

DESIGN DATA: RP 73.667 to 74.623 NB				
Traffic	Average Daily			
Current 2020	Pass: 4,060	Trucks: 225	Total: 4,285	
Forecast 2040	Pass: 5,485	Trucks: 325	Total: 5,810	
Clear Zone Distance: Use Existing		Design Speed: 55		
Minimum Sight Dist. for Stopping: Use Existing		Bridges: N/A		
Sight Dist. for No Passing Zone: Use Existing				
Pavement Design Life (years)				
Design Accumulated One-way ESALs:				
DESIGN DATA: RP 73.667 to 74.623 SB				
Traffic	Average Daily			
Current 2020	Pass: 4,200	Trucks: 225	Total: 4,425	
Forecast 2040	Pass: 5,670	Trucks: 325	Total: 5,995	
Clear Zone Distance: Use Existing		Design Speed: 65		
Minimum Sight Dist. for Stopping: Use Existing		Bridges: N/A		
Sight Dist. for No Passing Zone: Use Existing				
Pavement Design Life (years)				
Design Accumulated One-way ESALs:				

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

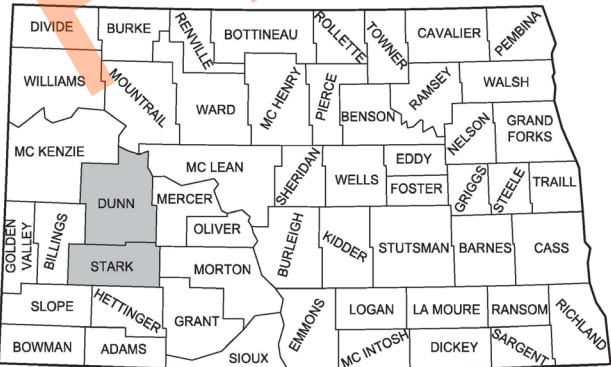
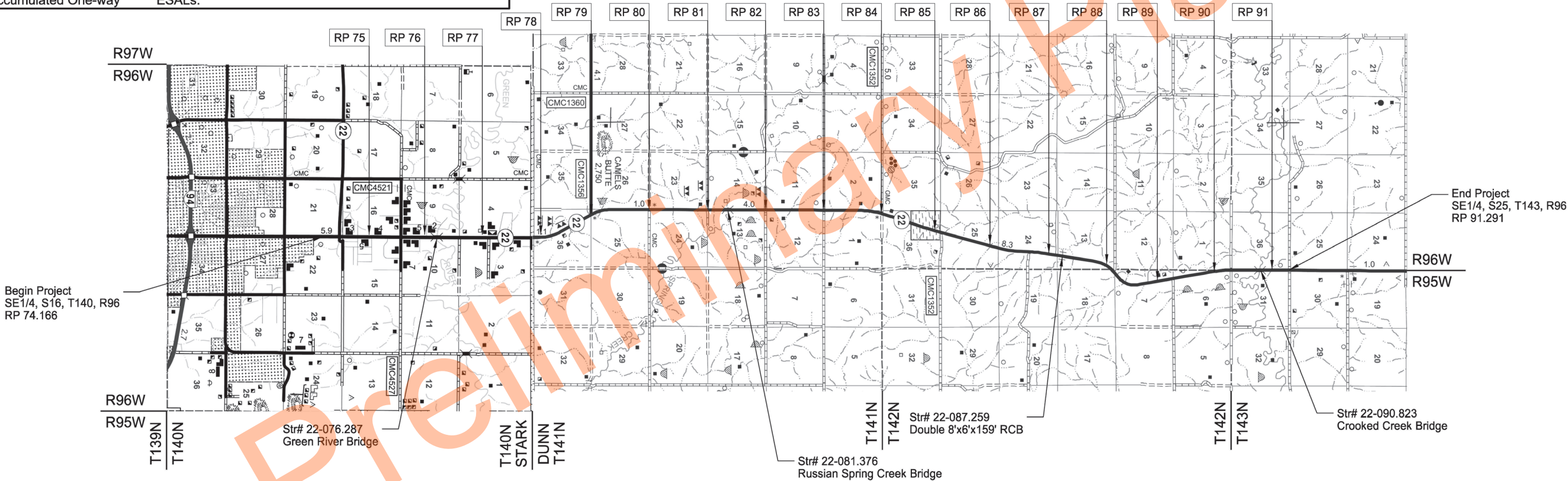
XA-SS-5-022(140)074

Stark & Dunn Counties
From Dickinson 45th St to 17th St NW

3" HMA Overlay, Structure Repairs, Pavement Markings

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	04/01/2023
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
XA-SS-5-022(140)074	17.125	17.125



DESIGNER Lucas Doerr, PE
DESIGNER Ryan Kleppinger
DESIGNER Paul Holter, EIT

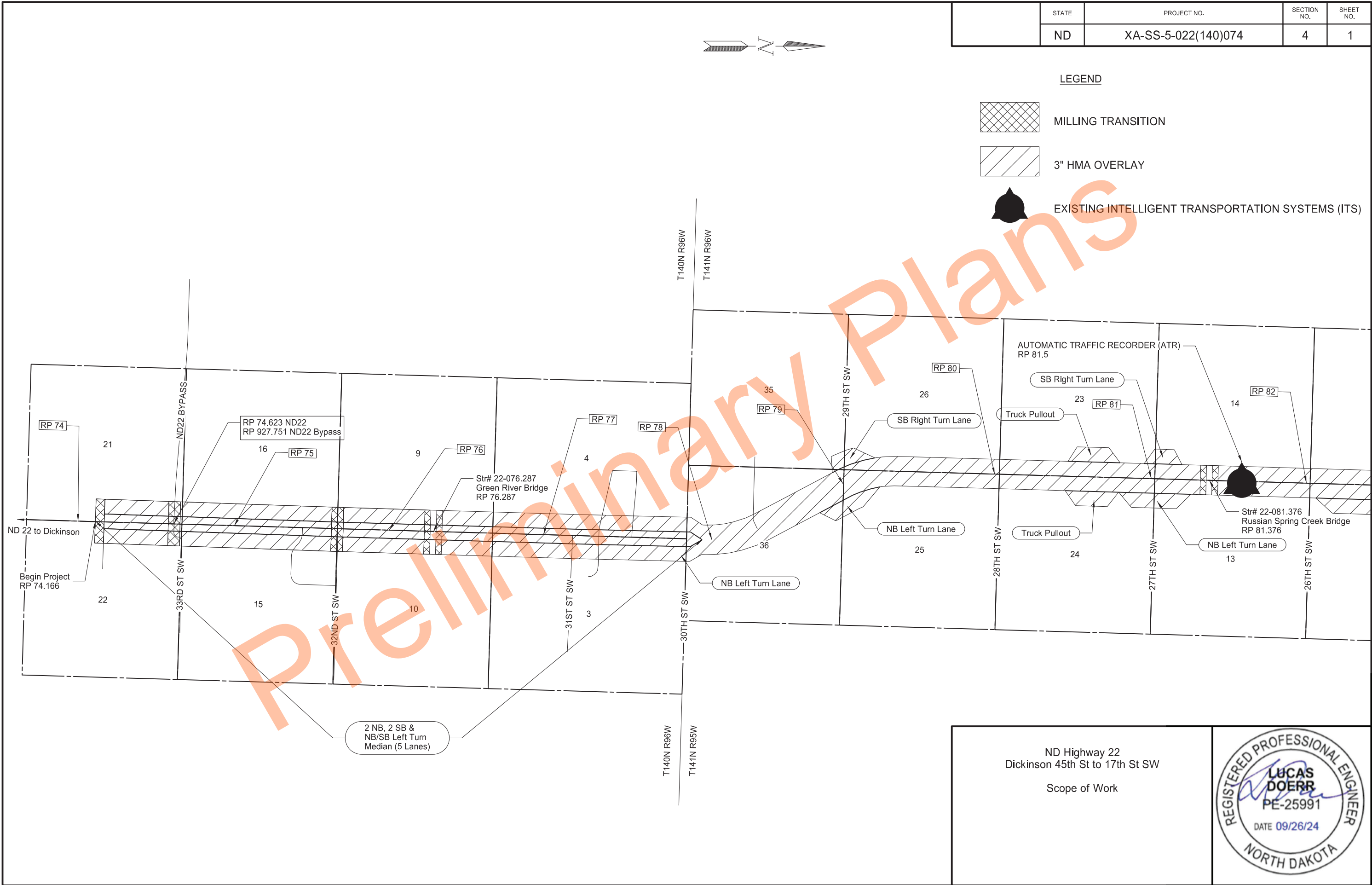
ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

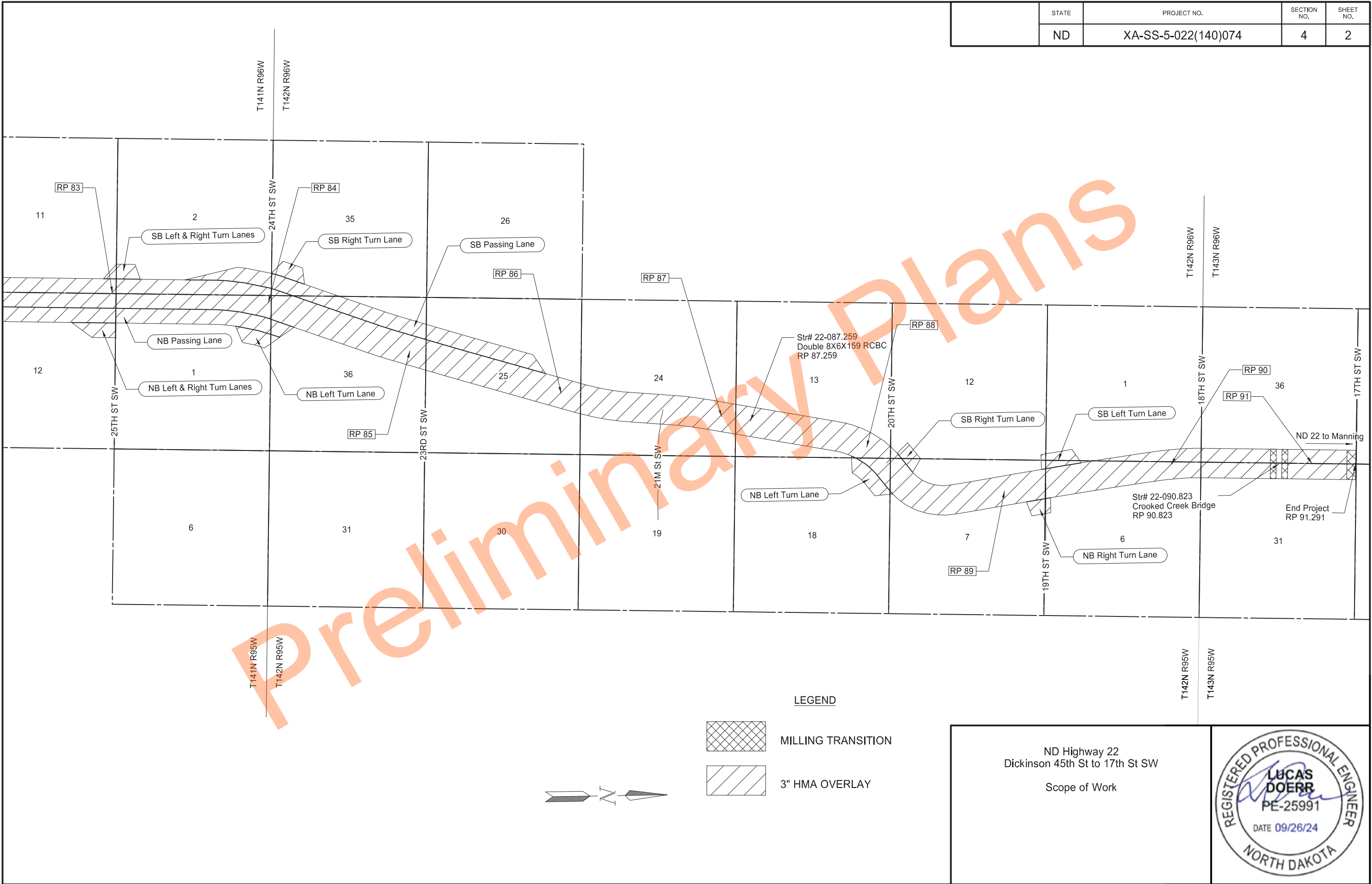
Kirk Hoff
11/18/24

BROSZ ENGINEERING, INC.



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Number	Description								
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NOTES

100-P01 COORDINATION OF PROJECTS: The following project is under contract for the 2025 construction season and will include construction activities within the vicinity of the work area of this project.

- XA-SS-5-022(141)091 – 17th St SW to JCT ND 200 Killdeer

The work to be performed as part of Project XA-SS-5-022(141)091 will include a 3" HMA Overlay, ADA Curb Ramps, Erosion Repairs, and Structure Repairs on ND Hwy 22 from 17th St SW to the junction of ND 22 and ND 200 – Killdeer.

The Contractor will be responsible for coordinating work activities for this project with the work activities to be performed from project XA-SS-5-022(141)091. All costs for project coordination are incidental to the project.

107-P01 MAINTAINING TRAFFIC – UNEVEN SHOULDER: If a shoulder and the adjacent lane are uneven due to milling or paving operations, the requirements of Section 704.04 O, "Traffic Control for Uneven Pavement" apply. If the uneven shoulder and adjacent lane are due to other circumstance, the contents of this note apply. If, at the end of the work-day, drop-offs greater than 2 inches and less than 18 inches or slopes steeper than 4:1 exist between the edge of a traffic lane and the outside edge of the proposed roadway, perform one of the following actions:

- Construct a traversable wedge in the area of the drop-off or steep slope; or
- Close the lane adjacent to the drop-off or steep slope and provide 24-hour flagging or pilot car operations.

When constructing a wedge, construct a wedge composed of aggregate or earthen materials with a 4:1 or flatter slope along the entire length of the area. Compact materials using Type C compaction, as specified in 203.04 G.4, "Compaction Control Type C".

Install stackable vertical panels that meet the requirements of Section 704.03 H, "Stackable Vertical Panels", along the edge of the driving lane closest to the wedge.

The Engineer will measure stackable vertical panels as specified in Section 704.05, "Method of Measurement" and will pay for panels as specified in Section 704.06, "Basis of Payment".

The Engineer will not measure material used to construct the wedge. Include the cost of materials, equipment, labor, and incidentals required for this operation in the price bid for aggregate or earthwork pay items.

If a 4:1 or flatter wedge is not installed, provide 24 hour flagging or pilot car operations and associated traffic control at no additional cost to the Department.

108-100 WEEKLY PLANNING & REPORTING MEETING: A weekly planning and reporting meeting is required.

430-P01 HMA LONGITUDINAL JOINTS: Construct the joints within the final lift of pavement as detailed within this note.

Place a longitudinal joint at the centerline of the roadway.

Unless work zone traffic control phasing dictates otherwise, construct each lane and the adjoining shoulder using a single pass or a hot seam.

A hot seam is defined as follows:

- Constructed using two pavers simultaneously;
- No more than 300 feet between pavers; and
- Roll the seam between paver passes in a manner such that the seam is not visible.

430-P02 BLADE LEVELING: Perform blade leveling on the project. Use approximately ¼" of the 3" HMA for blade leveling prior to paving. Perform blade leveling in a single motor grader pass across the full width of the driving surface in each lane. Compact the material using a pneumatic roller prior to paving. The minimum thickness for the top lift is 1.5". Include all costs to perform blade leveling in the price bid for "Superpave FAA 45".

704-100 TRAFFIC CONTROL SUPERVISOR: Provide a Traffic Control Supervisor.

704-500 PORTABLE RUMBLE STRIPS (PRS): Use PRS made of rubber or engineered polymers.

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

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

Install PRS that meet the following criteria:

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

Use individual PRS constructed in one of the following manners:

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



NOTES

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

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

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

704-P01 TRAFFIC CONTROL FOR UNEVEN LANES: The contents of this note replace Section 704.04 O.2, "Two Lane Roadways" in the Standard Specifications.

If the pavement in adjacent lanes is uneven at the completion of a day's work, install traffic control as described in this note. For the purposes of this note, use of a notched wedge during asphalt paving is considered greater than 1 inch and less than 2 inches.

If the difference in elevation between the lanes is less than 1 inch install the following signs:

- "Uneven Lanes" sign (Sign W8-11-48) and a supplementary plaque identifying the length of the uneven pavement (Sign W20-52-54). Place this assembly on the right shoulder, in both directions, in advance of the uneven pavement.

If the difference in elevation between the lanes is greater than 1 inch and less than 2 inches install the following signs:

- "Uneven Lanes" sign (Sign W8-11-48) and a supplementary plaque identifying the length of the uneven pavement (Sign W20-52-54). Place this assembly on the right shoulder, in both directions, in advance of the uneven pavement.
- Between the "Uneven Lanes" sign and the beginning of the uneven pavement, install a "Do Not Pass" sign (Sign R4-1-48) on the right shoulder in both directions.

If the difference in elevation between the lanes is 2 inches or greater install the following traffic control devices:

- "Uneven Lanes" sign (Sign W8-11-48) and a supplementary plaque identifying the length of the uneven pavement (Sign W20-52-54). Place this assembly on the right shoulder, in both directions, in advance of the uneven pavement.
- Between the "Uneven Lanes" sign and the beginning of the uneven pavement, install a "Do Not Pass" sign (Sign R4-1-48) on the right shoulder in both directions.
- Install tubular markers spaced at 2 times the posted speed limit through the uneven lane area.

In all instances install "Uneven Lanes" signs and a supplementary plaque identifying the length of the uneven pavement at the following intersections:

County Major Collectors; 23rd St SW, 24th St SW, 28th St SW, 29th St SW, and 32nd St SW
State Highways; ND22 Bypass

704-P02 TRAFFIC CONTROL FOR BITUMINOUS PAVEMENT: From RP 77.941 to RP 91.439, provide traffic control consisting of a temporary road closure, flagging, and a pilot car.

Traffic control device quantities are estimated based on a 6-mile lane closure and the list below. The Department will pay for all necessary deployed devices, regardless of the length of the lane closure.

1. Standard D-704-12;
2. Standard D-704-33;
3. Standard D-704-20, layout G – signing will be required at junctions at HWY 22: 23rd St SW, 24th St SW, 28th St SW 29th St SW
4. Standard D-704-22, layouts K and L; and
5. Standard D-704-26, layouts CC, EE, and GG
6. Standard D-704-26, layout KK – signing will be required at junctions at HWY 22: 23rd St SW, 24th St SW, 28th St SW 29th St SW when pilot car operations are being utilized.

762-050 PAVEMENT MARKING: If the Engineer and Contractor agree, plan quantity will be used as the measurement for payment for pavement marking items.

772-P01 ITS EQUIPMENT: Intelligent Transportation Systems (ITS) equipment is located within the project limits.

An Automatic Traffic Recorder (ATR) site is located on ND Highway 22 at RP 81.5. Provide 2 weeks' notice before work begins in this area. NDDOT district personnel will disconnect the loops in the roadway. Pave through this area as shown in the plans.



ENVIRONMENTAL NOTES

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

EN-1 AQUATIC NUISANCE SPECIES (ANS): Equipment that was last used outside of North Dakota or within a Class I infested waterbody (identified on the North Dakota Game and Fish Department (NDGFD) website) requires an inspection by NDGFD. Notify the NDGFD at least 10 business days prior to pumps, watercraft, or any equipment entering a public water to allow the NDGFD sufficient time to inspect any and all such equipment for ANS. Contact the NDGFD ANS Coordinator, Ben Holen by e-mail - bholen@nd.gov for equipment inspections. Supply one of the following to the engineer as proof of compliance prior to work taking place in the water: (1) the NDGFD inspection report, (2) documented NDGFD correspondence (email or signed letter).

Preliminary Plans



Estimated Quantities

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	ND	XA-SS-5-022(140)074	8	1

Mainline:					
SPEC	CODE	ITEM DESCRIPTION	UNIT		TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
109	1000	E-TICKETING	L SUM	1	1
216	0100	WATER	M GAL	65	65
302	0120	AGGREGATE BASE COURSE CL 5	TON	1992	1992
401	0050	TACK COAT	GAL	54315	54315
411	0100	MILLING PAVEMENT SURFACE	TON	5003	5003
411	0110	MILLING PCC PAVEMENT	SY	212	212
430	0045	SUPERPAVE FAA 45	TON	90970	90970
430	1000	CORED SAMPLE	EA	968	968
430	5818	PG 58H-34 ASPHALT CEMENT	TON	5460	5460
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1961	1961
602	7000	SPECIAL SURFACE FINISH	SF	1802	1802
702	0100	MOBILIZATION	L SUM	1	1
704	0100	FLAGGING	MHR	1936	1936
704	1000	TRAFFIC CONTROL SIGNS	UNIT	3772	3772
704	1048	PORTABLE RUMBLE STRIPS	EA	6	6
704	1052	TYPE III BARRICADE	EA	12	12
704	1060	DELINEATOR DRUMS	EA	44	44
704	1067	TUBULAR MARKERS	EA	494	494
704	1080	STACKABLE VERTICAL PANELS	EA	50	50
704	1185	PILOT CAR	HR	420	420
706	0550	BITUMINOUS LABORATORY	EA	1	1
706	0600	CONTRACTOR'S LABORATORY	EA	1	1
760	0025	SINUSOIDAL RUMBLE STRIP - ASPHALT SHOULDER	MILE	34	34
760	0027	SINUSOIDAL RUMBLE STRIP - ASPHALT CENTERLINE	MILE	17	17
762	0111	EPOXY PVMT MK 12IN LINE	LF	16664	16664
762	0112	EPOXY PVMT MK MESSAGE	SF	1791	1791
762	0114	EPOXY PVMT MK 6IN LINE	LF	361676	361676
762	0117	EPOXY PVMT MK 24IN LINE	LF	333	333
762	0432	SHORT TERM 6IN LINE-TYPE NR	LF	624402	624402
762	0436	SHORT TERM 24IN LINE-TYPE NR	LF	601	601
762	0437	SHORT TERM 12IN LINE-TYPE NR	LF	65370	65370
930	9223	CRACK SEALING	LF	1881	1881
930	9612	SPALL REPAIR	SF	10	10
930	9694	GIRDER PATCHING	L SUM	1	1

																		STATE		PROJECT NO.				SECTION NO.		SHEET NO.														
																ND		XA-SS-5-022(140)074								10		1												
Basis of Estimate ND 22		Typical Section 1			Typical Section 2			Typical Section 3			Typical Section 4			Typical Section 5			Typical Section 6			Typical Section 7																				
		RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP																		
Surfacing Quantities		74.166	to	77.440	3.274	77.750	to	77.816	0.066	77.864	to	77.918	0.054	78.108	to	78.772	0.664	78.870	to	78.942	0.072	79.017	to	79.074	0.057	80.609	to	80.666	0.057											
		83.909	to	83.959	0.050									79.155	to	80.552	1.397	80.880	to	80.951	0.071	81.018	to	81.146	0.128															
														80.723	to	80.825	0.102					88.147	to	88.280	0.133															
														81.271	to	82.078	0.807																							
														85.840	to	87.917	2.077																							
														88.319	to	89.138	0.819																							
														89.535	to	91.291	1.756																							
Total =		3.324			Total =			0.066			Total =			0.054			Total =			7.622			Total =			0.143			Total =			0.318			Total =			0.057		
Material	Unit	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section												
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	76.0	2229.3	7,410.30	68.0	1994.7	131.65	76.0	2229.3	120.38	40.0	1173.3	8,943.15	52.0	1525.3	218.12	60.0	1760.0	559.68	80.0	2346.7	133.76																		
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	76.0	2229.3	7,410.30	68.0	1994.7	131.65	76.0	2229.3	120.38	40.0	1173.3	8,943.15	52.0	1525.3	218.12	60.0	1760.0	559.68	80.0	2346.7	133.76																		
Superpave FAA 45 (2 Ton/CY)	Ton	73.8	7324.0	24,344.98	65.8	6544.0	431.90	73.8	7327.0	395.66	37.8	3804.0	28,994.09	49.8	4977.0	711.71	57.8	5760.0	1,831.68	78.0	7716.0	439.81																		
PG 58H-34 Asphalt Cement (6.0%)	Ton	73.8	439.4	1,460.57	65.8	392.6	25.91	73.8	439.6	23.74	44.5	228.2	1,739.34	49.8	298.6	42.70	57.8	345.6	109.90	78.0	463.0	26.39																		
Basis of Estimate ND 22		Typical Section 8			Typical Section 9			Typical Section 10			Typical Section 11			Typical Section 12			Transition: Typ 1 to 2			Transition: Typ 1 to 10																				
		RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP																		
Surfacing Quantities		82.223	to	82.800	0.577	82.909	to	83.148	0.239	84.018	to	84.145	0.127	84.31	to	85.706	1.396	89.199	to	89.284	0.085	77.44	to	77.750	0.310	83.959	to	84.018	0.059											
		83.249	to	83.574	0.325																																			
		Total =		0.902	Total =			0.239	Total =			0.127	Total =			1.396	Total =			0.085	Total =			0.310	Total =			0.059												
Material	Unit	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section												
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	48.0	1408.0	1,270.02	72.0	2112.0	504.77	80.0	2346.7	298.03	48.0	1408.0	1,965.57	60.0	1760.0	149.60	72.0	2112.0	654.72	76.0	2288.0	134.99																		
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	48.0	1408.0	1,270.02	72.0	2112.0	504.77	80.0	2346.7	298.03	48.0	1408.0	1,965.57	60.0	1760.0	149.60	72.0	2112.0	654.72	76.0	2288.0	134.99																		
Superpave FAA 45 (2 Ton/CY)	Ton	45.8	4587.0	4,137.47	69.8	6936.0	1,657.70	77.8	7718.0	980.19	45.8	4587.0	6,403.45	57.8	5762.0	489.77	69.8	6934.0	2,149.54	73.8	7521.0	443.74																		
PG 58H-34 Asphalt Cement (6.0%)	Ton	45.8	275.2	248.23	69.8	416.2	99.47	77.8	463.1	58.81	45.8	275.2	384.18	57.8	345.7	29.38	69.8	416.0	128.96	73.8	451.3	26.62																		
Basis of Estimate ND 22		Transition: Typ 2 to 3			Transition: Typ 3 to 4			Transition: Typ 4 to 5			Transition: Typ 4 to 7 & Typ 7 to 4			Transition: Typ 4 to 8			Transition: Typ 4 to 6 & Typ 6 to 4			Transition: Typ 4 to 12 & Typ 12 to 4																				
		RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP																		
Surfacing Quantities		77.816	to	77.864	0.048	77.918	to	78.108	0.190	78.772	to	78.87	0.098	80.552	to	80.609	0.057	82.078	to	82.223	0.145	79.074	to	79.155	0.081	89.138	to	89.199	0.061											
										80.825	to	80.88	0.055	80.666	to	80.723	0.057					81.146	to	81.271	0.125	89.284	to	89.535	0.251											
																						87.917	to	88.147	0.23															
																						88.28	to	88.319	0.039															
		Total =		0.048	Total =			0.190	Total =			0.153	Total =			0.114	Total =			0.145	Total =			0.475	Total =			0.312												
Material	Unit	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section												
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	58.0	2112.0	101.38	64.0	1701.3	323.25	78.0	1349.3	206.45	78.0	1760.0	200.64	68.0	1290.7	187.15	60	1466.7	696.7	78.0	1466.7	457.60																		
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	58.0	2112.0	101.38	64.0	1701.3	323.25	78.0	1349.3	206.45	78.0	1760.0	200.64	68.0	1290.7	187.15	60	1466.7	696.7	78.0	1466.7	457.60																		
Superpave FAA 45 (2 Ton/CY)	Ton	55.8	6935.5	332.90	61.8	5565.5	1,057.44	75.9	4390.5	671.75	75.8	5760.0	656.64	65.8	4195.5	608.35	57.8	4782.0	2271.5	75.9	4783.0	1,492.30																		
PG 58H-34 Asphalt Cement (6.0%)	Ton	59.2	416.1	19.97	61.8	333.9	63.44	75.9	263.4	40.30	75.8	345.6	39.40	65.8	251.7	36.50	57.8	286.9	136.3	75.9	287.0	89.53																		
																ND Highway 22 Dickinson 45th St to 17th St SW Basis of Estimate																								

																	STATE		PROJECT NO.				SECTION NO.		SHEET NO.	
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Basis of Estimate ND 22			Transition: Typ 5 to 6			Transition: Typ 8 to 9 & Typ 9 to 8			Transition: Typ 8 to 1			Transition: Typ 10 to 11			Transition: Typ 11 to 4		
			RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP	RP		# of RP
			78.942 to 80.951	79.017 to 81.018	0.075 to 0.067	82.8 to 83.148	82.909 to 83.249	0.109 to 0.101	83.574 to 83.909		0.335	84.145 to 84.31		0.165	85.706 to 85.84		0.134
Surfacing Quantities			Total =		0.142	Total =		0.210	Total =		0.335	Total =		0.165	Total =		0.134
Material	Unit	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	Average Width (ft)	Quantity per Mile	Total Per Section	
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	62.0	1642.7	233.26	44.0	1760.0	369.60	54.0	1818.7	609.25	70.0	1877.3	309.76	48.0	1290.7	172.95	
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	62.0	1642.7	233.26	44.0	1760.0	369.60	54.0	1818.7	609.25	70.0	1877.3	309.76	48.0	1290.7	172.95	
Superpave FAA45 (2 Ton/CY)	Ton	59.8	5368.5	762.33	41.8	5761.5	1,209.92	51.8	5955.5	1,995.09	67.8	6152.5	1,015.16	45.8	4195.5	562.20	
PG 58H-34 Asphalt Cement (6.0%)	Ton	59.8	322.1	45.74	45.2	345.7	72.60	51.8	357.3	119.70	67.8	369.2	60.91	45.8	251.7	33.73	

		Section 10 Surfacing Quantities	Section 20 Sheet 1	Section 20 Sheet 3	Section 40 Sheet 1	Section 40 Sheet 2	Section 40 Sheet 3	Section 40 Sheet 4	Section 40 Sheet 5	Section 40 Sheet 6	Section 90 Sheet 1	Section 90 Sheet 2	Section 90 Sheet 3	Section 90 Sheet 4	Section 90 Sheet 5	Section 90 Sheet 6	Total	Unit
Material - Project Summary		Unit																
Milling Pavement Surface		Ton	---	134	1,080	1,340	1,027	---	---	1,046	376	---	---	---	---	---	5,003	Ton
Milling PCC Pavement		SY	---	---	---	---	137	75	---	---	---	---	---	---	---	---	212	SY
Aggregate Base Course CL 5 (1.875 Ton/CY) (Mainline)		Ton	---	1,768	---	---	---	---	---	---	---	---	---	---	---	---	1,768	Ton
Aggregate Base Course CL 5 (1.875 Ton/CY) (Radius Slough		Ton	---	224	---	---	---	---	---	---	---	---	---	---	---	---	224	Ton
Tack Coat (0.05 Gal/SY)		Gal	52,726	1,076	---	---	---	---	---	---	4	3	8	4	358	136	54,315	Gal
Superpave FAA 45 (2 Ton/CY)		Ton	86,047	3,448	---	---	---	---	---	---	7	4	22	11	1,055	376	90,970	Ton
PG 58H-34 Asphalt Cement (6.0%)		Ton	5,162	207	---	---	---	---	---	---	1	1	1	1	64	23	5,460	Ton

HBP Cored Samples							HBP Cored Samples						
Specification	A	B	C	D	Quantity (A x B x C) (1 per mile)	Unit	Specification	A	B	C	D	Quantity (A x B x C) (1 per mile)	Unit
	Distance (ft)/1000	Lanes	Lifts					Distance (ft)/1000	Joints	Lifts			
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 4 & 7	44	2	2	176	N/A	EA	SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 4 & 7	44	1	2	88	N/A	EA
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 5, 8 & 11	19	3	2	114	N/A	EA	SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 5, 8, & 11	19	2	2	76	N/A	EA
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 2, 6, & 12	4	4	2	32	N/A	EA	SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 2, 6, & 12	4	3	2	24	N/A	EA
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 1, 3, & 9	23	5	2	230	N/A	EA	SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 1, 3, & 9	23	4	2	184	N/A	EA
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 10	2	6	2	24	N/A	EA	SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 10	2	5	2	20	N/A	EA
							Total				968	0	EA

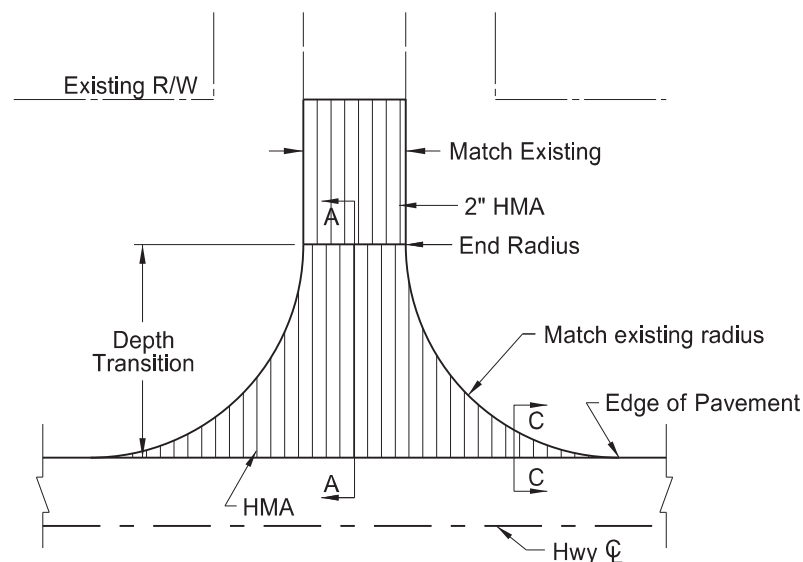
Sinusoidal Rumble Strips					
Type	Start RP	End RP	Length (LF)	Basis	Quantity
Asphalt Centerline	74.166	91.291	90,420	1 / Mile	17.1 Miles
Asphalt Shoulder	74.166	91.291	90,420	2 / Mile	34.3 Miles

Water	Total
25 MGal for Dust Palliative	25
0.02 MGal/Ton for Aggregates	40
Total (MGAL) =	65

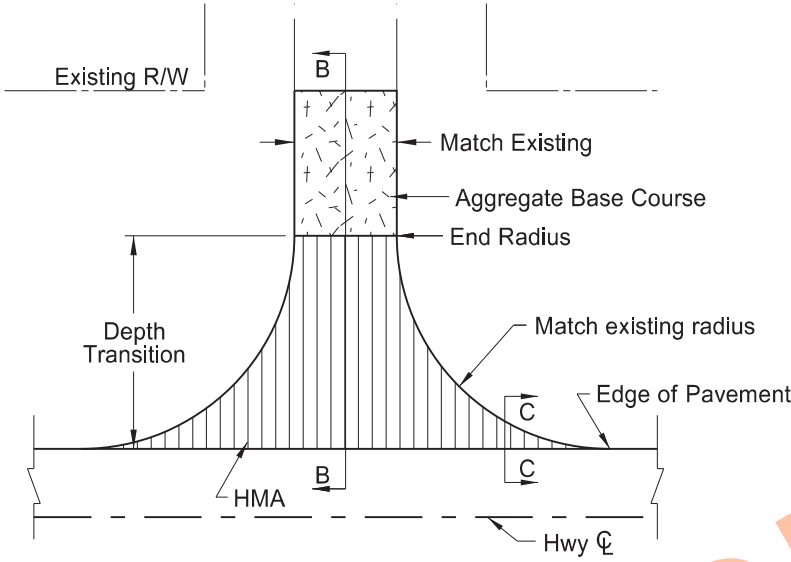
ND Highway 22
Dickinson 45th St to 17th St SW

Basis of Estimate

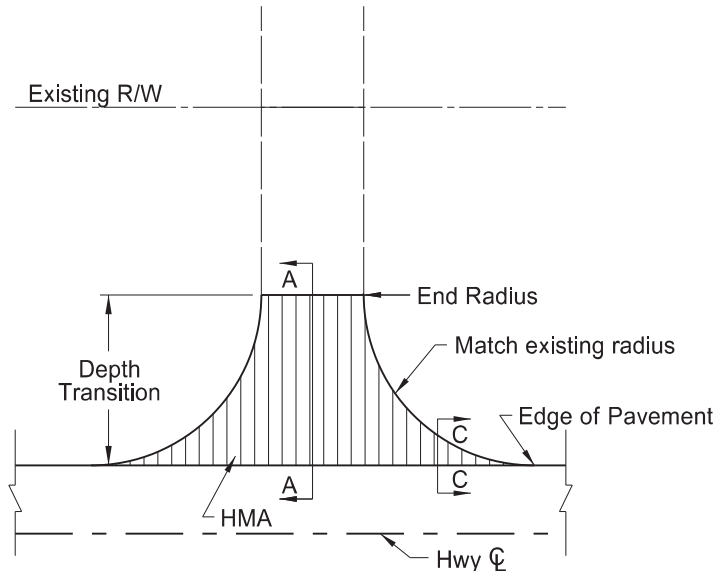
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	20	1



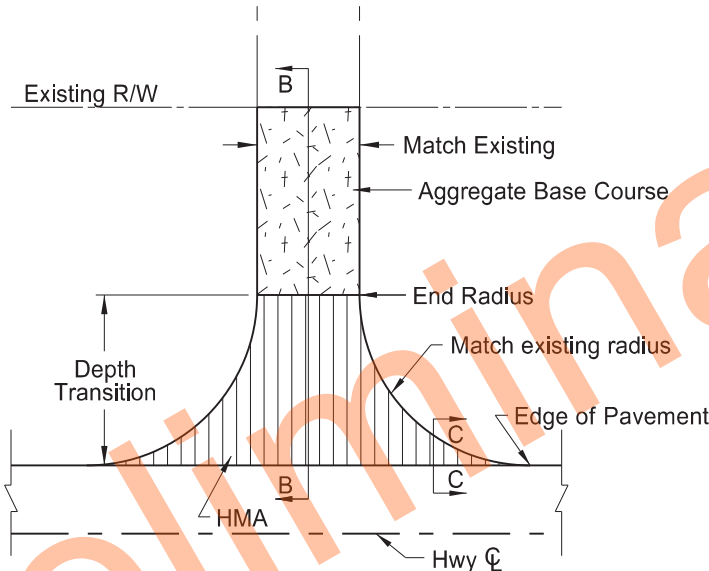
(1) Paved Section Line, County Road, or Street Approach



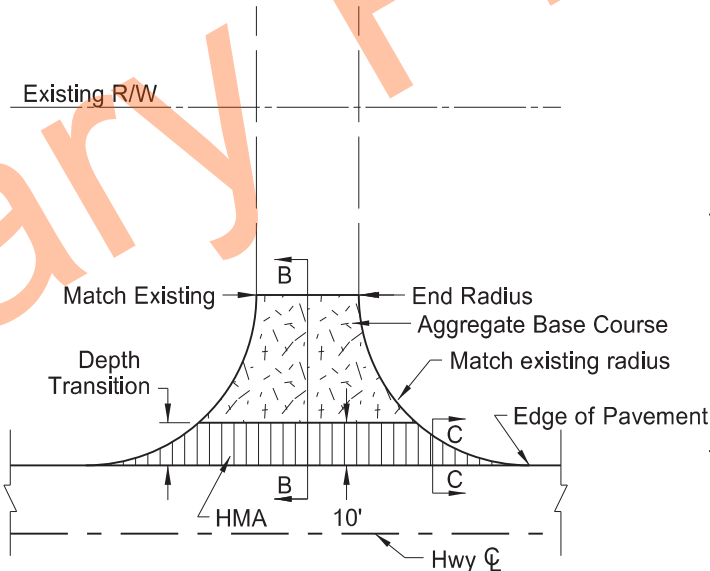
(2) Gravel Section Line, County Road, or Street Approach



(3) Paved Private Drive Approach



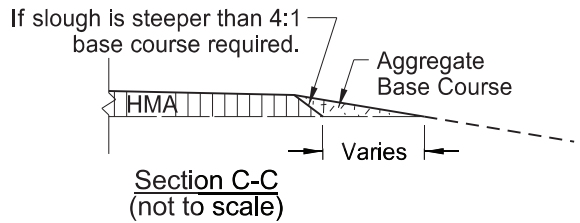
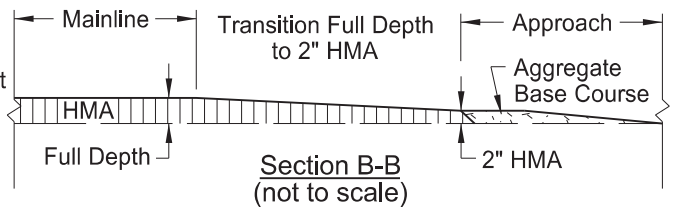
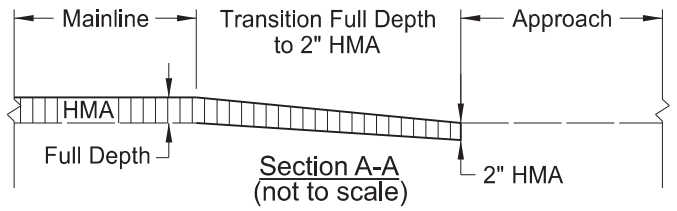
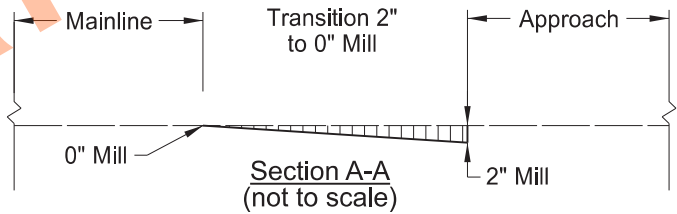
(4) Gravel Private Drive Approach



(5) Field Drive Approach

Notes:

- Actual HMA paving and aggregate base course locations may vary in the field, as approved by the Engineer.
- Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.
- Aggregate base course has been provided in the quantities to fill in around the radii. This material will be required when sloughs are steeper than 4:1 (see section C-C)



BASIS OF ESTIMATE		1	2	3	4	5	TOTAL
		Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Private Drive	Field Drive	
NUMBER OF APPROACH TYPE		6	22	5	29	44	
Material	UNIT	Quantity Per Location	Quantity Per Location	Quantity Per Location	Quantity Per Location	Quantity Per Location	
Tack Coat	GAL	20	18	10	10	5	1,076.00
Superpave FAA 45	TON	65	60	33	33	14	3,448.00
PG 58H-34 Asphalt Cement	TON	3.9	3.6	2.0	2.0	0.8	206.88
Aggregate Base Course CL 5	TON	0	20	0	20	17	1,768.00
Aggregate Base Course CL 5 - Radius Slough	TON	4	2	2	2	2	224.00
Milling	TON	14	0	10	0	0	134.00

ND Highway 22
Dickinson 45th St to 17th St SW

General Details
Approach Paving

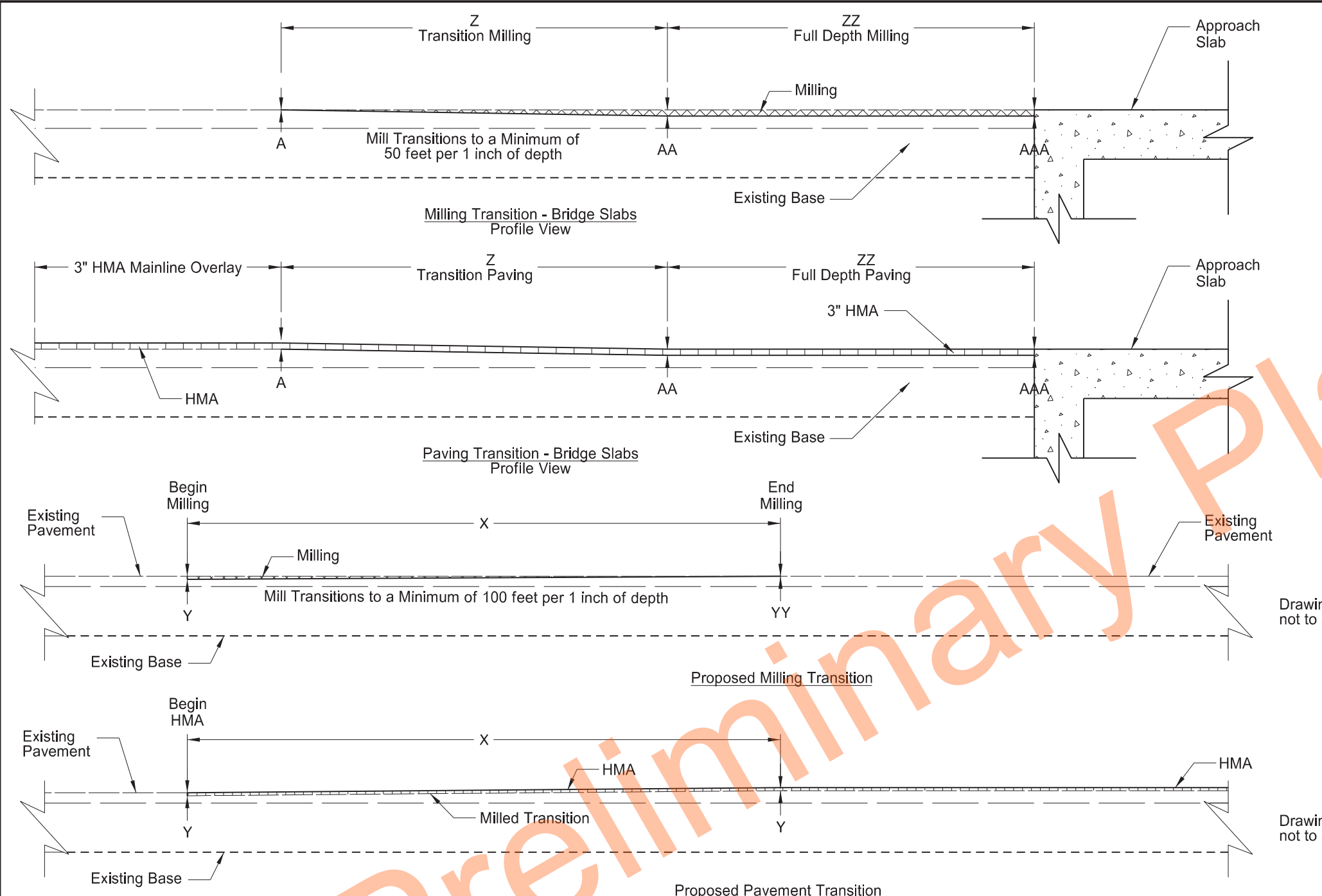


Locations For Approaches				
1: Paved Section Line	2: Gravel Section Line	3: Paved Private Drive	4: Gravel Private Drive	5: Field Drive
Location	Location	Location	Location	Location
RP 74.63 Lt & Rt	RP 76.68 Lt & Rt	RP 74.94 Rt	RP 74.18 Rt	RP 74.18 Lt
RP 75.68 Lt & Rt	RP 77.17 Lt & Rt	RP 75.45 Lt	RP 75.04 Rt	RP 76.55 Rt
RP 77.90 Rt	RP 77.90 Lt	RP 76.11 Lt	RP 75.79 Rt	RP 78.14 Lt & Rt
RP 79.02 Lt	RP 80.02 Lt & Rt	RP 76.89 Rt	RP 75.95 Rt	RP 78.76 Lt
---	RP 81.03 Lt & Rt	RP 77.11 Lt	RP 76.17 Rt	RP 79.52 Rt
---	RP 82.02 Lt & Rt	---	RP 76.55 Lt	RP 80.52 Rt
---	RP 83.03 Lt & Rt	---	RP 76.63 Lt	RP 80.74 Lt & Rt
---	RP 84.03 Lt	---	RP 77.34 Rt	RP 81.29 Lt
---	RP 85.11 Rt	---	RP 77.54 Rt	RP 81.53 Lt
---	RP 87.13 Lt	---	RP 78.50 Lt & Rt	RP 81.78 Lt & Rt
---	RP 88.17 Lt	---	RP 79.84 Lt	RP 82.94 Rt
---	RP 89.29 Rt	---	RP 80.52 Lt	RP 83.56 Lt & Rt
---	RP 90.29 Lt & Rt	---	RP 80.96 Lt	RP 83.68 Rt
---	RP 91.29 Lt & Rt	---	RP 81.53 Rt	RP 84.03 Rt
---	---	---	RP 82.32 Lt & Rt	RP 84.19 Rt
---	---	---	RP 83.68 Lt	RP 84.59 Rt
---	---	---	RP 84.19 Lt	RP 85.11 Lt
---	---	---	RP 84.65 Lt	RP 85.30 Lt & Rt
---	---	---	RP 86.66 Rt	RP 85.65 Lt
---	---	---	RP 88.30 Lt	RP 85.74 Rt
---	---	---	RP 88.49 Rt	RP 86.11 Lt & Rt
---	---	---	RP 88.98 Lt	RP 86.26 Lt
---	---	---	RP 89.11 Lt	RP 86.42 Lt
---	---	---	RP 89.42 Lt	RP 86.66 Lt
---	---	---	RP 89.49 Lt	RP 86.75 Lt
---	---	---	RP 40.88 Rt	RP 87.13 Rt
---	---	---	RP 91.17 Lt	RP 87.60 Lt & Rt
---	---	---	---	RP 88.30 Rt
---	---	---	---	RP 88.79 Lt & Rt
---	---	---	---	RP 88.98 Rt
---	---	---	---	RP 89.42 Rt
---	---	---	---	RP 89.57 Rt
---	---	---	---	RP 40.68 Lt & Rt
---	---	---	---	RP 40.88 Lt
---	---	---	---	RP 91.18 Rt

ND Highway 22
Dickinson 45th St to 17th St SW

Approach Types and Locations





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	20	3

NOTES:
- Cross-sectional view of bridge tie-in shown on Sec 30 Sheet 5.
- All bridge tie-ins must be milled out and the bottom lift repaved within the same working day.

LOCATION	X (FT)	BEGIN MILLING/PAVING RP/STATION	Y (IN)	YY (IN)	END MILLING/PAVING RP/STATION				MILLING (TON)	Comments
Beginning of Project Overlay	300	74.166	6.0	0.0	74.223				422	Tack Coat, Superpave FAA 45, PG 58H-28 Asphalt Cement Quantities calculated in section 10
End of Project Overlay	300	91.291	6.0	0.0	91.234				222	
LOCATION	Z (FT)	BEGIN TRANSITION MILLING RP	A (IN)	AA (IN)	END TRANSITION MILLING/BEGIN FULL DETPH MILLING RP	ZZ (FT)	AAA (IN)	END FULL DEPTH MILLING RP	MILLING (TON)	
Green River Bridge (South Tie-In)	150	76.150	0.0	3.0	76.221	250	3.0	76.268	106	Full Depth Milling section quantities are shown in section 40
Green River Bridge (North Tie-In)	150	76.422	0.0	3.0	76.351	250	3.0	76.304	106	
Russian Spring Creek Bridge (South Tie-In)	150	81.255	0.0	3.0	81.326	250	3.0	81.373	56	
Russian Spring Creek Bridge (North Tie-In)	150	81.498	0.0	3.0	81.427	250	3.0	81.380	56	
Crooked Creek Bridge (South Tie-In)	150	90.670	0.0	3.0	90.741	250	3.0	90.788	56	
Crooked Creek Bridge (North Tie-In)	150	90.921	0.0	3.0	90.850	250	3.0	90.803	56	

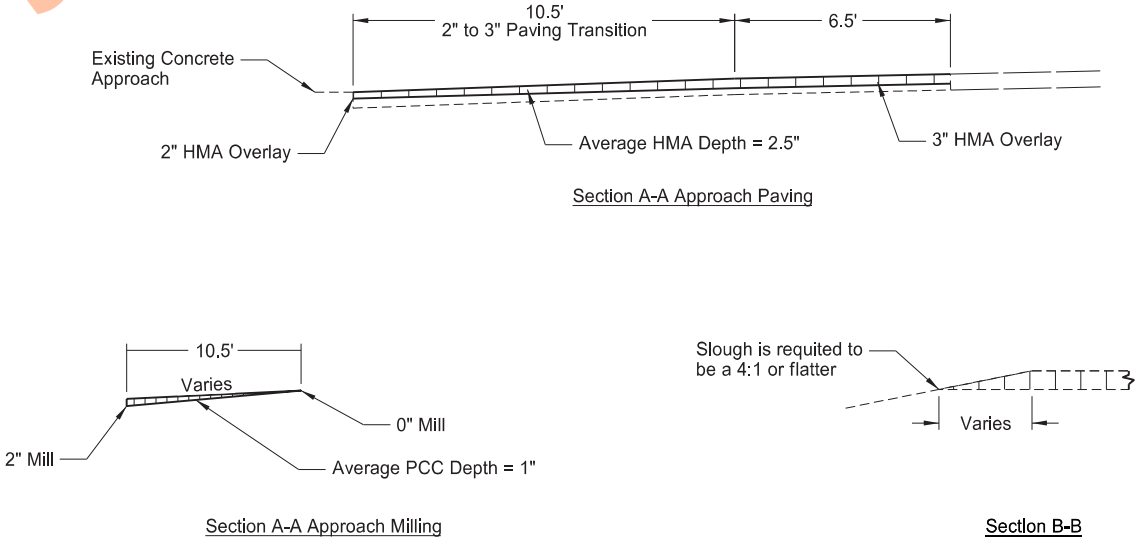
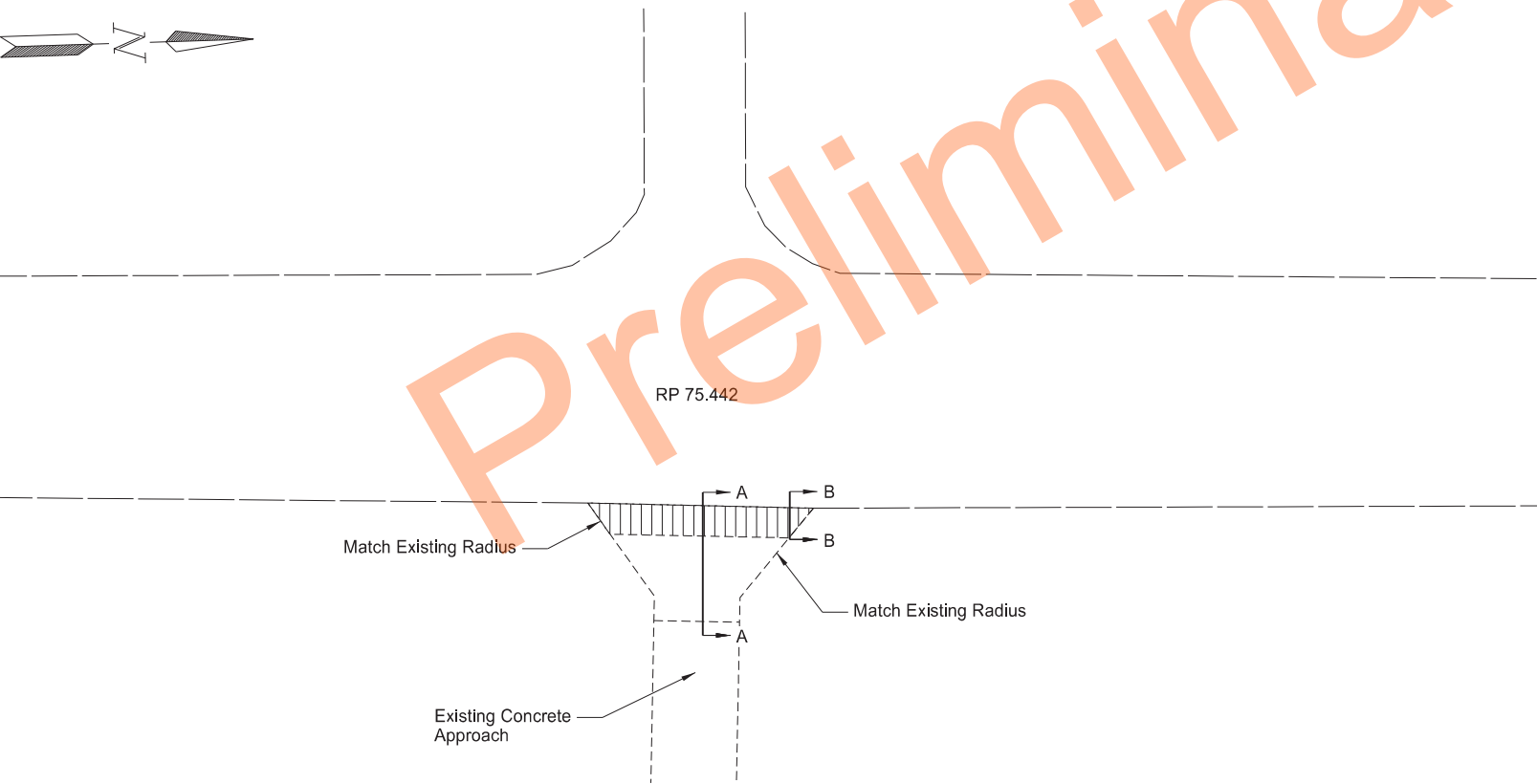
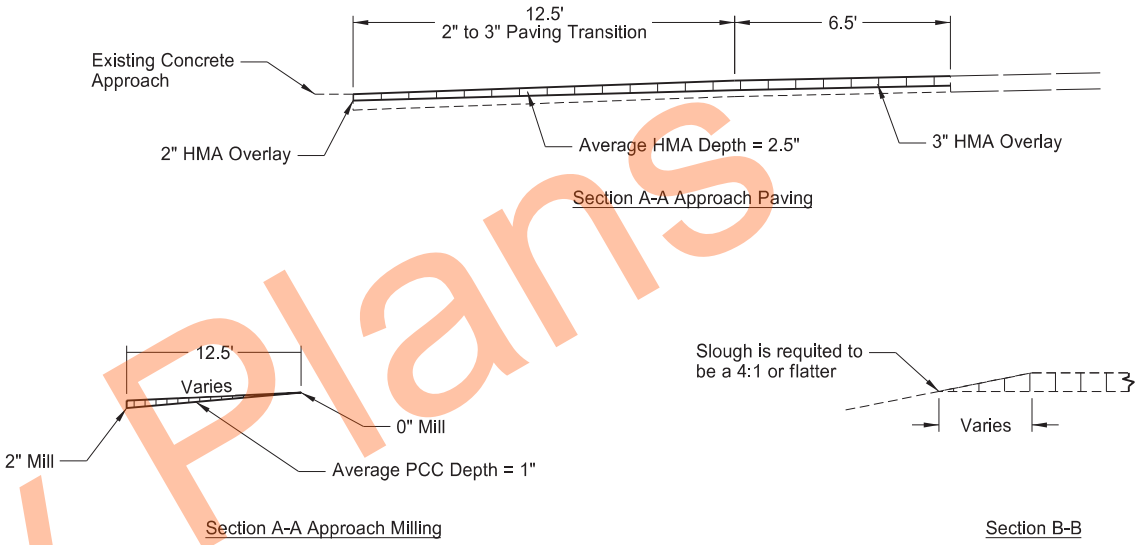
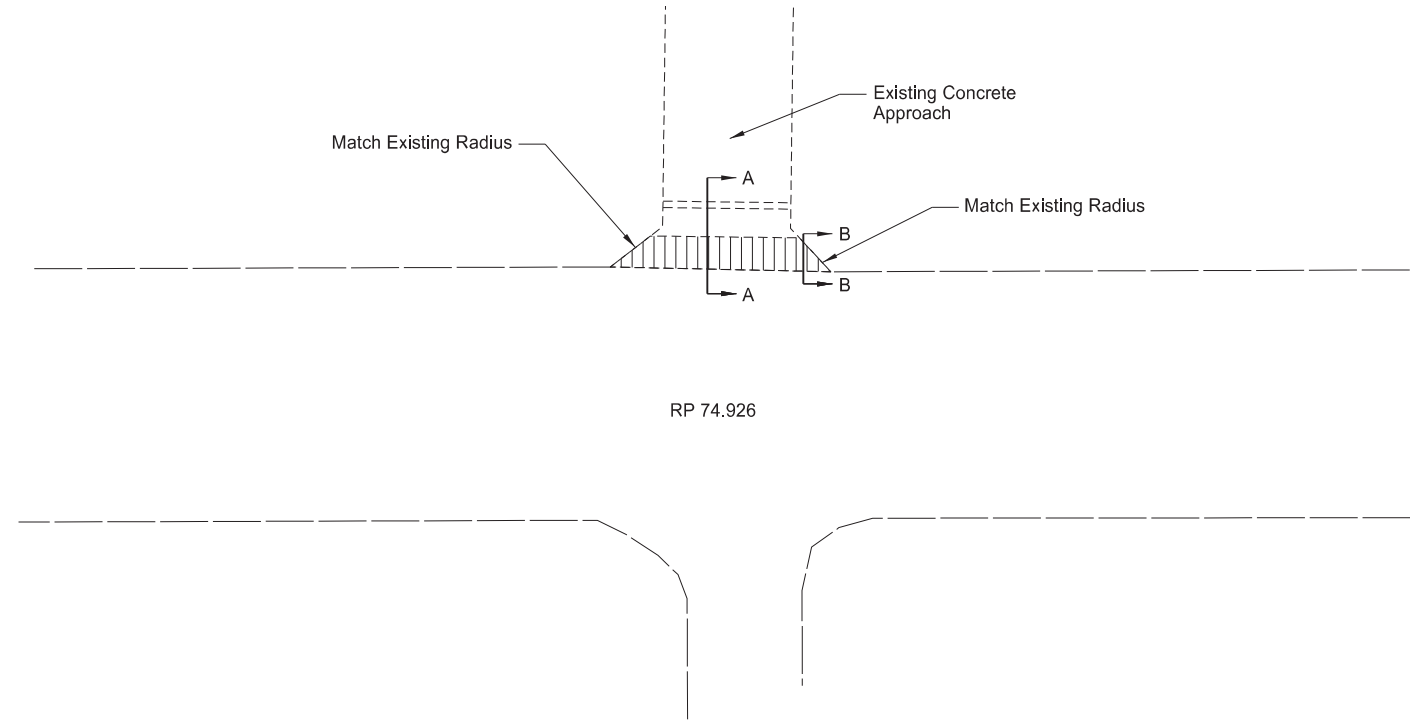
ND Highway 22
Dickinson 45th St to 17th St SW

General Details
Milling and Paving Transitions



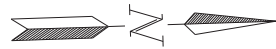
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	20	4

- Notes:
1. See Section 40 for Removal/Milling
2. Drawings Not to Scale



ND Highway 22
Dickinson 45th St to 17th St SW
Concrete Approach





STATE

PROJECT NO.

SECTION NO.

SHEET NO.

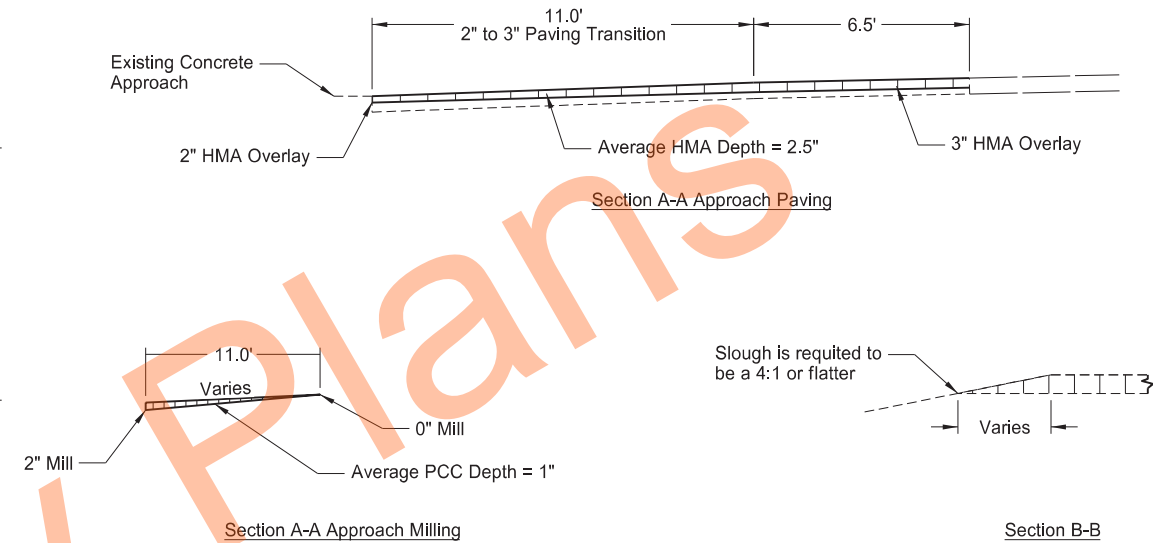
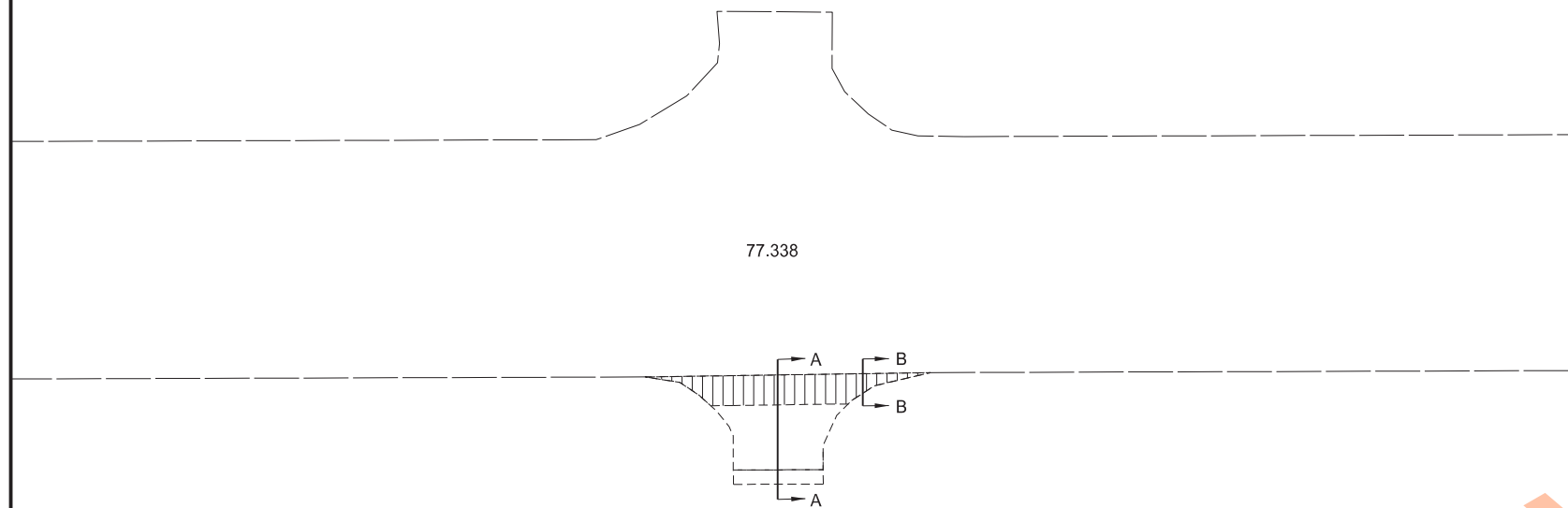
ND

XA-SS-5-022(140)074

20

5

- Notes:
1. See Section 40 for Removal/Milling
2. Drawings Not to Scale

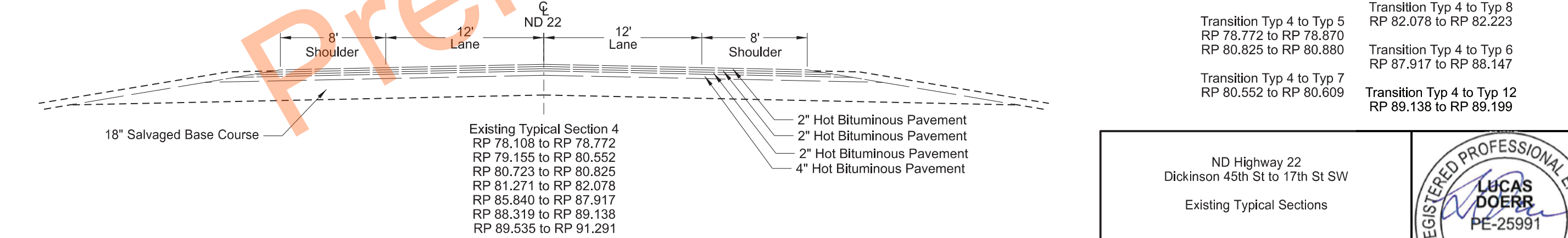
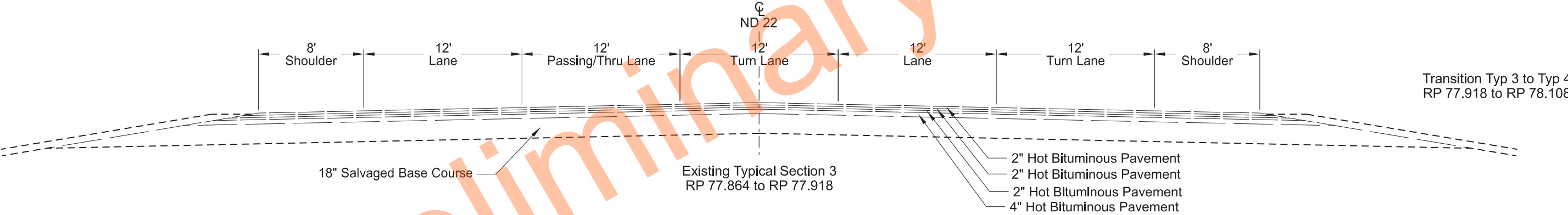
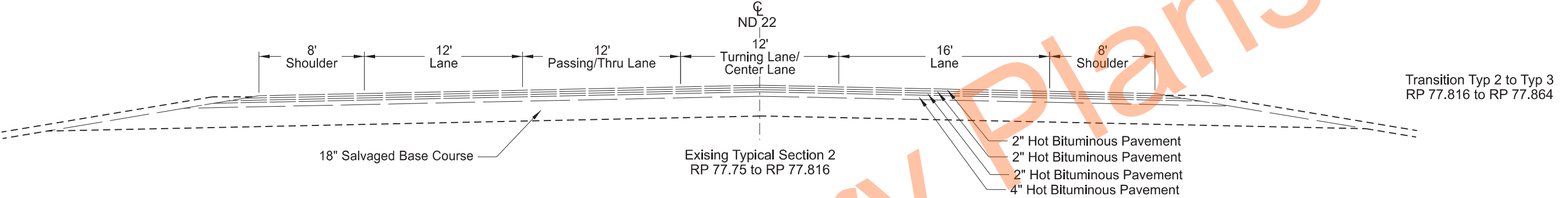
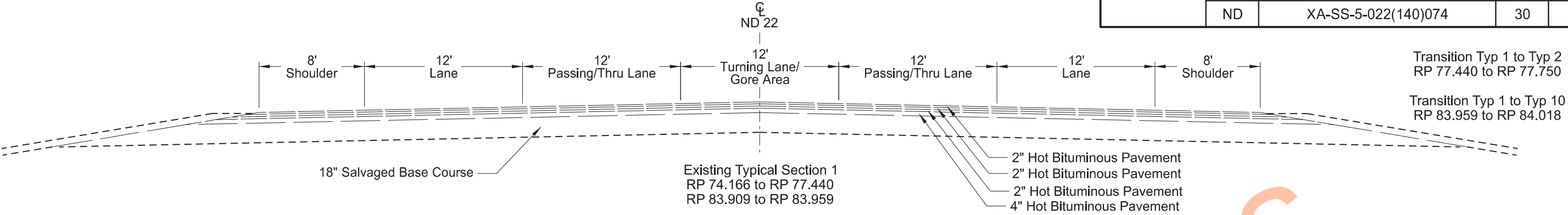


Preliminary Plans

ND Highway 22
Dickinson 45th St to 17th St SW
Concrete Approach



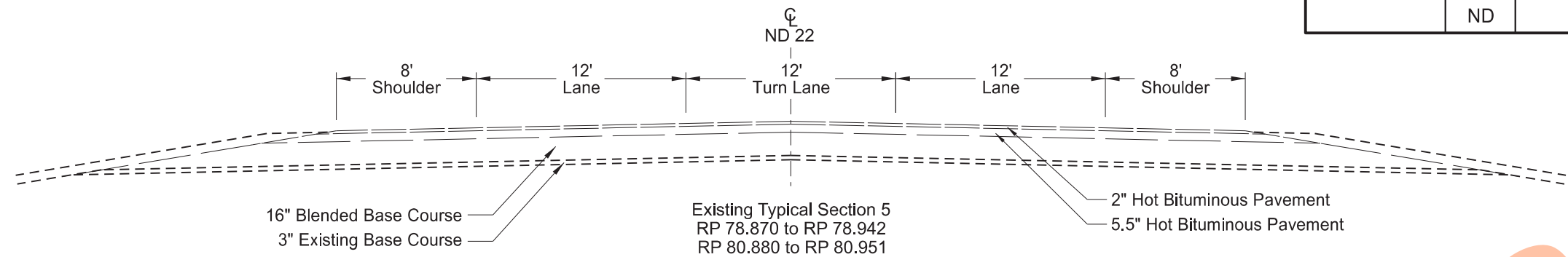
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	30	1



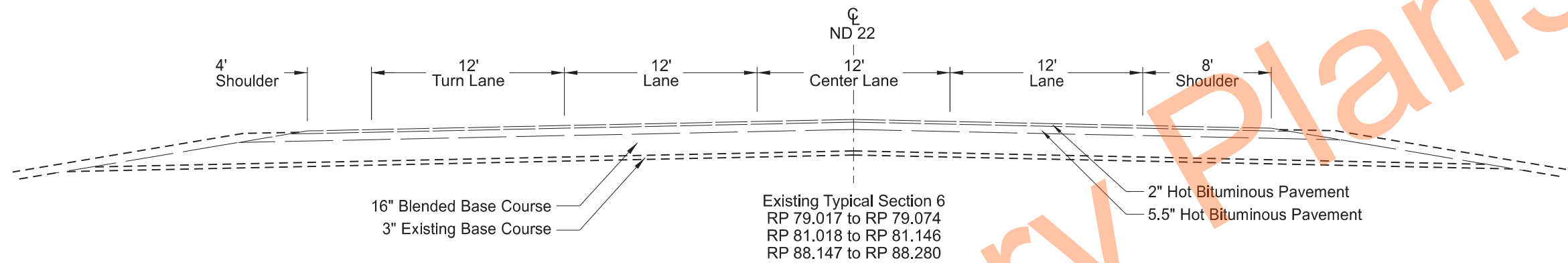
ND Highway 22
Dickinson 45th St to 17th St SW
Existing Typical Sections



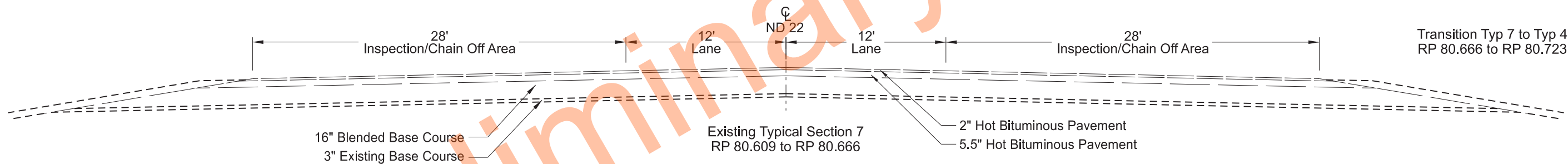
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ND	XA-SS-5-022(140)074	30	2



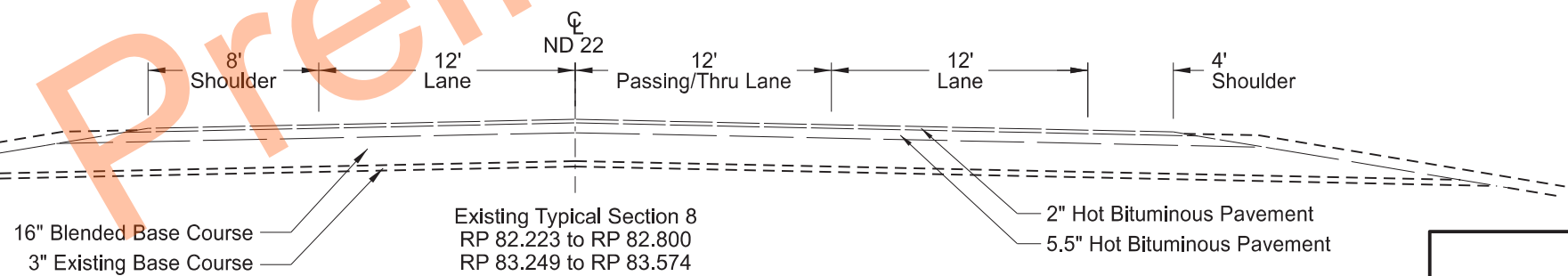
Transition Typ 5 to Typ 6
RP 78.942 to RP 79.017
RP 80.951 to RP 81.018



Transition Typ 6 to Typ 4
RP 79.074 to RP 79.155
RP 81.146 to RP 81.271
RP 88.280 to RP 88.319



Transition Typ 7 to Typ 4
RP 80.666 to RP 80.723

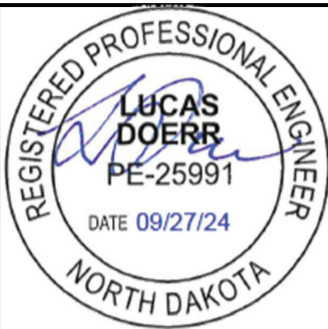


Transition Typ 8 to Typ 9
RP 82.800 to RP 82.909

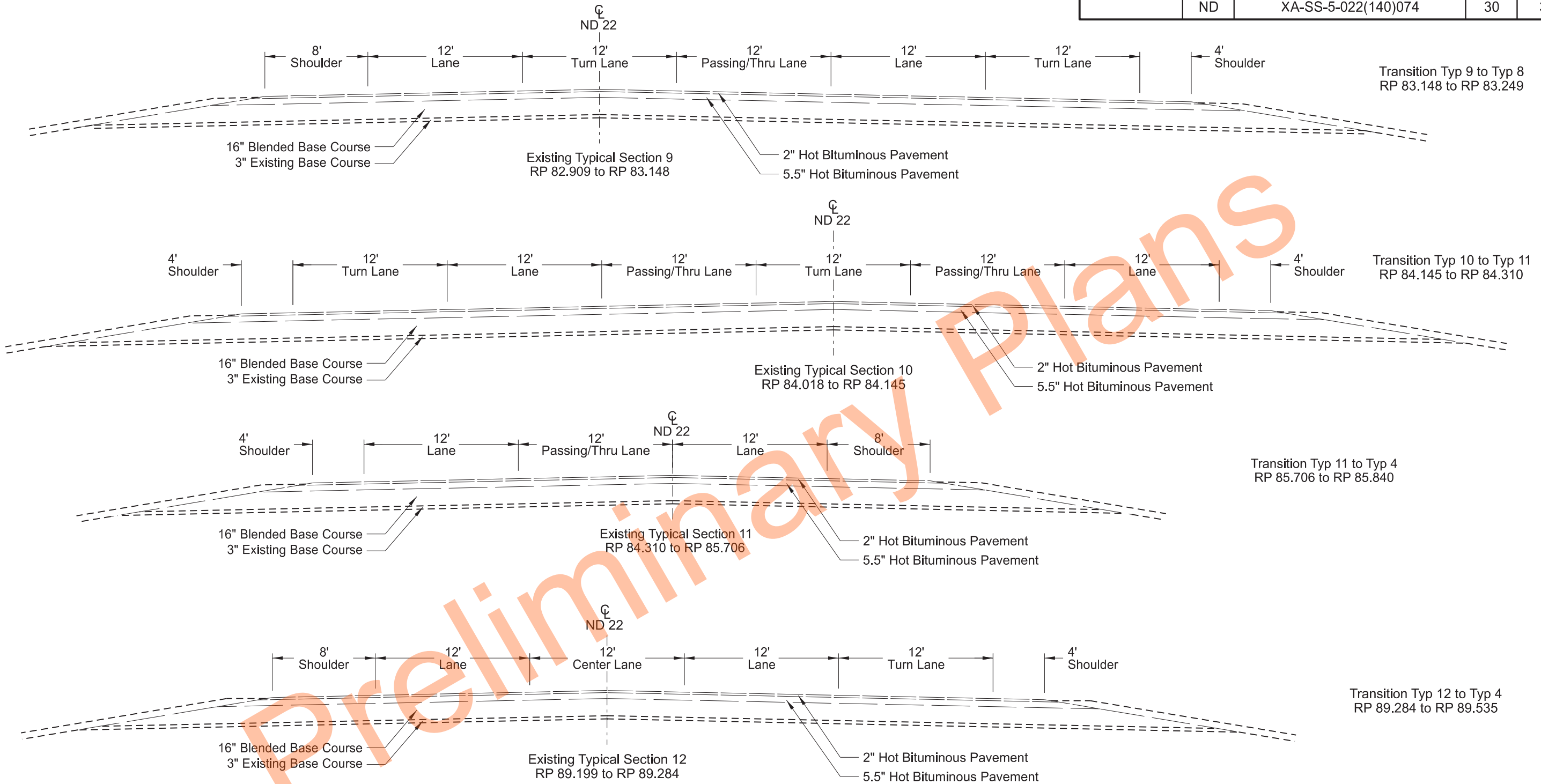
Transition Typ 8 to Typ 1
RP 83.574 to RP 83.909

Transition Typ 8 to Typ 4
RP 89.453 to RP 89.535

ND Highway 22
Dickinson 45th St to 17th St SW
Existing Typical Sections



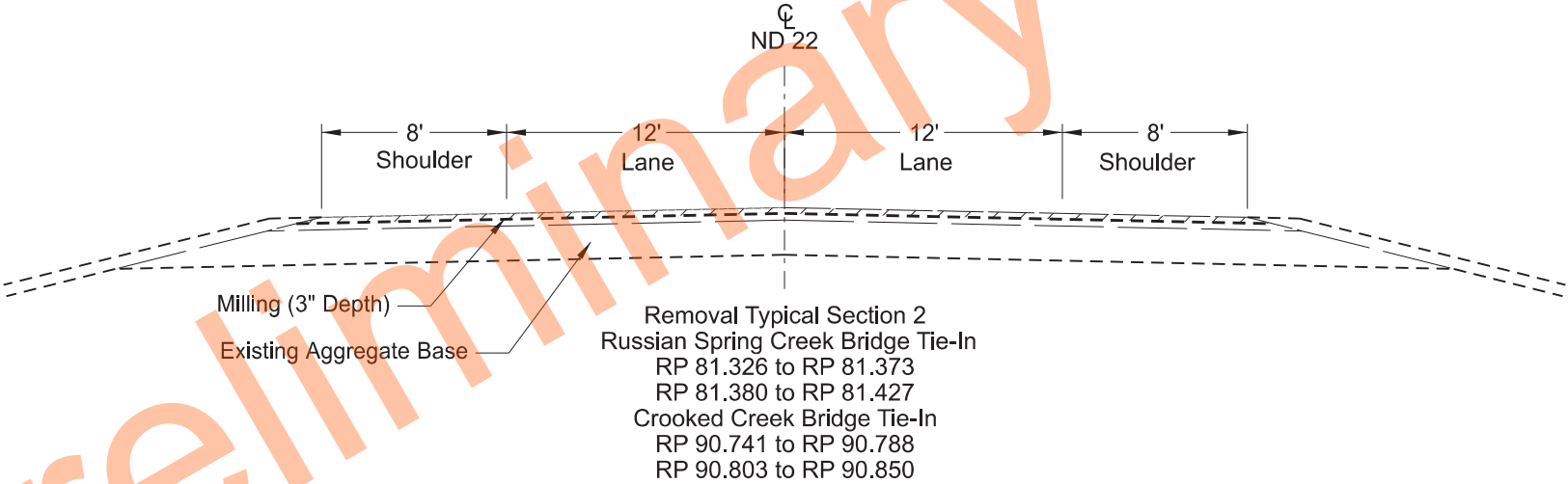
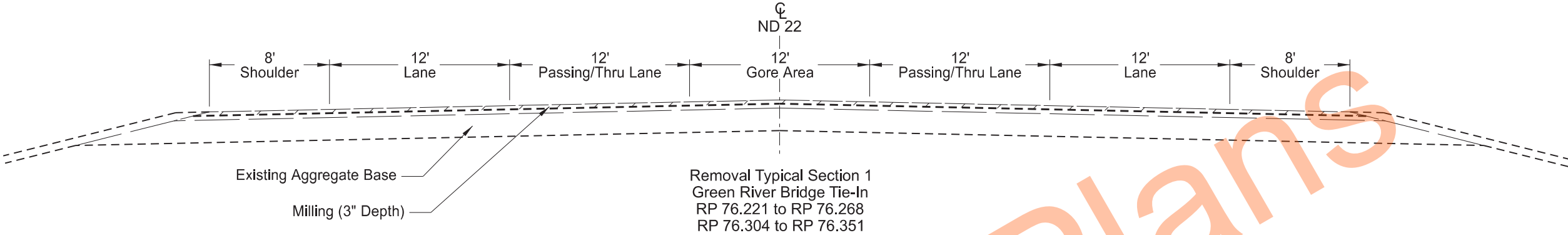
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ND	XA-SS-5-022(140)074	30	3



ND Highway 22
Dickinson 45th St to 17th St SW
Existing Typical Sections



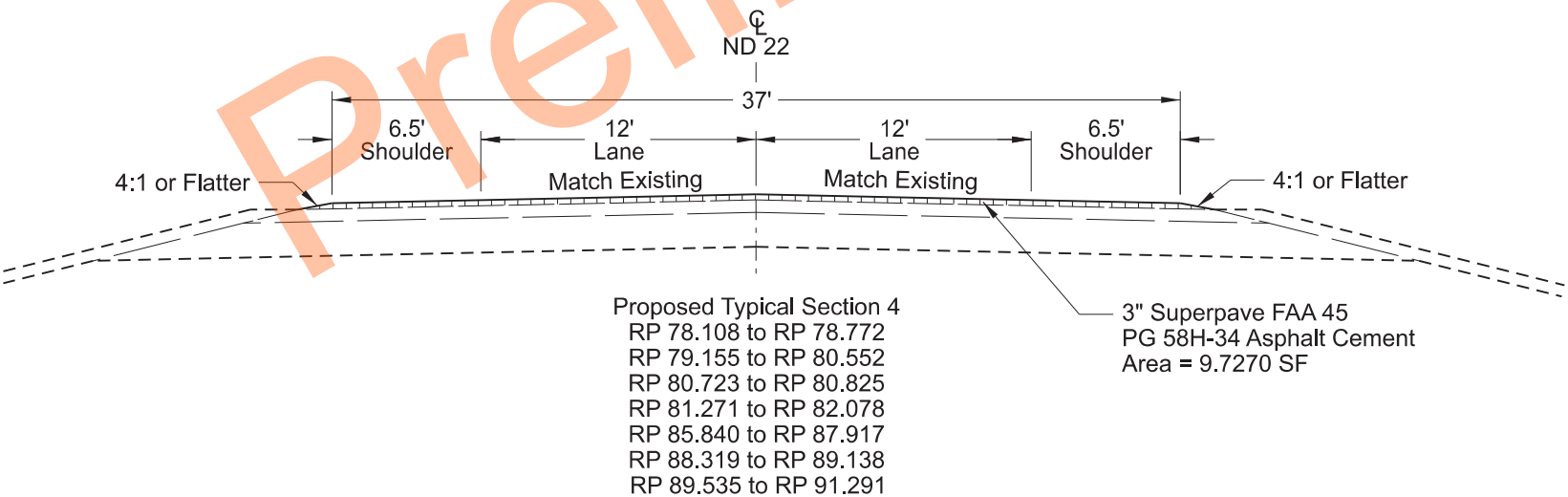
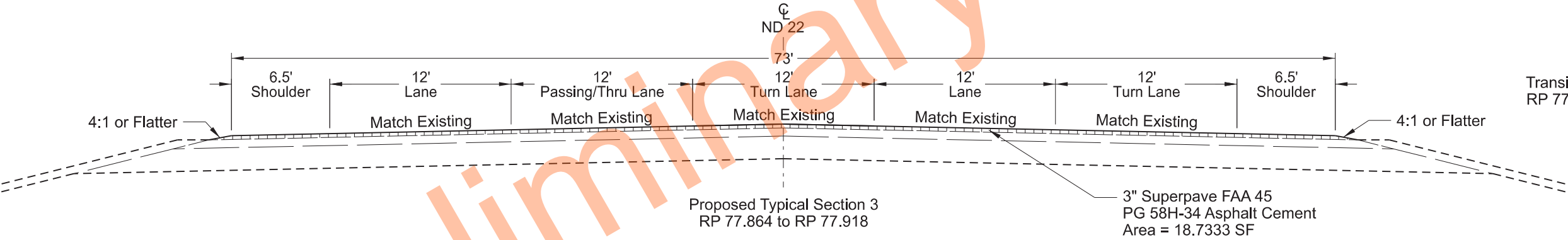
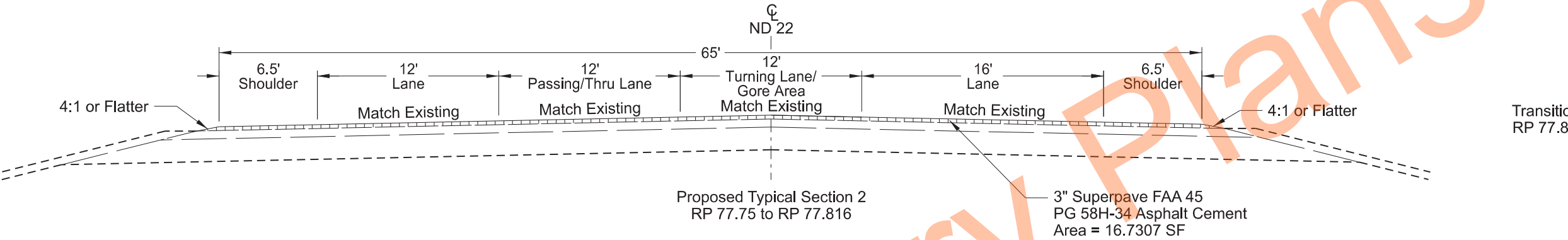
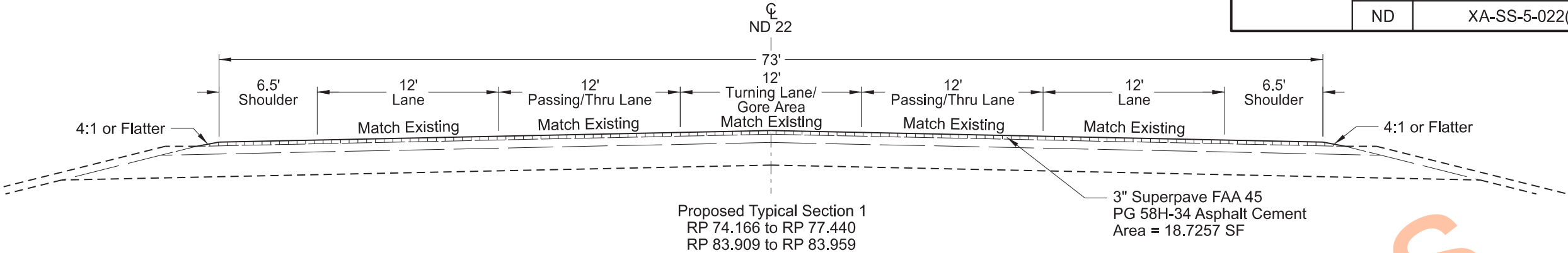
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	ND	XA-SS-5-022(140)074	30	4



NOTE: Refer to Section 40 Sheets 5-6 for quantities related to these typical-sections

ND Highway 22
Dickinson 45th St to 17th St SW
Removal Typical Sections





Transition Typ 4 to Typ 5
RP 78.772 to RP 78.870
RP 80.825 to RP 80.880

Transition Typ 4 to Typ 6
RP 87.917 to RP 88.147

Transition Typ 4 to Typ 7
RP 80.552 to RP 80.609

Transition Typ 4 to Typ 8
RP 82.078 to RP 82.223

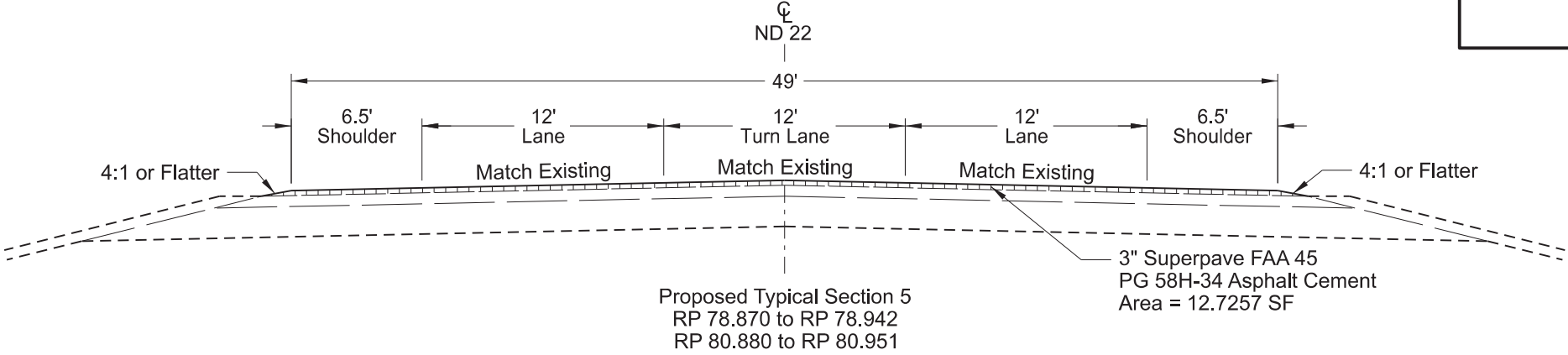
Transition Typ 4 to Typ 12
RP 89.138 to RP 89.199

ND Highway 22
Dickinson 45th St to 17th St SW

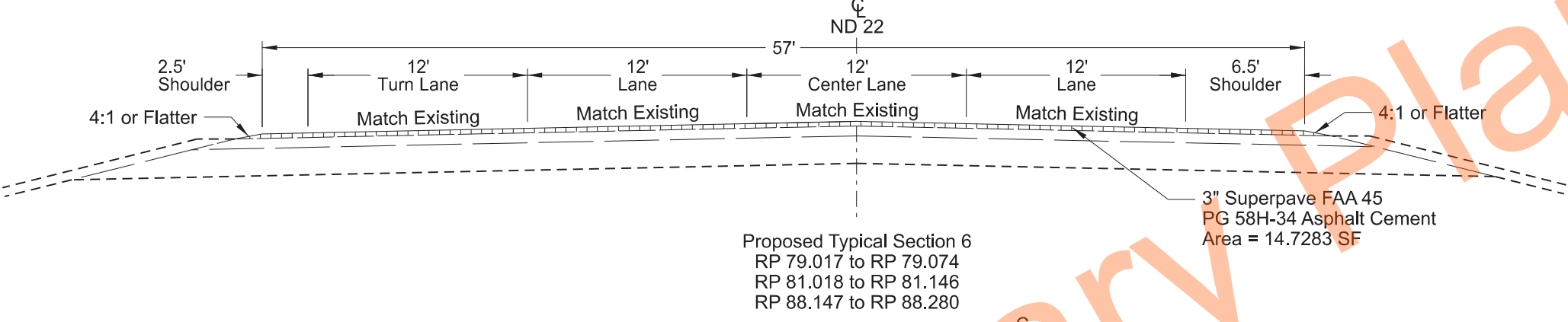
Proposed Typical Sections



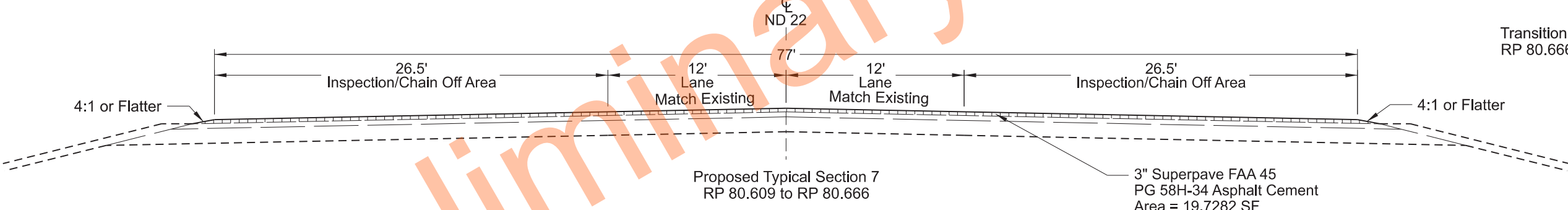
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	30	6



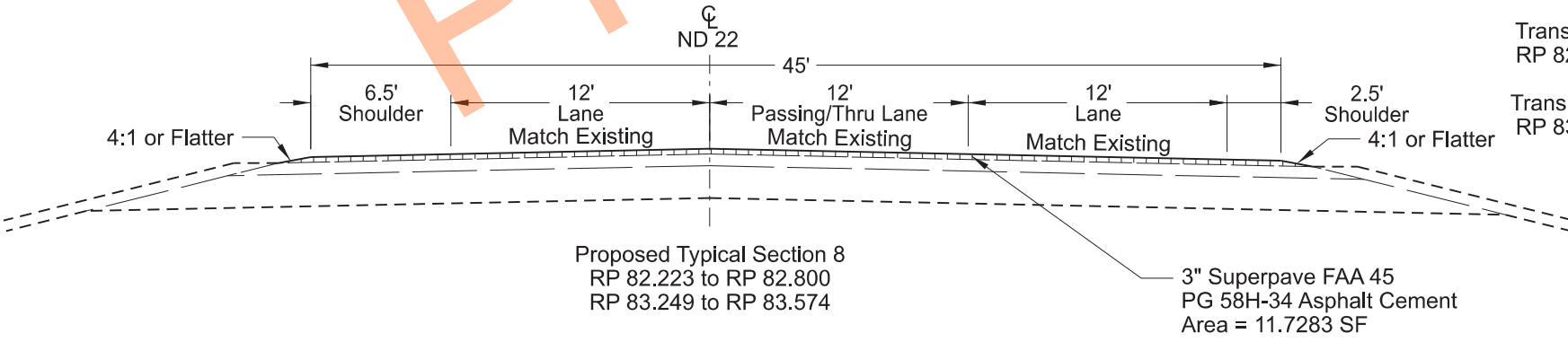
Transition Typ 5 to Typ 6
RP 78.942 to RP 79.017
RP 80.951 to RP 81.018



Transition Typ 6 to Typ 4
RP 79.074 to RP 79.155
RP 81.146 to RP 81.271
RP 88.280 to RP 88.319



Transition Typ 7 to Typ 4
RP 80.666 to RP 80.723



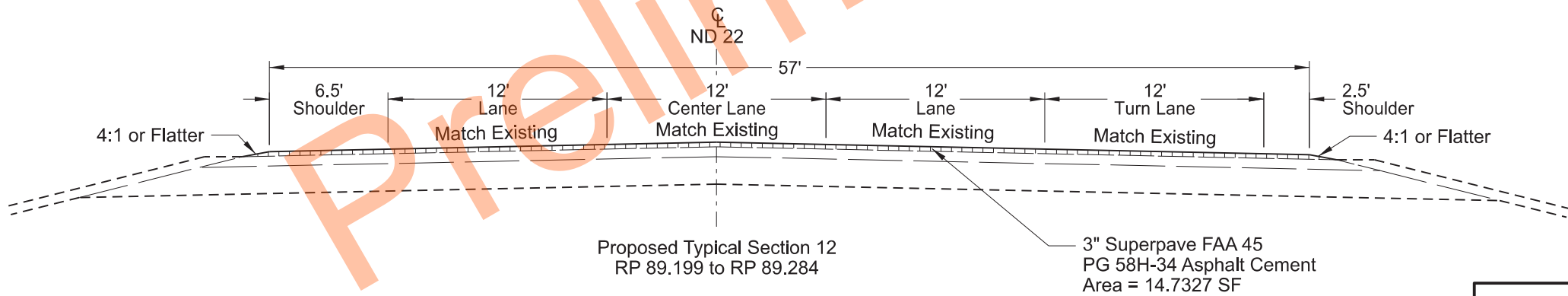
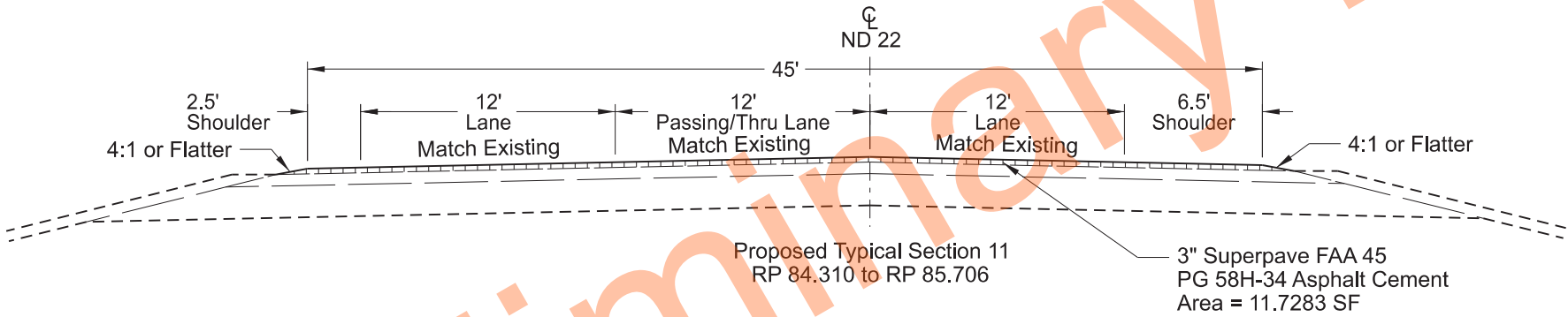
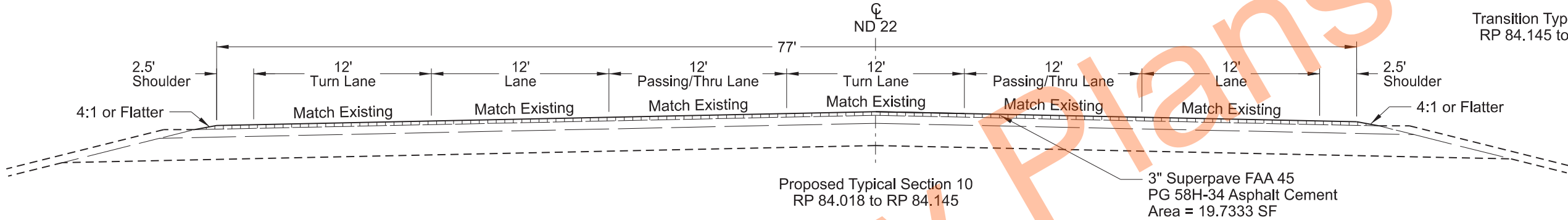
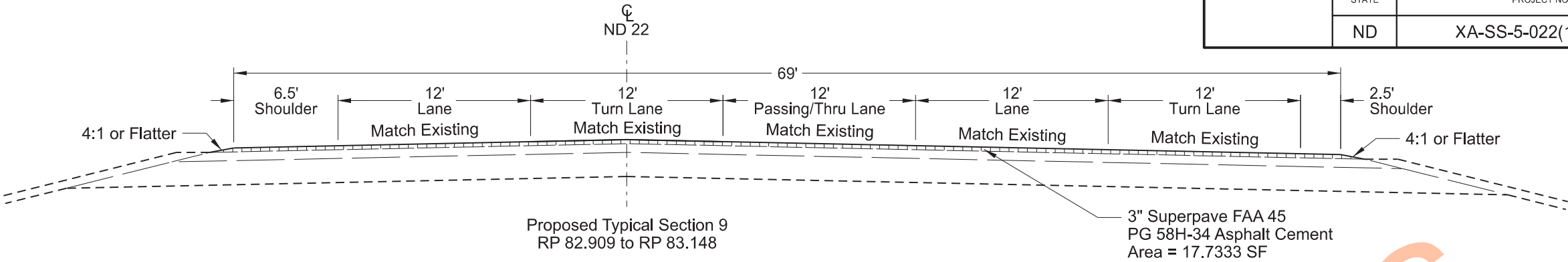
Transition Typ 8 to Typ 9
RP 82.800 to RP 82.909

Transition Typ 8 to Type 1
RP 83.574 to RP 83.909

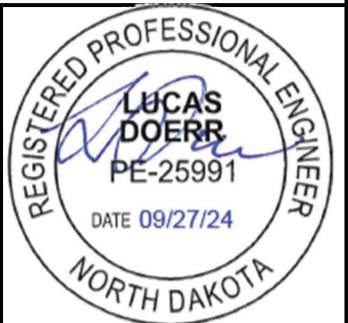
ND Highway 22
Dickinson 45th St to 17th St SW
Proposed Typical Sections

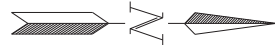


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	30	7



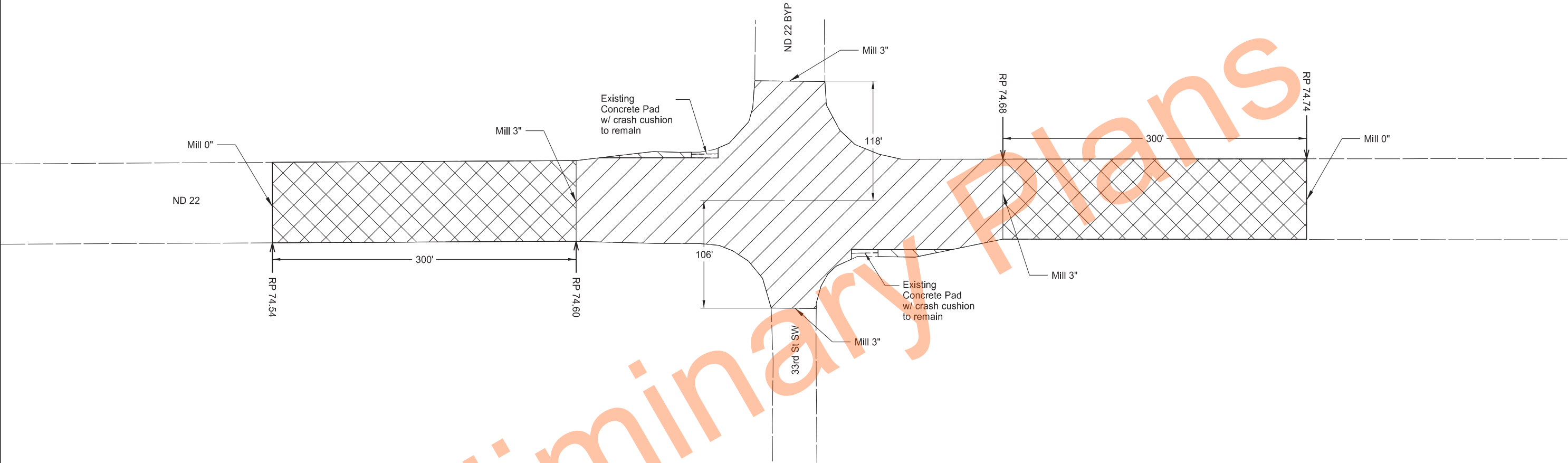
ND Highway 22
Dickinson 45th St to 17th St SW
Proposed Typical Sections



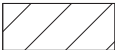


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	40	1

SPEC	CODE	ITEM DESCRIPTION	QUANTITY	UNIT
411	0100	MILLING PAVEMENT SURFACE RP 74.54 to RP 74.74	1340	TON



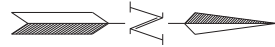
LEGEND

-  3" Mill - 5351 SY
-  1.5" Mill - 86 SY
-  Transitional Mill - 5294 SY

ND Highway 22
Dickinson 45th St to 17th St SW

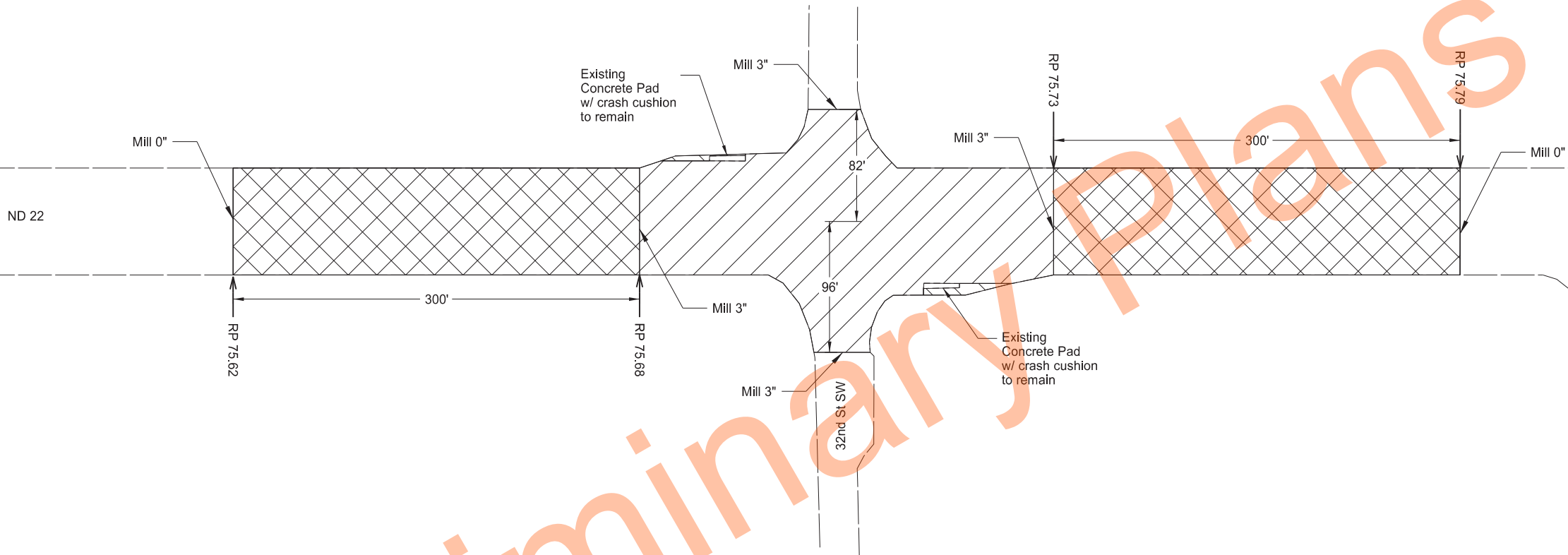
33rd Street Intersection
Removals





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	40	2

SPEC	CODE	ITEM DESCRIPTION	QUANTITY	UNIT
411	0100	MILLING PAVEMENT SURFACE RP 75.62 to RP 75.79	1027	TON



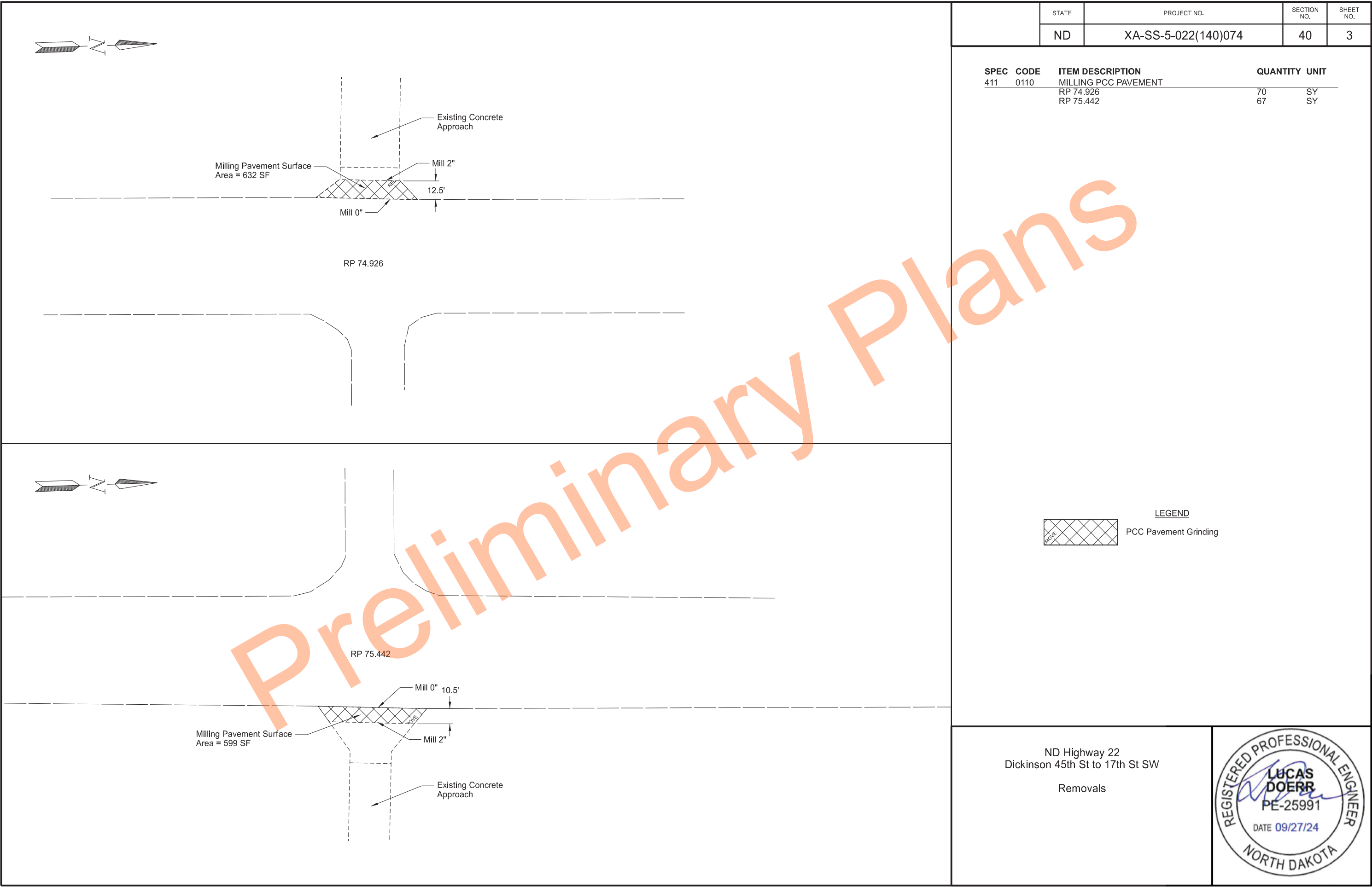
LEGEND

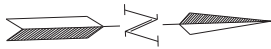
	3" Mill - 3501 SY
	1.5" Mill - 51 SY
	Transitional Mill - 5267 SY

ND Highway 22
Dickinson 45th St to 17th St SW

32nd Street Intersection
Removals

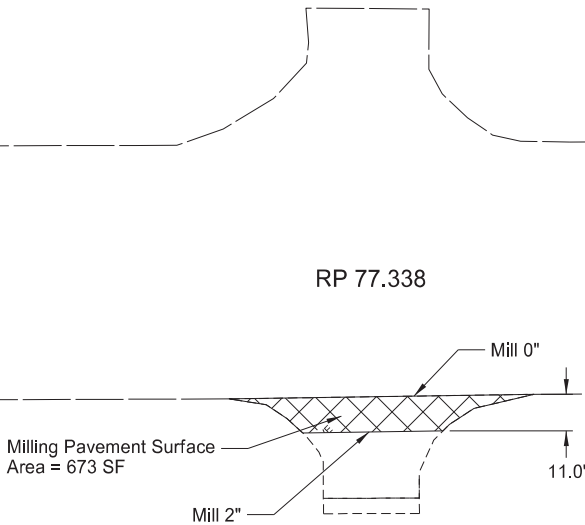






STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	40	4

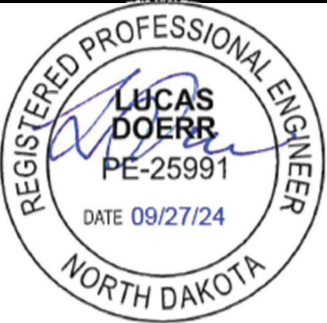
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411	0110	MILLING PCC PAVEMENT		
		RP 77.338	75	SY

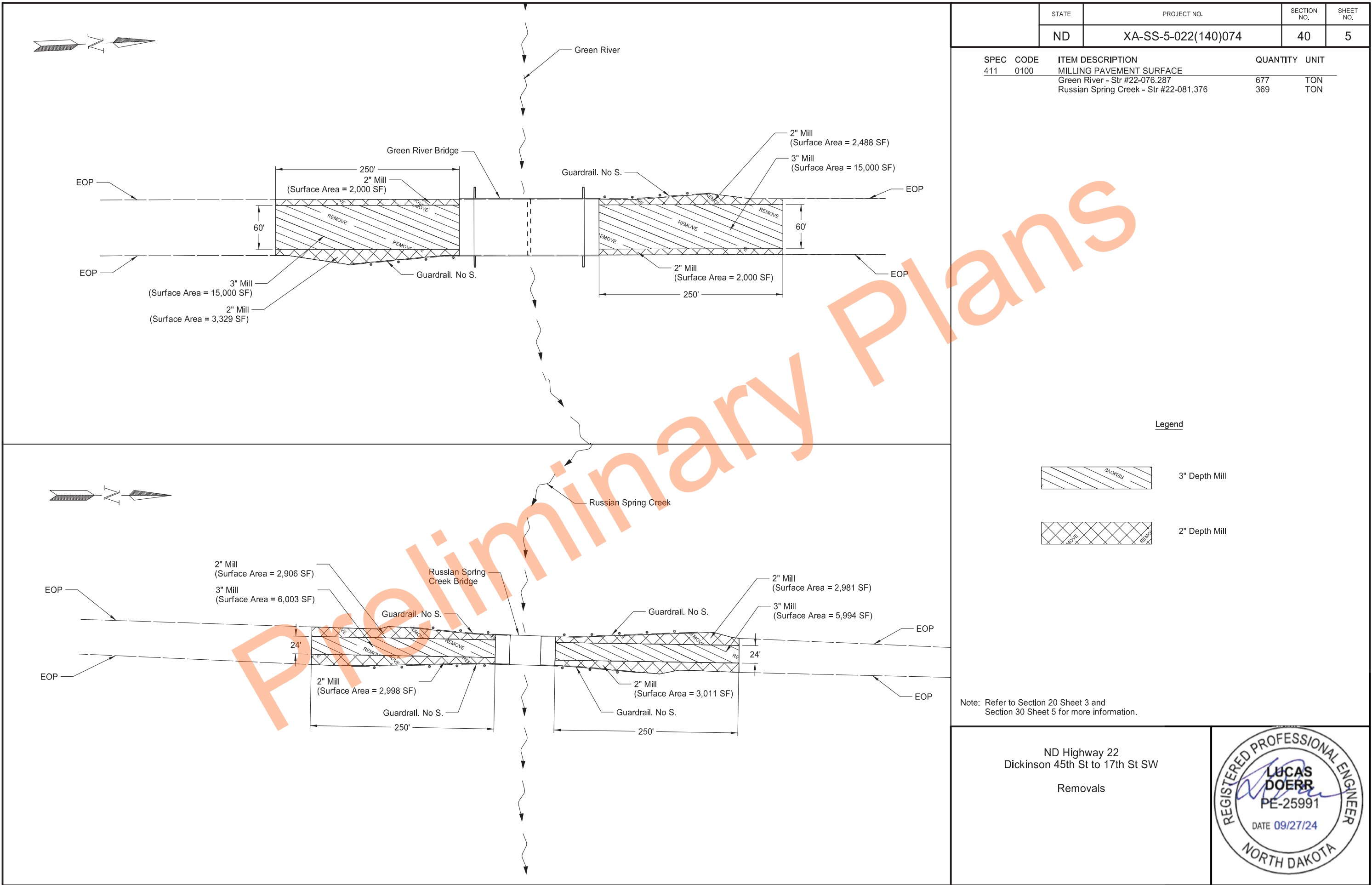


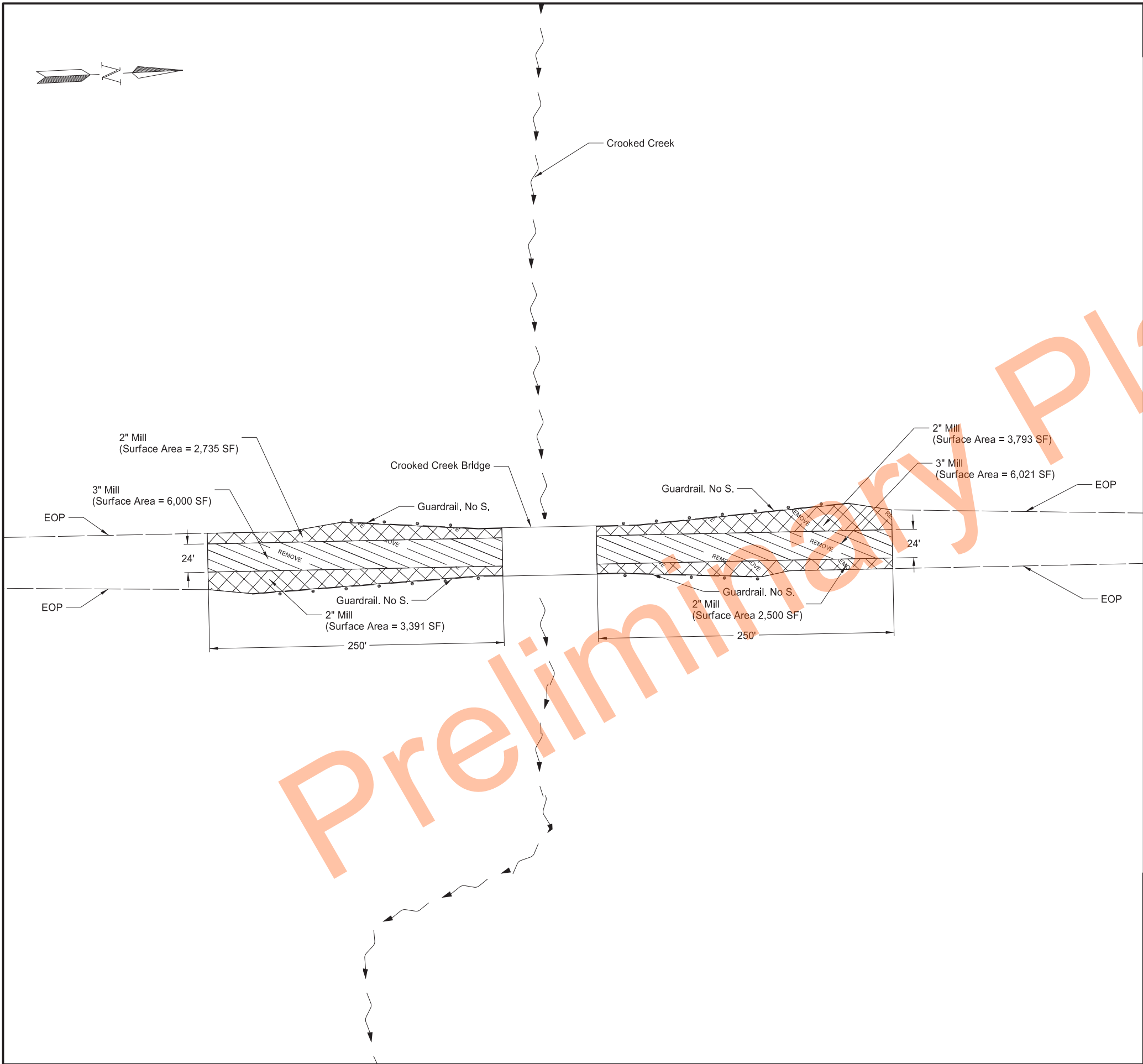


LEGEND
PCC Pavement Grinding

ND Highway 22
Dickinson 45th St to 17th St SW
Removals







STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	40	6

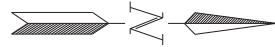
SPEC	CODE	ITEM DESCRIPTION	QUANTITY	UNIT
411	0100	MILLING PAVEMENT SURFACE		
		Crooked Creek Bridge - Str #22-090.823	376	TON

Legend

	3" Depth Mill
	2" Depth Mill

Note: Refer to Section 20 Sheet 3 and Section 30 Sheet 5 for more information.

ND Highway 22 Dickinson 45th St to 17th St SW Removals	
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	90	1

SPEC	CODE	ITEM DESCRIPTION	QUANTITY	UNIT
401	0050	TACK COAT 33rd Street	4	GAL
430	0045	SUPERPAVE FAA 45 33rd Street	7	TON
430	5818	PG 58H-34 ASPHALT CEMENT 33rd Street	1	TON



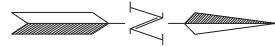
LEGEND

1.5" Superpave FAA 45, PG 58H-34 Asphalt Cement - 86 SY

ND Highway 22
Dickinson 45th St to 17th St SW

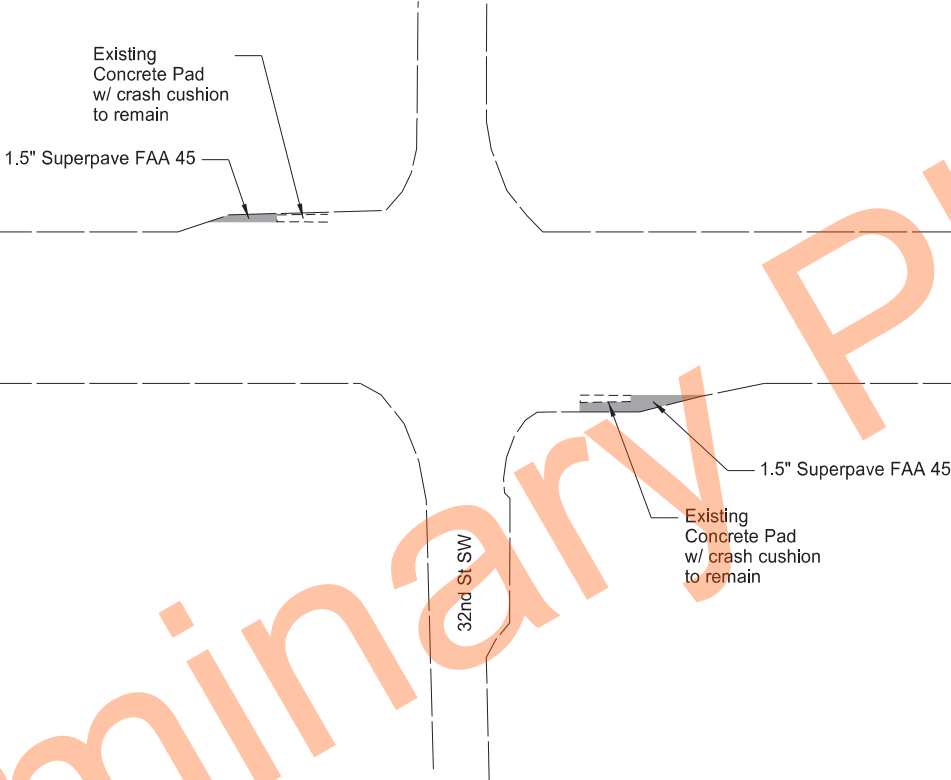
33rd Street Intersection
Pavement Layout





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	90	2

SPEC	CODE	ITEM DESCRIPTION	QUANTITY	UNIT
401	0050	TACK COAT 32nd Street	3	GAL
430	0045	SUPERPAVE FAA 45 32nd Street	4	TON
430	5818	PG 58H-34 ASPHALT CEMENT 32nd Street	1	TON



ND 22

32nd St SW

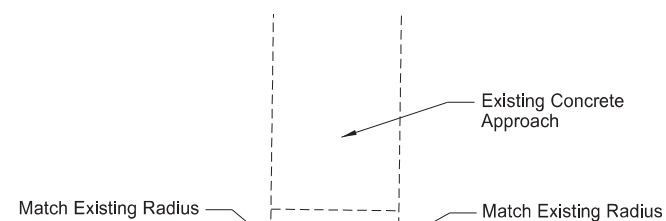
LEGEND

1.5" Superpave FAA 45, PG 58H-34 Asphalt Cement - 49 SY

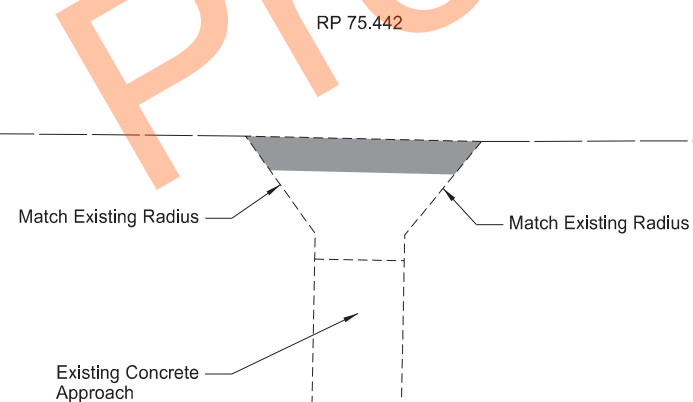
ND Highway 22
Dickinson 45th St to 17th St SW

32nd Street Intersection
Pavement Layout





RP 74.926



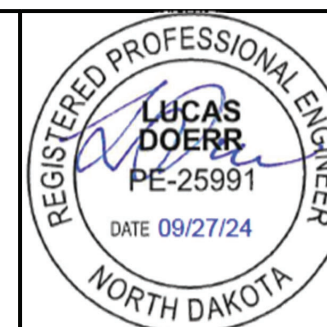
SPEC	CODE	ITEM DESCRIPTION	QUANTITY	UNIT
401	0050	TACK COAT		
		RP 74.926 Lt	4	GAL
		RP 75.442 Rt	4	GAL
430	0045	SUPERPAVE FAA 45		
		RP 74.926 Lt	11	TON
		RP 75.442 Rt	11	TON
430	5803	PG 58H-34 ASPHALT CEMENT		
		RP 74.926 Lt	0.6	TON
		RP 75.442 Rt	0.6	TON

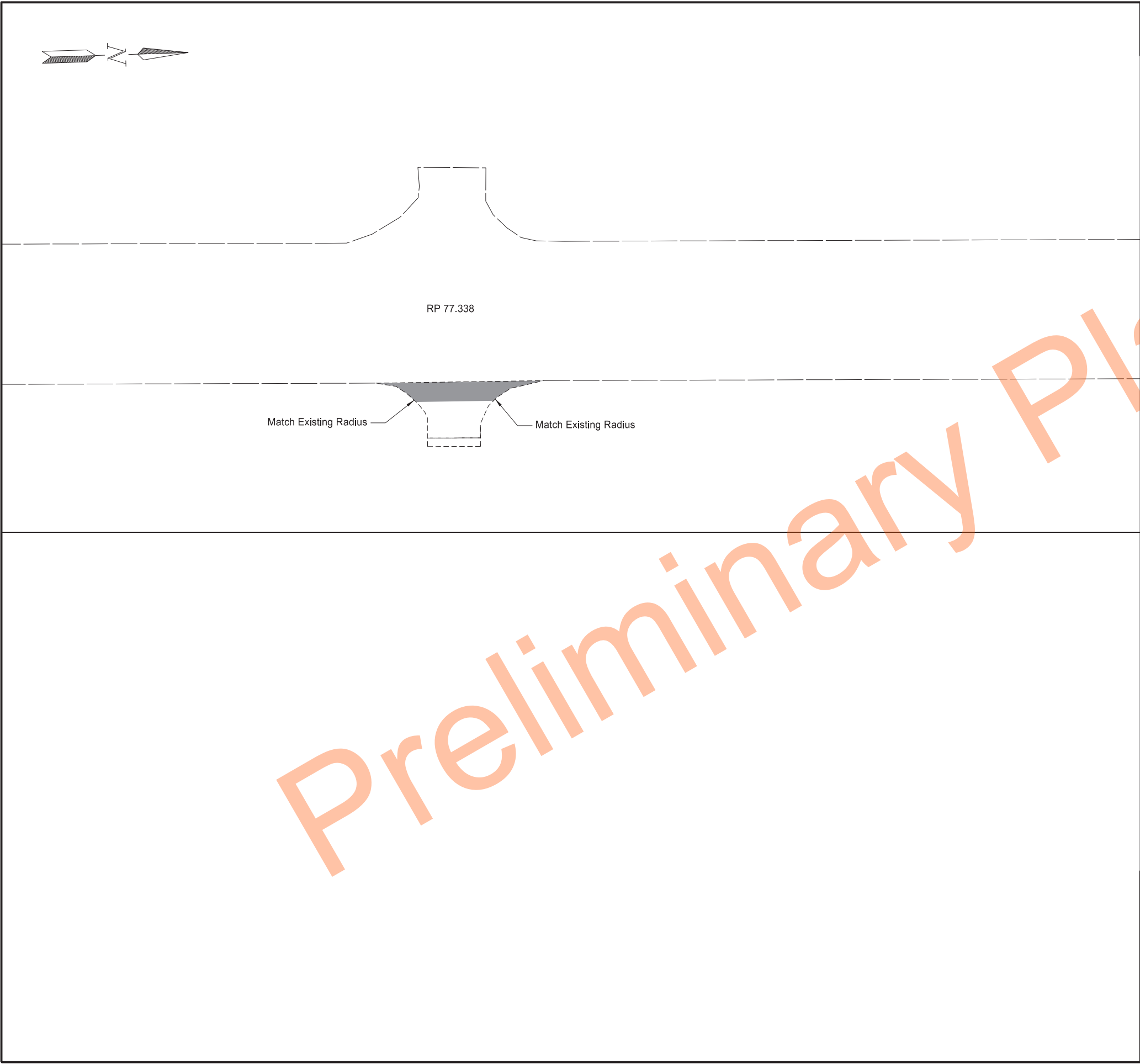
LEGEND



Superpave FAA 45, PG 58H-34 Asphalt Cement

ND Highway 22
Dickinson 45th St to 17th St SW
Pavement Layout



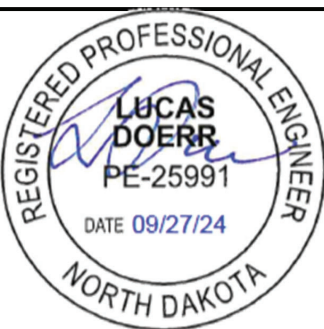


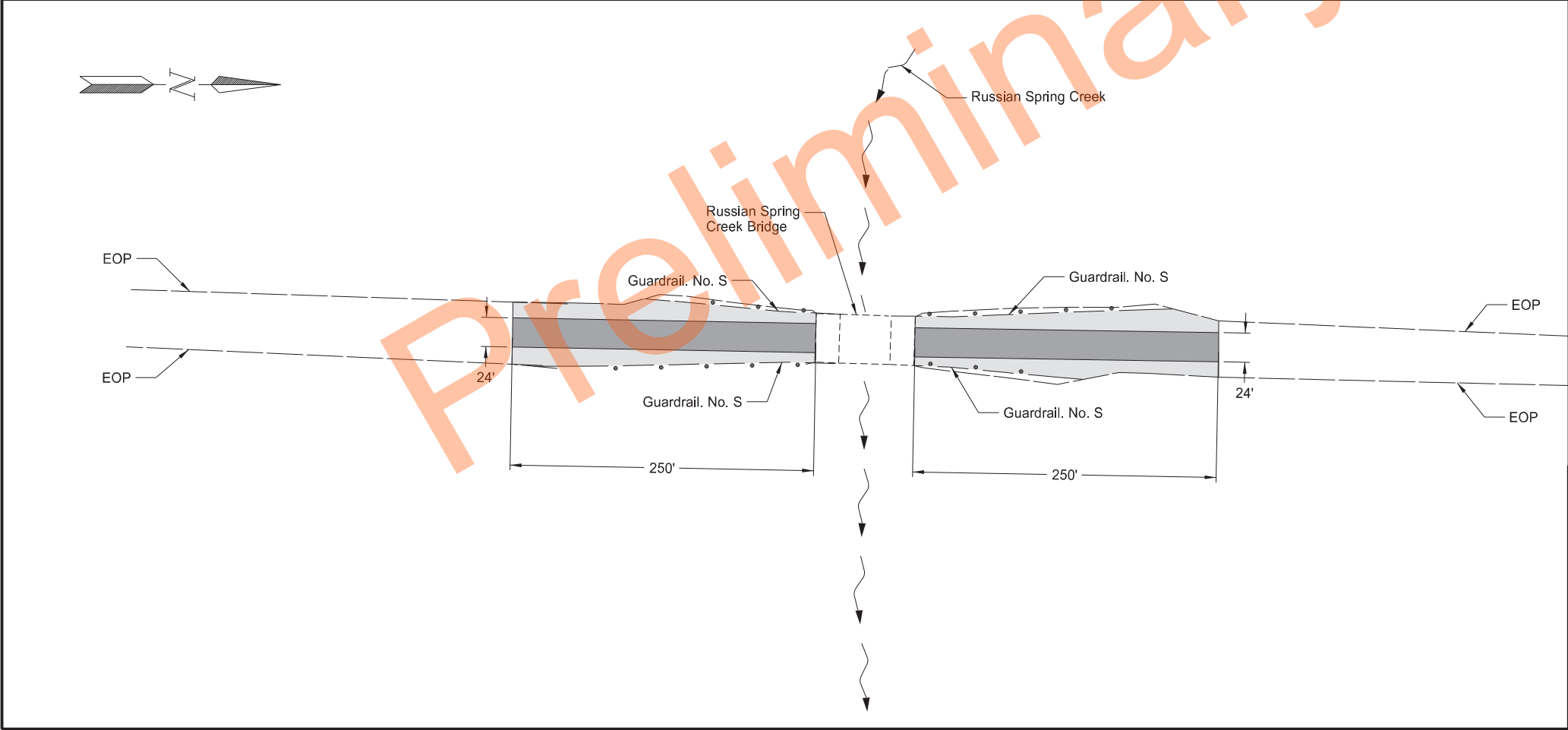
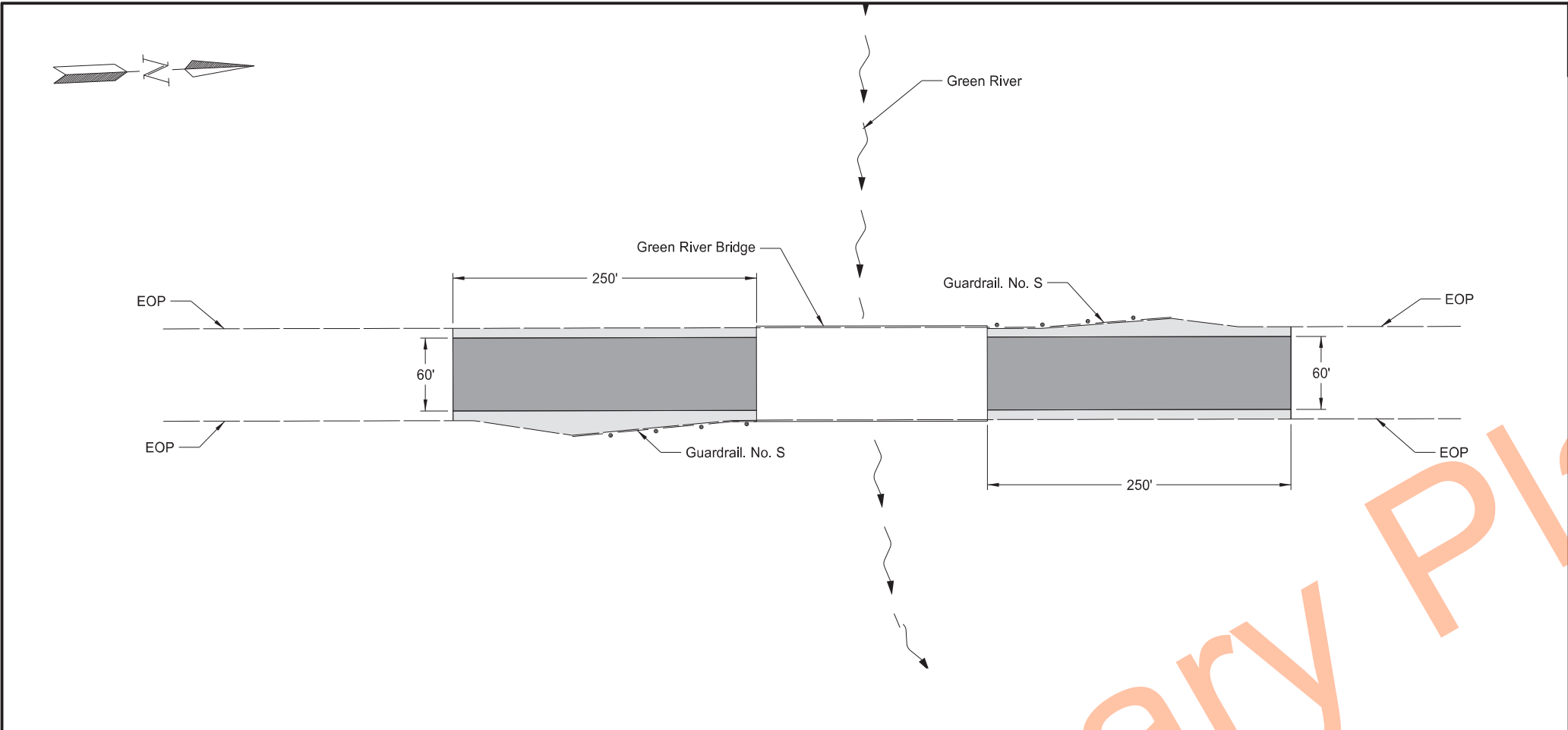
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	90	4

SPEC	CODE	ITEM DESCRIPTION	QUANTITY	UNIT
401	0050	TACK COAT RP 75.442 Rt	4	GAL
430	0045	SUPERPAVE FAA 45 RP 75.442 Rt	11	TON
430	5803	PG 58H-34 ASPHALT CEMENT RP 75.442 Rt	0.6	TON

LEGEND

Superpave FAA 45, PG 58H-34 Asphalt Cement

ND Highway 22 Dickinson 45th St to 17th St SW Pavement Layout	
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		STATE	PROJECT NO.		SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(140)074		90	5
SPEC	CODE	ITEM DESCRIPTION			QUANTITY	UNIT
401	0050	TACK COAT				
		Green River - Str #22-076.287			221	GAL
		Russian Spring Creek - Str #22-081.376			137	GAL
430	0045	SUPERPAVE FAA 45				
		Green River - Str #22-076.287			677	TON
		Russian Spring Creek - Str #22-081.376			378	TON
430	5803	PG 58H-34 ASPHALT CEMENT				
		Green River - Str #22-076.287			41	TON
		Russian Spring Creek - Str #22-081.376			23	TON

2" Superpave FAA 45, PG 58H-34 Asphalt Cement

3" Superpave FAA 45, PG 58H-34 Asphalt Cement

ND Highway 22
Dickinson 45th St to 17th St SW

Pavement Layout

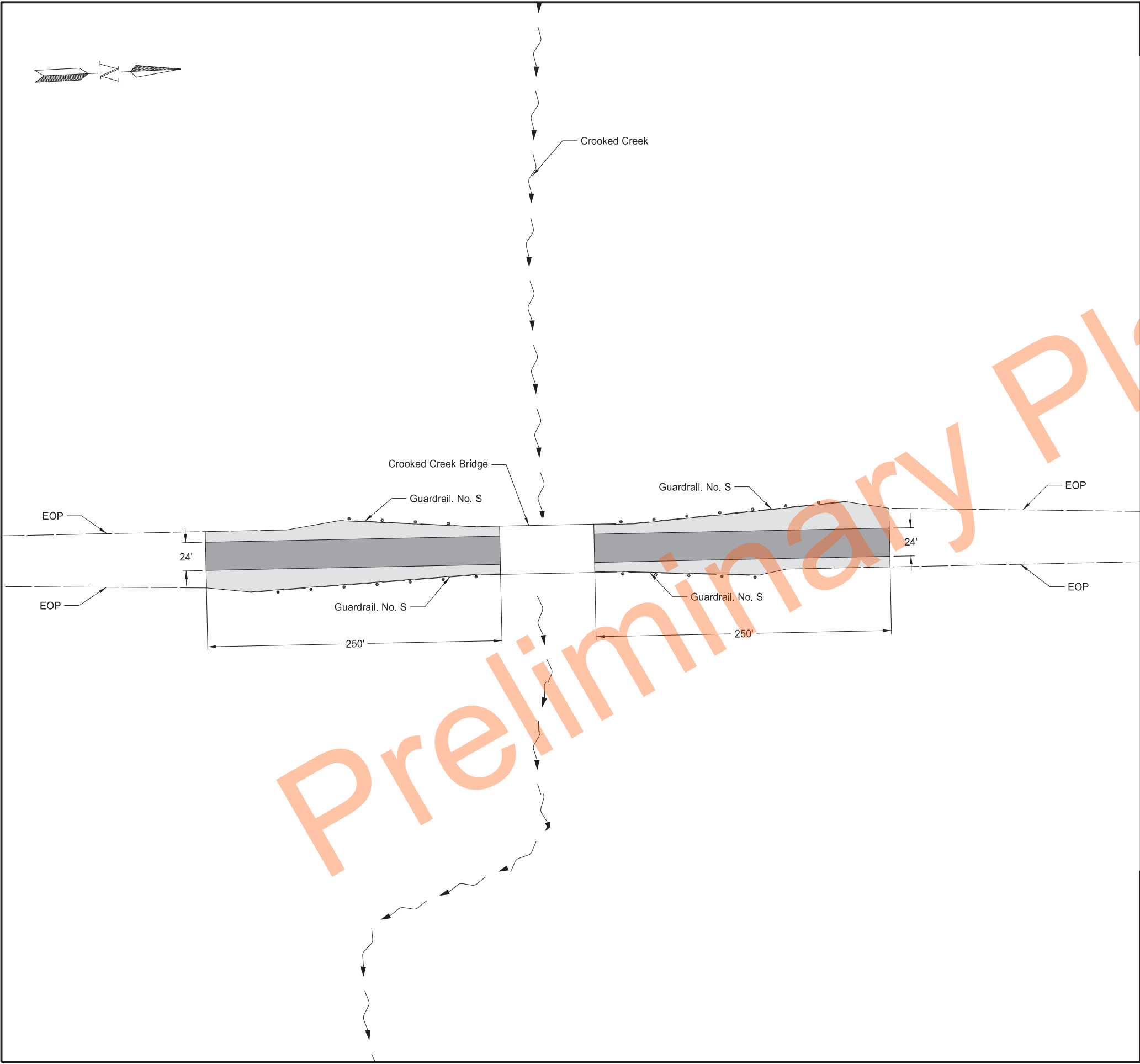
REGISTERED PROFESSIONAL ENGINEER

LUCAS DOERR

PE-25991

DATE 09/27/24

NORTH DAKOTA



		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(140)074	90	6
SPEC	CODE	ITEM DESCRIPTION		QUANTITY	UNIT
401	0050	TACK COAT			
		Crooked Creek Bridge - Str #22-090.823		136	GAL
430	0045	SUPERPAVE FAA 45			
		Crooked Creek Bridge - Str #22-090.823		376	TON
430	5803	PG 58H-34 ASPHALT CEMENT			
		Crooked Creek Bridge - Str #22-090.823		23	TON

Legend

2" Superpave FAA 45, PG 58H-34 Asphalt Cement

3" Superpave FAA 45, PG 58H-34 Asphalt Cement

ND Highway 22
Dickinson 45th St to 17th St SW
Pavement Layout

REGISTERED PROFESSIONAL ENGINEER

LUCAS DOERR

PE-25991

DATE 09/27/24

NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	60"x24"	ROAD WORK NEXT ____ MILES	2	28	56
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	48"x24"	END ROAD WORK	2	26	52
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR	6	18	108
G20-10-108	108"x48"	CONTRACTOR SIGN		70	
G20-50a-72	72"x36"	ROAD WORK NEXT ____ MILES RT & LT ARROWS	27	43	1161
G20-52a-72	72"x24"	ROAD WORK NEXT ____ MILES RT or LT ARROW	3	36	108
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$80 WHEN WORKERS PRESENT	2	59	118
I2-5-96	96"x48"	YOUR HIGHWAY DOLLARS AT WORK		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	36"x48"	SPEED LIMIT ____ (Portable only)	4	30	120
R2-1-48	48"x60"	SPEED LIMIT ____	4	39	156
R2-1aP-24	24"x18"	MINIMUM FEE \$80 (Mounted on Speed Limit post)	4	10	40
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	4	35	140
W3-5-48	48"x48"	SPEED REDUCTION AHEAD	4	35	140
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT		35	
W5-1-48	48"x48"	ROAD NARROWS	4	35	140
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	4	35	140
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES	10	35	350
W8-12-48	48"x48"	NO CENTER LINE	4	35	140
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL	4	35	140
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY	4	35	140
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or ____ FT or ____ MILE		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or ____ FT or ____ MILE		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W13-1P-30	30"x30"	____ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	____ FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	48"x48"	ROAD WORK AHEAD or ____ FT or ____ MILE	5	35	175
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		35	
W20-7-48	48"x48"	FLAGGER	4	35	140
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back	4	5	20
W20-52P-54	54"x12"	NEXT ____ MILES (Mounted on warning sign post)	4	12	48
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	3772

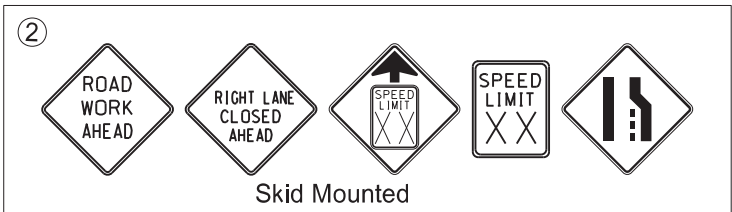
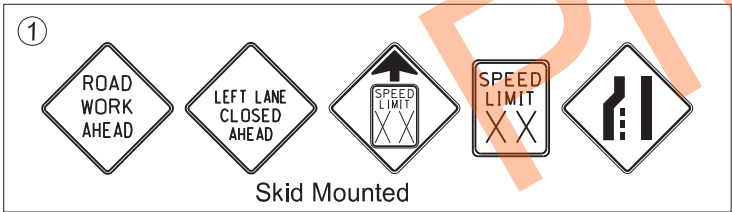
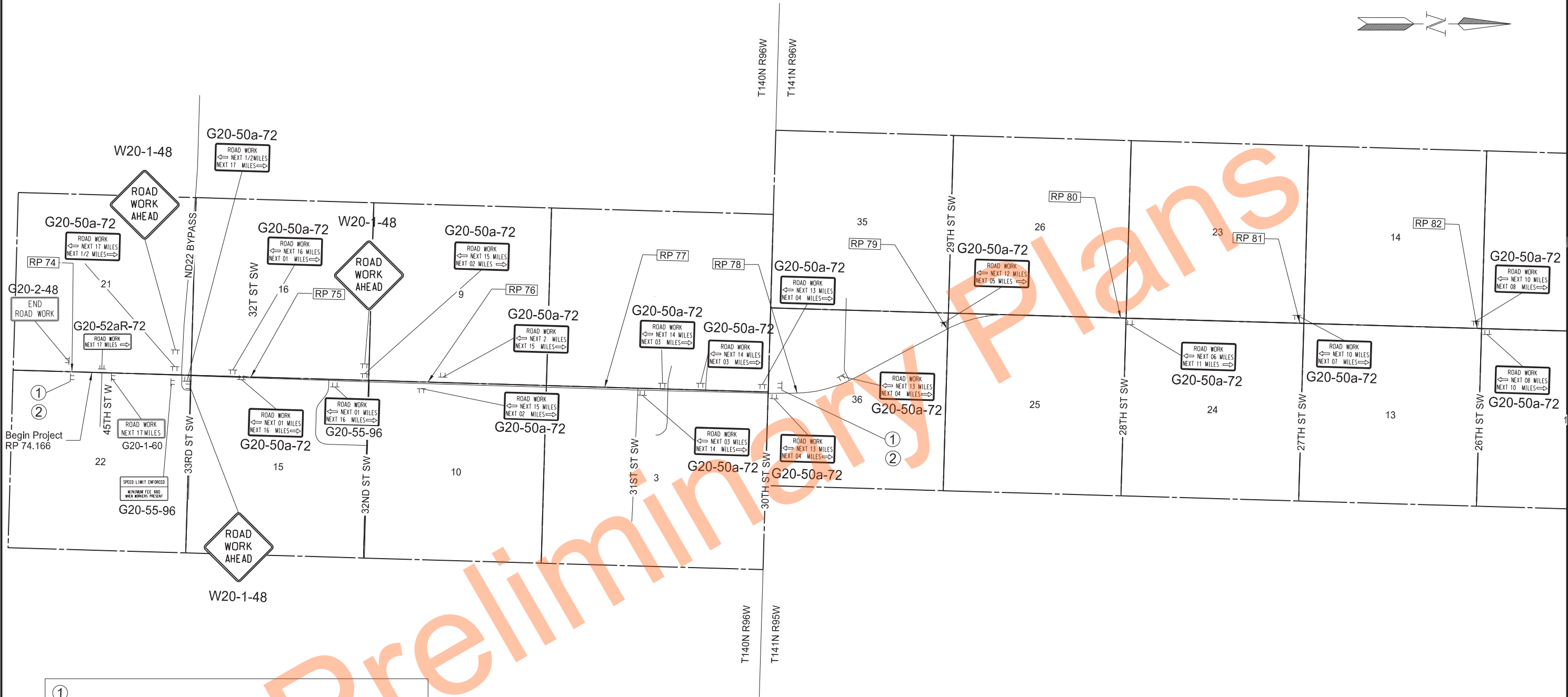
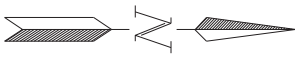
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NOTE:
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.
<http://www.dot.nd.gov/>

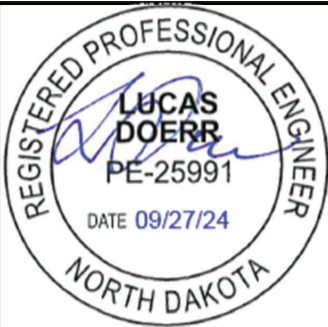


Traffic Control Devices List
ND Highway 22
Dickinson 45th St to 17th St SW

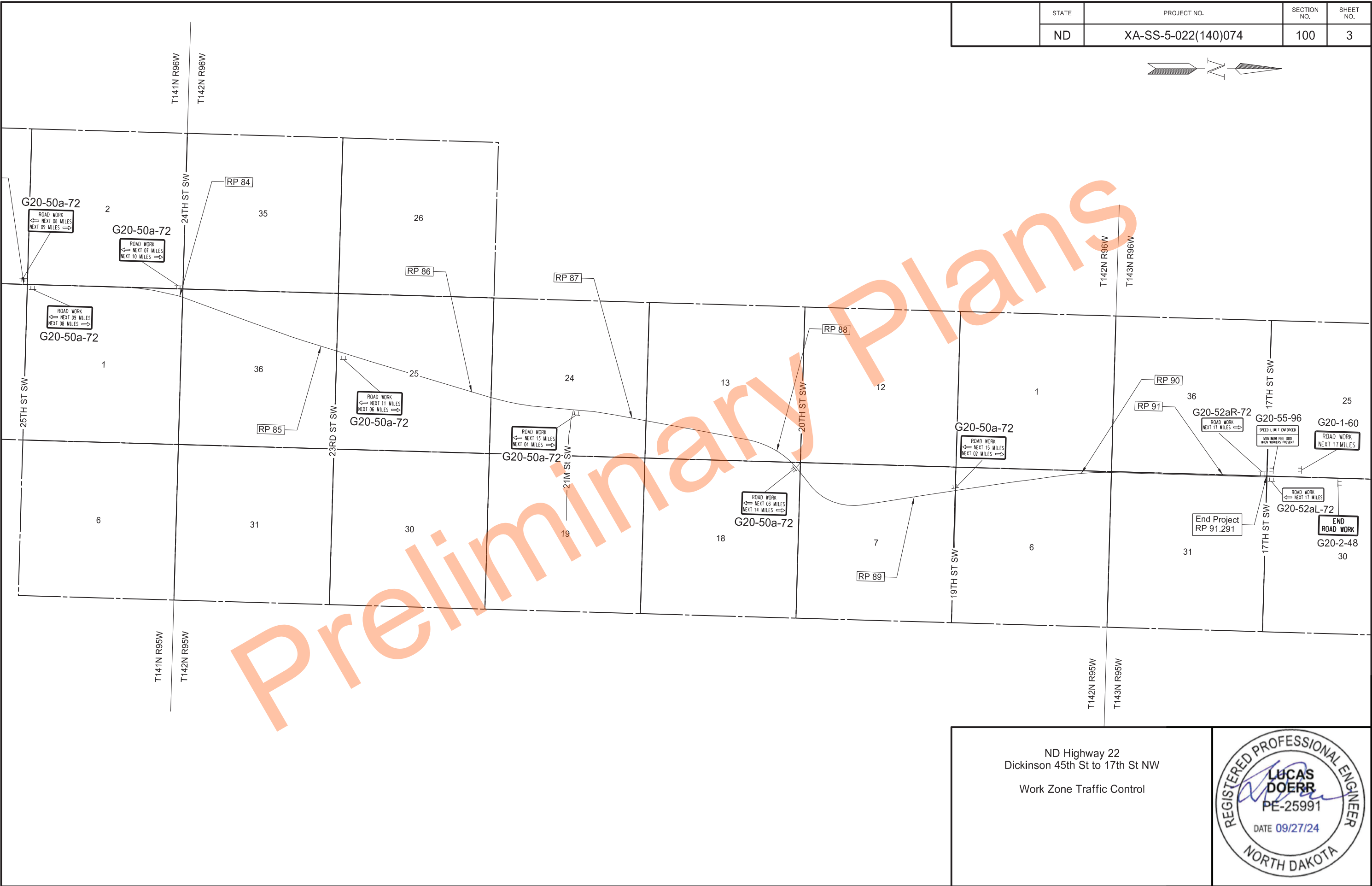
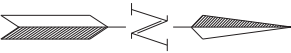
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	100	2



ND Highway 22
Dickinson 45th St to 17th St NW
Work Zone Traffic Control



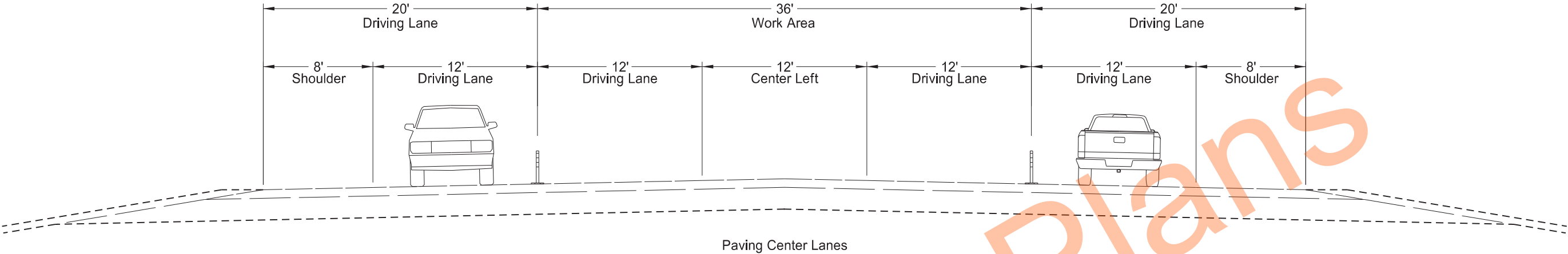
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	ND	XA-SS-5-022(140)074	100	3



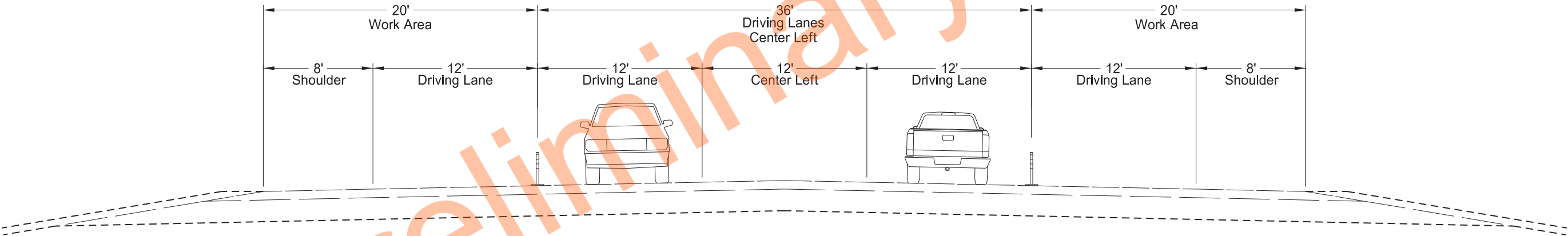
ND Highway 22
Dickinson 45th St to 17th St NW
Work Zone Traffic Control



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	100	4



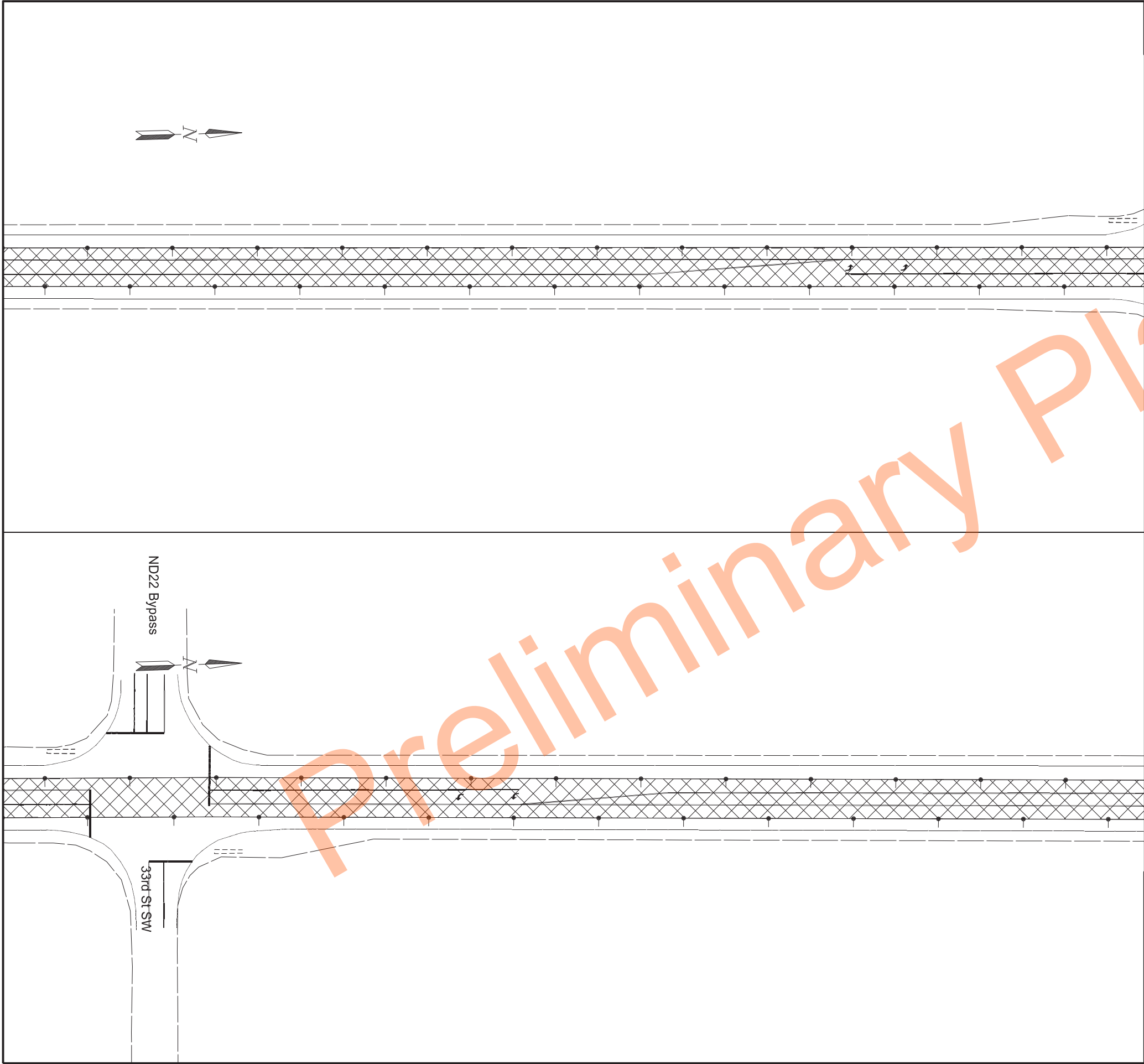
Paving Center Lanes



Paving Outside Lanes

ND Highway 22
Dickinson 45th St to 17th St NW
RP 74.166 to Urban Limit





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	100	6

ROAD
WORK
AHEAD

*
BE
PREPARED
TO STOP

BUMP

*
UNEVEN
LANES

* Not required on approaches
Use all other signs where necessary

Note:
Use D-704-20 for Sign Spacing

Legend



- Work Zone



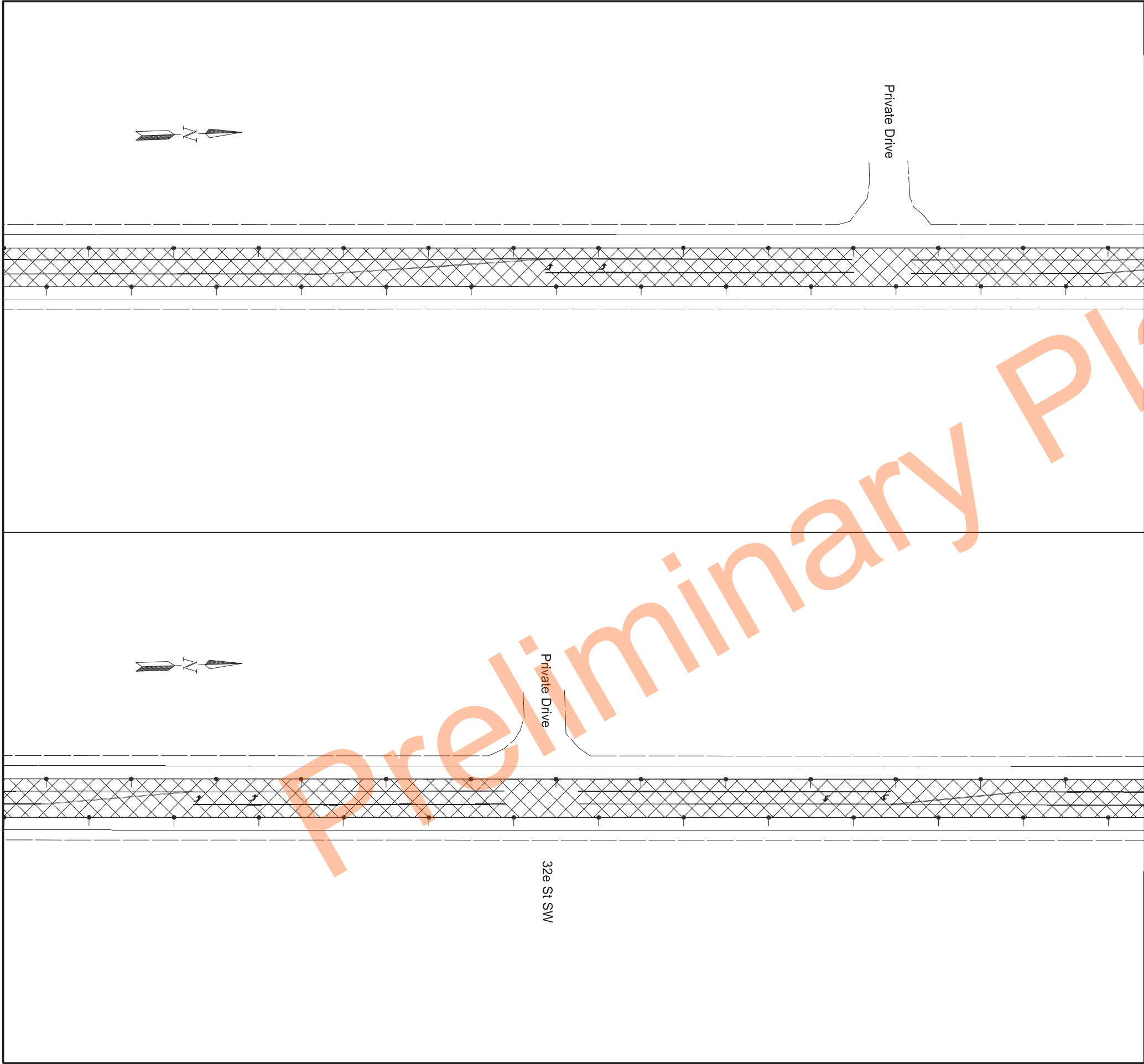
- Work Zone



- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 1





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	8

ROAD
WORK
AHEAD

*
BE
PREPARED
TO STOP

BUMP

*
UNEVEN
LANES

* Not required on approaches
Use all other signs where necessary

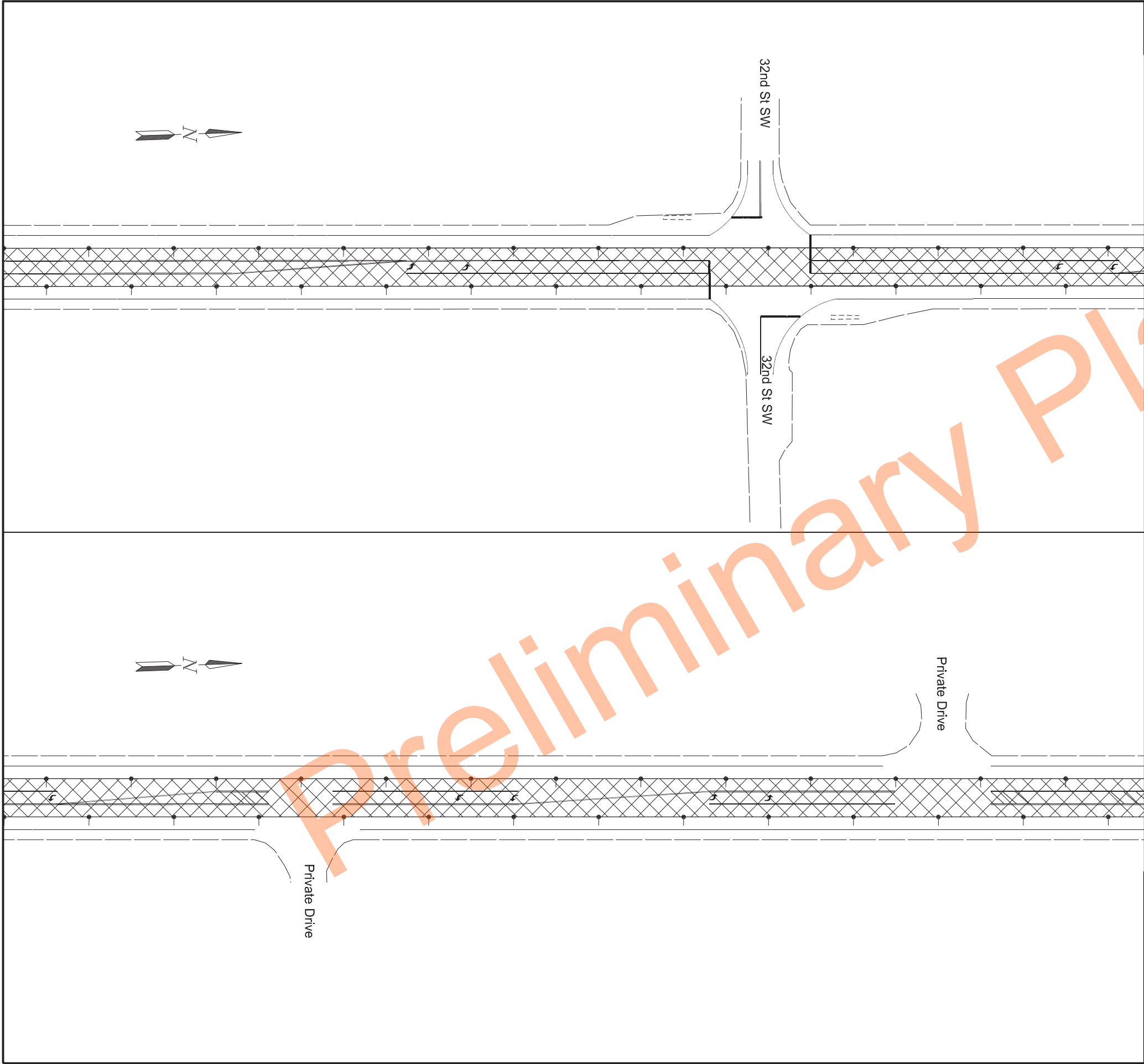
Note:
Use D-704-20 for Sign Spacing

Legend

- Work Zone
- Work Zone
- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 1





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	100	9

ROAD WORK AHEAD

* BE PREPARED TO STOP

BUMP

* UNEVEN LANES

* Not required on approaches
Use all other signs where necessary

Note:
Use D-704-20 for Sign Spacing

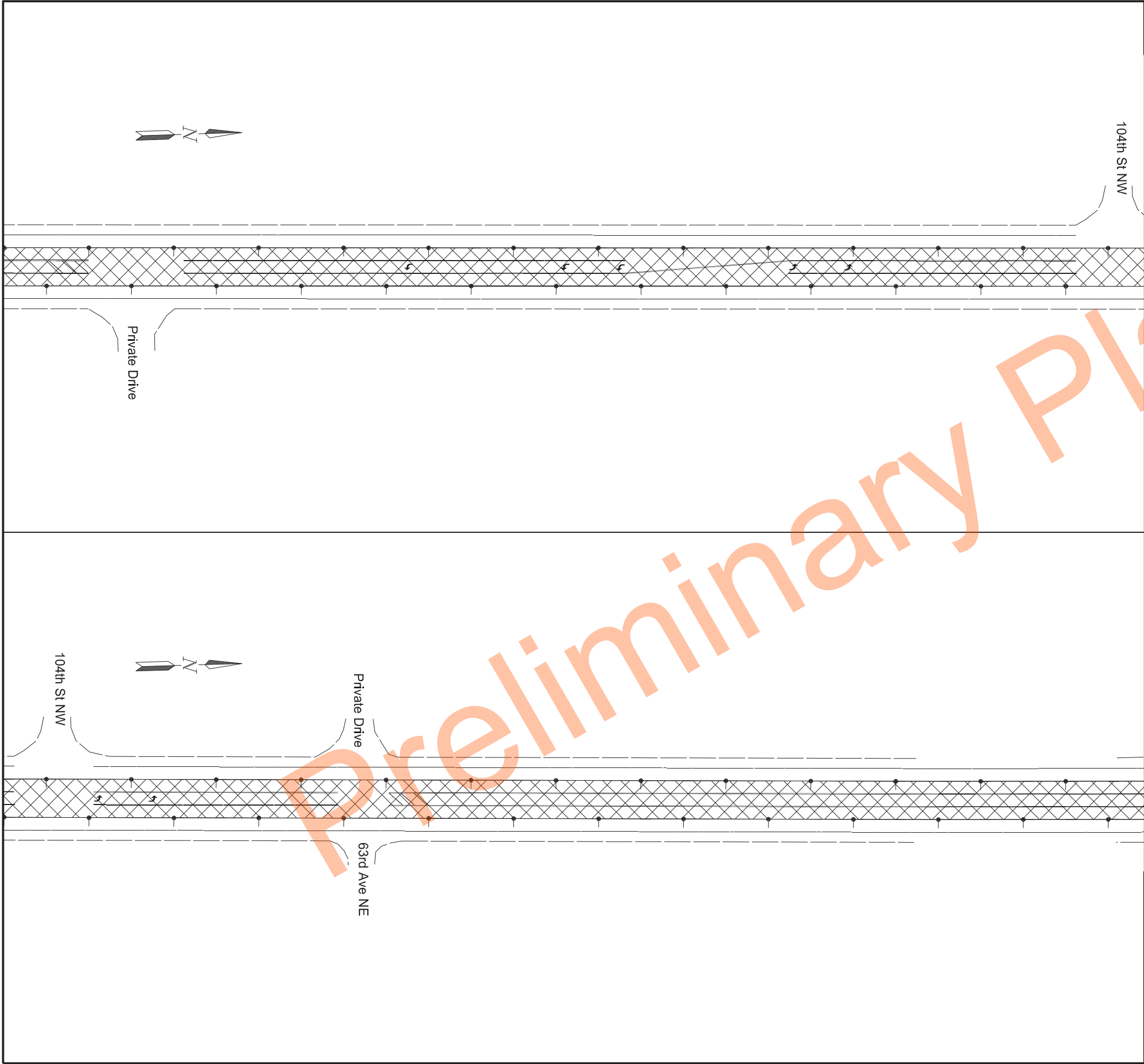
Legend

- Work Zone

- Work Zone

- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 1



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	10

ROAD WORK AHEAD

* BE PREPARED TO STOP

BUMP

* UNEVEN LANES

* Not required on approaches
Use all other signs where necessary

Note:
Use D-704-20 for Sign Spacing

Legend

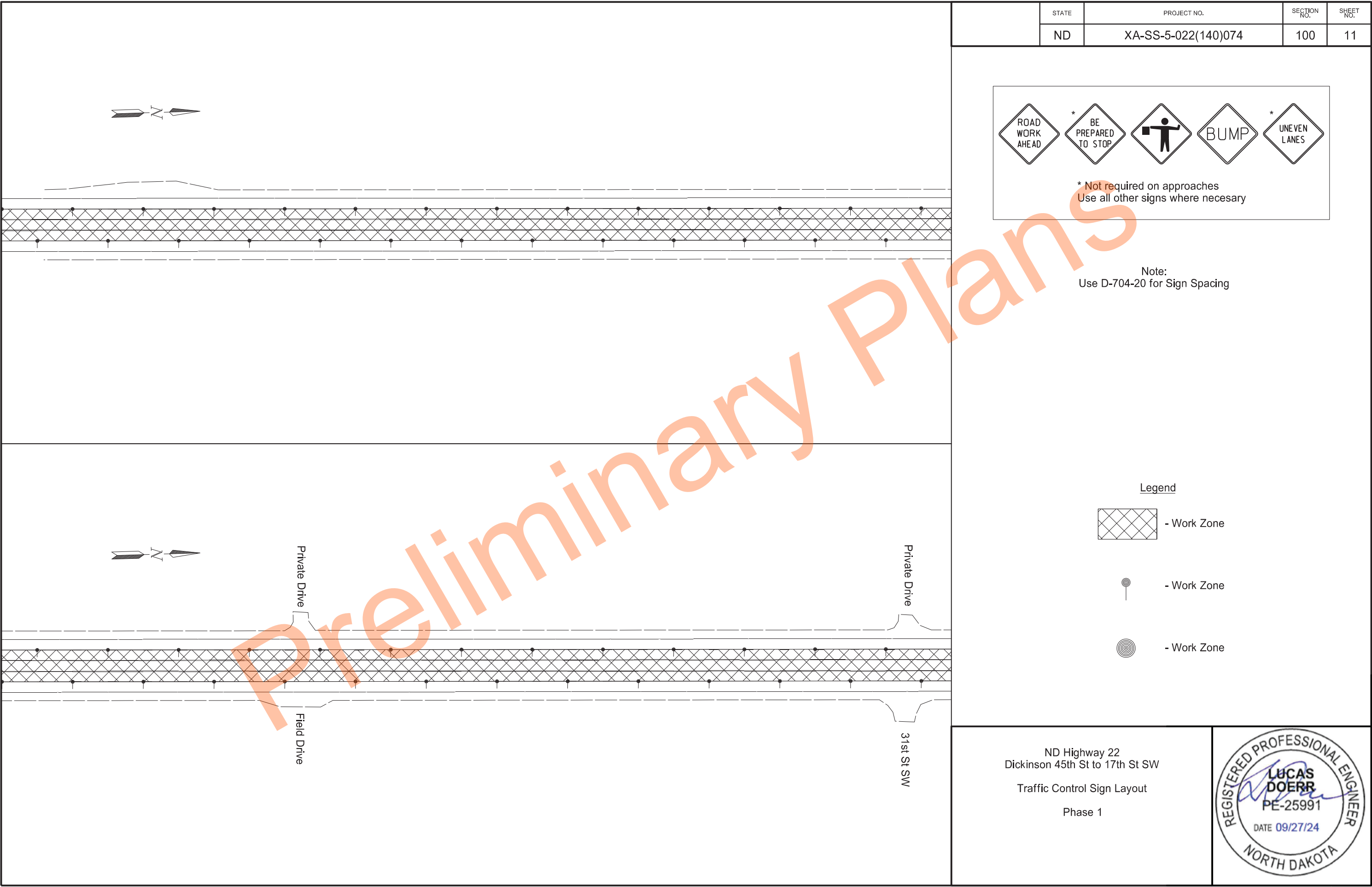
- Work Zone

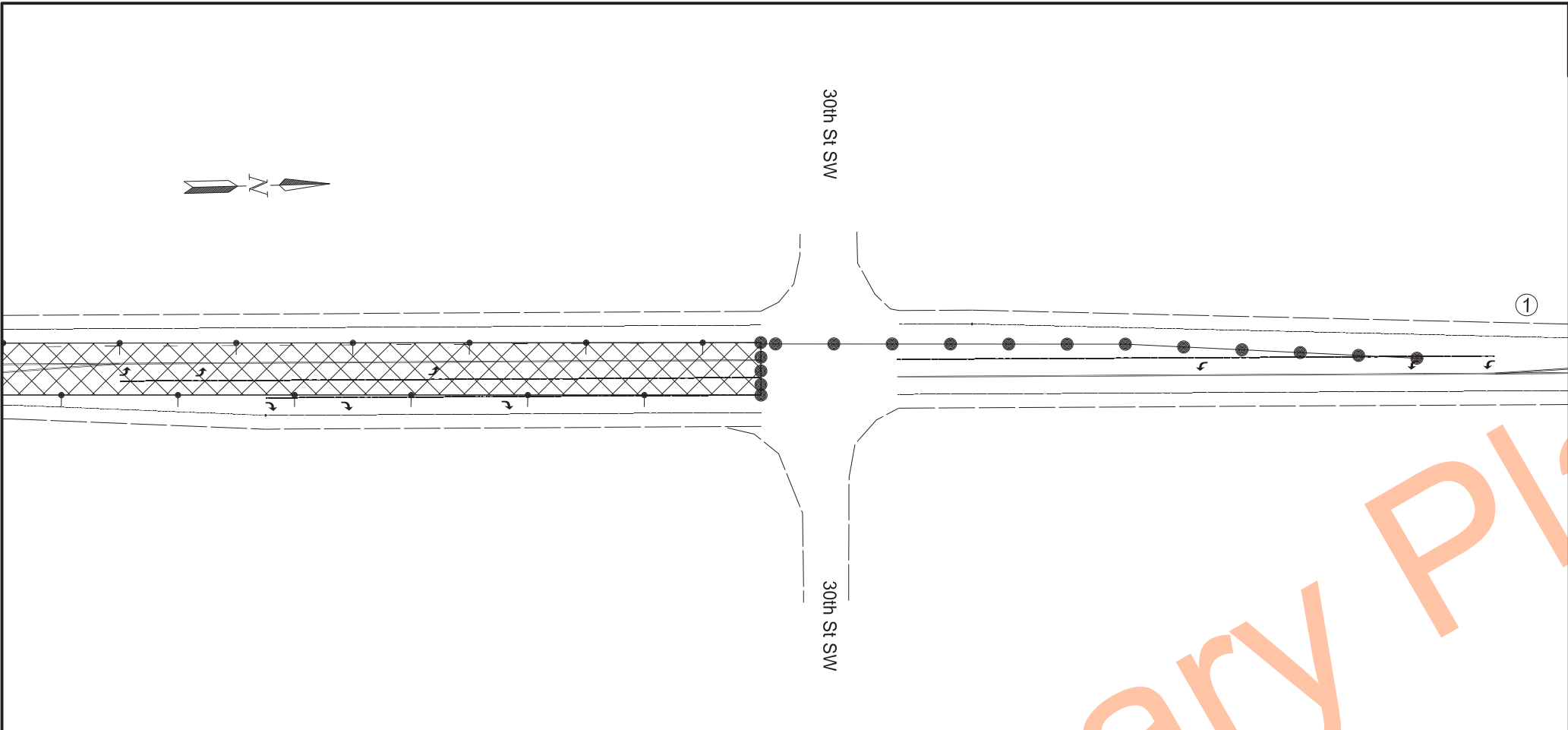
- Work Zone

- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 1

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 09/27/24
NORTH DAKOTA





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	15

ROAD WORK AHEAD

* BE PREPARED TO STOP

BUMP

* UNEVEN LANES

* Not required on approaches
Use all other signs where necessary

1

ROAD WORK AHEAD

LEFT LANE CLOSED AHEAD

SPEED LIMIT XX

Note:
Use D-704-20 for Sign Spacing

Legend



- Work Zone



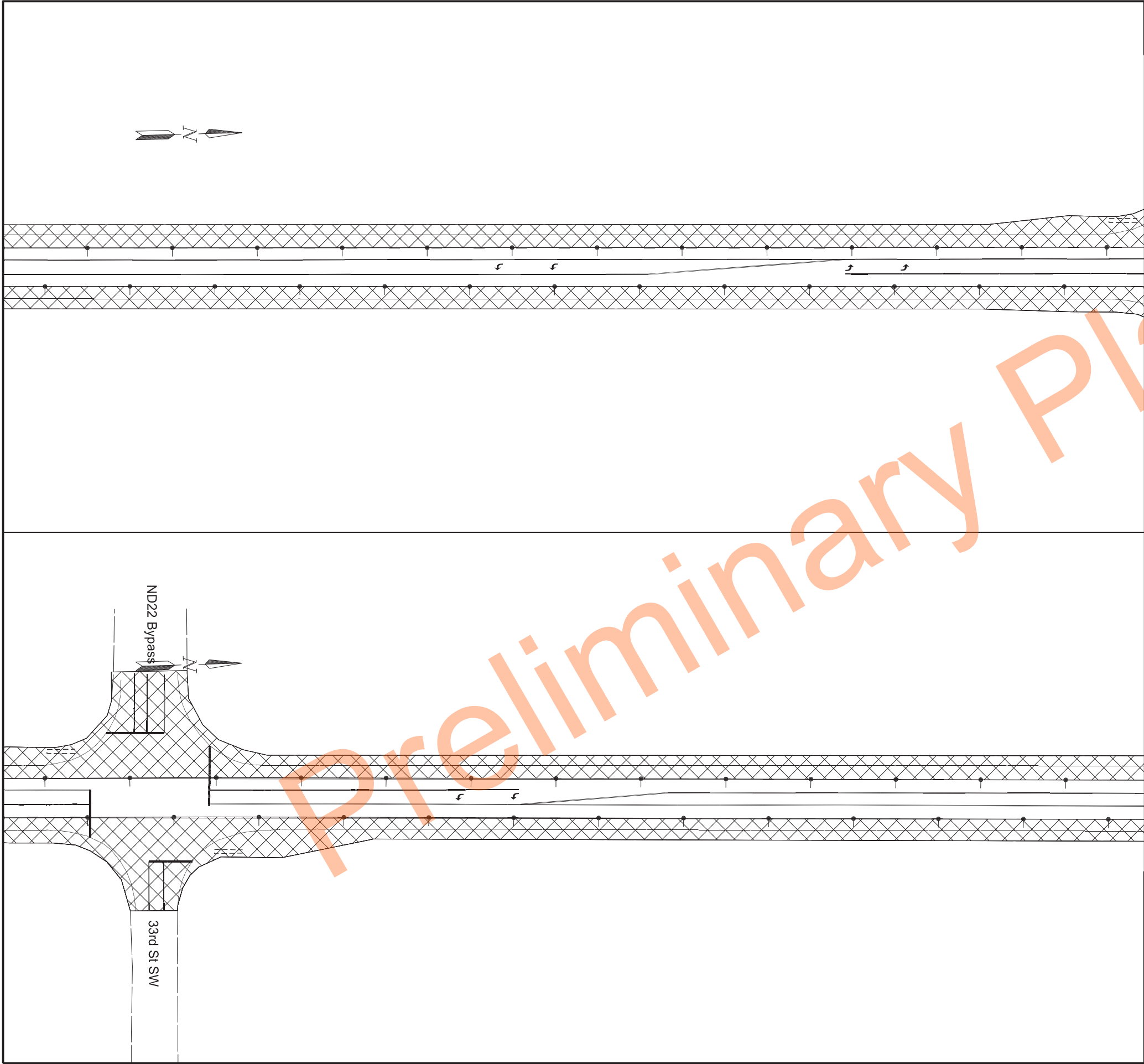
- Work Zone



- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 1





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	17

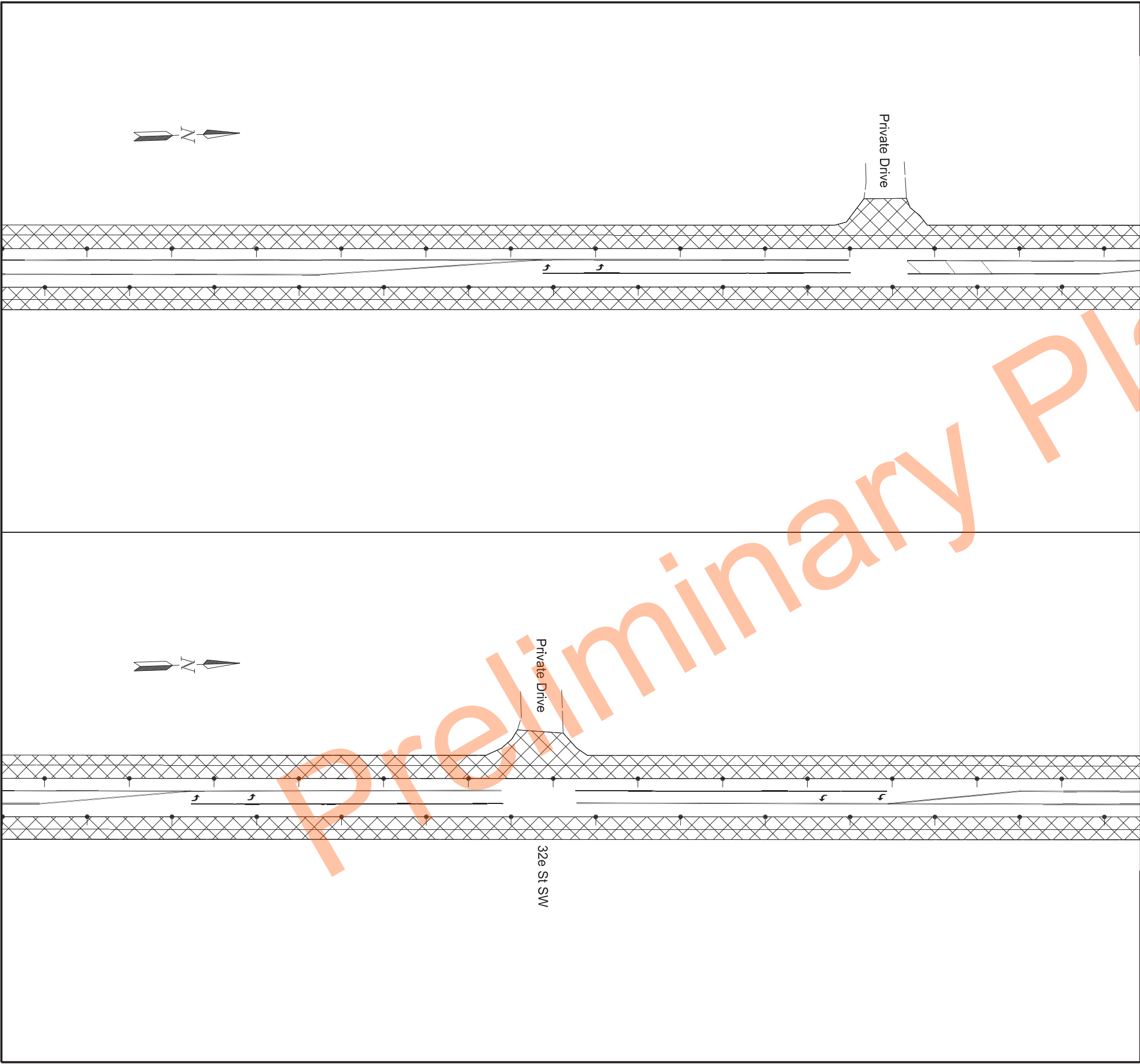
* Not required on approaches
Use all other signs where necessary

Note:
Use D-704-20 for Sign Spacing

Legend

- Work Zone
- Work Zone
- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 2



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	19

ROAD
WORK
AHEAD

*
BE
PREPARED
TO STOP

BUMP

*
UNEVEN
LANES

* Not required on approaches
Use all other signs where necessary

Note:
Use D-704-20 for Sign Spacing

Legend



- Work Zone



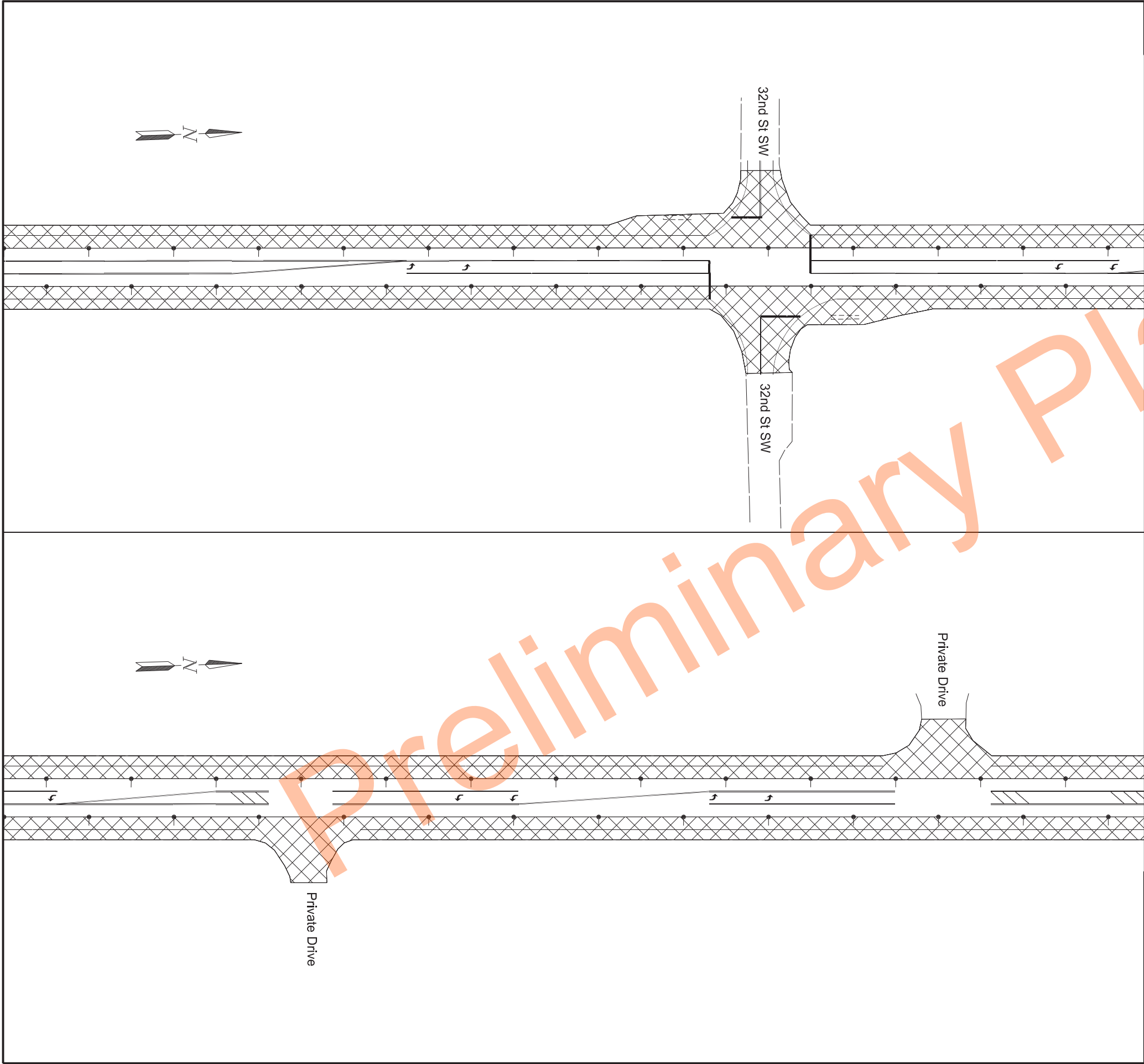
- Work Zone



- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 2





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	20

ROAD
WORK
AHEAD

*
BE
PREPARED
TO STOP

BUMP

*
UNEVEN
LANES

* Not required on approaches
Use all other signs where necessary

Note:
Use D-704-20 for Sign Spacing

Legend



- Work Zone



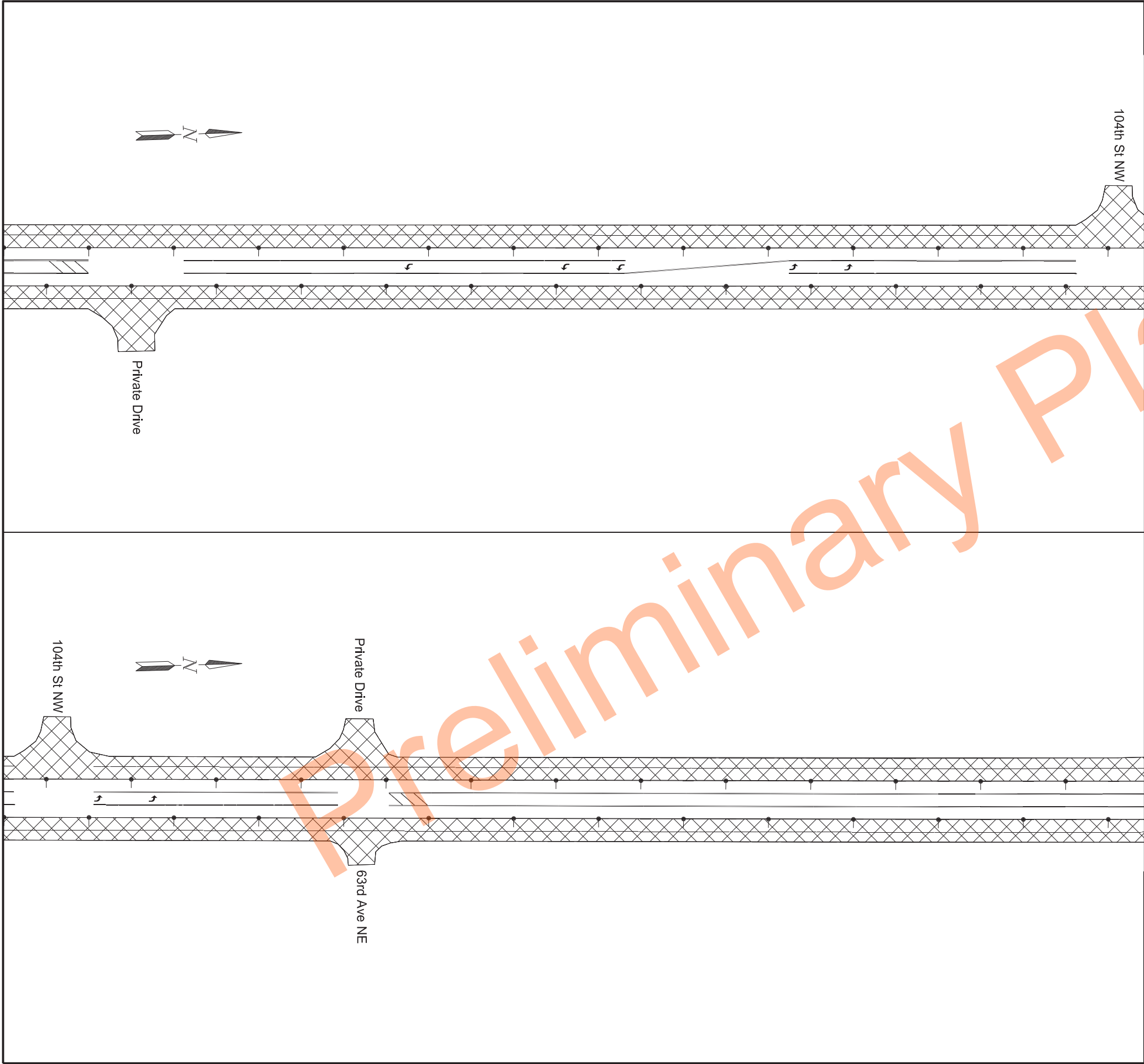
- Work Zone



- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 2





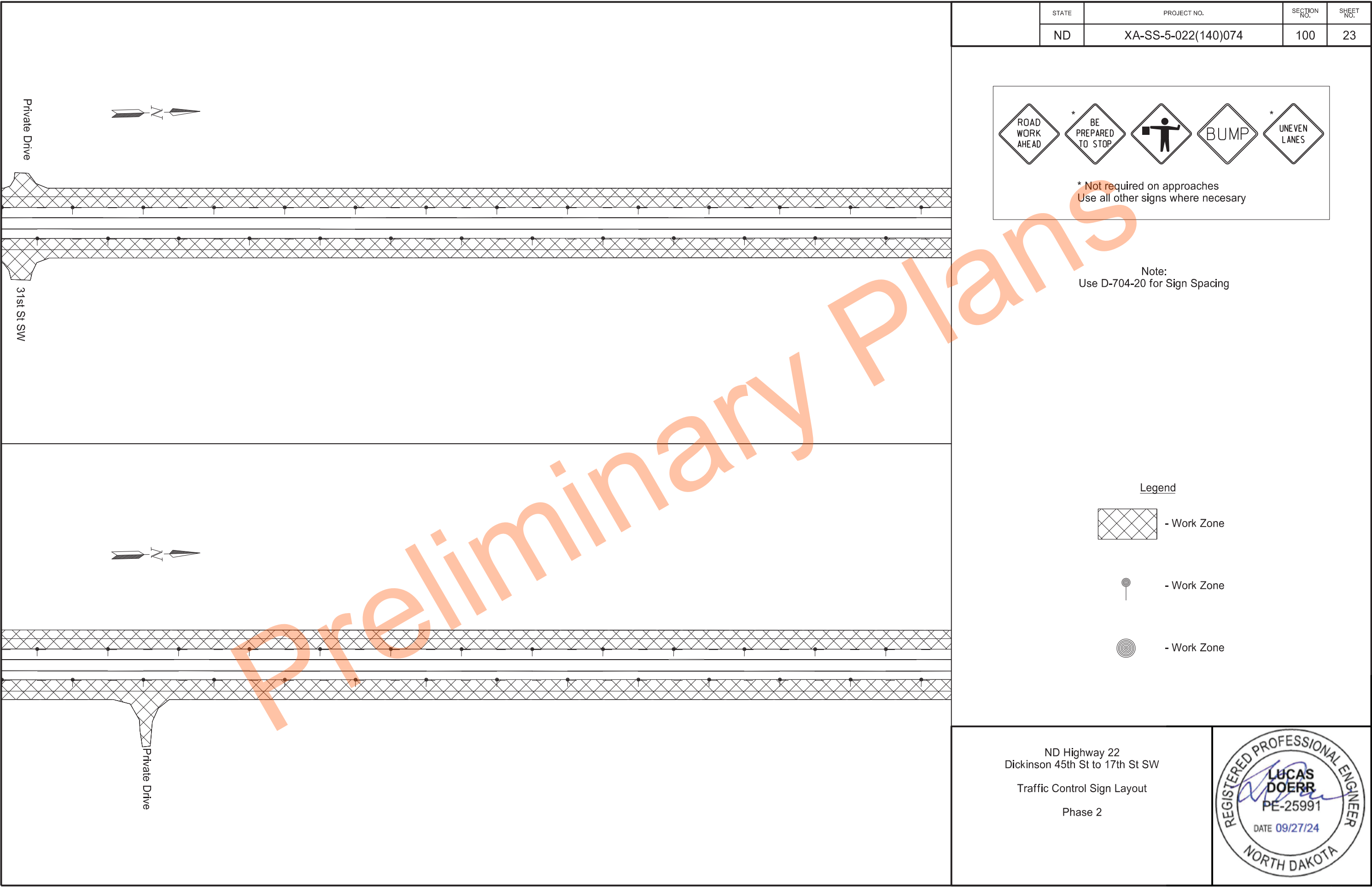
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ND	XA-SS-5-022(140)074	100	21

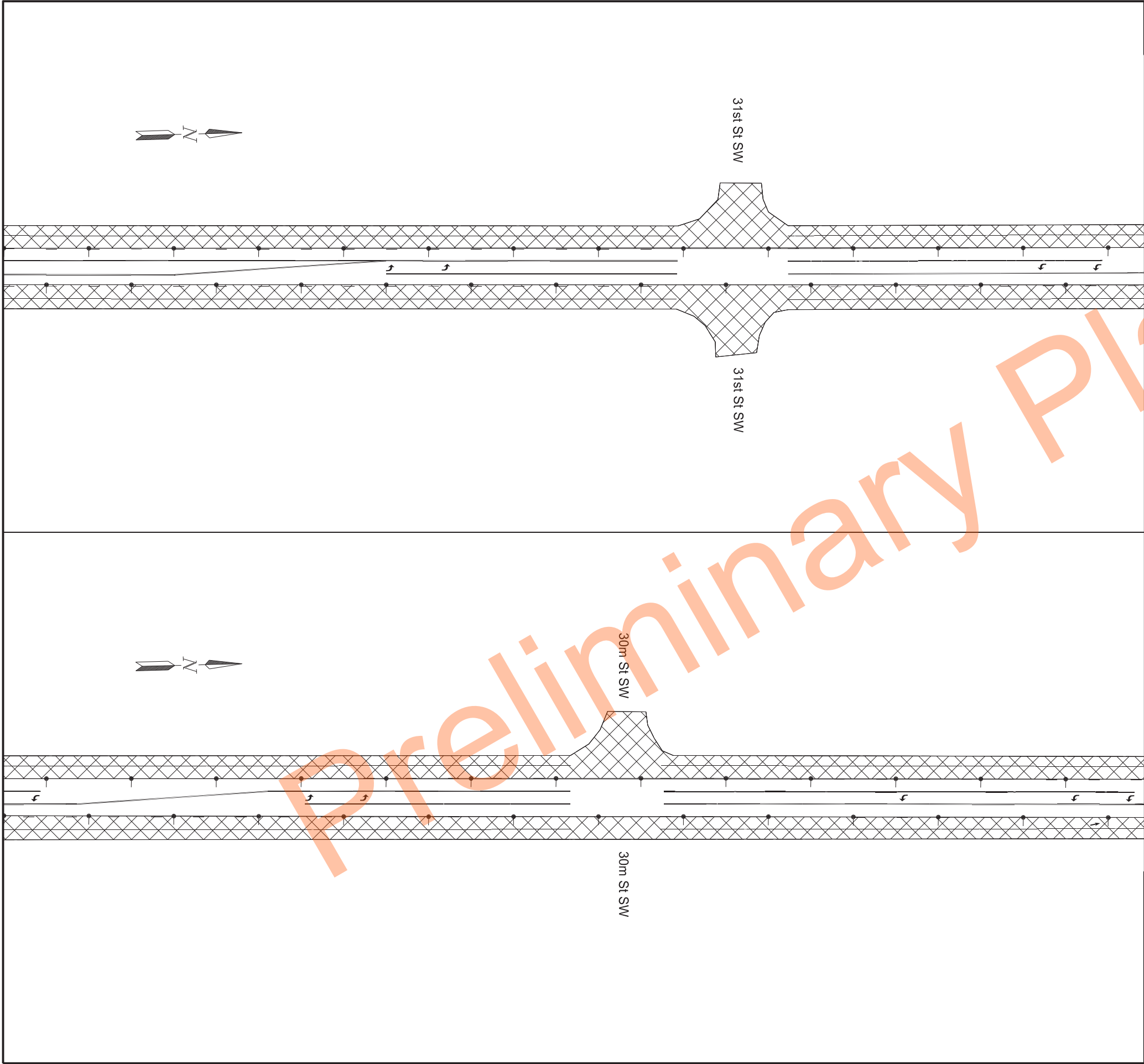
Note:
Use D-704-20 for Sign Spacing

Legend

- Work Zone
- Work Zone
- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 2





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	24

ROAD WORK AHEAD

* BE PREPARED TO STOP

BUMP

* UNEVEN LANES

* Not required on approaches
Use all other signs where necessary

Note:
Use D-704-20 for Sign Spacing

Legend

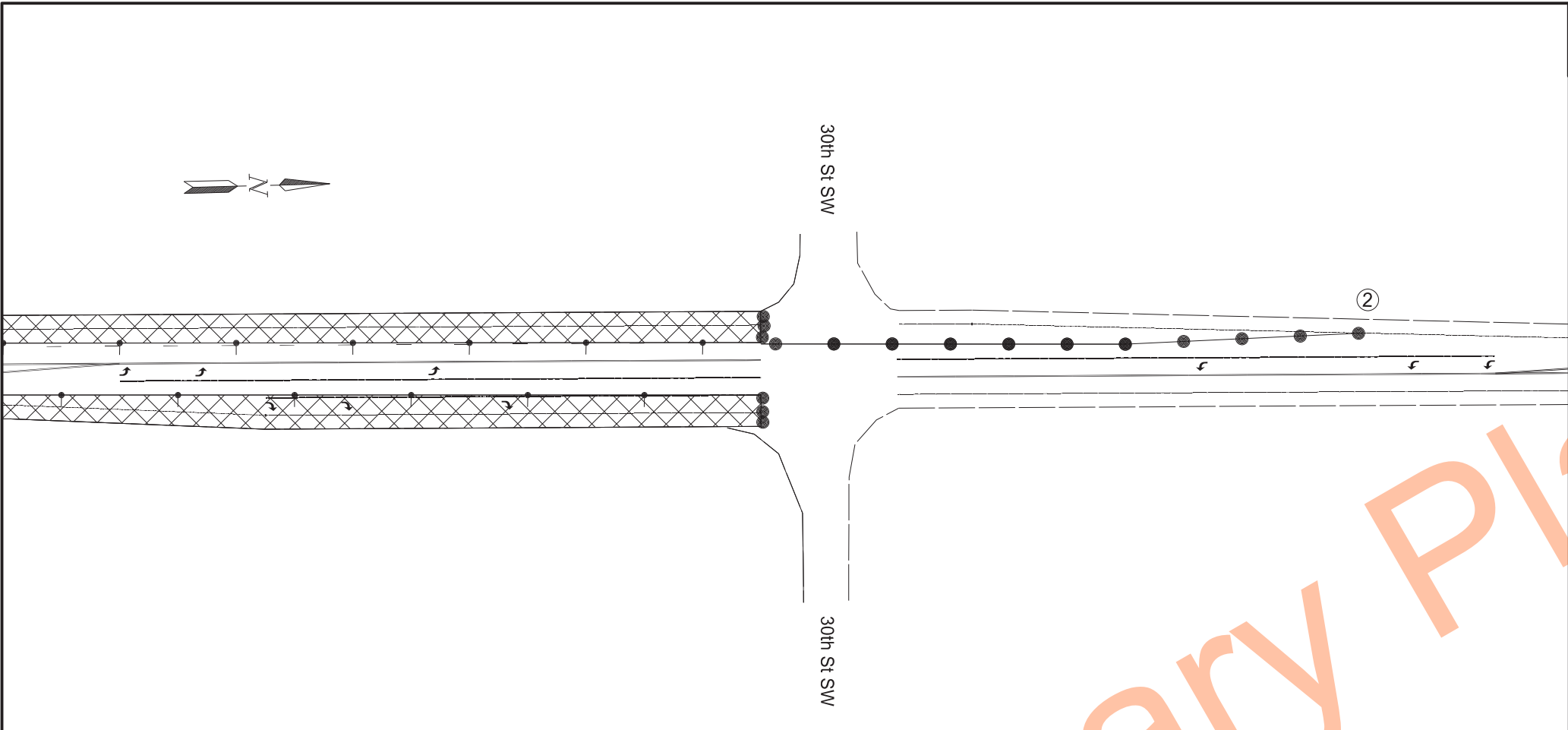
- Work Zone

- Work Zone

- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 2

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 09/27/24
NORTH DAKOTA



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	100	26

ROAD WORK AHEAD

* BE PREPARED TO STOP

BUMP

* UNEVEN LANES

* Not required on approaches
Use all other signs where necessary

2

ROAD WORK AHEAD

RIGHT LANE CLOSED AHEAD

SPEED LIMIT XX

Note:
Use D-704-20 for Sign Spacing

Legend



- Work Zone



- Work Zone



- Work Zone

ND Highway 22
Dickinson 45th St to 17th St SW
Traffic Control Sign Layout
Phase 2



HIGHWAY 22

NO PASSING RIGHT (RP)			NO PASSING LEFT (RP)			Comment	SKIPS (RP)			DOUBLE BARRIER(RP)		
START	END	LENGTH (FT)	START	END	LENGTH (FT)		START	END	LENGTH (FT)	START	END	LENGTH (FT)
-	-	-	78.100	78.293	1019.040		-	-	-	-	-	-
-	-	-	-	-	-		78.293	78.767	2502.720	-	-	-
78.767	79.245	2523.840	78.767	79.245	2523.840		-	-	-	78.767	79.245	2523.840
79.245	79.716	2486.880	-	-	-		-	-	-	-	-	-
79.716	79.793	406.560	79.716	79.793	406.560		-	-	-	79.716	79.793	406.560
-	-	-	79.793	80.000	1092.960		-	-	-	-	-	-
-	-	-	-	-	-		80.000	80.472	2492.160	-	-	-
80.472	81.247	4092.000	80.472	81.247	4092.000		-	-	-	80.472	81.247	4092.000
-	-	-	-	-	-		81.247	81.935	3632.640	-	-	-
81.935	81.959	126.720	-	-	-		-	-	-	-	-	-
81.959	85.987	21267.840	81.959	85.987	21267.840		-	-	-	81.959	85.957	21109.440
85.987	86.076	469.920	-	-	-		-	-	-	-	-	-
86.076	86.168	485.760	86.076	86.168	485.760		-	-	-	86.076	86.186	580.800
-	-	-	86.168	86.398	1214.400		-	-	-	-	-	-
-	-	-	-	-	-		86.398	87.359	5074.080	-	-	-
87.359	87.604	1293.600	-	-	-		-	-	-	-	-	-
-	-	-	87.604	87.807	1071.840		-	-	-	-	-	-
87.807	87.919	591.360										
87.919	88.473	2925.120	87.919	88.473	2925.120		-	-	-	87.919	88.473	2925.120
-	-	-	-	-	-		88.473	88.993	2745.600	-	-	-
88.993	89.053	316.800	-	-	-		-	-	-	-	-	-
-	-	-	-	-	-		89.053	89.120	353.760	-	-	-
89.120	89.526	2143.680	89.120	89.526	2143.680		-	-	-	89.120	89.526	2143.680
-	-	-	-	-	-		89.526	89.867	1800.480	-	-	-
89.867	90.008	744.480	-	-	-		-	-	-	-	-	-
-	-	-	-	-	-		90.008	90.078	369.600	-	-	-
-	-	-	90.078	90.239	850.080		-	-	-	-	-	-
-	-	-	-	-	-		90.239	91.291	5554.560	-	-	-
-	-	-	-	-	-		-	-	-	-	-	-
TOTAL LENGTH =		39,875	TOTAL LENGTH =		39,093		TOTAL LENGTH =		24,526	TOTAL LENGTH =		33,781

HIGHWAY 22 TEMPORARY PAVEMENT MARKINGS			
6" LINES		# OF APPLICATIONS	
Yellow Centerline	87,950.00	3	263,850.00
Yellow Non-Centerline	78,111.00	1	78,111.00
White Skips	14,724.00	2	29,448.00
TOTAL (LF)			371,409.00
12" LINES		# OF APPLICATIONS	
Lane Lines	16,021.00	2	32,042.00
Yellow Gore	593.00	1	593.00
TOTAL (LF)			32,635.00
24" LINES		# OF APPLICATIONS	
Stop Bar	268.00	1	268.00
TOTAL (LF)			268.00

PAINTED LENGTH CALCULATIONS			6IN WHITE EDGE LINE CALCULATIONS				
(A) NO PASSING ZONE =	78,968	FT		START	END	LENGTH	
(B) DOUBLE BARRIER =	33,781	FT	White Edge Line Left=	74.166	91.291	90,420	FT
(C) SKIPS =	24,526	FT	White Edge Line Right=	74.166	91.291	90,420	FT
(D) = (A) - 2(B) = SINGLE BARRIER W/ SKIP =	11,405	FT	TOTAL PAINTED WHITE EDGE LINE LENGTH =		180,840	FT	
PAINTED LENGTH = 2(B) +0.25(C) +1.25(D) =	87,950	FT					

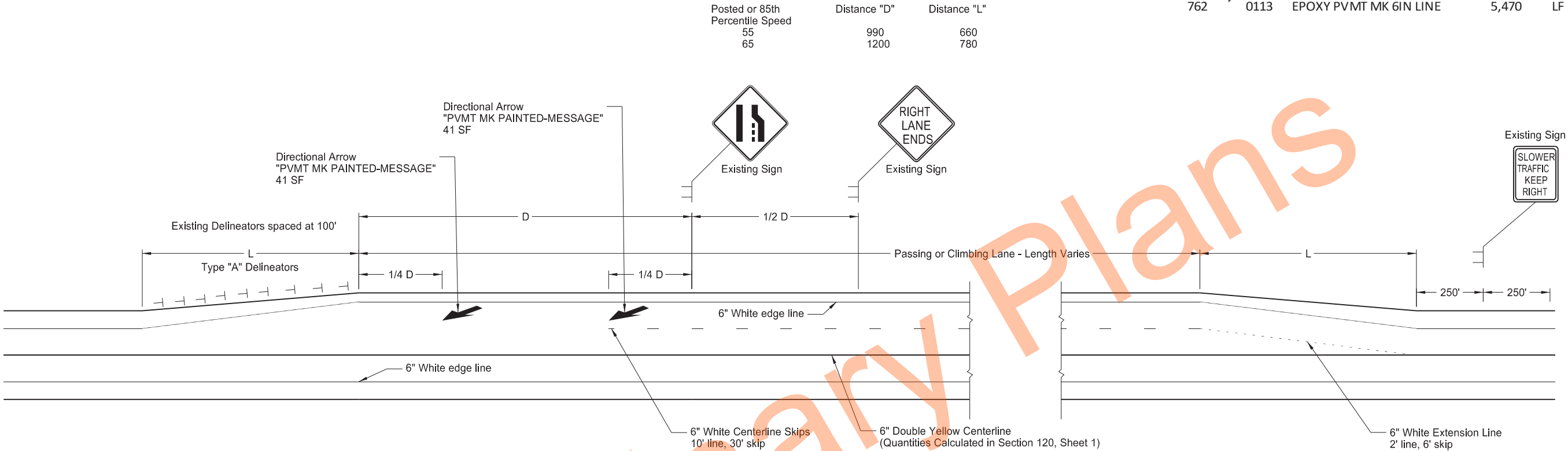
ND Highway 22
Dickinson 45th St to 17th St SW

Pavement Markings



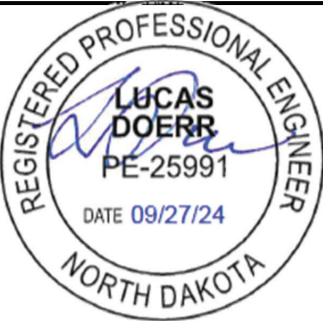
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	120	2

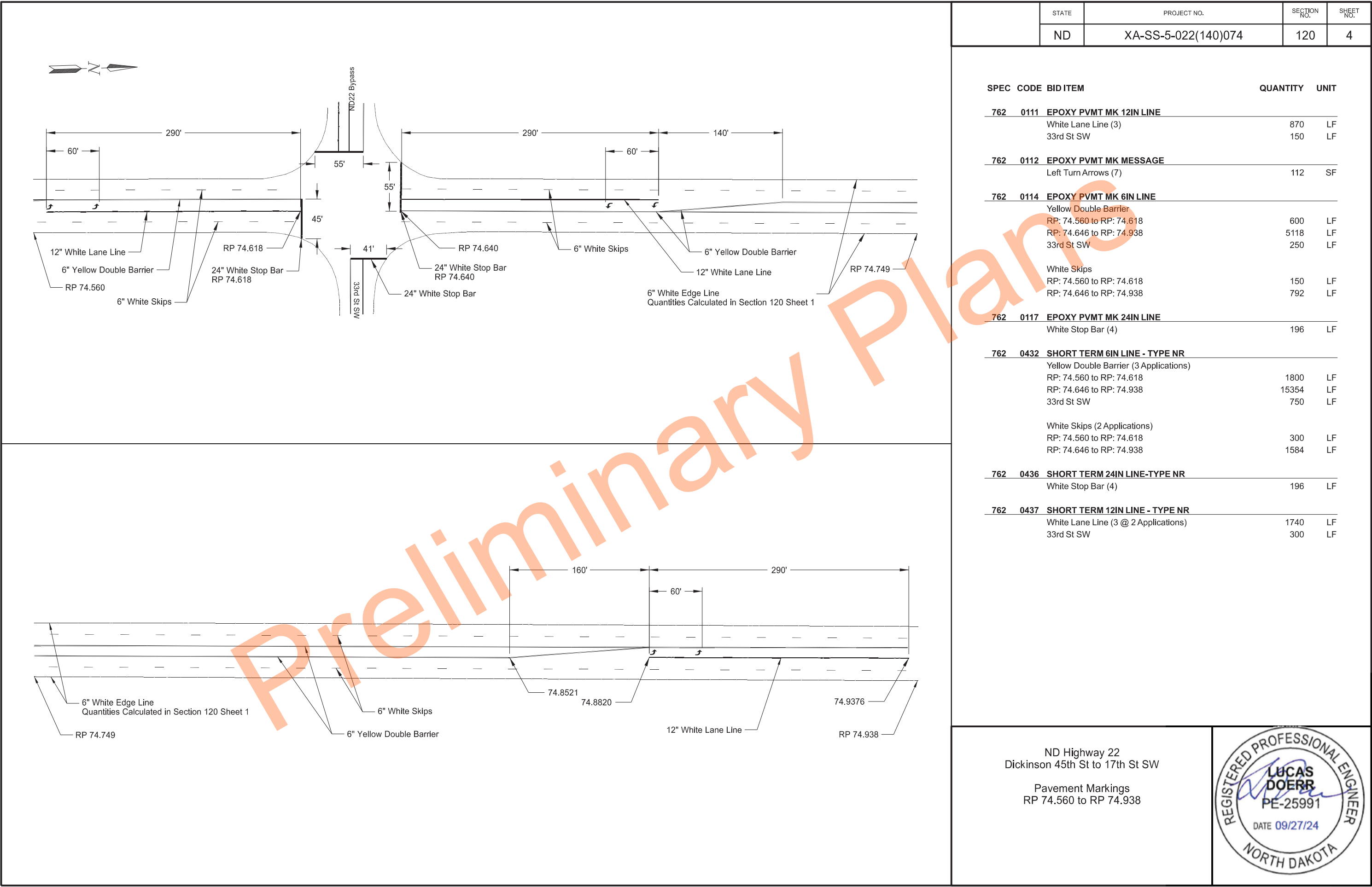
SPEC	CODE	ITEM DESCRIPTION	QUANTITY	UNIT
762	0112	EPOXY PVMT MK MESSAGE	164	SF
762	0113	EPOXY PVMT MK 6IN LINE	5,470	LF



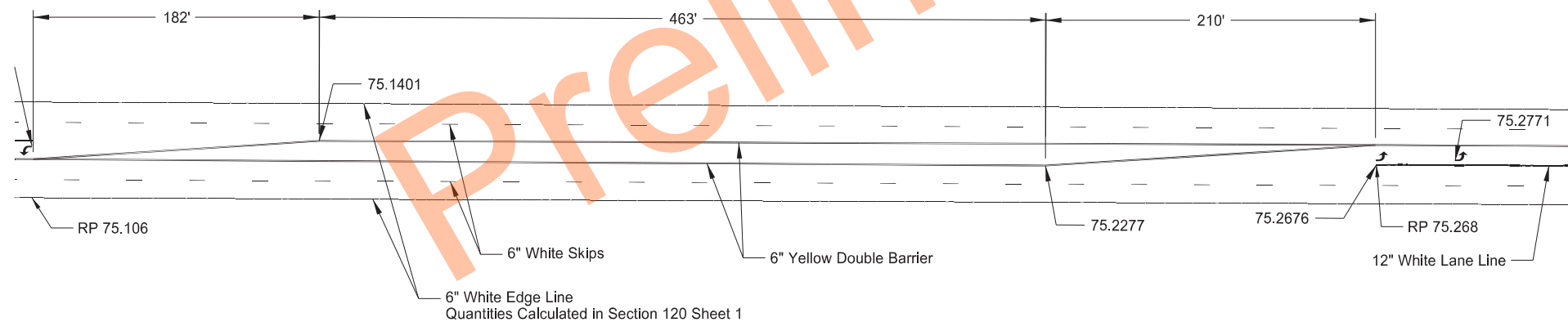
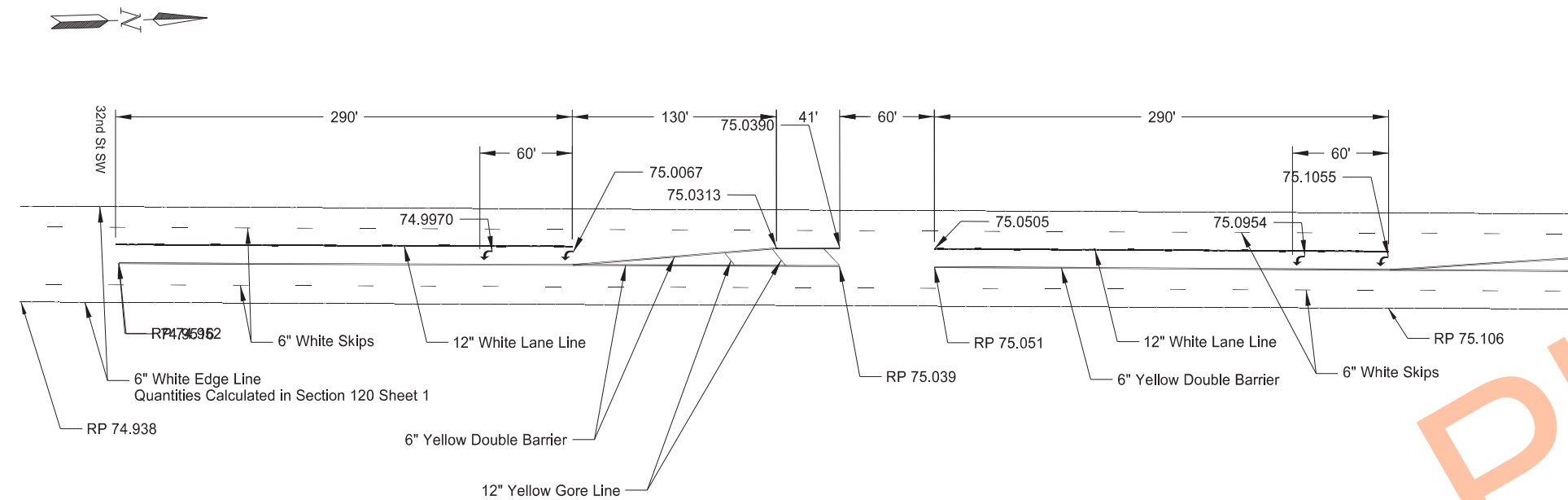
PASSING / CLIMBING LANE LOCATIONS							6" WHITE CL	6" WHITE CL	6" WHITE	6" WHITE SHORT	DIRECTIONAL
		(RP)	FULL WIDTH		(RP)		SKIPS LENGTH	SKIPS PAY	SHORT SKIPS	SKIPS PAY	ARROW
DIRECTION	BEGIN TAPER	END TAPER	BEGIN	END	BEGIN TAPER	END TAPER	(FT)	LENGTH (FT)	LEGNTH (FT)	LENGTH (FT)	MESSAGE
NB	82.073	82.223	82.223	84.103	84.103	84.427	9,926	2,482	780	195	2
SB	83.490	83.795	83.795	85.763	85.763	85.911	10,391	2,598	780	195	2

ND Highway 22
Dickinson 45th St to 17th St SW
Pavement Markings



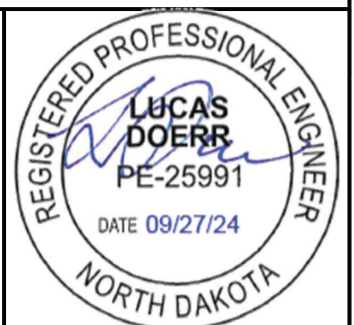


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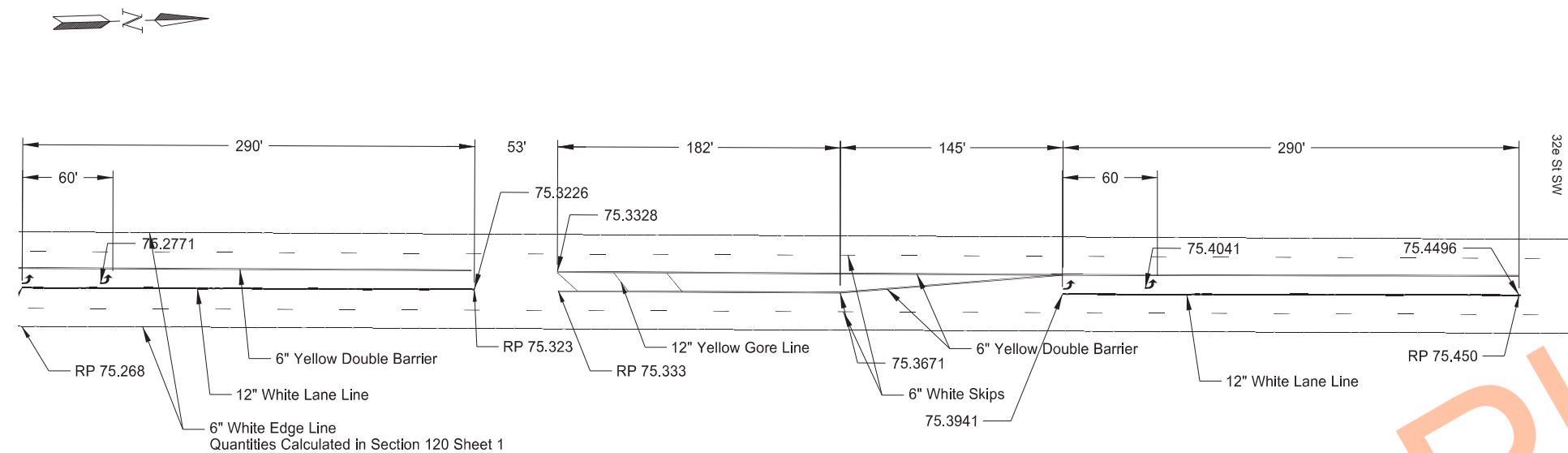


ND Highway 22
Dickinson 45th St to 17th St SW

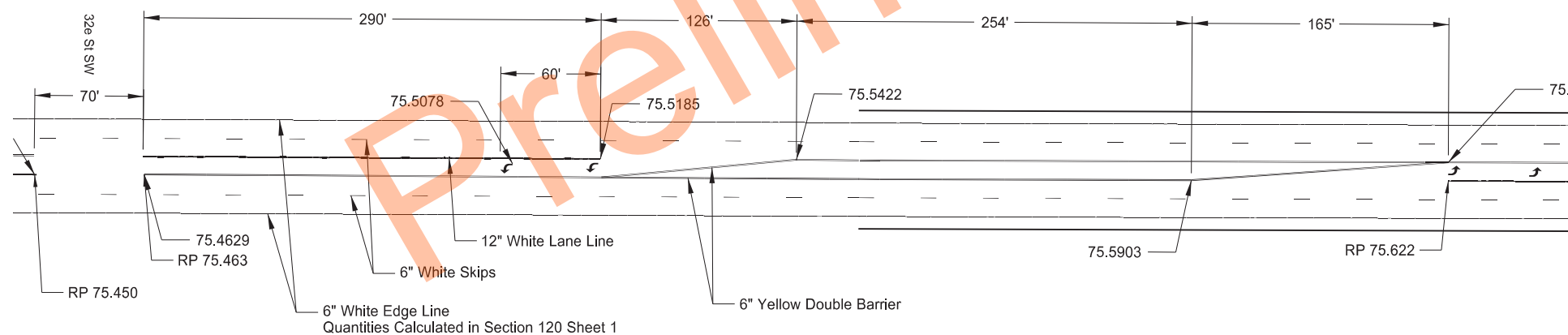
Pavement Markings
RP 74.938 to RP 75.316



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(140)074	120	6



SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	EPOXY PVMT MK 12IN LINE		
		White Lane Line (3)	870	LF
		Yellow Gore Line (3)	48	LF
762	0112	EPOXY PVMT MK MESSAGE		
		Left Turn Arrows (6)	96	SF
762	0114	EPOXY PVMT MK 6IN LINE		
		Yellow Double Barrier		
		RP: 75.268 to RP 75.323	580	LF
		RP: 75.333 to RP: 75.450	1882	LF
		RP: 75.463 to RP 75.622	2766	LF
		White Skips		
		RP: 75.268 to RP: 75.622	934	LF
762	0432	SHORT TERM 6IN LINE - TYPE NR		
		Yellow Double Barrier (3 Applications)		
		RP: 75.268 to RP 75.323	1740	LF
		RP: 75.333 to RP: 75.450	5646	LF
		RP: 75.463 to RP 75.622	8298	LF
		White Skips (2 Applications)		
		RP: 75.268 to RP: 75.622	1868	LF
762	0437	SHORT TERM 12IN LINE - TYPE NR		
		White Lane Line (3 @ 2 Applications)	1740	LF
		Yellow Gore Line (3)	48	LF

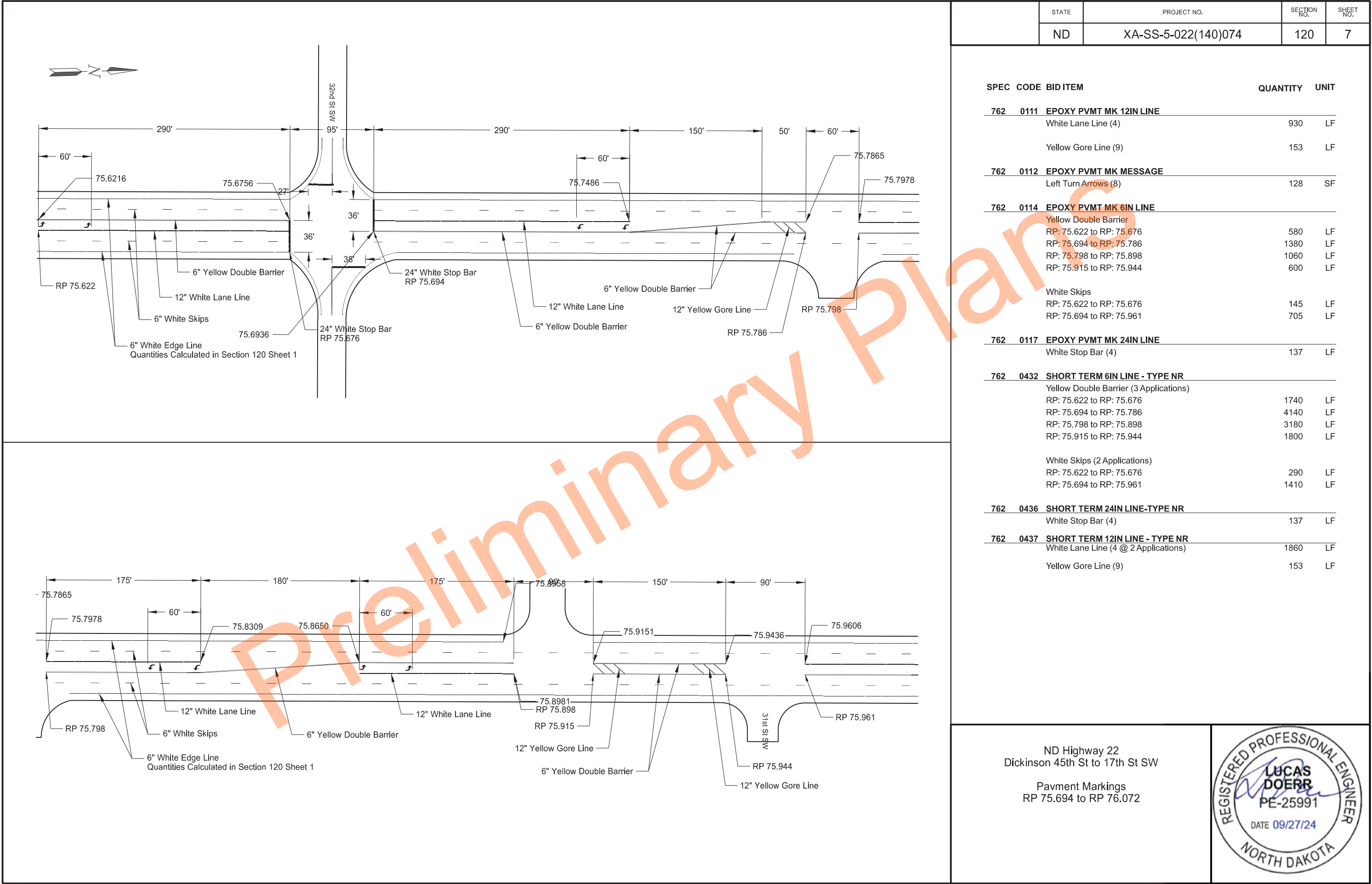


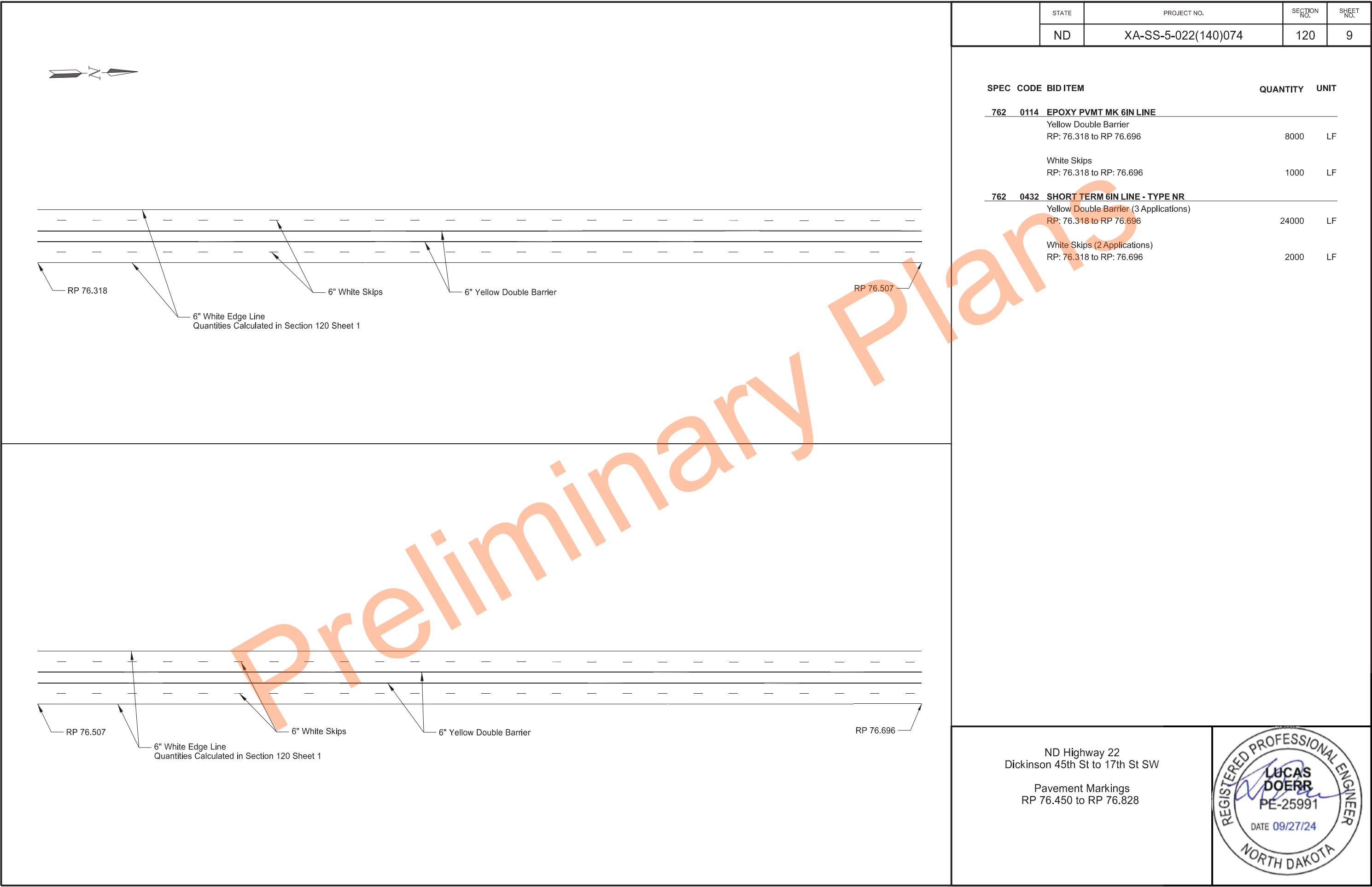
ND Highway 22
Dickinson 45th St to 17th St SW

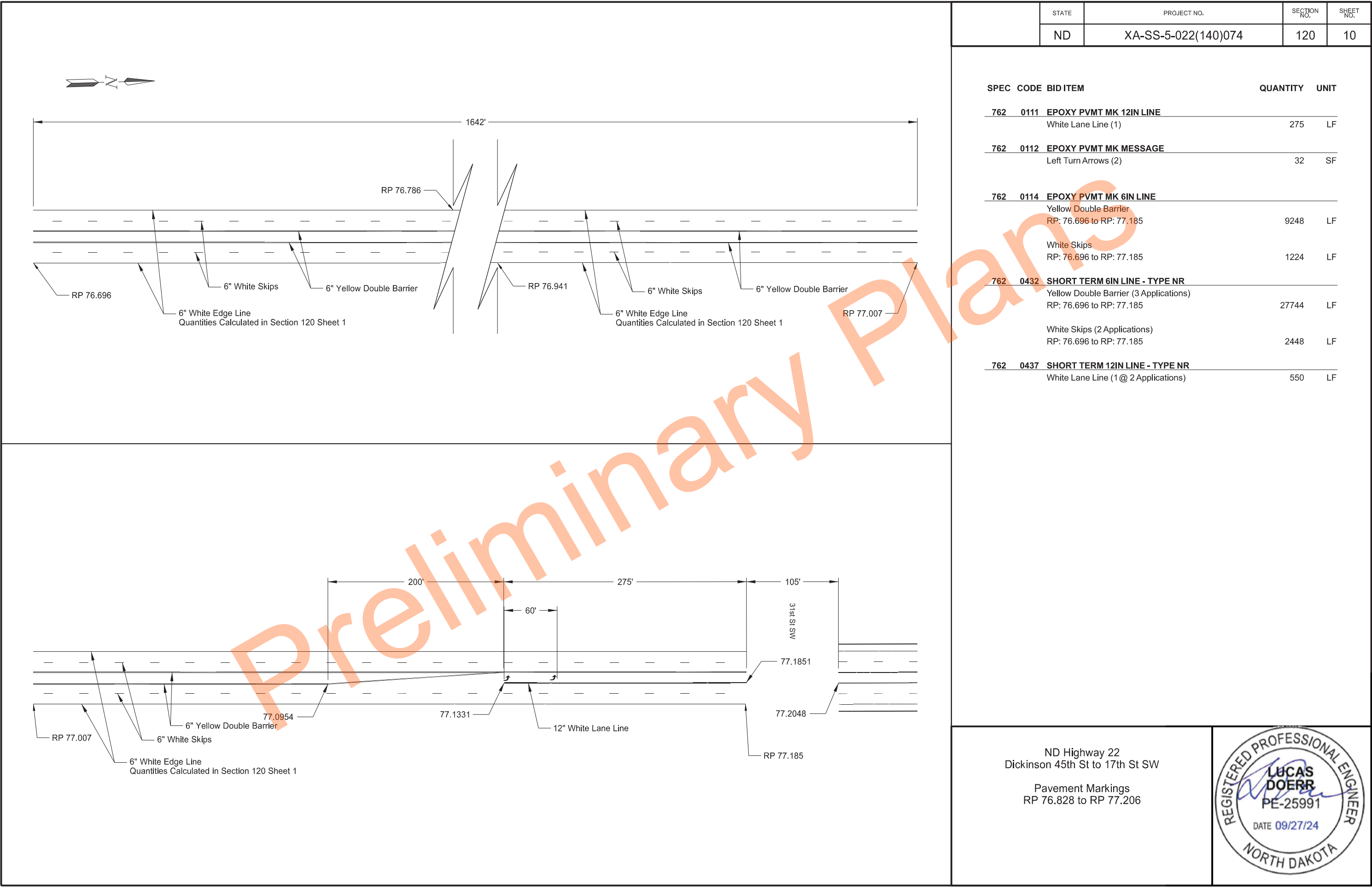
Pavement Markings

RP 75.316 to RP 75.694



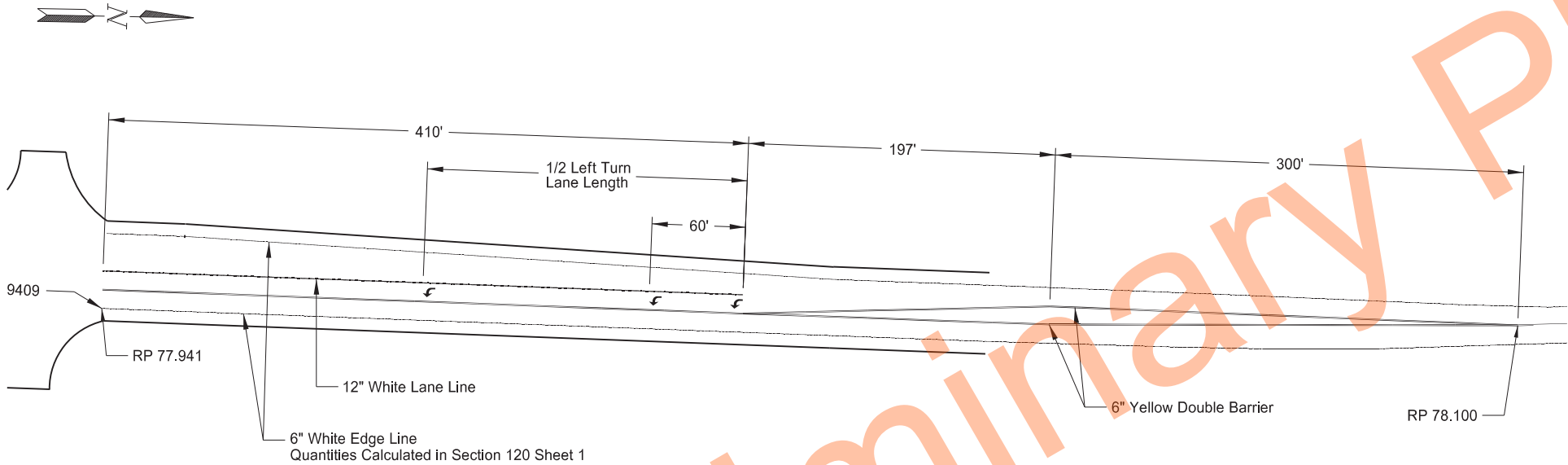






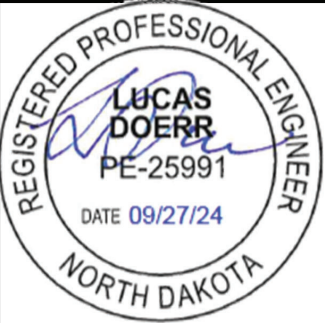
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	ND	XA-SS-5-022(140)074	120	13

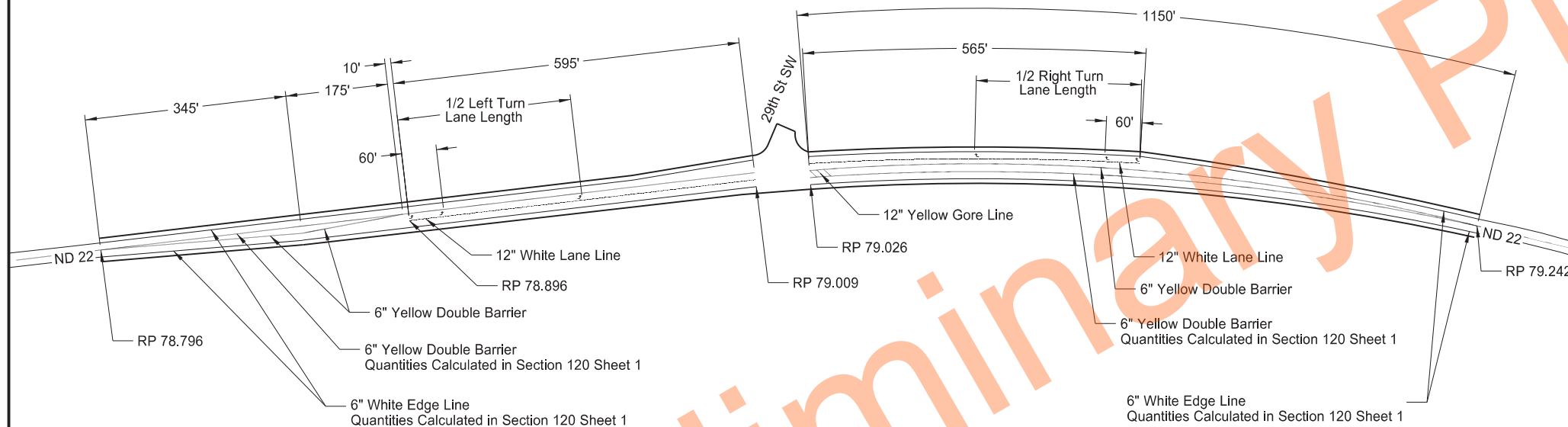
SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	EPOXY PVMT MK 12IN LINE White Lane Line	410	LF
762	0112	EPOXY PVMT MK MESSAGE Left Turn Arrows (3)	48	SF
762	0114	EPOXY PVMT MK 6IN LINE Yellow Double Barrier RP: 77.941 to RP: 78.100	2804	LF
762	0432	SHORT TERM 6IN LINE - TYPE NR Yellow Double Barrier (3 Applications) RP: 77.941 to RP: 78.100	8412	LF
762	0437	SHORT TERM 12IN LINE - TYPE NR White Lane Line (2 Applications)	820	LF



ND Highway 22
Dickinson 45th St to 17th St SW

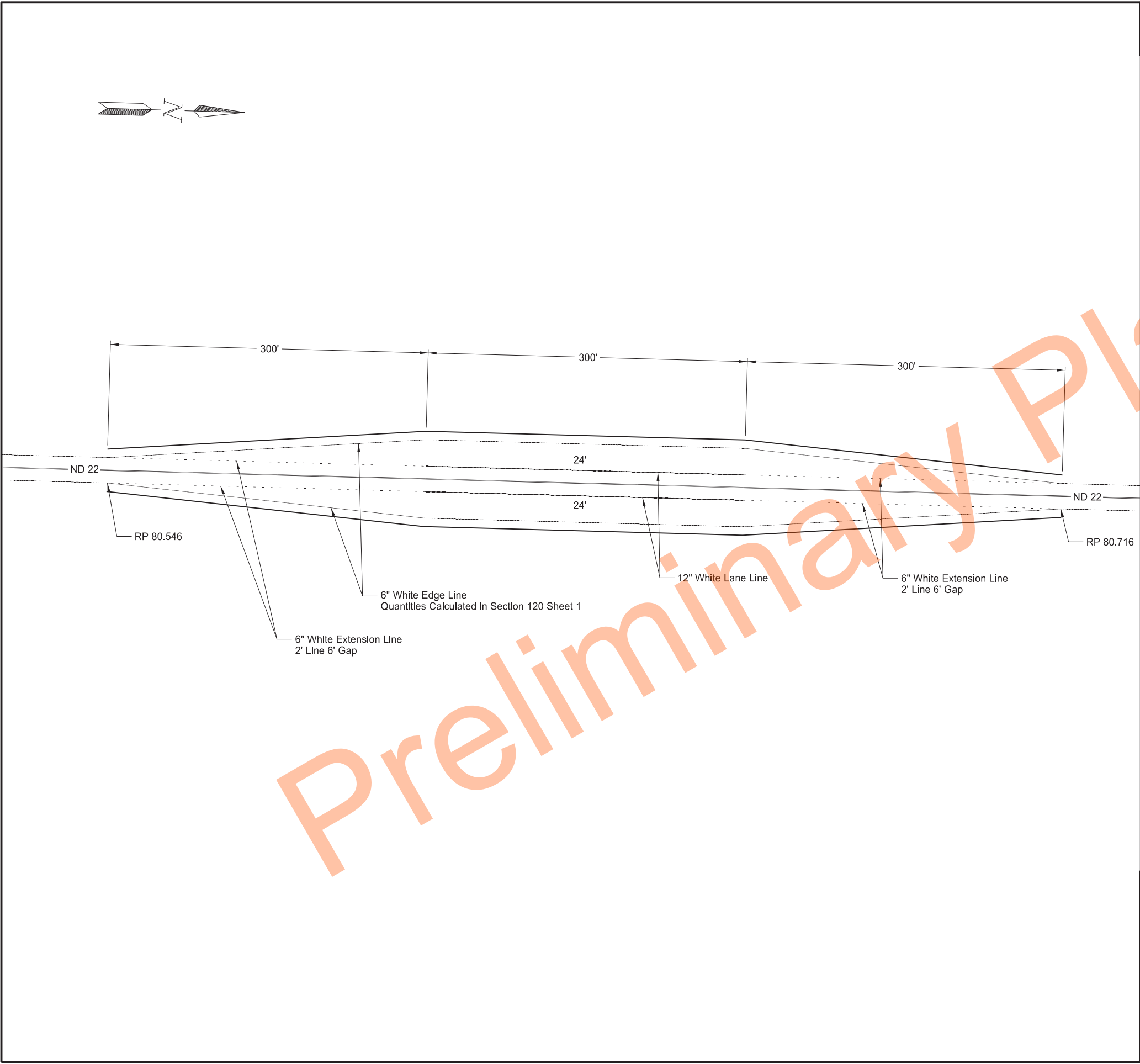
Pavement Markings
RP 77.962 to RP 78.151



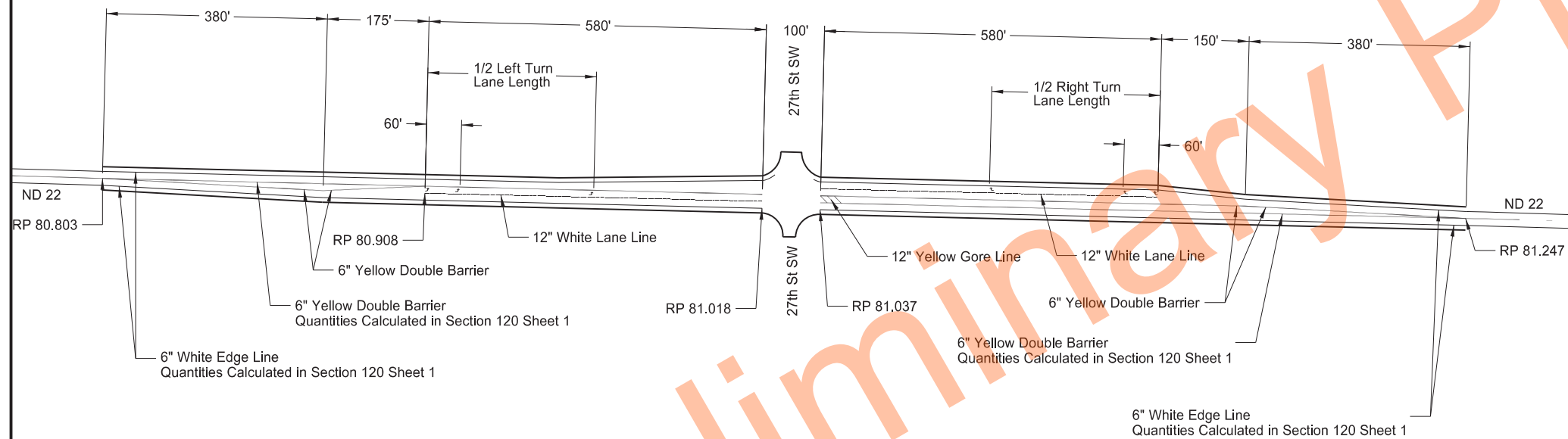
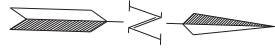


ND Highway 22
Dickinson 45th St to 17th St SW

Pavement Markings
29th St SW



		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(140)074	120	15
SPEC	CODE	BID ITEM	QUANTITY	UNIT	
762	0111	EPOXY PVMT MK 12IN LINE			
		White Lane Line (2)	600	LF	
762	0114	EPOXY PVMT MK 6IN LINE			
		White Extension Line (4)	300	LF	
762	0432	SHORT TERM 6IN LINE - TYPE NR			
		Yellow Double Barrier (4 @ 2 Applications)	600	LF	
762	0437	SHORT TERM 12IN LINE - TYPE NR			
		White Lane Line (2 Applications)	1200	LF	
ND Highway 22 Dickinson 45th St to 17th St SW Pavement Markings Truck Inspection					
REGISTERED PROFESSIONAL ENGINEER LUCAS DOERR PE-25991 DATE 09/27/24 NORTH DAKOTA					



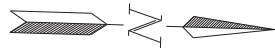
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	120	16

SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	EPOXY PVMT MK 12IN LINE		
		White Lane Line (2)	1160	LF
		Yellow Gore Line (3)	51	LF
762	0112	EPOXY PVMT MK MESSAGE		
		Left Turn Arrows (3)	48	SF
		Right Turn Arrows (3)	48	SF
762	0114	EPOXY PVMT MK 6IN LINE		
		Yellow Double Barrier		
		RP: 80.803 to RP: 80.908	1110	LF
		RP: 81.037 to RP: 81.247	2220	LF
762	0432	SHORT TERM 6IN LINE - TYPE NR		
		Yellow Double Barrier (3 Applications)		
		RP: 80.803 to RP: 80.908	3330	LF
		RP: 81.037 to RP: 81.247	6660	LF
762	0437	SHORT TERM 12IN LINE - TYPE NR		
		White Lane Line (2 Applications)	2320	LF
		Yellow Gore Line (3)	51	LF

ND Highway 22
Dickinson 45th St to 17th St SW

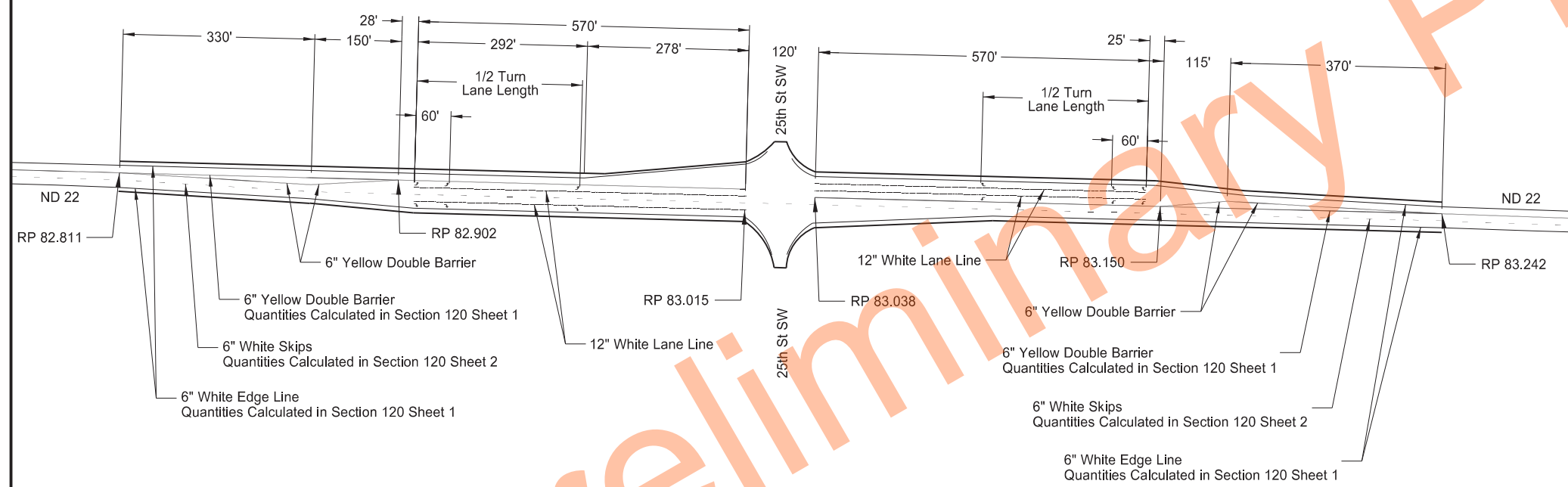
Pavement Markings
27th St SW





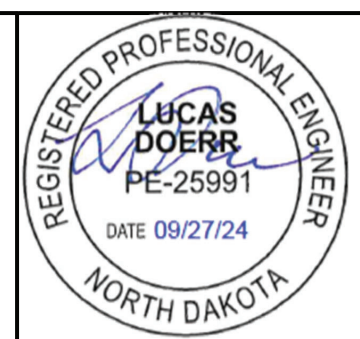
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	120	17

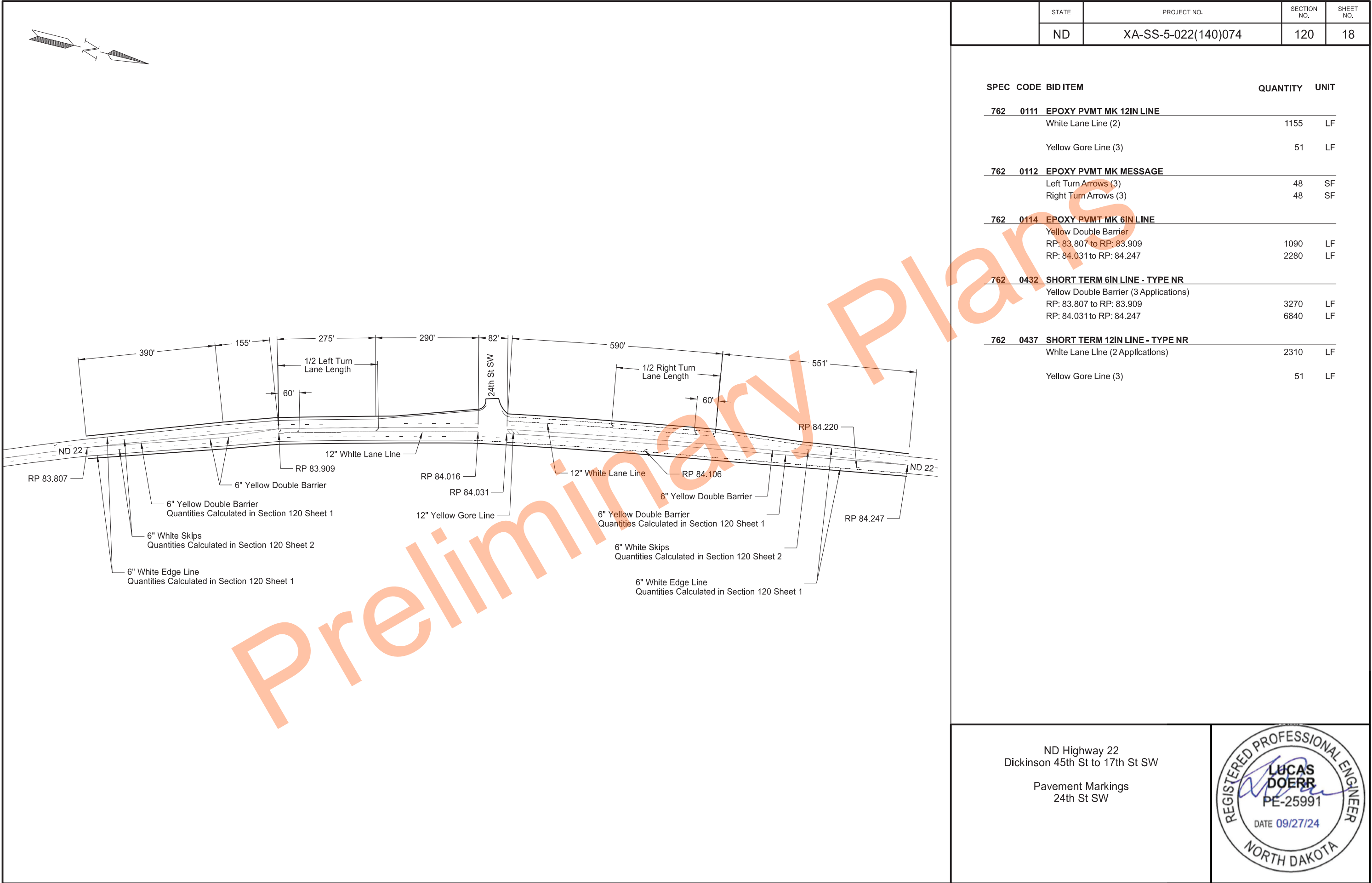
SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	EPOXY PVMT MK 12IN LINE		
		White Lane Line (4)	2280	LF
762	0112	EPOXY PVMT MK MESSAGE		
		Left Turn Arrows (6)	96	SF
		Right Turn Arrows (6)	96	SF
762	0114	EPOXY PVMT MK 6IN LINE		
		Yellow Double Barrier		
		RP: 82.811 to RP 82.902	960	LF
		RP: 83.150 to RP: 83.242	970	LF
762	0432	SHORT TERM 6IN LINE - TYPE NR		
		Yellow Double Barrier (3 Applications)		
		RP: 82.811 to RP 82.902	2880	LF
		RP: 83.150 to RP: 83.242	2910	LF
762	0437	SHORT TERM 12IN LINE - TYPE NR		
		White Lane Line (2 Applications)	4560	LF

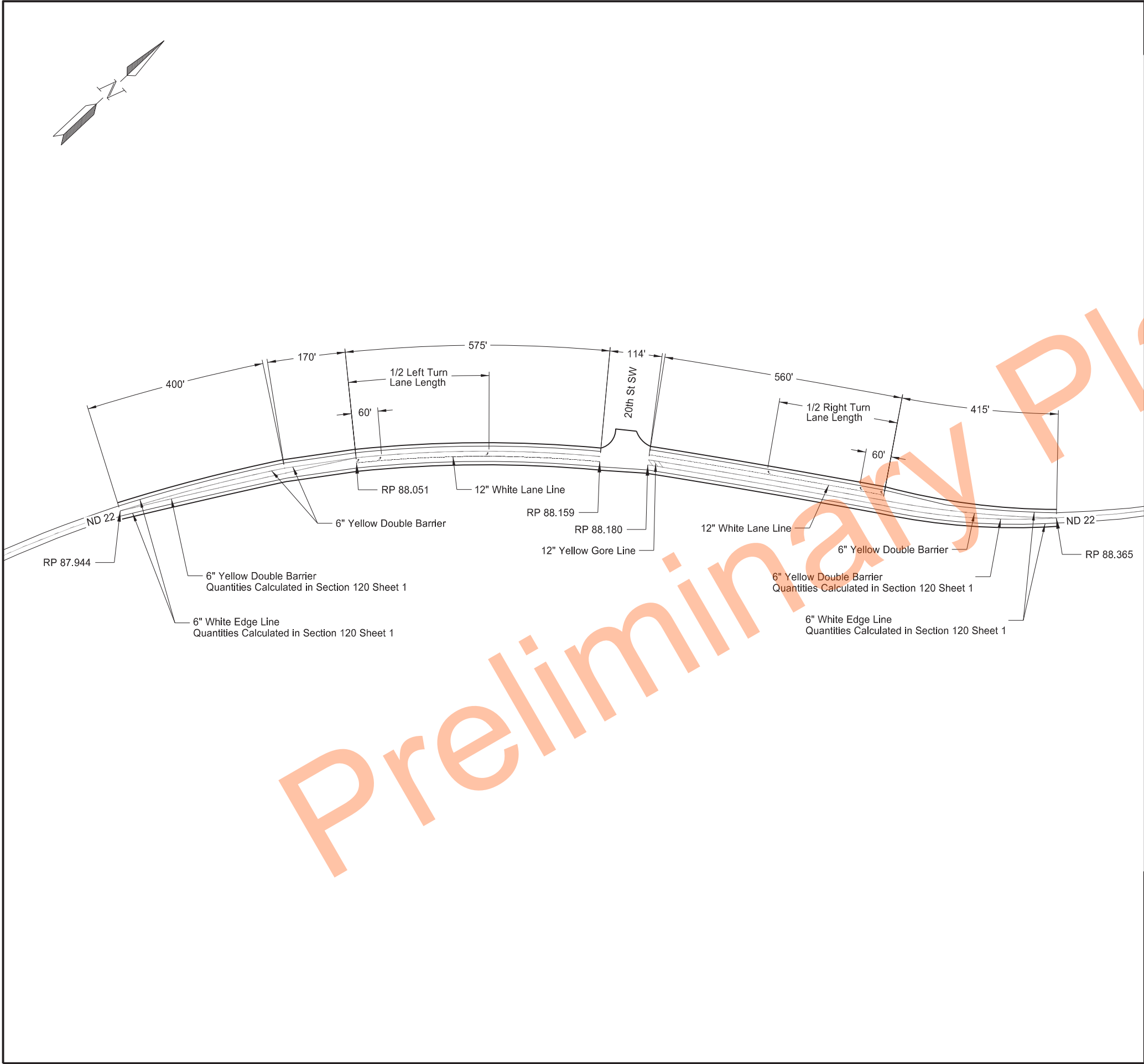


ND Highway 22
Dickinson 45th St to 17th St SW

Pavement Markings
25th St SW







		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(140)074	120	19
SPEC	CODE	BID ITEM	QUANTITY	UNIT	
762	0111	EPOXY PVMT MK 12IN LINE			
		White Lane Line (2)	1135	LF	
		Yellow Gore Line (3)	51	LF	
762	0112	EPOXY PVMT MK MESSAGE			
		Left Turn Arrows (3)	48	SF	
		Right Turn Arrows (3)	48	SF	
762	0114	EPOXY PVMT MK 6IN LINE			
		Yellow Double Barrier			
		RP: 87.944 to RP: 88.051	1140	LF	
		RP: 88.180 to RP: 88.365	1950	LF	
762	0432	SHORT TERM 6IN LINE - TYPE NR			
		Yellow Double Barrier (3 Applications)			
		RP: 87.944 to RP: 88.051	3420	LF	
		RP: 88.180 to RP: 88.365	5850	LF	
762	0437	SHORT TERM 12IN LINE - TYPE NR			
		White Lane Line (2 Applications)	2270	LF	
		Yellow Gore Line (3)	51	LF	

ND Highway 22
Dickinson 45th St to 17th St SW

Pavement Markings
20th St SW

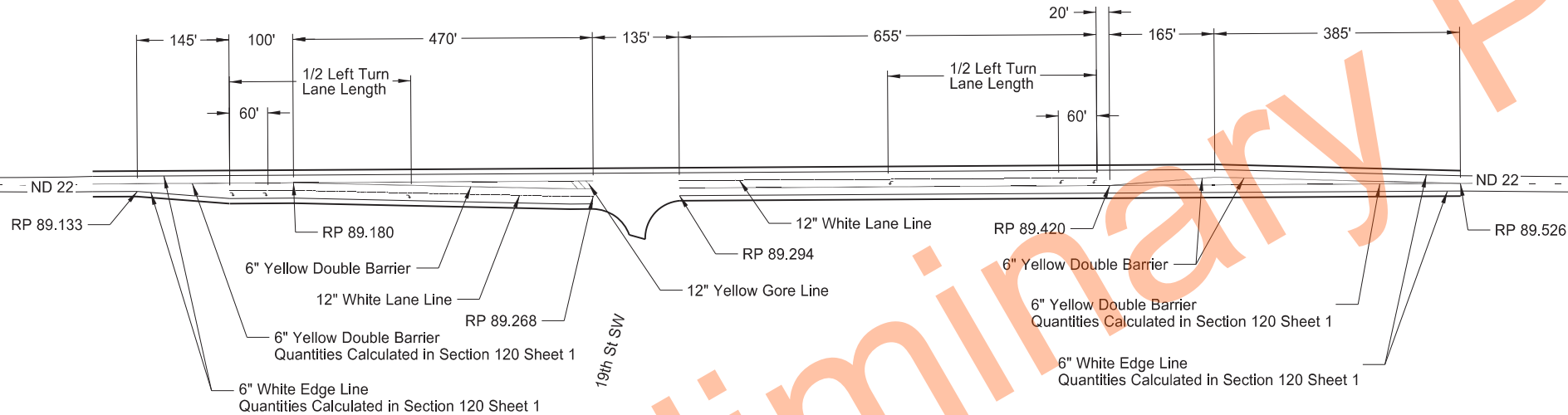
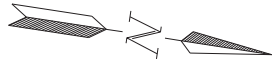
REGISTERED PROFESSIONAL ENGINEER

LUCAS DOERR

PE-25991

DATE 09/27/24

NORTH DAKOTA



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	120	20

SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	EPOXY PVMT MK 12IN LINE		
		White Lane Line (2)	1225	LF
		Yellow Gore Line (3)	51	LF
762	0112	EPOXY PVMT MK MESSAGE		
		Left Turn Arrows (3)	48	SF
		Right Turn Arrows (3)	48	SF
762	0114	EPOXY PVMT MK 6IN LINE		
		Yellow Double Barrier		
		RP: 89.180 to RP: 89.268	940	LF
		RP: 89.420 to RP: 89.526	1100	LF
762	0432	SHORT TERM 6IN LINE - TYPE NR		
		Yellow Double Barrier (3 Applications)		
		RP: 89.180 to RP: 89.268	2820	LF
		RP: 89.420 to RP: 89.526	3300	LF
762	0437	SHORT TERM 12IN LINE - TYPE NR		
		White Lane Line (2 Applications)	2450	LF
		Yellow Gore Line (3)	51	LF

ND Highway 22
Dickinson 45th St to 17th St SW

Pavement Markings
19th St SW



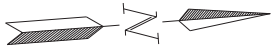
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(140)074	170	1

NOTES:

- 100 SCOPE OF WORK: Work at this site consists of crack sealing, penetrating water repellent, special surface finish and repairing a spill on the west exterior beam on the south span.
- 602 PENETRATING WATER REPELLENT TREATMENT: Apply the penetrating water repellent solution to the top of the bridge deck, and top of approach slabs. Apply penetrating water repellent solution prior to sealing any bridge deck or approach slab. Do not allow traffic until the solution has completely penetrated and the entire driving surface is dry.

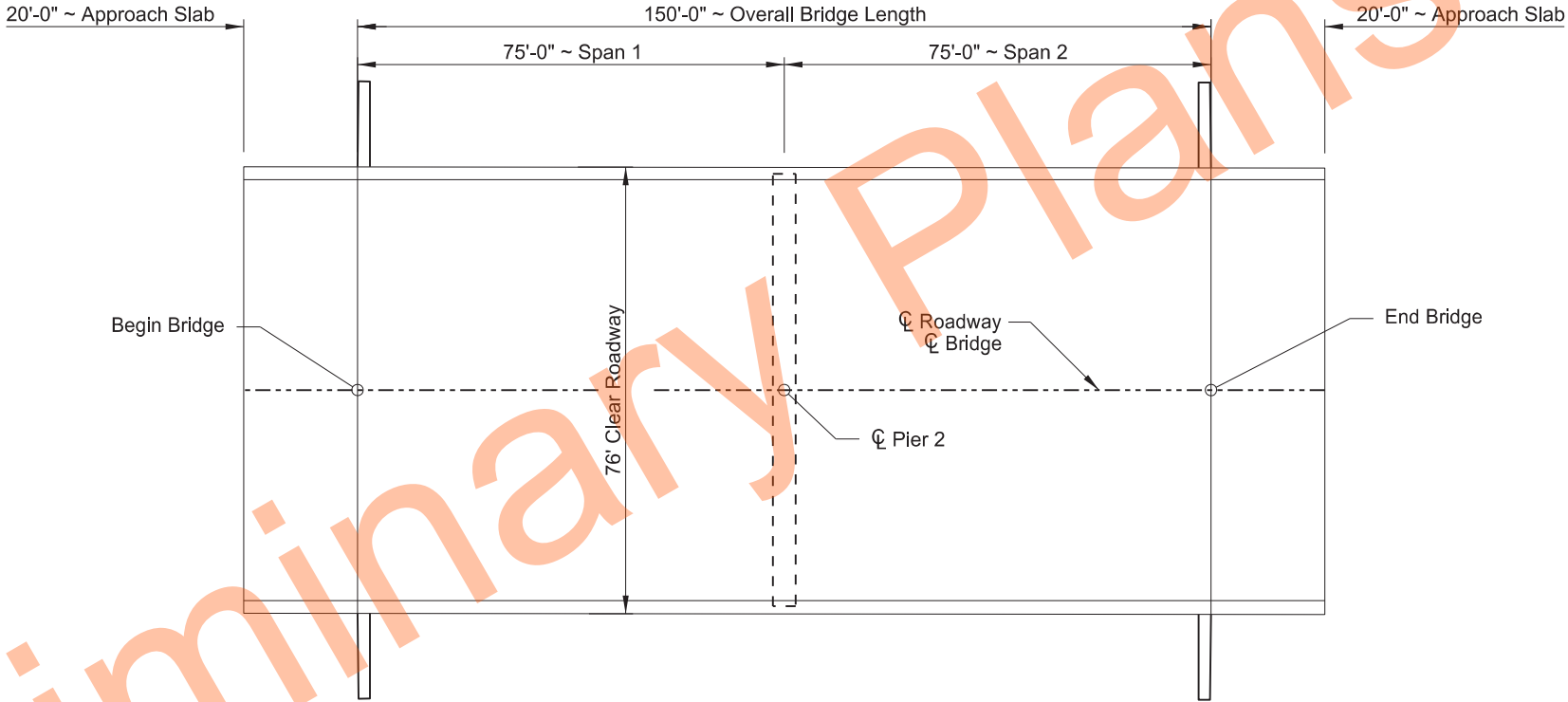
Collect all roadway debris while cleaning; do not discharge sand, gravel, or other debris into bridge drains. if water washing equipment is used for cleaning, provide either a water pressure washer with 160°F water at 1,800 psi minimum nozzle pressure or a cold water pressure at 3,000 psi minimum nozzle pressure.
- 602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck, approach slab, and barriers to determine the need for crack sealing. Mark and repair all visable cracks appearing on the top surface 0.007" or greater in width at its widest segment or is directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to limits of crack, including those portions that are narrower than 0.007" wide. Use Paulco TE-2501 (Viking Paint, Inc), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved epoxy sealer. Include all work and materials associated with the deck, approach slab, and barrier crack sealing in bid item "Crack Sealing".
- 602 SPECIAL SURFACE FINISH: After the crack sealing work has been completed, apply TexCote XL70 Bridge Cote with Silane (medium texture) to the inside and top surfaces of the existing bridge barriers. Use gray surface finish color number 36424 meeting Aerospace Material Specification (AMS) Standard 595 for the inside and top surfaces of the bridge barriers.
- 704 TRAFFIC CONTROL: An additional 16 hours of falgging has been included for the repairs to this structure. Utilize the provided traffic control devices.
- 930 GIRDER PATCHING: The west exterior beam in Span 1 has a surface spill. Remove unsound concrete and coat the spill with a Type VIII neat (no sand) epoxy compound meeting ASTM C 881 Type I or IV. Prepare the concrete surface and mix the epoxy in accordance with manufacturers recommendations. Brush, roll or scrub the epoxy material into the prepared substrate to ensure that all small voids are filled. Cover the entire damaged area with at least 20 mils of neat epoxy compound. Include all work and materials associated with the girder patching in the bid item "Girder Patching."

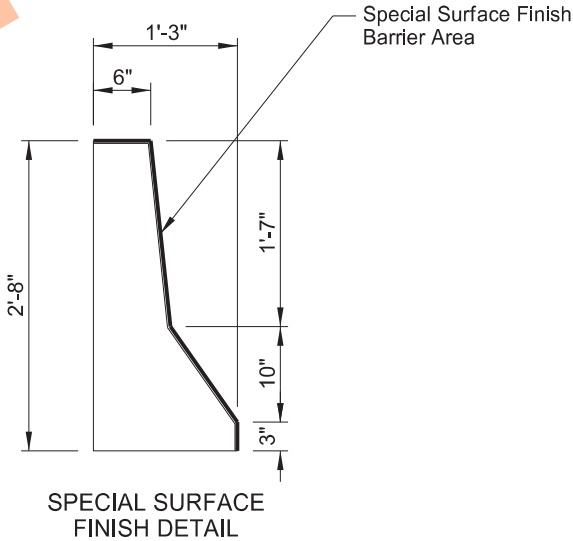


BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPLENT TREATEMENT	SY	1605
602	7000	SPECIAL SURFACE FINISH	SF	1275
930	9223	CRACK SEALING	SF	1358
930	9694	GIRDER PATCHING	LSUM	1



PLAN



SPECIAL SURFACE FINISH DETAIL



NOTE: - Drawing not to scale

GIRDER PATCHING		
PICTURE	LOCATION	TOTAL (SF)
#1	West Exterior Beam South Span	1.0

GREEN RIVER
DICKINSON 45TH ST TO 17TH ST NW

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson

Jason Thorenson
11/01/23

NOTES:

100 SCOPE OF WORK: Work at this site consists of spall repairs on the box culvert walls.

930 SPALL REPAIR: The structures have areas of spalling and concrete deterioration as indicated in the "Spall Repair" table below.

Remove all unsound concrete and replace it with new concrete to the original constructed section. Use a 15-pound maximum size chipping hammer on any unsound concrete. Remove concrete around the periphery of any exposed reinforcing steel to provide a minimum clearance behind the bar of 1/4" plus or minus the dimension of the maximum size aggregate of the repair material. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.

Sand blast clean the existing concrete and exposed reinforcing steel. Clean the existing concrete surface by high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.

Use material that is specifically intended for patching concrete. This patching material may be Sike Top 123 (Sika Corporation), Duraltop Gel (Euclid Chemical Co.), ThoRoc HB2 (BASF Corporation), or an approved equal repair mortar. Cure the material as recommended by the manufacturer.

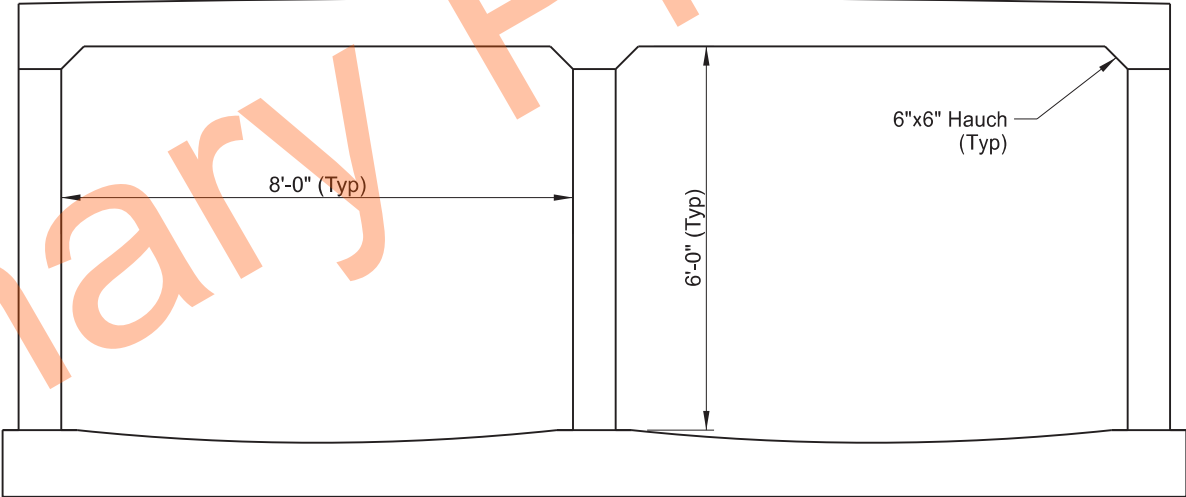
The extents of repairs as shown in the "Spall Repair" table are approximations. The actual limits and the number of repair locations are to be determined by the Engineer in the field. See supplemental bid information for photos.

Water elevations may vary in the field. Utilize sand bags and pumps to isolate and dewater the work area if necessary. Furinish, install, and remove floatation silt curtain if dewatering is required.

Include all labor, equipment, erosion control, and materials needed to dewater the work area and repair the spall area in the bid item "Spall Repair".

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
930	9612	SPALL REPAIR	SF	7.0



BARREL SECTION

SPALL REPAIR (SF)		
PICTURE	LOCATION	TOTAL (SF)
#2	North Barrel North Wall	1.0
#3	North Barrel North Wall	1.0
#4	North Barrel South Wall	1.0
#5	North Barrel South Wall	1.0
#6	South Barrel North Wall	1.0
#7	South Barrel North Wall	2.0



CREEK
DICKINSON 45TH ST TO 17TH ST NW

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

 Jason Thorenson
11/01/23

NOTES:

100 SCOPE OF WORK: Work at this site consists of crack sealing, penetrating water repellent, special surface finish and repairing a spalls on the south end of the east bridge barrier, the bottom of the west barrier and the south end of the west barrier.

602 PENETRATING WATER REPELLENT TREATMENT: Apply the penetrating water repellent solution to the top of the bridge deck, and top of approach slabs. Apply penetrating water repellent solution prior to sealing any bridge deck or approach slab. Do not allow traffic until the solution has completely penetrated and the entire driving surface is dry.

Collect all roadway debris while cleaning; do not discharge sand, gravel, or other debris into bridge drains. If water washing equipment is used for cleaning, provide either a water pressure washer with 160°F water at 1,800 psi minimum nozzle pressure or a cold water pressure at 3,000 psi minimum nozzle pressure.

602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck, approach slab, and barriers to determine the need for crack sealing. Mark and repair all visable cracks appearing on the top surface 0.007" or greater in width at its widest segment or is directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer's recommendations. Chase crack with the sealant application to limits of crack, including those portions that are narrower than 0.007" wide. Use Paulco TE-2501 (Viking Paint, Inc), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved epoxy sealer. Include all work and materials associated with the deck, approach slab, and barrier crack sealing in bid item "Crack Sealing".

602 SPECIAL SURFACE FINISH: After the crack sealing work has been completed, apply TexCote XL70 Bridge Cote with Silane (medium texture) to the inside and top surfaces of the existing bridge barriers. Use gray surface finish color number 36424 meeting Aerospace Material Specification (AMS) Standard 595 for the inside and top surfaces of the bridge barriers.

704 TRAFFIC CONTROL: An additional 16 hours of falgging has been included for the repairs to this structure. Utilize the provided traffic control devices.

930 SPALL REPAIR: The structures have areas of spalling and concrete deterioration as indicated in the "Spall Repair" table below.

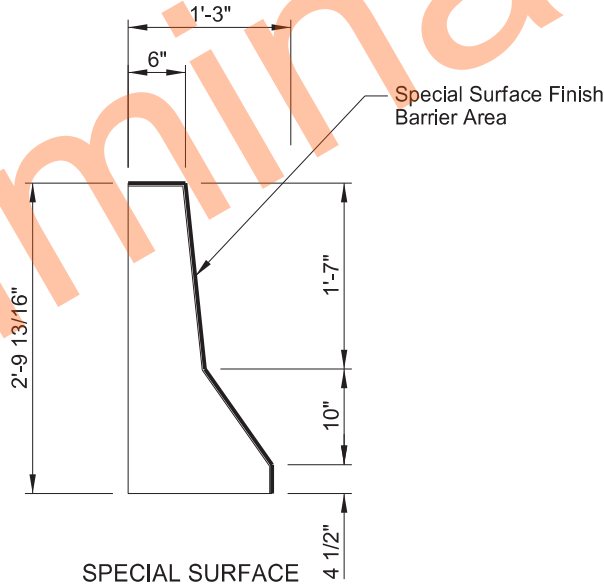
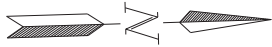
Remove all unsound concrete and replace it with new concrete to the original constructed section. Use a 15-pound maximum size chipping hammer on any unsound concrete. Remove concrete around the periphery of any exposed reinforcing steel to provide a minimum clearance behind the bar of 1/4" plus or minus the dimension of the maximum size aggregate of the repair material.Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, near lines by saw cutting or other means approved by the Engineer.

Sand Blast clean the existing concrete and exposed reinforcing steal. Clean the existing concrete surface by high pressure water blasting. After the surface has dried and just before the patching material is placed, coat the surface with an epoxy bonding agent.

Use material that is specifically intended for patching concrete. This patching material may be Sike Top 123 Plus (Sike Corporation), Duraltop Gel (Euclid Chemical Co.), ThoRoc HB2 (BASF Corporation), or an approved equal repair mortor. Cure the material as recommended by the manufacturer.

The extents of repairs as shown in the "Spall Repair" table are approximations. the actual limits and number of repair locations are to be determined by the Engineer in the field. See supplemental bid information for photos.

Include all labor, equipment, and materials needed to repair the spall area in the bid item "Spall Repair".



SPECIAL SURFACE FINISH DETAIL

NOTE: - Drawing not to scale

SPALL REPAIR (SF)		
PICTURE	LOCATION	TOTAL (SF)
#8	South End of East Bridge Barrier	1.0
#9	Bottom of West Barrier	1.0
#10	South End of West Barrier	1.0

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

STATE

ND

PROJECT NO.

XA-SS-5-022(140)074

SECTION NO.

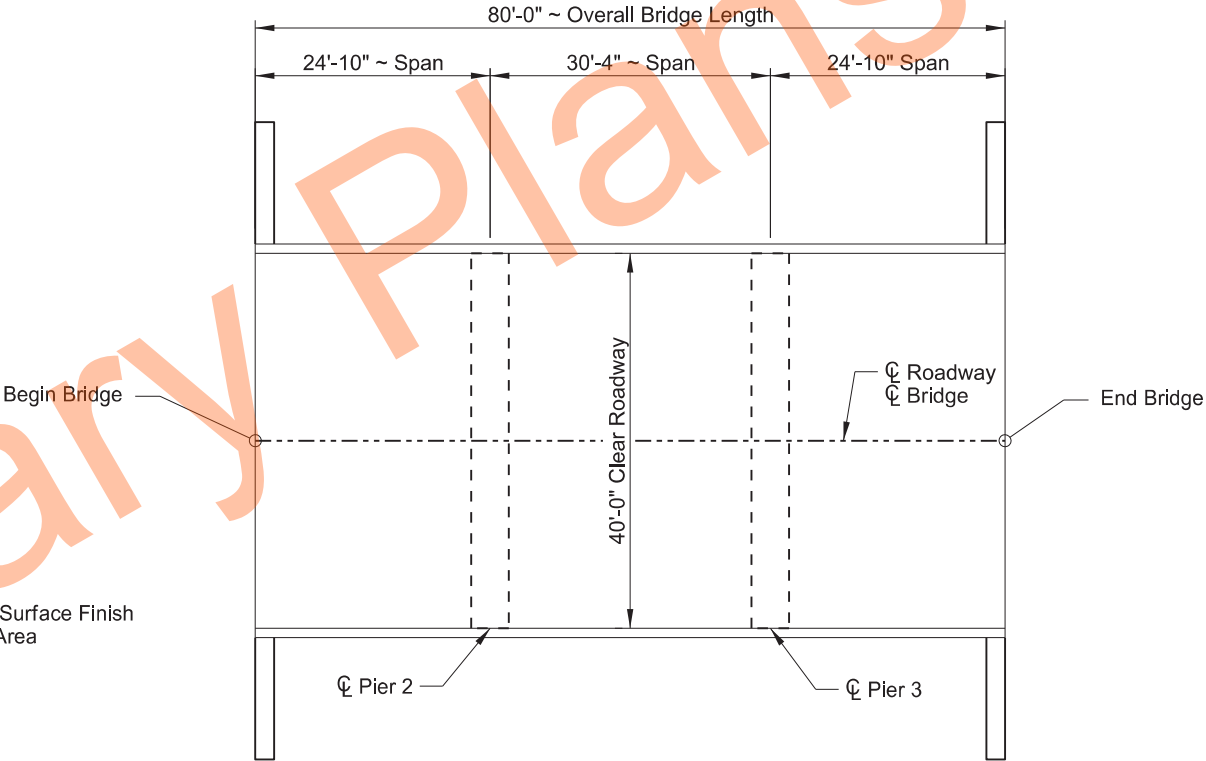
170

SHEET NO.

3

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	356
602	7000	SPECIAL SURFACE FINISH	SF	527
930	9223	CRACK SEALING	LF	523
930	9612	SPALL REPAIR	SF	3.0



PLAN



CROOKED CREEK
DICKINSON 45TH ST TO 17TH ST NW

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson

Jason Thorenson
11/01/23

Certificate Of Completion

Envelope Id: 4C776DE45ADF494A974664F60DAF2E5E

Status: Completed

Subject: XA-SS-5-022(140)074, PCN 23544: Final Plan Signatures

Contract Number:

PCN:

Source Envelope:

Document Pages: 3

Signatures: 3

Envelope Originator:

Certificate Pages: 2

Initials: 0

Dustin Wing

AutoNav: Enabled

Stamps: 3

608 E Boulevard Ave

Envelopeld Stamping: Enabled

Bismarck, ND 58505

Time Zone: (UTC-06:00) Central Time (US & Canada)

dwing@nd.gov

IP Address: 165.234.252.245

Record Tracking

Status: Original

Holder: Dustin Wing

Location: DocuSign

11/1/2023 1:50:24 PM

dwing@nd.gov

Security Appliance Status: Connected

Pool: StateLocal

Storage Appliance Status: Connected

Pool: Carahsoft OBO North Dakota Department of Transportation CLOUD

Location: DocuSign

Signer Events**Signature****Timestamp**

Lucas Doerr

Signed

Sent: 11/1/2023 1:57:08 PM

lucasd@brozengineering.com



Viewed: 11/1/2023 1:59:04 PM

Security Level: Email, Account Authentication (None), Digital Certificate

Signed: 11/1/2023 2:06:26 PM

Signature Provider Details:

Signature Type: DS Email (Client ID: 5cdd2566-cd0e-4f6f-8921-5c73afd124b1)

Using IP Address: 173.241.180.84

Signature Issuer: DocuSign Cloud Signing CA-US-Email

Signature Provider Location:

<https://ssasign.docusign.net/sca/1930>**Electronic Record and Signature Disclosure:**

Not Offered via DocuSign

Jason Thorenson

Sent: 11/1/2023 2:06:28 PM

jthorens@nd.gov

Viewed: 11/1/2023 2:28:11 PM

Carahsoft OBO North Dakota Department of Transportation CLOUD

Signed: 11/1/2023 2:28:30 PM

Security Level: Email, Account Authentication (None), Digital Certificate

Signature Adoption: Uploaded Signature Image

Using IP Address: 165.234.253.7

Signature Provider Details:

Signature Type: DS Email (Client ID: 5cdd2566-cd0e-4f6f-8921-5c73afd124b1)

Signature Provider Location:

<https://ssasign.docusign.net/sca/1930>

Signature Issuer: DocuSign Cloud Signing CA-US-Email

Electronic Record and Signature Disclosure:

Not Offered via DocuSign

In Person Signer Events**Signature****Timestamp****Editor Delivery Events****Status****Timestamp****Agent Delivery Events****Status****Timestamp****Intermediary Delivery Events****Status****Timestamp**

Certified Delivery Events	Status	Timestamp
Carbon Copy Events	Status	Timestamp
Witness Events	Signature	Timestamp
Notary Events	Signature	Timestamp
Envelope Summary Events	Status	Timestamps
Envelope Sent	Hashed/Encrypted	11/1/2023 1:57:08 PM
Certified Delivered	Security Checked	11/1/2023 2:28:11 PM
Signing Complete	Security Checked	11/1/2023 2:28:30 PM
Completed	Security Checked	11/1/2023 2:28:31 PM
Payment Events	Status	Timestamps

Preliminary Plans

NDDOT ABBREVIATIONS

D-101-1

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions
12-10-20	General Revisions
08-16-22	General Revisions



08/16/22

NDDOT ABBREVIATIONS

D-101-2

Galv	galvanized	Ln	lane	Obsc	obscure(d)	Qty	quantity
Gar	garage	Lg	large	Ocpd	occupied	Qtr	quarter
Gs L	gas line	Lat	latitude	Ocpy	occupy		
G Reg	gas line regulator	Lt	left	O/s	offset		
GMV	gas main valve	Lens	lenses	OC	on center	Rad or R	radius
G Mtr	gas meter	Lvl	level	C	one dimensional consolidation	RR	railroad
GSV	gas service valve	Lvng	leveling	OC	organic content	Rlwy	railway
GVP	gas vent pipe	Lht	light	Orig	original	Rsd	raised
GV	gate valve	LP	light pole	O To O	out to out	RC	rapid curing
Ga	gauge	Ltg	lighting	OD	outside diameter	Rec	record
Gov	government	Liq	liquid	OH	overhead	Rcy	recycle
Grd	graded/grade	LL	liquid limit			RAP	recycled asphalt pavement
Grnd	ground	Loc	location			RPCC	recycled portland cement concrete
GWM	ground water monitor	Long.	longitude	PMT	pad mounted transformer	Ref	reference
Gdrl	guardrail	Lp	loop	Pg	pages	R Mkr	reference marker
Gtr	gutter	LD	loop detector	Pntd	painted	RM	reference monument
		Lum	luminaire	Pr	pair	RP	reference point
				Pnl	panel	Refl	reflectorized
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	Pl	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	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				

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-03-15	General Revisions
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12-18-20	General Revisions
08-16-22	General Revisions



08/16/22

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-03-15	General Revisions
04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

08/16/22

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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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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04-23-18	General Revisions
05-28-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions



08/16/22

LINE STYLES

D-101-20

Existing Topography

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

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

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

	24 Inch Pipe
	Reinforced Concrete Pipe
	Under Drain
	Edge Drain

Traffic Utilities

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

Sign Structures

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

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



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
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09-23-16	Added and Revised Items, Organized by Functional Groups
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PE-4683

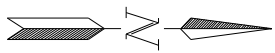
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NORTH DAKOTA

12 18 2020

SYMBOLS

D-101-30

	North Arrow (Half Scale)		Existing Bush or Shrub		Continuous Split Barrel Sample
	Alignment Data Point		Existing Large Evergreen Tree		Flight Auger Sample
	Alignment Monument		Existing Small Evergreen Tree		Split Barrel Sample
	Spot Elevation		Existing Large Tree		Thinwall Tube Sample
	Existing Miscellaneous Spot		Existing Small Tree		Standard Penetration Test
	Existing Access Control Arrow		Existing Tree Trunk		Inclinometer Tube
	Existing Benchmark		Cairn or Stone Circle		Excavation Unit
	Reset USGS Marker		Existing Artifact		Existing Ground Water Well Bore Hole
	Iron Monument Found		Existing Satellite Dish		
	Iron Pin R/W Monument		Existing Weather Station		
	Property Corner		Existing Windmill or Tower		
	Iron Pin Reference Monument		Reinforced Pavement		
	Right of Way Marker (Exst, Ppsd, Reset)				
	Existing Federal Reference Corner				
	Existing Section Corner (Full, Quarter, Sixteenth, Meander)				
	Existing Witness Corner				
	Existing Control Point (CP, GPS-RTK, TRI)				
	Existing Traverse PI Aerial Panel				
	Existing Reference Marker Point NGS				
	Existing EFB Misc				

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SYMBOLS

D-101-31

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

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NORTH DAKOTA
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

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SYMBOLS

D-101-33

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

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12-18-20	General Revisions Sheet added - Continued from D-101-32

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12 18 2020

Cross Section Legend

D-101-40



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update

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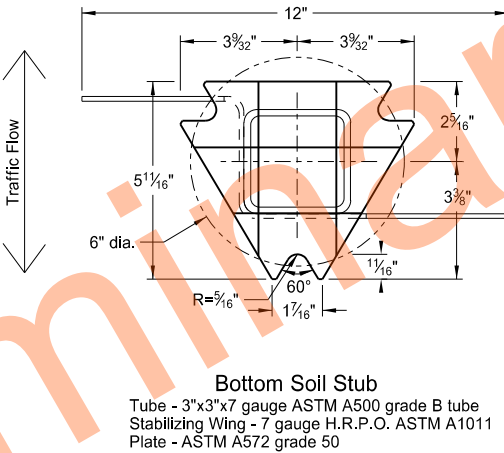
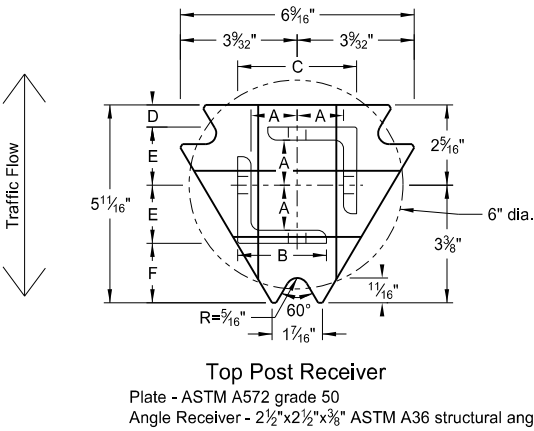
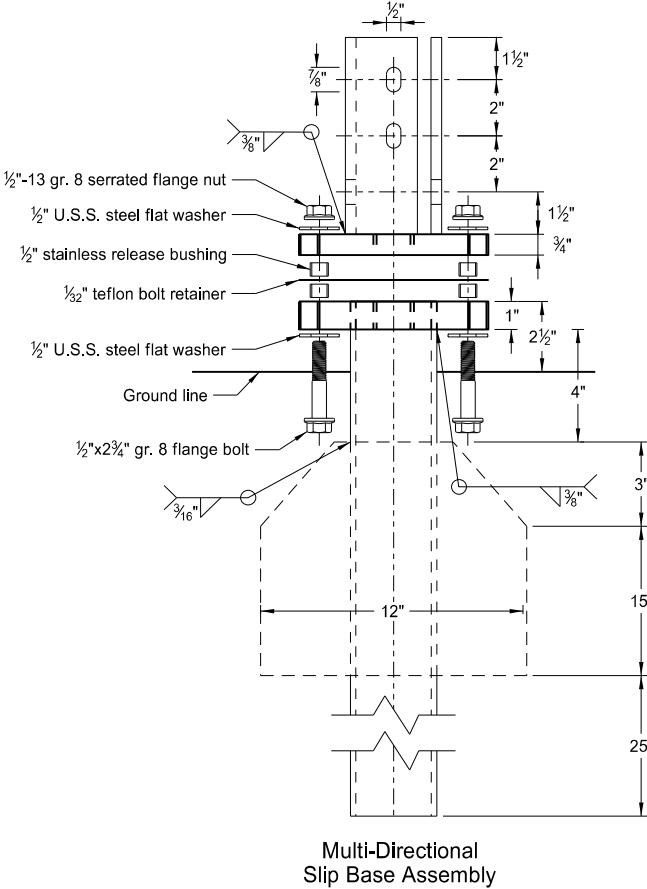
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06/14/23

Perforated Tube

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

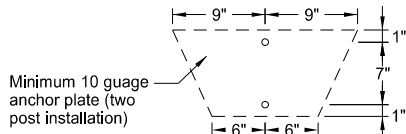
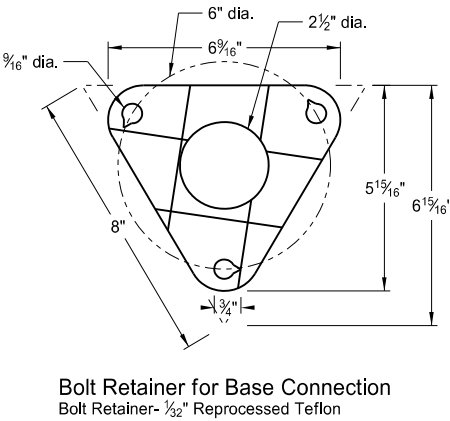
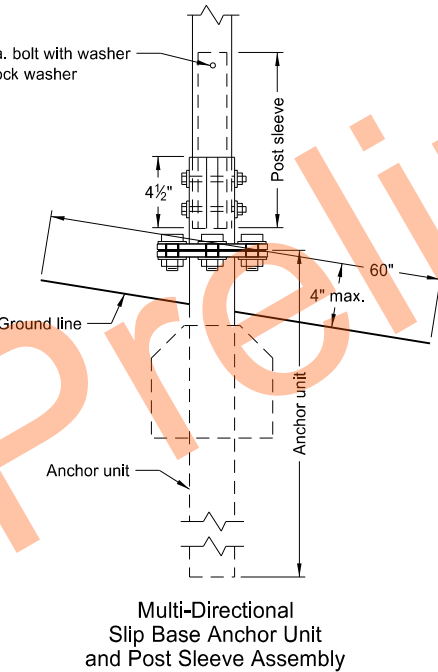
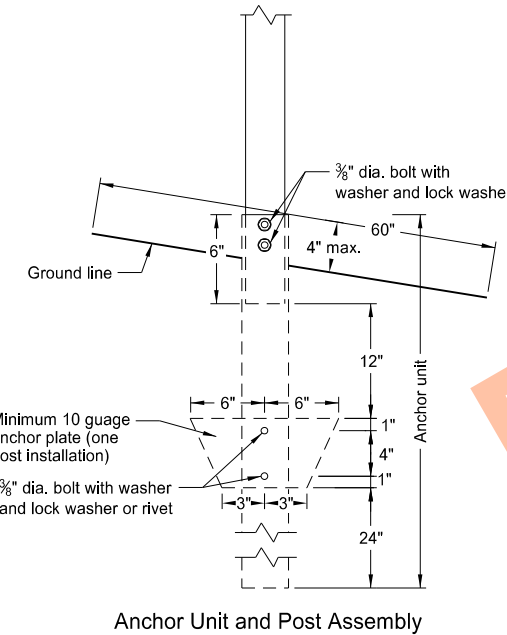


Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/8 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 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

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

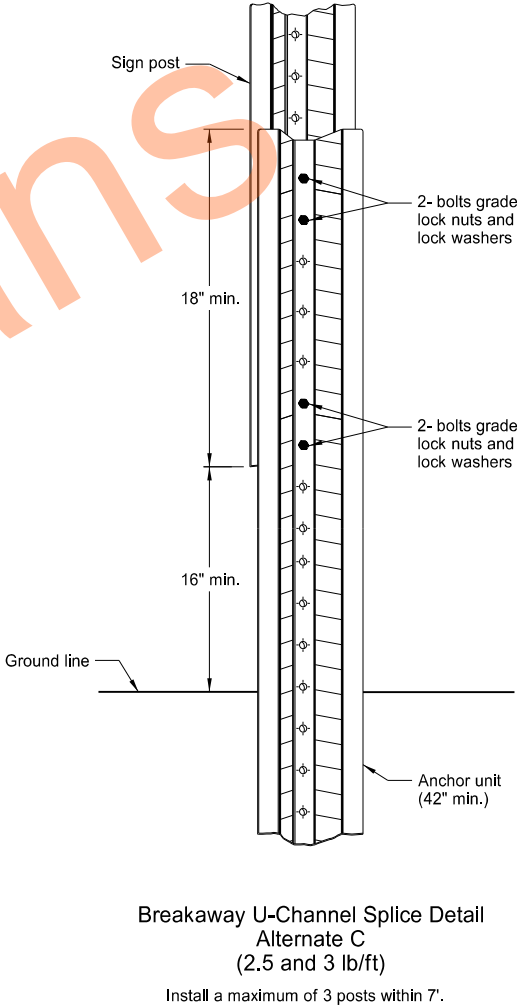
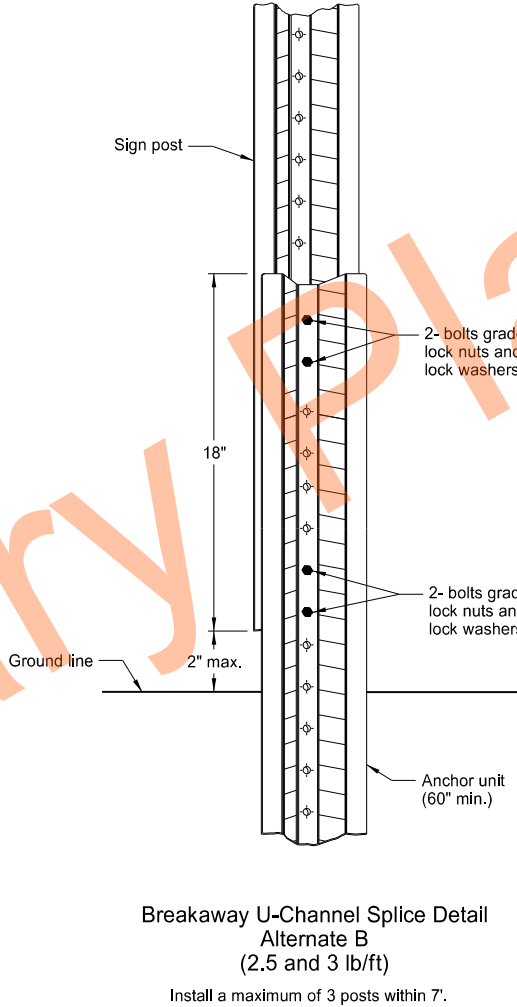
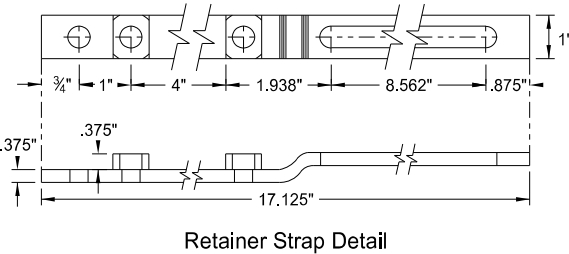
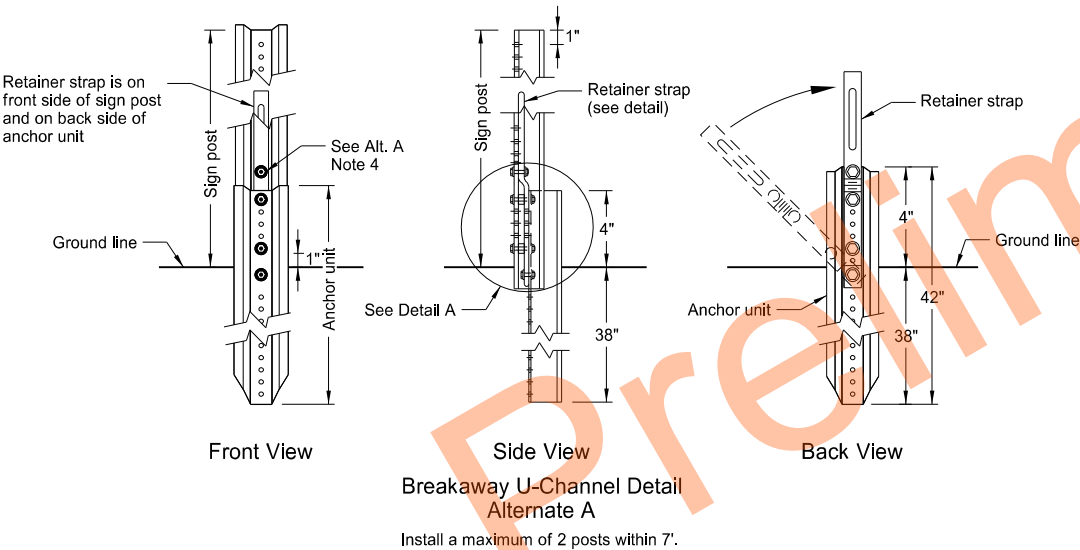
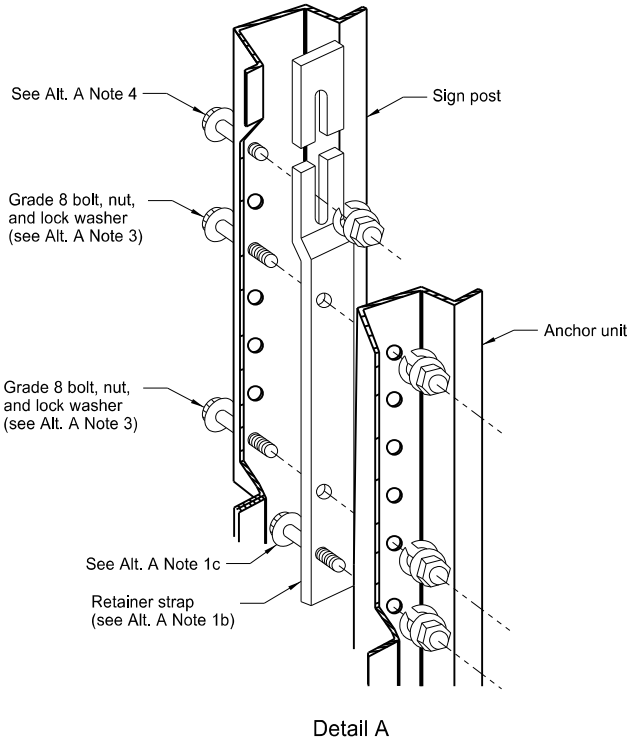
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U-Channel Post



Alternate A Steps of Installation:

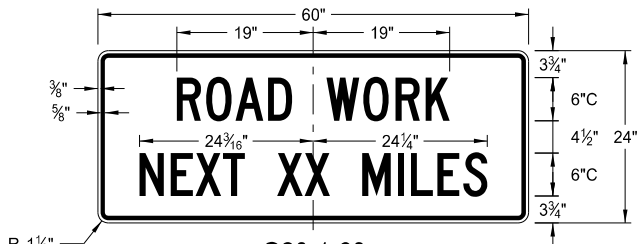
- a) Drive anchor unit to within 12" of ground level.
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
- a) Drive anchor 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

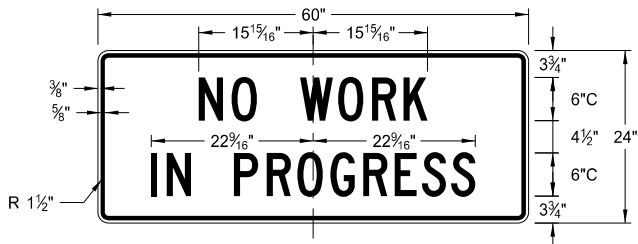
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

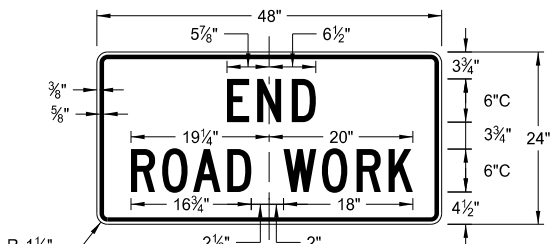
D-704-9



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



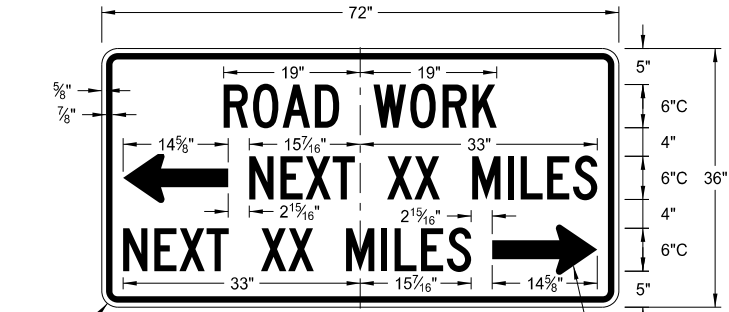
G20-1b-60
Legend: black (non-refl)
Background: orange



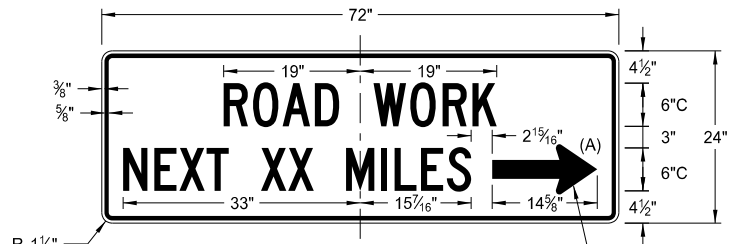
G20-2-48
Legend: black (non-refl)
Background: orange



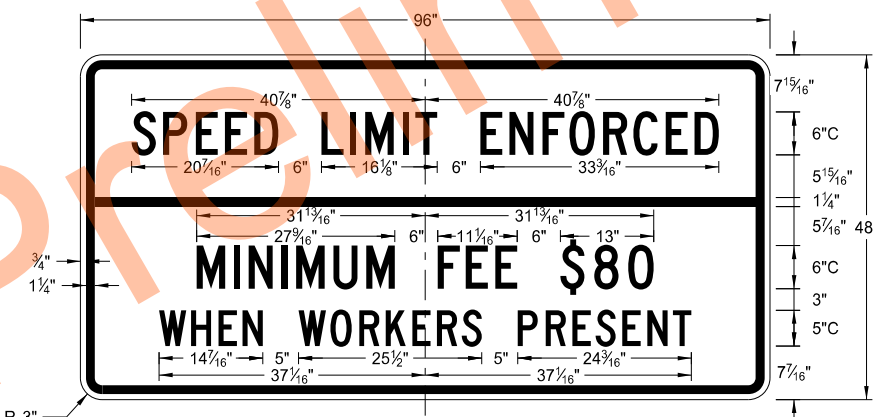
G20-4b-36
Legend: black (non-refl)
Background: orange



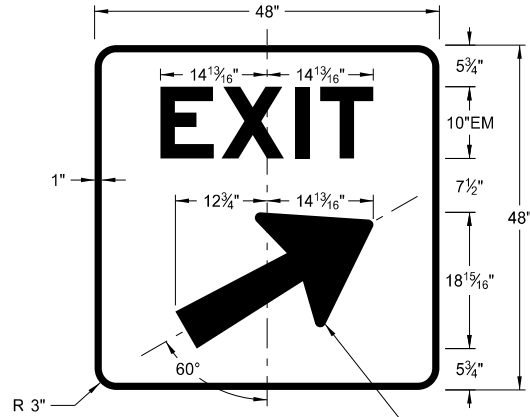
G20-50a-72
Legend: black (non-refl)
Background: orange



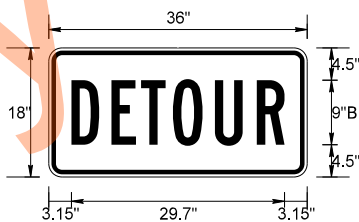
G20-52a-72
Legend: black (non-refl)
Background: orange



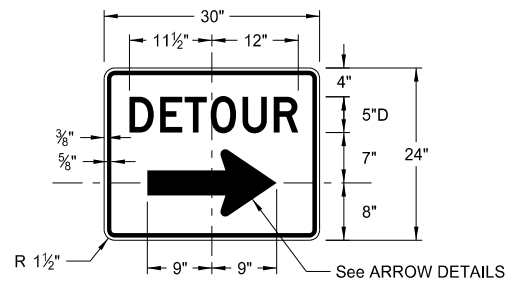
G20-55-96
Legend: black (non-refl)
Background: orange



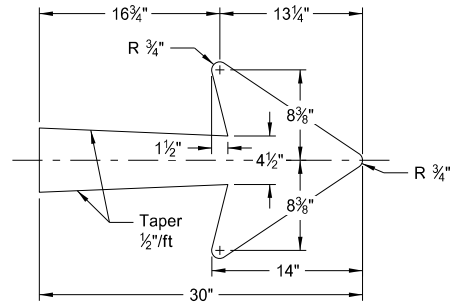
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



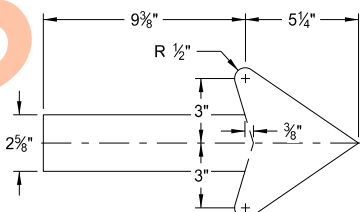
M4-8-36
Legend: black (non-refl)
Background: orange



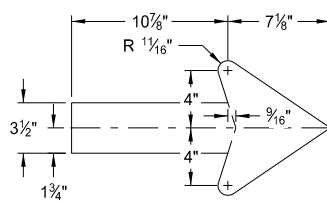
M4-9(L or R)-30 & M4-9-30
Legend: black (non-refl)
Background: orange



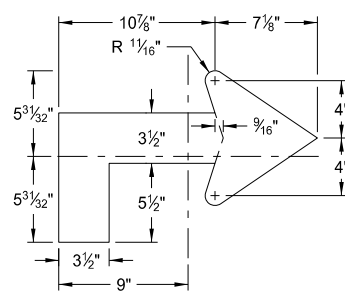
E5-1-48



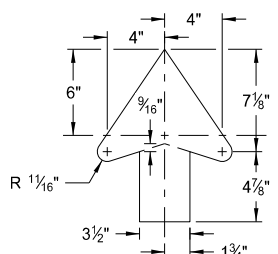
G20-50a-72
G20-52a-72



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

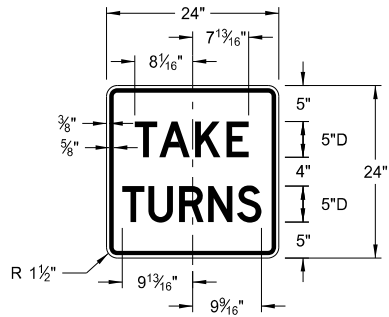
NOTES:
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

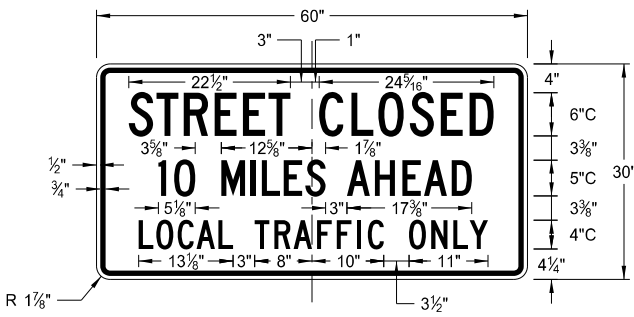
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

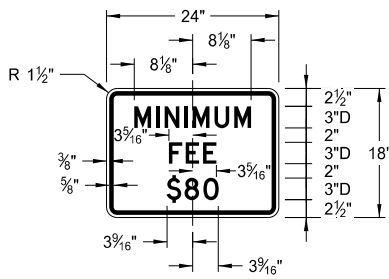
D-704-10



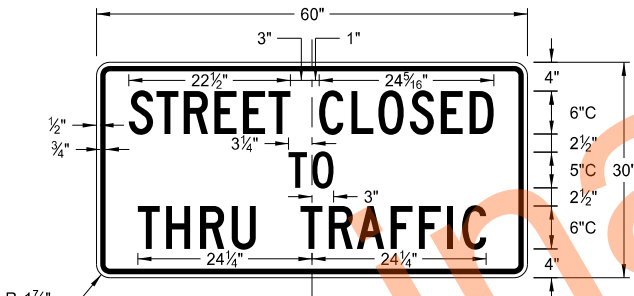
R1-50P-24
Legend: black (non-refl)
Background: white



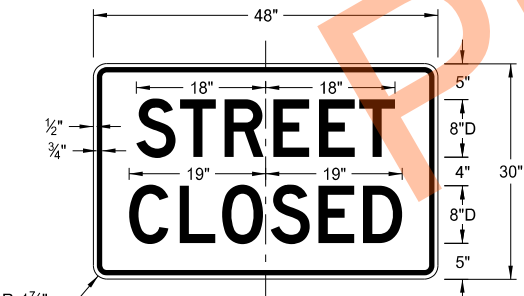
R11-3c-60
Legend: black (non-refl)
Background: white



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



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



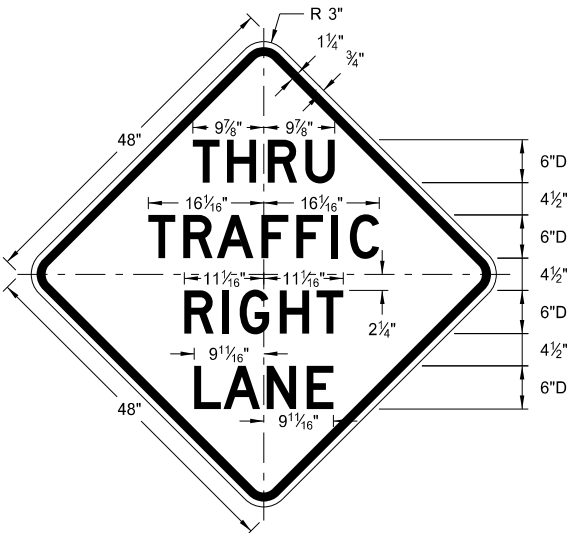
R11-2a-48
Legend: black (non-refl)
Background: white

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

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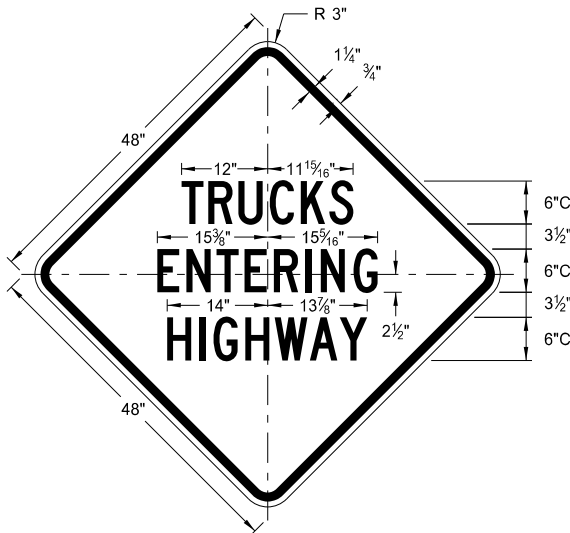
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

D-704-11



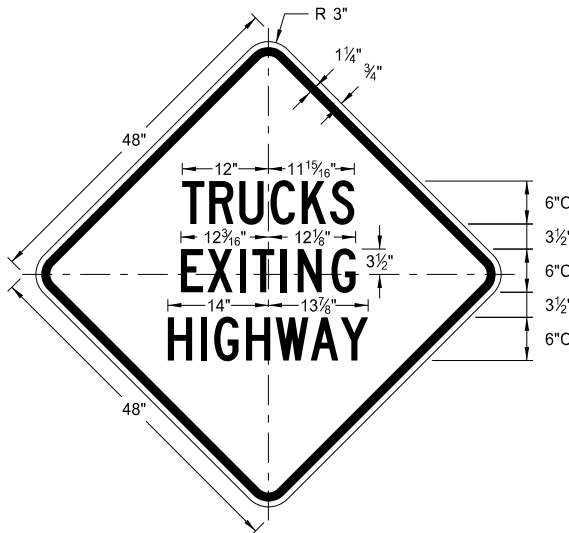
W5-8-48

Legend: black (non-refl)
Background: orange



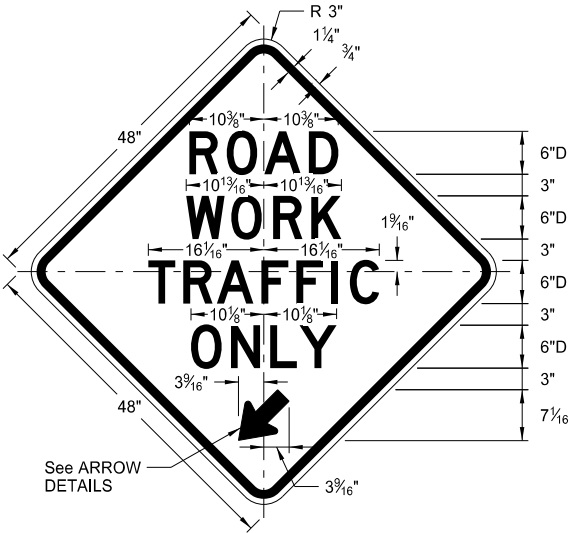
W8-53-48

Legend: black (non-refl)
Background: orange



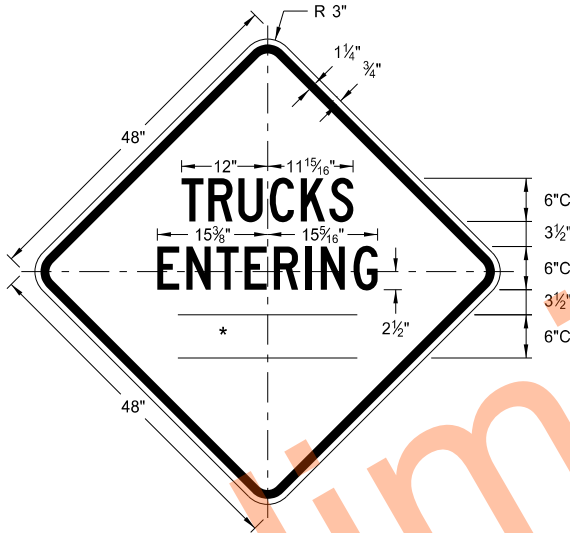
W8-56-48

Legend: black (non-refl)
Background: orange



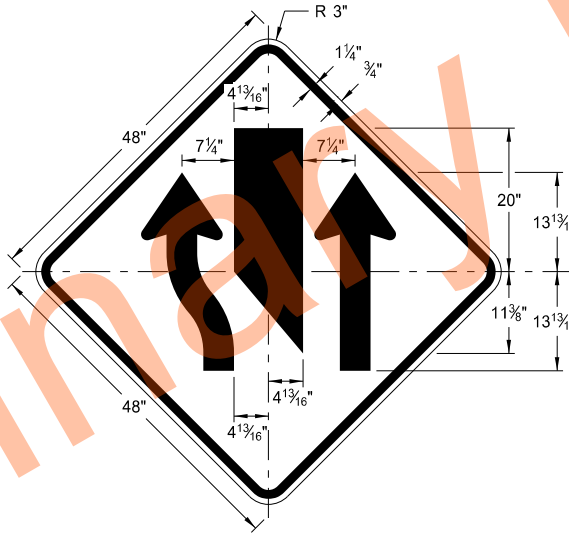
W5-9-48

Legend: black (non-refl)
Background: orange



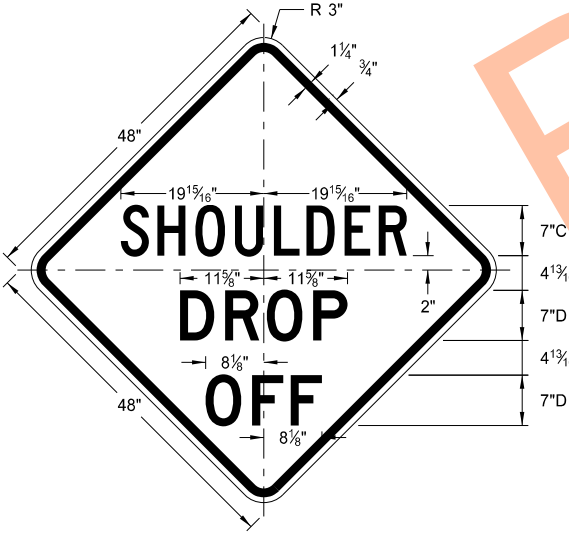
W8-54-48

Legend: black (non-refl)
Background: orange



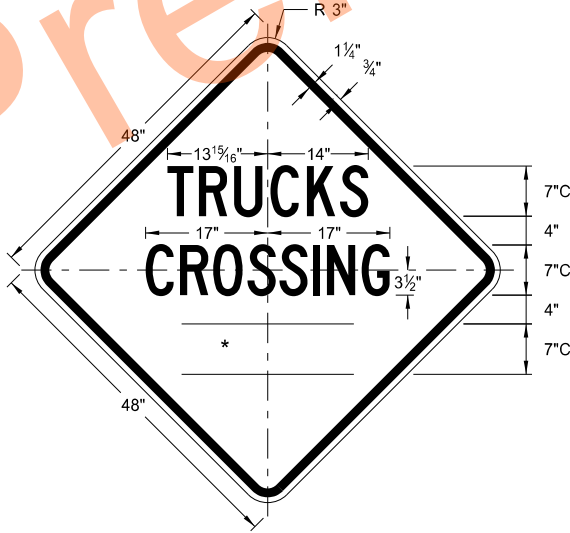
W9-3a-48

Legend: black (non-refl)
Background: orange



W8-9a-48

Legend: black (non-refl)
Background: orange

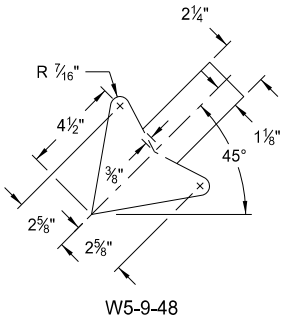


W8-55-48

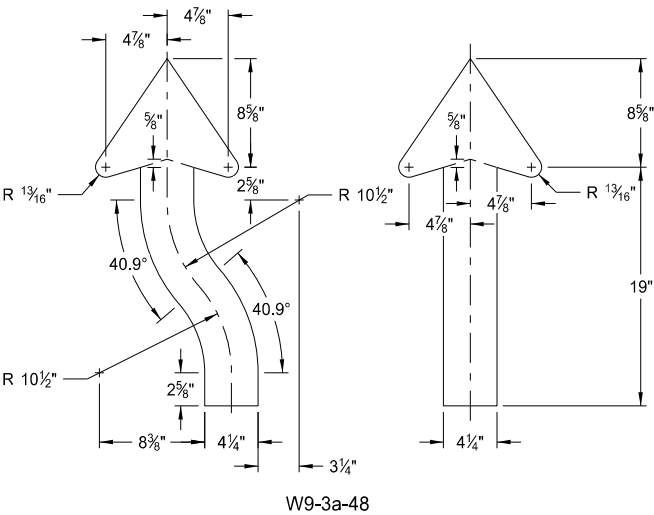
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

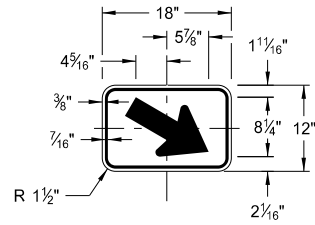
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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of Transportation

CONSTRUCTION SIGN DETAILS
WARNING SIGNS

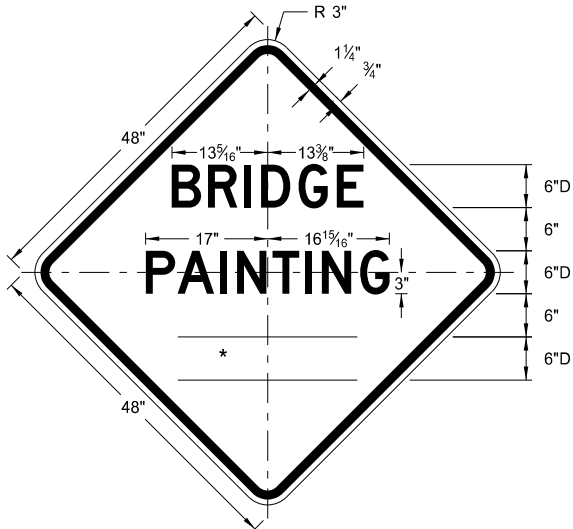
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



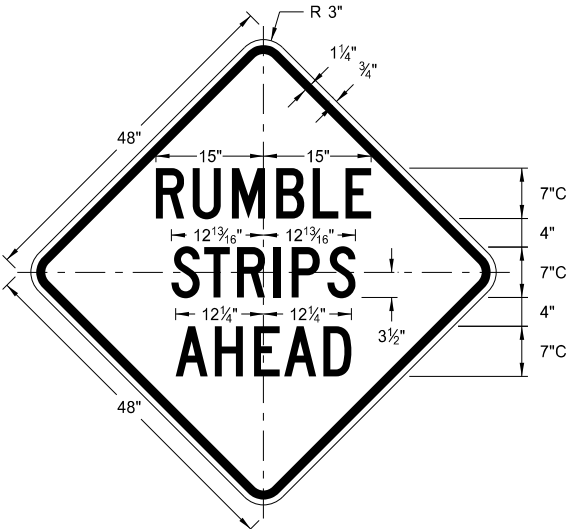
W16-7aP-18

Legend: black (non-refl)
Background: orange



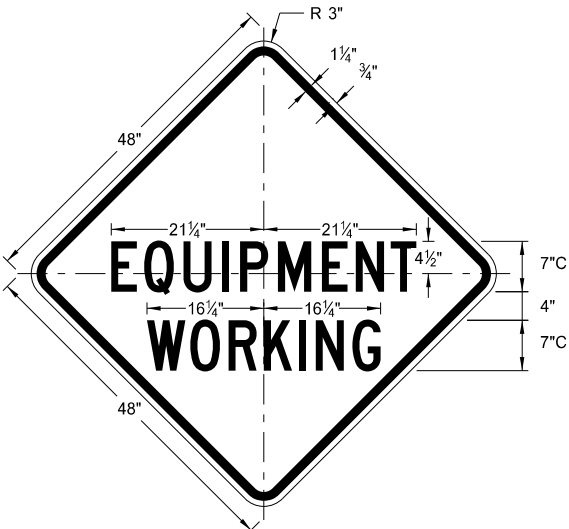
W21-50-48

Legend: black (non-refl)
Background: orange



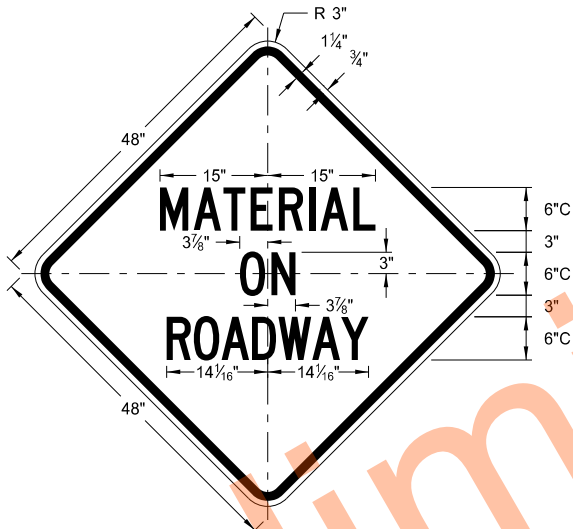
W21-53-48

Legend: black (non-refl)
Background: orange



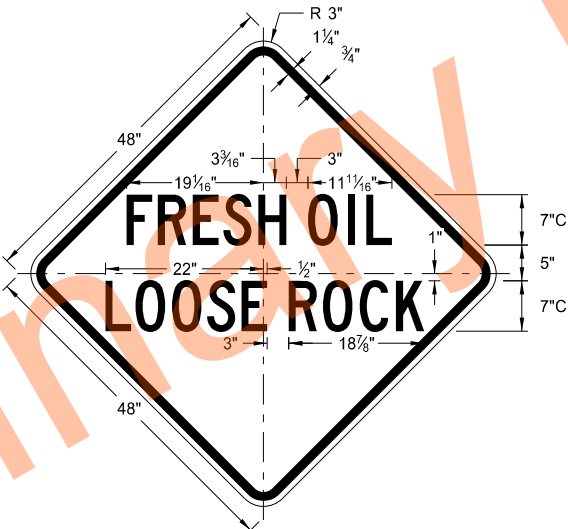
W20-51-48

Legend: black (non-refl)
Background: orange



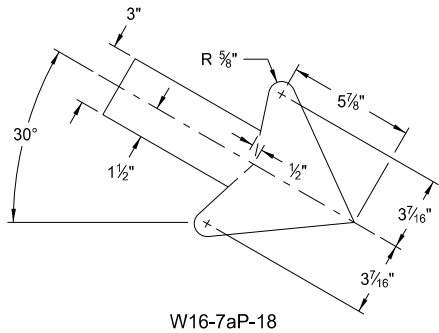
W21-51-48

Legend: black (non-refl)
Background: orange

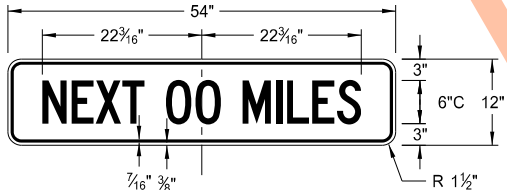


W22-8-48

Legend: black (non-refl)
Background: orange

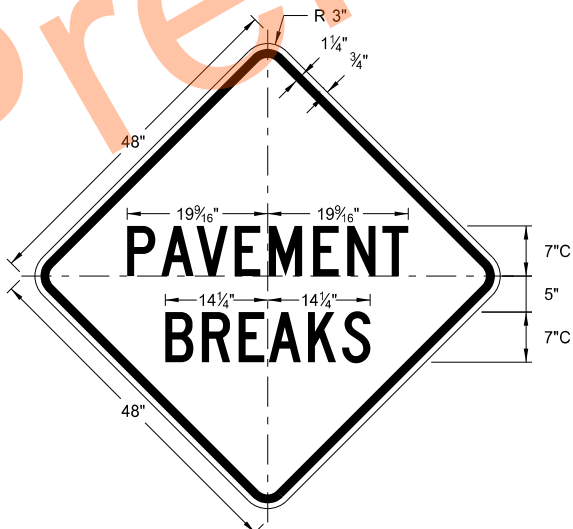


W16-7aP-18



W20-52P-54

Legend: black (non-refl)
Background: orange

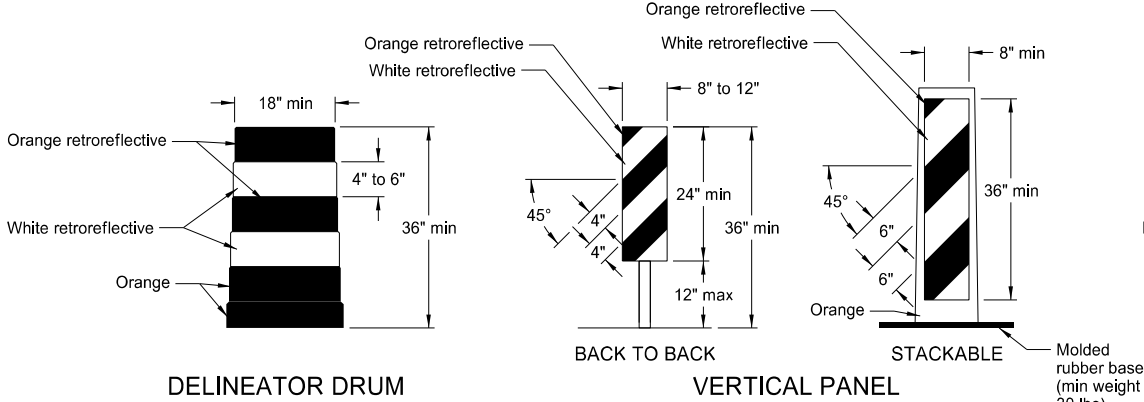


W21-52-48

Legend: black (non-refl)
Background: orange

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5-31-18		
REVISIONS		
DATE	CHANGE	
11-01-19	Added details for sign W16-7aP-18.	

BARRICADE AND CHANNELIZING DEVICE DETAILS



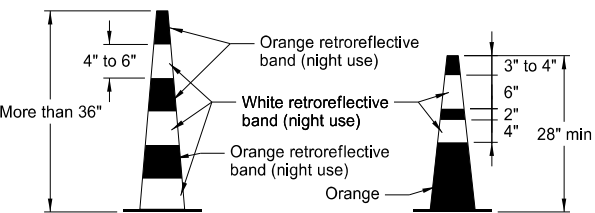
DELINEATOR DRUM

VERTICAL PANEL

STACKABLE
Molded rubber base (min weight 30 lbs)

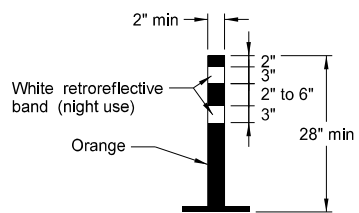
Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and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



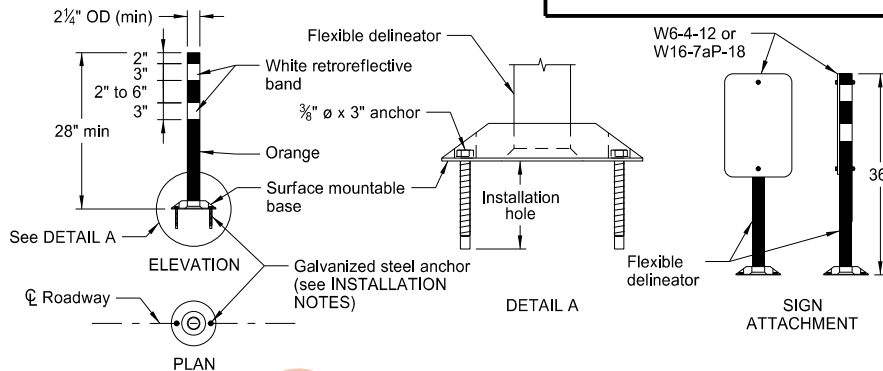
TRAFFIC CONE

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



TUBULAR MARKER

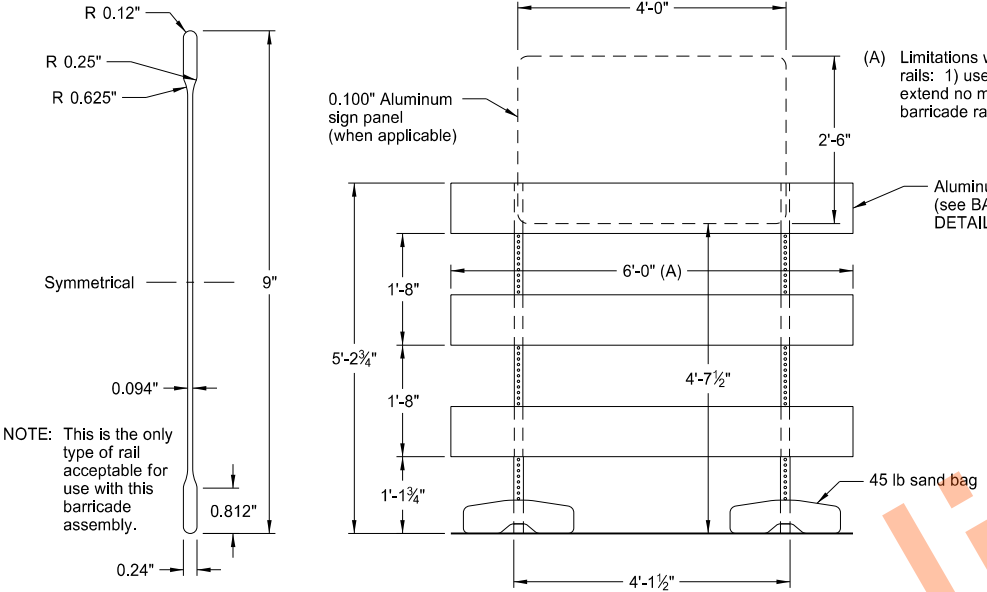
Provide retroreflectORIZATION of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

INSTALLATION NOTES:

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

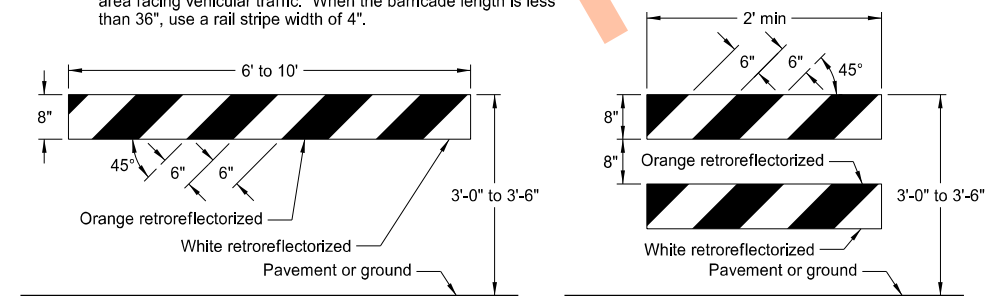


BARRICADE BLADE DETAIL

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

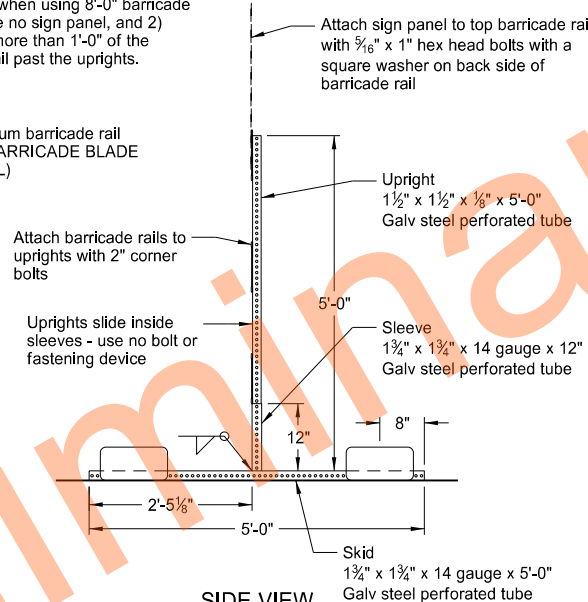
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



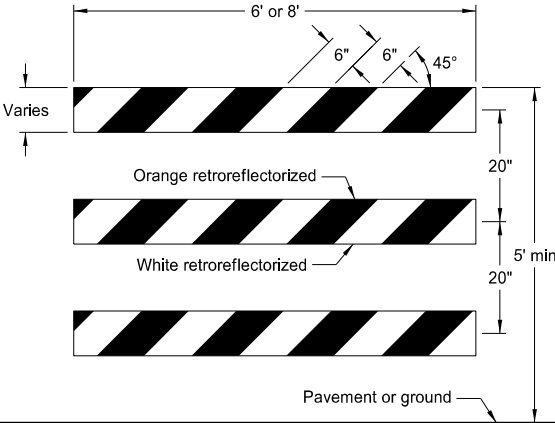
TYPE I BARRICADE

TYPE II BARRICADE

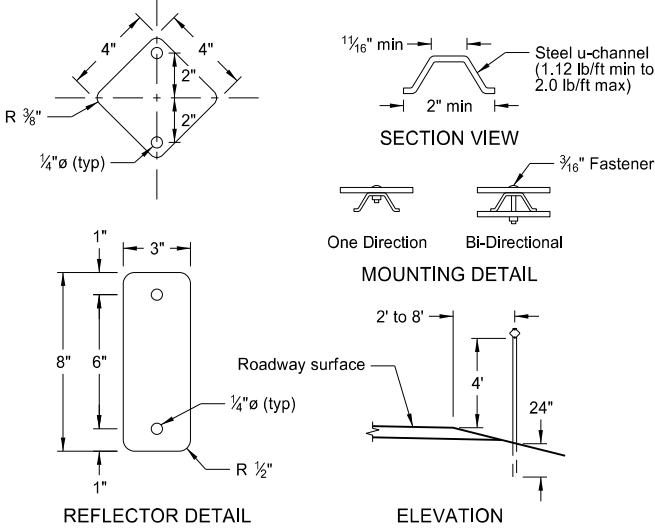
BARRICADE RAIL DETAILS



SIDE VIEW



TYPE III BARRICADE



REFLECTOR DETAIL

ELEVATION

DELINEATORS

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

SIDE VIEW

MINIMUM BALLAST
(For each side of barricade support)

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

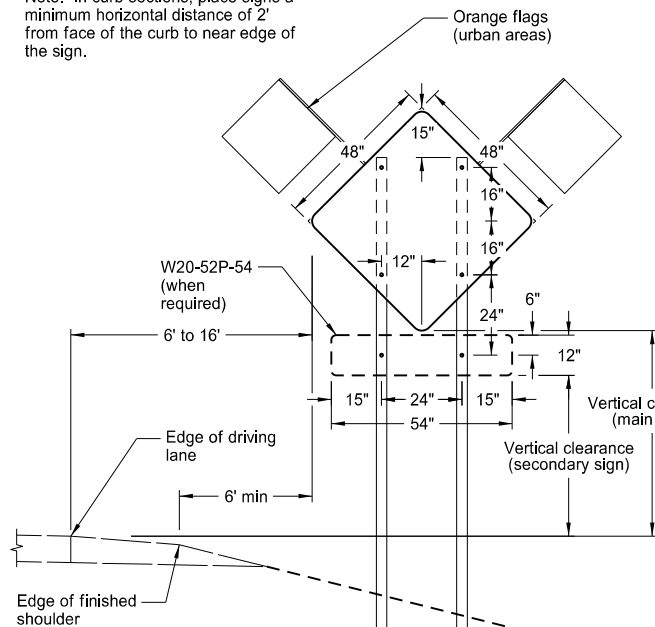
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

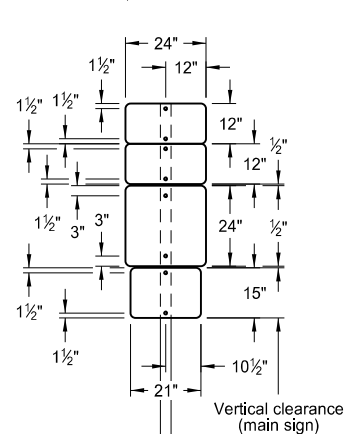
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

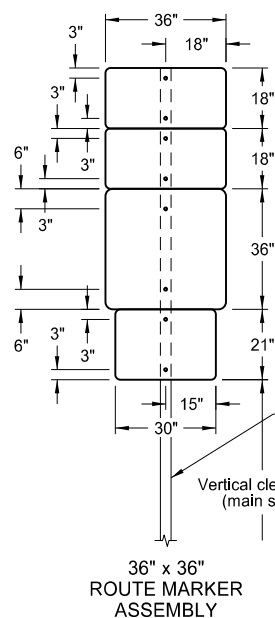
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



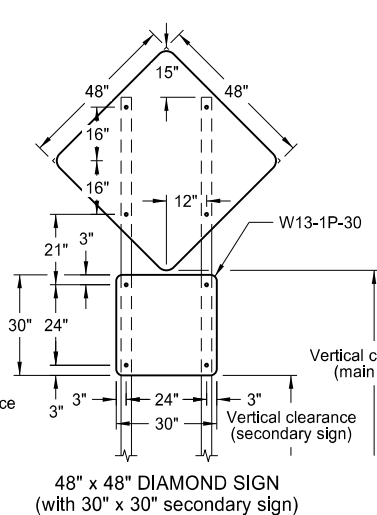
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



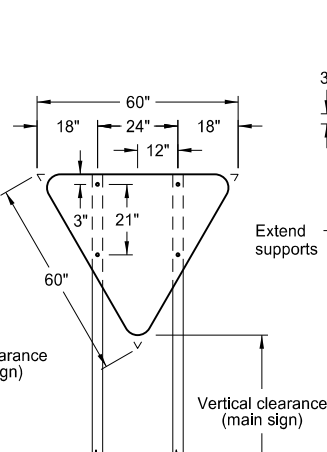
24" x 24"
ROUTE MARKER
ASSEMBLY



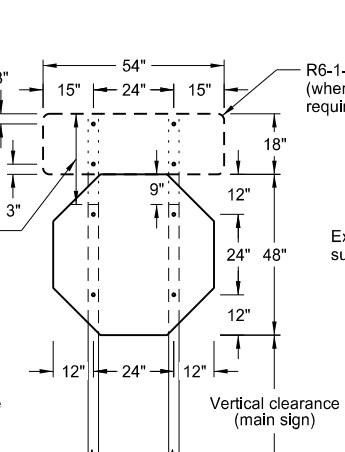
36" x 36"
ROUTE MARKER
ASSEMBLY



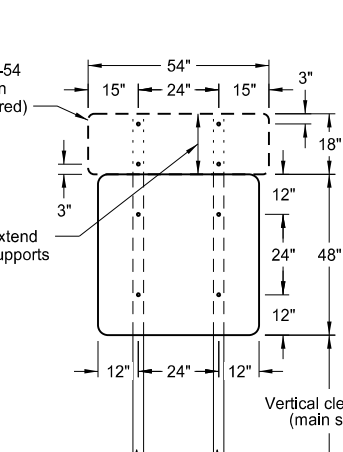
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



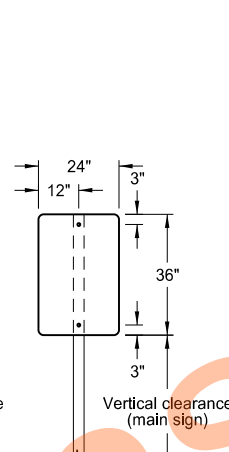
R1-2-60 - YIELD SIGN



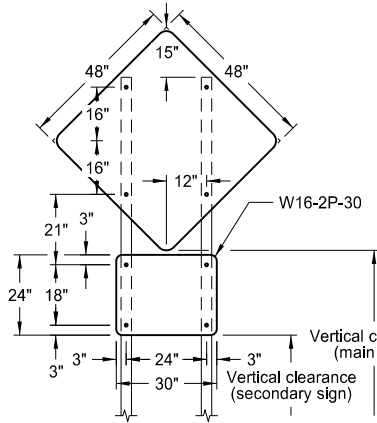
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



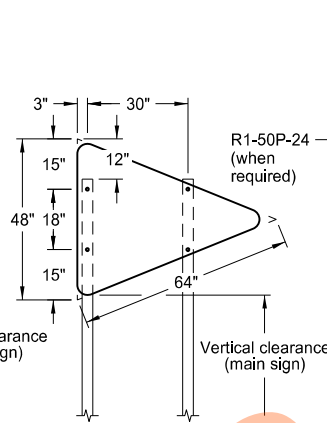
48" x 48" SIGN
(with R6-1-54 sign as required)



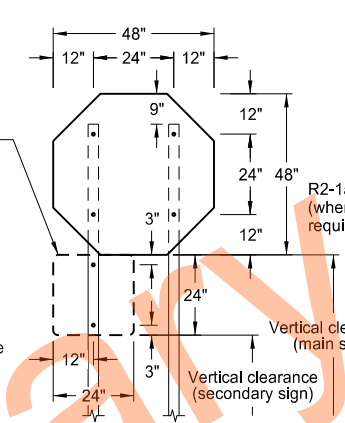
24" x 36" SIGN



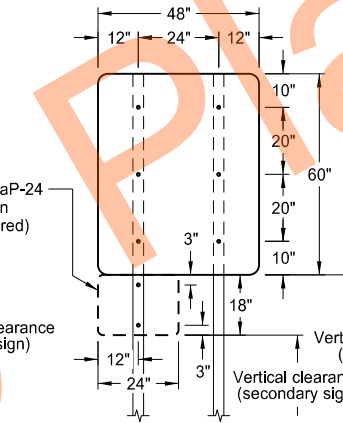
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



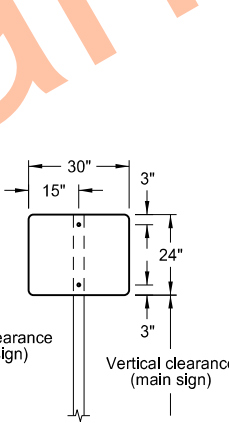
W14-3-64 - PENNANT SIGN



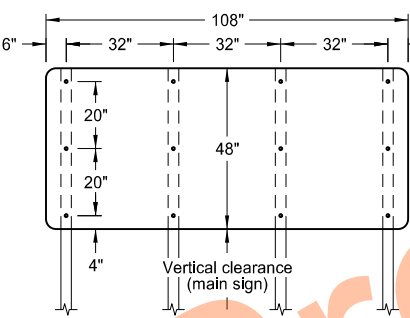
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



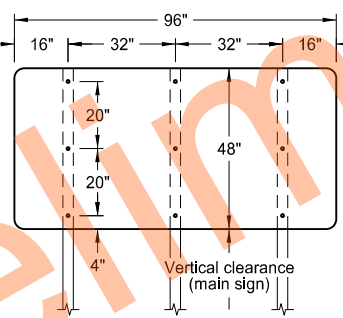
48" x 48" SIGN
(with R2-1aP-24 sign as required)



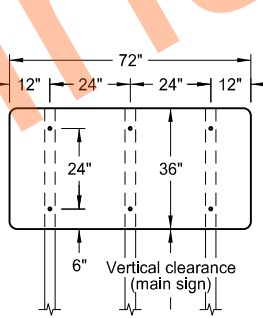
30" x 24" SIGN



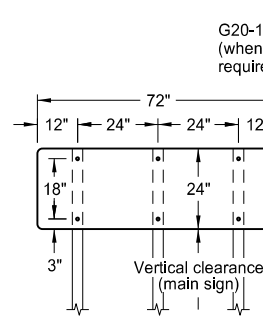
108" x 48" SIGN



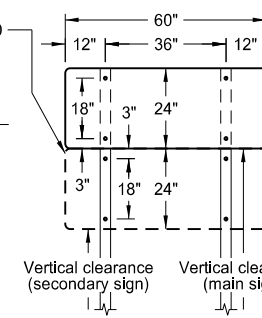
96" x 48" SIGN



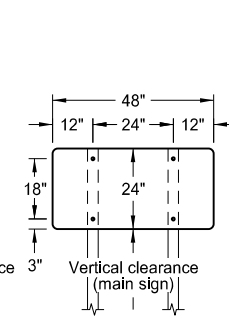
72" x 36" SIGN



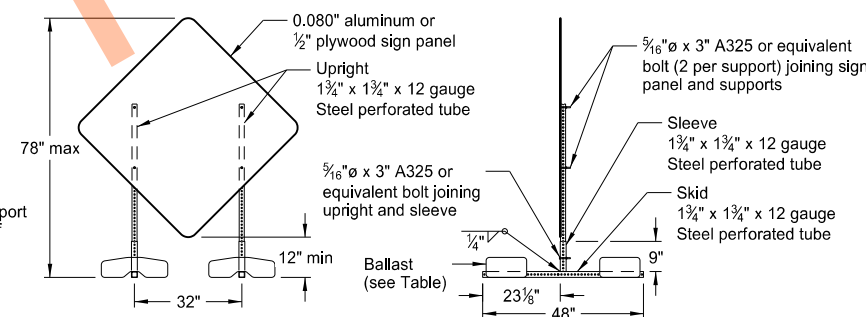
72" x 24" SIGN



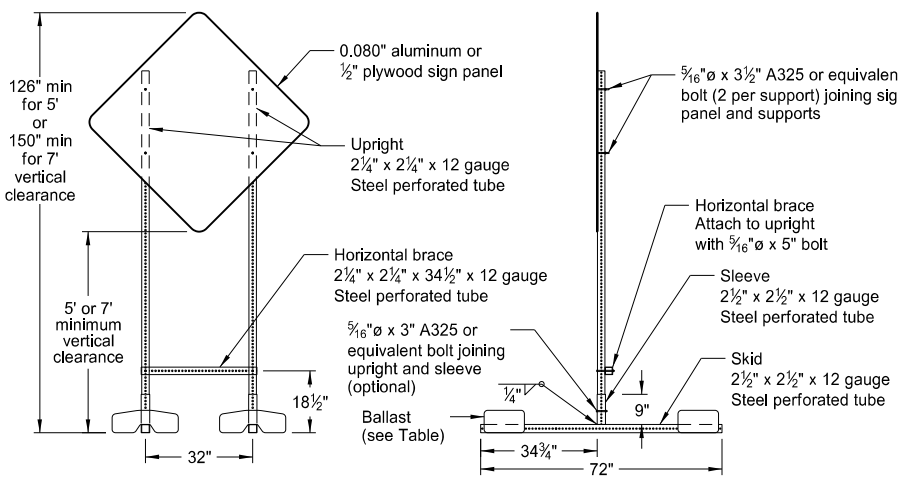
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Galvanize or paint supports. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.

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

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

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

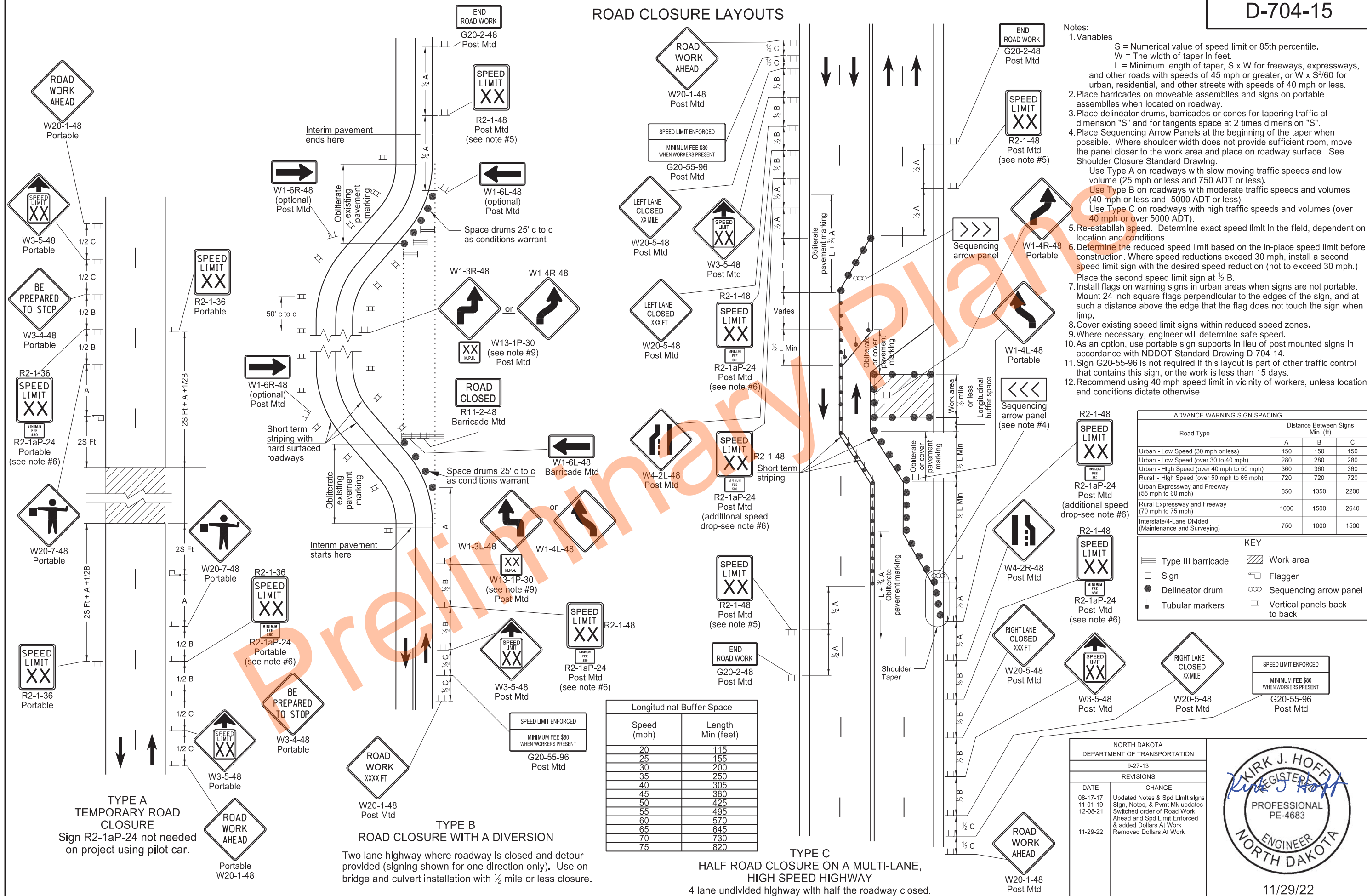
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

This document was originally issued and sealed by

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

ROAD CLOSURE LAYOUTS



NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13
REVISIONS

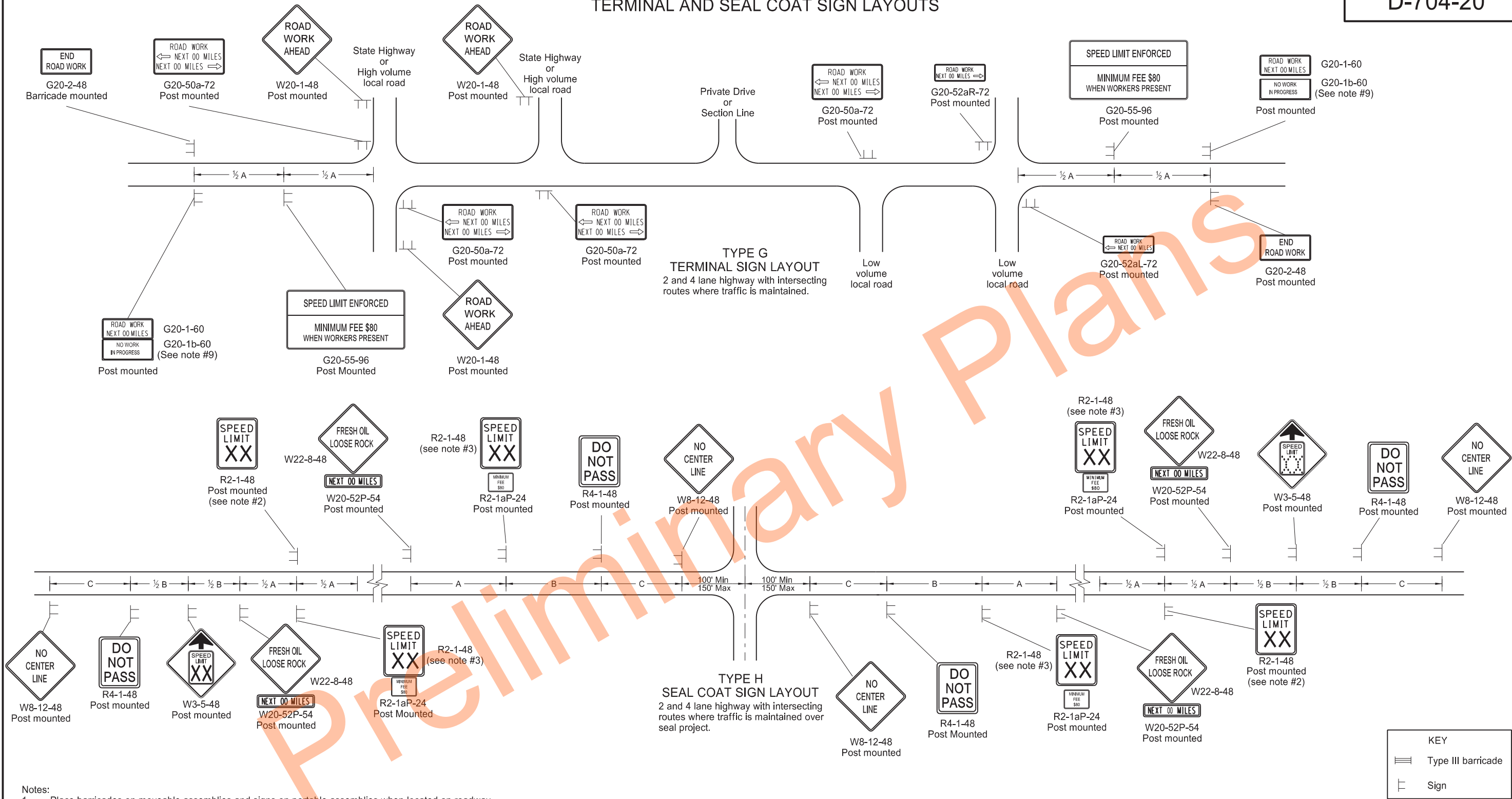
DATE	CHANGE
08-17-17	Updated Notes & Spd Limit signs
11-01-19	Sign, Notes, & Pmt Mk updates
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work



11/29/22

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



Notes:

- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
- Determine the exact speed limit in the field, based on location and conditions.
- Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at 1/2 B.
- Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
- Cover existing speed limit signs within a reduced speed zone.
- On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
- Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
- Install sign G20-1b-60 when work is suspended for winter.
- Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
- 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.
- Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Updated notes & sign numbers
11-01-19	Updated note & sign
12-08-21	Switched order of Road Work and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work



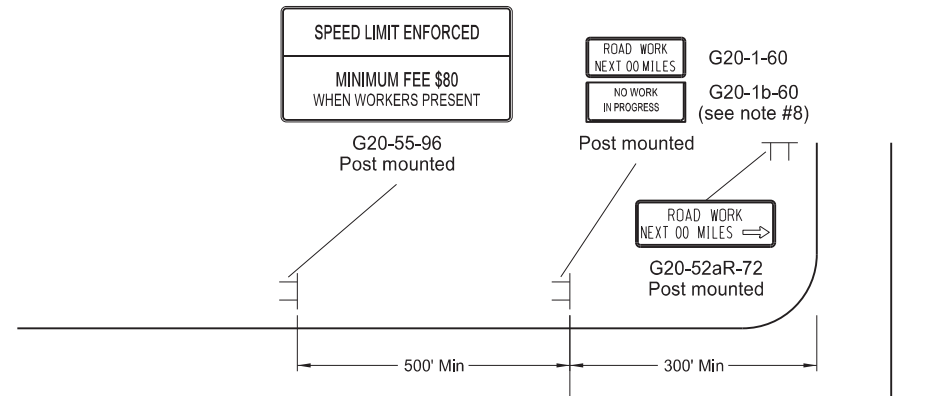
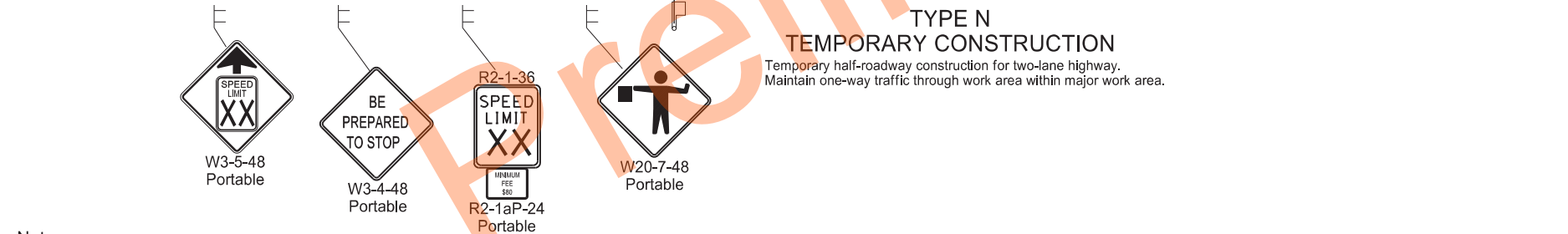
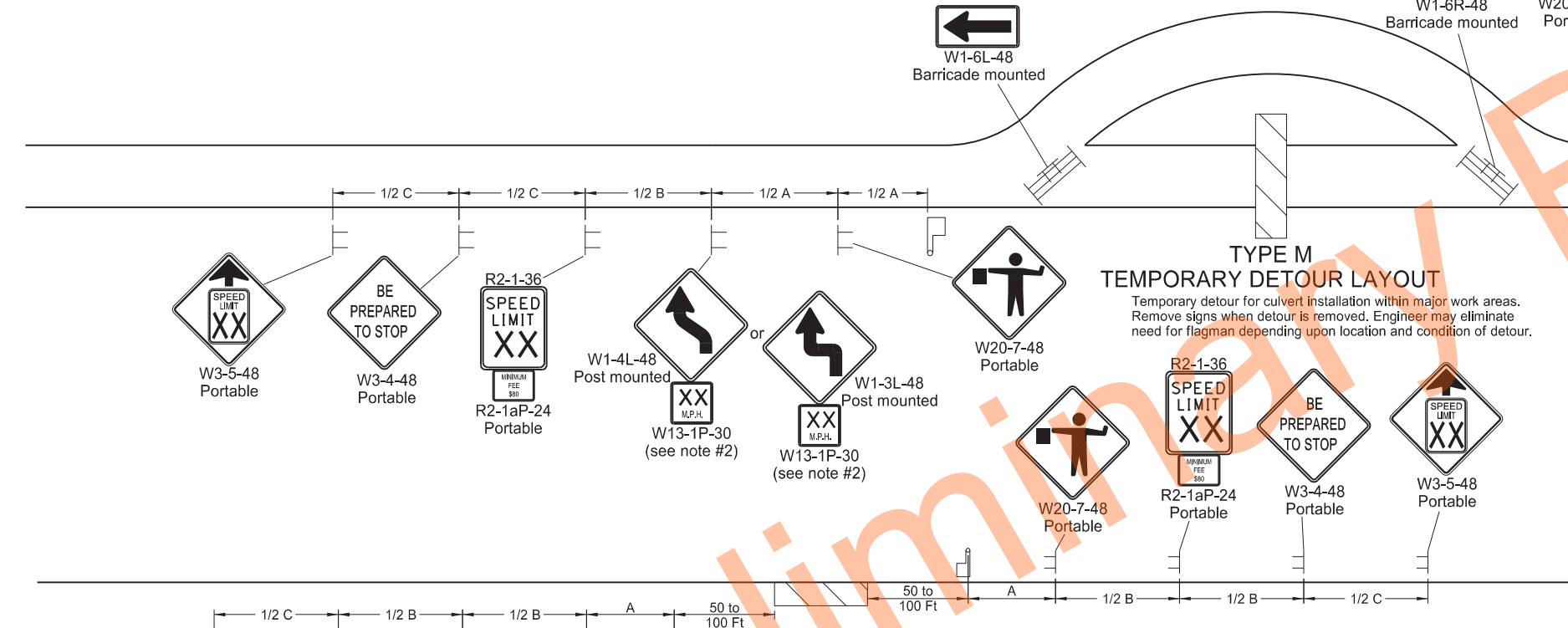
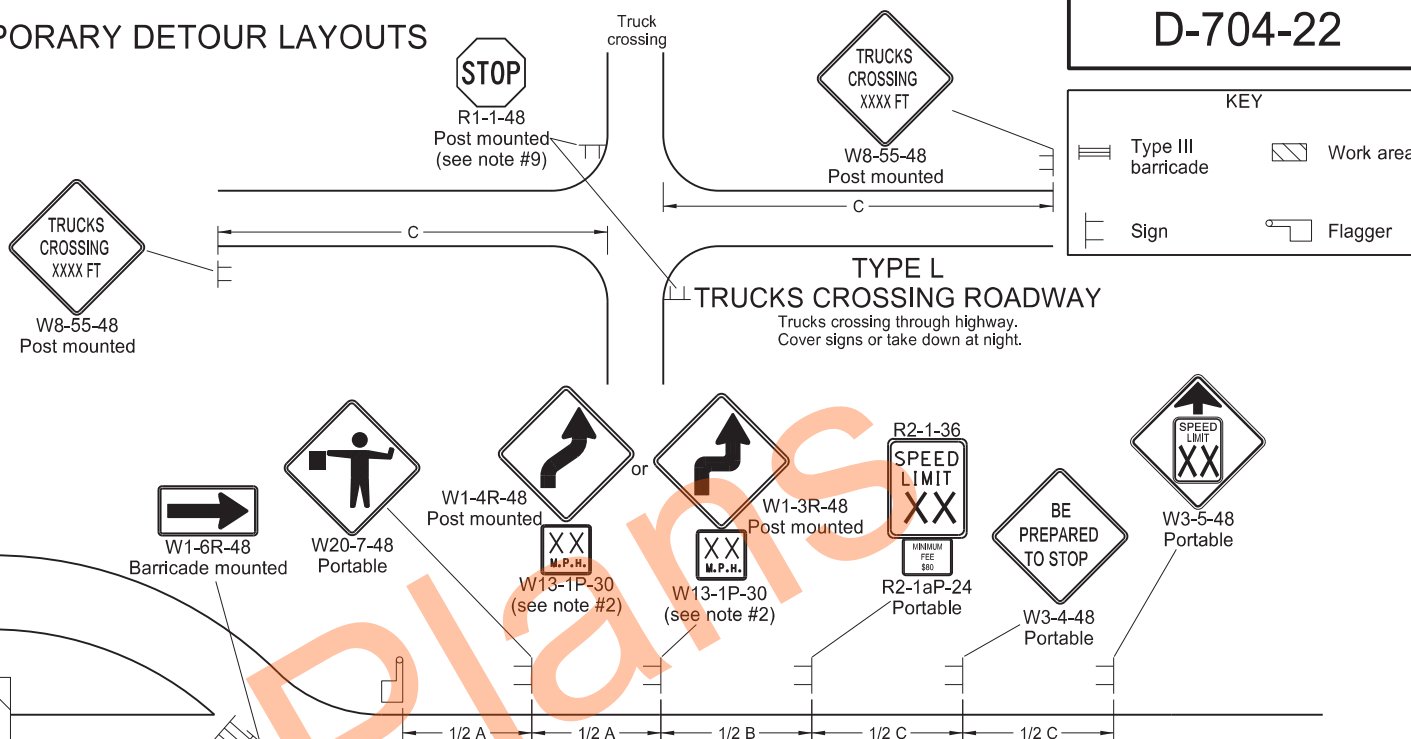
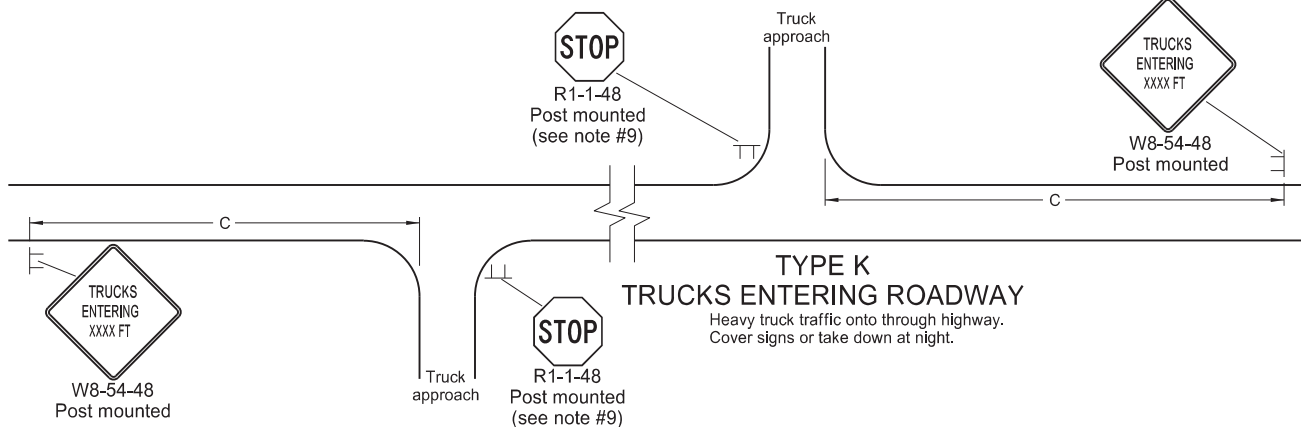
11/29/22

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22

KEY

- Type III barricade
- Sign
- Work area
- Flagger



Notes:

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

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

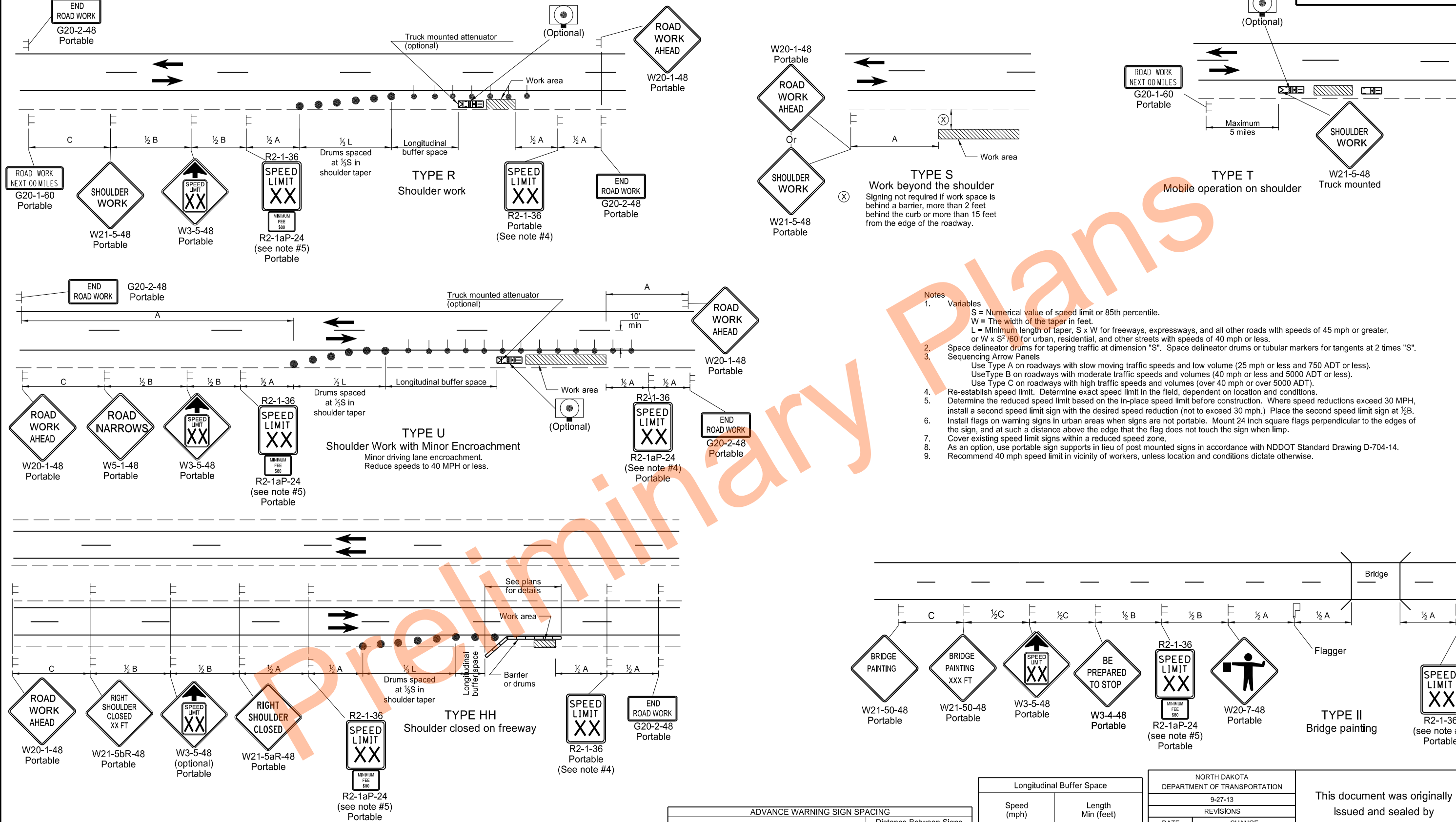
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs
11-29-22	Removed Dollars At Work



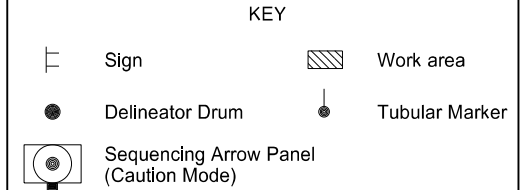
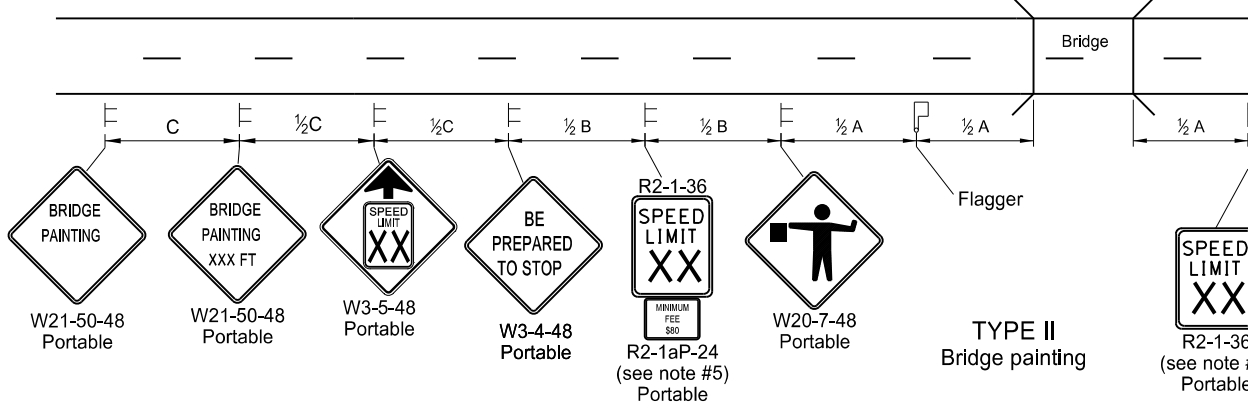
11/29/22

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

D-704-24



- Notes
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of the taper in feet.
 - L = Minimum length of taper, $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
 - Sequencing Arrow Panels
 - Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
 - Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
 - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at $\frac{1}{2}B$.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.



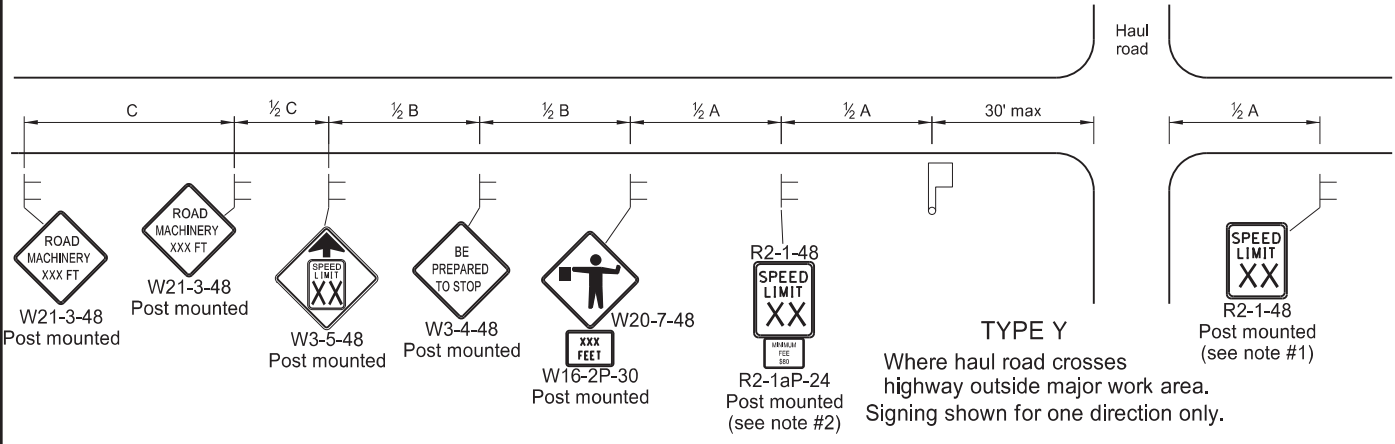
ADVANCE WARNING SIGN SPACING				
Road Type	Distance Between Signs			
	A	B	C	
Urban - Low Speed (30 mph or less)	150	150	150	
Urban - Low Speed (over 30 to 40 mph)	280	280	280	
Urban - High Speed (over 40 mph to 50 mph)	360	360	360	
Rural - High Speed (over 50 mph to 65 mph)	720	720	720	
Urban Expressway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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17 11-01-19	Updated notes & revised signs Revised drum spacing & signs nos.

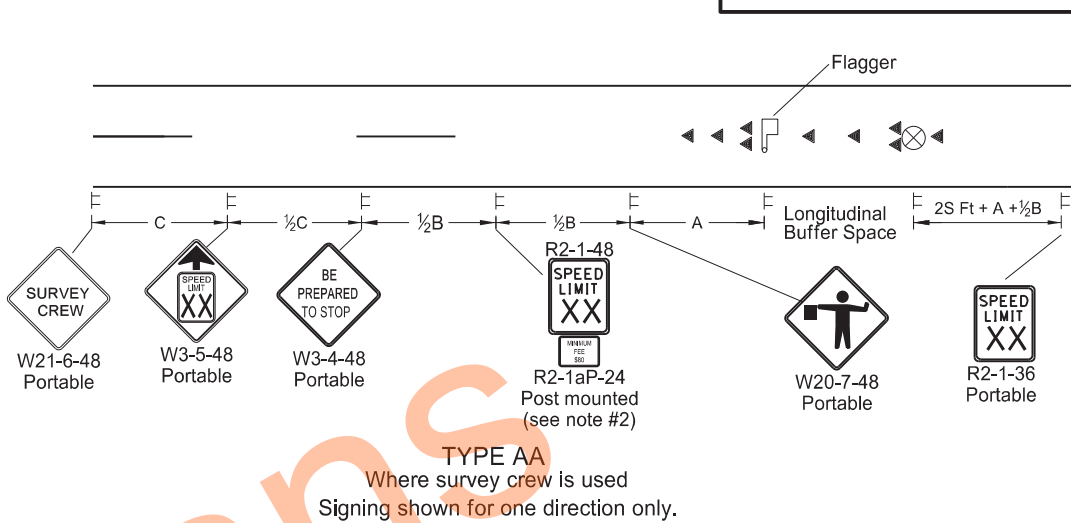
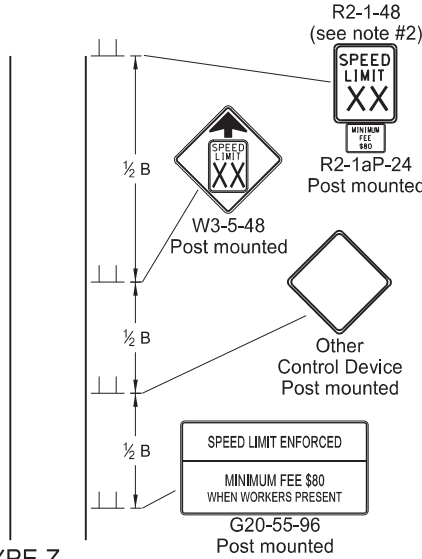
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 11/1/19 and the original document is stored at the
North Dakota Department
of Transportation

MISCELLANEOUS SIGN LAYOUTS

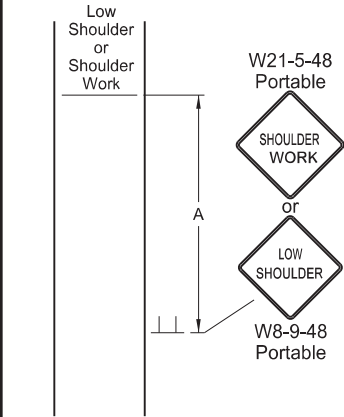


TYPE Y
Where haul road crosses highway outside major work area. Signing shown for one direction only.

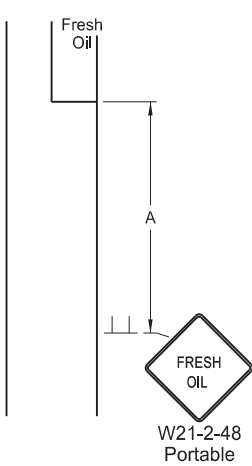
TYPE Z
Where speed zone is needed
Signing shown for one direction only.



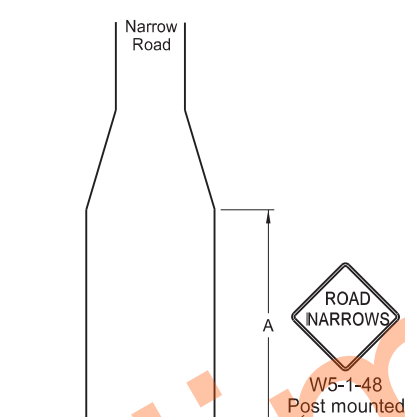
TYPE AA
Where survey crew is used
Signing shown for one direction only.



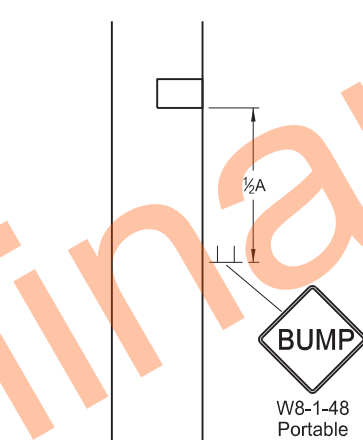
TYPE BB
Within major work area where sign conditions exist



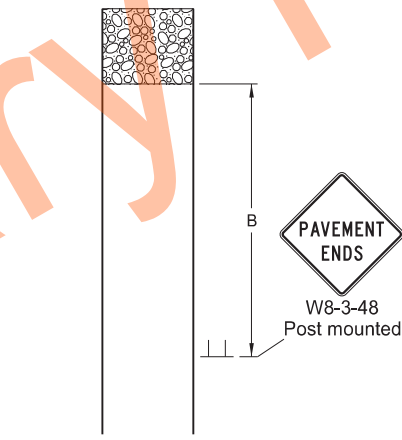
TYPE CC
Where sign conditions exist



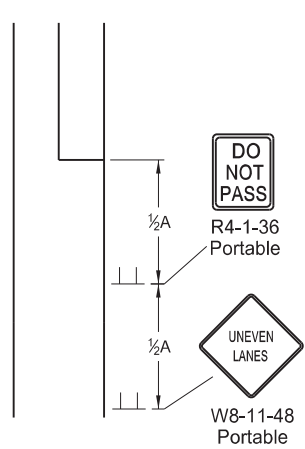
TYPE DD
Where sign conditions exist



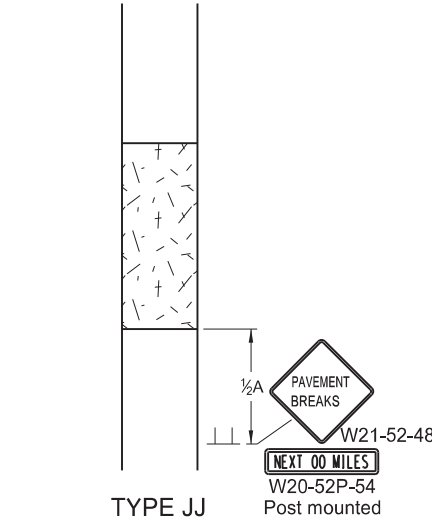
TYPE EE
Where sign conditions exist



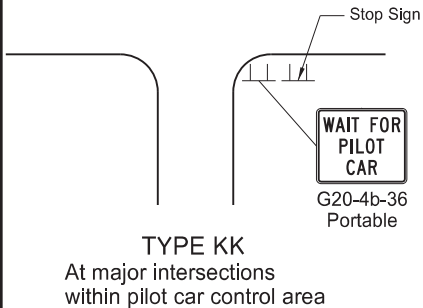
TYPE FF
Where sign conditions exist
Signing shown for one direction only.



TYPE GG
Where elevation difference exists between lanes



TYPE JJ
For break in pavement. Install signs when conditions exist and remove when not applicable. Signing shown for one direction only.



TYPE KK
At major intersections within pilot car control area

- Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 2. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
 3. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 4. Cover existing speed limit signs within reduced speed zones.
 5. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 6. Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
 7. When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
 8. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 9. Layouts shown for one direction only.

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

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

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

KEY

Flagger Sign

Cones Survey Equipment

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

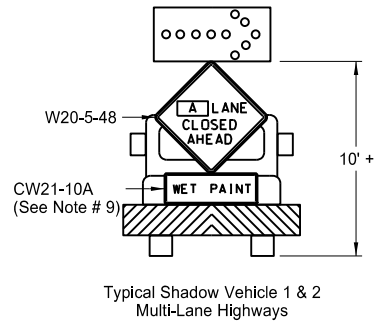
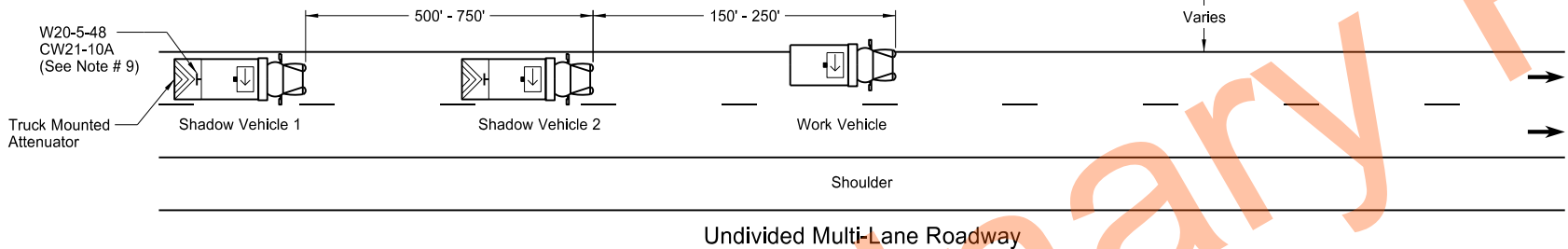
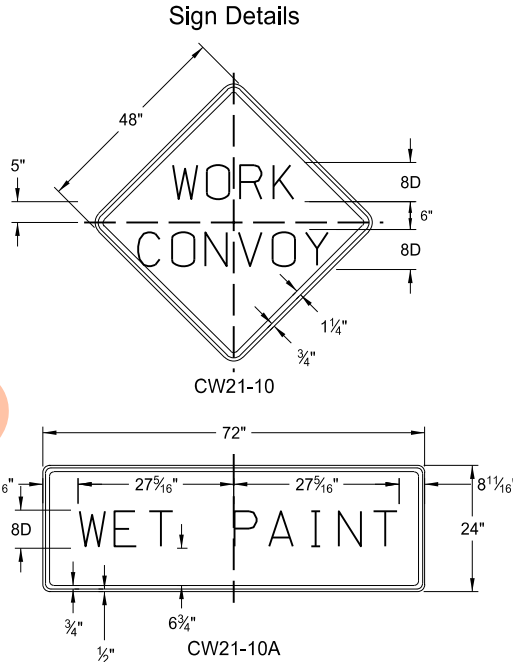
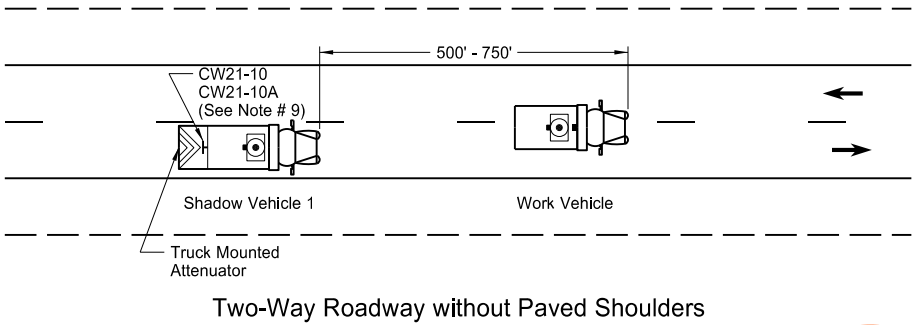
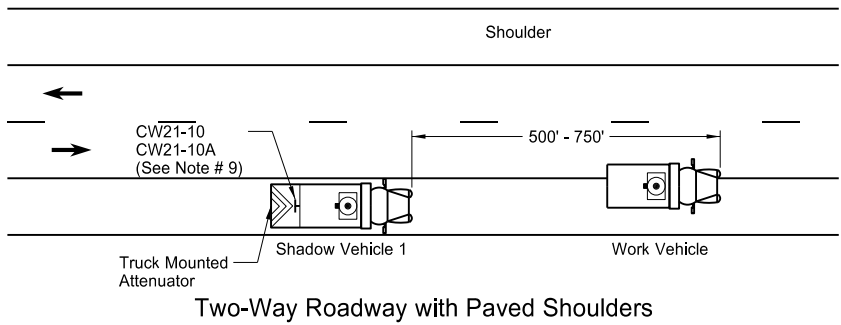
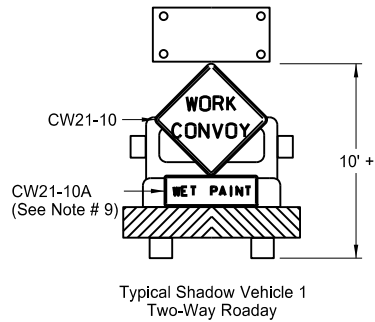
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers.
11-01-19	Revised note 5 & sign numbers.
2-23-23	Revised distance & removed signs.



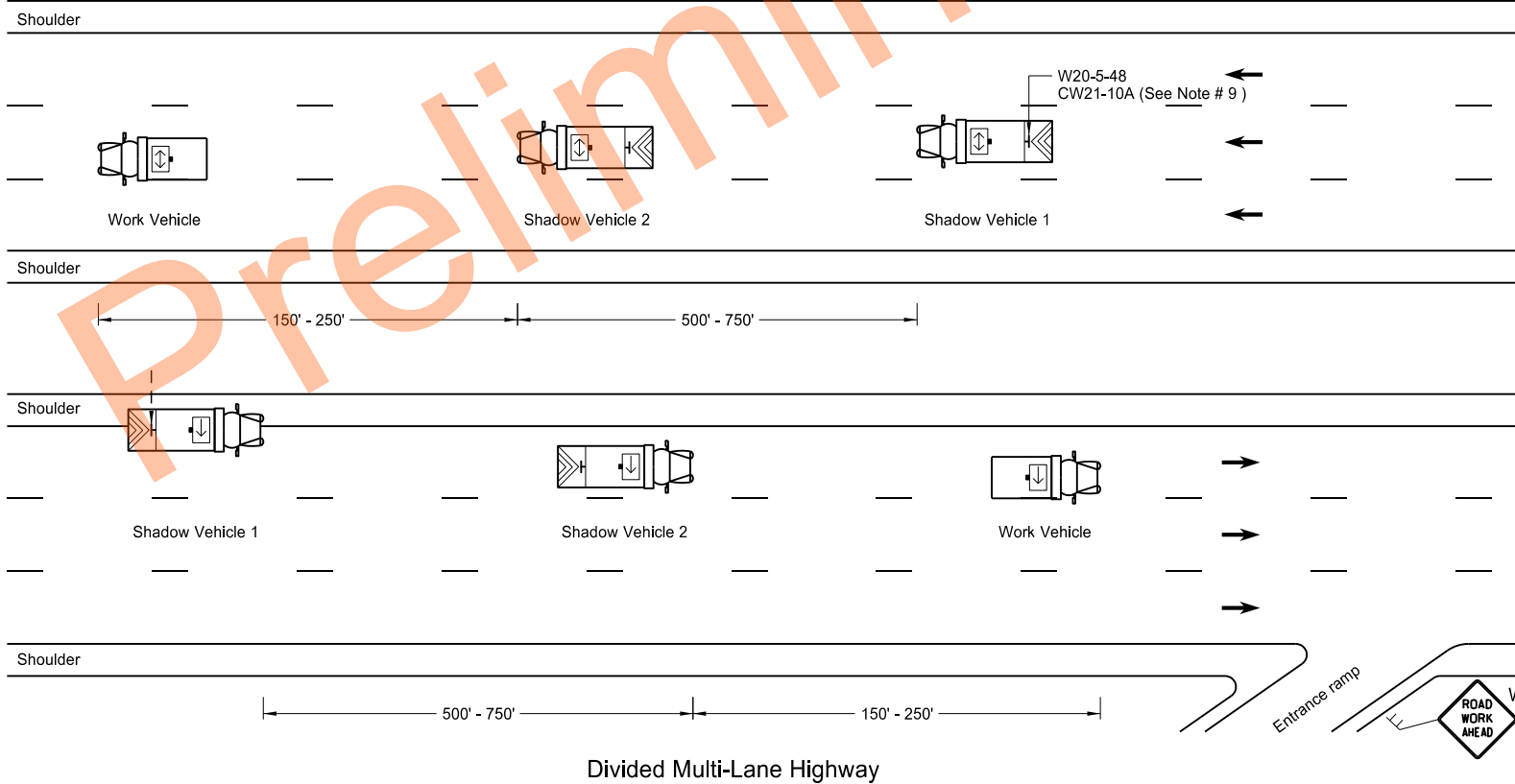
02/23/23

MOBILE OPERATION
(PAVEMENT MARKING)

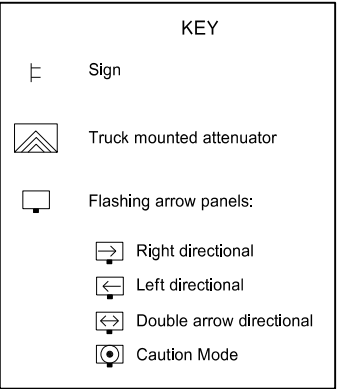
D-704-27



A = [Left] [Right] [Center]



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



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

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 11/08/19 and the original document is stored at the
North Dakota Department
of Transportation

Two-Lane Roadway Portable Rumble Strips

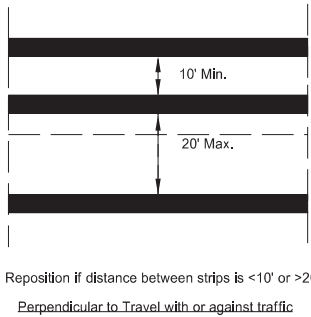
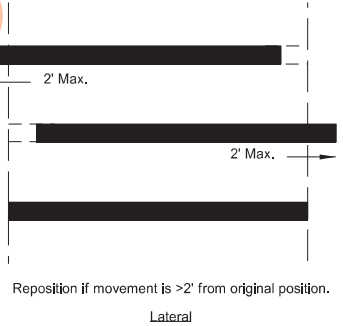
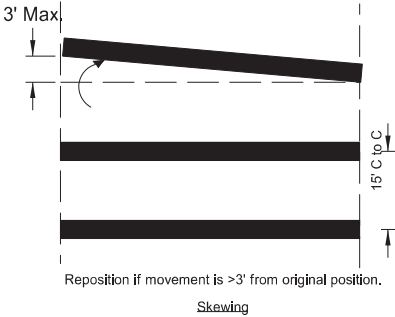
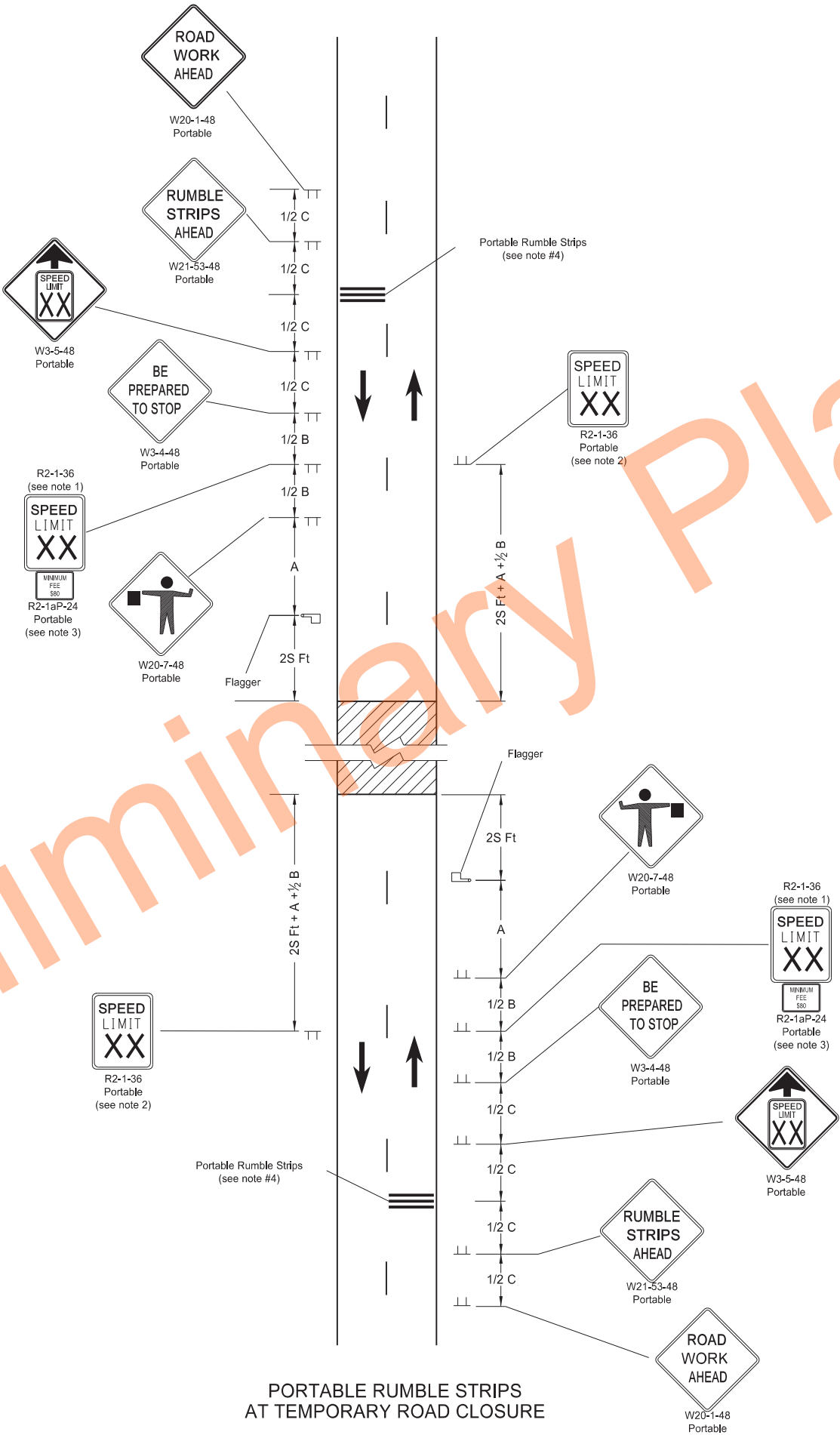
Work area

Flagger

Sign

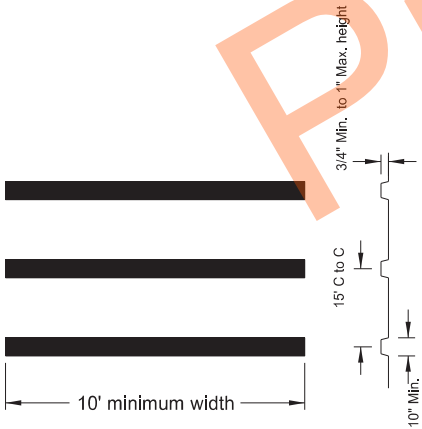
S = Numerical value of speed limit or 85th percentile.

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



PORTABLE RUMBLE STRIPS ARRAY TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

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



PORTABLE RUMBLE STRIPS ARRAY DETAIL

PORTABLE RUMBLE STRIPS AT TEMPORARY ROAD CLOSURE

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

02-22-22

REVISIONS

DATE03/07/23

CHANGEUse changed to min 45 mph.

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

03/07/23

D-704-37

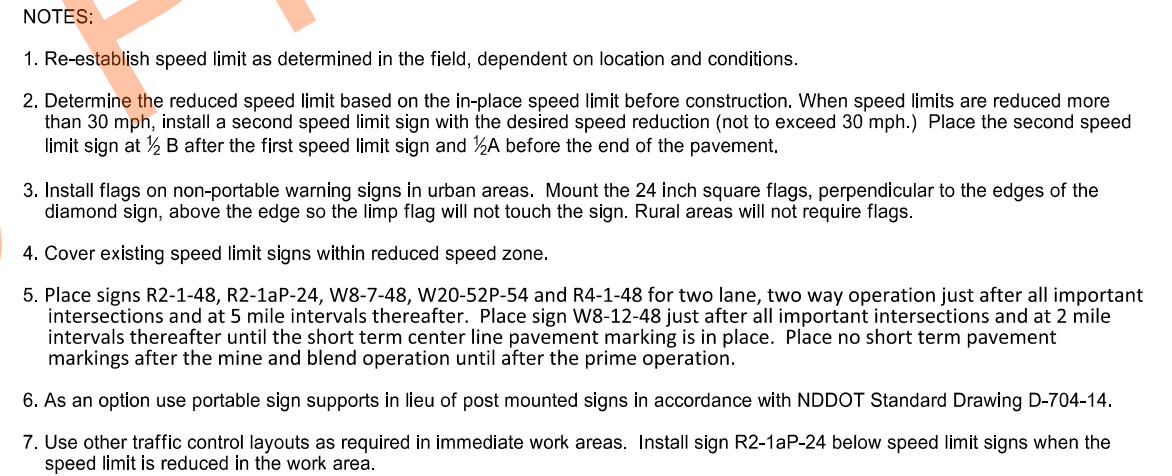


Diagram of a Four Lane Divided Roadway

The diagram illustrates the placement of various traffic signs on a four-lane divided roadway. The signs are categorized by their shape and color, and their placement is indicated by dimensions and labels.

Signs and Placement:

- NO CENTER LINE (W8-12-48):** Diamond-shaped sign, placed on the left side of the roadway.
- PAVEMENT ENDS (W8-3-48):** Diamond-shaped sign, placed on the left side of the roadway.
- SPEED LIMIT 50 (W3-5-48):** Rectangular sign, placed on the left side of the roadway.
- LOOSE GRAVEL (W8-7-48):** Diamond-shaped sign, placed on the left side of the roadway.
- SPEED LIMIT 70 (R2-1-48):** Rectangular sign, placed on the right side of the roadway.

Dimensions and Labels:

- 1/2 C:** Distance from the left edge of the roadway to the center line.
- C:** Distance from the center line to the first sign.
- B:** Distance from the first sign to the second sign.
- 1/2 A:** Distance from the second sign to the third sign.
- A:** Distance from the third sign to the fourth sign.
- 100' Min, 150' Max:** Distance from the fourth sign to the fifth sign.
- 1/2 A:** Distance from the fifth sign to the right edge of the roadway.

Table of Revisions:

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-26-2012	
REVISIONS	
DATE	CHANGE
09-17-15	Spec Book Updates
09-27-17	Update to active voice & revised sign numbers
11-01-19	No Center Line sign

Additional Information:

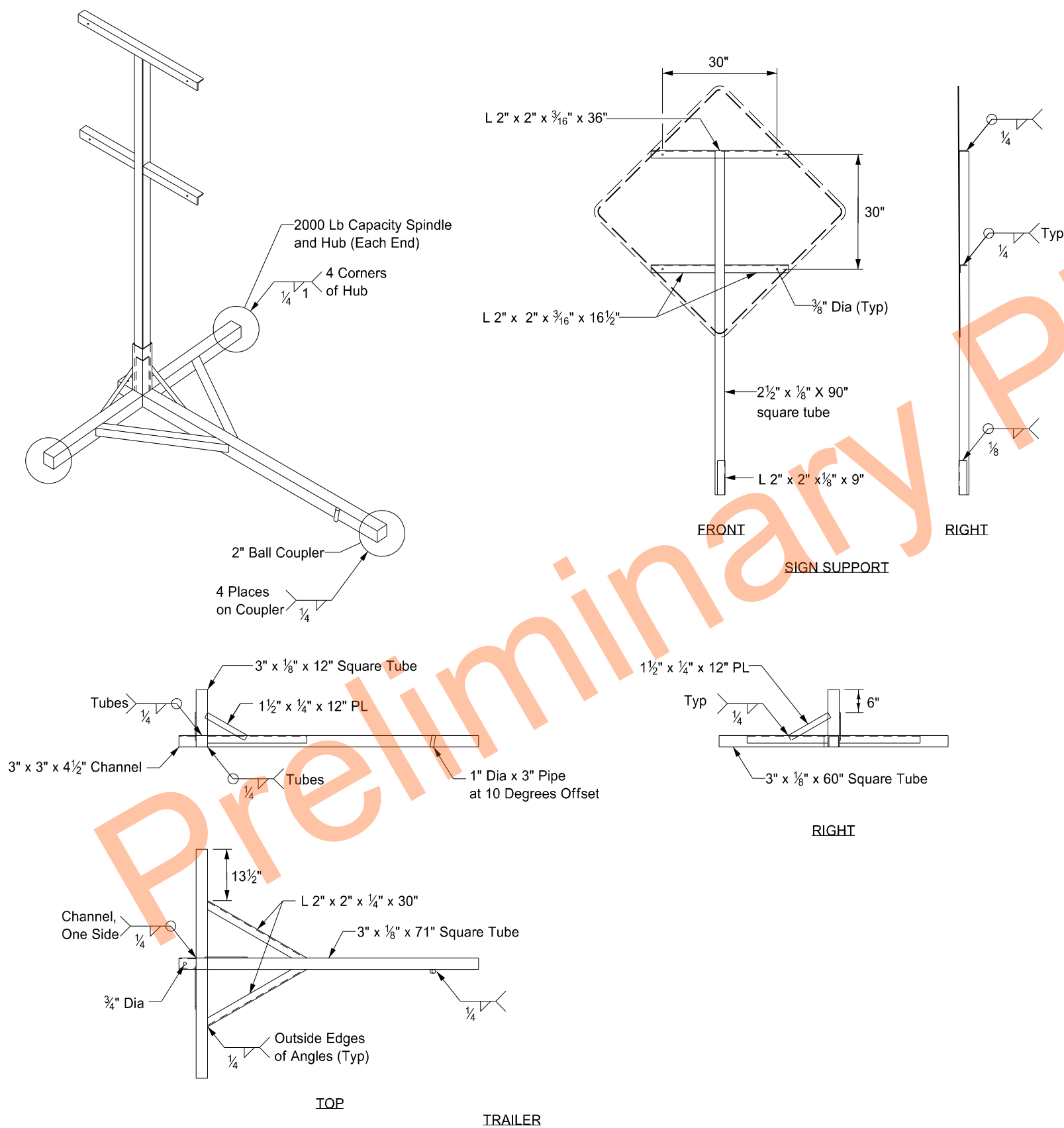
- This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-26-2012	
REVISIONS	
DATE	CHANGE
09-17-15	Spec Book Updates
09-27-17	Update to active voice & revised sign numbers
11-01-19	No Center Line sign

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



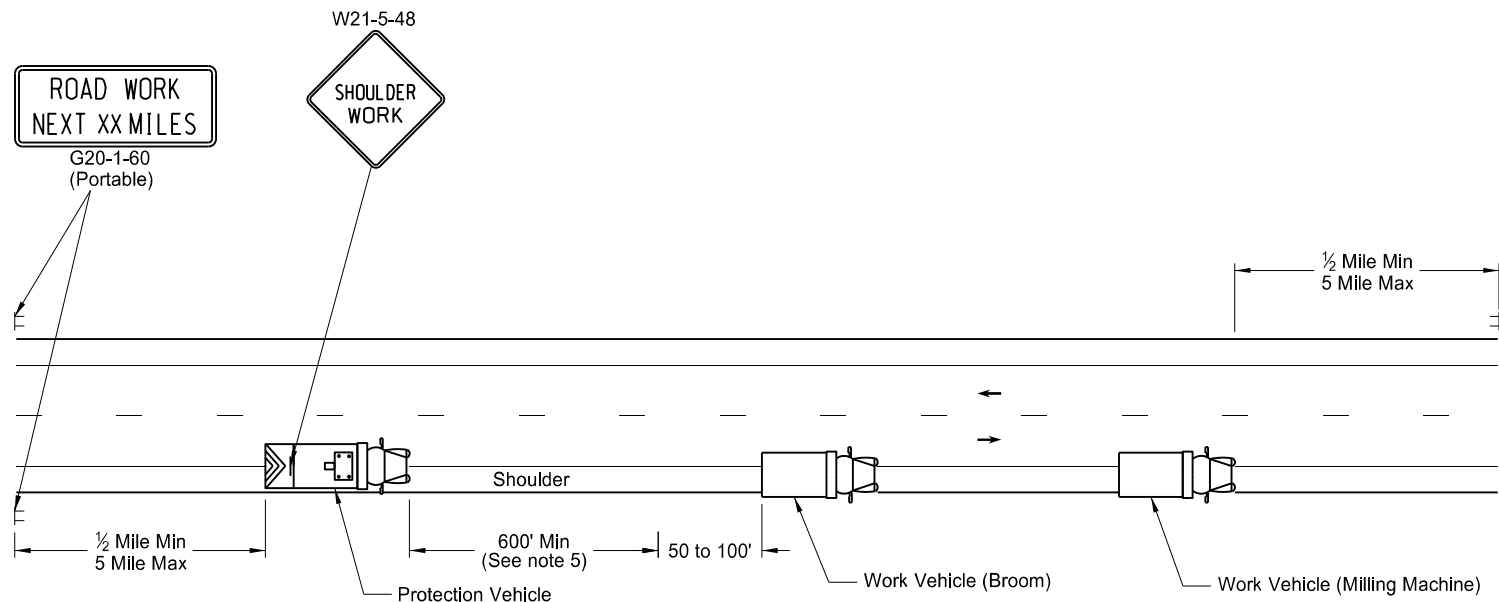
- Notes:
- 1. Maximum 250 pound weight of assembly.
 - 2. Use a 14" wheel and tire.
 - 3. Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
 - 4. Other NCHRP 350 or MASH crash tested assemblies are acceptable.

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

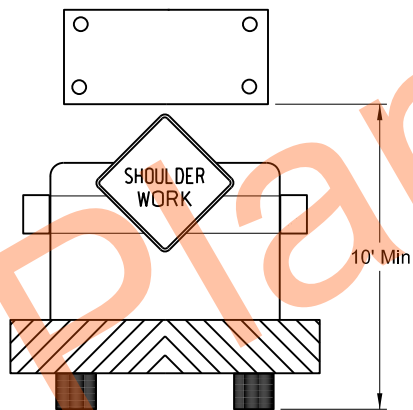
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

MOBILE OPERATION
Grinding Shoulder Rumble Strips

D-704-56

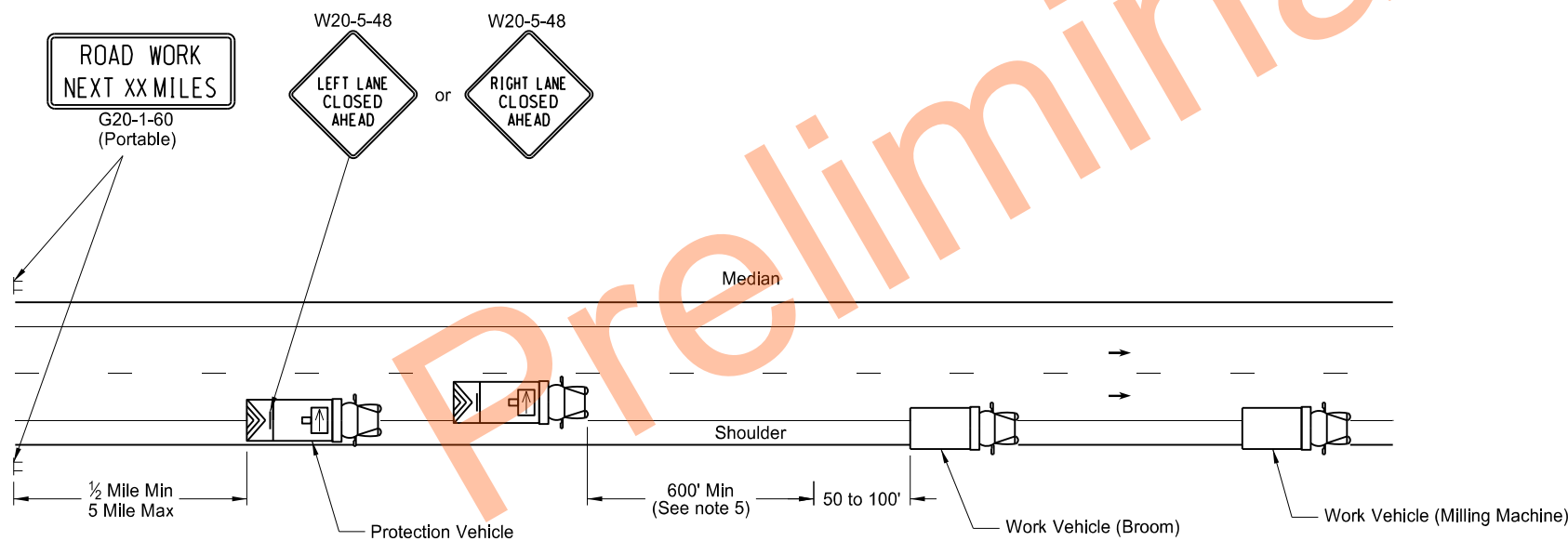


TWO LANE - TWO WAY ROADWAY

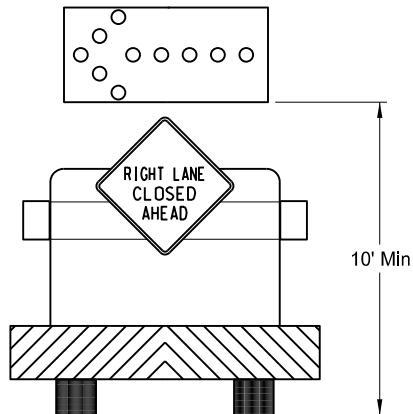


TWO LANE - TWO WAY ROADWAY
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

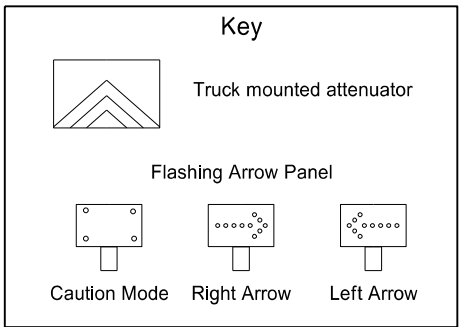
- Notes:
1. Provide truck mounted attenuators on additional vehicles in the convoy, at no additional cost.
 2. Provide rotating, flashing, oscillating, or strobe lights on vehicles.
 3. Provide Type B or Type C flashing arrow panels that are controlled from inside the vehicle.
 4. Provide two - way electronic communication capability in each vehicle.
 5. Vary vehicle spacing between the protection vehicle and work vehicle depending on sight distance restrictions. Keep the spacing of the convoy vehicles such that motorists approaching the work convoy can see the protection vehicle in time to slow down and safely pass the work vehicles.
 6. Move advance Road Work Ahead signs as the work area moves through the construction zone.



INTERSTATE & 4 LANE DIVIDED HIGHWAY



INTERSTATE & 4 LANE DIVIDED HIGHWAY
Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode

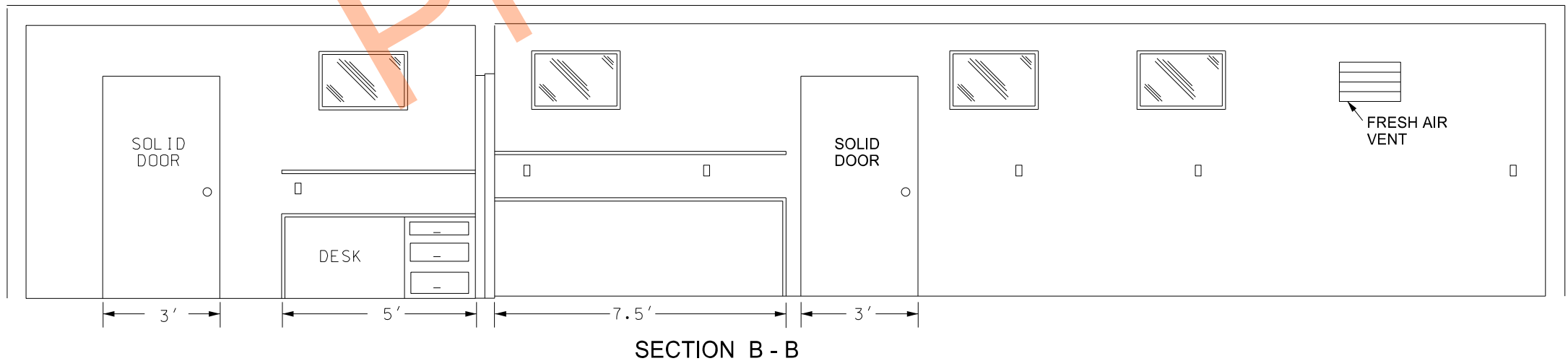
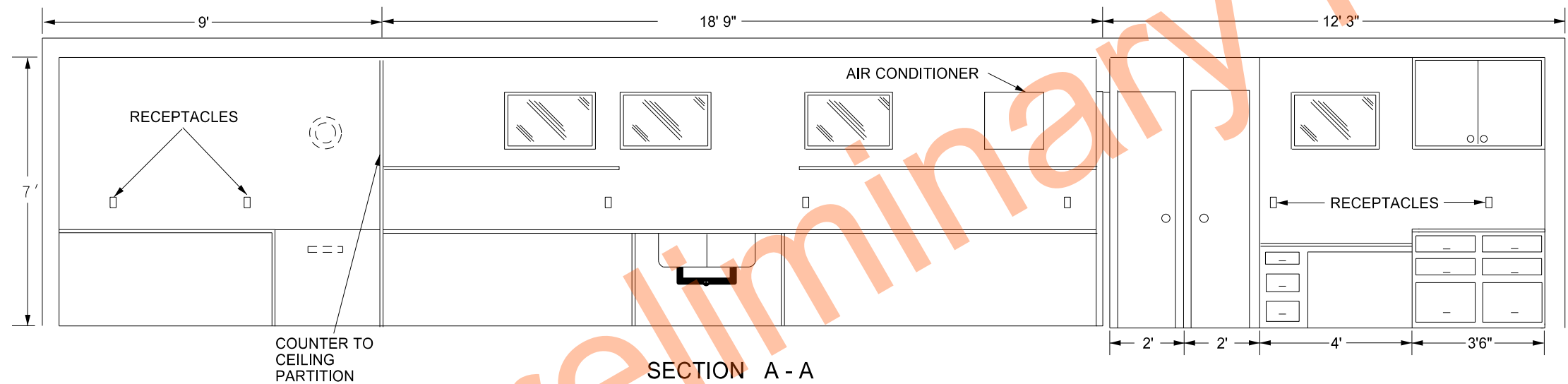
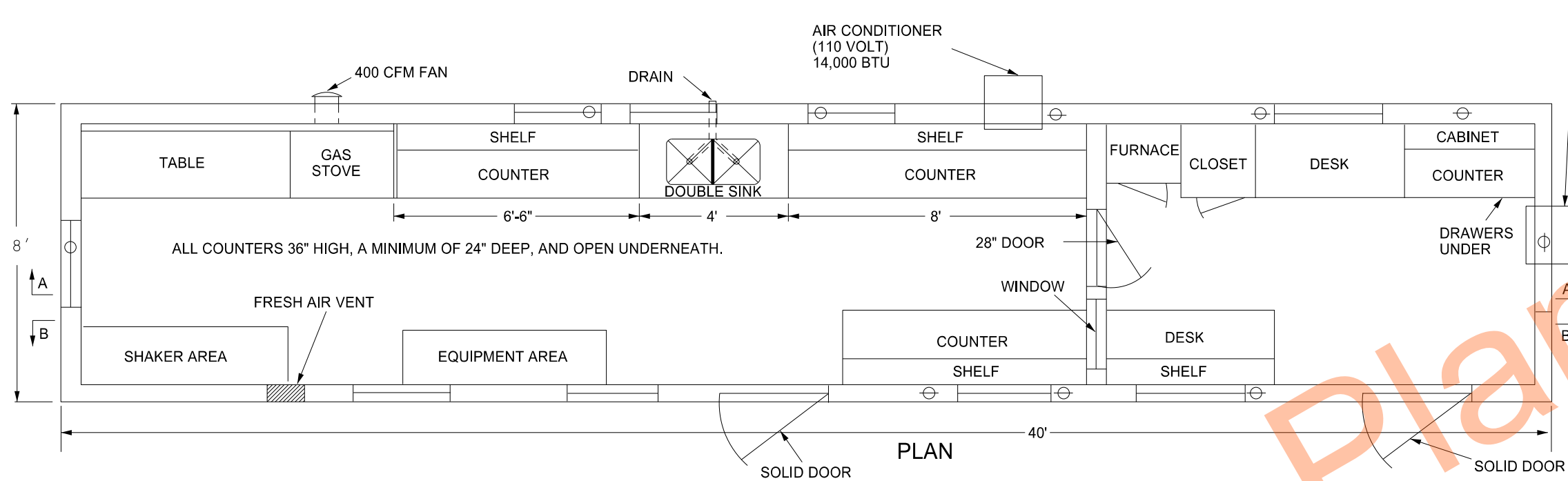


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & signs
10-03-19	New Design Engineer PE Stamp

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BITUMINOUS LABORATORY

D-706-1



Provide a laboratory with the following:

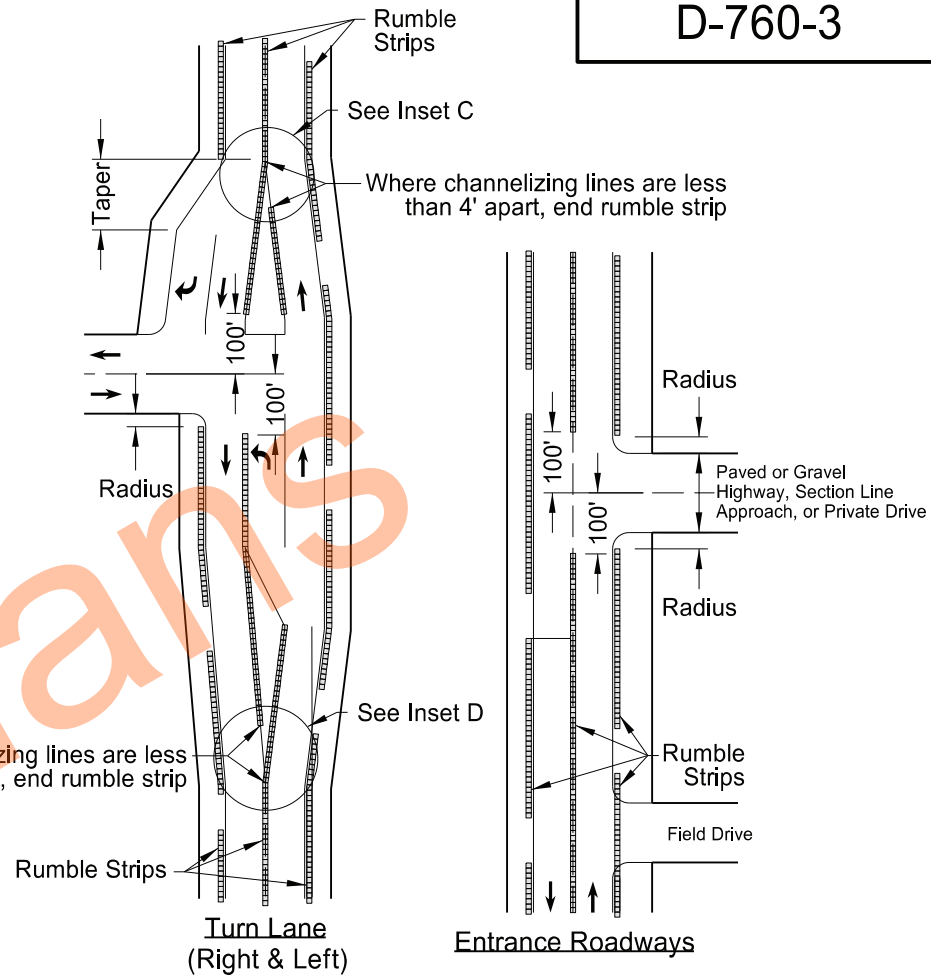
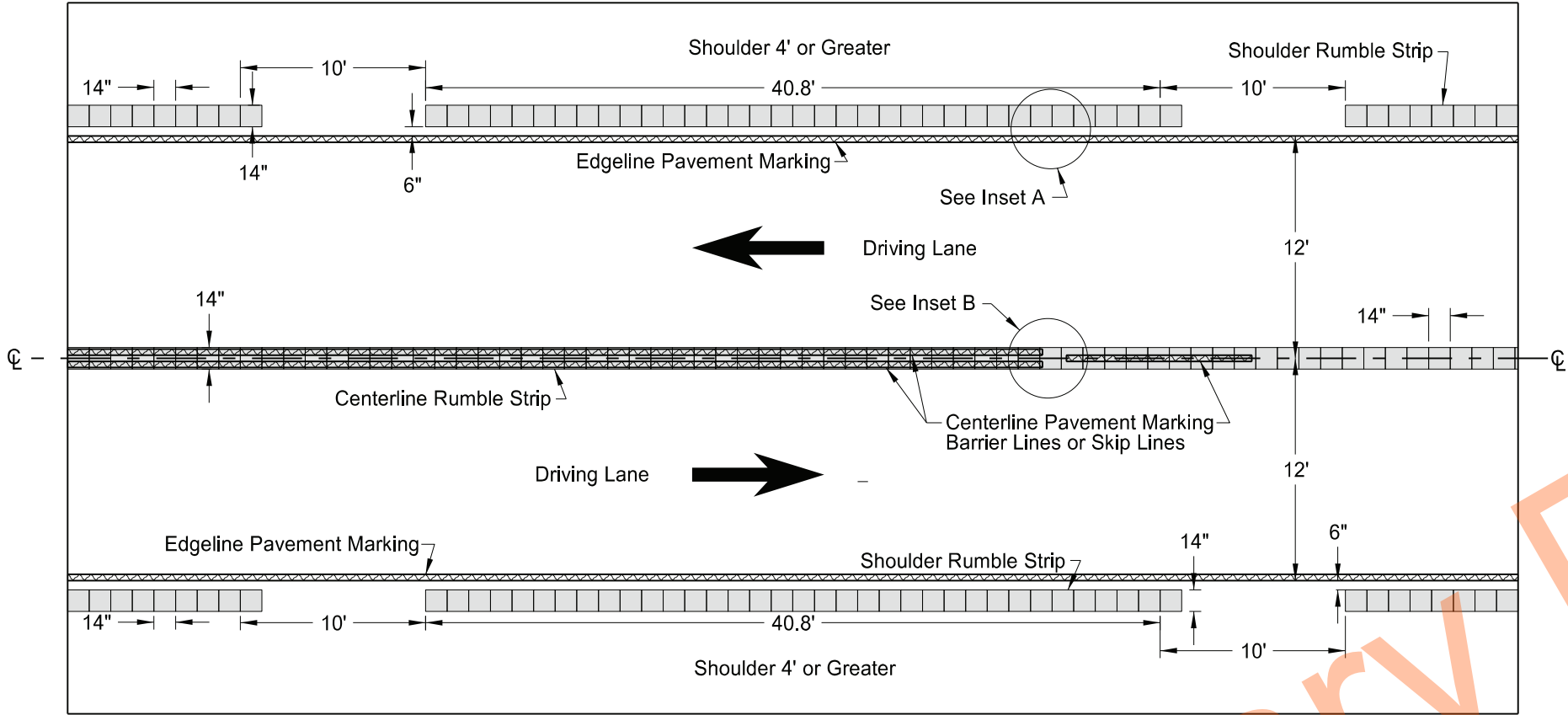
1. A 1'x1' shelf at 36" above the regular countertop.
2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of 1/2 inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.
08-27-19	New Design Engineer PE Stamp

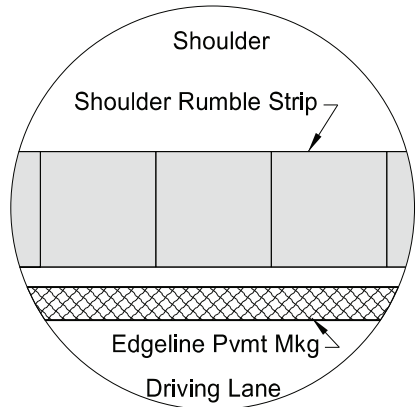
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RUMBLE STRIPS UNDIVIDED HIGHWAYS (SHOULDERS 4' OR GREATER)

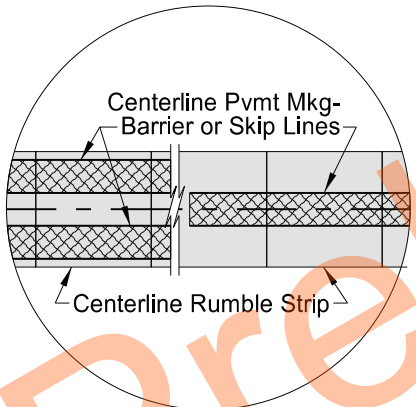
D-760-3



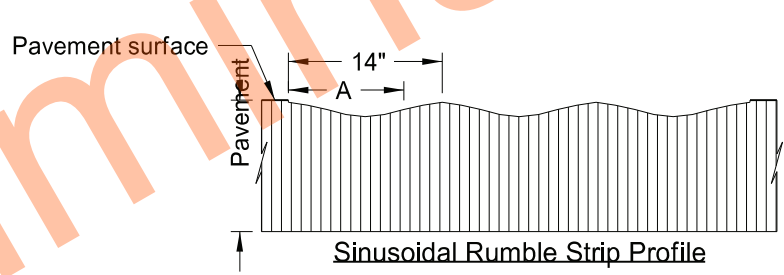
Undivided Highways (Shoulders 4' or Greater)



Inset A - Shoulder Rumble Strip
(Layout for opposite shoulder reversed)

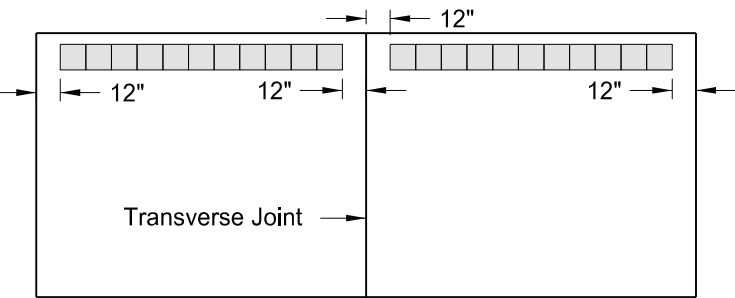


Inset B - Centerline Rumble Strip

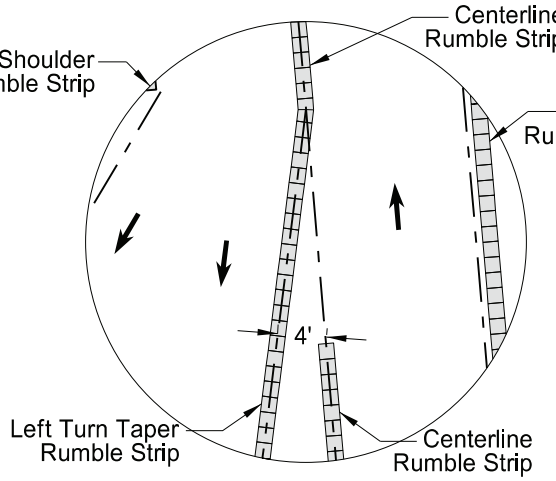


Milling Depths		
Location A (in)	MIL	Depth in
0	62.5	1/16
1 3/4	156	5/32
3 1/2	281	9/32
5 1/4	438	7/16
7	500	1/2
8 3/4	438	7/16
10 1/2	281	9/32
12 1/4	156	5/32
14	62.5	1/16

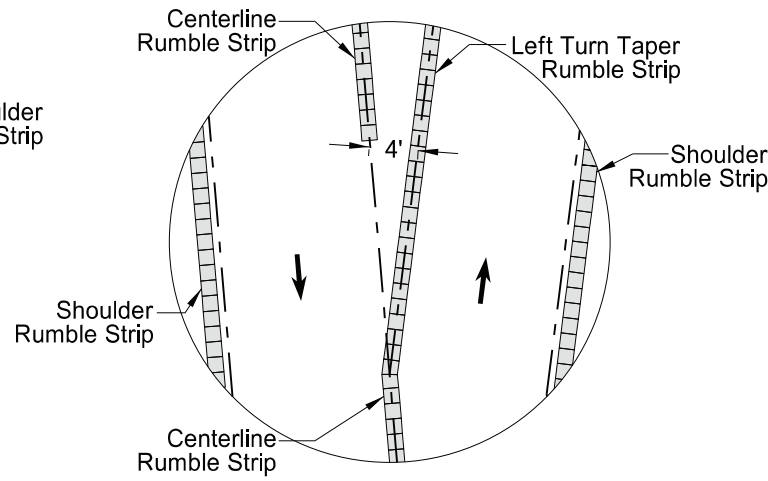
- NOTES:
- 1) Discontinue shoulder rumble strips through the entire length of right turn lanes and tapers, and at the radius of paved or gravel highways, section line approaches, or private drives.
 - 2) Discontinue centerline rumble strips 100' before and after paved or gravel highways, section line approaches, or private drives. Place rumble strips at left turn lanes as shown below.
 - 3) No additional quantity provided for centerline rumble strips on left turn tapers. Include all costs for centerline rumble strips on left turn tapers in the price bid for "Sinusoidal Rumble Strip - Asphalt Centerline" or "Sinusoidal Rumble Strip - Concrete Centerline".



Discontinue rumble strip approx. 12" on both sides of PCC transverse joint



Inset C



Inset D

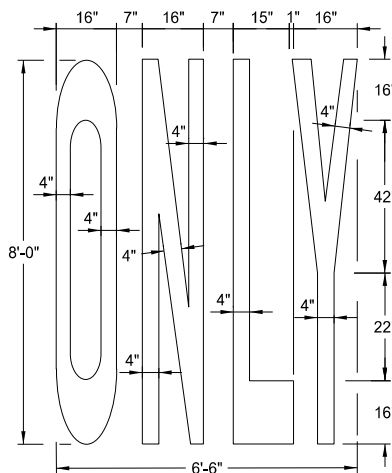
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-08-11	Revised Notes and D-760-3.
10-25-19	Added missing dimensions.
11-16-21	Changed turn lane rumble layouts.
3-07-23	Added Note 3.
5-26-23	Made rumble strips sinusoidal.



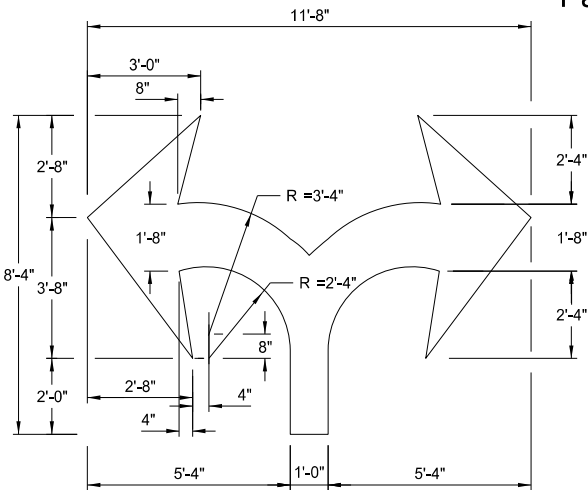
05/26/23

Pavement Marking Message Details

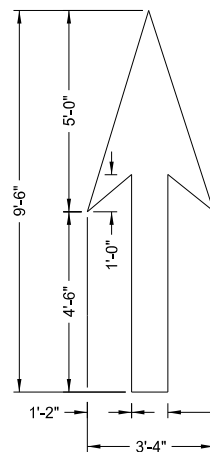
D-762-1



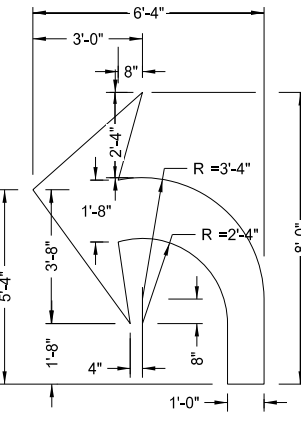
22 S. F.



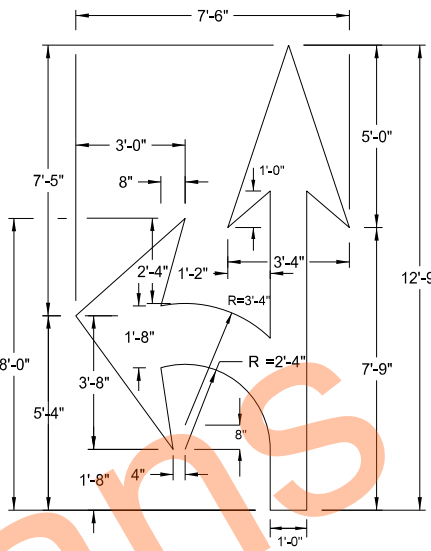
29 S. F.



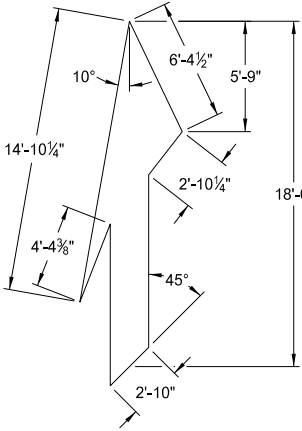
12 S. F.



16 S. F.

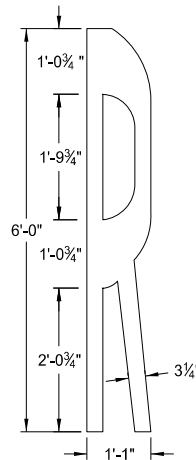


27 S. F.

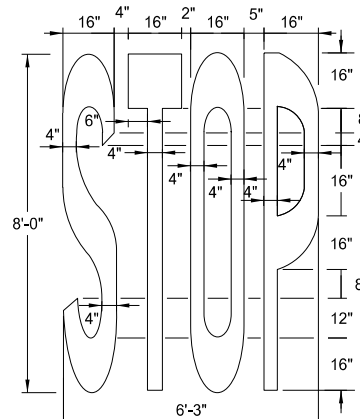


41 S. F.

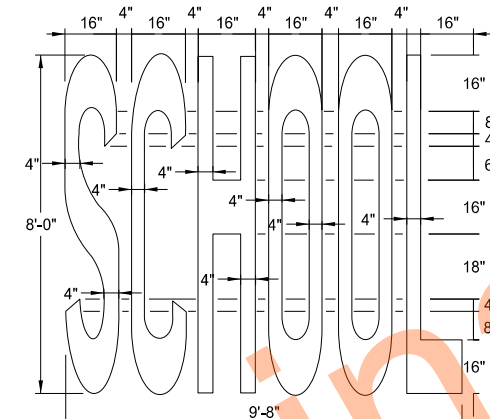
Note: Rotate merge arrow 20° from edge of roadway.



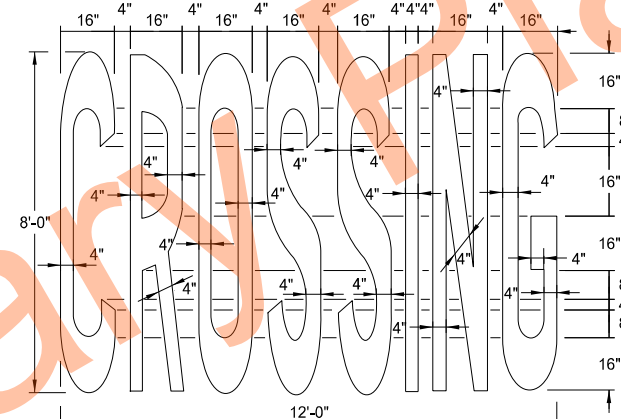
4 S. F.



22 S. F.



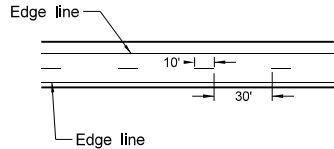
34.5 S. F.



46 S. F.

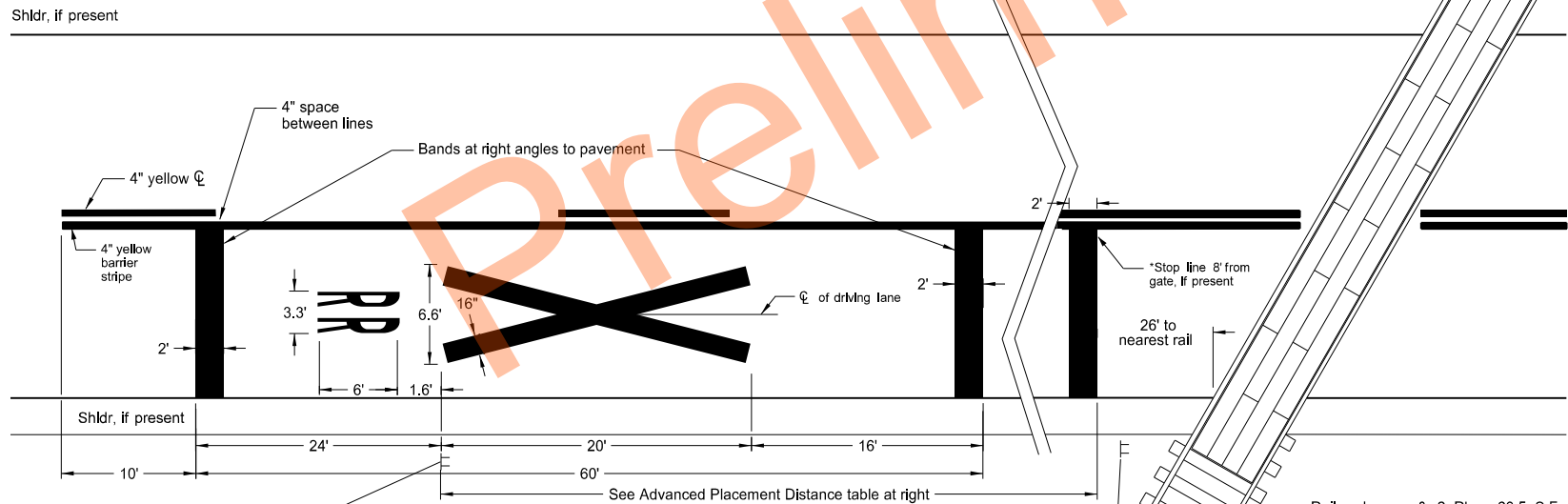
Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table



Centerline Pavement Marking Skip Spacing Detail

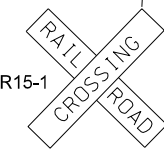
Advance Placement Distance for Railroad Warning Signs	
Posted or 85th Percentile Speed	Advance Distance
20 mph	min. 100 ft
25 mph	min. 100 ft
30 mph	min. 100 ft
35 mph	min. 100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft



See Standard Drawing D-754-81

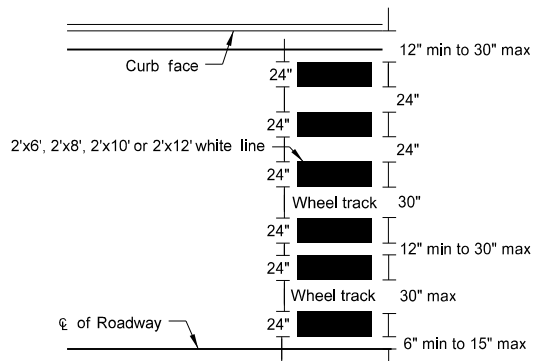
Notes:
Mark a three lane roadway with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, extend the transverse bands across all approach lanes, and use individual R X R symbols in each approach lane.

See plans for correct message. Use white pavement markings unless noted otherwise.



R15-1

*Stop Bar nearest crossing - 8' from gate or 26' to nearest rail - Use whichever is further from tracks.

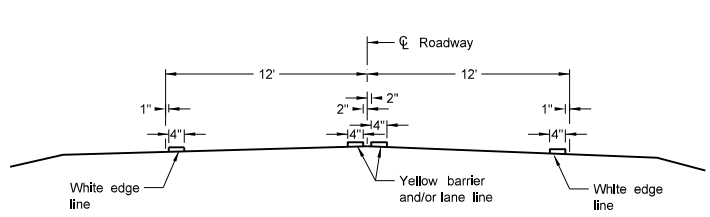


Continental Crosswalk Detail

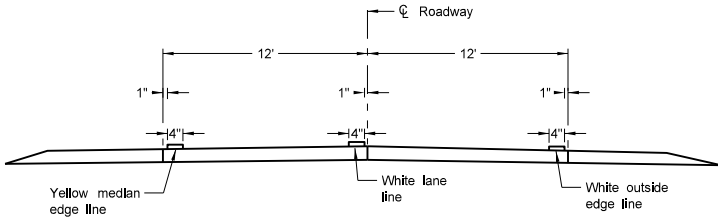
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-6-11	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
01-28-2020	Revised min Stop Bar distance to rail.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE-4683,
on 1/28/2020 and the original document is stored at the
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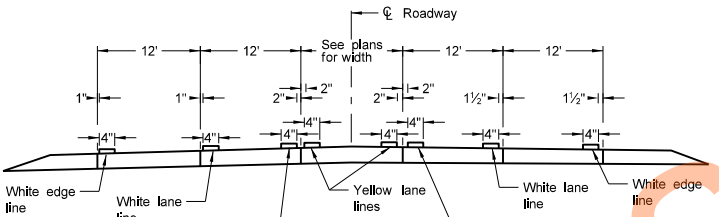
NOTES:
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.



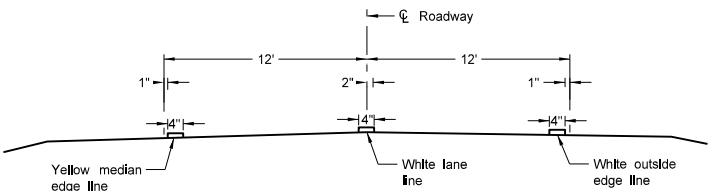
Two Lane Two Way
RURAL ROADWAY



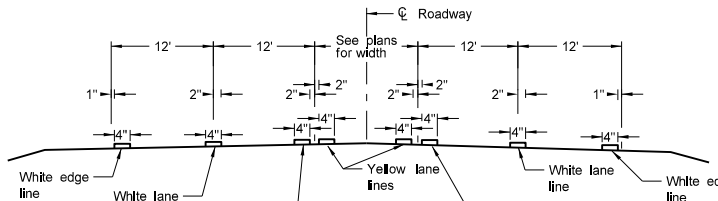
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



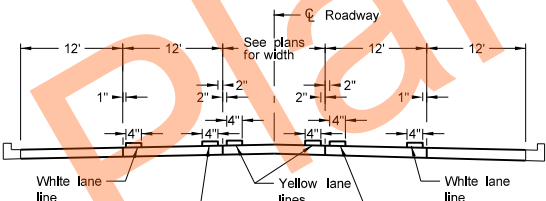
RURAL FIVE LANE ROADWAY
Concrete Section



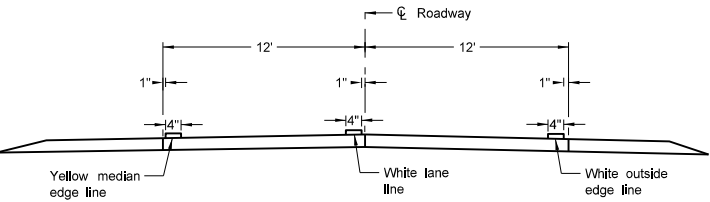
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



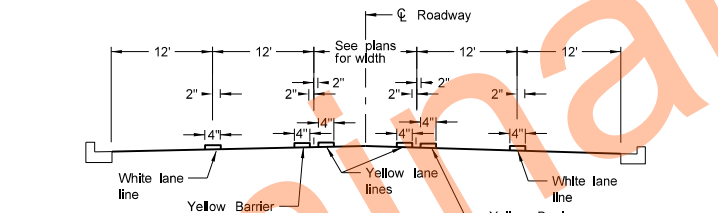
RURAL FIVE LANE ROADWAY
Asphalt Section



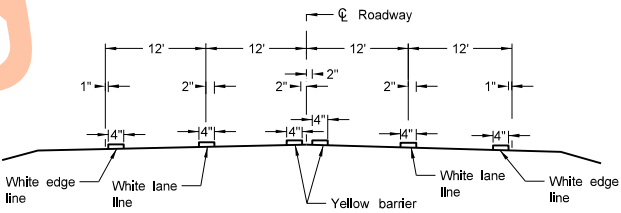
URBAN FIVE LANE SECTION
Concrete Section



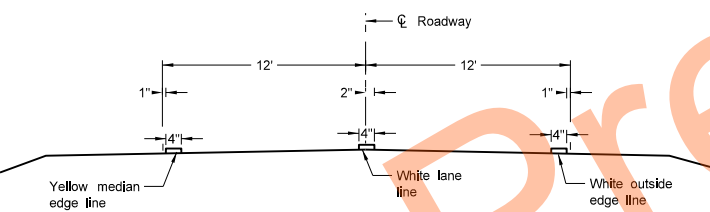
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



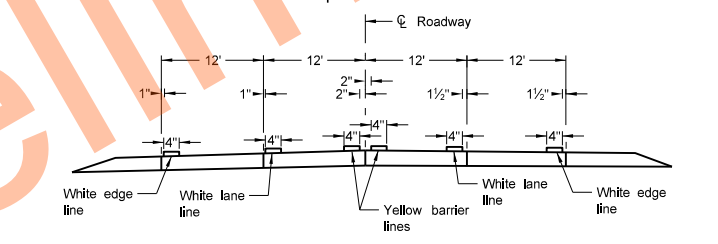
URBAN FIVE LANE SECTION
Asphalt Section



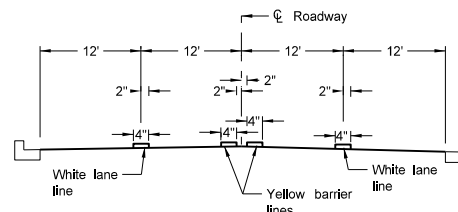
RURAL FOUR LANE ROADWAY
Asphalt Section



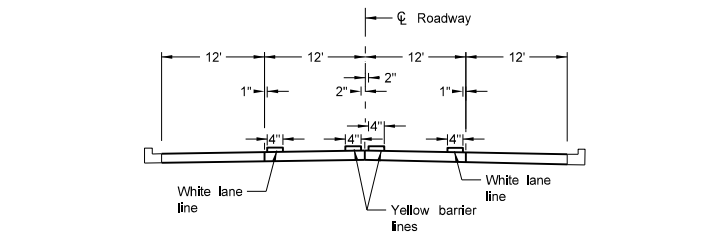
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



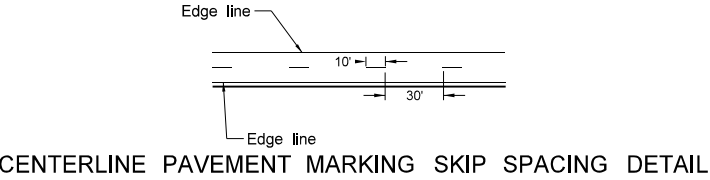
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section

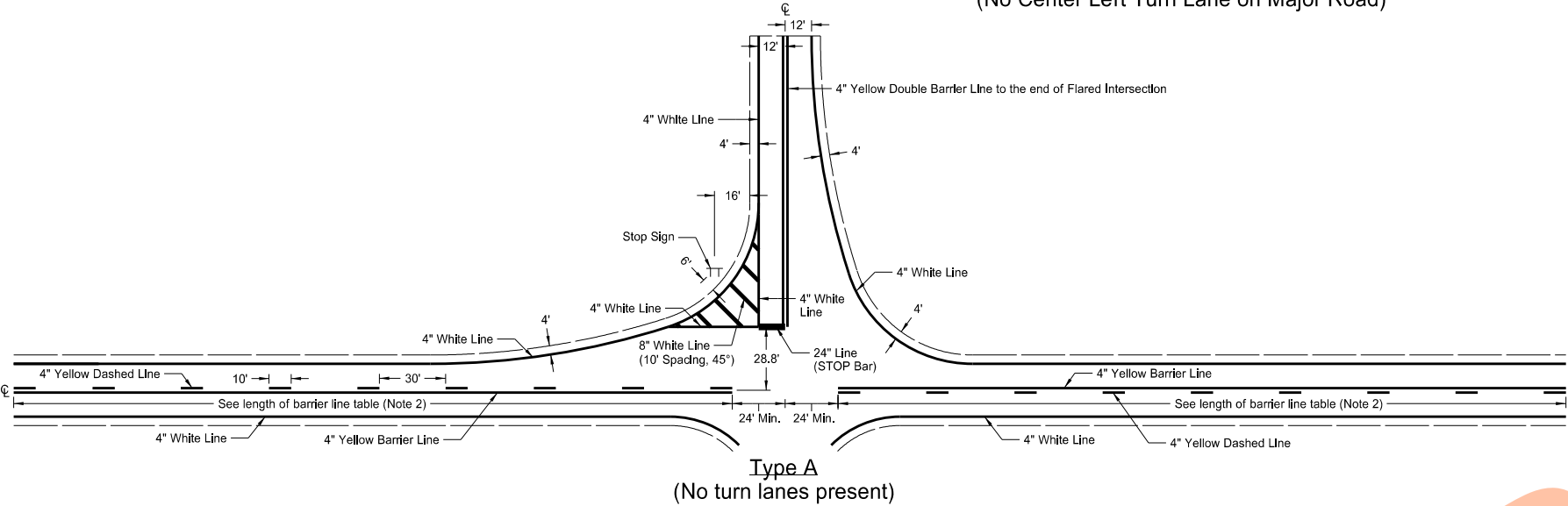


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE-4683,
on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION
(No Center Left Turn Lane on Major Road)

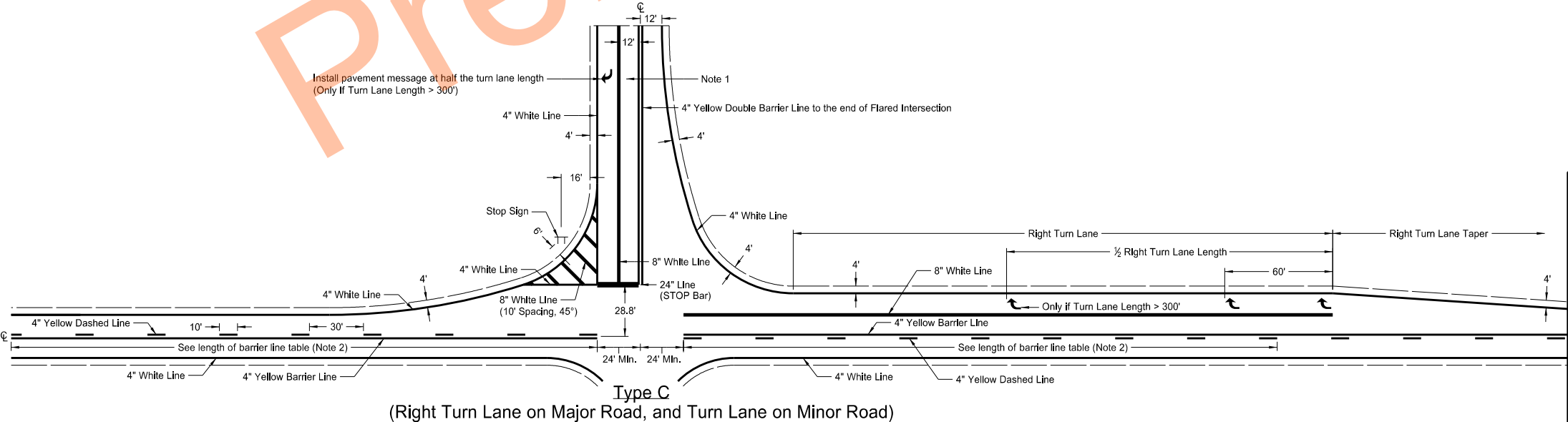
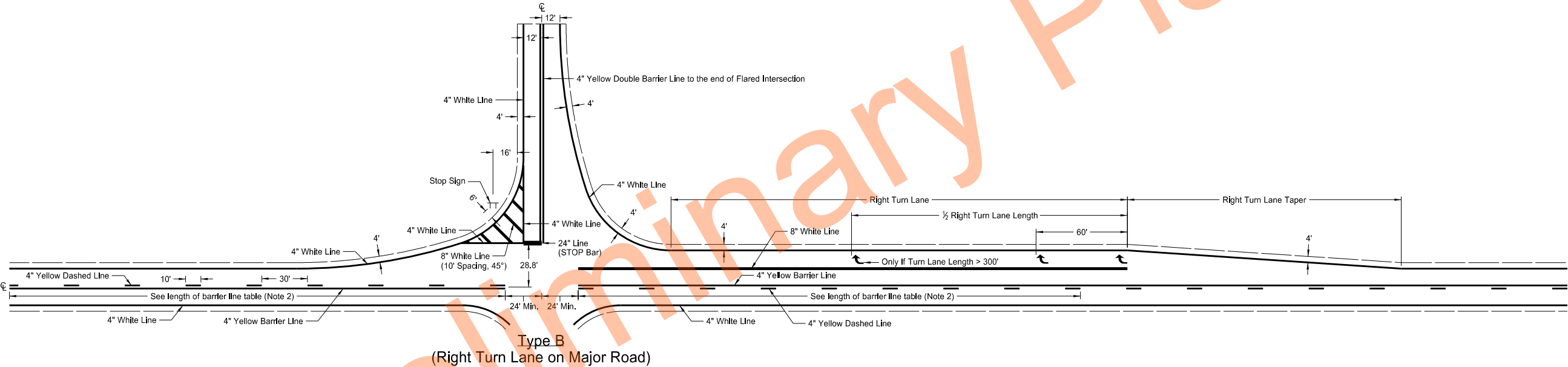
D-762-5



Notes

- 1. At "T" intersections (3-leg), additionally install left turn pavement marking message arrow.
- 2. The barrier lines have variable distances dependent on speed limit. Obtain barrier line length from table below (stopping sight distance.)

Table for Length of Barrier Line									
Speed Limit (mph)	30	35	40	45	50	55	60	65	70
Minimum Length	200'	250'	305'	360'	425'	495'	570'	645'	730'



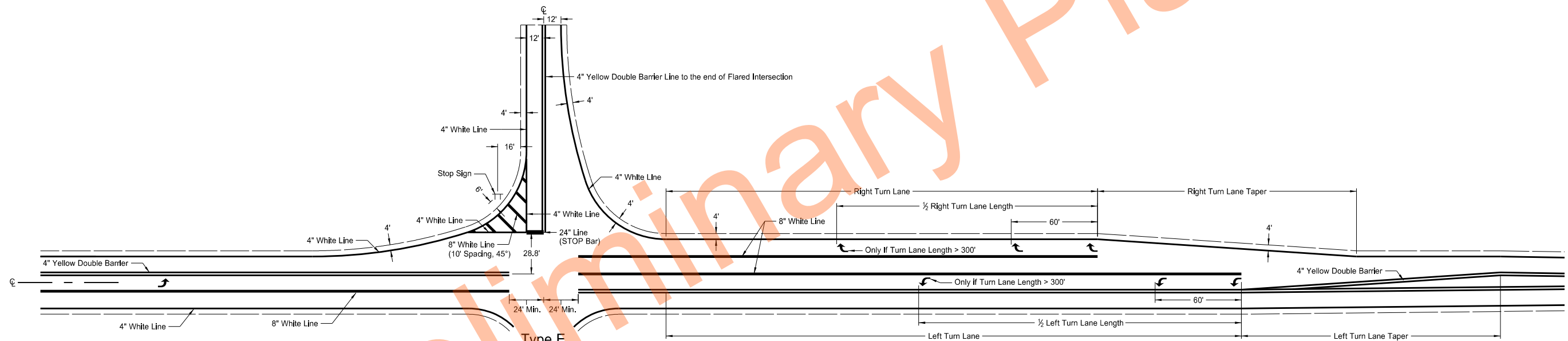
- 4" Marking
- 8" Marking
- 24" Marking

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17	Updated note & dimensioning. Corrected pivot mkg placement. New Design Engineer PE Stamp.
8-30-18	
8-27-19	

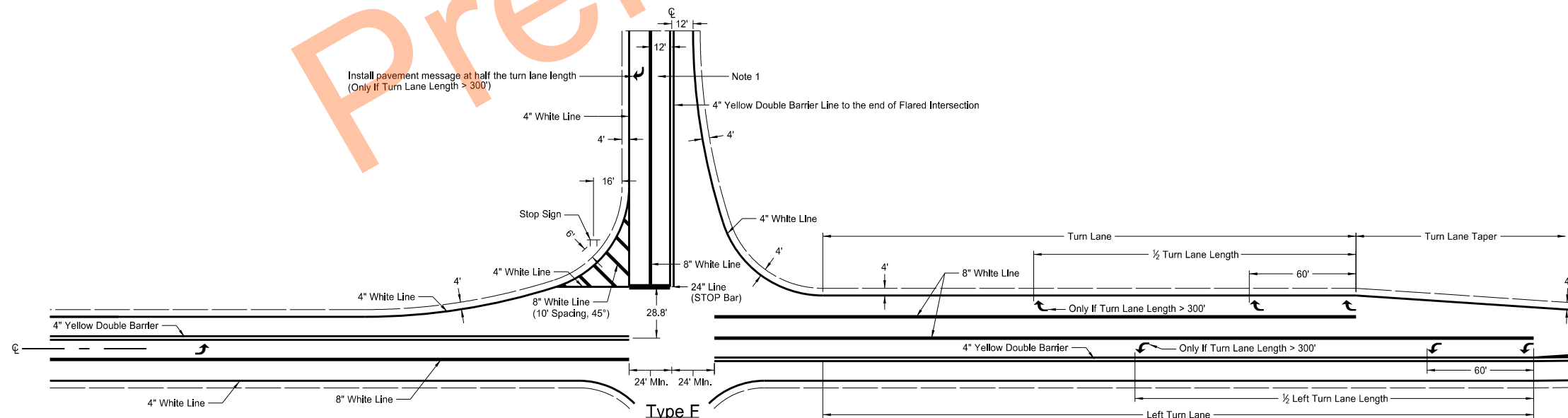
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-
- Notes**
- At "T" intersections (3-leg), additionally install left pavement marking message arrow.

Type D
(Center Left Turn Lane on Major Road)



Type E
(Center Left & Right Turn Lane on Major Road)

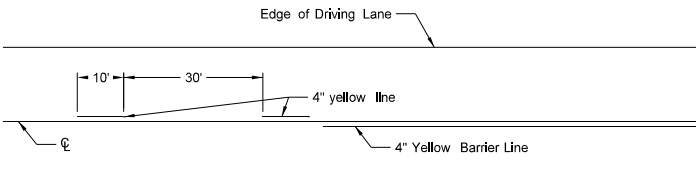


(Center Left & Right Turn Lane on Major road, and Turn Lane on Minor Road)

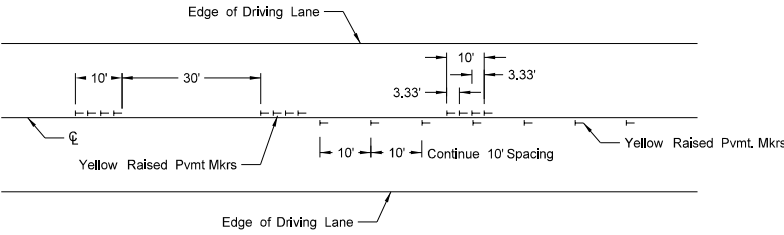
 4" Marking
 8" Marking
 24" Marking

NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17 8-27-19	Updated dimensioning. New Design Engineer PE Stamp.

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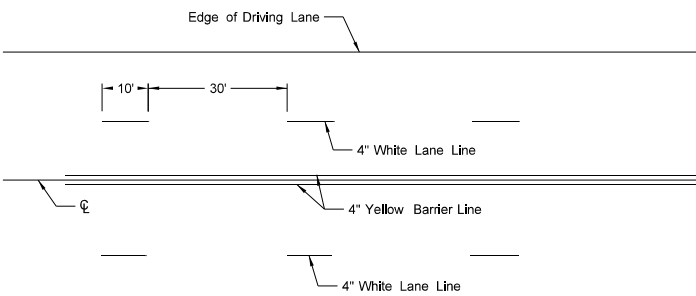


Painted or Tape Lines

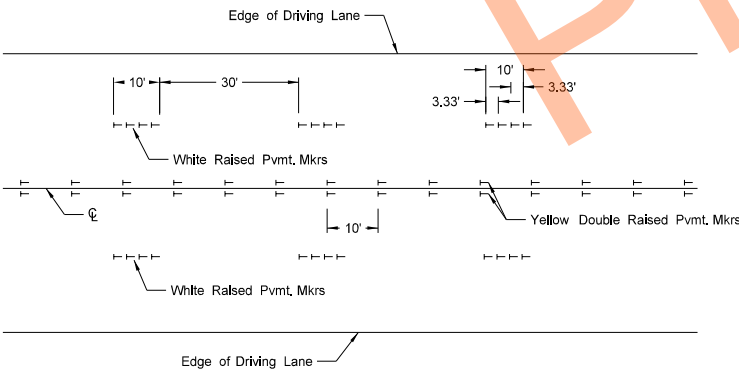


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

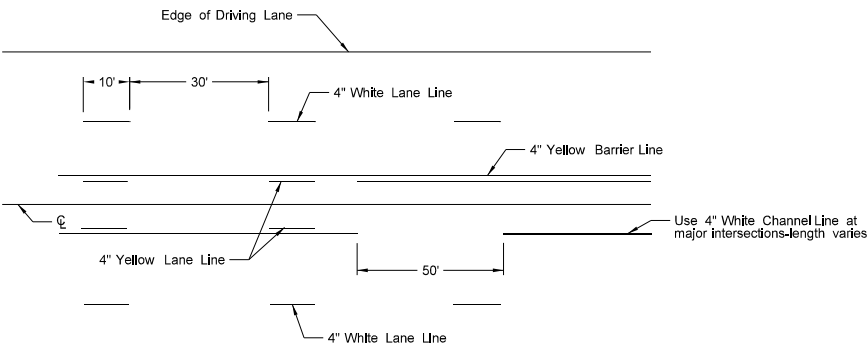


Painted or Tape Lines

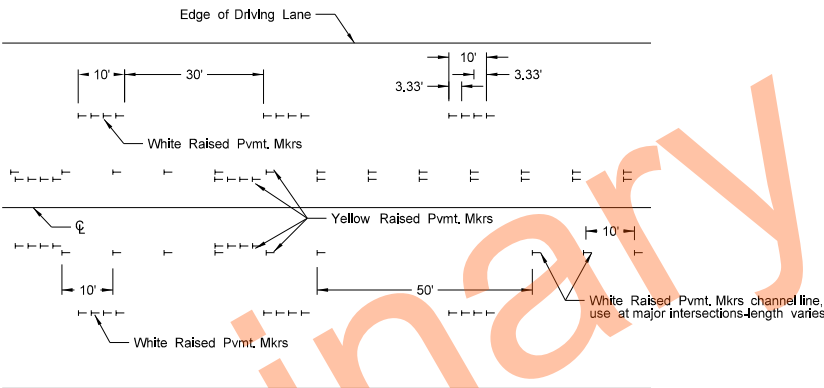


Raised Pavement Markers

FOUR LANE ROADWAY

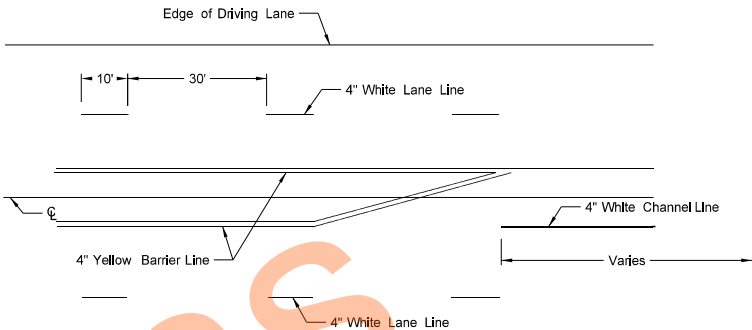


Painted or Tape Lines

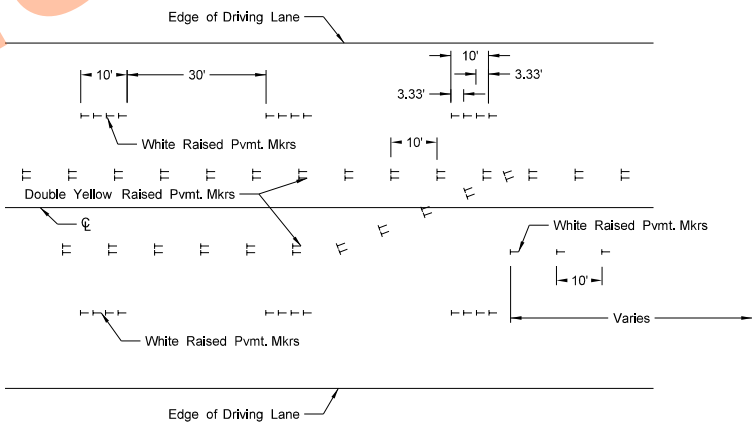


Raised Pavement Markers

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.

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.

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