

DESIGN DATA				
Traffic	Average Daily			Location
Current 2024	Pass: 647	Trucks: 168	Total: 815	RP 298.9
Current 2024	Pass: 752	Trucks: 188	Total: 940	RP 301.9
Current 2024	Pass: 1,510	Trucks: 170	Total: 1,680	RP 310.4
Current 2024	Pass: 960	Trucks: 198	Total: 1,158	RP 317.0
Clear Zone Distance: 6:1; 26' (RP 297.70 to 298.45)			Design Speed: 65	
Clear Zone Distance: Use Existing (RP 303.36)			Design Speed: 65	
Clear Zone Distance: Use Existing (RP 313.75)			Design Speed: 25	
Clear Zone Distance: Use Existing (RP 314.45)			Design Speed: 45	

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

NH-6-005(054)297

Cavalier & Pembina Counties
Guardrail Replacement ~ 15 miles west of Cavalier
Structure No. 0005-303.364 ~ 10.5 miles southwest of Cavalier
Structure 0005-313.750 ~ Northern part of Cavalier
Structure No. 0005-314.446 ~ Northern part of Cavalier

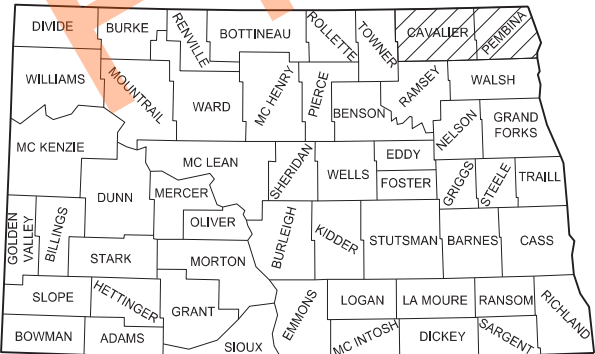
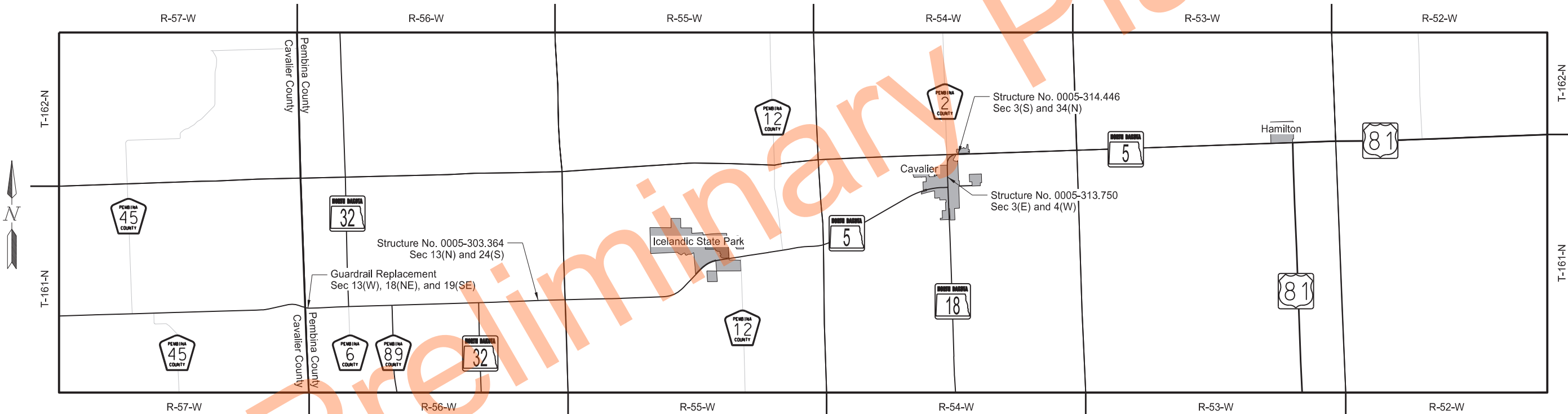
High Tension Cable Guardrail, Rail Retrofit, Deck Repair,
Curb Spall Repair, Abutment Spall Repair,
Barrier End Modification, Approach Guardrail

GOVERNING SPECIFICATIONS

Date Published and Adopted
by the North Dakota
Department of Transportation

Standard Specifications	7/1/2025
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
Guardrail Replacement	0.767	0.767
Structure No. 0005-303.364	0.121	0.121
Structure No. 0005-313.750	0.029	0.029
Structure No. 0005-314.446	0.076	0.076
	0.993	0.993



STATE COUNTY MAP

DESIGNER Adam McGill
DESIGNER Jonathon Backer
DESIGNER Mason Heustis
DESIGNER Marcus Rosing
DESIGNER Ryan Bergum

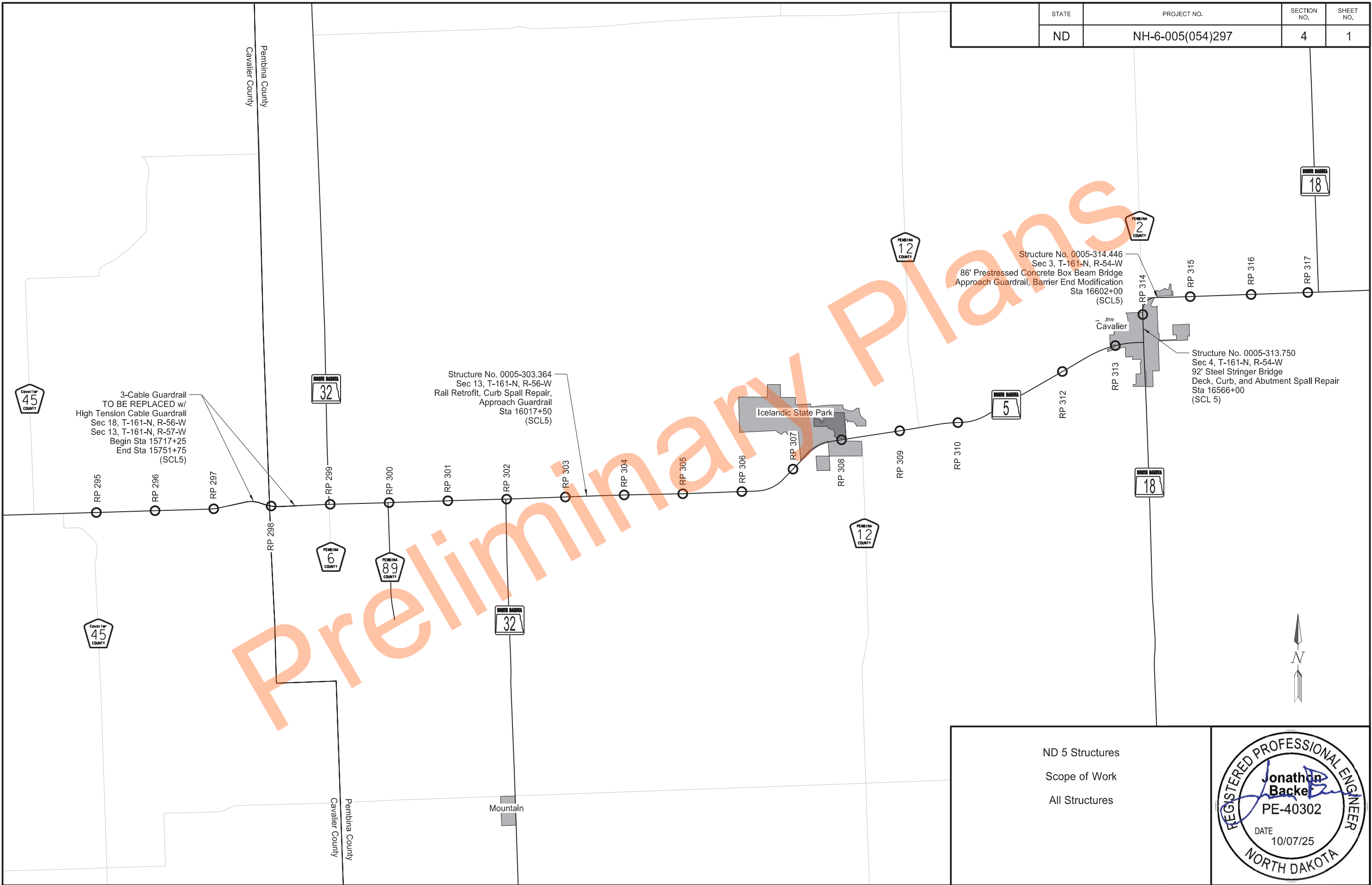
ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Jason Thorenson
10/13/25

KLJ



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			D-764-22	Typical Grading At Bridge Ends With W-Beam Guardrail					
			D-764-38	MGS Flared Energy Absorbing Terminal - Wood Post					
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			D-764-48	Typical Grading at Bridge Ends with MGS W-Beam Guardrail					
			D-764-50	MASH SoftStop End Terminal - Steel Post					
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SPECIAL PROVISIONS									
Number	Description								
SSP 1	Temporary Erosion and Sediment Best Management Practices								
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SP 22(25)	Drilled Shafts								
SP 23(25)	Commercial Grade Hot Mix Asphalt								
SP 39(25)	Utility Coordination								
SP 45(25)	Concrete Spall Repair								



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ND 5 Structures
Scope of Work
All Structures



NOTES

- 107-P01

PAVEMENT SWEEPING: Sweep paved areas that were used by construction traffic before opening these areas to public traffic.

Sweep all newly constructed pavement no more than 24 hours before a scheduled final inspection.

Use a vacuum or pick-up type sweeper in the City of Cavalier and a broom type sweep in rural areas.
- 203-P01

ADDITIONAL DAMAGE: Seed and mulch additional areas where damage is incurred to the topsoil at the Contractor's expense.
- 251-P01

SEEDING CLASS II & HYDRAULIC MULCH: A discretionary quantity of 0.5 acres of SEEDING CLASS II and HYDRAULIC MULCH is included to account for seeding and mulching adjacent to guardrail grading.
- 261-P01

FIBER ROLLS 12IN: A discretionary quantity of 800 linear feet of FIBER ROLLS 12IN is included to be used at W-beam guardrail placement locations.
- 704-450

LANE CLOSURE – SIGNAL CONTROL/FLAGGING CONTROL: Install either the signal controlled lane closure on Standard D-704-16 or the flagging controlled lane closure on Standard D-704-17.

Obtain an electrical source for traffic signals. Solar powered signals may be used. Place generators a minimum of 60 feet from the roadway centerline, unless the generator and signal are part of a trailer mounted unit.

Place utility poles and equipment a minimum of 60 feet from the roadway centerline and place power conductors a minimum of 6 inches below the ground surface. Remove poles after they are no longer necessary.

The Engineer will measure individual traffic control devices, other than the signal system and flaggers, shown on the standards. Payment will be made at the respective contract unit price. Include the cost of either a traffic signal system or flaggers in the contract unit price for "LANE CLOSURE – SIGNAL CONTROL/FLAGGING CONTROL".
- 704-P01

TRAFFIC CONTROL DEVICES: Provide traffic control consisting of a combination of terminal signing, temporary shoulder closure(s), and other traffic control layouts identified below. For estimating purposes, it is assumed all layouts are utilized concurrently.

The traffic control device list was developed using the following standard drawings and plan sheets:

- Traffic Control Device List Section 100 Sheet 1:
- Phase 1 (ND 5 – RP 297.70 to 298.45 Guardrail Replacement)
 - D-704-24 Type R
 - One side to be worked on at a time
 - Phase 2 (Str 0005-303.364)
 - D-704-16 / D-704-17
 - Tubular Markers spaced at 25 feet to be used in place of portable median barrier
 - 20 flagging hours (separate from the 704 1018 bid item)
 - Phase 3 (Str 0005-313.750)
 - D-704-16 / D-704-17
 - Tubular Markers spaced at 25 feet to be used in place of portable median barrier
 - 20 flagging hours (separate from the 704 1018 bid item)
 - Phase 4 (Str 0005-314.446)
 - D-704-16 / D-704-17
 - Tubular Markers spaced at 25 feet to be used in place of portable median barrier
 - 20 flagging hours (separate from the 704 1018 bid item)
 - Phase T (Summation)
 - Sum of all traffic devices required on all four sites concurrently. Traffic control sign units and devices will be paid for when installed at each individual site regardless of the number of sites being worked on concurrently.
- 764-P01

REMOVE 3-CABLE GUARDRAIL & POSTS: Deliver all removed 3-cable guardrail posts deemed salvageable by the Engineer to the following NDDOT Grand Forks Section and neatly stack them at a location designated by the Engineer.

Deliver to: 9398 138th Ave NE

Cavalier, ND 58220

Include all costs to remove and deliver the posts in the contract unit price bid for "REMOVE 3-CABLE GUARDRAIL & POSTS".



ENVIRONMENTAL NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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ENVIRONMENTAL NOTES (EN): The North Dakota Department of Transportation and the Federal Highway have made environmental commitments to secure approval of this project. The following environmental notes are requirements to comply with these commitments:

EN-1 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-2 THREATENED AND ENDANGERED SPECIES: The project is located near/within suitable habitat for the species listed in the following table:

SPECIES	HABITAT	PRESENCE
Northern Long-Eared Bat	Forested/Wooded Areas/Bridges/Box Culverts/Caves/Mines	Active Season: April 15 - October 31* Inactive Season: Nov 1 – April 14*

*Time frames can differ slightly, depending on the year

If any of the above threatened and endangered species are identified within 1 mile of the project, the Contractor will notify the Engineer immediately and cease construction activities in the vicinity until an avoidance area is established. The Engineer will establish an avoidance area that is at least a 0.5 mile and immediately coordinate with the USFWS (701-355-8513), FHWA (701-221-9464), and NDDOT Environmental and Transportation Services (701-328-2592). The Contractor will not resume work within the avoidance area until the Engineer has confirmed with the agencies that work may proceed (either the species have left the area, or approved avoidance/minimization measures have been implemented).

NOTIFICATIONS TO BE FILED BY CONTRACTOR:

EN-3 FAA Notice: Notification is required for work within 3 nautical miles of the airport. Complete the Federal Aviation Administration Notice of Proposed Construction or Alteration Form 7460-1 in accordance with 14 CFR 77.7 and 77.9 (at least 45 days before the start date of the proposed construction or alteration or the date an application for a construction permit is filed, whichever is earliest) (online at <http://oeaaa.faa.gov>).

Estimated Quantities						STATE	PROJECT NO.	SECTION NO.	SHEET NO.
						ND	NH-6-005(054)297	8	1
					Mainline:				
SPEC	CODE	ITEM DESCRIPTION	UNIT				TOTAL		
103	0100	CONTRACT BOND	L SUM	1			1		
203	0218	GUARDRAIL EMBANKMENT	EA	3			3		
251	0200	SEEDING CLASS II	ACRE	0.5			0.5		
253	0201	HYDRAULIC MULCH	ACRE	0.5			0.5		
261	0112	FIBER ROLLS 12IN	LF	800			800		
302	0120	AGGREGATE BASE COURSE CL 5	TON	491			491		
411	0105	MILLING PAVEMENT SURFACE	SY	396			396		
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	193			193		
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1426			1426		
602	1260	BRIDGE DECK CRACK SEALING	LF	115			115		
602	2105	CURB REPAIR	SF	9			9		
602	7000	SPECIAL SURFACE FINISH	SF	893			893		
624	0120	PEDESTRIAN RAILING-REMOVE & REPLACE	L SUM	1			1		
624	3001	DOUBLE BOX BEAM RAIL RETROFIT-FREE STANDING	LF	106			106		
650	0805	DECK SPALL REPAIR	SF	44			44		
702	0100	MOBILIZATION	L SUM	1			1		
704	0100	FLAGGING	MHR	120			120		
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2229			2229		
704	1018	LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EA	3			3		
704	1052	TYPE III BARRICADE	EA	6			6		
704	1054	SIDEWALK BARRICADE	EA	2			2		
704	1060	DELINEATOR DRUMS	EA	42			42		
704	1067	TUBULAR MARKERS	EA	94			94		
764	0100	HIGH TENSION CABLE GUARDRAIL	LF	6584			6584		
764	0105	HIGH TENSION CABLE ANCHOR ASSEMBLY	EA	4			4		
764	0131	W-BEAM GUARDRAIL	LF	691			691		
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	8			8		
764	2020	REMOVE 3-CABLE GUARDRAIL & POSTS	LF	8502			8502		
764	2080	REMOVE BOX BEAM GUARDRAIL	LF	780			780		
764	2081	REMOVE END TREATMENT & TRANSITION	EA	8			8		
930	9223	CRACK SEALING	LF	300			300		
930	9647	BARRIER END MODIFICATION	EA	4			4		
930	9650	ABUTMENT REPAIR	SF	63			63		

						STATE		PROJECT NO.		SECTION NO.		SHEET NO.	
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PAVING SUMMARY									
Structure 0005-303.364									
Material	Unit	Begin Sta	End Sta	Offset	Area (SF)	Quantity	Unit	Subtotal	Unit
302 0120 AGGREGATE BASE COURSE CL 5 @ 1.875 Ton/CY	TON	16014+52	16017+34	Rt	2891	101	TON	308	TON
		16015+64	16017+34	Lt	1276	45			
		16017+89	16019+62	Rt	1371	48			
		16017+89	16020+84	Lt	3272	114			
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON	16014+52	16017+34	Rt	2483	31	TON	93	TON
		16015+64	16017+34	Lt	1029	13			
		16017+89	16019+62	Rt	1123	14			
		16017+89	16020+84	Lt	2817	35			
TACK COAT @ 0.05 Gal/SY - Incidental	GAL	16014+52	16017+34	Rt	-	14	GAL	43	GAL
		16015+64	16017+34	Lt		6			
		16017+89	16019+62	Rt		7			
		16017+89	16020+84	Lt		16			
PRIME COAT @ 0.35 Gal/SY - Incidental	GAL	16014+52	16017+34	Rt	-	97	GAL	292	GAL
		16015+64	16017+34	Lt		41			
		16017+89	16019+62	Rt		44			
		16017+89	16020+84	Lt		110			
Structure 0005-313.750									
4110105 MILLING PAVEMENT SURFACE	SY	16566+60	16567+54	-	3564	396	SY	396	SY
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON					44	TON	44	TON
TACK COAT @ 0.05 Gal/SY (Overlay) - Incidental	GAL					3	GAL	3	GAL
Structure 0005-314.446									
302 0120 AGGREGATE BASE COURSE CL 5 @ 1.875 Ton/CY	TON	16600+01	16601+61	Rt	1646	58	TON	183	TON
		16600+39	16601+61	Lt	887	31			
		16602+47	16603+74	Rt	1093	38			
		16602+47	16604+02	Lt	1598	56			
430 0500 COMMERCIAL GRADE HOT MIX ASPHALT @ 2 Ton/CY	TON	16600+01	16601+61	Rt	1416	18	TON	56	TON
		16600+39	16601+61	Lt	711	9			
		16602+47	16603+74	Rt	911	12			
		16602+47	16604+02	Lt	1374	17			
TACK COAT @ 0.05 Gal/SY - Incidental	GAL	16600+01	16601+61	Rt	-	8	GAL	26	GAL
		16600+39	16601+62	Lt		4			
		16602+47	16601+63	Rt		6			
		16602+47	16601+64	Lt		8			
PRIME COAT @ 0.35 Gal/SY - Incidental	GAL	16600+01	16601+61	Rt	-	56	GAL	174	GAL
		16600+39	16601+61	Lt		28			
		16602+47	16603+74	Rt		36			
		16602+47	16604+02	Lt		54			

Guardrail Runs							
Segment	RP		Station		Location	764 0100 HIGH TENSION CABLE GUARDRAIL	764 0105 HIGH TENSION CABLE ANCHOR ASSEMBLY
						①	
	Start	Stop	Start	Stop		(LF)	(EA)
A	297.681	298.339	15717+55	15751+45	LT	3,385	2
B	297.728	298.339	15719+50	15751+45	RT	3,199	2
Total =						6,584	4

Notes:
① Guardrail quantity measured along the guardrail, not along the alignment.

ND 5 Structures
Basis of Estimate
All Structures

REGISTERED PROFESSIONAL ENGINEER

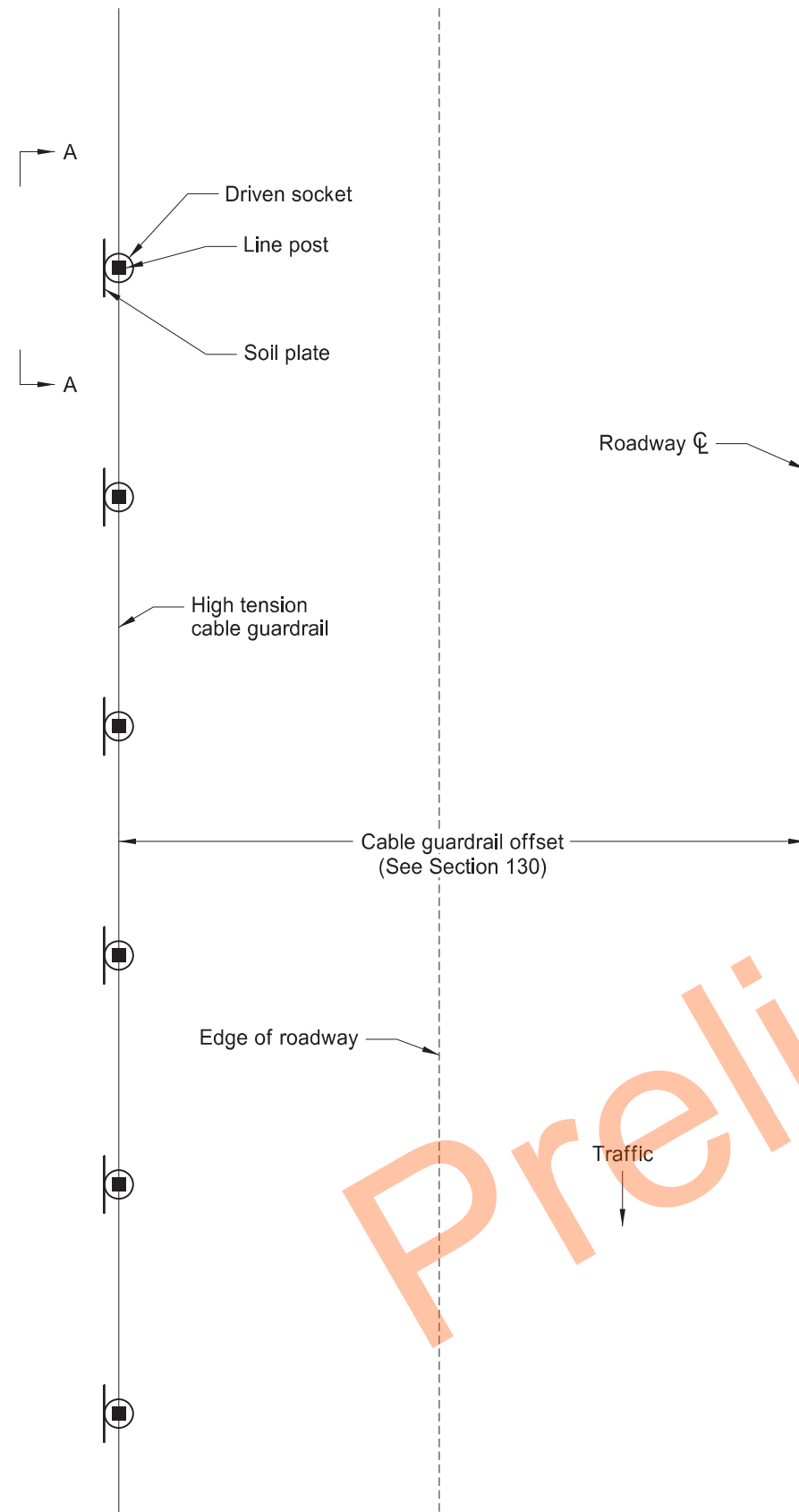
Jonathon Backe

PE-40302

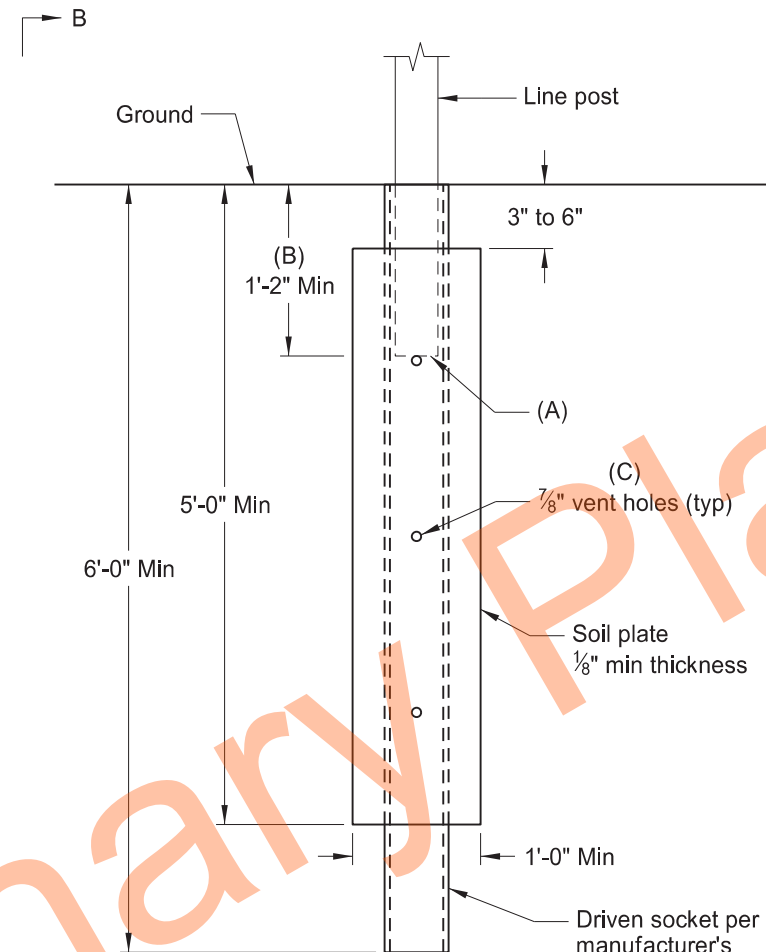
DATE 10/07/25

NORTH DAKOTA

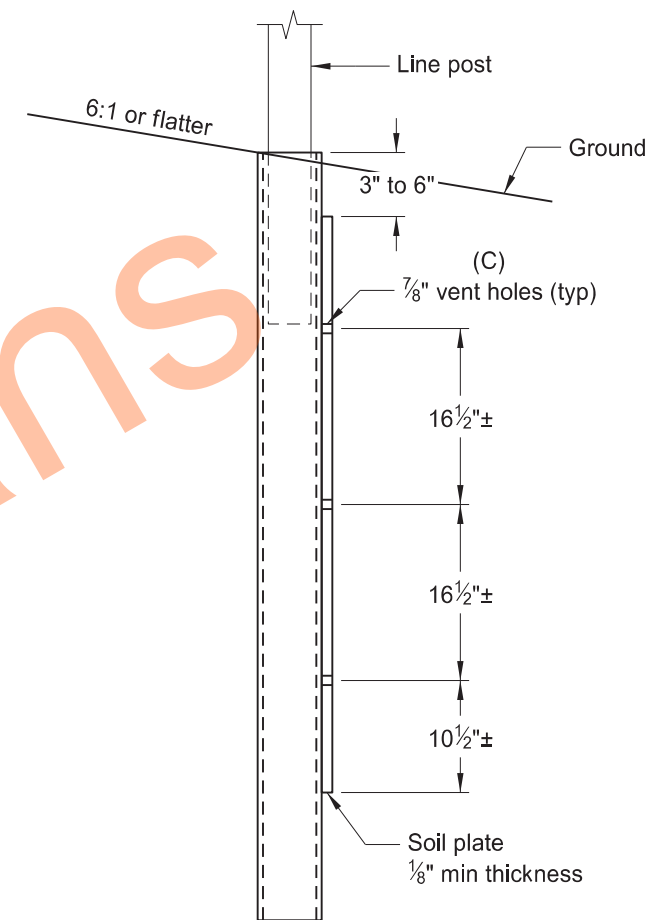
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PLAN VIEW



SECTION A-A



SECTION B-B

DESIGN REQUIREMENTS:

1. Design socket for a maximum deflection of 1" at ground level.
2. Sockets to have a yield strength equal to or greater than that of the crash tested line posts.
3. Design socket for line posts to yield above ground.

NOTES:

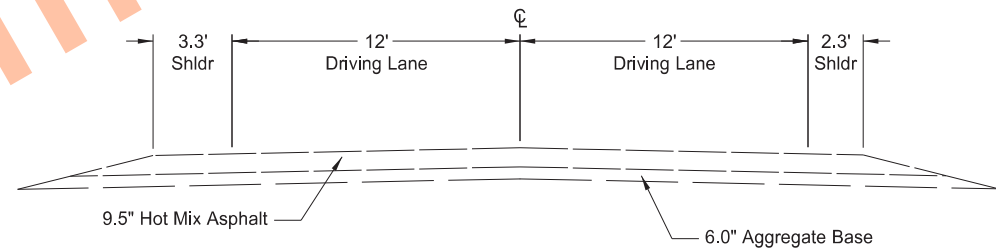
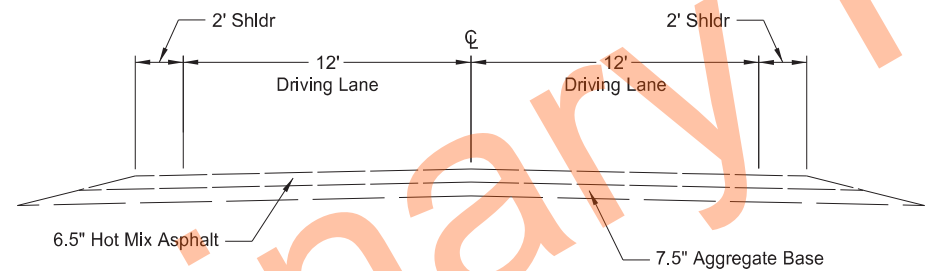
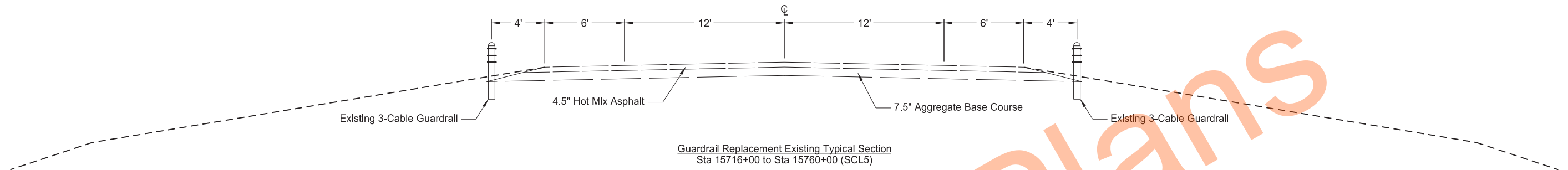
- (A) Provide post stop per manufacturer's recommendation.
- (B) Line post depth as per manufacturer's specifications.
- (C) Provide three 7/8" diameter vent holes for galvanizing. Upper hole may be used for post stop. Vent holes are optional per manufacturer's recommendation.

ND 5 Structures
RP 297.70 to 298.45 Cable Guardrail Replacement

General Details
Steel Socket Detail



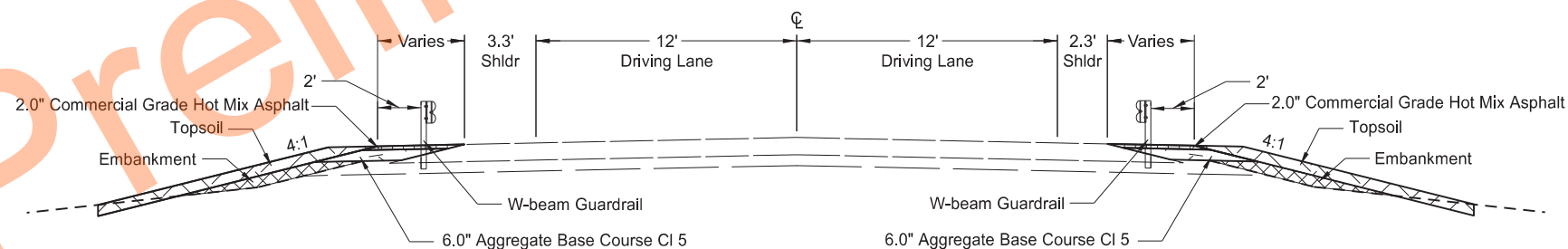
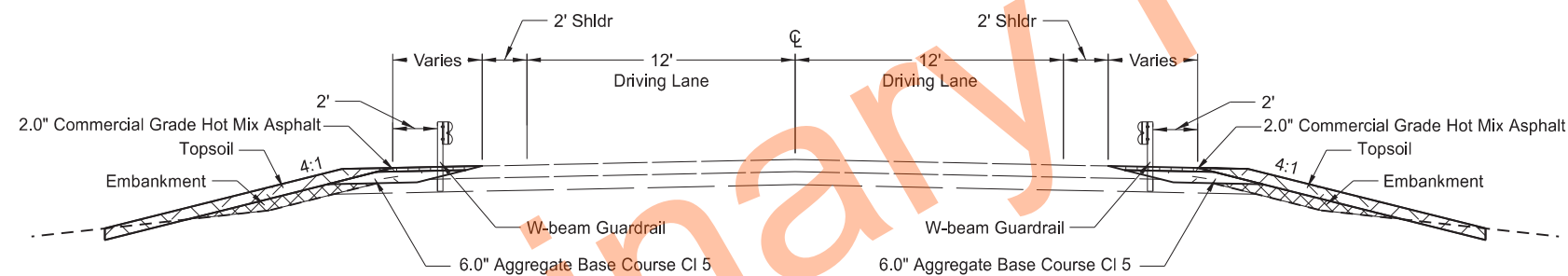
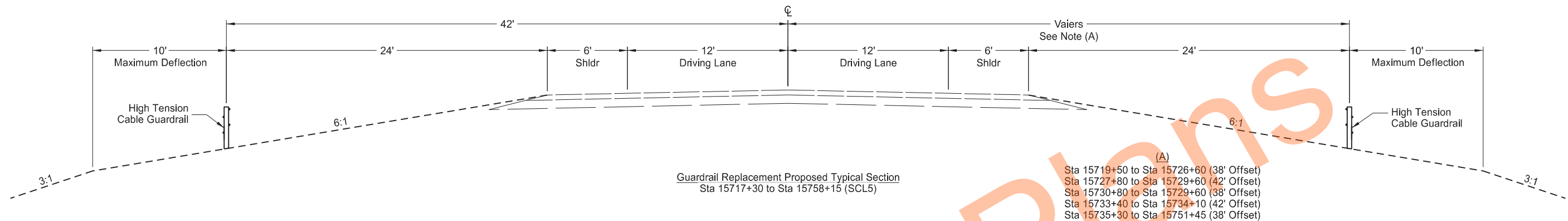
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ND 5 Structures
Existing Typical Sections
All Structures

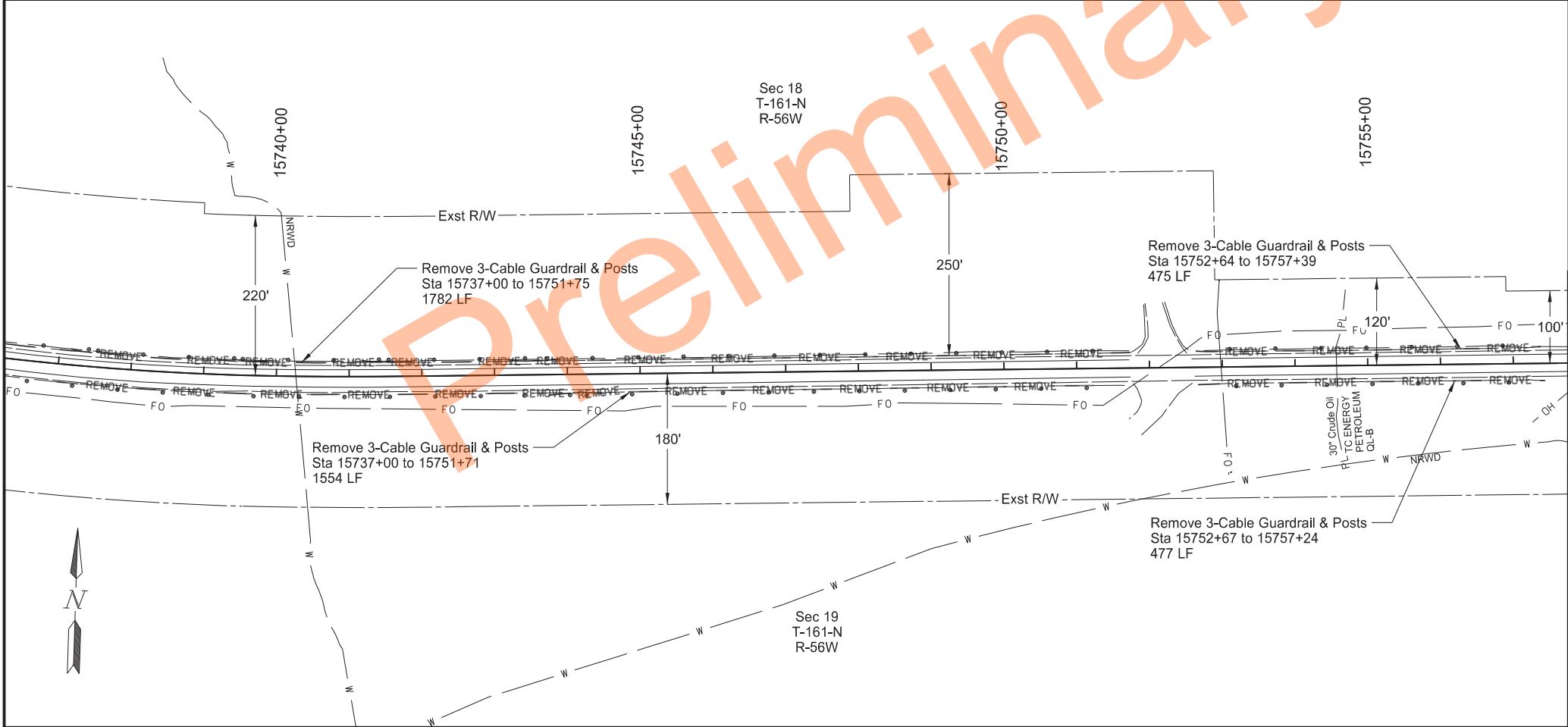
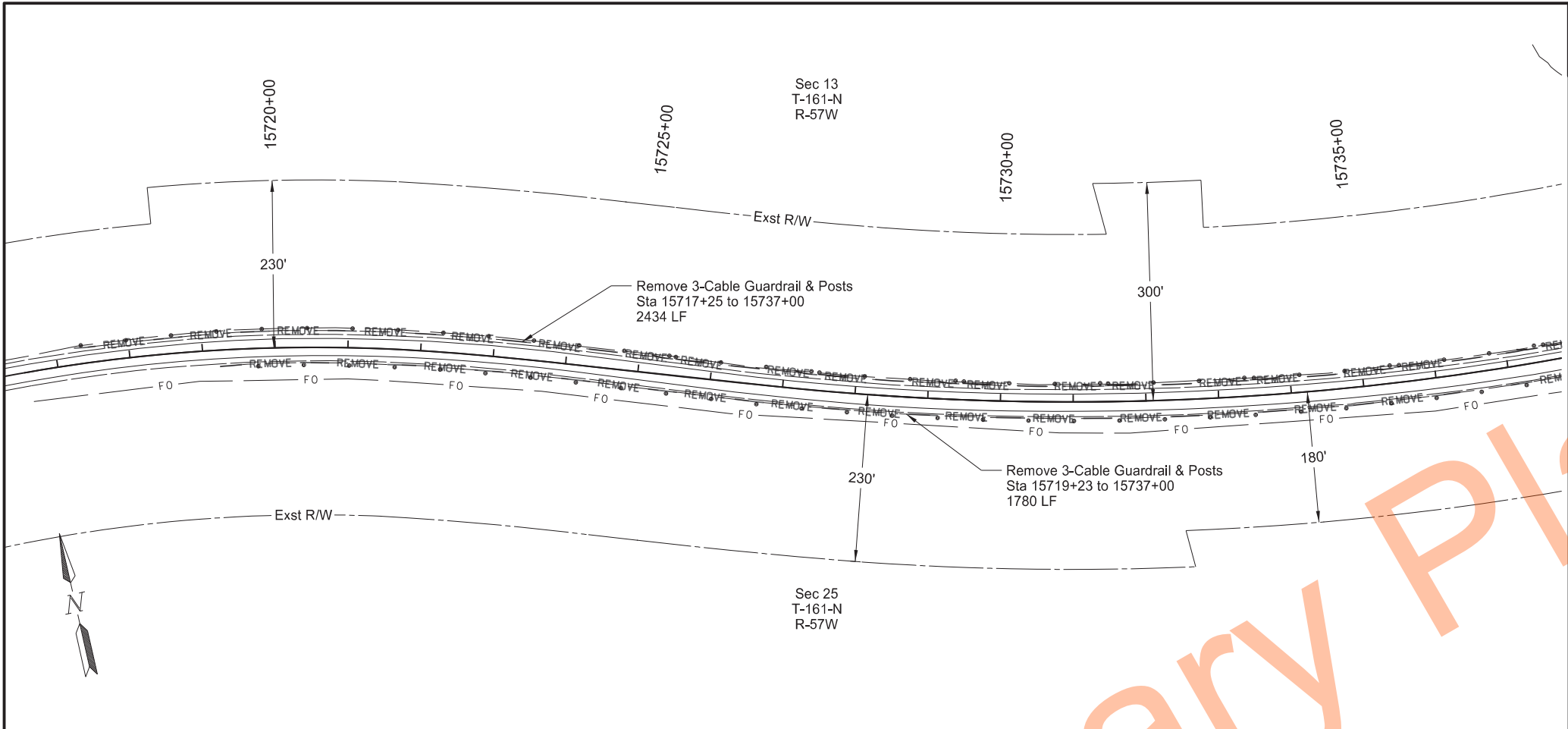


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ND 5 Structures
Proposed Typical Sections
All Structures





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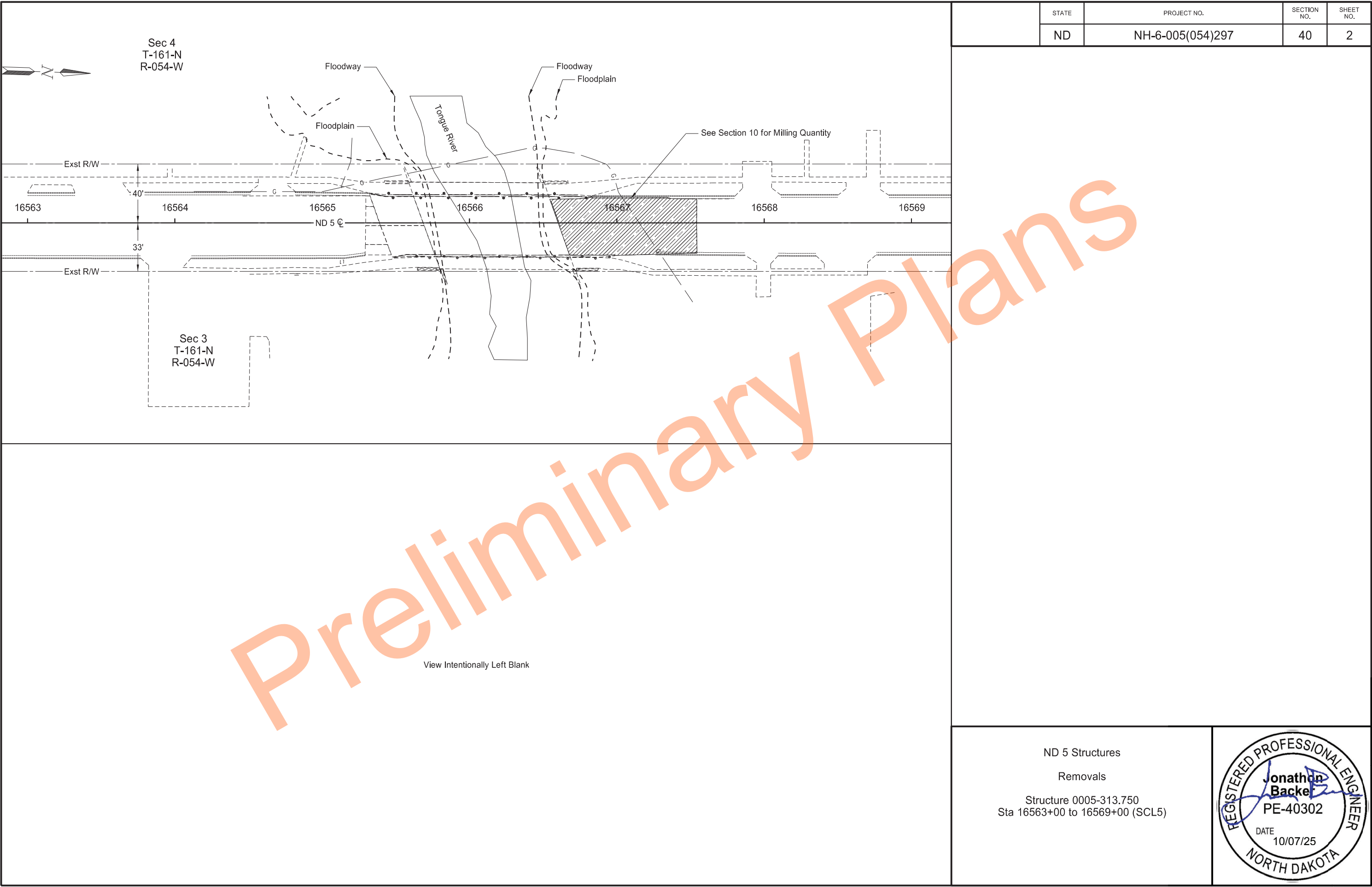
SPEC	CODE	BID ITEM	QTY	UNIT
764	2020	REMOVE 3-CABLE GUARDRAIL & POSTS Sta 15717+00 to Sta 15757+00	8,502	LF

LEGEND

— REMOVE — Remove 3-Cable Guardrail & Posts

ND 5 Structures
RP 297.70 to 298.45 Cable Guardrail Replacement
Removals
3-Cable Guardrail Removal
Sta 15717+00 to 15757+00 (SCL5)





Wetland Impact Table																							
Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands'	Wetland Impact					Wetland Mitigation													
					Wetland Impacts Acre(s)			USFWS Easement Impacts Acre(s)		Mitigation Proposed			USACE/11990 Bank		11990 Bank		USFWS Bank		Onsite Mitigation Method			Onsite Constructed Location	
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)	Location	Acre(s)	Location	Acre(s)	Mitigation Location; Ratio	Ditch Shift Acre(s)	Onsite Acre(s)	Onsite Constructed Site #	Onsite Constructed Size Acre(s)
4	Sec 23, T-161-N, R-56-W	Ditch	Created	Y																			
5	Sec 13, T-161-N, R-56-W	Ditch	Created	Y																			
Totals					-	-							Kirkeby Bank		Anderson Bank				-	-		-	

Other Waters Impact Table															
Number	Location	Type	Feature	USACE Jurisdictional	Impacts to Other Waters						Other Water Mitigation				
					Acres			Linear Feet			Mitigation Proposed			USACE Mitigation Bank	
					Temp.	Permanent				Location				Acre(s)	
						Total	Perm. (Loss)	Perm. (No Loss)	Perm. (Loss)		Perm. (No Loss)	EO 11990	USACE		USFWS
6	Sec 13 & 24, T-161-N, R-56-W	River	Natural	Y											
10	Sec 3 & 4, T-161-N, R-54-W	River	Natural	Y											
11	Sec 3 & 34, T-161-N, R-54-W	River	Natural	Y											
Totals					0.000	0.000	0.000	0.000	0	0				0.000	

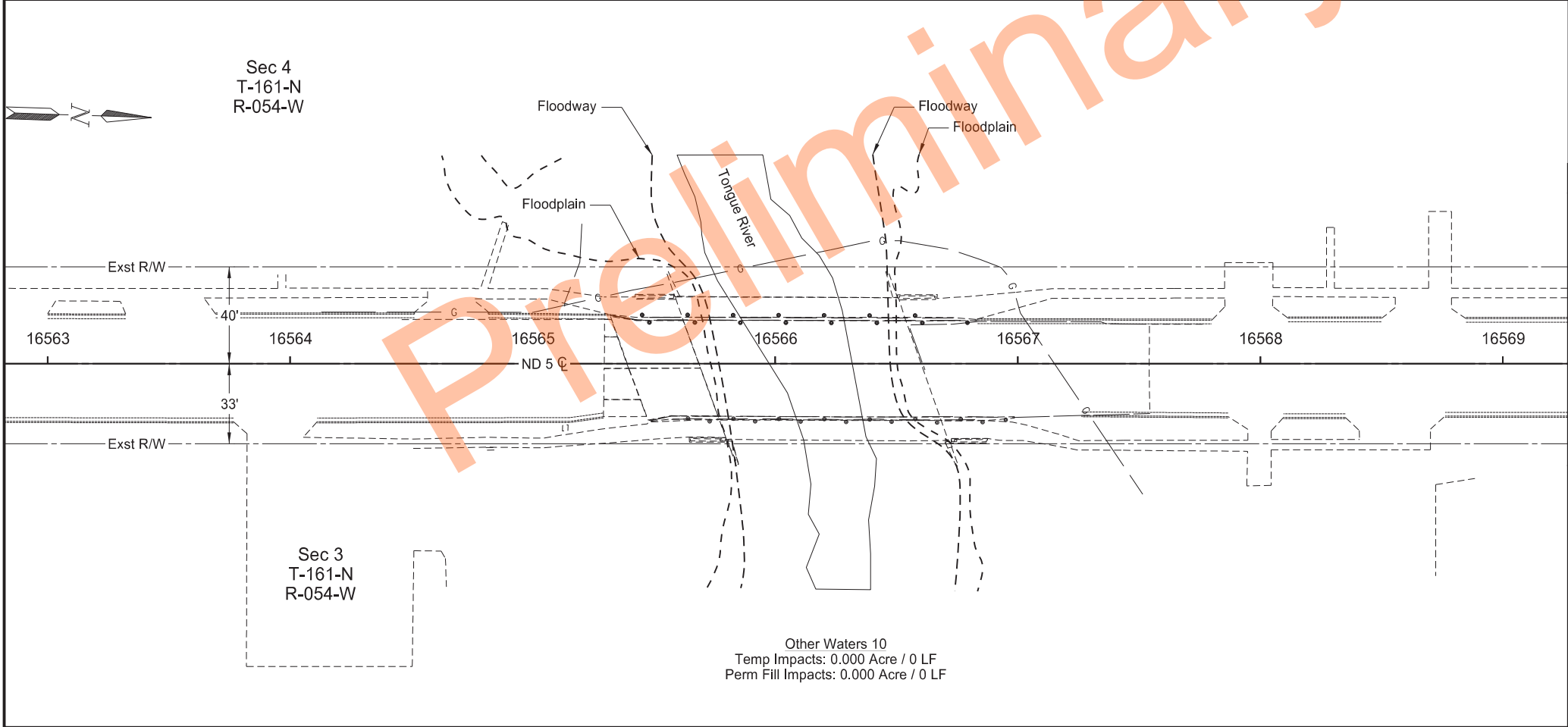
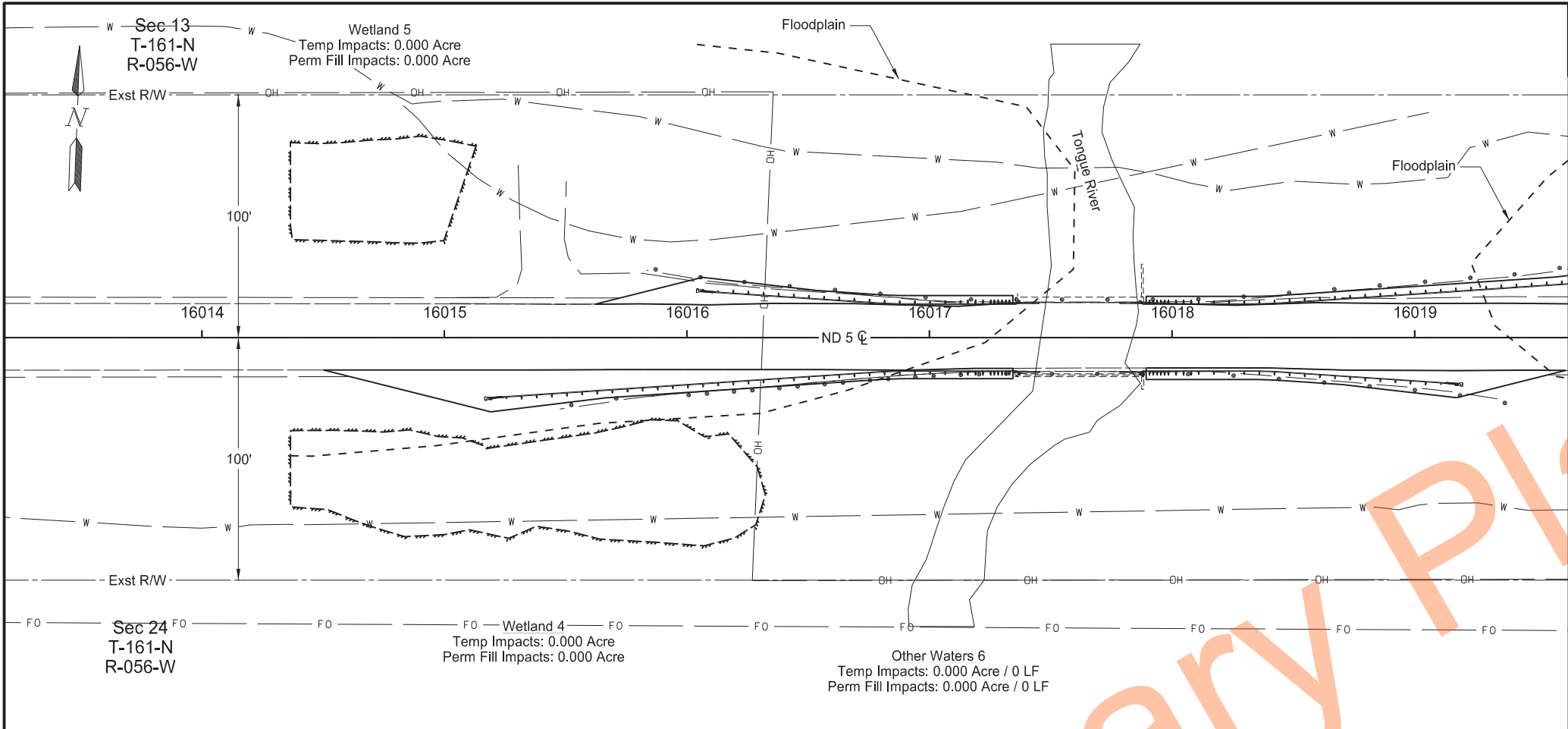
¹ A Preliminary Wetland Jurisdictional Determination was issued by the USACE on 9/25/2024; NWO-2024-01546-BIS.

Impact Summary Table			
Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total Acre(s)	Water Type	Total Acre(s)
Natural/JD (Fill/Drain)	0.000	Temporary Wetland JD	0.000
Natural/Non-JD (Fill/Drain)	0.000	Non-JD Wetland Temporary	0.000
Artificial/JD (Fill/Drain)	0.000		
Artificial/Non-JD (Fill/Drain)	0.000	Permanent OW (loss)	0.000
Total	0.000	Permanent OW (no loss)	0.000
JD Natural (Cut)	-	Temporary OW	0.000
JD Artificial (Cut)	-	Permanent OW-d	-
Non-JD Natural (Cut)	-	Temporary OW-d	-
Non-JD Artificial (Cut)	-		
Total	-		

Mitigation Summary Table						
	Location	Ditch Shift Acre(s)	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only						
EO 11990 Only	Anderson Bank			0.000		
USACE/11990	Kirkeby Bank				0.000	
USFWS						
	Total			0.000	0.000	

ND 5 Structures
Wetlands, Mitigation, and Environmental
Wetland Impact Table
All Structures

REGISTERED PROFESSIONAL ENGINEER
Jonathon Backe
PE-40302
DATE 10/07/25
NORTH DAKOTA



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(054)297	75	2

LEGEND			
	Wetland Impact Permanent		Grading Tie Line (Fill)
	Wetland Impact Temporary		Existing Delineated Wetland
	Other Water Impacts Temporary		Existing Other Waters
	Other Water Impacts Permanent		Grading Tie Line (Cut)

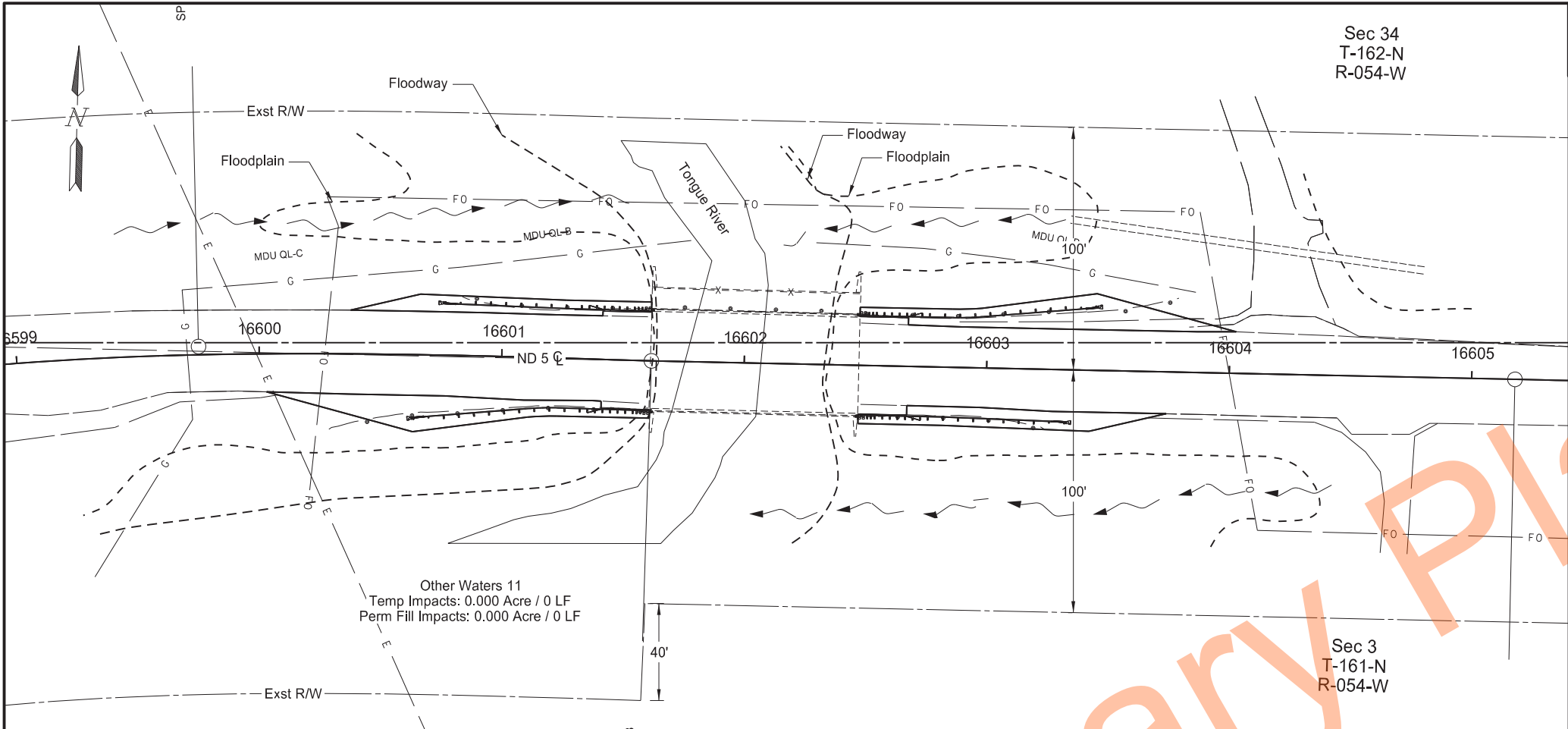
ND 5 Structures

Wetlands, Mitigation, and Environmental

Structure 0005-303.364
Sta 16013+50 to 16019+50 (SCL5)

Structure 0005-313.750
Sta 16563+00 to 16569+00 (SCL5)





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(054)297	75	3

LEGEND			
	Wetland Impact Permanent		Grading Tie Line (Fill)
	Wetland Impact Temporary		Existing Delineated Wetland
	Other Water Impacts Temporary		Existing Other Waters
	Other Water Impacts Permanent		Grading Tie Line (Cut)

ND 5 Structures

Wetlands, Mitigation, and Environmental

Structure 0005-314.446
Sta 16599+00 to 16605+00 (SCL5)



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(054)297	100	1

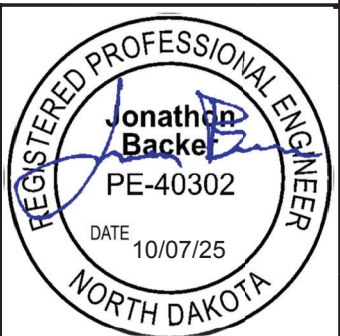
SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED					TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL	
			BY PHASE NO.								
			1	2	3	4	T				
E5-1-48	48"x48"	EXIT GORE								35	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES	1				1	1		28	28
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)								18	
G20-2-48	48"x24"	END ROAD WORK	2	2	2	2	8	8		26	208
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)								18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR								18	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS								43	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW								36	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$150 WHEN WORKERS PRESENT		2	2	2	6	6		59	354
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)								11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)								10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)								10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)								7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)								7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)								7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)								7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)								7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT								15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)								7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)								7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)								9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)								7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)								9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)								7	
R1-1-48	48"x48"	STOP								32	
R1-2-60	60"x60"	YIELD								29	
R2-1-36	36"x48"	SPEED LIMIT __ (Portable only)	2					2		30	60
R2-1-48	48"x60"	SPEED LIMIT __		4	4	4	12	12		39	468
R2-1aP-24	24"x18"	MINIMUM FEE \$150 (Mounted on Speed Limit post)	1	2	2	2	7	7		10	70
R3-2-48	48"x48"	NO LEFT TURN								35	
R4-1-48	48"x60"	DO NOT PASS								39	
R4-7-48	48"x60"	KEEP RIGHT								39	
R5-1-48	48"x48"	DO NOT ENTER								35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)								14	
R7-1-12	12"x18"	NO PARKING ANY TIME								11	
R9-9-24	24"x12"	SIDEWALK CLOSED (Mounted on barricade)		2		2	2	2		3	6
R10-6-24	24"x36"	STOP HERE ON RED								16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)								12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)								12	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)								15	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)								15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)								15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT								35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT								35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT								35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW								26	
W3-1-48	48"x48"	STOP AHEAD								35	
W3-3-48	48"x48"	SIGNAL AHEAD								35	
W3-4-48	48"x48"	BE PREPARED TO STOP								35	
W3-5-48	48"x48"	SPEED REDUCTION AHEAD	1	2	2	2	7	7		35	245
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT								35	
W5-1-48	48"x48"	ROAD NARROWS								35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE								35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW								35	
W6-3-48	48"x48"	TWO WAY TRAFFIC								35	
W8-1-48	48"x48"	BUMP								35	
W8-3-48	48"x48"	PAVEMENT ENDS								35	
W8-7-48	48"x48"	LOOSE GRAVEL								35	
W8-11-48	48"x48"	UNEVEN LANES								35	
W8-12-48	48"x48"	NO CENTER LINE								35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL								35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY								35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT or __ MILE								35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or __ MILE								35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY								35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL								35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)								14	
W14-3-64	64"x48"	NO PASSING ZONE								28	
W16-2P-30	30"x24"	__ FEET PLAQUE (Mounted on warning sign post)		2	2	2	6	6		10	60
W20-1-48	48"x48"	ROAD WORK AHEAD or __ FT or __ MILE	1	2	2	2	7	7		35	245
W20-2-48	48"x48"	DETOUR AHEAD or __ FT or __ MILE								35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT or __ MILE								35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT or __ MILE		2	2	2	6	6		35	210
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or __ MILE								35	
W20-7-48	48"x48"	FLAGGER		2	2	2	6	6		35	210
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back		2	2	2	6	6		5	30
W20-52P-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)								12	
W21-1-48	48"x48"	WORKERS								35	
W21-2-48	48"x48"	FRESH OIL								35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or __ MILE								35	
W21-5-48	48"x48"	SHOULDER WORK	1				1	1		35	35
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED								35	

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SPEC & CODE			
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	2229

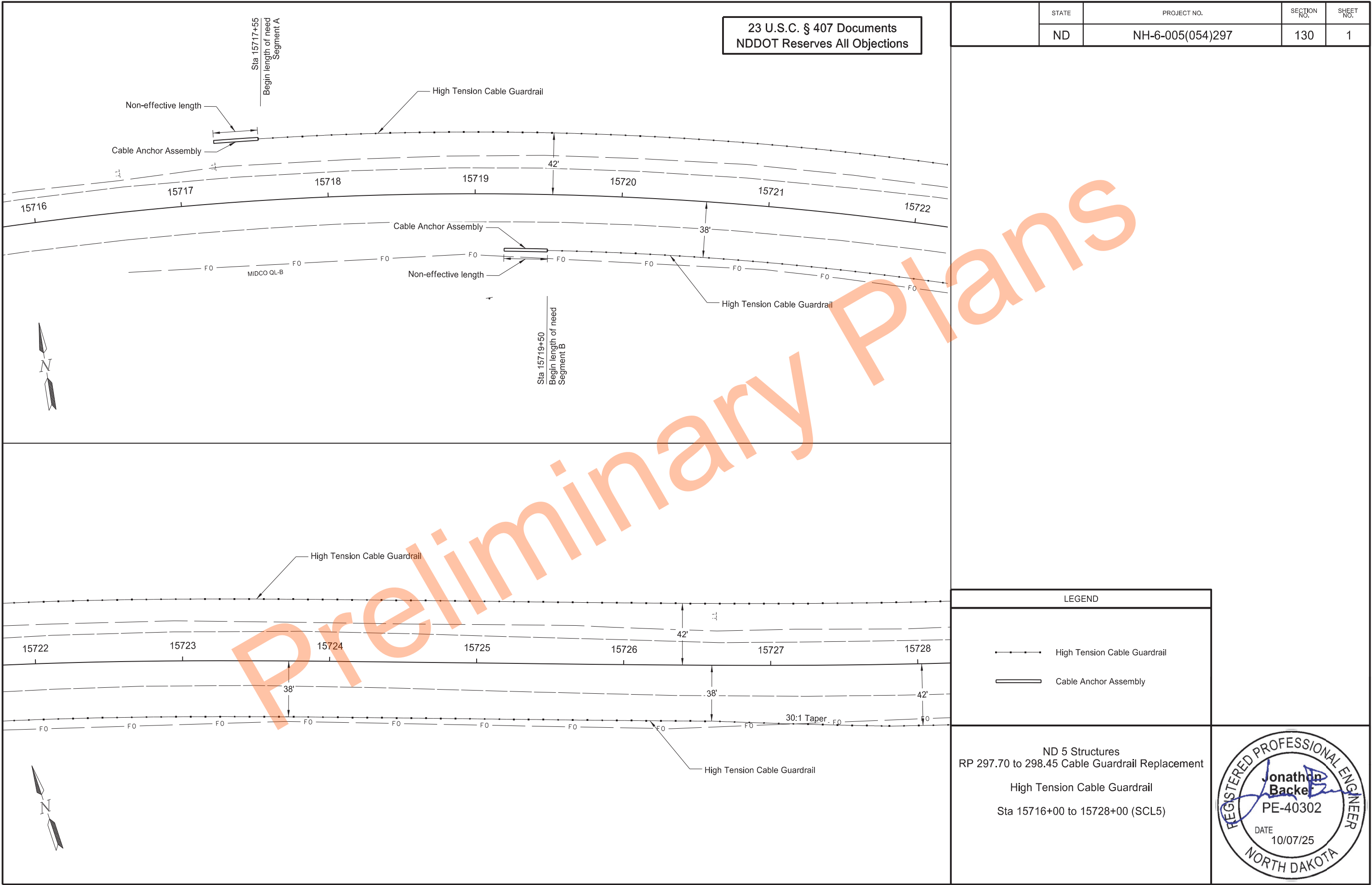
[illegible]

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



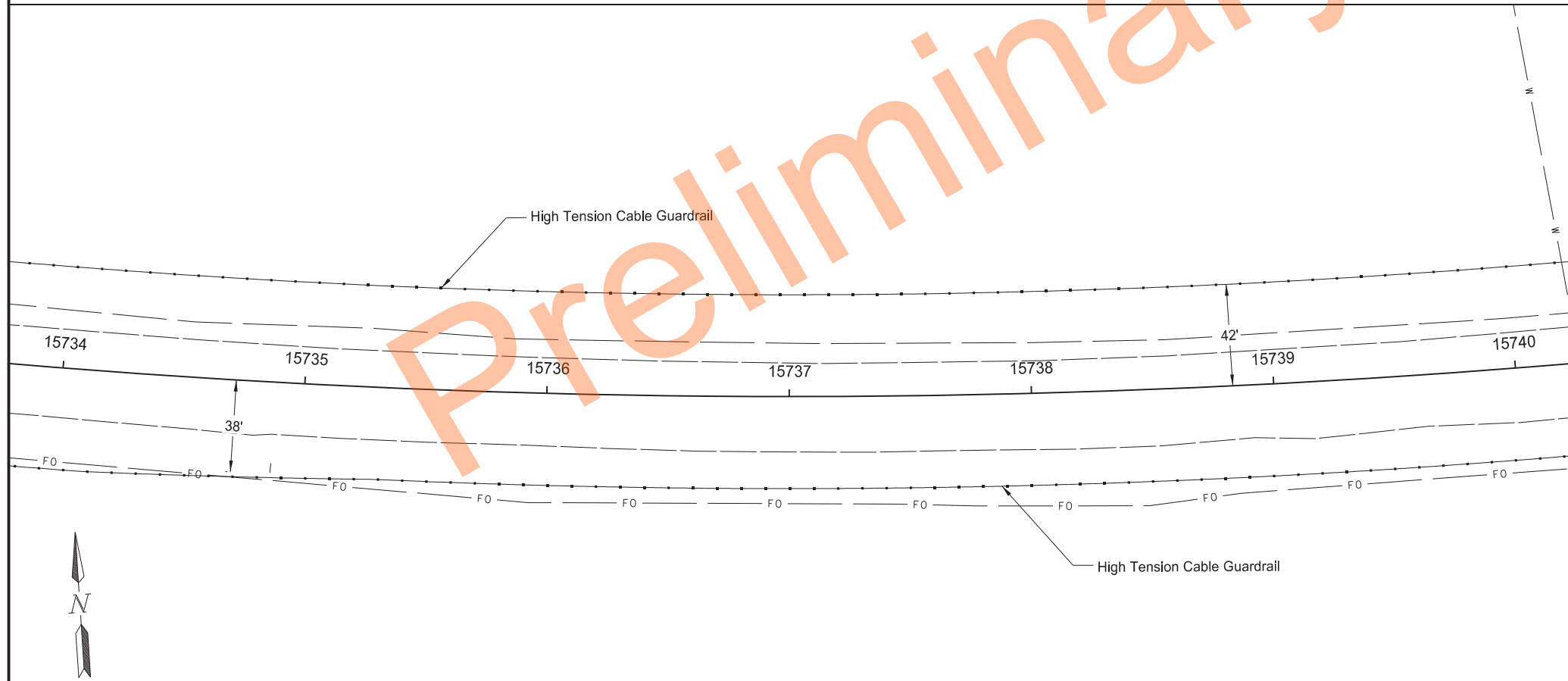
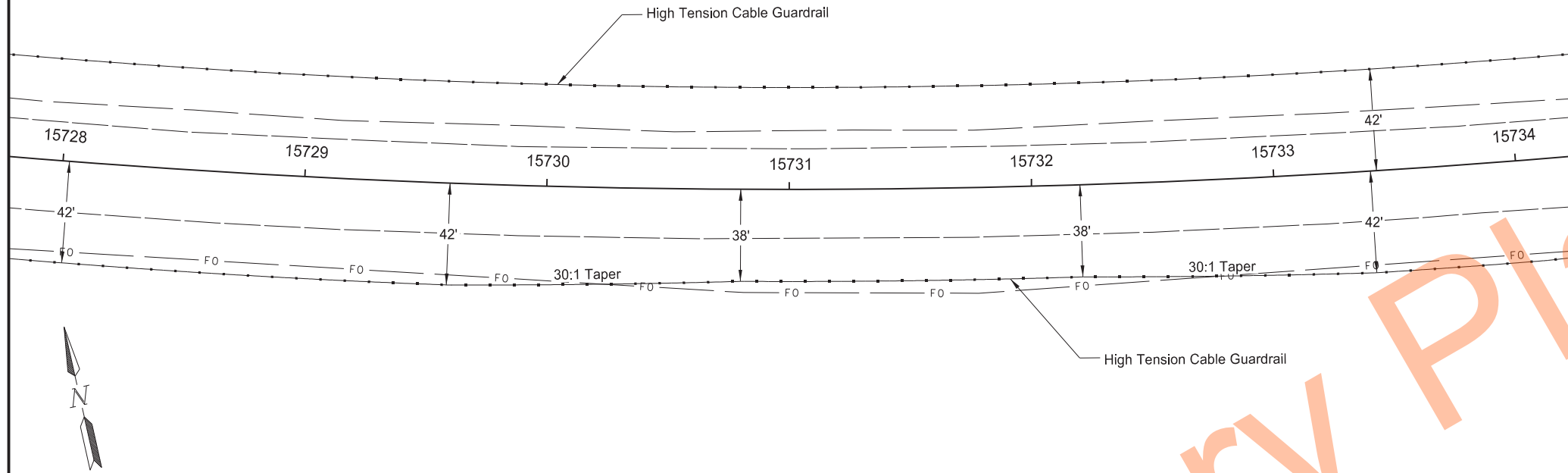
Traffic Control Devices List

ND 5 Structures



23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(054)297	130	2

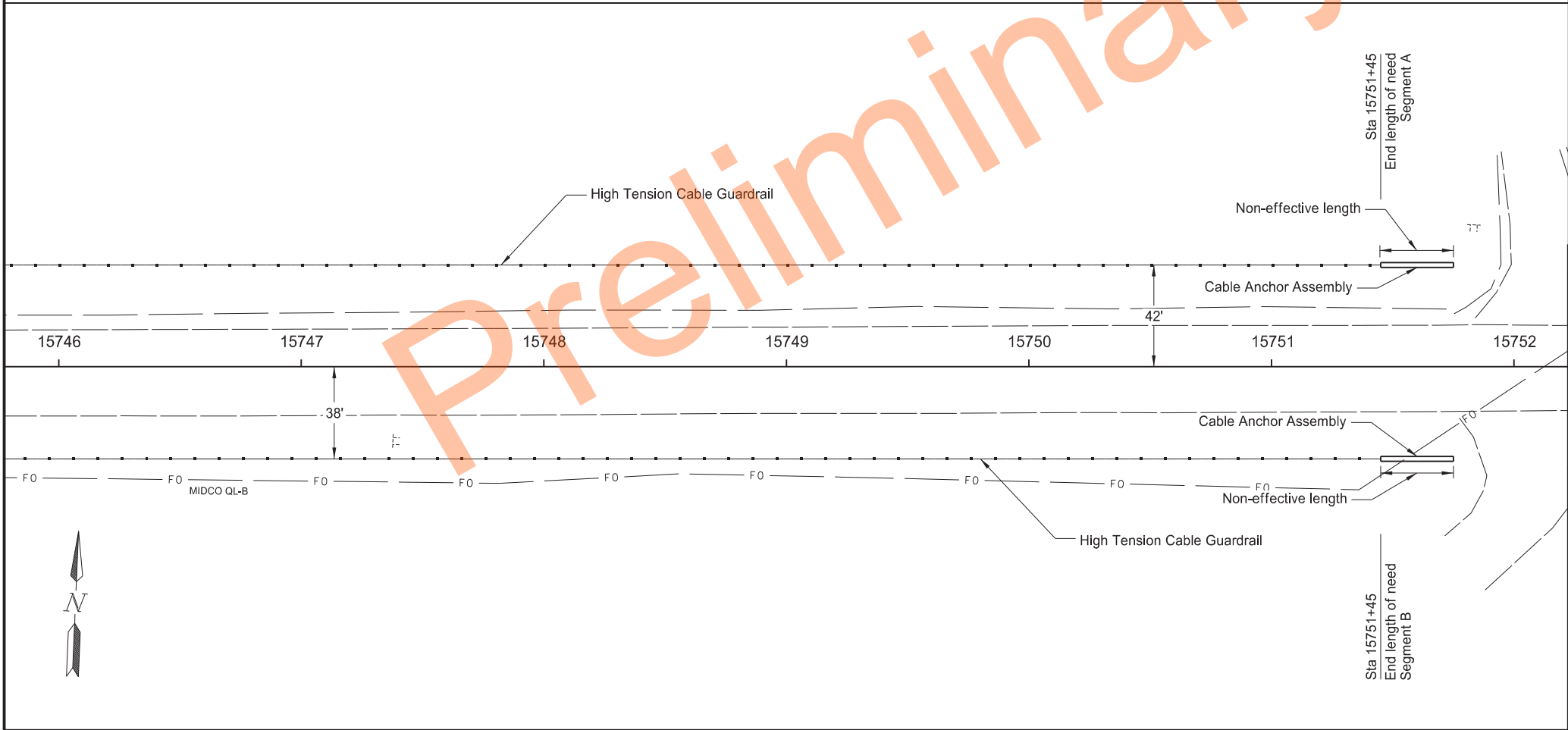
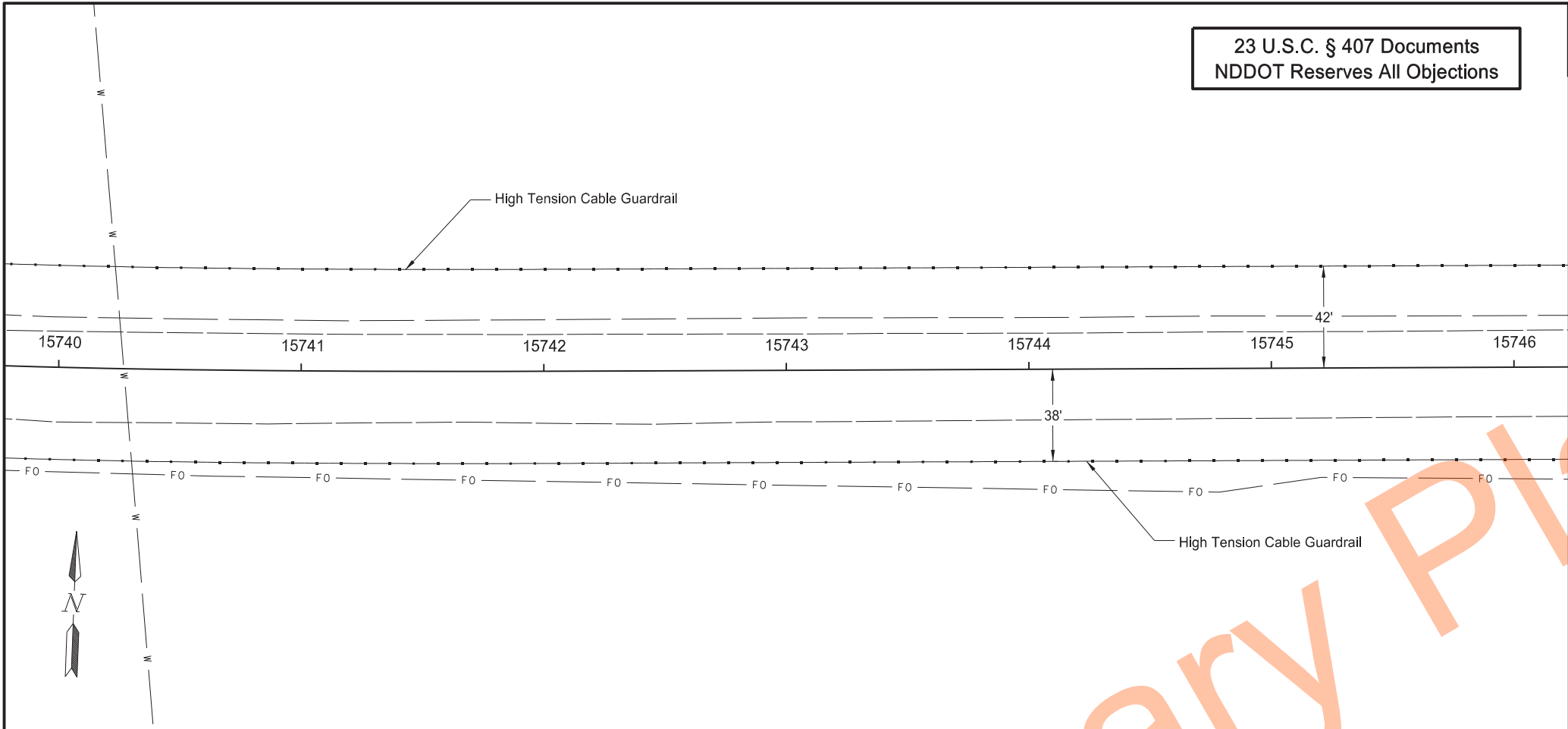


LEGEND

- High Tension Cable Guardrail
- Cable Anchor Assembly

ND 5 Structures
RP 297.70 to 298.45 Cable Guardrail Replacement
High Tension Cable Guardrail
Sta 15728+00 to 15740+00 (SCL5)





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(054)297	130	3

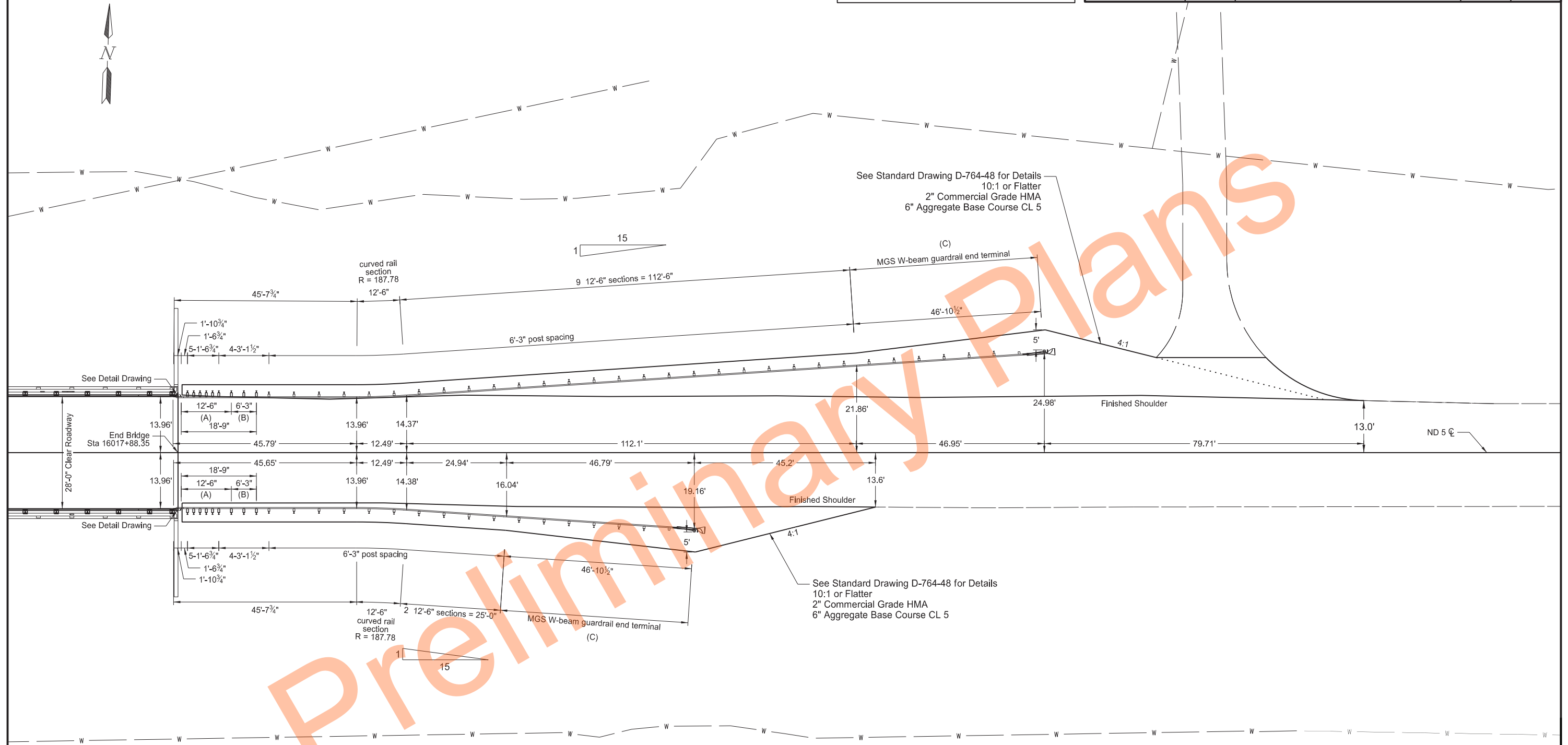
LEGEND

- High Tension Cable Guardrail
- Cable Anchor Assembly

ND 5 Structures
RP 297.70 to 298.45 Cable Guardrail Replacement

High Tension Cable Guardrail
Sta 15740+00 to 15752+00 (SCL5)

REGISTERED PROFESSIONAL ENGINEER
Jonathon Backe
PE-40302
DATE 10/07/25
NORTH DAKOTA



- (A) Thrie Beam rail section (double thickness)
- (B) Symmetrical W-beam to thrie beam transition section.
- (C) Install an MGS FLEAT end terminal at this location. See Standard Drawing D-764-38. Instead of the CRT wood posts at posts 3-8 shown on D-764-38, install:
- Posts 3 through 6:
Steel posts, per the manufacturer's recommendation, with 8" routed timber blocks.
- Posts 7 and 8:
Standard steel line posts with 8" routed wood blocks. See plan details.

Thrie/MGS W-Beam Guardrail Layout
At End of Bridge

Tongue River Bridge
Str 0005-303.364

ND 5 Structures



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(054)297	130	6

SPEC	CODE	BID ITEM	QTY	UNIT
203	0218	GUARDRAIL EMBANKMENT		
		Str 0005-303.364	1	EA
764	0131	W-BEAM GUARDRAIL		
		Sta 16016+53.38 to Sta 16017+36.46 (LT)	83.2	LF
		Sta 16015+66.08 to Sta 16017+36.46 (RT)	170.7	LF
		Sta 16017+87.24 to Sta 16019+57.63 (LT)	170.7	LF
		Sta 16017+87.24 to Sta 16018+70.32 (RT)	83.2	LF
764	0145	W-BEAM GUARDRAIL END TERMINAL		
		Sta 16016+06.65 to Sta 16016+53.38 (LT)	1	EA
		Sta 16015+19.34 to Sta 16015+66.08 (RT)	1	EA
		Sta 16019+57.63 to Sta 16020+04.36 (LT)	1	EA
		Sta 16018+70.32 to Sta 16019+17.06 (RT)	1	EA
764	2080	REMOVE BOX BEAM GUARDRAIL		
		Sta 16016+20.98 to Sta 16017+35.35 (LT)	114.5	LF
		Sta 16015+85.17 to Sta 16017+35.35 (RT)	150.2	LF
		Sta 16017+88.35 to Sta 16019+37.99 (LT)	149.7	LF
		Sta 16017+88.35 to Sta 16019+00.49 (RT)	112.2	LF
764	2081	REMOVE END TREATMENT & TRANSITION		
		Sta 16015+83.48 to Sta 16016+20.98 (LT)	1	EA
		Sta 16015+47.67 to Sta 16015+85.17 (RT)	1	EA
		Sta 16019+37.99 to Sta 16019+75.49 (LT)	1	EA
		Sta 16019+00.49 to Sta 16019+37.99 (RT)	1	EA

W-BEAM GUARDRAIL SUMMARY OF QUANTITIES																	
MGS THRIE/W-BEAM GUARDRAIL AT BRIDGE ENDS																	
LOCATION	(A) 2'-6" THRIE BEAM TERMINAL CONNECTOR	(A) 7/8" Ø x 3/4" LONG BOLT	(A) 5/8" Ø x 2" LONG POST BOLT	(A) 5/8" Ø x 1-1/4" LONG GUARDRAIL BOLT	(A) 5/8" Ø x 10" LONG GUARDRAIL BOLT	(A) 5/8" Ø x 14" LONG GUARDRAIL BOLT	(A) 6" x 8" x 14" WOOD TIMBER BLOCK	(A) W6 x 9 x 6'-6" POST	(A) W6 x 9 x 6' POST	(A) HSS12 x 6 x 1/4 x 1'-9 1/8" STEEL BLOCK	(A) HSS12 x 6 x 1/4 x 1'-2" STEEL BLOCK	(A) 6'-3" W-THRIE BEAM TRANSITION SECTION	(A) 12'-6" STRAIGHT W-BEAM RAIL SECTION	(A) 12'-6" DOUBLE THRIE SECTION	(A) 12'-6" CURVED W-BEAM RAIL SECTION	(A) REFLECT- ORIZED PLATES	(B) EMBANK- MENT
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	CY
Sta 16016+53.38 to Sta 16017+36.46 (LT)	1	5	2	112	21	16	21	27	2	7	2	1	11	1	1	5	0
Sta 16015+66.08 to Sta 16017+36.46 (RT)	1	5	2	56	7	16	7	13	2	7	2	1	4	1	1	5	0
Sta 16017+87.24 to Sta 16019+57.63 (LT)	1	5	2	56	7	16	7	13	2	7	2	1	4	1	1	5	0
Sta 16017+87.24 to Sta 16018+70.32 (RT)	1	5	2	112	21	16	21	27	2	7	2	1	11	1	1	5	17
TOTAL	4	20	8	336	56	64	56	80	8	28	8	4	30	4	4	20	17

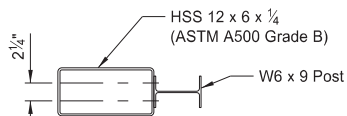
(A) Include these items in the contract unit price for "W-BEAM GUARDRAIL".
(B) The volume of embankment (cubic yards) is for informational purposes only.

Thrie/ MGS W-Beam Guardrail Quantities

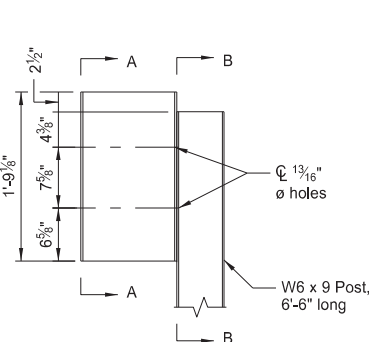
Tongue River Bridge
Str 0005-303.364

ND 5 Structures

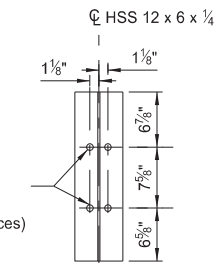




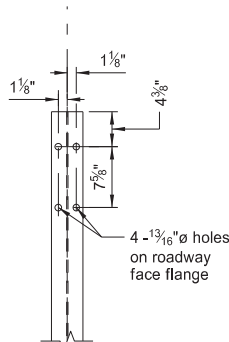
TOP VIEW



ELEVATION VIEW

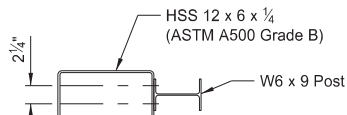


SECTION A-A

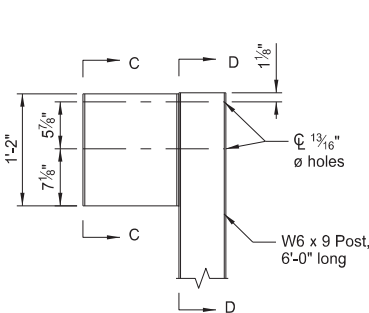


SECTION B-B

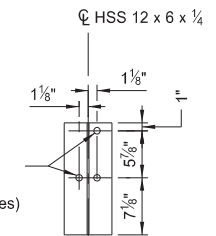
THRIE BEAM STEEL BLOCKOUT (POSTS 1-7)



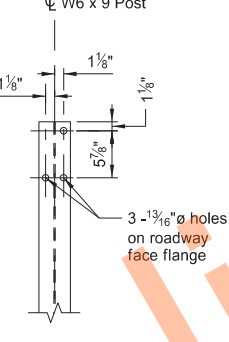
TOP VIEW



ELEVATION VIEW

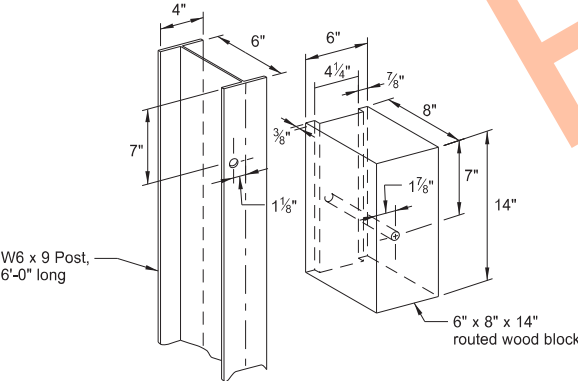


SECTION C-C

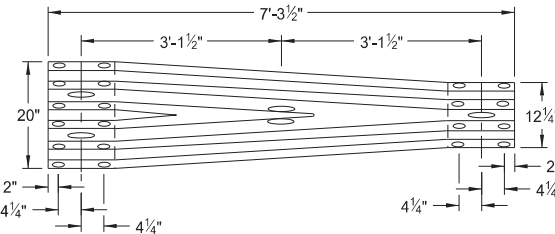


SECTION D-D

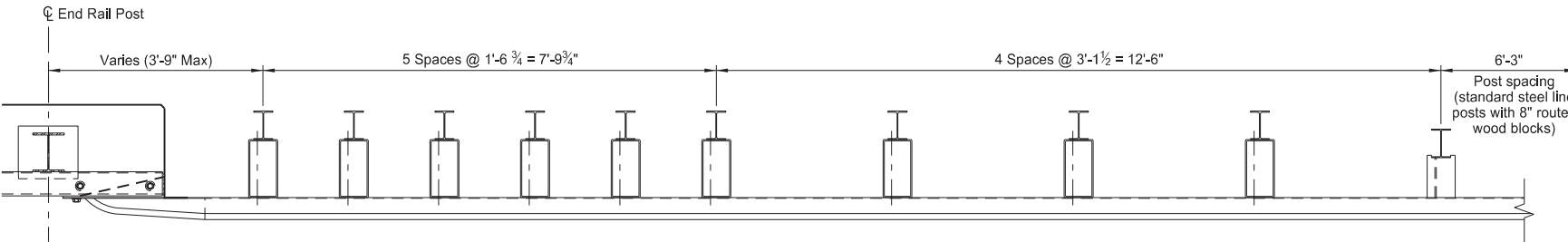
THRIE BEAM STEEL BLOCKOUT (POSTS 8-9)



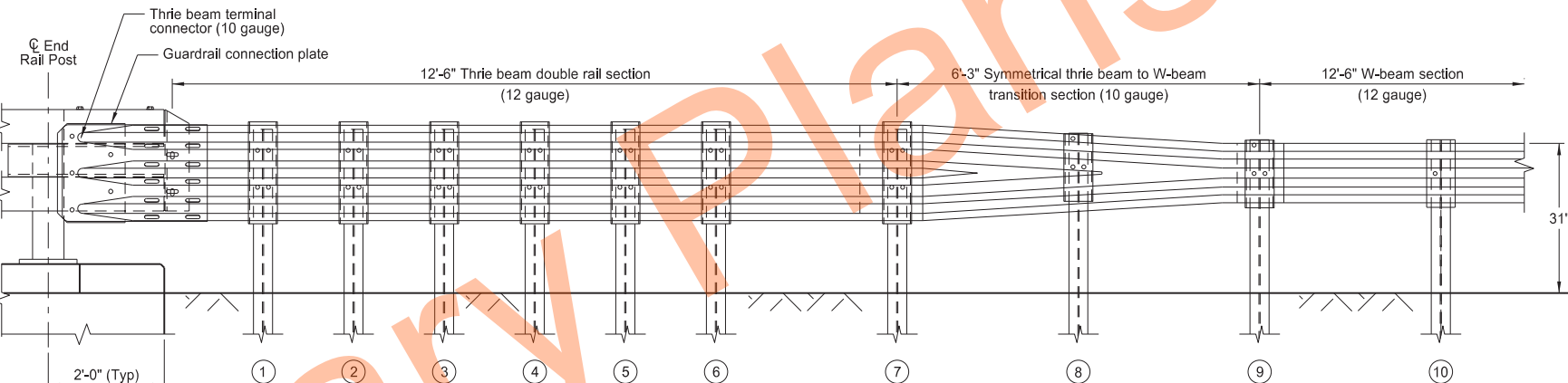
STANDARD STEEL LINE POST WITH 8" ROUTED WOOD BLOCKS (POST 10)



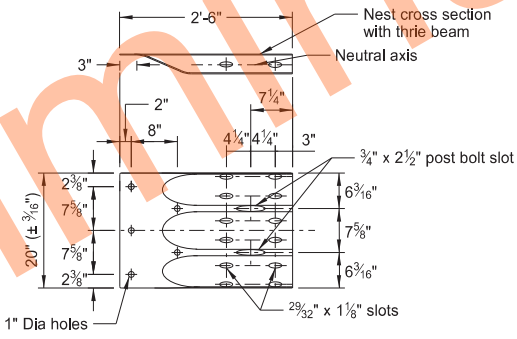
SYMMETRICAL THRIE TO W-BEAM TRANSITION SECTION (10 GAUGE)



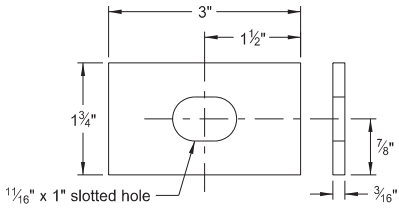
PLAN VIEW



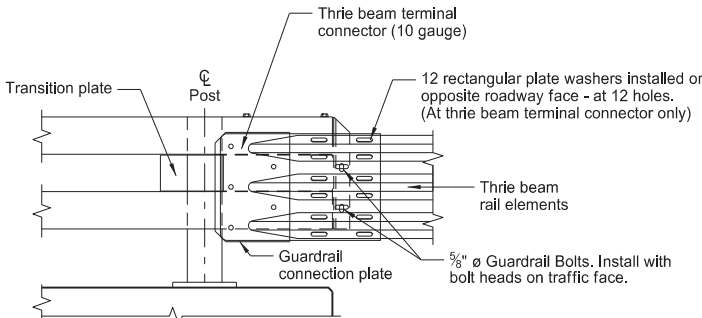
ELEVATION VIEW



THRIE BEAM TERMINAL CONNECTOR



RECTANGULAR PLATE WASHER



TRANSITION CONNECTION - ELEVATION

TRANSITION POST AND BLOCKOUT SIZING

POST NO.	POST SIZE	BLOCKOUT SIZE
1-7	W6 x 9 x 6'-6" long	HSS 12 x 6 x 1/4 x 1'-9 1/8" long
8-9	W6 x 9 x 6'-0" long	HSS 12 x 6 x 1/4 x 1'-2" long
10	W6 x 9 x 6'-0" long	6" x 8" x 14" routed wood

Note:
The 6" x 8" x 14" routed wood blocks can be substituted with composite blocks that have been MASH tested. Acceptable blocks include Mondo, King, or an approved equal.

MGS Thrie Beam Transition to Double Box Beam Detail

Tongue River Bridge
Str 0005-303.364

ND 5 Structures





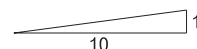
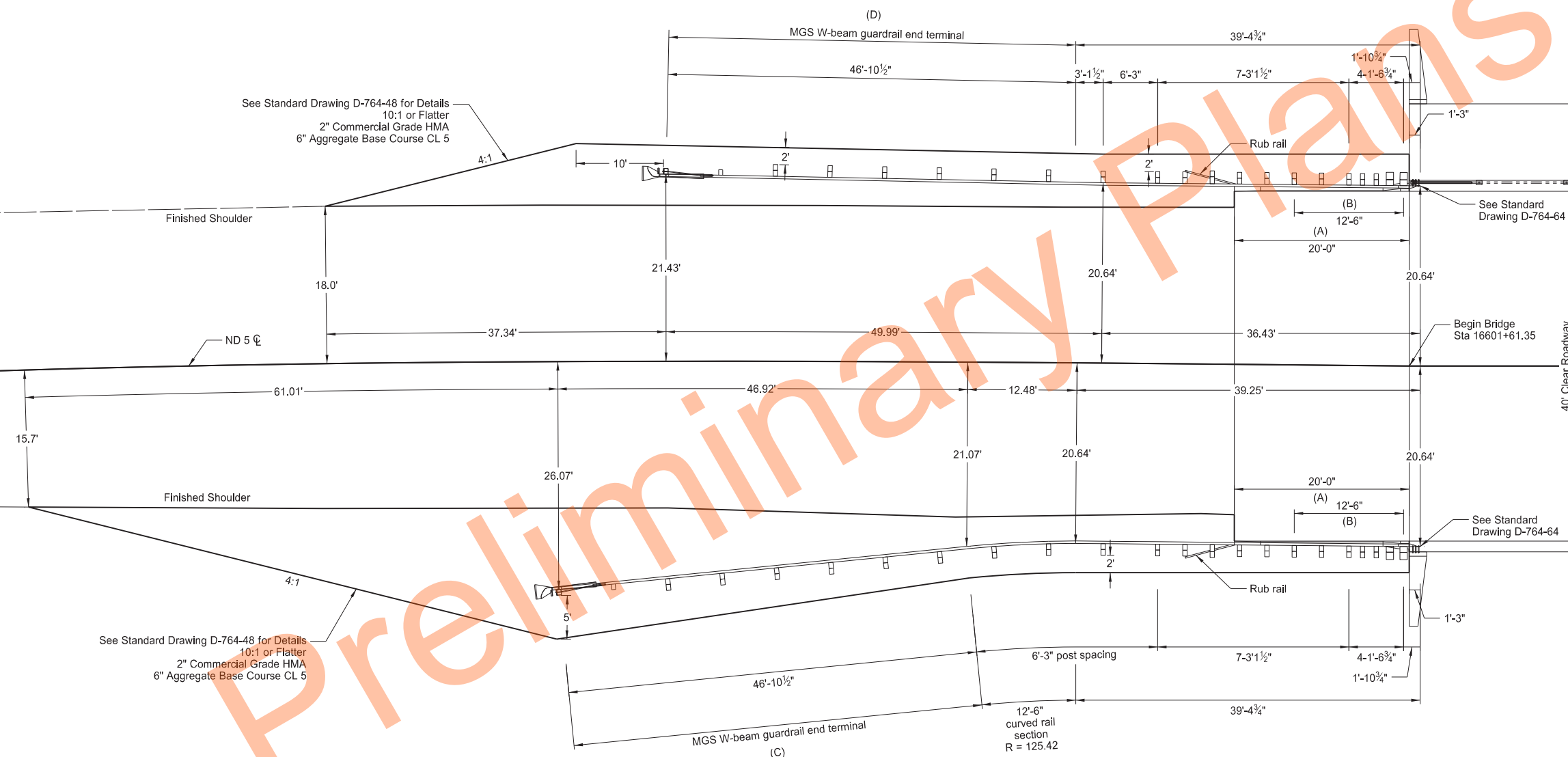
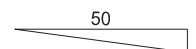
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE
ND

PROJECT NO.
NH-6-005(054)297

SECTION NO.
130

SHEET NO.
8

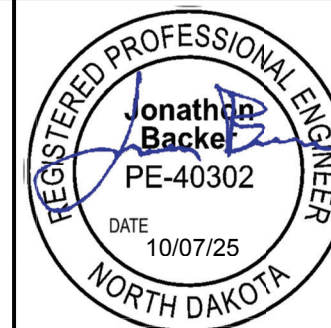


- (A) Remove and replace existing curb on approach slab. See Section 170.
- (B) Double 12-Gauge W-beam rail section.
- (C) Install an MGS FLEAT end terminal at this location. See Standard Drawing D-764-38.
- (D) Install a MASH SoftStop or SKT end terminal at this location. See Standard Drawing D-764-50 or D-764-51.
- If the MASH SKT is installed use the flare shown on this detail.
- If the MASH SoftStop is installed, use a 50:1 taper over its length. Include the cost of the extra grading in the contract unit price for "W-BEAM GUARDRAIL END TERMINAL."

MGS W-Beam Guardrail Layout
At Beginning of Bridge

Tongue River Bridge
Str 0005-314.446

ND 5 Structures



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(054)297	130	10

SPEC	CODE	BID ITEM	QTY	UNIT
203	0218	GUARDRAIL EMBANKMENT		
		Str 0005-314.446	2	EA
764	0131	W-BEAM GUARDRAIL		
		Sta 16601+23.04 to Sta 16601+62.60 (LT)	39.4	LF
		Sta 16601+10.86 to Sta 16601+62.60 (RT)	51.9	LF
		Sta 16602+46.10 to Sta 16602+97.97 (LT)	51.9	LF
		Sta 16602+46.10 to Sta 16602+85.49 (RT)	39.4	LF
764	0145	W-BEAM GUARDRAIL END TERMINAL		
		Sta 16600+76.17 to Sta 16601+23.04 (LT)	1	EA
		Sta 16600+64.02 to Sta 16601+10.86 (RT)	1	EA
		Sta 16602+97.97 to Sta 16603+44.56 (LT)	1	EA
		Sta 16602+85.49 to Sta 16603+32.35 (RT)	1	EA
764	2080	REMOVE BOX BEAM GUARDRAIL		
		Sta 16601+20.17 to Sta 16601+61.35 (LT)	41.2	LF
		Sta 16600+65.37 to Sta 16601+61.35 (RT)	96.0	LF
		Sta 16602+47.30 to Sta 16603+41.78 (LT)	84.6	LF
		Sta 16602+47.30 to Sta 16602+88.31 (RT)	30.7	LF
764	2081	REMOVE END TREATMENT & TRANSITION		
		Sta 16600+83.26 to Sta 16601+20.17 (LT)	1	EA
		Sta 16600+28.90 to Sta 16600+65.37 (RT)	1	EA
		Sta 16603+41.78 to Sta 16603+78.69 (LT)	1	EA
		Sta 16602+88.31 to Sta 16603+24.78 (RT)	1	EA

W-BEAM GUARDRAIL SUMMARY OF QUANTITIES																									
MGS W-BEAM GUARDRAIL AT BRIDGE ENDS																									
LOCATION ~	(A) TERMINAL CONNECTOR	(A) 7/8" ø x 9" LONG H.S. HEX BOLTS	(A) 1/2" ø x 4" LONG LAG SCREW	(A) 5/8" ø x 11" LONG HEX HEAD BOLT	(A) 5/8" ø x 1-1/4" LONG GUARDRAIL BOLT	(A) 5/8" ø x 1-1/2" LONG GUARDRAIL BOLT	(A) 5/8" ø x 18" LONG GUARDRAIL BOLT	(A) 5/8" ø x 20" LONG GUARDRAIL BOLT	(A) 5/8" ø x 22" LONG RUB RAIL BOLT	(A) 6" x 8" x 6'-0" TIMBER POST	(A) 6" x 8" x 7'-0" TIMBER POST	(A) 10" x 10" x 8'-0" TIMBER POST	(A) 6" x 8" x 14" WOOD TIMBER BLOCK	(A) 6" x 8" x 21" WOOD TIMBER BLOCK	(A) 6" x 9-3/4" x 14" WOOD TIMBER BLOCK	(A) 10" x 8" x 21" TAPERED WOOD TIMBER BLOCK	(A) C6 x 8.2 x 14'-6 1/4" RUB RAIL SECTION	(A) C6 x 8.2 x 12'-7" BENT RUB RAIL SECTION	(A) 7 3/4" x 4 1/2" x 3/8" RUB RAIL SECTION	(A) RUB RAIL END SHOE	(A) 12'-6" STRAIGHT W-BEAM RAIL SECTION	(A) 12'-6" DOUBLE W-BEAM RAIL SECTION	(A) 12'-6" CURVED W-BEAM RAIL SECTION	(A) REFLECT- ORIZED PLATES	(B) EMBANK- MENT
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	CY
Sta 16601+23.04 to Sta 16601+62.60 (LT)	1	4	1	2	32	4	10	10	2	8	3	2	3	7	1	2	1	1	1	1	2	1	0	5	0
Sta 16601+10.86 to Sta 16601+62.60 (RT)	1	4	1	2	40	4	12	10	2	10	3	2	5	7	1	2	1	1	1	1	2	1	1	5	93
Sta 16602+46.10 to Sta 16602+97.97 (LT)	1	4	1	2	40	4	12	10	2	10	3	2	5	7	1	2	1	1	1	1	2	1	1	5	0
Sta 16602+46.10 to Sta 16602+85.49 (RT)	1	4	1	2	32	4	10	10	2	8	3	2	3	7	1	2	1	1	1	1	2	1	0	5	52
TOTAL	4	16	4	8	144	16	44	40	8	36	12	8	16	28	4	8	4	4	4	4	8	4	2	20	145

(A) Include these items in the contract unit price for "W-BEAM GUARDRAIL".
(B) The volume of embankment (cubic yards) is for informational purposes only.

MGS W-Beam Guardrail Quantities

Tongue River Bridge
Str 0005-314.446

ND 5 Structures



23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

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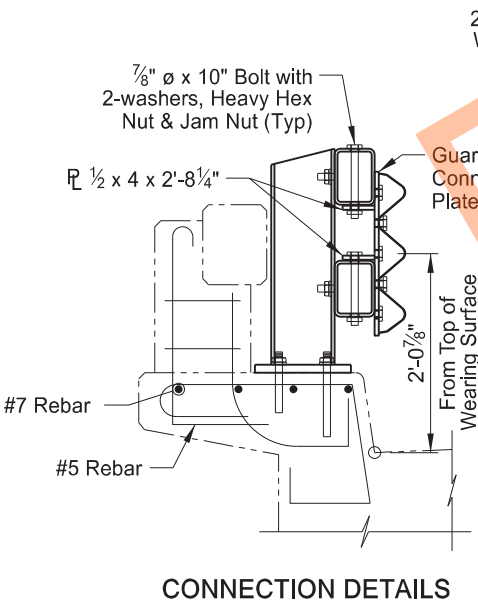
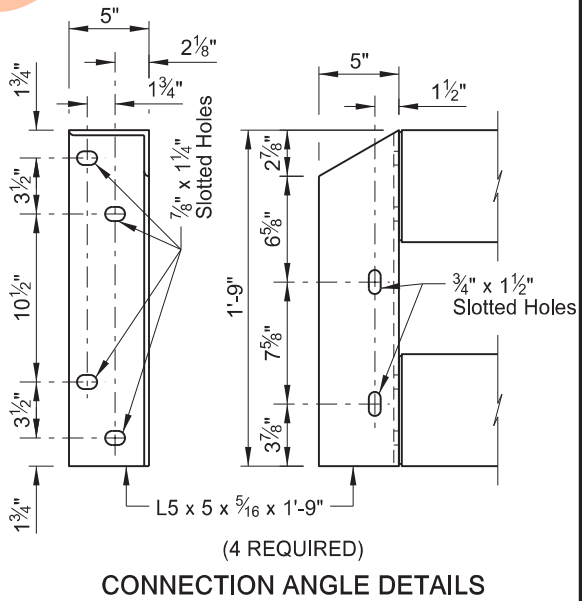
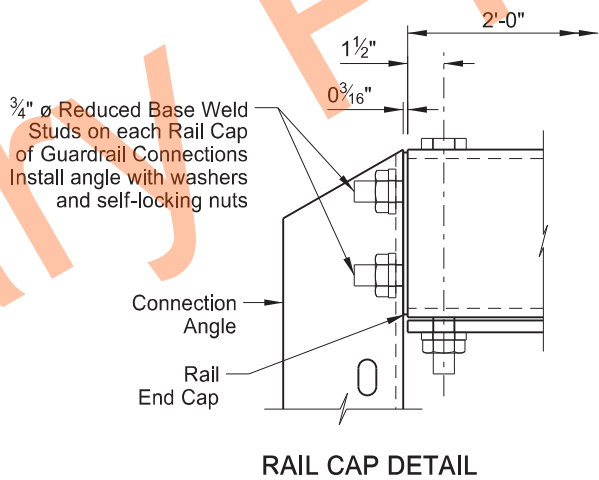
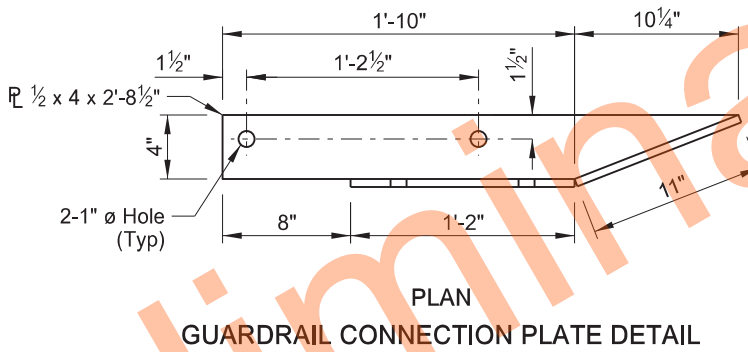
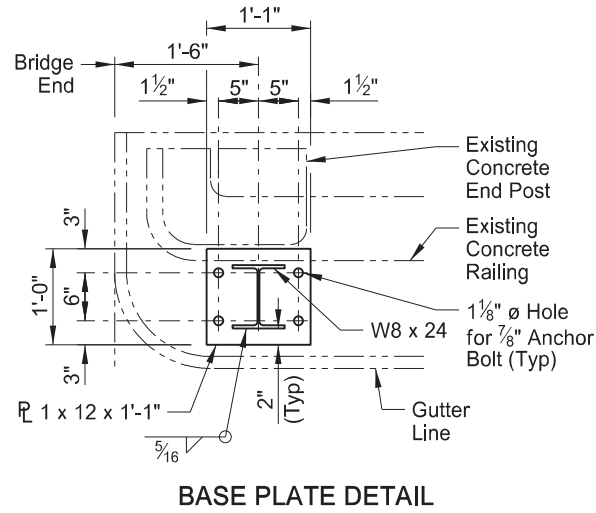
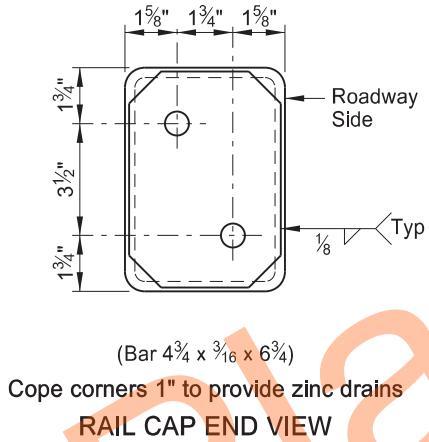
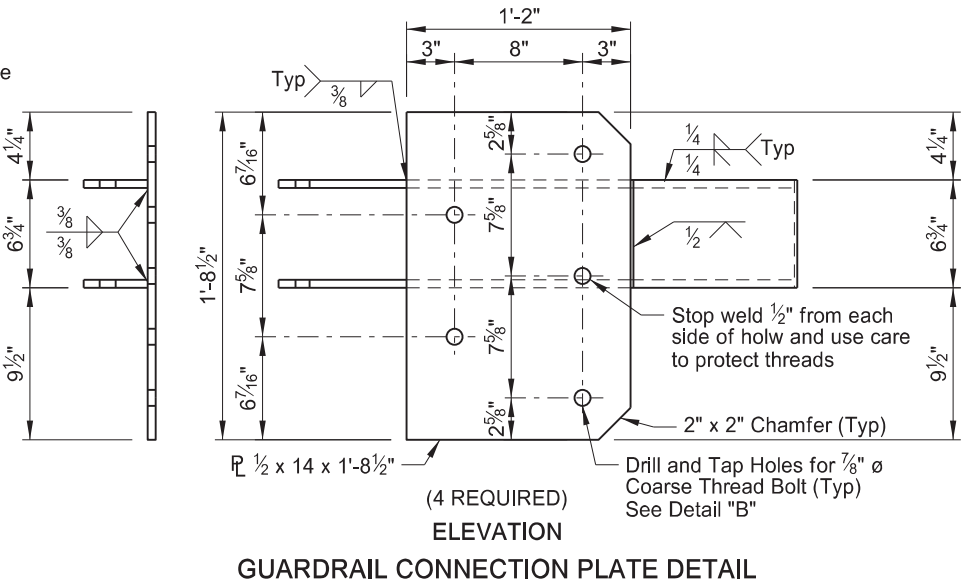
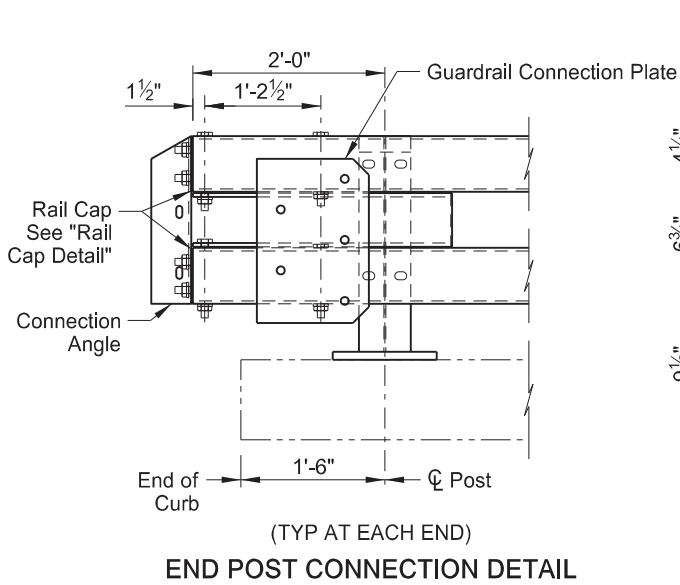
NOTES:

Provide steel posts and base plates in accordance with ASTM A709 Grade 50. Provide bars, bar washers, and guardrail connection plates and angles in accordance with ASTM A709 Grade 36.

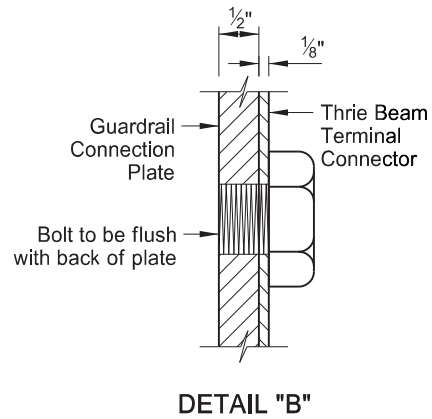
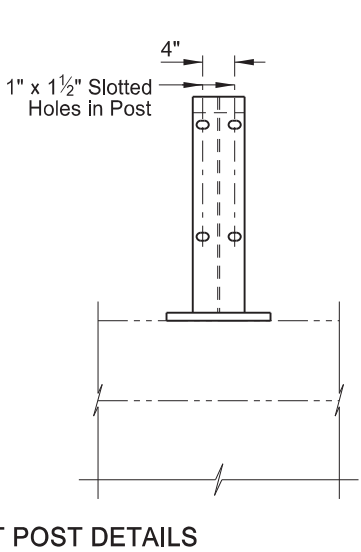
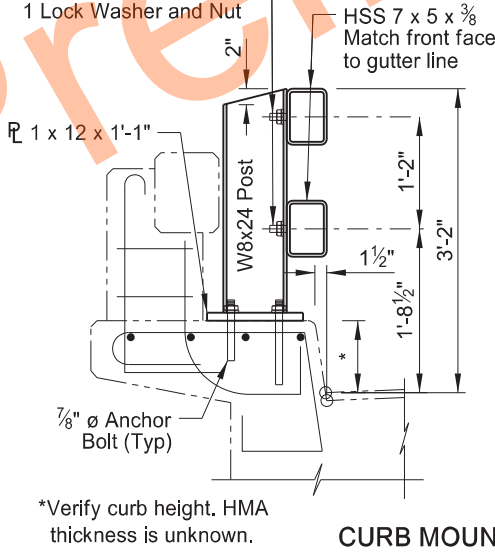
Provide reduced base studs in accordance with ASTM A108 Grade 1010. Provide 7/8" ø anchor bolts in accordance with ASTM F1554 Grade 105.

Remove existing box beam retrofit railing and posts.

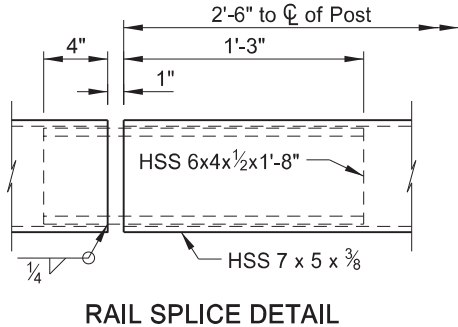
Include all labor, equipment, and materials needed to furnish and install the guardrail connection plates, saw and remove portions of the curb, and remove the existing box beam rail retrofit in the bid item "Double Box Beam Rail Retrofit-Free Standing."



2 - Threaded 3/4" ø x 2" Reduced Base Weld Stud with 1 Bar Washer "C" and 1 Lock Washer and Nut



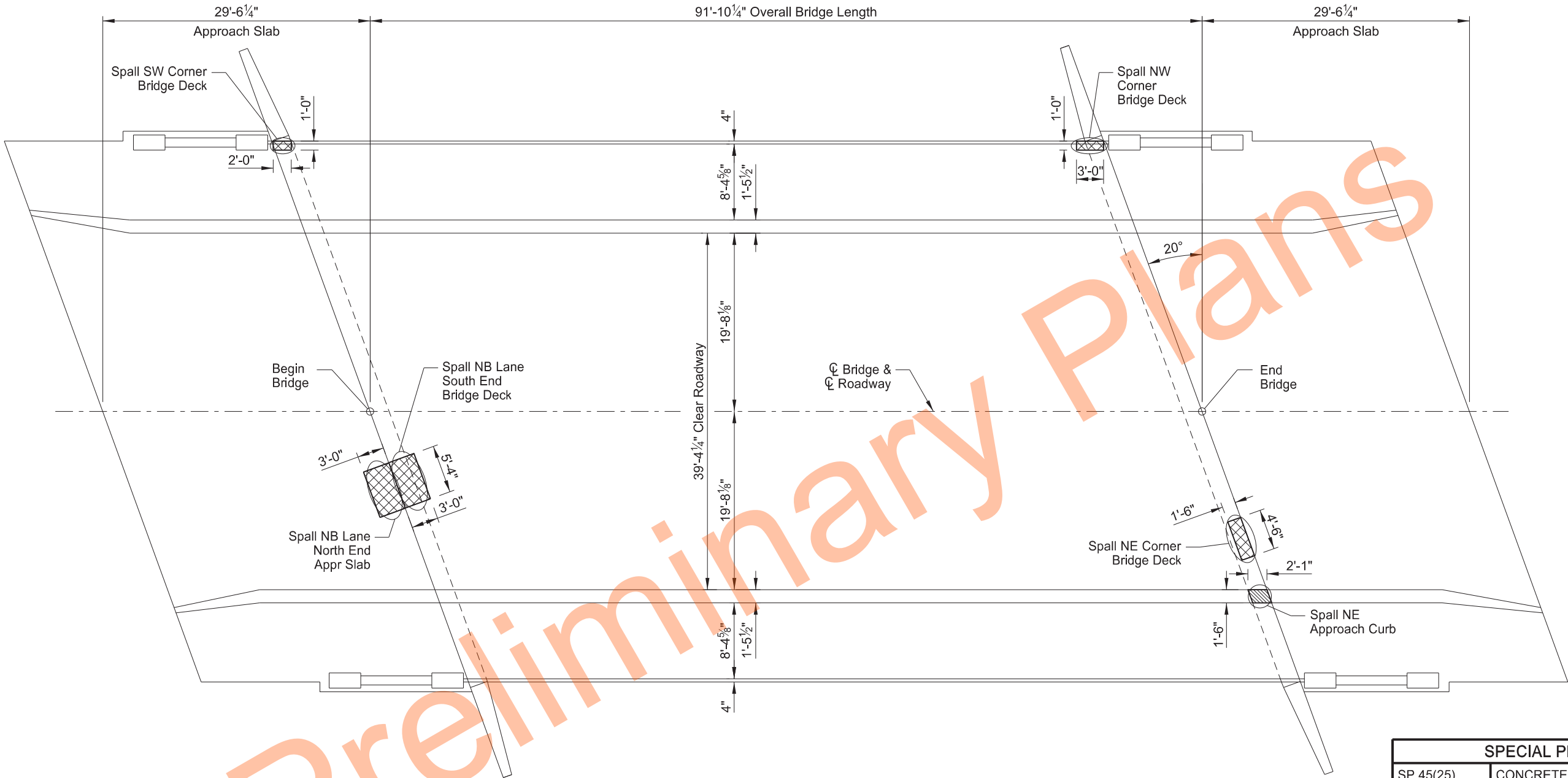
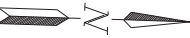
Position washers to completely cover slotted holes
1/4" BAR WASHER "C"



QUANTITIES (ONE SIDE)	
RAIL RETROFIT - FREE STANDING	53 LF
TONGUE RIVER 1 EAST ND 32 SOUTH	
DOUBLE BOX BEAM RAIL RETROFIT DETAILS - FREE STANDING	
DRAWING NO.	5-303.364-2

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

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PLAN



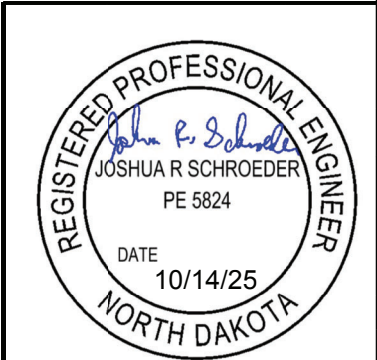
Hatched area indicates
deck spall repair area.



Hatched area indicates
curb repair area.

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	911
602	1260	BRIDGE DECK CRACK SEALING	LF	60
602	2105	CURB REPAIR	SF	4
650	0805	DECK SPALL REPAIR	SF	44
930	9650	ABUTMENT REPAIR	SF	63



SPECIAL PROVISIONS	
SP 45(25)	CONCRETE SPALL REPAIR
TONGUE RIVER CAVALIER	
BRIDGE LAYOUT	
ND DEPARTMENT OF TRANSPORTATION BRIDGE DIVISION	
Jason Thorenson 10/14/25	
DRAWING NO.	5-313.750-1

		23 U.S.C. § 407 NDDOT Reserves All Objections		STATE ND	PROJECT NO. NH-6-005(054)297	SECTION NO. 170	SHEET NO. 4
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NOTES

100

SCOPE OF WORK: Work at this site consists of a curb repair, deck spall repairs, and abutment repairs.

602

WATER-WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D., a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.

602

PENETRATING WATER REPELLENT TREATMENT: Apply the penetrating water repellent solution to the top of the bridge deck and south approach slab, including the curb face and sidewalk surfaces on the bridge and both approach slabs. Also apply the penetrating water repellent solution to all surfaces of the decorative concrete rails located at all four corners of the bridge. Apply penetrating water repellent solution prior to sealing any cracks. Do not apply pavement marking or allow traffic until the solution has completely penetrated and the entire driving surface is dry.

602

CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck and south approach slab to determine the need for crack sealing. Mark and repair all visible cracks on the top surface measuring 0.012" or greater in width at the widest segment or as directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to limits of crack, including those portions that are narrower than 0.012" wide. Use Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer.

Include all work and materials associated with the bridge deck crack sealing in the bid item "Bridge Deck Crack Sealing." Include all work and materials associated with the approach slab crack sealing in the bid item "Bridge Deck Crack Sealing."

602

CURB REPAIR: The concrete bridge curb has a spall at the indicated location. The actual limits are to be determined by the Engineer in the field.

Remove all unsound concrete at the identified location and replace it with new material to the original constructed section. Use a 15 pound maximum size chipping hammer on any unsound concrete. Remove concrete around the periphery of any exposed reinforcing steel to provide a minimum clearance behind the bar of ¼" plus the dimension of the maximum size aggregate of the repair material. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by cutting or other means approved by the Engineer.

Sandblast clean the existing concrete and exposed reinforcing steel. Clean the existing concrete surface by a high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent. Replace removed concrete with a two-component, polymer modified, cementitious repair mortar material that is specifically intended for patching concrete and contains a

corrosion inhibitor. This patching material may be SikaTop 123 Plus (Sika Corporation), Duratop Gel (Euclid Chemical Company), MasterEmaco N 400 (BASF Corporation), or an approved equal repair mortar. Cure the materials as recommended by the manufacturer. Include all labor, equipment, and materials needed for these repairs in the bid item "Curb Repair."

650

DECK SPALL REPAIR: The bridge deck and south approach slab have areas of surface spalling. The actual limits of deck spall areas to be repaired will be determined by the Engineer in the field by sounding areas with visible surface spalls and/or locations designated in the plans for deck spall repairs.

- Saw cut the perimeter of the repair area to a depth of 1". Remove all concrete to a depth of 2" or to sound concrete, whichever is greater.
- Complete removals using mechanical equipment, with the exception that a milling machine specified for Class 1 removals will not be required.
- Use Class AE concrete meeting 602.03 B to restore the full depth of the repair area. Provide a mix that will attain a compressive strength of 4,000 psi at 28 days.
- Concrete placement using a buggy or pump is not required.
- Section 650.04 E "Mixing of Materials" is waived. Use of a mobile mixer is not required.
- Perform grooving according to Section 602.04 D.2 "Approach Slab Tining"

Include all labor, equipment, and materials required to complete this work in the bid item "Deck Spall Repair."

REGISTERED PROFESSIONAL ENGINEER

Joshua R. Schroeder

JOSHUA R SCHROEDER

PE 5824

DATE

10/14/25

NORTH DAKOTA

10/7/2025 2:32:10 PM K:\Projects\State\ND\DOT\2302-00377.2_ND5BridgeReplacements\CAD\16005297.054\Bridge\5-313.750\170BR_004_NOTES.docm

5-313.750-2

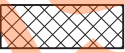
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

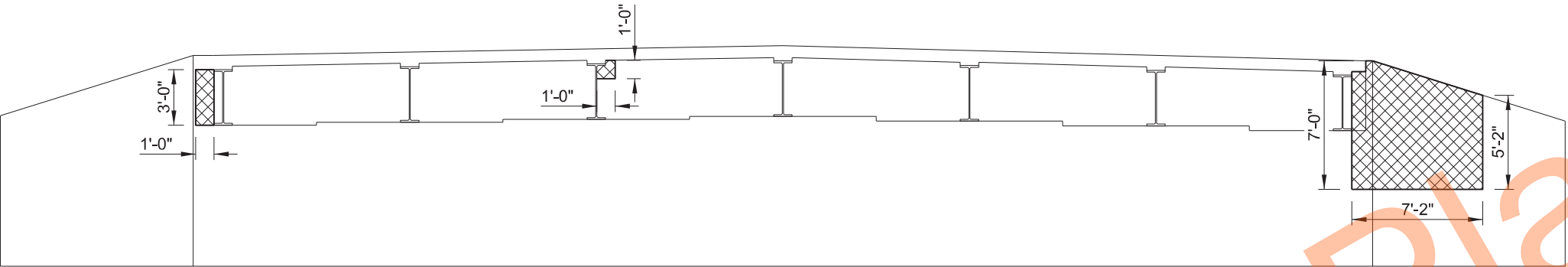
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-6-005(054)297	170	5

NOTES:

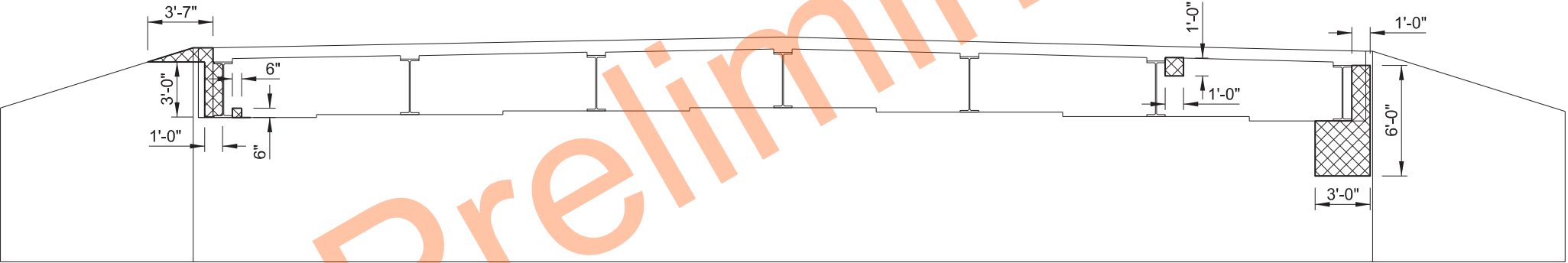
930 ABUTMENT REPAIR: Both bridge abutments have areas of spalled and delaminated concrete. Areas designated in the plans are approximate. The actual limits of abutmen repair will be determined and marked by the Engineer.

Complete repair work at the locations identified for abutment repair in accordance with SP 45(25) "Concrete Spall Repair." Include all labor, equipment, and material required to complete this work in the bid item "Abutment Repair."

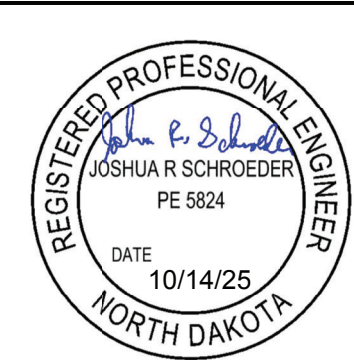
 Hatched area indicates abutment spall repair area.



(LOOKING SOUTH)
SOUTH ABUTMENT ELEVATION



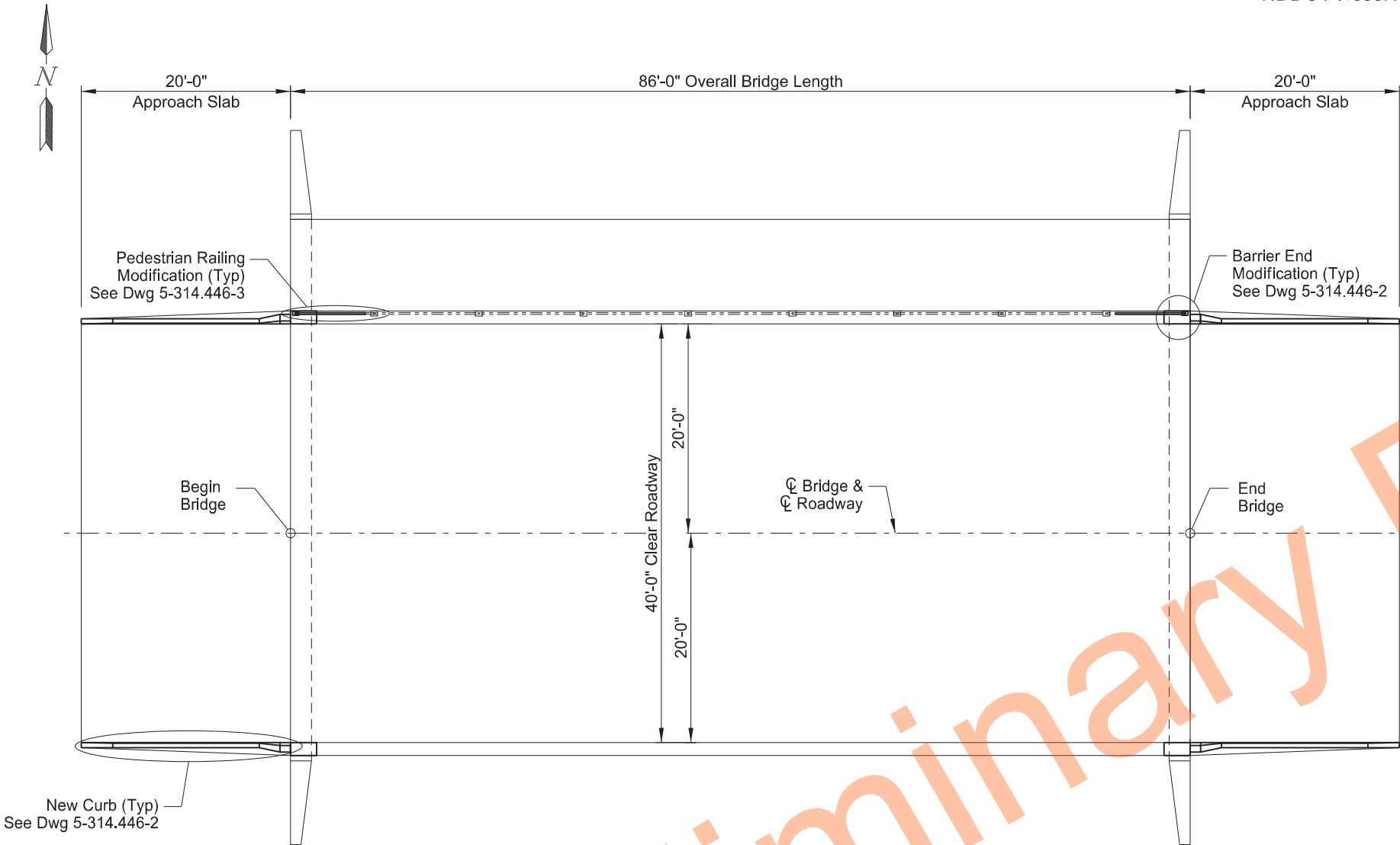
(LOOKING NORTH)
NORTH ABUTMENT ELEVATION



QUANTITIES	
ABUTMENT REPAIR	63 SF
TONGUE RIVER CAVALIER	
ABUTMENT REPAIR	
DRAWING NO.	5-313.750-3

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-6-005(054)297	170	6



PLAN

NOTES:

- 100 SCOPE OF WORK: Work at this site consists of removing the concrete curbs on the approach slabs, installing new curbs, modifying the ends of the barriers, and crack sealing.
- 602 WATER-WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D., a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.
- 602 PENETRATING WATER REPELLENT TREATMENT: Apply the penetrating water repellent solution to the top of the bridge deck, the sidewalk surfaces on the bridge, and the new curbs installed on the approach slabs. Apply penetrating water repellent solution prior to sealing any cracks. Do not apply pavement marking or allow traffic until the solution has completely penetrated and the entire driving surface is dry.
- 602 SPECIAL SURFACE FINISH: Clean the surfaces that are to receive the Tex-Cote surface finish using sandblasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, and laitance. Ensure any curing compounds and release agents have been completely removed from the surfaces to receive the Tex-Cote surface finish.

Apply Tex-Cote XL 70 Bridge Cote with Silane to the areas listed below. Apply the surface finish in accordance with the manufacturer's recommended application procedures to attain a dry film thickness of 15 mils.
 - Barrier inside and top surfaces
 - Barrier outside surface (sidewalk side only)
Finish the surface with a uniform texture, color, and appearance free from fines, projections, cavities, and porous areas. Use gray surface finish color number 36424 meeting AMS-STD-595 and a sand textured finish.
- 930 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.02" or greater in width at its widest segment or as directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to limits of crack, including those portions that are narrower than 0.02" wide. Use Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer.

Include all labor, equipment, and materials associated with the bridge deck crack sealing in the bid item "Crack Sealing."

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREAMENT	SY	478
602	1260	BRIDGE DECK CRACK SEALING	LF	55
602	7000	SPECIAL SURFACE FINISH	SF	893
624	0120	PEDESTRIAN RAILING-REMOVE & REPLACE	L SUM	1
930	9223	CRACK SEALING	LF	200
930	9647	BARRIER END MODIFICATION	EA	4



TONGUE RIVER CAVALIER	
BRIDGE LAYOUT	
ND DEPARTMENT OF TRANSPORTATION BRIDGE DIVISION	
DRAWING NO.	5-314.446-1

Left Diagram Dimensions:

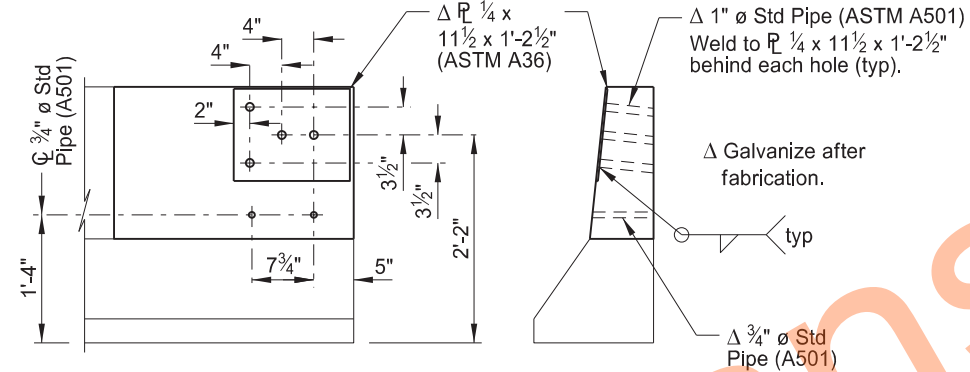
- Top Section Width: 2'-0"
- Top Section Height: 4"
- Section Height: 1'-3"
- Reinforcement Bar: 5" x 1/4" x 3'-0"
- Bottom Section Width: 2'-6"

Right Diagram Dimensions:

- Top Section Width: 2'-6"
- Section Height: 1'-7"
- Reinforcement Bar: 5B900
- Bottom Section Width: 2'-6"

Existing Reinforcing Steel ~ To remain in place.

(SHOWING MODIFIED BARRIER END)



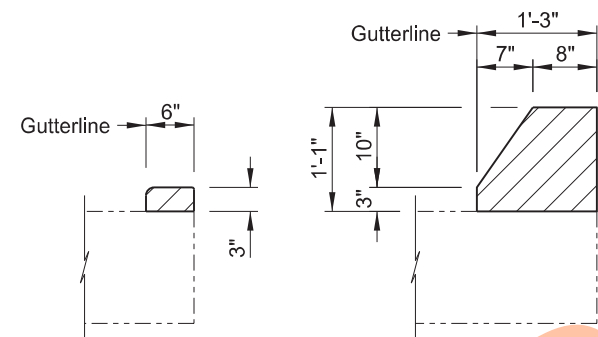
(SHOWING FRONT FACE)

Technical drawing of a curb elevation. The drawing shows a side view of a curb with a sloped top surface. Key dimensions and specifications include:

- Overall width: 3'-0"
- Top surface width: 14'-0"
- Top surface material: 17 Eq Sp ~ 4A901
- Top surface thickness: 3"
- Bottom surface material: 4A900
- Bottom surface width: 17 Eq Sp ~ 4A901
- Bottom surface thickness: 3"
- Section lines: B-B and A-A
- Notes:
 - Pedestrian Railing Modification (Typ) See Dwg 5-314.446-3
 - See Barrier End Modification
 - See "Detail A"

 See "Detail A"

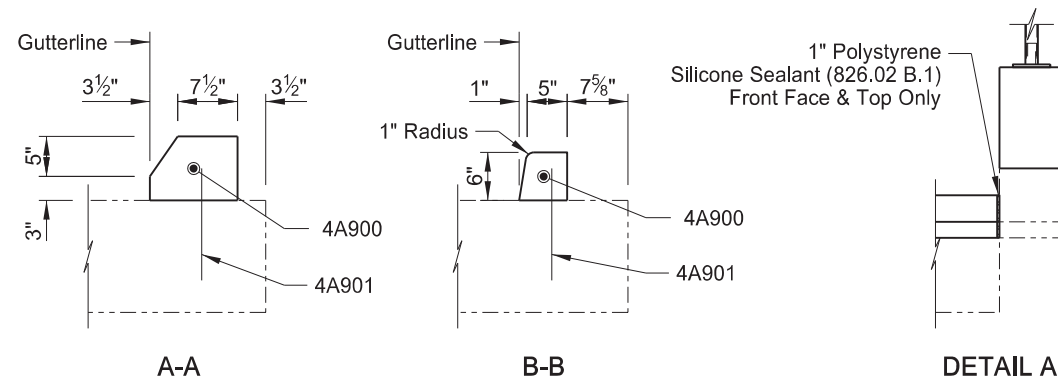
(NORTHWEST CORNER SHOWN, OTHERS SIMILAR)



(AT APPROACH SLAB END)

(AT BRIDGE END)

CURB REMOVAL
(TYP EACH CORNER)



DETAIL A

NOTES:

The dimensions shown in the "Bent Bar Details" are out to out.

The estimated material quantities shown are for informational purposes only. Include the removal of concrete for the curb and the barrier, replacement concrete for the curb and the barrier, reinforcing bars, polystyrene, connection plates, pipe, and labor to modify the concrete curb and barrier ends in the bid item "Barrier End Modification." Use Class AE concrete per Section 602.03 B and Grade 60 reinforcing steel meeting Section 612.

Cut existing reinforcing steel in the curb flush with the top of the approach slab. Grind out cut reinforcing steel 1/2" below top of the approach slab and fill holes with light gray epoxy or an approved sealer. Include all labor and equipment to complete this work in the bid item "Barrier End Modification."

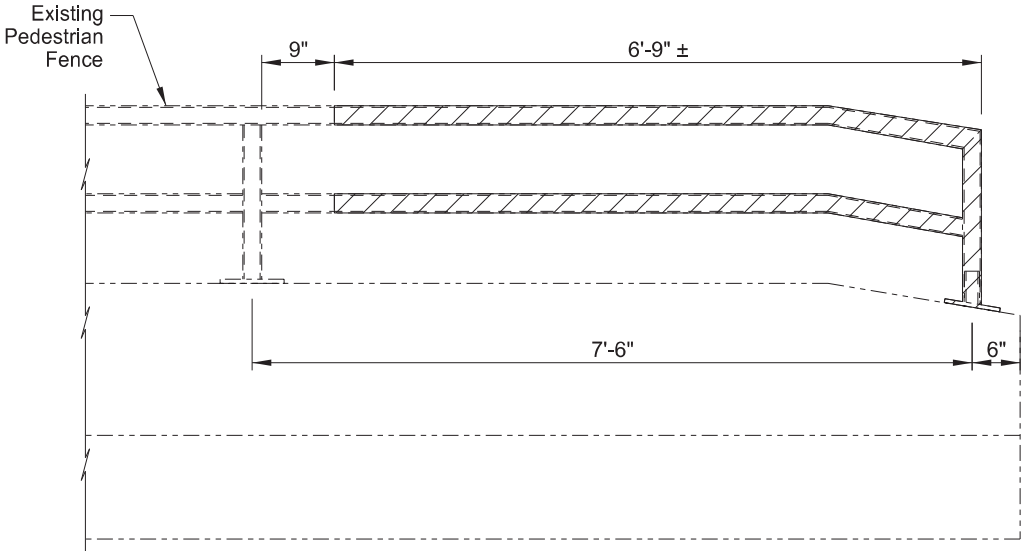
Install 4A901 bars according to manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage (16k min. ultimate pullout) and taht meets the requirements of Section 806.02. Provide a minimum anchorage length of 10 inches. Include all labor and equipment to complete this work in the bid item "Barrier End Modification."

BARRIER END MODIFICATIONS			
BAR LIST - FOUR CORNERS			
SIZE	MARK	NO.	LENGTH
5	B900	8	2'-4"
ESTIMATED MATERIAL QUANTITIES			
REINFORCING STEEL (LBS)		CONCRETE (CY)	
19		0.3	
CONCRETE CURB			
BAR LIST - FOUR CURBS			
SIZE	MARK	NO.	LENGTH
4	A900	4	16'-8"
4	A901	72	1'-2"
ESTIMATED MATERIAL QUANTITIES			
REINFORCING STEEL (LBS)		CONCRETE (CY)	
101		0.2	

QUANTITIES	
BARRIER END MODIFICATION	4 EA
TONGUE RIVER CAVALIER BARRIER END MODIFICATION & CURB DETAILS	
DRAWING NO.	5-314.446-2

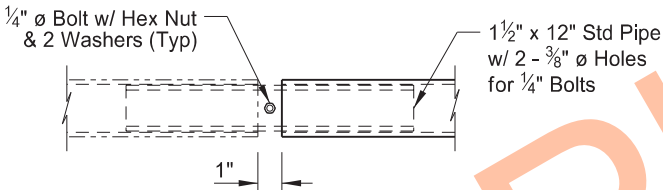


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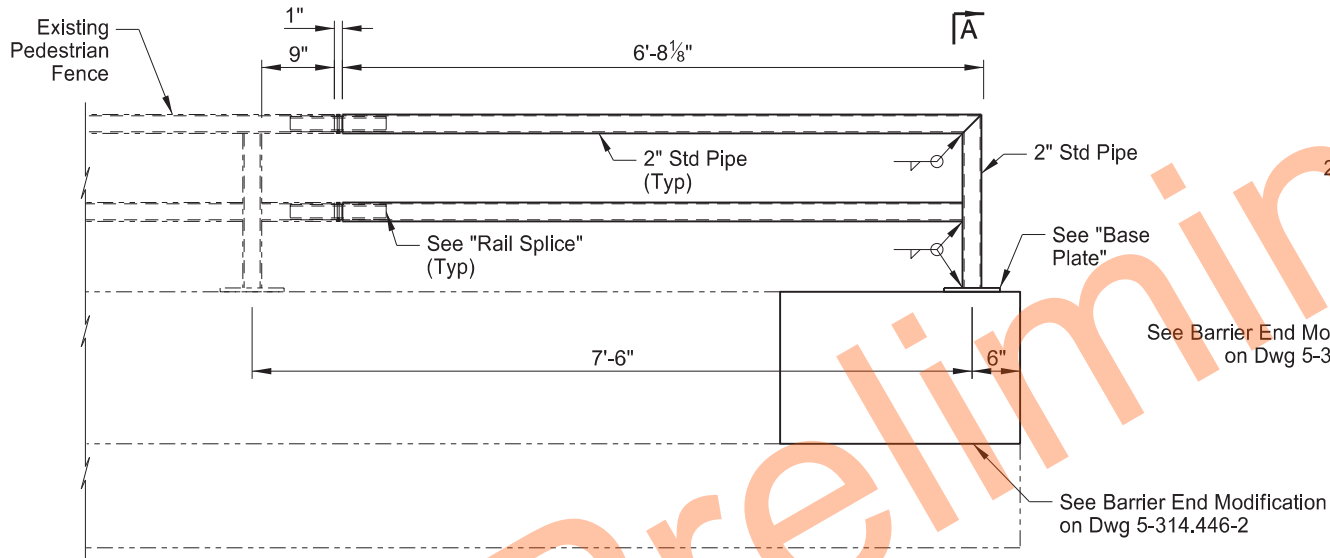


EXISTING PEDESTRIAN FENCE REMOVAL ELEVATION

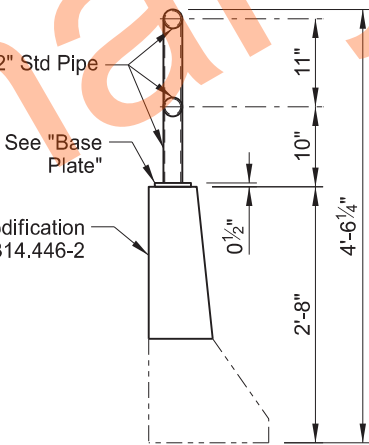
Hatched area indicates
pedestrian railing to be
cut and removed.



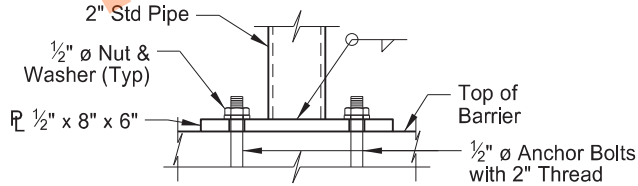
(TOP VIEW)
RAIL SPLICE



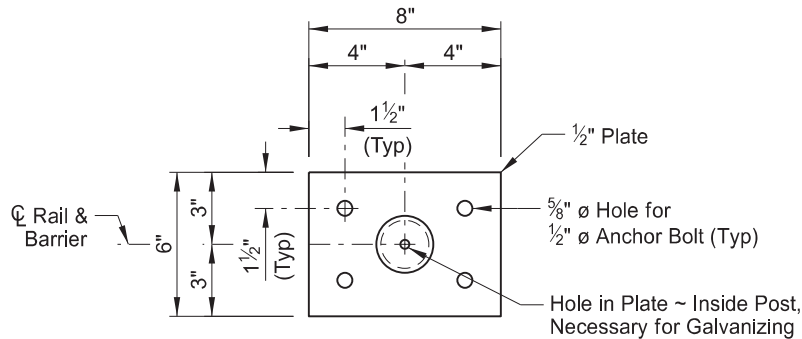
NEW PEDESTRIAN FENCE ELEVATION



A-A



ELEVATION
POST ANCHORAGE DETAIL



BASE PLATE PLAN

NOTES:

Provide base plates that meet ASTM A36. Provide pipe that meets ASTM A53 Grade B. Galvanize all steel elements after fabrication according to Section 854 of the Standard Specifications.

Epoxy in 1/2" Ø anchor bolts or place them in the concrete at the time of pouring. Provide an adhesive with a minimum characteristic bond strength in uncracked concrete of 1.5 ksi and a minimum embedment of 10" for each anchor bolt. Use anchor bolts meeting ASTM F1554, Grade 36.

Drill vent hole in rail post as necessary to facilitate galvanizing. Maximum hole size is 1/2" Ø and shall be location on the non-traffic side of the post.

Include the existing pedestrian railing removal, new pedestrian railing, rail splices, anchorage, hardware, and labor to remove replace the pedestrian railing in the bid item "Pedestrian Railing-Remove & Replace."

QUANTITIES

PEDESTRIAN RAILING-REMOVE & REPLACE 1 LSUM

TONGUE RIVER
CAVALIER

BARRIER END MODIFICATION &
CURB DETAILS

DRAWING NO. 5-314.446-3



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

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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	Lvng	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
				Pk	park	RCB	reinforced concrete box
H Plg	H piling			PSD	passing sight distance	RCES	reinforced concrete end section
Hdwl	headwall	Mb	mailbox	Pvmt	pavement	RCFES	reinforced concrete flared end section
Ht	height	ML	main line	Ped	pedestal	RCP	reinforced concrete pipe
Hel	helical	MH	manhole	Ped	pedestrian	RCPS	reinforced concrete pipe sewer
HDPE	high density polyethylene	Mkd	marked	PPP	pedestrian pushbutton post	RCTES	reinforced concrete traversable end section
HM	high mast	Mkr	marker	Pen.	penetration	Reinf	reinforcement
HP	high pressure	Mkg	marking	Perf	perforated	Res	reservation
HPS	high pressure sodium	MA	mast arm	Per.	perimeter	Res	residence
HTCG	high tension cable guardrail	Matl	material	Perm	permanent	Ret	retaining
Hwy	highway	Max	maximum	PL	pipeline	Rev	reverse
Hor	horizontal			Pl	place	Rt	right
HBP	hot bituminous pavement	Meas	measure	P&P	plan & profile	R/W	right of way
HMA	hot mix asphalt	Mdn	median	PL	plastic limit	Riv	river
Hyd	hydrant	MD	median drain	Pl or P	plate	Rd	road
Ph	hydrogen ion content	MC	medium curing	Pt	point	Rdbd	road bed
		MGS	Midwest Guardrail System	PE	polyethylene	Rdwy	roadway
		MM	mile marker	PVC	polyvinyl chloride	RWIS	roadway weather information system
Id	identification	MP	mile post	PCC	Portland Cement concrete	Rk	rock
Incl	inclinometer tube	Min	minimum	PP	power pole	Rt	route
IMH	inlet manhole	Misc	miscellaneous	Preempt	preemption		
ID	inside diameter	Mon	monument	Prefab	prefabricated		
Inst	instrument	Mnd	mound	Prfmd or Pref	preformed		
Intchg	interchange	Mtbl	mountable	Prep	preperation		
Intmdt	intermediate	Mtd	mounted	Press.	pressure		
Intscn	intersection	Mtg	mounting	PRV	pressure relief valve		
Inv	invert	Mk	muck	Prestr	prestressed		
IP	iron pipe			Pvt	private		
				PD	private drive		
				Prod.	production/produce		
				Prog	programmed		
				Prop.	property		
				Ppsd	proposed		
				PB	pull box		
Jt	joint	Neop	neoprene				
Jct	junction	Ntwk	network				
		N	North				
		NE	Northeast				
		NW	Northwest				
		NB	Northbound				
		No. or #	number				

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NDDOT ABBREVIATIONS

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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	Southeast	TERO	tribal employment rights ordinance
SW	Southwest	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	VG	valley gutter
SB	split barrel sample	Vap	vapor
SH	sprinkler head	Vert	vertical
SV	sprinkler valve	VCP	vitrified clay pipe
Sq	square	Vol	volume
Stk	stake	VSFS	vehicle speed feedback sign
Std	standard		
N	standard penetration test	Wkwy	walkway
Std Specs	standard specifications	W	water content
Stm L	steam line	WGV	water gate valve
SEC	steel encased concrete	WL	water line
SMA	stone matrix asphalt	WM	water main
SSD	stopping sight distance	WMV	water main valve
SD	storm drain	W Mtr	water meter
St	street	WSV	water service valve
SPP	structural plate pipe	WW	water well
SPPA	structural plate pipe arch	Wrng	wearing
Str	structure	WIM	weigh in motion
Subd	subdivision	W	west
Sub	subgrade	WB	westbound
Sub Prep	subgrade preparation	Wrng	wiring
Ss	subsoil	W/	with
SS	supplement specification	W/o	without
Supp	supplemental		
Surf	surfacing		
Surv	survey		
Sym	symmetrical		

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NDDOT ABBREVIATIONS

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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
CC	closing corner
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
MC	meander corner
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
SC	standard corner
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
WC	witness corner
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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

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

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LINE STYLES

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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

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KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

ENGINEER

NORTH DAKOTA

12 18 2020

LINE STYLES

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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

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DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups General Revisions
12-18-20	

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PE-4683

ENGINEER

NORTH DAKOTA

12 18 2020

SYMBOLS

D-101-30

	North Arrow (Half Scale)		Existing Bush or Shrub		Continuous Split Barrel Sample
	Alignment Data Point		Existing Large Evergreen Tree		Flight Auger Sample
	Alignment Monument		Existing Small Evergreen Tree		Split Barrel Sample
	Spot Elevation		Existing Large Tree		Thinwall Tube Sample
	Existing Miscellaneous Spot		Existing Small Tree		Standard Penetration Test
	Existing Access Control Arrow		Existing Tree Trunk		Inclinometer Tube
	Existing Benchmark		Cairn or Stone Circle		Excavation Unit
	Reset USGS Marker		Existing Artifact		Existing Ground Water Well Bore Hole
	Iron Monument Found		Existing Satellite Dish		
	Iron Pin R/W Monument		Existing Weather Station		
	Property Corner		Existing Windmill or Tower		
	Iron Pin Reference Monument		Reinforced Pavement		
	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				

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

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12 18 2020

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	
07-01-14 REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

12 18 2020

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					

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

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



12 18 2020

SYMBOLS

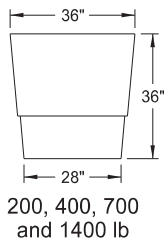
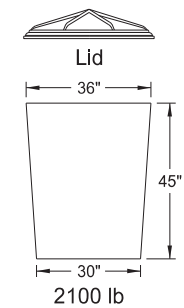
D-101-33

			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	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32

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12 18 2020

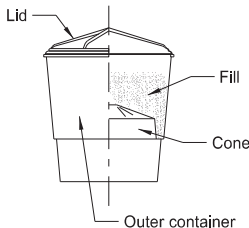
ATTENUATION DEVICE



Outer Containers

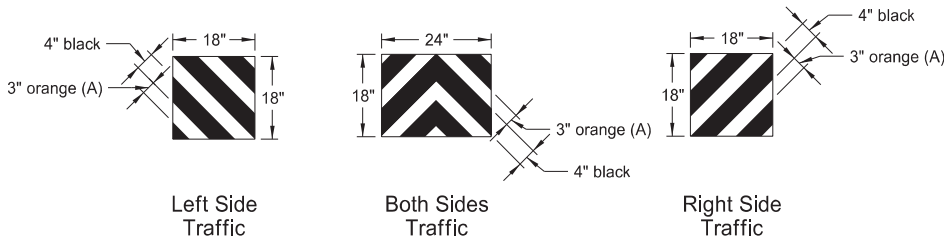


Cones



Typical Assembly

Typical Module Construction Detail

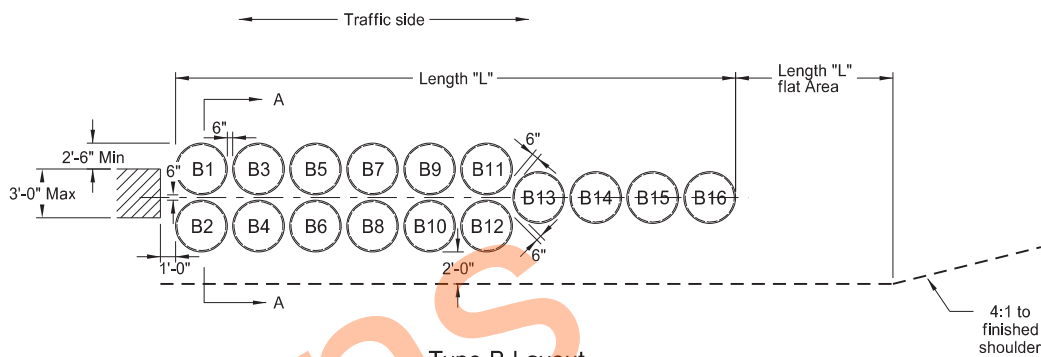


Reflective Sheet Detail

Note:
Apply Type IV reflective sheeting (as specified in the NDDOT Standard Specifications) directly to the outer container of the last attenuation device facing traffic, following the details above.
Or apply the sheet to a metallic sheet and attach it to the container with approved fasteners.

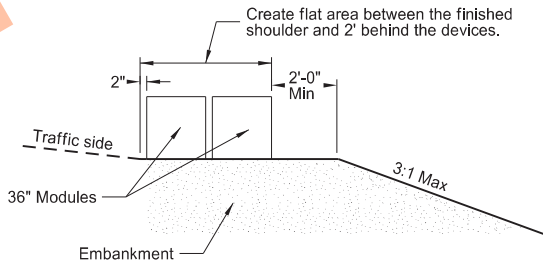
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.

Fill Chart					
	Module Weights (LBS)				
	200	400	700	1400	2100
Distance from top edge	8½"	5"	4"	3"	0"



Type B Layout

Note:
Angle attenuation devices 10 degrees towards traffic when placed at piers offset from roadway.



Section A-A
(Type B Layout)

Type B Attenuation Device												
Module Number	Dash Number											
	80	75	70	65	60	55	50	45	40	35	30	25
	Module Weights (LBS)											
B1	2100	2100										
B2	2100	2100										
B3	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B4	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B5	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400	400
B16	200	200	200	200	200	200	200	200	200	200	200	200
Length (L)	34.2'	34.2'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	27.2'	27.2'
Module Weights (LBS)	Replacement Module											
	1	1	1	1	1	1	1	1	1	1	1	1
2100	1	1	1	1	1	1	1	1	1	1	1	1
1400	1	1	1	1	1	1	1	1	1	1	1	1
700	2	2	2	2	2	2	2	2	2	2	2	2
400	1	1	1	1	1	1	1	1	1	1	1	1
200	2	2	2	2	1	1	1	1	1	1	1	1

Notes:

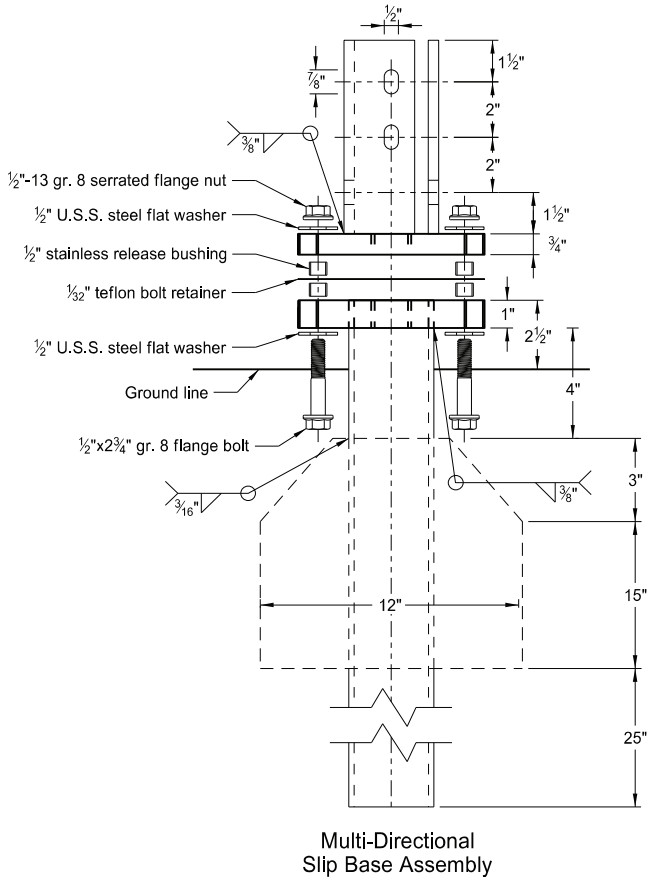
- Materials
 - Use modules manufactured from frangible polyethylene material which shatters upon impact.
 - Fill modules with class 43 aggregate meeting NDDOT Standard Specifications aggregate requirements. Use fill with a unit weight of at least 100 pounds per cubic foot. Use fill with a moisture content of 2% or less when left over winter.
- Modules
 - Provide three components for 2, 4, or 7 cubic foot module containers:
 - A 14 C.F., yellow outer container.
 - A black lid securely locking over the top lip of the container.
 - A variable cone-shaped supporting insert capable of supporting 200, 400, or 700 pounds of sand mass to allow for three sizes of modules. Place cone inserts inside the 14 cubic foot container.
 - Provide two components for the 14 cubic foot module container:
 - A 14 C.F., yellow outer container.
 - A black lid securely locking over the top lip of the container.
 - Provide two components for the 21 cubic foot module container:
 - A 36" height X 36" width yellow outer container.
 - A black lid which locks securely over the top of the container.
- For temporary installations use Energite or Fitch attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or approved equal modules. As an option, place attenuation devices on 3½" maximum thickness pallets to facilitate maintenance.
- For permanent installations use Barrel Attenuation Device consisting of one-piece outer sand container modules with separate detachable lid. Energite attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or approved equal meet these requirements.
- The Typical Module Construction Detail and Type B Layout are based on the Energite Crash Cushion manufactured by Energy Absorption. Provide any required layouts and details from other sand filled attenuation module manufacturers which differ from those shown here.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
07-18-14	Revised sheeting in reflective sheet detail
09-27-17	Update to active voice
10-03-19	New Design Engr PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes

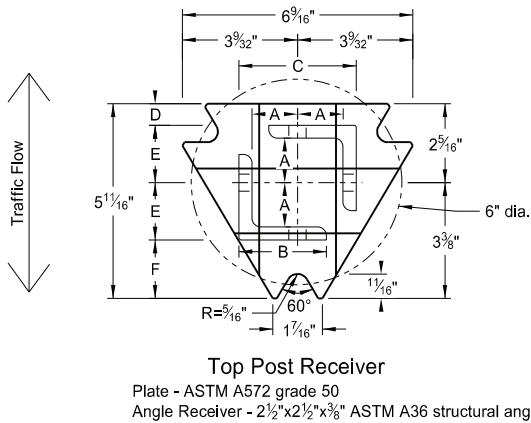


BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7



Perforated Tube



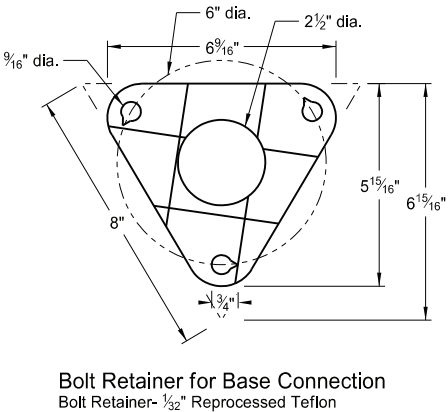
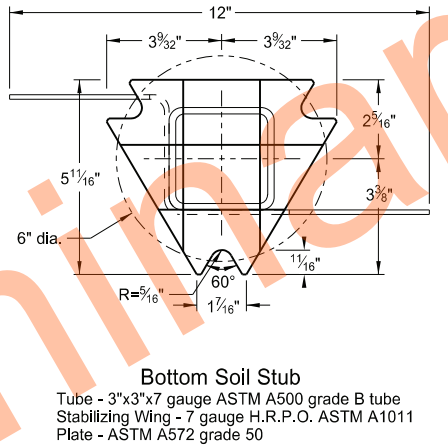
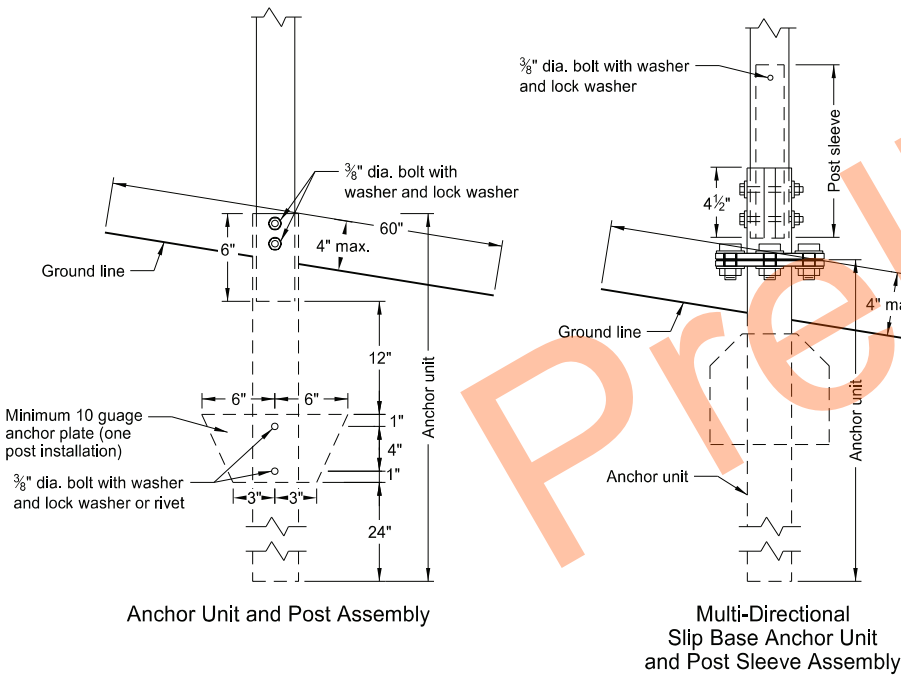
- Notes:
1. Torque slip base bolts as specified by manufacturer.
 2. Use anchor with 43.9 KSI yield strength and 59.3 KSI tensile strength.
 3. Provide 4" vertical clearance for anchor or breakaway base. Measure the 4"x60" measurement above and below post location and back and ahead of post.
 4. In concrete 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 Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

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

Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 5/16"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 7/8"
2 1/2"x10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	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 3/16"x10 ga. into 2 1/2"x10 ga.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp
8-01-24	Electronic Stamp/Signature

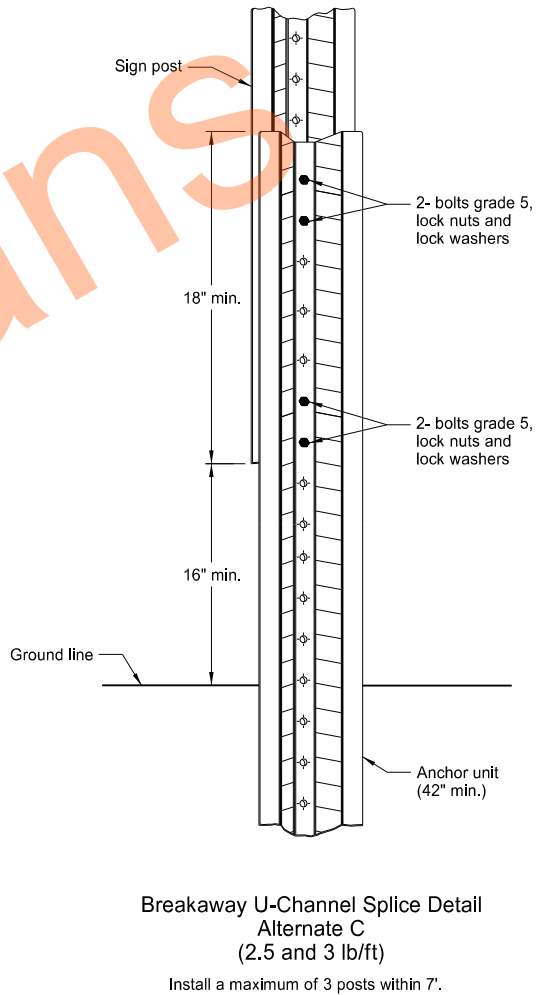
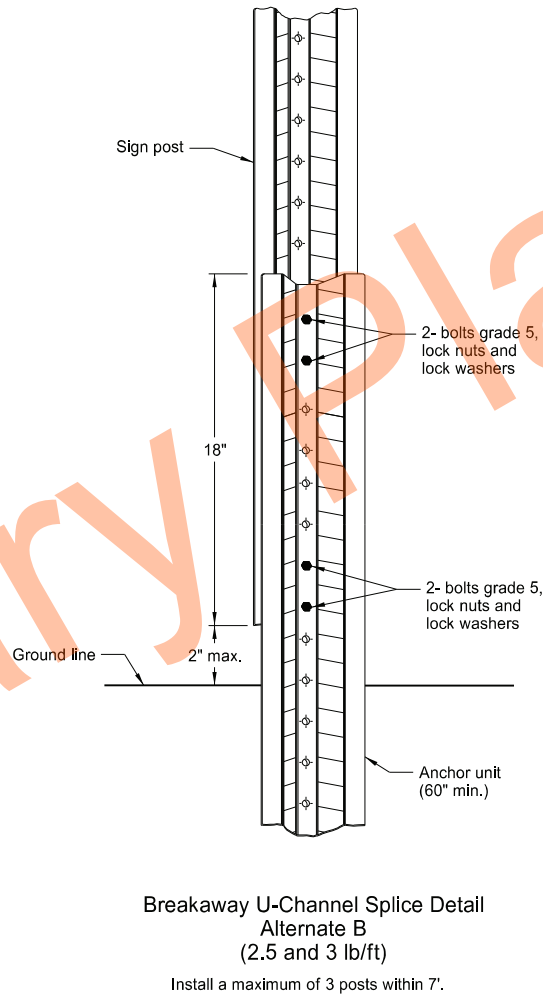
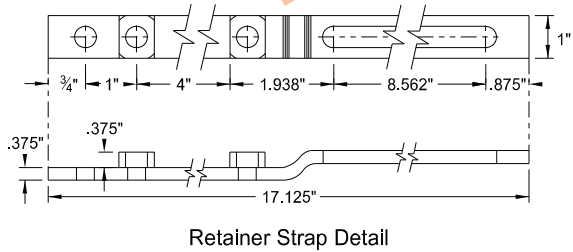
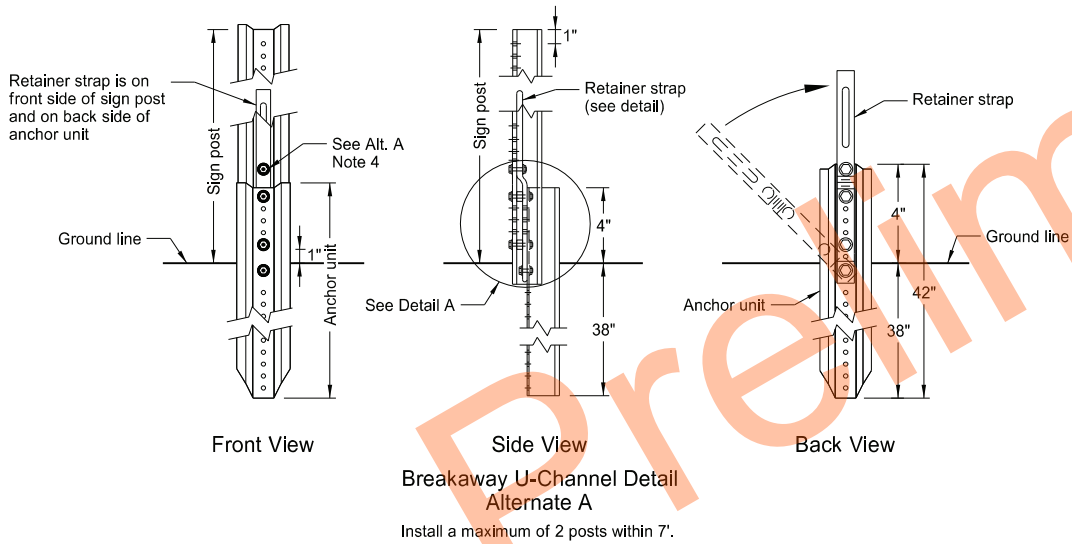
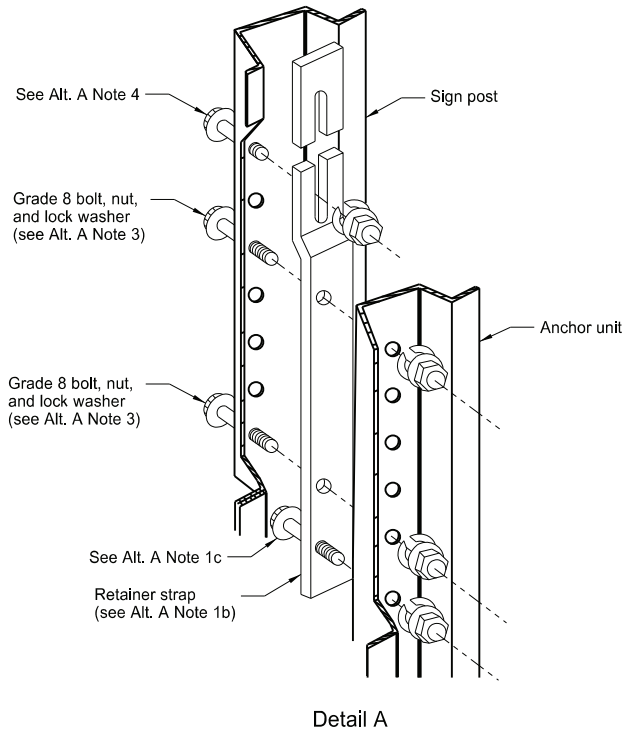


08/01/24

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



Alternate A Steps of Installation:

- Drive anchor unit to within 12" of ground level.
 - Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
 - Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
 - Rotate strap 90° to left.
- Drive anchor unit to 4" above ground.
 - Rotate strap to vertical position.
- 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.
 - 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	Updated to active voice
10-03-19	New Design Engr PE Stamp
8-01-24	Electronic Stamp/Signature

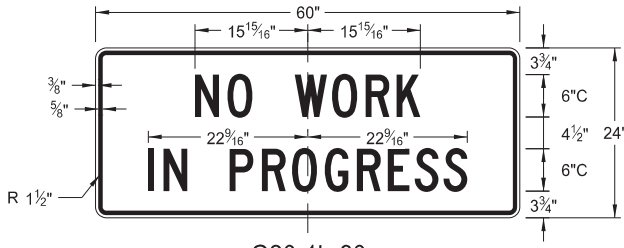


08/01/24

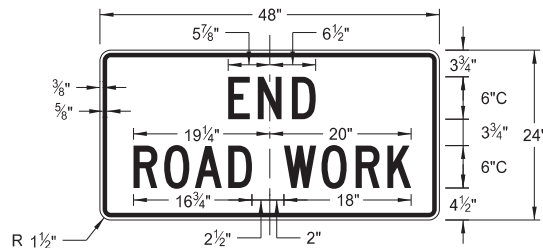
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



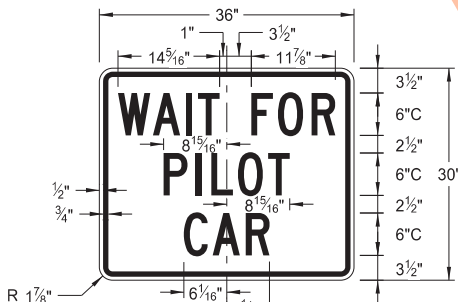
G20-1-60
Legend: black (non-refl)
Background: orange



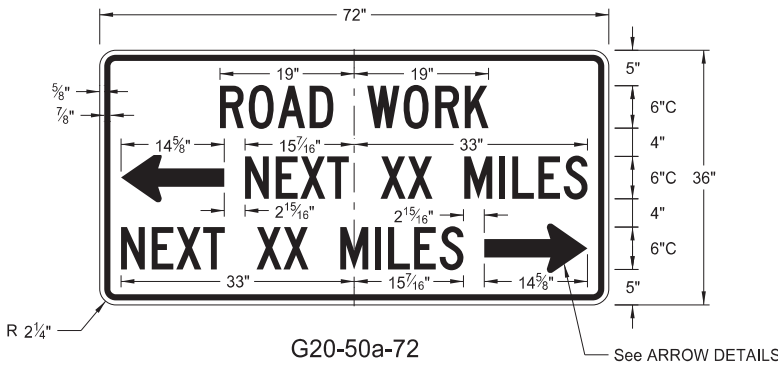
G20-1b-60
Legend: black (non-refl)
Background: orange



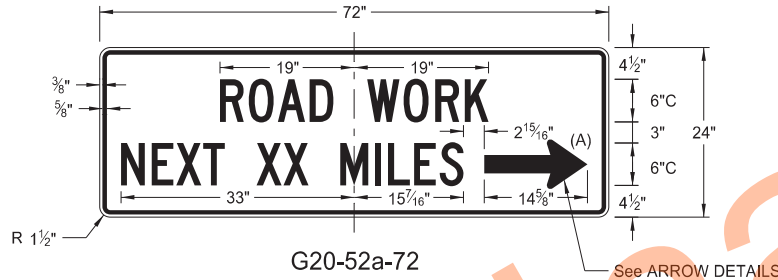
G20-2-48
Legend: black (non-refl)
Background: orange



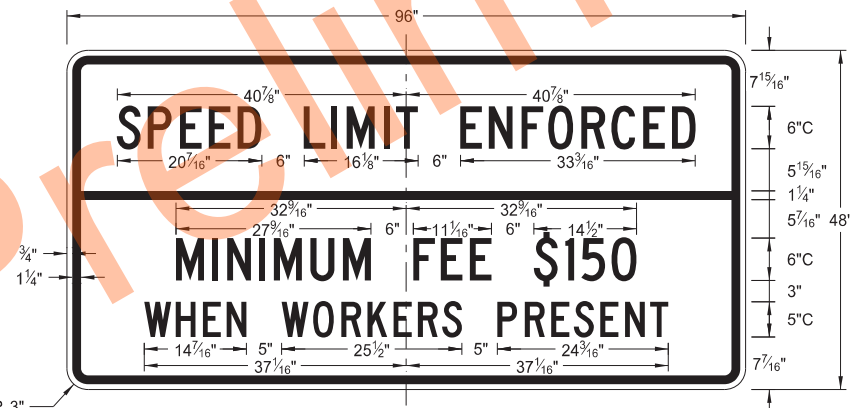
G20-4b-36
Legend: black (non-refl)
Background: orange



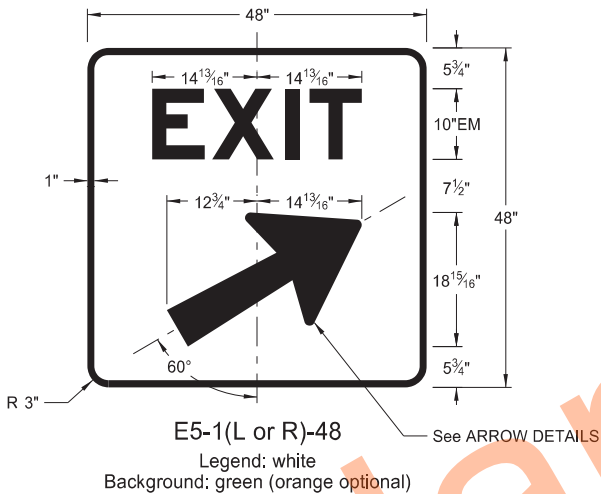
G20-50a-72
Legend: black (non-refl)
Background: orange



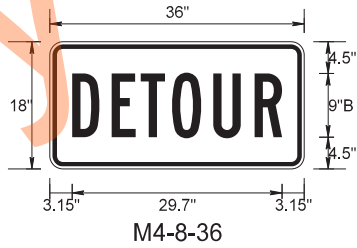
G20-52a-72
Legend: black (non-refl)
Background: orange



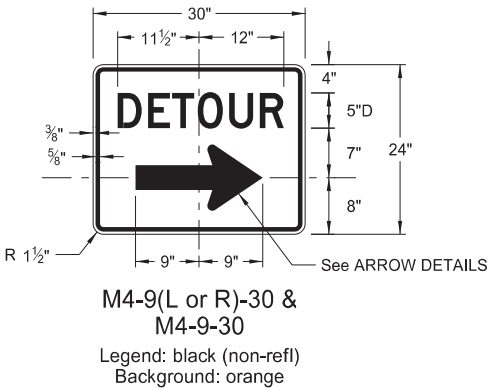
G20-55-96
Legend: black (non-refl)
Background: orange



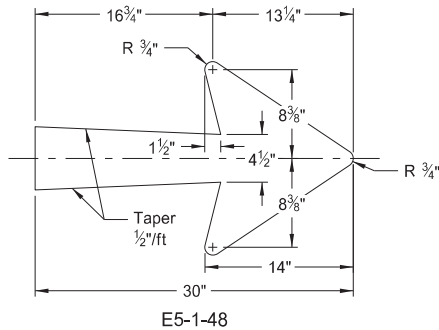
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



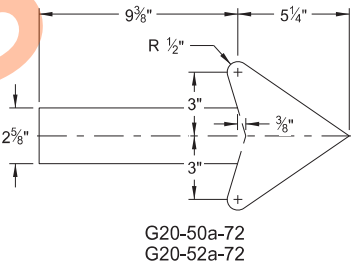
M4-8-36
Legend: black (non-refl)
Background: orange



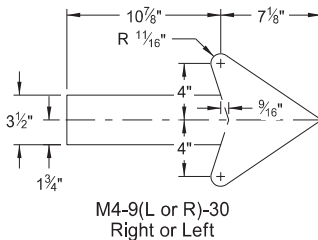
M4-9(L or R)-30 & M4-9-30
Legend: black (non-refl)
Background: orange



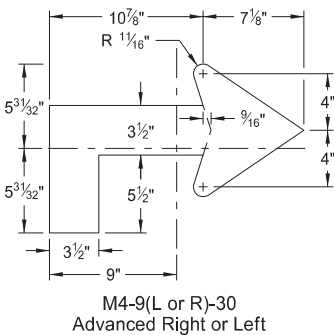
E5-1-48



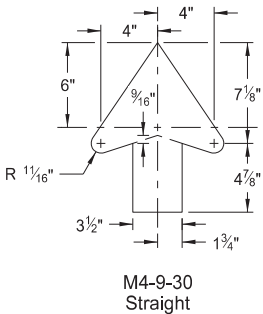
G20-50a-72
G20-52a-72



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:

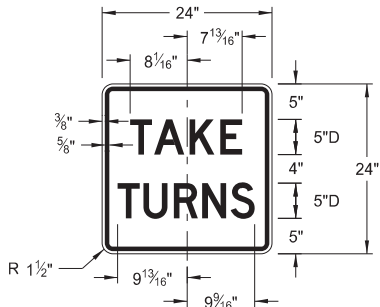
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17	Added sign & background color
10-03-19	New Design Engineer PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes

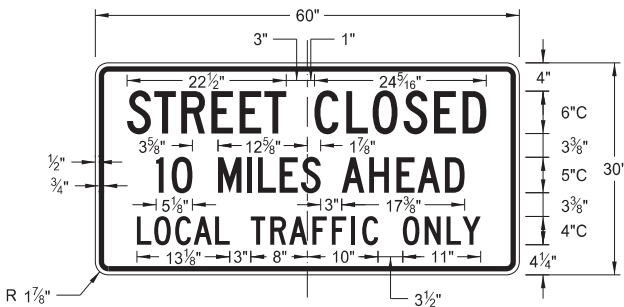


CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

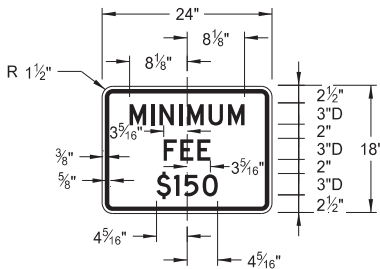
D-704-10



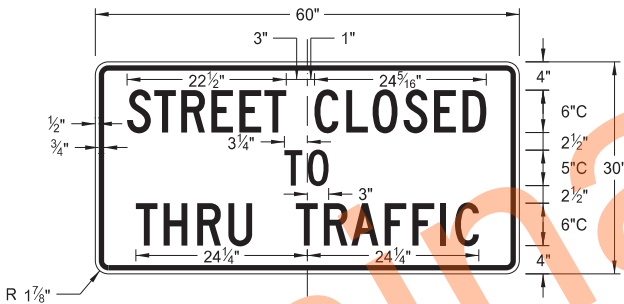
R1-50P-24
Legend: black (non-refl)
Background: white



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

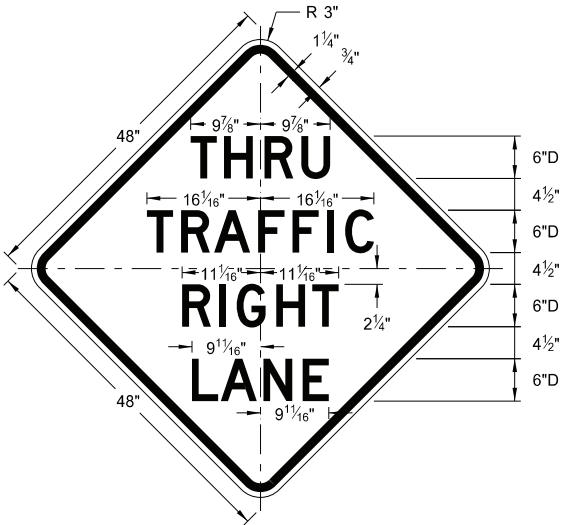
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes



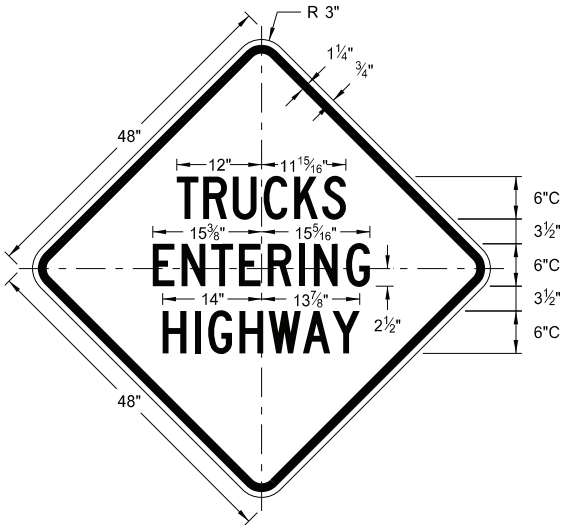
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

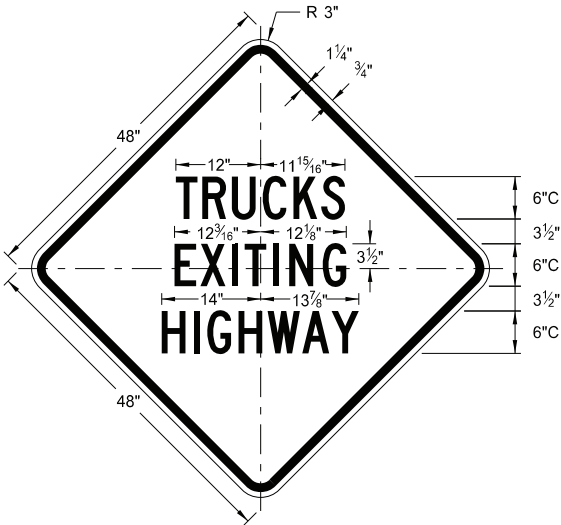
* DISTANCE MESSAGES



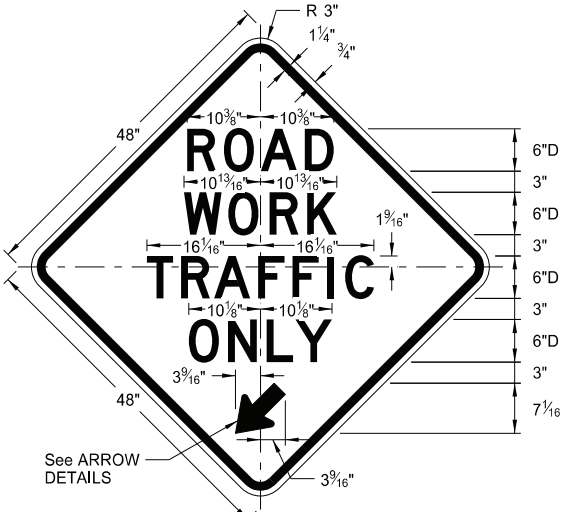
W5-8-48
Legend: black (non-refl)
Background: orange



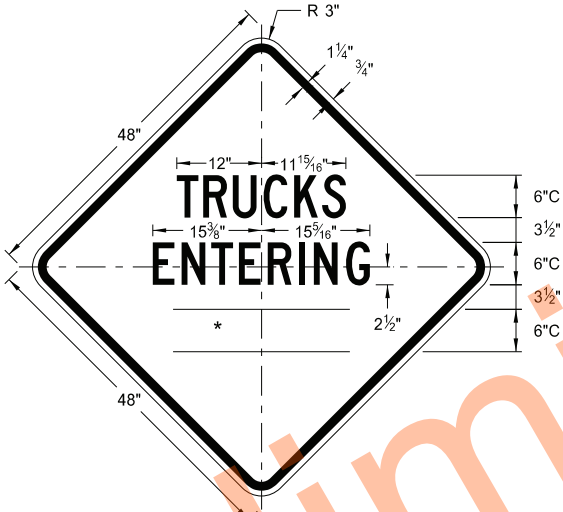
W8-53-48
Legend: black (non-refl)
Background: orange



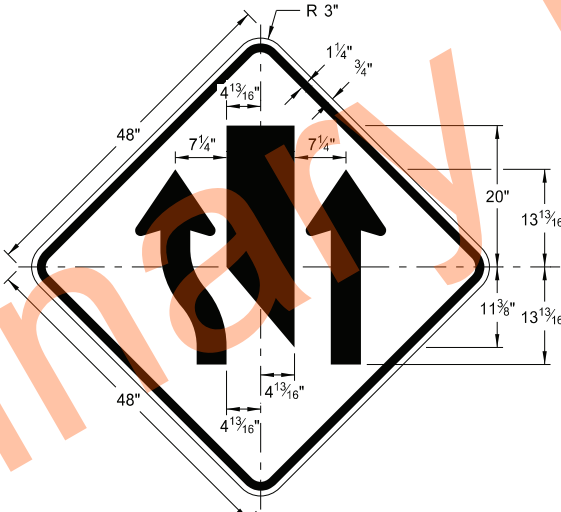
W8-56-48
Legend: black (non-refl)
Background: orange



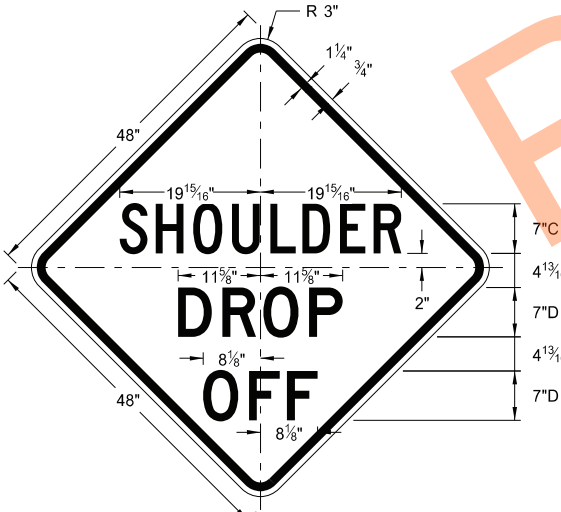
W5-9-48
Legend: black (non-refl)
Background: orange



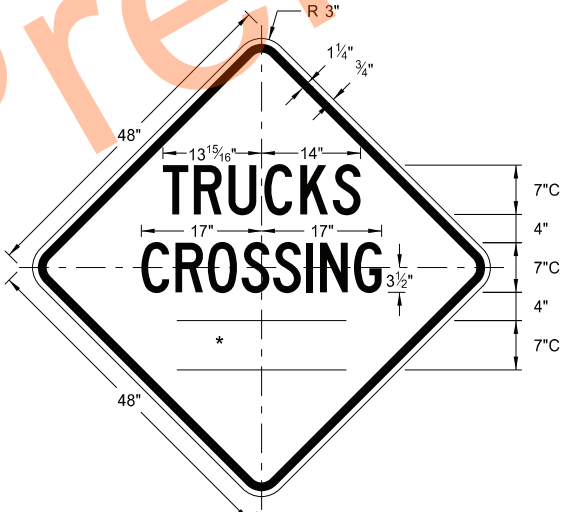
W8-54-48
Legend: black (non-refl)
Background: orange



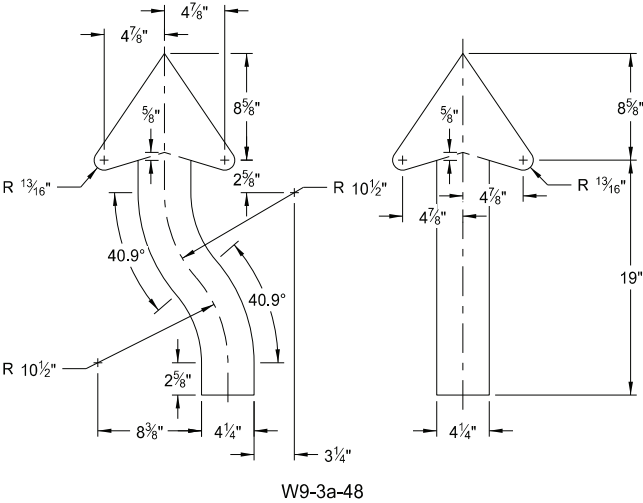
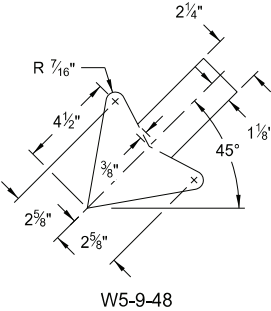
W9-3a-48
Legend: black (non-refl)
Background: orange



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



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



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
8-01-24	Electronic Stamp/Signature

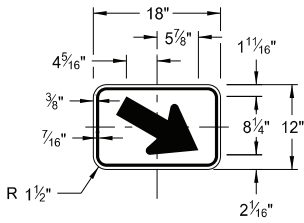


08/01/24

CONSTRUCTION SIGN DETAILS
WARNING SIGNS

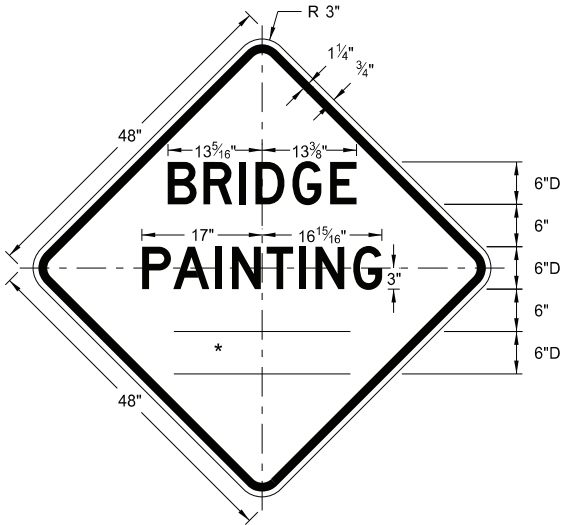
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



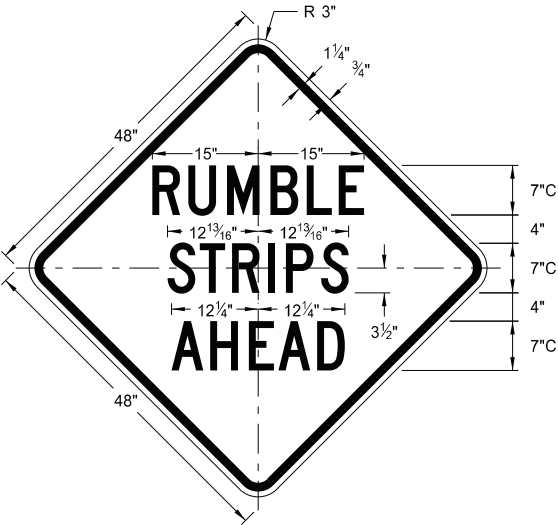
W16-7aP-18

Legend: black (non-refl)
Background: orange



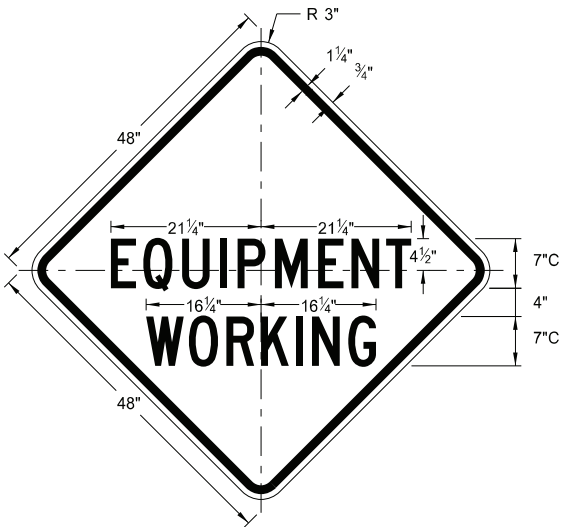
W21-50-48

Legend: black (non-refl)
Background: orange



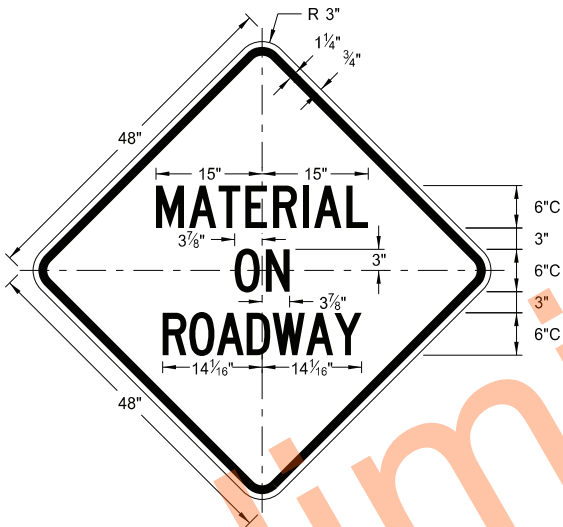
W21-53-48

Legend: black (non-refl)
Background: orange



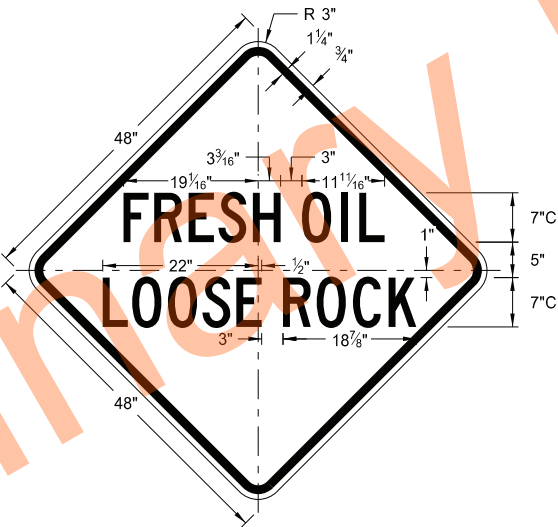
W20-51-48

Legend: black (non-refl)
Background: orange



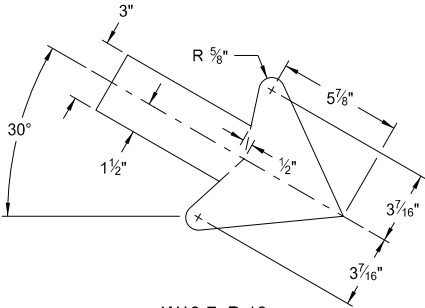
W21-51-48

Legend: black (non-refl)
Background: orange

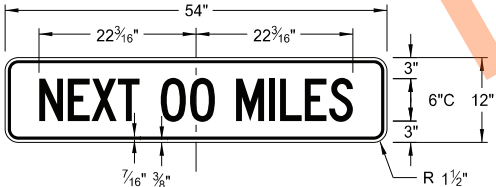


W22-8-48

Legend: black (non-refl)
Background: orange

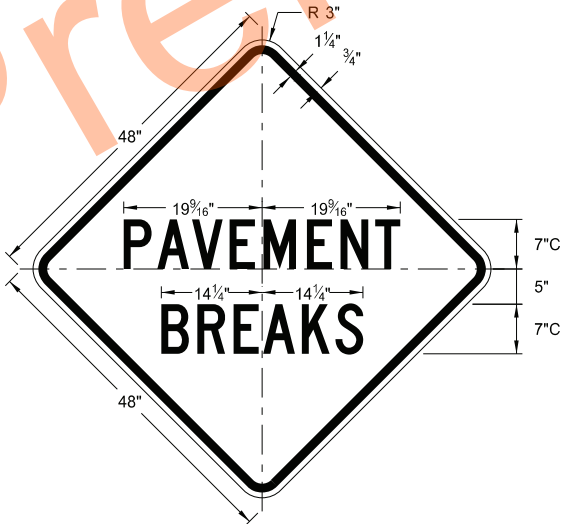


W16-7aP-18



W20-52P-54

Legend: black (non-refl)
Background: orange



W21-52-48

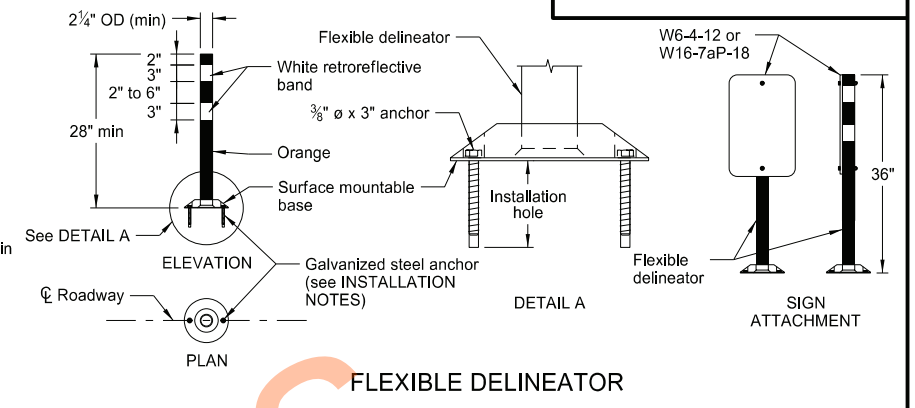
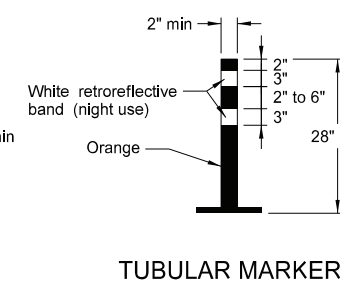
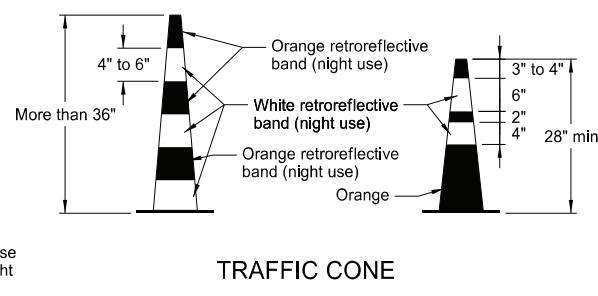
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE
11-01-19	Added details for sign W16-7aP-18.
8-01-24	Electronic Stamp/Signature.



08/01/24

D-704-13



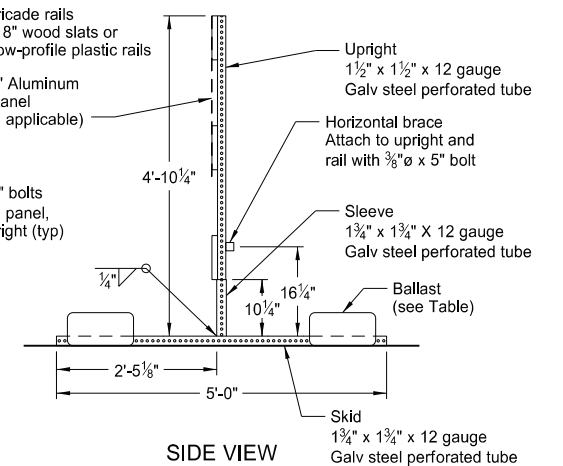
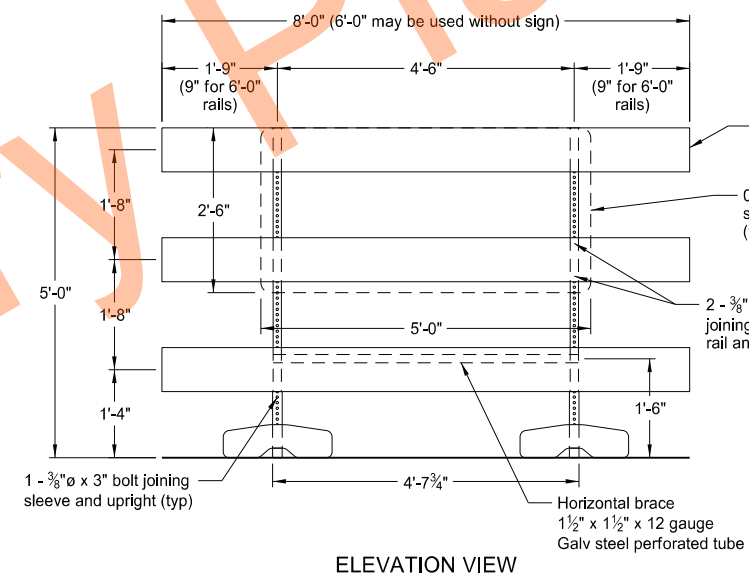
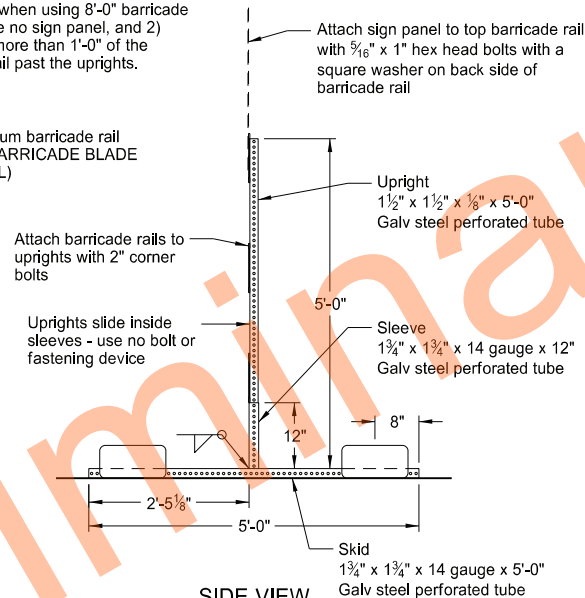
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, use a stripe width of 6 inches.

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.

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.

INSTALLATION NOTES:

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

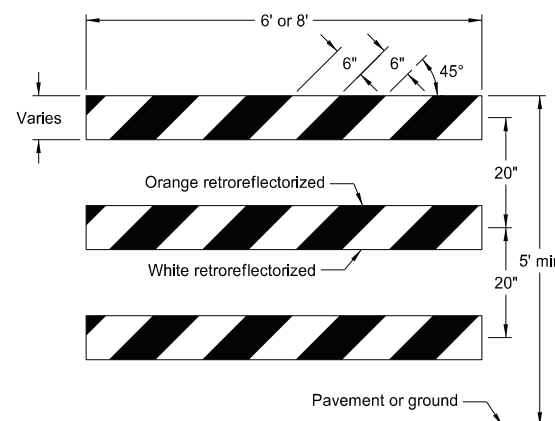


BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

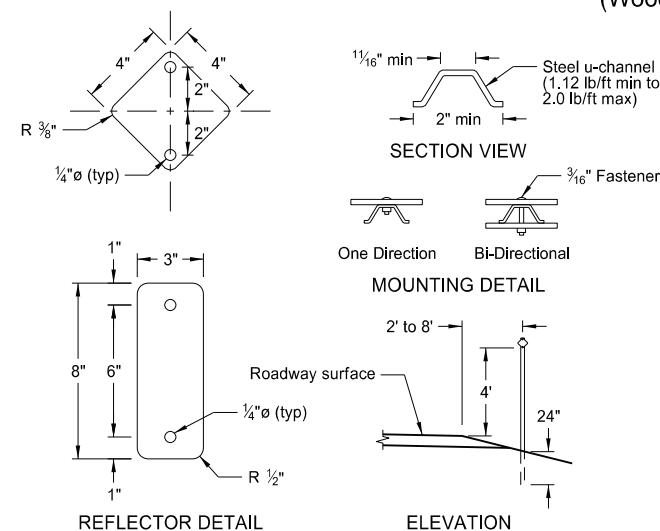
Diagram illustrating the standard crosswalk dimensions and materials:

- Length: 6' to 10'
- Width: 8"
- Stripe Angle: 45°
- Stripe Width: 6"
- Stripe Spacing: 6"
- Materials: Orange retroreflectORIZED, White retroreflectORIZED
- Height: 3'-0" to 3'-6"
- Surface: Pavement or ground

BARRICADE RAIL DETAILS



TYPE III BARRICADE



DELINEATORS

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

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 sklds.

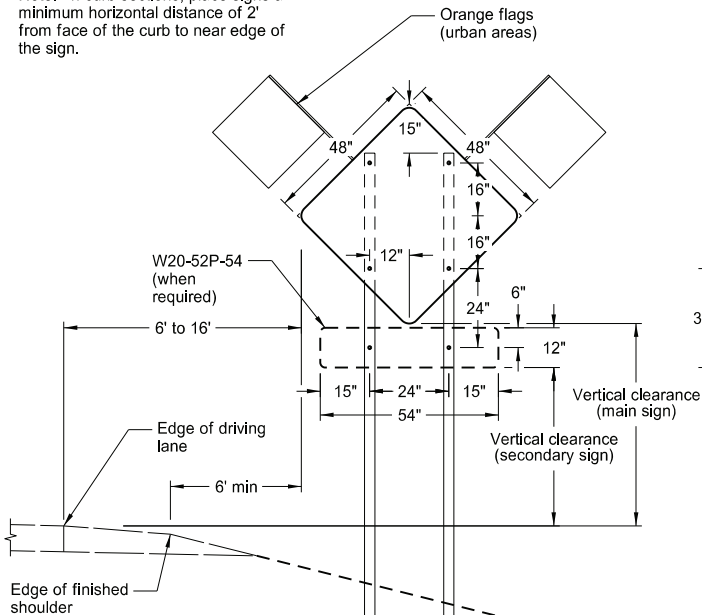
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	Revised details for Flexible Delineator
8-01-24	Electronic Stamp/Signature



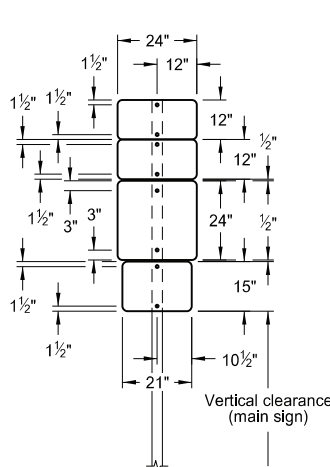
08/01/24

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

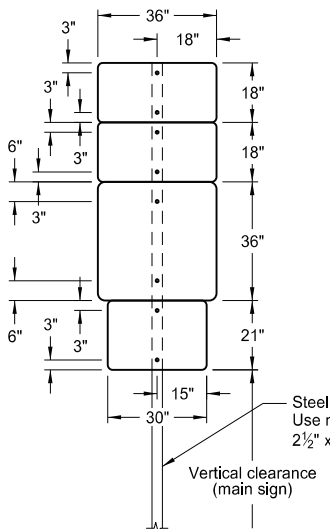
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



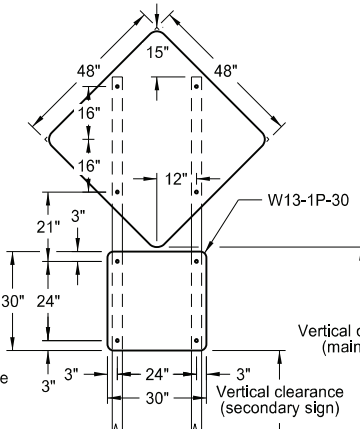
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



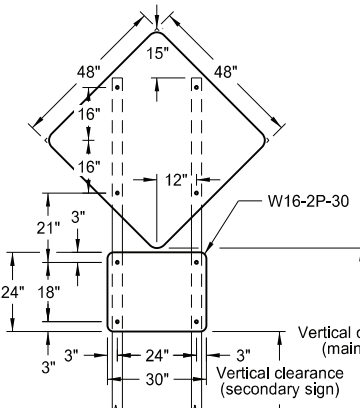
24" x 24"
ROUTE MARKER
ASSEMBLY



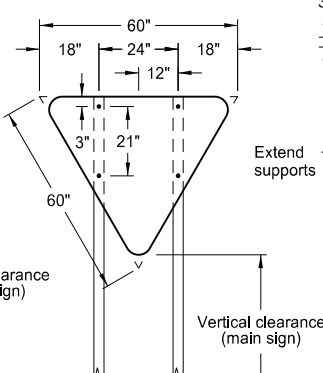
36" x 36"
ROUTE MARKER
ASSEMBLY



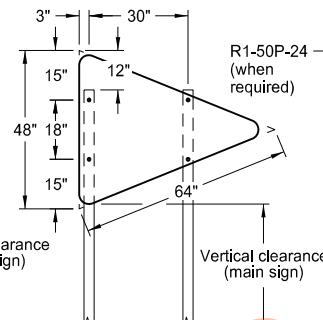
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



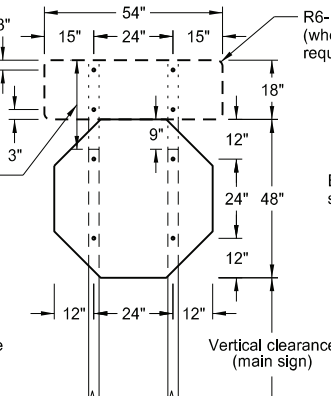
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



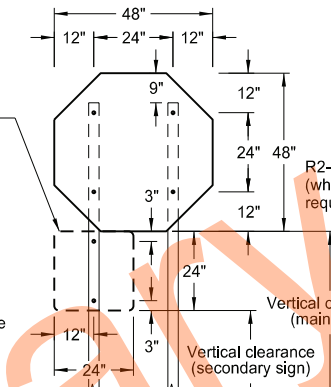
R1-2-60 - YIELD SIGN



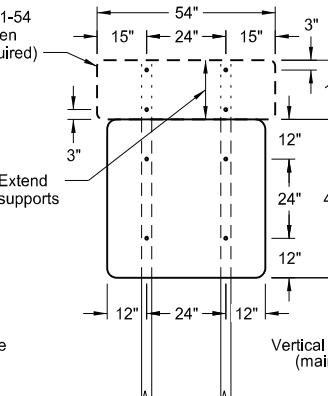
W14-3-64 - PENNANT SIGN



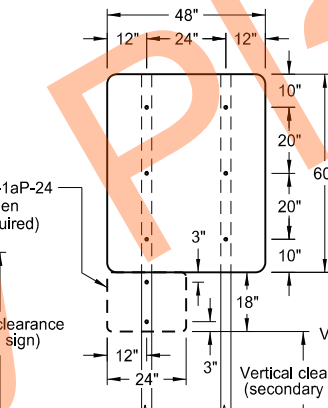
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



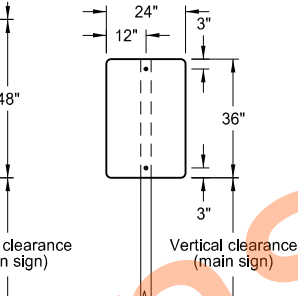
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



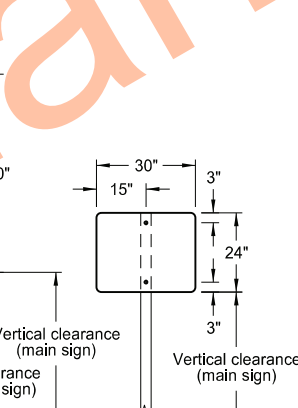
48" x 48" SIGN
(with R6-1-54 sign as required)



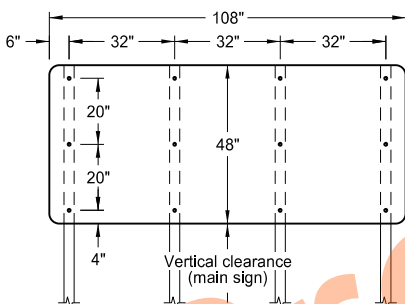
48" x 48" SIGN
(with R2-1aP-24 sign as required)



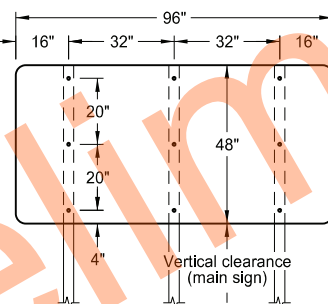
24" x 36" SIGN



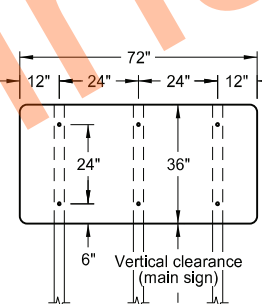
30" x 24" SIGN



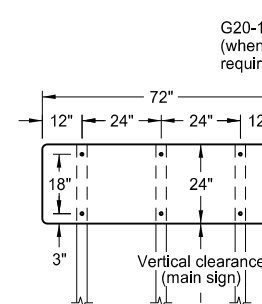
108" x 48" SIGN



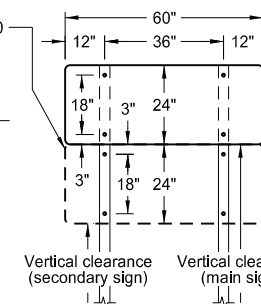
96" x 48" SIGN



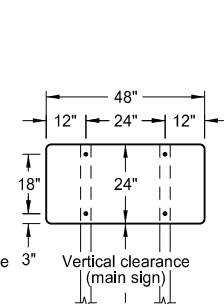
72" x 36" SIGN



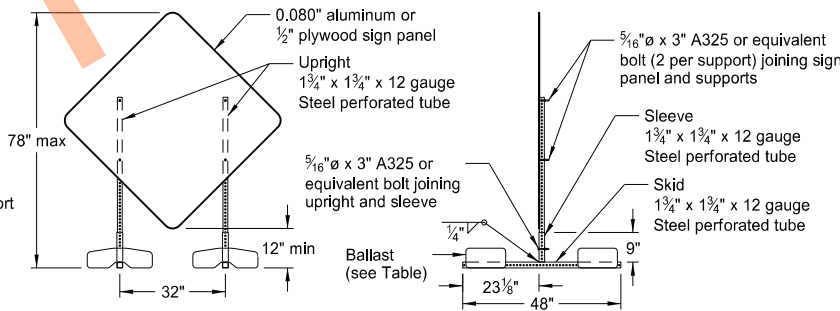
72" x 24" SIGN



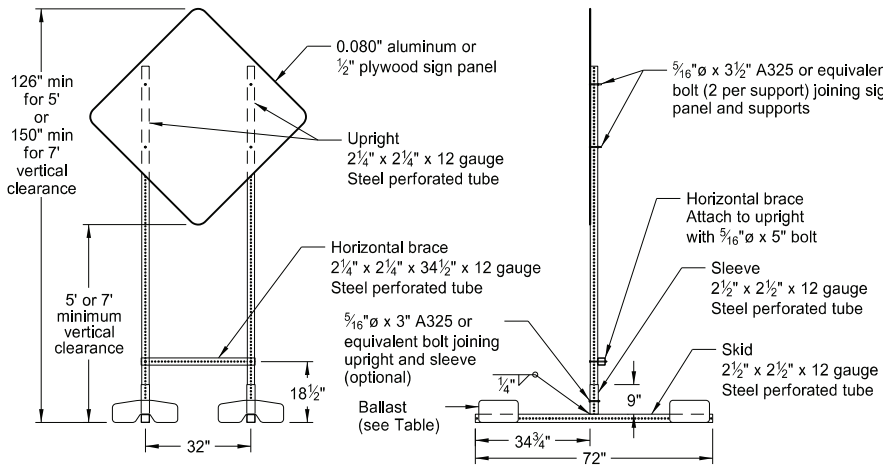
60" x 24" SIGN



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 2 1/2" x 2 1/2" 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, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 3/8" 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.

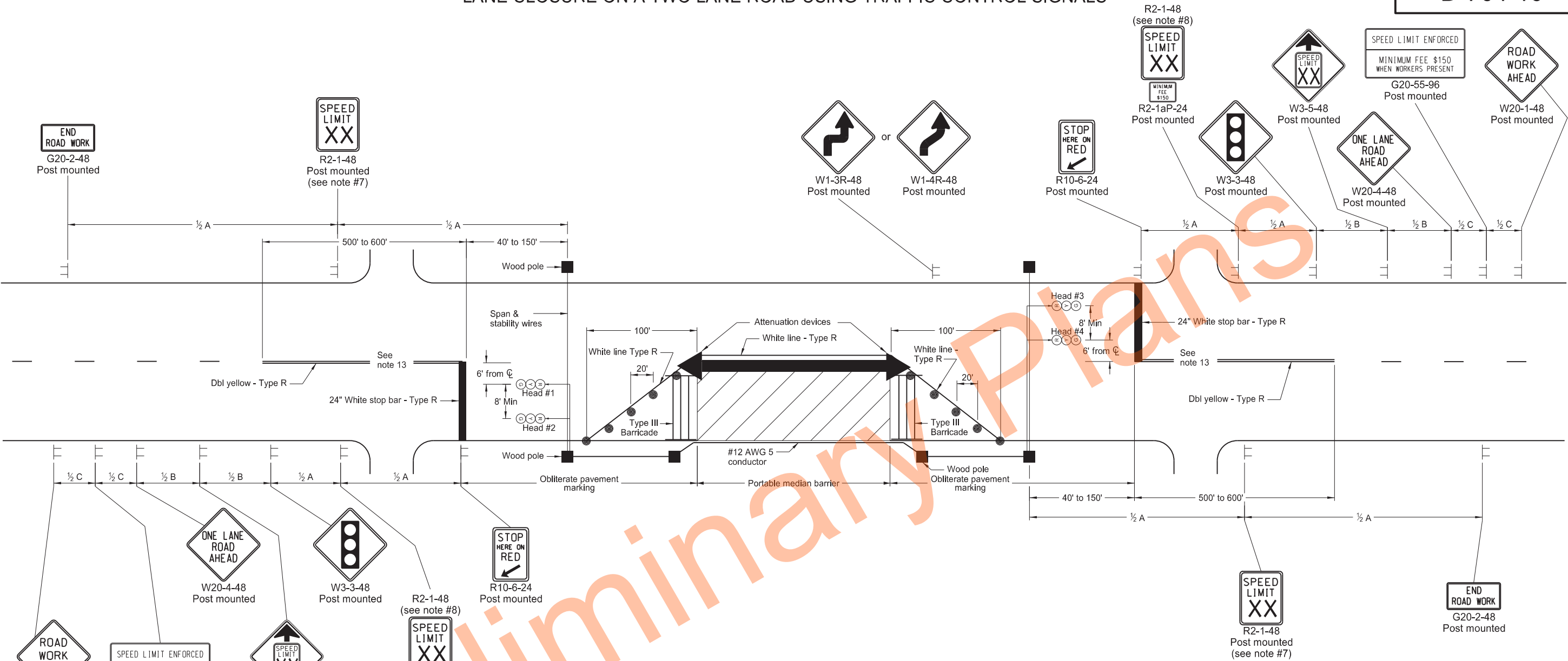
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail
8-01-24	Electronic Stamp/Signature



08/01/24

LANE CLOSURE ON A TWO LANE ROAD USING TRAFFIC CONTROL SIGNALS

D-704-16



Notes:

- Span conductor overhead between poles except on bridges, where it may alternately be attached and supported by the bridge structure. When conductor is supported by the bridge structure, attach conductor to avoid interference with bridge construction. Attach conductor on either side of bridge as determined by field personnel.
- Locate controller on a wood pole in the cable run between signal heads for through traffic movements.
- The timing schedule is suggested trial setting. Check signals in operation frequently to obtain the most efficient timing schedule.
- Place wood poles a minimum of 16 feet from edge of driving lane. Provide a minimum 16 to 19 feet clearance from the center line of the roadway to the bottom of traffic signal heads suspended over the roadway.
- Place traffic signal heads with 12 inch red, yellow and green lenses and 5 inch louvered backplates.
- See standard drawing "Span Wire Mounted Traffic Signals" for interim traffic construction details.
- 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 the second speed limit sign at 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.
- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- Continue double yellow centerline thru private drives.
- Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
- Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
- As an option, use solar powered signals instead of wood pole signal system.

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 80 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

SUGGESTED TIMING AND SIGNAL SEQUENCE						
Heads 1 & 2 Heads 3 & 4 Time Cycle = 90 seconds Percent of Cycle	Green	Yellow	Red			
		Red	Green	Yellow	Red	
	18.0	4.5	22.5	18.0	4.5	22.5
	20	5	25	20	5	25

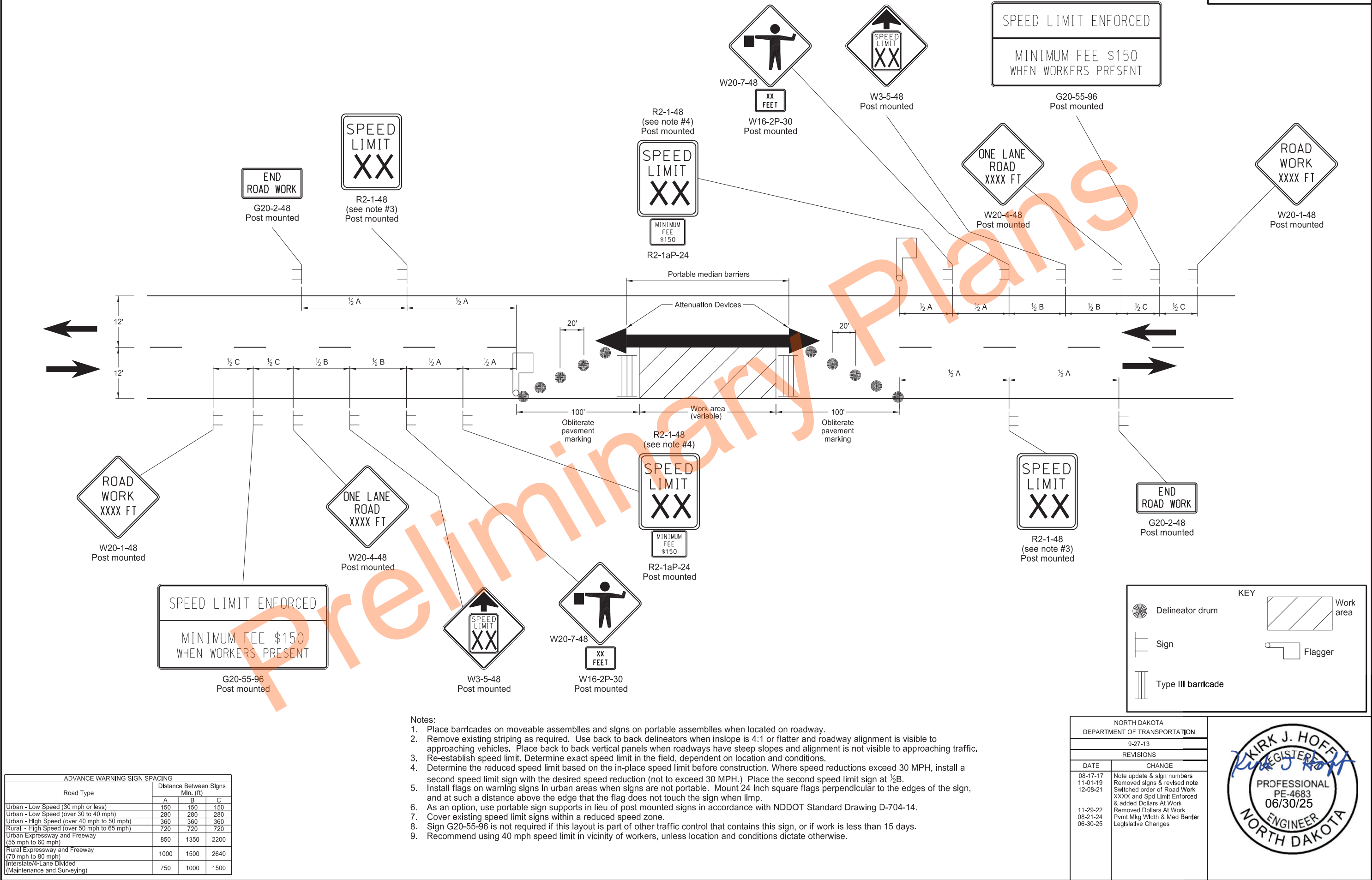
KEY	
	Work Area
	Type III Barricade
	Sign
	Delineator Drum
	Wood Pole

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
11-20-15	Revised Note 6 & Renumbered Minimum Fee plaque
08-17-17	Revised notes & added note
11-01-19	Revise sign #s & pvmt mk type
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work
08-31-23	Corrected Note 14 grammar
08-21-24	Pvmt Mkg Width & Med Bartr
06-30-25	Legislative Changes



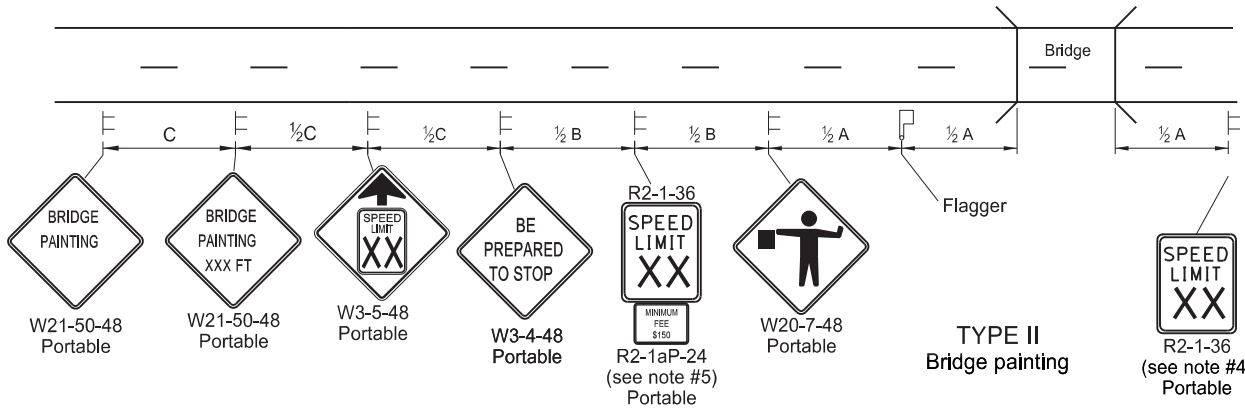
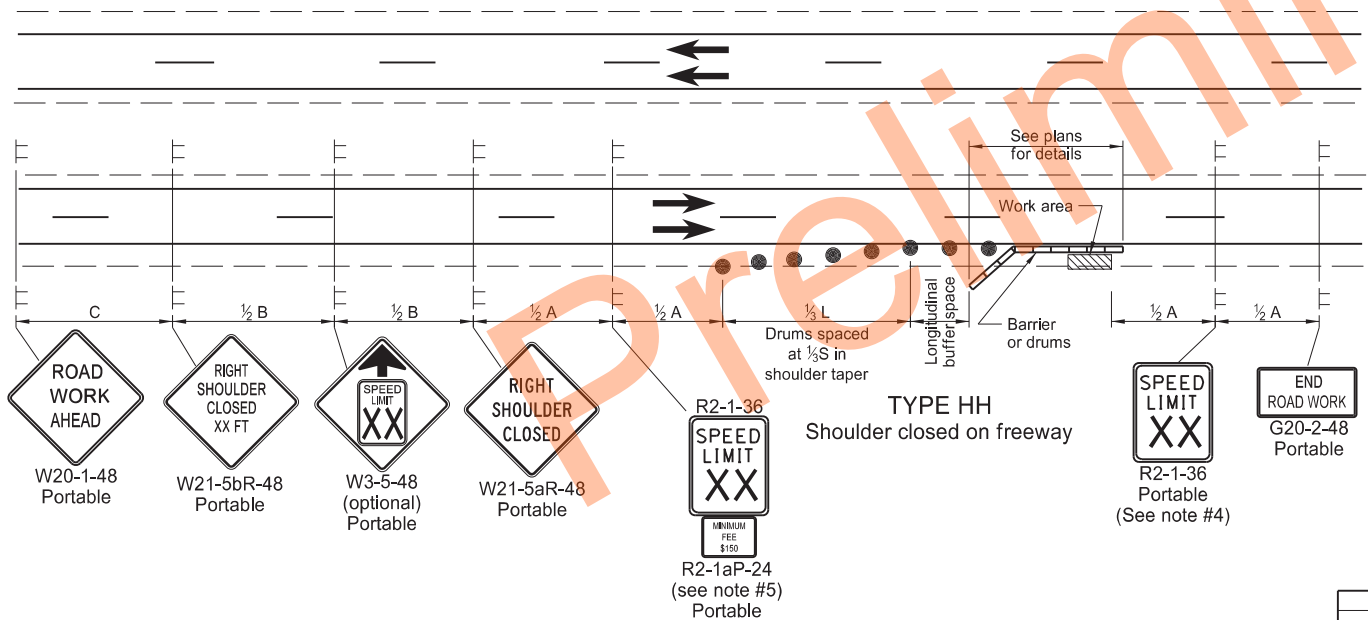
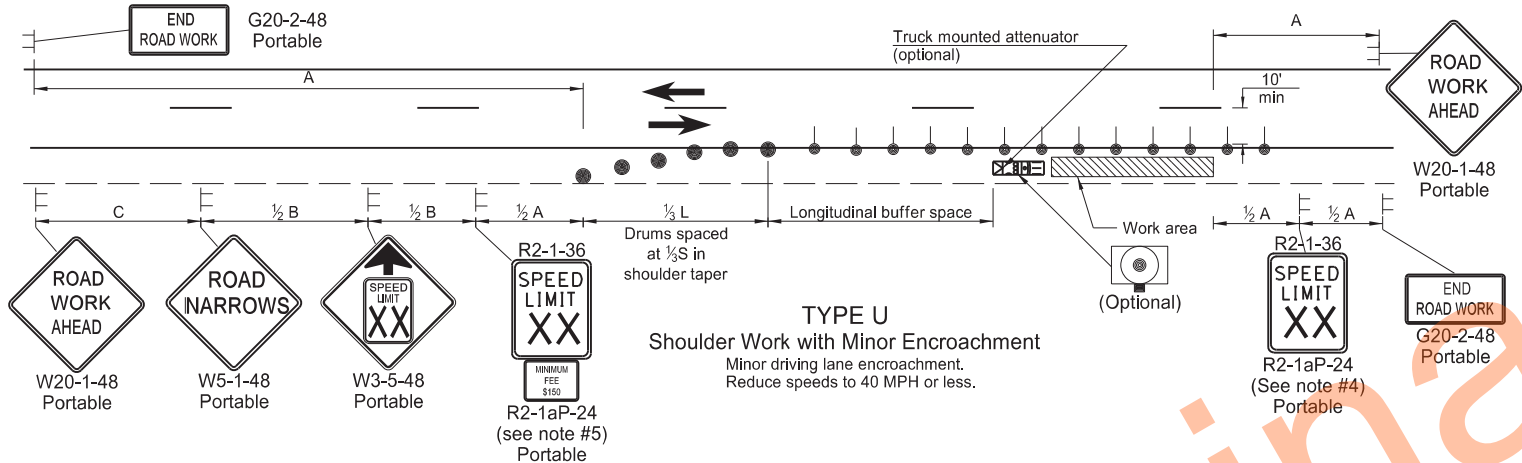
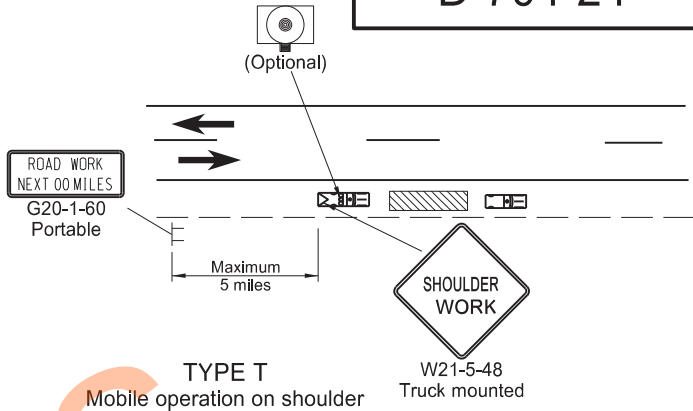
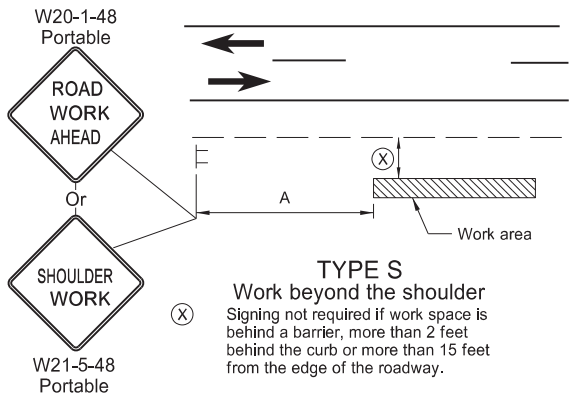
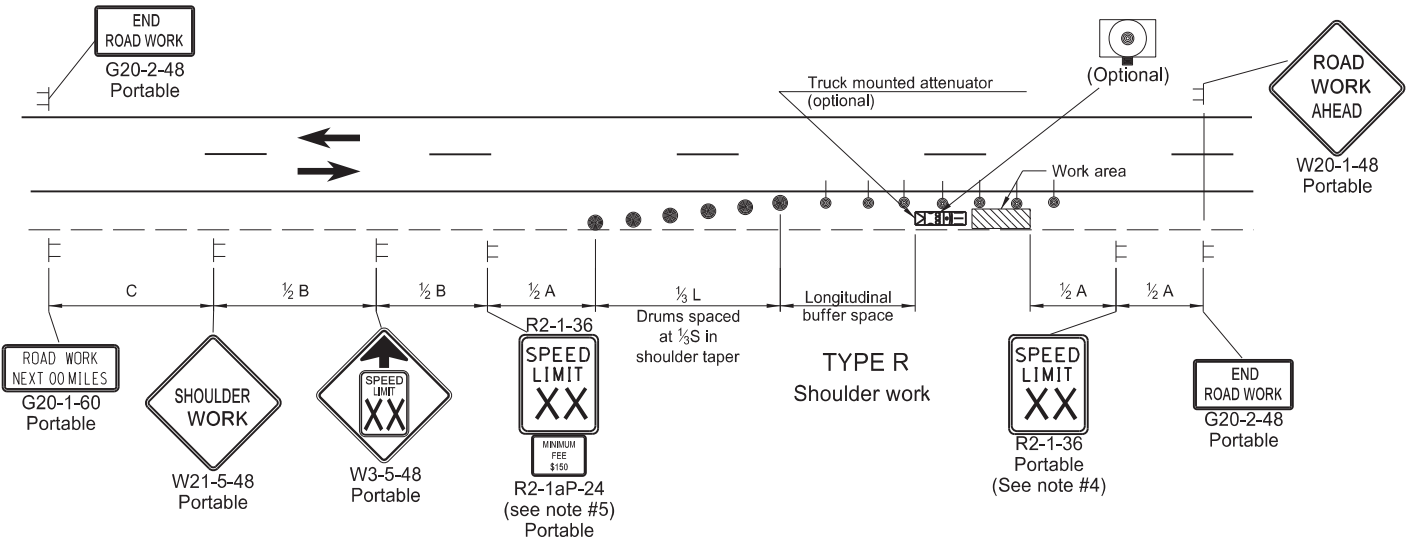
SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17

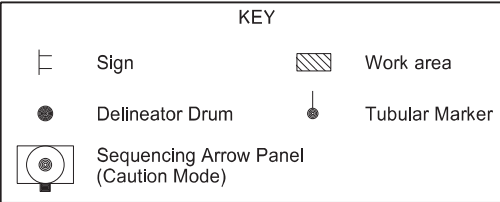


SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

D-704-24



- Notes
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of the taper in feet.
 - L = Minimum length of taper, S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S² / 60 for urban, residential, and other streets with speeds of 40 mph or less.
 - Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
 - Sequencing Arrow Panels
 - Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
 - Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
 - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - 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 the second speed limit sign at 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.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.



ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 80 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

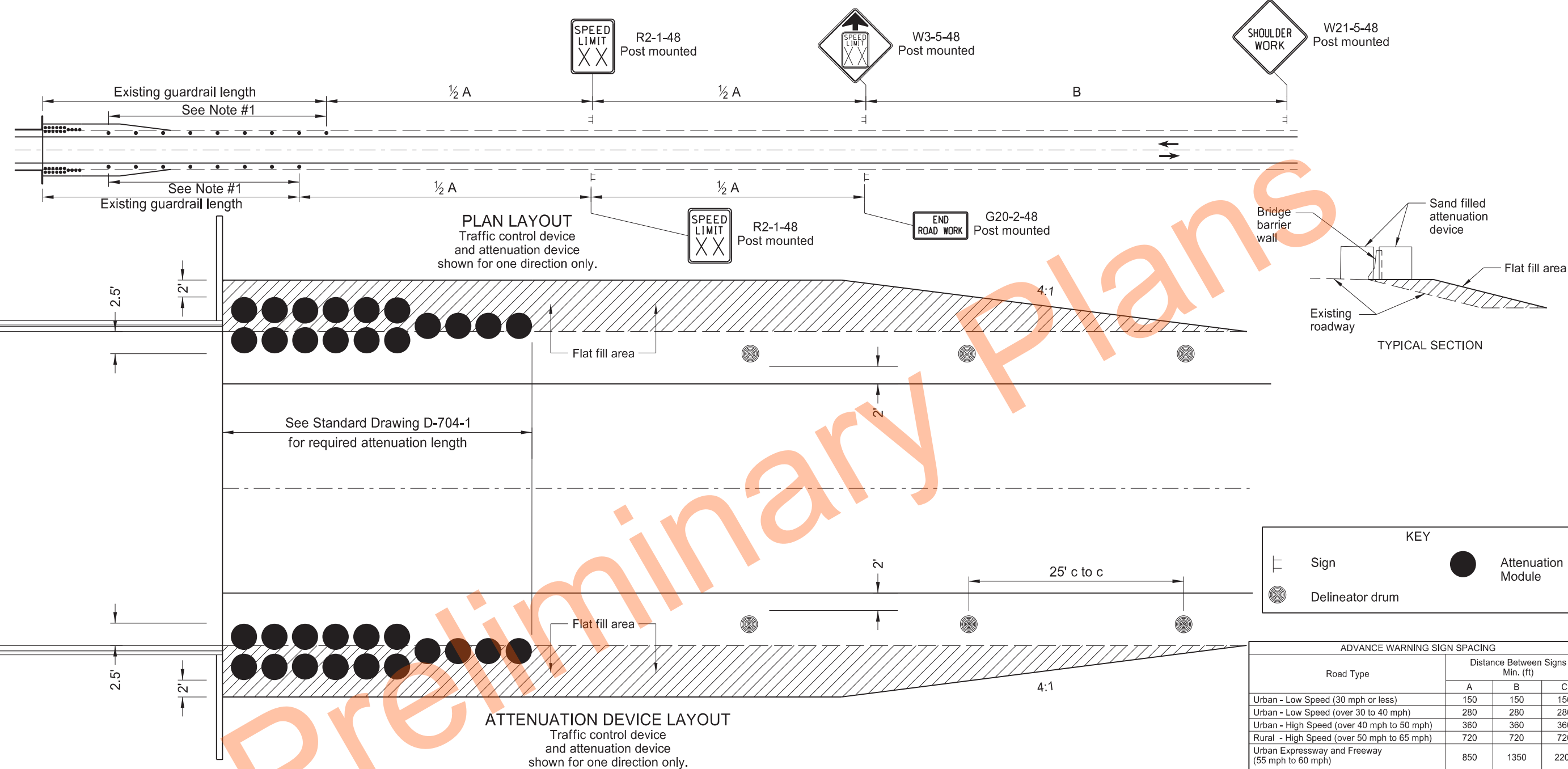
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Updated notes & revised signs
11-01-19	Revised drum spacing & signs nos
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes



10/30/24

SHORT TERM END TREATMENT FOR BRIDGES
(ATTENUATION DEVICE METHOD)

D-764-20



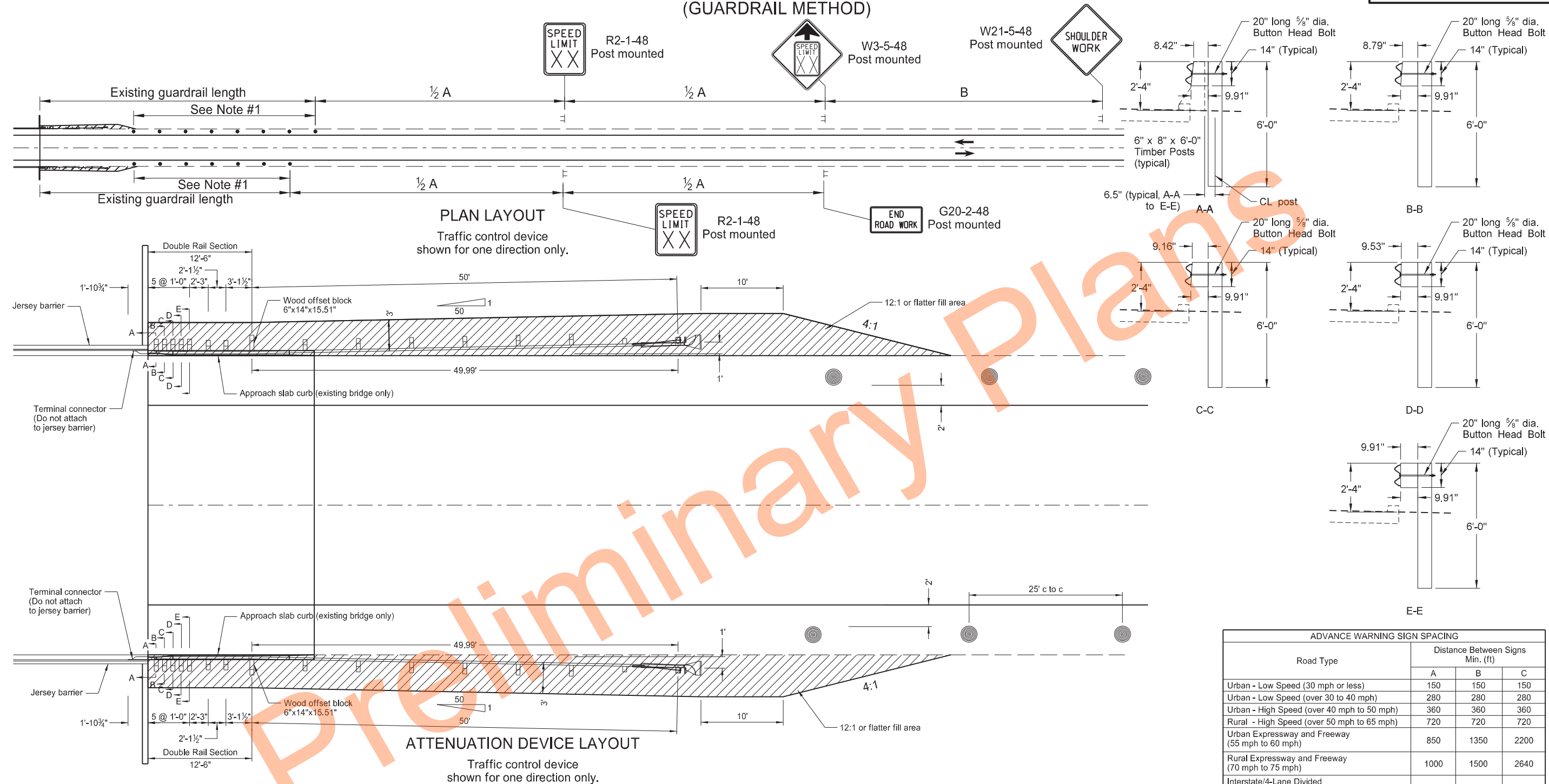
Notes

- When the shoulder width is less than 3', use vertical panels placed as far from the driving lane as possible on the finished shoulder. When there is no shoulder, place vertical panels as near as possible to the driving lane on the foreslope of the shoulder.
- When the bridge is within the construction zone signing, eliminate the reduced speed ahead sign.
- Determine the reduced speed limit dependent on the in place speed limit before construction. Where total speed reduction exceed 30 mph, reduce the speed limit in two stages with each reduction not exceeding 30 mph. Place the second speed limit sign at $\frac{1}{2}$ B.
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
- Cover existing speed limit signs within a reduced speed zone.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.



SHORT TERM END TREATMENT FOR BRIDGES (GUARDRAIL METHOD)

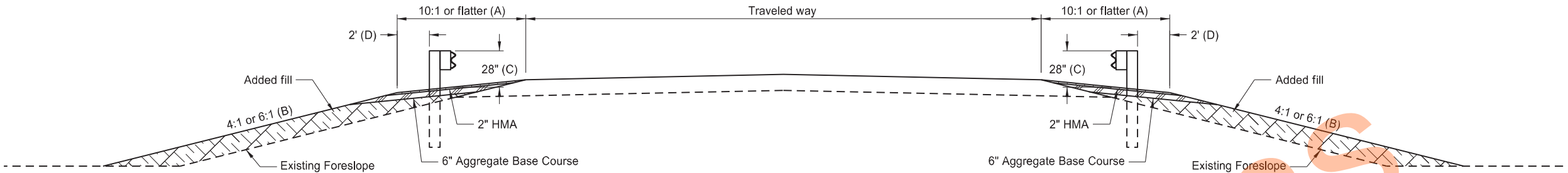


NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13
REVISIONS
DATE CHANGE
12-02-20 Updated notes to active voice.

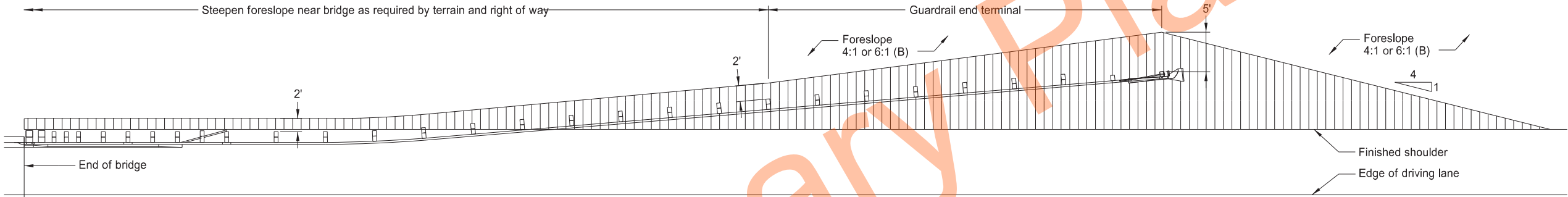
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

TYPICAL GRADING AT BRIDGE ENDS
WITH W-BEAM GUARDRAIL

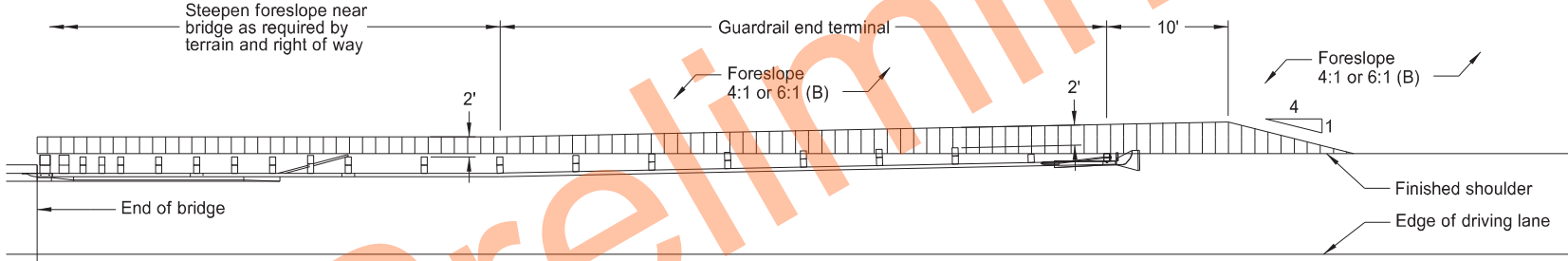
D-764-22



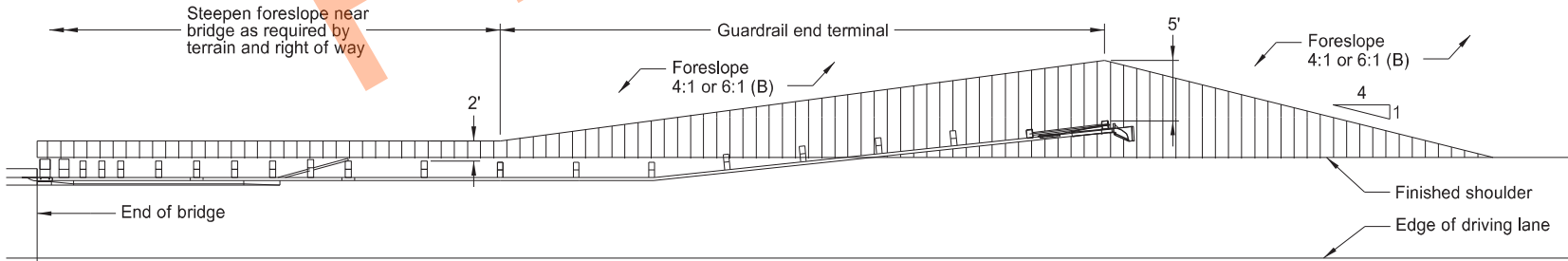
TYPICAL SECTION



PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

- NOTES:
- (A) Use slope flatter than 10:1 when necessary to provide proper guardrail height.
 - (B) When normal foreslope is 4:1, use added fill slope of 4:1. When normal foreslope is 6:1, use added fill slope of 6:1.
 - (C) Measure from top of guardrail to top of surfacing at front face of guardrail.
 - (D) Dimension at end terminals vary per Plan Layouts shown on this sheet.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

ENGINEER

NORTH DAKOTA

12 02 2020

D-764-38



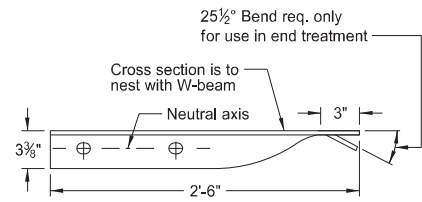
NOTE: Standard wood line post, block, and associated hardware not included in Bill of Materials Table.

1. Wood posts are required with the Flared Energy Absorbing Terminal except posts 1 and 2.
2. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Flare the Flared Energy Absorbing Terminal when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, ensure the Flared Energy Absorbing Terminal has only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, ensure the Flared Energy Absorbing Terminal is turned parallel to the roadway.
4. Site grade as necessary to ensure the lower sections of the posts do not protrude more than 4" above the ground (measured along a 5' cord).
5. Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material to prevent settlement.
6. Install the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent cable from twisting when tightening nuts.
7. "Toe nail" the wood blockouts to the rectangular wood posts with two 20 penny galvanized nails to prevent them from turning when the wood shrinks.

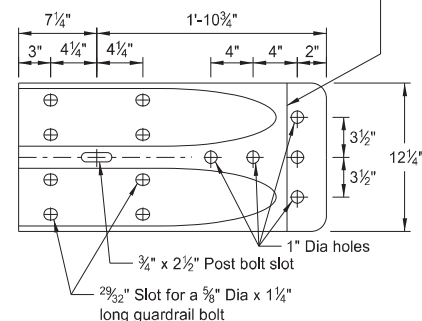
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.



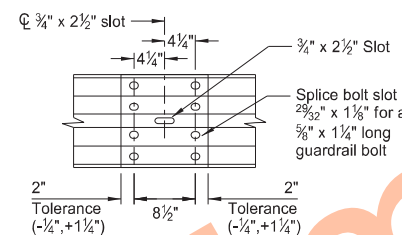
12 02 2020



Bend & hole only required to modify
connector for use in end treatment.



W BEAM TERMINAL CONNECTOR



SPLICE DETAIL

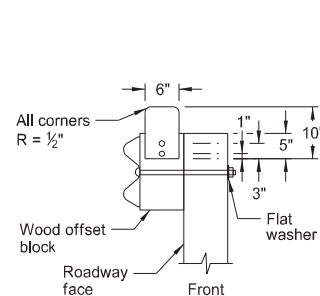


5/8" Diameter Carriage Bolt	
L	Thread Length
1½"	Full length thread
3"	1½" Min thread length
11"	1¾" Min thread length
13"	1¾" Min thread length

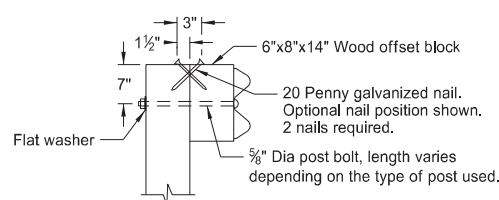


$\frac{5}{8}$ " Dia hex nut

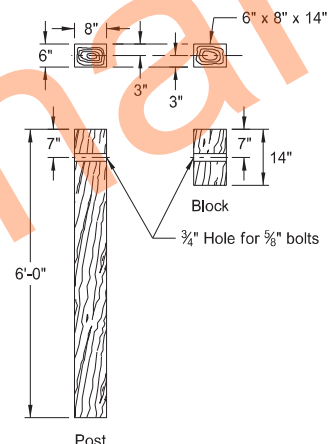
$\frac{5}{8}$ " CARRIAGE BOLT & NUT



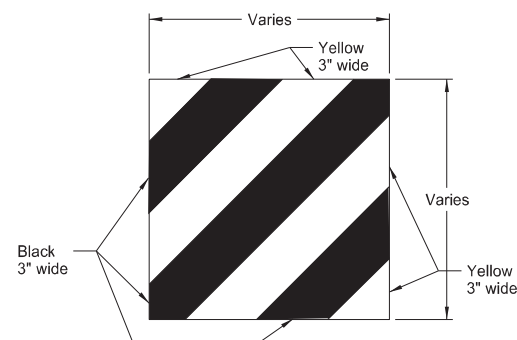
NOTE: Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



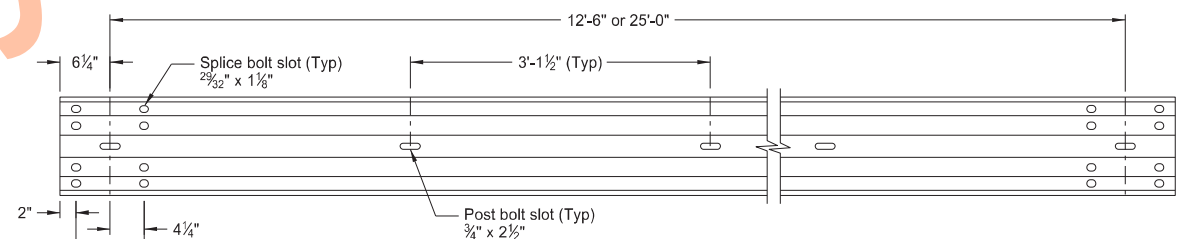
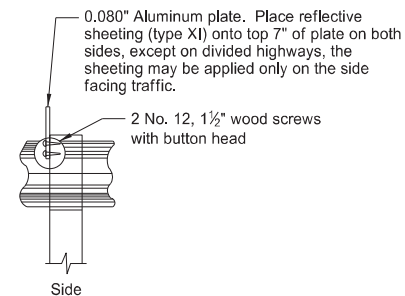
TYPICAL WOOD POST ATTACHMENT DETAIL



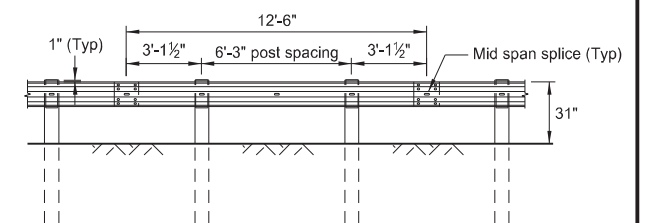
NOTE: Where soil conditions require, alternate lengths may be specified, in 6" increments.



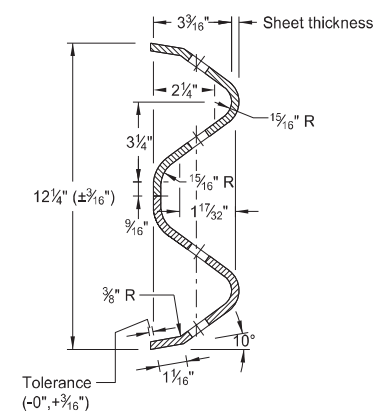
IMPACT HEAD OBJECT MARKER



STANDARD MGS GUARDRAIL PANEL



STANDARD MGS GUARDRAIL SYSTEM



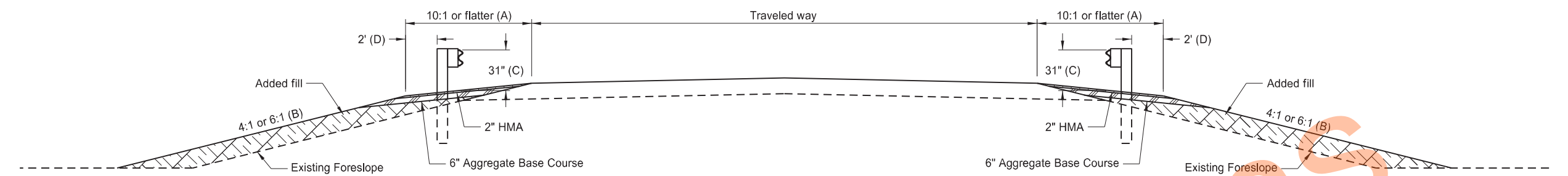
W-BEAM CROSS SECTION

1. Begin reflector plates at the first post and space at 25' centers on guardrail less than 250' length and at 50' centers for guardrail over 250' length. Provide the reflector the same color as the pavement marking adjacent to it unless noted otherwise on the plans.
2. Replacing bituminous material at guardrail post: Dispose all excess earth from excavations for guard posts as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. Fit the Object Marker within the vertical edges of the Impact Plate. Provide type XI retroreflective sheeting meeting the requirements of Section 894.02.E of the standard specifications. Apply the sheeting to 0.100 Aluminum sheeting meeting the requirements of Section 894.01.A. Attach the Object Marker to the Impact Head Plate with rivets or other attachment device. Ensure the rivets or attachment device are non-rust. Slope the stripes downward toward the roadway side.
4. Guardrail installation height tolerance = $\pm 1"$.

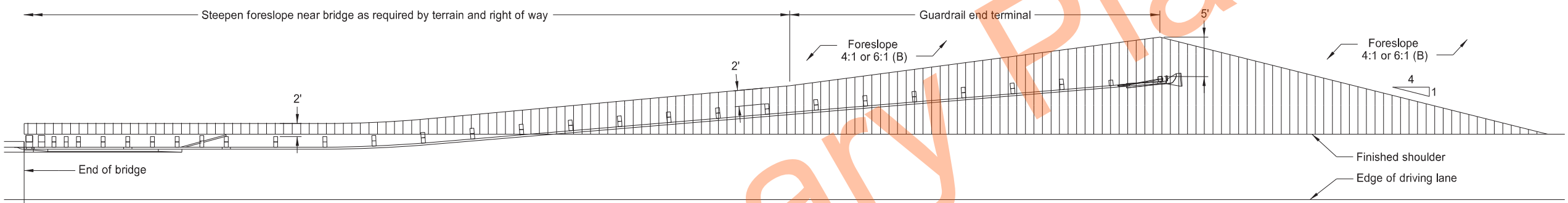
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TYPICAL GRADING AT BRIDGE ENDS
WITH MGS W-BEAM GUARDRAIL

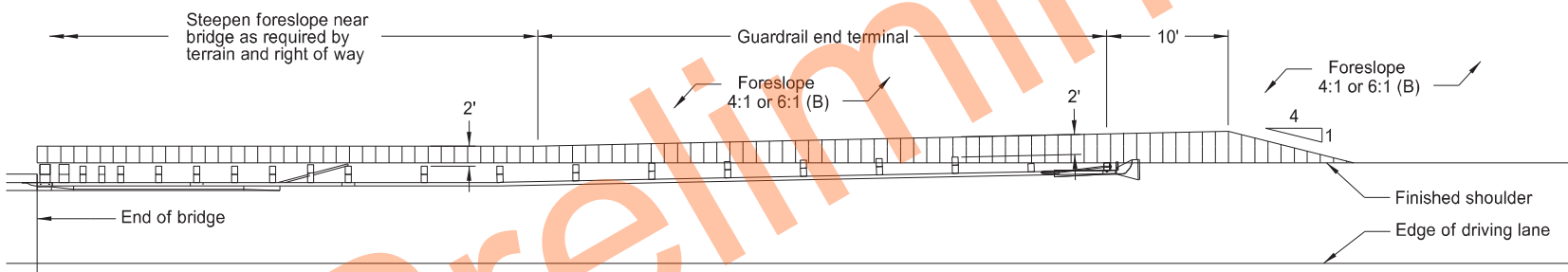
D-764-48



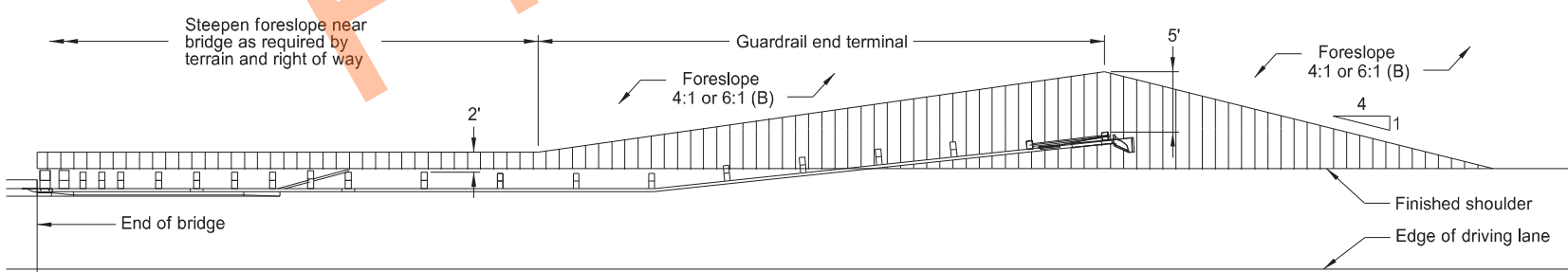
TYPICAL SECTION



PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

- (A) Use slope flatter than 10:1 when required to provide proper guardrail height.
- (B) When normal foreslope is 4:1, use added fill slope of 4:1. When normal foreslope is 6:1, use added fill slope of 6:1.
- (C) Measure from top of guardrail to top of surfacing at front face of guardrail.
- (D) Vary dimension at end terminals per Plan Layouts shown on this sheet.

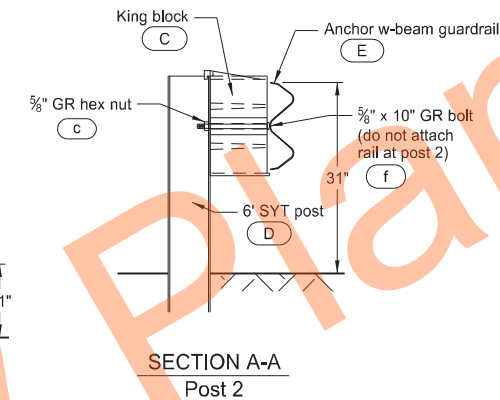
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12/02/20	Updated notes to active voice.



12 02 2020

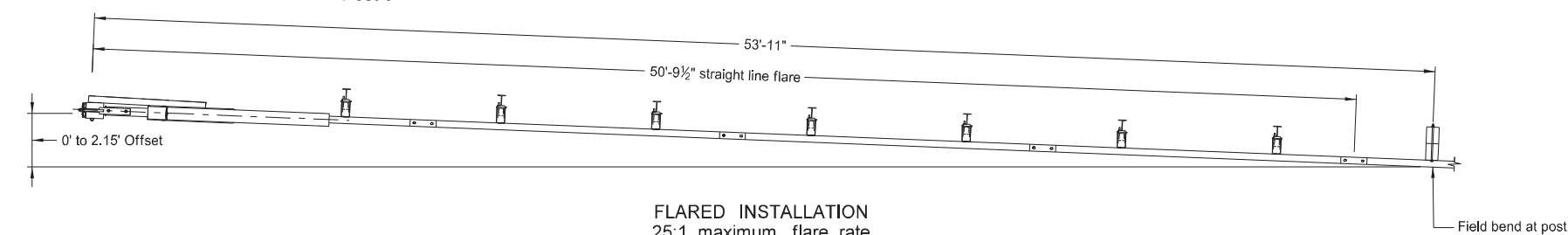
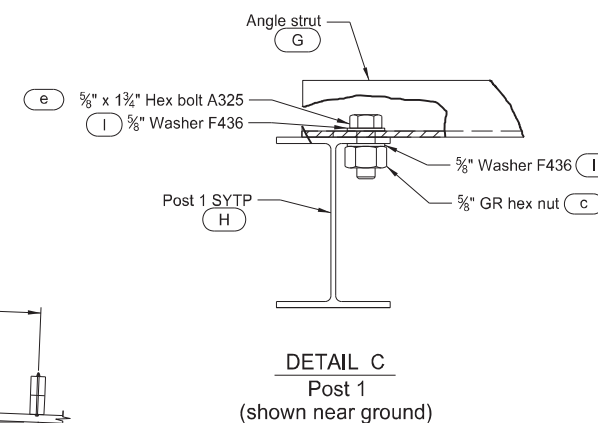
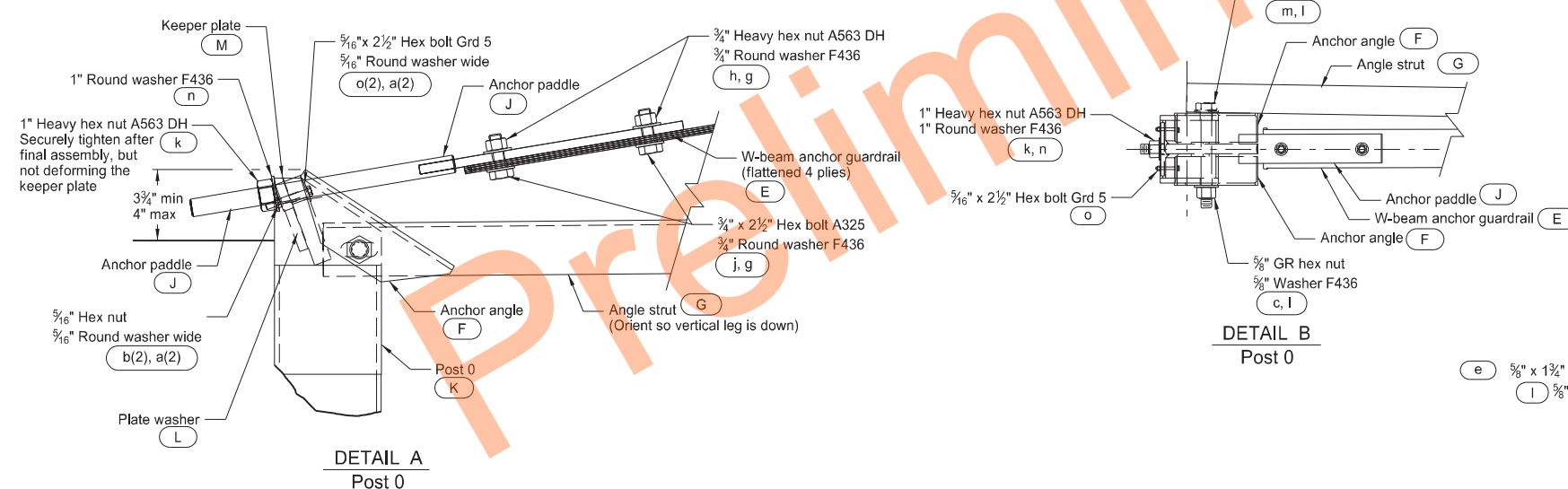
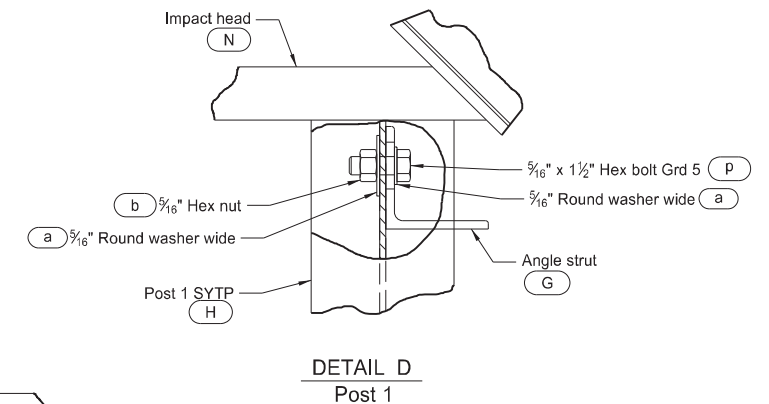
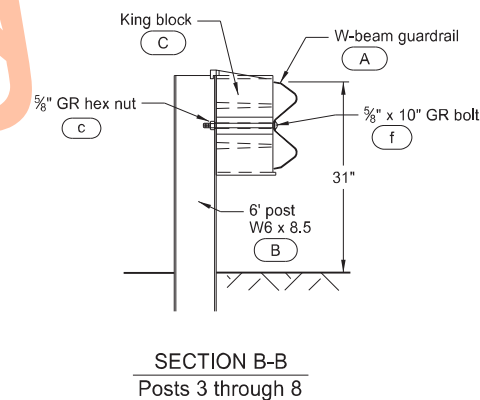
D-764-50

- ### GENERAL NOTES:
1. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
 2. Flare the SoftStop at a rate of 25:1 or flatter.
 3. Do not curve the guardrail within the SoftStop under any circumstances.
 4. If necessary, install the SoftStop impact head parallel to the grade line or with an upward tilt. See softstop assembly manual for specific details.



ITEM	ITEM NO.	BILL OF MATERIALS	QTY
A	000011	12 / 12'-6" / 3'-1½" / S MGS W-BEAM RAIL SECTION	3
B	000533	6'-0" STEEL POST W/6 x 8.5	6
C	006777	KING BLOCK 4" X 7½" X 1'-2"	7
D	015000	6'-0" SYT POST / 8.5 / 31" GR HT	1
E	015200	SFST - ANCHOR GUARDRAIL 12'-6"	1
F	015201	SFST - ANCHOR ANGLE	2
G	015202	SFST - ANGLE STRUT	1
H	015203	SFST - POST #1 SYTP	1
J	015204	SFST - ANCHOR PADDLE	1
K	015205	SFST - POST #0	1
L	015206	SFST - PLATE WASHER	1
M	015207	SFST - KEEPER PLATE	1
N	015208	SFST - IMPACT HEAD	1

HARDWARE			
a	003240	5/16" ROUND WASHER WIDE	6
b	003245	5/16" HEX NUT	3
c	003340	5/8" GR HEX NUT	41
d	003360	5/8" x 1 1/4" GR BOLT	32
e	003391	5/8" x 1 3/4" HEX BOLT A325	1
f	003500	5/8" x 10" GR BOLT A307	7
g	003701	3/4" ROUND WASHER F436	4
h	003704	3/4" HVY HEX NUT A563 DH	2
j	003717	3/4" x 2 1/2" HEX BOLT A325	2
k	003908	1" HVY HEX NUT A563 DH	1
l	004372	5/8" WASHER F436	4
m	004489	5/8" x 9" HEX BOLT A325	1
n	004902	1" ROUND WASHER F436	1
o	105285	5/16" x 2 1/2" HEX BOLT GRD 5	2
p	105286	5/16" x 1 1/2" HEX BOLT GRD 5	1

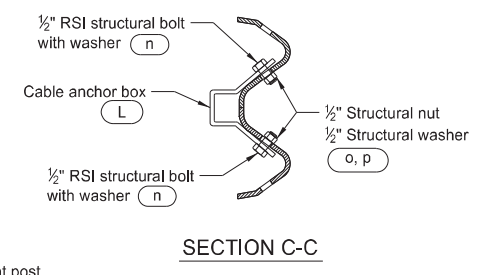
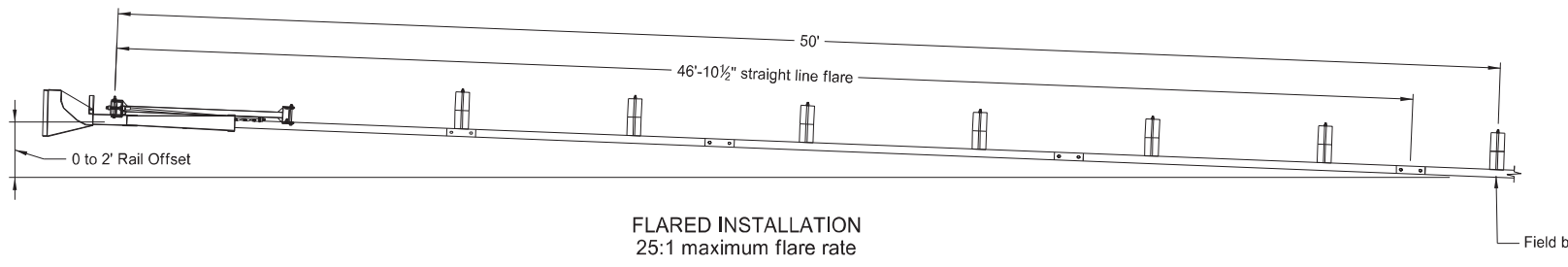
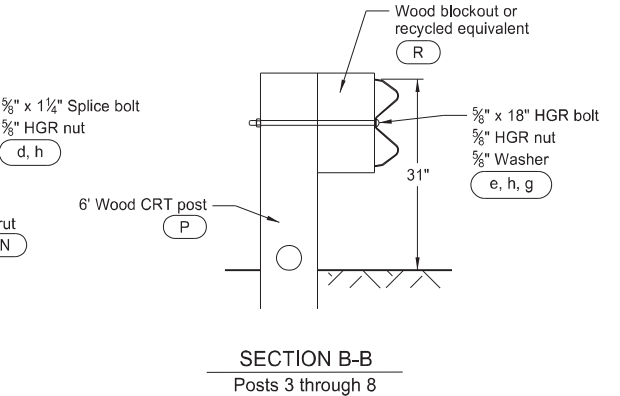
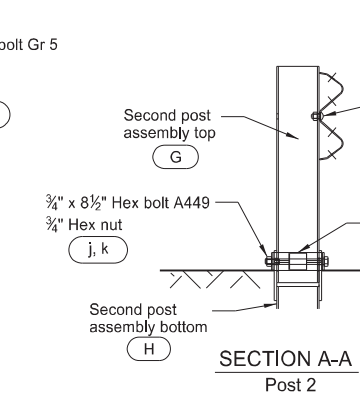
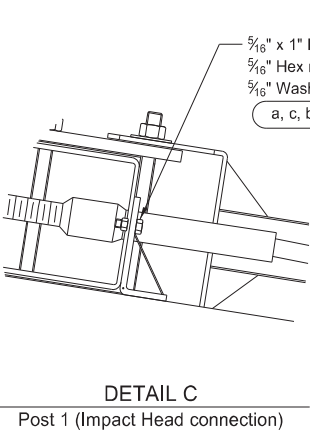
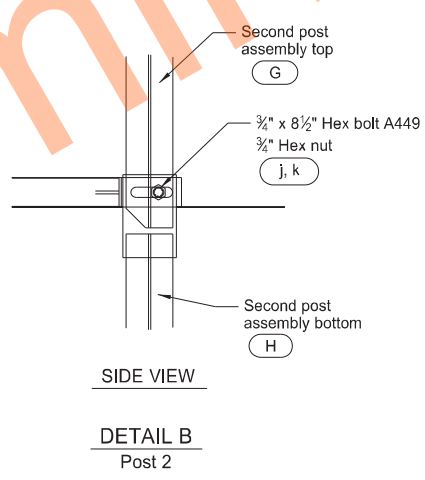
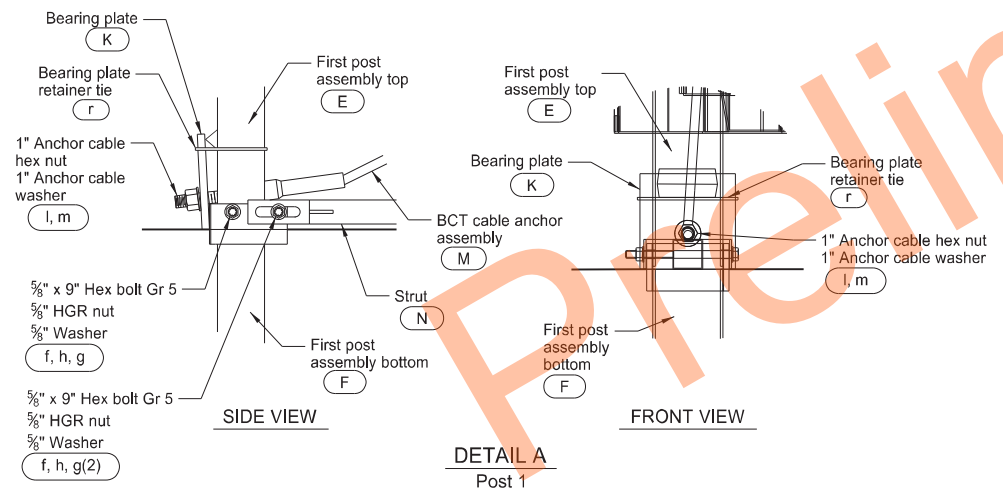
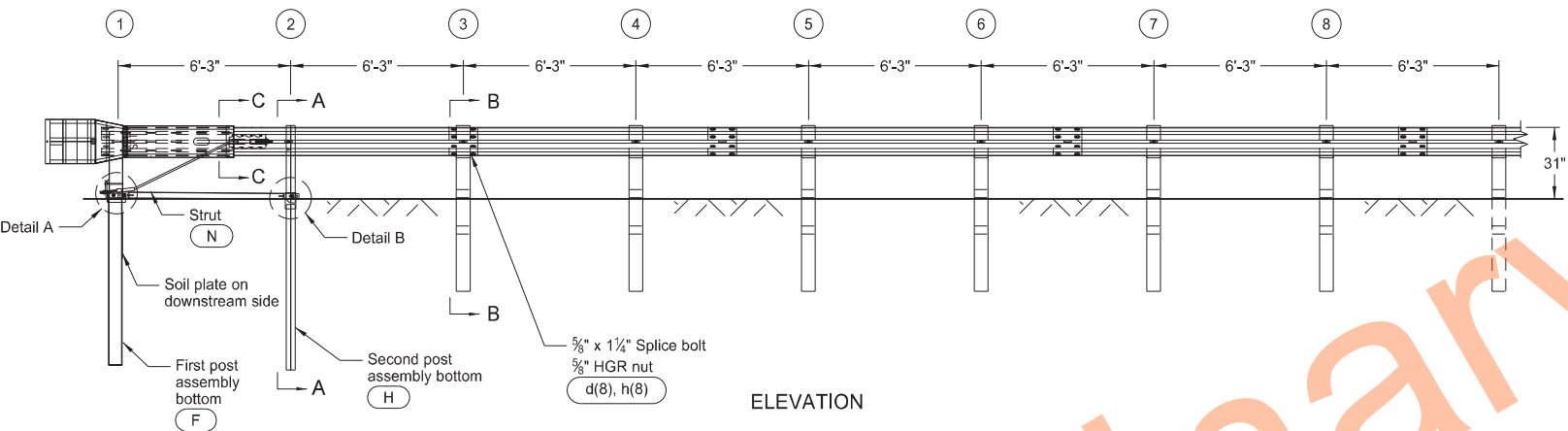
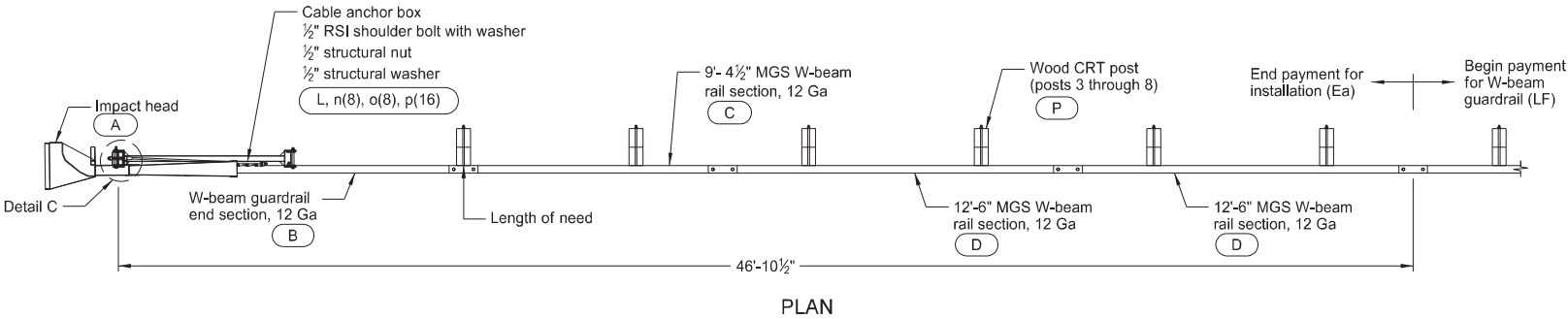


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.



MASH SEQUENTIAL KINKING TERMINAL - WOOD POST

D-764-51



- GENERAL NOTES:
- Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
 - Flare the MSKT at a rate of up to 25:1, as needed to prevent the impact head from encroaching on the shoulder.
 - Site grade as necessary to ensure the lower sections of posts do not protrude more than 4" above the ground (measured along a 5' cord).
 - Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material to prevent settlement.
 - Install breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
 - "Toe nail" the wood blockouts to the rectangular wood posts at post 3 through post 8 with two 20 penny galvanized nails to prevent them from turning when the wood warps.

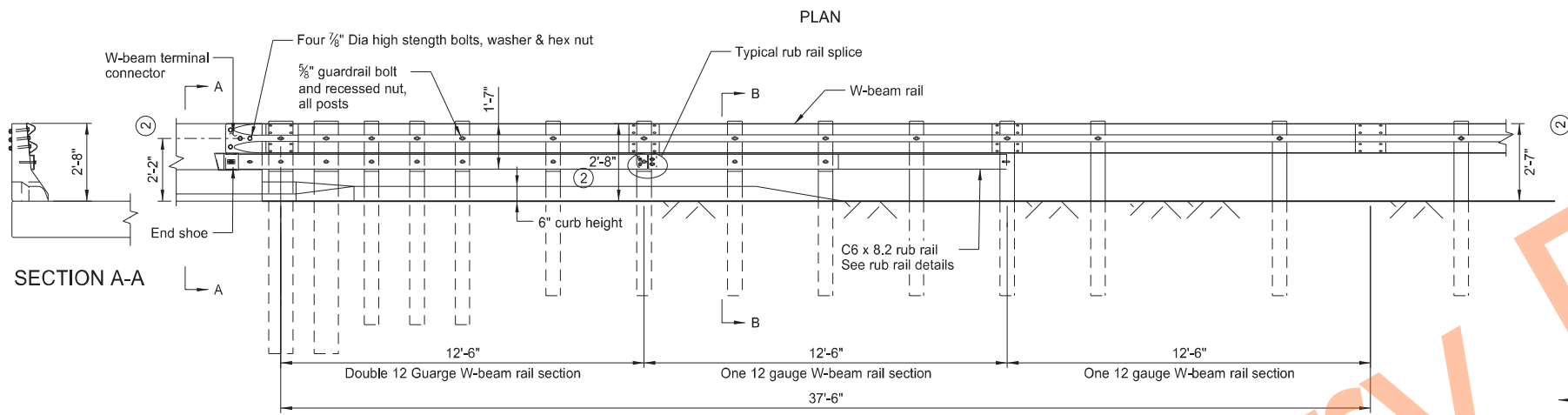
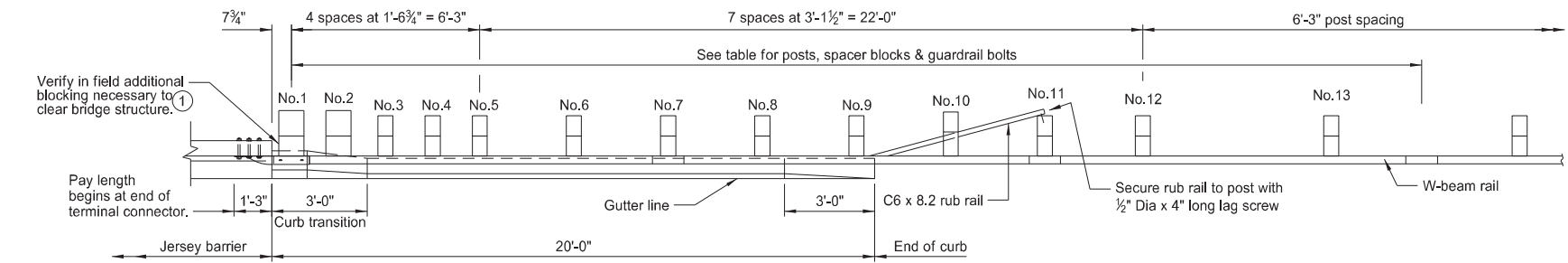
ITEM	ITEM NO.	BILL OF MATERIALS	QTY
A	MS3000	IMPACT HEAD	1
B	SF1303	W-BEAM GUARDRAIL END SECTION, 12 Ga	1
C	G12025	9'-4 1/2" MGS W-BEAM RAIL SECTION, 12 Ga	1
D	G1203A	12'-6" MGS W-BEAM RAIL SECTION, 12 Ga	2
E	MTPHP1A	FIRST POST ASSEMBLY TOP (6" X 6" X 1/8" Tube)	1
F	MTPHP1B	FIRST POST ASSEMBLY BOTTOM (6" W6X15)	1
G	UHP2A	SECOND POST ASSEMBLY TOP	1
H	HP2B	SECOND POST ASSEMBLY BOTTOM	1
K	E750	BEARING PLATE	1
L	S760	CABLE ANCHOR BOX	1
M	E770	BCT CABLE ANCHOR ASSEMBLY	1
N	MS785	STRUT	1
P	UP671	6' WOOD CRT POST	6
R	P675	WOOD BLOCKOUT OR RECYCLED EQUIVALENT	6
HARDWARE			
a	B5160104A	5/16" x 1" HEX BOLT GR 5	2
b	W0516	5/16" WASHER	4
c	N0516	5/16" HEX NUT	2
d	B580122	5/8" Dia x 1 1/4" SPLICE BOLT	33
e	B581802	5/8" Dia x 18" HGR BOLT (POSTS 3 THRU 8)	6
f	B580904A	5/8" x 9" HEX BOLT GR 5	2
g	W050	5/8" WASHER	9
h	N050	5/8" Dia HGR NUT	35
j	B340854A	3/4" Dia x 8 1/2" HEX BOLT GRD A449	1
k	N030	3/4" Dia HEX NUT	1
l	N100	1" ANCHOR CABLE HEX NUT	2
m	W100	1" ANCHOR CABLE WASHER	2
n	SB12A	1/2" RSI SHOULDER BOLT WITH WASHER	8
o	N012A	1/2" STRUCTURAL NUT	8
p	W012A	1/2" STRUCTURAL WASHER	8
r	CT-100ST	BEARING PLATE RETAINER TIE	1

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

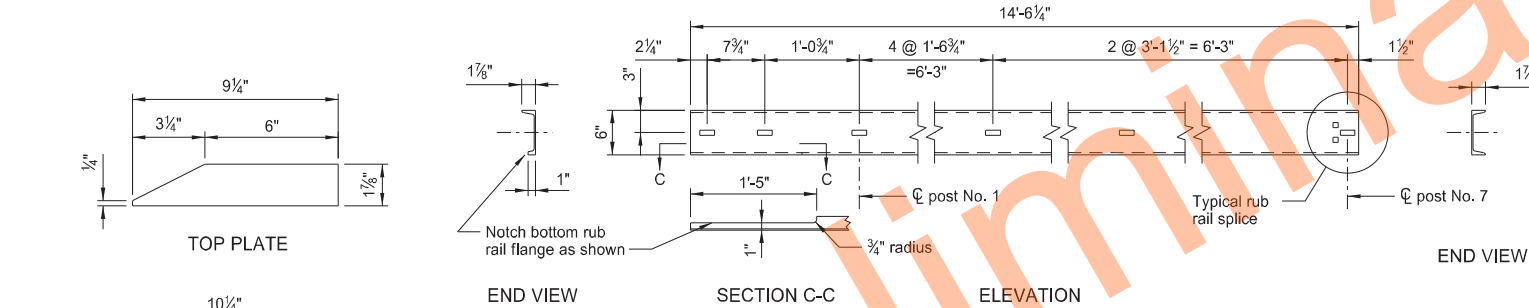


MGS W-BEAM TRANSITION WITH APPROACH CURB TO IN PLACE CONCRETE JERSEY BARRIER

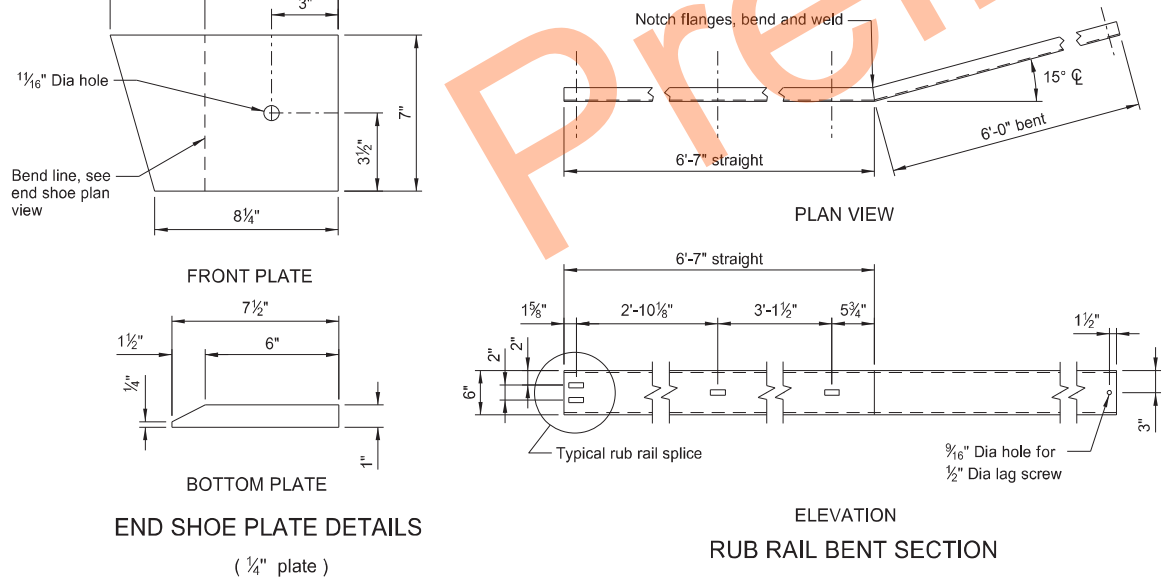
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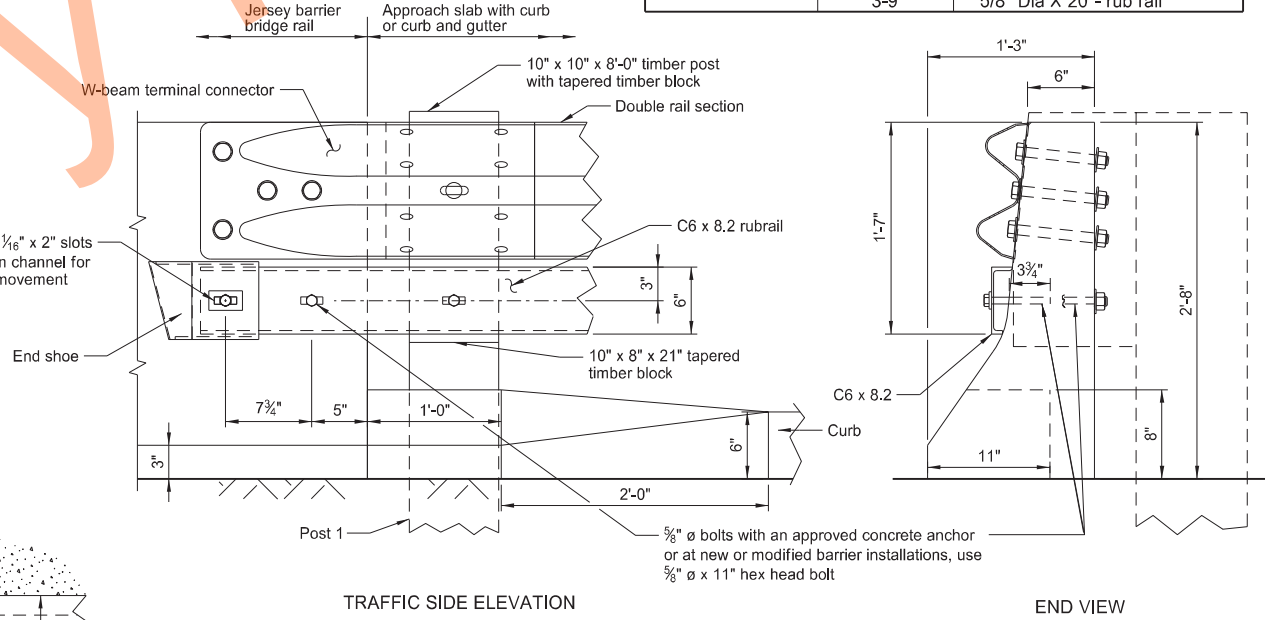
GENERAL ASSEMBLY DETAILS



RUB RAIL STRAIGHT SECTION



RUB RAIL BENT SECTION



RAIL ATTACHMENT AND CURB DETAIL

- 1 Verify need for additional blocking at post No. 1 in the field.
2 Height is 2'-8" from 0' to 12'-6" from bridge. Height tapers from 2'-8" to 2'-7" between 12'-6" to 37'-6" from bridge.

NOTES:

Galvanize AASHTO 270M Grade 250 C6 x 8.2 rub rail and structural steel after fabrication

All rub rail slotted holes are 1 1/16" x 2".

All rub rail square holes are 1 1/16".

Use timber posts and blocks for W-beam guardrail.

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