

DESIGN DATA				
Traffic	Average Daily			Max.Hr.
Current 2009	Pass: 540	Trucks: 55	Total: 595	60
Forecast 2029	Pass: 670	Trucks: 70	Total: 740	75
Clear Zone Distance: 18'		Design Speed: 55 MPH		
Minimum Sight Dist. for Stopping: 495'		Bridges: NA		
Minimum Sight Dist. for Safe Passing: 1985'				
Sight Dist. for No Passing Zone: 900'				
Pavement Design Life 20 (years)				

JOB# 16
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	18016	1	1

SERFO-3-020(085)093

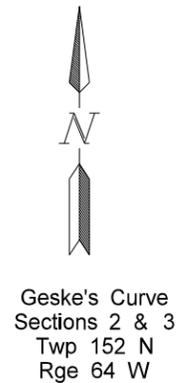
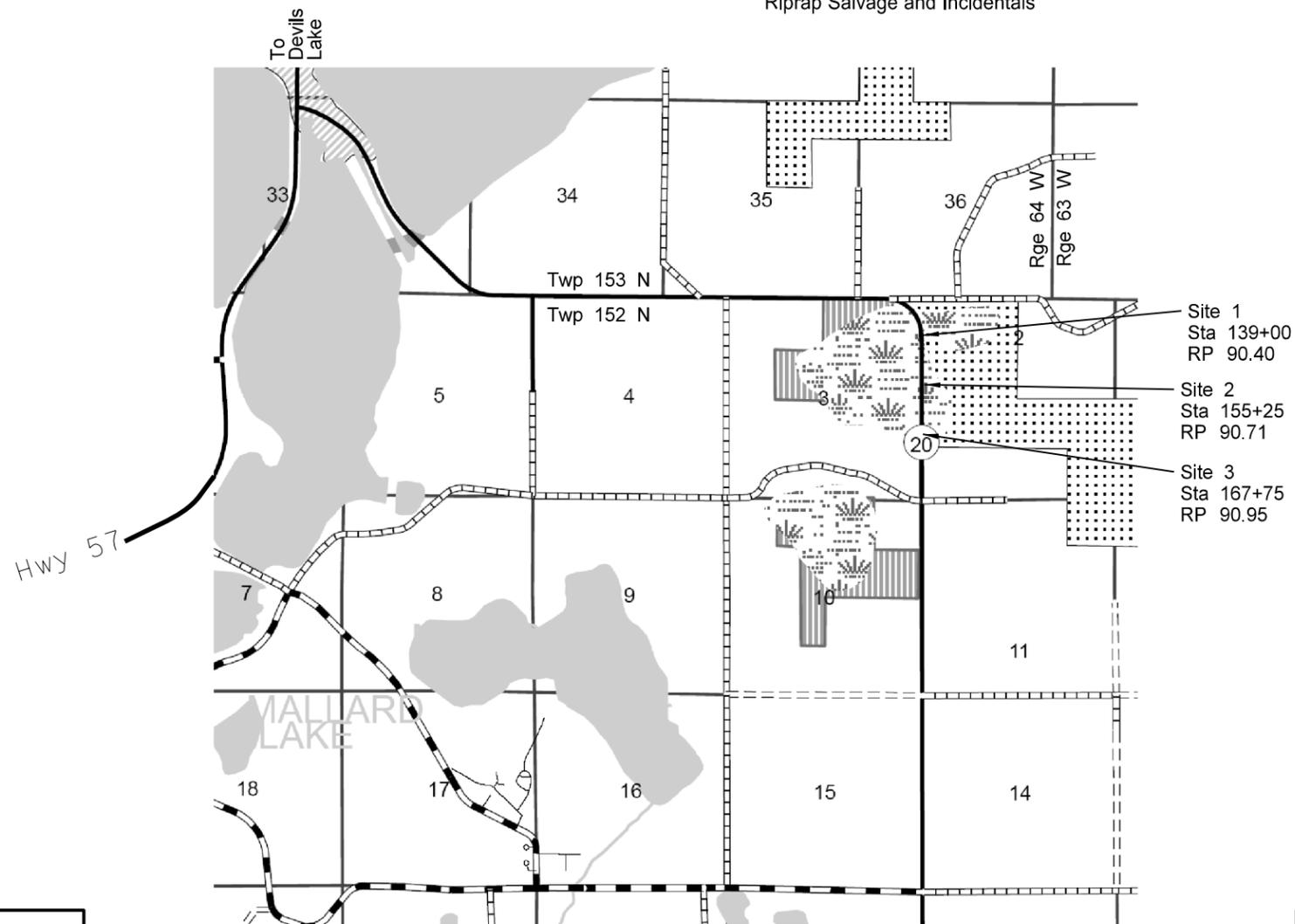
Benson County
Geske's Curve

Equalization Pipes,
Riprap Salvage and Incidentals

GOVERNING SPECIFICATIONS:

Standard Specifications adopted by the North Dakota Department of Transportation October 2008; Standard Drawings currently in effect; and other Contract Provisions submitted herein.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SERFO-3-020(085)093		
Site 1	0.029	0.029
Site 2	0.029	0.029
Site 3	0.029	0.029
Total	0.087	0.087



DESIGNERS
John M. Schmidt

APPROVED DATE 12/21/10
Roger Weigel /s/
FOR OFFICE OF PROJECT DEVELOPMENT
ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.
APPROVED DATE 12/21/10
James Douglas Rath /s/
NDDOT DESIGN DIVISION

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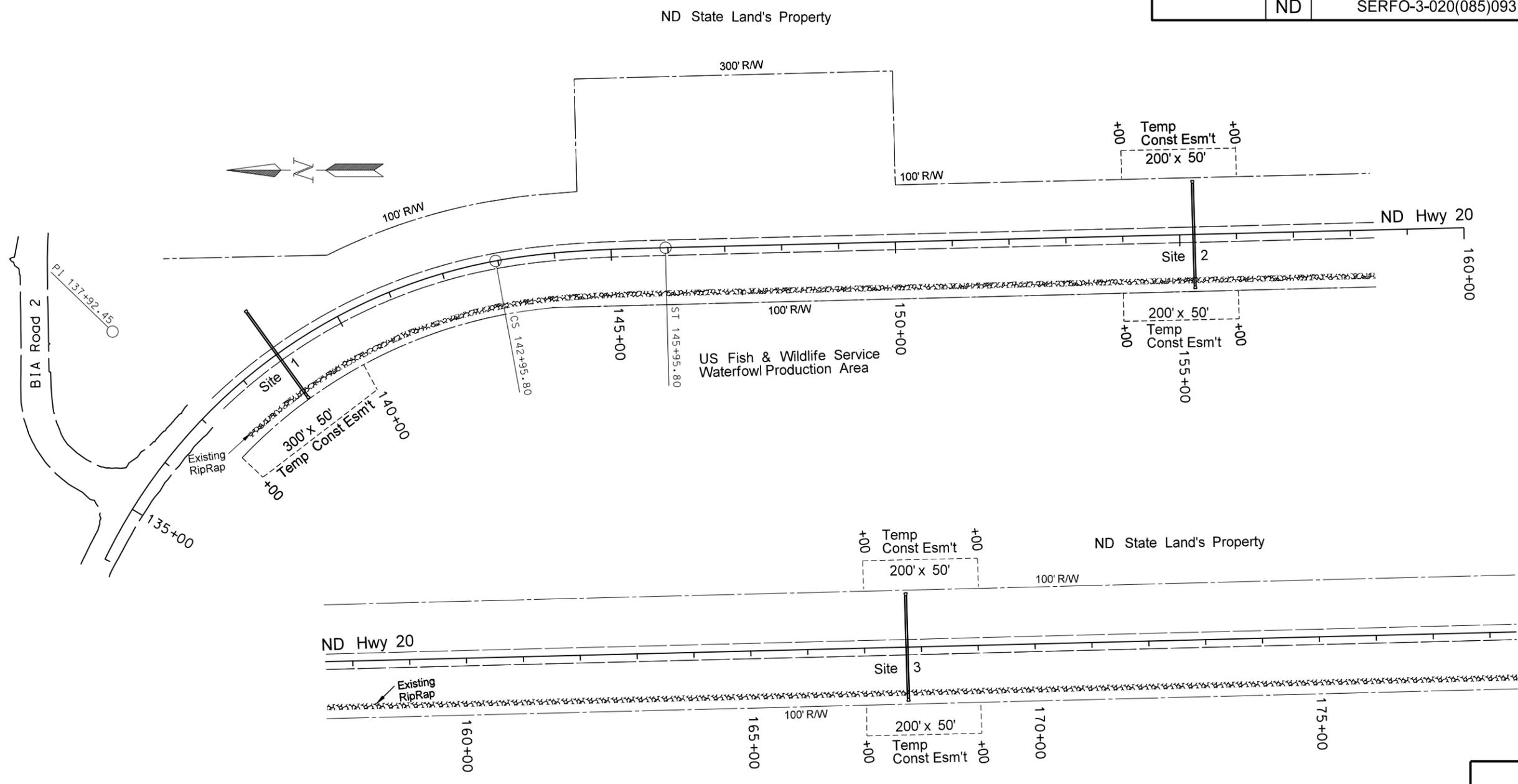
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LIST OF STANDARD DRAWINGS

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D-714-1	Reinforced Concrete Pipe Culvert and End Sections
D-714-4	Corrugated Steel Pipe Culverts and End Sections (Round Pipe)
D-714-16	Jacked or Bored Pipe
D-714-22	Concrete Pipe Ties
D-714-27	Pipe Backfill for Storm Drain Under Roadways of 40 MPH or Less and Pipe Not Under Roadway

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	4	1



Project SERFO-3-020(085)093 consists of jacking or boring three equalization pipes through ND Hwy 20. See Std D-714-16, Jacked or Bored Pipe. Relay on-site riprap at the new pipe locations.

Two lanes of traffic will be maintained through the construction sites.

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Scope of Work
Geske's Curve

GENERAL NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	6	1

100-P01 SPIRIT LAKE RESERVATION: This project is within the boundaries of an Indian Reservation. Therefore, the Contractor is advised to review any and all laws or ordinances pertaining to doing work within the exterior boundaries of the reservation.

105-P01 COOPERATION BETWEEN CONTRACTORS: Other projects in the vicinity may be under construction at the same time this project is being constructed. Contractors may still need to haul through each other's work zones and should plan accordingly.

203-P01 Common Excavation-Type C: Common Excavation quantity is based on a trench 10 feet wide with 3:1 side slopes from the end section of the new pipe to near the outer edge of the temporary construction easement. Also, included is the area from above the proposed foreslope to the top of the existing ground. Some of this material shall be used for the shoulder widening for the attenuation device and concrete barrier placement (as shown in Section 100, Sheet 2) and remain in place after the culvert installation is complete. Spread the remaining material along the adjacent foreslopes and berm to form a smooth transition with the existing foreslopes. No compaction other than that obtained by passage of the construction equipment over the work area is required. All labor, equipment, and water required to do this work shall be included in the price bid for "Common Excavation-Type C".

The Common Excavation-Type C will be paid for according to Section 203.03 B of the NDDOT Standard Specifications (Plan Quantity).

203-P02 TOPSOIL: Topsoil shall be stripped from all areas which will be impacted by the project. The topsoil shall be stripped to a maximum depth of 3 inches. All costs to remove, stockpile, and place the topsoil shall be included in the price bid for "Topsoil."

Payment for "Topsoil" shall include the Seeding –Type B Cl. II, Cl. IV and Mulching. Seeding and mulching are required in all disturbed areas, including any trails on the bottom of the slope. Seeding and mulching shall be done at the end of the project in accordance with Section 708 of the Standard Specifications.

704-P01 PRECAST CONCRETE MEDIAN BARRIERS - STATE FURNISHED: The number of precast concrete median barriers required on the project shall be 36 ten x 2.5 foot units. The Contractor shall obtain 36 barriers from the Steele Maintenance storage yard. Upon completion of the project, all barriers shall remain the property of the state and the Contractor shall return them to the Steele Maintenance storage yard. Upon final storage, one barrier connecting bolt with two washers shall be placed through the barrier loops at one end of each segment, and the nut shall be installed sufficiently threaded to the bolt to retain this hardware during transportation. Any barrier segments that become damaged during handling, transportation, placing, or use, or any missing connecting bolts, nuts or washers, shall be replaced at the Contractor's expense. The Contractor shall contact the Bismarck District Office a

minimum of 24 hours prior to picking up the barriers and contact the Bismarck District Office a minimum of 24 hours prior to returning them.

The barriers shall be counted prior to removal from the storage area and after placement on the roadway and the number agreed to by the Engineer and the Contractor. Another count shall be made once the barriers have been returned to the storage area and agreed to by the Engineer and the Contractor. Both agreements shall be made in writing and signed by all parties.

Upon final storage, the state furnished barriers shall be stacked a maximum of two high and shall be placed on 4" x 4" boards separating the barrier from the ground and separating the barriers between stacked rows. Some 4" x 4" boards are available from the Bismarck Maintenance storage yard, but any additional 4" x 4" boards that are needed shall be supplied by the Contractor, become property of the NDDOT, and shall be included in the price bid for "Precast Concrete Median Barrier - State Furnished."

All labor and equipment needed for obtaining, loading, transporting, installing, moving, removing, unloading, and maintaining the portable precast concrete median barriers shall be provided by the Contractor and included in the price bid for the item "Precast Concrete Median Barriers - State Furnished."

Concrete barriers are provided for two concurrent construction sites. If the Contractor wants a third set of barriers it will be at his expense, including all additional traffic control devices for that location.

704-P02 TRAFFIC CONTROL DEVICES: Two-lane traffic will be maintained through the construction site.

The traffic control devices list has been developed using the following layouts on the Standard Drawings and plan sheets for traffic control:

D-704-1, 7, 8, 9, 11, 12A, 13, 14, and 50 as applicable.

D-704-19 Type F for shoulder widening and concrete barrier installation. 21 Delineator Drums have been provided to maintain single lane traffic between the two sites during setup.

D-704-24 Type R, during construction at each pipe location. Concrete barriers have been provided in lieu of traffic cones. See Section 100, Sheet 2 & 3 – for precast concrete barrier placement.

Concrete barriers cannot be moved to another site unless the new pipe is installed and foreslope restored and reshaped.

Additional devices required to accommodate the Contractor's operation shall be the Contractor's responsibility.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	6	2

GENERAL NOTES

704-P03 SILT FENCE: The silt fence shall be removed by the Contractor after the area is seeded and mulched.

708-P01 RIPRAP – LOOSE ROCK – SALVAGED: At the pipe installation locations the existing riprap will be removed and re-laid. A trench shall be shaped at the ends of each pipe to provide for drainage. The salvaged riprap shall be laid to form a smooth transition with the undisturbed riprap. Geotextile Fabric Type RR shall be placed below the re-laid riprap. Payment for the fabric shall be included in the price bid for "Riprap-Loose Rock – Salvaged."

714-P01 JACKED PIPE: The method used to install the pipe indicated as jacked on the plans shall be left to the discretion of the Contractor. The boring or jacked methods are acceptable. If the boring method is used, the Contractor may use Smooth Wall Steel Pipe or Reinforced Concrete Pipe.

If smooth walled steel pipe is to be used, this material shall be welded steel pipe of new material meeting ASTM Specifications A-139, Grade B with minimum yield strength of 35,000 psi. No hydrostatic testing will be performed. The 36 Inch Smooth Wall Steel Pipe shall have a minimum wall thickness of 0.469 inches.

If the Contractor opts to install Reinforced Concrete Pipe through the roadway, the bored or jacked sections shall be CL IV. Sections which will not be bored or jacked shall be CL III Reinforced Concrete Pipe.

If the Contractor opts to install Smooth Wall Steel Pipe by boring, pipe sections on each end which do not require boring, and the end sections, may be either spiral rib corrugated steel pipe having a minimum wall thickness of 0.064 inches, with steel end sections, or CL III Reinforced Concrete Pipe with concrete end sections. Smooth Wall Steel Pipe shall be tied to Reinforced Concrete Pipe as shown on Standard Drawing D-714-16. Connections between Smooth Wall Steel Pipe and Spiral Rib Corrugated Steel Pipe shall be as recommended by the pipe manufacturer, and approved by the Engineer.

The flow line elevation at the starting point for jacked/bored pipe shall be within 0.1 foot of the staked grade and within 0.2 feet at the ending point.

Regardless of the method or type of pipe used, the price bid for "Pipe Conduit 36 In – Jacked or Bored" shall be full compensation for the pipe and its installation, including all costs for labor, equipment, excavation, embankment, and materials required for installing the pipe through the roadway by boring or jacking.

714-P02 CENTERLINE PIPE: In the area of the three new equalization pipe locations, there are existing 24" RCPs. Each jacked/bored pipe shall be installed approximately 25' away from the existing 24" RCP, which is to remain in place.

The sections of pipe that are not jacked or bored shall be installed as shown on Standard D-714-27, Bedding and Backfill for Storm Drain Not Under Roadway.

The Contractor shall provide dewatering if necessary according to site conditions. All costs associated with dewatering shall be included in the price bid for centerline pipe installation.

After the installation of the pipes are complete the Contractor will have to prove to the satisfaction of the Engineer that the pipe is free of sediment or debris by passing a culvert cleanout device through the pipe. The device shall have a diameter that is not less than 95% of the inside diameter of the pipe. The test shall be performed a minimum of two weeks after the pipe is installed.

All cost to complete the above described work shall be included in the price bid for "Pipe Conduit 36 In" and "Pipe Conduit 36 In – Jacked or Bored."

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ENVIRONMENTAL COMMITMENT

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	6	3

ENVIRONMENTAL COMMITMENTS: The North Dakota Department of Transportation and the Federal Highway Administration have made several environmental commitments to various agencies and the public to secure approval of this project. The environmental commitments are as follows:

COMMITMENT NO. 1: Unavoidable impacts to wetlands will be mitigated on-site, adjacent to the project or at an approved location prior to or at the time of construction.

ACTION TAKEN/REQUIRED: No wetlands will be impacted permanently, and approximately 0.063 acres of jurisdictional wetlands will be impacted temporarily. Temporary impacts will not be mitigated as original grades will be re-established.

PERMITS REQUIRED:

A USACE Section 404 Permit (US Army Corps of Engineers)
 Non-Building Floodplain Permits (Benson County and Spirit Lake Nation)
 Special Use Permit No. 62580 – 11-015

Wetland Number	Location	LONG / LAT (Dec. Deg.)	Cowardin Classification	Wetland Type	Wetland Feature	Wetland Size (acres)	Wetlands Protected Under E.O. 11990	USACE Jurisdictional Wetlands*	Wetland Impacts	
									Temp.	Perm.
Zone B Wetland 11	Sec.12, T153N, R64W	-98.9252 W 48.0163 N	Lacustrine fringe/lacustrine littoral persistent emergent; Depressional/ Palustrine scrub-shurb	Natural	Basin	13.013	X	X	0.063	0.00
TOTALS									0.063	0.00

COMMITMENT NO. 2: One 50 feet by 300 feet and one 50 feet by 200 feet temporary construction easement on Mission Slough Waterfowl Production Area require a Special Use Permit from the US Fish and Wildlife Service.

ACTION TAKEN/REQUIRED: The US Fish and Wildlife Service permit 11-015 was issued for the installation of two 36 inch culverts through ND 20. The purpose of the culverts will serve to equalize water on the east and west side of ND 20. The permit conditions include:

1. Install effective silt fence or barrier around the perimeter of temporary construction easement to prevent the erosion of soil and material into the WPA during the excavation. It is the responsibility of the Contractor to remove the silt fence or barrier at the conclusion of construction or stabilization.
2. Temporary construction easement will be clearly marked by the NDDOT with the USFWS Refuge Manager on site.
3. All construction equipment and workers will remain in designated right of way or designated temporary easement parcels during construction.
4. Contractor will have spill containment plan and equipment suitable of containing equipment fluid capacities.
5. Overnight parking of equipment is not allowed in temporary construction easement area.
6. NDDOT will notify the USFWS Refuge Manager Paul Halko at (701) 662-8611 Ext. 323 one week in advance of expected construction start.

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	8	1

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	1	1
203	0103 COMMON EXCAVATION-TYPE C	CY	575	575
203	0109 TOPSOIL	CY	98	98
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	30	30
704	1000 TRAFFIC CONTROL SIGNS	UNIT	711	711
704	1041 ATTENUATION DEVICE-TYPE B-55	EA	8	8
704	1060 DELINEATOR DRUMS	EA	21	21
704	3510 PRECAST CONCRETE MED BARRIER-STATE FURNISHED	EA	36	36
708	1024 RIPRAP-LOOSE ROCK-SALVAGED	CY	78	78
708	1322 SILT FENCE UNSUPPORTED	LF	700	700
708	1430 FIBER ROLLS 12IN	LF	800	800
714	4115 PIPE CONDUIT 36IN	LF	332	332
714	4124 PIPE CONDUIT 36IN-JACKED OR BORED	LF	235	235
754	0805 OBJECT MARKERS - CULVERTS	EA	6	6

BASIS OF ESTIMATE

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	10	1

Common Excavation-Type C:

Trench Dimensions					
	Average Depth	3:1 Side Slopes	Trench Bottom	End Area Com Exc	CY +/- Excavated
Site 1 Left	4'	12'	10'	385.5 SF	314 CY
Site 1 Right	2'	6'	10'	78.8 SF	47 CY
Site 2 Left	3'	9'	10'	161.4 SF	114 CY
Site 2 Right	2'	6'	10'	39.5 SF	24 CY
Site 3 Left	2'	6'	10'	64.5 SF	38 CY
Site 3 Right	2'	6'	10'	64.0 SF	38 CY
Total:					575 CY

Water:

10 Gal/CY for Embankment.

Not a pay item. Included in the price bid for "Common Excavation-Type C."

Topsoil:

Topsoil areas are based on 50' x 35' x 3" = 16.2 CY Each.

Price bid for "Topsoil" includes approximately 0.5 acres of Seeding-Type B-CL II, 0.5 acres of Seeding-Type B-CL IV, and 0.5 acres of Mulching.

Seeding and Mulching:

All areas disturbed by the Contractor's operation, plus adjacent slopes and berm to be mulched and seeded as directed by the Engineer.

Flagging:

30 MHR has been provided for traffic control to be used during shoulder widening and concrete barrier placement.

Riprap - Loose Rock - Salvaged:

Quantity based on 2' depth by 10' width by 35' length. Actual field conditions may vary.

Price bid for "Riprap - Loose Rock - Salvaged" includes approximately 117 SY of Geotextile Fabric - Type RR.

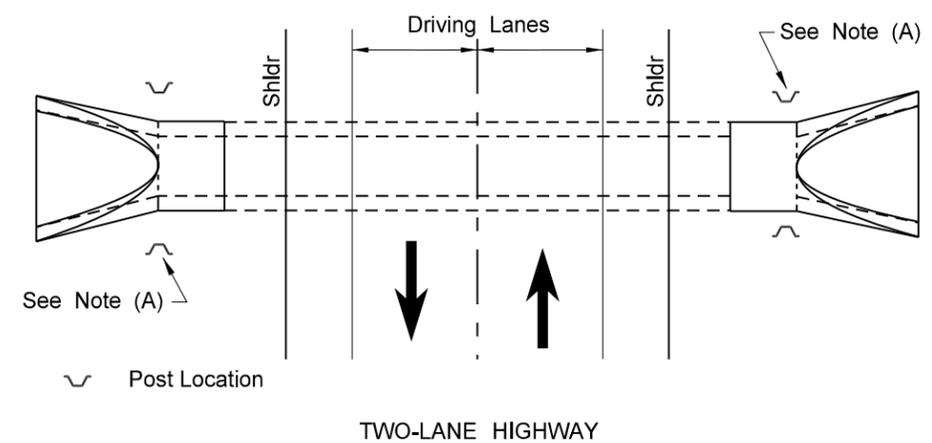
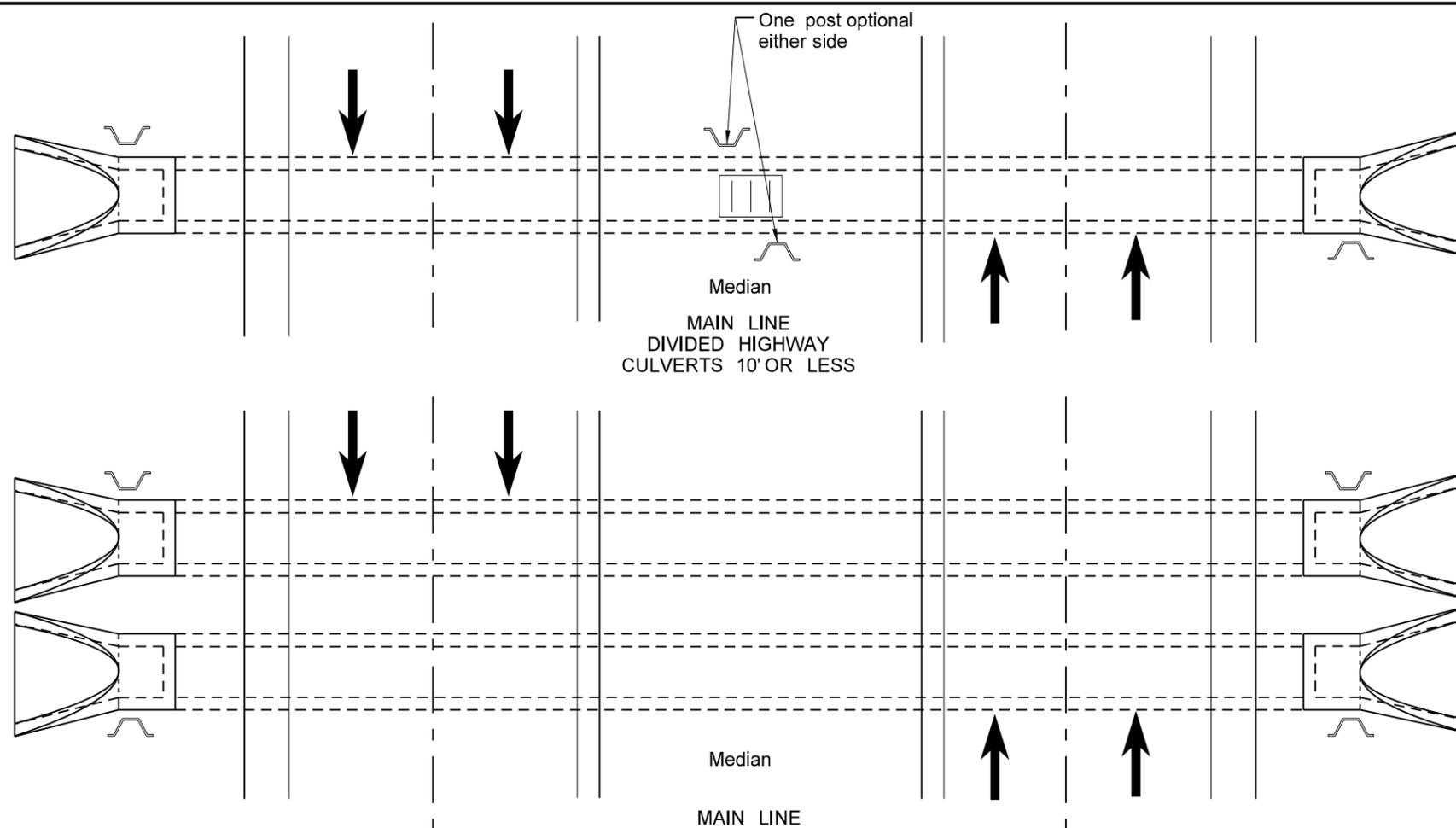
Special Provisions:

SP 320(08) TERO

SP 513(08) Permits and Environmental Considerations

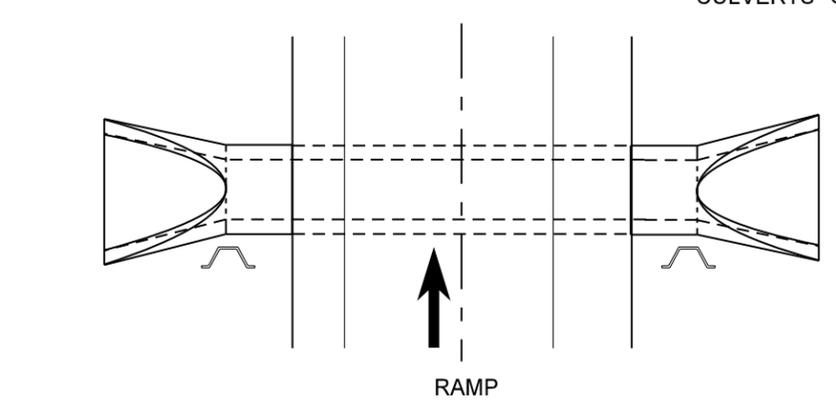
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ND	SERFO-3-020(085)093	20	1



(A) Additional marker shall be installed where multiple pipe installations have a width of greater than 10'.

Post Location

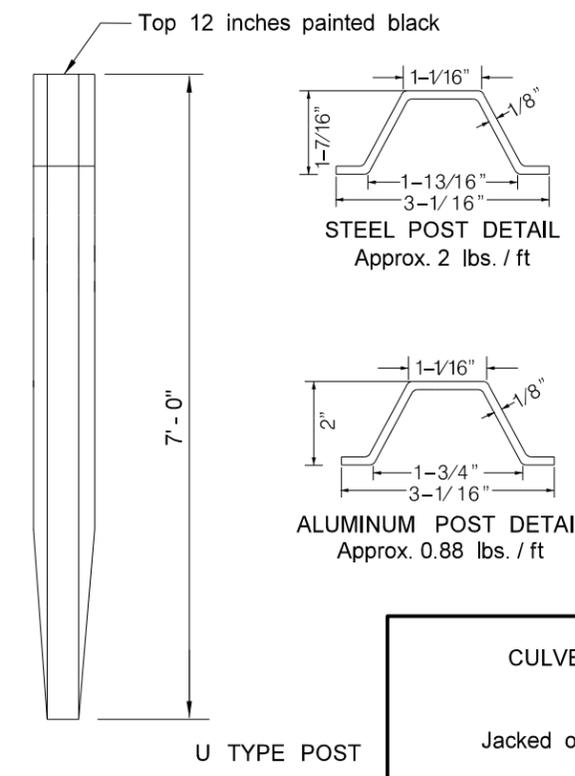
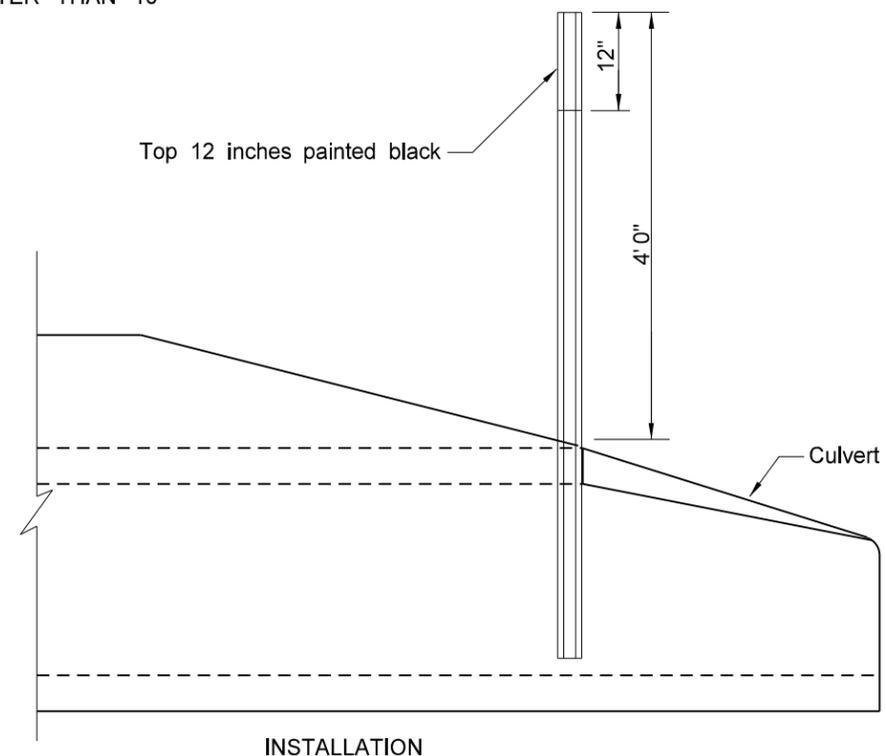


NOTES:
Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown.

INSTALLATION:
Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.

POSTS:
Posts shall conform to section 894.06 of the Standard Specifications.

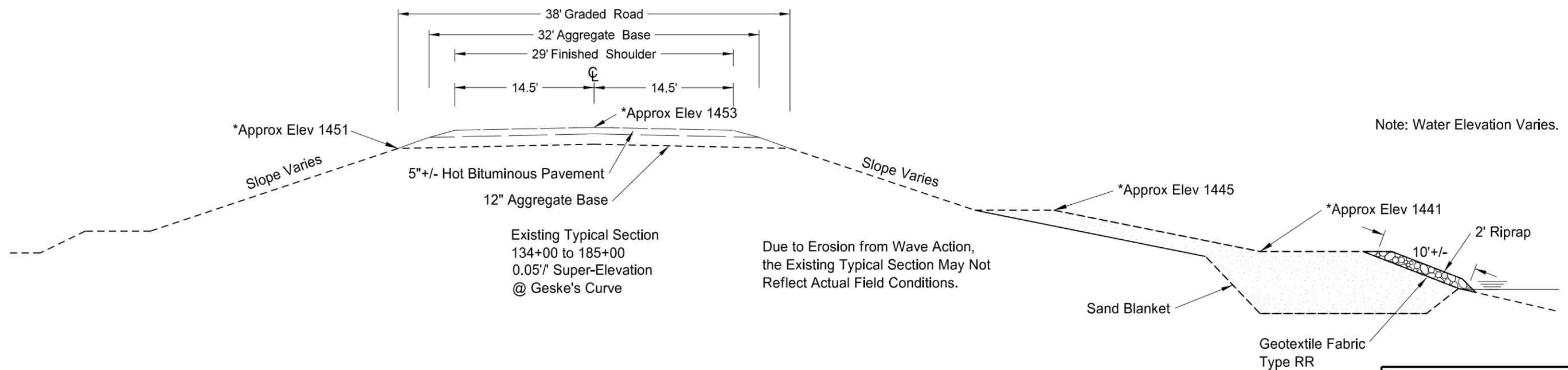
BASIS OF PAYMENT:
All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Marker - Culverts".



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CULVERT MARKER DETAIL
Jacked or Bored Equalization Pipe
Geske's Curve

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	30	1



Note: Water Elevation Varies.

Existing Typical Section
134+00 to 185+00
0.05' Super-Elevation
@ Geske's Curve

Due to Erosion from Wave Action,
the Existing Typical Section May Not
Reflect Actual Field Conditions.

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Existing Typical Section
Geske's Curve

*NGVD 1929 datum.

	Begin Offset	End Station / Location	End Offset	Conduit Length	Pipe Conduit Pay Size	Pipe Conduit Jacked Pay Size	Allowable Material	Required Diameter	Minimum Thickness	(A) End Sections		Applicable Backfill Detail
										Begin	End	
				LF	In	In		In	In	EA	EA	
139+00	41' Lt	139+00	39' Rt	80 J/B		36	Reinforced Concrete Pipe - Class IV (barrel length = 80 LF)	36				NA
							Smooth Wall Steel Pipe	36	0.469			
139+00	41' Lt	139+00	95' Lt	54	36		Reinforced Concrete Pipe - Class III (barrel length = 50 LF)	36			Y	D-714-27
							Polymeric Coated Steel (over zinc or aluminum coated steel)	36	0.064			
139+00	39' Rt	139+00	94' Rt	55	36		Reinforced Concrete Pipe - Class III (barrel length = 52 LF)	36			Y	D-714-27
							Polymeric Coated Steel (over zinc or aluminum coated steel)	36	0.064			
155+25	38.5' Lt	155+25	38.5' Rt	77 J/B		36	Reinforced Concrete Pipe - Class IV (barrel length = 78 LF)	36				NA
							Smooth Wall Steel Pipe	36	0.469			
155+25	38.5' Lt	155+25	94.5' Lt	56	36		Reinforced Concrete Pipe - Class III (barrel length = 52 LF)	36			Y	D-714-27
							Polymeric Coated Steel (over zinc or aluminum coated steel)	36	0.064			
155+25	38.5' Rt	155+25	94.5' Rt	56	36		Reinforced Concrete Pipe - Class III (barrel length = 52 LF)	36			Y	D-714-27
							Polymeric Coated Steel (over zinc or aluminum coated steel)	36	0.064			
167+75	39' Lt	167+75	39' Rt	78 J/B		36	Reinforced Concrete Pipe - Class IV (barrel length = 78 LF)	36				NA
							Smooth Wall Steel Pipe	36	0.469			
167+75	39' Lt	167+75	94' Lt	55	36		Reinforced Concrete Pipe - Class III (barrel length = 52 LF)	36			Y	D-714-27
							Polymeric Coated Steel (over zinc or aluminum coated steel)	36	0.064			
167+75	39' Rt	167+75	95' Rt	56	36		Reinforced Concrete Pipe - Class III (barrel length = 52 LF)	36			Y	D-714-27
							Polymeric Coated Steel (over zinc or aluminum coated steel)	36	0.064			

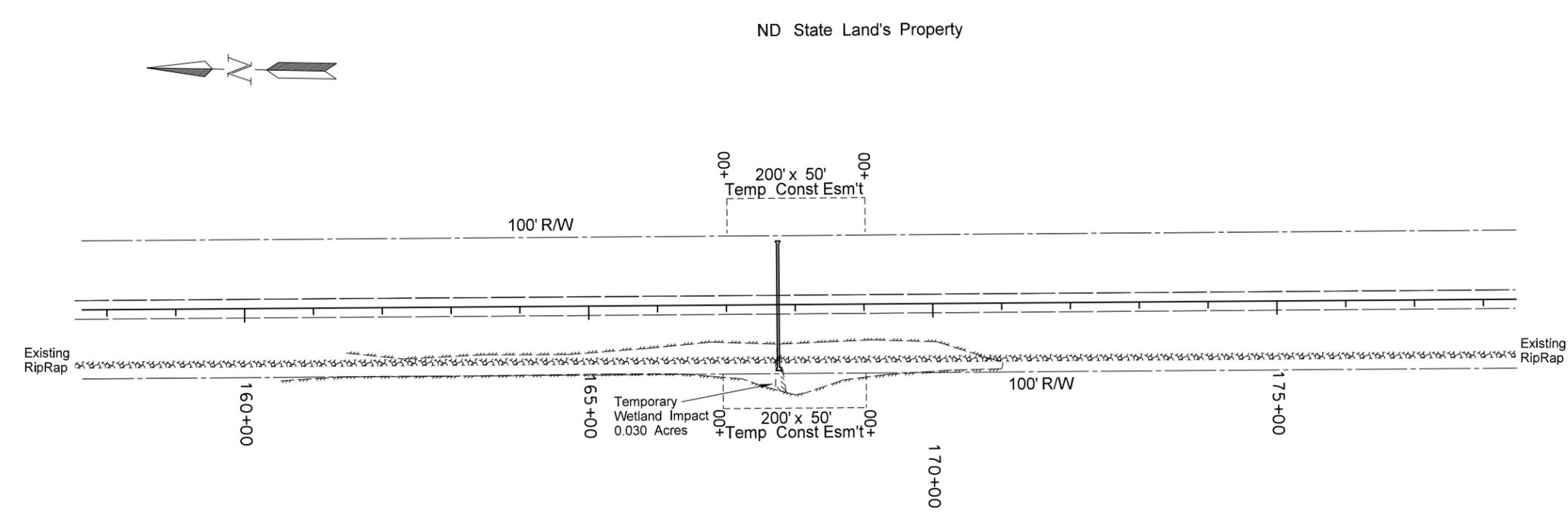
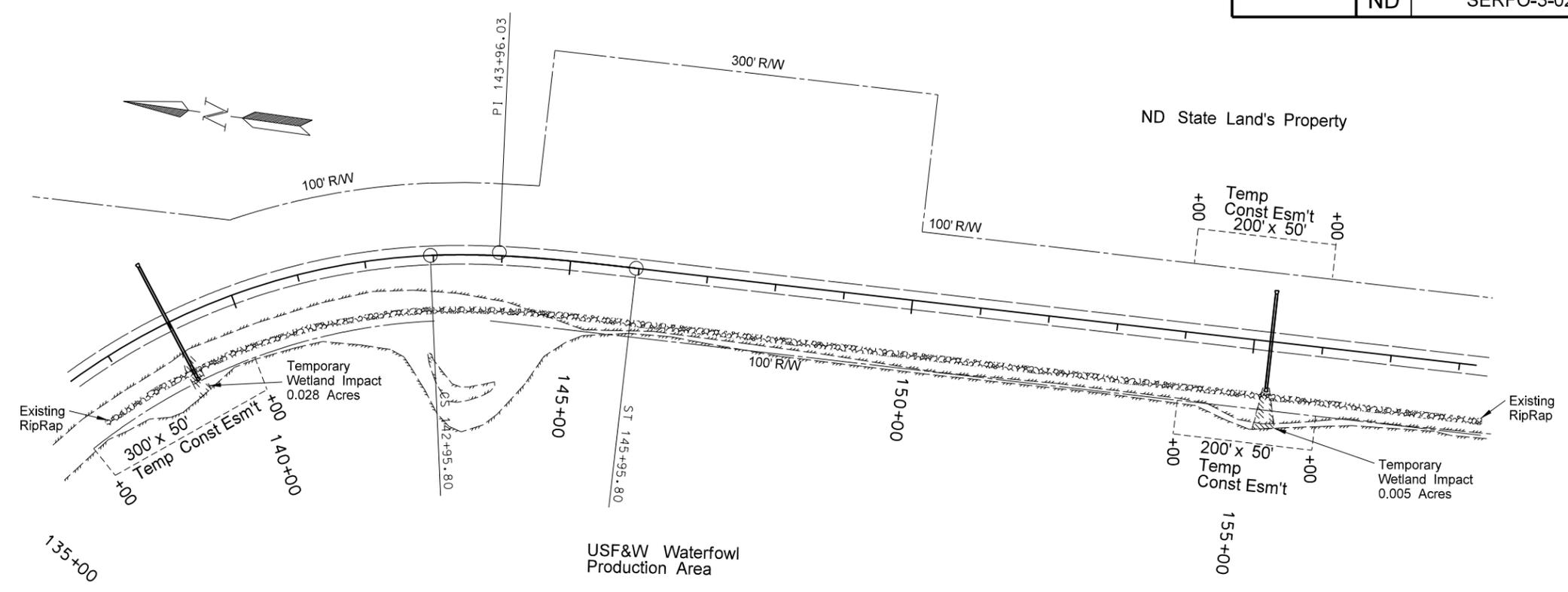
J/B: Jacked or Bored Pipe Conduit.

(A) Not paid for separately, to be included in the price bid for Pipe Conduit.

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Allowable Pipe List
Jacked or Bored and Extensions
Geske's Curve

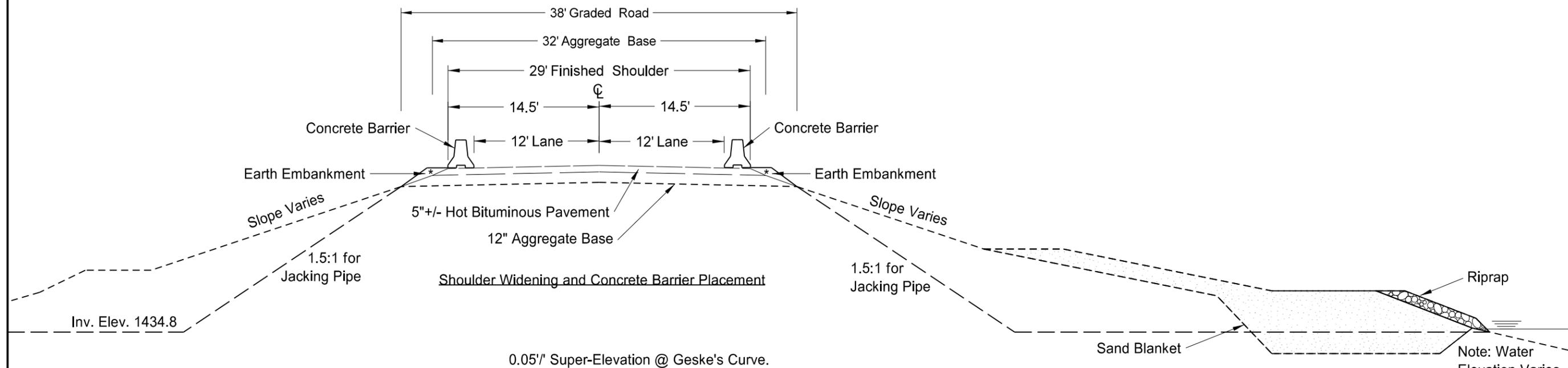
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	075	1



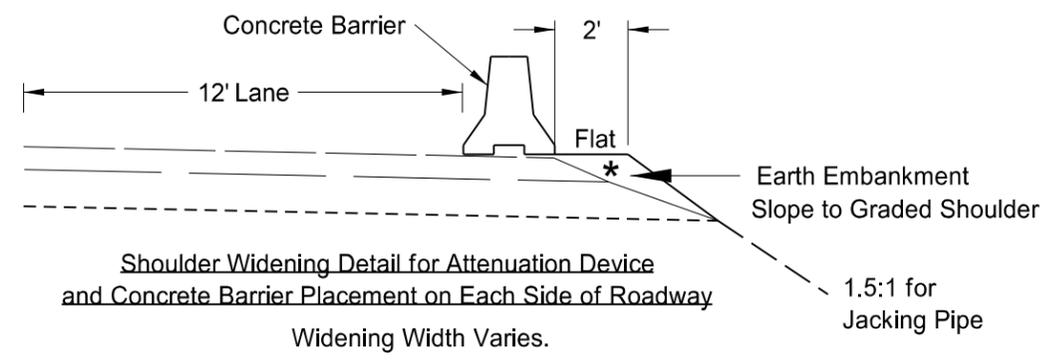
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Temporary Wetland Impacts
Geske's Curve

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Due to Erosion from Wave Action,
the Existing Typical Section May Not
Reflect Actual Field Conditions.



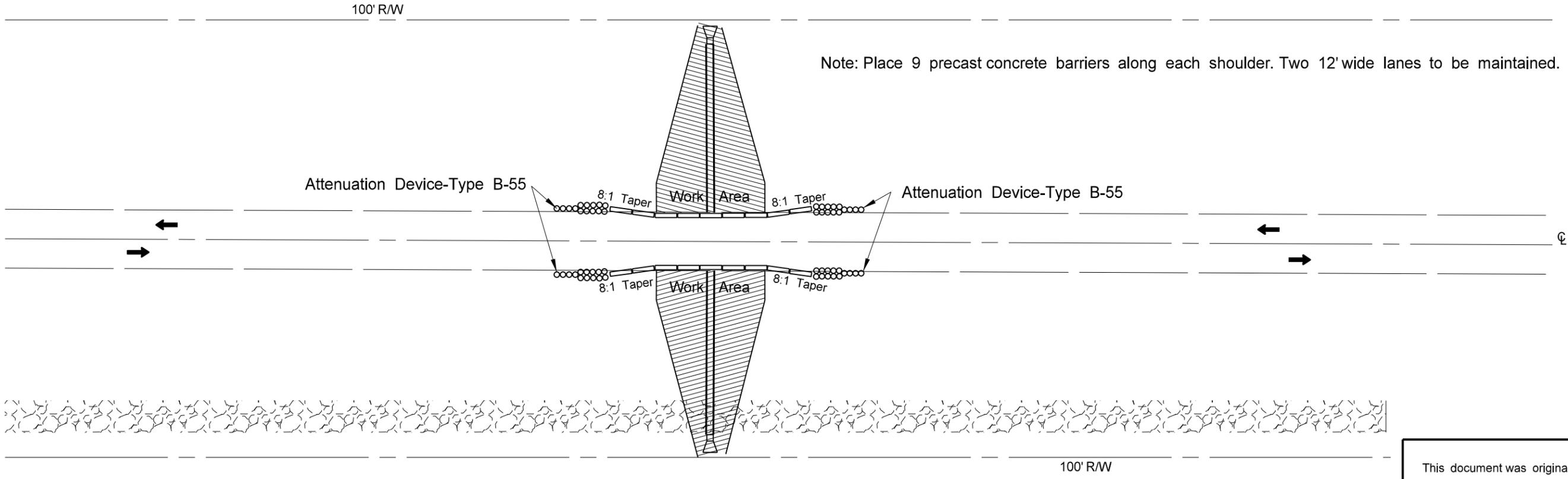
Widening Width Varies.

*Obtain Earth from Common Excavation - Type C.
See Cross Sections, Section 200.

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Work Zone Traffic Control
Concrete Barrier Placement
With Shoulder Widening Detail
Geske's Curve

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	100	3



Precast concrete barrier placement to be done in conjunction with Std D-704-24 Type R. Concrete barriers are provided for two concurrent locations.

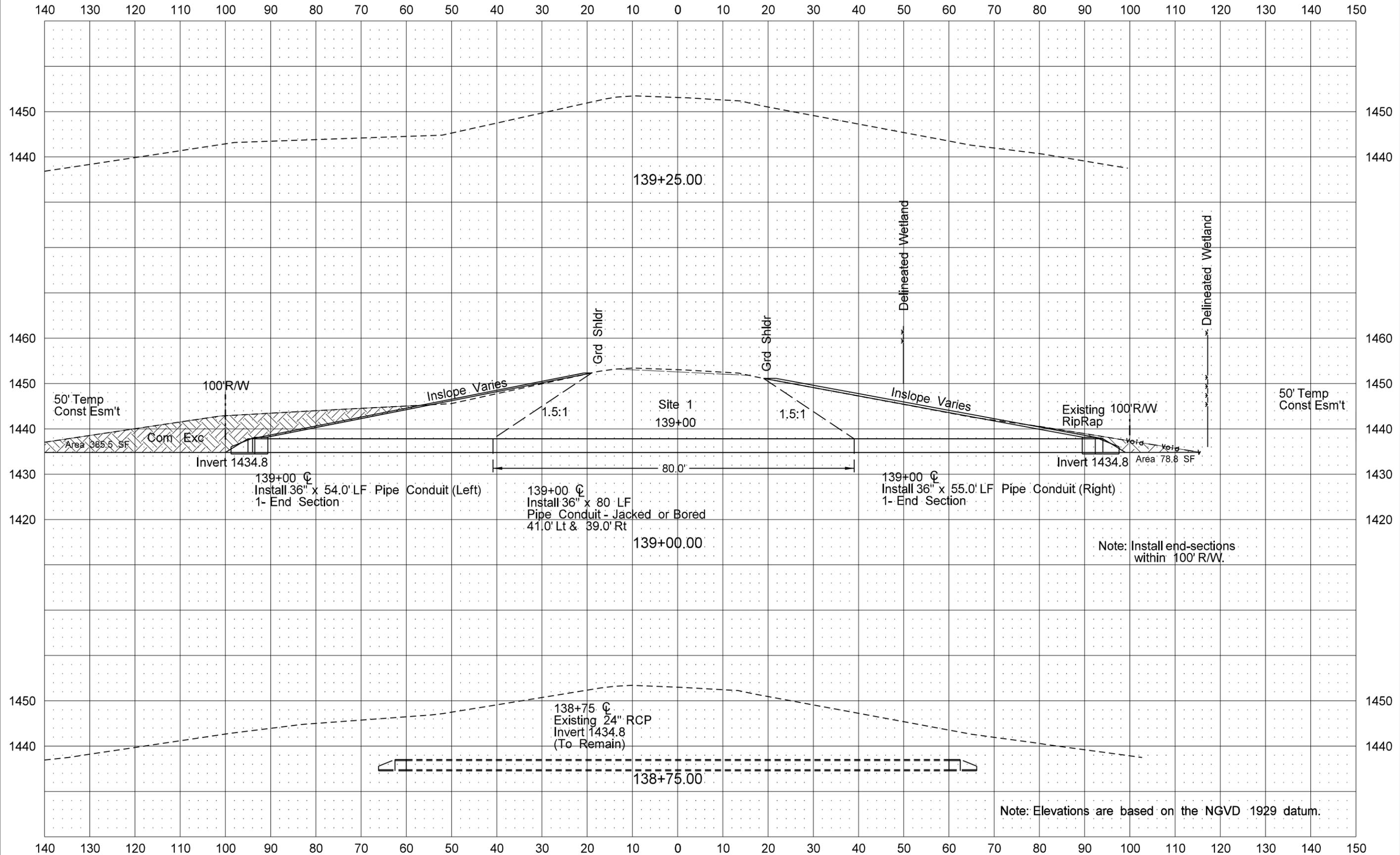
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Work Zone Traffic Control
Concrete Barrier Placement

Geske's Curve

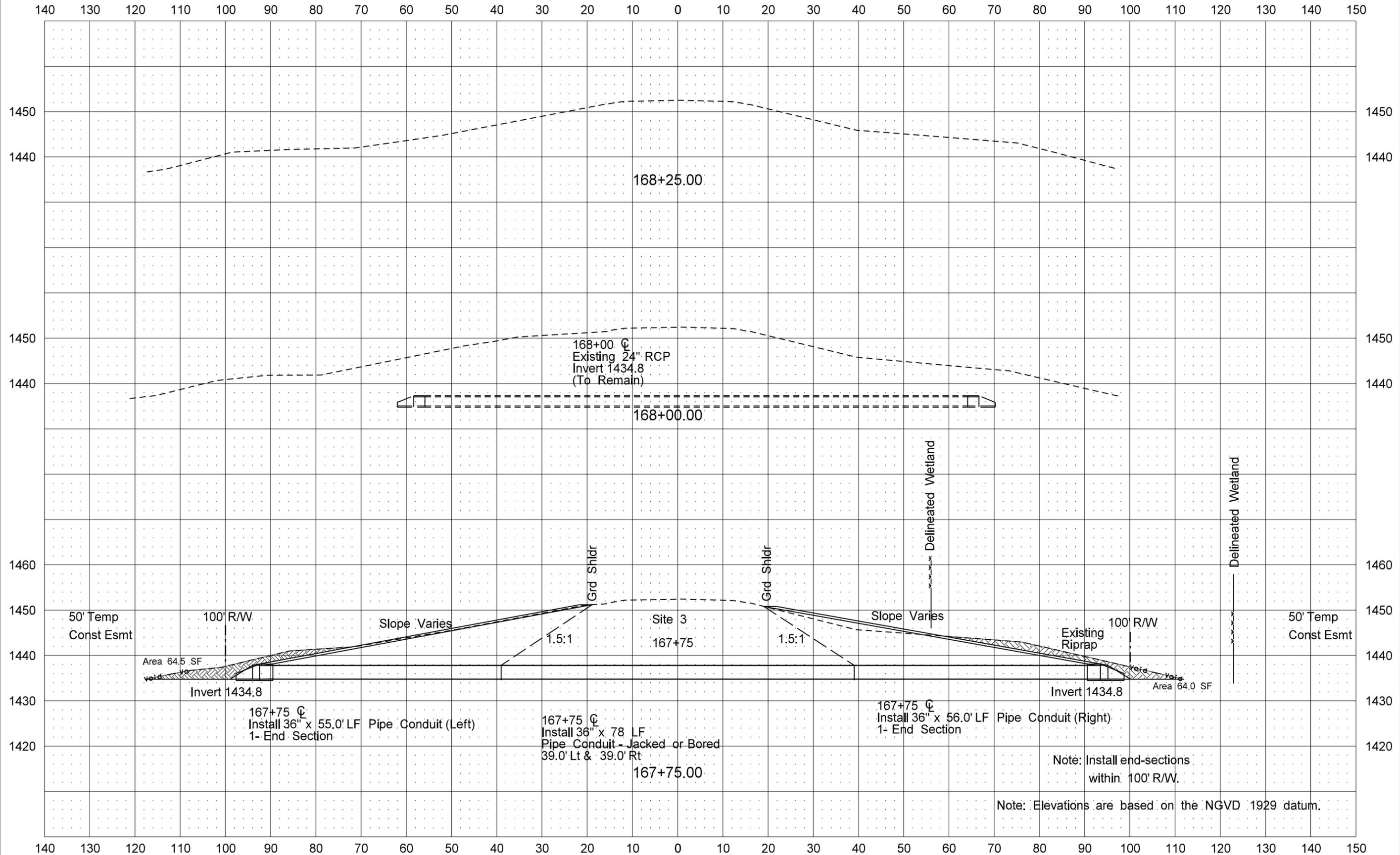
Site 1 Jacked or Bored Equalization Pipe Geske's Curve

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	200	1

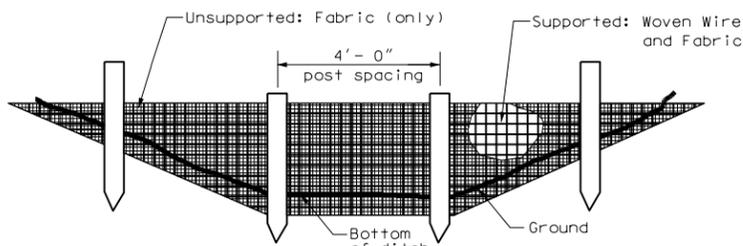
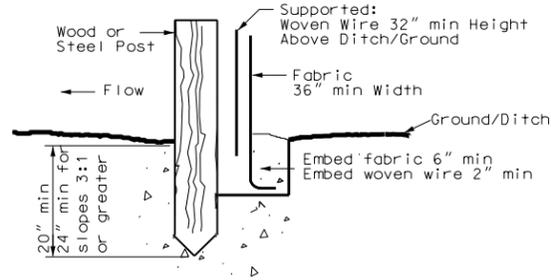


Site 3 Jacked or Bored Equalization Pipe Geske's Curve

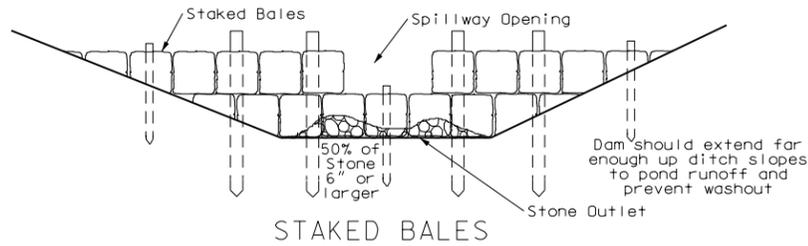
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SERFO-3-020(085)093	200	3



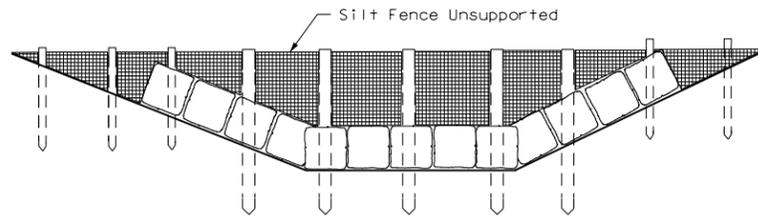
EROSION AND SILTATION CONTROLS



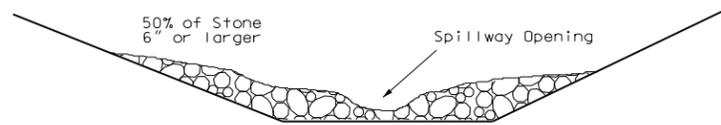
SILT FENCE
Supported and Unsupported



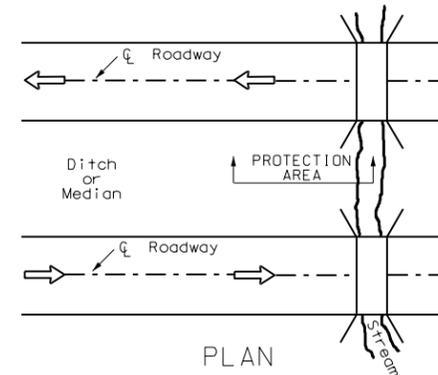
STAKED BALES



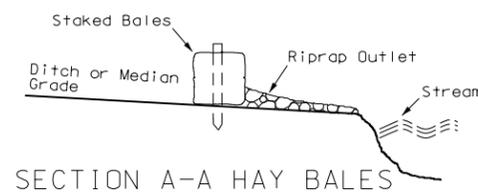
FENCE-BACKED BALES



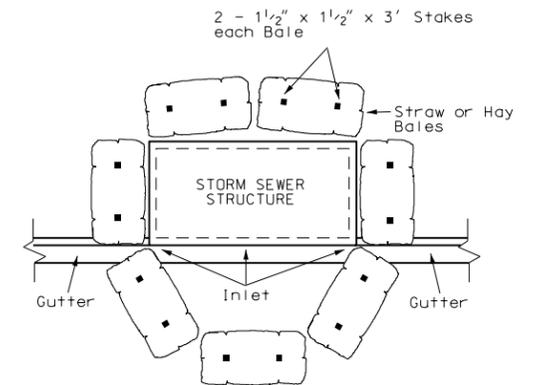
GRADED STONE
DITCH EROSION DAMS



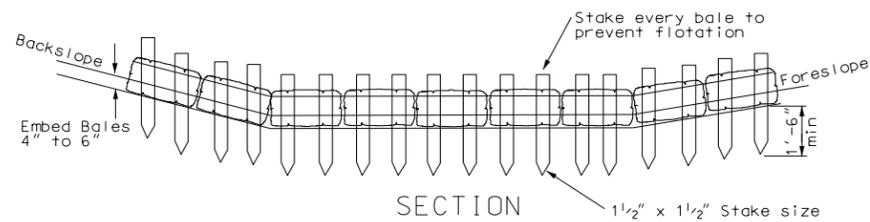
PLAN



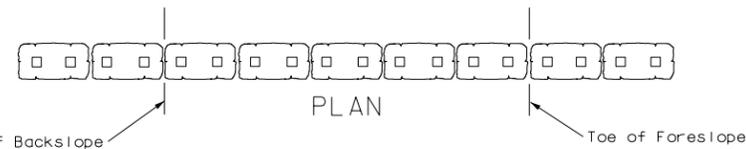
SECTION A-A HAY BALES



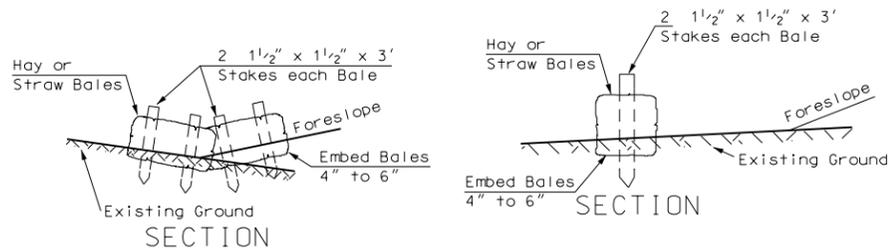
STORM SEWER INLET
EROSION & SILTATION
BARRIER



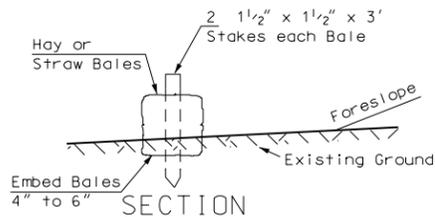
SECTION



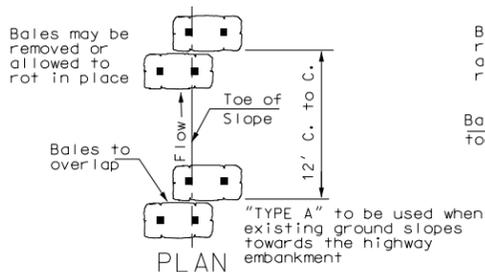
"TYPE A"



SECTION

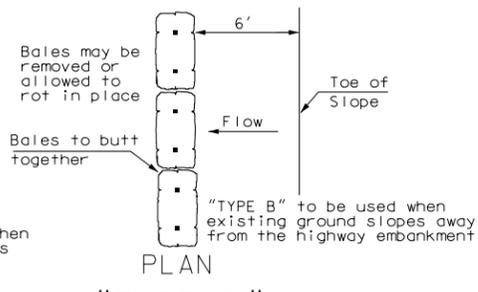


SECTION

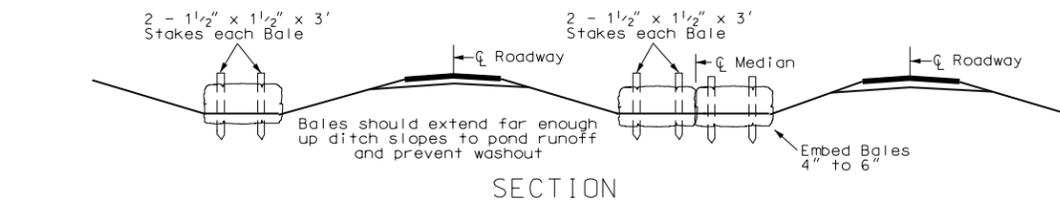


"TYPE B"

BALED HAY OR STRAW EROSION CHECKS

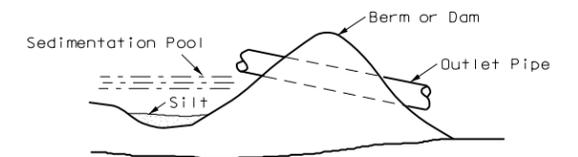


"TYPE C"

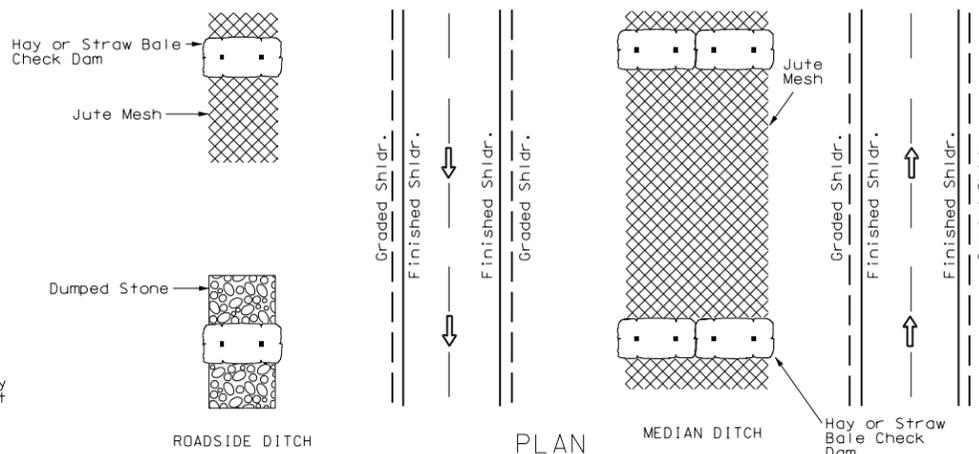


SECTION

MEDIAN OR DITCH PROTECTION
AT STREAM CROSSING



SMALL SEDIMENT DAM OR BERM



ROADSIDE DITCH

PLAN

MEDIAN DITCH

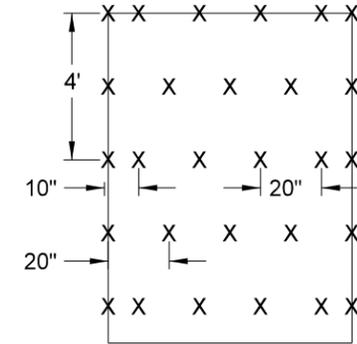
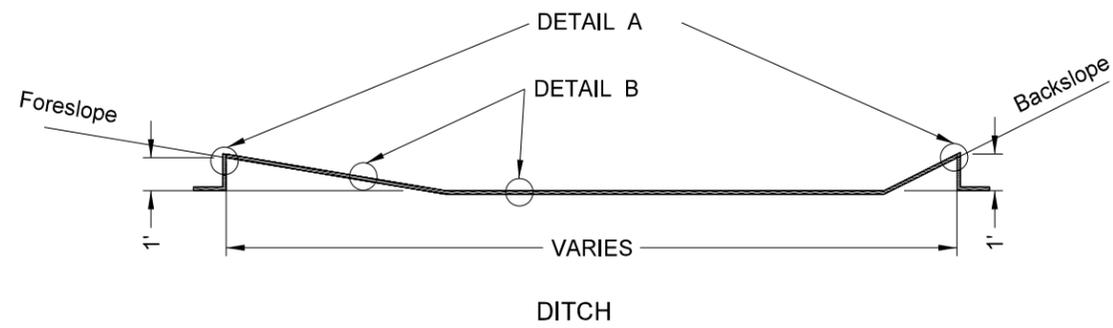
STONE, JUTE, MESH, OR SOD
DITCH & MEDIAN EROSION CONTROL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
09-04-92	Ditch check
09-16-92	Sediment cont. fencing
01-31-95	General revisions
10-09-02	Sediment fence
01-24-04	Silt fence
02-06-04	Rev silt fence details
12-01-04	PE Stamp added

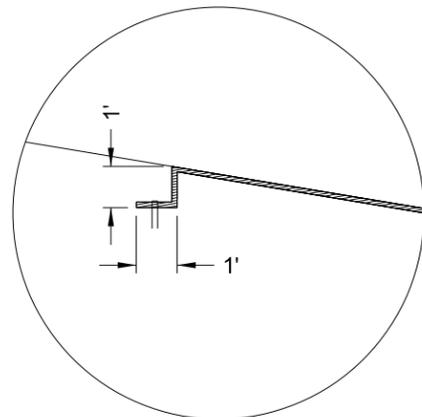
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EROSION AND SILTATION CONTROL
BLANKET INSTALLATION

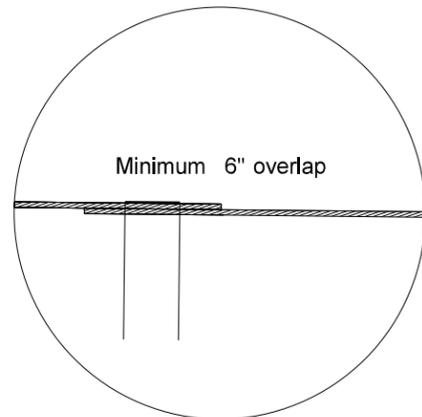
D-708-5



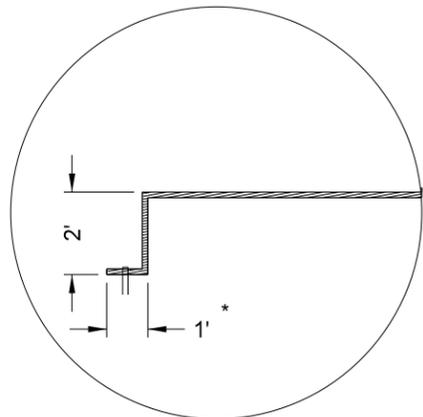
STAPLE PATTERN: 3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



DETAIL A

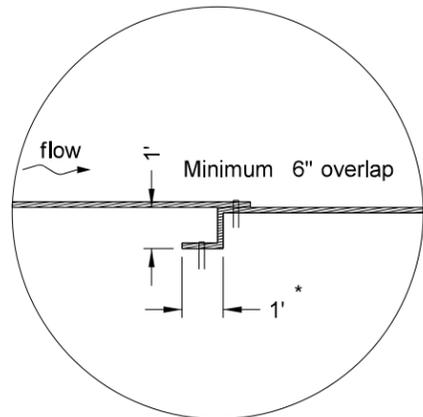


DETAIL B

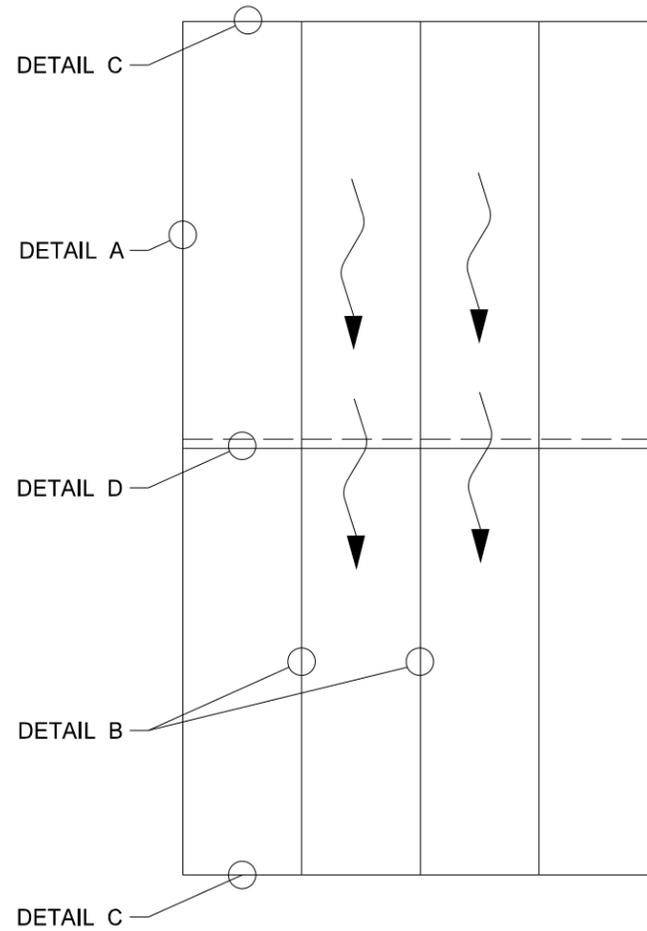


DETAIL C

* This tie may be placed ahead or back.

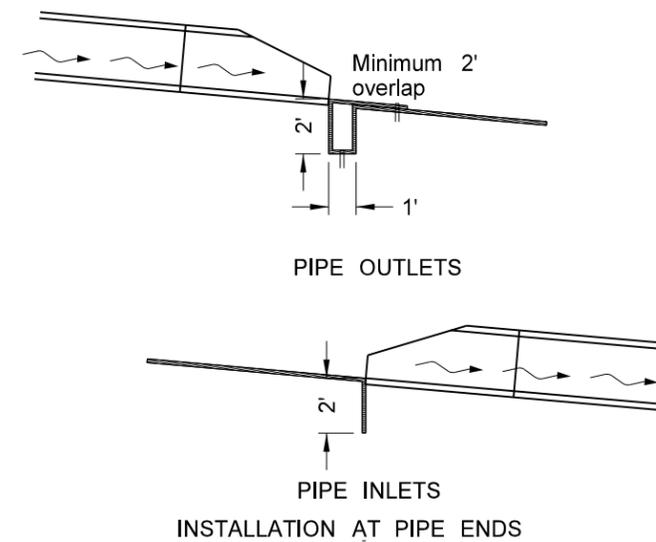


DETAIL D



BLANKET LAYOUT

Note: Beginning and ending of erosion control blanket areas shall be installed as DETAIL C.



PIPE OUTLETS

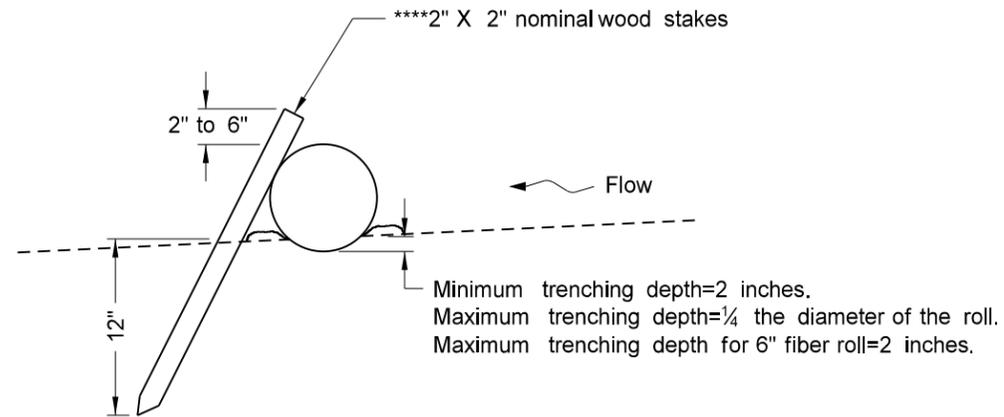
PIPE INLETS
INSTALLATION AT PIPE ENDS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-13-06	
REVISIONS	
DATE	CHANGE

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PE- 4518 ,
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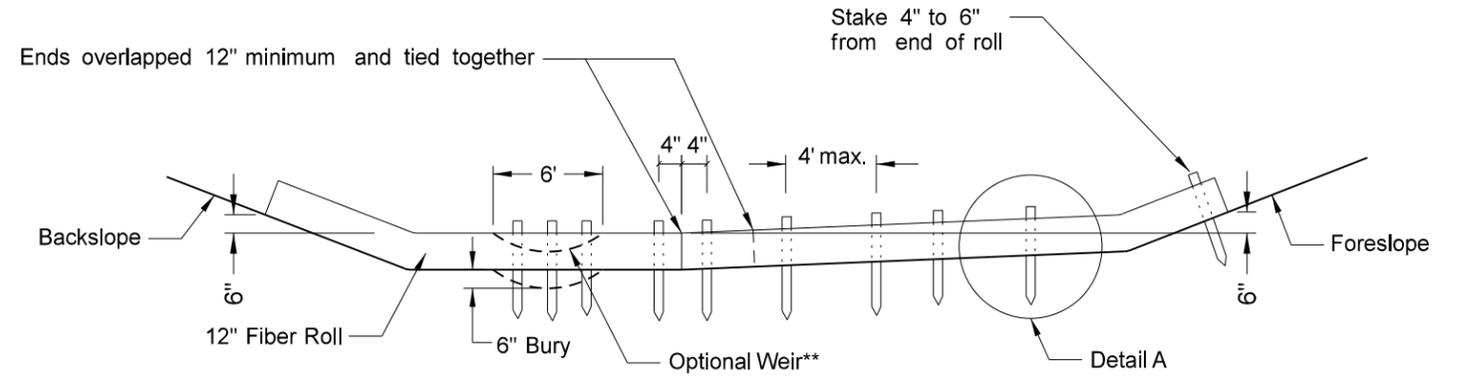
EROSION CONTROL
FIBER ROLL STAKING DETAILS

D-708-7



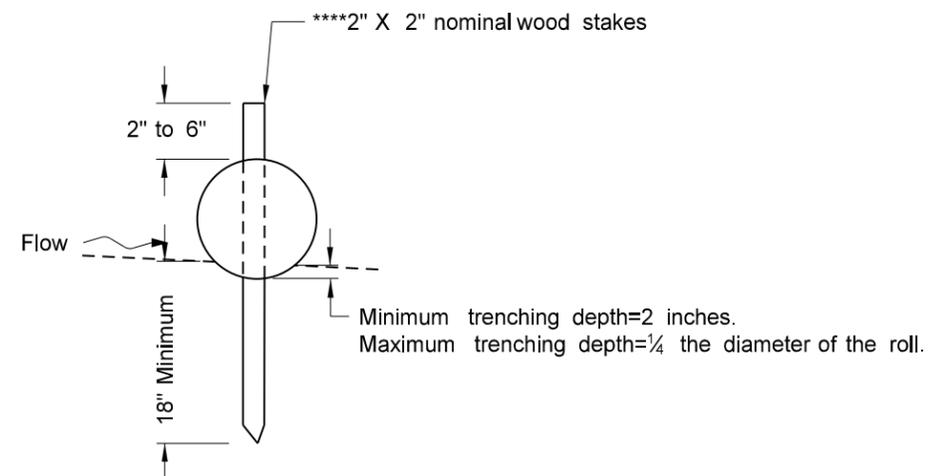
***DETAIL A**
6" or 12" Fiber Roll Staking Detail

*Manufacturer may require stake through center of fiber roll.
****Stakes spaced every 3-4 feet.

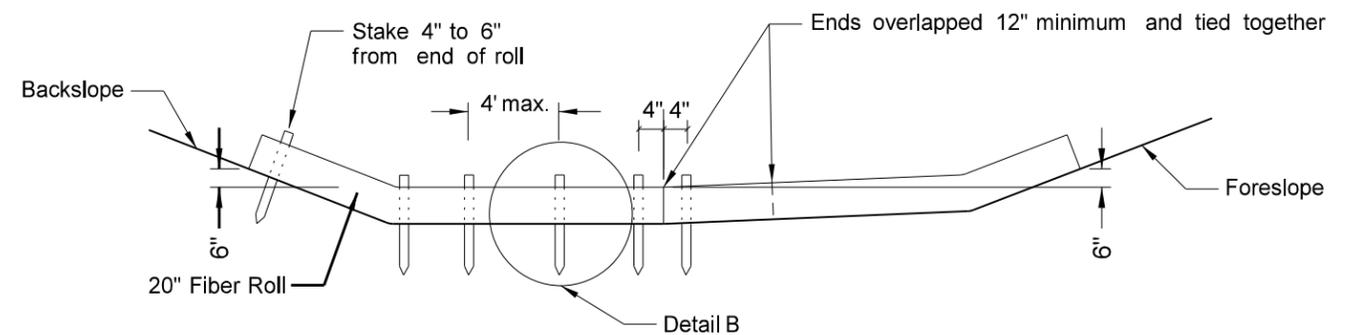


**Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property.

12 INCH FIBER ROLL - DITCH BOTTOM



DETAIL B
20" Fiber Roll Staking Detail



*****20 INCH FIBER ROLL - DITCH BOTTOM**

***Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up on adjacent property.

NOTE: Runoff must not be allowed to run under or around roll.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE

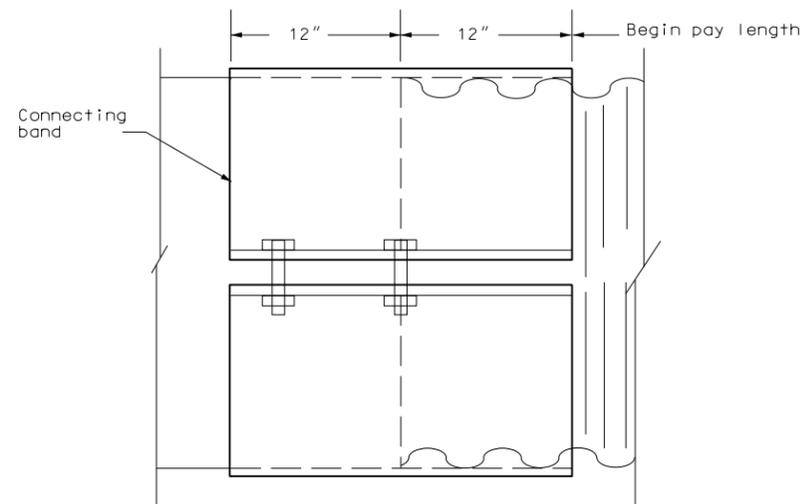
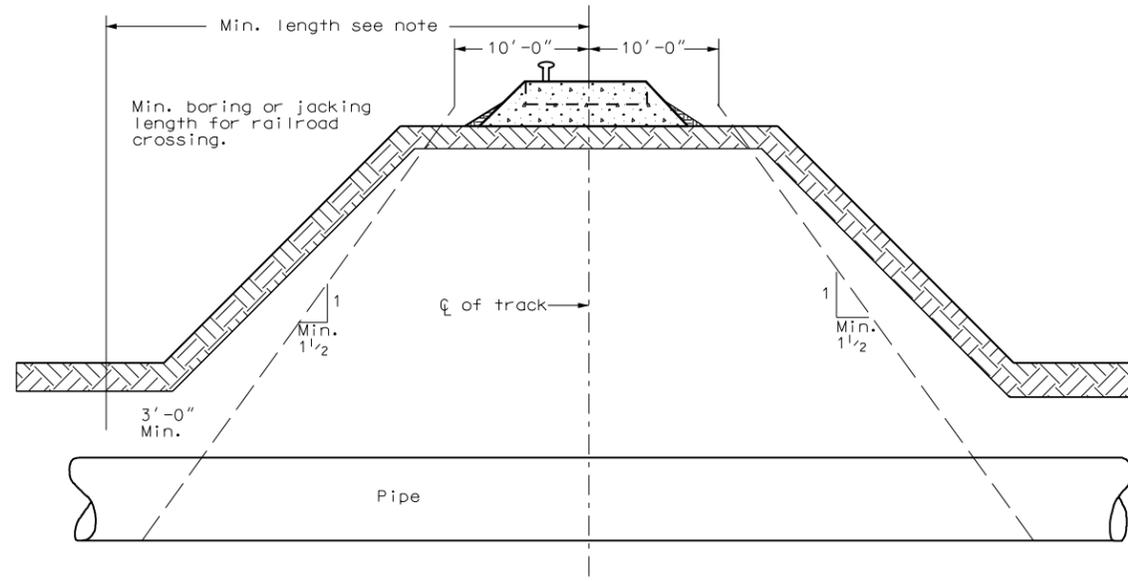
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JACKED AND BORED PIPE

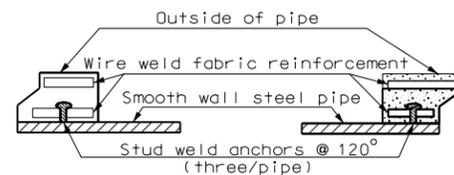
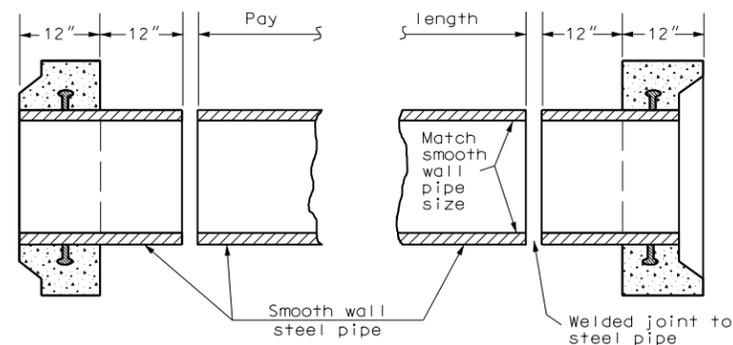
D-714-16

NOTES:

- Pipe under railroad tracks and across railroad right-of-way shall extend to the greater of the following distances, measured at right angles to center line of track.
 - 2 ft. beyond toe of slope
 - 3 ft. beyond ditch
 - A minimum distance of 25 ft. from center line of outside track when end of casing is below ground.
- Depth Of Installation: Pipe under railway tracks and across railway right-of-way shall be not less than 5 1/2 ft. from base of railway to top of casing at its closest point, except that under secondary or industry tracks this distance may be 4 1/2 ft.
- Pipe culverts shall be installed using equipment that encases the hole as the earth is removed. Boring or jacking without the concurrent installation of the pipe will not be permitted. Pipe shall extend through the undisturbed fill and shall be installed so as not to disrupt traffic nor damage roadway grade and surface. Use of water in the process of boring or jacking is prohibited. The boring or jacking shall be made in straight lines and to the grade and alignment shown on the plans. The flow line elevation at the starting point for boring or jacking shall be within 0.1 ft. of staked grade; the flow line shall not be reversed at any point; and the line and grade at any point within the pipe shall not vary by more than 0.5 ft. from the line and grade designated.
- Jacked Pipe: The method used to install the pipe indicated as jacked on the plans shall be left to the discretion of the contractor. The boring or jacked methods are acceptable. If the boring method is used, the contractor may use smooth wall steel pipe in lieu of RCP. Regardless of the method or type of pipe used, the price bid for jacked pipe shall be considered full compensation for the pipe and its installation.
- Pipe culverts that are bored or jacked shall conform to section 714 of the standard specifications.
- Reinforced concrete pipe, class V, shall be used at all railroad crossings unless otherwise indicated on the plans.
- The price of connecting bands will be included in the price bid for "conduit pipe-jacked or bored."



STANDARD DETAIL FOR JOINTING SMOOTH WALL STEEL PIPE TO CORRUGATED PIPE



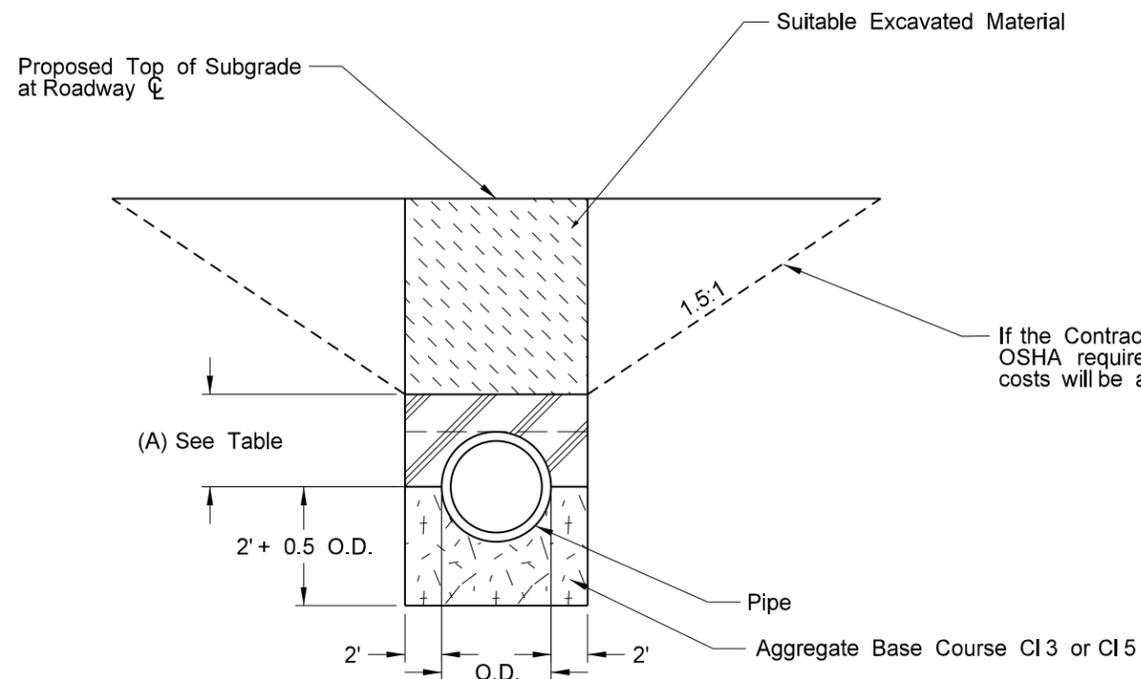
STANDARD DETAIL FOR JOINTING SMOOTH WALL STEEL PIPE TO REINFORCED CONCRETE PIPE

Nominal Thickness (Inches)	Nominal Diameter (Inches)
0.188	Under 14
0.219	14 and 16
0.250	18
0.281	20
0.312	22
0.344	24
0.375	26
0.406	28 and 30
0.438	32
0.469	34 and 36
0.500	38, 40 and 42

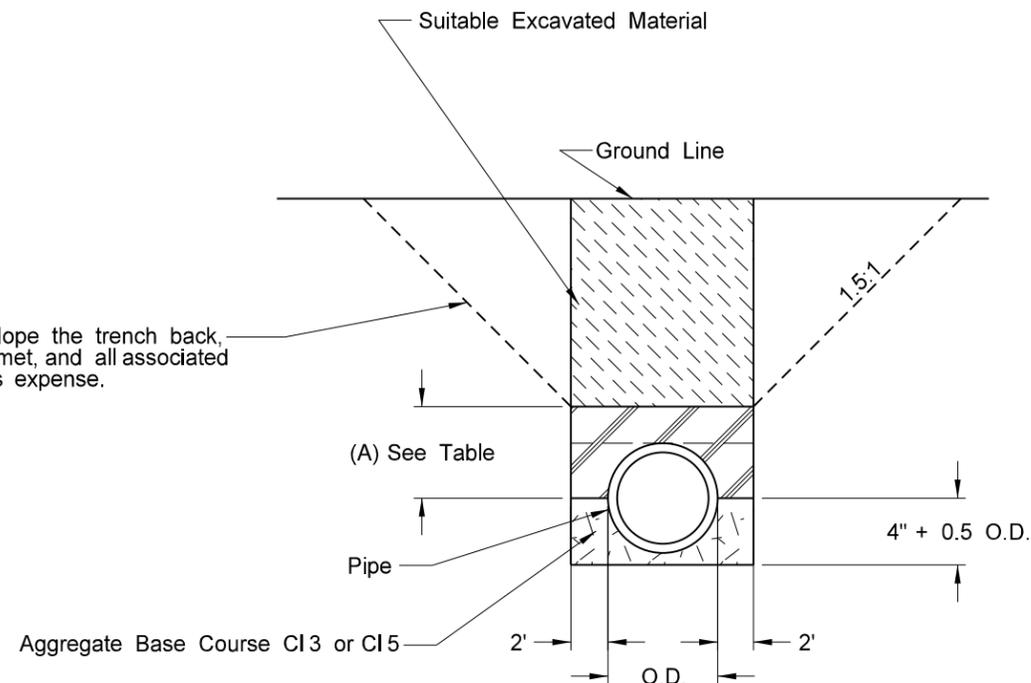
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
04-03-89	
REVISIONS	
DATE	CHANGE
09-03-96	Weld anchor spacing
06-25-03	Layout revisions
12-01-04	PE Stamp added

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PIPE BACKFILL FOR STORM DRAIN UNDER ROADWAYS OF 40 MPH OR LESS AND PIPE NOT UNDER ROADWAY



BEDDING AND BACKFILL FOR STORM DRAIN UNDER ROADWAY



BEDDING AND BACKFILL FOR STORM DRAIN NOT UNDER ROADWAY

If the Contractor chooses to slope the trench back, OSHA requirements must be met, and all associated costs will be at the contractor's expense.

Included in Pipe Pay Item

- 1) Pipe
- 2) Trench excavation
- 3) Disposal of unsuitable excavated material and placement of suitable excavated material.
- 4) Backfill of suitable excavated material
- 5) Aggregate Base Course CI 3 or CI 5

Backfill Requirements		
Pipe Material	Dimension (A)	Backfill
Concrete	0.5 O.D.	Approved Backfill (Note 2)
Metal	0.5 O.D. + 1'	CI 3 or CI 5
PVC/HDPE	0.5 O.D. + 1'	CI 3 or CI 5

Pay Items

- 1) Pipe
- 2) Surfacing removal

NOTES:

1. This drawing corresponds to Storm Drain Pipe only. It does not include pipes in approaches.
2. Approved backfill shall meet the requirements of AASHTO M 145 for A-1, A-2, and A-3 soils.
3. Compaction requirements for all materials associated with the trench installation shall meet 90% of AASHTO T-180. Maximum thickness of any one lift shall not exceed 6 inches.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-08-08	
REVISIONS	
DATE	CHANGE

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