DESIGN DATA				
Traffic	Average Daily			Max.Hr.
Current 2013	Pass: N/A	Trucks: N/A	Total: 20	N/A
Forecast 2033	Pass: N/A	Trucks: N/A	Total: 40	N/A
Clear Zone Distance: 18'		Design Speed: 55 MPH		
Minimum Sight Dist. for Stopping: 495'		Bridges: STA 70+75 & STA 53+05		
Minimum Sight Dist. for Safe Passing: N/A		Bridge Loading: HL93		
Sight Dist. for No Passing Zone: N/A				
Pavement Design Life (years)				

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	BRO-0041(012)	20039	1	1

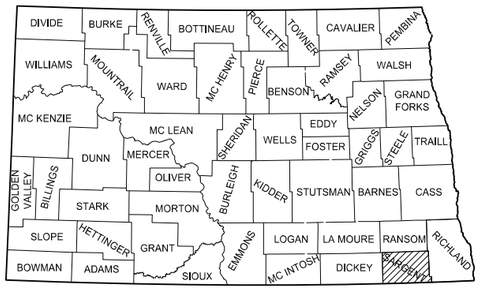
JOB# 10
SARGENT COUNTY, NORTH DAKOTA
PLANS FOR

FEDERAL AID PROJECT NUMBER BRO-0041(012)
STRUCTURE NUMBER 135-05.0 AND 135-05.1

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

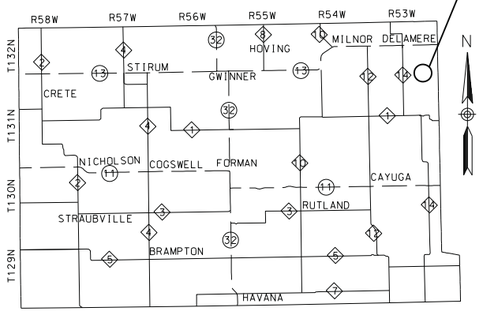
PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
BRO-0041(012)	0.378	0.378
COUNTY FUNDS	0.313	0.313

PROJECT CONSISTS OF THE REPLACEMENT OF A CULVERT CROSSING AND A SINGLE SPAN BRIDGE WITH A DOUBLE 12FT X 11FT BOX CULVERT AND SINGLE 12FT X 11FT BOX CULVERT AND APPROXIMATELY 3650 FT. OF ROAD GRADING AND INCIDENTALS

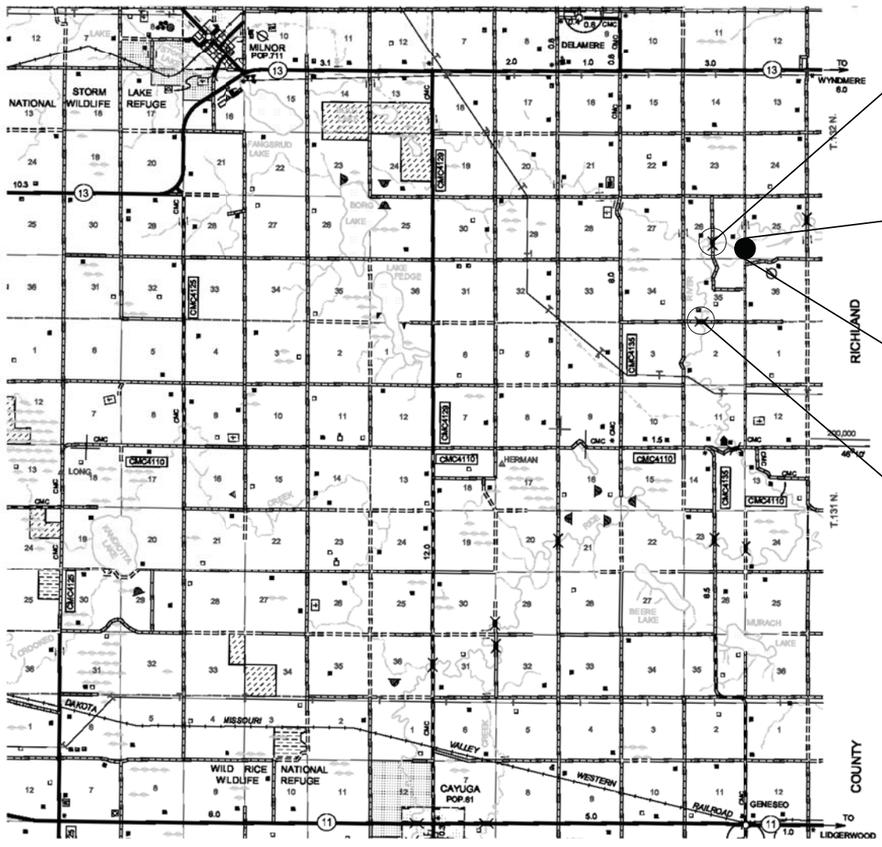


SKETCH MAP OF NORTH DAKOTA
SHOWING COUNTIES

PROJECT LOCATION



SKETCH MAP OF SARGENT COUNTY



Bridge No. 135-05-2
Removal of Structure
Site 1

End Project BRO-0041(012)
Station 83+00
N=217833.4488
E=2783344.2630
83' East of the NE
Corner of Section 26 T132N R53W

Begin Project BRO-0041(012)
Station 46+50
N=214186.6057
E=2783493.2633
650' North of the SW
Corner of Section 25 T132N R53W

Bridge No. 135-06-0
Removal of Structure
Site 3 and Wetland
Mitigation/Borrow site

N

P.S.&E. CORRECTIONS MADE DATE 02-16
SURVEYED DATE 11-11
DESIGNED DATE 01-16

DESIGNERS

Mike Bassingthwaite, PE

Tim Pearson

Shelley Terfehr

Tyler Birchem, EIT

Aaron Mendenwaldt

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 03/28/2016

Michael L. Bassingthwaite /s/
INTERSTATE ENGINEERING

W11-158

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0041(012)	2	1

TABLE OF CONTENTS

LIST OF STANDARD DRAWINGS

Standard No.	Description
D-101-1,2,3	NDDOT Abbreviations
D101-20,21	Line Styles
D101-30,31,32	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- Silt Fence
D-261-1	Fiber Roll Placement Details
D-704-7	Breakaway Systems for Construction Zone Signs – Perforated Tube
D-704-8	Breakaway Systems for Construction Zone Signs – U-Channel Post
D-704-9	Construction Sign Details Terminal and Guide Signs
D-704-10	Construction Sign Details Regulatory Signs
D-704-11	Construction Sign Details Warning Signs
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-15	Road Closure Layouts
D-704-19	Road Closure and Lane Closure on a Two Way Road Layouts
D-704-21	Detour and Roadway Diversion Sign Layouts
D-704-22	Construction Truck and Temporary Detour Layouts
D-714-4	Round Corrugated Steel Pipe Culverts and End Sections
D-754-83	Object Markers- Culverts

LIST OF SPECIAL PROVISIONS (SP)

SP #	Description
SP 0003(14)	Temporary Erosion & Sediment Best Management Practices
SP 0004(14)	Federal Migratory Bird Treaty Act
SP 0310(14)	Temporary Stream Diversion
SP 5112(14)	Permits & Environmental Considerations

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

100-P01 UTILITIES: Utilities that the Engineer has been made aware of are shown on the plans. Other utilities may exist that are not shown. Underground utility locations are approximate and not all utilities are shown on the plans. The location and elevations are unknown. The Contractor will be liable for any costs resulting from damage to utilities or pipelines.

Utility companies will move or adjust conflicting facilities that are not designated for relocation in the plan documents. Coordinate work with the utility companies affected by the project.

Dakota Valley Electric will replace two poles at the North end of the project with taller poles due to grade raise.

Dickey Rural Telephone will adjust their facilities at the North box location and at the SE public road. The remainder of the line will stay in place.

107-710 HAUL ROADS: Before submitting a proposal contact the appropriate State, County, or City officials to determine if there are any roads that will be designates as “no haul roads”.

203-P01 COMMON EXCAVATION: Benching of the existing roadway in-slopes shall be required. Each bench shall be thoroughly compacted before additional embankment is placed. A scarifying, re-compacting, and benching shall be included in bid price for “Common Excavation–Type B”. “Common Excavation–Type B” shall be paid at plan quantity.

203-P02 TOPSOIL: Arrangements for topsoil storage area shall be made if room isn’t available within the right-of-way. No payment will be made for additional handling of topsoil that is moved to provide additional excavation area between proposed grading limits and the right-of-way. The bid item “Topsoil” includes all labor, materials, and equipment associated with stripping, stockpiling, and re-spreading the topsoil. Topsoil shall be spread evenly over the entire disturbed area, except 26-foot roadbed, approaches, and riprap. Topsoil will not be measured separately and will be paid at plan quantity.

203-P03 MANDATORY BORROW AREA: This project contains a mandatory borrow site that will also serve as a wetland mitigation site. The roadway east of bridge #135-06.0 will serve as this area. A plan and profile sheet with details of this work is included in section 75 of these plans and cross sections are contained in section 200. Topsoil and borrow from this location shall not be measured separately and will be paid at plan quantity. All additional borrow required for the project shall be provided by the BORROW-EXCAVATION bid item.

203-P04 BORROW-EXCAVATION: The Contractor shall be responsible for obtaining areas to provide suitable “Borrow” material, and shall bear all costs obtaining, opening, and restoring the site. Compaction of Embankment material shall be in accordance with Section 203.04 E.3 of the Standard Specifications. The price bid for “Borrow-Excavation” includes all royalties, utility, environmental and cultural clearances, site restoration, and any other costs associated with obtaining, transporting, and placing borrow material.

Several landowners have indicated they are willing to provide borrow material:
SW of site – Lynn Halmrast (701) 219-9918
SE of site – Art Solberg (701) 439-2935
NE of site & off site – Ray Zajac (701) 640-5096

251-P01 SEEDING: All disturbed areas within the right-of-way shall receive “seeding class II” except for the wetland areas. Wetland areas will receive “wetland seed mix”.

253-P01 MULCHING: All disturbed areas are to be straw mulched prior to seeding.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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ENVIRONMENTAL COMMITMENTS

ENVIRONMENTAL COMMITMENTS (EC): Sargent County, 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 permanent impacts will be mitigated onsite, adjacent to the project, or at a NDDOT approved mitigation site or bank.

ACTION REQUIRED /TAKEN: 2.11 acres of permanent USACE impacts to jurisdictional waters and to EO11990 wetlands will require mitigation. Sargent County will mitigate jurisdictional and EO 11990 impacts near the site (section 35 T132N R53W / section 2 T131N R53W 1.0 acres), and at a Ducks Unlimited mitigation bank to be determined. 1.99 acres of temporary impacts will result from construction. Temporary impact areas will be graded to preconstruction contours.

Summary Impact Table

Total Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	**Total (Acres)**	**Wetland Type**	**Total (Acres/Lf)**
Natural/JD	2.11	**Temporary JD**	1.99
Natural/Non-JD	0.00	**Non-JD Temporary**	0.07
Artificial/JD	0.00	**Permanent JD > 0.10**	2.11
Artificial /Non-JD	0.00	**Permanent OW**	0.31 ac/159 ft.
Total	**2.11**	**Temporary OW**	0.12 ac/72 ft

Wetland Impact Table

Wetland Number	Test Hole (in wetland)	Location	LONG West (Dec. Deg.)	LAT North (Dec. Deg.)	Field Cowardin Classification	Wetland Type	Wetland Size (acres)	Wetland Feature	Wetland Impacts (acres)		Wetland Mitigation						
											Mitigation Required			Bank		Onsite	
									Temp. Ac.	Perm. Ac.	EO 11990	USACE	USFWS	Location	Acres	Mitigation Location; Ratio	Acres
#1	1	Sec. 26, T132N, R53W	-97.280329	46.208989	PEMC	Floodplain	0.34	Natural	0.12	0.13	Y	Y	N	bridge 135-06.0 site	0.13		
#1a	7	Sec. 26, T132N, R53W	-97.280252	46.210112	PEMA	Floodplain	1.85	Natural	0.70	0.44	Y	Y	N	bridge 135-06.0 site	0.44		
#2	3	Sec. 25, T132N, R53W	-97.280044	46.209141	PEMF	Floodplain	0.39	Natural	0.15	0.17	Y	Y	N	bridge 135-06.0 site	0.17		
#2a	5	Sec. 25, T132N, R53W	-97.280053	46.210078	PEMC	Floodplain	2.18	Natural	0.79	1.03	Y	Y	N			Sec. 25	1.03
#3	11	Sec. 26, T132N, R53W	-97.280303	46.215164	PEMAx	Floodplain	0.07	Artificial	0.07	0	N	Y	N			relocated ditch adjacent	0
#4	9	Sec. 25, T132N, R53W	-97.279862	46.215369	PEMA	Floodplain	0.66	Natural	0.26	0.34	Y	Y	N	bridge 135-06.0 site	0.26	Sec. 25	0.08
						Total	5.49		2.09	2.11					1.00		1.11

Other Waters Impact Table

Other Waters													Other Water Mitigation				
Number	Location	LONG West (Dec. Deg.)	LAT North (Dec. Deg.)	Local Waterway Name	Tributary To	Field Cowardin Classification	OW Size (acres)	OW Length (feet)	Feature	Impacts to Other Waters				Mitigation Required			Mitigation Location; ratio	Method
										Acres		Linear Feet						
										Temp	Perm	Temp	Perm	EO 11990	USACE	USFWS		
#OW 1	Sec. 26, T132N, R53W	-97.28034	46.209897	Wild Rice River	Wild Rice River	PEMA/R4SB	0.19	87	Perennial Stream	0.02	0.17	12	85	N	Y	N	on site	Box culvert and riprap lowered 1'
#OW 1a	Sec. 25, T132N, R53W	-97.279966	46.209953	Wild Rice River	Wild Rice River	PEMA/R4SB	0.07	59	Perennial Stream	0.03	0.04	12	47	N	Y	N	on site	Box culvert and riprap lowered 1'
#OW 2	Sec. 26, T132N, R53W	-97.290371	46.21478	Wild Rice River	Wild Rice River	PEMA/R4SB	0.08	29	Perennial Stream	0.03	0.05	24	5	N	Y	N	on site	Box culvert and riprap lowered 1'
#OW 2a	Sec. 25, T132N, R53W	-97.279929	46.214741	Wild Rice River	Wild Rice River	PEMA/R4SB	0.09	46	Perennial Stream	0.04	0.05	24	22	N	Y	N	on site	Box culvert and riprap lowered 1'
						Total	0.43	221		0.12	0.31	72	159					

EC- 2: The structure shall not act as a barrier to the movement of fish and other aquatic organism in the river channel under any flow conditions.

ACTION REQUIRED /TAKEN: The box culvert and associated riprap will be countersunk approximately one foot below the existing grade of the stream bed, as shown in the plans.

EC- 3: No construction or demolition activities will take place during the spawning season in the Wild Rice River from April 15 to June 1.

EC-4: The Contractor shall prevent the introduction of ANS into North Dakota waters, or transport of aquatic vegetation to or from any waters of the state, or transport of any aquatic vegetation into the state.

ACTION TAKEN/REQUIRED: The contractor shall follow the North Dakota Game and Fish Department's (NDGFD) Administrative Rules 30-3-06 for compliance with ND Century Code Chapter 20.1-17 on Aquatic Nuisance Species (ANS). Contractor shall notify the NDGFD at least 72 hours prior to the placement IN or ON the waters of the State of North Dakota of any and all vehicles, vessels, pumps and equipment that will be used in the project, to allow the Department sufficient time to inspect any and all such equipment for ANS. The NDGFD ANS Coordinator, Fred Ryckman, shall be contacted by phone (701.770.0920) or e-mail fryckman@nd.gov for equipment inspections, or any additional information regarding ANS prevention protocol.

PERMITS REQUIRED: NDPDES (North Dakota Pollutants Discharge Elimination System) – to be obtained by the contractor. **The owner of the permit shall be listed as Sargent County.**

[1] A wetland Jurisdictional Determination was issued by the USACE on 09/09/15; NWO-2015-1482-BIS.

[2] 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.

[3] 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.

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ESTIMATE OF QUANTITIES

SPEC	CODE	ITEM DESCRIPTION	UNIT	PARTICIPATING (BRO) QUANTITIES	NON-PARTICIPATING QUANTITIES
103	0100	CONTRACT BOND	L SUM	0.75	0.25
202	0108	REMOVAL OF STRUCTURE-SITE 1	L SUM	1	
202	0109	REMOVAL OF STRUCTURE-SITE 2	L SUM	1	
202	0110	REMOVAL OF STRUCTURE-SITE 3	L SUM	1	
202	0170	REMOVAL OF CULVERTS-ALL TYPES AND SIZES	LF	180	30
203	0102	COMMON EXCAVATION-TYPE B	CY	3043	600
203	0109	TOPSOIL	CY	2591	1728
203	0116	TOPSOIL MANDATORY BORROW AREA	CY	815	
203	0117	MANDATORY BORROW	CY	3570	
203	0140	BORROW-EXCAVATION	CY	22500	21400
210	0051	BOX CULVERT EXCAVATION SITE 1	L SUM	1	
210	0052	BOX CULVERT EXCAVATION SITE 2	L SUM	1	
210	0128	CHANNEL EXCAVATION-SITE 1	L SUM	1	
210	0129	CHANNEL EXCAVATION-SITE 2	L SUM	1	
210	0209	FOUNDATION FILL	TON	2650	
210	0202	FOUNDATION PREPARATION-SITE 1	L SUM	1	
210	0203	FOUNDATION PREPARATION-SITE 2	L SUM	1	
210	0225	FOUNDATION FILL - TYPE 1	CY	1240	
216	0100	WATER	MGAL	200	200
251	200	SEEDING CLASS II	ACRE	5.1	2.4
251	1000	WETLAND SEED	ACRE	1.04	1
251	2000	TEMPORARY COVER CROP	ACRE	6.14	3.4
253	0101	STRAW MULCH	ACRE	6.14	3.4
255	0102	ECB TYPE 2	SY	320	
256	0201	RIPRAP GRADE II	TON	446	
260	0100	SILT FENCE UNSUPPORTED	LF	2905	2400
260	0101	REMOVE SILT FENCE UNSUPPORTED	LF	2905	2400
261	0112	FIBER ROLLS 12IN	LF	465	15
261	0113	REMOVE FIBER ROLLS 12IN	LF	200	
262	0100	FLOATATION SILT CURTAIN	LF	130	
262	0101	REMOVE FLOATATION SILT CURTAIN	LF	130	
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	1360	950
606	1211	12FT X 11FT PRECAST RCB CULVERT	LF	56	
606	3211	DBL 12FT X 11FT PRECAST RCB CULVERT	LF	56	
606	5211	12FT X 11FT PRECAST RCB END SECTION	EA	2	
606	7211	DBL 12FT X 11FT PRECAST RCB END SECTION	EA	2	
702	0100	MOBILIZATION	L SUM	0.75	0.25
704	1000	TRAFFIC CONTROL SIGNS	UNIT	441	
704	1052	TYPE III BARRICADES	EA	10	
704	1060	DELINEATOR DRUMS	EA	10	
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	1610	
714	5035	PIPE CORR STEEL .064IN 24IN	LF	120	
714	5820	END SECT CORR STEEL .064IN 24IN	EA	4	
754	0805	OBJECT MARKERS - CULVERTS	EA	4	
900	1000	TEMPORARY STREAM DIVERSION	EA	1	

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Estimated Quantities

Sargent County, North Dakota

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BASIS OF ESTIMATE

203 BORROW – EXCAVATION

Plan dimension less structural fill plus 35% for shrinkage

210 FOUNDATION FILL	1.875 Ton/CY
210 FOUNDATION FILL – TYPE 1	1.5 Ton/CY

216 WATER

Common Excavation	6 gal/CY
Borrow	6 gal/CY
Dust Palliative	25 Mgal/Mile
Aggregate Surface Course	30 gal/Ton
256 RIPRAP GRADE II	1.5 Ton/CY

302 AGGREGATE SURFACE COURSE CL13

4” Depth, 22’ Top Width. 2’ Sloughs	1.875 Ton/CY
Field Approach	10 Tons/EA
Public Road Approach	100 Tons
Private Drive Relocation	100 Tons

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Basis of Estimate

Sargent County, North Dakota

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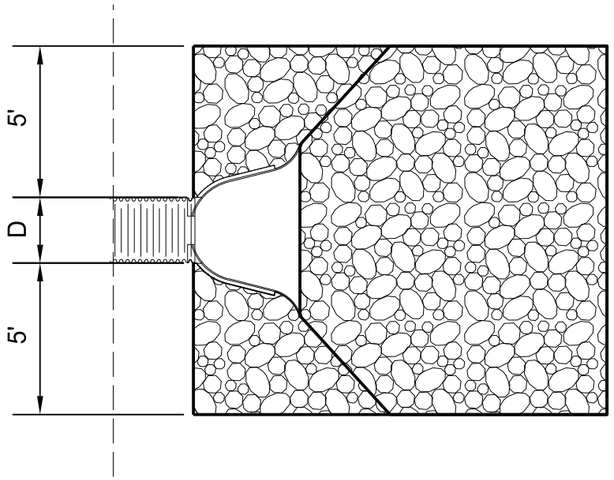
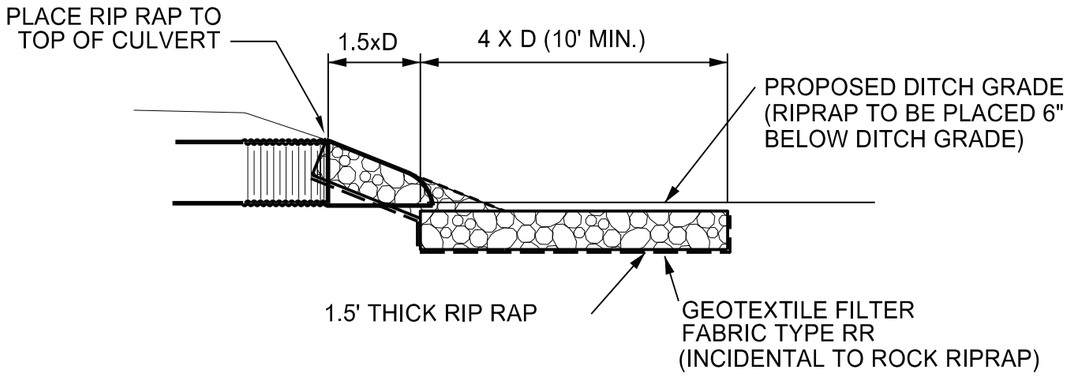




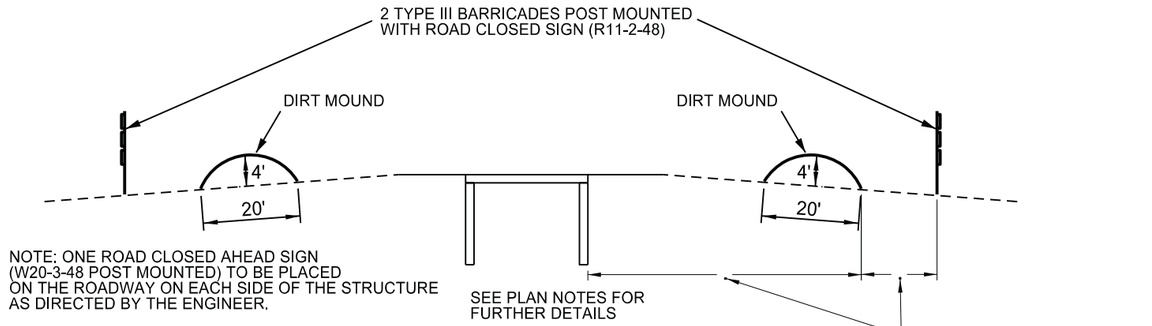
SECTION A-A

N.T.S.

RIPRAP AT CULVERT ENDS		
SIZE OF CULVERT	QUANTITY OF RIPRAP	QUANTITY OF FILTER FABRIC
(in.)	(CY)	(SY)
12	7.0	14.1
15	7.4	14.8
18	7.8	15.7
24	8.7	17.3
30	9.5	19.1
36	11.9	23.8
48	17.1	34.2

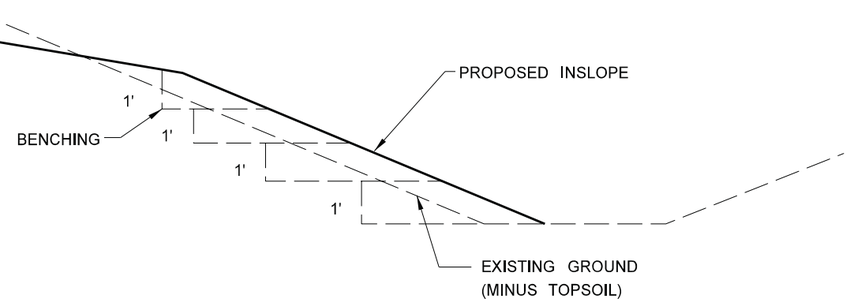
RIP RAP AT CULVERT ENDS

N.T.S.



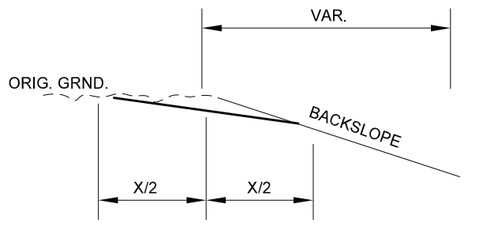
BRIDGE CLOSURE DETAIL

N.T.S.



BENCHING TYPICAL SECTION

N.T.S.



BACKSLOPE ROUNDING WHERE X = 10'
UNLESS RESTRICTED BY HEIGHT OF BACKSLOPE

BACKSLOPE ROUNDING

N.T.S.

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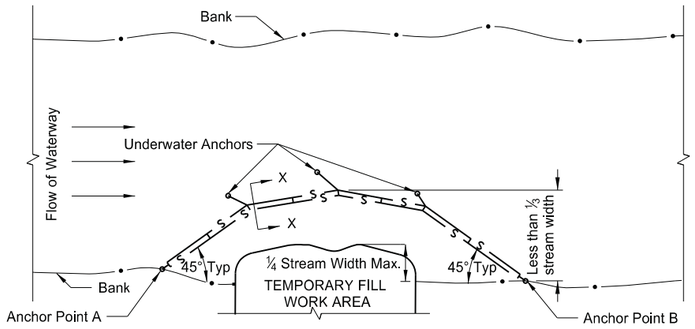
Details

Sargent County North Dakota

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	20	2

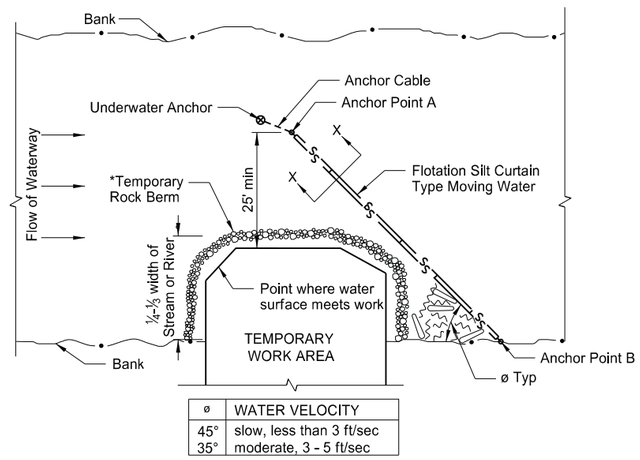
TYPICAL INSTALLATIONS
May vary with conditions



PLAN VIEW

FLOTATION SILT CURTAIN - TYPE WORK AREA

DESIGN GUIDELINES:
When temporary work encroaches less than ¼ of the width of stream.



ø	WATER VELOCITY
45°	slow, less than 3 ft/sec
35°	moderate, 3 - 5 ft/sec

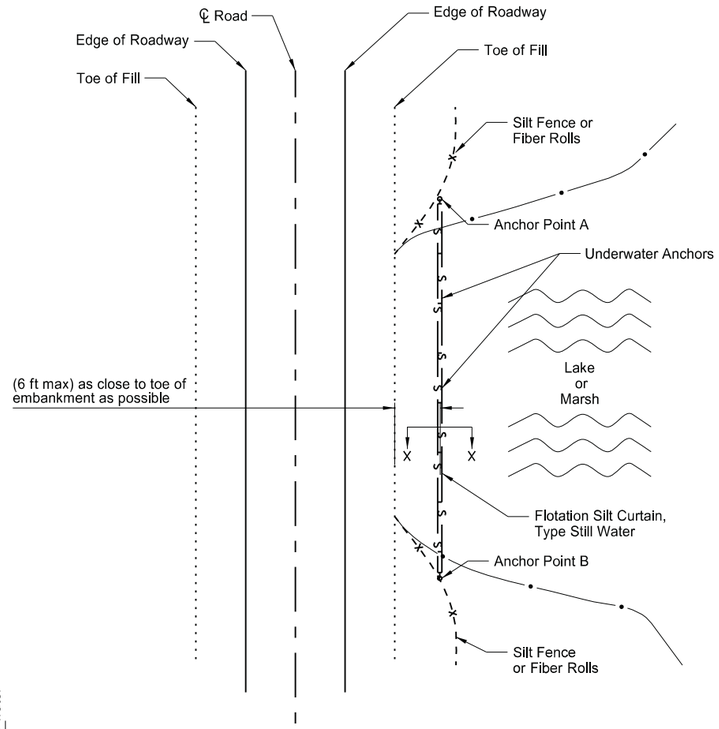
PLAN VIEW

FLOTATION SILT CURTAIN - TYPE MOVING WATER

DESIGN GUIDELINES:
When temporary work encroaches more than ¼ but less than ⅓ width of the stream.

For narrow waterways, the curtain may be placed 1 foot above the bottom of waterway to allow water flow.

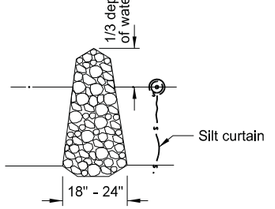
*In areas where the plans call for riprap at the bridge, provide a temporary rock berm. Include all costs for the temporary rock berm in price bid for the "Riprap".



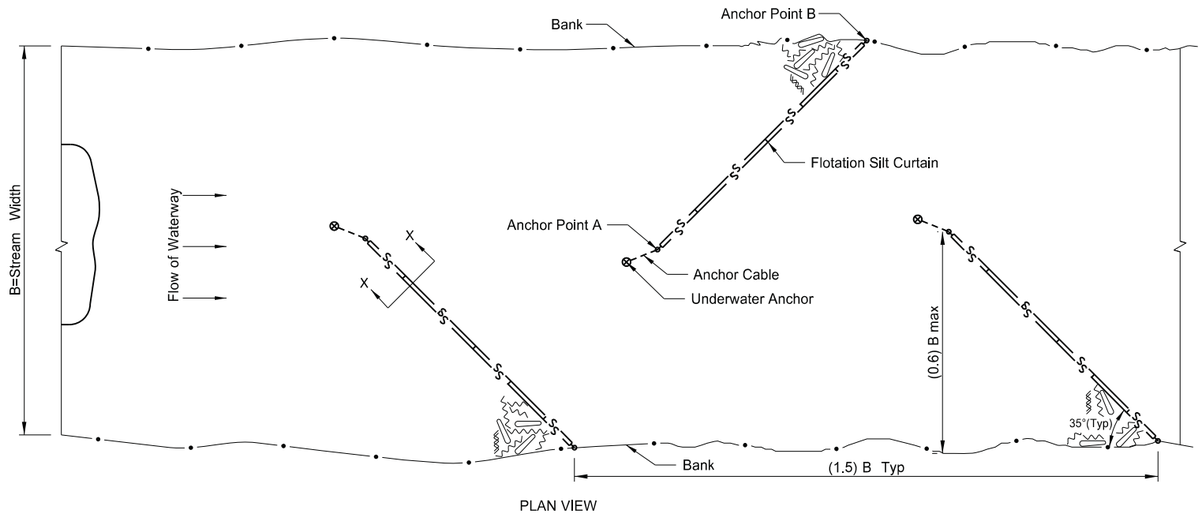
PLAN VIEW

FLOTATION SILT CURTAIN - TYPE STILL WATER

The silt curtain shall extend onto shore and shall also be anchored there.



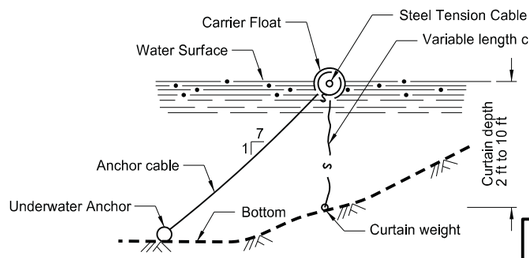
TEMPORARY ROCK BERM



PLAN VIEW

FLOTATION SILT CURTAIN - TYPE HERRING BONE PATTERN

DESIGN GUIDELINES:
When temporary work encroaches more than ⅓ width of the stream
Or where stream width doesn't allow use of Type Moving Water



SECTION X-X
FLOTATION SILT CURTAINS

Note:
Maximum water velocity for moving water = 5 ft/sec

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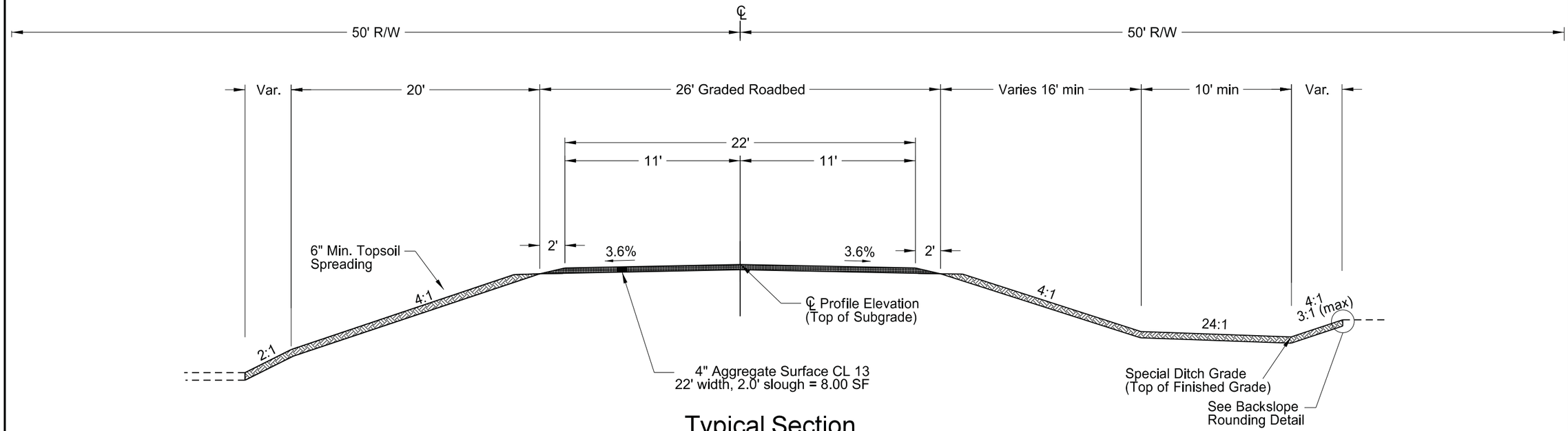
Temporary Erosion Control - Flotation Silt Curtain

Sargent County, North Dakota

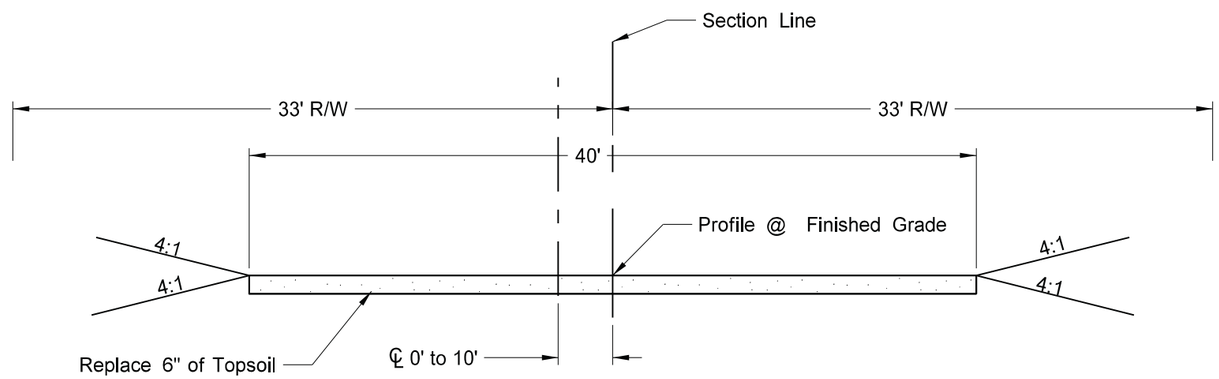
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	30	1



Typical Section

N.T.S.

Sta. 46+50 to Sta. 83+00



Wetland Mitigation Typical Section

N.T.S.

Sta. 17+00 to Sta. 28+00
Bridge 135-06.0 Site 3 Removal

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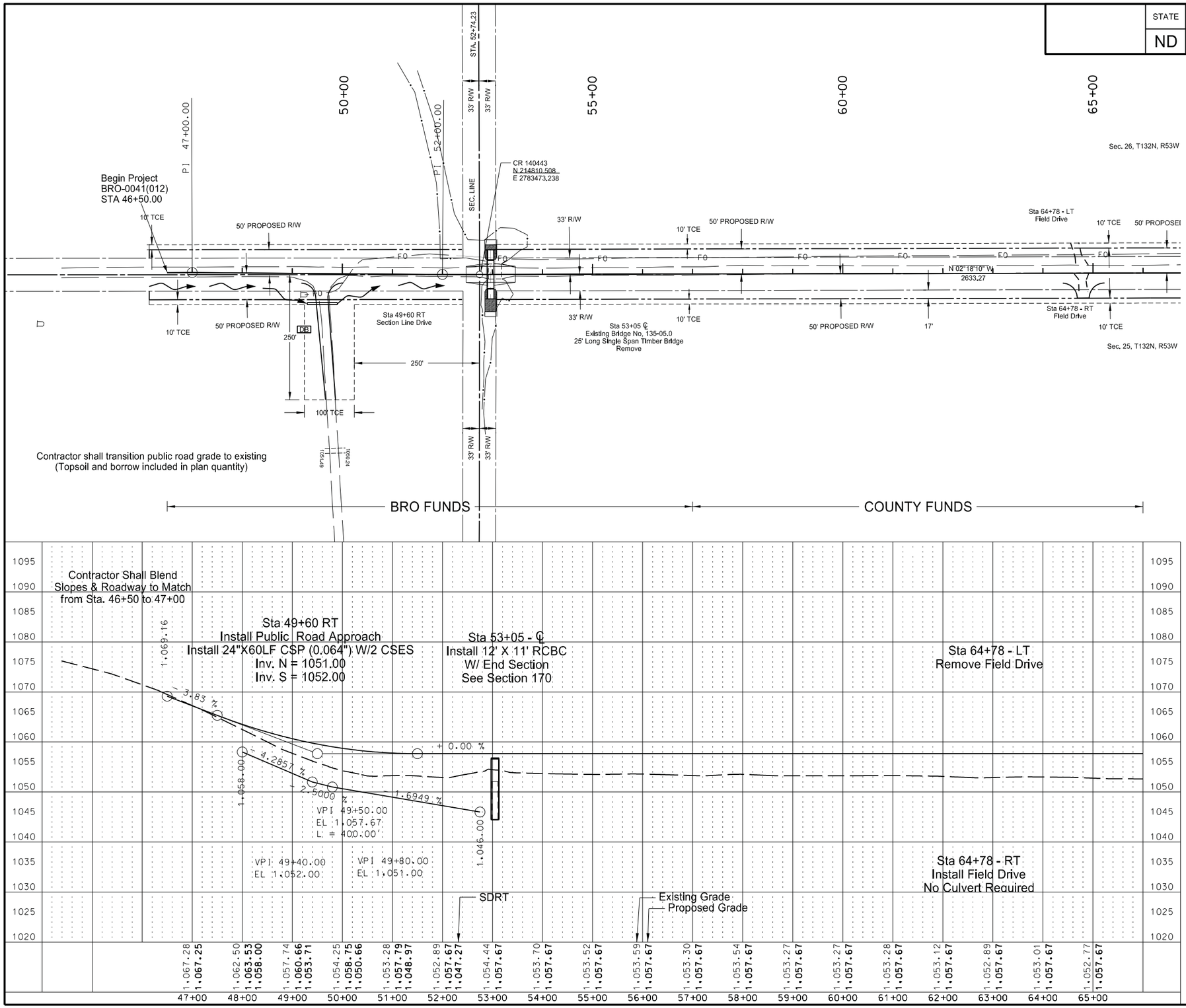
Typical Section

Sargent County North Dakota

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	60	1



REMOVAL OF STRUCTURE - SITE 2

Sta 53+05 ℄ 1 EA

12'X11' PRECAST RCB CULVERT

Sta 53+05 ℄ 56 LF

12'X11' PRECAST RCB END SECTION

Sta 53+05 RT & LT 2 EA

PIPE CORR STEEL .064IN 24IN

Sta 69+60 RT 60 LF

END SECT CORR STEEL .064IN 24IN

Sta 49+60 RT 2 EA

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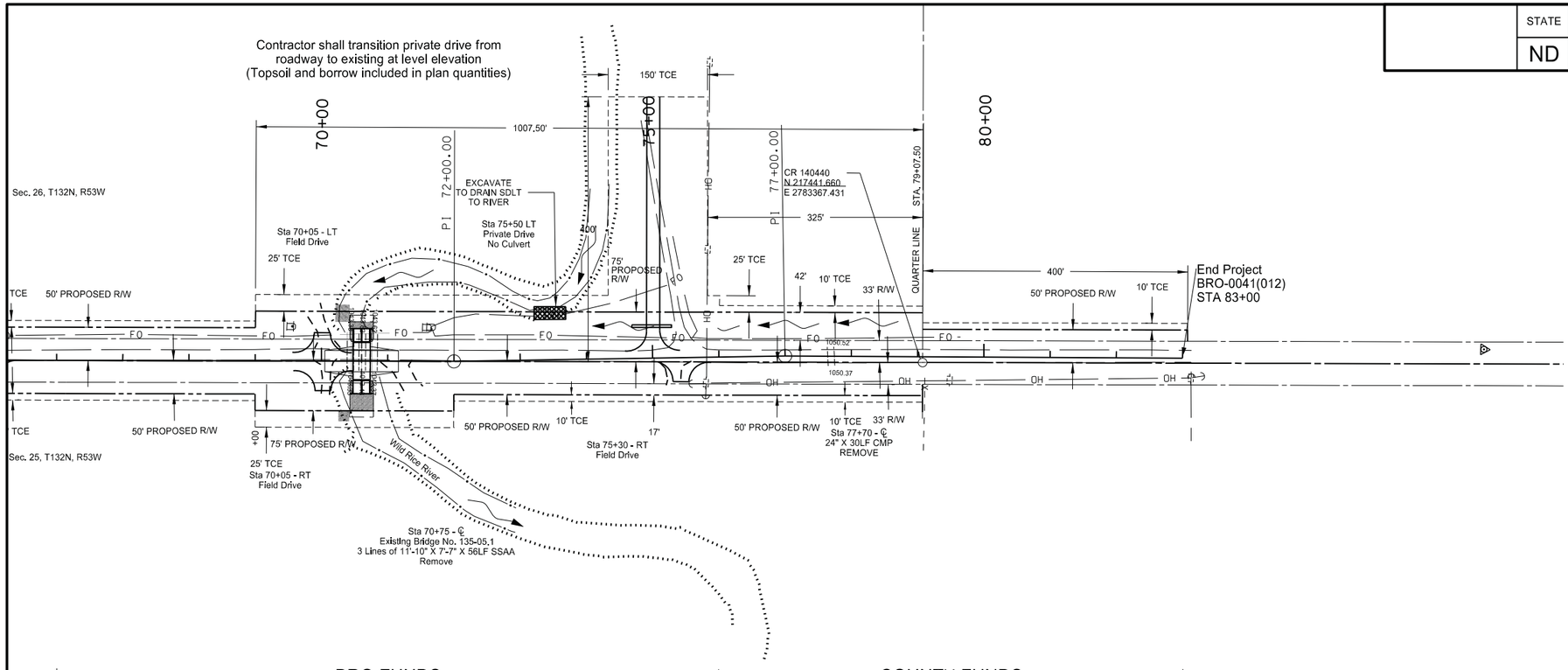
Plan & Profile Sheet

Sta 46+50 to 66+00

Sargent County, North Dakota

3/28/2016 8:47:11 AM Shelley.Terfehr Q:\2011\W11s\W1100158\CADD\Design\SHEETS\SECTION 60\060PP_001_PP1.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0041(012)	60	2



REMOVAL OF CULVERTS - ALL TYPES AND SIZES

Sta 77+70 ℄	30 LF
Sta 70+60 (3)℄	180 LF

PIPE CORR STEEL ,064IN 24IN

Sta 75+00 LT	60 LF

END SECT CORR STEEL .064IN 24IN

Sta 75+00 LT	2 EA

DBL 12'X11' PRECAST RCB CULVERT

Sta 70+60 ℄	56 LF

DBL 12'X11' PRECAST RCB END SECTION

Sta 70+60 RT & LT	2 EA

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Plan & Profile Sheet

Sta 66+00 to 83+00

Sargent County, North Dakota

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	75	1

50+00

55+00

60+00

CR 140443
N 214810.508
E 2783473.238

SEC. LINE

Wetland 1
0.13 Permanent Acres
0.12 Temporary Acres

Wetland 1

OW1

33' R/W

Wetland 1A
0.38 Permanent Acres
0.42 Temporary Acres

10' TCE

Cut/Fill Limits

Wetland 1A

50' PROPOSED R/W

N 02°18'10" W
2633.27

50' PROPOSED R/W

33' R/W

17'

Wetland 2

OW1A

Wetland 2A

10' TCE

Cut/Fill Limits

Wetland 2
0.17 Permanent Acres
0.12 Temporary Acres

Wetland 2A
0.69 Permanent Acres
0.49 Temporary Acres

65+00

70+00

75+00

Wetland 1A
0.06 Permanent Acres
0.28 Temporary Acres

Cut/Fill Limits

10' TCE

50' PROPOSED R/W

Wetland 1A

25' TCE

OW2

Wetland 3
0.07 Temporary Acres

400'

Wetland 3

75' PROPOSED R/W

1007.50

325'

Cut/Fill Limits

25' TCE

10' TCE

42'

33' R/W

1050.52

1050.37

Wetland 4

33' R/W

Wetland 2A

50' PROPOSED R/W

10' TCE

Cut/Fill Limits

OW2A

75' PROPOSED R/W

25' TCE

50' PROPOSED R/W

17'

10' TCE

50' PROPOSED R/W

Cut/Fill Limits

+00

Wild Rice River

Sec. 25, T132N, R53W

Wetland 2A
0.34 Permanent Acres
0.30 Temporary Acres

Wetland 4
0.34 Permanent Acres
0.26 Temporary Acres

Legend

Wetland 32

- Wetland Delineated Existing
- Wetland Creation Mitigation
- Riprap
- OWUS Impacts that are Minimized
- Wetland Impacts Permanent
- Wetland Impacts Temporary

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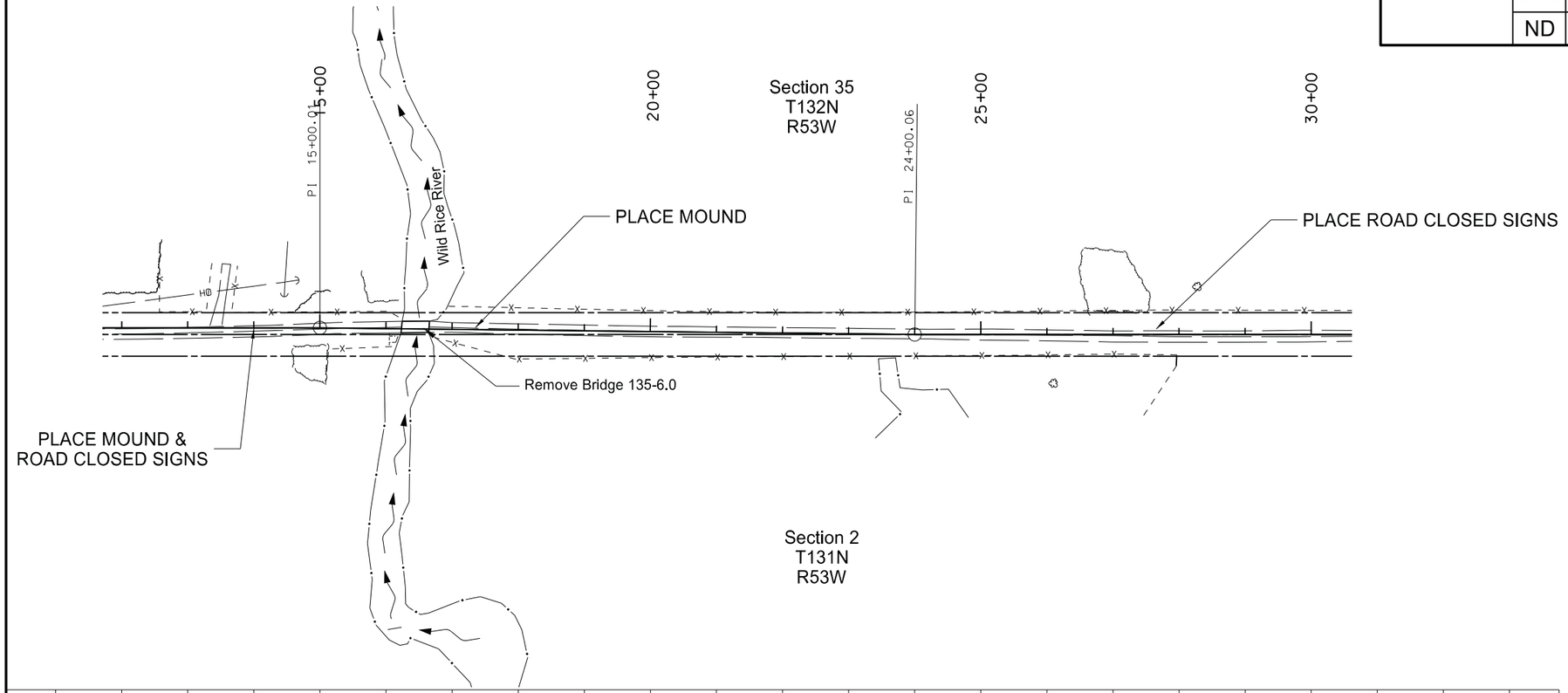
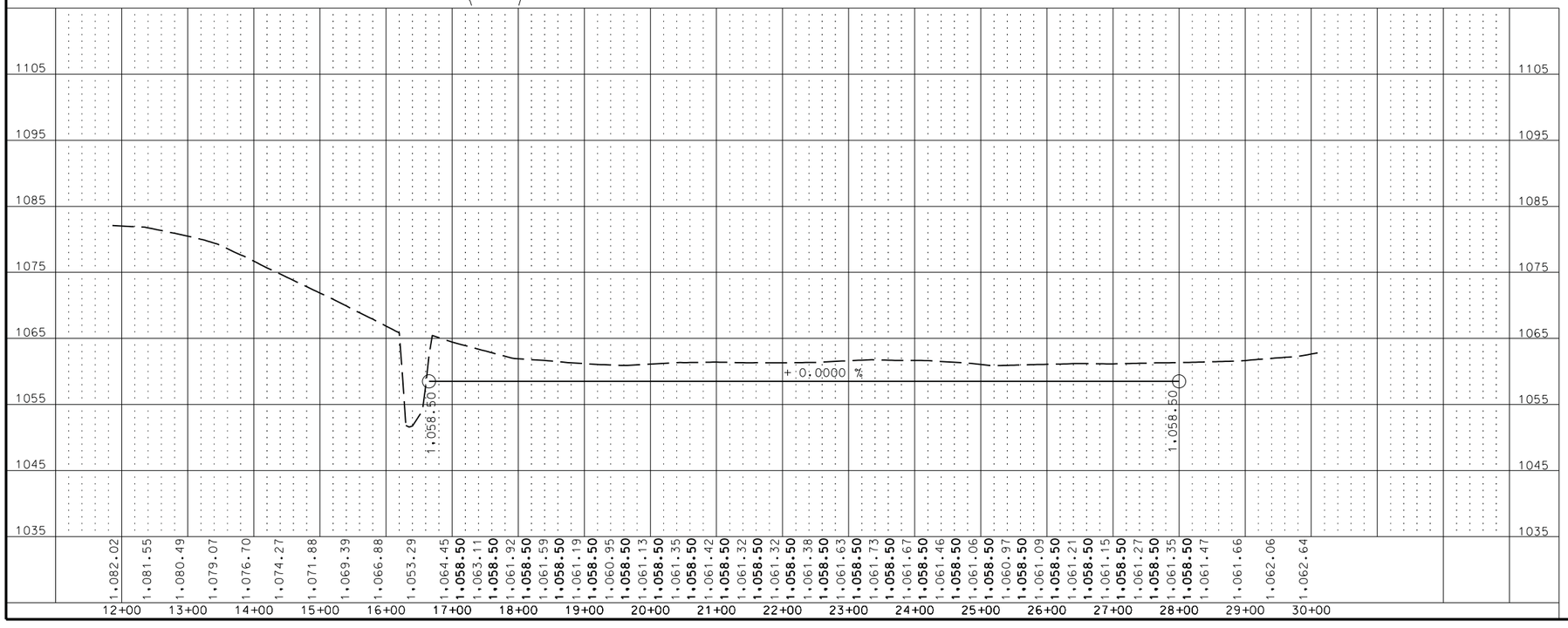
Wetland Impacts

Sargent County, North Dakota

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	75	2





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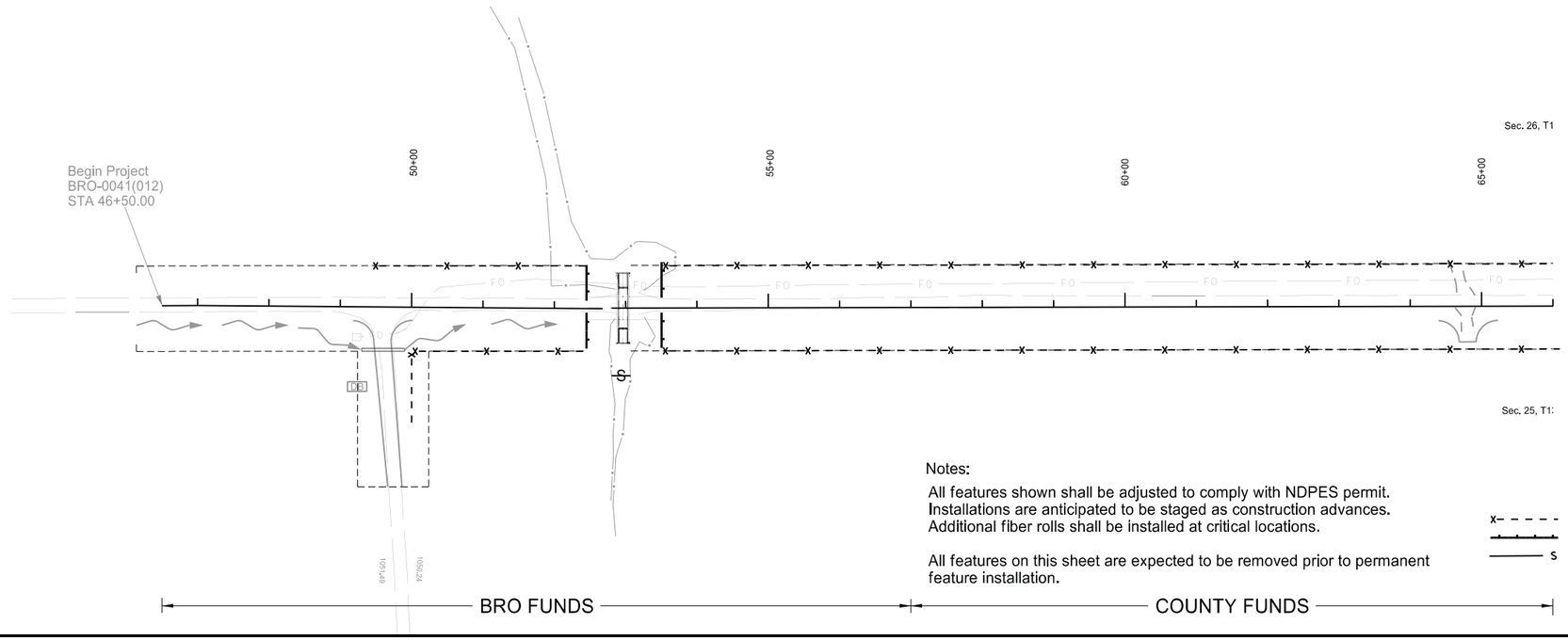
Wetland Mitigation / Mandatory Borrow

Sta 12+00 to Sta 30+00

Sargent County, North Dakota

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	76	1



Notes:

All features shown shall be adjusted to comply with NDPES permit. Installations are anticipated to be staged as construction advances. Additional fiber rolls shall be installed at critical locations.

All features on this sheet are expected to be removed prior to permanent feature installation.

x- - - - Silt Fence
Fiber Roll
S Flotation Curtain

FLOTATION CURTAIN

Sta. 70+75 RT	100 LF
Sta. 53+05 RT	30 LF

SILT FENCE

Sta. 75+00 to 71+00 LT	300 LF
Sta. 82+00 to 76+00 RT	600 LF
Sta. 76+00 to 71+50 RT	450 LF
Sta. 69+85 to 66+00 RT	385 LF
Sta. 66+00 to 57+00 RT	900 LF
Sta. 57+00 to 53+50 RT	350 LF
Sta. 69+75 to 66+00 LT	385 LF
Sta. 66+00 to 57+00 LT	900 LF
Sta. 57+00 to 53+50 LT	385 LF
Sta. 52+50 to 50+00 RT	350 LF
Sta. 52+50 to 49+50 LT	300 LF

FIBER ROLLS 12 IN

Sta. 53+50 LT & RT	100 LF
Sta. 52+50 LT & RT	100 LF

REMOVE FLOTATION CURTAIN

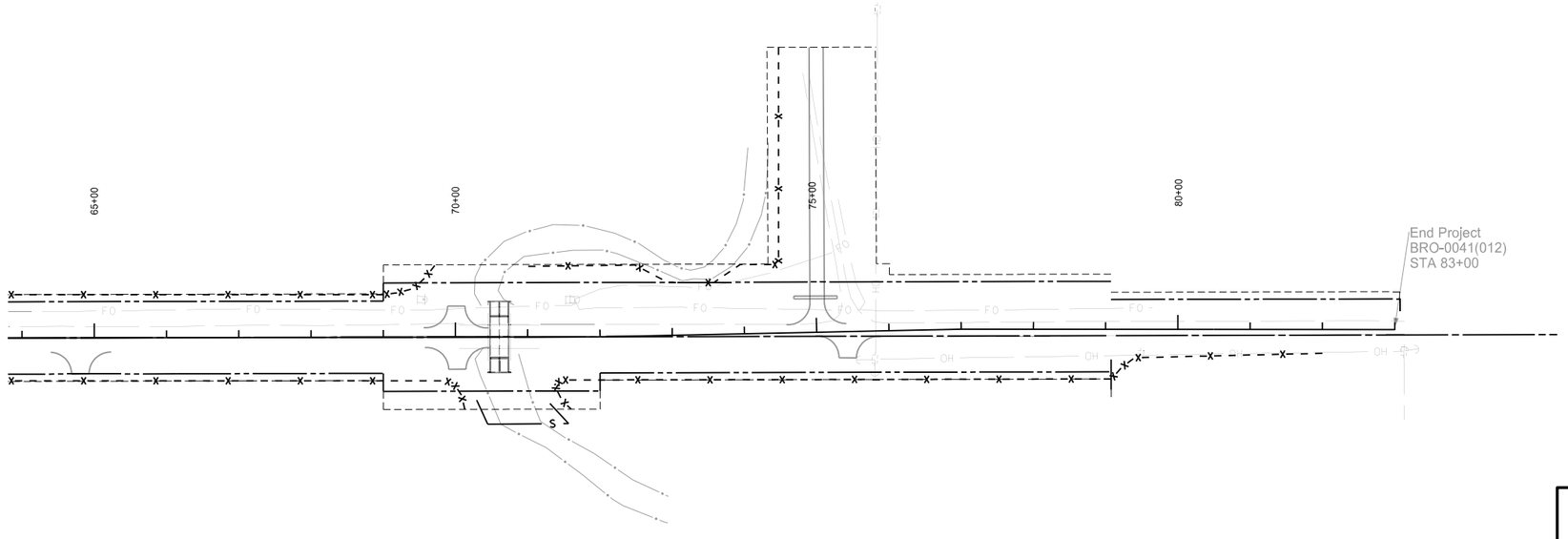
Sta. 70+75 RT	100 LF
Sta. 53+05 RT	30 LF

REMOVE SILT FENCE

Sta. 75+00 to 71+00 LT	700 LF
Sta. 82+00 to 76+00 RT	600 LF
Sta. 76+00 to 71+50 RT	450 LF
Sta. 69+85 to 66+00 RT	385 LF
Sta. 66+00 to 57+00 RT	900 LF
Sta. 57+00 to 53+50 RT	350 LF
Sta. 69+75 to 66+00 LT	385 LF
Sta. 66+00 to 53+50 LT	900 LF
Sta. 57+00 to 53+50 LT	385 LF
Sta. 52+50 to 50+00 RT	350 LF
Sta. 52+50 to 49+50 LT	300 LF

REMOVE FIBER ROLLS 12 IN

Sta. 53+50 LT & RT	100 LF
Sta. 52+50 LT & RT	100 LF



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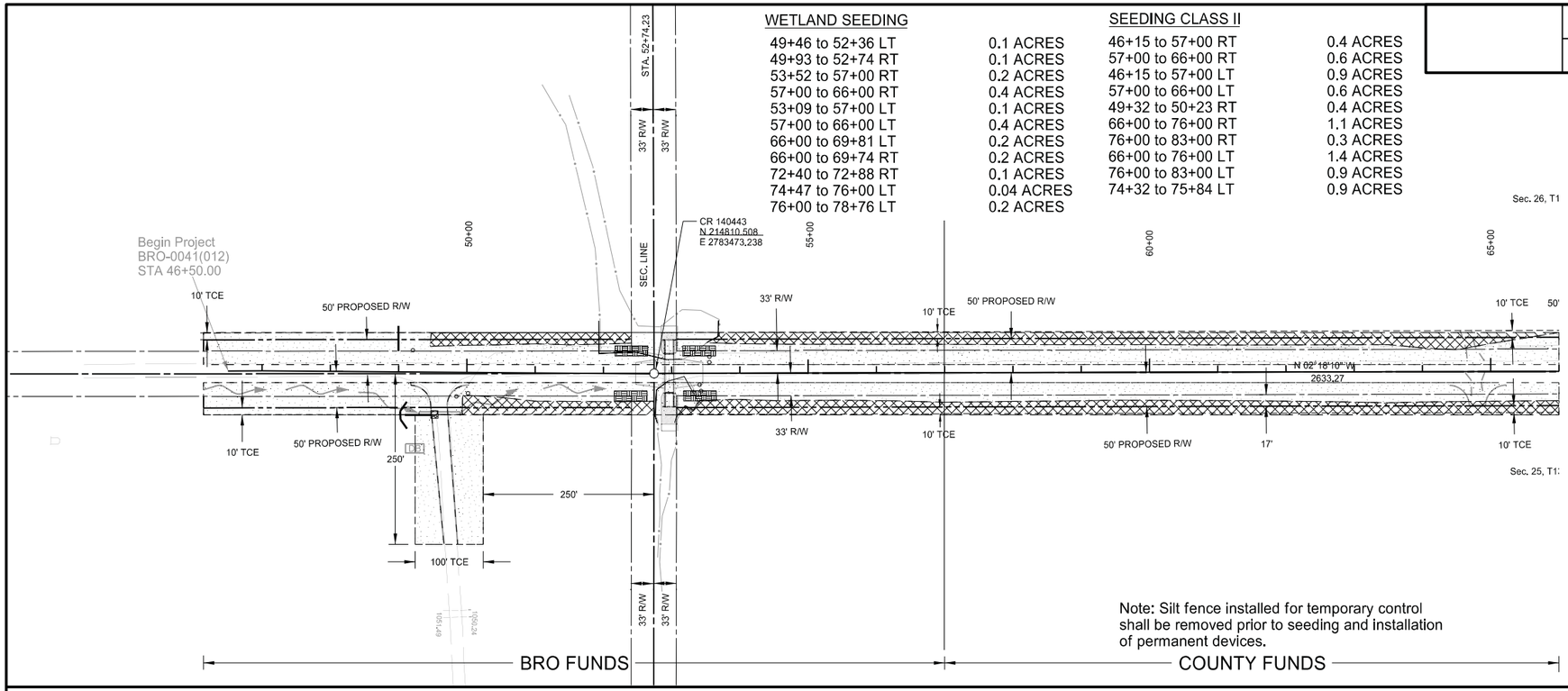
Temporary Erosion Control

Sargent County, North Dakota

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0041(012)	77	1



WETLAND SEEDING

49+46 to 52+36 LT	0.1 ACRES
49+93 to 52+74 RT	0.1 ACRES
53+52 to 57+00 RT	0.2 ACRES
57+00 to 66+00 RT	0.4 ACRES
53+09 to 57+00 LT	0.1 ACRES
57+00 to 66+00 LT	0.4 ACRES
66+00 to 69+81 LT	0.2 ACRES
66+00 to 69+74 RT	0.2 ACRES
72+40 to 72+88 RT	0.1 ACRES
74+47 to 76+00 LT	0.04 ACRES
76+00 to 78+76 LT	0.2 ACRES

SEEDING CLASS II

46+15 to 57+00 RT	0.4 ACRES
57+00 to 66+00 RT	0.6 ACRES
46+15 to 57+00 LT	0.9 ACRES
57+00 to 66+00 LT	0.6 ACRES
49+32 to 50+23 RT	0.4 ACRES
66+00 to 76+00 RT	1.1 ACRES
76+00 to 83+00 RT	0.3 ACRES
66+00 to 76+00 LT	1.4 ACRES
76+00 to 83+00 LT	0.9 ACRES
74+32 to 75+84 LT	0.9 ACRES

STRAW MULCH

46+50 to 57+00 LT & RT	2.2 ACRES
57+00 to 66+00 LT & RT	2.0 ACRES
66+00 to 76+00 LT & RT	3.9 ACRES
76+00 to 83+00 LT & RT	1.4 ACRES

FIBER ROLLS 12 IN

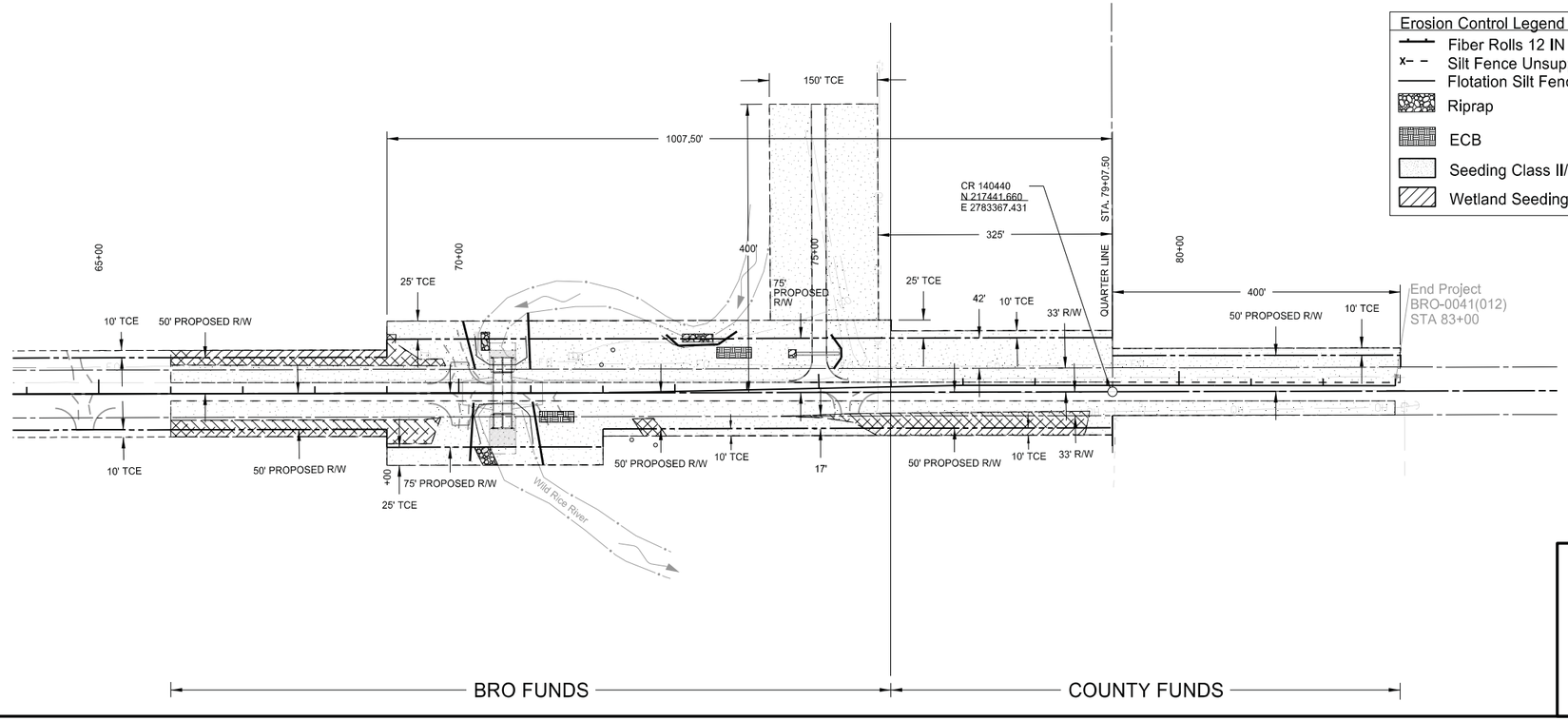
49+00 LT	15 LF
49+25 RT	15 LF
49+40 RT	15 LF
70+25 RT & LT	60 LF
71+00 RT & LT	60 LF
73+00 to 74+00 LT	100 LF
75+50 LT	15 LF

ECB TYPE II

52+50 RT & LT	80 SY
53+50 RT & LT	80 SY
71+25 RT	80 SY
74+25 LT	80 SY

RIPRAP GRADE II

49+60 RT	13 TON
70+25 LT	30 TON
70+25 RT	30 TON
73+25 RT	30 TON
74+80 LT	13 TON



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Permanent Erosion Control

Sargent County, North Dakota

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - BRO-0041(012)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0041(012)	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
100000	0+00	209540.0460	2783672.0730
100001	44+38.61	213975.3965	2783502.0540
100002	47+00	214236.5624	2783491.1840
100003	52+00	214736.3329	2783476.0364
100004	72+00	216734.7252	2783395.8591
100005	77+00	217233.8586	2783366.4335
100006	105+40.86	220072.7810	2783261.4610

CURVE DATA

ARC DEFINITION

US PUBLIC LAND SURVEY DATA

DESC.	SEC-TWP-RGE	NORTHING	EASTING
SESEC35	35-132-53	209540.0460	2783672.0730
SWSEC35	35-132-53	209322.2810	2778407.5920
SESEC25	25-132-53	215004.0640	2788742.1910
SQCOR25	25-132-53	214907.3140	2786107.6100
NESEC25	25-132-53	220311.8040	2788532.0410
NWSEC26	26-132-53	220072.7810	2783261.4610
NQCOR26	26-132-53	219967.6340	2780622.9560
NWSEC		219862.6920	2777984.3830
WQCOR		217227.6800	2778091.9510
SWSEC		214592.7740	2778199.4940
SESEC		214810.5080	2783473.2380
EQCOR		217441.6600	2783367.4310

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	CONTROL POINT DESCRIPTION
7	218287.5280	2783311.5010	1076.2680		CP7	
10	209402.8490	2779742.3660	1079.2790		GPS10	

NOTES:

Date Survey Completed 11/11/2011

☐ Assumed Coordinates

☒ All coordinates on this sheet are Sargent County ground coordinates. They are derived from the NAD83(CORS 96) reference frame; North Dakota South Zone Combination Factor (cf) = 0.99995013

All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK OPUS

☒ NAVD-88
☐ NGVD-29

☐ GEOID 09 ☒ GEOID 03
☐ GEOID 12A

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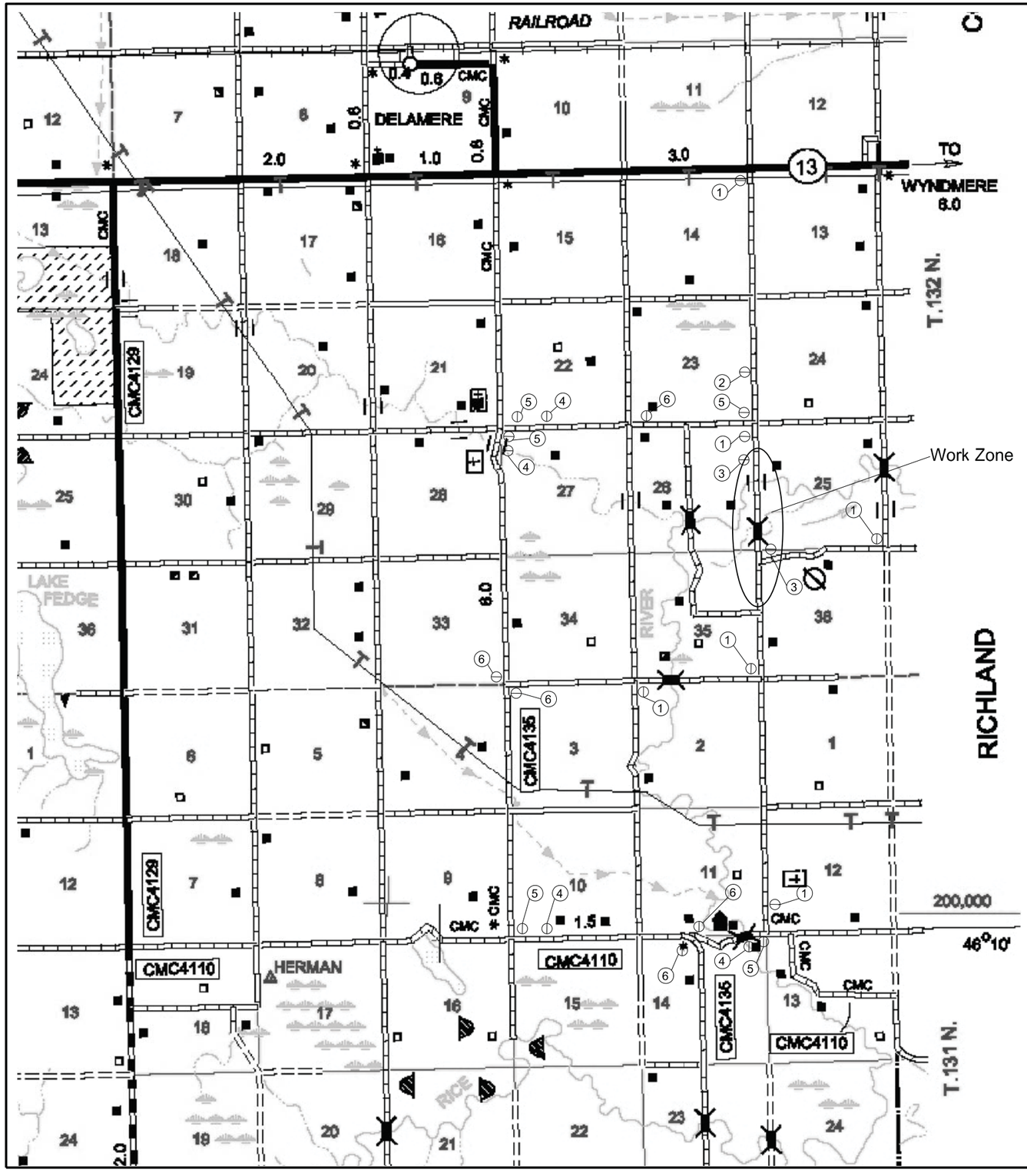
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	100	1



① W20-3-48 "Road Closed Ahead" with Type III Barricade Mounted (1 Barricade Post Mounted)

② W20-2-48 "Detour 2000 Feet" Post Mounted

③ R11-2-48 "Road Closed" with Type III Barricade Mounted (3 Barricades)

④ M4-8-24 "Detour" M5-1-21 " ↰ " or " ↱ " Post Mounted

⑤ M4-8-24 "Detour" M6-1-21 " ← " or " → "

⑥ M4-8-24 "Detour" M6-3-21 " ↑ "

The construction signing layout is for informational purposes only. Traffic control signing shall be installed as per MUTCD manual and/or standard drawings.

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Construction Signing Layout

Sargent County North Dakota

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0041(012)	100	2

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	48"x24"	END ROAD WORK		19	
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		64	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	**24"x12"**	**DETOUR (Mounted on route marker post)**	**10**	**7**	**70**
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	**21"x15"**	**ARROW AHD AND RT or LT(Mounted on route marker post)**	**2**	**7**	**14**
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	**21"x15"**	**ARROW RT or LT (Mounted on route marker post)**	**3**	**7**	**21**
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	**21"x15"**	**ARROW AHD (Mounted on route marker post)**	**5**	**7**	**35**
R1-1-48	48"x48"	STOP		32	
R1-1a-18	18"x18"	STOP and SLOW PADDLE Back to Back		5	
R1-2-60	60"x60"	YIELD		29	
R2-1-48	48"x60"	SPEED LIMIT __		39	
R2-1a-24	24"x18"	MINIMUM FEE $80 (Mounted on Speed Limit post)		10	
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	**48"x30"**	**ROAD CLOSED**	**2**	**28**	**56**
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	48"x48"	SPEED REDUCTION AHEAD		35	
W4-2-48	48"x48"	RIGHT or LEFT LANE TRANSITION SYMBOL		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT.		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT.		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	48"x48"	ROAD WORK AHEAD or _FT or _ MILE		35	
W20-2-48	**48"x48"**	**DETOUR AHEAD or __ FT**	**1**	**35**	**35**
W20-3-48	**48"x48"**	**ROAD or STREET CLOSED AHEAD or __ FT.**	**6**	**35**	**210**
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	48"x48"	RIGHT or LEFT LANE CLOSED AHEAD or __ FT.		35	
W20-7a-48	48"x48"	FLAGGING SYMBOL		35	
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		35	
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

SPECIAL SIGNS

SPEC & CODE

704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	441

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**10**
704-1060	**DELINEATOR DRUMS**	**EACH**	**10**
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.
http://www.dot.nd.gov/

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Traffic Control Devices List

Sargent County, North Dakota

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0041(012)	170	1

STRUCTURE NOTES

100-P01 SCOPE OF WORK: This project shall consist of the removal of 3 bridges and 1 large culvert crossing and the installation of RCB at 2 of the removal locations.

202-P01 REMOVAL OF STRUCTURE-SITE 1: The existing structure to be removed at this location consists of a single span concrete/steel girder bridge 29 feet in length. The existing roadway embankments have been washed away at this location. The contractor shall be responsible for access for the removal as part of this bid item.

REMOVAL OF STRUCTURE-SITE 2: The existing structure to be removed at this location consists of a single span timber bridge 28 feet in length.

REMOVAL OF STRUCTURE-SITE 3: The existing structure to be removed at this location consists of a single span timber bridge with steel piling 41 feet in length.

All salvaged materials will become property of the Contractor for all 3 removals. The Contractor shall arrange for and secure a suitable disposal site off of the right-of-way for the remainder of the structure. Any existing substructures shall be removed in accordance with Section 202.04B of the Standard Specifications.

Embankment is required for the barrier mound (see section 20 detail) and shall be obtained from the roadway fill excavation behind the existing abutments as directed by the Engineer. All natural grass and disturbed areas shall be seeded per section 251 of the standard specifications and plan notes. Road closure signing shall be as detailed in section 20. All signs, posts, and barricades shall be installed per section 704 of the standard specifications and relevant standard drawings.

All costs associated with removal and disposal of the structure shall be included in the price bid for “Removal of Structure-Site x”. These costs shall include removal, signing, barricades, posts, labor seeding, earthwork, etc.

202-P02 REMOVAL OF PIPES ALL TYPES AND SIZES: The existing pipes to be removed at Station 70+75 consist of three (3) 11ftx10in x7ftx7in SPPA’s 60 feet in length each. All salvaged materials will become property of the Contractor.

210-P01 BOX CULVERT EXCAVATION: Shall be to the limits shown on the plan typical box culvert layout drawings. All material not considered suitable for the roadbed shall be used to fill the road in-slopes unless the material is deemed waste excavation by the engineer. It is assumed that this material will be suitable for use in embankment areas. Payment for all Box Culvert Excavation to the limits shown on the plans will be Lump Sum. The price bid for Box Culvert Excavation shall include the costs for placement of this material in embankment areas. The embankment shall meet the requirements of Section 203.02H Compaction Control Type B.

210-P02 FOUNDATION FILL – TYPE 1: Foundation Fill – Type 1 shall consist of Concrete Course Aggregate Size 4 and shall be installed in the bottom 3 feet of the excavated area below the box culvert as shown in plans. This aggregate must be wrapped completely with Geosynthetic Material Type S1. The Geosynthetic Material Type S1 shall be included in the price bid for Foundation Fill – Type 1.

606-P01 PRECAST REINFORCED CONCRETE BOX CULVERTS: Tie all barrel sections together with galvanized tie-bolts. Each joint will require four tie bolts at the third points of the wall height. Provide fence anchors for each end section. Anchors required on all four corners and shall be suitable for four strand barbed wire fence.

Double and single box culvert end sections shall include a reinforced concrete parapet on the top of the roof and a reinforced concrete cutoff wall below the floor. The parapet shall be one (1) foot by one (1) foot and as long as the barrel sections outside width. The cutoff wall shall be placed below the end of the end sections and shall be a minimum of one (1) foot thick, and three (3) feet, two (2) inches deep, and shall extend three (3) feet beyond both of the end section’s outside walls. These items shall be included in the bid price of each end section.

The design loading of the box culverts shall be HL-93 with the minimum fill heights shown in the plans. The design of single and double box culvert barrels shall be based on a 10” thick roof, 10” floor, and 8” walls and the following total factored moments and shears that would result from the application of the required loads:

FACTORED DESIGN MOMENTS (SINGLE)

Wall Moment	
Top Corner	-13.2 ft-lbs
Mid Height, +VE	6.52 ft-lbs
Mid Height, -VE	-6.15 ft-lbs
Bottom Corner	-13.06 ft-lbs
Roof Moments	
Corner	-11.31 ft-lbs
Midspan	29.02 ft-lbs
Floor Moments	
Corner	-12.45 ft-lbs
Midspan	25.42 ft-lbs

FACTORED DESIGN MOMENTS (DBL)

Wall Moment	
Top Corner	-8.6 ft-lbs
Mid Height, + VE	6.51 ft-lbs
Mid Height, - VE	-1.19 ft-lbs
Bottom Corner	-10.38 ft-lbs
Roof Moments	
Ext. Corner	-10.67 ft-lbs
Midspan	28.08 ft-lbs
Interior Corner	-24.97 ft-lbs
Floor Moments	
Ext. Corner	-11.22 ft-lbs
Midspan	13.35 ft-lbs
Int. Corner	-19.99 ft-lbs

NOTES
1. Moments are due to strength I limit state.
2. Negative (-VE) moments at corners are computed at the intersection of the haunch and the uniform depth member per AASHTO 27.7.4.5
3. Positive (+VE) moments cause tension at the inside face of the component. Negative (-VE) moments cause tension on the outside face of the component.

709-P01 GEOSYNTHETIC MATERIAL TYPE R1: The contractor shall install one continuous piece of fabric to meet the required longitudinal length indicated in the plans. Transverse seaming may be done by overlap per the standard specification.

WORKING DRAWINGS: The contractor shall submit the following working drawings to the Engineer of Record: Precast RCB Culvert and End Sections

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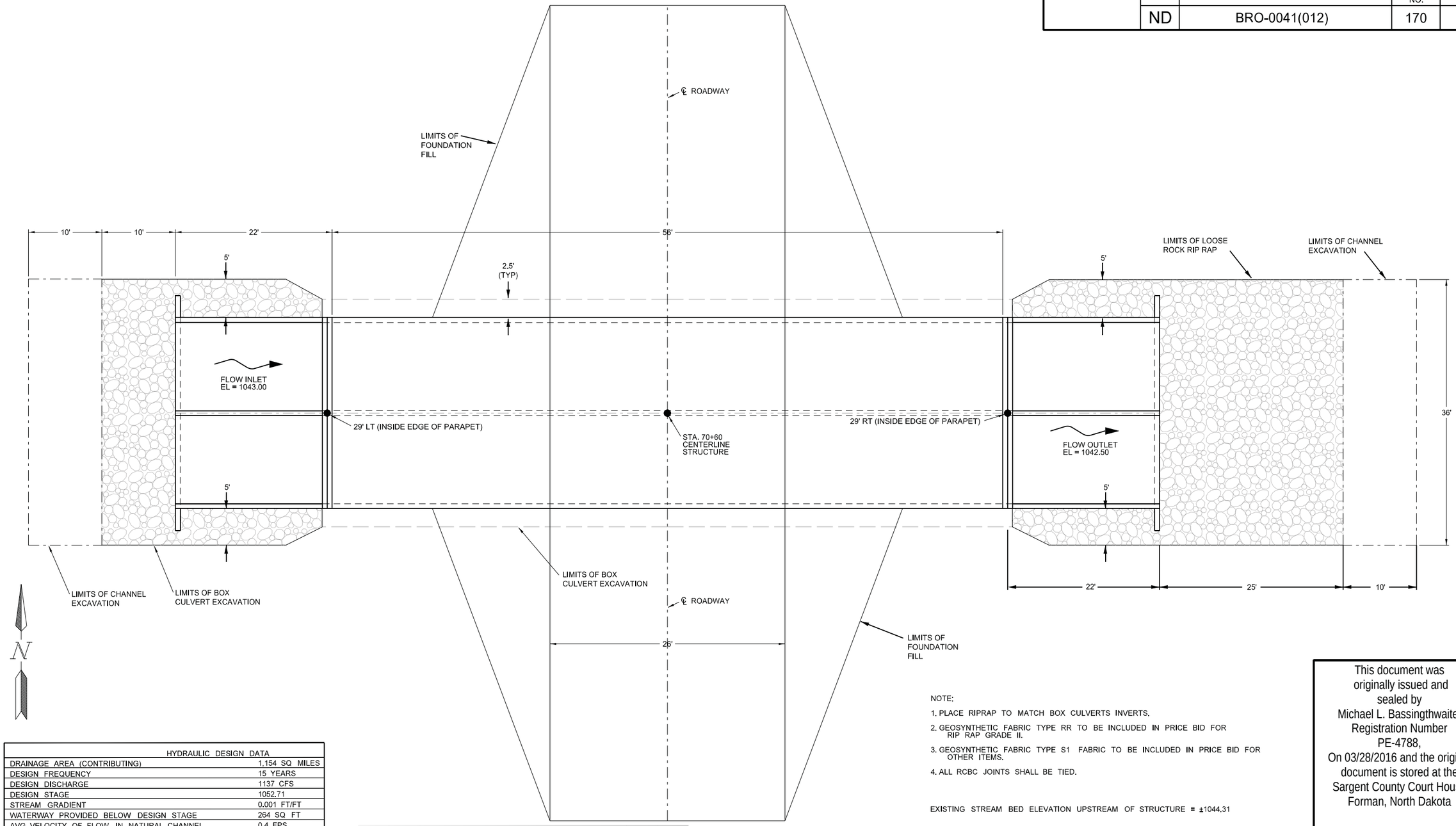
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	170	2



HYDRAULIC DESIGN DATA	
DRAINAGE AREA (CONTRIBUTING)	1,154 SQ MILES
DESIGN FREQUENCY	15 YEARS
DESIGN DISCHARGE	1137 CFS
DESIGN STAGE	1052.71
STREAM GRADIENT	0.001 FT/FT
WATERWAY PROVIDED BELOW DESIGN STAGE	264 SQ FT
AVG. VELOCITY OF FLOW IN NATURAL CHANNEL	0.4 FPS
DEPTH OF FLOW	8.73 FT
VELOCITY OF FLOW THRU CULVERT	3.57 FPS
FREEBOARD PROVIDED	2.27 FT (MIN.)
100 YEAR FREQUENCY DISCHARGE	2846 CFS
100 YEAR FREQUENCY STAGE	1056.19
MAXIMUM OBSERVED STAGE	UNKNOWN
MAXIMUM RECORDED DISCHARGE	UNKNOWN
FREQUENCY OF MAXIMUM FLOOD	UNKNOWN
MINIMUM WATER ELEVATION	1.5 FT

SPEC.	CODE	ITEM DESCRIPTION	UNIT	QUAN.
210	0051	BOX CULVERT EXCAVATION - SITE 1	LSUM	1
210	0128	CHANNEL EXCAVATION - SITE 1	LSUM	1
210	0209	FOUNDATION FILL	TON	1350
210	0202	FOUNDATION PREP - SITE 1	LSUM	1
210	0225	FOUNDATION FILL - TYPE 1	CY	781
256	0201	RIPRAP GRADE II	TON	190
606	3211	DBL 12FT X 11FT PRECAST RCB CULVERT	LF	56
606	5211	DBL 12FT X 11FT PRECAST RCB END SECTION	EA	2
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	840

NOTE:

1. PLACE RIPRAP TO MATCH BOX CULVERTS INVERTS.
2. GEOSYNTHETIC FABRIC TYPE RR TO BE INCLUDED IN PRICE BID FOR RIP RAP GRADE II.
3. GEOSYNTHETIC FABRIC TYPE S1 FABRIC TO BE INCLUDED IN PRICE BID FOR OTHER ITEMS.
4. ALL RCBC JOINTS SHALL BE TIED.

EXISTING STREAM BED ELEVATION UPSTREAM OF STRUCTURE = ±1044.31

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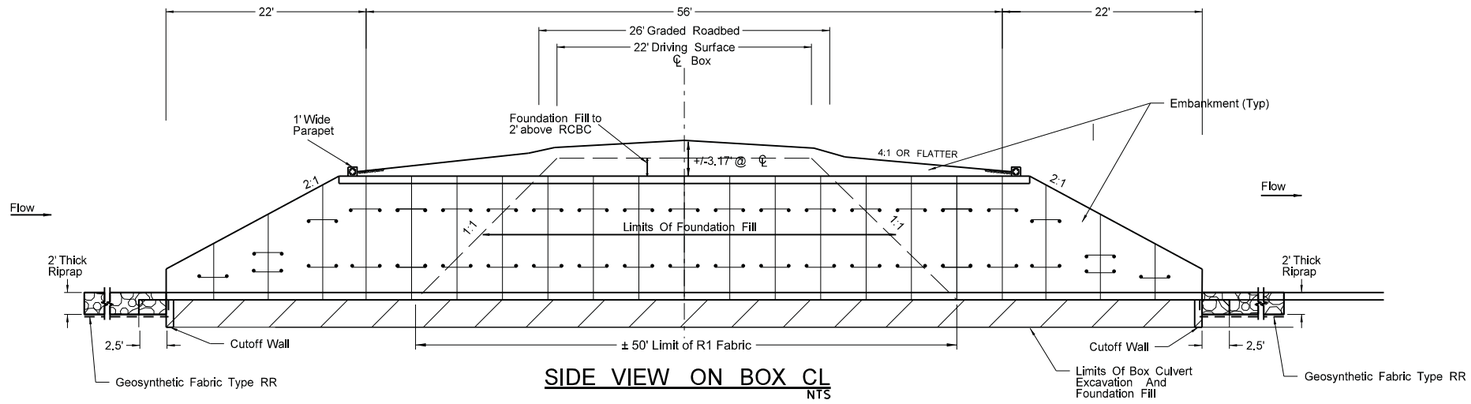
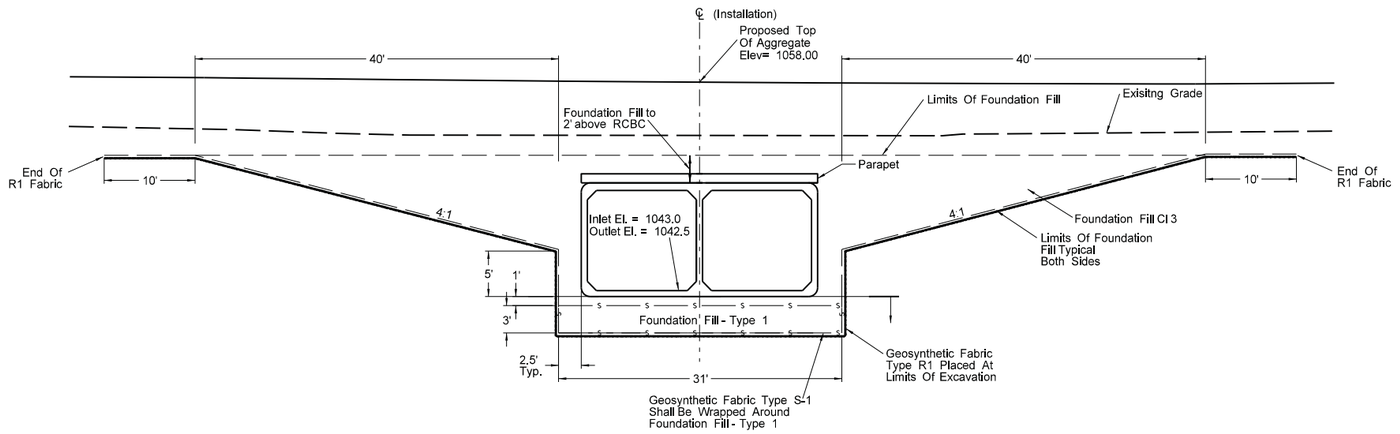
Box Culvert Layout
Double 12'X11' RCBC
Sta 70+60

Sargent County North Dakota

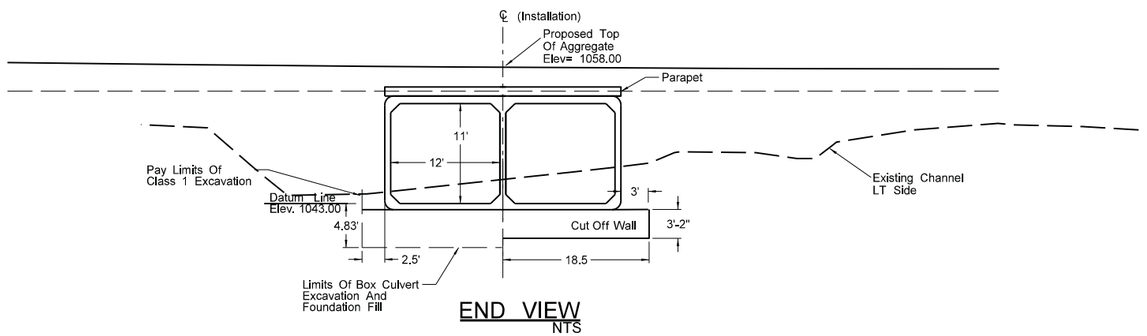
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	170	3



SIDE VIEW ON BOX CL
NTS



END VIEW SHOWING FOUNDATION FILL
NTS



END VIEW
NTS

Note:

Geosynthetic Type S1 fabric to be incidental to the box culvert bid item.

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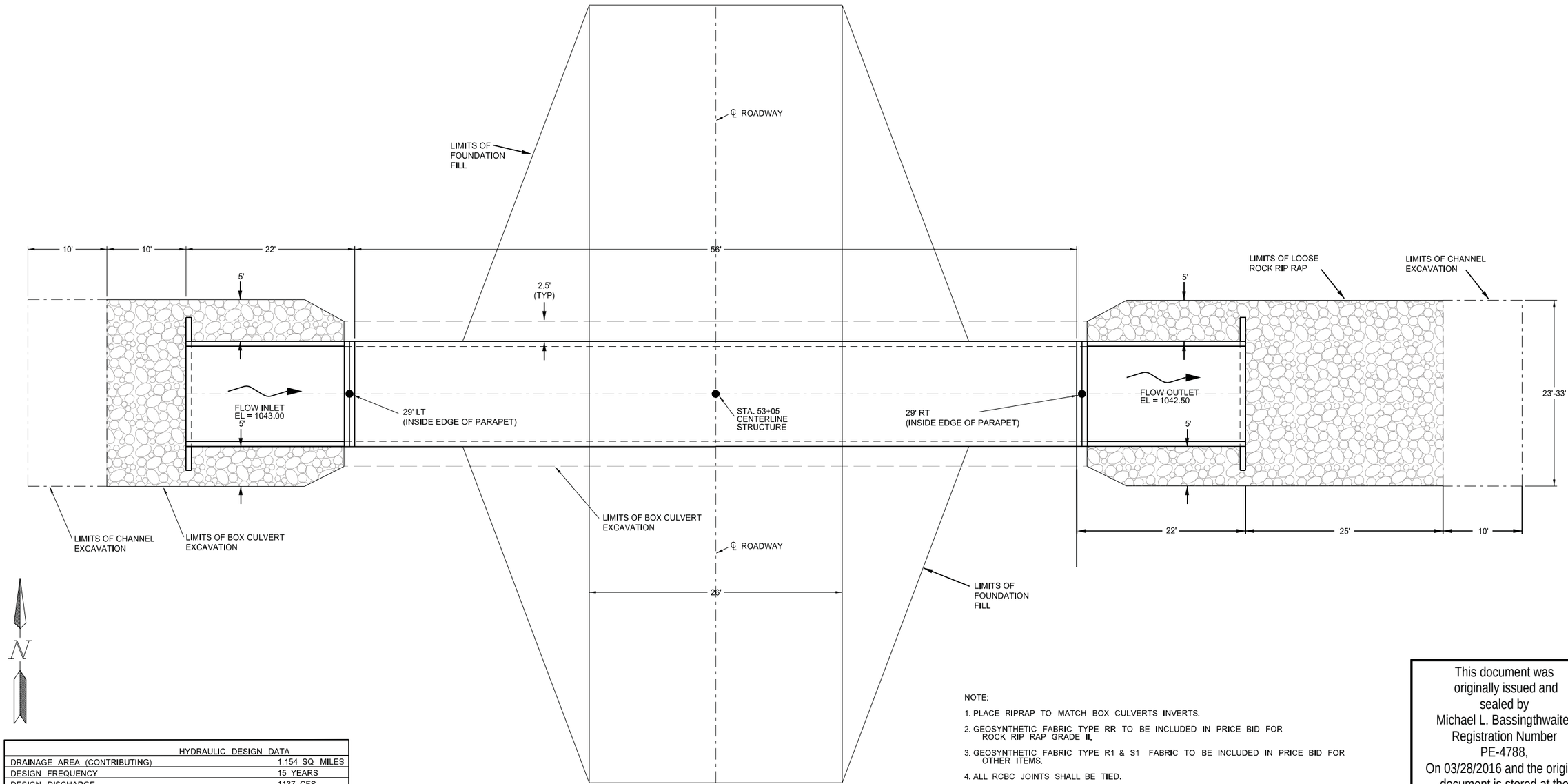
Excavation Limits & Foundation Fill
Double 12'X11' RCBC
Sta 70+60

Sargent County North Dakota

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	170	4



HYDRAULIC DESIGN DATA	
DRAINAGE AREA (CONTRIBUTING)	1,154 SQ MILES
DESIGN FREQUENCY	15 YEARS
DESIGN DISCHARGE	1137 CFS
DESIGN STAGE	1052.71
STREAM GRADIENT	0.001 FT/FT
WATERWAY PROVIDED BELOW DESIGN STAGE	264 SQ FT
AVG. VELOCITY OF FLOW IN NATURAL CHANNEL	0.4 FPS
DEPTH OF FLOW	8.73 FT
VELOCITY OF FLOW THRU CULVERT	3.57 FPS
FREEBOARD PROVIDED	2.27 FT (MIN.)
100 YEAR FREQUENCY DISCHARGE	2846 CFS
100 YEAR FREQUENCY STAGE	1056.19
MAXIMUM OBSERVED STAGE	UNKNOWN
MAXIMUM RECORDED DISCHARGE	UNKNOWN
FREQUENCY OF MAXIMUM FLOOD	UNKNOWN
MINIMUM WATER ELEVATION	1.5 FT

SPEC.	CODE	ITEM DESCRIPTION	UNIT	QUAN.
210	0052	BOX CULVERT EXCAVATION - SITE 2	LSUM	1
210	0129	CHANNEL EXCAVATION - SITE 2	LSUM	1
210	0210	FOUNDATION FILL	TON	1300
210	0203	FOUNDATION PREP - SITE 2	LSUM	1
210	0225	FOUNDATION FILL - TYPE 1	CY	459
256	0201	RIPRAP GRADE II	TON	140
606	1211	12FT X 11FT PRECAST RCB CULVERT	LF	56
606	5211	12FT X 11FT PRECAST RCB END SECTION	EA	2
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	770

NOTE:

1. PLACE RIPRAP TO MATCH BOX CULVERTS INVERTS.
2. GEOSYNTHETIC FABRIC TYPE RR TO BE INCLUDED IN PRICE BID FOR ROCK RIP RAP GRADE II.
3. GEOSYNTHETIC FABRIC TYPE R1 & S1 FABRIC TO BE INCLUDED IN PRICE BID FOR OTHER ITEMS.
4. ALL RCBC JOINTS SHALL BE TIED.

EXISTING STREAM BED ELEVATION UPSTREAM OF STRUCTURE = ±1045.00

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Box Culvert Layout

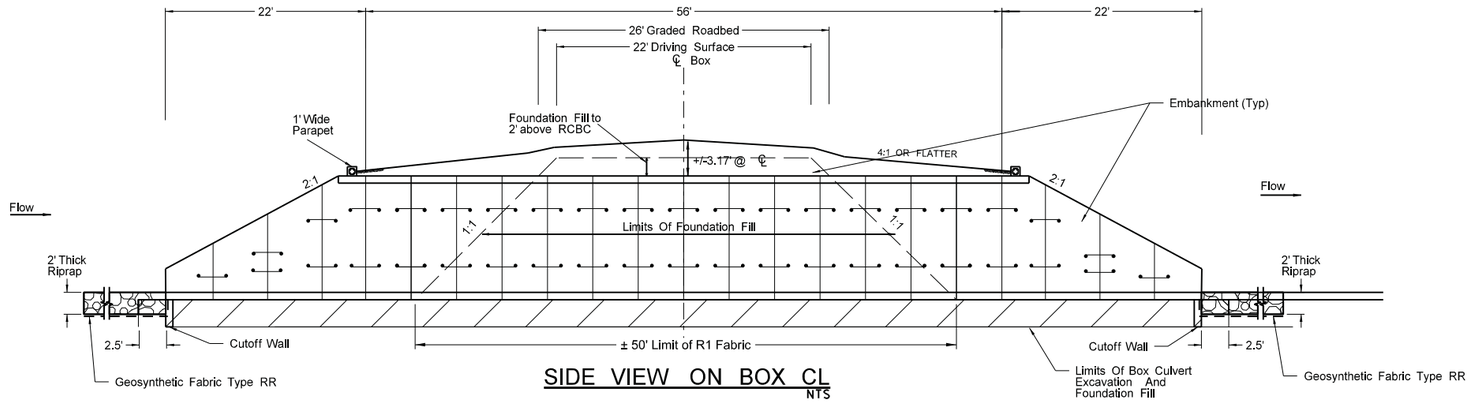
Single 12'X11' RCBC

Sta 53+05

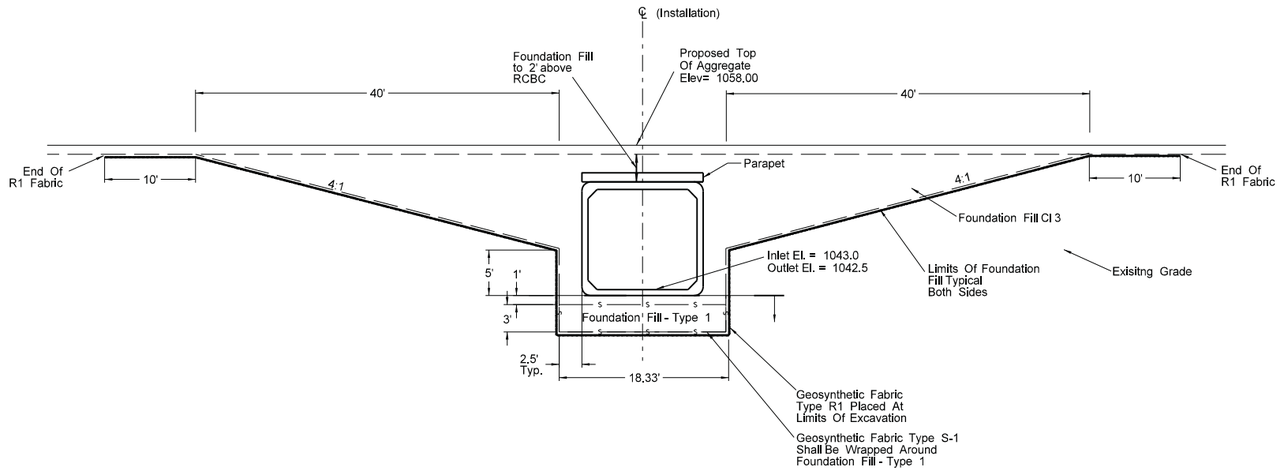
Sargent County North Dakota

Shelley.Terfehr Q:\2011\W11s\W1100158\CADD\Design\SHEETS\SECTION 170\170BC_003_Box CulvertSingle.dgn

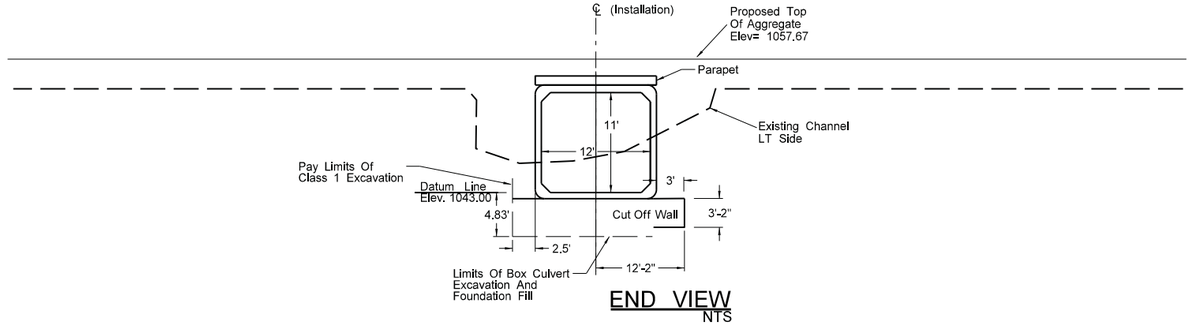
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0041(012)	170	5



SIDE VIEW ON BOX CL
NTS



END VIEW SHOWING FOUNDATION FILL
NTS



END VIEW
NTS

Note:

Geosynthetic Type S1 fabric to be incidental to the box culvert bid item.

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Excavation Limits & Foundation Fill
Single 12'X11' RCBC
Sta 53+05

Sargent County North Dakota

NDDOT ABBREVIATIONS

D-101-1

?	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 ℄	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
Dlnt	delineate
Dlntr	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	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-101-2

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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08-03-15	General Revisions

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NDDOT ABBREVIATIONS

D-101-3

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

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D-101-20

Line Styles

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

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Line Styles

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

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Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

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Symbols

D-101-31

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

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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 Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate 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 (CSB)
- Flight Auger Sample (FA)
- Split Barrel Sample (SB)
- Thinwall Tube Sample
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- Standard Penetration Test (N)
- Transformer
- Inclinometer Tube (Incl)
- Underdrain Cleanout
- Excavation Unit
- Water Valve

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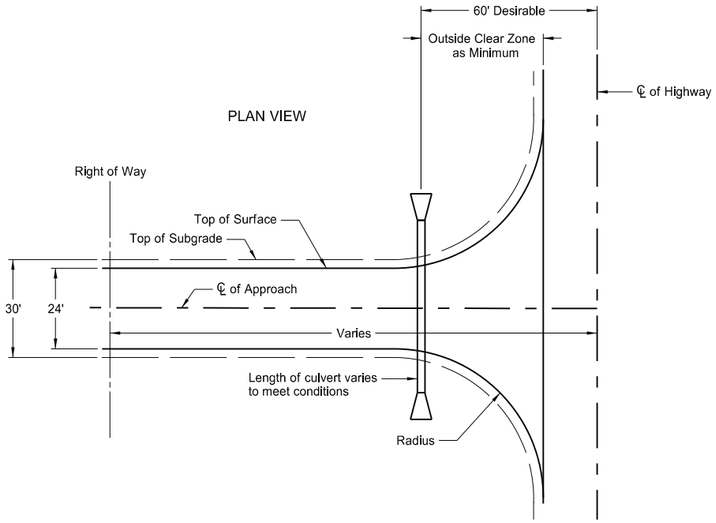
STANDARD RURAL APPROACHES

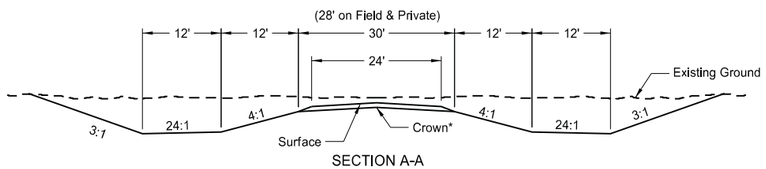
D-203-8

PLAN VIEW



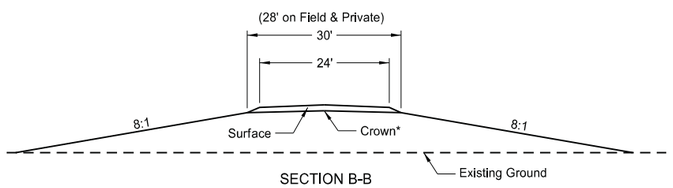
CRITERIA FOR RURAL APPROACH TYPES

	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)

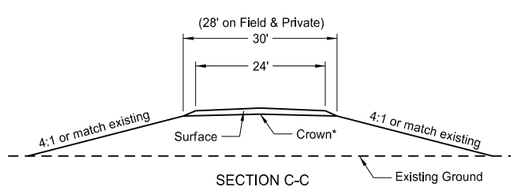


SECTION A-A

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

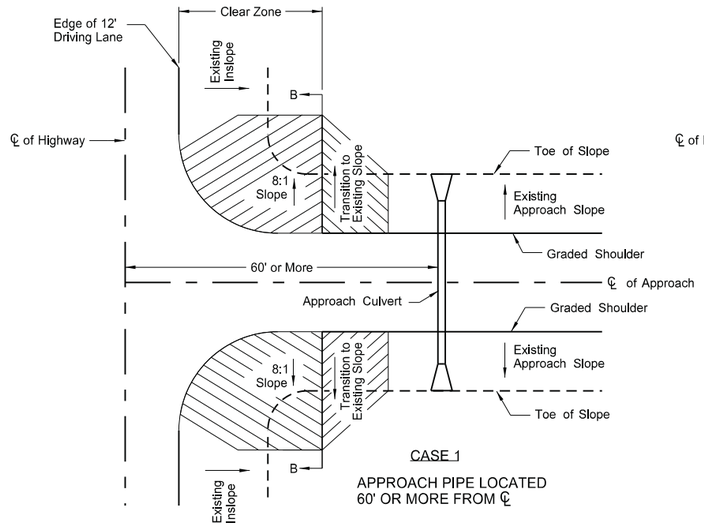


SECTION B-B



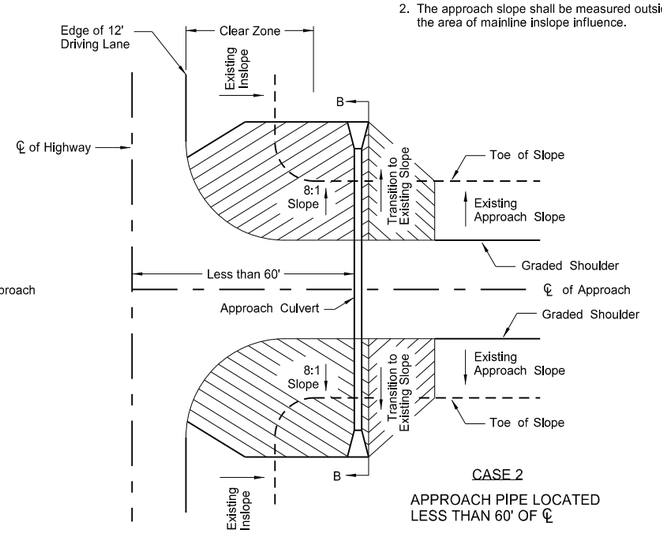
SECTION C-C

APPROACH INSLOPES



CASE 1

APPROACH PIPE LOCATED 60' OR MORE FROM ℄

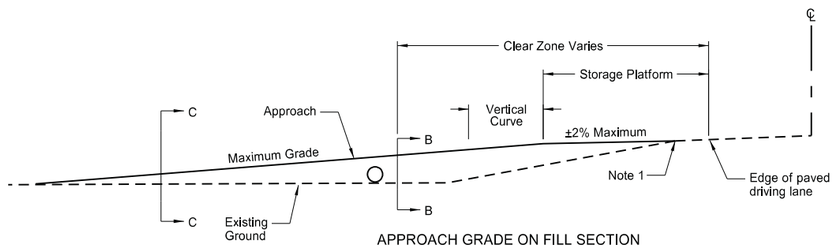


CASE 2

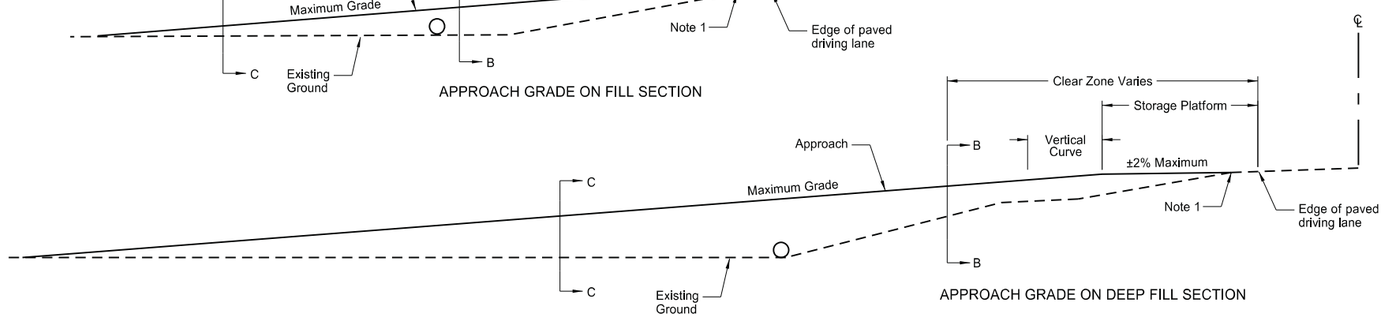
APPROACH PIPE LOCATED LESS THAN 60' OF ℄

NOTES:

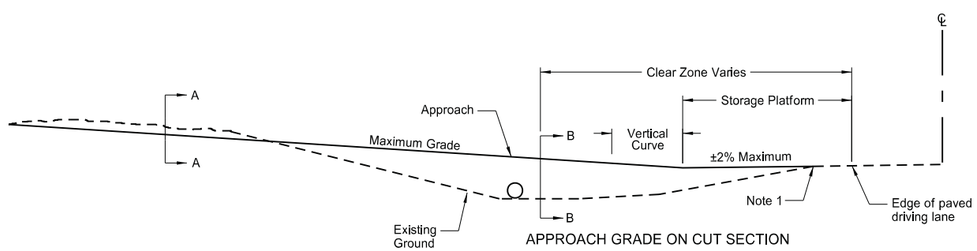
1. Max breakover between approach storage platform and highway shall not exceed 5%.
2. The approach slope shall be measured outside the area of mainline inslope influence.



APPROACH GRADE ON FILL SECTION



APPROACH GRADE ON DEEP FILL SECTION



APPROACH GRADE ON CUT SECTION

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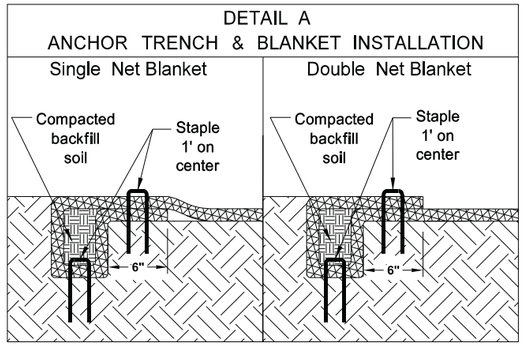
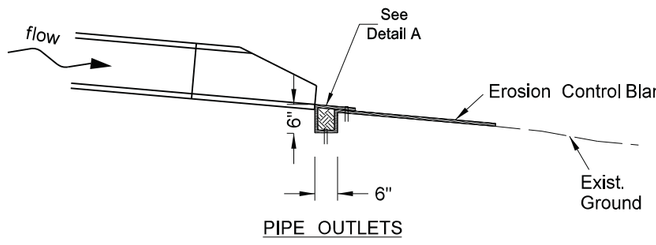
D-255-2

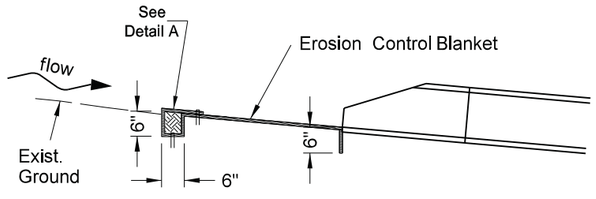
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



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

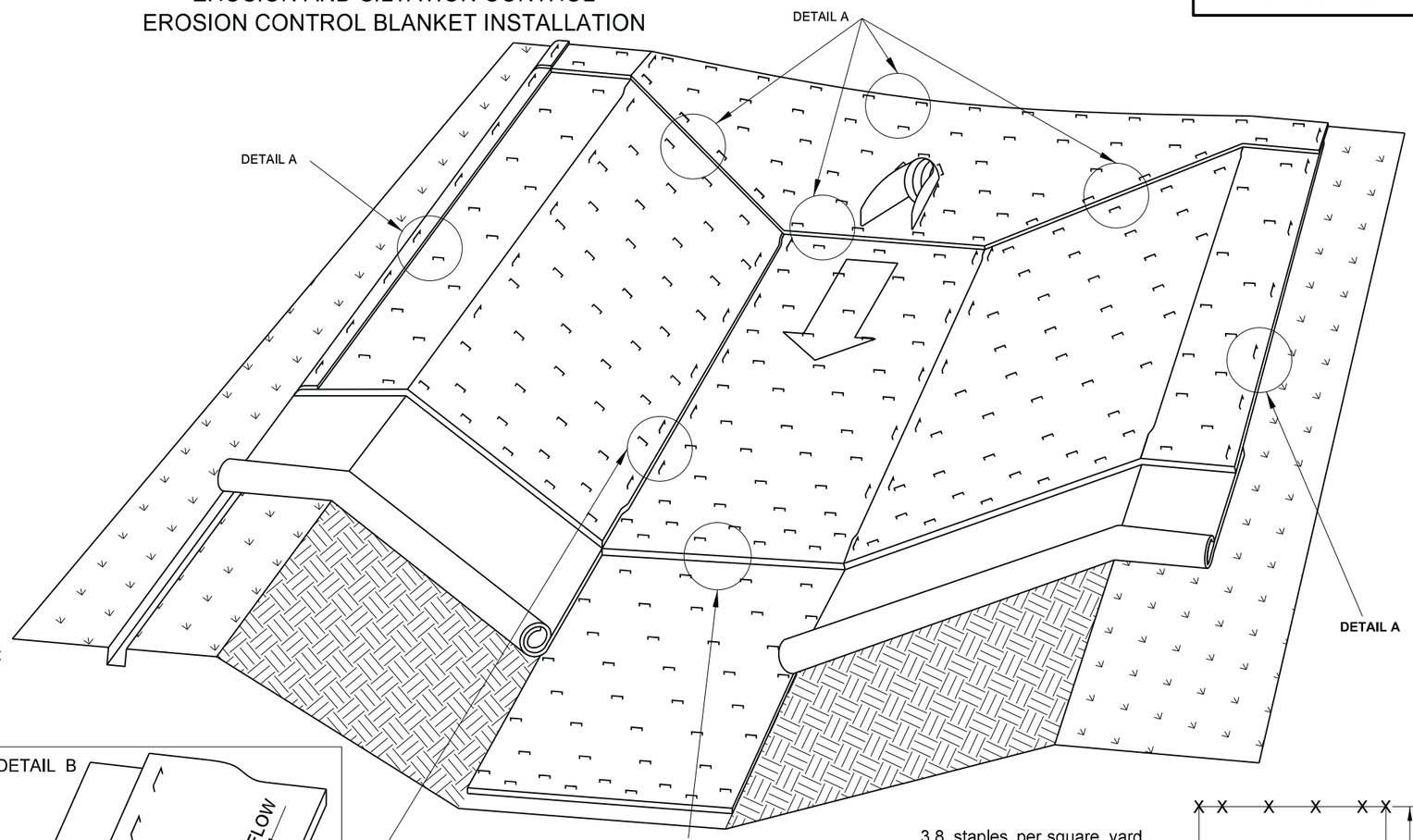


PIPE OUTLETS

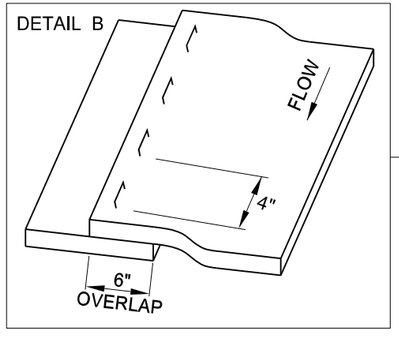


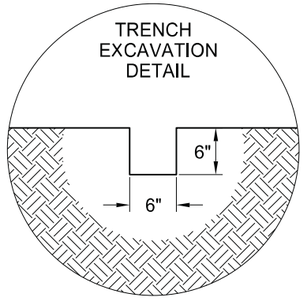
PIPE INLETS

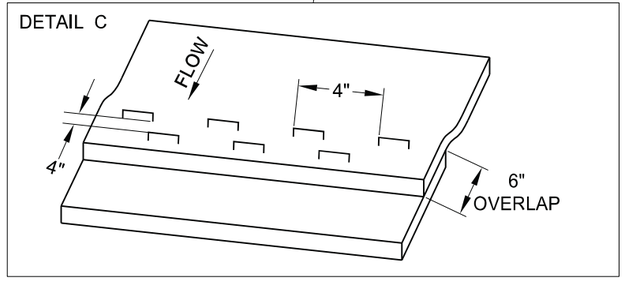
INSTALLATION AT PIPE ENDS



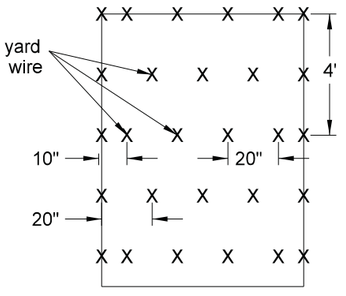
BLANKET LAYOUT
CHANNEL OR SLOPE INSTALLATION







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



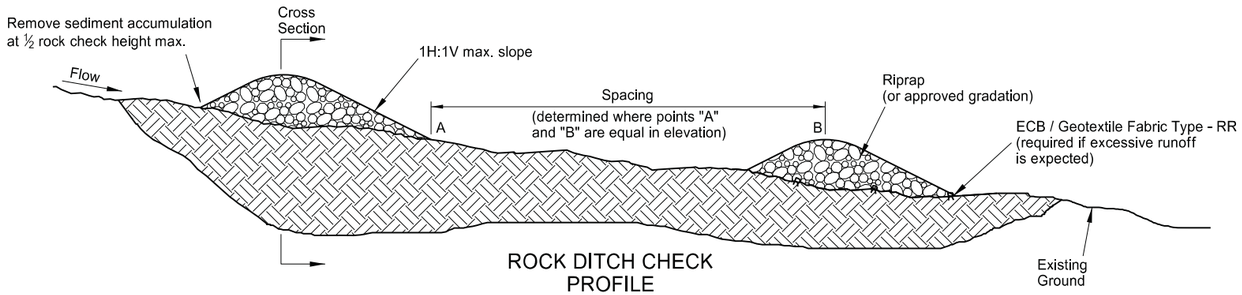
STAPLE PATTERN

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-709-5 to D-255-2.
07-27-15	Changed installation details such as trench depth and overlap dimensions.

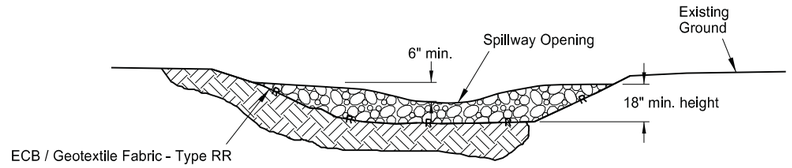
This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930 , on 07/27/15 and the original document is stored at the North Dakota Department of Transportation

EROSION AND SILTATION CONTROLS

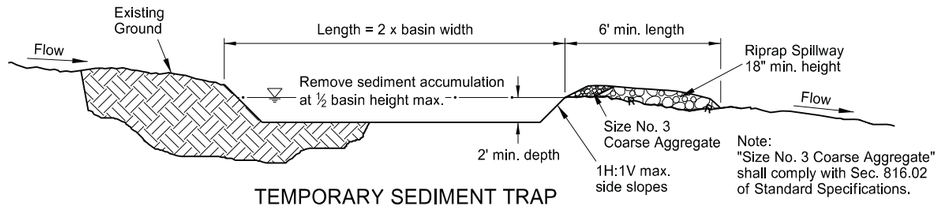
D-256-1



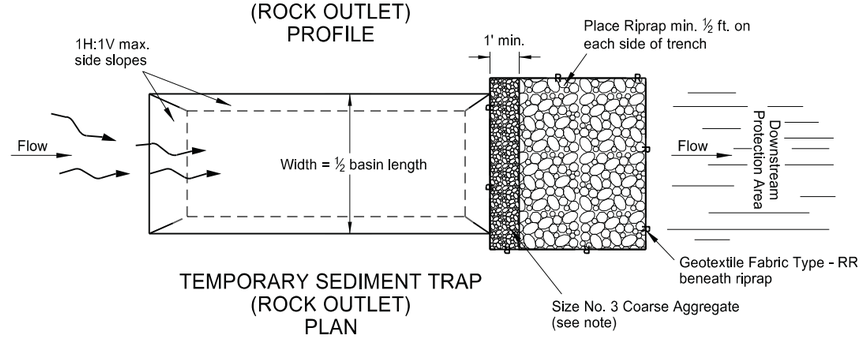
ROCK DITCH CHECK
PROFILE



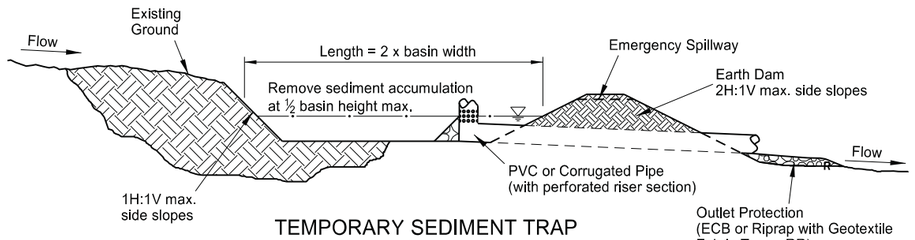
ROCK DITCH CHECK
CROSS SECTION



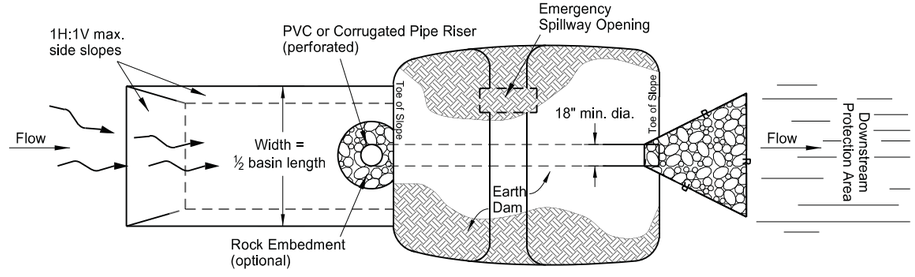
TEMPORARY SEDIMENT TRAP
(ROCK OUTLET)
PROFILE



TEMPORARY SEDIMENT TRAP
(ROCK OUTLET)
PLAN



TEMPORARY SEDIMENT TRAP
(RISER PIPE OUTLET)
PROFILE



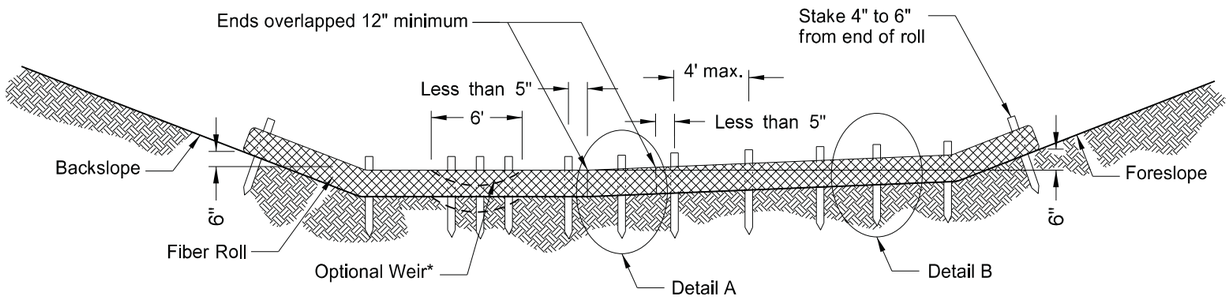
TEMPORARY SEDIMENT TRAP
(RISER PIPE OUTLET)
PLAN

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.

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 06/26/14 and the original document is stored at the North Dakota Department of Transportation

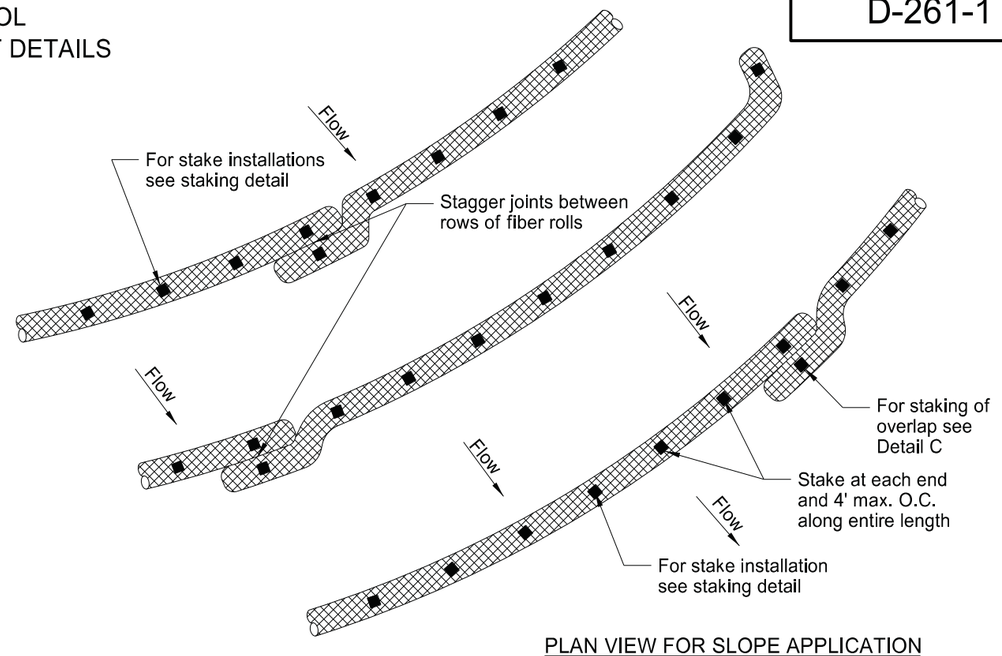
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

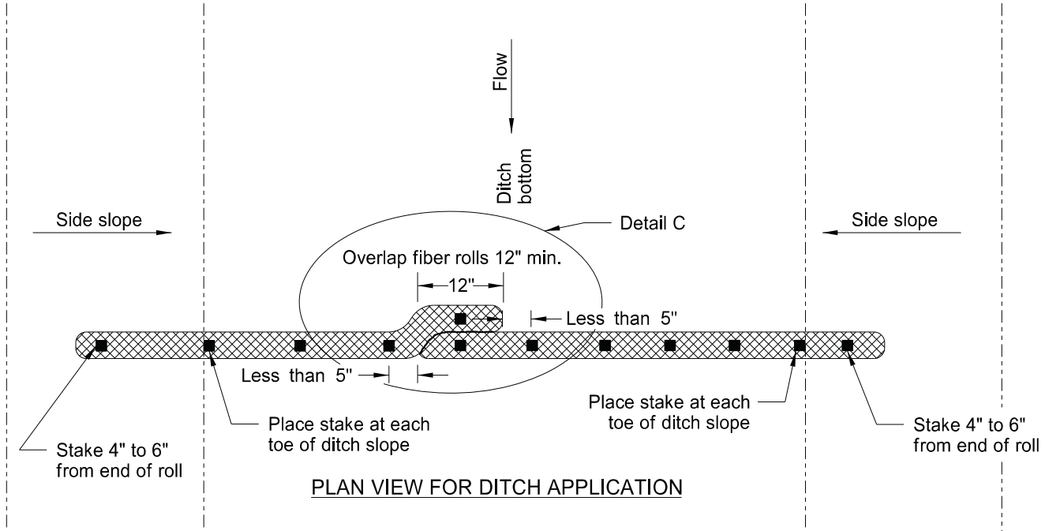


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

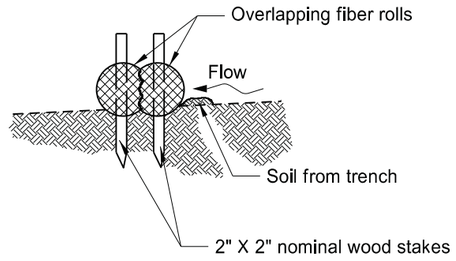
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

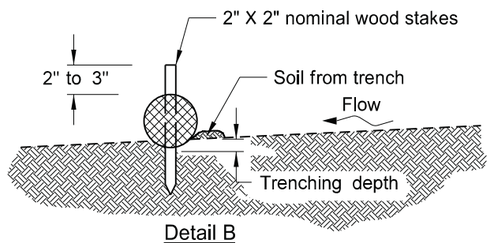


PLAN VIEW FOR DITCH APPLICATION



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

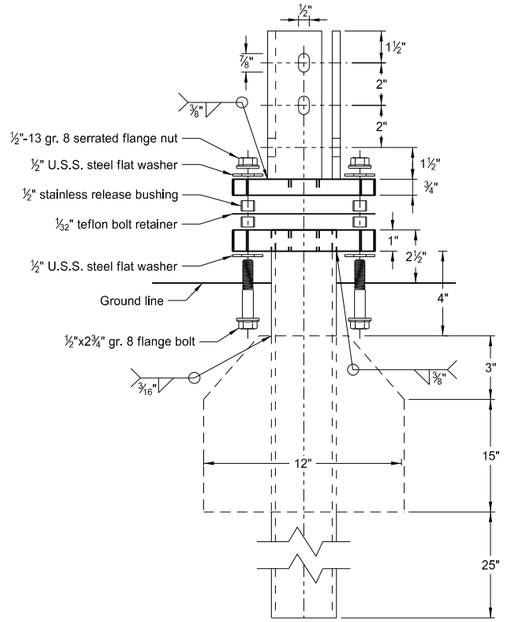
REVISIONS

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 06/26/14 and the original document is stored at the North Dakota Department of Transportation

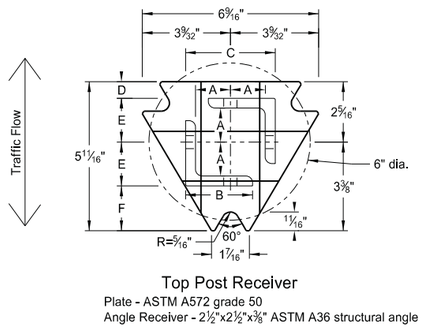
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

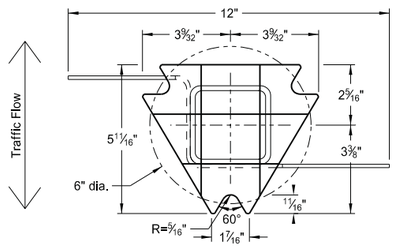


Multi-Directional
Slip Base Assembly

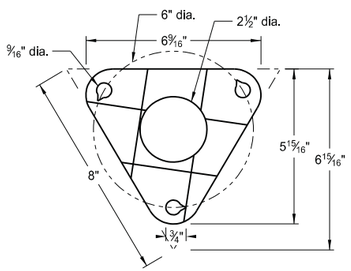
Perforated Tube



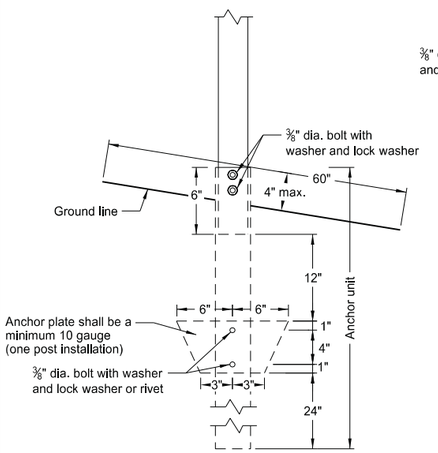
Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



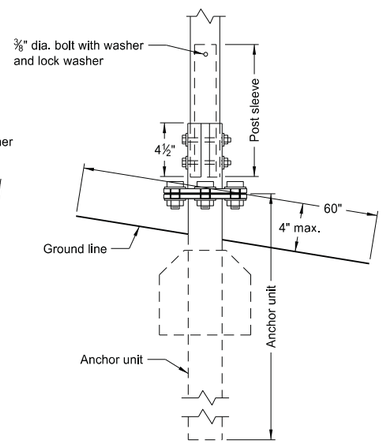
Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50



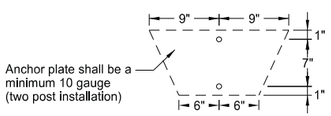
Bolt Retainer for Base Connection
Bolt Retainer- 1/32" Reprocessed Teflon



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



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 Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	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 $in.^3$
1½ x 1½	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
2¼ x 2¼	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
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	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"	2½"	3 1/32"	25/32"	1 33/64"	1⅞"
2½"x10 ga.	1 9/32"	2½"	3 5/16"	⅝"	1 21/32"	1¾"

(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 2½"x10 ga. for additional wind load.

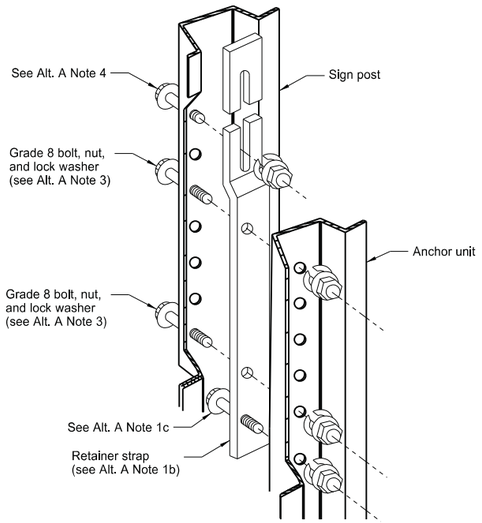
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 2/28/14 and the original document is stored at the North Dakota Department of Transportation

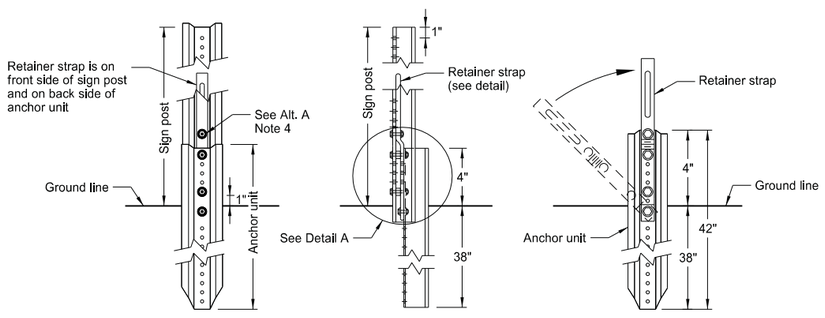
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



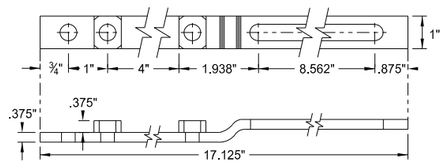
Detail A



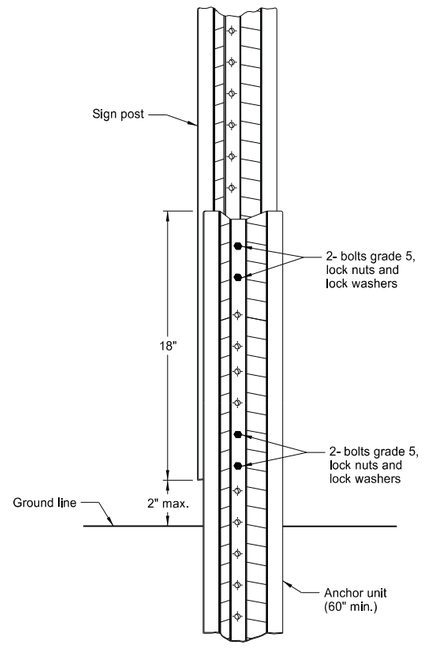
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

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

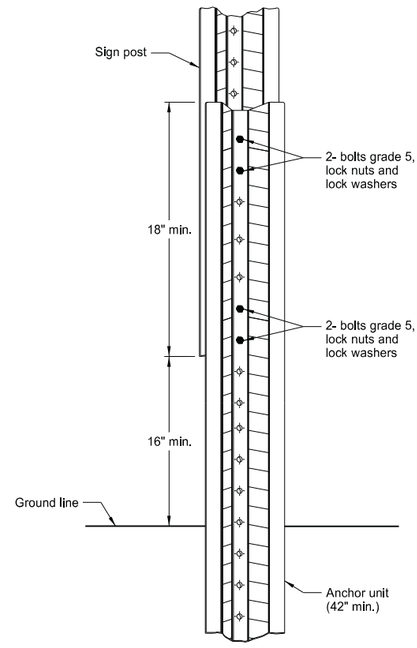


Retainer Strap Detail



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'.

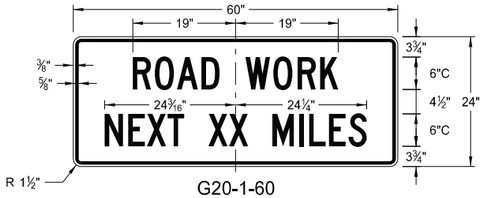
Alternate A Steps of Installation:

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.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

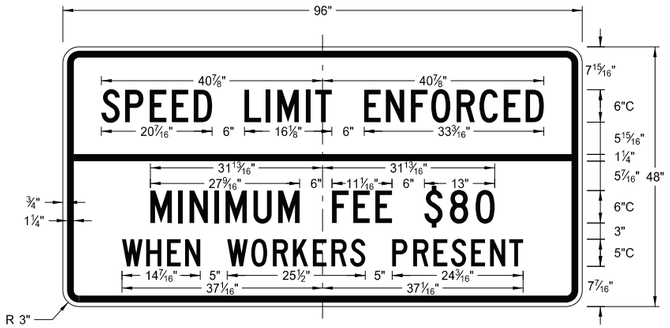
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 2/28/14 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



G20-1-60
Legend: black (non-refl)
Background: orange

G20-4b-36
Legend: black (non-refl)
Background; orange



G20-55-96
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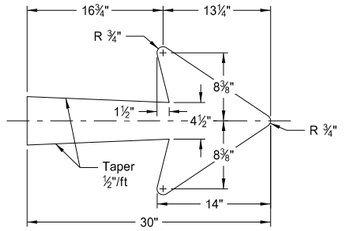
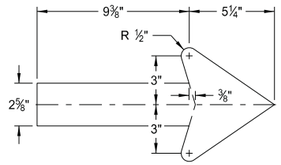
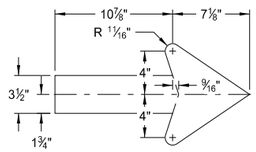


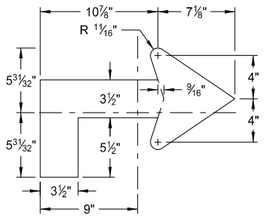
E5-1-48



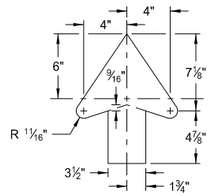
G20-50a-72
G20-52a-72



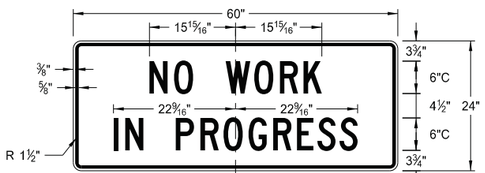
M4-9(L or R)-30
Right or Left



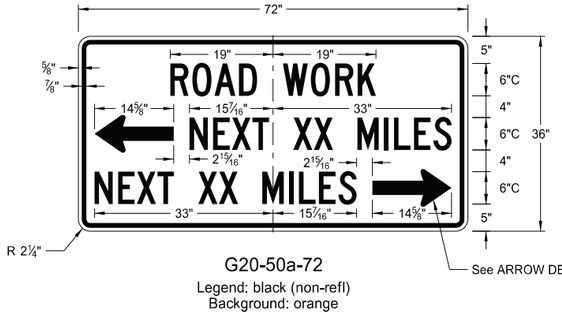
M4-9(L or R)-30
Advanced Right or Left



M4-9-30
Straight



G20-1b-60
Legend: black (non-refl)
Background: orange



G20-50a-72
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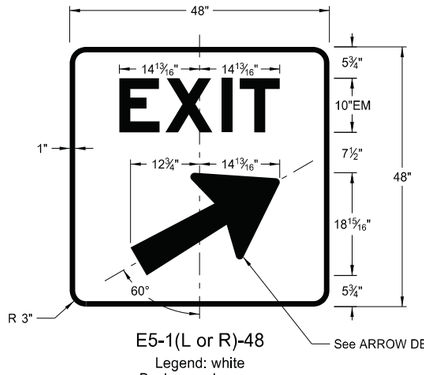
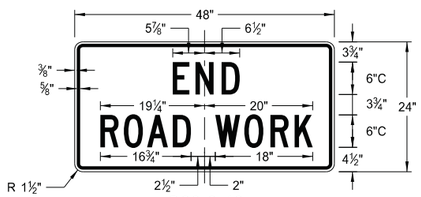
Background: orange

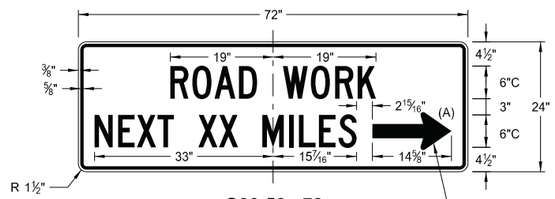


E5-1(L or R)-48
Legend: white
Background: green

ARROW DETAILS



G20-2-48
Legend: black (non-refl)
Background: orange



G20-52a-72
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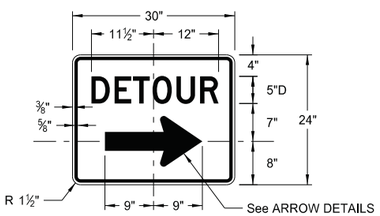
Background: orange



M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

NOTES:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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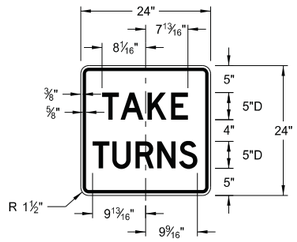
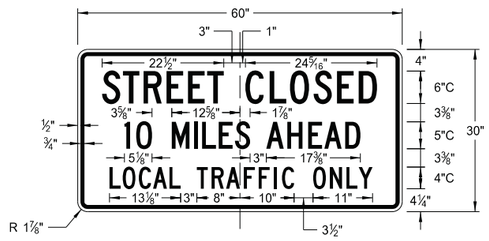
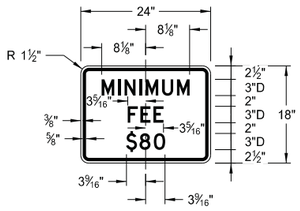
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



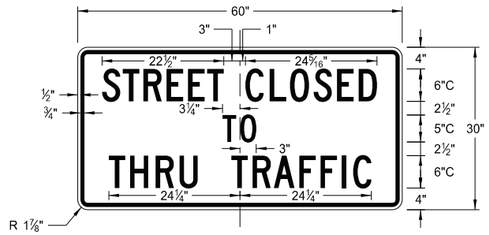
R1-50-24
Legend: black (non-refl)
Background: white



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



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



R11-4a-60
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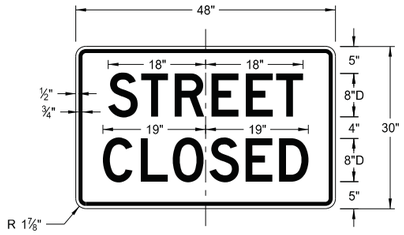

R11-2a-48
Legend: black (non-refl)
Background: white

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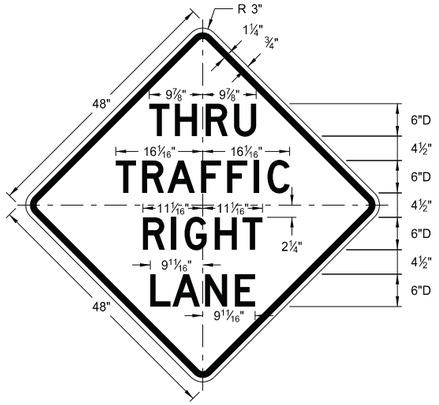
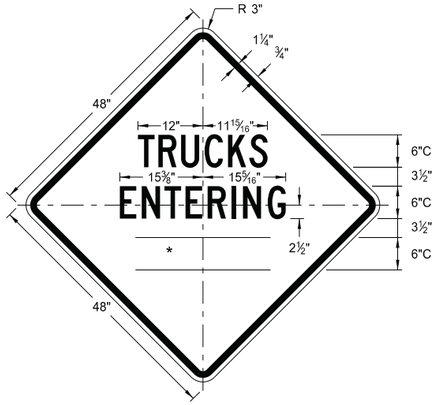
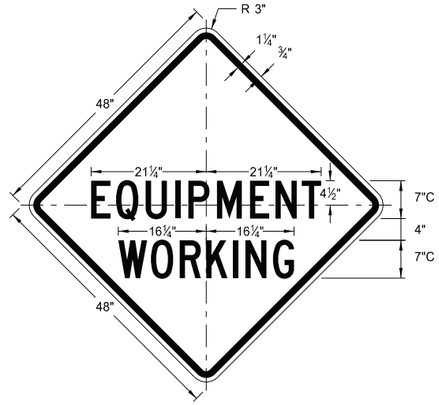
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



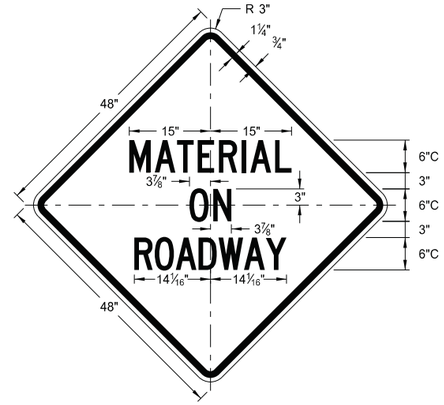
W5-8-48
Legend: black (non-refl)
Background: orange



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



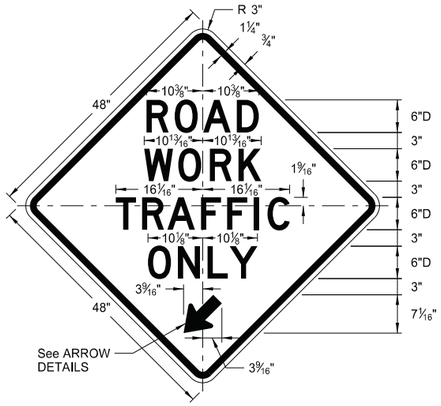
W20-51-48
Legend: black (non-refl)
Background: orange



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

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



W5-9-48
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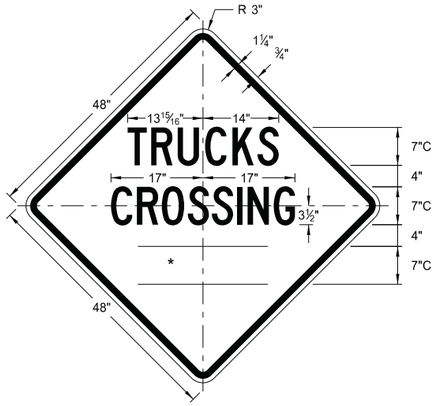
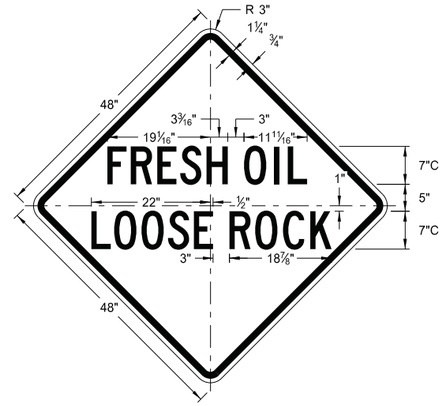
Background: orange

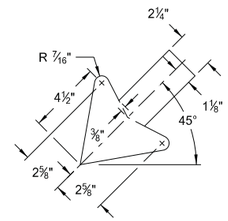


W8-55-48
Legend: black (non-refl)
Background: orange

W20-52-54
Legend: black (non-refl)
Background: orange

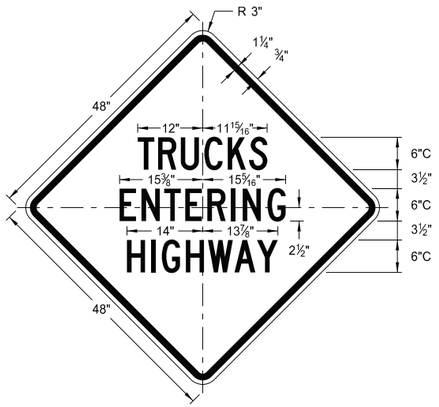


W22-8-48
Legend: black (non-refl)
Background: orange

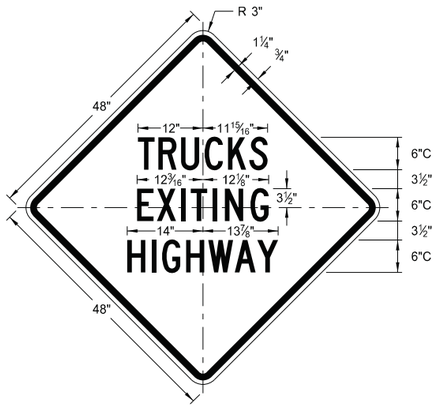


W5-9-48

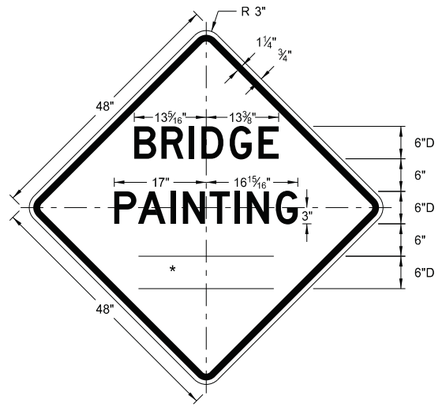
ARROW DETAILS



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



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



W21-50-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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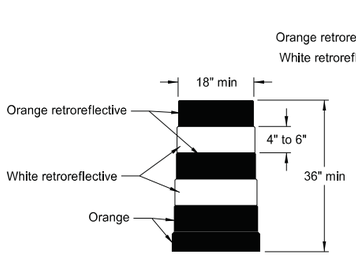
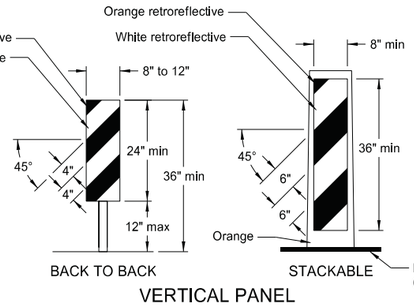
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



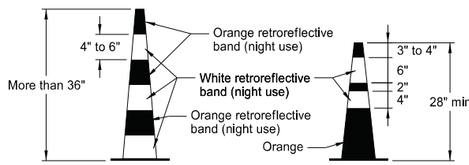
DELINEATOR DRUM

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.



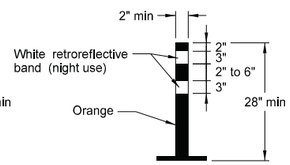
VERTICAL PANEL

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.



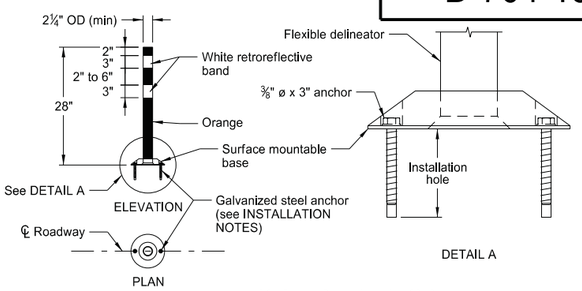
TRAFFIC CONE

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.



TUBULAR MARKER

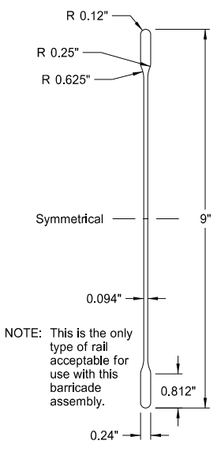
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



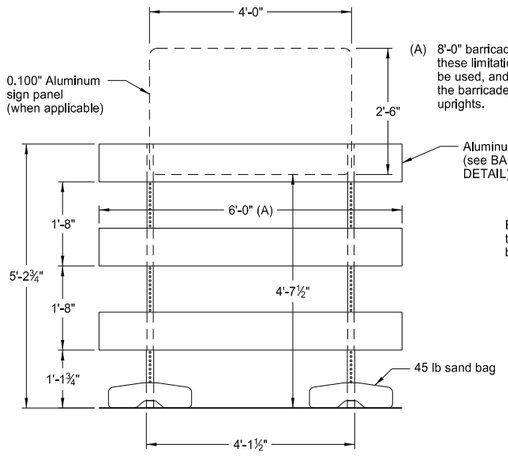
FLEXIBLE DELINEATOR

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.

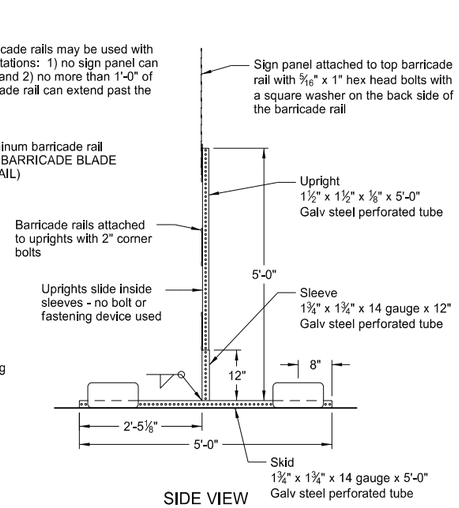


BARRICADE BLADE DETAIL



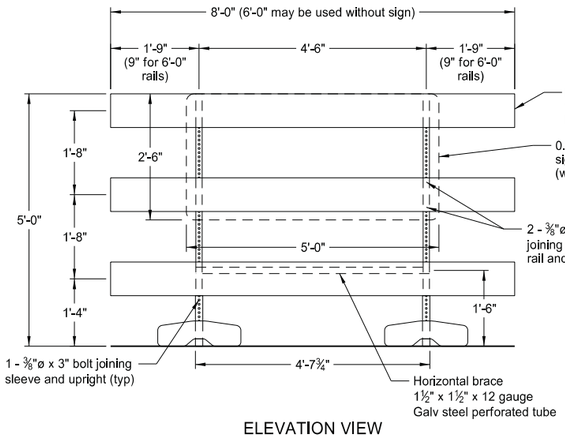
ELEVATION VIEW

(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.

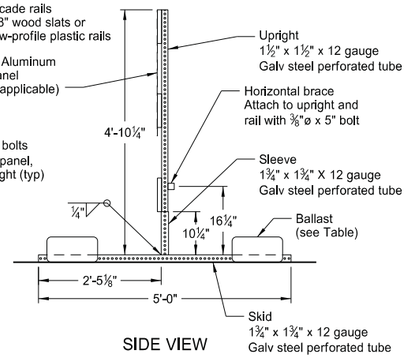


SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)



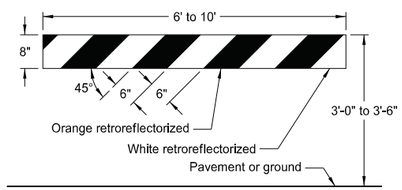
ELEVATION VIEW



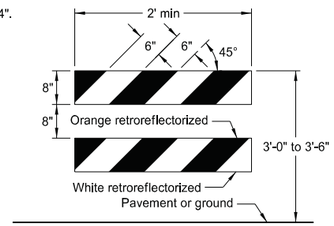
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

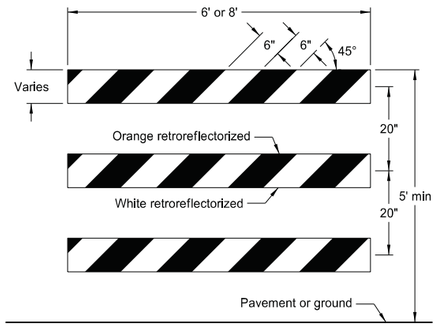
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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



TYPE I BARRICADE

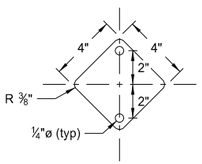


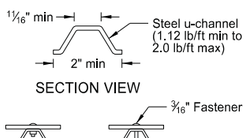
TYPE II BARRICADE

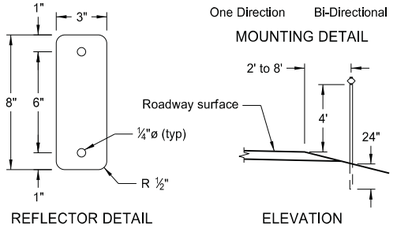


TYPE III BARRICADE

BARRICADE RAIL DETAILS







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	
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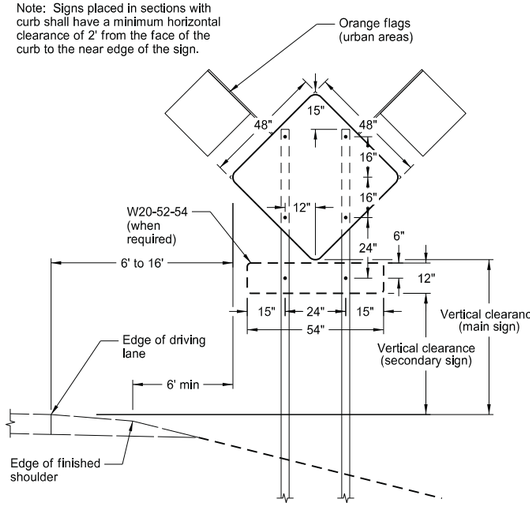
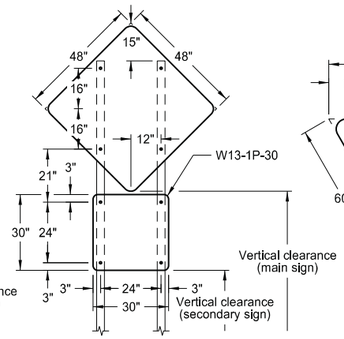
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

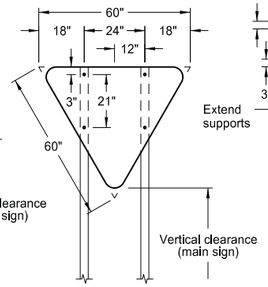
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



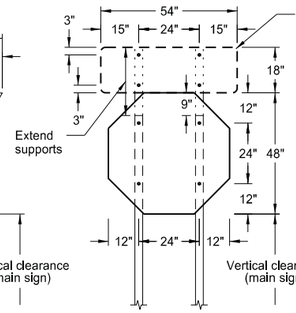
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



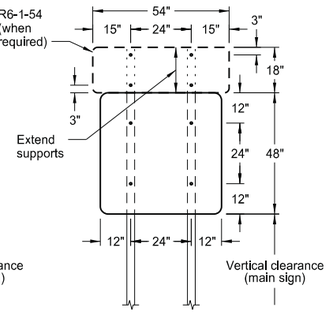
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



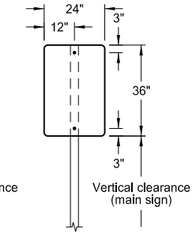
R1-2-60 - YIELD SIGN



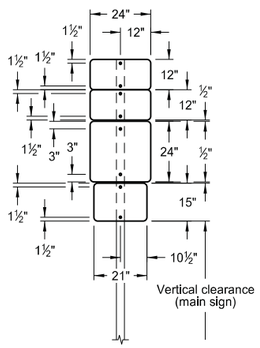
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



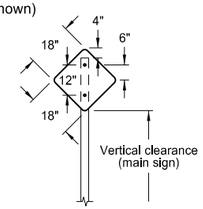
48" x 48" SIGN
(with R6-1-54 sign as required)



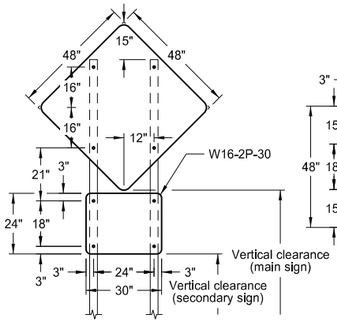
24" x 36" SIGN



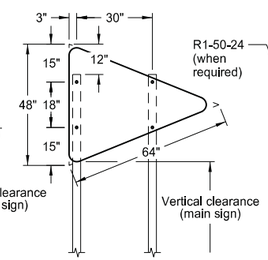
24" x 24"
ROUTE MARKER
ASSEMBLY



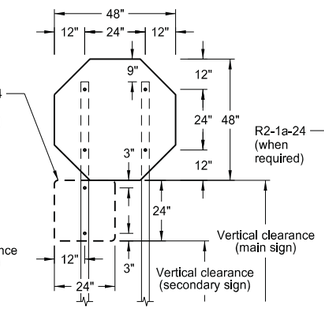
18" x 18"
DIAMOND SIGN



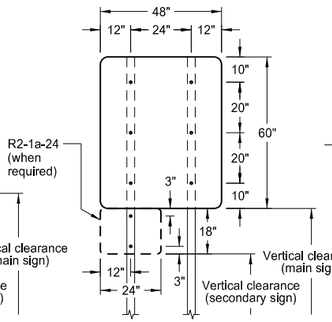
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



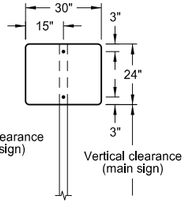
W14-3-64 - PENNANT SIGN



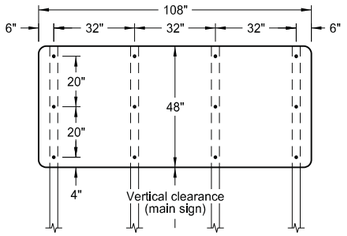
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



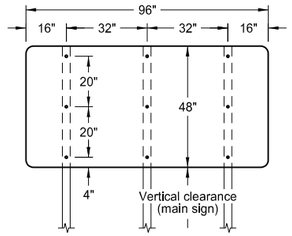
48" x 48" SIGN
(with R2-1a-24 sign as required)



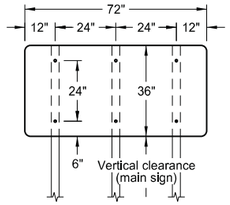
30" x 24" SIGN



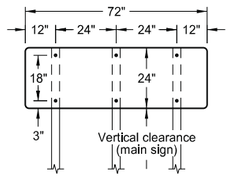
108" x 48" SIGN



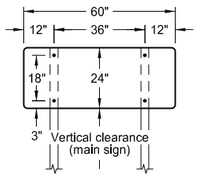
96" x 48" SIGN



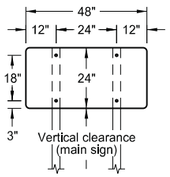
72" x 36" SIGN



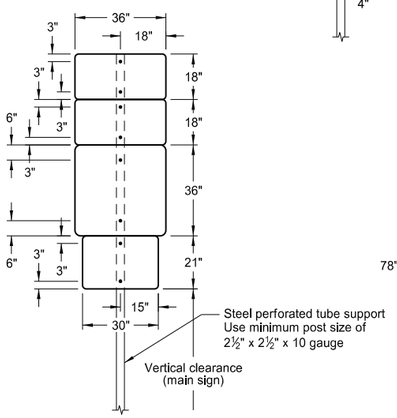
72" x 24" SIGN



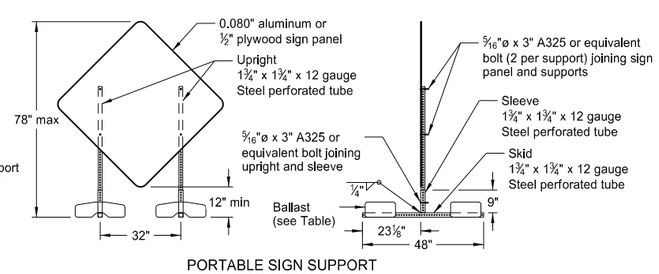
60" x 24" SIGN



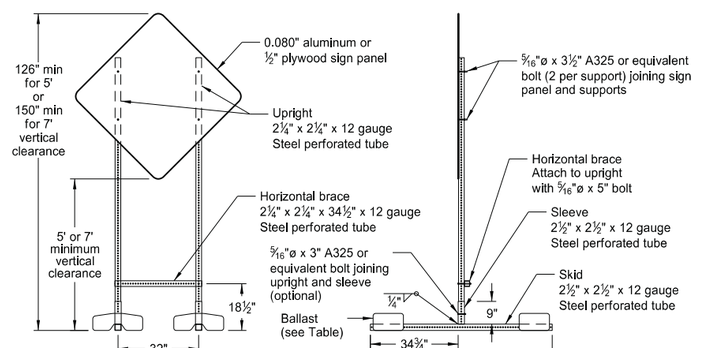
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

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 2½" x 2½" 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, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" 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 unforseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-6 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	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

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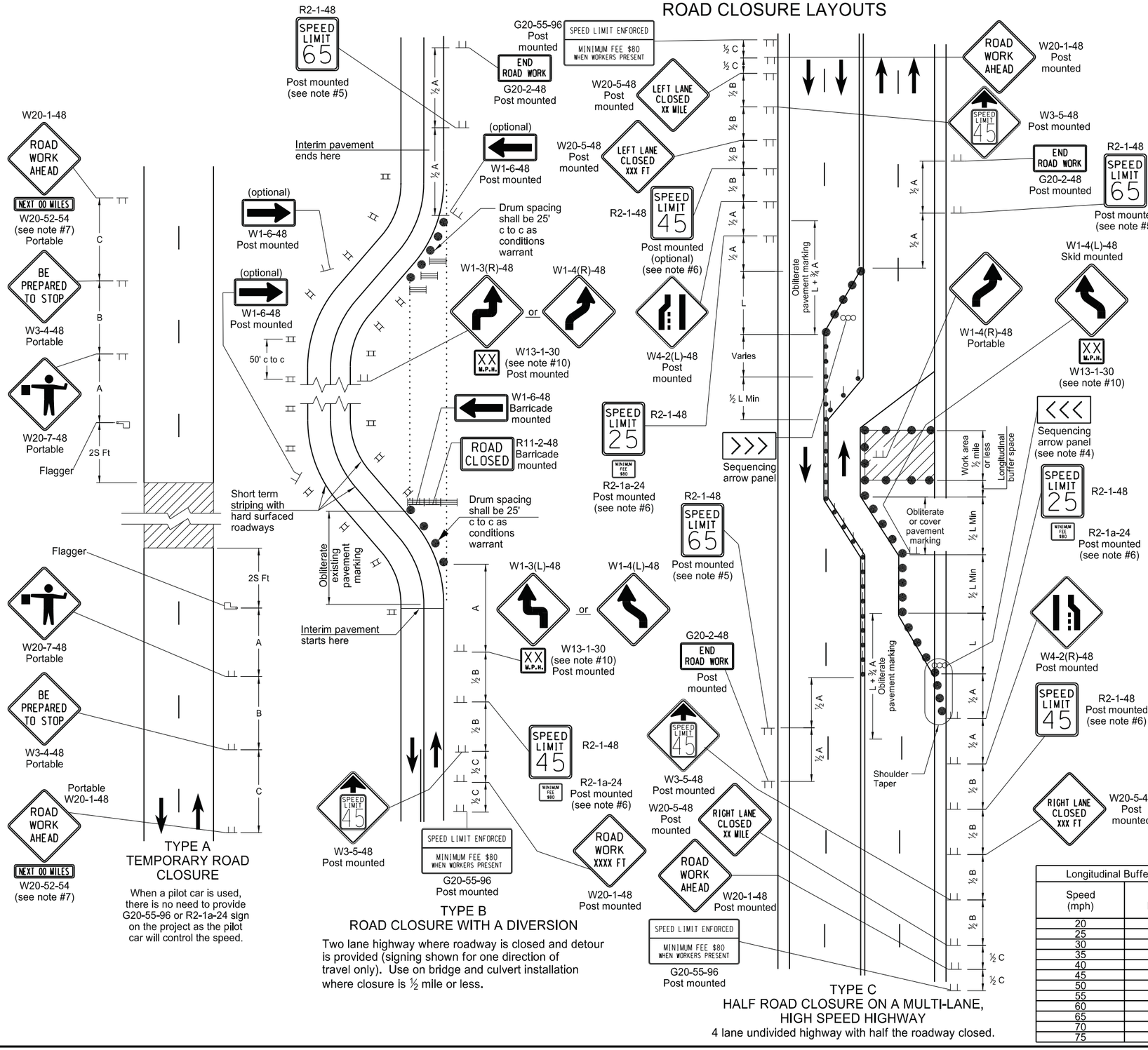
ROAD CLOSURE LAYOUTS

D-704-15



Notes

1. 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 x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
3. 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".
4. 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).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. 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 ½ B.
7. Use when work area is 1 mile or longer.
8. 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.
9. Existing speed limit signs within a reduced speed zone shall be covered.
10. Where necessary, safe speed to be determined by the Engineer.
11. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
12. 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.

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

KEY

- Type III barricade
- Sign
- Delineator drum
- Tubular markers
- Work area
- Flagger
- Sequencing arrow panel
- 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

REVISIONS

DATE	CHANGE

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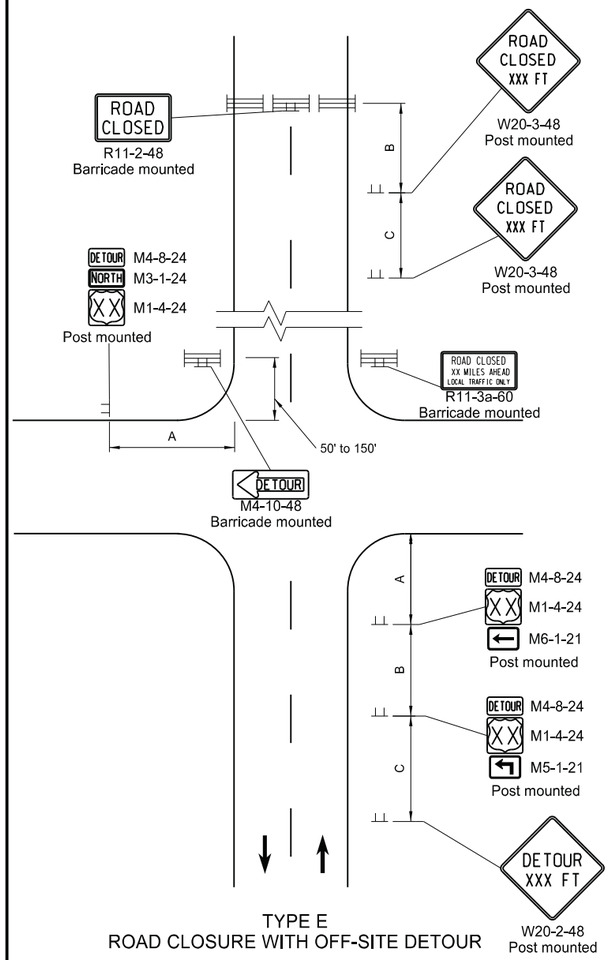
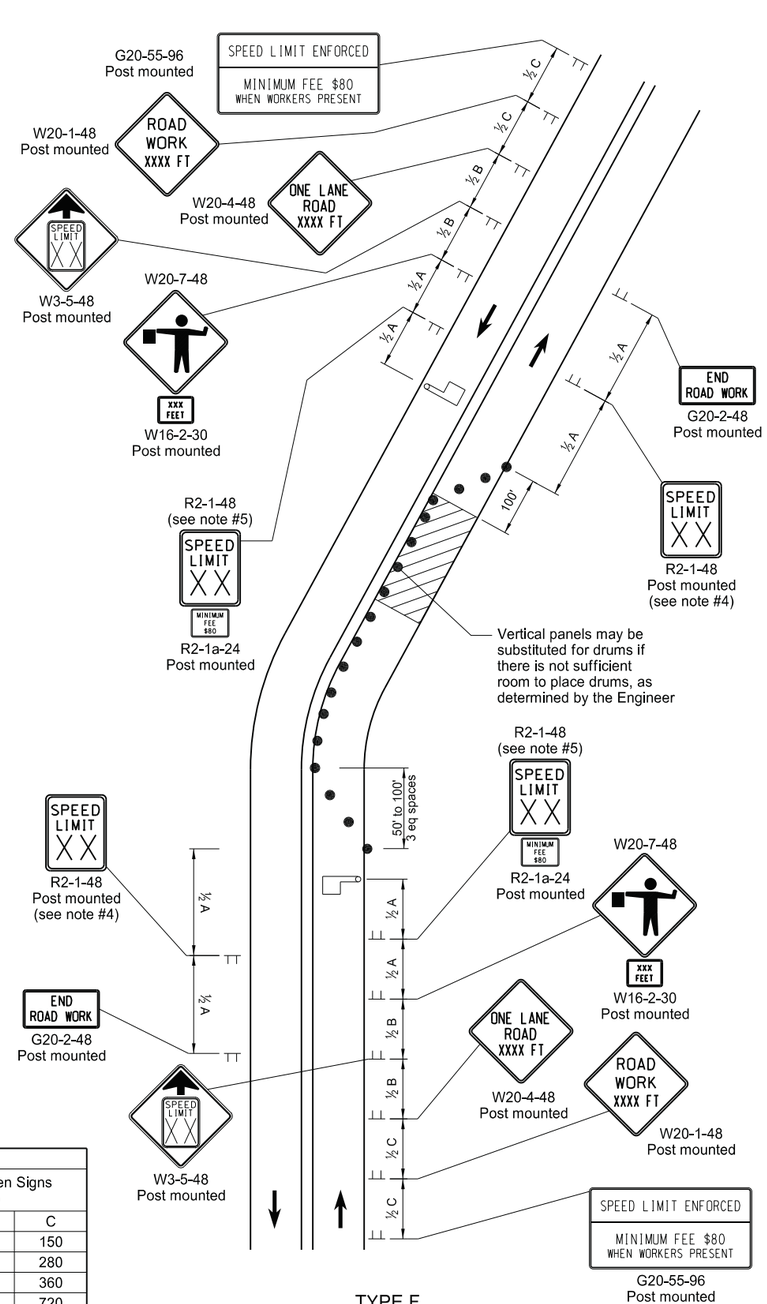
ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19



TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

Used where a road is closed beyond a detour point. Signing shown for one direction only. Sign not shown on detour shall be shown in plans and installed and maintained by the contractor.



TYPE F
LANE CLOSURE ON A TWO LANE ROAD USING FLAGGERS

Two lane highway with one lane closed. Flagger is at a point where it is visible to approaching traffic.

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

Notes

1. 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 x S^2/60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
3. Delineator drums used for tapering traffic shall be placed at 3 equal spaces. Delineator drums for tangents shall be spaced at 2 times dimension "S".
4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
5. 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.
6. 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.
7. Existing speed limit signs within a reduced speed zone shall be covered.
8. Where necessary, safe speed to be determined by the Engineer.
9. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
10. G20-55-96 or R2-1a-24 sign are not required when a pilot car operation is used, if this standard is part of other traffic control layouts, or the work is less than 15 days.
11. When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
    a. Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
    b. A "Do Not Stop on Tracks" sign (R8-8-24) should be placed near the cross buck in each direction while the lane closure is in the vicinity of the tracks.
    c. A buffer space between the work zone and the lane closure transition should be extended upstream of the highway-rail grade crossing so a queue created by the flagging operation will not extend across the highway-rail grade crossing.
    d. If the queuing of vehicles across active rail tracks cannot be avoided, a flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing, even if automatic warning devices are in place.

KEY

- Delineator Drum
- Type III Barricade
- Flagger
- Sign
- Work/Hazard Area

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
3-13-14	Revised Sign Cell "ROAD WORK XXX FT"

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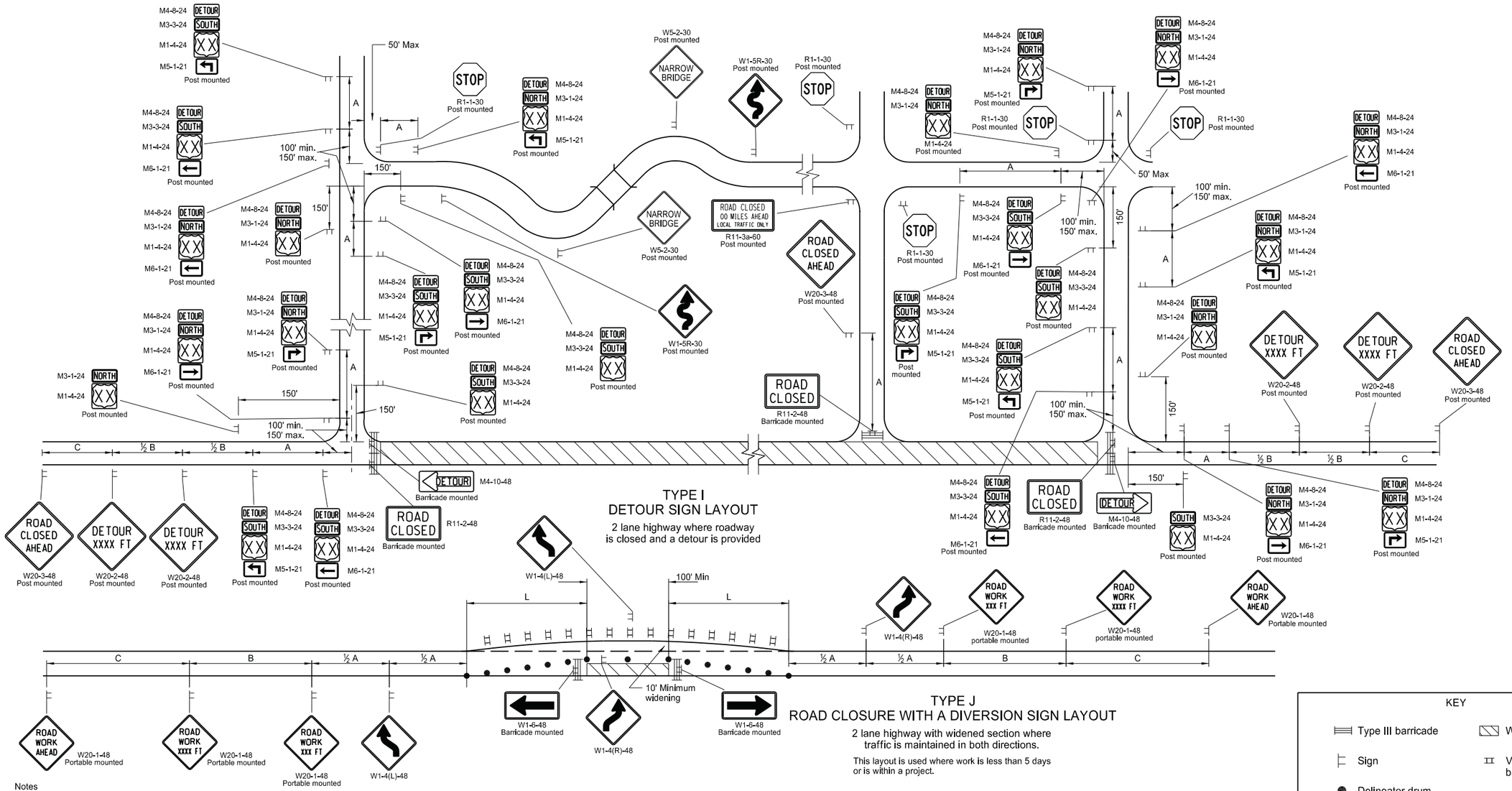
DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS

D-704-21



KEY

- Type III barricade
- Work area
- Sign
- Vertical panels back to back
- Delineator drum

Notes

1. 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 x S^2 / 60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
3. Delineator drums and vertical panels used for tapering traffic shall be spaced at dimension "S". Delineator drums, tubular markers and vertical panels used for tangents shall be spaced at 2 times "S".
4. 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 shall be placed at ½ B.
5. 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.
6. Existing speed limit signs within a reduced speed zone shall be covered.
7. Obliterated or covered payment marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
8. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
9. A W24-1-48 sign may be used in place of the double reverse curve signs if the tangent between tapers is less than 600'.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE

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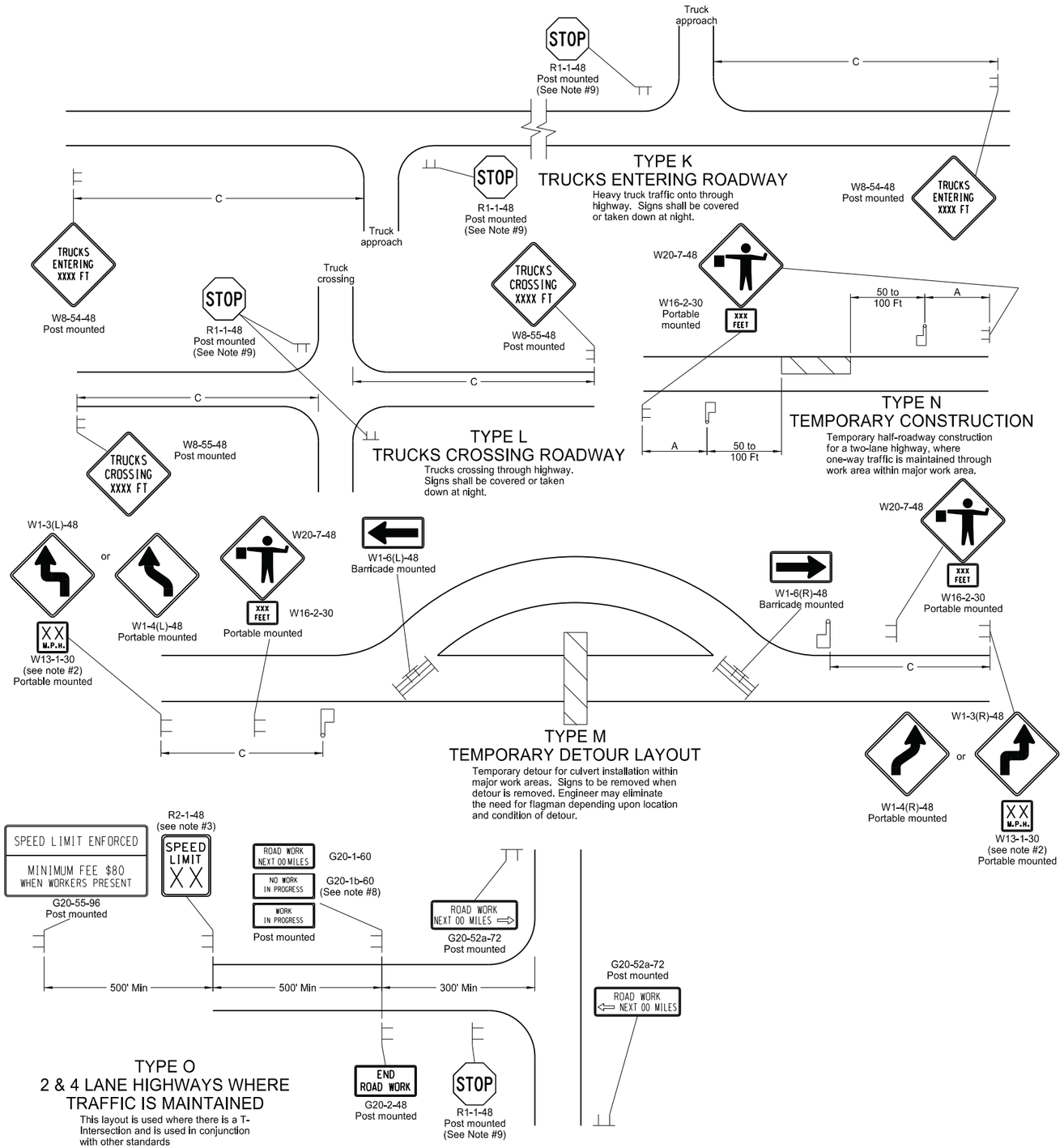
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

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.
2. Where necessary, safe speed to be determined by the Engineer.
3. 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 ½ B.
4. 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.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. 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.

KEY

Type III barricade — Work area

Sign — Flagger

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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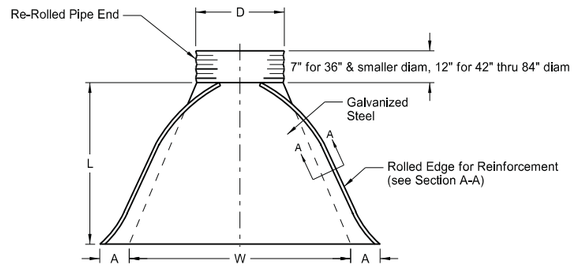
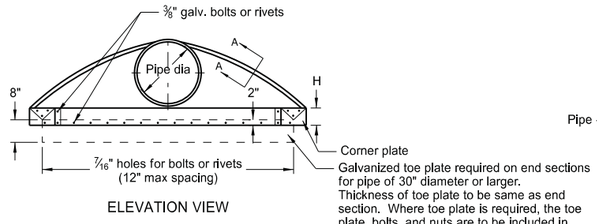
ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4

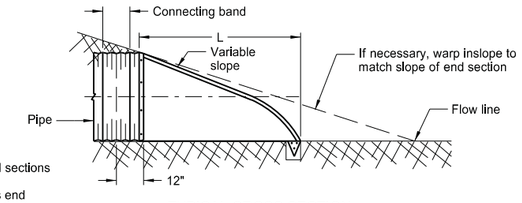


PLAN VIEW



ELEVATION VIEW

Galvanized toe plate required on end sections for pipe of 30" diameter or larger. Thickness of toe plate to be same as end section. Where toe plate is required, the toe plate, bolts, and nuts are to be included in price bid for end sections.



TYPICAL CROSS SECTION
(showing connector section)

* * PIPE DIA. IN	GALV. THICK. IN	END SECTION DIMENSIONS A IN	B IN	H IN	L IN	W IN	APPROX. SLOPE RATE	BODY PIECE
15	0.064	7	8	6	26	30	2½:1	1
18	0.064	8	10	6	31	36	2½:1	1
24	0.064	10	13	6	41	48	2½:1	1
30	0.079	12	16	8	51	60	2½:1	1 or 2
36	0.079	14	19	9	60	72	2½:1	2
42	0.109	16	22	11	69	84	2½:1	2
48	0.109	18	27	12	78	90	2½:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1¾:1	3
* 66	0.109	18	36	12	87	120	1½:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1¼:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

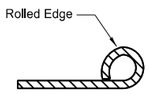
* These sizes have 0.109" sides and 0.138" center panels.

* * Pipe diameter is equal to dimension "D" of end section.

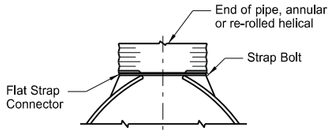
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

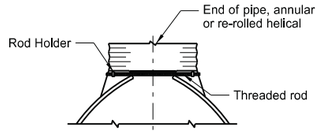
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



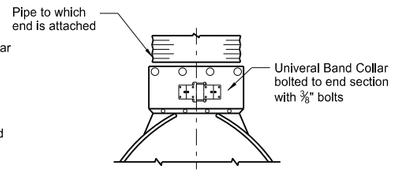
SECTION A-A



TYPE #1
For circular pipes with diameter 24" & smaller



TYPE #2
For circular pipes with diameter 30" through 36"

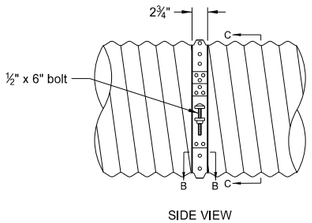


TYPE #3
For all pipe sizes

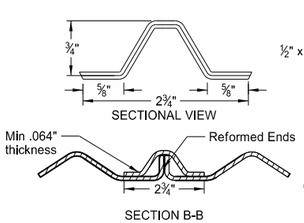
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"	.052"
		78" - 84"	10½"	.079"
	3" x 1" Rerolled End	48" - 120"	10½"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"

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 ¼" galv. angle for 60" through 72" dia. and 2½" x 2½" x ¼" galv. angle for 78" and 84" dia.. Angles to be attached by galv. ⅜" 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. ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four ½" bolts with maximum spacing of 5½" are used for the connection.
7. Length of spot welds shall be minimum ½".

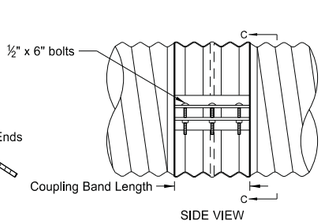


SIDE VIEW

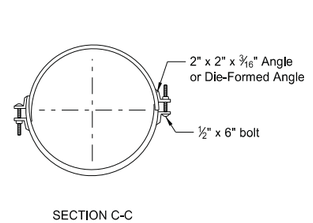


SECTION B-B

HAT BAND FOR FLANGED END PIPE

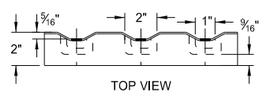


SIDE VIEW

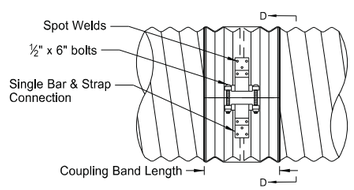


SECTION C-C
Angle Connection

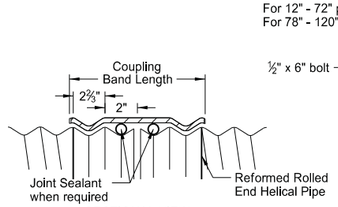
ANNULAR BAND



TOP VIEW
Die-Formed Angle Connector

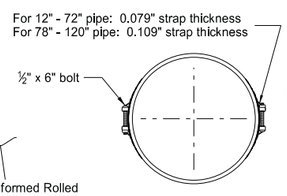


SIDE VIEW

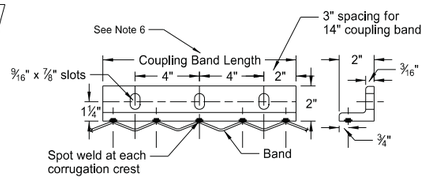


SECTIONAL VIEW

HUGGER COUPLING BAND



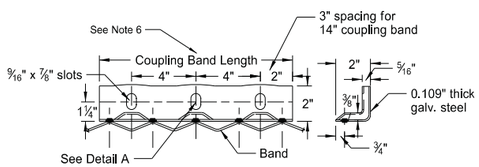
SECTION D-D
Bar & Strap Connection



SIDE VIEW

END VIEW

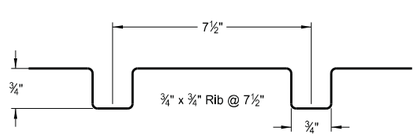
2" x 2" x 3/16" Angle Connector

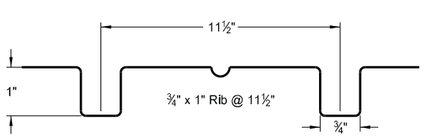


SIDE VIEW

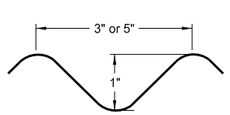
END VIEW

Die-Formed Angle Connector

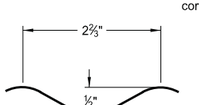




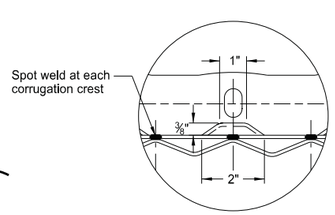
SPIRAL RIB CORRUGATIONS



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



2⅔" x ½" CORRUGATIONS



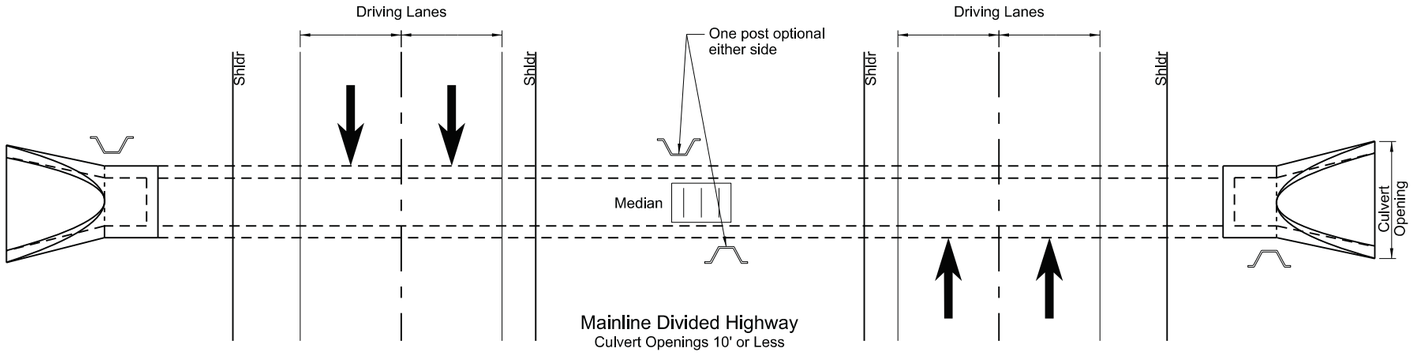
Detail A

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

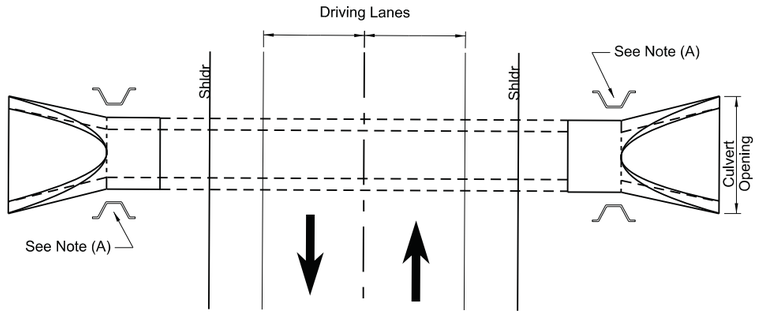
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 02/27/2014 and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS - CULVERTS

D-754-83

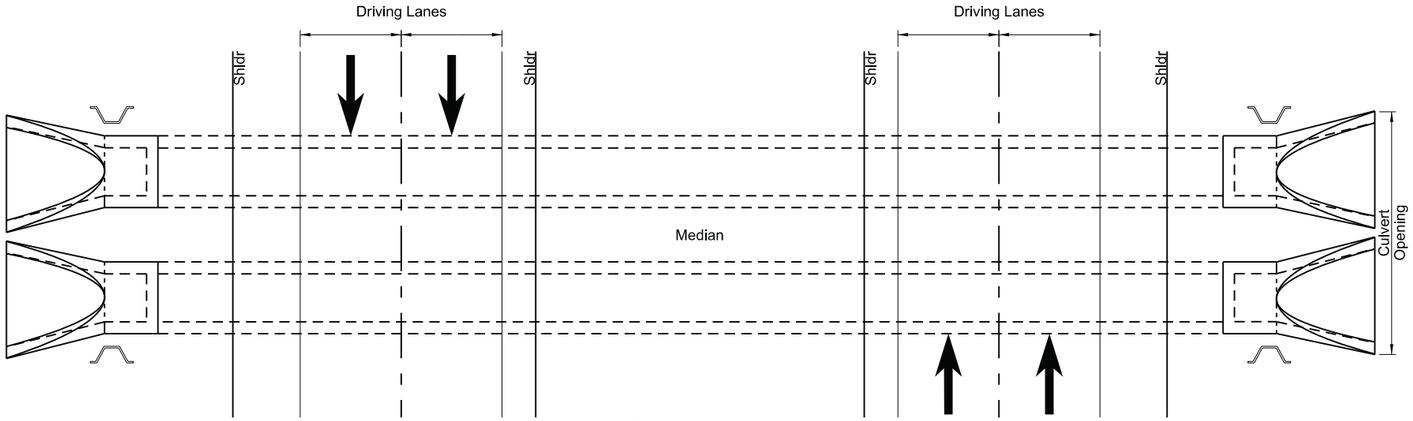


Mainline Divided Highway
Culvert Openings 10' or Less

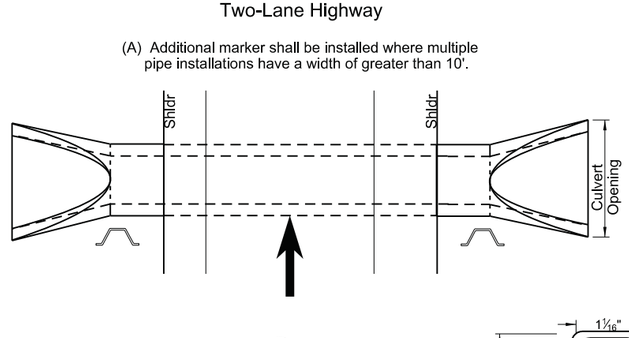


Two-Lane Highway

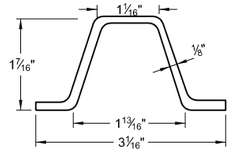
(A) Additional marker shall be installed where multiple pipe installations have a width of greater than 10'.



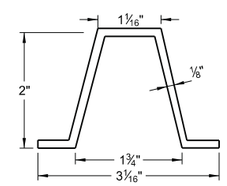
Mainline Divided Highway
Culvert Openings Greater than 10'
Multiple Installations



Ramp



Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft

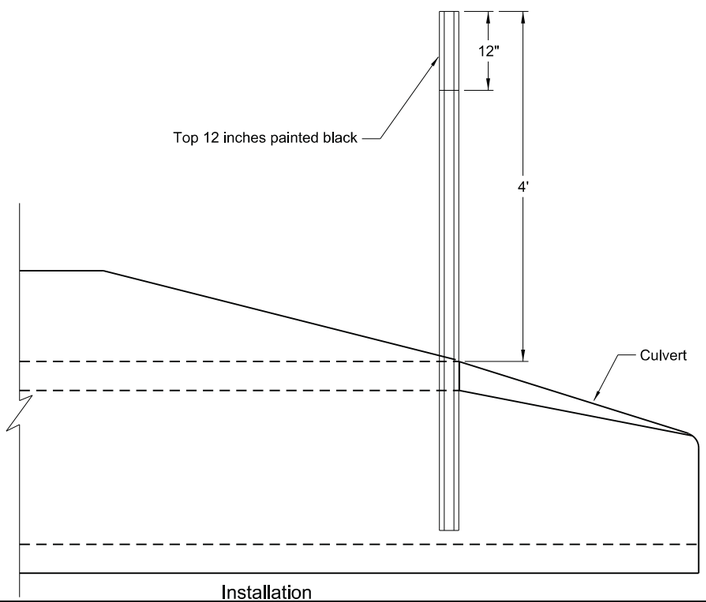
Post Location

Notes:

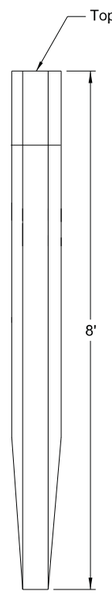
Installation: Construction requirements shall meet 754.04D. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert 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".



Installation



U-Type Post

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/7/2014 and the original document is stored at the North Dakota Department of Transportation