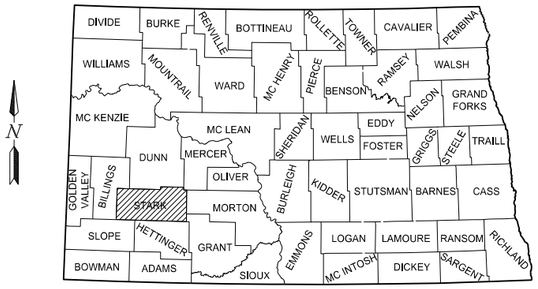
	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	21994	1	1



STATE COUNTY MAP

JOB #14
STARK COUNTY
NORTH DAKOTA

FEDERAL AID PROJECT
BRO-0045(066)

CMC 4537/94th Avenue Southwest
Removal of Structure, Precast RCB Culvert, Grading & Incidentals
Existing Structure No. 45-138-21.0
New Structure No. 45-138-21.1
6 miles east and 2 miles north of Lefor

GOVERNING SPECIFICATIONS

2020 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

PROJECT LENGTH

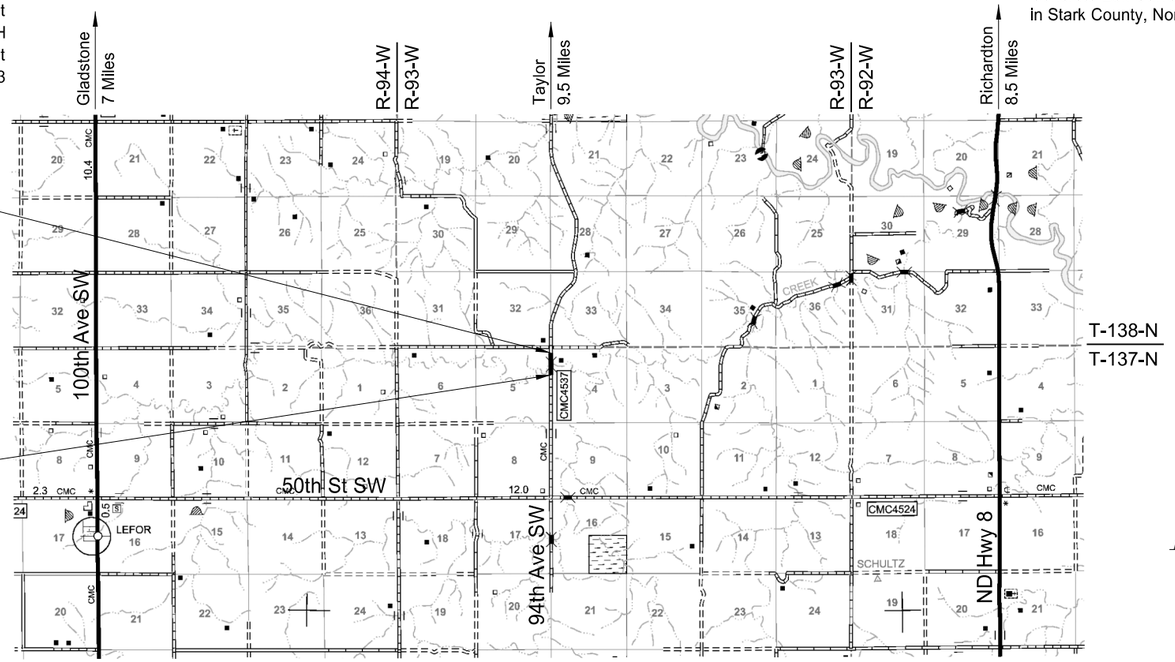
Project	Gross Miles	Net Miles
BRO-0045(066)	0.114	0.114

This project consists of Removing the existing structure, the installation of a 21' x 12' x 58' Precast Reinforced Concrete Box Culvert, and 0.114 miles of grading located in Stark County, North Dakota.

DESIGN DATA

Traffic ~ BRO-0045(066)		Average Daily Passenger	Average Daily Trucks	Average Daily Total	Est. 30th Max. Hr.
Current Traffic	2020	<100	-	<100	-
Forecast Traffic	2020	<100	-	<100	-

Clear Zone Distance:	14 Feet
Design Speed:	45 MPH
Minimum Sight Dist. for Stopping:	360 Feet
Structure Design Loading:	HL-93



END PROJECT BRO-0045(066):

Sta 115+50.00. A point 1626.08 feet south and 84.29 feet west of the Noutheast Corner of Section 5, Township 137 N, Range 93 W of the 5th P.M., Stark County, North Dakota.

BEGIN PROJECT BRO-0045(066):

Sta 109+50.00. A point 2225.68 feet south and 99.61 feet west of the Noutheast Corner of Section 5, Township 137 N, Range 93 W of the 5th P.M., Stark County, North Dakota.

SURVEY FIELD BOOK: C-765 Pgs 21-28

DESIGNERS

Andrew Krebs, PE

Wade Thompson, PE

Charlie Bowen, EI

This document was originally issued and sealed by Andrew J. Krebs Registration Number PE-7876 on August 21, 2020, and the original document is stored at KLJ, Dickinson, ND.

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.

Andrew J. Krebs /s/

ANDREW J. KREBS, P.E.
KLJ ENGINEERING LLC

DATE 8/21/2020 REGISTRATION NUMBER PE-7876

677 27TH AVENUE EAST
DICKINSON, ND 58601
(701) 483-1284, FAX (855) 288-8055

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	2	1

TABLE OF CONTENTS

LIST OF STANDARD DRAWINGS

STANDARD NO.	DESCRIPTION
D-101-1, 2 & 3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20 & 21	Line Styles
D-101-30, 31 & 32	Symbols
D-101-40	Cross Section Legend
D-255-2	Erosion and Siltation Control – Erosion Control Blanket Installation
D-261-1	Erosion Control – Fiber Roll Placement Details
D-704-7	Breakaway Systems for Construction Zone Signs – Perforated Tube
D-704-8	Breakaway Systems for Construction Zone Signs – U Channel Post
D-704-9	Construction Sign Details – Terminal and Guide Signs
D-704-10	Construction Sign Details – Regulatory Signs
D-704-11	Construction Sign Details – Warning Signs
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-19	Road Closure and Lane Closure on a Two Way Road Layouts
D-704-22	Construction Truck and Temporary Detour Layouts
D-704-50	Portable Sign Support Assembly
D-714-22	Concrete Pipe, Cattle Pass, or Precast Concrete Box Culvert Ties

LIST OF SPECIAL PROVISIONS

SP #	DESCRIPTION
SSP 1	Temporary Erosion and Sediment Best Management Practices
SSP 2	Federal Migratory Bird Treaty Act
SSP 3	Local Agency Contracts
SP 103(20)	Temporary Water Diversion
PSP 23(20)	Permits and Environmental Considerations

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	6	1

PLAN NOTES

GENERAL NOTES

100-P01 **FENCES:** The County will attend to the removal of existing fences to the new highway right-of-way line.

105-P01 **UTILITIES:** The vertical and horizontal utility locations shown in the plans are approximate. Plan locations should not be interpreted as exact for bidding or construction purposes.

105-P02 **UTILITIES:** No utility relocations or adjustments are planned. All utilities on the project need to be protected and remain in existing location.

202-P01 **SALVAGE EXISTING AGGREGATE SURFACING:** Remove and stockpile the aggregate surfacing on the existing roadway for reuse. Use the material as a traffic surface gravel upon completion of the newly constructed roadbed, or as deemed necessary by the Engineer. Do not use the salvaged aggregate as foundation fill.

The salvaged material is included in the topsoil quantity. Include the salvaging, stockpiling, re-spreading and laying of the salvaged material in the unit price bid for “TOPSOIL”.

202-P02 **REMOVED ITEMS:** The following removal and salvage items will remain County property. Remove without further damage to these items:

- All signs and hazard markers.
- Bridge components (refer to Section 170 Sheet 2)
- All removed and salvaged items will be reviewed by the Engineer. If the Engineer determines that the item is not salvageable based on the condition, it becomes the Contractor’s property.

203-010 **SHRINKAGE:** 25 percent additional volume is included for shrinkage in earth embankment.

203-385 **AVERAGE HAUL:** No average haul has been computed for this project.

203-P01 **COMMON EXCAVATION-TYPE C:** In Section 203.04 E.4 insert the following after the 2nd paragraph:

The addition of water or drying of fill material is required when directed by the Engineer. Include all costs for drying and manipulation of the fill material in the unit price bid for “COMMON EXCAVATION-TYPE C”.

In cut areas, scarify and recompact the finish subgrade to a minimum depth of 12-inches. Manipulate substandard areas by working the soil as needed. Include all costs for this work in the unit price bid for “COMMON EXCAVATION-TYPE C”.

203-P02 **CONTRACT QUANTITY PAYMENT:** The quantities of “COMMON EXCAVATION-TYPE C” to be paid will be those shown in the Contract, provided the Project is constructed to the lines and grades shown on the plans.

When disagreement exists between the Contractor and the Owner as to the accuracy of the Plan quantities, either party may request that the quantities be measured. The party requesting the measurement is responsible for all costs associated with the measurement.

Any additional required excavation will be measured as per Section 203.05 A or 203.05 B of the Standard Specifications.

203-P03 **BACKSLOPE ROUNDING:** Round backslopes on all cut sections as shown on the Typical Sections. Include this work in the unit price bid for “COMMON EXCAVATION-TYPE C”.

203-P04 **TOPSOIL:** Include all costs associated with the stabilization of topsoil stockpiles in the unit price bid for “TOPSOIL”.

203-P05 **TOPSOIL-WETLAND:** Excavate the wetland mitigation area to the elevations as specified in Section 200. Place 6 inches of stockpiled topsoil from impacted Wetland 2a, Wetland 2b, and Wetland 3 in the proposed wetland mitigation area. Include all associated costs for the wetland mitigation and any necessary manipulating and drying of material in the unit price bid for “TOPSOIL-WETLAND”.

Stockpiled topsoil from impacted Wetlands 2a, 2b, and 3 spread on the proposed wetland mitigation area will be used as the seed source for the establishment of wetland vegetation. In addition, furnish wetland seed mix according to Section 251.03 F of the Standard Specifications and seed both the temporary wetland impacts and the mitigation area after placing wetland topsoil in the mitigation area. Include all associated costs with seeding temporary wetland impacts and the mitigation area in the unit price bid for “WETLAND SEED”.

203-P06 **COMMON EXCAVATION-SUBCUT:** 100 CY of “COMMON EXCAVATION-SUBCUT” has been provided, if needed, for use to remove existing unsuitable material in the roadbed as determined by the Engineer. The Engineer will direct the location and actual quantity of “COMMON EXCAVATION-SUBCUT”. Backfill subcut areas with suitable onsite material. Spread the subcut material in the fills outside the main roadbed, or outside the road right of way, not adjacent to the construction site, in accordance with Section 107.17 of the Standard Specifications. The unit price bid for “COMMON EXCAVATION-SUBCUT” will govern regardless of the quantity used. An increase or decrease from plan quantity will not be accepted as a reason to negotiate any pay adjustment under this bid item. The bid item “COMMON EXCAVATION-SUBCUT” may be eliminated at the discretion of the Engineer.

203-P07 **BORROW-EXCAVATION:** Density and moisture requirements shall be the same as Common Excavation-Type C. Borrow material shall consist of approved natural compactable soil. The soil shall not be saturated or contain organic material.

251-P01 **SEEDING**: Seeding Class III shall consist of the following mixture:

Species	Lbs. of PLS/Acre
Alfalfa	9
Western Wheatgrass	4
Fairway Crested Wheatgrass	5
Slender Wheatgrass	2
Oats	10
Total	**30**

The “SEEDING CLASS III”, “TEMPORARY COVER CROP”, and “STRAW MULCH” quantities shown in Sections 76 & 77 are based on the calculated area between the edge of roadway and the limits of construction. They will be paid for at plan quantity. Additional seeding and mulching for disturbed areas used to facilitate construction or accommodate the Contractor’s method and means will be the responsibility of the Contractor with no additional cost to the project. This includes locations such as staging areas, stockpile sites, and any other temporary locations. Seed these areas with the same mixture shown above and mulch.

251-P02 **WETLAND SEED:** Wetland seeding areas will not be measured for payment unless changes are made in the field. Payment for “WETLAND SEED” will be at plan quantity.

BRO-0045(066)

CMC 4537/94th Ave SW

KLJ

Plan Notes

Stark County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
AK	AK	3316111

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0045(066)	6	2

PLAN NOTES

256-P01 **RIPRAP GRADE II:** Riprap Grade II will be paid according to designated length, width, and depth as shown on the plans unless otherwise designated by the Engineer.

261-P01 **FIBER ROLLS:** Fiber rolls have been provided for temporary and permanent erosion control. The temporary erosion control has been provided for placement prior to disturbing the topsoil or as indicated by the Engineer.

Preserve the temporary erosion control throughout the duration of the project. If the erosion control is damaged due to negligence, repair at the Contractor's expense.

Place permanent fiber rolls within the construction limits as construction progresses. Locations are shown in Section 77.

An additional 200 LF of Fiber Rolls 12IN have been provided for locations to be determined by the Engineer. Include all costs for labor, equipment, and materials necessary to complete this work and all costs to relocate fiber rolls as needed for construction related activities in the unit price bid for "FIBER ROLLS 12IN".

261-P02 **EROSION CONTROL SEQUENCING:** In areas where erosion control blankets and fiber rolls are both specified, follow the following installation sequence:

1. Trench for fiber rolls per Standard Drawing D-261-1
2. Install erosion control blanket per Standard Drawing D-255-2
3. Install fiber rolls per Standard Drawing D-261-1

302-P01 **AGGREGATE SURFACE COURSE:** County forces will haul, lay, & compact the 6 inches of aggregate surfacing, as noted on the Typical Sections. Coordinate grading operation with Stark County so that the surfacing can be placed within 48 hours after the finished grading is complete. The County is available to haul, lay, and compact Aggregate Surface Course from Monday through Thursday only.

The Contractor is responsible for all roadway maintenance from the project start through final acceptance. The only exception is if the County does not begin delivery of aggregate surface course within the 48 hours notice period, not including Friday through Sunday. The contact is Al Heiser at (701) 290-8429.

704-P01 **TRAFFIC CONTROL DEVICES LIST:** The traffic control devices list has been developed using the following layouts on the Standard Drawing for traffic control:

- Standard D-704-19, Type E: For road closure to all traffic. Detour is not provided.
- Standard D-704-22, Type K: For trucks hauling material.
- Standard Drawings D-704-7, 8, 9, 10, 11, 13, 14, and 50 are applicable.
- Traffic Control Layouts for construction are in Section 100 of the plans.

704-P02 **TRAFFIC CONTROL GENERAL:** Leave roadway open to local traffic during construction. Cover or remove signs that do not apply.

704-P03 **PRECAST RCB CULVERT INSTALLATION:** Close the roadway to all traffic during the installation of the box culvert as shown on Section 100 Sheet 3. Open the roadway to local traffic after the box culvert is backfilled. The roadway can be closed to all traffic for a maximum of 10 working days. If the roadway is not open to local traffic after 10 working days, the Engineer will assess liquidated damages of $1,000 per calendar day it remains closed.

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BRO-0045(066)

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Plan Notes

Stark County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
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ENVIRONMENTAL NOTES

ENVIRONMENTAL NOTES (EN): Stark County, the North Dakota Department of Transportation, and the Federal Highway Administration have made environmental commitments to secure approval of this project. The following environmental notes are requirements to comply with these commitments:

EN-1 SPAWNING RESTRICTION: Do not work within Plum Creek from April 15 to June 1.

EN-2 AQUATIC NUISANCE SPECIES (ANS): Equipment that was last used outside of North Dakota or within a Class I infested waterbody (identified on the North Dakota Game and Fish Department (NDGFD) website) requires an inspection by NDGFD. Notify the NDGFD at least 10 business days prior to pumps, watercraft, or any equipment entering a public water to allow the NDGFD sufficient time to inspect any and all such equipment for ANS. Contact the NDGFD ANS Coordinator, Jessica Howell by e-mail jmhowell@nd.gov for equipment inspections. Supply one of the following to the engineer as proof of compliance prior to work taking place in the water: (1) the NDGFD inspection report, (2) documented NDGFD correspondence (email or signed letter). If an inspection is not required, no follow up documentation is required.

EN-3 MIGRATORY BIRDS: Active migratory bird nests with eggs or chicks are protected by the Federal Migratory Bird Treaty Act. NDDOT's special provision, SSP 2 for compliance with the Federal Regulation is to be followed.

EN-4 TEMPORARY WETLAND IMPACT: Temporary impact areas within wetlands and or other waters are incorporated into the plans for this project. Remove temporary fill placed and sedimentation in wetlands or other waters. Restore these wetlands to preconstruction contours.

EN-5 WETLAND MITIGATION: Wetland mitigation is required for unavoidable permanent wetland impacts. The wetland mitigation plan is incorporated into the plans for this project. After completion of the mitigation area, the Engineer will complete the Onsite Mitigation Certification Form SFN 61042. Any sedimentation occurring within the mitigation area will be removed.

EN-6 CONSTRUCTION DEBRIS: Take steps to prevent construction debris from falling into the waterway.

NOTIFICATIONS TO BE FILED BY CONTRACTOR:

EN-7 An Asbestos Survey was completed by a certified inspector from KLJ on August 22, 2018. Based on visual inspection of the site, no building or structure materials were determined to contain asbestos. The results from the Asbestos Survey are available upon request from the Engineer. Complete and submit North Dakota Department of Health SFN 17987 Asbestos Notification of Demolition and Renovation.

PERMITS REQUIRED:

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

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

North Dakota Department of Environmental Quality – NDPDES Permit
Status: To be obtained by the Contractor prior to construction. Owner is to be listed as Stark County on the permit.

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BRO-0045(066)

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Environmental Notes

Stark County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
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ESTIMATE OF QUANTITIES

Spec	Code	Description	Unit	Total Quantities
103	0100	CONTRACT BOND	LSUM	1
201	0330	CLEARING & GRUBBING	LSUM	1
202	0105	REMOVAL OF STRUCTURE	LSUM	1
203	0103	COMMON EXCAVATION-TYPE C	CY	691
203	0109	TOPSOIL	CY	830
203	0121	TOPSOIL-WETLAND	CY	66
203	0138	COMMON EXCAVATION-SUBCUT	CY	100
203	0140	BORROW-EXCAVATION	CY	3,566
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	418
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
216	0100	WATER	MGAL	109
251	0300	SEEDING CLASS III	ACRE	1.14
251	1000	WETLAND SEED	ACRE	0.10
251	2000	TEMPORARY COVER CROP	ACRE	1.24
253	0101	STRAW MULCH	ACRE	2.48
255	0103	ECB TYPE 3	SY	662
256	0200	RIPRAP GRADE II	CY	74
261	0112	FIBER ROLLS 12IN	LF	1,260
261	0113	REMOVE FIBER ROLLS 12IN	LF	540
606	2112	21FT X 12FT PRECAST RCB CULVERT	LF	58
606	6112	21FT X 12FT PRECAST RCB END SECTION	EA	2
702	0100	MOBILIZATION	LSUM	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	316
704	1052	TYPE III BARRICADE	EA	8
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	635
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	149
900	1000	TEMPORARY STREAM DIVERSION	EA	1

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0045(066)	10	1

BASIS OF ESTIMATE AND EARTHWORK SUMMARY

Topsoil
4” Depth

Wetland Topsoil
6” Depth

Box Culvert Excavation
Limits as shown on the Plans and Specifications

Foundation Fill – (Volume +25%)
RCB Culvert: 3.0’ Depth; Limits same as Box Culvert Excavation

Water
50 MGal for Dust Control
10 Gal/CY for Embankment
40 Gal/CY for Foundation Fill

Temporary Cover Crop with Straw Mulch & Seeding Cl III with Straw Mulch
Area between the edge of roadway and limits of construction less riprapped area is estimated to be 1.24 acres
Seeding and mulching limits include all disturbed areas along the proposed project

Riprap Grade II
1.5’ Depth; Length and Width as shown on the plans

Earthwork and Topsoil Summary					
Project	Excavation (CY)	Embankment (CY)	Borrow (CY)	Topsoil (CY)	Topsoil-Wetland (CY)
BRO-0045(066)	691	4,257	3,566	830	66

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

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BRO-0045(066)
CMC 4537/94th Ave SW

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Basis of Estimate and Earthwork Summary

Stark County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
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ND	BRO-0045(066)	11	1

EARTHWORK VALUES

BRO-0045(066)					
	End Area (SF)		Adjusted Volume (CY)		
Station	Exc	Fill	Exc	Fill	Mass Ordinate
109+50.00	15.24	2.07	0.0	0.0	0.0
110+00.00	54.60	1.36	64.7	4.0	60.7
110+50.00	14.78	46.86	64.2	55.8	69.1
111+00.00	10.05	194.77	23.0	279.7	-187.5
111+50.00	13.52	351.58	21.8	632.4	-798.1
112+00.00	36.93	341.04	46.7	801.6	-1553.0
112+50.00	58.50	294.82	88.4	736.0	-2200.6
112+79.00	0.00	905.78	31.4	806.0	-2975.1
112+80.00	0.00	162.45	0.0	24.7	-2999.9
112+91.00	0.00	141.42	0.0	77.4	-3077.2
113+02.00	0.00	121.84	0.0	67.0	-3144.3
113+03.00	0.00	788.64	0.0	21.1	-3165.4
113+13.00	19.15	256.57	3.5	242.0	-3403.8
113+50.00	47.46	58.56	45.6	269.9	-3628.1
114+00.00	46.02	35.91	86.6	109.3	-3650.8
114+50.00	47.96	22.67	87.0	67.8	-3631.6
114+90.00	61.38	14.49	81.0	34.4	-3585.1
114+95.00	56.77	12.95	10.9	3.2	-3577.3
115+00.00	16.64	11.46	6.8	2.8	-3573.4
115+50.00	14.76	7.38	29.1	21.8	-3566.1
			Volume (CY)		
			Exc	Fill	Mass Ordinate
Totals			691	4,257	-3,566

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BRO-0045(066)

CMC 4537/94th Ave SW

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Earthwork Values

Stark County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
AK	AK	3316111

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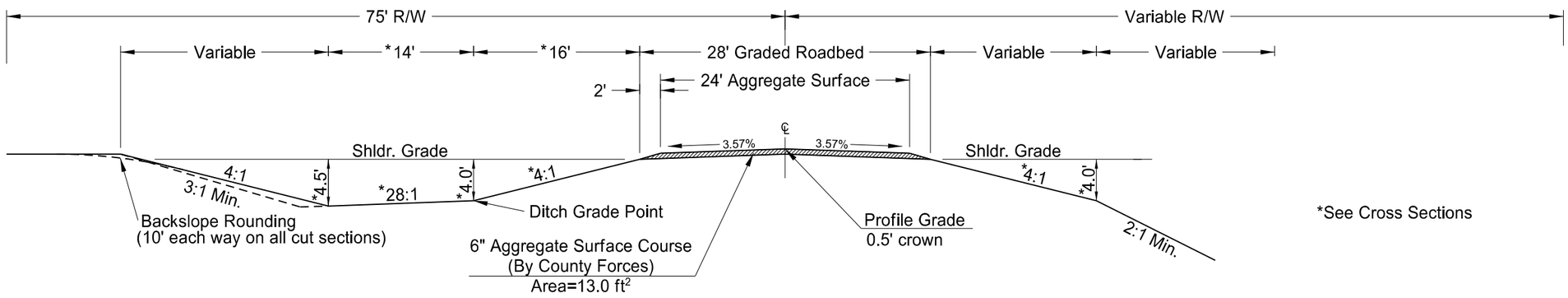
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	30	1



Cut Section

PROPOSED TYPICAL SECTION
Sta 109+50 to Sta 115+50

Fill Section

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BRO-0045(066)

CMC 4537/94th Ave SW

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Proposed Typical Sections

Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	3316111

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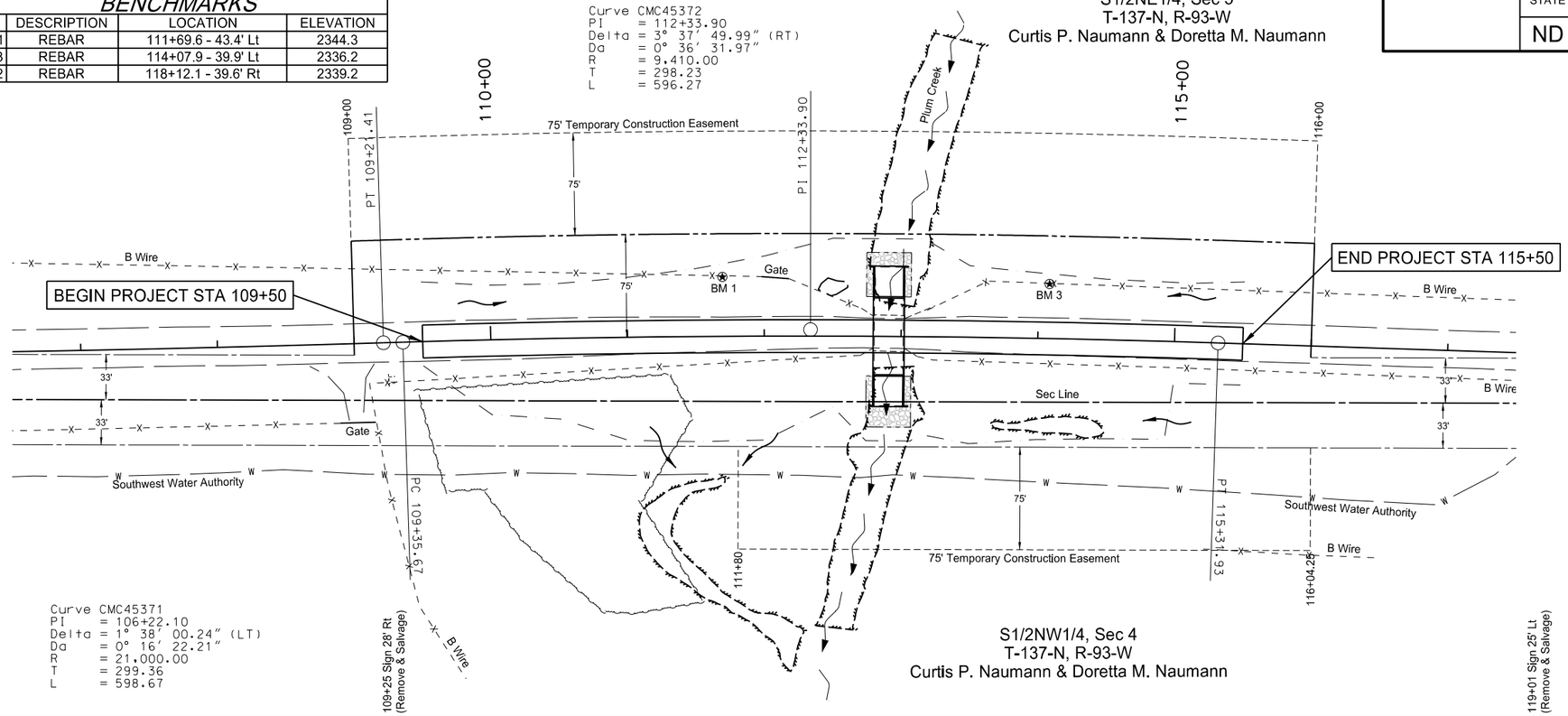
BENCHMARKS			
NO.	DESCRIPTION	LOCATION	ELEVATION
BM 1	REBAR	111+69.6 - 43.4' Lt	2344.3
BM 3	REBAR	114+07.9 - 39.9' Lt	2336.2
BM 2	REBAR	118+12.1 - 39.6' Rt	2339.2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	60	1



SCALE

Horizontal 1"=100'
Vertical 1"=10'

SURVEY COMPLETED USING NAVD 88 DATUM

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BRO-0045(066)

CMC 4537/94th Ave SW

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Plan & Profile
Sta 107+00 to 117+00

Stark County, ND

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AK	AK	3316111

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WETLANDS, MITIGATION AND ENVIRONMENTAL

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0045(066)	75	1

Wetland Impact Table

Wetland Number	Location	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impacts Acre(s)		USFWS Easement Impacts Acre(s)		Wetland Mitigation											
								Mitigation Required			USACE/11990 Bank		11990 Bank		USFWS Bank		Onsite			
				Temp.	Perm.	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)	Location	Acre(s)	Location	Acre(s)	Mitigation Location; Ratio	Acre(s)	Constructed Site #	Constructed Size Acre(s)
1	Sec.4, T137N, R93W	Natural	Yes	0.00	0.00			N	N	N										
2a	Sec.4, T137N, R93W	Natural	Yes	0.01	0.03			Y	N	N							Adjacent to WL2a & WL3 (1:1)	0.06	Site 1	0.06
2b	Sec.5, T137N, R93W	Natural	Yes	0.01	0.03			Y	N	N										
3	Sec.4, T137N, R93W	Natural	Yes	0.02	0.00			N	N	N										
4	Sec.5, T137N, R93W	Natural	Yes	0.00	0.00			N	N	N										
				0.04	**0.06**	**0**	**0**					**0**		**0**		**0**		**0.06**		**0.06**

[1] A wetland Jurisdictional Determination was issued by the USACE on 1/23/2019; NWO-2018-02143-BIS.

[2] 1199 Mitigation requirements - All impacts to natural wetlands (natural/jurisdictional and natural/non-jurisdictional), regardless of size, as well as impacts greater than 0.10 acre to wetlands require mitigation.
USACE Mitigation Requirements - All jurisdictional impacts greater than 0.10 acre to each resource (cumulative. eg 1a ,1b,1c..etc.) requires mitigation. Other Water impact greater than 300 linear feet requires mitigation.

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

Impact Summary Table

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	**Total (Acres)**	**Wetland Type**	**Total (Acres/Lf)**
Natural/JD	0.06	**Temporary JD**	0.04
Natural/Non-JD	0.00	**Non-JD Temporary**	0.00
Artificial/JD	0.00	**Permanent JD > 0.10**	0.00
Artificial /Non-JD	0.00	**Permanent OW**	0.00 ac/00 ft.
Total	**0.06**	**Temporary OW**	0.00 ac/00 ft.

Mitigation Summary Table

	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only					
EO 11990 Only	Onsite	0.06			
USACE/11990					
USFWS					
	Total	**0.06**	**0**	**0**	**0**

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BRO-0045(066)

CMC 4537/94th Ave SW

KLJ

Wetlands, Mitigation and Environmental Wetlands 1-4 Stark County, ND

DRWN. BY	CHKD. BY	PROJECT NO.
AK	AK	3316111

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	75	2

Wetland Delineated Existing

Wetland Impacts Permanent

Wetland Impacts Temporary

Proposed Wetland Mitigation

Proposed Riprap

S1/2NE1/4, Sec 5
T-137-N, R-93-W
Curtis P. Naumann & Doretta M. Naumann

105+00

Qtr Line 105+10.72

B Wire

RTK Gate

B Wire

Existing Road

Exst R/W

33'

33'

B Wire

Gate

Exst R/W

Southwest Water Authority

Qtr Line

PI 106+22.10

109+00

PT 109+21.41

110+00

75' Temporary Construction Easement

75'

Ppsd R/W

Const Limits

75'

Gate

BM 1

Begin Project
Sta 109+50

Proposed 21'x12'x58' RCB Culvert
with Sloped End Sections

Const Limits

PC 109+35.67

B Wire

Delineated Wetland 1

Wetland 1
Permanent Impacts = 0.00 Acre
Temporary Impacts = 0.00 Acre

S1/2NW1/4, Sec 4
T-137-N, R-93-W
Curtis P. Naumann & Doretta M. Naumann

PI 112+33.90

Plum Creek

Delineated Wetland 2b

Wetland 2b
Permanent Impacts = 0.03 Acre
Temporary Impacts = 0.01 Acre

Proposed Riprap

BM 3

Existing Structure

Proposed Riprap

Sec Line

Delineated Wetland 3

Wetland 2a
Permanent Impacts = 0.03 Acre
Temporary Impacts = 0.01 Acre
Proposed Mitigation = 0.06 Acre

75' Temporary Construction Easement

111+80

Delineated Wetland 2a

115+00

PT 115+31.93

116+00

Wetland 4
Permanent Impacts = 0.00 Acre
Temporary Impacts = 0.00 Acre

Delineated Wetland 4

Lot Line 118+33.87

End Project
Sta 115+50

B Wire

33'

B Wire

BM 2

Southwest Water Authority

116+04.28

B Wire

Lot Line

Wetland 3
Permanent Impacts = 0.00 Acre
Temporary Impacts = 0.02 Acre

SCALE
1"=100'

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BRO-0045(066)

CMC 4537/94th Ave SW

KLJ

Wetlands, Mitigation and Environmental
Wetlands 1-4
Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	3316111

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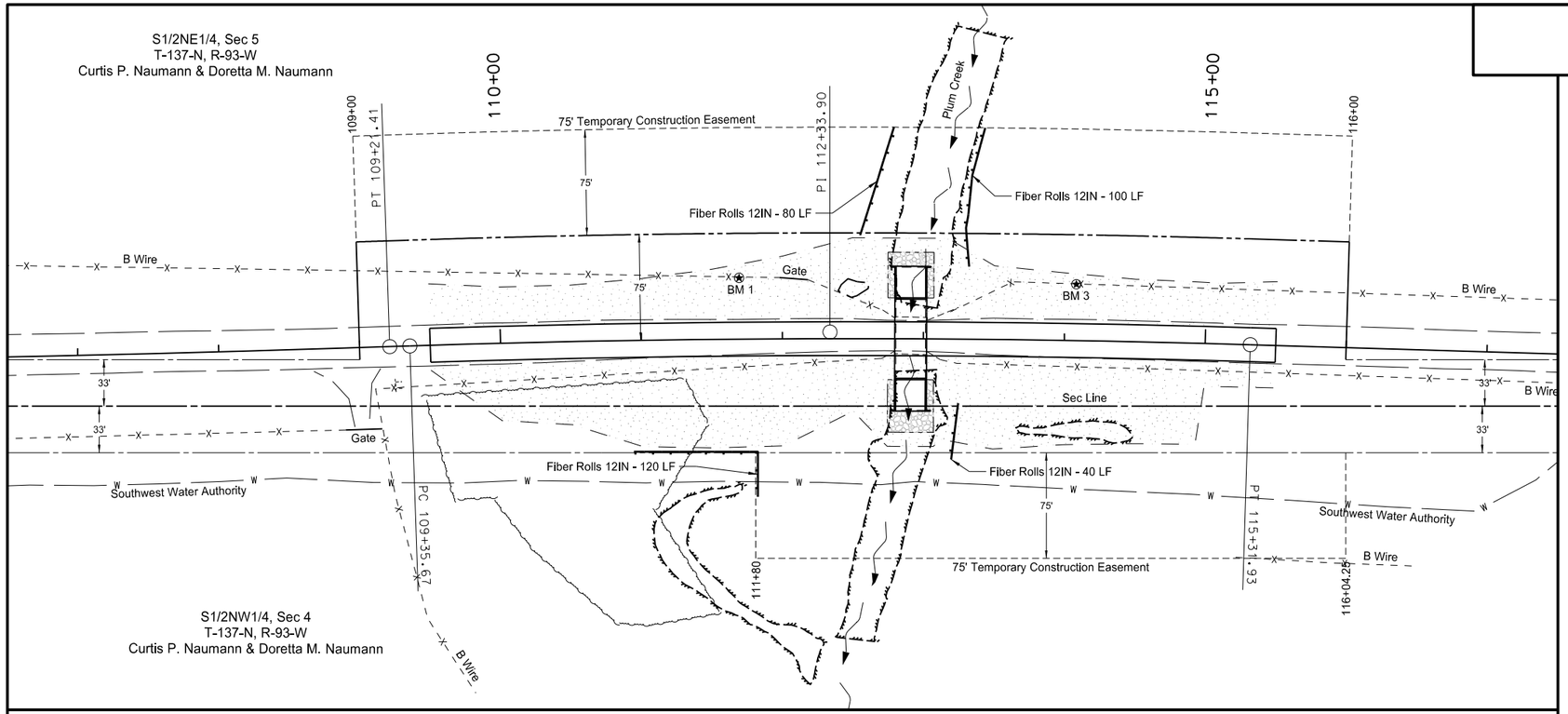

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0045(066)	76	1

TEMPORARY COVER CROP
Sta 109+50 to 115+50 — 1.24 ACRE

STRAW MULCH
Sta 109+50 to 115+50 — 1.24 ACRE

FIBER ROLLS 12IN/REMOVE FIBER ROLLS 12IN

Sta 110+94 to 111+82 Rt	120 LF
Sta 112+55 to 112+79 Lt	80 LF
Sta 113+20 to 113+25 Rt	40 LF
Sta 113+30 to 113+42 Lt	100 LF
	TOTAL = 340 LF

Temporary Cover Crop & Straw Mulch

Fiber Rolls 12IN

SCALE
1"=100'

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BRO-0045(066)

CMC 4537/94th Ave SW

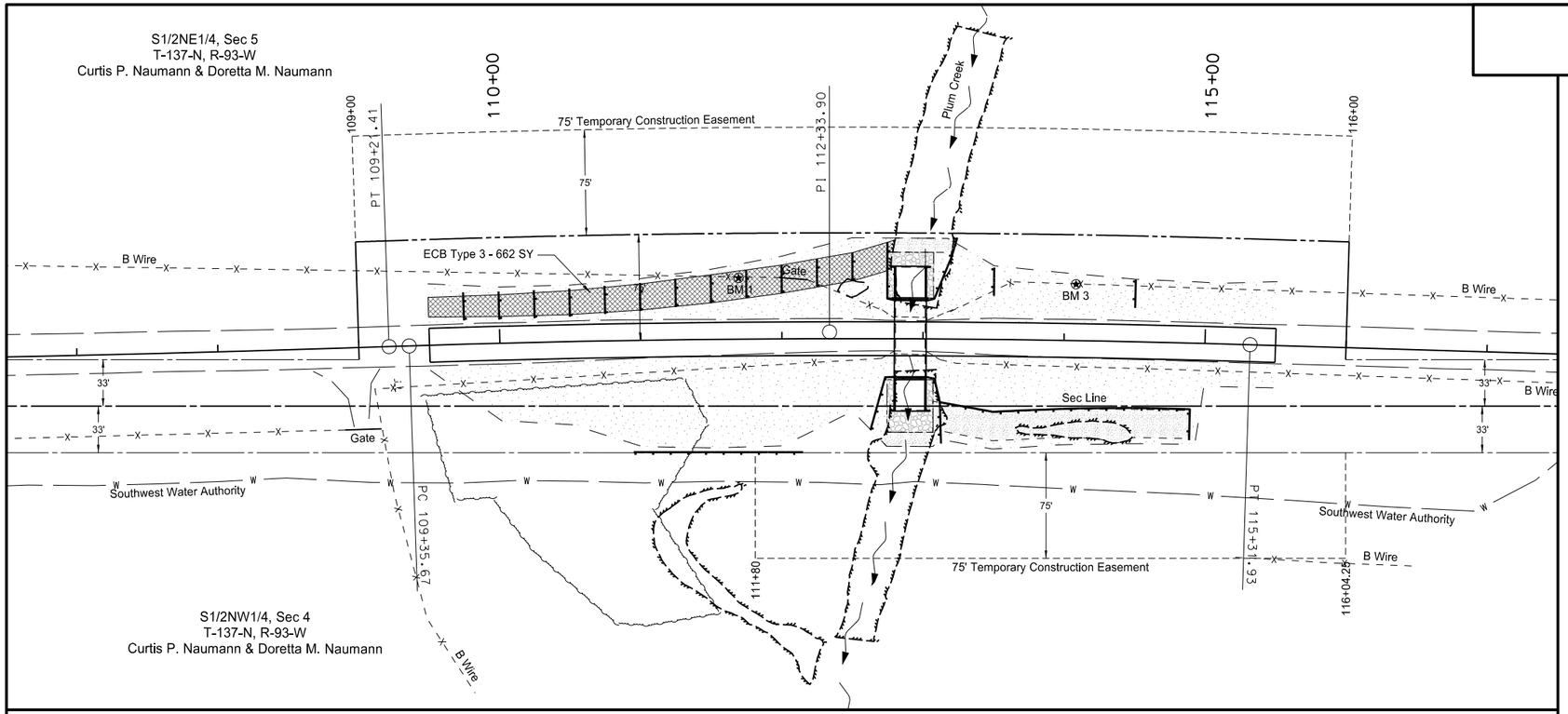
KLJ

Temporary Sediment and Erosion Control

Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	3316111

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0045(066)	77	1



SEEDING CLASS III

Sta 109+50 to 115+50	1.14 ACRE

WETLAND SEED

Sta 112+69 to 114+90 Rt	0.09 ACRE
Sta 112+78 to 113+21 Lt	0.01 ACRE
	TOTAL = 0.10 ACRE

STRAW MULCH

Sta 109+50 to 115+50	1.24 ACRE

ECB TYPE 3

Sta 109+50 to 112+80 Lt	662 SY

FIBER ROLLS 12IN

Sta 109+75 to 112+50 Lt (25' Spacing)	240 LF
Sta 110+94 to 112+14 Rt	120 LF
Sta 112+63 to 114+91 Rt	200 LF
Sta 112+75 to 113+24 Lt	120 LF
Sta 113+50 Lt	20 LF
Sta 114+50 Lt	20 LF
	TOTAL = 720 LF

Seeding Class III & Straw Mulch

Wetland Seed & Straw Mulch

ECB Type 3

Fiber Rolls 12IN

SCALE
1"=100'

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BRO-0045(066)

CMC 4537/94th Ave SW

KLJ

Permanent Sediment and Erosion Control

Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	3316111

ALIGNMENT SURVEY COORDINATE DATA - CMC 4537/94TH AVE SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0045(066)	81	1

HORIZONTAL ALIGNMENT

POINT	STATION	NORTHING	EASTING	LATITUDE	LONGITUDE	DESCRIPTION
POT	100+00.00	385,921.71	1,483,717.26	46°42'30.761" N	102°25'57.497" W	
PC	103+22.74	386,244.38	1,483,723.93	46°42'33.947" N	102°25'57.515" W	
PI	106+22.10	386,543.68	1,483,730.12	46°42'36.902" N	102°25'57.532" W	
PT	109+21.41	386,843.02	1,483,727.77	46°42'39.855" N	102°25'57.671" W	
PC	109+35.67	386,857.28	1,483,727.65	46°42'39.996" N	102°25'57.678" W	
PI	112+33.90	387,155.50	1,483,725.31	46°42'42.938" N	102°25'57.817" W	
PT	115+31.93	387,453.28	1,483,741.86	46°42'45.881" N	102°25'57.684" W	
POT	122+34.61	388,154.87	1,483,780.85	46°42'52.814" N	102°25'57.373" W	

SURVEY CONTROL POINTS

POINT	NORTHING	EASTING	ELEVATION	LATITUDE	LONGITUDE	DESCRIPTION
1	378,489.32	1,462,272.67	2589.2	46°41'12.095" N	102°31'02.394" W	GPS 1
2	386,408.53	1,483,664.37	2400.9	46°42'35.552" N	102°25'58.427" W	RTK 1
BM1	387,091.98	1,483,685.32	2344.3	46°42'42.302" N	102°25'58.368" W	BM 1
BM2	387,730.85	1,483,796.97	2339.2	46°42'48.633" N	102°25'56.992" W	BM 2
BM3	387,331.07	1,483,695.90	2336.2	46°42'44.664" N	102°25'58.301" W	BM 3

NOTES: Survey is based upon North Dakota State Plane System, NAD83(96), South Zone, US Survey Feet
Coordinates are grid coordinates. Combined scale factor to go from Grid Distance to Ground Distance = 1.0001825333
Vertical Control Datum: North American Vertical Datum 1988 (NAVD 88), Geoid 12, derived from OPUS Solution

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☐ Assumed Coordinates

☒ All coordinates on this sheet are GRID coordinates.
They are dereived from the "North Dakota State Plane Coordinate System of 1983", NAD83(96). Units are in U.S. Survey Feet.

BRO-0045(066)

CMC4537/94th Ave SW

KLJ

Survey Coordinate and Curve Data

Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	JAC	3316111

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRO-0045(066)	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	**48"x24"**	**END ROAD WORK**	**2**	**26**	**52**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		70	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		43	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		36	
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	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	36"x48"	SPEED LIMIT __ (Portable only)		30	
R2-1-48	48"x60"	SPEED LIMIT __		39	
R2-1aP-24	24"x18"	MINIMUM FEE $80 (Mounted on Speed Limit post)		10	
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	**48"x30"**	**ROAD CLOSED (Mounted on barricade)**	**2**	**12**	**24**
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)		12	
R11-3a-60	**60"x30"**	**ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)**	**2**	**15**	**30**
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)		15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT		35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT		35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT		35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD		35	
W3-3-48	48"x48"	SIGNAL AHEAD		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"	LANE ENDS RIGHT or LEFT		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		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER LINE		35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	**48"x48"**	**TRUCKS ENTERING AHEAD or __ FT or _ MILE**	**2**	**35**	**70**
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or _ MILE		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		35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	__ FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	48"x48"	ROAD WORK AHEAD or _FT or _ MILE		35	
W20-2-48	48"x48"	DETOUR AHEAD or __ FT or _ MILE		35	
W20-3-48	**48"x48"**	**ROAD or STREET CLOSED AHEAD or __ FT or _ MILE**	**4**	**35**	**140**
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT or _ MILE		35	
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE		35	
W20-7-48	48"x48"	FLAGGER		35	
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back		5	
W20-52P-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE		35	
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE		35	
W21-6-48	48"x48"	SURVEY CREW		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-52-48	48"x48"	PAVEMENT BREAKS		35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	

SPECIAL SIGNS

SPEC & CODE			
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**316**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	
704-1048	PORTABLE RUMBLE STRIPS	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**8**
704-1060	DELINEATOR DRUMS	EACH	
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	STACKABLE VERTICAL PANELS	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	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.
http://www.dot.nd.gov/

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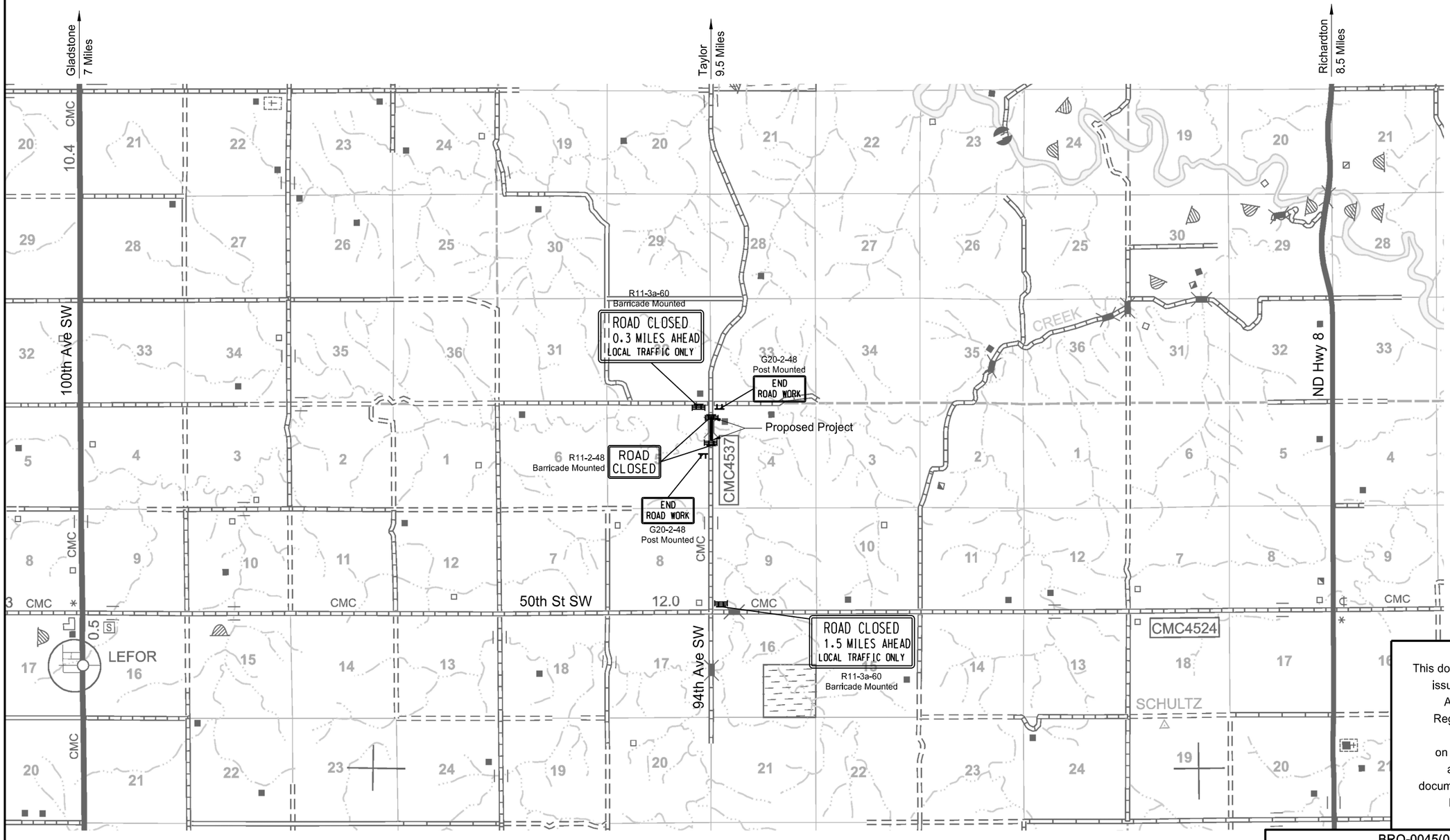
Traffic Control Devices List

Work Zone Traffic Control

Stark County, ND

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	100	2

CONSTRUCTION SIGN LAYOUT



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.

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BRO-0045(066)

CMC 4537/94th St SW

KLJ

Work Zone Traffic Control

Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	3316111

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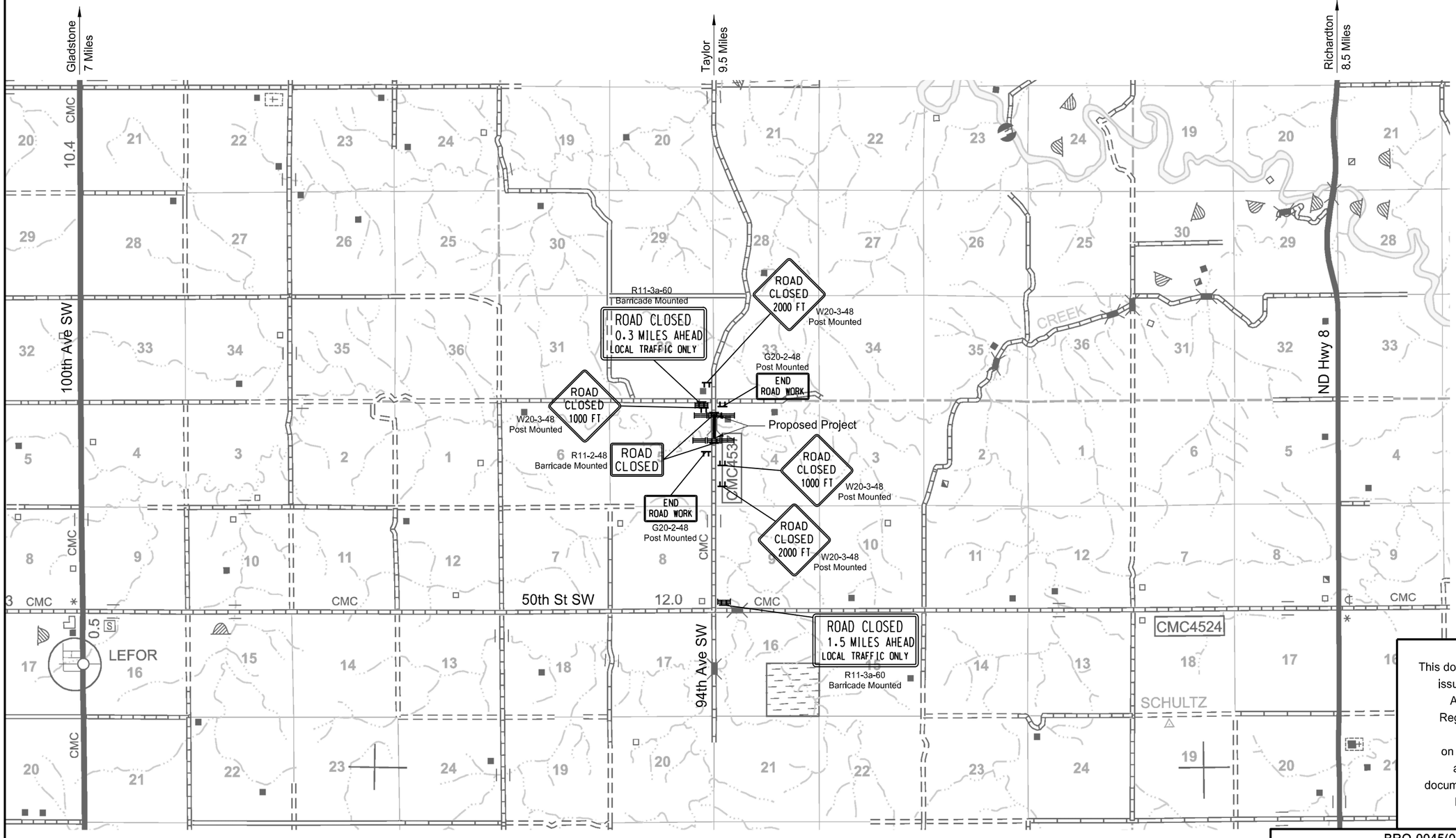
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	100	3

CONSTRUCTION SIGN LAYOUT



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.

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BRO-0045(066)

CMC 4537/94th St SW

KLJ

Work Zone Traffic Control
Road Closed to
All Traffic Detail
Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
AK	AK	3316111

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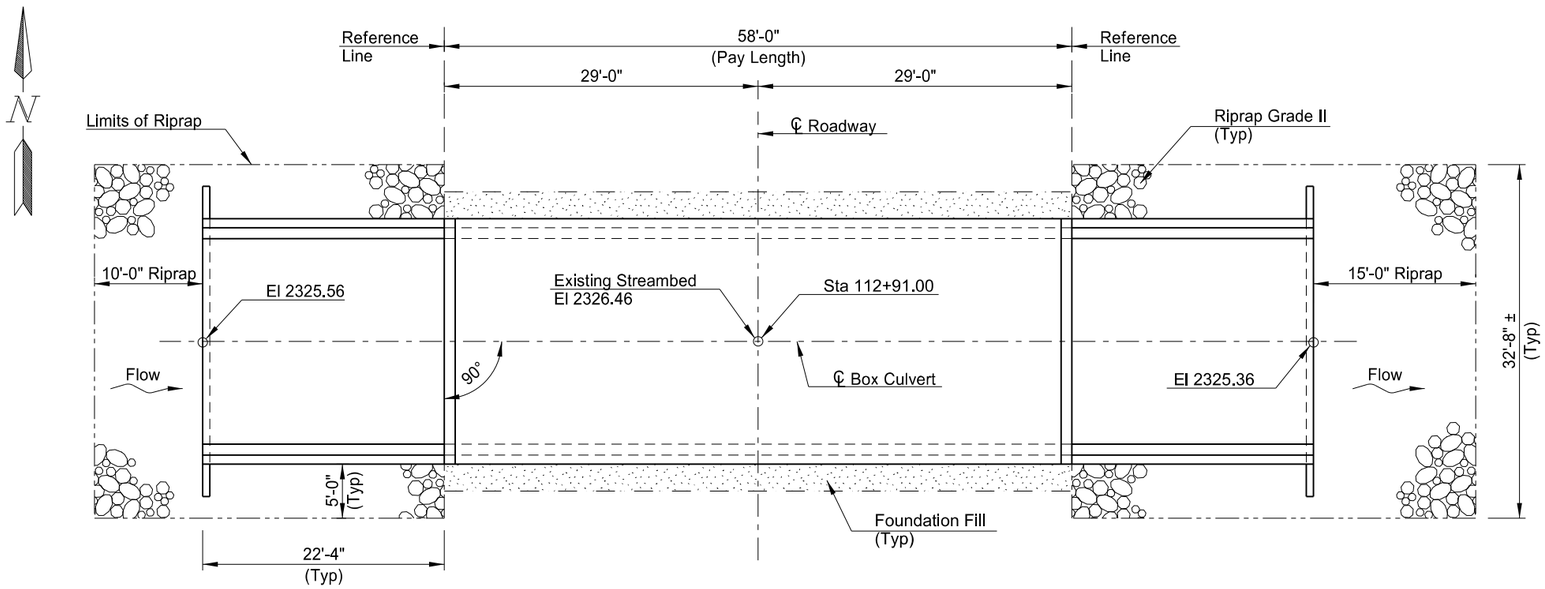
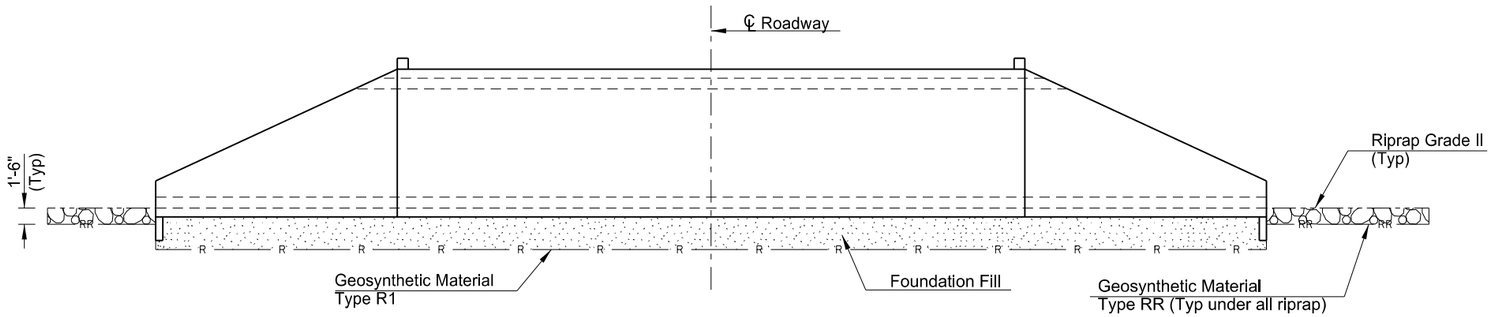
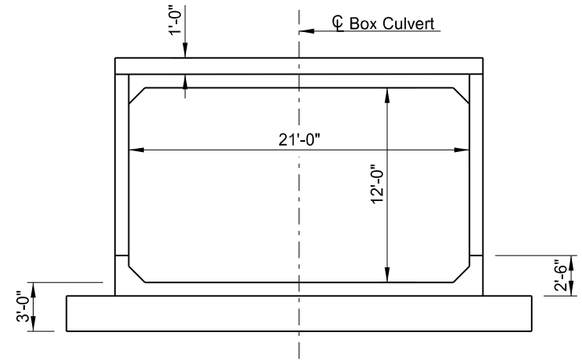
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	170	1



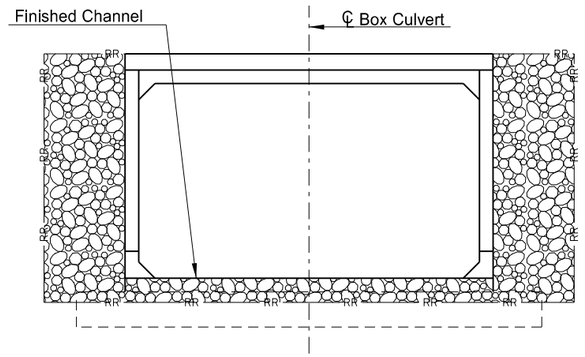
PLAN



ELEVATION



END VIEW
(Showing Dimensions)



END VIEW
(Showing Finished Section)

PRECAST BOX CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0105	REMOVAL OF STRUCTURE	L SUM	1
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	418
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
256	0200	RIPRAP GRADE II	CY	74
606	2112	21FT X 12FT PRECAST RCB CULVERT	LF	58
606	6112	21FT X 12FT PRECAST RCB END SECTION	EA	2
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	635
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	149

HYDRAULIC DATA:

Drainage Area	26.3	sq mi
Stream Gradient	0.0022	ft/ft
Design Frequency	25	yr
Design Discharge	1,280	cfs
Design Headwater Stage	2,335.6	ft
Design Tailwater Stage	2,332.9	ft
Velocity of Flow Under Bridge	9.8	fps
100-Year Frequency Discharge	2,010	cfs
100-Year Frequency Stage	2,338.5	ft
Overtopping Stage	N/A	ft
Overtopping Discharge	N/A	cfs

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

This document was originally issued and sealed by Wade M Thompson Registration Number PE-10777 on August 21, 2020, and the original document is stored at KLJ, Dickinson, ND.

BRO-0045(066)
Structure # 45-138-21.1
CMC 4537/94th Ave SW

KLJ

Precast Box Culvert Layout

Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
BJJ	CDB	3316111

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	170	2

STRUCTURAL NOTES

100 **SCOPE OF WORK:** Work at this site consists of removing a single span timber bridge and replacing it with a new single barrel 21' x 12' x 58' precast reinforced concrete box culvert.

202 **REMOVAL OF STRUCTURE:** The existing structure is a 23'-0" long by 26'-0" wide, single span bridge with timber decking and abutments.

The lump sum bid item, "REMOVAL OF STRUCTURE" includes all work required to remove all bridge components in accordance with the Standard Specifications.

Remove and salvage all timber decking components. Remove and dispose of all other bridge components in their entirety. Stockpile any salvaged materials in the county right of way. The county is responsible for hauling materials from the site. The contact is Al Heiser at (701) 290-8429.

210 **FOUNDATION FILL:** Delete Section 210.04 B.3 and insert the following:

3. Foundation Fill.
   Place foundation fill in layers not exceeding 6 inches to the required elevation. Thoroughly compact each layer with mechanical tamping equipment. Use water as required to achieve satisfactory compaction and stability.

If additional Foundation Fill is required, the additional area will be measured and applied a 25% shrinkage factor.

606 **PRECAST REINFORCED CONCRETE BOX CULVERT AND END SECTIONS:** Tie all barrel sections together with prestressing strands or 1" galvanized tie-bolts as shown on Standard Drawing D-714-22. If strands are used, use a minimum of six ½" diameter 270K strands for double box section with one strand in each corner and the center wall. Stress prestressing strands from opposite ends to a force of 20 kips. Protect prestressing cables against corrosion and grout their ends. If tie-bolts are used, the joints will require two ties per exterior wall located at the third points of the wall clear height.

The "21FT X 12FT PRECAST RCB END SECTION" bid item consists of the cutoff wall, parapet, and end sections. Attach the end sections to the last barrel section by the use of tie bolts or another approved method so the inside surface is smooth. After backfilling, end sections are to be in line. If the end sections are not in line remove and reset the end sections to be in proper alignment. Any foundation fill not shown in plans that is required to facilitate the installation of the end sections is to be included in price bid for "21FT X 12FT PRECAST RCB END SECTION".

The contractor must contact the precast suppliers prior to bid to determine if foundation fill or another similar off-site material is required for use when installing the end sections. Include all costs for supplying and installing the material needed for the suppliers design in the price bid for "21FT X 12FT PRECAST RCB END SECTION".

Install seven ¾" diameter threaded inserts and steel eye bolts (20 total) along top of faces of each end section to provide anchorage for fencing. A 3"x3"x⅜" hot dipped galvanized angle, as shown in Section 170, Sheet 3 of the plans, is to also be included at each end section. Anchorage locations and specifications are to be shown on the work drawings for approval by the Engineer. All costs associated with the threaded inserts, steel eye bolts, and galvanized angles are to be included in the price bid for "21FT X 12FT PRECAST RCB END SECTION."

All bolts, plates, angles, and studs are to meet ASTM A36. Nuts are to be a heavy hex in conformance with ASTM A563 and washers shall be ASTM F436, Type 1. Welded pipe sleeves are to conform to ASTM A53, Grade B. Welders are required to be properly certified for all shop and field welds. Coat all field welds with galvanizing paint. Galvanize all hardware according to AASHTO M 232. Galvanize structural steel after fabrication according to AASHTO M 111.

Cast holes at 3'-0" centers through the last end section and into the cutoff wall to receive ¾" ø reinforcing bars. Cast holes in the last barrel section at 1'-0" centers for ½" ø reinforcing bars to attach the parapet. Cast the parapet against the section. Install the bars according to the manufacturer's recommendation, with a high strength adhesive specifically intended for concrete anchorage, in accordance with Section 806.02 of the NDDOT Standard Specifications.

DESIGN LOADS:

A. HL-93 Loading
B. Maximum Fill Height = 5'-0"

WORK DRAWINGS: Submit the following work drawings to the Engineer of Record:

21FT X 12FT PRECAST RCB CULVERT

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BRO-0045(066)
Structure # 45-138-21.1
CMC 4537/94th Ave SW

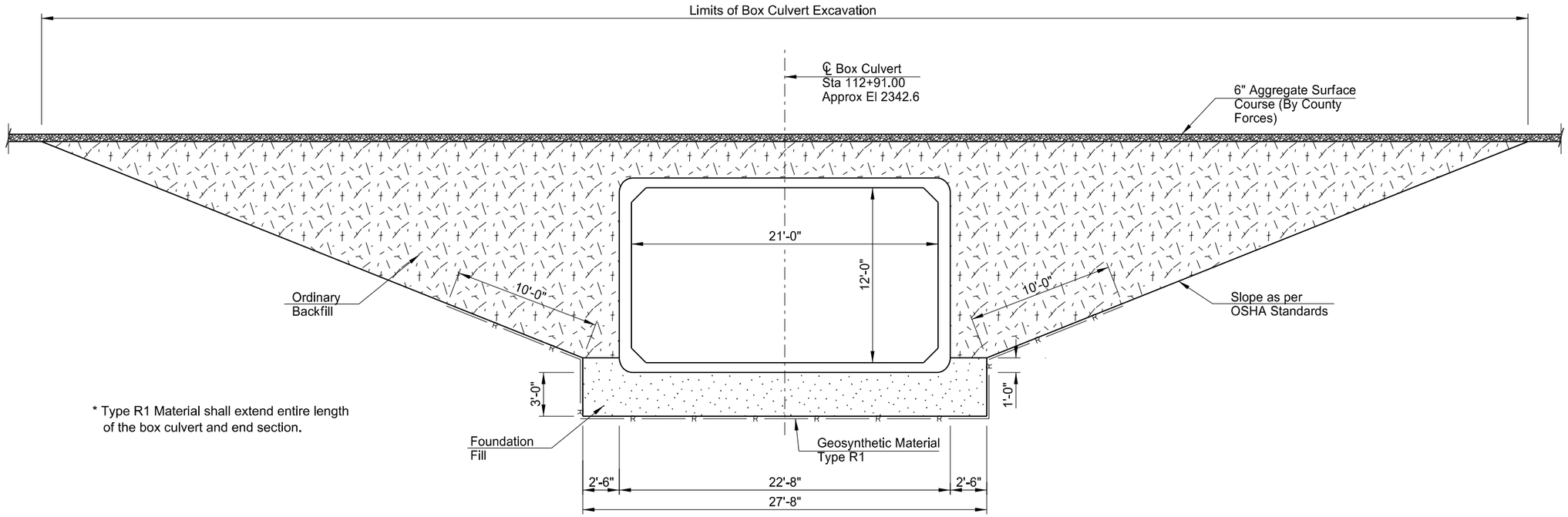
KLJ

Precast Box Culvert Structural Notes

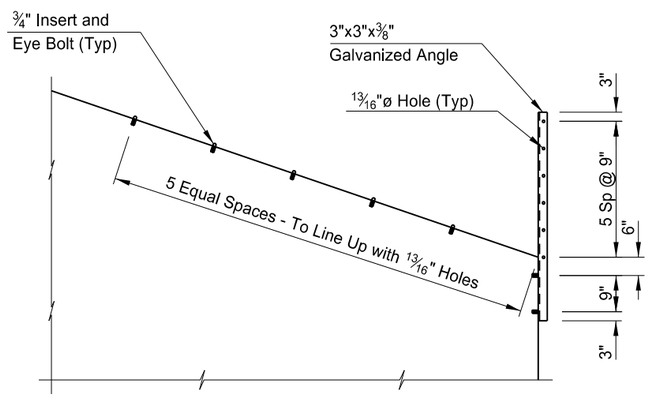
Stark County, ND

DRWN. BY	CHK'D. BY	PROJECT NO.
BJJ	CDB	3316111

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	170	3



BOX CULVERT EXCAVATION AND BACKFILL



END SECTION INSERT AND ANGLE DETAIL

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BRO-0045(066)
Structure # 45-138-21.1
CMC 4537/94th Ave SW

KLJ

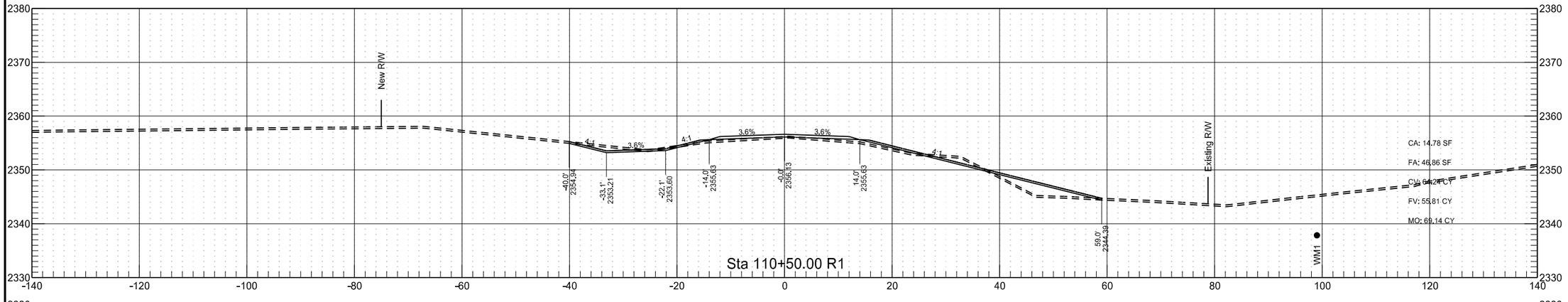
Precast Box Culvert Backfill Details

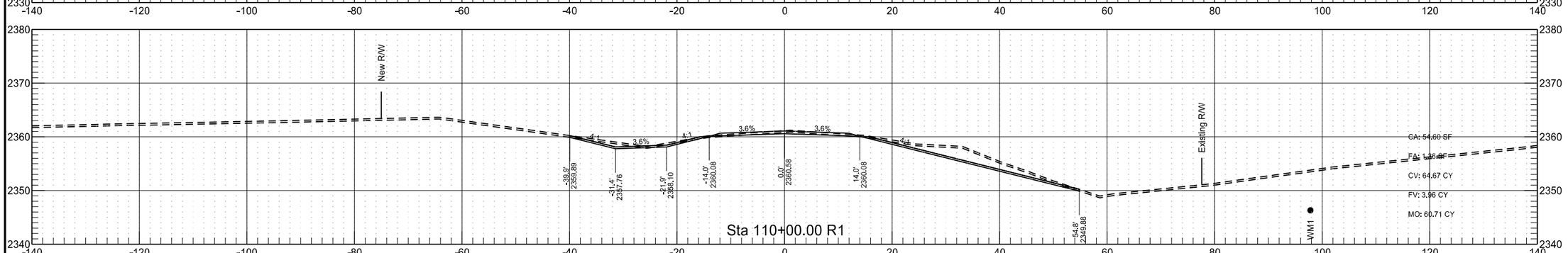
Stark County, ND

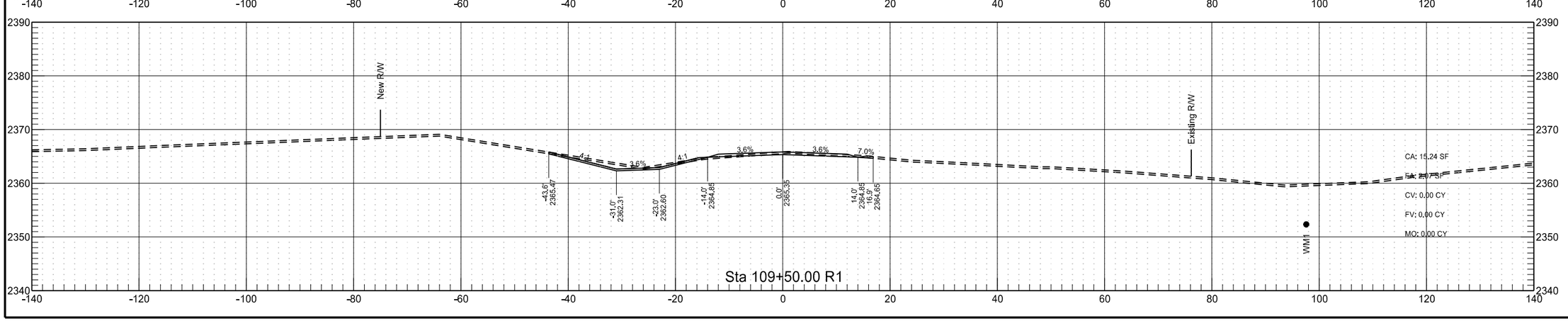
DRWN. BY	CHK'D. BY	PROJECT NO.
BJJ	CDB	3316111

Note: All elevations, offsets, and slopes, shown are top of proposed subgrade.

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	200	1

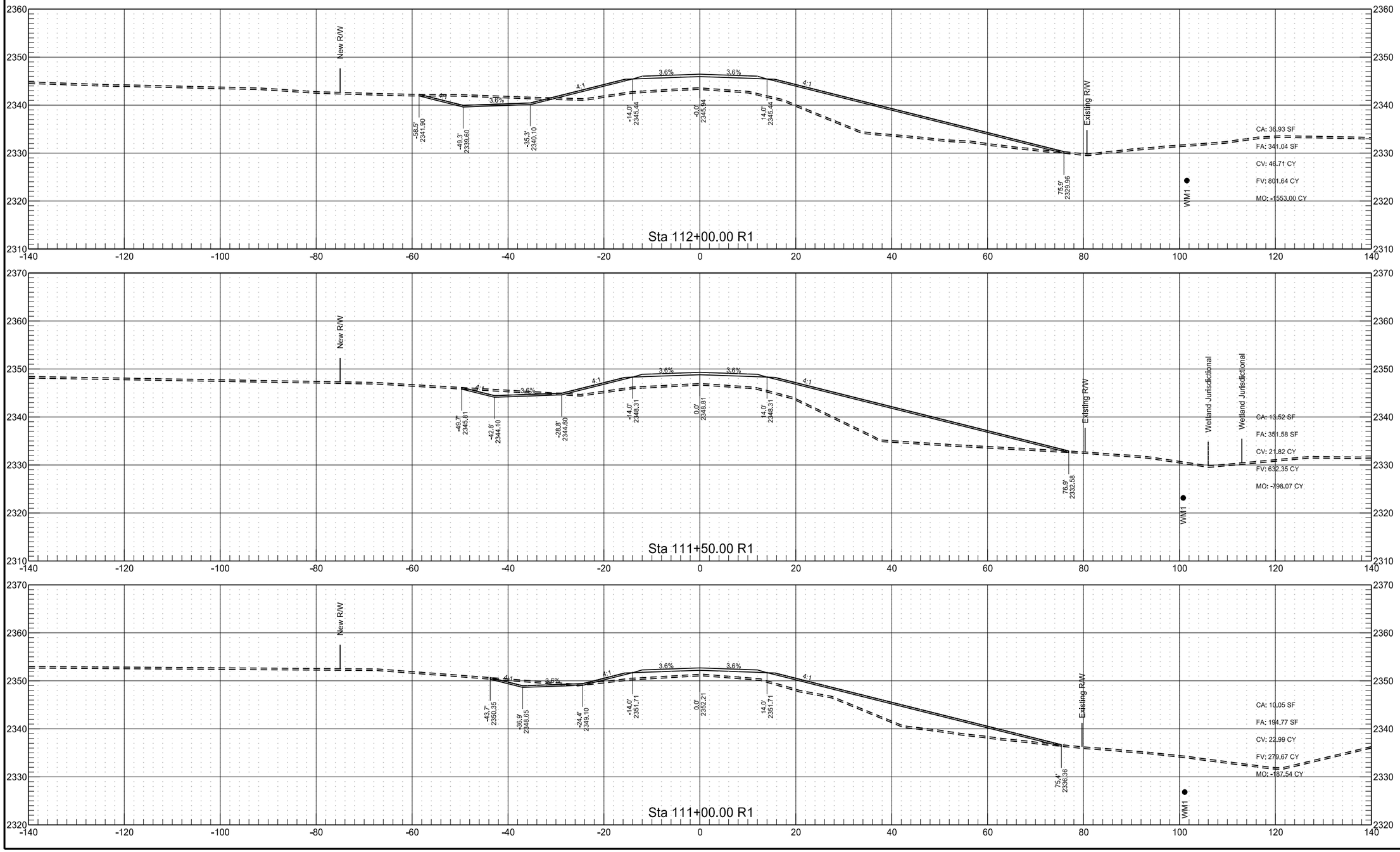






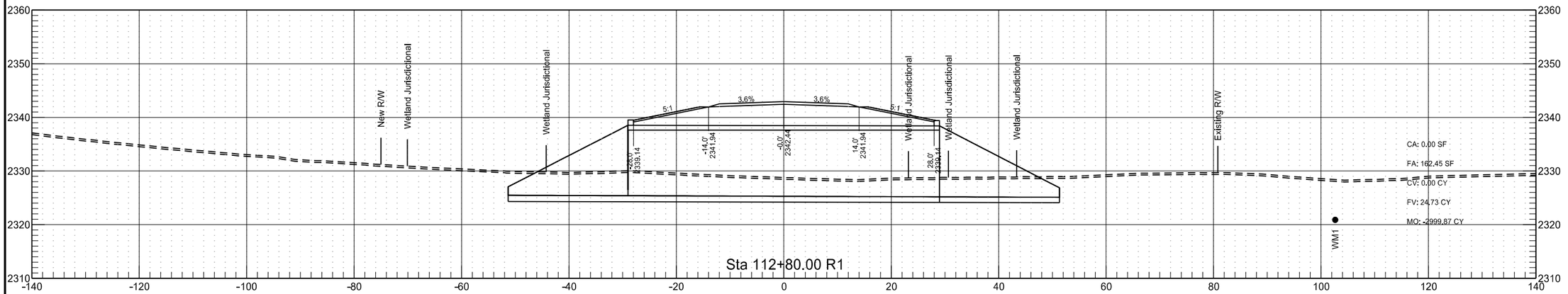
Note: All elevations, offsets, and slopes, shown are top of proposed subgrade.

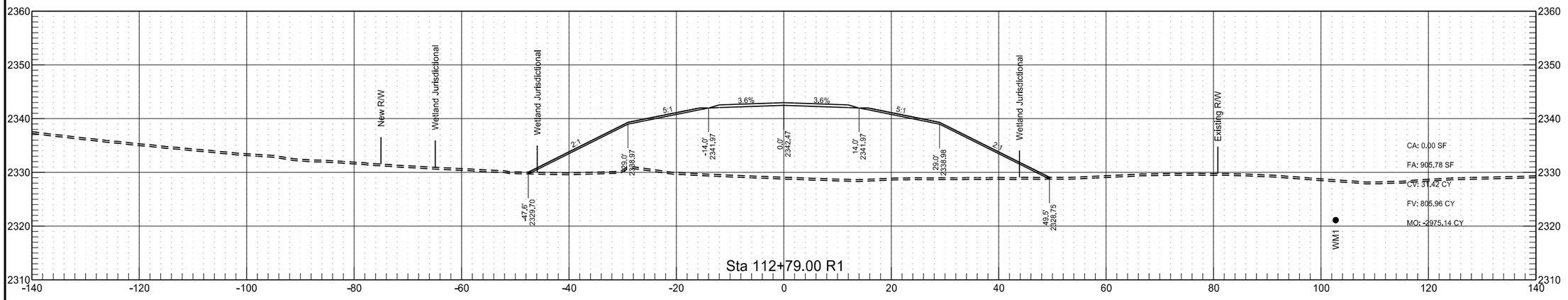
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	200	2

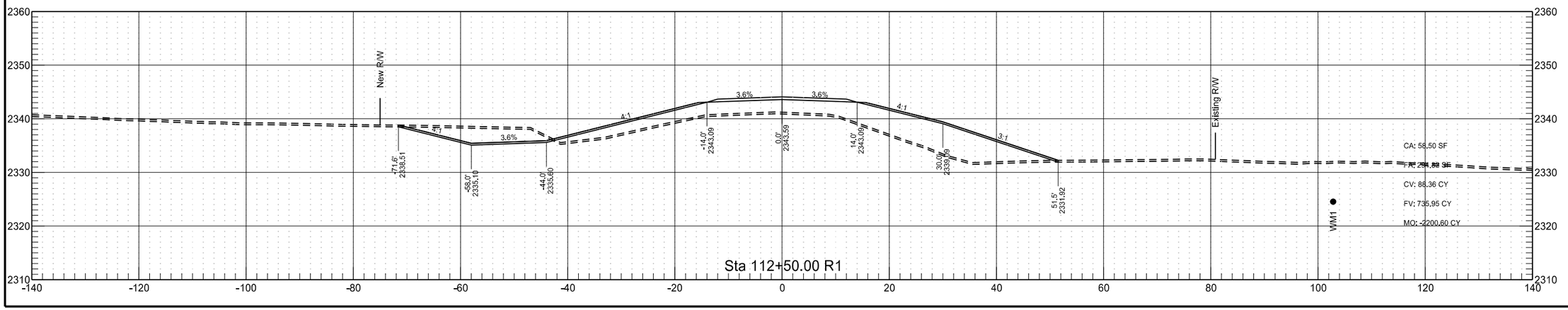


Note: All elevations, offsets, and slopes, shown are top of proposed subgrade.

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	200	3

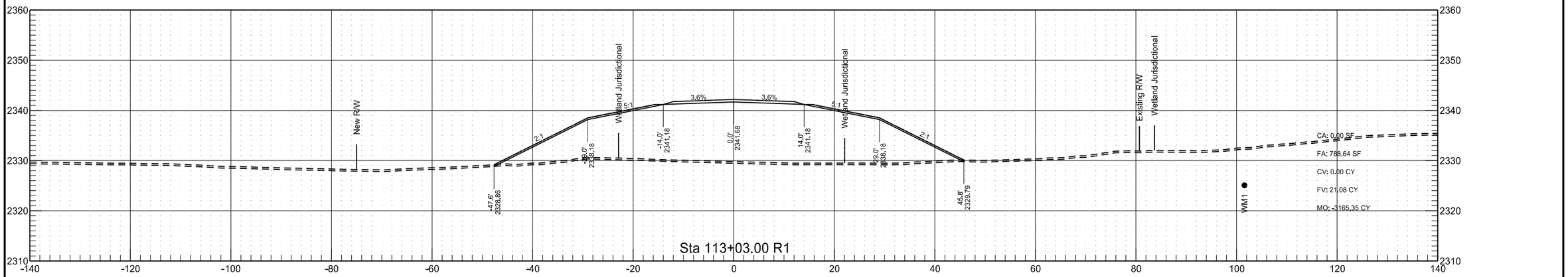


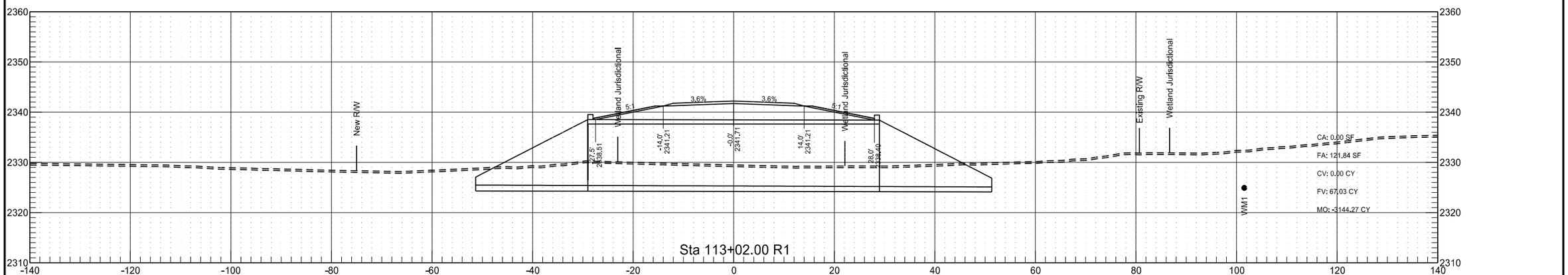


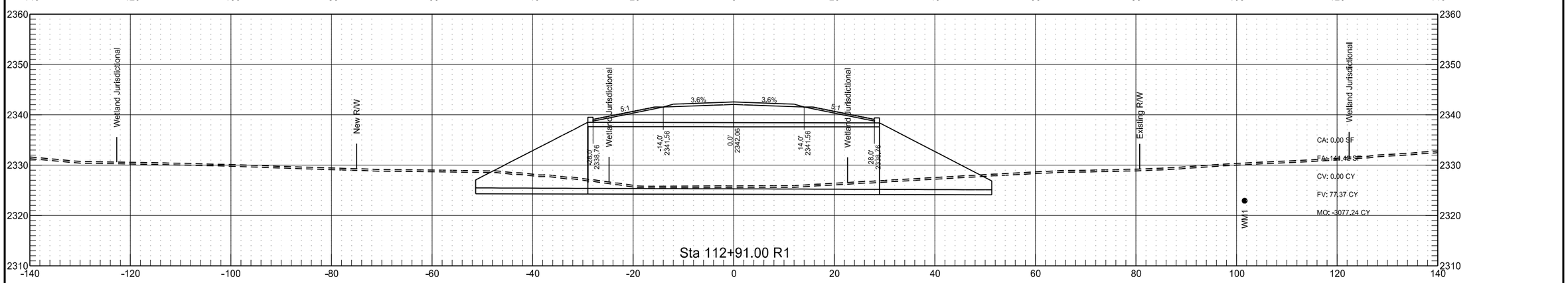


Note: All elevations, offsets, and slopes, shown are top of proposed subgrade.

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	200	4

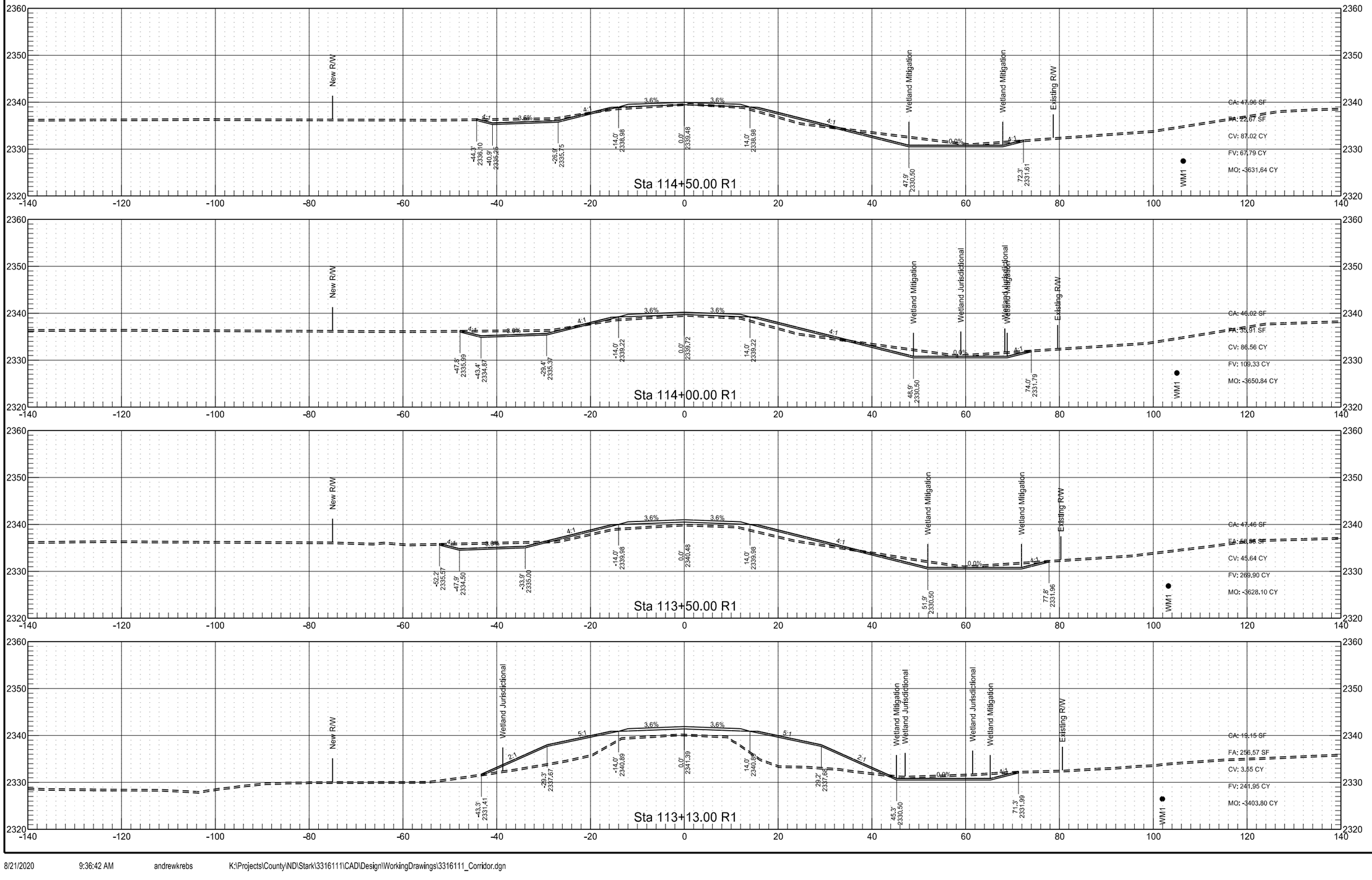






Note: All elevations, offsets, and slopes, shown are top of proposed subgrade.

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	200	5



Note: All elevations, offsets, and slopes, shown are top of proposed subgrade.

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRO-0045(066)	200	6

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
BG	below grade
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
CI 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
C Gr	coarse gravel
CS	coarse sand
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
CECB	concrete erosion control blanket
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
CSFES	corrugated steel flared end section
CSP	corrugated steel pipe
CSTES	corrugated steel traversable end section
C	coulomb
Co	County
Crse	course
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 or ø	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
DSDS	dynamic speed display sign
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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 09/20/18 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-101-2

Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser
FFP	fuel filler pipes
FLS	fuel leak sensor
Furn	furnish/ed
Gal	gallon
Galv	galvanized
Gar	garage
Gs L	gas line
G Reg	gas line regulator
GMV	gas main valve
G Mtr	gas meter
GSV	gas service valve
GVP	gas vent pipe
GV	gate valve
Ga	gauge
Geod	geodetic
GIS	Geographical Information System
G	giga
GPS	Global Positioning System
Gov	government
Grd	graded/grade
Gr	gravel
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ha	hectare
Ht	height
HI	height of instrument
Hel	helical
H	henry
Hz	hertz
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hr	hour(s)
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
In or "	inch
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IM	iron monument
I Pn	Iron Pin
IP	iron Pipe
Jt	joint
J	joule
Jct	junction
K	kelvin
Kn	kilo newton
Kpa	kilo pascal
Kg	kilogram
Kg/m3	kilogram per cubic meter
Km	kilometer
K	Kip(s)
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
Ln	lane
Lg	large
Lat	latitude
Lt	left
L	length of curve
Lens	lenses
Lvl	level
LB	level book
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Lig Co	lignite coal
Lig Sl	lignite slack
LF	linear foot
Liq	liquid
LL	liquid limit
L	litre
Lm	loam
Loc	location
LC	long chord
Long.	longitude
Lp	loop
LD	loop detector
Lm	lumen
Lum	luminaire
L Sum	lump sum
Lx	lux
Mb	mailbox
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
MGS	Midwest Guardrail System
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
P Cap	plastic cap
Pl or ℙ	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 or Pref	preformed
Prep	preperation
Press.	pressure

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions

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NDDOT ABBREVIATIONS

D-101-3

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
Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
RTP	random traverse point
Rge or R	range
RC	rapid curing
Rec	record
Rcy	recycle
RAP	recycled asphalt pavement
RPCC	recycled portland cement concrete
Ref	reference
R Mkr	reference marker
RM	reference monument
RP	reference point
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCFES	reinforced concrete flared end section
RCTES	reinforced concrete traversable end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
Reinf	reinforcement
Res	reservation
Rs	residence
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 or Sdwk	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
SRCP	slotted reinforced concrete pipe
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SA	special assembly
SP	special provisions
G	specific gravity
Spk	spike
SC	spiral to curve
ST	spiral to tangent
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
SF	square feet
Km2	square kilometer
M2	square meter
SY	square yard
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
Sta	station
Sta Yd	station yards
Stm L	steam line
SEC	steel encased concrete
SMA	stone matrix asphalt
SSD	stopping sight distance
SD	storm drain
St	street
SPP	structural plate pipe
SPPA	structural plate pipe arch
Str	structure
Subd	subdivision
Sub	subgrade
Sub Prep	subgrade preperation
Ss	subsoil
SE	superelevation
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical
SI	systems international
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	tesla
T	thinwall tube sample
T/mi	tons per mile
Ts	topsoil
Twp or T	township
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
TB	transit book
Trans	transition
TT	transmission tower
TES	traversable end section
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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 04/23/18 and the original document is stored at the North Dakota Department of Transportation

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
GTR RAMSEY WD	Greater Ramsey Water District
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 VALL COMM	Missouri Valley Communications
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
NWRWD	Northwest Rural Water District
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
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Cooperative
RRVW	Red River Valley & Western Railroad
S CENT REG WD	South Central Regional Water District
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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions

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Line Styles

D-101-20

Existing Topography

- Existing Ground Void
- Existing Cemetary Boundary
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Existing Gravel Surface
- Existing Riprap
- Existing Dirt Surface
- Existing Asphalt Surface
- Existing Tie Point Line
- Existing Railroad Centerline
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Existing Fence
- Existing Railroad
- Existing Field Line
- Exst Flow
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter

- Existing 3-Cable w Posts
- Site Boundary
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Existing Tree Boundary
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Existing W-Beam Guardrail with Posts
- Existing Railroad Switch
- Gravel Pit - Borrow Area
- Existing Wet Area-Vegetation Break

Proposed Topography

- 3-Cable w Posts
- Flow
- Fence
- Remove Line
- Wall
- Retaining Wall (Plan View)
- W-Beam w Posts

Existing Utilities

- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Existing Culvert
- Existing Telephone Line
- Existing TV Line
- Existing Water or Steam Line
- Existing Under Drain
- Existing Slotted Drain
- Existing Conduit
- Existing Conductor
- Existing Down Guy Wire Down Guy
- Existing Underground Vault or Lift Station

Proposed Utilities

- 24 Inch Pipe
- Reinforced Concrete Pipe
- Under Drain
- Edge Drain

Traffic Utilities

- Conductor
- Fiber Optic
- Existing Loop Detector
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Micro Loop Detector
- Micro Loop Detector
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm

Sign Structures

- Existing Overhead Sign Structure
- Existing Overhead Sign Structure Cantilever
- Overhead Sign Structure Cantilever

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups

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Line Styles

D-101-21

Right Of Way

- Easement
- Existing Easement
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Existing Right of Way Not State Owned
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines
- Sight Distance Triangle Line
- Dimension Leader

Boundary Control

- Existing City Corporate Limits or Reservation Boundary
- Existing State or International Line
- Existing Township
- Existing County
- Existing Section Line
- Existing Quarter Section Line
- Existing Sixteenth Section Line
- Existing Centerline
- Tangent Line

Cross Sections and Typicals

- Existing Ground
- Existing Topsoil (Cross Section View)
- Existing Ground Void (Not Surveyed) (void — void — void — v)
- Existing Concrete
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar

Geotechnical

- Geotextile Fabric Type D (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — S)
- Subgrade Reinforcement
- Failure Line

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

- 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

Pavement Joints

- Doweled Joint
- Tie Bar 30 Inch 4 Foot Center to Center
- Tie Bar 18 Inch 3 Foot Center to Center
- Tie Bar at Random Spacing

Bridge Details

- Hidden Object
- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Centerline Main
- Centerline
- Existing Ground (Details)
- Existing Conditions
- Sheet Piling

Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Floating Silt Curtain (S — S)
- Silt Fence (SF — SF)
- Excavation Limits
- Fiber Rolls

Environmental

- Wetland Mitigation
- Existing Wetland Easement USFWS
- Existing Wetland Jurisdictional
- Existing Wetland
- Tree Row

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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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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Cross Section Legend

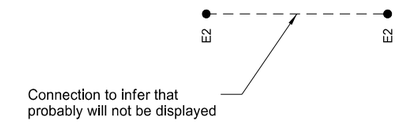
D-101-40

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Cable Line	CBL1	CBL2
Conduit Line	CDU1	CDU2
Electric Line	E1	E2
Fiber Optic Line	F1	F2
Gas Main Line	GM1	GM2
Gas Service Line	GS1	GS2
Gas Transmission Line	GT1	GT2
Fuel Pipeline	PL1	PL2
Sanitary Sewer Force Main	SSF1	SSF2
Sanitary Sewer	SS1	SS2
Steam Line	STE1	STE2
Storm Drain (Assumed Depth)	SD1	SD2
Telephone Line	T1	T2
TV Line	TV1	TV2
Water Main Line	WM1	WM2
Water Service Line	WS1	WS2

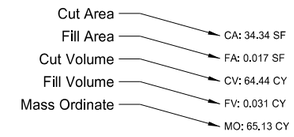
Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Overhead Power Transmission Line	OHT1	OHT2
Overhead Line	OH1	OH2

When storm drain invert elevations are NOT used to draw pipe, they will appear as shown to the left. When invert elevations are used to draw pipe, they will be a cross section similar to the graphics shown below.

* Usually the transverse utilities are shown on a cross section with 2 or more symbols. The utility runs from one symbol to the other, but the connection may not be shown.



On the right side of most cross sections there is a earthwork table. The following example (values not related to project) details the earthwork table layout.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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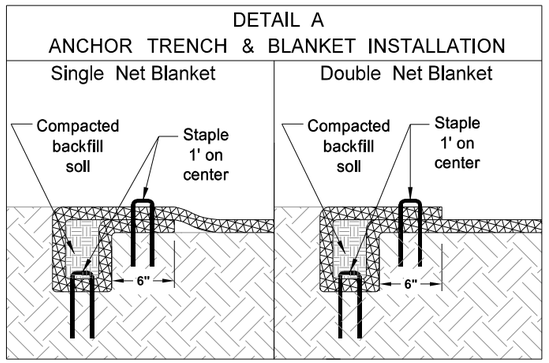
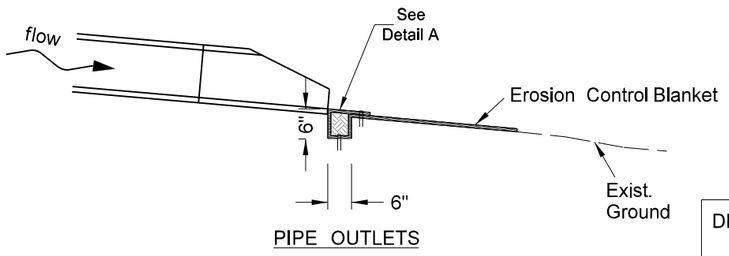
D-255-2

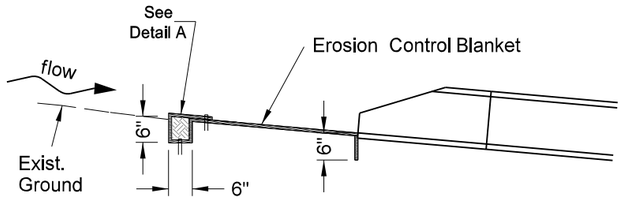
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



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

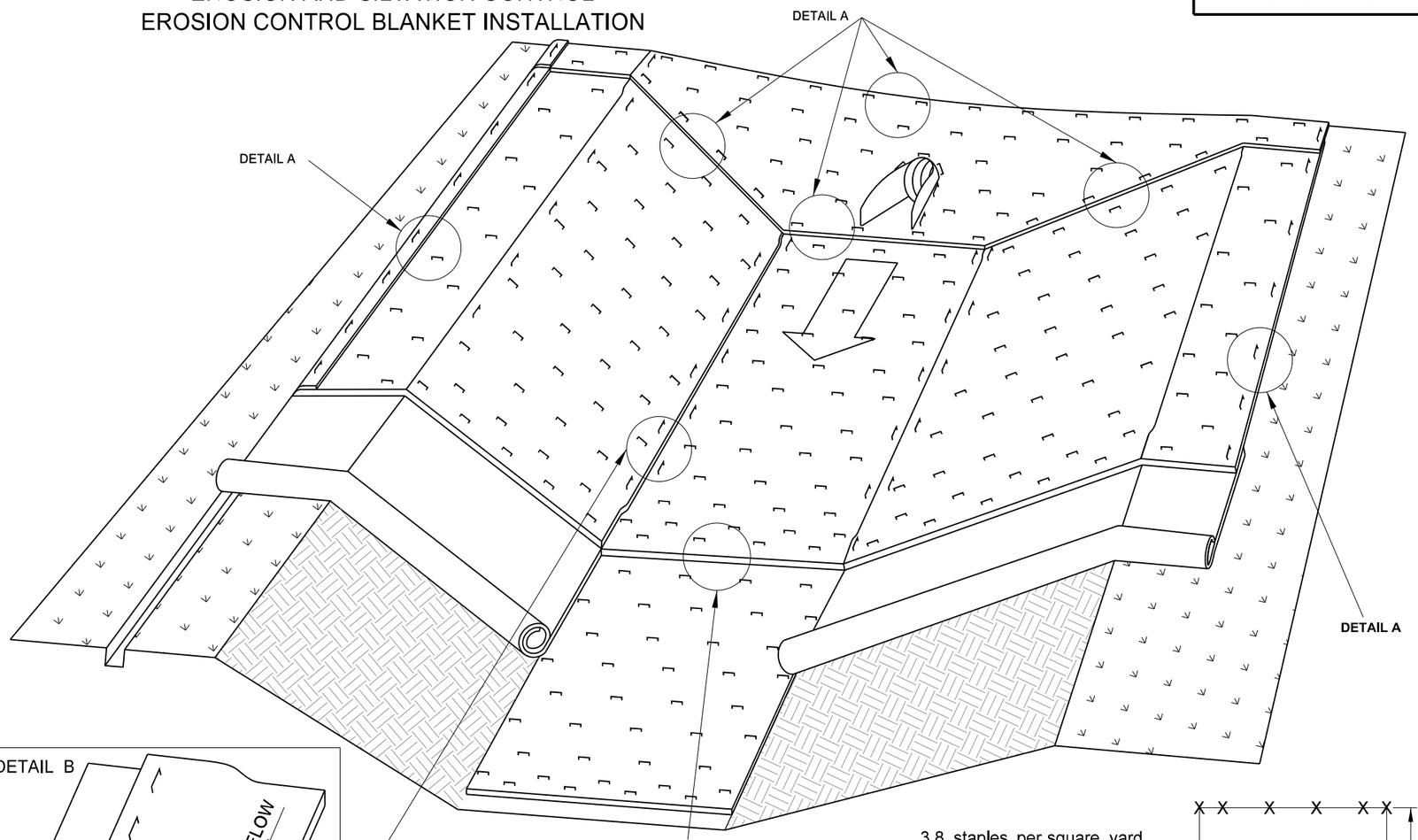


PIPE OUTLETS

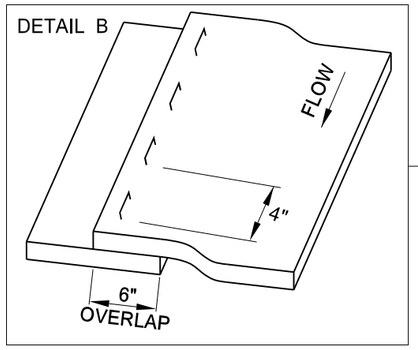


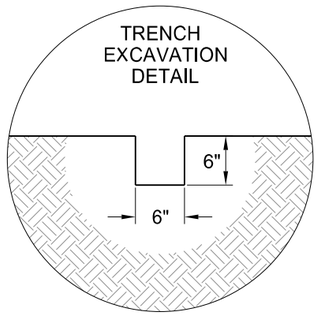
PIPE INLETS

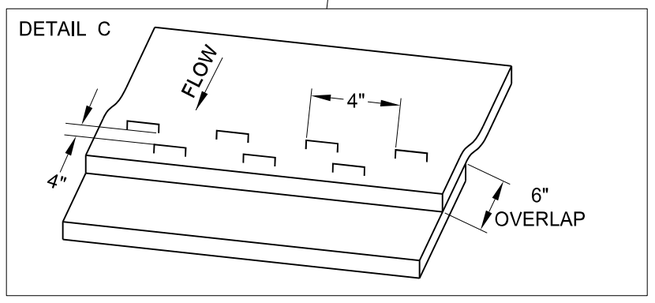
INSTALLATION AT PIPE ENDS



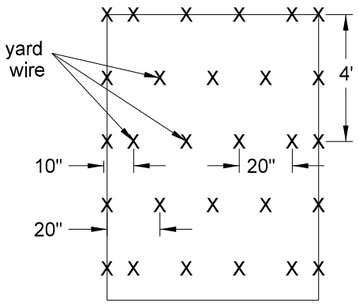
BLANKET LAYOUT
CHANNEL OR SLOPE INSTALLATION







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



STAPLE PATTERN

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-5 to D-255-2.
07-27-15	Changed Installation details such as trench depth and overlap dimensions.
08-27-19	New Design Engineer PE Stamp.

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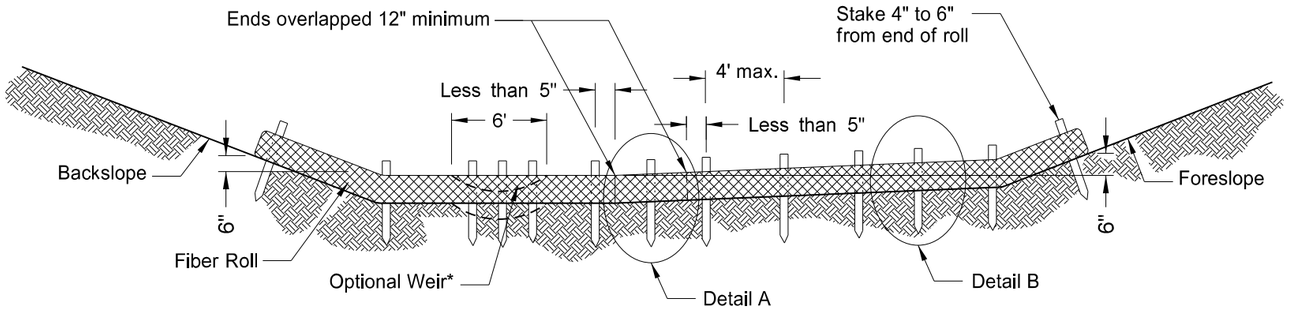
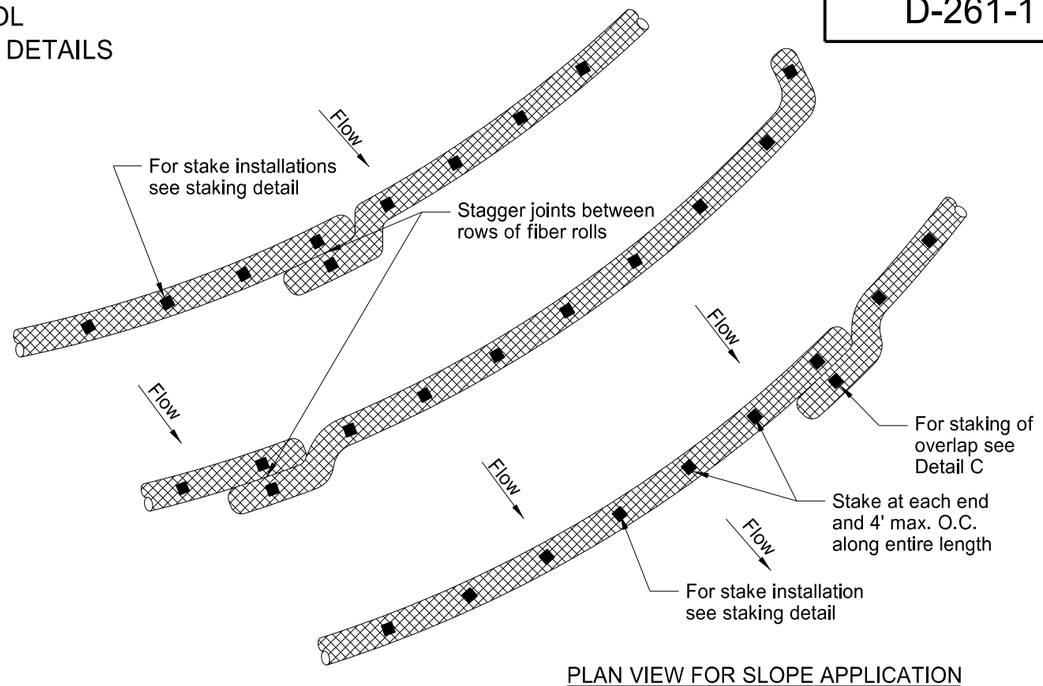
EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

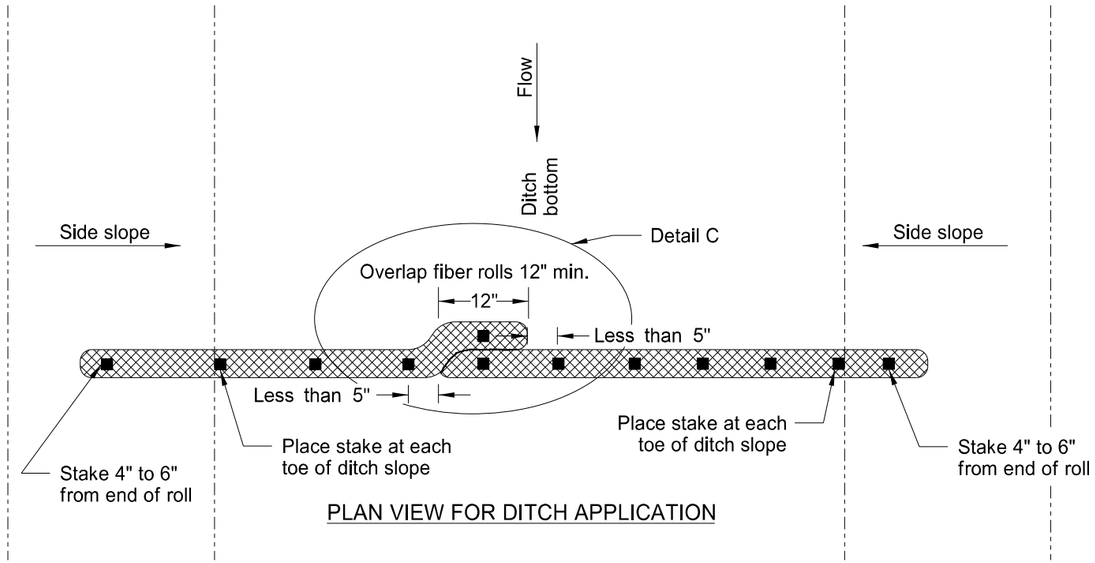


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

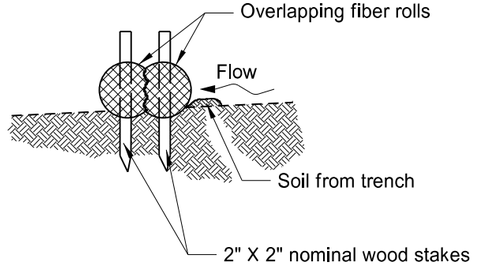
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

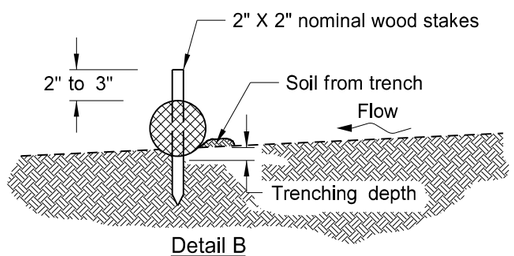


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-18-10

REVISIONS

DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.
08-27-19	New Design Engineer PE Stamp

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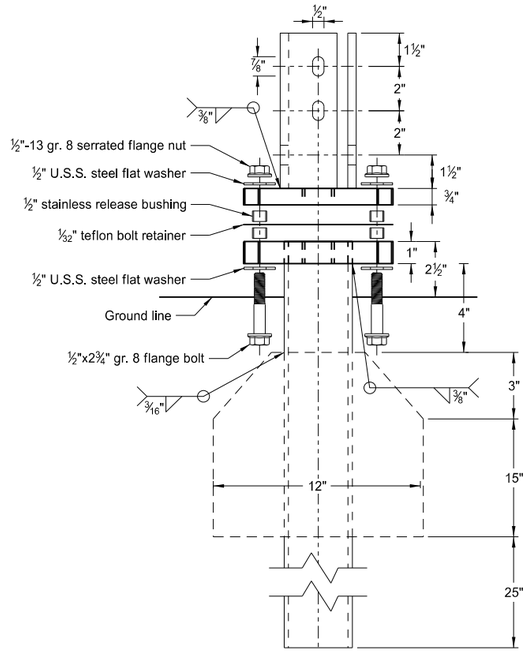
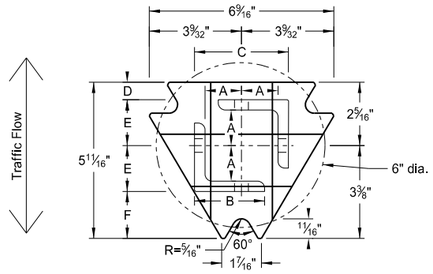
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

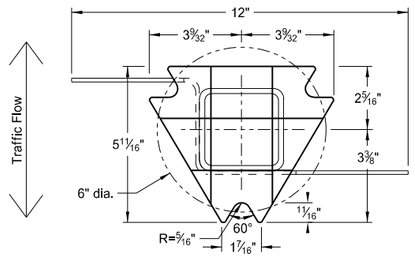


Multi-Directional
Slip Base Assembly

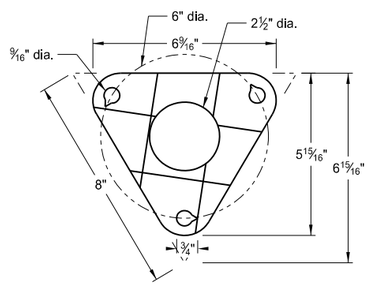
Perforated Tube



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



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

Notes:

1. Torque slip base bolts as specified by manufacturer.
2. Use anchor with 43.9 KSI yield strength and 59.3 KSI tensile strength.
3. Provide 4" vertical clearance for anchor or breakaway base. Measure the 4"x60" measurement above and below post location and back and ahead of post.
4. In concrete sidewalk, use same anchor without wings.
5. Provide more than 7' between the first and fourth posts of a four post sign.

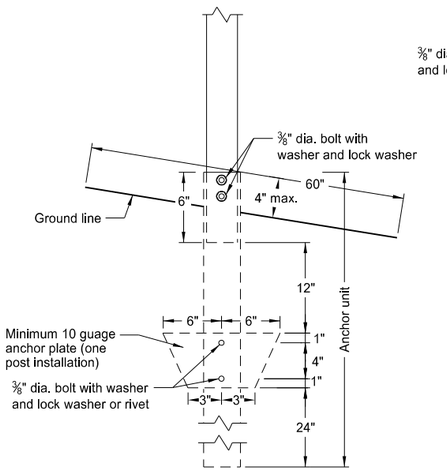
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½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

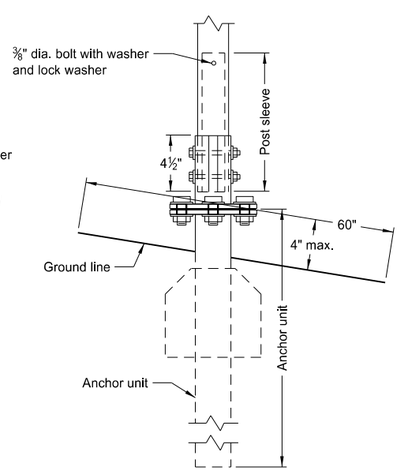
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³/16"x10 ga.	1⁹/64"	2½"	3¹/32"	2⁵/32"	1³³/64"	1⅞"
2½"x10 ga.	1⁹/32"	2½"	3⁵/16"	⅝"	1²¹/32"	1¾"

(A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.

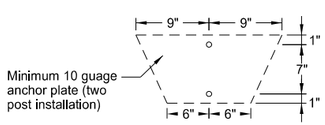
(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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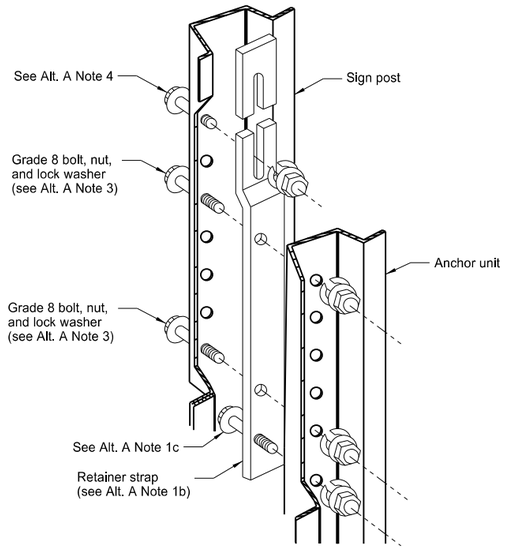
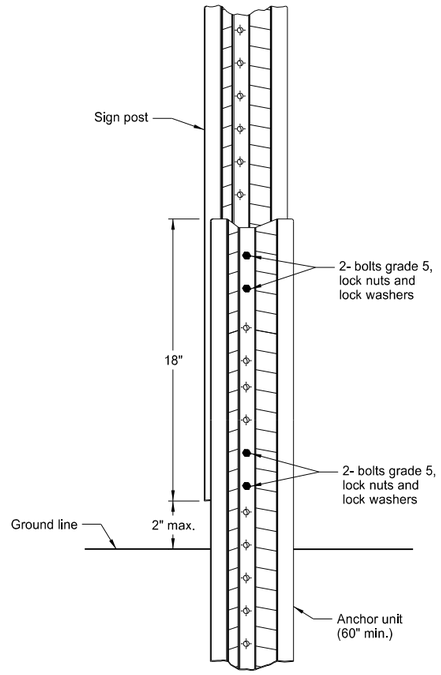
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

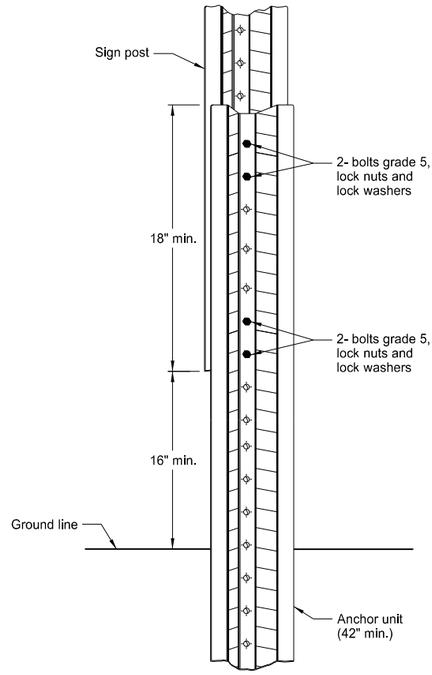


Detail A



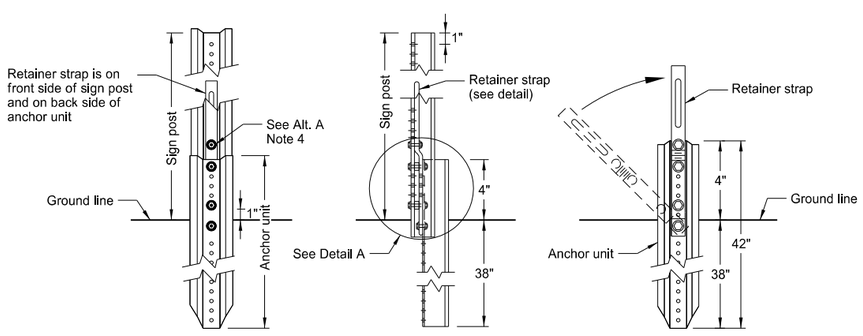
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



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

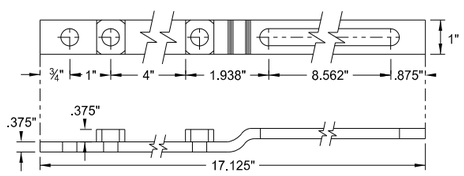
Install a maximum of 3 posts within 7'.



Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



Retainer Strap Detail

Alternate A Steps of Installation:

1. a) Drive anchor unit to within 12" of ground level.
   b) Establish proper assembly by lining up bottom hole of retainer strap with 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. Properly nest base post, strap, and sign post. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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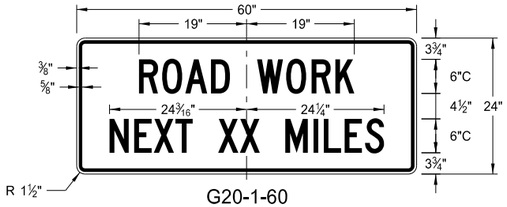
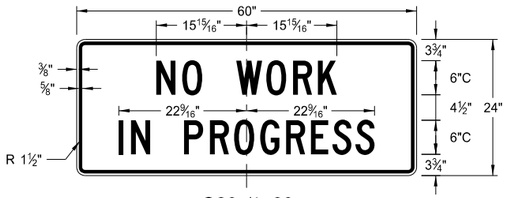
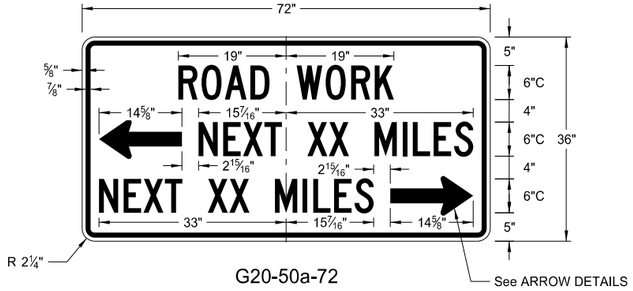
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



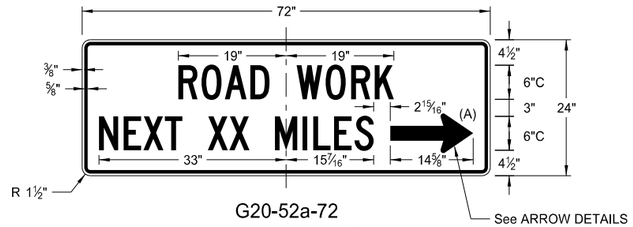
G20-1-60
Legend: black (non-refl)
Background: orange



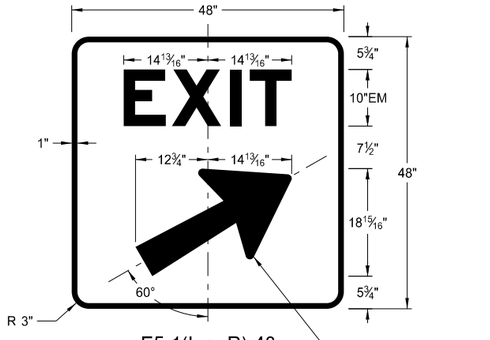
G20-1b-60
Legend: black (non-refl)
Background: orange



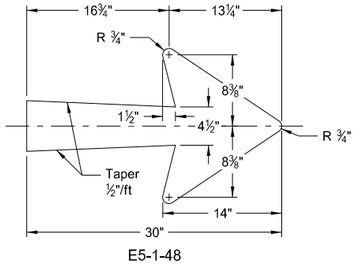
G20-50a-72
Legend: black (non-refl)
Background: orange



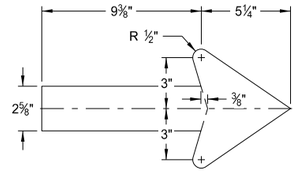
G20-52a-72
Legend: black (non-refl)
Background: orange



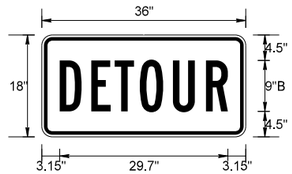
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



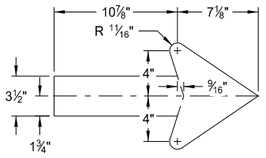
E5-1-48



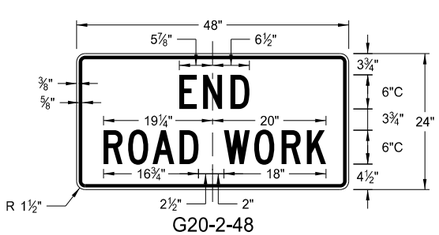
G20-50a-72
G20-52a-72



M4-8-36
Legend: black (non-refl)
Background: orange



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



G20-2-48
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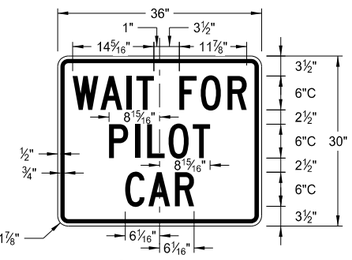
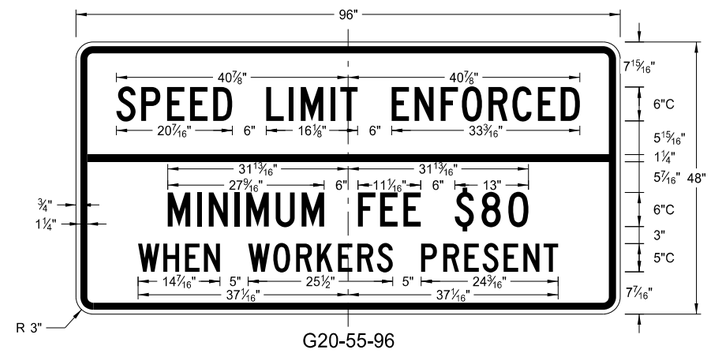
Background: orange



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



G20-55-96
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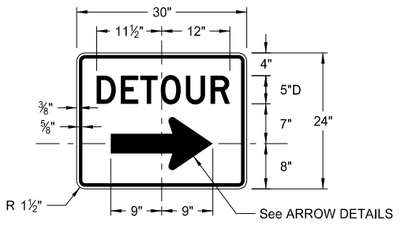
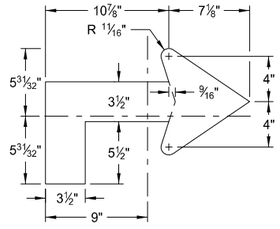
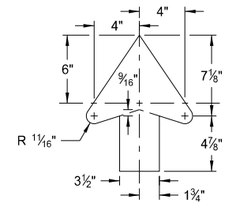
Background: orange



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



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



M4-9-30
Straight

ARROW DETAILS

NOTES:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added sign & background color
10-03-19	New Design Engineer PE Stamp

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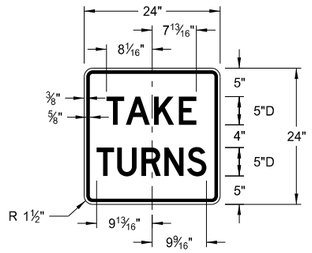
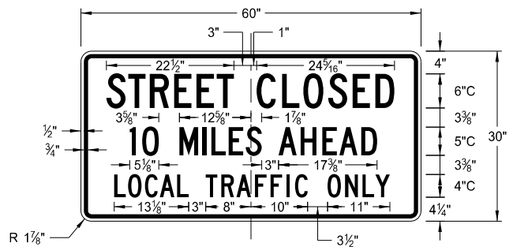
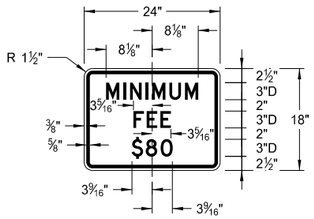
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



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



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



R2-1aP-24
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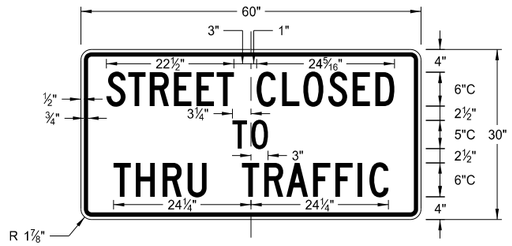
Background: white



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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp

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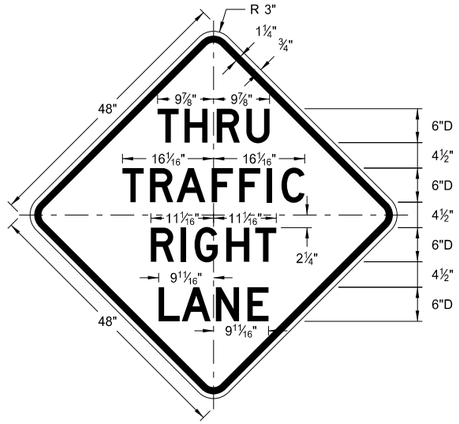
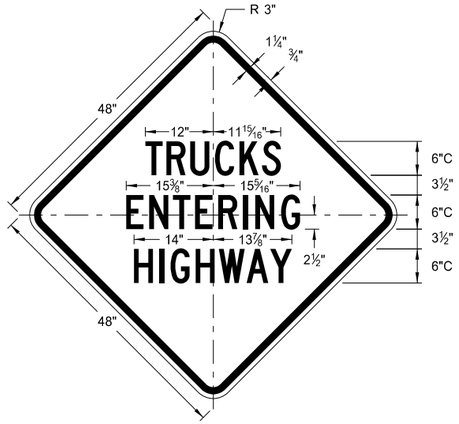
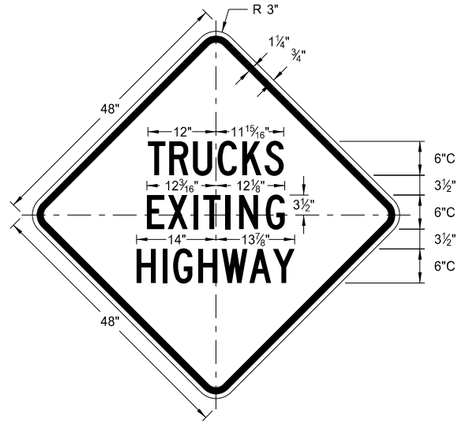
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



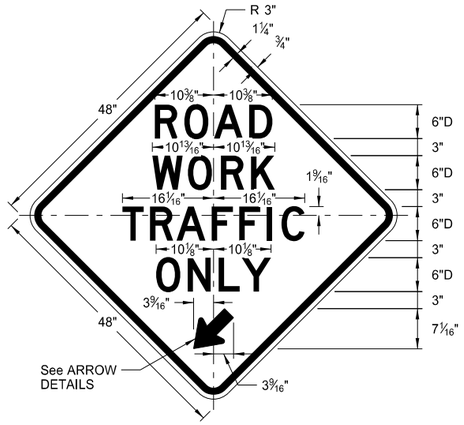
W5-8-48
Legend: black (non-refl)
Background: orange



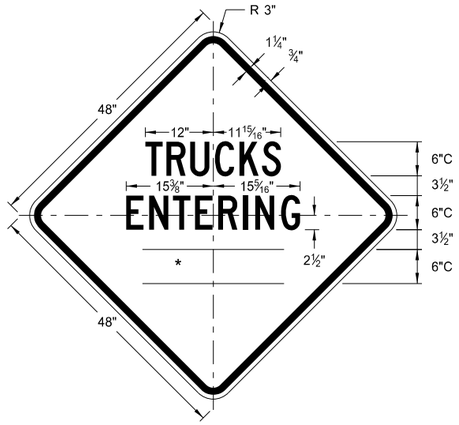
W8-53-48
Legend: black (non-refl)
Background: orange



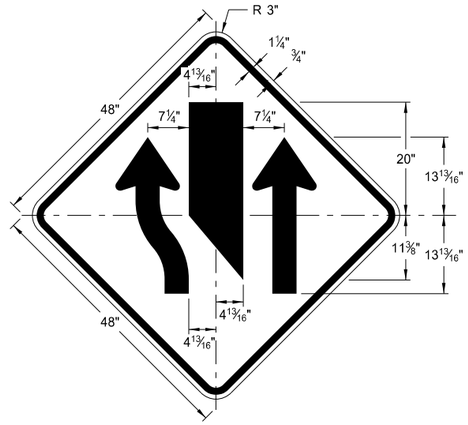
W8-56-48
Legend: black (non-refl)
Background: orange



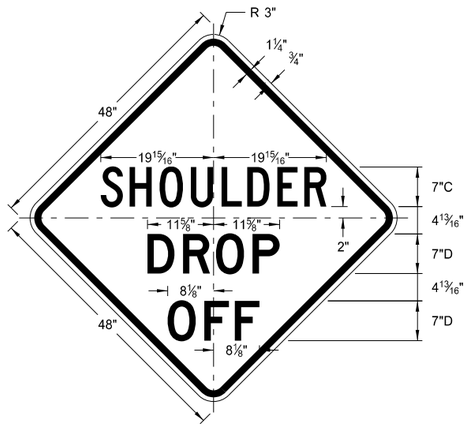
W5-9-48
Legend: black (non-refl)
Background: orange



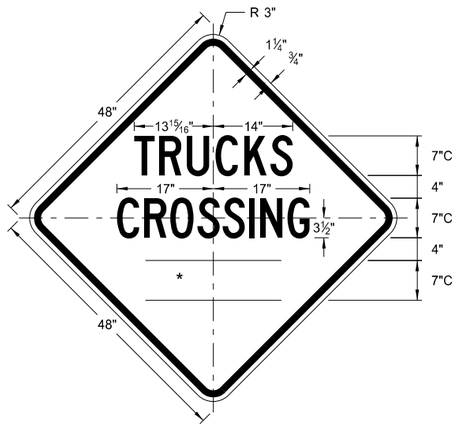
W8-54-48
Legend: black (non-refl)
Background: orange



W9-3a-48
Legend: black (non-refl)
Background: orange



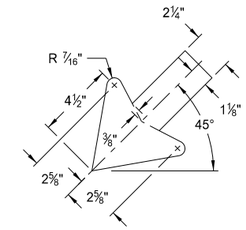
W8-9a-48
Legend: black (non-refl)
Background: orange



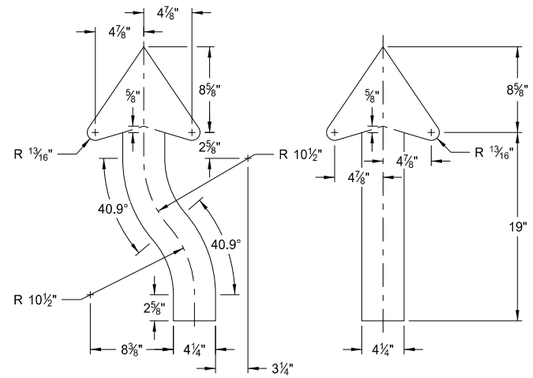
W8-55-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



W9-3a-48

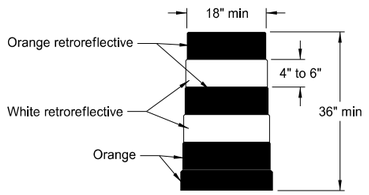
ARROW DETAILS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 10/03/19 and the original document is stored at the North Dakota Department of Transportation

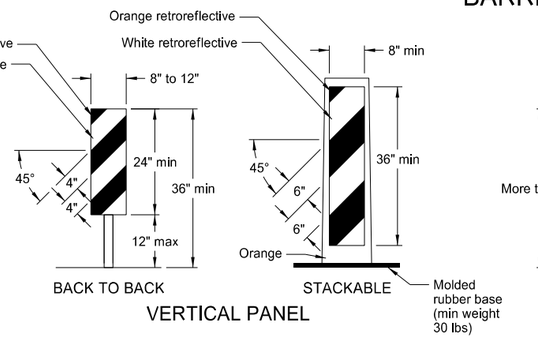
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



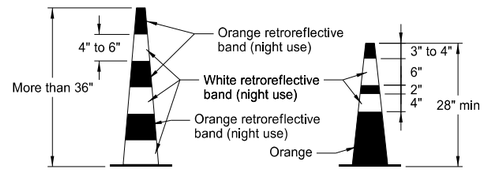
DELINEATOR DRUM

Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectorized spaces between the horizontal orange and white stripes. Avoid placement of stripes on drum ribs or indentations. Use closed top drums that will not allow collection of debris. Do not place ballast on the top of drum.



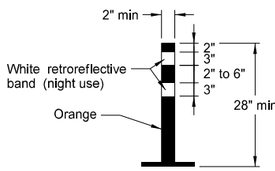
VERTICAL PANEL

Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with 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, use a stripe width of 6 inches.



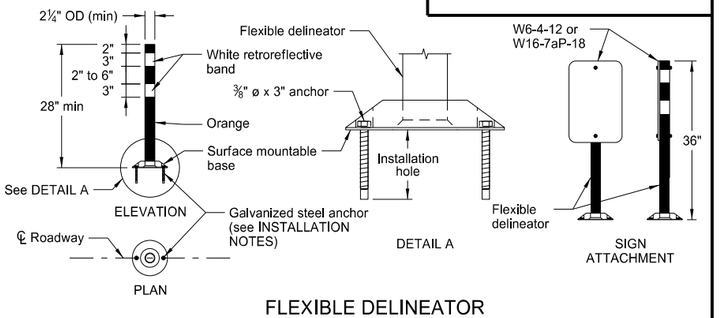
TRAFFIC CONE

Provide retroreflectorization of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectorized space between the orange and white stripes.



TUBULAR MARKER

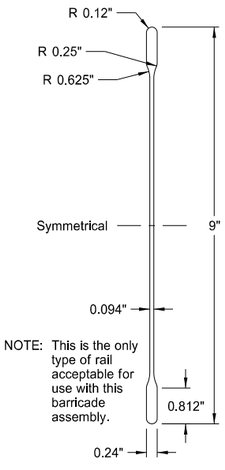
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

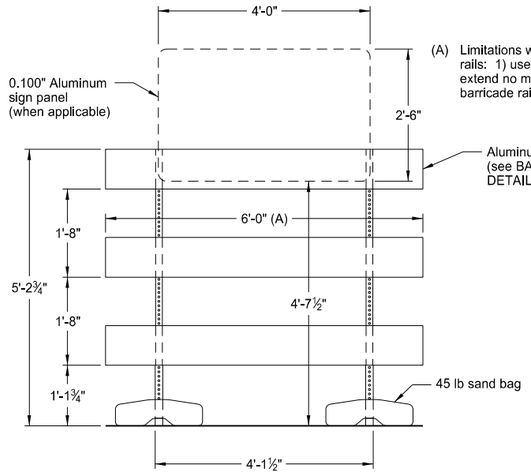
INSTALLATION NOTES:

1. Drill installation holes to diameter and depth 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, use an 8" x 8" butyl pad or hot melt butyl. Remove butyl as close as possible to pavement surface.



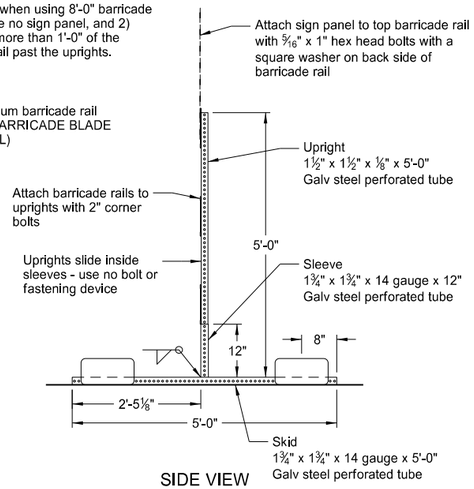
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



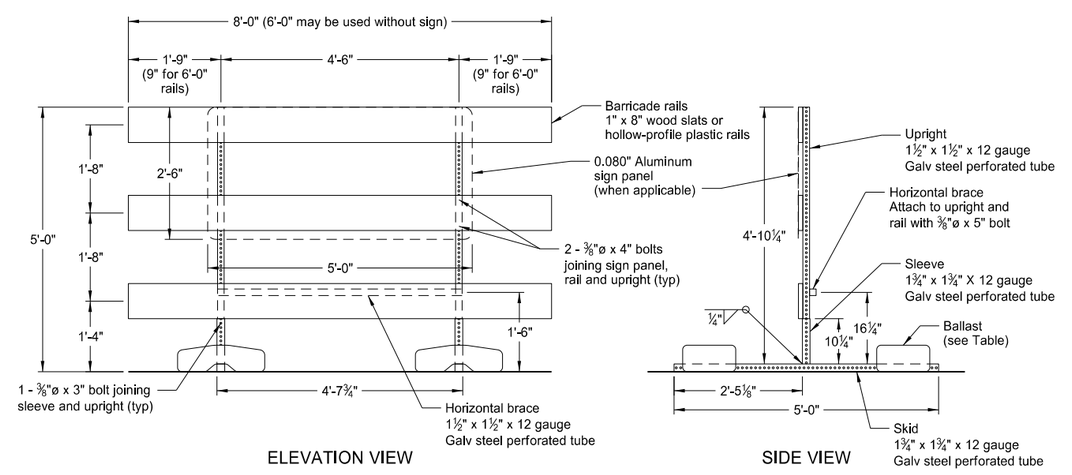
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW



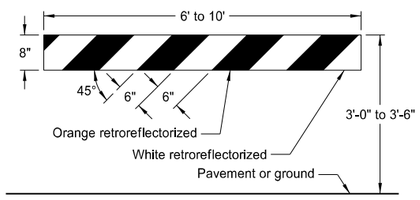
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

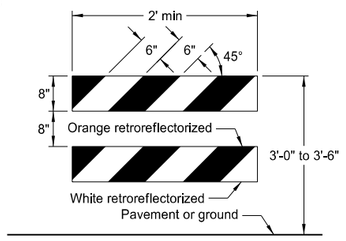


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

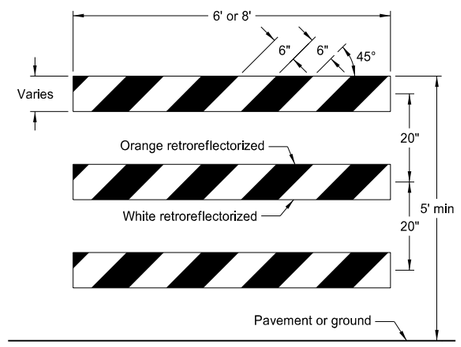
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", use a rail stripe width of 4".



TYPE I BARRICADE

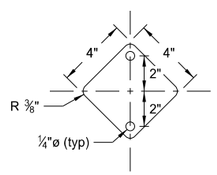


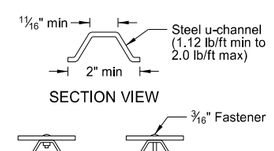
TYPE II BARRICADE

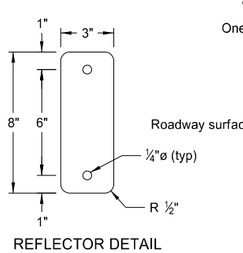


TYPE III BARRICADE

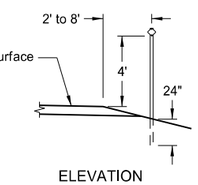
BARRICADE RAIL DETAILS







REFLECTOR DETAIL



ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

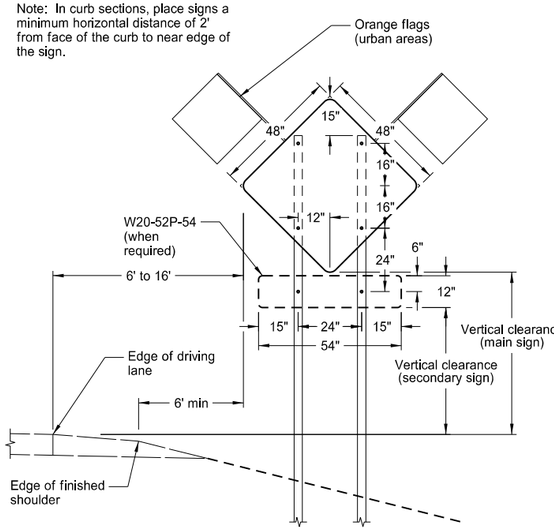
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

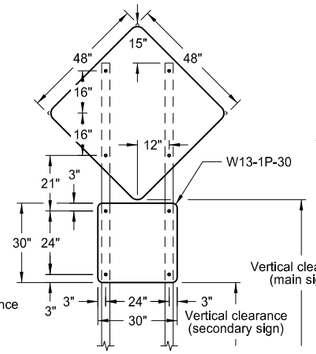
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

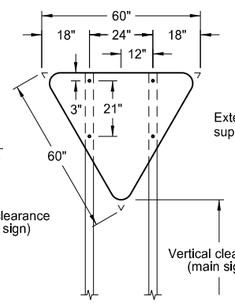
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



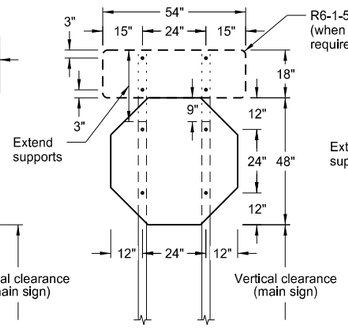
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



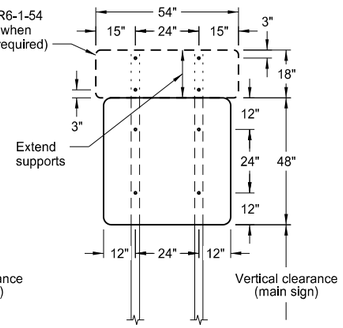
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



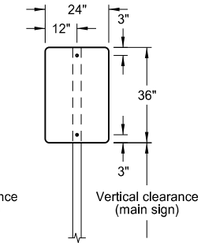
R1-2-60 - YIELD SIGN



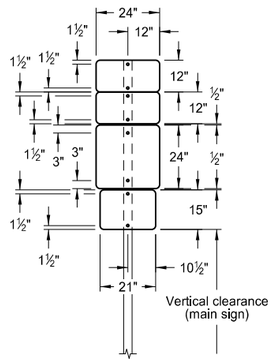
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



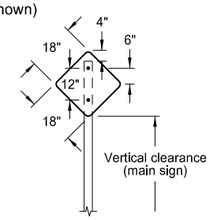
48" x 48" SIGN
(with R6-1-54 sign as required)



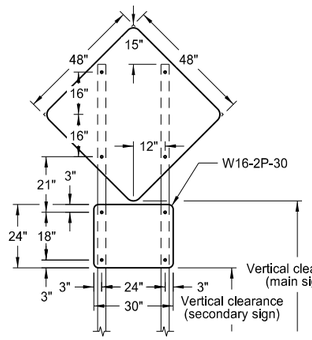
24" x 36" SIGN



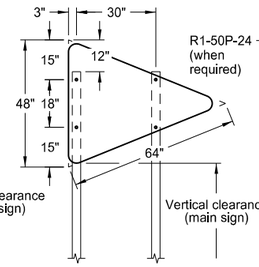
24" x 24"
ROUTE MARKER
ASSEMBLY



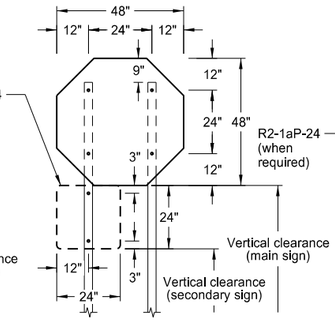
18" x 18"
DIAMOND SIGN



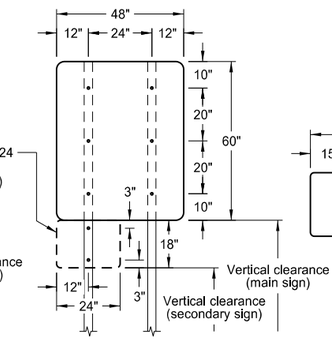
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



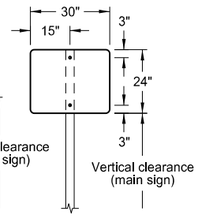
W14-3-64 - PENNANT SIGN



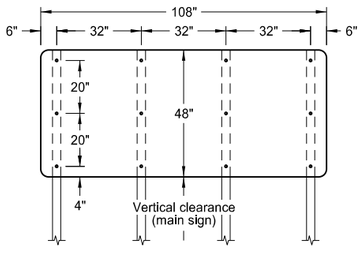
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



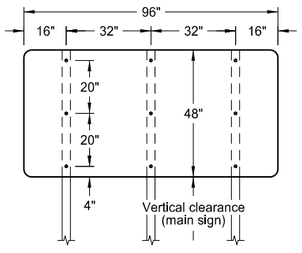
48" x 48" SIGN
(with R2-1aP-24 sign as required)



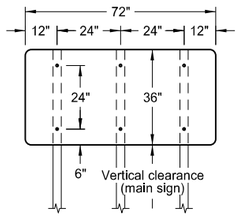
30" x 24" SIGN



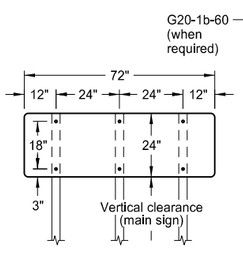
108" x 48" SIGN



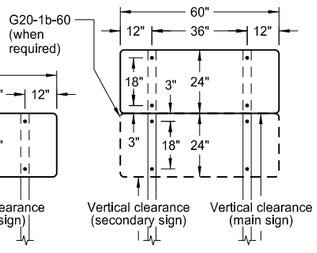
96" x 48" SIGN



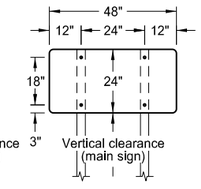
72" x 36" SIGN



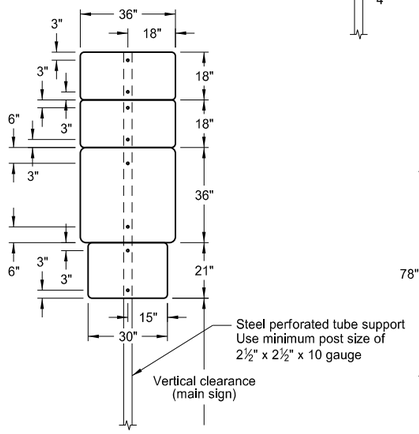
72" x 24" SIGN



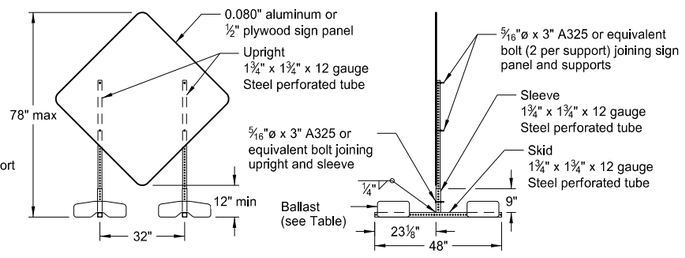
60" x 24" SIGN



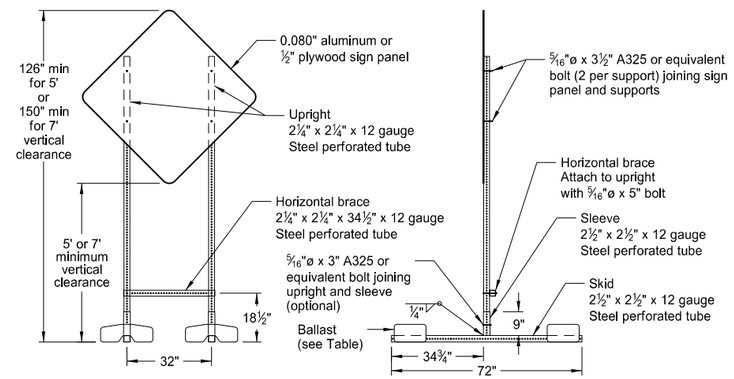
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Galvanize or paint supports. 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, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.

   Place signs over 50 square feet on 2½" x 2½" perforated tube supports as a minimum.

   Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅜" bolts.

3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on 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 stated above.

   Provide a minimum clearance of 7'-0" from the ground at the post for signs with an area exceeding 50 square feet.

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

   Use of low-mounting height (minimum 12" vertical clearance) portable signs for 5 days or less, is allowed 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. Use of R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 is allowed for longer than 5 days.

   Restrict signs mounted on portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT details to 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

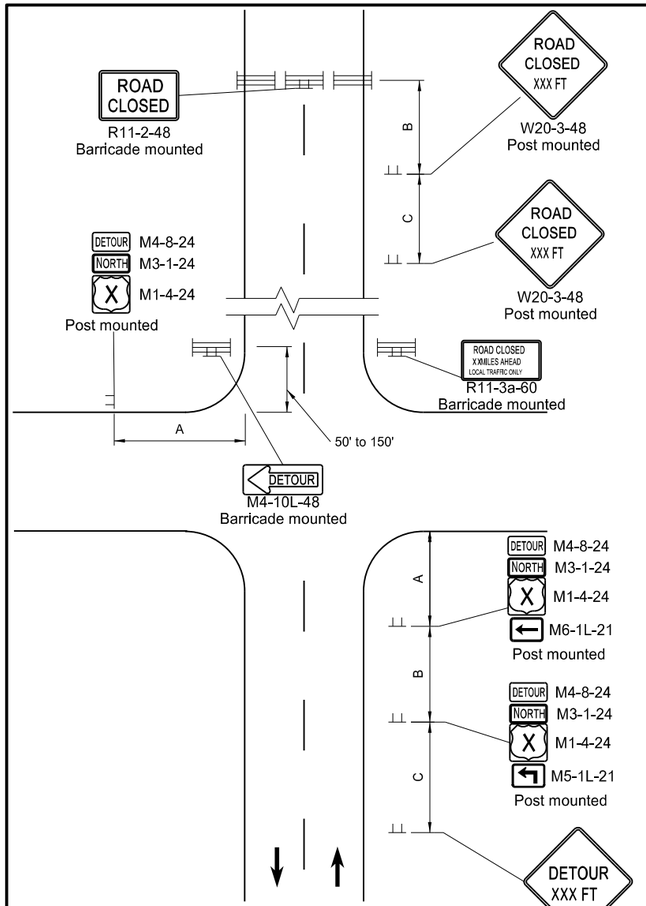
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

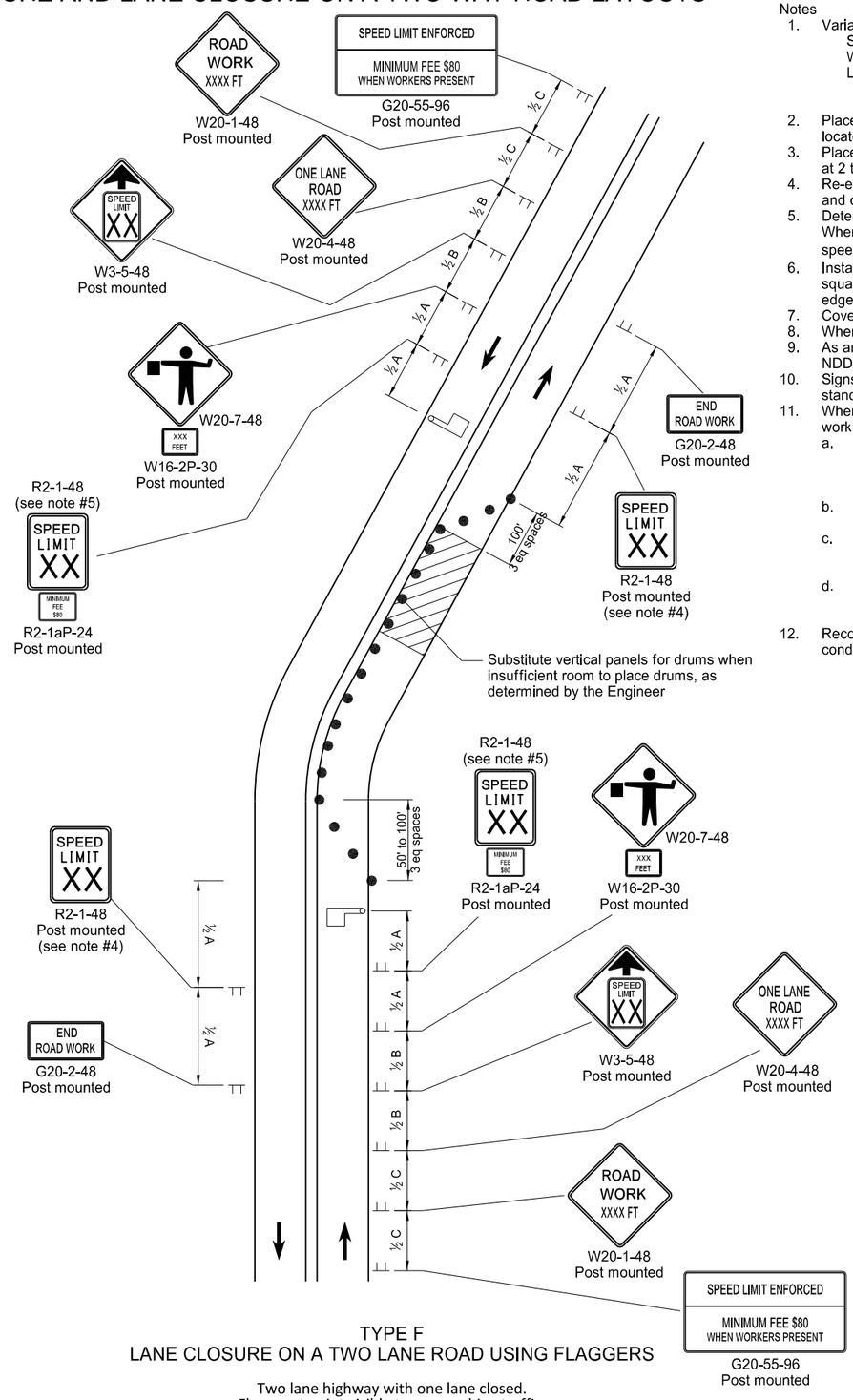
ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19



TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

Road closed beyond detour point.
Signing shown for one direction only.
Install and maintain signs shown in plans.



TYPE F
LANE CLOSURE ON A TWO LANE ROAD USING FLAGGERS

Two lane highway with one lane closed.
Flagger at point visible to approaching traffic.

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet
   L = Minimum length of taper in feet. S x W for freeways, expressways, and roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
3. Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. Determine the reduced speed limit based on the in place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place second speed limit sign at ½B.
6. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
7. Cover existing speed limit signs within a reduced speed zone.
8. Where necessary, safe speed to be determined by the Engineer.
9. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
10. Signs G20-55-96 or R2-1aP-24 are not required when pilot car operation is used, if this standard is part of other traffic control layouts, or if 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. Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
    c. Extend buffer space between work zone and lane closure transition upstream of the highway-rail grade crossing to prevent flagging queue from extending across highway-rail grade crossing.
    d. If queuing extends across highway-rail crossing, provide flagger at crossing to prevent vehicles from stopping within the crossing (even when automatic warning devices are in place.)
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

KEY

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

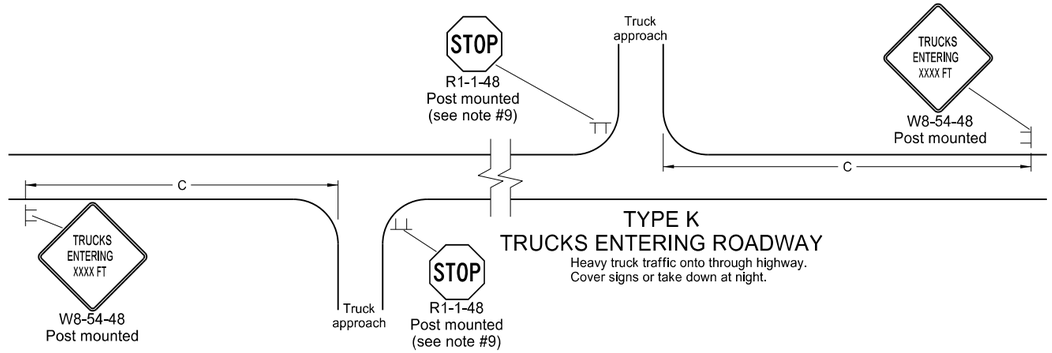
REVISIONS

DATE	CHANGE
3-13-14	Revised Sign Cell "ROAD WORK XXX FT".
8-17-17	Update notes & sign numbers.
11-01-19	Revised signs, sign #s and notes.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

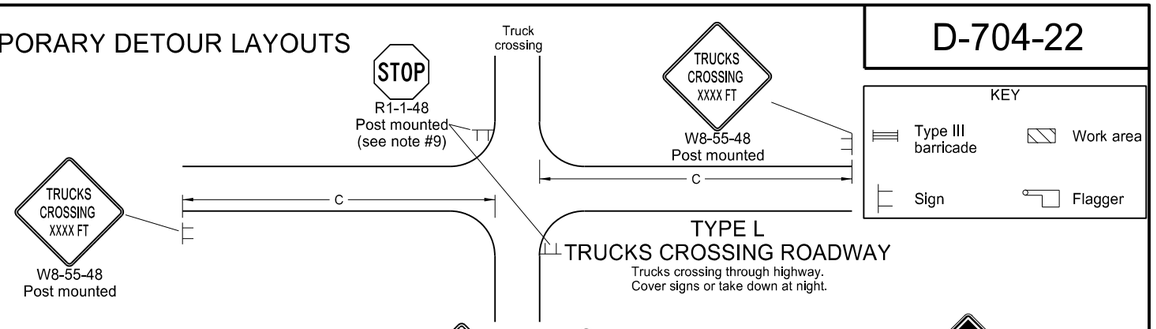
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



TYPE K
TRUCKS ENTERING ROADWAY

Heavy truck traffic onto through highway.
Cover signs or take down at night.

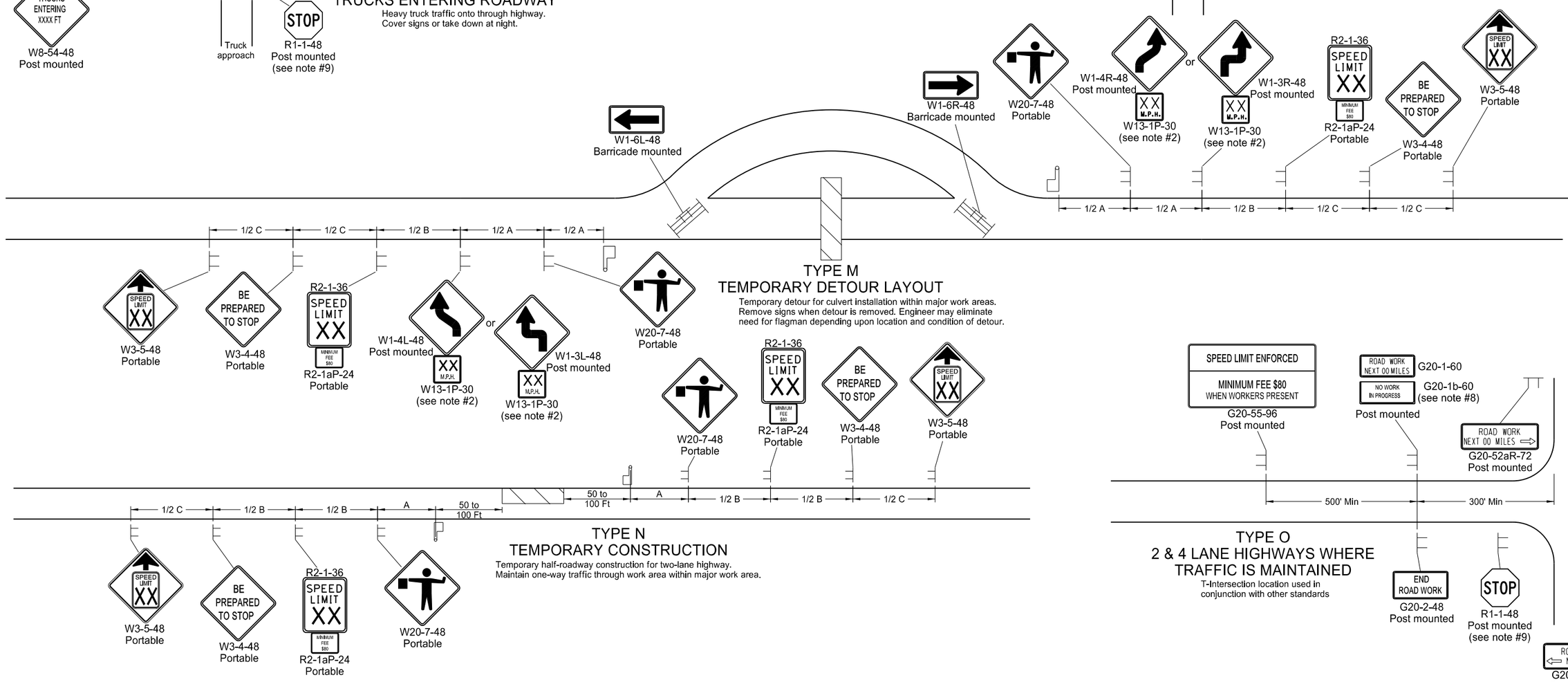


TYPE L
TRUCKS CROSSING ROADWAY

Trucks crossing through highway.
Cover signs or take down at night.

KEY

- Type III barricade
- Work area
- Sign
- Flagger



TYPE M
TEMPORARY DETOUR LAYOUT

Temporary detour for culvert installation within major work areas.
Remove signs when detour is removed. Engineer may eliminate need for flagman depending upon location and condition of detour.

TYPE N
TEMPORARY CONSTRUCTION

Temporary half-roadway construction for two-lane highway.
Maintain one-way traffic through work area within major work area.

TYPE O
2 & 4 LANE HIGHWAYS WHERE TRAFFIC IS MAINTAINED

T-Intersection location used in conjunction with other standards

Notes

1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
8. Install sign G20-1b-60 when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. Sign G20-55-96 is not required if layout is part of other traffic control or if work is less than 15 days.
11. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

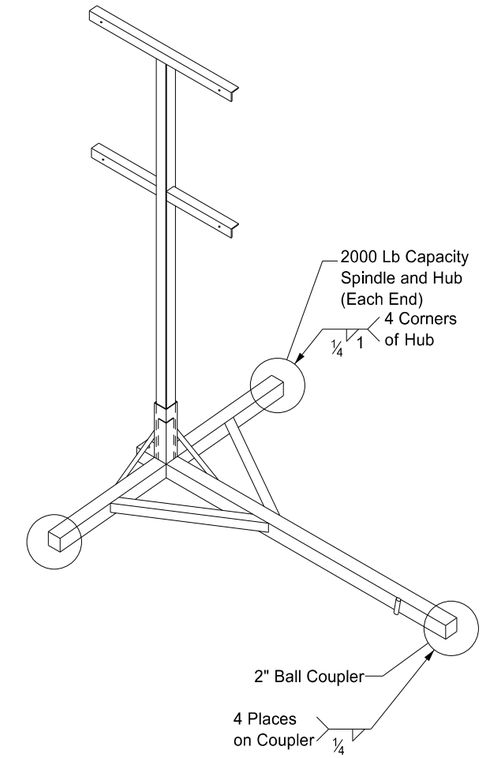
REVISIONS

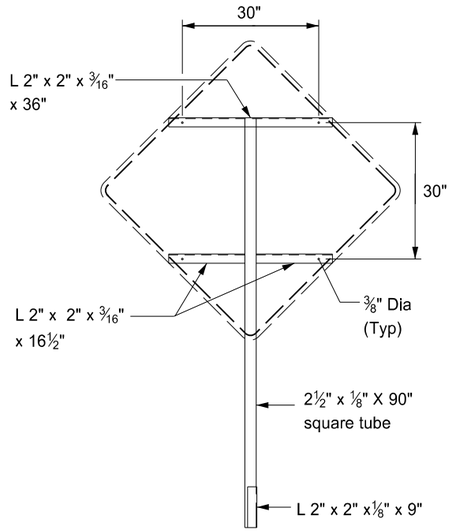
DATE	CHANGE
8-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

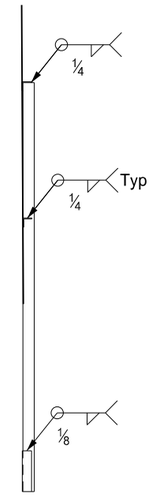
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



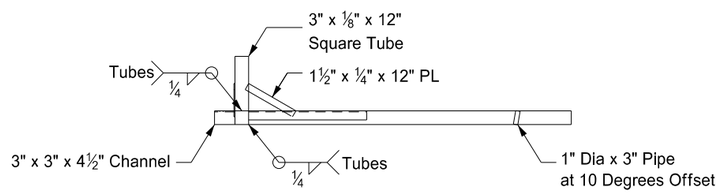


FRONT



RIGHT

SIGN SUPPORT



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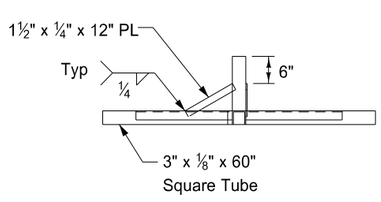

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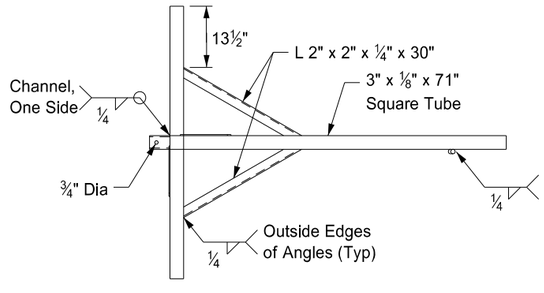


TOP

TRAILER

Notes:

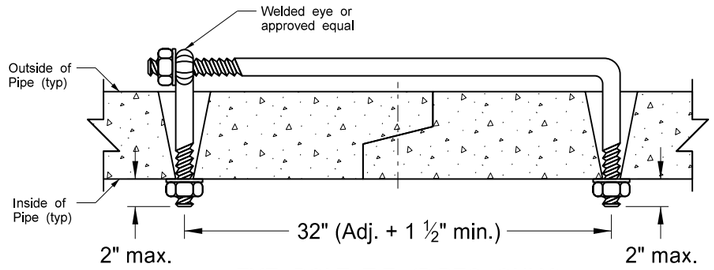
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

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

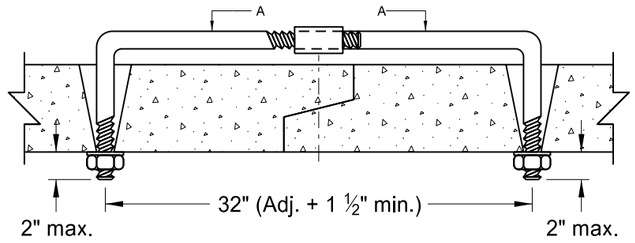
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

CONCRETE PIPE, CATTLE PASS, OR PRECAST CONCRETE BOX CULVERT TIES

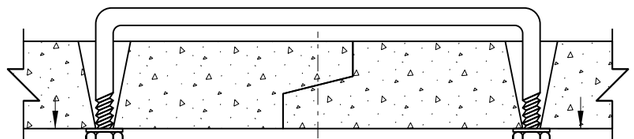
D-714-22



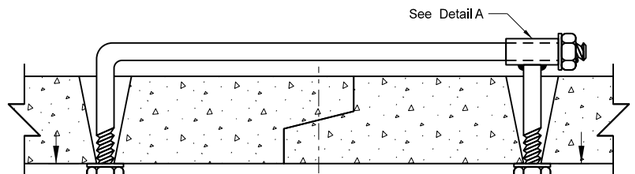
EYE BOLT TIE (PIPES ONLY)



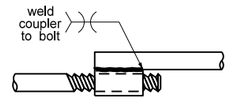
ADJUSTABLE TIE (RCB AND PIPES ONLY)



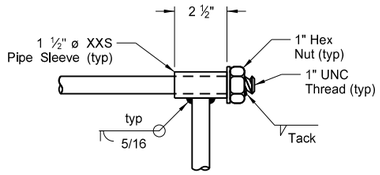
U BOLT TIE (RCB, PIPES, OR CATTLE PASSES)



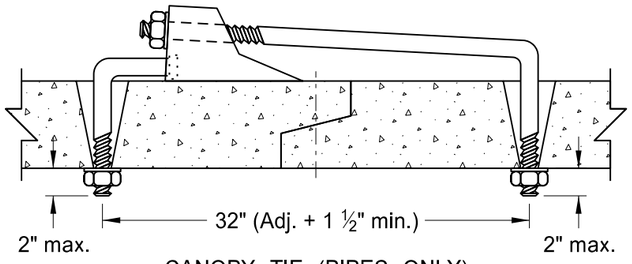
WELDED TIE (RCB AND PIPES ONLY)



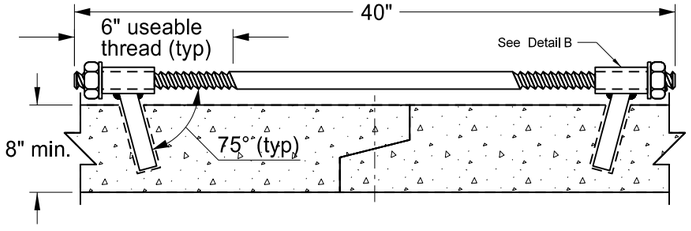
SECTION A-A



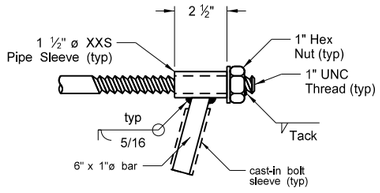
DETAIL A



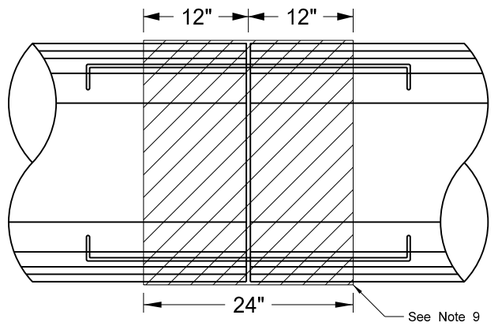
CANOPY TIE (PIPES ONLY)



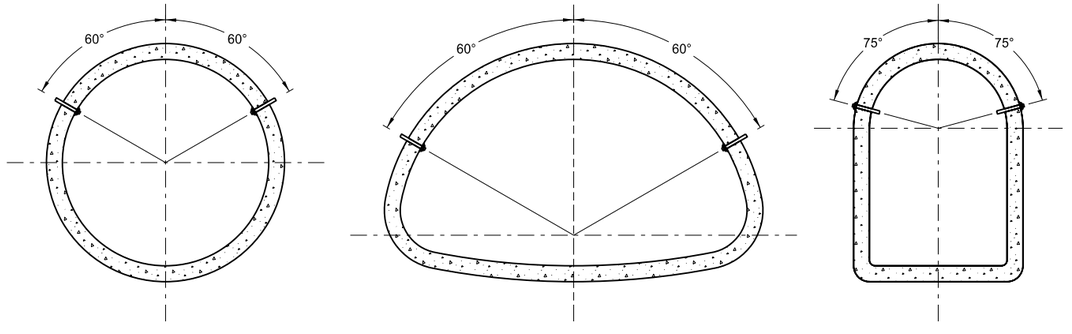
HIDDEN TIE (RCB ONLY)



DETAIL B



PLAN VIEW



END VIEW

REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ø	XXS Pipe Sleeve Inner ø
18" - 24"	⅝" See note 2	¾"
30" - 66"	¾"	1"
72" - 78"	1"	1 ¼"
RCB/Cattle Pass		

NOTES:

1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
3. Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
4. Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
5. Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
6. Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter ¼" larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1 ¼".
7. The contractor has the option of selecting the type of tie bolt used from those shown.
8. The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
9. All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
10. Place joint wrap prior to installing ties. Overlap the joint by 12" in both directions.
11. Tie bolts shall conform to ASTM A 36. Nuts shall be be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
12. RCB tie locations shall be as shown on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-6-17	Notes 2-11, Table, Title, Lables

This document was originally issued and sealed by Jonathan David Ketterling, Registration Number PE-4684, on 6/6/2017 and the original document is stored at the North Dakota Department of Transportation