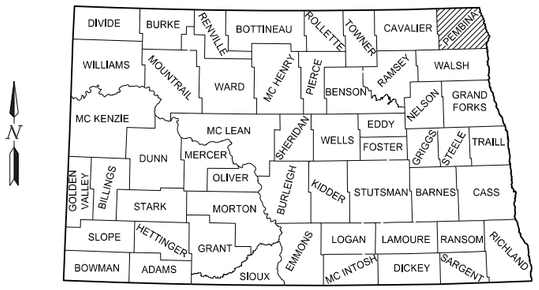
JOB # 13

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	20641	1	1

PEMBINA COUNTY, NORTH DAKOTA
FEDERAL AID PROJECT BRO-0034(030)
STRUCTURE REPLACEMENT
& INCIDENTALS



STATE COUNTY MAP

GOVERNING SPECIFICATIONS

Standard Specifications for Road and Bridge Construction
adopted by the North Dakota Department of Transportation October 2014;
Standard Drawings currently in effect; and other Contract Provisions submitted herein.

Structure #34-109-26.1
Project Consists of Construction of a Precast Double 14' x 8' x 50' R.C.B.C. and Incidentals

PROJECT LENGTH

Project	Gross Miles	Net Miles
BRO-0034(030)	0.057	0.057

DESIGN DATA

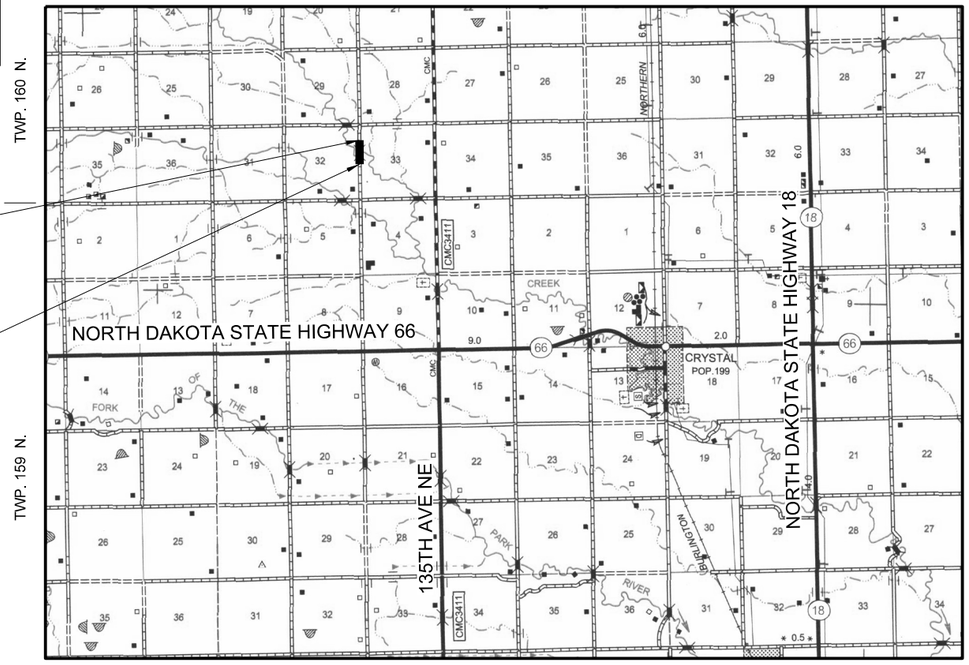
Traffic ~ BRO-0034(030)		Average Daily Passenger	Average Daily Trucks	Average Daily Total	Est. 30th Max. Hr.
Current Traffic	2013	LESS THAN 100 VPD			
Forecast Traffic	2033				

Design Speed: 55 MPH
Minimum Sight Dist. for Stopping: 495 Feet
Design Loads for Structure: HL93

Project is located 4 Miles West and 2.5 Miles North of Crystal, North Dakota.

END PROJECT BRO-0034(030)
Sta. 16+50 = A Point 2,038 Feet
South and 2 Feet West of the Northwest Corner
of Section 32 Twp. 160 N., Rge 55 W.

BEGIN PROJECT BRO-0034(030)
Sta. 13+50 = A Point 2,338 Feet
South and 2 Feet West of the Northwest Corner
of Section 32 Twp. 160 N., Rge 55 W.



PS&E Corrections Made: August 2014
Surveyed & Designed Date: November 2013

DESIGNER Matt Lange
DESIGNER Jake Nohl
DESIGNER Kyle Reedstrom
DESIGNER
DESIGNER

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CERTIFICATION

I HEREBY CERTIFY THAT THESE 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 NORTH DAKOTA.

Jon E. Markusen /s/
KADRMAS, LEE & JACKSON, INC.

DATE _____ REGISTRATION NUMBER PE-5453

KLJ
1010 4th AVENUE SW
P.O. BOX 937
VALLEY CITY, ND 58072-0937
(701) 845-4980, FAX (701) 845-0252

BRO-0034(030)

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	2	1

TABLE OF CONTENTS

SECTION NO.	SHEET NO.	DESCRIPTION
1	1	Title Sheet
2	1	Table of Contents & List of Standard Drawings
6	1	Plan Notes
6	2	Environmental Commitments
8	1	Estimate of Quantities
10	1	Basis of Estimate
30	1	Typical Sections
60	1	Plan & Profile
75	1	Wetland Impacts
76	1	Temporary Erosion Control
77	1	Permanent Erosion Control
100	1	Traffic Control Devices List
100	2	Traffic Control Signing Layout
170	1-3	Structural Drawings & Notes
200	1-2	Cross Sections

LIST OF STANDARD DRAWINGS

STANDARD NO.	DESCRIPTION
D-101-1, 2 & 3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company Abbreviations
D-101-20 & 21	Line Styles
D-101-30, 31 & 32	Symbols
D-261-1	Erosion Control Fiber Roll Placement Details
D-704-7 & 8	Breakaway Systems for Construction Zone Signs
D-704-10	Construction Sign Details Regulatory Signs
D-704-13	Barricade Details and Channelizing Devices
D-704-14	Construction Sign and Barricade Assembly Details
D-704-19	Construction Sign and Barricade Location Details
D-754-82	Object Markers

SPECIAL PROVISIONS

SP#	DESCRIPTION
SP-5017(14)	Permits and Environmental Considerations
SP-4(14)	Federal Migratory Bird Treaty Act

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	6	1

PLAN NOTES

100-P01 **UTILITIES:** Contact the utility companies a minimum of 2 weeks prior to beginning work. The contractor is responsible for charges by the utility companies for location services.

107-P01 **HAUL ROADS:** Do not exceed a gross vehicle weight of 80,000 pounds on county, township or local roads unless approved by the local agency. Contact the appropriate State, County, Township, or City officials to determine if there are any No Haul Routes prior to preparing a bid for this project.

201-P01 **CLEARING & GRUBBING:** Total topsoil from clearing and grubbing areas is approximately 170 CY from the project limits. Remove and stockpile the existing topsoil (4" minimum) from the entire construction area. Prior to seeding, replace the topsoil to all disturbed construction areas. Make arrangements for topsoil storage areas where sufficient room is not available on the existing right of way. No reimbursement will be made for additional handling of topsoil that must be moved to provide additional excavation area between the plan back slope and the right of way line. Include all costs associated with topsoil removal and replacement in the bid item "CLEARING & GRUBBING".

202-P01 **REMOVE EXISTING FENCE:** Remove fence and posts within the project limits. Salvage and stockpile the posts on site. Coordinate with the Engineer to arrange pick up of posts by the property owner.

203-P01 **SHRINKAGE:** 35 percent additional volume is included for shrinkage in earth embankment.

203-P02 **BORROW:** The price bid for "BORROW-EXCAVATION" includes all royalties, utility and fencing adjustments, environmental and cultural clearances, erosion control measures, site restoration, and any other costs associated with obtaining, transporting, and placing borrow material.

203-P03 **BENCHING ON WIDENING SECTIONS:** Bench all inslopes, regardless of rate of slope, unless otherwise directed by the Engineer. Bench deep enough to provide sufficient width to permit placing, spreading, and compacting equipment to operate. Compact each bench thoroughly before placing additional embankment. Include costs for benching in the price bid for earthwork items.

203-P04 **COMMON EXCAVATION-TYPE B:** Place and compact embankment in accordance with Section 203.04 E3 of the Standard Specifications. "COMMON EXCAVATION-TYPE B" will be paid at plan quantity.

251-P01 **SEEDING:** Cover all the disturbed areas of the right-of-way, excluding the roadbed with seeding.

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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE 109-26.1

KLJ

PLAN NOTES

DRWN. BY	CHKD. BY	PROJECT NO.
KS	JM	6313128

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	6	2

ENVIRONMENTAL COMMITMENTS

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

Commitment No. 1: Unavoidable impacts to wetlands shall be mitigated onsite, adjacent to the project, or at a North Dakota Department of Transportation approved mitigation site or bank.

Action Taken/Required: *0.07 acres of permanent impacts to natural (jurisdictional) wetlands require mitigation; 0.04 acres will be accounted for by sinking the box culvert and riprap and the remaining 0.03 will be mitigated onsite, as shown in section 075.*

Wetland Impact Table

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size Ac.	Wetland Feature	USACE Jurisdictional Wetlands*	Wetland Impacts (acres)		USFWS Easement Impacts		Wetland Mitigation				
											Mitigation Required**/***			Location; Acreage; Wetland#; Ratio	Onsite Mitigation Acres
							Temp. Ac.	Perm. Ac.	Temp.	Perm.	EO 11990	USACE	USFWS		
1	Sec 33 T160N, R55W	PEMA	Drainage	0.41	Natural	Yes	0.01	0.07	--	--	Y	N	N/A	Sink box culvert and riprap 0.04 at WL1(1:1); 0.03 at WL1 & WL2 (1:1)	0.07
2	Sec 32 T160N, R55W	PEMA	Ditch	0.02	Artificial	Yes	0.01	0.01	--	--	N	N	N/A	N/A	--
			Totals	**0.43**			**0.02**	**0.08**	**0.00**	**0.00**					**0.07**

* A wetland Jurisdictional Determination was issued by USACE on 11/29/2013; NWO-2013-2309-BIS.
**All impacts to natural wetlands (natural/jurisdictional and natural/non-jurisdictional), regardless of size, as well as impacts greater than 0.10 acre to artificial/jurisdictional wetlands require mitigation.
***All artificial/non-jurisdictional, deep water (impacts greater than 6.6 feet), Other Waters less than 300 linear feet (determined by the USACE on a case by case), Preamble Wetlands, and temporary impacts do not require mitigation.

Other Waters Impact Table

Other Waters											Other Water Mitigation				
Number	Location	Type	Size		Feature	USACE Jurisdictional*	Impacts to Other Waters				Mitigation Required			Location	Method
			Acres	Linear Feet			Acres Temp	Acres Perm	Linear Feet Temp	Linear Feet Perm	EO 11990	USACE	USFWS		
Open water	Sec 32 & 33 T160N, R55W	Named Stream	0.09	300	Natural	Yes	0.03	0.03	86	144	N	N	N	N/A	N/A
		Totals	**0.09**	**300**			**0.03**	**0.03**	**86**	**144**					

* A wetland Jurisdictional Determination was issued by USACE on 11/29/2013; NWO-2013-2309-BIS.

Summary Impact Table

Total Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD	0.07	Temporary JD	0.02
Natural/Non-JD	0.00	Non-JD Temporary	0.00
Artificial/JD	0.01	Permanent JD > 0.10	0.00
Artificial /Non-JD	0.00	Permanent OW	0.03 ac/144 ft.
Total	**0.08**	Temporary OW	0.03 ac/86 ft

Compensation Requirements by Agency and Water Type

Water Type	USACE Mitigation	EO 11990 Mitigation
Natural/JD Wetland	> 0.1 acre	All
Natural/Non-JD Wetland	No mitigation required	All
Artificial/JD Wetland	> 0.1 acre	No mitigation required
Artificial/Non-JD Wetland	No mitigation required	No mitigation required
Deep Water (> than 6.6 feet)	No mitigation required	No mitigation required
Other Water	> 300 linear feet	No mitigation required
Preamble	No mitigation required	No mitigation required

Commitment No. 2: All impacted riparian trees within the project right-of-way must be mitigated for as directed by resource agencies. Removal of the tree shall be done in such a way as to not impact the northern long-eared bat.

Action Taken/Required: *There is one riparian tree within the project right-of-way; Pembina County forces will remove the tree from the project area prior to construction between October 1 and March 31, outside of the summer maternity season for the northern long-eared bat. This tree will be mitigated at a 2:1 ratio in the impacted riparian corridor prior to or following construction by Pembina county forces.*

Commitment No 3: No construction or demolition activities will take place during the spawning season in Cart Creek from April 15 to June 1.

Action Taken/Required: No construction or demolition activities will take place in Cart Creek from April 15 to June 1.

Commitment No. 4: The Contractor shall take steps to prevent construction debris from falling into the waterway.

Action Taken/Required: *The Contractor will minimize debris falling into the waterway to the maximum extent practicable. Any debris that falls into the waterway will be retrieved.*

Commitment No. 5: The structure shall not act as a barrier to the movement of fish and other aquatic organism in the stream channel under any flow conditions.

Action Taken/Required: *The box culvert and associated riprap will be countersunk approximately one foot below the existing grade of the stream bed.*

Commitment No. 6: The project is located within the migration corridor of the endangered whopping crane, and suitable stopover habitat for the whooping crane is present. The migration periods of the whooping crane are April 1st to May 15th and September 1st to October 31st.

Action Taken/Required: *If whooping cranes are observed within one mile of the project, construction work will cease until the USFWS is contacted, within 24 hours or the next business day – whichever is first -- at (701) 250-4402, in order to evaluate the level of disturbance risk to the individuals present. Following coordination with the USFWS, construction activities would resume if it is unlikely that the bird(s) would be disturbed by the continuation of construction activities or after the bird(s) relocate to a new site beyond the disturbance area of the project.*

Commitment No. 7: The project is located within potential suitable habitat for the northern long-eared bat. The summer maternity season for the northern long-eared bat in North Dakota is from April 1 to September 30; the winter hibernation season is from October 1 to May 15. Spring staging and fall swarming seasons occur between summer and winter seasons. The project shall not impact the northern long-eared bat.

Action Taken/Required: *Construction will take place during daylight hours; the Contractor will not work after sunset nor use portable lighting towers after sunset. Two structures will be removed during the project. Netting to prevent wildlife from nesting and roosting within the structure will be placed prior to February 1 by Pembina County forces. The contractor will be responsible for notifying the Project Engineer prior to demolition of the structures. The Project Engineer will then have a qualified biologist conduct an inspection of the bridge undersides to confirm that there is no presence of northern long-eared bats immediately prior to demolition. (A qualified biologist is one who holds a four year degree in a natural sciences field from an accredited university and is active in a professional environmental organization). In the event that any northern long-eared bats are found to be present during the inspection, coordination with USFWS, at (701) 250-4402, would occur prior to commencement of demolition; demolition would proceed as determined by USFWS, either after the summer maternity season has ended and/or after any bats have left the area.*

Commitment No. 8: The Contractor shall prevent the introduction of aquatic nuisance species (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 (NDGF) Administrative Rules 30-3-06 for compliance with ND Century Code Chapter 20.1-17 on ANS. The Contractor shall notify NDGF 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 NDGF sufficient time to inspect any and all such equipment for ANS. The NDGF ANS Coordinator, Fred Ryckman, shall be contacted by phone at (701) 770-0920 or by e-mail at fryckman@nd.gov for equipment inspections, or any additional information regarding ANS prevention protocol.

NOTIFICATIONS TO BE FILED BY CONTRACTOR:

North Dakota Department of Health SFN 17987 Asbestos Notification of Demolition and Renovation for bridges and boxes. Mike Huffington (ND License #5303) of KLJ (728 E. Beaton Dr #101, West Fargo, ND 58078; 701 271 2100) completed an asbestos inspection of Bridge No. 34-109-26.1 and the adjacent structure on October 8, 2013. Based on visual inspection of the sites, no building or structure materials were determined to contain asbestos. No other inaccessible and/or assumed ACMs were identified.

PERMITS REQUIRED:

Pembina County – *Non-Building Floodplain Development*
Status: Has been obtained for the project.

United States Army Corps of Engineers – *Section 404 Permit*
Status: Has been obtained for the project.

Temporary Work Bypass – *If additional fill will be placed within the stream channel for a temporary work bypass, it will be the Contractor's responsibility to develop and employ a work plan for construction. The Contractor will be responsible for obtaining the proper permits and approvals prior to performing such activities.*

BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE #34-109-26.1

KLJ

ENVIRONMENTAL COMMITMENTS

DRWN. BY	CHKD. BY	PROJECT NO.
MB	DJK	6313128

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0034(030)	8	1

ESTIMATE OF QUANTITIES

SPEC	CODE	ITEM	UNIT	QUANTITY
103	0100	CONTRACT BOND	L SUM	1
201	0330	CLEARING & GRUBBING	L SUM	1
202	0108	REMOVAL OF STRUCTURE-SITE 1	L SUM	1
202	0109	REMOVAL OF STRUCTURE-SITE 2	L SUM	1
202	0312	REMOVE EXISTING FENCE	LF	108
203	0102	COMMON EXCAVATION-TYPE B	CY	81
203	0130	MUCK EXCAVATION	CY	75
203	0140	BORROW-EXCAVATION	CY	1,602
210	0109	CLASS 2 EXCAVATION-BOX CULVERT	EA	1
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
210	0210	FOUNDATION FILL	CY	320
216	0100	WATER	M GAL	43
251	0200	SEEDING CLASS II	ACRE	0.314
253	0101	STRAW MULCH	ACRE	0.314
256	0100	RIPRAP GRADE I	CY	128
261	0112	FIBER ROLLS 12IN	LF	895
261	0113	REMOVAL FIBER ROLLS 12IN	LF	360
262	0100	FLOTATION SILT CURTAIN	LF	60
262	0101	REMOVE FLOTATION SILT CURTAIN	LF	60
302	0357	AGGREGATE SURFACE COURSE CL 13	CY	96
606	3408	DBL 14FT X 8FT PRECAST RCB CULVERT	LF	50
606	7408	DBL 14FT X 8FT PRECAST RCB END SECTION	EA	2
702	0100	MOBILIZATION	L SUM	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	258
704	1052	TYPE III BARRICADE	EA	6
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	350
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	255
754	0803	OBJECT MARKERS – TYPE III	EA	4

BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE 109-26.1

KLJ

ESTIMATE OF QUANTITIES

DRWN. BY	CHKD. BY	PROJECT NO.
KS	JM	6313128

MAINLINE			
QUANTITY PER MILE	**WIDTH**	**UNIT**	**DESCRIPTION**
-	-	M GAL	Water (10 Gal/CY of Borrow & 40 Gal/CY of Aggregate Surface Course/Foundation Fill & 10 M GAL for Dust Palliative)
1,695	24’	CY	Aggregate Surface Course CL 13 (Measured In Place Compacted)

EARTHWORK SUMMARY

EMBANKMENT (CY)	COMMON EXCAVATION (CY)	BORROW REQUIRED (CY)
1,683	81	1,602

Volume includes 35% shrinkage and losses.

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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE 109-26.1

BASIS OF ESTIMATE

DRWN. BY	CHKD. BY	PROJECT NO.
KS	JM	6313128

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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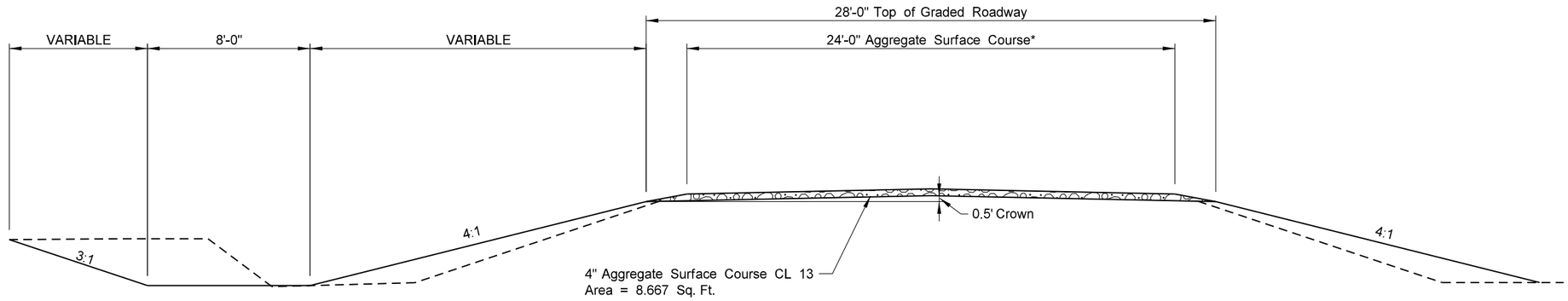
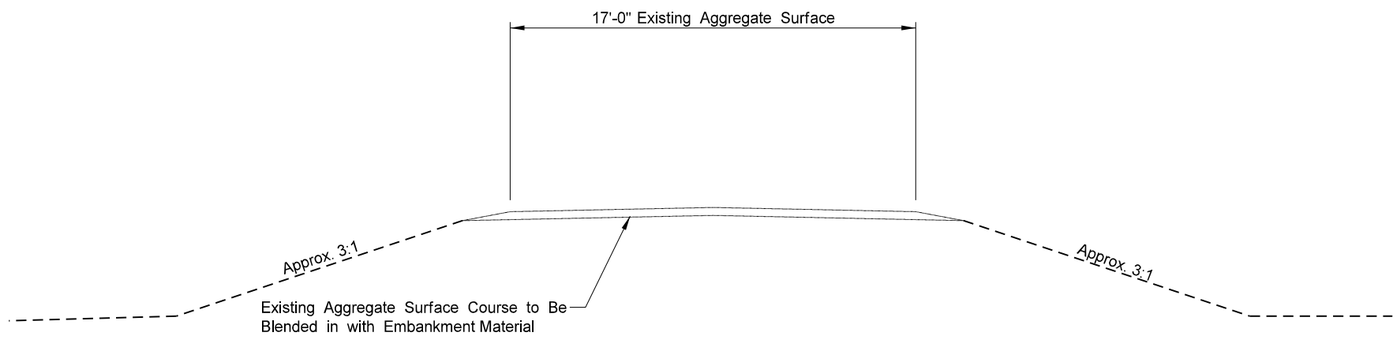


* Roadway shall be transitioned from Proposed Typical to Existing Typical between the following stations: 13+50 to 14+50 & 15+50 to 16+50

PROPOSED ROADWAY TYPICAL SECTION
(Sta. 13+50 to Sta. 16+50)

DITCH SECTION
(Sta. 13+50 to Sta. 14+50 ~ LT)



EXISTING ROADWAY TYPICAL SECTION
(Sta. 13+50 to Sta. 16+50)

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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE 109-26.1

KLJ

TYPICAL SECTIONS

DRWN. BY	CHK'D. BY	PROJECT NO.
KS	JM	6313128

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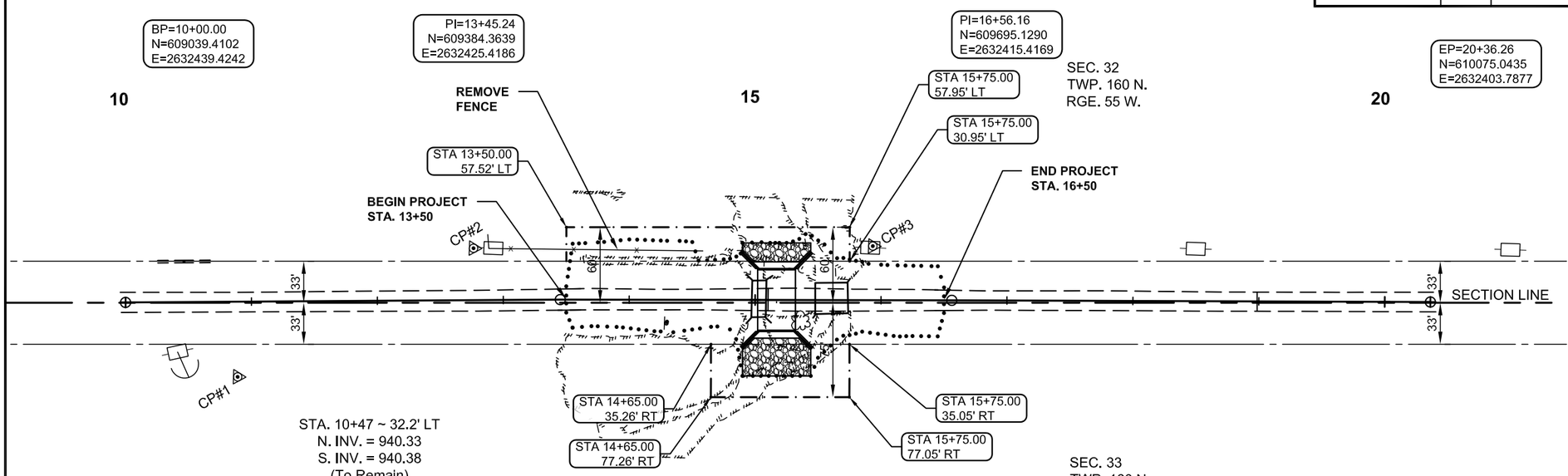
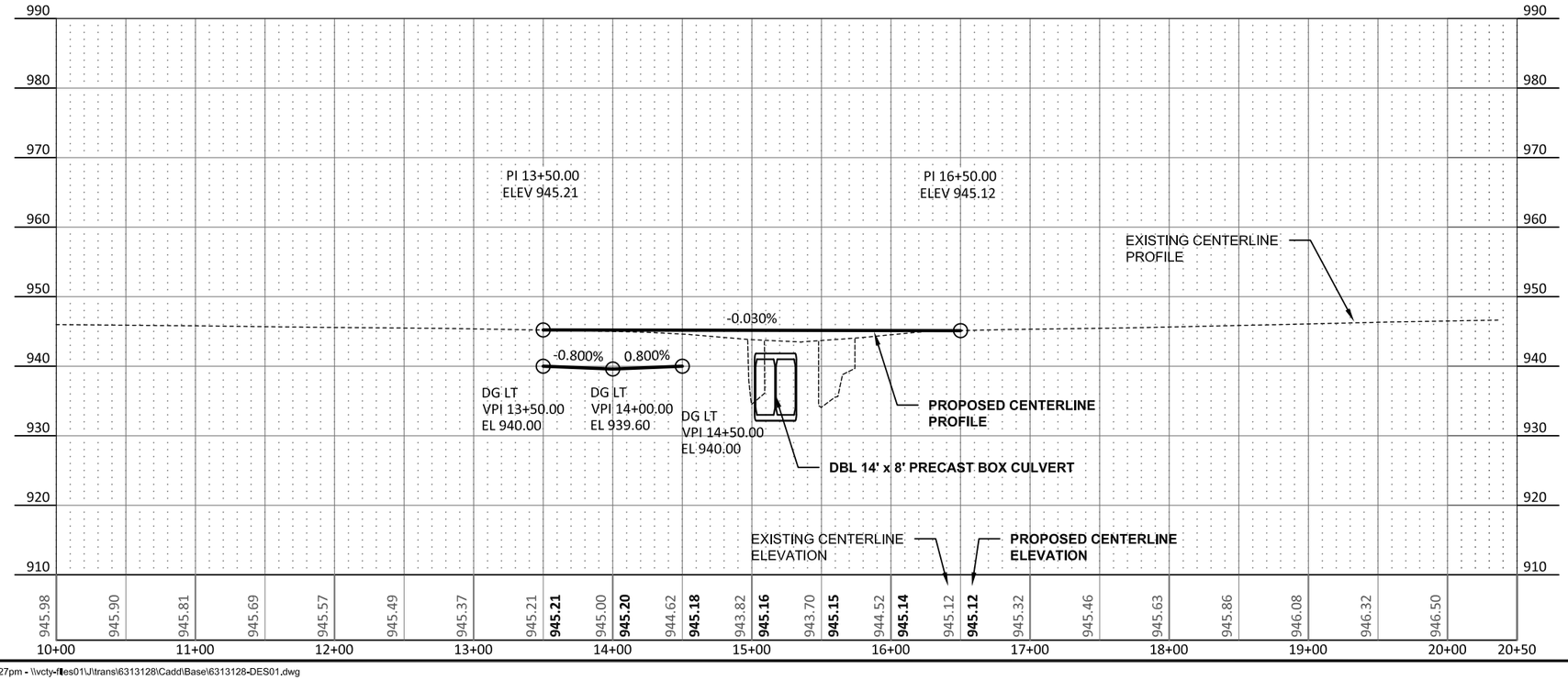
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	60	1

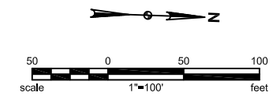


REMOVE EXISTING FENCE
STA 13+50 TO 14+58 ~ LT 108 LF

CP#1 N609130.3940 E2632495.4900 ELEV. 943.41 STA. 10+88.63 ~ 59.71' RT
CP#2 N609314.1300 E2632386.9960 ELEV. 942.88 STA. 12+76.62 ~ 41.24' LT
CP#3 N609630.9890 E2632374.4890 ELEV. 942.40 STA. 15+93.37 ~ 42.97' LT

COORDINATE SYSTEM: US STATE PLANE 1983 ND NORTH 3301
HORIZ. DATUM: NAD 83 (CORS 96) OPUS
VERT. DATUM: NAVD 88
GEOID MODEL: GEOID 12A
UNITS: INTERNATIONAL FOOT





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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
BRIDGE NUMBER 109-26.1

KLJ

PLAN & PROFILE
STA. 10+00 TO 20+50

DRWN. BY	CHK'D BY	PROJECT NO.
KS	JD	6313128

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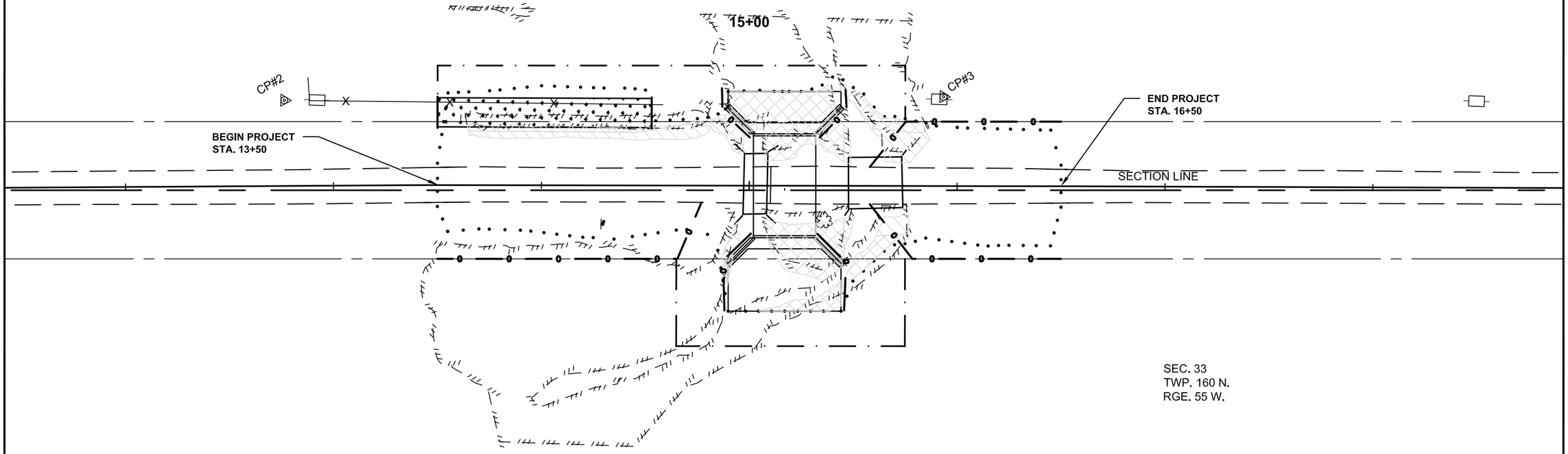
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	75	1

SEC. 32
TWP. 160 N.
RGE. 55 W.



SEC. 33
TWP. 160 N.
RGE. 55 W.

N

50 0 50 100
scale 1"=100' feet

PERMANENT WETLAND IMPACT

TEMPORARY WETLAND IMPACT

WETLAND MITIGATION
0.03 ACRES

DELINEATED WETLANDS

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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
BRIDGE NUMBER 109-26.1

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WETLAND IMPACTS

DRWN. BY	CHKD BY	PROJECT NO.
KS	JD	6313128

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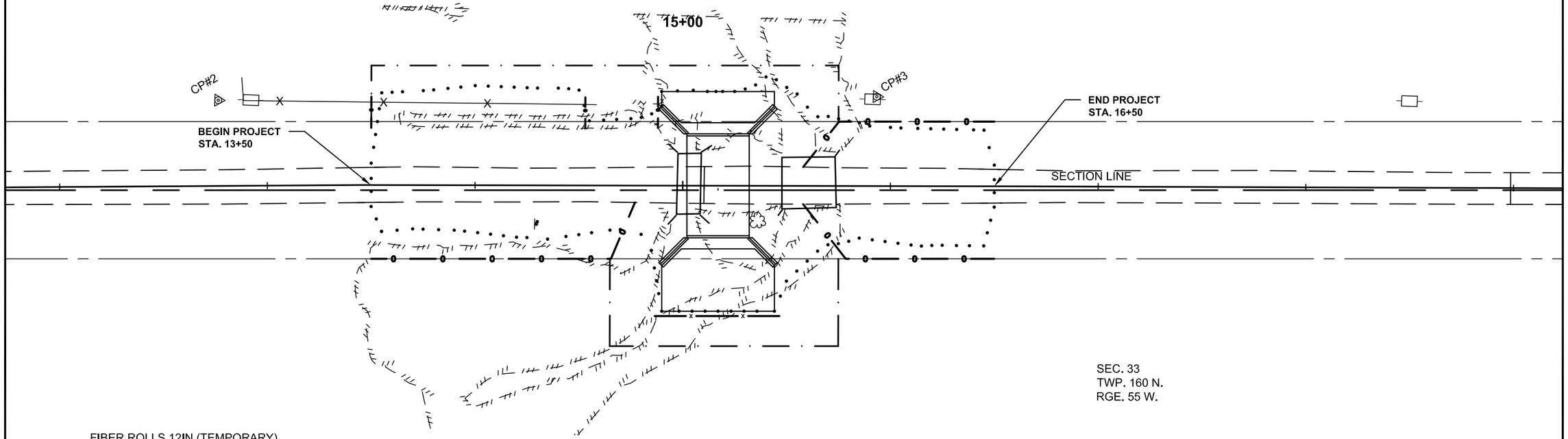
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	76	1

SEC. 32
TWP. 160 N.
RGE. 55 W.



SEC. 33
TWP. 160 N.
RGE. 55 W.

FIBER ROLLS 12IN (TEMPORARY)

STA 13+50 ~ LT	15 LF
STA 14+50 ~ LT	15 LF
STA 14+85 ~ LT	15 LF
STA 13+50 TO 14+77 ~ RT	145 LF
STA 15+80 TO 16+50 ~ RT	85 LF
STA 15+80 TO 16+50 ~ LT	85 LF
	360 LF

REMOVAL FIBER ROLLS 12IN

STA 13+50 ~ LT	15 LF
STA 14+50 ~ LT	15 LF
STA 14+85 ~ LT	15 LF
STA 13+50 TO 14+77 ~ RT	145 LF
STA 15+80 TO 16+50 ~ RT	85 LF
STA 15+80 TO 16+50 ~ LT	85 LF
	360 LF

FLOTATION SILT CURTAIN

STA 14+87 TO 15+47 ~ RT	60 LF

REMOVE FLOTATION SILT CURTAIN

STA 14+87 TO 15+47 ~ RT	60 LF

—— o —— FIBER ROLLS 12IN

—— x —— FLOTATION SILT CURTAIN

N

50 0 50 100
scale 1"=100' feet

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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
BRIDGE NUMBER 109-26.1

KLJ

TEMPORARY EROSION CONTROL

DRWN. BY	CHK'D BY	PROJECT NO.
KS	JD	6313128

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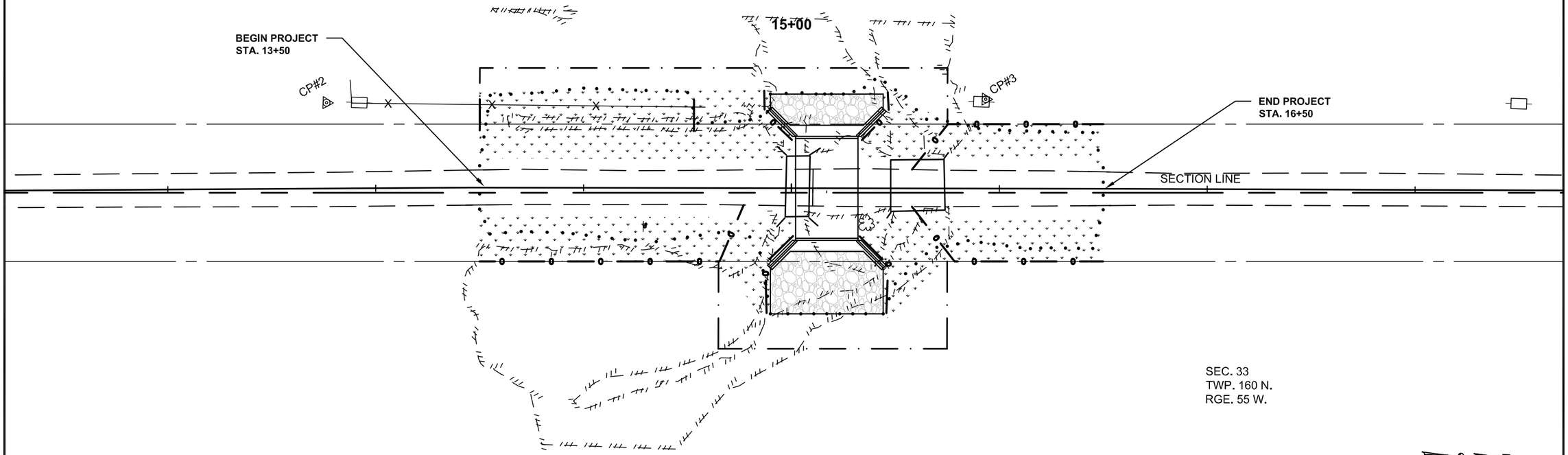
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	77	1

SEC. 32
TWP. 160 N.
RGE. 55 W.



SEC. 33
TWP. 160 N.
RGE. 55 W.

N

50 0 50 100
scale 1"=100' feet

RIPRAP GRADE I

STA 15+20 LT & RT	128 CY

FIBER ROLLS 12IN

STA 13+50 ~ LT	15 LF
STA 14+50 ~ LT	15 LF
STA 14+85 TO 15+00 ~ LT	30 LF
STA 14+85 TO 15+00 ~ RT	45 LF
STA 13+50 TO 14+77 ~ RT	145 LF
STA 15+32 TO 15+47 ~ LT	30 LF
STA 15+32 TO 15+47 ~ RT	45 LF
STA 15+58 TO 16+50 ~ RT	105 LF
STA 15+58 TO 16+50 ~ LT	105 LF
	535 LF

SEEDING CLASS II

STA 13+50 TO 16+50	0.314 ACRE

STRAW MULCH

STA 13+50 TO 16+50	0.314 ACRE

FIBER ROLLS 12IN

RIPRAP-LOOSE ROCK

SEEDING CLASS II
STRAW MULCH

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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
BRIDGE NUMBER 109-26.1

KLJ

PERMANENT EROSION CONTROL

DRWN. BY	CHK'D BY	PROJECT NO.
KS	JD	6313128

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0034(030)	100	1

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	
G20-1a-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	
G20-2a-48	48"x24"	END ROAD WORK		19	
G20-4-36	36"x18"	PILOT CAR FOLLOW ME		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)		7	
M4-8a-24	24"x12"	END DETOUR		12	
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)		7	
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)		7	
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)		7	
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**	**2**	**31**	**62**
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		35	
W20-3-48	**48"x48"**	**ROAD or STREET CLOSED AHEAD or __ FT.**	**4**	**35**	**140**
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	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
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**	**258**

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**	**6**
704-1060	DELINEATOR DRUMS	EACH	
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	
704-3501	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	
762-1500	OBLITERATION OF PVMT MK	SF	
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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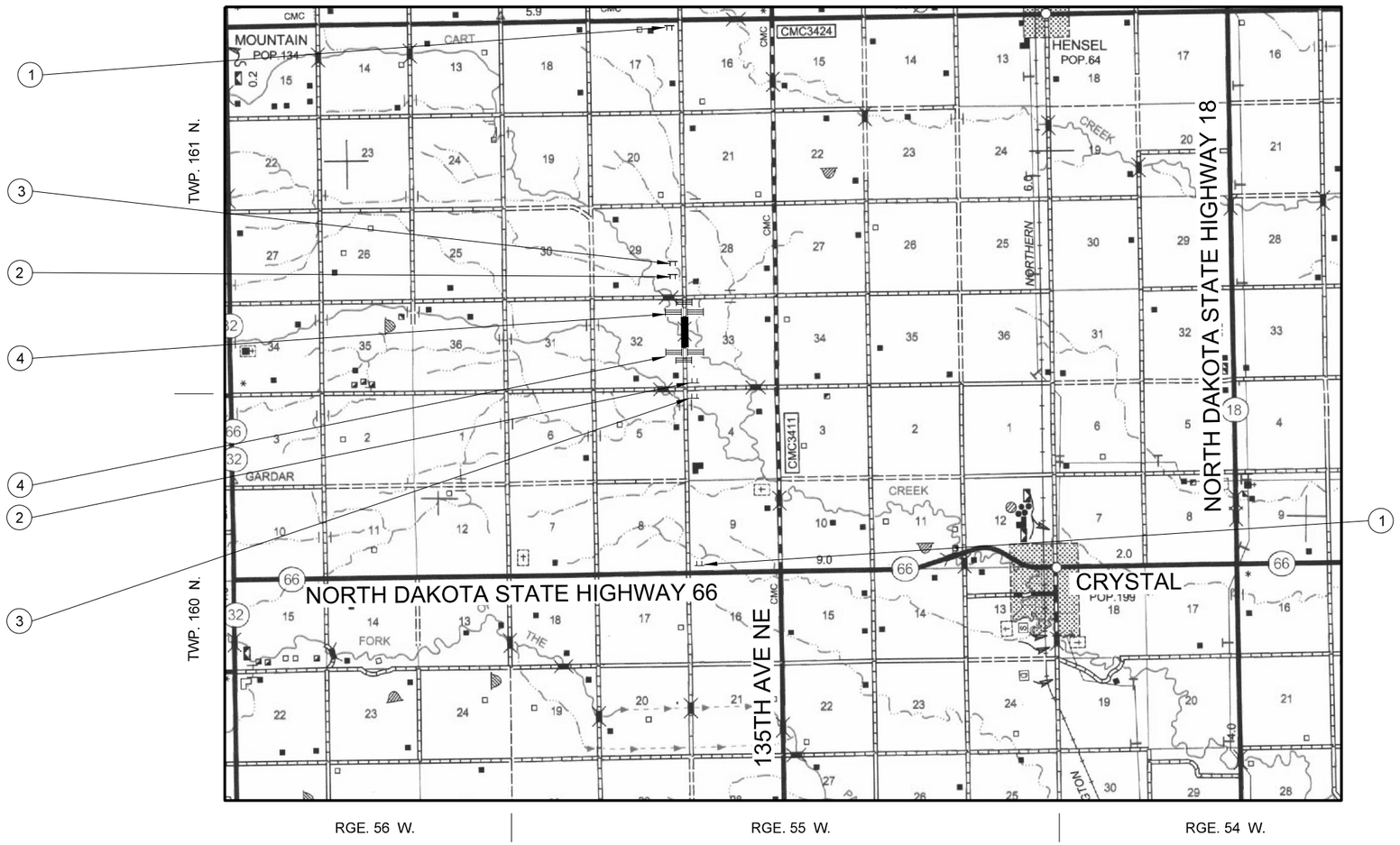
Traffic Control Devices List

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BR0-0034(030)	100	2



ROAD CLOSED
00 MILES AHEAD
LOCAL TRAFFIC ONLY

(1) (1) R11-3a-60
Post Mounted

ROAD
CLOSED
500 FT

(2) (1) W20-3-48
Post Mounted
(500 Feet)

ROAD
CLOSED
1000 FT

(3) (1) W20-3-48
Post Mounted
(1000 Feet)

ROAD
CLOSED

(4) (1) R11-2-48
(3) Type III Barricade

N

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The sign layout as shown is for general information purposes only. The contractor will be required to conform to MUTCD and the Standard Drawings when installing the traffic control signing.

BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE #109-26.1

KLJ

TRAFFIC CONTROL SIGNING LAYOUT

DRWN. BY	CHK'D. BY	PROJECT NO.
ZV	JM	6313128

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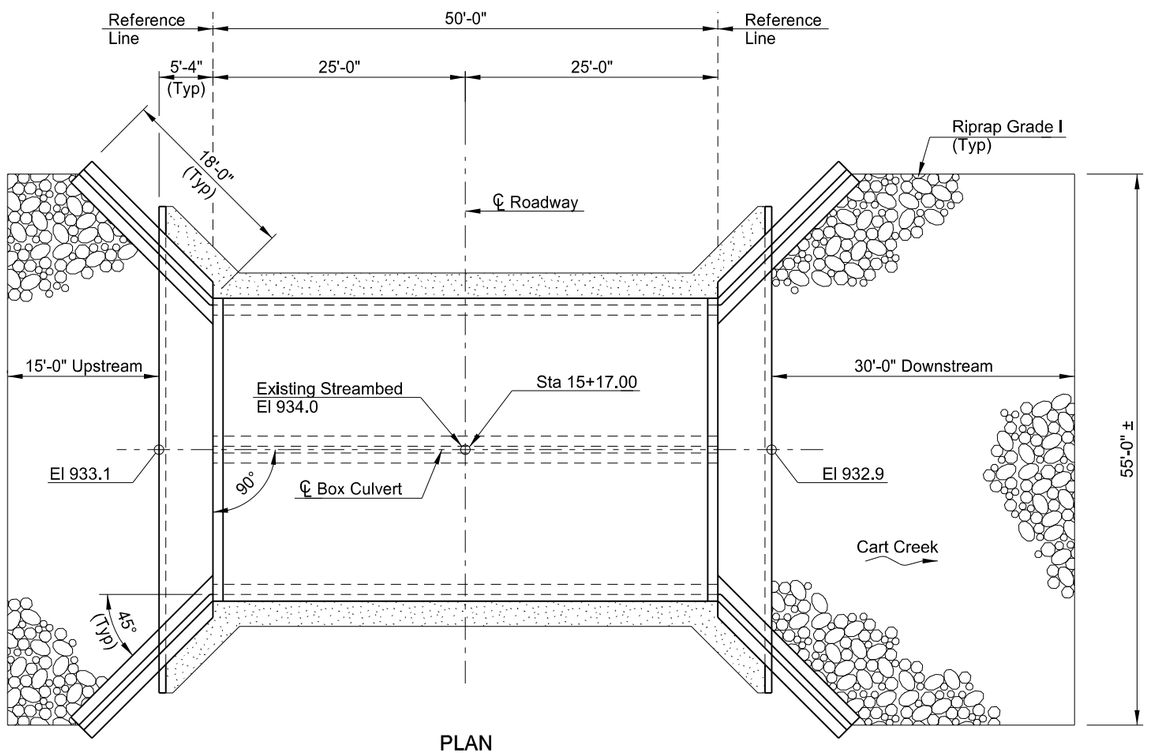
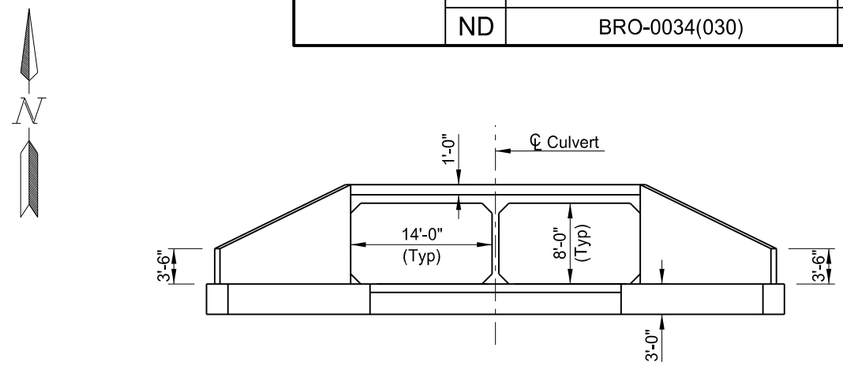
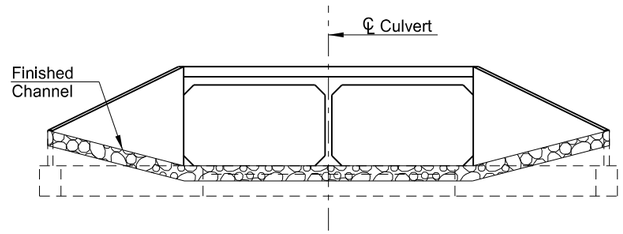
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	170	1



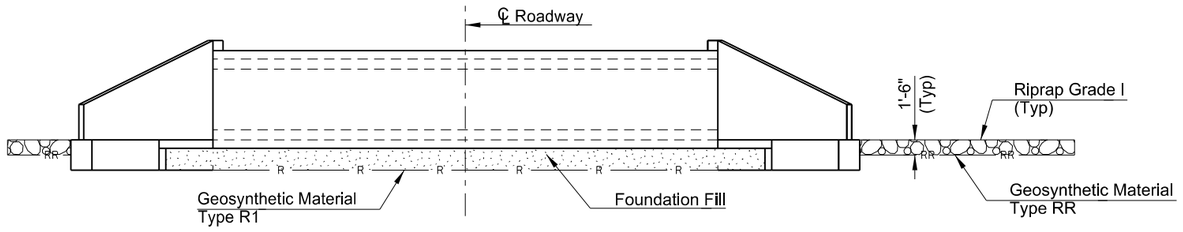
PLAN



END VIEW
(Showing Dimensions)



END VIEW
(Showing Finished Section)



ELEVATION

HYDRAULIC DATA:

Drainage Area	40.29	sq mi
Stream Gradient	0.0014	ft/ft
Design Frequency	15	yr
Design Discharge	1,271	cfs
Design Headwater Stage	942.7	ft
Design Tailwater Stage	941.9	ft
Velocity Through Culvert	6.5	fps
100-Year Frequency Discharge	2,664	cfs
100-Year Frequency Headwater	945.8	ft
Overtopping Stage	945.0	ft
Overtopping Discharge	2,100	cfs

NOTE:
The invert elevations shown represent an elevation 1 foot below the existing streambed.

For a double barrel box culvert with 10" thick roof, 10" floor, and 8" walls, the following total factored moments and shears would result from the application of the required loads:

FACTORED DESIGN MOMENTS (DOUBLE)	
WALL MOMENT	328 ft-lbs
ROOF MOMENTS	
CORNER	-12,828 ft-lbs
BOTTOM	29,802 ft-lbs
TOP	-36,491 ft-lbs
FLOOR MOMENTS	
CORNER	-9,404 ft-lbs
TOP	17,788 ft-lbs
BOTTOM	-32,650 ft-lbs

FACTORED DESIGN SHEARS (DOUBLE)	
WALL SHEAR	1,854 lbs
ROOF SHEARS	
CORNER	5,778 lbs
WALL	9,004 lbs
FLOOR SHEARS	
CORNER	7,657 lbs
WALL	10,827 lbs

STRUCTURAL QUANTITIES ONLY

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0108	REMOVAL OF STRUCTURE-SITE 1	L SUM	1
202	0109	REMOVAL OF STRUCTURE-SITE 2	L SUM	1
203	0130	MUCK EXCAVATION	CY	75
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	320
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
256	0100	RIPRAP GRADE I	CY	128
606	3408	DBL 14FT X 8FT PRECAST RCB CULVERT	LF	50
606	7408	DBL 14FT X 8FT PRECAST RCB END SECTION	EA	2
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	350
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	255

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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE #34-109-26.1

KLJ

PRECAST BOX CULVERT LAYOUT

DRWN. BY	CHK'D. BY	PROJECT NO.
BJJ	KDR	6313128

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	BRO-0034(030)	170	2

STRUCTURAL NOTES

100-P01 **SCOPE OF WORK:** Work at this site consists of removing two existing structures, a 23' long bridge and a 12' long bridge, and replacing them with a new double barrel 14' x 8' x 50' precast concrete box culvert.

202-P01 **REMOVAL OF STRUCTURE:** The existing north structure is a single span steel bridge, 23' long with a deck width of 26 feet. The existing south structure is a single span steel bridge, 12' long with a deck width of 26 feet. The abutments are concrete. Refer to Section 6, sheet 2 and SP-4(14) for allowable removal dates for the structures.

The lump sum bid item "REMOVAL OF STRUCTURE - SITE 1" includes all work required to remove all bridge components and any hazard markers at the south bridge in accordance with the Standard Specifications. The lump sum bid item "REMOVAL OF STRUCTURE - SITE 2" includes all work required to remove all bridge components and any hazard markers at the north bridge in accordance with the standard specifications. All removed materials are the property of the contractor and are to be disposed of properly off the right-of-way.

203-P01 **MUCK EXCAVATION:** The muck excavation quantity of 75 CY is based on an estimated removal area that is 40' wide, 25' long, and 2' deep. Actual limits of muck excavation will be determined by the Engineer, measured, and paid for accordingly.

210-P01 **BOX CULVERT EXCAVATION:** The unit price bid for "BOX CULVERT EXCAVATION" includes all excavation required to build the box culvert. Perform Box Culvert Excavation according to Section 210 of the Standard Specifications. The unit price bid for "BOX CULVERT EXCAVATION" includes all labor and materials required to place the ordinary backfill within the limits shown on Section 170, Sheet 3.

The suitability of material from on-site excavations for use as ordinary backfill will be determined by the engineer. Embankment constructed from channel excavated material will not be measured for separate payment but will be included in the price bid for "BOX CULVERT EXCAVATION." Channel excavated material that is deemed not suitable for ordinary backfill will become property of the contractor and disposed of outside of the road right-of-way, not adjacent to the construction site, and at a site approved by the engineer. The unit price bid for "BOX CULVERT EXCAVATION" includes all costs associated with excavation, hauling, depositing and leveling the waste material.

210-P02 **FOUNDATION PREPARATION:** Be aware of the possible inundated conditions at this site before the bid opening. The cost of any cofferdams and dewatering the excavation is included in the bid for "FOUNDATION PREPARATION - BOX CULVERT."

210-P03 **FOUNDATION FILL:** Use CL 5 as specified in Section 816, "Aggregates." Place foundation fill in layers of not more than six inches, moisten or dry as required, and thoroughly compact with mechanical tamping equipment.

When additional Foundation Fill is placed under the box, payment will be determined by computation using plan dimensions and adding 25% for shrinkage.

256-P01 **RIPRAP GRADE I:** Do not use broken concrete as riprap.

606-P01 **PRECAST REINFORCED CONCRETE BOX CULVERT AND END SECTIONS:** Tie all barrel sections together with prestressing strands or galvanized tie-bolts. If strands are used, use a minimum of six 1#2" diameter strands through each joint placed at each outside corner and center wall on the double cell and four 1#2" diameter strands on the single cell. Protect prestressing cables against corrosion and grout their ends. If tie-bolts are used, the four tie-bolts will be located at the third points of the outside walls.

Attach the apron to the last barrel section, the wingwalls, and the cutoff wall. Cast holes at 3' centers through the apron and into the cutoff wall to receive ¾" diameter reinforcing bars. Use a welded tie type system or approved equal for the connections of the apron to the box and the wingwalls . Connect the wingwalls to the last barrel section by the use of galvanized u-bolts, galvanized steel-bolted plates, or another approved method so that the inside corner surface is smooth. After backfilling, wingwall sections are to be in line. If wingwall sections are not in line or not installed to the angles shown in the plans, remove and reset the wingwalls to be in proper alignment.

The "DBL 14FT X 8FT PRECAST RCB END SECTION" consists of all apron, wingwall, cutoff wall, and parapet components required to build the double cell end sections.

DESIGN LOADS:

A. HL-93 Loading
B. Maximum Fill Height = 3'

WORK DRAWINGS: The contractor shall submit the following work drawings to the Engineer of Record:

PRECAST RCB CULVERT

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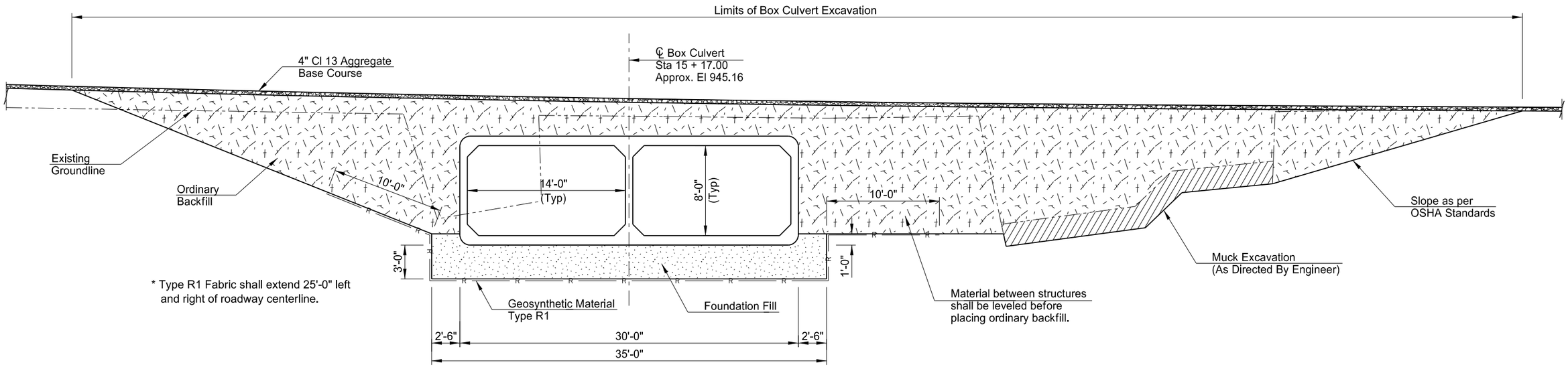
BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE #34-109-26.1

KLJ

STRUCTURAL NOTES

DRWN. BY	CHK'D. BY	PROJECT NO.
BJJ	KDR	6313128

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRO-0034(030)	170	3



* Type R1 Fabric shall extend 25'-0" left and right of roadway centerline.

BOX CULVERT EXCAVATION AND BACKFILL

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BRO-0034(030)
PEMBINA COUNTY, NORTH DAKOTA
STRUCTURE #34-109-26.1

BACKFILL DETAIL

DRWN. BY	CHK'D. BY	PROJECT NO.
BJJ	KDR	6313128

CROSS-SECTIONS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0034(030)	200	1

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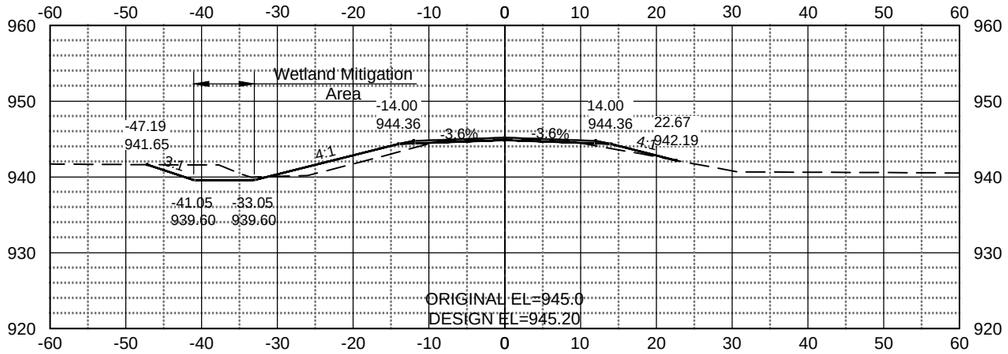

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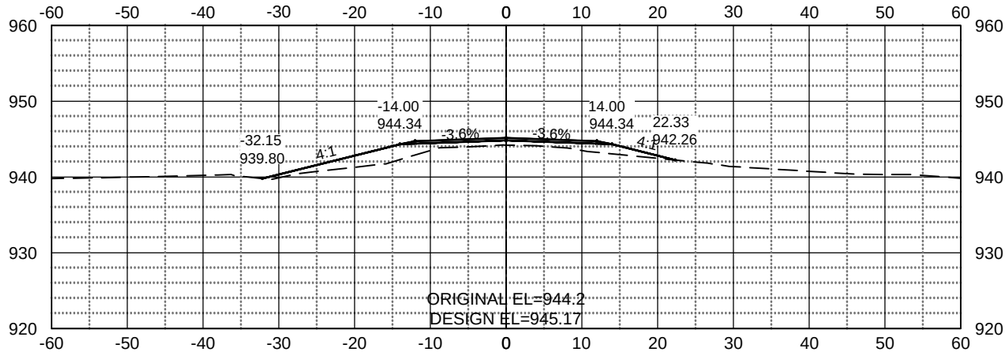

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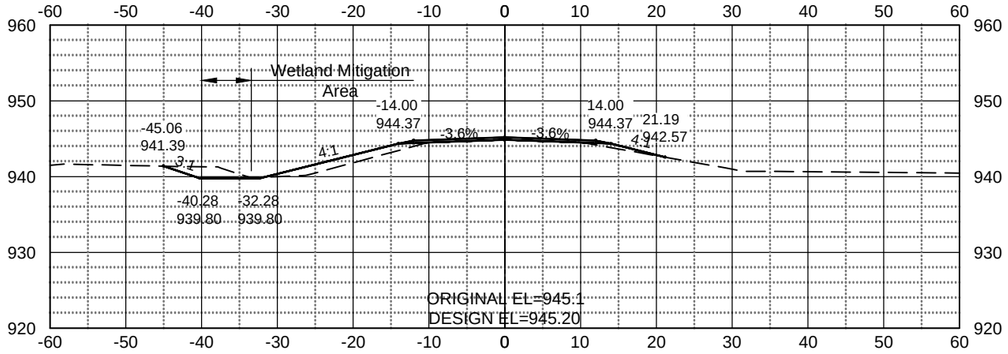

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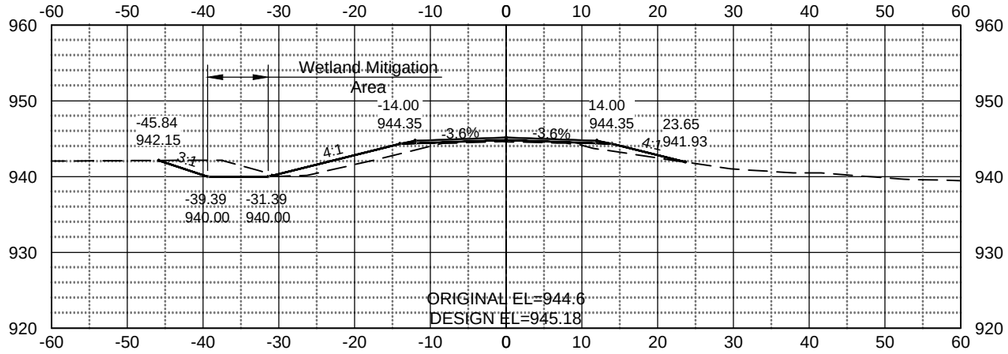

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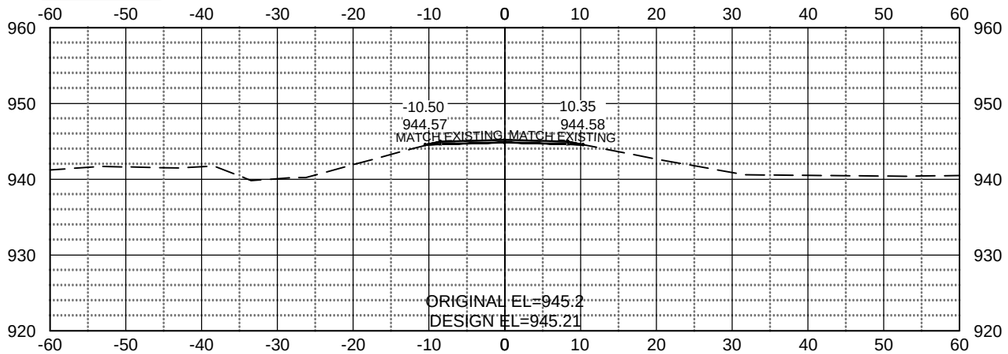

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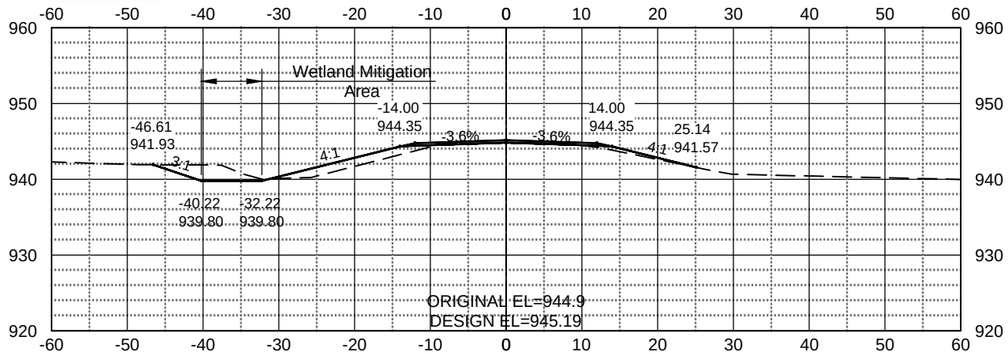
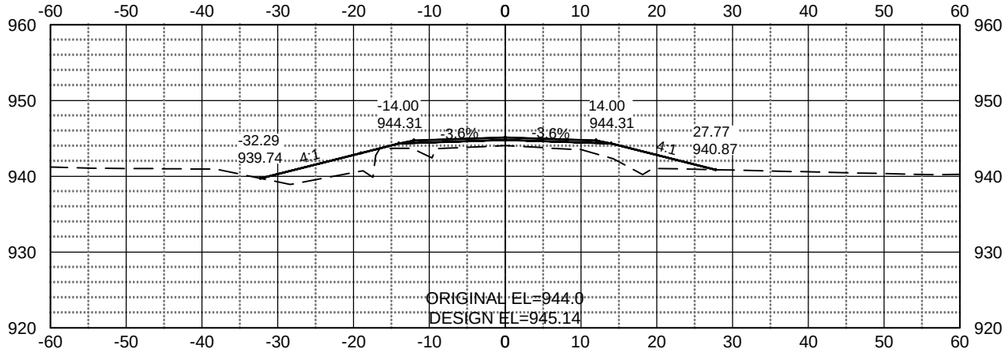


CROSS-SECTIONS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0034(030)	200	2

15+75.00



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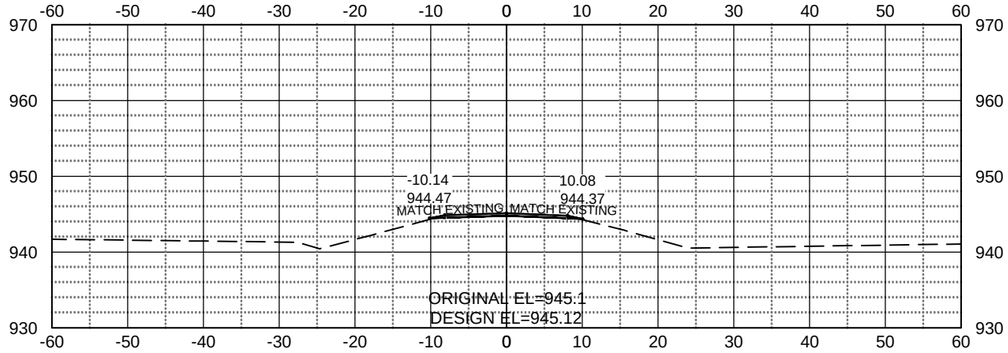

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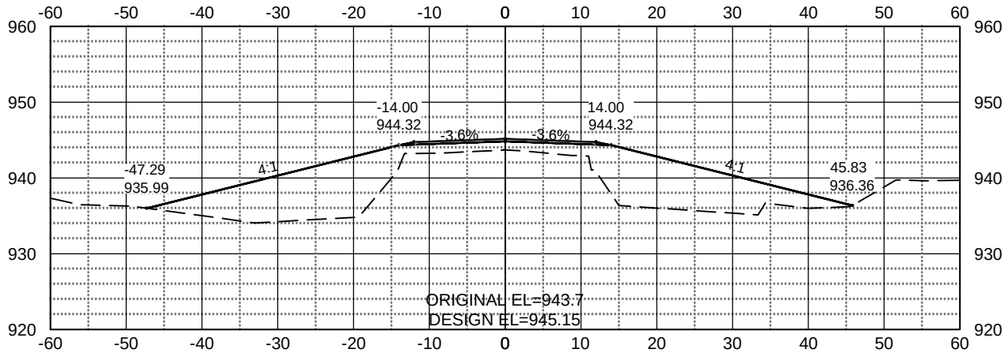

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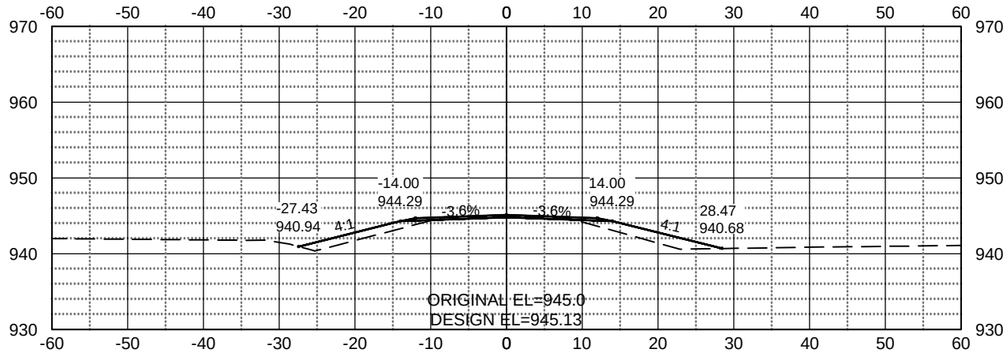

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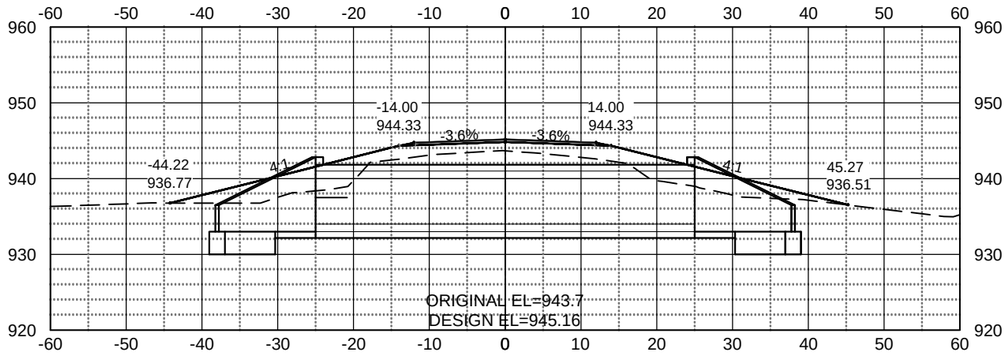

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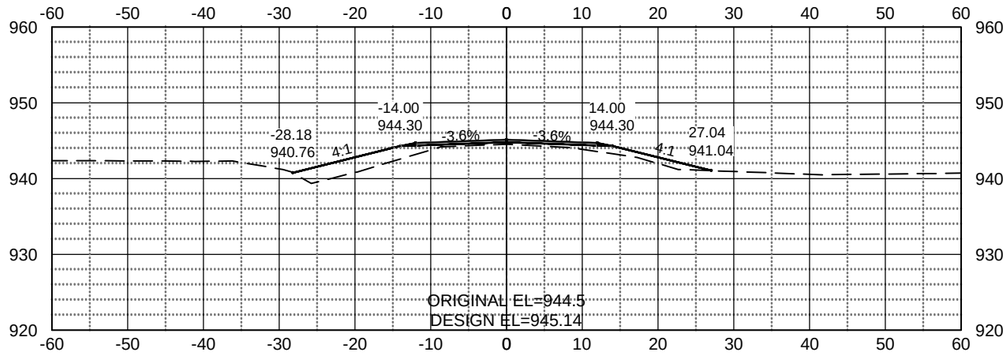

NDDOT ABBREVIATIONS

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	
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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
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

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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
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
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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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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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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D-101-21

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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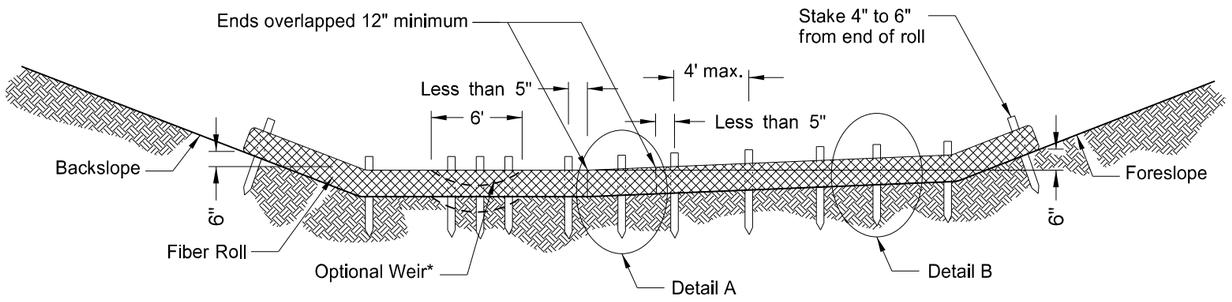
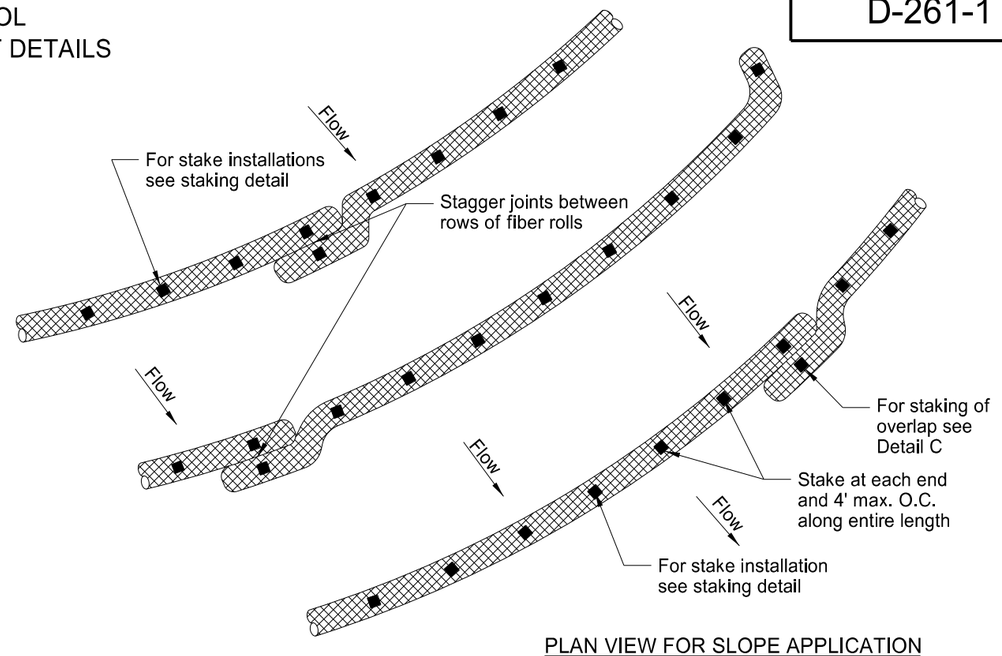
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

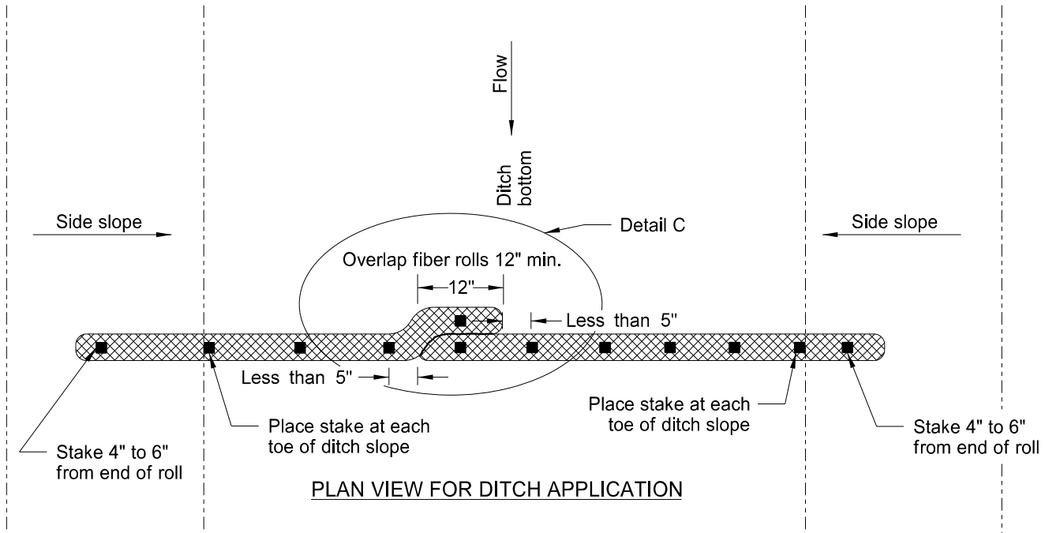


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

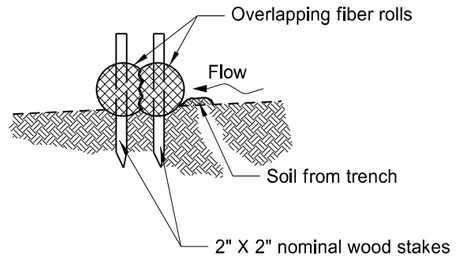
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

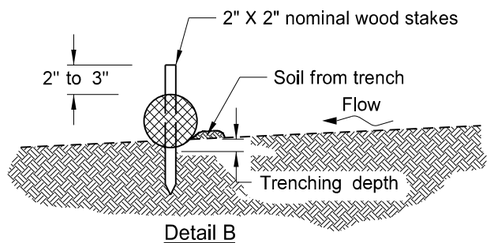


PLAN VIEW FOR DITCH APPLICATION



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.

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

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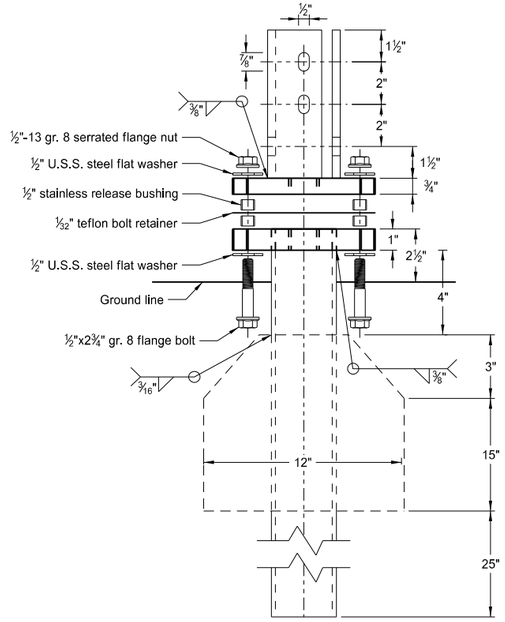
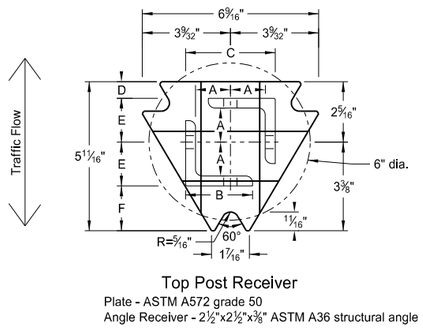
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

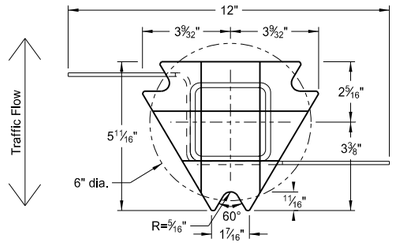


Multi-Directional
Slip Base Assembly

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

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.

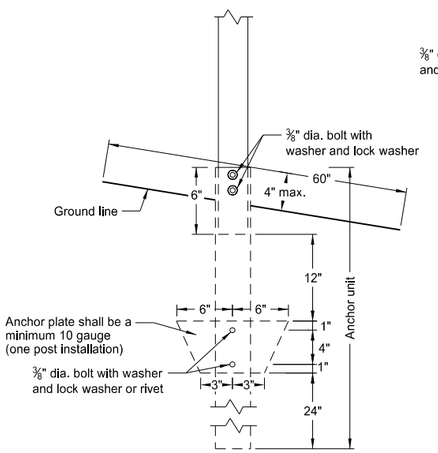
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	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	2³⁄₁₆	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
2³⁄₁₆ x 2³⁄₁₆	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

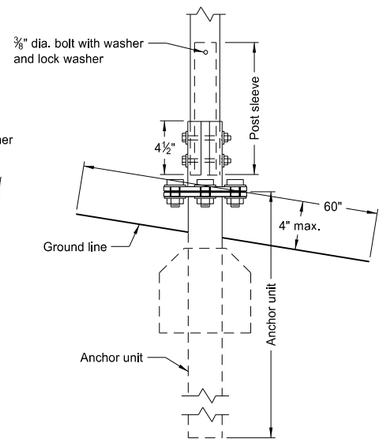
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³⁄₁₆"x10 ga.	1⁹⁄₆₄"	2½"	3¹⁄₃₂"	25⁄₃₂"	1³³⁄₆₄"	1⅞"
2½"x10 ga.	1⁹⁄₃₂"	2½"	3⁵⁄₁₆"	⅝"	1²¹⁄₃₂"	1¾"

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

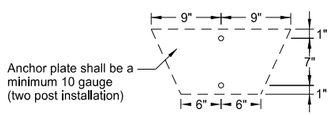
(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

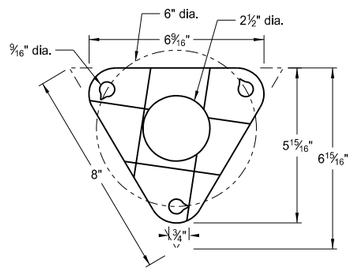


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





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

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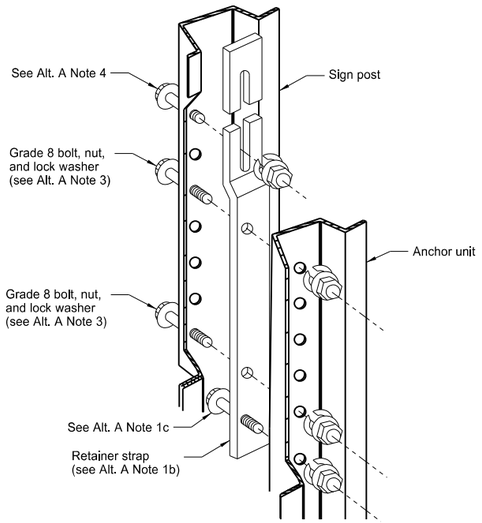
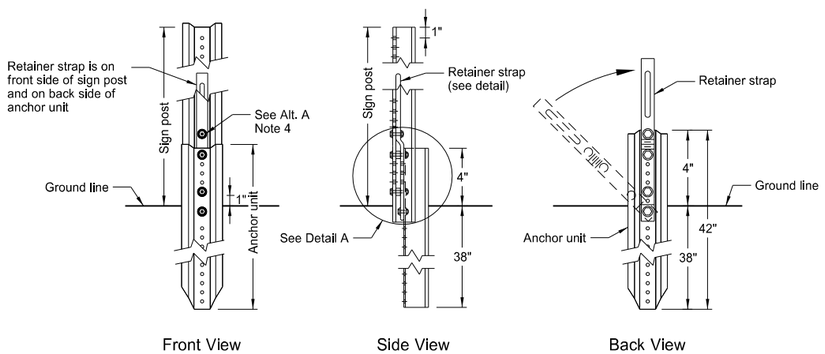
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



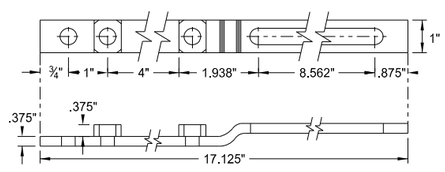
Detail A



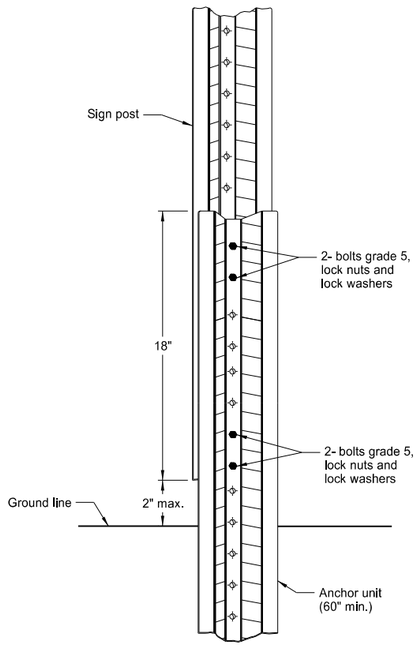
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

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

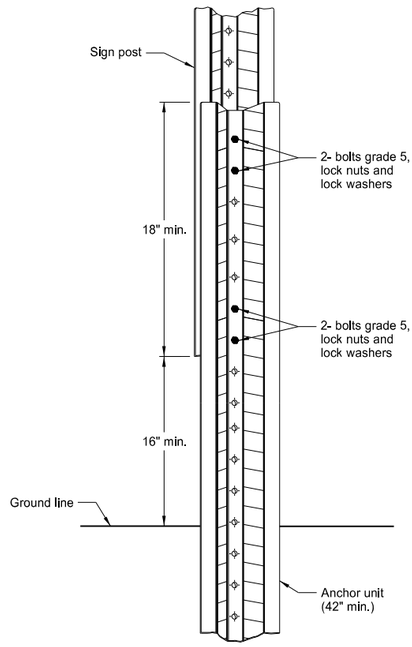


Retainer Strap Detail



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.

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REVISIONS	
DATE	CHANGE

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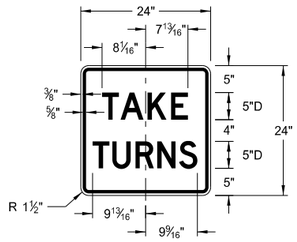
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50-24
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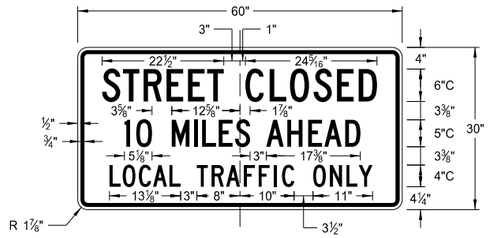
Background: white



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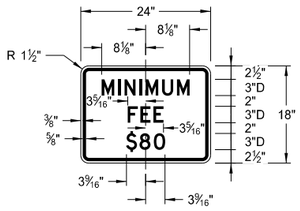

R2-1a-24
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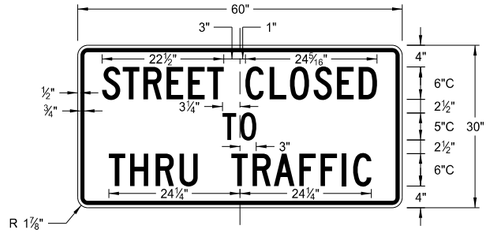

R11-4a-60
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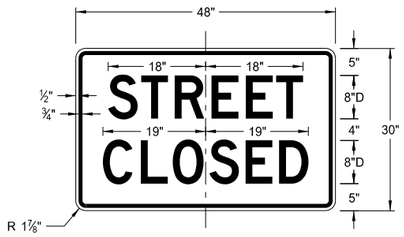


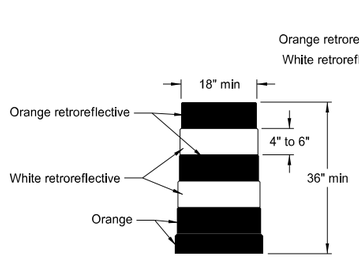
R11-2a-48
Legend: black (non-refl)
Background: white

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/13/13 and the original document is stored at the North Dakota Department of Transportation

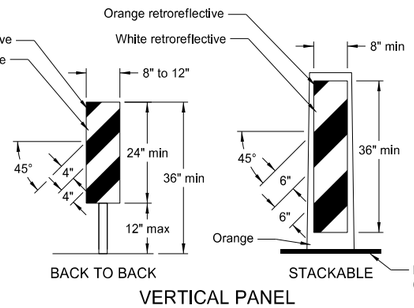
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



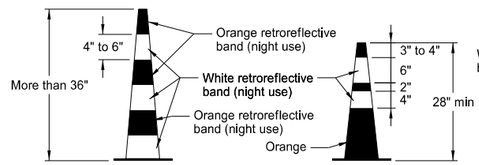
DELINEATOR DRUM

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.



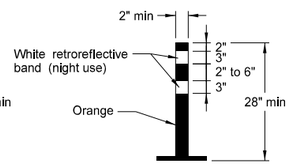
VERTICAL PANEL

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.



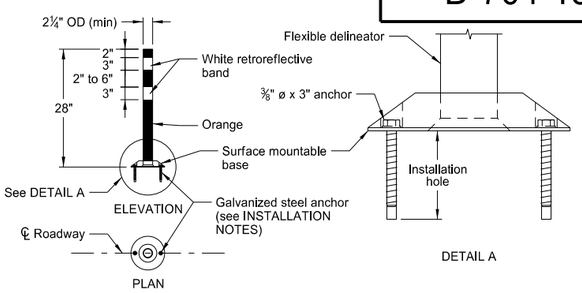
TRAFFIC CONE

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

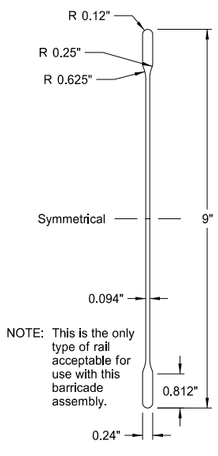
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



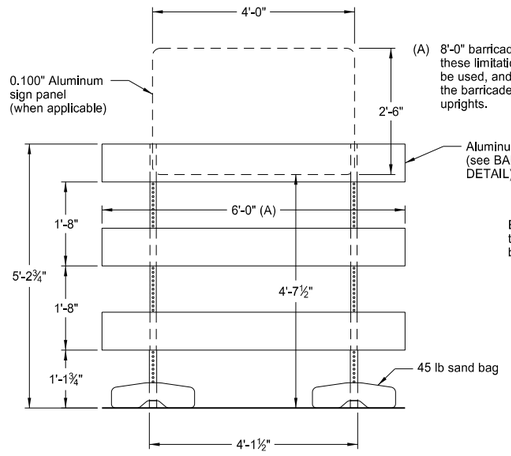
FLEXIBLE DELINEATOR

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.

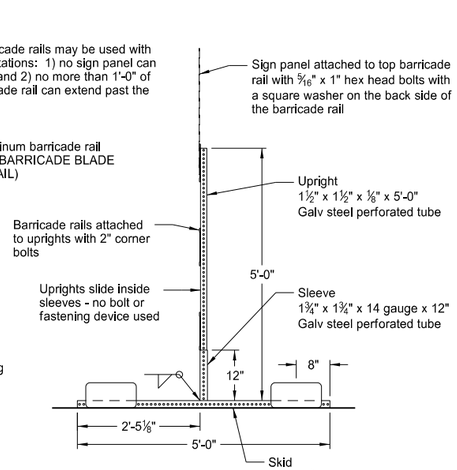


BARRICADE BLADE DETAIL



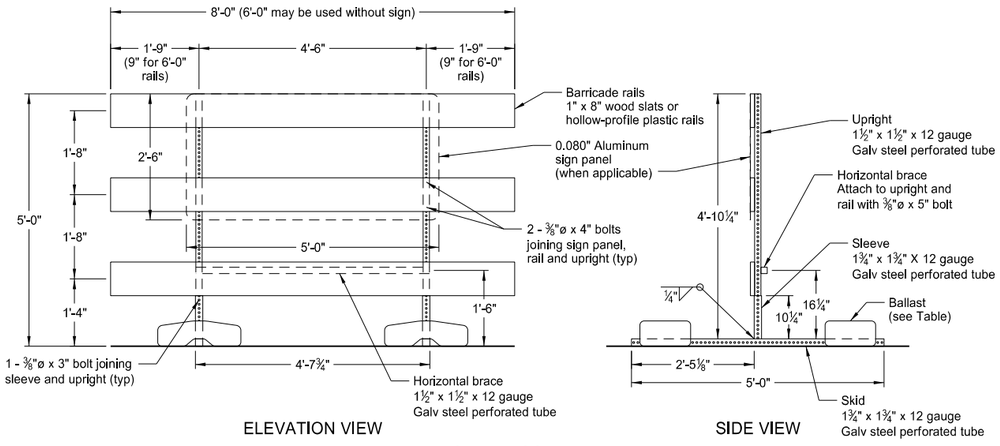
ELEVATION VIEW

(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)

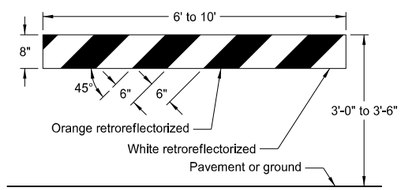


ELEVATION VIEW

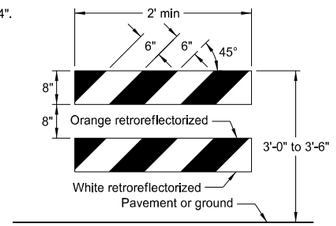
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

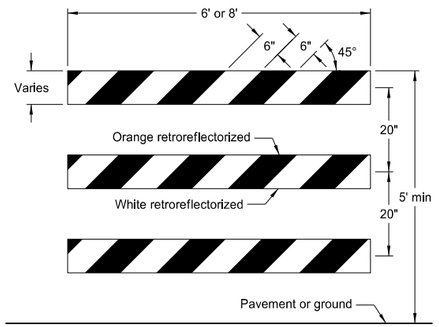
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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



TYPE I BARRICADE

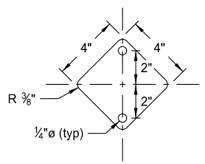


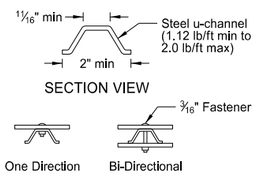
TYPE II BARRICADE

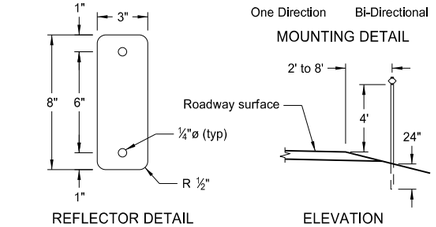


TYPE III BARRICADE

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	
REVISIONS	
DATE	CHANGE

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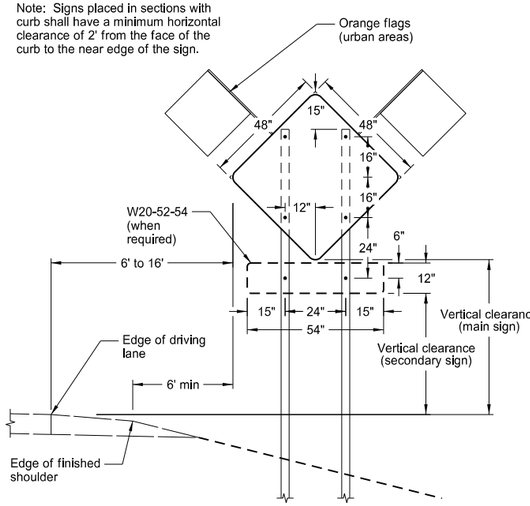
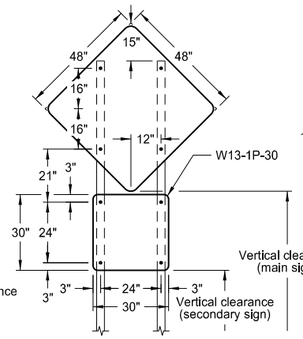
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

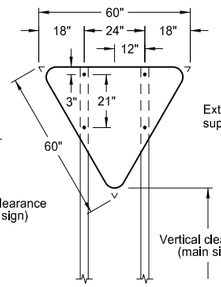
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



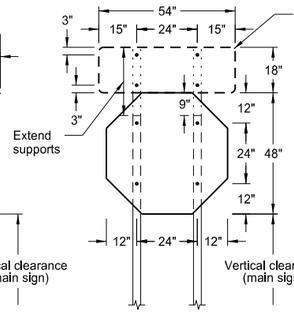
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



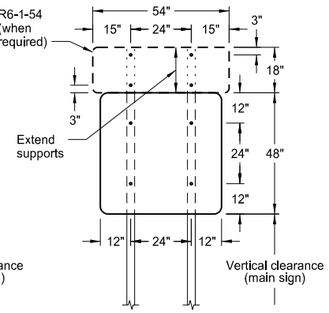
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



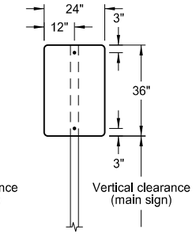
R1-2-60 - YIELD SIGN



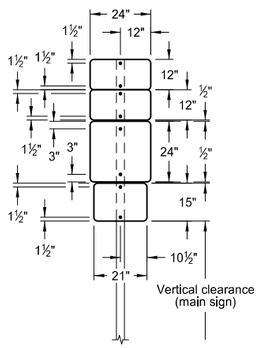
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



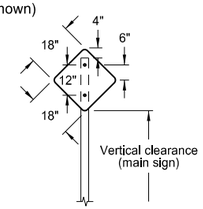
48" x 48" SIGN
(with R6-1-54 sign as required)



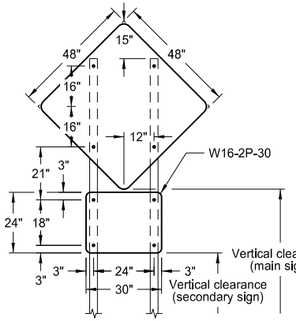
24" x 36" SIGN



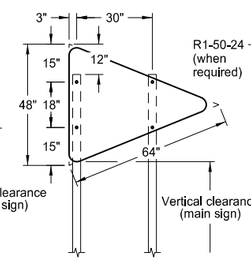
24" x 24"
ROUTE MARKER
ASSEMBLY



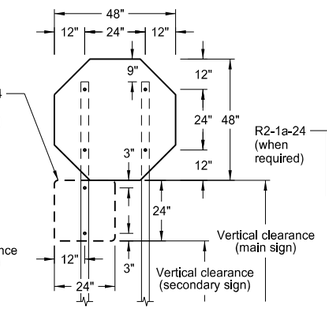
18" x 18"
DIAMOND SIGN



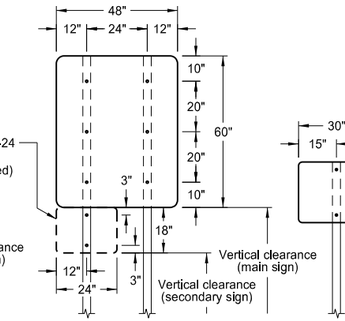
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



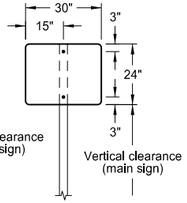
W14-3-64 - PENNANT SIGN



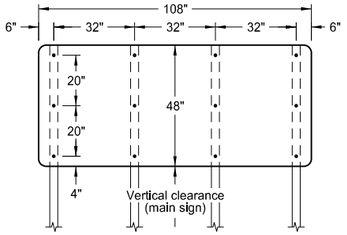
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



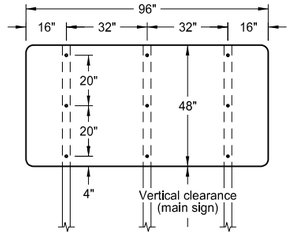
48" x 48" SIGN
(with R2-1a-24 sign as required)



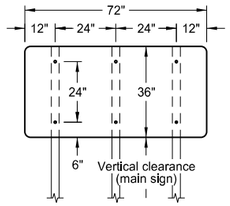
30" x 24" SIGN



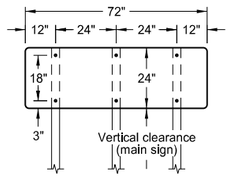
108" x 48" SIGN



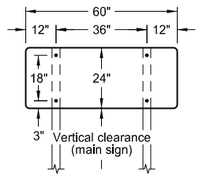
96" x 48" SIGN



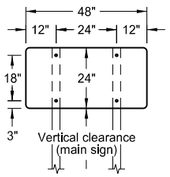
72" x 36" SIGN



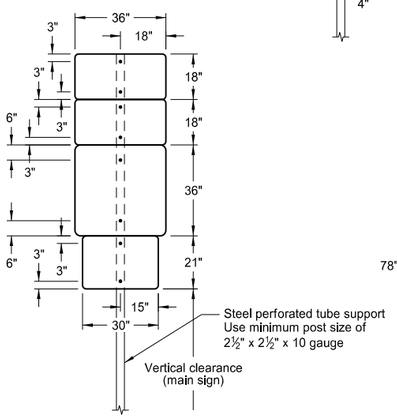
72" x 24" SIGN



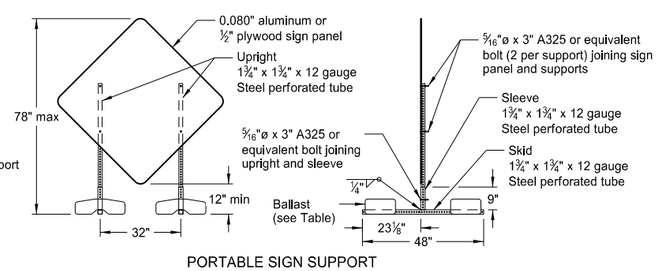
60" x 24" SIGN



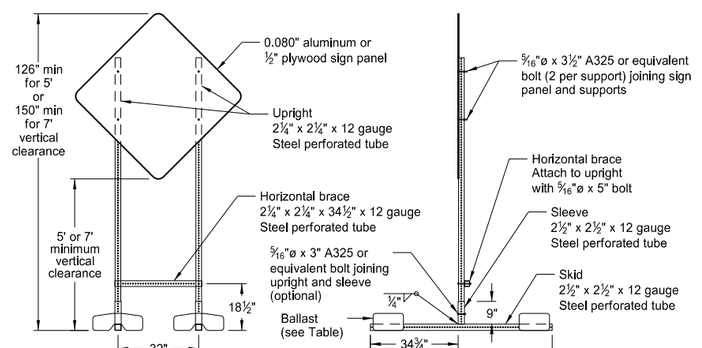
48" x 24" SIGN



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

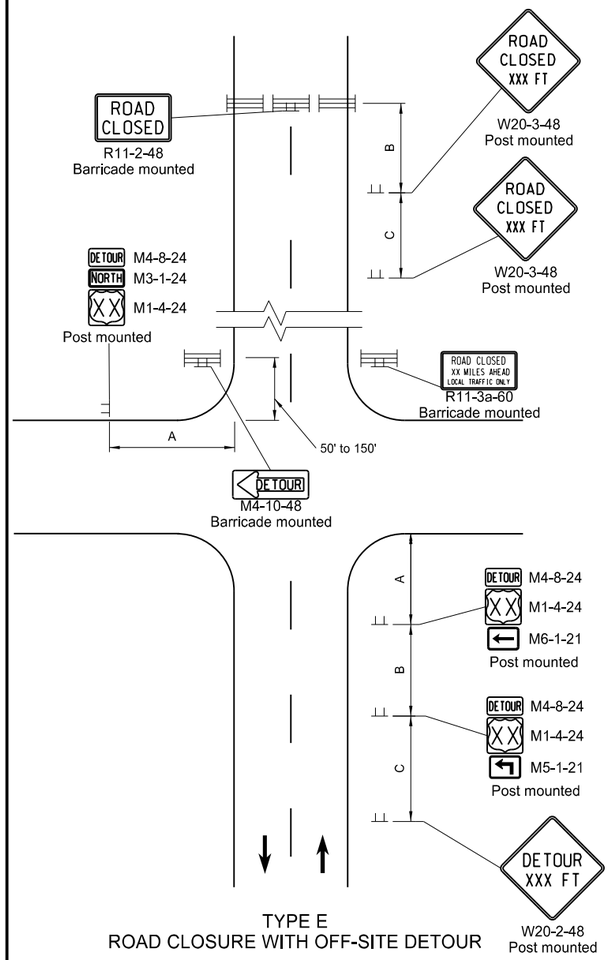
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/14/13 and the original document is stored at the North Dakota Department of Transportation

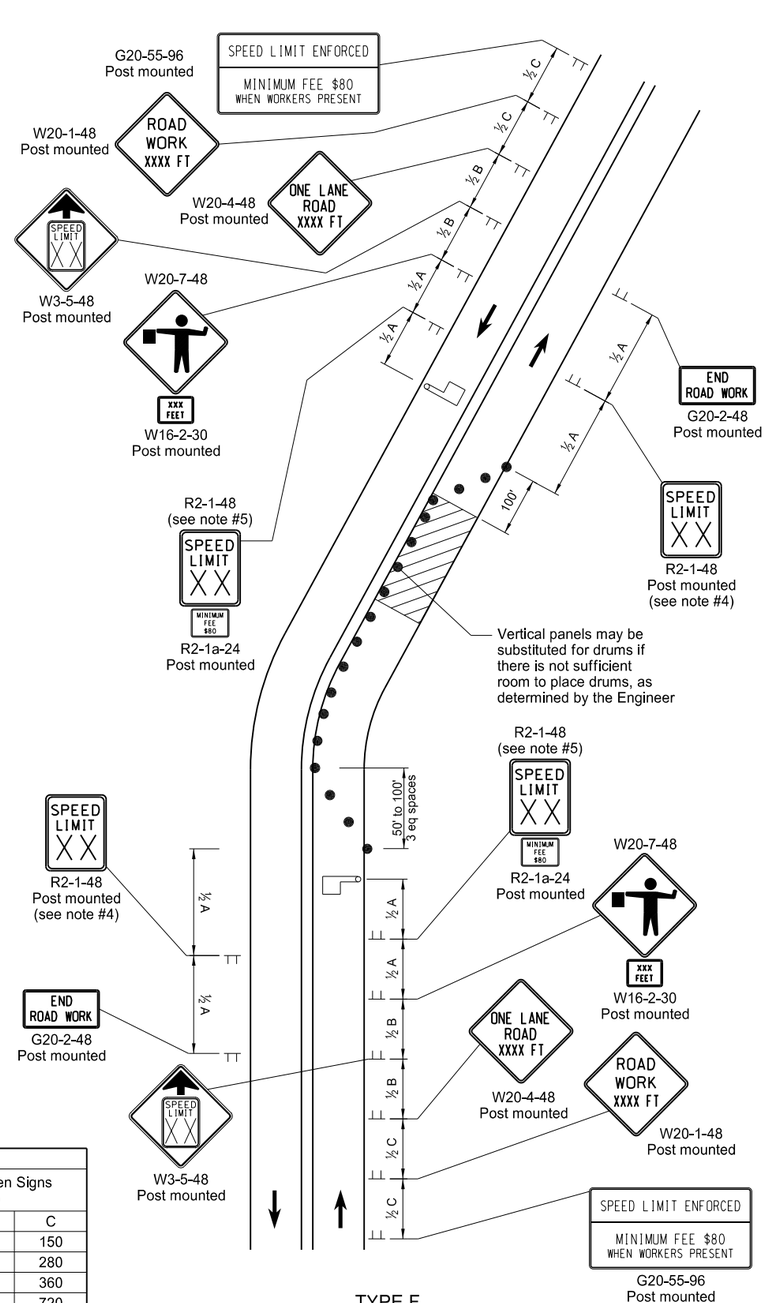
ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

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

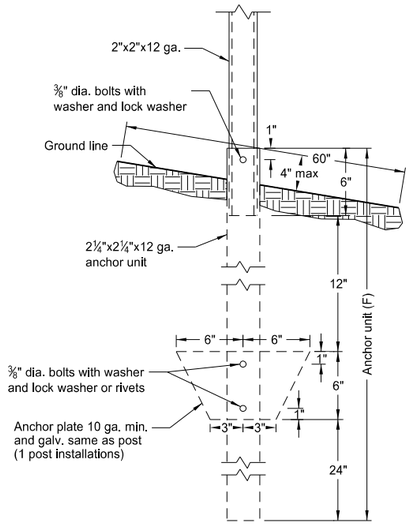
- Delineator Drum
- Type III Barricade
- Flagger
- Sign
- Work/Hazard Area

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

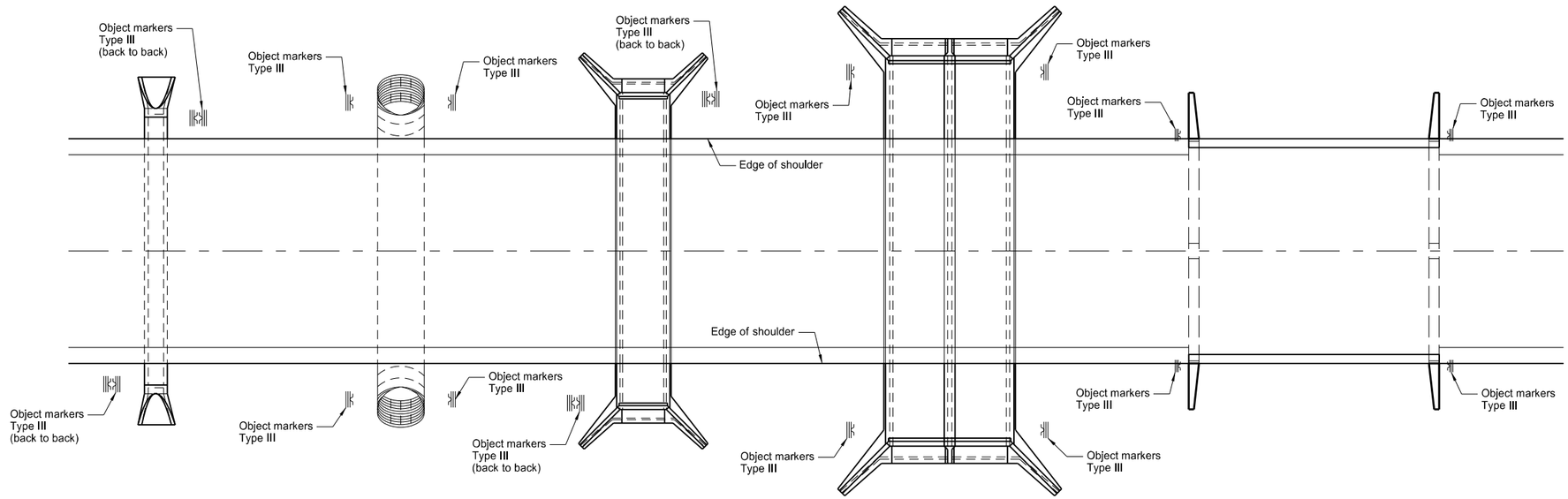
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 03/13/14 and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS

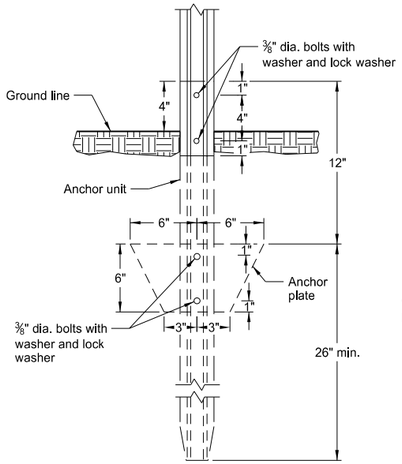
D-754-82



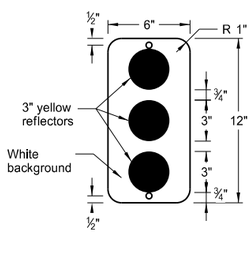
Perforated Tube Anchor Unit Assembly



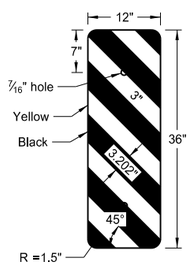
Pipe Culverts 10' max | Pipe Culverts greater than 10' | Box Culverts 10' max | Box Culverts greater than 10' | Bridges (B)



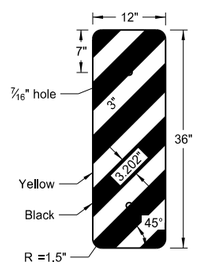
U-Channel Anchor Unit Assembly



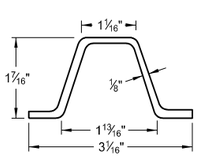
Object Marker
OM2-1V (C)
Type II



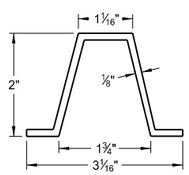
Object Marker Left
OM-3L (C)
Type III



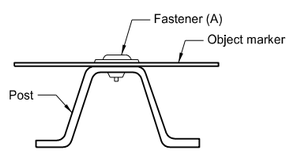
Object Marker Right
OM-3R (C)
Type III



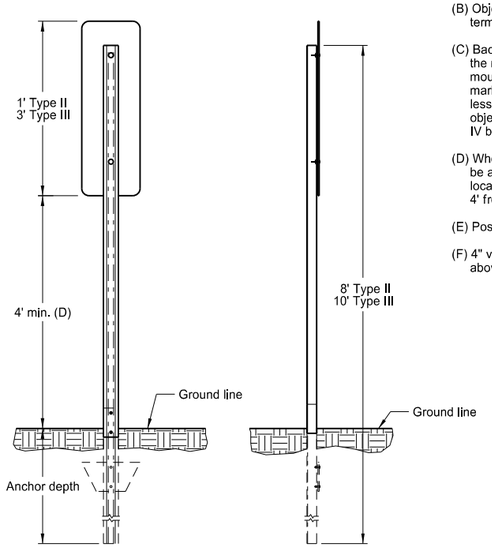
Steel Post Detail (E)
Approx. 2 lb/ft



Aluminum Post Detail (E)
Approx. 0.88 lb/ft



Fastener Detail



Object Marker
Installation Detail

Notes:

(A) The fastener shall be ⅜" dia. with flat washer having a min. outside dia. of 1 3/16". Fasteners shall be tension pin type or other non-rust vandal resistant fastener.

(B) Object markers are not required if approach guardrail is installed with reflectors and end terminal with impact head object markers.

(C) Back to back mountings require two object markers. The 3" yellow reflector shall conform to the requirements of Section 894.06 B.2 of the Standard Specifications. Object markers to be mounted vertically on steel posts in front of the bridge railing on each side of highway to mark the horizontal clearance on all bridges where the distance between wheel guards is less than approach width. All sign backing material shall be .100" sheet aluminum. Type III object markers shall be ASTM Type XI sheeting. Type II object markers shall be ASTM Type IV background sheeting with ASTM Type XI reflectors.

(D) When an object marker is located 8' or less from shoulder or curb, vertical clearance shall be a minimum of 4' from the near edge of the traveled way to the bottom of the sign. If located more than 8' from the shoulder or curb the vertical clearance shall be a minimum of 4' from the ground to the bottom of the sign.

(E) Posts shall conform to Section 894.03 B of the Standard Specifications.

(F) 4" vertical clearance of anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and back and ahead of post.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-18-14	Revised Note C

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 7/18/14 and the original document is stored at the North Dakota Department of Transportation