

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	IM-BRI-8-029(216)000	23905	1	1

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

IM-BRI-8-029(216)000

Richland County
I-29 102nd St. SE Interchange
I-29 Kindred Interchange
Bridge Deck Overlay, Spall Repair, Curb Overlay,
Slope Protection Repairs, & Pier Embankment Repair

GOVERNING SPECIFICATIONS

Date Published and Adopted
by the North Dakota
Department of Transportation

Standard Specifications

7/1/2025

Supplemental Specifications

NONE

PROJECT NUMBER \ DESCRIPTION

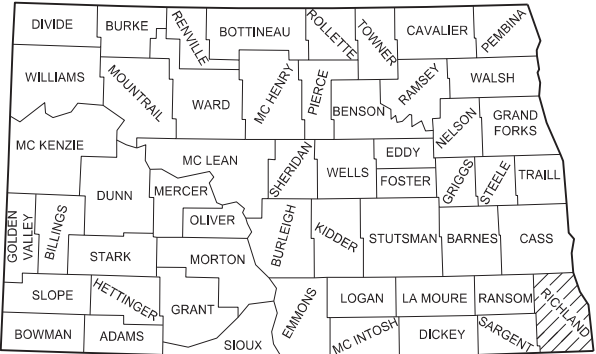
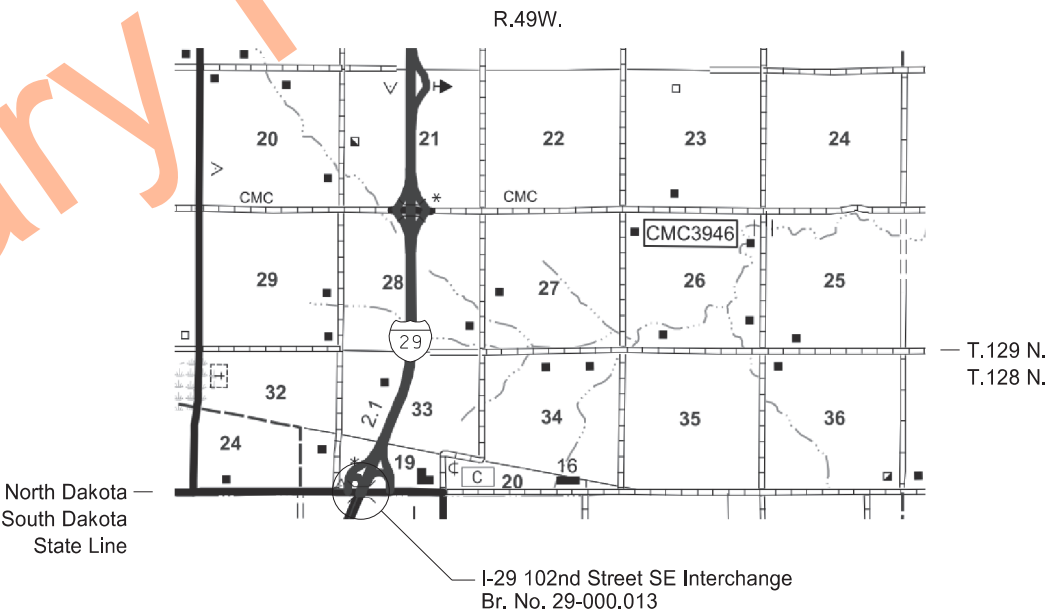
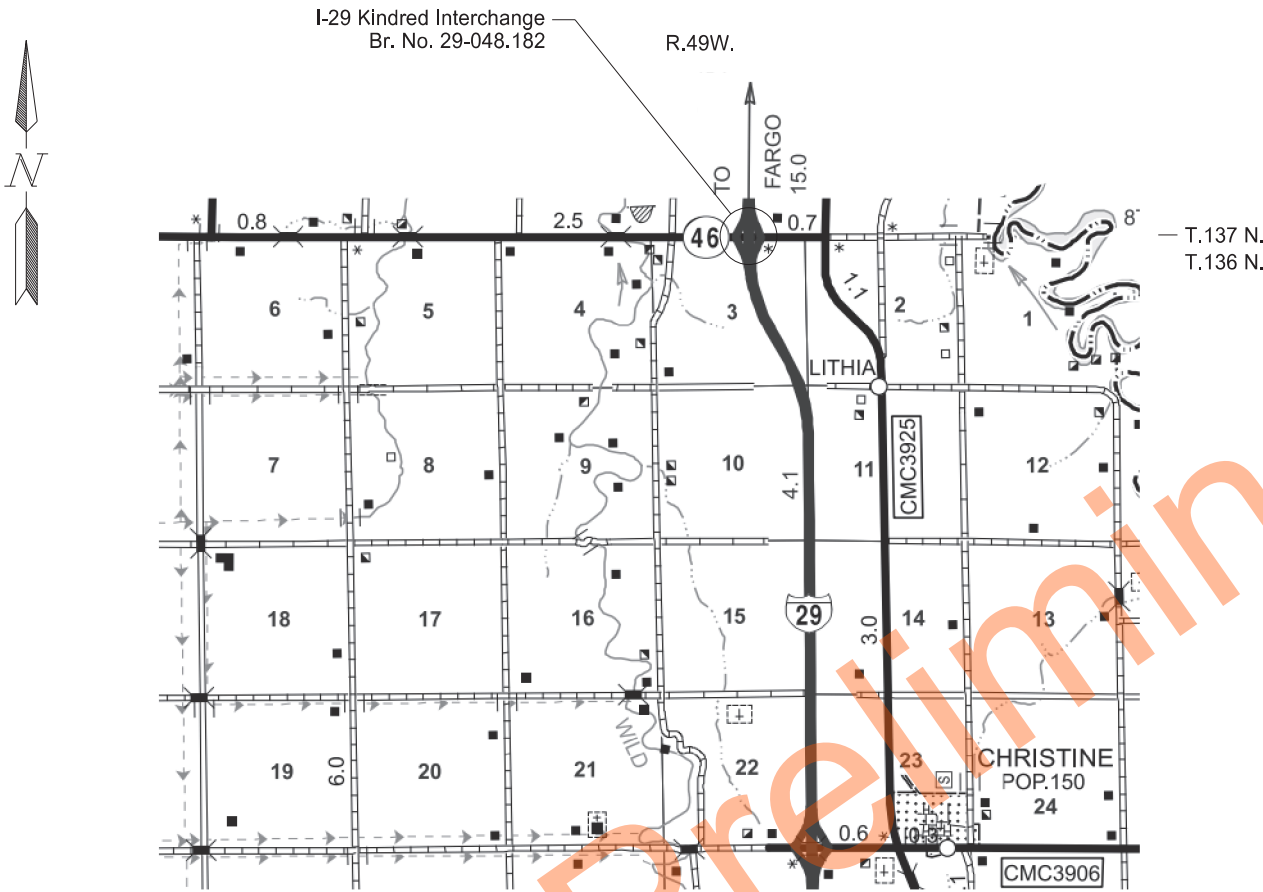
IM-BRI-8-029(216)000

NET MILES

0.00

GROSS MILES

0.00



STATE COUNTY MAP

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Jason Thorenson

Jason Thorenson
08/04/26

NDDOT BRIDGE DIVISION



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SPECIAL PROVISIONS										
Number	Description									
SSP 2	Federal Migratory Bird Treaty Act									
SSP 10	E-Ticketing									
SP 464(25)	Concrete Spall Repair									
SP 465(25)	Hydrodemolition and Overlay of Concrete Bridge Decks									
SP 466(25)	Commercial Grade Asphalt With Density									
SP 547(25)	Tribal Employment Rights Ordinance (TERO)									

This preliminary plan view illustrates the proposed bridge deck rehabilitation project on I-29. The project area is centered around the intersection of I-29 and 54th Street SE. The bridge deck is shown with a cross-hatched pattern, indicating the area of rehabilitation. The project is bounded by a 2" Mill & Fill area on the left and a 2" Mill & Fill area on the right. The bridge deck is labeled with the project number RP 48.182. The bridge deck is shown with a cross-hatched pattern, indicating the area of rehabilitation. The project is bounded by a 2" Mill & Fill area on the left and a 2" Mill & Fill area on the right. The bridge deck is labeled with the project number RP 48.182. The bridge deck is shown with a cross-hatched pattern, indicating the area of rehabilitation. The project is bounded by a 2" Mill & Fill area on the left and a 2" Mill & Fill area on the right. The bridge deck is labeled with the project number RP 48.182.

Scope of Work RP 000 & RP 048 Bridge Rehabilitation	 08/03/26
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NOTES

- 105-110

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 to perform this work.
- 107-100

LAWS TO BE OBSERVED: All or a portion of this project lies within the exterior boundaries of an Indian Reservation. Review law and ordinances pertaining to the work contained within the boundaries of the reservation.
- 108-500

TERO COORDINATION: Invite the Tribal TERO Office to the Preconstruction Conference.
- 704-200

STATE FURNISHED MEDIAN BARRIER: Obtain (73) 2' x 10' concrete barriers and (32) 18" x 19' steel barriers. They can be picked up and returned to the Casselton yard at 15482 37th St SE in Casselton ND 58012. The hardware can be picked up and returned to the Fargo District yard at 503 38th St S in Fargo ND 58103. Contact the Fargo District office at 701-239-8900 to facilitate the exchanges.

If returning barriers with connection components, coordinate the delivery location for the connecting components with the Engineer. Some 4 inch x 4 inch boards are available at the return location. Provide any additional 4 inch x 4 inch boards necessary to stack barriers. The boards will become property of the Department.

Include all costs associated with median barriers in the contract unit price for "State Furnished Median Barrier".
- 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".

- 704-500

PORTABLE RUMBLE STRIPS (PRS): Use PRS made of rubber or engineered polymers.

Install PRS as part of the temporary traffic control when the following signs are also part of the required traffic control set up:

 - "Be Prepared to Stop" (W3-4); and
 - "Flagger" symbol (W20-7)

Install PRS that meet the following criteria:

 - Have no adhesives or fasteners required for placement;
 - Have a manufacture's speed rating that meets or exceeds the posted speed limit; and
 - Each strip in the array must weigh a minimum of 100 pounds.

Use individual PRS constructed in one of the following manners:

 - A single piece;
 - Interlocking segments; or
 - Two pieces hinged at the midpoint.

An installed array of PRS consists of a minimum of 3 individual strips.

Move rumble strips with the flagging operation. Do not place rumble strips on horizontal curves.

The Engineer will count and measure each array as one unit. Include the cost of providing, installing, maintaining, and relocating PRS in the unit price bid for "Portable Rumble Strips".
- 704-P01

TRAFFIC CONTROL: Traffic control device quantities are based on the following list:

 - D-704-16 or D-704-17, Temporary Lane Closure.
 - D-704-18, One-Lane Closure – For slope protection replacement at RP 000, median pier embankment grading at RP 048, and for single lane closures beneath the structures at RP 000 and 048 during roadway canopy installation and removal.
 - D-704-22, Construction Truck and Temporary Detour Layouts – Type K & L for hauling material.
 - D-704-33, Two-Lane Roadway Portable Rumble Strips – For mill and fill operations
 - D-704-35 One Lane Closure – For east slope protection replacement at RP 048.



08/03/26

NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	6	2

- 704-P02 WORK ZONE TRAFFIC CONTROL PHASES: Work can be performed at both structures concurrently. The device list and plan sheets have been developed based on the following phases:
- RP 000

Phase 1

Perform single lane closures on I-29 (one bound at a time) beneath the structure as canopy is installed overhead in accordance with D-704-18. Close the WB lane while performing the north half of the bridge deck overlay. Place signing for the single lane closure in accordance with Sheets 100-4-8.

Phase 2

Flip the traffic control on Sheets 100-4-8 to close the EB lanes while performing the south half of the bridge deck overlay. Perform single lane closures on I-29 (one bound at a time) beneath the structure as canopy is removed overhead in accordance with D-704-18.

Phase 3

Perform Mill and Overlay operations with signing in accordance with D-704-33 beyond the bridge ends. Construct one bound at a time. Both lanes of traffic must be open after work is completed for the day.

Phase A (Can be performed concurrently with any numbered phase)

Perform right lane closure of NB and SB I-29 (including turn lane) to repair the slope protection underneath the bridge in accordance with D-704-35 and Section 100, Sheet 100-9 for additional signing to accommodate turn lane.
- RP 048

Phase 1

Perform single lane closures on I-29 (one bound at a time) beneath the structure as canopy is installed overhead in accordance with D-704-18. Close the WB lane while performing the north half of the bridge deck overlay. Place signing for the single lane closure in accordance with Sheets 100-4,10-14.

Phase 2

Flip the traffic control on Sheets 100-4, 10-14 to close the EB lanes while performing the south half of the bridge deck overlay. Perform single lane closures on I-29 (one bound at a time) beneath the structure as canopy is removed overhead in accordance with D-704-18.

Phase 3

Perform Mill and Overlay operations with signing in accordance with D-704-33 beyond the bridge ends. Construct one bound at a time. Both lanes of traffic must be open after work is completed for the day.

Phase B (Can be performed concurrently with any numbered phase)

Perform right lane closure of NB I-29 to repair the slope protection underneath the bridge in accordance with D-704-18.

Phase C (Can be performed concurrently with any numbered phase)

Perform left lane closure of NB and SB I-29 to perform earthwork grading repair the pier in accordance with D-704-35.



ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	8	1

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100 CONTRACT BOND	L SUM	1	1
203	0195 EMBANKMENT SPECIAL	L SUM	1	1
255	0201 TRM TYPE 1	SY	115	115
258	0200 REMOVE & REPLACE CONCRETE SLOPE PROTECTION	SY	423	423
411	0114 MILLING PAVEMENT SURFACE - 2 INCH	SY	6,744	6,744
430	0500 COMMERCIAL GRADE HOT MIX ASPHALT	TON	755	755
430	1000 CORED SAMPLE	EA	7	7
602	1250 PENETRATING WATER REPELLENT TREATMENT	SY	2,668	2,668
602	1300 BRIDGE DECK GROOVING	SF	17,050	17,050
624	3012 REMOVE & RESET DBL BOX BEAM RETROFIT - E-RAIL	LF	980	980
650	0704 OVERLAY CONCRETE	CY	132	132
650	0707 DECK CONCRETE	CY	79	79
650	0710 CLASS 1-H REMOVAL	SY	1,894	1,894
650	0720 CLASS 1 REMOVAL	SY	1,894	1,894
650	0723 CLASS 3 REMOVAL	SY	294	294
650	0724 CLASS 4 REMOVAL	SY	147	147
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	140	140
704	1000 TRAFFIC CONTROL SIGNS	UNIT	4,698	4,698
704	1018 LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EA	2	2
704	1038 ATTENUATION DEVICE-TYPE B-40	EA	1	1
704	1039 ATTENUATION DEVICE-TYPE B-45	EA	1	1
704	1041 ATTENUATION DEVICE-TYPE B-55	EA	1	1
704	1043 ATTENUATION DEVICE-TYPE B-65	EA	1	1
704	1046 ATTENUATION DEVICE-TYPE B-80	EA	1	1
704	1048 PORTABLE RUMBLE STRIPS	EA	4	4
704	1052 TYPE III BARRICADE	EA	8	8
704	1060 DELINEATOR DRUMS	EA	102	102
704	1067 TUBULAR MARKERS	EA	49	49
704	1087 SEQUENCING ARROW PANEL-TYPE C	EA	2	2
704	1500 OBLITERATION OF PAVEMENT MARKING	SF	1,329	1,329
704	3511 STATE FURNISHED MEDIAN BARRIER	LF	1,338	1,338
748	0141 CURB & GUTTER-TYPE 1 SPECIAL	LF	60	60

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	8	2

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
762	0422 SHORT TERM 6IN LINE-TYPE R	LF	18,880	18,880
762	0426 SHORT TERM 24IN LINE-TYPE R	LF	48	48
762	1106 PVMT MK PAINTED 6IN LINE	LF	8,900	8,900
764	0150 REMOVE & RESET GUARDRAIL	LF	83	83
930	7012 ROADWAY CANOPY	L SUM	1	1
930	9612 SPALL REPAIR	SF	69	69
930	9690 CURB OVERLAY	LF	980	980

Preliminary Plans

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	1106	PVMT MK PAINTED 6IN LINE		
		RP 000 Yellow Centerline Lines	2900	LF
		RP 000 White Edge Lines	2900	LF
		RP 048 Yellow Centerline Lines	1550	LF
		RP 048 White Edge Lines	1550	LF

HMA (CY) * 2 Ton/CY = Tons of HMA

HMA Cored Samples (RP 000)							
	A	B		C			
Specification Section	Distance (Ft) □ 1000	Lanes	Joints	Lifts	Quantity (A x B x C)	Quantity (1 per mile)	Unit
430.04 I.2.b(2), "Pavement Density Cores"	1	2	N/A	1	2	N/A	EA
SSP 4 Longitudinal Joint Density in HMA Pavements (Centerline)	1	N/A	1	1	1	N/A	EA
430.04 I.2.b(3), "Pavement Thickness Determination Cores"					N/A	0	EA
				Total	3	0	EA

HMA Cored Samples (RP 048 - Kindred)							
	A	B		C			
Specification Section	Distance (Ft) □ 1000	Lanes	Joints	Lifts	Quantity (A x B x C)	Quantity (1 per mile)	Unit
430.04 I.2.b(2), "Pavement Density Cores"	1	2	N/A	1	2	N/A	EA
SSP 4 Longitudinal Joint Density in HMA Pavements (Centerline)	1	N/A	1	1	1	N/A	EA
430.04 I.2.b(3), "Pavement Thickness Determination Cores"					N/A	1	EA
				Total	3	1	EA

Preliminary Plans

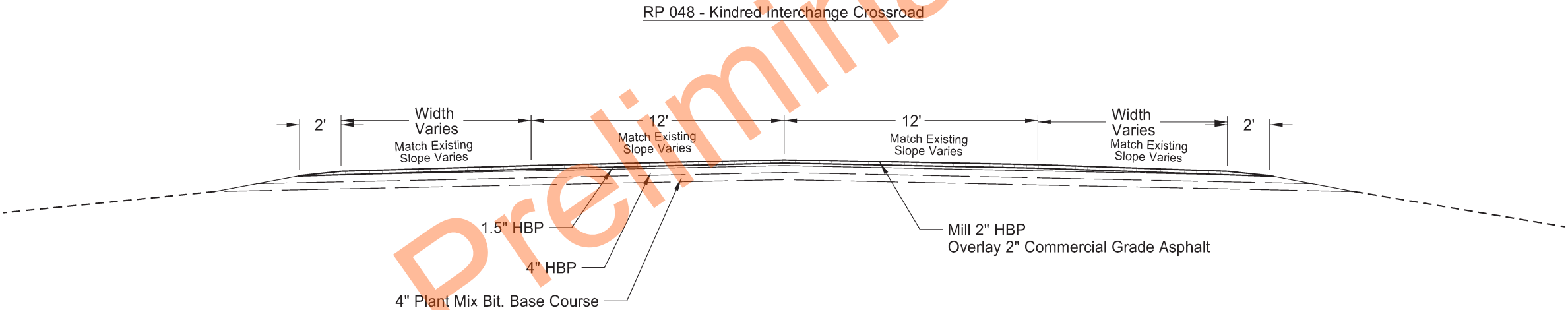
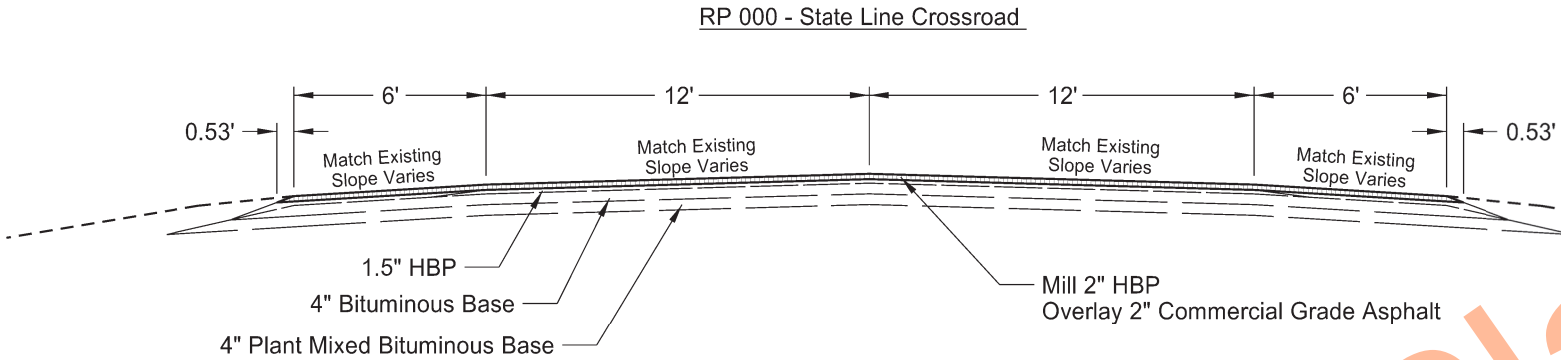
Basis of Estimate

I-29 Bridge Rehabilitation



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	ND	IM-BRI-8-029(216)000	30	1



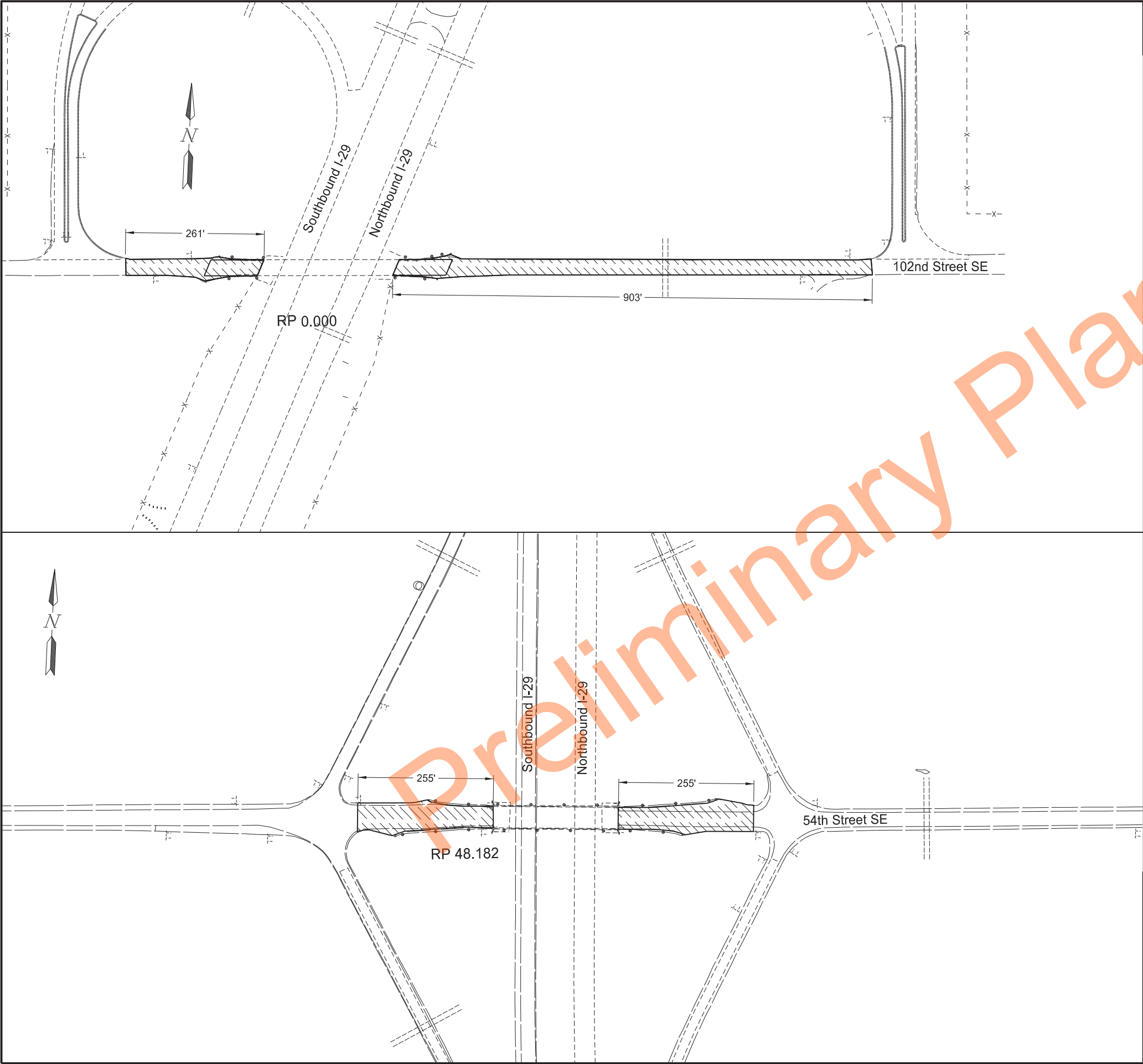
Typical Sections

RP 000 & RP 048

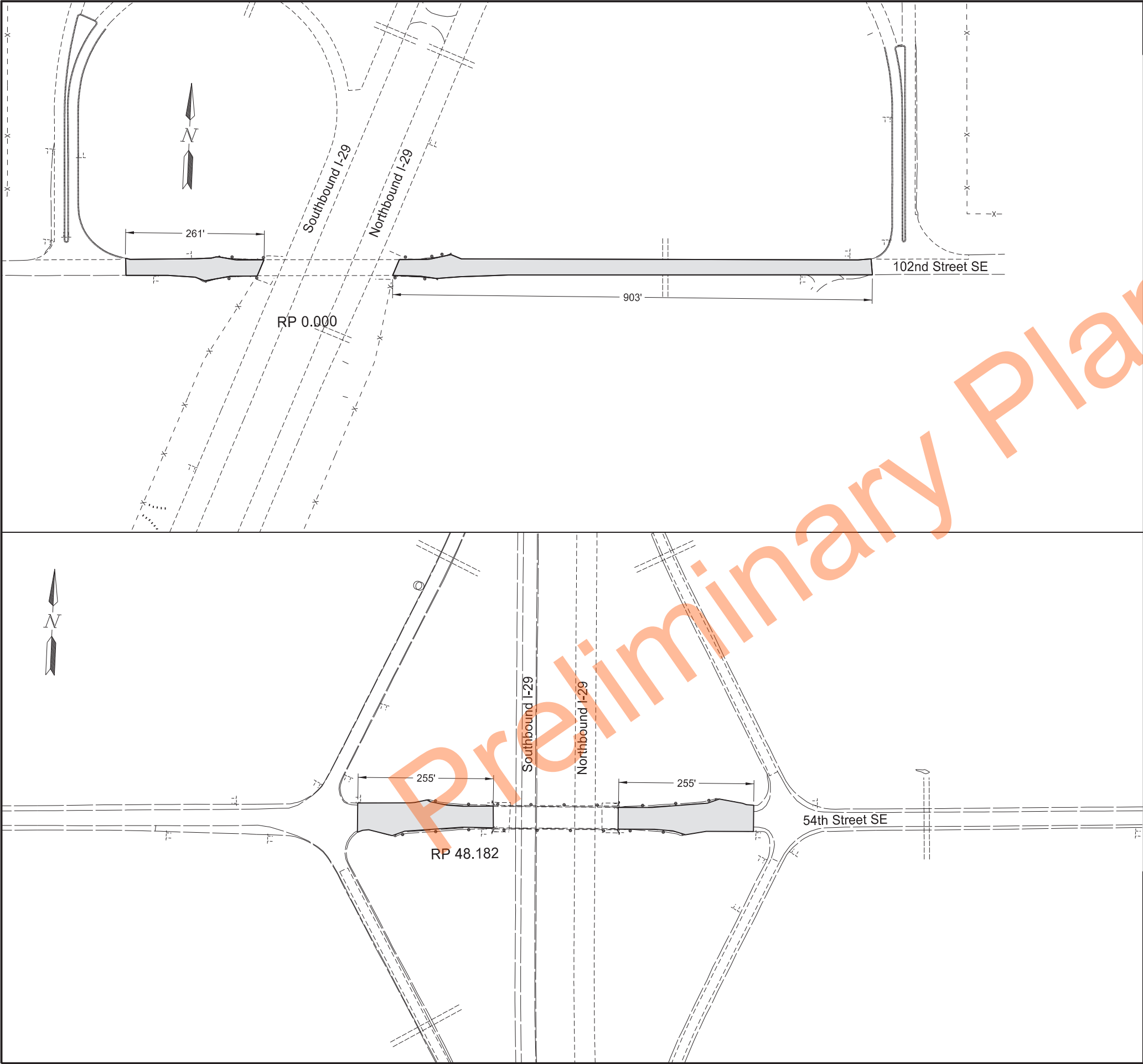
Bridge Rehabilitation



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		ND	IM-BRI-8-029(216)000	40	1
SPEC	CODE	BID ITEM		QUANTITY	UNIT
411	0114	MILLING PAVEMENT SURFACE - 2 INCH			
		RP 000 - West Approach		935	SY
		RP 000 - East Approach		3011	SY
		RP 048 - West Approach		1395	SY
		RP 048 - East Approach		1403	SY
Milling 2"					
Removal Milling Dimension RP 000 and RP 048 I-29 Bridge Rehabilitations			BRIAN J. ROSIN REGISTERED PROFESSIONAL PE 2928 ENGINEER NORTH DAKOTA 08/03/26		



		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	IM-BRI-8-029(216)000	90	1
SPEC	CODE	BID ITEM		QUANTITY	UNIT
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT			
		RP 000 - West Approach		104	TON
		RP 000 - East Approach		335	TON
		RP 048 - West Approach		155	TON
		RP 048 - East Approach		156	TON

Overlay 2" HMA

Paving Layout

RP 000 and RP 048

I-29 Bridge Rehabilitations

BRIAN J. ROSIN

REGISTERED

PROFESSIONAL

PE 2928

ENGINEER

NORTH DAKOTA

08/03/26

[illegible]

SPEC & CODE			
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	1590

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY		TOTAL QUANTITY
			BY PHASE NO.		
			1&2	3	
704-0100	FLAGGING	MHR		40	40
704-1018	LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EACH	1		1
704-1038	ATTENUATION DEVICE-TYPE B-40	EA	1		1
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	1		1
704-1048	PORTABLE RUMBLE STRIPS	EACH		2	2
704-1050	TYPE I BARRICADES	EACH			
704-1052	TYPE III BARRICADES	EACH	2		2
704-1060	DELINEATOR DRUMS	EACH	12		12
704-1065	TRAFFIC CONES	EACH			
704-1067	TUBULAR MARKERS	EACH			
704-1070	DELINEATOR	EACH			
704-1072	FLEXIBLE DELINEATORS	EACH			
704-1080	STACKABLE VERTICAL PANELS	EACH			
704-1081	VERTICAL PANELS - BACK TO BACK	EACH			
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH			
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH			
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH			
704-1500	OBLITERATION OF PVMT MK	SF	355		355
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF			
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH			
704-3511	STATE FURNISHED MEDIAN BARRIER	LF	608		608
762-0200	RAISED PAVEMENT MARKERS	EACH			
762-0420	SHORT TERM 4IN LINE - TYPE R	LF			
762-0422	SHORT TERM 6IN LINE-TYPE R	LF	2440		2440
762-0426	SHORT TERM 24IN LINE-TYPE R	LF	24		24
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF			

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SPEC & CODE			
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	1512

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY			TOTAL QUANTITY
			BY PHASE NO.			
			1&2	3		
704-0100	FLAGGING	MHR		40		40
704-01018	LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EACH	1			1
704-1039	ATTENUATION DEVICE-TYPE B-45	EA	1			1
704-1043	ATTENUATION DEVICE-TYPE B-65	EA	1			1
704-1048	PORTABLE RUMBLE STRIPS	EACH		2		2
704-1050	TYPE I BARRICADES	EACH				
704-1052	TYPE III BARRICADES	EACH	4			4
704-1060	DELINEATOR DRUMS	EACH	24			24
704-1065	TRAFFIC CONES	EACH				
704-1067	TUBULAR MARKERS	EACH				
704-1070	DELINEATOR	EACH				
704-1072	FLEXIBLE DELINEATORS	EACH				
704-1080	STACKABLE VERTICAL PANELS	EACH				
704-1081	VERTICAL PANELS - BACK TO BACK	EACH				
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH				
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH				
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH				
704-1500	OBLITERATION OF PVMT MK	SF	254			254
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF				
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH				
704-3511	STATE FURNISHED MEDIAN BARRIER	LF	530			530
762-0200	RAISED PAVEMENT MARKERS	EACH				
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	2040			2040
762-0426	SHORT TERM 24IN LINE-TYPE R	LF	24			24
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF				

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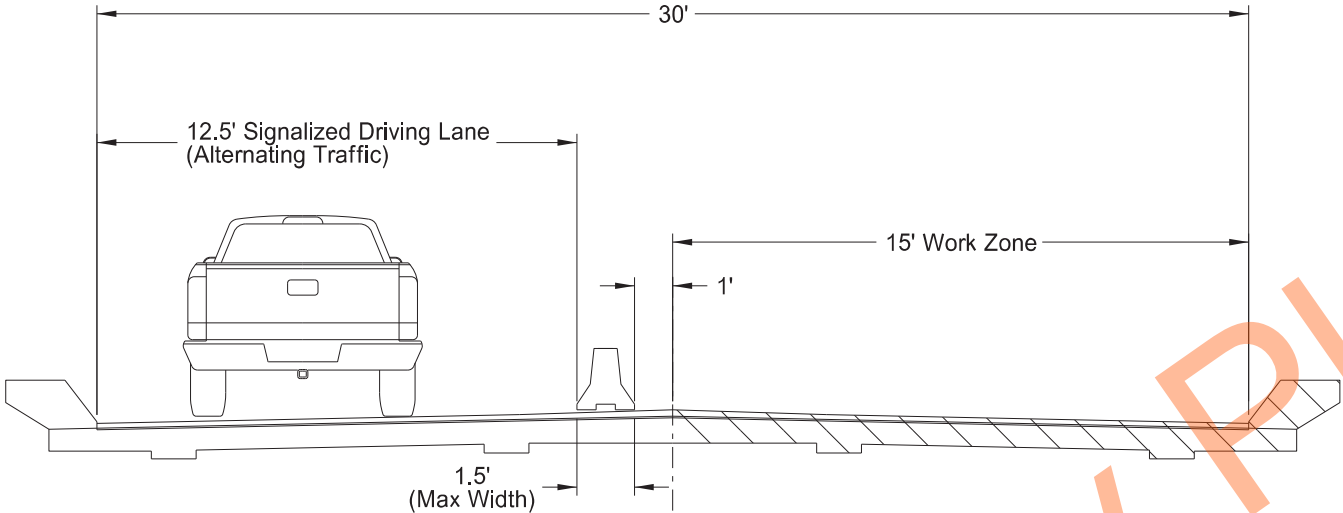
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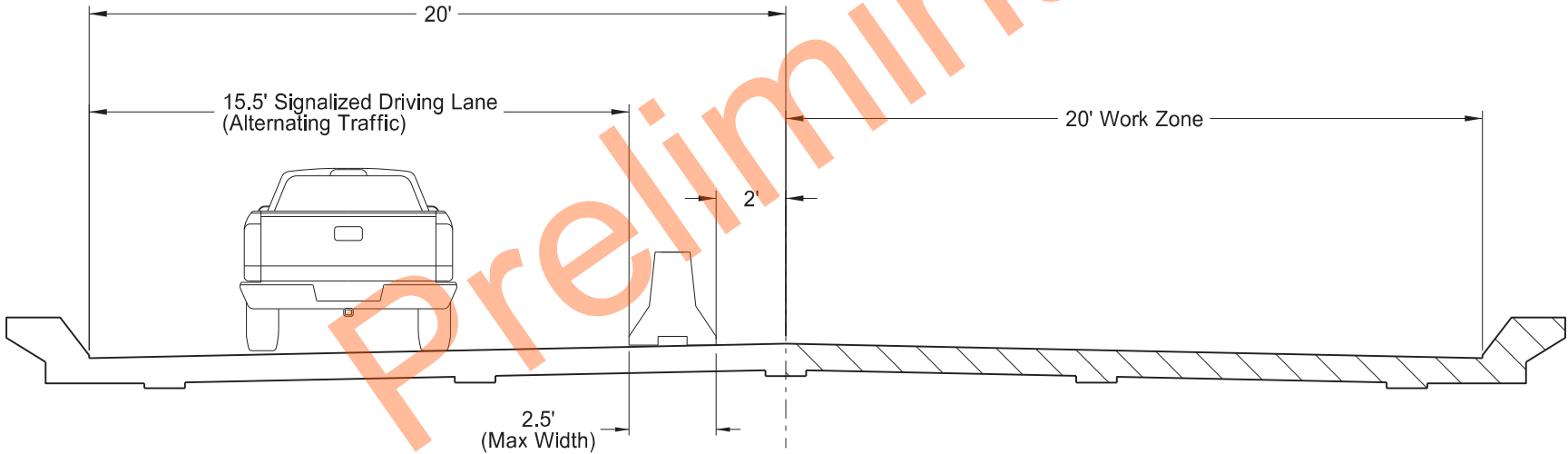
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			BY PHASE NO.			
			A	B	C	
704-0100	FLAGGING	MHR	20		40	60
704-1045	ATTENUATION DEVICE-TYPE B-75	EACH				
704-1046	ATTENUATION DEVICE-TYPE B-80	EACH		1		1
704-1048	PORTABLE RUMBLE STRIPS	EACH				
704-1050	TYPE I BARRICADES	EACH				
704-1052	TYPE III BARRICADES	EACH	2		2	2
704-1060	DELINEATOR DRUMS	EACH	55	31	66	66
704-1065	TRAFFIC CONES	EACH				
704-1067	TUBULAR MARKERS	EACH	49		24	49
704-1070	DELINEATOR	EACH				
704-1072	FLEXIBLE DELINEATORS	EACH				
704-1080	STACKABLE VERTICAL PANELS	EACH				
704-1081	VERTICAL PANELS - BACK TO BACK	EACH				
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH				
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH				
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	2	1	2	2
704-1500	OBLITERATION OF PVMT MK	SF	240	120	240	600
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF				
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH				
704-3511	STATE FURNISHED MEDIAN BARRIER	LF		200		200
762-0200	RAISED PAVEMENT MARKERS	EACH				
762-0420	SHORT TERM 4IN LINE - TYPE R	LF				
762-0422	SHORT TERM 6IN LINE-TYPE R	LF	4800	2400	4800	12000
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF				

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Structure Number 0029-000.013



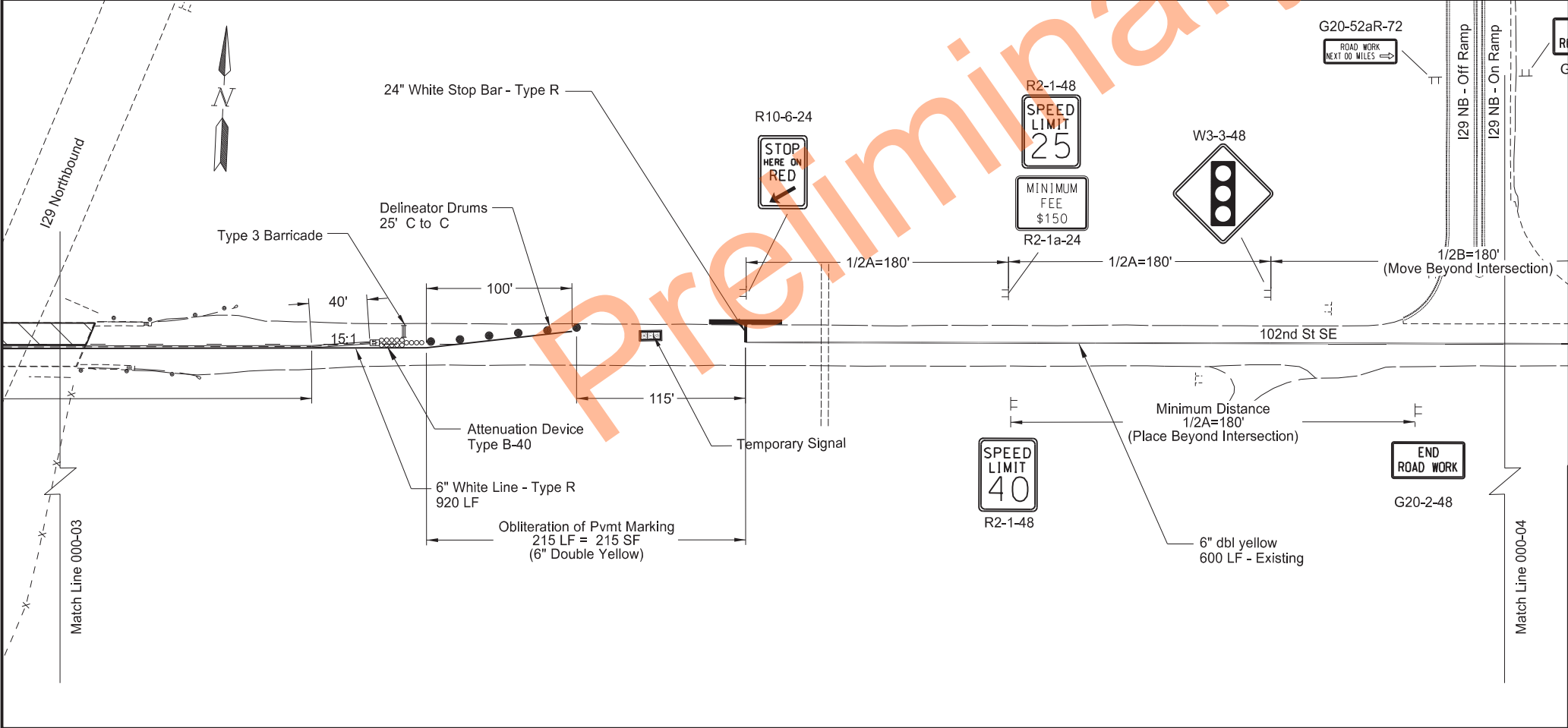
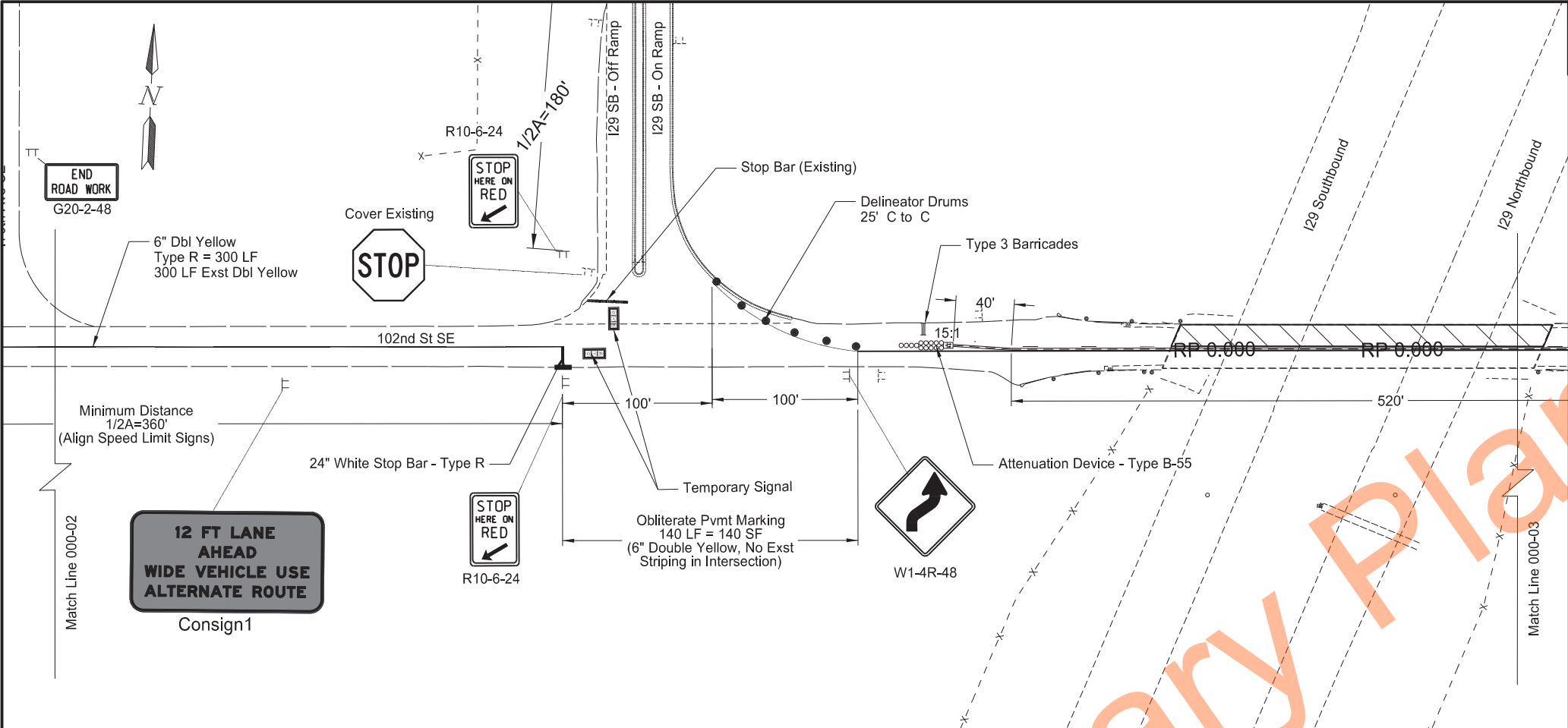
Structure Number 0029-048.182

Work Zone Traffic Control
RP 000 & 048
Phase 1 (Flip for Phase 2)

I-29 Bridge Rehabilitation



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Work Zone Traffic Control

RP 000
Phase 1

I-29 Bridge Rehabilitation

BRIAN J. ROSIN

REGISTERED

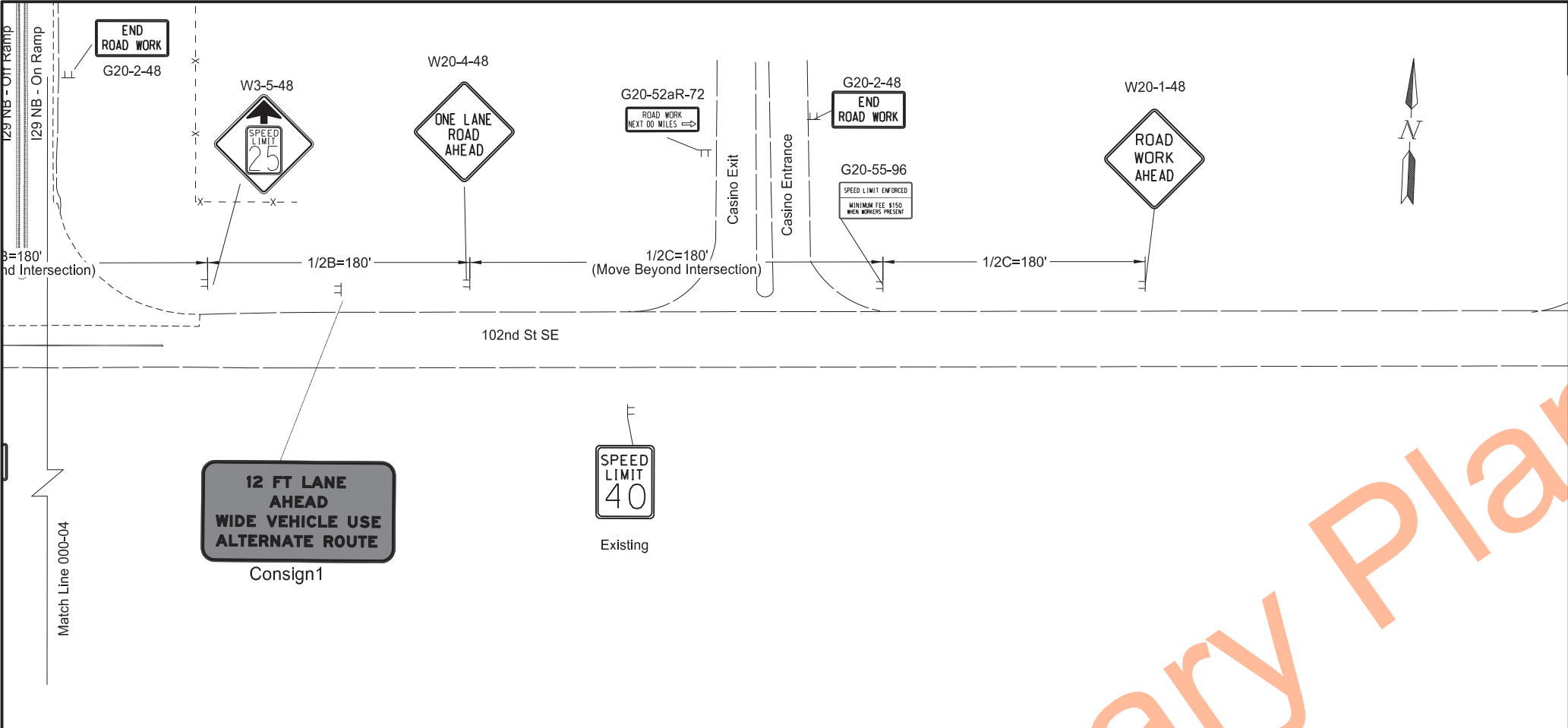
PROFESSIONAL

PE 2928

ENGINEER

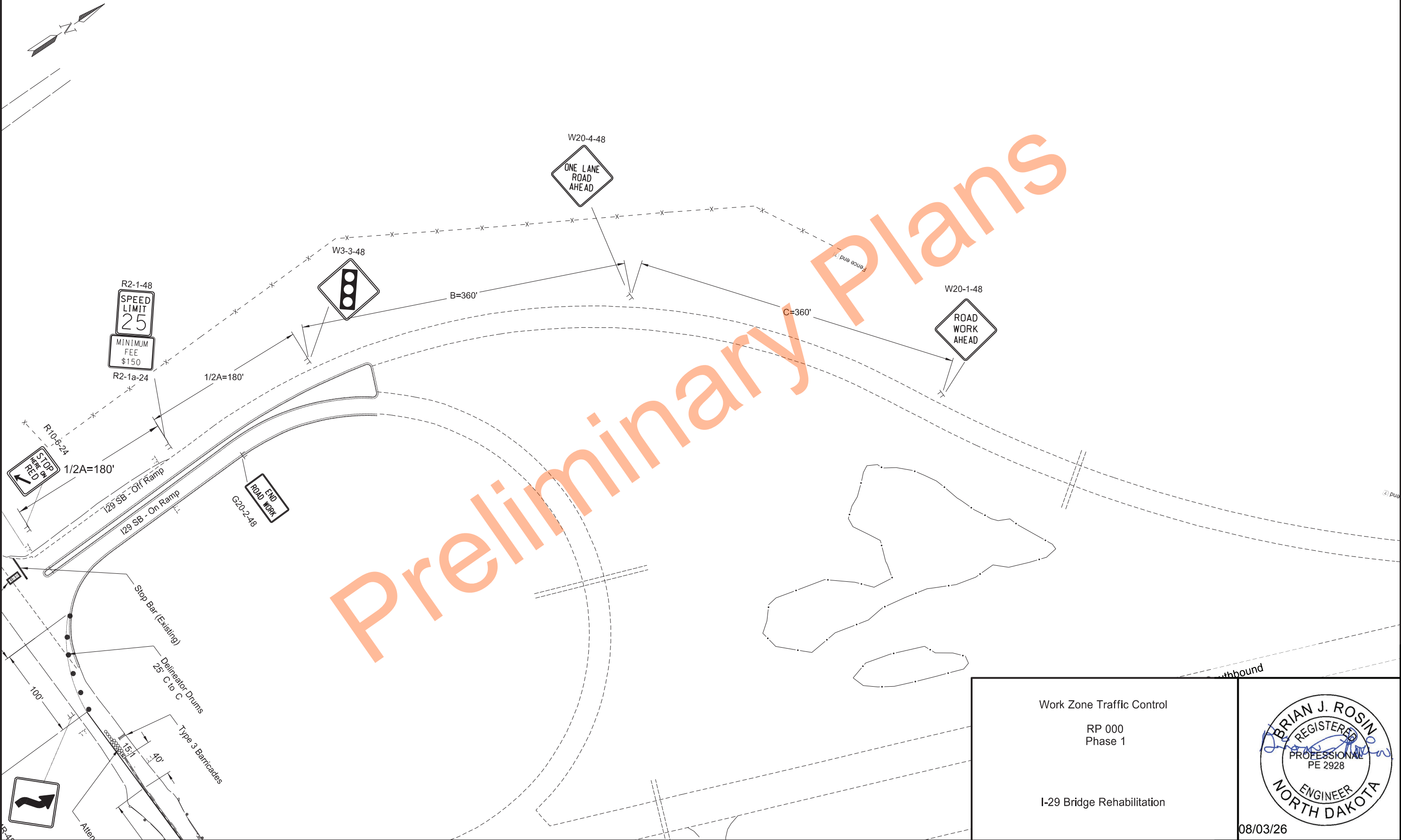
NORTH DAKOTA

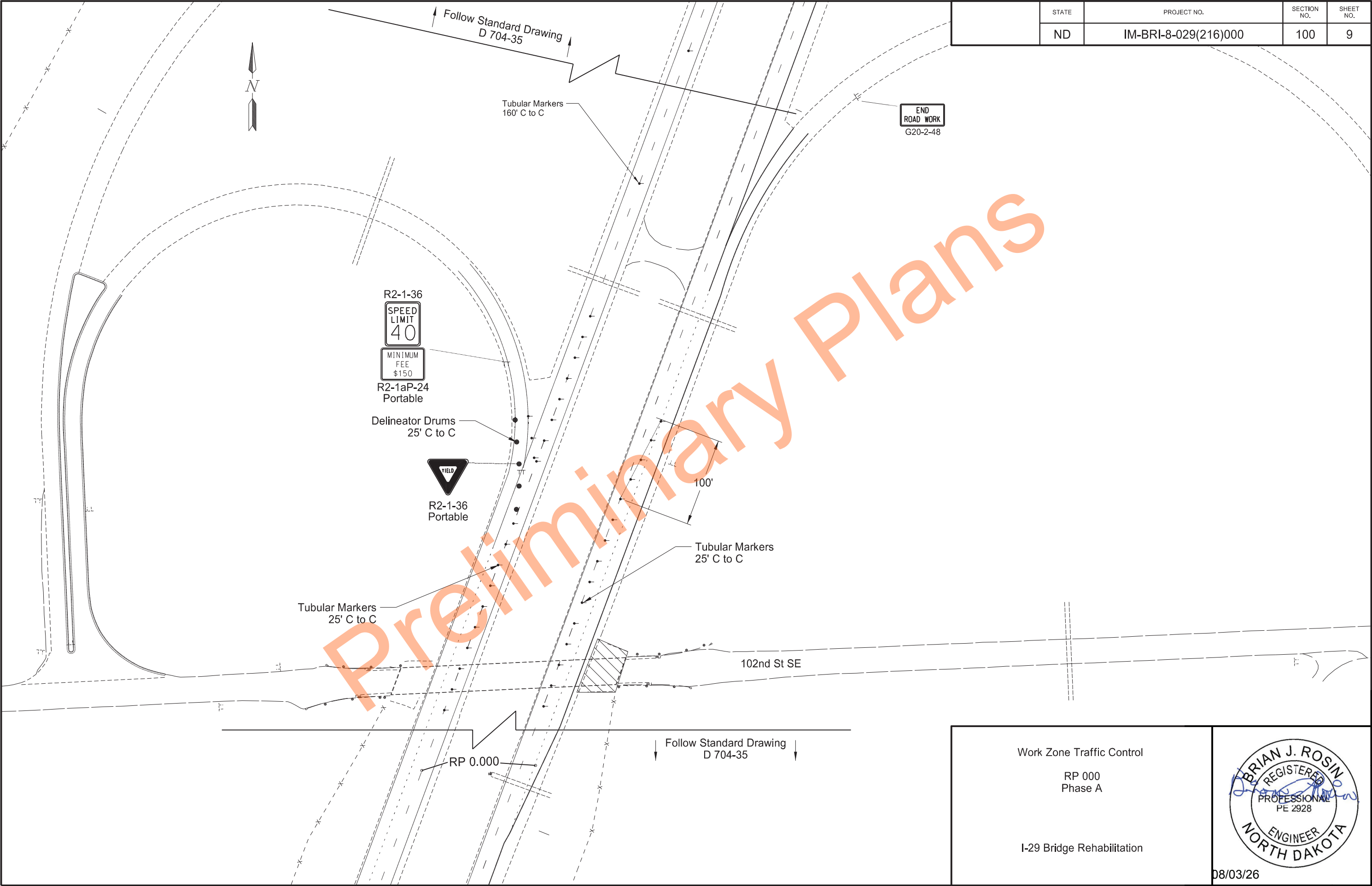
08/03/26

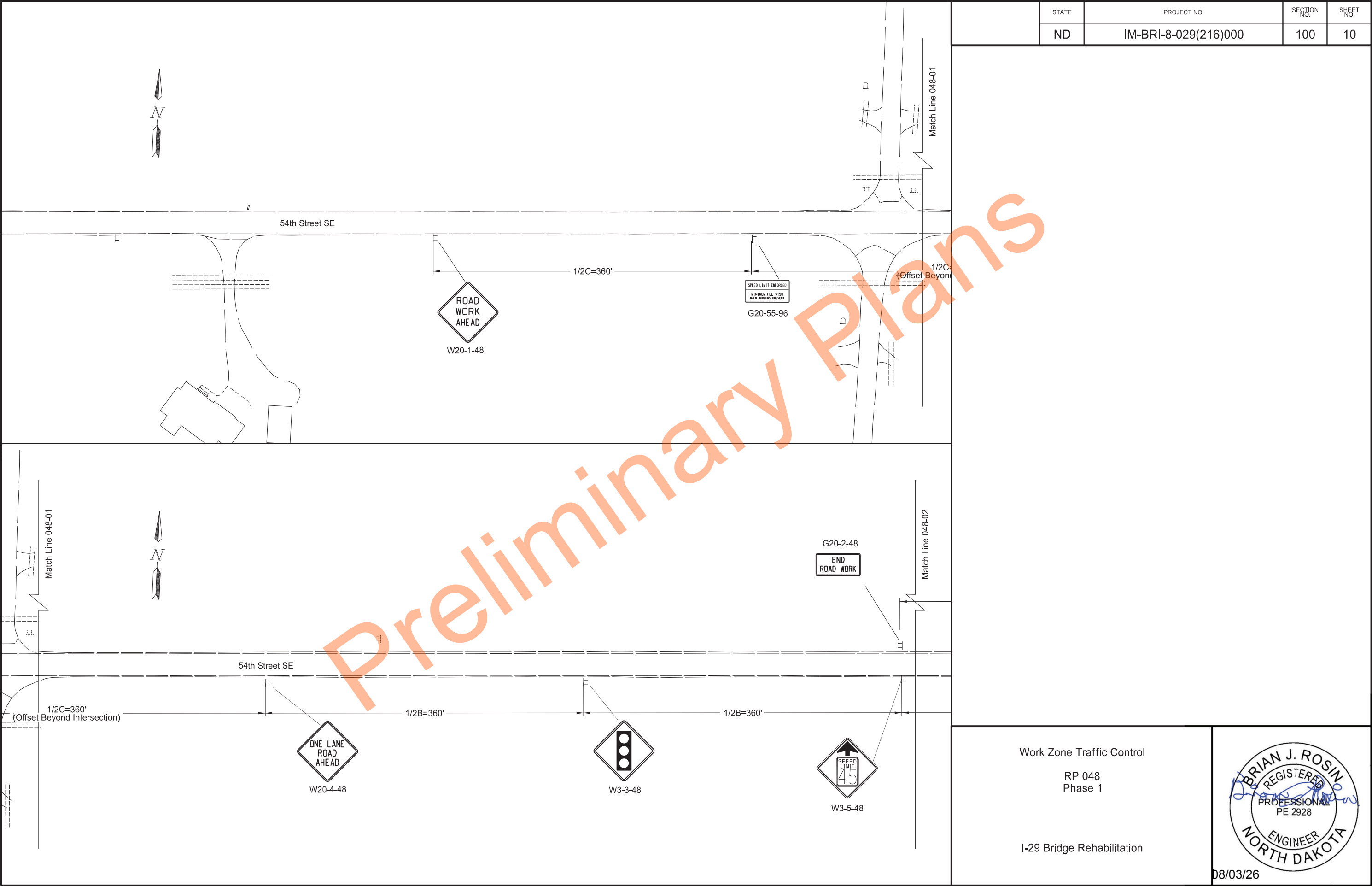


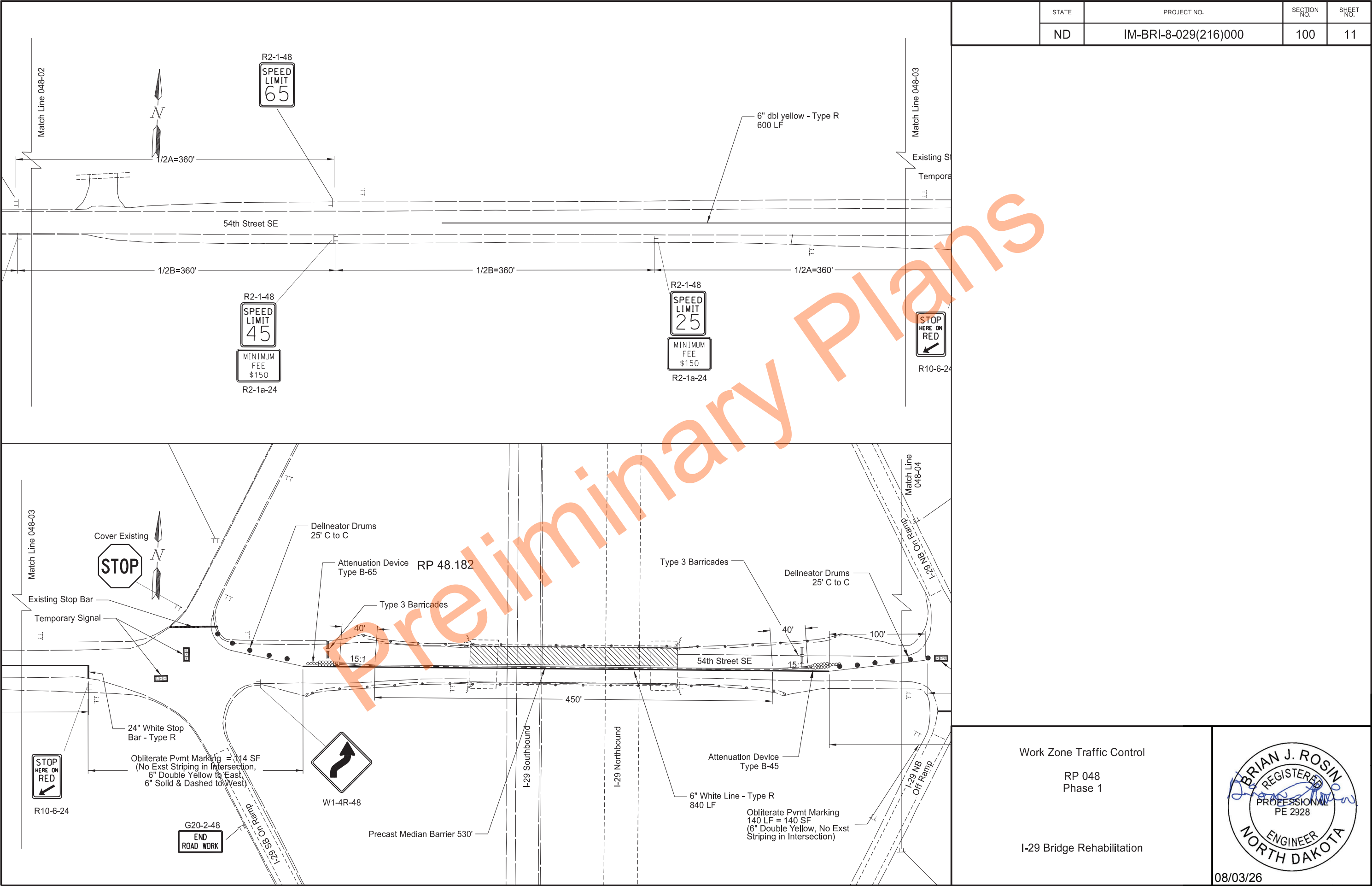
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-BRI-8-029(216)000	100	7
Preliminary Plans				
Work Zone Traffic Control RP 000 Phase 1 I-29 Bridge Rehabilitation			BRIAN J ROSIN REGISTERED PROFESSIONAL PE 2928 ENGINEER NORTH DAKOTA 08/03/26	

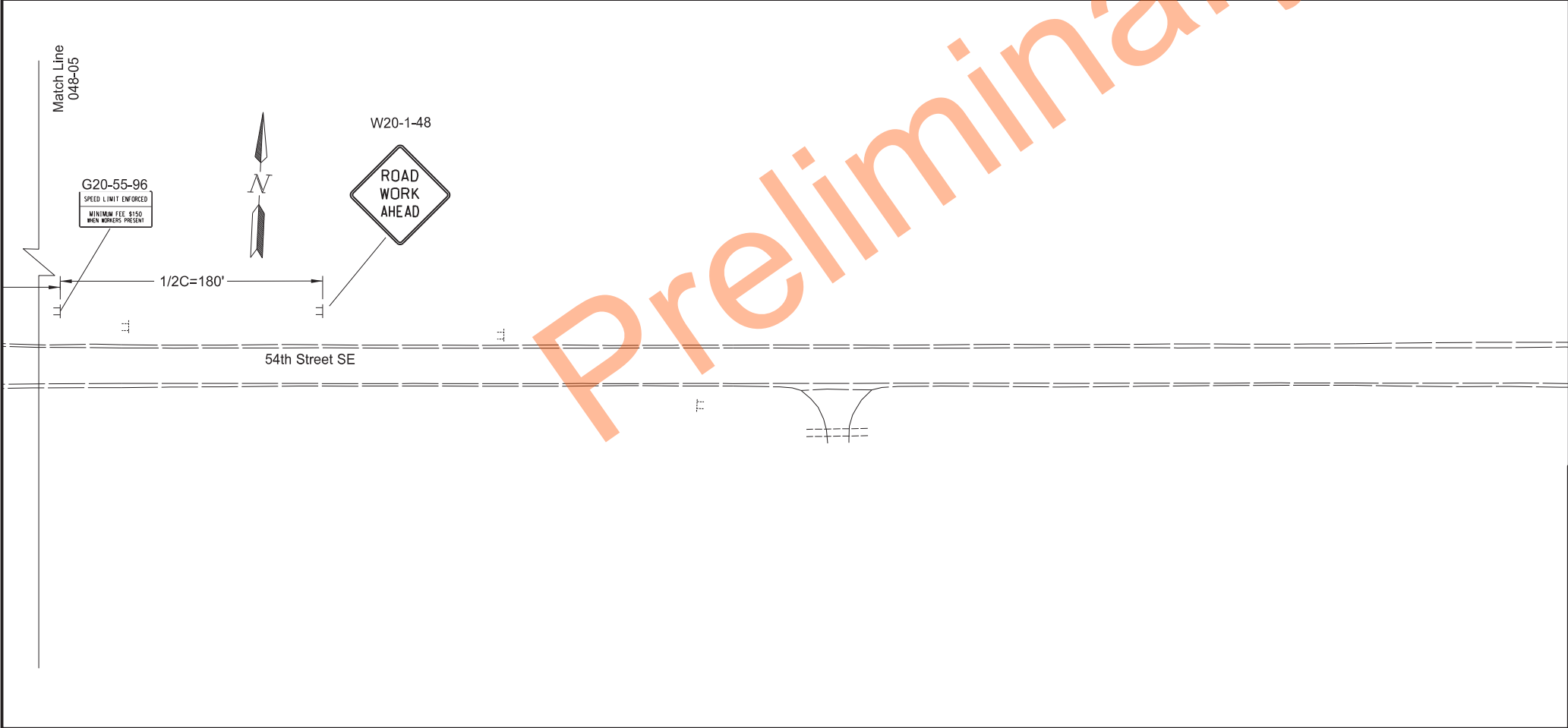
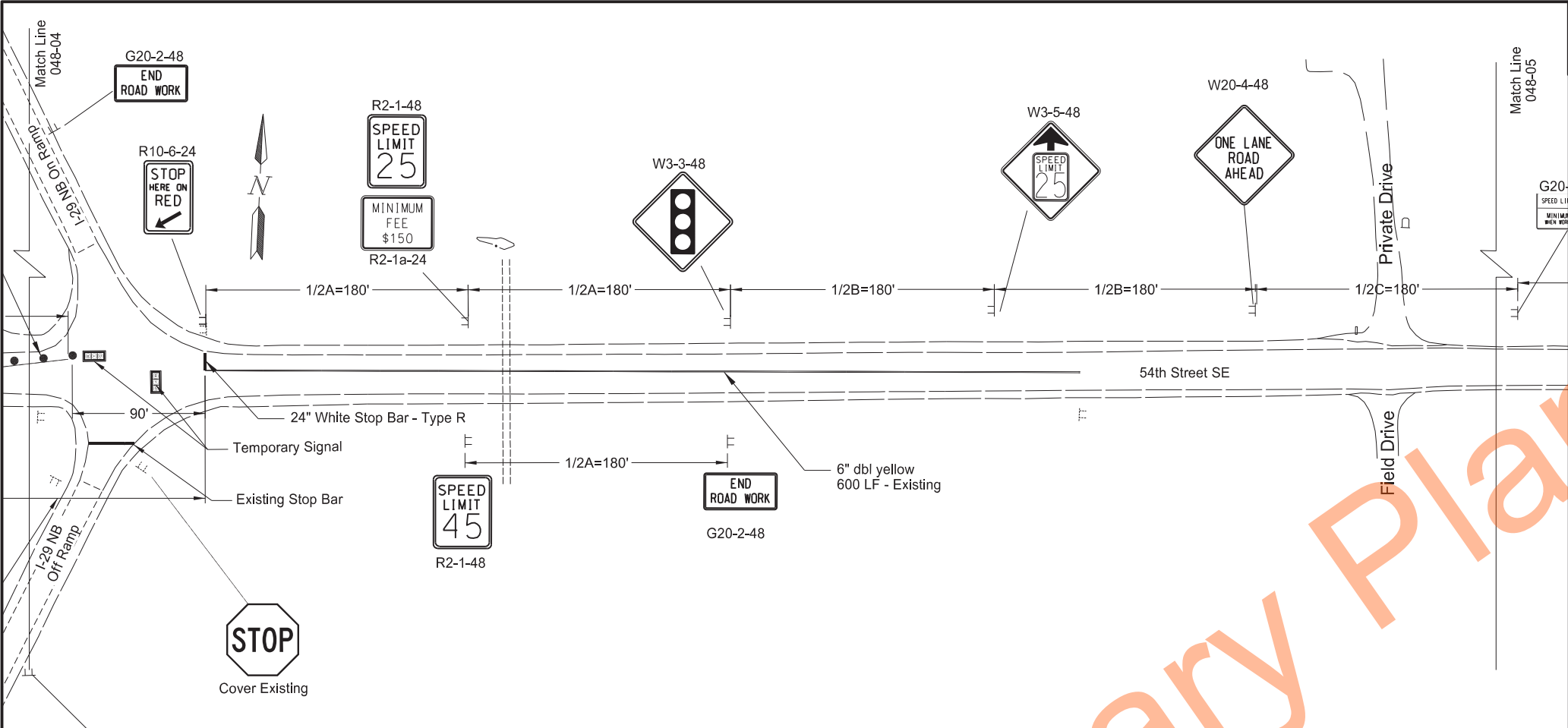
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-BRI-8-029(216)000	100	8











STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	100	12

Work Zone Traffic Control

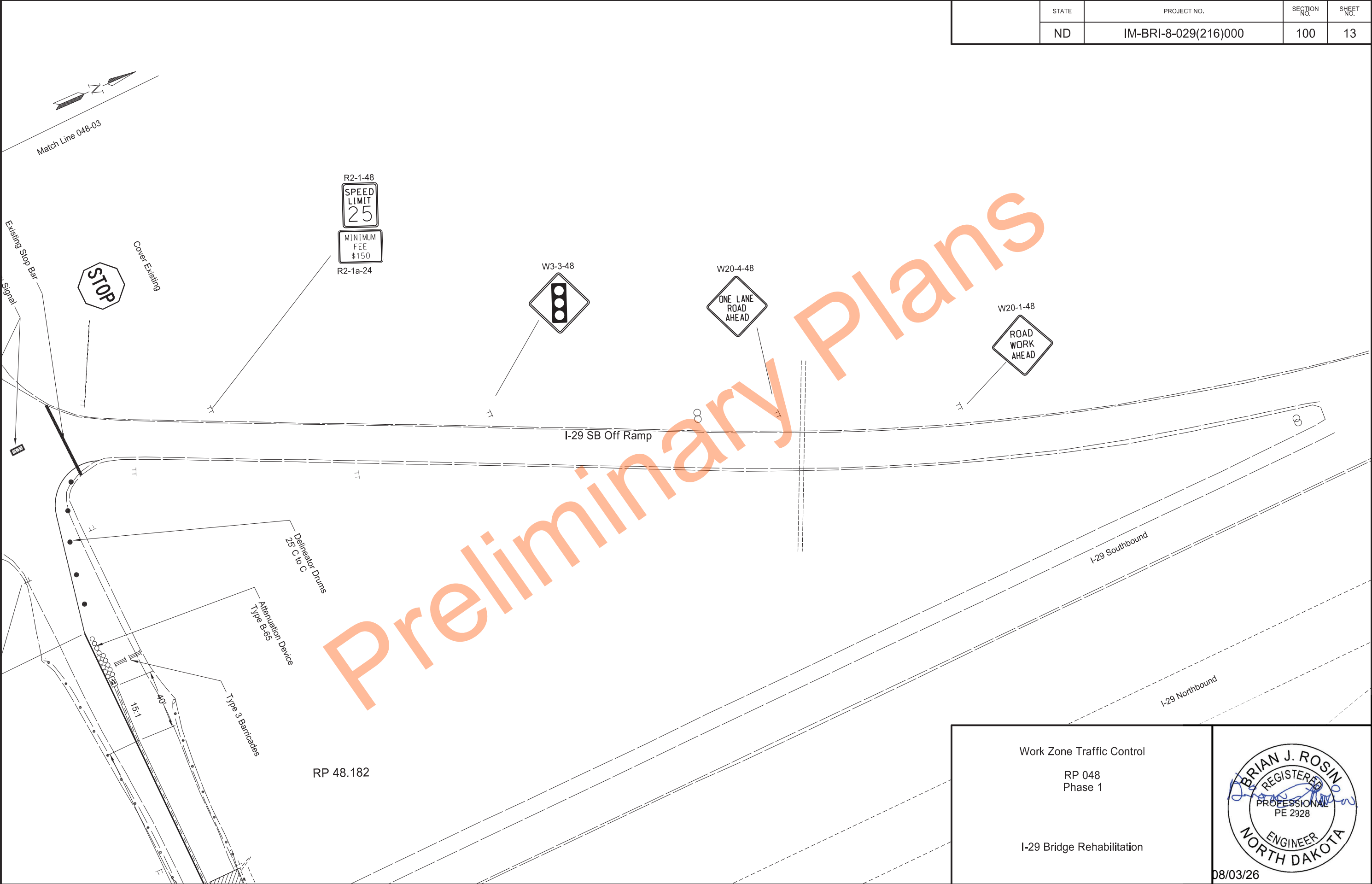
RP 048
Phase 1

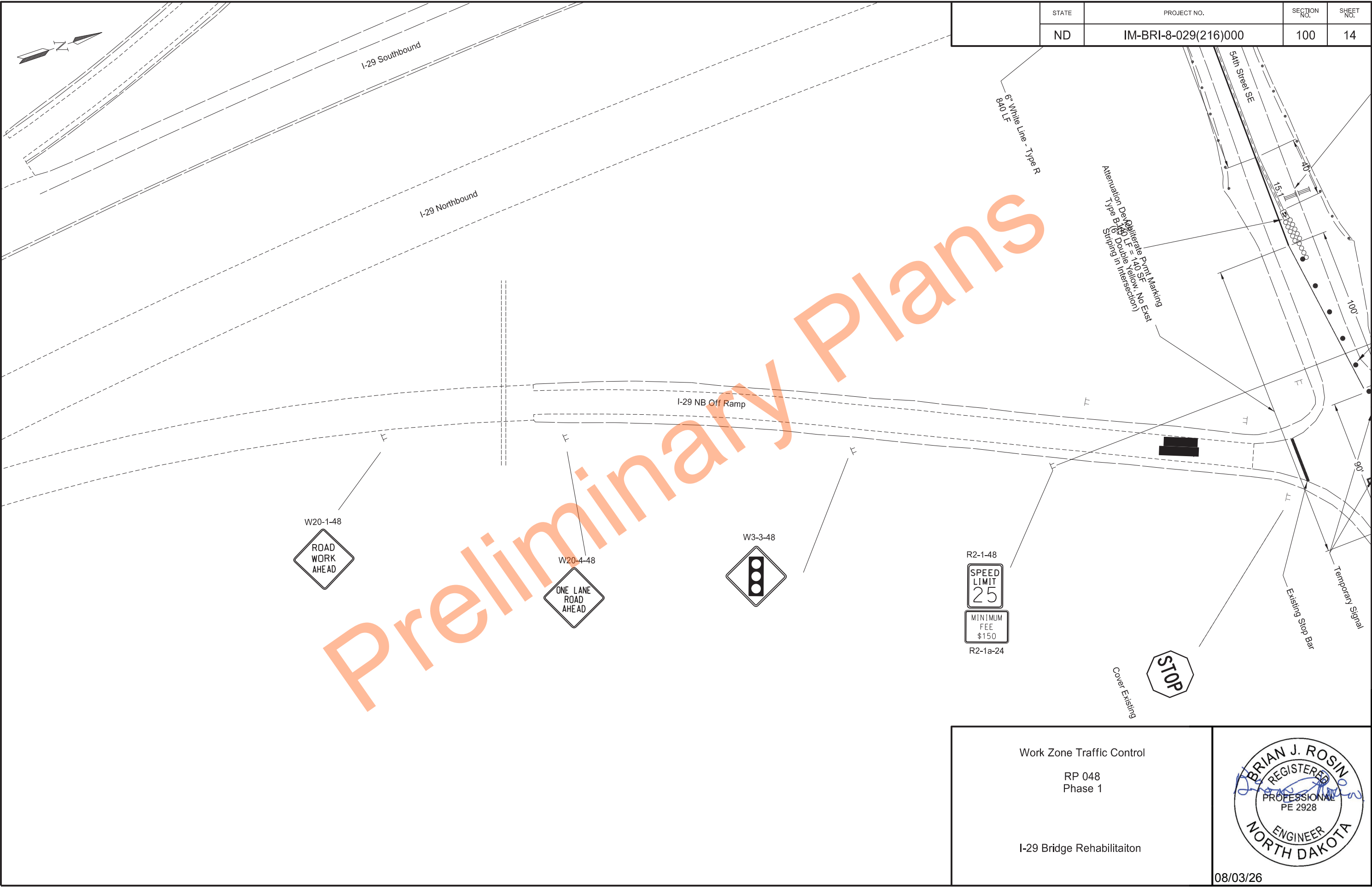
I-29 Bridge Rehabilitation



08/03/26

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-BRI-8-029(216)000	100	13





[illegible]

Diagram of a rectangular traffic sign with the following dimensions and text:

- Overall Dimensions:**
 - Width: 12' 6"
 - Height: 5'0"
- Text:**

12 FT LANE AHEAD
WIDE VEHICLES USE
ALTERNATE ROUTE
- Internal Dimensions (from left edge to text area):**
 - Left margin: 12.6"
 - Text area width: 124.875"
 - Right margin: 12.6"
- Internal Dimensions (from top edge to text area):**
 - Top margin: 12"
 - Text area height: 8EM
 - Line spacing: 6"
 - Text area height: 8EM
 - Line spacing: 6"
 - Text area height: 8EM
 - Bottom margin: 12"

Dimensions are in inches tenths Letter locations are panel edge to lower left corner

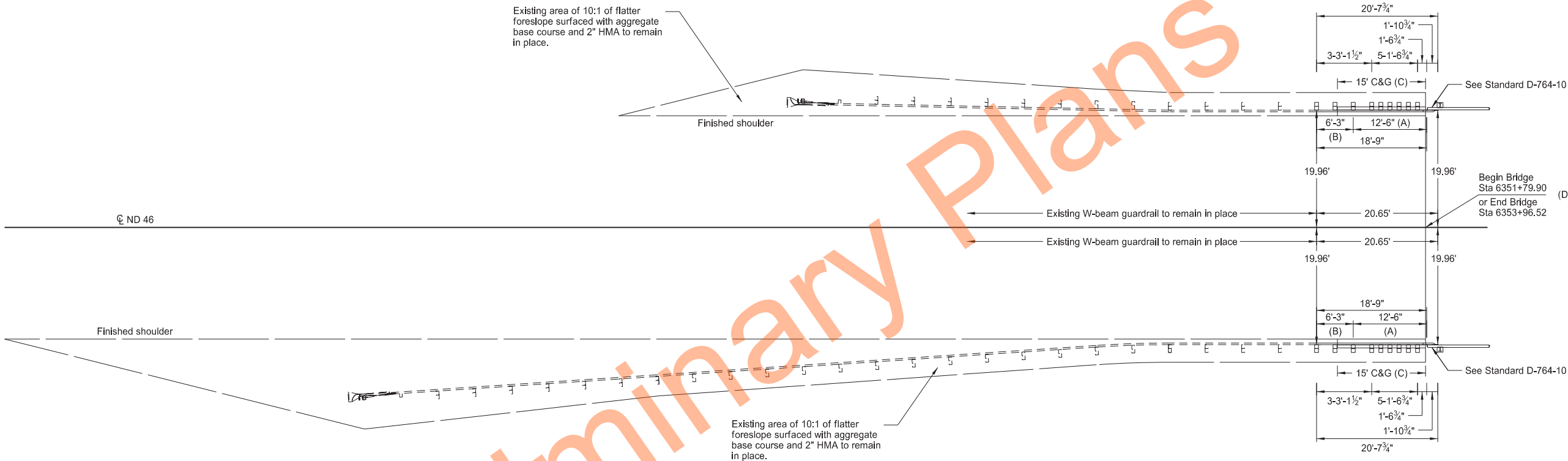
[illegible]

I-29



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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-BRI-8-029(216)000	130	1



SPEC	CODE	BID ITEM	QTY	UNIT
764	0150	REMOVE & RESET GUARDRAIL		
		Sta 6351+60.02 to 6351+80.67 Rt	20.7	LF
		Sta 6351+60.02 to 6351+80.67 Lt	20.7	LF
		Sta 6353+95.75 to 6354+16.40 Rt	20.7	LF
		Sta 6353+95.75 to 6354+16.40 Lt	20.7	LF
		Total	82.8	LF

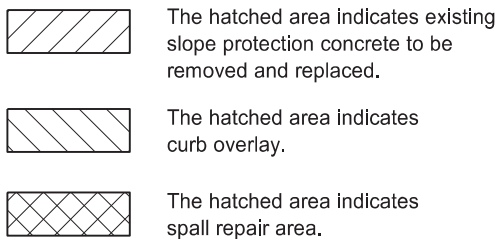
- (A) Thrie beam rail section (double thickness)
(B) W-Thrie beam transition section (double thickness)
(C) See Section 170
(D) Equation
6352+97.42 Bk=
6352+79.04 Ahd

Thrie/W-Beam Guardrail Layout
At Both Ends of Bridge

Kindred Interchange Crossroad
RP 48.182

I-29



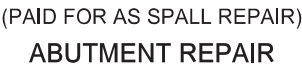


PLAN



(PAID FOR AS SPALL REPAIR)

POST REPAIR



BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
258	0200	REMOVE & REPLACE CONCRETE SLOPE PROTECTION	SY	198
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,252
602	1300	BRIDGE DECK GROOVING	SF	7,650
624	3012	REMOVE & RESET DBL BOX BEAM RETROFIT - E-RAIL	LF	510
650	0704	OVERLAY CONCRETE	CY	59
650	0707	DECK CONCRETE	CY	19
650	0710	CLASS 1-H REMOVAL	SY	850
650	0720	CLASS 1 REMOVAL	SY	850
650	0723	CLASS 3 REMOVAL	SY	85
650	0724	CLASS 4 REMOVAL	SY	43
930	7012	ROADWAY CANOPY	L SUM	0.5
930	9612	SPALL REPAIR	SF	36
930	9690	CURB OVERLAY	LF	510



SPECIAL PROVISIONS	
SP 465(25)	HYDRODEMOLITION AND OVERLAY
SP 464(25)	CONCRETE SPALL REPAIR
STANDARD DRAWINGS	
D-258-1	
I-29/102ND ST SE INTERCHANGE	
BRIDGE LAYOUT	
ND DEPARTMENT OF TRANSPORTATION BRIDGE DIVISION	
Jason Thorenson 08/04/26	
DRAWING NO.	29-000.013-1

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	170	2

NOTES

- 100 SCOPE OF WORK: Work at this site consists of the following:
- Bridge deck overlay

• Remove & reset double box beam rail

• Concrete spall repairs

• Curb overlay

• Penetrating water repellent treatment

• Concrete slope protection repairs
- 258 REMOVE & REPLACE CONCRETE SLOPE PROTECTION: Remove and replace the concrete slope protection at the east abutment according to Std. Dwg. D-258-1. Remove foam and other repair material previously placed between and beneath the concrete panels. Place and compact ordinary backfill to fill any voids in the subgrade.
- 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 deck, front face and top of curbs, concrete rails, and rails posts after repairs have been made. Apply penetrating water repellent solution prior to sealing any bridge deck cracks. Do not apply pavement markings or allow traffic on the driving surfaces until the solution has completely penetrated and the entire driving surface is dry.
- 602 BRIDGE DECK GROOVING: Perform bridge deck grooving in accordance with Section 602.04 D.3. Bridge deck grooving will be paid separately.
- 624 REMOVE & RESET RETROFIT: Prior to performing repairs to the concrete curb, posts, and rail, remove the existing double box beam retrofit. After the repairs have been completed, reset the double box beam retrofit in accordance with Section 624.
- Include all labor, equipment, and materials required to perform the work as specified in the price bid for "Remove & Reset Double Box Beam Retrofit – E-Rail."
- 650 OVERLAY CONCRETE: An additional 1/2" depth of overlay concrete was included in the overlay concrete quantities to account for the irregular surface profile from milling and hydrodemolition.
- 650 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 curb 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 the limits of the 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 material, labor, and equipment required to crack seal the bridge deck and curb in the price bid for "Overlay Concrete."
- 930 SPALL REPAIR: The structure has areas of spalling and concrete deterioration as indicated in the table below. See supplemental bid information for photos of concrete spalling. The extents of repairs as shown in the "Spall Repair" table are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field.
- | LOCATION | PHOTO | QUANTITY (SF) |
|-------------------|-----------|---------------|
| Abutment Backwall | #69 | 8 |
| Posts | #18 to 25 | 1.5 each |
- 930 CURB OVERLAY: The concrete curb surface is cracked and delaminated. Remove the existing curb concrete as shown. Use a 15-pound maximum size chipping hammer on any unsound concrete.
- Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.
- Sand blast clean any rust scale found on the exposed reinforcing steel. Clean the existing concrete surface by light sand blasting or 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 Class AE-5 Concrete or 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), Duraltop Gel (Euclid Chemical Company), MasterEmaco N 400 (BASF Corporation), Duo Patch (SpecChem) or an approved equal repair mortar. Place and cure the material as recommended by the manufacturer.
- Include all labor, equipment, and materials needed for the repair as specified in the bid item "Curb Overlay."



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	170	3

NOTES

930 ROADWAY CANOPY: Construct a canopy above the traveled roadway under the existing structure to protect traffic from falling material. The canopy is an added safeguard and does not relieve the Contractor from any responsibility for the safety of the public.

Submit the canopy details, including materials that will be used, to the Engineer for review at least 14 calendar days prior to installation of the canopy. Provide a canopy under the existing structure with a minimum vertical clearance of 15'-6" above the traveled roadway. Extend the canopy a minimum distance of 5'-0" beyond the outside edge of the bridge deck and a minimum distance of 5'-0" beyond the edge of the driving lanes beneath the structure. Notify the Engineer two calendar days prior to installation of the canopy. The Engineer will update the NDDOT travel map for the reduced vertical clearance with the canopy in place.

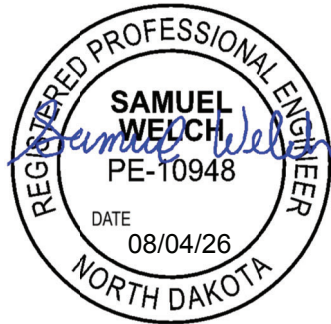
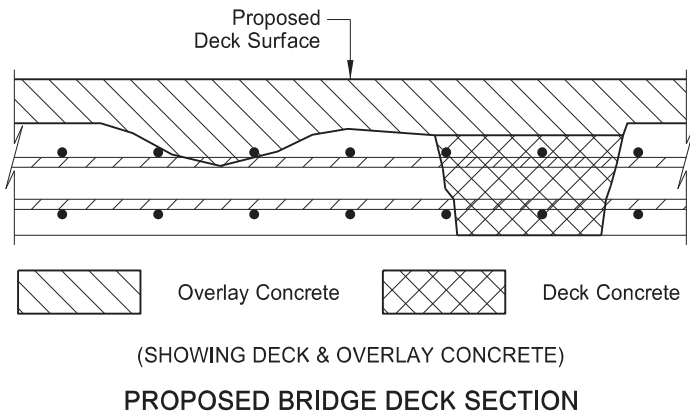
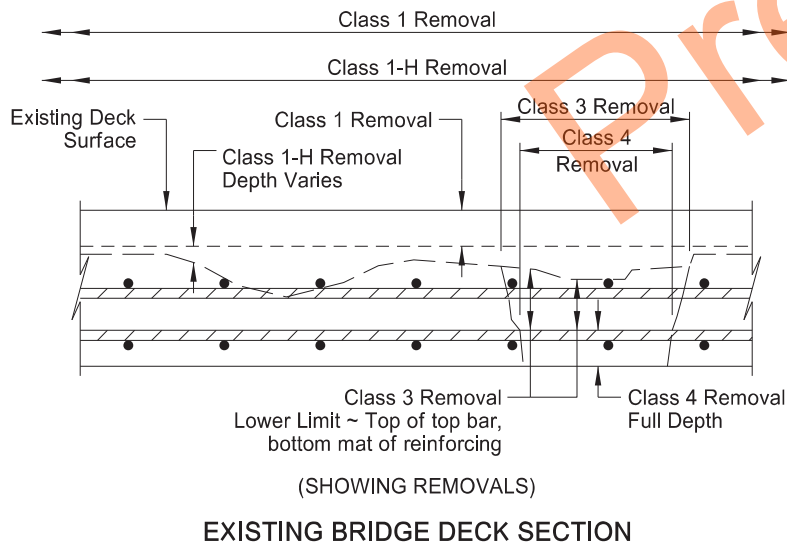
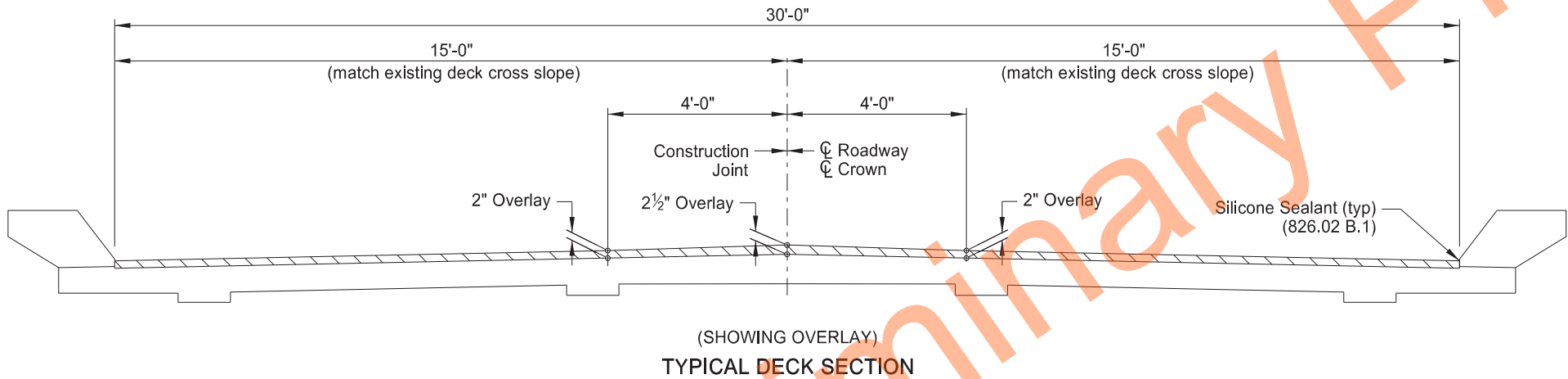
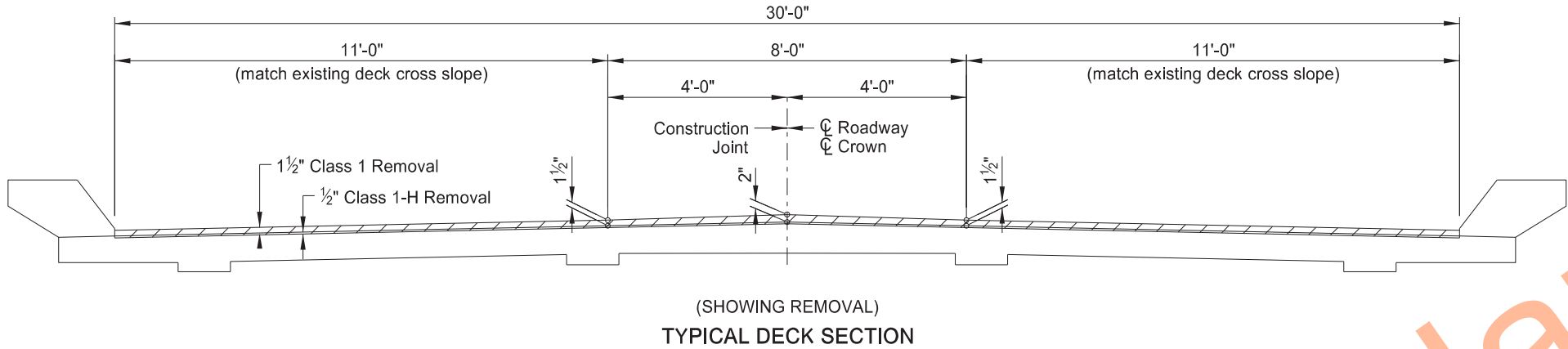
The canopy must be in place before conducting work above traffic lanes under the bridge and remain in place until after work is complete. The canopy may be supported from the ground or suspended from the girders. Complete the installation of the canopy in a minimum amount of time and with the least inconvenience to the public. Remove the canopy after all work taking place above traffic lanes is completed.

Include all costs for construction, maintenance, and removal of the canopy system in the contract unit price for "Roadway Canopy."

Preliminary Plans



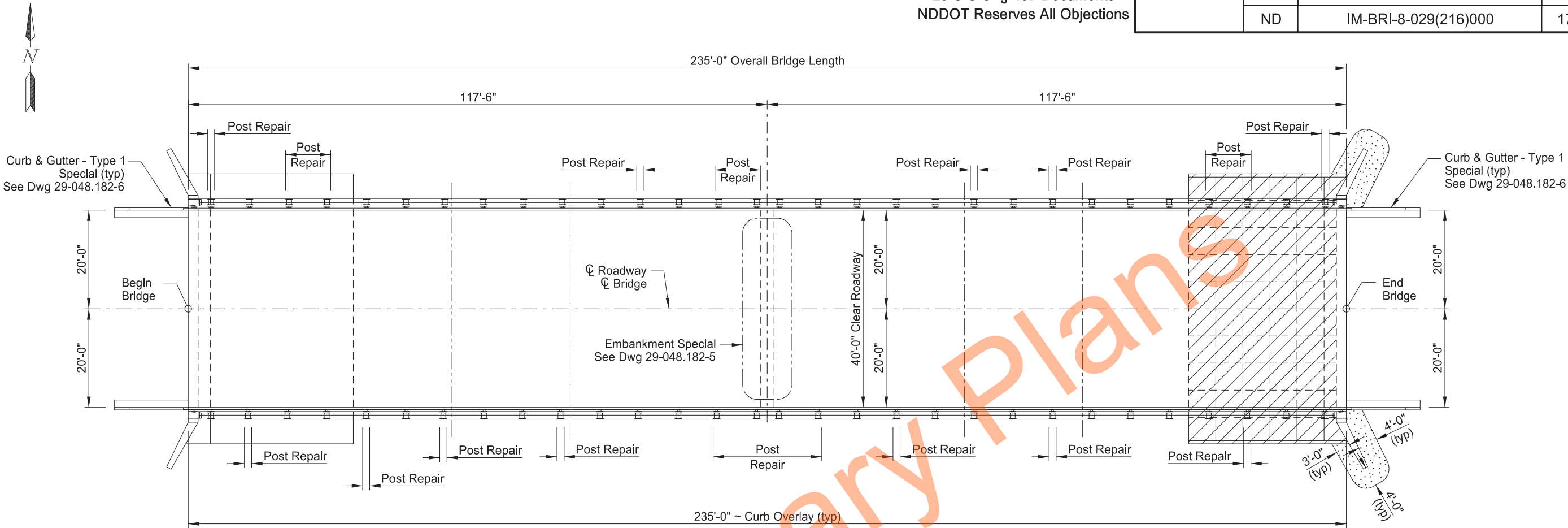
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	170	4



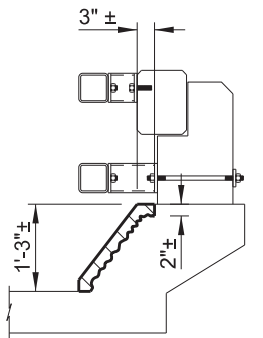
QUANTITIES	
OVERLAY CONCRETE	59 CY
DECK CONCRETE	19 CY
CLASS 1-H REMOVAL	850 SY
CLASS 1 REMOVAL	850 SY
CLASS 3 REMOVAL	85 SY
CLASS 4 REMOVAL	43 SY
I-29/102ND ST SE INTERCHANGE	
DECK OVERLAY DETAILS	
DRAWING NO.	29-000.013-4

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

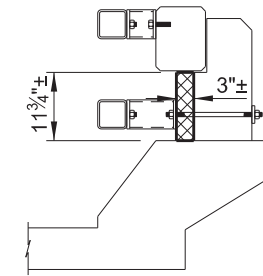
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	170	5



PLAN



CURB OVERLAY



(PAID FOR AS SPALL REPAIR)
POST REPAIR

- The hatched area indicates existing slope protection concrete to be removed and replaced.
- The hatched area indicates curb overlay.
- The hatched area indicates spall repair area.

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
203	0195	EMBANKMENT SPECIAL	L SUM	1
255	0201	TRM TYPE I	SY	115
258	0200	REMOVE & REPLACE CONCRETE SLOPE PROTECTION	SY	225
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,416
602	1300	BRIDGE DECK GROOVING	SF	9,400
624	3012	REMOVE & RESET DBL BOX BEAM RETROFIT - E-RAIL	LF	470
650	0704	OVERLAY CONCRETE	CY	73
650	0707	DECK CONCRETE	CY	60
650	0710	CLASS 1-H REMOVAL	SY	1,044
650	0720	CLASS 1 REMOVAL	SY	1,044
650	0723	CLASS 3 REMOVAL	SY	209
650	0724	CLASS 4 REMOVAL	SY	104
748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF	60
930	7012	ROADWAY CANOPY	L SUM	0.5
930	9612	SPALL REPAIR	SF	33
930	9690	CURB OVERLAY	LF	470

The hatched area indicates embankment special and TRM. Actual limits to be determined by the Engineer.



SPECIAL PROVISIONS	
SP 465(25)	HYDRODEMOLITION AND OVERLAY
SP 464(25)	CONCRETE SPALL REPAIR
STANDARD DRAWINGS	
D-258-1, D-748-1, D-764-22	
I-29/KINDRED INTERCHANGE	
BRIDGE LAYOUT	
ND DEPARTMENT OF TRANSPORTATION BRIDGE DIVISION	
Jason Thorenson 08/04/26	
DRAWING NO.	29-048.182-1

		23 U.S.C. § 407 Documents NDDOT Reserves All Objections		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
				ND	IM-BRI-8-029(216)000	170	6

NOTES

100

SCOPE OF WORK: Work at this site consists of the following:

- Bridge deck overlay
- Remove & reset double box beam rail
- Concrete spall repairs
- Curb overlay
- Penetrating water repellent treatment
- Concrete slope protection repairs
- Install curb at bridge ends
- Erosion repairs

203

EMBANKMENT SPECIAL: Furnish, place, and compact earthen embankment to restore areas of erosion and settlement around the bridge pier and east wing walls. Remove the bituminous and other repair materials previously placed to fill the erosion voids wrapping around the wing walls. Place and compact borrow in layers not to exceed 6 inches. Compact the borrow in place with jumping jack or plate compactor. Shape embankment to allow for topsoil to be placed as per Section 203.04.D.3. It is anticipated that this work will require approximately 30 CY of embankment and topsoil at the pier and approximately 10 CY of embankment and topsoil around the east wing walls. Include all labor, equipment, and material to complete this work in the bid item "Embankment Special."

255

TRM TYPE 1: After placing imported topsoil at the pier and east wing walls, seed the topsoil with Class II seed mixture meeting Section 251.03 D. Prior to seeding, loosen the soil by means of a hand rake or drag. Place seed by broadcasting the area at a rate of 0.06 pounds per SY. After seeding, rake the area loosely to cover the seed. Install TRM Type 1 over the repaired embankment. The extents shown in the plans are approximations, the actual extents will be determined by the Engineer in the field. Include all labor, equipment, and material to seed and install the TRM in the bid item "TRM TYPE 1."

258

REMOVE & REPLACE CONCRETE SLOPE PROTECTION: Remove and replace the concrete slope protection at the east abutment according to Std. Dwg. D-258-1. Remove foam and other repair material previously placed between and beneath the concrete panels. Place and compact ordinary backfill to fill any voids in the subgrade.

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 deck, front face and top of curbs, concrete rails, and rails posts after repairs have been made. Apply penetrating water repellent solution prior to sealing any bridge deck cracks. Do not apply pavement markings or allow traffic on the driving surfaces until the solution has completely penetrated and the entire driving surface is dry.

602

BRIDGE DECK GROOVING: Perform bridge deck grooving in accordance with Section 602.04 D.3. Bridge deck grooving will be paid separately.

624

REMOVE & RESET RETROFIT: Prior to performing repairs to the concrete curb, posts, and rail, remove the existing double box beam retrofit. After the repairs have been completed, reset the double box beam retrofit in accordance with Section 624.

Include all labor, equipment, and materials required to perform the work as specified in the price bid for "Remove & Reset Double Box Beam Retrofit – E-Rail."

650

OVERLAY CONCRETE: An additional 1/2" depth of overlay concrete was included in the overlay concrete quantities to account for the irregular surface profile from milling and hydrodemolition.

650

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 curb 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 the limits of the 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 material, labor, and equipment required to crack seal the bridge deck and curb in the price bid for "Overlay Concrete."

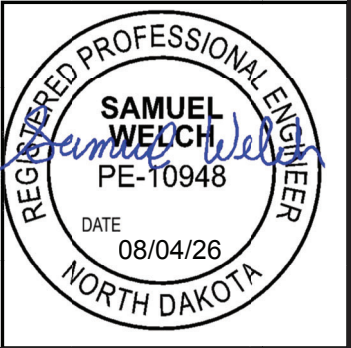
748

CURB & GUTTER – TYPE 1 SPECIAL: Construct curb & gutter within the existing HMA pavement as shown in the plans to direct runoff away from the bridge ends. Remove the existing HMA and base to a depth of 12" to allow for construction of the new curb and gutter.

Place and compact foundation fill to the bottom limits of the curb and gutter. After constructing the new curb and gutter, place and compact commercial grade HMA to patch the roadway surfacing and provide a smooth transition to the new curb and gutter.

Include all costs for curb installation as specified, including HMA and base removals, and foundation fill in the unit price bid for "Curb & Gutter – Type 1 Special." Payment for the commercial grade HMA used for patching will be made separately.

REGISTERED PROFESSIONAL ENGINEER
SAMUEL WELCH
PE-10948
DATE 08/04/26
NORTH DAKOTA



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	170	7

NOTES

930 SPALL REPAIR: The structure has areas of spalling and concrete deterioration as indicated in the table below. See supplemental bid information for photos of concrete spalling. The extents of repairs as shown in the “Spall Repair” table are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field.

LOCATION	PHOTO	QUANTITY (SF)
Posts	#14, 16, & 68 to 73	1.5 each
Rail	#118	1.5 each

The canopy must be in place before conducting work above traffic lanes under the bridge and remain in place until after work is complete. The canopy may be supported from the ground or suspended from the girders. Complete the installation of the canopy in a minimum amount of time and with the least inconvenience to the public. Remove the canopy after all work taking place above traffic lanes is completed.

Include all costs for construction, maintenance, and removal of the canopy system in the contract unit price for “Roadway Canopy.”

930 CURB OVERLAY: The concrete curb surface is cracked and delaminated. Remove the existing curb concrete as shown. Use a 15-pound maximum size chipping hammer on any unsound concrete.

Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.

Sand blast clean any rust scale found on the exposed reinforcing steel. Clean the existing concrete surface by light sand blasting or 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 Class AE-5 Concrete or 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), Duraltop Gel (Euclid Chemical Company), MasterEmaco N 400 (BASF Corporation), Duo Patch (SpecChem) or an approved equal repair mortar. Place and cure the material as recommended by the manufacturer.

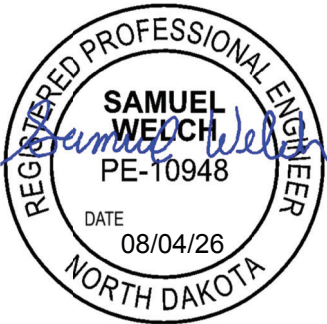
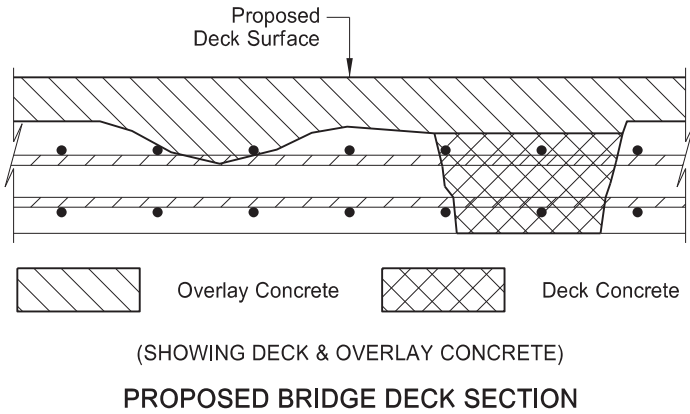
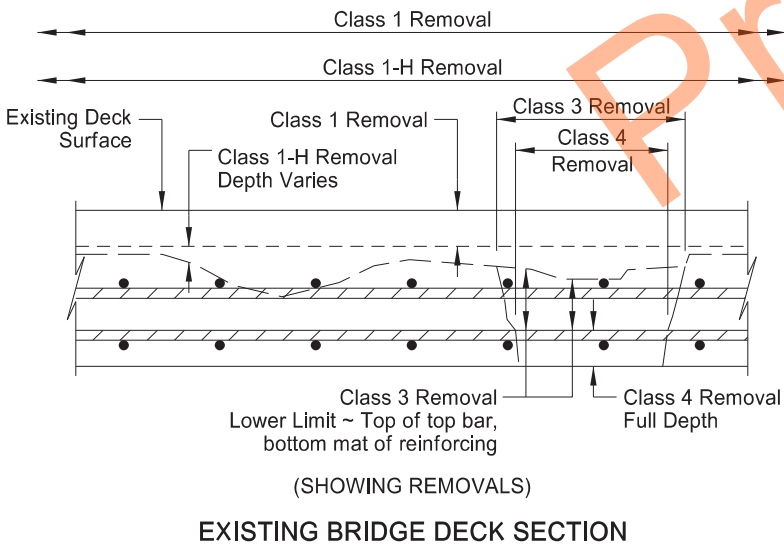
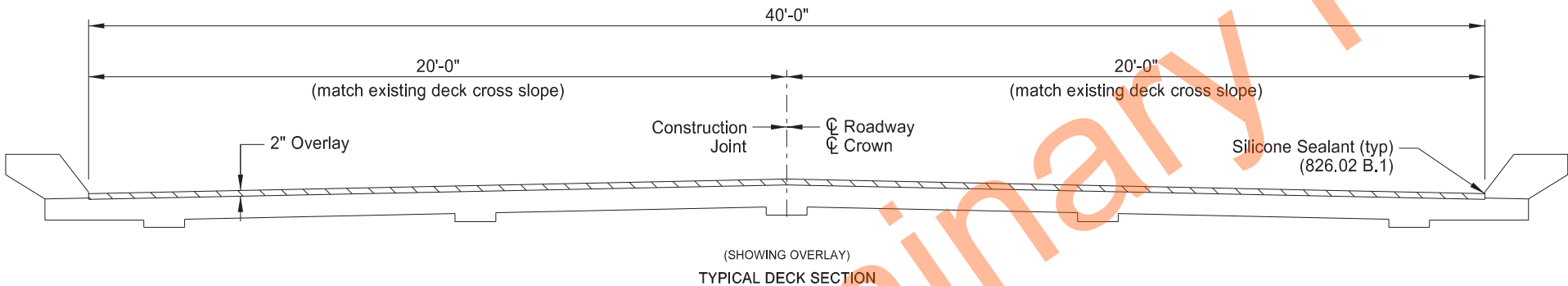
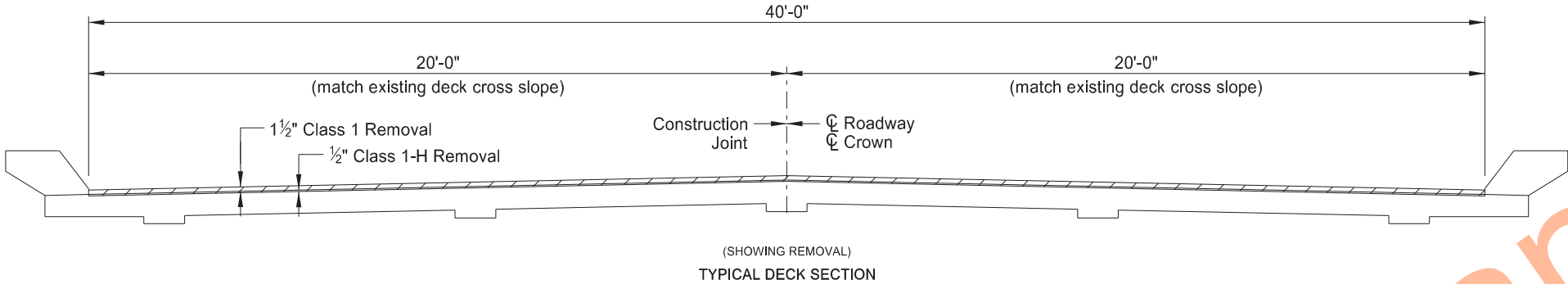
Include all labor, equipment, and materials needed for the repair as specified in the bid item "Curb Overlay."

930 ROADWAY CANOPY: Construct a canopy above the traveled roadway under the existing structure to protect traffic from falling material. The canopy is an added safeguard and does not relieve the Contractor from any responsibility for the safety of the public.

Submit the canopy details, including materials that will be used, to the Engineer for review at least 14 calendar days prior to installation of the canopy. Provide a canopy under the existing structure with a minimum vertical clearance of 15'-6" above the traveled roadway. Extend the canopy a minimum distance of 5'-0" beyond the outside edge of the bridge deck and a minimum distance of 5'-0" beyond the edge of the driving lanes beneath the structure. Notify the Engineer two calendar days prior to installation of the canopy. The Engineer will update the NDDOT travel map for the reduced vertical clearance with the canopy in place.



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-BRI-8-029(216)000	170	8



QUANTITIES	
OVERLAY CONCRETE	73 CY
DECK CONCRETE	60 CY
CLASS 1-H REMOVAL	1,044 SY
CLASS 1 REMOVAL	1,044 SY
CLASS 3 REMOVAL	209 SY
CLASS 4 REMOVAL	104 SY
I-29/KINDRED INTERCHANGE	
DECK OVERLAY DETAILS	
DRAWING NO.	29-048.182-4

NOTES

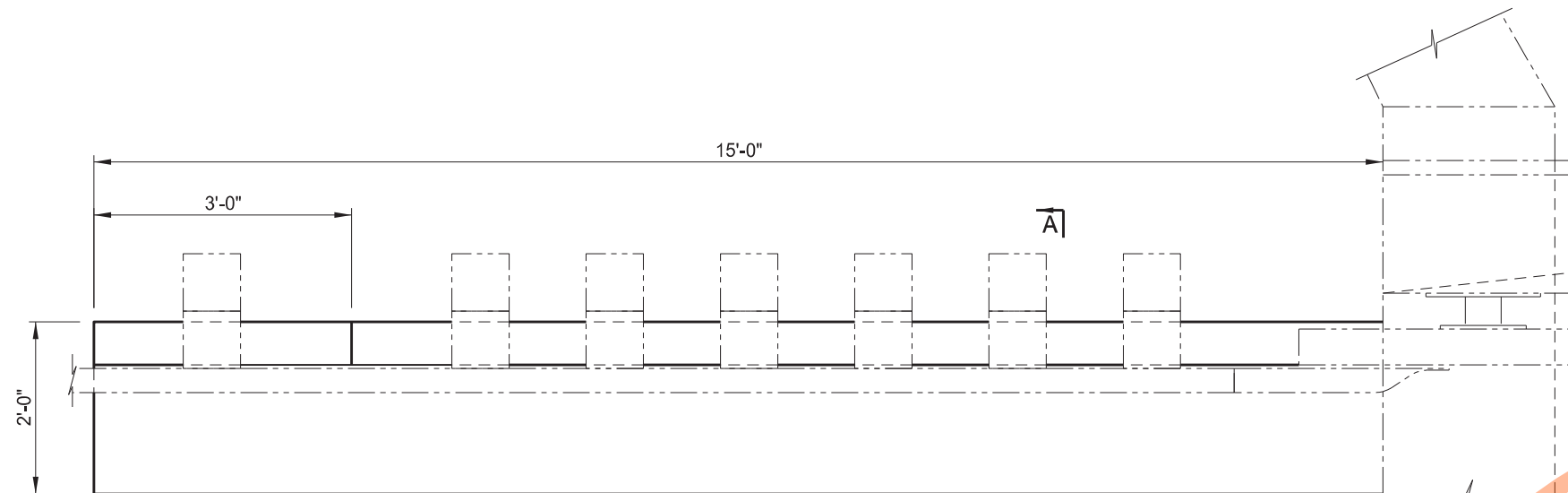
The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, silicone sealant, and labor required to build the curbs in the pay item "Curb & Gutter - Type 1 Special." Use Class AE concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612.

Install 5A901 bars according to manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage (16k min. ultimate pullout) and that meets the requirements of Section 806.02. Provide a minimum anchorage length of 9 inches.

* Length may vary depending on manufacturer's recommendations for anchorage. Length based on 9 inches minimum anchorage length.

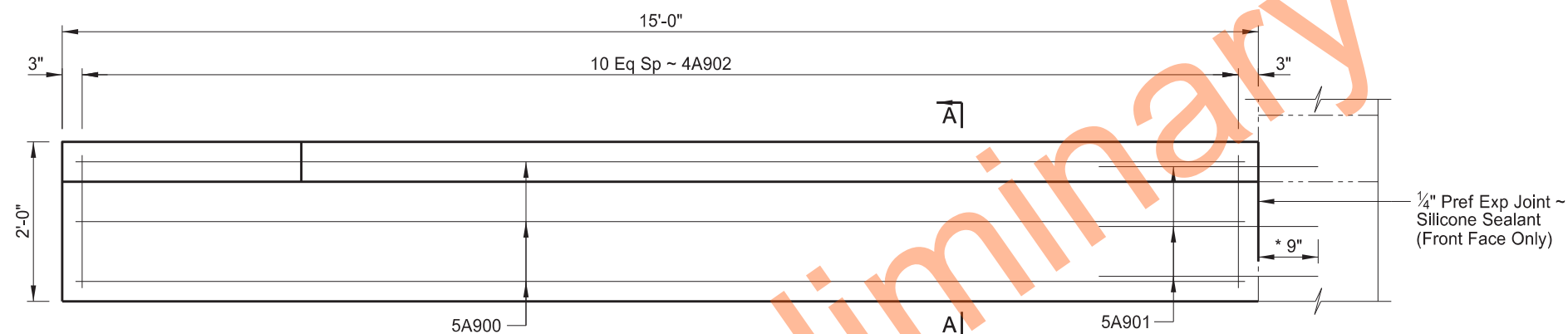
** Shape to the grading requirements of standard drawing D-764-22.

SKEW ANGLE = 0°			
BAR LIST - ONE CURB			
SIZE	MARK	NO.	LENGTH
5	A900	3	14'-8"
5	A901	3	* 2'-9"
4	A902	11	1'-8"
ESTIMATED MATERIAL QUANTITIES			
REINFORCING STEEL (LBS)		CONCRETE (CY)	
60		.5	

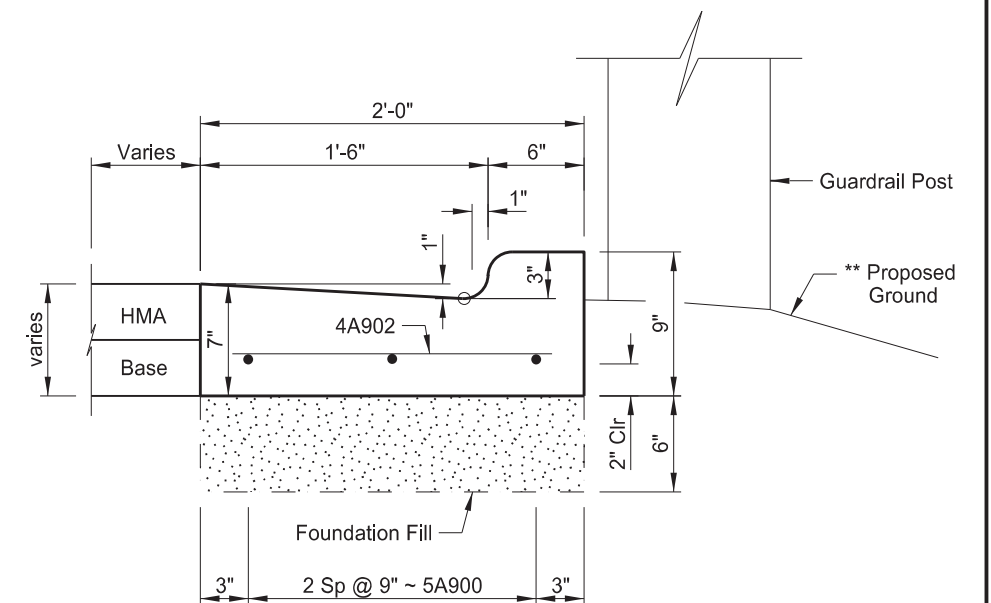


(SHOWING DIMENSIONS)

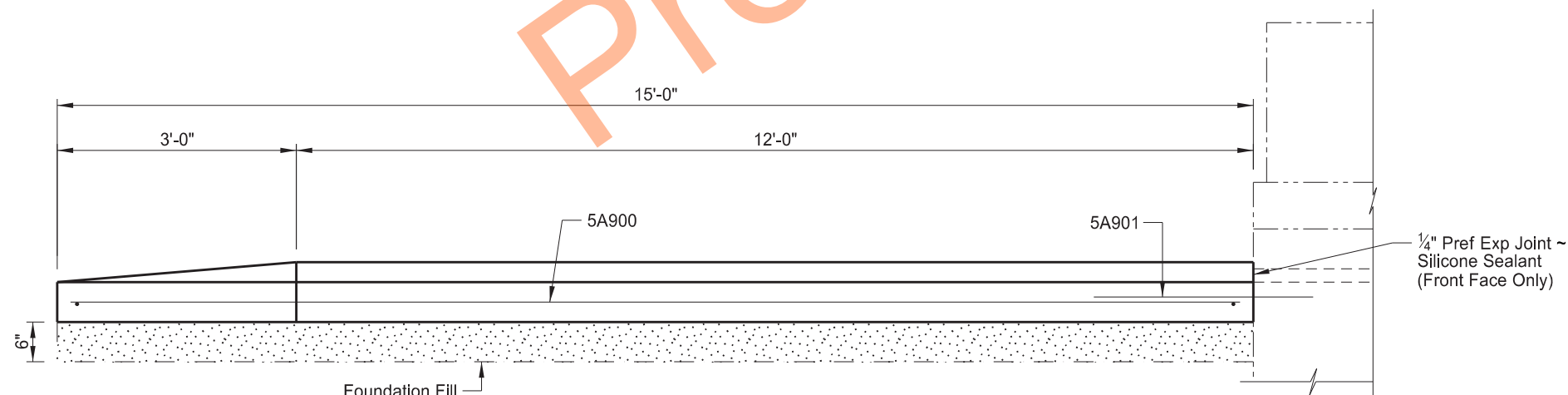
PLAN



(SHOWING REINFORCING)
PLAN



(NEW CONCRETE CURB)
A-A



ELEVATION



QUANTITIES		(ONE CURB)
CURB & GUTTER - TYPE 1 SPECIAL		15 LF
I-29/KINDRED INTERCHANGE NEW CONCRETE CURB & GUTTER		
DRAWING NO.	29-048.182-6	

NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.	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 ☐	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	Flrd	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 ø	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				
Bk	back	CP	control point	Ea	each		
BF	back face	Coord	coordinate	Esmt	easement		
Balc	balcony	Cor	corner	E	East		
B Wire	barbed wire	Corr	corrected	EB	Eastbound		
Barr	barricade	CAES	corrugated aluminum end section	Elast	elastomeric		
Btry	battery	CAP	corrugated aluminum pipe	EL	electric locker		
BI	beehive inlet	CMES	corrugated metal end section	E Mtr	electric meter		
Beg	begin	CMP	corrugated metal pipe	EVSE	electric vehicle supply equipment		
BG	below grade	CPVCP	corrugated poly-vinyl chloride pipe	Elec	electric/al		
BM	bench mark	CSES	corrugated steel end section	EDM	electronic distance meter		
Bkwy	bikeway	CSFES	corrugated steel flared end section	Elev or El	elevation		
Bit	bituminous	CSP	corrugated steel pipe	Ellipt	elliptical		
Blk	block	CSTES	corrugated steel traversable end section	Emb	embankment		
BH	bore hole	Co	County	Emuls	emulsion/emulsified		
Bot	bottom	Crse	course	ES	end section		
Blvd	Boulevard	Ct	Court	Engr	engineer		
Bndry	boundary	Xarm	cross arm	ESS	environmental sensor station		
Brkwy	breakaway	Xbuck	cross buck	Eq	equal		
Br	bridge	Xsec	cross sections	Evgr	evergreen		
Bldg	building	Xing	crossing	Exc	excavation		
Bus.	business	Xrd	crossroad	Exst	existing		
BV	butterfly valve	Crn	crown	Exp	expansion		
Byp	bypass			Expy	Expressway		
				E	external of curve		
				Extru	extruded		

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NDDOT ABBREVIATIONS

D-101-2

Galv galvanized
Gar garage
Gs L gas line
G Reg gas line regulator
GMV gas main valve
G Mtr gas meter
GSV gas service valve
GVP gas vent pipe
GV gate valve
Ga gauge
Gov government
Grd graded/grade
Grnd ground
GWM ground water monitor
Gdrl guardrail
Gtr gutter

H Plg H piling
Hdwl headwall
Ht height
Hel helical
HDPE high density polyethylene
HM high mast
HP high pressure
HPS high pressure sodium
HTCG high tension cable guardrail
Hwy highway
Hor horizontal
HBP hot bituminous pavement
HMA hot mix asphalt
Hyd hydrant
Ph hydrogen ion content

Id Identification
Incl inclinometer tube
IMH inlet manhole
ID inside diameter
Inst instrument
Intchg interchange
Intmdt intermediate
Intscn intersection
Inv invert
IP iron pipe

Ln lane
Lg large
Lat latitude
Lt left
Lens lenses
Lvl level
Lvng leveling
Lht light
LP light pole
Ltg lighting
Liq liquid
LL liquid limit
Loc location
Long. longitude
Lp loop
LD loop detector
Lum luminaire

Mb mailbox
ML main line
MH manhole
Mkd marked
Mkr marker
Mkg marking
MA mast arm
Matl material
Max maximum

Meas measure
Mdn median
MD median drain
MC medium curing
MGS Midwest Guardrail System
MM mile marker
MP mile post
Min minimum
Misc miscellaneous
Mon monument
Mnd mound
Mtbl mountable
Mtd mounted
Mtg mounting
Mk muck

Neop neoprene
Ntwk network
N North
NE Northeast
NW Northwest
NB Northbound
No. or # number

Obsc obscure(d)
Ocpd occupied
Ocpy occupy
O/s offset
OC on center
C one dimensional consolidation
OC organic content
Orig original
O To O out to out
OD outside diameter
OH overhead

PMT pad mounted transformer
Pg pages
Pntd painted
Pr pair
Pnl panel
Pk park
PSD passing sight distance
Pvmt pavement
Ped pedestal
Ped pedestrian
PPP pedestrian pushbutton post
Pen. penetration
Perf perforated
Per. perimeter
Perm permanent
PL pipeline
Pl place
P&P plan & profile
PL plastic limit
Pl or P plate
Pt point
PE polyethylene
PVC polyvinyl chloride
PCC Portland Cement concrete
PP power pole
Preempt preemption
Prefab prefabricated
Prfmd or Pref preformed
Prep preperation
Press. pressure
PRV pressure relief valve
Prestr prestressed
Pvt private
PD private drive
Prod. production/produce
Prog programmed
Prop. property
Ppsd proposed
PB pull box

Qty quantity
Qtr quarter

Rad or R radius
RR railroad
Rlwy railway
Rsd raised
RC rapid curing
Rec record
Rcy recycle
RAP recycled asphalt pavement
RPCC recycled portland cement concrete
Ref reference
R Mkr reference marker
RM reference monument
RP reference point
Refl reflectorized
RCB reinforced concrete box
RCES reinforced concrete end section
RCFES reinforced concrete flared end section
RCP reinforced concrete pipe
RCPS reinforced concrete pipe sewer
RCTES reinforced concrete traversable end section
Reinf reinforcement
Res reservation
Res residence
Ret retaining
Rev reverse
Rt right
R/W right of way
Riv river
Rd road
Rdbd road bed
Rdwy roadway
RWIS roadway weather information system
Rk rock
Rt route

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NDDOT ABBREVIATIONS

D-101-3

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

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NDDOT ABBREVIATIONS

D-101-4

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

D-101-10

702COM
ACCENT
AGASSIZ WU
AGC
ALL PL
ALL SEAS WU
AMOCO PI
AMRDA HESS
AT&T
B PAW
BAKER ELEC
BASIN ELEC
BEK TEL
BELLE PL
BLM
BNSF
BOEING
BRNS RWD
BURK-DIV ELEC
BURL WRD
CABLE ONE
CABLE SERV
CAP ELEC
CASS CO ELEC
CASS RWU
CAV ELEC
CBLCOM
CENEX PL
CENT PL WATER DIST
CENT PWR ELEC
CENTURYLINK
COE
CONS COMM
CONS TELCOM
CONT RES
CPR
D O E
DAK CARR
DAK CENT TEL
DAK RWD
DGC
DICKY R NET
DICKY WRD
DICKY TEL
DNRR
DOME PL
DVELEC
DVMW
E CENT REG WD
ENBRDG
ENVENTIS
EQUINOR
FALK MNG
FHWA
G FKS-TRL WD
GETTY TRD & TRAN
GLDN W ELEC

702 Communications
Accent Communications
Agassiz Water Users District
Associated General Contractors of America
Alliance Pipeline
All Seasons Water Users District
Amoco Pipeline Company
Amerada Hess Corporation
AT&T Corporation
Bear Paw Energy Incorporated
Baker Electric
Basin Electric Cooperative Incorporated
Bek Communications Cooperative
Belle Fourche Pipeline Company
Bureau of Land Management
Burlington Northern Santa Fe Railway
Boeing
Barnes Rural Water District
Burke-Divide Electric Cooperative
Burleigh County Water Resource District
Cable One
Cable Services
Capital Electric Cooperative Incorporated
Cass County Electric Cooperative
Cass Rural Water Users District
Cavalier Rural Electric Cooperative
Cablecom Of Fargo
Cenex Pipeline
Central Pipe Line Water District
Central Power Electric Cooperative
CenturyLink
Corps of Engineers
Consolidated Communications
Consolidated Telcom
Continental Resource Inc
Canadian Pacific Railway
Department Of Energy
Dakota Carrier Network
Dakota Central Telephone
Dakota Rural Water District
Dakota Gasification Company
Dickey Rural Networks
Dickey County Water Resource District
Dickey Telephone
Dakota Northern Railroad
Dome Pipeline Company
Dakota Valley Electric Cooperative
Dakota, Missouri Valley & Western
East Central Water District
Enbridge Pipelines Incorporated
Enventis Telephone
Equinor Pipeline
Falkirk Mining Company
Federal Highway Administration
Grand Forks-traill Water District
Getty Trading & Transportation
Golden West Electric Cooperative

GTR RAMSEY WD
GT PLNS NAT GAS
HALS TEL
IDEA1
INT-COMM TEL
KANEB PL
KEM ELEC
KOCH GATH SYS
LKHD PL
LWR YELL R ELEC
LUMEN
MCKNZ CON
MCKNZ ELEC
MCKNZ WRD
MCLEOD
MCLN ELEC
MCLN-SHRDN R WAT
MDU
MIDCO
MIDSTATE TEL
MINOT CABLE
MINOT TEL
MISS VALL COMM
MISS W W S
MNMOTA PWR
MOR-GRAN-SOU ELEC
MOUNT-WILLI ELEC
MLGC
MUNICIPAL
MUNICIPAL
N CENT ELEC
N PRAIR REG WD
ND PKS & REC
ND TEL
NDDOT
NE REG WD
NDSU SOIL SCI DEPT
NEMONT TEL
NODAK R ELEC
NOON FRMS TEL
NPR
NSP
NTHN BRDR PL
NTHN PLNS ELEC
NTHWSTRN REF
NW COMM
NWRWD
ONEOK
OSHA
OTTR TL PWR
PAAP
P L E M
POLAR COM
PVT ELEC
QWEST
R&T REG WD

Greater Ramsey Water District
Great Plains Natural Gas Company
Halstad Telephone Company
Idea1
Inter-Community Telephone Company
Kaneb Pipeline Company
Kem Electric Cooperative Incorporated
Koch Gathering Systems Incorporated
Lakehead Pipeline Company
Lower Yellowstone Rural Electric
Lumen Technologies Incorporated
McKenzie Consolidated Telcom
McKenzie Electric Cooperative
McKenzie County Water Resource District
McLeod USA
McLean Electric Cooperative
McLean-Sheridan Rural Water District
Montana-dakota Utilities
MidContinent Communications
Midstate Telephone Company
Minot Cable Television
Minot Telephone Company
Missouri Valley Communications Incorporated
Missouri West Water System
Minnkota Power
Mor-gran-sou Electric Cooperative
Mountrail-williams Electric Cooperative
Moore & Liberty - Griggs County
City Water And Sewer
City Of '.....'
North Central Electric Cooperative
North Prairie Regional Water District
North Dakota Parks And Recreation
North Dakota Telephone Company
North Dakota Department of Transportation
Northeast Regional Water District
NDSU Soil Science Department
Nemont Telephone
Nodak Rural Electric Cooperative
Noonan Farmers Telephone Company
Northern Plains Railroad
Northern States Power
Northern Border Pipeline
Northern Plains Electric Cooperative Incorporated
Northwestern Refinery Company
Northwest Communication Cooperation
Northwest Rural Water District
Oneok gas
Occupational Safety and Health Administration
Otter Tail Power Company
Plains All American Pipeline
Praieliands Energy Marketing
Polar Communications
Private Electric
Qwest Communications
R & T Water District

RED RIV COMM
RESVTN TEL
ROBRTS TEL
R-RIDER ELEC
RRVW
S CENT REG WD
SE W U
SCOTT CABLE
SHERDN ELEC
SHEYN VLY ELEC
SKYTECH
SLOPE ELEC
SOURIS RIV TELCOM
ST WAT COMM
STATE LN WATER
STER ENG
STUT RWD
SW PL PRJ
SWWA
SUNOCO
T M C
TCI
TESORO GHG PLNS PL
TRI-CNTY WU
TRL CO WRD
UNTD TEL
UPPR SOUR WD
US SPRINT
USAF MSL CABLE
USFWS
USW COMM
VRNDRY ELEC
W RIV TEL
WAPA
WAWSA
WEB
WILLI WRD
WILSTN BAS PL
WLSH RWD
WOLVRTN TEL
XLENER
YSVR

Red River Communications
Reservation Telephone
Roberts Company Telephone
Roughrider Electric Cooperative
Red River Valley & Western Railroad
South Central Regional Water District
Southeast Water Users Incorporated
Scott Cable Television Dickinson
Sheridan Electric Cooperative
Sheyenne Valley Electric Cooperative
Skyland Technologies Incorporated
Slope Electric Cooperative Incorporated
Souris River Telecommunications
State Water Commission
State Line Water Cooperative
Sterling Energy
Stutsman Rural Water District
Southwest Pipeline Project
Southwest Water Authority
Sunoco LP
Turtle Mountain Communications
TCI of North Dakota
Tesoro High Plains Pipeline
Tri-County Water Users Incorporated
Traill County Water Resource District
United Telephone
Upper Souris Water District
U.S. Sprint
U.S.A.F. Missile Cable
US Fish and Wildlife Service
U.S. West Communications
Verendrye Electric Cooperative
West River Telephone Incorporated
Western Area Power Administration
Western Area Water Supply Authority
W. E. B. Water Development Association
Williams County Water Resource District
Williston Basin Interstate Pipeline Company
Walsh Water Rural Water District
Wolverton Telephone
Xcel Energy
Yellowstone Valley Railroad

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LINE STYLES

D-101-20

Existing Topography

	Existing Ground Void
	Existing Cemetery 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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12 18 2020

LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

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

Countours

	Depression Contours
	Supplemental Contour

Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile

Striping

	Centerline Pavement Marking
	Barrier with Centerline Pavement Marking
	Barrier Pavement Marking
	Stripe 4 IN Dotted Extension White
	Stripe 8 IN Dotted Extension White
	Stripe 8 IN Lane Drop

Pavement Joints

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

Bridge Details

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

Erosion Control

	Limits of Const Transition Line
	Bale Check
	Rock Check
	Floating Silt Curtain
	Silt Fence
	Excavation Limits
	Fiber Rolls

Environmental

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups
12-18-20	General Revisions

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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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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

STANDARD SLOPE PROTECTION UNDER BRIDGES

D-258-1

NOTES:

Construct the toe wall before concrete is placed on the slope.

Construct 5'-6" square interior panels. Vary the width of the outside panels from 5'-0" min to 8'-0" max to achieve the width shown in the plans. Vary the length of the bottom panel from 3'-0" min to 8'-0" max to achieve the length shown in the plans.

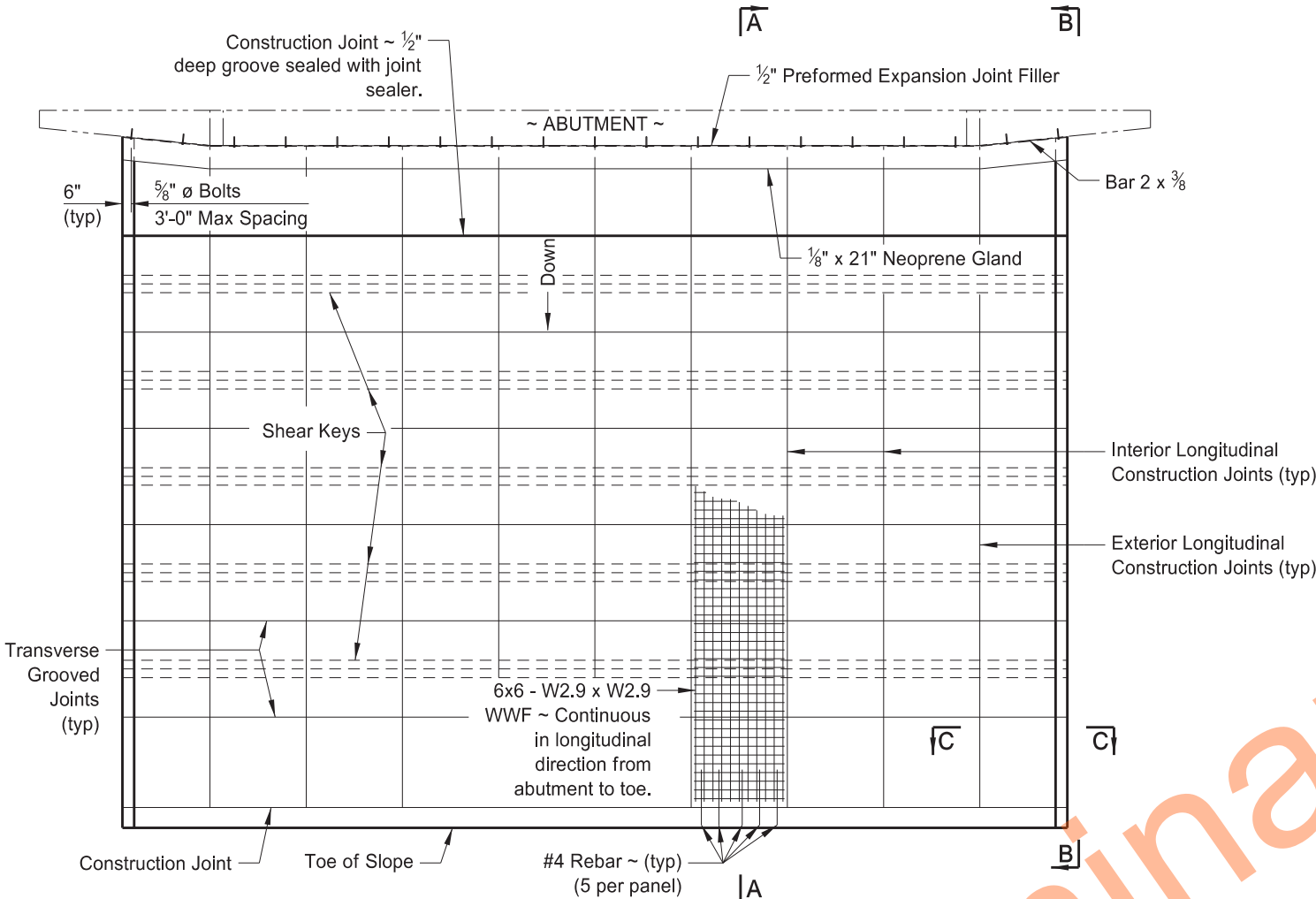
Construct 1/2" deep grooves in transverse and longitudinal joints. Seal the joints with a concrete joint sealant meeting 826.02 or ASTM C-920, Class 25.

Install 1/2" thick preformed expansion joint filler around pier columns or other obstructions projecting through the concrete slope protection.

Place shear keys in every panel on the slope, as shown.

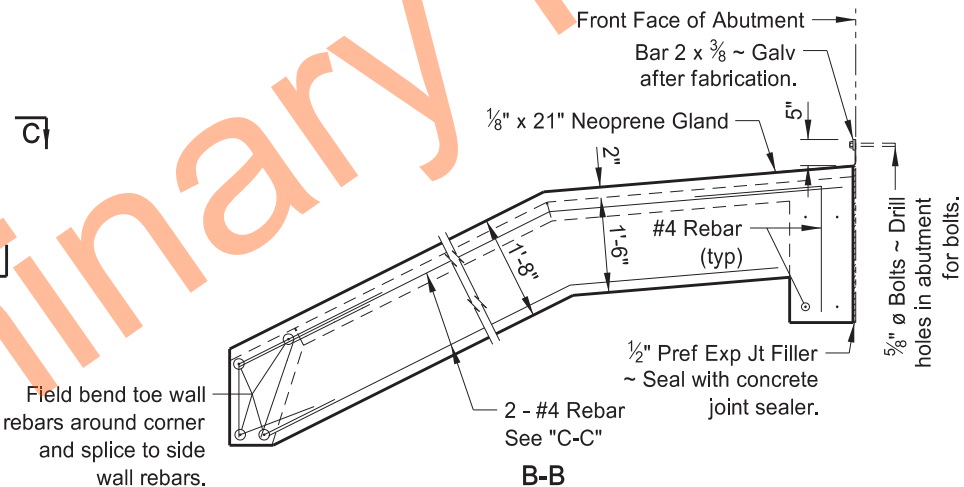
Supply the welded wire fabric (WWF) in sheets. Use a lap splice at least 8" long when it is necessary to make the WWF continuous.

Fasten the neoprene gland to the front face of abutment using 5/8" diameter bolts passing through a 2" wide x 3/8" thick steel bar. Provide a continuous steel bar, or a series of shorter bars, each with a length sufficient to hold a minimum of 3 bolts and extend a minimum distance of 6" past the centerline of outer bolts. Install the bolts into the front face of abutment using chemical or mechanical anchors. Galvanize the bolts and steel bars per Section 854.



SLOPE PROTECTION LAYOUT

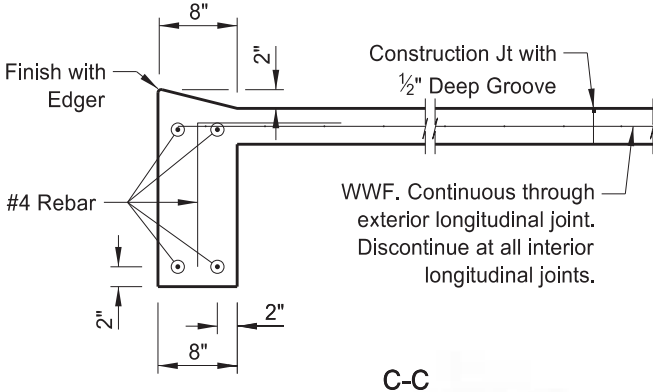
SKEWED SLOPE PROTECTION LAYOUT



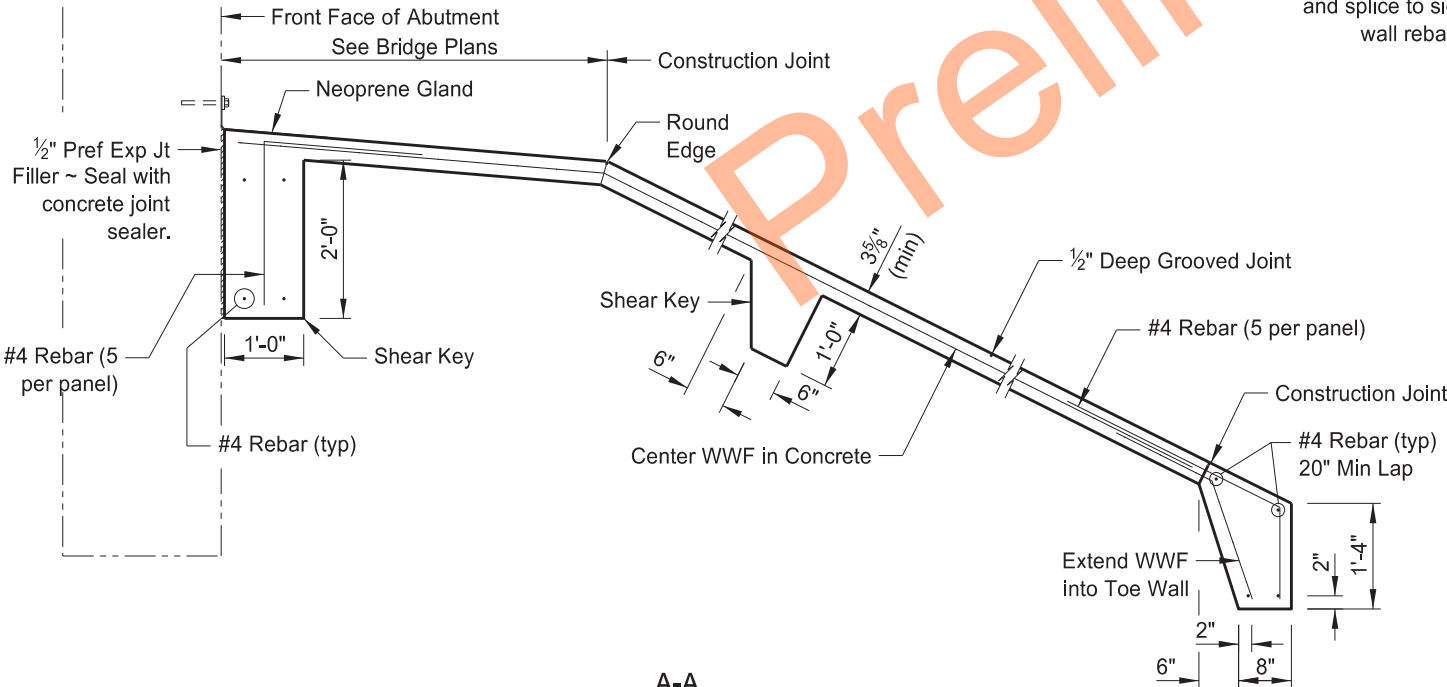
B-B

#4 SHEAR KEY BENT BAR DETAIL

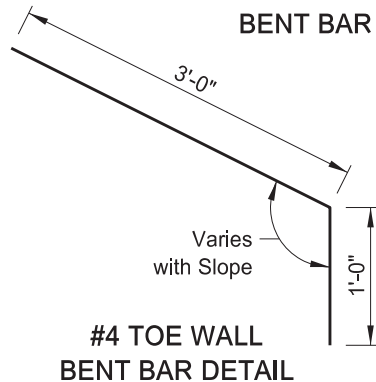
#4 SIDE WALL BENT BAR DETAIL



C-C

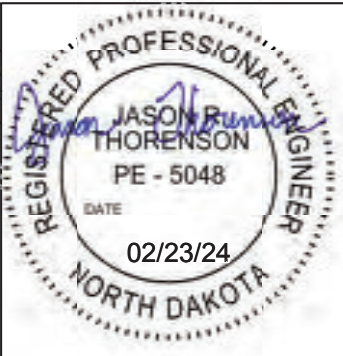


A-A

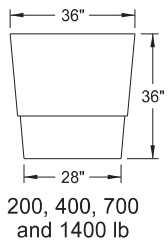
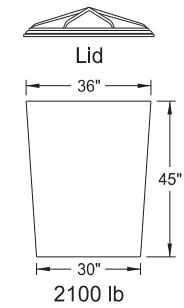


#4 TOE WALL BENT BAR DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07/10/14	
REVISIONS	
DATE	CHANGE
07/10/14	CHANGED FROM D-708-1
09/03/19	UPDATED SIGNATURE
02/23/24	Updated Signature Revised notes & updated to active voice



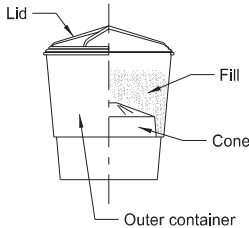
ATTENUATION DEVICE



Outer Containers

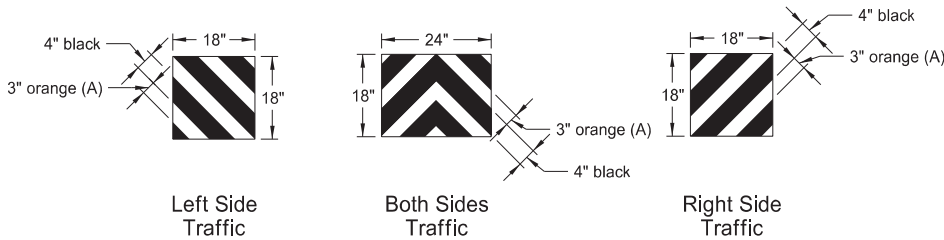


Cones



Typical Assembly

Typical Module Construction Detail

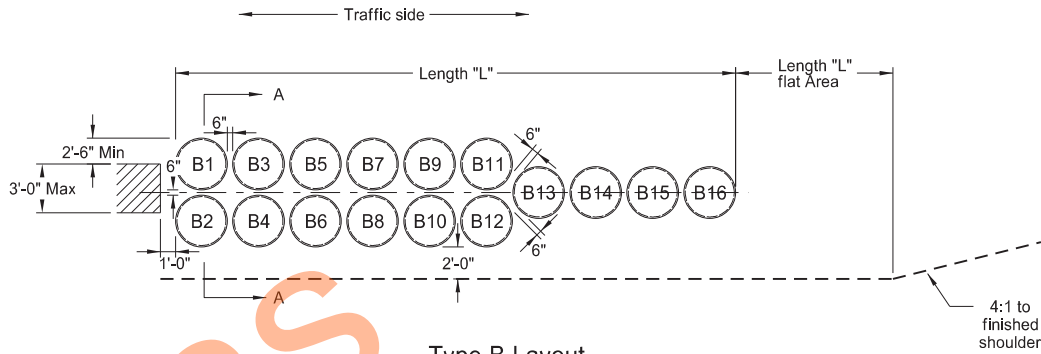


Reflective Sheet Detail

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.

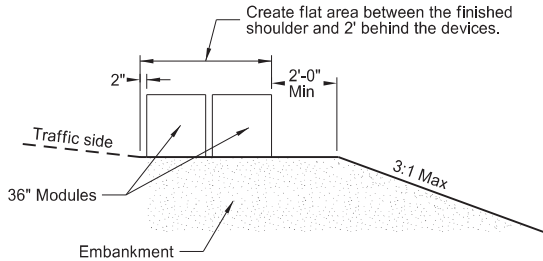
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.

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	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 modules in two sizes containing volumes of either 2, 4, 7, 14, or 21 cubic feet minimum.
 - 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.

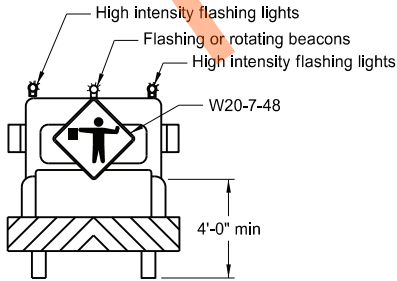
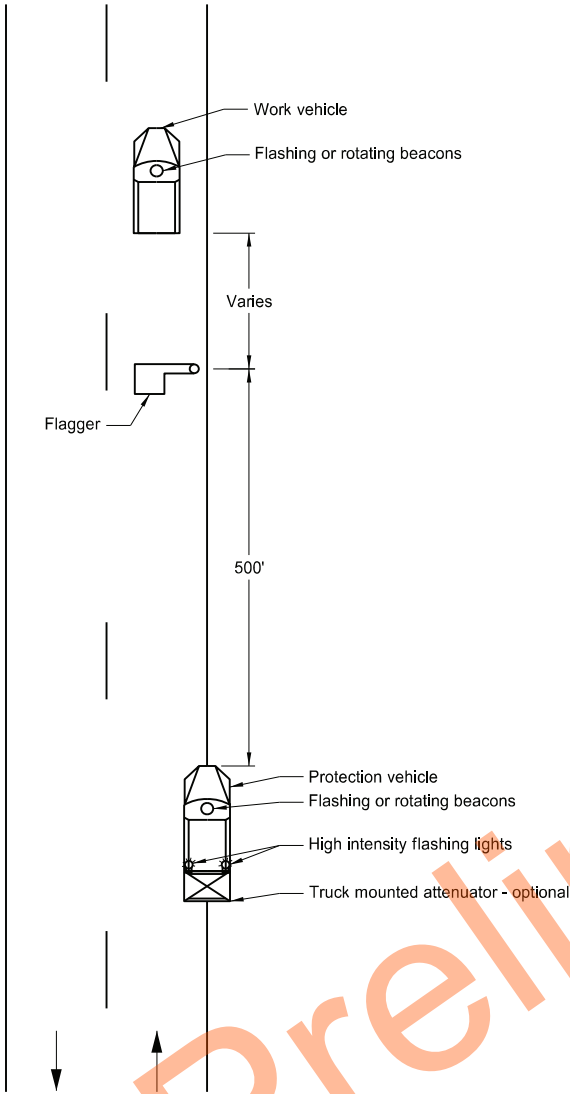
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
07-18-14	Revised sheeting in reflective sheet detail
09-27-17	Update to active voice
10-03-19	New Design Engr PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes



TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

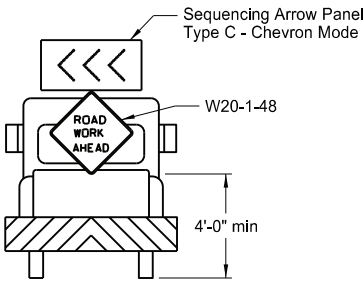
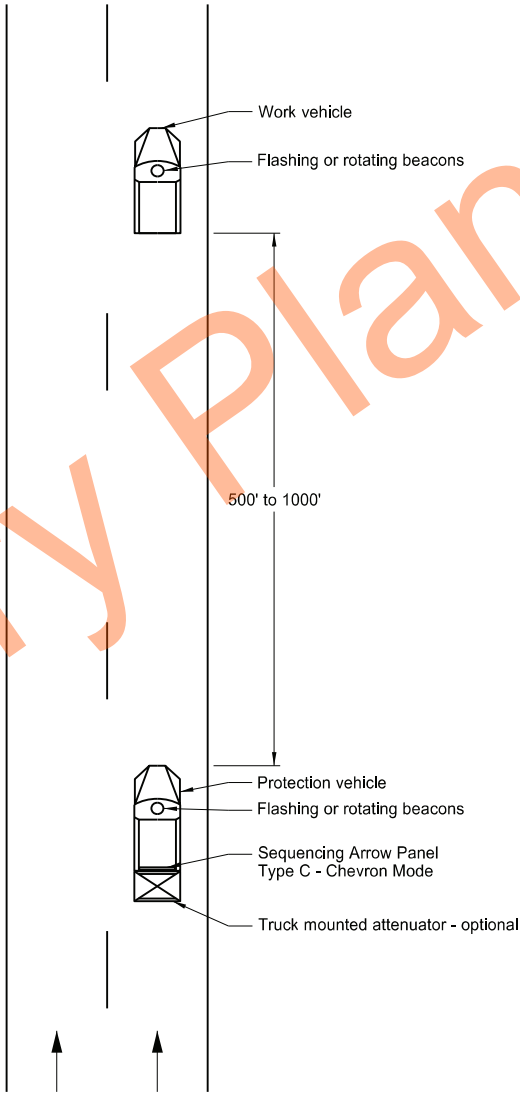
D-704-2

Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways



Typical Protection Vehicle

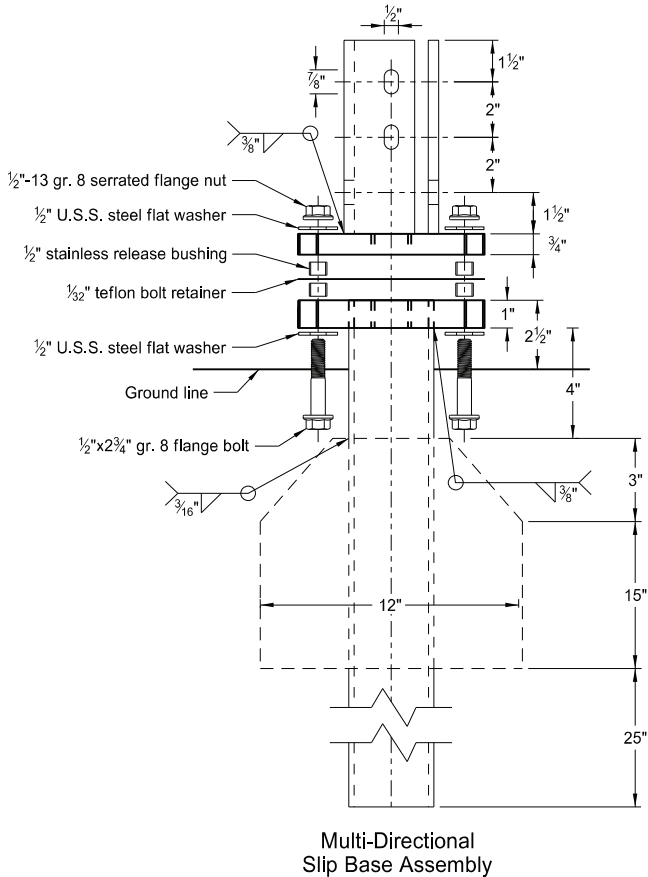
- Notes:
1. Display a 360 degree rotating, flashing, oscillating or strobe light on the working vehicle.
 2. Display a 360 degree rotating, flashing, oscillating or strobe light on the shadow vehicle. Operate a sequencing arrow panel Type C in chevron mode on the shadow vehicle for Multilane Roadway.
 3. Use these layouts during daylight hours and in areas of good visibility only.
 4. Use flagger to protect the work area and warn oncoming traffic for two lane, two way roadway.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp
8-01-24	Electronic Stamp/Signature

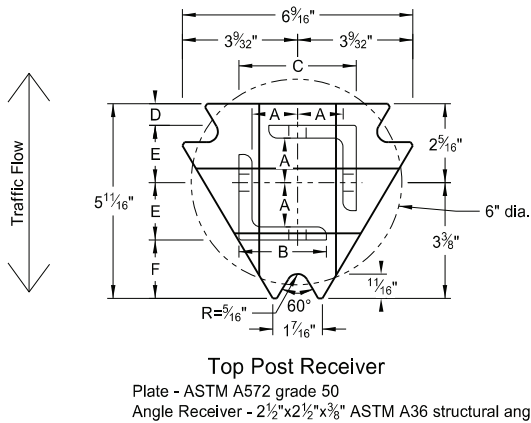
08/01/24

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7



Perforated Tube



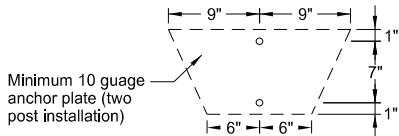
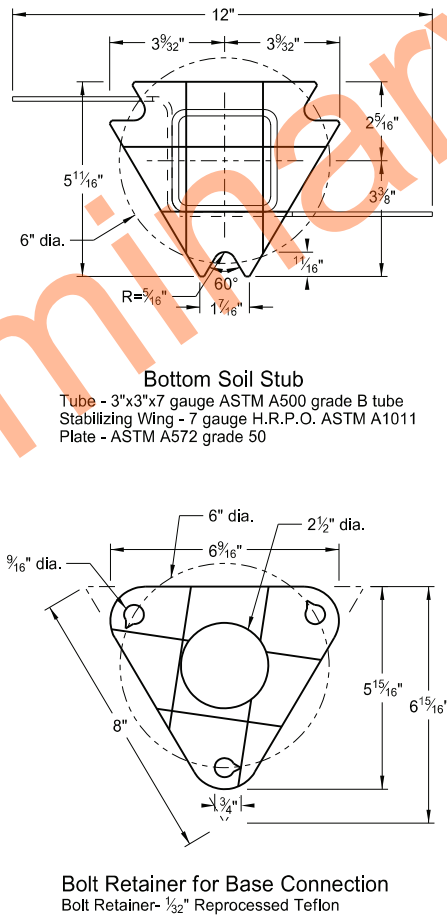
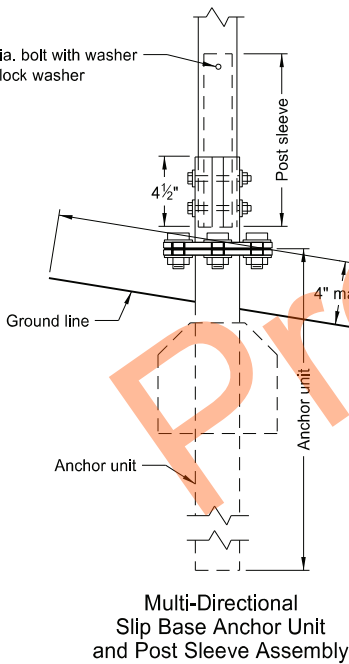
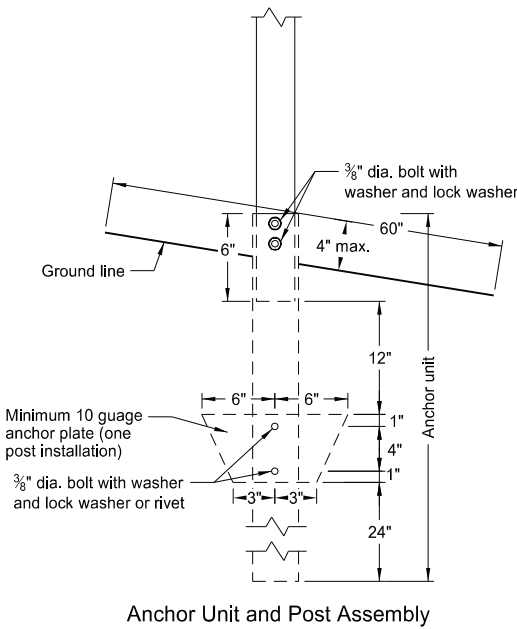
- Notes:
1. Torque slip base bolts as specified by manufacturer.
 2. Use anchor with 43.9 KSI yield strength and 59.3 KSI tensile strength.
 3. Provide 4" vertical clearance for anchor or breakaway base. Measure the 4"x60" measurement above and below post location and back and ahead of post.
 4. In concrete 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 5/8"	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

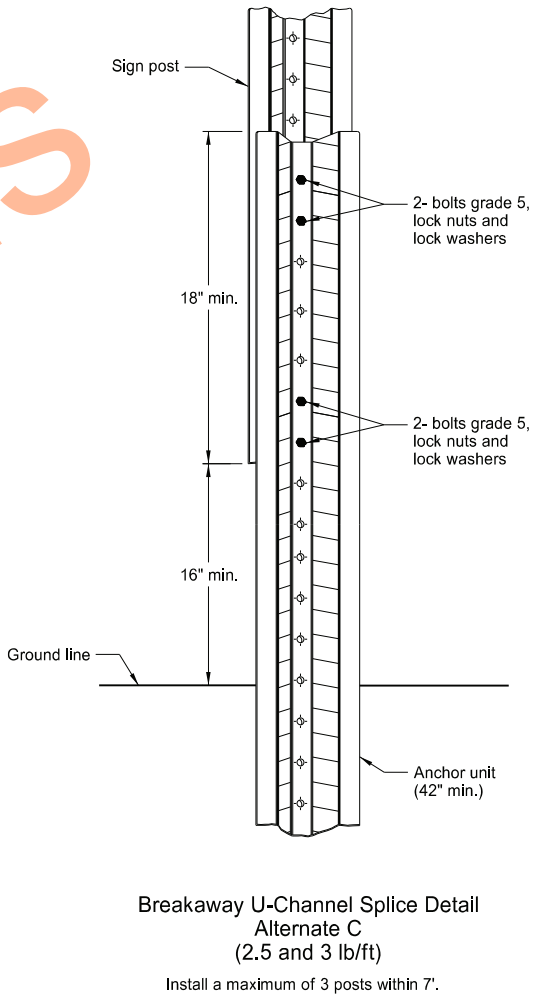
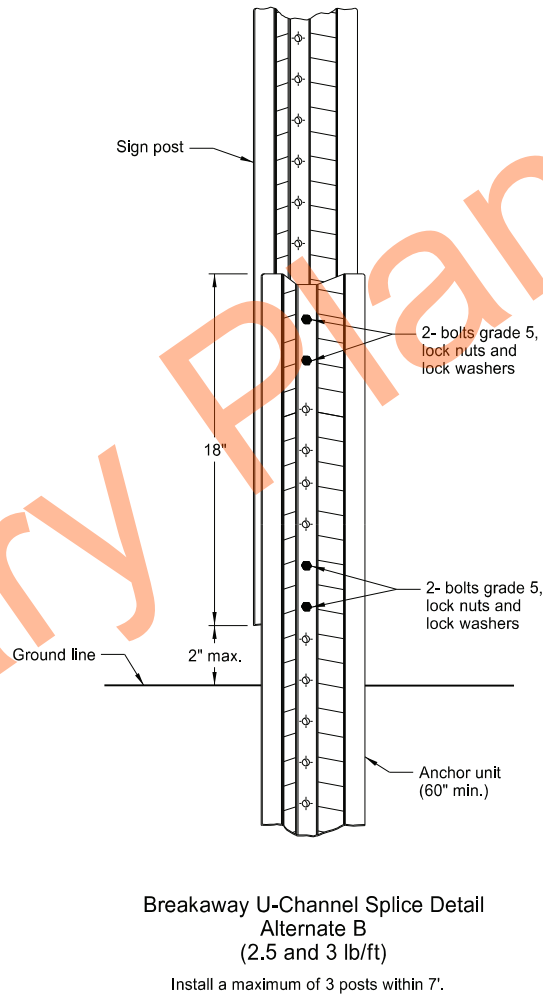
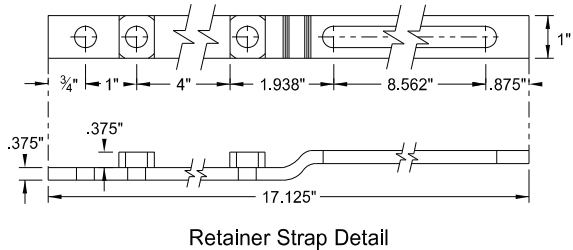
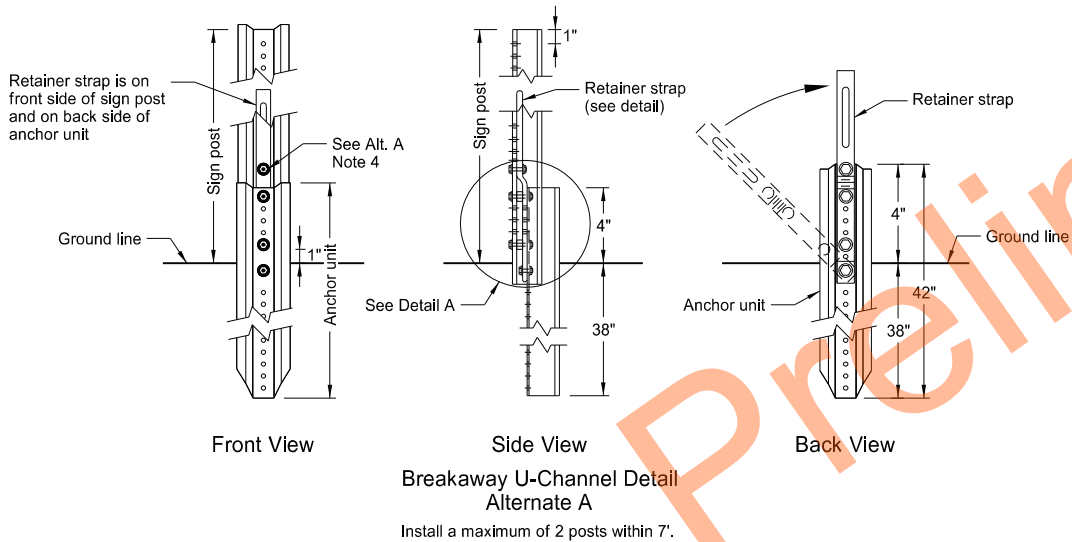
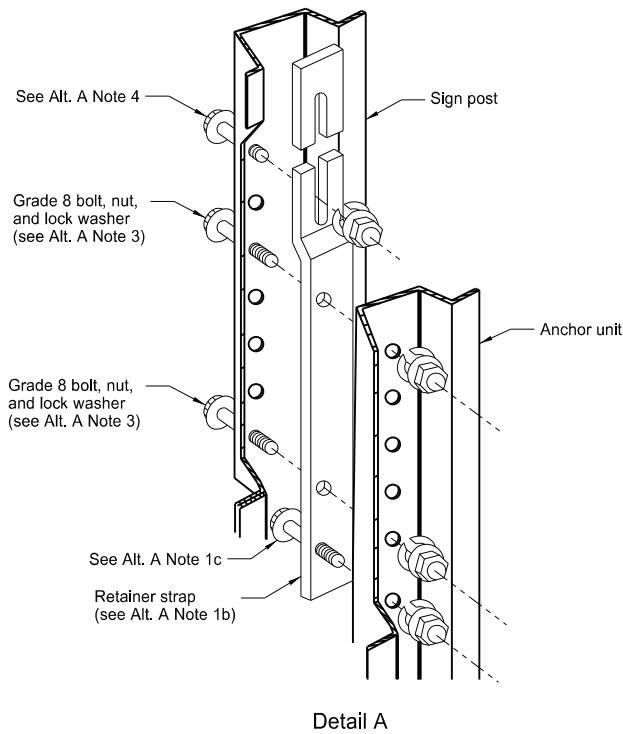


08/01/24

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



Alternate A Steps of Installation:

- a) Drive anchor unit to within 12" of ground level.
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
- a) Drive anchor unit to 4" above ground.
b) Rotate strap to vertical position.
- a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
b) Alternately tighten two connector bolts.
- Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
- Properly nest base post, strap, and sign post. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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

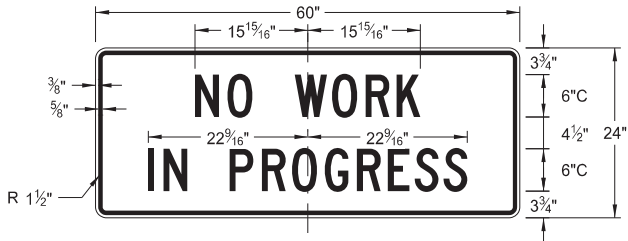


08/01/24

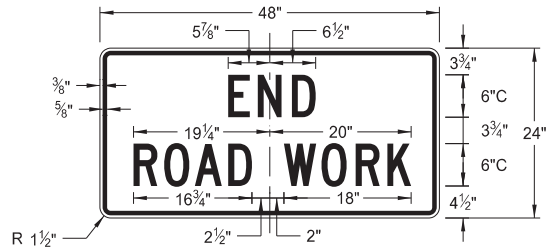
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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



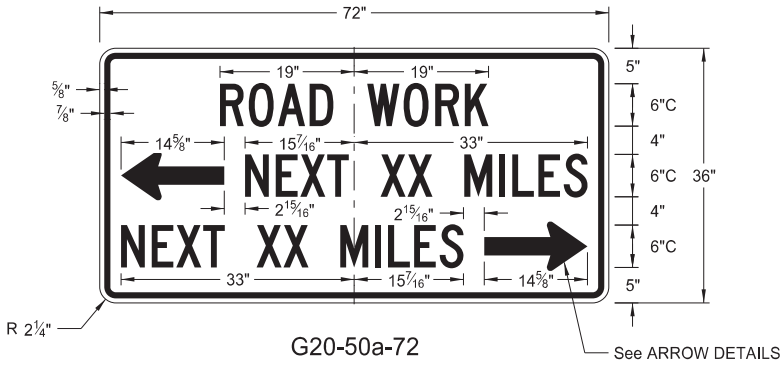
G20-1b-60
Legend: black (non-refl)
Background: orange



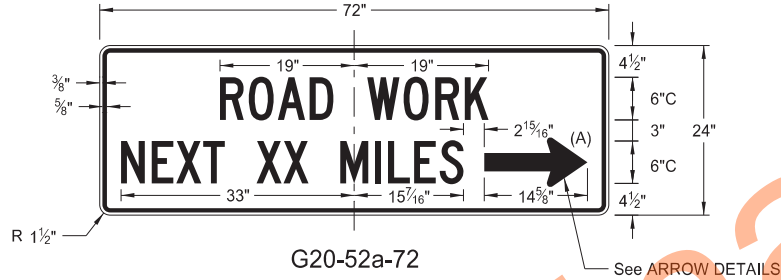
G20-2-48
Legend: black (non-refl)
Background: orange



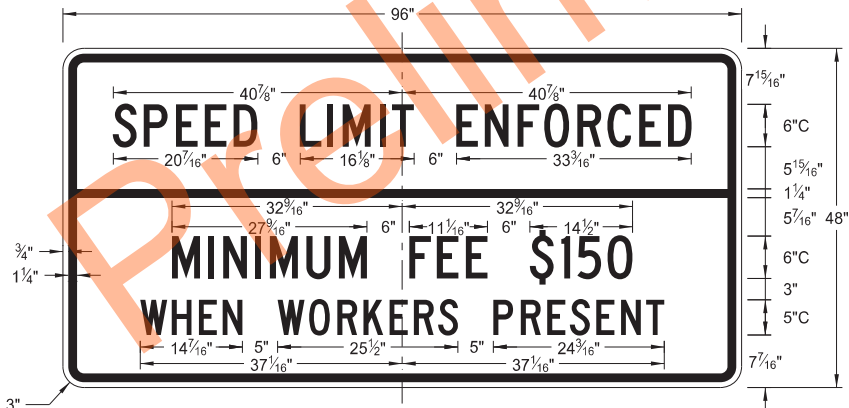
G20-4b-36
Legend: black (non-refl)
Background: orange



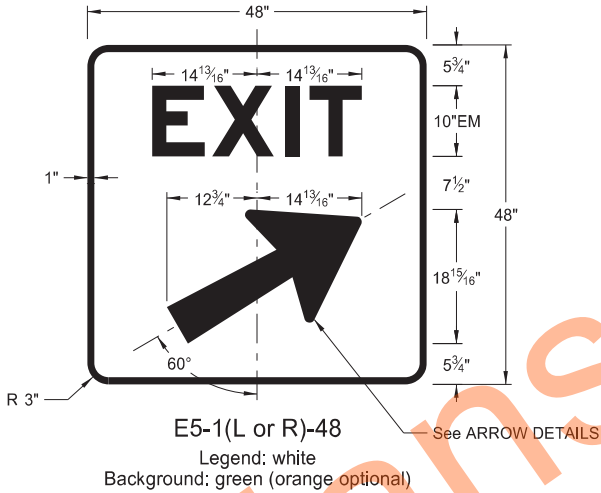
G20-50a-72
Legend: black (non-refl)
Background: orange



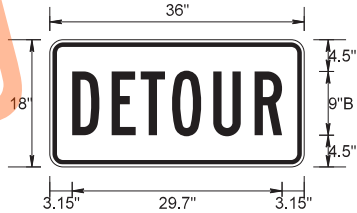
G20-52a-72
Legend: black (non-refl)
Background: orange



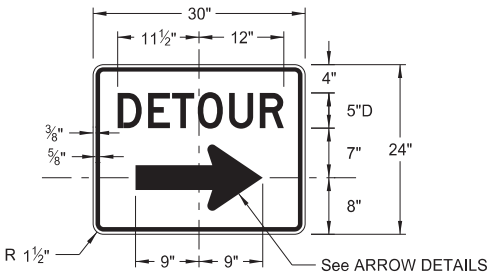
G20-55-96
Legend: black (non-refl)
Background: orange



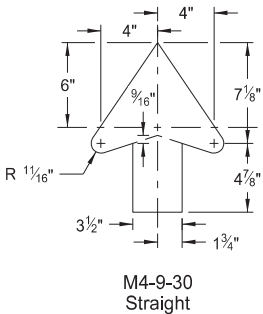
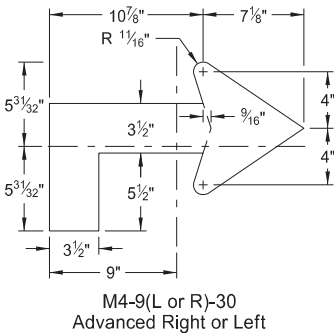
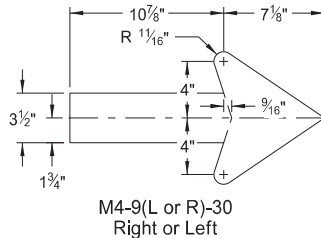
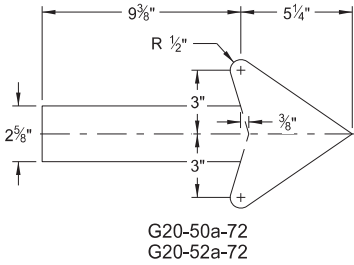
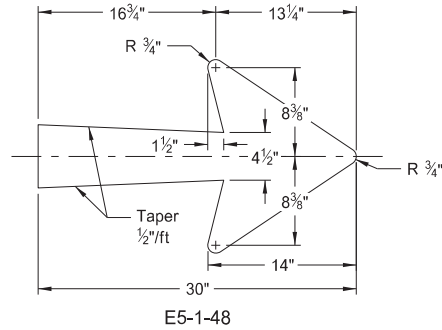
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



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



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



ARROW DETAILS

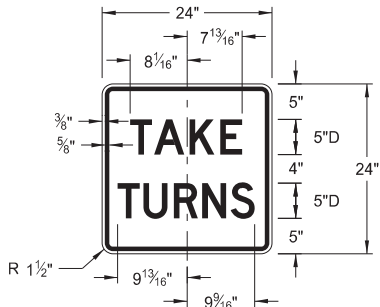
NOTES:

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

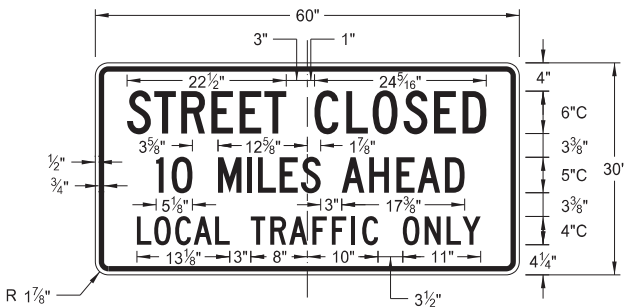
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17	Added sign & background color
10-03-19	New Design Engineer PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes



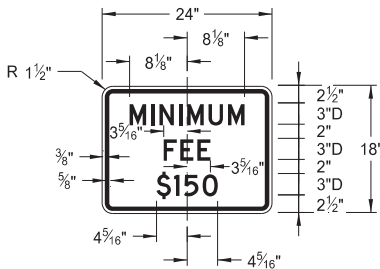
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



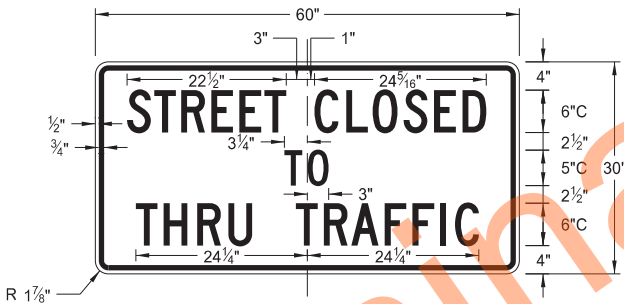
R1-50P-24
Legend: black (non-refl)
Background: white



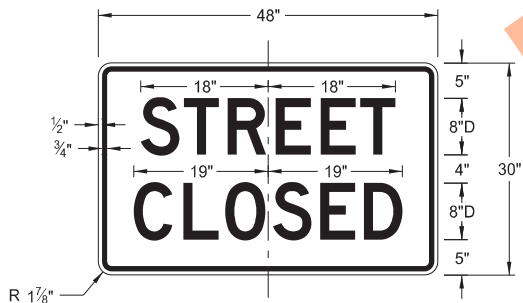
R11-3c-60
Legend: black (non-refl)
Background: white



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

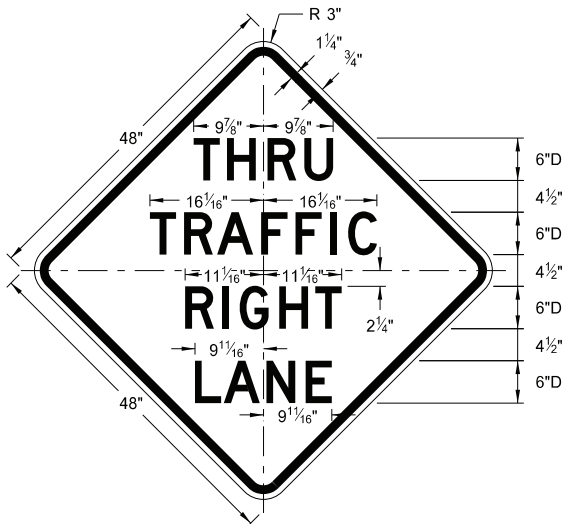


CONSTRUCTION SIGN DETAILS
WARNING SIGNS

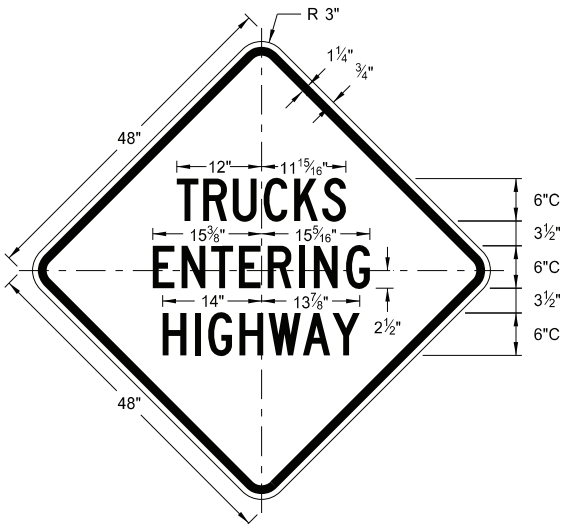
D-704-11

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

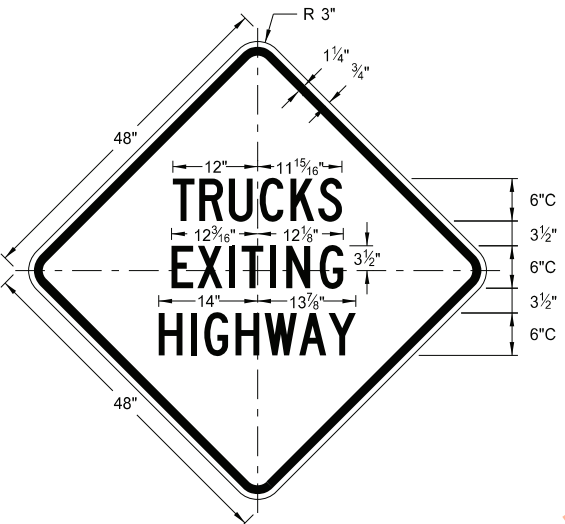
* DISTANCE MESSAGES



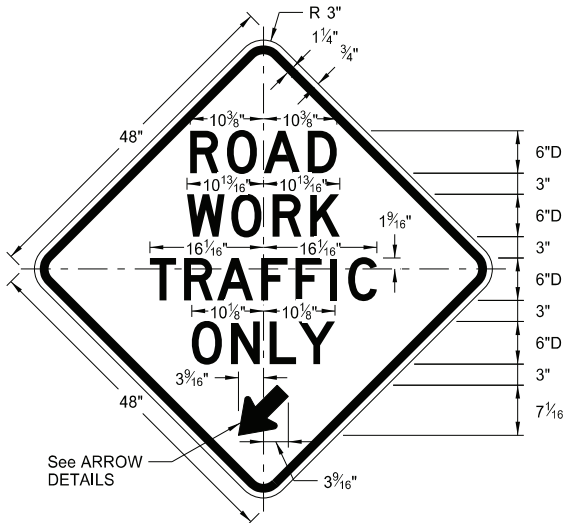
W5-8-48
Legend: black (non-refl)
Background: orange



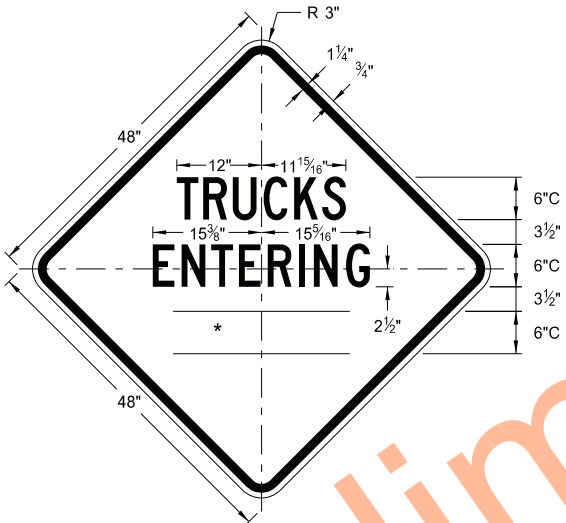
W8-53-48
Legend: black (non-refl)
Background: orange



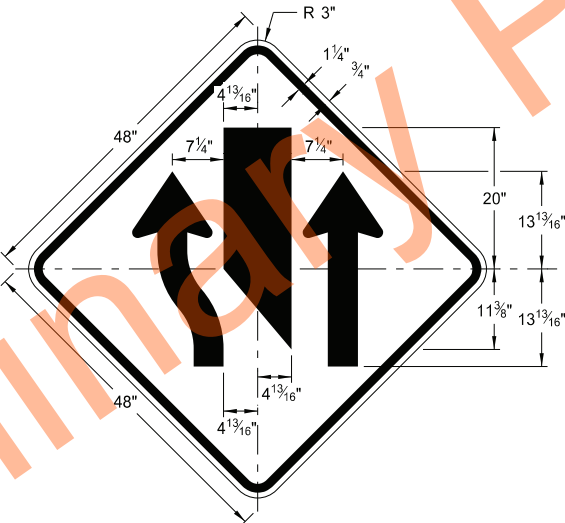
W8-56-48
Legend: black (non-refl)
Background: orange



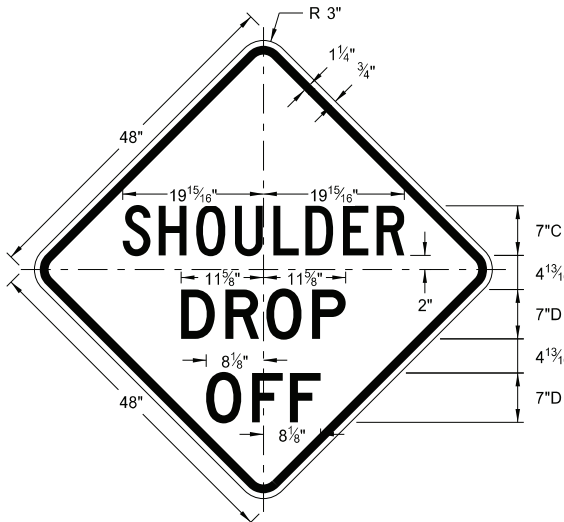
W5-9-48
Legend: black (non-refl)
Background: orange



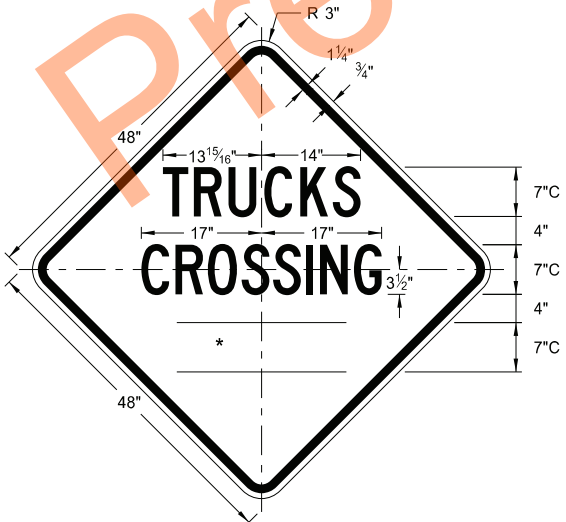
W8-54-48
Legend: black (non-refl)
Background: orange



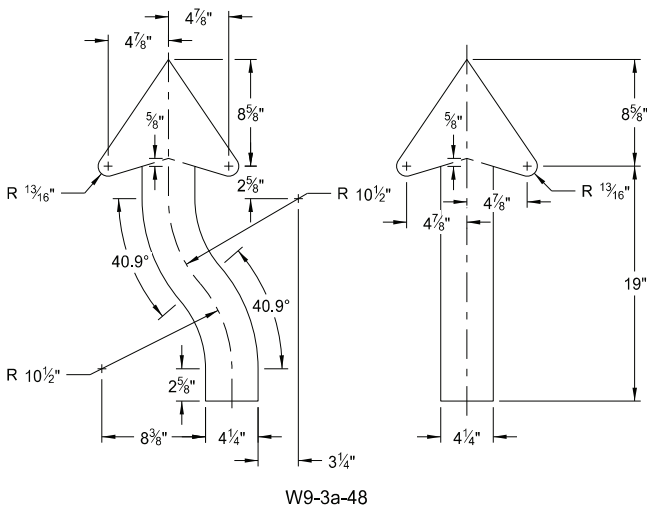
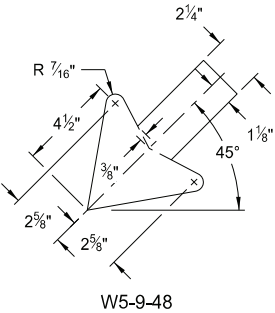
W9-3a-48
Legend: black (non-refl)
Background: orange



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



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



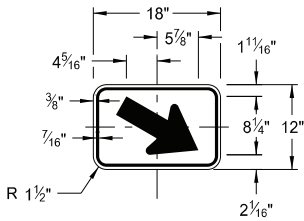
ARROW DETAILS

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

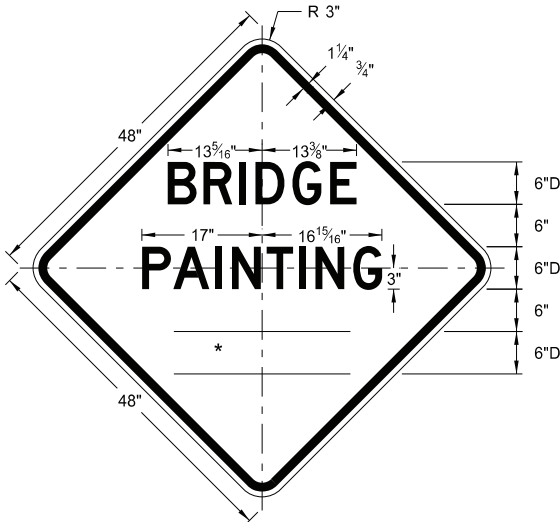


08/01/24

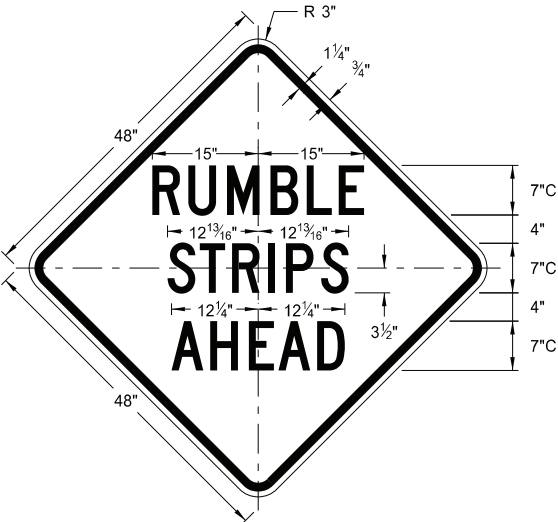
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



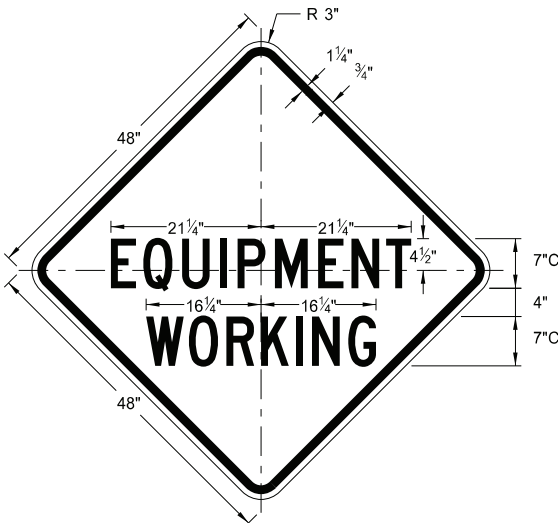
W16-7aP-18
Legend: black (non-refl)
Background: orange



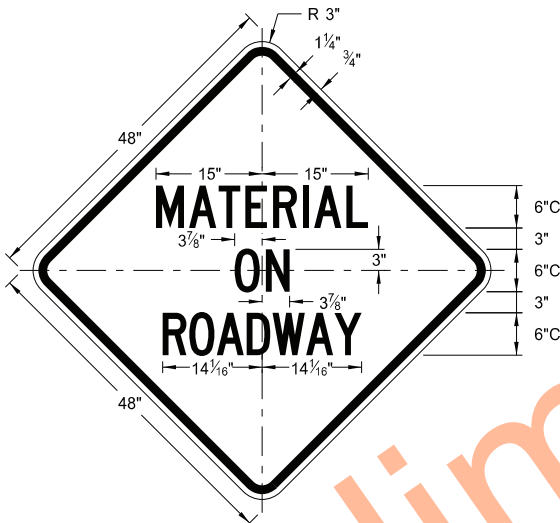
W21-50-48
Legend: black (non-refl)
Background: orange



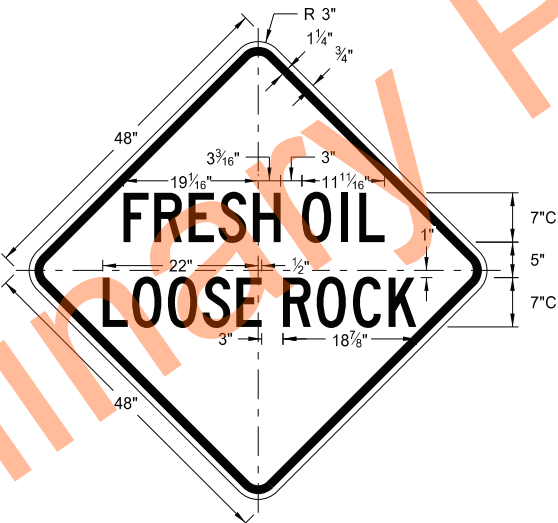
W21-53-48
Legend: black (non-refl)
Background: orange



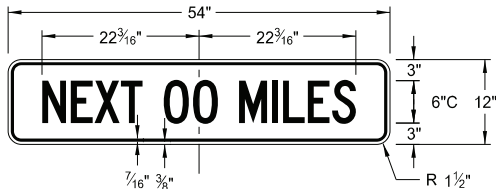
W20-51-48
Legend: black (non-refl)
Background: orange



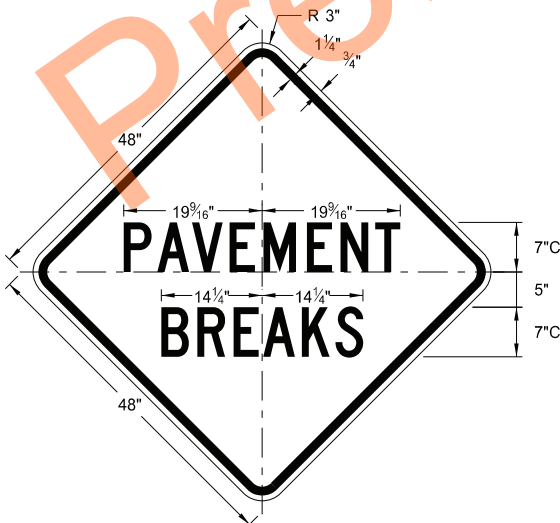
W21-51-48
Legend: black (non-refl)
Background: orange



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



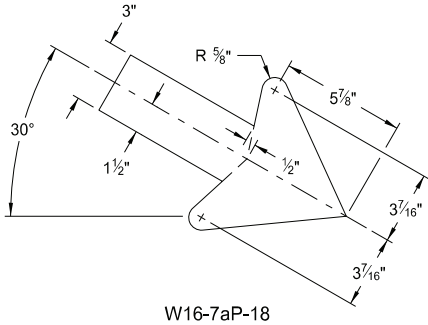
W20-52P-54
Legend: black (non-refl)
Background: orange



W21-52-48
Legend: black (non-refl)
Background: orange

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
1/2 MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



W16-7aP-18

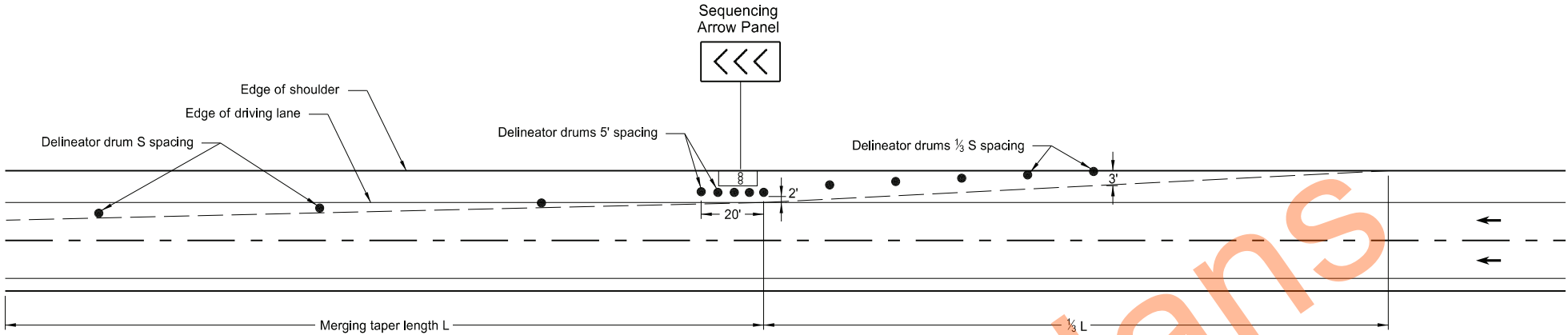
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE
11-01-19	Added details for sign W16-7aP-18.
8-01-24	Electronic Stamp/Signature.



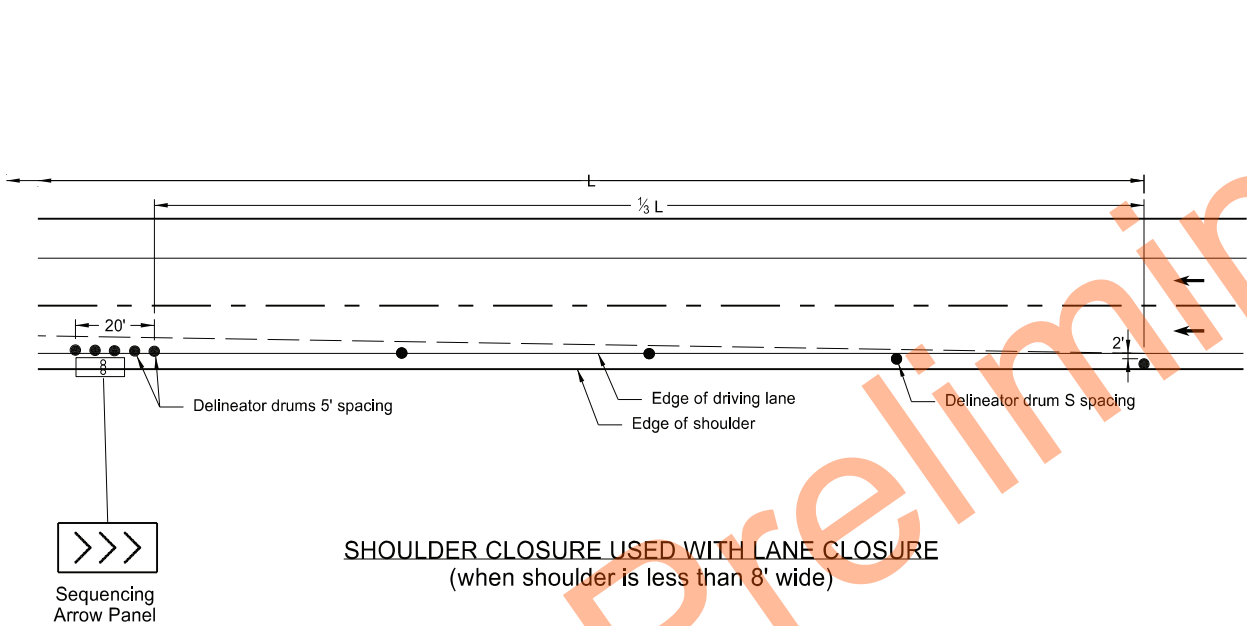
08/01/24

SHOULDER CLOSURE TAPERS

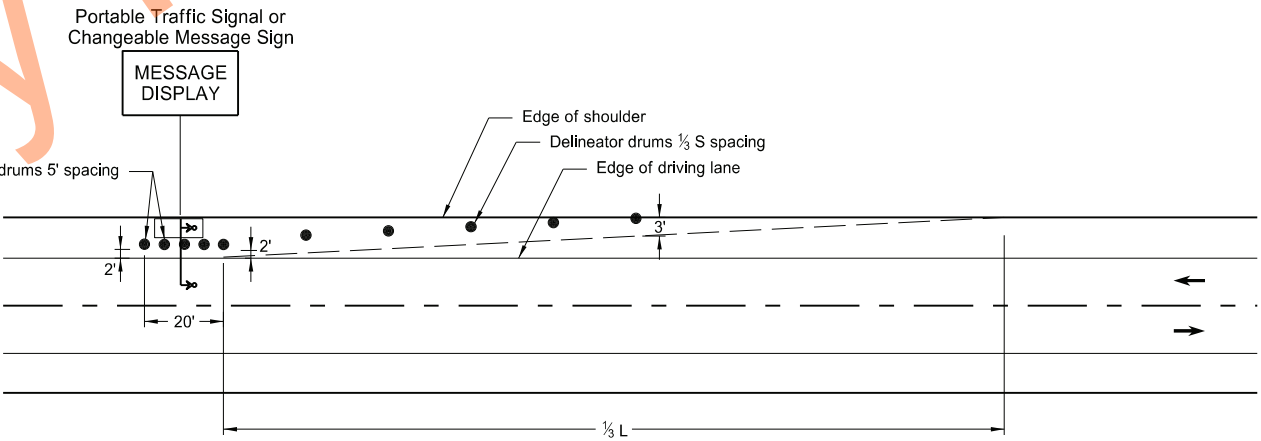
D-704-12



SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



SHOULDER CLOSURE USED WITH LANE CLOSURE
(when shoulder is less than 8' wide)



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY

- Delineator Drum
- Message Display
- ∞ Sequencing Arrow Panel
- ↳ Portable Traffic Signal

Notes:

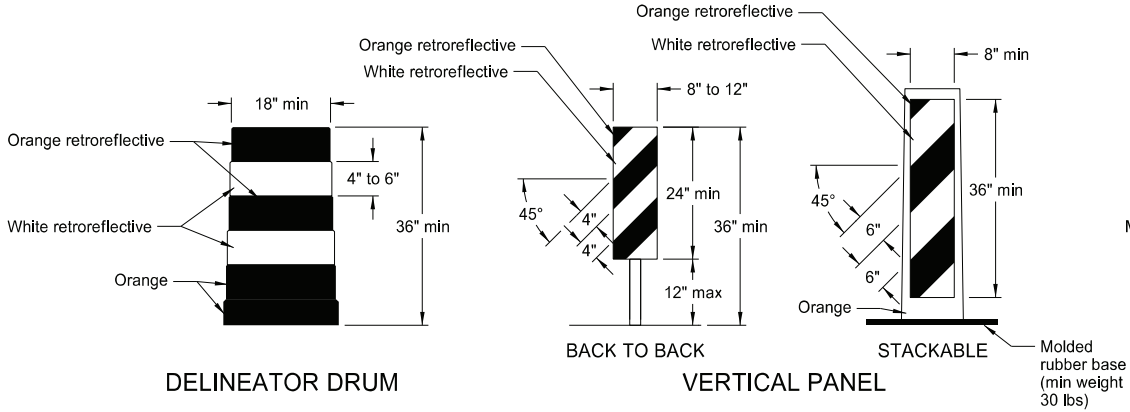
- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
L = $WS^2/60$ (40mph or less)
L = WS (45mph or more)
- If a shoulder taper is used, use a length of approximately $\frac{1}{3}L$. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
- When paved shoulders of 8 foot width or more are closed, use channelizing devices to close shoulder in advance, to delineate beginning of work space, and to direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-25-19	Added L dimension to detail
8-01-24	Electronic Stamp/Signature



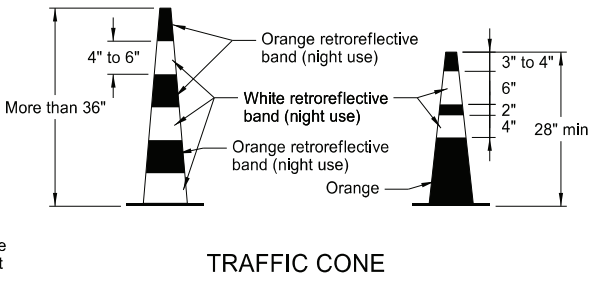
08/01/24

BARRICADE AND CHANNELIZING DEVICE DETAILS

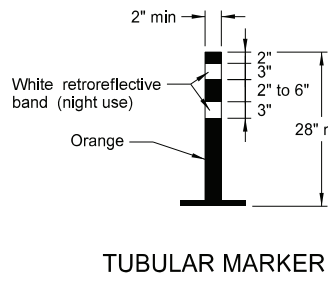


Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflective spaces between the horizontal orange and white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

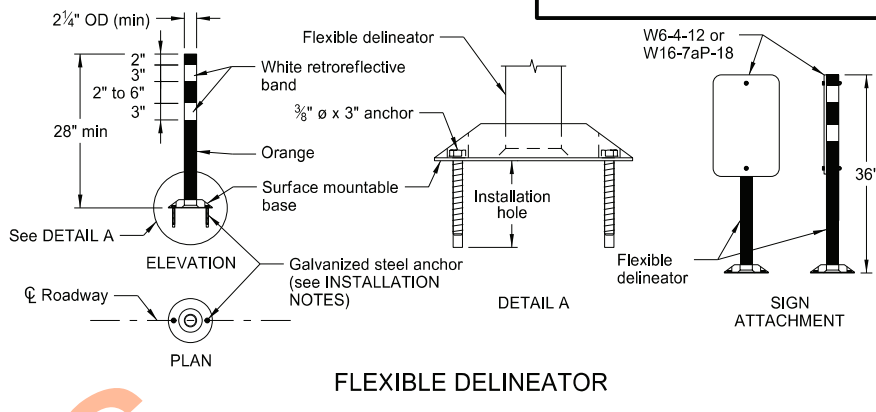
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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



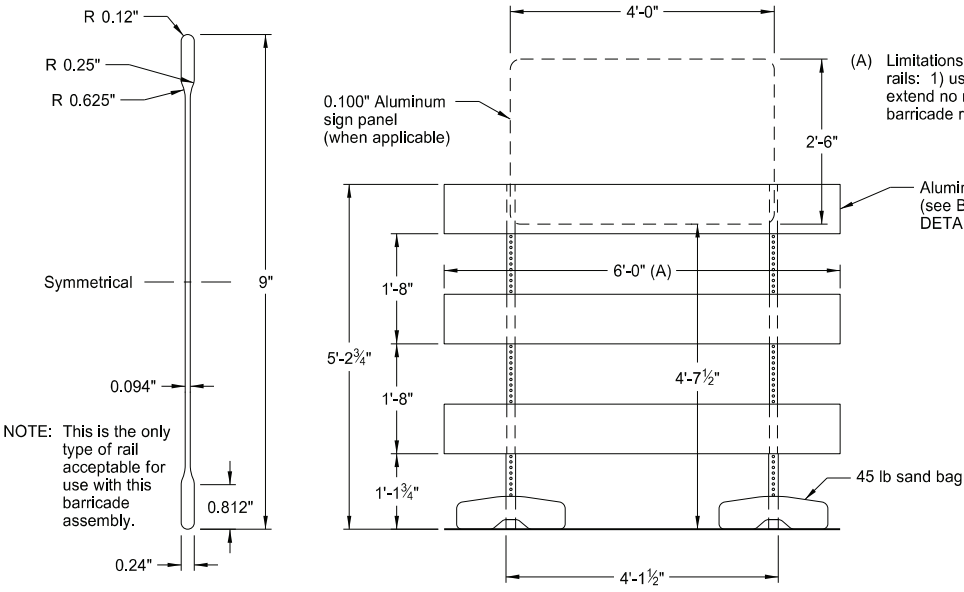
Provide retroreflectorization of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflective space between the orange and white stripes.



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.



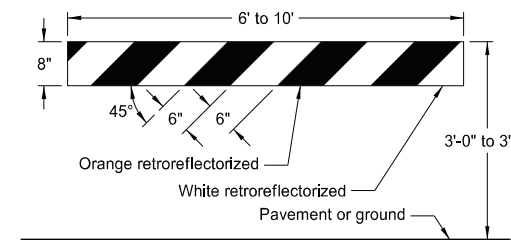
BARRICADE BLADE DETAIL

ELEVATION VIEW

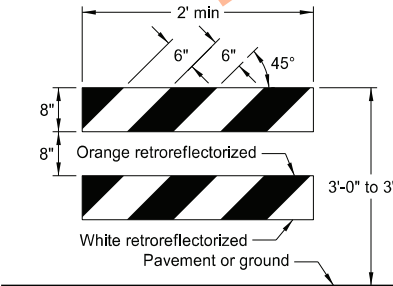
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

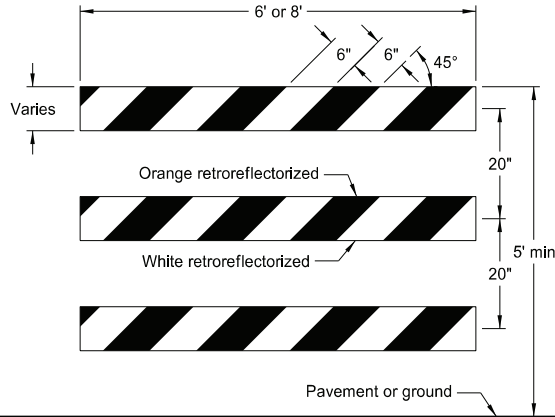
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



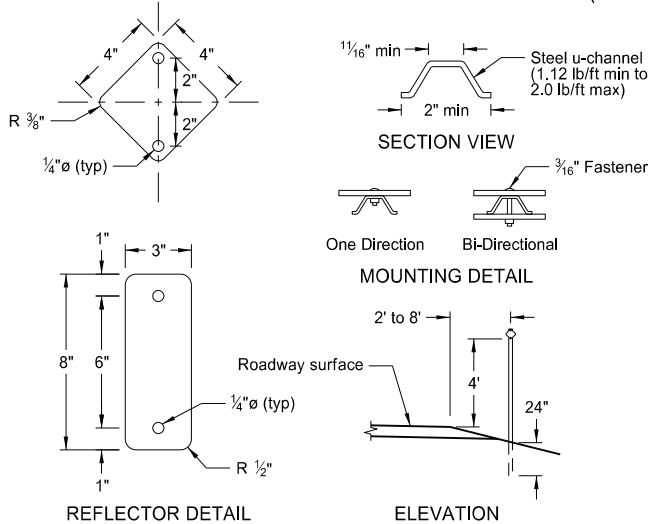
TYPE I BARRICADE



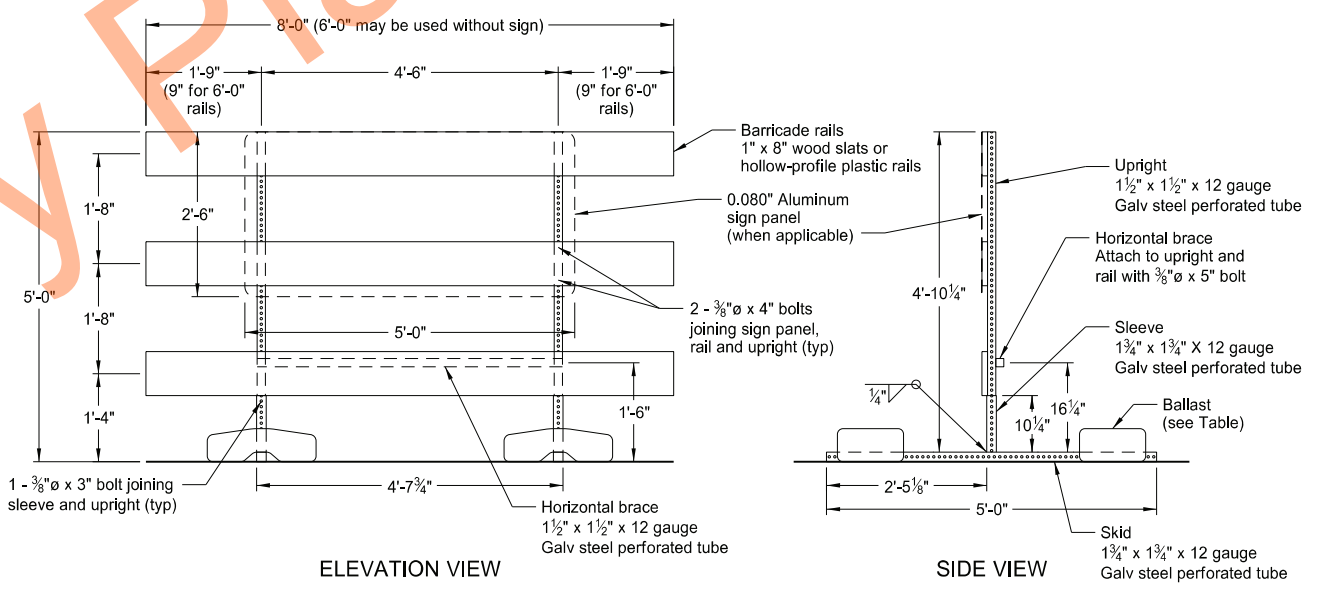
TYPE II BARRICADE



TYPE III BARRICADE



DELINEATORS



ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

SIDE VIEW

MINIMUM BALLAST
(For each side of barricade support)

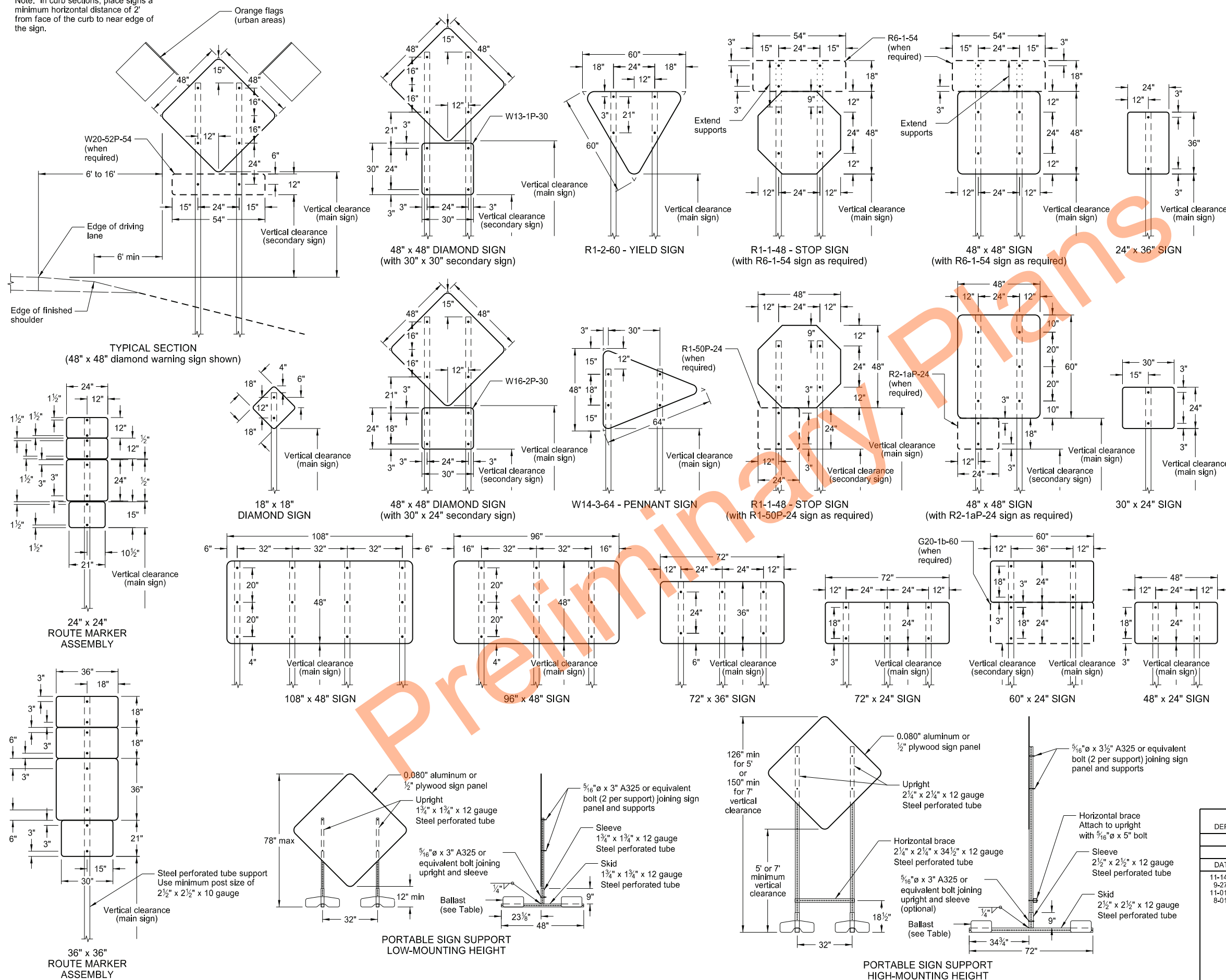
Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

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

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



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



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 90 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 sklds.

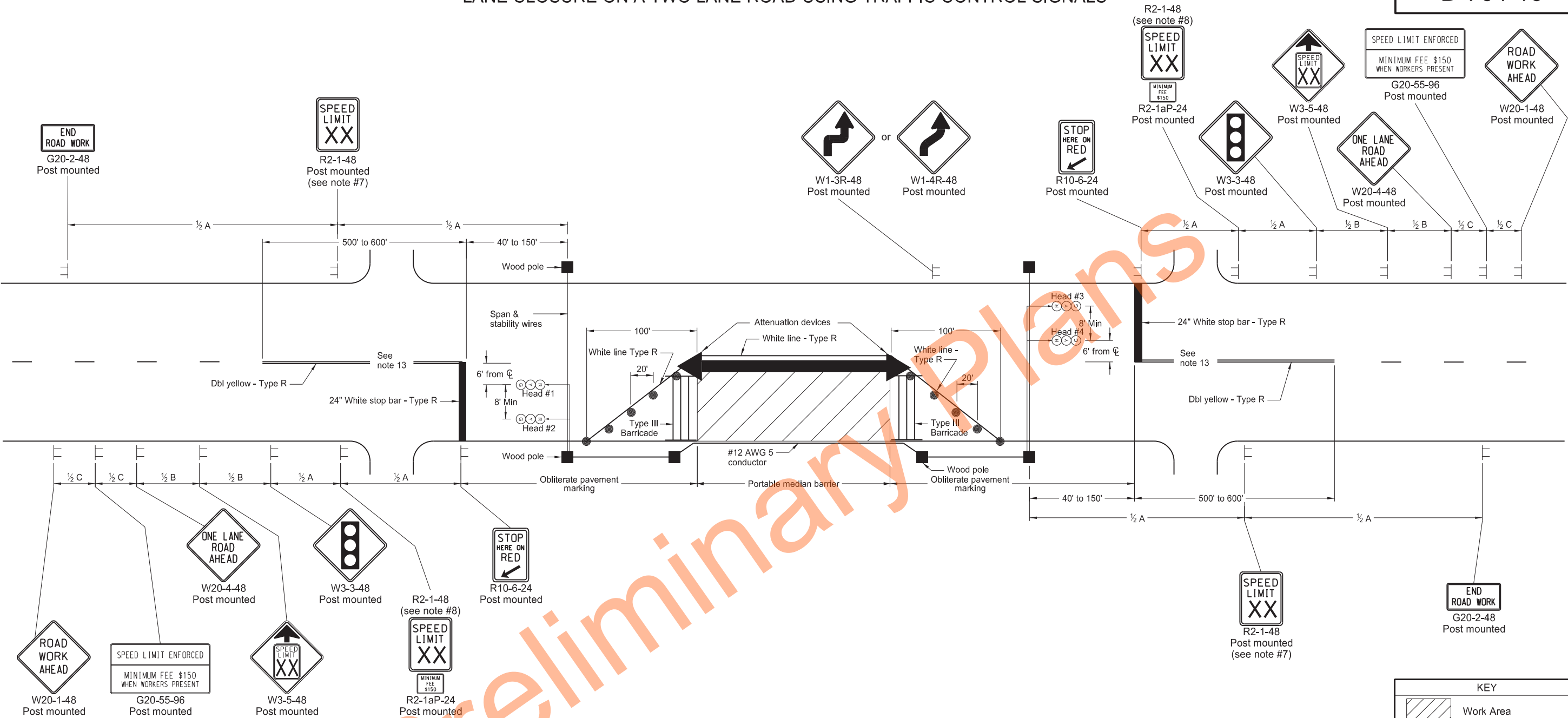
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail
8-01-24	Electronic Stamp/Signature



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	Green	Yellow	Red			
			Green	Yellow	Red	
Heads 3 & 4						
Time	18.0	4.5	22.5	18.0	4.5	22.5
Cycle = 90 seconds						
Percent of Cycle	20	5	25	20	5	25

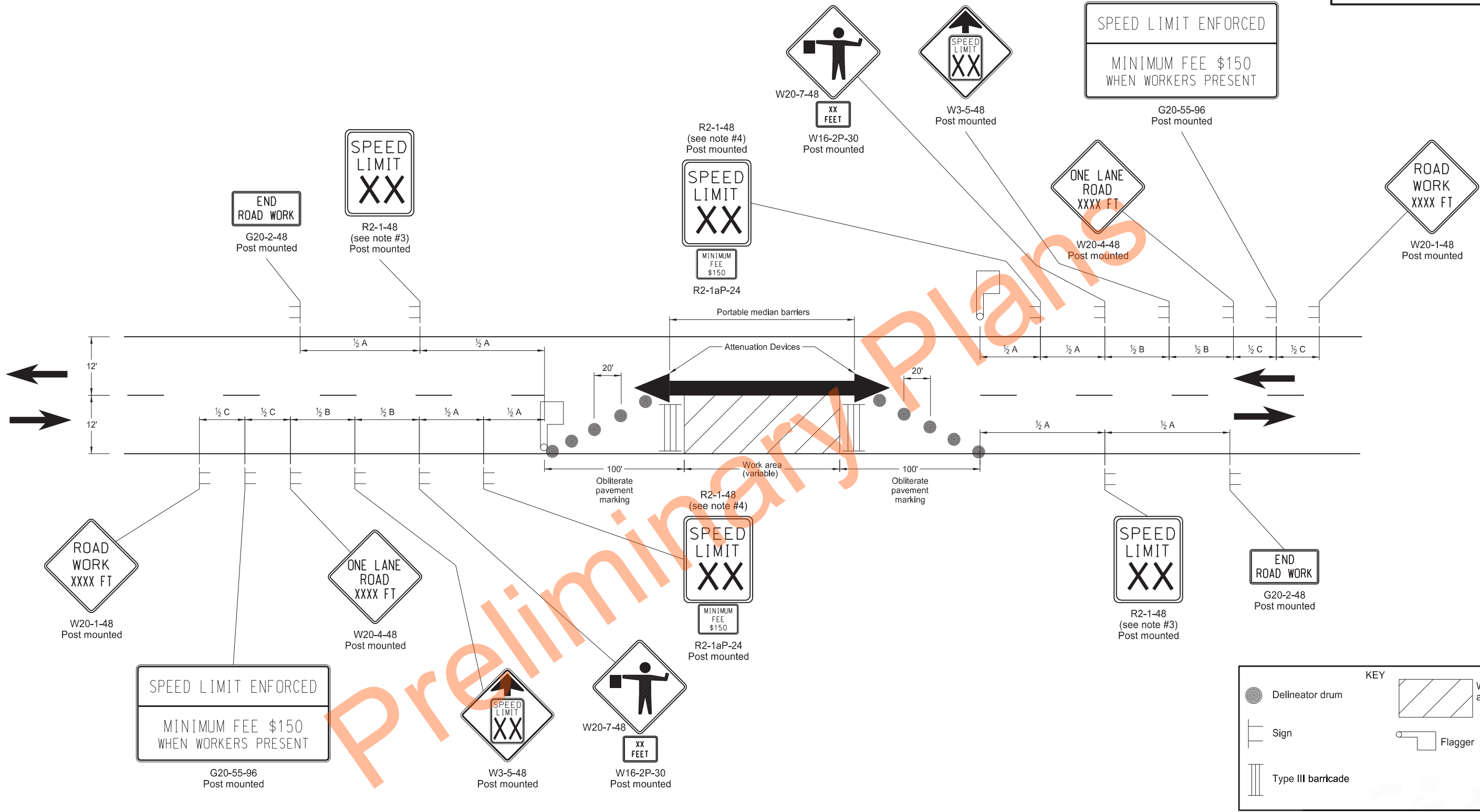
KEY	
	Work Area
	Type III Barricade
	Sign
	Delineator Drum
	Wood Pole

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 & pvmr 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



KEY

Delineator drum

Sign

Type III barricade

Work area

Flagger

Notes:

- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
- Remove existing striping as required. Use back to back delineators when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Place back to back vertical panels when roadways have steep slopes and alignment is not visible to approaching traffic.
- 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 1/2B.
- 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.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- Cover existing speed limit signs within a reduced speed zone.
- 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.

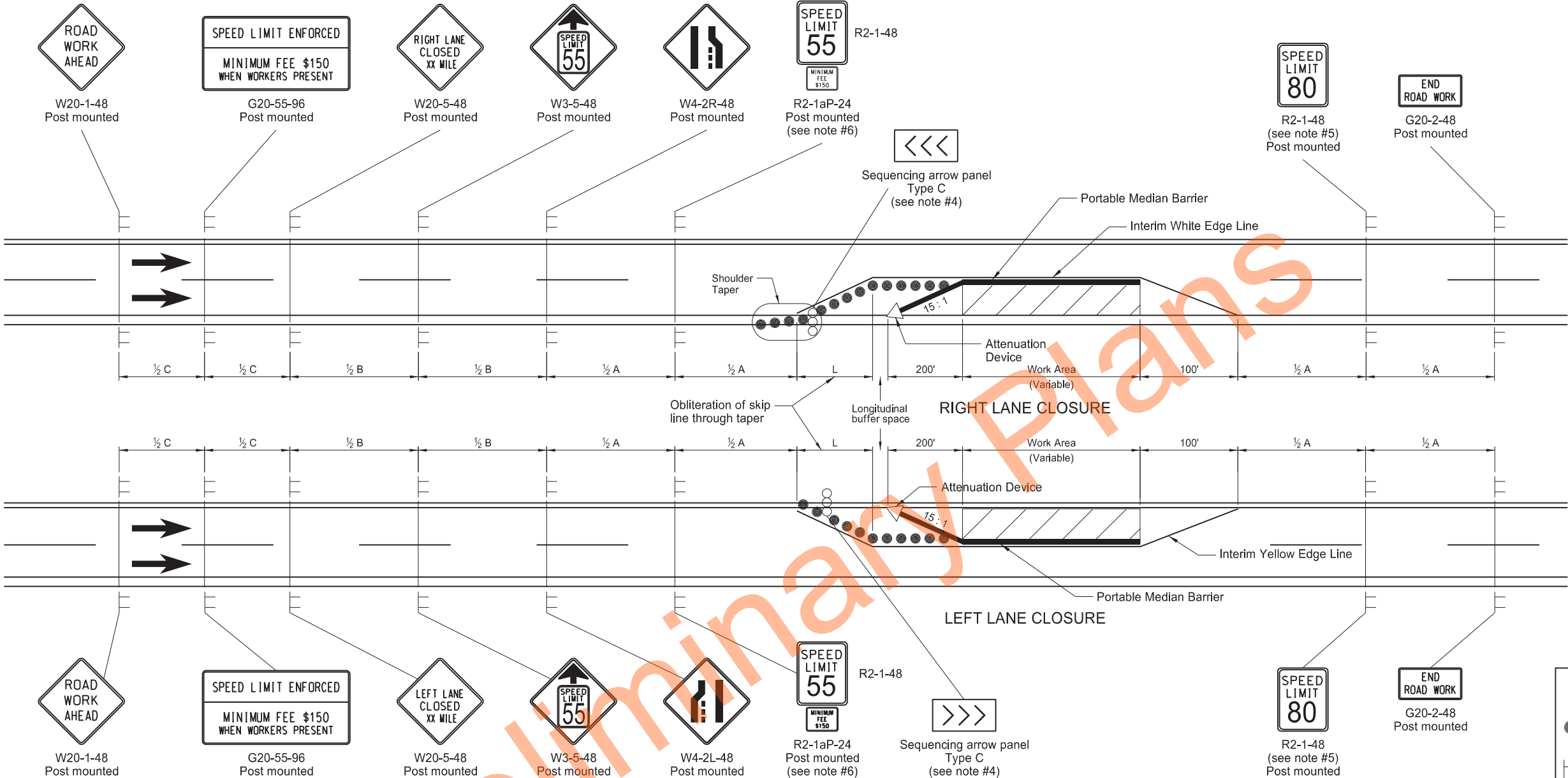
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway 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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Note update & sign numbers
11-01-19	Removed signs & revised note
12-08-21	Switched order of Road Work XXXX and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work
08-21-24	Pvmt Mkg Width & Med Barter
06-30-25	Legislative Changes



SIGN LAYOUT FOR INTERSTATE SYSTEM ONE LANE CLOSURE

D-704-18



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

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

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

- Notes:
- Variables
 - S = Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed in MPH.
 - W = The width of offset in feet.
 - L = Minimum taper length in feet. $S \times W$ for freeways, expressways, and roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
 - Space delineator drums used for tapering traffic and on tangent at dimension "S".
 - Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface. See Shoulder Closure Standard Drawing. Use Type C on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
 - 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 $\frac{1}{2}$ B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with the Standard D-704-14.
 - 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.
 - Reduce speed limit further, if location and conditions dictate.

KEY

Delineator Drum

Sign

Attenuation Device

Sequencing Arrow Panel

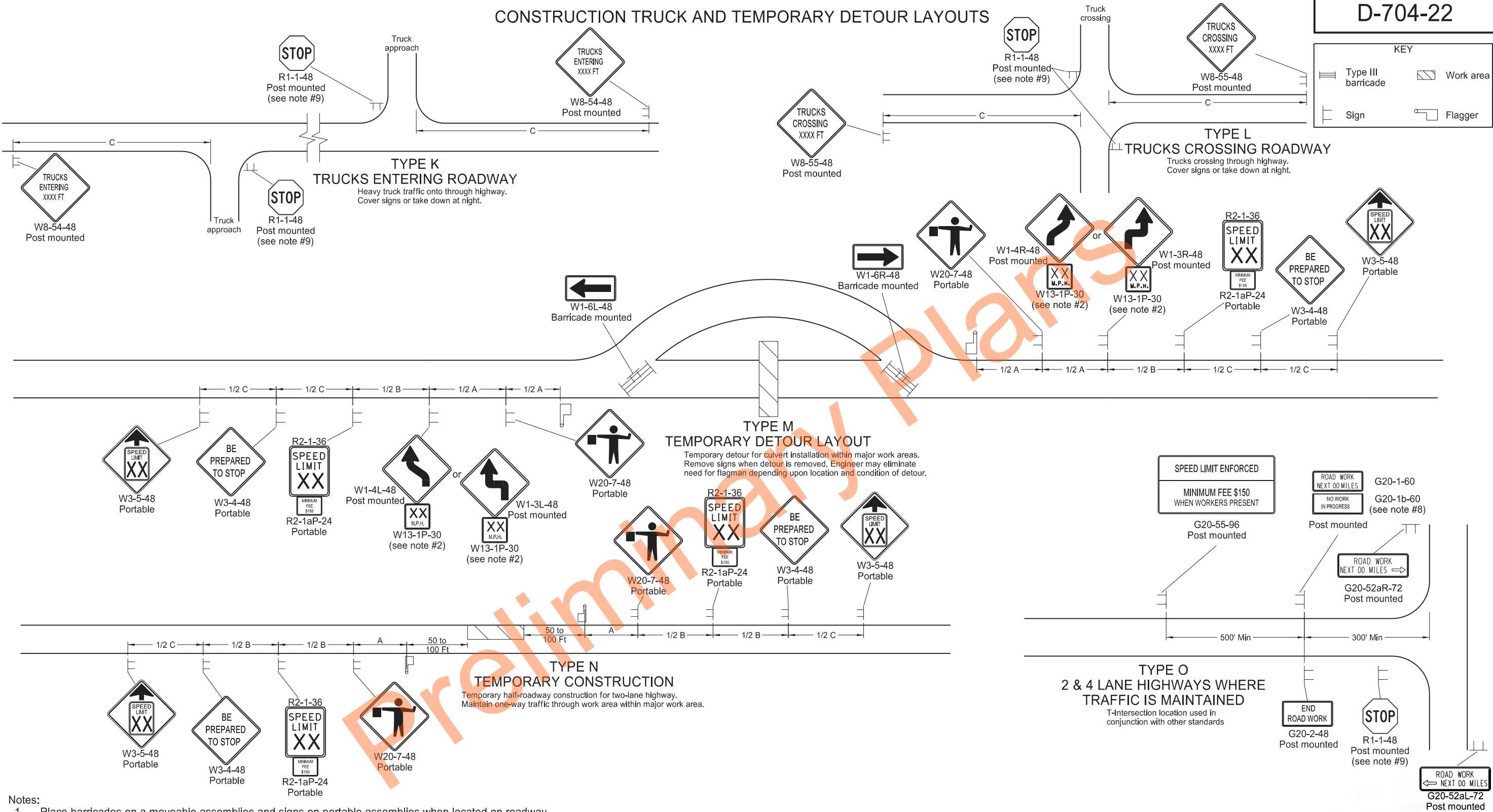
Work Area

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
01-13-16	Changed to Interim yellow edge line
03-15-16	Removed Do Not Pass signs & updated notes
08-17-17	Updated notes & sign numbers
11-01-19	Note, sign #, & pvmt oblt change
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work
08-21-24	Portable Median Barriers
06-30-25	Legislative Changes



CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



Notes:

- Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
- Where necessary, safe speed to be determined by the Engineer.
- 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.
- Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- Install sign G20-1b-60 when work is suspended for winter.
- If existing stop sign is in place, a 48" stop sign is not required.
- Sign G20-55-96 is not required if 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.

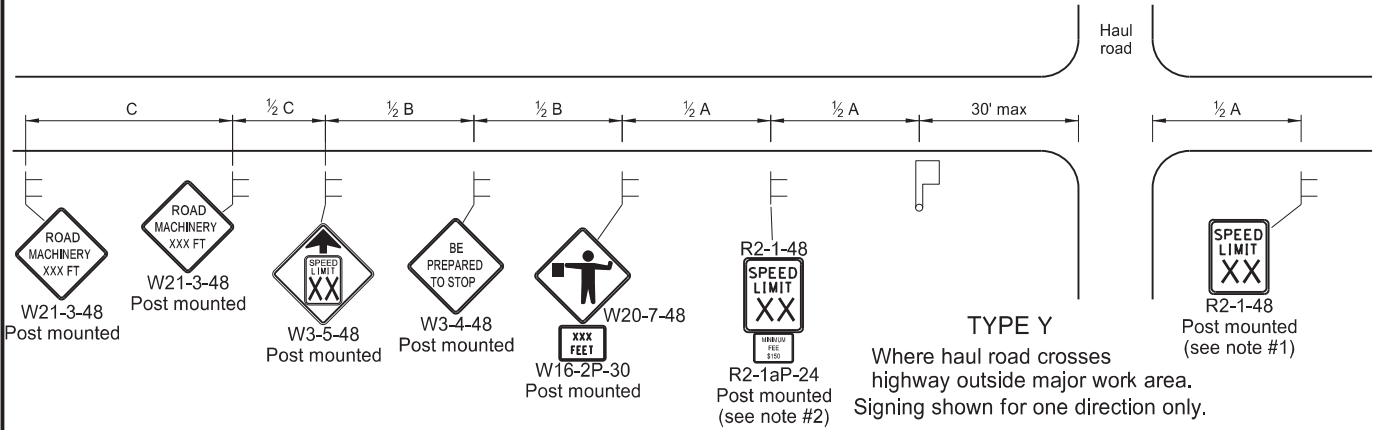
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs
11-29-22	Removed Dollars At Work
06-30-25	Legislative Changes

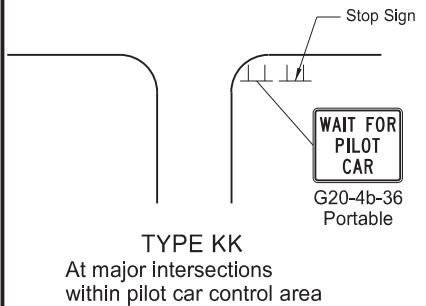
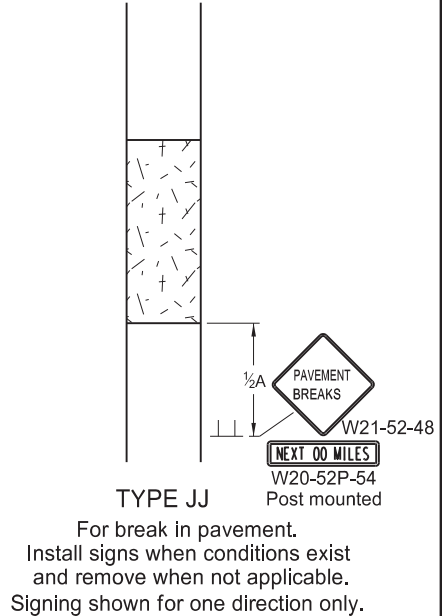
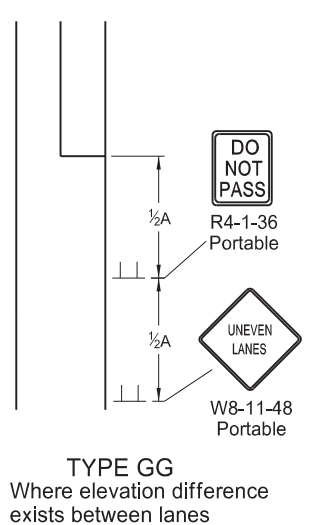
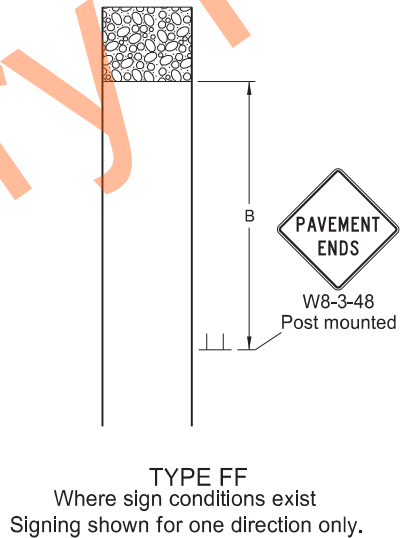
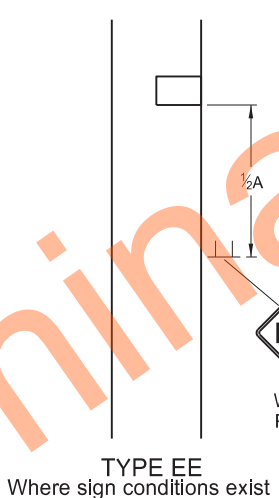
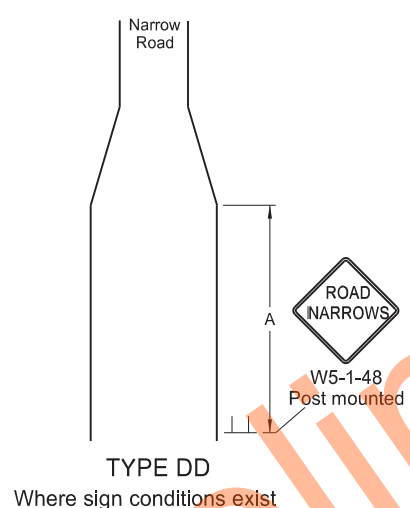
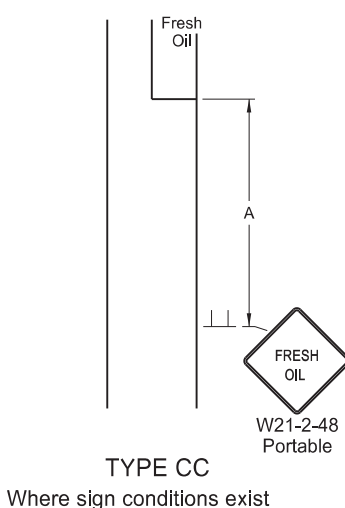
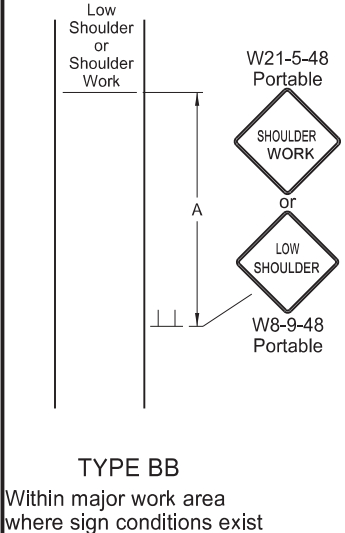
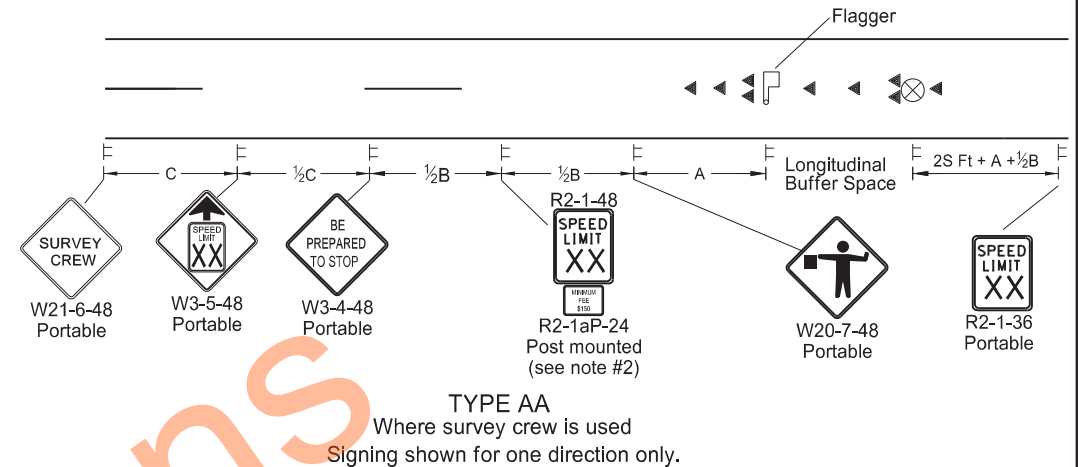
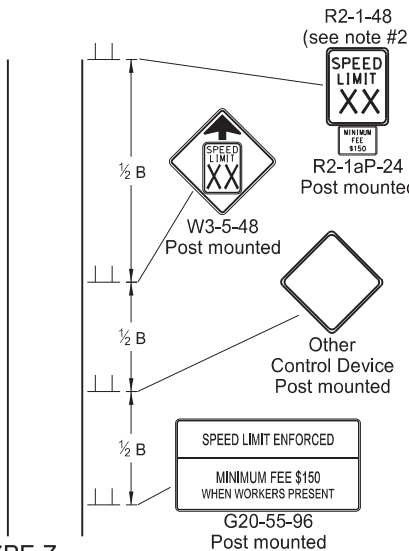


MISCELLANEOUS SIGN LAYOUTS

D-704-26



TYPE Z
Where speed zone is needed
Signing shown for one direction only.



- Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 2. Determine reduced speed limit based on 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.
 3. 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.
 4. Cover existing speed limit signs within reduced speed zones.
 5. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 6. Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
 7. When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
 8. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 9. Layouts shown for one direction only.

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

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

KEY

Flagger Sign

Cones Survey Equipment

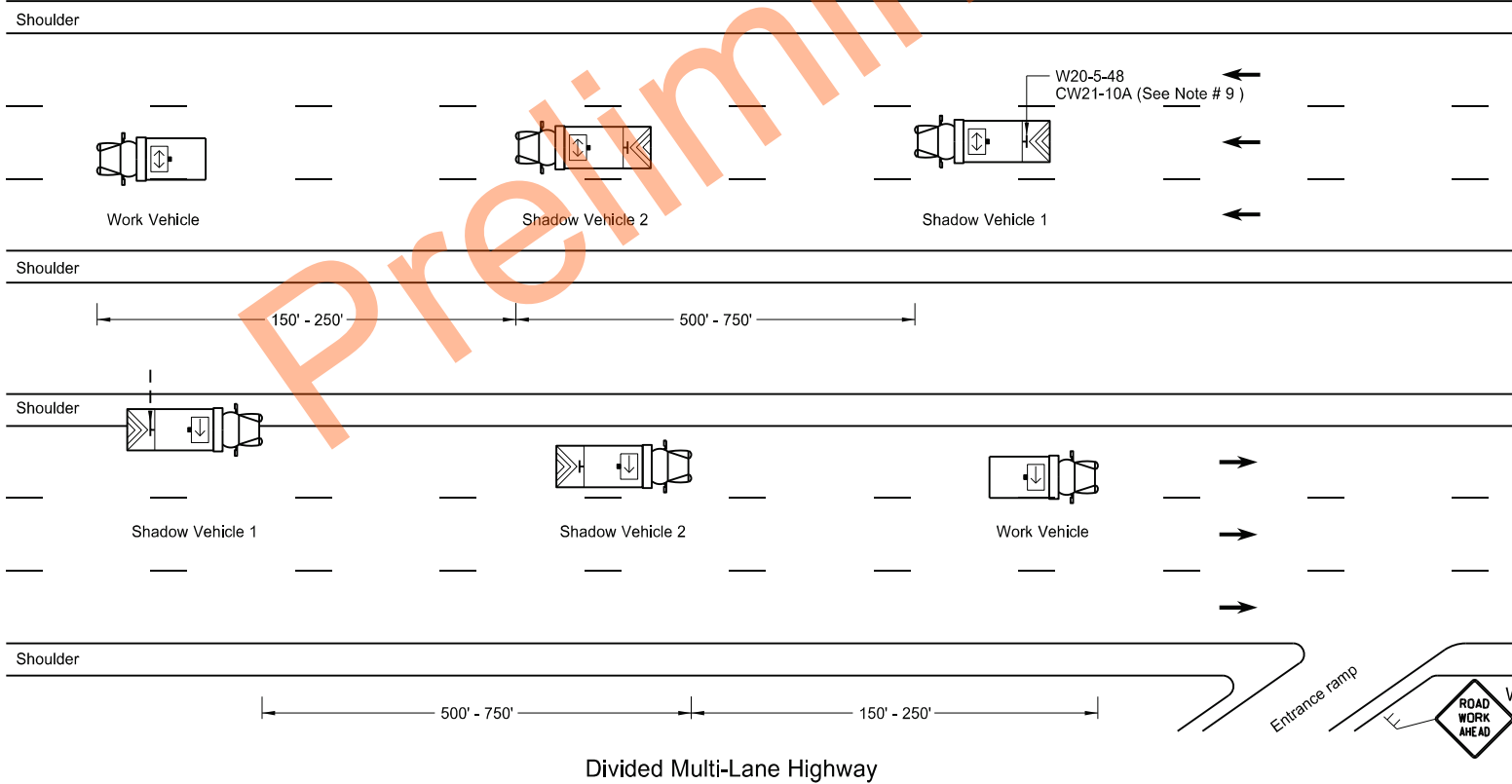
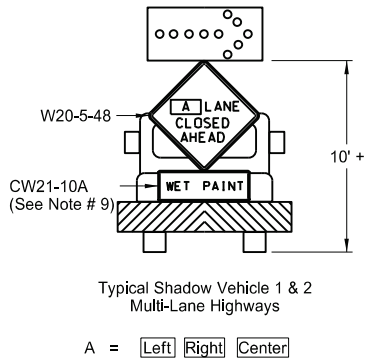
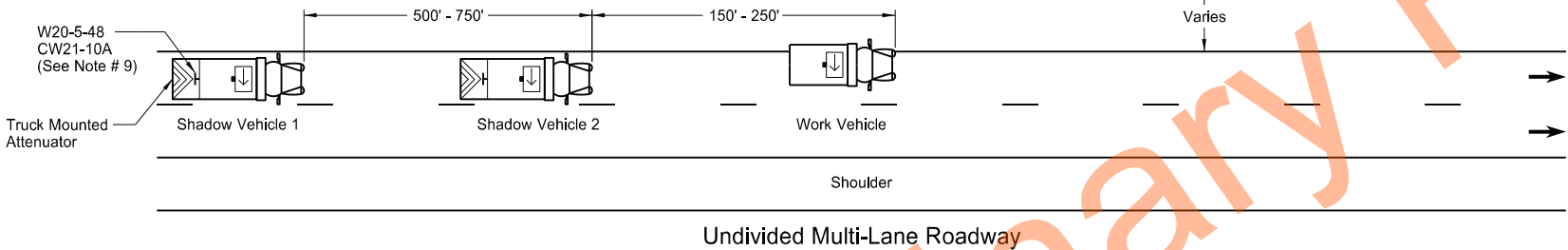
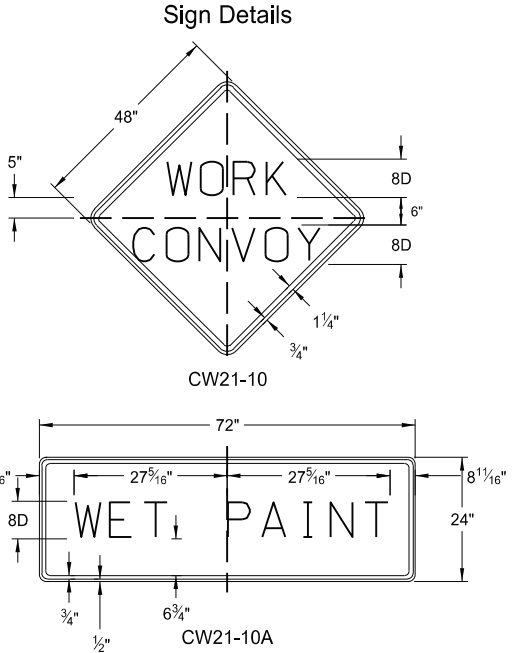
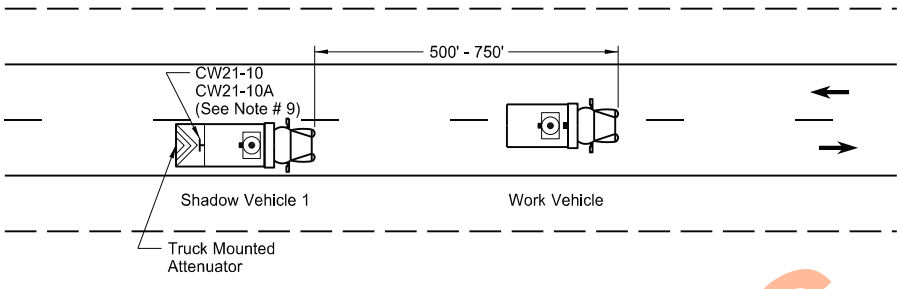
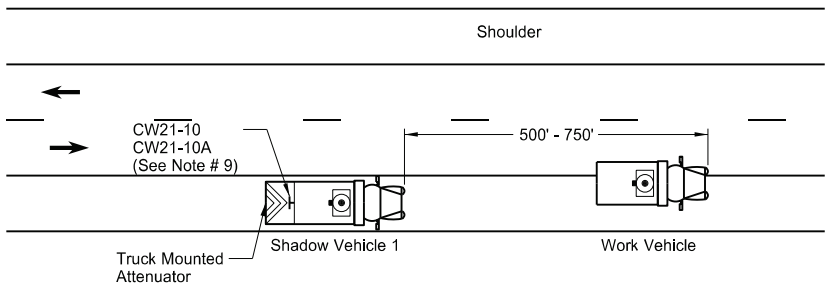
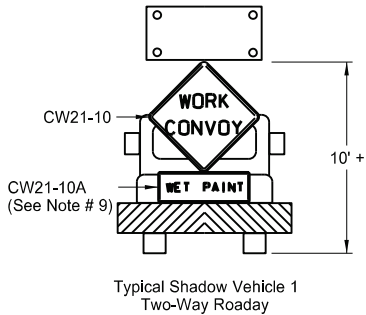
S = Numerical value of speed limit or 85th percentile.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Added speed limit signs. Updated notes & sign numbers
11-01-19	Revised note 5 & sign numbers
02-23-23	Revised distance & removed signs
06-30-25	Legislative Changes

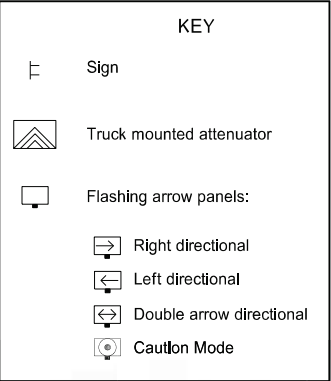


MOBILE OPERATION
(PAVEMENT MARKING)

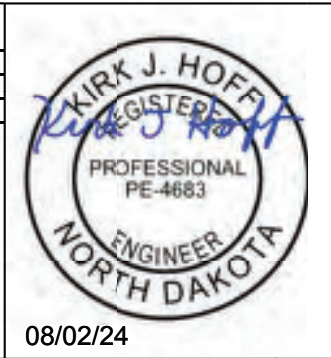
D-704-27



- Notes
1. Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
 2. Display yellow rotating beacons or strobe lights on shadow and work vehicles, unless otherwise stated in the plans.
 3. Use Type B or Type C flashing arrow panels controlled from inside the vehicle.
 4. Provide each vehicle with two-way electronic communication capability.
 5. Move shadow vehicle 1 first to shadow other convoy vehicles when convoy changes lane.
 6. Vary vehicle spacing between shadow vehicle 1 and shadow vehicle 2 based on sight distance restrictions. Motorists approaching the work convoy need to see trail vehicle in time to slow down and/or change lanes as they approach shadow vehicle.
 7. Sign Colors
Letters = Black
Border = Black
Background = Orange
 8. As an option, use shadow vehicle 2 the paint tender vehicle.
 9. Use sign CW21-10A only during painting operation.
 10. Pull over work and shadow vehicles periodically to allow motor vehicle traffic to pass on two lane - two way roadways.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways
9-27-17	Updated to active voice
11-08-19	Changed Standard Heading
6-02-24	Electronic Stamp/Signature.



Two-Lane Roadway Portable Rumble Strips

D-704-33

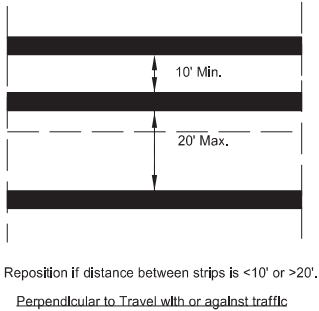
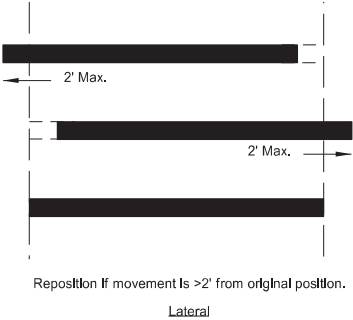
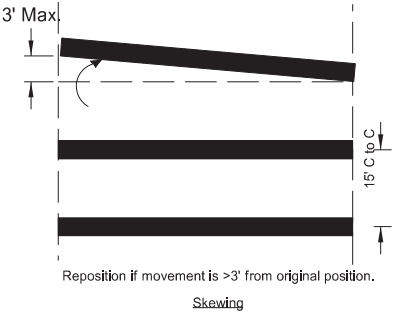
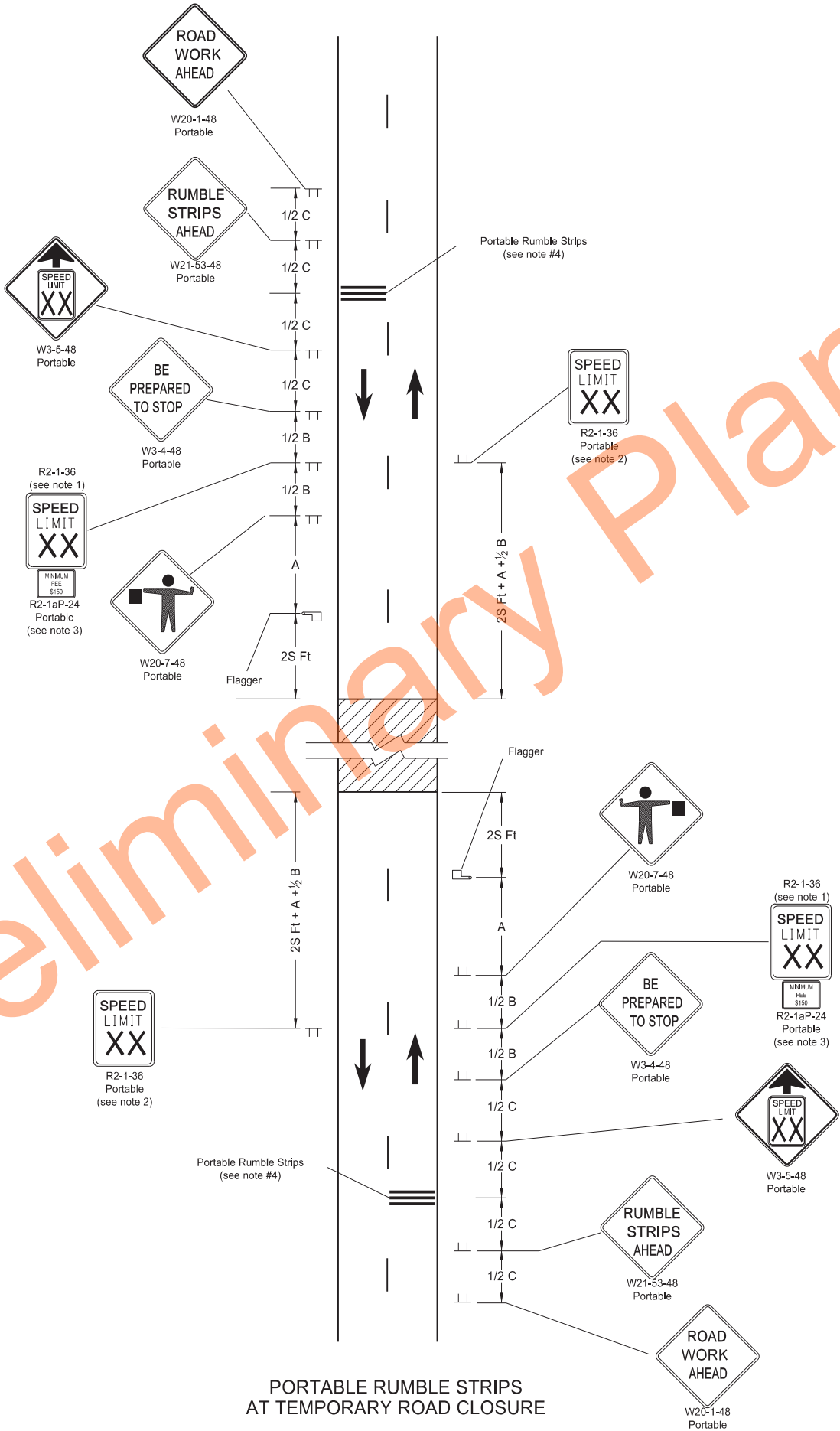
Work area

Flagger

Sign

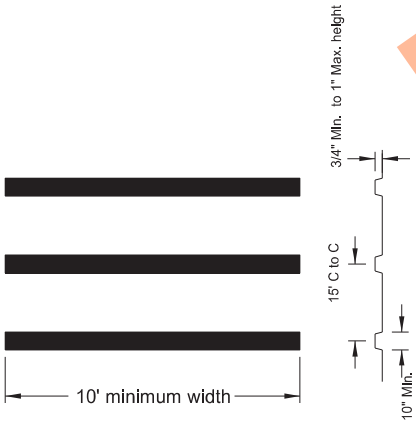
S = Numerical value of speed limit or 85th percentile.

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - High Speed (over 45 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720



PORTABLE RUMBLE STRIPS ARRAY
TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

- Notes:
- Determine speed in the field based on location and conditions.
 - Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
 - Sign R2-1aP-24 is not required when pilot car operation is used.
 - Do not use rumble strips on a non paved surface or in a pre-construction speed zone of 45 mph or less.



PORTABLE RUMBLE STRIPS ARRAY DETAIL

PORTABLE RUMBLE STRIPS
AT TEMPORARY ROAD CLOSURE

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

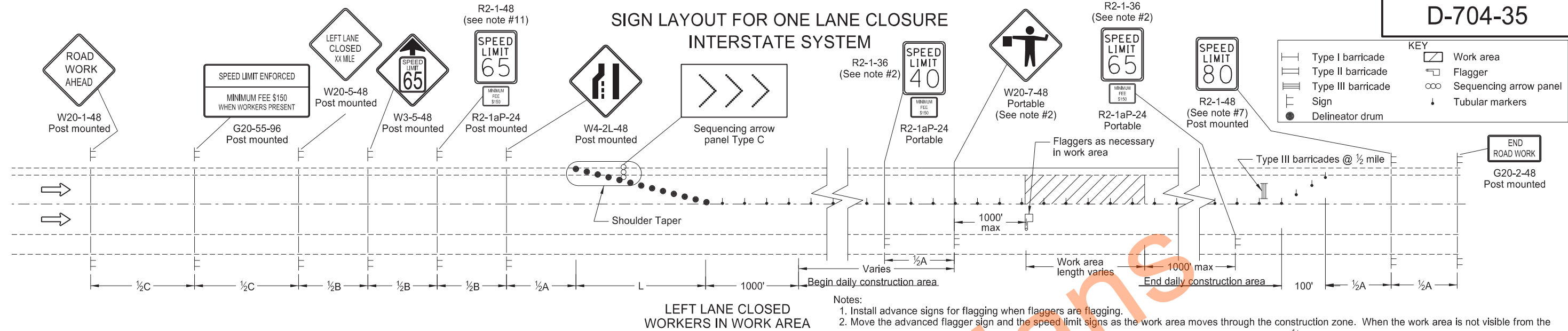
02-22-22

REVISIONS

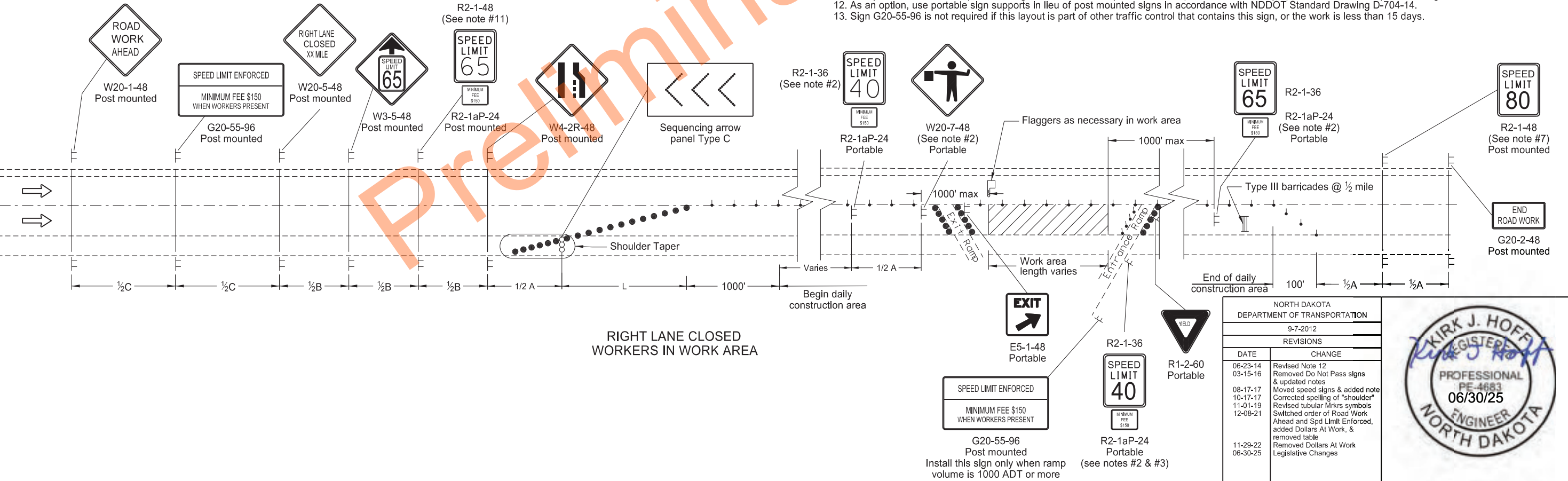
DATE	CHANGE
03-07-23	Use changed to min 45 mph
06-30-25	Legislative Changes

SIGN LAYOUT FOR ONE LANE CLOSURE
INTERSTATE SYSTEM

D-704-35



ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min (ft)		
	A	B	C
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



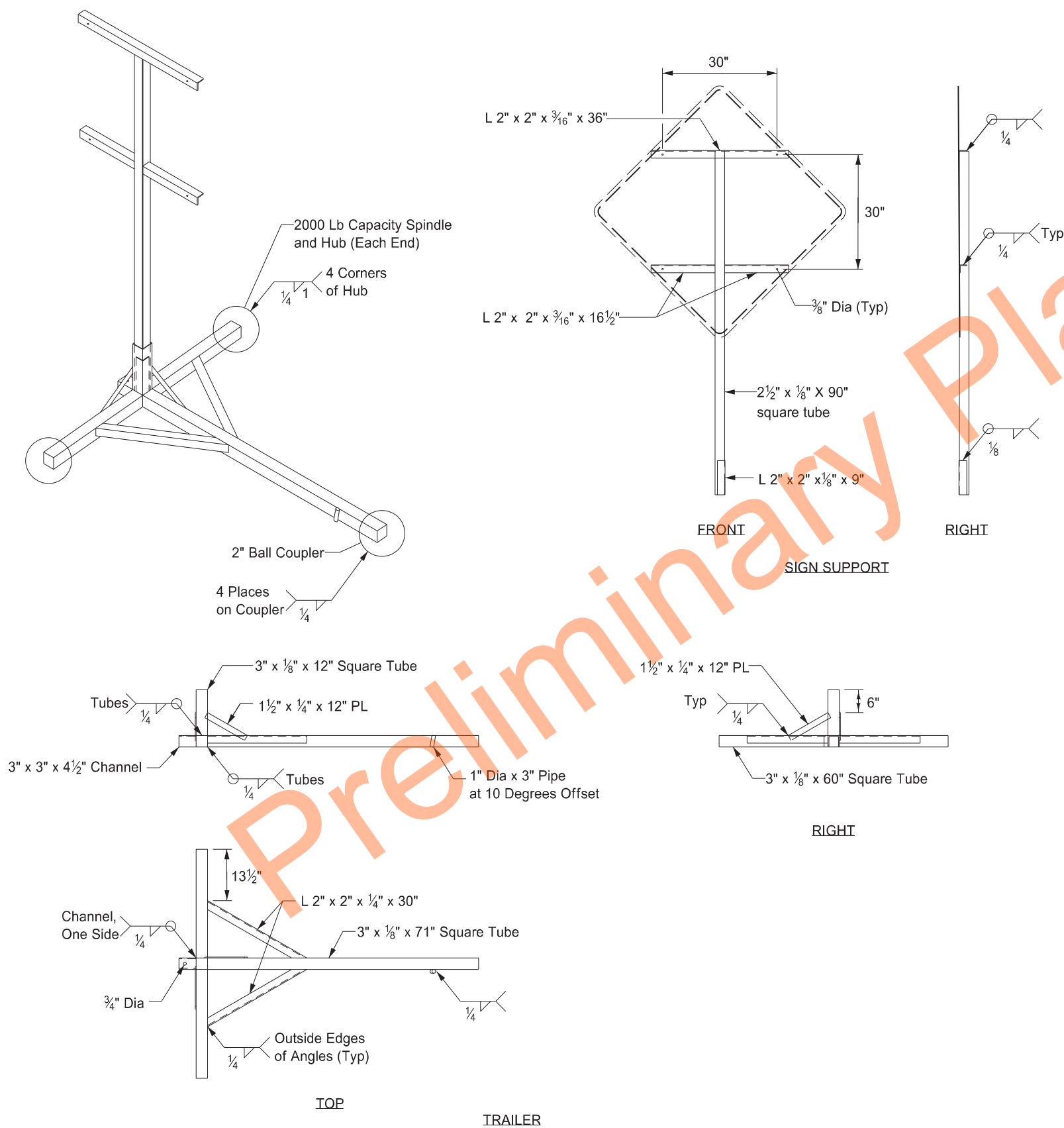
- Notes:
1. Install advance signs for flagging when flaggers are flagging.
 2. Move the advanced flagger sign and the speed limit signs as the work area moves through the construction zone. When the work area is not visible from the flagger, move the flagger station so the work area is visible. Space the 40 mph speed limit sign at 1/2A in advance of the flagger sign and move the 65 mph speed limit sign. Cover or remove the 40 mph speed limit and Minimum Fee \$150 signs and the 65 mph speed limit sign upon completion of the work day or when workers are not present.
 3. RAMP: When the work area encompasses an entrance ramp, install a 40 mph speed limit sign on the ramp and cover any existing yield sign. Install new yield sign as necessary. Remove the ramp speed limit sign when the main line 40 mph speed zone is moved past the ramp.
 4. Variables:
 - S=Numerical value of speed limit or 85th percentile
 - W=The width of taper.
 - L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or WxSxS/60 for urban, residential, and other streets with speeds of 40 mph or less.
 5. Space delineator drums for tapering traffic at the dimension "S". Space tubular markers used for tangents at 2 times dimension "S".
 6. Place sequencing arrow panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface.
 - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
 7. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
 8. Cover existing speed limit signs within a reduced speed zone.
 9. Upon approval, the Engineer will measure obliterated or covered pavement marking as Obliteration of Pavement Marking.
 10. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the diamond sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 11. Determine the reduced speed limit dependent on the in place speed limit before construction. When speed limits are to be reduced more than 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 1/2B.
 12. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 13. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-7-2012	
REVISIONS	
DATE	CHANGE
06-23-14	Revised Note 12
03-15-16	Removed Do Not Pass signs & updated notes
08-17-17	Moved speed signs & added note
10-17-17	Corrected spelling of "shoulder"
11-01-19	Revised tubular Mkrs symbols
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced, added Dollars At Work, & removed table
11-29-22	Removed Dollars At Work
06-30-25	Legislative Changes



PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



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

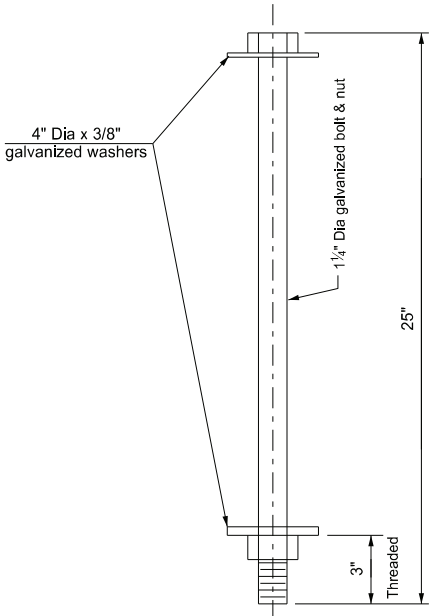
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)

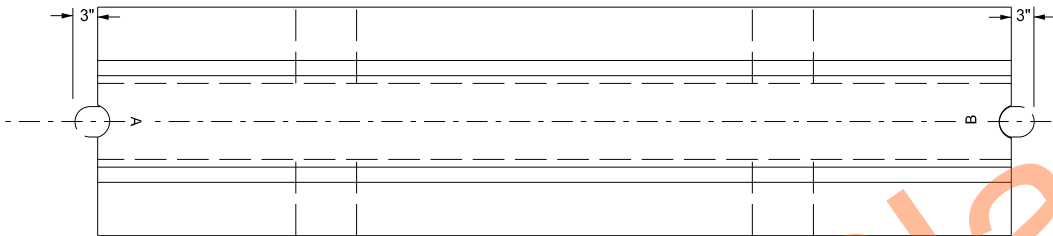
D-704-51

Notes:

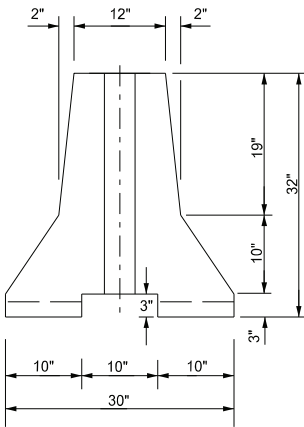
- Barrier ends imprinted with 4 inch letters A and B. Field match A end with B end.
- Place barrier markers at the center of the barrier at 20' centers.
- Connect barrier sections with 1 ¼" Dia A-307 double hex connecting bolt. Maintain bottom nut and washer connection for duration of barrier installation.
- Place barrier to minimize openings between individual sections.



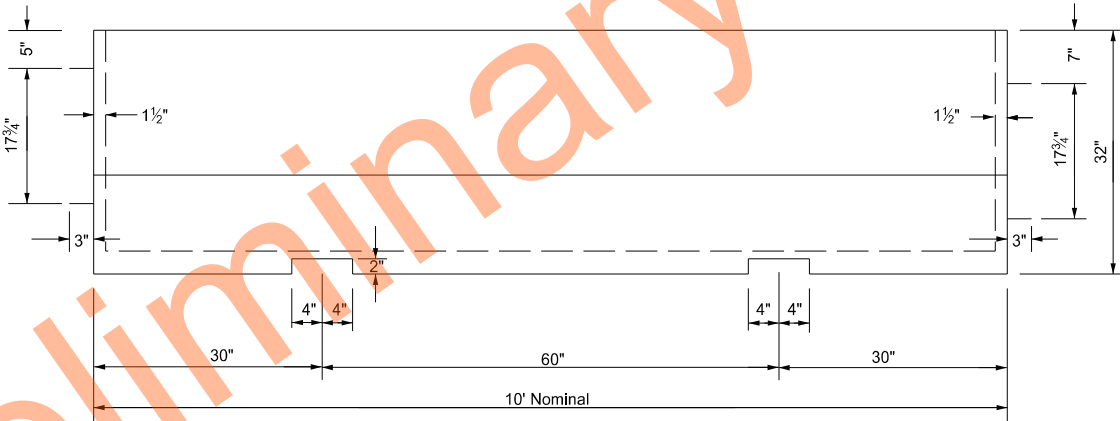
Connecting Bolt Detail
(One per 10 Ft section)



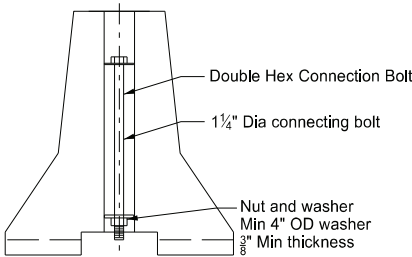
Plan View



End View



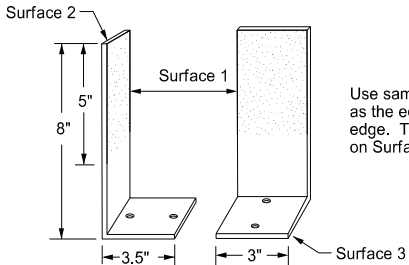
Side View



Bolt Connection Detail

Marker Body
Use high impact,weatherable engineering thermo-plastic material conforming to the following:

Property	Result	ASTM Test Method
Thickness (min)	.090"	—
Tensile strength (min psi) @ yield	5,500	D638
Impact strength @ -20°F (ft-lbs/in of notch)	3.2	D256 Method A
Impact strength @ 73°F (ft-lbs/in of notch)	14.0	D256 Method A
Flexural strength, PSI ¼" @ 73°F	8,000	D790
Flexural modulus, PSI ¼" @ 73°F	300,000	D790
Elongation @ yield	30%	D638



Barrier Marker Detail

Use same color reflective faces as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

Reflective Tape
Use retroreflective, acrylic microprism material with acrylic backing, 3" wide, providing the following minimum optical performance with an observation angle of 0.1° measured in candlepower for the reflector:

Entrance Angle	Specific Intensity
Yellow - 4"	136
White - 4"	200

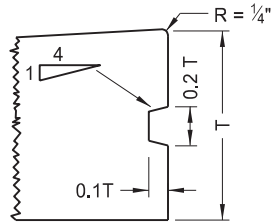
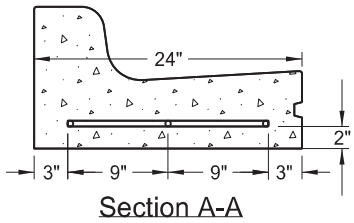
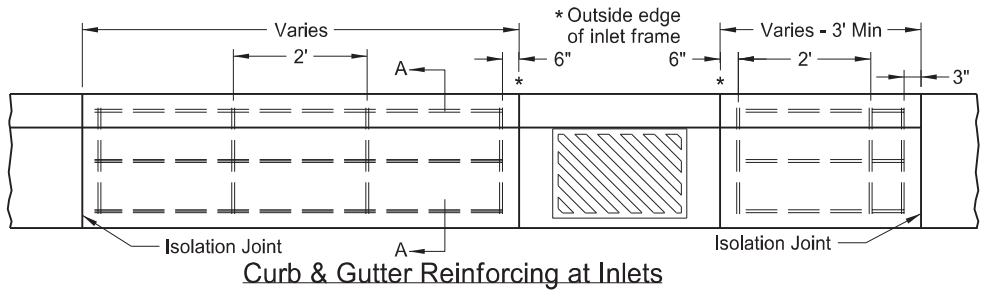
Adhesive
Use factory applied solid butyl rubber ⅛" thick, 2" wide on 2 ¼" wide release paper on surface 3 to temporarily mount markers to portable concrete barrier.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	New Design Engr PE Stamp
8-21-24	Removed Fabrication Info



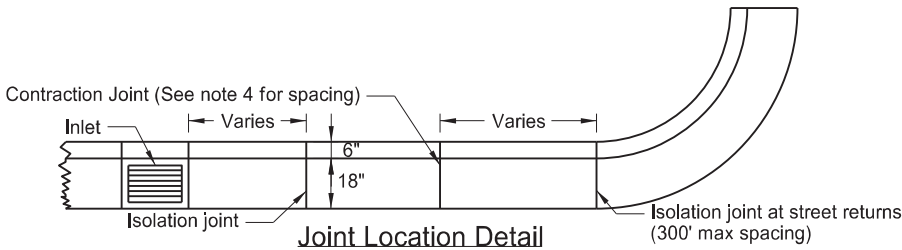
08/21/24

Curb & Gutter and Valley Gutter

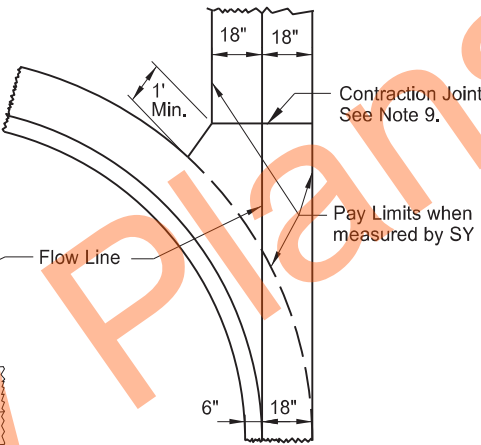


Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)

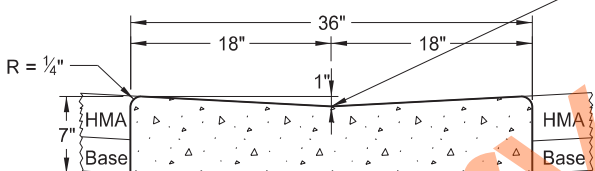
T= Thickness of pavement unless otherwise noted on plans.



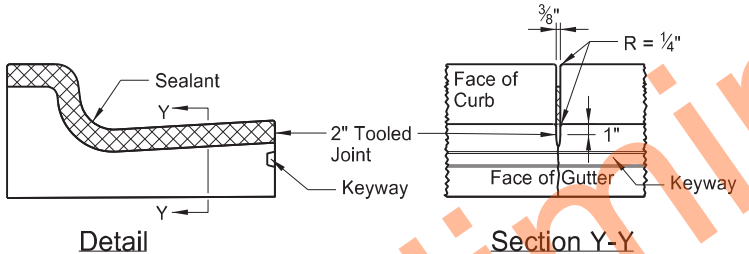
Joint Location Detail



36" Concrete Valley Gutter Plan



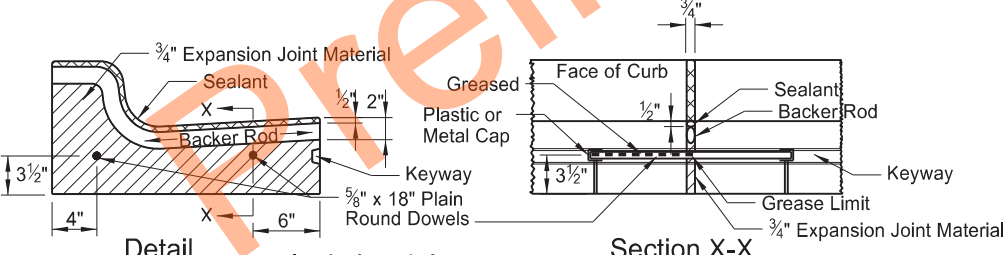
36" Concrete Valley Gutter Detail



Detail

Section Y-Y

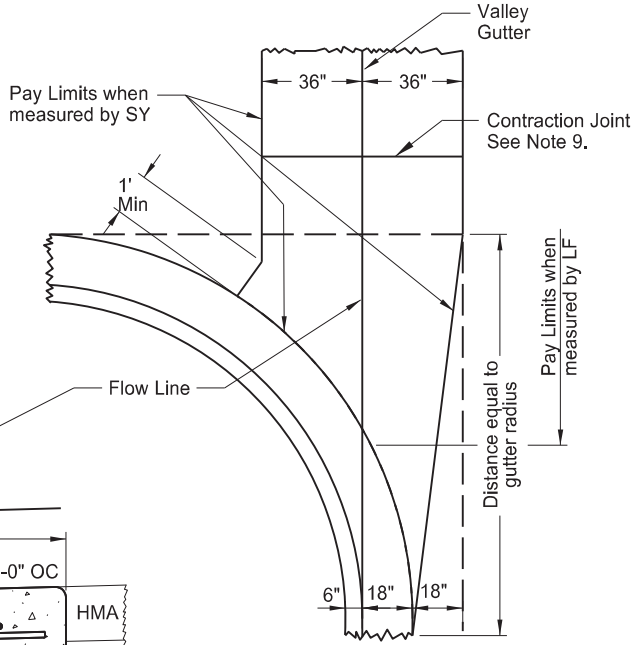
Contraction Joint



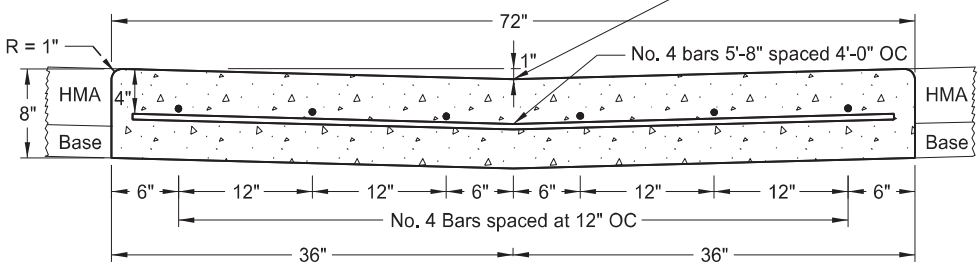
Detail

Isolation Joint

Section X-X



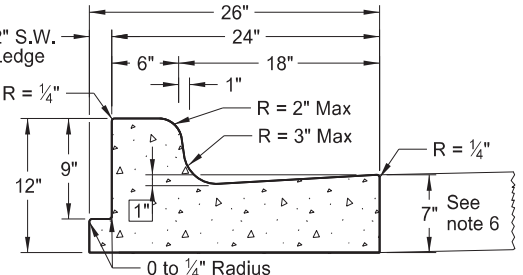
72" Concrete Valley Gutter Plan



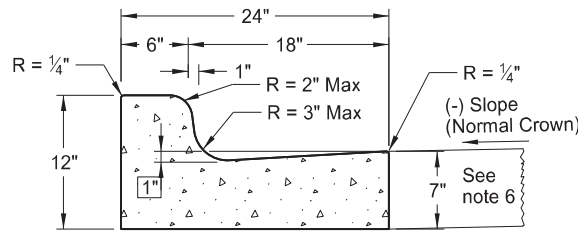
72" Concrete Valley Gutter Detail

NOTES:

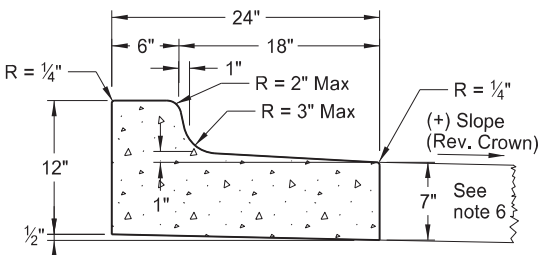
1. Use Curb and Gutter Type 1 (Sec. A & B). Use section "A" with (-) pavement slopes and section "B" with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Use $\frac{3}{4}$ " expansion joint material for isolation joints. Form the backer rod and joint sealant opening with a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint. Install plastic or metal caps and greased dowels in the cold joint for the second pour.
4. Joint Spacing: For hot mix asphalt pavements use a 10' max joint spacing for the curb and gutter with panels on each side of the inlets. For concrete pavements match the joint spacing for the curb and gutter to the pavement joint on PCC Pavements (approximately 15' spacing.)
5. Joint sealing: For contraction joint, use joint sealant that conforms to section 826.02B. Use sealant for expansion joints specified in note 3 above. Tool and install sealant in accordance with the manufacturer's recommendations.
6. Curb & Gutter-Pavement Interface: For hot mix asphalt pavement use gutter depth shown. For PCC pavements, either match gutter depth to adjacent pavement depth or construct gutter depth shown.
7. Tie curb and gutter to abutting PCC pavement with No. 4 bars, 2'-0" in length, spaced at 3'-9" centers for 15' joint spacing (maximum spacing of 4' centers).
8. On street returns and other locations where new curb and gutter ends and does not abut existing curb and gutter, taper the last two (2) feet of the curb from 6" in height to 0". Install a 1/2" premolded full depth isolation joint (the same shape as the curb and gutter just ahead of the taper) with an 18" plain round bar across the joint.
9. Valley Gutter Joints: Form, saw, or score $\frac{1}{8}$ " min. to $\frac{3}{8}$ " max. width contraction joints (a minimum 2" depth) at approx 10' intervals. Seal the joints with hot poured elastic type joint sealer (Section 826.02A.2 of the Standard Specifications.) Include all costs for the joint and sealant in the price bid for Valley Gutter.
10. Reinforcing at Inlets: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlets (even inlets located on radii) in the price bid for "Curb & Gutter - Type 1" or "Curb & Gutter Mountable - Type 1." Extend reinforcement to the second joint (with rebar placed through the first joint) in cases where the 3' minimum panel length can't be obtained.



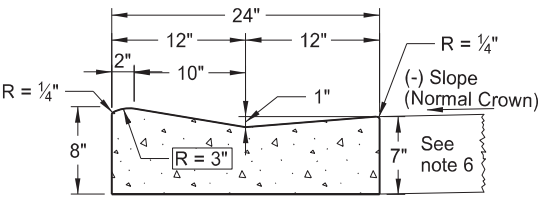
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk, Median,
or Parking Lot. (Sec. A shown. See
Sec B for additional details.)



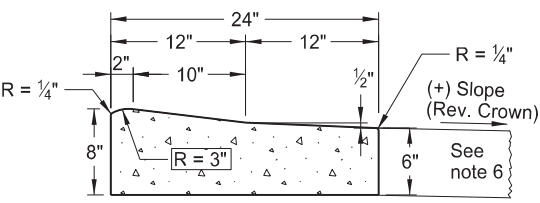
Curb & Gutter Type 1 (Sec. A)



Curb & Gutter Type 1 (Sec. B)



Mountable Curb & Gutter Type 1 (Sec. A)



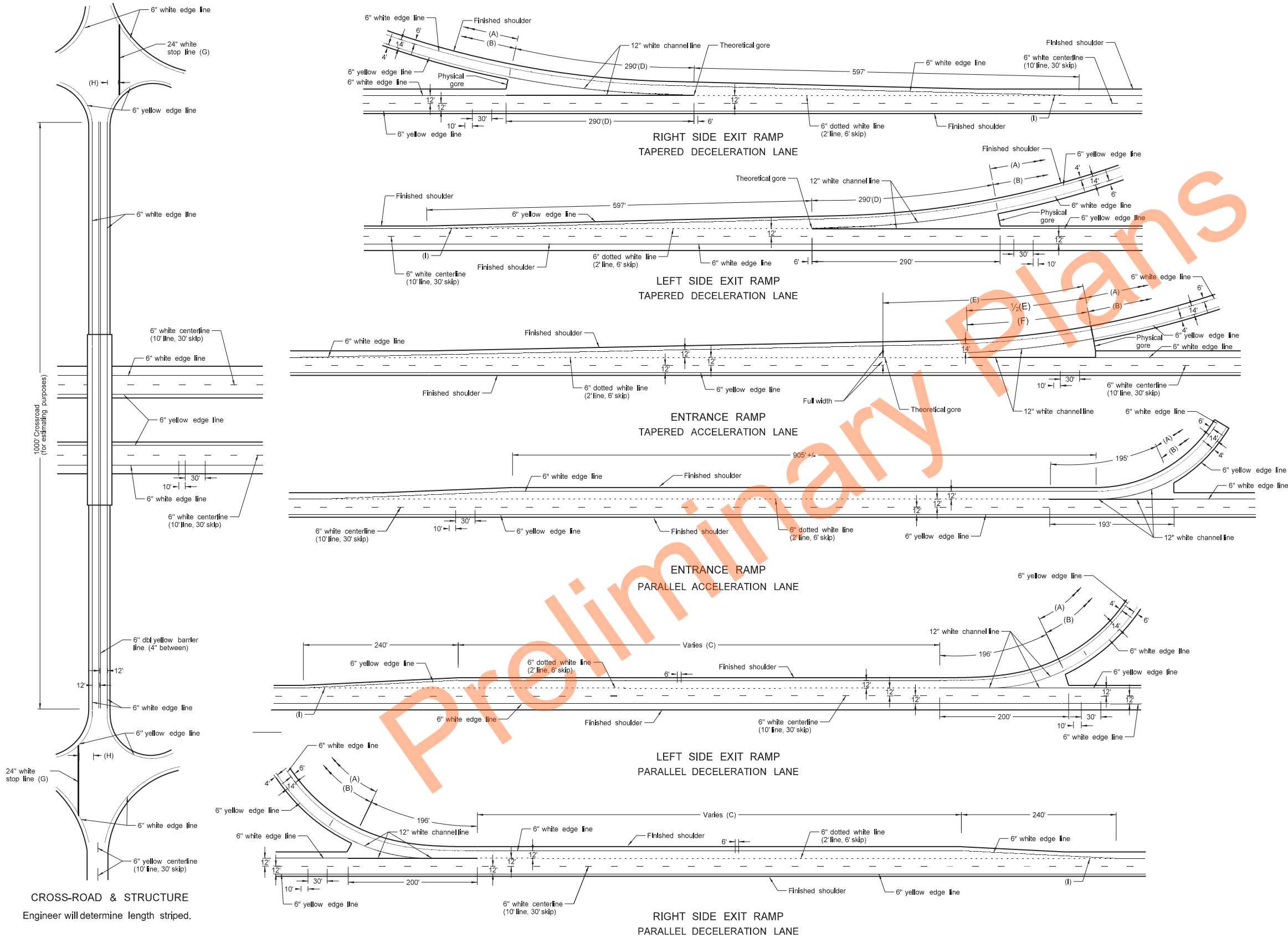
Mountable Curb & Gutter Type 1 (Sec. B)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engr PE Stamp.
10-30-24	Revised bar size & notes.



10/30/24

INTERSTATE PAVEMENT MARKING
4 LANE DIVIDED HIGHWAY



- NOTE:
- (A) Normal width white edge line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
 - (B) Normal width yellow edge line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
 - (C) Assume "varies" equals 790' for purpose of estimate. Place pavement marking from beginning of taper to the 12" line.
 - (D) Beginning of physical gore to theoretical gore.
 - (E) If the distance is less than 350' extend the 12" channel line to the theoretical gore, otherwise use 195'.
 - (F) Use 195' for estimating purposes.
 - (G) Not required for gravel surface crossroad approaches.
 - (H) 4' minimum, 15' maximum from nearest edge of intersection traveled way.
 - (I) Extend dotted line until it touches the edgeline.

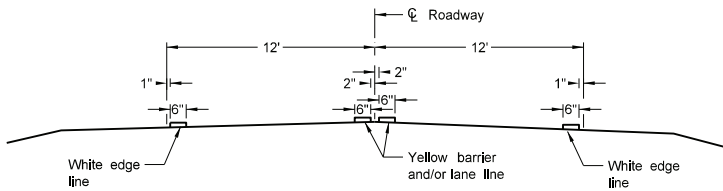
BASIS OF ESTIMATE		
LOCATION	ITEM	
Right or Left Side Exit Ramp TAPERED	12" White channel line	580 LF
	24" White stop line	60 LF
	6" White dotted line	148 LF
	6" White edge line	1115 LF
	6" Yellow edge line	1075 LF
Entrance Ramp TAPERED	12" White channel line	390 LF
	6" White dotted line	258 LF
	6" White edge line	1270 LF
Right or Left Side Exit Ramp PARALLEL	6" Yellow edge line	1075 LF
	12" White channel line	398 LF
	24" White stop line	60 LF
	6" White dotted line (C)	258 LF
	6" White edge line	1115 LF
Entrance Ramp PARALLEL	6" Yellow edge line	1075 LF
	12" White channel line	388 LF
	6" White dotted line	283 LF
	6" White edge line	1275 LF
Main Line (Both Roadways)	6" Yellow edge line	1075 LF
	6" White lane line, 10' line, 30' skip	2640 LF/MI
	6" White edge line	10,560 LF/MI
Cross Road	6" Yellow edge line	10,560 LF/MI
	6" White edge line	2000 LF
	6" Dbl yellow barrier line (4" between)	2000 LF

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice
10-25-19	Replaced 2' Max dim with Note (I)
11-05-21	Revised labels
11-22-23	Revised pvmt marking widths
1-17-24	Revised wide pvmt marking width

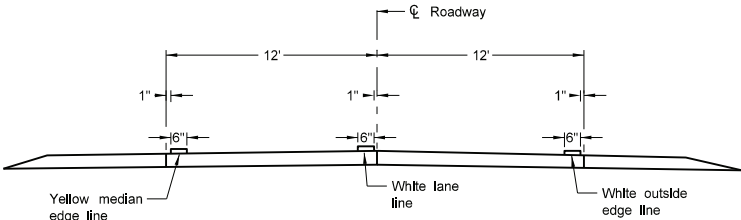


PAVEMENT MARKING

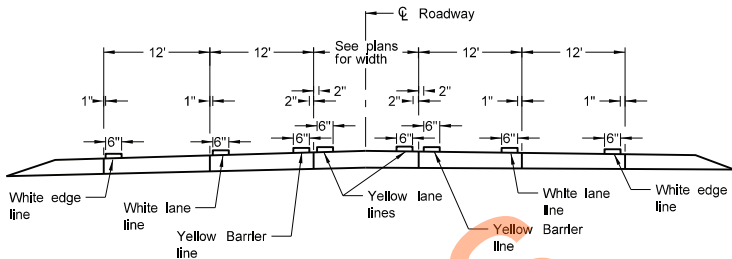
D-762-4



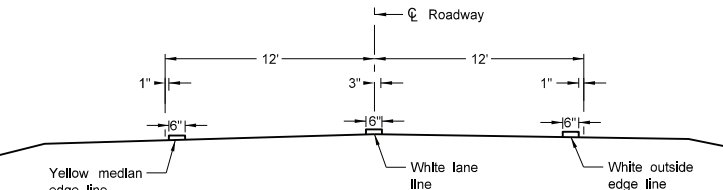
Two Lane Two Way
RURAL ROADWAY



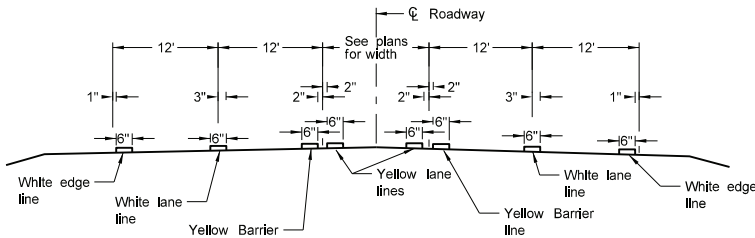
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



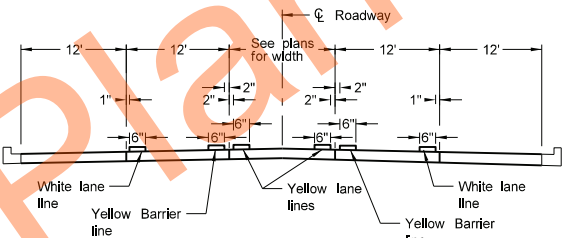
RURAL FIVE LANE ROADWAY
Concrete Section



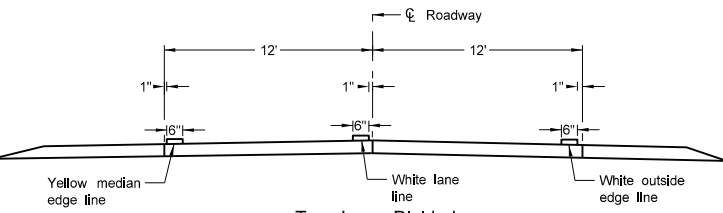
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



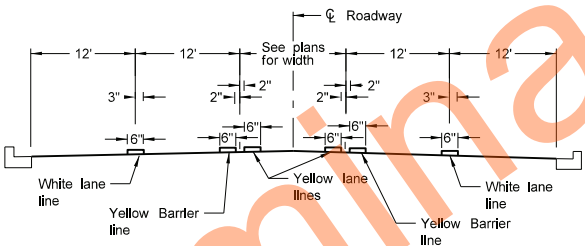
RURAL FIVE LANE ROADWAY
Asphalt Section



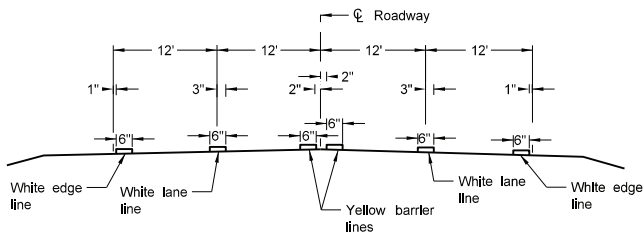
URBAN FIVE LANE SECTION
Concrete Section



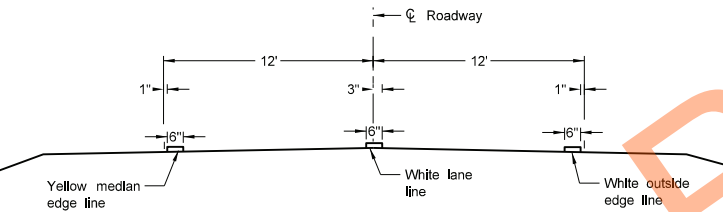
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



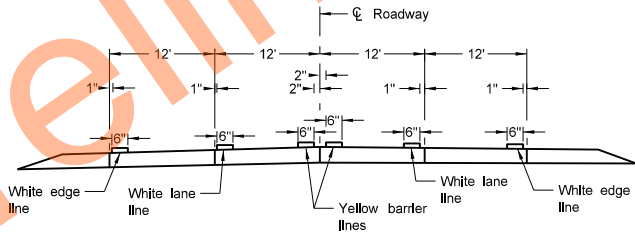
URBAN FIVE LANE SECTION
Asphalt Section



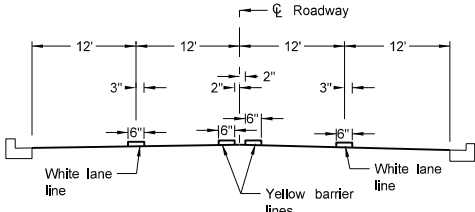
RURAL FOUR LANE ROADWAY
Asphalt Section



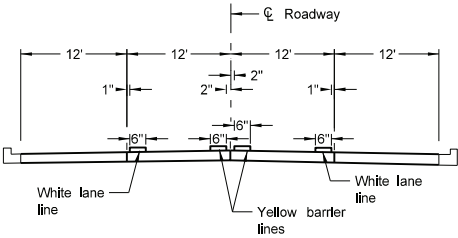
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



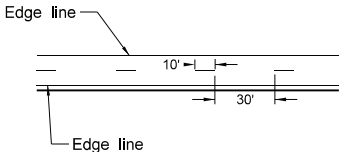
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

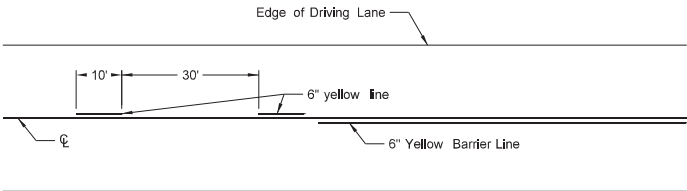
- NOTES:
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.
For section lines, county roads, and street approaches, stripe the radii and edge lines of the paved surface within the right of way except where curb and gutter is present.
 2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
 3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits < 40 mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
07-09-24	Modified Note 1.

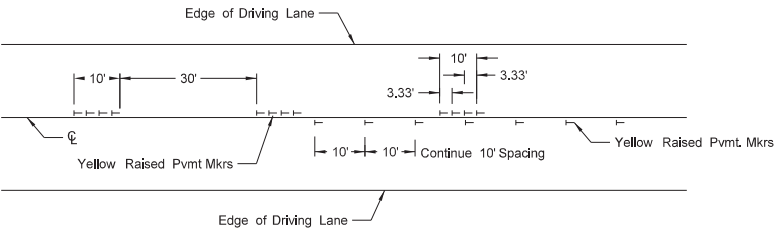


SHORT-TERM PAVEMENT MARKING

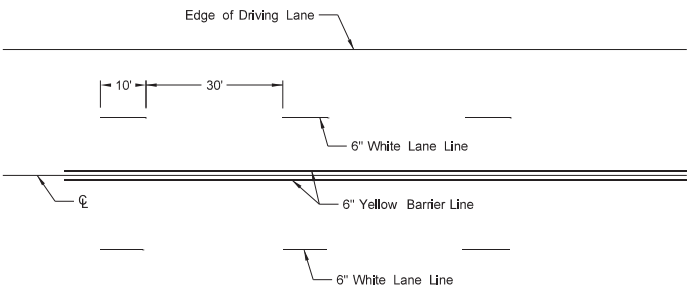
D-762-11



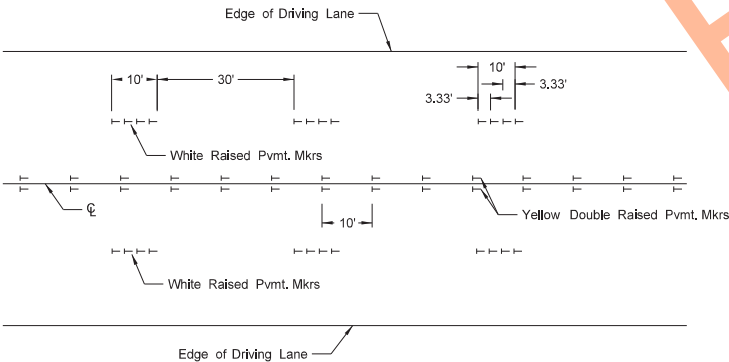
Painted or Tape Lines



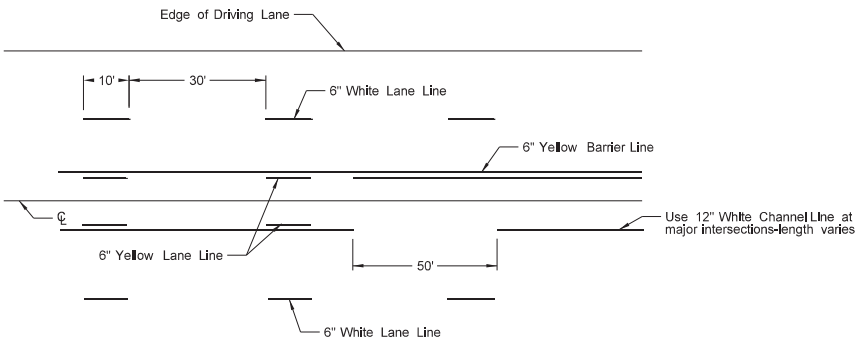
Raised Pavement Markers
TWO-LANE TWO-WAY ROADWAY



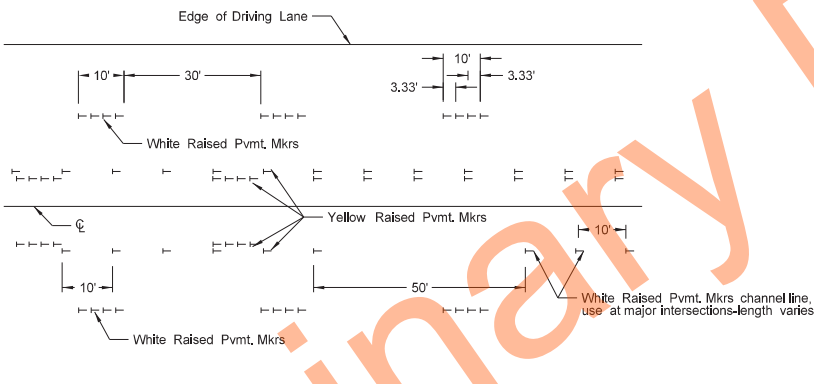
Painted or Tape Lines



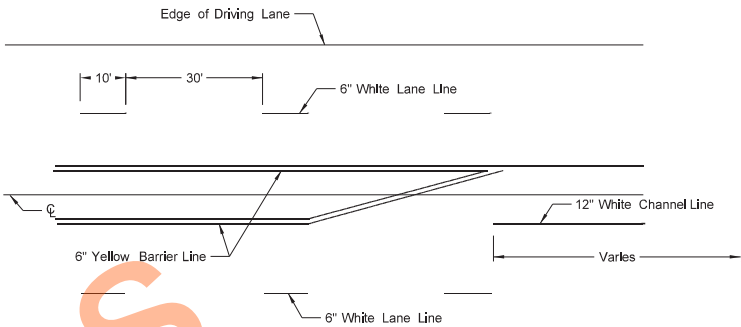
Raised Pavement Markers
FOUR LANE ROADWAY



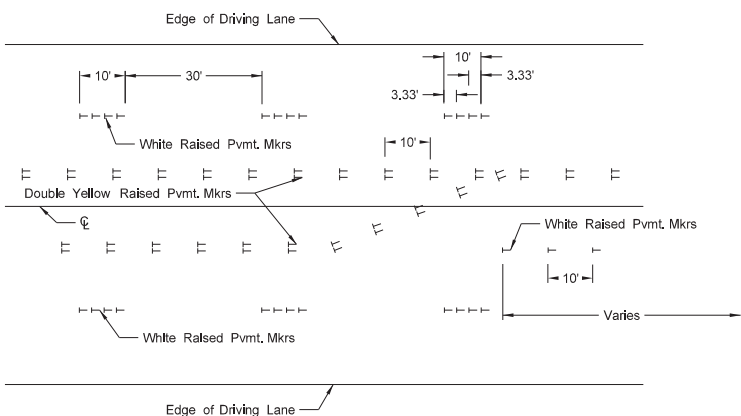
Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

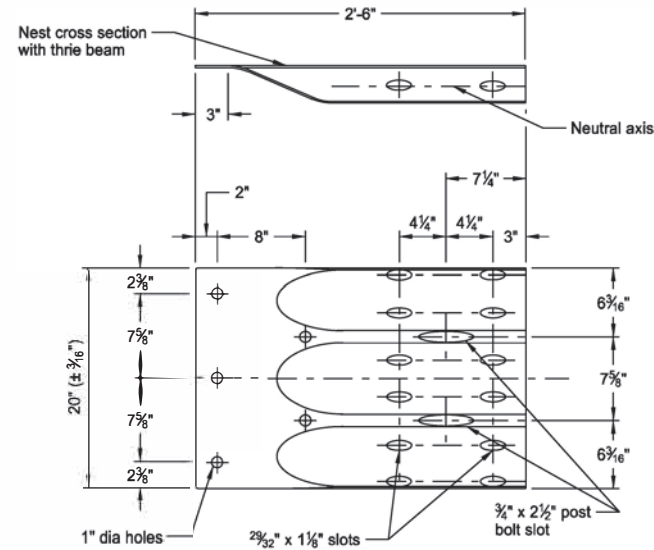
1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.
4. Normal width line - 6 inches wide for freeways, expressways, and ramps;
6 inches for all other roadways with speed limits > 40 mph.
5. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
6. Wide lines - 8 inches wide if 4 inch normal width lines are used and
12 inches wide if 6 inch normal width lines are used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths
1-17-24	Revised wide pvmt marking width.

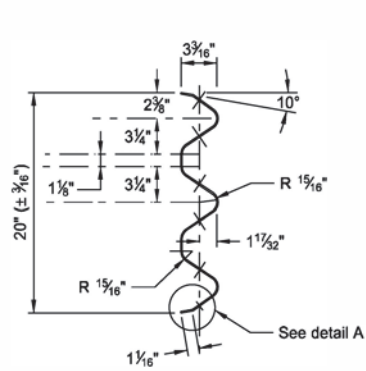


THRIE BEAM TRANSITION TO DOUBLE BOX BEAM RETROFIT

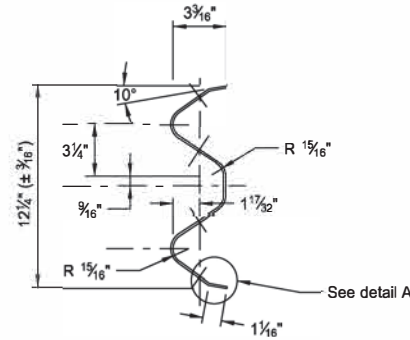
D-764-10



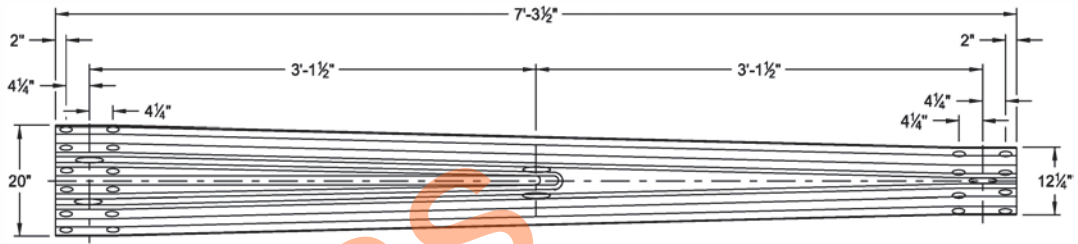
THRIE BEAM TERMINAL CONNECTOR



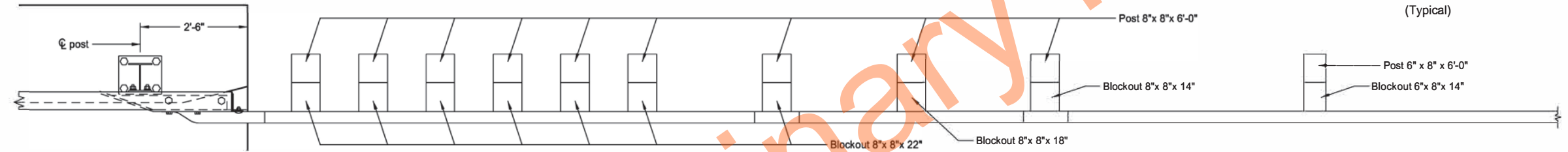
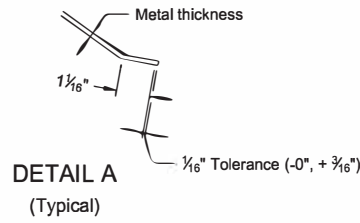
THRIE BEAM END VIEW



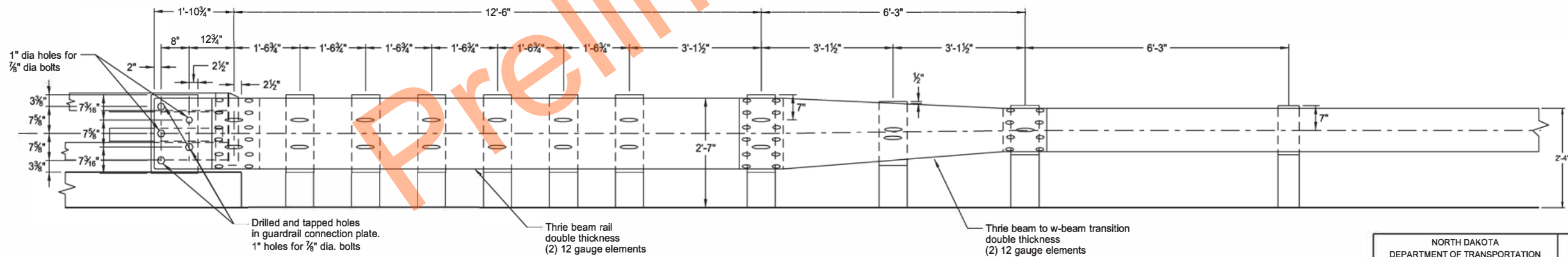
W-BEAM END VIEW



THRIE BEAM TO W-BEAM TRANSITION SECTION



PLAN



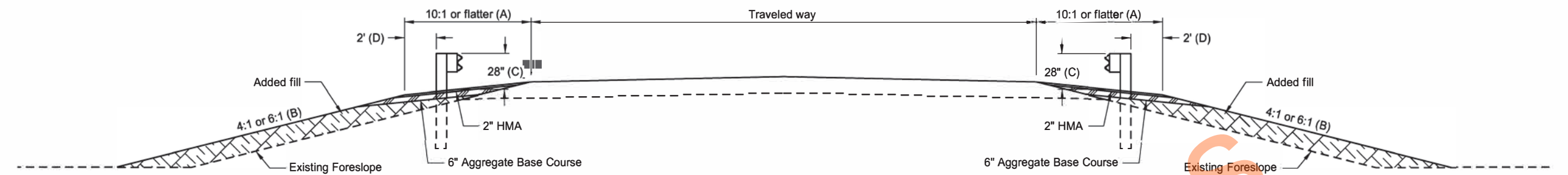
ELEVATION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12/02/20	Updated text to active voice.

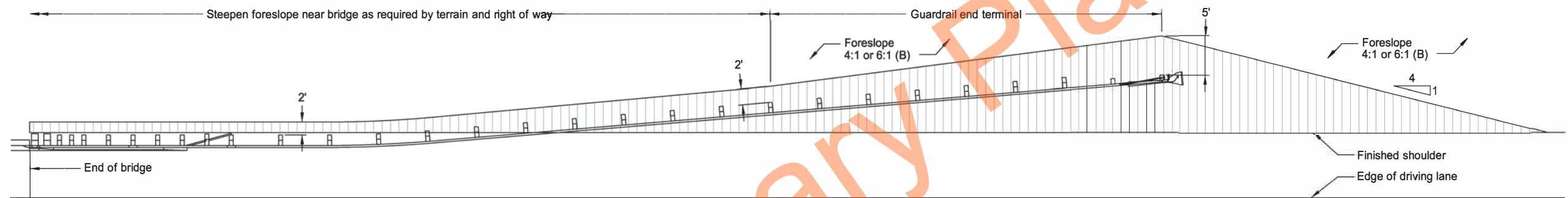


TYPICAL GRADING AT BRIDGE ENDS
WITH W-BEAM GUARDRAIL

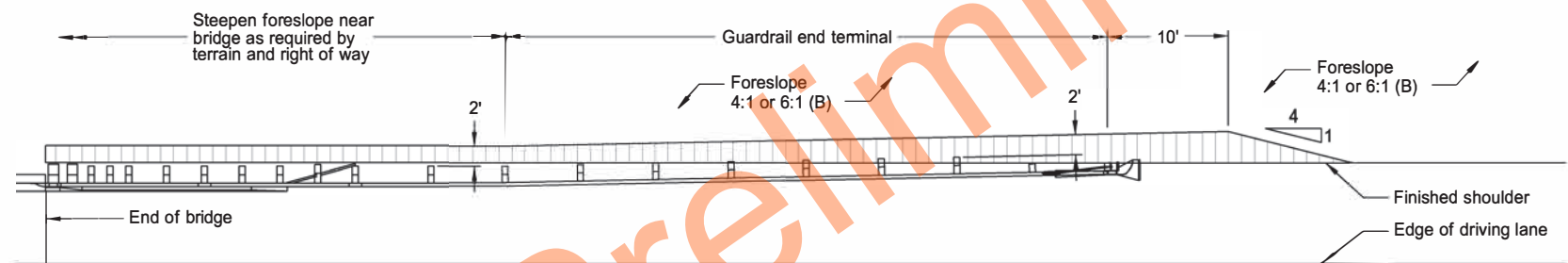
D-764-22



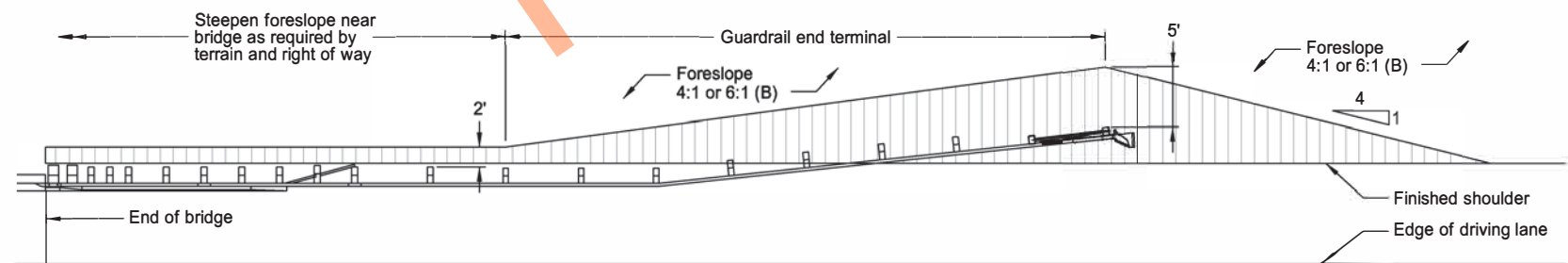
TYPICAL SECTION



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

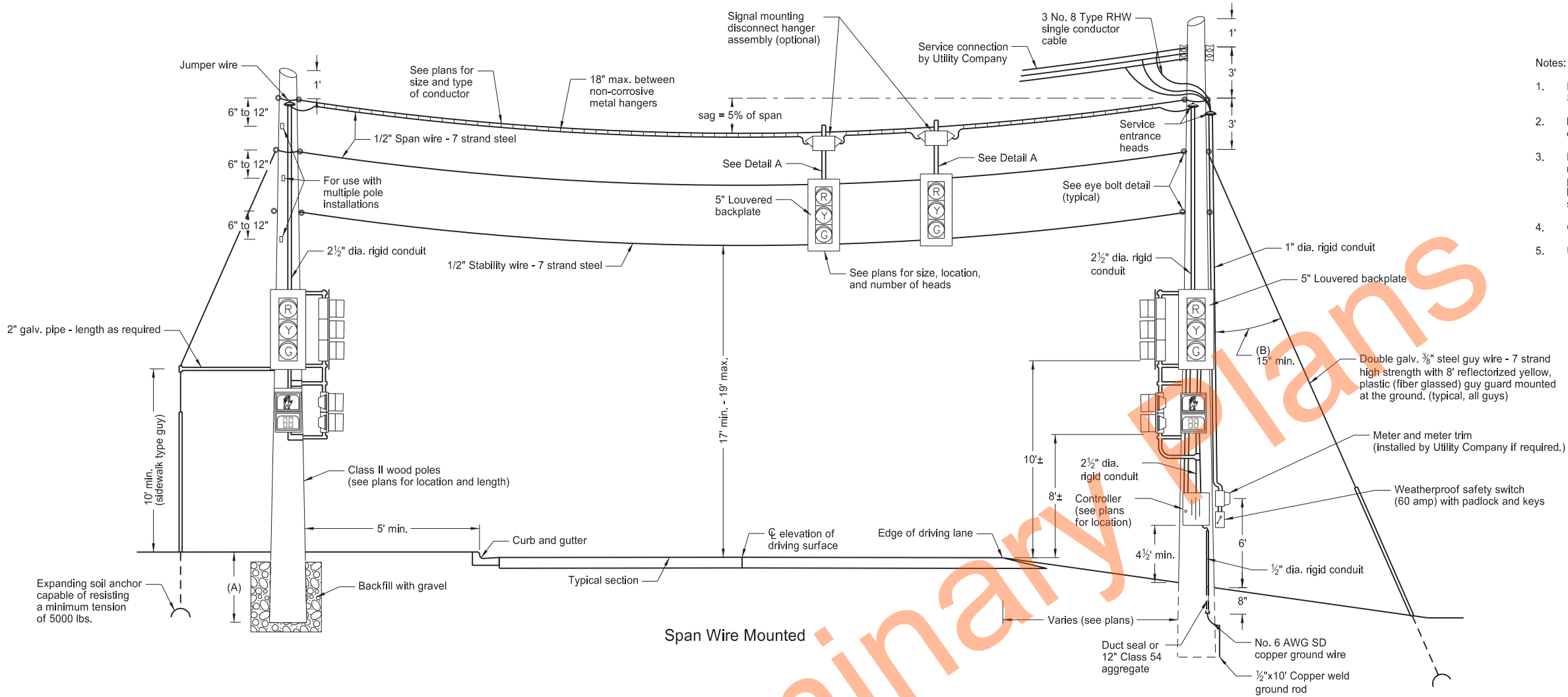
ENGINEER

NORTH DAKOTA

12 02 2020

SPAN WIRE MOUNTED TRAFFIC SIGNALS

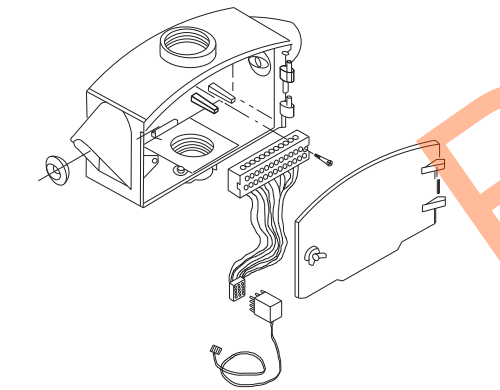
D-772-6



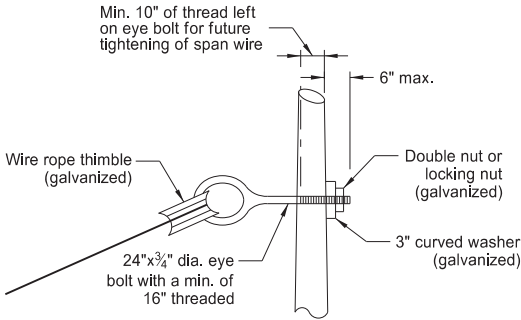
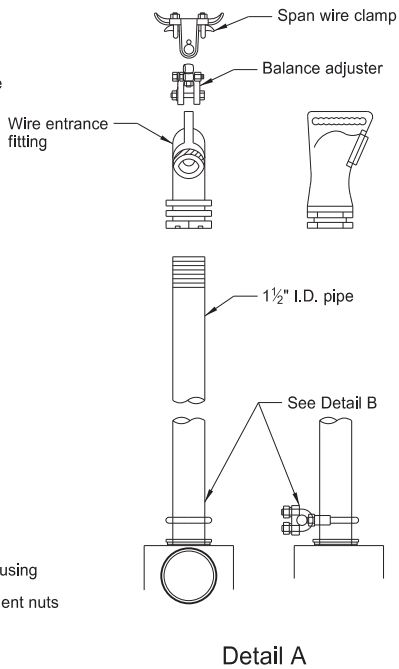
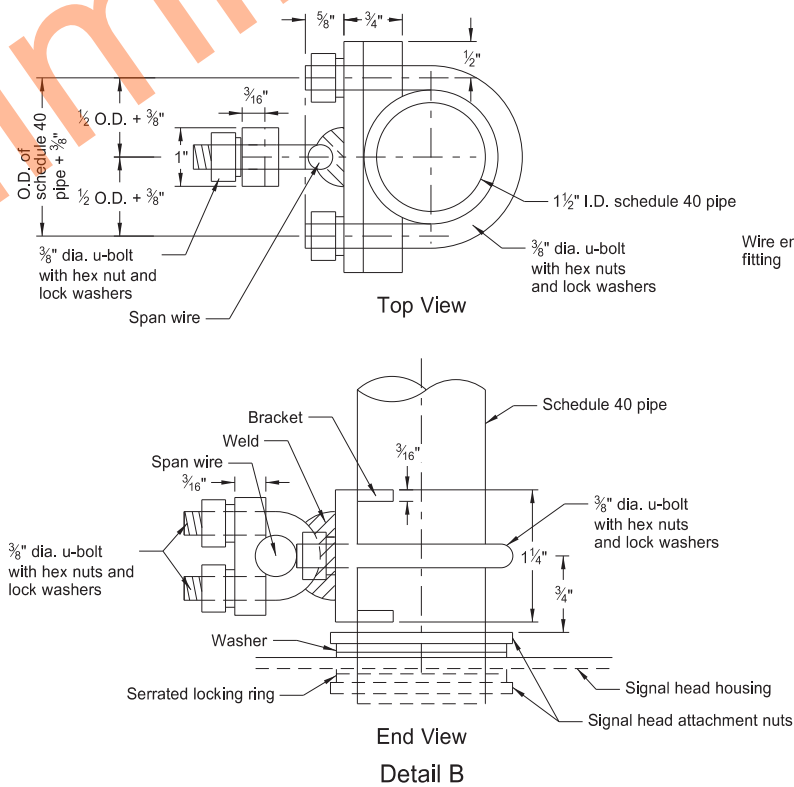
- Notes:
- Place span wired mounted traffic signals in accordance with Standard Specifications Section 772 and 896.
 - If a guy wire angle of less than 45° is used, increase the capability of the expanding soil anchor to resist tensions on site.
 - Maintain the required 17 to 19 ft. signal height over the roadway for a minimum period of 90 calendar days after installation, unless written permission is granted by the Engineer to waive the 90 day requirement. Include all costs to maintain the signal head elevation in the price bid for span wire mounted signals.
 - Operate traffic signal controller on 120 volts.
 - Use thimble type connections for span wire and stability wire.

(A) Pole Depth of Setting	
Length of pole (ft)	Depth of pole min. (ft)
35	6
40	6
45	6.5
50	7
55	7.5

(B) Guy Wire	
Angle	Anchor Resistance min.
30°	12,000 lbs.
15°	24,500 lbs.



Signal Mounting Disconnect Hanger Assembly



Eye Bolt Detail

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
07-08-14	Title change, span wire slze 7 sag
10-17-17	Updated to active voice
08-28-19	New Design Engineer PE Stamp
08-20-25	Added physical stamp & signature



08/20/25