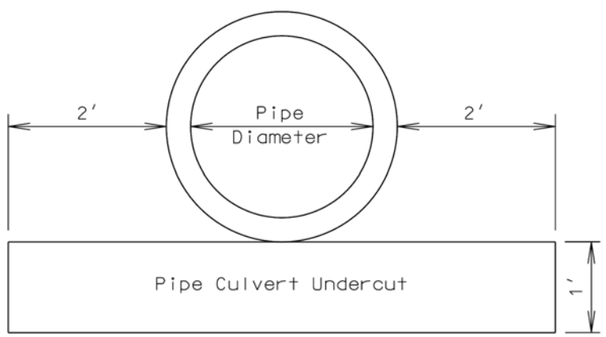
The Table of Pipe Culvert Undercut is intended to be used to establish an estimated quantity of Pipe Culvert Undercut for bidding purposes only. The depth of undercut is an estimate and the actual depth necessary shall be determined during construction. Pipes shown may or may not require undercutting and pipes not shown may require undercutting. The Engineer will determine which pipe shall be undercut in accordance with Section 421 of the Specifications.

Sta.	L/R	Pipe Culvert Undercut
		CuYd
3+21		24
4+04, twin	R	41
4+85, twin	R	30
Totals:		**95**

The table contains the rate 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	Side (L/R)	Description
2+89		Take Out Twin 24" - 70' CMP
3+90	R	Take Out 36" - 40' CMP
4+88	R	Take Out 36" - 58' CMP
4+88	R	Remove Intersection Road Material that falls outside the grading limits

CONTROLLED DENSITY FILL FOR PIPE

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

The controlled density fill shall be placed between the pipes from the base of pipe elevation to the haunch of the pipes.

TABLE OF CONTROLLED DENSITY FILL FOR PIPE

Sta.	L/R	Controlled Density Fill
		CuYd
4+04, twin	R	22
4+85, twin	R	16
	Totals:	**38**

DROP INLETS

The plan shown quantities for the drop inlets 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

Sta.	L/R	Drop Inlet Type	Type C Frame and Grate	H	Class M6 Conc.	Rein. Steel
			Each	Ft	CuYd	Lb
4+53	48' R	3'x4' C	1	3.27	1.10	144
4+53	52' R	3'x4' C	1	3.27	1.10	144
		Total:	**2**		**2.2**	**289**

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TABLE OF PIPE QUANTITIES

Sta.	L/R	30" RCP Class 2	36" RCP Arch Class 2	30" RCP Sloped End	36" RCP Arch Sloped End
		Ft	Ft	Each	Each
3+21			76		2
4+04, twin	R	156		2	
4+85, twin	R	116		2	
Totals:		**272**	**76**	**4**	**2**

TABLE OF PIPE OUTLET PROTECTION

Sta to	L/R	Location	L (Ft)	W (Ft)	D (Ft)	Bank and Channel Protection Gabion CuYd	Type B Drainage Fabric (SqYd)
3+21	R	Pipe Outlet	12	9	1.5	6.0	20
4+85	R	Pipe Outlet	12	15	1.5	10.0	30
				Total:		**16.0**	**50**

TABLE OF SUPERELEVATION

Station	to	Station		
0+00		0+50	-	Normal Crown Section
0+50		1+75	-	Superelevation Transition
1+75		9+00	-	371’ Radius Curve Left 0.04’/’ Superelevation Rate Point of Rotation at Centerline

HORIZONTAL ALIGNMENT DATA

POB	-0+29.13		536526.527	1137576.157
	TL=180.24	S 7°17'35" W		
PC	1+51.11		536347.740	1137553.276
PI	4+79.68		536021.828	1137511.566
	R=371.00	Delta= 83°03'31" Left		
PT	6+88.93		535941.035	1137830.049
	TL= 4.09	S 75°45'56" E		
PC	6+93.02		535940.029	1137834.016
PI	9+95.63		535865.620	1138127.333
	R=1000.00	Delta= 33°40'21" Left		
PT	12+80.72		535966.323	1138412.693
	TL= 72.54	N 70°33'43" E		
POE	13+53.25		535990.462	1138481.095

The coordinates shown on this sheet are based on the State Plane NAD 1983 SOUTH Zone, Geoid 09 SF = 0.9996662074

CONTROL DATA

COOLIDGE N: 530268.072 E: 1136792.043 Z: 6028.090

ML01 N: 535993.303 E: 1137606.519 Z: 5120.650
2.0 FT. REBAR, 10.0 FT. N. OF SHOULDER HWY 87 S.

ML02 N: 536912.198 E: 1137161.757 Z: 5168.374
2.0 FT. REBAR, 10.0 FT. N. OF SHOULDER HWY 16A

ML03 N: 535889.050 E: 1138224.214 Z: 5109.181
2.0 FT. REBAR, 12.6 FT.S. OF SHOULDER HWY 16A & 87

ML04 N: 536183.339 E: 1139061.719 Z: 5085.149
2.0 FT. REBAR, 9.0 FT.S. OF SHOULDER HWY 16A & 87

ML05 N: 535770.090 E: 1136846.396 Z: 5137.692
2.0 FT. REBAR, 14.0 FT.W. OF SHOULDER HWY 87 S. SIDE OF DRIVEWAY

ML06 N: 536690.813 E: 1137555.527 Z: 5149.381
2.0 FT. REBAR, 4.0 FT. E. OF SHOULDER HWY 16A

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
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Plotting Date: 11/12/2015

PLOT SCALE - 1:8

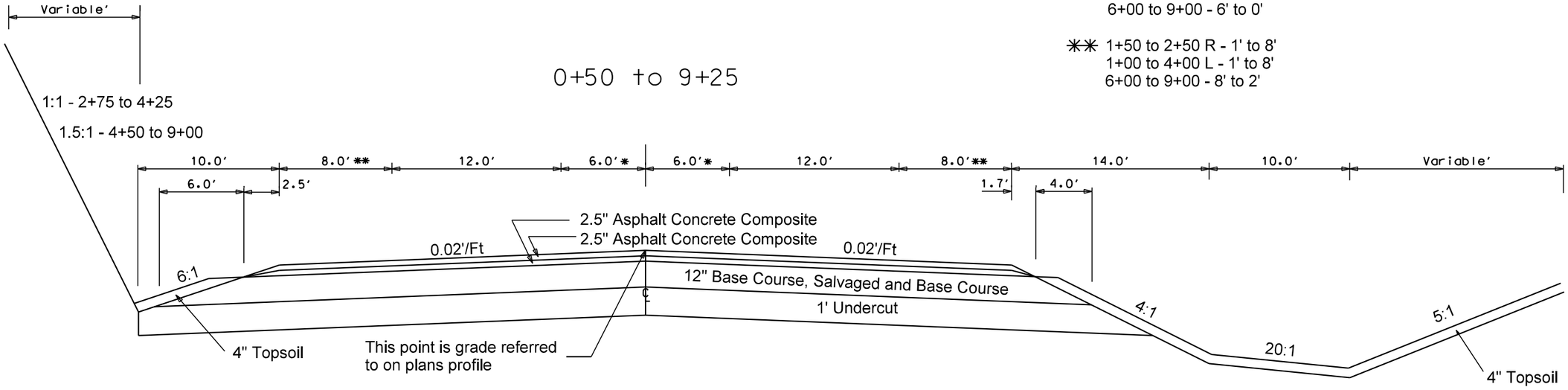
PLOT NAME - 3

TYPICAL GRADING AND SURFACING SECTION

✳ 1+00 to 4+00 - 0' to 6'
6+00 to 9+00 - 6' to 0'

✳✳ 1+50 to 2+50 R - 1' to 8'
1+00 to 4+00 L - 1' to 8'
6+00 to 9+00 - 8' to 2'

0+50 to 9+25



PLOTTED FROM - TRRC11951

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STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(214)	B7	B15

Plotting Date: 03/26/2012

EXISTING TOPOGRAPHY SYMBOLOGY AND LEGEND

- 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
- Creek Edge
- Curb/Gutter
- Curb
- Dam Grade/Dike/Levee
- Ditch Block
- Drainage Profile
- Drop Inlet
- Edge Of Asphalt
- Edge Of Concrete
- Edge Of Gravel
- Edge Of Other
- Edge Of Shoulder
- Elec. Trans./Power Jct. Box
- Fence Barbwire
- Fence Chainlink
- Fence Electric
- Fence Misc.
- Fence Rock
- Fence Snow
- Fence Wood
- Fence Woven
- Fire Hydrant
- Flag Pole
- Flower Bed
- Gas Valve Or Meter
- Gas Pump Island
- Grain Bin
- Guardrail
- Gutter
- Guy Pole
- Haystack
- Hedge
- Highway R.O.W. Marker
- Information Sign One Post
- Information Sign Two Post
- Interstate Close Gate
- Iron Pin
- Irrigation Ditch
- Lake Edge
- Lawn Sprinkler
- Mailbox
- Manhole Electric
- Manhole Gas
- Manhole Misc
- Manhole Sanitary Sewer
- Manhole Storm Sewer
- Manhole Telephone
- Manhole Water
- Merry-Go-Round
- Microwave Radio Tower
- Misc. Property Corner
- Misc. Post
- Overhang Or Encroachment
- Overhead Utility Line — OH —
- Parking Meter
- 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 R.O.W. Marker
- Railroad Signs
- Railroad Switch
- Railroad Track
- Railroad Trestle
- Rebar
- Rebar With Cap
- Reference Mark
- Retaining Wall
- Riprap
- River Edge
- Rock And Wire Baskets
- Rockpiles
- Route Sign One Post
- Route Sign Two Post
- Satellite Dish
- Septic Tank
- Shrub Tree
- Sidewalk
- Sign Face
- Sign Post
- Slough Or Marsh
- Spring
- Stream Gauge
- Street Marker
- 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 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
- R. O. W. Line
- New R. O. W. Line
- Cut and Fill Limits
- Control of Access
- New Control of Access

PLOT SCALE - 1:200

PLOTTED FROM - TRRC11951

PLOT NAME - 8

FILE - ...\CUSTH031\DESIGN\TOPOSYMB.DGN

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2+89
Take Out Twin 24" - 70' CMP
(Incidental Work, Grading)

3+21 (26 ac)
(Skew 34° RHF)
Install 36"-76' RCP Arch
& 2 Sloped Ends

3+51 R
Install Bank and Channel
Protection Gabions
(6.0 CY)

3+90 R
Take Out 36" - 40' CMP
(Incidental Work, Grading)

4+04 - 50' R (301 ac)
Install Twin 30"-78' RCP
& 2 Sloped Ends
with Controlled Density Fill
6' C to C

4+88 R
Take Out 36" - 58' CMP
(Incidental Work, Grading)

4+85 - 50' R (301 ac)
Install Twin 30"-58' RCP
& 2 Sloped Ends
with Controlled Density Fill
6' C to C

5+20 R
Install Bank and Channel
Protection Gabions
(10.0 CY)

4+53 - 50' R
Install 2 - 3'x4' Type C Drop Inlet
& Type C Frame and Grate

Begin PH 0040(214)
Station 0+50

CUSTER
STATE
PARK

Sec. 26 - T3S - R5E

Sec. 25 - T3S - R5E

Section Line

PI 4+79.68
N 536021.83
E 1137511.57
Del 83°03'31" L
Dc 15°26'37"
T 328.57'
L 537.82'
R 371.00'

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

NE1/4 of Section 26 - Township 3 South -
Range 5 East of the B.H.M.

Parcel A1

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

NW1/4 of Section 25 - Township 3 South -
Range 5 East of the B.H.M.

Parcel A2

0+44.11
33.00'

1+33.31
33.00'

1+88
86'

2+26
89'

3+88
76'

3+80.46
104.70'

4+49-98' R
Do Not Disturb Rock in Intersection

5+94.87
68.33'
6+14.17
33.00'

5+84.16
75.57'

6+44.50
40.01'

6+49.01
61.67'

8+22
70'

6+88.87
33.00'

9+02.47
33.00'

Present SD Hwy 87

Present US Hwy 16A

66'

T/F

End PH 0040(214)
Station 9+25

PI 9+95.63
N 535865.62
E 1138127.33
Del 33°40'21" L
Dc 5°43'46"
T 302.61'
L 587.70'
R 1000.00'

Parcel A1
0+44.11 to 3+80.46 R
Temporary Easement for
Cut & Fill containing
0.3 ac, more or less

Parcel A1
5+61.16 to 6+49.01 R
Temporary Easement for
Cut containing
0.1 ac, more or less

Parcel A1
1+33.31 to 6+14.17 L
Temporary Easement for
Cut containing
0.4 ac, more or less

Parcel A2
6+44.50 to 9+02.47 R
Temporary Easement for
Cut & Fill containing
0.2 ac, more or less

Parcel A2
5+94.87 to 8+88.87 L
Temporary Easement for
Cut containing
0.2 ac, more or less

Plot Scale - 1:100

Plotted From - trrc11951

File - ...\prj\Cust04GR\Design\000.dgn

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Plotting Date: 09/11/2015

PLOT SCALE - 1:200

PLOT NAME - 2

FILE - ...\PROJCUST04GR\DESIGN\000V.DGN

PLOTTED FROM - TRRC11951

0+50

EXC 4265
UNDERCUT 3049
7314

9+25

EMB 350
+20.0% 70 420
UNDERCUT 3049
+20.0% 610 3659
WASTE 3235 3235
7314

HAUL 27,539 C Y STA'S

4+04 R
24' Int Rd

4+85 R
24' Int Rd

PVI -0+24
Elev 5140.55

PVI 0+50
Elev 5136.92

L 200.00ft
G1 -4.5123%
G2 -4.1808%
K 603

L 200.00ft
G1 -4.1808%
G2 -2.7183%
K 137

L 200.00ft
G1 -2.7183%
G2 -0.7357%
K 101

L 200.00ft
G1 -1.3239%
G2 -5.8505%
K 44

RDGPI 1+00
Elev 5131.65

RDG -2.8%

RDG -4.0%

PVI 1+61
Elev 5131.89

RDGPI 1+50
Elev 5130.01

RDGPI 2+75
Elev 5125.00

FL 21.20
FL 21.00

FL 20.26
FL 17.59

PVI 3+75
Elev 5122.95

LDG -0.4527%

PVI 6+77
Elev 5114.73

PVI 8+84
Elev 5113.21

PVI 10+49
Elev 5111.02

PVI 11+70
Elev 5103.95

LDGPI 6+99
Elev 5112.31

LDGPI 9+00
Elev 5111.40

Q_{100}= 49.1 cfs
El 5125.26
Q_{25}=39.1 cfs
El 5124.51

Q_{100}= 155.0 cfs
El 5125.16
Q_{25} = 67.0 cfs
El 5123.00

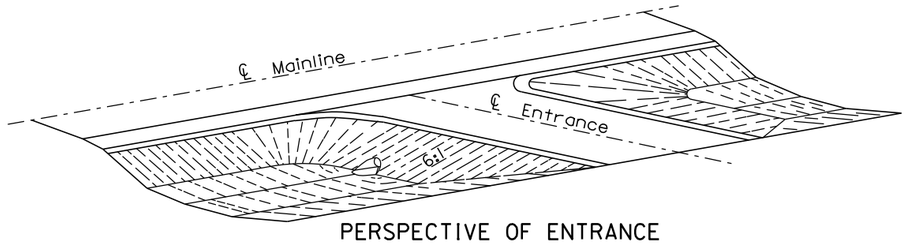
Q_{100}=155.0 cfs
El 5122.45
Q_{25} =67.0 cfs
El 5120.00

5160
5150
5140
5130
5120
5110
5100
5090
5080
5070
5060
5050

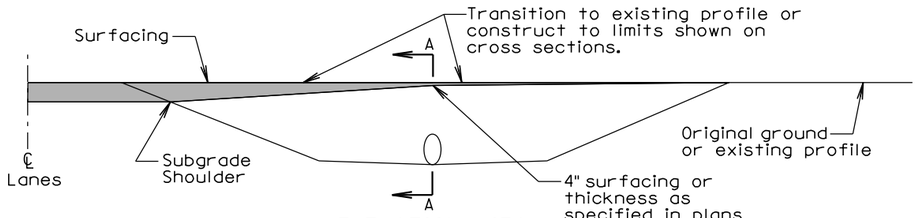
5139.36
5134.67
5130.30
5126.11
5122.48
5119.55
5116.86
5114.86
5113.83
5113.00
5111.38
5107.78

-5+00
0+00
5+00
10+00
15+00

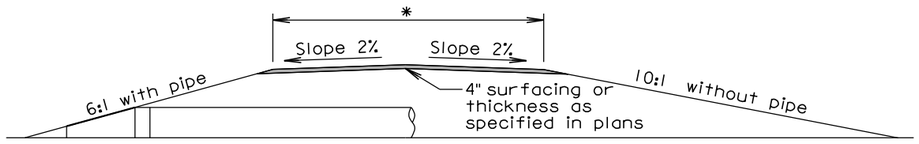
STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(214)	B10	B15



PERSPECTIVE OF ENTRANCE



ELEVATION VIEW (ENTRANCE)



SECTION A-A (ENTRANCE)

*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 and elevation view is only for illustrative purposes.

A 6:1 inslope shall be constructed for an entrance when a pipe is required. A 10:1 inslope shall be constructed when a pipe is not required.

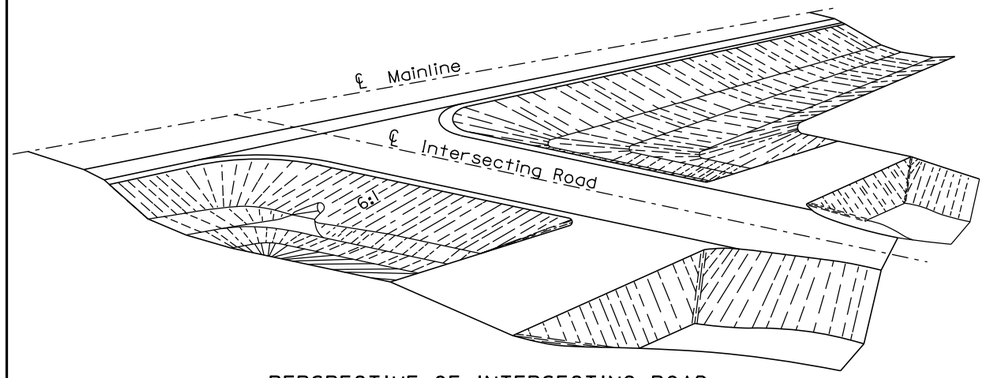
Pipe lengths shall be adjusted if necessary during construction to obtain the 6:1 slopes. For grading projects, the pipe lengths are estimated typically using a 4" thickness of surfacing directly over the subgrade above the pipe.

The transition area between the mainline inslope and the approach inslope for entrances shall be rounded to eliminate an abrupt transition.

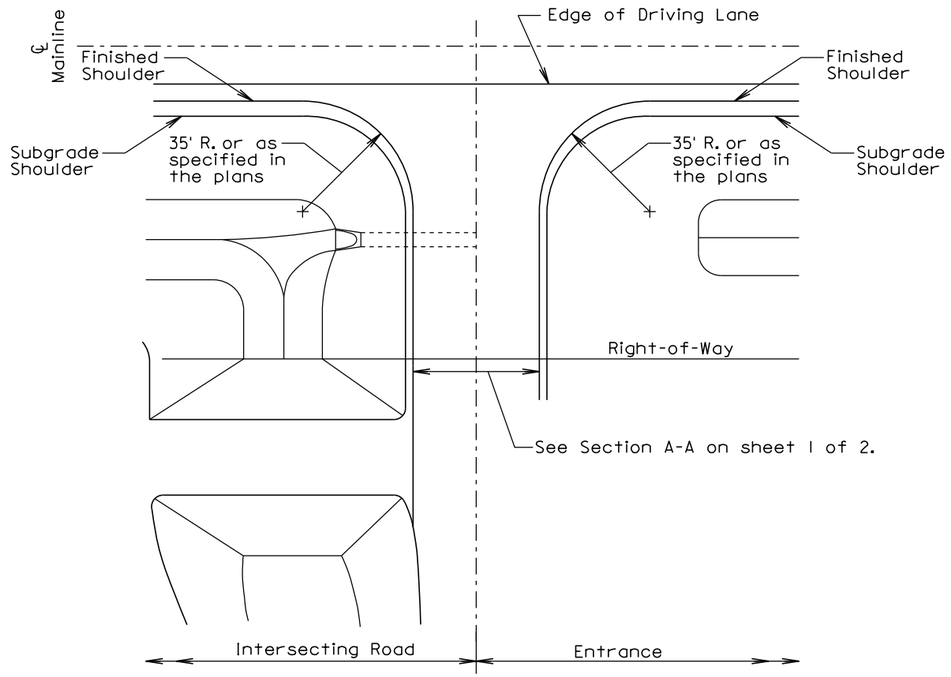
The turning radii shall be 35' for intersecting roads and entrances unless stated otherwise in the plans.

September 6, 2013

Published Date: 3rd Qtr. 2015	SDDOT	INTERSECTING ROADS AND ENTRANCES	PLATE NUMBER 120.01
			Sheet 1 of 2



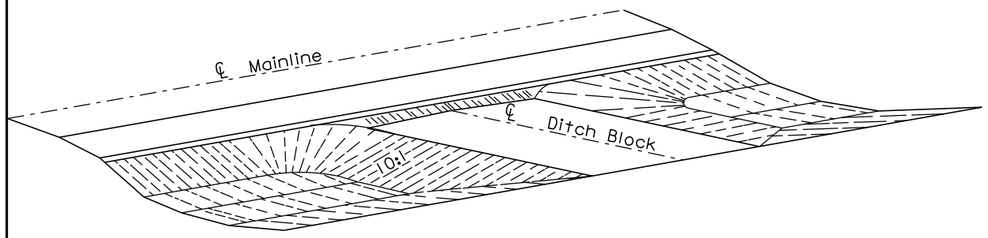
PERSPECTIVE OF INTERSECTING ROAD



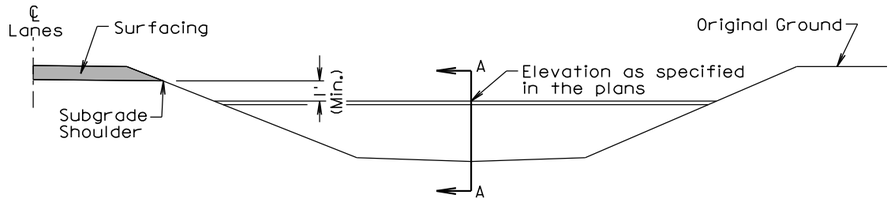
PLAN VIEW

September 6, 2013

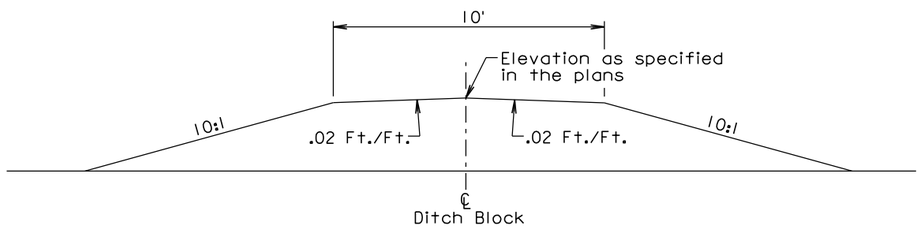
Published Date: 3rd Qtr. 2015	SDDOT	INTERSECTING ROADS AND ENTRANCES	PLATE NUMBER 120.01
			Sheet 2 of 2



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 purposes.

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

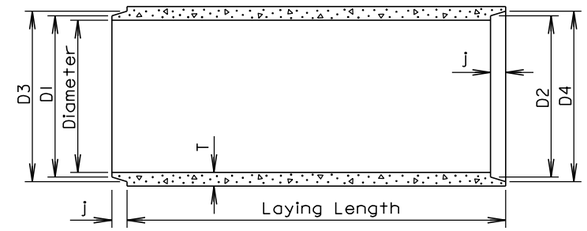
The transition area between the mainline inslope and the ditch block inslope shall be rounded to eliminate an abrupt transition.

February 14, 2011

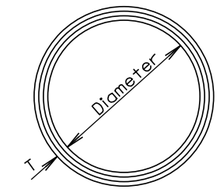
Published Date: 3rd Qtr. 2015	SDDOT	DITCH BLOCK	PLATE NUMBER 120.02
			Sheet 1 of 1

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:

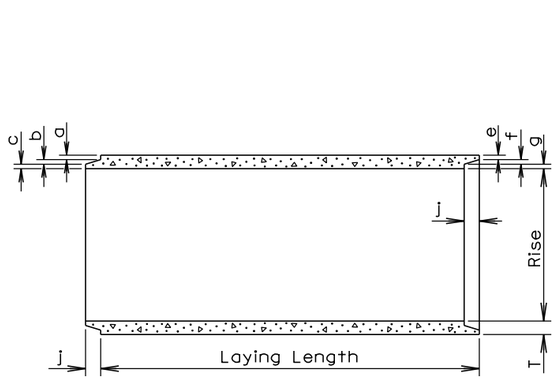
Construction of R.C.P. shall conform to the requirements of Section 990 of the Specifications.

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.

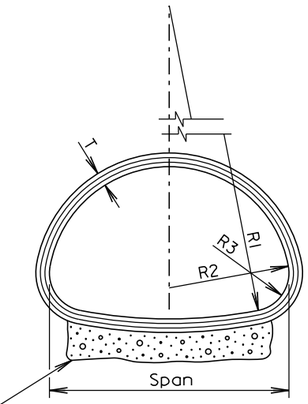
Diam. (in.)	Approx. Wt. /Ft. (lb.)	T (in.)	J (in.)	D1 (in.)	D2 (in.)	D3 (in.)	D4 (in.)
12	92	2	1 3/4	13 1/4	13 5/8	13 7/8	14 1/4
15	127	2 1/4	2	16 1/2	16 7/8	17 1/4	17 5/8
18	168	2 1/2	2 1/4	19 5/8	20	20 3/8	20 3/4
21	214	2 3/4	2 1/2	22 7/8	23 1/4	23 3/4	24 1/8
24	265	3	2 3/4	26	26 3/8	27	27 3/8
27	322	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: 3rd Qtr. 2015	SDDOT	REINFORCED CONCRETE PIPE	PLATE NUMBER 450.01
			Sheet 1 of 1



LONGITUDINAL SECTION



END VIEW

TOLERANCES IN DIMENSIONS

Radial dimensions at joints: ± 1/8" for 65" span or less and ± 1/4" for longer spans.
Rise and Span: ±2% of tabular values.
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".

Gravel Bedding Material shall be supplied for 102" to 169" spans. It shall be placed to a thickness of 6" (Min.) x 85% of the Span x Length of culvert and shall conform to the gradation requirements for gravel surfacing except material may be screened or may be plan provided material.

* Size (in.)	Approx. Wt./Ft. (lb.)	Rise (in.)	Span (in.)	T (in.)	a (in.)	b (in.)	c (in.)	j (in.)	e (in.)	f (in.)	g (in.)	R1 (in.)	R2 (in.)	R3 (in.)
18	170	13 1/2	22	2 1/2	1 3/8	3/8	3/4	2	1 1/8	3/8	1	27 1/2	13 3/4	5 1/4
24	320	18	28 1/2	3 1/2	1 5/8	1/2	1 3/8	3	1 3/8	1/2	1 5/8	40 11/16	14 3/4	4 5/8
30	450	22 1/2	36 1/4	4	1 13/16	5/8	1 9/16	3 1/2	1 9/16	5/8	1 13/16	51	18 3/4	6 1/8
36	600	26 5/8	43 3/4	4 1/2	2	3/4	1 3/4	4	1 3/4	3/4	2	62	22 1/2	6 1/2
42	740	31 5/16	51 1/8	4 1/2	2	3/4	1 3/4	4	1 3/4	3/4	2	73	26 1/4	7 3/4
48	890	36	58 1/2	5	2 1/4	3/4	2	5	2	3/4	2 1/4	84	30	8 7/8
54	1100	40	65	5 1/2	2 1/2	3/4	2 1/4	5	2 1/4	3/4	2 1/2	92 1/2	33 3/8	10
60	1400	45	73 1/2	6	3 5/16	3/4	1 15/16	5	2 3/4	3/4	2 1/2	105	37 1/2	11
72	1900	54	88	7	3 13/16	1	2 3/16	6	3 1/4	1	2 3/4	126	45	13 5/16
84	2500	62	102	8	4 1/8	1	2 7/8	6	3 1/2	1	3 1/2	162 1/2	52	14 1/2
96	3300	78	122 3/8	9	4 1/2	1	3 1/2	7	4	1	4	218	62	20
108	4200	88	138 1/2	10	5	1	4	7	4 1/2	1	4 1/2	269	70	22
120	5100	96 7/8	154	11	5 1/2	1	4 1/2	7	5	1	5	301 3/8	78	24
132	5100	106 1/2	168 3/4	10		1	4	7	4 1/2	1	4 1/2	329	85 5/8	26 7/8

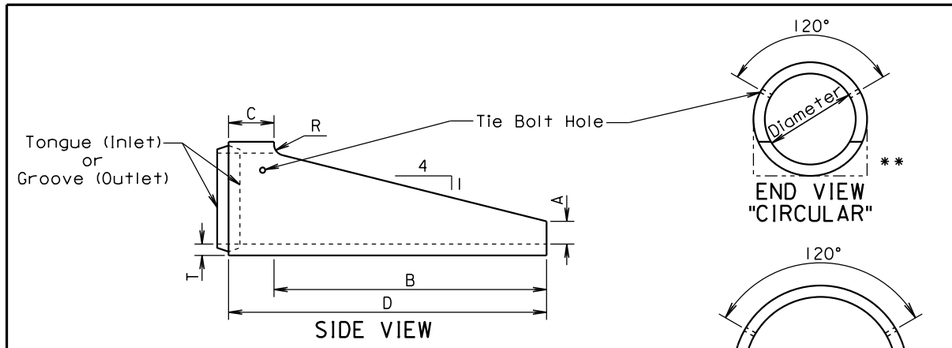
* Equivalent Diameter of Circular R. C. P.

GENERAL NOTES:

Construction of R.C.P. Arch 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.

June 26, 2015

Published Date: 3rd Qtr. 2015	SDDOT	REINFORCED CONCRETE PIPE ARCH	PLATE NUMBER 450.02
			Sheet 1 of 1



SIDE VIEW

END VIEW
"CIRCULAR"

END VIEW
"ARCH"

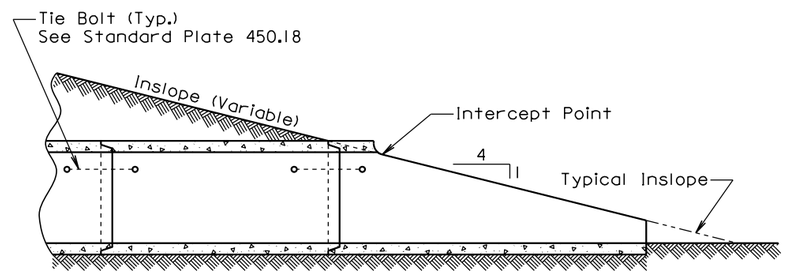
Dia. (in.)	T (in.)	A (in.)	B (in.)	C (in.)	D (in.)	R (in.)
FOR CIRCULAR PIPE						
24	3	6	72	12	84	3
30	3 1/2	7 1/2	90	12	102	3 1/2
FOR ARCH PIPE						
* 24	3	6	48	12	60	3
* 30	3 1/2	7 1/2	60	12	72	3 1/2
* 36	4 1/2	8 5/8	66	30	96	0
* 42	4 1/2	10	77 1/4	18 3/4	96	0

ALTERNATE

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

* Equivalent Diameter of Circular R.C.P.

** Acceptable Flat Bottom Alternate.



SECTION
(Along Centerline of Pipe)

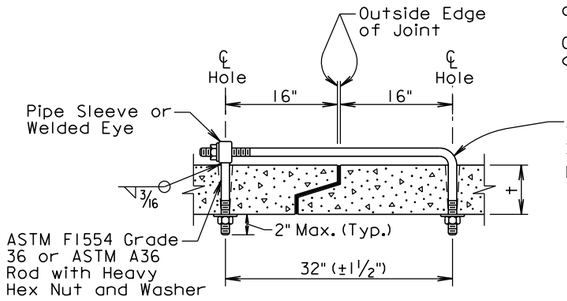
GENERAL NOTE:

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

September 22, 2006

Published Date: 3rd Qtr. 2015	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

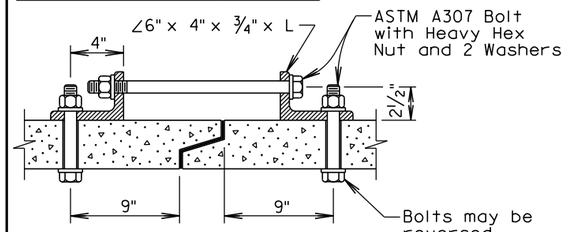
GENERAL NOTES:

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



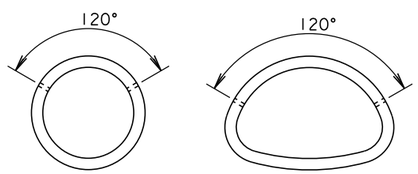
ANGLE AND BOLT TIE

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:

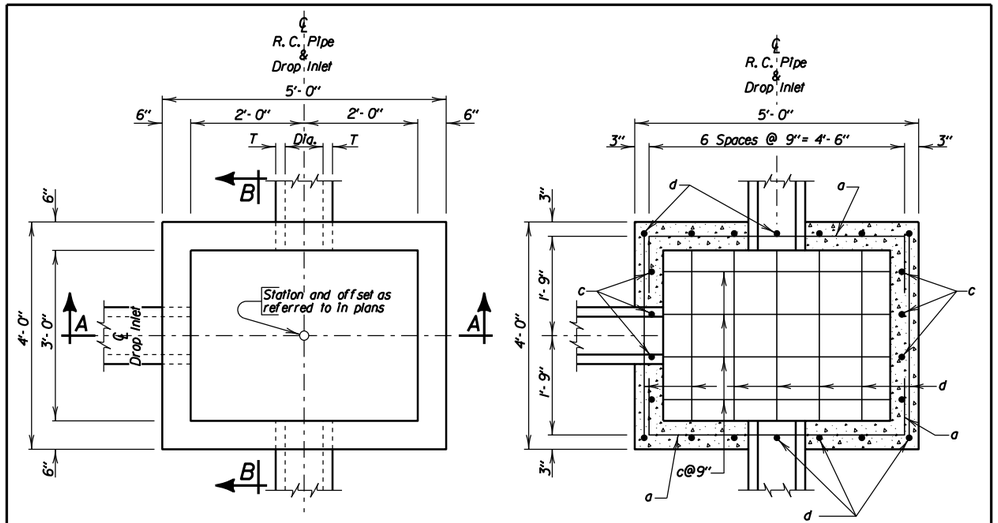
In lieu of the tie bolts detailed above other types of tie bolt connections may be installed as approved by the Office of Bridge Design.

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: 3rd Qtr. 2015	SDDOT	TIE BOLTS FOR R.C.P. AND R.C.P. ARCH	PLATE NUMBER 450.18
			Sheet 1 of 1



PLAN

BOTTOM SECTION

PIPE DISPLACEMENT REDUCTIONS

R.C. Pipe Diameter Inches	T Inches	Class M6 Concrete Cu'd
12	2	0.03
15	2 ¼	0.04
18	2 ½	0.05
24	3	0.09
30	3 ½	0.14
36	4	0.20

ESTIMATED QUANTITIES

ITEM	UNIT	CONSTANT QUANTITY	VARIABLE QUANTITY
⚹ Class M6 Concrete	Cu'd	0.43	0.29H
Reinforcing Steel	Lb	57	26.72H
Frame and Grate	Each	1	———

DROP INLETS FOR 12" TO 36" DIAMETER PIPE

GENERAL NOTES:

⚹ Reduce total quantities of concrete by the amount of concrete displaced by the pipe. 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 inlets shown may be modified by the addition or omission of connecting pipes as shown on the layouts.

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

Pipe shall not enter through a corner of the drop inlet.

Use 2" clear cover on all reinforcing steel unless otherwise noted.

Precasting of reinforced drop inlets will be permissible. Prior to precasting, the Contractor shall submit details to the Engineer for approval.

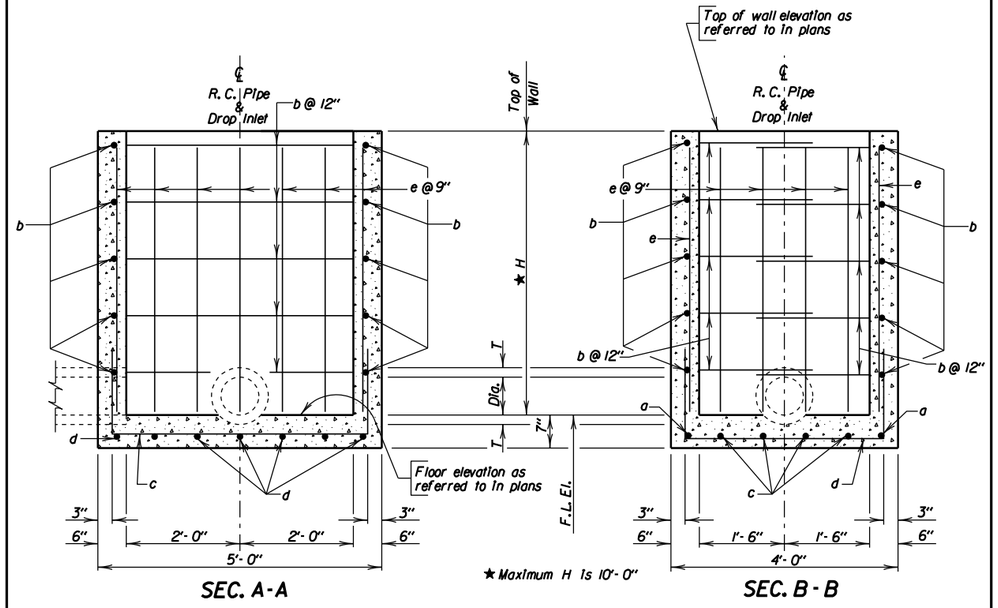
Maximum pipe diameter shall not exceed 27 inches on the 4 foot wide side and shall not exceed 36 inches on the 5 foot wide side of the drop inlet.

The dimension of H is in feet.

December 23, 2009

Published Date: 3rd Qtr. 2015	SDDOT	3'X 4' TYPE C REINFORCED CONCRETE DROP INLET	PLATE NUMBER 670.10
			Sheet 1 of 2

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	PH 0040(214)	B14	B15

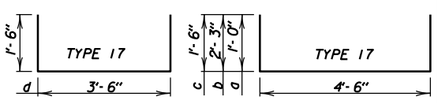


DROP INLETS FOR 12" TO 36" DIAMETER PIPE

REINFORCING SCHEDULE

Mk.	No.	Size	Length	Type
a	2	4	6'- 6"	17
b	2H	4	9'- 0"	17
c	4	4	7'- 6"	17
d	7	4	6'- 6"	17
e	22	4	H - 2"	Str.

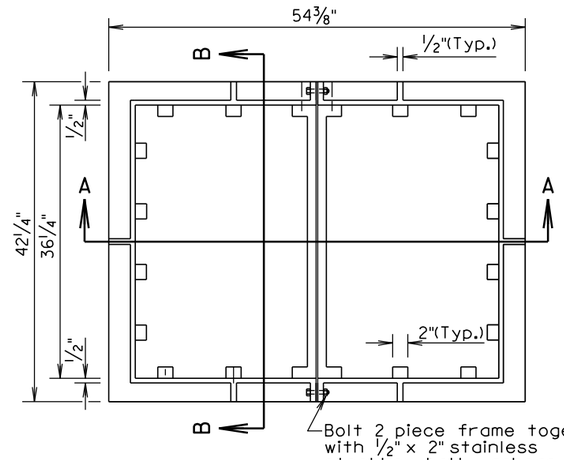
Bending Details



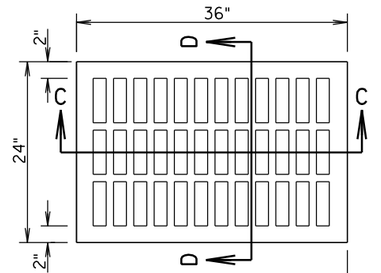
NOTE: All dimensions are out to out of bars.

December 23, 2009

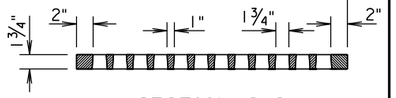
Published Date: 3rd Qtr. 2015	SDDOT	3' X 4' TYPE C REINFORCED CONCRETE DROP INLET	PLATE NUMBER 670.10
			Sheet 2 of 2



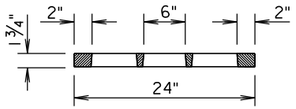
PLAN OF FRAME



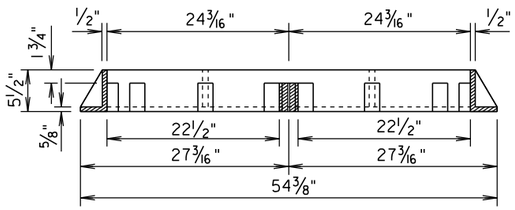
PLAN OF GRATE



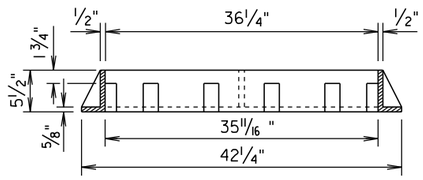
SECTION C-C



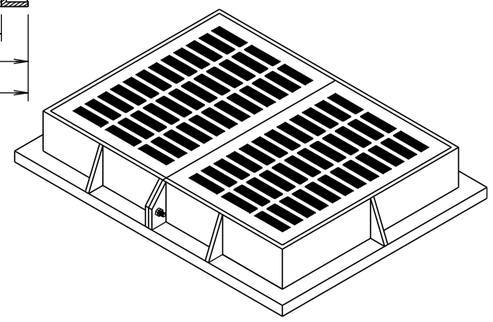
SECTION D-D



SECTION A-A



SECTION B-B



ASSEMBLED VIEW

GENERAL NOTE:
The total weight of the frame and grate shall be 850 pounds minimum.

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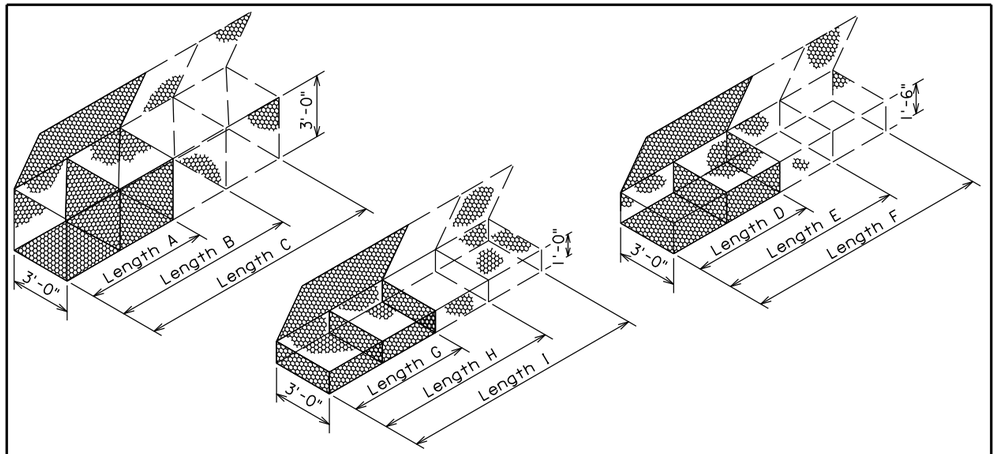

GABION DETAILS

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 shall be 0.0866 inch diameter steel wire ASTM A641 Class 3 soft temper measured after galvanizing and for PVC coated gabions shall 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 1 ½ 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 shall be used for gabion assembly and final construction of gabion structures. Interlocking fasteners for galvanized gabions shall be high tensile 0.120 inch diameter galvanized steel wire measured after galvanizing. The galvanizing shall conform to ASTM A641-92 Class 3 coating. Fasteners shall also be in accordance with ASTM A764, Class II, Type III.

Interlocking fasteners for PVC coated gabions shall 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 shall not exceed 6 inches. All fasteners shall be placed where the mesh weaves around the selvage wire at the vertical and horizontal joints.

June 26, 2001

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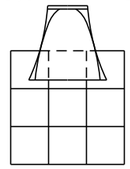
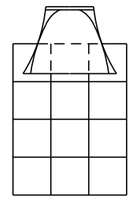
12", 18", & 24" RCP & CMP
12", 18", & 24" RCP Arch & CMP Arch



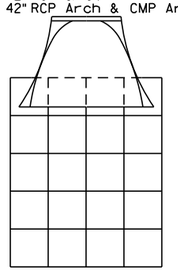
4.5 Cu. Yds.

30" & 36" RCP & CMP
30" & 36" RCP Arch & CMP Arch



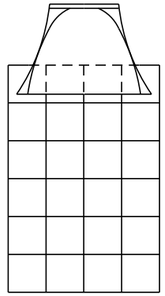
6.0 Cu. Yds.

42" RCP & CMP
42" RCP Arch & CMP Arch



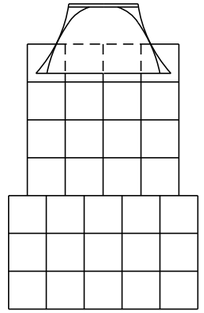
10.0 Cu. Yds.

48" & 54" RCP & CMP
48" & 54" RCP Arch & CMP Arch



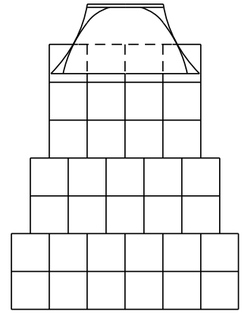
12.0 Cu. Yds.

60" RCP & CMP
60" RCP Arch & CMP Arch



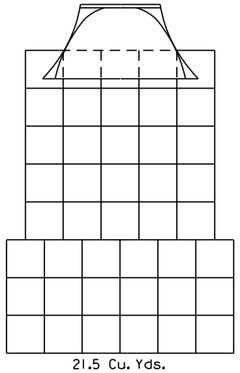
15.5 Cu. Yds.

66" RCP & CMP



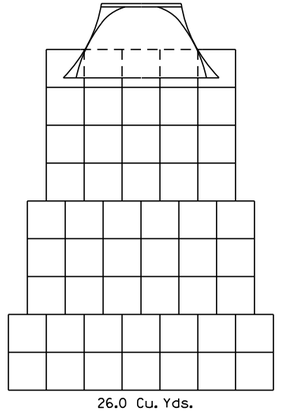
17.0 Cu. Yds.

72" RCP & CMP
72" RCP Arch & CMP Arch



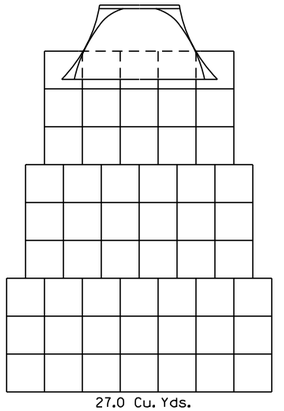
21.5 Cu. Yds.

78" RCP & CMP



26.0 Cu. Yds.

84" RCP & CMP



27.0 Cu. Yds.

GENERAL NOTES:

Gabions at outlets of C. M. pipe and R. C. pipe shall be placed under the end section a distance of 2' from the outlet end of the section. For C. M. pipe end section installations, the upper fabric of the gabions shall be modified to accommodate the metal end section in a manner approved by the Engineer.

Quantities shown on this standard plate are based on standard gabion sizes D, E, and F (See Standard Plate 720.01).

June 26, 2001

Published Date: 3rd Qtr. 2015	SDDOT	**BANK AND CHANNEL PROTECTION GABION PLACEMENT UNDER PIPE END SECTIONS**	*PLATE NUMBER* 720.03 *Sheet 1 of 1*