

STATE OF NORTH DAKOTA
SHOWING COUNTIES

DESIGN DATA

TRAFFIC		AVERAGE DAILY			EST. 30th MAX. HR.
		PASSENGER	TRUCKS	TOTAL	
CURRENT TRAFFIC	2022	LESS THAN 100 VPD			—
TRAFFIC FORECAST	2042				

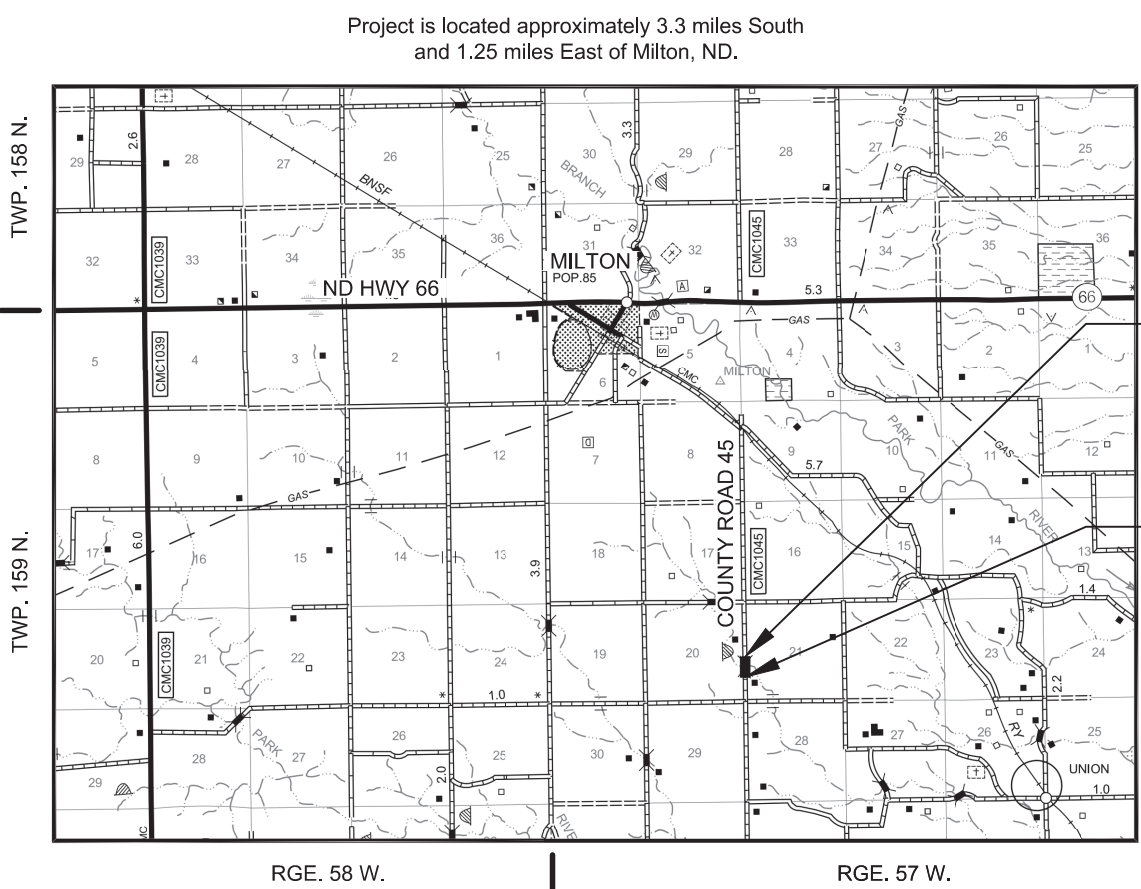
DESIGN SPEED 30 MPH
MINIMUM SIGHT DISTANCE (STOPPING) 200 FEET
DESIGN LOADS FOR STRUCTURE: HL-93

CAVALIER COUNTY, NORTH DAKOTA
PLANS FOR FEDERAL AID PROJECT
BRC-1045(055)
STRUCTURE REPLACEMENT
& INCIDENTALS

Project consists of Structure Removal, Installation of a Precast
14' x 10' x 68' R.C.B.C., Gravel Surfacing & Incidentals.

EXISTING STRUCTURE #10-145-30.0
NEW STRUCTURE # NONE

Project is located approximately 3.3 miles South
and 1.25 miles East of Milton, ND.



END PROJECT
STA. 13+75 = A POINT APPROXIMATELY
1,677 FEET NORTH AND 7 FEET WEST OF
THE SOUTHWEST CORNER OF
SEC. 21, TWP. 159 N., RGE. 57 W.

BEGIN PROJECT
STA. 11+35 = A POINT APPROXIMATELY
1,437 FEET NORTH AND 5 FEET WEST OF
THE SOUTHWEST CORNER OF
SEC. 21, TWP. 159 N., RGE. 57 W.

PS&E Corrections Made
Surveyed & Designed Date

March 2022
April 2021 - February 2022

DESIGNER Wade Thompson, PE
DESIGNER Jeff Daley, PE
DESIGNER Zach Vlaminck
DESIGNER Samantha Dvorak
DESIGNER -



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.

Jeffrey D. Daley
KLJ ENGINEERING LLC

DATE 03/21/2022 REGISTRATION NUMBER PE-7865



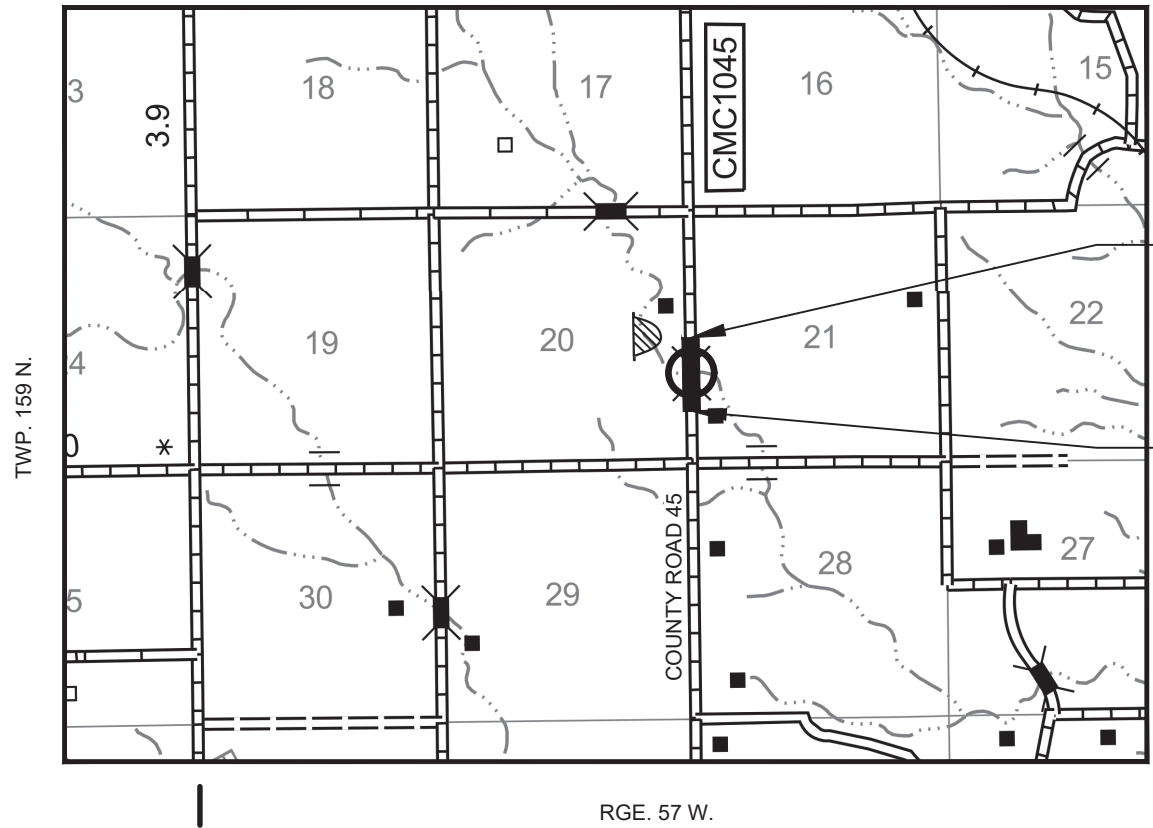
864 WEST 12TH ST
GRAFTON, ND 58237-2120
(701) 352-1555, FAX (855) 288-8055

© KLJ 2022

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- GRADING & GRAVELING
- STRUCTURE REPLACEMENT
& INCIDENTALS



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BRC-1045(055) CAVALIER COUNTY, NORTH DAKOTA STRUCTURE #10-145-30.0		
KLJ		
SCOPE OF WORK	DRWN. BY ZRV	CHKD BY JD
	PROJECT NO. 2103-00378	

PLAN NOTES

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	6	1

- 100-P01

EROSION CONTORL: Bid items Temporary Cover Crop, Silt Fence, Fiber Rolls and Flotation Silt Curtain are included for use in conjunction with the Contractor’s SWPPP. These quantities may be eliminated depending on the Contractor’s operation. An estimated quantity has been set up for each item.
- 105-P01

UTILITIES: Utilities that the Engineer has been made aware of are shown in the plans. Other utilities may exist that are not shown. The 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: Notify all utility owners of the project schedule as specified in Section 105.03, “Cooperation with Utility Owners”.

Coordinate and perform construction activities in a manner that accommodates the utility coordination requirements included in the Utility Coordination Table.

Protect utilities not listed in the Utility Coordination Table in their existing locations.

Utility Coordination Table					
Sta	Offset	Appr. Qty	Comments	Utility Company	Type of Facility
11+35 to 13+75	25' RT	240 LF	Utility will be relocated by United and Turtle Mountain Communications prior to construction.	United and Turtle Mountain Communications	Fiber Optic

- 203-010

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

TOPSOIL: The quantity of topsoil to be removed, salvaged, and respread is based upon an assumed existing depth of 6 inches. Make arrangements for topsoil storage areas if sufficient room is not available within the right of way. No payment will be made for additional handling of topsoil that must be moved to provide additional excavation area between the proposed grading limits and the right of way. Re-spread topsoil evenly over the areas to be seeded. The bid item “TOPSOIL” includes all labor, materials, and equipment associated with stripping, stockpiling, and respreading the existing topsoil. “TOPSOIL” will be paid at plan quantity.
- 203-P02

COMMON EXCAVATION-TYPE B: Include all costs associated with excavating, transporting and placing the material in the price bid for “COMMON EXCAVATION-TYPE B”. “COMMON EXCAVATION-TYPE B” will be paid at plan quantity. Any change to plan quantity must be approved by the Owner or Engineer.
- 251-P01

SEEDING & MULCHING: Cover all disturbed areas of the right of way, except the roadbed with Seeding CL II and Straw Mulch. An additional 0.20 acres of seeding and mulching have been added to the quantities to seed the topsoil stockpile area.
- 251-P02

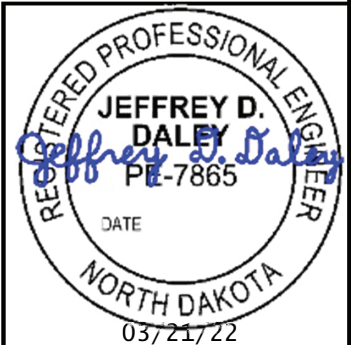
WETLAND SEED: The bid item “WETLAND SEED” includes all labor, materials, and equipment associated with preparing the seedbed and seeding the wetland mitigation area. “WETLAND SEED” will be paid at plan quantity.
- 262-P01

FLOTATION SILT CURTAIN: Install the “FLOTATION SILT CURTAIN” within water prior to any removals or stripping of topsoil in the adjacent area.

Place the flotation silt curtain at a location that allows for sufficient area to construct the project without placing material against the flotation silt curtain. Place no material against the flotation silt curtain. If the project is not completed in one construction season, remove, and replace the flotation silt curtain in accordance with Standard Specification 262.04 B. The flotation silt curtain will not be paid for twice.
- 704-P01

TRAFFIC CONTROL FOR STRUCTURE REPLACEMENT: Use the construction signing layout on Sheet 2, Section 100 for the removal of the existing structure and installation of the proposed single barrel box culvert. The Contractor will be allowed to close the roadway for 21 consecutive days to remove the existing structures and install the single barrel box culvert. If removal and installation are not completed in the allotted time, liquidated damages in the amount of \$900/day will be deducted from the money due to the Contractor. Coordinate scheduling with the Engineer and the County to ensure the least amount of downtime and disruption to traffic. Provide additional signs at no cost to the Owner if needed for Contractor operations.

The traffic control devices list has been developed using the following layouts on the Standard Drawings for traffic control:
 - Standard D-704-19, Type E: For road closure to all traffic.
 - Standards D-704-7, 8, 9,10, 11, 11A, 13, 14, 19, and 50 are applicable.



BRC-1045(055)

CAVALIER COUNTY, NORTH DAKOTA

STRUCTURE #10-145-30.0

PLAN NOTES

DRWN. BY
ZRV

CHKD. BY
JD

PROJECT NO.
2103-00378

ENVIRONMENTAL NOTES

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	6	2

ENVIRONMENTAL NOTES (EN): Cavalier 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 the tributary to the Middle Branch of the Park River 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, Ben Holen by e-mail - bholen@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).


EN-3 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 areas to preconstruction contours.

EN-4 PRE-CONSTRUCTION PHOTOS AND NOTIFICATION: In accordance with the Section 404 Permit issued for the project (see PSP 17(22)), notify the USACE, North Dakota Regulatory Office, in writing of the anticipated start date for the work at least 10 days prior to commencing construction activities within waters of the US (i.e., jurisdictional wetlands and Other Waters as shown in Section 75). At the same time, submit pre-construction site and aerial photographs of the project site that have been taken no more than one year prior to initiation of construction activities. Photos shall include all major project features and waters of the US, including avoidance areas. Identify the camera positions and view-angles of the photographs on a map, aerial photograph, or project drawing. Reference Project Number XXX-XXXX-XXXX-BIS when contacting the USACE.

EN-5 POST-CONSTRUCTION PHOTOS: In accordance with the Section 404 Permit issued for the project (see PSP 17(22)), provide ground or aerial photographs to the owner. Photos shall include all major project features and waters of the US, including avoidance areas. Identify the camera positions and view-angles of the photographs on a map, aerial photograph, or project drawing. The owner will provide these photos and additional information to the USACE in accordance with the permit.



BRC-1045(055)
CAVALIER COUNTY, NORTH DAKOTA
STRUCTURE #10-145-30.0



**ENVIRONMENTAL
NOTES**

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PROJECT NO.
2103-00378

Estimated Quantities						STATE	PROJECT NO.	SECTION NO.	SHEET NO.
						ND	BRC-1045(055)	8	1
SPEC	CODE	ITEM DESCRIPTION	UNIT						TOTAL
103	0100	CONTRACT BOND	L SUM	1					1
202	0174	REMOVAL OF PIPE ALL TYPES AND SIZES	LF	360					360
203	0102	COMMON EXCAVATION-TYPE B	CY	2085					2085
203	0109	TOPSOIL	CY	210					210
210	0050	BOX CULVERT EXCAVATION	EA	1					1
210	0210	FOUNDATION FILL	CY	318					318
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1					1
216	0100	WATER	M GAL	81					81
251	0200	SEEDING CLASS II	ACRE	0.39					0.39
251	1000	WETLAND SEED	ACRE	0.01					0.01
251	2000	TEMPORARY COVER CROP	ACRE	0.19					0.19
253	0101	STRAW MULCH	ACRE	0.59					0.59
256	0200	RIPRAP GRADE II	CY	62					62
260	0200	SILT FENCE SUPPORTED	LF	50					50
260	0201	REMOVE SILT FENCE SUPPORTED	LF	50					50
261	0112	FIBER ROLLS 12IN	LF	1000					1000
261	0113	REMOVE FIBER ROLLS 12IN	LF	500					500
262	0100	FLOTATION SILT CURTAIN	LF	60					60
262	0101	REMOVE FLOTATION SILT CURTAIN	LF	60					60
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	180					180
606	1410	14FT X 10FT PRECAST RCB CULVERT	LF	68					68
606	5410	14FT X 10FT PRECAST RCB END SECTION	EA	2					2
702	0100	MOBILIZATION	L SUM	1					1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	301					301
704	1052	TYPE III BARRICADE	EA	8					8
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	366					366
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	124					124
900	1000	TEMPORARY STREAM DIVERSION	EA	1					1

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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BASIS OF ESTIMATE


Aggregate Surface Course CL 13	1.875 Ton/CY (Shrinkage and Compaction)
Seeding & Mulching	All disturbed areas within the right of way and project limits minus hard surfaces.
Water	50 M Gal/Site for Dust Palliative 10 Gal/CY for Embankment 40 Gal/CY for Foundation Fill and Aggregate Surface Course CL 13

Earthwork Summary					
Earthwork			Topsoil		
Spec and Code	203-0102			203-0109	
Embankment ²	Common Excavation-Type B	Excess ³ Excavation	Topsoil Embankment	Topsoil	Excess ¹ Topsoil
A	B	C = B - A	D	E	F = E - D
1335	2085	750	135	210	75

- 1) Topsoil quantities based on 6" stripping and 6" respreading. Excess topsoil shall be uniformly spread on the site within the ROW.
- 2) Embankment quantities include 35% for shrinkage.
- 3) Excess excavation shall be wasted on roadway inslopes as approved by the Engineer.



BRC-1045(055)
CAVALIER COUNTY, NORTH DAKOTA
STRUCTURE #10-145-30.0



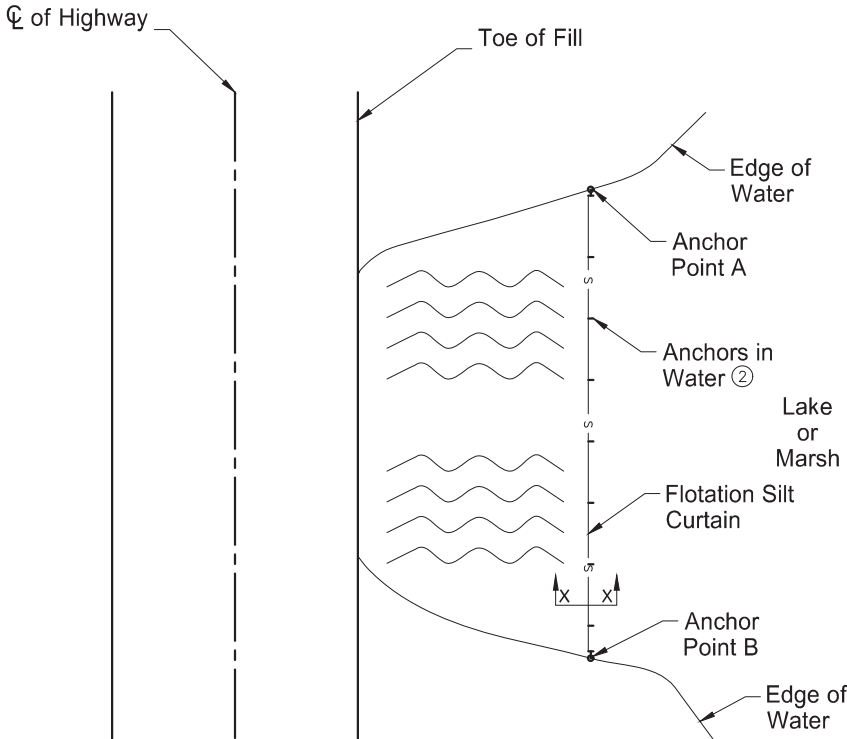
BASIS OF ESTIMATE & EARTHWORK SUMMARY

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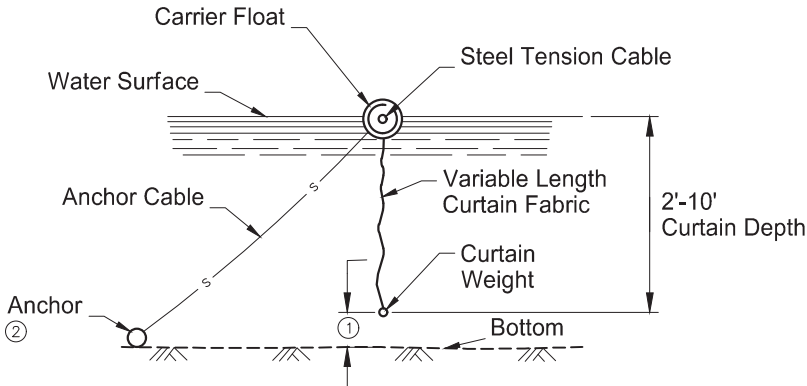
CHKD BY
JD

PROJECT NO.
2103-00378

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	20	1



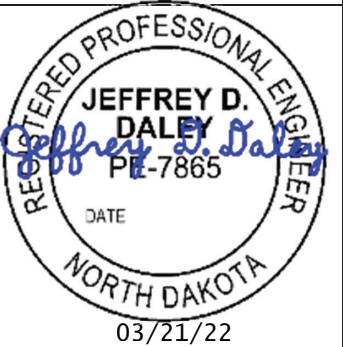
PLAN VIEW
FLOTATION SILT CURTAIN




SECTION X-X

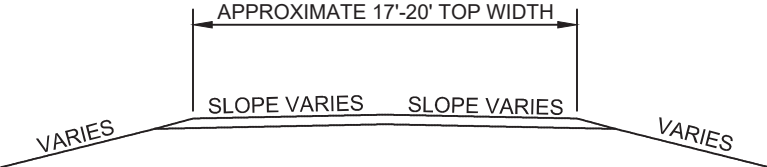
NOTES:

- ① Curtain varies from bottom.
- ② Contractor to supply and install sufficient quantity of anchors to hold the flotation silt curtain in place.

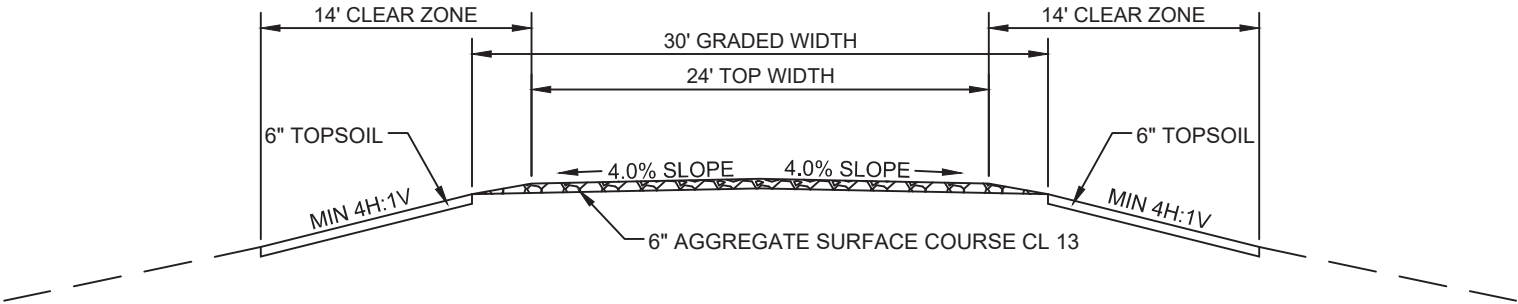


BRC-1045(055) CAVALIER COUNTY, NORTH DAKOTA STRUCTURE #10-145-30.0		
		FLOTATION SILT CURTAIN DETAILS
DRWN. BY ZRV	CHKD BY JD	PROJECT NO. 2103-00378

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	30	1

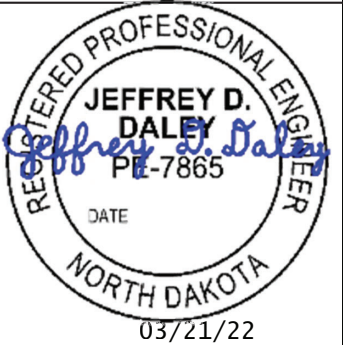


EXISTING TYPICAL SECTION
STA. 11+35 TO 13+75




PROPOSED TYPICAL SECTION
STA. 11+35 TO 13+75

- NOTES
1. TRANSITION EXISTING TO PROPOSED FROM STA. 11+35 TO 11+85 AND STA. 13+25 TO 13+75.



BRC-1045(055)
CAVALIER COUNTY, NORTH DAKOTA
STRUCTURE #10-145-30.0

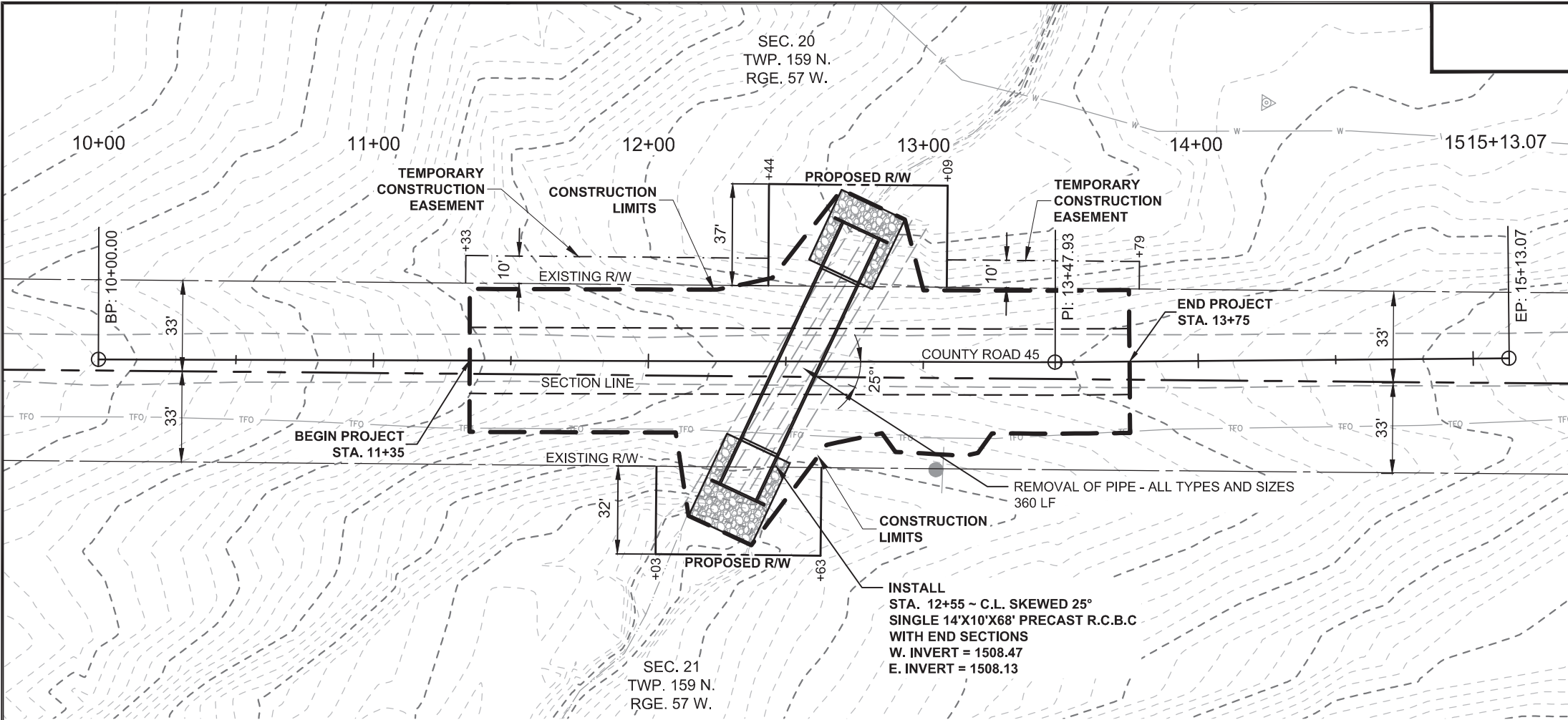


TYPICAL SECTIONS

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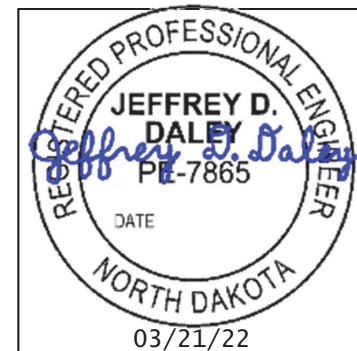
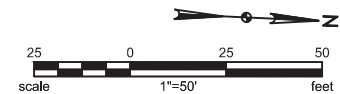
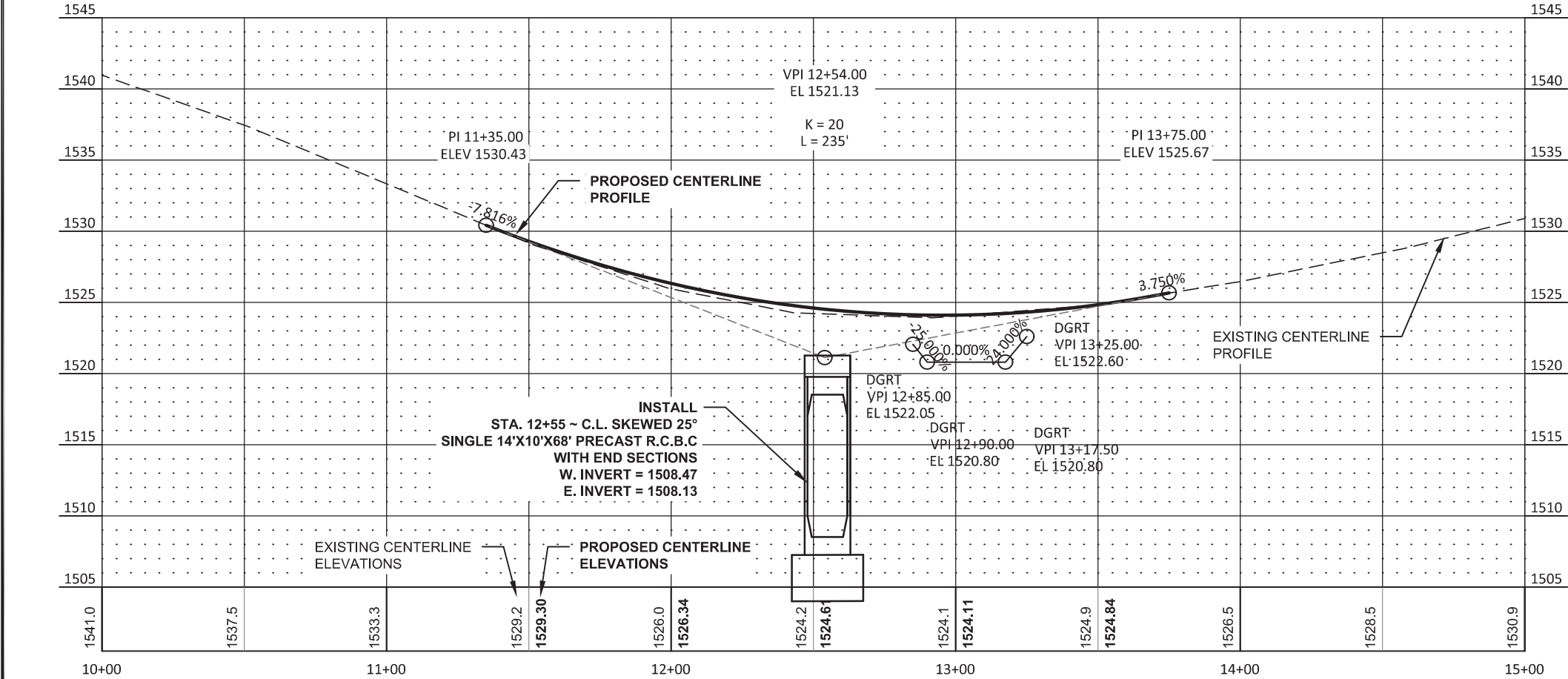
CHKD BY
JD


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2103-00378



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRC-1045(055)	60	1

SPEC CODE	BID ITEM	QTY	UNIT
202	0174 REMOVAL OF PIPE ALL TYPES AND SIZES		
	STA. 12+48 ~ C.L.	120	LF
	STA. 12+58 ~ C.L.	120	LF
	STA. 12+68 ~ C.L.	120	LF
		360	LF





BRC-1045(055)
CAVALIER COUNTY, NORTH DAKOTA
STRUCTURE #10-145-30.0

PLAN & PROFILE
STA. 11+35 TO 13+75

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PROJECT NO.
2103-00378

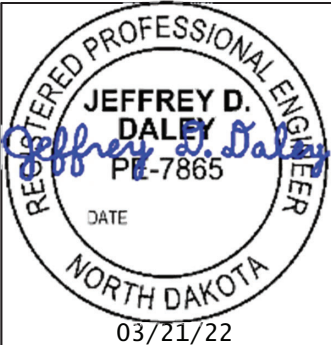
Wetland Impact Table - Structure #10-145-30.0											
Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands ¹	Wetland Impacts Acre(s)			Wetland Mitigation			
								Mitigation Required		Onsite EO11990 Mitigation	
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	EO 11990	USACE	Mitigation Location; Ratio	Acre(s)
2a	Sec. 20, T159N, R57W	Riverine	Natural	Y	0.001	0.001	-	Y	N	1:1	0.001
2d	Sec. 20, T159N, R57W	Riverine	Natural	Y	0.005	-	-	Y	N	-	-
2e	Sec. 21, T159N, R57W	Riverine	Natural	Y	-	-	-	Y	N	-	-
2f	Sec. 21, T159N, R57W	Riverine	Natural	Y	0.001	0.003	-	Y	N	1:1	0.003
Totals					0.007	0.004	0.000				0.004

Other Waters Impact Table - Structure #10-145-30.0																
Other Waters													Other Water Mitigation			
Number	Location	Type	Size		Feature	USACE Jurisdictional ¹	Impacts to Other Waters						Mitigation Required		USACE/11990 Bank	
			Acre(s)	Linear Feet			Acres			Linear Feet			EO 11990	USACE	Mitigation Location; Ratio	Acre(s)
							Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm. (Fill/Drain)	Perm. (Cut)				
OW 2b	Sec. 20, T159N, R57W	Stream	0.04	186	Natural	Y	0.003	0.001	-	10	5	-	N	N	-	-
OW 2c	Sec. 21, T159N, R57W	Stream	0.05	169	Natural	Y	0.006	0.001	-	15	5	-	N	N	-	-
						Totals	0.009	0.002	0.000	25	10	0				0.000


¹ All aquatic resources are assumed to be USACE jurisdictional.

Impact Summary Table			
Permanent	Impact Summary	Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD (Fill/Drain)	0.004	Temporary JD	0.007
Natural/Non-JD (Fill/Drain)	-	Non-JD Temporary	-
Artificial/JD (Fill/Drain)	-	Permanent JD > 0.10	0.006
Artificial /Non-JD (Fill/Drain)	-	Permanent OW	0.002/10
Total	0.004	Temporary OW	0.009/25
JD Natural (Cut)	-		
JD Artificial (Cut)	-		
Non-JD Natural (Cut)	-		
Non-JD Artificial (Cut)	-		
Total	-		

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	0.004	-		
USACE/11990	-	-		-	
USFWS	-				-
	Total	0.004	-	-	-



BRC-1045(055)
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STRUCTURE #10-145-30.0



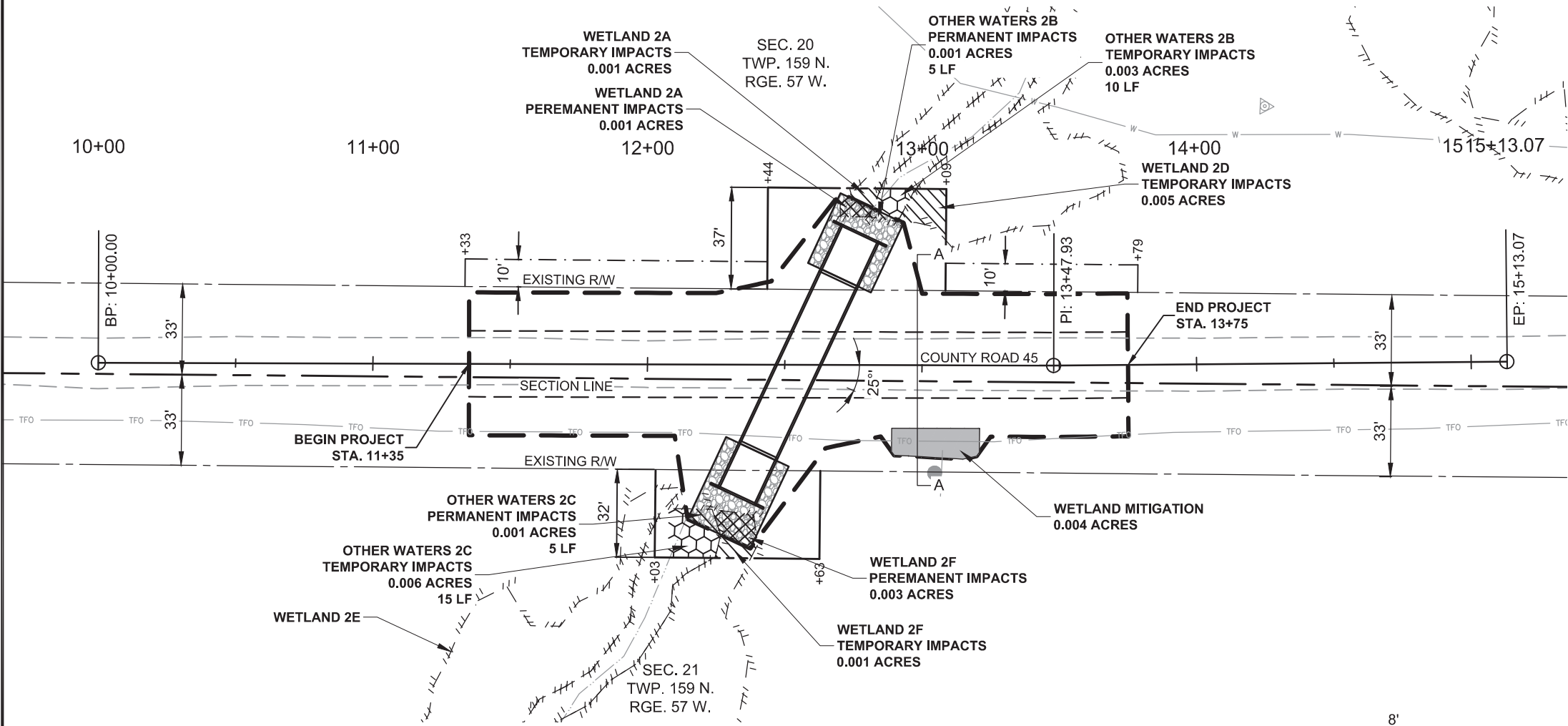
WETLAND TABLES

DRWN. BY
ZRV

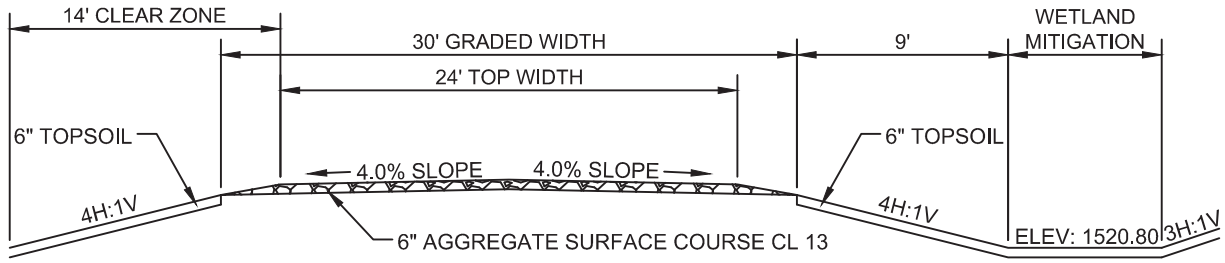
CHKD BY
JD


PROJECT NO.
2103-00378

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	75	2



- DELINEATED AQUATIC RESOURCE
- [Pattern] TEMPORARY WETLAND IMPACTS
- [Pattern] PERMANENT WETLAND IMPACTS (FILL DRAIN)
- [Pattern] PERMANENT OTHER WATERS IMPACTS (FILL DRAIN)
- [Pattern] TEMPORARY OTHER WATERS IMPACTS
- [Pattern] WETLAND MITIGATION





BRC-1045(055)
CAVALIER COUNTY, NORTH DAKOTA
STRUCTURE #10-145-30.0

WETLAND IMPACTS

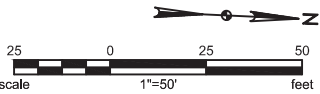
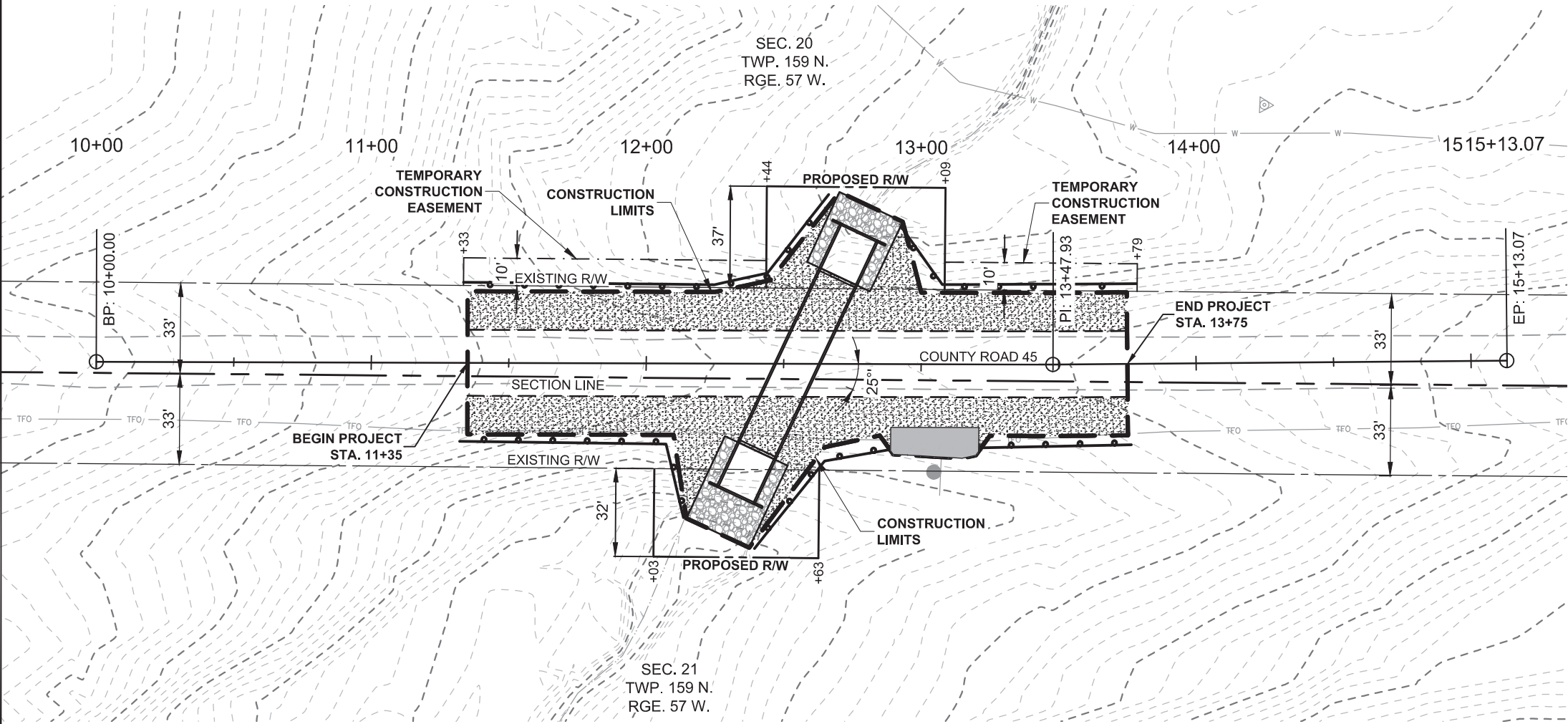
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ZRV





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PROJECT NO.
2103-00378

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	77	1


SPEC CODE	BID ITEM	QTY	UNIT
251 0200	SEEDING CLASS II STA. 11+35 TO 13+75	0.19	ACRE
251 1000	WETLAND SEED STA. 11+35 TO 13+75	0.01	ACRE
253 0101	STRAW MULCH STA. 11+35 TO 13+75	0.20	ACRE
256 0200	RIPRAP GRADE II STA. 11+35 to 13+75	62	CY
261 0112	FIBER ROLLS 12IN STA. 11+35 to 13+75	500	LF



-  SEEDING CLASS II & STRAW MULCH
-  WETLAND SEEDING & STRAW MULCH
-  FIBER ROLLS
-  RIPRAP GRADE II



BRC-1045(055)
CAVALIER COUNTY, NORTH DAKOTA
STRUCTURE #10-145-30.0



**PERMANENT
EROSION CONTROL**

DRWN. BY
ZRV

CHKD BY
JD

PROJECT NO.
2103-00378

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	100	2



W20-3-48
Post Mounted



R11-3a-60
(1) TYPE III BARRICADE



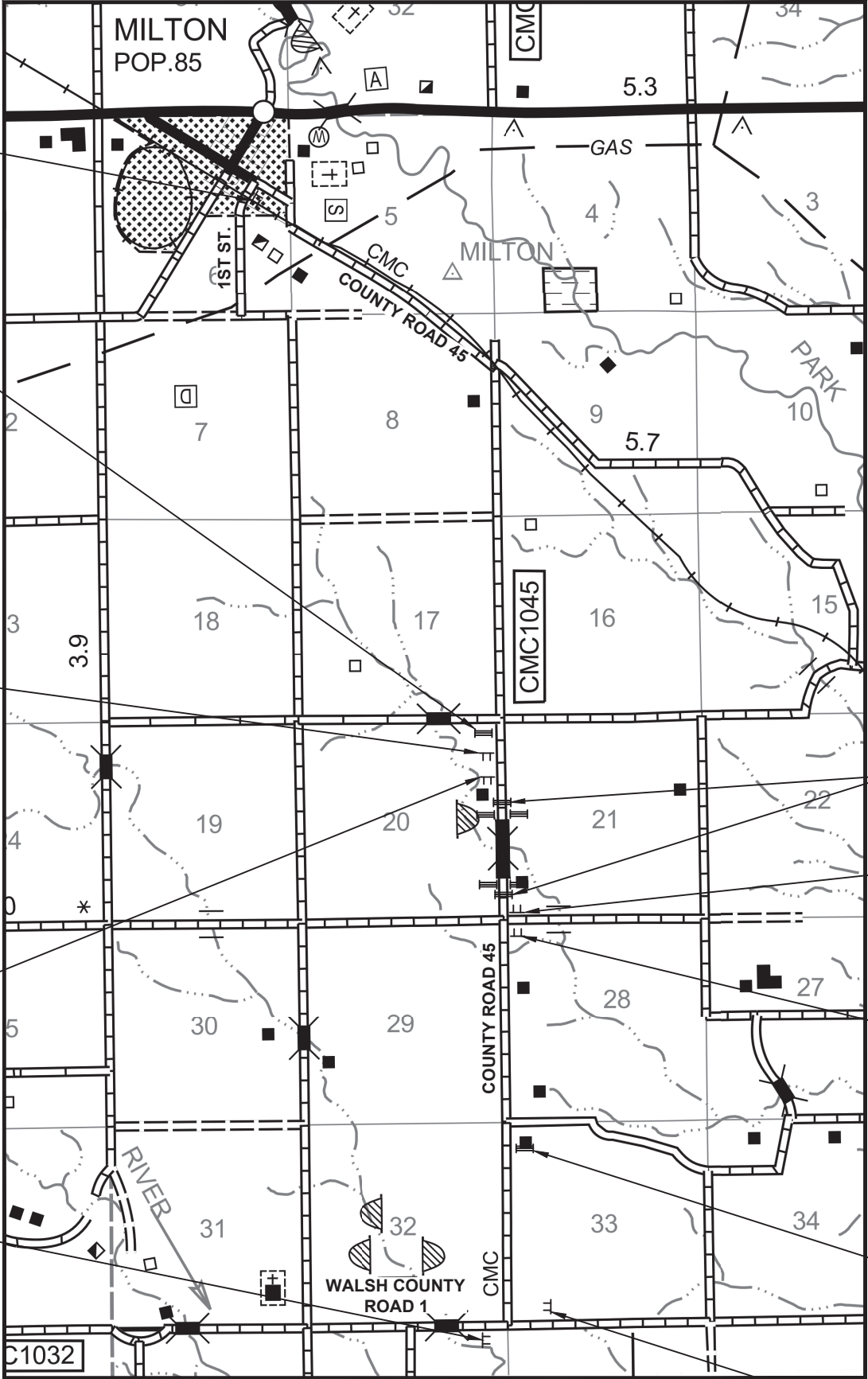
W20-3-48
Post Mounted



W20-3-48
Post Mounted



G20-52a-72
Post Mounted



(1) R11-2-48
(3) TYPE III BARRICADE



W20-3-48
Post Mounted



W20-3-48
Post Mounted



R11-3a-60
(1) TYPE III BARRICADE



G20-52a-72
Post Mounted



BRC-1045(055)
CAVALIER COUNTY, NORTH DAKOTA
STRUCTURE #10-145-30.0

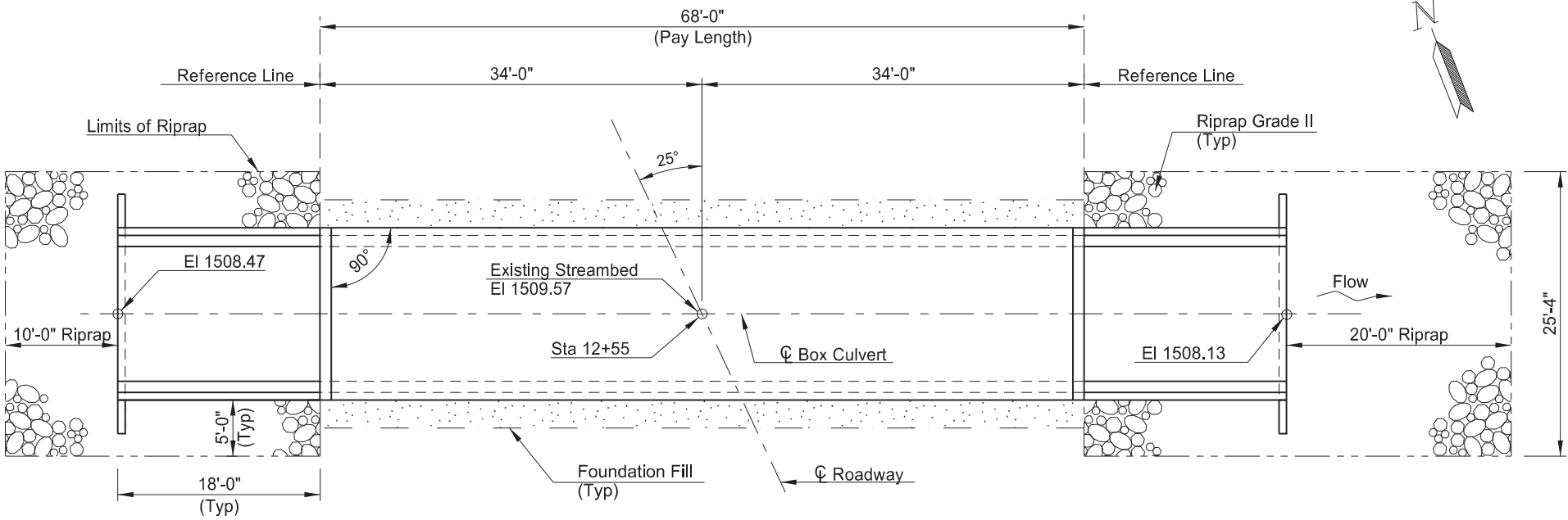
KLJ

**CONSTRUCTION
SIGNING LAYOUT**

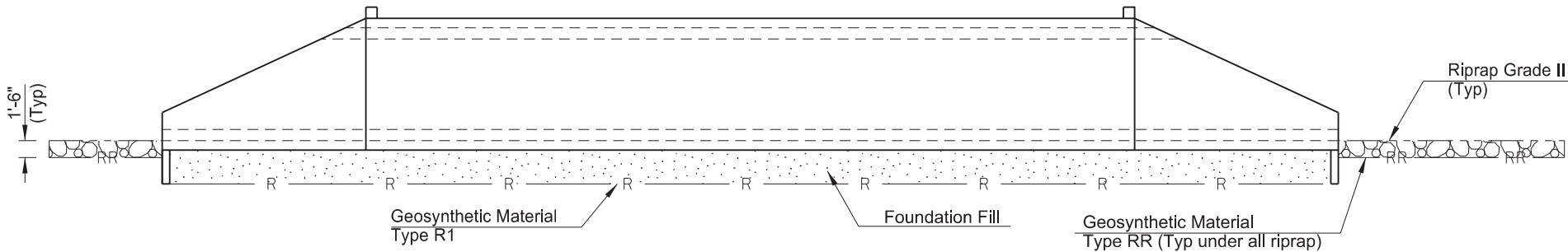
DRWN BY ZRV	CHKD BY JD	PROJECT NO. 2103-00378
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The sign layout as shown is for general information purposes only. The contractor will be required to conform to MUTCD and the Standard Drawings when installing the traffic control signing.

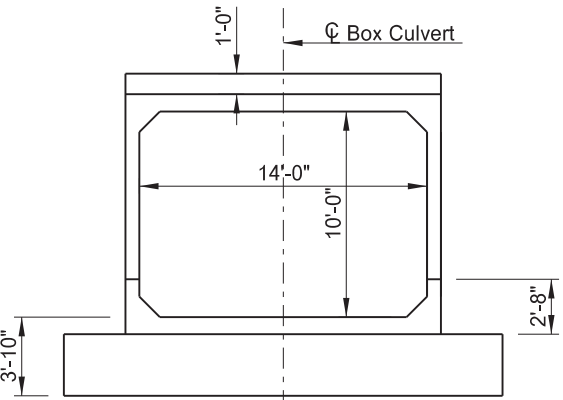
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	170	1



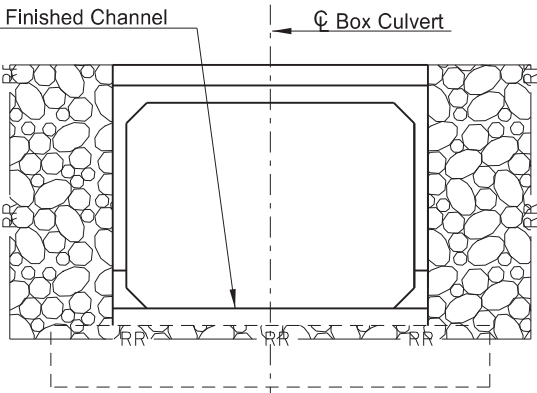
PLAN



ELEVATION



END VIEW
(Showing Dimensions)



END VIEW
(Showing Finished Section)

PRECAST BOX CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	318
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
256	0200	RIPRAP GRADE II	CY	62
606	1410	14FT X 10FT PRECAST RCB CULVERT	LF	68
606	5410	14FT X 10FT PRECAST RCB END SECTION	EA	2
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	366
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	124

HYDRAULIC DATA:

Drainage Area	8.32	sq mi
Stream Gradient	0.00497	ft/ft
Design Frequency	25	yr
Design Discharge	552	cfs
Design Headwater Stage	1515.8	ft
Design Tailwater Stage	1513.7	ft
Velocity of Flow Under Bridge	8.7	fps
100-Year Frequency Discharge	795	cfs
100-Year Frequency Stage	1517.7	ft
Overtopping Stage	1523.9	ft
Overtopping Discharge	1650	cfs

NOTE:

Invert elevation shown represent an elevation 1 foot below the existing stream bed



BRC-1045(055)
CAVALIER COUNTY, NORTH DAKOTA
STRUCTURE #10-145-30.0

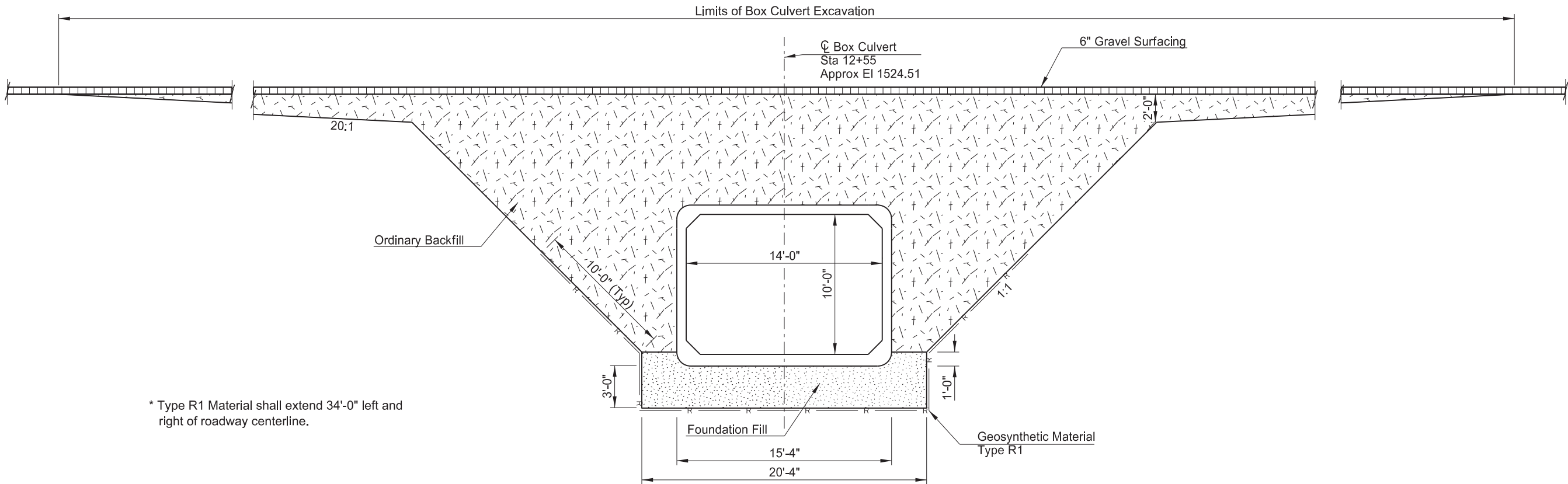


PRECAST BOX CULVERT
LAYOUT

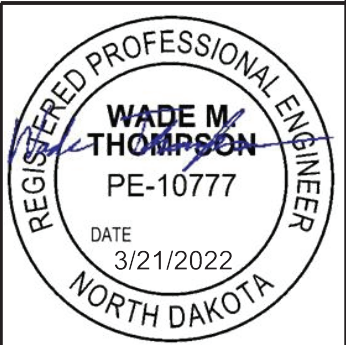
DRAWN BY AMB	CHECKED BY WMT	PROJECT NO. 2103-00378
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		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	BRC-1045(055)	170	2
STRUCTURAL NOTES					
100	SCOPE OF WORK: Work this site consists of removing three 6'-0" x 120' corrugated steel pipe and replacing them with a new single barrel 14' x 10' x 68' precast reinforced concrete box culvert.				
202	REMOVAL OF STRUCTURE: The existing structure consists of three 120' long, 6'-0" dia. corrugated steel pipe. The bid item "REMOVAL OF PIPES ALL TYPES AND SIZES" includes all work required to remove all three pipes in accordance with the Standard Specifications.				
210	FOUNDATION FILL: Use CL 5 as specified in Section 816 of the Standard Specifications, "Aggregates" except as noted below. Notify the Engineer if the Contractor elects to use a coarse rock material under the box culvert as replacement for a portion or all of the CL 5 material. The replacement of the CL 5 material with coarse rock under the box culvert is subject to the approval of the Engineer. No additional payment will be made for the substitution of the CL 5. All CL 5 and coarse rock used will be paid at the unit price bid for "FOUNDATION FILL". 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" diameter galvanized tie-bolts as shown on Standard Drawing D-714-22. If strands are used, use a minimum of four ½" diameter 270K strands for single box culverts with one strand in each corner. 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 "14FT X 10FT PRECAST RCB END SECTION" bid items consist of the cutoff wall, parapet, and sloped end section. Attach the end section 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 the price bids for "14FT X 10FT 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" diameter reinforcing bars. Cast holes in the last barrel section at 2'-0" centers for ½" diameter 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 Standard Specifications. DESIGN LOADS: A. HL-93 Loading B. Fill Height = 4'-0" to 6'-0" WORK DRAWINGS: Submit the following work drawings to the Engineer of Record: 14FT X 10FT PRECAST RCB CULVERT				
			<div><div><div>REGISTERED PROFESSIONAL ENGINEER</div><div>WADE M. THOMPSON</div><div>PE-10777</div><div>DATE 3/21/2022</div><div>NORTH DAKOTA</div></div></div>		
			<div><div><div>BRC-1045(055)</div><div>CAVALIER COUNTY, NORTH DAKOTA</div><div>STRUCTURE # 10-145-30.0</div></div><div><div><div>KLJ</div><div>PRECAST BOX CULVERT STRUCTURAL NOTES</div></div><div><div>DRAWN BY AMB</div><div>CHK'D BY WMT</div><div>PROJECT NO. 2103-00378</div></div></div></div>		

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	170	3



BOX CULVERT EXCAVATION AND BACKFILL



BRC-1045(055)

CAVALIER COUNTY, NORTH DAKOTA

STRUCTURE #10-145-30.0

KLJ

PRECAST BOX CULVERT BACKFILL DETAILS

DRAWN BY

AMB

CHECKED BY

WMT

PROJECT NO.

2103-00378

3/21/2022

11:28:38 AM

samanthadvorak

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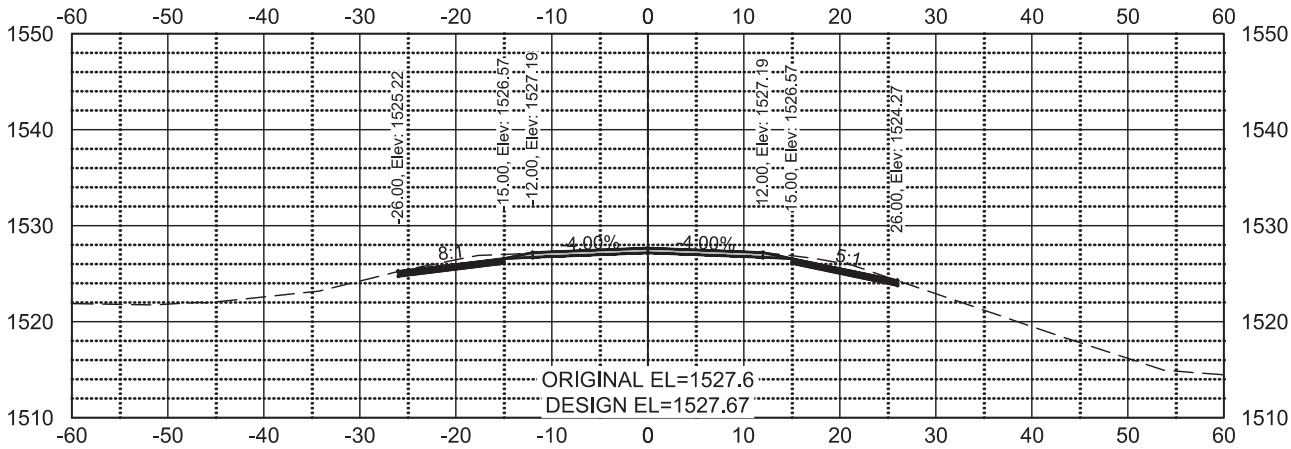
© KLJ 2022

CROSS-SECTIONS

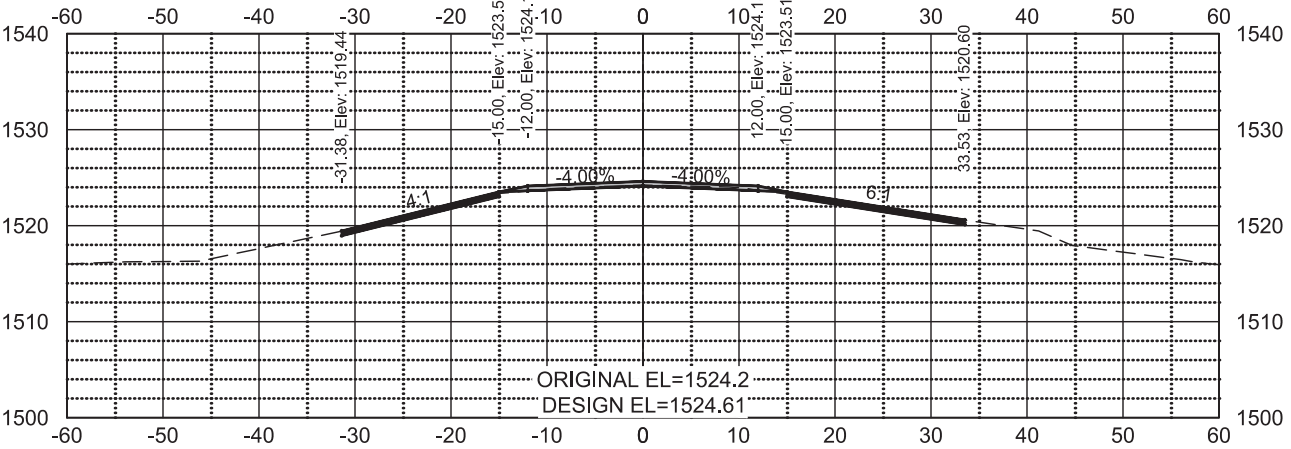


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	200	1

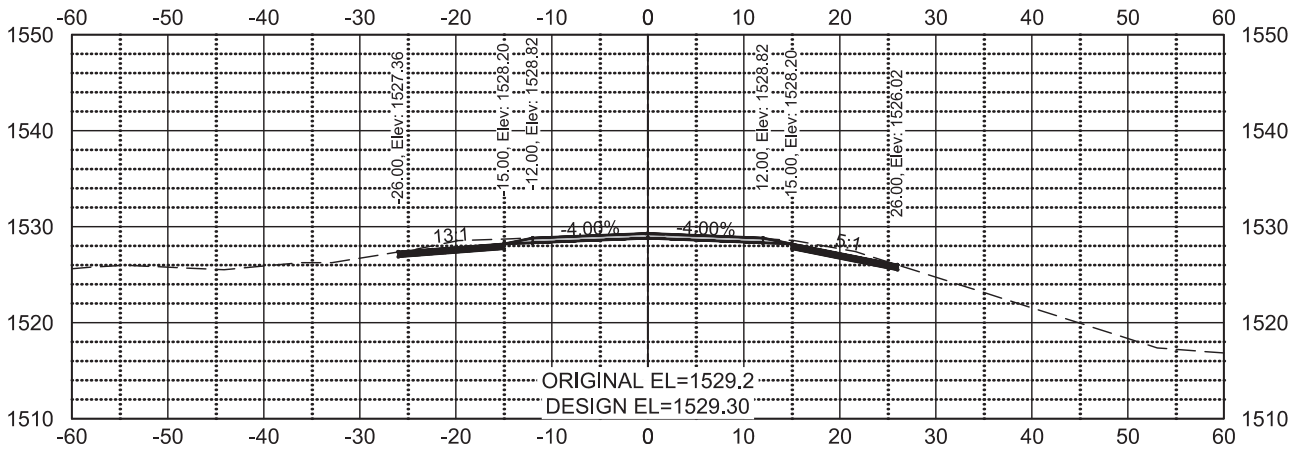
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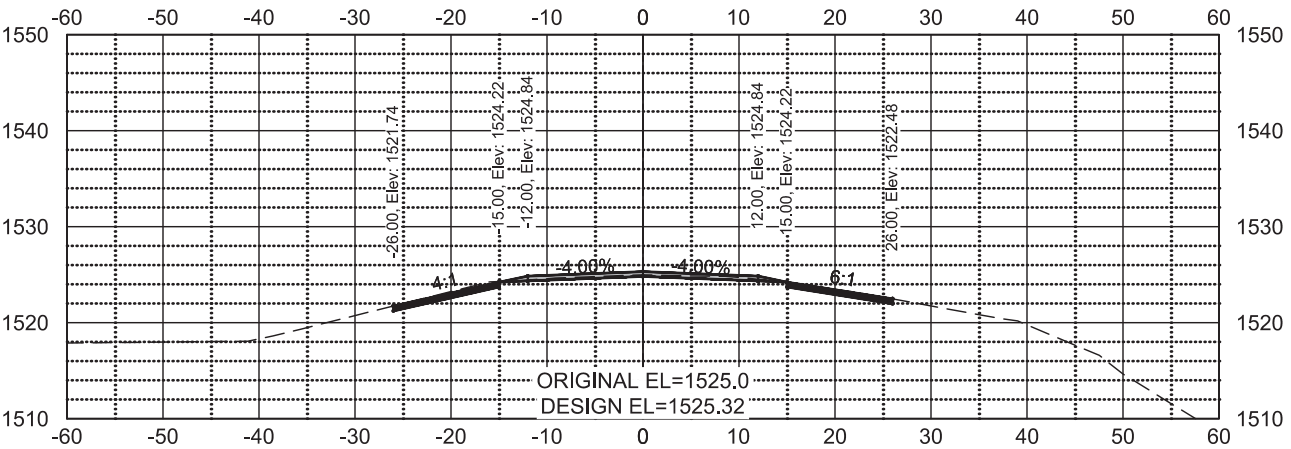
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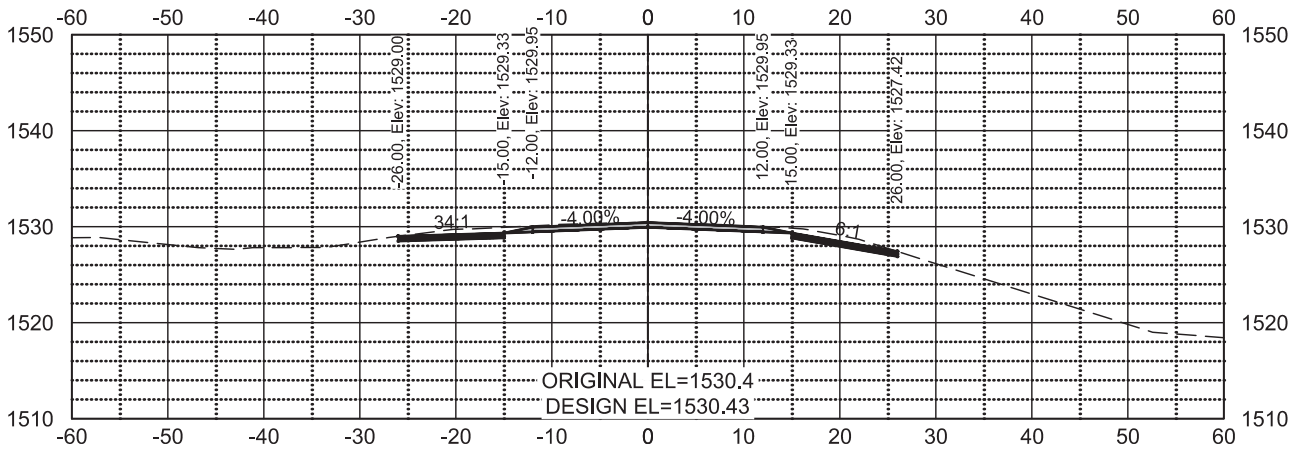
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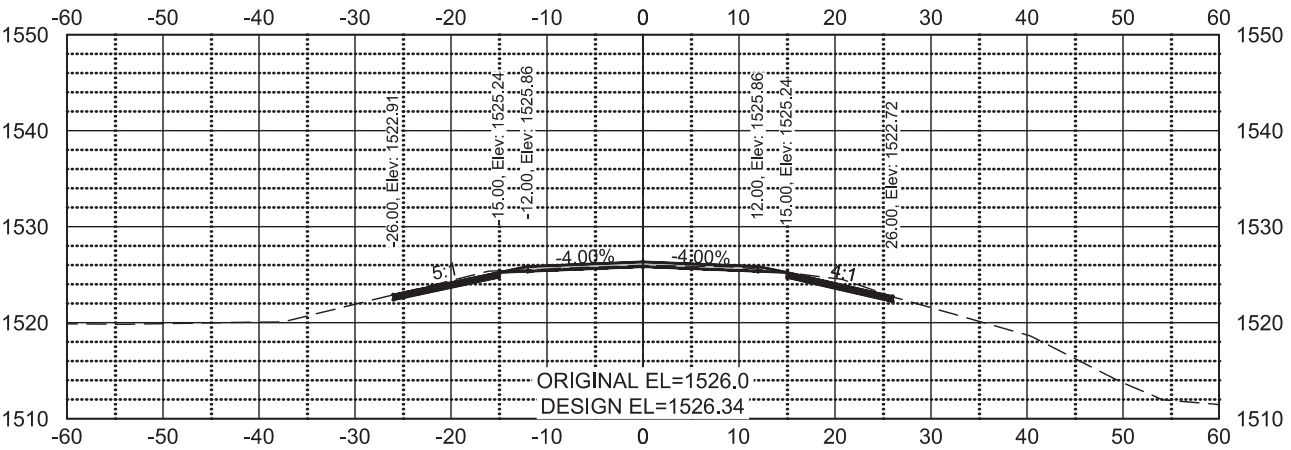
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11+35.00



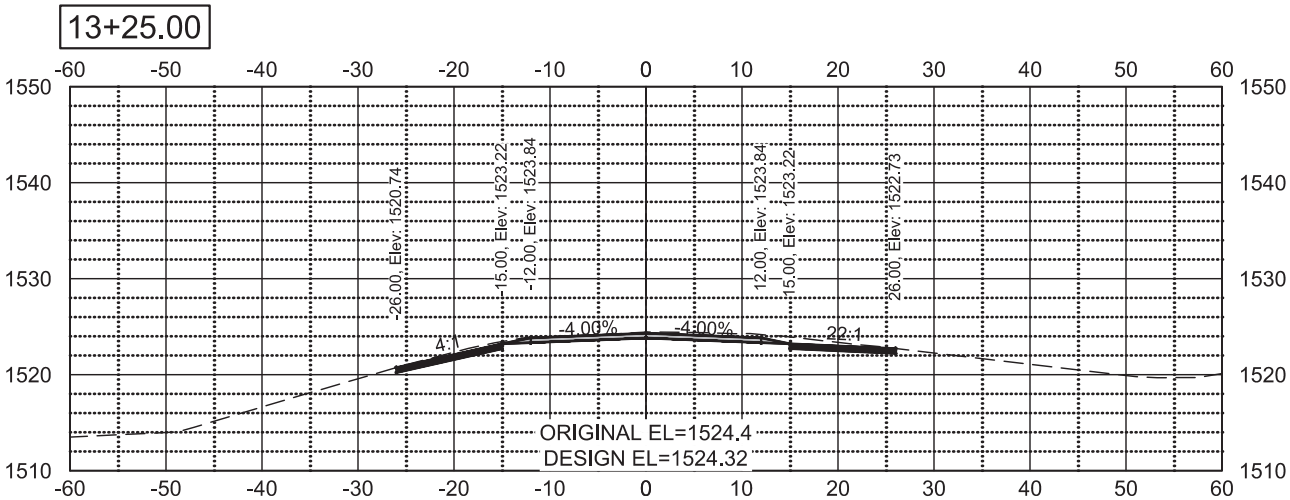
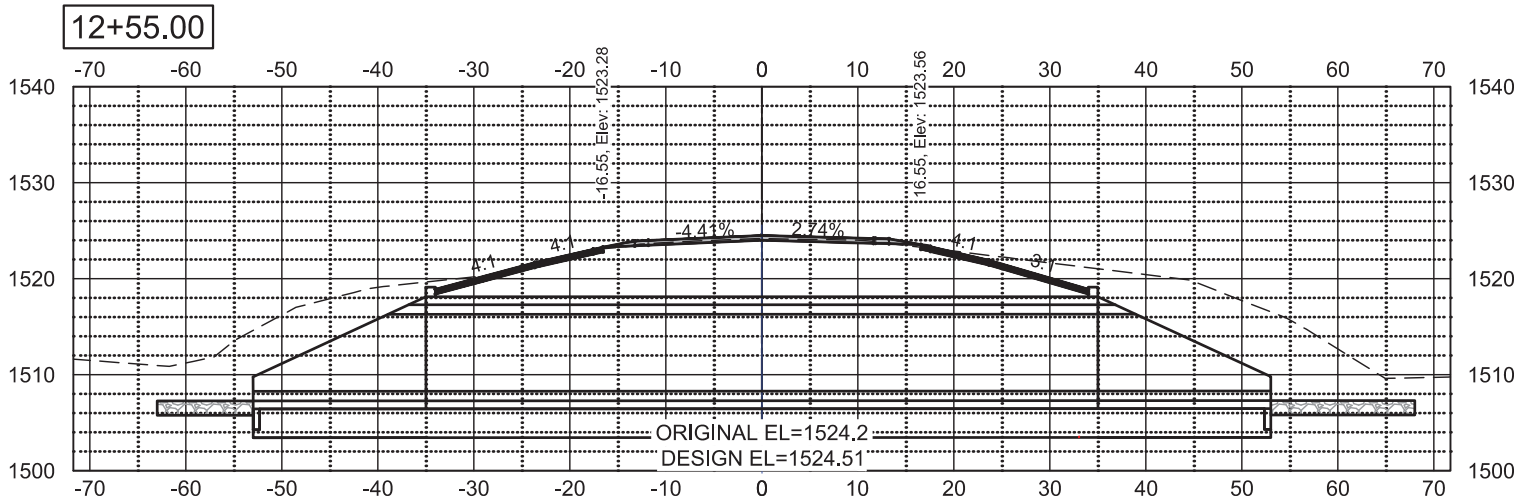
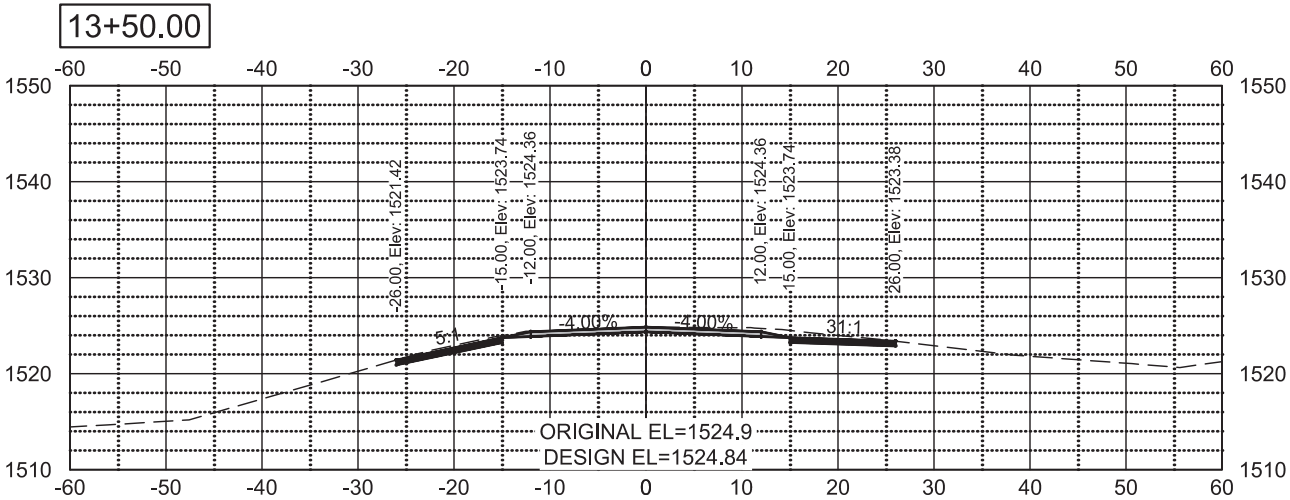
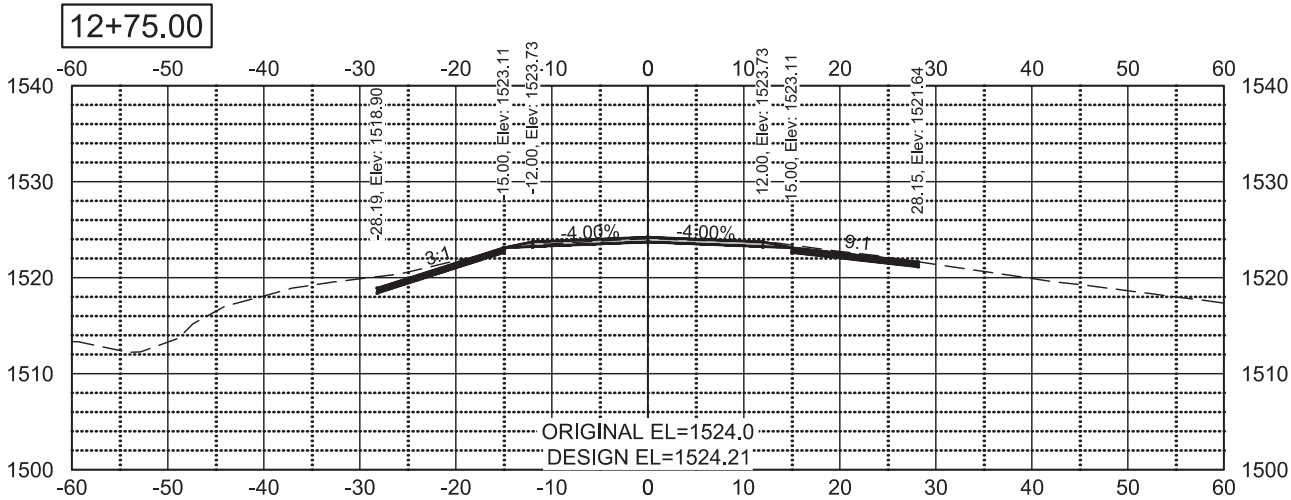
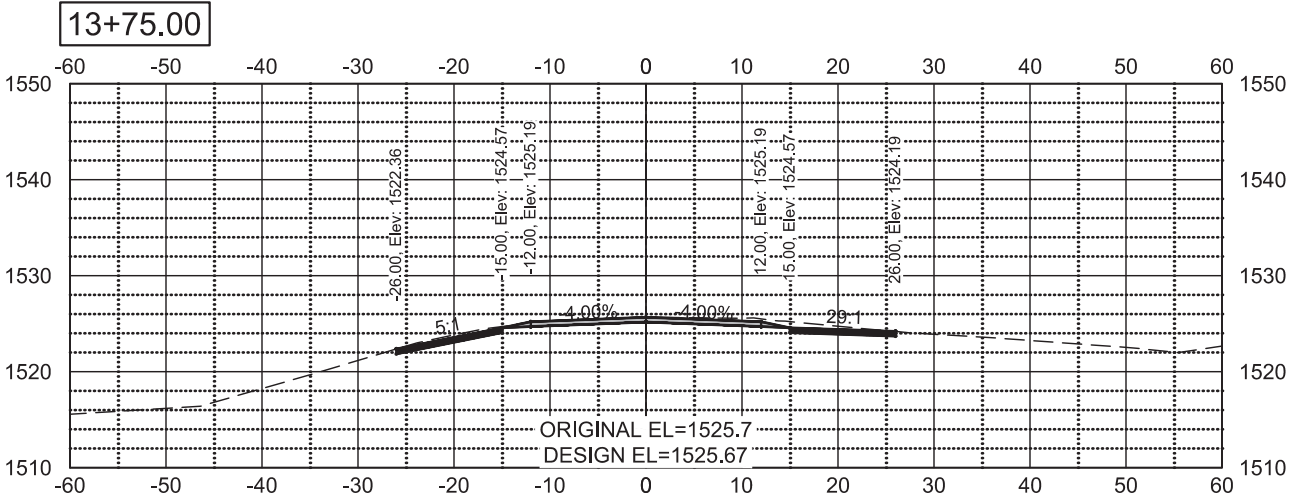
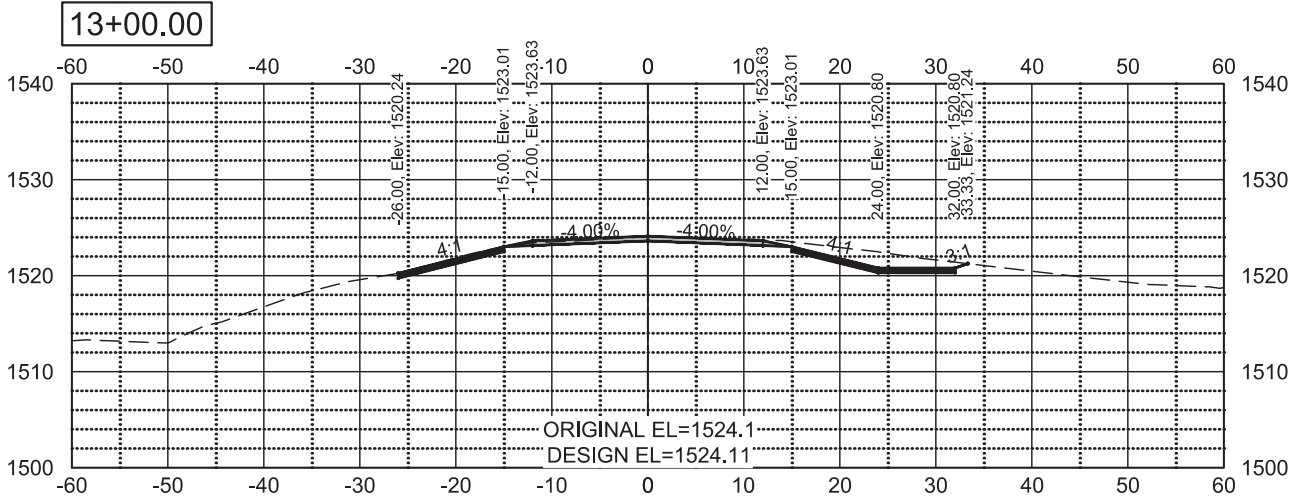
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CROSS-SECTIONS



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRC-1045(055)	200	2



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	C Gdrl	cable guardrail	Culv	culvert	FOS	factor of safety
Abut	abutment	Calc	calculate	C&G	curb & gutter	Fed	Federal
Adj	adjusted	CIP	cast iron pipe	CI	curb inlet	FP	feed point
Aggr	aggregate	CB	catch basin	CR	curb ramp	Fn	fence
Ahd	ahead	CRS	cationic rapid setting	C	cut	Fn P	fence post
ARV	air release valve	C Gd	cattle guard	Dd Ld	dead load	FO	fiber optic
Align	alignment	C To C	center to center	Defl	deflection	FD	field drive
Al	alley	CL or C	centerline	Defm	deformed	F	fill
Alt	alternate	Ch	chain	DInt	delineate	FAA	fine aggregate angularity
Alum	aluminum	ChnIk	chain-link	DIntr	delineator	FH	fire hydrant
ADA	Americans with Disabilities Act	Ch Blk	channel block	Depr	depression	FI	flange
&	and	Ch Ch	channel change	Desc	description	FIRD	flared
Appr	approach	Chk	check	Det	detail	FES	flared end section
Approx	approximate	Chsld	chiseled	DWP	detectable warning panel	F Bcn	flashing beacon
ACP	asbestos cement pipe	Cir	circle	Dtr	detour	FA	flight auger sample
Asph	asphalt	CI	class	Dia or \varnothing	diameter	FL	flow line
AC	asphalt cement	CInt	clean-out	Dir	direction	Ftg	footing
Assmd	assumed	Clr	clear	Dist	distance	FM	force main
@	at	CI&gr	clearing & grubbing	DM	disturbed material	Fnd	found
Atten	attenuation	Comb.	combination	DB	ditch block	Fdn	foundation
ATR	automatic traffic recorder	Coml	commercial	DG	ditch grade	Frac	fractional
Ave	Avenue	Compr	compression	Dbl	double	Frwy	freeway
Avg	average	CADD	computer aided drafting & design	Dn	down	Frt	front
ADT	average daily traffic	Conc	concrete	Dwg	drawing	FF	front face
		CECB	concrete erosion control blanket	Dr	drive	F Disp	fuel dispenser
		Cond	conductor	Drwy	driveway	FFP	fuel filler pipes
		Const	construction	DI	drop inlet	FLS	fuel leak sensor
		Cont	continuous	D	dry density	Furn	furnish/ed
		CSB	continuous split barrel sample	DSDS	dynamic speed display sign		
		Contr	contraction				
		Contr	contractor				
Bk	back	CP	control point				
BF	back face	Coord	coordinate	Ea	each		
Balc	balcony	Cor	corner	Esmt	easement		
B Wire	barbed wire	Corr	corrected	E	East		
Barr	barricade	CAES	corrugated aluminum end section	EB	Eastbound		
Btry	battery	CAP	corrugated aluminum pipe	Elast	elastomeric		
BI	beehive inlet	CMES	corrugated metal end section	EL	electric locker		
Beg	begin	CMP	corrugated metal pipe	E Mtr	electric meter		
BG	below grade	CPVCP	corrugated poly-vinyl chloride pipe	Elec	electric/al		
BM	bench mark	CSES	corrugated steel end section	EDM	electronic distance meter		
Bkwy	bikeway	CSFES	corrugated steel flared end section	Elev or El	elevation		
Bit	bituminous	CSP	corrugated steel pipe	Ellipt	elliptical		
Blk	block	CSTES	corrugated steel traversable end section	Emb	embankment		
BH	bore hole	Co	County	Emuls	emulsion/emulsified		
Bot	bottom	Crse	course	ES	end section		
Blvd	Boulevard	Ct	Court	Engr	engineer		
Bndry	boundary	Xarm	cross arm	ESS	environmental sensor station		
Brkwy	breakaway	Xbuck	cross buck	Eq	equal		
Br	bridge	Xsec	cross sections	Evgr	evergreen		
Bldg	building	Xing	crossing	Exc	excavation		
Bus.	business	Xrd	crossroad	Exst	existing		
BV	butterfly valve	Crn	crown	Exp	expansion		
Byp	bypass			Expy	Expressway		
				E	external of curve		
				Extru	extruded		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18 09-20-18 12-18-20	General Revisions General Revisions General Revisions

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 18 2020

NDDOT ABBREVIATIONS

D-101-2

Galv	galvanized	Ln	lane	Obsc	obscure(d)	Qty	quantity
Gar	garage	Lg	large	Ocpd	occupied	Qtr	quarter
Gs L	gas line	Lat	latitude	Ocpy	occupy		
G Reg	gas line regulator	Lt	left	O/s	offset		
GMV	gas main valve	Lens	lenses	OC	on center	Rad or R	radius
G Mtr	gas meter	Lvl	level	C	one dimensional consolidation	RR	railroad
GSV	gas service valve	LvIng	leveling	OC	organic content	Rlwy	railway
GVP	gas vent pipe	Lht	light	Orig	original	Rsd	raised
GV	gate valve	LP	light pole	O To O	out to out	RC	rapid curing
Ga	gauge	Ltg	lighting	OD	outside diameter	Rec	record
Gov	government	Liq	liquid	OH	overhead	Rcy	recycle
Grd	graded/grade	LL	liquid limit			RAP	recycled asphalt pavement
Grnd	ground	Loc	location			RPCC	recycled portland cement concrete
GWM	ground water monitor	Long.	longitude	PMT	pad mounted transformer	Ref	reference
Gdrl	guardrail	Lp	loop	Pg	pages	R Mkr	reference marker
Gtr	gutter	LD	loop detector	Pntd	painted	RM	reference monument
		Lum	luminaire	Pr	pair	RP	reference point
				Pnl	panel	Refl	reflectorized
H Plg	H piling			Pk	park	RCB	reinforced concrete box
Hdwl	headwall	Mb	mailbox	PSD	passing sight distance	RCES	reinforced concrete end section
Ht	height	ML	main line	Pvmt	pavement	RCFES	reinforced concrete flared end section
Hel	helical	MH	manhole	Ped	pedestal	RCP	reinforced concrete pipe
HDPE	high density polyethylene	Mkd	marked	Ped	pedestrian	RCPS	reinforced concrete pipe sewer
HM	high mast	Mkr	marker	PPP	pedestrian pushbutton post	RCTES	reinforced concrete traversable end section
HP	high pressure	Mkg	marking	Pen.	penetration	Reinf	reinforcement
HPS	high pressure sodium	MA	mast arm	Perf	perforated	Res	reservation
Hwy	highway	Matl	material	Per.	perimeter	Res	residence
Hor	horizontal	Max	maximum	Perm	permanent	Ret	retaining
HBP	hot bituminous pavement	MC	meander corner	PL	pipeline	Rev	reverse
HMA	hot mix asphalt	Meas	measure	Pl	place	Rt	right
Hyd	hydrant	Mdn	median	P&P	plan & profile	R/W	right of way
Ph	hydrogen ion content	MD	median drain	PL	plastic limit	Riv	river
		MC	medium curing	Pl or \overline{P}	plate	Rd	road
		MGS	Midwest Guardrail System	Pt	point	Rdbd	road bed
Id	identification	MM	mile marker	PE	polyethylene	Rdwy	roadway
Incl	inclinometer tube	MP	mile post	PVC	polyvinyl chloride	RWIS	roadway weather information system
IMH	inlet manhole	Min	minimum	PCC	Portland Cement concrete	Rk	rock
ID	inside diameter	Misc	miscellaneous	PP	power pole	Rt	route
Inst	instrument	Mon	monument	Preempt	preemption		
Intchg	interchange	Mnd	mound	Prefab	prefabricated		
Intmdt	intermediate	Mtbl	mountable	Prfmd or Pref	preformed		
Intscn	intersection	Mtd	mounted	Prep	preperation		
Inv	invert	Mtg	mounting	Press.	pressure		
IP	iron pipe	Mk	muck	PRV	pressure relief valve		
				Prestr	prestressed		
				Pvt	private		
				PD	private drive		
Jt	joint			Prod.	production/produce		
Jct	junction			Prog	programmed		
		Neop	neoprene	Prop.	property		
		Ntwk	network	Prop Ln	property line		
		N	North	Ppsd	proposed		
		NE	North East	PB	pull box		
		NW	North West				
		NB	Northbound				
		No. or #	number				

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15 04-23-18 12-18-20	General Revisions General Revisions General Revisions



12 18 2020

NDDOT ABBREVIATIONS

D-101-3

Salv	salvage(d)	Tel	telephone
San	sanitary sewer line	Tel B	Telephone Booth
Sec	section	Tel P	telephone pole
SL	section line	Tv	television
Sep	separation	Temp	temperature
Seq	sequence	Temp	temporary
Serv	service	TBM	temporary bench mark
Sht	sheet	T	thinwall tube sample
Shtng	sheeting	Ts	topsoil
Shldr	shoulder	Traf	traffic
Sw or Sdwk	sidewalk	TSCB	traffic signal control box
SD	sight distance	Tr	trail
SN	sign number	Transf	transformer
Sig	signal	Trans	transition
Sgl	single	TT	transmission tower
SRCP	slotted reinforced concrete pipe	TES	traversable end section
SC	slow curing	Trans	transverse
SS	slow setting	Trtd	treated
Sm	small	Trmt	treatment
S	South	Qc	triaxial compression
SE	South East	TERO	tribal employment rights ordinance
SW	South West	Tpl	triple
SB	Southbound	Typ	typical
Sp	spaces		
Spcl	special	Qu	unconfined compressive strength
SA	special assembly	Ugrnd	underground
SP	special provisions	Util	utility
G	specific gravity		
Spk	spike		
SB	split barrel sample	VG	valley gutter
SH	sprinkler head	Vap	vapor
SV	sprinkler valve	Vert	vertical
Sq	square	VCP	vitrified clay pipe
Stk	stake	Vol	volume
Std	standard		
N	standard penetration test		
Std Specs	standard specifications	Wkwy	walkway
Stm L	steam line	W	water content
SEC	steel encased concrete	WGV	water gate valve
SMA	stone matrix asphalt	WL	water line
SSD	stopping sight distance	WM	water main
SD	storm drain	WMV	water main valve
St	street	W Mtr	water meter
SPP	structural plate pipe	WSV	water service valve
SPPA	structural plate pipe arch	WW	water well
Str	structure	Wrng	wearing
Subd	subdivision	WIM	weigh in motion
Sub	subgrade	W	west
Sub Prep	subgrade preparation	WB	westbound
Ss	subsoil	Wrng	wiring
SS	supplement specification	W/	with
Supp	supplemental	W/o	without
Surf	surfacing	WC	witness corner
Surv	survey		
Sym	symmetrical		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15 04-23-18 12-18-20	General Revisions General Revisions General Revisions



12 18 2020

MEASUREMENTS

ac	acres
A	ampere
Bd Ft	board feet
Cd	candela
cm	centimeter
C	coulomb
CF	cubic feet
m3	cubic meter
m3/s	cubic meters per second
CY	cubic yard
CY/mi	cubic yards per mile
D or Deg	degree
F	Fahrenheit
F	farad
ft	feet/foot
Gal	gallon
G	giga
Ha	hectare
H	henry
Hz	hertz
hr	hour(s)
in	inch
J	joule
K	kelvin
kN	kilo newton
kPa	kilo pascal
kg	kilogram
kg/m3	kilogram per cubic meter
km	kilometer
K	Kip(s)
LF	linear foot
L	litre
Lm	lumen
L sum	lump sum
Lx	lux
M Hr	man hour
M	mega
m	meter
m/s	meters per second
mi	mile
mL	milliliter
mm	millimeter
mm/hr	millimeters per hour
n	nano
N	newton
Pa	pascal
lb	pounds
sec	seconds
S	siemens
SF	square feet
km2	square kilometer
m2	square meter
SY	square yard
Sta Yd	station yards
SI	Systems International

T	tesla
T/mi	tons per mile
V	volt
W	watt
Wb	weber

SURVEY DESCRIPTIONS

Az	azimuth
Bs	backsight
Brg	bearing
BP Cap	blue plastic cap
BS	both sides
BC	brass cap
CS	curve to spiral
Eq	equation
E	external of curve
FS	far side
FB	field book
Fs	foresight
Geod	geodetic
GIS	Geographical Information System
GPS	Global Positioning System
HI	height of instrument
IM	iron monument
I Pn	iron pin
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
L	length of curve
LC	long chord
LB	level book
Mer	meridian
M	mid ordinate of curve
NGS	National Geodetic Survey
NS	near side
Obsn	observation
Off Loc	office location
OP Cap	orange plastic cap
PK	Parker-Kalon nail
P Cap	plastic cap
PP Cap	pink plastic cap
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
RTP	random traverse point
Rge	range
RP Cap	red plastic cap
SC	spiral to curve
ST	spiral to tangent
Sta	station
SE	superelevation
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Twp	township
TB	transit book
TP	traverse point
TP	turning point
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
VC	vertical curve
WGS	World Geodetic System
YP Cap	yellow plastic cap
Z	zenith

SOIL TYPES

Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Co S	coal slack
C Gr	coarse gravel
CS	coarse sand
FS	fine sand
Gr	gravel
Lig Co	lignite coal
Lig Sl	lignite slack
Lm	loam
Rk	rock
Sd	sand
Sdy Cl	sandy clay
Sdy Cl Lm	sandy clay loam
Sdy Fl	sandy fill
Sdy Lm	sandy loam
Sc	scoria
Sh	shale
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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12-18-20	Sheet Added - Continued from D-101-3

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12 18 2020

NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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04-23-18 09-20-18 12-18-20	General Revisions General Revisions General Revisions

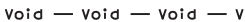





























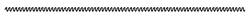
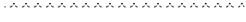







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LINE STYLES



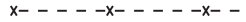





D-101-20

Existing Topography









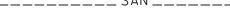













	Existing Ground Void
	Existing Cemetary Boundary
	Existing Box Culvert Bridge
	Existing Concrete Surface
	Existing Drainage Structure
	Existing Gravel Surface
	Existing Riprap
	Existing Dirt Surface
	Existing Asphalt Surface
	Existing Tie Point Line
	Existing Railroad Centerline
	Existing Guardrail Cable
	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
	Existing High Tension Cable Guardrail
	Existing High Tension Cable Guardrail with Posts




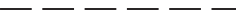
Proposed Topography

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






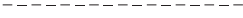







	Existing Overhead Sign Structure
	Existing Overhead Sign Structure Cantilever
	Overhead Sign Structure Cantilever

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		
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09-23-16 12-18-20	Added and Revised Items, Organized by Functional Groups General Revisions	
		12 18 2020










LINE STYLES

D-101-21



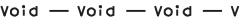





Right Of Way

	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







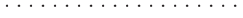
Boundary Control

	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)
	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
	Geogrid
	Geotextile Fabric Type R
	Geotextile Fabric Type R1
	Geotextile Fabric Type RR
	Geotextile Fabric Type S
	Subgrade Reinforcement

	Failure Line
--	--------------







Countours

	Depression Contours
	Supplemental Contour




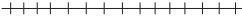
Profile

	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

	Small Hidden Object
	Large Hidden Object
	Phantom Object
	Existing Conditions Object
	Centerline Main
	Centerline Secondary
	Excavation Limits
	Proposed Ground
	Sheet Piling

Erosion Control

	Limits of Const Transition Line
	Bale Check
	Rock Check
	Floating Silt Curtain
	Silt Fence
	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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09-23-16 12-18-20	Added and Revised Items, Organized by Functional Groups General Revisions

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12 18 2020


SYMBOLS

D-101-30


 North Arrow (Half Scale)

 Alignment Data Point

 Alignment Monument

 Spot Elevation

 Existing Miscellaneous Spot

 Existing Access Control Arrow

 Existing Benchmark

 Reset USGS Marker

 Iron Monument Found

 Iron Pin R/W Monument

 Property Corner




 Iron Pin Reference Monument

   Right of Way Marker (Exst, Ppsd, Reset)


 Existing Federal Reference Corner

    Existing Section Corner (Full, Quarter, Sixteenth, Meander)

 Existing Witness Corner


   Existing Control Point (CP, GPS-RTK, TRI)

 Existing Traverse PI Aerial Panel

 Existing Reference Marker Point NGS

 Existing EFB Misc

 Existing Bush or Shrub


 Existing Large Evergreen Tree

 Existing Small Evergreen Tree

 Existing Large Tree

 Existing Small Tree

 Existing Tree Trunk

 Cairn or Stone Circle


 Existing Artifact

 Existing Satellite Dish

 Existing Weather Station

 Existing Windmill or Tower

 Reinforced Pavement


 Continuous Split Barrel Sample

 Flight Auger Sample

 Split Barrel Sample

 Thinwall Tube Sample

 Standard Penetration Test

 Inclinometer Tube

 Excavation Unit

 Existing Ground Water Well Bore Hole

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SYMBOLS

D-101-31

	Flexible Delineator		Highway Sign (Exst, Ppsd)
	Flexible Delineator Type A (Exst, Ppsd)		Mile Post Type A (Exst-Ppsd-Reset)
	Flexible Delineator Type B (Exst, Ppsd)		Mile Post Type B (Exst, Ppsd)
	Flexible Delineator Type C (Exst, Ppsd)		Mile Post Type C (Exst, Ppsd)
	Flexible Delineator Type D (Exst, Ppsd)		Object Marker Type I (Exst, Ppsd)
	Flexible Delineator Type E (Exst, Ppsd)		Object Marker Type II (Exst, Ppsd)
	Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)		Object Marker Type III (Exst, Ppsd)
	Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)		Existing Reference Marker
	Delineator Type C (Exst, Ppsd, Diamond Grade)		Road Closure Gate 18 Ft (Exst, Ppsd)
	Delineator Type D (Exst, Ppsd, Diamond Grade)		Road Closure Gate 28 Ft (Exst, Ppsd)
	Delineator Type E (Exst, Ppsd, Diamond Grade)		Road Closure Gate 40 Ft (Exst, Ppsd)
	Barricade (Type I, Type II, Type III)		Existing Railroad Battery Box
	Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)		Existing RR Profile Spot
	Attenuation Device		Existing Railroad Crossbuck
	Truck Mounted Attenuator		Existing Railroad Frog
	Delineator Drums		Existing Mailbox (Private, Federal)
	Flagger		
	Tubular Marker		
	Traffic Cone		
	Back to Back Vertical Panel Sign		

















































































NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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SYMBOLS


D-101-32

	Existing Luminaire			High Mast Light Standard 3 Luminaire (Exst, Ppsd)		Existing Traffic Signal Standard			
	Luminaire LED			High Mast Light Standard 4 Luminaire (Exst, Ppsd)				Pull Box (Exst-Ppsd-Undefined)	
	Existing Light Standard Luminaire			High Mast Light Standard 5 Luminaire (Exst, Ppsd)				Intelligent Transportation Pull Box (Exst, Ppsd)	
	Relocate Light Standard			High Mast Light Standard 6 Luminaire (Exst, Ppsd)				Transformer (Exst, Ppsd)	
	Light Standard Light LED Luminaire			High Mast Light Standard 7 Luminaire (Exst, Ppsd)				Power Pole (Exst-Ppsd-with Transformer)	
	Light Standard 35 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 8 Luminaire (Exst, Ppsd)				Wood Pole (Exst, Ppsd)	
	Light Standard 50 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 9 Luminaire (Exst, Ppsd)				Pedestrian Push Button Post (Exst, Ppsd)	
	Light Standard 70 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 10 Luminaire (Exst, Ppsd)				Existing Pole	
	Light Standard 100 Watt High Pressure Sodium Vapor Luminaire			Overhead Sign Structure Load Center (Exst, Ppsd)				Existing Telephone Pole	
	Light Standard 150 Watt High Pressure Sodium Vapor Luminaire			Traffic Signal Controller (Exst, Ppsd)				Existing Post	
	Light Standard 200 Watt High Pressure Sodium Vapor Luminaire			Pad Mounted Traffic Signal Controller (Exst, Ppsd)					Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
	Light Standard 250 Watt High Pressure Sodium Vapor Luminaire			Flashing Beacon (Exst, Ppsd)					
	Light Standard 310 Watt High Pressure Sodium Vapor Luminaire			Concrete Foundation (Exst, Ppsd)					
	Light Standard 400 Watt High Pressure Sodium Vapor Luminaire			Pipe Mounted Flasher (Exst, Ppsd)					
	Light Standard 700 Watt High Pressure Sodium Vapor Luminaire			Pad Mounted Feed Point (Exst, Ppsd)					
	Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire			Pipe Mounted Feed Point with Pad (Exst, Ppsd)					
	Emergency Vehicle Detector			Pole Mounted Feed Point (Exst, Ppsd)					
	Video Detection Camera			Junction Box (Exst, Ppsd)					
				Existing Pedestrian Head with Number					
				Existing Signal Head					
				Pole Mounted Head					
				Existing Lighting Standard Pole					

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SYMBOLS

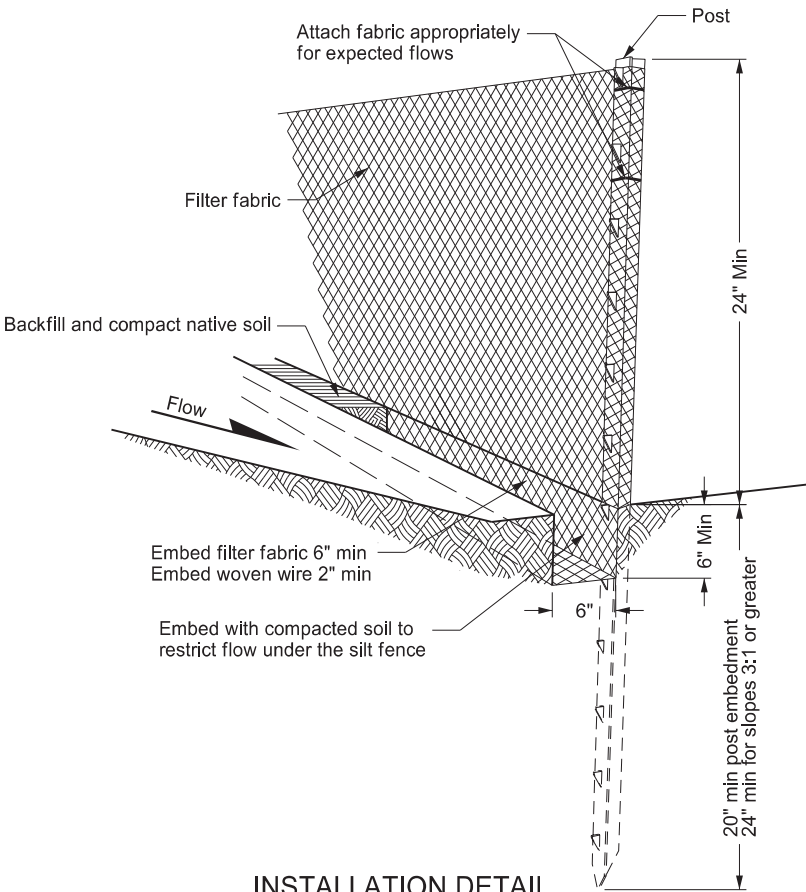
D-101-33

			Existing Manhole (Electrical, Gas, Telephone)		Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water
			Water Manhole (Exst, Exst with Valve)		Existing Pedestal Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined
			Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)		Existing Pipe Vent Gas, Fuel, Sanitary, Storm Drain, Water, Undefined
			Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)		Valve Exst Gas, Exst Water, Ppsd Water, Exst Undefined
			Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)		Pump Sanitary, Storm Drain, Exst Water
			Force Main Storm Drain Manhole (Exst, Exst with Valve)		Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)		Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Existing Water Appurtenance		Existing Utility Marker
			Sprinkler Head (Exst, Ppsd)		Existing Meter
			Fire Hydrant (Exst, Ppsd)		Existing Fuel Dispensers
			Cleanout (Exst Sanitary, Underdrain)		Existing Fuel Filler Pipes
			Existing Catch Basin Inlet (Round, Square)		Existing Fuel Leak Sensors
			Existing Curb Inlet (Round, Square)		
			Existing Slotted Reinforced Concrete Pipe		
			Catch Basin (Riser 30 Inch, Beehive, Type A)		
			Inlet Mountable Curb (Type A, Type B)		
			Inlet Saddle Base (Type 1, Type 2)		
			Inlet Special (Catch Basin, Type 1, Type A)		
			Inlet (Tee, Type 1, Type 2, Type 2 Double)		
			Median Drain		
			Headwall (Exst, Ppsd, Ppsd Single with Vegetation Barrier, Ppsd Double with Vegetation Barrier)		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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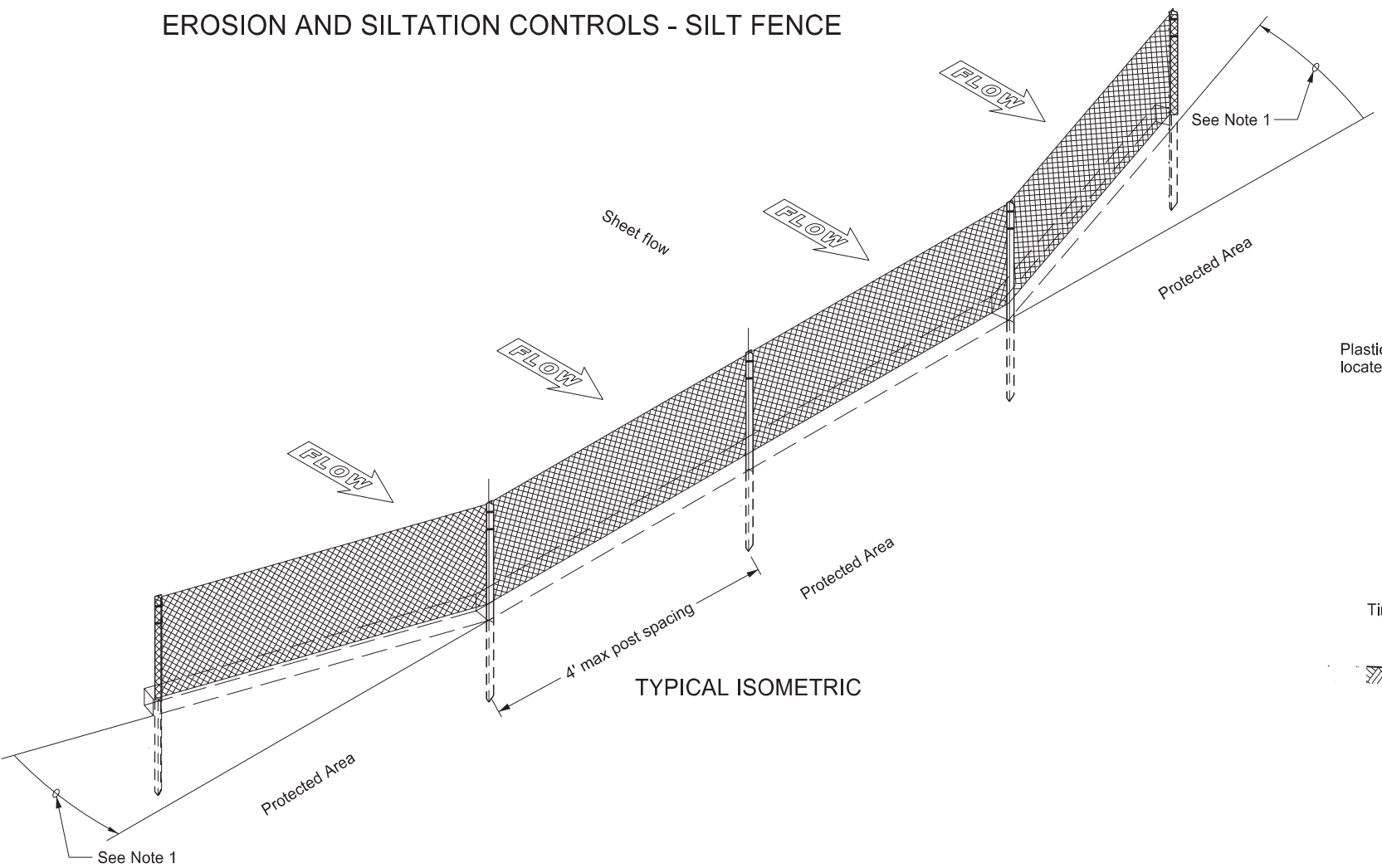
12 18 2020

EROSION AND SILTATION CONTROLS - SILT FENCE

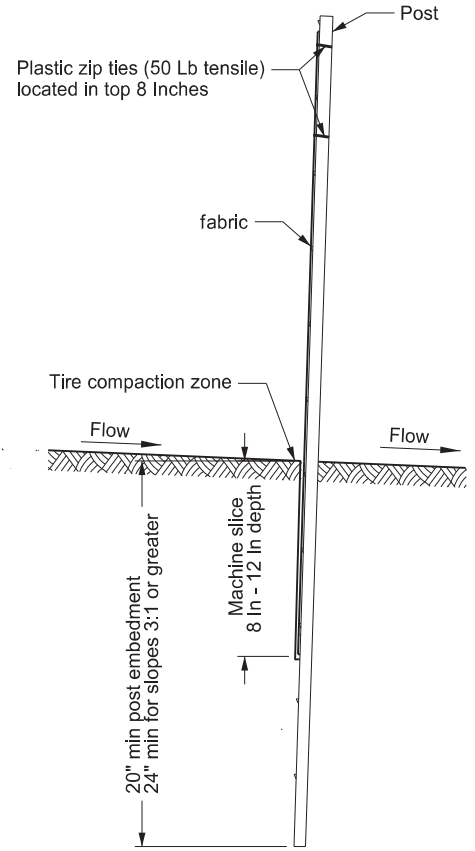


INSTALLATION DETAIL

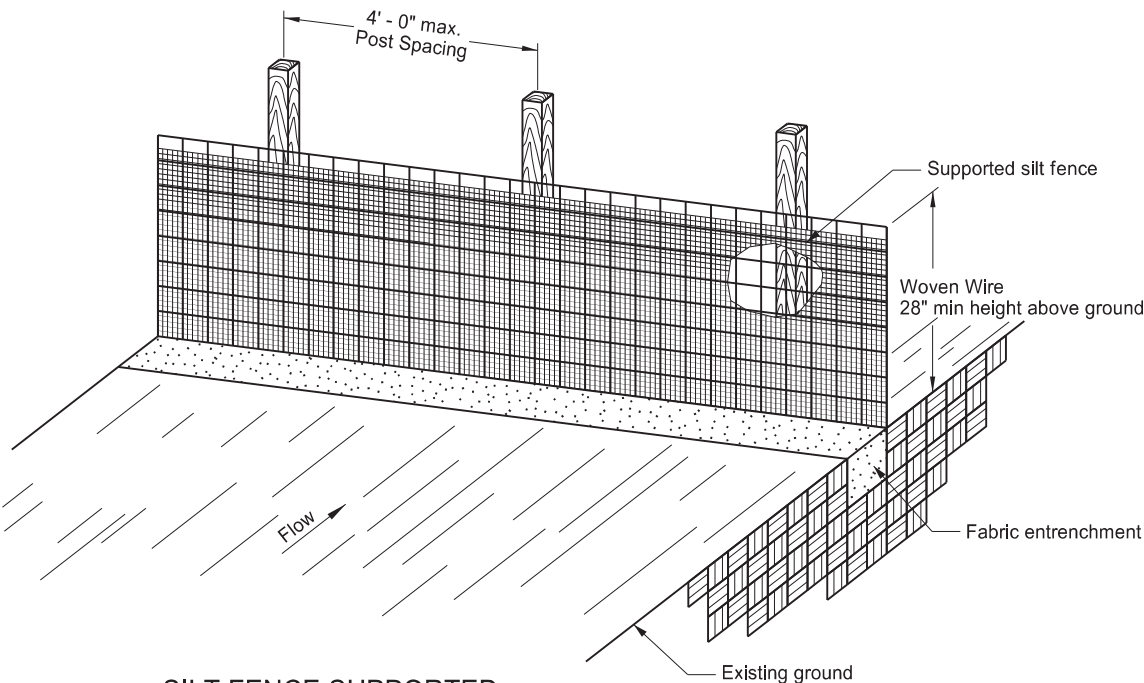
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.



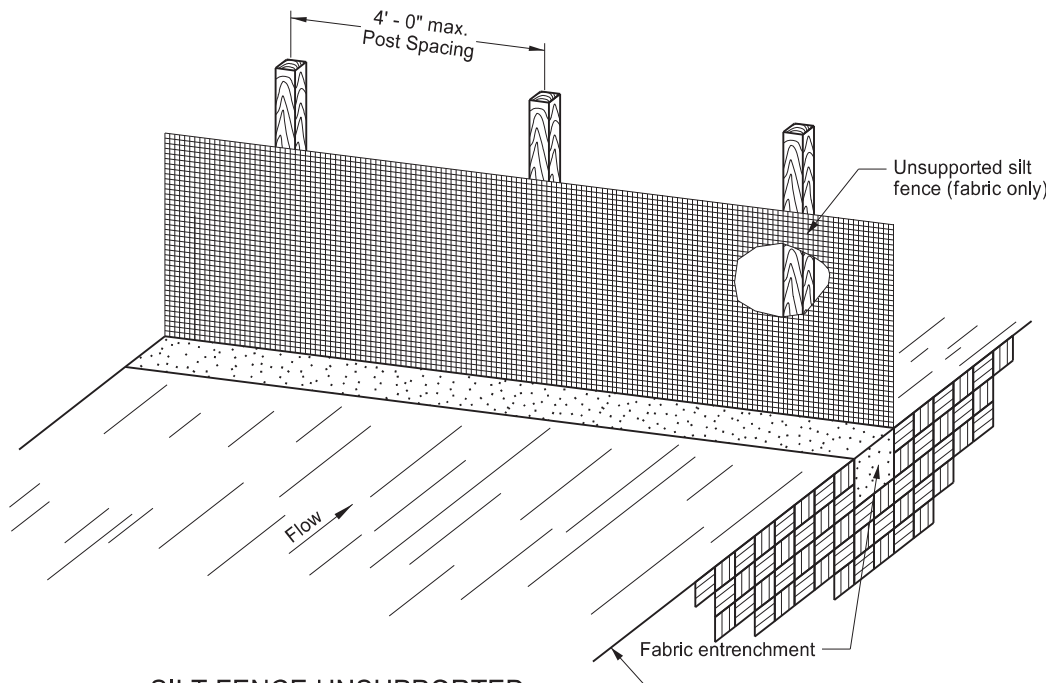
TYPICAL ISOMETRIC



MACHINE SLICED SILT FENCE



SILT FENCE SUPPORTED



SILT FENCE UNSUPPORTED

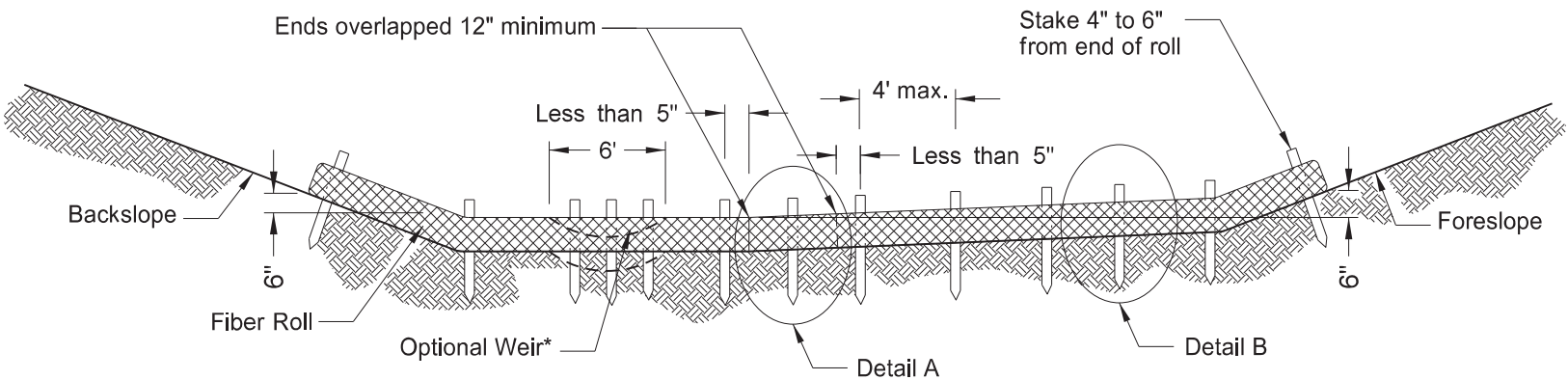
- NOTES:
- 1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
 - 2. Place splices outside low spots.
 - 3. Install silt fencing parallel to contour lines.
 - 4. Do not embed silt fence when placed in standing water.
 - 5. Silt fence material does not need to reach the top of woven wire support.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2.
06-27-16 08-27-19	Revised details & added new ones. New Design Engineer PE Stamp.

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Registration Number
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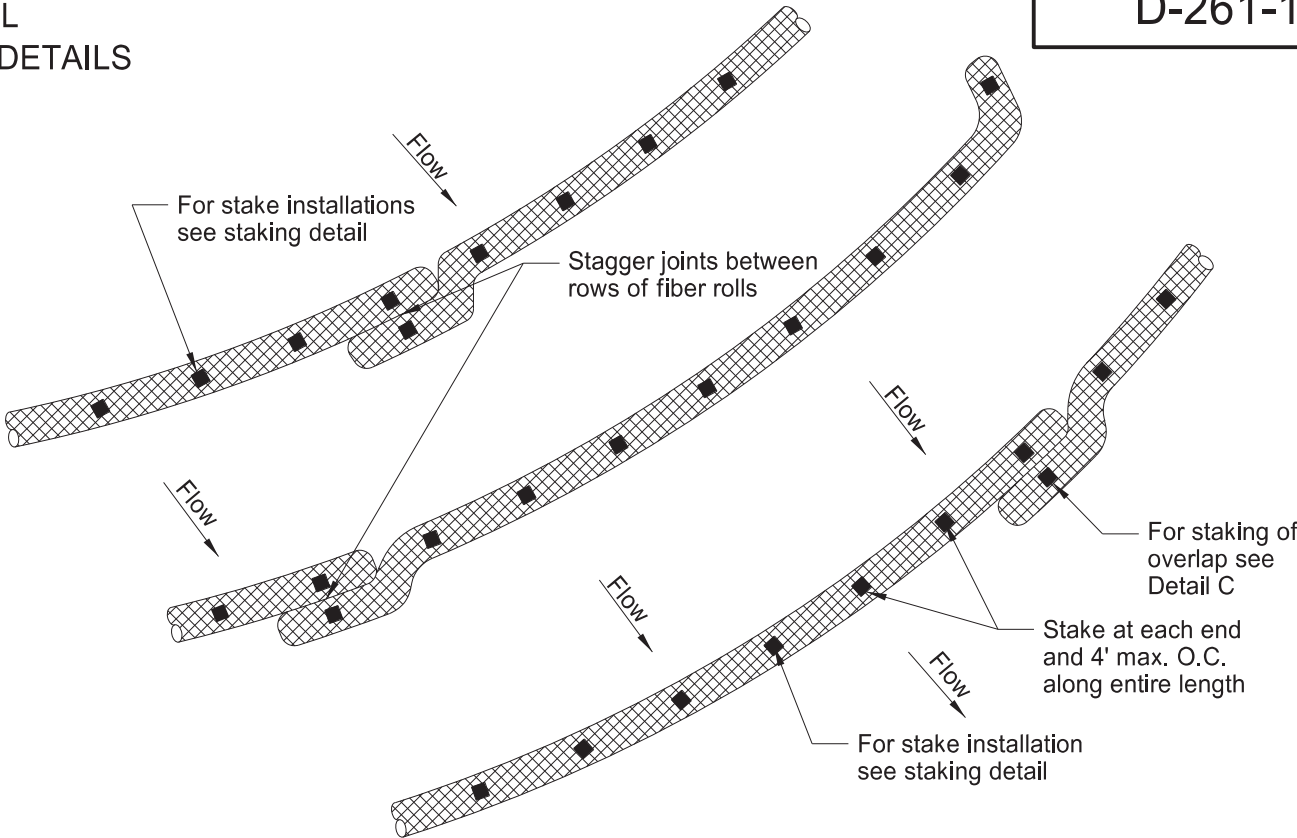
EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

D-261-1

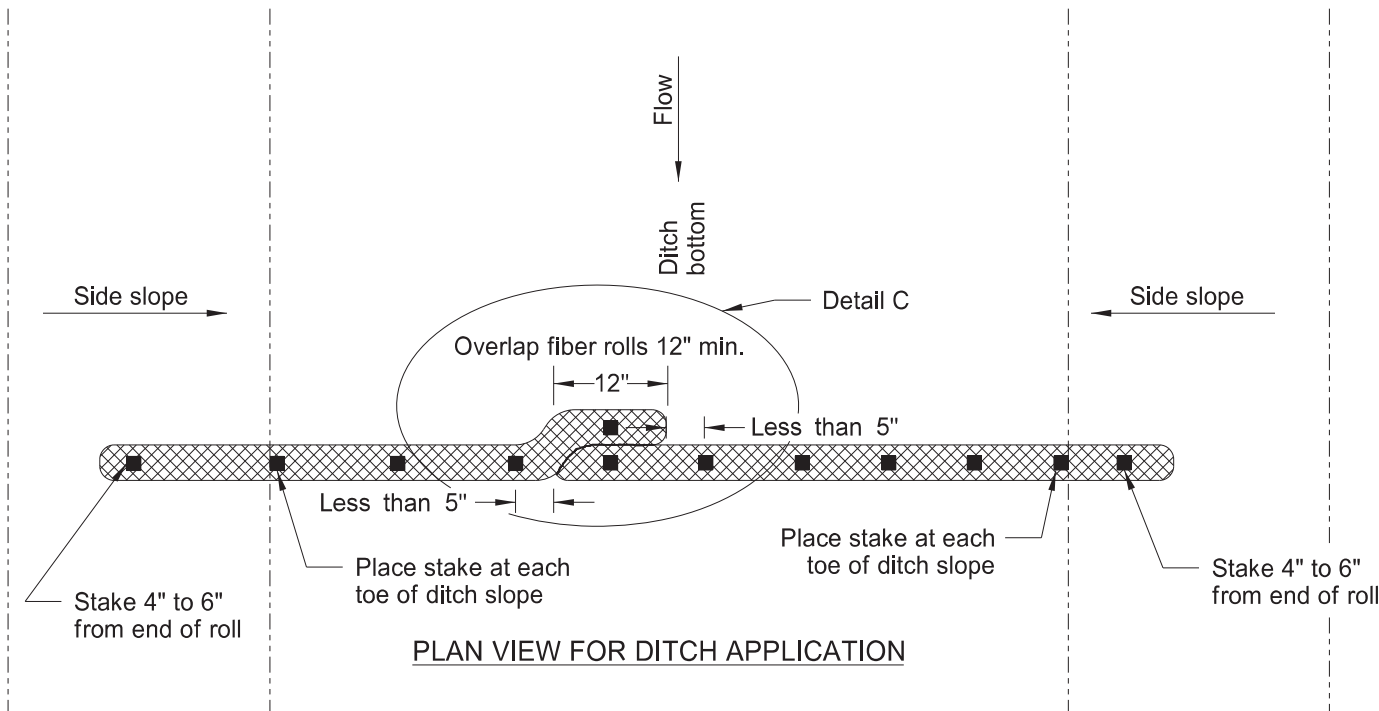


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

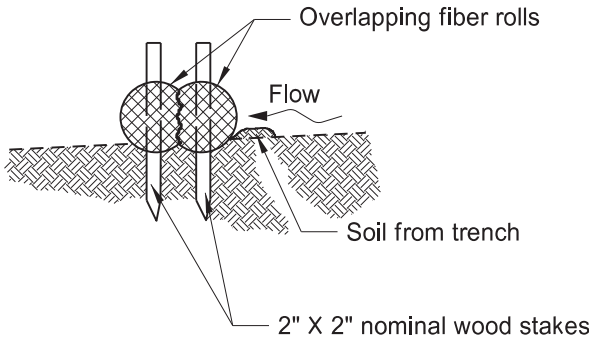
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



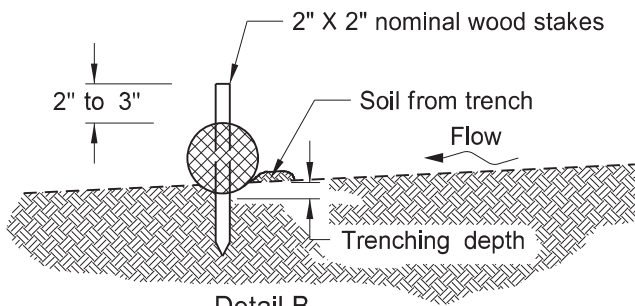
PLAN VIEW FOR SLOPE APPLICATION



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"

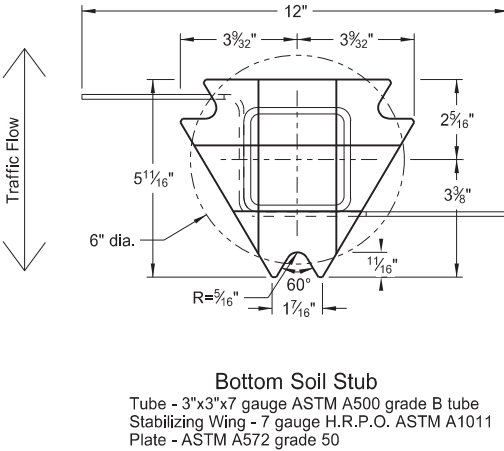
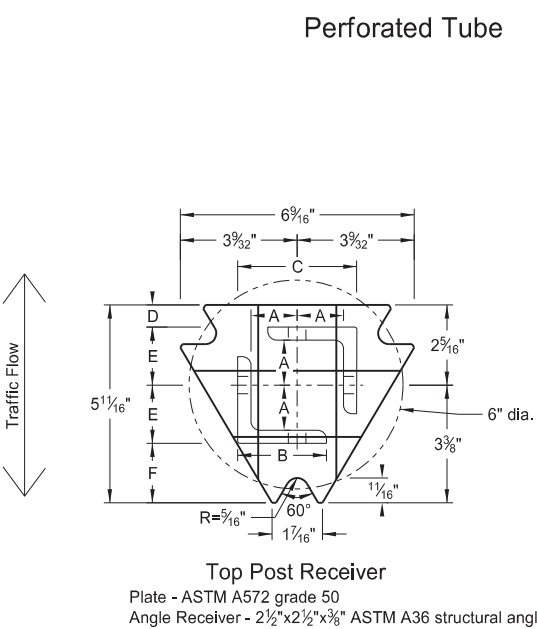
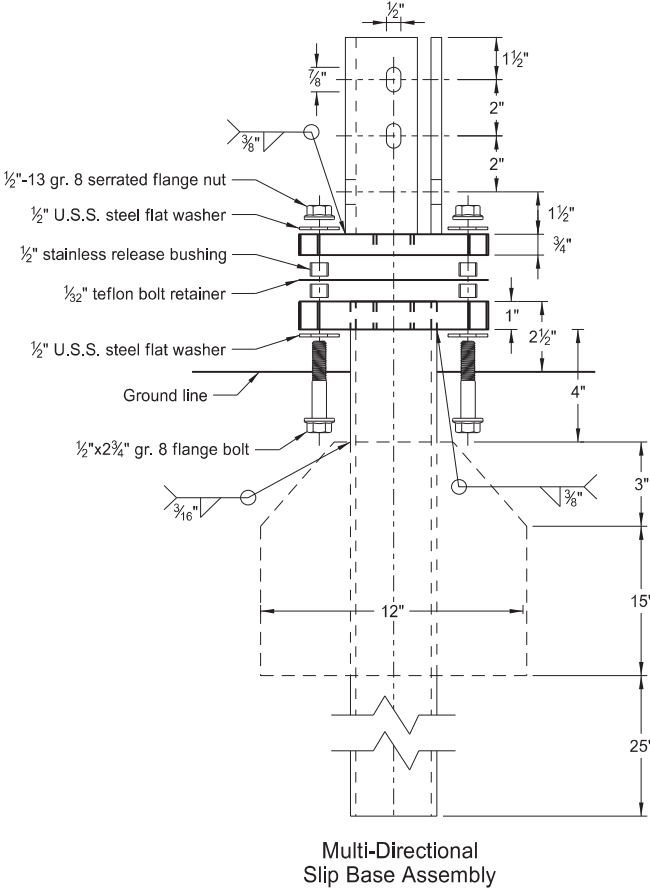
NOTE: Runoff must not be allowed to run under or around roll.

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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Perforated Tube

- 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.

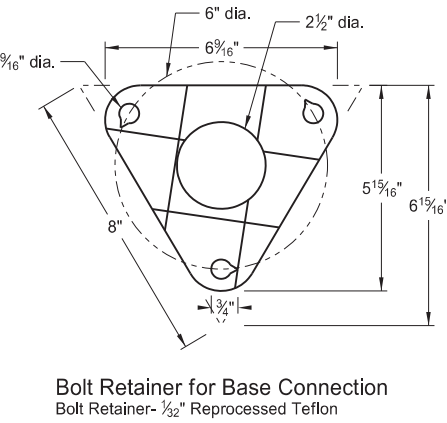
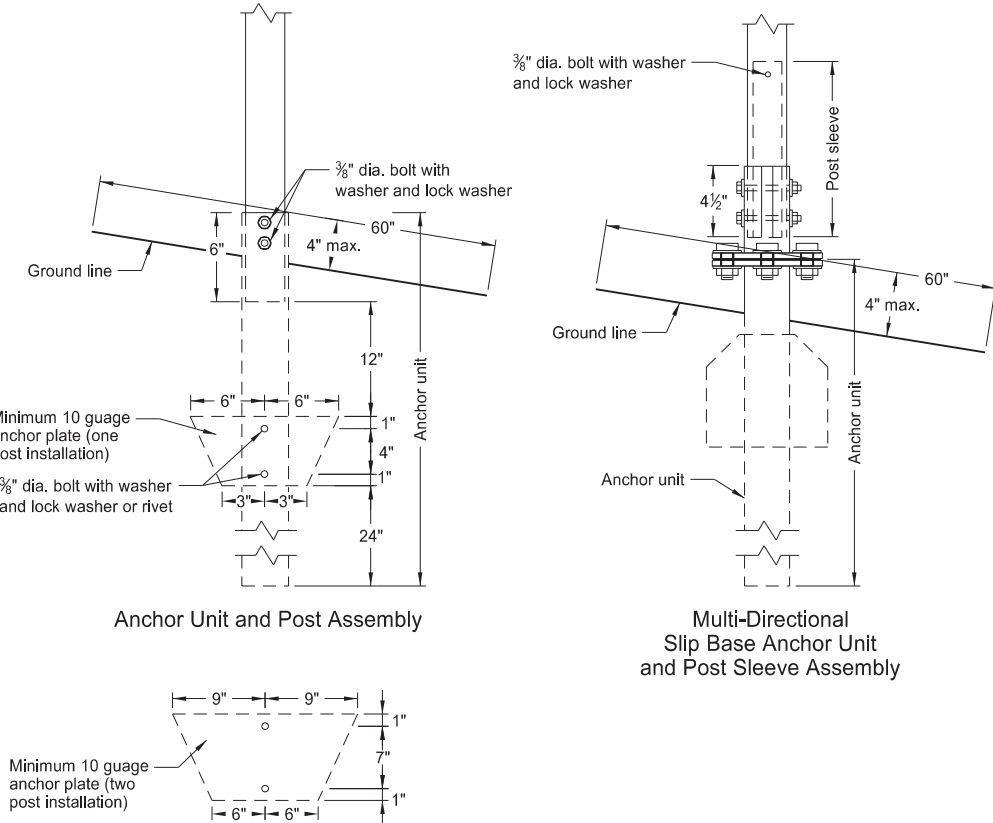


Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

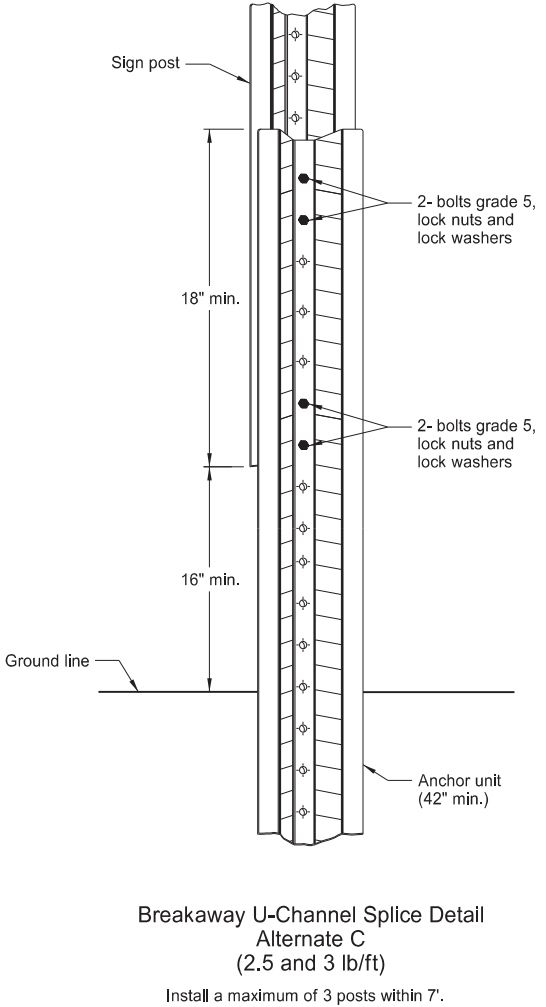
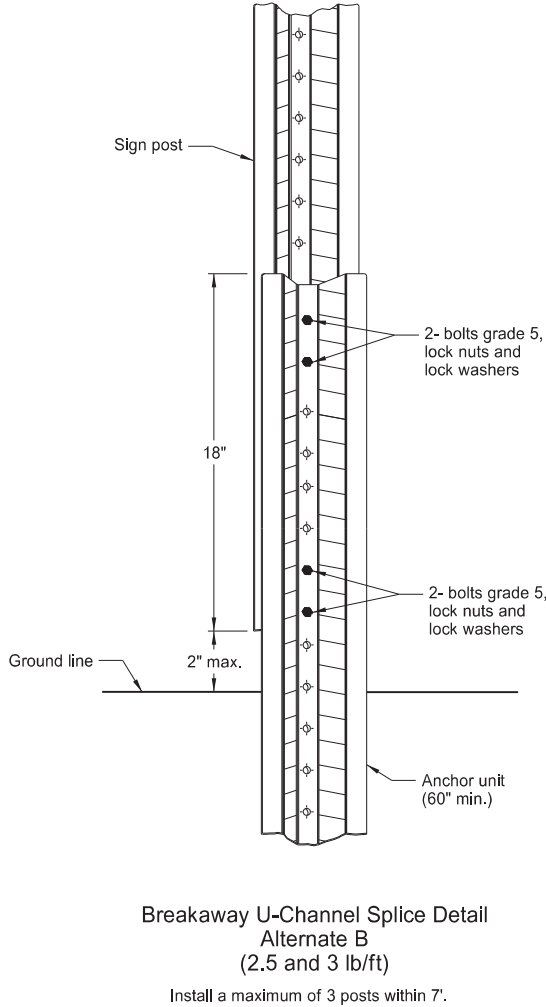
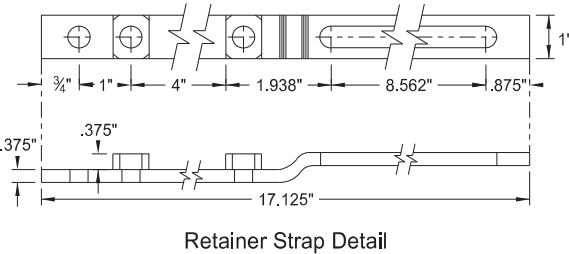
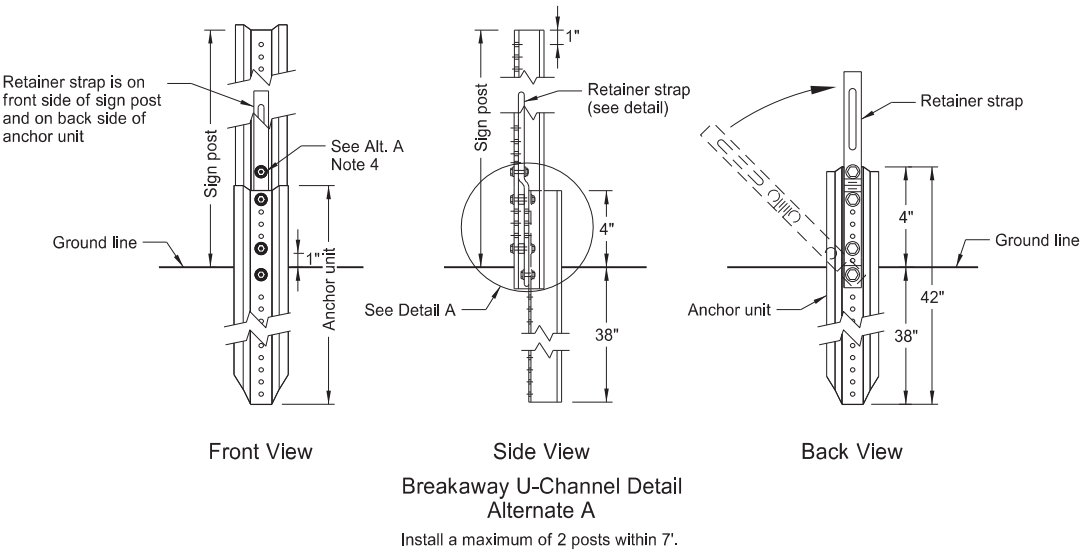
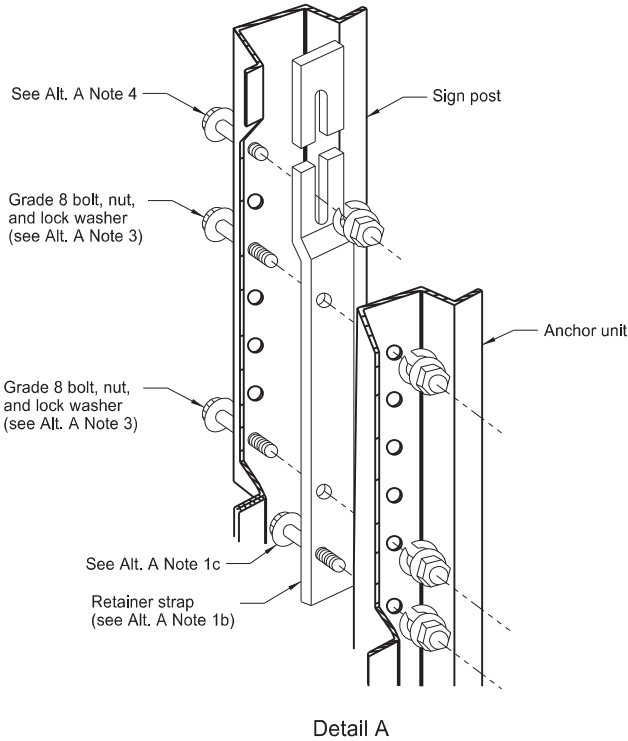
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 5/16"	2 1/2"	3 1/2"	2 5/32"	1 3 3/64"	1 7/8"
2 1/2"x10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 2 1/32"	1 3/4"

- (A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.
- (B) For additional wind load, insert the 2 3/8"x10 ga. into 2 1/2"x10 ga.



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

U-Channel Post



Alternate A Steps of Installation:

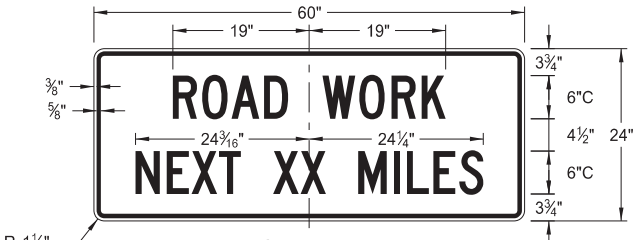
- a) Drive anchor unit to within 12" of ground level.
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
- a) Drive anchor unit to 4" above ground.
b) Rotate strap to vertical position.
- 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.
- Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
- 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 10-03-19	Updated to active voice New Design Engr PE Stamp

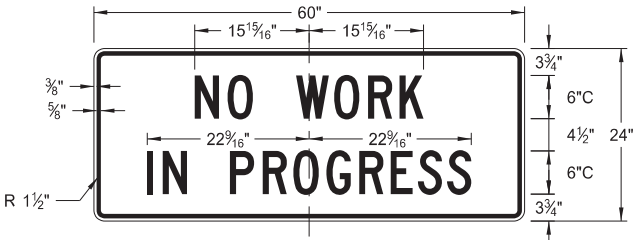
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

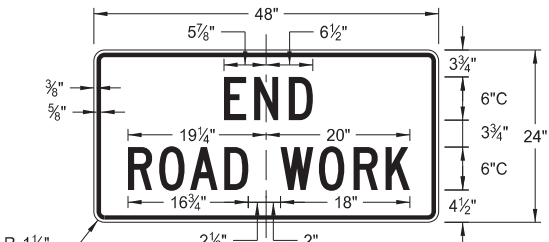
D-704-9



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



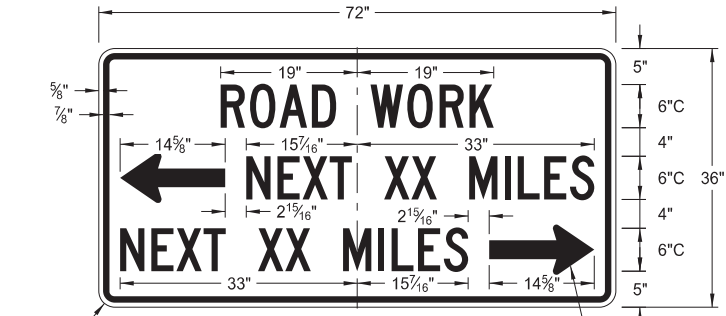
G20-1b-60
Legend: black (non-refl)
Background: orange



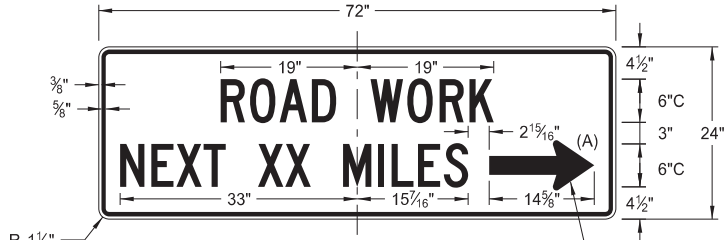
G20-2-48
Legend: black (non-refl)
Background: orange



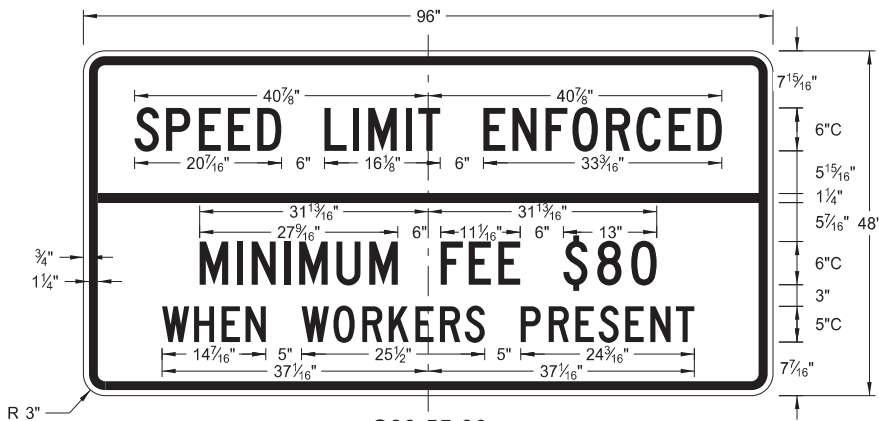
G20-4b-36
Legend: black (non-refl)
Background: orange



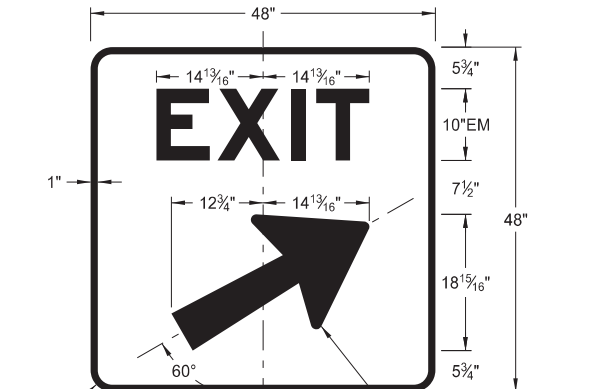
G20-50a-72
Legend: black (non-refl)
Background: orange



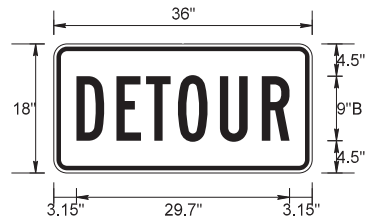
G20-52a-72
Legend: black (non-refl)
Background: orange



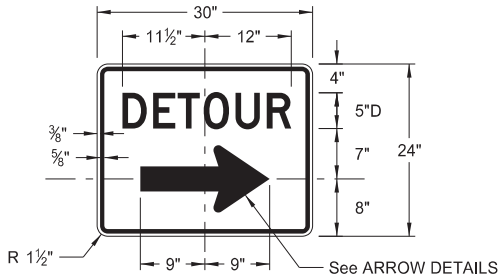
G20-55-96
Legend: black (non-refl)
Background: orange



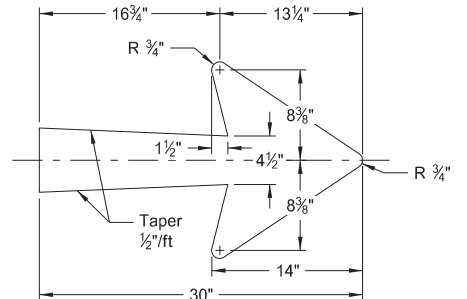
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



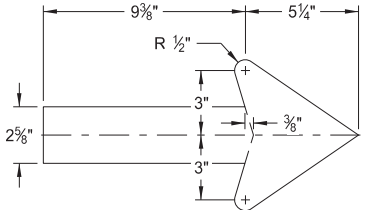
M4-8-36
Legend: black (non-refl)
Background: orange



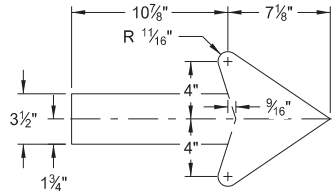
M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange



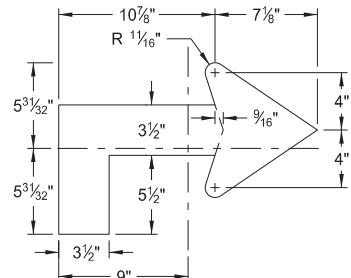
E5-1-48



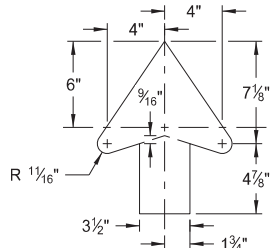
G20-50a-72
G20-52a-72



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



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



M4-9-30
Straight

ARROW DETAILS

NOTES:

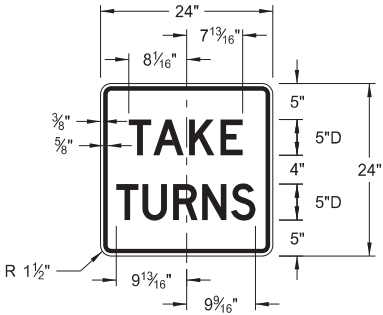
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

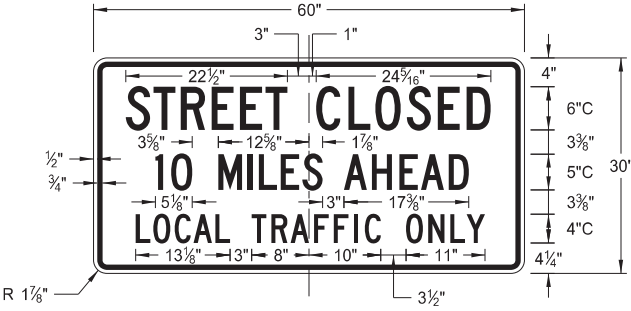
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

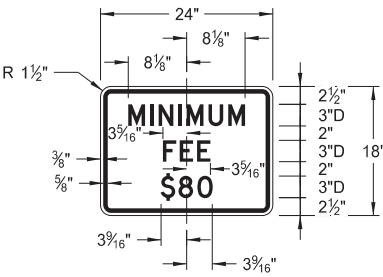
D-704-10



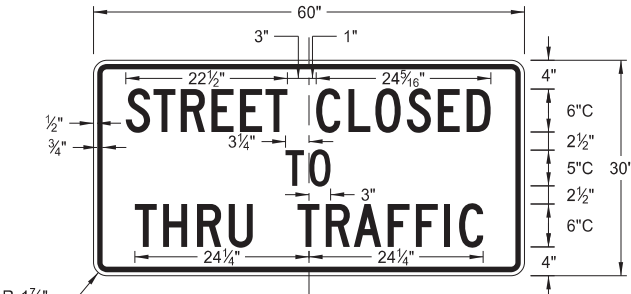
R1-50P-24
Legend: black (non-refl)
Background: white



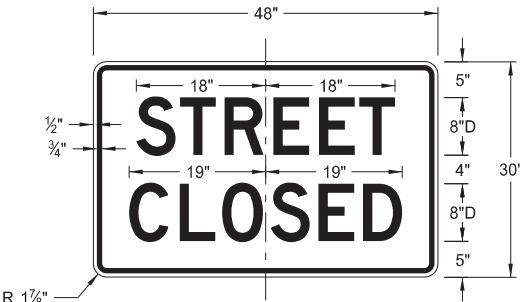
R11-3c-60
Legend: black (non-refl)
Background: white



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



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

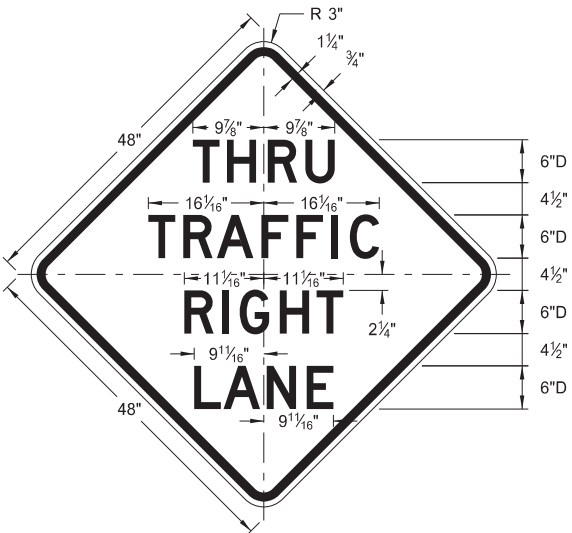


R11-2a-48
Legend: black (non-refl)
Background: white

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8-13-13		
REVISIONS		
DATE	CHANGE	
8-17-17 10-03-19	Revised sign number New Design Engineer PE Stamp	

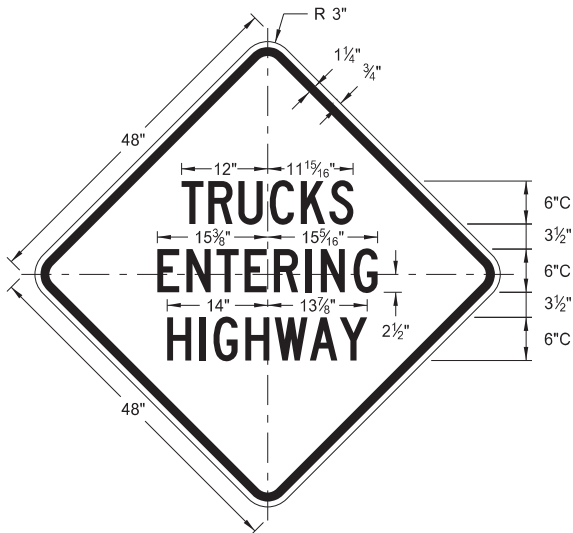
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

D-704-11



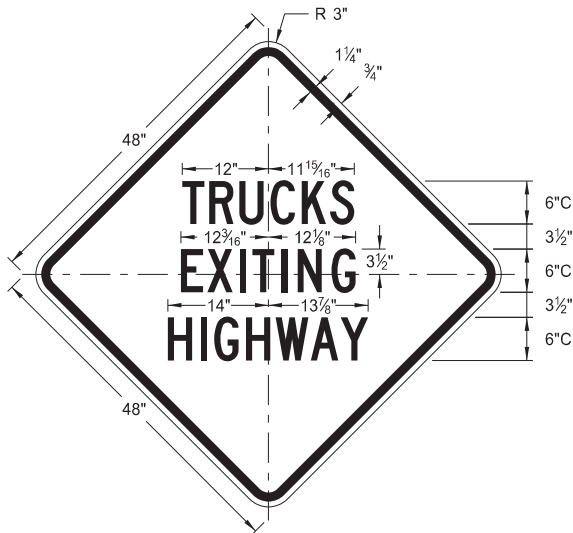
W5-8-48

Legend: black (non-refl)
Background: orange



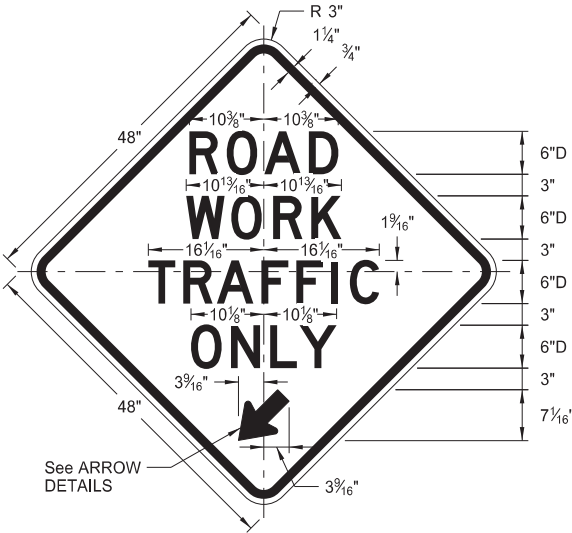
W8-53-48

Legend: black (non-refl)
Background: orange



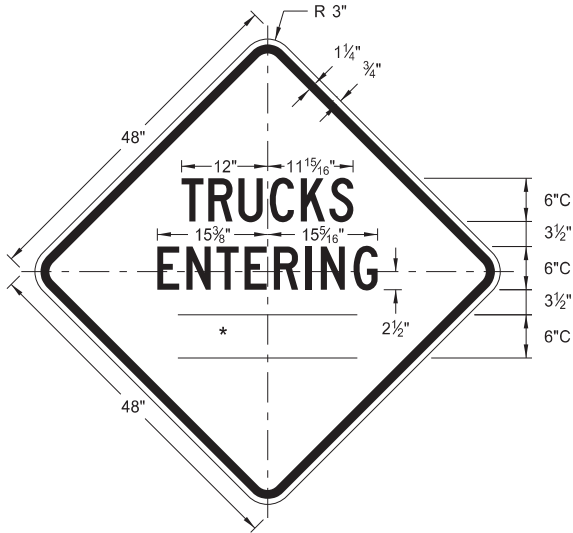
W8-56-48

Legend: black (non-refl)
Background: orange



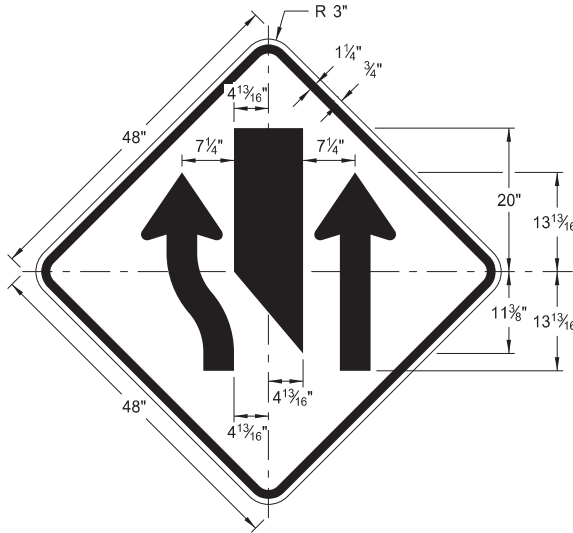
W5-9-48

Legend: black (non-refl)
Background: orange



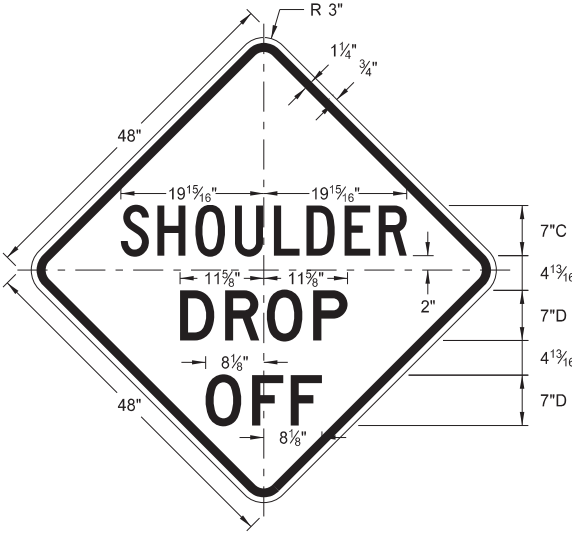
W8-54-48

Legend: black (non-refl)
Background: orange



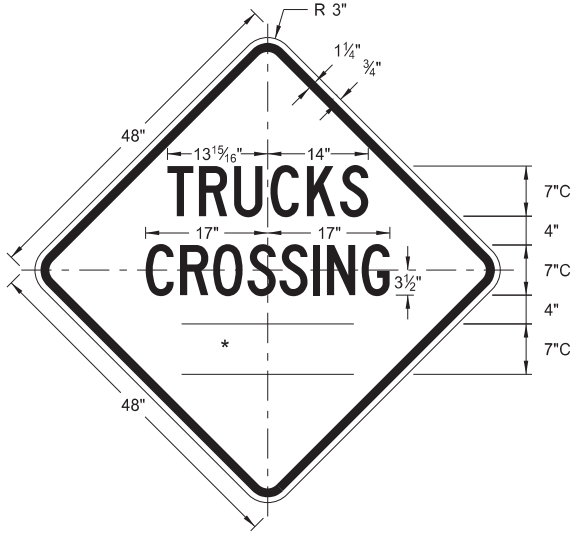
W9-3a-48

Legend: black (non-refl)
Background: orange



W8-9a-48

Legend: black (non-refl)
Background: orange

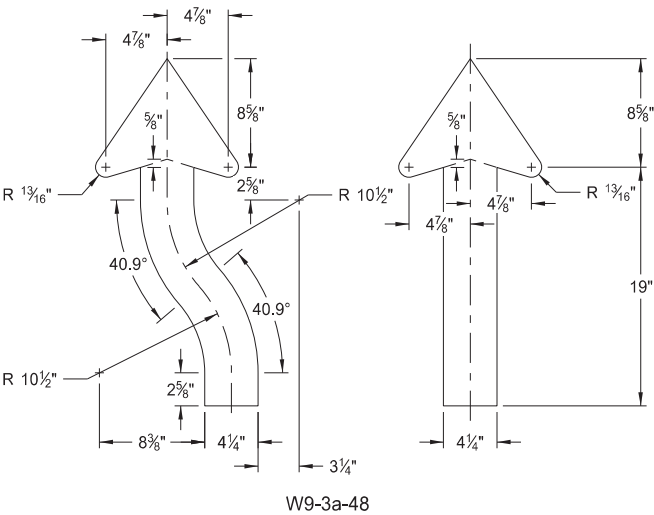
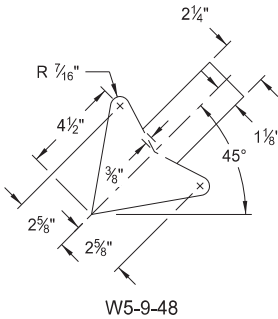


W8-55-48

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%
1/2 MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



ARROW DETAILS

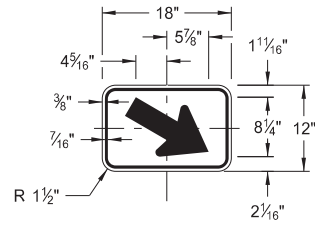
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

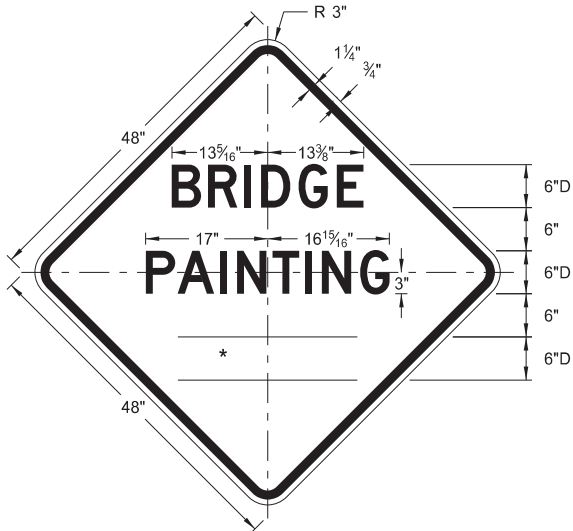
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



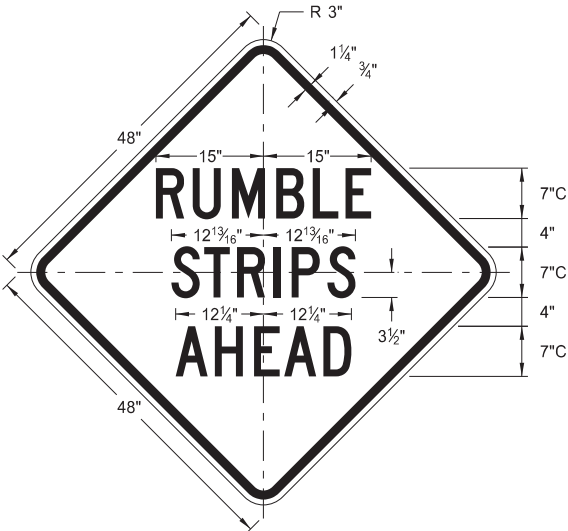
W16-7aP-18

Legend: black (non-refl)
Background: orange



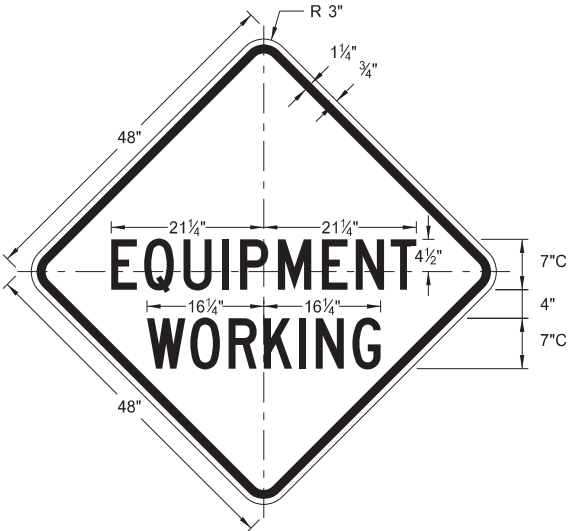
W21-50-48

Legend: black (non-refl)
Background: orange



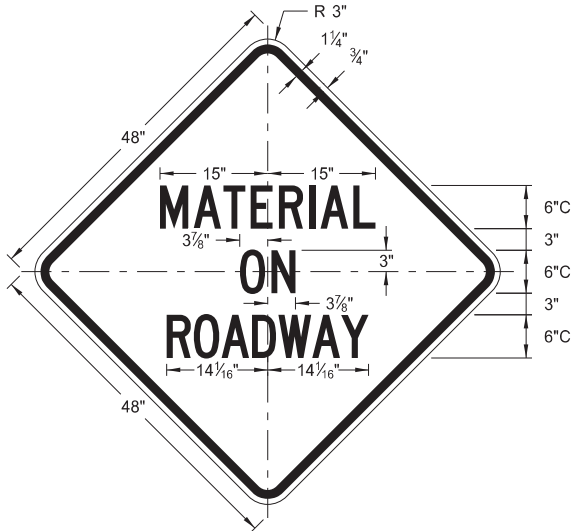
W21-53-48

Legend: black (non-refl)
Background: orange



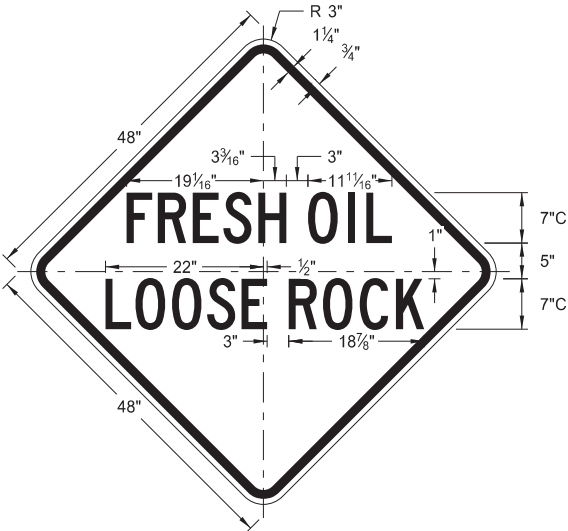
W20-51-48

Legend: black (non-refl)
Background: orange



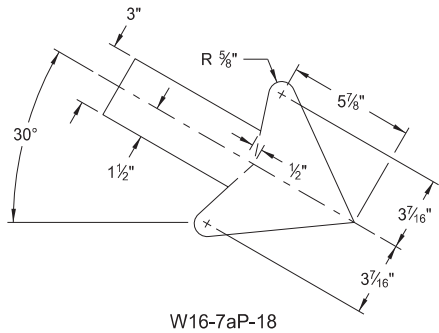
W21-51-48

Legend: black (non-refl)
Background: orange

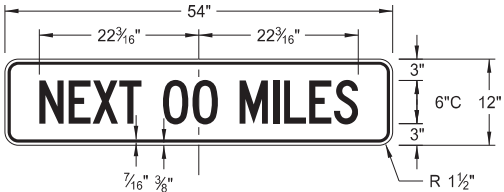


W22-8-48

Legend: black (non-refl)
Background: orange

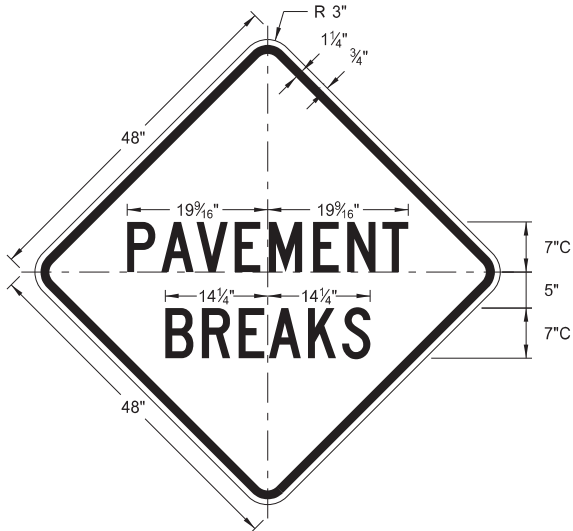


W16-7aP-18



W20-52P-54

Legend: black (non-refl)
Background: orange

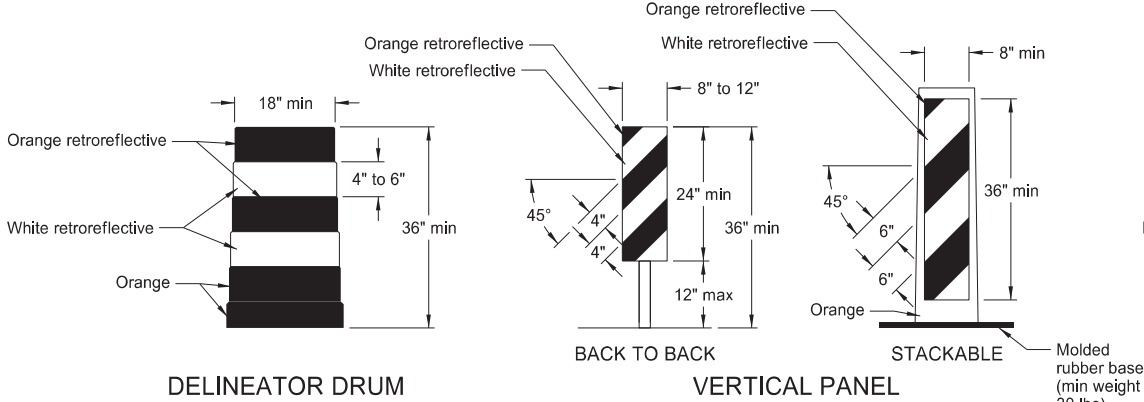


W21-52-48

Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		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
5-31-18		
REVISIONS		
DATE	CHANGE	
11-01-19	Added details for sign W16-7aP-18.	

BARRICADE AND CHANNELIZING DEVICE DETAILS



DELINEATOR DRUM

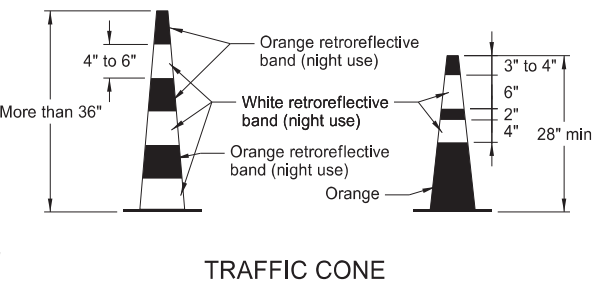
Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and 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.

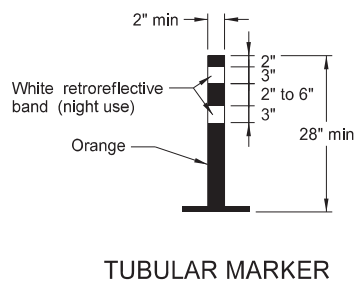
STACKABLE

Molded rubber base (min weight 30 lbs)



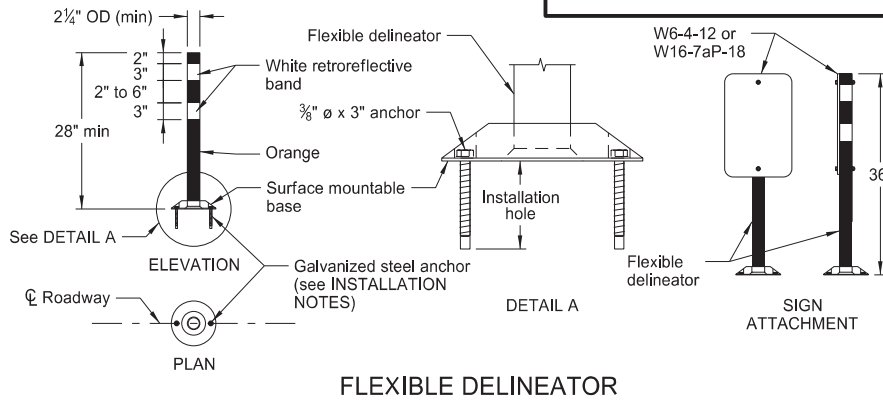
TRAFFIC CONE

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

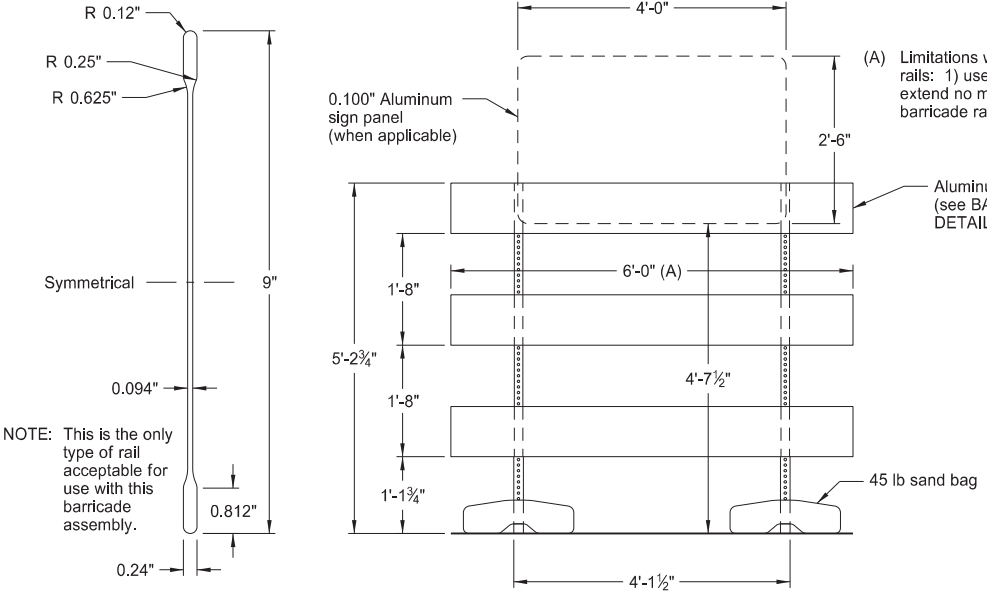
Provide retroreflectORIZATION of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

INSTALLATION NOTES:

- Drill installation holes to diameter and depth required by manufacturer's specifications.
- For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
- 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.

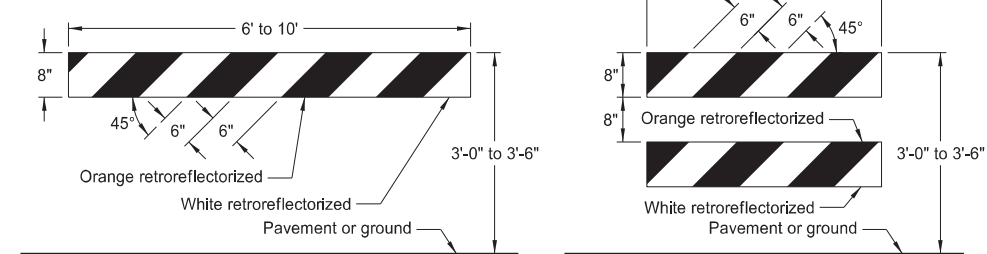


BARRICADE BLADE DETAIL

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

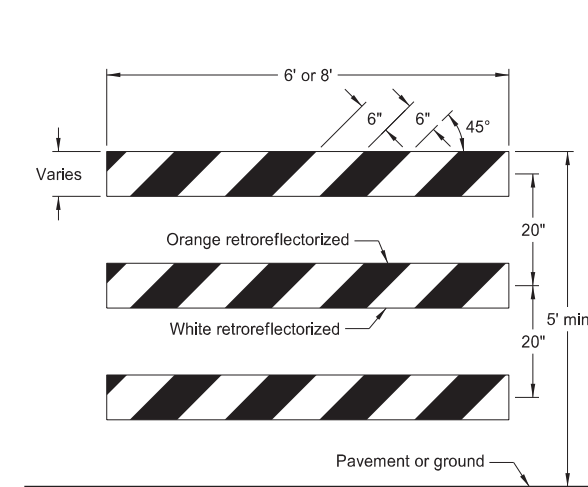
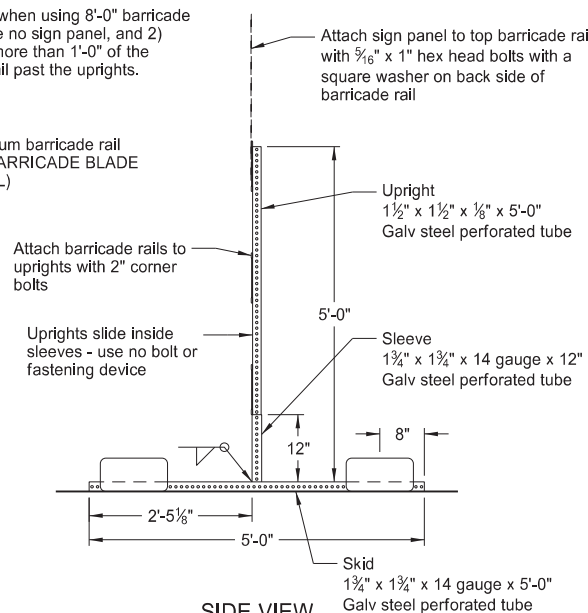
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



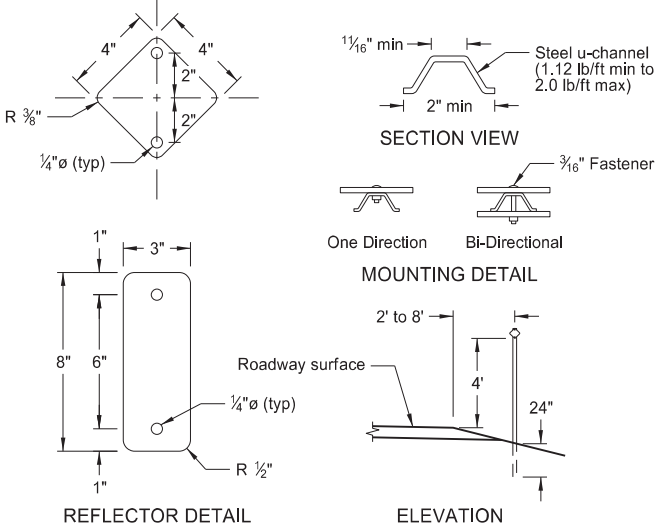
TYPE I BARRICADE

TYPE II BARRICADE

BARRICADE RAIL DETAILS



TYPE III BARRICADE



DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

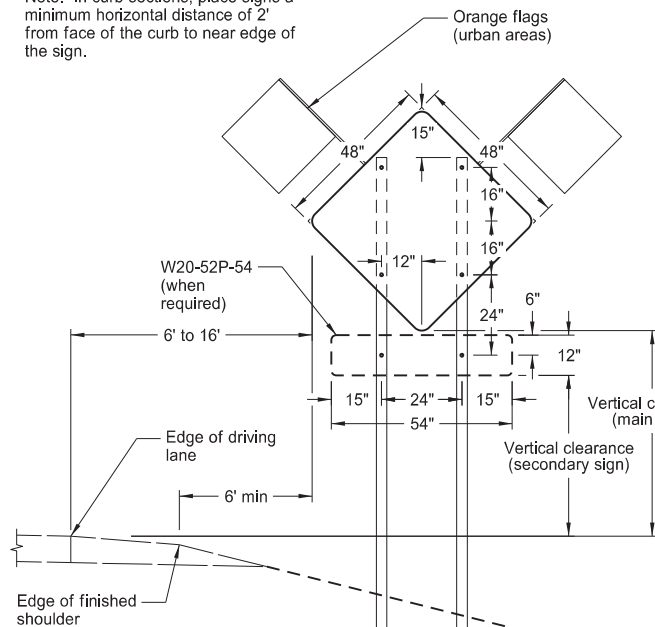
NOTE: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

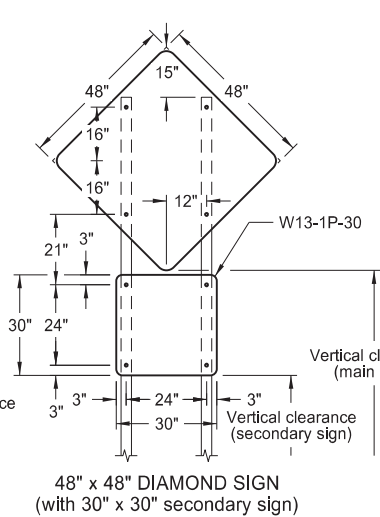
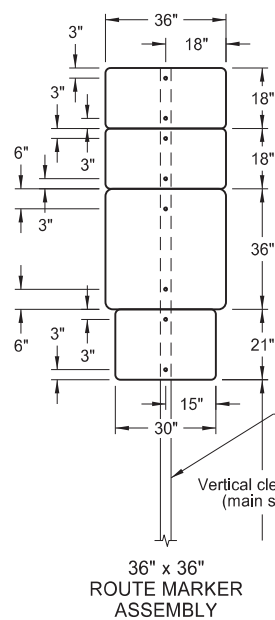
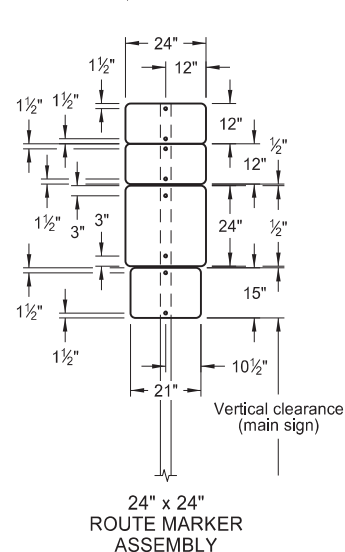
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE-4683,
on **11/1/19** and the original document is stored at the
North Dakota Department
of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

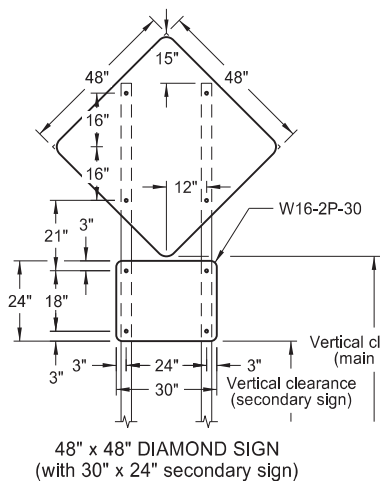
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



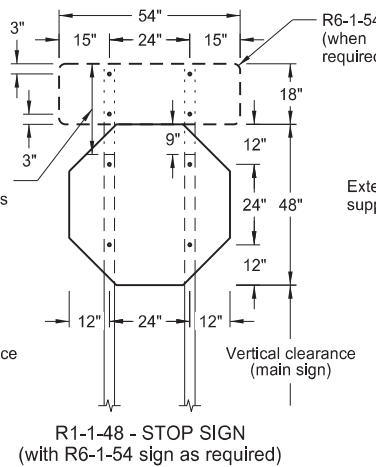
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



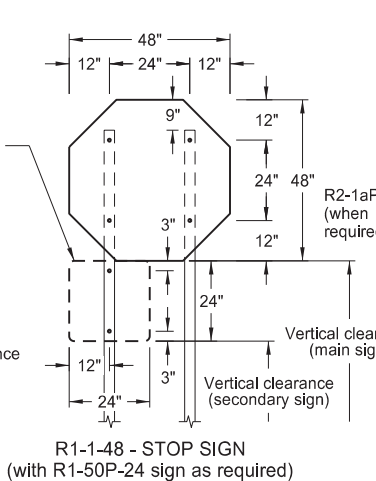
R1-2-60 - YIELD SIGN



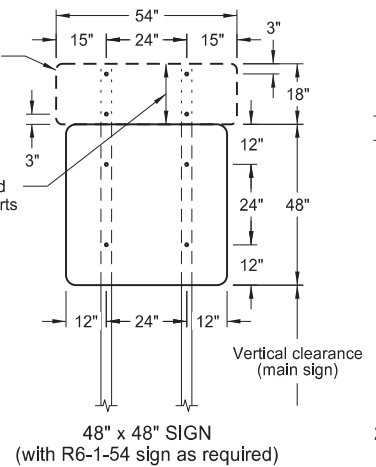
W14-3-64 - PENNANT SIGN



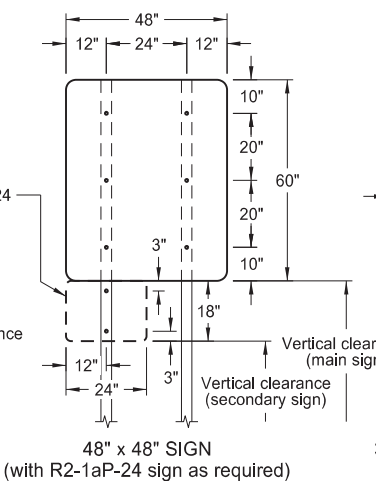
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



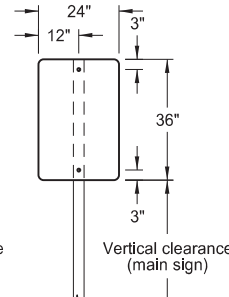
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



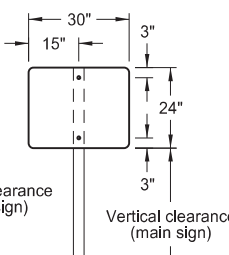
48" x 48" SIGN
(with R6-1-54 sign as required)



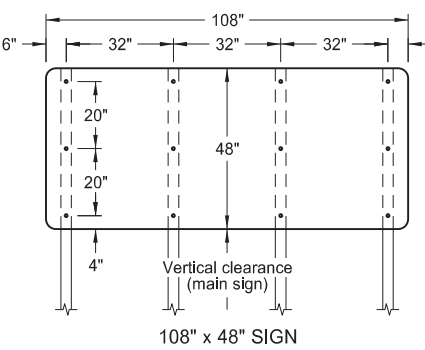
48" x 48" SIGN
(with R2-1aP-24 sign as required)



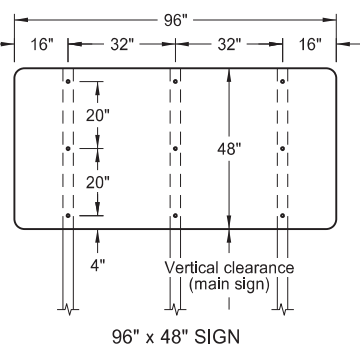
24" x 36" SIGN



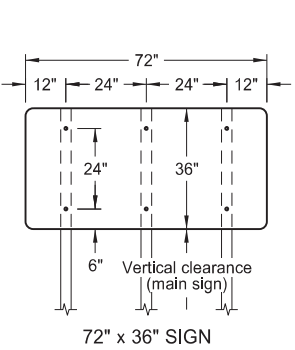
30" x 24" SIGN



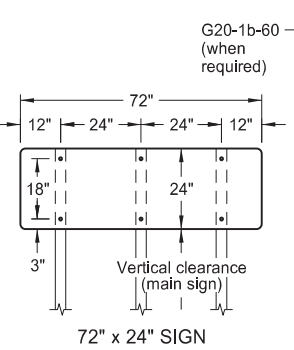
108" x 48" SIGN



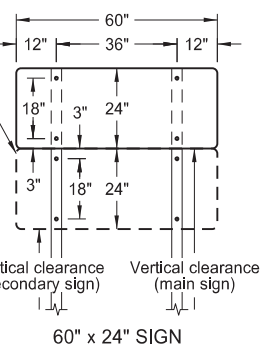
96" x 48" SIGN



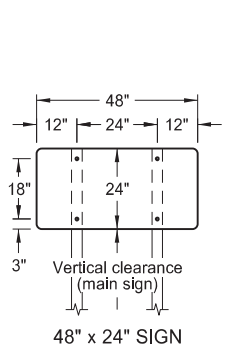
72" x 36" SIGN



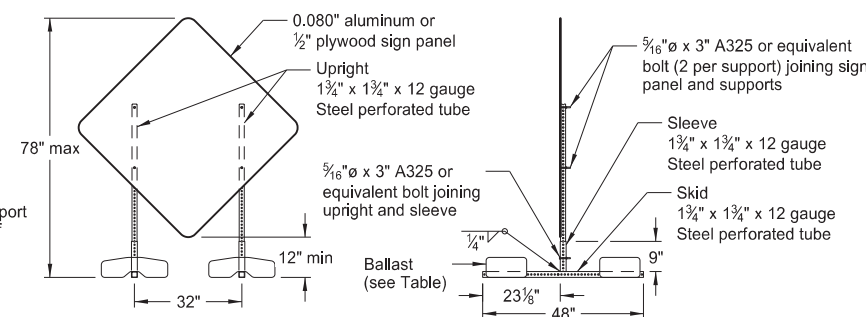
72" x 24" SIGN



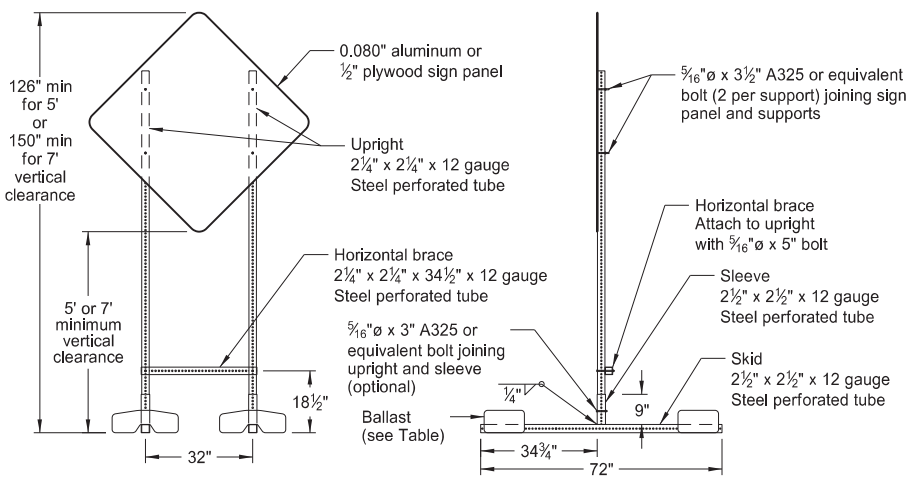
60" x 24" SIGN



48" x 24" SIGN



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 ⅝" 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 unforeseen 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.

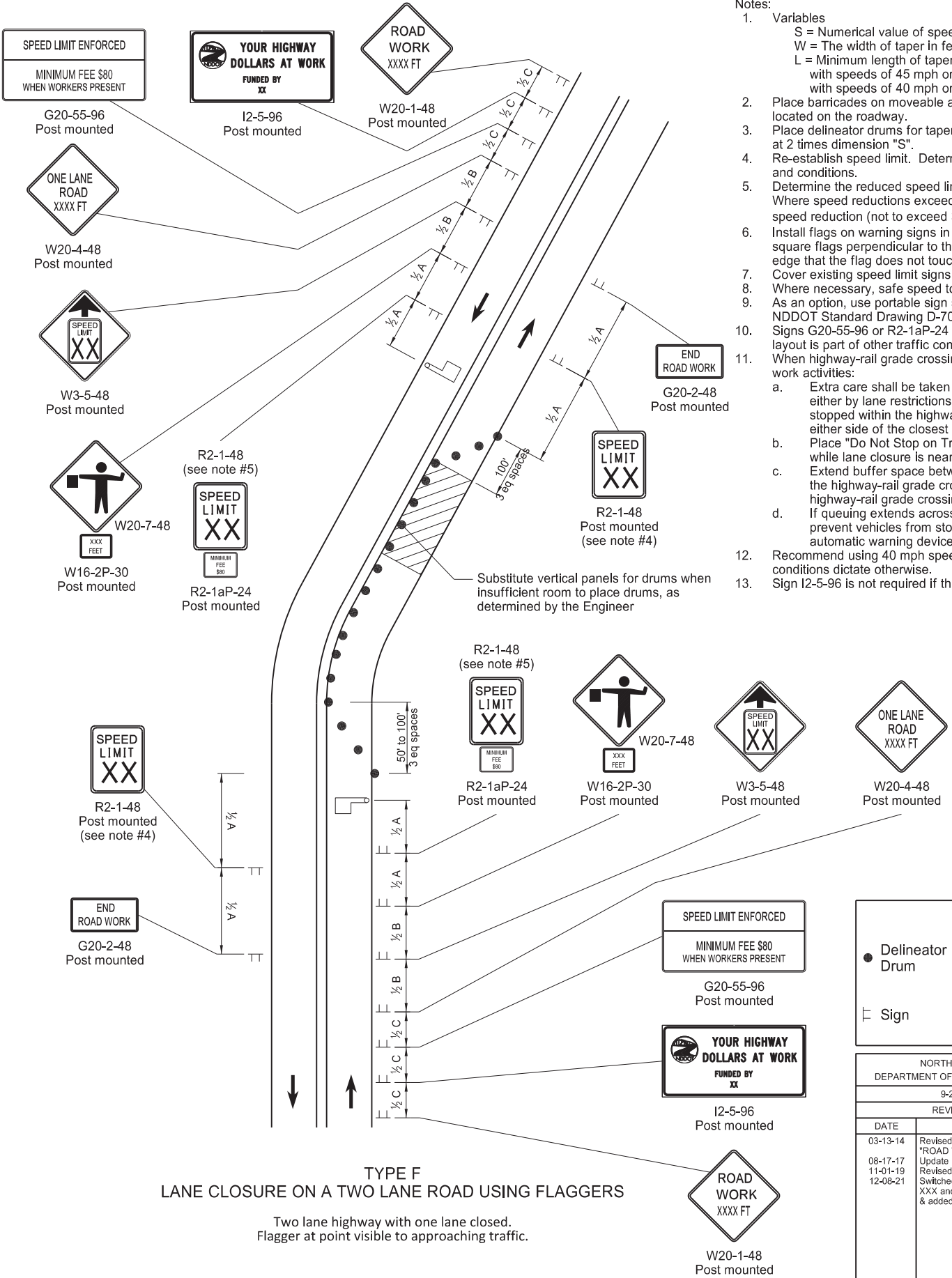
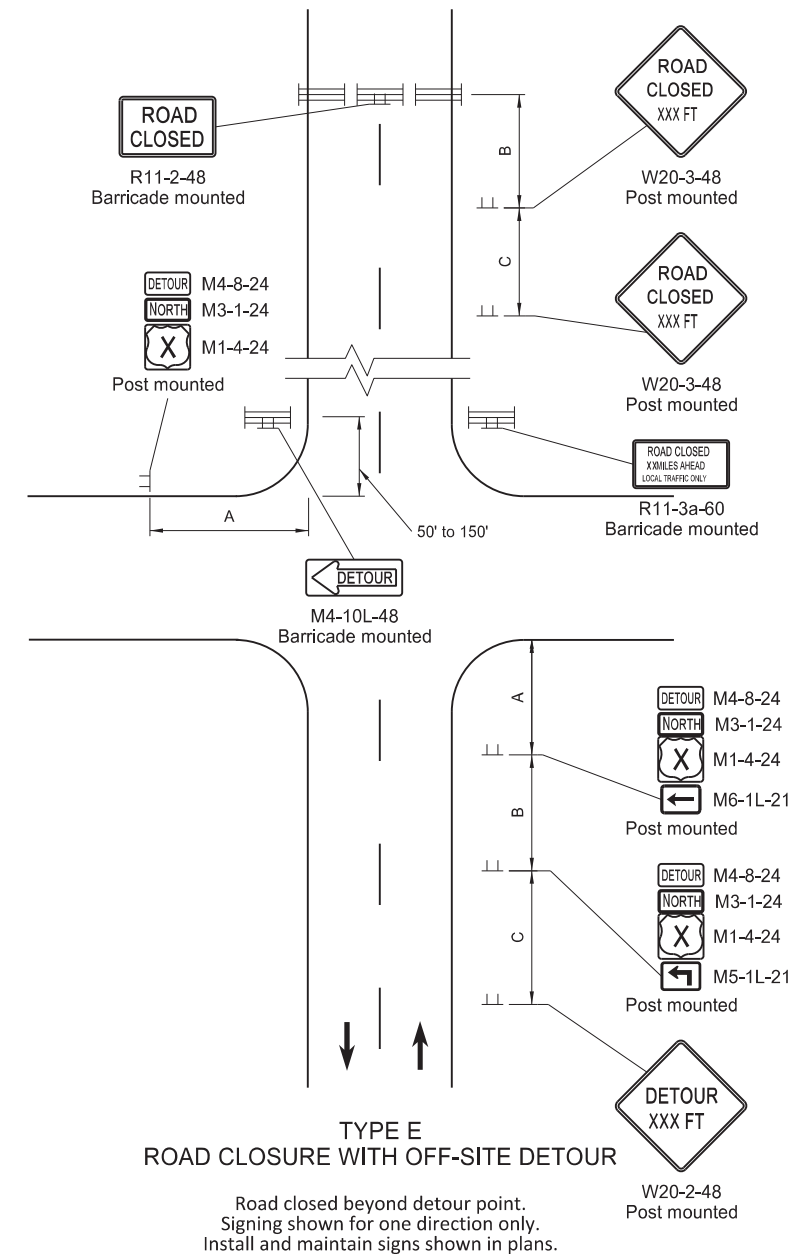
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail

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

- Notes:
- Variables
 - Numerical value of speed limit or 85th percentile.
 - The width of taper in feet
 - Minimum length of taper in feet. $S \times W$ for freeways, expressways, and roads with speeds of 45 mph or greater, or $W \times S^2/60$ for urban, residential, and streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
 - Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - 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 $\frac{1}{2}B$.
 - 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.
 - Cover existing speed limit signs within a reduced speed zone.
 - Where necessary, safe speed to be determined by the Engineer.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Signs G20-55-96 or R2-1aP-24 are not required when pilot car operation is used, if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
 - When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
 - 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.) Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
 - 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.
 - 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.)
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 - Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.



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

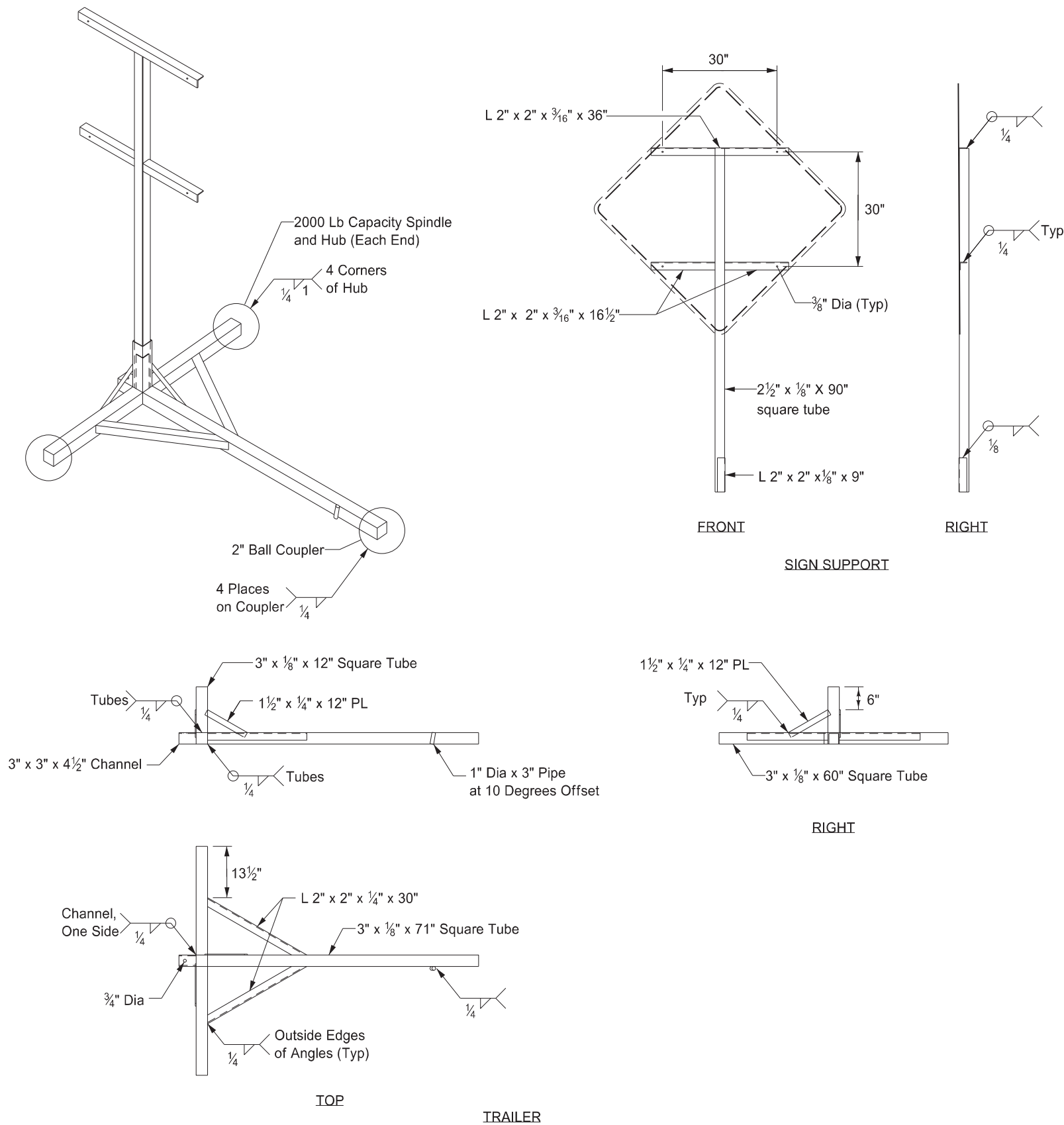
KEY		
Delineator Drum	Type III Barricade	Flagger
Sign	Work/Hazard Area	

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
03-13-14	Revised Sign Call "ROAD WORK XXX FT"
08-17-17	Update notes & sign numbers
11-01-19	Revised signs, sign #s, & notes
12-08-21	Switched order of Road Work XXX and Spd Limit Enforced & added Dollars At Work

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NORTH DAKOTA
12/08/21

PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



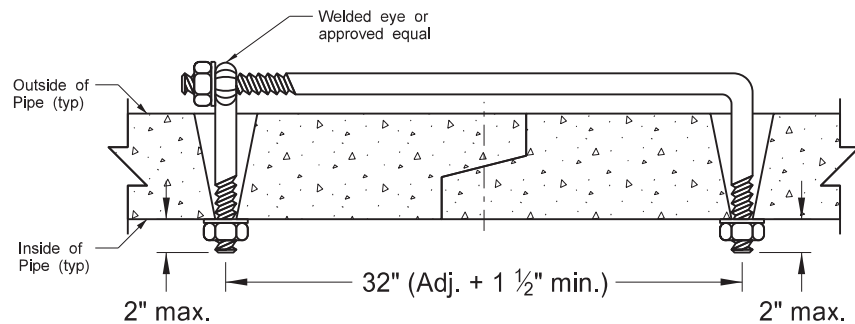
- Notes:
- 1. Maximum 250 pound weight of assembly.
 - 2. Use a 14" wheel and tire.
 - 3. Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
 - 4. Other NCHRP 350 or MASH crash tested assemblies are acceptable.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

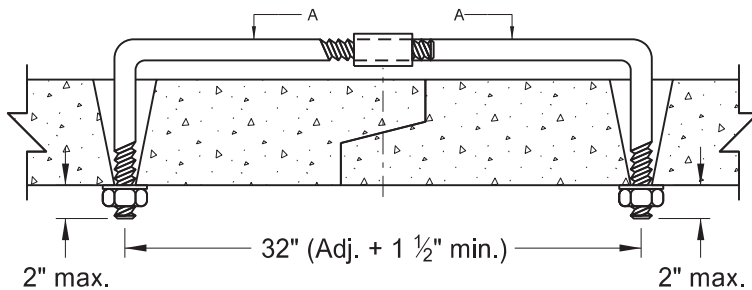
KIRK J. HOFF
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ENGINEER
NORTH DAKOTA
12 02 2020

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

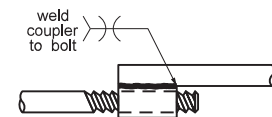
D-714-22



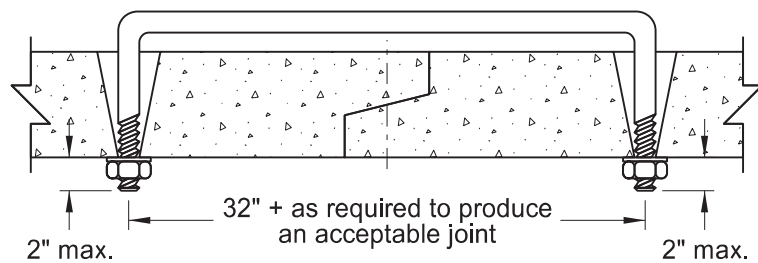
EYE BOLT TIE (PIPES ONLY)



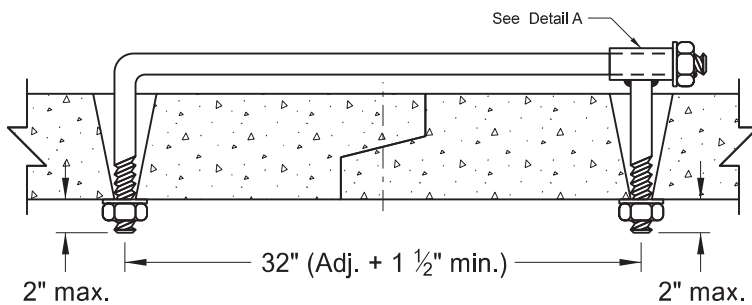
ADJUSTABLE TIE (RCB AND PIPES ONLY)



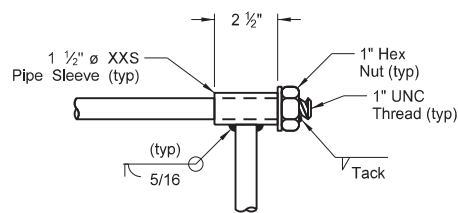
SECTION A-A



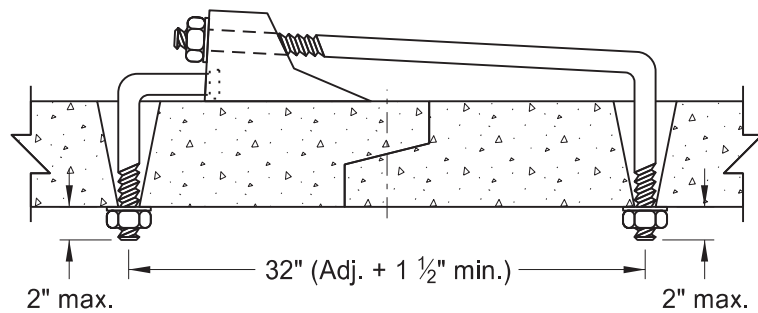
U BOLT TIE (RCB, PIPES, OR CATTLE PASSES)



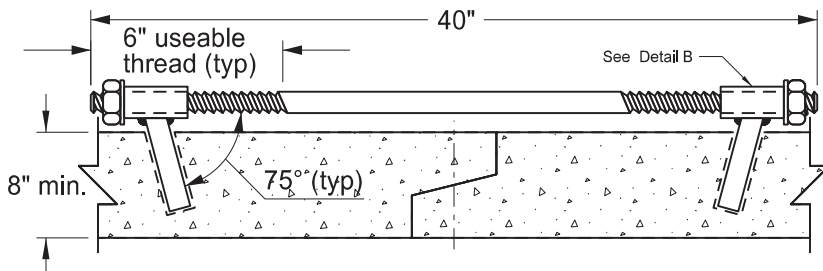
WELDED TIE (RCB AND PIPES ONLY)



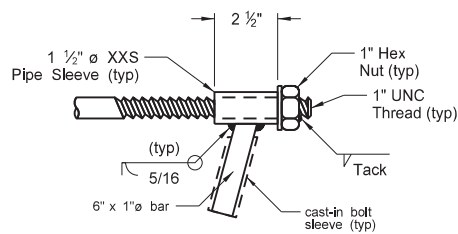
DETAIL A



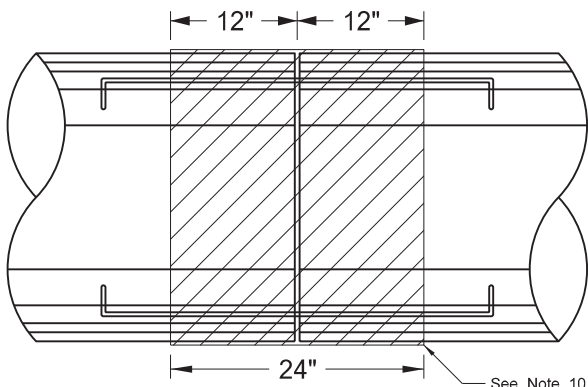
CANOPY TIE (PIPES ONLY)



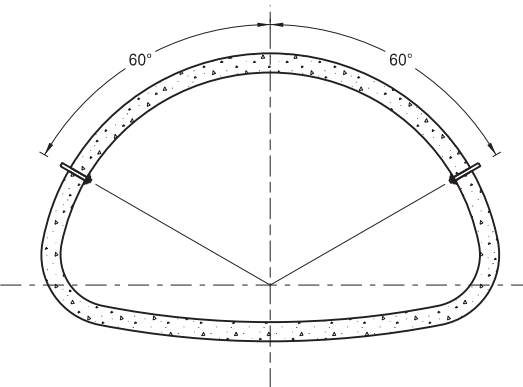
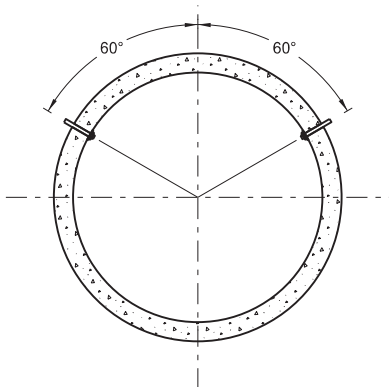
HIDDEN TIE (RCB ONLY)



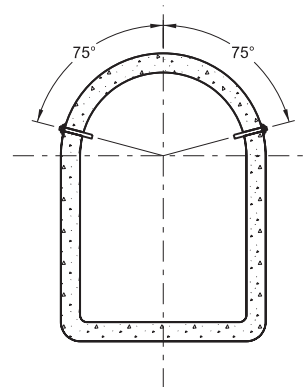
DETAIL B



PLAN VIEW (PIPES ONLY)



END VIEW



REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ϕ	XXS Pipe Sleeve Inner ϕ
18" - 24"	$\frac{5}{8}$ " See note 3	$\frac{3}{4}$ "
30" - 66"	$\frac{3}{4}$ "	1"
72" - 120"	1"	1 $\frac{1}{4}$ "
RCB/Cattle Pass		

NOTES:

- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
- Insert pipe ties from the inside of the pipes and grout in place for Cattle Pass and Jacked and Bored pipes. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
- Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Insert and grout tie bars into place where nuts and washers are not used.
- Do not use pipe ties to pull the pipe or RCB sections tight. The ties are only for holding sections together.
- Use only tie bolt assemblies that have been hot dip galvanized in accordance with ASTM A 153.
- Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Use holes that have a diameter $\frac{1}{4}$ " larger than the diameter of the thread. In precast RCB's, use holes that contain cast-in bolt sleeves with an inside diameter of 1 $\frac{1}{4}$ ".
- Select the type of tie bolt used from those shown.
- Include the cost of precasting or drilling the required holes and furnishing and installing the tie bolts in the price bid for the appropriate conduit or RCB pay item.
- Tie all centerline and approach RCP culvert joints. Tie the first three joints including the end section of all free ends of storm drain systems. 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.
- Place joint wrap prior to installing ties. Firmly secure the wrap around the full perimeter. For concrete pipes, overlap the joint by 12" in both directions. For box culverts, use a waterproof membrane that meets ASTM C877 (Type III). Provide a membrane that is a minimum of 12" wide and center it at the joint. Provide a minimum overlap of 2.5" at the seams.
- Use tie bolts that conform to ASTM A 36. Use heavy hex nuts that conform to ASTM A 563. Use washers that conform to ASTM F 436, Type 1. Use welded pipe sleeves and cast-in bolt sleeves that conform to ASTM A 53, Grade B.
- Tie RCB's at locations shown on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-8-17	Notes 2-11, Table, Title, Labels
8-11-21	Notes 2-12, Table, Label

