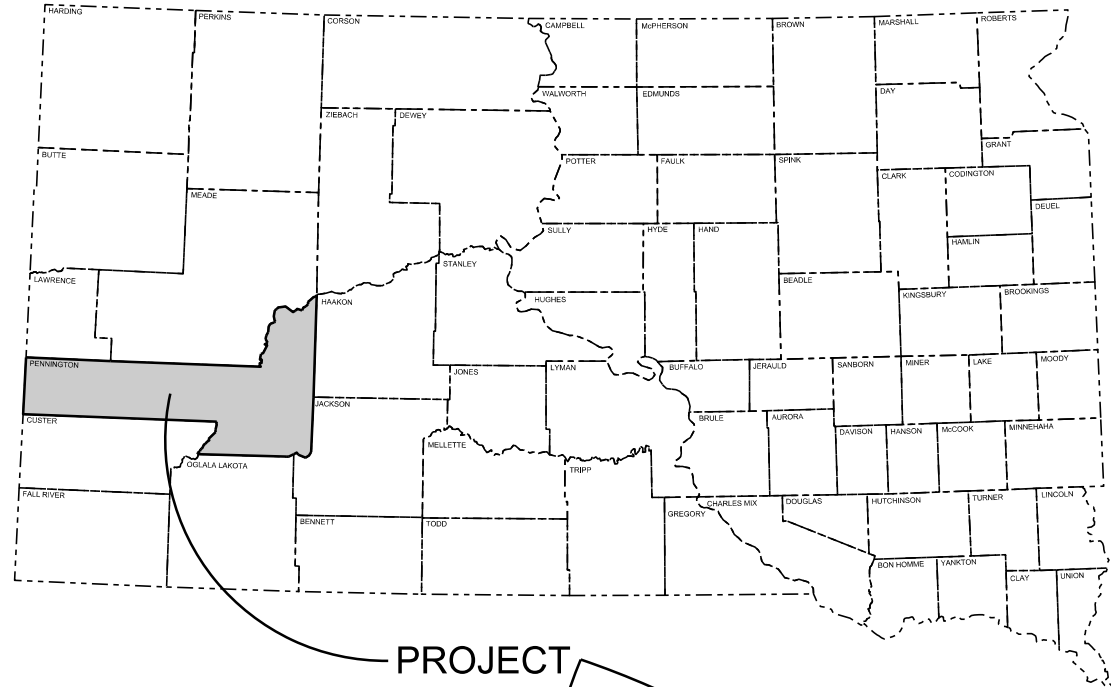


1:200  
Plot Scale -

TRRC12608

Plotted From -



STATE OF SOUTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
PLANS FOR PROPOSED  
**PROJECT 016 W-452**  
**US HIGHWAY 16**  
**PENNINGTON COUNTY**  
LANDSLIDE REPAIR  
PCN i42c

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016 W-452	1	20

Plotting Date: 10/06/2015

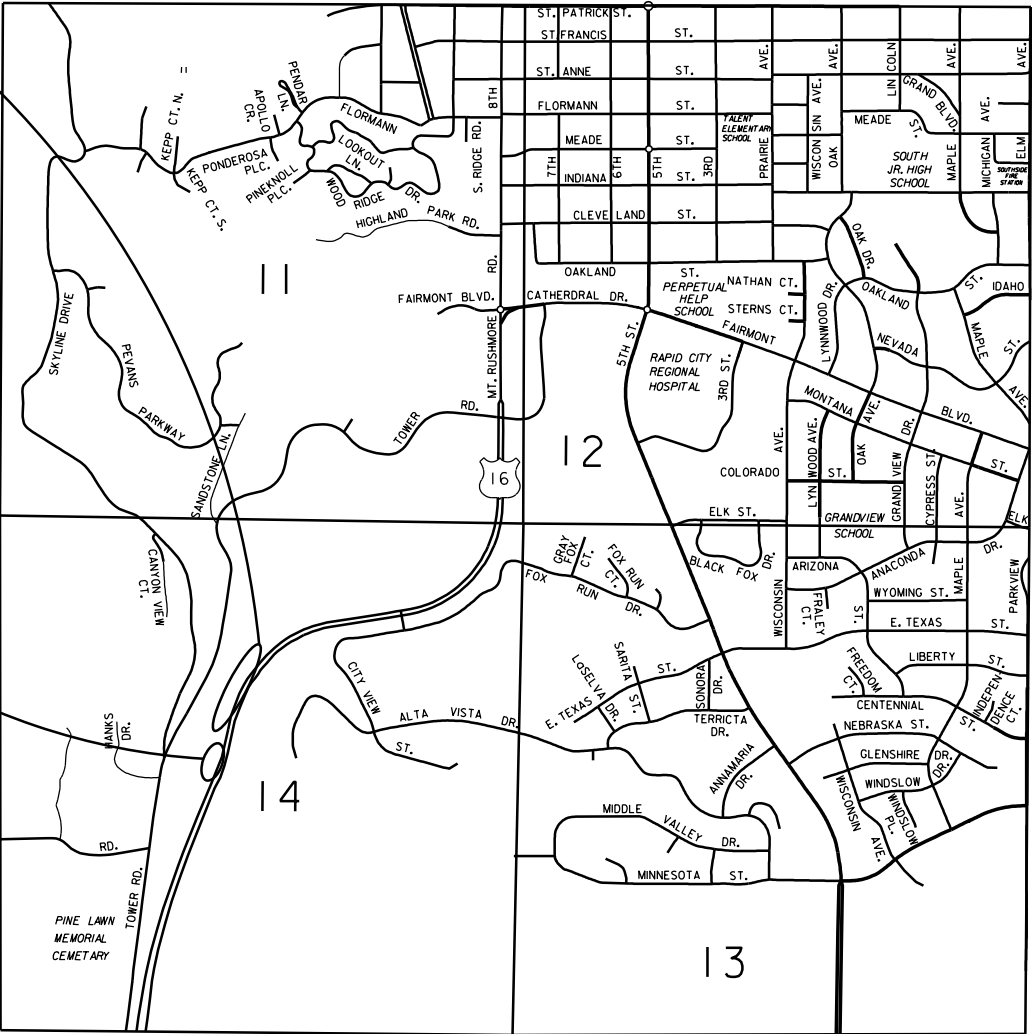
INDEX OF SHEETS

- Sheet No. 1: Title and Index  
Sheets No. 2 - 6: Notes, Tables, and Estimate  
Sheet No. 7: Plan Sheet  
Sheet No. 8: Typical Section  
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Sheets No. 13 - 14: Erosion Control Details  
Sheets No. 15 - 20: Standard Plates

PROJECT

HIGHWAY US 16  
MRM 66.31

HIGHWAY US 16  
MRM 66.05



DESIGN DESIGNATION

ADT (2014)	5850
ADT (2034)	8488
DHV	1290
D	51%
T DHV	3.9%
T ADT	8.5%
V	50 MPH

STORM WATER PERMIT

None Required

ESTIMATE OF QUANTITIES

BID ITEM NUMBER	ITEM	QUANTITY	UNIT
009E0010	Mobilization	Lump Sum	LS
100E0100	Clearing	Lump Sum	LS
120E0010	Unclassified Excavation	3,067	CuYd
120E6100	Water for Embankment	11.3	MGal
430E0700	Precast Concrete Headwall for Drain	1	Each
634E0010	Flagging	40.0	Hour
634E0110	Traffic Control Signs	176	SqFt
634E0120	Traffic Control, Miscellaneous	Lump Sum	LS
634E0420	Type C Advance Warning Arrow Board	1	Each
680E0240	4" Corrugated Polyethylene Drainage Tubing	25	Ft
680E0440	4" Slotted Corrugated Polyethylene Drainage Tubing	200	Ft
680E2500	Porous Backfill	84.0	Ton
700E0410	Class D Riprap	3,195.0	Ton
730E1200	Hydroseeding	3,373	SqYd
731E0100	Fertilizing	1,050	Lb
734E0104	Type 4 Erosion Control Blanket	3,373	SqYd
734E0154	12" Diameter Erosion Control Wattle	92	Ft
734E0325	Surface Roughening	0.5	Acre
831E0110	Type B Drainage Fabric	912	SqYd

SPECIFICATIONS

Standard Specifications for Roads and Bridges, 2015 Edition and Required Provisions, Supplemental Specifications, and Special Provisions as included in the Proposal.

ENVIRONMENTAL COMMITMENTS

An Environmental Commitment is a measure that SDDOT commits to implement in order to avoid, minimize, and/or mitigate a real or potential environmental impact. Environmental commitments to various agencies and the public have been made to secure approval of this project. An agency mentioned below with permitting authority can influence a project if perceived environmental impacts have not been adequately addressed. Unless otherwise designated, the Contractor's primary contact regarding matters associated with these commitments will be the Project Engineer. These environmental commitments are not subject to change without prior written approval from the SDDOT Environmental Office. The environmental commitments associated with this project are as follows:

COMMITMENT C: WATER SOURCE

The Contractor shall not withdraw water with equipment previously used outside the State of South Dakota without prior approval from the SDDOT Environmental Office. Thoroughly wash all construction equipment before entering South Dakota to reduce the risk of invasive species introduction into the project vicinity.

Action Taken/Required:

The Contractor shall obtain the necessary permits from the regulatory agencies such as the Department of Environment and Natural Resources (DENR) and the United States Army Corps of Engineers (COE) prior to executing water extraction activities.

COMMITMENT H: WASTE DISPOSAL SITE

The Contractor shall furnish a site(s) for the disposal of construction and/or demolition debris generated by this project.

Action Taken/Required:

Construction and/or demolition debris may not be disposed of within the State ROW.

The waste disposal site(s) shall be managed and reclaimed in accordance with the following from the General Permit for Highway, Road, and Railway Construction/Demolition Debris Disposal Under the South Dakota Waste Management Program issued by the Department of Environment and Natural Resources.

The waste disposal site(s) shall not be located in a wetland, within 200 feet of surface water, or in an area that adversely affects wildlife, recreation, aesthetic value of an area, or any threatened or endangered species, as approved by the Project Engineer.

If the waste disposal site(s) is located such that it is within view of any ROW, the following additional requirements shall apply:

- Construction and/or demolition debris consisting of concrete, asphalt concrete, or other similar materials shall be buried in a trench completely separate from wood debris. The final cover over the construction and/or demolition debris shall consist of a minimum of 1 foot of soil capable of supporting vegetation. Waste disposal sites provided outside of the State ROW shall be seeded in accordance with Natural Resources Conservation Service recommendations. The seeding recommendations may be obtained through the appropriate County NRCS Office. The Contractor shall control the access to waste disposal sites not within the State ROW through the use of fences, gates, and placement of a sign or signs at the entrance to the site stating “No Dumping Allowed”.
- Concrete and asphalt concrete debris may be stockpiled within view of the ROW for a period of time not to exceed the duration of the project. Prior to project completion, the waste shall be removed from view of the ROW or buried and the waste disposal site reclaimed as noted above.

The above requirements will not apply to waste disposal sites that are covered by an individual solid waste permit as specified in SDCL 34A-6-58, SDCL 34A-6-1.13, and ARSD 74:27:10:06.

Failure to comply with the requirements stated above may result in civil penalties in accordance with South Dakota Solid Waste Law, SDCL 34A-6-1.31.

All costs associated with furnishing waste disposal site(s), disposing of waste, maintaining control of access (fence, gates, and signs), and reclamation of the waste disposal site(s) shall be incidental to the various contract items.

COMMITMENT I: HISTORICAL PRESERVATION OFFICE CLEARANCES

The SDDOT has obtained concurrence with the State Historical Preservation Office (SHPO or THPO) for all work included within the project limits and all designated option borrow sites provided within the plans.

Action Taken/Required:

All earth disturbing activities not designated within the plans require review of cultural resources impacts. This work includes, but is not limited to: staging areas, borrow sites, waste disposal sites, and all material processing sites.

The Contractor shall arrange and pay for a cultural resource survey and/or records search. The Contractor has the option to contact the state Archaeological Research Center (ARC) at 605-394-1936 or another qualified archaeologist, to obtain either a records search or a cultural resources survey. A record search might be sufficient for review; however, a cultural resources survey may need to be conducted by a qualified archaeologist.

The Contractor shall provide ARC with the following: a topographical map or aerial view on which the site is clearly outlined, site dimensions, project number, and PCN. If applicable, provide evidence that the site has been previously disturbed by farming, mining, or construction activities with a landowner statement that artifacts have not been found on the site.

The Contractor shall submit the records search or cultural resources survey report and if the location of the site is within the current geographical or historic boundaries of any South Dakota reservation to SDDOT Environmental Engineer, 700 East Broadway Avenue, Pierre, SD 57501-2586 (605-773-3180). SDDOT will submit the information to the appropriate SHPO/THPO. Allow **30 Days** from the date this information is submitted to the Environmental Engineer for SHPO/THPO review.

If evidence for cultural resources is uncovered during project construction activities, then such activities shall cease and the Project Engineer shall be immediately notified. The Project Engineer will contact the SDDOT Environmental Engineer in order to determine an appropriate course of action.

SHPO/THPO review does not relieve the Contractor of the responsibility for obtaining any additional permits and clearances for staging areas, borrow sites, waste disposal sites, or material processing sites that affect wetlands, threatened and endangered species, or waterways. The Contractor shall provide the required permits and clearances to the Project Engineer at the preconstruction meeting.

COMMITMENT K: RAPID CITY AREA AIR QUALITY CONTROL ZONE

Administrative Rule of South Dakota (ARSD) 74:36:18:03 states that "no state facility or state contractor may engage in any construction activity or continuous operation activity within the Rapid City air quality control zone which may cause fugitive emissions of particulate to be released into the ambient air without first obtaining a permit issued by the board or the secretary."

Construction activity is defined as any temporary activity at a state facility, which involves the removal or alteration of the natural or pre-existing cover of one acre or more of land. One acre of surface area is based on a cumulative area of disturbance to be completed for the entire project. Construction activity shall include, but not be limited to, stripping of topsoil, drilling, blasting, excavation, dredging, ditching, grading, street maintenance and repair, or earth moving. Construction activity is generally completed within one year. It also includes stockpiles, access roads, and disposal areas. An off-site disposal area of excess material will require an additional permit.

Action Taken/Required:

In order to be considered eligible for authorization to conduct a construction activity under the terms and conditions of this permit, the owner operator must submit a Notice of Intent (NOI) form. The form must be submitted to the address below at least seven business days prior to the anticipated date of beginning the construction activity.

South Dakota Department of Environment and Natural Resources Air Quality Program  
523 East Capitol, Joe Foss Building  
Pierre, SD 57501-3181  
Phone: 605-773-3151

The permit requires the Contractor to use reasonably available technology to control fugitive dust emissions. The Contractor is required to use control measures for track out, paved areas, unpaved roads, unpaved parking lots, disturbed areas, and for material handling and storage. The control measures that the Contractor is required to use are listed in the permit.

UTILITIES

The Contractor shall be responsible for locating and protecting any utility that would conflict with any work. Utilities are not planned to affected on this project. If utilities are identified to be affected through the SD One Call Process as required by South Dakota Codified Law 49-7A and Administrative Rule Article 20:25, the contractor shall contact the project engineer to determine modifications that will be necessary to avoid utility impacts.

SDN Communications has fiber optic lines within the work area. These lines shall not be disturbed during construction. The Contractor shall coordinate work activites with Paul Lowe, SDN Communications, 605-390-3502 to assist with locating and protecting their line during construction.

SEQUENCE OF OPERATIONS

The intent of the plan sequence of operations is to have the least amount of impact on the traveling public and adjacent landowners. Approval of an alternate sequence of operations will only be allowed when the proposed changes meet with the Department's intent for traffic control and sequencing of the work. An alternate sequence shall be submitted for review a minimum of two weeks prior to potential implementation. Work shall proceed according .to the following sequence or as approved by the Engineer:

MRM 66.05

1. Set up traffic control.
2. Excavate to 1.5:1 backslope.
3. Place underdrain tubing, porous backfill and backfill trench.
4. Place Type B fabric.
5. Place rock buttress.
6. Place embankment above rock buttress.
7. Place erosion control measures.
8. Remove traffic control.

MRM 66.31

1. Set up traffic control.
2. Grade backslope to 2:1.
3. Place erosion control measures.
4. Remove traffic control.

HORIZONTAL ALIGNMENT DATA

HORIZONTAL AND VERTICAL CONTROL POINTS				
POINT	DESCRIPTION	NORTHING	EASTING	ELEVATION
SDRC	RC Base	650865.405	1208665.173	3277.427
KE100	REFMRK - Large spike set at edge of road by delineator, MRM 66.3 SB.	638379.647	1203773.725	3727.919

The coordinates shown on this sheet are based on the South Dakota State Plane Coordinate System. South Zone (NAD 83/2011);  
Geoid 12A; SF = 1.0

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

MRM 66.05

Typ e	Station			Northing	Easting
POE	0+00.00			636946.35	1203200.63
		TL= 276.45	N 22°04'52" E		
POE	2+76.45			637202.52	1203304.55

MRM 66.31

Typ e	Station			Northing	Easting
POE	0+00.00			638129.73	1203671.05
		TL= 195.72	N 21°11'55" E		
PC	1+95.72			638312.21	1203741.8
PI	2+08.88	R = 500.00	Delta = 03°00'59" R	638324.49	1203746.56
PT	2+22.04			638336.49	1203751.96
		TL= 92.02	N 24°12'32" E		
PC	3+14.06			638420.42	1203789.69
PI	4+27.63	R = 1200.00	Delta = 10°48'49" R	638524.01	1203836.27
PT	5+40.54			638617.02	1203901.45
		TL= 66.77	N 35°01'21" E		
POE	6+07.30			638671.69	1203939.77

UNCLASSIFIED EXCAVATION

Unclassified Excavation is provided on the project for removing slide material and to install the underdrains.

Unclassified Excavation shall be completed in such a manner so as to not undermine or destabilize the surrounding undisturbed slope

Excavated Material shall be used in fill construction above the Rock Buttress at MRM 66.05.

Plans quantity shall be the basis of payment for the Unclassified Excavation quantity. If changes are made in the field during construction, measurements shall be taken and the quantity shall be adjusted accordingly.

Excess material not needed on the project shall be handled as waste.

Table of Excavation Quantities				
		Water		
	Unclassified	for		
	Excavation	Embankment	#Embankment	#Waste
MRM	(CuYd)	(Mgal)	(CuYd)	(CuYd)
66.05	3066.8	11.3	564.8	2502.0
Total	3066.8	11.3	564.8	2502
# For informational purposes only				



ROCK BUTTRESS

The Rock Buttress shall be constructed at MRM 66.05 from Station 0+25 to Station 2+25 as per the typical section. A 2:1 Rock Buttress shall be constructed from Station 0+25± to Station 2+25±, Lt at MRM 66.05. The Rock Buttress shall be, at a minimum, constructed to the lines shown in the plans. Construction activities shall be sequenced to minimize the amount of time the steep temporary backslopes are left exposed and unsupported.

The Contractor shall remove the slide material as specified. The contract item Unclassified Excavation will be full compensation for all cost associated with removing the slide material. Material not used for embankment construction shall be handled as waste at a waste location secured by the Contractor. No additional payment shall be made for material is wasted off-site.

To produce a compact slope hand placing and/or rearranging of individual stones by mechanical equipment may be required. The material shall substantially conform the specifications for Class D Riprap.

Type B Drainage Fabric shall be placed on all excavated slopes encapsulating the Rock Buttress. Vegetation and loose debris shall be removed from areas to be covered prior to drainage fabric and riprap placement. Drainage fabric and sheet drains shall be held in place by a method approved by the Engineer.

The rock shall meet the requirements for Class D Rip Rap and shall be properly seated and compacted as directed by the Engineer. Rock shall be placed uniformly without segregation or large voids throughout the entire slope. Place drainage fabric over the completed Rock Buttress prior to placement of the overlying fill.

The Contractor shall backfill, up to the top of the Class D Riprap, any portion of the 1.5:1 temporary backslope that is exposed within 5 calendar days. The 5 calendar day count will begin when excavation has begun.

The Contractor is encouraged to limit the exposure of the temporary 1.5:1 slope by breaking up the work into segments.

The Contractor shall not schedule work to expose the temporary 1.5:1 backslope if precipitation is forecast prior to expected backfill of Class D Riprap. In addition, the Contractor shall modify his schedule as necessary if excavation of the temporary 1.5:1 backslope has already begun and weather forecasts involving precipitation change. Modifications shall include, at a minimum:

- No further excavation of the temporary 1.5:1 backslope.
- Backfill the portion of the temporary 1.5:1 backslope already exposed with Class D Riprap.

Visual observation of the material will be the basis of acceptance. Larger stones *may* be Incorporated in the first or bearing course as required by the Engineer.

The rock shall be durable.

After the Riprap has been placed the 2:1 backslope shall be reconstructed by placing fill material adjacent to and over the Rock Buttress from Station 0+00± to Station 2+50±. The slope shall be warped to fit fill into the adjacent undisturbed backslope.

Prior to fill placement, Type B Drainage Fabric shall be placed around and over the Rock Buttress to prevent migration of soil into the rock.

Care shall be taken to not damage the drainage fabric during fill placement. Unclassified Excavation material shall be utilized to construct embankment. It

CLASS D RIPRAP

- The Riprap shall be constructed to the configuration, limits and elevations shown on the plan sheets. Slopes in the areas of riprap placement shall be reconstructed as shown in the plan drawings and as approved by the Engineer. Cost of reconstructing the slopes shall be incidental to the unit price bid for Riprap Class D except as noted otherwise in these plans.
- Riprap shall consist of quarried ledgerock.
- Drainage fabric will be placed underneath the Riprap. The fabric shall conform to Section 831 of the Standard Specifications.
- The fabric shall be placed so that the lapped joints between rolls (if any) are transverse to the direction of flow with the overlapping in the direction of flow. All joints shall be lapped a minimum of twelve (12) inches.
- Vehicles and equipment shall not be operated directly on the fabric. The full depth of riprap shall be in place before any equipment is allowed on the area.
- Prior to placement of the drainage fabric, the surface to be covered shall be smooth, free of obstructions, and conform to the plan configuration.
- A factor of 1.4 tons/cu.yd. was used to convert Cu. Yds. to Tons.
- Type B Drainage Fabric will be measured and paid for by the square yard of surface area of fabric accepted complete in place on the project. Measurement will not include fabric required for lapped seams or joints. Payment will be full compensation for furnishing the Drainage Fabric and for all labor, equipment, materials, and incidentals necessary to prepare the area for the fabric and satisfactory installation of the Drainage Fabric.
- SDDOT Geotechnical Engineering Activity will be available for assistance during construction if needed.

Table of Rock Buttress Quantities		
		Type B
	Class D	Drainage
	Riprap	Fabric
MRM	(Ton)	(SqYd)
66.05	3195	912.1

UNDERDRAIN

After the Unclassified Excavation is complete, an underdrain system shall be installed at the toe of the temporary backslope. The underdrain system shall be installed in conjunction with drainage fabric and sheet drain installation prior to Rock Buttress construction.

The underdrain shall be installed from Station 0+25±, 30' Lt. to Station 2+50±, 20' Lt.

The underdrain will consist of 4 inch Slotted Corrugated Polyethylene Tubing placed in a 2 foot wide variable depth trench backfilled with a minimum of 1 foot of Porous Backfill.

The underdrain shall outlet through 25 feet of 4 inch Corrugated Polyethylene Tubing placed in a 2 foot wide trench of variable depth backfilled with fill material.

Where the drainage tubing is unable to be installed within a trench, a minimum of 1 foot of porous backfill or soil shall be heaped over the tubing prior to buttress construction.

The underdrain outlet tubing shall daylight at an Outlet Headwall at approximately Station 2+50±, 20' Lt. as directed by the Engineer.

Actual field conditions may require that the adjustments in location and depth be made by the Engineer to provide for sufficient drainage.

All tubing shall be paid under the contract unit price per foot for 4" Corrugated Polyethylene Drainage Tubing or 4" Slotted Corrugated Polyethylene Drainage Tubing.

The underdrain trench shall be graded to maintain a minimum of .01ft/ft drop from beginning to outlet.

The Outlet Headwall shall be placed to blend in with the surrounding topography with the outlet tubing placed above the bottom of the drainage so as to permit proper flow from the outlet.

Care must be taken to insure that the underdrain and outlet tubing is not damaged during construction. Sufficient cover material is to be placed over the underdrain before heavy equipment is allowed to work over the underdrain.

Table of Underdrain Quantities				
		4" Slotted		
	4" Corrugated	Corrugated	Precast	
	Polyethylene	Polyethylene	Concrete	
	Porous	Drainage	Drainage	Headwall
	Backfill	Tubing	Tubing	for Drain
MRM	(Ton)	(Ft)	(Ft)	(Each)
66.05	84	25	200	1

TRAFFIC CONTROL – GENERAL NOTES

1. Requests to deviate from the sequence of operations shall be submitted in writing to the Engineer for review. Approval of an alternate sequence of operations will only be allowed when the proposed changes meet with the Department’s intent for traffic control and sequencing of the work. An alternate sequence shall be submitted for review a minimum of one week prior to potential implementation.
2. Unless otherwise stated in these plans, no work will be allowed during hours of darkness.
3. Indiscriminate driving and parking of vehicles within the right-of-way will not be permitted. Any damage of the vegetation, surfacing, embankment, delineators, and existing signs resulting from such indiscriminate use shall be repaired and/or restored by the Contractor, at no expense to the State, and to the satisfaction of the Engineer.
4. Existing guide, route, informational logo, regulatory, warning signs and delineation shall be temporarily reset and maintained during construction as directed by the Engineer. Removing, relocating, salvaging and resetting of the above items shall be the responsibility of the Contractor..
5. Construction signing mounted on portable supports shall not be used for a duration of more than 3 days, unless approved by the Engineer. Construction signing that remains in the same location for more than 3 days shall be mounted on fixed location, ground mounted, breakaway supports.
6. Any delineators and signs damaged or lost shall be replaced by the Contractor at no cost to the State.
7. All materials and equipment shall be stored a minimum distance of 30’ from the traveled way during nonworking hours.
8. The Contractor shall provide installation details at the preconstruction meeting for all breakaway sign support assemblies.
9. All haul trucks shall be equipped with a second flashing amber light that is visible from the backside of the haul truck. The costs for the flashing amber lights shall be incidental to the various related contract bid items.
10. All construction operations shall be conducted in the general direction of traffic movement.
11. If there is a discrepancy between the traffic control plans, standard plates, and the MUTCD – whichever is more stringent shall be used, as determined by the Engineer.
12. Temporary Flexible Vertical Markers (Tabs) shall be used for lane closure tapers or lane shift tapers and shall be installed at 5’ spacing. Tabs used for tapers and shifts will not be measured for payment. All costs associated to furnish, install, maintain (including replacement as required by the Engineer at no added cost to the Department), and remove all markers will be incidental to the contract lump sum price for Traffic Control, Miscellaneous.

INVENTORY OF TRAFFIC CONTROL DEVICES

SIGN CODE	SIGN DESCRIPTION	NUMBER	SIGN SIZE	SQFT PER SIGN	SQFT
W4-2	LEFT or RIGHT LANE ENDS (symbol)	2	48" x 48"	16	32
W20-1	ROAD WORK AHEAD	2	48" x 48"	16	32
W20-5	LEFT or RIGHT LANE CLOSED AHEAD	2	48" x 48"	16	32
W20-7	FLAGGER (symbol)	2	48" x 48"	16	32
W21-5	SHOULDER WORK	2	48" x 48"	16	32
G20-2	END ROAD WORK	2	48" x 24"	8	16
		EXPRESSWAY / INTERSTATE TRAFFIC CONTROL SIGNS			176
					SQFT

TYPE C ADVANCE WARNING ARROW PANEL

The quantity of Type C Advance Warning Arrow Panels paid will be the most installations in place at any one time regardless of the number of set-ups on the project.

SURFACE ROUGHENING

The slopes shall be shaped at MRM 66.31 so that positive drainage is provided down the slope and erosion ruts are filled in prior to placement of topsoil. All costs associated with shaping the slope prior to placement of topsoil and erosion control blanket shall be incidental to the contract unit price per acre for Surface Roughening.

MYCORRHIZAL INOCULUM

Mycorrhizal inoculum shall consist of mycorrhizal fungi spores and mycorrhizal fungi-infected root fragments in a solid carrier. The carrier may include organic materials, calcinated clay, or other materials consistent with application and good plant growth. The supplier shall provide certification of the fungal species claimed and the live propagule count. The inoculum shall include the following fungal species:

<i>Glomus intraradices</i>	25%
<i>Glomus aggregatu</i>	25%
<i>Glomus mosseae</i>	25%
<i>Glomus etunicatum</i>	25%

All seed shall be inoculated by the seed supplier with a minimum of 100,000 live propagules of mycorrhizal fungi per acre. All costs of inoculating the seed shall be incidental to the contract unit price per pound for the corresponding permanent seed mixture.

The mycorrhizal inoculum shall be as shown below or an approved equal:

Product

MycoApply

Manufacturer

Mycorrhizal Applications, Inc.  
Grants Pass, OR  
Phone: 1-866-476-7800  
<http://www.mycorrhizae.com/>

FERTILIZING

The Contractor shall apply an all-natural slow release fertilizer prior to seeding or placing sod. The all-natural fertilizer shall have a minimum guaranteed analysis of 4-6-4 and be USDA Certified BioBased. It should provide a minimum of 4% (N) nitrogen with a minimum water insoluble nitrogen (WIN) fraction of 3.2%, a minimum of 6% (P2O5) available phosphate, a minimum of 4% (K2O) soluble potash, and a maximum carbon to nitrogen ratio (C:N ratio) of 5:1. The all-natural fertilizer shall be free of weed-seed and pathogens accomplished through thermophilic composting, and not mechanical or chemical sterilization, to assure presence of beneficial soil microbiology. The fertilizer shall have a near neutral pH, a low salt index, a low biological oxygen demand, contain organic humic and fulvic acids, and have high aerobic organism counts. The fertilizer shall also be stable, free of bad odors, and be unattractive as a food source for animals. It should also be in a granular form that is easily spread.

The all-natural slow release fertilizer shall be applied according to the manufacturer’s application recommendations.

The application rate is 1,500 pounds per acre.

The all-natural slow release fertilizer shall be as shown below or an approved equal:

Product

Sustane

Manufacturer

Sustane Corporate Headquarters  
Cannon Falls, Minnesota  
Phone: 1-800-352-9245  
<http://www.sustane.com/>

HYDROSEEDING

The areas to be hydroseeded with Type F Permanent Seed Mixture shall comprise of all newly graded areas within the project limits.

Type F Permanent Seed Mixture shall consist of the following:

Grass Species	Variety	Pure Live Seed (PLS) (Pounds/Acre)
Western Wheatgrass	Arriba, Flintlock, Rodan, Rosana	7
Green Needlegrass	Lodorm	4
Sideoats Grama	Butte, Killdeer, Pierre, Trailway	3
Blue Grama	Bad River, Willis	2
Oats or Spring Wheat: April through May; Winter Wheat: August through November		10
Total:		26

Hydroseeding shall be done by applying a mixture of water and seed at locations determined by the Engineer during construction.

The equipment used for hydroseeding shall be a mechanical agitation hydroseeding machine.

All costs for hydroseeding including equipment, labor, and materials which include the water and seed shall be incidental to the contract unit price per square yard for Hydroseeding

EROSION CONTROL WATTLE

Erosion control wattles for restraining the flow of runoff and sediment shall be installed at locations noted in the table and at locations determined by the Engineer during construction. Refer to Standard Plate 734.06 for details.

The Contractor shall provide certification that the erosion control wattles do not contain noxious weed seeds.

Erosion control wattles shall remain on the project to decompose.

An additional quantity of 12” Diameter Erosion Control Wattles has been added to the Estimate of Quantities for temporary erosion and sediment control in highway ditch channels and as an alternative to low flow or high flow silt fence at wetland areas adjacent to the highway.

The erosion control wattle provided shall be from the approved product list. The approved product list for erosion control wattle may be viewed at the following internet site:

<http://sddot.com/business/certification/products/Default.aspx>

EROSION CONTROL BLANKET

Erosion control blanket shall be installed 16 feet wide at the locations noted in the table and at locations determined by the Engineer during construction.

The erosion control blanket provided shall be from the approved product list. The approved product list for erosion control blanket may be viewed at the following internet site:

<http://sddot.com/business/certification/products/Default.aspx>

Table of Erosion Control Items							
MRM	Acres	Hydro-seeding (SqYd)	Type 4 Erosion Control Blanket (SqYd)	Fertilizin g (Lb)	Surface Roughening Acre	12" Erosioun Control Wattle (Ft)	Erosion Control Wattle Notes
66.05	0.2	1012	1012.0	300		56	Perimet er &
66.31	0.5	2361	2361.0	750	0.5	36	Perimeter
	Total	3373	3373	1050	0.5	92	

Plot Scale - 1:40

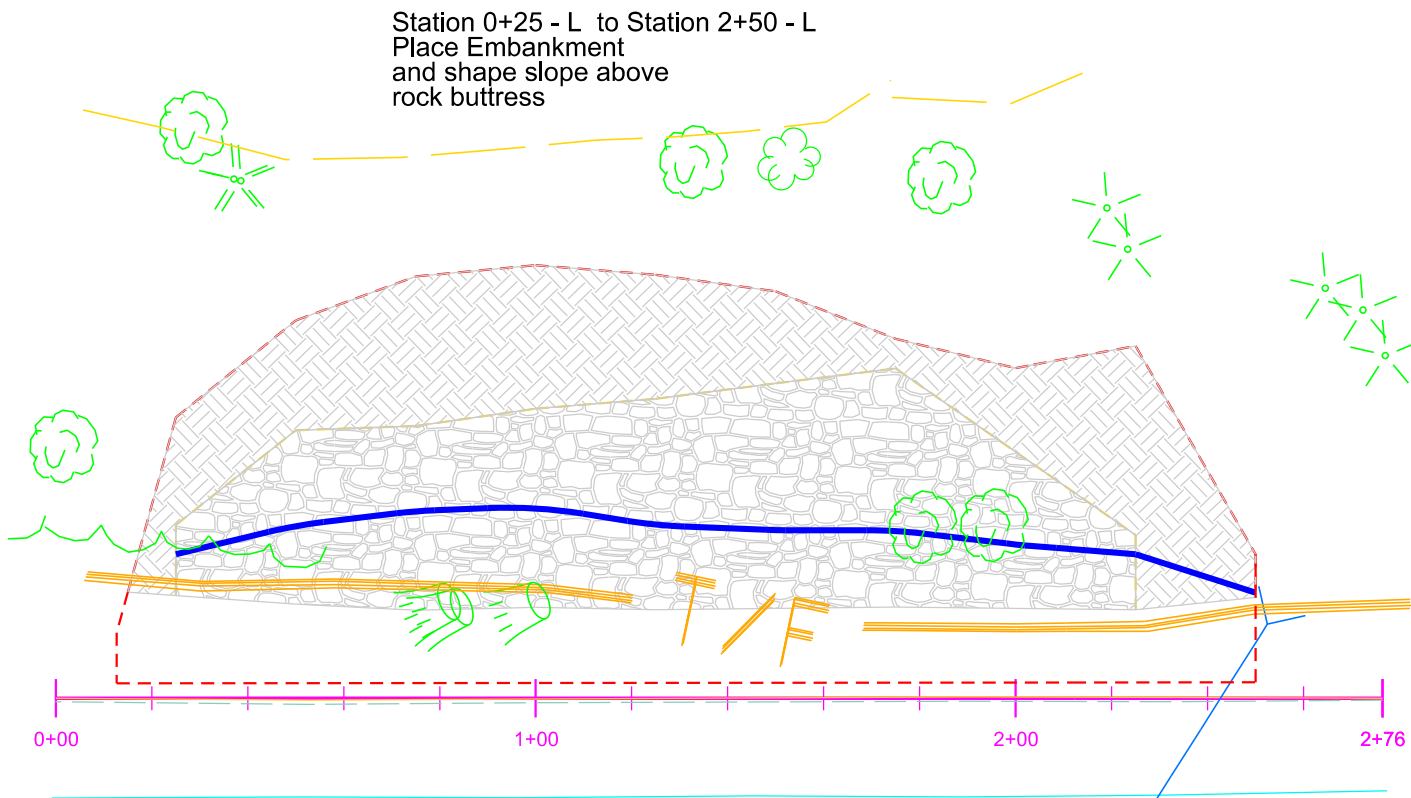
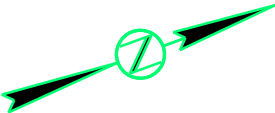
Plotted From - TRRC12608

# PLAN VIEW

## US Highway 16 - MRM 66.05

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016 W-452	7	20

Plotting Date: 10/06/2015



Station 0+25 - L  
Begin Underdrain  
Begin 4"

Station 2+25 - L  
End 4"

Station 2+25 - L



Embankment



Type D Riprap



4" (Slotted or Unslotted) Corrugated  
Polyethylene Drainage Tubing

POB 0+00.00  
N 636946.349  
E 1203200.632

POE 2+76.45  
N 637202.519  
E 1203304.554

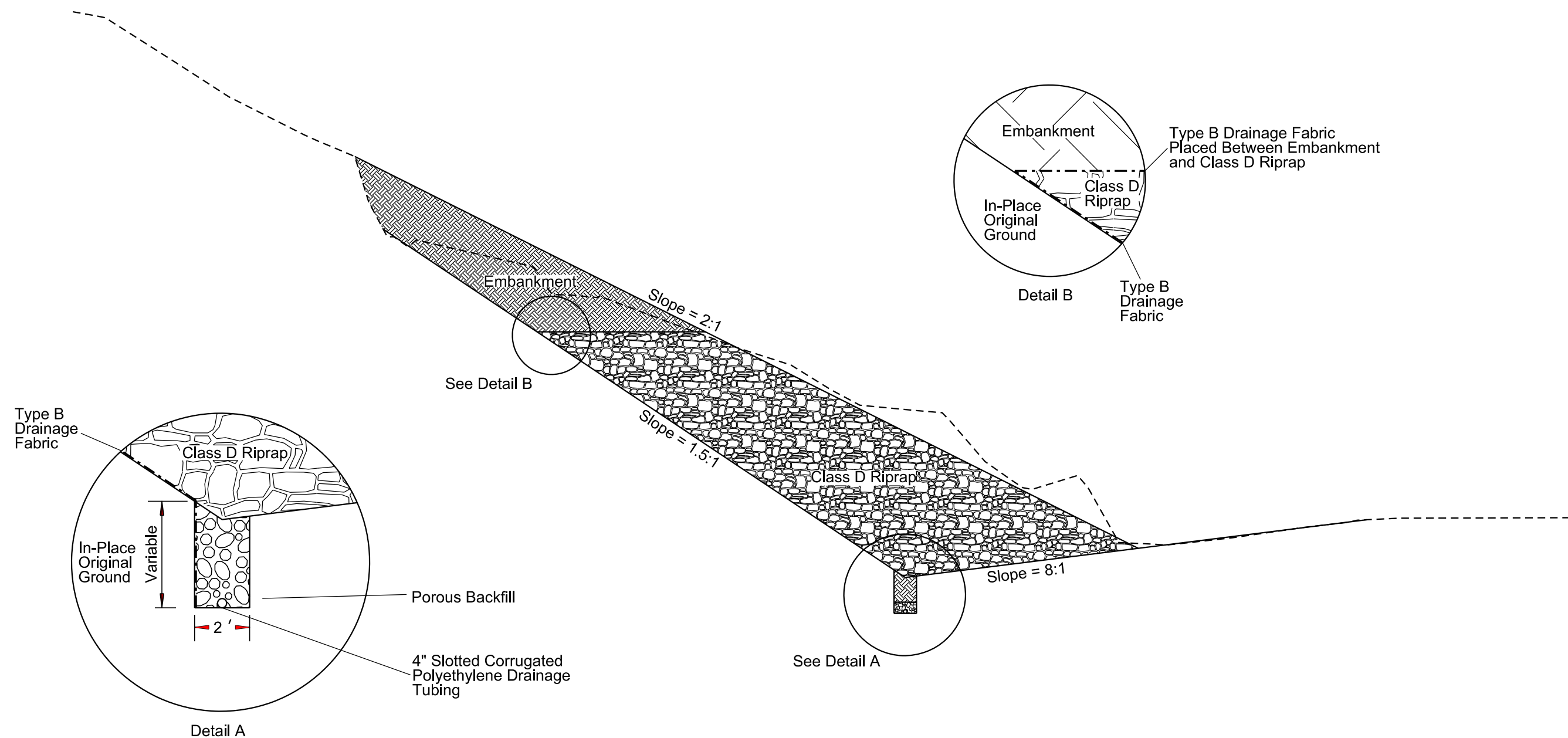
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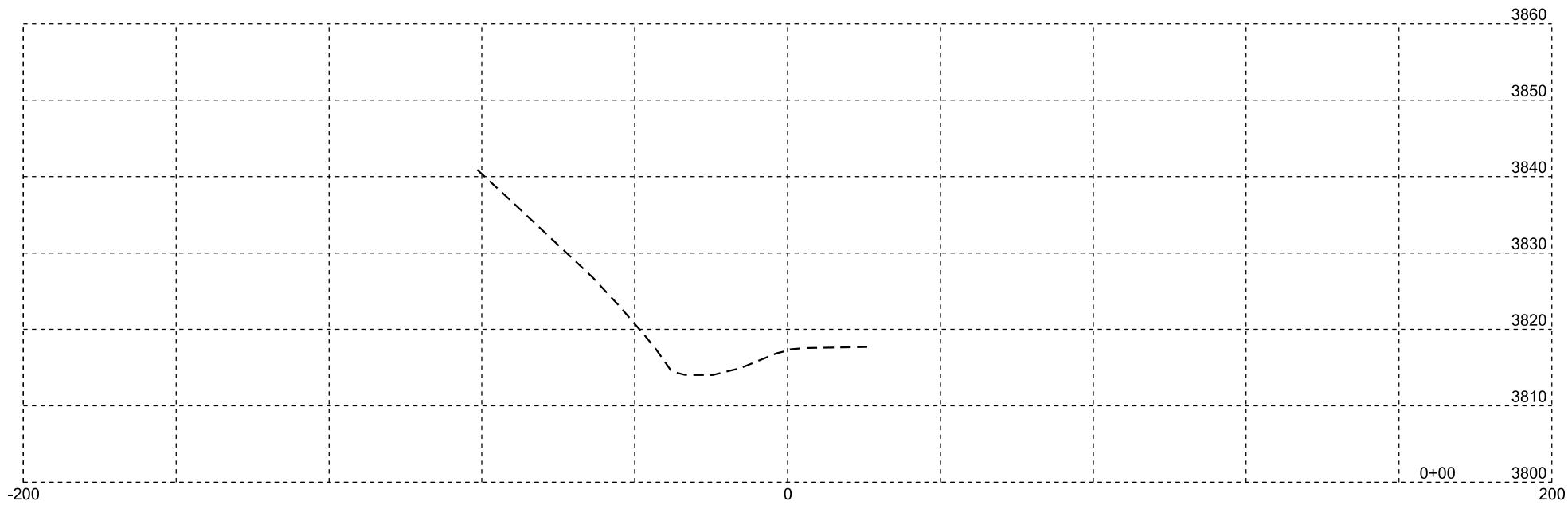
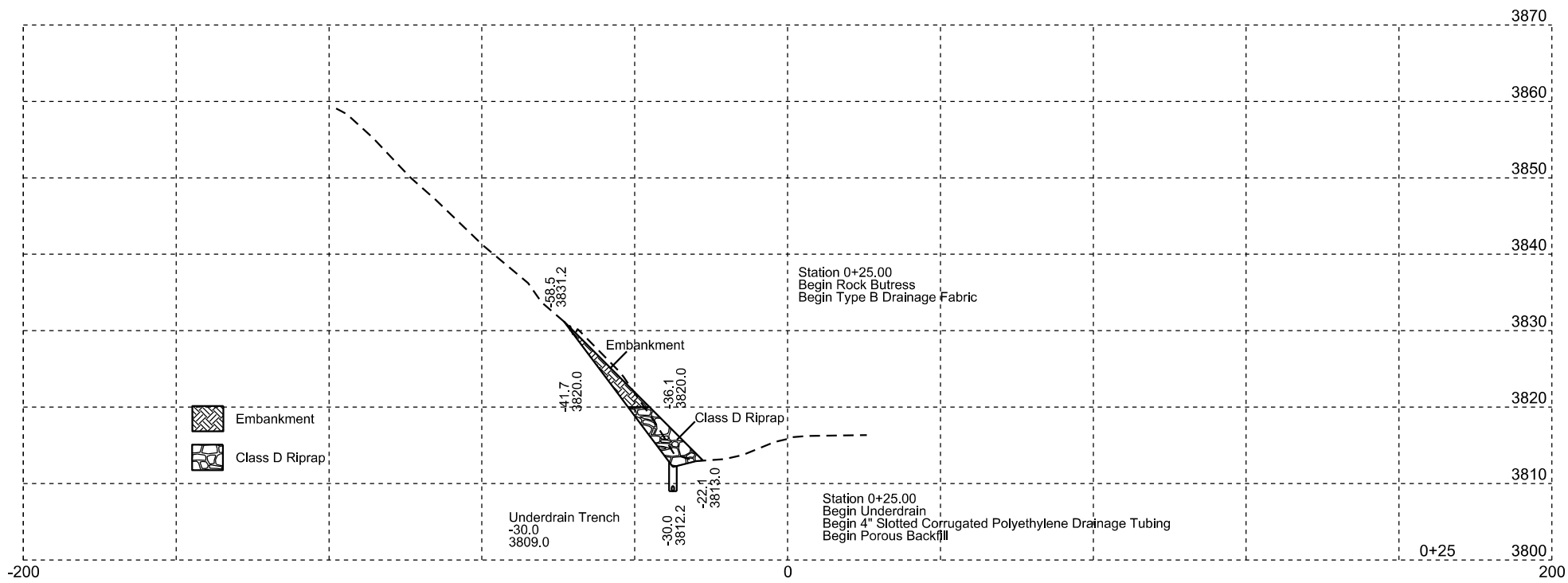
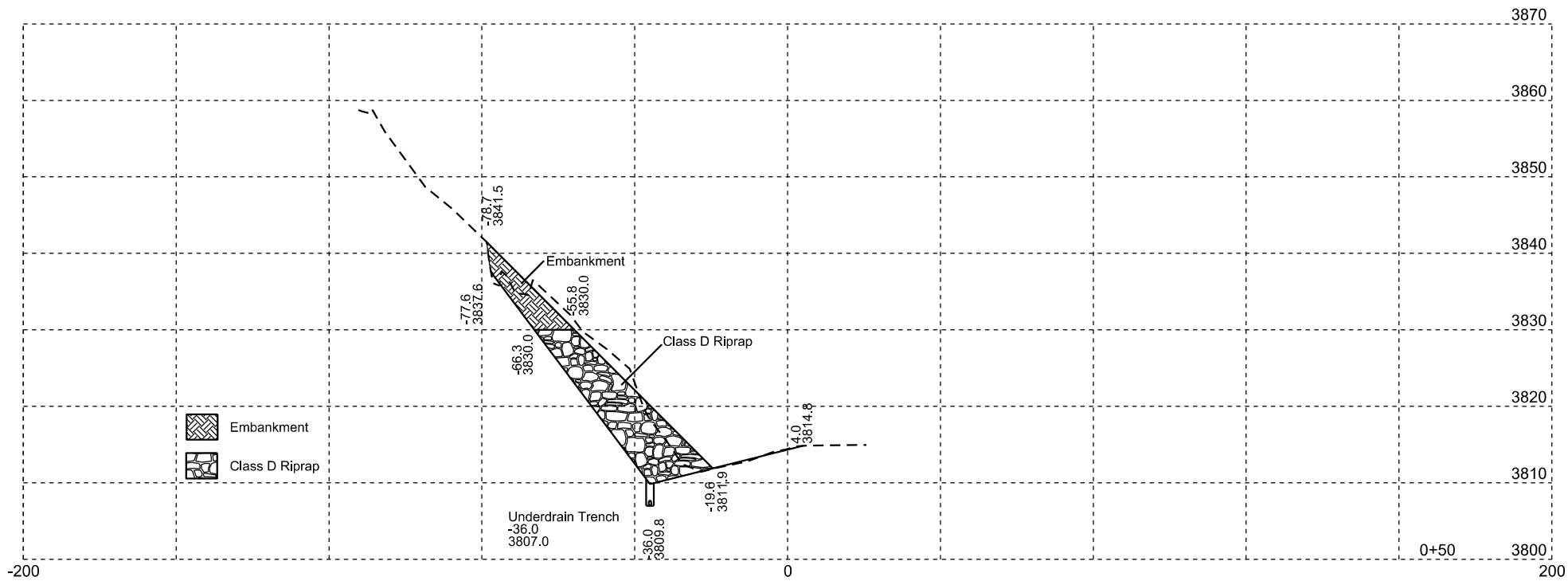
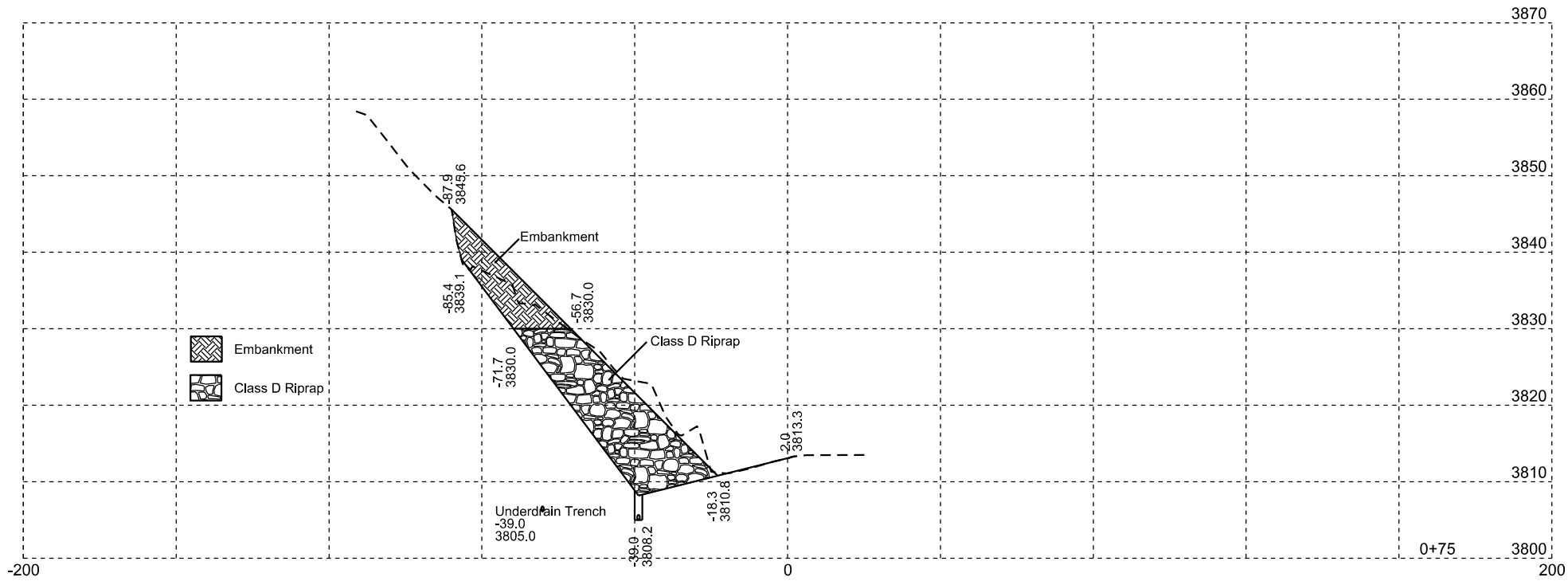
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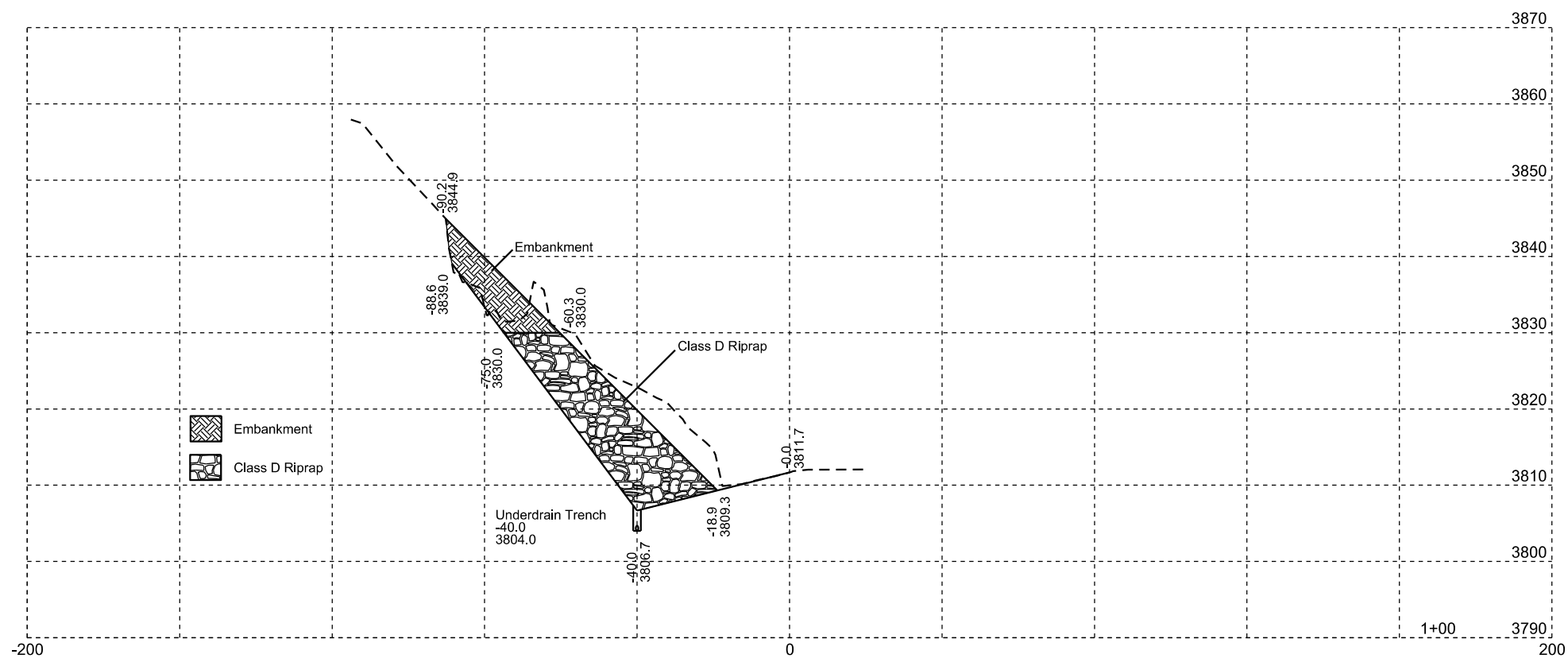
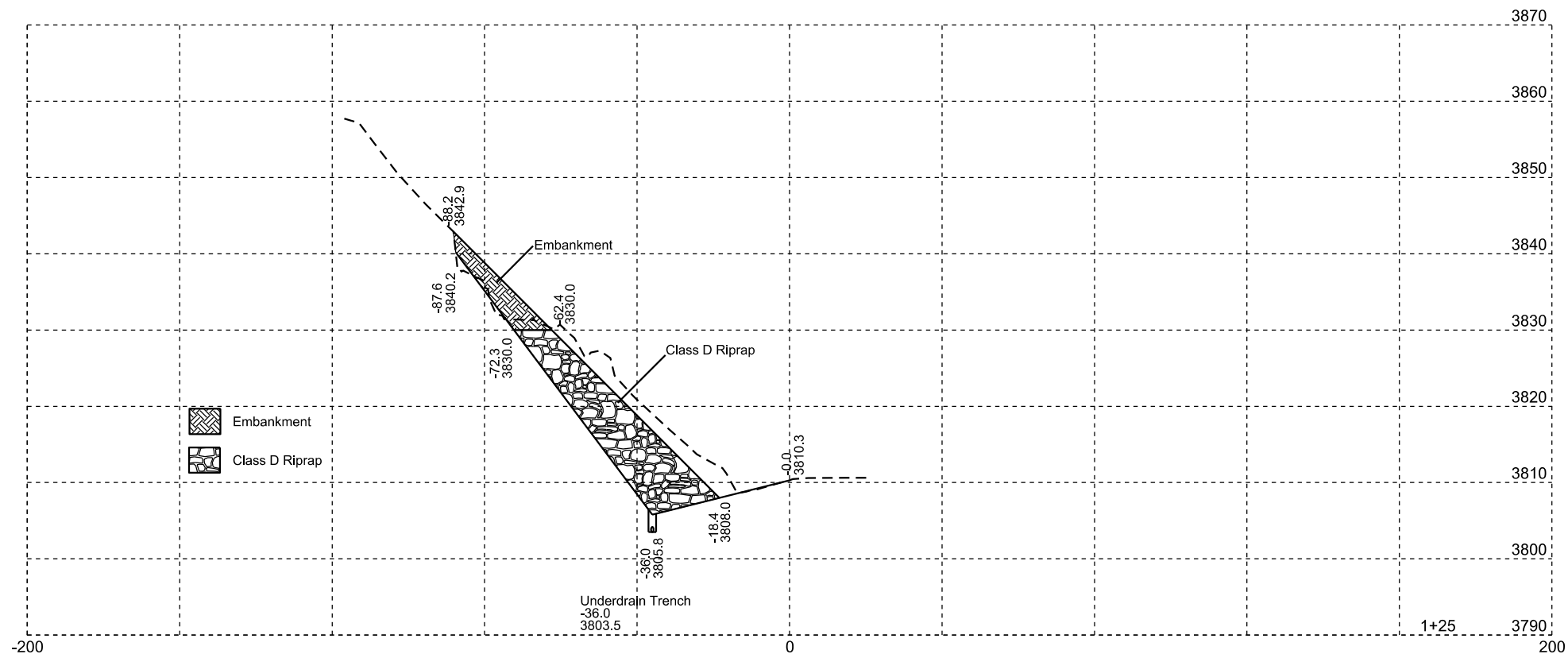
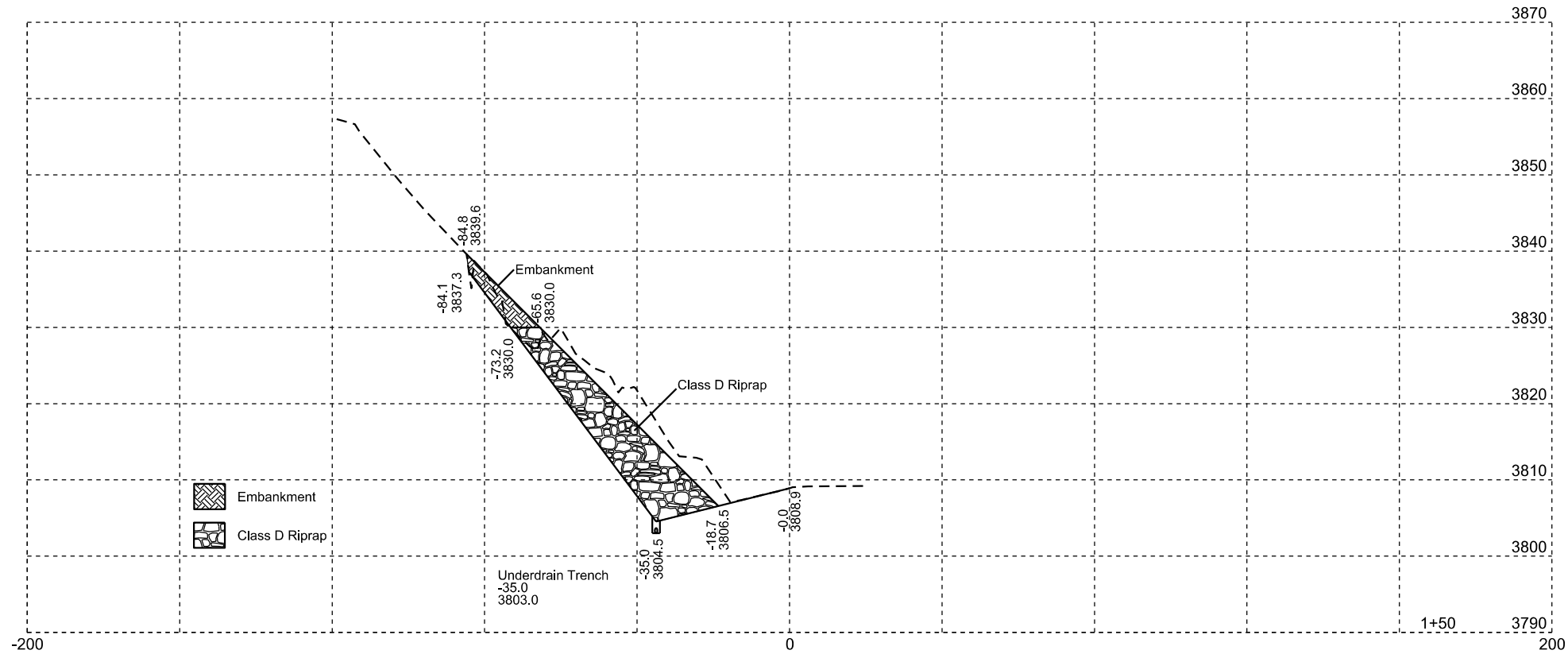
Plotted From - TRRC12608

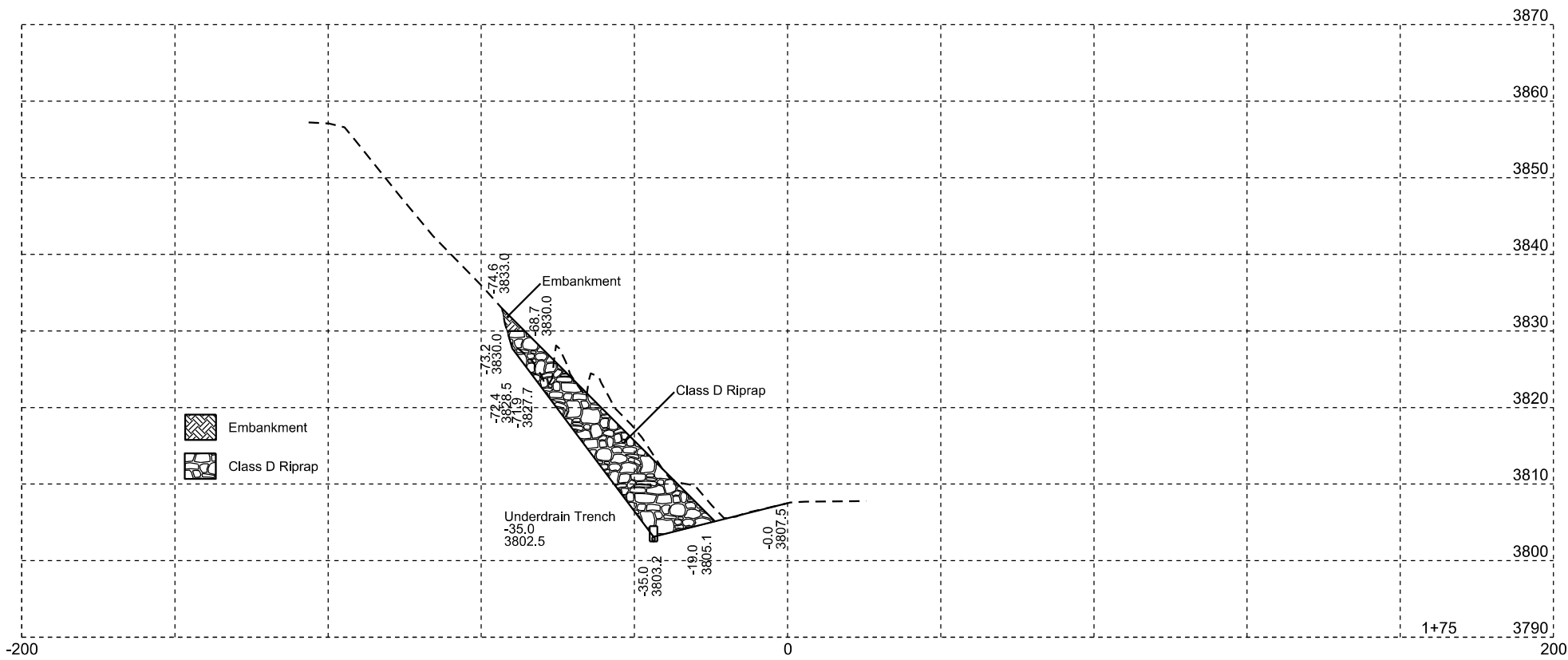
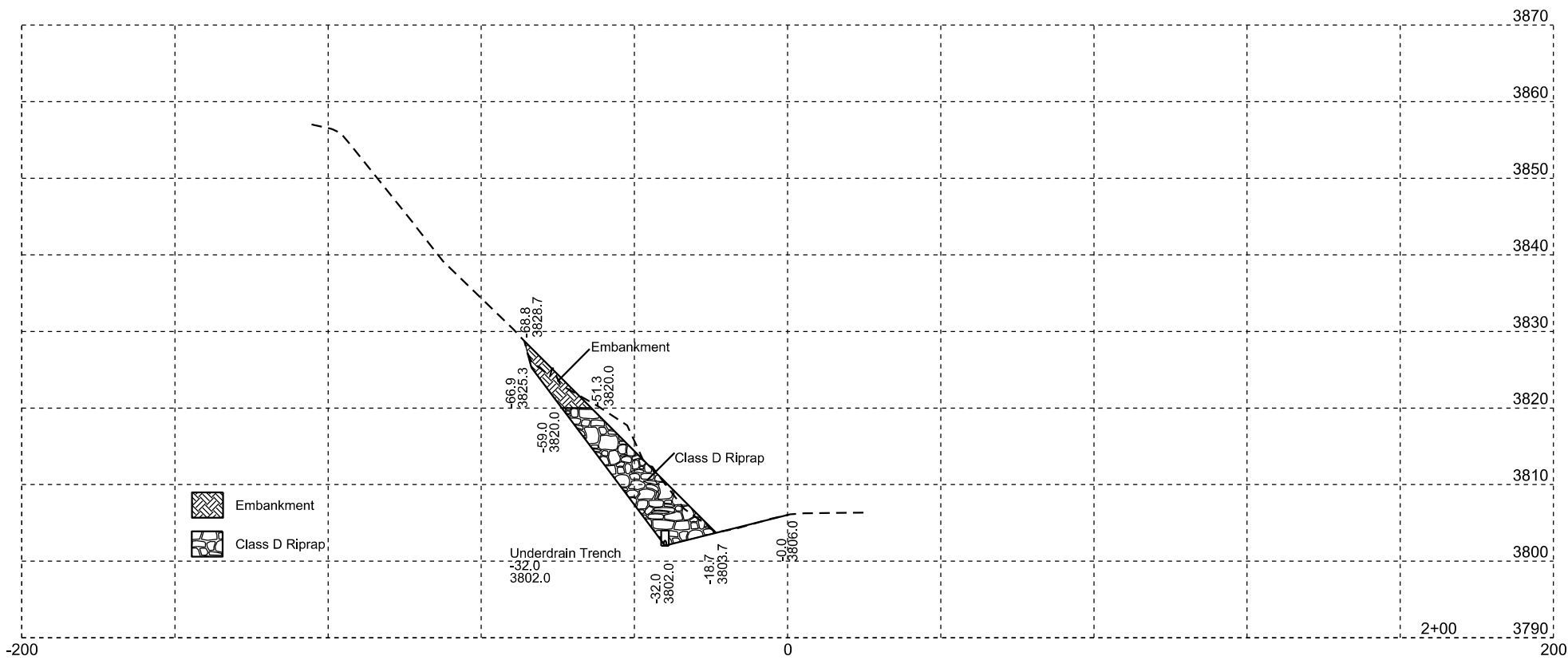
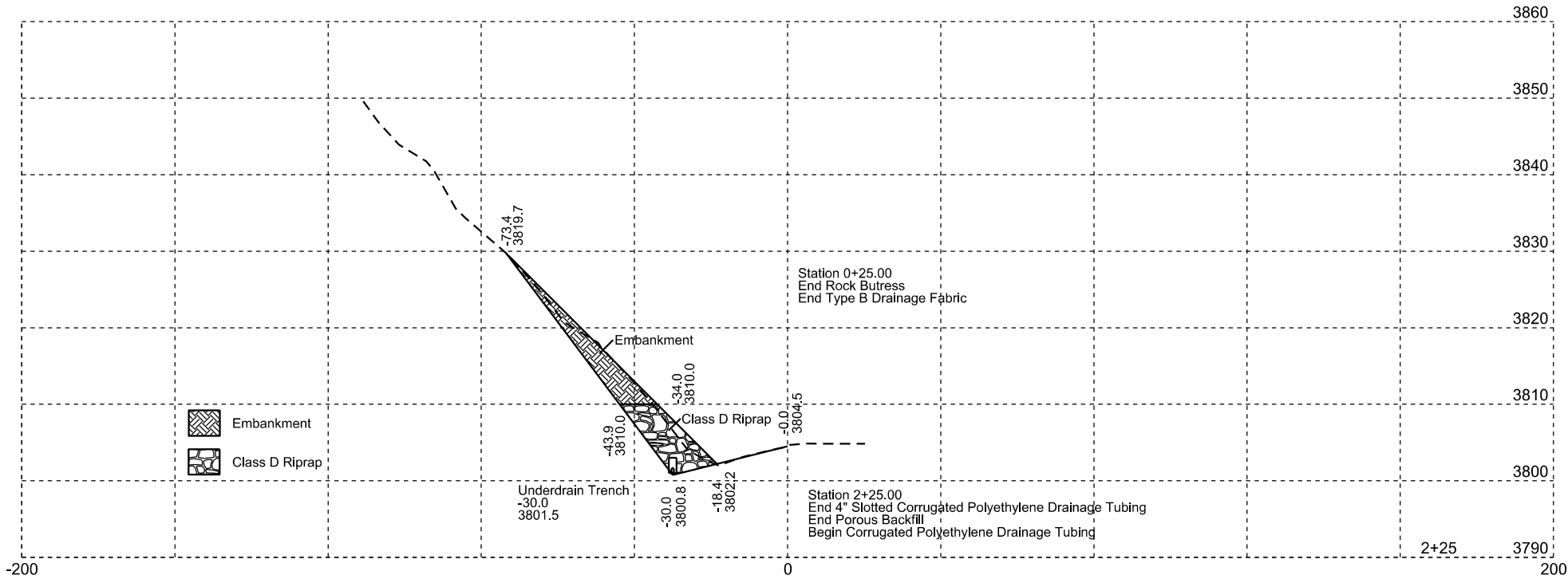
File - ... \MRM 66.05.dgn

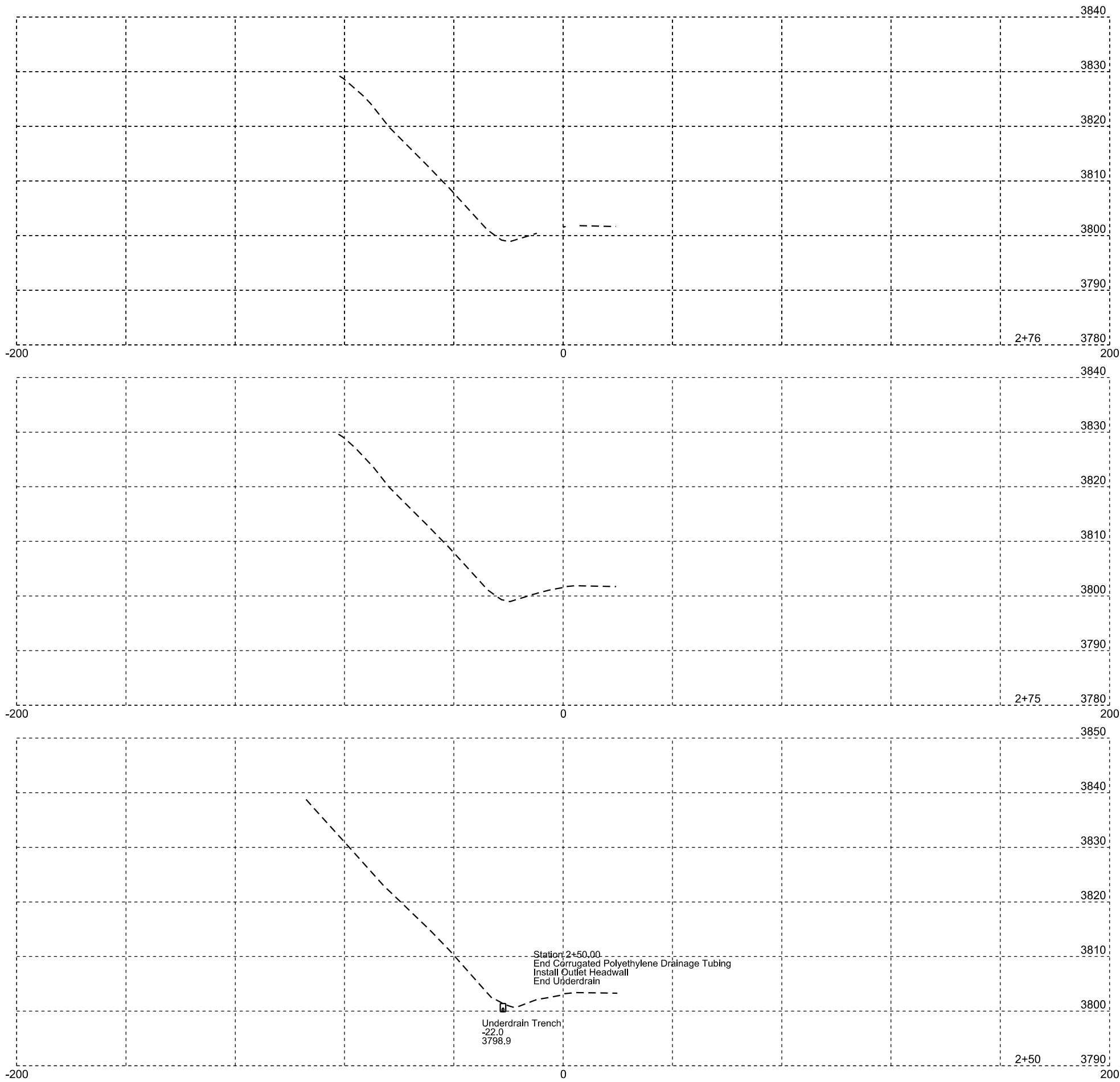












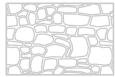
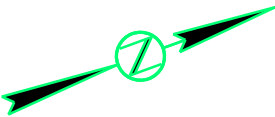


# EROSION CONTROL

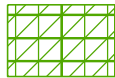
## US Highway 16 - MRM 66.05

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016 W-452	13	20

Plotting Date: 10/06/2015



Class D Riprap



Type 4 Erosion Control Blanket



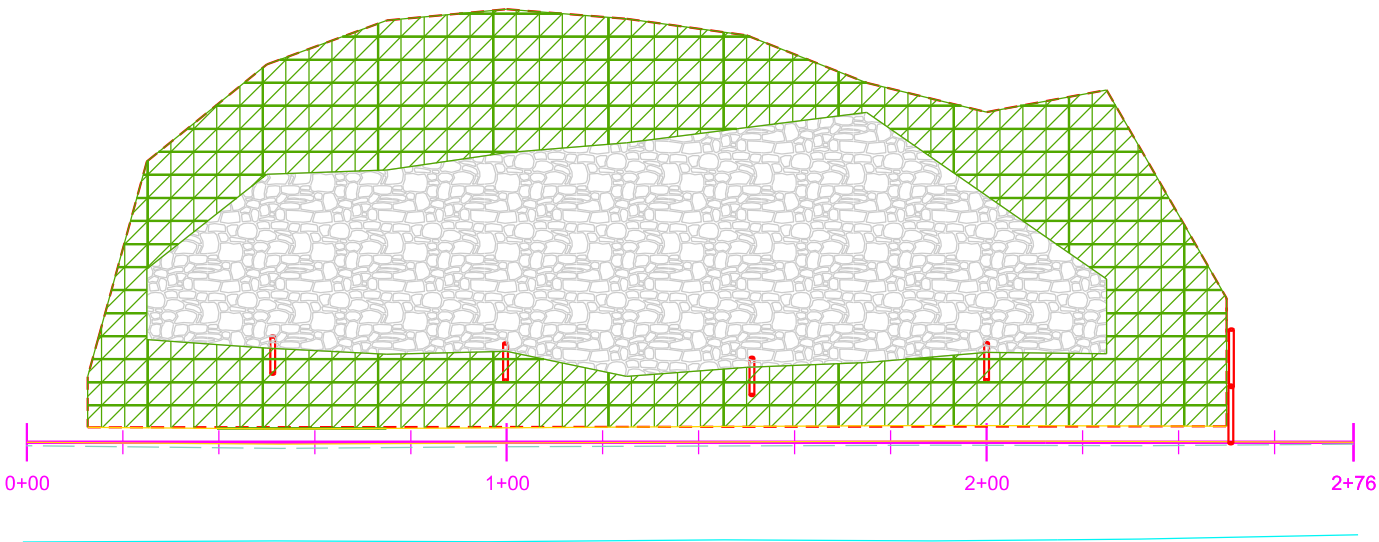
12" Erosion Control Wattle

Place 12" Erosion Control Wattle:

0+50 - 8'  
1+00 - 8'  
1+50 - 8'  
2+00 - 8'  
2+50 - 24'

Staion 0+15 to Station 2+50  
Install 1012 SqYd of  
Type 4 Erosion Control Blanket

Staion 0+15 to Station 2+50  
1012 SqYd Hydroseeding



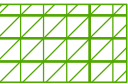
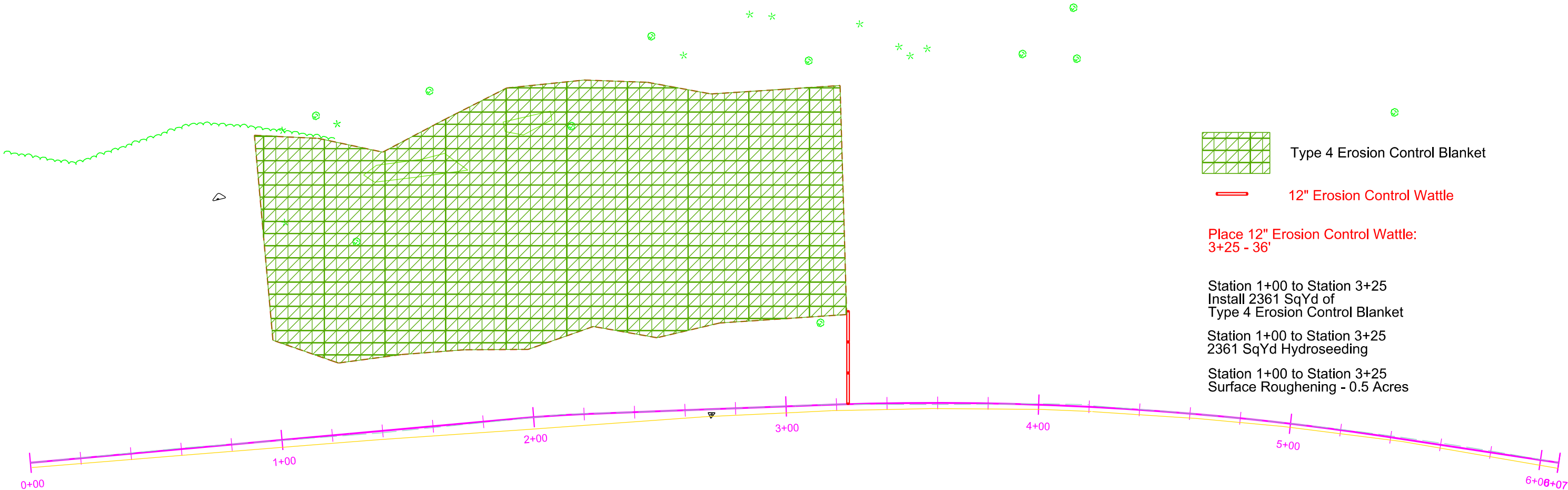
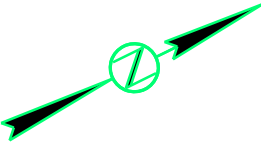
Plotted From: TRR012608  
Plot Scale: 1"=40'

# EROSION CONTROL

## US Highway 16 - MRM 66.31

STATE OF SOUTH DAKOTA	PROJECT	SHEET	TOTAL SHEETS
	016 W-452	14	20

Plotting Date: 10/06/2015



Type 4 Erosion Control Blanket



12" Erosion Control Wattle

Place 12" Erosion Control Wattle:  
3+25 - 36'

Station 1+00 to Station 3+25  
Install 2361 SqYd of  
Type 4 Erosion Control Blanket

Station 1+00 to Station 3+25  
2361 SqYd Hydroseeding

Station 1+00 to Station 3+25  
Surface Roughening - 0.5 Acres

POB 0+00.00  
N 638129.730  
E 1203671.049

PI 2+08.88  
N 638324.486  
E 1203746.561  
Del 03°00'59" R  
Dc 11°27'33"  
T 13.16  
L 26.32  
R 500.00

PI 4+27.63  
N 638524.005  
E 1203836.266  
Del 10°48'49" R  
Dc 04°46'29"  
T 113.58  
L 226.48  
R 1200.00

POE 6+07.30  
N 638671.693  
E 1203939.765

The signs illustrated are not required if the work space is behind a barrier, more than 2 feet behind the curb, or 15 feet or more from the edge of any roadway.

The signs illustrated shall be used where there are distracting situations; such as: vehicles parked on shoulder, vehicles accessing the work site via the highway, and equipment traveling on or crossing the roadway to perform work operations.

The ROAD WORK AHEAD sign may be replaced with other appropriate signs, such as the SHOULDER WORK sign. The SHOULDER WORK sign may be used for work adjacent to the shoulder.

\* If the work space is on a divided highway, an advance warning sign should also be placed on the left side of the directional roadway.

For short term, short duration, or mobile operations, all signs and channelizing devices may be eliminated if a vehicle with an activated flashing or revolving yellow light is used.

Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)
0 - 30	200
35 - 40	350
45 - 50	500
55	750
60 - 80	1000



April 15, 2015

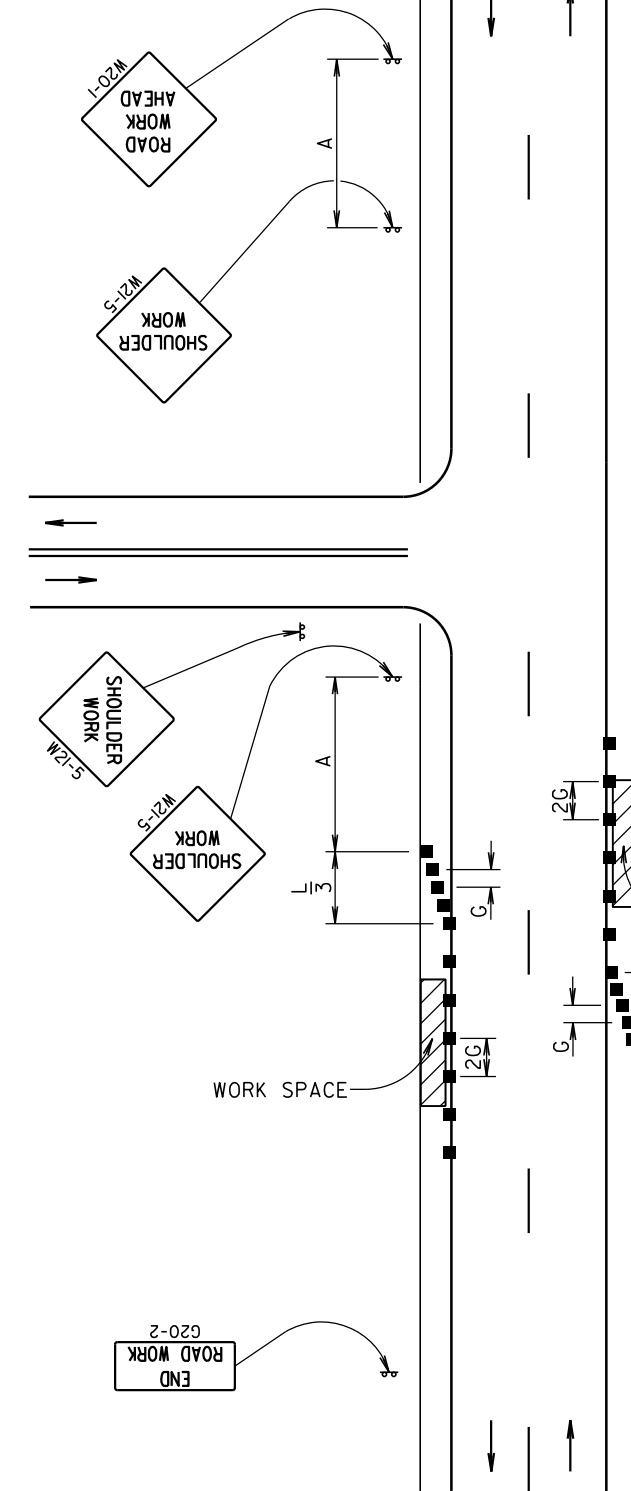
Published Date: 3rd Qtr. 2015

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GUIDES FOR TRAFFIC CONTROL DEVICES  
WORK BEYOND THE SHOULDER

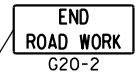
PLATE NUMBER  
634.01

Sheet 1 Of 1



Posted Speed Prior to Work (M.P.H.)	Spacing of Advance Warning Signs (Feet) (A)	Taper Length (Feet) (L)	Spacing of Channelizing Devices (Feet) (G)
0 - 30	200	180	25
35 - 40	350	320	25
45 - 50	500	600	50
55	750	660	50
60 - 65	1000	780	50

■ Channelizing Device



The channelizing devices shall be drums or 42" cones if traffic control must remain overnight.

For short duration operations (1 hour or less) all channelizing devices may be eliminated if a vehicle with an activated flashing or revolving yellow light is used.

Worker signs (W21-1 or W21-1a) may be used instead of SHOULDER WORK signs.

A SHOULDER WORK sign should be placed on the left side of a divided or one-way roadway only if the left shoulder is affected.

The SHOULDER WORK sign on an intersecting roadway is not required if drivers emerging from that roadway will encounter another advance warning sign before they reach a work activity area.

WORK SPACE



September 22, 2014

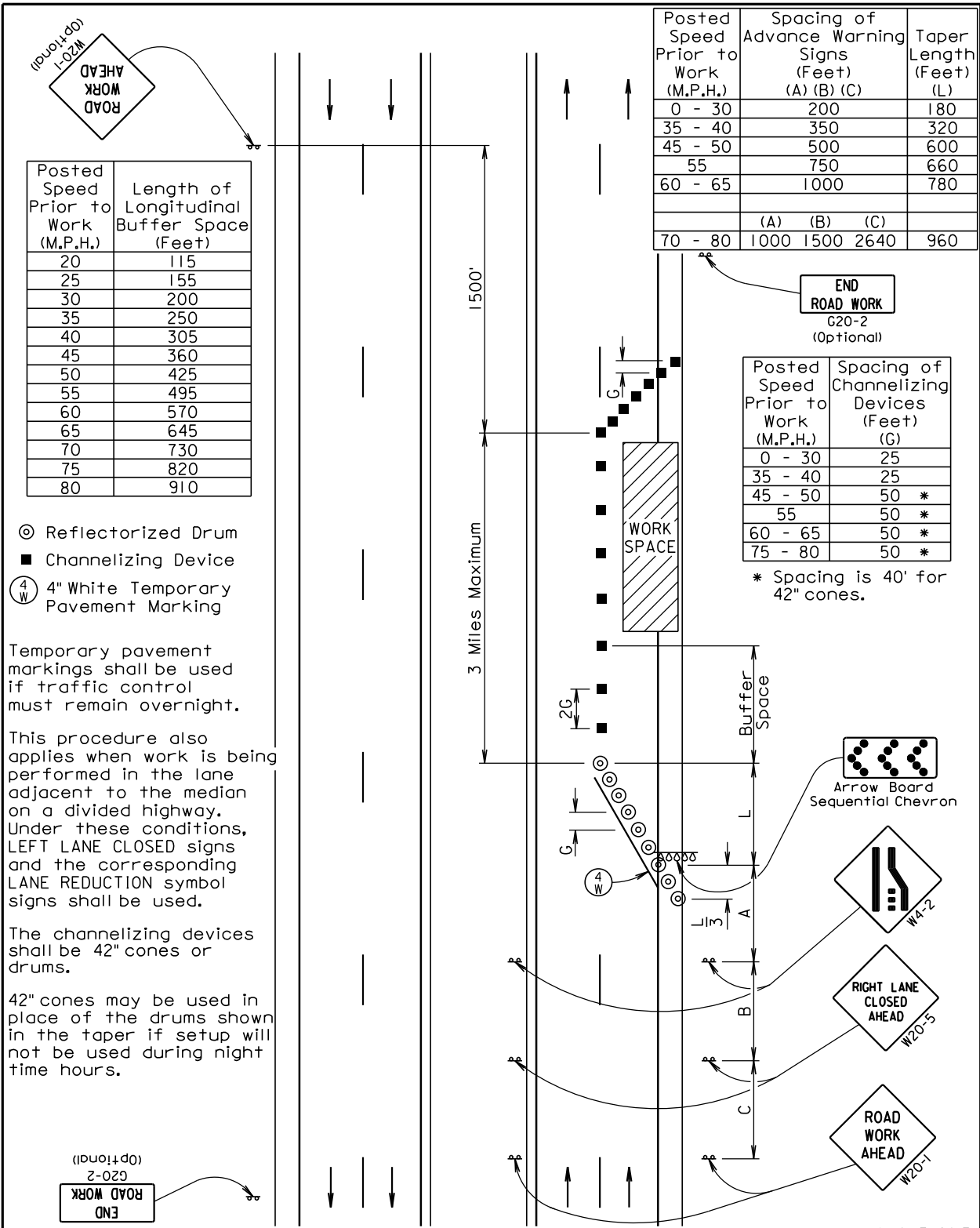
Published Date: 3rd Qtr. 2015

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GUIDES FOR TRAFFIC CONTROL DEVICES  
WORK ON SHOULDERS

PLATE NUMBER  
634.03

Sheet 1 of 1



- ⊙ Reflectorized Drum  
■ Channelizing Device  
④ W 4" White Temporary Pavement Marking

Temporary pavement markings shall be used if traffic control must remain overnight.

This procedure also applies when work is being performed in the lane adjacent to the median on a divided highway. Under these conditions, LEFT LANE CLOSED signs and the corresponding LANE REDUCTION symbol signs shall be used.

The channelizing devices shall be 42" cones or drums.

42" cones may be used in place of the drums shown in the taper if setup will not be used during night time hours.

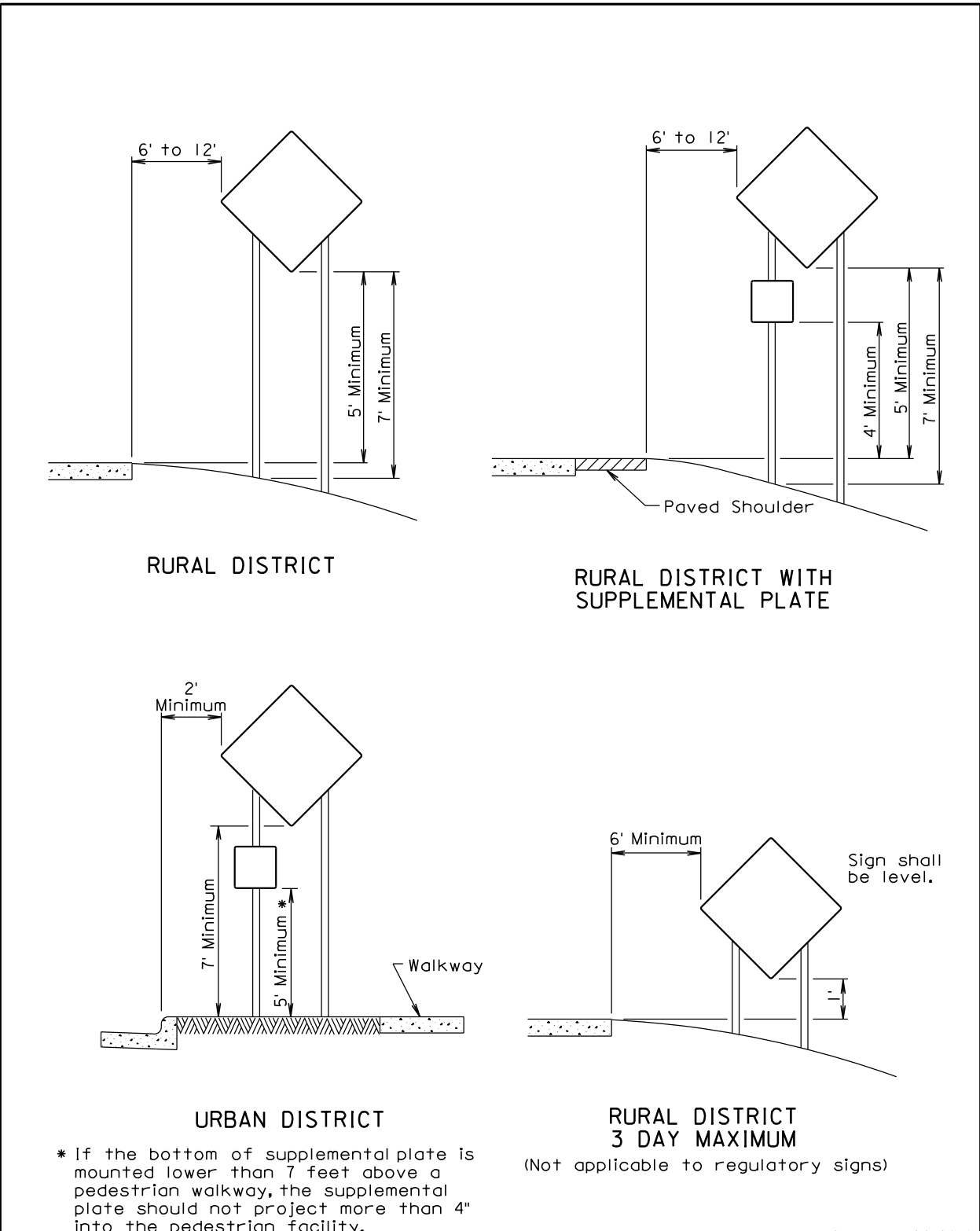
Published Date: 3rd Qtr. 2015

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GUIDES FOR TRAFFIC CONTROL DEVICES  
LANE CLOSURE WITHOUT BARRIER

PLATE NUMBER  
634.64

Sheet 1 of 1



Published Date: 3rd Qtr. 2015

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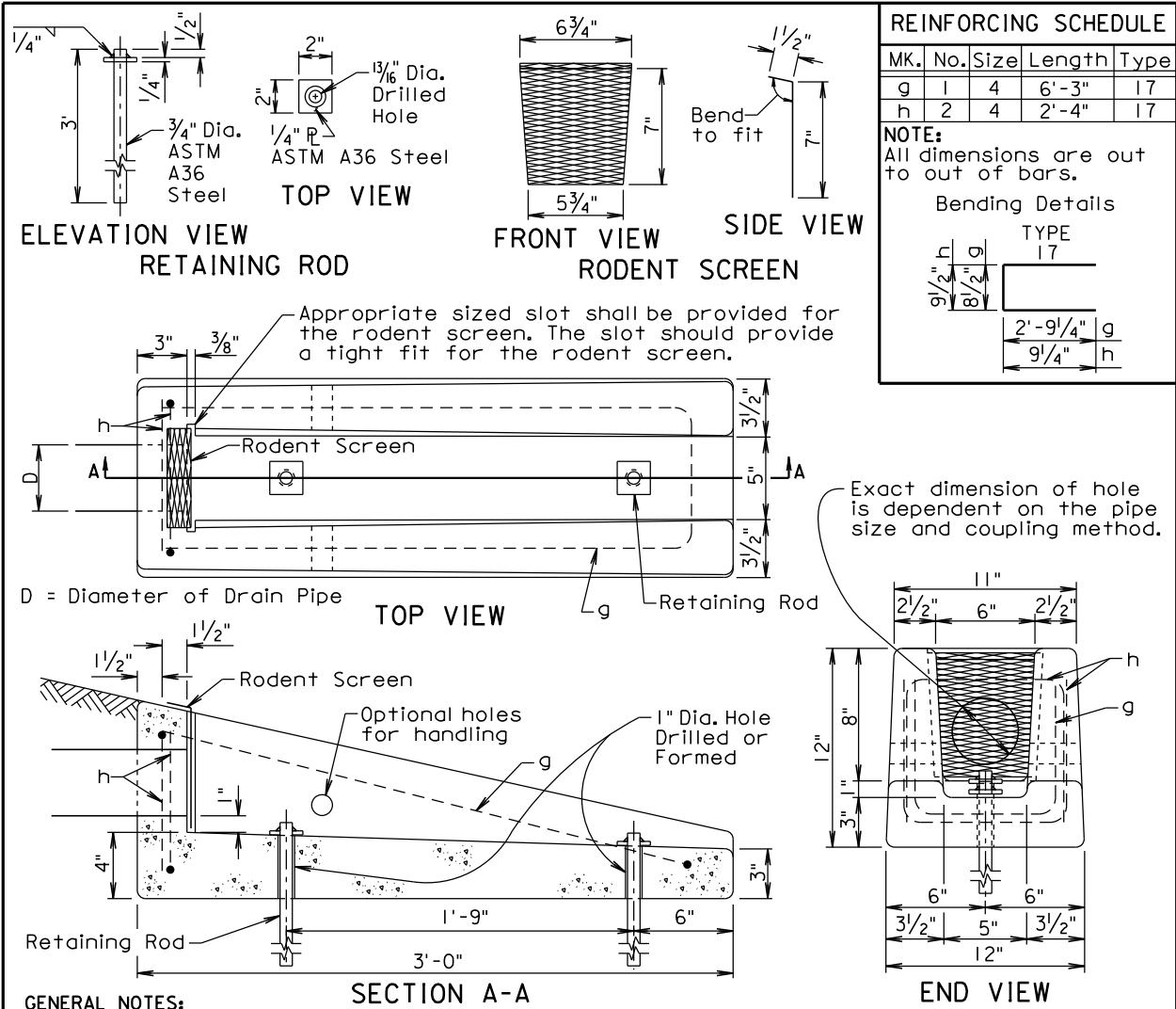
CRASHWORTHY SIGN SUPPORTS  
(Typical Construction Signing)

PLATE NUMBER  
634.85

Sheet 1 of 1







GENERAL NOTES:

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

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

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

The rodent screen shall be galvanized 13 Ga. steel with a diamond shaped flattened mesh pattern. The size shall be 1/2". The size refers to the measurement across the smallest diamond shaped opening measured from the centers of the wires.

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

The drawing indicates using 1/2" fillets; however, 3/4" chamfers may be substituted for the 1/2" fillets.

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

December 23, 2010

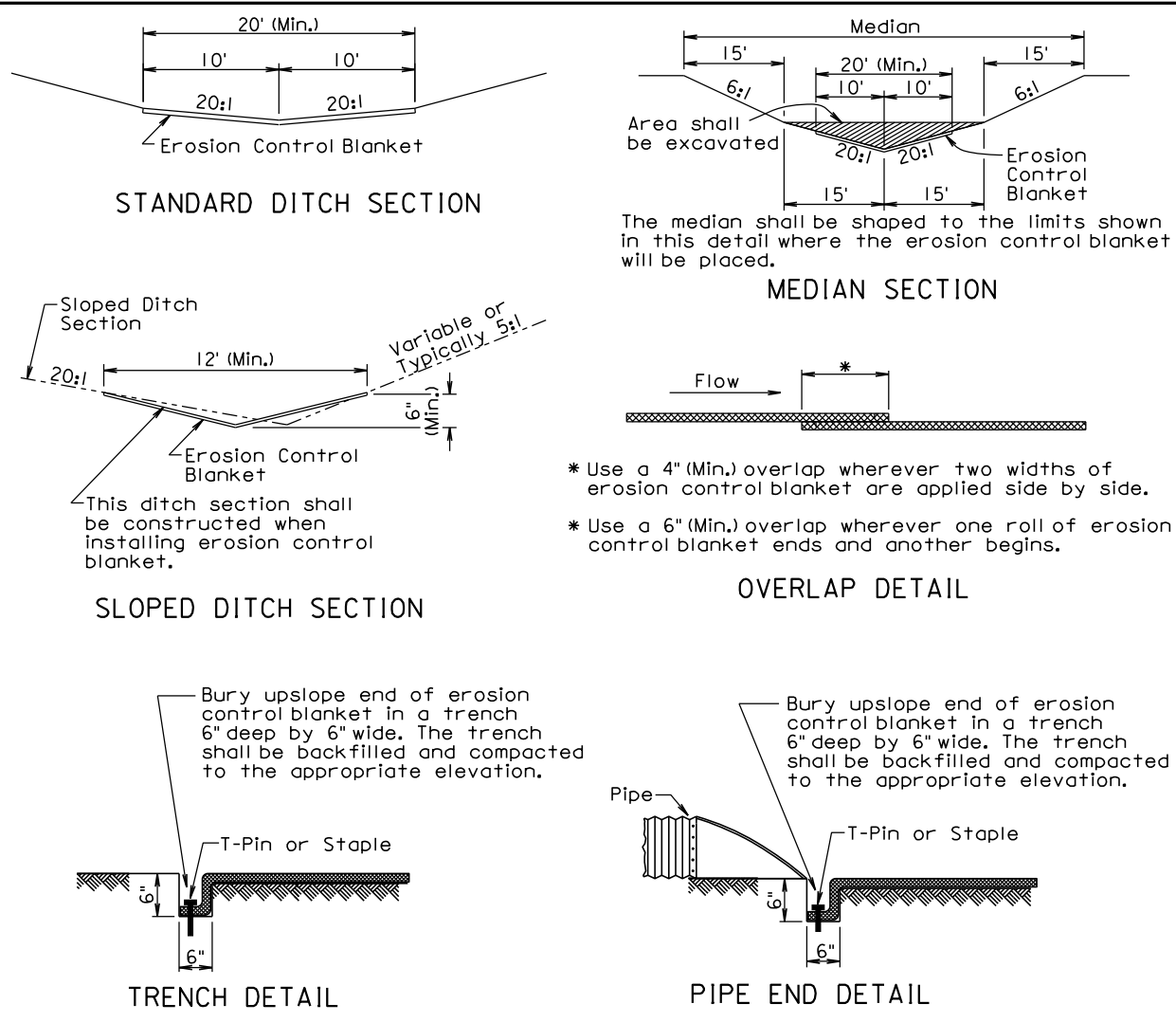
Published Date: 3rd Qtr. 2015

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PRECAST CONCRETE HEADWALL  
FOR DRAIN

PLATE NUMBER  
680.03

Sheet 1 of 1



**GENERAL NOTES:**

Prior to placement of the erosion control blanket, the areas shall be properly prepared, shaped, seeded, and fertilized.

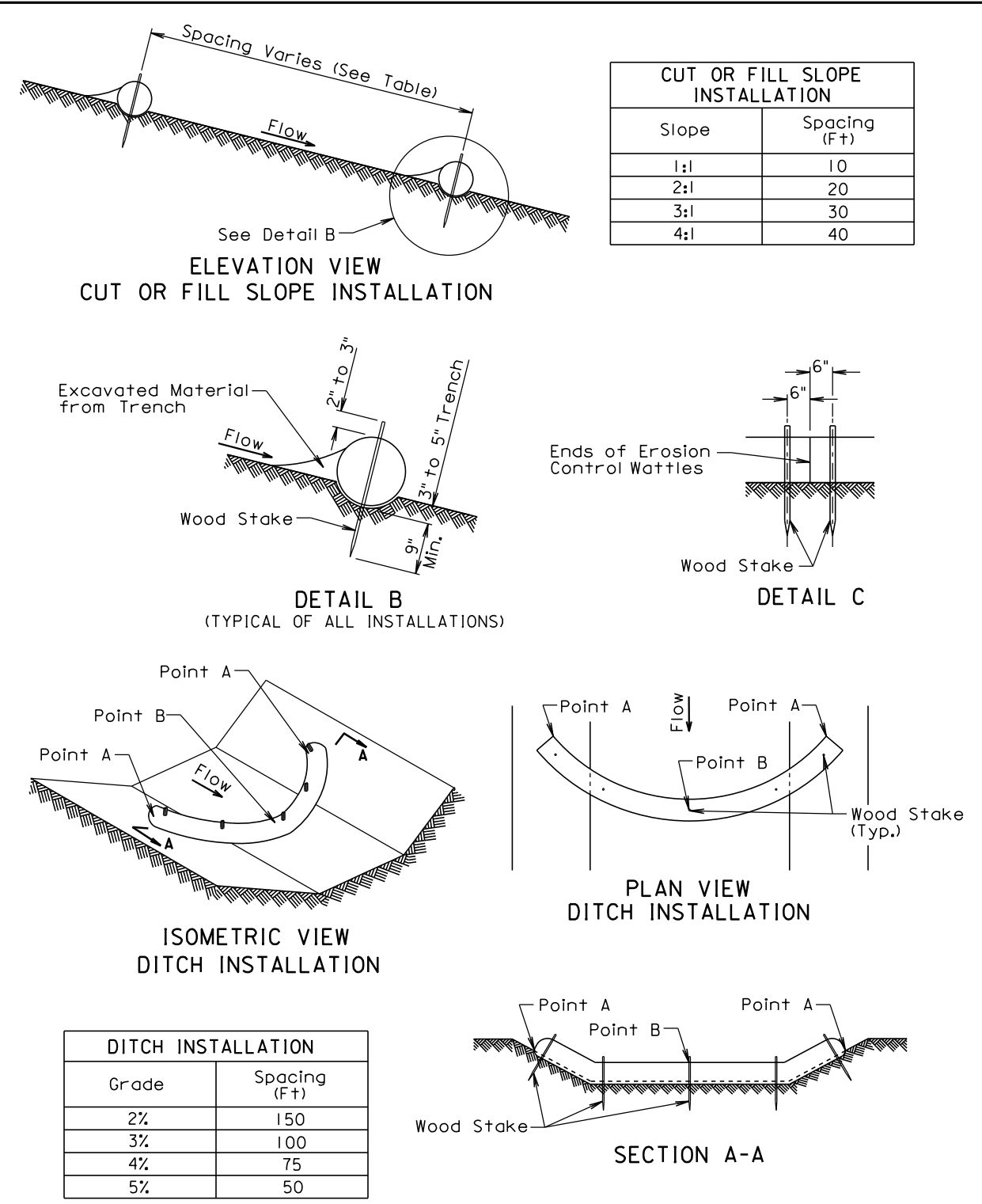
Erosion control blanket shall be unrolled in the direction of the flow of water when placed in ditches and on slopes. The upslope end of the erosion control blanket shall be buried in a trench 6" wide by 6" deep. There shall be at least a 6" overlap wherever one roll of erosion control blanket ends and another begins, with the upslope erosion control blanket placed on top of the downslope erosion control blanket.

The erosion control blanket shall be pinned to the ground according to the manufacturer's installation recommendations.

After the placement of the erosion control blanket, the Contractor shall fine grade along all edges of the blanket to maintain a uniform slope adjacent to the blanket and level any low spots which might prevent uniform and unrestricted flow of side drainage directly onto the erosion control blanket.

All ditch sections shall be shaped when installing the erosion control blanket. All costs for shaping the ditches shall be incidental to the contract unit price per foot for "Shaping for Erosion Control Blanket".

December 23, 2004



December 23, 2004

GENERAL NOTES:

At cut or fill slope installations, wattles shall be installed along the contour and perpendicular to the water flow.

At ditch installations, point A must be higher than point B to ensure that water flows over the wattle and not around the ends.

The Contractor shall dig a 3" to 5" trench, install the wattle tightly in the trench so that daylight can not be seen under the wattle, and then compact the soil excavated from the trench against the wattle on the uphill side. See Detail B.

The stakes shall be 1"x2" or 2"x2" wood stakes, however, other types of stakes such as rebar may be used only if approved by the Engineer. The stakes shall be placed 6" from the ends of the wattles and the spacing of the stakes along the wattles shall be 3' to 4'.

Where installing running lengths of wattles, the Contractor shall butt the second wattle tightly against the first and shall not overlap the ends. See Detail C.

The Contractor and Engineer shall inspect the erosion control wattles once every week and within 24 hours after every rainfall event greater than 1/2". The Contractor shall remove, dispose, or reshape the accumulated sediment when necessary as determined by the Engineer.

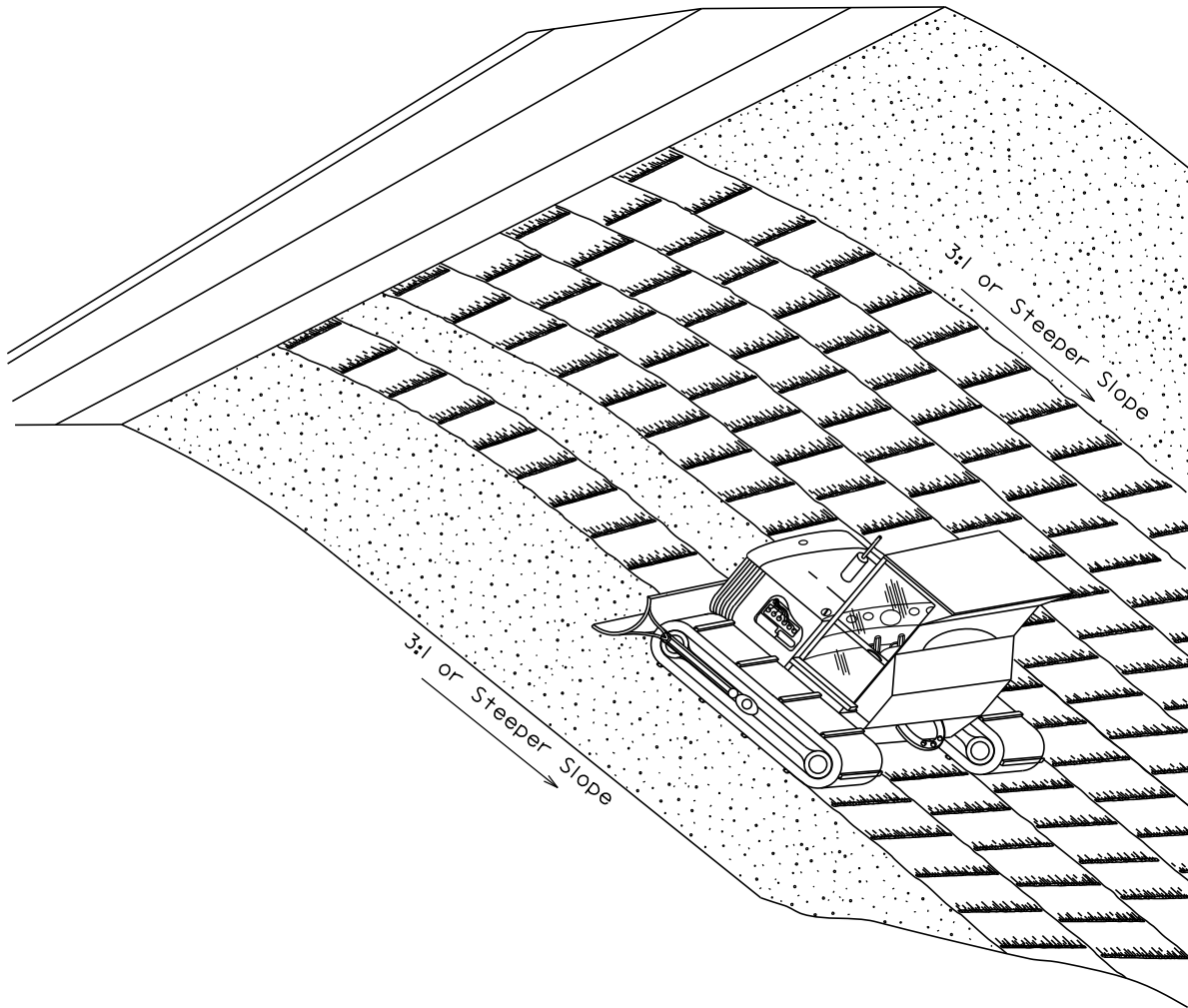
Sediment removal, disposal, or necessary shaping shall be as directed by the Engineer. All costs for removing accumulated sediment, disposal of sediment, and necessary shaping shall be incidental to the contract unit price per cubic yard for "Remove Sediment".

All costs for furnishing and installing the erosion control wattles including labor, equipment, and materials shall be incidental to the contract unit price per foot for the corresponding erosion control wattle bid item.

All costs for removing the erosion control wattle from the project including labor, equipment, and materials shall be incidental to the contract unit price per foot for "Remove Erosion Control Wattle".

December 23, 2004

<i>Published Date: 3rd Qtr. 2015</i>	<b>S D D O T</b>	<b>EROSION CONTROL WATTLE</b>	PLATE NUMBER 734.06
			Sheet 2 of 2



GENERAL NOTES:

Where practical, surface roughening shall be done on slopes 3:1 and steeper and on slopes deemed necessary by the Engineer.

The equipment used for surface roughening shall be equipped with tracks that are capable of creating ridges in the soil that are perpendicular to the slope. The final condition of the surface roughening shall be approved by the Engineer.

Measurement for surface roughening shall be to the nearest tenth of an acre.

All costs associated with surface roughening including labor, equipment, and materials shall be incidental to the contract unit price per acre for "Surface Roughening".

June 26, 2009

<i>Published Date: 3rd Qtr. 2015</i>	<b>S D D O T</b>	<b>SURFACE ROUGHENING</b>	PLATE NUMBER 734.25
			Sheet 1 of 1