

DESIGN DATA				
Traffic	Average Daily			Max.Hr.
Current 2011	Pass: 1410	Trucks: 150	Total: 1560	160
Forecast 2031	Pass: 1635	Trucks: 185	Total: 1820	205
Clear Zone Distance: 32 feet		Design Speed: 65 mph		
Minimum Sight Dist. for Stopping: 645 feet		Bridges: NA		
Minimum Sight Dist. for Safe Passing: 1865 feet				
Sight Dist. for No Passing Zone: 1100 feet				
Pavement Design Life: 20 years				

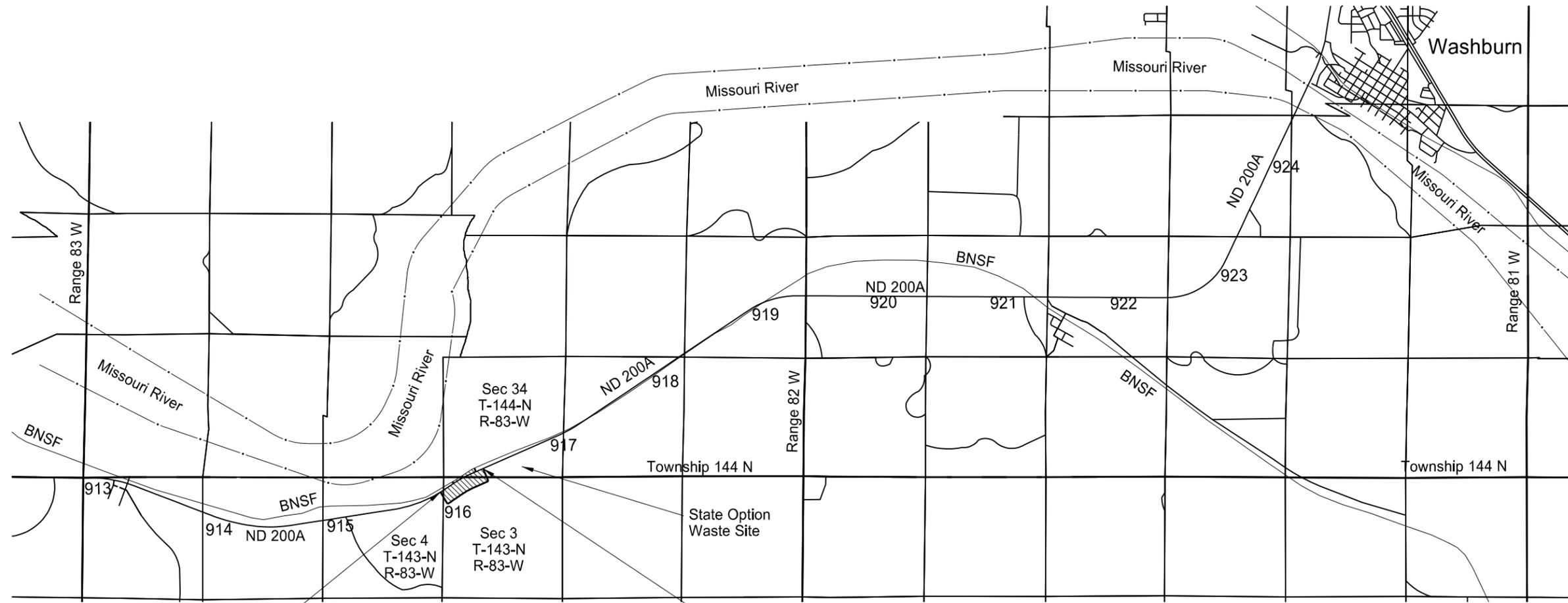
JOB # 4
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	19329	1	1

SNH-1-200(063)916
 FHWA Project of Division Interest (PODI)
 Oliver County
 ND 200A - RP 916
 Slope Stabilization, Roadway Realignment & HMA

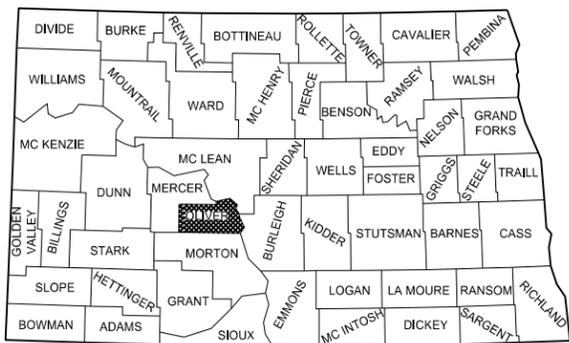
GOVERNING SPECIFICATIONS:
 2014 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SNH-1-200(063)916	0.445	0.445



Begin Project
 RP 915.943
 Station 201+50

End Project
 RP 916.388
 Station 225+00



STATE COUNTY MAP

DESIGNERS
 Jeffrey R. Rensch /s/

APPROVED DATE 7/29/2015
 Roger Weigel /s/
 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 7/29/2015
 James Douglas Rath /s/
 NDDOT DESIGN DIVISION

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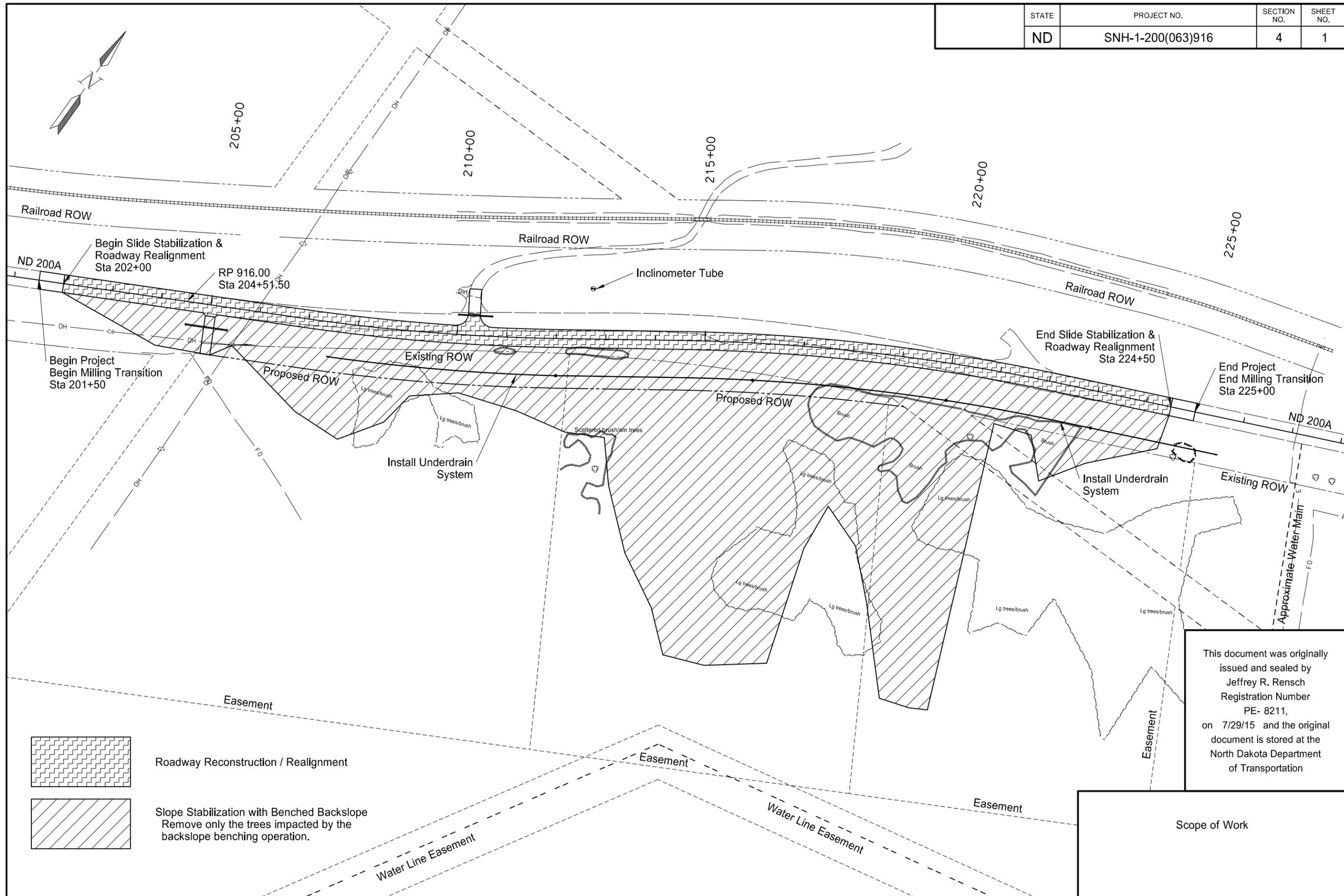
Special Provisions

03(14) Temporary Erosion and Sediment BMP

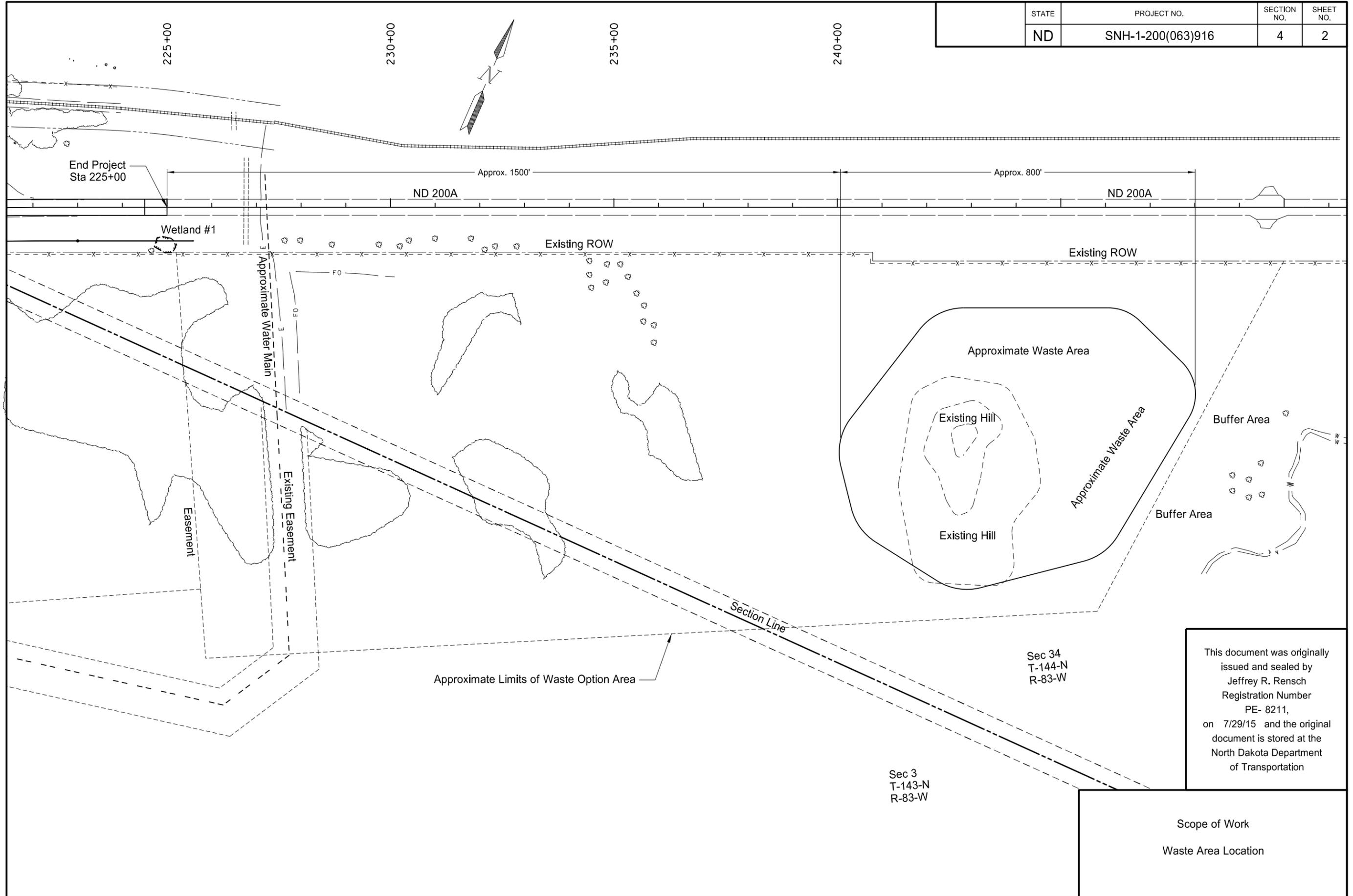
List of Standard Drawings

Standard No.	Description
D-101-1, 2, 3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31, 32	Symbols
D-203-8	Standard Rural Approaches
D-255-2	Erosion and Siltation Control – Erosion Control Blanket Installation
D-256-1	Erosion and Siltation Controls
D-260-1	Erosion and Siltation Controls – Silt Fence
D-261-1	Erosion and Siltation Controls – Fiber Roll Placement Detail
D-704-5	Contractor Sign Detail
D-704-7, 8	Breakaway Systems for Construction Zone Signs
D-704-9, 10, 11	Construction Sign Details
D-704-12,	Shoulder Closure Tapers
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-15	Road Closure Layouts
D-704-22	Construction Truck and Temporary Detour Layouts
D-704-24	Shoulder Closures and Bridge Painting Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-27	Traffic Control Plan for Moving Operations
D-704-50	Portable Sign Support Assembly
D-704-56	Mobile Operation - Grinding Shoulder Rumble Strips
D-708-6	Erosion Control Median or Ditch Inlet Protection
D-714-1	Reinforced Concrete Pipe Culverts and End Section (Round Pipe)
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D-714-11	Traversable End Sections for Corrugated Steel Pipe Culverts
D-714-22	Concrete Pipe or Precast Concrete Box Culverts Ties
D-720-1	Standard Monuments and Right of Way Markers
D-722-5	Manhole Details
D-754-83	Object Markers - Culverts
D-760-3	Rumble Strips Undivided Highways (Shoulders 4' or Greater)
D-762-4	Pavement Marking

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Scope of Work
Waste Area Location

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

- 100-P01 GENERAL: Traffic shall be maintained on ND 200A for the duration of the project. The existing bituminous surfacing on ND 200A shall remain in-place until the time that the proposed alignment's dirt grade is ready to receive the aggregate base.
- The earthwork contractor shall unload the slide area in a manner that does not create additional slides or embankment instability that may impact ND 200A or the clear zone of ND 200A. Additional slides may occur if the contractor unloads the area from the bottom first.
- Any cart way that is needed for the earthmoving operation shall be located in an area outside of the ND 200A clear zone.
- 100-P02 AREAS OF FREE WATER: If areas of free water are encountered during construction, drainage must be provided. Materials & Research shall be contacted for drainage design.
- 105-200 UTILITY COORDINATION: A utility coordination meeting is required.
- 107-710 HAUL ROADS: Before submitting a proposal, contact the appropriate State, County, Township or City officials to determine if there are any roadways that will be designated as "no haul routes".
- 200-010 SHRINKAGE: 25 percent additional volume is included for shrinkage in earth embankment.
- 200-P01 INCLINOMETER TUBE: There is an existing inclinometer tube located at station 212+73, 101 feet left. The inclinometer tube and the ground within a 5-foot radius of the inclinometer tube are not to be disturbed.
- 201-P01 CLEARING & GRUBBING: Clearing and grubbing includes the removal and disposal of trees (all sizes), shrubs, stumps, roots, brush, and other surface objects from the excavation areas along this project. Payment for "Clearing and Grubbing" will be lump sum.
- There are numerous clusters of trees located on the existing backslope. Many of the trees may have to be removed for the slide stabilization. The contractor shall minimize the impact of the trees located outside the slide stabilization area.
- 202-P01 REMOVAL OF BITUMINOUS SURFACING: Removal of bituminous surfacing consists of removing and salvaging the existing bituminous pavement and aggregate base. Include the cost of providing a full depth vertical saw cut in the contract unit price for "Removal of Bituminous Surfacing". If the pavement is removed with a milling machine a saw cut is not required. The bottom 2" of existing aggregate has been considered unsuitable and shall be included in the excavation quantities.
- 203-385 HAUL: No average haul has been computed for this project.
- 203-P01 TOPSOIL: The existing topsoil within the areas of roadway foreslopes and ditch bottoms shall be salvaged. It may be difficult to salvage the existing topsoil on the proposed backslope and benches. Salvageable topsoil located on the backslope and benching is required to be salvaged. The Contractor will be required to use imported topsoil where the topsoil was not salvaged. It will be the Contractor's responsibility to obtain and furnish imported topsoil where required. Quantities have been developed using imported topsoil for the backslope and benching areas.

- All work associated with obtaining, hauling and placing the imported topsoil shall be included in the price bid for "Topsoil – Imported". All other topsoil work shall be included in the price bid for "Topsoil".
- 203-P02 COMMON EXCAVATION - WASTE: Excavated material from the slide area may be disposed of at the state optioned waste site or a site selected by the contractor and accepted by the Engineer. The waste material removed from the slide location primarily consists of earthen embankment but also may include rocks, boulders, sandstone, coal, shale and other unsuitable materials. The contractor shall not stockpile any waste material within the highway right of way.
- The state optioned waste site will accept both suitable and unsuitable material removed from the slide area. All unsuitable material shall be buried under at least three feet of suitable earthen material. The state optioned waste site is located just east of a hill type terrain. The waste material shall be placed in a hill type fashion that will blend into the existing terrain.
- The area between the slide and the state option waste site has an existing utility easement that the contractor will have to cross. Minnkota Power has a water line and fiber optic line within this utility easement area. Minnkota Power has required that the contractor place a minimum of two feet of earthen material over this easement area to bridge the load over the existing utilities.
- All costs to complete the above-described work shall be included in the price bid for "Common Excavation – Waste".
- 203-P03 RESET SIGN PANEL: The stop sign at the driveway intersection shall be removed and reset at the proposed intersection location. Any damage to the sign and support caused by the contractor's operation shall be replaced at the contractor's expense. All labor and equipment necessary to remove and reset the sign and support shall be included in the price bid for "Common Excavation-Waste."
- 203-P04 RESET REFERENCE MARKER: The reference marker located at mile point 916 shall be removed and reset as directed by the Engineer. Any damage to the sign and support caused by the contractor's operation shall be replaced at the contractor's expense. All labor and equipment necessary to remove and reset the sign and support shall be included in the price bid for "Common Excavation-Waste."
- 203-P05 REMOVE SIGNS & SUPPORTS: There are 2 – "MATERIAL ON ROADWAY" signs and 6 – Object Markers Type III located within the project limits. These signs shall be removed by the Contractor and stockpiled in the highway right of way outside the roadway clear zone. Signs and supports will be picked up by maintenance staff from the NDDOT Center Section. The Engineer shall contact the maintenance staff at 701-794-3480 to pick up the signs and supports. All labor and equipment necessary to perform this work shall be included in the price bid for "Common Excavation-Waste."
- 230-P01 SUBGRADE PREPARATION-TYPE A: Subgrade Preparation-Type A shall be required in areas where the proposed roadway section differs from the existing roadway and where new embankment will be required. The depth shall be 12 inches.

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NOTES

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302-P01 TRAFFIC SERVICE AGGREGATE: 1,250 tons of Traffic Service Aggregate has been provided for maintaining traffic. This is sufficient quantity for a single lift, 24' wide and 4" deep for the entire length of the realignment.

Of the quantity stated above, the contractor shall provide a stockpile of Traffic Service Aggregate within the project limits or within a 15-minute distance from the project site. A quantity of 600 tons of Traffic Service Aggregate shall be available prior to removing the existing bituminous surfacing on ND 200A. This material will be used for repairs as requested by the Engineer. All costs to obtain this stockpile site will be the responsibility of the contractor. This site shall be cleared as described in Section 107.05 of the Standard Specifications.

The payment for material will cover all costs associated with the stockpiling of the material, and the delivery of the material to the repair site or graded roadbed as directed by the Engineer. All costs to perform this above described work shall be included in the price bid for "Traffic Service Aggregate".

411-P01 MILLING SECTIONS: At the beginning and end of milling sections, the existing bituminous material shall be removed to form a straight vertical edge to allow placement of the full depth of surfacing. All material removed in these operations shall become the property of the contractor and shall be disposed of off the right of way. All costs to perform the above described work shall be included in the price bid for "Milling Pavement Surface".

411-P02 TEMPORARY ASPHALT WEDGES: The Contractor shall place temporary asphalt wedges at the end of the project to allow smooth passage of vehicles at these milled locations. The temporary wedges shall be placed on these milled areas prior to the traffic being allowed back on the milled roadway section. Milled material shall not be used for wedges. All costs associated with labor, materials and equipment for the installation and removal of the asphalt wedges shall be included in the price bid for "Milling Pavement Surface".

430-P01 COMMERCIAL GRADE HOT MIX ASPHALT: The Hot Mix Asphalt shall be placed in accordance with Section 430.03F, with the following revisions:

- The Hot Mix Asphalt provided by the Contractor shall meet the requirements of Superpave FAA 43 shown in Section 430.03 C of the Standard Specifications
- Compaction shall meet the requirements of Section 430.04 I.3 "Ordinary Compaction".
- Acceptance of material shall be in accordance with Section 105.07 of the Standard Specifications.

704-P01 TRAFFIC CONTROL: The traffic control for the construction of the project shall consist of one-lane road closures, shoulder closures, flagging, and pilot car operations. Pilot car is only required for grading and paving operations and transition from the existing roadway to the proposed roadway. The traffic control devices shall comply with the following Standard Drawings:

- D-704-5, Contractor sign is applicable
- D-704-7, 8, 9, 10, 11, 12, 13, 14 and 50 are applicable
- D-704-15, Layout Type A used to develop the traffic control layout plan sheet as shown in Section 100.
- D-704-22, Layout Type K for construction trucks hauling material.
- D-704-24, Layout Type U used to develop the traffic control layout plan sheet as shown in Section 100.

D-704-26, Layout Type CC and FF used to develop the traffic control layout plan sheet as shown in Section 100.

D-704-27, for pavement marking
D-704-56, for grinding shoulder rumble strips

The contractor will be required to provide a traversable shoulder and/or foreslope after working hours throughout the project. A traversable slope is defined as having a cross-slope of 4:1 or flatter and drop-offs 2" or less. If a traversable slope cannot be provided, the Contractor shall provide 24 hour flagging and traffic control at their expense until a traversable slope can be constructed.

The required traffic control signs and devices are included in the "Traffic Control Devices List" and will be measured and paid at the Contract Unit Price for each device. Additional devices required to accommodate the Contractor's operation shall be the Contractor's responsibility.

714-P01 UNDERDRAIN SYSTEM: The underdrain system shall consist of a fabric wrapped 6" drainage pipe placed in a trench and backfilled with class 43 drainage aggregate and earth fill. All work and materials required to install the underdrain system shall be included in the unit price bid for "Pipe Polyethylene Corr Perf 6in Drain".

The NDDOT Materials and Research Geotechnical Section shall be contacted a minimum of one week prior to the installation of the underdrain system.

714-P02 HEADWALL PRECAST CONCRETE 6IN: Each headwall shall be provided with a rodent screen that fits snugly into the headwall so mice and other rodents are unable to enter the drain. The rodent screens must be removable. The Contractor will not be permitted to grout the screens into place. All costs associated with the rodent screens and installation will be included in the unit price bid for "Headwall Precast Concrete 6in".

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ENVIRONMENTAL COMMITMENTS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	6	3

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

EC-1: Unavoidable impacts to wetlands will be mitigated onsite, adjacent to the project, or at a NDDOT approved mitigation site or bank.

ACTION REQUIRED /TAKEN: All artificial/non-jurisdictional wetlands do not require mitigation.

Wetland Impact Table															
Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size Ac.	Wetland Feature	USACE Jurisdictional Wetlands*	Wetland Impacts (acres)		USFWS Easement Impacts		Wetland Mitigation				
							Temp. Ac.	Perm. Ac.	Temp.	Perm.	Mitigation Required			Location; Acreage; Wetland#; Ratio	Onsite Mitigation Acres
											EO 11990	USACE	USFWS		
1	Sec.34, T144N, R83W	PEMCx	Ditch	0.03	Artificial	No	0	0.03	0	0	N	N	N	None	0
Totals				0.03			0.00	0.03	0.00	0.00					0.00

* A wetland Jurisdictional Determination was issued by the USACE on 4/9/2012; NWO-2011-02548-BIS.

**All impacts to natural wetlands (natural/jurisdictional and natural/non-jurisdictional), regardless of size, as well as impacts greater than 0.10 acre to artificial/jurisdictional wetlands require mitigation.

***All artificial/non-jurisdictional, deep water (impacts greater than 6.6 feet), Other Waters less than 300 linear feet (determined by the USACE on a case by case), and temporary impacts do not require mitigation.

Summary Impact Table			
Total Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD	0.0	Temporary JD	0
Natural/Non-JD	0.0	Non-JD Temporary	0
Artificial/JD	0.0	Permanent JD > 0.10	0
Artificial/Non-JD	0.03	Permanent OW	0
Total	0.03	Temporary OW	0

EC-2: ND 200A through the project limits is designated as part of the Sakakawea Scenic Byway. Any proposed slope work would blend into the surrounding existing contours and be reseeded with native grasses.

ACTION TAKEN/REQUIRED: The design of the slope stabilization is proposed to blend into the surrounding area. All disturbed areas shall be seeded after the earth moving operation.

EC-3: The Project area occurs within a portion of the migration corridor for the Aransas Wood Buffalo Population (AWBP) of whooping cranes where historically 75% of the whooping crane observations have occurred during the annual spring and autumn migration. The proposed timing for the Project construction activities could occur when whooping cranes are expected to be in ND during the autumn migration. Surveillance monitoring for whooping cranes will be conducted daily during the construction activities with the objective to suspend construction activities if/when roosting, foraging or in-flight whooping cranes are observed within one mile of the Project site.

ACTION TAKEN/REQUIRED: The contractor will notify the Project engineer immediately in the event a whooping crane is identified within one mile of the Project Area. The Project engineer will cease all construction activities, establish an avoidance area, and immediately notify and coordinate with the USFWS, FHWA, and NDDOT. The contractor will not resume work within the avoidance area until the Project engineer has confirmed that the bird has left the area. In addition, if above ground utility lines are adjusted/relocated or newly installed as a result of this project, line markers (bird diverters) will be added at a ratio of 1:1 (per linear foot) to the adjusted/relocated lines, and a 2:1 ratio to the newly installed lines. Refer to the Utility Conflict Plans regarding bird diverter information, and Relocation Utility Agreement.

EC-4: Suitable Northern Long-Eared Bat habitat is located within the Action Area.

ACTION TAKEN/REQUIRED: No trees shall be removed from the work area between the dates of April 1st and September 30th.

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	8	1

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	1	1
201	0330 CLEARING & GRUBBING	L SUM	1	1
202	0135 REMOVAL OF BITUMINOUS SURFACING	TON	8,982	8,982
202	0174 REMOVAL OF PIPE ALL TYPES AND SIZES	LF	124	124
203	0101 COMMON EXCAVATION-TYPE A	CY	2,888	2,888
203	0109 TOPSOIL	CY	8,189	8,189
203	0113 COMMON EXCAVATION-WASTE	CY	362,497	362,497
203	0119 TOPSOIL-IMPORTED	CY	5,745	5,745
216	0100 WATER	M GAL	272	272
230	0300 SUBGRADE PREPARATION-TYPE A	STA	13	13
251	0200 SEEDING CLASS II	ACRE	25.909	25.909
251	2000 TEMPORARY COVER CROP	ACRE	25.909	25.909
253	0101 STRAW MULCH	ACRE	15.227	15.227
255	0102 ECB TYPE 2	SY	51,794	51,794
260	0200 SILT FENCE SUPPORTED	LF	900	900
260	0201 REMOVE SILT FENCE SUPPORTED	LF	900	900
261	0112 FIBER ROLLS 12IN	LF	25,401	25,401
261	0113 REMOVE FIBER ROLLS 12IN	LF	6,420	6,420
265	0100 STABILIZED CONSTRUCTION ACCESS	EA	1	1
265	0101 REMOVE STABILIZED CONSTRUCTION ACCESS	EA	1	1
302	0050 TRAFFIC SERVICE AGGREGATE	TON	1,250	1,250
302	0100 SALVAGED BASE COURSE	TON	9,827	9,827
401	0050 TACK COAT	GAL	456	456
401	0060 PRIME COAT	GAL	2,569	2,569
401	0160 BLOTTER MATERIAL CL 44	TON	77	77
411	0105 MILLING PAVEMENT SURFACE	SY	400	400
430	0500 COMMERCIAL GRADE HOT MIX ASPHALT	TON	2,489	2,489
430	5828 PG 58-28 ASPHALT CEMENT	TON	146.8	146.8
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	1,500	1,500
704	1000 TRAFFIC CONTROL SIGNS	UNIT	1,087	1,087
704	1060 DELINEATOR DRUMS	EA	102	102
704	1067 TUBULAR MARKERS	EA	92	92

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	8	2

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
704	1081 VERTICAL PANELS-BACK TO BACK	EA	90	90
704	1185 PILOT CAR	HR	250	250
706	0500 AGGREGATE LABORATORY	EA	1	1
714	3151 HEADWALL-PRECAST CONCRETE 6IN	EA	2	2
714	3159 HEADWALL VEGETATION BARRIER	EA	2	2
714	4099 PIPE CONDUIT 18IN-APPROACH	LF	62	62
714	4106 PIPE CONDUIT 24IN-APPROACH	LF	72	72
714	6581 PIPE POLYETHYLENE CORR PERF 6IN DRAIN	LF	1,796	1,796
720	0110 RIGHT OF WAY MARKERS	EA	7	7
720	0125 ALIGNMENT MONUMENTS	EA	8	8
720	0130 IRON PIN R/W MONUMENTS	EA	6	6
720	0135 IRON PIN REFERENCE MONUMENTS	EA	1	1
722	0100 MANHOLE 48IN	EA	4	4
722	1100 MANHOLE RISER 48IN	LF	23.4	23.4
754	0805 OBJECT MARKERS - CULVERTS	EA	4	4
760	0005 RUMBLE STRIPS - ASPHALT SHOULDER	MILE	0.89	0.89
762	0430 SHORT TERM 4IN LINE-TYPE NR	LF	4,830	4,830
762	1104 PVMT MK PAINTED 4IN LINE	LF	6,410	6,410

Reconstruction ND 200A
202+00 to 224+50
Total Stations = 22.5

Material	Unit	Width (ft)	Depth (in)	Quantity per Station	Total
Salvaged Base Course @ 1.875 Ton/CY	Ton	41.4	15	432	9719
Prime Coat @ 0.25 Gal/SY (one application on base course)	Gal	41.1		114	2569
Blotter Material CI 44 @ 15 lbs/SY	Ton	41.1		3.4	77
Tack Coat @ 0.05 Gal/SY (2 nd Lift)	Gal	36		20	450
Commercial Grade HMA @ 2 Ton/CY	Ton	36	4.5	107	2417
PG 58-28 Asphalt Cement @ 5.9%	Ton	36		6.3	142.6

SPEC CODE	BID ITEM	UNIT	QUANTITY
754 805	OBJECT MARKERS - CULVERTS		
	Station 204+65 Rt	EA	1
	Station 205+40 Rt	EA	1
	Station 210+00 Lt	EA	1
	Station 210+70 Rt	EA	1

SPEC CODE	BID ITEM	UNIT	QUANTITY
760 5	RUMBLE STRIPS - ASPHALT SHOULDER		
	RP 915.943 to RP 916.388	MILE	0.890

White Edge Lines - Pvmt Mk Painted 4In Line			
Location	Basis	Quantity	Unit
201+50 to 225+00	10,560 LF/mile	4,800	LF

Yellow Centerline Skips - Pvmt Mk Painted 4In Line			
Location	Basis	Quantity	Unit
201+50 to 225+00	1,320 LF/mile	600	LF

Yellow Eastbound Centerline Barrier - Pvmt Mk Painted 4In Line			
Location	Basis	Quantity	Unit
211+00 to 218+00	5,280 LF/mile	700	LF

Yellow Westbound Centerline Barrier - Pvmt Mk Painted 4In Line			
Location	Basis	Quantity	Unit
221+90 to 225+00	5,280 LF/mile	310	LF

Short Term 4In Line-Type NR			
Location	Basis	Quantity	
Yellow Centerline	Center Skips	1,320 LF / Mile	600 LF
Top of Primed Surface	Barrier Stripe	1,010 LF	1,010 LF
Yellow Centerline	Center Skips	1,320 LF / Mile	600 LF
Top of 1st Lift	Barrier Stripe	1,010 LF	1,010 LF
Yellow Centerline	Center Skips	1,320 LF / Mile	600 LF
Top of 2nd Lift	Barrier Stripe	1,010 LF	1,010 LF

Water

50 MGal for dust palliative
20 Gal/Ton for Aggregates

Topsoil

4" removal and replacement depth along ND 200A foreslopes and ditch bottoms

Topsoil - Imported

4" replacement depth along ND 200A backslopes and benches

WASTE AREA				
SPEC CODE	BID ITEM	UNIT	QUANTITY	
203 109	TOPSOIL			
	Waste Area	CY	4633	
251 200	SEEDING CLASS II			
	Waste Area	ACRE	8.615	
251 2000	TEMPORARY COVER CROP			
	Waste Area	ACRE	8.615	
253 101	STRAW MULCH			
	Waste Area	ACRE	8.615	
260 200	SILT FENCE SUPPORTED			
	Waste Area	LF	600	
260 201	REMOVE SILT FENCE SUPPORTED			
	Waste Area	LF	600	
261 112	FIBER ROLLS 12IN			
	Waste Area	LF	2250	

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Basis of Estimate
ND 200A

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-200(063)916	11	1

Earth Summary

Location	Excavation (CY)	Pvmt & Aggr Removal from Excavation Areas (CY)	Embankment (CY)	Common Excavation - Type A (CY)	Common Excavation - Waste (CY)
	A	B	C	Pay Item D	Pay Item E = A - B - D
ND 200A (202+00 to 224+50)	370,092	4,707	2,888	2,888	362,497
TOTALS =	370,092	4,707	2,888	2,888	362,497

Note: Quantity shown for ND 200A embankment has been increased by 25% to account for shrinkage.

Granular Base Summary

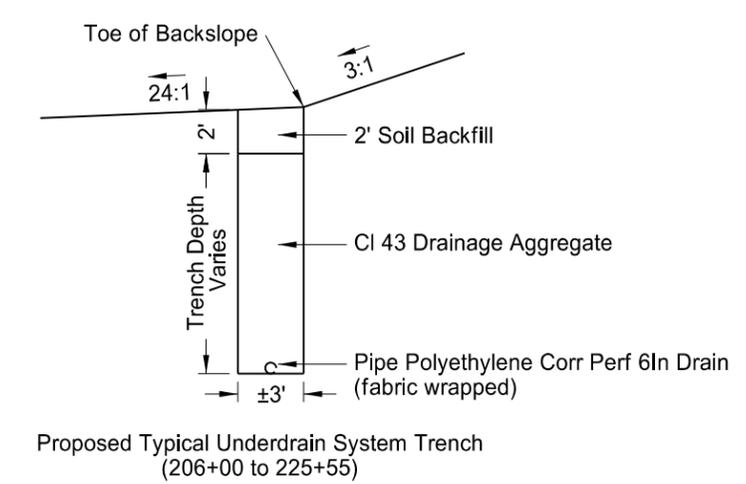
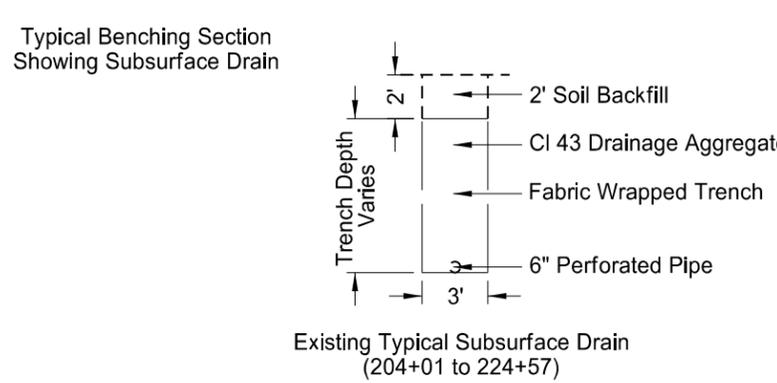
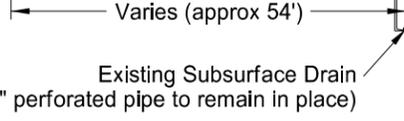
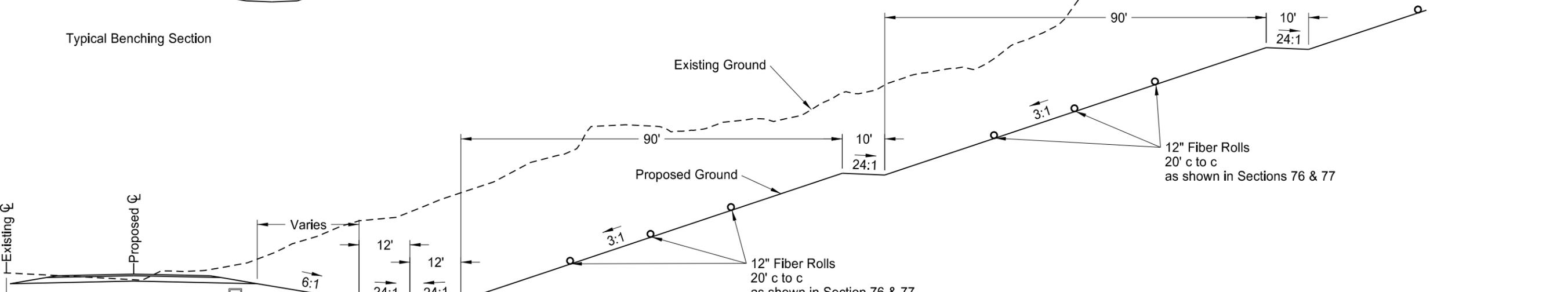
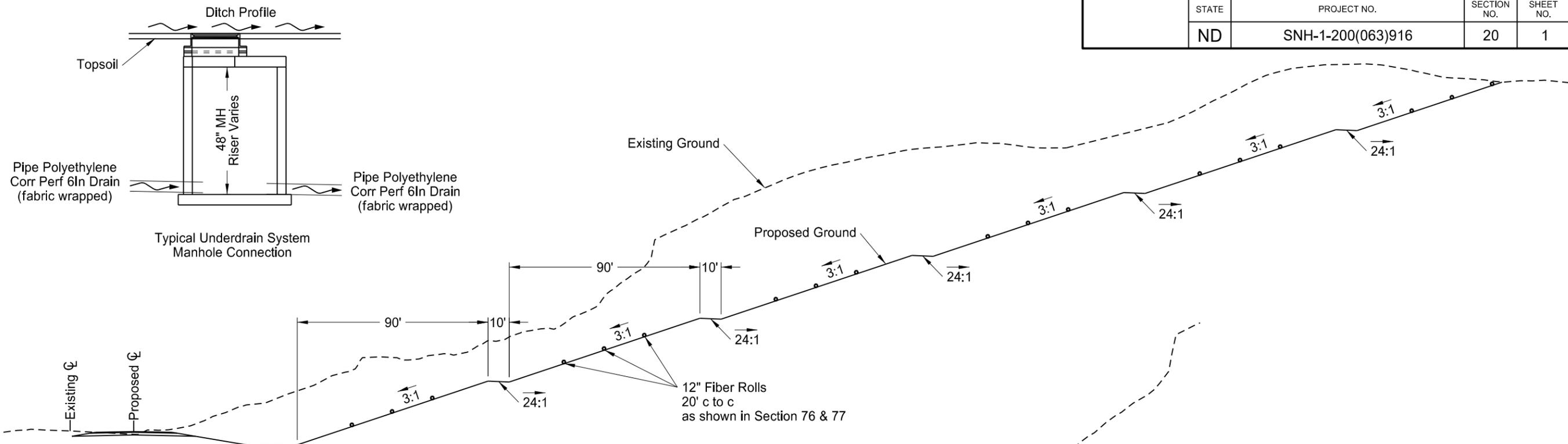
Location	Removal of Aggregate (TON)	Removal of HBP (TON)	Material (Aggr. & Bit.) to be removed (TON)	Salvageable Material (Aggr. & Bit.) After Loss (TON)	Salvaged Base Course Required (TON)	Additional Material for Salvaged Base Course (TON)
	A	B	C = A + B	D = 0.90 x C	Pay Item E	F = E - D
ND 200A (202+00 to 224+50)	6,538	2,444	8,982	8,084	9,827	1,743
TOTAL	6,538	2,444	8,982	8,084	9,827	1,743

Note: Quantity shown for Salvageable Material assumes 10% loss.

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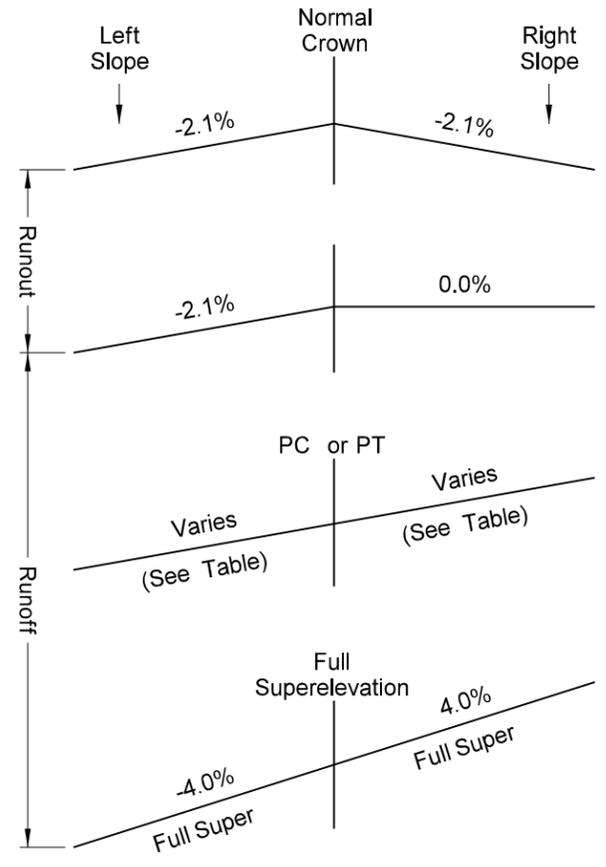
Earth & Granular Base Summaries
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	20	1

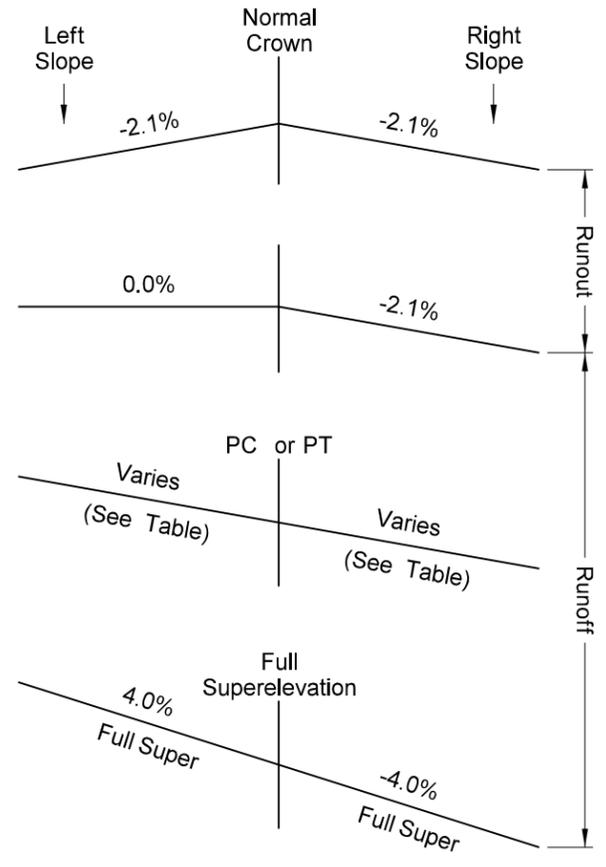


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Slide Stabilization Details



Curve PRO200A-1



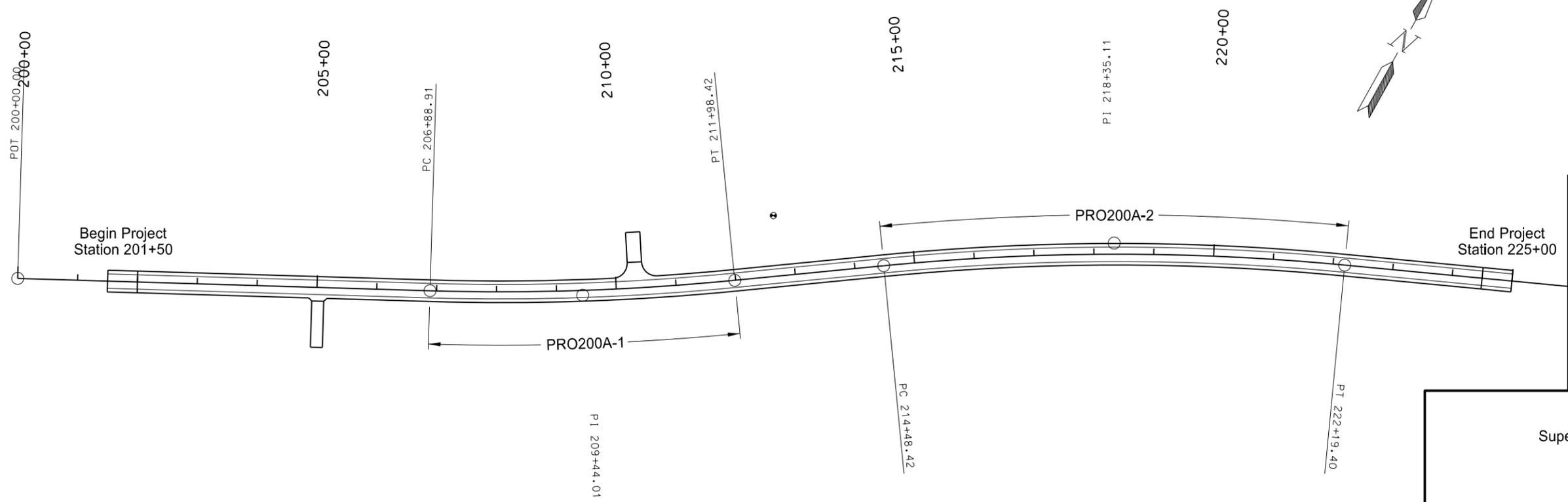
Curve PRO200A-2

Curve PRO200A-1

PI Station	209+44.01	
Delta	7° 17' 53.61" (LT)	
Degree	1° 25' 56.62"	
Radius	4,000.00'	
Length	509.51'	
Station	LT Slope	RT Slope
205+29.1	-2.10	-2.10
206+69.9	-2.10	2.10
PC 206+88.9	-2.67	2.67
207+33.6	-4.00	4.00
211+89.3	-4.00	4.00
PT 211+98.4	-3.73	3.73

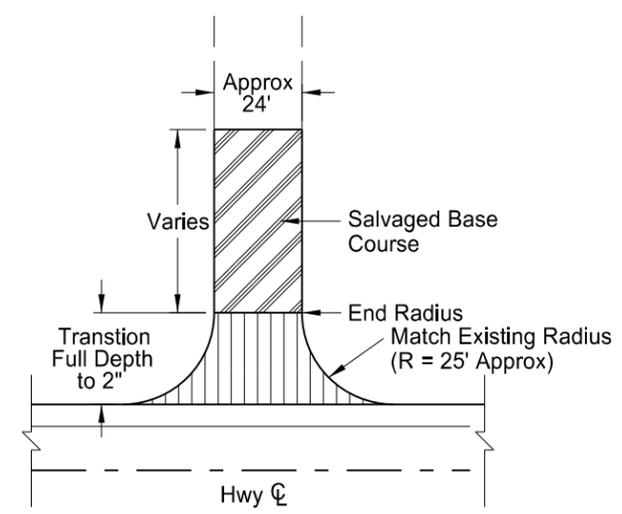
Curve PRO200A-2

PI Station	218+35.11	
Delta	11° 02' 36.90" (RT)	
Degree	1° 25' 56.62"	
Radius	4,000.00'	
Length	770.99'	
Station	LT Slope	RT Slope
PC 214+48.4	3.73	-3.73
214+57.5	4.00	-4.00
221+74.7	4.00	-4.00
PT 222+19.4	2.67	-2.67
222+38.4	2.10	-2.10
223+79.2	-2.10	-2.10

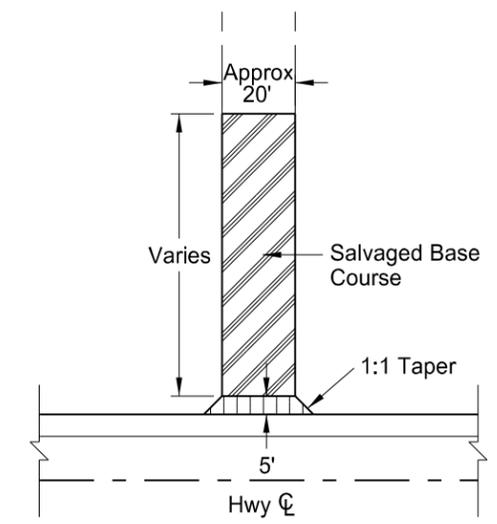


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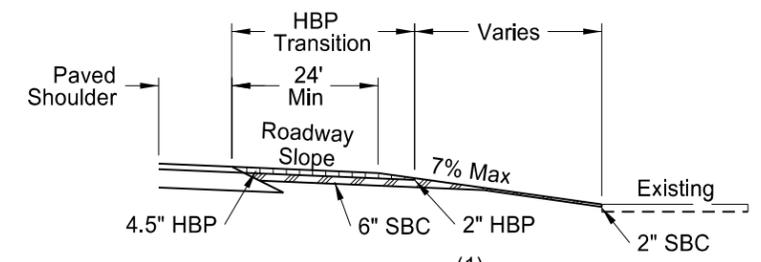
Superelevation Data
ND 200A



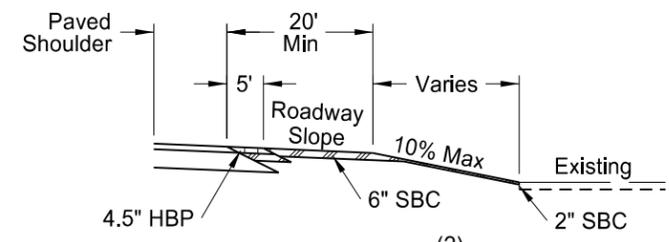
(1)
Gravel Private Drive Approach
Plan View



(2)
Field Drive Approach
Plan View



(1)
Gravel Private Drive Approach
Profile View



(2)
Field Drive Approach
Profile View

BASIS OF ESTIMATE				(1)	(2)	TOTAL
				Gravel Private Drive	Field Drive	
Number of Locations				210+33 Lt	205+02 Rt	
SPEC	CODE	DESCRIPTION	UNIT	Total	Total	
302	100	SALVAGED BASE COURSE (SBC) @ 1.875 ton/cy	TON	60	48	108
401	50	TACK COAT @ 0.05 gal/sy	GAL	5	1	6
430	500	COMMERCIAL GRADE HMA @ 2 ton/cy	TON	24	4	28
430	5828	PG 58-28 ASPHALT CEMENT @ 5.9%	TON	1.4	0.2	1.6

Notes:

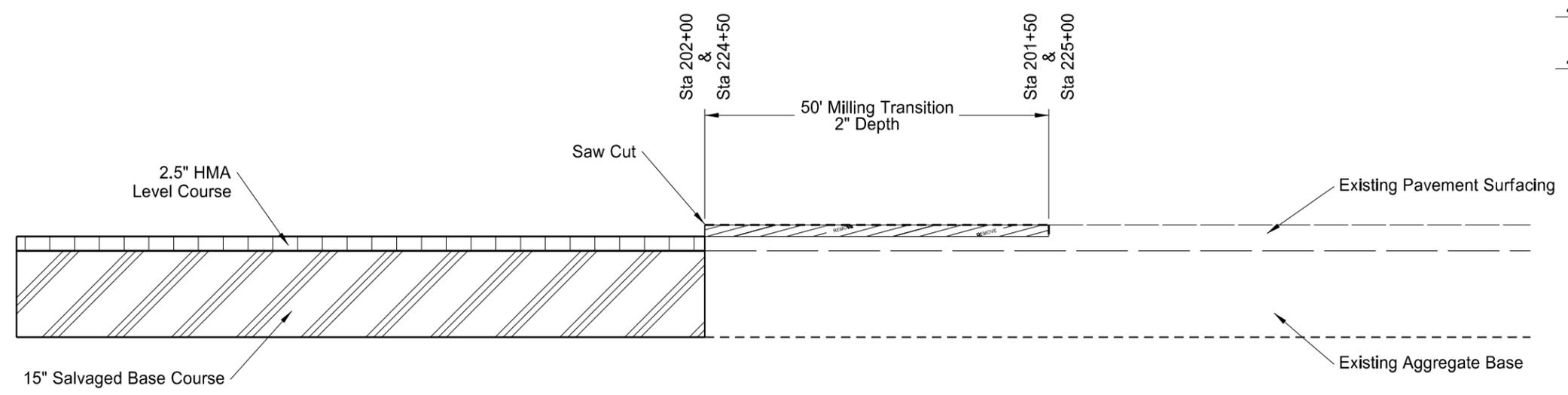
- Actual quantities and locations may vary in the field, as approved by the Engineer.
- This detail sheet is to be used with Standard Drawing D-203-8.

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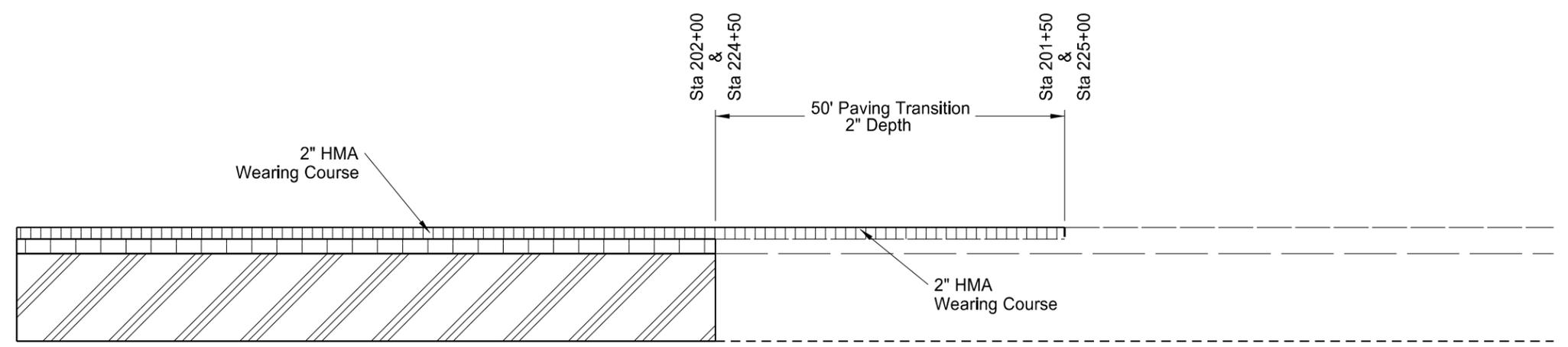
Approach Paving Details

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	20	4

SPEC	CODE	BID ITEM	UNIT	QUANTITY
411	105	MILLING PAVEMENT SURFACE		
		201+50 to 202+00	SY	200
		224+50 to 225+00	SY	200
430	500	COMMERCIAL GRADE HOT MIX ASPHALT		
		201+50 to 202+00	TON	22
		224+50 to 225+00	TON	22
430	5828	PG 58-28 ASPHALT CEMENT		
		201+50 to 202+00	TON	1.3
		224+50 to 225+00	TON	1.3



Milling Transition



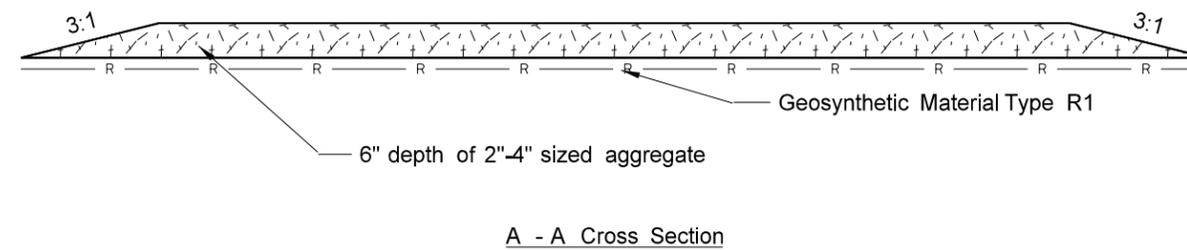
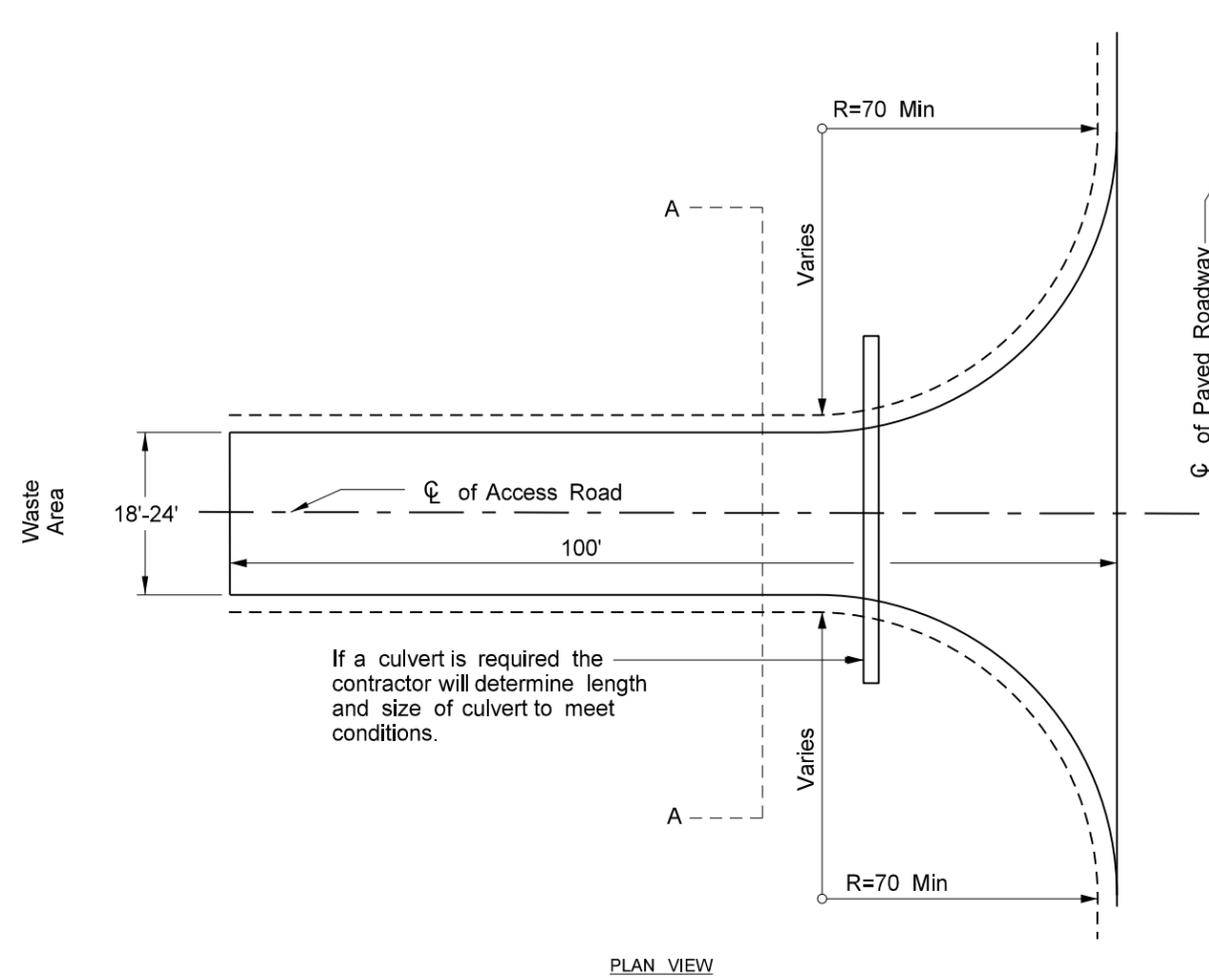
Paving Transition

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Milling & Paving Transition Details

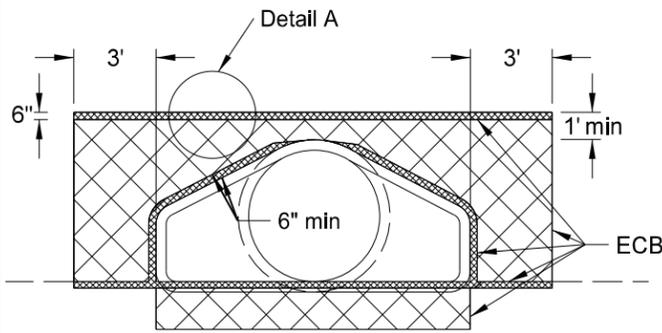
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	20	5

SPEC CODE	BID ITEM	UNIT	QUANTITY
265 100	STABILIZED CONSTRUCTION ACCESS		
	Waste Area (if needed)	EA	1
265 101	REMOVE STABILIZED CONSTRUCTION ACCESS		
	Waste Area (if needed)	EA	1

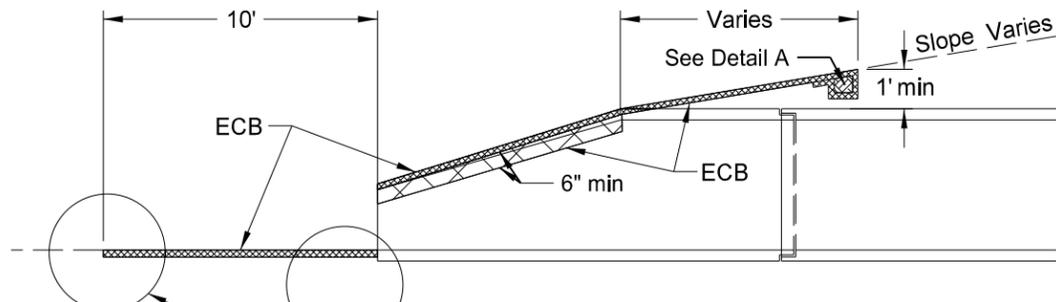


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Stabilized Construction Access

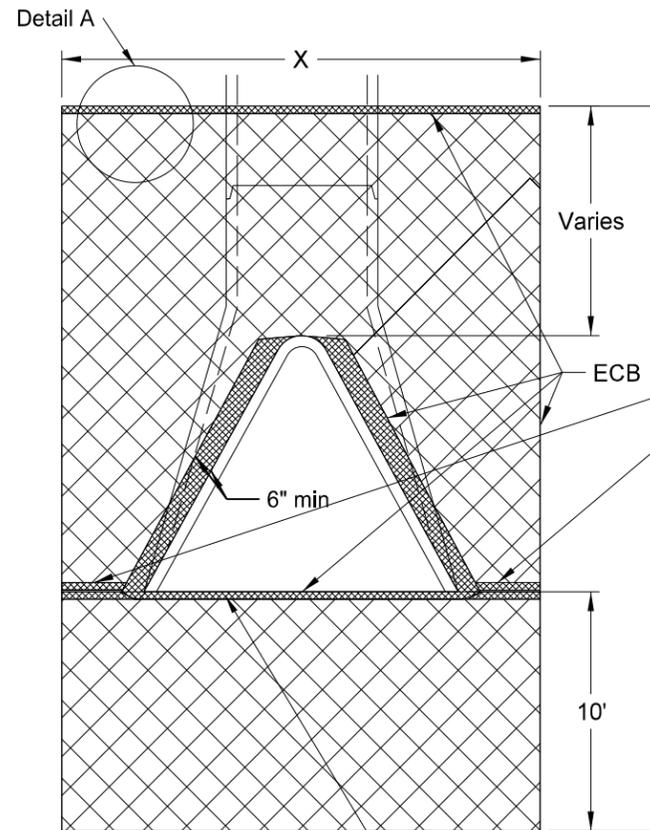


FRONT VIEW



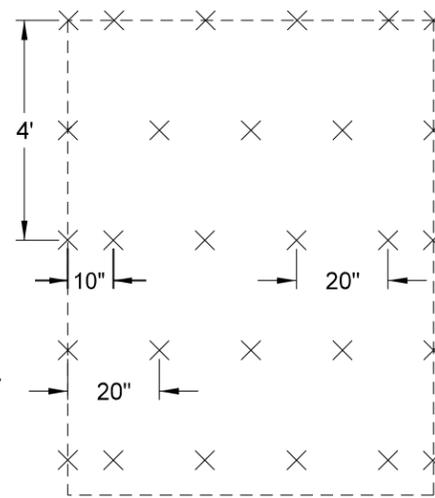
SIDE VIEW

Erosion Control Blanket (ECB)								
Location to be Protected	Culvert Type	Pipe Diam (Inch)	No	Unit Quantity (SY)	Total Quantity			
					Type 1 (SY)	Type 2 (SY)	Type 3 (SY)	Type 4 (SY)
204+54 Rt	Appr	24	1	24		24		
205+40 Rt	Appr	24	1	24		24		
210+00 Lt	Appr	18	1	22		22		
210+70 Lt	Appr	18	1	22		22		
Total (SYs)						92		



TOP VIEW

Tuck this end a minimum of 6" into the embankment.



STAPLE PATTERN

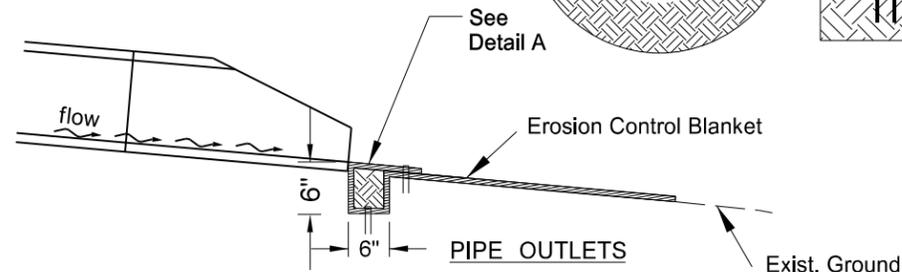
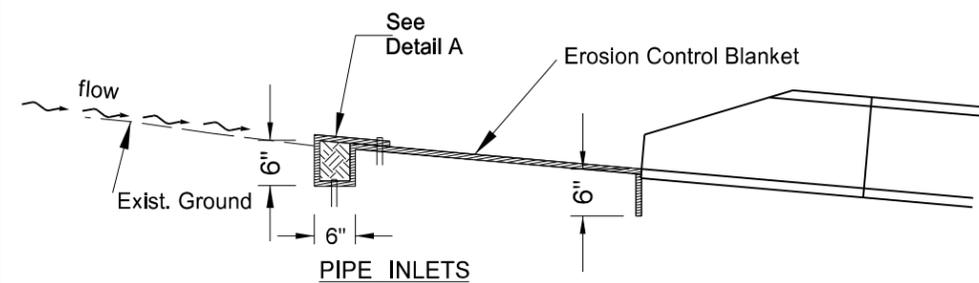
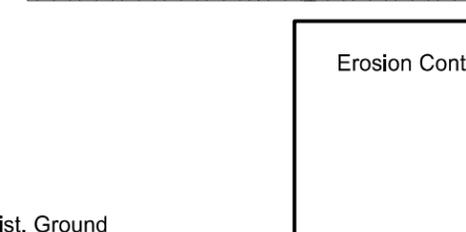
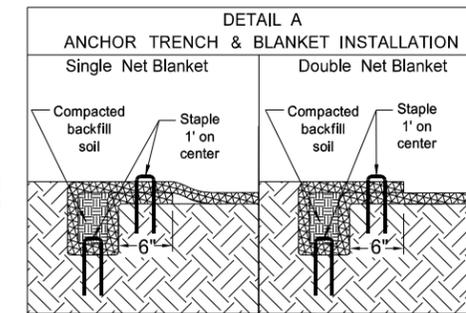
APPROACH CULVERTS				
DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY
15	9.0	20.0	176.0	20
18	9.5	20.7	190.7	22
21	9.5	21.0	190.9	22
24	10.5	21.6	214.1	24
27	11.0	22.0	226.3	25
30	11.6	22.5	241.5	27
36	12.7	23.3	268.8	30
42	13.3	23.3	279.7	31
48	13.8	24.0	293.2	33
54	14.5	23.4	300.6	34
60	15.0	23.0	307.5	35
66	15.6	24.0	325.6	37
72	16.2	24.5	340.6	38

Note: Quantities based on 8:1 slope.

CENTERLINE CULVERTS									
DIA	X	Y	Surface area to be protected	ECB	DIA	X	Y	Surface area to be protected	ECB
24	10.5	19.6	193.1	22	24	10.5	27.6	172.1	20
27	11.0	20.0	204.3	23	27	11.0	18.0	182.3	21
30	11.6	20.5	218.3	25	30	11.6	18.5	195.1	22
36	12.7	21.2	242.1	27	36	12.7	19.2	216.7	24
42	13.3	21.2	251.8	28	42	13.3	19.2	225.2	25
48	13.8	22.0	265.6	30	48	13.8	20.0	238.0	27
54	14.5	21.5	273.7	31	54	14.5	19.5	244.7	28
60	15.0	21.0	278.3	31	60	15.0	19.0	248.3	28
66	15.6	22.0	295.7	33	66	15.6	20.0	264.5	30
72	16.2	22.5	309.2	35	72	16.2	20.5	276.8	31

Note: Quantities based on 6:1 slope.

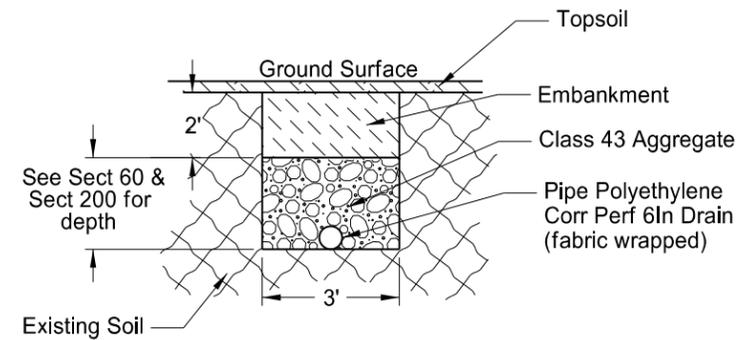
NOTE: Tuck the ECB a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section.



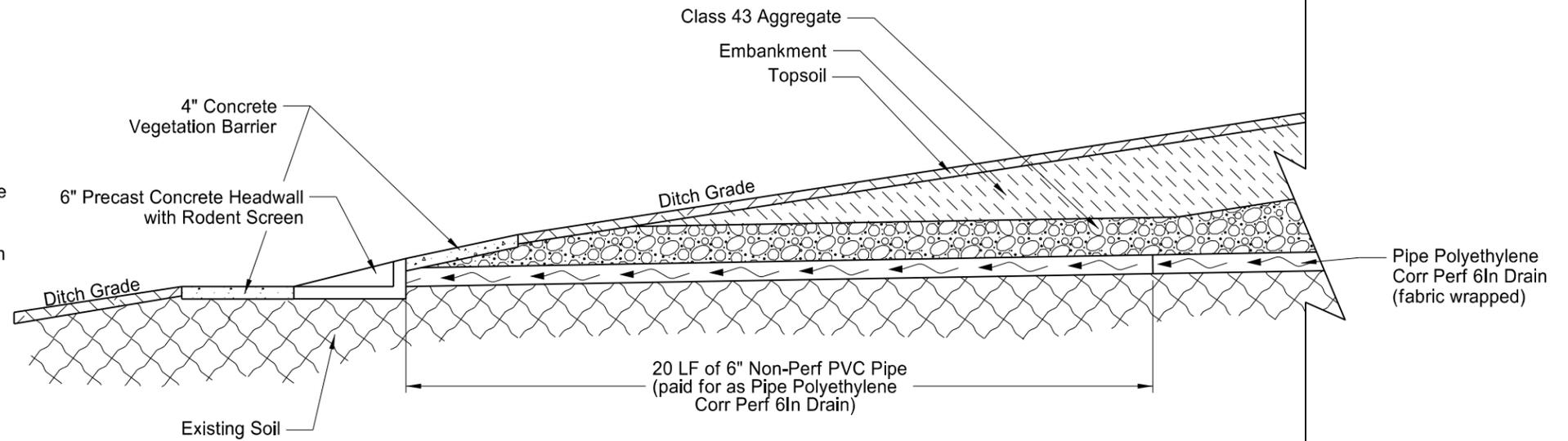
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Erosion Control at Culvert Flared End Sections
ND 200A

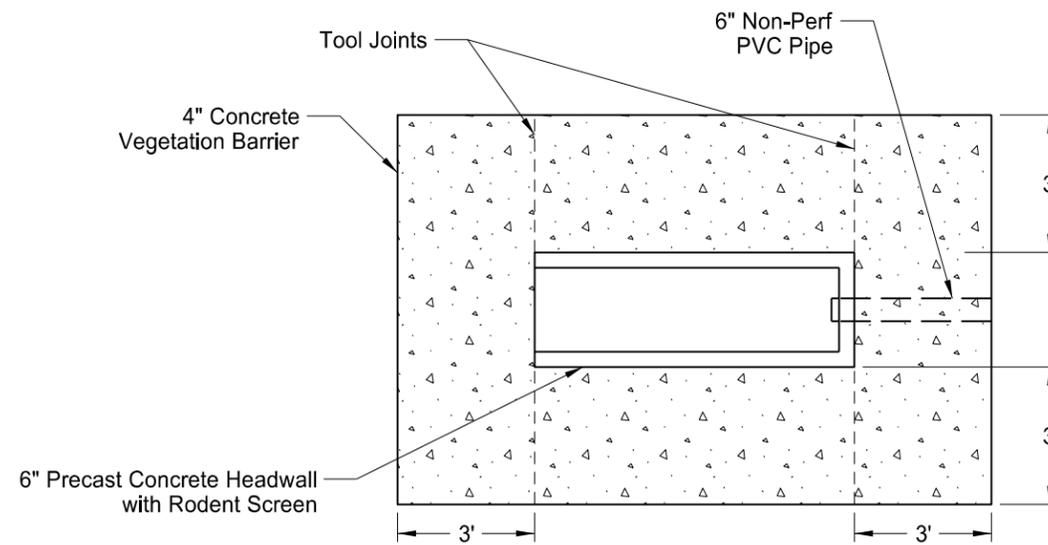
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-200(063)916	20	7



Cross Section of Trench Drain



Profile View of Trench Drain

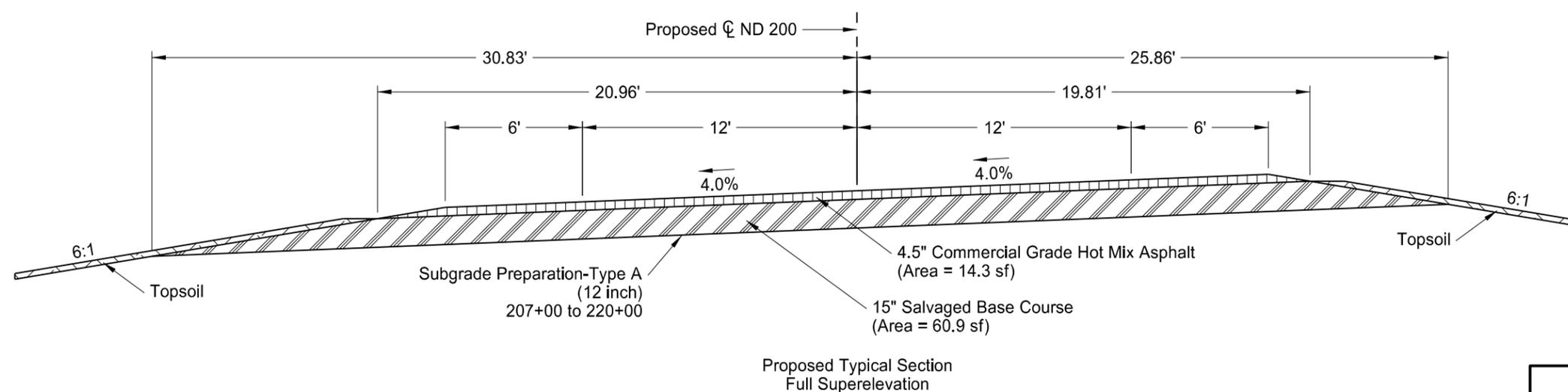
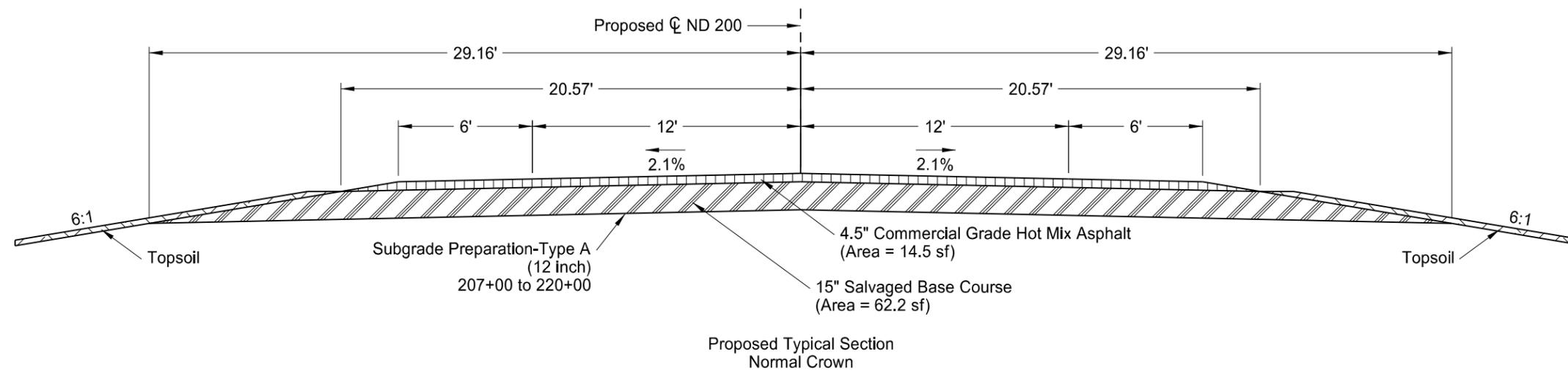
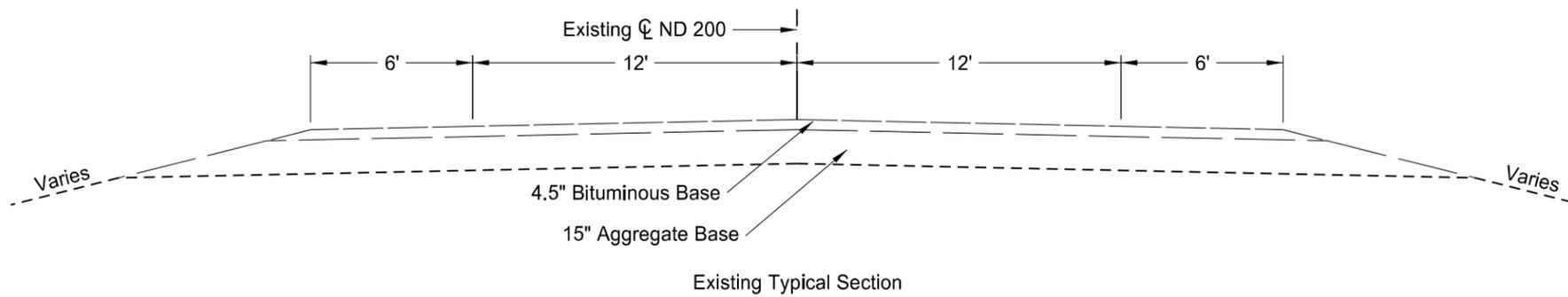


Top View of Headwall and Concrete Vegetation Barrier

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Trench Drain Details

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	30	1

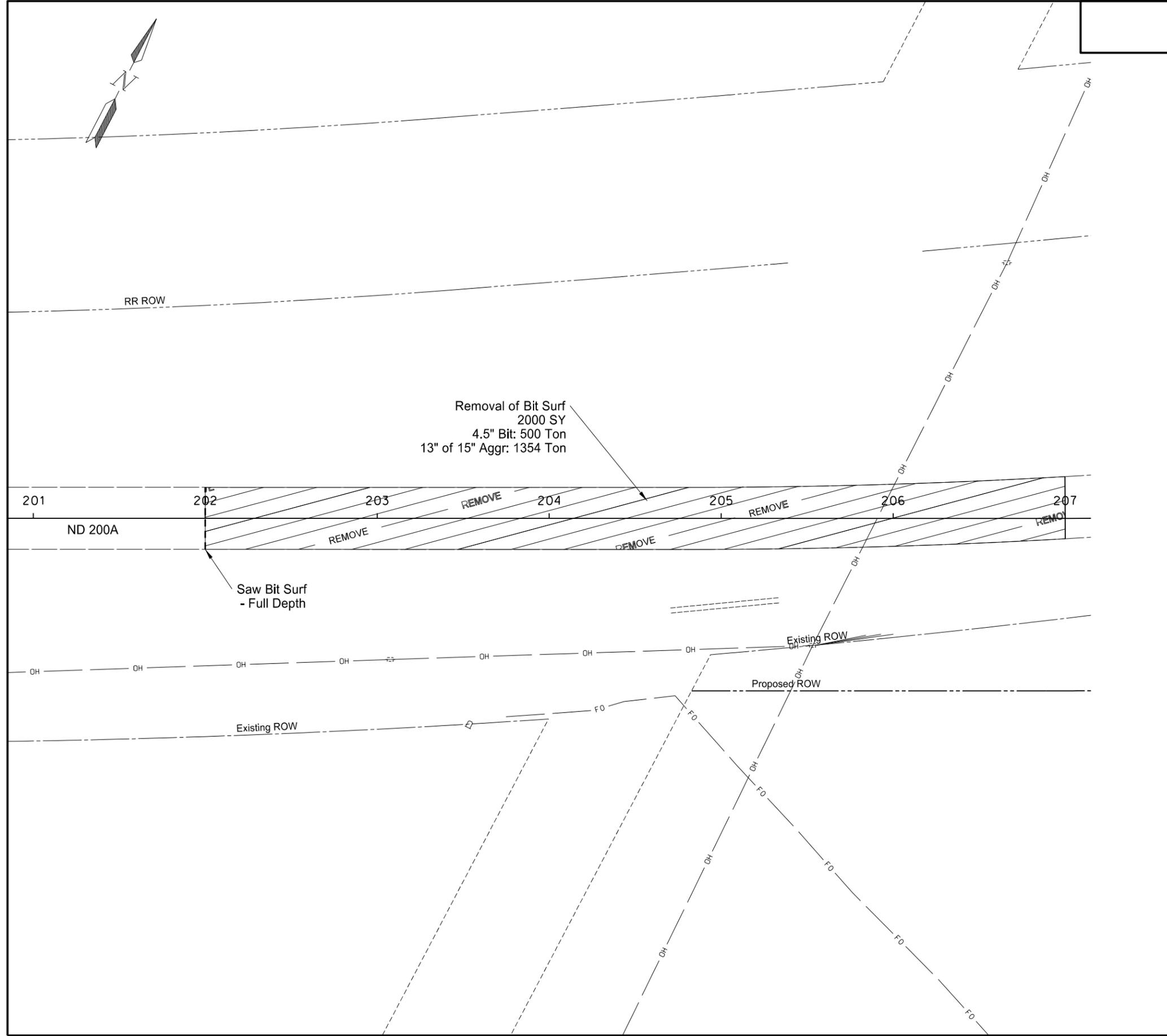


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ND 200A
Typical Sections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	40	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	135	REMOVAL OF BITUMINOUS SURFACING	TON	1,855
202+00 to 207+00				

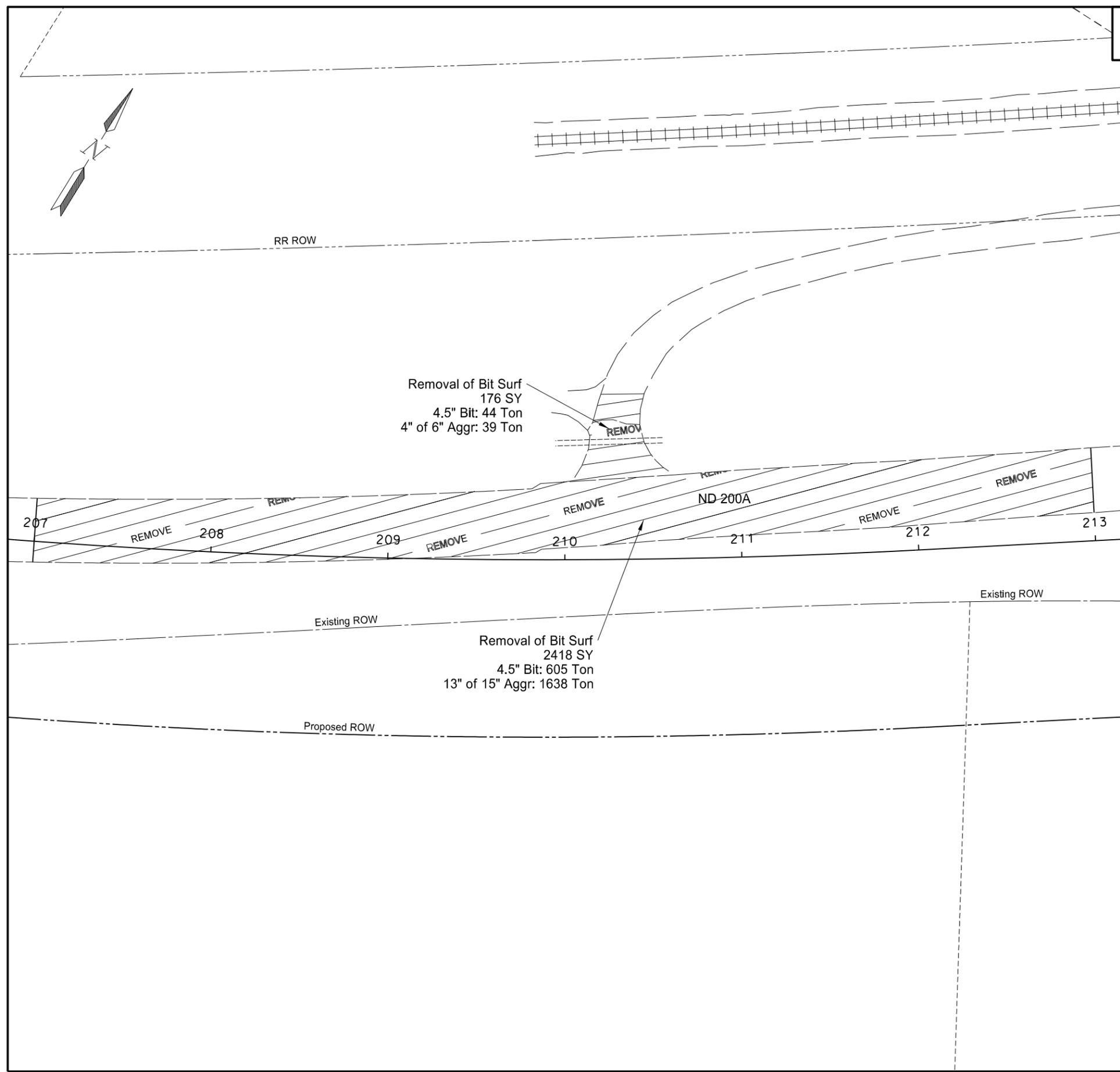


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ND 200A Removals
Sta 202+00 to 207+00

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	40	2

SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	135	REMOVAL OF BITUMINOUS SURFACING		
		207+00 to 213+00	TON	2,242
		210+04 to 210+63 (approach)	TON	83

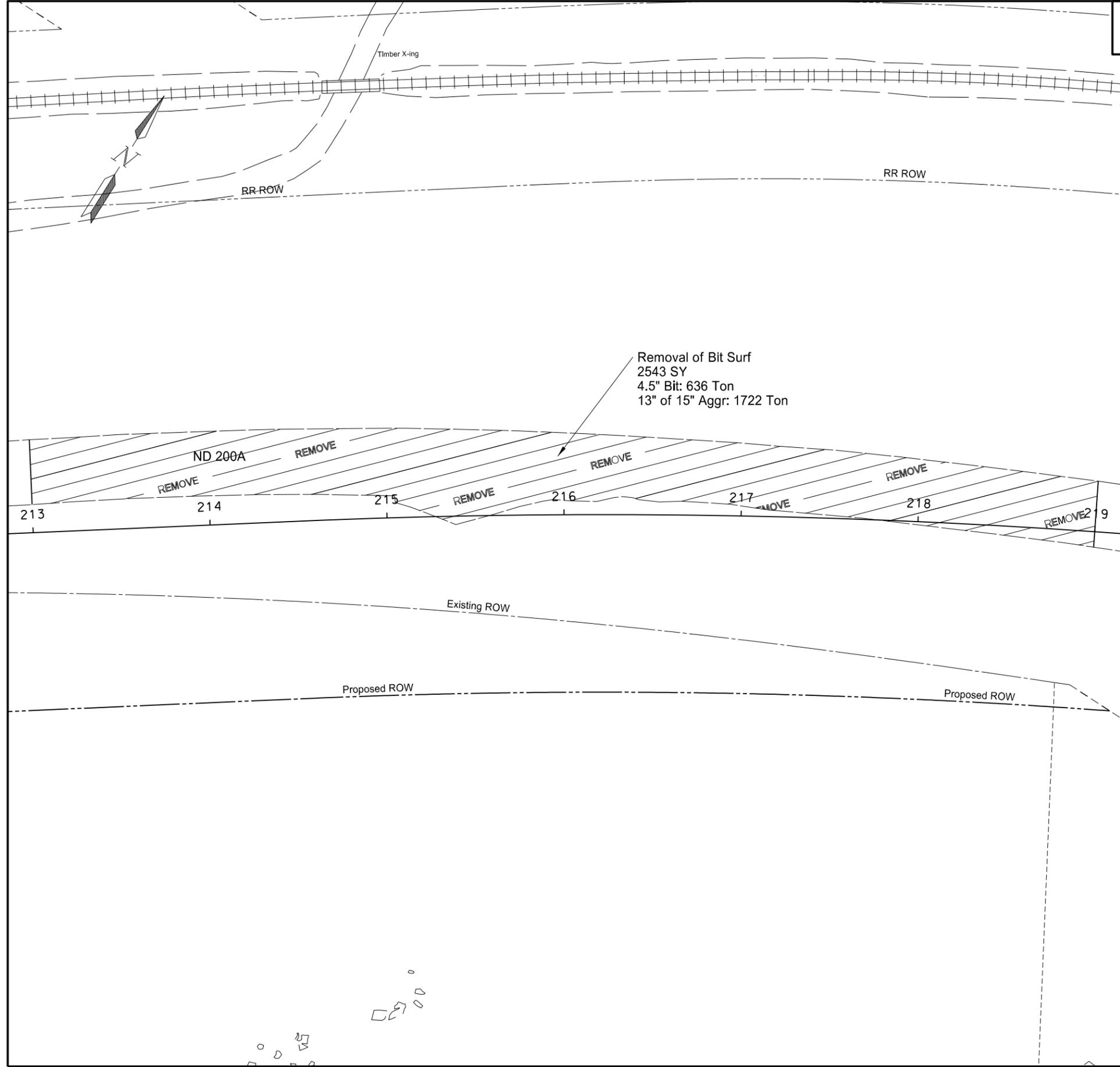


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ND 200A Removals
Sta 207+00 to 213+00

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	40	3

SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	135	REMOVAL OF BITUMINOUS SURFACING	TON	2,358
213+00 to 219+00				

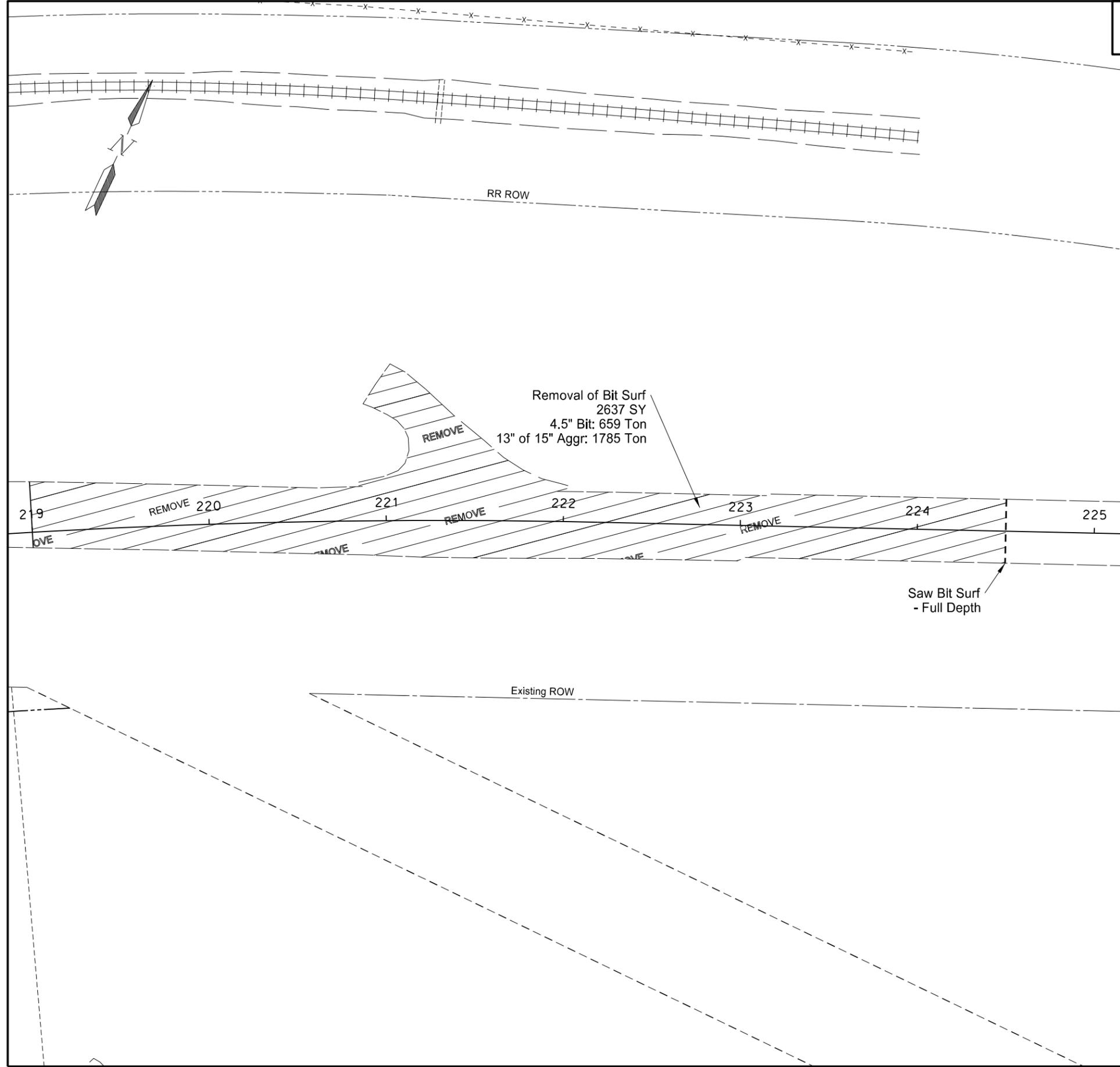


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ND 200A Removals
 Sta 213+00 to 219+00

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	40	4

SPEC	CODE	BID ITEM	UNIT	QUANTITY
202	135	REMOVAL OF BITUMINOUS SURFACING	TON	2,444
219+00 to 224+50				



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ND 200A Removals
Sta 219+00 to 224+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-200(063)916	50	1

Manhole No. 1 - 48In.

Sta. 212+00 - 75' Rt. (PRO200A)
 Top Elev. 1,738.48
 Base Elev. 1,731.25
 Invert Elev. 1,731.42
 Riser 5.73 Ft.

 6 In. Drain NE 1,731.42
 6 In. Drain SW 1,731.42

Manhole No. 2 - 48In.

Sta. 216+00 - 75' Rt. (PRO200A)
 Top Elev. 1,740.54
 Base Elev. 1,733.45
 Invert Elev. 1,733.62
 Riser 5.59 Ft.

 6 In. Drain NE 1,733.62
 6 In. Drain SW 1,733.62

Manhole No. 3 - 48In.

Sta. 220+00 - 75' Rt. (PRO200A)
 Top Elev. 1,743.29
 Base Elev. 1,735.65
 Invert Elev. 1,735.82
 Riser 6.14 Ft.

 6 In. Drain NE 1,735.82
 6 In. Drain SW 1,735.82

Manhole No. 4 - 48In.

Sta. 223+00 - 75' Rt. (PRO200A)
 Top Elev. 1,741.47
 Base Elev. 1,734.03
 Invert Elev. 1,734.20
 Riser 5.94 Ft.

 6 In. Drain NE 1,734.20
 6 In. Drain SW 1,734.20

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Manhole Summary

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	51	1

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)		Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	R1 Fabric (Pay Item)	(*) End Sections		Applicable Backfill Detail	
				In	Bid Item							LF	In		Type	In	SY	EA	EA
204+54	46' Rt	205+40	46' Rt	24	Pipe Conduit - Approach	72	Reinforced Concrete Pipe - Class III (barrell length = 72 LF)	24				NA	TES (6:1)	TES (6:1)	NA
							Corrugated Steel Pipe	24	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	24	Z, A, P	3/4, 1	0.064				
							High-Density Polyethylene	24							
210+00	40' Lt	210+70	40' Lt	18	Pipe Conduit - Approach	62	Reinforced Concrete Pipe - Class III (barrell length = 60 LF)	18				NA	TES (6:1)	TES (6:1)	NA
							Corrugated Steel Pipe	18	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	18	Z, A, P	3/4, 1	0.064				
							High-Density Polyethylene	18							

Coatings: Z = Zinc

Corrugations: 2 = 2-2/3"x1/2"

Spiral Ribs: 3/4 = 3/4"x3/4"@7-1/2"

(*) The price bid for "Pipe Conduit" includes end sections. For pipe extensions, end sections shall be paid for separately.

A = Aluminum

3 = 3"x1"

1 = 3/4"x1"@11-1/2"

FES = Flared End Section

P = Polymeric (over Zinc or Aluminum)

5 = 5"x1"

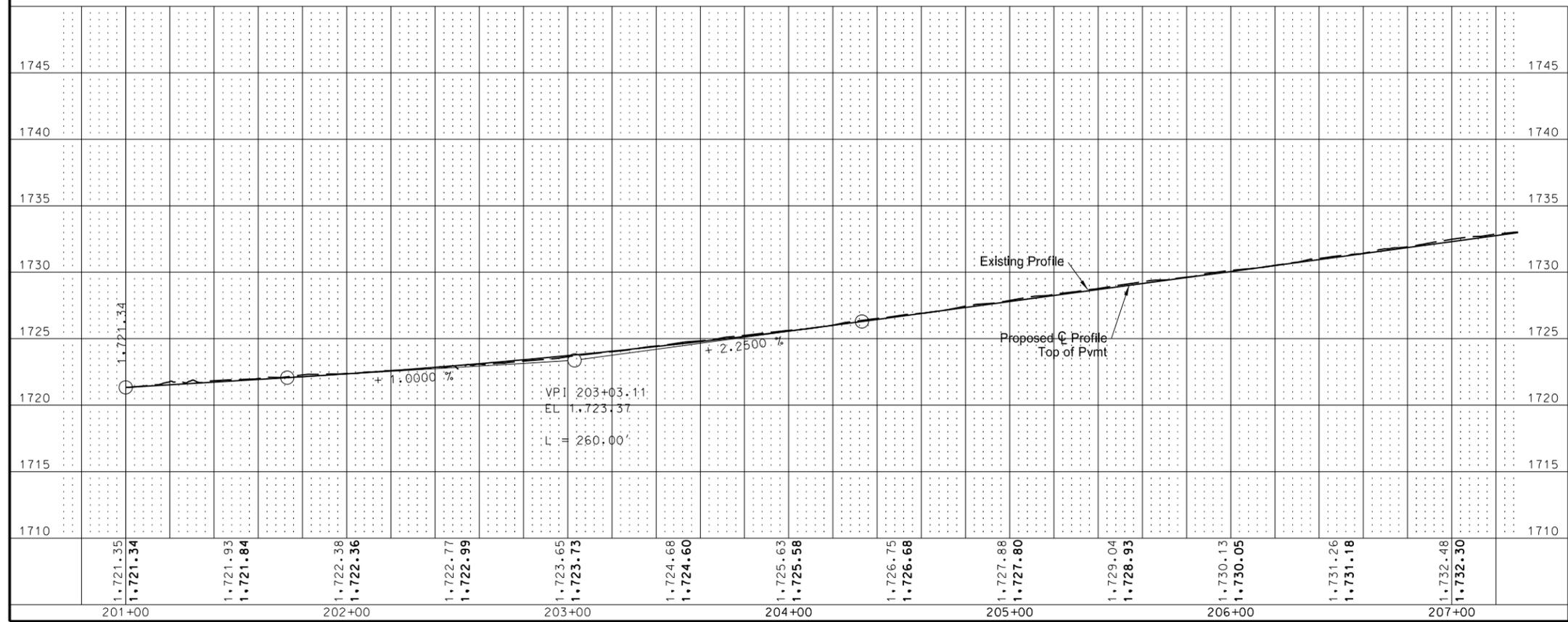
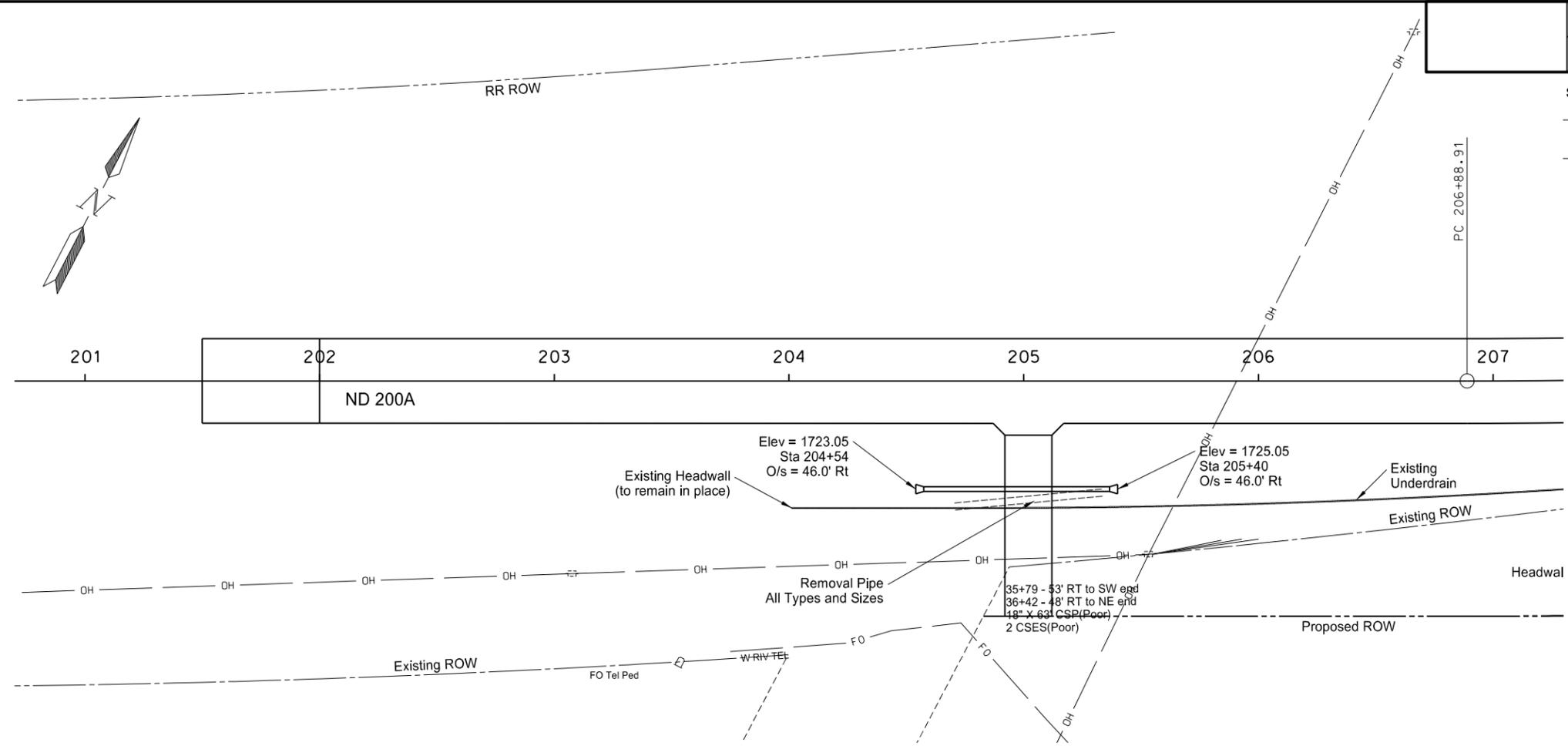
TES = Traversable End Section

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Allowable Pipe List
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	60	1

SPEC CODE	BID ITEM	UNIT	QUANTITY
202 174	REMOVAL OF PIPES ALL TYPES AND SIZES		
	Sta 204+70 to 205+33 Rt	LF	63
714 4106	PIPE CONDUIT 24IN-APPROACH		
	Sta 204+54 to 205+40 Rt	LF	72

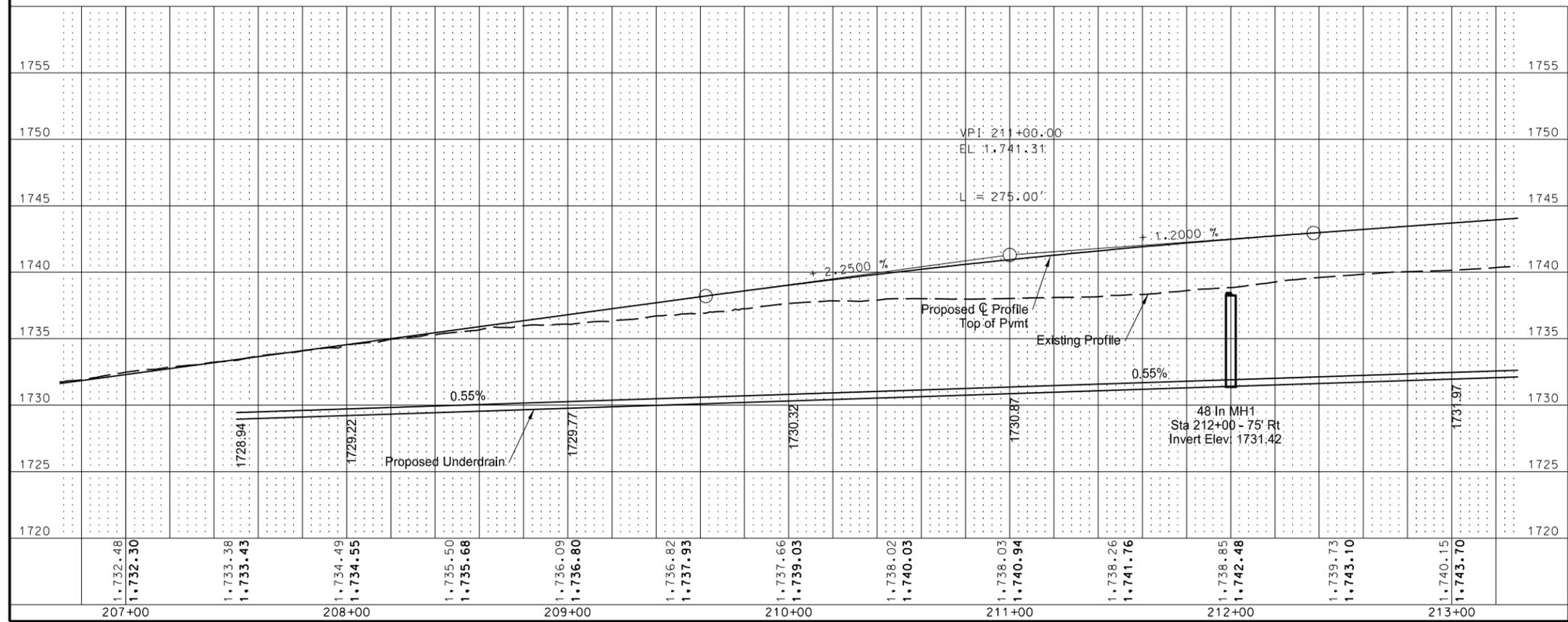
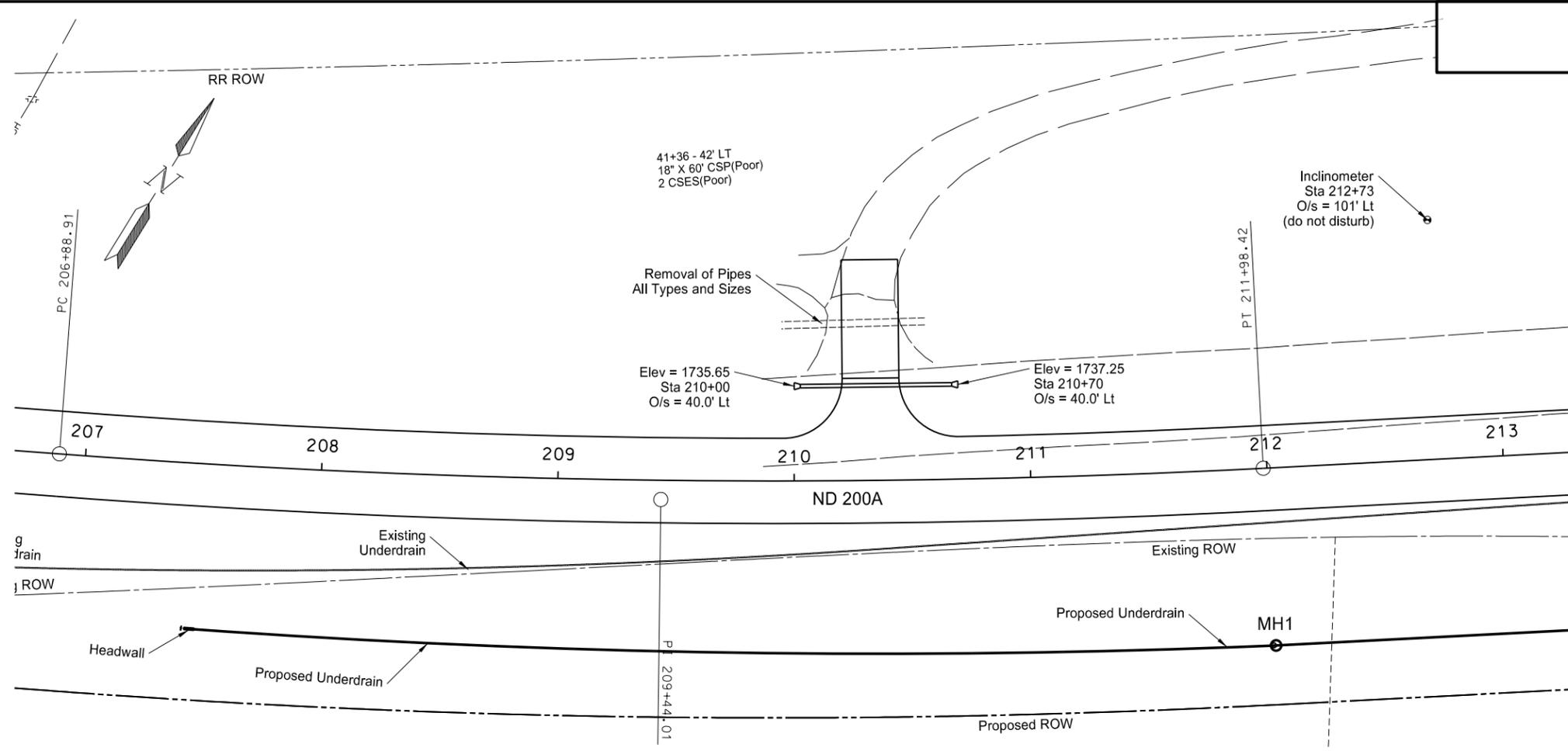


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Plan & Profile
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	60	2

SPEC CODE	BID ITEM	UNIT	QUANTITY
202 174	REMOVAL OF PIPES ALL TYPES AND SIZES	LF	61
230 300	SUBGRADE PREPARATION-TYPE A	STA	6
714 3151	HEADWALL-PRECAST CONCRETE 6IN	EA	1
714 3159	HEADWALL VEGETATION BARRIER	EA	1
714 4099	PIPE CONDUIT 18IN-APPROACH	LF	62
714 6581	PIPE POLYETHYLENE CORR PERF 6IN DRAIN	LF	456
722 100	MANHOLE 48IN	EA	1
722 1100	MANHOLE RISER 48IN	LF	5.73

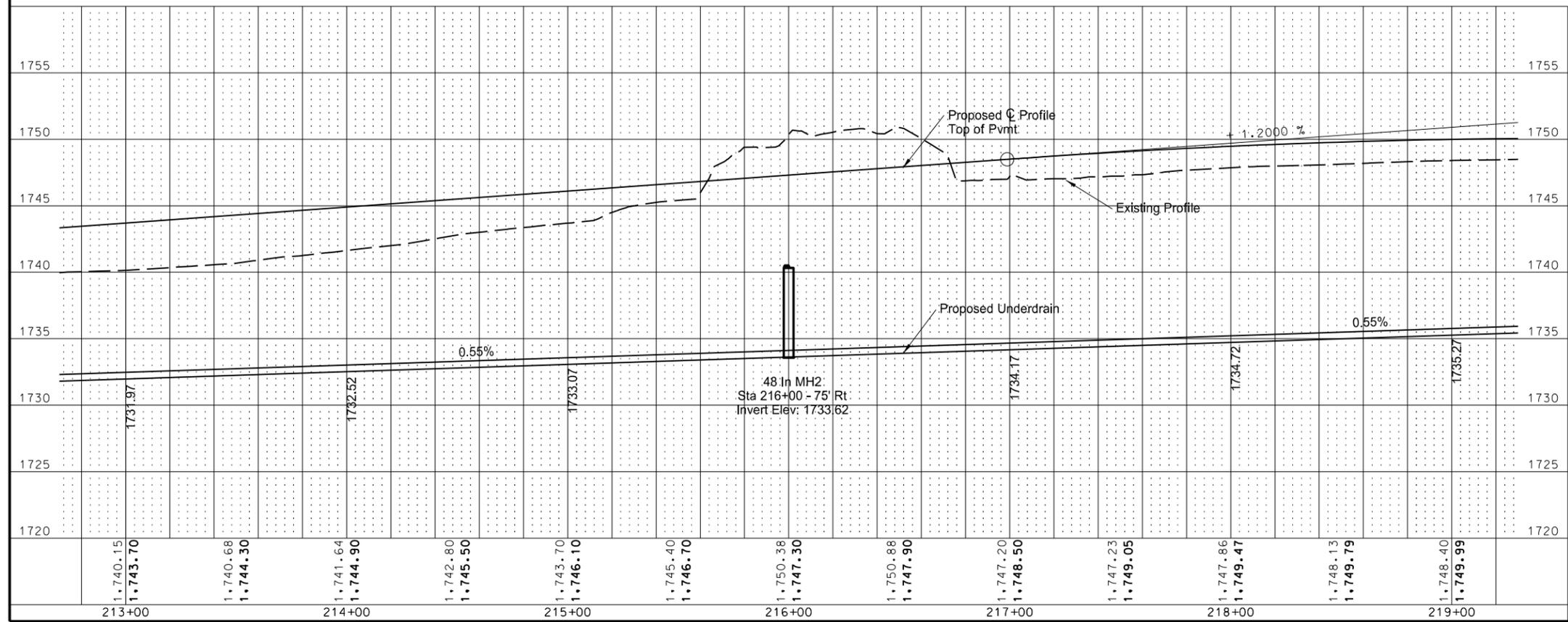
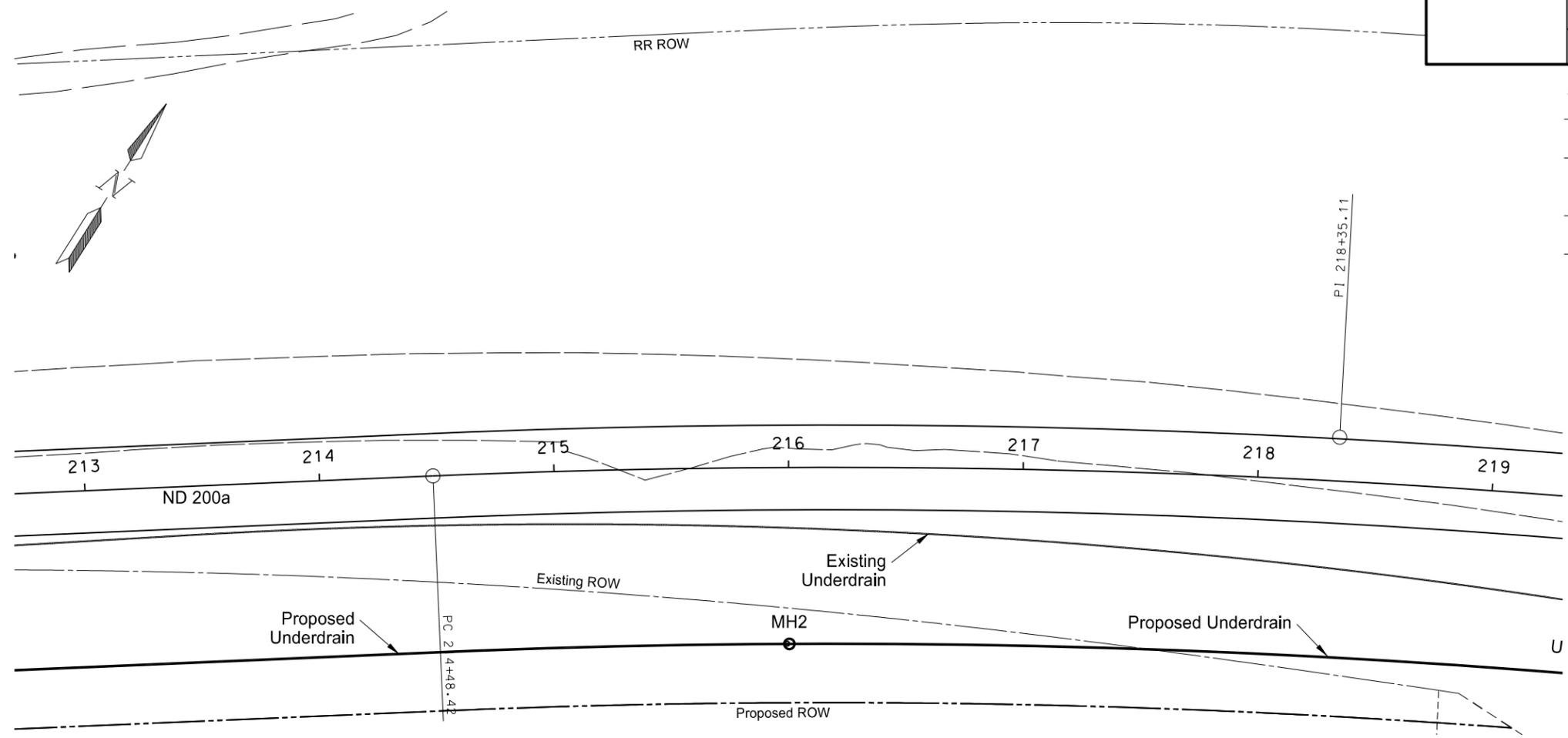


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Plan & Profile
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	60	3

SPEC CODE	BID ITEM	UNIT	QUANTITY
230 300	SUBGRADE PREPARATION-TYPE A		
	Sta 213+00 to 219+00	STA	6
714 6581	PIPE POLYETHYLENE CORR PERF 6IN DRAIN		
	Sta 213+00 to MH2	LF	296
	MH2 to Sta 219+00	LF	296
722 100	MANHOLE 48IN		
	MH2	EA	1
722 1100	MANHOLE RISER 48IN		
	MH2	LF	5.59

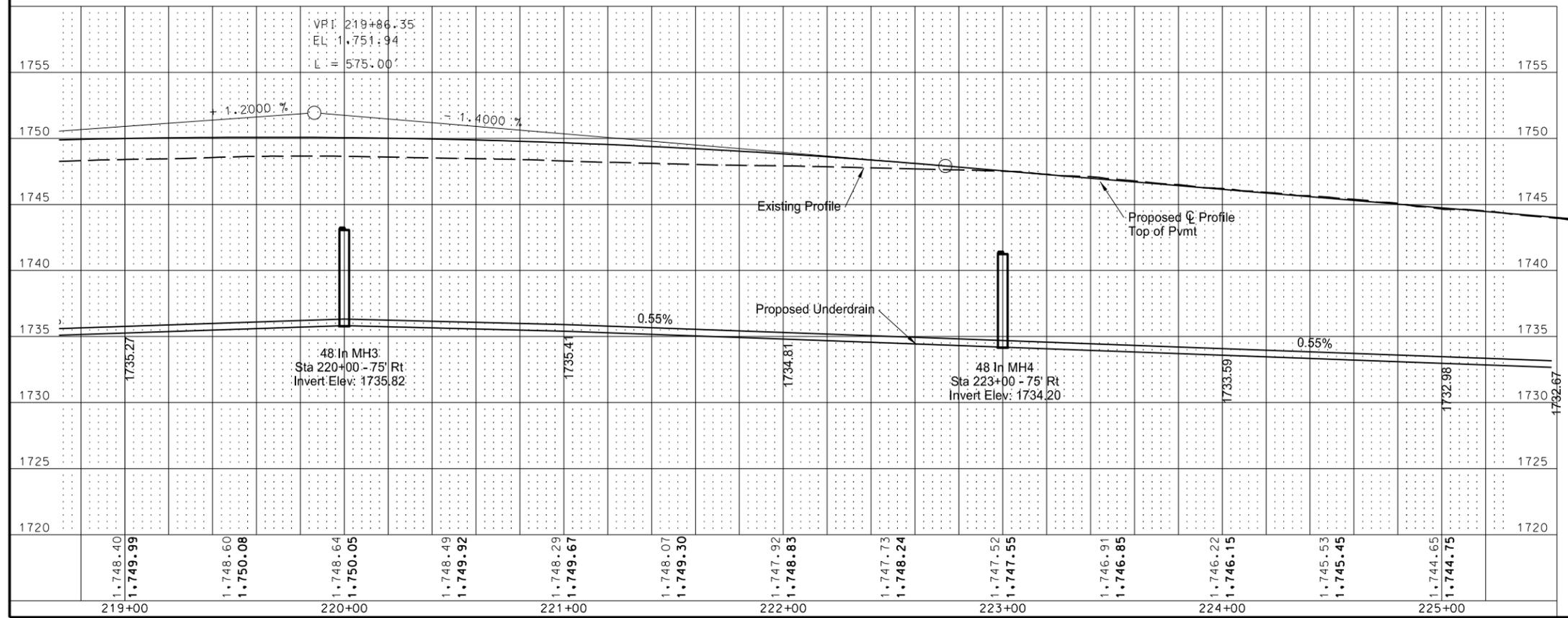
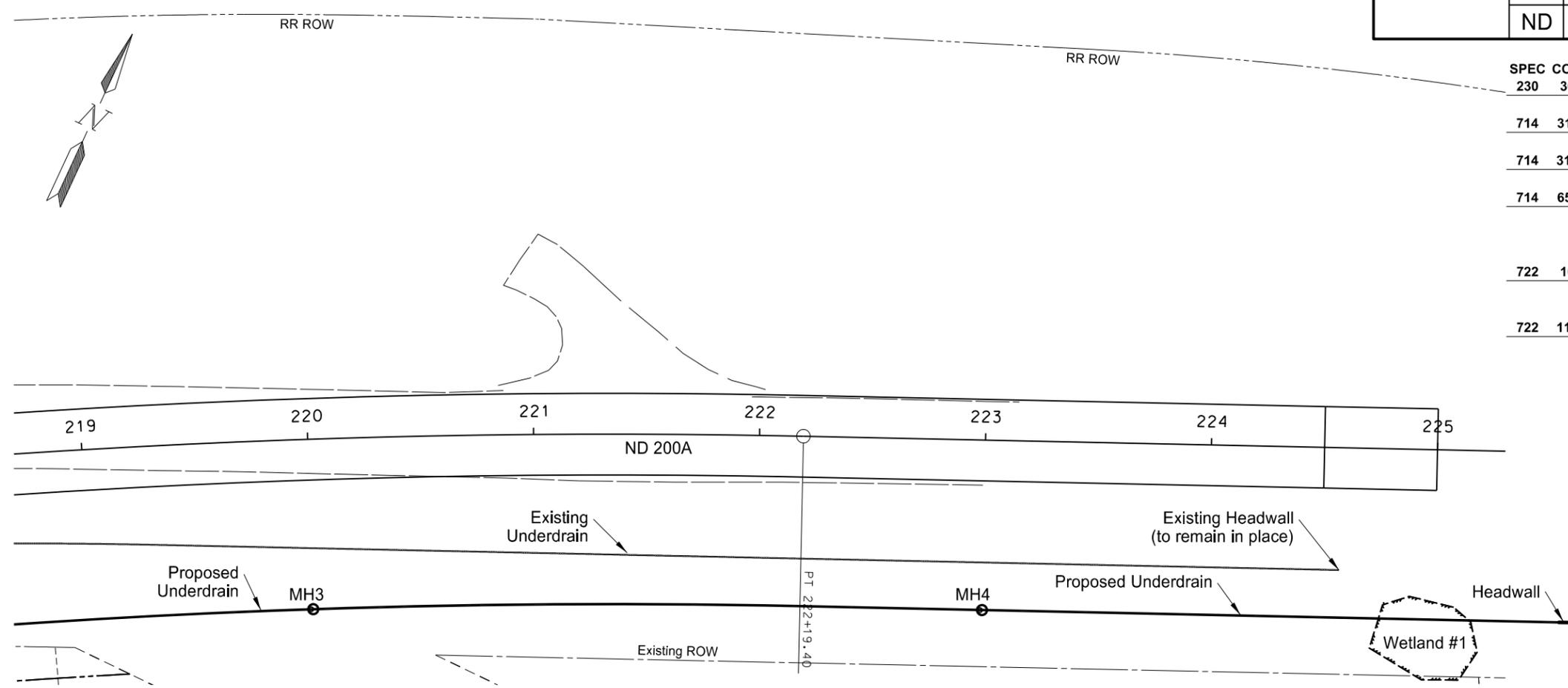


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Plan & Profile
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	60	4

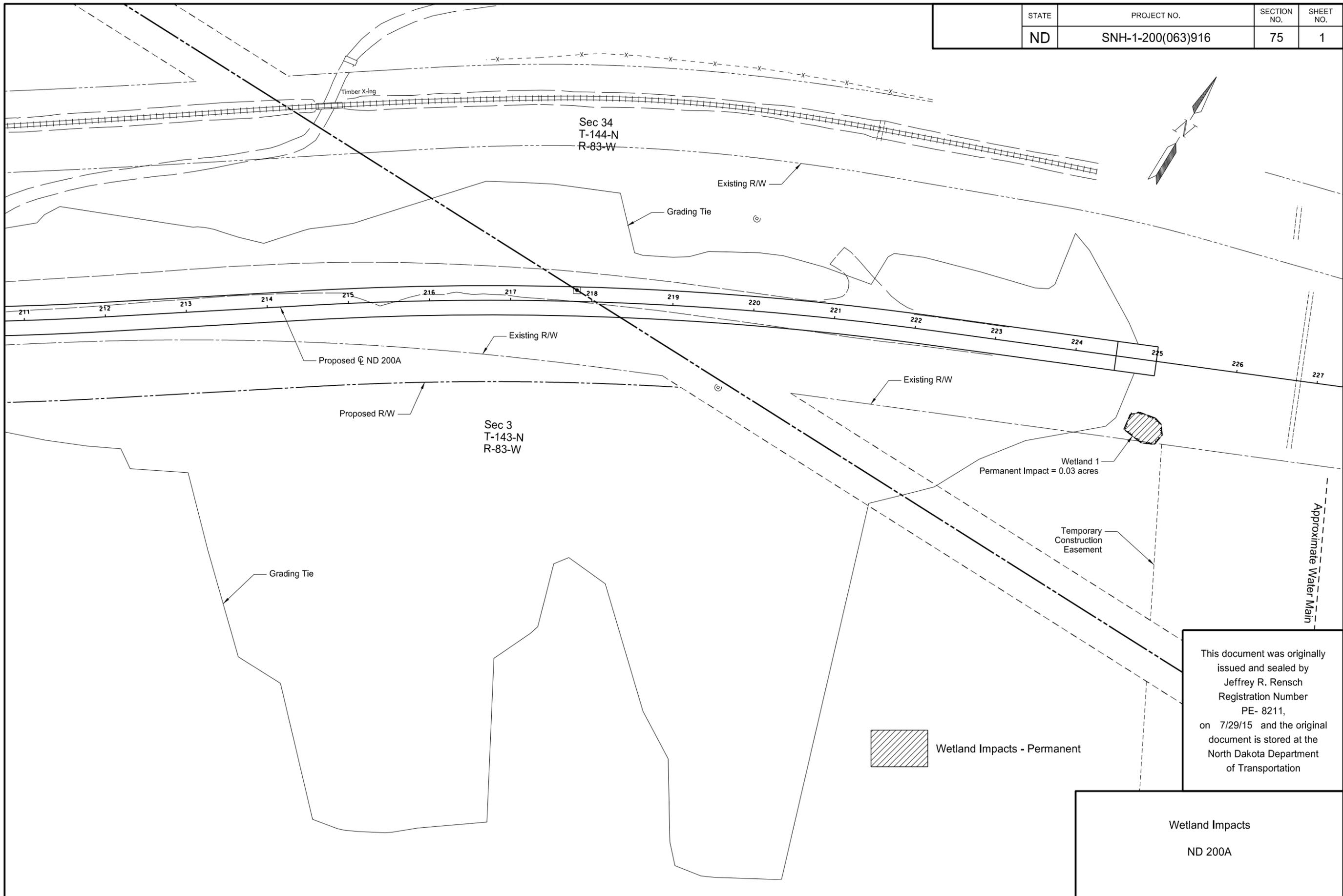
SPEC CODE	BID ITEM	UNIT	QUANTITY
230 300	SUBGRADE PREPARATION-TYPE A		
	Sta 219+00 to 220+00	STA	1
714 3151	HEADWALL-PRECAST CONCRETE 6IN		
	Sta 225+50 - 75' Rt	EA	1
714 3159	HEADWALL VEGETATION BARRIER		
	Sta 225+50 - 75' Rt	EA	1
714 6581	PIPE POLYETHYLENE CORR PERF 6IN DRAIN		
	Sta 219+00 to MH3	LF	98
	MH3 to MH4	LF	295
	MH4 to Sta 225+50	LF	255
722 100	MANHOLE 48IN		
	MH3	EA	1
	MH4	EA	1
722 1100	MANHOLE RISER 48IN		
	MH3	LF	6.14
	MH4	LF	5.94



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Plan & Profile
ND 200A

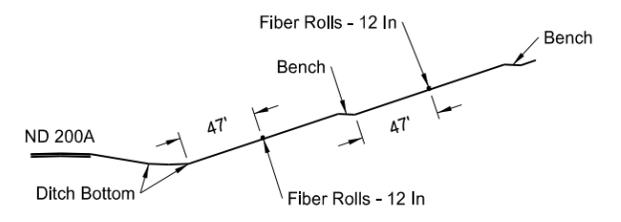
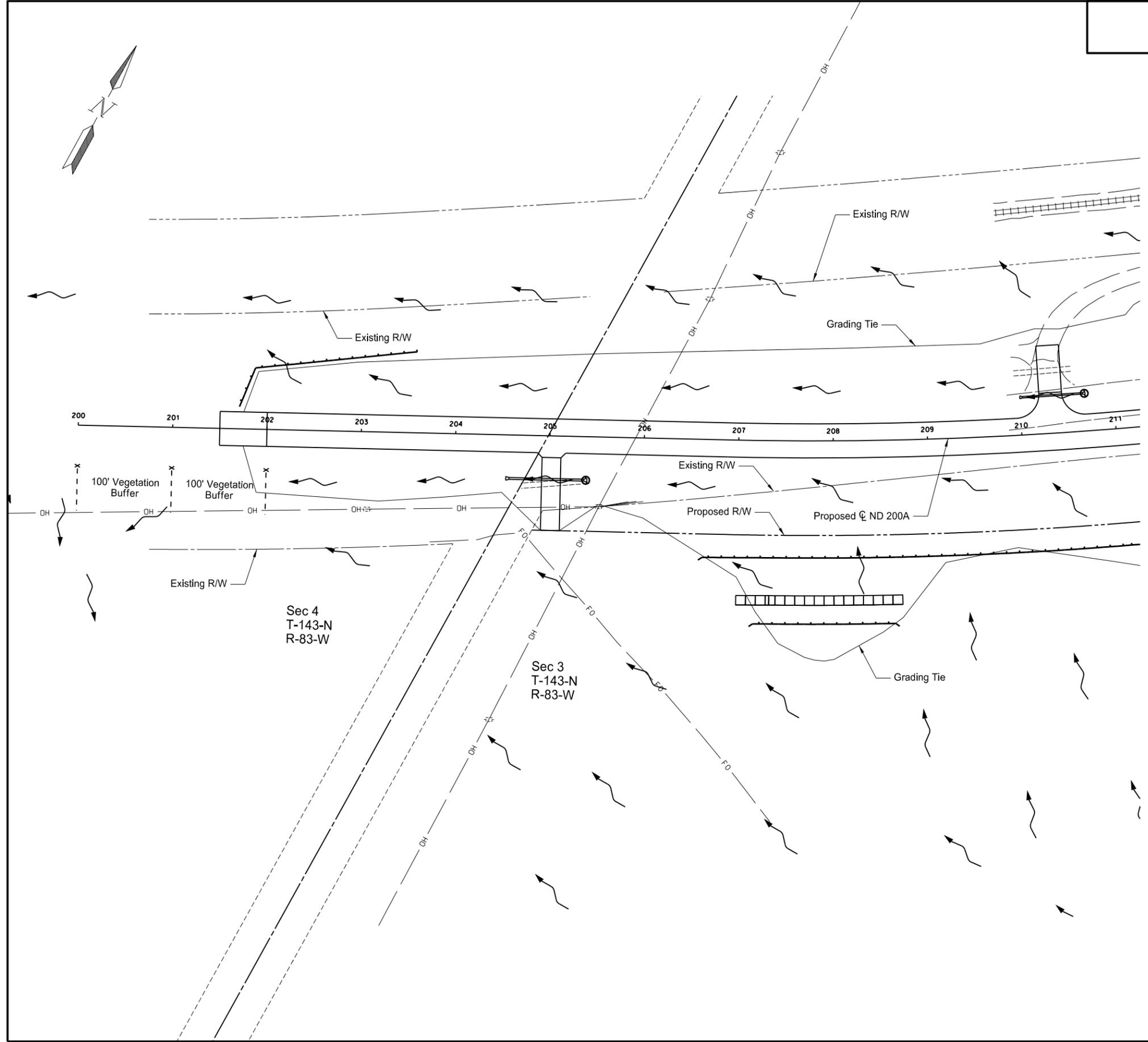
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	75	1



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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	76	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
260	200	SILT FENCE SUPPORTED		
		Right Ditch Bottom	LF	150
260	201	REMOVE SILT FENCE SUPPORTED		
		Right Ditch Bottom	LF	150
261	112	FIBER ROLLS 12IN		
		Culvert Inlet Protection	LF	50
		North Foreslope	LF	215
		South Backslope	LF	615
261	113	REMOVE FIBER ROLLS 12IN		
		Culvert Inlet Protection	LF	50
		North Foreslope	LF	215
		South Backslope	LF	615



Backslope & Fiber Roll Detail

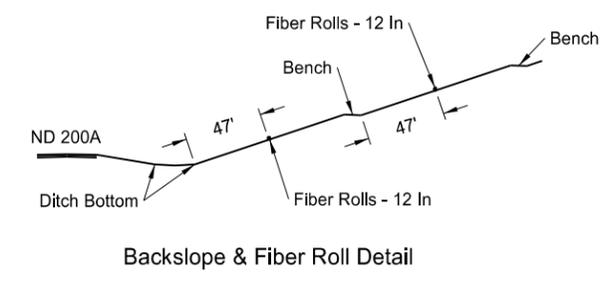
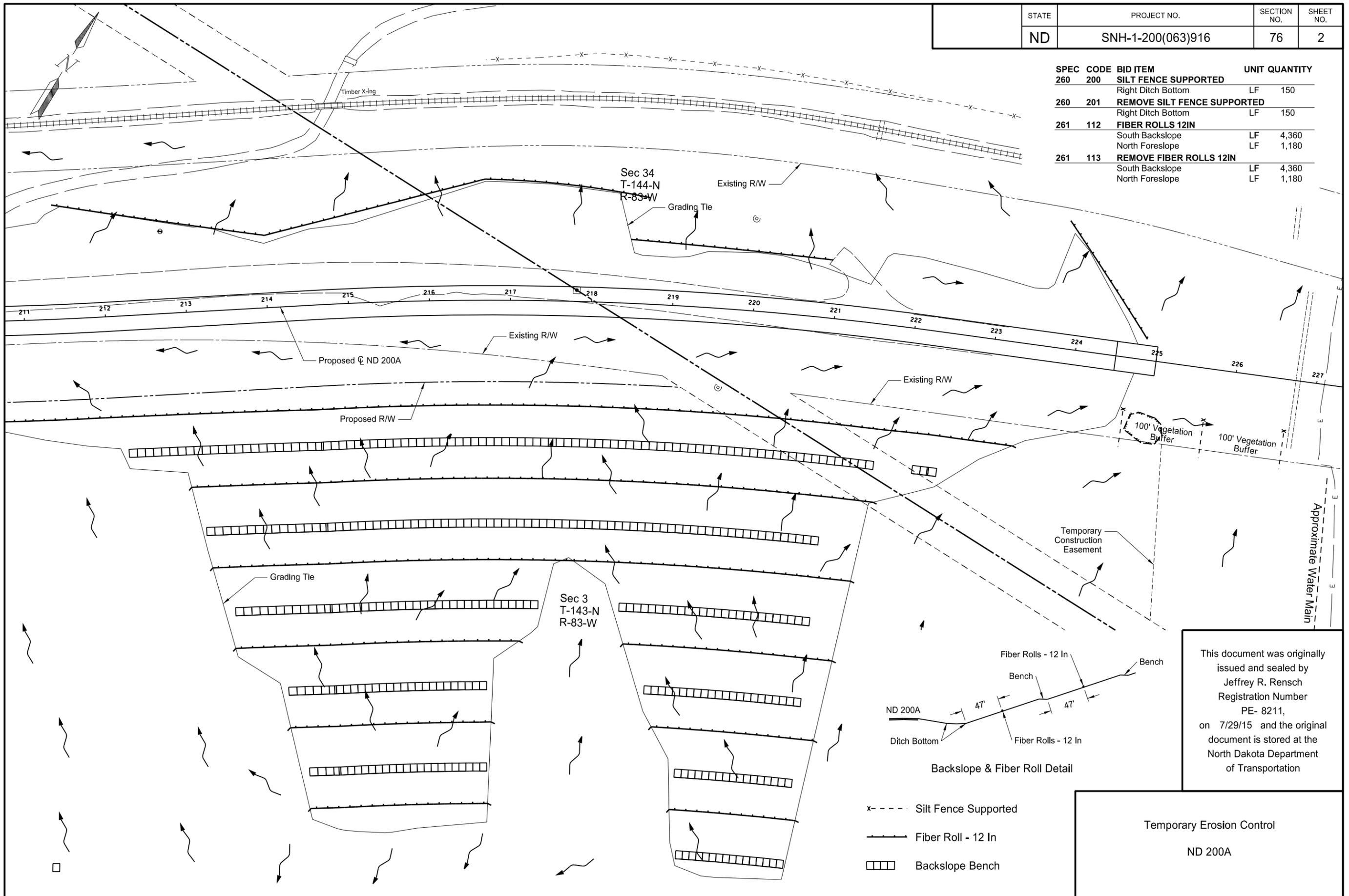
- x- - - - Silt Fence Supported
- Fiber Roll - 12 In
- Backslope Bench

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Temporary Erosion Control
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	76	2

SPEC	CODE	BID ITEM	UNIT	QUANTITY
260	200	SILT FENCE SUPPORTED		
		Right Ditch Bottom	LF	150
260	201	REMOVE SILT FENCE SUPPORTED		
		Right Ditch Bottom	LF	150
261	112	FIBER ROLLS 12IN		
		South Backslope	LF	4,360
		North Foreslope	LF	1,180
261	113	REMOVE FIBER ROLLS 12IN		
		South Backslope	LF	4,360
		North Foreslope	LF	1,180



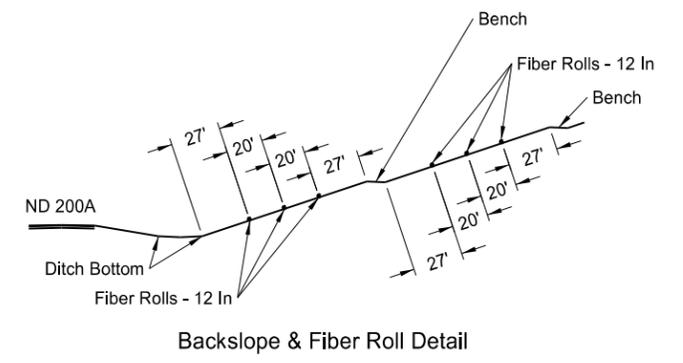
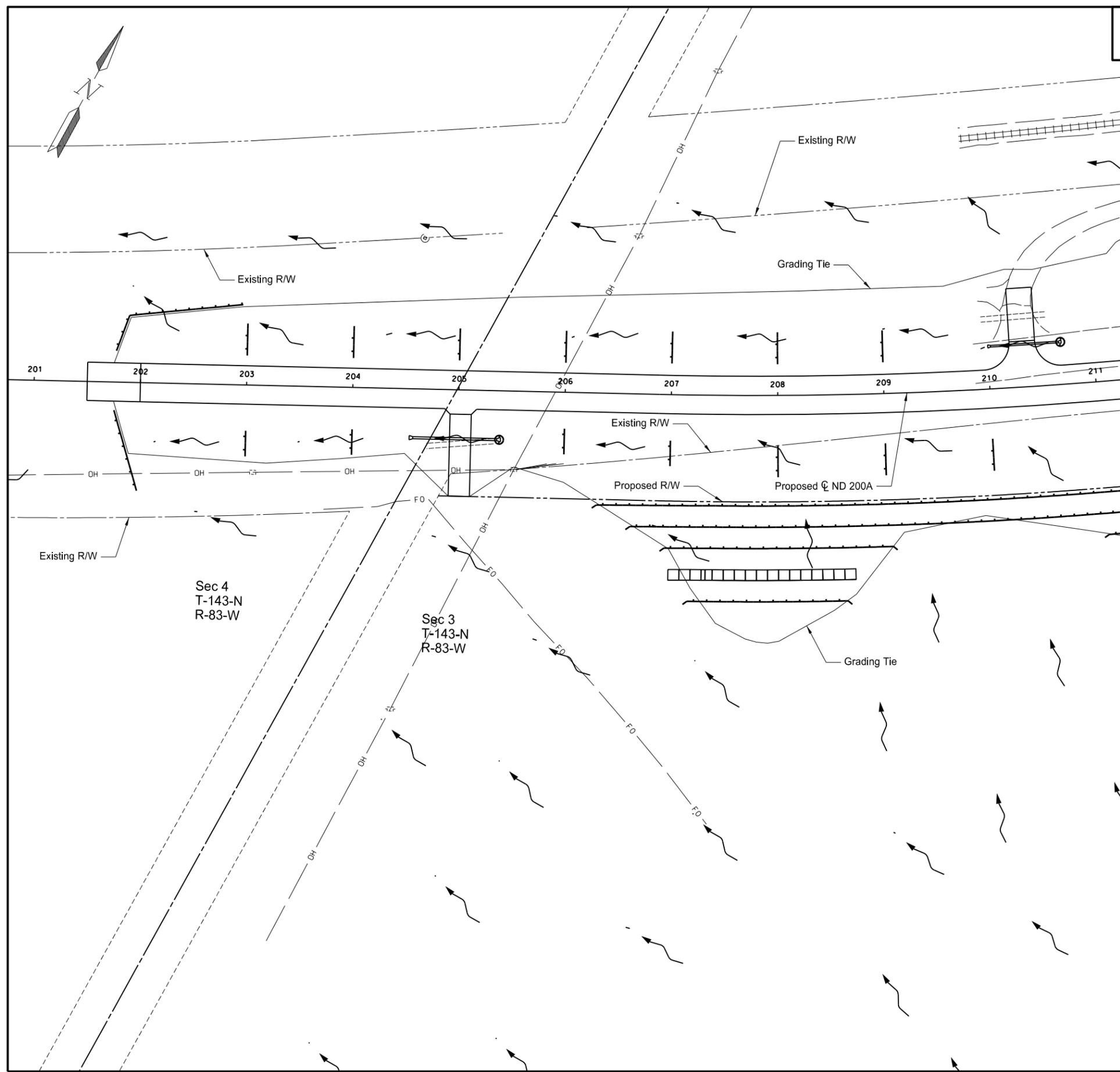
- x- - - Silt Fence Supported
- Fiber Roll - 12 In
- Backslope Bench

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Temporary Erosion Control
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	77	1

SPEC CODE	BID ITEM	UNIT	QUANTITY
261 112	FIBER ROLLS 12IN		
	Culvert Inlet Protection	LF	50
	Right Ditch Bottom	LF	266
	Left Ditch Bottom	LF	355
	South Backslope	LF	1,330



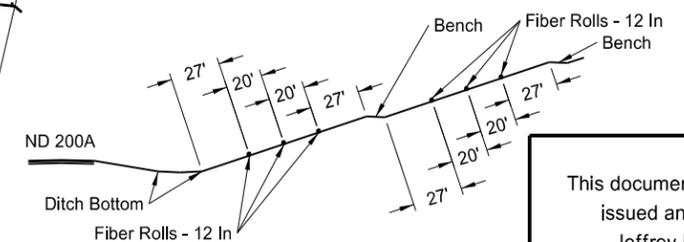
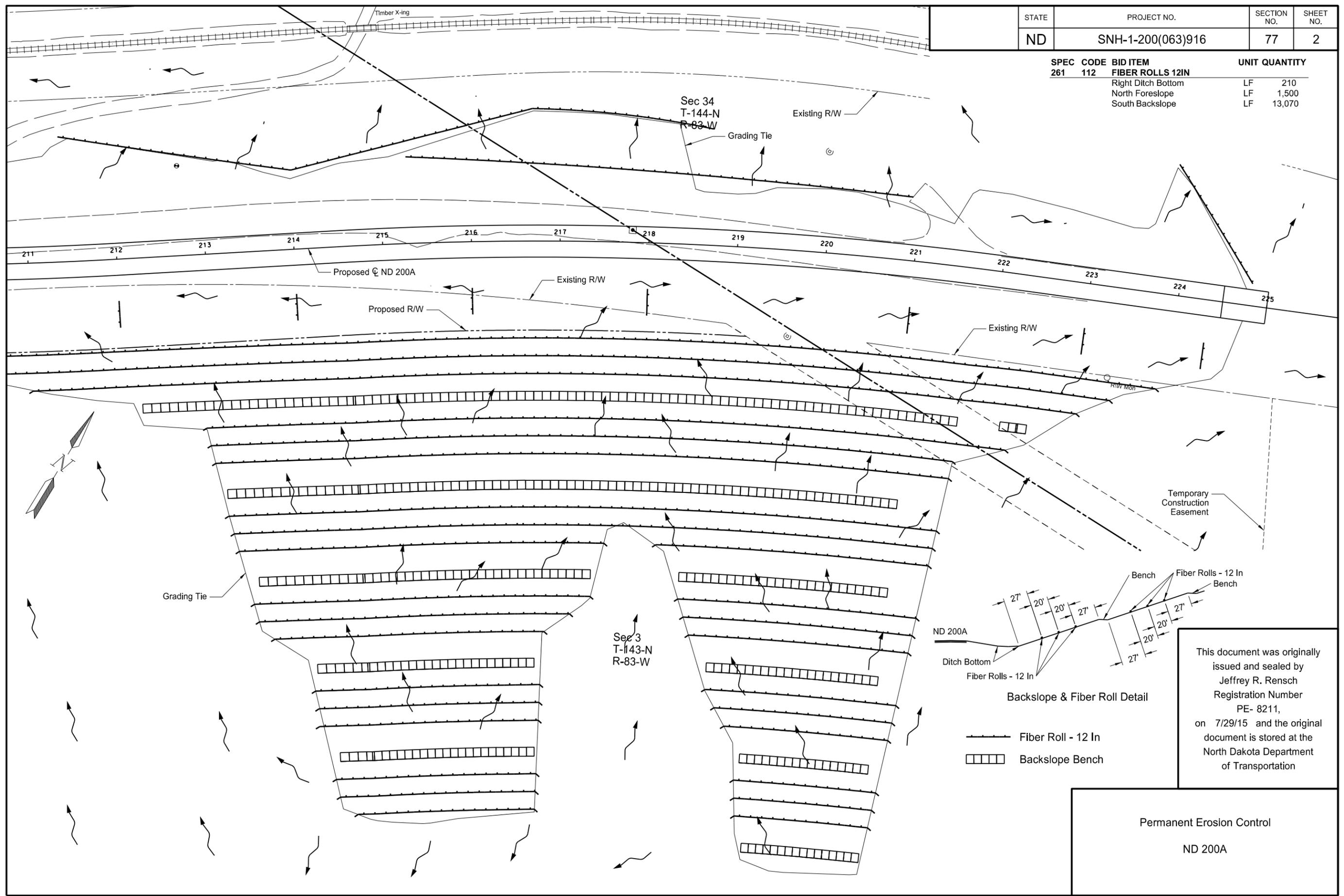
- Fiber Roll - 12 In
- Backslope Bench

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Permanent Erosion Control
 ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	77	2

SPEC CODE	BID ITEM	UNIT	QUANTITY
261 112	FIBER ROLLS 12IN		
	Right Ditch Bottom	LF	210
	North Foreslope	LF	1,500
	South Backslope	LF	13,070



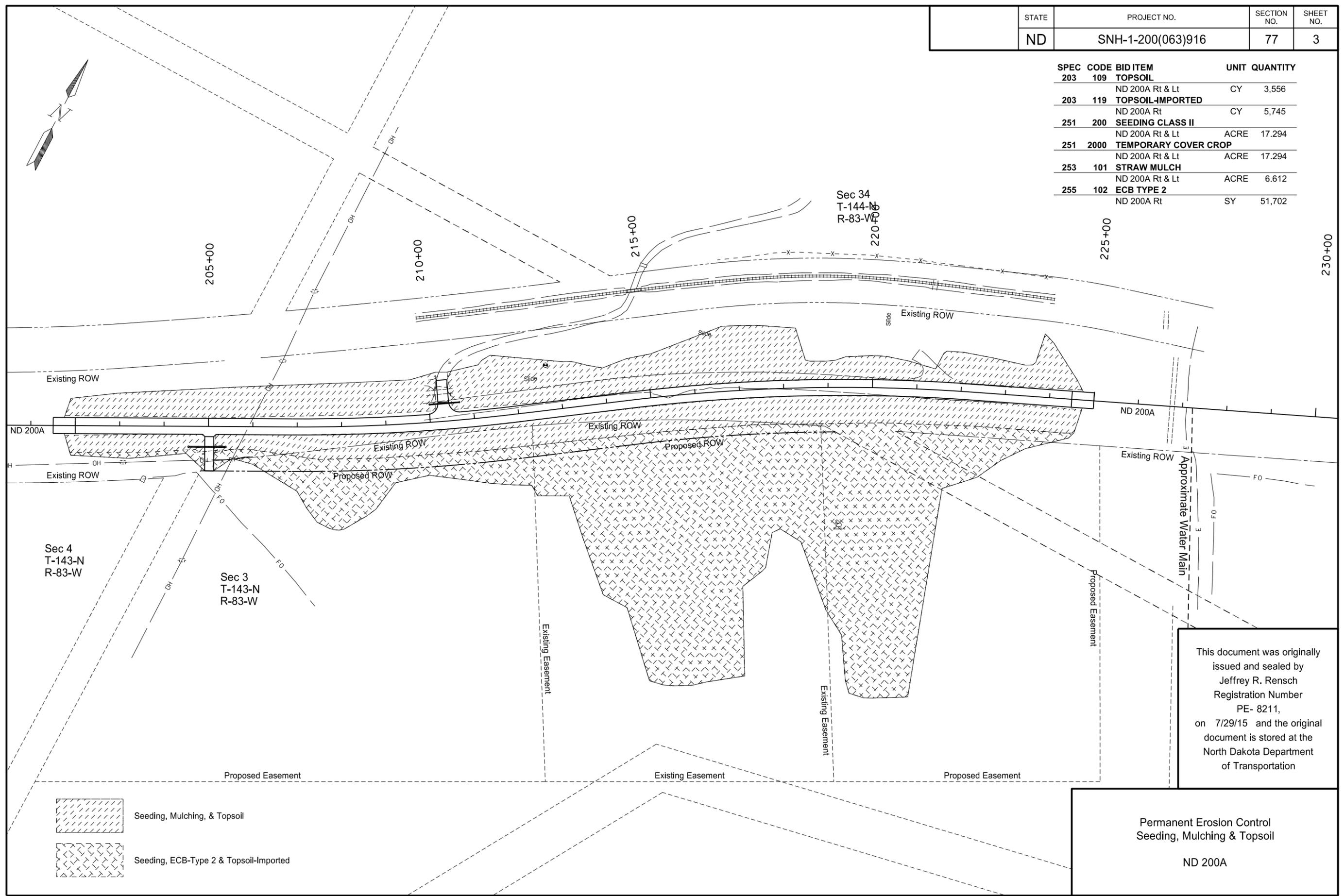
- Fiber Roll - 12 In
- Backslope Bench

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Permanent Erosion Control
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	77	3

SPEC	CODE	BID ITEM	UNIT	QUANTITY
203	109	TOPSOIL		
		ND 200A Rt & Lt	CY	3,556
203	119	TOPSOIL-IMPORTED		
		ND 200A Rt	CY	5,745
251	200	SEEDING CLASS II		
		ND 200A Rt & Lt	ACRE	17.294
251	2000	TEMPORARY COVER CROP		
		ND 200A Rt & Lt	ACRE	17.294
253	101	STRAW MULCH		
		ND 200A Rt & Lt	ACRE	6.612
255	102	ECB TYPE 2		
		ND 200A Rt	SY	51,702

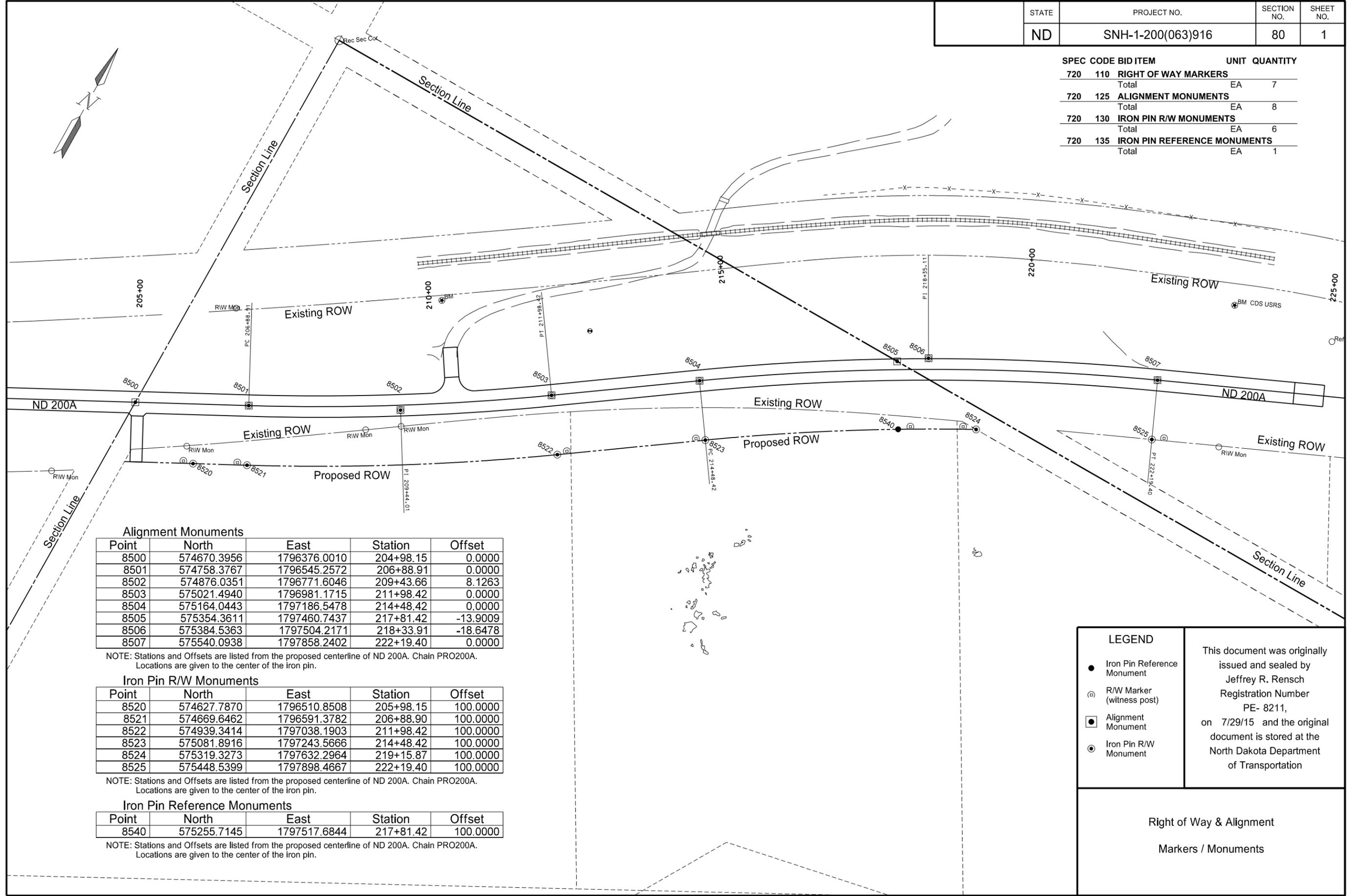


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Permanent Erosion Control
Seeding, Mulching & Topsoil
ND 200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	80	1

SPEC CODE	BID ITEM	UNIT	QUANTITY
720 110	RIGHT OF WAY MARKERS		
	Total	EA	7
720 125	ALIGNMENT MONUMENTS		
	Total	EA	8
720 130	IRON PIN R/W MONUMENTS		
	Total	EA	6
720 135	IRON PIN REFERENCE MONUMENTS		
	Total	EA	1



Alignment Monuments

Point	North	East	Station	Offset
8500	574670.3956	1796376.0010	204+98.15	0.0000
8501	574758.3767	1796545.2572	206+88.91	0.0000
8502	574876.0351	1796771.6046	209+43.66	8.1263
8503	575021.4940	1796981.1715	211+98.42	0.0000
8504	575164.0443	1797186.5478	214+48.42	0.0000
8505	575354.3611	1797460.7437	217+81.42	-13.9009
8506	575384.5363	1797504.2171	218+33.91	-18.6478
8507	575540.0938	1797858.2402	222+19.40	0.0000

NOTE: Stations and Offsets are listed from the proposed centerline of ND 200A. Chain PRO200A. Locations are given to the center of the iron pin.

Iron Pin R/W Monuments

Point	North	East	Station	Offset
8520	574627.7870	1796510.8508	205+98.15	100.0000
8521	574669.6462	1796591.3782	206+88.90	100.0000
8522	574939.3414	1797038.1903	211+98.42	100.0000
8523	575081.8916	1797243.5666	214+48.42	100.0000
8524	575319.3273	1797632.2964	219+15.87	100.0000
8525	575448.5399	1797898.4667	222+19.40	100.0000

NOTE: Stations and Offsets are listed from the proposed centerline of ND 200A. Chain PRO200A. Locations are given to the center of the iron pin.

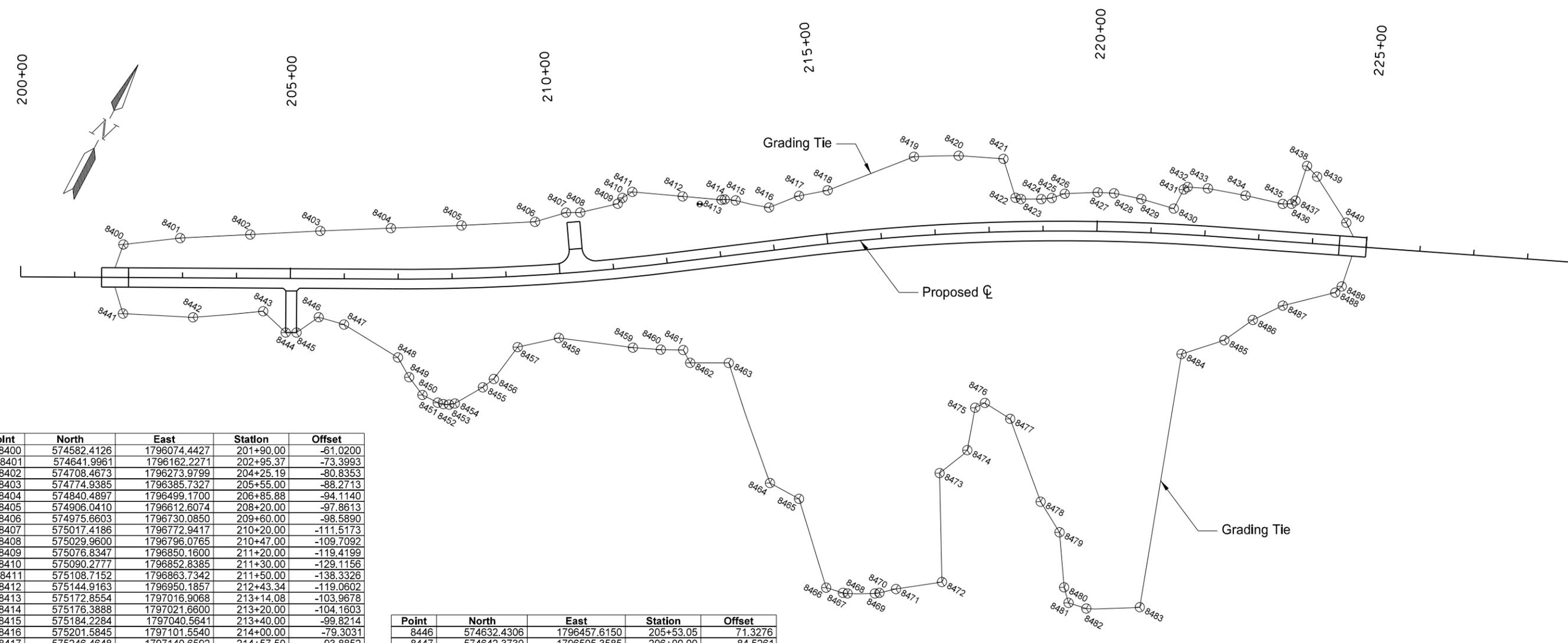
Iron Pin Reference Monuments

Point	North	East	Station	Offset
8540	575255.7145	1797517.6844	217+81.42	100.0000

NOTE: Stations and Offsets are listed from the proposed centerline of ND 200A. Chain PRO200A. Locations are given to the center of the iron pin.

<p>LEGEND</p> <ul style="list-style-type: none"> ● Iron Pin Reference Monument ⊙ R/W Marker (witness post) ■ Alignment Monument ⊙ Iron Pin R/W Monument 	<p>This document was originally issued and sealed by Jeffrey R. Rensch Registration Number PE- 8211, on 7/29/15 and the original document is stored at the North Dakota Department of Transportation</p>
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Right of Way & Alignment
Markers / Monuments



Point	North	East	Station	Offset
8400	574582.4126	1796074.4427	201+90.00	-61.0200
8401	574641.9961	1796162.2271	202+95.37	-73.3993
8402	574708.4673	1796273.9799	204+25.19	-80.8353
8403	574774.9385	1796385.7327	205+55.00	-88.2713
8404	574840.4897	1796499.1700	206+85.88	-94.1140
8405	574906.0410	1796612.6074	208+20.00	-97.8613
8406	574975.6603	1796730.0850	209+60.00	-98.5890
8407	575017.4186	1796772.9417	210+20.00	-111.5173
8408	575029.9600	1796796.0765	210+47.00	-109.7092
8409	575076.8347	1796850.1600	211+20.00	-119.4199
8410	575090.2777	1796852.8385	211+30.00	-129.1156
8411	575108.7152	1796863.7342	211+50.00	-138.3326
8412	575144.9163	1796950.1857	212+43.34	-119.0602
8413	575172.8554	1797016.9068	213+14.08	-103.9678
8414	575176.3888	1797021.6600	213+20.00	-104.1603
8415	575184.2284	1797040.5641	213+40.00	-99.8214
8416	575201.5845	1797101.5540	214+00.00	-79.3031
8417	575246.4648	1797140.6592	214+57.50	-93.8852
8418	575280.2376	1797182.6981	215+10.00	-98.1342
8419	575409.9636	1797295.3114	216+70.00	-146.3672
8420	575450.3575	1797367.7539	217+50.00	-143.6557
8421	575483.8967	1797443.9564	218+30.00	-134.7856
8422	575430.6734	1797497.2726	218+50.14	-62.3312
8423	575433.2477	1797507.4043	218+60.10	-59.6816
8424	575450.7765	1797540.6262	218+97.11	-59.1669
8425	575461.6575	1797557.0468	219+16.43	-60.9973
8426	575479.8964	1797574.4942	219+40.00	-68.9555
8427	575510.6101	1797627.3519	220+00.00	-72.0125
8428	575523.3619	1797655.1180	220+30.00	-70.9562
8429	575537.5544	1797704.7626	220+80.00	-61.8824
8430	575549.9446	1797766.1716	221+40.00	-46.8531
8431	575589.8339	1797766.0956	221+56.36	-83.1129
8432	575597.2663	1797770.4056	221+63.23	-88.0796
8433	575612.5287	1797804.7511	222+00.00	-87.8811
8434	575633.4158	1797872.4984	222+70.00	-79.7022
8435	575651.8922	1797940.8394	223+40.00	-69.1256
8436	575659.6677	1797955.2241	223+56.30	-70.4575
8437	575668.2095	1797959.1070	223+63.29	-76.7157
8438	575735.1089	1797947.9652	223+80.00	-142.4454
8439	575726.2101	1797973.7208	224+00.00	-123.9375
8440	575676.1920	1798061.2354	224+60.00	-42.9399
8441	574469.0176	1796133.3870	201+90.00	66.7801
8442	574523.4749	1796251.5937	203+20.00	72.9806
8443	574594.1730	1796361.3584	204+50.00	60.8772
8444	574578.8396	1796416.6847	204+92.02	100.0000
8445	574588.0641	1796434.4304	205+12.02	100.0000

Note: Stations and Offsets are listed from the proposed centerline of ND 200A. Chain PRO200A

Point	North	East	Station	Offset
8446	574632.4306	1796457.6150	205+53.05	71.3276
8447	574642.3730	1796505.3585	206+00.00	84.5261
8448	574635.2089	1796622.2503	207+00.01	144.8118
8449	574612.6249	1796657.6658	207+20.01	181.2951
8450	574595.0585	1796694.6911	207+43.26	214.2211
8451	574595.6821	1796726.4460	207+70.00	228.7938
8452	574598.2590	1796737.0919	207+80.00	231.6458
8453	574602.3908	1796746.8953	207+90.00	232.7558
8454	574609.0805	1796755.2840	208+00.00	230.9690
8455	574659.7956	1796787.1989	208+50.00	202.4661
8456	574682.9528	1796798.0743	208+70.00	187.8186
8457	574755.7242	1796809.6471	209+15.00	130.8931
8458	574806.4316	1796869.3452	209+90.00	118.5008
8459	574854.6142	1796999.0875	211+20.85	148.0883
8460	574875.4565	1797046.5827	211+70.00	157.3730
8461	574894.1722	1797083.6440	212+10.00	163.0254
8462	574879.2440	1797106.1783	212+20.00	188.1381
8463	574912.4975	1797169.5374	212+91.01	196.9476
8464	574751.7986	1797340.7106	213+40.00	426.5657
8465	574751.1484	1797402.0258	213+90.00	462.0619
8466	574629.3286	1797523.0984	214+20.00	631.1732
8467	574635.3832	1797555.1039	214+50.00	644.4486
8468	574638.3658	1797563.2376	214+60.00	646.6224
8469	574662.0094	1797607.9320	215+20.00	652.1619
8470	574666.8011	1797614.7969	215+30.00	651.9796
8471	574687.5255	1797638.8279	215+67.57	647.8661
8472	574738.7638	1797708.0797	216+70.00	641.5964
8473	574914.8259	1797610.2538	216+80.00	440.3676
8474	574976.3703	1797635.8973	217+40.00	400.8363
8475	575052.5726	1797612.2095	217+60.00	323.1378

Note: Stations and Offsets are listed from the proposed centerline of ND 200A. Chain PRO200A

Point	North	East	Station	Offset
8476	575068.7702	1797624.0837	217+80.00	315.0980
8477	575064.6804	1797679.1949	218+30.00	345.9217
8478	574955.4411	1797800.6875	218+90.00	500.2472
8479	574921.8567	1797858.0315	219+30.00	556.9152
8480	574835.8349	1797912.9616	219+40.00	658.6263
8481	574814.2855	1797933.6419	219+50.00	687.3121
8482	574820.3207	1797967.7467	219+90.00	697.5874
8483	574868.8246	1798054.3875	221+10.00	692.2273
8484	575318.8477	1797904.3688	221+69.90	220.8217
8485	575378.5507	1797962.6404	222+50.00	189.8934
8486	575436.2965	1797991.8809	223+00.00	148.7889
8487	575485.6176	1798028.6461	223+53.50	118.4244
8488	575552.1977	1798103.4049	224+48.73	87.5430
8489	575567.9714	1798108.7875	224+60.00	75.2671

Note: Stations and Offsets are listed from the proposed centerline of ND 200A. Chain PRO200A

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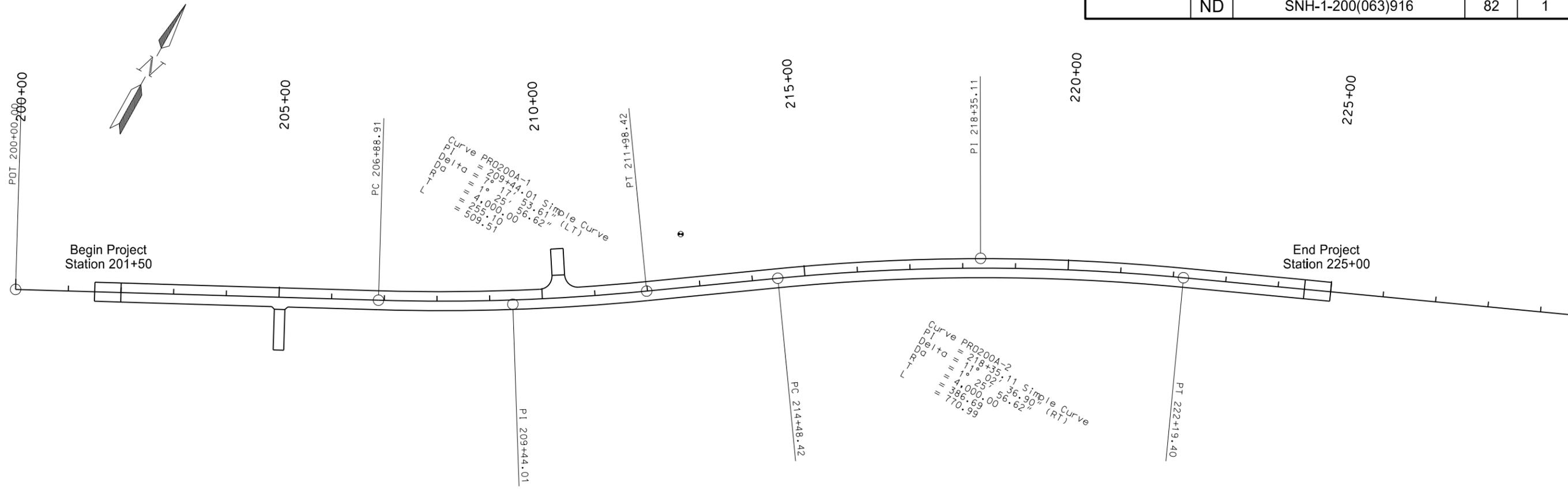
Survey Data Points
Grading Tie Points

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - ND 200A slide area (Hensler)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	AC-SNH-1-200(063)916	81	1

HORIZONTAL ALIGNMENT				CURVE DATA		US PUBLIC LAND SURVEY DATA			SURVEY CONTROL POINTS						
PNT	STATION	NORTHING	EASTING	ARC DEFINITION		DESC. SEC-TWP-RGE	NORTHING	EASTING	PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	
									CONTROL POINT DESCRIPTION						
ND 200A (OCL200) - 2005 Realignment				SCS411		C412		W 1/4 Cor Sec 3 T-143-N R-83-W 572622.25 1796365.52							
BEG	0+00.00	573,670.07	1,792,940.64	PI STA= 21+85.34	PI STA= 38+64.45	NE Cor Sec 3 T-143-N R-83-W	575304.92	1801635.83	PRIMARY CONTROL						
TS	10+99.23	573,839.56	1,794,026.72	Delta = 18° 35' 46" (LT)	Delta = 8° 12' 15" LT	NW Cor Sec 3 T-143-N R-83-W	575367.16	1796379.57	GPS 1	573328.26	1789347.51	1739.88	N/A	N/A	
SC	13+99.23	573,888.41	1,794,322.71	Do = 1° 00' 00"	Do = 1° 30' 00"										
PI SCS411	21+85.34	574,007.03	1,795,099.85	R = 5,729.65'	R = 3,819.83'										
PT	31+08.86	574,440.64	1,795,934.00	Ls in = 300.00'	T = 273.95'										
PC	35+90.50	574,662.78	1,796,361.35	Sc in = 1° 30'	L = 546.96'										
PI C412	38+64.45	574,789.13	1,796,604.42	Ts in = 1,086.12'											
PT	41+37.46	574,948.88	1,796,826.98	Ts out = 940.12'	C413										
PC	44+48.18	575,130.06	1,797,079.40	L = 2,009.63	PI STA= 47+48.01										
PI C413	47+48.01	575,304.90	1,797,322.98			Delta = 11° 56' 58" RT									
PT	50+45.68	575,425.52	1,797,597.49			Do = 2° 00' 00"									
END	91+15.64	577,062.78	1,801,323.62			R = 2,864.90'									
						T = 299.84'									
						L = 597.50'									
									REFERENCE MARKERS						
									R Mkr #	NORTHING	EASTING	STATION	OFFSET	ALIGNMENT	
									915	573368.38	1791272.86	N/A	N/A	OCL200	
									916	574617.40	1796352.00	35+61	36' R+	OCL200	
ND 200A (SCL200) - 1970 Alignment				SCS403		SCS404									
BEG	652+10.37	573,670.07	1,792,940.64	PI STA= 677+76.40	PI STA= 697+76.82										
TS	663+09.60	573,839.56	1,794,026.72	Delta = 25° 53' LT	Delta = 11° 01' 57" RT										
SC	666+09.60	573,888.41	1,794,322.71	Do = 1° 00'	Do = 1° 30'										
PI SCS403	677+76.40	574,065.73	1,795,475.98	R = 5,729.65'	R = 3,819.83'										
CS	688+97.96	574,733.02	1,796,433.16	Ls = 300.00'	Ls = 300.00'										
ST	691+97.96	574,901.87	1,796,681.12	Sc = 1° 30'	Sc = 2° 15'										
TS	692+57.83	574,936.00	1,796,730.31	Ts = 1,466.80'	Ts = 518.99'										
SC	695+57.83	575,103.76	1,796,979.00	L = 2,288.37'	L = 435.53'										
PI SCS404	697+76.82	575,231.85	1,797,156.72												
CS	699+93.36	575,316.37	1,797,358.83												
ST	702+93.36	575,440.63	1,797,631.87												
END	743+25.78	577,062.78	1,801,323.62												
NOTES: Sheet 1 of 1				Date Survey Completed 8/25/11		<input type="checkbox"/> Assumed Coordinates <input checked="" type="checkbox"/> All coordinates on this sheet are Ollver County County ground coordinates. They are derived from the "North Dakota Coordinate System of 1983", NAD83(CORS), South Zone Combination factor (cf) = 0.9998530			All coordinates and measurements on this document derived from the International Foot definition.			This document was originally issued and sealed by Chad A. Hanson Registration Number LS-5572, on 4/4/12 and the original document is stored at the North Dakota Department of Transportation			
						<input checked="" type="checkbox"/> NAVD-88 <input type="checkbox"/> NGVD-29 <input checked="" type="checkbox"/> ENGLISH UNITS <input type="checkbox"/> METRIC UNITS									

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	82	1



Beginning chain PRO200A description

Point 8100 N 574,440.6383 E 1,795,934.0024 Sta 200+00.00
 Course from 8100 to PC PRO200A-1 N 62° 32' 02.36" E Dist 688.9050

Curve Data

Curve PRO200A-1
 P.I. Station 209+44.01 N 574,876.0351 E 1,796,771.6046
 Delta = 7° 17' 53.61" (LT)
 Degree = 1° 25' 56.62"
 Tangent = 255.1012
 Length = 509.5123
 Radius = 4,000.0000
 External = 8.1263
 Long Chord = 509.1679
 Mid. Ord. = 8.1098
 P.C. Station 206+88.91 N 574,758.3767 E 1,796,545.2572
 P.T. Station 211+98.42 N 575,021.4940 E 1,796,981.1715
 C.C. N 578,307.5151 E 1,794,700.3678
 Back = N 62° 32' 02.36" E
 Ahead = N 55° 14' 08.74" E
 Chord Bear = N 58° 53' 05.55" E

Course from PT PRO200A-1 to PC PRO200A-2 N 55° 14' 08.74" E Dist 250.0000

Curve Data

Curve PRO200A-2
 P.I. Station 218+35.11 N 575,384.5363 E 1,797,504.2171
 Delta = 11° 02' 36.90" (RT)
 Degree = 1° 25' 56.62"
 Tangent = 386.6917
 Length = 770.9876
 Radius = 4,000.0000
 External = 18.6478
 Long Chord = 769.7947
 Mid. Ord. = 18.5613
 P.C. Station 214+48.42 N 575,164.0443 E 1,797,186.5478
 P.T. Station 222+19.40 N 575,540.0938 E 1,797,858.2402
 C.C. N 571,878.0232 E 1,799,467.3516
 Back = N 55° 14' 08.74" E
 Ahead = N 66° 16' 45.64" E
 Chord Bear = N 60° 45' 27.19" E

Course from PT PRO200A-2 to 8101 N 66° 16' 45.64" E Dist 3,785.1541

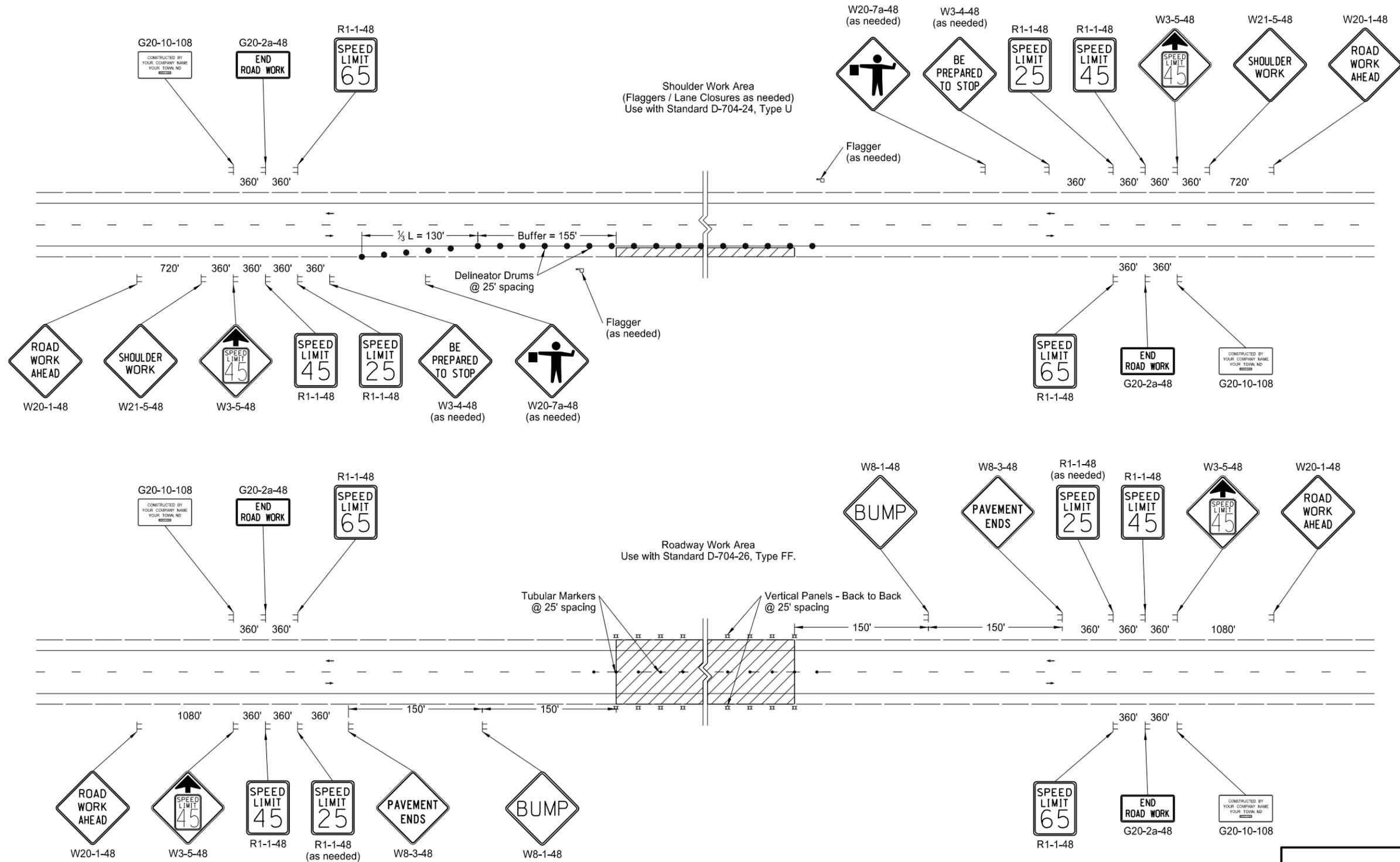
Point 8101 N 577,062.7774 E 1,801,323.6156 Sta 260+04.56

Ending chain PRO200A description

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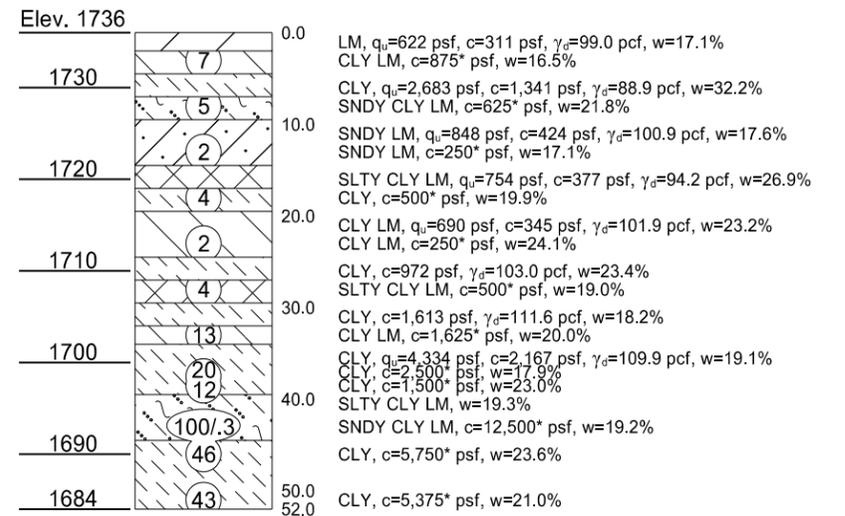
Alignment Description
 Chain: PRO200A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-200(063)916	100	2

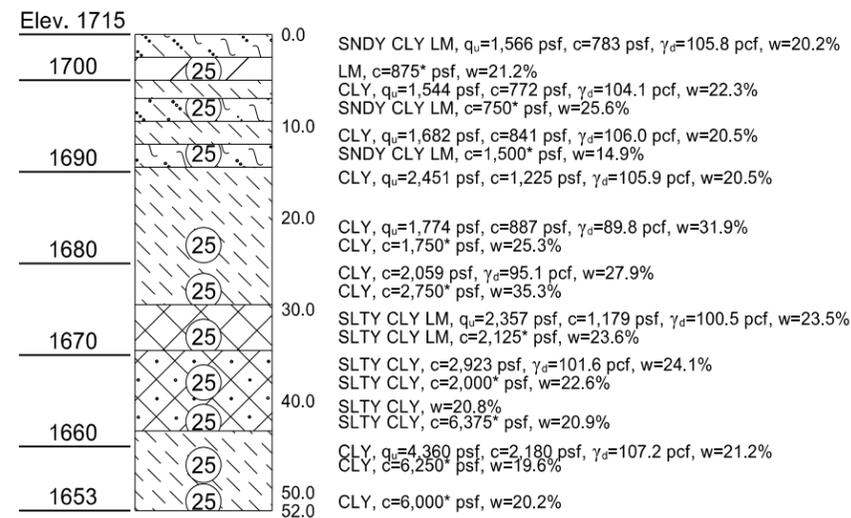


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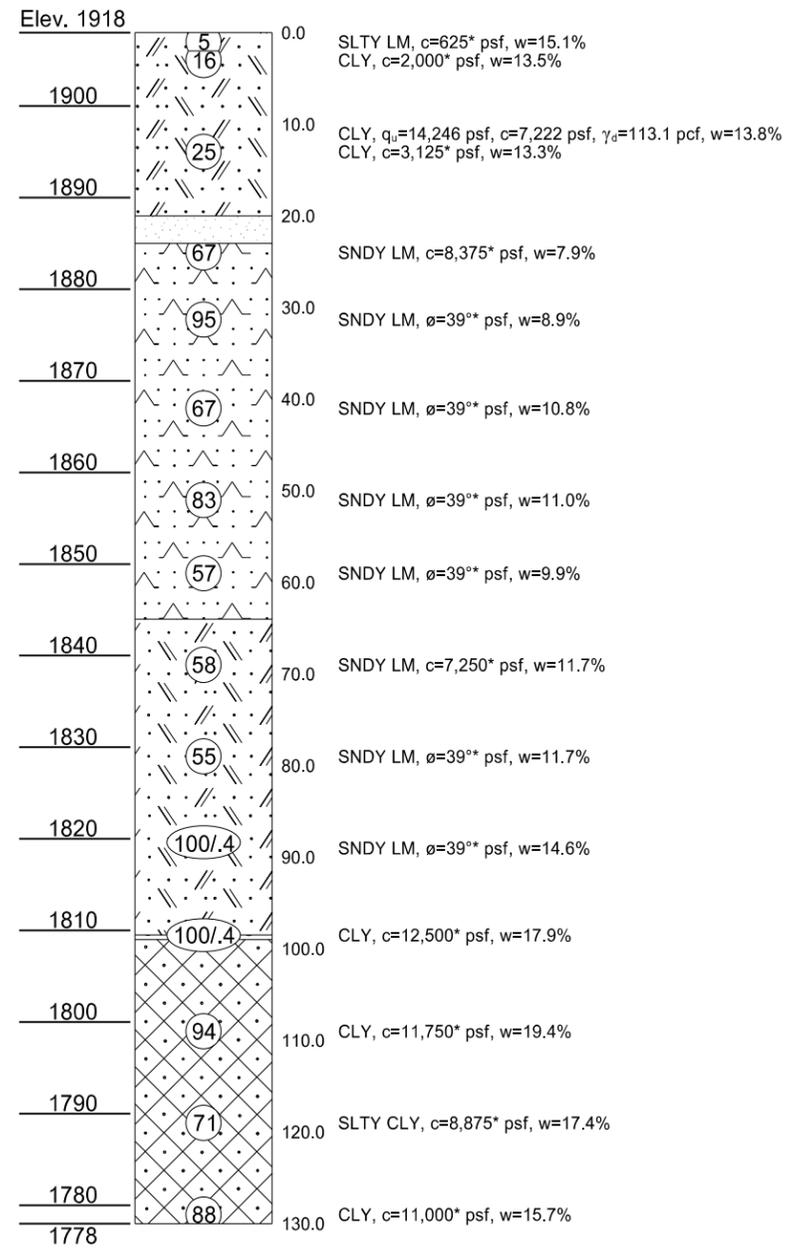
Work Zone Traffic Control
ND 200A



Boring #1 Station 43+82 69' LT
 Drilled on 9/12/2011 to 9/13/2011



Boring #2 Station 45+08 147' LT
 Drilled on 9/12/2011 to 9/13/2011



Boring #3 Station 46+30 565' RT
 Drilled on 11/15/2011 to 11/16/2011

Notes:
 THE ENCIRCLED NUMBERS INDICATE THE NUMBER OF BLOWS DELIVERED BY A 140 POUND AUTOMATIC HAMMER FROM A HEIGHT OF 30 INCHES TO DRIVE A 2 INCH O.D. SPLIT-BARREL SAMPLER 1 FOOT.

THE BORING DATA SHOWN IS FOR NORTH DAKOTA DEPARTMENT OF TRANSPORTATION'S (NDDOT) DESIGN AND ESTIMATING PURPOSES ONLY. THE BORING LOGS ARE ONLY REPRESENTATIVE OF THE EXACT LOCATION FROM WHICH THE SAMPLES WERE TAKEN AND INTERPRETATION BETWEEN THE SAMPLE LOCATIONS IS DISCOURAGED. THE NDDOT ASSUMES NO RESPONSIBILITY IF THE SOIL CONDITIONS ENCOUNTERED DURING CONSTRUCTION DIFFER FROM THOSE SHOWN. FURTHER SOIL INFORMATION MAY BE AVAILABLE AT:

NDDOT
 MATERIALS & RESEARCH DIVISION
 300 AIRPORT ROAD
 BISMARCK, NORTH DAKOTA 58504-6005
 PHONE (701)328-6900

q_u =Unconfined Compressive Strength (psf)
 w =Moisture Content (%)
 ϕ =Friction Angle (deg)
 c =Cohesion (psf)
 γ_d =Dry Density (pcf)
 *These cohesive values and friction angles are estimated from blow counts

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 Registration Number
 PE- 5950,
 on 1/17/2012 and the original document is stored at the
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 of Transportation

Soil Boring Logs

NDDOT ABBREVIATIONS

? This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.

Abn abandoned
 Abut abutment
 Ac acres
 Adj adjusted
 Aggr aggregate
 Ahd ahead
 ARV air release valve
 Align alignment
 Al alley
 Alt alternate
 Alum aluminum
 ADA Americans with Disabilities Act
 A ampere
 & and
 Appr approach
 Approx approximate
 ACP asbestos cement pipe
 Asph asphalt
 AC asphalt cement
 Assmd assumed
 @ at
 Atten attenuation
 ATR automatic traffic recorder
 Ave Avenue
 Avg average
 ADT average daily traffic
 Az azimuth
 Bk back
 BF back face
 Bs backsight
 Balc balcony
 B Wire barbed wire
 Barr barricade
 Btry battery
 Brg bearing
 BI beehive inlet
 Beg begin
 BM bench mark
 Bkwy bikeway
 Bit bituminous
 Blk block
 Bd Ft board feet
 BH bore hole
 BS both sides
 Bot bottom
 Blvd Boulevard
 Bndry boundary
 BC brass cap
 Brkwy breakaway
 Br bridge
 Bldg building

BV butterfly valve
 Byp bypass
 C Gdrl cable guardrail
 Calc calculate
 Cd candela
 CIP cast iron pipe
 CB catch basin
 CRS cationic rapid setting
 C Gd cattle guard
 C To C center to center
 Cl or C centerline
 Cm centimeter
 Ch chain
 Chnlk chain-link
 Ch Blk channel block
 Ch Ch channel change
 Chk check
 Chsld chiseled
 Cir circle
 Cl class
 Cl clay
 Cl F clay fill
 Cl Hvy clay heavy
 Cl Lm clay loam
 Clnt clean-out
 Clr clear
 Cl&gr clearing & grubbing
 Co S coal slack
 Comb. combination
 Coml commercial
 Compr compression
 CADD computer aided drafting & design
 Conc concrete
 Cond conductor
 Const construction
 Cont continuous
 CSB continuous split barrel sample
 Contr contraction
 Contr contractor
 CP control point
 Coord coordinate
 Cor corner
 Corr corrected
 CAES corrugated aluminum end section
 CAP corrugated aluminum pipe
 CMES corrugated metal end section
 CMP corrugated metal pipe
 CPVCP corrugated poly-vinyl chloride pipe
 CSES corrugated steel end section
 CSP corrugated steel pipe
 C coulomb
 Co County
 Crse course
 C Gr course gravel
 CS course sand

Ct Court
 Xarm cross arm
 Xbuck cross buck
 Xsec cross sections
 Xing crossing
 Xrd Crossroad
 Crn crown
 CF cubic feet
 M3 cubic meter
 M3/s cubic meters per second
 CY cubic yard
 Cy/mi cubic yards per mile
 Culv culvert
 C&G curb & gutter
 CI curb inlet
 CR curb ramp
 CS curve to spiral
 C cut
 Dd Ld dead load
 Defl deflection
 Defm deformed
 Deg or D degree
 DInt delineate
 DIntr delineator
 Depr depression
 Desc description
 Det detail
 DWP detectable warning panel
 Dtr detour
 Dia diameter
 Dir direction
 Dist distance
 DM disturbed material
 DB ditch block
 DG ditch grade
 Dbl double
 Dn down
 Dwg drawing
 Dr drive
 Drwy driveway
 DI drop inlet
 D dry density
 Ea each
 Esmt easement
 E East
 EB Eastbound
 Elast elastomeric
 EL electric locker
 E Mtr electric meter
 Elec electric/al
 EDM electronic distance meter
 Elev or El elevation
 Ellipt elliptical
 Emb embankment
 Emuls emulsion/emulsified

ES end section
 Engr engineer
 ESS environmental sensor station
 Eq equal
 Eq equation
 Evgr evergreen
 Exc excavation
 Exst existing
 Exp expansion
 Expy Expressway
 E external of curve
 Extru extruded
 FOS factor of safety
 F Fahrenheit
 FS far side
 F farad
 Fed Federal
 FP feed point
 Ft feet/foot
 Fn fence
 Fn P fence post
 FO fiber optic
 FB field book
 FD field drive
 F fill
 FAA fine aggregate angularity
 FS fine sand
 FH fire hydrant
 Fl flange
 Flrd flared
 FES flared end section
 F Bcn flashing beacon
 FA flight auger sample
 FL flow line
 Ftg footing
 FM force main
 Fs foresight
 Fnd found
 Fdn foundation
 Frac fractional
 Frwy freeway
 Frt front
 FF front face
 F Disp fuel dispenser

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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NDDOT ABBREVIATIONS

D-101-2

FFP	fuel filler pipes	IP	iron Pipe	M	mega	Ped	pedestrian
FLS	fuel leak sensor	Jt	joint	Mer	meridian	PPP	pedestrian pushbutton post
Furn	furnish/ed	J	joule	M	meter	Pen.	penetration
Gal	gallon	Jct	junction	M/s	meters per second	Perf	perforated
Galv	galvanized	K	kelvin	M	mid ordinate of curve	Per.	perimeter
Gar	garage	Kn	kilo newton	Mi	mile	PL	pipeline
Gs L	gas line	Kpa	kilo pascal	MM	mile marker	PI	place
G Reg	gas line regulator	Kg	kilogram	MP	mile post	P&P	plan & profile
GMV	gas main valve	Kg/m3	kilogram per cubic meter	MI	milliliter	PL	plastic limit
G Mtr	gas meter	Km	kilometer	Mm	millimeter	PI	plate
GSV	gas service valve	K	Kip(s)	Mm/hr	millimeters per hour	Pt	point
GVP	gas vent pipe	LS	Land Surveyor (licensed)	Min	minimum	PCC	point of compound curve
GV	gate valve	LSIT	Land Surveyor In Training	Misc	miscellaneous	PC	point of curve
Ga	gauge	Ln	lane	Mon	monument	PI	point of intersection
Geod	geodetic	Lg	large	Mnd	mound	PRC	point of reverse curvature
GIS	Geographical Information System	Lat	latitude	Mtbl	mountable	PT	point of tangent
G	giga	Lt	left	Mtd	mounted	POC	point on curve
GPS	Global Positioning System	L	length of curve	Mtg	mounting	POT	point on tangent
Gov	government	Lens	lenses	Mk	muck	PE	polyethylene
Grd	graded/grade	Lvl	level	Mun	municipal	PVC	polyvinyl chloride
Gr	gravel	LB	level book	N	nano	PCC	Portland Cement concrete
Grnd	ground	LvIng	leveling	NGS	National Geodetic Survey	Lb or #	pounds
GWM	ground water monitor	Lht	light	NS	near side	PP	power pole
Gdrl	guardrail	LP	light pole	Neop	neoprene	Preempt	preemption
Gtr	gutter	Ltg	lighting	Ntwk	network	Prefab	prefabricated
H Plg	H piling	Lig Co	lignite coal	N	newton	Prfmd	performed
Hdwl	headwall	Lig Sl	lignite slack	N	North	Prep	preparation
Ha	hectare	LF	linear foot	NE	North East	Press.	pressure
Ht	height	Liq	liquid	NW	North West	PRV	pressure relief valve
HI	height of instrument	LL	liquid limit	NB	Northbound	Prestr	prestressed
Hel	helical	L	litre	No. or #	number	Pvt	private
H	henry	Lm	loam	Obsc	obscure(d)	PD	private drive
HZ	hertz	Loc	location	Obsn	observation	Prod.	production/produce
HDPE	high density polyethylene	LC	long chord	Ocpd	occupied	Prog	programmed
HM	high mast	Long.	longitude	Ocpy	occupy	Prop.	property
HP	high pressure	Lp	loop	Off Loc	office location	Prop Ln	property line
HPS	high pressure sodium	LD	loop detector	O/s	offset	Ppsd	proposed
Hwy	highway	Lm	lumen	OC	on center	PB	pull box
Hor	horizontal	Lum	luminaire	C	one dimensional consolidation		
HBP	hot bituminous pavement	L Sum	lump sum	OC	organic content		
Hr	hour(s)	Lx	lux	Orig	original		
Hyd	hydrant	ML	main line	O To O	out to out		
Ph	hydrogen ion content	M Hr	man hour	OD	outside diameter		
Id	identification	MH	manhole	OH	overhead		
In or "	inch	Mkd	marked	PMT	pad mounted transformer		
Incl	inclinometer tube	Mkr	marker	Pg	pages		
IMH	inlet manhole	Mkg	marking	Pntd	painted		
ID	inside diameter	MA	mast arm	Pr	pair		
Inst	instrument	Matl	material	Pnl	panel		
Intchg	interchange	Max	maximum	Pk	park		
Intmdt	intermediate	MC	meander corner	PK	Parker-Kalon nail		
Intscn	intersection	Meas	measure	Pa	pascal		
Inv	invert	Mdn	median	PSD	passing sight distance		
IM	iron monument	MD	median drain	Pvmt	pavement		
IPn	Iron Pin	MC	medium curing	Ped	pedestal		

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NDDOT ABBREVIATIONS

D-101-3

Qty	quantity	Sig	signal	TS	tangent to spiral	WB	Westbound
Qtr	quarter	Si Cl	silt clay	Tel	telephone	Wrng	wiring
Rad or R	radius	Si Cl Lm	silty clay loam	Tel B	Telephone Booth	W/	with
RR	railroad	Si Lm	silty loam	Tel P	telephone pole	W/o	without
Rlwy	railway	Sgl	single	Tv	television	WC	witness corner
Rsd	raised	SC	slow curing	Temp	temperature	WGS	World Geodetic System
RTP	random traverse point	SS	slow setting	Temp	temporary	Z	zenith
Rge or R	range	Sm	small	TBM	temporary bench mark		
RC	rapid curing	S	South	T	tesla		
Rec	record	SE	South East	T	thinwall tube sample		
Rcy	recycle	SW	South West	T/mi	tons per mile		
RPCC	recycled Portland cement concrete	SB	Southbound	Ts	topsoil		
Ref	reference	Sp	spaces	Twp or T	township		
R Mkr	reference marker	Spcl	special	Traf	traffic		
RM	reference monument	SA	special assembly	TSCB	traffic signal control box		
Refl	reflectorized	SP	special provisions	Tr	trail		
RCB	reinforced concrete box	G	specific gravity	Transf	transformer		
RCES	reinforced concrete end section	Spk	spike	TB	transit book		
RCP	reinforced concrete pipe	SC	spiral to curve	Trans	transition		
RCPS	reinforced concrete pipe sewer	ST	spiral to tangent	TT	transmission tower		
Reinf	reinforcement	SB	split barrel sample	Trans	transverse		
Res	reservation	SH	sprinkler head	Trav	traverse		
Ret	retaining	SV	sprinkler valve	TP	traverse point		
Rev	reverse	Sq	square	Trtd	treated		
Rt	right	SF	square feet	Trmt	treatment		
R/W	right of way	Km2	square kilometer	Qc	triaxial compression		
Riv	river	M2	square meter	TERO	tribal employment rights ordinance		
Rd	road	SY	square yard	Tpl	triple		
Rdbd	road bed	Stk	stake	TP	turning point		
Rdwy	roadway	Std	standard	Typ	typical		
RWIS	Roadway Weather Information System	N	standard penetration test	Qu	unconfined compressive strength		
Rk	rock	Std Specs	Standard Specifications	Ugrnd	underground		
Rt	route	Sta	station	USC&G	US Coast & Geodetic Survey		
Salv	salvage(d)	Sta Yd	station yards	USGS	US Geologic Survey		
Sd	sand	Stm L	steam line	Util	utility		
Sdy Cl	sandy clay	SEC	steel encased concrete	VG	valley gutter		
Sdy Cl Lm	sandy clay loam	SSD	stopping sight distance	Vap	vapor		
Sdy Fl	sandy fill	SD	storm drain	Vert	vertical		
Sdy Lm	sandy loam	St	street	VC	vertical curve		
San	sanitary sewer line	SPP	structural plate pipe	VCP	vitrified clay pipe		
Sc	scoria	SPPA	structural plate pipe arch	V	volt		
Sec	seconds	Str	structure	Vol	volume		
Sec	section	Subd	subdivision	Wkwy	walkway		
SL	section line	Sub	subgrade	W	water content		
Sep	separation	Sub Prep	subgrade preparation	WGV	water gate valve		
Seq	sequence	Ss	subsoil	WL	water line		
Serv	service	SE	superelevation	WM	water main		
Sh	shale	SS	supplement specification	WMV	water main valve		
Sht	sheet	Supp	supplemental	W Mtr	water meter		
Shtng	sheeting	Surf	surfacing	WSV	water service valve		
Shldr	shoulder	Surv	survey	WW	water well		
Sw	sidewalk	Sym	symmetrical	W	watt		
S	siemens	SI	Systems International	Wrng	wearing		
SD	sight distance	Tan	tangent	Wb	weber		
SN	sign number	T	tangent (semi)	WIM	Weigh In Motion		
				W	West		

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications	GT PLNS NAT GAS	Great Plains Natural Gas Company	RED RIV TEL	Red River Rural Telephone
ACCENT	Accent Communications	HALS TEL	Halstad Telephone Company	RESVTN TEL	Reservation Telephone
AGASSIZ WU	Agassiz Water Users Incorporated	IDEA1	Idea1	ROBRTS TEL	Roberts Company Telephone
AGC	Associated General Contractors of America	INT-COMM TEL	Inter-Community Telephone Company	R-RIDER ELEC	Roughrider Electric Coop
All PI	Alliance Pipeline	KANEB PL	Kaneb Pipeline Company	RRVW	Red River Valley & Western Railroad
ALL SEAS WU	All Seasons Water Users Association	KEM ELEC	Kem Electric Cooperative Incorporated	RSR ELEC	R.S.R. Electric Cooperative
AMOCO PI	Amoco Pipeline Company	KOCH GATH SYS	Koch Gathering Systems Incorporated	S E W U	South East Water Users Incorporated
AMRDA HESS	Amerada Hess Corporation	LKHD PL	Lakehead Pipeline Company	SCOTT CABLE	Scott Cable Television Dickinson
AT&T	AT&T Corporation	LNGDN RWU	Langdon Rural Water Users Incorporated	SHERDN ELEC	Sheridan Electric Cooperative
B PAW	Bear Paw Energy Incorporated	LWR YELL R ELEC	Lower Yellowstone Rural Electric	SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
BAKER ELEC	Baker Electric	MCKNZ CON	McKenzie Consolidated Telcom	SKYTECH	Skyland Technologies Incorporated
BASIN ELEC	Basin Electric Cooperative Incorporated	MCKNZ ELEC	McKenzie Electric Cooperative	SLOPE ELEC	Slope Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative	MCKNZ WRD	McKenzie County Water Resource District	SOURIS RIV TELCOM	Souris River Telecommunications
BELLE PL	Belle Fourche Pipeline Company	MCLEOD	McLeod USA	ST WAT COMM	State Water Commission
BLM	Bureau of Land Management	MCLN ELEC	McLean Electric Cooperative	STATE LN WATER	State Line Water Cooperative
BNSF	Burlington Northern Santa Fe Railway	MCLN-SHRDN R WAT	McLean-Sheridan Rural Water	STER ENG	Sterling Energy
BOEING	Boeing	MDU	Montana-dakota Utilities	STUT RWU	Stutsman Rural Water Users
BRNS RWD	Barnes Rural Water District	MID-CONT CABLE	Mid-Continent Cable	SW PL PRJ	Southwest Pipeline Project
BURK-DIV ELEC	Burke-Divide Electric Cooperative	MIDSTATE TEL	Midstate Telephone Company	T M C	Turtle Mountain Communications
BURL WU	Burleigh Water Users	MINOT CABLE	Minot Cable Television	TCI	TCI of North Dakota
Cable One	Cable One	MINOT TEL	Minot Telephone Company	TESORO GHG PLNS PL	Tesoro High Plains Pipeline
CABLE SERV	Cable Services	MISS W W S	Missouri West Water System	TRI-CNTY WU	Tri-County Water Users Incorporated
CAP ELEC	Capital Electric Cooperative Incorporat	MNKOTA PWR	Minnkota Power	TRL CO RWU	Traill County Rural Water Users
CASS CO ELEC	Cass County Electric Cooperative	MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative	UNTD TEL	United Telephone
CASS RWU	Cass Rural Water Users Incorporated	MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative	UPPR SOUR WUA	Upper Souris Water Users Association
CAV ELEC	Cavalier Rural Electric Cooperative	MRE LBTY TEL	Moore & Liberty Telephone	US SPRINT	U.S. Sprint
CBLCOM	Cablecom Of Fargo	MUNICIPAL	City Water And Sewer	USAF MSL CABLE	U.S.A.F. Missile Cable
CENEX PL	Cenex Pipeline	MUNICIPAL	City Of '.....'	USFWS	US Fish and Wildlife Service
CENT PL WATER DIST	Central Pipe Line Water District	N CENT ELEC	North Central Electric Cooperative	USW COMM	U.S. West Communications
CENT PWR ELEC	Central Power Electric Cooperative	N VALL W DIST	North Valley Water District	VRNDRY ELEC	Verendrye Electric Cooperative
COE	Corps of Engineers	ND PKS & REC	North Dakota Parks And Recreation	W RIV TEL	West River Telephone Incorporated
CONS TEL	Consolidated Telephone	ND TEL	North Dakota Telephone Company	WEB	W. E. B. Water Development Association
CONT RES	Continental Resource Inc	NDDOT	North Dakota Department of Transportation	WILLI RWA	Williams Rural Water Association
CPR	Canadian Pacific Railway	NDSU SOIL SCI DEPT	NDSU Soil Science Department	WILSTN BAS PL	Williston Basin Interstate Pipeline Company
D O E	Department Of Energy	NEMONT TEL	Nemont Telephone	WLSH RWD	Walsh Water Rural Water District
DAK CARR	Dakota Carrier Network	NODAK R ELEC	Nodak Rural Electric Cooperative	WOLVRTN TEL	Wolverton Telephone
DAK CENT TEL	Dakota Central Telephone	NOON FRMS TEL	Noonan Farmers Telephone Company	XLENER	Xcel Energy
DAK RWD	Dakota Rural Water District	NPR	Northern Plains Railroad	YSVR	Yellowstone Valley Railroad
DGC	Dakota Gasification Company	NSP	Northern States Power		
DICKEY R NET	Dickey Rural Networks	NTH PRAIR RW	Northern Prairie Rural Water Association		
DICKEY RWU	Dickey Rural Water Users Association	NTHN BRDR PL	Northern Border Pipeline		
DICKEY TEL	Dickey Telephone	NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated		
DNRR	Dakota Northern Railroad	NTHWSTRN REF	Northwestern Refinery Company		
DO ME PL	Dome Pipeline Company	NW COMM	Northwest Communication Cooperation		
DVELEC	Dakota Valley Electric Cooperative	ONEOK	Oneok gas		
DVMW	Dakota, Missouri Valley & Western	OSHA	Occupational Safety and Health Administration		
ENBRDG	Enbridge Pipelines Incorporated	OTTR TL PWR	Otter Tail Power Company		
ENVENTIS	Enventis Telephone	P L E M	Prairielands Energy Marketing		
FALK MNG	Falkirk Mining Company	POLAR COM	Polar Communications		
FHWA	Federal Highway Administration	PVT ELEC	Private Electric		
G FKS-TRL WD	Grand Forks-trail Water District	QWEST	Qwest Communications		
GETTY TRD & TRAN	Getty Trading & Transportation	R&T W SUPPLY	R & T Water Supply Association		
GLDN W ELEC	Golden West Electric Cooperative	RAMSEY R SEW	Ramsey Rural Sewer Association		
GRGS CO TEL	Griggs County Telephone	RAMSEY RW	Ramsey Rural Water Association		
		RAMSEY UTIL	Ramsey County Rural Utilities		

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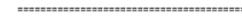
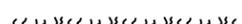
Line Styles

.....	Limits of Const Transition Line	—— s —— s ——	Floating Silt Curtain	—— ——— ———	Existing Aggregate (Cross Section View)	- - - - -	Existing Centerline
.....	Bale Check	—— ——— T ——	Existing Telephone Line	—— ——— ———	Existing Curb and Gutter (Cross Section View)	- - - - -	Supplemental Contour
.....	Rock Check	—— ——— TV ——	Existing TV Line	—— ——— ———	Existing Riprap	—— - - - - -	Right of Way
.....	Sight Distance Triangle Line	Void — void — void — v	Existing Assumed Ground (Not Surveyed)	—— ——— ———	Existing Underground Vault or Lift Station	—— - - - - -	Existing Right of Way
- - - - -	Small Hidden Object	Void — void — void — v	Tentative Ground Line	—— ——— ———	Tangent Line	—— - - - - -	Existing Right of Way Railroad
- - - - -	Dimension Leader	—— ——— w ——	Existing Water or Steam Line	- - - - -	Hidden Object	- - - - -	Failure Line
- - - - -	Existing Ground	=====	Existing Under Drain	—— ——— ———	Existing Dirt Surface	- - - - -	Existing Conditions
- - - - -	Existing Topsoil (Cross Section View)	=====	Under Drain	—— ——— ———	Existing Conduit	- - - - -	Existing Ground (Details)
—— ——— ———	Large Hidden Object	=====	Wall	—— ——— ———	Topsoil Profile	—— - - - - -	Existing Sixteenth Section Line
—— ——— ———	Edge Drain	=====	Existing Slotted Drain	- - - - -	Existing Conductor	- - - - -	Existing Right of Way Not State Owned
—— D —— D ——	Geotextile Fabric Type D	—— + —— + ——	Existing Cemetary Boundary	- - - - -	Conductor	- - - - -	Phantom Object
—— ——— E ——	Existing Electrical	—— ——— ———	Centerline Pavement Marking	- - - - -	Fiber Optic	- - - - -	Centerline Main
—— ——— FO ——	Existing Fiber Optic Line	=====	Barrier with Centerline Pavement Marking	- - - - -	Existing Loop Detector	-	Existing Guardrail Cable
—— ——— FO ——	Existing TV Fiber Optic	=====	Barrier Pavement Marking	- - - - -	Subgrade, Subcut or Ditch Grade	— . — . — . — .	Existing Guardrail Metal
—— ——— G ——	Existing Gas Pipe	- - - - -	Stripe 4 IN Dotted Extension White	—— ——— ———	Existing Asphalt Surface	—— . —— . —— . ——	Existing Edge of Water
—— ——— Geo —— Geo ——	Geogrid	- - - - -	Stripe 8 IN Dotted Extension White	—— ——— ———	Existing Asphalt (Cross Section View)	- - - - -	Excavation Limits
—— ——— OH ——	Existing Overhead Utility Line	- - - - -	Stripe 8 IN Lane Drop	—— ——— ———	Existing Reinforcement Rebar	—— . . . —— . . . ——	Existing Government Lot Line
—— ——— P ——	Existing Power	—— ——— ———	Wetland Mitigation	—— ——— ———	Existing Tie Point Line	.....	Existing Adjacent Block Lines
—— ——— PL ——	Existing Fuel Pipeline	- - - - -	Existing Box Culvert Bridge	—— ——— ———	Existing State or International Line	.....	Existing Adjacent Lot Lines
—— ——— PL ——	Existing Undefined Above Ground Pipe Line	- - - - -	Existing Concrete Surface	—— ——— ———	Existing Quarter Section Line	.....	Existing Adjacent Property Line
—— ——— R —— R ——	Geotextile Fabric Type R	- - - - -	Existing Drainage Structure	—— ——— ———	Existing County	.....	Existing Adjacent Subdivision Lines
—— ——— R —— R ——	Geotextile Fabric Type R1	- - - - -	Easement	—— ——— ———	Existing Section Line	.....
—— REMOVE —— REMOVE ——	Remove Line	- - - - -	Existing Concrete	—— ——— ———	Existing Township	.....
—— ——— RR —— RR ——	Geotextile Fabric Type RR	- - - - -	Existing Easement	—— ——— ———	Existing Railroad Centerline	
—— ——— S —— S ——	Geotextile Fabric Type S	—— ——— ———	Existing Gravel Surface	—— ——— ———	Centerline	

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07-01-14	
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Line Styles

	Subgrade Reinforcement		Existing Railroad Switch		Sheet Piling
	Existing Down Guy Wire Down Guy		Overhead Sign Structure Cantilever		W-Beam w Posts
	Existing Fence		24 Inch Pipe		Existing W-Beam Guardrail with Posts
	Existing Railroad		Reinforced Concrete Pipe		Exst Wet Area-Vegetation Break
	Existing Sanitary Sewer		Signal Head with Mast Arm		Existing Wetland Delineated
	Existing Sanitary Force Main		Existing Signal Head with Mast Arm		
	Existing Storm Drain		Tie Bar at Random Spacing		
	Existing Storm Drain Force Main		3-Cable w Posts		
	Fence		Existing 3-Cable w Posts		
	Silt Fence		Site Boundary		
	Existing Field Line		Fiber Rolls		
	Exst Flow		Doweled Joint		
	Flow		Tie Bar 30 Inch 4 Foot Center to Center		
	Existing Culvert		Tie Bar 18 Inch 3 Foot Center to Center		
	Existing Curb		Existing Berm, Dike, Pit, or Earth Dam		
	Existing Valley Gutter		Existing Ditch Block		
	Existing Driveway Gutter		Depression Contours		
	Existing Curb and Gutter		Existing City Corporate Limits or Reservation Boundary		
	Existing Mountable Curb and Gutter		Gravel Pit - Borrow Area		
	Existing Double Micro Loop Detector		Existing Tree Boundary		
	Micro Loop Detector Double		Tree Row		
	Existing Overhead Sign Structure		Existing Brush or Shrub Boundary		
	Existing Micro Loop Detector		Existing Retaining Wall		
	Micro Loop Detector		Existing Planter or Wall		
	Existing Overhead Sign Structure Cantilever		Retaining Wall (Plan View)		

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DATE	CHANGE

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Symbols

	North Arrow (Half Scale)		Attenuation Device		Existing Railroad Battery Box		Existing Delineator Type E
	Truck Mounted Attenuator		Diamond Grade Delineator Type A		Existing Bush or Shrub		Existing EFB Misc
	Type I Barricade		Diamond Grade Delineator Type B		Existing Gas Cap or Stub		Existing Flashing Beacon
	Type II Barricade		Diamond Grade Delineator Type C		Existing Sanitary Cap or Stub		Existing Pipe Mounted Flasher
	Type III Barricade		Diamond Grade Delineator Type D		Existing Storm Drain Cap or Stub		Existing Pad Mounted Feed Point
	Catch Basin		Diamond Grade Delineator Type E		Existing Water Cap or Stub		Existing Pipe Mounted Feed Point with Pad
	Cairn or Stone Circle		Flexible Delineator		Existing Sanitary Cleanout		Existing Pole Mounted Feed Point
	Video Detection Camera		Flexible Delineator Type A		Existing Concrete Foundation		Existing Railroad Frog
	Storm Drain Cap or Stub		Flexible Delineator Type B		Existing Traffic Signal Controller		Existing Snow Gate 18
	Corrugated Metal End Section 18 Inch		Flexible Delineator Type C		Existing Pad Mounted Signal Controller		Existing Snow Gate 28
	Corrugated Metal End Section 24 Inch		Flexible Delineator Type D		Existing Sixteenth Section Corner		Existing Snow Gate 40
	Corrugated Metal End Section 30 Inch		Flexible Delineator Type E		Existing Quarter Section Corner		Existing Headwall
	Corrugated Metal End Section 36 Inch		Delineator Type A		Existing Section Corner		Existing Pedestrian Head with Number
	Corrugated Metal End Section 42 Inch		Delineator Type A Reset		Existing Railroad Crossbuck		Existing Signal Head
	Corrugated Metal End Section 48 Inch		Delineator Type B		Existing Satellite Dish		Existing Sprinkler Head
	Concrete Foundation		Delineator Type B Reset		Existing Fuel Dispensers		Existing Fire Hydrant
	Ground Connection Conductor		Delineator Type C		Existing Flexible Delineator Type A		Existing Catch Basin Drop Inlet
	Neutral Connection Conductor		Delineator Type D		Existing Flexible Delineator Type B		Existing Curb Inlet
	Phase 1 Connection Conductor		Delineator Type E		Existing Flexible Delineator Type C		Existing Manhole Inlet
	Phase 2 Connection Conductor		Delineator Drums		Existing Flexible Delineator Type D		Existing Junction Box
	Traffic Cone		Spot Elevation		Existing Flexible Delineator Type E		
	Signal Controller		Existing Access Control Arrow		Existing Delineator Type A		
	Pad Mounted Signal Controller		Existing Artifact		Existing Delineator Type B		
	Alignment Data Point		Existing Flashing Beacon		Existing Delineator Type C		
	Emergency Vehicle Detector		Existing Benchmark		Existing Delineator Type D		

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Symbols

	Existing Light Standard		Existing Manhole with Valve Water		Existing Telephone Pole		Existing Undefined Manhole
	Existing High Mast Light Standard 10 Luminaire		Existing Water Manhole		Existing Wood Pole		Existing Undefined Pull Box
	Existing High Mast Light Standard 3 Luminaire		Existing Mile Post Type A		Existing Post		Existing Undefined Pedestal
	Existing High Mast Light Standard 4 Luminaire		Existing Mile Post Type B		Existing Pedestrian Push Button Post		Existing Undefined Valve
	Existing High Mast Light Standard 5 Luminaire		Existing Mile Post Type C		Existing Control Point CP		Existing Undefined Pipe Vent
	Existing High Mast Light Standard 6 Luminaire		Existing Reference Marker		Existing Control Point GPS-RTK		Existing Gas Valve
	Existing High Mast Light Standard 7 Luminaire		Existing RW Marker		Existing Control Point TRI		Existing Water Valve
	Existing High Mast Light Standard 8 Luminaire		Existing Utility Marker		Existing Reference Marker Point NGS		Existing Fuel Pipe Vent
	Existing High Mast Light Standard 9 Luminaire		Iron Monument Found		Existing Pull Box		Existing Gas Pipe Vent
	Existing Overhead Sign Structure Load Center		Iron Pin R/W Monument		Existing Intelligent Transportation Pull Box		Existing Sanitary Pipe Vent
	Existing Luminaire		Existing Object Marker Type I		Existing Water Pump		Existing Storm Drain Pipe Vent
	Existing Light Standard Luminaire		Existing Object Marker Type II		Existing Slotted Reinforced Concrete Pipe		Existing Water Pipe Vent
	Existing Federal Mailbox		Existing Object Marker Type III		Existing RR Profile Spot		Existing Weather Station
	Existing Private Mailbox		Existing Electrical Pedestal		Existing Fuel Leak Sensors		Existing Ground Water Well Bore Hole
	Existing Meander Section Corner		Existing Telephone Pedestal		Existing Highway Sign		Existing Windmill or Tower
	Existing Meter		Existing Fiber Optic Telephone Pedestal		Existing Miscellaneous Spot		Existing Witness Corner
	Existing Electrical Manhole		Existing TV Pedestal		Existing Lighting Standard Pole		Flashing Beacon
	Existing Gas Manhole		Existing Fiber Optic TV Pedestal		Existing Traffic Signal Standard		Flagger
	Existing Sanitary Manhole		Existing Fuel Filler Pipes		Existing Transformer		Pipe Mounted Flasher
	Existing Sanitary Force Main Manhole		Existing Traverse PI Aerial Panel		Existing Large Evergreen Tree		Sanitary Force Main with Valve
	Existing Sanitary Manhole with Valve		Existing Pole		Existing Small Evergreen Tree		
	Existing Storm Drain Manhole		Existing Power Pole		Existing Large Tree		
	Existing Force Main Storm Drain Manhole		Existing Power Pole with Transformer		Existing Small Tree		
	Existing Force Main Storm Drain Manhole with Valve				Existing Tree Trunk		
	Existing Telephone Manhole				Existing Pad Mounted Traffic Signal Control Box		

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Symbols

D-101-32

 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Gate Type 2  Junction Box  High Mast Light Standard 10 Luminaire  High Mast Light Standard 3 Luminaire  High Mast Light Standard 4 Luminaire  High Mast Light Standard 5 Luminaire  High Mast Light Standard 6 Luminaire  High Mast Light Standard 7 Luminaire  High Mast Light Standard 8 Luminaire  High Mast Light Standard 9 Luminaire  Relocate Light Standard  Overhead Sign Structure Load Center  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire	 Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 175 Watt High Pressure Sodium Vapor Luminaire  Light Standard 200 Watt High Pressure Sodium Vapor Luminaire  Light Standard 250 Watt High Pressure Sodium Vapor Luminaire  Light Standard 310 Watt High Pressure Sodium Vapor Luminaire  Light Standard 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 50 Watt High Pressure Sodium Vapor Luminaire  Light Standard 70 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Manhole  Manhole 48 Inch  Sanitary Force Main Manhole  Sanitary Sewer Manhole  Storm Drain Manhole  Storm Drain Manhole with Inlet  Reset Mile Post  Mile Post Type A  Mile Post Type B  Mile Post Type C  Right of Way Marker  Tubular Marker  Alignment Monument  Iron Pin Reference Monument	 Object Marker Type I  Object Marker Type II  Object Marker Type III  Caution Mode Arrow Panel  Back to Back Vertical Panel Sign  Double Direction Arrow Panel  Left Directional Arrow Panel  Right Directional Arrow Panel  Sequencing Arrow Panel  Truck Mounted Arrow Panel  Power Pole  Wood Pole  Pedestrian Push Button Post  Property Corner  Pull Box  Intelligent Transportation Pull Box  Sanitary Pump  Storm Drain Pump  Reinforced Pavement  Reinforced Concrete End Section 15 Inch  Reinforced Concrete End Section 18 Inch  Reinforced Concrete End Section 24 Inch  Reinforced Concrete End Section 30 Inch  Reinforced Concrete End Section 36 Inch  Reinforced Concrete End Section 42 Inch	 Reinforced Concrete End Section 48 Inch  Reinforced Concrete End Section 54 Inch  Reset Right of Way Marker  Reset USGS Marker  Right of Way Markers  Riser 30 Inch  Continuous Split Barrel Sample  Flight Auger Sample  Split Barrel Sample  Thinwall Tube Sample  Highway Sign  SNOW GATE 18 FT  SNOW GATE 28 FT  SNOW GATE 40 FT  Standard Penetration Test  Transformer  Inclinometer Tube  Underdrain Cleanout  Excavation Unit  Water Valve
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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

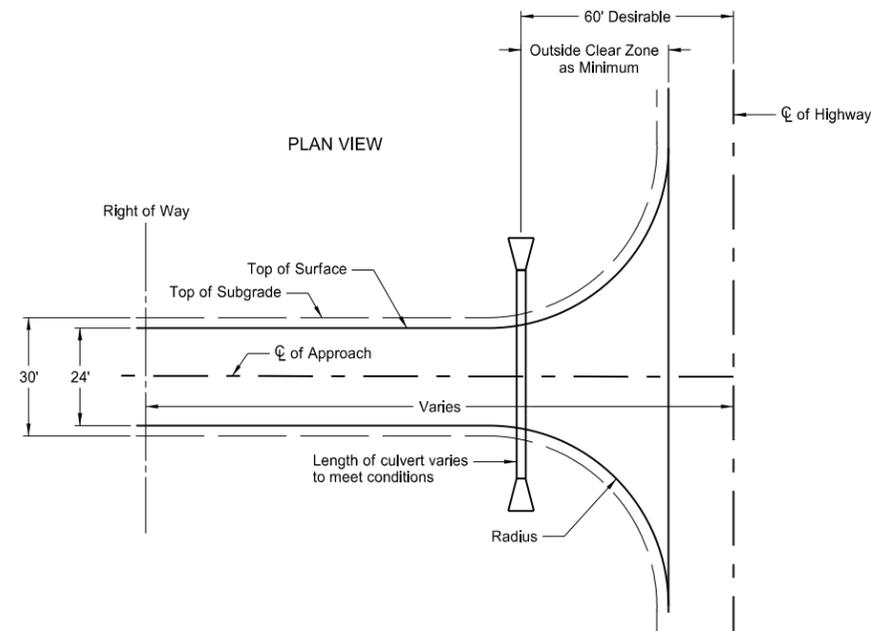
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STANDARD RURAL APPROACHES

D-203-8

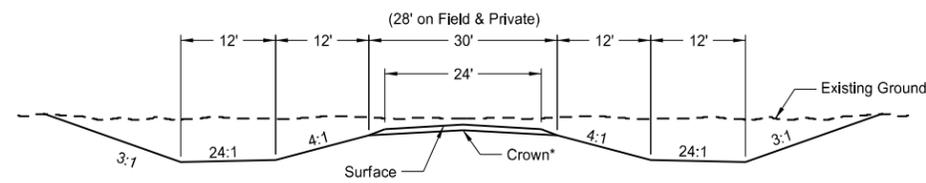
NOTES:

1. Max breakover between approach storage platform and highway shall not exceed 5%.
2. The approach slope shall be measured outside the area of mainline inslope influence.



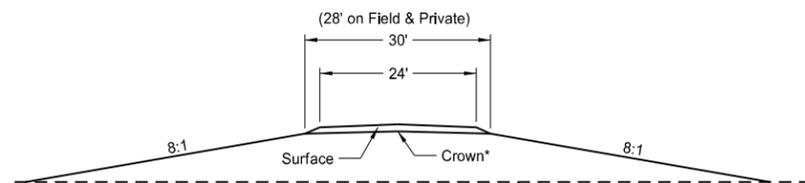
CRITERIA FOR RURAL APPROACH TYPES

	Field Drives	Private Drives	Low Volume Public Roads
Radius	R=24 ft	R=30 ft	R=40 ft
Maximum Grade	10%	7%	7%
Storage Platform	20 ft	24 ft	30 ft
Vertical Curve Length	10 ft	10 ft	Varies (Min. 20 mph)

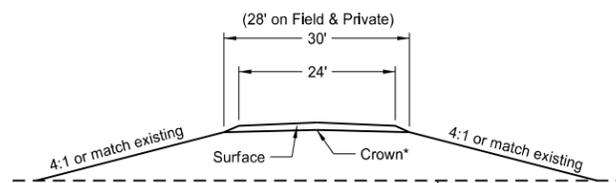


SECTION A-A

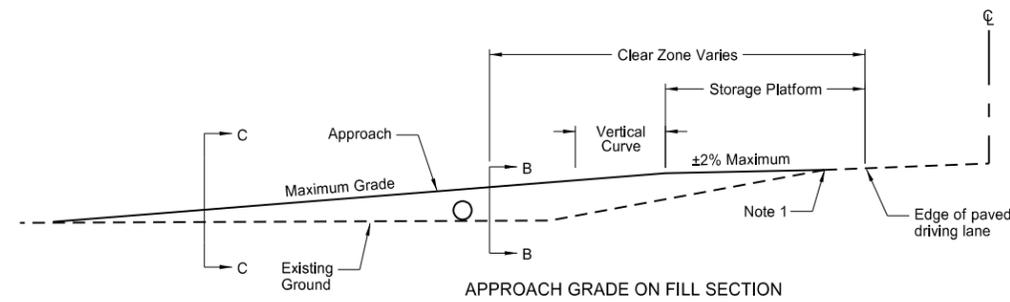
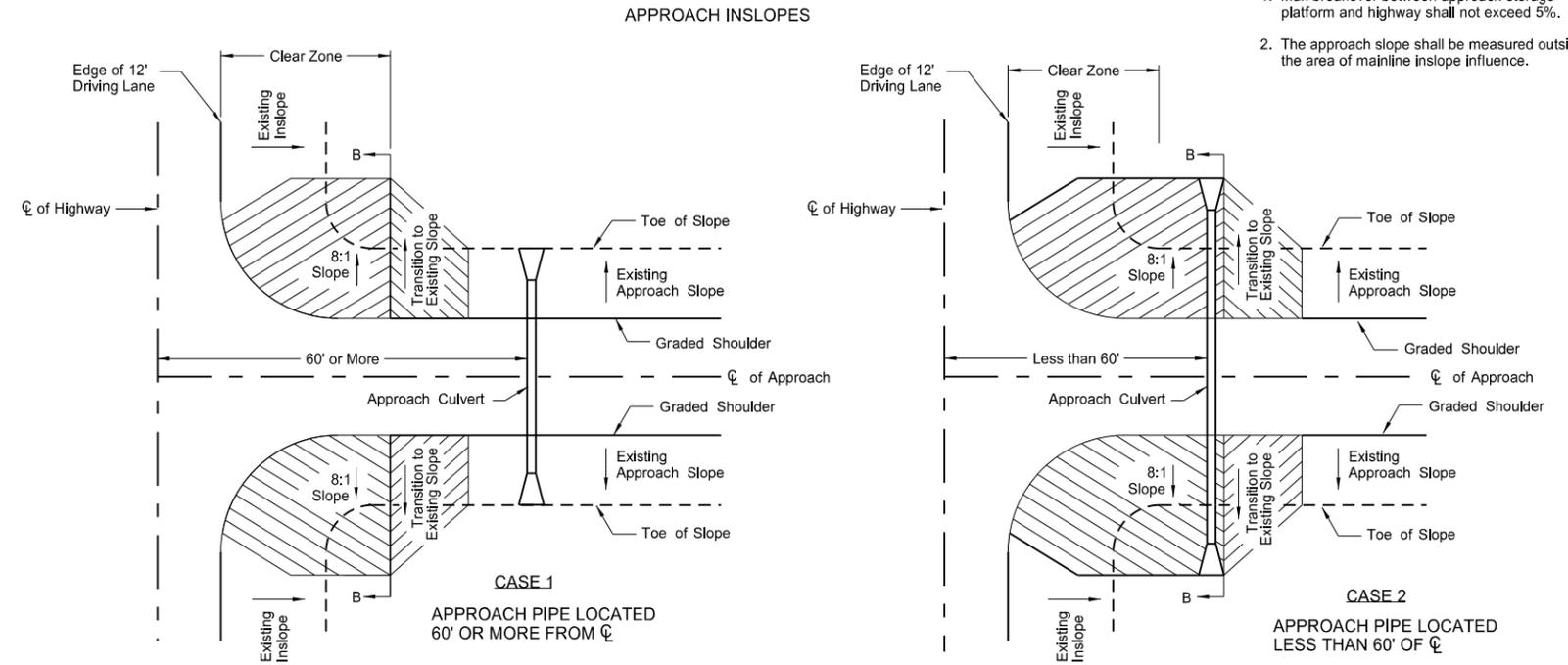
*2.1% crown for paved surface
*3.0% crown for gravel surface



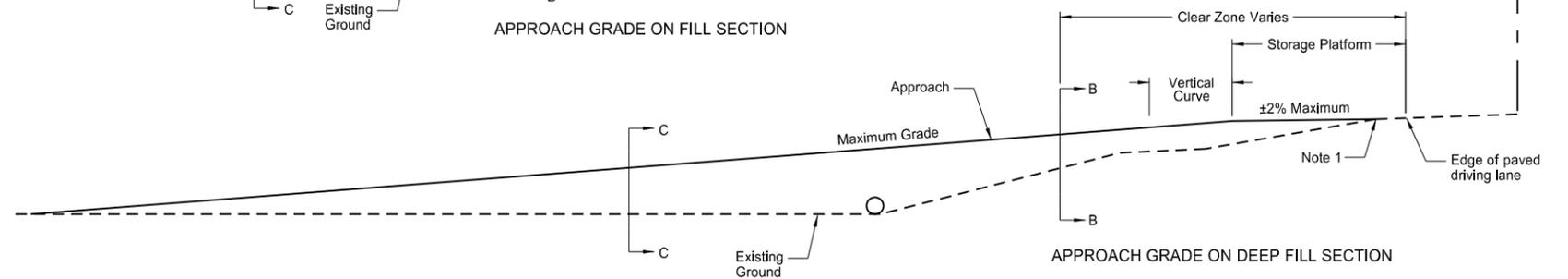
SECTION B-B



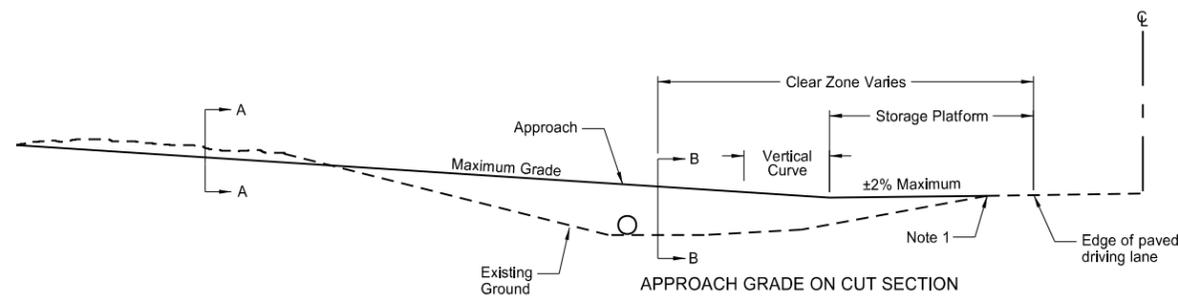
SECTION C-C



APPROACH GRADE ON FILL SECTION



APPROACH GRADE ON DEEP FILL SECTION

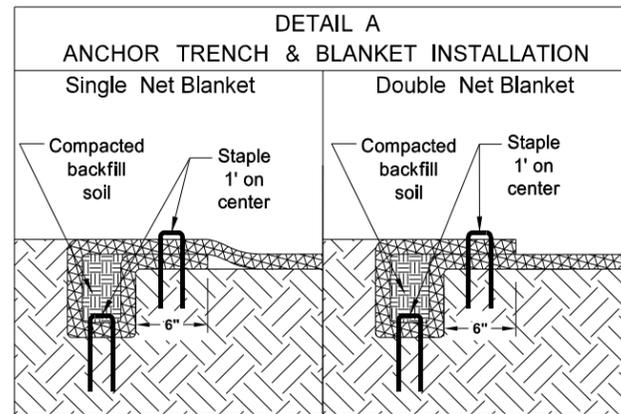


APPROACH GRADE ON CUT SECTION

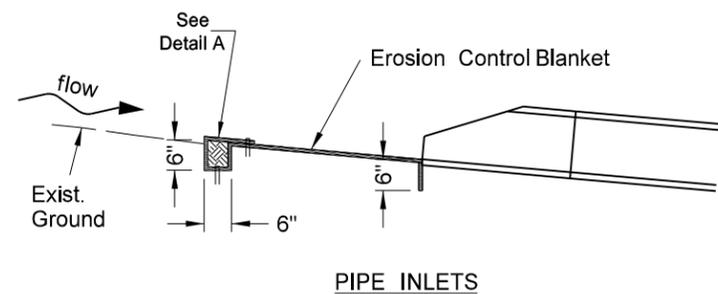
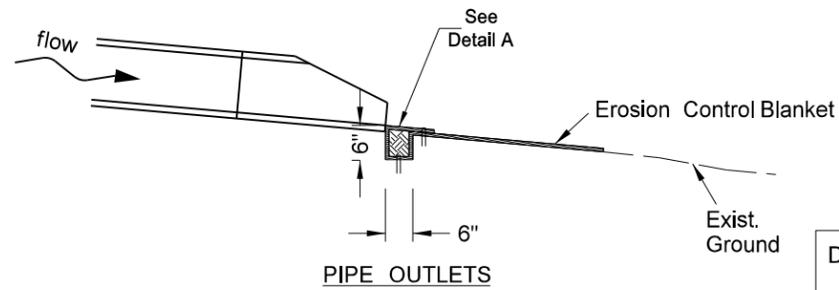
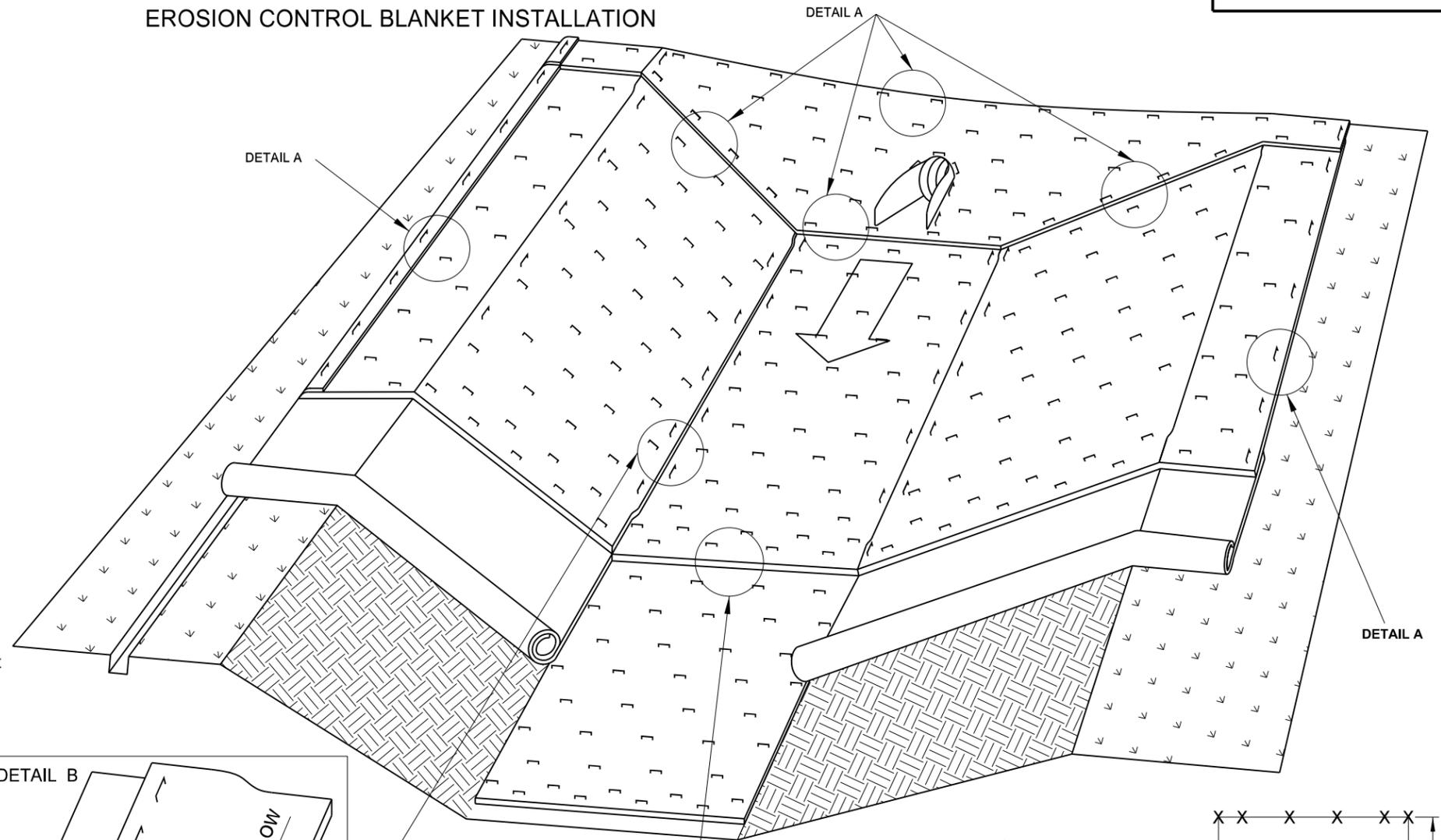
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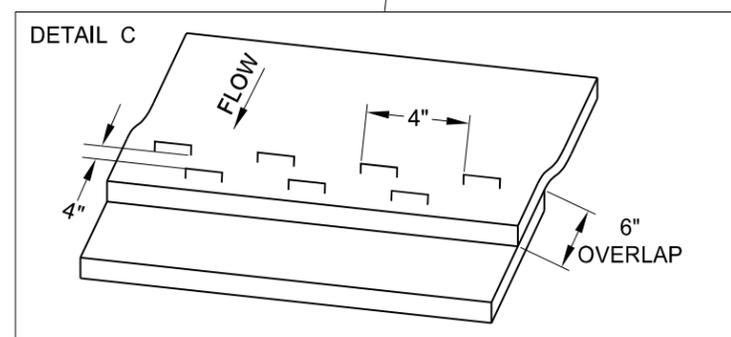
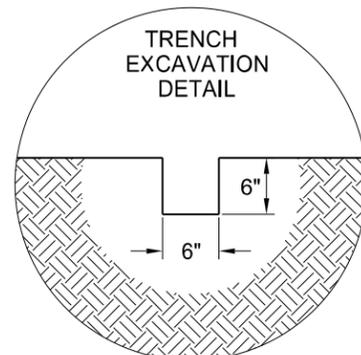
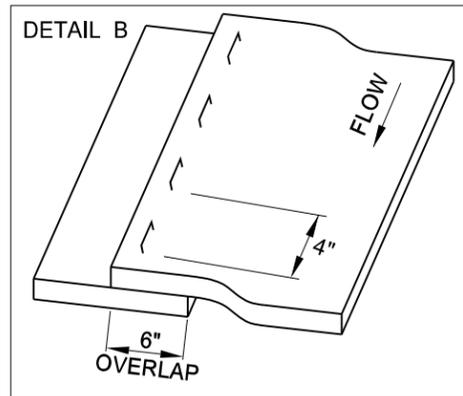
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



NOTE:
If a Single Net Blanket is used the side with the netting should be on the top once the blanket is installed.

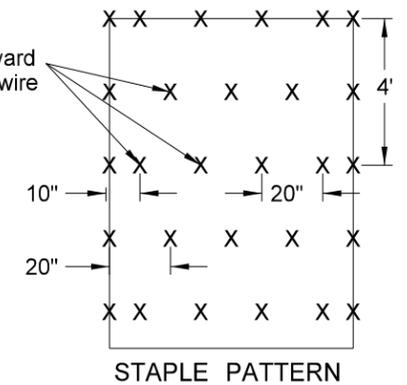


PIPE INLETS
INSTALLATION AT PIPE ENDS



BLANKET LAYOUT
CHANNEL OR SLOPE INSTALLATION

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

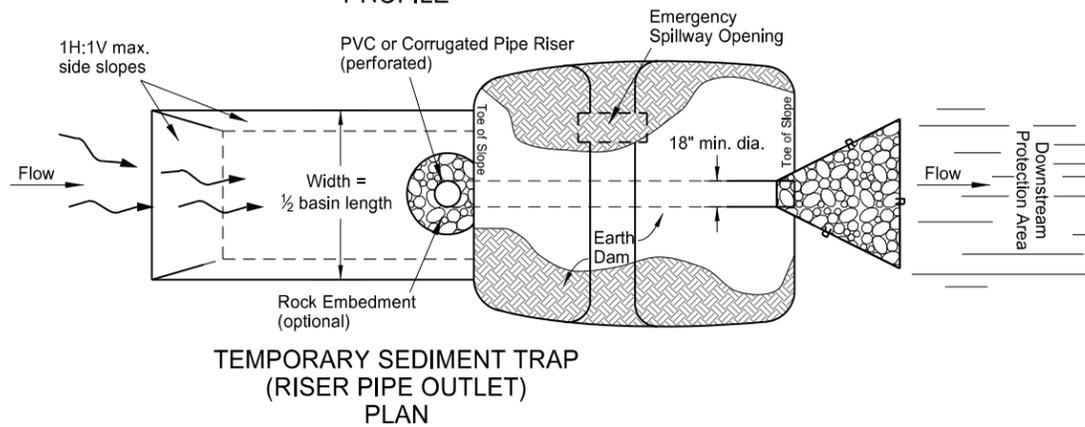
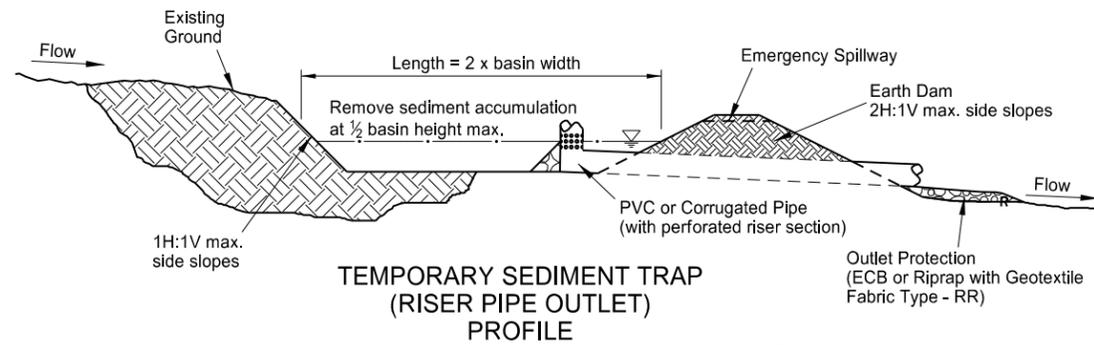
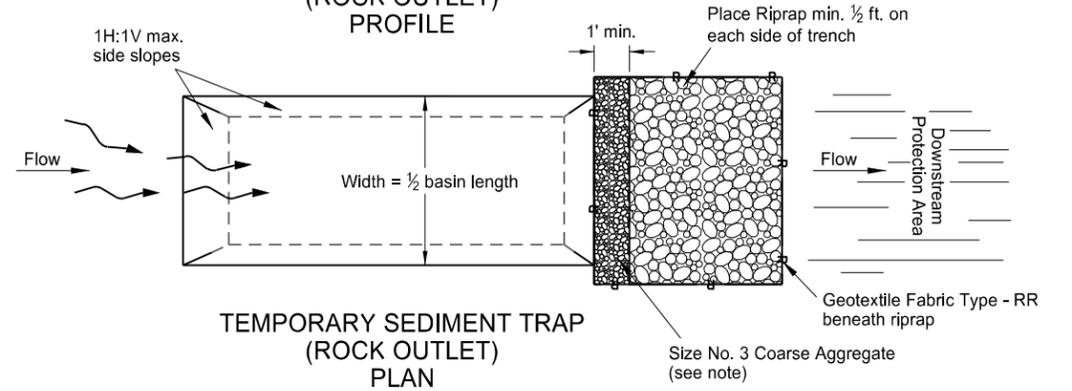
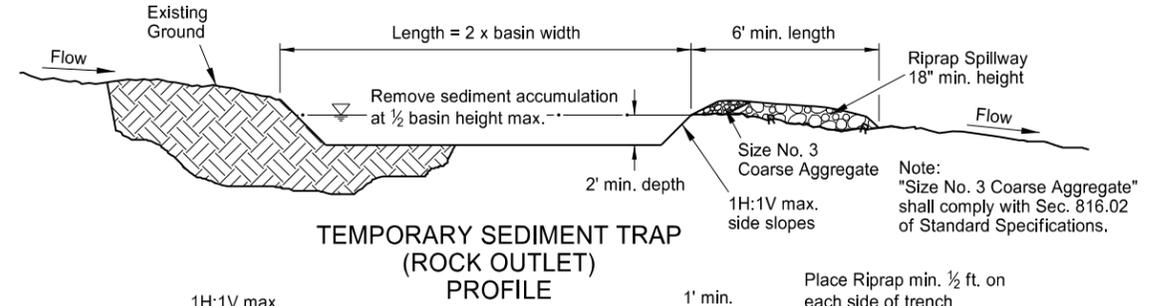
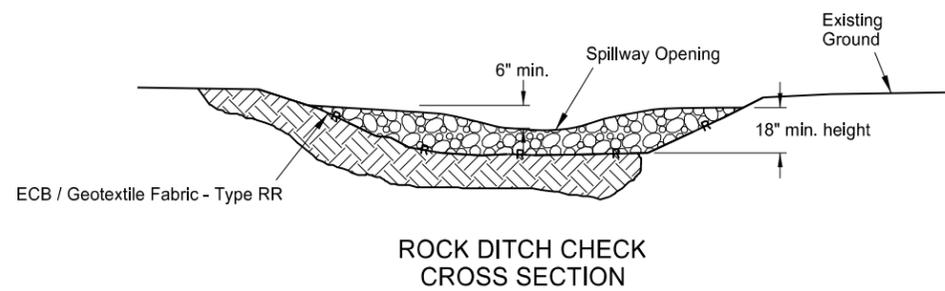
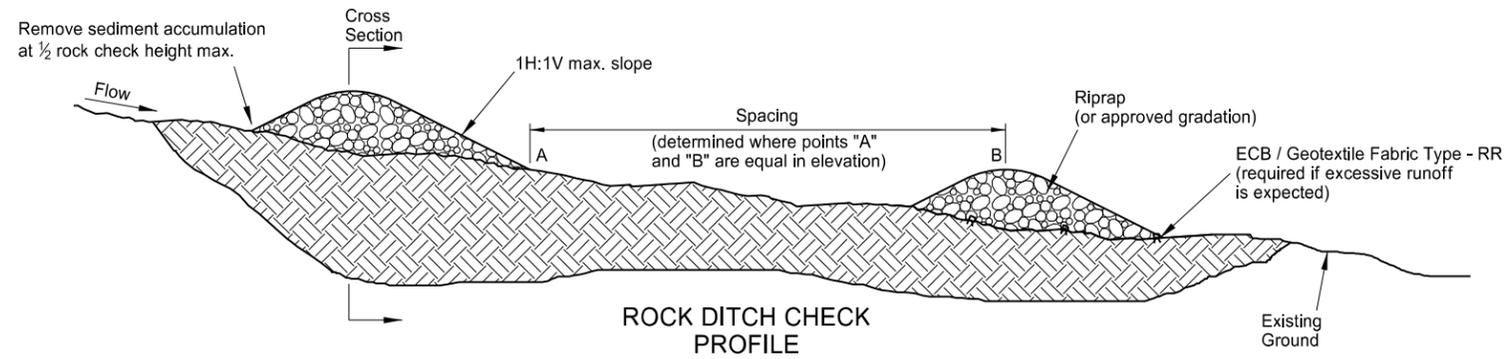


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-5 to D-255-2.
07-27-15	Changed installation details such as trench depth and overlap dimensions.

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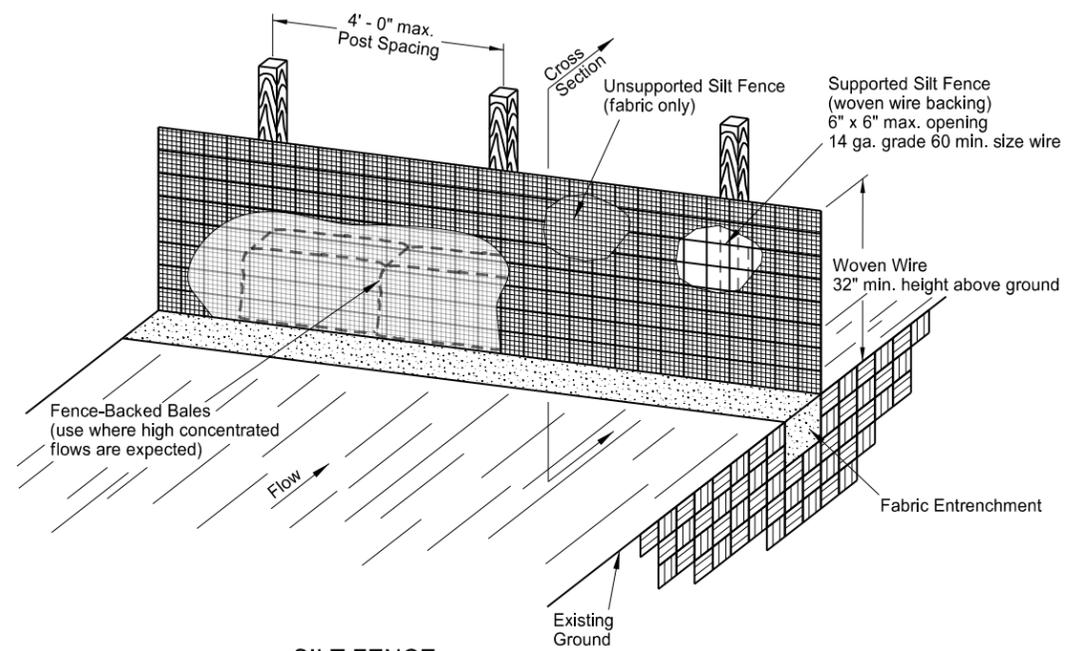
EROSION AND SILTATION CONTROLS

D-256-1

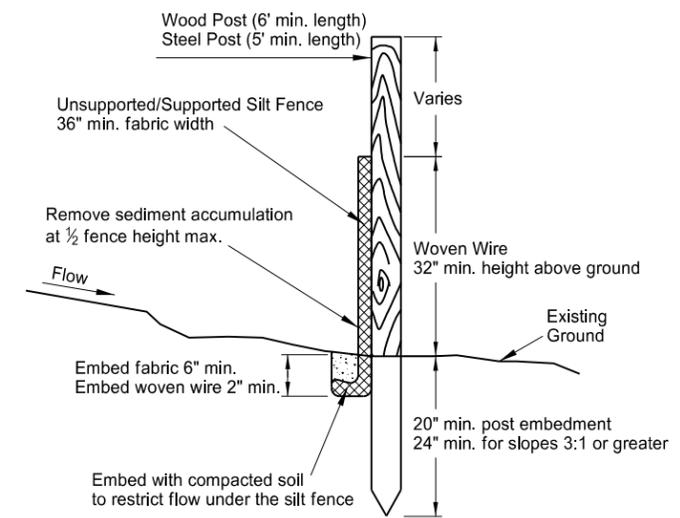


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-2 to D-256-1. Deleted silt fence details.

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SILT FENCE SUPPORTED AND UNSUPPORTED

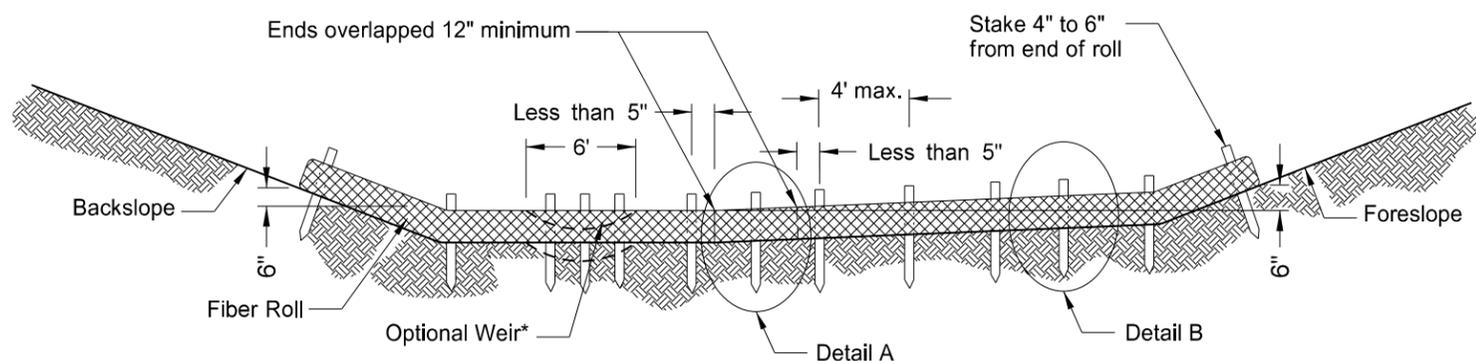


SILT FENCE CROSS SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2.

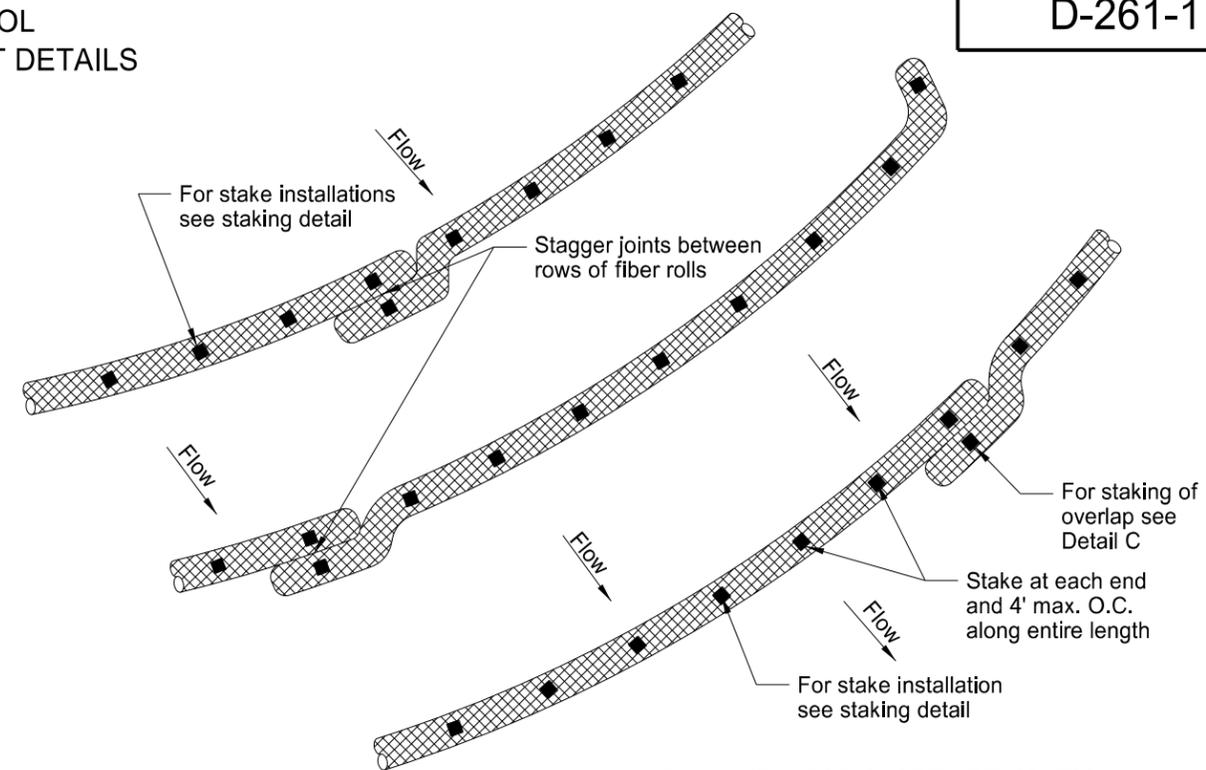
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

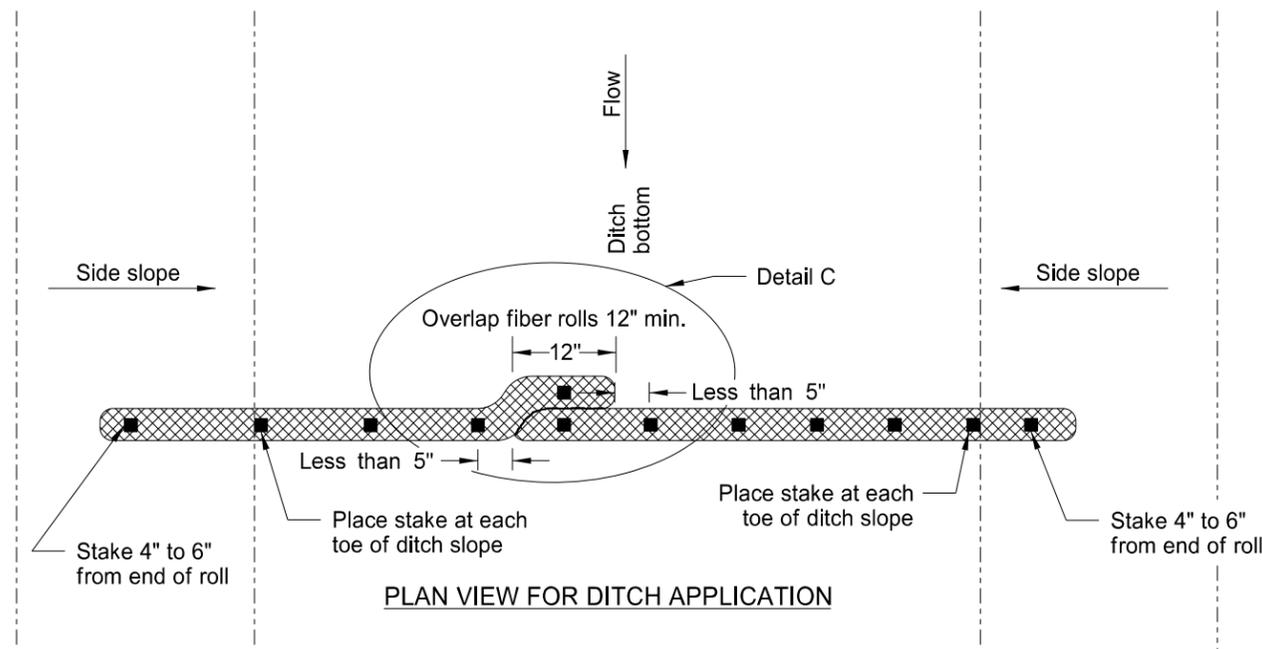


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up on adjacent property.

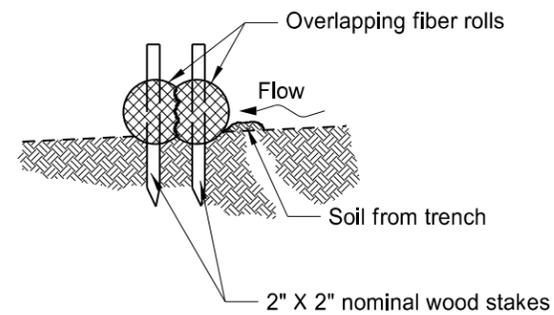
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



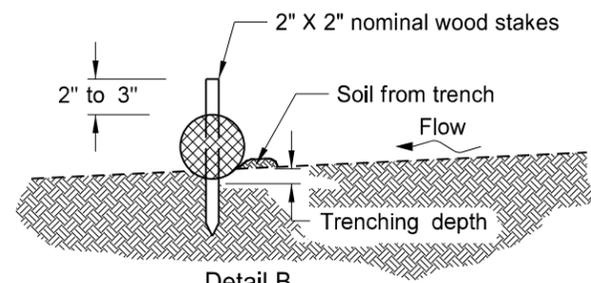
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



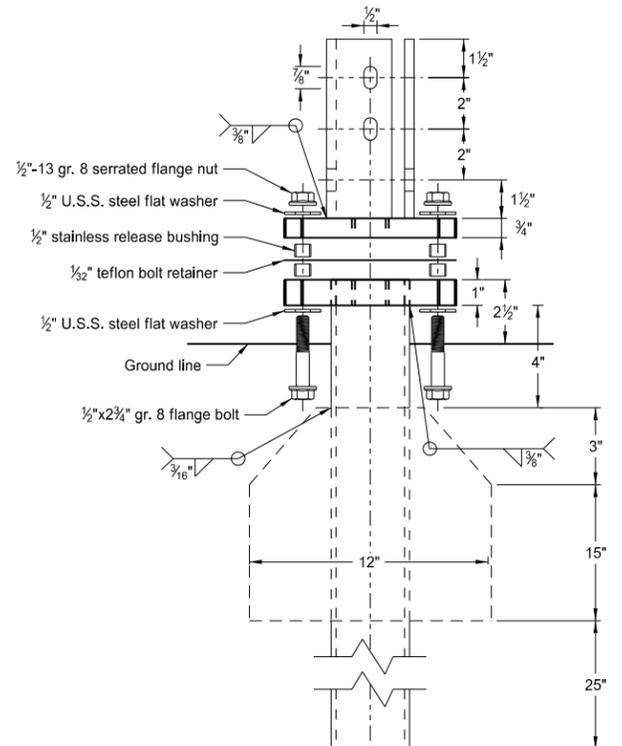
Detail B
Fiber Roll Staking Detail

FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

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

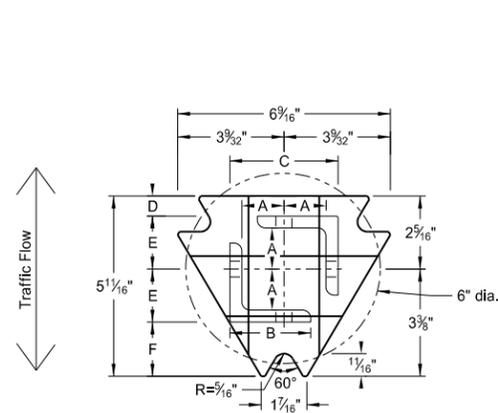
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application, Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1

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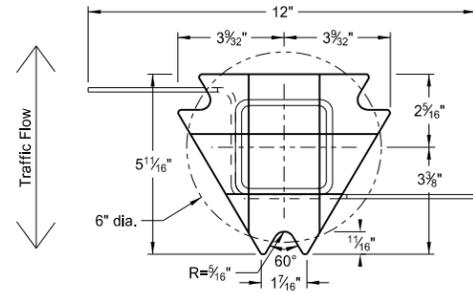


Multi-Directional Slip Base Assembly

Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2"x2 1/2"x3/8" ASTM A36 structural angle



Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

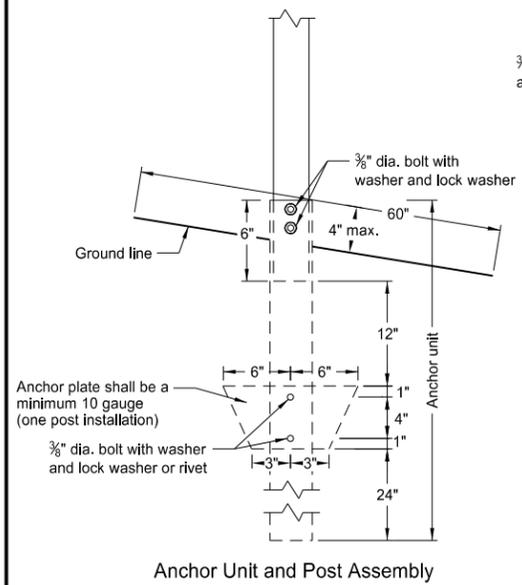
Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

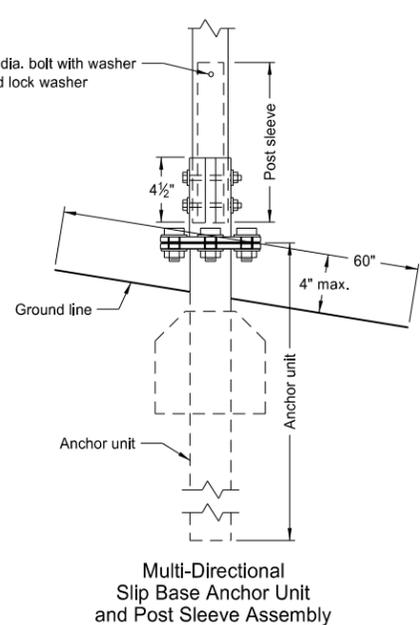
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

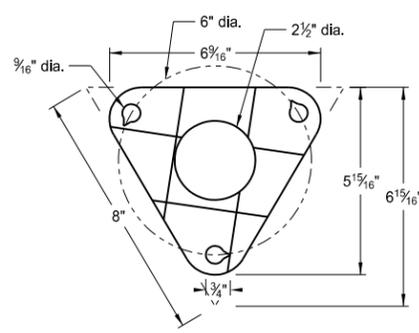
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



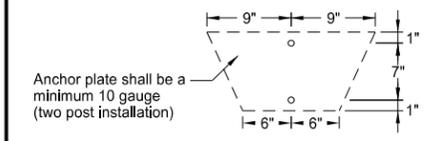
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



Bolt Retainer for Base Connection
Bolt Retainer - 1/32" Reprocessed Teflon



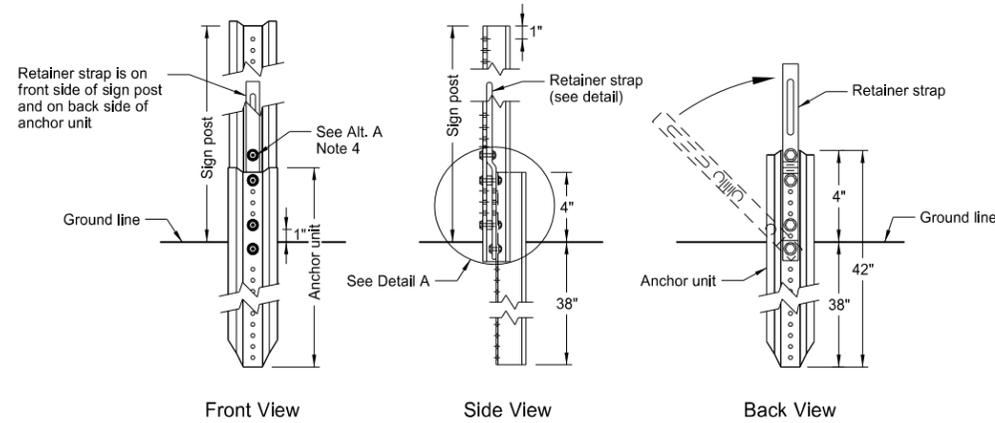
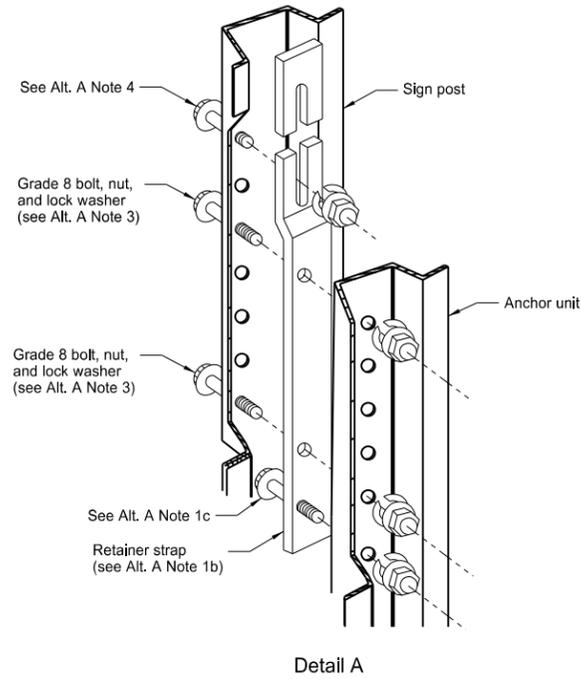
Anchor plate shall be a minimum 10 gauge (two post installation)

- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.
(B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.

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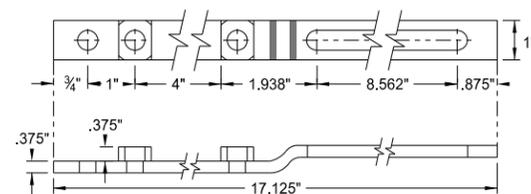
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U-Channel Post

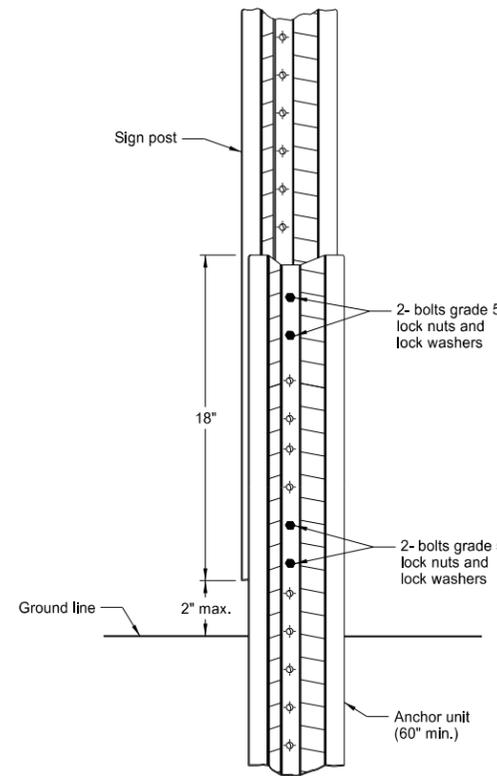


Breakaway U-Channel Detail Alternate A

A maximum of 2 posts shall be installed within 7'.

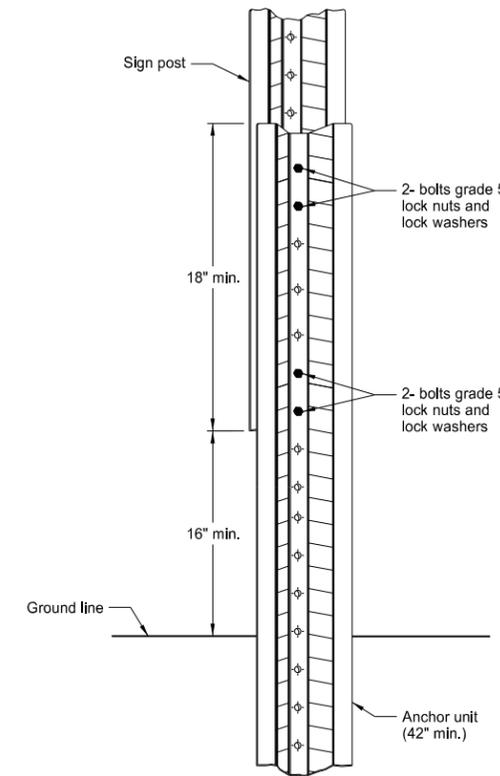


Retainer Strap Detail



Breakaway U-Channel Splice Detail Alternate B (2.5 and 3 lb/ft)

A maximum of 3 posts shall be installed within 7'.



Breakaway U-Channel Splice Detail Alternate C (2.5 and 3 lb/ft)

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

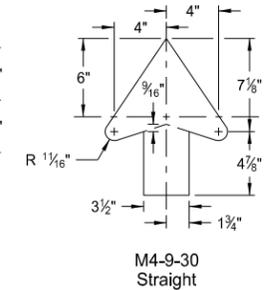
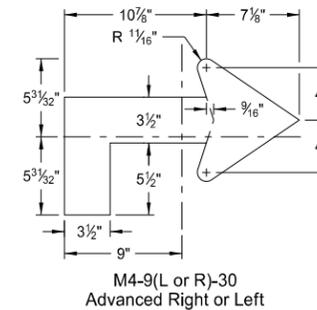
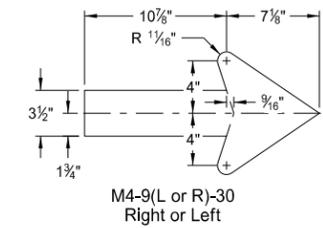
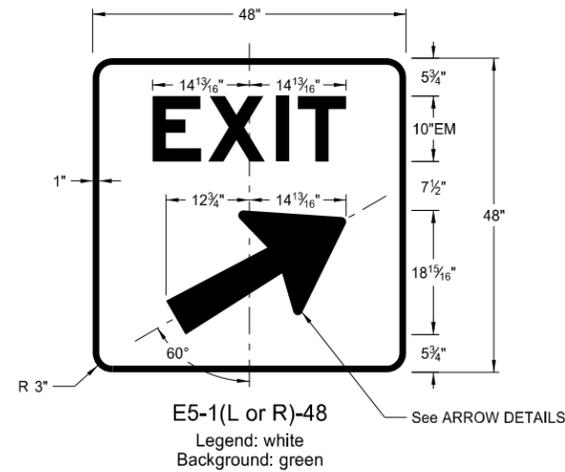
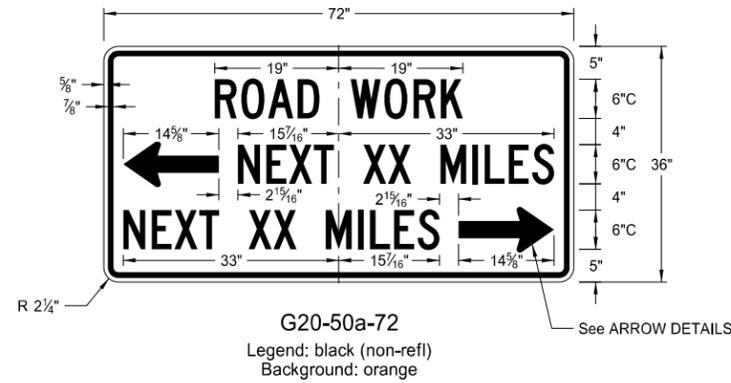
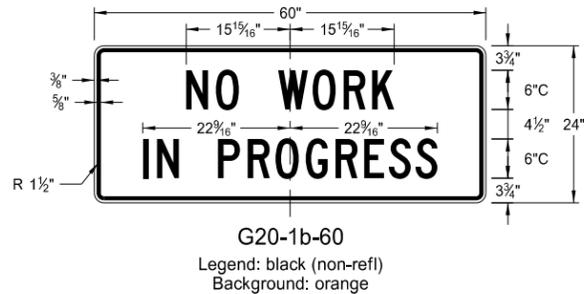
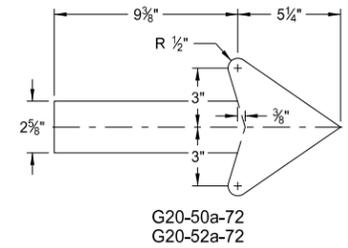
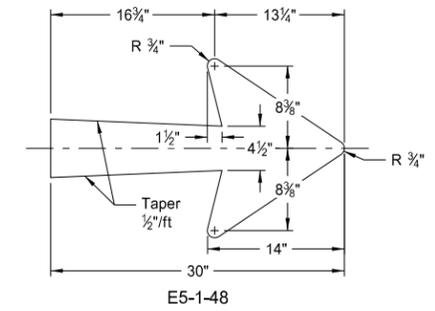
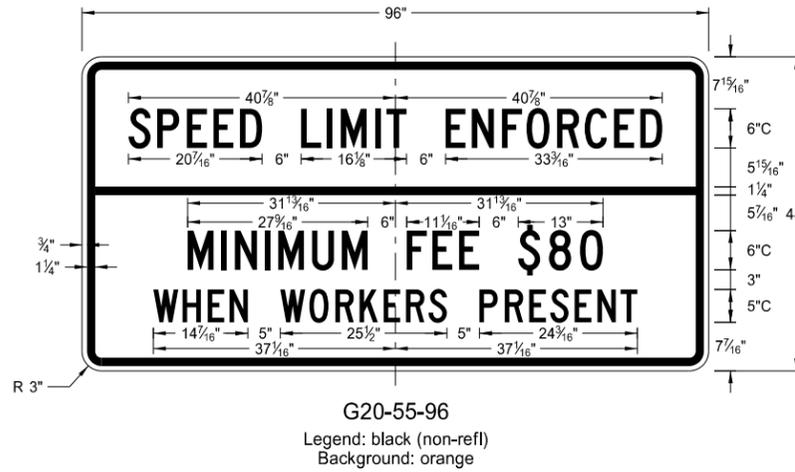
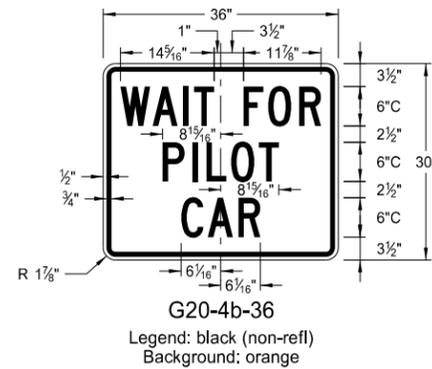
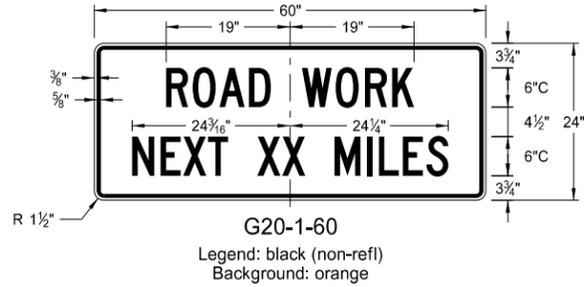
1. a) Drive anchor unit to within 12" of ground level.
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
2. a) Drive anchor unit to 4" above ground.
b) Rotate strap to vertical position.
3. a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
b) Alternately tighten two connector bolts.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. The base post, strap and sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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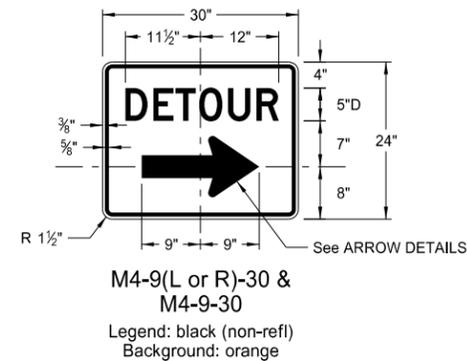
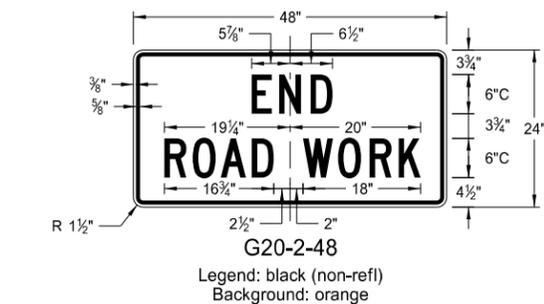
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CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

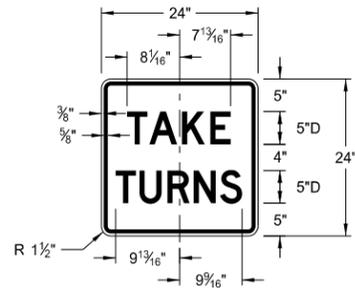
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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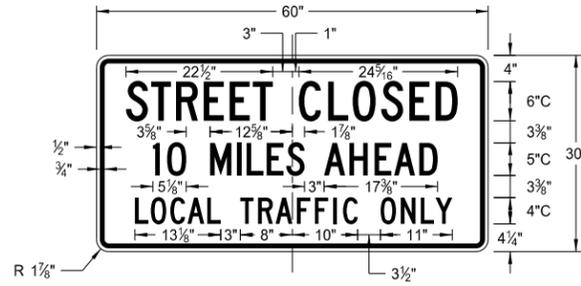
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

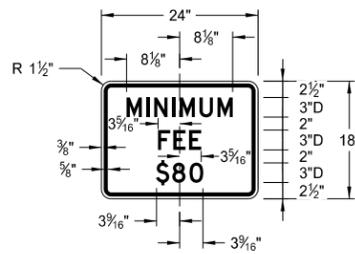
D-704-10



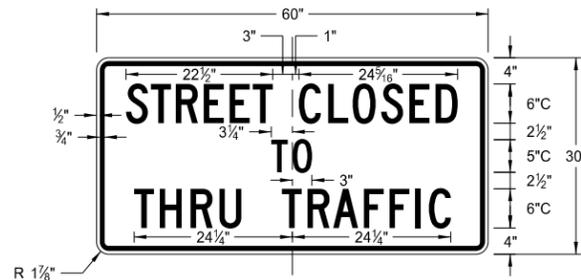
R1-50-24
Legend: black (non-refl)
Background: white



R11-3c-60
Legend: black (non-refl)
Background: white



R2-1a-24
Legend: black (non-refl)
Background: white



R11-4a-60
Legend: black (non-refl)
Background: white



R11-2a-48
Legend: black (non-refl)
Background: white

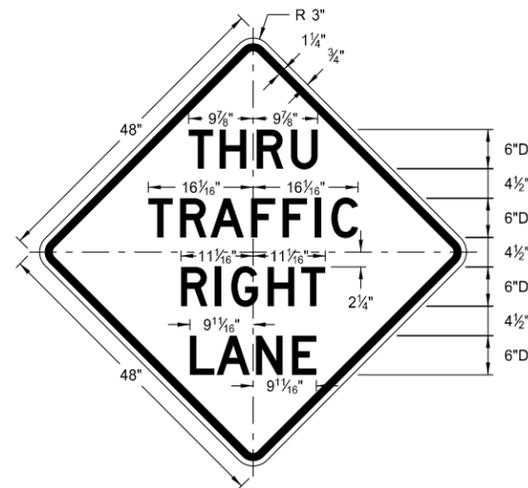
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8-13-13	
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DATE	CHANGE

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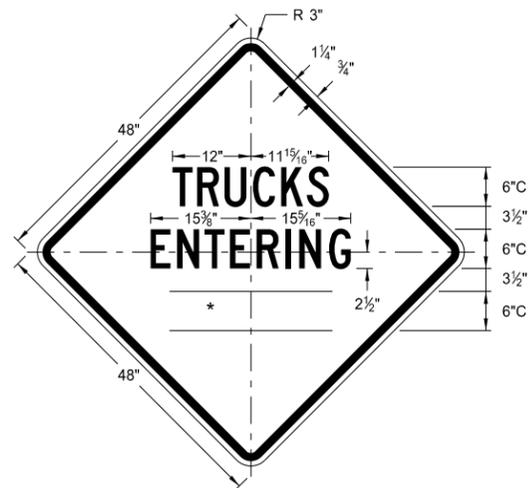
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

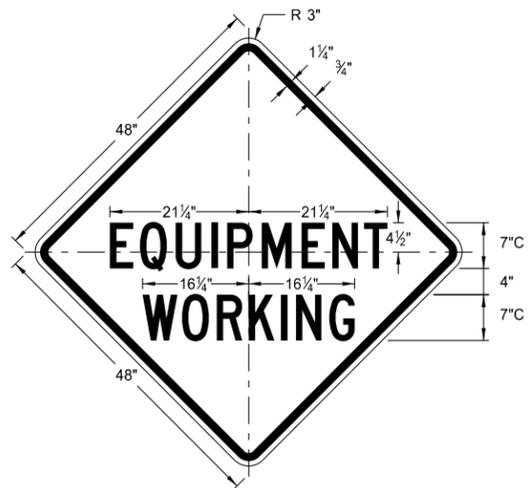
* DISTANCE MESSAGES



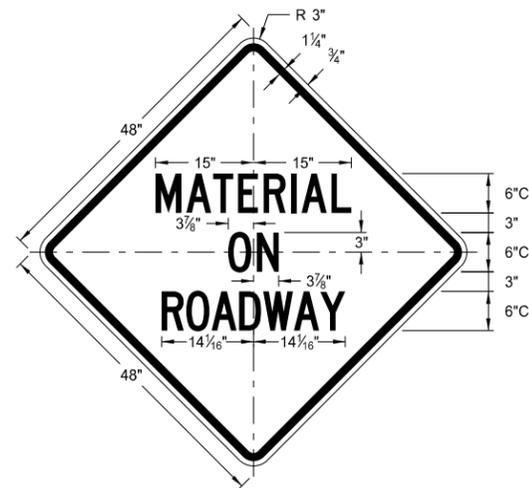
W5-8-48
Legend: black (non-refl)
Background: orange



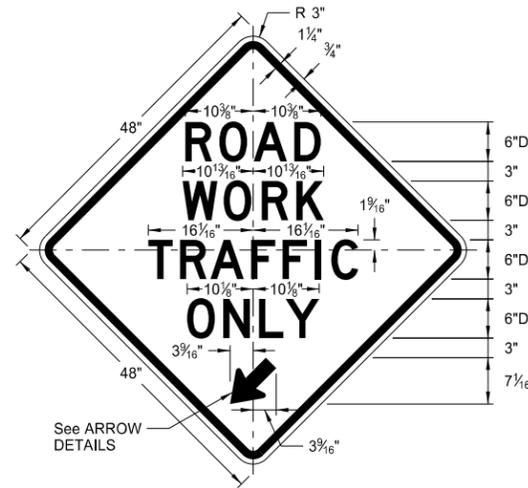
W8-54-48
Legend: black (non-refl)
Background: orange



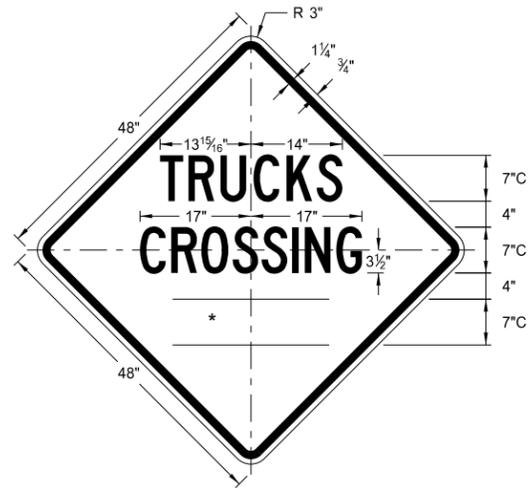
W20-51-48
Legend: black (non-refl)
Background: orange



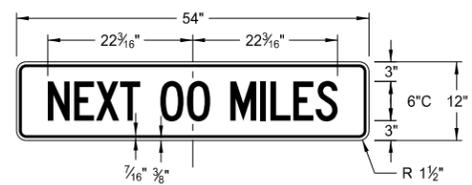
W21-51-48
Legend: black (non-refl)
Background: orange



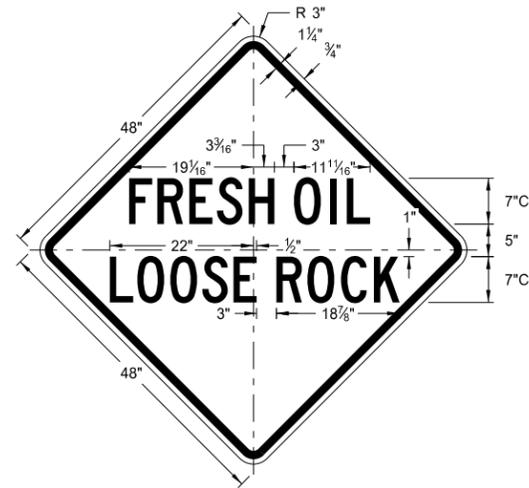
W5-9-48
Legend: black (non-refl)
Background: orange



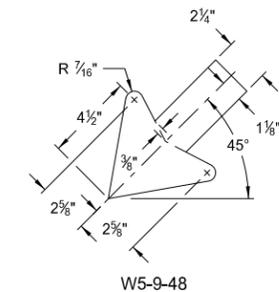
W8-55-48
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Background: orange



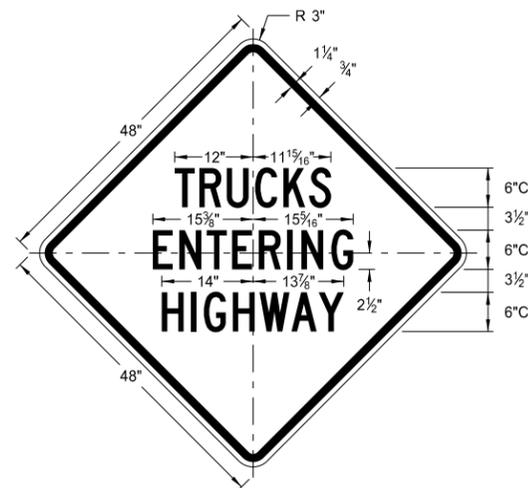
W20-52-54
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Background: orange



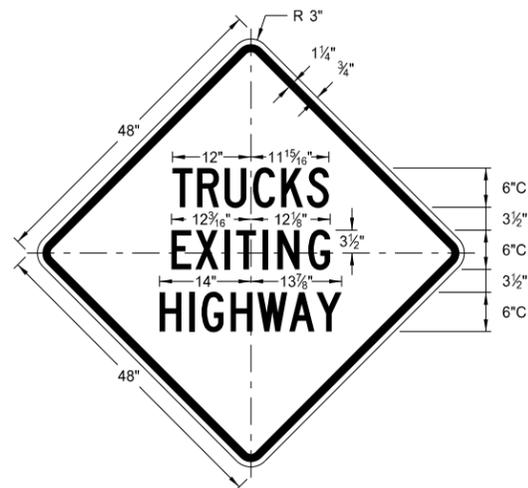
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Background: orange



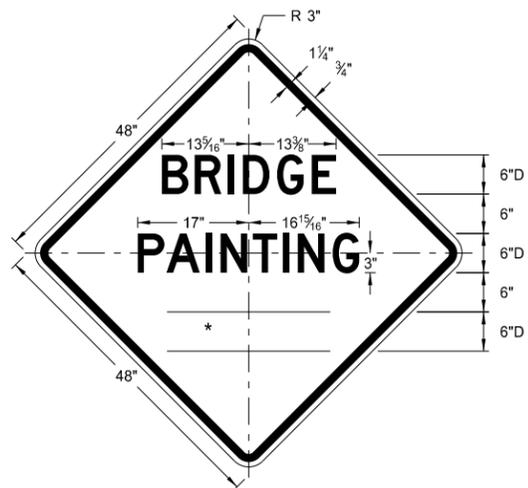
W5-9-48
ARROW DETAILS



W8-53-48
Legend: black (non-refl)
Background: orange



W8-56-48
Legend: black (non-refl)
Background: orange



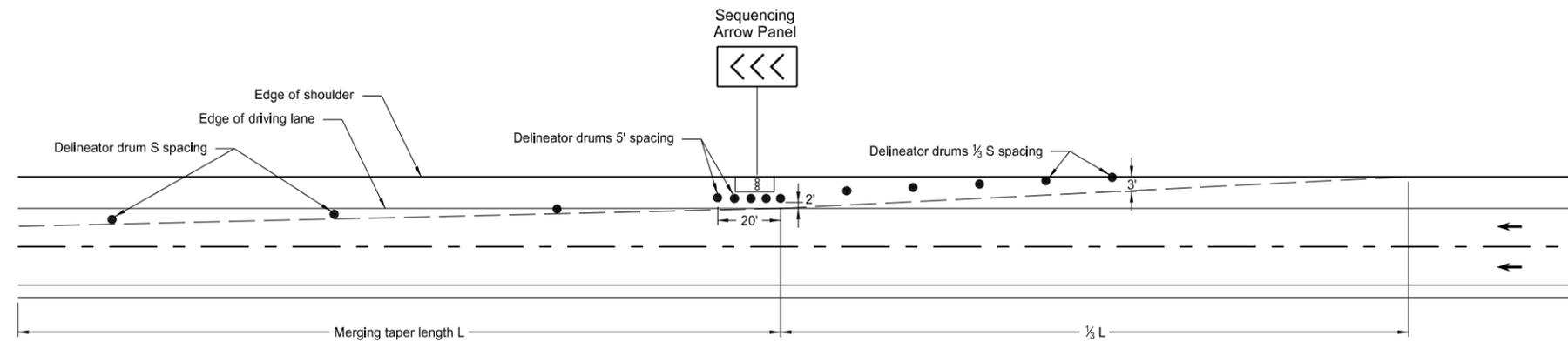
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DATE	CHANGE

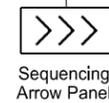
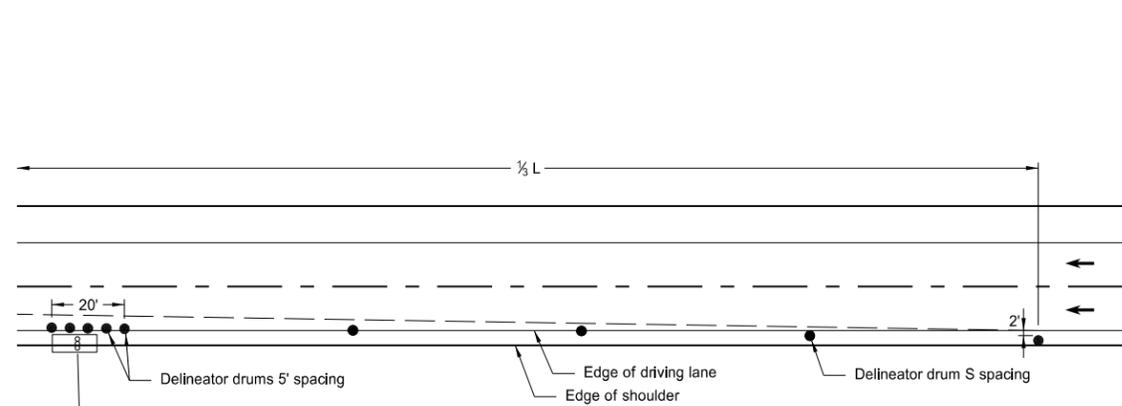
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SHOULDER CLOSURE TAPERS

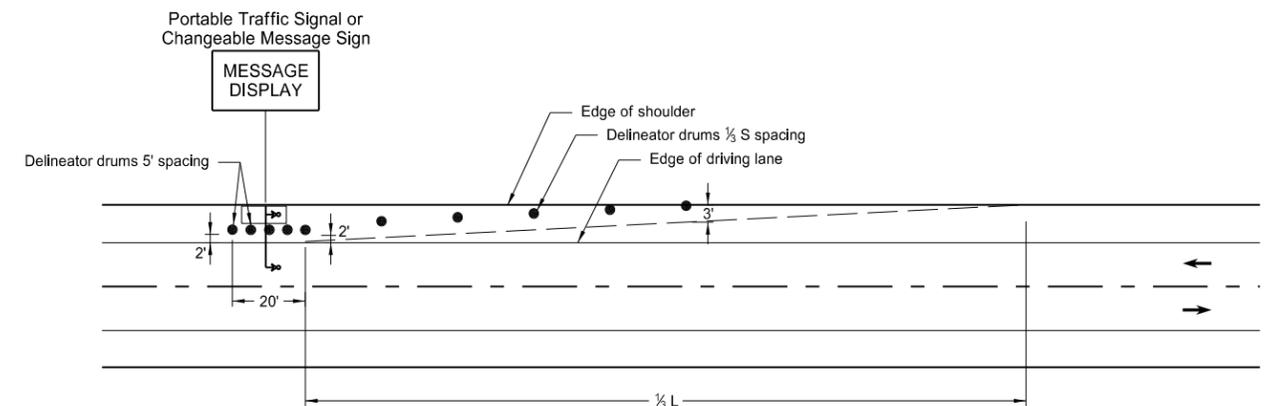
D-704-12



SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



SHOULDER CLOSURE USED WITH LANE CLOSURE
(when shoulder is less than 8' wide)



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY	
● Delineator Drum	∞ Sequencing Arrow Panel
• Message Display	↳ Portable Traffic Signal

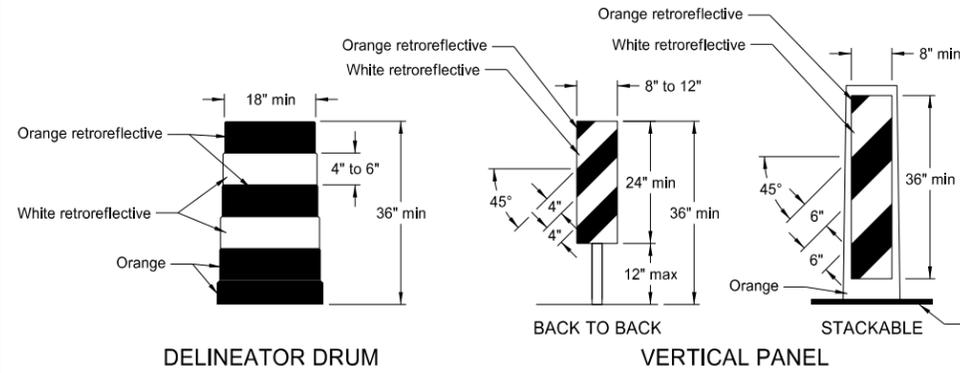
Notes:

- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
L = WS²/60 (40mph or less)
L = WS (45mph or more)
- If a shoulder taper is used, it should have a length of approximately 1/3L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
- When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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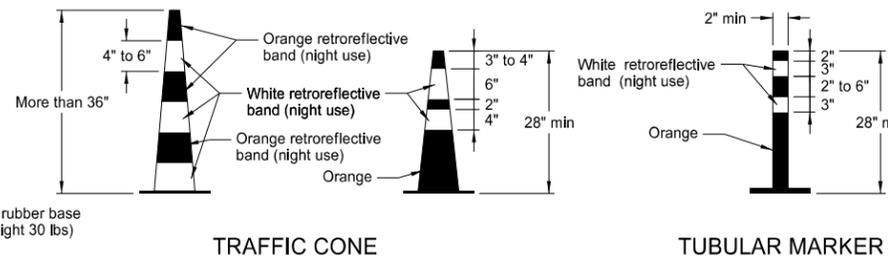
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BARRICADE AND CHANNELIZING DEVICE DETAILS



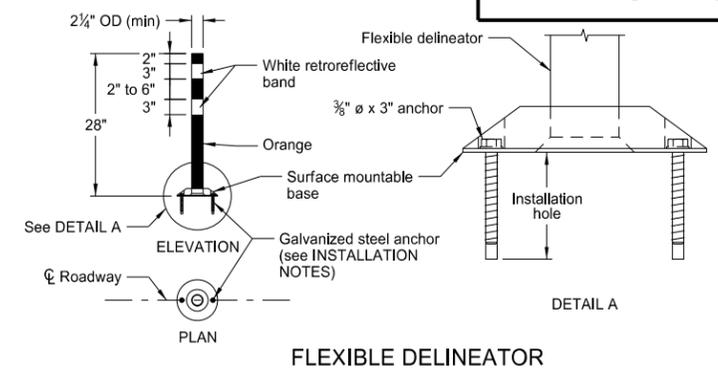
The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.



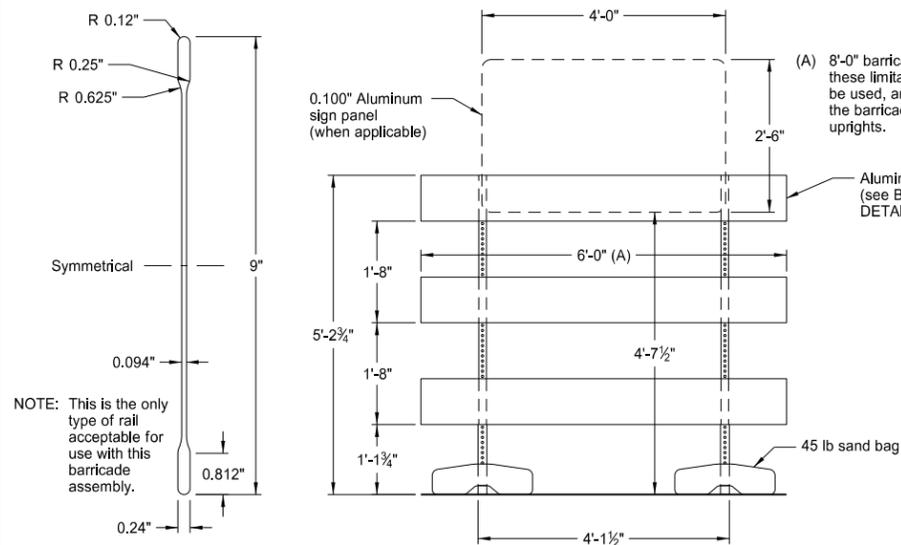
RetroreflectORIZATION of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED space between the orange and white stripes shall not exceed 3" wide.

RetroreflectORIZATION of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



INSTALLATION NOTES:

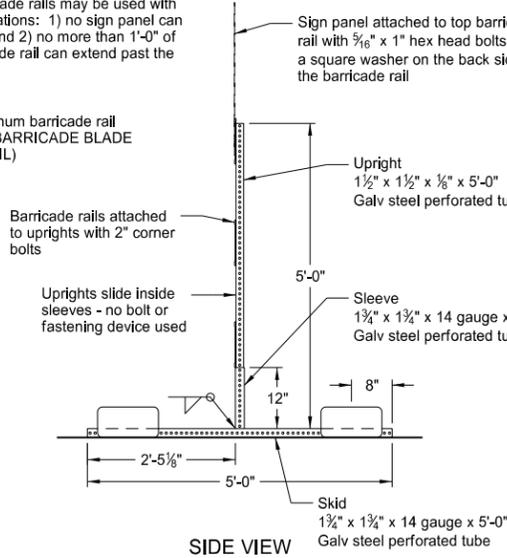
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.



BARRICADE BLADE DETAIL

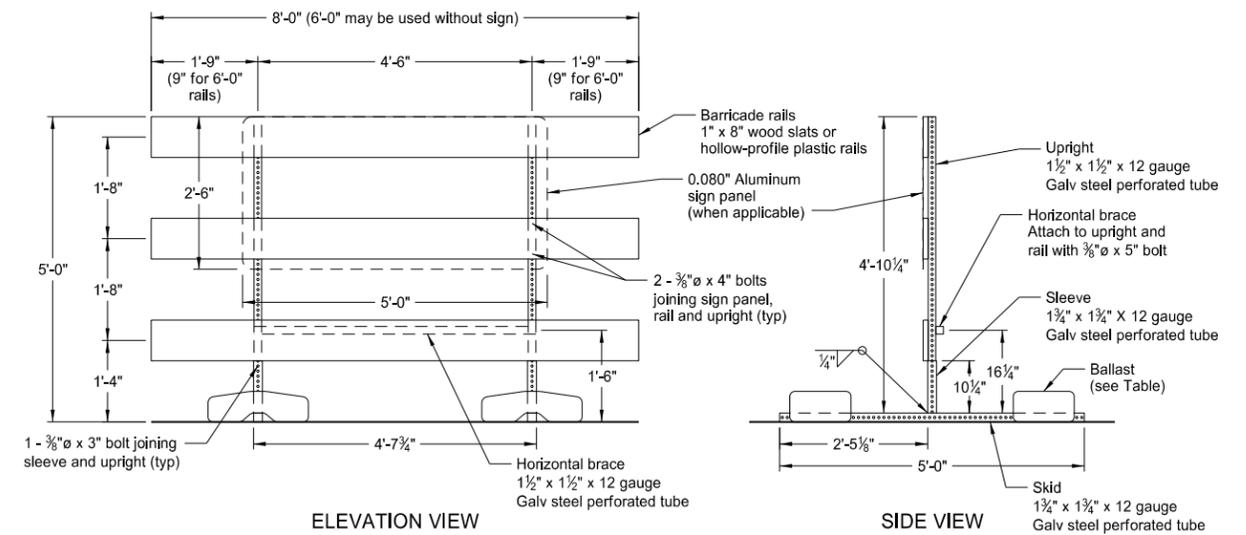
ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)



SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

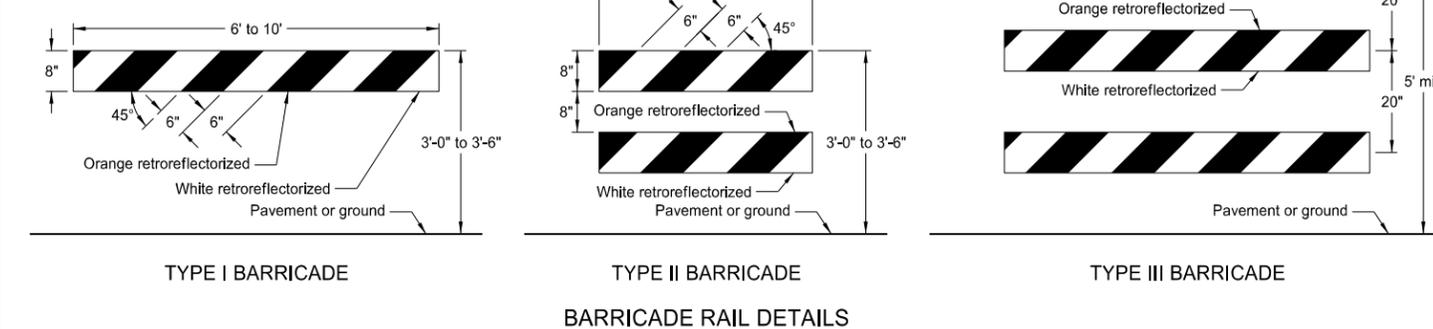


ELEVATION VIEW

SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".

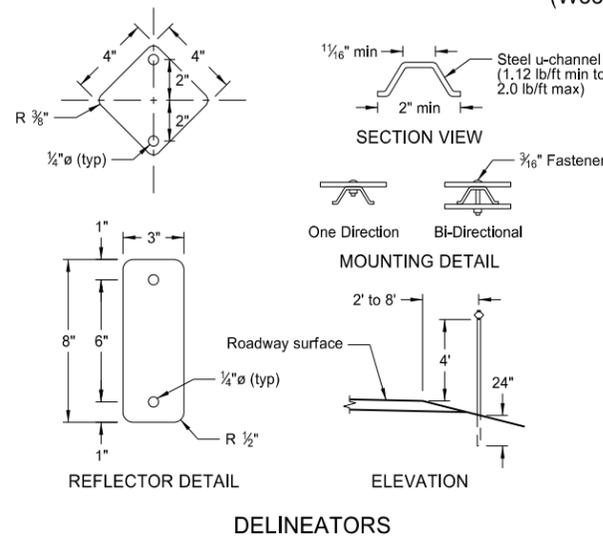


TYPE I BARRICADE

TYPE II BARRICADE

TYPE III BARRICADE

BARRICADE RAIL DETAILS



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

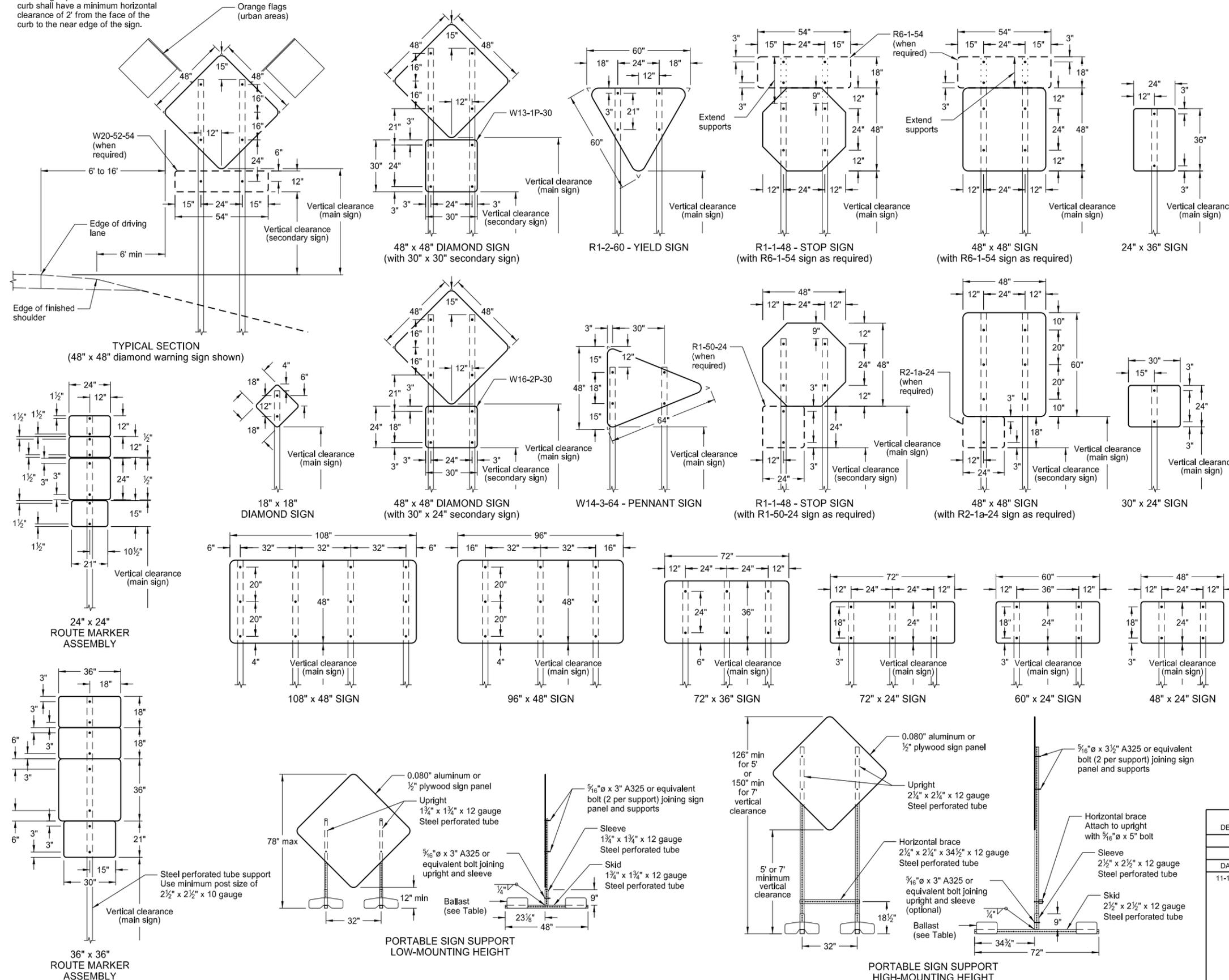
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



- NOTES:
1. Sign Supports: Supports shall be galvanized or painted. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

Signs over 50 square feet should be installed on 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)

4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
 Interstate Business Loop - white legend on green background
 US and State - black legend on white background
 County - yellow legend on blue background

5. Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

The vertical clearance to secondary signs is 1'-0" less than the vertical clearance as stated above.

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

6. Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST
 (For each side of sign support base)

Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
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DATE	CHANGE
11-14-13	Revised Note 6.

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ROAD CLOSURE LAYOUTS

Notes

- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper.
 - L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
- Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
- Delineator drums, barricades or cones used for tapering traffic shall be spaced at the dimension "S". Delineator drums or cones used for tangents shall be spaced at 2 times dimension "S".
- Sequencing Arrow Panels
 - Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface. See Shoulder Closure Standard Drawing.
 - Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
 - Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
 - Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- Use when work area is 1 mile or longer.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Where necessary, safe speed to be determined by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- G20-55-96 sign is not required if this standard is part of other traffic control layouts, or the work is less than 15 days.

Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY

	Type III barricade		Work area
	Sign		Flagger
	Delineator drum		Sequencing arrow panel
	Tubular markers		Vertical panels back to back

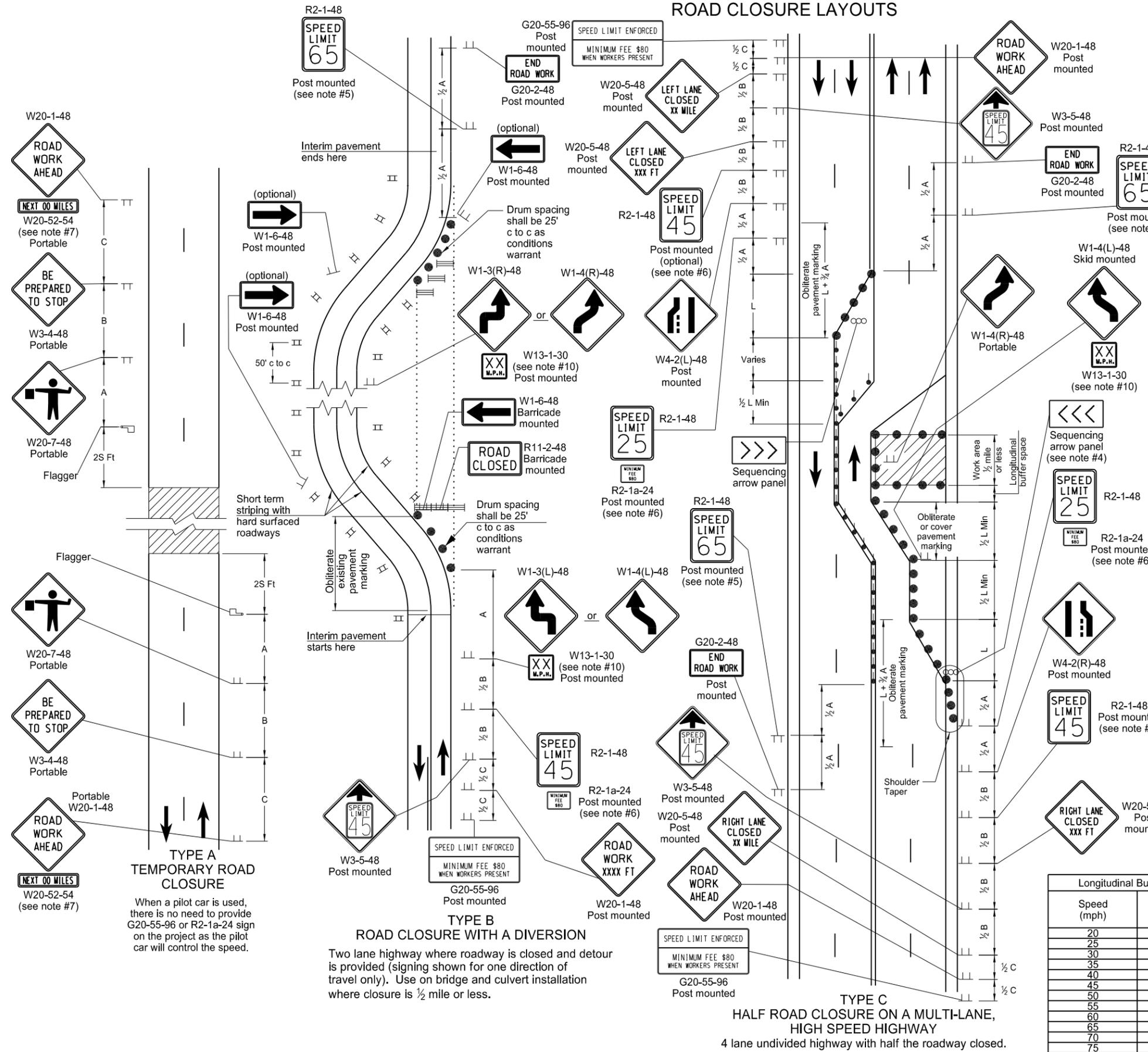
Longitudinal Buffer Space

Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13

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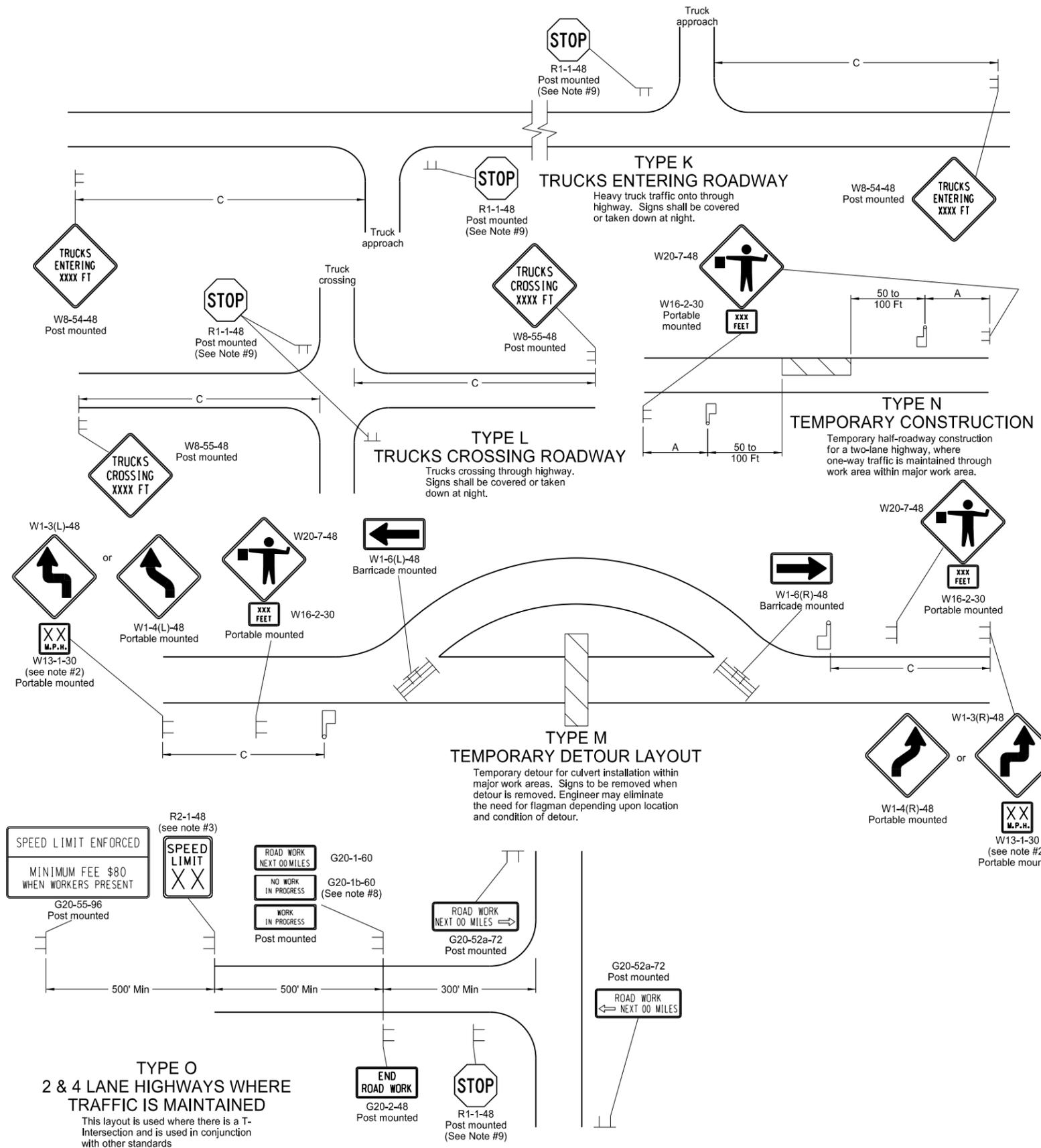
**TYPE A
TEMPORARY ROAD CLOSURE**
 When a pilot car is used, there is no need to provide G20-55-96 or R2-1a-24 sign on the project as the pilot car will control the speed.

**TYPE B
ROAD CLOSURE WITH A DIVERSION**
 Two lane highway where roadway is closed and detour is provided (signing shown for one direction of travel only). Use on bridge and culvert installation where closure is 1/2 mile or less.

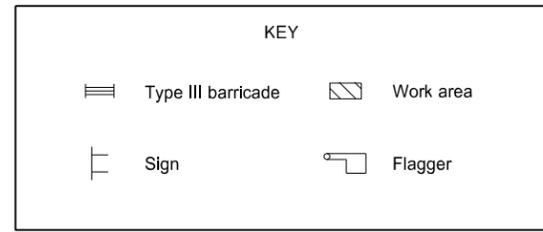
**TYPE C
HALF ROAD CLOSURE ON A MULTI-LANE,
HIGH SPEED HIGHWAY**
 4 lane undivided highway with half the roadway closed.

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



- Notes
1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies. Where necessary, safe speed to be determined by the Engineer.
 2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 4. Existing speed limit signs within a reduced speed zone shall be covered. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 6. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
 7. If existing stop sign is in place, a 48" stop sign is not required.
 8. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.



ADVANCE WARNING SIGN SPACING

Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

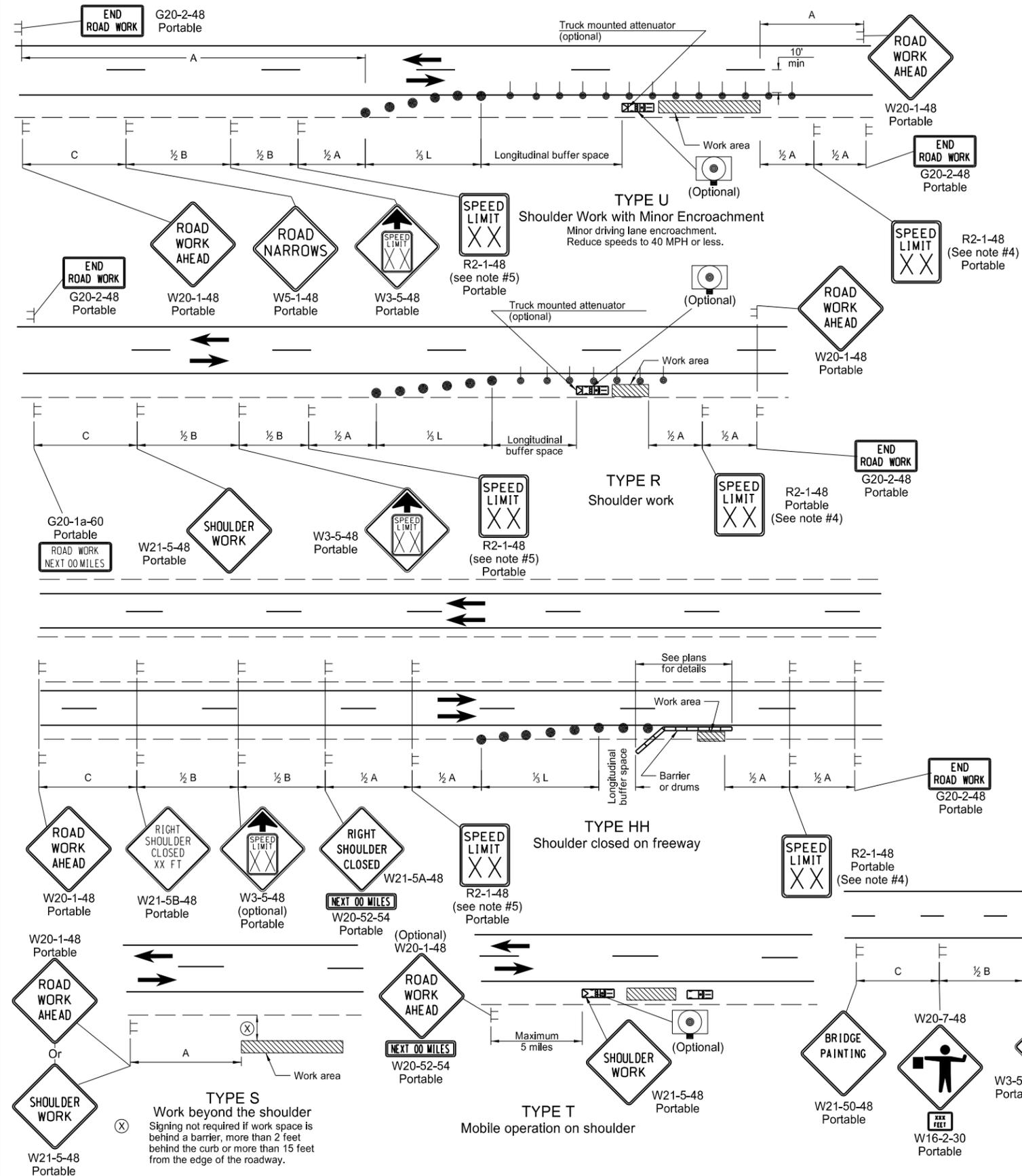
REVISIONS

DATE	CHANGE

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SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

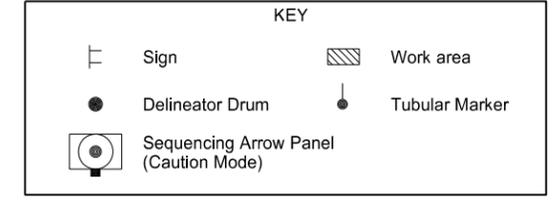
D-704-24



- Notes
- Variables
S = Numerical value of speed limit or 85th percentile.
W = The width of the taper.
L = Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Delineator drums used for tapering traffic shall be spaced at dimension "S".
Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
 - Sequencing Arrow Panels
Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}B$.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

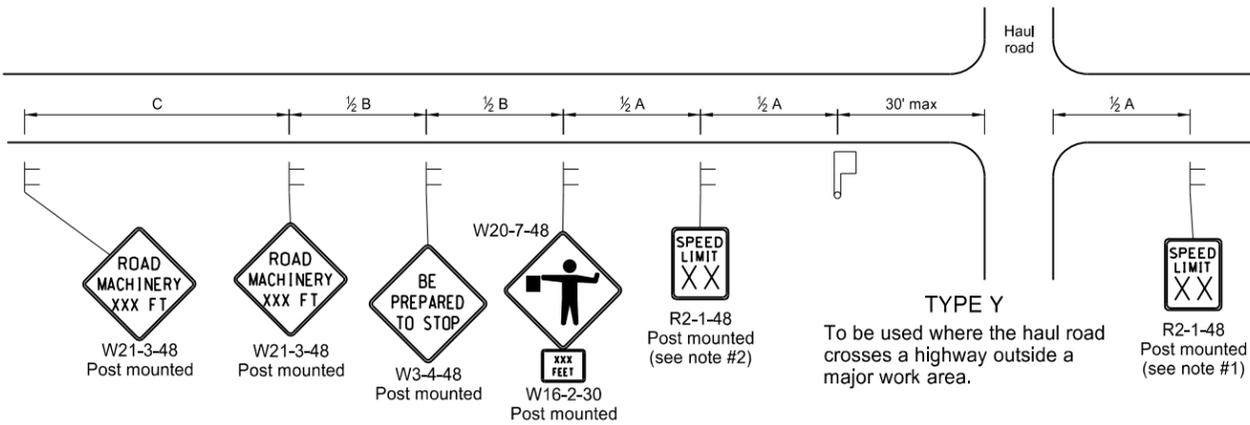


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9-27-13	
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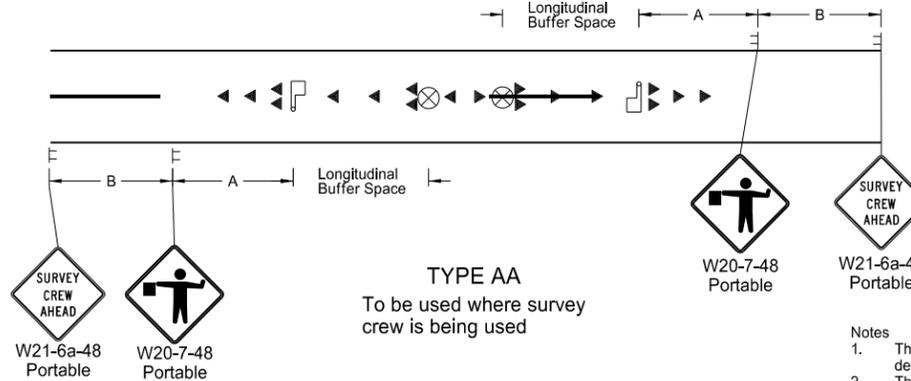
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MISCELLANEOUS SIGN LAYOUTS

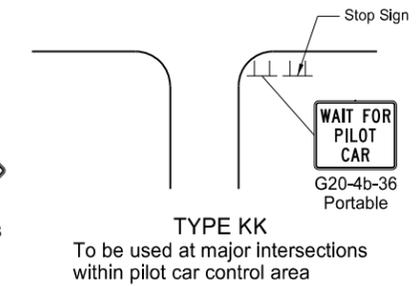
D-704-26



TYPE Y
To be used where the haul road crosses a highway outside a major work area.

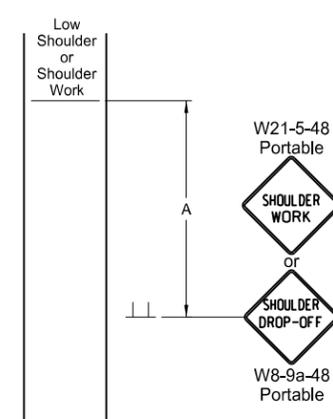


TYPE AA
To be used where survey crew is being used

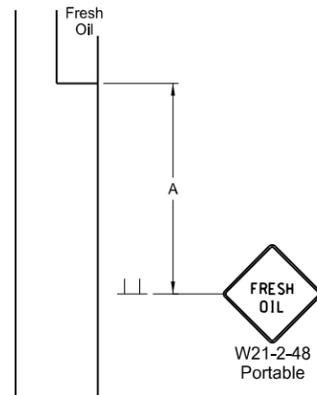


TYPE KK
To be used at major intersections within pilot car control area

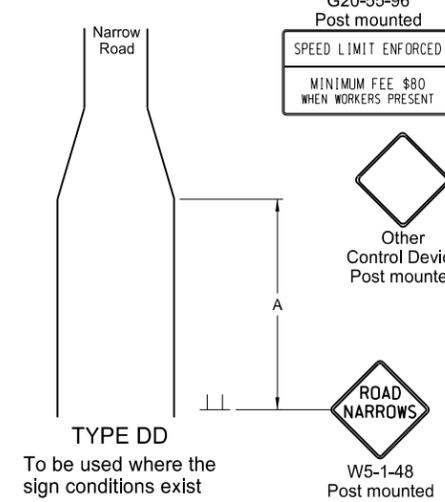
- Notes
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 - G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
 - When a pilot car operation is used, place a G20-4b-36 "Wait For Pilot Car" sign at major intersections within pilot car control area.



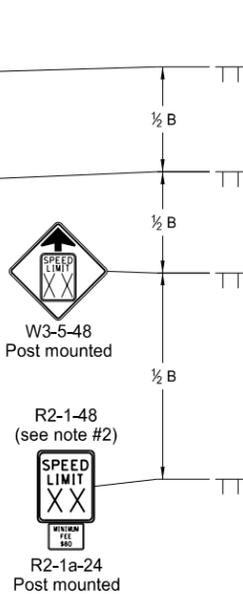
TYPE BB
To be used within a major work area where the sign conditions exist



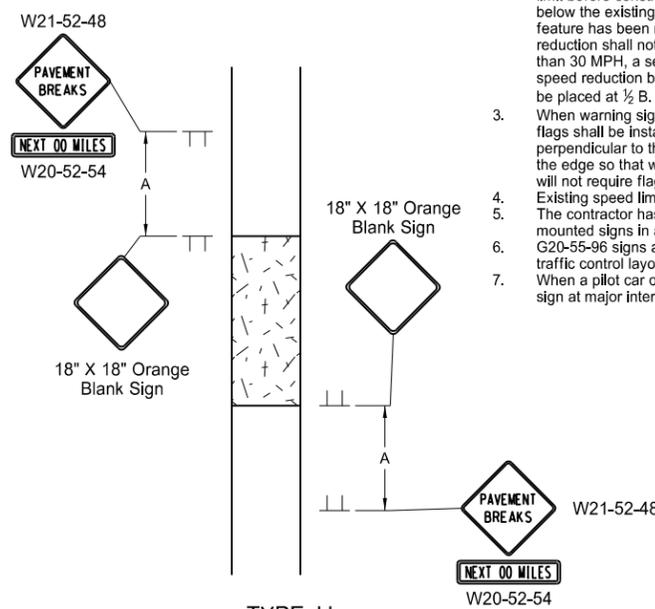
TYPE CC
To be used where the sign conditions exist



TYPE DD
To be used where the sign conditions exist



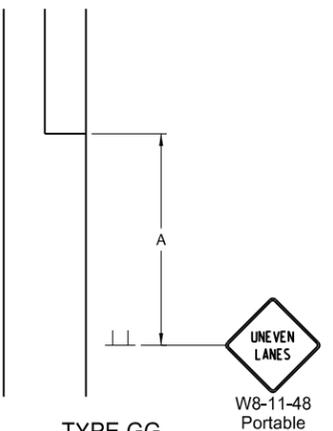
TYPE Z
To be used where speed zone is needed



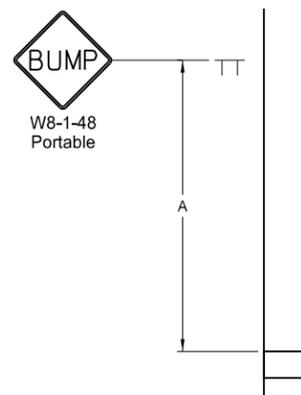
TYPE JJ
To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.

Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

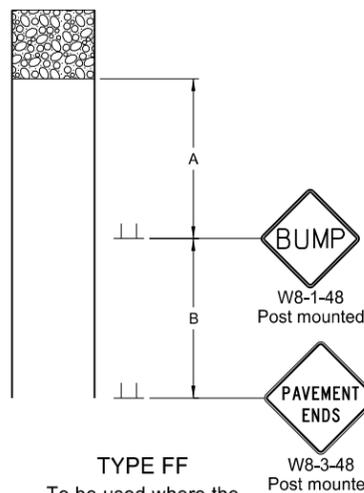
* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.



TYPE GG
To be used where a difference of elevation between lanes exist



TYPE EE
To be used where the sign conditions exist



TYPE FF
To be used where the sign conditions exist

Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY

Sign (represented by a vertical line with a horizontal bar)

Cones (represented by a triangle)

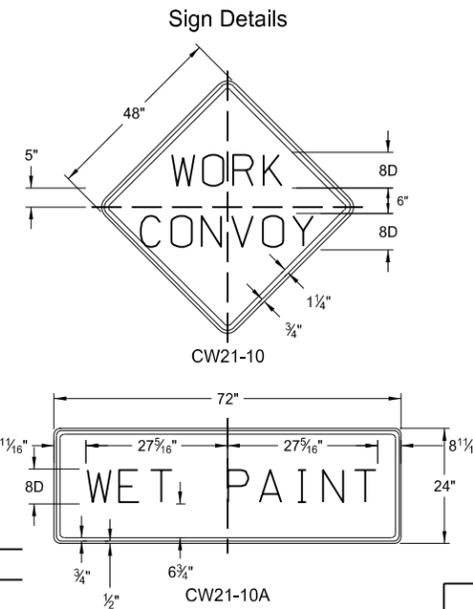
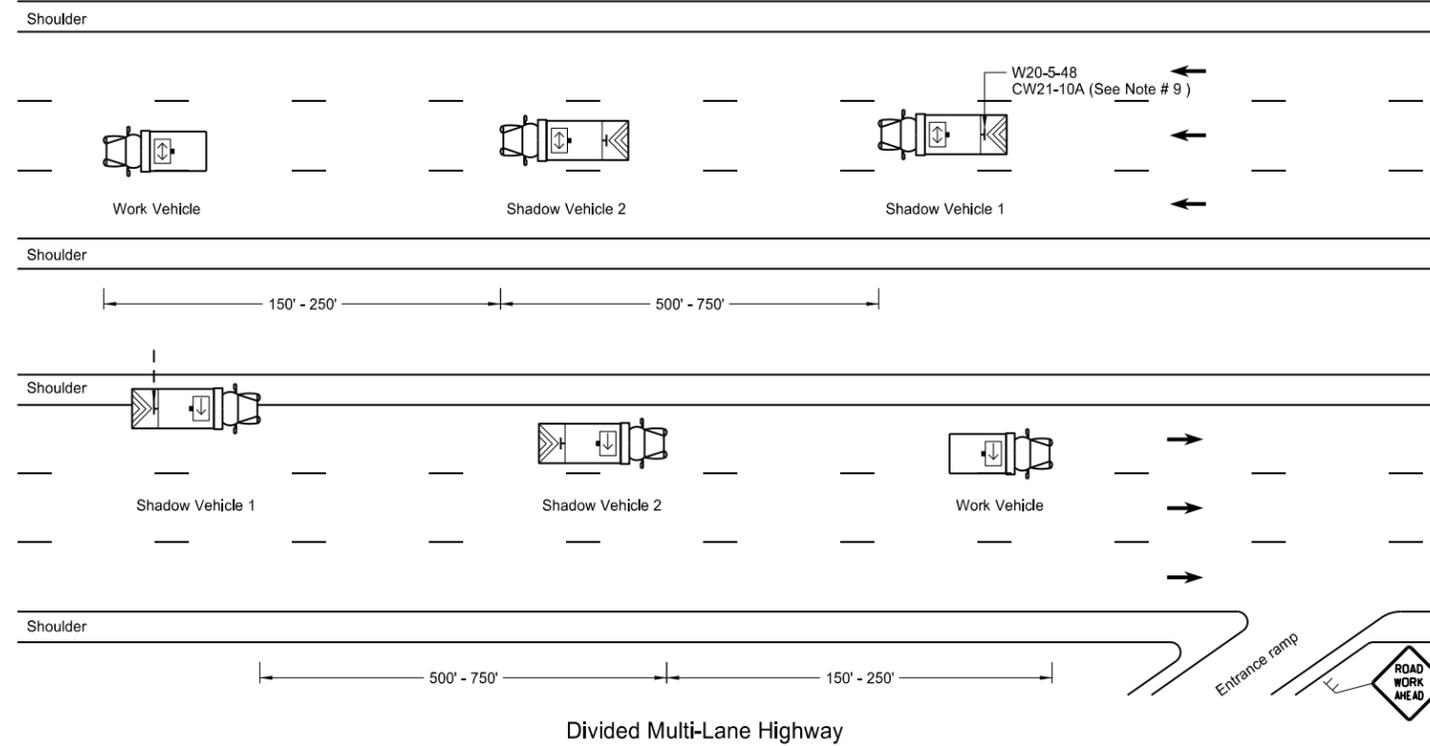
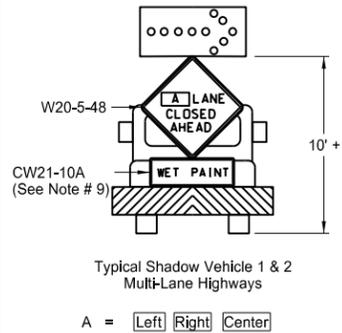
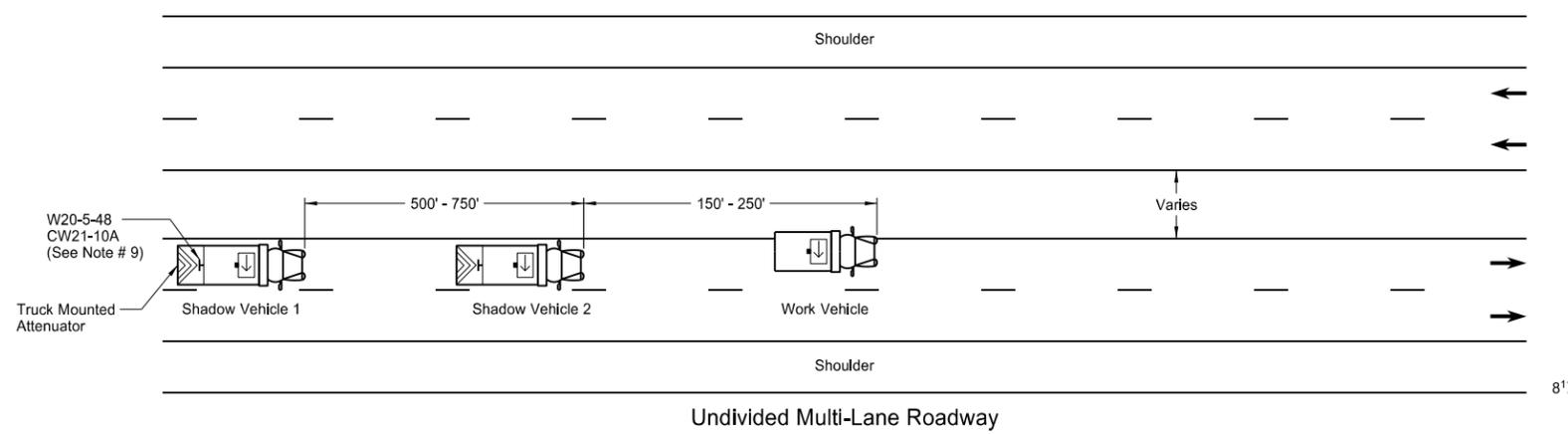
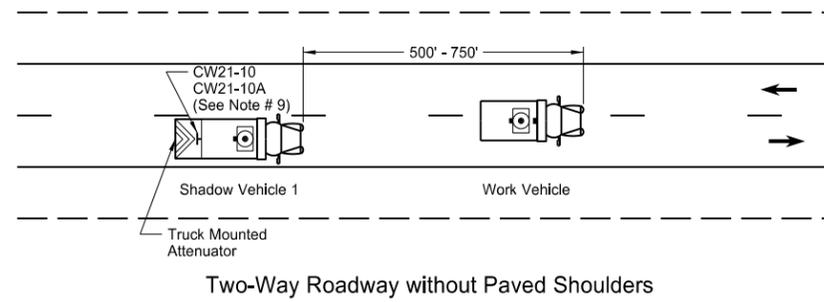
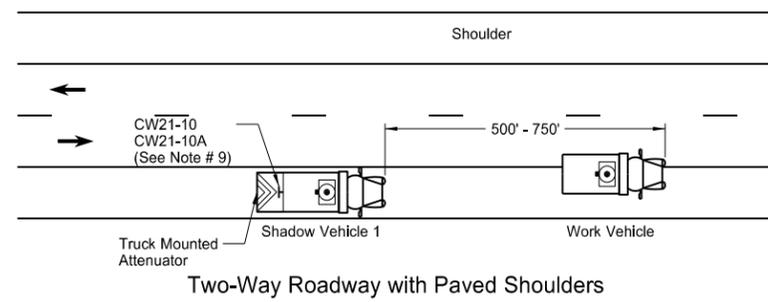
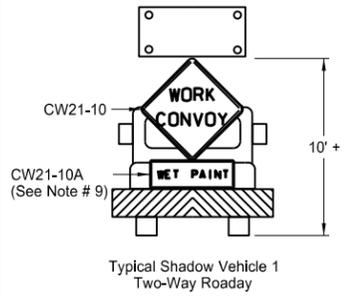
Flagger (represented by a square with a diagonal line)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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DATE	CHANGE

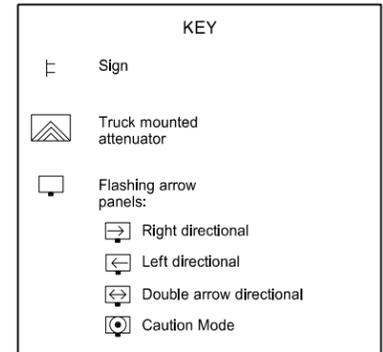
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TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

D-704-27



- Notes
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
 2. Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
 3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
 4. Each vehicle shall have two-way electronic communication capability.
 5. When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
 6. Vehicle spacing between the shadow vehicle 1 and shadow vehicle 2 will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the trail vehicle in time to slow down and/or change lanes as they approach the shadow vehicle.
 7. Sign Colors
Letters = Black
Border = Black
Background = Orange
 8. Shadow vehicle 2 may be used as the paint tender vehicle.
 9. Sign CW21-10A shall only be used during a painting operation.
 10. On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.

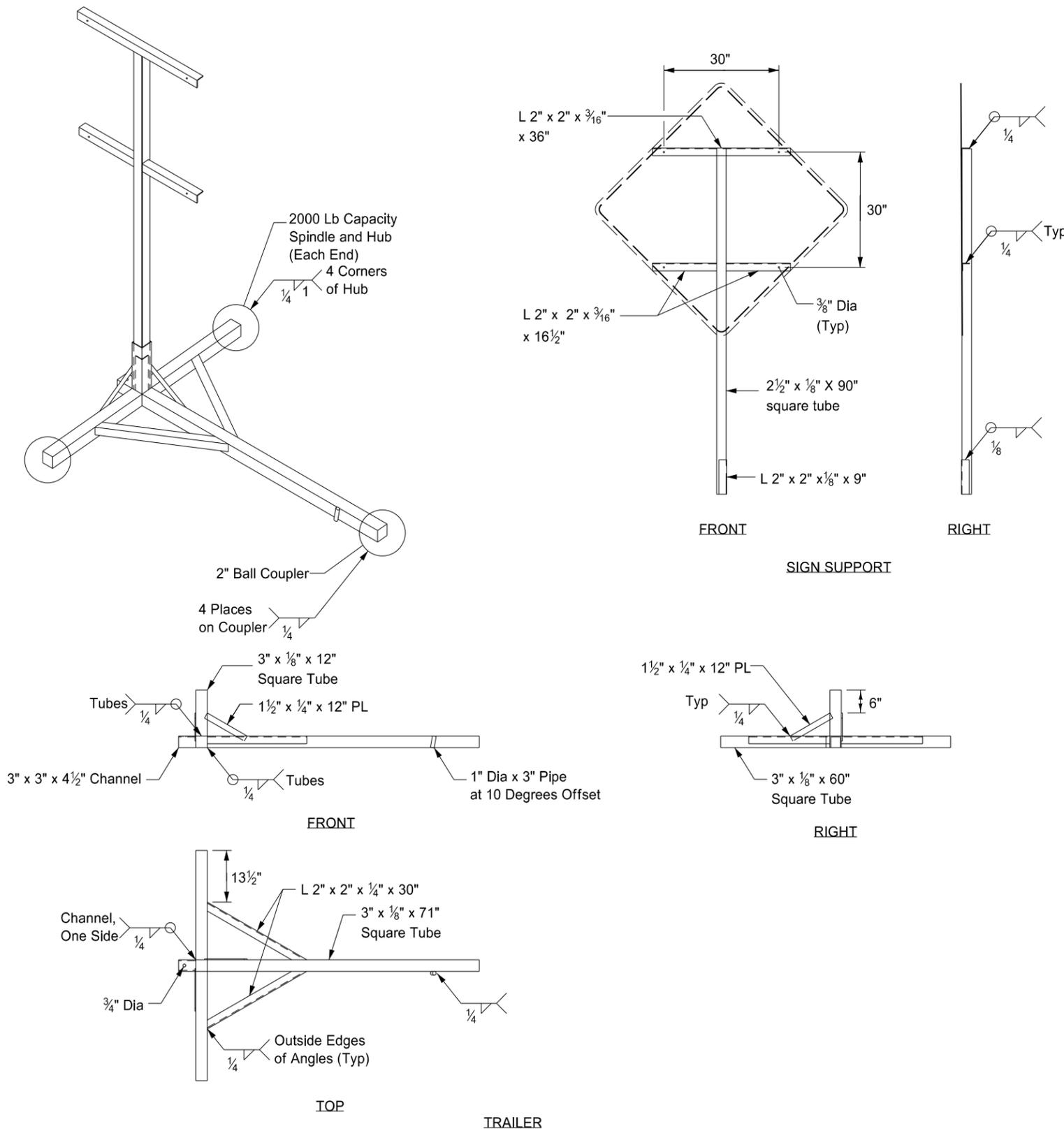


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



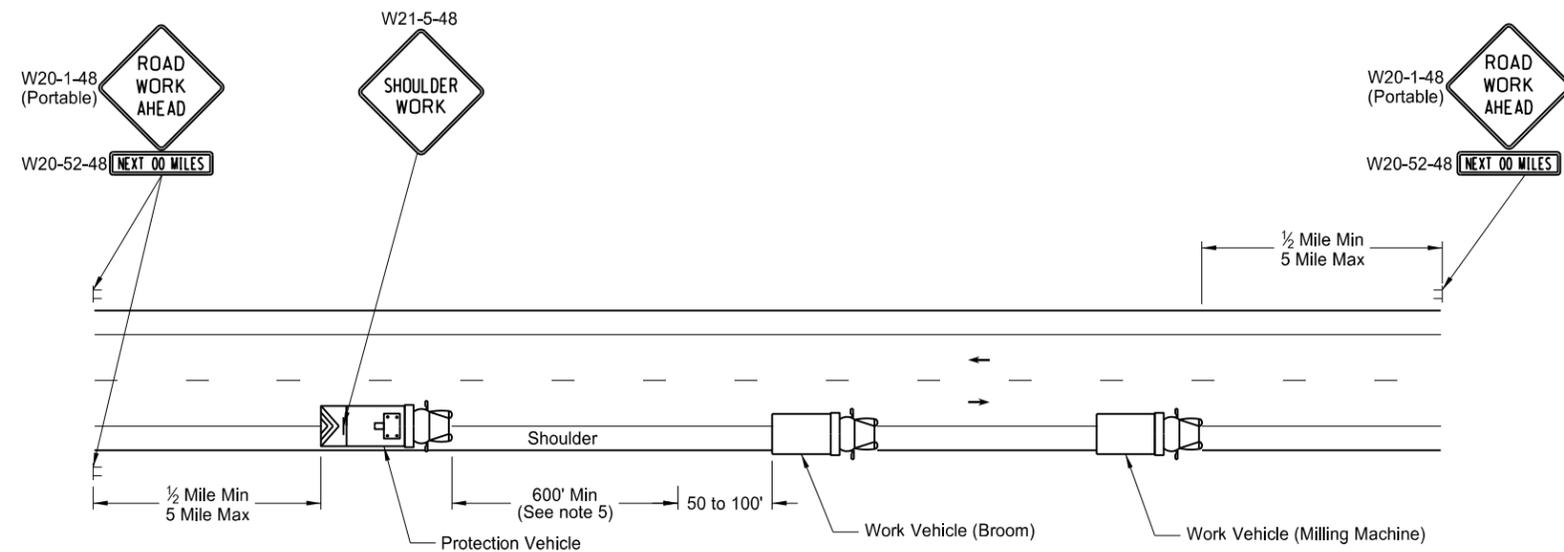
Notes:

- ① The maximum weight of the assembly is 250 pounds.
- ② Use a 14" wheel and tire.
- ③ Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
- ④ Other NCHRP 350 crash tested assemblies are acceptable.

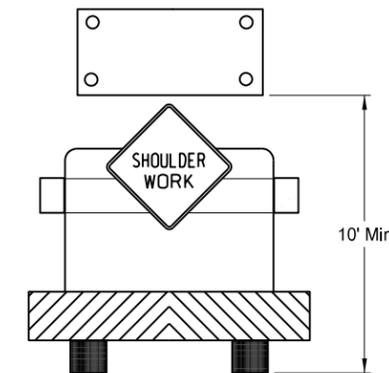
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

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MOBILE OPERATION
Grinding Shoulder Rumble Strips



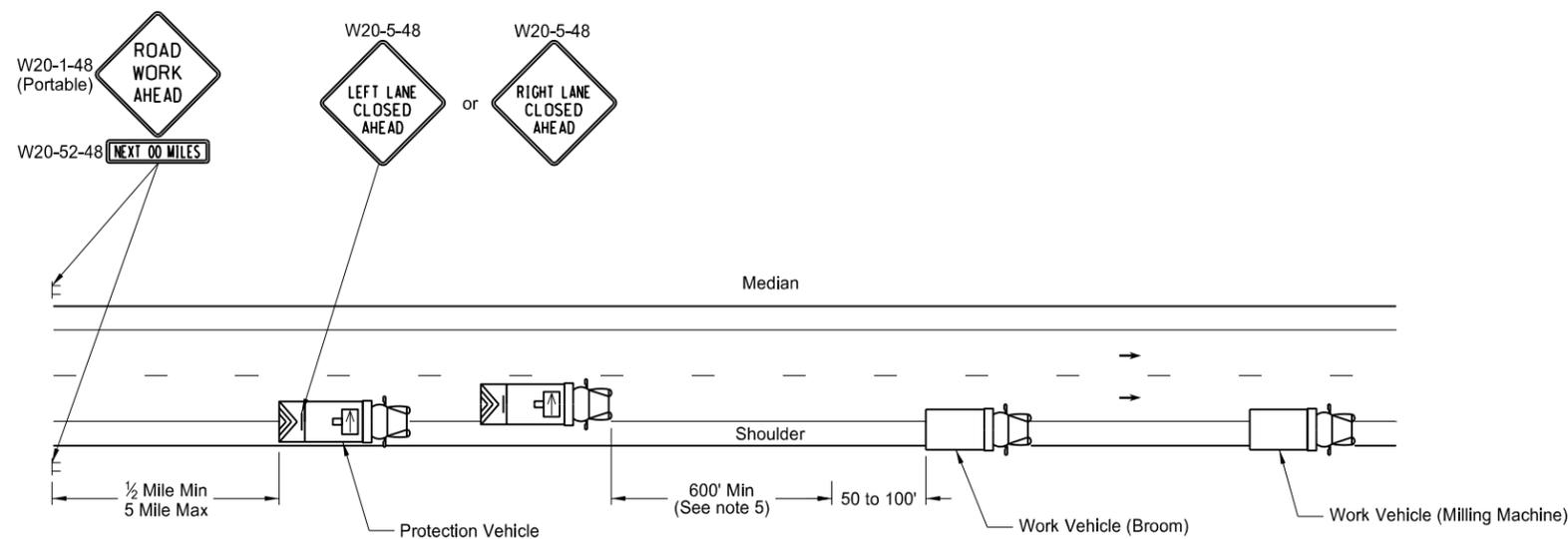
TWO LANE - TWO WAY ROADWAY



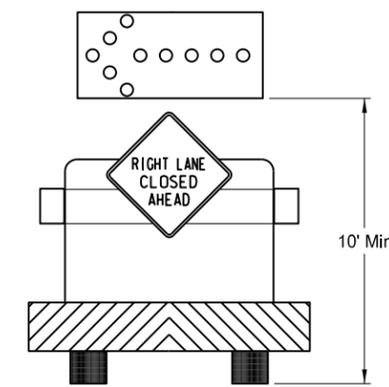
TWO LANE - TWO WAY ROADWAY
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

Notes:

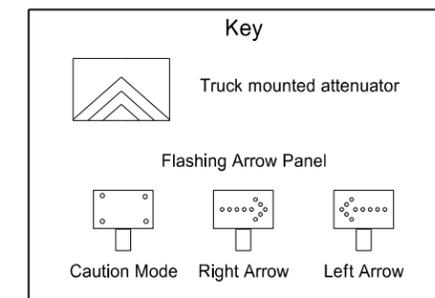
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
2. Vehicles shall have a rotating, flashing, oscillating or strobe lights.
3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
4. Each vehicle shall have two - way electronic communication capability.
5. Vehicle spacing between the protection vehicle and work vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the protection vehicle in time to slow down and safely pass the work vehicles.
6. ROAD WORK AHEAD SIGN: Advance Road Work Ahead signs shall be moved as the work area moves through the construction zone.
7. Next XX Miles sign required when the distance from Road Work Ahead sign to the work location is two miles or greater.



INTERSTATE & 4 LANE DIVIDED HIGHWAY



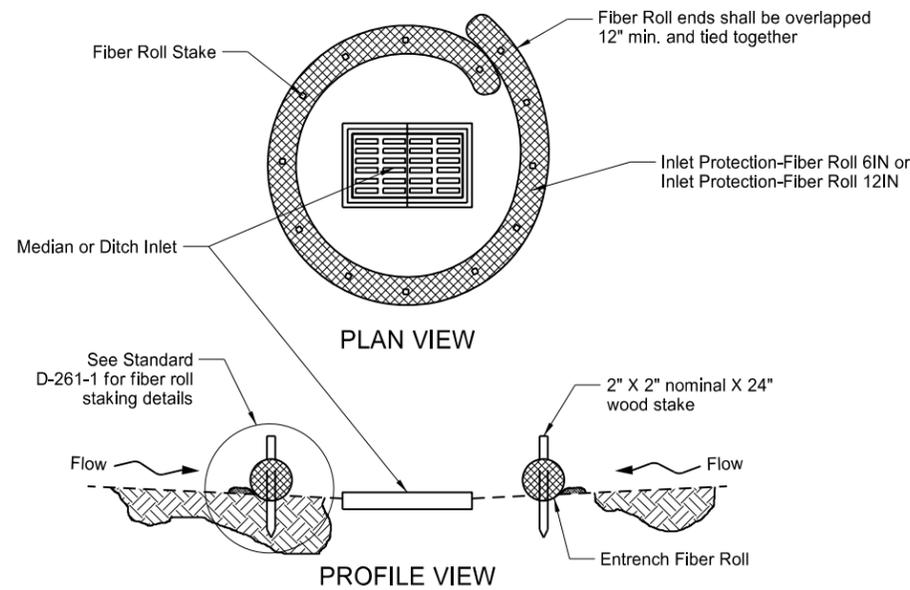
INTERSTATE & 4 LANE DIVIDED HIGHWAY
Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode



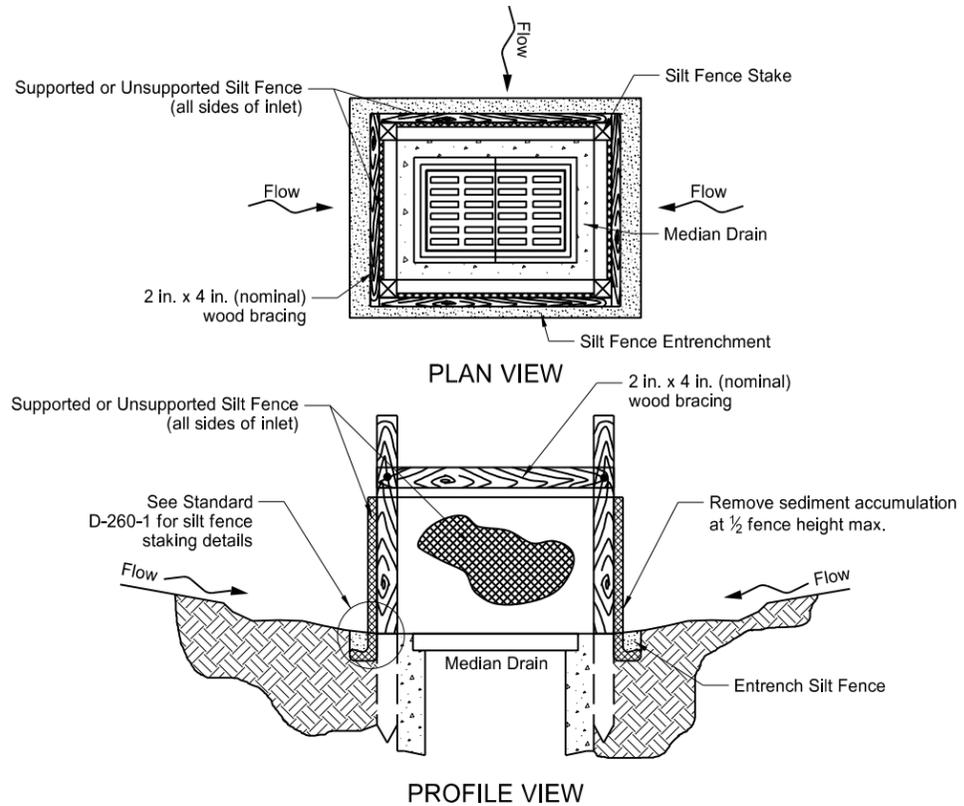
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/15/12 and the original document is stored at the North Dakota Department of Transportation

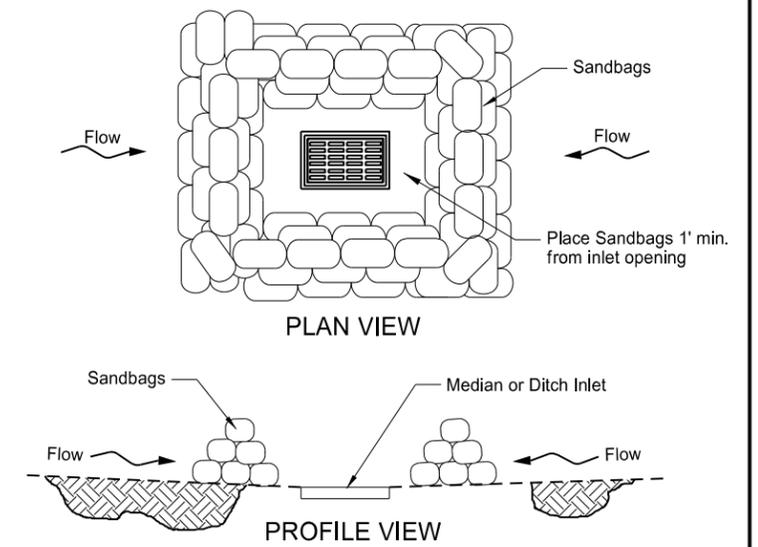
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



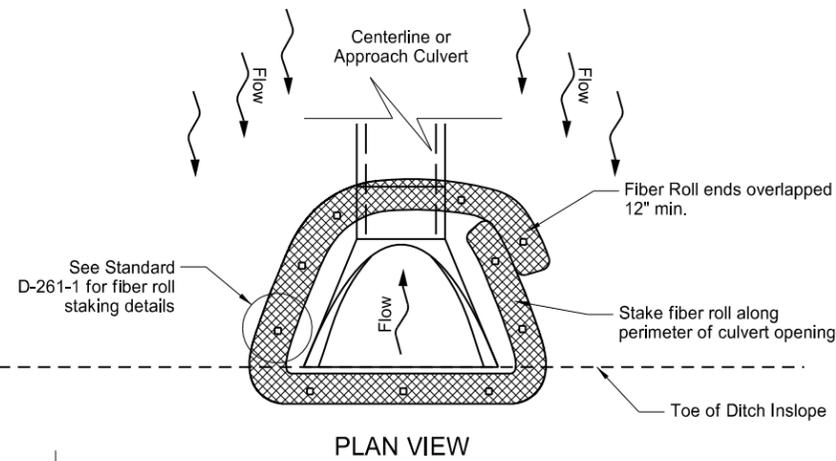
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



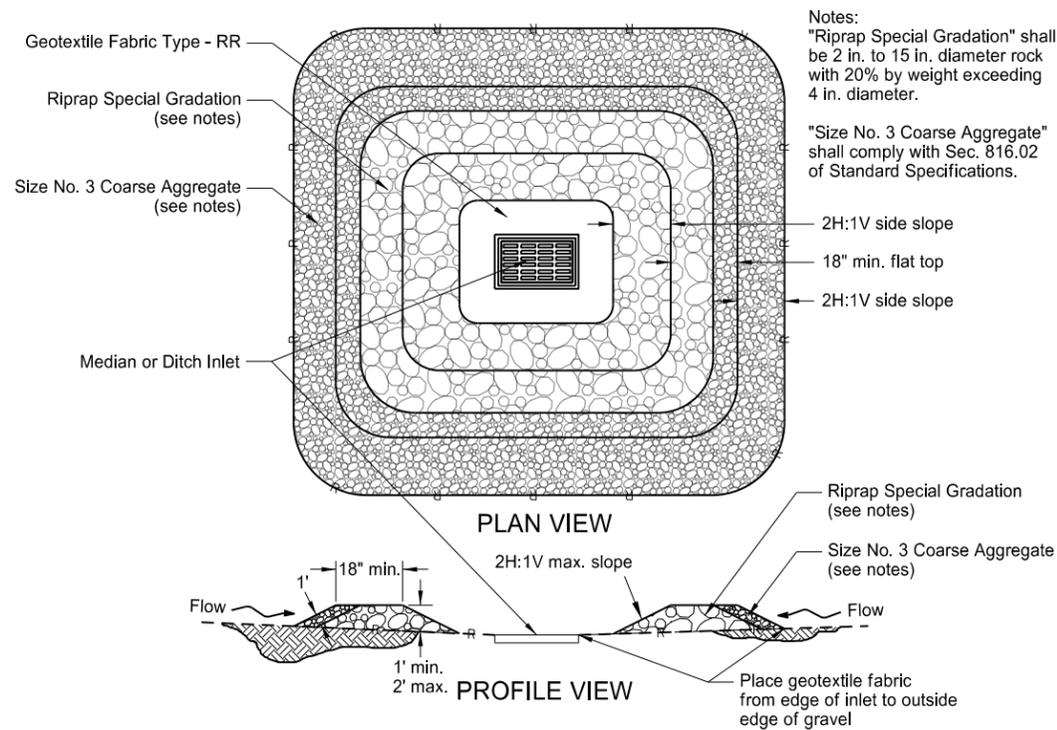
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



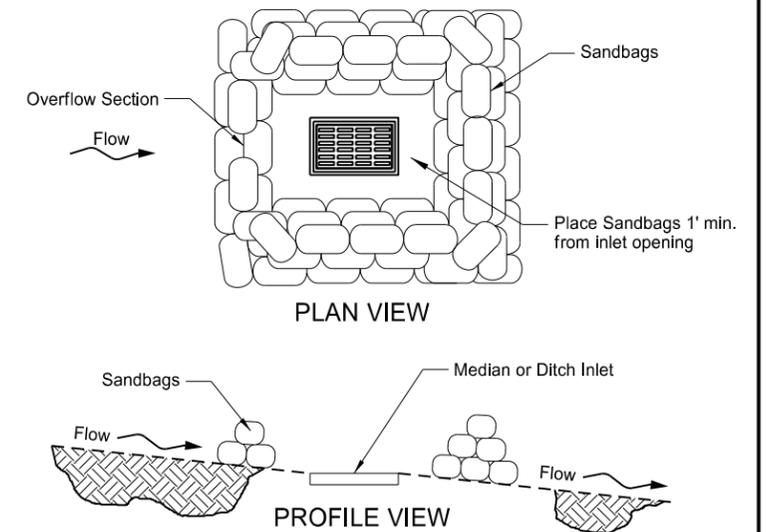
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



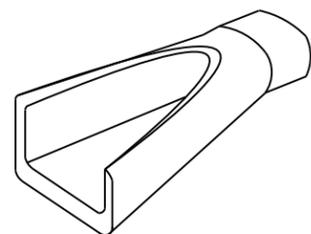
SANDBAG PROTECTION (ON SLOPE)

Notes:
"Riprap Special Gradation" shall be 2 in. to 15 in. diameter rock with 20% by weight exceeding 4 in. diameter.
"Size No. 3 Coarse Aggregate" shall comply with Sec. 816.02 of Standard Specifications.

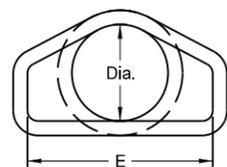
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.

This document was originally issued and sealed by
Roger Weigel
Registration Number
PE-2930,
on 10/01/14 and the original document is stored at the North Dakota Department of Transportation

REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

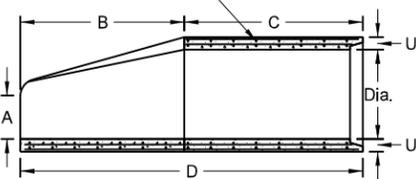


PERSPECTIVE

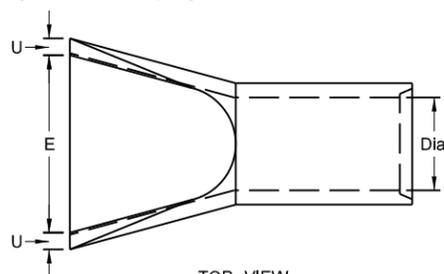


END VIEW

Standard Reinforcement for Class III pipe reinforced as per AASHTO M170



SIDE VIEW

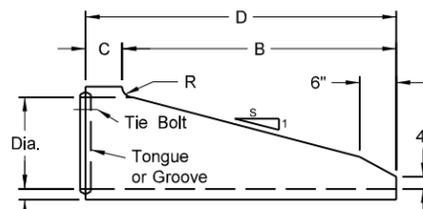


TOP VIEW

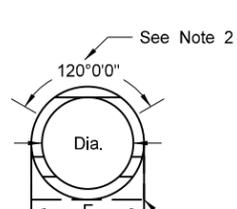
REINFORCED CONCRETE PIPE - FLARED END SECTION

Reinforcement to be equivalent to Class III RCP

TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4'	9"	4'-9"	1'-7½"	2½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	2½"	3"	6
24"	6'	1'	7'	2'-6"	3"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	4"	3"	4



SIDE VIEW



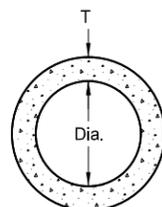
END VIEW

NOTES (Traversable End Section):

1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

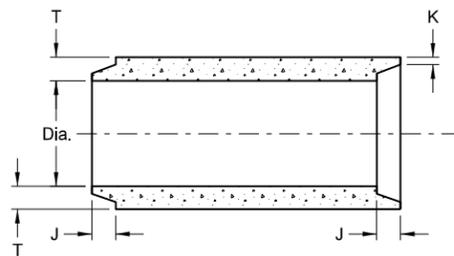
REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

Reinforcement to be equivalent to Class III RCP

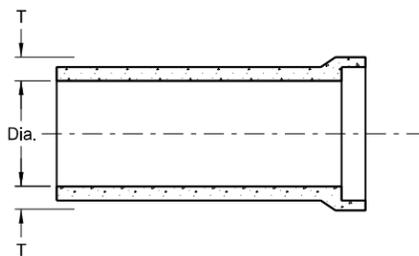


END VIEW

CIRCULAR PIPE

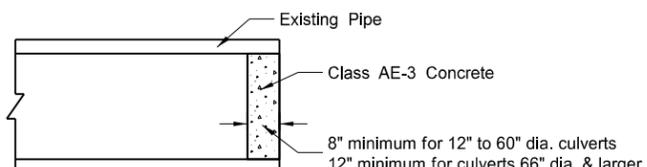


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0½"	6'-0½"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2½"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2½"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3½"
30	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4½"
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9½"	8'-2½"	7'-6"	5½"
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5½"
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6½"
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	6½"
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	6½"

All Classifications of Round Concrete Pipe

Internal Dia. of Pipe (In.)	Cross-Sectional Water Area (Sq. ft.)	Weight per Lin. Foot of Pipe (Lbs.)	Joint Groove End Min./Max. (In.)	Joint Tongue End Min./Max. (In.)	Minimum Wall Thickness (In.)
12	0.79	92	1½-2¾	¾	2
15	1.23	127	1¾-2¾	¾	2½
18	1.77	168	1¾-2¾	1	2½
21	2.40	214	1¾-3¾	1½	2¾
24	3.14	265	2¾-3¾	1½	3
27	3.98	322	2¾-4	1¾	3¼
30	4.91	384	3¾-4¼	1¾	3½
33	5.94	452	3¾-4¼	1½	3¾
36	7.07	524	3¾-4¼	1½	4
42	9.62	685	3¾-4¼	1¾	4½
48	12.57	885	3¾-4¼	1¾	5
54	15.90	1070	4½-5½	2	5½
60	19.63	1296	4½-5½	2¼	6
66	23.76	1542	5-6	2½	6½
72	28.27	1810	5½-6¾	2½	7
78	33.18	2098	6¼-7¼	2½	7½
84	38.48	2410	5½-7¼	3¾	8
90	44.18	2793	6¾-8½	3¾	8½
96	50.27	3092	7-8¼	3½	9
102	56.75	3466	7-8¼	3½	9½
108	63.62	3864	7¼-8½	3¾	10

SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

NOTES:

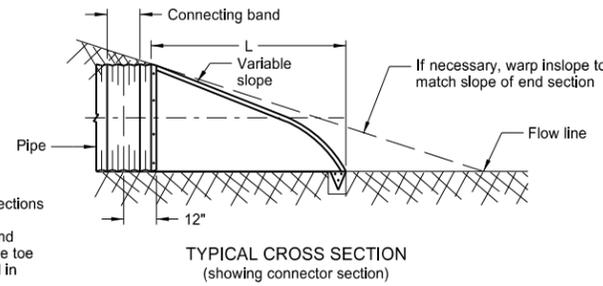
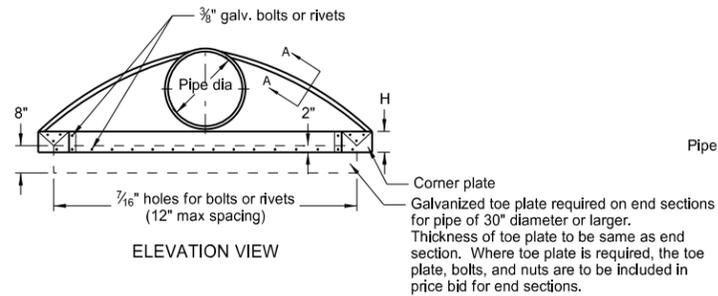
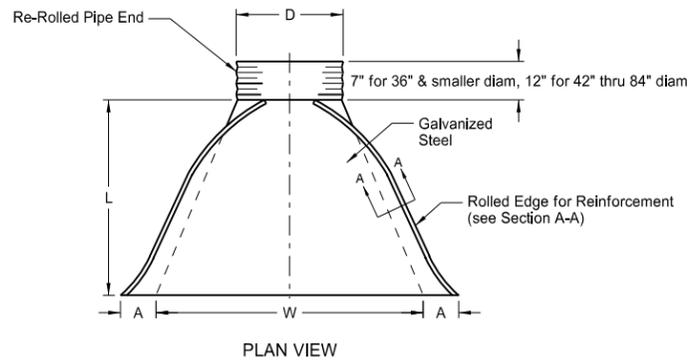
1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
66" to 108" (incl.) = not less than 6 feet
4. Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
5. For Class IV and Class V reinforced concrete pipe and end section sizes which do not have reinforcement specified by AASHTO M170, shop drawings and design calculations shall be prepared and sealed by a Professional Engineer and submitted for the Engineer's review.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5

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ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



PIPE DIA.	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE	BODY PIECE
		A	B	H	L	W		
15	0.064	7	8	6	26	30	2 1/2:1	1
18	0.064	8	10	6	31	36	2 1/2:1	1
24	0.064	10	13	6	41	48	2 1/2:1	1
30	0.079	12	16	8	51	60	2 1/2:1	1 or 2
36	0.079	14	19	9	60	72	2 1/2:1	2
42	0.109	16	22	11	69	84	2 1/2:1	2
48	0.109	18	27	12	78	90	2 1/2:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1 1/2:1	3
* 66	0.109	18	36	12	87	120	1 1/2:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1 1/2:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

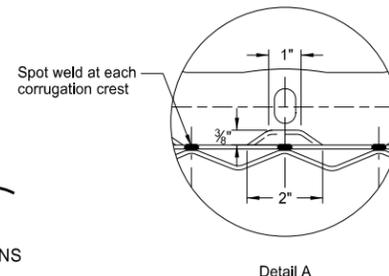
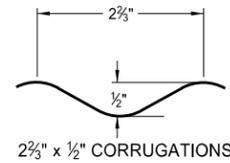
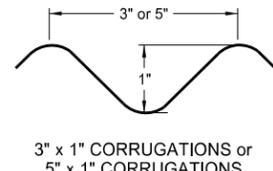
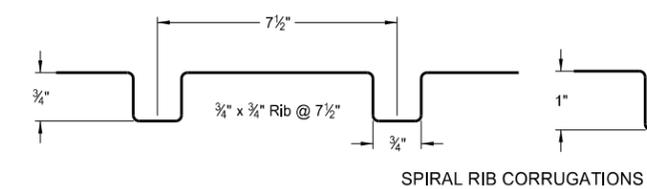
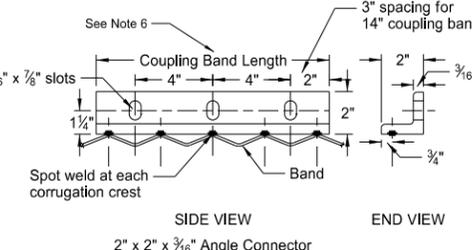
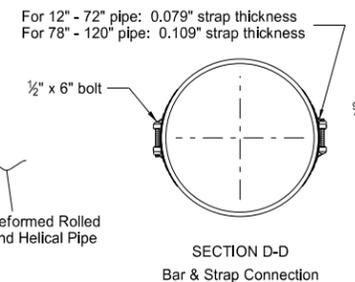
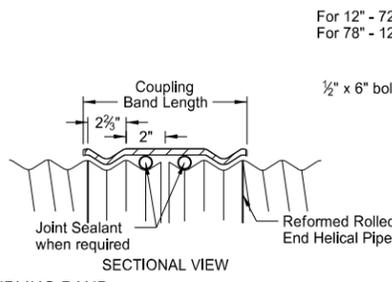
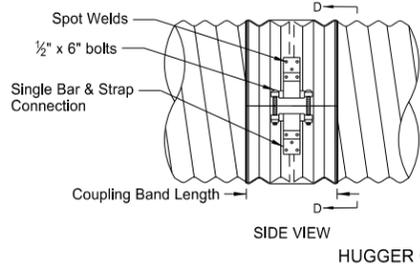
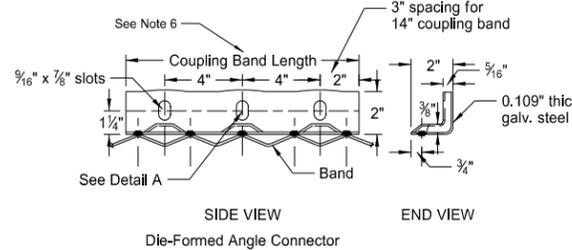
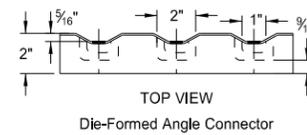
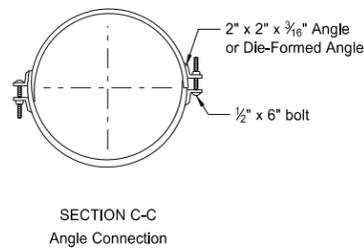
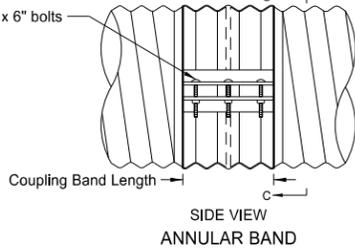
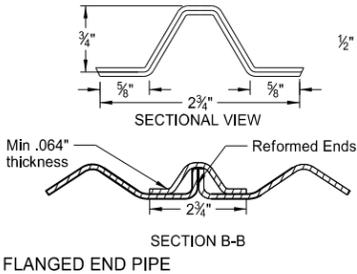
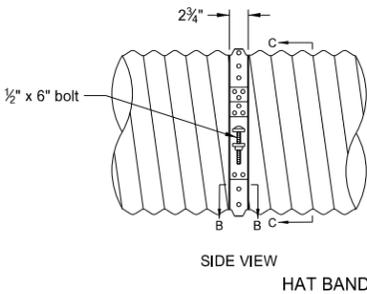
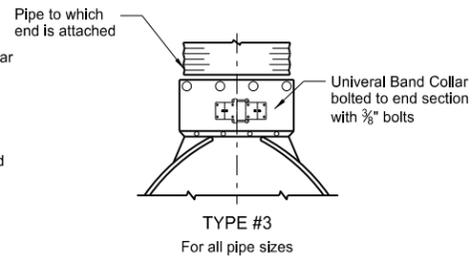
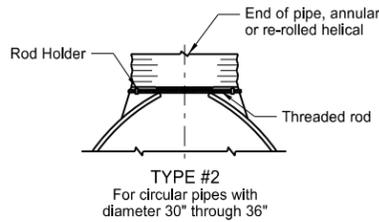
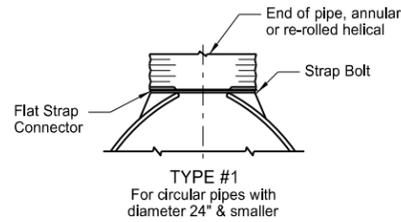
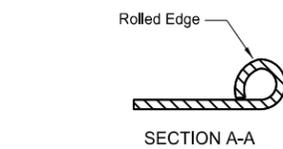
- These sizes have 0.109" sides and 0.138" center panels.
 - Pipe diameter is equal to dimension "D" of end section.
- Manufacturers tolerances of above dimensions will be allowed.
- Splices to be the lap riveted type.

Multiple panel bodies shall have lap seams which are to be tightly joined with 3/8" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.

NOTES:

1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x 1/4" galv. angle for 60" through 72" dia. and 2 1/2" x 2 1/2" x 1/4" galv. angle for 78" and 84" dia.. Angles to be attached by galv. 3/8" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
5. 1/2" x 8" bolts may be used as a substitute for the 1/2" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four 1/2" bolts with maximum spacing of 5 1/2" are used for the connection.
7. Length of spot welds shall be minimum 1/2".

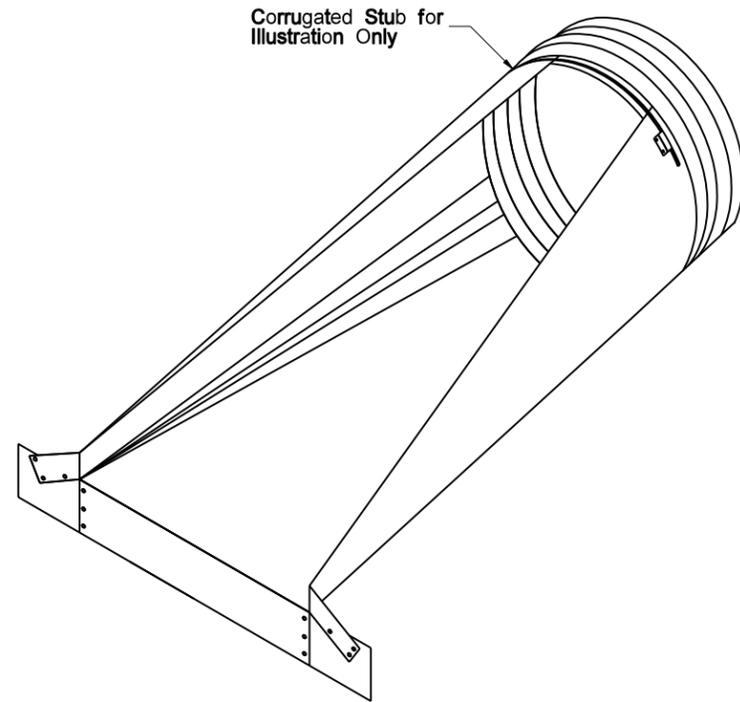
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2 3/8" x 1/2"	12" - 48"	2 3/4"	.064"
Annular Band	2 3/8" x 1/2"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
Hugger Band	2 3/8" x 1/2" Rerolled End	12" - 72"	10 1/2"	.052"
		78" - 84"	10 1/2"	.079"
	3" x 1" Rerolled End	48" - 120"	10 1/2"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"



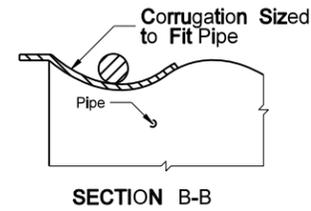
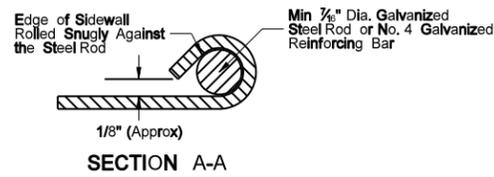
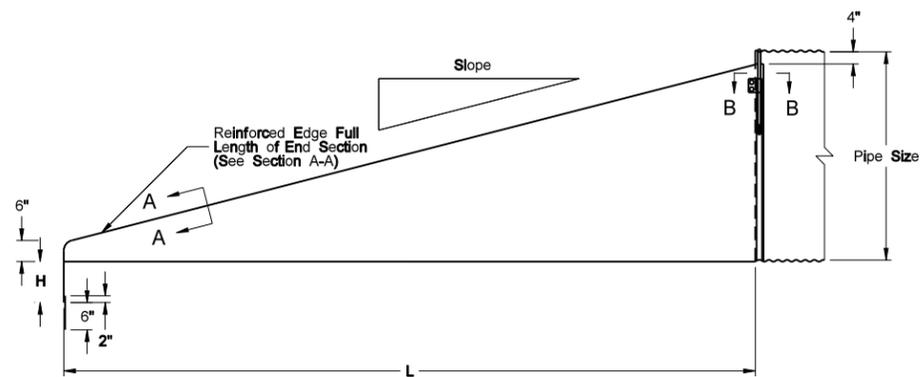
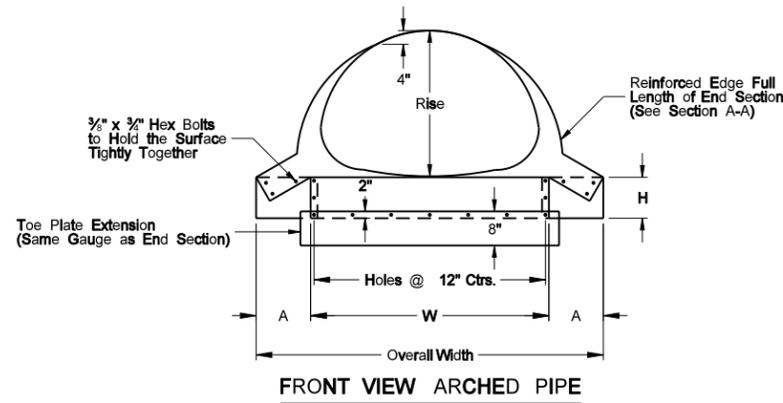
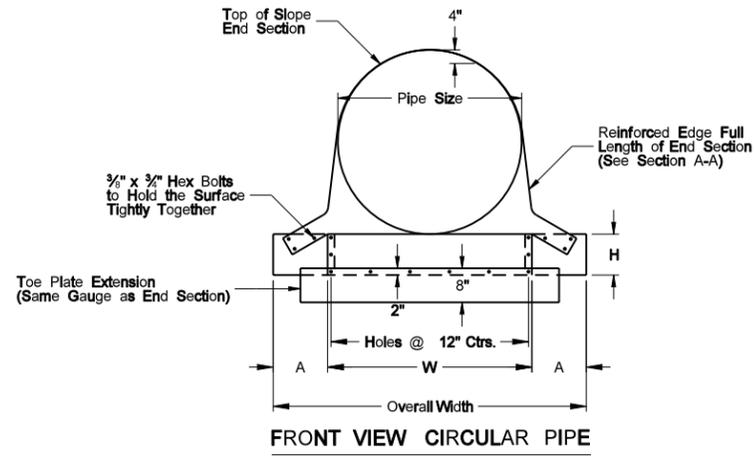
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail

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TRAVERSABLE END SECTIONS FOR CORRUGATED STEEL PIPE CULVERTS



ISOMETRIC VIEW



TRAVERSABLE END SECTIONS FOR CIRCULAR PIPES

Pipe Dia. (in.)	Min. Thick.		Dimensions (inches)				L Dimensions			
	in.	Gauge	A	H	W	Overall Width	Slope	Length (in.)	Slope	Length (in.)
15	.064	16	8	6	21	37	4:1	20	6:1	30
18	.064	16	8	6	24	40	4:1	32	6:1	48
24	.064	16	8	6	30	46	4:1	56	6:1	84
30	.109	12	12	9	36	60	4:1	80	6:1	120

TRAVERSABLE END SECTIONS FOR ARCHED PIPES

Equiv. Dia. (in.)	(inches)		Min. Thick.		Dimensions (inches)				L Dimensions			
	Span	Rise	in.	Gauge	A	H	W	Overall Width	Slope	Length (in.)	Slope	Length (in.)
18	21	15	.064	16	8	6	27	43	4:1	20	6:1	30
21	24	18	.064	16	8	6	30	46	4:1	32	6:1	48
24	28	20	.064	16	8	6	34	50	4:1	40	6:1	60

Note: See Standard Drawing D-714-04 for end section to pipe details.

For 15", 18" and 24" diameter end sections, 1/2" diameter rod, or strap type connection to corrugated steel pipe shall be used.

For 30" diameter round end sections, rod type connection to corrugated steel pipe, using 5/8" diameter rod shall be used.

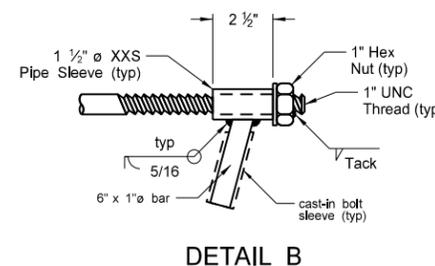
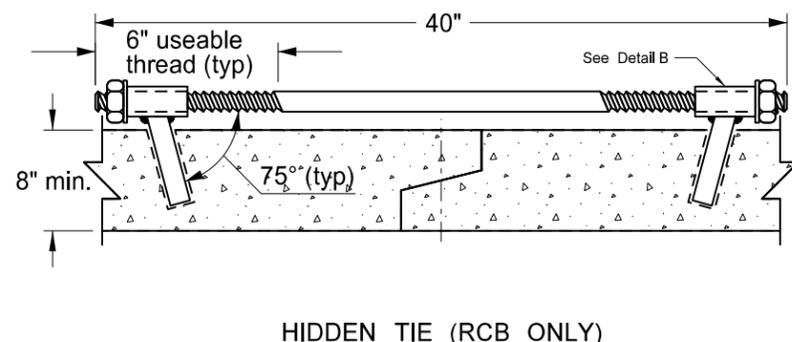
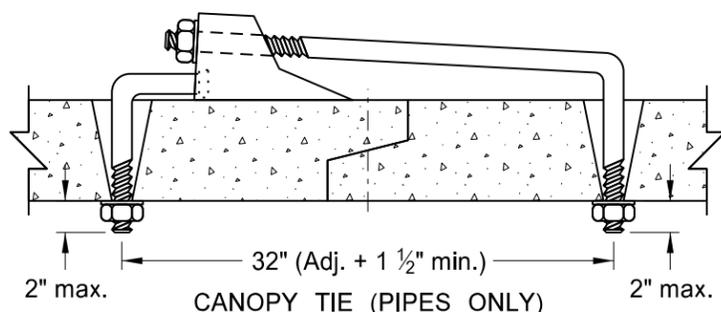
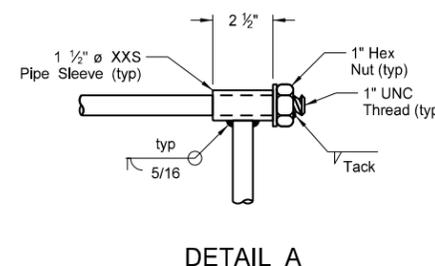
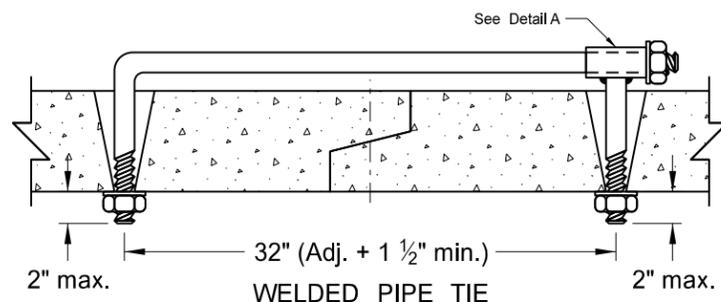
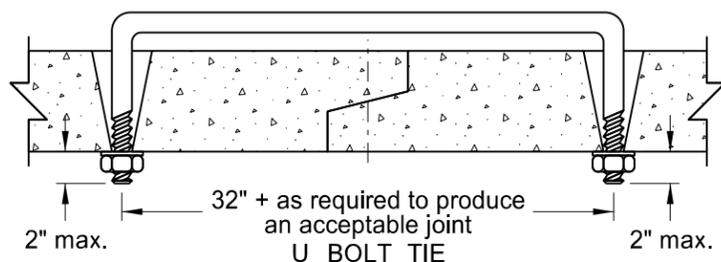
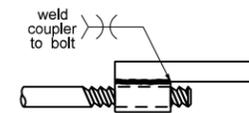
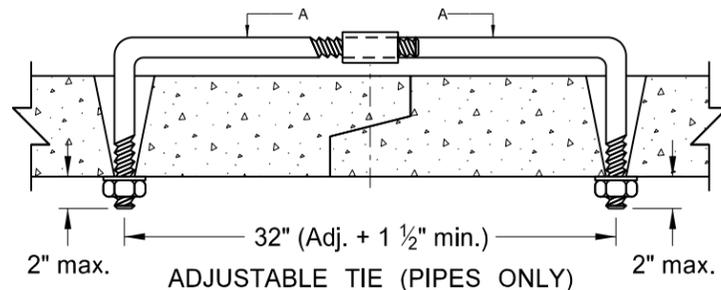
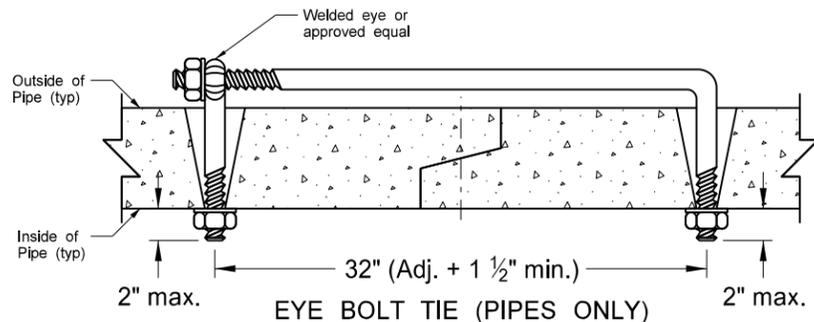
For arched pipe end sections (21" X 15" through 28" X 20"), rod type connection to corrugated steel pipe, using 1/2" diameter rod shall be used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-23-09	
REVISIONS	
DATE	CHANGE

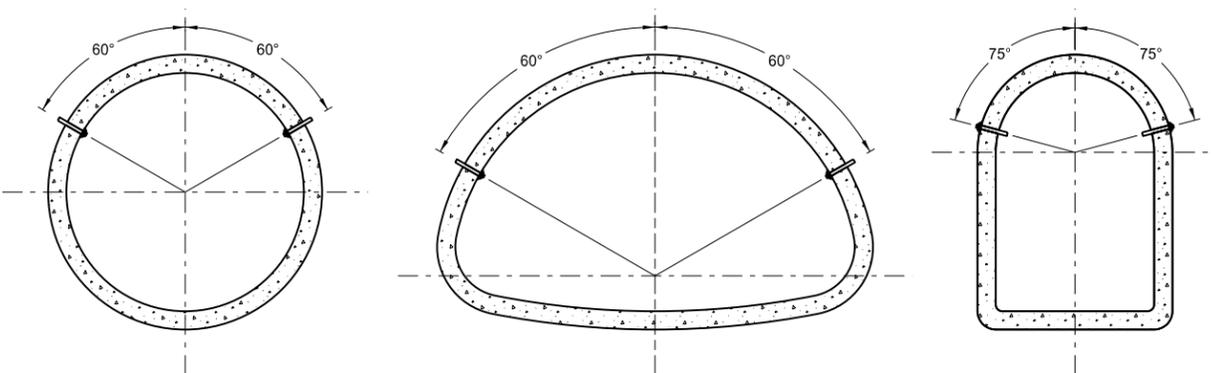
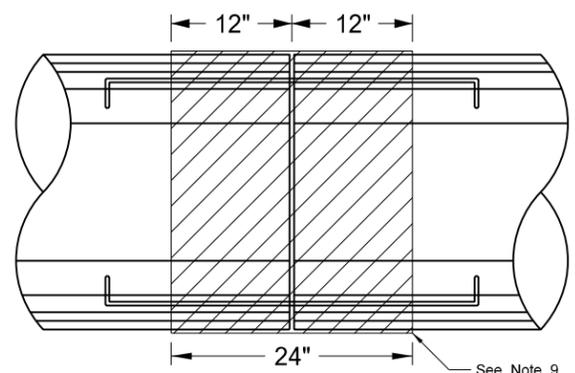
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 07/23/09 and the original document is stored at the North Dakota Department of Transportation

CONCRETE PIPE OR PRECAST CONCRETE BOX CULVERT TIES

REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ϕ	XXS Pipe Sleeve Inner ϕ
18" - 24"	$\frac{5}{8}$ " See note 2	$\frac{3}{4}$ "
30" - 66"	$\frac{3}{4}$ "	1"
72" - 78"	1"	1 $\frac{1}{4}$ "
RCB		



- NOTES:
- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
 - Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
 - Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
 - Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
 - Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter $\frac{1}{4}$ " larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of $1 \frac{1}{4}$ ".
 - The contractor has the option of selecting the type of tie bolt used from those shown.
 - The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
 - All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
 - When joint wrap is specified in the plans, place wrap beneath ties. Overlap the joint by 12" in both directions.
 - Tie bolts shall conform to ASTM A 36. Nuts shall be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
 - Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
 - RCB tie locations shall be as shown on the plans.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8

This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 07/21/15 and the original document is stored at the North Dakota Department of Transportation

STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

NOTES:

The construction and installation of Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) shall conform to Section 720 of the Standard Specifications.

ALIGNMENT MONUMENTS:

Iron Pin or Precast Concrete Alignment Monuments with aluminum caps will be placed on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

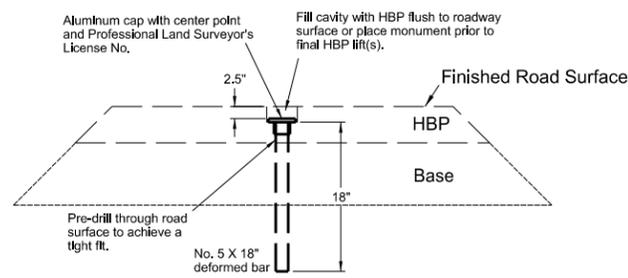
IRON PIN R/W MONUMENT:

Iron pins with aluminum caps (No. 5 X 18") will be placed at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

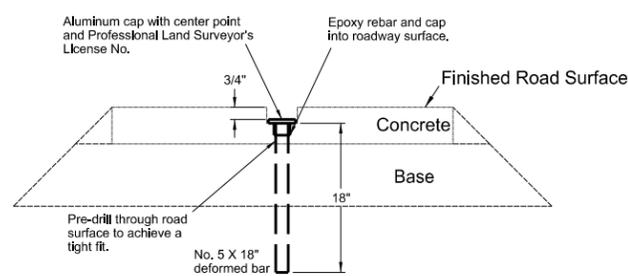
IRON PIN REFERENCE MONUMENT:

Iron Pins without aluminum caps (No. 5 X 18") will be placed as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

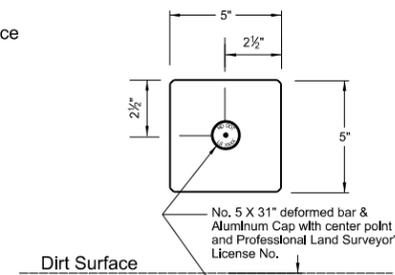
ALIGNMENT MONUMENT DETAILS



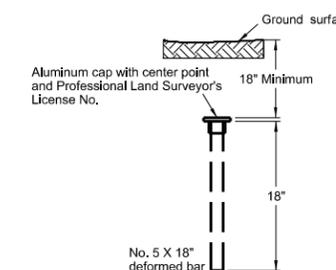
IRON PIN
(Within Finished Roadway Surface)



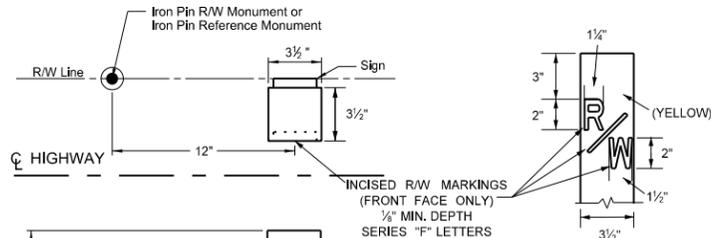
IRON PIN
(Within Finished Roadway Surface)



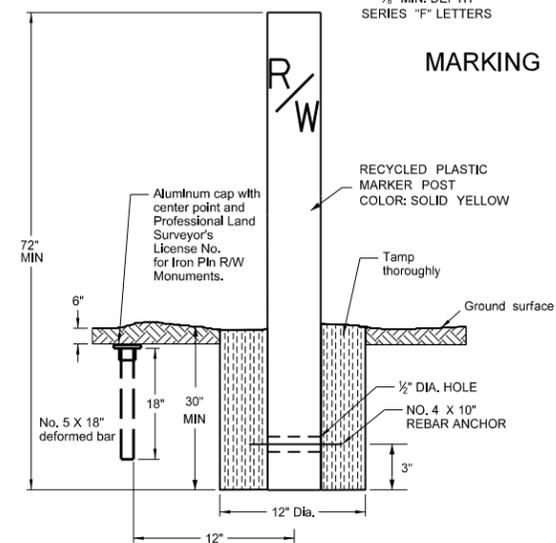
PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)



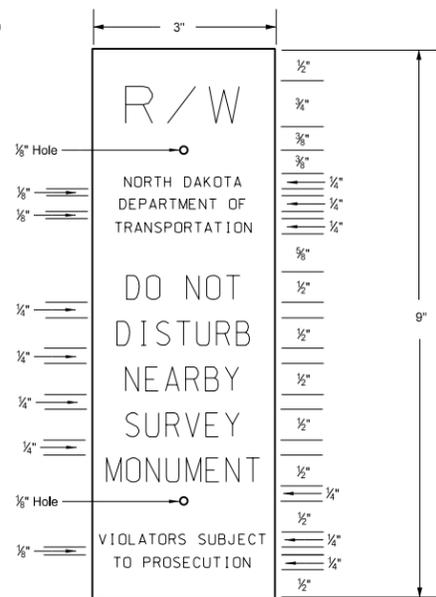
IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)



MARKING DETAIL



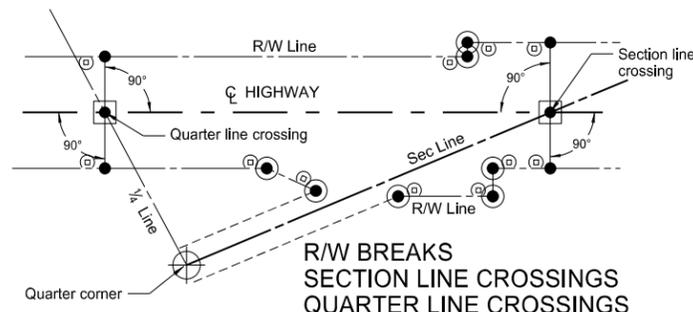
RECYCLED PLASTIC
RIGHT OF WAY MARKER
(WITNESS POST) DETAILS
&
IRON PIN REFERENCE AND R/W
MONUMENT DETAILS



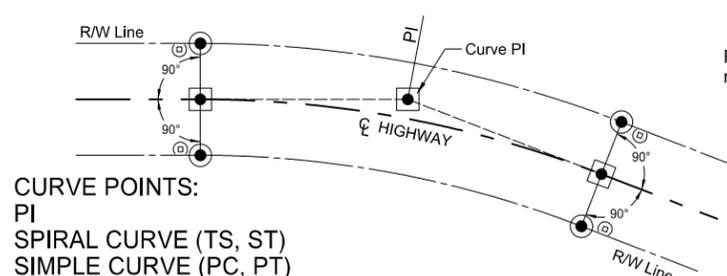
SIGN DETAIL

Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Sign shall be attached by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Sign shall be installed 2" from top of post.

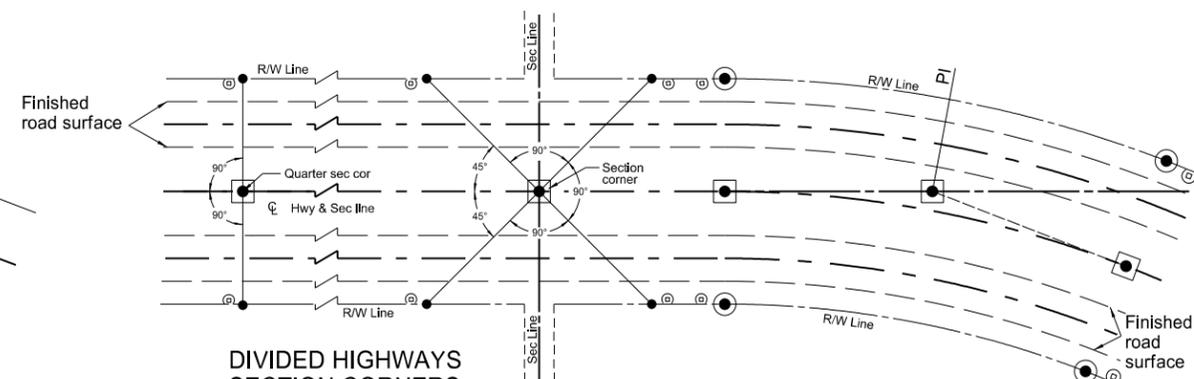
VARIOUS MONUMENT AND MARKER PLACEMENTS



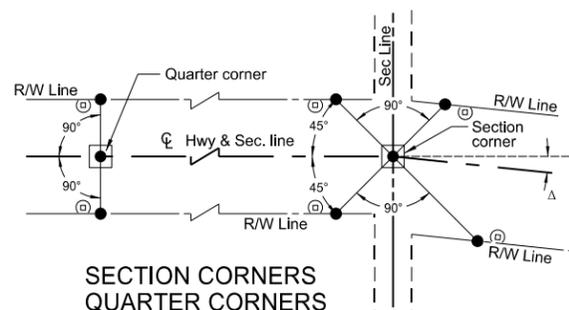
R/W BREAKS
SECTION LINE CROSSINGS
QUARTER LINE CROSSINGS



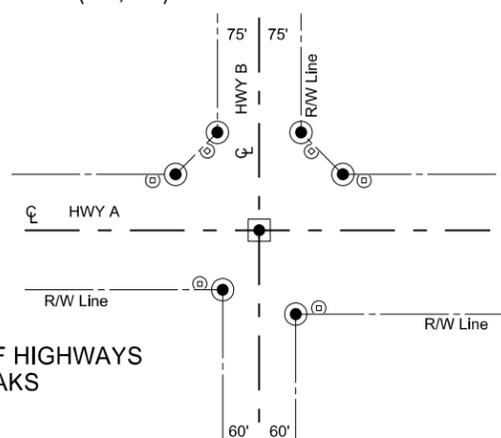
CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)



DIVIDED HIGHWAYS
SECTION CORNERS
QUARTER CORNERS



SECTION CORNERS
QUARTER CORNERS



INTERSECTION OF HIGHWAYS
FLARED R/W BREAKS

LEGEND

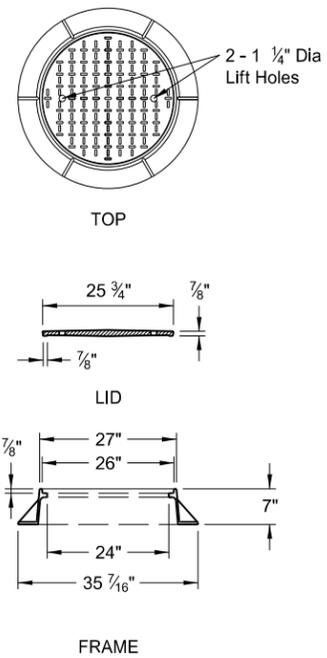
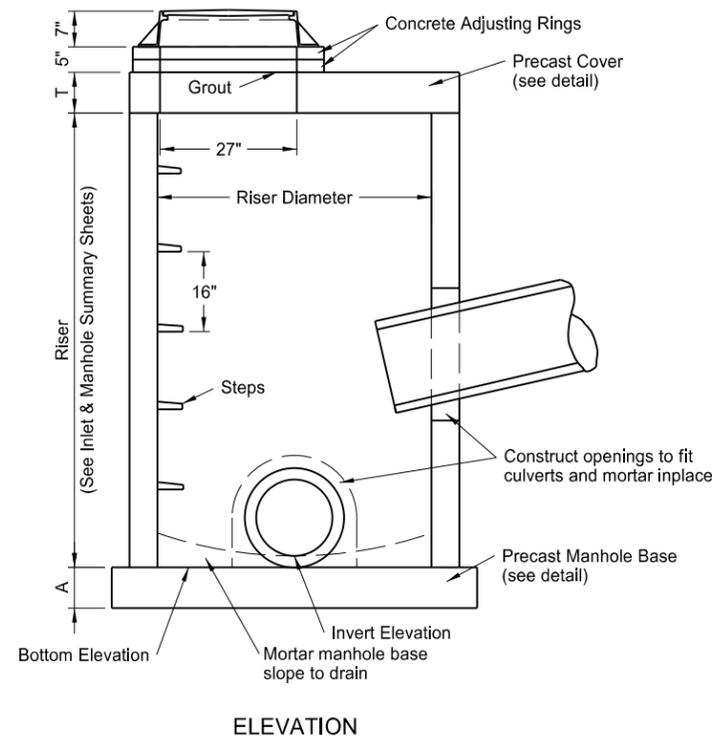
- Iron Pin Reference Monument
- ⊙ R/W Marker (witness post)
- Alignment Monument
- Iron Pin R/W Monument

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
11/12/13	Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38

This document was originally issued and sealed by
Roger Weigel
Registration Number
PE-2930,
on 11/12/13 and the original document is stored at the
North Dakota Department
of Transportation

MANHOLE DETAILS

D-722-5



PRECAST MANHOLE COVERS

RISER DIAMETER	COVER DIAMETER	WEIGHT OF SECTION	T	K	L	BOTTOM * BARS	TOP * BARS
48"	58"	1,080 Lb	6"	6"	8"	#4 at 6"	—
54"	65"	1,910 Lb	8"	6"	8"	#4 at 6"	—
60"	72"	2,430 Lb	8"	7"	9"	#4 at 6"	#4 at 11"
66"	79"	3,010 Lb	8"	7"	9"	#4 at 6"	#4 at 11"
72"	86"	3,640 Lb	8"	8"	10"	#4 at 6"	#4 at 11"
84"	100"	5,060 Lb	8"	9"	11"	#5 at 6"	#5 at 11"
96"	114"	6,695 Lb	8"	9"	11"	#5 at 6"	#5 at 11"
108"	128"	12,810 Lb	12"	10"	12"	#5 at 6"	#5 at 11"
120"	142"	15,900 Lb	12"	11"	13"	#5 at 6"	#5 at 11"

* - Reinforcement listed shall be placed in each direction.

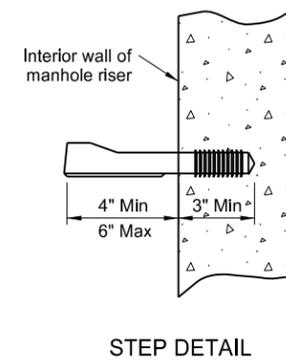
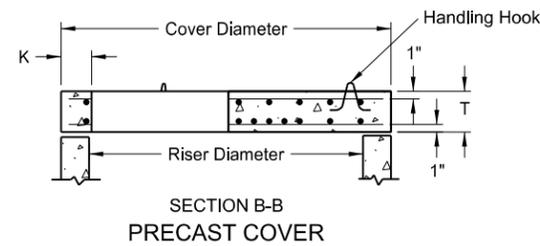
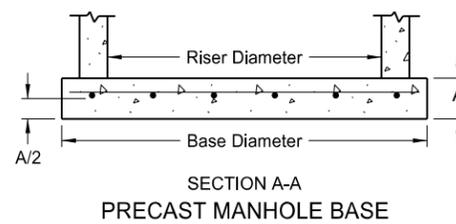
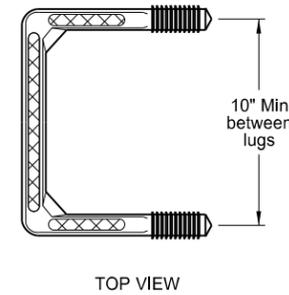
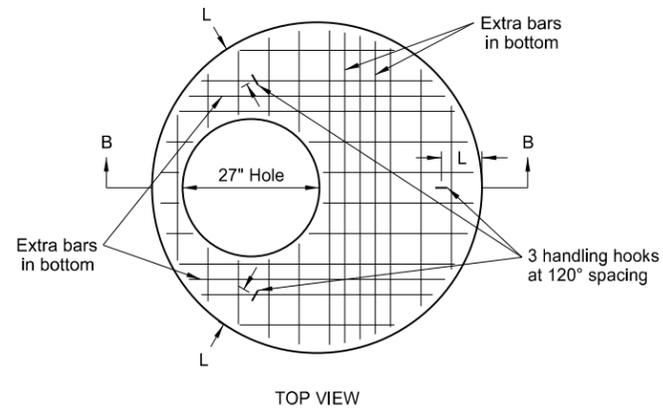
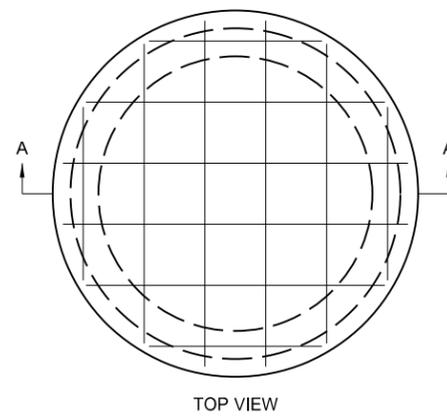
MANHOLE BASES

RISER DIAMETER	BASE DIAMETER	WEIGHT OF SECTION	A	BARS *
48"	66"	1,785 Lb	6"	#4 at 12"
54"	72"	2,830 Lb	8"	#4 at 12"
60"	78"	3,320 Lb	8"	#4 at 12"
66"	86"	4,035 Lb	8"	#4 at 12"
72"	92"	4,620 Lb	8"	#4 at 12"
84"	107"	6,245 Lb	8"	#4 at 12"
96"	120"	7,855 Lb	8"	#4 at 12"
108"	132"	14,255 Lb	12"	#4 at 8"
120"	148"	17,925 Lb	12"	#4 at 8"

* - Reinforcement listed shall be placed in each direction.

NOTES:

- The contractor shall have the option of using precast or cast-in-place bases. Class of concrete shall be AE. The aggregate size shall be approved by the engineer in the field. Construction shall be in accordance with the NDDOT Standard Specifications.
- Precast concrete manholes, risers and steps shall conform to AASHTO M199.
- Precast concrete bases and covers shall be reinforced as shown in the table for the corresponding riser diameter.
- All reinforcing steel shall be Grade 60 steel.
- Bottoms of manhole risers shall be cut or precast square to fit the manhole base. Grout joint between base and riser with cement mortar.
- The manhole riser length listed in the plans has been determined assuming the use of the 7" manhole casting plus 2 concrete adjusting rings (5") plus the "T" dimension shown in the Precast Manhole Covers table.
- Manhole steps shall be corrosion resistant and shall have a minimum vertical load resistance of 800 pounds and a minimum horizontal pull-out resistance of 400 pounds. Configuration of the steps shall be approved by the Engineer.
- Precast concrete manhole covers shown are designed for an HS-20 wheel load and a maximum fill height of 15'-0". Special design required for heavier wheel loads and/or greater fill heights.
- Other castings, similar in dimension, may be used if the casting conforms to the manhole cover and has a lid style as specified. If modifications to the manhole cover are required to facilitate similar castings the contractor must receive written approval from the engineer.
- Castings shall be manufactured in accordance with AASHTO M306-09. Metal used in the manufacture of castings shall conform to AASHTO M105 Class 35B.

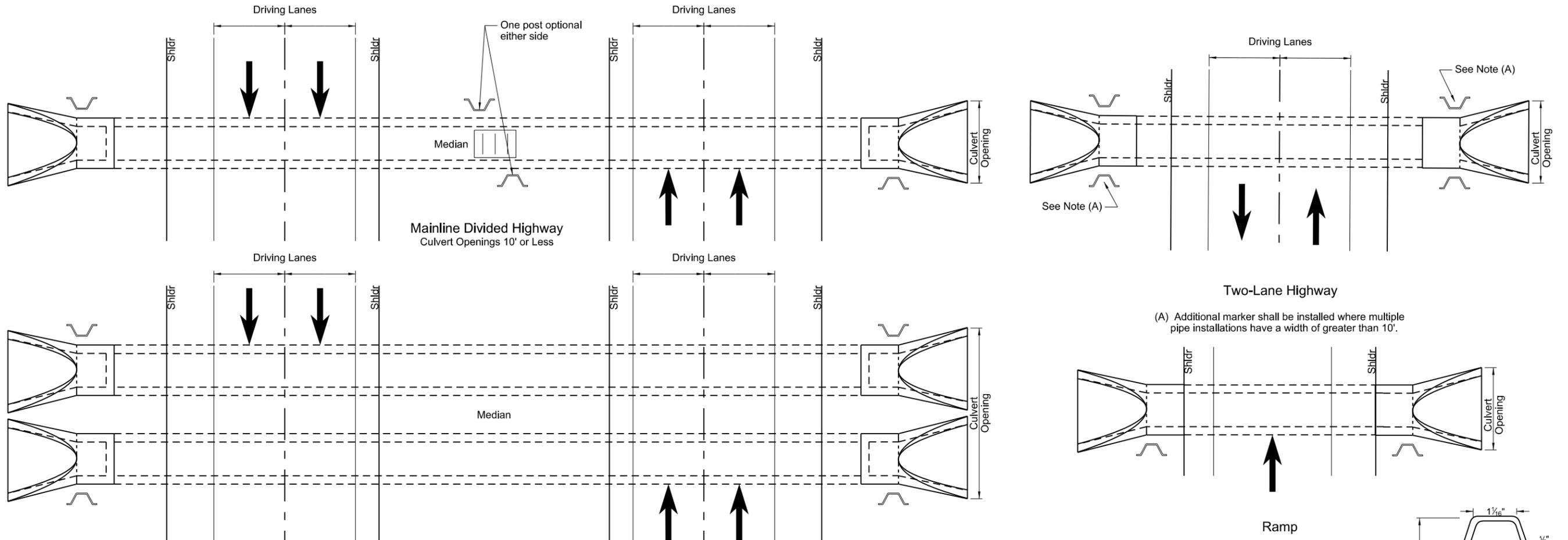


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-14-2013	
REVISIONS	
DATE	CHANGE
6-24-14	Revised notes 1 & 6, added dimensions to Elev. drawing

This document was originally issued and sealed by
 Roger Weigel,
 Registration Number
 PE-2930,
 on 6-24-14 and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS - CULVERTS

D-754-83

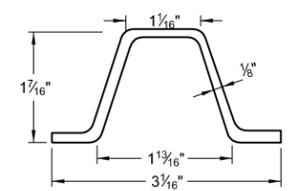


Post Location

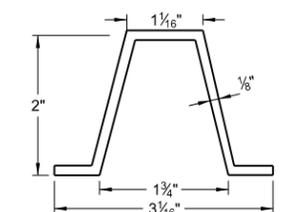
Mainline Divided Highway Culvert Openings Greater than 10' Multiple Installations

Top 12 inches painted black

Top 12 inches painted black



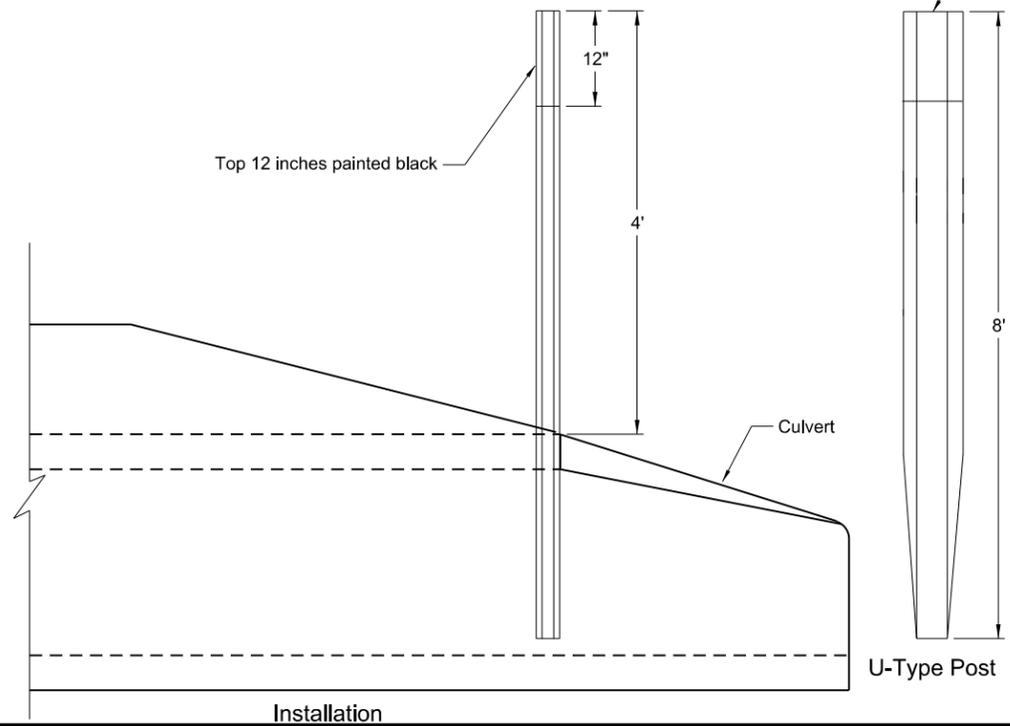
Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft

Notes:

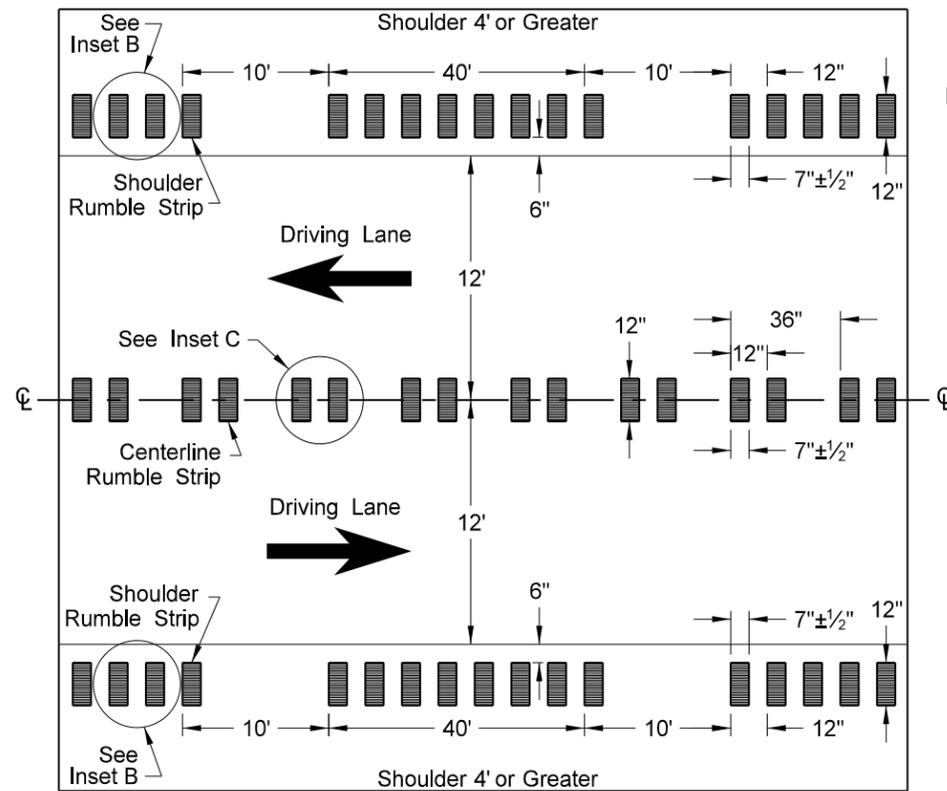
- Installation:** Construction requirements shall meet 754.04D. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.
- Posts:** Posts shall conform to section 894.04A of the Standard Specifications with the exception that the post may or may not have holes drilled.
- Basis of Payment:** The quantity will be measured by the number of object markers each installed. All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Markers - Culverts".



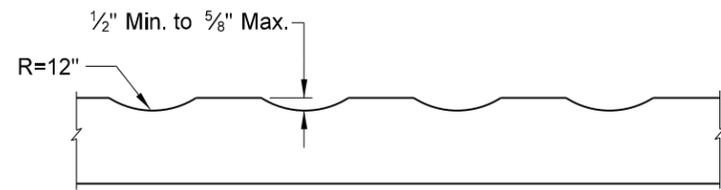
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes

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on 7/7/2014 and the original document is stored at the North Dakota Department of Transportation

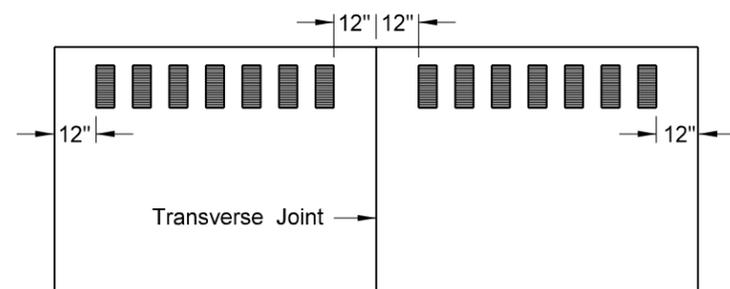
RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS 4' OR GREATER)



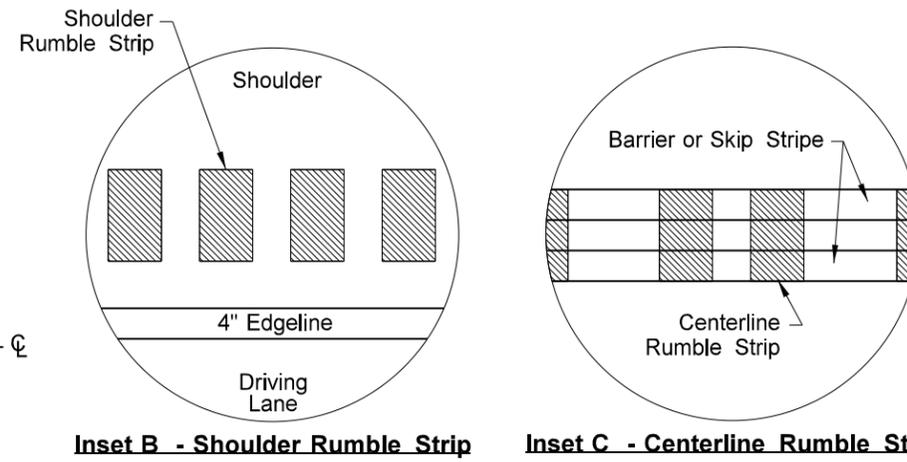
Undivided Highways (Shoulders 4' or Greater)



Profile of Rumble Strips - Bituminous and PCC Pavements



Discontinue rumble strip approx. 12" on both sides of PCC transverse joint

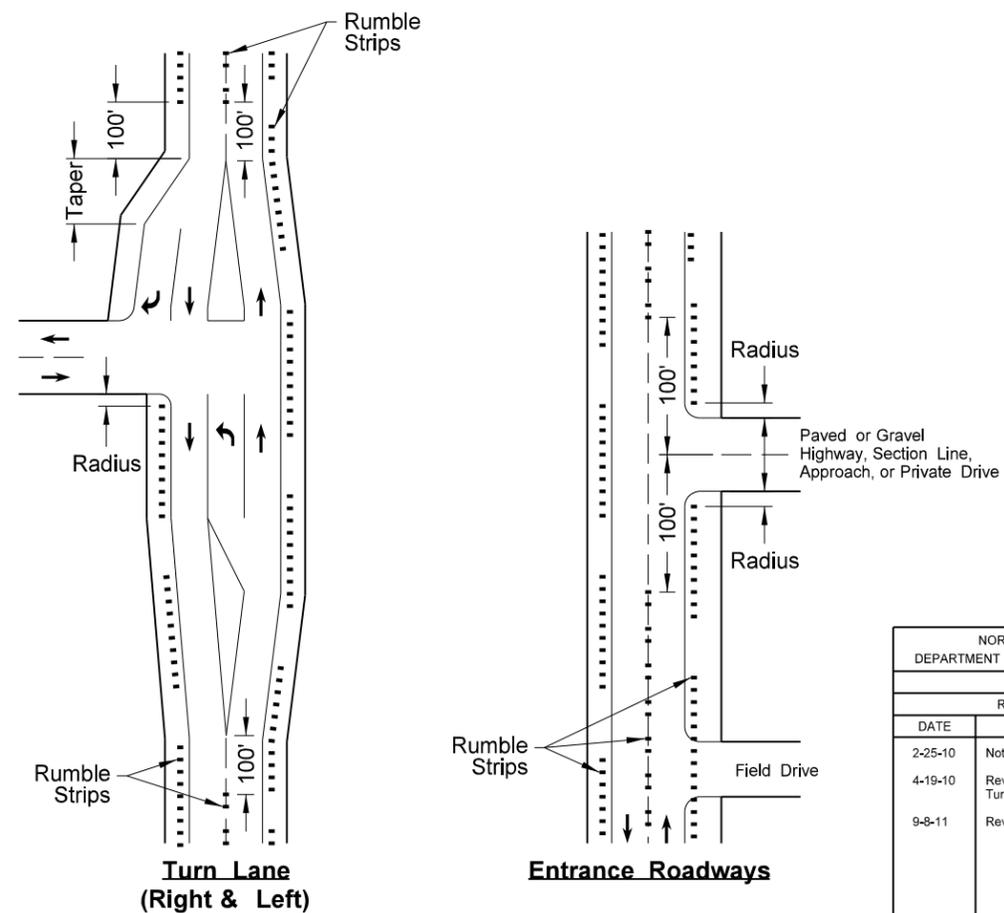


Inset B - Shoulder Rumble Strip

Inset C - Centerline Rumble Strip

NOTES:

- 1) Discontinue shoulder rumble strips through the entire length of right turn lanes, 100' before right turn lane tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive.
- 2) Discontinue centerline rumble strips through the entire length of left turn lanes, 100' before left turn lane tapers and median islands, and 100' before and after a paved or gravel highway, section line, approach, or private drive.



Turn Lane (Right & Left)

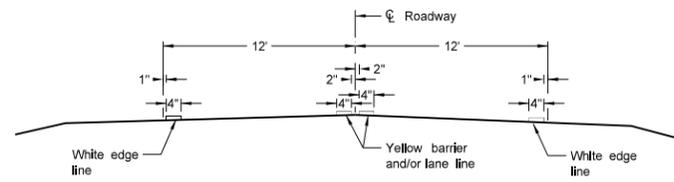
Entrance Roadways

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-8-11	Revised Notes and D-760-3.

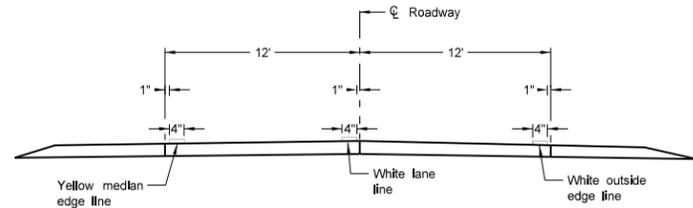
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 9/8/11 and the original document is stored at the North Dakota Department of Transportation

PAVEMENT MARKING

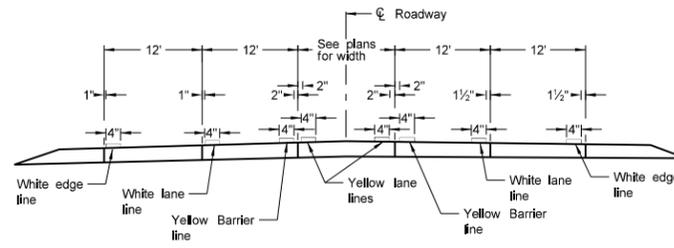
D-762-4



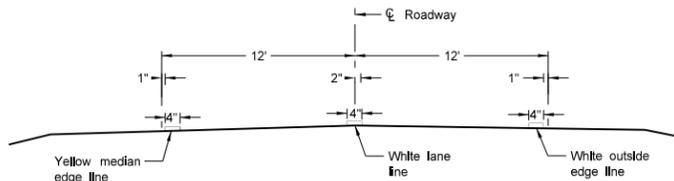
Two Lane Two Way
RURAL ROADWAY



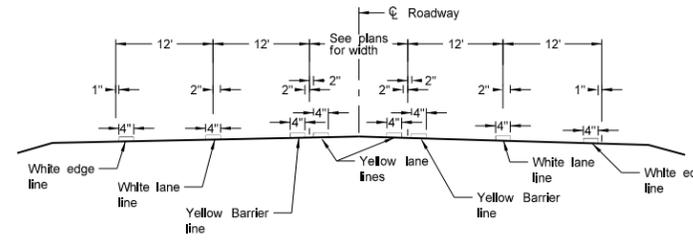
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



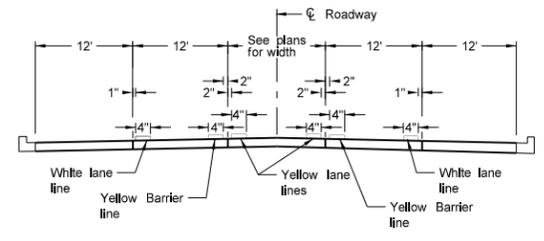
RURAL FIVE LANE ROADWAY
Concrete Section



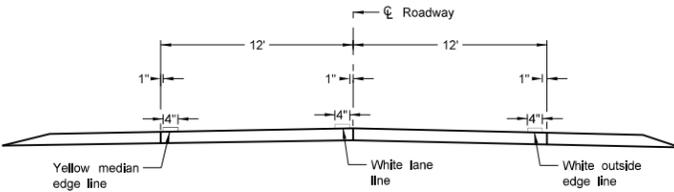
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



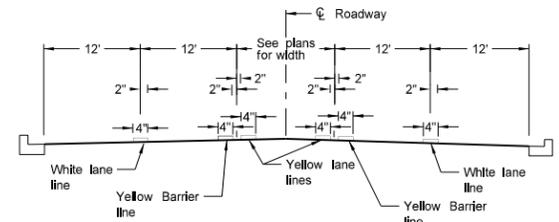
RURAL FIVE LANE ROADWAY
Asphalt Section



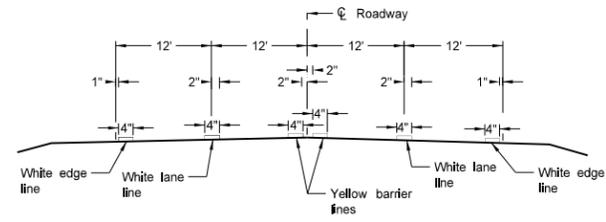
URBAN FIVE LANE SECTION
Concrete Section



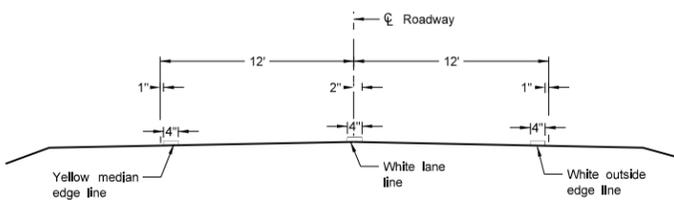
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



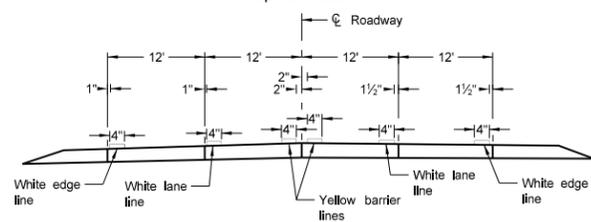
URBAN FIVE LANE SECTION
Asphalt Section



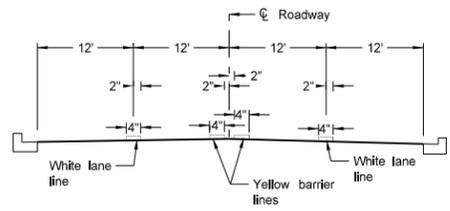
RURAL FOUR LANE ROADWAY
Asphalt Section



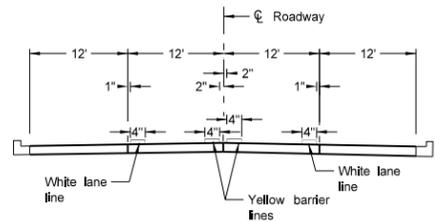
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



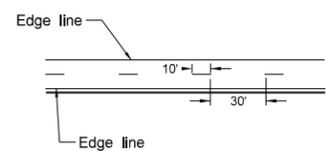
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:
1. Edge lines shall be continued through private drives and field drives and broken for intersections.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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