

DESIGN DATA				
Traffic		Average Daily		
Current	2024	Pass: 4,410	Trucks: 1,580	Total: 5,990
Preventive Maintenance				

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

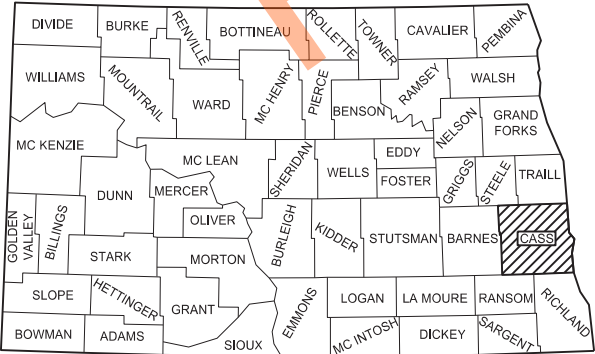
IM-8-094(117)315

Cass
I94 EB & WB
Buffalo E to Wheatland
Concrete Pavement Repair
Hot Bit. Surf on Cross Roads, Ramps & I-94 EB Shoulders

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	24111	1	1

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	7/1/2025
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
IM-8-094(117)315	8.863	8.863



STATE COUNTY MAP

DESIGNER Justin Oss, PE
DESIGNER Noah Jembere
DESIGNER -

ND DEPARTMENT OF TRANSPORTATION
Fargo District

Joe Peyerl
08/27/26

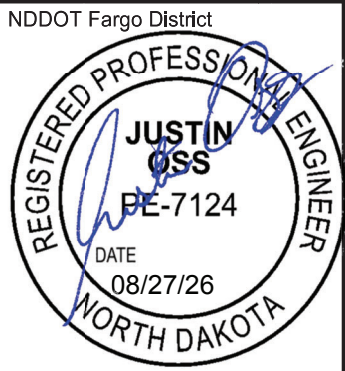
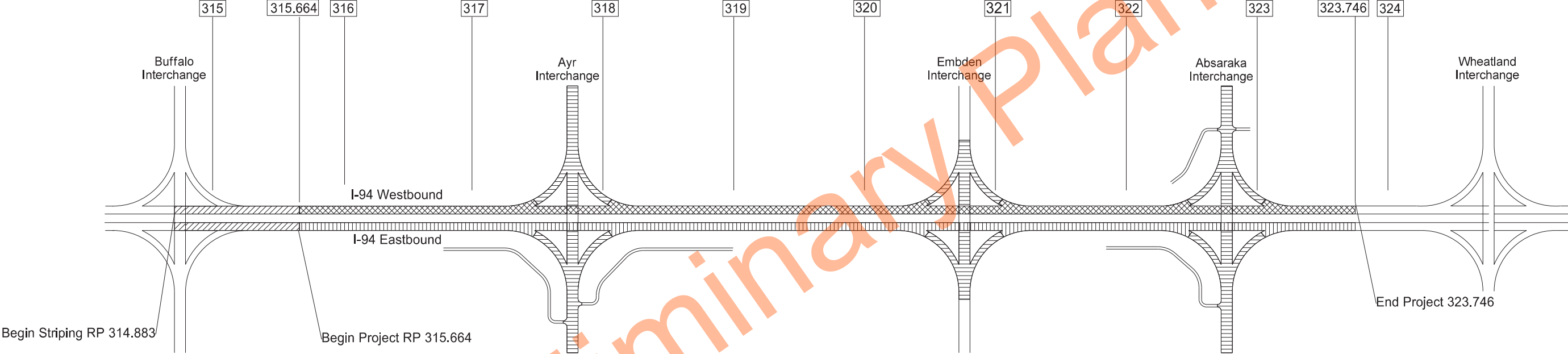
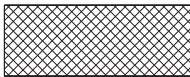
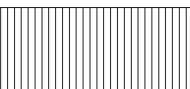
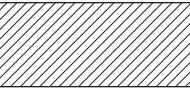


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-  Concrete Pavement Repair/Striping
-  Mill/HBP Overlay/Striping
-  EB I-94 CPR/ Shoulder Mill/HBP Overlay/Striping
-  Striping Only

Scope of Work
I-94 EB & WB
RP 314.883 to RP 323.746



NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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GENERAL NOTES

- 430-P01 REMOVE AND SALVAGE BITUMINOUS SURFACING: Remove and salvage 1-inch Bituminous surfacing at the interchanges as specified in the plans, also remove and salvage 1.5-inch bituminous shoulders on the EB roadway from RP 315.664 to RP 323.746.
- 430-P02 HOT BITUMINOUS PAVEMENT: Pave 2-inch Hot Bituminous Pavement at Absaraka, Embden, and Ayr interchanges as shown in the plans. Pave 1.5 inches of Hot Bituminous Pavement on shoulders of the EB roadway from RP 315.664 to 323.746. Use the PG 58S-34 asphalt cement. Compact in accordance with section 430.04.I.3 (ordinary compaction) of the standard specifications.
- 570-P01 CONCRETE PAVEMENT REPAIR: An additional 20% has been added to the quantities for CONCRETE PAVEMENT REPAIR – FULL DEPTH – DOWELED, DOWELED, CONTRACTION JOINT ASSEMBLIES, RANDOM PCC CRACK CLEANING AND SEALING and the associated quantity shown for dowel bars. Include all costs for labor, materials, and equipment to be installed as directed by the Engineer in the bid price Concrete Pavement Repair – Full Depth.
- 570-P02 TRANSVERSE AND LONGITUDINAL JOINTS CLEANING AND SEALING: Include all costs for labor, materials, and equipment to saw, clean, and seal the described joints in the unit bid price for Concrete Pavement Repair – Full Depth and Spall Repair – Partial Depth, as shown the detail plan sheets.
- 704-P01 MAINTENANCE & PROTECTION OF TRAFFIC FOR CONCRETE PAVEMENT REPAIRS: Place stackable vertical panels in full depth removal area spaced at 10 feet on the centerline roadway until concrete has been replaced. Use a minimum of two stackable vertical panels at each full depth removal area.

Place Type I Barricades in front of each open area or as directed by the Engineer.

Place barricades so they do not encroach into the adjacent lane.

Complete the concrete pavement repairs and any other associated items (striping, sealing, incidental grinding etc.) for the entire length of one lane closure before starting any work in the adjacent lane.

If the contractor would like to operate in a manner other than as herein provided, provide a complete traffic control layout and program to the engineer for review and approval.
- 704-P02 TRAFFIC ROUTING DURING CONSTRUCTION: Provide one lane for traffic. Drive in the same direction as the traffic in the adjacent lane. Do not drive against traffic. Maintain the ramp traffic all times during the pavement removal and replacement.

- 704-P03 CONSTRUCTION TRAFFIC: Construction access to the site is restricted to interchanges. Do not access the site from the median or the opposite roadway. Do not allow construction traffic in the median.
- 704-P04 TRAFFIC CONTROL FOR CONCRETE REPAIRS: The traffic control device list is based on two 4-mile lane closures, one in each direction and the following list:

1. Standard D-704-33
2. Standard D-704-35

Quantities of Type I barricades and vertical panels are based on the number of full-depth repairs locations and 3 vertical panels per location. The department will pay for additional barricades and panels at the contract unit price.
- 704-P05 TRAFFIC CONTROL PHASING:

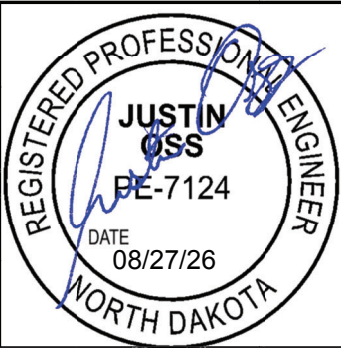
Phase 1: This phase consists of one lane closure on the outside lane for the removal of the spalls and the full depths for the CPR repairs from RP 319.725 to RP 323.746 for both EB and WB.

Phase 2: This phase consists of one lane closure on the inside lanes for the removal of the spalls and the full depths for the CPR repairs from RP 319.725 to RP 323.746 for both EB and WB.

Phase 3: This phase consists of one lane closure on the outside lane for the removal of the spalls and the full depths for the CPR repairs from RP 315.664 to RP 319.725 for both EB and WB.

Phase 4: This phase consists of one lane closure on the inside lane for the removal of the spalls and the full depths for the CPR repairs from RP 315.664 to RP 319.725 for both EB and WB.

Phase 5: This phase consists of maintaining a minimum travel width of 12 feet at all times when milling and overlaying the crossroads and ramps at the Absaraka, Embden and Ayr interchanges.
- 762-P01 PAVEMENT MARKING: Use 6-inch Epoxy Pavement Marking Wet Reflective Grooved as specified in section 880.02 of the standard specifications for the striping of both EB and WB I-94 from RP 314.883 to 323.746.



ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(117)315	8	1

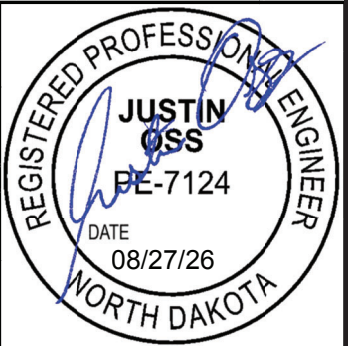
SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100 CONTRACT BOND	L SUM	1	1
401	0050 TACK COAT	GAL	2,165.63	2,165.63
411	0112 MILLING PAVEMENT SURFACE - 1 INCH	SY	43,318.67	43,318.67
430	0042 SUPERPAVE FAA 42	TON	4,909.45	4,909.45
430	1000 CORED SAMPLE	EA	32	32
430	5815 PG 58S-34 ASPHALT CEMENT	TON	230.74	230.74
570	0240 DOWELED CONTRACTION JOINT ASSEMBLY	LF	979	979
570	0649 CONCRETE PAVEMENT REPAIR-FULL DEPTH	SY	2,484	2,484
570	0966 RANDOM PCC CRACK CLEANING & SEALING	LF	2,194	2,194
570	1512 SPALL REPAIR-PARTIAL DEPTH	SF	542	542
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	500	500
704	1000 TRAFFIC CONTROL SIGNS	UNIT	2,269	2,269
704	1048 PORTABLE RUMBLE STRIPS	EA	2	2
704	1050 TYPE I BARRICADE	EA	22	22
704	1052 TYPE III BARRICADE	EA	18	18
704	1060 DELINEATOR DRUMS	EA	206	206
704	1067 TUBULAR MARKERS	EA	530	530
704	1080 STACKABLE VERTICAL PANELS	EA	62	62
704	1087 SEQUENCING ARROW PANEL-TYPE C	EA	2	2
762	0110 EPOXY PVMT MK 4IN LINE-GROOVED	LF	1,816	1,816
762	1106 PVMT MK PAINTED 6IN LINE	LF	37,710	37,710

BASIS OF ESTIMATE

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(117)315	10	1

Concrete Pavement Repair Totals					
	Full Depth (SY)	Dowel Bars (EA)	Dowel Contr. Joint Assembly (LF)	Spall Repair (SF)	Random Crack (LF)
Westbound	1106	600	396	230	404
Eastbound	946	600	420	190	64
Ramps	18	0	0	32	1360
20%	414	260	163	96	366
Total	2484	1460	984	542	2194

Permanent Pavement Marking		
Location - Type	Basis	Quantity
I-94 Eastbound		
Centerline – Pvmt MK 6 IN Line – Grooved Epoxy	Centerline Skips	11,710.00 LF
Edge Lines-Pvmt MK 6 IN Line - Grooved Epoxy	White Edge Lines	42,130.00 LF
Edge Lines – Pvmt MK 6 IN Line - Grooved Epoxy	Yellow Edge Lines	46,800.00 LF
Edge Lines-Pvmt MK 6 IN Line - Grooved Epoxy	Edge Line Mini Skips	1,160.00 LF
I-94 Westbound		
Centerline –Pvmt MK 6 IN Line – Grooved Epoxy	Centerline Skips	11,710.00 LF
Edge Lines – Pvmt MK 6 IN Line - Grooved Epoxy	White Edge Lines	42,130.00 LF
Edge Lines-Pvmt MK 6 IN Line - Grooved Epoxy	Yellow Edge Lines	46,800.00 LF
Edge Line-Pvmt MK 6 IN Line - Grooved Epoxy	Edge Line Mini Skips	1,160.00 LF
Ayr Crossroads & Ramps		
Centerline - Paint	Double Yellow Line	2,430 LF
Edge lines - Paint	White Edge Lines and Yellow Edge Lines	19,540.00 LF
Embsen Crossroads & Ramps		
Centerline - Paint	Double Yellow Line	3,440 LF
Edge lines - Paint	White Edge Lines and Yellow Edge Lines	15,380.00 LF
Absaraka Crossroads & Ramps		
Centerline - Paint	Double Yellow Line	3,140 LF
Edge lines - Paint	White Edge Lines and Yellow Edge Lines	14,890.00 LF

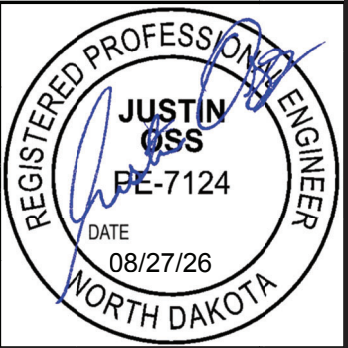


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(117)315	10	2

BASIS OF ESTIMATE

HMA CORED SAMPLES								
		A	B		C	D		
Location	Specification Section	Distance (Ft)/1000	Lanes	Joints	Lifts	Sublots (A x B x C)	Quantity (1 per mile)	Unit
Ayr Interchange Ramps	430.04 I.2.b (1), "General"	3	1	-	1	3	N/A	EA
	430.04 I.2.b(2), "Longitudinal Joint Density SSP 4"	3	-	1	1	3	N/A	EA
	430.04 I.2.b(3), "Pavement Thickness Determination Cores"	-	-	-	-	-	1	EA
Ayr Interchange Crossroads	430.04 I.2.b(1), "General"	1	2	1	1	2	N/A	EA
	430.04 I.2.b(2), "Longitudinal Joint Density SSP 4"	1	-	1	1	1	N/A	EA
	430.04 I.2.b(3), "Pavement Thickness Determination Cores"	-	-	-	-	-	1	EA
Embden Interchange Ramps	430.04 I.2.b(1) "General"	3	1	-	1	3	N/A	EA
	430.04 I.2.b(2) "Longitudinal Joint Density SSP 4"	3	-	1	1	3	N/A	EA
	430.04 I.2.b(3) "Pavement Thickness Determination Cores"	-	-	-	-	-	1	EA
Embden Interchange Crossroads	430.04 I.2.b(1), "General"	1	2	1	1	2	N/A	EA
	430.04 I.2.b(2), "Longitudinal Joint Density SSP 4"	1	-	1	1	1	N/A	EA
	430.04 I.2.b(3), "Pavement Thickness Determination Cores"	-	-	-	-	-	1	EA
Absaraka Interchange Ramps	430.04 I.2.b(1), "General"	3	1	-	1	3	N/A	EA
	430.04 I.2.b(2), "Longitudinal Joint Density SSP 4"	3	-	1	1	3	N/A	EA
	430.04 I.2.b(3), "Pavement Thickness Determination Cores"	-	-	-	-	-	1	EA
Absaraka Interchange Crossroads	430.04 I.2.b(1), "General"	1	2	1	1	2	N/A	EA
	430.04 I.2.b(2), "Longitudinal Joint Density SSP 4"	1	-	1	1	1	N/A	EA
	430.04 I.2.b(3), "Pavement Thickness Determination Cores"	-	-	-	-	1	1	EA
					Total	28	4	EA

		AYR INTERCHANGE (All Ramps & Crossroads)	EMBDEN INTERCHANGE (All Ramps & Crossroads)	ABSARAKA INTERCHANGE (All Ramps & Crossroads)	EB I-94 Shoulder	
ITEM	UNIT	SUBTOTAL	SUBTOTAL	SUBTOTAL	SUBTOTAL	TOTAL
Milling Pavement Surface	SY	13,726.34	15,041.78	14,550.55	43,932.58	87,251.25
Tack Coat 0.05 Gal/SY	GAL	686.32	752.09	727.53	2,196.63	4,362.57
RAP Superpave FAA42 @ 2 TON/CY (2" Asphalt for the interchanges & 1.5" Asphalt for the shoulders)	TON	1372.64	1504.18	1455.06	4393.26	8,725.14
PG 58S-34 Asphalt Cement 4.7% of Superpave	TON	64.51	70.70	68.39	206.48	410.08



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	1

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
323.739		PL											14	
323.671		PL							4	x	1	4		
323.52		DL							1	x	2	2		
323.488		10FT SHLDR	15	x	10	16.7								
323.478		DL	21	x	12	28.0	20	12						
323.461		DL	51	x	12	68.0	20	48						
323.457		PL							1	x	2	2		
323.411		DL							1	x	2	2		
323.085		DL							1	x	2	2		
Mile 323 Totals						112.7	40	60				12	14	
322.973		DL	21	x	12	28.0	20	12						
322.973		10FT SHLDR	21	x	10	23.3								
322.851		10FT SHLDR	155	x	10	172.2								
322.841		DL							1	x	3	3		
322.834		DL							1	x	4	4		
322.830		DL							4	x	1	4		
322.822		10FT SHLDR	10	x	10	11.1								
322.762		PL							1	x	1	1		
322.759		PL							1	x	1	1		
322.725		DL							1	x	1	1		
322.242		DL							1	x	1	1		
322.213		DL							1	x	2	2		
322.143		PL	21	x	16	37.3	20	12						
322.129		PL							1	x	2	2		
322.026		DL							1	x	1	1		
Mile 322 Totals						272.0	40	24				20	-	

Westbound
Data Table
RP 323.739 to RP 322.026



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	2

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
321.964		DL							1	x	2	2		
321.942		DL							1	x	1	1		
321.876		DL							2	x	1	2		
321.860		10FT SHLDR	10	x	10	11.1								
321.859		PL	36	x	16	64.0	20	36						
321.839		10FT SHLDR	15	x	10	16.7								
321.832		PL	21	x	16	37.3	20	12						
321.827		DL							1	x	1	1		
321.772		PL							1	x	2	2		
321.741		DL							1	x	1	1		
321.719		DL							1	x	2	2		
321.649		10FT SHLDR	15	x	10	16.7								
321.615		PL							1	x	1	1		
321.615		PL							1	x	1	1		
321.615		PL							3	x	1	3		
321.605		PL							2	x	1	2		
321.594		DL	21	x	12	28.0	20	12						
321.554		DL							1	x	3	3		
321.418		DL							1	x	2	2		
321.398		10FT SHLDR							1	x	1	1		
321.222		10FT SHLDR							1	x	1	1		
321.088		PL							1	x	2	2		
321.072		DL							4	x	2	8		
321.066		DL							8	x	2	16		
Mile 321 Totals						173.8	60	60				51	-	

Westbound
Data Table
RP 321.964 to RP 321.066



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	3

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
320.824		PL											100	
320.669		PL							1	x	2	2		
320.479		PL							3	x	1	3		
320.375		PL							1	x	1	1		
320.346		DL							1	x	1	1		
320.319		DL							3	x	1	3		
320.267		10FT SHLDR							1	x	1	1		
320.159		DL							1	x	1	1		
320.133		DL							1	x	1	1		
320.065		DL							1	x	1	1		
Mile 320 Totals						-	-	-				14	100	
319.982		DL							4	x	3	12		
319.935		DL							1	x	2	2		
319.890		PL							2	x	1	2		
319.887		PL							1	x	1	1		
319.735		PL							4	x	2	8		
319.617		PL							1	x	1	1		
319.579		PL											205	
319.390		DL							1	x	2	2		
319.330		DL	21	x	12	28.0	20	12						
319.330		PL	21	x	16	37.3	20	12						
319.140		DL	22	x	12	29.3	20	12						
319.140		PL	22	x	16	39.1	20	12						
319.028		PL							1	x	1	1		
Mile 319 Totals						133.8	80	48				29	205	

Westbound
Data Table
RP 320.824 to RP 319.028



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	4

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
318.841		DL							1	x	2	2		
318.806		DL	15	x	12	20.0	20	12						
318.806		10FT SHLDR	10	x	10	11.1								
318.763		DL							1	x	2	2		
318.666		DL							1	x	1	1		
318.666		DL							1	x	3	3		
318.566		DL	8	x	12	10.7	20	12						
318.566		10FT SHLDR	10	x	10	11.1								
318.545		DL							1	x	1	1		
318.517		PL							1	x	1	1		
318.513		10FT SHLDR							1	x	1	1		
318.501		PL							1	x	1	1		
318.486		10FT SHLDR	8	x	10	8.9								
318.489		DL							3	x	2	6		
318.489		PL							2	x	1	2		
318.435		PL	36	x	16	64.0	20	36						
318.434		DL							1	x	2	2		
318.434		DL							1	x	2	2		
318.414		PL							1	x	2	2		
318.398		DL							1	x	2	2		
318.369		10FT SHLDR											10	
318.132		DL							2	x	1	2		
318.107		DL							2	x	1	2		
Mile 318 Totals						125.8	60	60				32	10	

Westbound
Data Table
RP 318.841 to RP 318.107



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	5

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
317.932		DL							1	x	2	2		
317.822		DL							1	x	2	2		
317.709		DL							1	x	2	2		
317.628		DL							1	x	2	2		
317.573		PL							1	x	2	2		
317.381		PL							1	x	1	1		
317.381		PL							1	x	1	1		
317.372		PL											75	
317.349		DL							4	x	3	12		
317.315		DL							1	x	1	1		
317.189		DL							2	x	2	4		
317.046		DL							1	x	2	2		
Mile 317 Totals						-	-	-				31	75	
316.995		DL							1	x	1	1		
316.904		PL	36	x	16	64.0	20	36						
316.886		PL	36	x	16	64.0	20	36						
316.884		DL	21	x	12	28.0	20	24						
316.797		10FT SHLDR							3	x	1	3		
316.795		10FT SHLDR							1	x	1	1		
316.795		DL							2	x	2	4		
316.527		PL							1	x	2	2		
316.524		DL							2	x	2	4		
316.524		10FT SHLDR	10	x	10	11.1								
316.519		10FT SHLDR	10	x	10	11.1								
316.519		DL							4	x	2	8		
316.491		DL	22	x	12	29.3	20	24						
316.491		10FT SHLDR	10	x	10	11.1								
316.105		DL							1	x	2	2		
316.050		PL	6	x	16	10.7	20							
Mile 316 Totals						229.3	100	120				25	-	

Westbound
Data Table
RP 317.932 to RP 316.050



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	6

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
315.977		PL	7	x	16	12.4	20							
315.977		DL							1	x	2	2		
315.970		DL							3	x	1	3		
315.970		DL							2	x	1	2		
315.959		PL							3	x	1	3		
315.880		DL							1	x	1	1		
315.845		DL							1	x	1	1		
315.841		DL							1	x	1	1		
315.823		DL							1	x	1	1		
315.814		DL							2	x	1	2		
315.683		DL	21	x	12	28.0	20	24						
315.682		DL	14	x	12	18.7	20							
Mile 315 Totals						59.1	60	24				16	-	

Preliminary Plans

Westbound
Data Table
RP 315.977 to RP 315.682



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	7

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
315.664		DL							2	x	2	4		STRAIGHT JOINTS
315.978		PL							1	x	2	2		
mile 315 Totals												6		
316.076		DL							1	x	2	2		
316.151		DL	21	x	14	32.7	20	14						
316.151		PL	21	x	14	32.7	20	14						
316.162		PL							3	x	3	9		
316.164		PL							2	x	1	2		
316.258		DL	6	x	14	9.3	20							
316.258		PL	6	x	14	9.3	20							
316.296		PL											16	
316.303		DL							1	x	2	2		
316.765									1	x	1	1		
Mile 316 Totals						84.0	80	28				16	16	
317.103		DL							1	x	2	2		
317.107		DL							1	x	2	2		
317.216		DL	36	x	14	56.0	20	28						
317.217		PL							3	x	3	9		
317.301		DL	21	x	14	32.7	20	14						
317.301		PL	21	x	14	32.7	20	14						
317.382		DL							1	x	1	1		
317.507		DL							3	x	2	6		
317.552		DL							1	x	2	2		
317.570		DL							2	x	1	2		
317.575		DL							2	x	1	2		
317.592		DL							2	x	1	2		
317.592		RAMP							1	x	1	1		
317.595		DL							5	x	2	10		
317.597		RAMP							1	x	1	1		
317.636		RAMP							4	x	1	4		
317.644		DL							2	x	1	2		
317.864		DL											30	
317.870		DL							2	x	4	8		
317.979		DL	36	x	14	56.0	20	28						
317.979		PL	36	x	14	56.0	20	28						
Mile 317 Totals						233.3	100	112				54	30	

Eastbound
Data Table
RP 315.664 to RP 317.979



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	8

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
318.186		DL							1	x	1	1		
318.217		DL							1	x	1	1		
318.370		DL	9	x	14	14.0	20							
318.370		PL	9	x	14	14.0	20							
318.422		PL							1	x	2	2		
318.507		PL	52	x	14	80.9	20	42						
318.517		DL	21	x	14	32.7	20	14						
318.601		DL							2	x	1	2		
318.692		PL							1	x	2	2		
318.738		DL							2	x	5	10		
318.984		DL							1	x	1	1		
Mile 318 Totals						141.6	80	56				19	-	
319.004		DL							1	x	1	1		
319.061		DL							1	x	1	1		
319.109		DL							1	x	2	2		
319.265		DL							1	x	1	1		
319.672		DL							2	x	4	8		
319.719		DL	21	x	14	32.7	20	14						
319.719		PL	21	x	14	32.7	20	14						
Mile 319 Totals						65.3	40	28				13	-	

Eastbound
Data Table
RP 318.186 to RP 319.719



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	9

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
320.035		PL							1	x	3	3		
320.131		DL							1	x	2	2		
320.162		DL							1	x	2	2		
320.316		PL							1	x	4	4		
320.341		DL							1	x	2	2		
320.677		DL							1	x	1	1		
320.677		PL							2	x	1	2		
320.717		DL							1	x	2	2		
320.752		DL	21	x	14	32.7	20	14						
320.752		PL	21	x	14	32.7	20	14						
320.819		DL							1	x	2	2		
320.839		DL							1	x	2	2		
320.875		DL							1	x	3	3		
320.958		DL							1	x	1	1		
320.970		DL							6	x	1	6		
320.980		DL	6	x	14	9.3	20							
Mile 320 Totals						74.7	60	28				32	-	
321.652		DL	35	x	14	54.4	20	28						OVER BOX CULVERT
321.652		PL	29	x	14	45.1	20	28						OVER BOX CULVERT
321.664		DL											18	
321.668		PL	8	x	14	12.4	20	14						
Mile 321 Totals						112.0	60	70				-	18	
322.104		PL							1	x	2	2		
322.341		PL							1	x	2	2		
322.620		DL							1	x	2	2		
322.762		PL							1	x	2	2		
322.839		DL							1	x	4	4		
322.839		PL							1	x	4	4		
Mile 322 Totals						-	-	-				16	-	

Eastbound
Data Table
RP 320.035 to RP 322.839



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	10

Reference Point(RP)	Dist. From RP (FT)	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly (LF)	Spall Repair (ft)			SF	Random Cracks (LF)	Comments
			Length	X	Width				Length	X	Width			
323.211		PL	6	x	14	9.3	20	14						
323.319		DL	13	x	14	20.2	20							
323.319		PL	6	x	14	9.3	20							
323.387		DL	21	x	14	32.7	20	14						
323.422		PL							3	x	2	6		
323.426		PL							3	x	2	6		
323.428		PL							3	x	2	6		
323.430		PL							3	x	2	6		
323.432		PL							3	x	2	6		
323.435		PL	21	x	14	32.7	20	14						
323.435		DL	21	x	14	32.7	20	14						
323.469		DL	21	x	14	32.7	20	14						
323.489		PL	21	x	14	32.7	20	14						
323.492		DL	21	x	14	32.7	20	14						
323.493		PL							1	x	2	2		
323.722		DL							2	x	1	2		
Mile 323 Totals						234.9	180	98				34	-	

Eastbound
Data Table
RP 323.211 to RP 323.722



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	11

Reference Point (RP)	Dist. From RP	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly	Spall Repair (ft)			SF	Random Cracks	Comments
			Length	X	Width				Length	X	Width			
EB EXIT 317 OFF RAMP	460								1	x	1	1.0		
EB EXIT 317 OFF RAMP	490								3	x	1	3.0		
EB EXIT 317 OFF RAMP	640								1	x	1	1.0		
EB EXIT 317 OFF RAMP	697								4	x	1	4.0		
EB EXIT 317 OFF RAMP	711								2	x	1	2.0		
EB EXIT 317 OFF RAMP	768								1	x	3	3.0		
EB EXIT 317 OFF RAMP TOTALS						-	-	-				14.0	-	
EB EXIT 317 ON RAMP														
EB EXIT 317 ON RAMP TOTALS						-	-	-				-	-	
EB EXIT 320 OFF RAMP														
EB EXIT 320 OFF RAMP TOTALS						-	-	-				-	-	
EB EXIT 320 ON RAMP														
EB EXIT 320 ON RAMP TOTALS						-	-	-				-	-	
EB EXIT 322 OFF RAMP	915								1	x	1	1.0		
EB EXIT 322 OFF RAMP TOTALS						-	-	-				1.0	-	
EB EXIT 322 ON RAMP	914		11	x	6	7.3								ON SHOULDER
EB EXIT 322 ON RAMP TOTALS						7.3	-	-				-	-	

Eastbound Ramps
Data Table
Exit 317 Ramp to Exit 322 Ramp



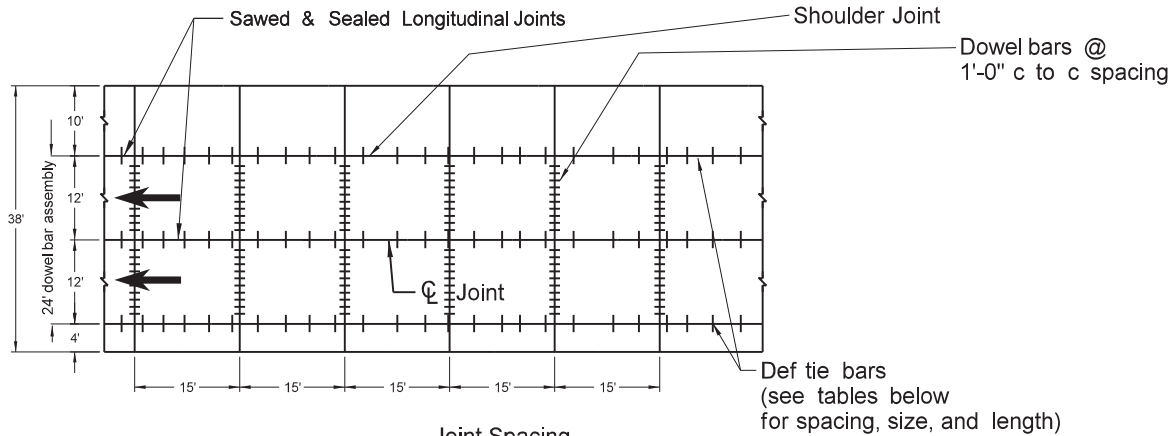
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	11	12

Reference Point (RP)	Dist. From RP	Lane	Full Depth Repair (ft)			SY	Dowel Bars	Doweled Contr. Joint Assembly	Spall Repair (ft)			SF	Random Cracks	Comments
			Length	X	Width				Length	X	Width			
WB EXIT 322 ON RAMP	333												30	
WB EXIT 322 ON RAMP	364		8	x	12	10.7	20							
WB EXIT 322 ON RAMP	560								1	x	2	2.0		
WB EXIT 322 ON RAMP TOTALS						10.7	20	-				2.0	30	
WB EXIT 320 OFF RAMP	38								2	x	2	4.0		
WB EXIT 320 OFF RAMP	166								4	x	1	4.0		
WB EXIT 320 OFF RAMP	407												175	
WB EXIT 320 OFF RAMP	715												20	
WB EXIT 320 OFF RAMP	715												15	
WB EXIT 320 OFF RAMP	824								1	x	1	1.0		
WB EXIT 320 OFF RAMP	841								1	x	1	1.0		
WB EXIT 320 OFF RAMP	841								1	x	2	2.0		
WB EXIT 320 OFF RAMP	894								1	x	1	1.0		
WB EXIT 320 OFF RAMP	894								1	x	2	2.0		
WB EXIT 320 OFF RAMP TOTALS						-	-	-				15.0	210	
WB EXIT 320 ON RAMP	314												15	
WB EXIT 320 ON RAMP	790												60	
WB EXIT 320 ON RAMP TOTALS						-	-	-				-	75	
WB EXIT 317 OFF RAMP	245												50	
WB EXIT 317 OFF RAMP	353												400	
WB EXIT 317 OFF RAMP	660												30	
WB EXIT 317 OFF RAMP TOTALS						-	-	-				-	480	
WB EXIT 317 ON RAMP	342												20	
WB EXIT 317 ON RAMP	364												100	
WB EXIT 317 ON RAMP	439												120	
WB EXIT 317 ON RAMP	472												75	
WB EXIT 317 ON RAMP	656												130	
WB EXIT 317 ON RAMP	814												120	
WB EXIT 317 ON RAMP TOTALS						-	-	-				-	565	

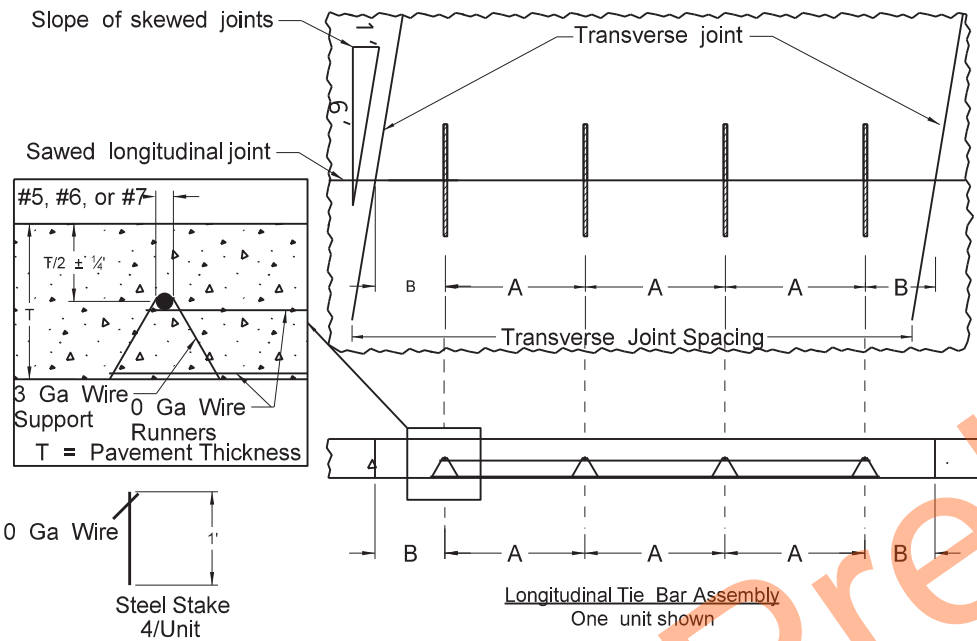
Westbound Ramps
Data Table
Exit 322 Ramp to Exit 317 Ramp



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	20	1

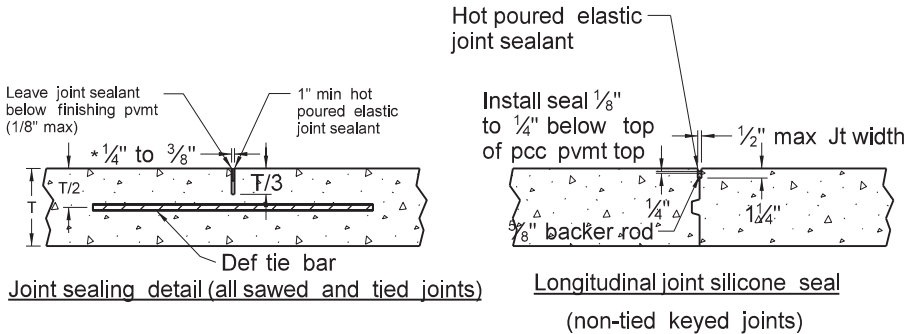
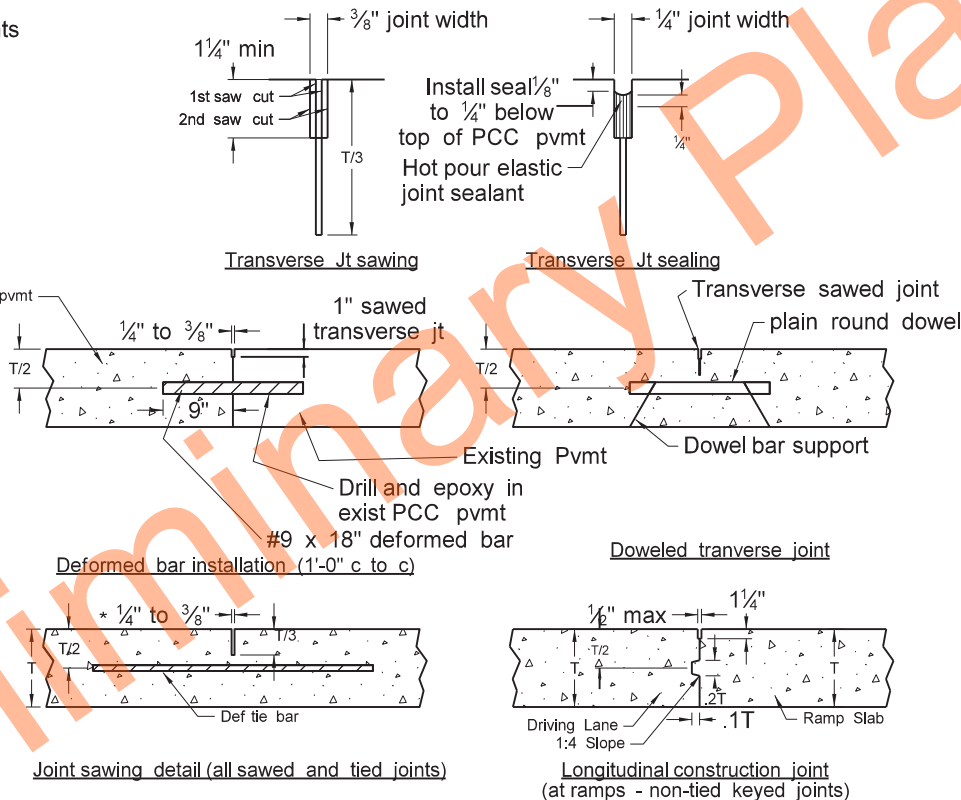


Joint Spacing
Mainline Joints Straight
Uniform Joint spacing 15'
*Same average spacing for skewed joints

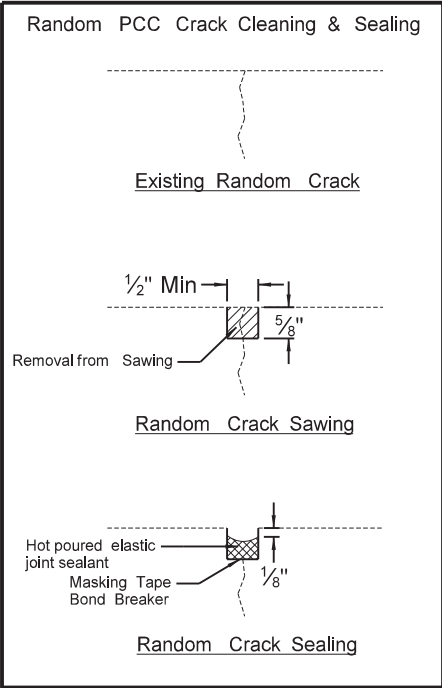


Longitudinal Joint Tie Bar Size and Length					
Pavement Depth	8"	9"	10"	11"	12"
ML & Ramps	#6 x 3' - 0"			#7 x 3' - 0"	
10' SHLDR	#5 x 2' - 6"				

Longitudinal Joint Uniform Tie Bar Spacing			
Joint Spacing	Distance A	Distance B	No. of Bars/Assembly
15'	45"	22½"	4



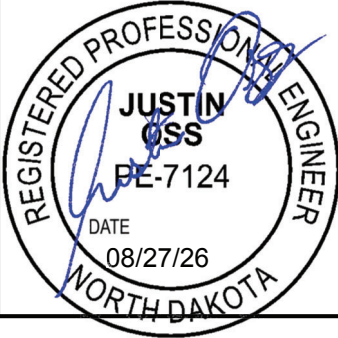
- Notes:
- T = Pavement Thickness
 - Dowel bars shall be 1½" x 18" when T = 10" or less and shall be 1½" x 18" when T is greater than 10".
 - The ramp tapers shall also be doweled
- *Width requirement for top 1" only. Bottom portion of saw cut may be narrower.



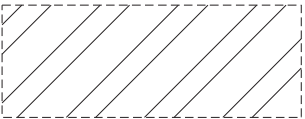
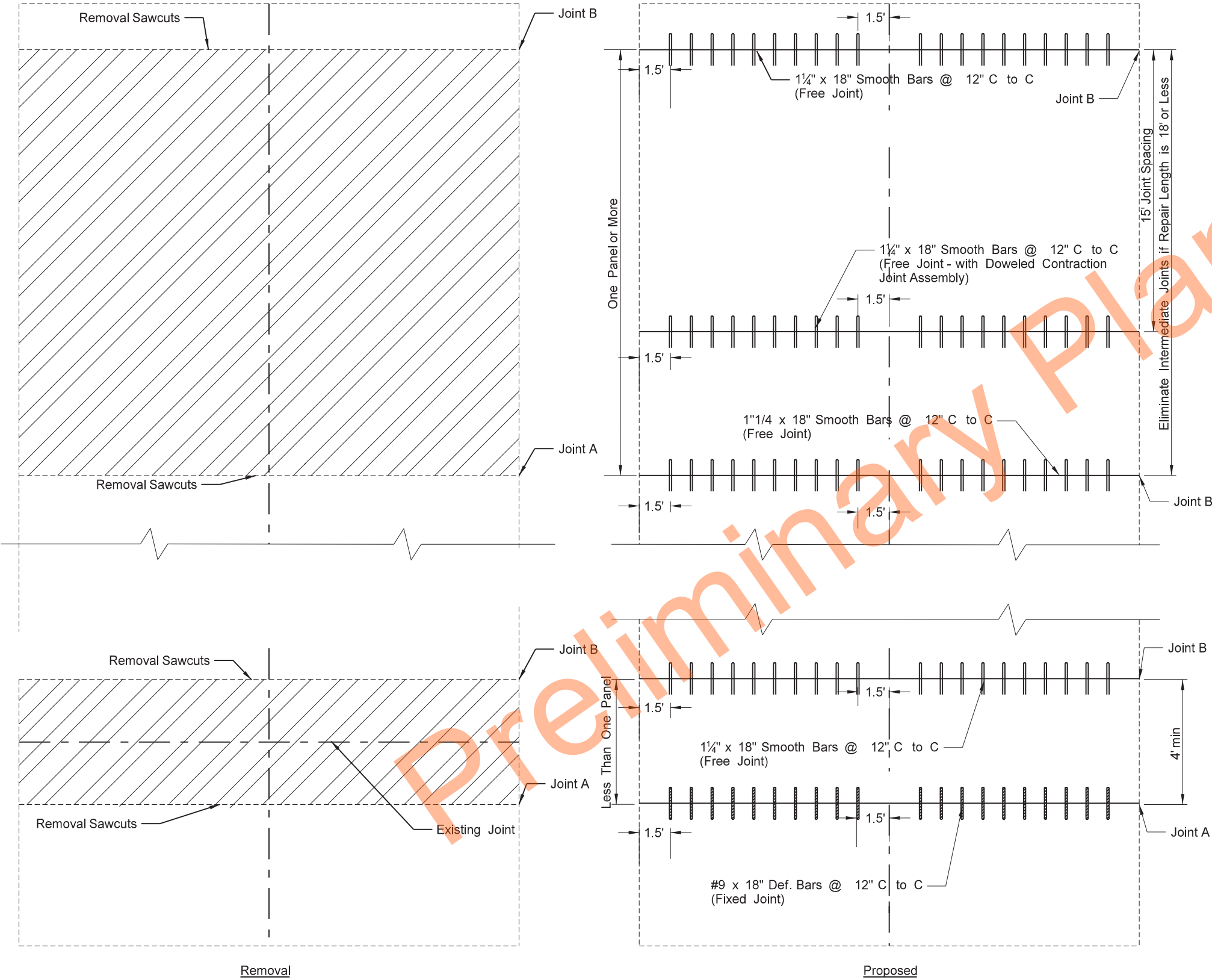
PCC Pavement Joint Details

With Uniform Spacing

I-94 EB & WB



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	20	2



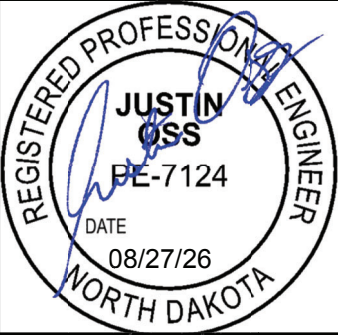
PCC Removal

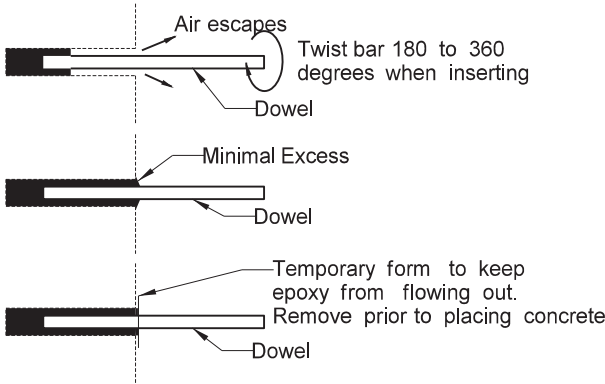
- Notes:
- Joint A (Fixed Joint) shall be the new joint with the shortest distance to the next transverse joint or working random crack. The saw cut will be made at 90° to the centerline. The deformed bars shall be placed perpendicular to the face of the saw cut.
 - Joint B (Free Joint) shall be the new joint with the greatest distance to the next transverse joint or working random crack. The smooth bars shall be installed within the tolerances shown on the "Dowel Bar Placement- Full Depth Repair" detail sheet.
 - When the distance to the next transverse joint or working random crack is equal for both new joints, the free joint (joint B) shall be placed on the approach side of the repair.
 - If greater than one panel in length, a Doweled Contraction Joint Assembly shall be installed at transverse contraction joints.
 - In repair areas which are not the entire roadway width, joints shall be placed to match the existing pavement wherever possible.
 - The joints at the beginning and end of a full depth repair section can be either a Joint B or Joint A depending on the existing joint.

Removal of Concrete & Dowel Bar

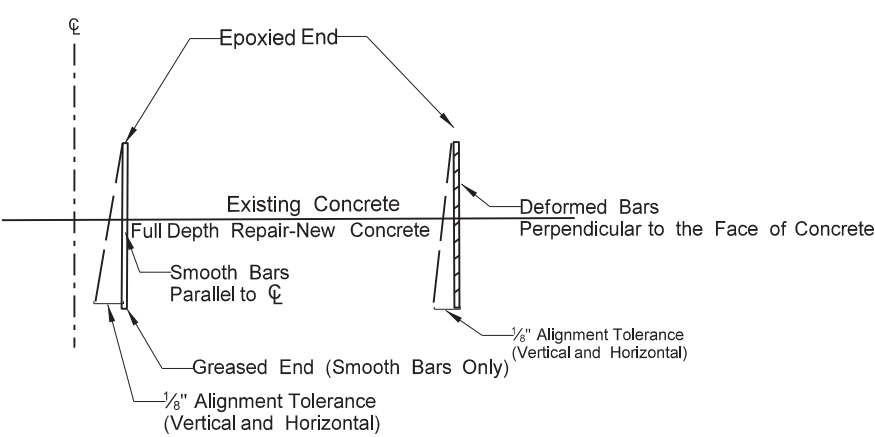
Placement-Full Depth Repair
Straight Joint

I-94 EB WB

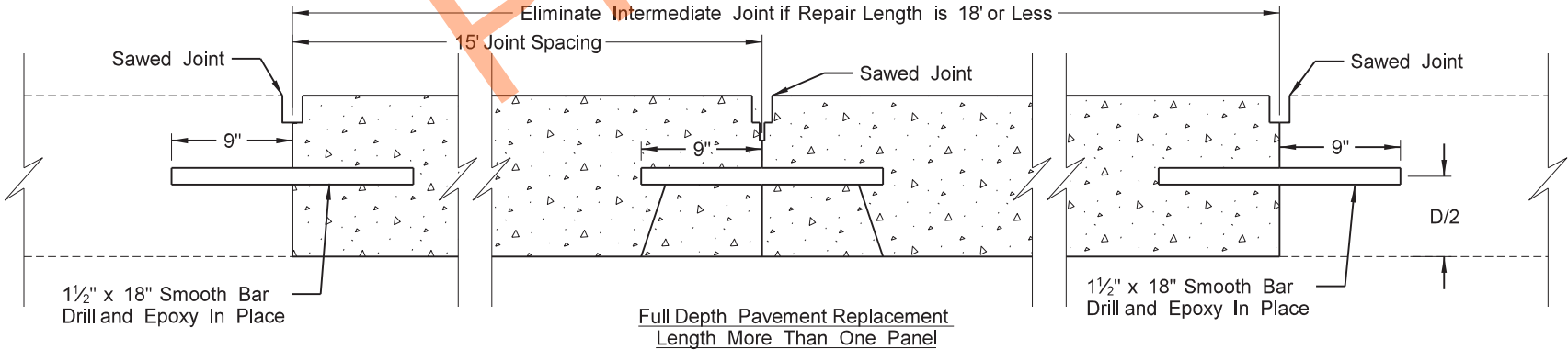
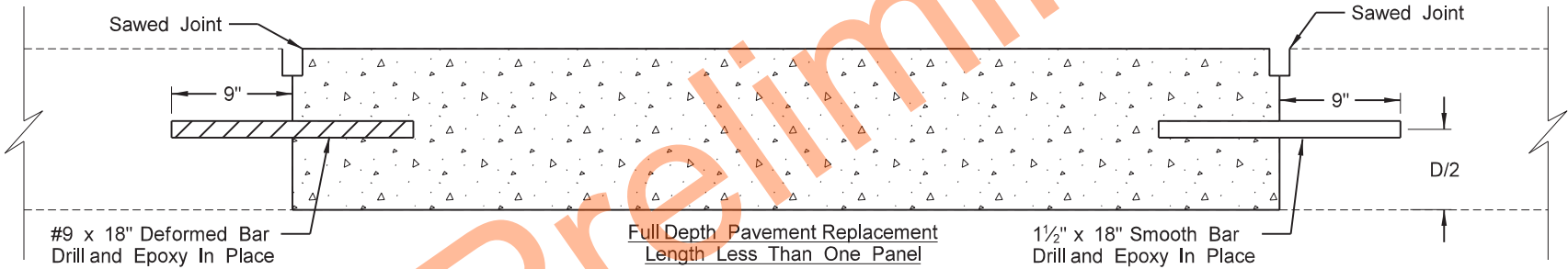
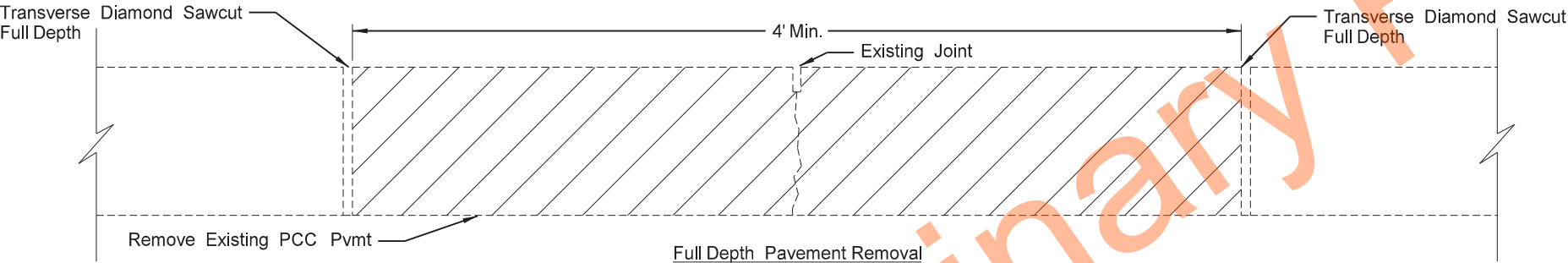




Dowel & Epoxy Installation
(Smooth or Deformed Bars)



Dowel Alignment Tolerance



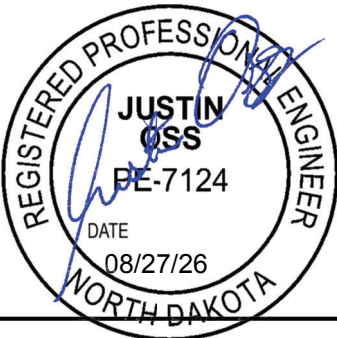
Notes:

- Variables:
D = Depth of Pavement
- Removal and replacement also applies to full depth repairs at cracks.
- Place smooth dowel bars in repair joint which is farthest away from the next transverse joint or working random crack. If distance is equal for both repair joints, place smooth dowels on approach side of patch.
- In full depth repair areas that fall within 3' of an existing joint, the repair area shall go beyond the joint by 3' to ensure all old doweled bars are removed.

Concrete Pavement Repair-Full Depth

Non-Reinforced PCC Pavement

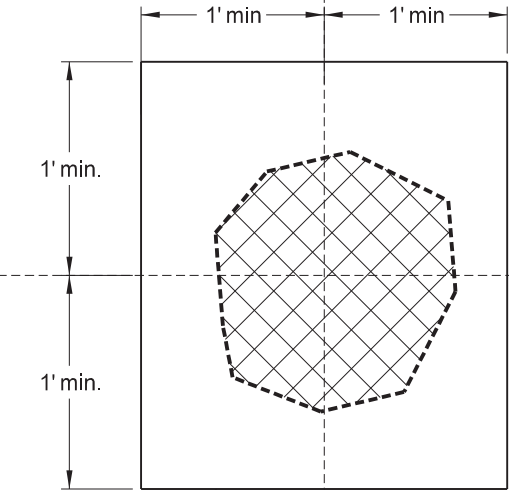
I-94 EB & WB



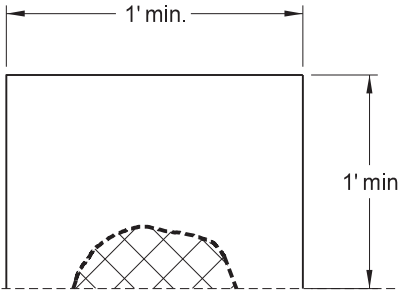
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	20	4

*Surveyed quantites in the plans are based on a minimum size spill of 1' by 1'. Actual size varies as per direction of the engineer with 1' being the minimum amount removed as shown.

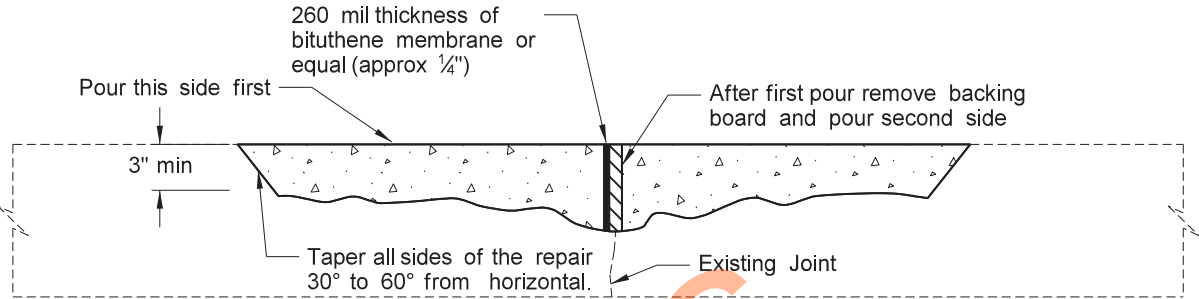
Plan View (not to scale)



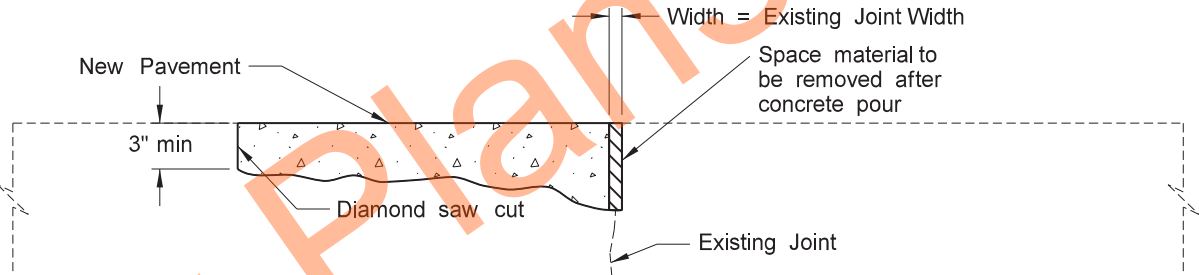
Existing Longitudinal Joint



Spall Repair



Cross Section - Repair Area on Both Sides of the Joint (Milling Method)



Cross Section - Repair Area on One Side of the Joint (Chipping Method)

- Notes:
- Existing concrete will be removed with a chipping hammer or other methods as approved by the engineer. The maximum size chipping hammer allowed will be 15 pounds. A milling machine may be used, as approved by the engineer, chipping will still be required to finish the removal and establish a 30° to 60° taper from vertical on all sides of the repair.
 - Grout shall be applied to the sides, and bottom of the repair area, excluding joint faces.
 - A spacer material, as approved by the engineer, shall be placed on the joint face to maintain the joint during repair. The material shall have the capability of maintaining a width equal to that of the existing joint, and being easily removed after the pour. In the case of repair on both sides of the transverse joint each side shall be poured separately.
 - In the case of repair on both sides of the joint, if deemed necessary by the engineer, a bituthene waterproofing membrane will be placed on the face of the newly poured joint in lieu of the spacer material prior to the concrete pour. The material shall be a minimum of 260 Mil (approximately 1/4") thick or equal to the width of the existing joint, whichever is larger. The material shall be cut to fit over the entire face of the existing joint. The material shall be placed to provide for expansion and to prevent water from entering the existing joint through the sides or bottom. The material shall be hand pressed into place to conform to the face of the existing joint. In the case of repair on both sides of the joint a backer board material, as approved by the engineer shall be placed over the bituthene material on the side facing the second pour prior to the 2nd pour. The backer board shall be removed after the repair is completed.
 - In the case of repair on one side of the joint, if deemed necessary by the engineer, a bituthene waterproofing membrane will be placed on the face of the existing joint in lieu of the spacer material and prior to the concrete pour.
 - For spall repairs in areas where the joints are at 90°, the 2' min. sawcuts shall be perpendicular to the longitudinal and transverse joints.
 - All joints shall be sealed according to NDDOT specification
 - All costs for cleaning and sealing joints and any bituthene installment shall be covered under the bid item " Spall Repair - Partial Depth."

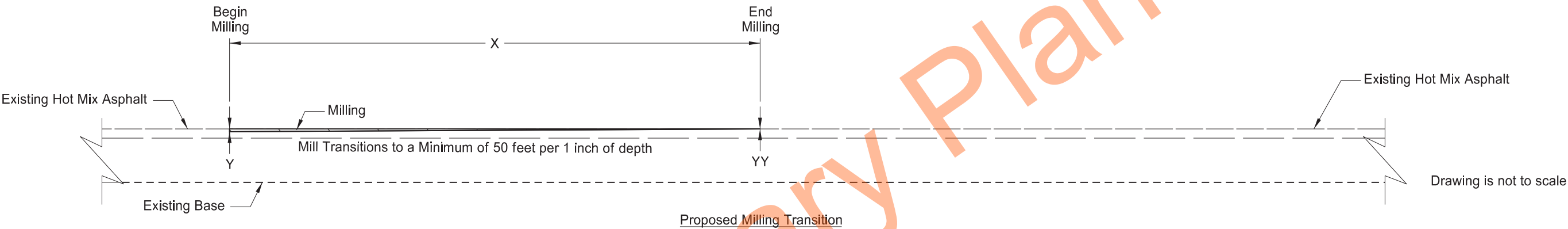


Spall Repair Detail

I-94 EB & WB



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	20	5



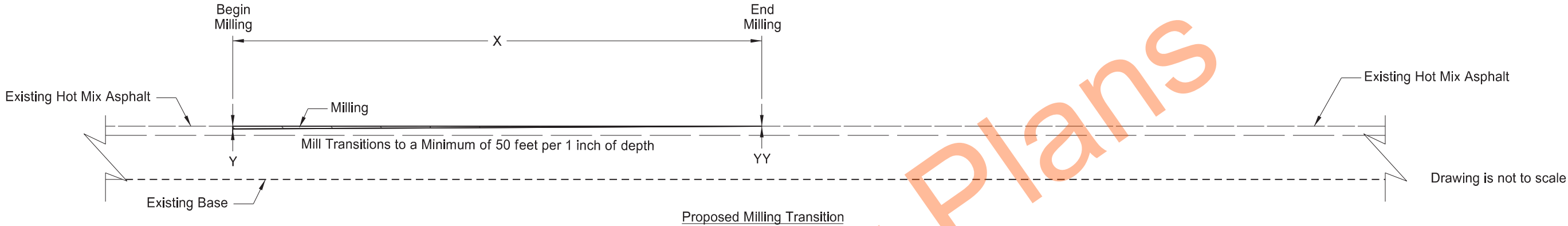
Milling Transitions

Location	X	Begin Milling/Paving Station	Y	YY	End Milling Station
Ayr N. Side Cross Road	50 ft	102+67	2 in	1 in	103+17
Ayr S. Side Cross Road	50 ft	97+28	2 in	1 in	96+78
Embden N. Side Cross Road	50 ft	17+63	2 in	1 in	18+13
Embden S. Side Cross Road	50 ft	12+32	2 in	1 in	11+82
Absaraka N. Side Cross Road	50 ft	17+63	2 in	1 in	18+13
Absaraka S. Side Cross Road	50 ft	12+34	2 in	1 in	11+84

Milling and Paving Transition



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	20	6



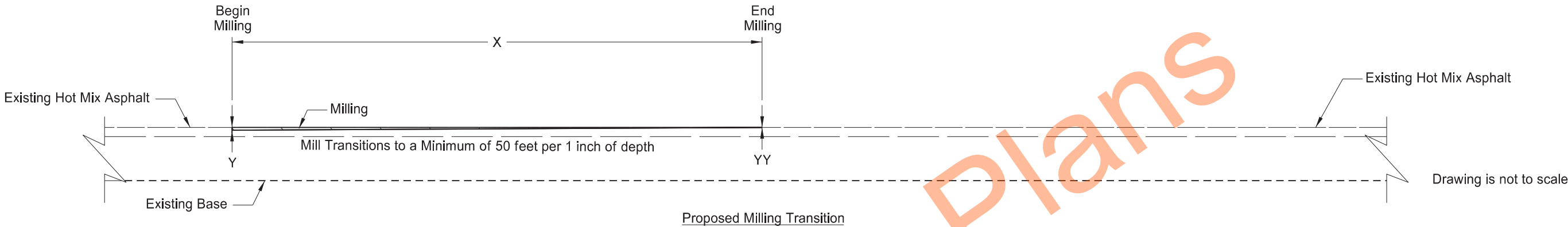
Milling Transitions

Location	X	Begin Milling/Paving Station	Y	YY	End Milling Station
Ayr NE Ramp	50 ft	8+38	2 in	1 in	7+88
Ayr NW Ramp	50 ft	13+27	2 in	1 in	13+77
Ayr SE Ramp	50 ft	8+99	2 in	1 in	8+49
Ayr SW Ramp	50 ft	9+82	2 in	1 in	10+32
Embden NE Ramp	50 ft	8+17	2 in	1 in	7+67
Embden NW Ramp	50 ft	13+19	2 in	1 in	13+69

Milling And Paving Transition



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	20	7



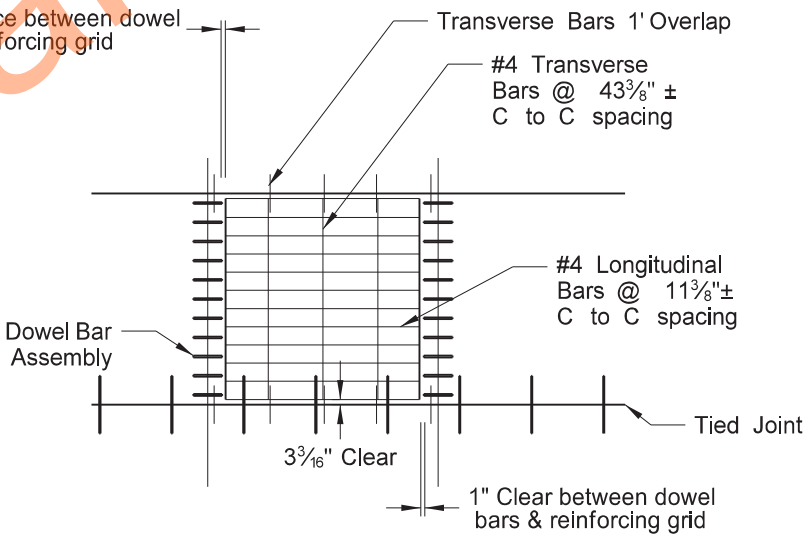
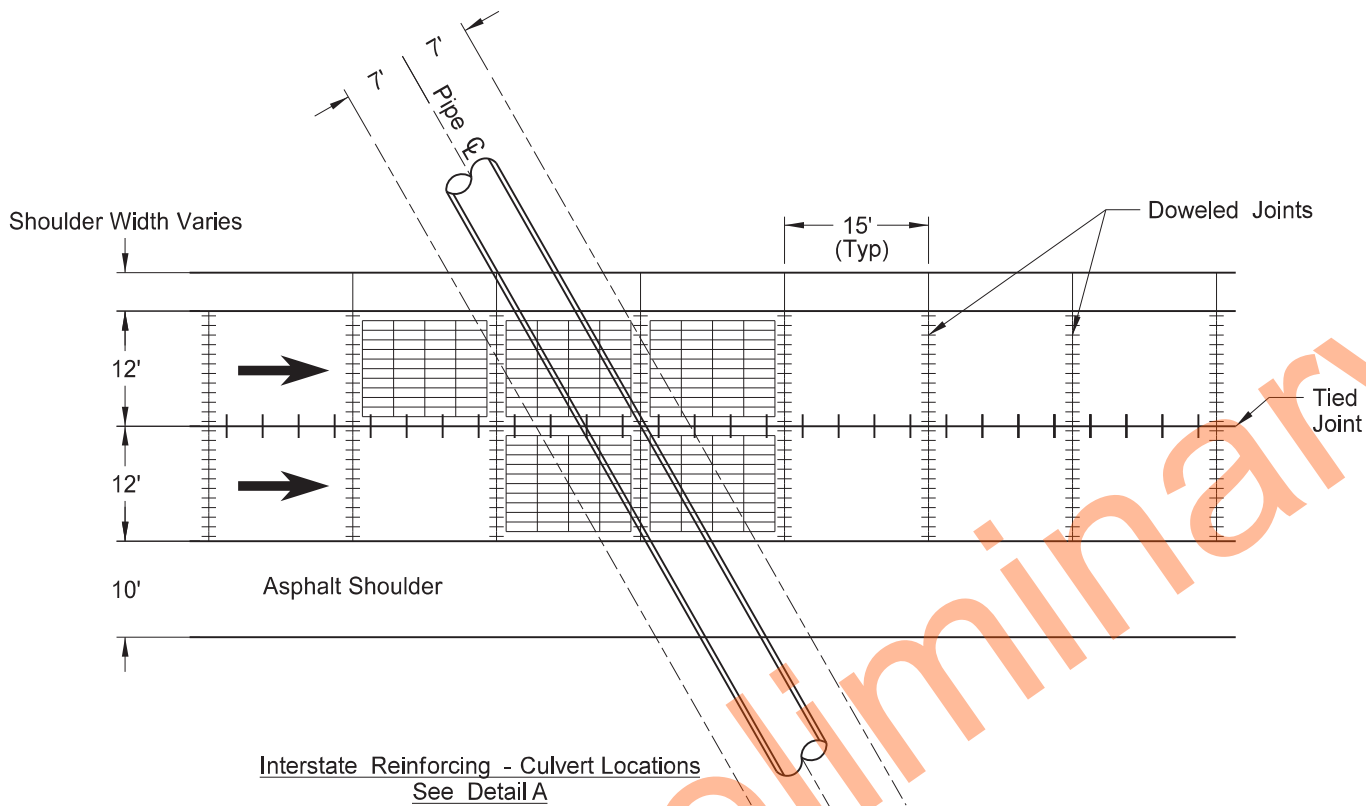
Milling Transitions

Location	X	Begin Milling/Paving Station	Y	YY	End Milling Station
Embden SE Ramp	50 ft	8+39	2 in	1 in	7+89
Embden SW Ramp	50 ft	9+83	2 in	1 in	10+33
Absaraka NE Ramp	50 ft	8+62	2 in	1 in	8+12
Absaraka NW Ramp	50 ft	13+30	2 in	1 in	13+80
Absaraka SE Ramp	50 ft	8+31	2 in	1 in	7+81
Absaraka SW ramp	50 ft	9+83	2 in	1 in	10+33

Milling and Paving End Transition



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	20	8



Detail A Reinforcing Layout

Longitudinal Bar Spacings		
Panel Width	Longitudinal Bar Spacing	Bar Clearance, From Long. Joint
12'	11 3/8"	3 1/2"
14'	11 1/2"	3 1/4"
16'	11 1/2"	3 3/4"

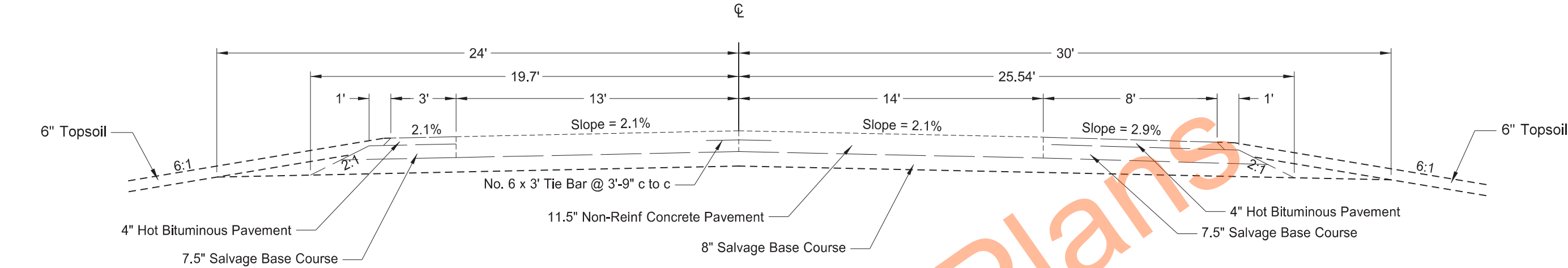
- NOTES:
1. Place reinforcing steel above dowel bars and longitudinal centerline tie bars.
 2. Provide a 1 foot minimum overlap of transverse reinforcing steel across the longitudinal tied joints.
 3. Reinforce the complete panel if any part of the panel lies within 7 feet of the pipe centerline.
 4. Include all costs to furnish and install the reinforcing steel as shown in the price bid for "10 IN CONCRETE PAVEMENT REPAIR-FULL DEPTH-DOWELED".

Concrete Reinforcement Detail at Culvert Locations

I-94 EB & WB RP 320.035 to RP 322.83

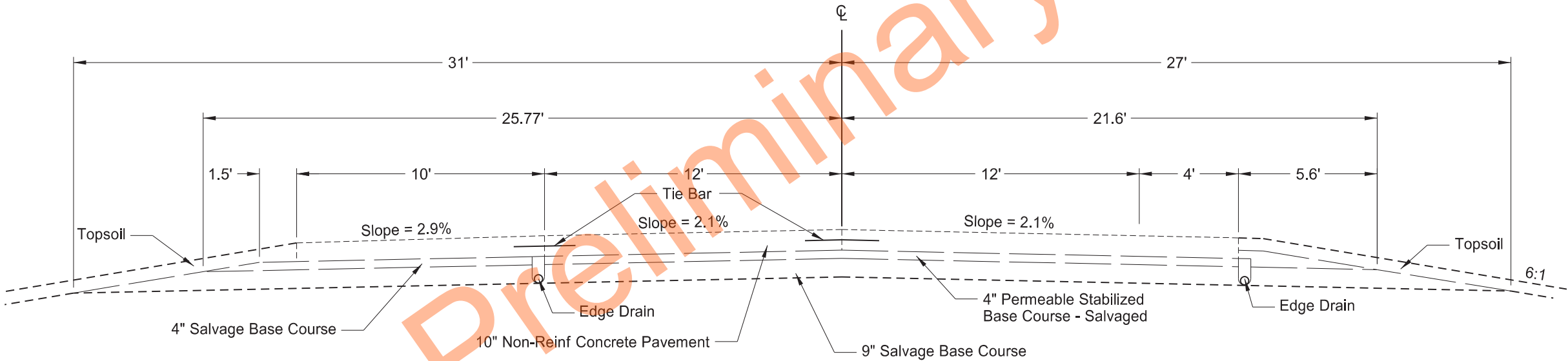


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	1



Typical Section 1

Eastbound Roadway - RP 315.664 to RP 323.746



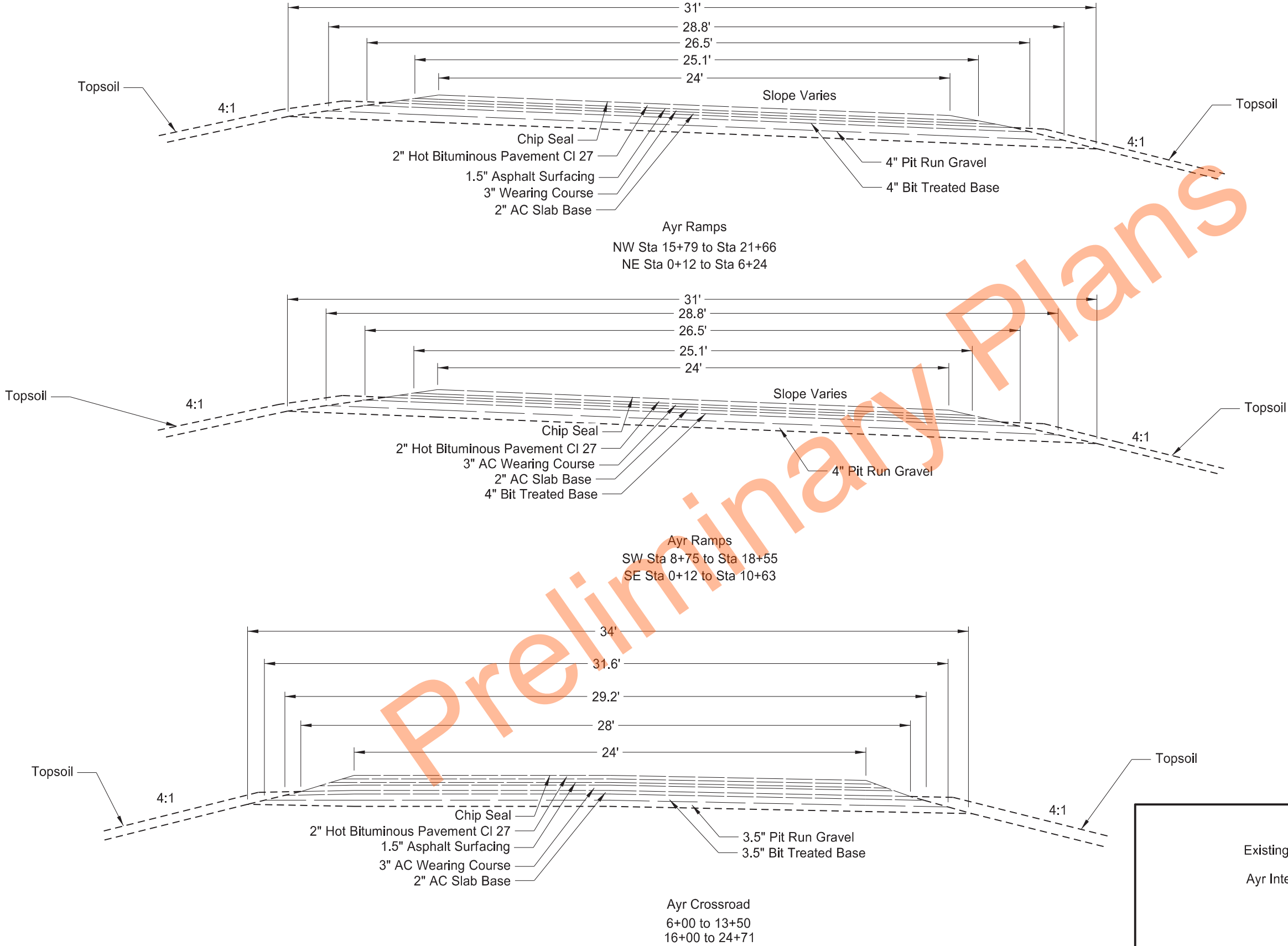
Typical Section 2

Westbound Roadway - RP 315.664 to RP 323.746

Existing Typical Sections
I-94 EB & WB Roadway



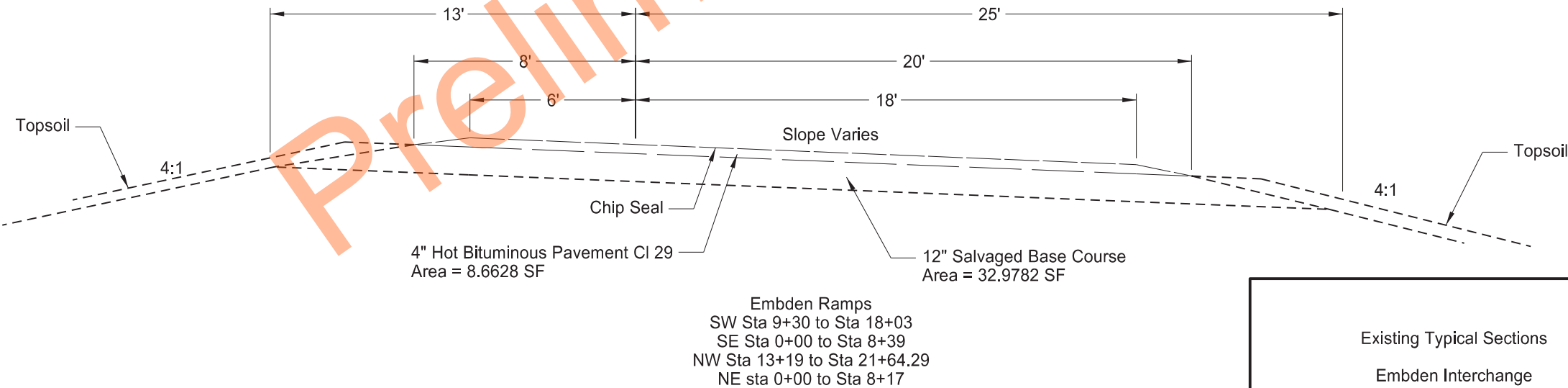
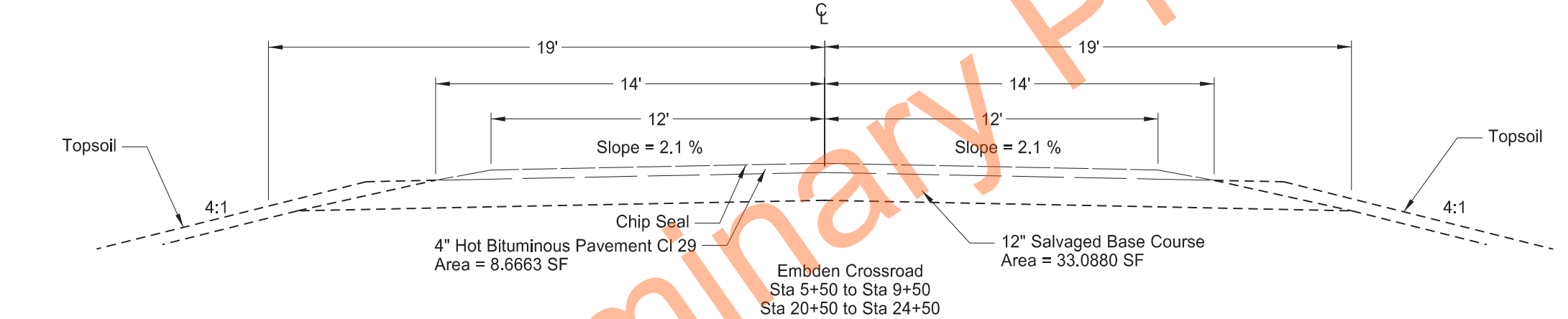
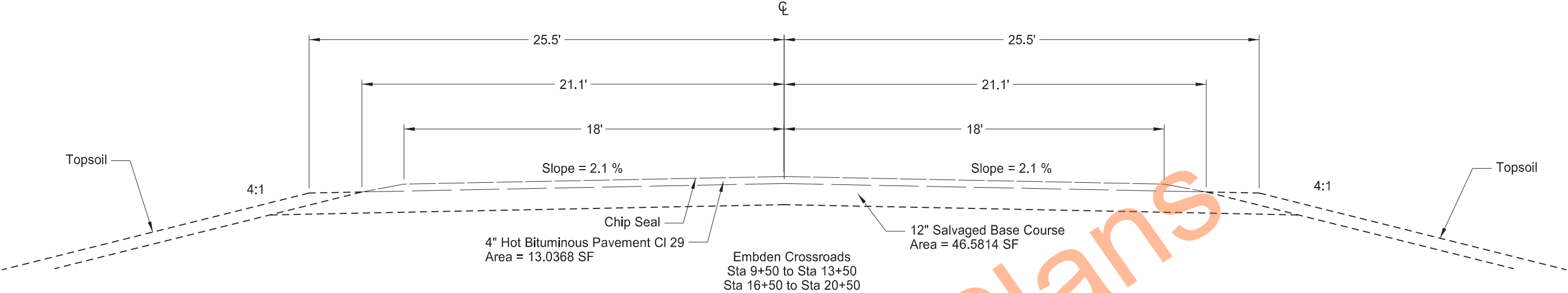
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	2



Existing Typical
Ayr Interchange



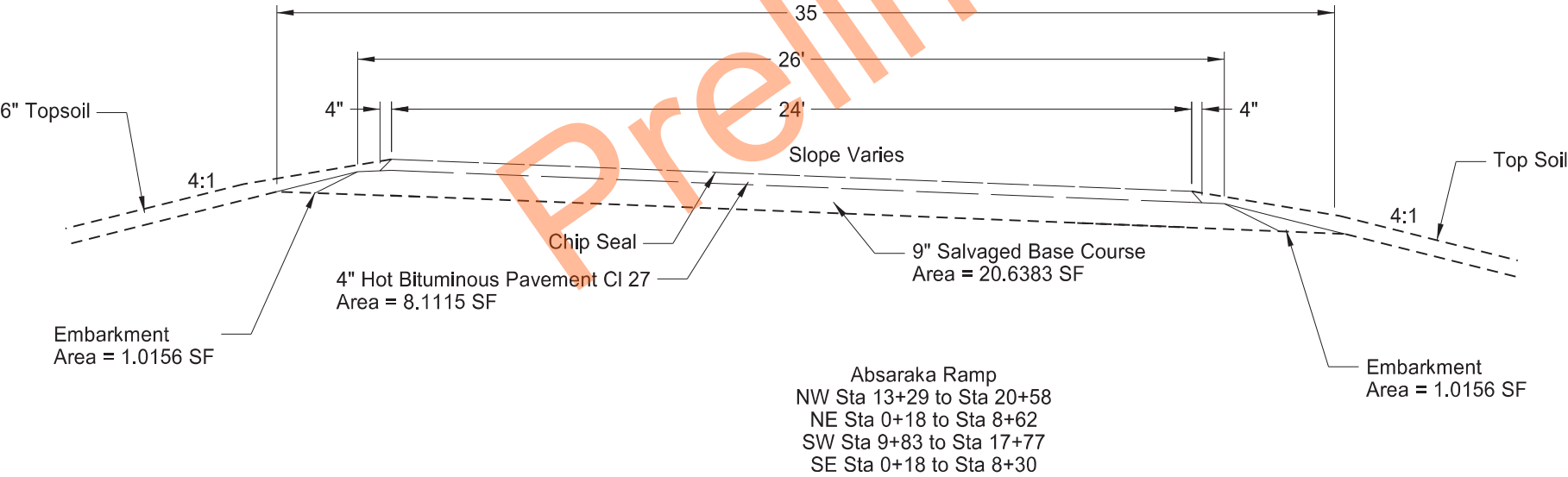
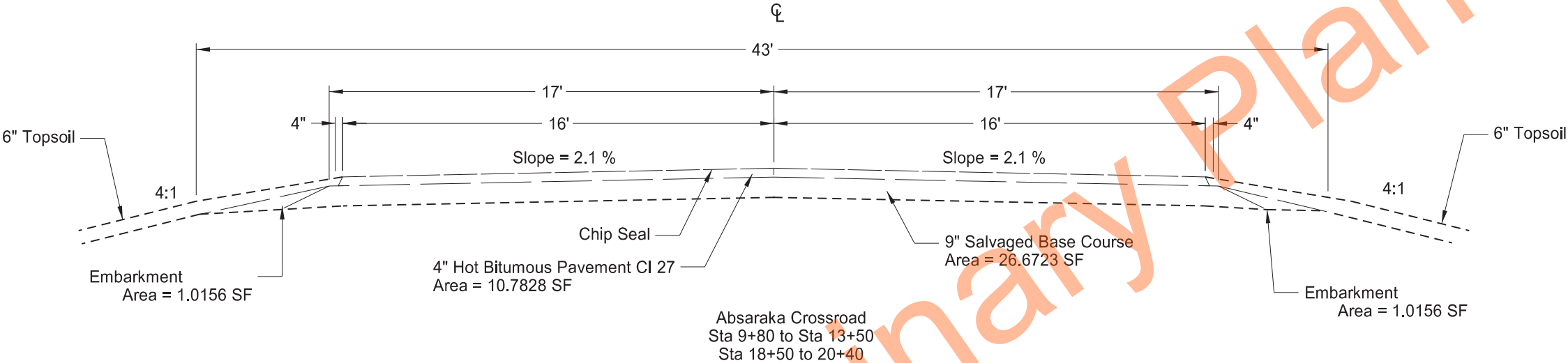
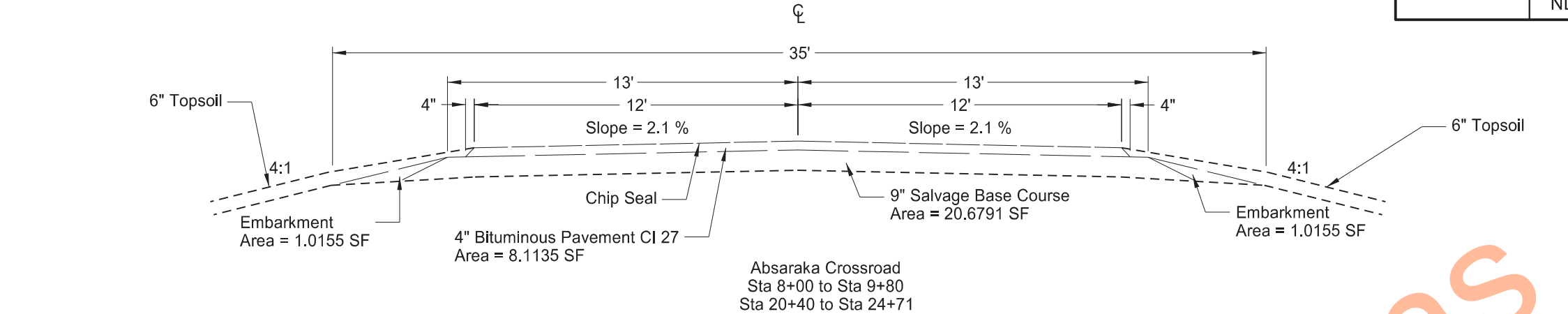
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	3



Existing Typical Sections
Embden Interchange



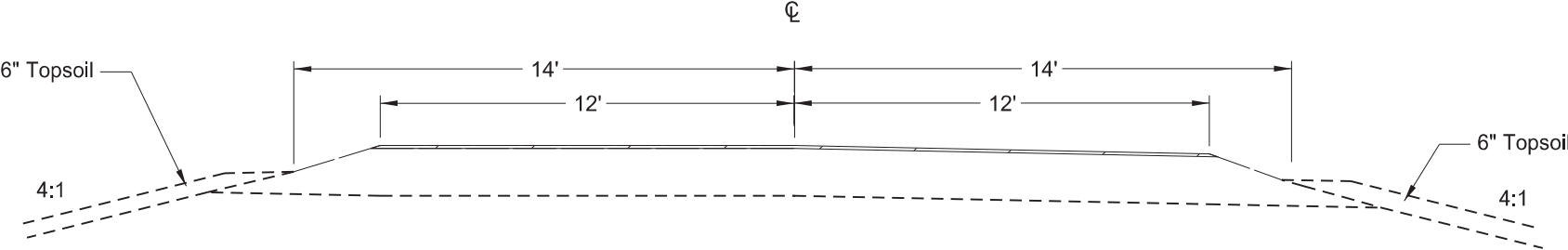
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	ND	IM-8-094(117)315	30	4



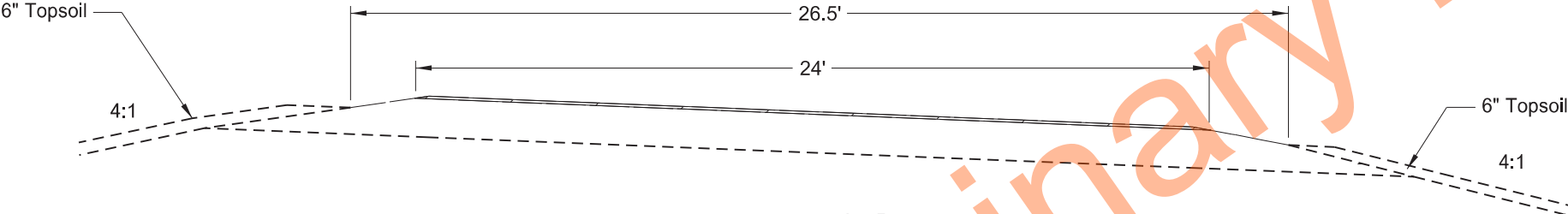
Existing Typical Sections
Absaraka Interchange



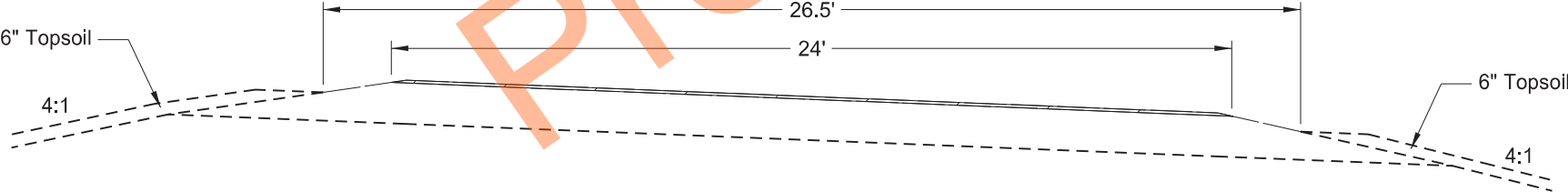
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	5



Ayr Crossroads
1" Milling from Sta 92+55 to Sta 96+78
1" to 2" Transition Milling from Sta 96+78 to 97+28
2" Milling from Sta 97+28 to Sta 98+69
2" Milling from Sta 101+30 to sta 102+67
2" to 1" Transition Milling from Sta 102+67 to 103+17
1" Milling from Sta 103+17 to 107+05



Ayr Ramps
NW Ramp: 2" to 1" Transition Milling from Sta 13+27 to Sta 13+77
NW Ramp: 1" Milling from Sta 13+77 to Sta 21+66
NE Ramp: 1" Milling from Sta 0+12 to Sta 7+88
NE Ramp: 1" to 2" Transition Milling from Sta 7+88 to sta 8+38

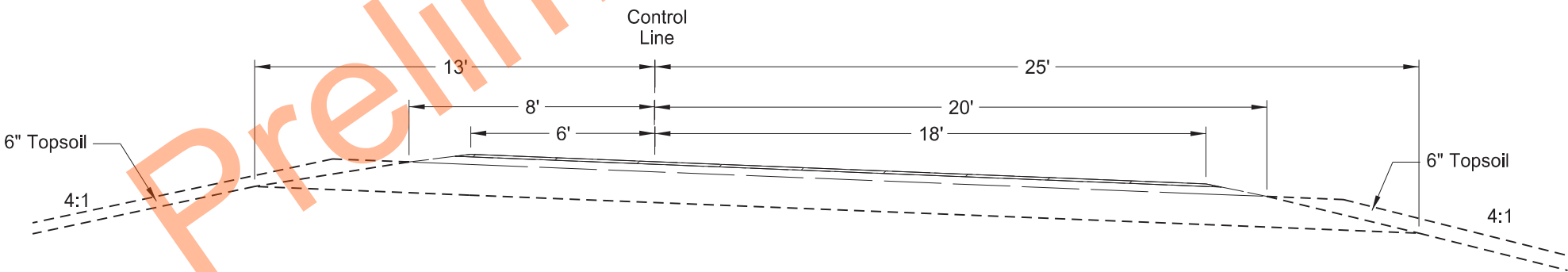
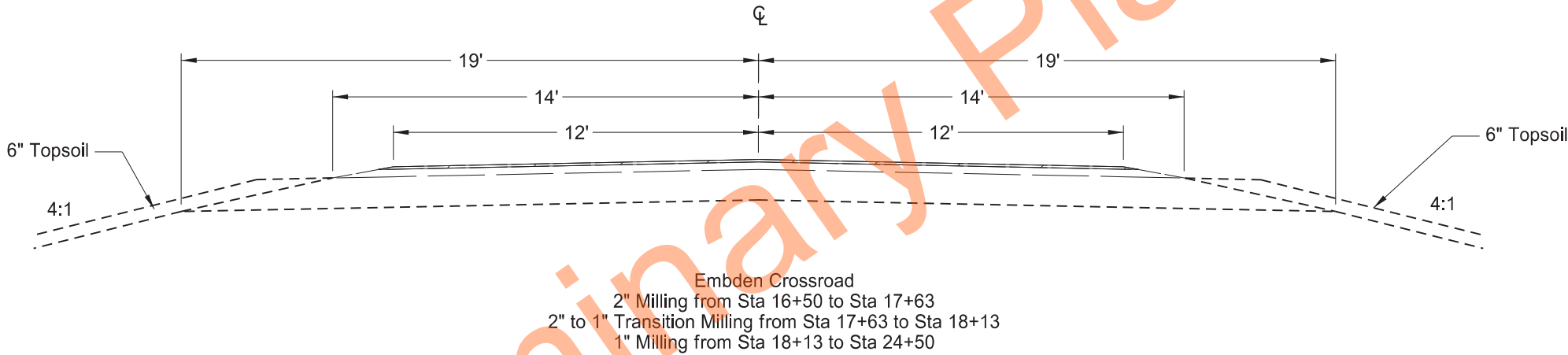
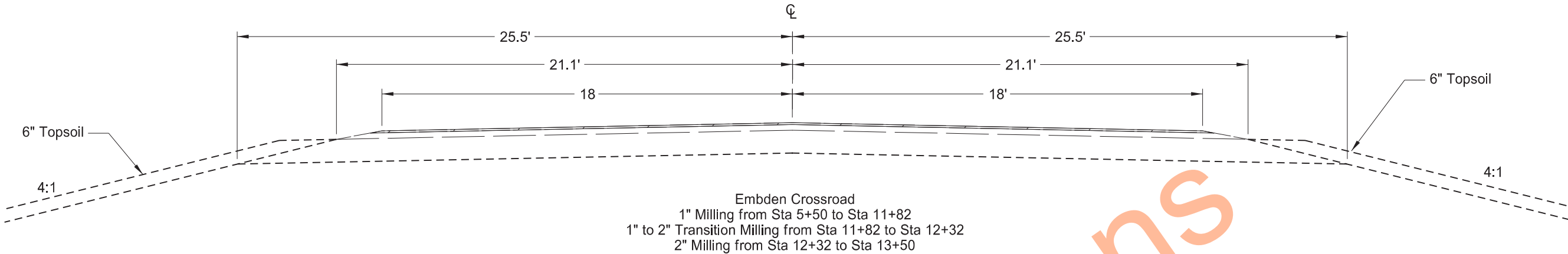


Ayr Ramps
SW Ramp: 2" to 1" Transition Milling from Sta 9+82 to Sta 10+32
SW Ramp: 1" Milling from Sta 10+32 to Sta Sta 18+55
SE Ramp: 1" Milling from Sta 0+12 to Sta 8+49
SE Ramp: 1" to 2" Transition Milling from Sta 8+49 to Sta 8+99

Removal Typical Sections
Ayr Interchange



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	6

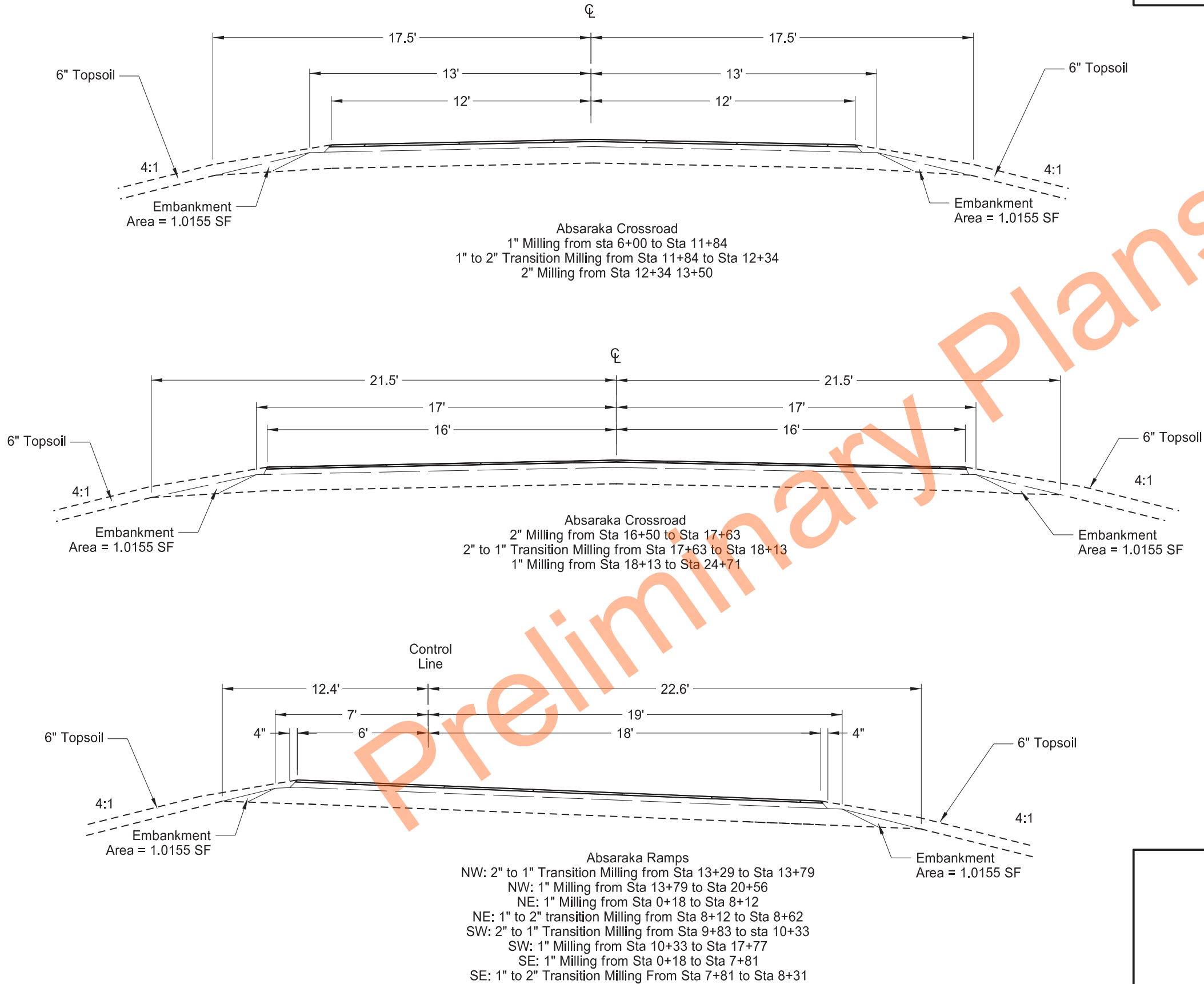


Embden Ramps
NW: 2" to 1" Transition Milling from Sta 13+19 to Sta 13+69
NW: 1" Milling from Sta 13+69 to Sta 21+46
NE: 1" Milling from Sta 0+18 to Sta 7+67
NE: 1" to 2" Transition Milling from Sta 7+67 to Sta 8+17
SW: 2" to 1" Transition Milling from Sta 8+87 to Sta 9+37
SW: 1" Milling from Sta 9+37 to Sta 17+87
SE: 1" Milling from Sta 0+16 to Sta 7+89
SE: 1" to 2" Transition Milling from Sta 7+89 to Sta 8+39

Removal Typical Sections
Embden Interchange



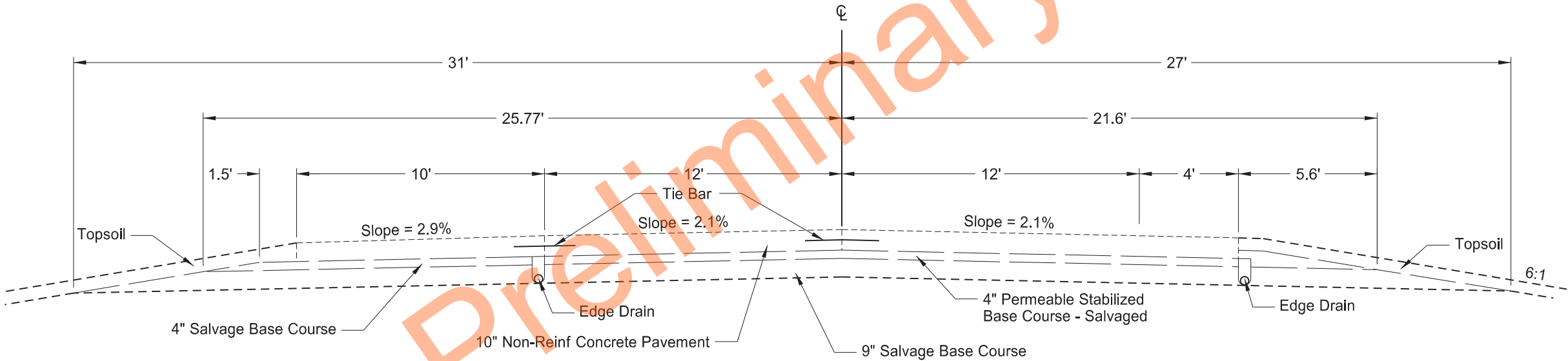
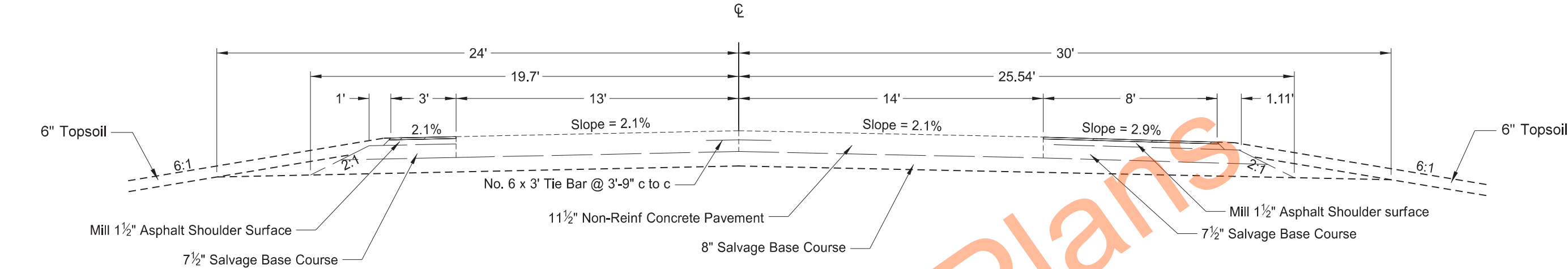
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	ND	IM-8-094(117)315	30	7



Removal Typical Sections
Absaraka Interchange



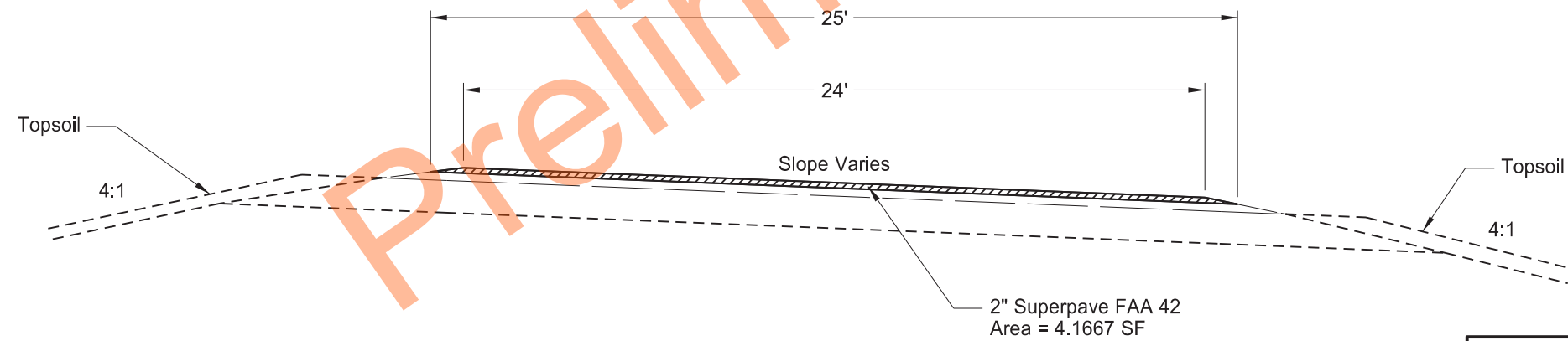
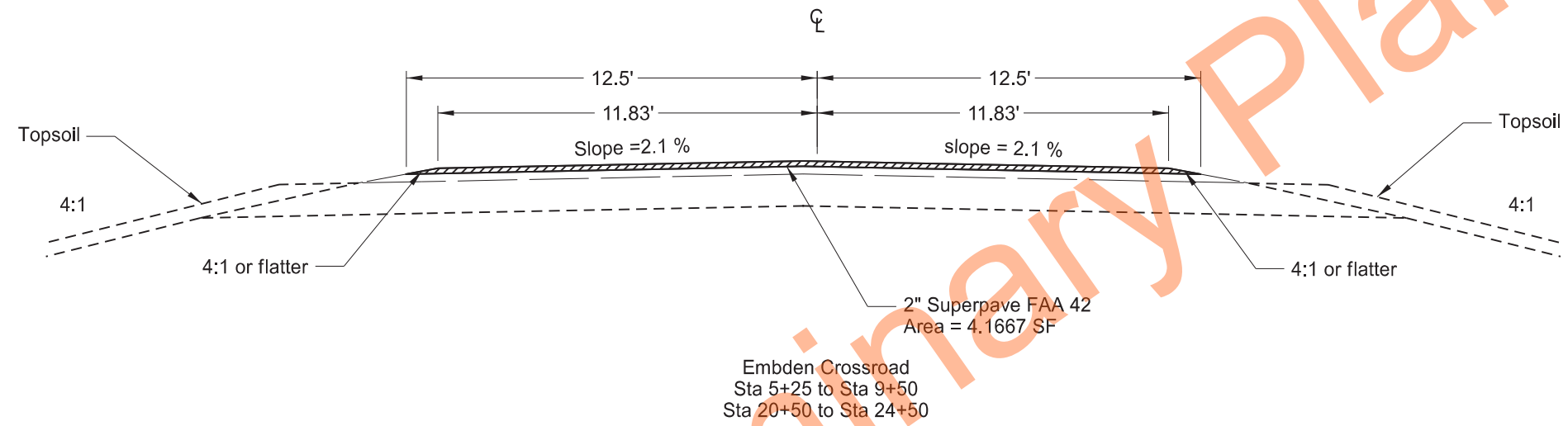
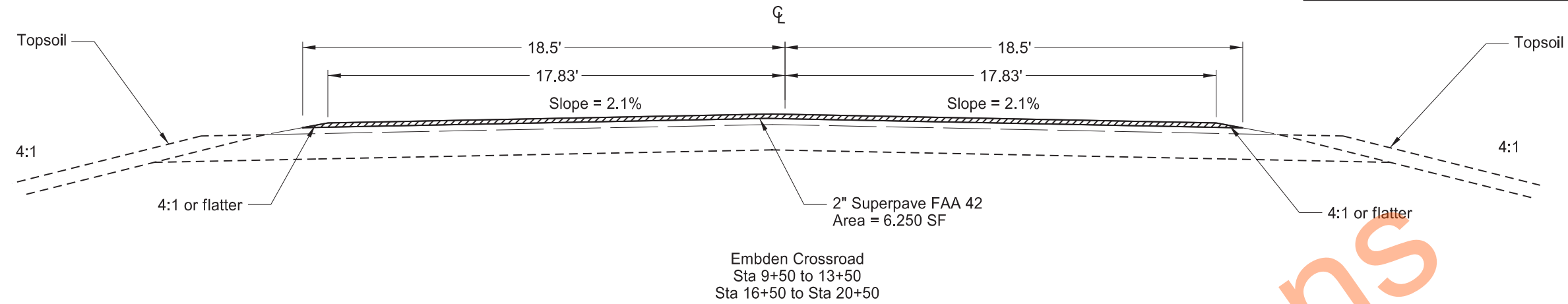
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	8



Removal Typical Sections
Milling I-94 EB Shoulders



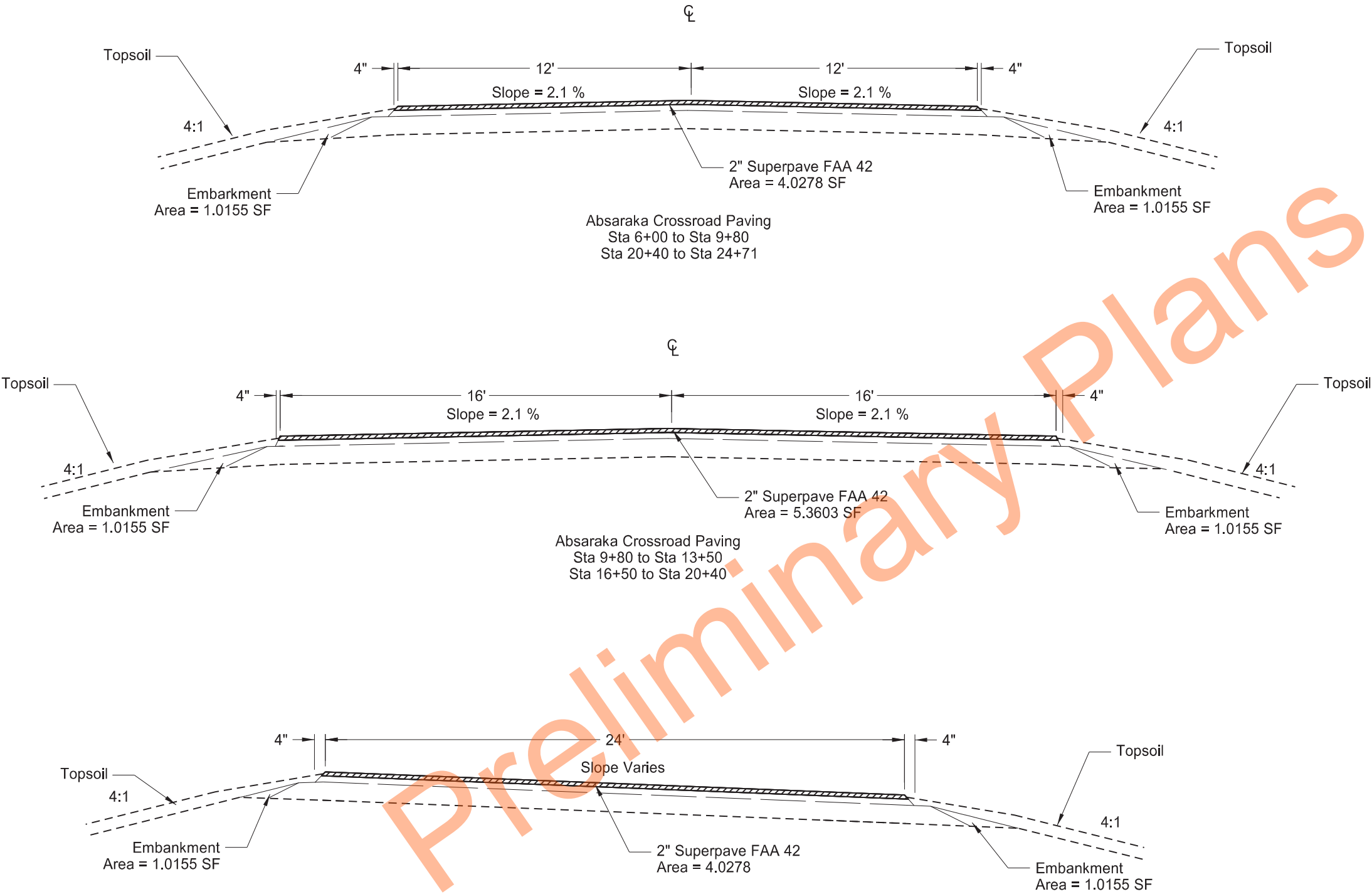
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	9



Proposed Typical Sections
Embden Interchange



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	10

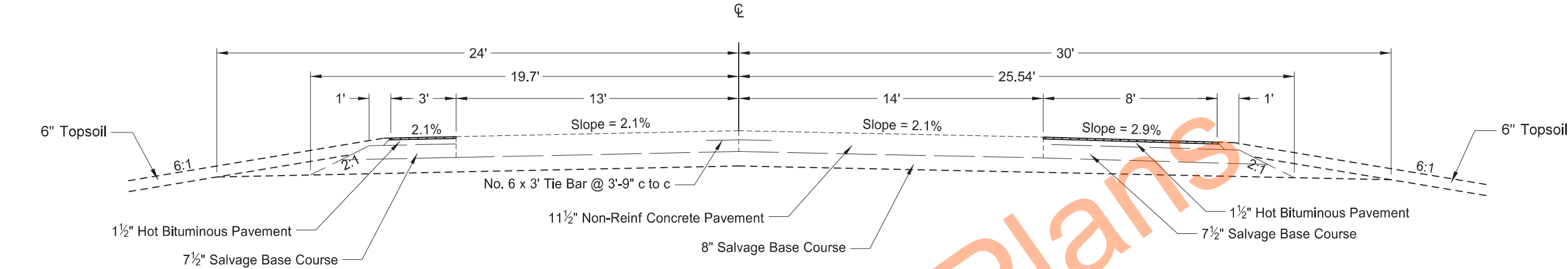


Proposed Typical Sections

Absaraka Interchange

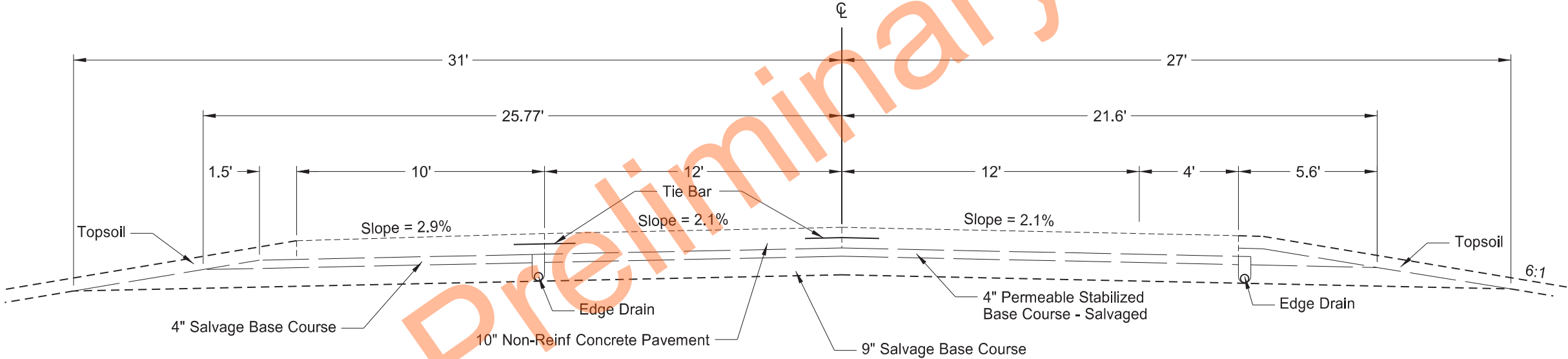


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	11



Typical Section 1

Eastbound Roadway - RP 315.664 to RP 323.746



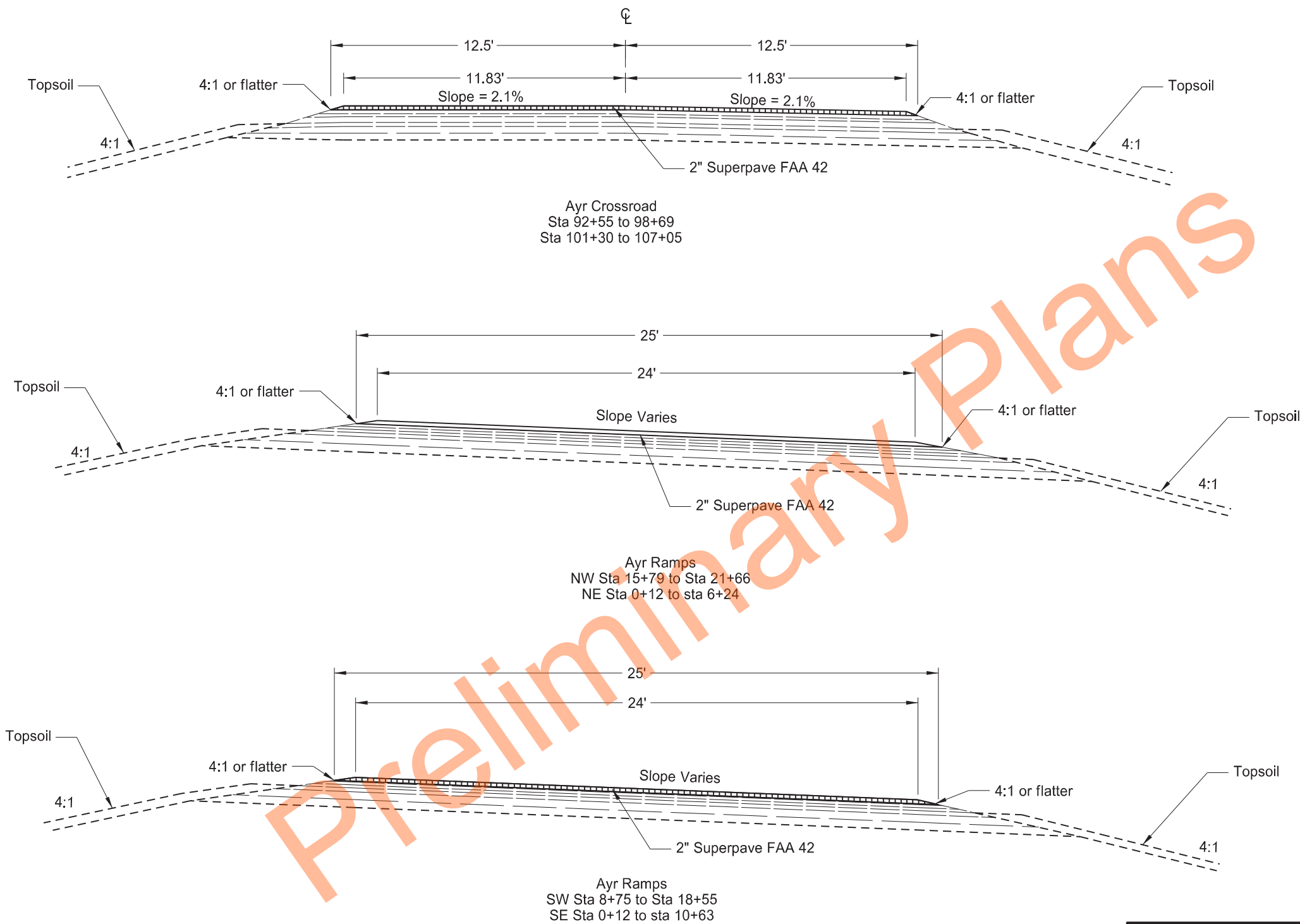
Typical Section 2

Westbound Roadway - RP 315.664 to RP 323.746

Proposed Typical Sections
WB I-94 Asphalt Shoulders

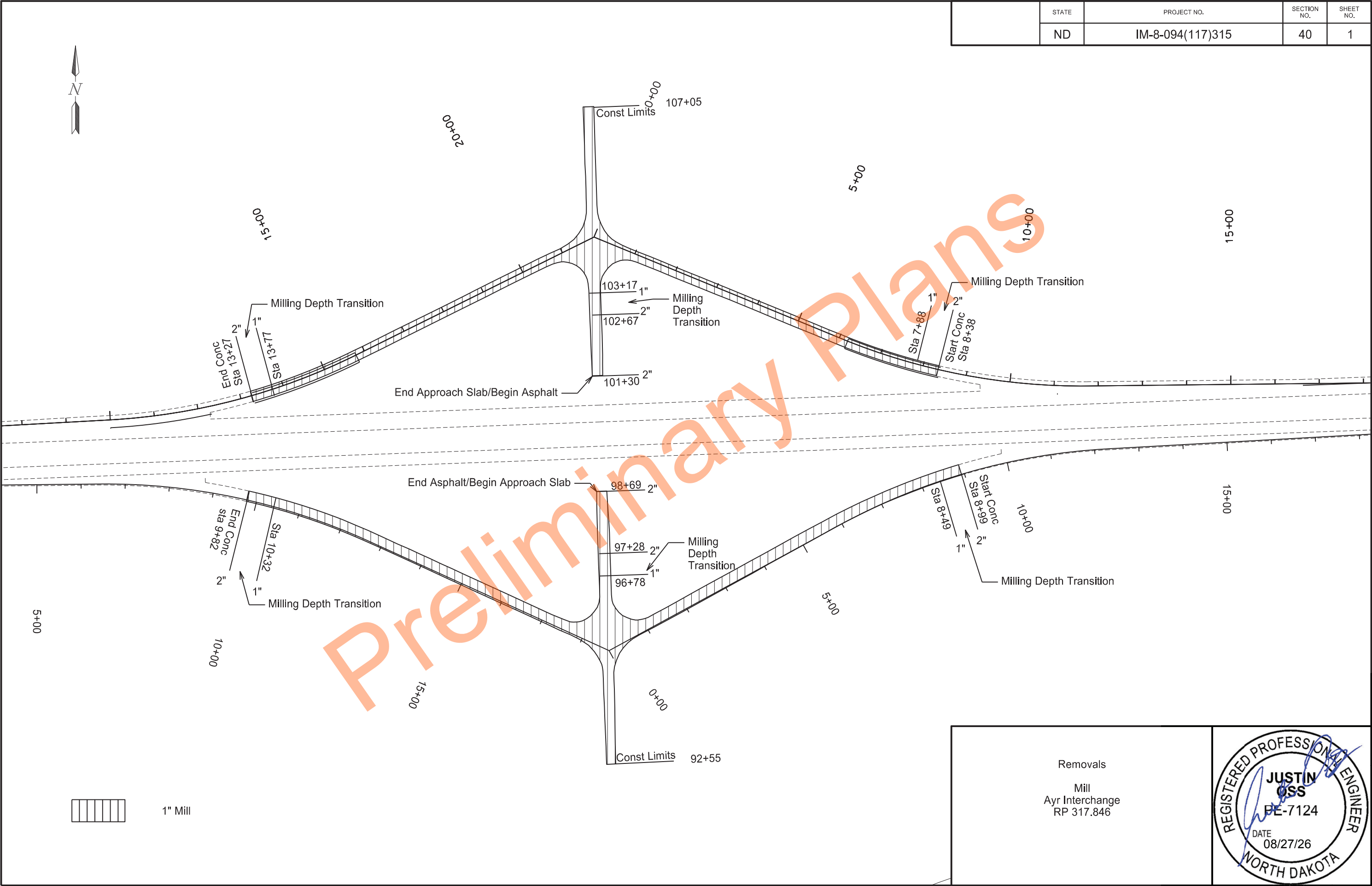


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	30	12



Proposed Typical Sections
Ayr Interchange





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	40	1

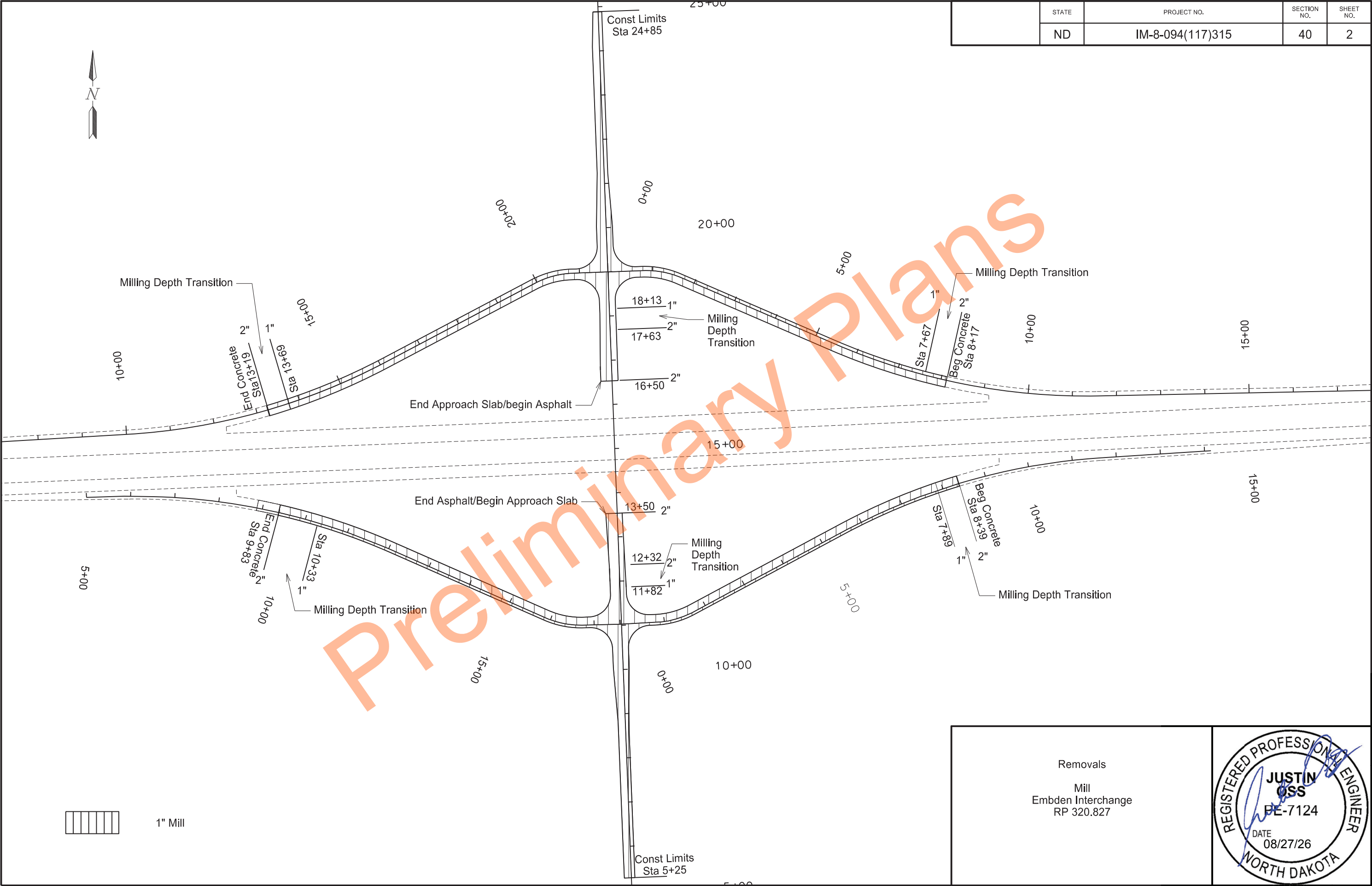


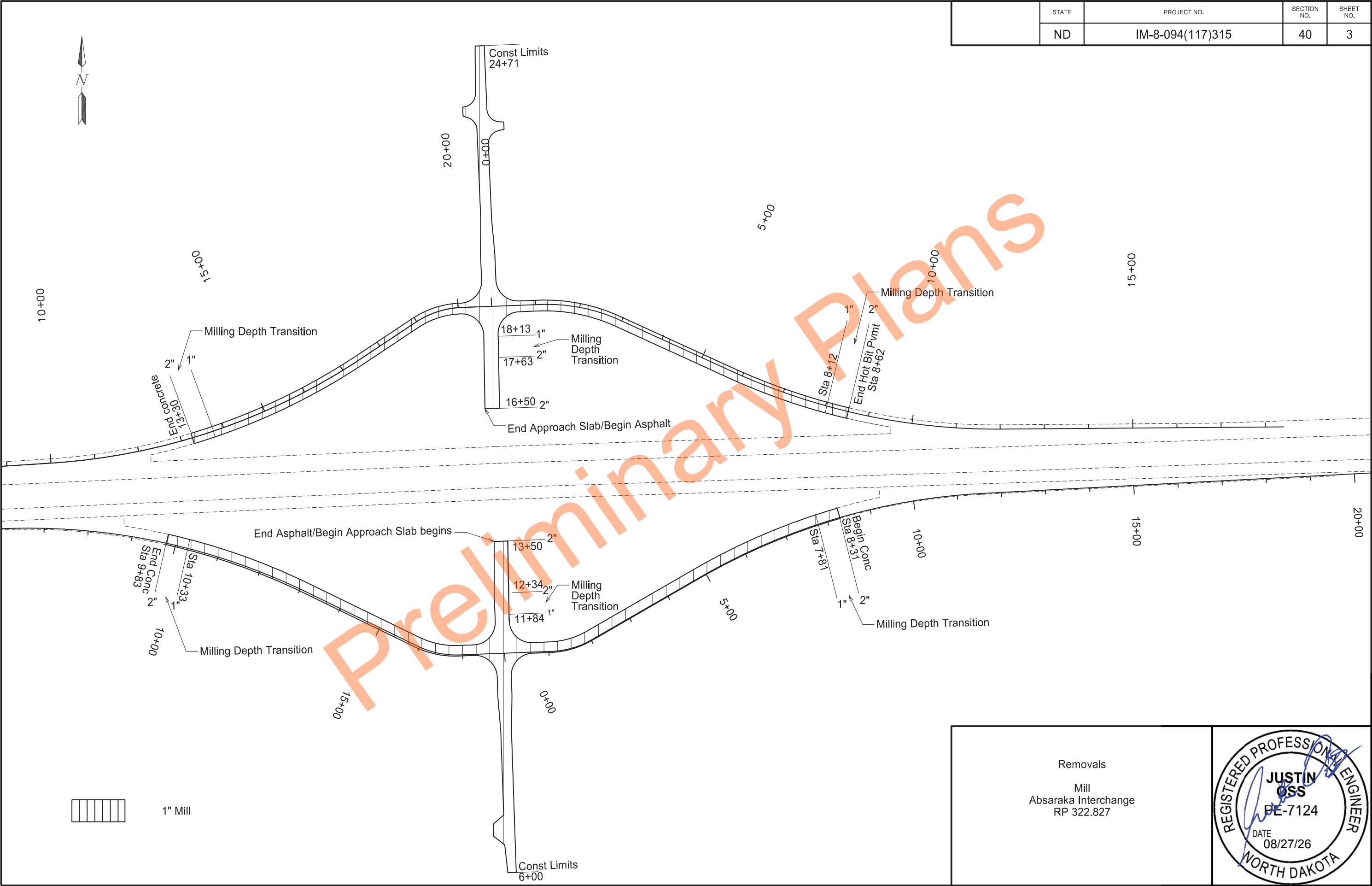
1" Mill

Removals

Mill
Ayr Interchange
RP 317.846



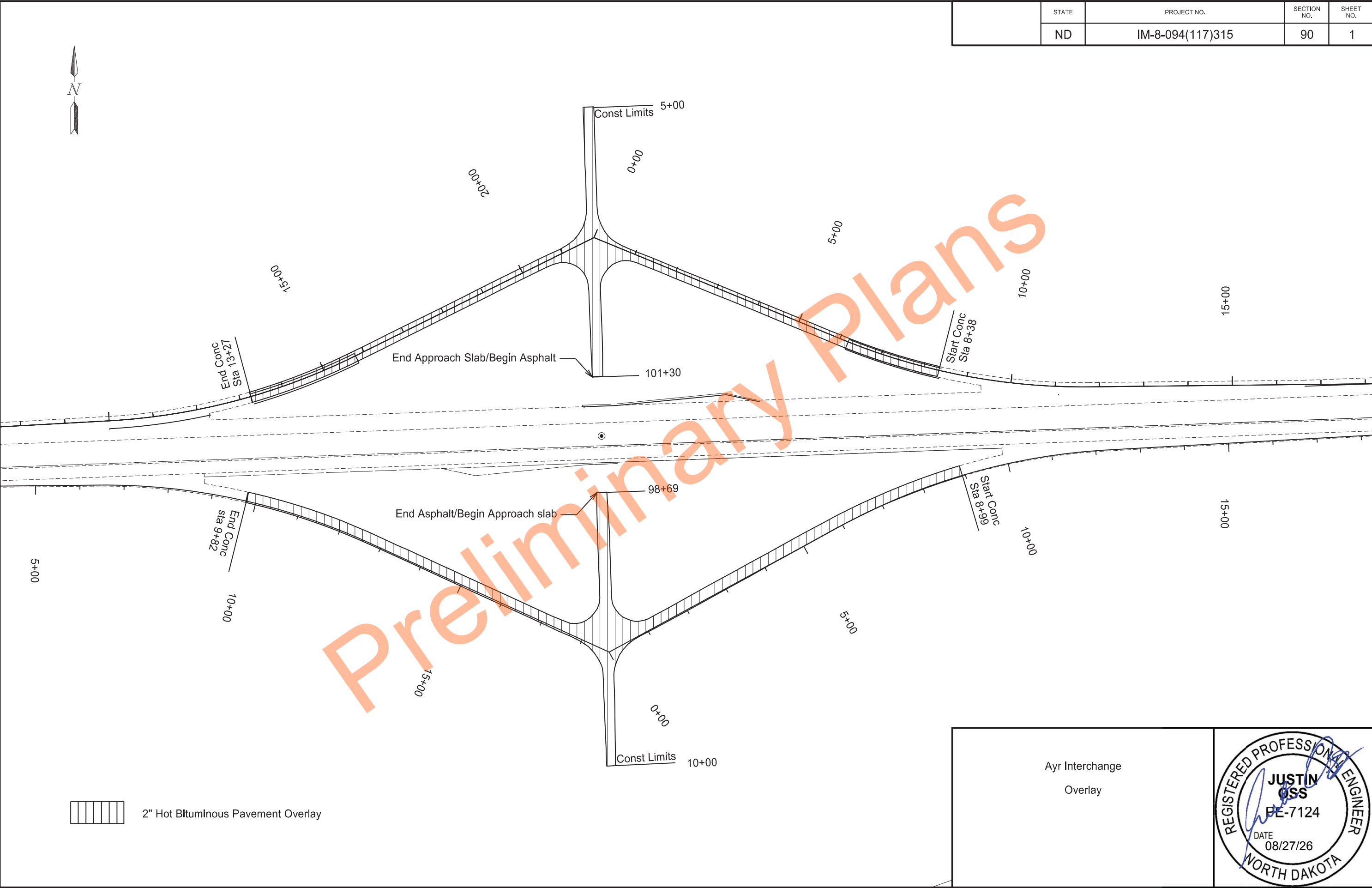


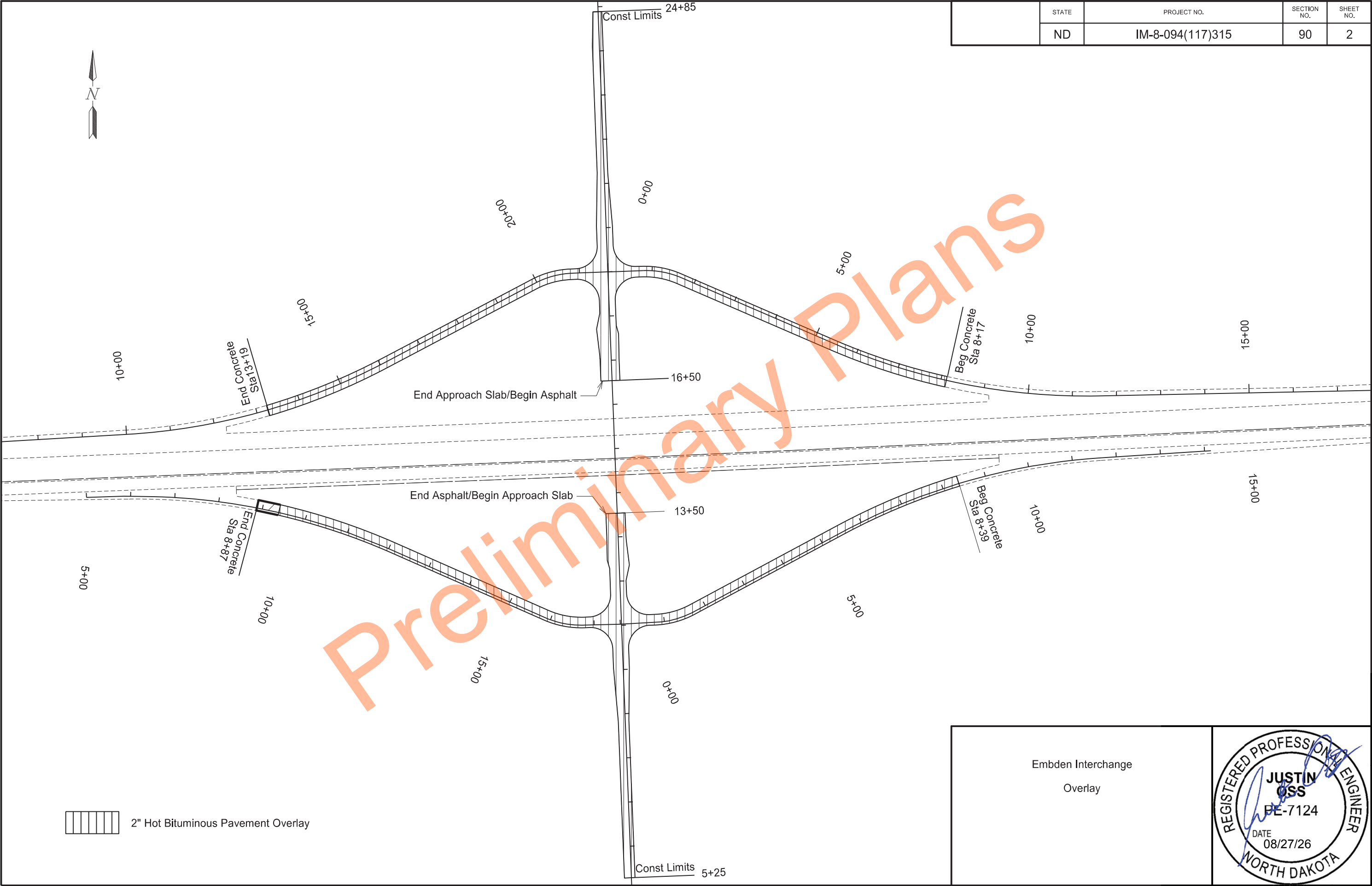


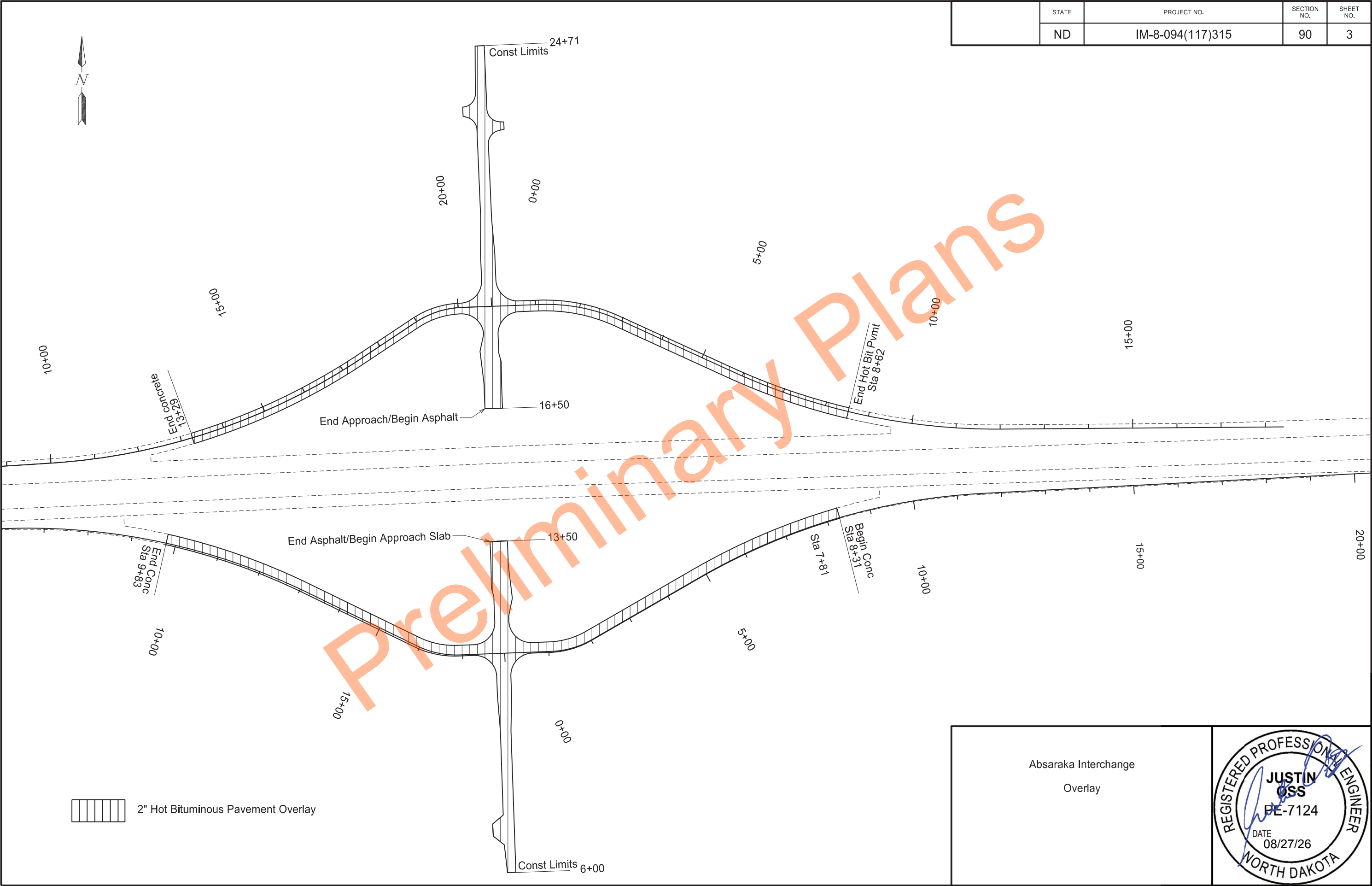
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(117)315	40	3

Removals
Mill
Absaraka Interchange
RP 322.827









STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-8-094(117)315	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED					TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
			BY PHASE NO.							
			1	2	3	4	5			
E5-1-48	48"x48"	EXIT GORE		2		4		4	35	140
G20-1-60	60"x24"	ROAD WORK NEXT ____ MILES							28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)							18	
G20-2-48	48"x24"	END ROAD WORK	6	6	8	8		8	26	208
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)							18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR							18	
G20-50a-72	72"x36"	ROAD WORK NEXT ____ MILES RT & LT ARROWS							43	
G20-52a-72	72"x24"	ROAD WORK NEXT ____ MILES RT or LT ARROW							36	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$150 WHEN WORKERS PRESENT	4	4	4	4		4	59	236
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)							11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)							10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)							10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)							7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)							7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)							7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)							7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)							7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT							15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)							7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)							7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)							9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)							7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)							9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)							7	
R1-1-48	48"x48"	STOP							32	
R1-2-60	60"x60"	YIELD	2	2	4	4		4	29	116
R2-1-36	36"x48"	SPEED LIMIT ____ (Portable only)	6	6	8	8	4	8	30	240
R2-1-48	48"x60"	SPEED LIMIT ____	8	8	8	8		8	39	312
R2-1aP-24	24"x18"	MINIMUM FEE \$150 (Mounted on Speed Limit post)	10	10	12	12	2	12	10	120
R3-2-48	48"x48"	NO LEFT TURN							35	
R4-1-48	48"x60"	DO NOT PASS							39	
R4-7-48	48"x60"	KEEP RIGHT							39	
R5-1-48	48"x48"	DO NOT ENTER							35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)							14	
R7-1-12	12"x18"	NO PARKING ANY TIME							11	
R10-6-24	24"x36"	STOP HERE ON RED							16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)							12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)							12	
R11-3a-60	60"x30"	ROAD CLOSED ____ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)							15	
R11-3c-60	60"x30"	STREET CLOSED ____ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)							15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)							15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT							35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT							35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT							35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW							26	
W3-1-48	48"x48"	STOP AHEAD							35	
W3-3-48	48"x48"	SIGNAL AHEAD							35	
W3-4-48	48"x48"	BE PREPARED TO STOP					2	2	35	70
W3-5-48	48"x48"	SPEED REDUCTION AHEAD	4	4	4	4	3	4	35	140
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT	4	4	4	4		4	35	140
W5-1-48	48"x48"	ROAD NARROWS							35	
W5-4-48	48"x48"	RAMP NARROWS					2	2	35	70
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE							35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW							35	
W6-3-48	48"x48"	TWO WAY TRAFFIC							35	
W8-1-48	48"x48"	BUMP							35	
W8-3-48	48"x48"	PAVEMENT ENDS							35	
W8-7-48	48"x48"	LOOSE GRAVEL							35	
W8-11-48	48"x48"	UNEVEN LANES							35	
W8-12-48	48"x48"	NO CENTER LINE							35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL							35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY							35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or ____ FT or ____ MILE							35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or ____ FT or ____ MILE							35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY							35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL							35	
W13-1P-30	30"x30"	____ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)							14	
W13-4P-36	36"x36"	ON RAMP					2	2	26	52
W14-3-64	64"x48"	NO PASSING ZONE							28	
W16-2P-30	30"x24"	____ FEET PLAQUE (Mounted on warning sign post)							10	
W20-1-48	48"x48"	ROAD WORK AHEAD or ____ FT or ____ MILE	4	4	4	4	4	4	35	140
W20-2-48	48"x48"	DETOUR AHEAD or ____ FT or ____ MILE							35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or ____ FT or ____ MILE							35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or ____ FT or ____ MILE							35	
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or ____ FT or ____ MILE	4	4	4	4		4	35	140
W20-7-48	48"x48"	FLAGGER	2	2	2	2	2	2	35	70
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back	1					1	5	5
W20-52P-54	54"x12"	NEXT ____ MILES (Mounted on warning sign post)							12	
W21-1-48	48"x48"	WORKERS							35	
W21-2-48	48"x48"	FRESH OIL							35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or ____ FT or ____ MILE							35	
W21-5-48	48"x48"	SHOULDER WORK							35	

[illegible][illegible]

SPEC & CODE			
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	2269

[illegible]

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



Traffic Control Devices List

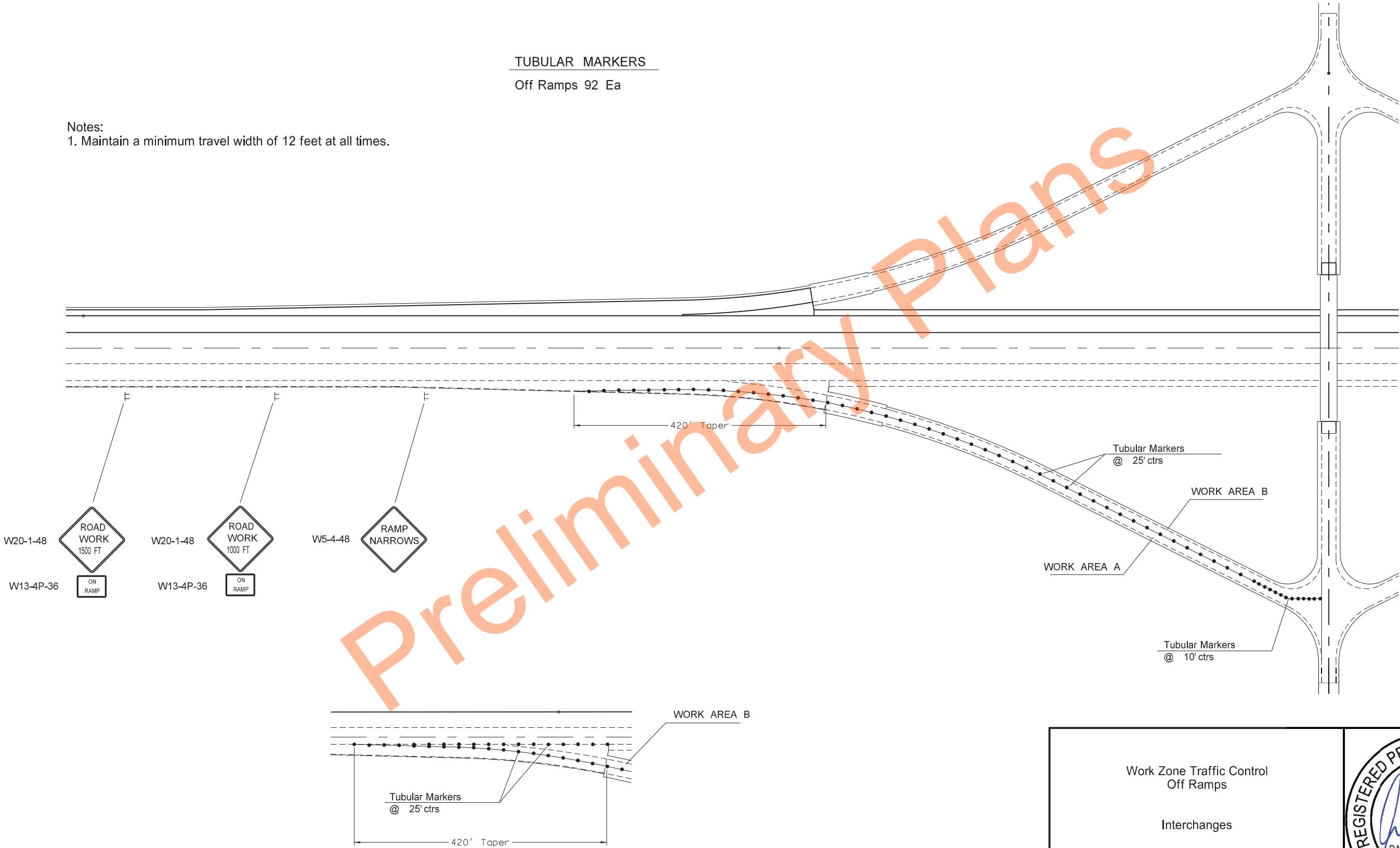
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	100	2

TUBULAR MARKERS

Off Ramps 92 Ea

Notes:

1. Maintain a minimum travel width of 12 feet at all times.



Work Zone Traffic Control
Off Ramps

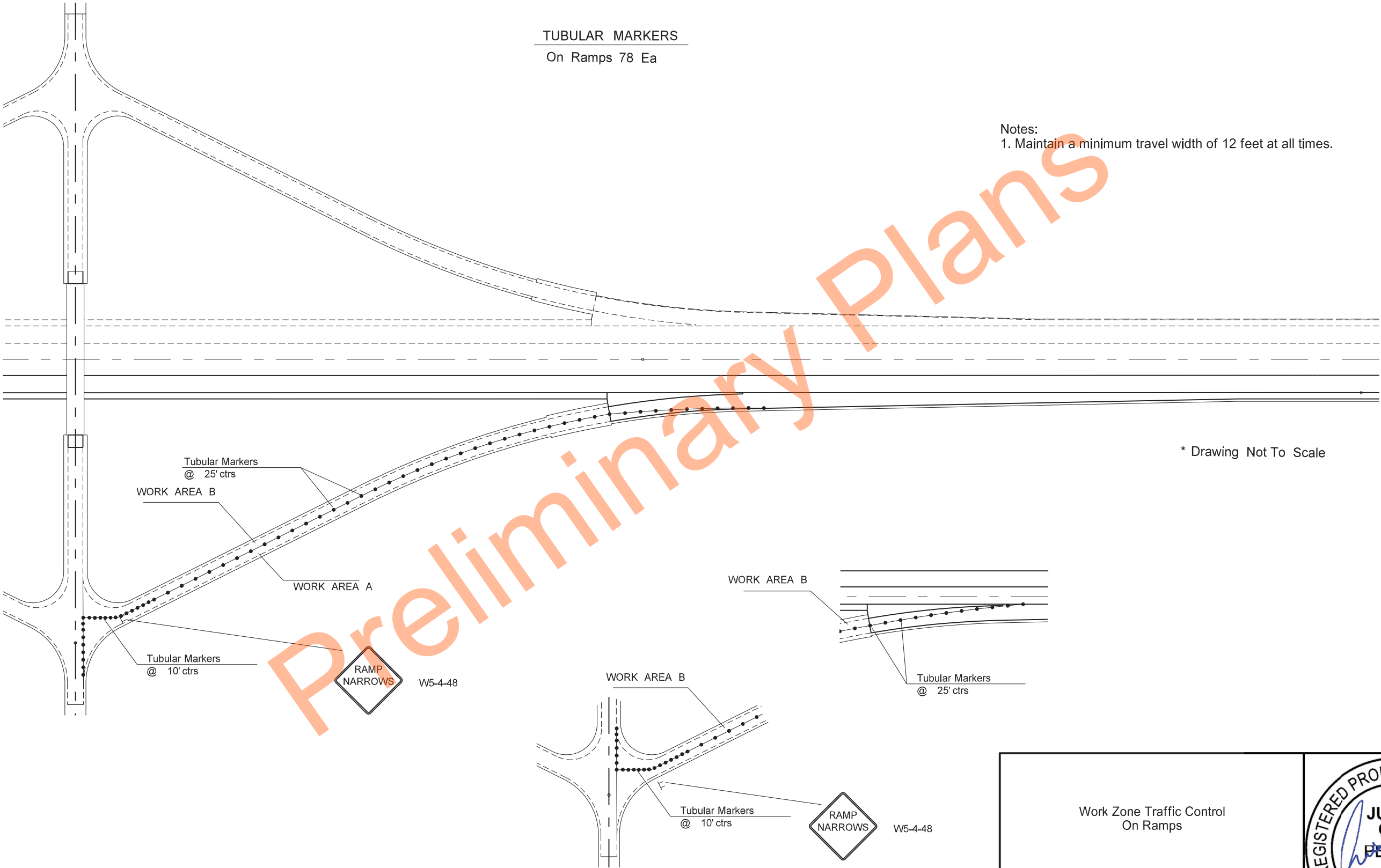
Interchanges



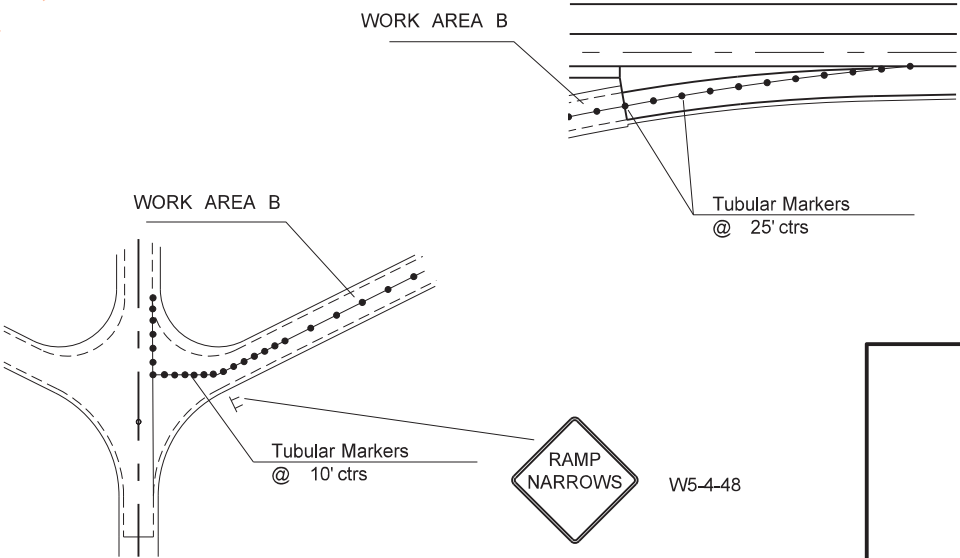
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	100	3

TUBULAR MARKERS
On Ramps 78 Ea

Notes:
1. Maintain a minimum travel width of 12 feet at all times.



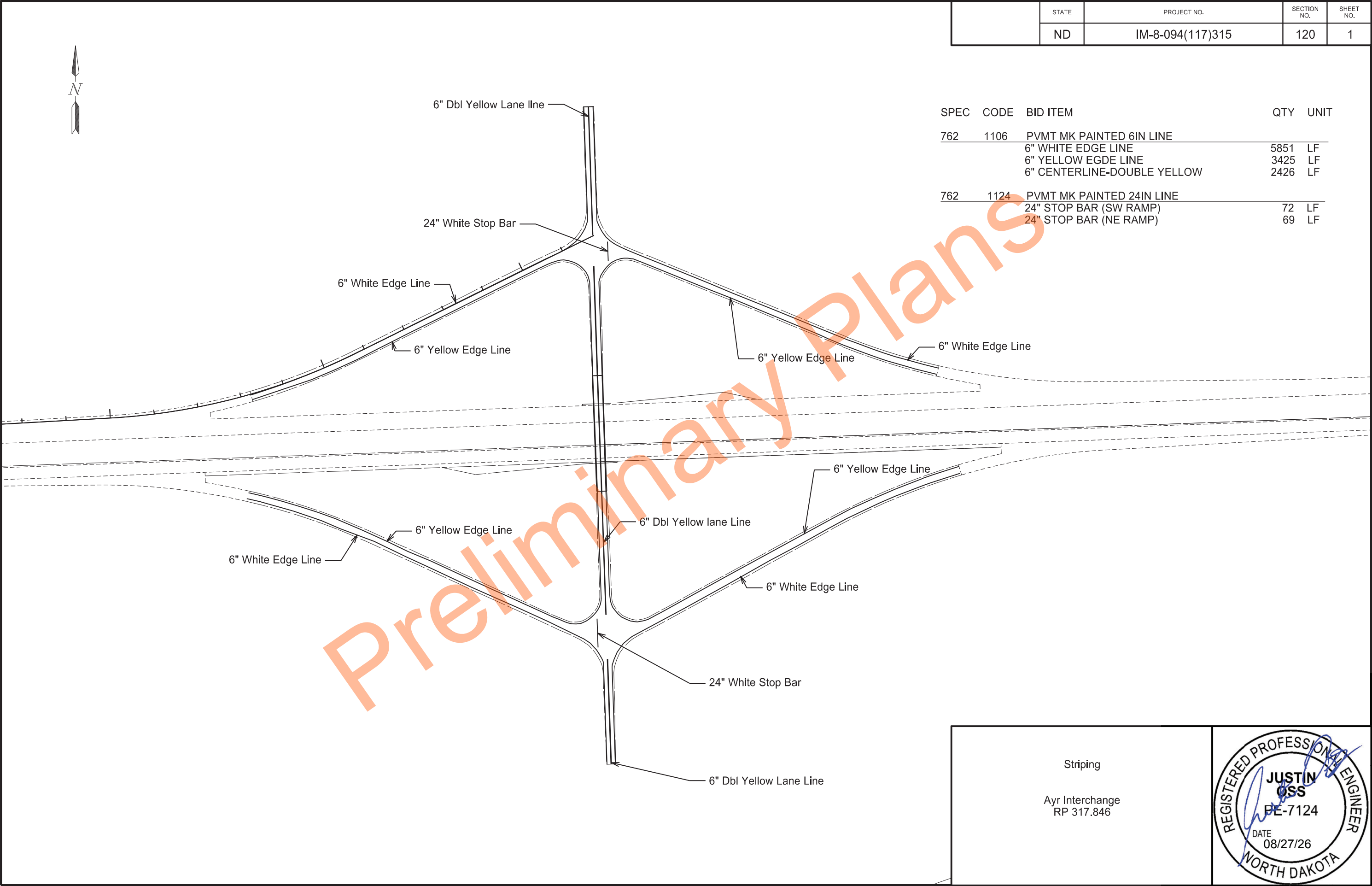
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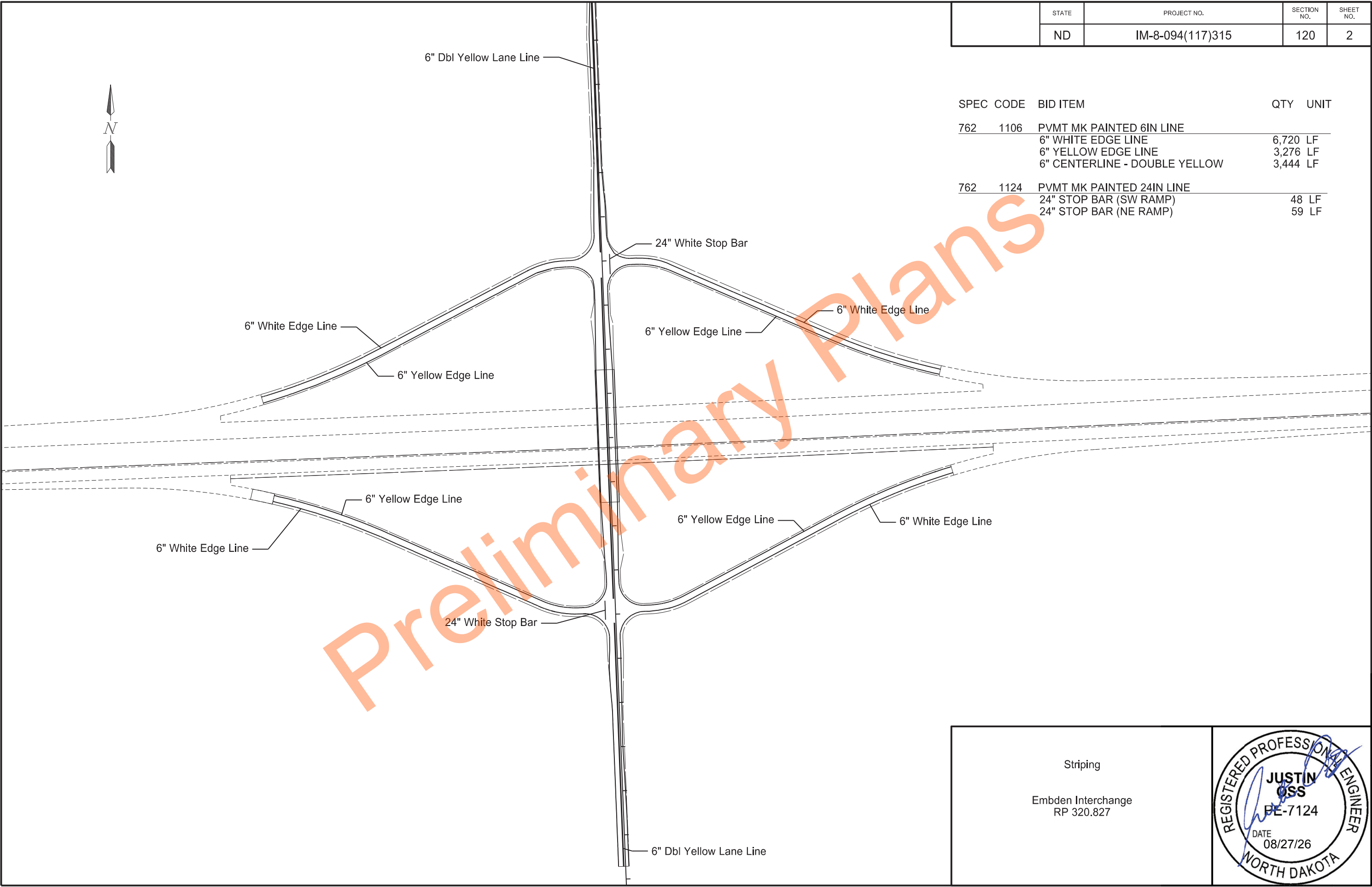


Work Zone Traffic Control
On Ramps

Interchanges







	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	120	2

SPEC	CODE	BID ITEM	QTY	UNIT
762	1106	PVMT MK PAINTED 6IN LINE		
		6" WHITE EDGE LINE	6,720	LF
		6" YELLOW EDGE LINE	3,276	LF
		6" CENTERLINE - DOUBLE YELLOW	3,444	LF
762	1124	PVMT MK PAINTED 24IN LINE		
		24" STOP BAR (SW RAMP)	48	LF
		24" STOP BAR (NE RAMP)	59	LF

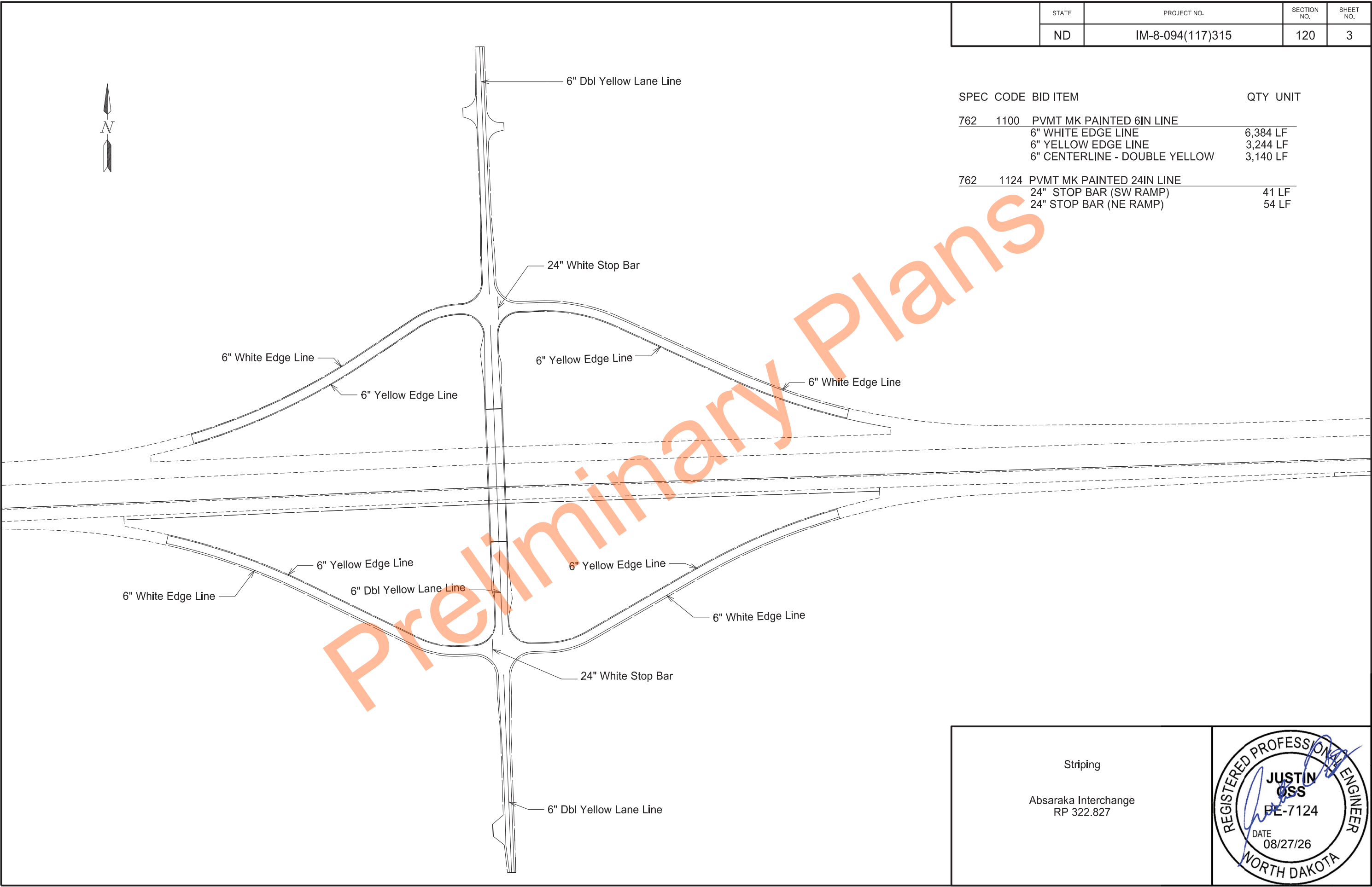
Striping
Embden Interchange
RP 320.827



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-8-094(117)315	120	3



SPEC	CODE	BID ITEM	QTY	UNIT
762	1100	PVMT MK PAINTED 6IN LINE		
		6" WHITE EDGE LINE	6,384	LF
		6" YELLOW EDGE LINE	3,244	LF
		6" CENTERLINE - DOUBLE YELLOW	3,140	LF
762	1124	PVMT MK PAINTED 24IN LINE		
		24" STOP BAR (SW RAMP)	41	LF
		24" STOP BAR (NE RAMP)	54	LF



Striping
Absaraka Interchange
RP 322.827



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

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NDDOT ABBREVIATIONS

D-101-2

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

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Salv	salvage(d)	Tel	telephone
San	sanitary sewer line	Tel B	Telephone Booth
Sec	section	Tel P	telephone pole
SL	section line	Tv	television
Sep	separation	Temp	temperature
Seq	sequence	Temp	temporary
Serv	service	TBM	temporary bench mark
Sht	sheet	T	thinwall tube sample
Shtng	sheeting	Ts	topsoil
Shldr	shoulder	Traf	traffic
Sw or Sdwk	sidewalk	TSCB	traffic signal control box
SD	sight distance	Tr	trail
SN	sign number	Transf	transformer
Sig	signal	Trans	transition
Sgl	single	TT	transmission tower
SRCP	slotted reinforced concrete pipe	TES	traversable end section
SC	slow curing	Trans	transverse
SS	slow setting	Trtd	treated
Sm	small	Trmt	treatment
S	South	Qc	triaxial compression
SE	South East	TERO	tribal employment rights ordinance
SW	South West	Tpl	triple
SB	Southbound	Typ	typical
Sp	spaces		
Spcl	special	Qu	unconfined compressive strength
SA	special assembly	Ugrnd	underground
SP	special provisions	Util	utility
G	specific gravity		
Spk	spike		
SB	split barrel sample	VG	valley gutter
SH	sprinkler head	Vap	vapor
SV	sprinkler valve	Vert	vertical
Sq	square	VCP	vitrified clay pipe
Stk	stake	Vol	volume
Std	standard	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 preparation	WB	westbound
Ss	subsoil	Wrng	wiring
SS	supplement specification	W/	with
Supp	supplemental	W/o	without
Surf	surfacing	WC	witness corner
Surv	survey		
Sym	symmetrical		

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MEASUREMENTS

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

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

SURVEY DESCRIPTIONS

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

SOIL TYPES

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

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KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

ENGINEER

NORTH DAKOTA

12 18 2020

NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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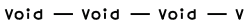
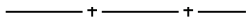
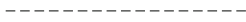
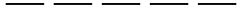


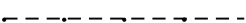
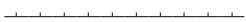
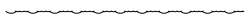
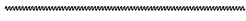
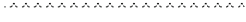
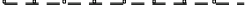
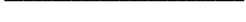
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LINE STYLES

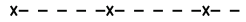
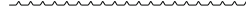
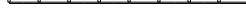
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Existing Topography

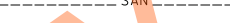
	Existing Ground Void
	Existing Cemetery Boundary
	Existing Box Culvert Bridge
	Existing Concrete Surface
	Existing Drainage Structure
	Existing Gravel Surface
	Existing Riprap
	Existing Dirt Surface
	Existing Asphalt Surface
	Existing Tie Point Line
	Existing Railroad Centerline
	Existing Guardrail Cable
	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

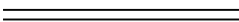
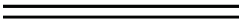
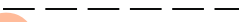
Proposed Topography

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

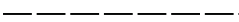
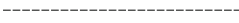
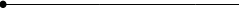
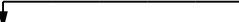
Existing Utilities

	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

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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PE-4683

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NORTH DAKOTA

12 18 2020

LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

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

Countours

	Depression Contours
	Supplemental Contour

Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

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

Erosion Control

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

Environmental

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

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

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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

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



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



12 18 2020

SYMBOLS

D-101-33

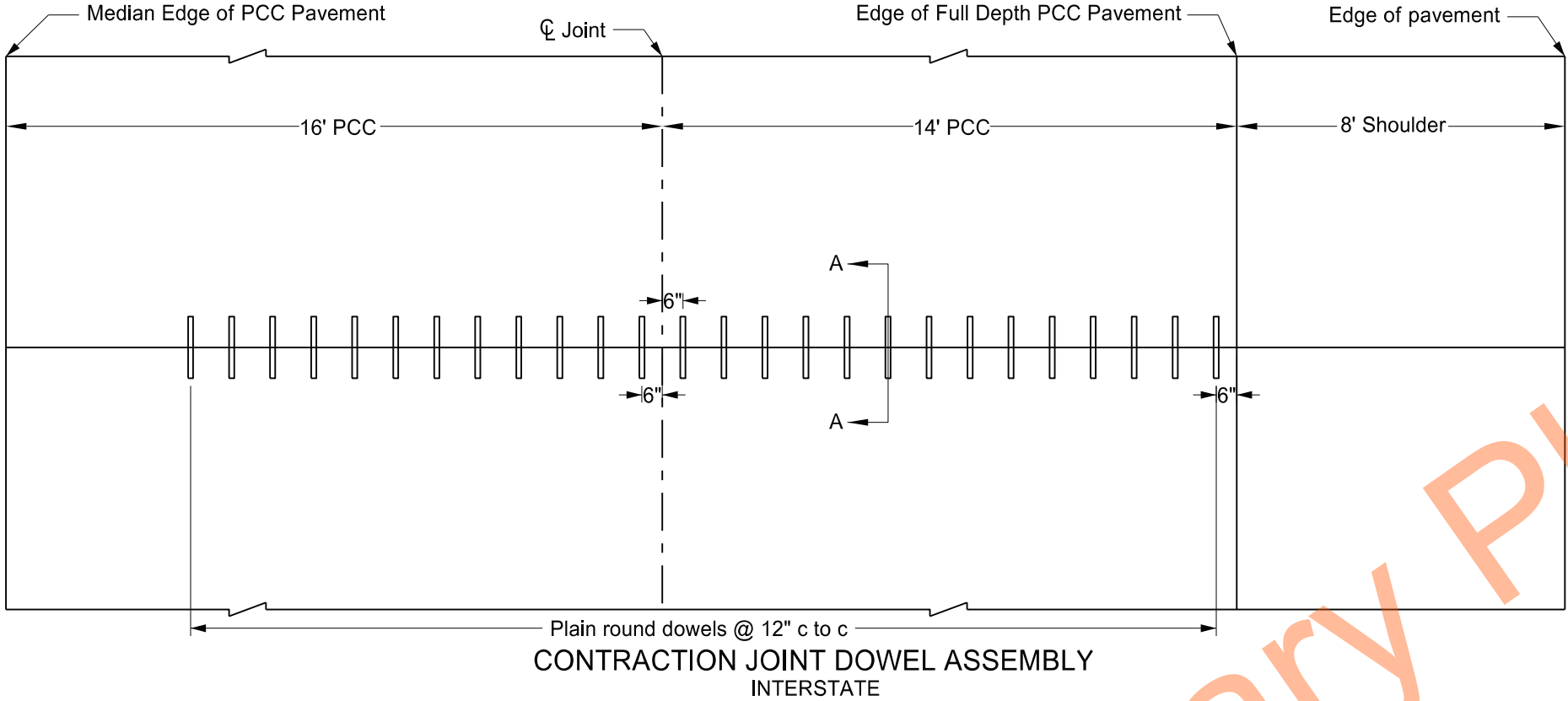
			Existing Manhole (Electrical, Gas, Telephone)		Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water
			Water Manhole (Exst, Exst with Valve)		Existing Pedestal Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined
			Sanitary Sewer Manhole (Exst, Ppsd,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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32

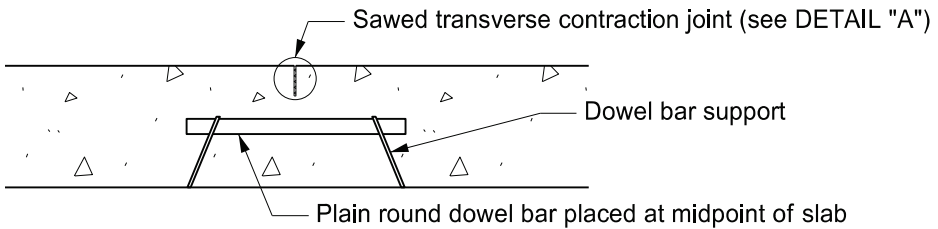
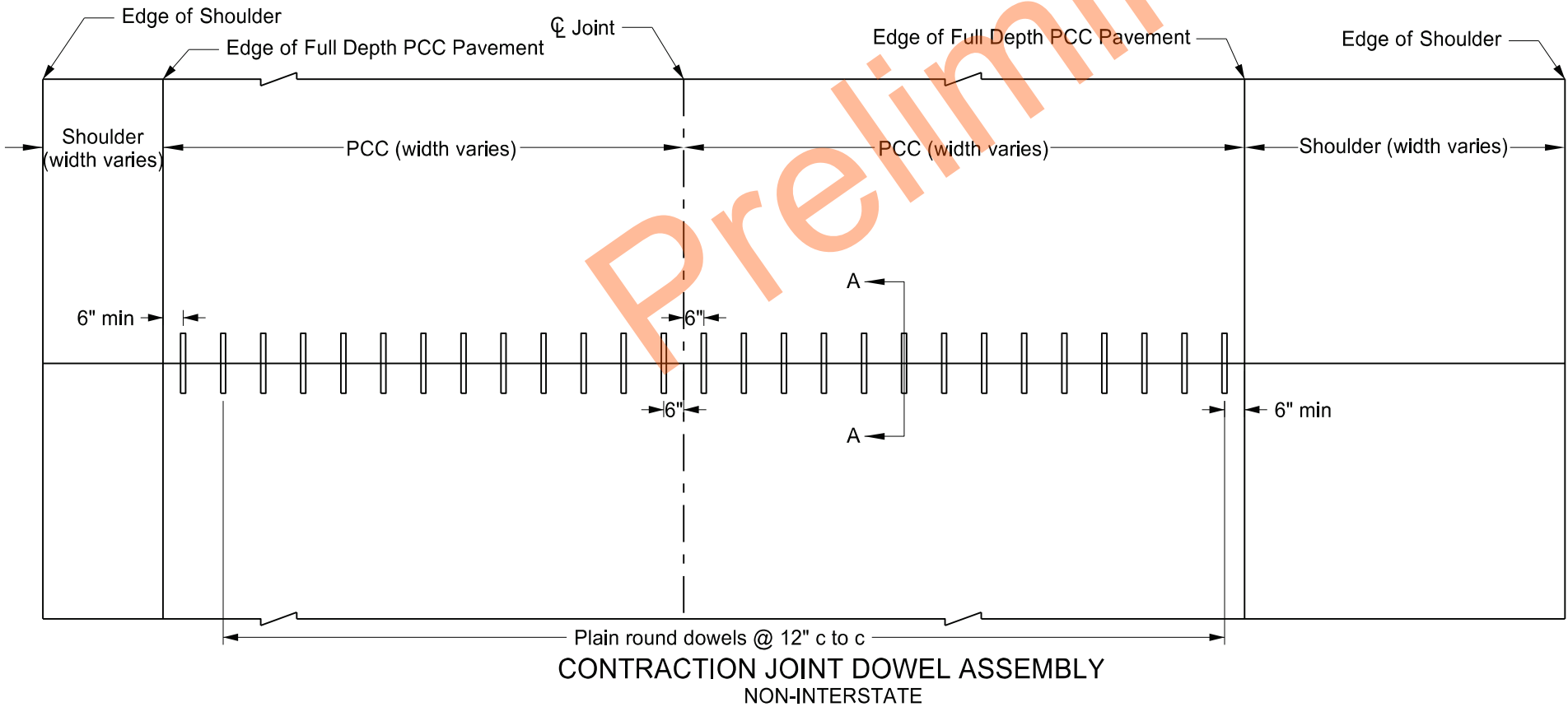
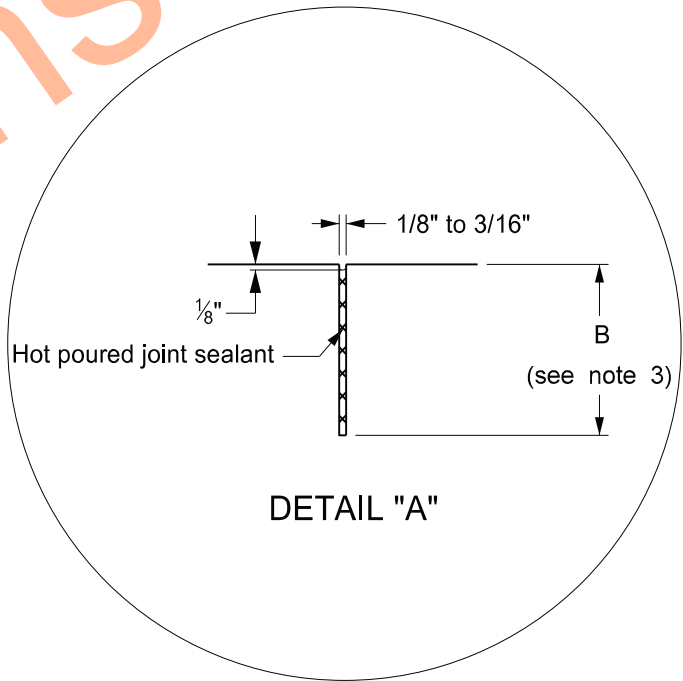
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REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 18 2020

TRANSVERSE CONTRACTION JOINT DETAILS

D-550-3



- Notes
1. The joint seal details apply to both doweled and non-doweled (plain) transverse joints.
 2. T = Thickness of pavement.
 3. $B = T/4 + 1/4"$ for AE or YE for non-doweled concrete pavement or $B = T/3$ for AAE or doweled concrete pavement

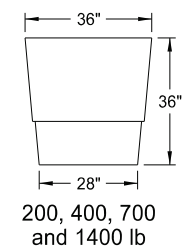
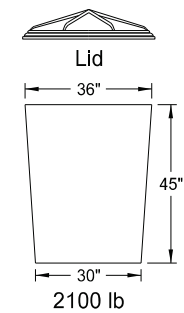


SECTION A-A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-10	
REVISIONS	
DATE	CHANGE
6/23/2014	Removed dowel size reference
3/16/2016	Revised Joint Details and notes
10/25/2019	Expanded Details for clarity

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 10/25/19 and the original document is stored at the
North Dakota Department
of Transportation

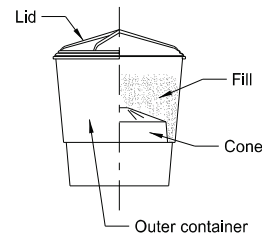
ATTENUATION DEVICE



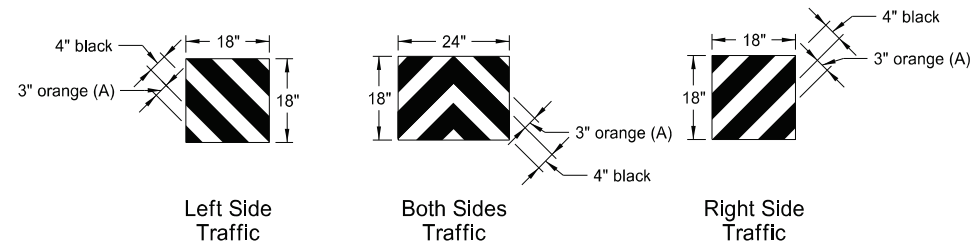
Outer Containers



Cones



Typical Assembly

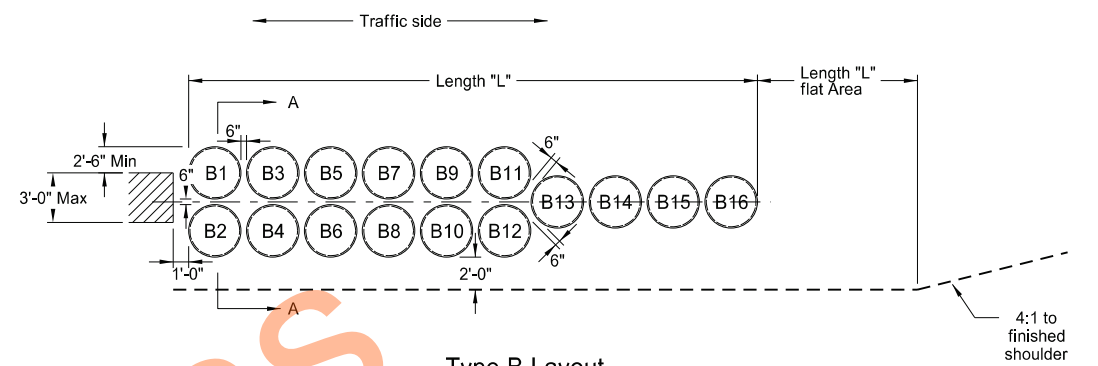


Reflective Sheet Detail

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.

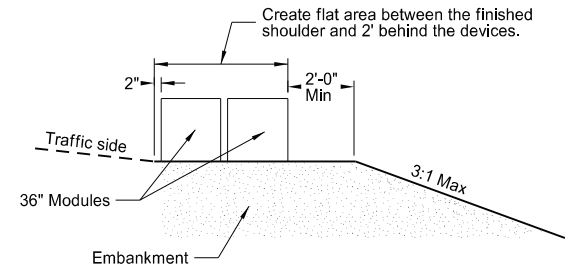
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.

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										
	75	70	65	60	55	50	45	40	35	30	25
	Module Weights (LBS)										
B1	2100										
B2	2100										
B3	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B4	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B5	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400
B16	200	200	200	200	200	200	200	200	200	200	200
Length (L)	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										
2100	1	1	1	1	1	1	1	1	1		
1400	1	1	1	1	1	1	1	1	1	1	1
700	2	2	2	2	2	2	2	2	2	2	2
400	1	1	1	1	1	1	1	1	1	1	1
200	2	2	2	1	1	1	1	1	1	1	1

Notes:

1. **Materials**
 - A) Use modules manufactured from frangible polyethylene material which shatters upon impact.
 - B) 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.
2. **Modules**

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

 - A) Provide three components for 2, 4, or 7 cubic foot module containers:
 - 1) A 14 C.F., yellow outer container.
 - 2) A black lid securely locking over the top lip of the container.
 - 3) 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.
 - B) Provide two components for the 14 cubic foot module container:
 - 1) A 14 C.F., yellow outer container.
 - 2) A black lid securely locking over the top lip of the container.
 - C) Provide two components for the 21 cubic foot module container:
 - 1) A 36" height X 36" width yellow outer container.
 - 2) A black lid which locks securely over the top of the container.
3. 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.
4. 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.
5. 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.

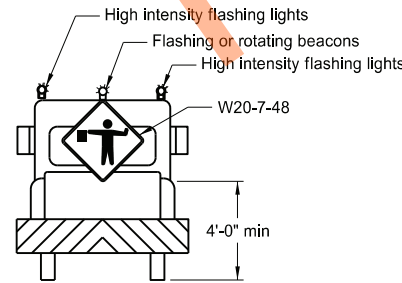
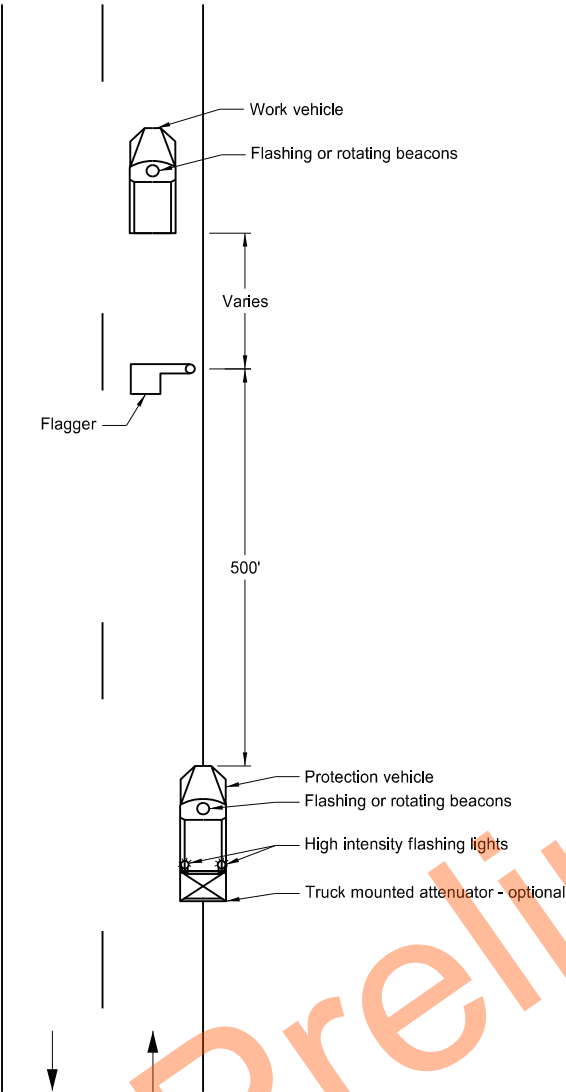
NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised sheeting in reflective sheet detail
9-27-17	Update to active voice
10-03-19	New Design Engr PE Stamp

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

TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

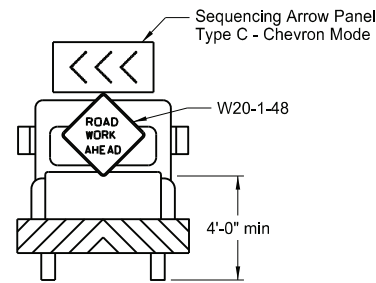
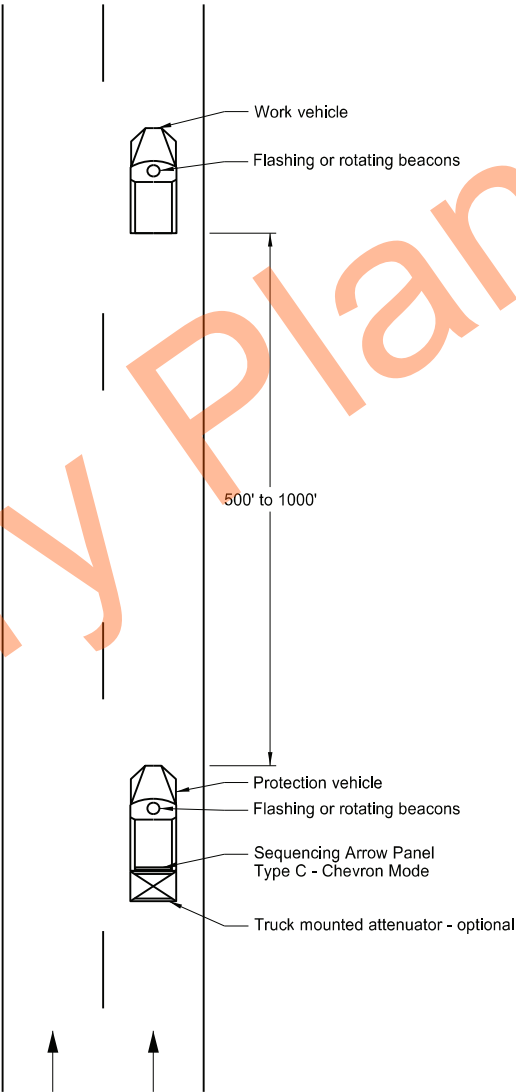
D-704-2

Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways



Typical Protection Vehicle

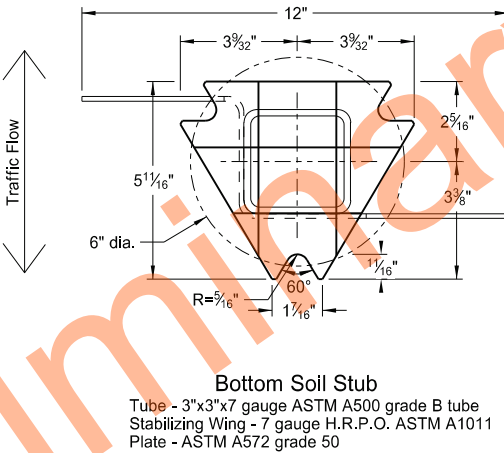
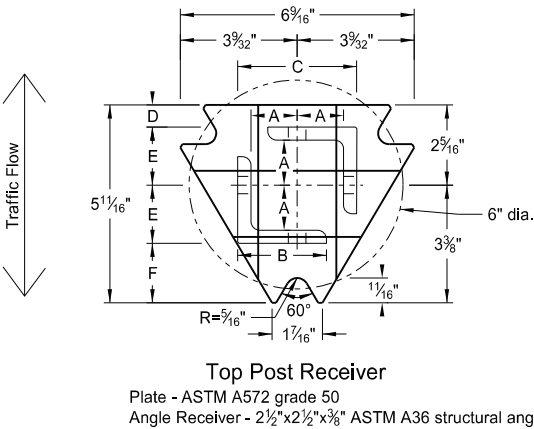
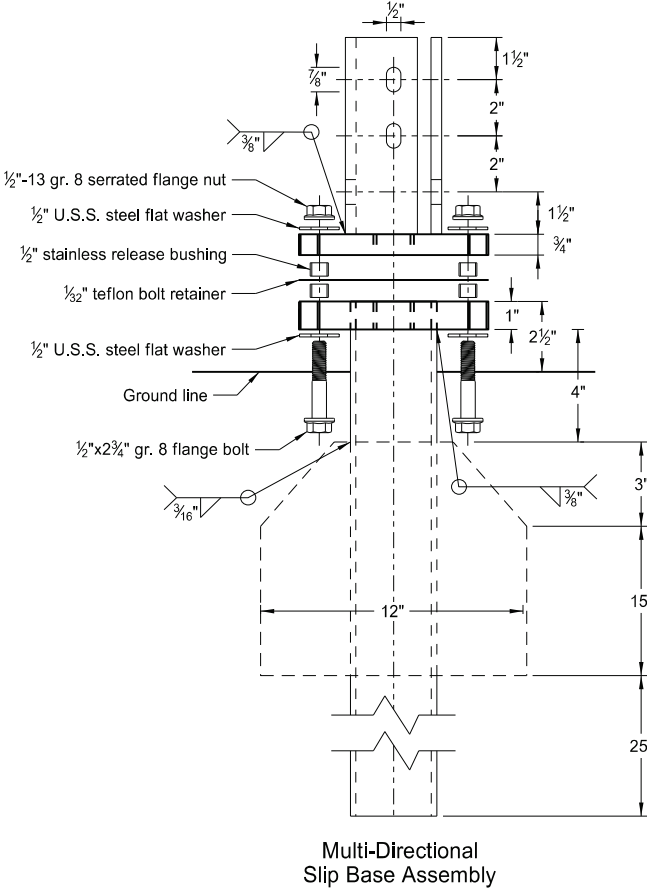
- Notes:
1. Display a 360 degree rotating, flashing, oscillating or strobe light on the working vehicle.
 2. Display a 360 degree rotating, flashing, oscillating or strobe light on the shadow vehicle. Operate a sequencing arrow panel Type C in chevron mode on the shadow vehicle for Multilane Roadway.
 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

Perforated Tube

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

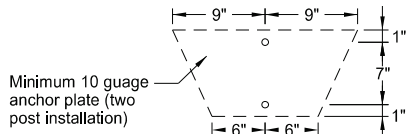
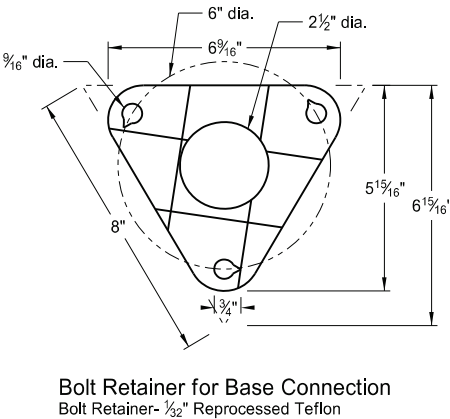
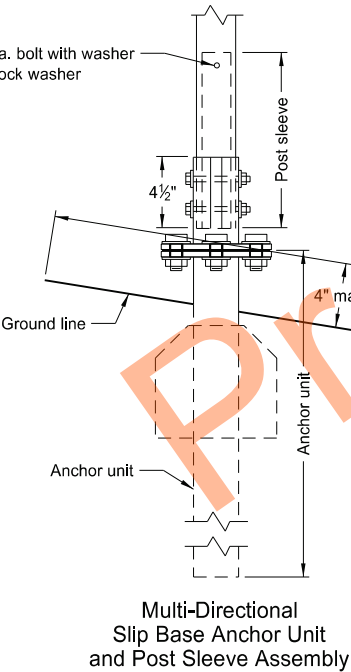
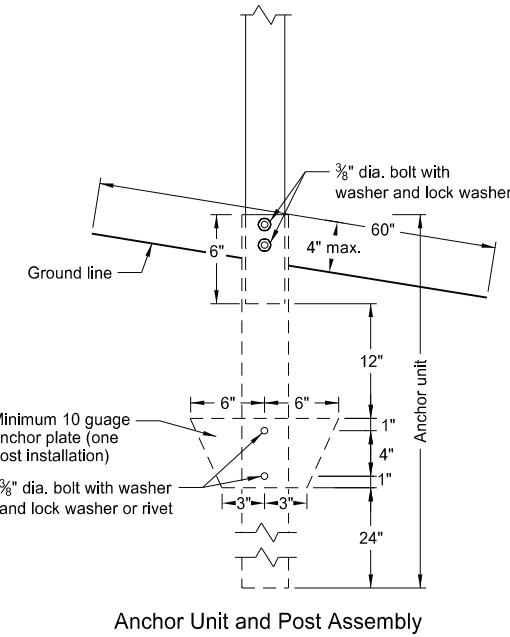


Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

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

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



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

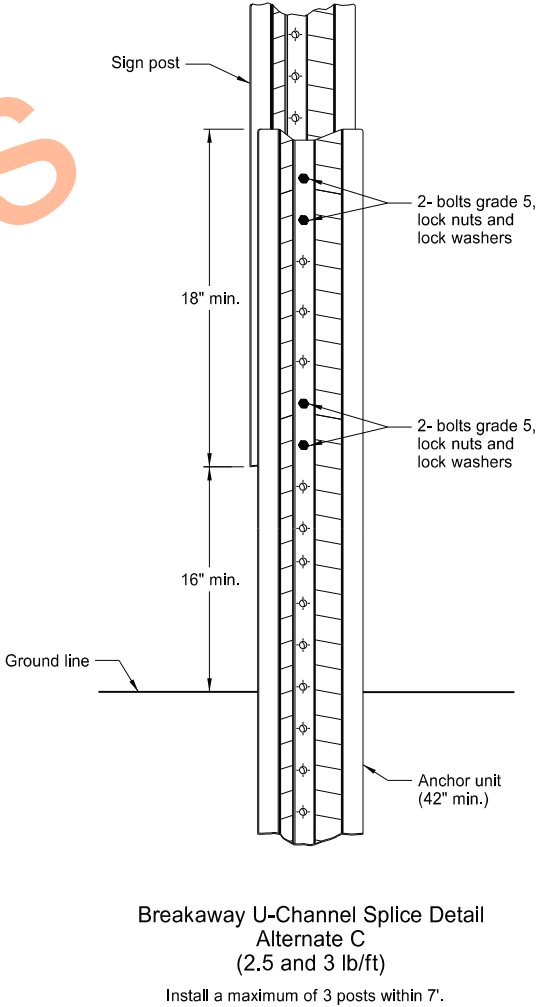
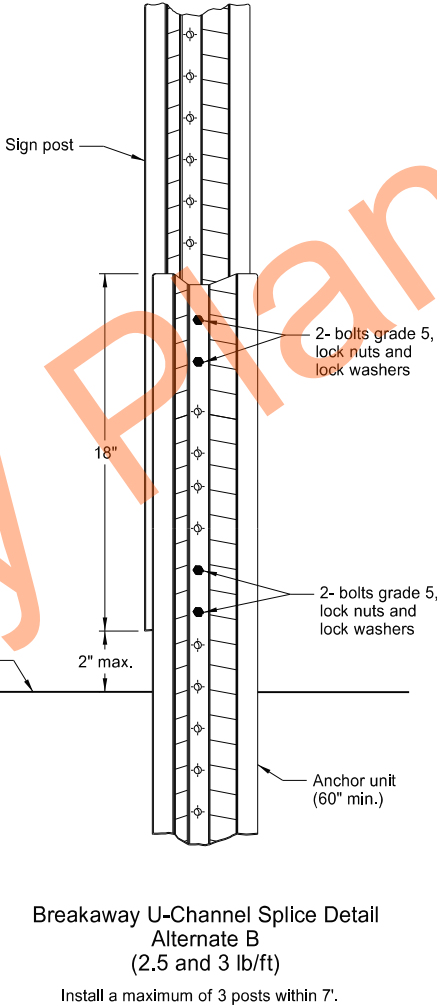
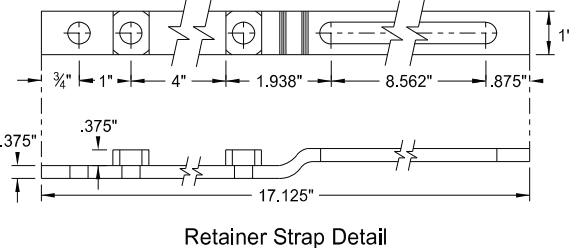
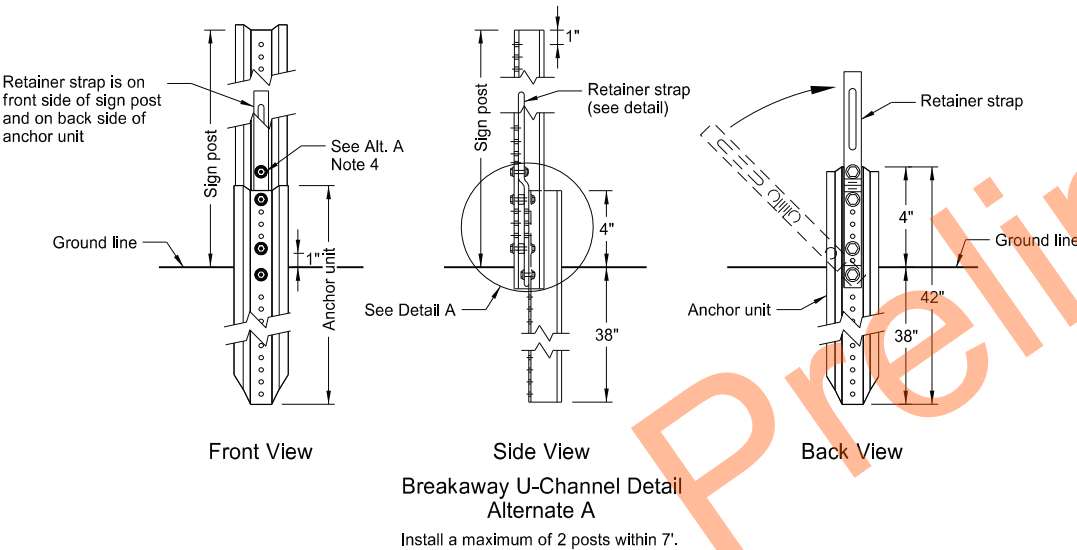
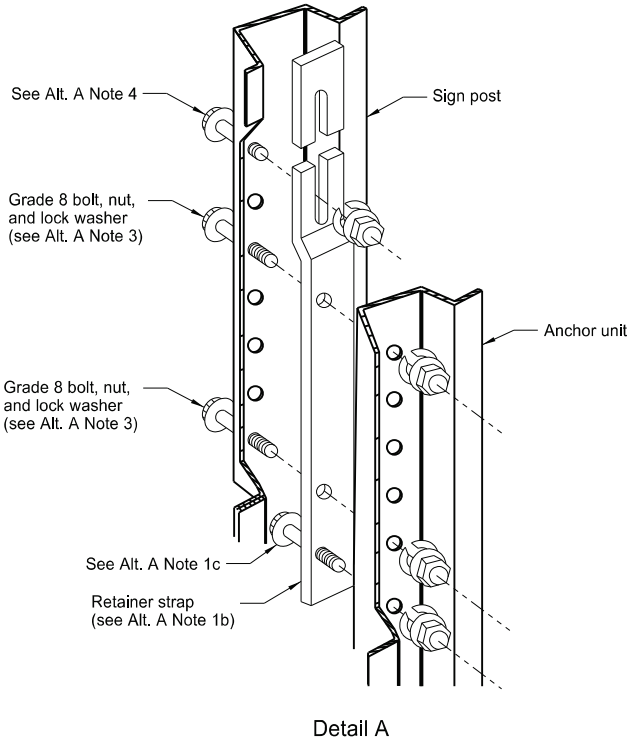
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U-Channel Post



Alternate A Steps of Installation:

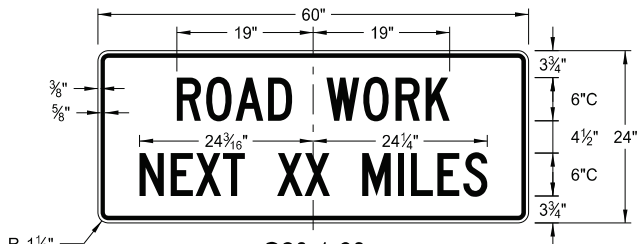
- a) Drive anchor unit to within 12" of ground level.
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
- a) Drive anchor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

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

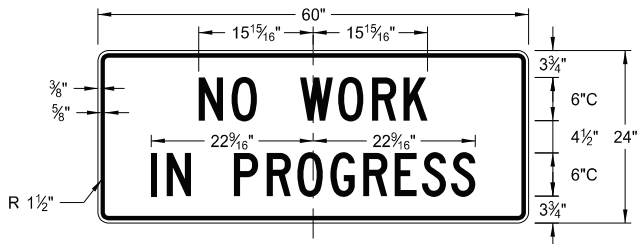
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

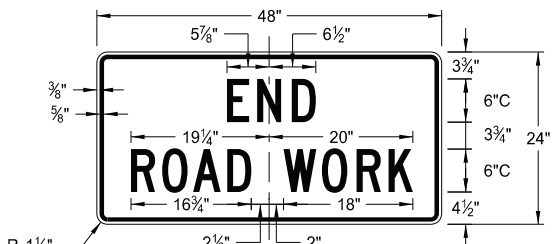
D-704-9



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



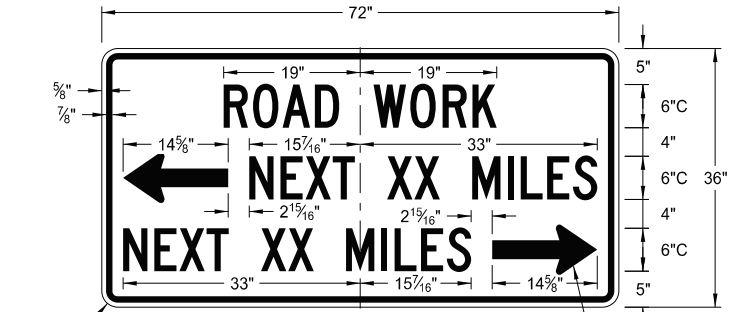
G20-1b-60
Legend: black (non-refl)
Background: orange



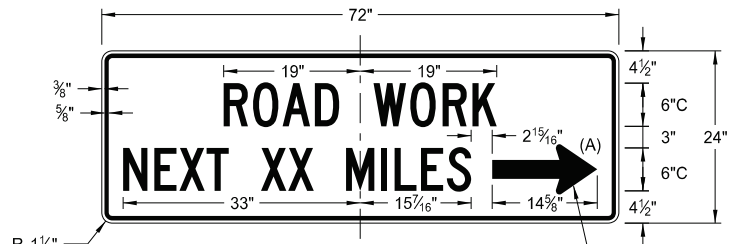
G20-2-48
Legend: black (non-refl)
Background: orange



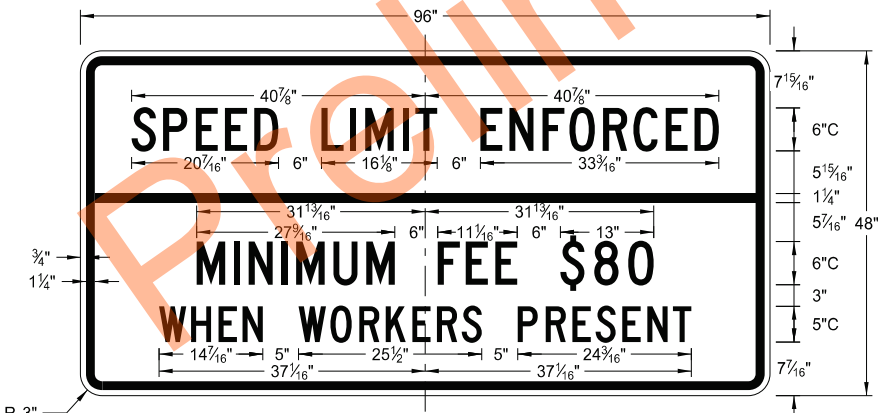
G20-4b-36
Legend: black (non-refl)
Background: orange



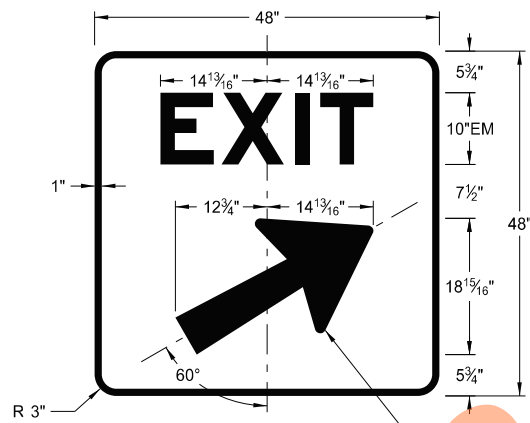
G20-50a-72
Legend: black (non-refl)
Background: orange



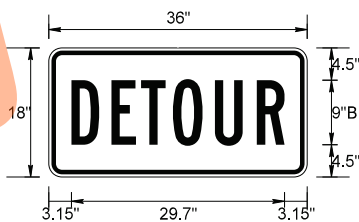
G20-52a-72
Legend: black (non-refl)
Background: orange



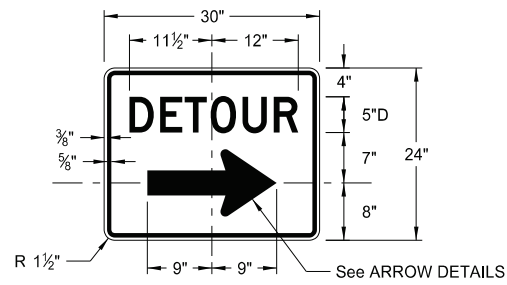
G20-55-96
Legend: black (non-refl)
Background: orange



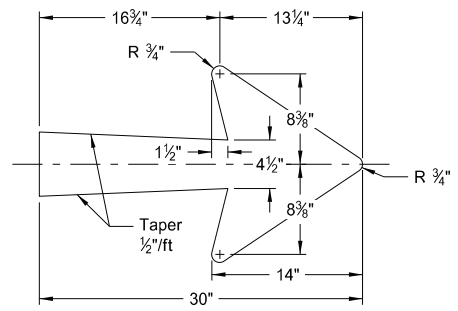
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



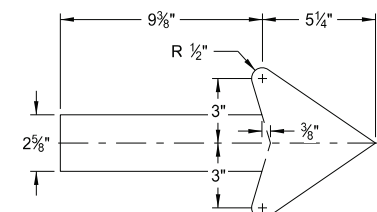
M4-8-36
Legend: black (non-refl)
Background: orange



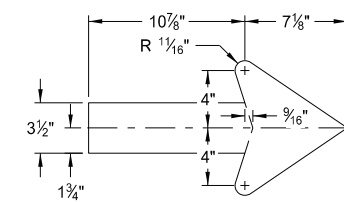
M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange



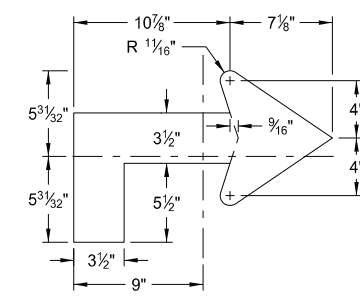
E5-1-48



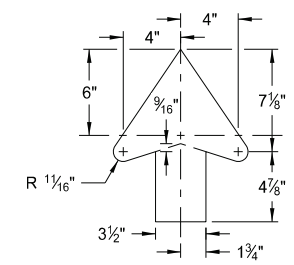
G20-50a-72
G20-52a-72



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



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



M4-9-30
Straight

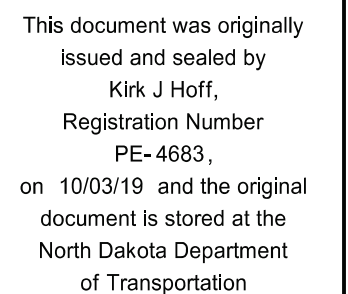
ARROW DETAILS

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

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

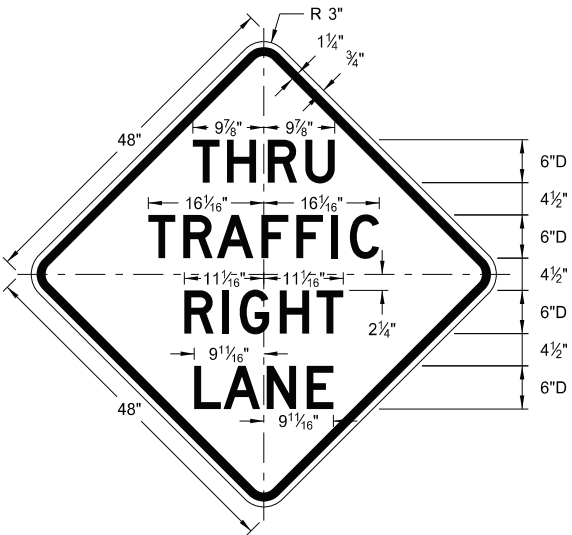
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D-704-10



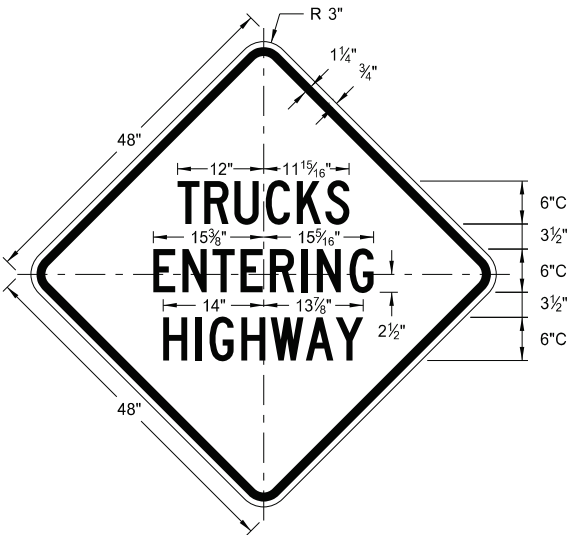
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

D-704-11



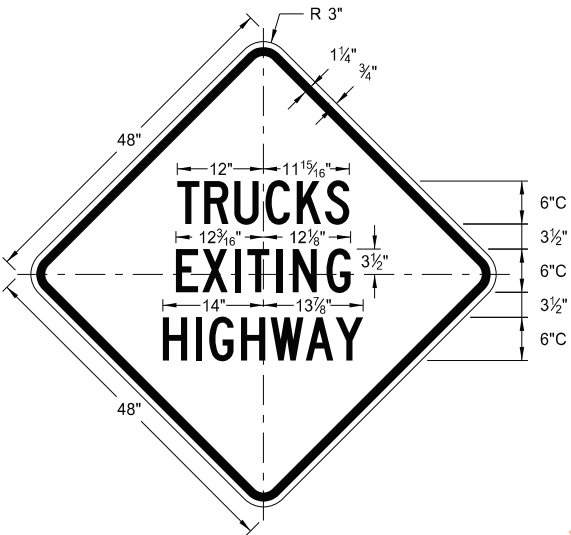
W5-8-48

Legend: black (non-refl)
Background: orange



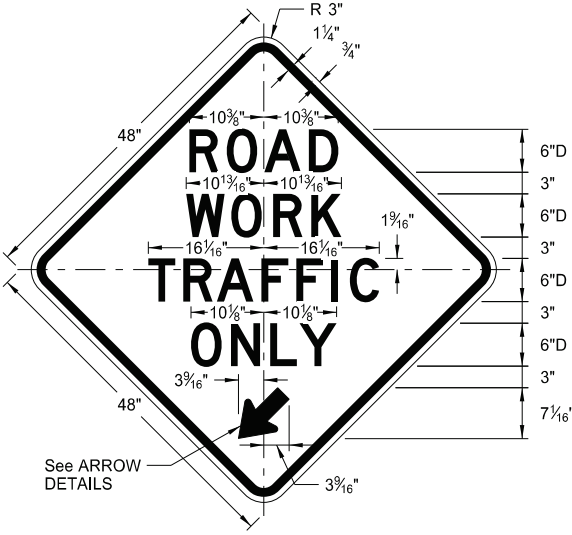
W8-53-48

Legend: black (non-refl)
Background: orange



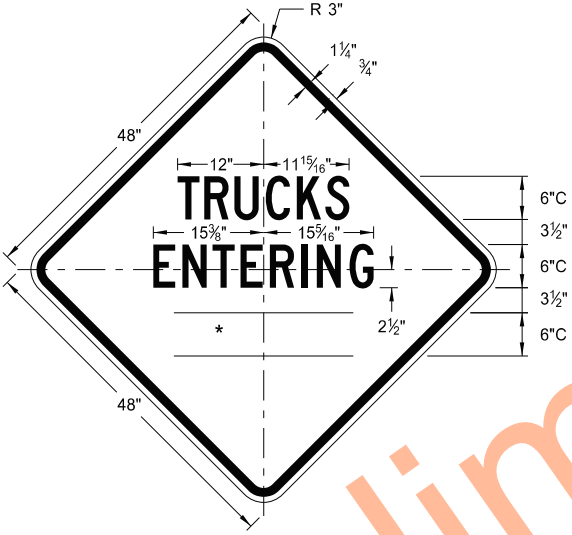
W8-56-48

Legend: black (non-refl)
Background: orange



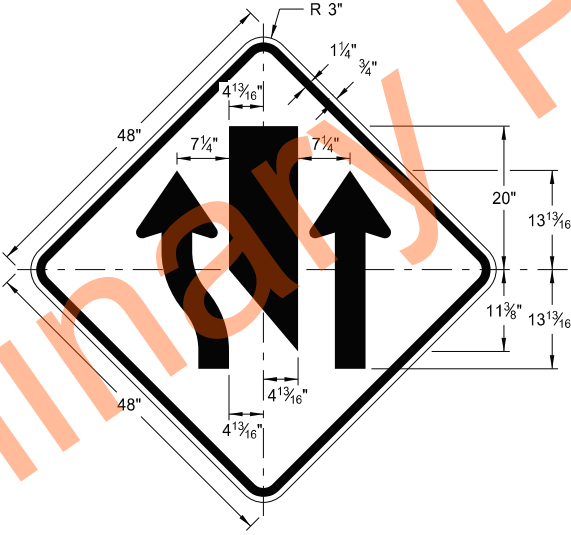
W5-9-48

Legend: black (non-refl)
Background: orange



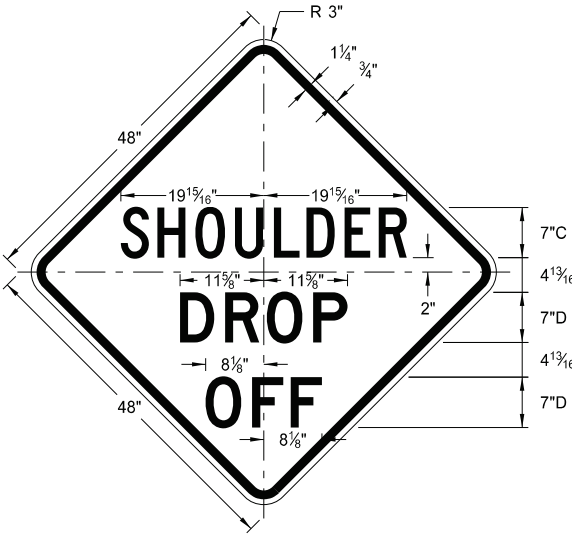
W8-54-48

Legend: black (non-refl)
Background: orange



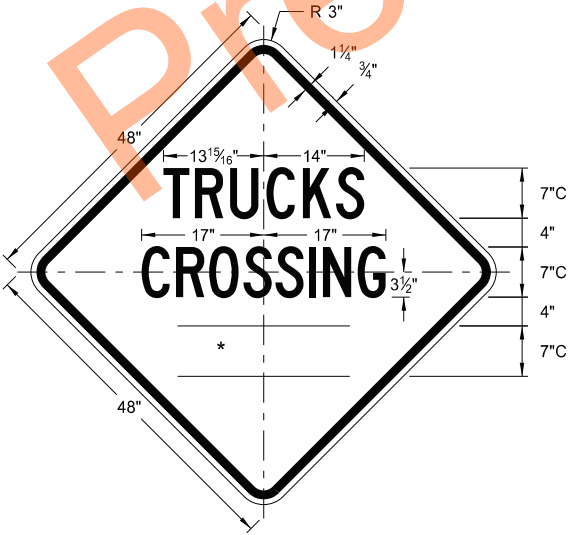
W9-3a-48

Legend: black (non-refl)
Background: orange



W8-9a-48

Legend: black (non-refl)
Background: orange

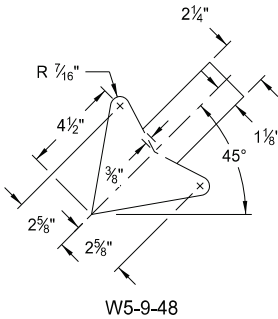


W8-55-48

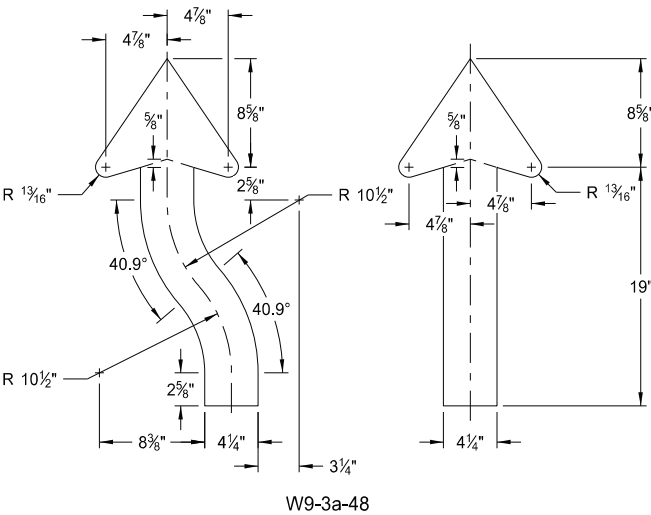
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

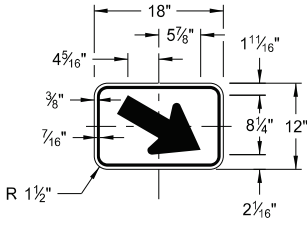
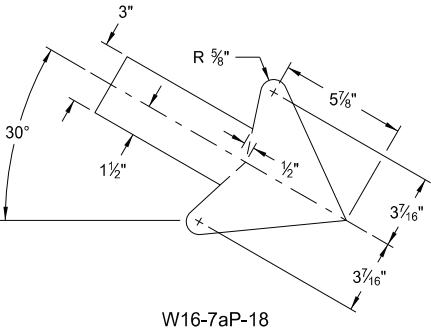
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

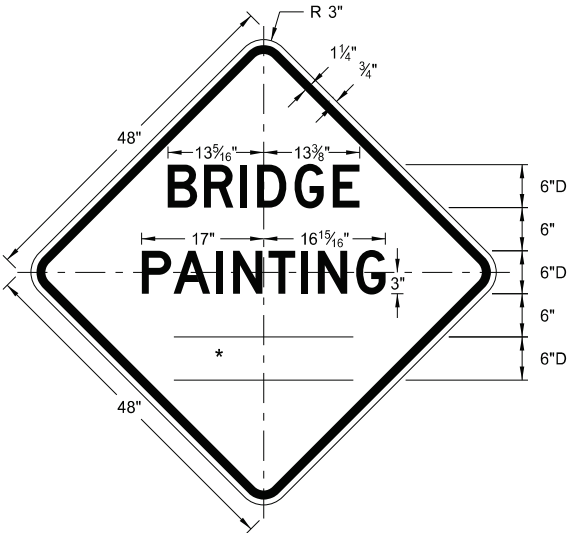
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



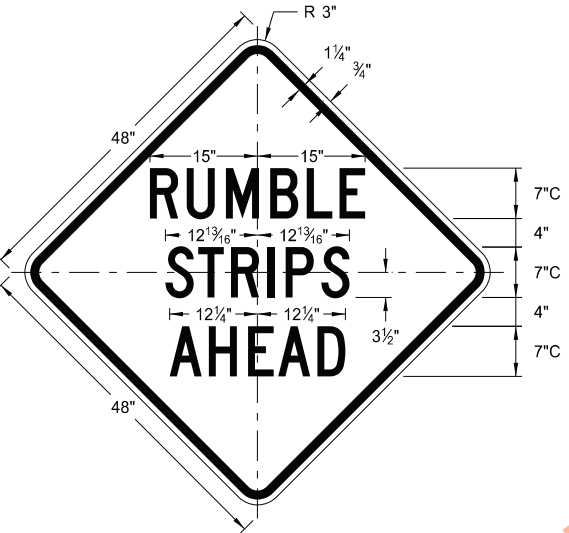
W16-7aP-18

Legend: black (non-refl)
Background: orange



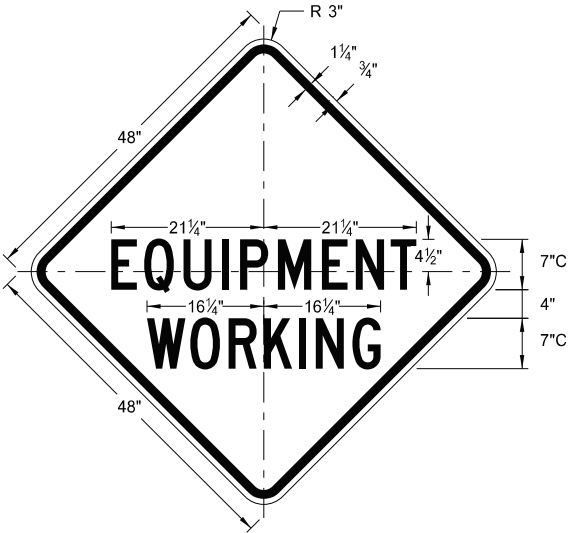
W21-50-48

Legend: black (non-refl)
Background: orange



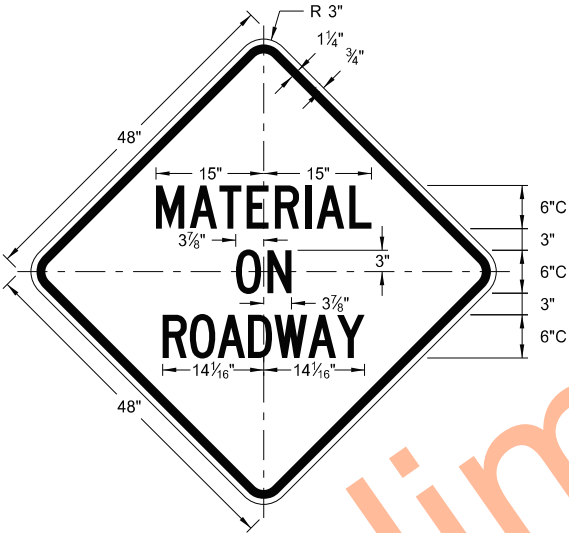
W21-53-48

Legend: black (non-refl)
Background: orange



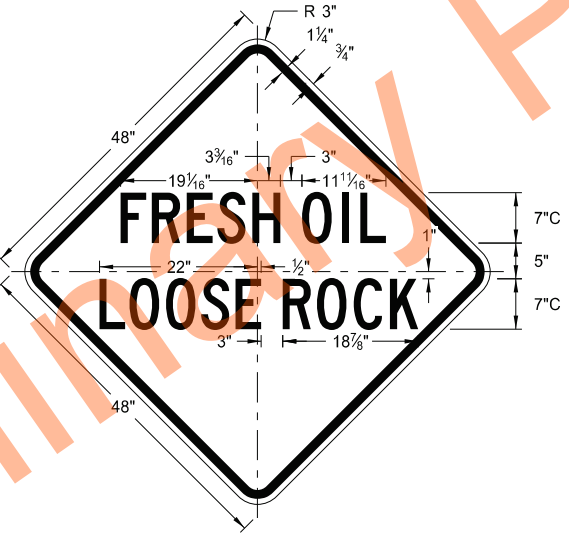
W20-51-48

Legend: black (non-refl)
Background: orange



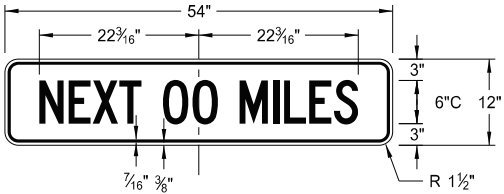
W21-51-48

Legend: black (non-refl)
Background: orange



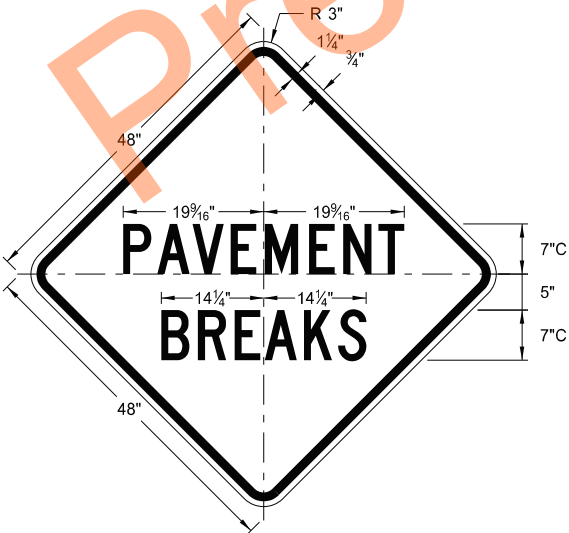
W22-8-48

Legend: black (non-refl)
Background: orange



W20-52P-54

Legend: black (non-refl)
Background: orange

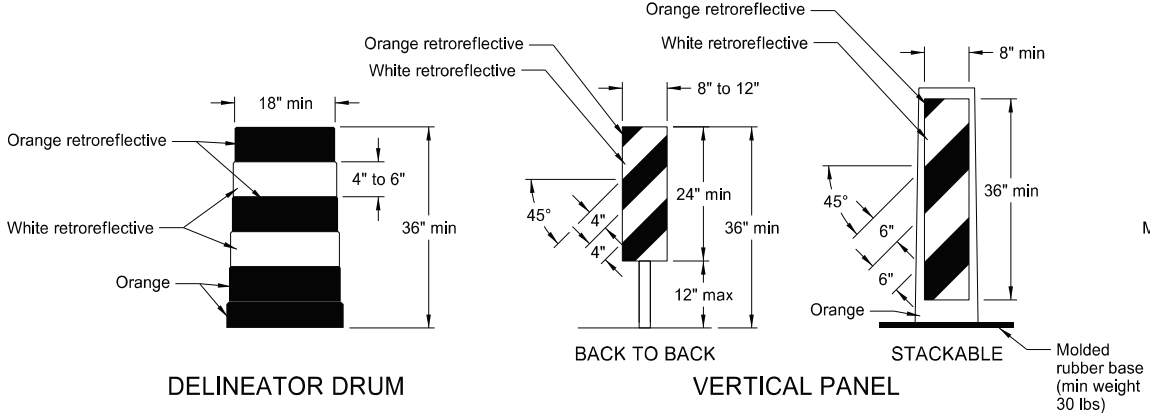


W21-52-48

Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation
5-31-18		
REVISIONS		
DATE	CHANGE	
11-01-19	Added details for sign W16-7aP-18.	

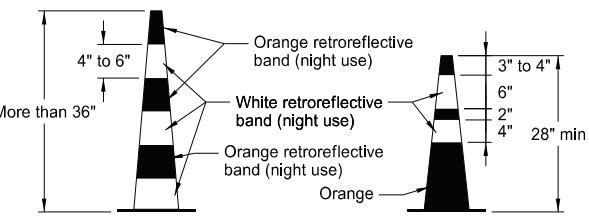
BARRICADE AND CHANNELIZING DEVICE DETAILS



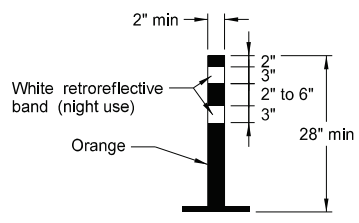
DELINEATOR DRUM

VERTICAL PANEL

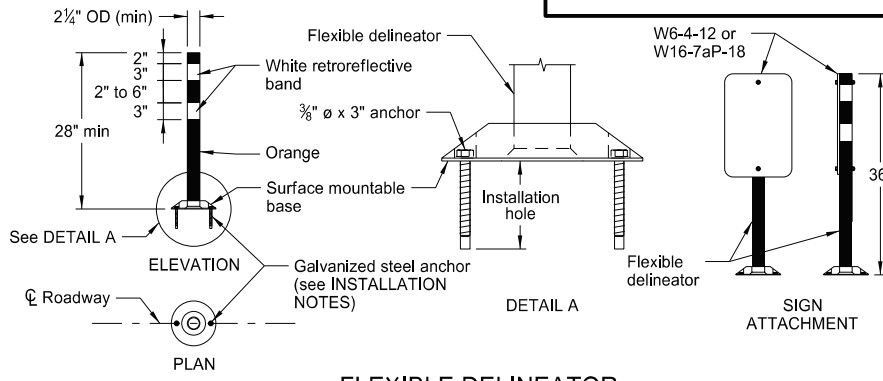
STACKABLE



TRAFFIC CONE



TUBULAR MARKER



FLEXIBLE DELINEATOR

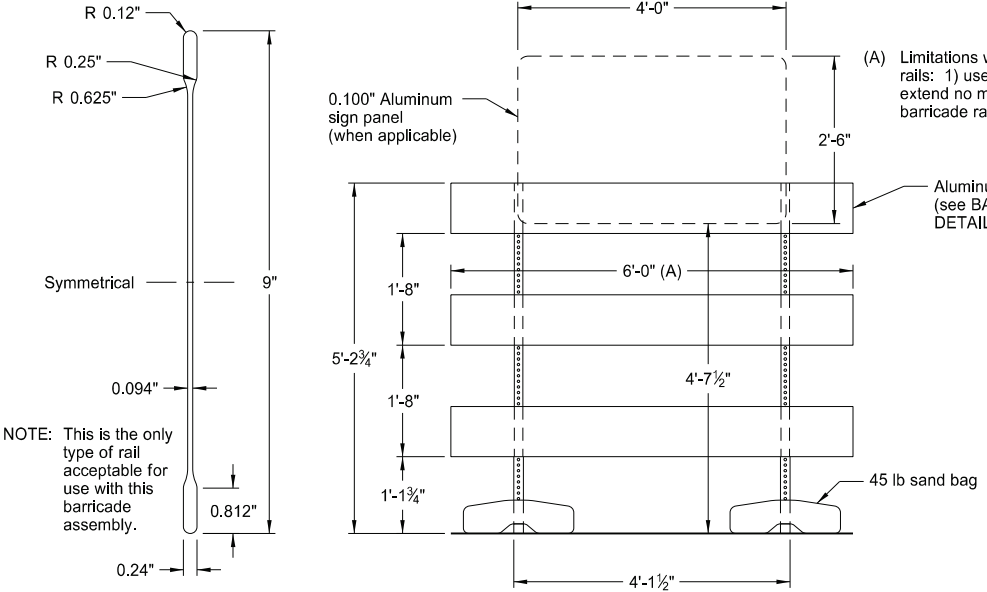
Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and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

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

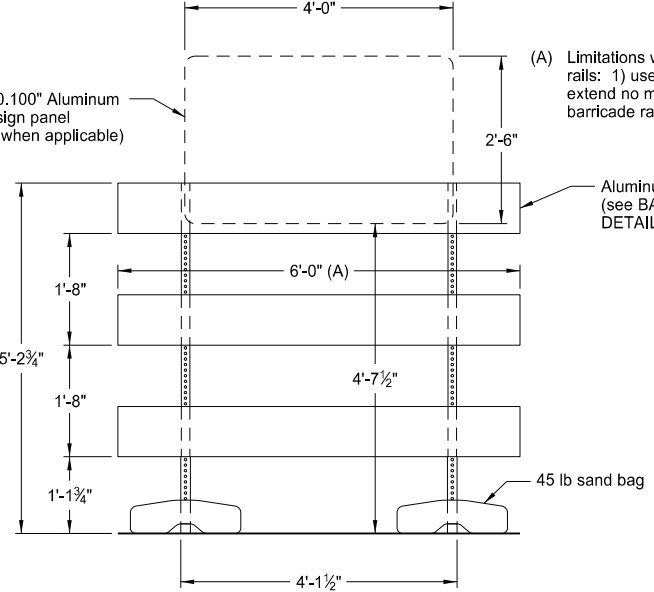
Provide retroreflectORIZATION of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectORIZED space between the orange and white stripes.

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

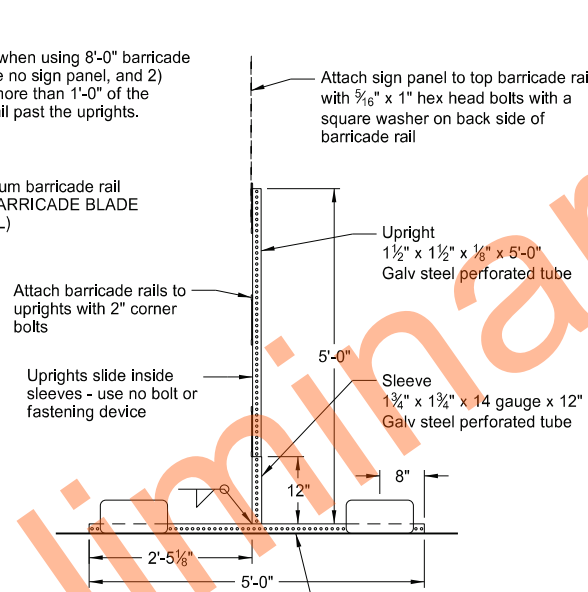
- INSTALLATION NOTES:
1. Drill installation holes to diameter and depth required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, use an 8" x 8" butyl pad or hot melt butyl.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



BARRICADE BLADE DETAIL



BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

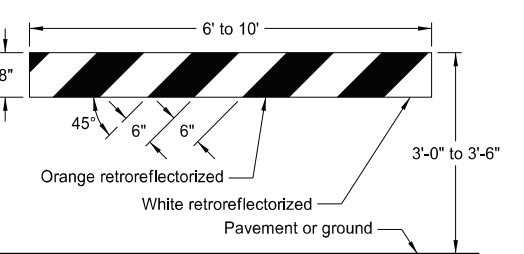


ELEVATION VIEW

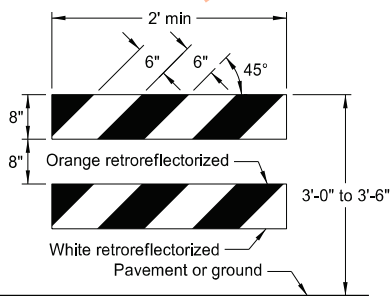
BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

SIDE VIEW

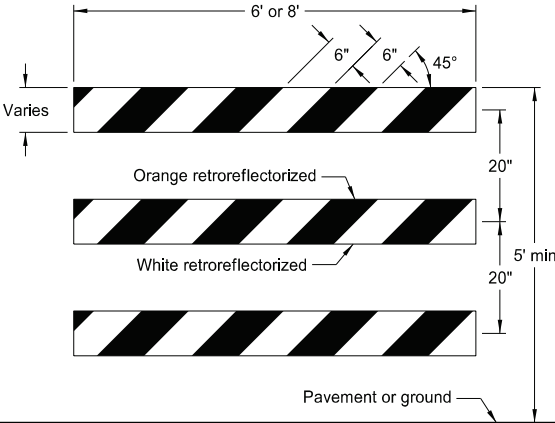
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



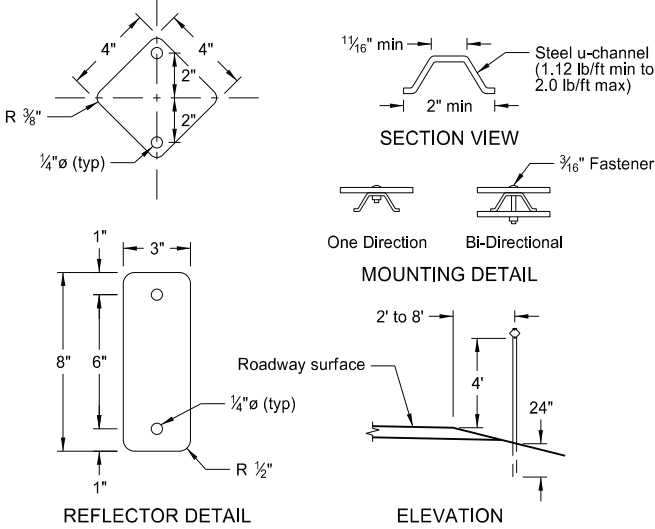
TYPE I BARRICADE



TYPE II BARRICADE



TYPE III BARRICADE



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

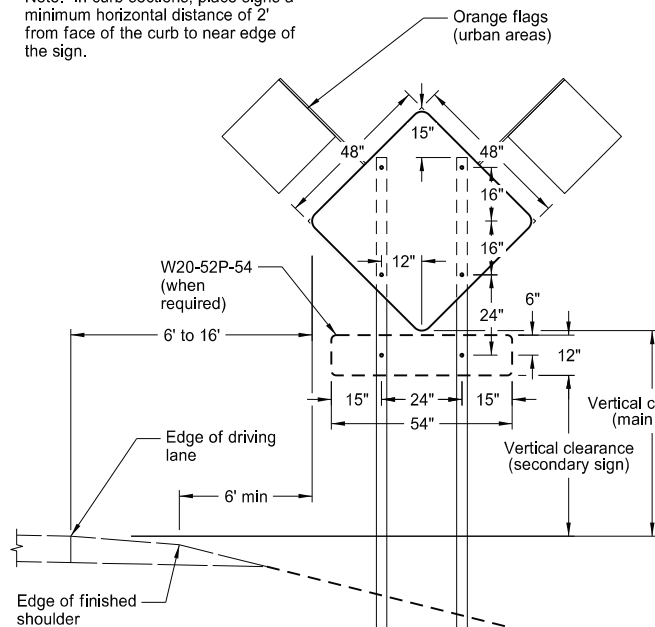
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

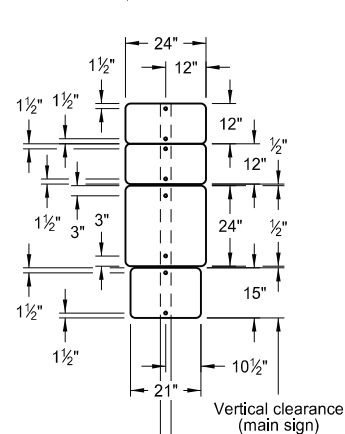
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on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

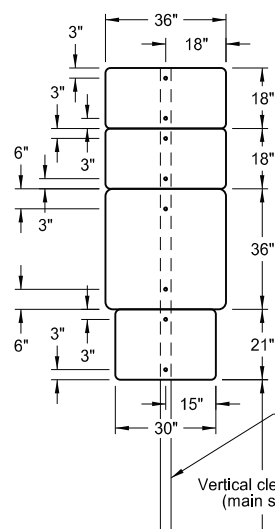
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



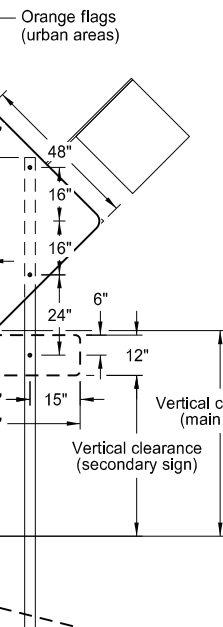
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



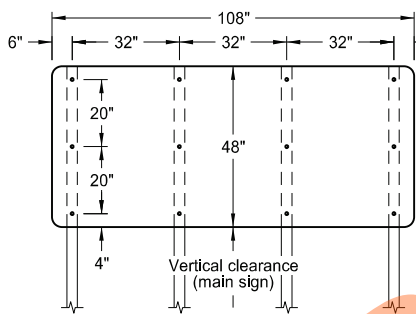
24" x 24"
ROUTE MARKER
ASSEMBLY



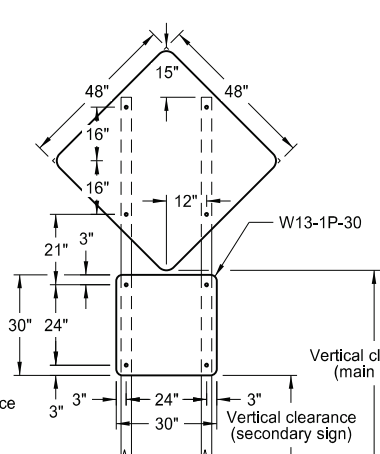
36" x 36"
ROUTE MARKER
ASSEMBLY



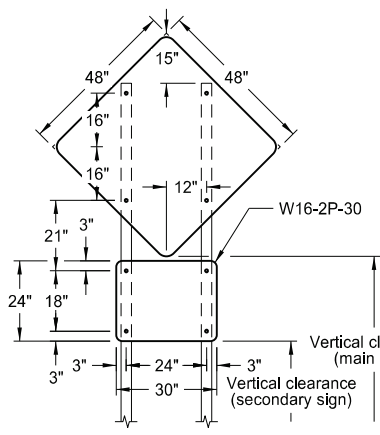
18" x 18"
DIAMOND SIGN



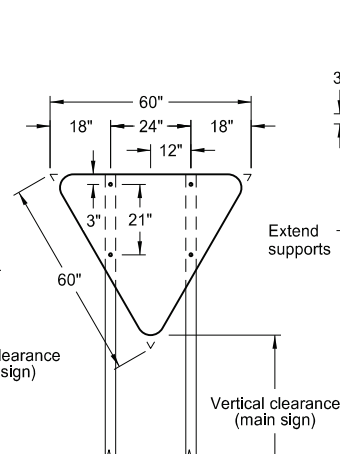
108" x 48" SIGN



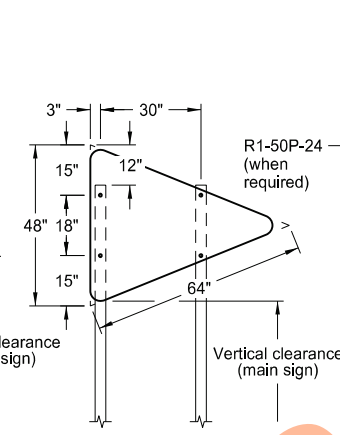
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



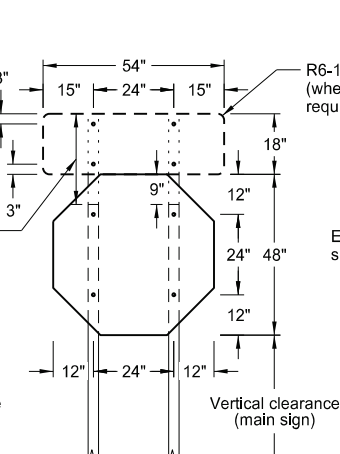
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



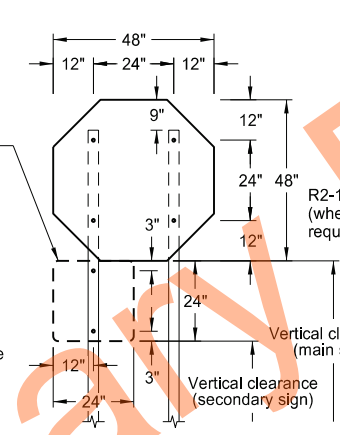
R1-2-60 - YIELD SIGN



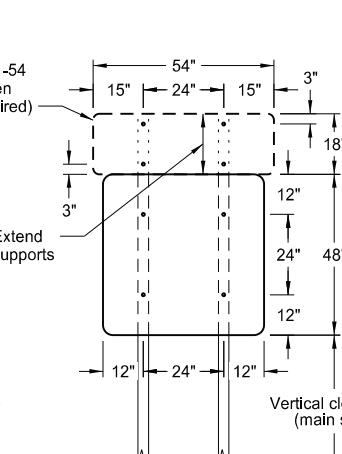
W14-3-64 - PENNANT SIGN



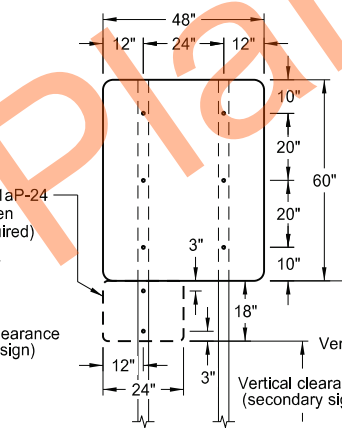
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



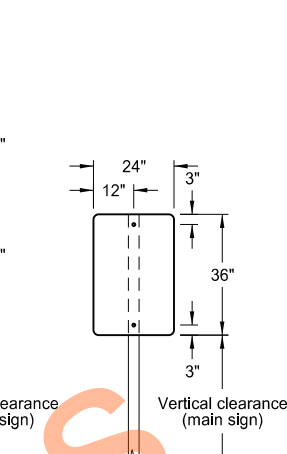
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



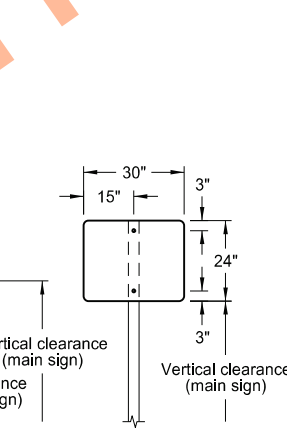
48" x 48" SIGN
(with R6-1-54 sign as required)



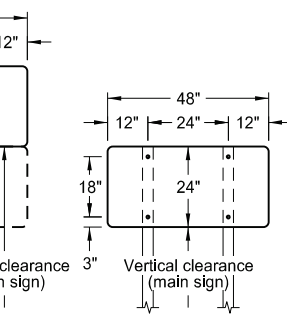
48" x 48" SIGN
(with R2-1aP-24 sign as required)



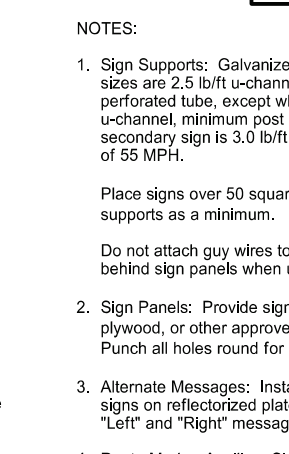
24" x 36" SIGN



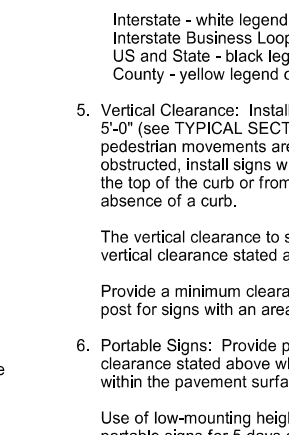
30" x 24" SIGN



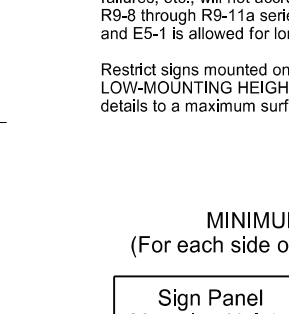
60" x 24" SIGN



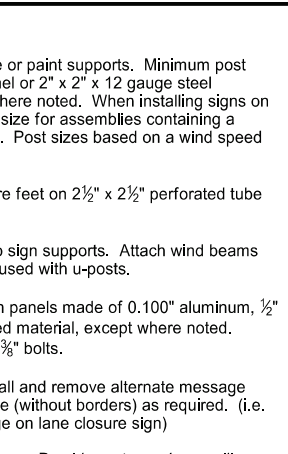
48" x 48" SIGN
(with R2-1aP-24 sign as required)



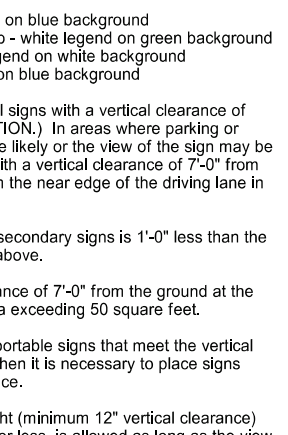
72" x 36" SIGN



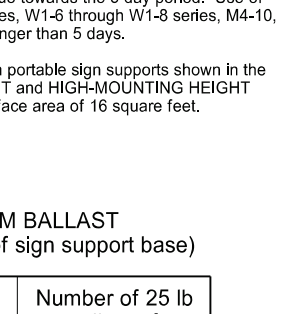
72" x 24" SIGN



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



48" x 24" SIGN



48" x 24" 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 50 square feet on 2½" x 2½" perforated tube supports as a minimum.

Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅝" bolts.
3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background

5. Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION). In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

The vertical clearance to secondary signs is 1'-0" less than the vertical clearance stated above.

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

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

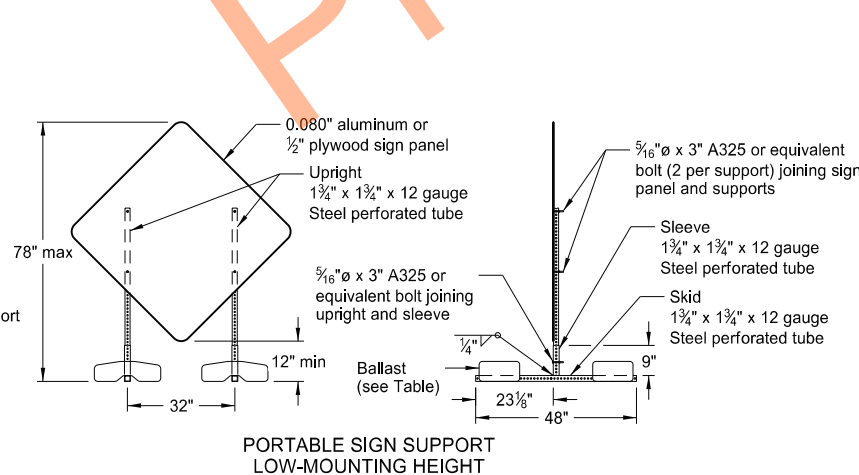
Use of low-mounting height (minimum 12" vertical clearance) portable signs for 5 days or less, is allowed as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. Use of R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 is allowed for longer than 5 days.

Restrict signs mounted on portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT details to a maximum surface area of 16 square feet.

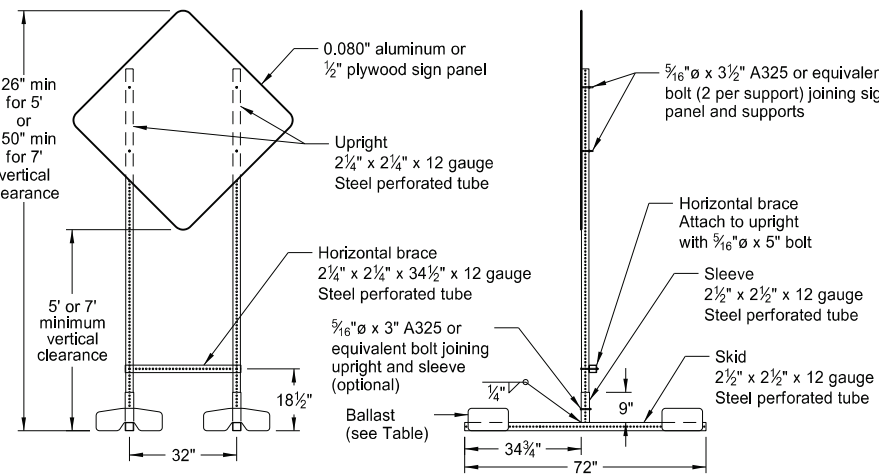
MINIMUM BALLAST
(For each side of sign support base)

Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

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



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

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

This document was originally issued and sealed by

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

Two-Lane Roadway Portable Rumble Strips

D-704-33

Work area

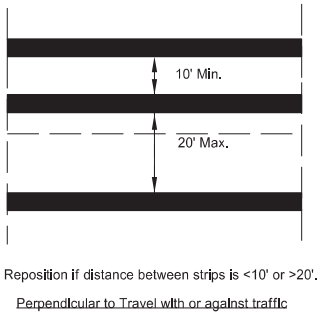
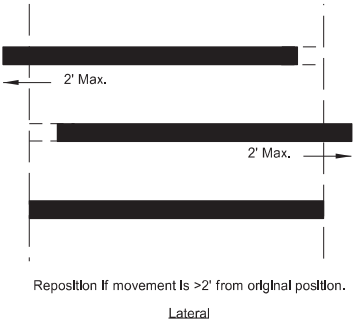
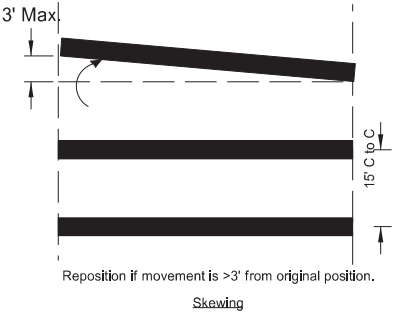
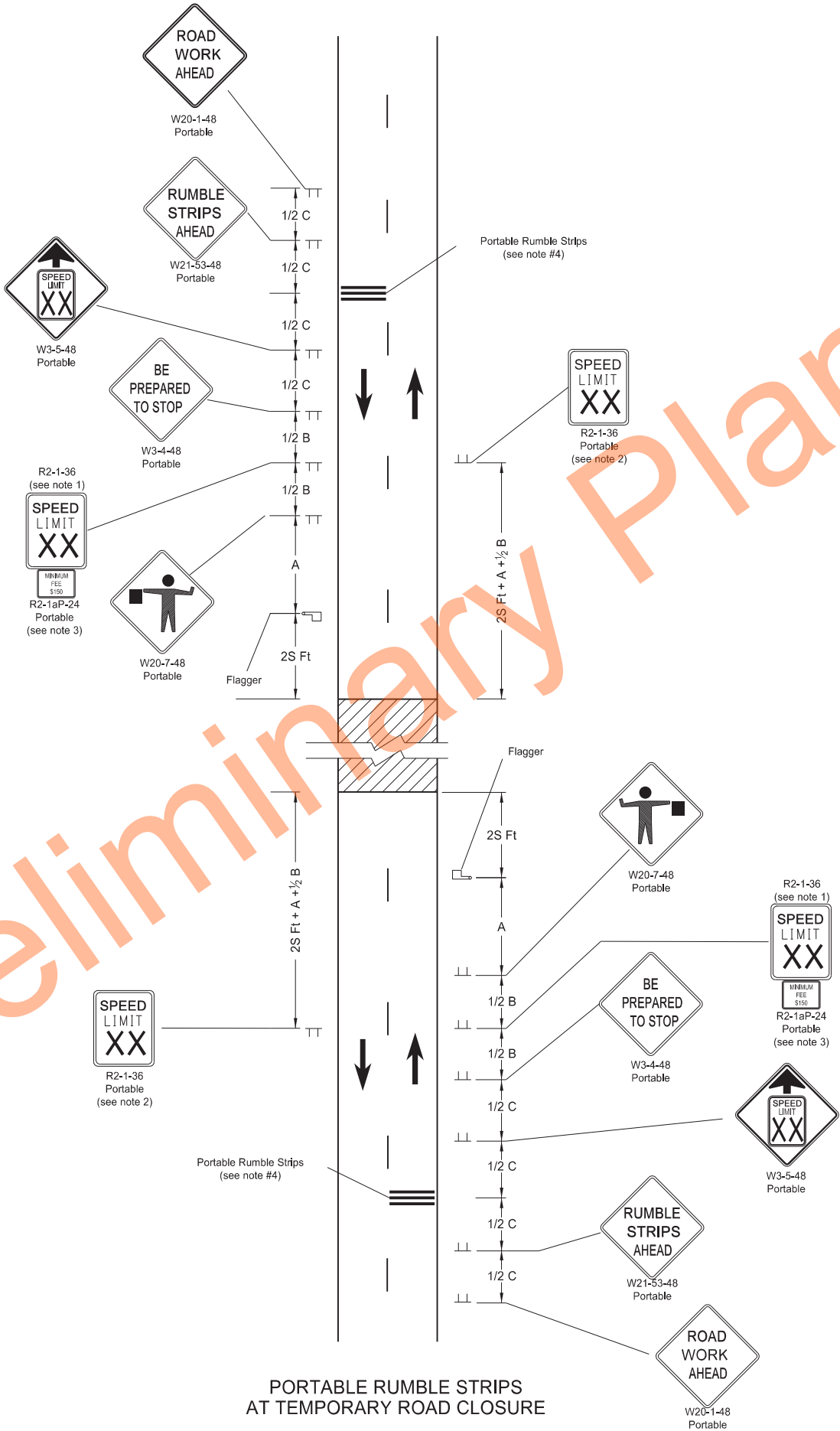
Flagger

Sign

KEY

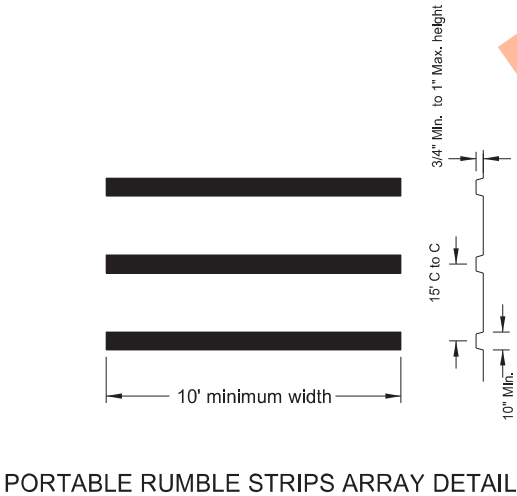
S = Numerical value of speed limit or 85th percentile.

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

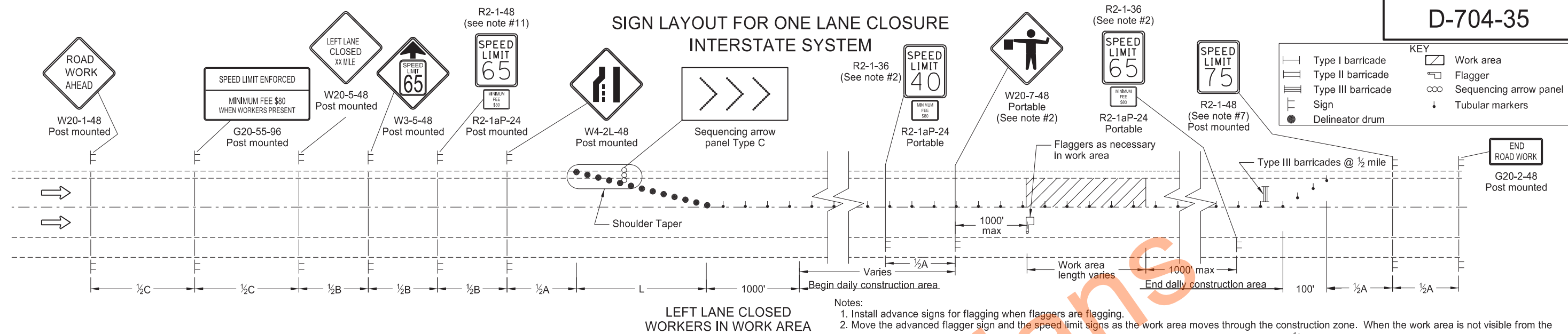
- Notes:
- Determine speed in the field based on location and conditions.
 - Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
 - Sign R2-1aP-24 is not required when pilot car operation is used.
 - Do not use rumble strips on a non paved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



PORTABLE RUMBLE STRIPS
AT TEMPORARY ROAD CLOSURE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
02-22-22	
REVISIONS	
DATE	CHANGE
03-07-23 06-30-25	Use changed to min 45 mph Legislative Changes

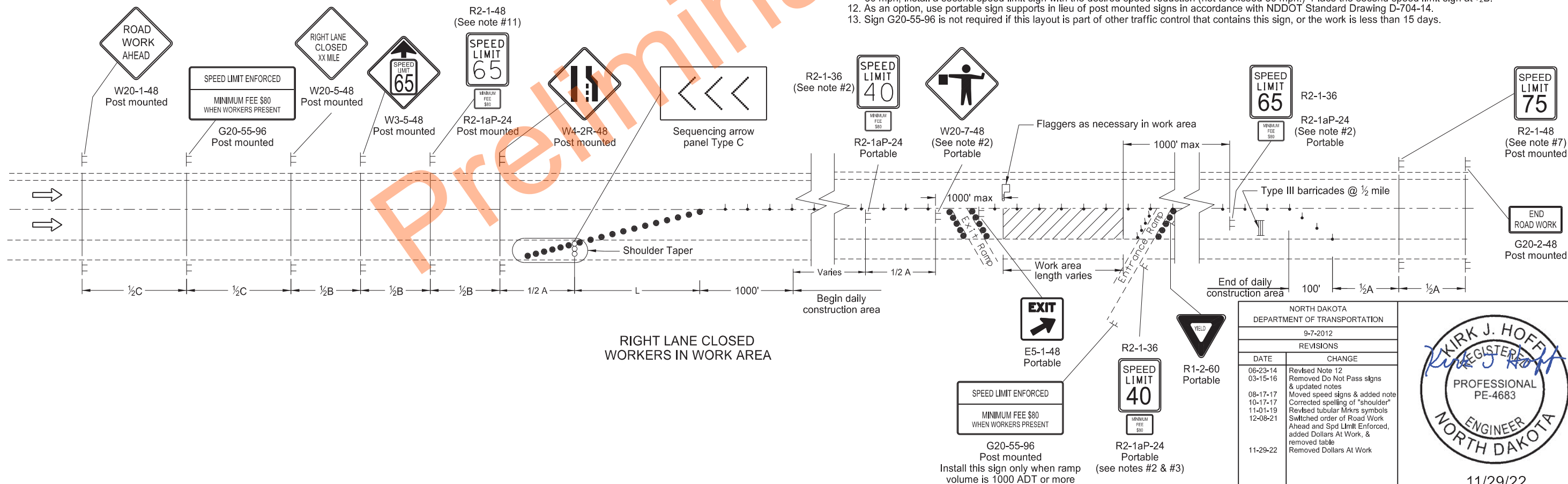




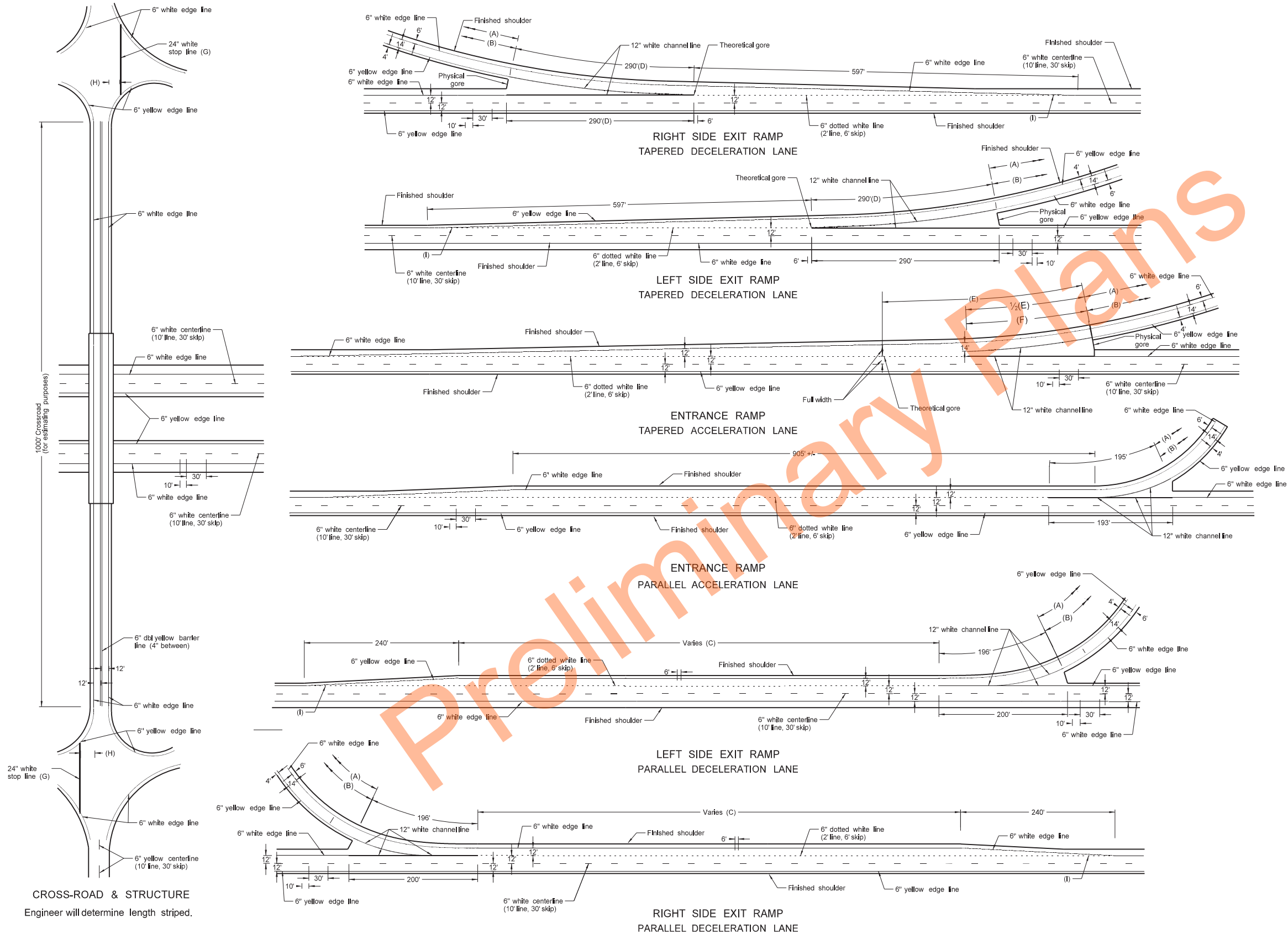
Notes:

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 $\frac{1}{2}A$ 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 \$80 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 $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S \times 60$ 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 $\frac{1}{2}B$.
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.

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 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500



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.
 - (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.
 - (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.

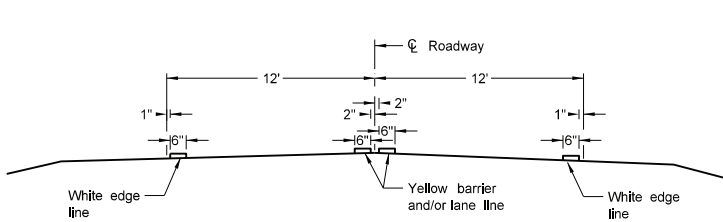
BASIS OF ESTIMATE		
LOCATION	ITEM	
Right or Left Side Exit Ramp TAPERED	12" White channel line	580 LF
	24" White stop line	60 LF
	6" White dotted line	148 LF
	6" White edge line	1115 LF
	6" Yellow edge line	1075 LF
Entrance Ramp TAPERED	12" White channel line	390 LF
	6" White dotted line	258 LF
	6" White 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" White lane line, 10' line, 30' skip	2640 LF/MI
	6" White edge line	10,560 LF/MI
	6" Yellow edge line	10,560 LF/MI
Cross Road	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

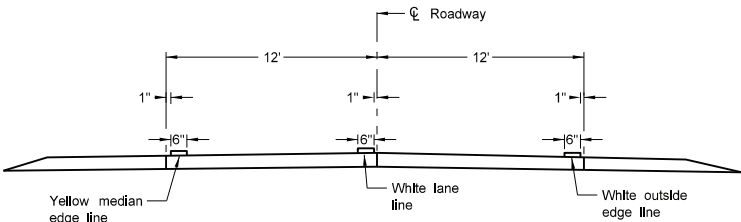


PAVEMENT MARKING

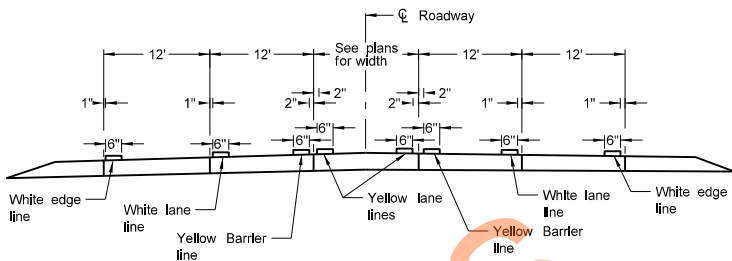
D-762-4



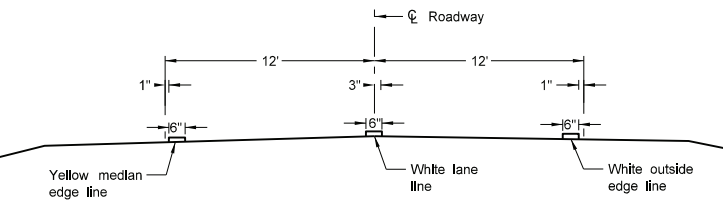
Two Lane Two Way
RURAL ROADWAY



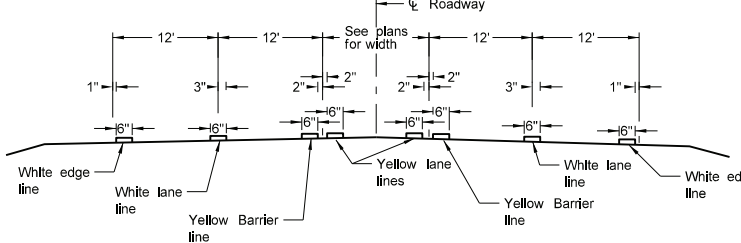
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



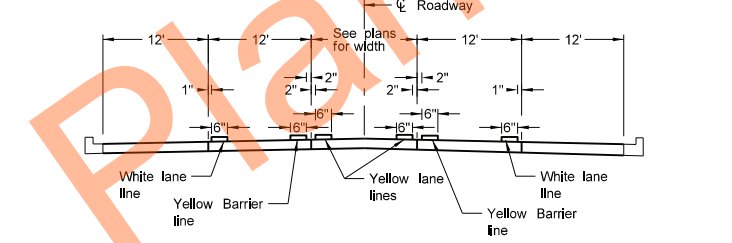
RURAL FIVE LANE ROADWAY
Concrete Section



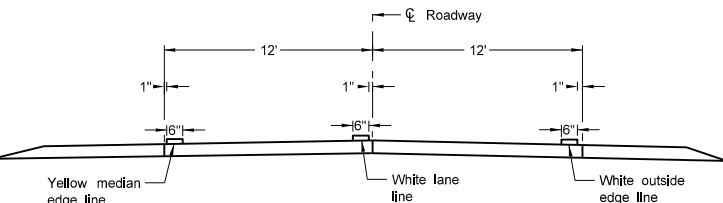
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



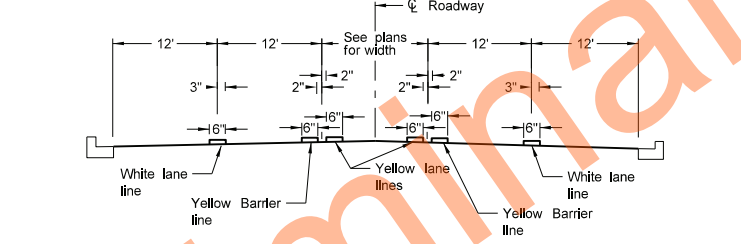
RURAL FIVE LANE ROADWAY
Asphalt Section



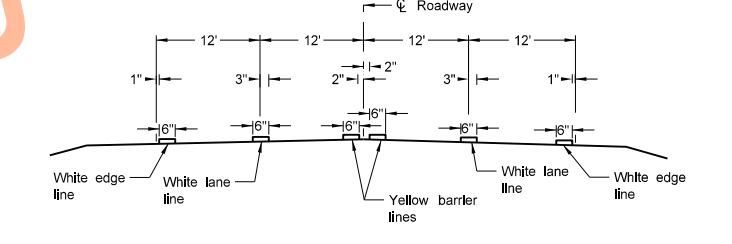
URBAN FIVE LANE SECTION
Concrete Section



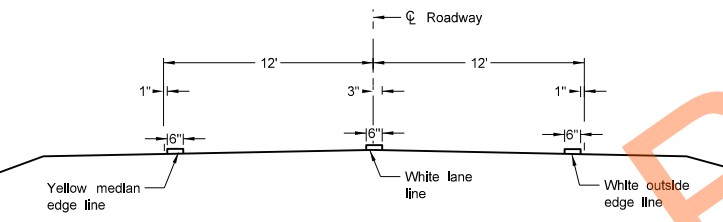
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



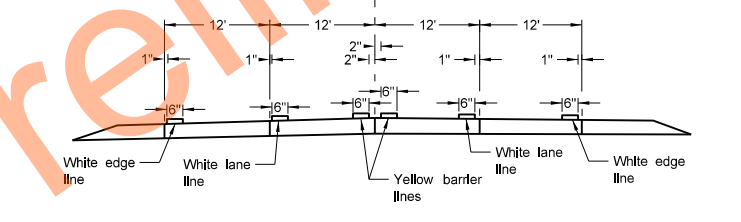
URBAN FIVE LANE SECTION
Asphalt Section



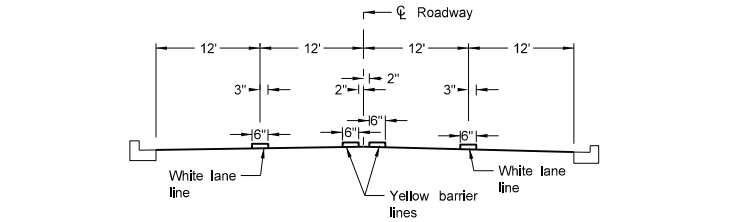
RURAL FOUR LANE ROADWAY
Asphalt Section



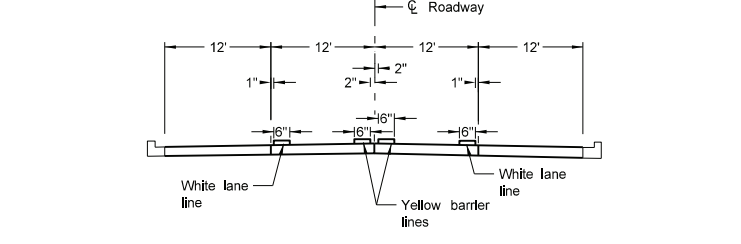
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



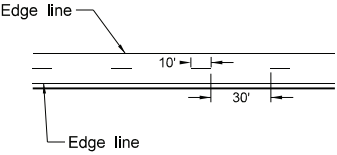
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

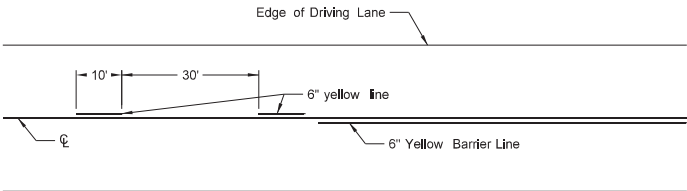
- NOTES:
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.
 2. For section lines, county roads, and street approaches, stripe the radii and edge lines of the paved surface within the right of way except where curb and gutter is present.
 3. Normal width 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.

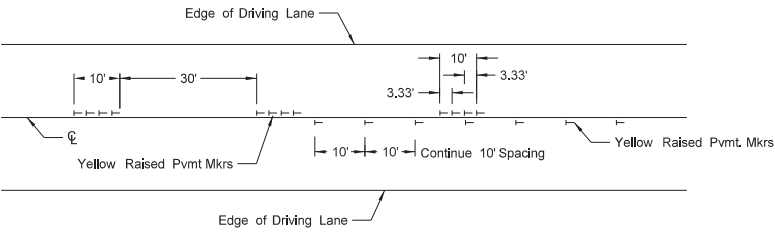


SHORT-TERM PAVEMENT MARKING

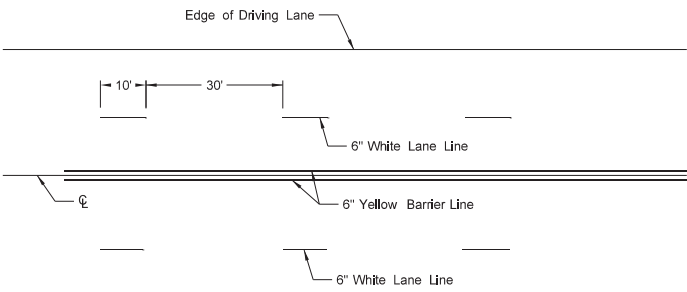
D-762-11



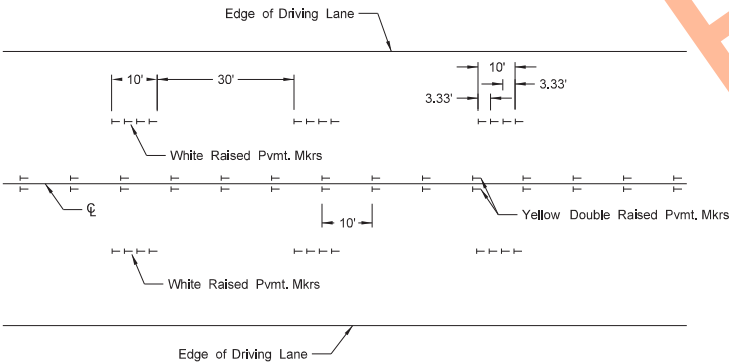
Painted or Tape Lines



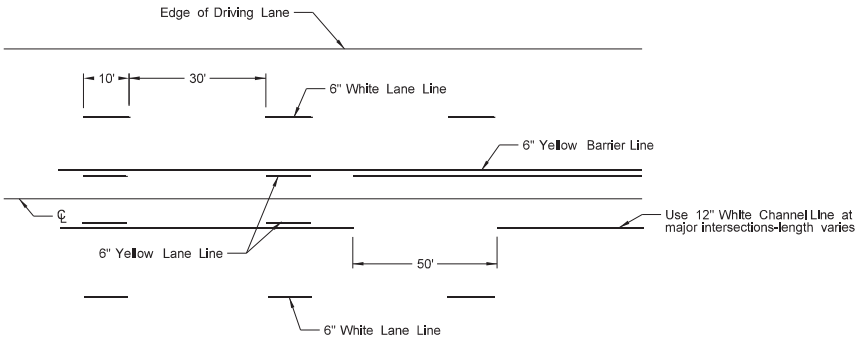
Raised Pavement Markers
TWO-LANE TWO-WAY ROADWAY



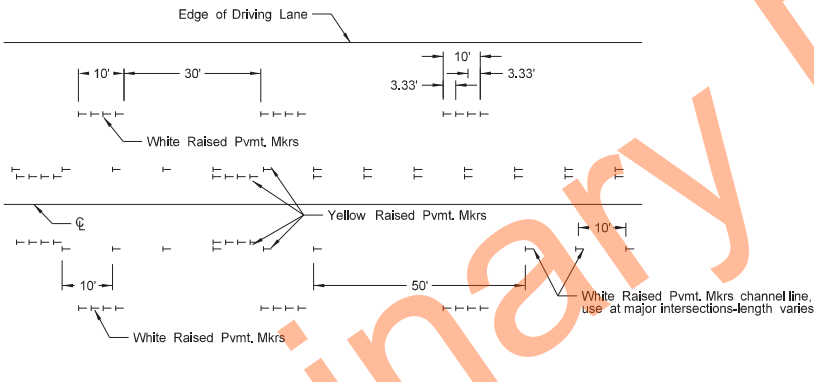
Painted or Tape Lines



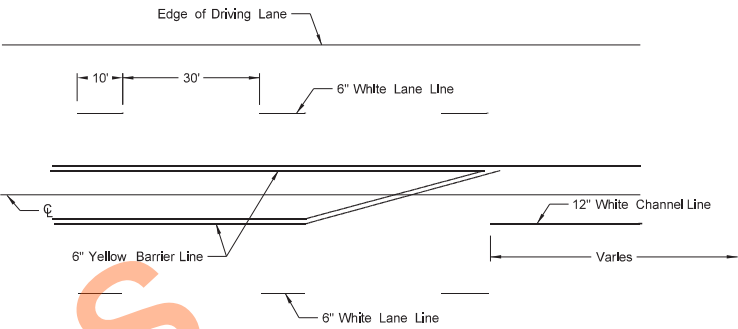
Raised Pavement Markers
FOUR LANE ROADWAY



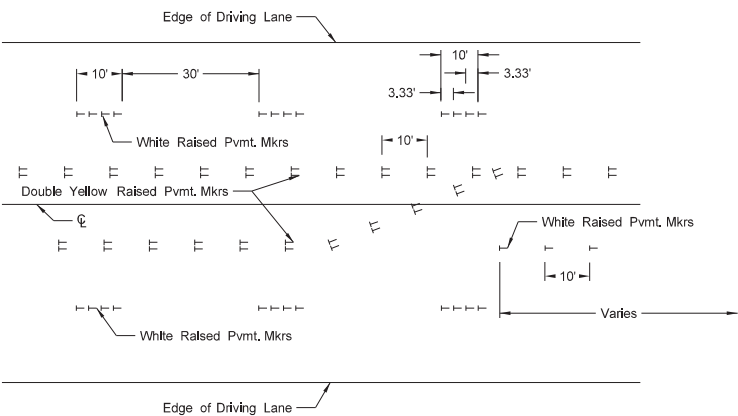
Painted or Tape Lines



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.

