

DESIGN DATA						
Traffic		Average Daily				
Current	2020	Pass:	3,210	Trucks:	1,695	Total: 4,905
Forecast	2040	Pass:	4,335	Trucks:	2,190	Total: 6,525
Clear Zone Distance:				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

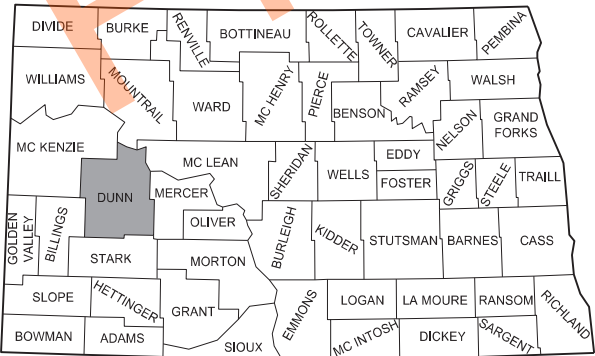
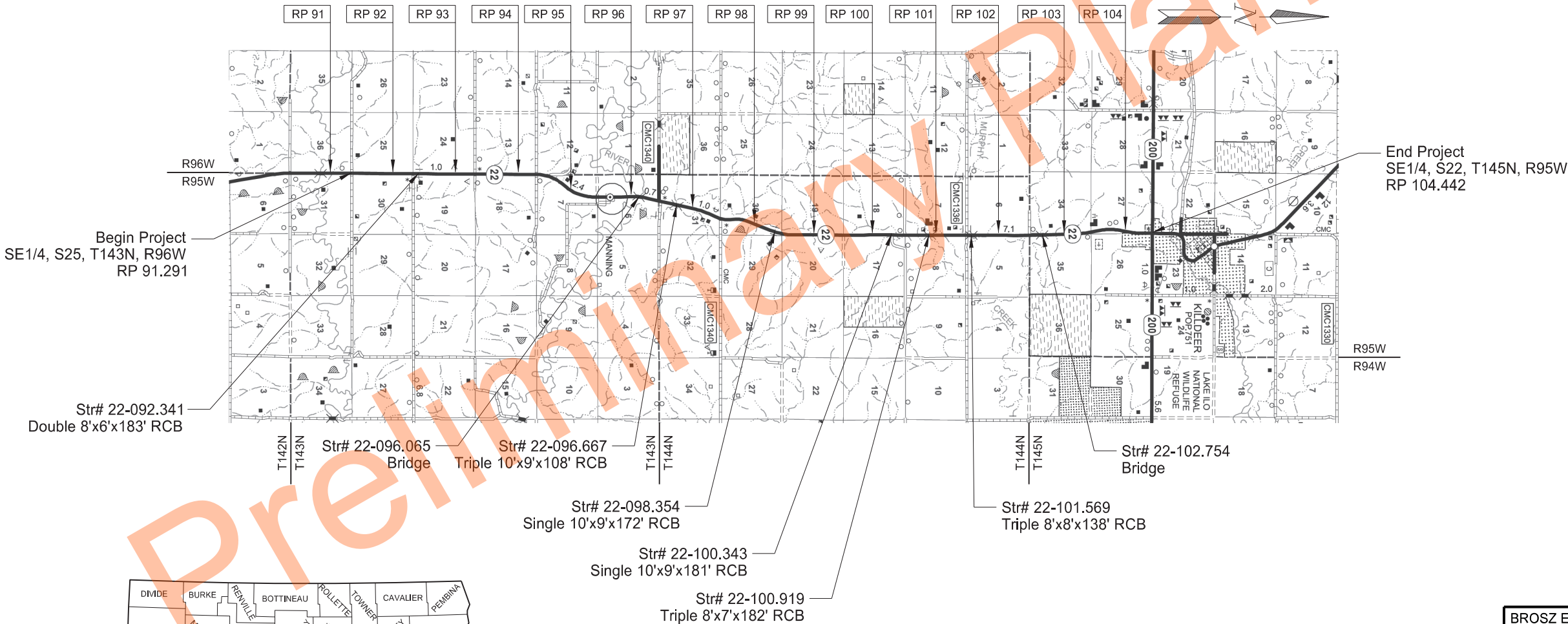
XA-SS-5-022(141)091

Dunn County
From 17th St SW to Jct ND 200

3" HMA Overlay, ADA Curb Ramps,
Erosion Repair, Structure Repairs, Pavement Markings

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	23545	1	1
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(141)091	13.15	13.15



STATE COUNTY MAP

DESIGNER Lucas Doerr, PE
DESIGNER Ryan Kleppinger
DESIGNER Ryan Mlekoday

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Kirk Hoff
11/18/24

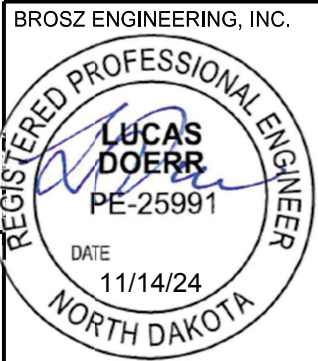
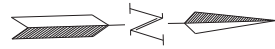
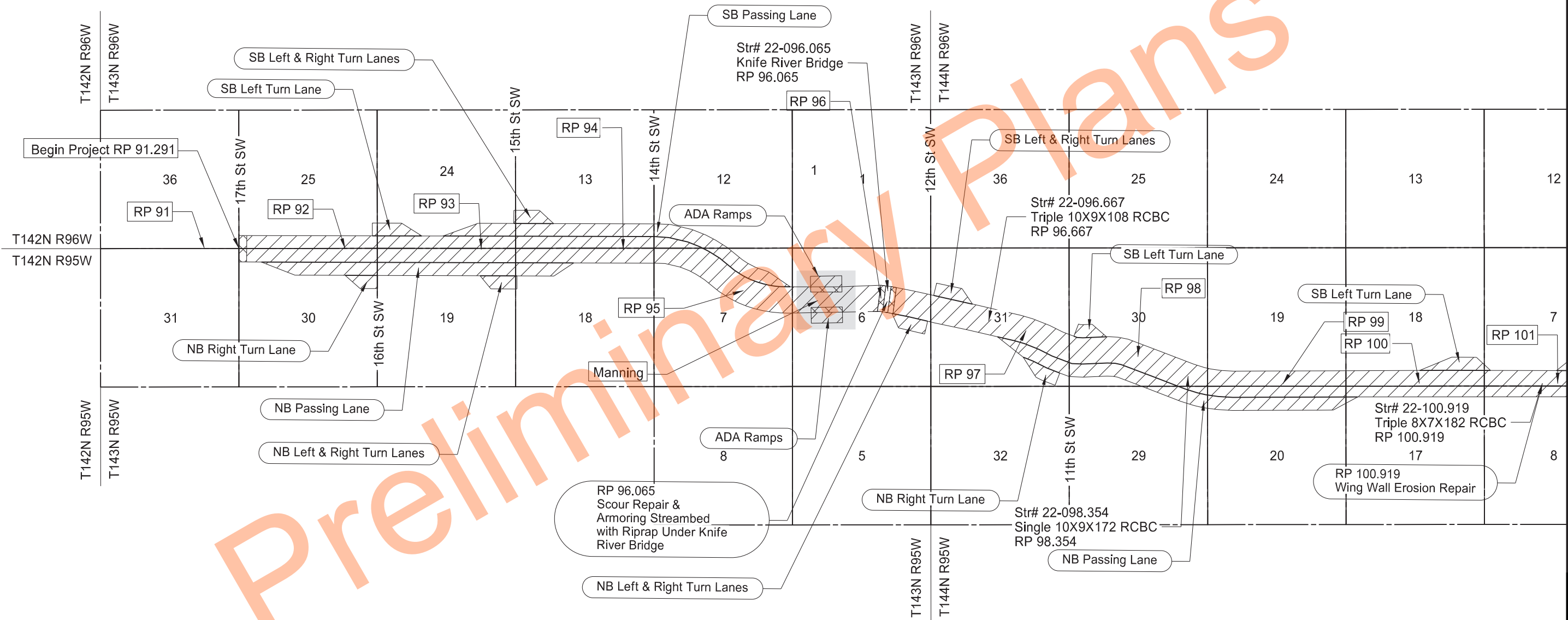


TABLE OF CONTENTS								
					STATE	PROJECT NO.	SECTION NO.	SHEET NO.
					ND	XA-SS-5-022(141)091	2	1
PLAN SECTIONS			LIST OF STANDARD DRAWINGS					
Section	Page(s)	Description	Number	Description				
1	1	Title Sheet	D-101-1, 2,3,4	NDDOT Abbreviations				
2	1	Table of Contents	D-101-10	NDDOT Utility Company and Organization Abbreviations				
4	1 - 2	Scope of Work	D-101-20, 21	Line Styles				
6	1 - 3	Notes	D-101-30, 31,32,33	Symbols				
6	4	Environmental Notes	D-101-40	Cross Section Legend				
8	1 - 2	Quantities	D-261-1	Erosion Control - Fiber Roll Placement Details				
10	1 - 3	Basis of Estimate	D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube				
20	1 - 8	General Details	D-704-8	Breakaway Systems For Construction Zone Signs - U-Channel Post				
30	1 - 13	Typical Sections	D-704-9	Construction Sign Details - Terminal And Guide Signs				
40	1 - 3	Removals	D-704-10	Construction Sign Details - Regulatory Signs				
75	1 - 2	Wetland Impacts	D-704-11, 11A	Construction Sign Details - Warning Signs				
76	1 - 4	Temporary Erosion Control	D-704-12	Shoulder Closure Tapers				
77	1 - 4	Permanent Erosion Control	D-704-13	Barricade And Channelizing Device Details				
90	1 - 3	Paving Layouts	D-704-14	Construction Sign Punching And Mounting Details				
100	1 - 8	Work Zone Traffic Control	D-704-15	Road Closure Layouts				
120	1 - 9	Pavement Marking	D-704-16	Lane Closure On A Two Lane Road Using Traffic Control Signals				
170	1 - 8	Bridges and Box Culverts	D-704-17	Sign Layout For One Lane Closure Two Lane Roadway				
			D-704-19	Road Closure And Lane Closure On A Two Way Road Layouts				
			D-704-20	Terminal And Seal Coat Sign Layouts				
			D-704-22	Construction Truck And Temporary Detour Layouts				
			D-704-24	Shoulder Closures And Bridge Painting Layouts				
			D-704-26	Miscellaneous Sign Layouts				
			D-704-27	Mobile Operation (Pavement Marking)				
			D-704-33	Two-Lane Roadway Portable Rumble Strips				
			D-704-37	Maintaining Traffic Through Area Already Full Depth Reclaimed				
			D-704-50	Portable Sign Support Assembly				
			D-704-56	Mobile Operation - Grinding Shoulder Rumble Strips				
			D-706-1	Bituminous Laboratory				
			D-708-6	Erosion And Siltation Controls - Median Or Ditch Inlet Protection				
			D-748-1	Curb & Gutter And Valley Gutter				
			D-750-2	Sidewalk				
			D-750-3	Curb Ramp Retrofit Details				
			D-750-4	Curb Ramp Retrofit Transitional Area Details				
			D-760-3	Rumble Strips Undivided Highways (Shoulders 4' Or Greater)				
			D-762-1	Pavement Marking Message Details				
			D-762-4	Pavement Marking				
			D-762-5	Pavement Marking for Standard 90 Degree Flared Intersection-(No Center Left Turn Lane on Major Road)				
			D-762-6	Pavement Marking for Standard 90 Degree Flared Intersection - (Center Left Turn Lane on Major Road)				
			D-762-11	Short-Term Pavement Marking				
SPECIAL PROVISIONS								
Number	Description							
SSP 2	Federal Migratory Bird Treaty Act							
SSP 10	Longitudinal Joint Density							
SP 321(23)	E-Ticketing (Mandatory)							
SP 322(23)	Temporary Pedestrian Facilities							
SP 323(23)	Flexible Pavement Surface Tolerance							
SP 324(23)	Temporary Water Diversion							
SP 353(23)	Utility Coordination							

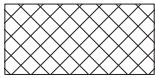


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	4	1

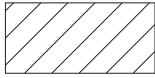


Preliminary Plans

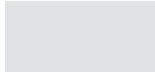
LEGEND



MILLING TRANSITION



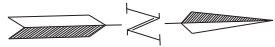
3" HMA OVERLAY



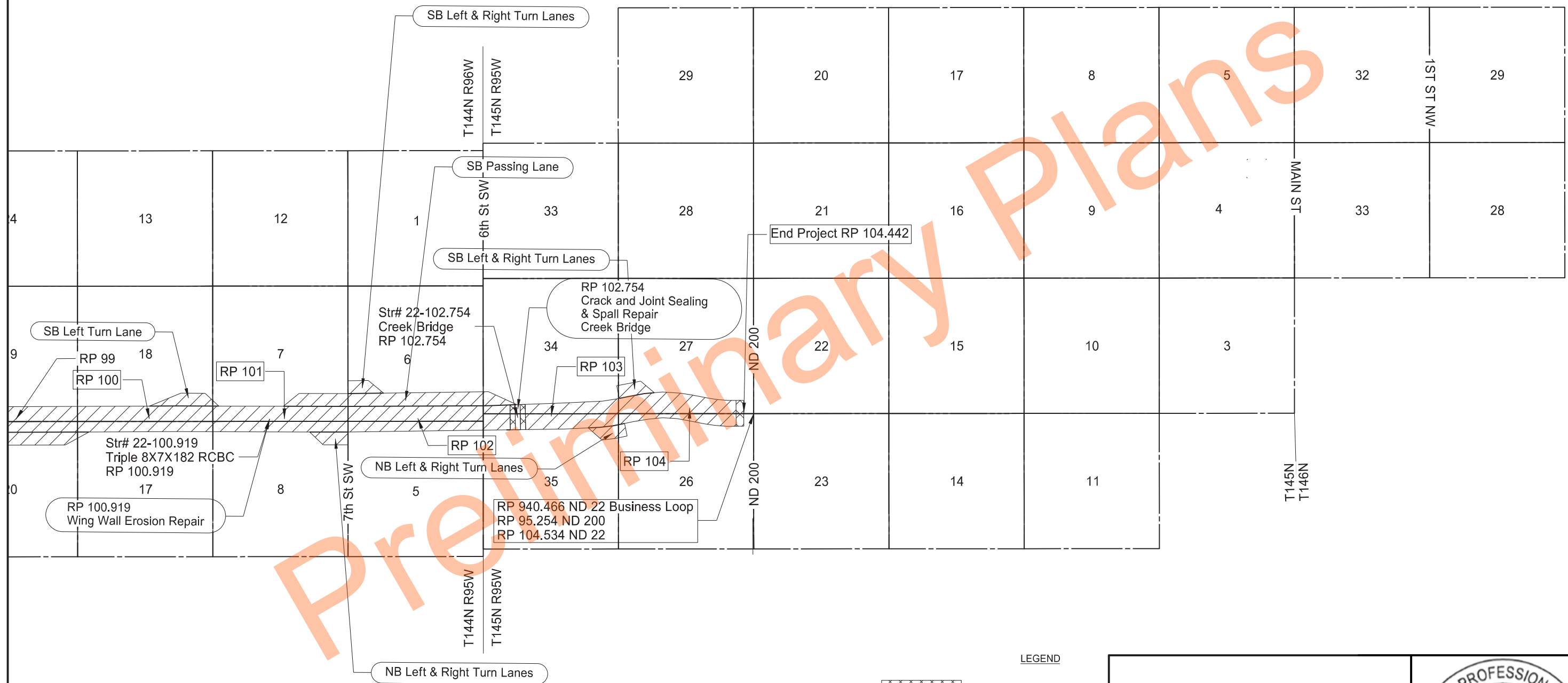
City of Manning

ND Highway 22
17th St SW to Jct ND 200
Scope of Work





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	4	2



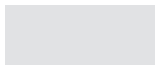
LEGEND



MILLING TRANSITION



3" HMA OVERLAY



City of Manning

ND Highway 22
17th St SW to Jct ND 200

Scope of Work



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	6	1

NOTES

100-P01 COORDINATION OF PROJECTS: The following projects are 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(140)074 – Dickinson 45th St to 17th St SW

The work to be performed as part of Project XA-SS-5-022(140)074 will include a 3” HMA Overlay and Structure Repairs on ND Hwy 22 from 45th St in Dickinson to 17th St SW.

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(140)074. All costs for project coordination are incidental to the project.

100-P02 SEQUENCE OF WORK: Complete the ADA Curb Ramp modifications prior to beginning the mainline improvements.

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 circumstances, 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 Base Course CI 5".

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.

203-P01 BRIDGE APPROACH REPAIR: Perform repair work on half of the roadway at a time while maintaining one lane of traffic on the other half as shown in Section 100. Do not load trucks on the lane used to maintain one lane traffic. It is allowable to dump aggregate base course directly into the repair area with side dumps from the travel lane provided the trucks stay in the pilot line and travel through the work zone with the public traffic. Public traffic is not allowed on the repair area until the base section is at finished grade. Use only low ground pressure construction equipment in the repair area until the first lift of material is placed.

253-P01 HYDRAULIC MULCH: Hydraulic mulch has been provided in the plans for temporary stabilization to be used if permanent seeding cannot be installed due to seasonal limitations.

253-P02 HYDRAULIC MULCH: Remove specification 253.04 B.2 from the contract.

302-P01 PLACEMENT AND COMPACTION OF AGGREGATE BASE COURSE: For bridge approach repairs place Aggregate Base Course according to 302.04 B, compact Aggregate Base Course to at least 90 percent of the maximum dry density with a moisture content no less than the optimum moisture and no more than 5.0 percentage points above the optimum moisture. The Engineer will determine the maximum dry density and optimum moisture content as specified in ND T 180.

400-P01 SURFACE TREATMENT: Prime or pave each bridge approach repair location within 48 hours of completing the repair.

430-P01 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”.

704-450 LANE CLOSURE - SIGNAL CONTROL/FLAGGING CONTROL: Install either the signal controlled lane closure on Standard D-704-16 or the flagging controlled lane closure on Standard D-704-17.

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

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



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	6	2

NOTES

The Engineer will measure individual traffic control devices, other than the signal system and flaggers, shown on the standards. Payment will be made at the respective contract unit price.

Include the cost of either a traffic signal system or flaggers in the contract unit price for "Lane Closure – Signal Control/Flagging Control".

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

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

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

Install PRS that meet the following criteria:

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

Use individual PRS constructed in one of the following manners:

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

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

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

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

704-P01 TRAFFIC CONTROL 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; 12th St SW, 11th St SW, 7th St SW

704-P02 TRAFFIC CONTROL FOR BITUMINOUS PAVEMENT: 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.

- Standard D-704-33;
- Standard D-704-20, layout G – signing will be required at junctions at HWY 22:
17th St SW, 16th St SW, 15th St SW, 14th St SW, 13th St SW, Wilcox St, Eger St, Owens St, 12th St SW, 11th St SW, 8th St SW, 7th St SW, and Hutchinson St.



NOTES

- 3. Standard D-704-22, layouts K and L; and
- 4. Standard D-704-26, layouts CC, EE, and GG
- 5. Standard D-704-26, layout KK – signing will be required at junctions at HWY 22: 17th St SW, 16th St SW, 15th St SW, 14th St SW, 13th St SW, Wilcox St, Eger St, Owens St, 12th St SW, 11st St SW, 8th St SW, 7th St SW, and Hutchinson St when pilot car operations are being utilized.

704-P03 KNIFE RIVER BRIDGE TRAFFIC CONTROL: Provide traffic control consisting of a lane closure and flagging as per Standard D-704-17. In lieu of portable precast concrete median barriers, place delineator drums along the centerline at 25 feet center to center spacing.

704-P04 TRAFFIC CONTROL FOR REPAIR WORK: Perform bridge approach repairs on one half of the roadway while maintaining traffic on a single 12’ minimum width lane with pilot car and flagging operations on the adjacent half. Resume two-way traffic by the end of the working day or continue to maintain one lane traffic with flagging and pilot car operations. Payment will only be made for flagging and pilot car while the contractor is actively working in the repair area. Do not exceed 15-minute wait time in flagging zones. See Section 100 of the plans for additional traffic control details.

Remove bituminous surfacing, excavate material, install aggregate base to finished grade, and construct a 4:1 traversable wedge between the edge of existing pavement and top of aggregate base prior to resuming two-way traffic.

706-P01 FIELD OFFICE: Provide a field office which meets the following requirements:

- 1. Be completely insulated and weather tight.
- 2. Minimum total area of 450 square feet.
- 3. Bathroom facilities, which includes sewer, potable water, and weekly cleaning or weekly service of a porta-potty.
- 4. Have a dependable source of electricity for power and lights with a minimum of 6 electrical outlets spaced throughout the building and light fixtures spaced to uniformly light the entire interior (lumens required 110 foot-candles).
- 5. Be wired for DSL Broadband internet with wireless Wi-Fi and have the capability to allow for hard wiring the computer. Include the cost of the installation and monthly fees.
- 6. A heating and cooling system that is capable of maintaining the temperature between 65°F and 78°F year-round.
- 7. A minimum of 3 desks and 3 desk chairs, 3 extra chairs, a drawer file cabinet with at least two drawers, one table minimum of 2.5 ft x 5 ft.
- 8. Photocopy machine/Printer capable of 11x17 photocopies/prints and toner to last the duration of the project. Engineer will provide paper. Other features to include digital copying & scanning. (Fax capabilities can be included but not necessary).
- 9. The location of the field office will be on, or as close to the project as possible and approved by the Engineer. Any rental fees will be paid by the Contractor.
- 10. Make the field office available for occupancy one week before the start of the project and remain through project completion. Provide a field office that is separate or independent from the contractor's field office.

11. Heat, electric, internet service, sewer, water hookups, and porta-potty service to be furnished by Contractor, Contractor to pay utility bills.

All requirements of the Field Office are subject to approval by the Engineer. Include the costs for the field office in the bid item “FIELD OFFICE” and the Schedule for Payment is as follows:

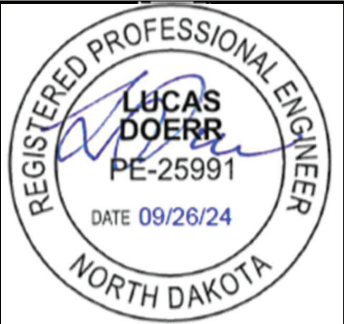
- 25% when set up on site,
- 50% when 30% of work is complete,
- 75% when 60% of work is complete,
- 100% when project is complete.

748-P01 CURB & GUTTER PLACEMENT: Remove a minimum of 6 inches and a maximum of 12 inches of existing surfacing adjacent to the new curb & gutter to allow for proper forming. Cut asphalt to a clean vertical edge. Include costs to cut the asphalt and dispose of the materials in the price bid for the curb and gutter bid item.

After the new curb & gutter has been installed and the forms removed, fill the remaining void to grade with Aggregate Base Course CL 5.

During the mainline paving operation, remove 6” of the Aggregate Base Course CL 5 from the areas outside of the mainline improvements. Place and compact new asphalt surfacing in 2 separate lifts in these areas. Include all costs necessary to remove and dispose of the aggregate material and to place and compact the new asphalt in the price bid for “Superpave FAA 45.”

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



ENVIRONMENTAL NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	6	4

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 with these commitments:

EN-1 SPAWNING RESTRICTION: Do not work within the Knife River from April 15 to June 1.

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

EN-3 THREATENED AND ENDANGERED SPECIES: The project is located near/within suitable habitat for the species listed in the following table.

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

*Time frames can differ slightly, depending on the year

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

EN-4 TEMPORARY WETLAND IMPACT: Temporary impact areas within wetlands and or other waters are incorporated into the plans for this project. Remove temporary fill placed and sedimentation in wetlands or other waters. Restore these wetlands to preconstruction contours.



Estimated Quantities

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	8	1

				Mainline:		
SPEC	CODE	ITEM DESCRIPTION	UNIT			TOTAL
103	0100	CONTRACT BOND	L SUM	1		1
109	1000	E-TICKETING	LSUM	1		1
202	0021	REMOVE AGGREGATE BASE & SURFACING	TON	2128		2128
202	0114	REMOVAL OF CONCRETE PAVEMENT	SY	101		101
202	0130	REMOVAL OF CURB & GUTTER	LF	109		109
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	27		27
203	0138	COMMON EXCAVATION-SUBCUT	CY	232		232
210	0210	FOUNDATION FILL	CY	15		15
216	0100	WATER	M GAL	89		89
230	0113	DITCH EROSION REPAIR	L SUM	1		1
251	0100	SEEDING CLASS I	ACRE	0.2		0.2
251	0200	SEEDING CLASS II	ACRE	0.1		0.1
251	2000	TEMPORARY COVER CROP	ACRE	0.1		0.1
253	0200	HYDRAULIC MULCH	SY	680		680
253	0210	HYDRAULIC MULCH WITH TACKIFIER	SY	204		204
255	0102	ECB TYPE 2	SY	204		204
256	0200	RIPRAP GRADE II	CY	309		309
260	0200	SILT FENCE SUPPORTED	LF	100		100
260	0201	REMOVE SILT FENCE SUPPORTED	LF	100		100
261	0112	FIBER ROLLS 12IN	LF	454		454
261	0113	REMOVE FIBER ROLLS 12IN	LF	227		227
262	0100	FLOTATION SILT CURTAIN	LF	60		60
262	0101	REMOVE FLOTATION SILT CURTAIN	LF	60		60
302	0120	AGGREGATE BASE COURSE CL 5	TON	3224		3224
401	0050	TACK COAT	GAL	38314		38314
411	0100	MILLING PAVEMENT SURFACE	TON	1612		1612
430	0045	SUPERPAVE FAA 45	TON	63617		63617
430	1000	CORED SAMPLE	EA	654		654
430	5818	PG 58H-34 ASPHALT CEMENT	TON	3817		3817
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1191		1191
602	7000	SPECIAL SURFACE FINISH	SF	1141		1141
702	0100	MOBILIZATION	L SUM	1		1
704	0100	FLAGGING	MHR	1300		1300
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2959		2959
704	1018	LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EA	1		1
704	1048	PORTABLE RUMBLE STRIPS	EA	4		4
704	1052	TYPE III BARRICADE	EA	8		8
704	1054	SIDEWALK BARRICADE	EA	8		8
704	1058	PEDESTRIAN WALKWAY	LF	473		473
704	1060	DELINEATOR DRUMS	EA	30		30
704	1067	TUBULAR MARKERS	EA	400		400
704	1080	STACKABLE VERTICAL PANELS	EA	64		64
704	1185	PILOT CAR	HR	308		308
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	267		267
704	2108	TEMPORARY CURB RAMP	EA	7		7
704	2200	TEMPORARY PEDESTRIAN SURFACING	SY	25		25
706	0400	FIELD OFFICE	EA	1		1

Estimated Quantities

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	8	2

			Mainline:		
SPEC	CODE	ITEM DESCRIPTION	UNIT		TOTAL
706	0500	AGGREGATE LABORATORY	EA	1	1
706	0550	BITUMINOUS LABORATORY	EA	1	1
706	0600	CONTRACTOR'S LABORATORY	EA	1	1
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	464	464
748	0140	CURB & GUTTER-TYPE I	LF	107	107
750	0115	SIDEWALK CONCRETE 4IN	SY	89	89
750	2115	DETECTABLE WARNING PANELS	SF	70	70
760	0025	SINUSOIDAL RUMBLE STRIP - ASPHALT SHOULDER	MILE	26.3	26.3
760	0027	SINUSOIDAL RUMBLE STRIP - ASPHALT CENTERLINE	MILE	13.2	13.2
762	0111	EPOXY PVMT MK 12IN LINE	LF	13757	13757
762	0112	EPOXY PVMT MK MESSAGE	SF	1336	1336
762	0114	EPOXY PVMT MK 6IN LINE	LF	291393	291393
762	0432	SHORT TERM 6IN LINE-TYPE NR	LF	445802	445802
762	0437	SHORT TERM 12IN LINE-TYPE NR	LF	27277	27277
930	0200	DEWATERING	L SUM	1	1
930	8644	SILICONE SEALANT	LF	82	82
930	9223	CRACK SEALING	LF	673	673
930	9612	SPALL REPAIR	SF	14	14
930	9671	BOX CULVERT JOINT REPAIR	EA	7	7

																		PROJECT NO.			SECTION NO.	SHEET NO.
																	ND	XA-SS-5-022(141)091			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									
Surfacing Quantities		Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP							
		91.291	to	91.459	0.168	91.705	to	92.046	0.341	92.139	to	92.291	0.152	92.356	to	92.468	0.112	93.017	to	93.036	0.019	93.116	to	93.141	0.025	93.174	to	93.294	0.120
		95.353	to	95.516	0.163	92.544	to	92.809	0.265	97.317	to	97.459	0.142	97.493	to	97.612	0.119	93.547	to	93.642	0.095								
		95.810	to	96.008	0.198	97.145	to	97.211	0.066																				
		96.669	to	96.960	0.291	97.688	to	99.471	1.783																				
		99.562	to	100.039	0.477																								
		100.523	to	101.017	0.494																								
		102.778	to	103.256	0.478																								
103.754	to	104.442	0.688																										
		Total =		2.957	Total =		2.455	Total =		0.294	Total =		0.231	Total =		0.114	Total =		0.025	Total =		0.120							
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	40.0	1173.3	3,469.55	48.0	1408.0	3,456.64	72.0	2112.0	620.93	60.0	1760.0	406.56	56.0	1642.7	187.26	68.0	1994.7	49.87	80.0	2346.7	281.60							
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	40.0	1173.3	3,469.55	48.0	1408.0	3,456.64	72.0	2112.0	620.93	60.0	1760.0	406.56	56.0	1642.7	187.26	68.0	1994.7	49.87	80.0	2346.7	281.60							
Superpave FAA 45 (2 Ton/CY)	Ton	37.8	3765.0	11,133.11	45.9	4547.0	11,162.89	69.9	6893.0	2,026.54	57.9	5720.0	1,321.32	54.0	5329.0	607.51	66.0	6502.0	162.55	78.0	7675.0	921.00							
PG 58H-34 Asphalt Cement (6.0%)	Ton	37.8	225.9	667.99	45.9	272.8	669.72	69.9	413.6	121.60	57.9	343.2	79.28	54.0	319.7	36.45	66.0	390.1	9.75	78.0	460.5	55.26							

Basis of Estimate ND 22		Typical Section 8			Typical Section 9			Typical Section 10			Typical Section 12			Typical Section 13			Typical Section 14			Typical Section 15									
Surfacing Quantities		Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP							
		93.294	to	93.413	0.119	93.446	to	93.467	0.021	93.869	to	95.173	1.304	96.195	to	96.233	0.038	96.271	to	96.337	0.066	96.376	to	96.433	0.057	96.490	to	96.543	0.053
										101.104	to	101.218	0.114	103.329	to	103.357	0.028	103.381	to	103.450	0.069	103.492	to	103.523	0.031	103.573	to	103.620	0.047
										101.727	to	102.516	0.789																
		Total =		0.119	Total =		0.021	Total =		2.207	Total =		0.066	Total =		0.135	Total =		0.088	Total =		0.100							
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	80.0	2346.7	279.25	68.0	1994.7	41.89	48.0	1408.0	3,107.46	52.0	1525.3	100.67	60.0	1760.0	237.60	68.0	1994.7	175.53	60.0	1760.0	176.00							
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	80.0	2346.7	279.25	68.0	1994.7	41.89	48.0	1408.0	3,107.46	52.0	1525.3	100.67	60.0	1760.0	237.60	68.0	1994.7	175.53	60.0	1760.0	176.00							
Superpave FAA 45 (2 Ton/CY)	Ton	78.0	7675.0	913.32	66.0	6503.0	136.56	45.9	4547.0	10,035.23	49.8	4938.0	325.91	57.9	5720.0	772.20	66.0	6502.0	572.18	57.9	5720.0	572.00							
PG 58H-34 Asphalt Cement (6.0%)	Ton	78.0	460.5	54.80	66.0	390.2	8.19	45.9	272.8	602.07	49.8	296.3	19.56	57.9	343.2	46.33	66.0	390.1	34.33	57.9	343.2	34.32							

Basis of Estimate ND 22		Typical Section 16			Typical Section 17			Typical Section 18			Typical Section 19			Typical Section 20			Typical Section 21			Typical Section 22									
Surfacing Quantities		Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP							
		96.562	to	96.593	0.031	101.296	to	101.329	0.033	101.356	to	101.417	0.061	101.452	to	101.487	0.035	101.542	to	101.595	0.053	101.626	to	101.653	0.027	103.648	to	103.673	0.025
		100.118	to	100.448	0.330																								
		Total =		0.361	Total =		0.033	Total =		0.061	Total =		0.035	Total =		0.053	Total =		0.027	Total =		0.025							
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	48.0	1408.0	508.29	60.0	1760.0	58.08	68.0	1994.7	121.67	80.0	2346.7	82.13	72.0	2112.0	111.94	60.0	1760.0	47.52	52.0	1525.3	38.13							
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	48.0	1408.0	508.29	60.0	1760.0	58.08	68.0	1994.7	121.67	80.0	2346.7	82.13	72.0	2112.0	111.94	60.0	1760.0	47.52	52.0	1525.3	38.13							
Superpave FAA 45 (2 Ton/CY)	Ton	45.9	4547.0	1,641.47	57.9	5720.0	188.76	66.0	6502.0	396.62	78.0	7676.0	268.66	69.9	6893.0	365.33	57.9	5719.0	154.41	49.8	4938.0	123.45							
PG 58H-34 Asphalt Cement (6.0%)	Ton	45.9	272.8	98.48	57.9	343.2	11.33	66.0	390.1	23.80	78.0	460.6	16.12	69.9	413.6	21.92	57.9	343.1	9.26	49.8	296.3	7.41							

NOTE:
- Typical Sections 11, 23, & 24 are not included in the Basis of Estimate.
Quantities are found in Section 90.

ND Highway 22
17th St SW to Jct ND 200

Basis of Estimate

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 09/26/24
NORTH DAKOTA

		Section 10 Surfacing Quantities	Section 20 Sheet 1	Section 20 Sheet 3	Section 20 Sheet 5	Section 20 Sheet 6	Section 20 Sheet 7	Section 20 Sheet 8	Section 40 Sheet 1	Section 40 Sheet 2	Section 40 Sheet 3	Section 90 Sheet 1	Section 90 Sheet 2	Section 90 Sheet 3	
Material - Project Summary	Unit														Total
Remove Aggregate Base & Surfacing	Ton	---	---	---	---	---	---	---	---	---	2128	---	---	---	2,128.0
Removal of Concrete Pavement	SY	---	---	---	---	---	---	---	51.4	49.3	---	---	---	---	100.7
Removal of Curb & Gutter	LF	---	---	---	---	---	---	---	50	59	---	---	---	---	109.0
Removal of Bituminous Surfacing	SY	---	---	---	---	---	---	---	11.7	15	---	---	---	---	26.4
Common Excavation-Subcut	CY	---	---	---	---	---	---	---	---	---	232	---	---	---	232.0
Milling Pavement Surface	Ton	---	229	222	---	---	---	---	172	219	769	---	---	---	1,611.2
Aggregate Base Course CL 5 (1.875 Ton/CY) (Mainline)	Ton	---	1,437	---	7.3	15.0	16.7	22.1	---	---	---	---	---	1725	3,223.1
Tack Coat (0.05 Gal/SY)	Gal	36,086	760	---	0.4	0.7	0.6	1.3	---	---	---	382	443	640	38,313.8
Superpave FAA 45 (2 Ton/CY)	Ton	58,327	2,384	---	1.4	2.5	2.4	5.0	---	---	---	637	738	1,520	63,617.2
PG 58H-34 Asphalt Cement (6.0%)	Ton	3,499	143	---	0.1	0.2	0.2	0.4	---	---	---	38	44	92	3,817.4
Curb & Gutter-Type 1	LF	---	---	---	12	25	24	46	---	---	---	---	---	---	107.0
Sidewalk Concrete 4IN	SY	---	---	---	10.8	21.4	32.0	24.0	---	---	---	---	---	---	88.2
Detectable Warning Panels	SF	---	---	---	10	20	20	20	---	---	---	---	---	---	70.0

HBP Cored Samples						
	A	B	C	D		
Specification	Distance (ft)/1000	Lanes	Lifts	Quantity (A x B x C)	Quantity (1 per mile)	Unit
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 1, 11, & 23	32	2	2	128	N/A	EA
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 2, 10, 12, 16, & 22	23	3	2	138	N/A	EA
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 4, 5, 13, 15, 17, & 21	7	4	2	56	N/A	EA
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 3, 6, 9, 14, 18, & 20	5	5	2	50	N/A	EA
430.04 I.2.b(2), "Pavement Density Cores" Proposed Typical 7, 8, & 19	2	6	2	24	N/A	EA

HBP Cored Samples						
	A	B	C	D		
Specification	Distance (ft)/1000	Joints	Lifts	Quantity (A x B x C)	Quantity (1 per mile)	Unit
SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 1, 11, & 23	32	1	2	64	N/A	EA
SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 2, 10, 12, 16, & 22	23	2	2	92	N/A	EA
SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 4, 5, 13, 15, 17, & 21	7	3	2	42	N/A	EA
SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 3, 6, 9, 14, 18, & 20	5	4	2	40	N/A	EA
SSP 4, "Longitudinal Joint Density in HMA Pavement" Proposed Typical 7, 8, & 19	2	5	2	20	N/A	EA
Total				654	0	EA

Water	M Gal
25 MGal for Dust Palliative	25
20 Gal/Ton for Aggregates	64
10 Gal/CY for Embankment	0

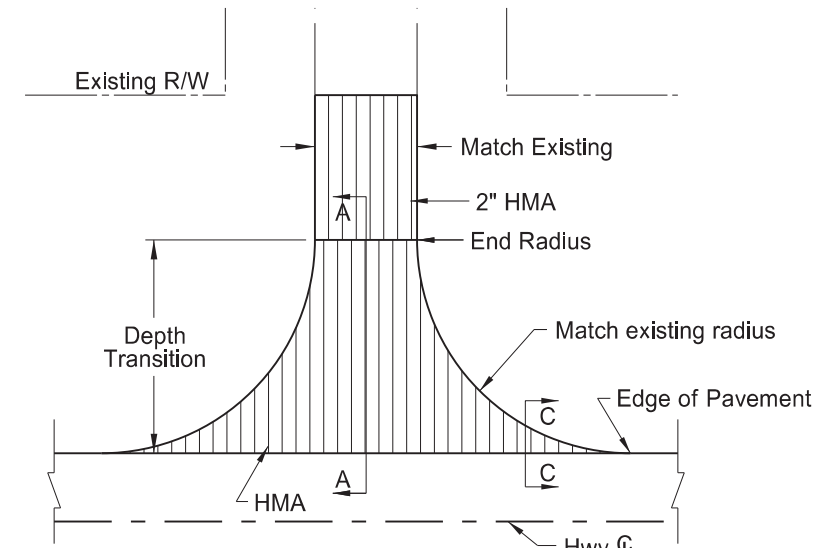
Sinusoidal Rumble Strips					
Type	Start RP	End RP	Length (LF)	Basis	Quantity
Asphalt Centerline	91.291	104.442	69,437	1 / Mile	13.2 Miles
Asphalt Shoulder	91.291	104.442	69,437	2 / Mile	26.3 Miles

ND Highway 22
17th St SW to Jct ND 200

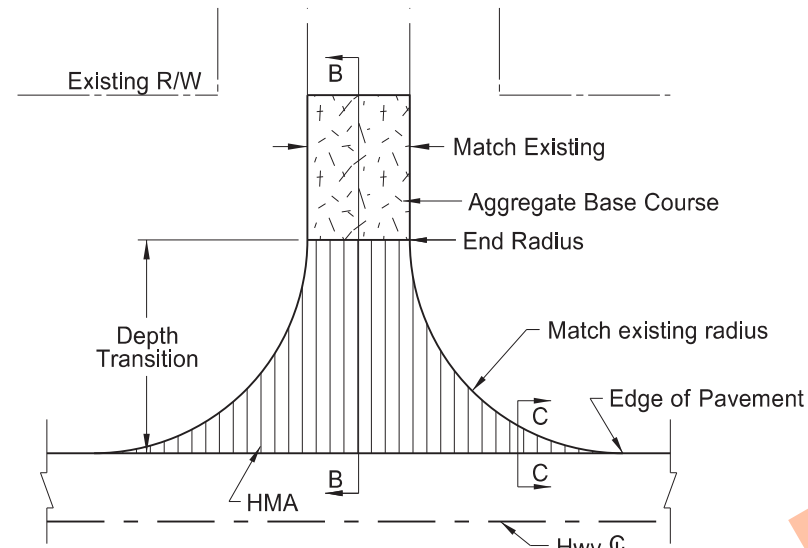
Basis of Estimate



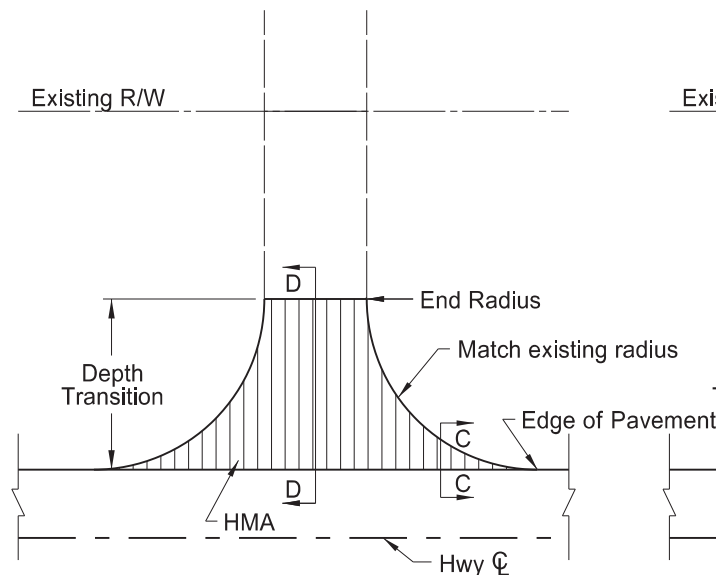
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	20	1



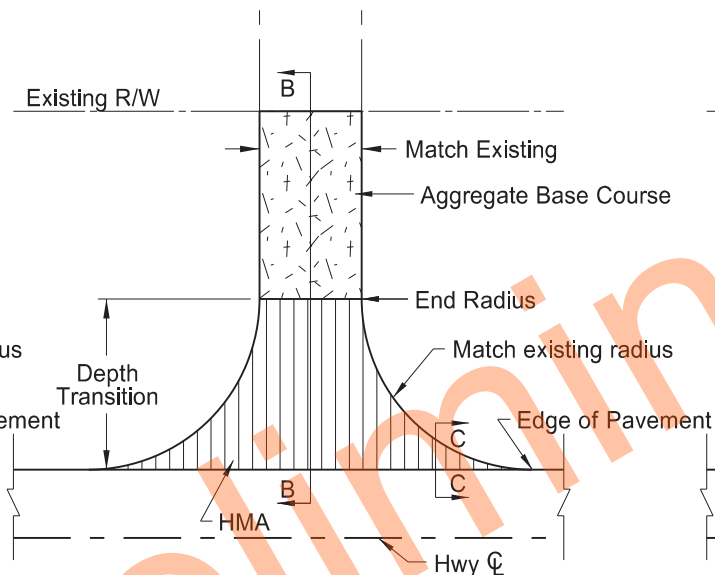
(1) Paved Section Line, County Road, or Street Approach



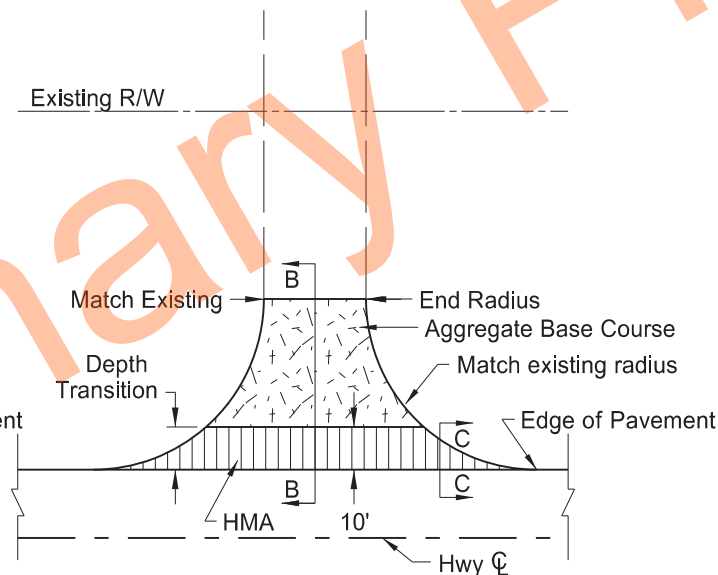
(2) Gravel Section Line, County Road, or Street Approach



(3) Paved Private Drive Approach



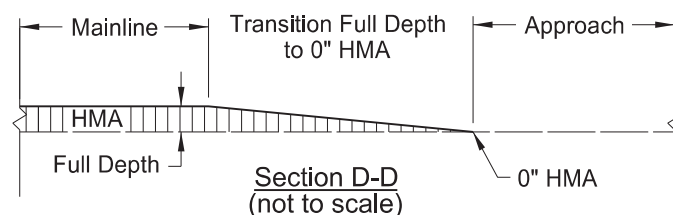
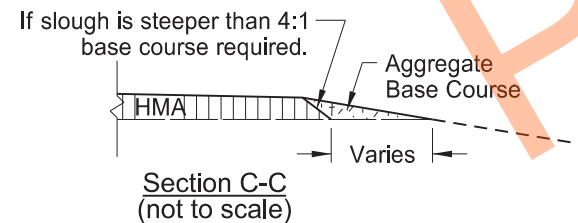
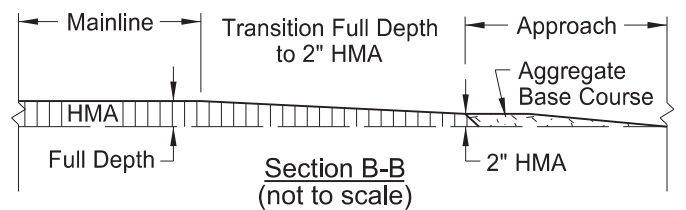
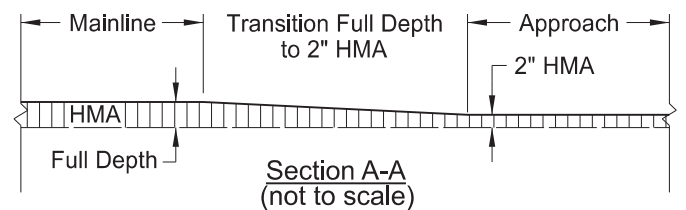
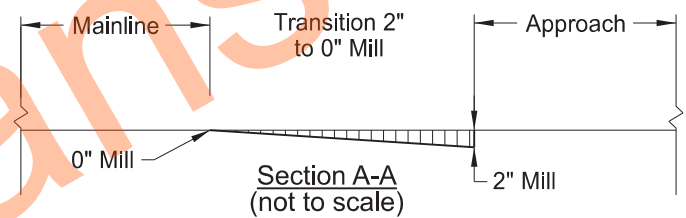
(4) Gravel Private Drive Approach



(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
NUMBER OF APPROACH TYPE		Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Private Drive	Field Drive	
Material	UNIT	Quantity Per Location	Quantity Per Location	Quantity Per Location	Quantity Per Location	Quantity Per Location	
Tack Coat	GAL	50	13	13	10	4	760
Superpave FAA 45	TON	139	43	35	31	13	2384
PG 58H-34 Asphalt Cement	TON	8.3	2.6	2.1	1.9	0.8	143.0
Aggregate Base Course CL 5	TON	N/A	15	N/A	19	17	1277
Aggregate Base Course CL 5 - Radius Slough	TON	2	2	2	2	2	160
Milling (Tie-In)	TON	83	N/A	21	N/A	N/A	229

ND Highway 22
17th St SW to Jct ND 200

General Details
Approach Paving

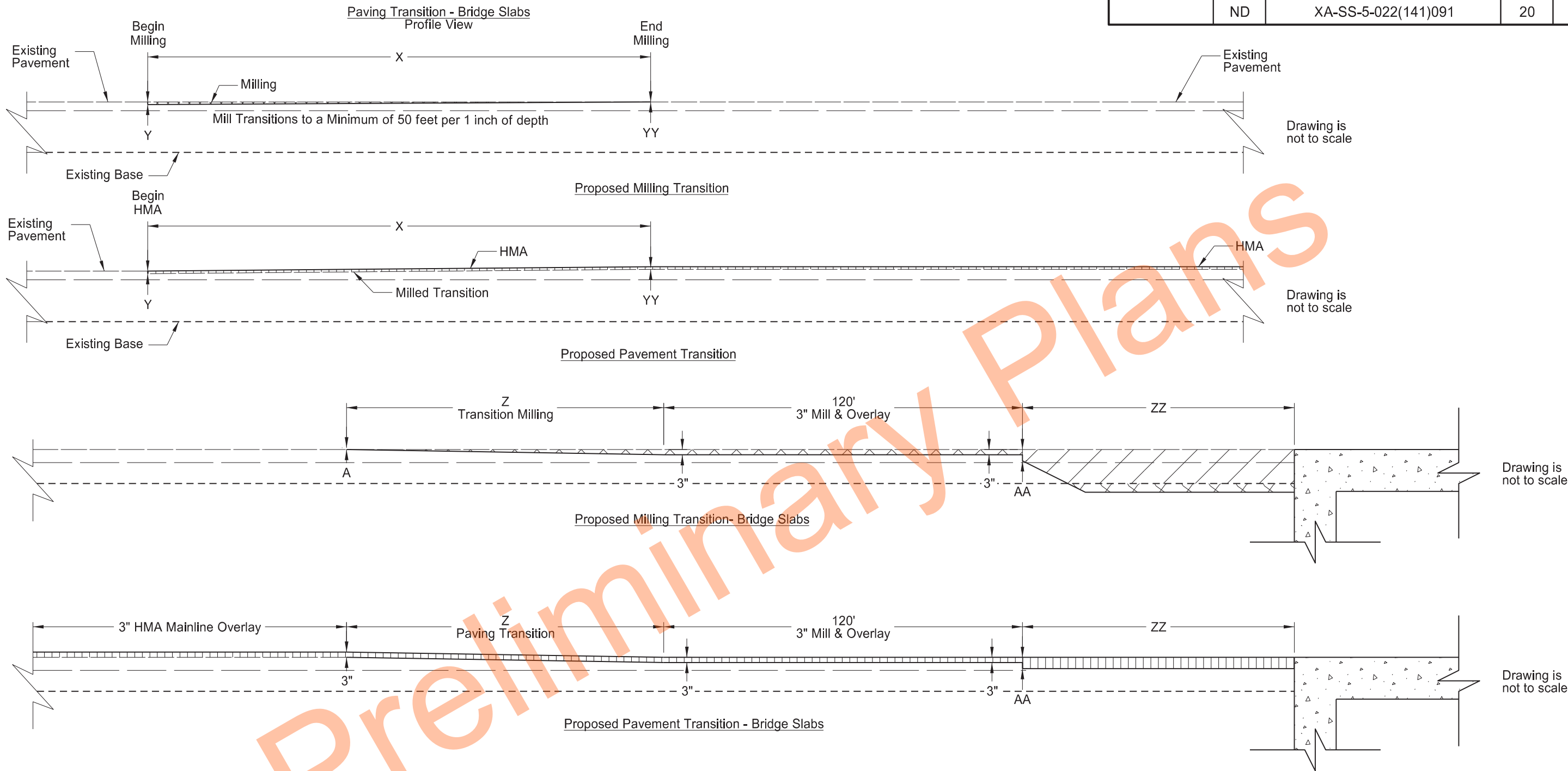


Locations For Approaches				
1: Paved Section Line	2: Gravel Section Line	3: Paved Private Drive	4: Gravel Private Drive	5: Field Drive
Location	Location	Location	Location	Location
RP 95.66 Rt	RP 91.29 Lt & Rt	RP 95.45 Lt	RP 91.80 Rt	RP 91.55 Lt & Rt
RP 96.40 Lt	RP 92.29 Rt	RP 95.80 Lt	RP 92.38 Rt	RP 91.72 Lt
---	RP 93.29 Lt & Rt	RP 102.81 Lt	RP 92.79 Lt	RP 92.23 Lt
---	RP 94.29 Lt & Rt	---	RP 94.51 Lt	RP 93.79 Lt & Rt
---	RP 95.38 Lt & Rt	---	RP 94.72 Lt & Rt	RP 95.45 Rt
---	RP 95.52 Lt & Rt	---	RP 95.73 Lt & Rt	RP 96.19 Rt
---	RP 95.59 Lt & Rt	---	RP 97.11 Rt	RP 97.11 Lt
---	RP 96.42 Rt	---	RP 97.97 Lt	RP 97.22 Lt & Rt
---	RP 97.43 Lt & Rt	---	RP 98.55 Rt	RP 97.79 Lt
---	RP 100.48 Lt	---	RP 99.08 Rt	RP 97.97 Rt
---	RP 101.47 Lt & Rt	---	RP 99.70 Lt	RP 98.23 Rt
---	RP 102.50 Lt	---	RP 100.27 Rt	RP 98.61 Lt
---	RP 104.40 Rt	---	RP 100.74 Lt	RP 99.48 Lt & Rt
---	---	---	RP 100.94 Lt	RP 99.70 Rt
---	---	---	RP 101.25 Lt	RP 100.14 Rt
---	---	---	RP 101.36 Lt	RP 100.48 Rt
---	---	---	RP 103.50 Lt & Rt	RP 100.83 Rt
---	---	---	RP 103.76 Lt	RP 101.69 Lt
---	---	---	RP 103.89 Rt	RP 101.91 Lt & Rt
---	---	---	---	RP 102.18 Rt
---	---	---	---	RP 102.29 Lt
---	---	---	---	RP 102.50 Rt
---	---	---	---	RP 102.81 Rt
---	---	---	---	RP 103.08 Lt & Rt
---	---	---	---	RP 104.12 Lt
---	---	---	---	RP 104.40 Lt

ND Highway 22
17th St SW to Jct ND 200

General Details
Approach Locations & Types
Manning, ND - Dunn County





NOTE:

- Cross-sectional view of bridge tie-in shown on Sec 30 Sheet 13.
- All bridge tie-ins must be milled out and the bottom lift repaved within the same working day.

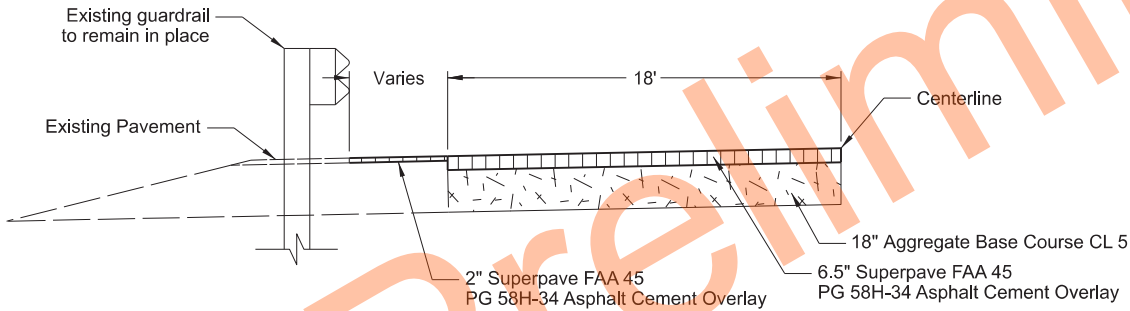
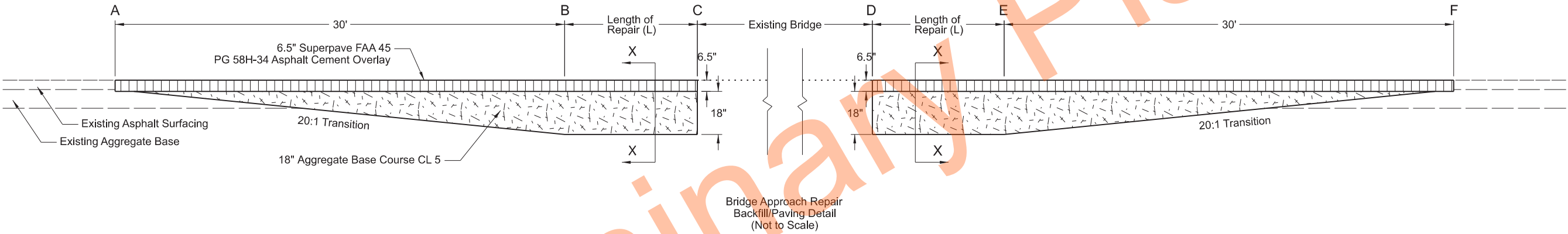
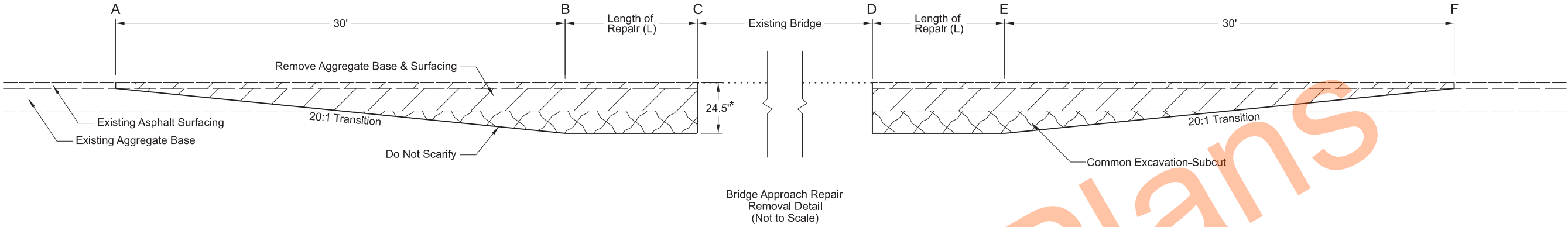
LOCATION	X (FT)	BEGIN MILLING/PAVIN	Y (IN)	YY (IN)	END MILLING/PAVING			MILLING (TON)	Comments
Beginning of Project Overlay	150	91.291	0.00	3.00	91.319			111	Tack, Superpave FAA 45, PG 58H-28 Asphalt Cement Quantities calculated in section 10
End of Project Overlay	150	104.357	0.00	3.00	104.385			111	
LOCATION	Z (FT)	BEGIN TRANSITION MILLING	A (IN)	AA (IN)	END TRANSITION MILLING/BEGIN PAVEMENT	ZZ* (FT)	END PAVEMENT REPAIR	MILLING (TON)	*See Section 20 Sheet 4 for Pavement Repair Detail
Knife River Bridge Tie-In (North Bound)	150	95.979	0.00	6.5	96.007	130	96.055	--	Bridge Tie-In Quantities are calculated in Sections 40 & 90
Knife River Bridge Tie-In (South Bound)	150	96.162	0.00	6.5	96.134	130	96.086	--	
Creek Bridge Tie-In (North Bound)	150	102.645	0.00	6.5	102.673	130	102.721	--	
Creek Bridge Tie-In (South Bound)	150	102.816	0.00	6.5	102.788	130	102.740	--	

ND Highway 22
17th St SW to Jct ND 200

General Details
Milling and Paving Transitions



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	20	4



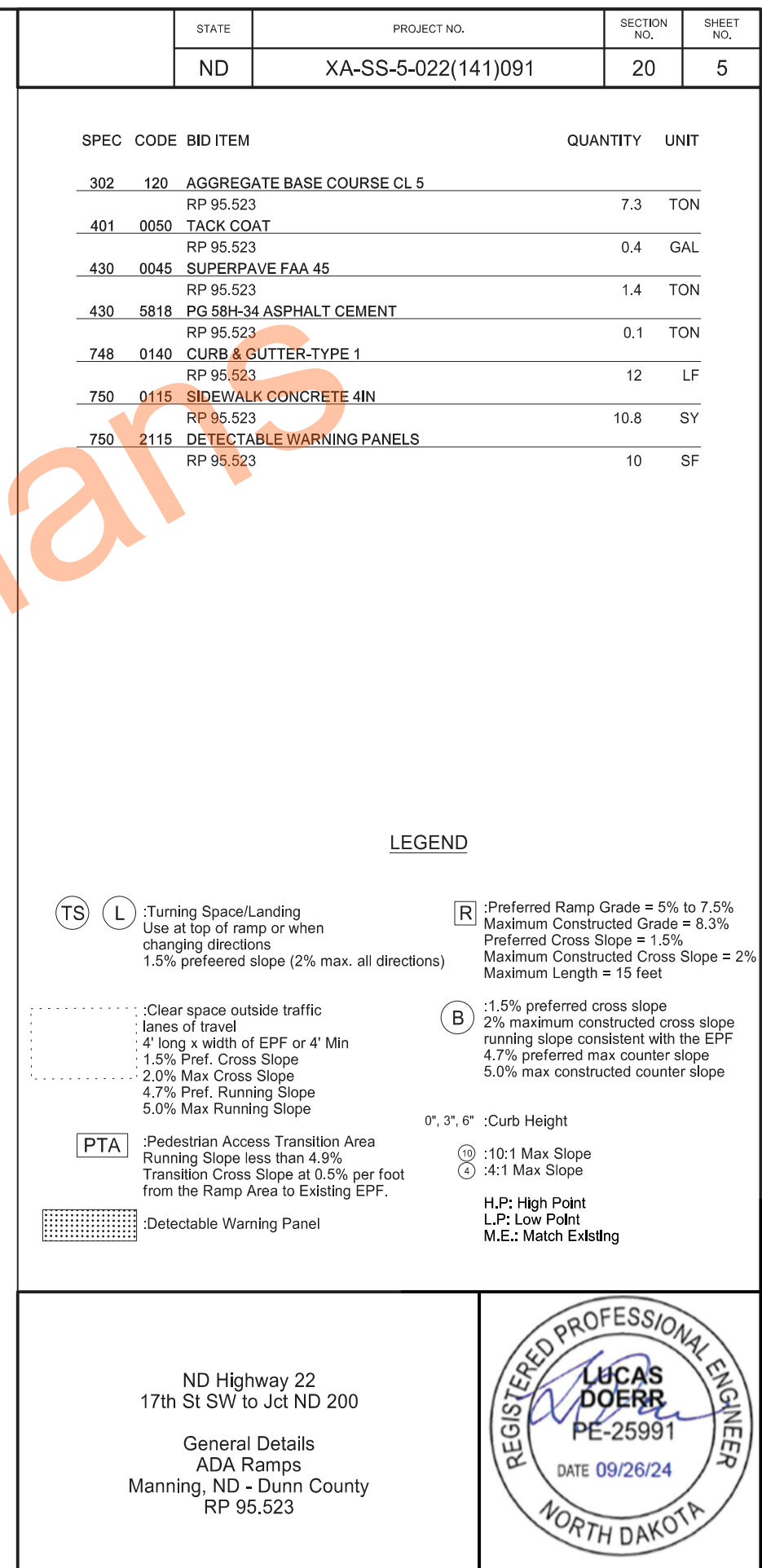
Section X-X Bridge Approach Repair
(not to scale)

96.030 to 96.055 (South End of Knife River Bridge)
96.086 to 96.111 (North End of Knife River Bridge)
102.696 to 102.721 (South End of Creek Bridge)
102.740 to 102.765 (North End of Creek Bridge)

ND Highway 22
17th St SW to Jct ND 200

General Details
Bridge End Detail







Point	Elevation (Ft)
300	2219.71
301	2220.10
302	2219.65
303	2219.66
304	2219.80
305	2219.88
306	2220.03
307	2219.94
308	2219.80
309	2219.72
310	2219.95
311	2219.58

SPEC	CODE	BID ITEM	QUANTITY	UNIT
302	120	AGGREGATE BASE COURSE CL 5		
		RP 95.583	7.7	TON
		RP 95.593	7.3	TON
401	0050	TACK COAT		
		RP 95.583	0.3	GAL
		RP 95.593	0.4	GAL
430	0045	SUPERPAVE FAA 45		
		RP 95.583	1.1	TON
		RP 95.593	1.4	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		RP 95.583	0.1	TON
		RP 95.593	0.1	TON
748	0140	CURB & GUTTER-TYPE 1		
		RP 95.583	12	LF
		RP 95.593	13	LF
750	0115	SIDEWALK CONCRETE 4IN		
		RP 95.583	10.6	SY
		RP 95.593	10.8	SY
750	2115	DETECTABLE WARNING PANELS		
		RP 95.583	10	SF
		RP 95.593	10	SF

TS L	:Turning Space/Landing Use at top of ramp or when changing directions 1.5% preferred slope (2% max. all directions)	R :Preferred Ramp Grade = 5% to 7.5% Maximum Constructed Grade = 8.3% Preferred Cross Slope = 1.5% Maximum Constructed Cross Slope = 2% Maximum Length = 15 feet
.....	:Clear space outside traffic lanes of travel 4' long x width of EPF or 4' Min 1.5% Pref. Cross Slope 2.0% Max Cross Slope 4.7% Pref. Running Slope 5.0% Max Running Slope	B :1.5% preferred cross slope 2% maximum constructed cross slope running slope consistent with the EPF 4.7% preferred max counter slope 5.0% max constructed counter slope
PTA	:Pedestrian Access Transition Area Running Slope less than 4.9% Transition Cross Slope at 0.5% per foot from the Ramp Area to Existing EPF.	0", 3", 6" :Curb Height 10 :10:1 Max Slope 4 :4:1 Max Slope H.P.: High Point L.P.: Low Point M.E.: Match Existing

General Details
ADA Ramps
Manning, ND - Dunn County
RP 95.583 & RP 95.593





Point	Elevation (Ft)
700	2221.67
701	2221.59
702	2221.22
703	2221.25
704	2221.47
705	2221.52
706	2221.62
707	2221.49
708	2221.47
709	2221.42
710	2221.17
711	2221.55
712	2221.46

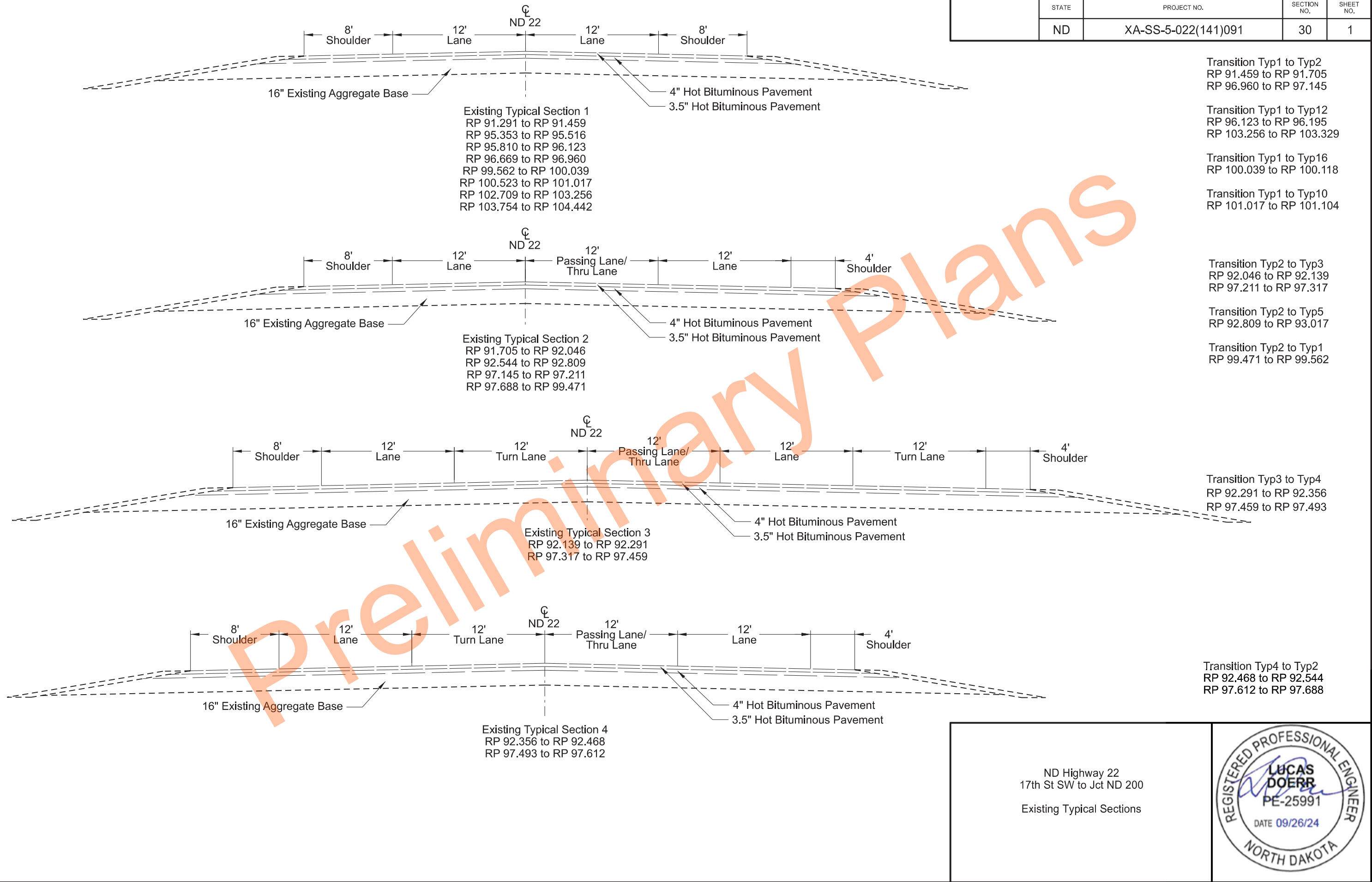
SPEC	CODE	BID ITEM	QUANTITY	UNIT
302	120	AGGREGATE BASE COURSE CL 5		
		RP 95.722	9.6	TON
		RP 95.737	12.5	TON
401	0050	TACK COAT		
		RP 95.722	0.6	GAL
		RP 95.737	0.7	GAL
430	0045	SUPERPAVE FAA 45		
		RP 95.722	2.3	TON
		RP 95.737	2.7	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		RP 95.722	0.2	TON
		RP 95.737	0.2	TON
748	0140	CURB & GUTTER-TYPE 1		
		RP 95.722	21	LF
		RP 95.737	25	LF
750	0115	SIDEWALK CONCRETE 4IN		
		RP 95.722	10.5	SY
		RP 95.737	13.5	SY
750	2115	DETECTABLE WARNING PANELS		
		RP 95.722	10	SF
		RP 95.737	10	SF

TS	Turning Space/Landing Use at top of ramp or when changing directions 1.5% preferred slope (2% max. all directions)	R	Preferred Ramp Grade = 5% to 7.5% Maximum Constructed Grade = 8.3% Preferred Cross Slope = 1.5% Maximum Constructed Cross Slope = 2% Maximum Length = 15 feet	
L	Clear space outside traffic lanes of travel 4' long x width of EPF or 4' Min 1.5% Pref. Cross Slope 2.0% Max Cross Slope 4.7% Pref. Running Slope 5.0% Max Running Slope	B	1.5% preferred cross slope 2% maximum constructed cross slope running slope consistent with the EPF 4.7% preferred max counter slope 5.0% max constructed counter slope	
PTA	Pedestrian Access Transition Area Running Slope less than 4.9% Transition Cross Slope at 0.5% per foot from the Ramp Area to Existing EPF.	0", 3", 6" :Curb Height	10 4	10:1 Max Slope 4:1 Max Slope
	Detectable Warning Panel	H.P.: High Point L.P.: Low Point M.E.: Match Existing		

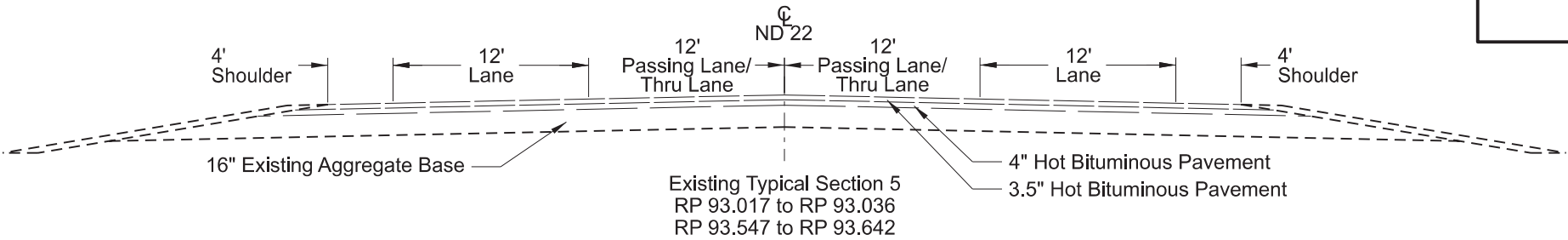
General Details
ADA Ramps
Manning, ND - Dunn County
RP 95.722 & RP 95.737



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	30	1

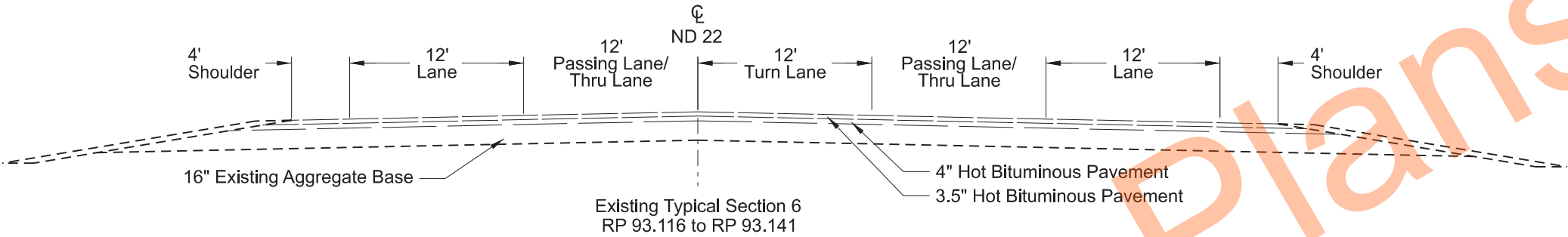


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	2

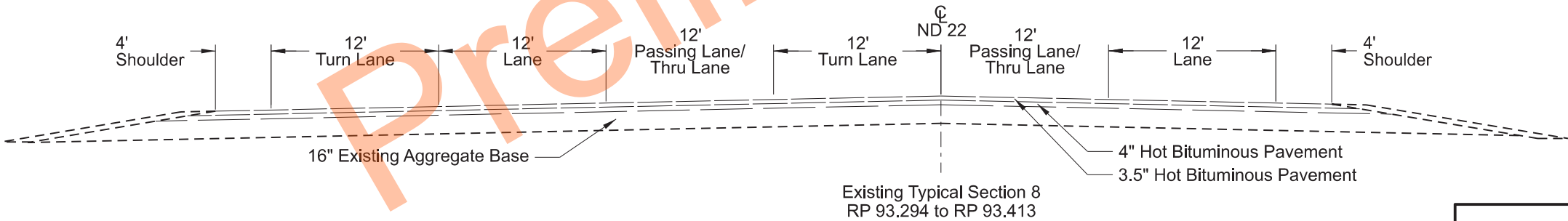
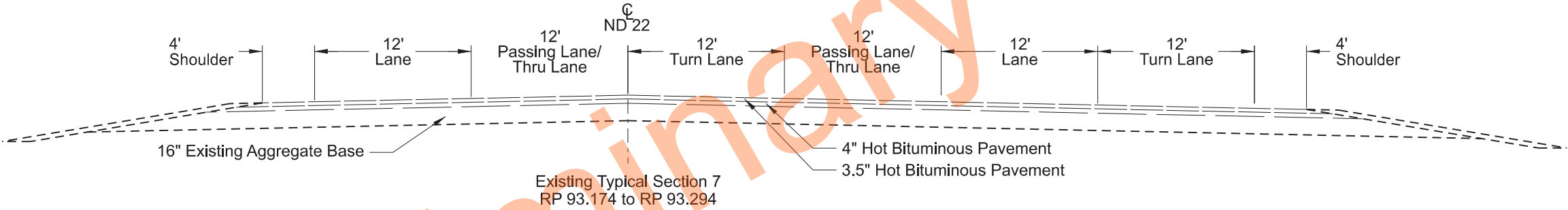


Transition Typ5 to Typ6
RP 93.036 to RP 93.116

Transition Typ5 to Typ10
RP 93.642 to RP 93.869



Transition Typ6 to Typ7
RP 93.141 to RP 93.174

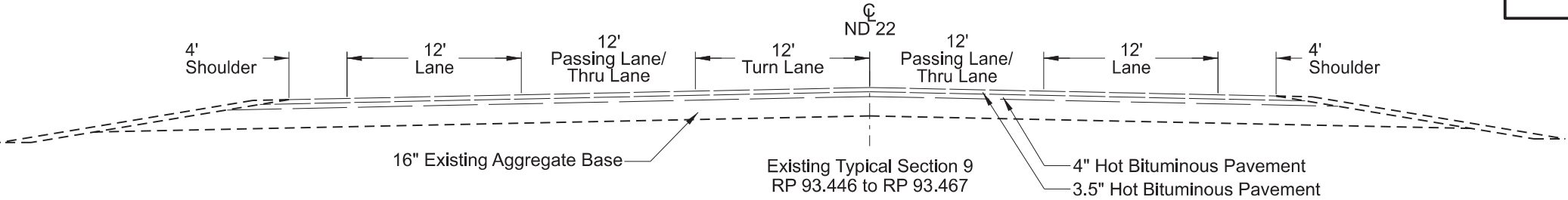


Transition Typ8 to Typ9
RP 93.413 to RP 93.446

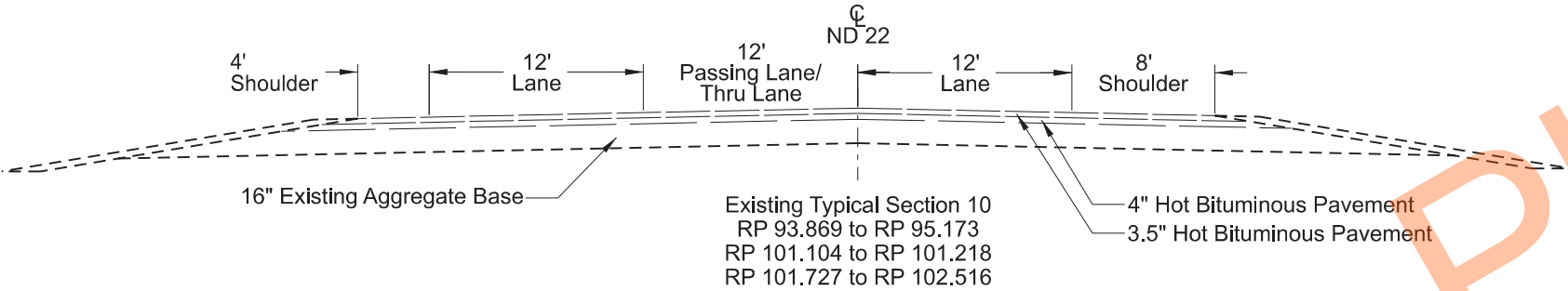
ND Highway 22
17th St SW to Jct ND 200
Existing Typical Sections



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	3

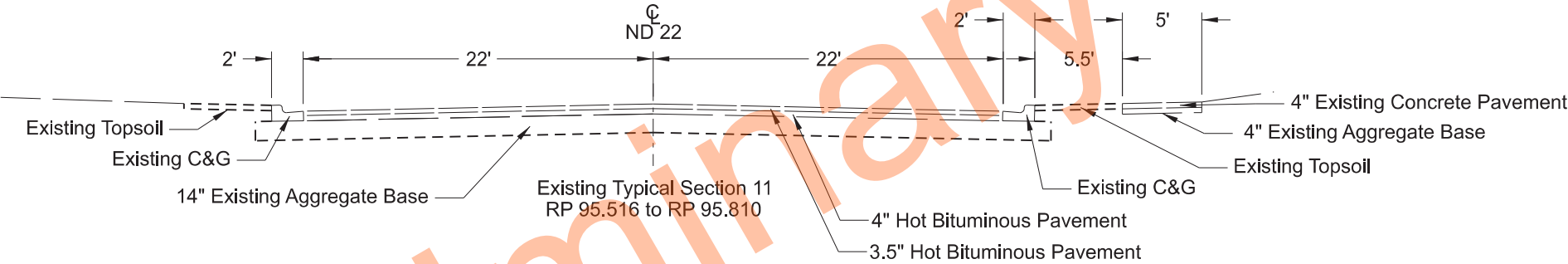


Transition Typ9 to Typ5
RP 93.467 to RP 93.547

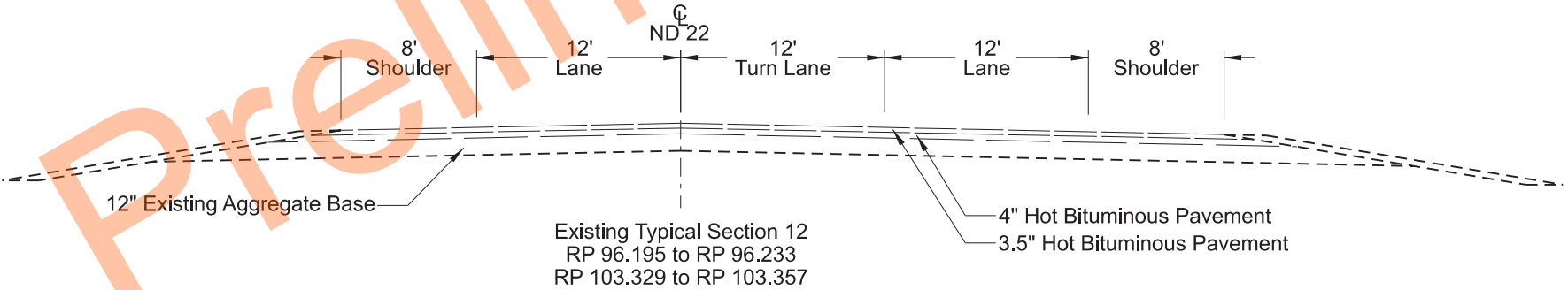


Transition Typ10 to Typ1
RP 95.173 to RP 95.353
RP 102.516 to RP 102.709

Transition Typ10 to Typ17
RP 101.218 to RP 101.296



Transition Typ12 to Typ13
RP 96.233 to RP 96.271
RP 103.357 to RP 103.381

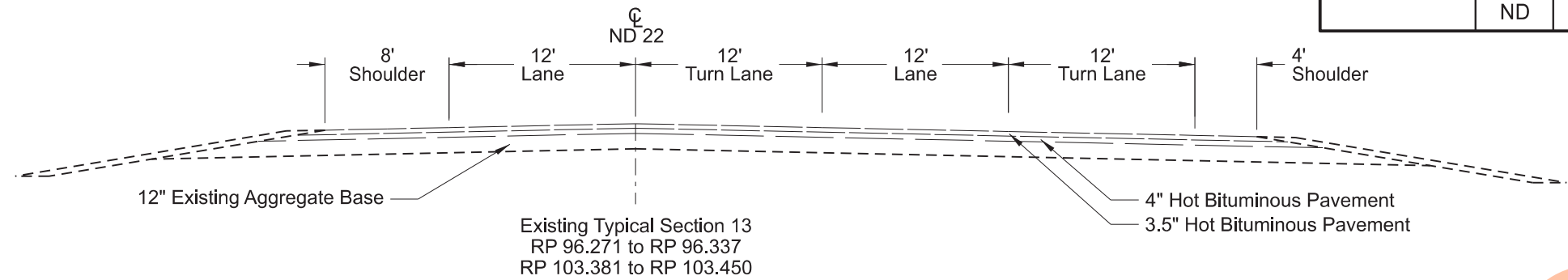


Transition Typ12 to Typ

ND Highway 22
17th St SW to Jct ND 200
Existing Typical Sections

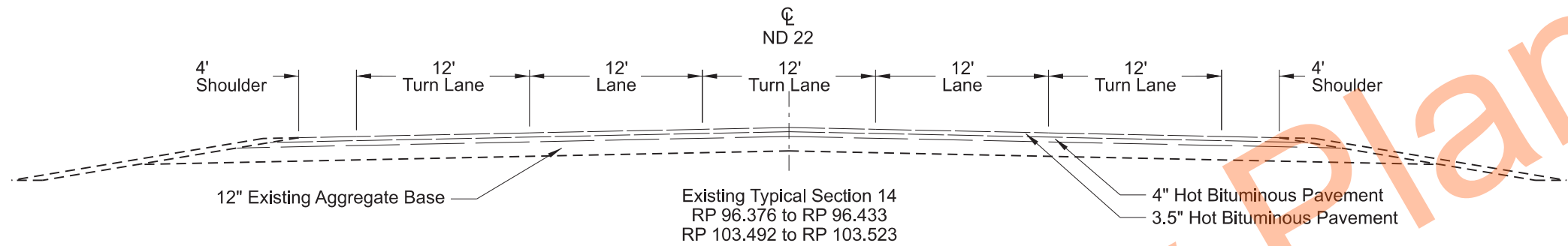


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	30	4

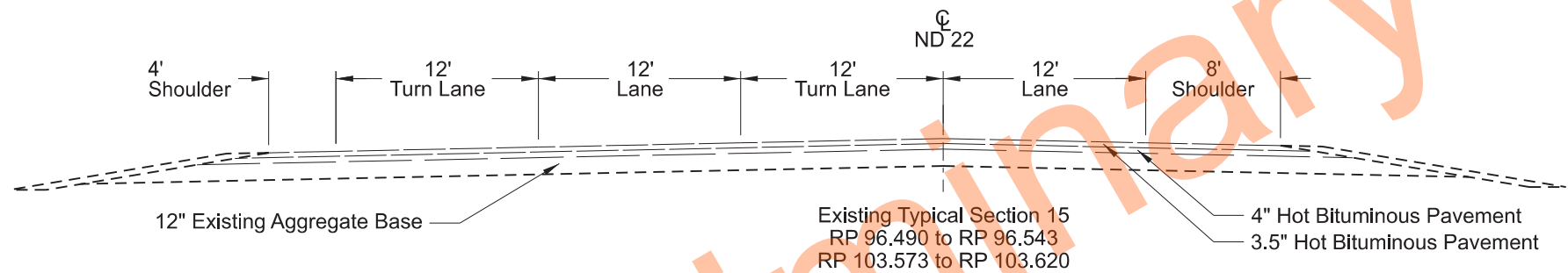


Transition Typ13 to Typ14
RP 96.337 to RP 96.376
RP 103.450 to RP 103.492

Transition Typ13 to Typ

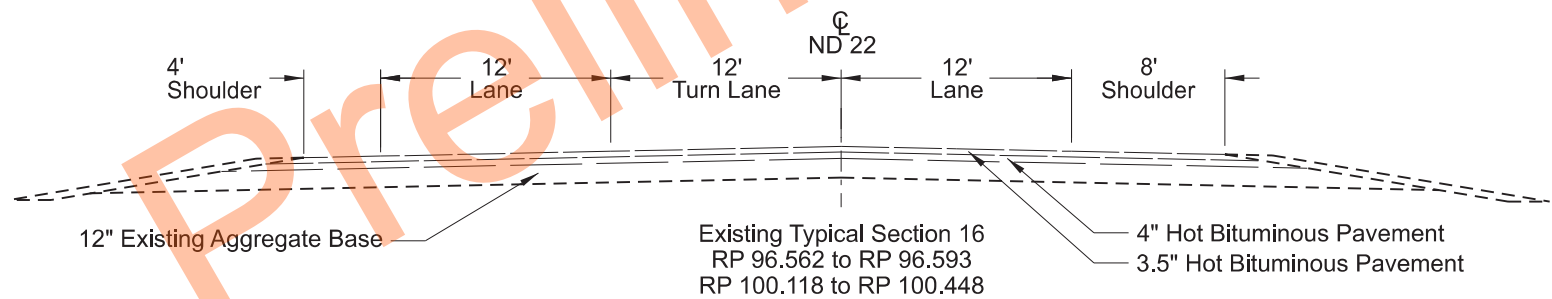


Transition Typ14 to Typ15
RP 96.433 to RP 96.490
RP 103.523 to RP 103.573



Transition Typ15 to Typ16
RP 96.543 to RP 96.562

Transition Typ15 to Typ22
RP 103.620 to RP 103.648

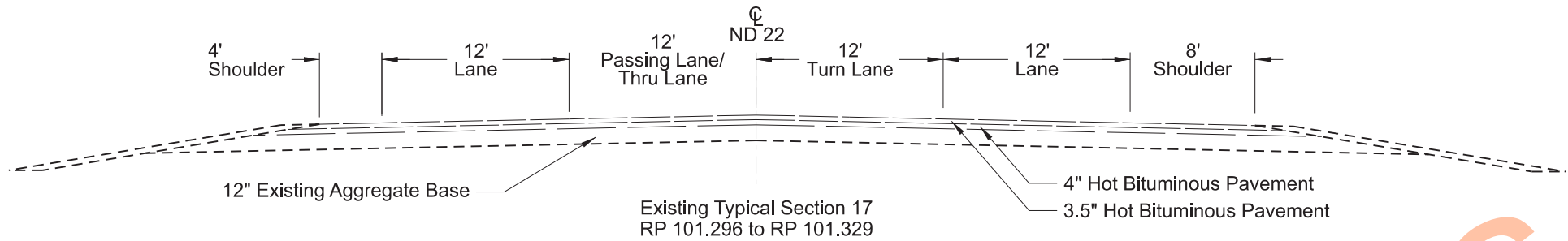


Transition Typ16 to Typ1
RP 96.593 to RP 96.669
RP 100.448 to RP 100.523

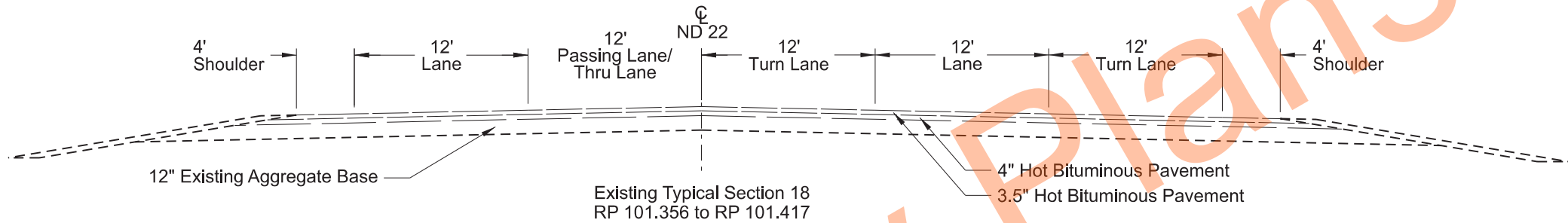
ND Highway 22
17th St SW to Jct ND 200
Existing Typical Sections



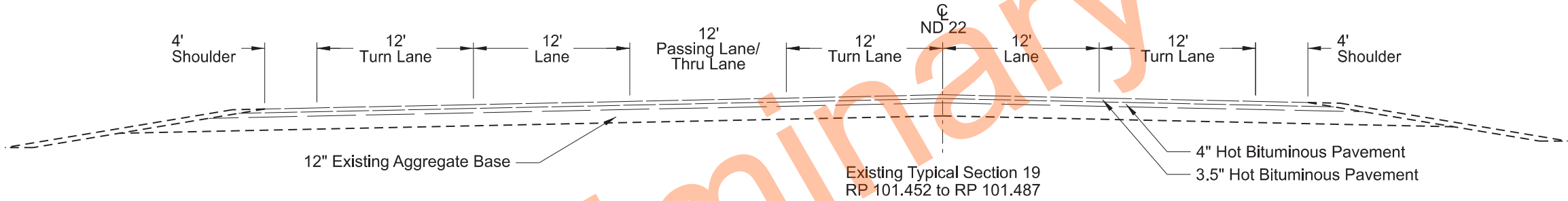
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	5



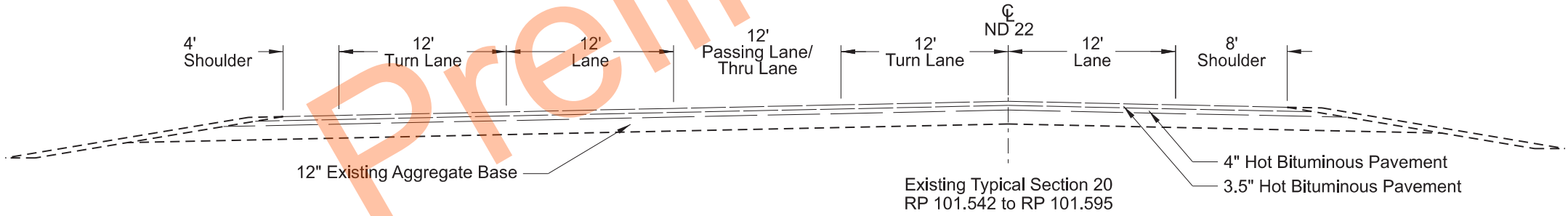
Transition Typ17 to Typ18
RP 101.329 to RP 101.356



Transition Typ18 to Typ19
RP 101.417 to RP 101.452



Transition Typ19 to Typ20
RP 101.487 to RP 101.542

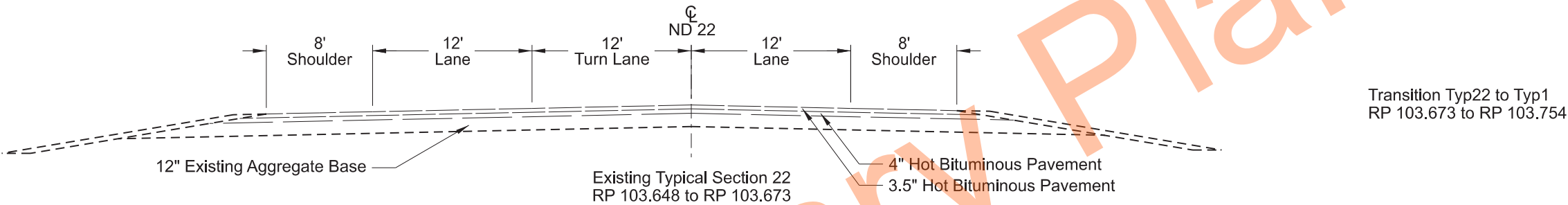
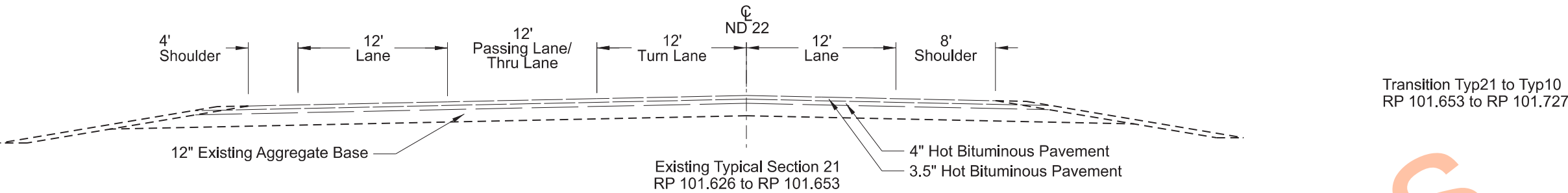


Transition Typ20 to Typ21
RP 101.595 to RP 101.626

ND Highway 22
17th St SW to Jct ND 200
Existing Typical Sections



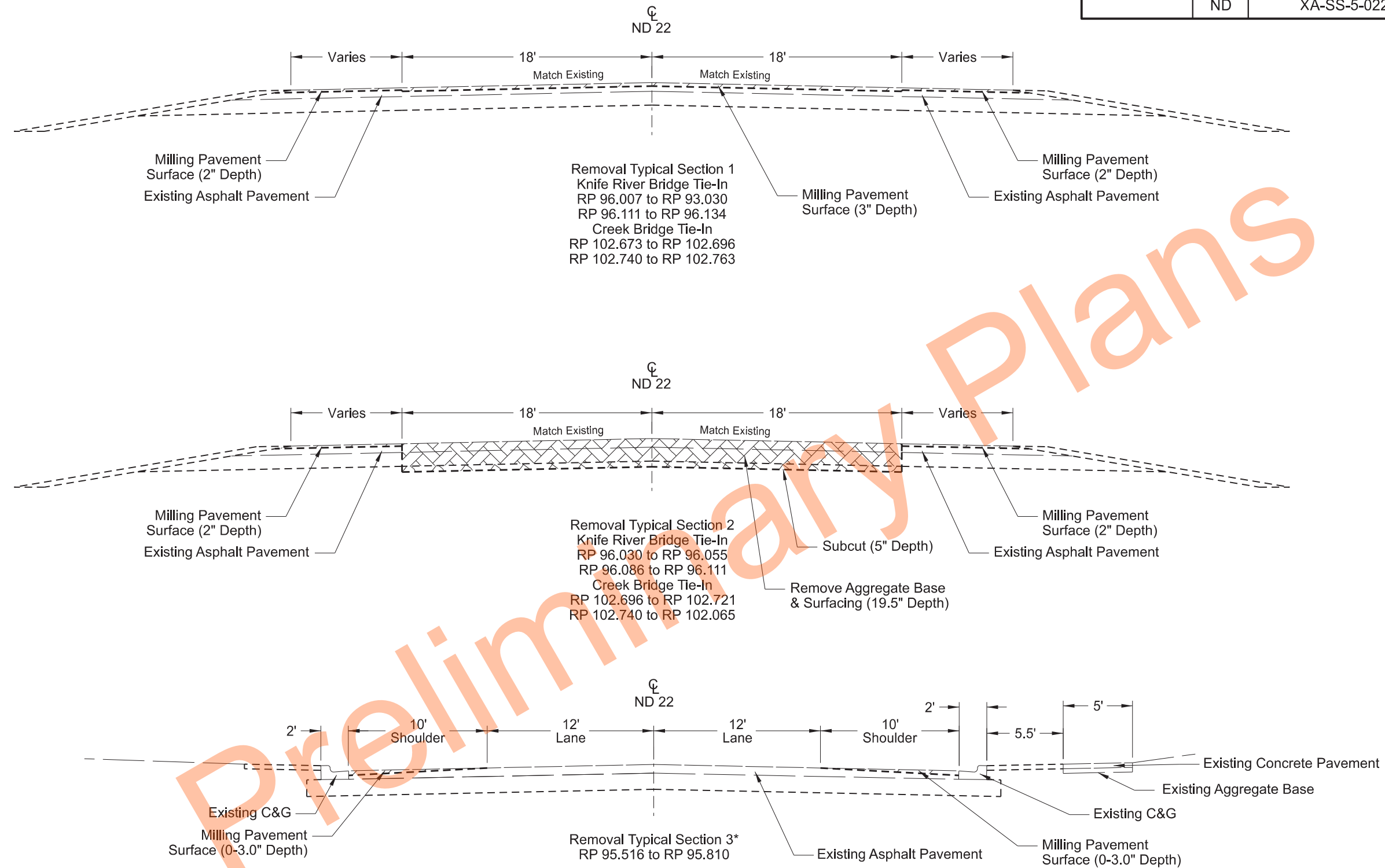
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	6



ND Highway 22
17th St SW to Jct ND 200
Existing Typical Sections



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	7

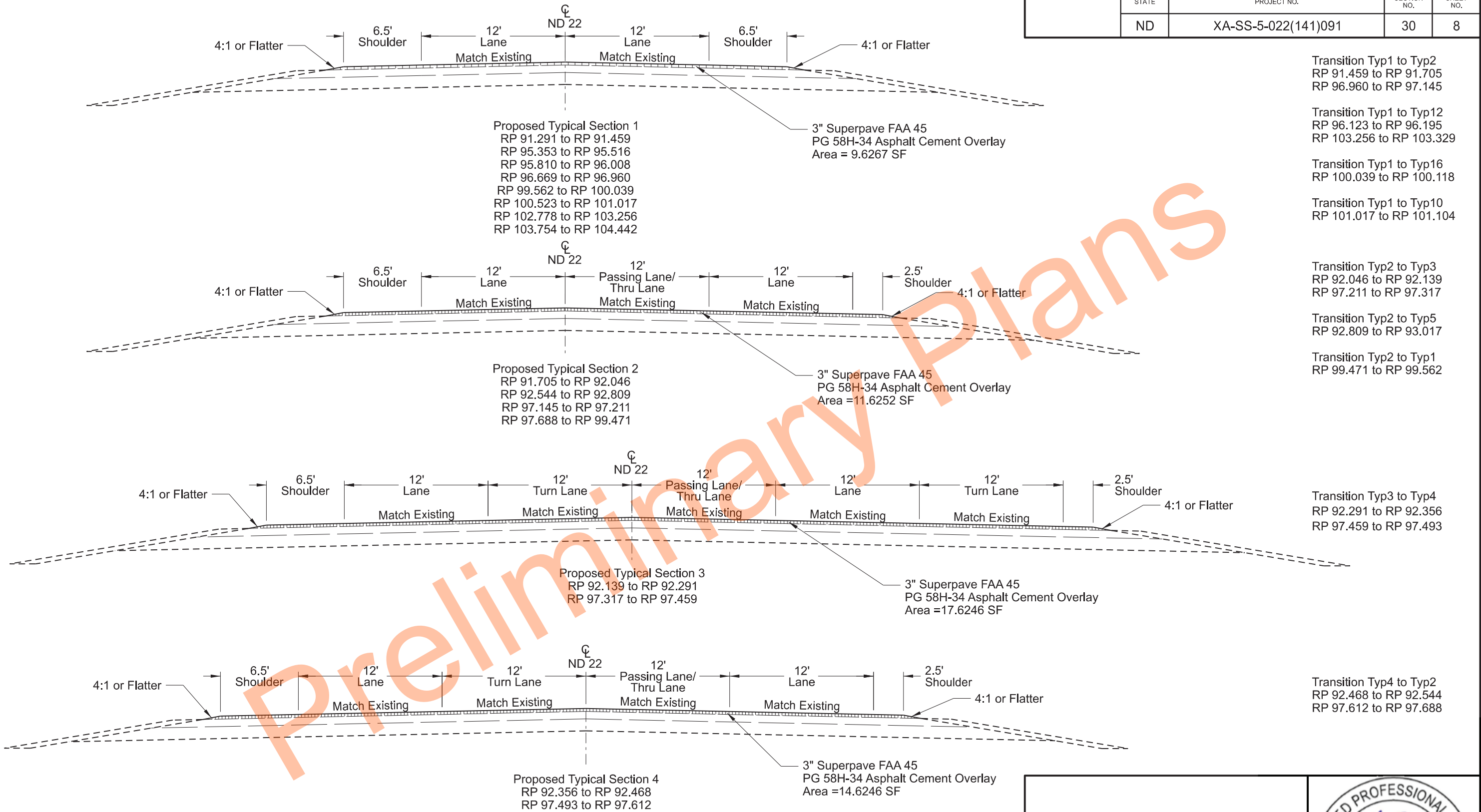


* Driving lanes will not be milled.
Milling depth of shoulder will vary from 0.0-Inch at driving lane edge to a depth that is 3.0-Inches below the top of the curb and gutter face.

ND Highway 22
17th St SW to Jct ND 200
Removal Typical Sections



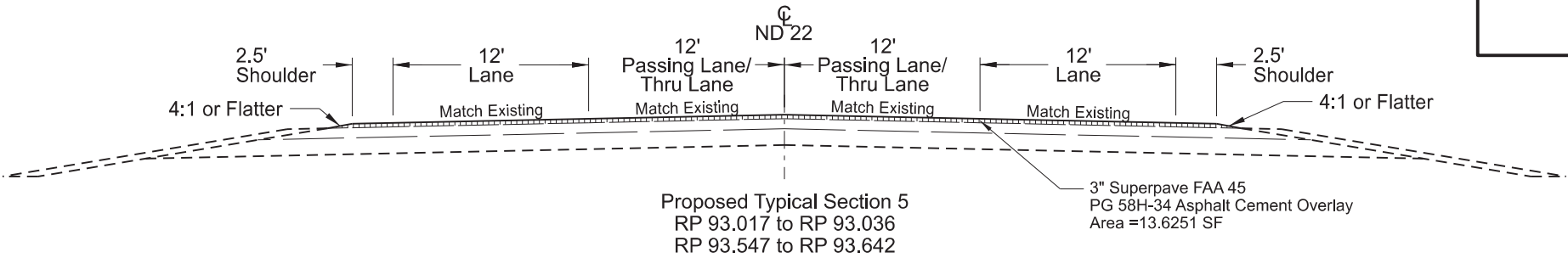
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	30	8



ND Highway 22
17th St SW to Jct ND 200
Proposed Typical Sections

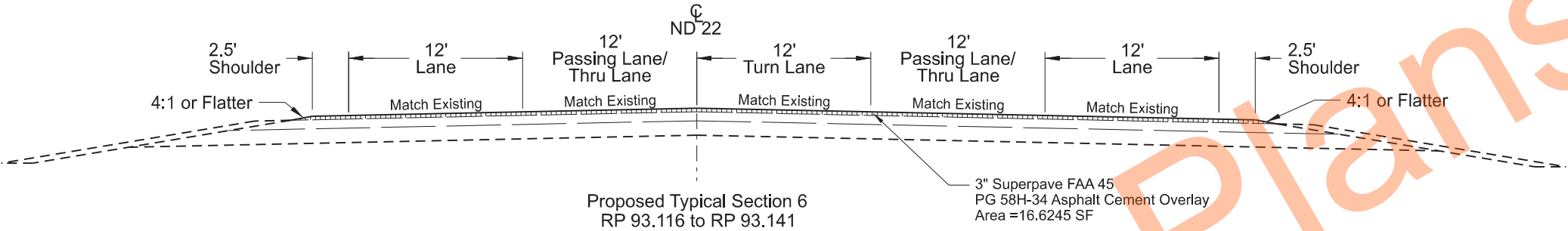


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	9

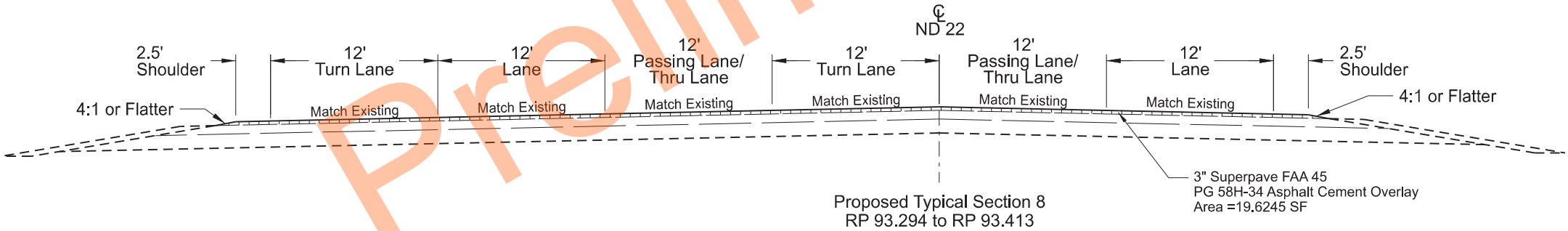
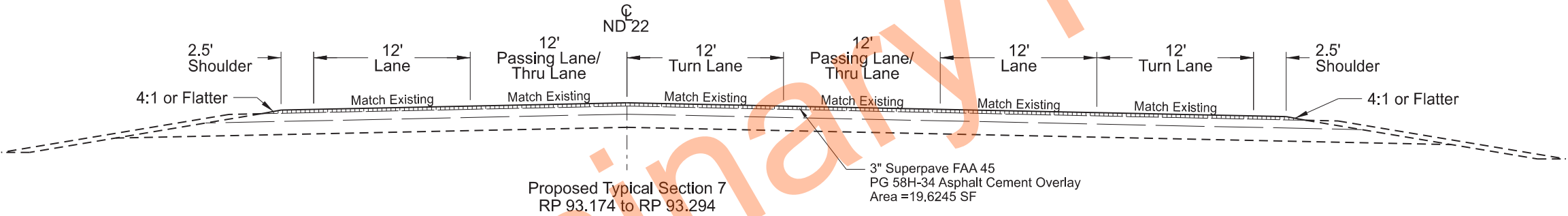


Transition Typ5 to Typ6
RP 93.036 to RP 93.116

Transition Typ5 to Typ10
RP 93.642 to RP 93.869



Transition Typ6 to Typ7
RP 93.141 to RP 93.174

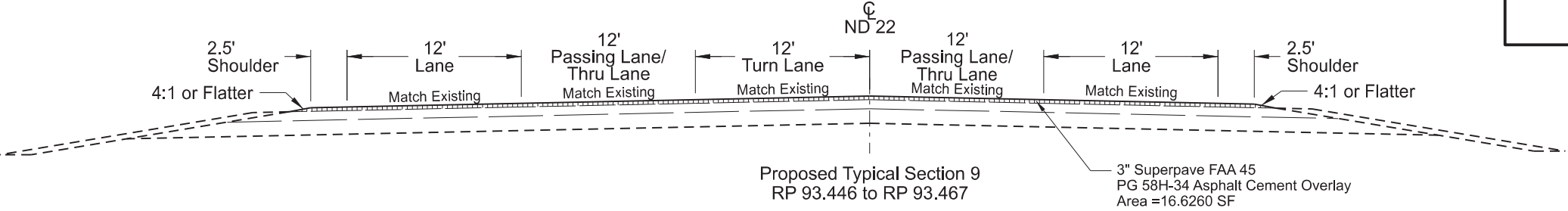


Transition Typ8 to Typ9
RP 93.413 to RP 93.446

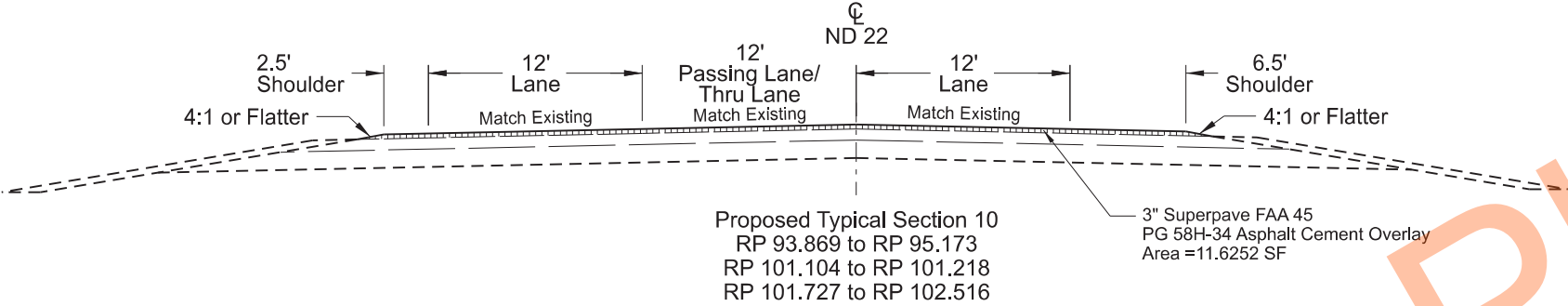
ND Highway 22
17th St SW to Jct ND 200
Proposed Typical Sections



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	30	10



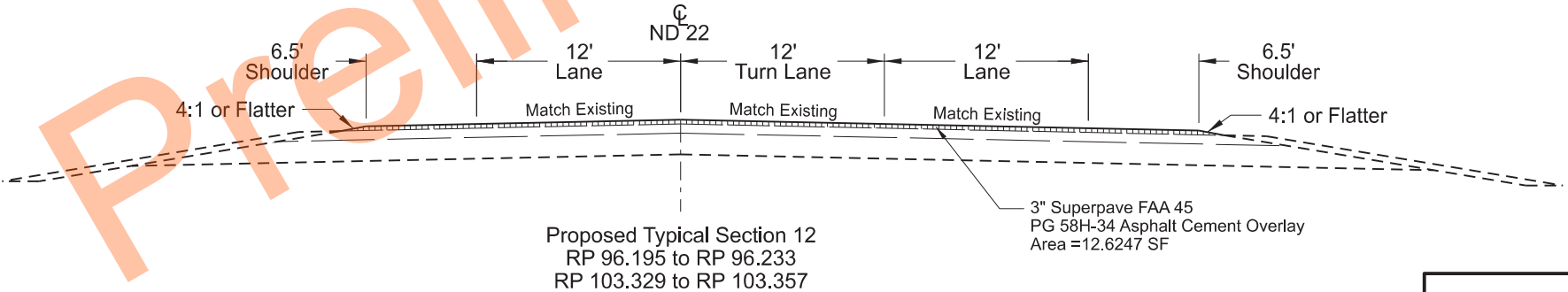
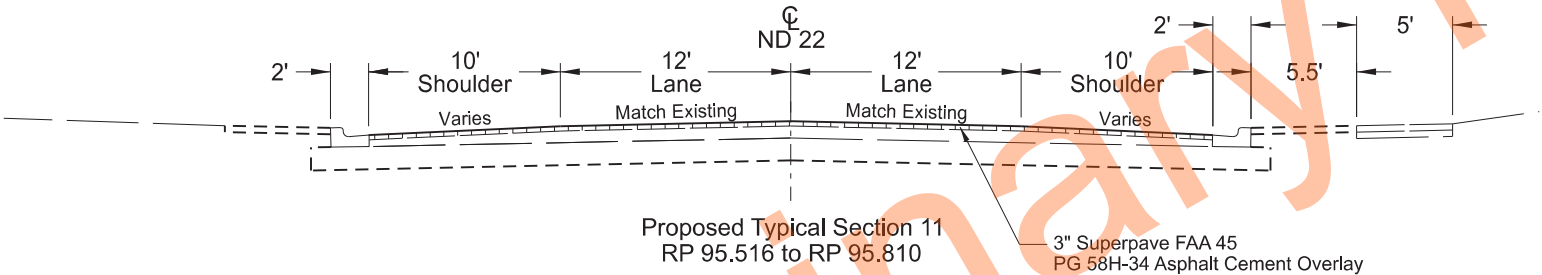
Transition Typ9 to Typ5
RP 93.467 to RP 93.547



Transition Typ10 to Typ1
RP 95.173 to RP 95.353

Transition Typ10 to Typ17
RP 101.218 to RP 101.296

Transition Typ10 to Typ23
RP 102.516 to RP 102.670

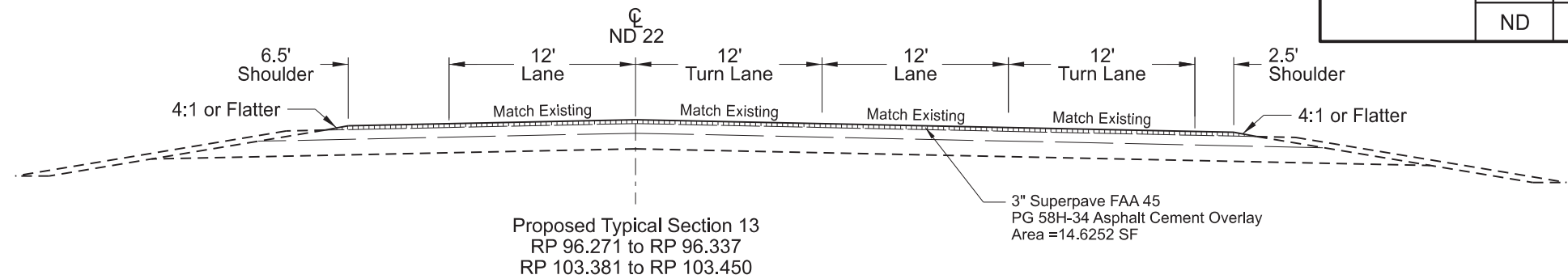


Transition Typ12 to Typ13
RP 96.233 to RP 96.271
RP 103.357 to RP 103.381

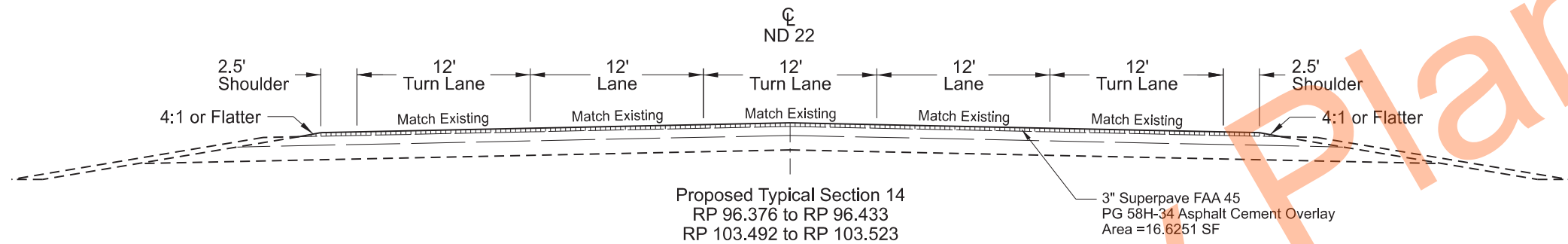
ND Highway 22
17th St SW to Jct ND 200
Proposed Typical Sections



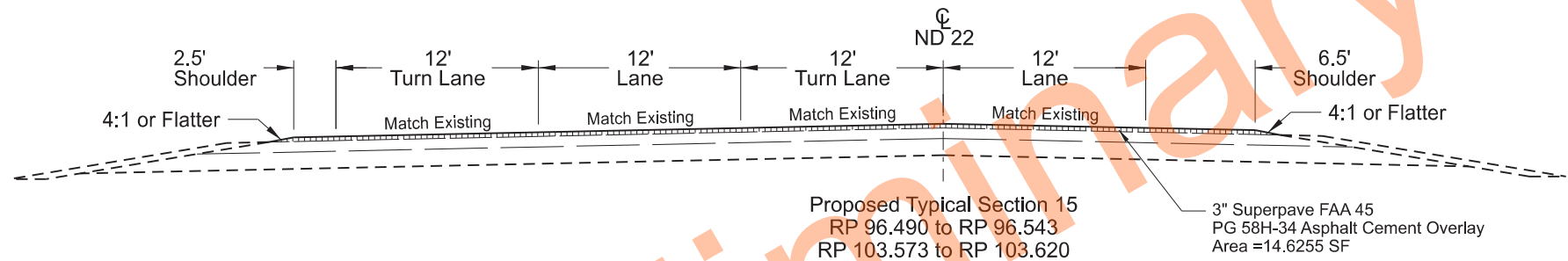
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	30	11



Transition Typ13 to Typ14
RP 96.337 to RP 96.376
RP 103.450 to RP 103.492

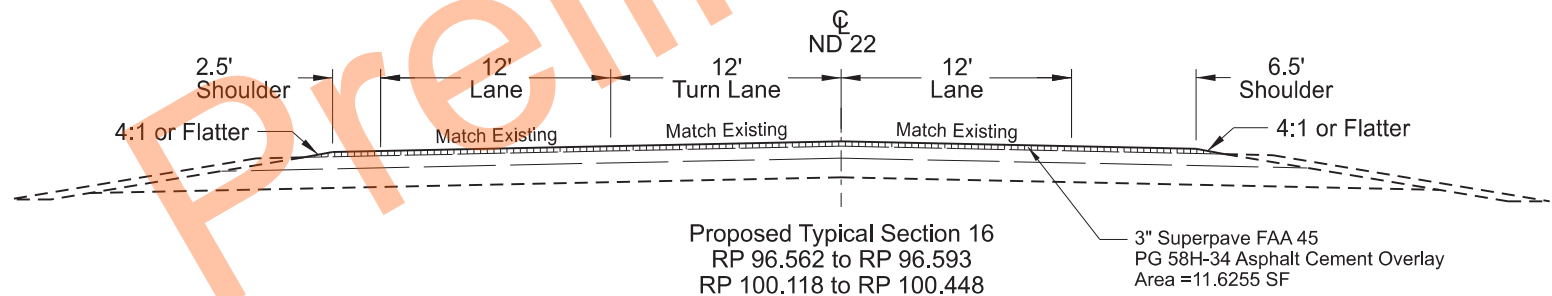


Transition Typ14 to Typ15
RP 96.433 to RP 96.490
RP 103.523 to RP 103.573



Transition Typ15 to Typ16
RP 96.543 to RP 96.562

Transition Typ15 to Typ22
RP 103.620 to RP 103.648

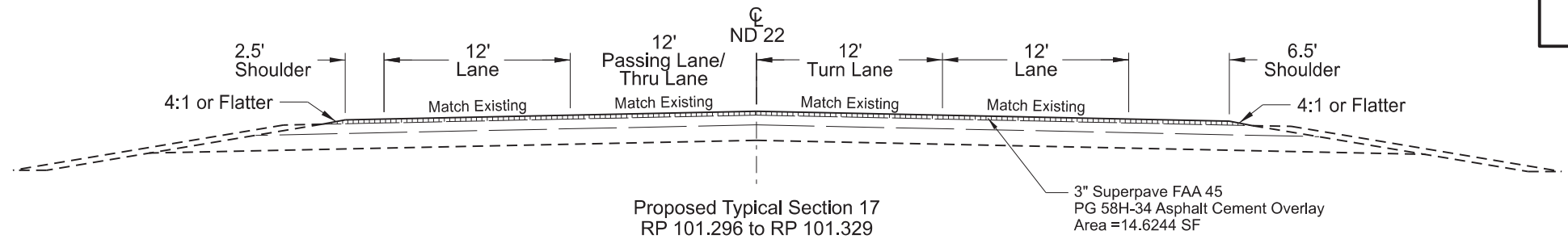


Transition Typ16 to Typ1
RP 96.593 to RP 96.669
RP 100.448 to RP 100.523

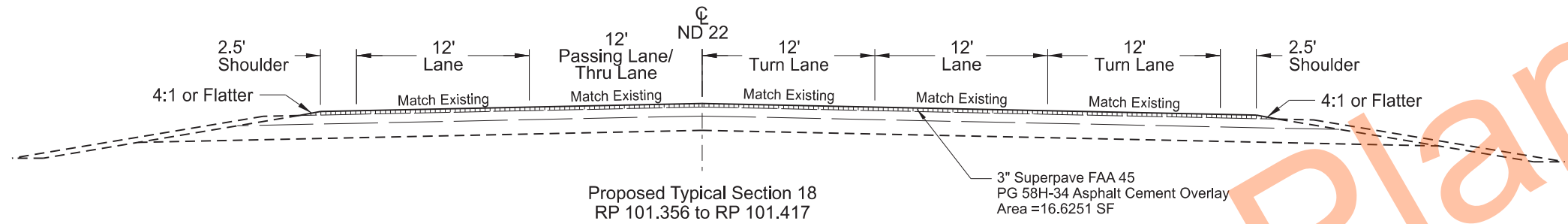
ND Highway 22
17th St SW to Jct ND 200
Proposed Typical Sections



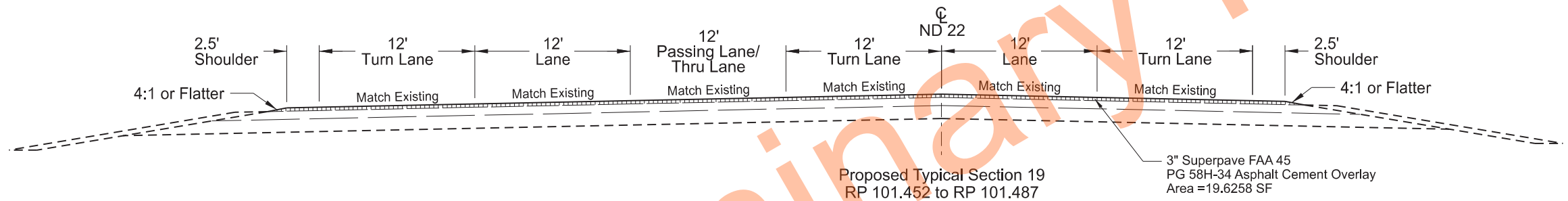
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	12



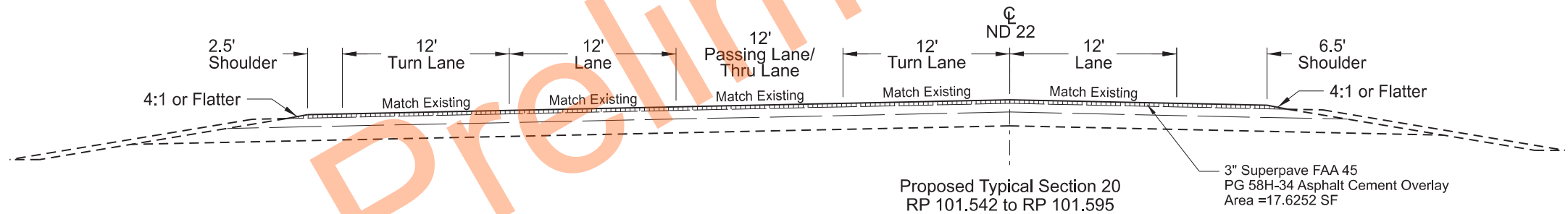
Transition Typ17 to Typ18
RP 101.329 to RP 101.356



Transition Typ18 to Typ19
RP 101.417 to RP 101.452



Transition Typ19 to Typ20
RP 101.487 to RP 101.542

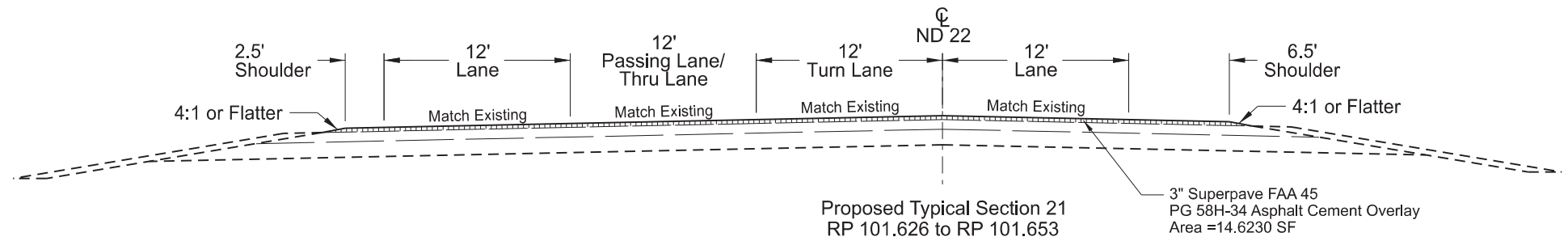


Transition Typ20 to Typ21
RP 101.595 to RP 101.626

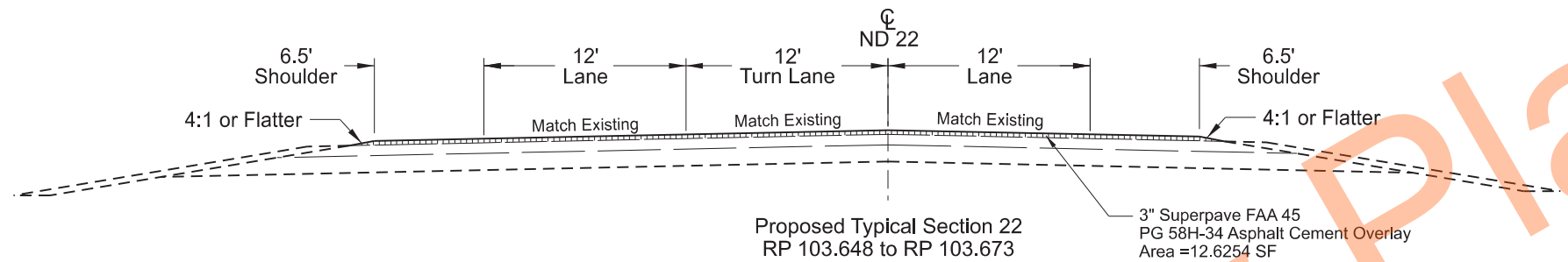
ND Highway 22
17th St SW to Jct ND 200
Proposed Typical Sections



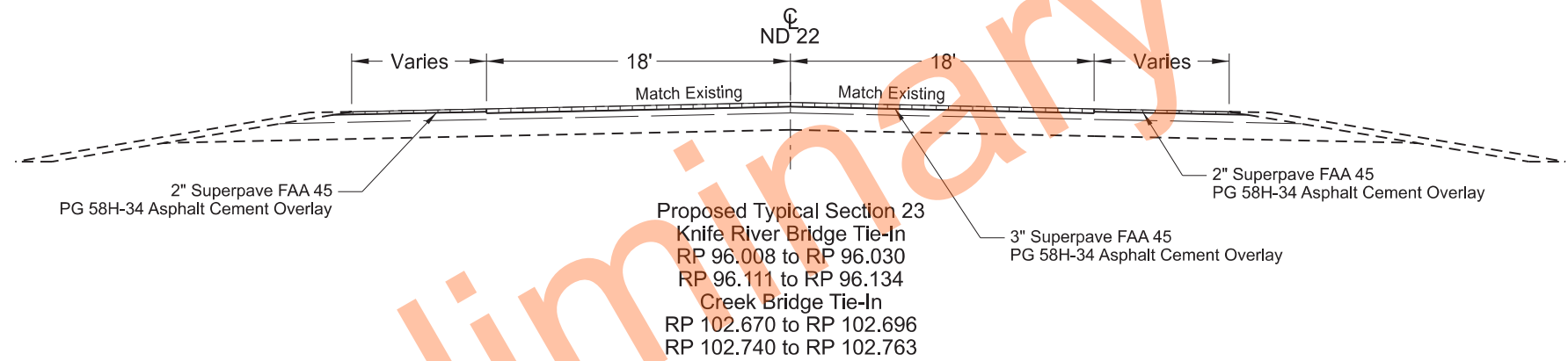
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	13



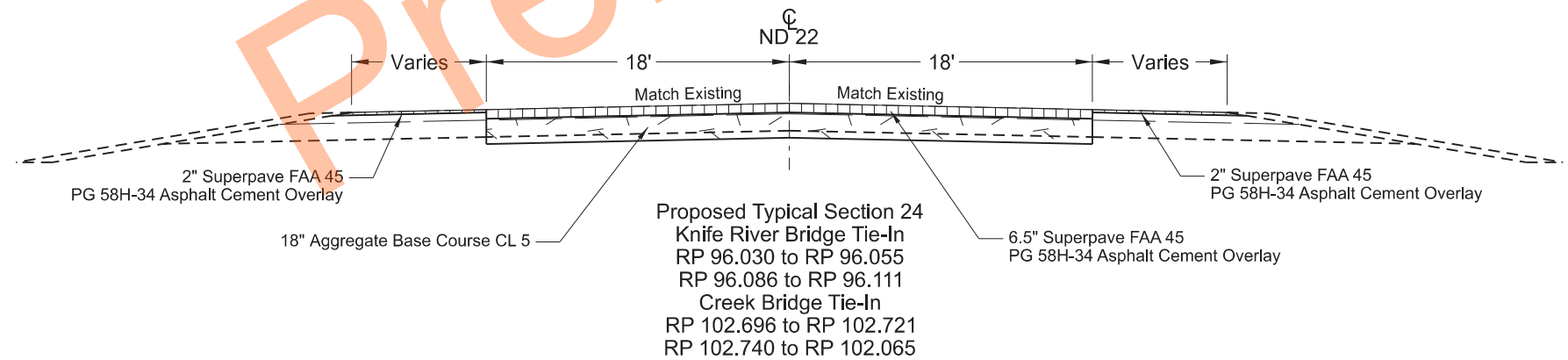
Transition Typ21 to Typ10
RP 101.653 to RP 101.727



Transition Typ22 to Typ1
RP 103.673 to RP 103.754

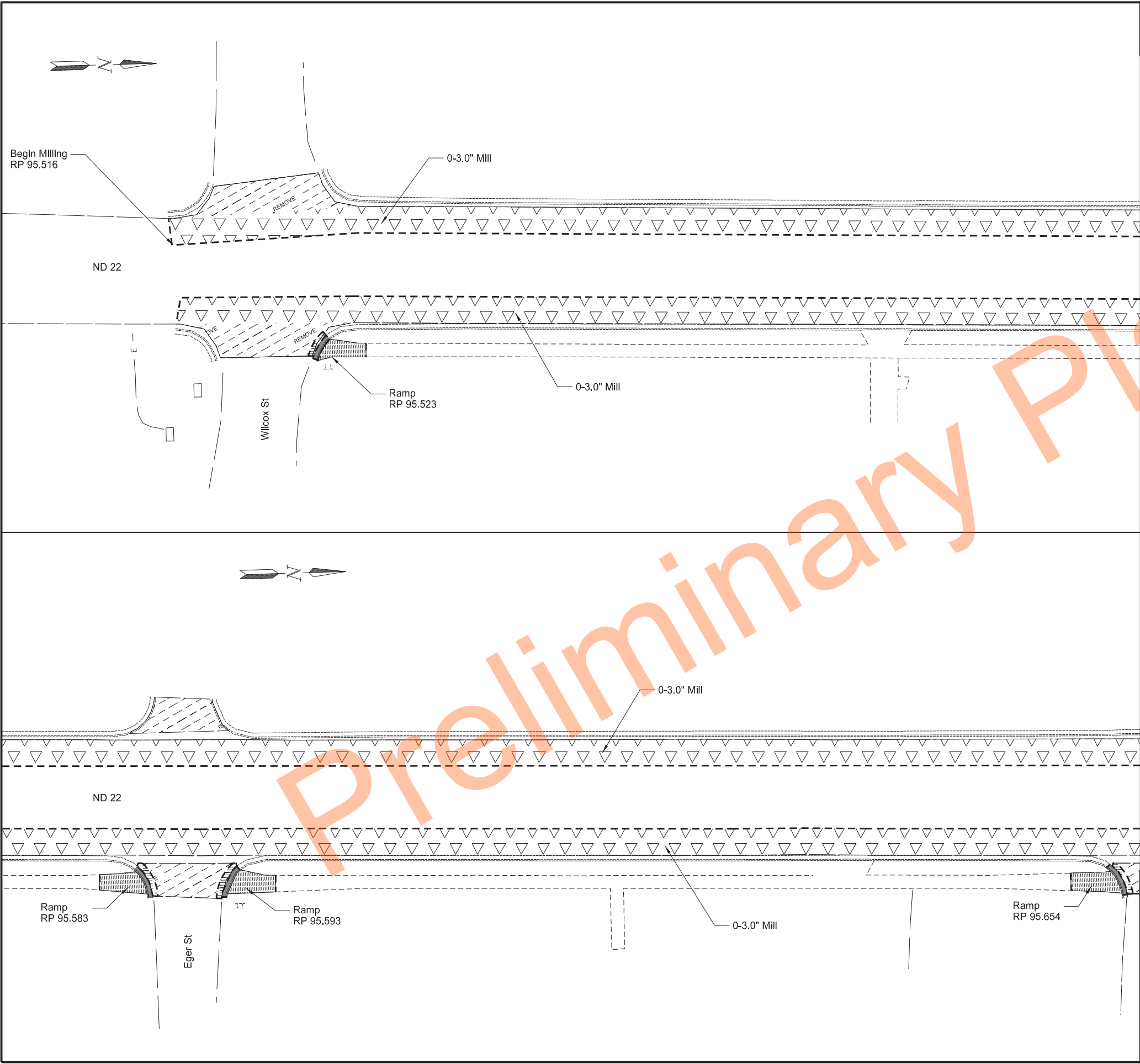


Transition Typ23 to Typ12
RP 95.979 to RP 96.007
RP 96.134 to RP 96.162
RP 102.645 to RP 102.673
RP 102.763 to RP 102.791



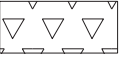
ND Highway 22
17th St SW to Jct ND 200
Proposed Typical Sections



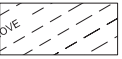


		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(141)091	40	1
SPEC	CODE	BID ITEM		QUANTITY	UNIT
202	0114	REMOVAL OF CONCRETE PAVEMENT			
		RP 95.523		10.9	SY
		RP 95.583		12.7	SY
		RP 95.593		13.6	SY
		RP 95.654		14.2	SY
202	0130	REMOVAL OF CURB & GUTTER			
		RP 95.523		10	LF
		RP 95.583		13	LF
		RP 95.593		14	LF
		RP 95.654		13	LF
202	0132	REMOVAL OF BITUMINOUS SURFACING			
		RP 95.523		2.2	SY
		RP 95.583		3.2	SY
		RP 95.593		3.4	SY
		RP 96.654		2.9	SY
411	0100	MILLING PAVEMENT SURFACE			
		RP 95.516 to RP 95.656		172	TON

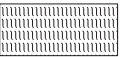
LEGEND



0-3.0" Mill Depth



3-0" Approach Milling



Removal of Concrete Pavement



Removal of Bituminous Surfacing



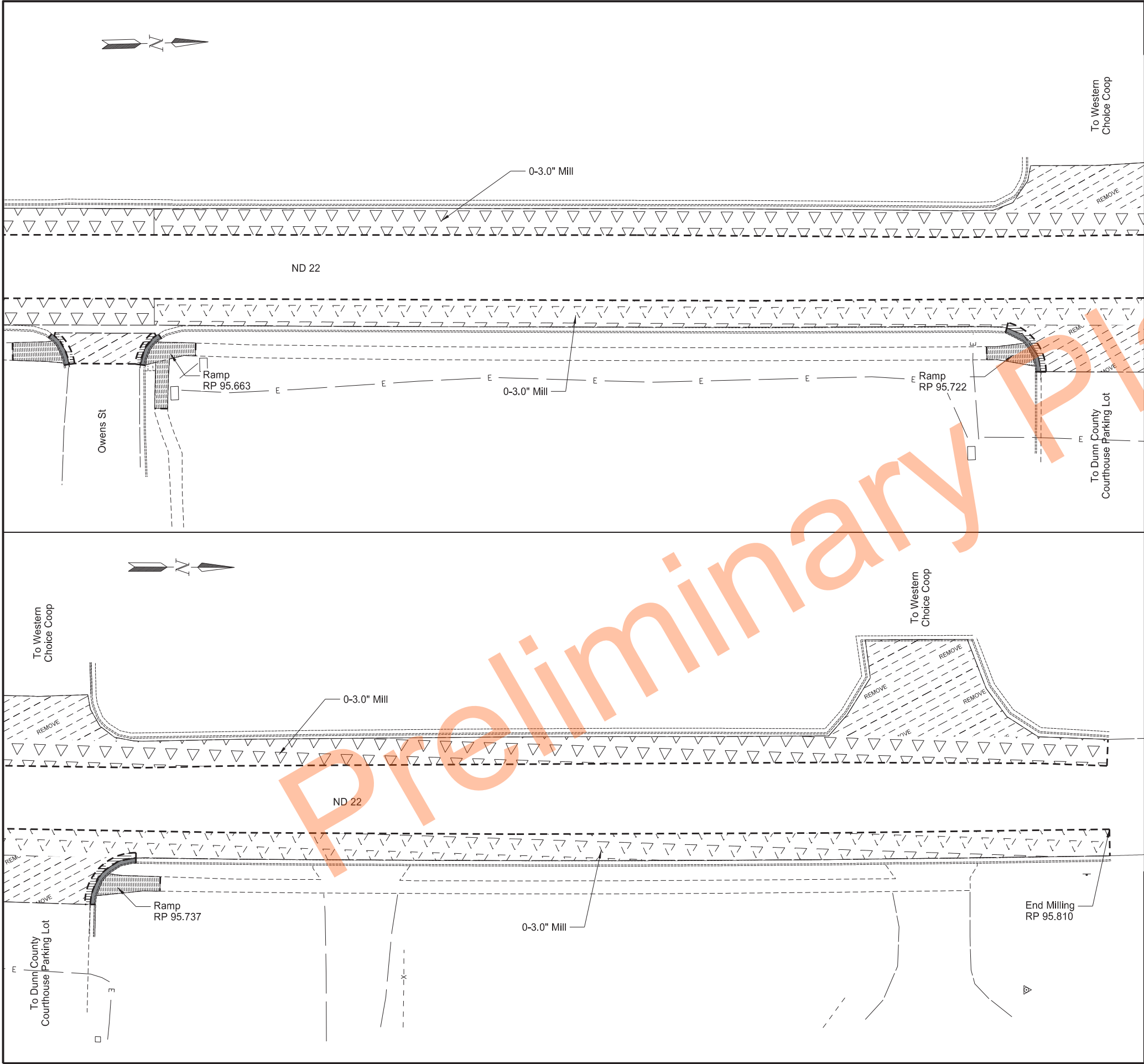
Removal of Curb & Gutter

NOTE:

- Refer to Section 30 Sheet 7 for typical-section view of removal location.
- Driving lanes will not be milled.
- Milling depth of shoulder will vary from 0.0-Inch at driving lane edge to a depth that is 3.0-Inches below the top of the curb and gutter face.

ND Highway 22
17th St SW to Jct ND 200
Manning
Removals
RP 95.516 to RP 95.654





		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(141)091	40	2
SPEC	CODE	BID ITEM		QUANTITY	UNIT
202	0114	REMOVAL OF CONCRETE PAVEMENT			
		RP 95.663		21.8	SY
		RP 95.722		11.7	SY
		RP 95.737		15.8	SY
202	0130	REMOVAL OF CURB & GUTTER			
		RP 95.663		14	LF
		RP 95.722		20	LF
		RP 95.737		25	LF
202	0132	REMOVAL OF BITUMINOUS SURFACING			
		RP 95.663		2.7	SY
		RP 95.722		5.2	SY
		RP 95.737		6.8	SY
411	0100	MILLING PAVEMENT SURFACE			
		RP 95.656 to RP 95.810		219	TON

LEGEND

0-3.0" Mill Depth

3-0" Approach Milling

Removal of Concrete Pavement

Removal of Bituminous Surfacing

Removal of Curb & Gutter

NOTE:

- Refer to Section 30 Sheet 7 for typical-section view of removal location.
- Driving lanes will not be milled.
- Milling depth of shoulder will vary from 0.0-Inch at driving lane edge to a depth that is 3.0-Inches below the top of the curb and gutter face.

ND Highway 22
17th St SW to Jct ND 200
Manning
Removals
RP 95.654 to RP 95.810

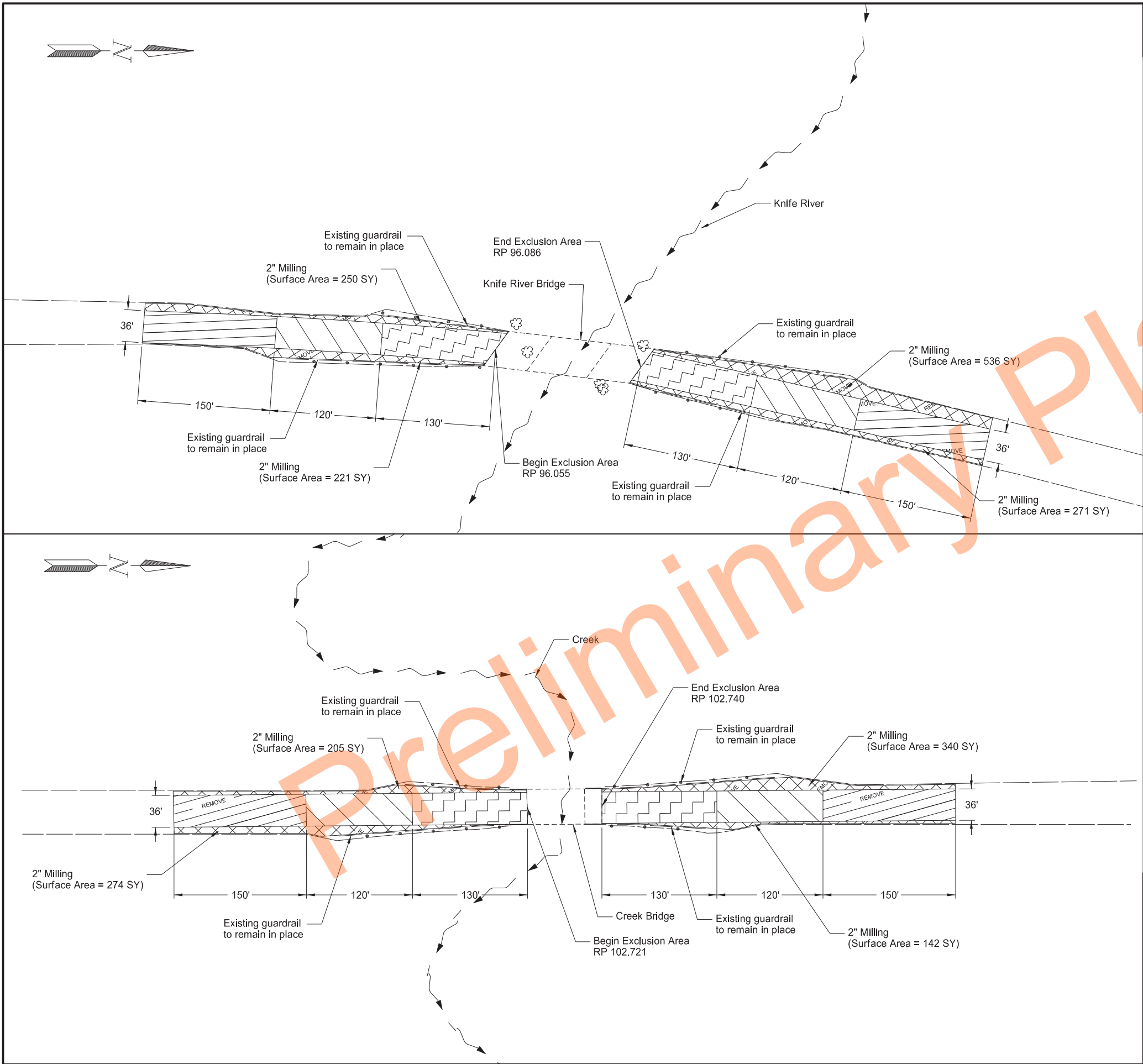
REGISTERED PROFESSIONAL ENGINEER

LUCAS DOERR

PE-25991

DATE 09/26/24

NORTH DAKOTA



		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(141)091	40	3
SPEC	CODE	BID ITEM	QUANTITY	UNIT	
202	0021	REMOVE AGGREGATE BASE & SURFACING			
		RP 96.008 to RP 96.133	1064	TON	
		RP 102.670 to RP 102.788	1064	TON	
203	0138	COMMON EXCAVATION-SUBCUT			
		RP 96.008 to RP 96.133	116	CY	
		RP 102.670 to RP 102.788	116	CY	
411	0100	MILLING PAVEMENT SURFACE			
		RP 96.008 to RP 96.133	402	TON	
		RP 102.670 to RP 102.788	367	TON	

LEGEND

Milling Transition

3" Depth Mill

2" Depth Mill

Remove Aggregate Base & Surfacing, Common Excavation-Subcut

NOTES:

- Refer to Section 20, Sheet 3 for Milling Transitions.

- Refer to Section 20, Sheet 4 for Bridge Repair Sections.

- Refer to Section 30, Sheet 7 for typical-section view of removal location.

ND Highway 22
17th St SW to Jct ND 200

Removals

Wetland Impact Table												
Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands ¹	Wetland Impacts Acre(s)				USFWS Easement Impacts Acre(s)		Wetland Mitigation	
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm.	EO 11990	USACE	USFWS
#2A	Sec. 7, T144N, R95W	Slope	Natural	Yes	0.02	0.00				N	N	N
#2B	Sec. 8, T144N, R95W	Slope	Natural	Yes	0.02	0.00				N	N	N
Totals					0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Other Waters Impact Table																	
Other Waters													Other Water Mitigation				
Number	Location	Type	Size		Feature	USACE Jurisdictional ¹	Impacts to Other Waters						Mitigation Required				
			Acre(s)	Linear Feet			Acres			Linear Feet			EO 11990	USACE	USFWS	Mitigation Location; ratio	Method
							Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm. (Fill/Drain)	Perm. (Cut)					
#OW 1A	Sec. 6, T143N, R95W	River	0.25	279	Natural	Yes	0.05		0.10	107.00		83.00	N	N	N		
						Totals	0.05	0.00	0.10	107.00	0.00	83.00					

¹ All wetland Jurisdictional Determination was issued by the USACE on 02/24/2023. NWO-2012-01608-BIS

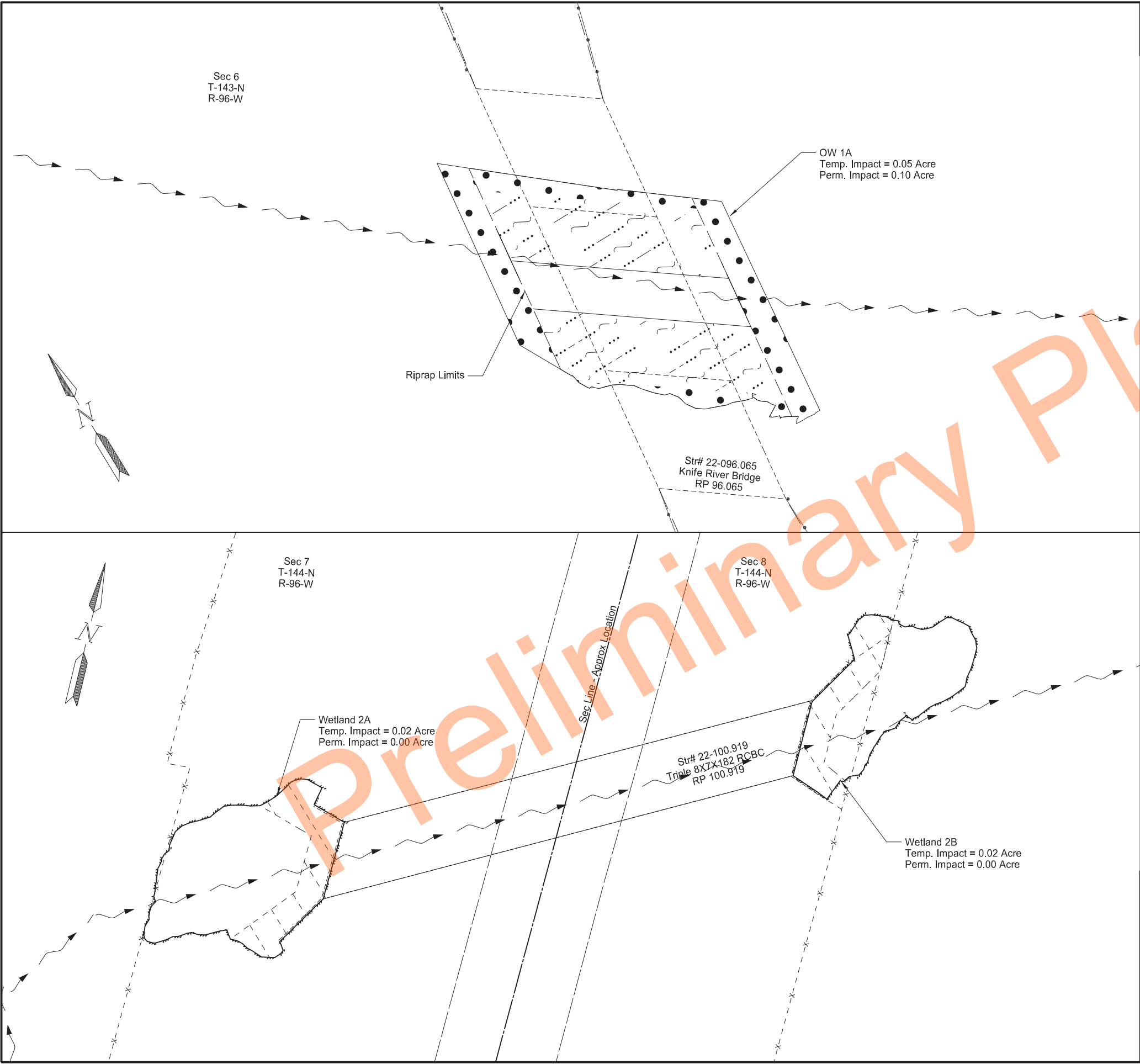
Impact Summary Table			
Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
JD (Fill/Drain)	0.00	Temporary JD	0.05
Non-JD (Fill/Drain)	0.00	Non-JD Temporary	0.00
Artificial/JD (Fill/Drain)	0.00	Permanent JD > 0.10	0.10
Artificial /Non-JD (Fill/Drain))	0.00	Permanent OW	0
Total	0.00	Temporary OW	0
JD (Cut)	0.00		
Non-JD (Cut)	0.00		
Total	0.00		

Mitigation Summary Table						
	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)	DUCKS UNLIMITED CREDITS Acre(s)
USACE Only	NA					
EO 11990 Only	NA					
USACE/11990	NA					
USFWS	NA					
Total		0	0	0	0	0

ND Highway 22
17th St SW to Jct ND 200

Wetland Impacts Table





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	75	2

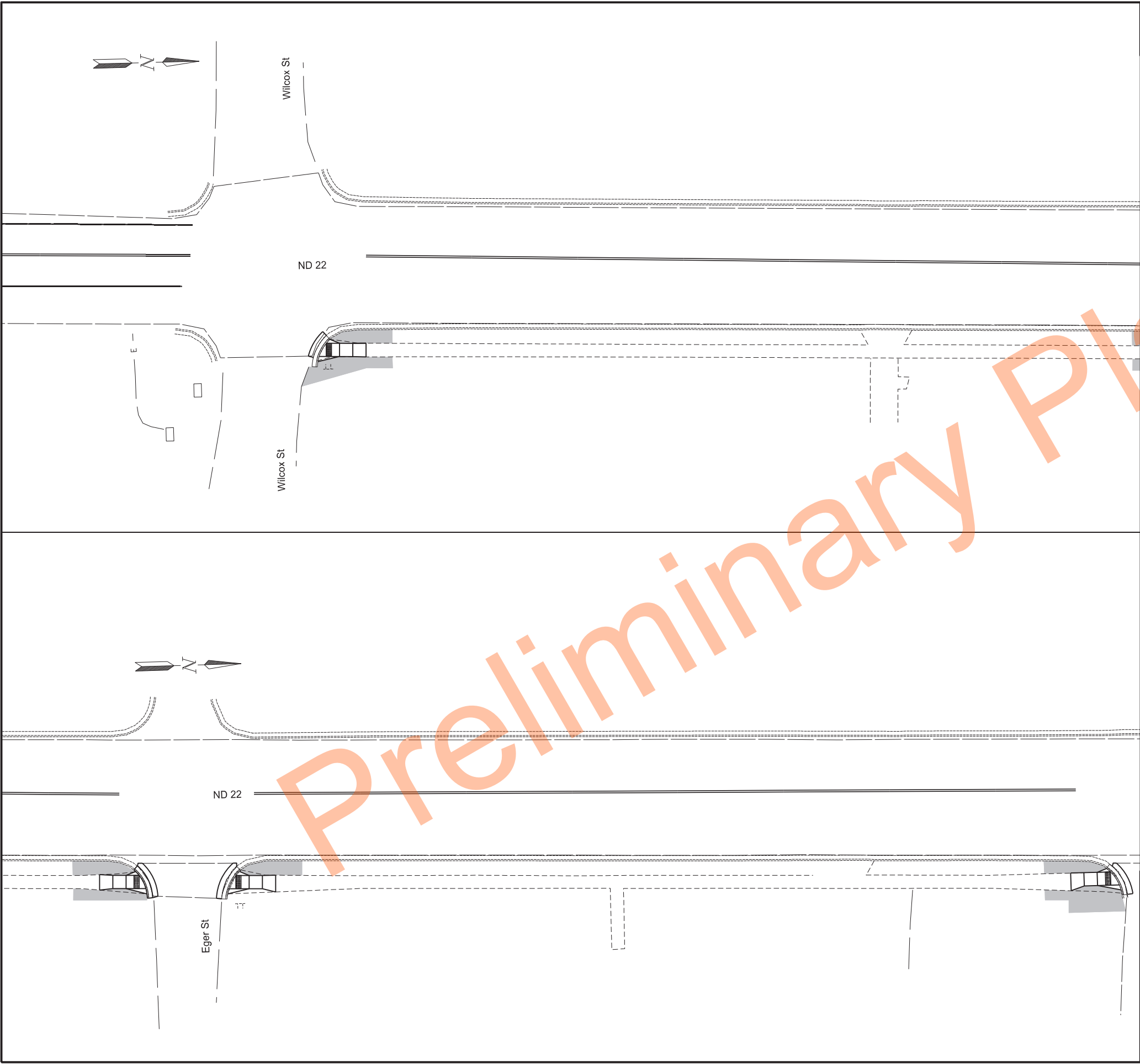
LEGEND

- Wetland Feature Line
- Other Waters Feature Line
- Grading Tie Line
- Flow Line
- Permanent Impact
- Temporary Impact
- Wetland Temporary Impact

ND Highway 22
17th St SW to Jct ND 200

Wetland Impacts
RP 96.065 & RP 100.919





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	76	1

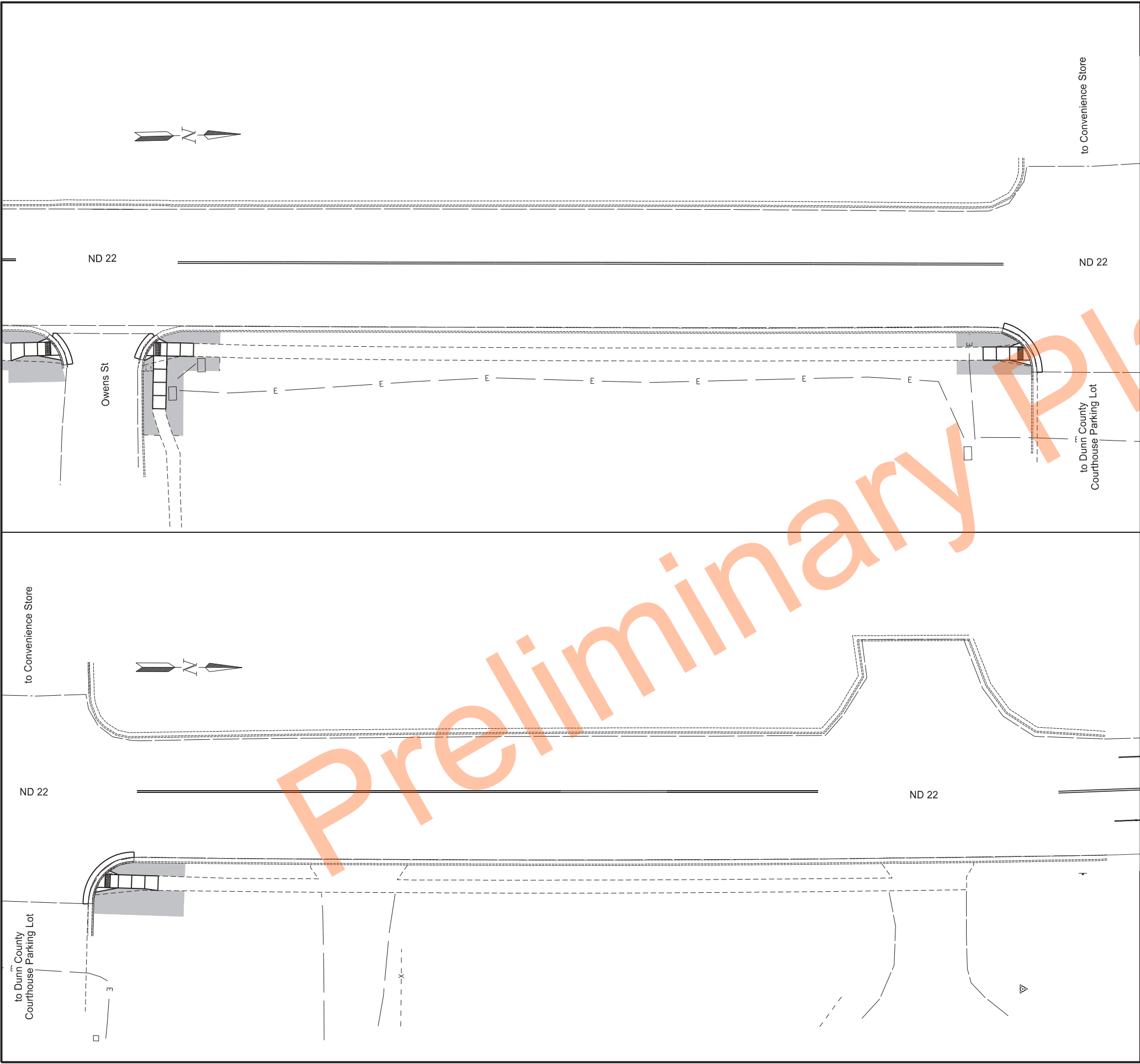
SPEC	CODE	BID ITEM	ANTITY	UNIT
253	0200	HYDRAULIC MULCH		
		RP 95.523	33.2	SY
		RP 95.583	24.6	SY
		RP 95.593	12.6	SY
		RP 95.654	26.9	SY

LEGEND

Hydraulic Mulch

ND Highway 22
17th St SW to Jct ND 200
Temporary Sediment and Erosion Control
RP 95.516 to RP 95.654

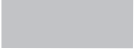




	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	76	2

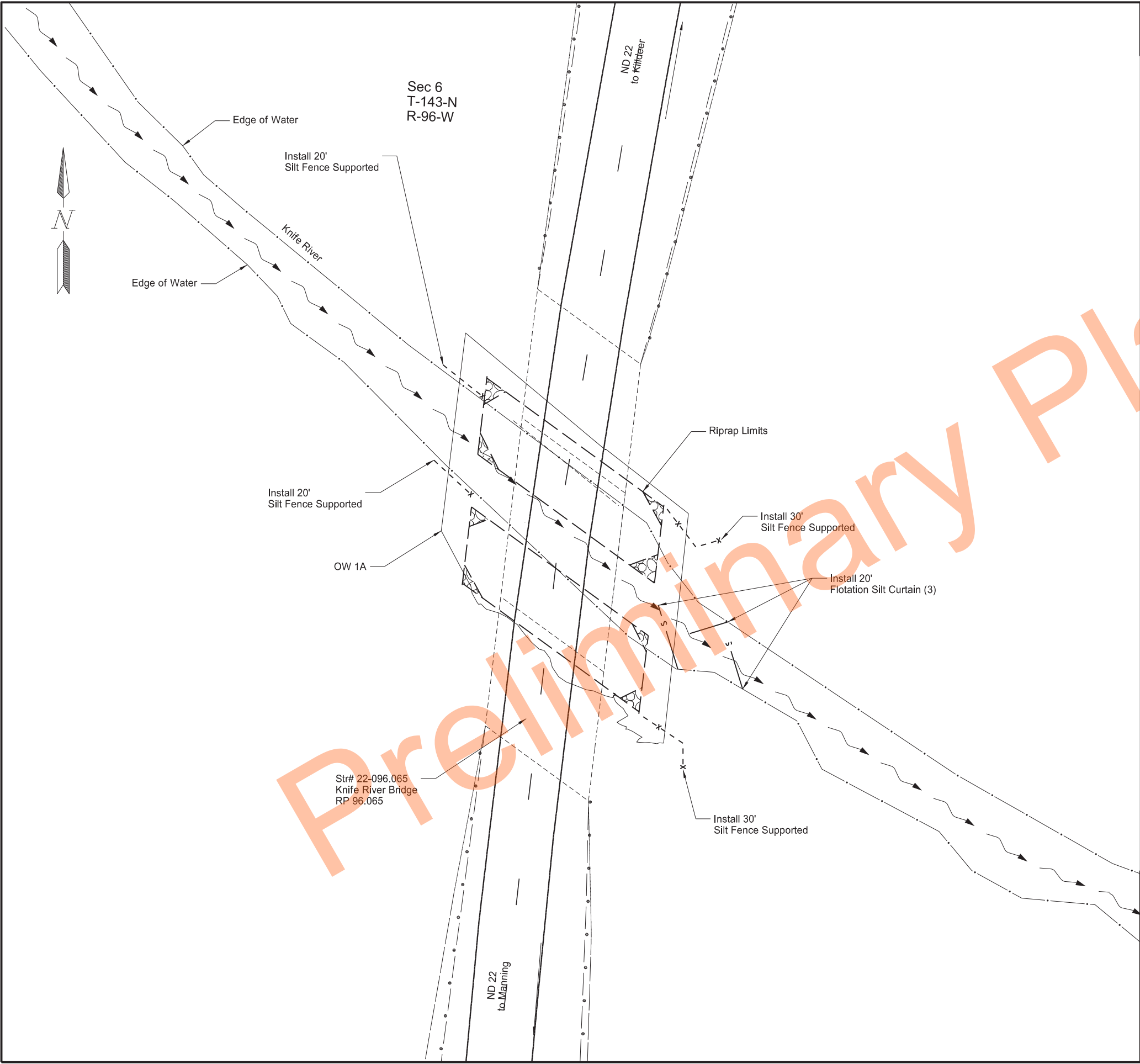
SPEC	CODE	BID ITEM	ANTITY	UNIT
253	0200	HYDRAULIC MULCH		
		RP 95.654	8.6	SY
		RP 95.663	53.0	SY
		RP 95.722	28.7	SY
		RP 95.737	50.2	SY

LEGEND

 Hydraulic Mulch

ND Highway 22
17th St SW to Jct ND 200
Temporary Sediment and Erosion Control
RP 95.654 to RP 95.810





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	76	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
260	0200	SILT FENCE SUPPORTED		
		RP 96.061	30	LF
		RP 96.061	20	LF
		RP 96.062	30	LF
		RP 96.062	20	LF
260	0201	REMOVE SILT FENCE SUPPORTED		
		RP 96.061	30	LF
		RP 96.061	20	LF
		RP 96.062	30	LF
		RP 96.062	20	LF
262	0100	FLOTATION SILT CURTAIN		
		RP 96.061	60	LF
262	0101	REMOVE FLOTATION SILT CURTAIN		
		RP 96.061	60	LF

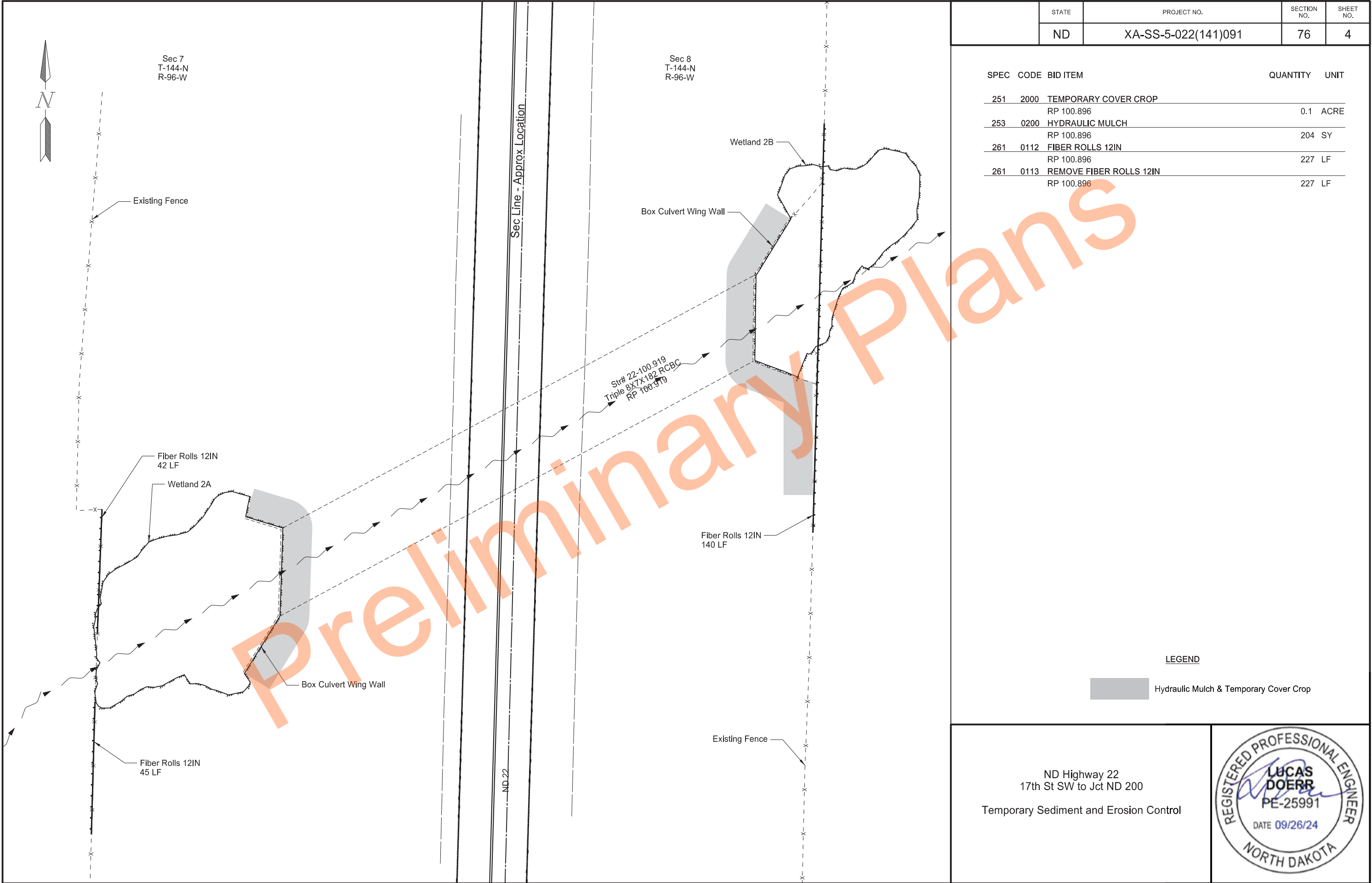
LEGEND

Flow Direction

NOTE:
- *DRAWING NOT TO SCALE
- Water Level may vary in field.

ND Highway 22
17th St SW to Jct ND 200
Temporary Sediment and Erosion Control





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	76	4

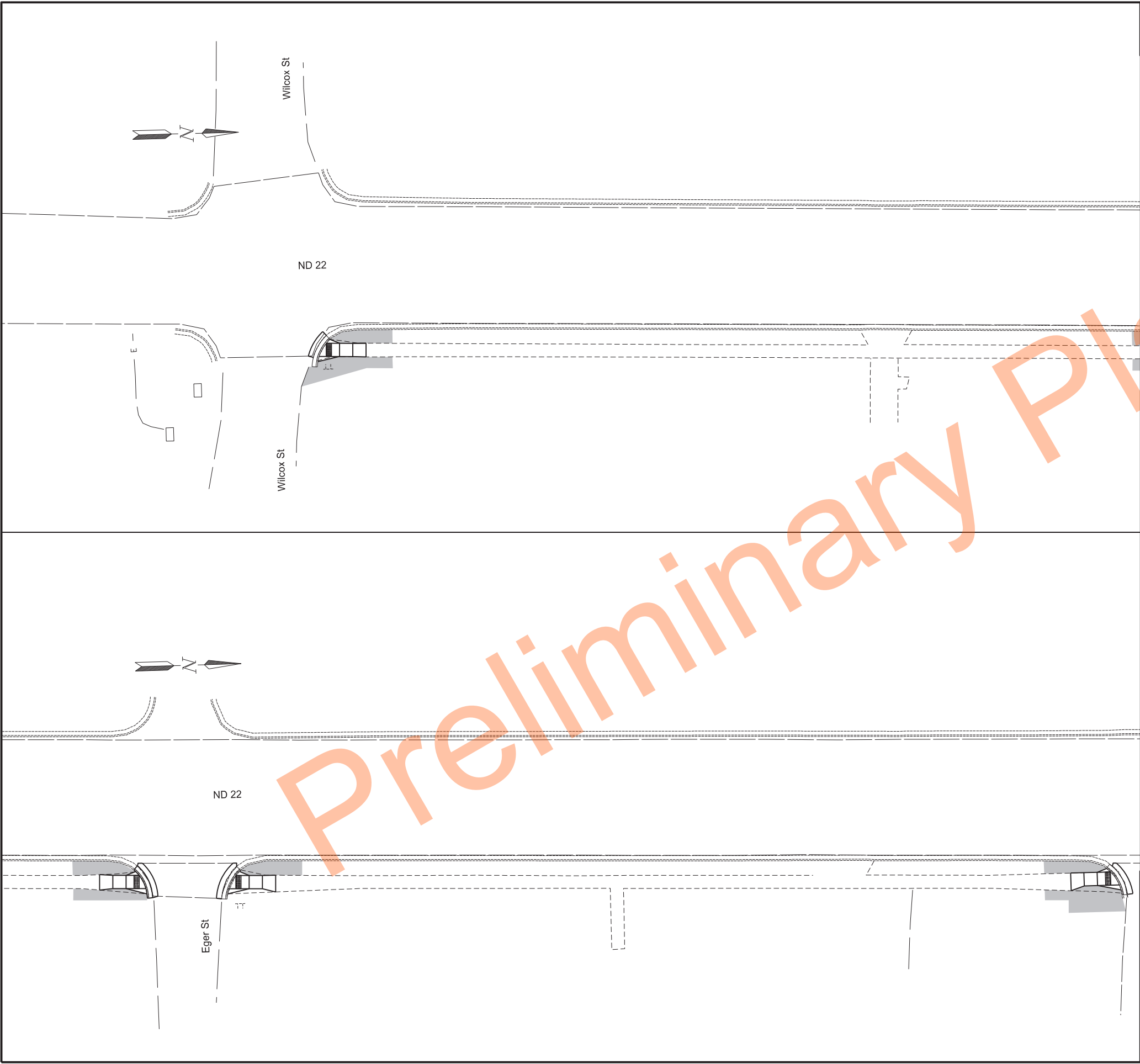
SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	2000	TEMPORARY COVER CROP		
		RP 100.896	0.1	ACRE
253	0200	HYDRAULIC MULCH		
		RP 100.896	204	SY
261	0112	FIBER ROLLS 12IN		
		RP 100.896	227	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		RP 100.896	227	LF

LEGEND

Hydraulic Mulch & Temporary Cover Crop

ND Highway 22
17th St SW to Jct ND 200
Temporary Sediment and Erosion Control

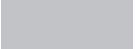




	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	77	1

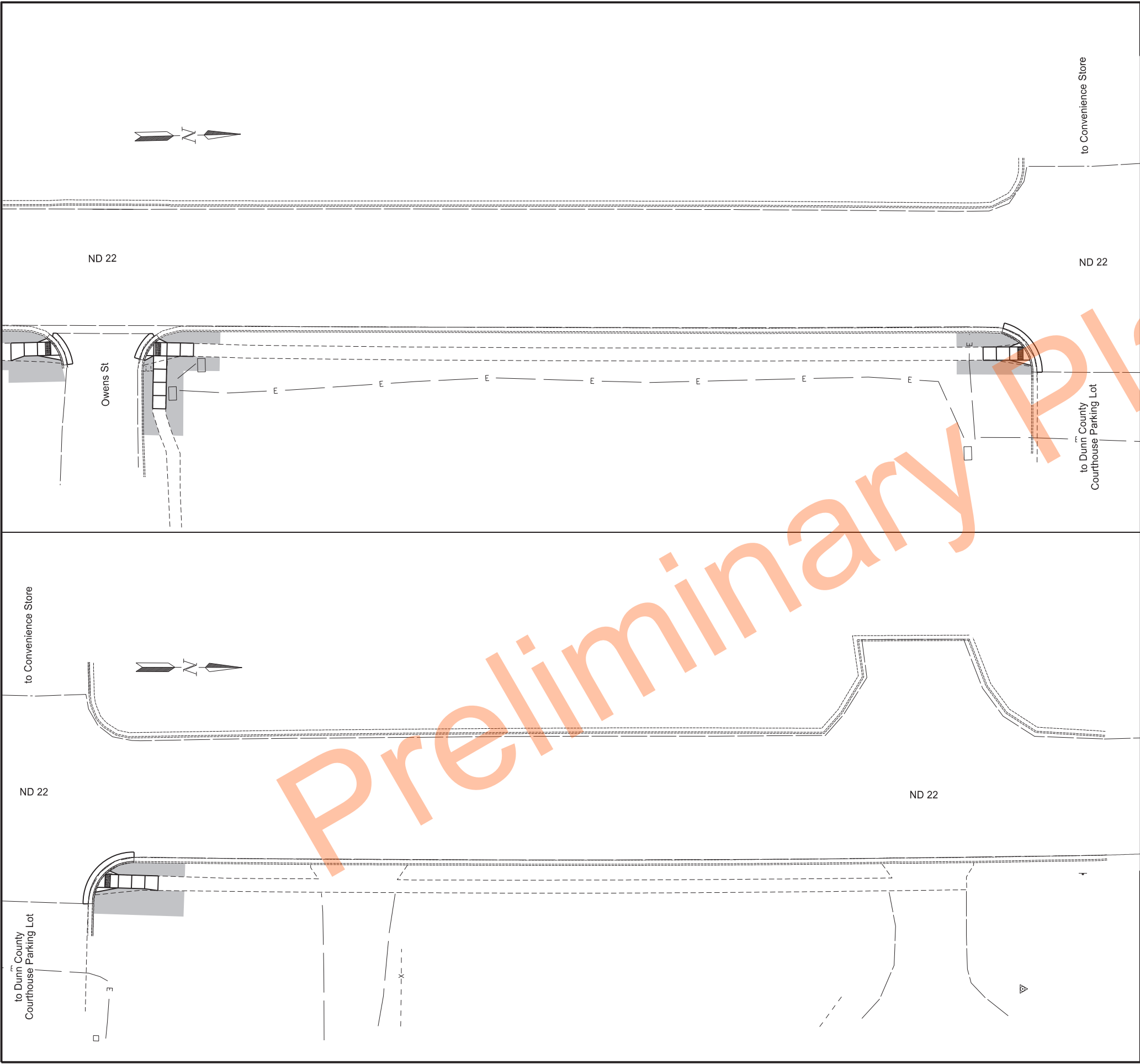
SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0100	SEEDING CLASS I		
		RP 95.523 to RP 95.654	0.1	ACRE
253	0200	HYDRAULIC MULCH		
		RP 95.523	33.2	SY
		RP 95.583	24.6	SY
		RP 95.593	12.6	SY
		RP 95.654	26.9	SY

LEGEND

 Seeding Class I & Hydraulic Mulch

ND Highway 22
17th St SW to Jct ND 200
Permanent Sediment and Erosion Control
RP 95.516 to RP 95.654

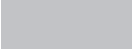




	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	77	2

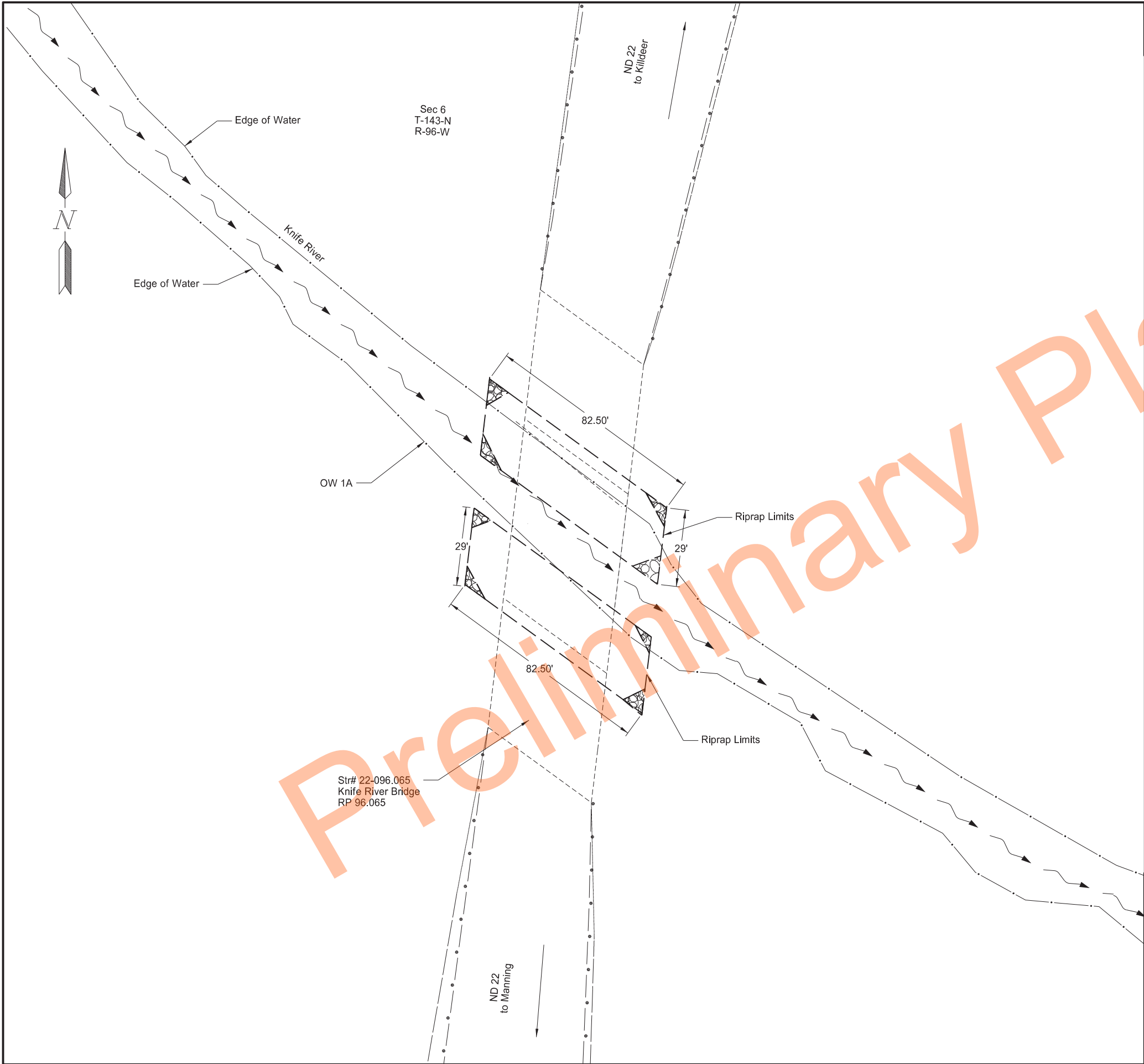
SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0100	SEEDING CLASS I		
		RP 95.654 to RP 95.737	0.1	ACRE
253	0200	HYDRAULIC MULCH		
		RP 95.654	8.6	SY
		RP 95.663	53.0	SY
		RP 95.722	28.7	SY
		RP 95.737	50.2	SY

LEGEND

 Seeding Class I & Hydraulic Mulch

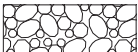
ND Highway 22
17th St SW to Jct ND 200
Permanent Sediment and Erosion Control
RP 95.654 to RP 95.810





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	77	3

LEGEND

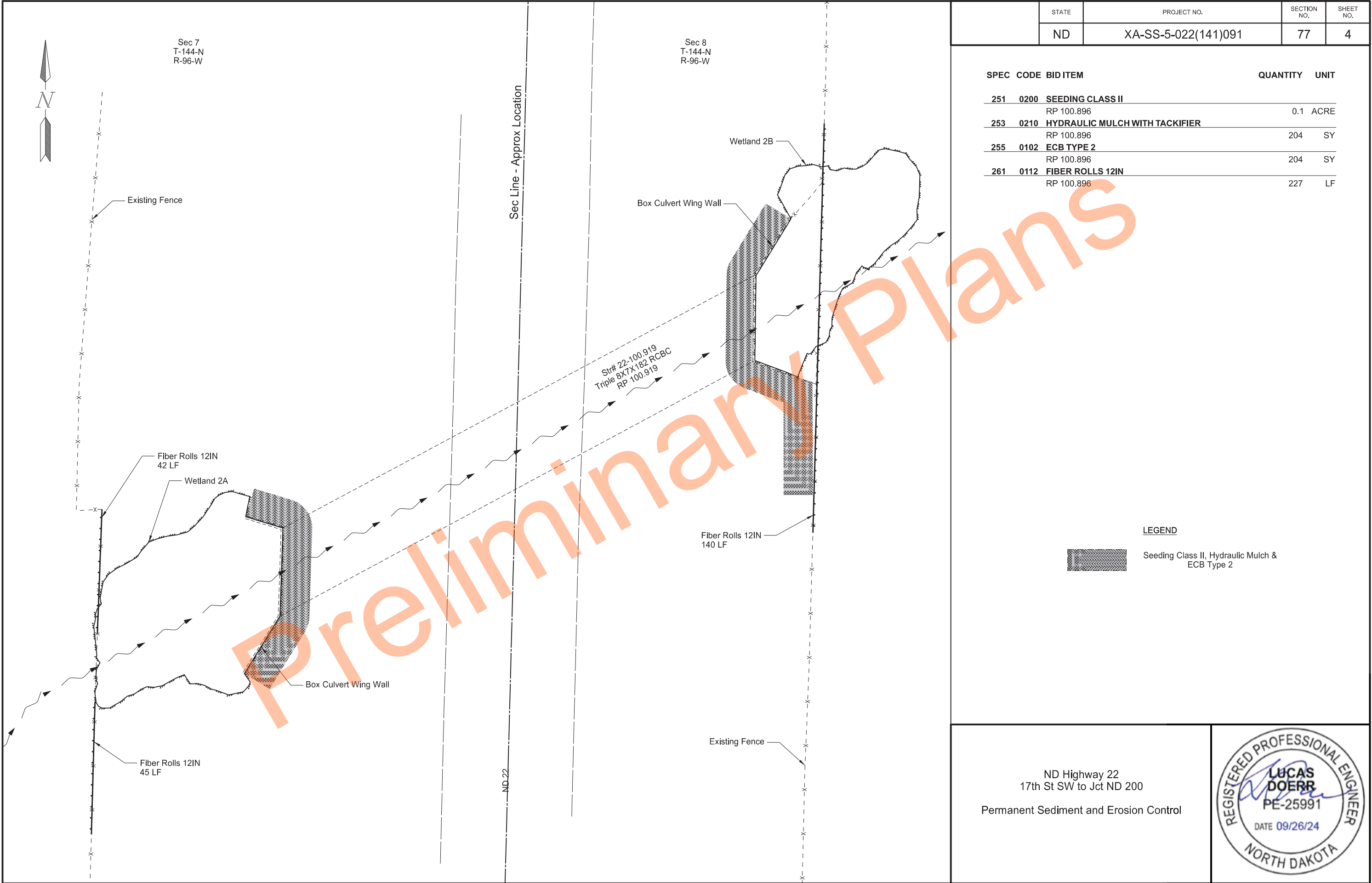
 Riprap Grade II

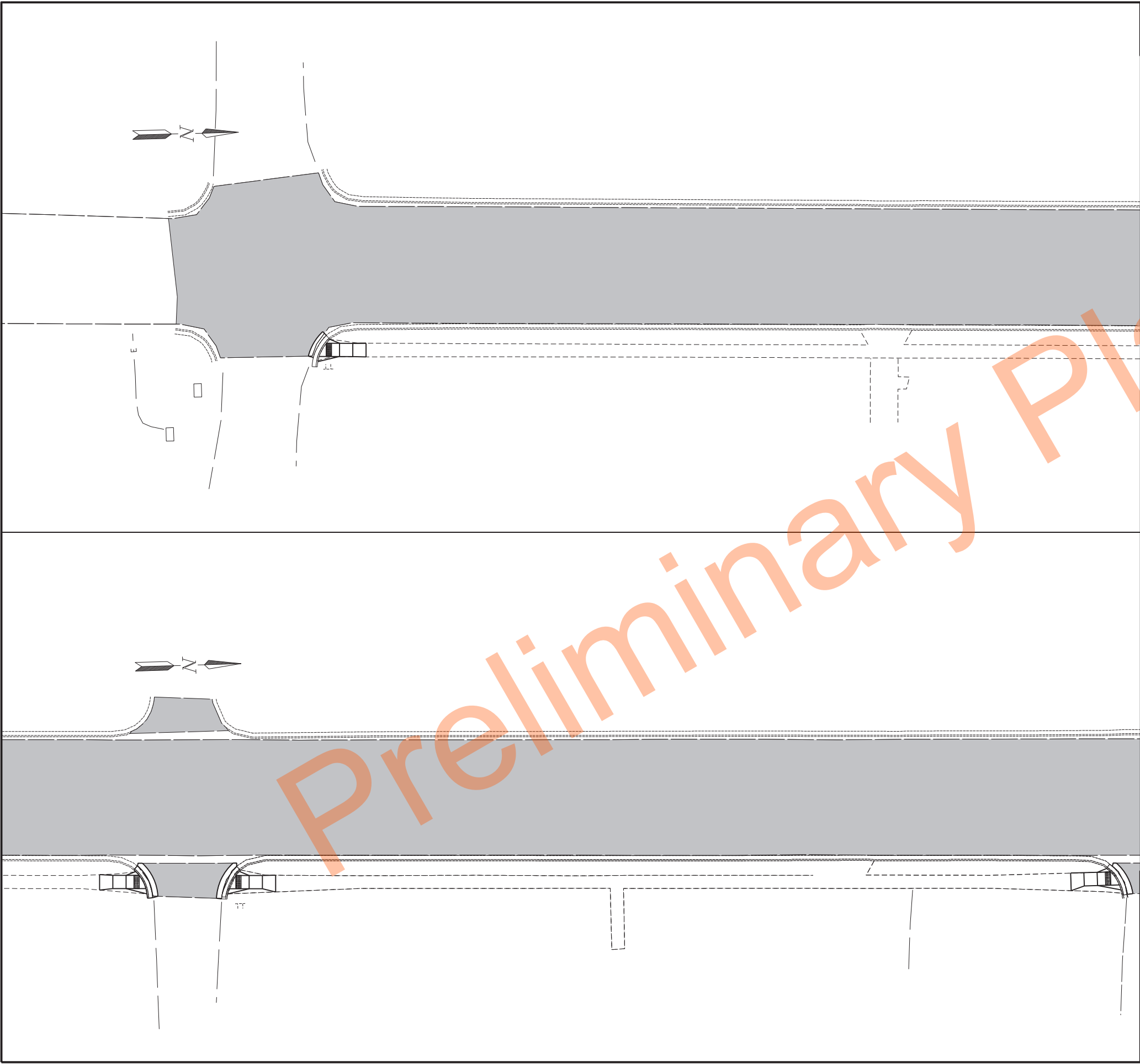
 Flow Direction

NOTE:
- *DRAWING NOT TO SCALE
- Water Level may vary in field.
- See Section 170 Sheet 2 for Quantities

ND Highway 22
17th St SW to Jct ND 200
Permanent Sediment and Erosion Control



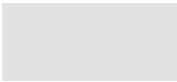




	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	90	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
401	50	TACK COAT		
		RP 65.516 to RP 95.656	382.3	GAL
430	0045	SUPERPAVE FAA 45		
		RP 65.516 to RP 95.656	637	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		RP 65.516 to RP 95.656	38	TON

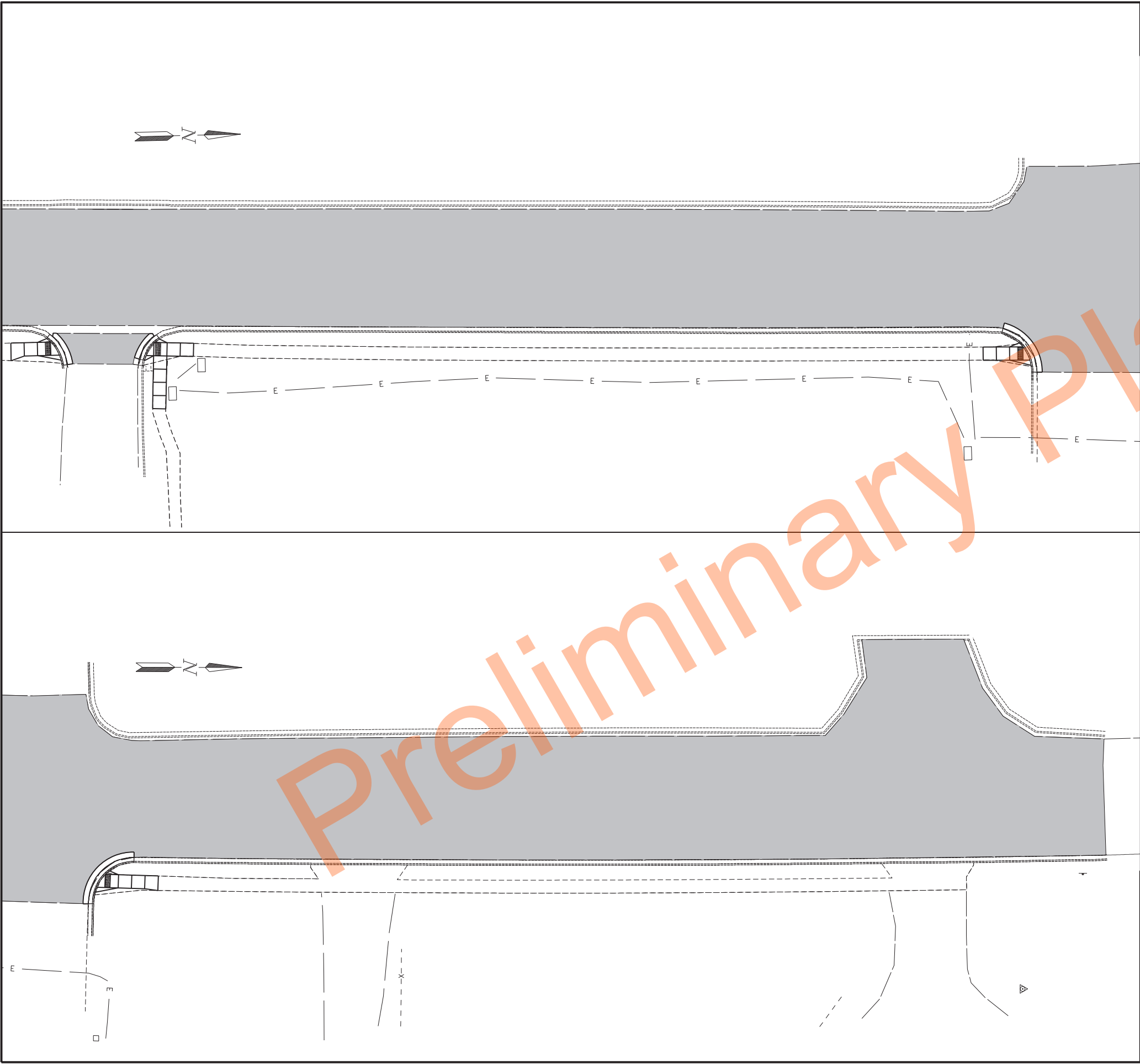
LEGEND

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

ND Highway 22
17th St SW to Jct ND 200

Paving Layout
RP 95.516 to RP 95.654

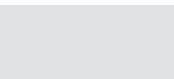




	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	90	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
401	50	TACK COAT		
		RP 95.656 to RP 95.810	442.6	GAL
430	0045	SUPERPAVE FAA 45		
		RP 95.656 to RP 95.810	738	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		RP 95.656 to RP 95.810	44	TON

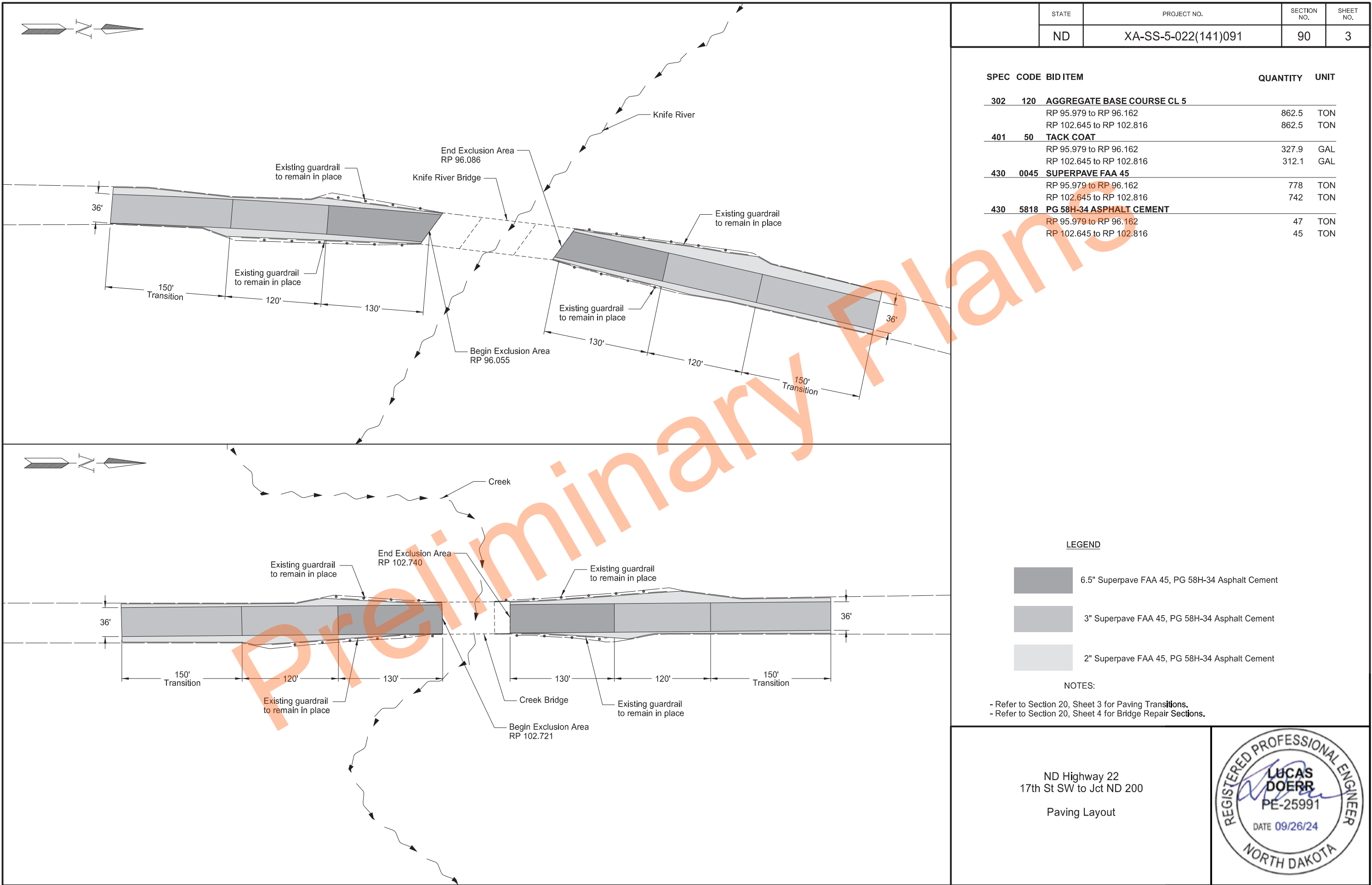
LEGEND

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

ND Highway 22
17th St SW to Jct ND 200

Paving Layout
RP 95.654 to RP 95.810





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	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)	2	18	36
G20-4b-36	36"x30"	WAIT FOR PILOT CAR	4	18	72
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS	18	43	774
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
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD	4	29	116
R2-1-36	36"x48"	SPEED LIMIT __ (Portable only)	4	30	120
R2-1-48	48"x60"	SPEED LIMIT		39	
R2-1aP-24	24"x18"	MINIMUM FEE \$80 (Mounted on Speed Limit post)	2	10	20
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	48"x60"	DO NOT PASS	2	39	78
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		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC		35	
W8-1-48	48"x48"	BUMP	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	4	35	140
W8-12-48	48"x48"	NO CENTER LINE	4	35	140
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY	2	35	70
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)	2	12	24
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL	2	35	70
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or __ MILE		35	
W21-5-48	48"x48"	SHOULDER WORK	2	35	70
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or __ MILE		35	

[illegible][illegible]

SPEC & CODE			
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	2959

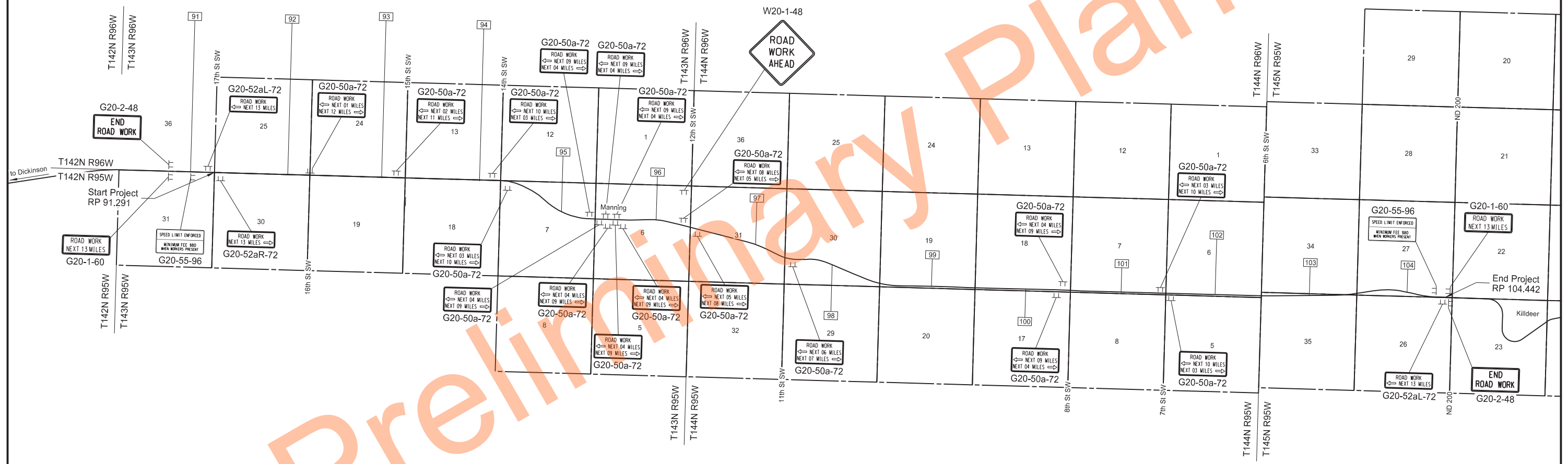
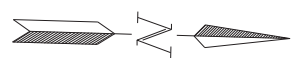
[illegible]

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



Traffic Control Devices List
ND Highway 22
17th St SW to Jct ND 200 Killdeer

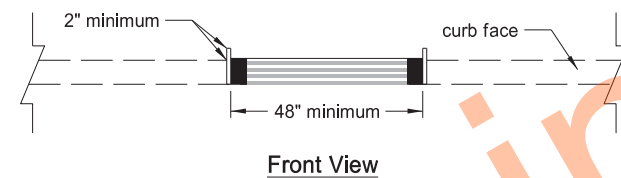
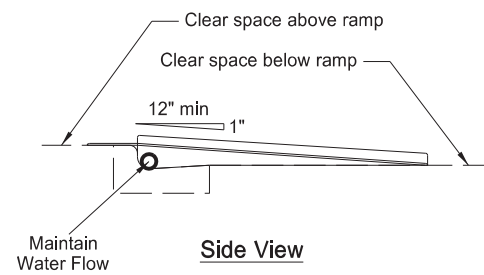
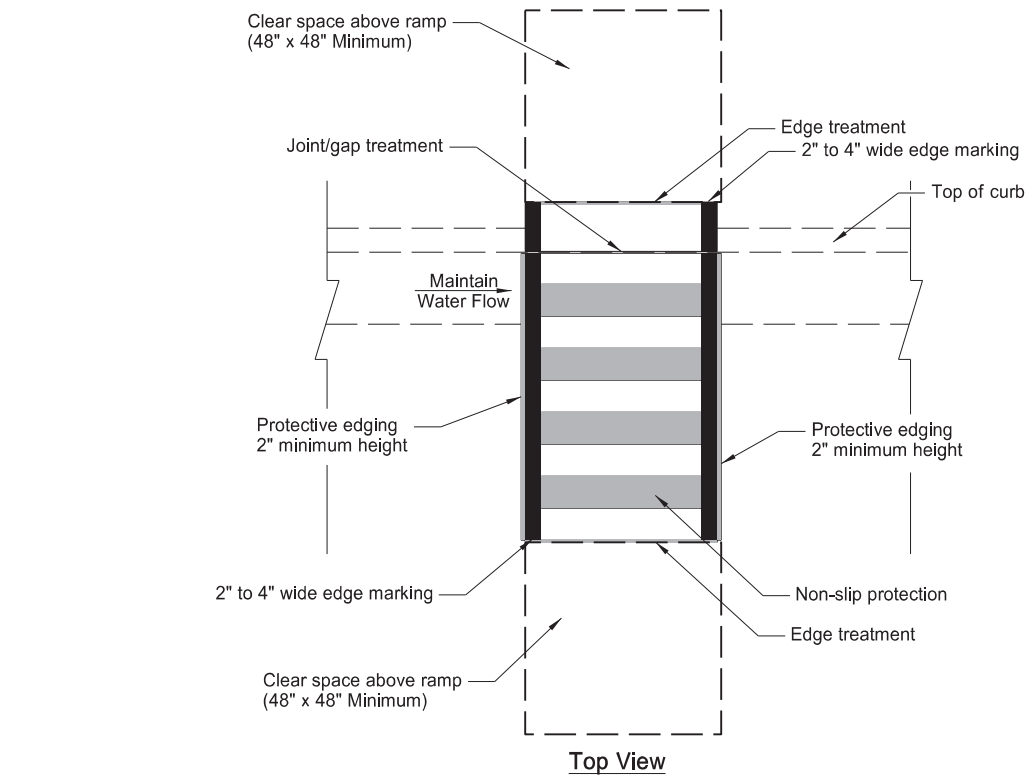
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	100	2



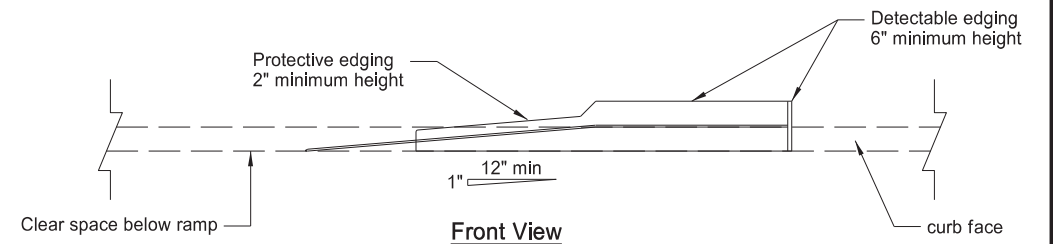
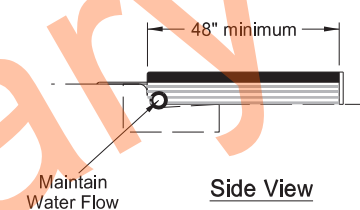
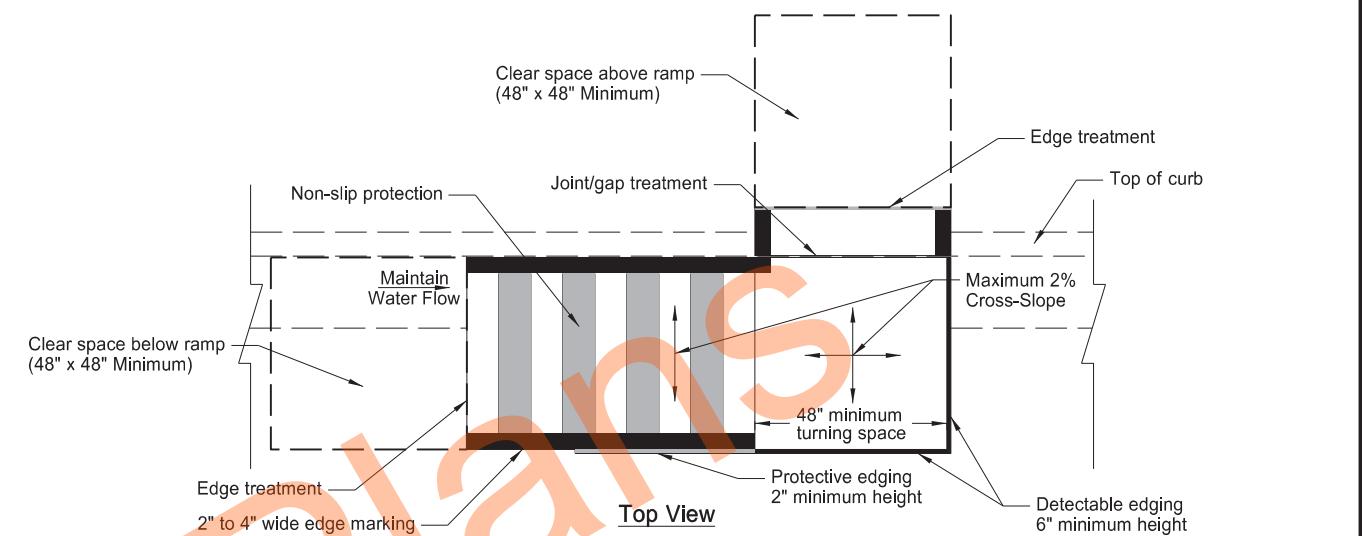
ND Highway 22
17th St SW to Jct ND 200
Work Zone Traffic Control



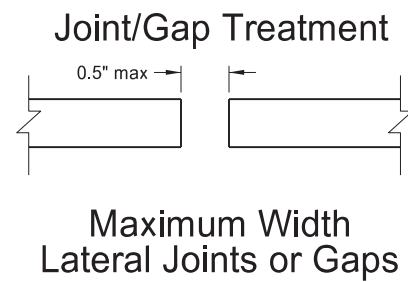
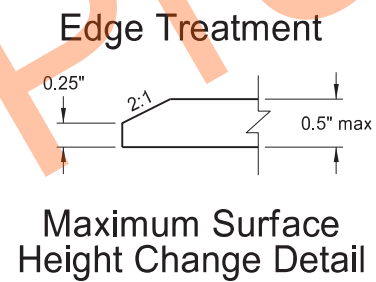
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	100	3



Temporary Perpendicular Curb Ramp

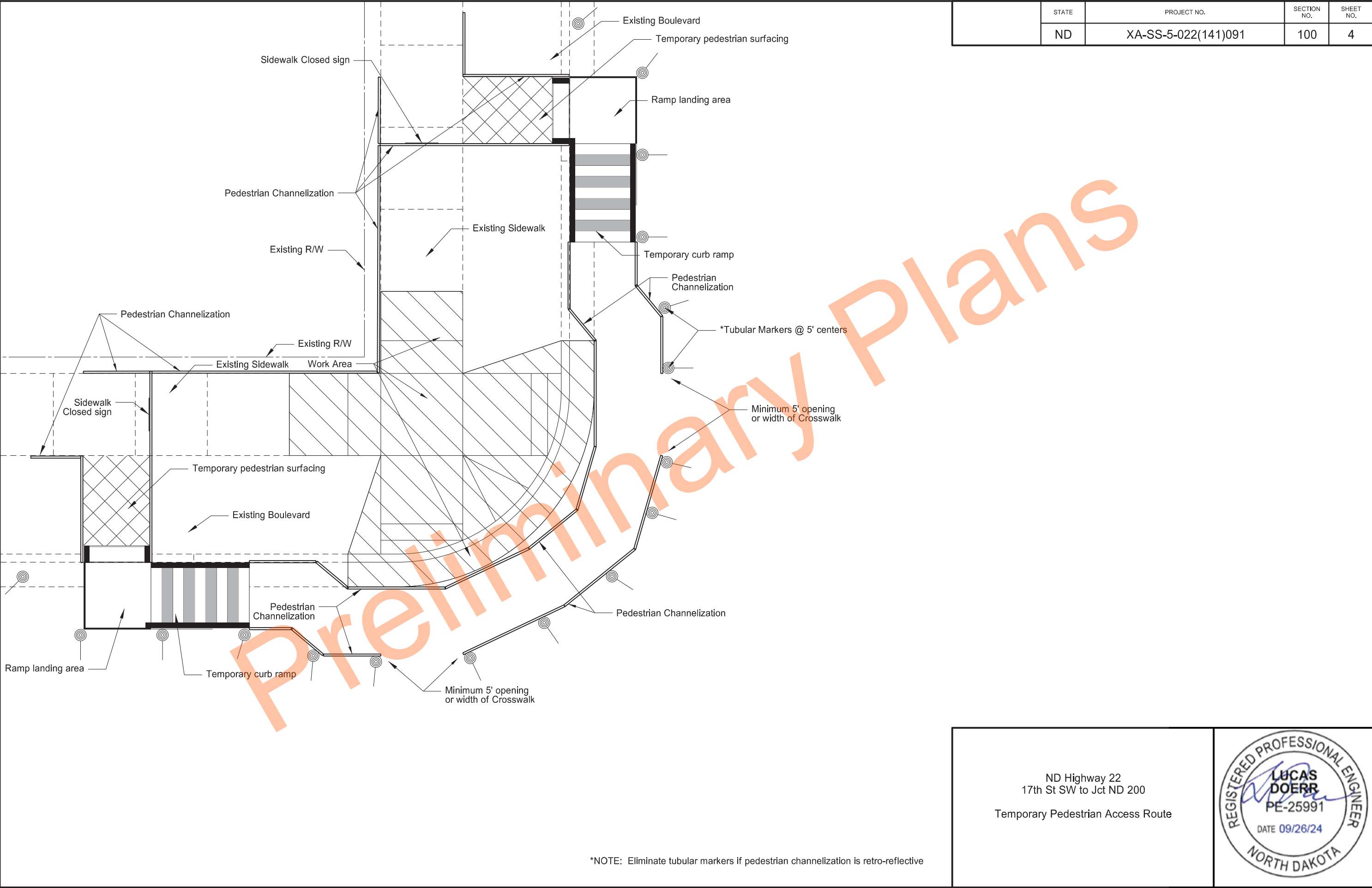


Temporary Parallel Curb Ramp



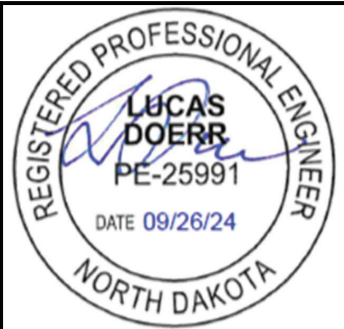
ND Highway 22
17th St SW to Jct ND 200
Temporary Pedestrian Curb Ramp Details





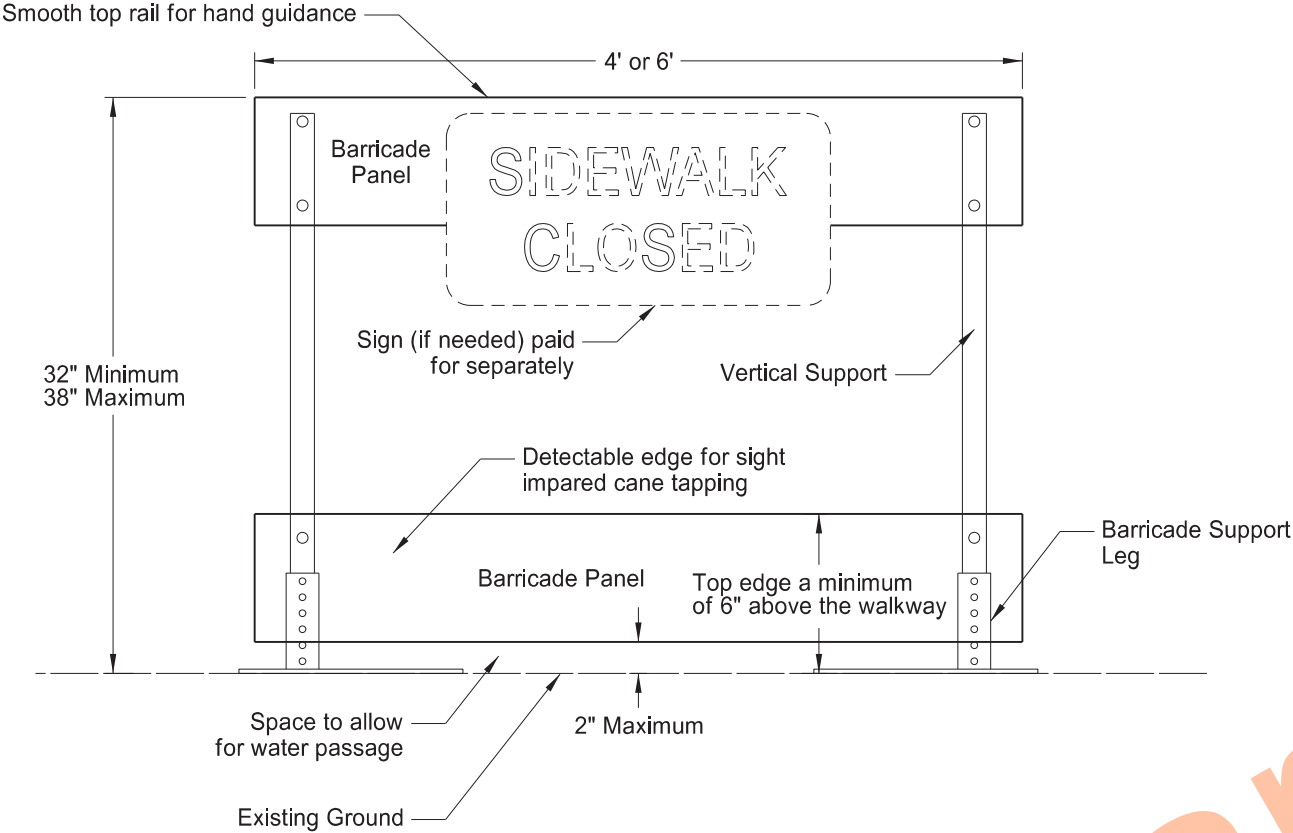
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	100	4

ND Highway 22
17th St SW to Jct ND 200
Temporary Pedestrian Access Route

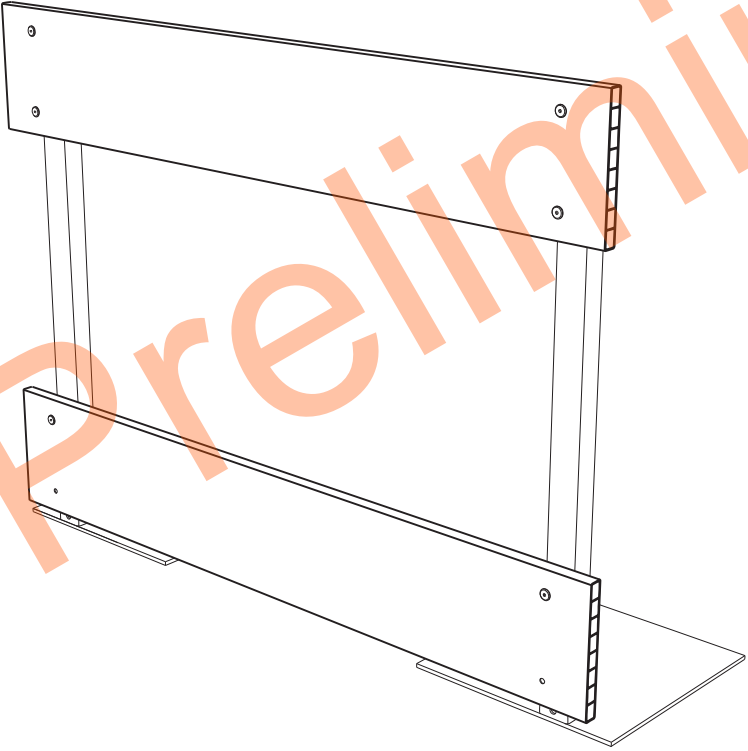


*NOTE: Eliminate tubular markers if pedestrian channelization is retro-reflective

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	100	5



Front View

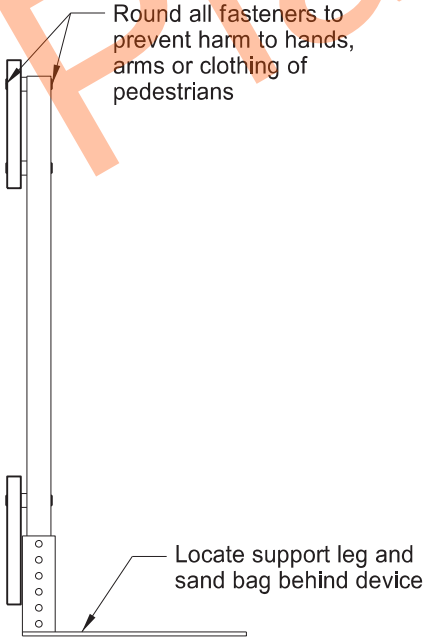


Perspective View

NOTES:

Sidewalk Barricades

1. Provide self standing sidewalk barricade with no supports extending into the pedestrians path.
2. Use orange or orange and white diagonal striped barricade panels contrasting with the walkway surface.
3. Provide ADA compliant and NCHRP 350 or Mash Test Level 3 (TL3) approved sidewalk barricades.
4. Include all costs to furnish, maintain and remove sidewalk barricades in the price bid for "Sidewalk Barricade".

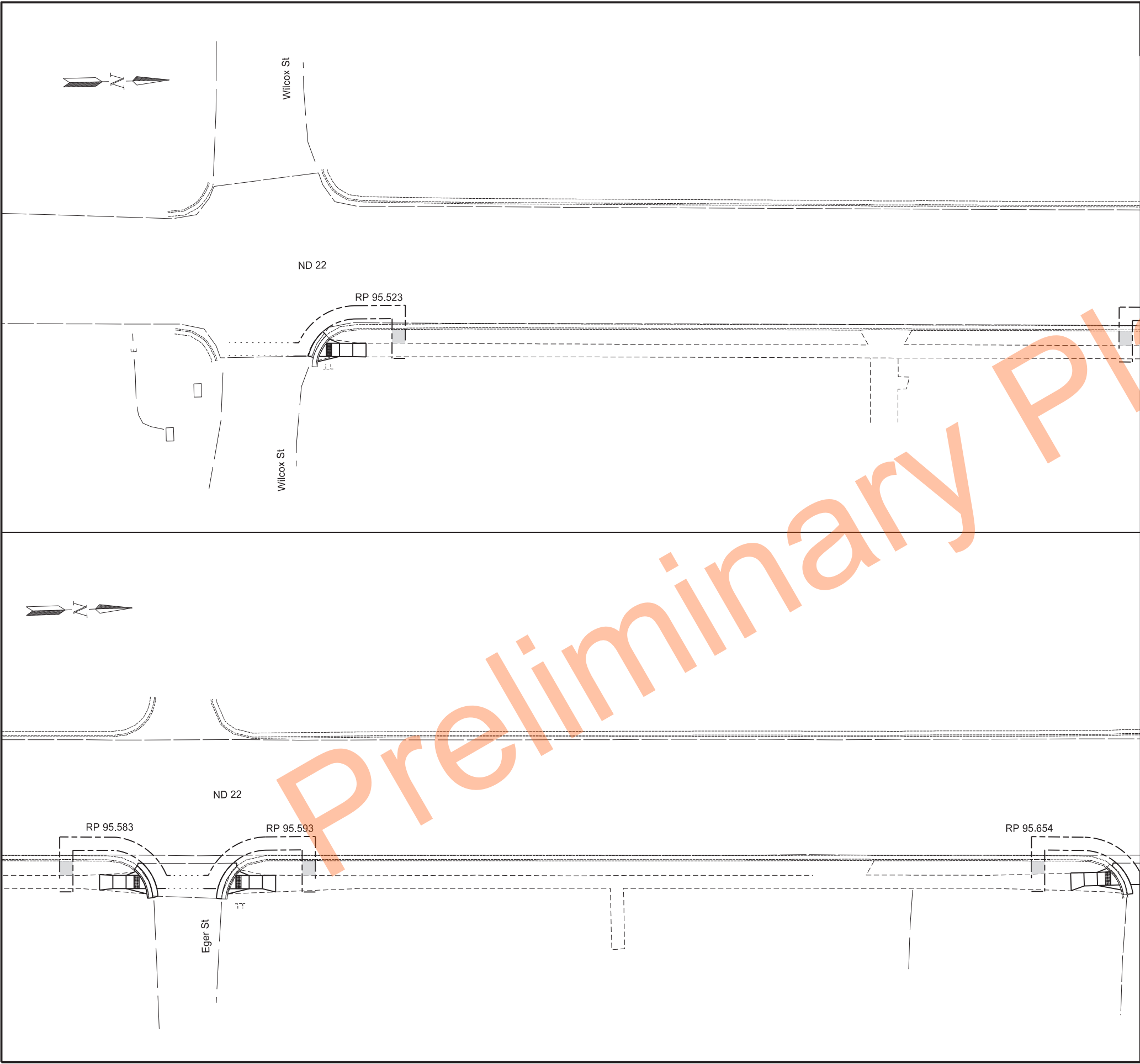


End View

ND Highway 22
17th St SW to Jct ND 200

Sidewalk Barricade





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	100	6

SPEC	CODE	BID ITEM	QUANTITY	UNIT
704	1054	SIDEWALK BARRICADE		
		RP 95.523	1	EA
		RP 95.583	1	EA
		RP 95.593	1	EA
		RP 95.654	1	EA
704	1058	PEDESTRIAN WALKWAY		
		RP 95.523	60	LF
		RP 95.583	51	LF
		RP 95.593	62	LF
		RP 95.654	61	LF
704	2108	TEMPORARY CURB RAMP		
		RP 95.523	1	EA
		RP 95.583	1	EA
		RP 95.593	1	EA
		RP 95.654	1	EA
704	2200	TEMPORARY PEDESTRIAN SURFACING		
		RP 95.523	2.9	SY
		RP 95.583	3.1	SY
		RP 95.593	3.1	SY
		RP 95.654	2.7	SY

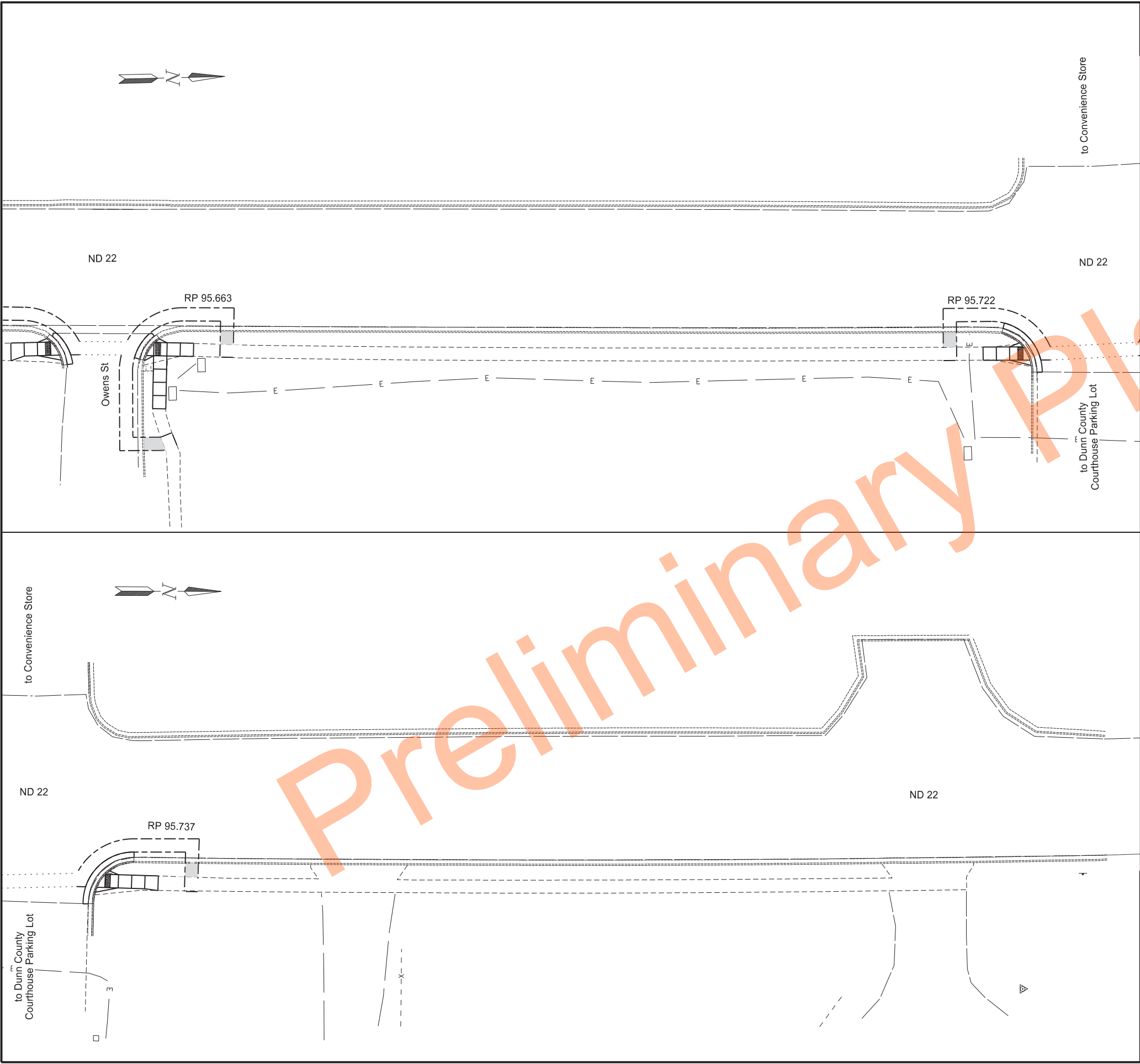
LEGEND

- Pedestrian Crossing
- Pedestrian Channelization
- Temporary Pedestrian Surfacing

ND Highway 22
17th St SW to Jct ND 200

Work Zone Traffic Control
RP 95.516 to RP 95.654





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	100	7

SPEC	CODE	BID ITEM	QUANTITY	UNIT
704	1054	SIDEWALK BARRICADE		
		RP 95.663	2	EA
		RP 95.722	1	EA
704	1058	PEDESTRIAN WALKWAY		
		RP 95.663	112	LF
		RP 95.722	61	LF
704	2108	TEMPORARY CURB RAMP		
		RP 95.663	1	EA
		RP 95.722	1	EA
704	2200	TEMPORARY PEDESTRIAN SURFACING		
		RP 95.663	6.7	SY
		RP 95.722	3.0	SY
		RP 95.737	2.9	SY

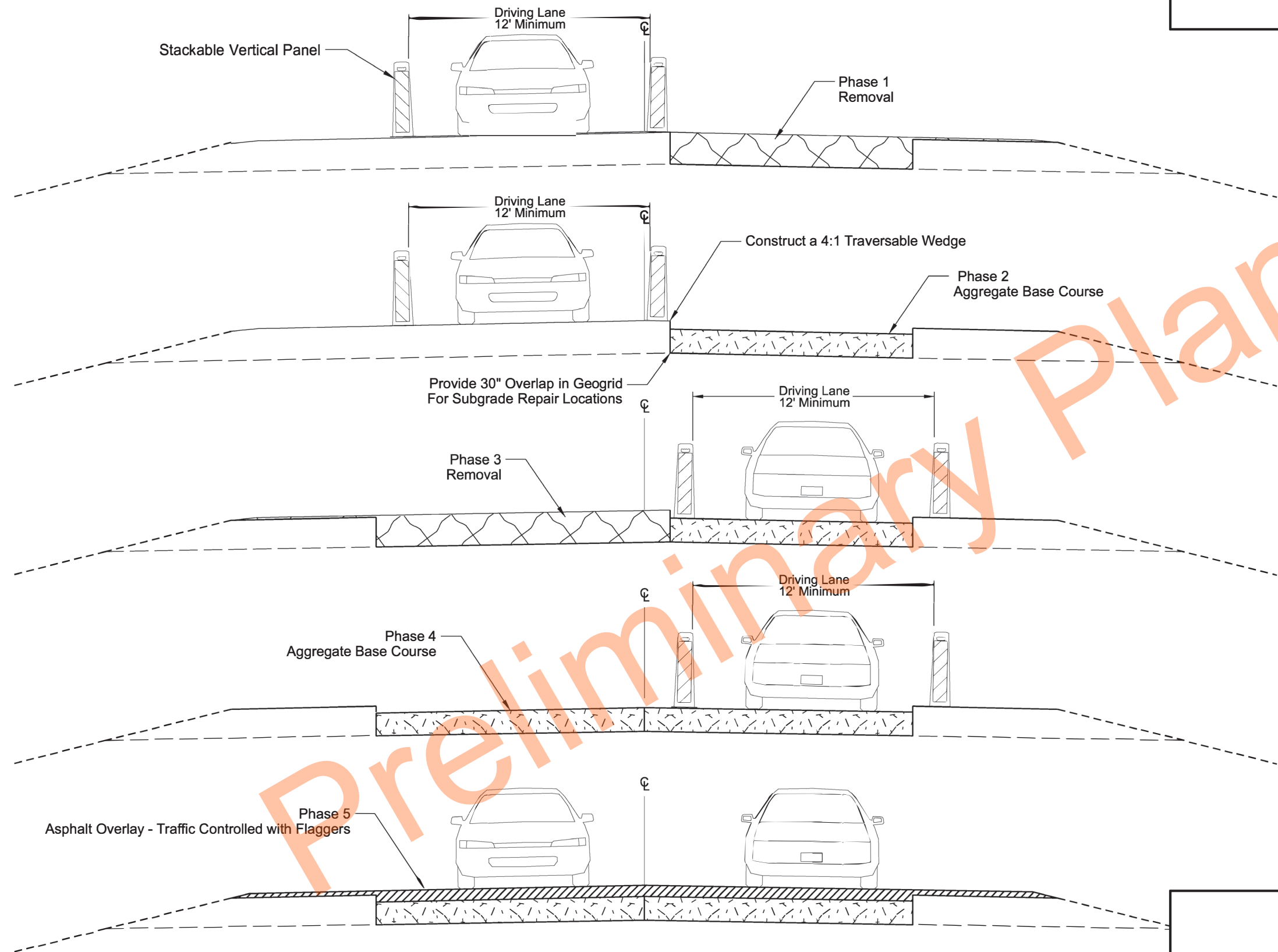
LEGEND

- Pedestrian Crossing
- Pedestrian Channelization
- Temporary Pedestrian Surfacing

ND Highway 22
17th St SW to Jct ND 200
Work Zone Traffic Control
RP 95.654 to RP 95.810



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	100	8



Drawing not to scale.

Note: See Section 20 Sheet 4 and Section 30 Sheets 7 & 13 for more detail.

ND Highway 22
17th St SW to Jct ND 200
Work Zone Traffic Control Phasing
for Bridge Approach Repair
RP 96.065 & RP 102.754



									STATE	PROJECT NO.		SECTION NO.	SHEET NO.
									ND	XA-SS-5-022(141)091		120	1

HIGHWAY 22											
NO PASSING RIGHT			NO PASSING LEFT			SKIPS			DOUBLE BARRIER		
START RP	END RP	LENGTH (FT)	START RP	END RP	LENGTH (FT)	START RP	END RP	LENGTH (FT)	START RP	END RP	LENGTH (FT)
--	--	0	--	--	0	91.291	91.461	900	--	--	0
91.461	95.434	20,975	91.461	95.434	20,975	--	--	0	91.461	95.434	20,975
--	--	0	--	--	0	95.434	95.529	500	--	--	0
95.529	95.789	1,377	95.529	95.789	1,377	--	--	0	95.529	95.789	1,377
--	--	0	--	--	0	95.789	96.123	1,759	--	--	0
96.123	96.672	2,901	96.123	96.672	2,901	--	--	0	96.123	96.672	2,901
--	--	0	--	--	0	96.672	96.902	1,215	--	--	0
96.902	99.754	15,060	96.902	99.754	15,060	--	--	0	96.902	99.754	15,060
99.754	99.860	560	--	--	0	--	--	0	--	--	0
--	--	0	--	--	0	99.860	99.937	405	--	--	0
--	--	0	99.937	100.043	560	--	--	0	--	--	0
100.035	100.527	2,598	100.035	100.527	2,598	--	--	0	100.035	100.527	2,598
--	--	0	--	--	0	100.527	100.900	1,970	--	--	0
100.900	102.807	10,070	100.900	102.807	10,070	--	--	0	100.900	102.807	10,070
--	--	0	--	--	0	102.807	103.262	2,400	--	--	0
103.250	104.446	6,315	103.250	104.446	6,315	--	--	0	103.250	104.446	6,315
TOTAL LENGTH =		59,855	TOTAL LENGTH =		59,855	TOTAL LENGTH =		9,149	TOTAL LENGTH =		59,295

PAINTED LENGTH CALCULATIONS			
(A) NO PASSING ZONE =	119,711	FT	
(B) DOUBLE BARRIER =	59,295	FT	
(C) SKIPS =	9,149	FT	
(D) = (A) - 2(B) = SINGLE BARRIER W/ SKIP =	1,120	FT	
PAINTED LENGTH = 2(B) + 0.25(C) + 1.25(D) =	122,278	FT	

6IN WHITE EDGE LINE CALCULATIONS				
	START	END	LENGTH	
White Edge Line Left=	91.291	104.442	69,437	FT
White Edge Line Right=	91.291	104.442	69,437	FT
TOTAL PAINTED WHITE EDGE LINE LENGTH =			138,875	FT

HIGHWAY 22 TEMPORARY PAVEMENT MARKINGS			
6" LINES		# OF APPLICATIONS	
Yellow Centerline	122,025.00	3	366,075.00
Yellow Non-Centerline	19,182.00	1	19,182.00
White Skips	1,029.85	2	2,059.70
TOTAL (LF)			387,316.70

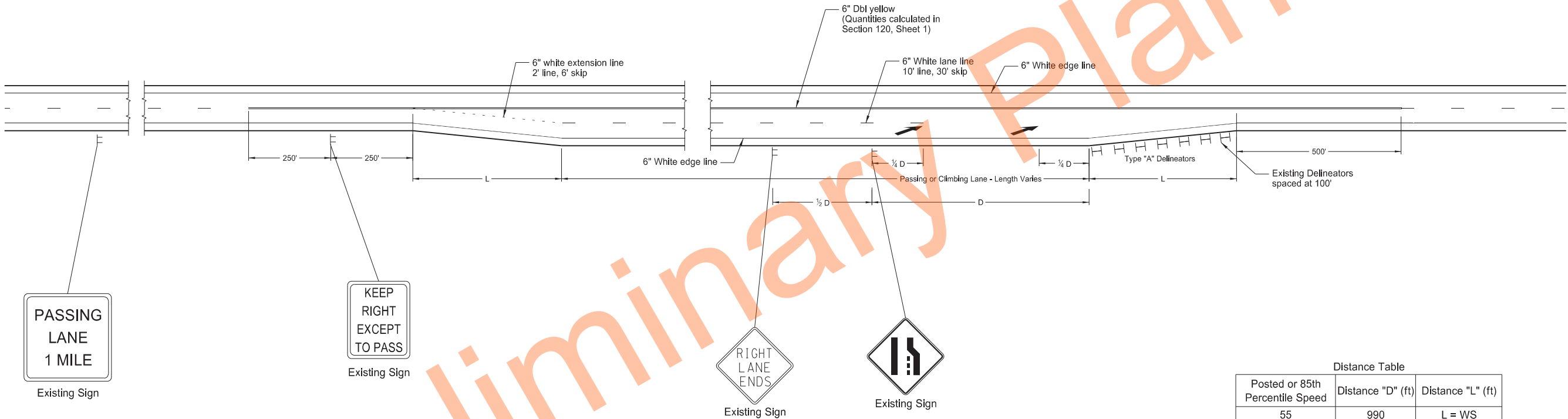
ND Highway 22
17th St SW to Jct ND 200

Pavement Markings



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	120	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0112	EPOXY PVTM MK MESSAGE	328	SF
762	0114	EPOXY PVTM MK 6IN LINE	10745	LF



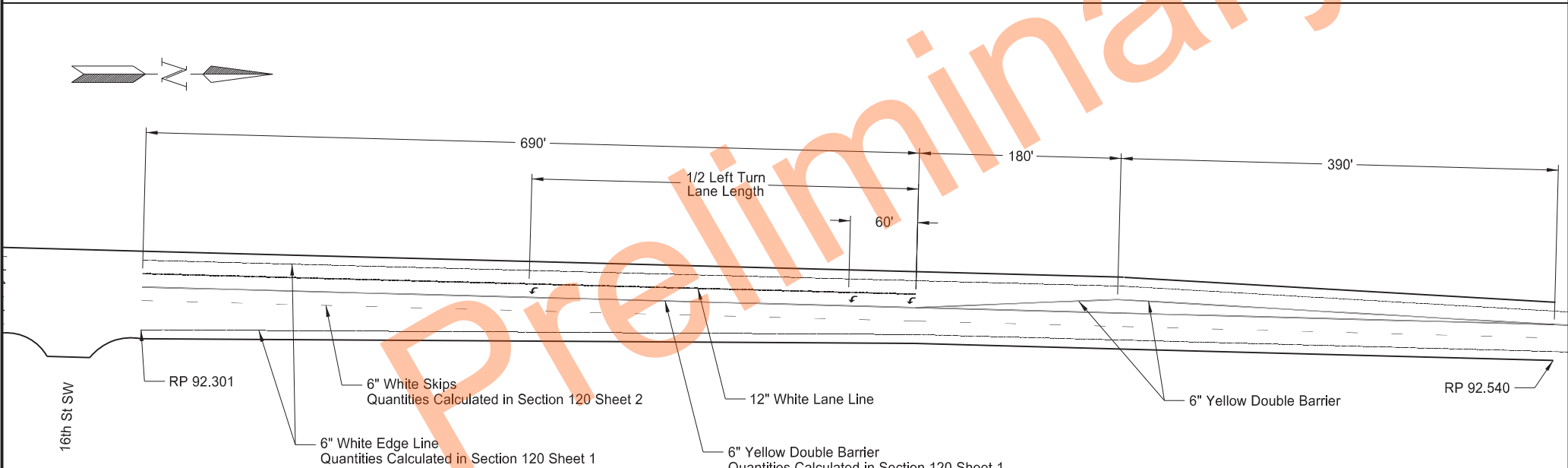
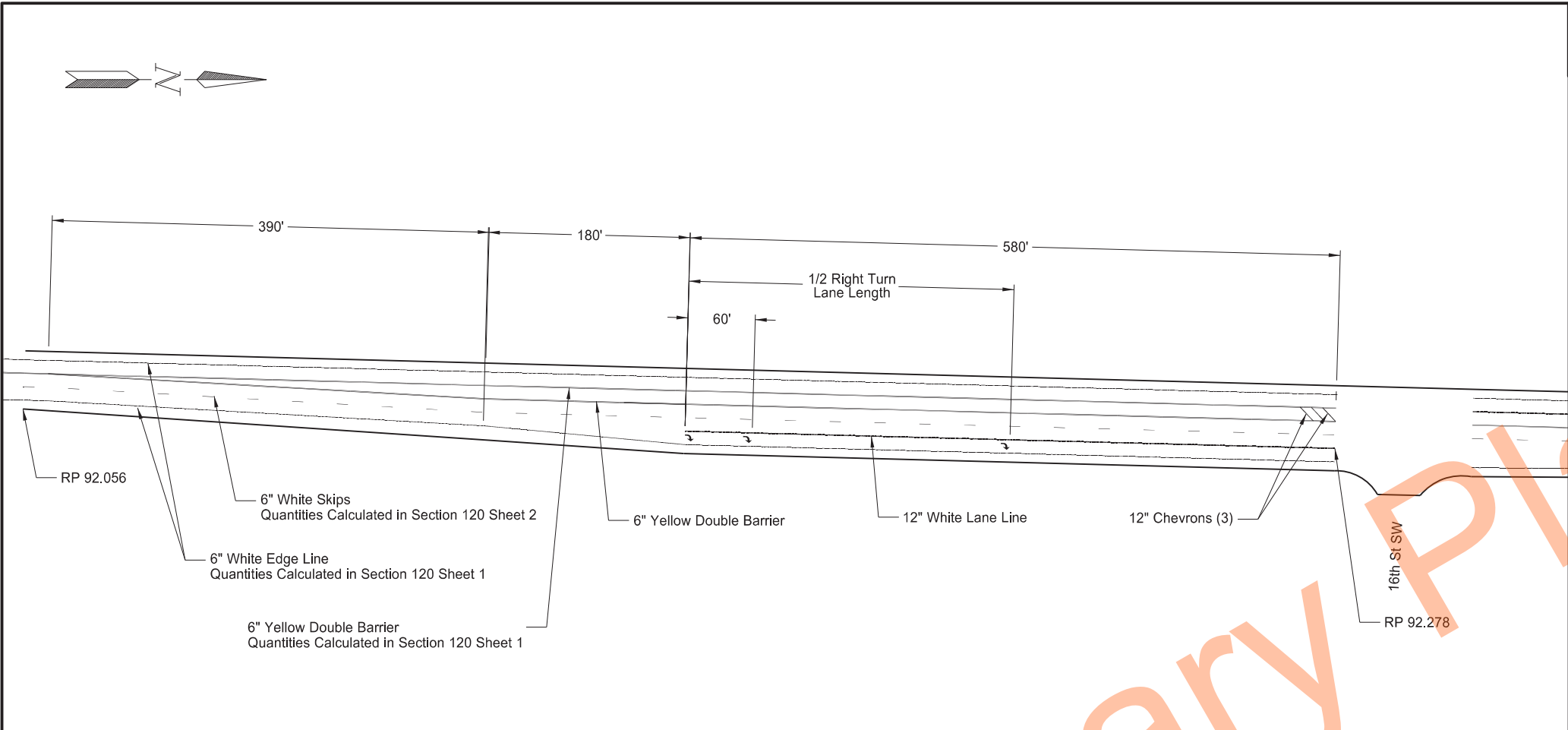
Distance Table		
Posted or 85th Percentile Speed	Distance "D" (ft)	Distance "L" (ft)
55	990	L = WS
65	1200	L = WS

W = Width of Offset (ft)
S = Posted Speed (mph)

PASSING / CLIMBING LANE LOCATIONS							6" WHITE CL SKIPS LENGTH (FT)	6" WHITE SHORT SKIPS LEGNTH (FT)	DIRECTIONAL ARROW MESSAGE
	(RP)		FULL WIDTH		(RP)				
DIRECTION	BEGIN TAPER	END TAPER	BEGIN	END	BEGIN TAPER	END TAPER			
NB	91.49	91.71	91.71	93.47	93.47	93.83	9,293	1,162	2
SB	92.84	93.13	93.13	95.18	95.18	95.36	10,824	950	2
NB	96.95	97.13	97.13	99.29	99.29	99.62	11,405	951	2
SB	101.00	101.12	101.12	102.51	102.51	102.71	7,339	1,056	2

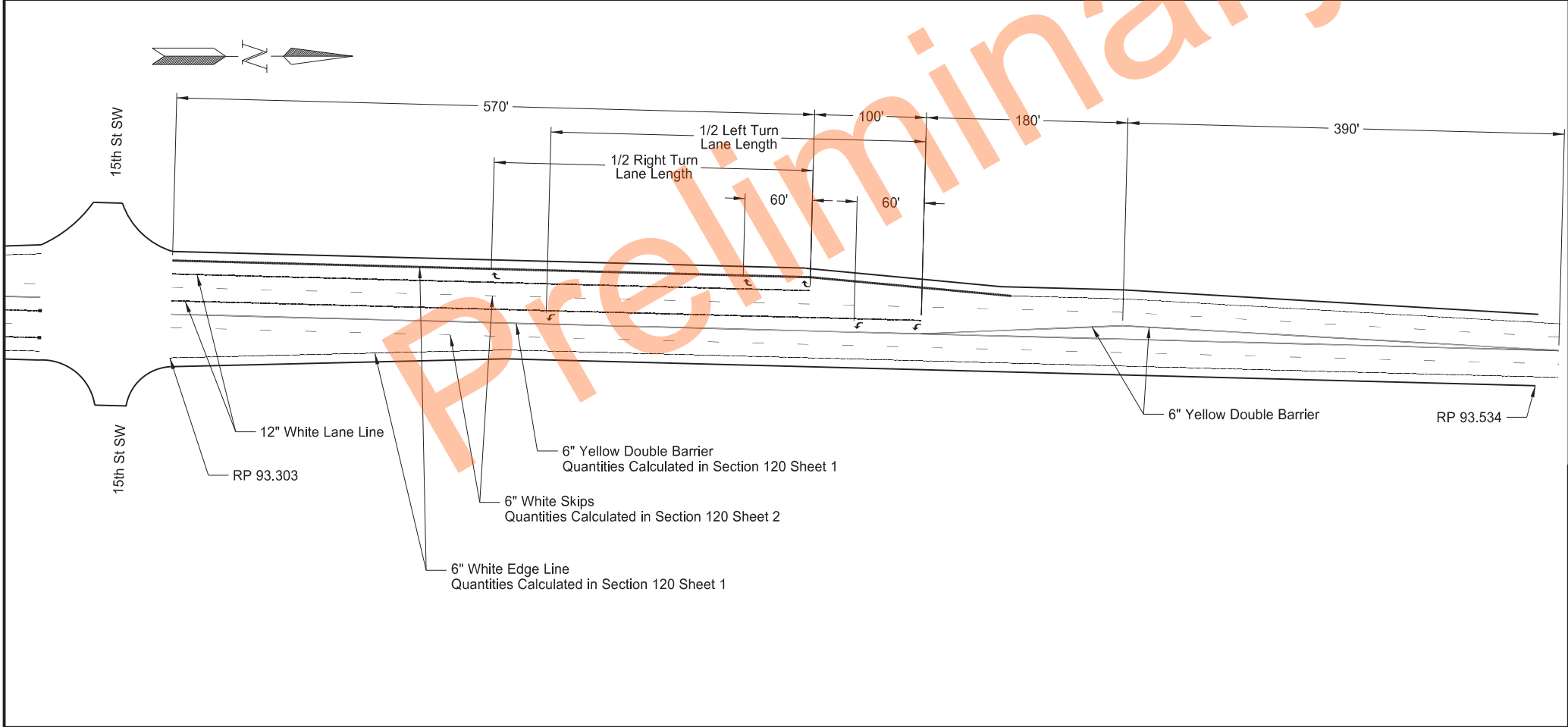
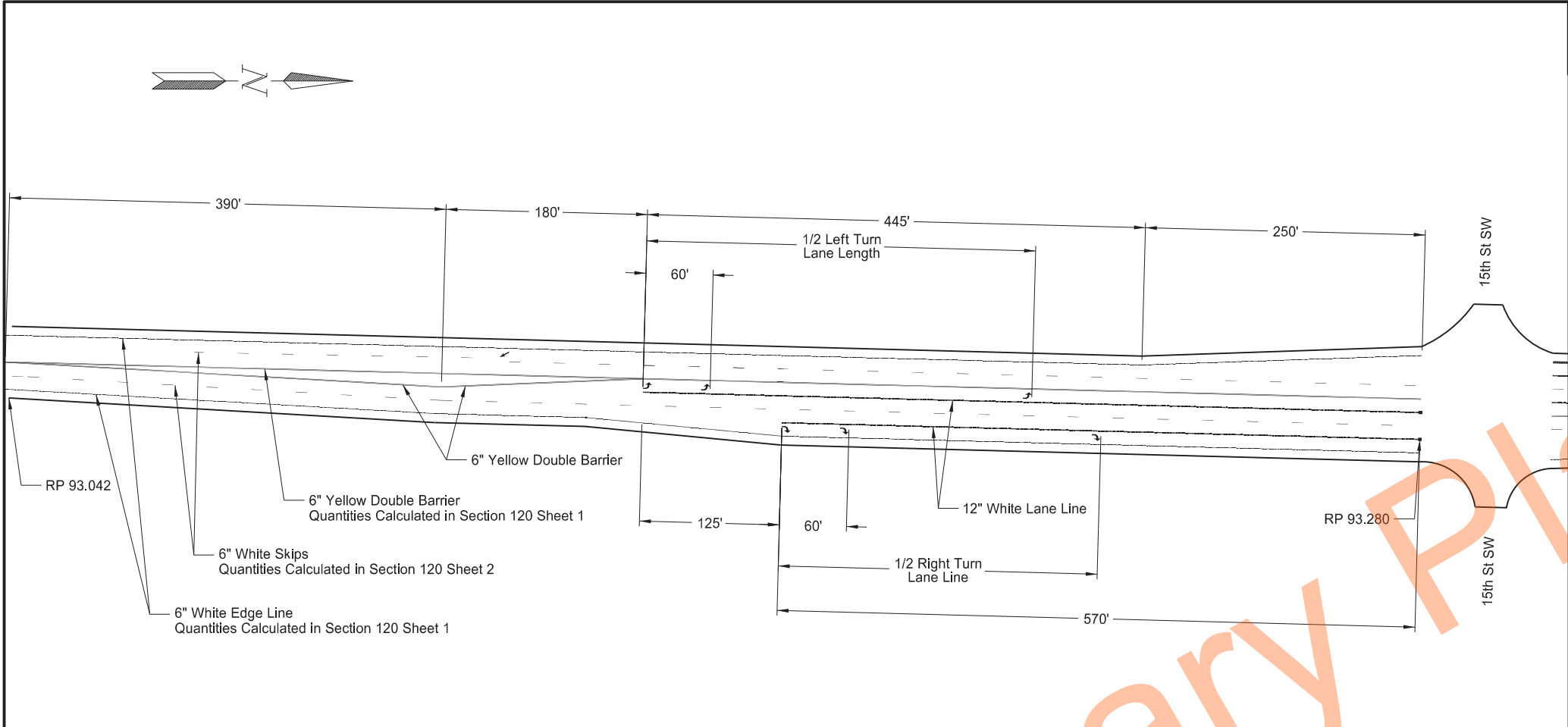
ND Highway 22
17th St SW to Jct ND 200
Pavement Markings





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	120	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	EPOXY PVMT MK 12IN LINE		
		White Lane Line	1270	LF
		Yellow Chevrons (3)	51	LF
762	0112	EPOXY PVMT MK MESSAGE		
		Turn Lane Arrows (6)	96	SF
762	0114	EPOXY PVMT MK 6IN LINE		
		Yellow Double Barrier	3550	LF
762	0432	SHORT TERM 6IN LINE - TYPE NR		
		Yellow Double Barrier (3 Applications)	10650	LF
762	0437	SHORT TERM 12IN LINE - TYPE NR		
		White Lane Line (2 Applications)	2540	LF
		Yellow Chevrons (3)	51	LF

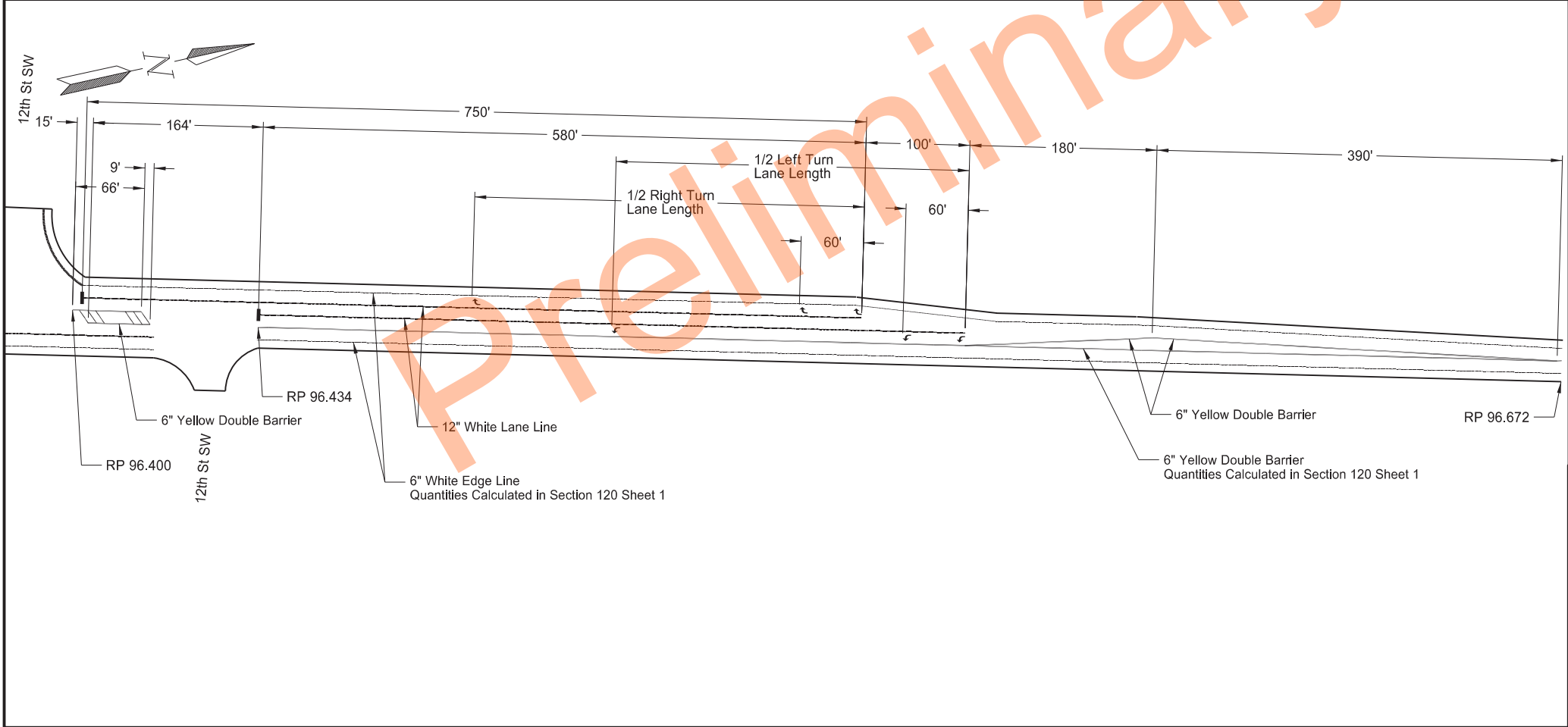
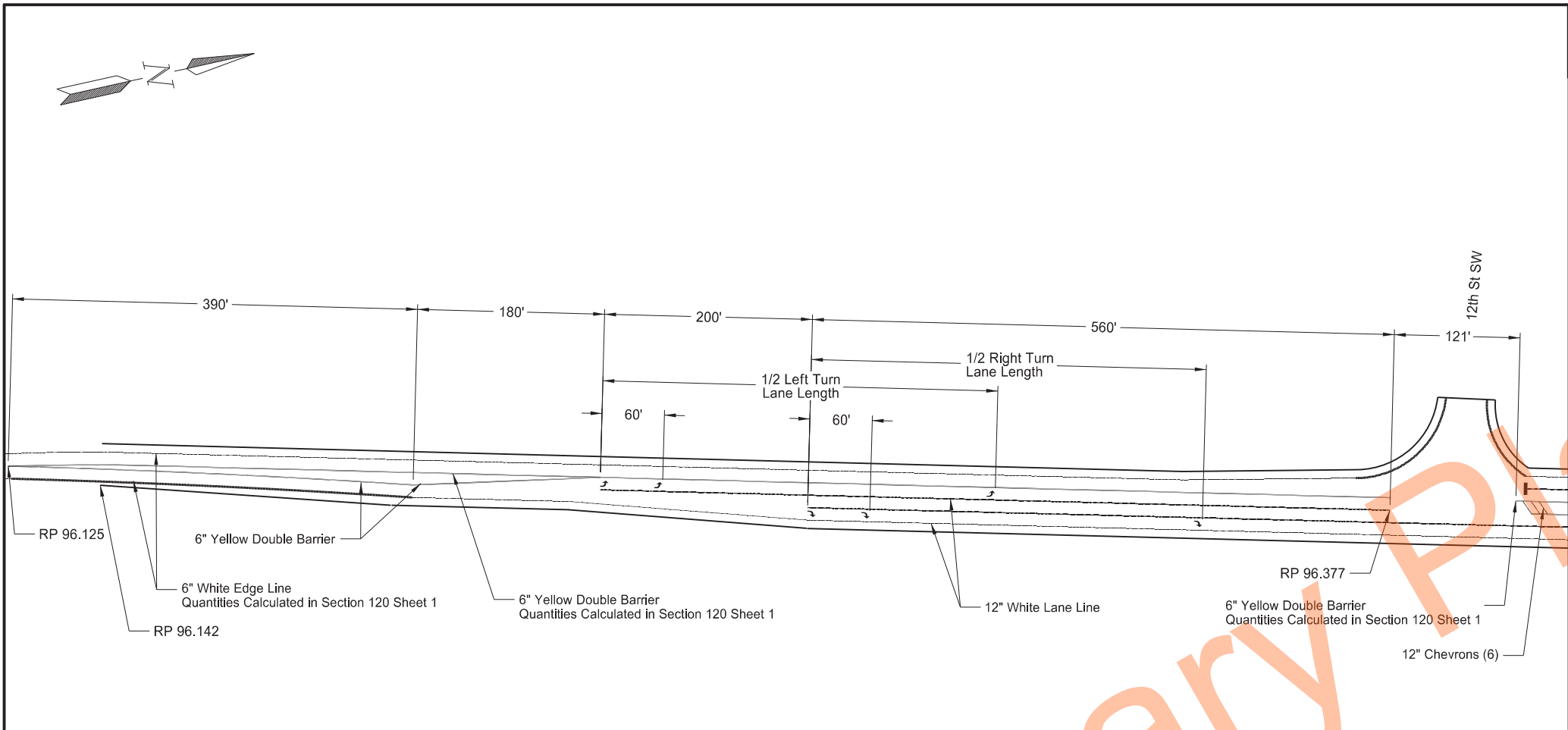


		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(141)091	120	4
SPEC	CODE	BID ITEM	QUANTITY	UNIT	
762	0111	EPOXY PVT MK 12IN LINE			
		White Lane Line	2500	LF	
762	0112	EPOXY PVT MK MESSAGE			
		Turn Lane Arrows (12)	192	SF	
762	0114	EPOXY PVT MK 6IN LINE			
		Yellow Double Barrier	2280	LF	
762	0432	SHORT TERM 6IN LINE - TYPE NR			
		Yellow Double Barrier (3 Applications)	6840	LF	
762	0437	SHORT TERM 12IN LINE - TYPE NR			
		White Lane Line (2 Applications)	5000	LF	

ND Highway 22
17th St SW to Jct ND 200

Pavement Markings
15th St SW

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 09/26/24
NORTH DAKOTA

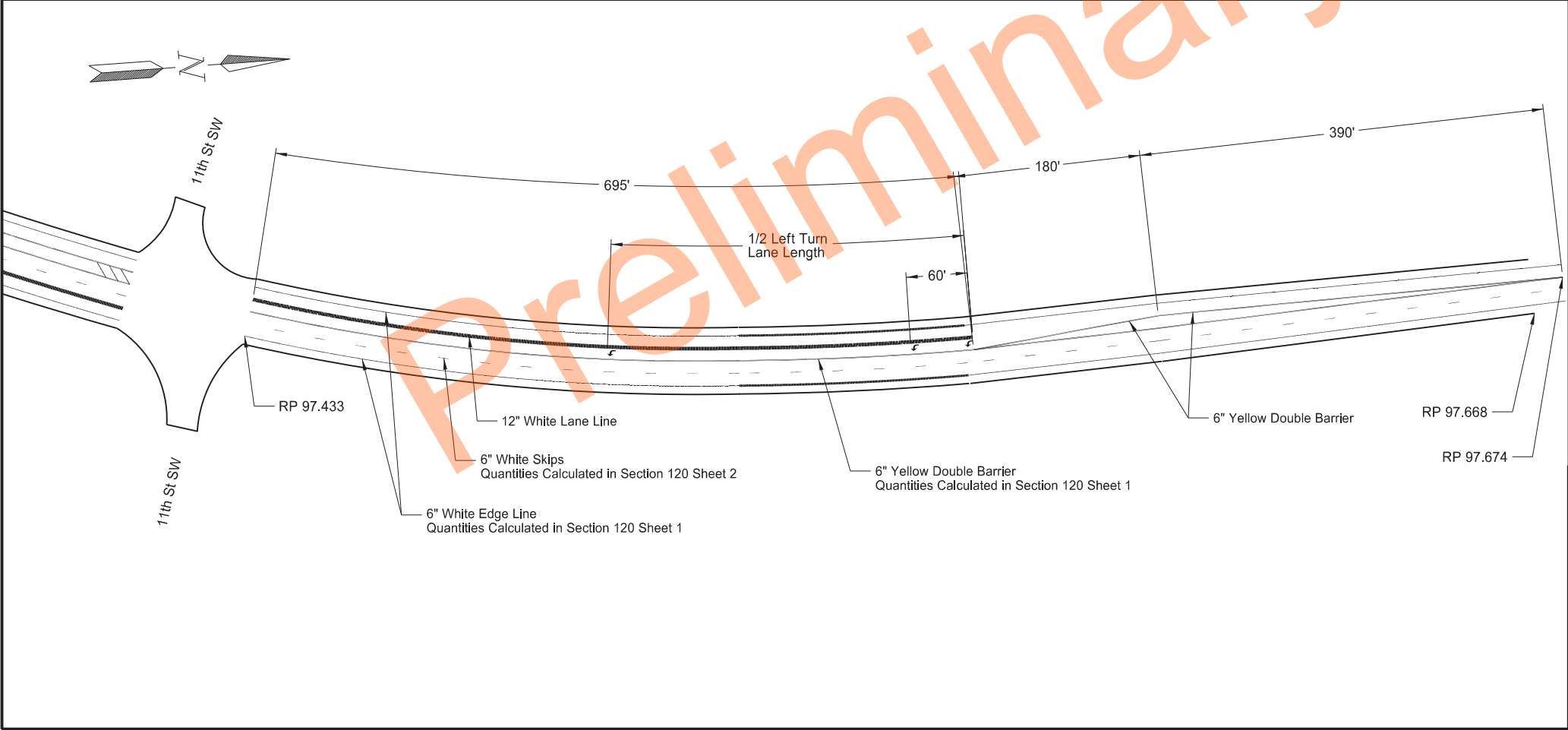
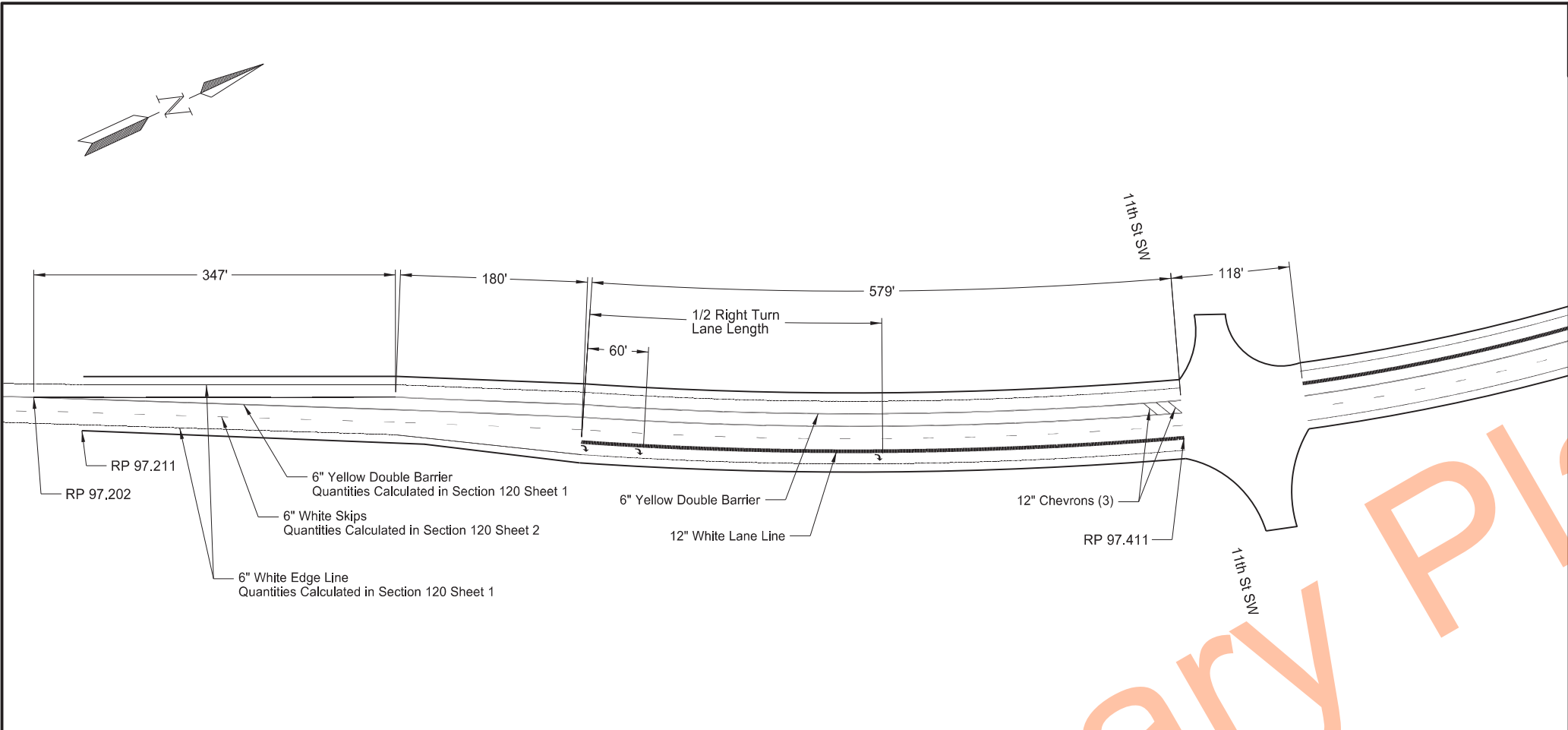


		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(141)091	120	5
SPEC	CODE	BID ITEM	QUANTITY	UNIT	
762	0111	EPOXY PVT MK 12IN LINE			
		White Lane Line	2950	LF	
		Yellow Chevrons (6)	90	LF	
762	0112	EPOXY PVT MK MESSAGE			
		Turn Lane Arrows (12)	192	SF	
762	0114	EPOXY PVT MK 6IN LINE			
		Yellow Double Barrier	2280	LF	
762	0432	SHORT TERM 6IN LINE - TYPE NR			
		Yellow Double Barrier (3 Applications)	6840	LF	
762	0437	SHORT TERM 12IN LINE - TYPE NR			
		White Lane Line (2 Applications)	5900	LF	
		Yellow Chevrons (6)	90	LF	

ND Highway 22
17th St SW to Jct ND 200

Pavement Markings
12th St SW

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 09/26/24
NORTH DAKOTA



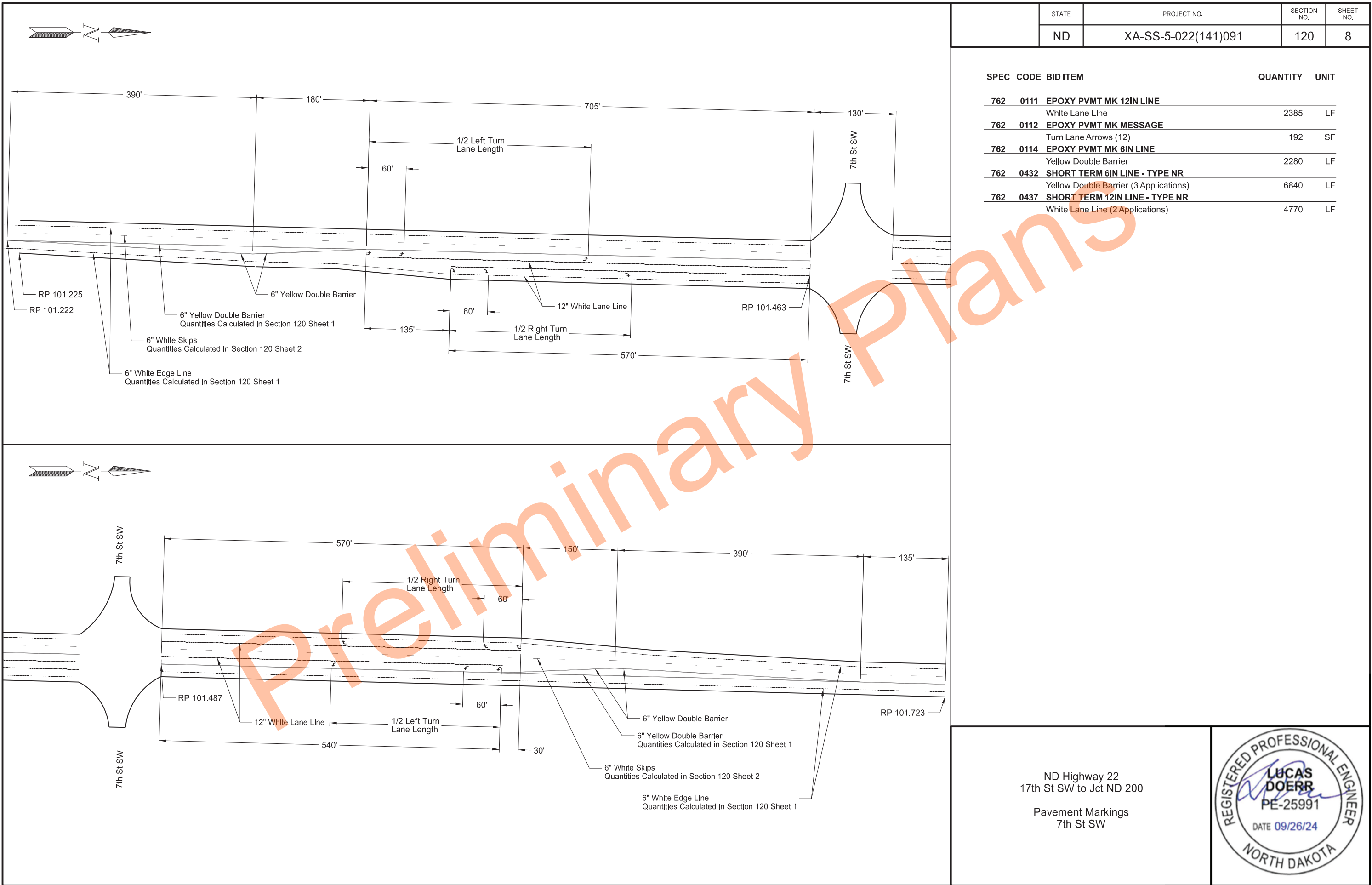
		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(141)091	120	6
SPEC	CODE	BID ITEM	QUANTITY	UNIT	
762	0111	EPOXY PVMT MK 12IN LINE			
		White Lane Line	1275	LF	
		Yellow Chevrons (3)	51	LF	
762	0112	EPOXY PVMT MK MESSAGE			
		Turn Lane Arrows (6)	96	SF	
762	0114	EPOXY PVMT MK 6IN LINE			
		Yellow Double Barrier	3345	LF	
762	0432	SHORT TERM 6IN LINE - TYPE NR			
		Yellow Double Barrier (3 Applications)	10035	LF	
762	0437	SHORT TERM 12IN LINE - TYPE NR			
		White Lane Line (2 Applications)	2550	LF	
		Yellow Chevrons (3)	51	LF	

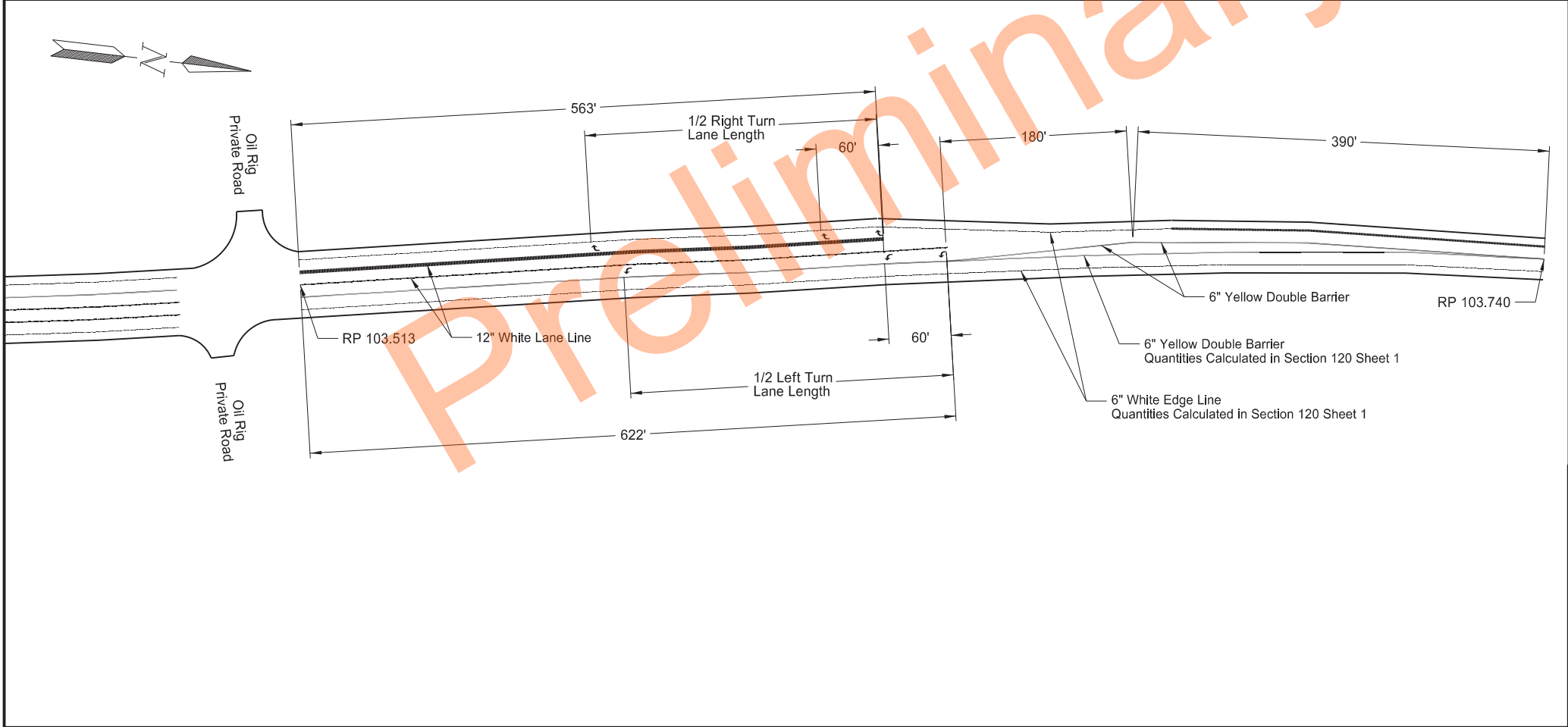
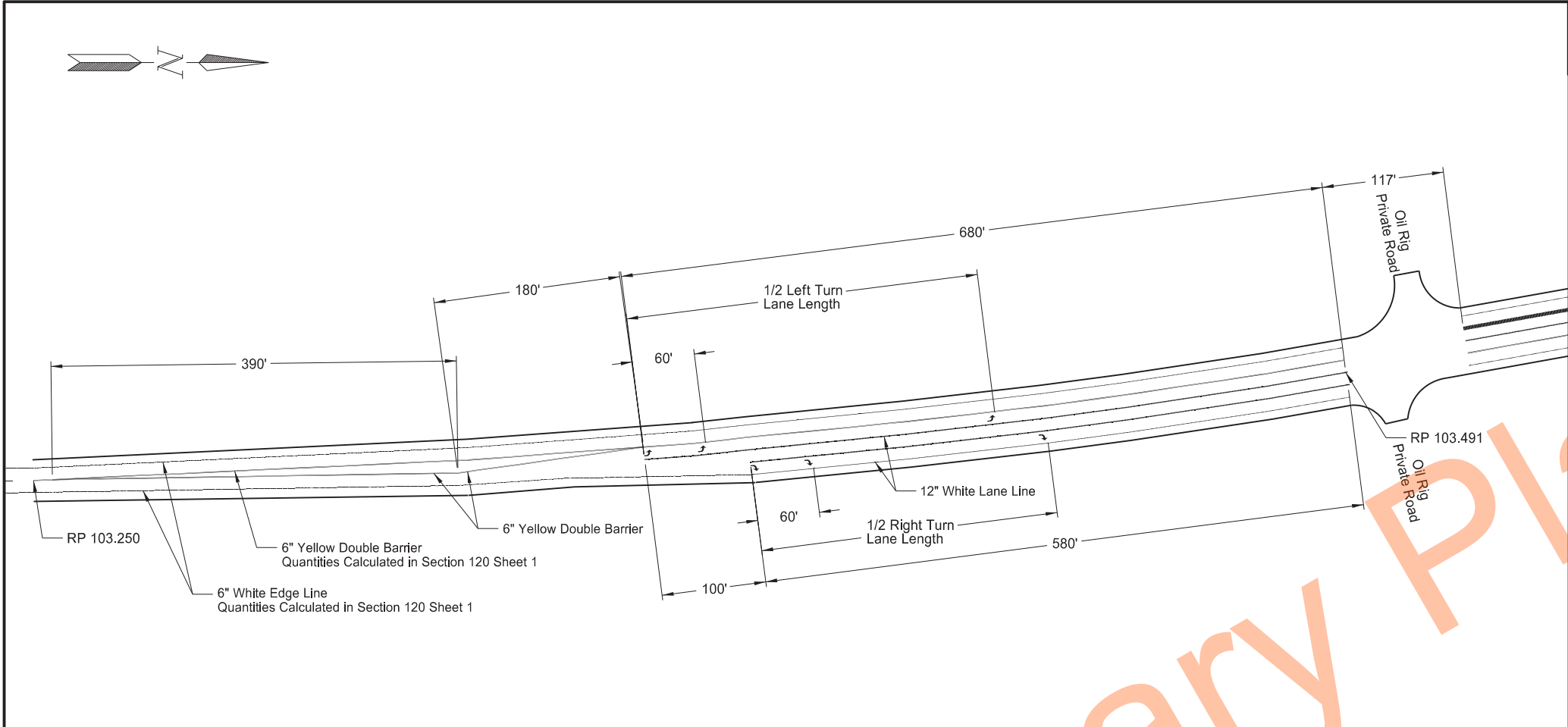
ND Highway 22
17th St SW to Jct ND 200

Pavement Markings
11th St SW

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 09/26/24
NORTH DAKOTA

9/26/2024 1:44:17 PM lucas S:\2022proj\Bowman\2201178\Project\Design\Plan Sheets\120MK_006.dgn





		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	XA-SS-5-022(141)091	120	9
SPEC	CODE	BID ITEM	QUANTITY	UNIT	
762	0111	EPOXY PVT MK 12IN LINE			
		White Lane Line	2445	LF	
762	0112	EPOXY PVT MK MESSAGE			
		Turn Lane Arrows (12)	192	SF	
762	0114	EPOXY PVT MK 6IN LINE			
		Yellow Double Barrier	2280	LF	
762	0432	SHORT TERM 6IN LINE - TYPE NR			
		Yellow Double Barrier (3 Applications)	6840	LF	
762	0437	SHORT TERM 12IN LINE - TYPE NR			
		White Lane Line (2 Applications)	4890	LF	

ND Highway 22
17th St SW to Jct ND 200
Pavement Markings

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 09/26/24
NORTH DAKOTA

NOTES:

- 100 SCOPE OF WORK: Work at this site consists of spall repairs on the north and south barrel and repairing a joint between sections of the double 8'x6'x183' box culvert.
- 900 TEMPORARY STREAM DIVERSION: It is anticipated that a temporary stream diversion will be required to complete the work at this site. Construct, maintain, and remove the temporary stream diversion in accordance with the Special Provision for Temporary Water Diversion.
- Do not construct a temporary stream diversion if the Contractor and Engineer agree that no diversion is required at this site. No payment will be made for a temporary stream diversion at this site if the diversion is eliminated by agreement of the Contractor and Engineer.
- 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 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 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 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 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".

SPALL REPAIR (SF)		
PICTURE	LOCATION	TOTAL (SF)
#1	South Wall North Barrel 4th Joint	1.0
#2	North Wall North Barrel	1.0
#3	South Wall South Barrel 3rd Joint	1.0
#4	North Wall North Barrel Middle Joint	1.0

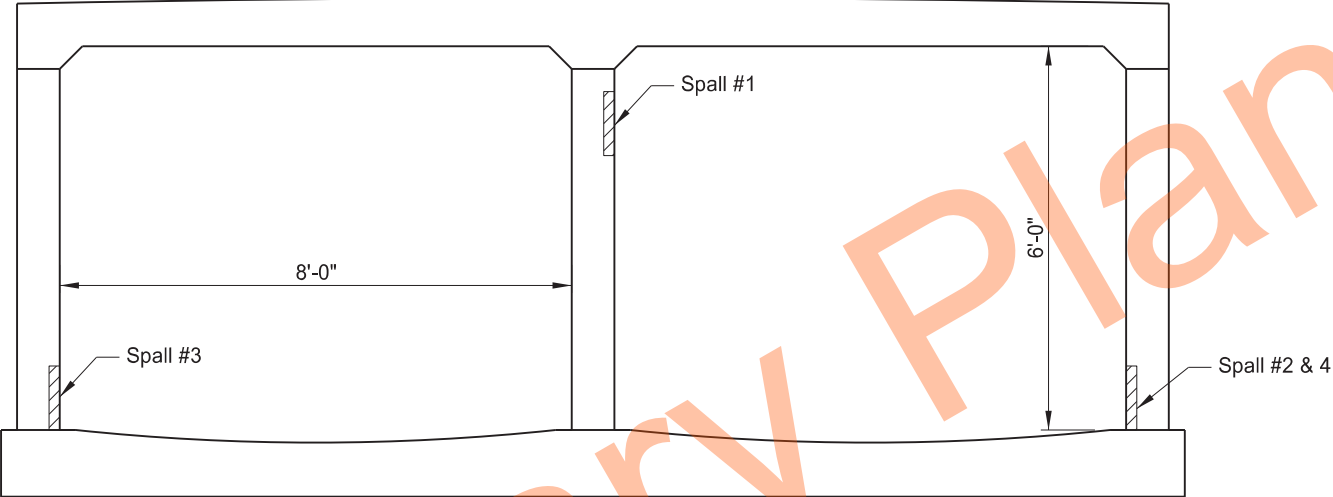
*Pictures are shown in the Supplemental Data.

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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	170	1

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
900	1000	TEMPORARY STREAM DIVERSION	EA	1
930	3640	HIGH EXPANSION POLYERETHANE FOAM	GAL	10
930	9612	SPALL REPAIR	SF	4
930	9671	BOX CULVERT JOINT REPAIR	EA	6



BARREL SECTION

- 930 BOX CULVERT JOINT REPAIR: The construction joint of the reinforced concrete box has separated approximately 2". Minimal voids behind roof and walls are anticipated.

Fill Voids above the roof and behind the walls with high expansion polyurethane foam. Cut the foam flush with the interior of the box culvert after it has cured. Provide expansive foam consisting of a high expansive hydrophobic polyurethane foam that is nontoxic, nonflammable, and meets the following requirements.

Test	Requirement	Method
Tensile Strength	50 PSI	ASTM D 638
Compressive Strength	90 PSI	ASTM D 1621
Shear Strength	25 PSI	ASTM D 732
Water Absorption	< 2% by Volume	ASTM D 2842

Fill the floor joint with concrete. Provide AE-3 concrete or a commercially packaged mix meeting ASTM C387. Fill the joint so the concrete is flush with the interior floor of the box culvert. Wet cure the concrete a minimum of 3 days.

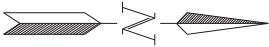
The bid item "Box Culvert Joint Repair" applies to all different types of joint segments in a box culvert. At this site, a total of 6 joint segments will be paid for at the construction joint: 2 exterior walls, 2 floors, and 2 roof segments.

Include all costs for labor, equipment and materials required to repair the floor joints, and to prep the wall and roof joints to receive the expansive foam, in the price bid for " Box Culvert Joint Repair"

Include the costs for labor, equipment and materials to place the expansive foam to fill the voids above the roof and behind the walls in the price bid for "High Expansion Polyurethane Foam". It is estimated that 10 gallons of foam (prior to expansion) will be required to fill the voids assuming a 16x foam expansion rate. Do not exceed the estimated quantity of foam without the permission of the Engineer.

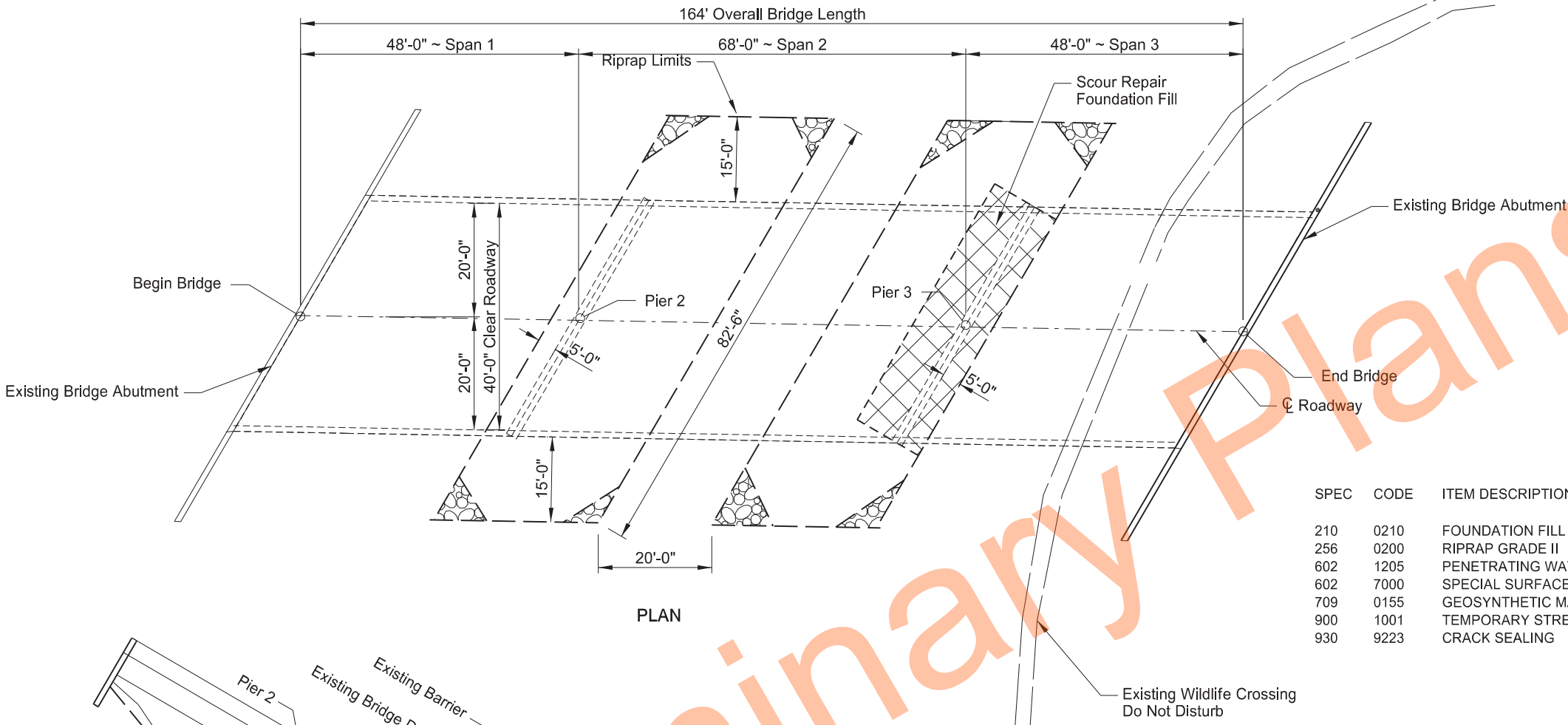


SPECIAL PROVISIONS	
SP 324(23)	TEMPORARY WATER DIVERSION
CREEK 17TH ST SW TO JCT ND 200	
BRIDGE LAYOUT	
ND DEPARTMENT OF TRANSPORTATION BRIDGE DIVISION	
Jason Thorenson 02/12/24	



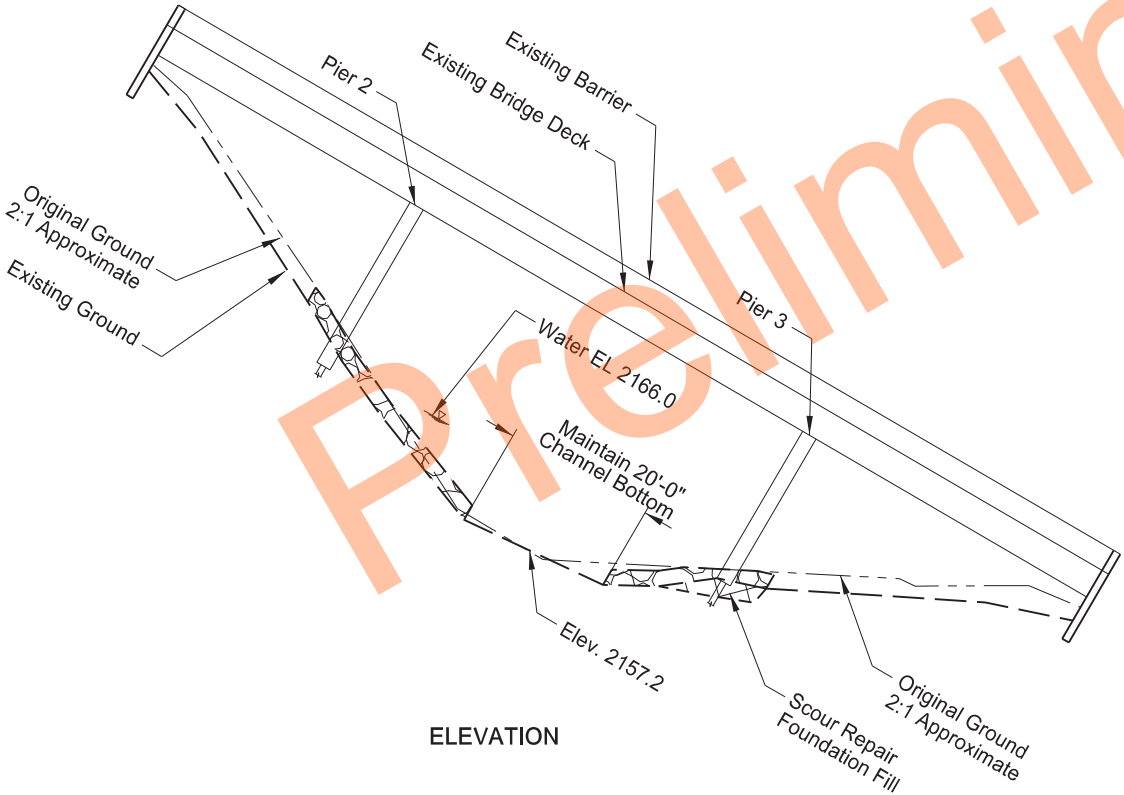
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	2

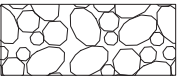


BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
210	0210	FOUNDATION FILL	CY	15
256	0200	RIPRAP GRADE II	CY	309
602	1205	PENETRATING WATER REPELENT TREATMENT	SY	729
602	7000	SPECIAL SURFACE FINISH	SF	1,038
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	464
900	1001	TEMPORARY STREAM DIVERSION - SITE 1	EA	1
930	9223	CRACK SEALING	LF	640



Legend



Riprap Grade II



Scour Repair Foundation Fill

SPECIAL PROVISIONS

SP 324(23) TEMPORARY WATER DIVERSION

KNIFE RIVER
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson

Jason Thorenson
02/12/24



NOTES			STATE	PROJECT NO.	SECTION NO.	SHEET NO.
23 U.S.C. 407 NDDOT Reserves All Objections			ND	XA-SS-5-022(141)091	170	3
100	SCOPE OF WORK: Work at this site consists of crack sealing, penetrating water repellent, special surface finish, erosion repair and riprap installation.	900	TEMPORARY STREAM DIVERION – SITE 1: It is anticipated that a temporary stream diversion will be required to complete the work at this site. Construct, maintain, and remove the temporary stream diversion in accordance with the Special Provision for Temporary Water Diversion.			
210	FOUNDATION FILL: Fill the scour exposing piling on Pier 3 with foundation fill (class 3 or 5) and armor the stream banks with Riprap Grade II. Compact foundation fill in 12“ lifts. Compact each lift to a uniform density. Prepare a smooth, uniform surface that is free of debris prior to placing the Geosynthetic Material Type RR and Riprap Grade II on the existing ground.		Do not construct a temporary stream diversion if the Contractor and Engineer agree that no diversion is required at this site. No payment will be made for a temporary stream diversion at this site if the diversion is eliminated by agreement of the Contractor and Engineer.			
602	WATER WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D, a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.					
	Collect all roadway debris while cleaning; do not discharge sand, gravel, or other debris into bridge drains.					
602	PENETRATING WATER REPELLENT TREATMENT: Apply the penetrating water repellent solution to the top of the bridge deck. Apply penetrating water repellent solution prior to sealing any bridge deck. Do not allow traffic until the solution has completely penetrated and the entire driving surface is dry.					
602	CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.02” or greater in width at its widest segment or 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 0.02” 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 crack sealing in bid item “Crack Sealing.”					
602	SPECIAL SURFACE FINISH: Clean the top and inside surfaces of the existing concrete barriers using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, laitance, and loose or flaking coatings. Fill cracks larger than 0.02” with Tex-Cote Skim or an approved crack sealer compatible with Tex-Cote XL Bridge Cote.					
	Apply Tex-Cote XL 70 Bridge Cote with Silane to the inside and top surfaces of the existing concrete barriers. Use gray surface finish color 36424 meeting AMS-STD-595 with a medium textured finish.					



NOTES:

100 SCOPE OF WORK: Work at this site consists of spall repairs in the north barrel and repairing joints between sections of the triple 10'x9'x100' box culvert.

900 TEMPORARY STREAM DIVERSION: It is anticipated that a temporary stream diversion will be required to complete the work at this site. Construct, maintain, and remove the temporary stream diversion in accordance with the Special Provision for Temporary Water Diversion.

Do not construct a temporary stream diversion if the Contractor and Engineer agree that no diversion is required at this site. No payment will be made for a temporary stream diversion at this site if the diversion is eliminated by agreement of the Contractor and Engineer.

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 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 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.

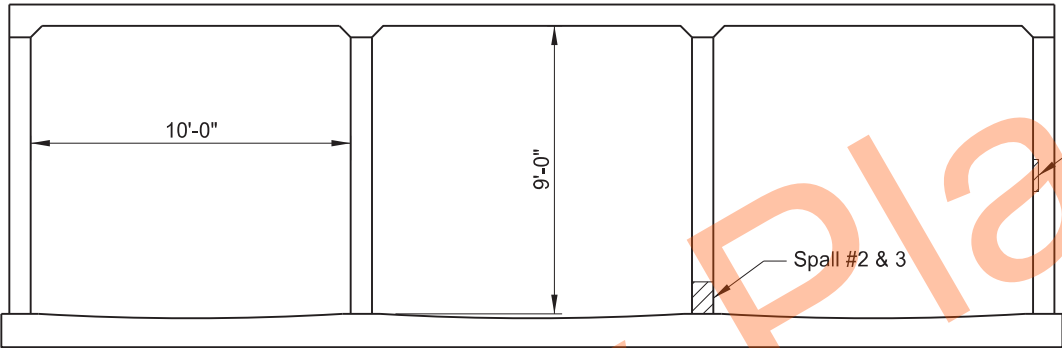
Use material that is specifically intended for patching concrete. This patching material may be Sike Top 123 Plus (Sike Corporation), Duraltop Gel (Euclid Chemical Co.), ThoRoc HB2 (BASF Corporation), or an approved equal repair mortor. Cure the material as recommended by the manufacturer.

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".

SPALL REPAIR (SF)		
*PICTURE	LOCATION	TOTAL (SF)
#1	North Wall North Barrel Center Joint	1.0
#2	South Wall North Barrel	1.0
#3	North Wall Center Barrel Middle Joint	1.0

*Pictures are shown in the Supplemental Data.



BARREL SECTION

930 BOX CULVERT JOINT REPAIR: The construction joint of the reinforced concrete box has separated approximately 2.5". The voids above the roof are approximately 1' and the voids behind the walls are approximately 3'.

Fill Voids above the roof and behind the walls with high expansion polyurethane foam. Cut the foam flush with the interior of the box culvert after it has cured. Provide expansive foam consisting of a high expansive hydrophobic polyurethane foam that is nontoxic, nonflammable, and meets the following requirements.

Test	Requirement	Method
Tensile Strength	50 PSI	ASTM D 638
Compressive Strength	90 PSI	ASTM D 1621
Shear Strength	25 PSI	ASTM D 732
Water Absorption	< 2% by Volume	ASTM D 2842

Fill the floor joint with concrete. Provide AE-3 concrete or a commercially packaged mix meeting ASTM C387. Fill the joint so the concrete is flush with the interior floor of the box culvert. Wet cure the concrete a minimum of 3 days.

The bid item "Box Culvert Joint Repair" applies to all different types of joint segments in a box culvert. At this site, a total of 8 joint segments will be paid for at the construction joint: 2 exterior walls, 3 floors, and 3 roof segments.

Include all costs for labor, equipment and materials required to repair the floor joints, and to prep the wall and roof joints to receive the expansive foam, in the price bid for " Box Culvert Joint Repair".

Include the costs for labor, equipment and materials to place the expansive foam to fill the voids above the roof and behind the walls in the price bid for "High Expansion Polyurethane Foam". It is estimated that 180 gallons of foam (prior to expansion) will be required to fill the voids assuming a 16x foam expansion rate. Do not exceed the estimated quantity of foam without the permission of the Engineer.

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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	170	4

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
900	1000	TEMPORARY STREAM DIVERSION	EA	1
930	3640	HIGH EXPANSION POLYURETHANE FOAM	GAL	180
930	9612	SPALL REPAIR	SF	3
930	9671	BOX CULVERT JOINT REPAIR	EA	8

SPECIAL PROVISIONS

SP 324(23) TEMPORARY WATER DIVERSION

CREEK
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson

Jason Thorenson
02/12/24



NOTES:

100 SCOPE OF WORK: Work at this site consists of repairing joints between sections of the single 10'x9'x172' box culvert.

900 TEMPORARY STREAM DIVERSION: It is anticipated that a temporary stream diversion will be required to complete the work at this site. Construct, maintain, and remove the temporary stream diversion in accordance with the Special Provision for Temporary Water Diversion.

Do not construct a temporary stream diversion if the Contractor and Engineer agree that no diversion is required at this site. No payment will be made for a temporary stream diversion at this site if the diversion is eliminated by agreement of the Contractor and Engineer.

930 BOX CULVERT JOINT REPAIR: The construction joint of the reinforced concrete box has separated approximately 2". The voids above the roof are approximately 1' and the voids behind the walls are approximately 4'.

Fill voids above the roof and behind the walls with high expansion polyurethane foam. Cut the foam flush with the interior of the box culvert after it has cured. Provide expansive foam consisting of high expansive hydrophobic polyurethane foam that is nontoxic, nonflammable, and meets the following requirements:

Test	Requirement	Method
Tensile Strength	50 PSI	ASTM D 638
Compressive Strength	90 PSI	ASTM D 1621
Shear Strength	25 PSI	ASTM D 732
Water Absorption	< 2% by Volume	ASTM D 2842

Fill the floor joint with concrete. Provide AE-3 concrete or a commercially packaged mix meeting ASTM C387. Fill the joint so the concrete is flush with the interior floor of the box culvert. Wet cure the concrete a minimum of 3 days.

The bid item "Box Culvert Joint Repair" applies to all different types of joint segments in a box culvert. At this site, a total of 4 joint segments will be paid for at the construction joint: 2 exterior walls, 1 floor segments, and 1 roof segments.

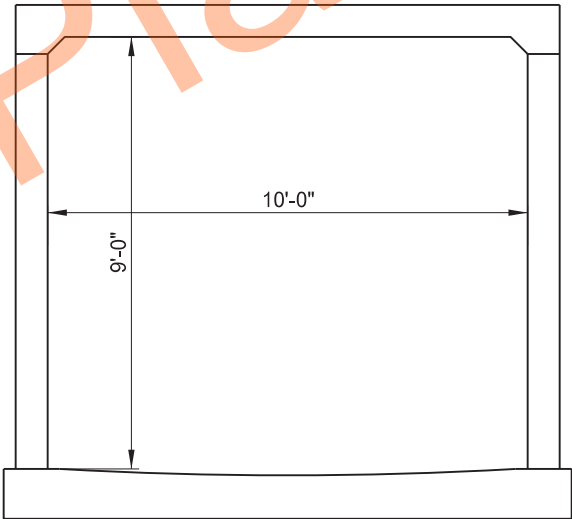
Include all costs for labor, equipment, and materials required to repair the floor joints, and to prep the wall and roof joints to receive the expansive foam, in the price bid for " Box Culvert Joint Repair".

Include the costs for labor, equipment and materials to place the expansive foam to fill the voids above the roof and behind the walls in the price bid for " High Expansion Polyurethane Foam". It is estimated that 280 gallons of foam (prior to expansion) will be required to fill the voids assuming a 16x foam expansion rate. Do not exceed the estimated quantity of foam without the permission of the Engineer.

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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	170	5

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
900	1000	TEMPORARY STREAM DIVERSION	EA	1
930	3640	HIGH EXPANSION POLYURETHANE FOAM	GAL	280
930	9671	BOX CULVERT JOINT REPAIR	EA	4



BARREL SECTION

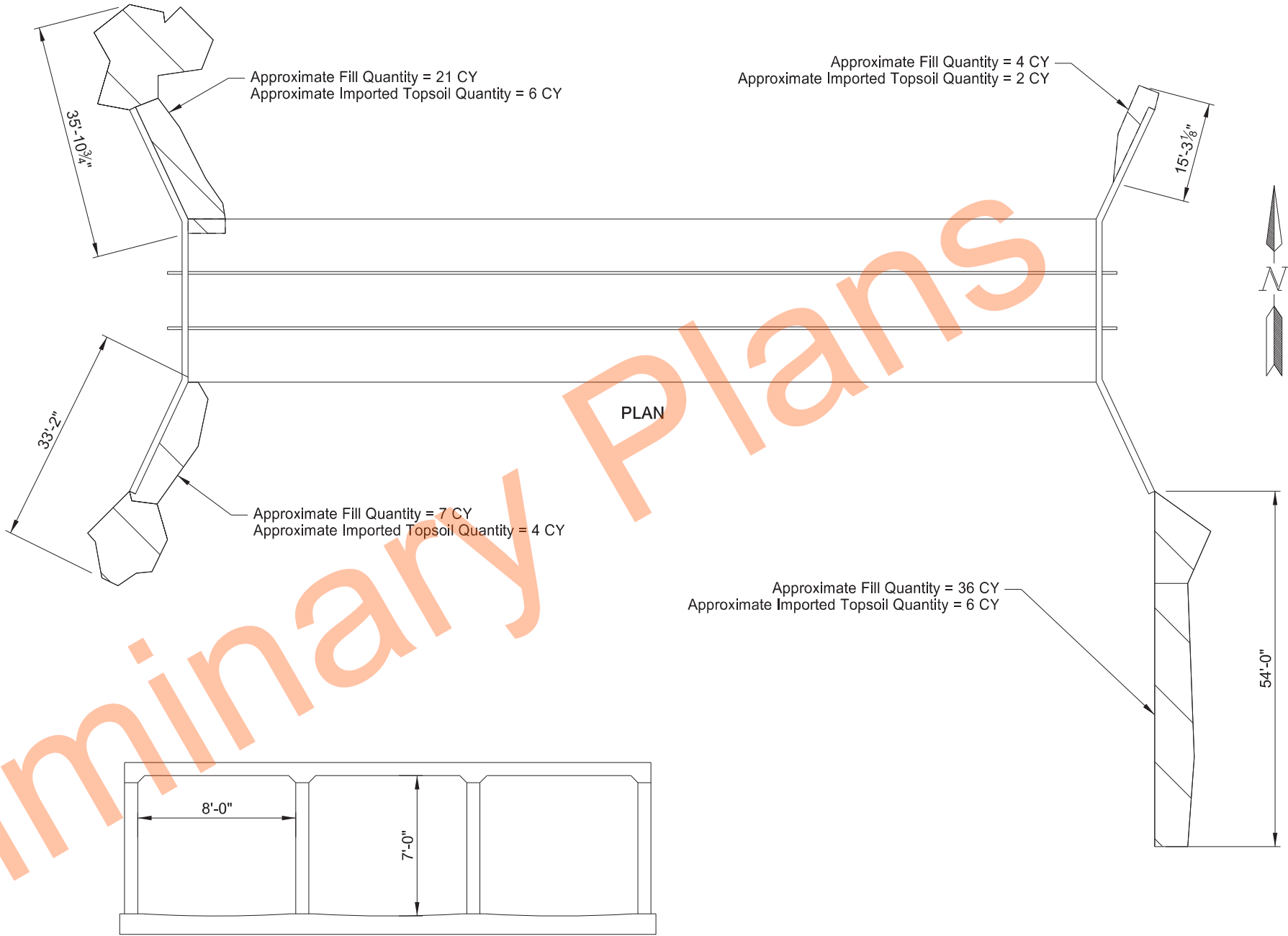


SPECIAL PROVISIONS	
SP 324(23)	TEMPORARY WATER DIVERSION
CREEK 17TH ST SW TO JCT ND 200	
BRIDGE LAYOUT	
ND DEPARTMENT OF TRANSPORTATION BRIDGE DIVISION	
Jason Thorenson 02/12/24	

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	6

- Notes:
- 100 SCOPE OF WORK: The work at this site consists of erosion repairs on all 4 wingwalls of the box culvert using embankment material and imported topsoil.
- It is anticipated that the work at this site can be completed without the use of a temporary stream diversion. No payment will be made for a temporary stream diversion at this site unless the Contractor and Engineer agree a stream diversion is needed to complete the work.
- 230 DITCH EROSION REPAIR: Repair the 4 washouts near the wingwalls of the triple 8'x7'x182' reinforced concrete box culvert. Furnish, install and compact approximately 68 CY of suitable embankment material and 18 CY of topsoil in the washouts. Compact the embankment material according to Section 203.04 G.4, "Compaction Control, Type C" Include all costs associated with labor, equipment and materials to repair the washouts in the unit price bid for "Ditch Erosion Repair"

Ditch Erosion Repair		
	Suitable Embankment Material (CY)	Topsoil (CY)
Southeast	36	6
Northeast	4	2
Southw est	7	4
Northw est	21	6
TOTAL	68	18



LEGEND

EROSION REPAIR

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
230	0113	DITCH EROSION REPAIR	LSUM	1

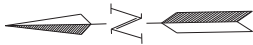


CREEK
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

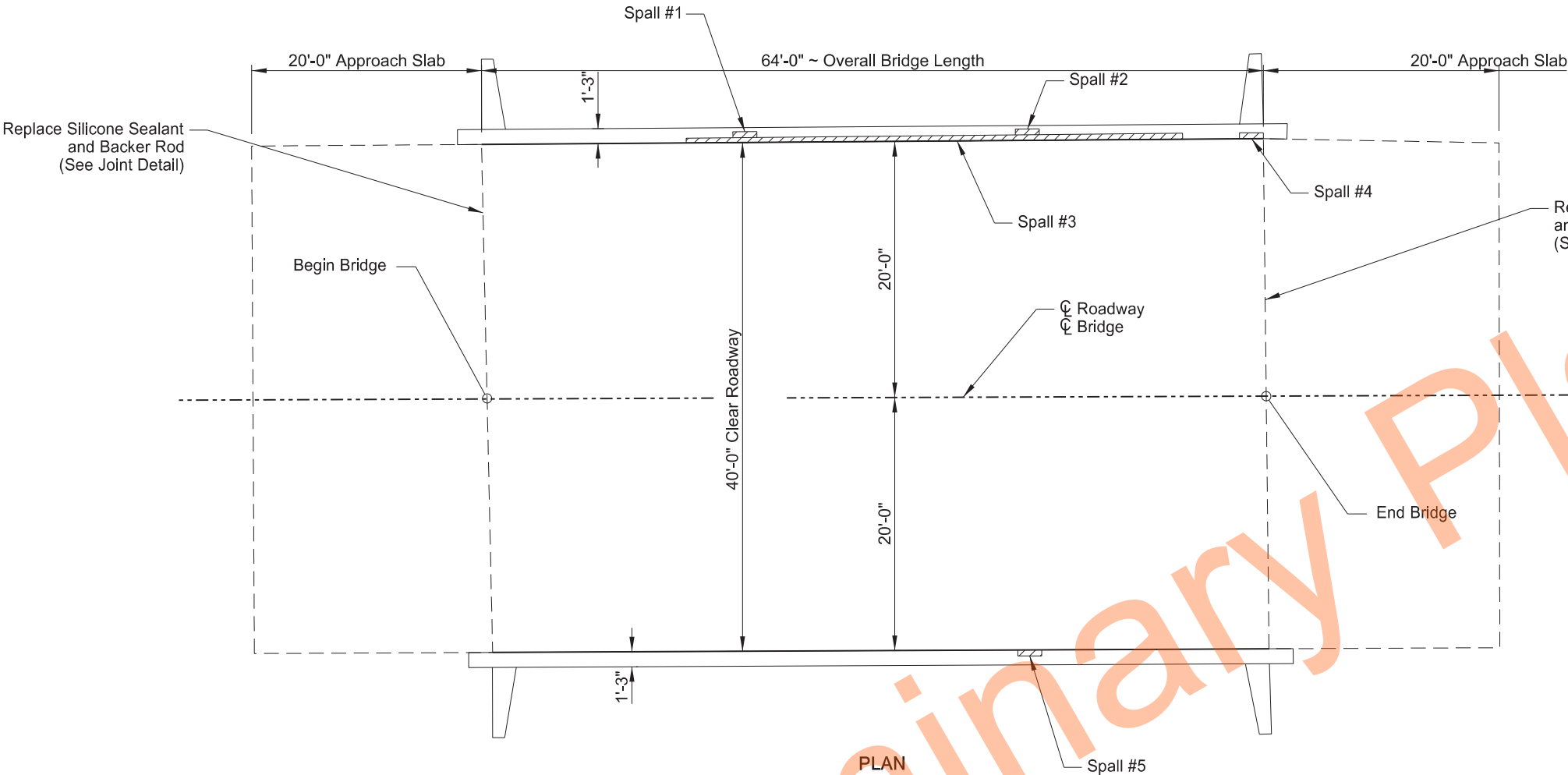
ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
02/12/24

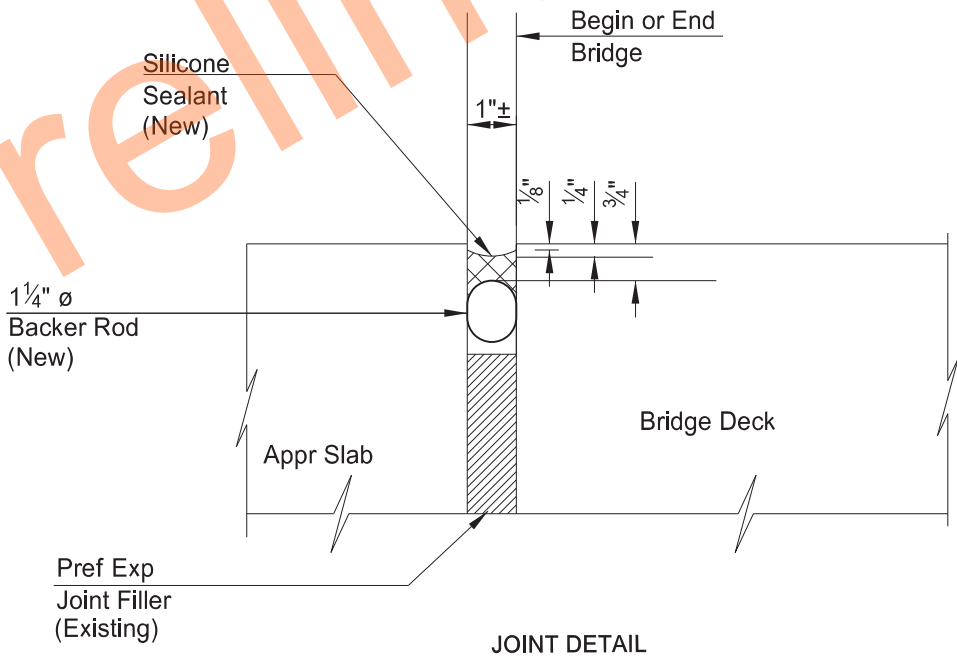


23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	7



SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	1205	PENETRATING WATER REPELLENT TREATMENT	SY	462
602	7000	SPECIAL SURFACE FINISH	SF	103
930	8644	SILICONE SEALANT	LF	82
930	9223	CRACK SEALING	LF	523
930	9612	SPALL REPAIR	SF	7



CREEK
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
02/12/24

NOTES		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
23 U.S.C. 407 NDDOT Reserves All Objections		ND	XA-SS-5-022(141)091	170	8

100

SCOPE OF WORK: Work at this site consists of resealing bridge end joints, repairing spalls on the barriers, crack sealing, penetrating water repellent and special surface finish.

602

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

Collect all roadway debris while cleaning; do not discharge sand, gravel, or other debris into bridge drains.

602

PENETRATING WATER REPELLENT TREATMENT: Apply the penetrating water repellent solution to the top of the bridge deck, top of approach slabs, and curbs on the approach slab. 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.

602

CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck and approach slabs to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.02" of 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 0.02" 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 and approach slabs crack sealing in bid item "Crack Sealing."

602

SPECIAL SURFACE FINISH: After the repairs to the concrete barriers have been completed, clean the top and inside surfaces of the existing concrete barriers using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, laitance, and loose or flaking coatings. Fill cracks larger than 0.02" with Tex-Cote Skim Cote or an approved crack sealer compatible with Tex-Cote XL Bridge Cote.

Apply Tex-Cote CL 70 Bridge Cote with Silane to the inside and top surfaces of the existing concrete barriers. Use gray surface finish color 36424 meeting AMS-STD-595 with a medium textured finish.

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 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" 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 Plus (Sika Corporation, Duraltop Gel (Euclid Chemical Company), 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 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". Include all labor, equipment and materials needed to repair the spall area in bid item "Spall Repair."

SPALL REPAIR (SF)			
RP	PICTURE	LOCATION	TOTAL (SF)
102.754	#1	Joint 4 – 44' N of South Abutment	1.0
102.754	#2	Joint 2 – 22' N of South Abutment	1.0
102.754	#3	13 Spots from 14' to 47' N of South Abutment	2.0
102.754	#4	South End of East Bridge Barrier	1.0
102.754	#5	2 nd Barrier Joint 22' N of South Abutment	2.0

*Pictures are shown in the Supplemental Data.

930

SILICONE SEALANT: Remove and replace the silicone sealant and backer rod in the joint between the approach slab and abutment at both ends of the bridge. Clean the joint of all foreign material and sand blast before the new silicone sealant is installed. Extend the new silicone sealant and backer rod 6" up the front face of the barrier. Include all materials, labor, and equipment required to remove and replace the silicone sealant in the bid item "Silicone Sealant".

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 02/12/24
NORTH DAKOTA

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



NDDOT ABBREVIATIONS

D-101-2

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

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	Sheet Added - Continued from D-101-3

KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

ENGINEER

NORTH DAKOTA

12 18 2020

NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-28-18	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

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

LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

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

Countours

	Depression Contours
	Supplemental Contour

Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

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

Erosion Control

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

Environmental

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

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

KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

ENGINEER

NORTH DAKOTA

12 18 2020

SYMBOLS

D-101-30

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

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

Kirk J. Hoff
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 18 2020

SYMBOLS

D-101-31

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

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

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
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 DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions



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



12 18 2020

SYMBOLS

D-101-33

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

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

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

Cross Section Legend

D-101-40

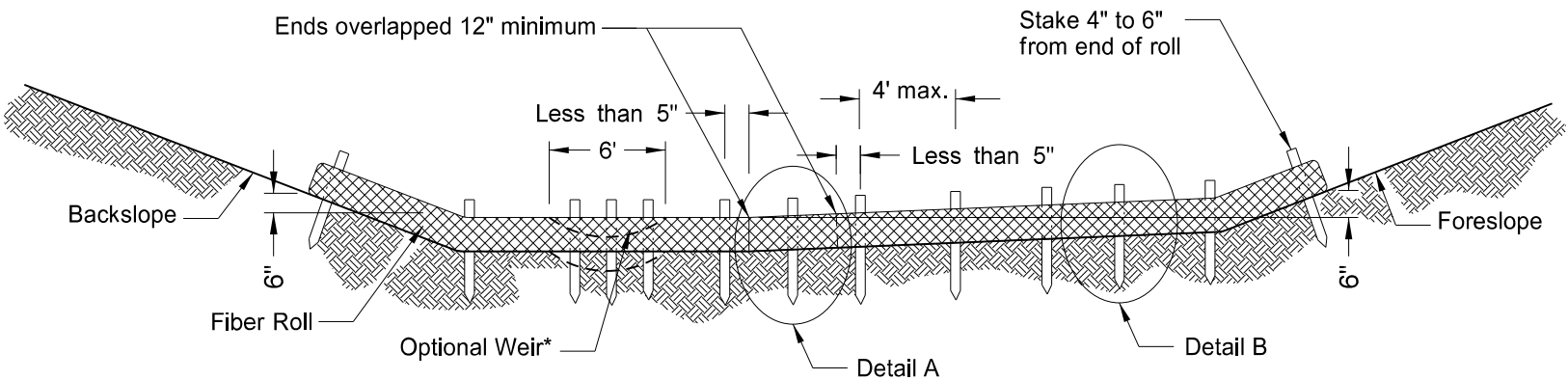


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update

06/14/23

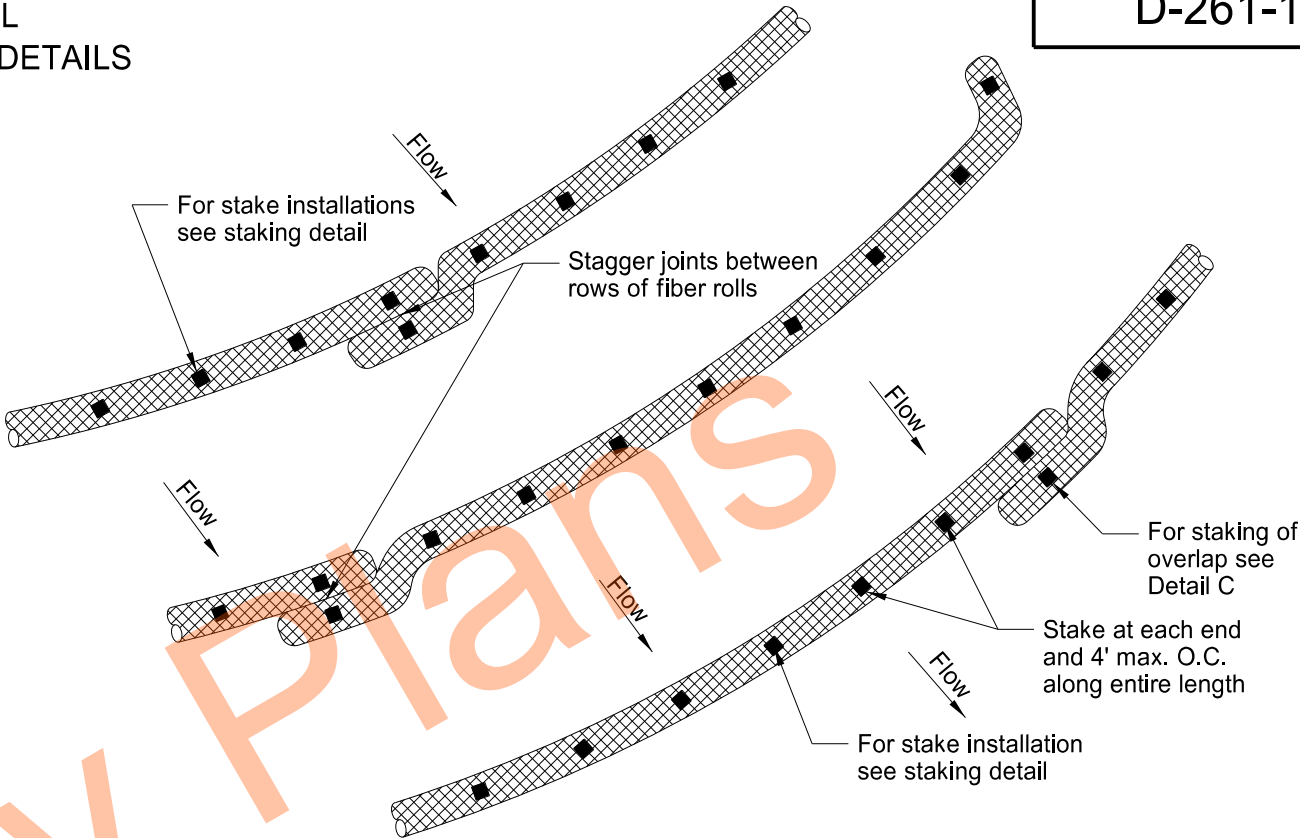
EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

D-261-1

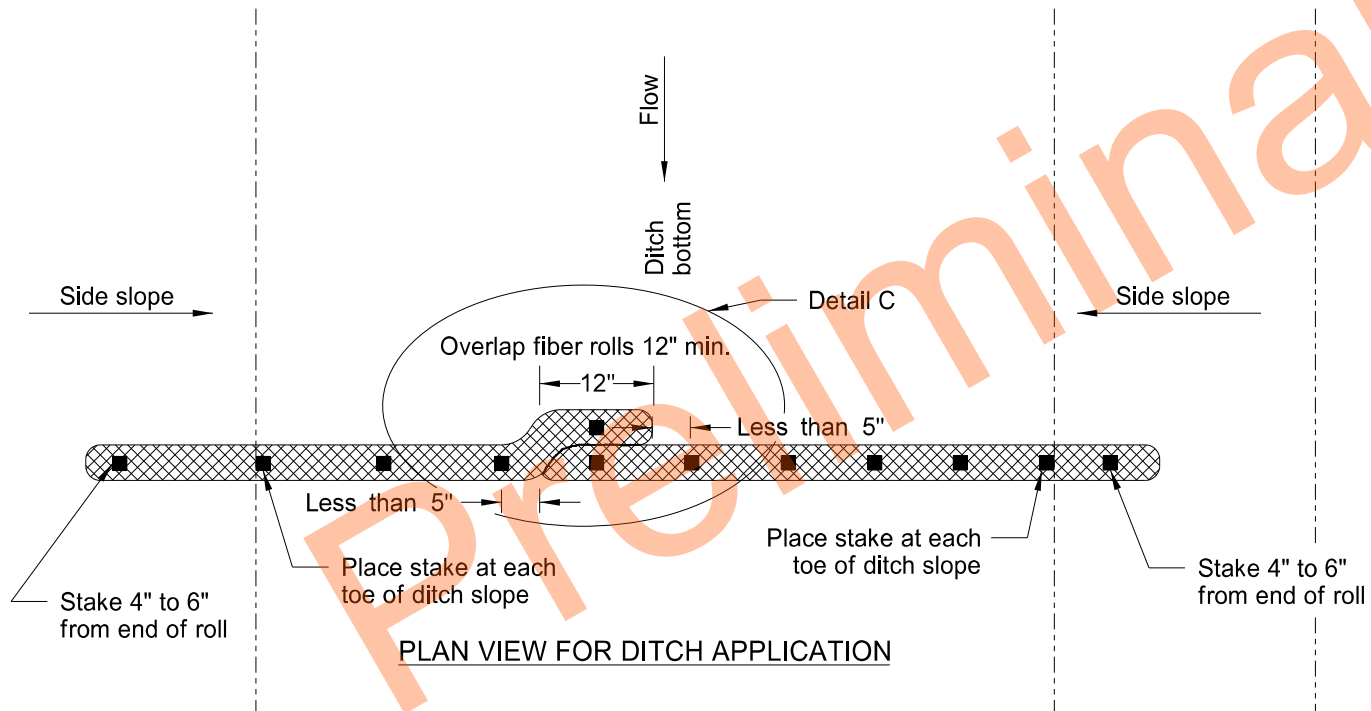


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

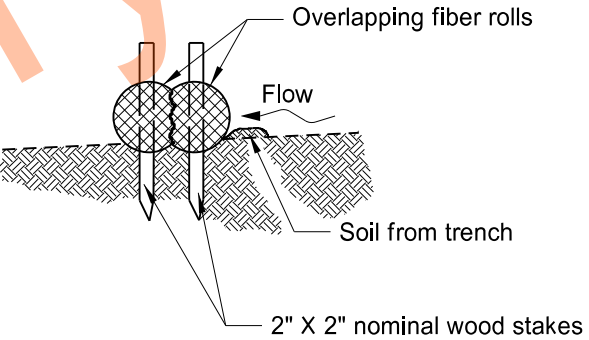
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



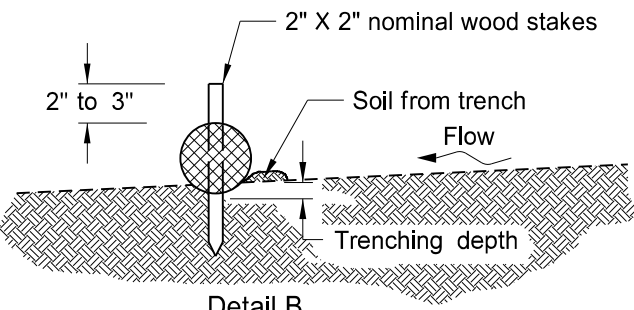
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

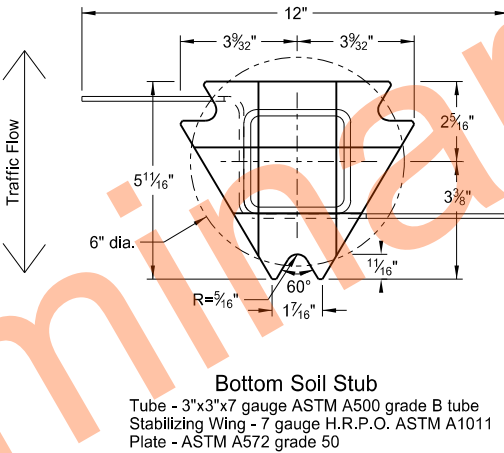
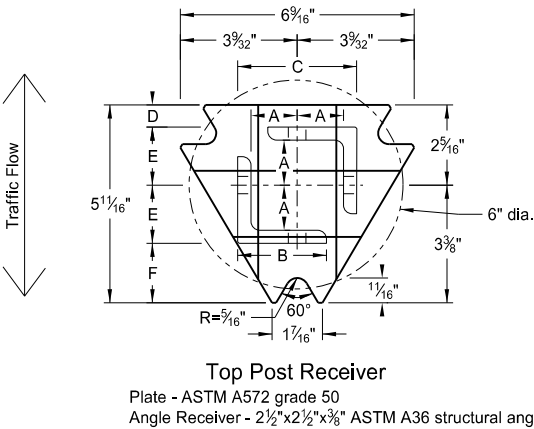
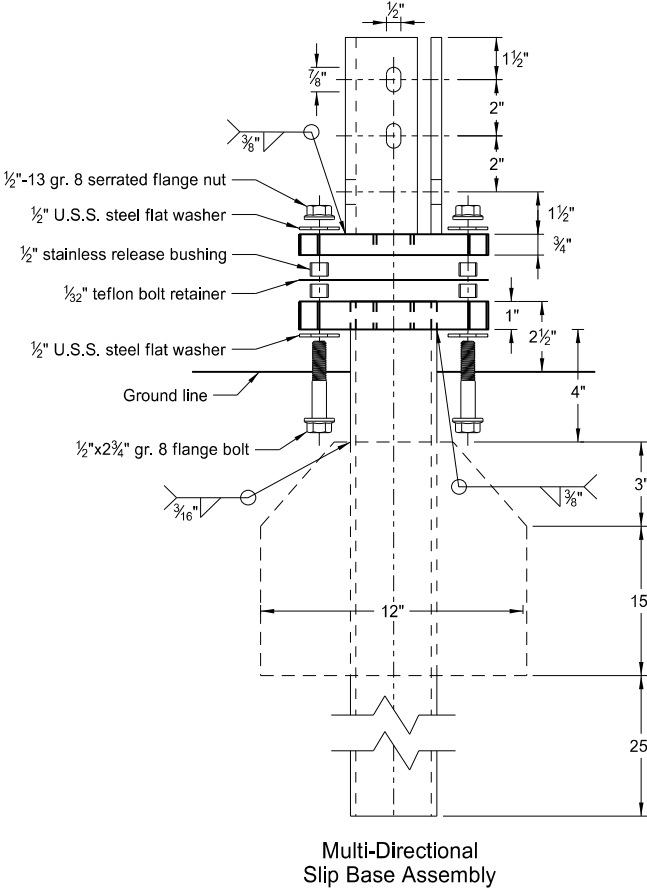
NOTE: Runoff must not be allowed to run under or around roll.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.
08-27-19	New Design Engineer PE Stamp

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 08/27/19 and the original document is stored at the
North Dakota Department
of Transportation

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.

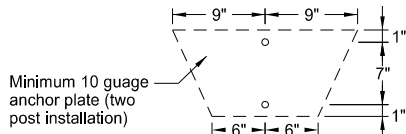
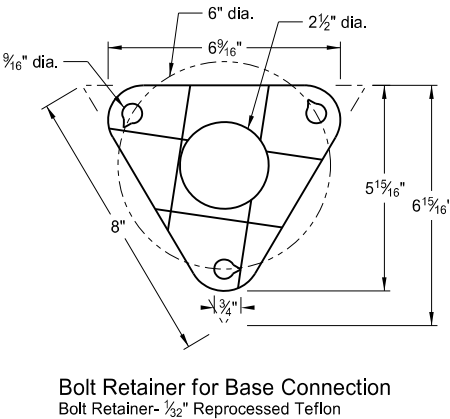
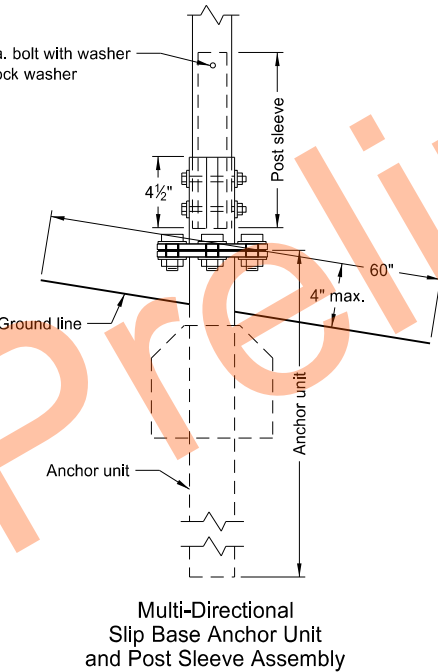
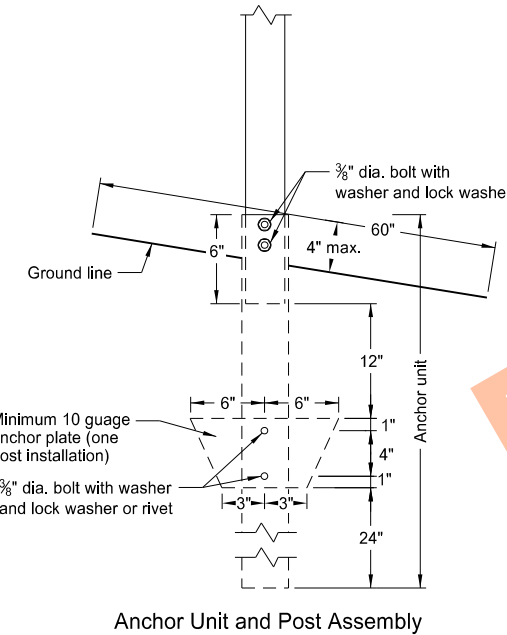


Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

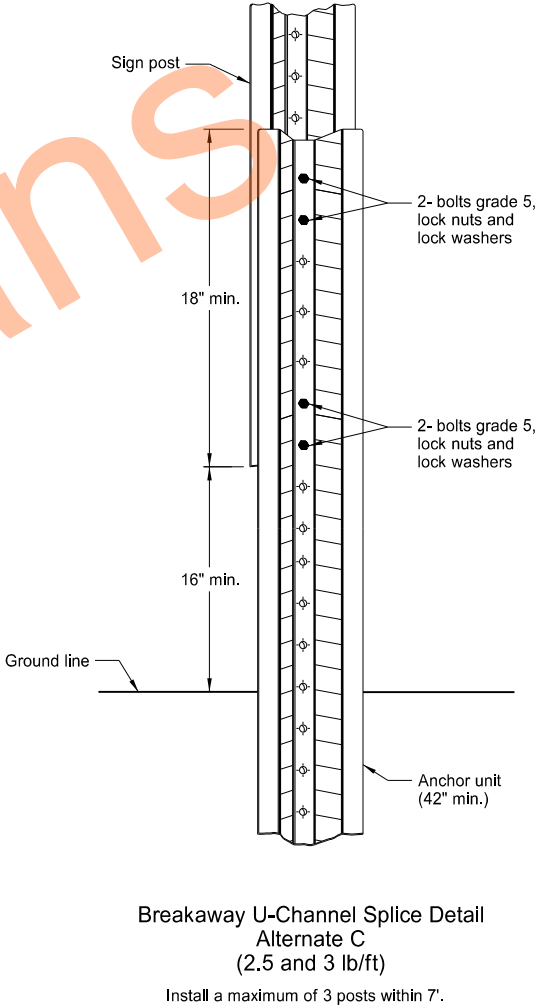
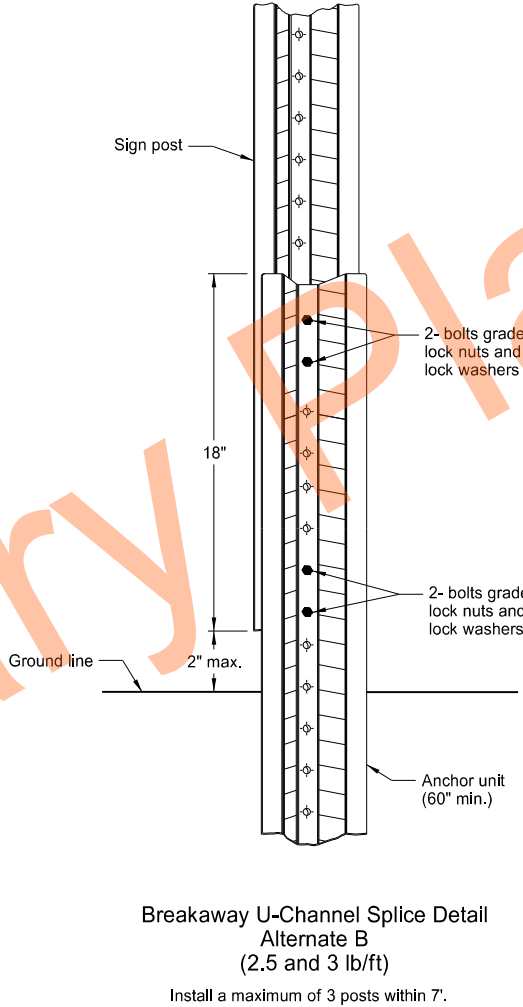
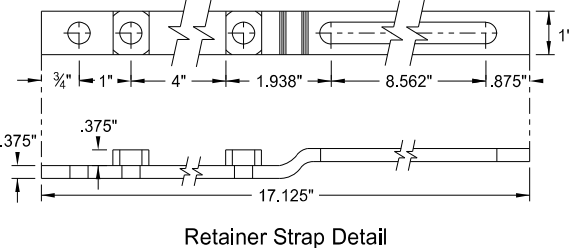
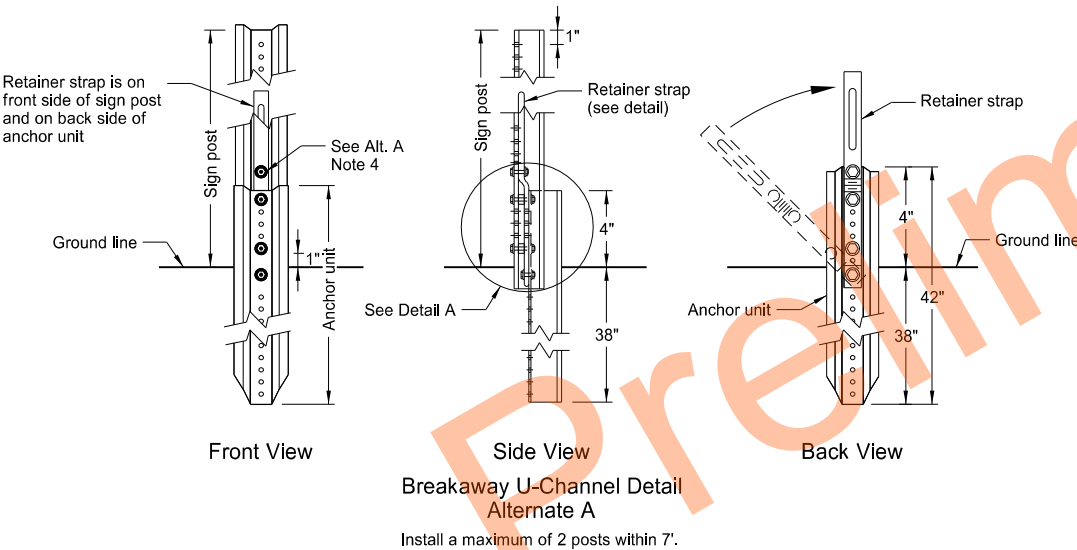
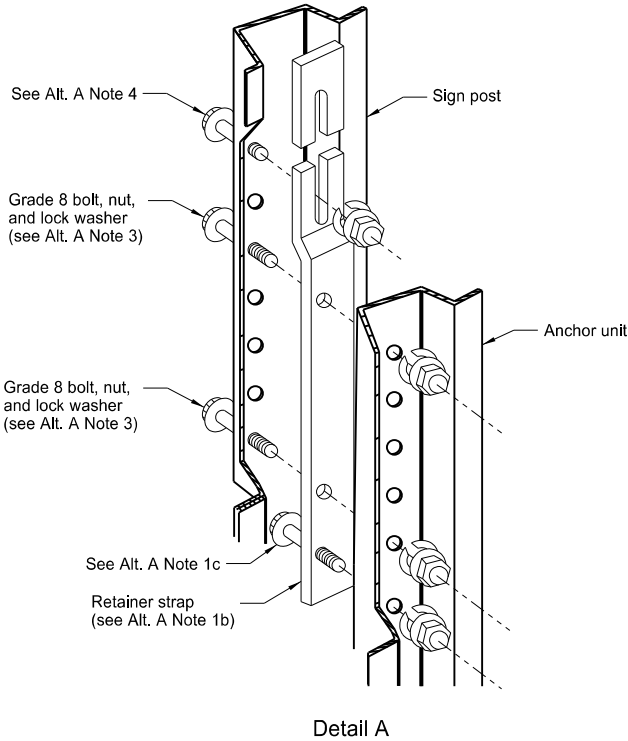
This document was originally issued and sealed by

Kirk J Hoff,

Registration Number
PE-4683,

on 10/03/19 and the original document is stored at the
North Dakota Department
of Transportation

U-Channel Post



Alternate A Steps of Installation:

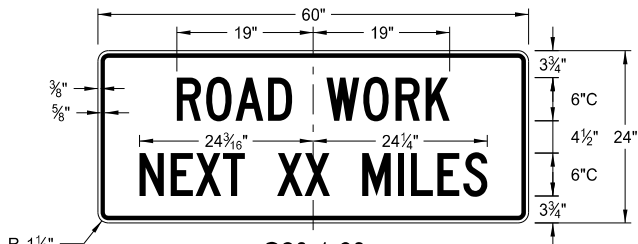
- a) Drive anchor unit to within 12" of ground level.
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
- a) Drive anchor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

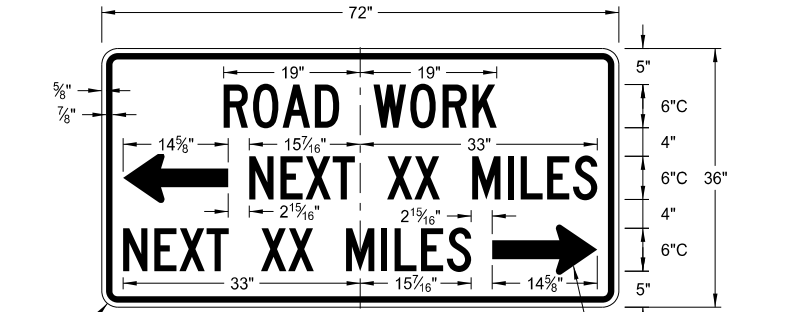
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 10/03/19 and the original document is stored at the
North Dakota Department
of Transportation

CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

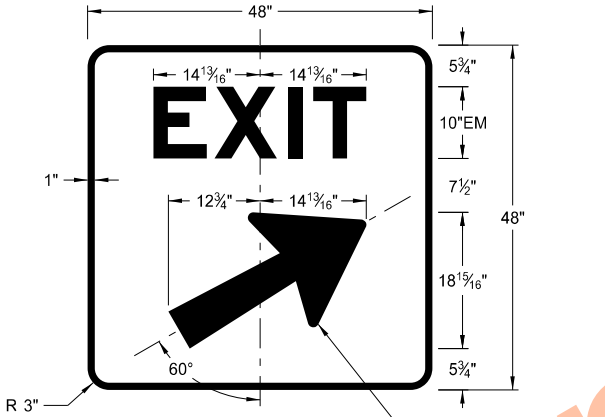
D-704-9



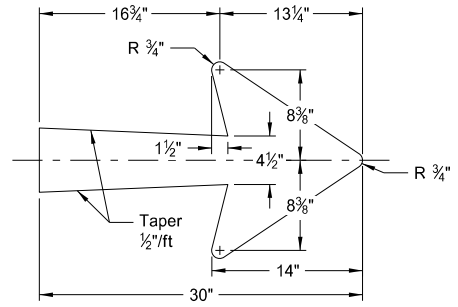
G20-1-60
Legend: black (non-refl)
Background: orange



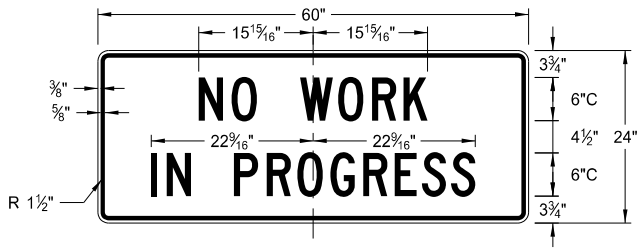
G20-50a-72
Legend: black (non-refl)
Background: orange



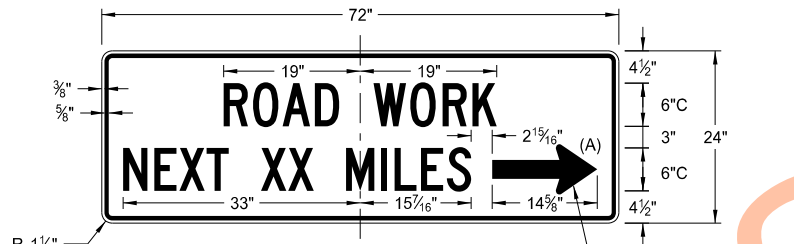
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



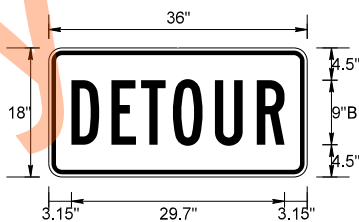
E5-1-48



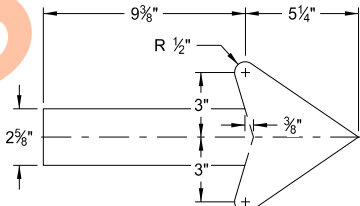
G20-1b-60
Legend: black (non-refl)
Background: orange



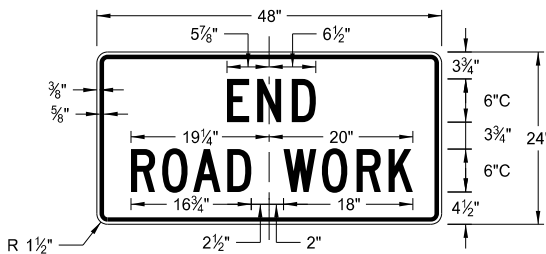
G20-52a-72
Legend: black (non-refl)
Background: orange



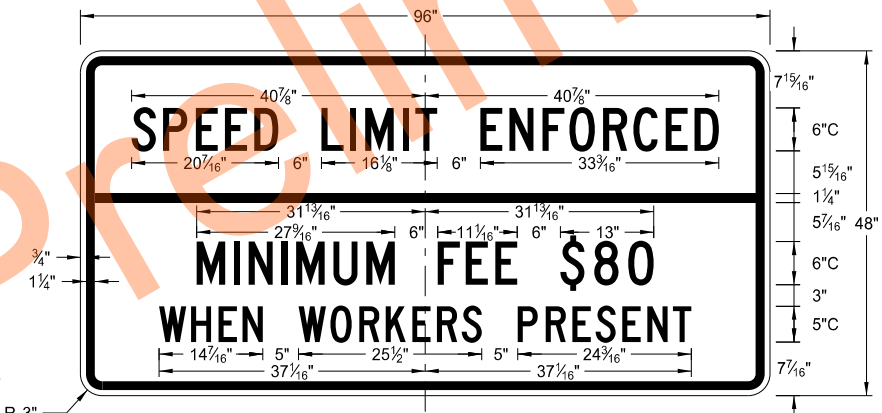
M4-8-36
Legend: black (non-refl)
Background: orange



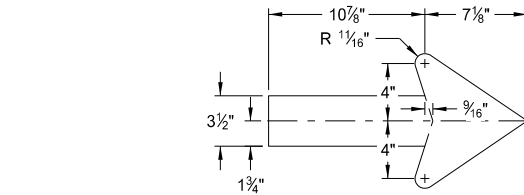
G20-50a-72
G20-52a-72



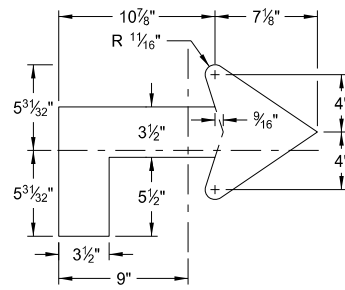
G20-2-48
Legend: black (non-refl)
Background: orange



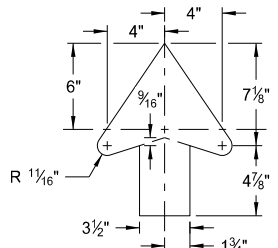
G20-55-96
Legend: black (non-refl)
Background: orange



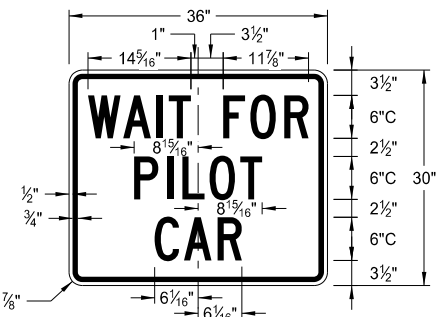
M4-9(L or R)-30
Right or Left



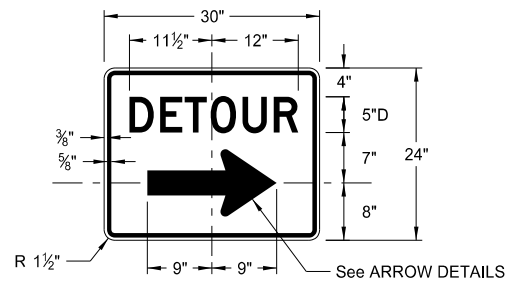
M4-9(L or R)-30
Advanced Right or Left



M4-9-30
Straight



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



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

ARROW DETAILS

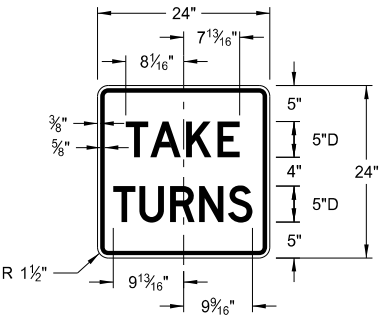
NOTES:
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

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

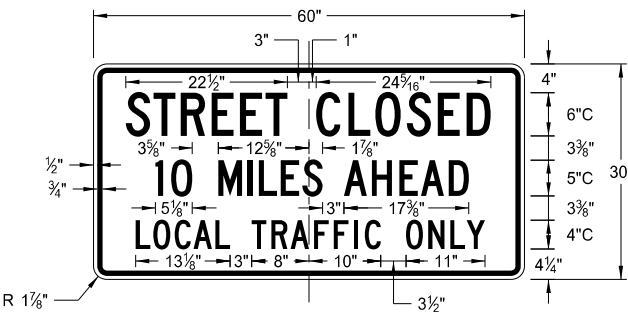
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



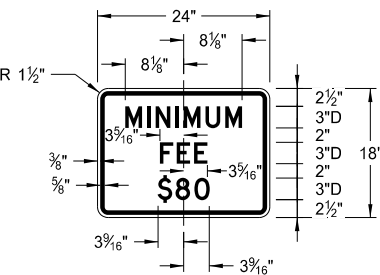
R1-50P-24

Legend: black (non-refl)
Background: white



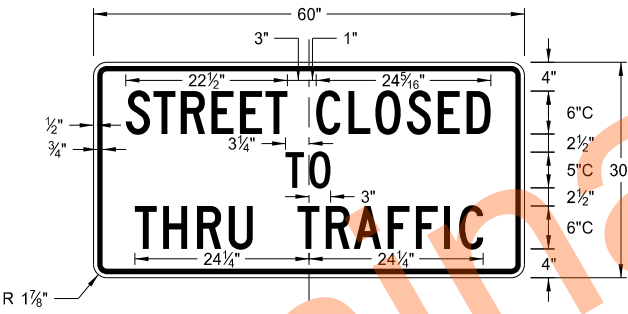
R11-3c-60

Legend: black (non-refl)
Background: white



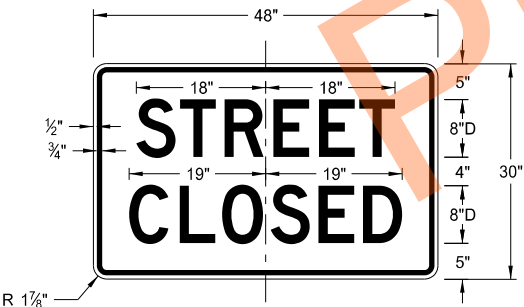
R2-1aP-24

Legend: black (non-refl)
Background: white



R11-4a-60

Legend: black (non-refl)
Background: white



R11-2a-48

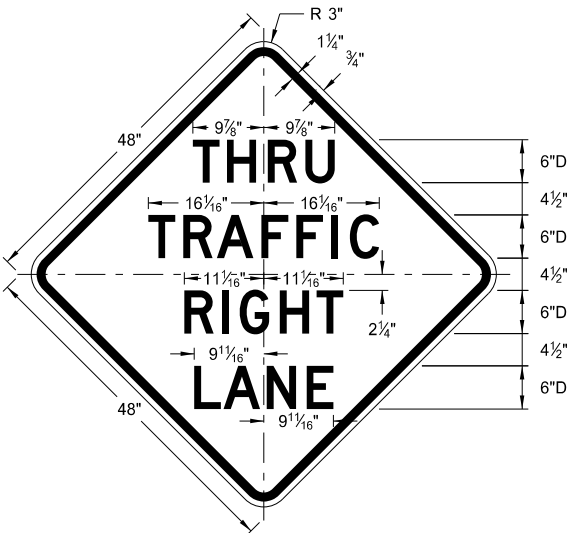
Legend: black (non-refl)
Background: white

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

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

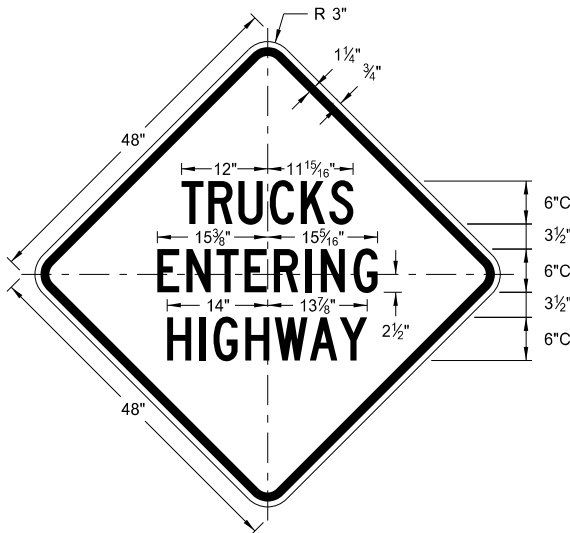
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

D-704-11



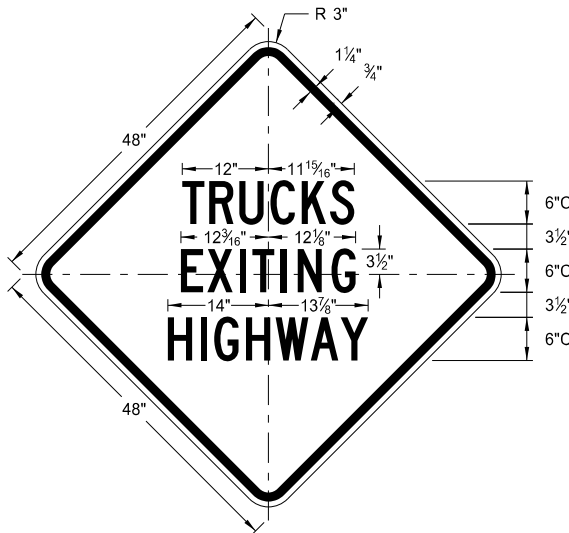
W5-8-48

Legend: black (non-refl)
Background: orange



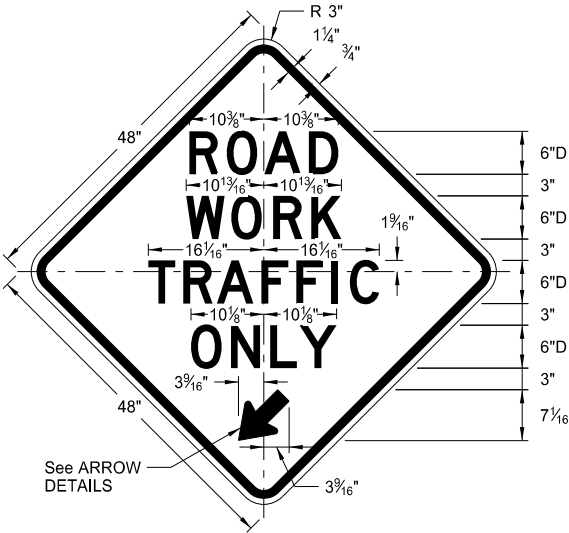
W8-53-48

Legend: black (non-refl)
Background: orange



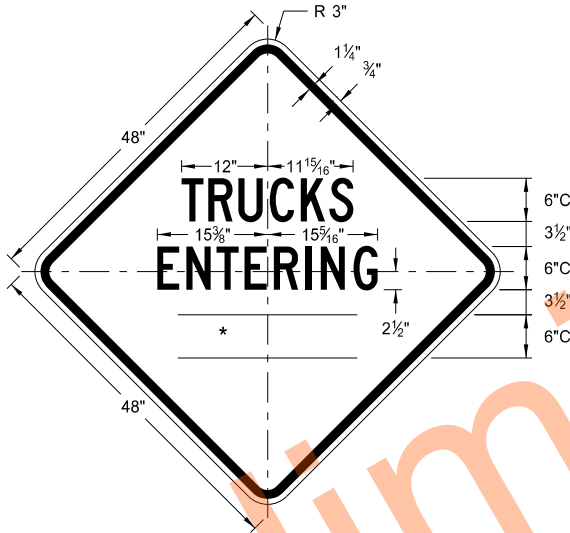
W8-56-48

Legend: black (non-refl)
Background: orange



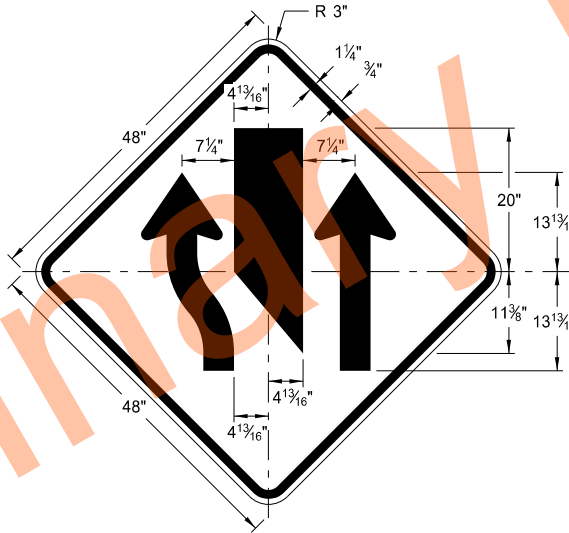
W5-9-48

Legend: black (non-refl)
Background: orange



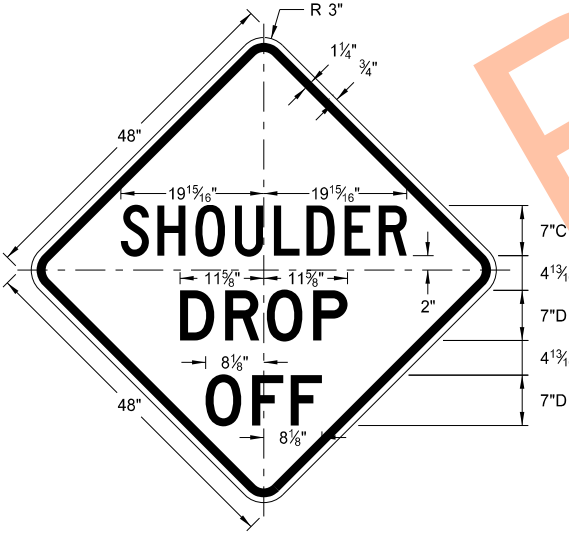
W8-54-48

Legend: black (non-refl)
Background: orange



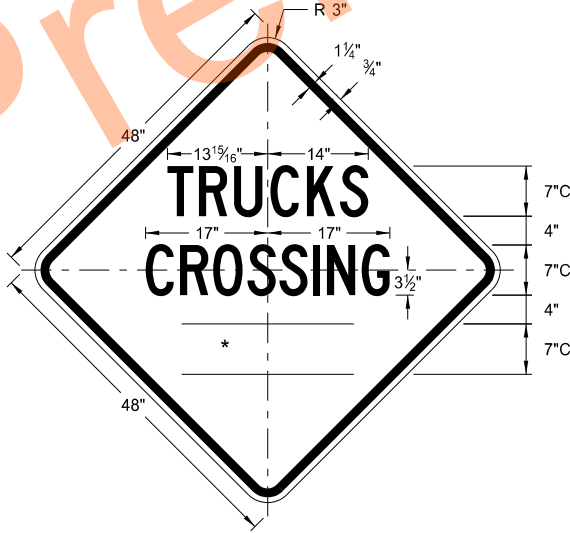
W9-3a-48

Legend: black (non-refl)
Background: orange



W8-9a-48

Legend: black (non-refl)
Background: orange

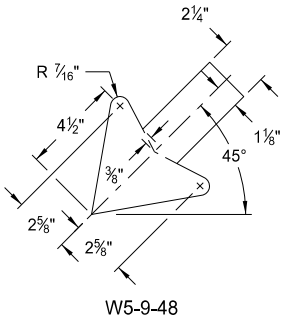


W8-55-48

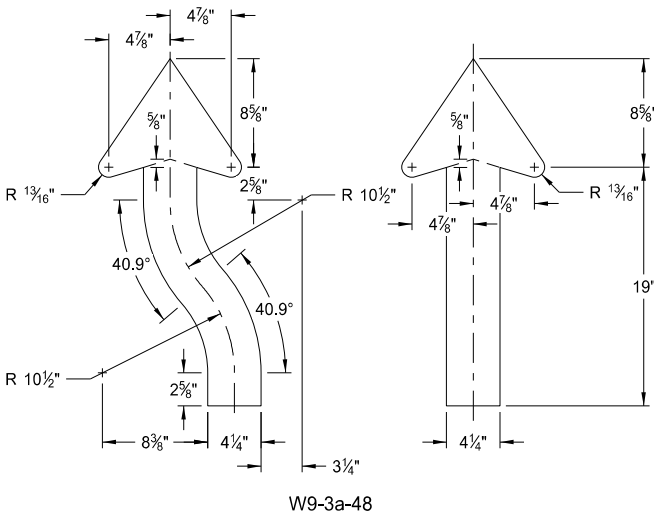
Legend: black (non-refl)
Background: orange

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

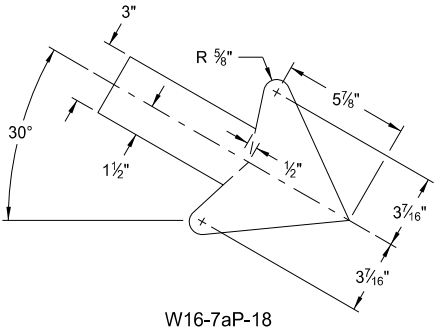
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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

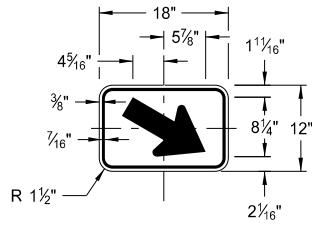
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

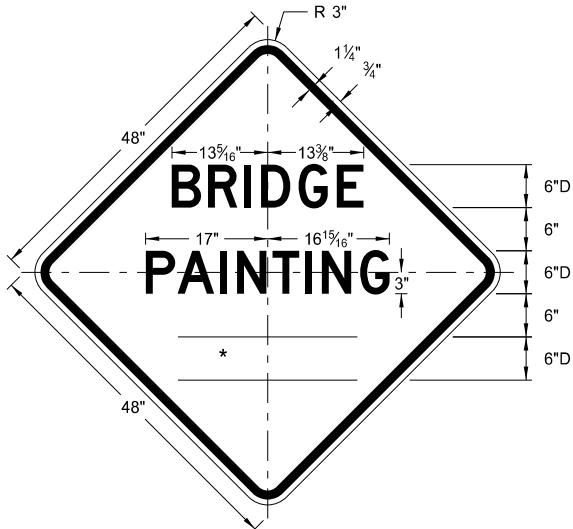


W16-7aP-18



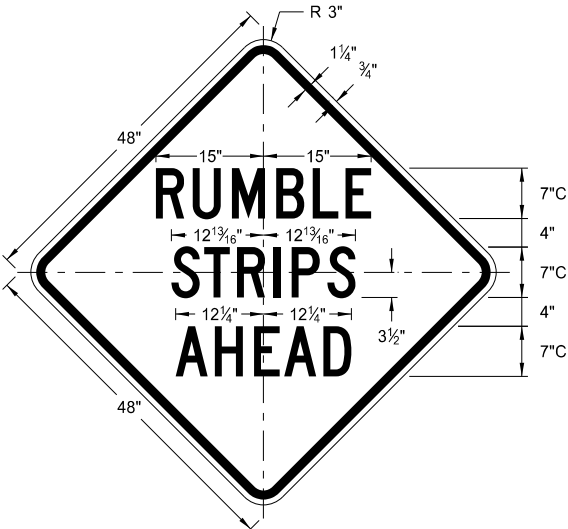
W16-7aP-18

Legend: black (non-refl)
Background: orange



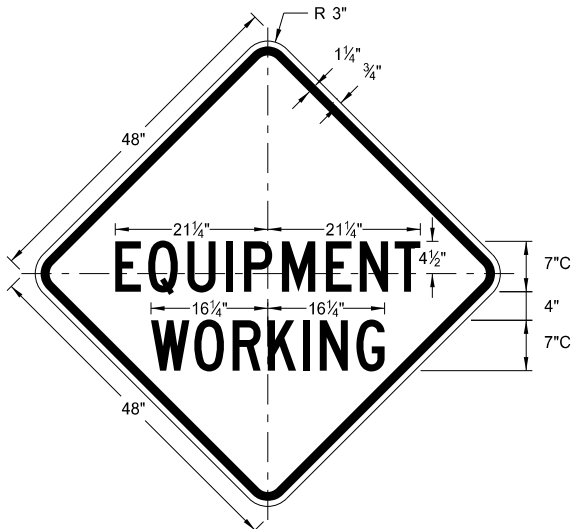
W21-50-48

Legend: black (non-refl)
Background: orange



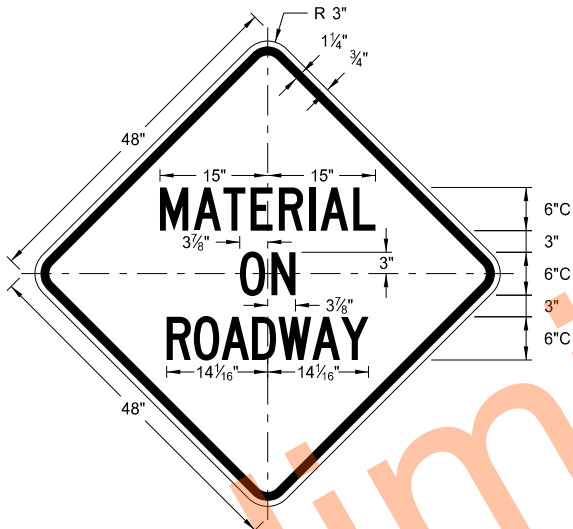
W21-53-48

Legend: black (non-refl)
Background: orange



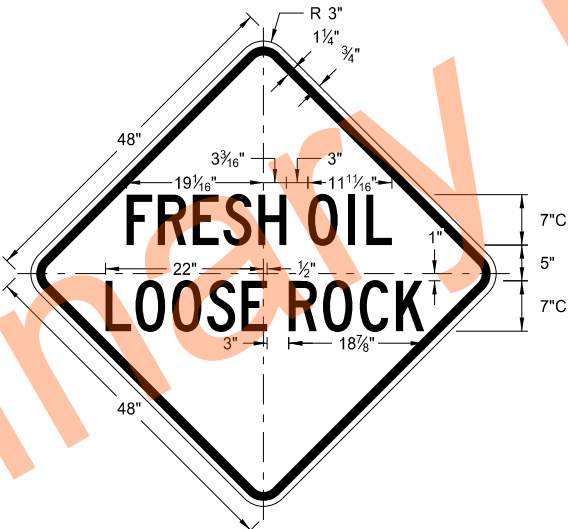
W20-51-48

Legend: black (non-refl)
Background: orange



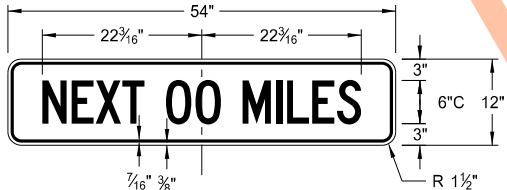
W21-51-48

Legend: black (non-refl)
Background: orange



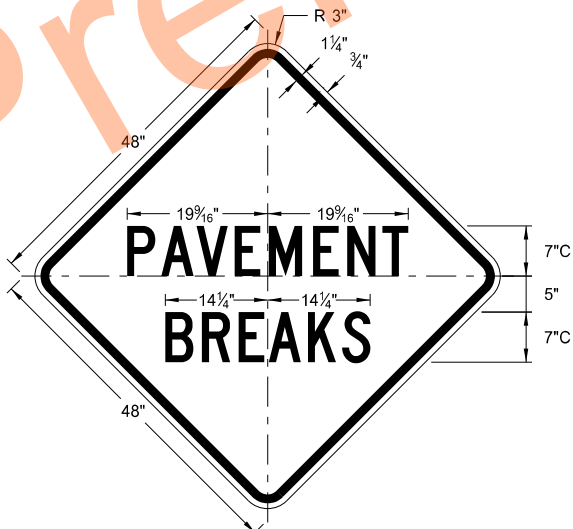
W22-8-48

Legend: black (non-refl)
Background: orange



W20-52P-54

Legend: black (non-refl)
Background: orange

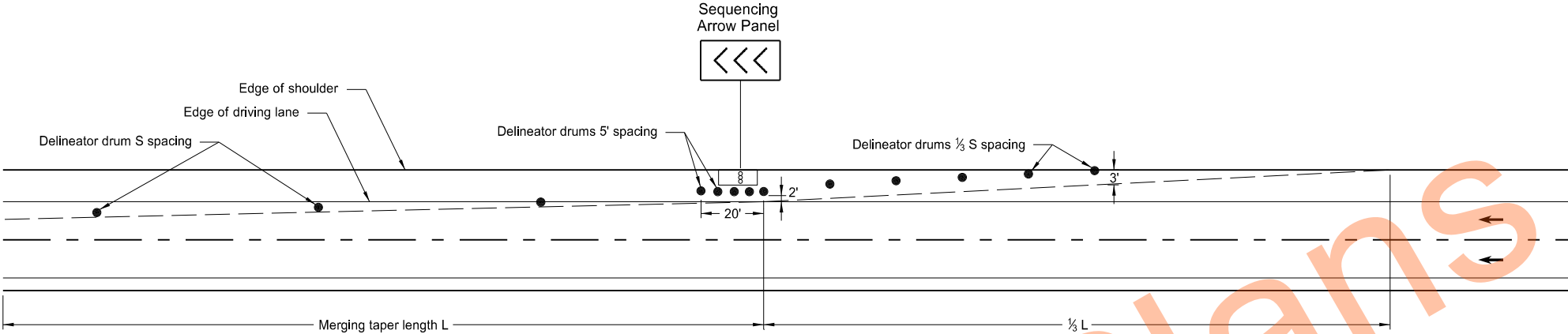


W21-52-48

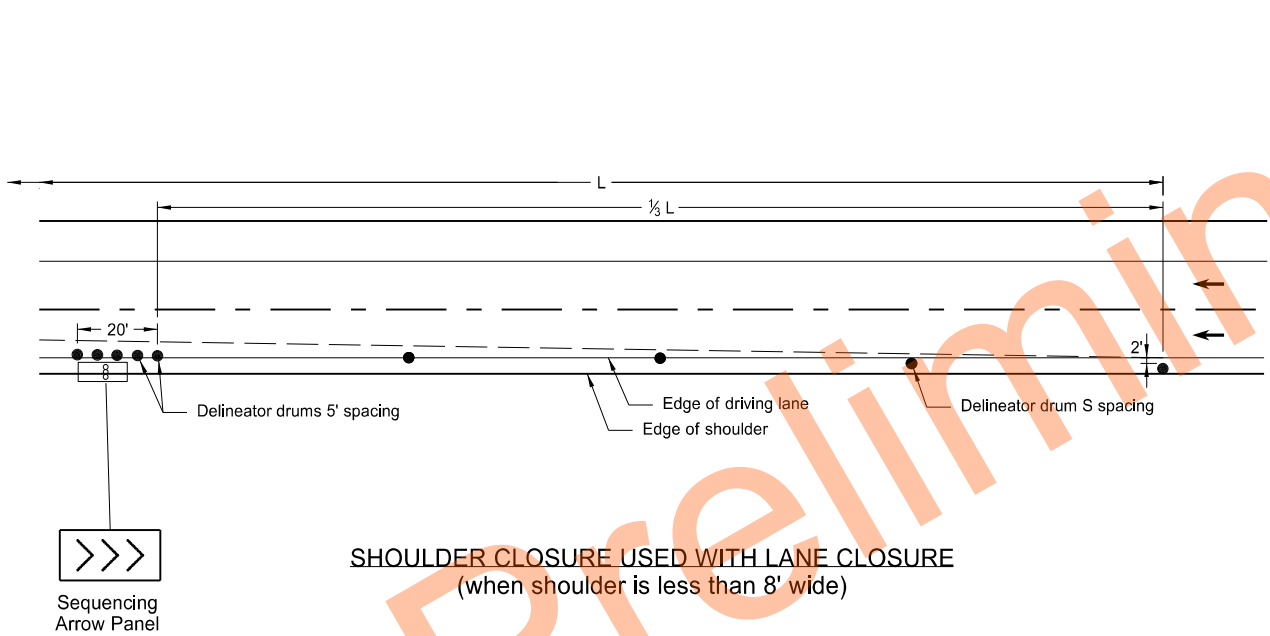
Legend: black (non-refl)
Background: orange

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

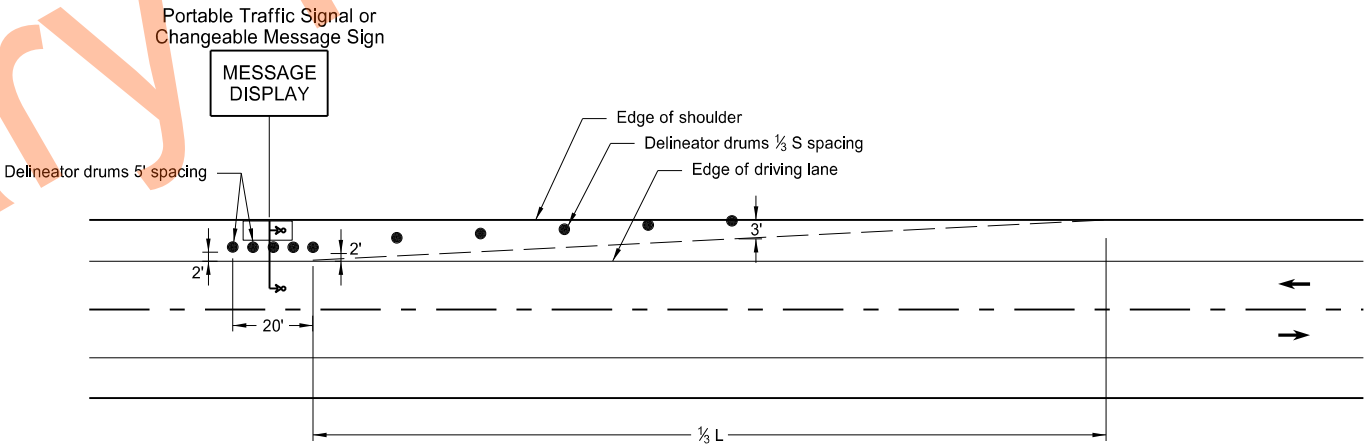
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 11/1/19 and the original document is stored at the
North Dakota Department
of Transportation



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



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY

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

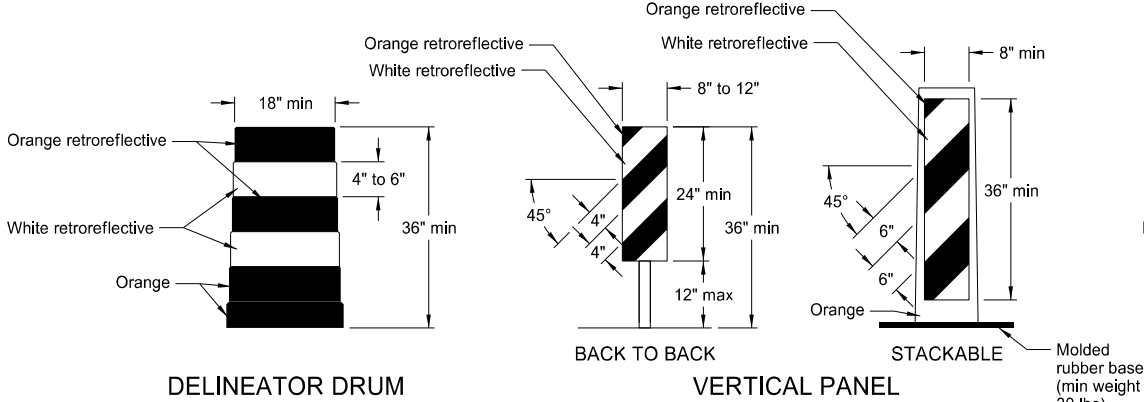
Notes:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-25-19	Added L dimension to detail

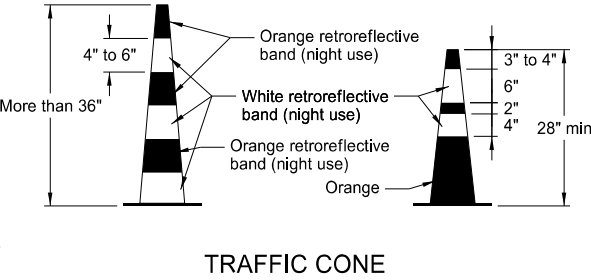
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 10/25/19 and the original document is stored at the
North Dakota Department
of Transportation

BARRICADE AND CHANNELIZING DEVICE DETAILS

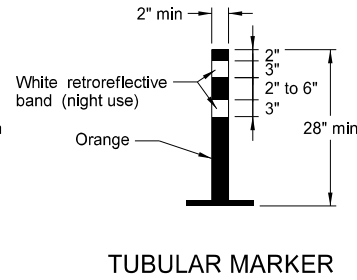


Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and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

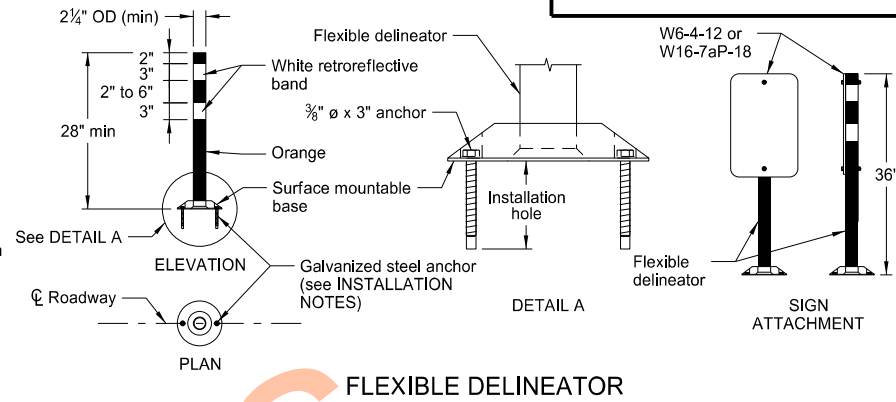
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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



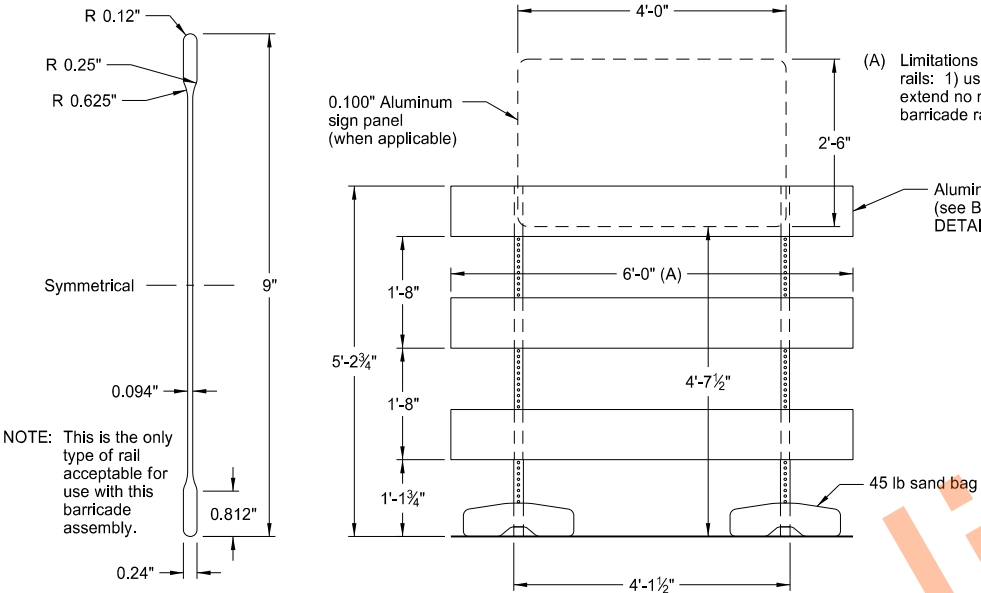
Provide retroreflectORIZATION of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectORIZED space between the orange and white stripes.



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



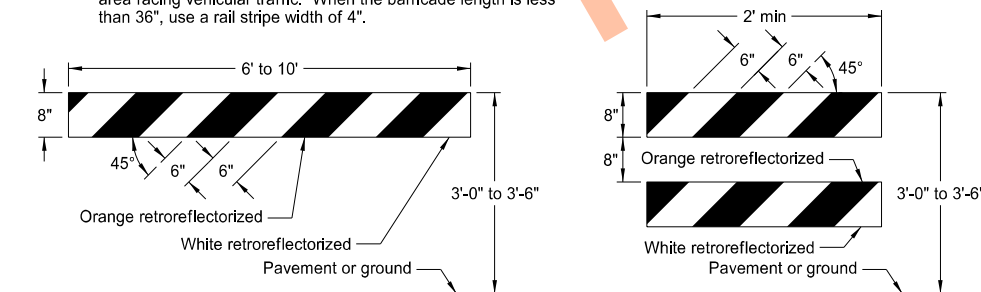
- INSTALLATION NOTES:
1. Drill installation holes to diameter and depth required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, use an 8" x 8" butyl pad or hot melt butyl.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



BARRICADE BLADE DETAIL

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

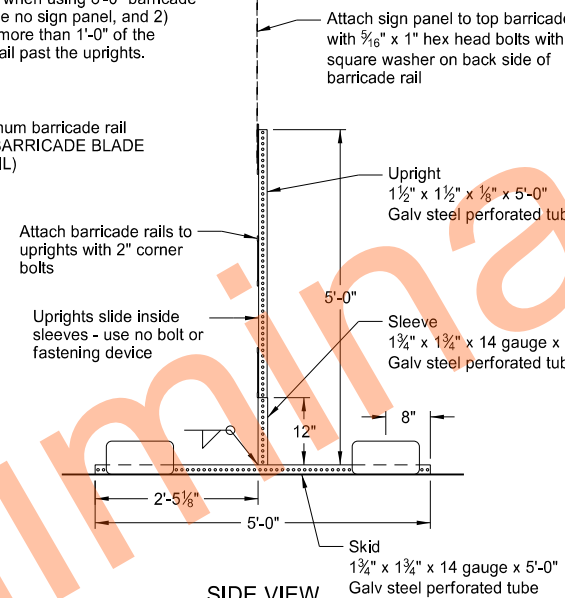
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

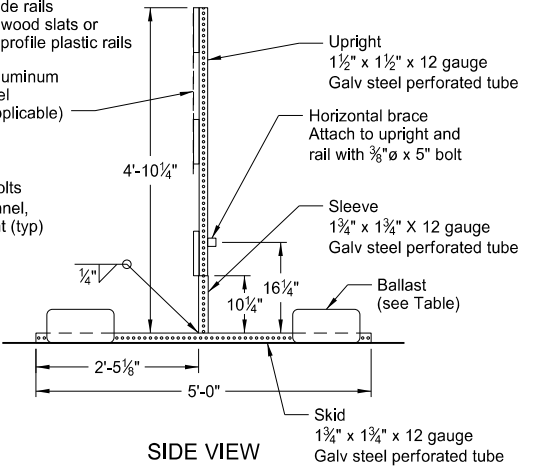
TYPE II BARRICADE

BARRICADE RAIL DETAILS



ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

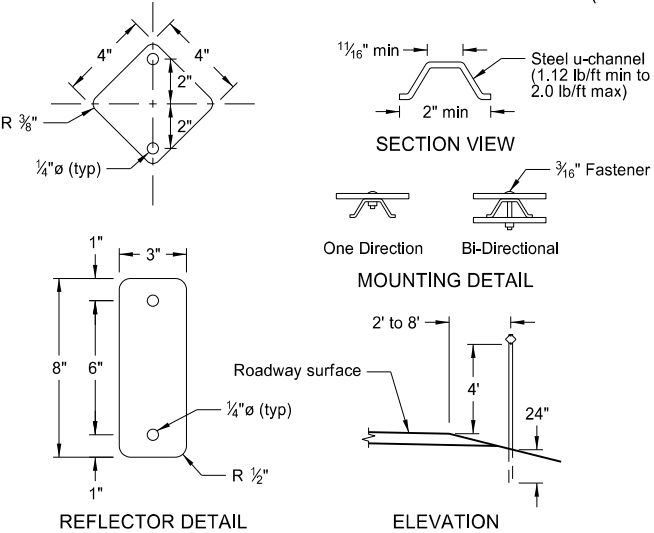


SIDE VIEW

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.



REFLECTOR DETAIL

ELEVATION

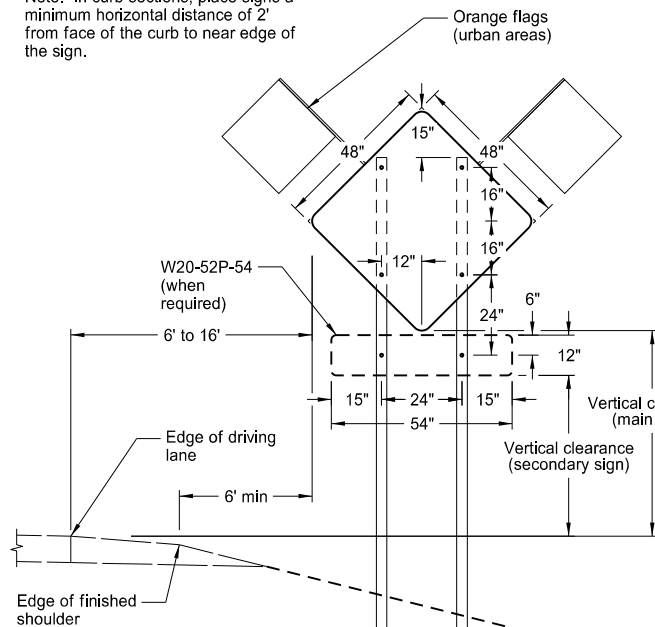
DELINEATORS

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

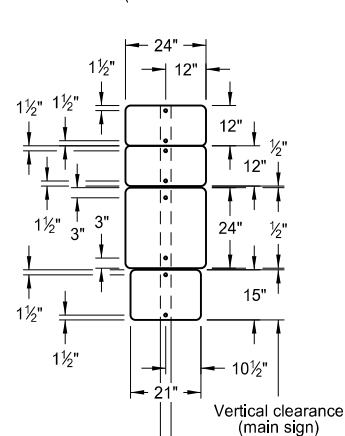
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

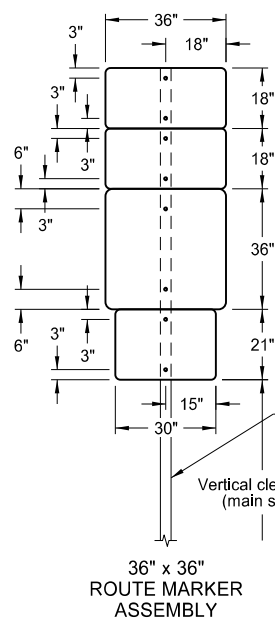
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



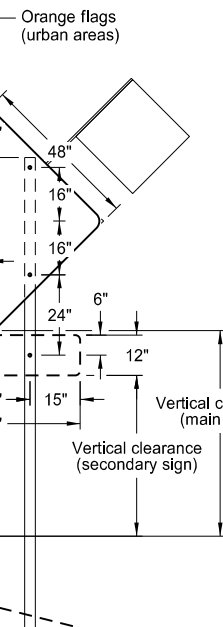
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



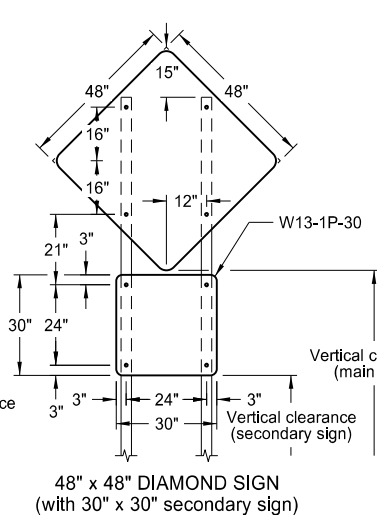
24" x 24"
ROUTE MARKER
ASSEMBLY



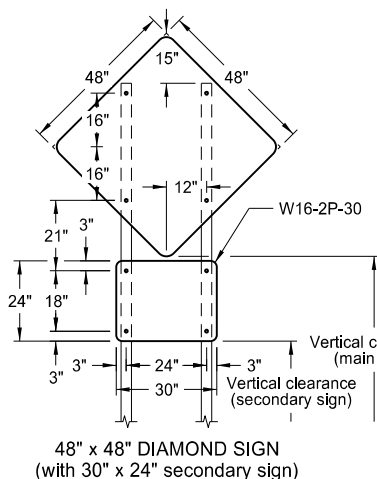
36" x 36"
ROUTE MARKER
ASSEMBLY



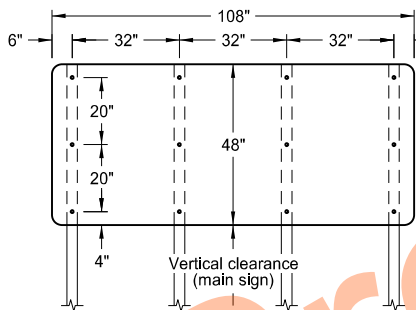
18" x 18"
DIAMOND SIGN



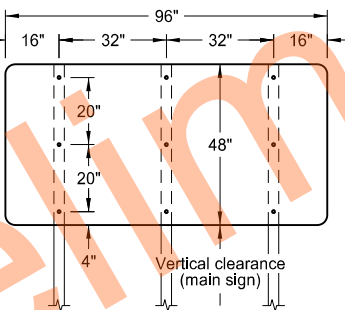
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



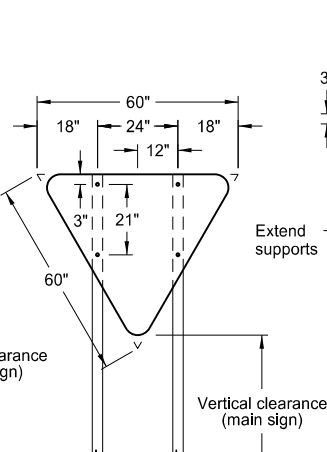
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



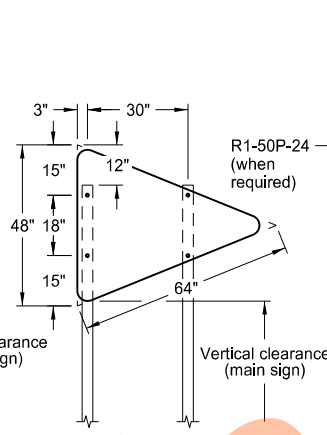
108" x 48" SIGN



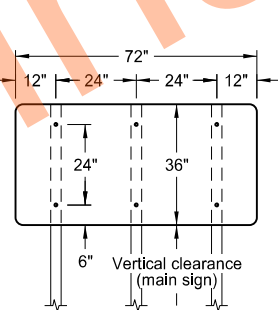
96" x 48" SIGN



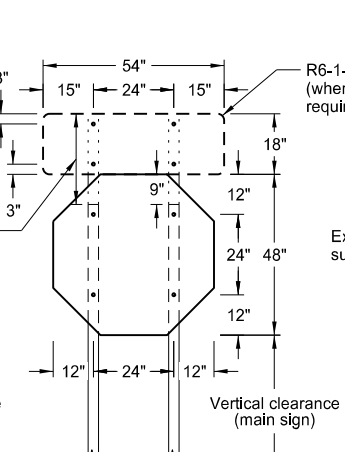
R1-2-60 - YIELD SIGN



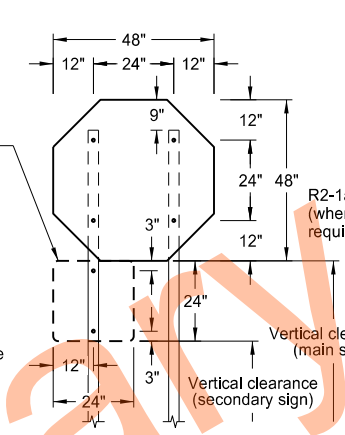
W14-3-64 - PENNANT SIGN



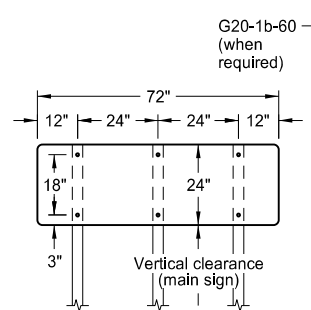
72" x 36" SIGN



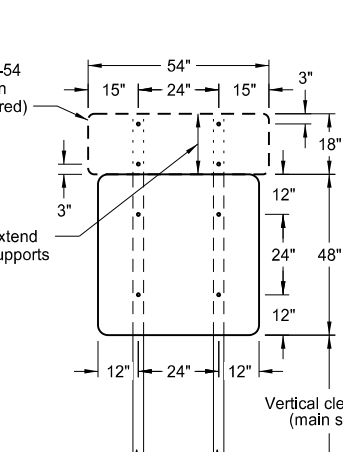
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



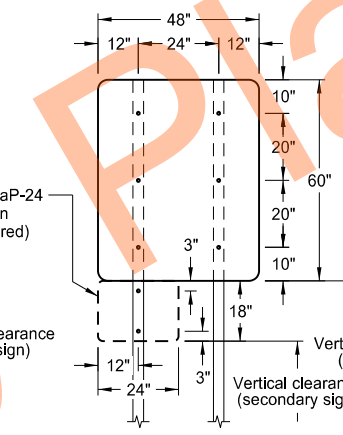
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



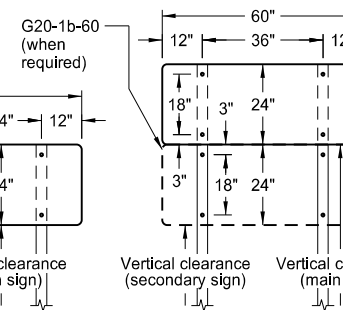
72" x 24" SIGN



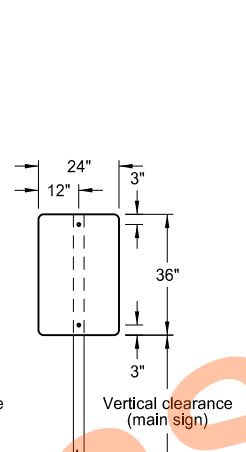
48" x 48" SIGN
(with R6-1-54 sign as required)



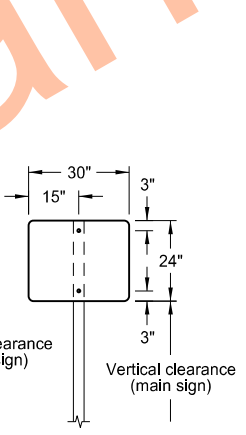
48" x 48" SIGN
(with R2-1aP-24 sign as required)



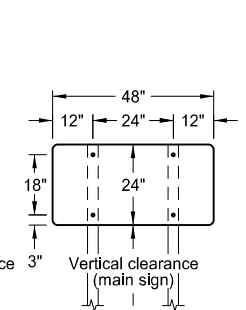
60" x 24" SIGN



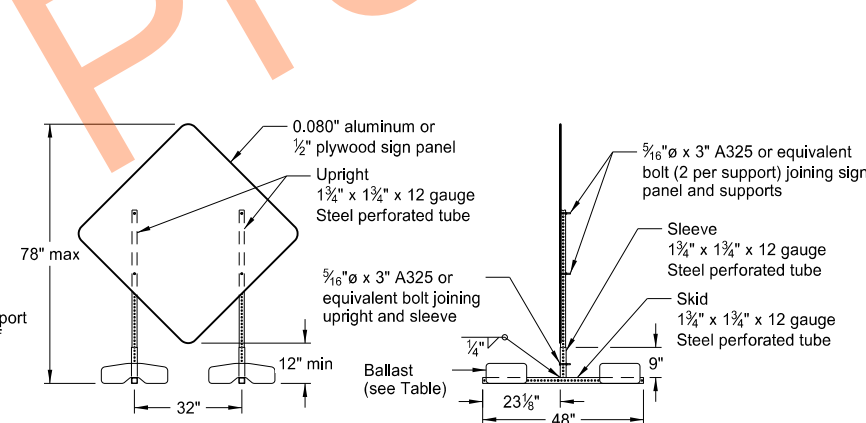
24" x 36" SIGN



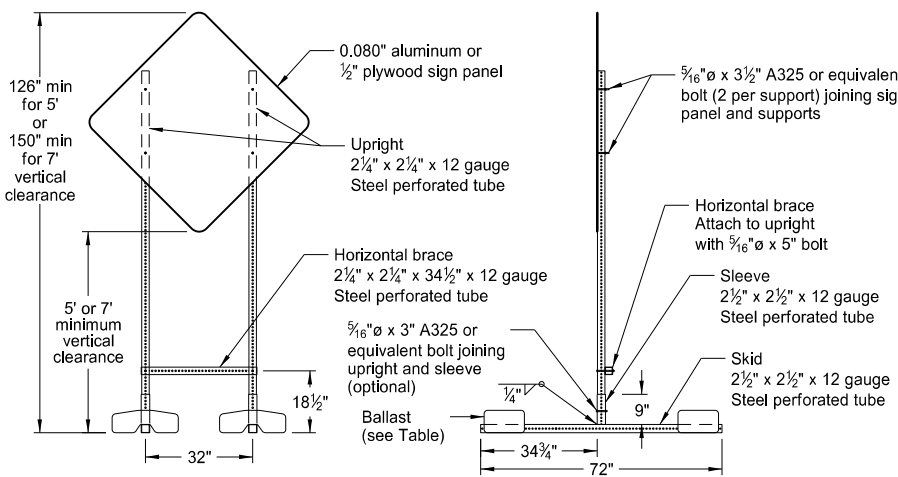
30" x 24" SIGN



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

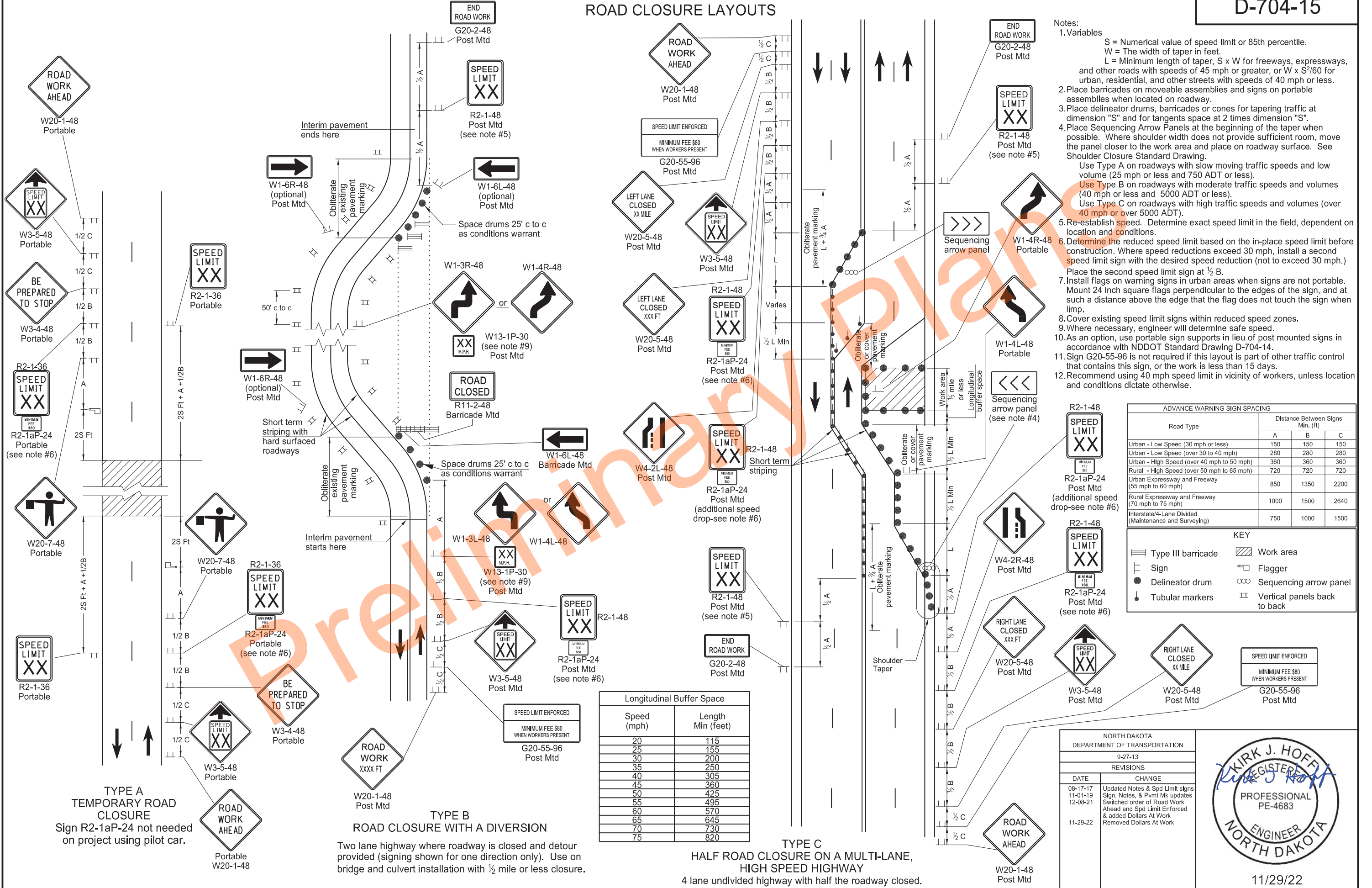
ROAD CLOSURE LAYOUTS

- Notes:
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper in feet.
 - L = Minimum length of taper, S x W for freeways, expressways, and other roads with speeds of 45 mph or greater, or W x S²/60 for urban, residential, and other streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
 - Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
 - Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.
 - 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. Determine exact speed limit in the field, dependent on location and conditions.
 - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within reduced speed zones.
 - Where necessary, engineer will determine safe speed.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - 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.

Road Type	ADVANCE WARNING SIGN SPACING		
	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

KEY			
	Type III barricade		Work area
	Sign		Flagger
	Delineator drum		Sequencing arrow panel
	Tubular markers		Vertical panels back to back

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



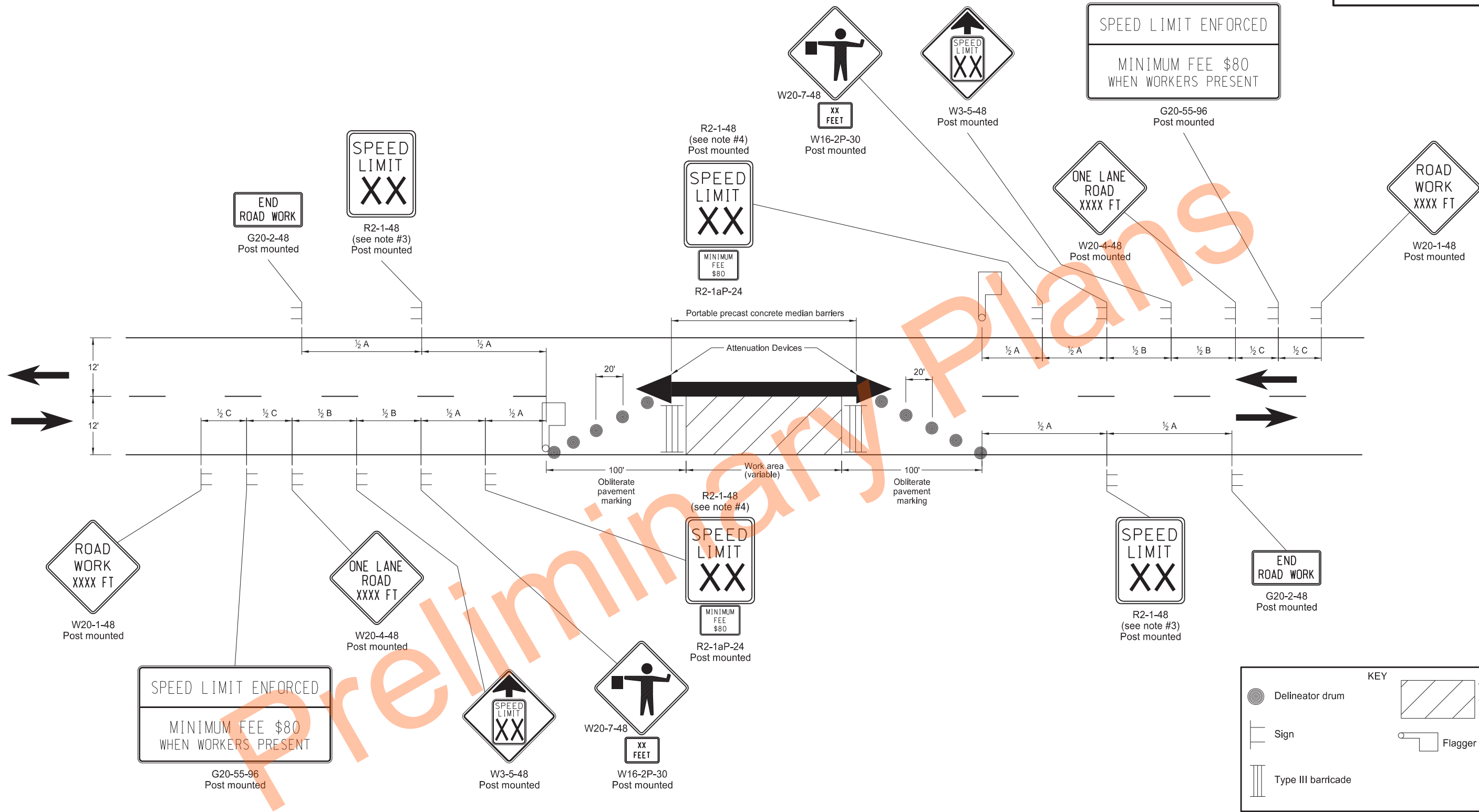
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Updated Notes & Spd Limit signs
11-01-19	Sign, Notes, & Pmnt Mk updates
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work



11/29/22

SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



KEY

- Delineator drum
- Sign
- Type III barricade
- Work area
- Flagger

- Notes:
- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
 - Remove existing striping as required. Use back to back delineators when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Place back to back vertical panels when roadways have steep slopes and alignment is not visible to approaching traffic.
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at 1/2B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Cover existing speed limit signs within a reduced speed zone.
 - Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

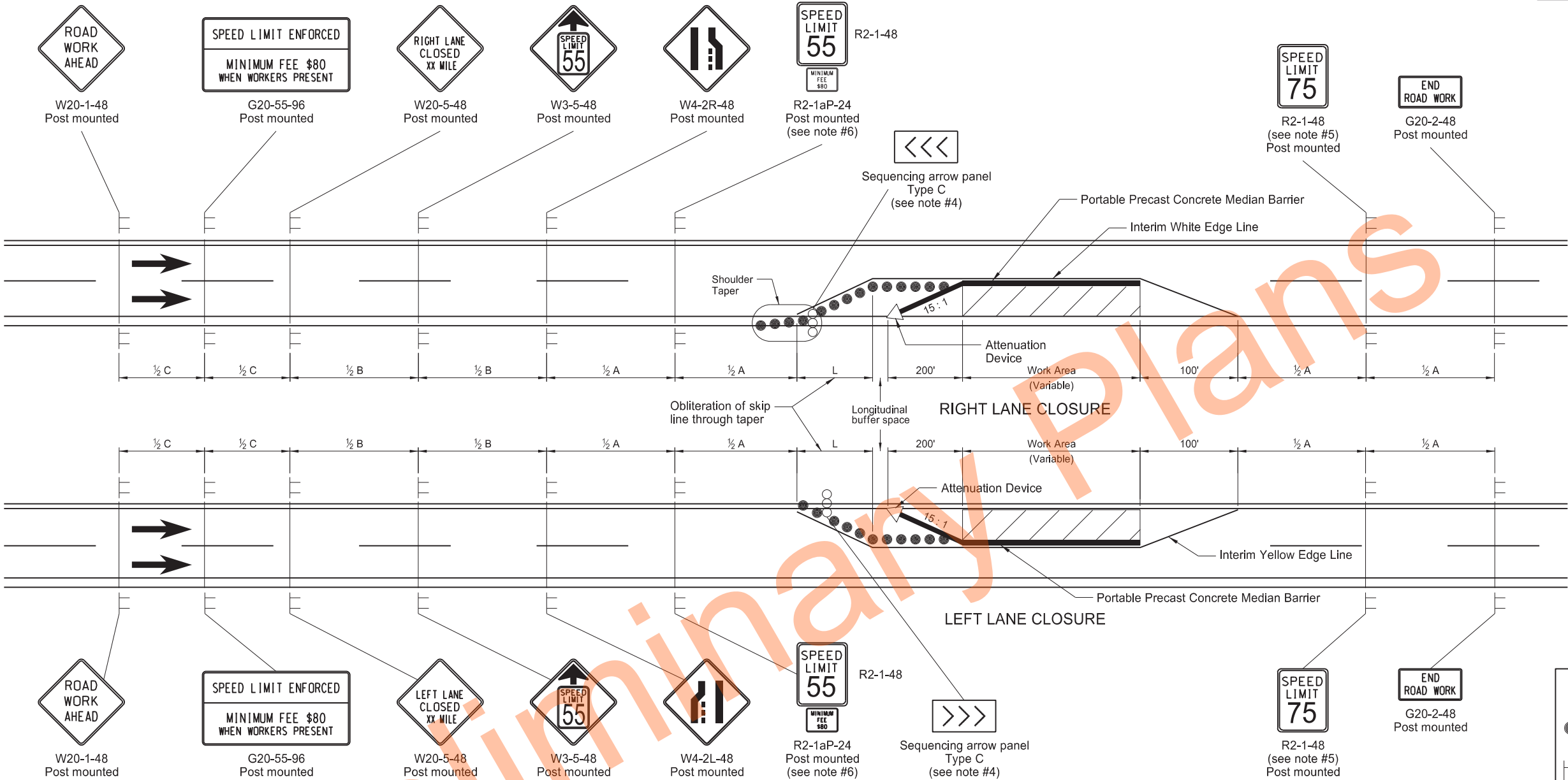
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Note update & sign numbers
11-01-19	Removed signs & revised note
12-08-21	Switched order of Road Work XXXX and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work



11/29/22

SIGN LAYOUT FOR INTERSTATE SYSTEM ONE LANE CLOSURE

D-704-18



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

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

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

- Notes:
- Variables
S = Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed in MPH.
W = The width of offset in feet.
L = Minimum taper length in feet. $S \times W$ for freeways, expressways, and roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
 - Space delineator drums used for tapering traffic and on tangent at dimension "S".
 - Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface. See Shoulder Closure Standard Drawing. Use Type C on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - Determine the reduced speed limit based on the in place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at $\frac{1}{2}$ B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with the Standard D-704-14.
 - Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
 - Reduce speed limit further, if location and conditions dictate.

KEY

Delineator Drum

Sign

Attenuation Device

Sequencing Arrow Panel

Work Area

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

KIRK J. HOFF

REGISTERED

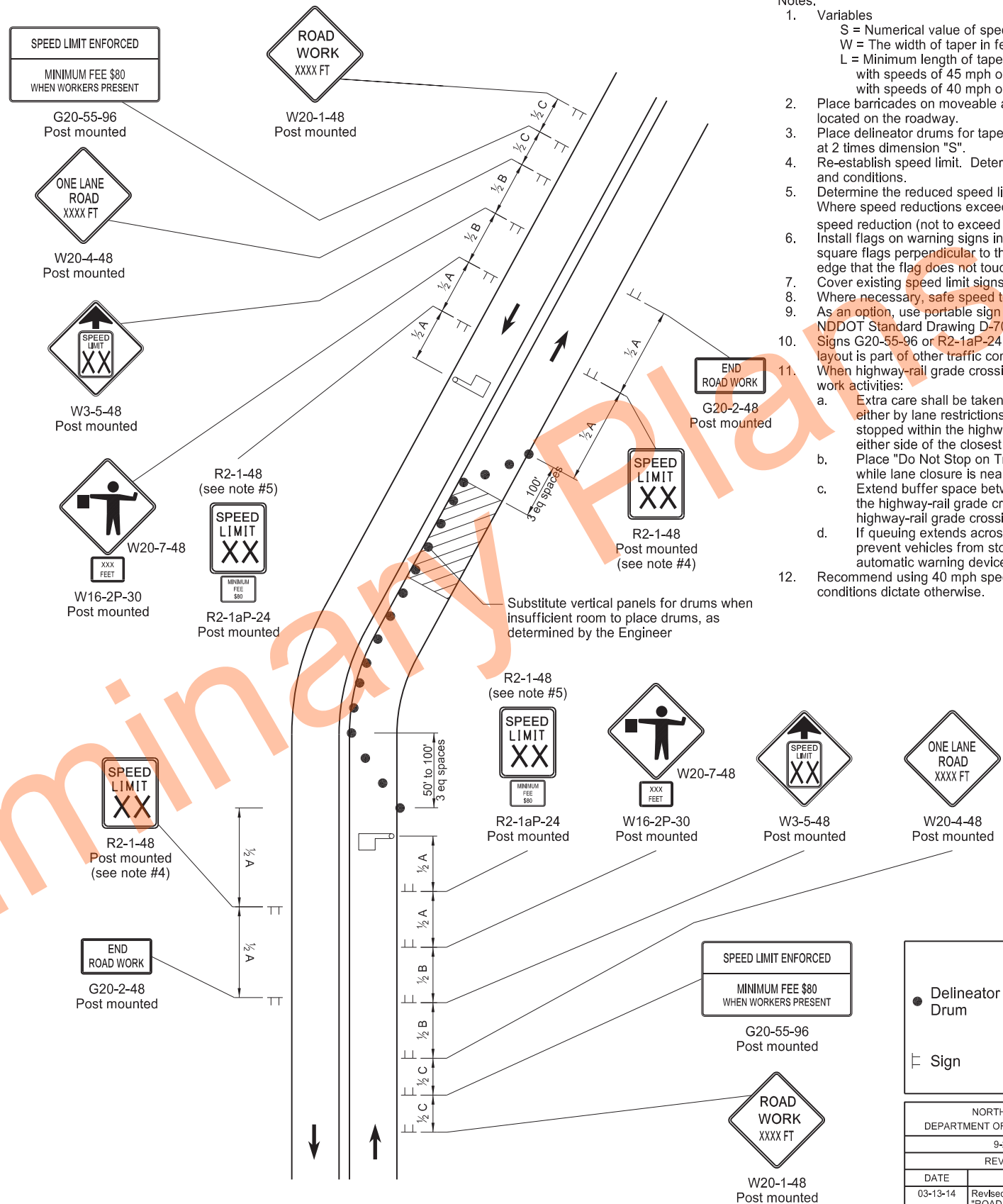
PROFESSIONAL

PE-4683

ENGINEER

NORTH DAKOTA

11/29/22



KEY

 Delineator Drum	 Type III Barricade	 Flagger
 Sign	 Work/Hazard Area	

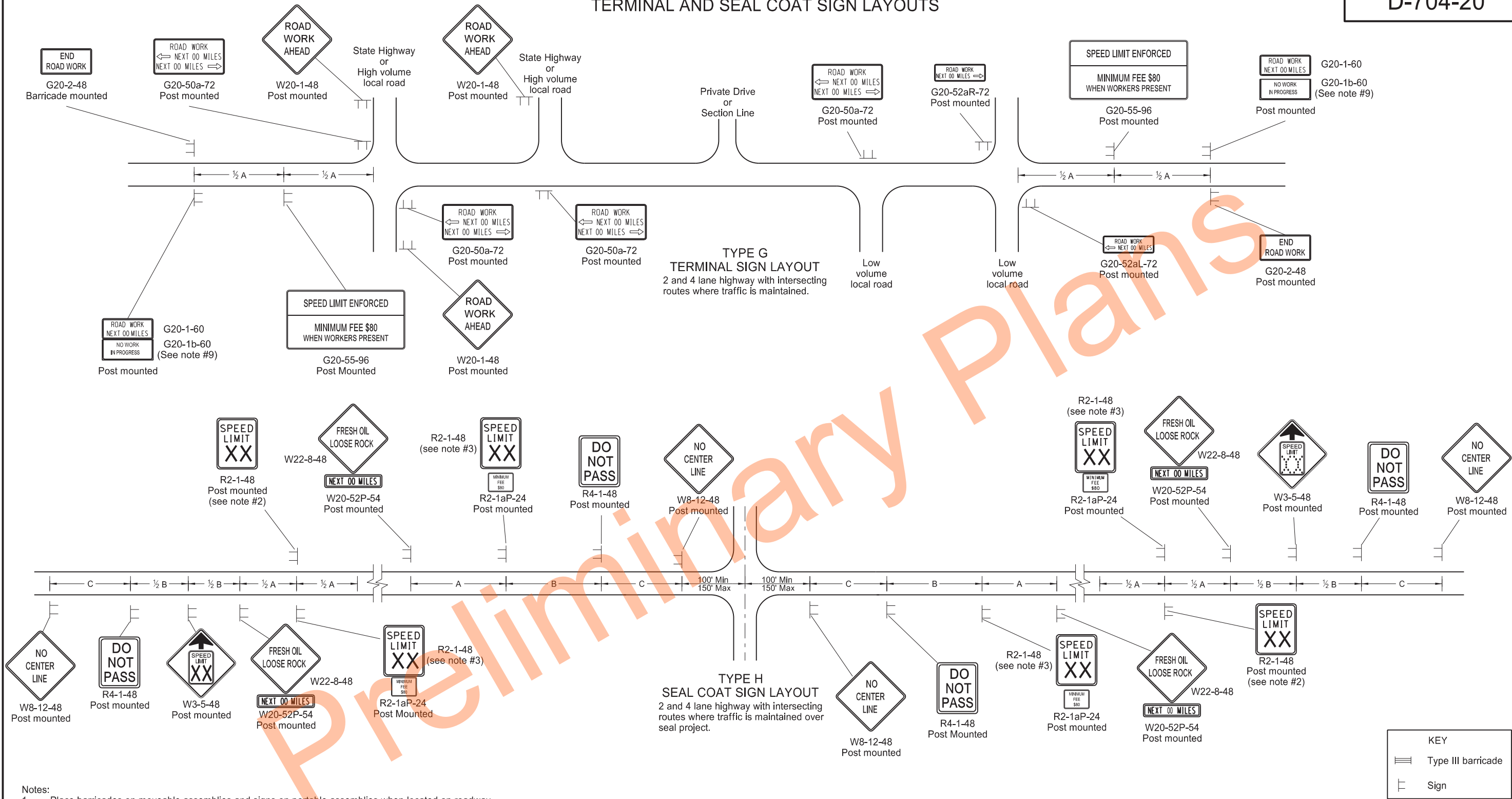
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway 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
03-13-14	Revised Sign Cell "ROAD WORK XXX FT"
08-17-17	Update notes & sign numbers
11-01-19	Revised signs, sign #s, & notes
12-08-21	Switched order of Road Work XXX and Spd Limit Enforced & added Dollars At Work
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
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



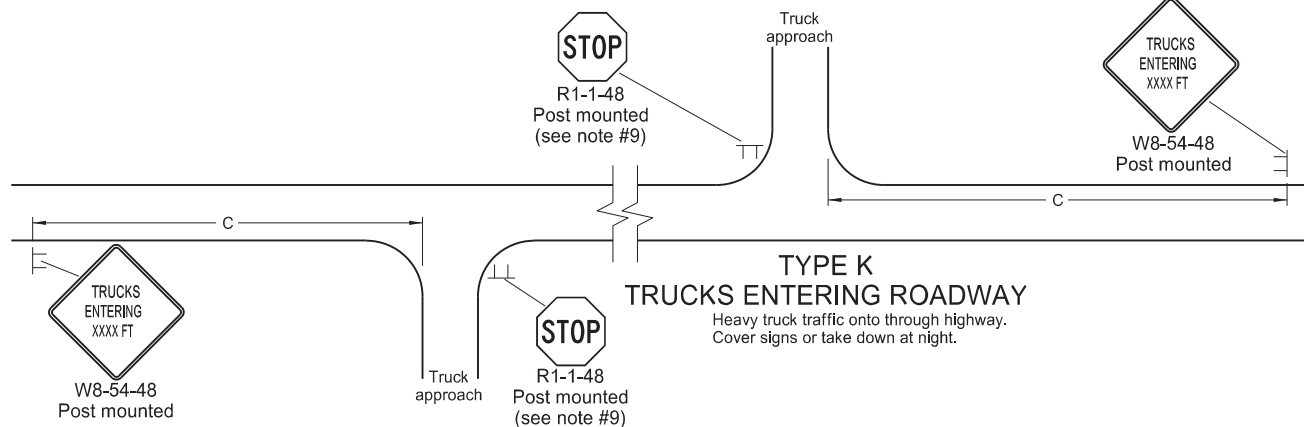
11/29/22

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22

KEY

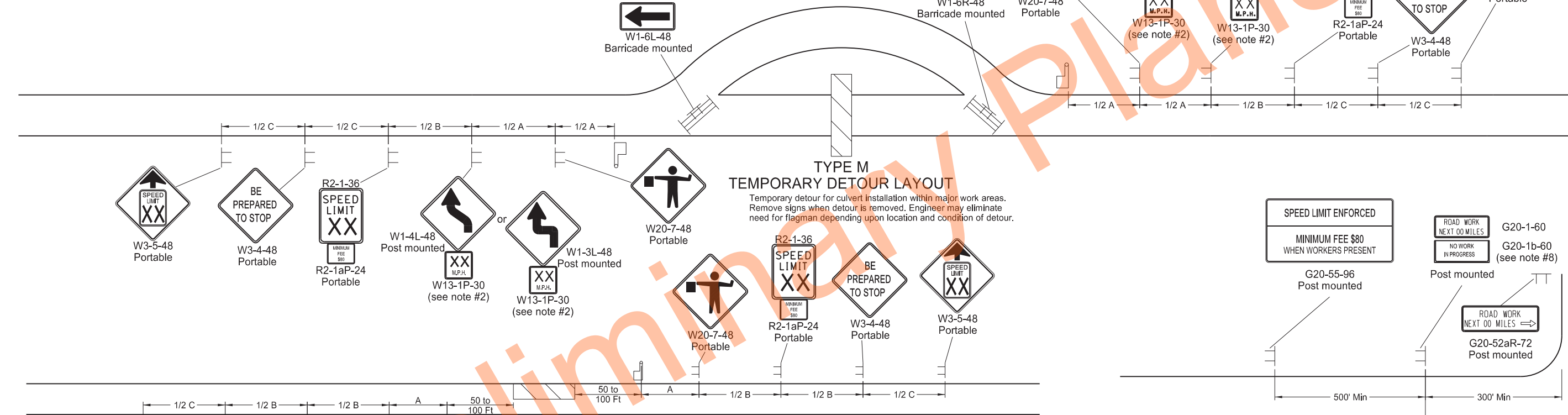
- Type III barricade
- Sign
- Work area
- Flagger



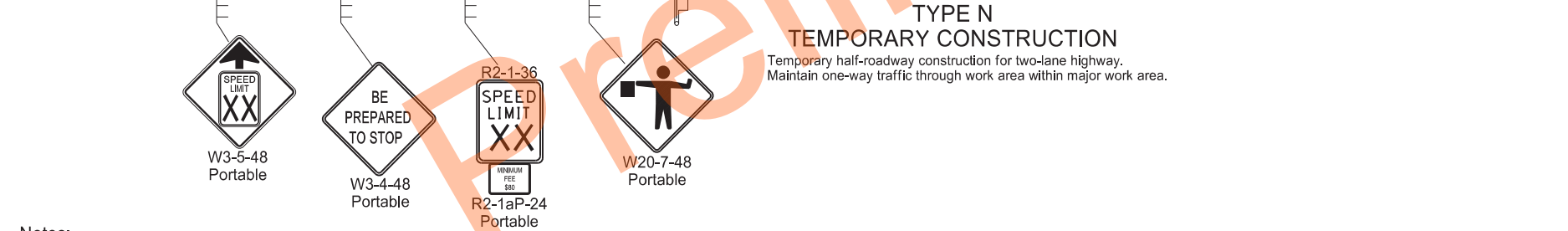
TYPE K
TRUCKS ENTERING ROADWAY
Heavy truck traffic onto through highway.
Cover signs or take down at night.



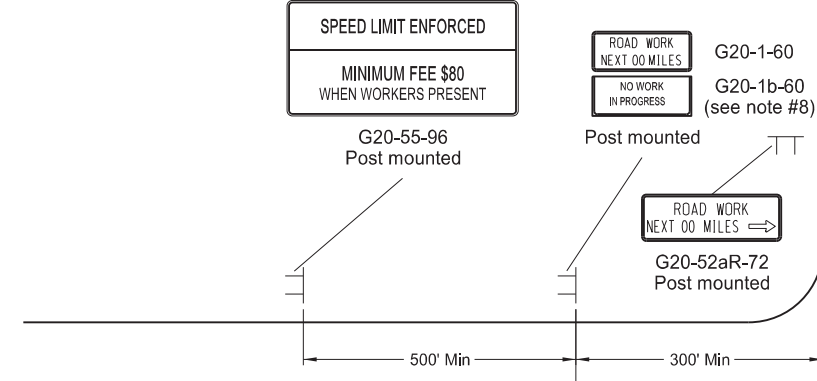
TYPE L
TRUCKS CROSSING ROADWAY
Trucks crossing through highway.
Cover signs or take down at night.



TYPE M
TEMPORARY DETOUR LAYOUT
Temporary detour for culvert installation within major work areas.
Remove signs when detour is removed. Engineer may eliminate need for flagman depending upon location and condition of detour.



TYPE N
TEMPORARY CONSTRUCTION
Temporary half-roadway construction for two-lane highway.
Maintain one-way traffic through work area within major work area.



TYPE O
2 & 4 LANE HIGHWAYS WHERE TRAFFIC IS MAINTAINED
T-Intersection location used in conjunction with other standards

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.

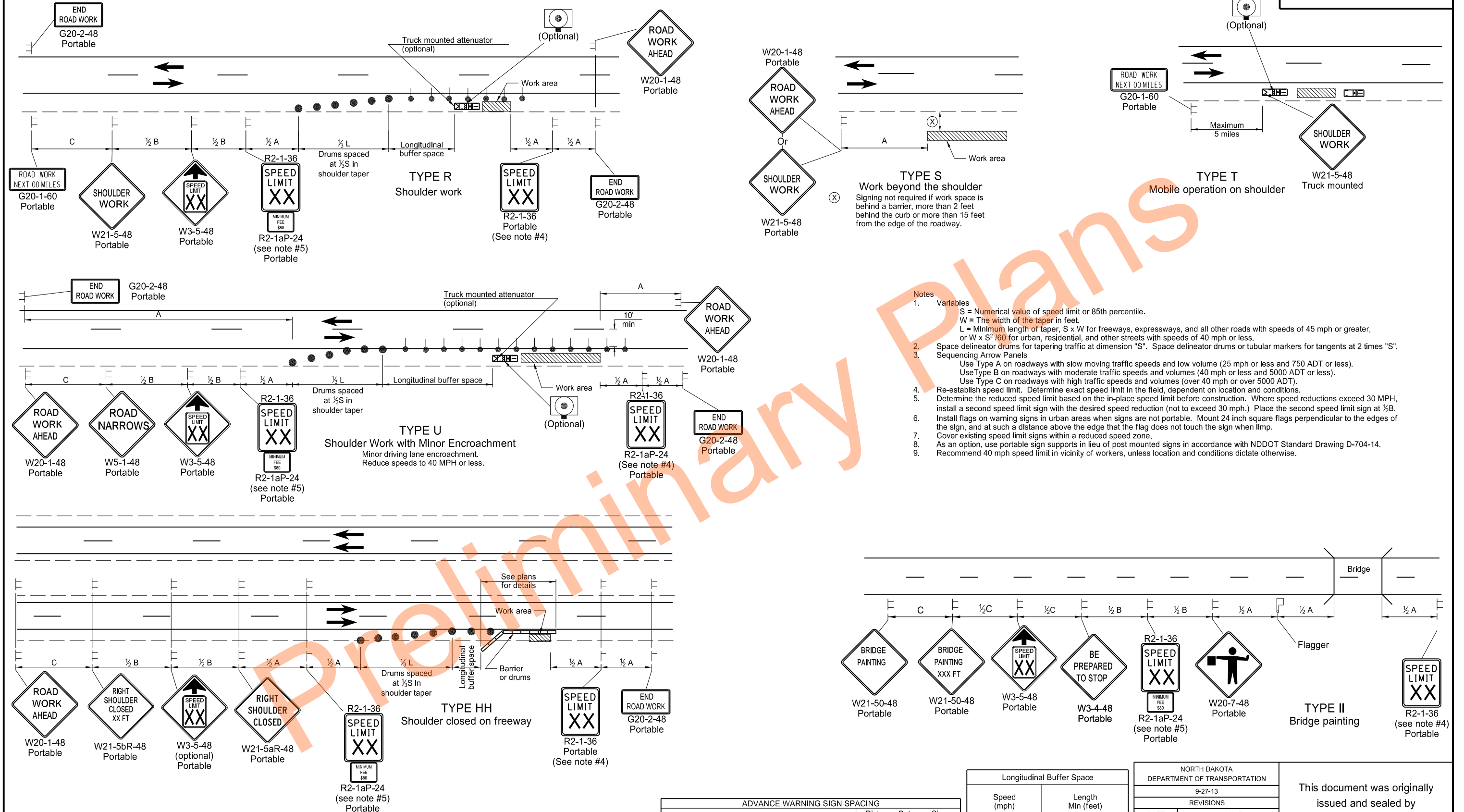
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

D-704-24



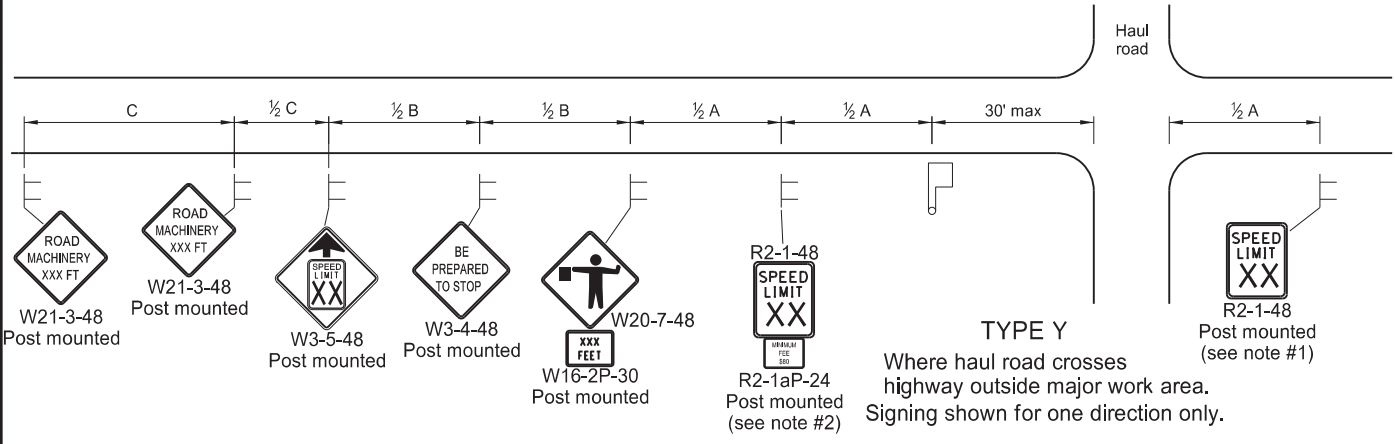
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

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

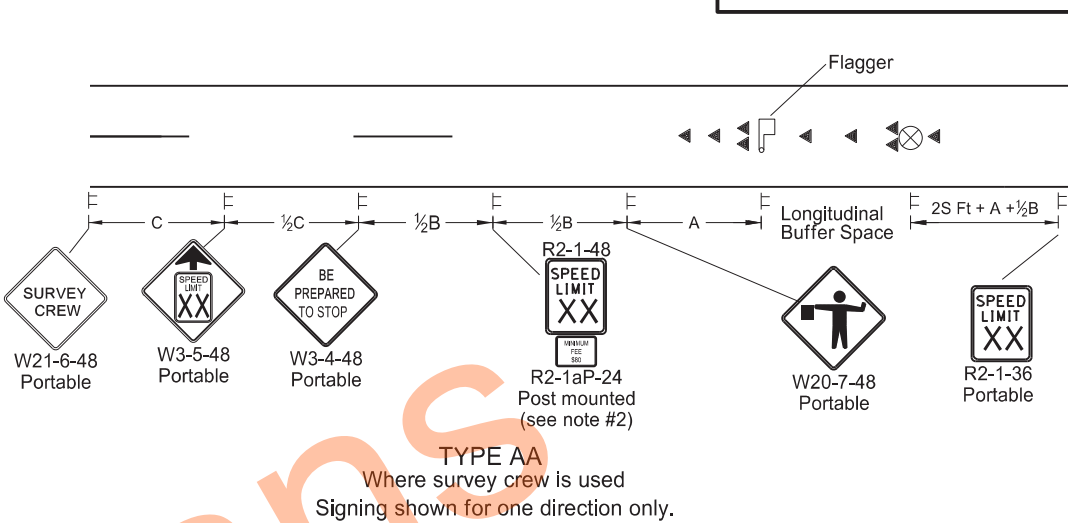
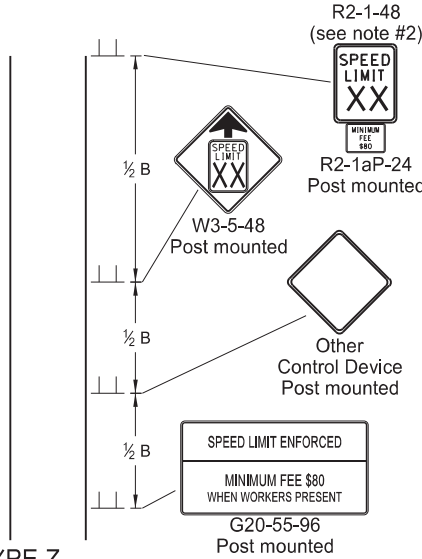
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE-4683,
on 11/1/19 and the original document is stored at the
North Dakota Department
of Transportation

MISCELLANEOUS SIGN LAYOUTS

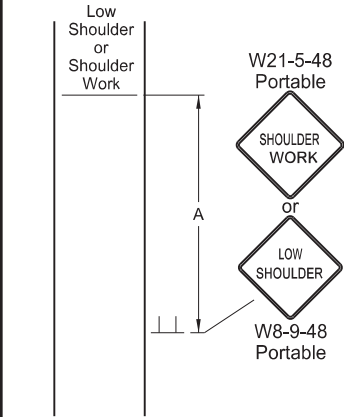


TYPE Y
Where haul road crosses highway outside major work area. Signing shown for one direction only.

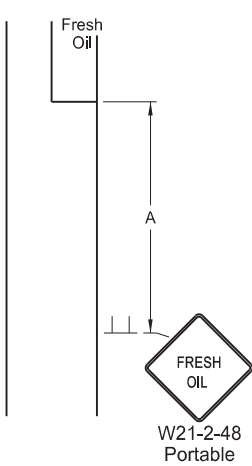
TYPE Z
Where speed zone is needed
Signing shown for one direction only.



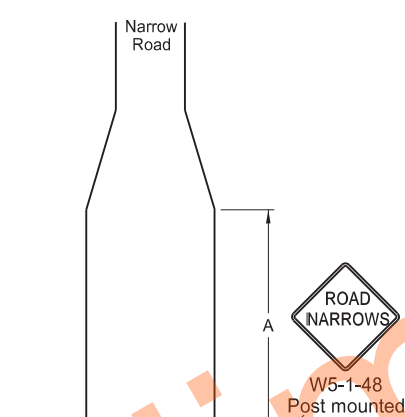
TYPE AA
Where survey crew is used
Signing shown for one direction only.



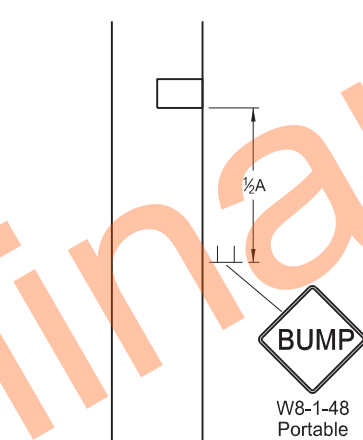
TYPE BB
Within major work area where sign conditions exist



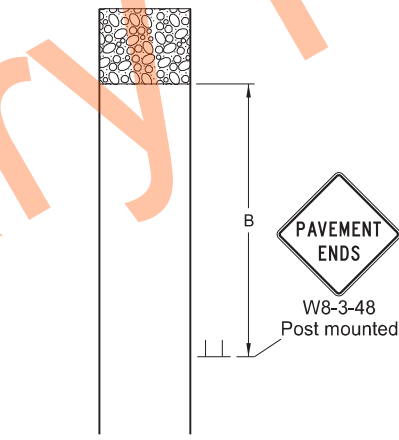
TYPE CC
Where sign conditions exist



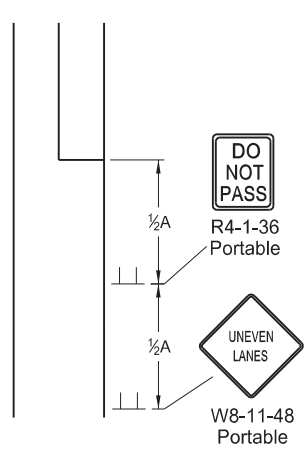
TYPE DD
Where sign conditions exist



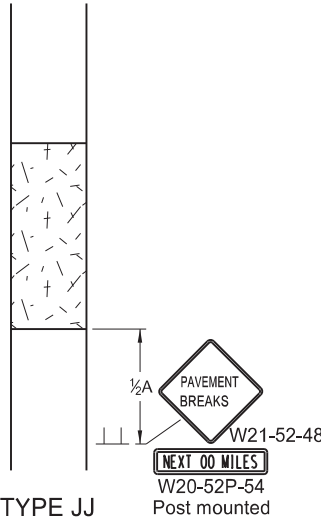
TYPE EE
Where sign conditions exist



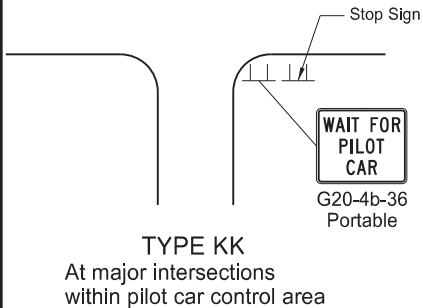
TYPE FF
Where sign conditions exist
Signing shown for one direction only.



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.

KIRK J. HOFF

REGISTERED

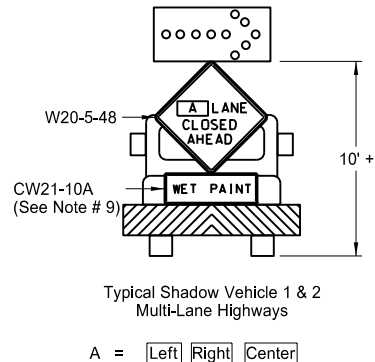
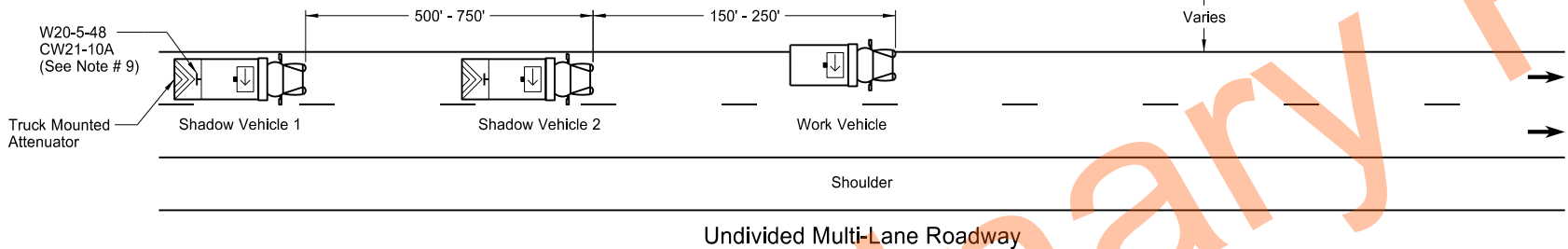
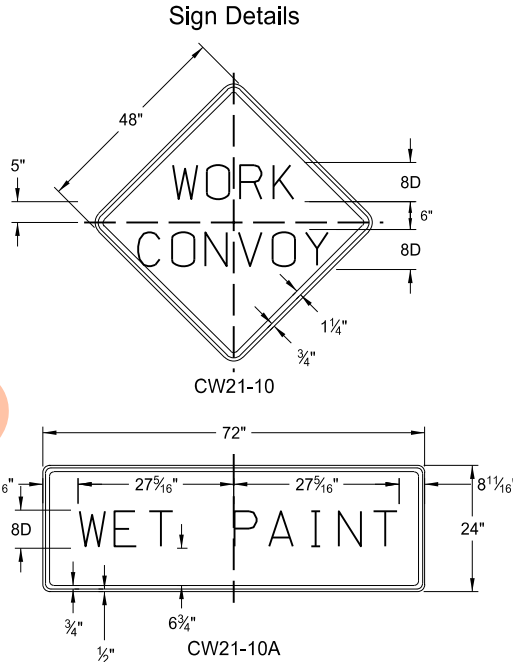
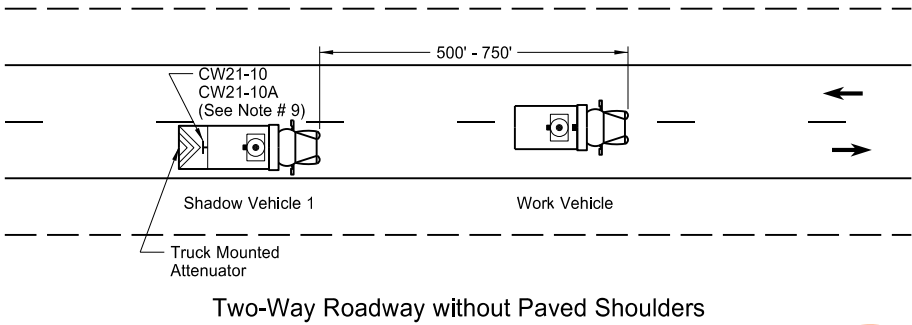
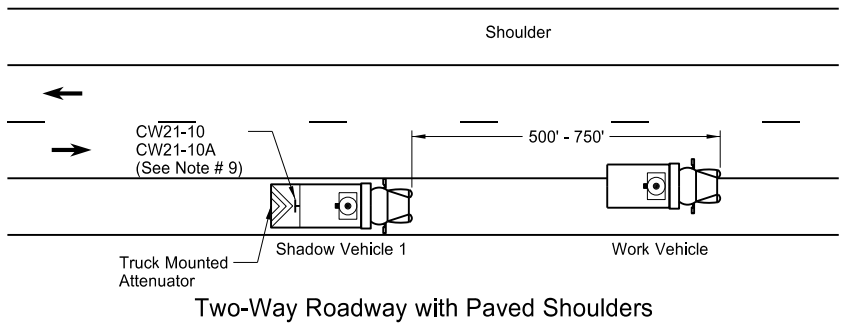
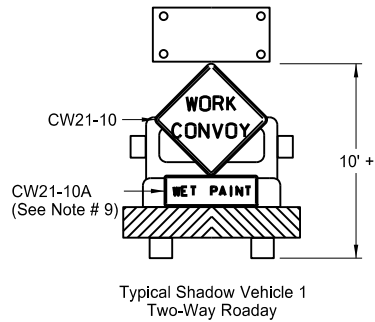
PROFESSIONAL PE-4683

ENGINEER NORTH DAKOTA

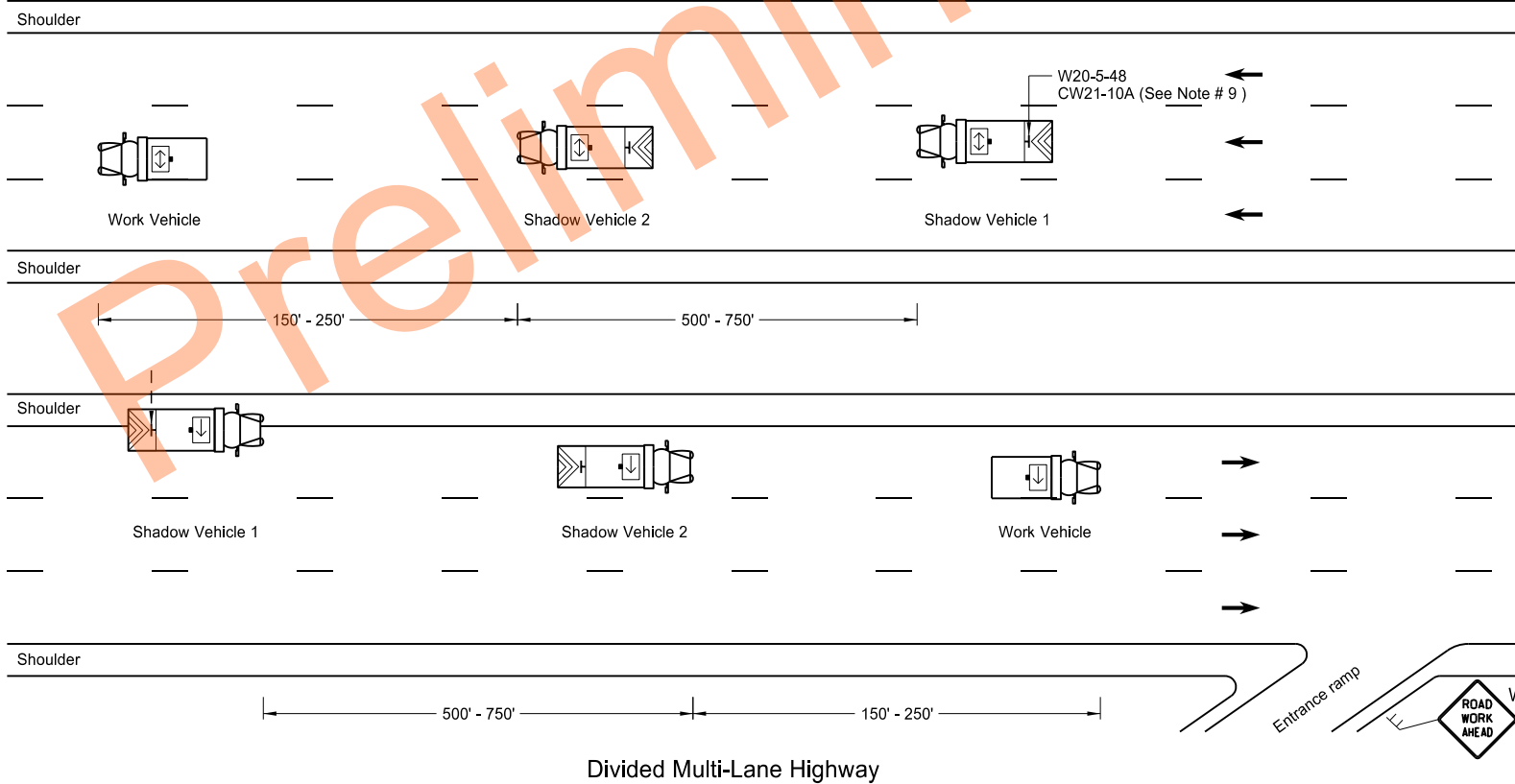
02/23/23

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.

KEY	
	Sign
	Truck mounted attenuator
	Flashing arrow panels:
	Right directional
	Left directional
	Double arrow directional
	Caution Mode

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

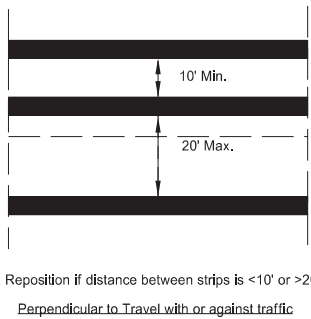
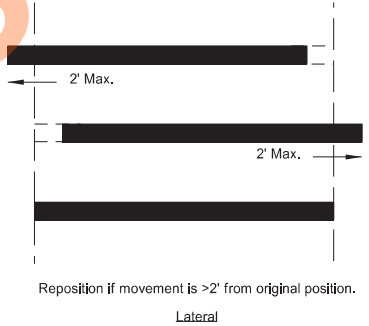
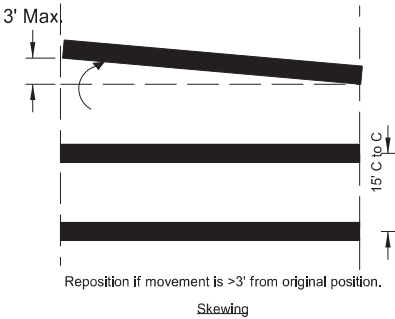
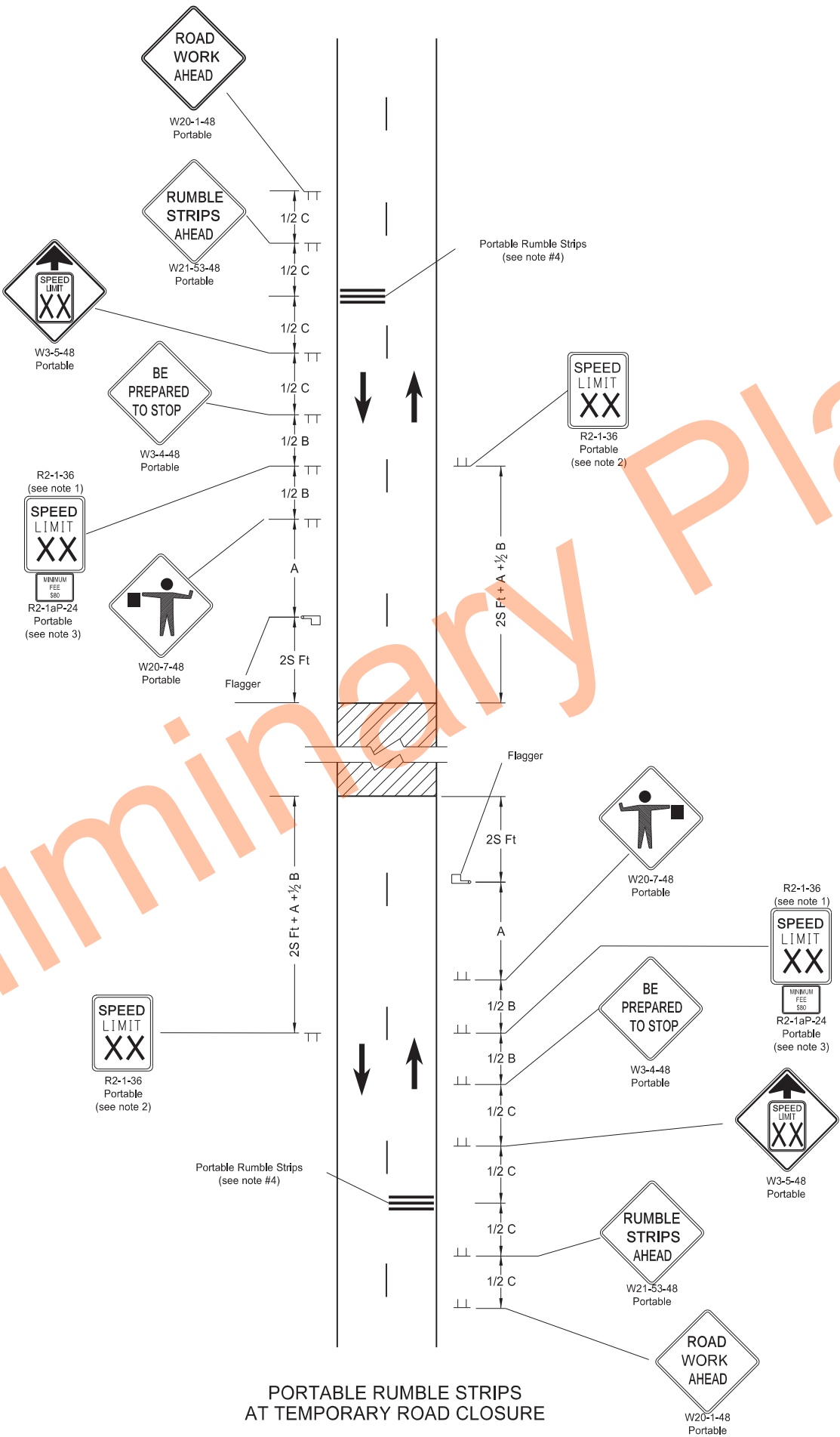
Work area

Flagger

Sign

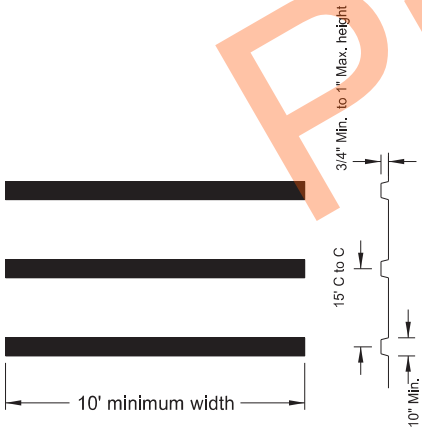
S = Numerical value of speed limit or 85th percentile.

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

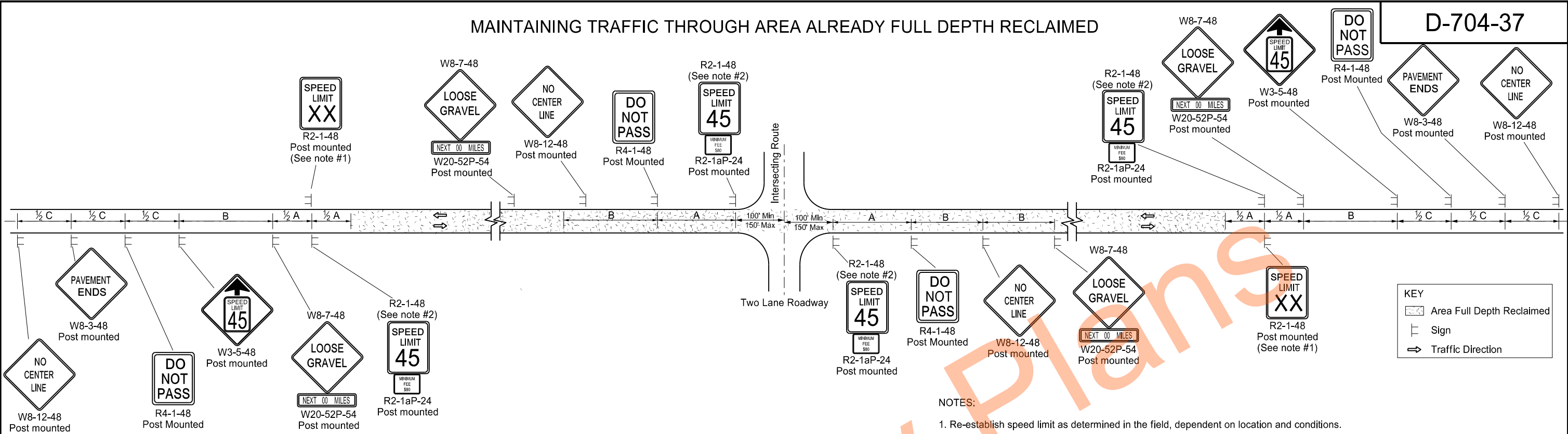
PORTABLE RUMBLE STRIPS
AT TEMPORARY ROAD CLOSURE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
02-22-22	
REVISIONS	
DATE	CHANGE
03/07/23	Use changed to min 45 mph.



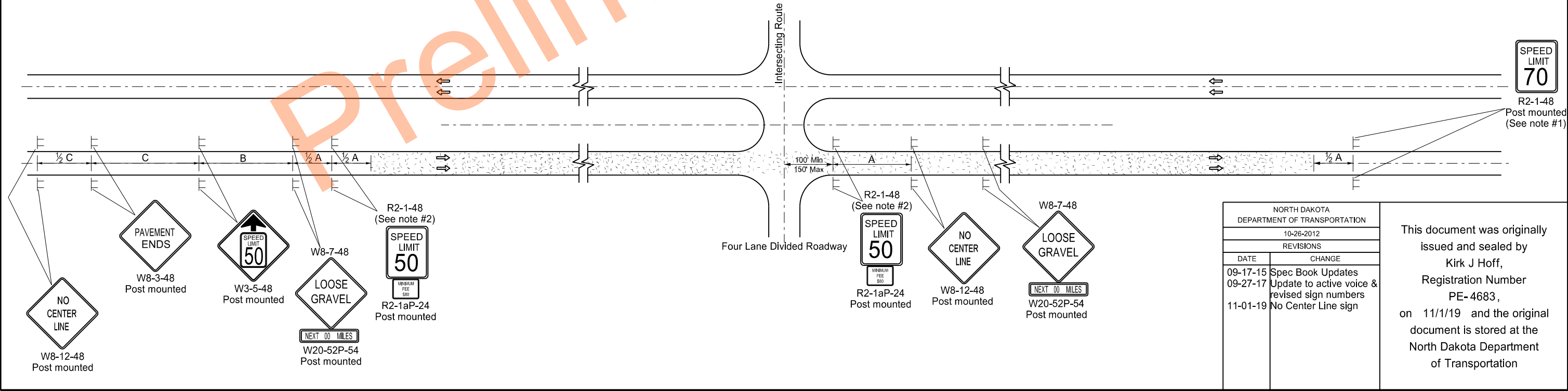
03/07/23

MAINTAINING TRAFFIC THROUGH AREA ALREADY FULL DEPTH RECLAIMED



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

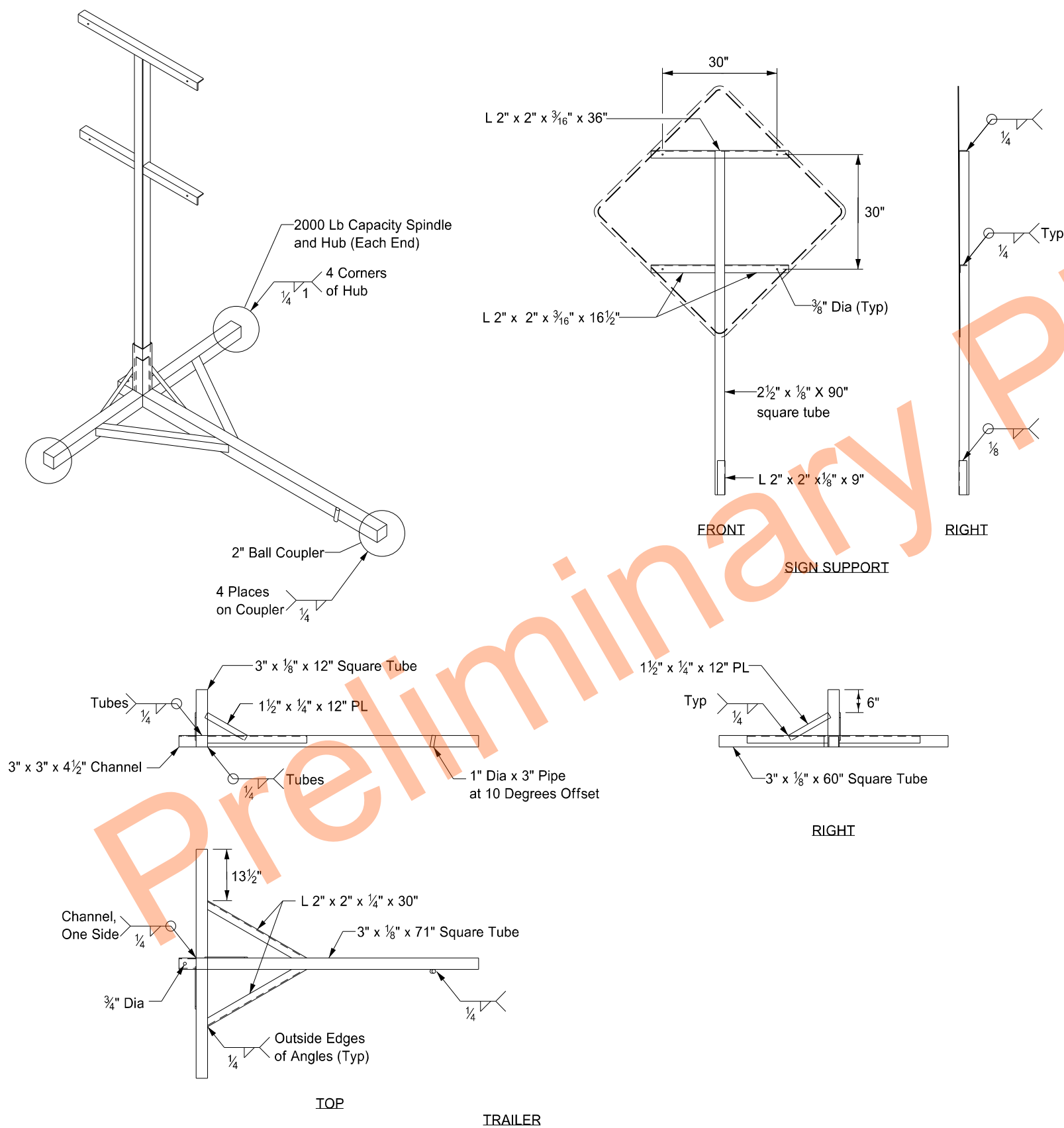
- NOTES:
1. Re-establish speed limit as determined in the field, dependent on location and conditions.
 2. Determine the reduced speed limit based on the in-place speed limit before construction. When speed limits are reduced more than 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B after the first speed limit sign and 1/2 A before the end of the pavement.
 3. Install flags on non-portable warning signs in urban areas. Mount the 24 inch square flags, perpendicular to the edges of the diamond sign, above the edge so the limp flag will not touch the sign. Rural areas will not require flags.
 4. Cover existing speed limit signs within reduced speed zone.
 5. Place signs R2-1-48, R2-1aP-24, W8-7-48, W20-52P-54 and R4-1-48 for two lane, two way operation just after all important intersections and at 5 mile intervals thereafter. Place sign W8-12-48 just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. Place no short term pavement markings after the mine and blend operation until after the prime operation.
 6. As an option use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 7. Use other traffic control layouts as required in immediate work areas. Install sign R2-1aP-24 below speed limit signs when the speed limit is reduced in the work area.



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

PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



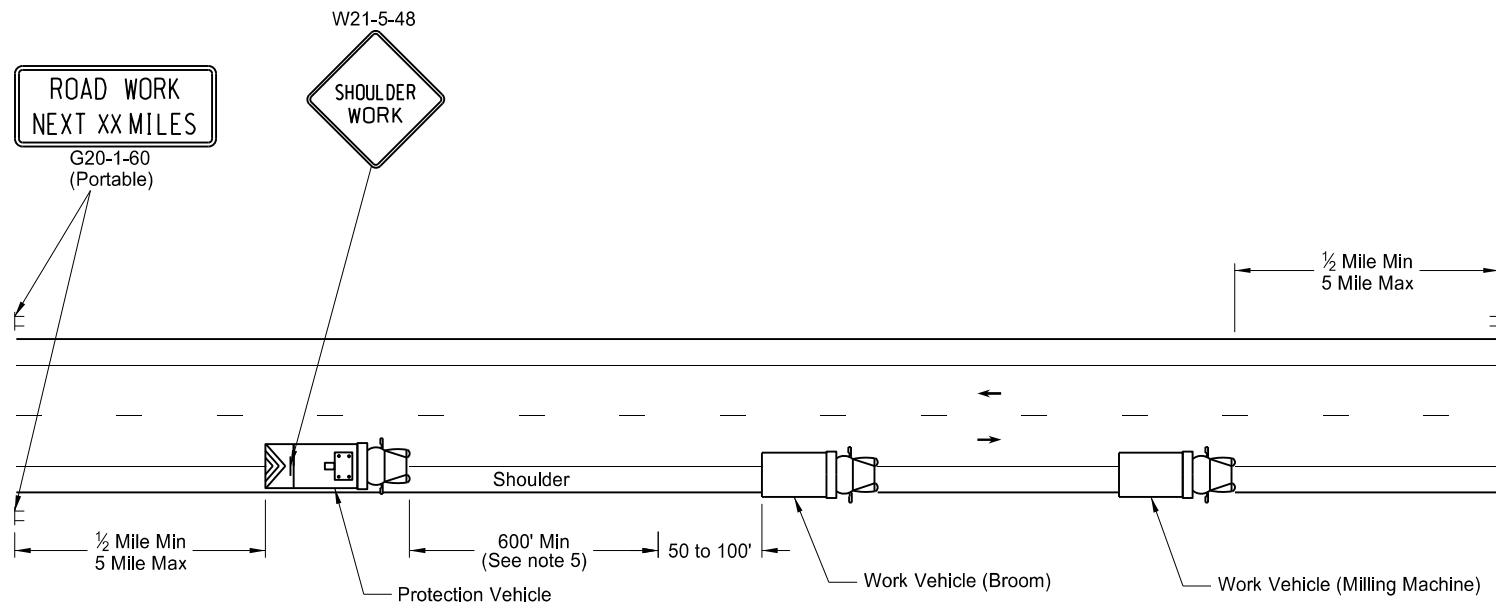
- Notes:
- ①. Maximum 250 pound weight of assembly.
 - ②. Use a 14" wheel and tire.
 - ③. Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
 - ④. Other NCHRP 350 or MASH crash tested assemblies are acceptable.

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

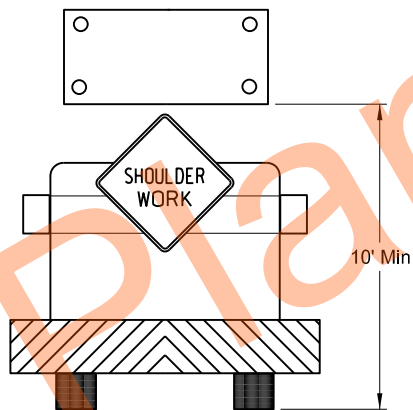
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

MOBILE OPERATION
Grinding Shoulder Rumble Strips

D-704-56

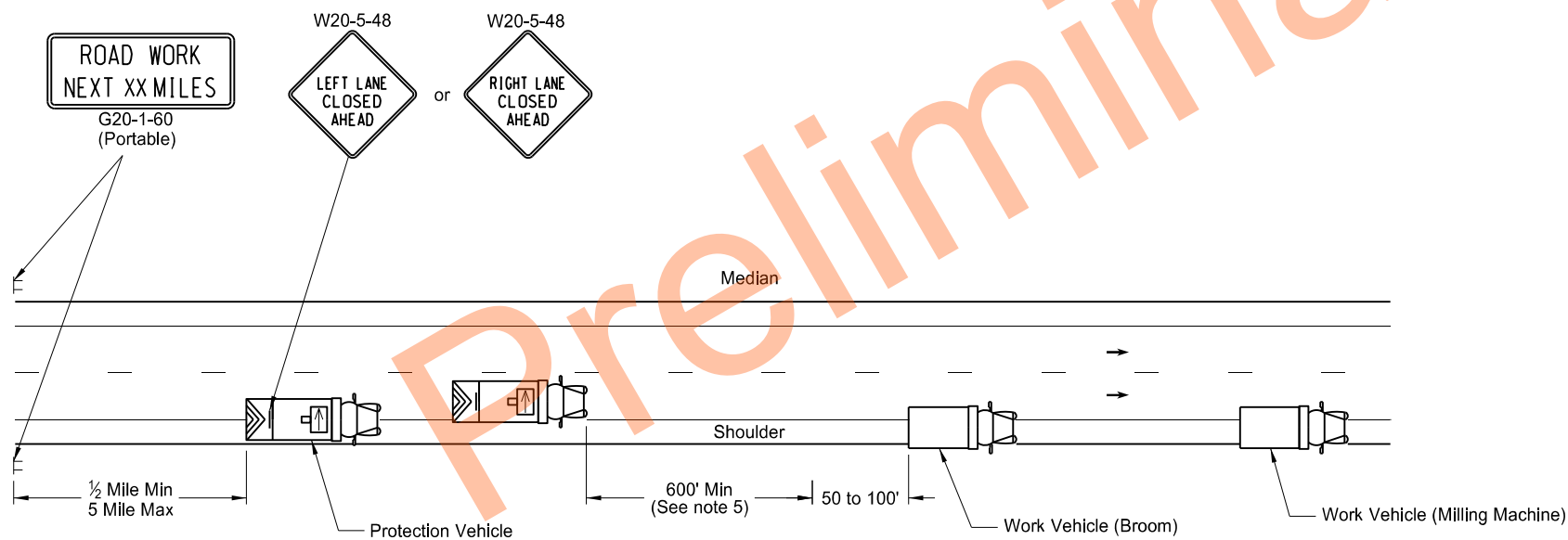


TWO LANE - TWO WAY ROADWAY

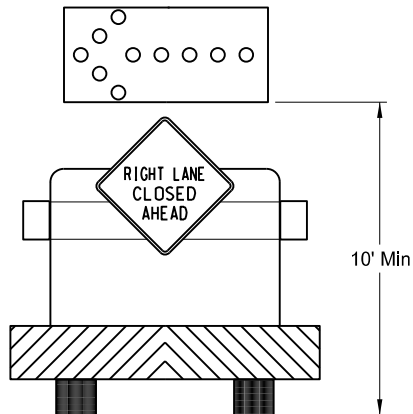


TWO LANE - TWO WAY ROADWAY
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

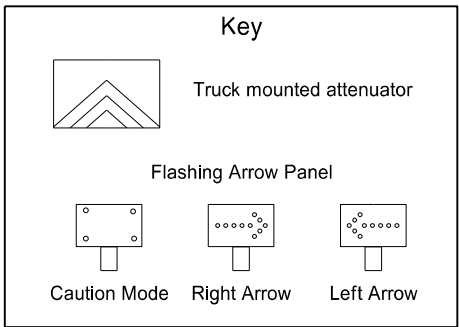
- Notes:
1. Provide truck mounted attenuators on additional vehicles in the convoy, at no additional cost.
 2. Provide rotating, flashing, oscillating, or strobe lights on vehicles.
 3. Provide Type B or Type C flashing arrow panels that are controlled from inside the vehicle.
 4. Provide two - way electronic 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

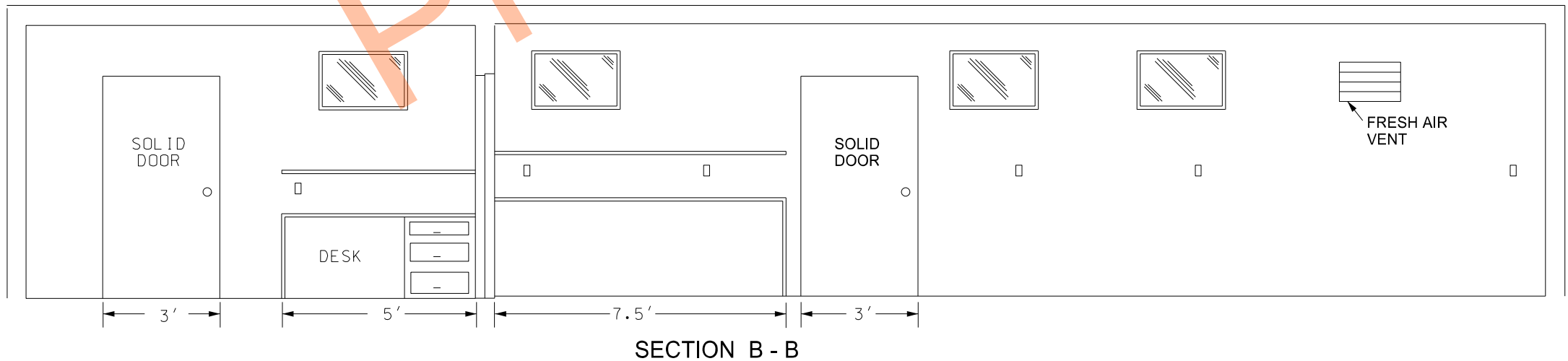
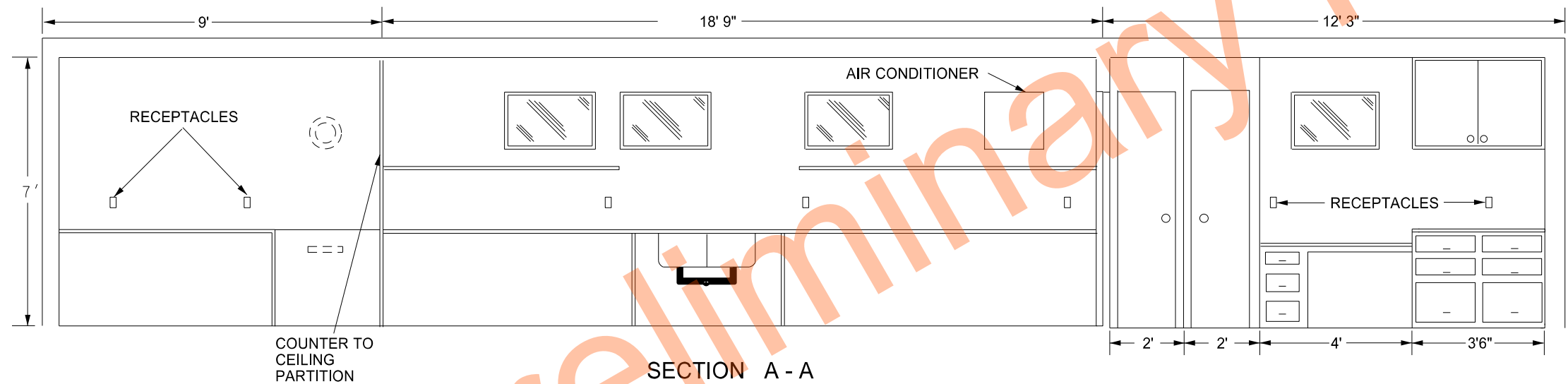
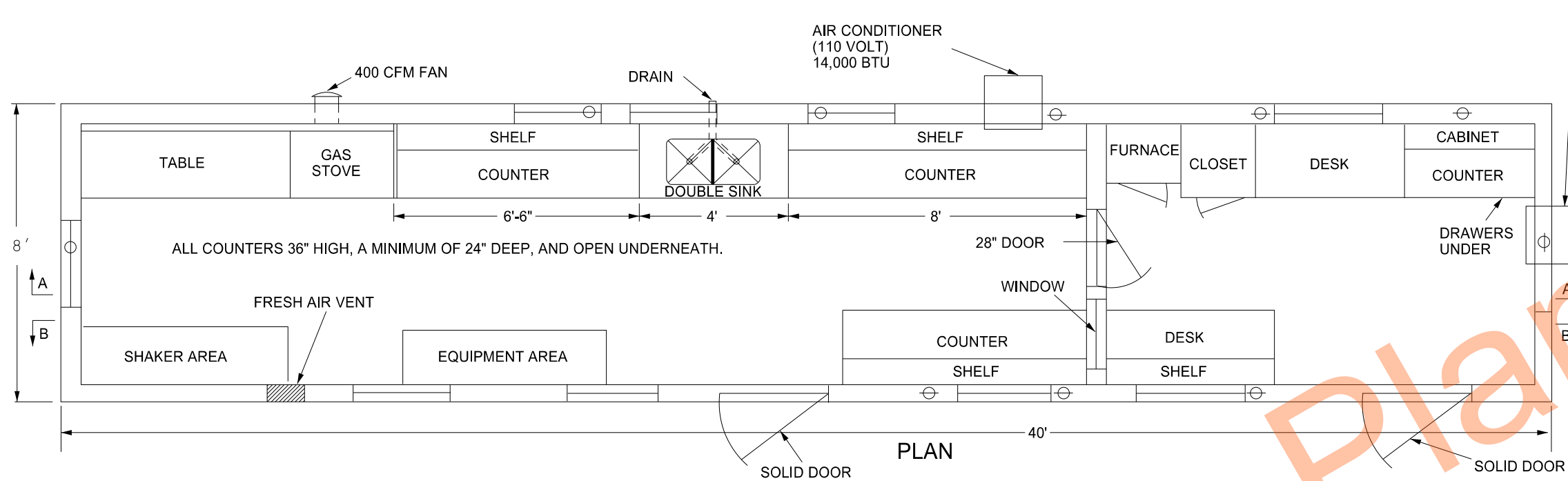


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & signs
10-03-19	New Design Engineer PE Stamp

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 10/3/19 and the original document is stored at the
North Dakota Department
of Transportation

BITUMINOUS LABORATORY

D-706-1



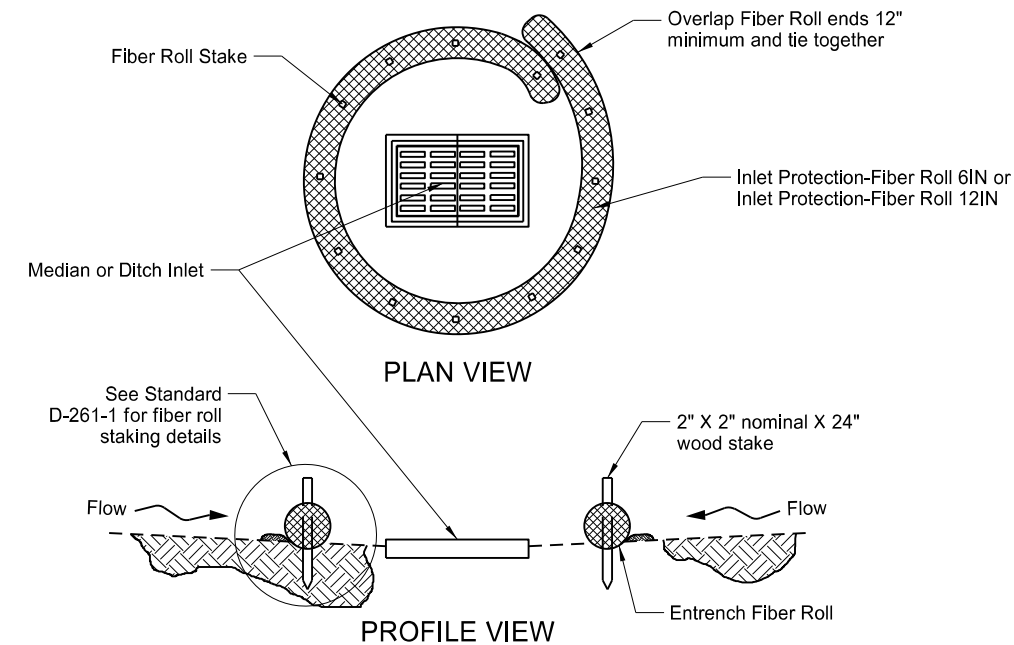
Provide a laboratory with the following:

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.

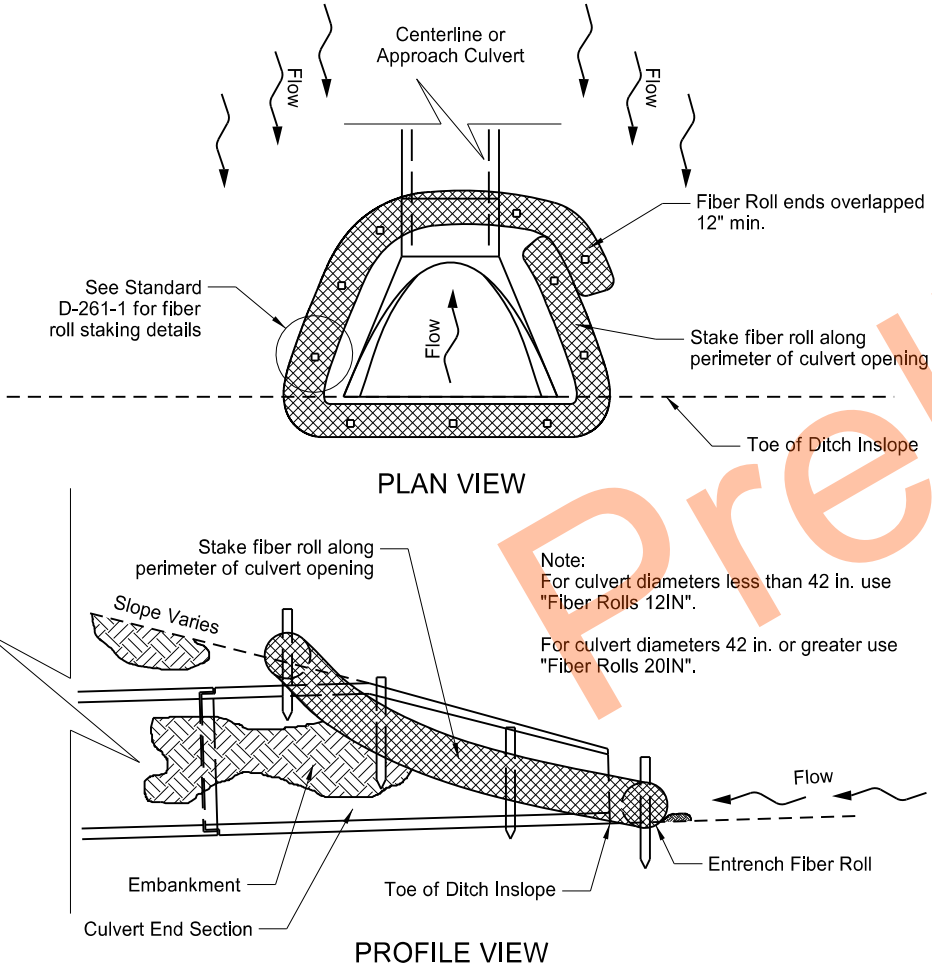
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.
08-27-19	New Design Engineer PE Stamp

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 08/27/19 and the original document is stored at the
North Dakota Department
of Transportation

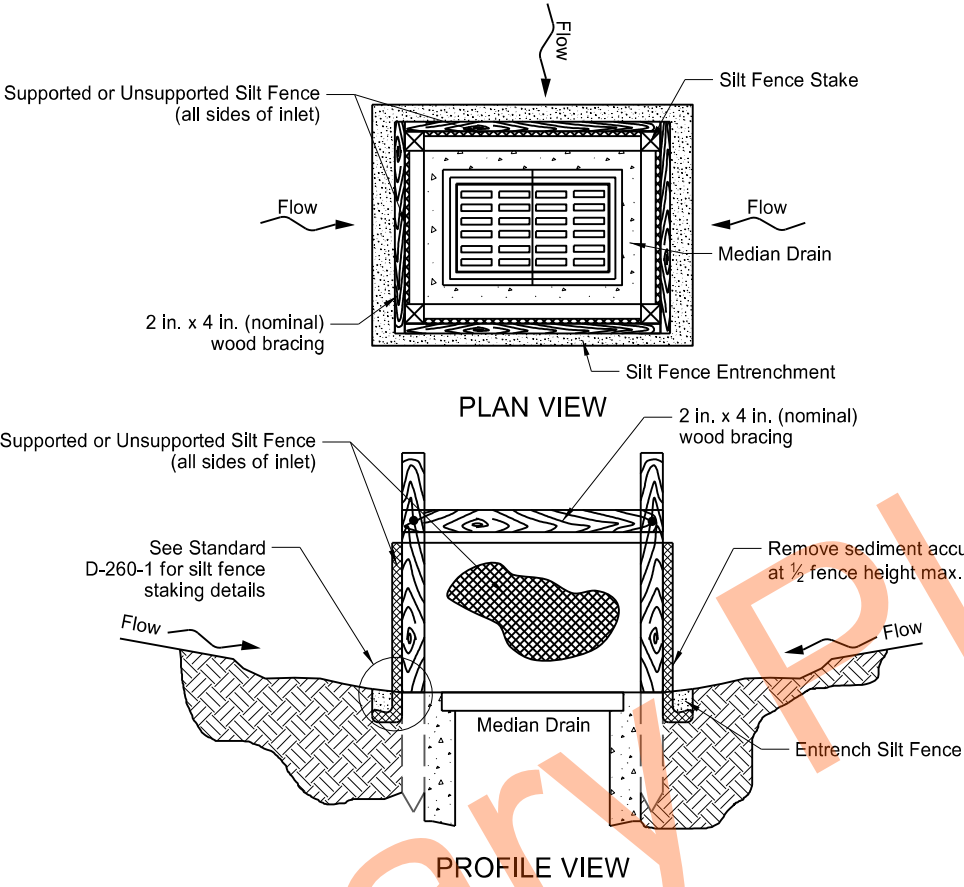
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



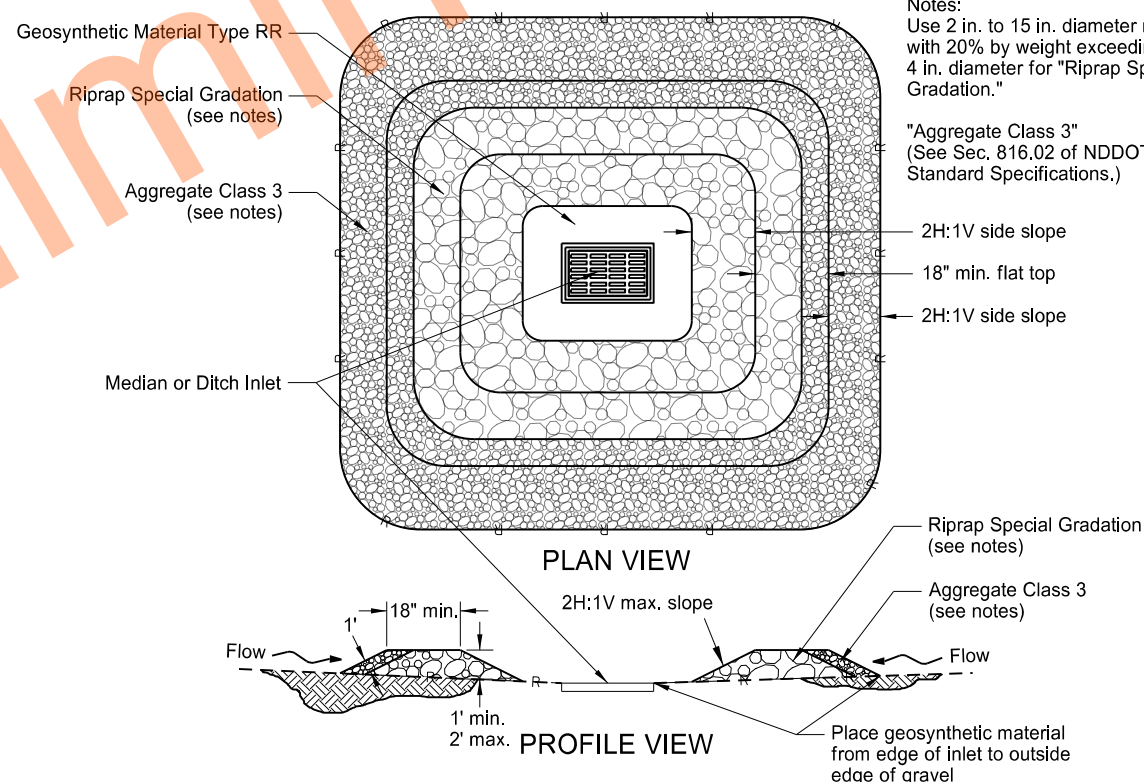
FIBER ROLL PROTECTION
(MEDIAN OR DITCH INLET)



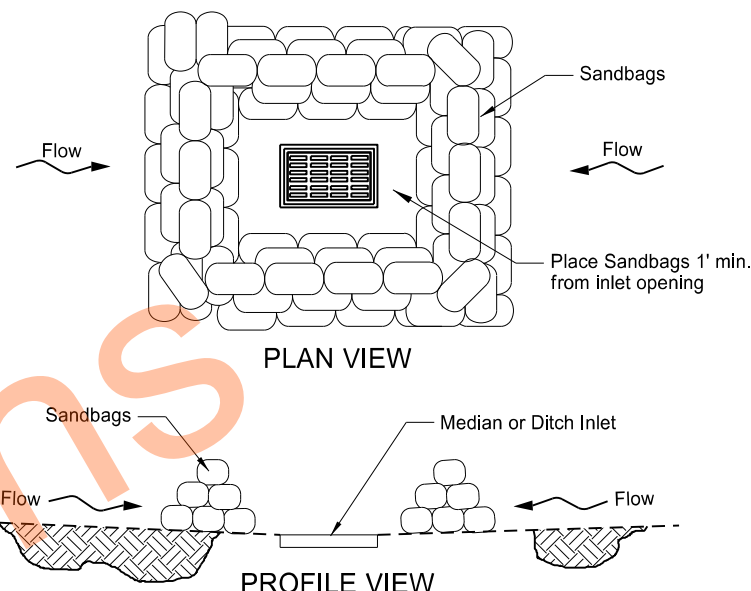
FIBER ROLL PROTECTION
(INLET OF CULVERT)



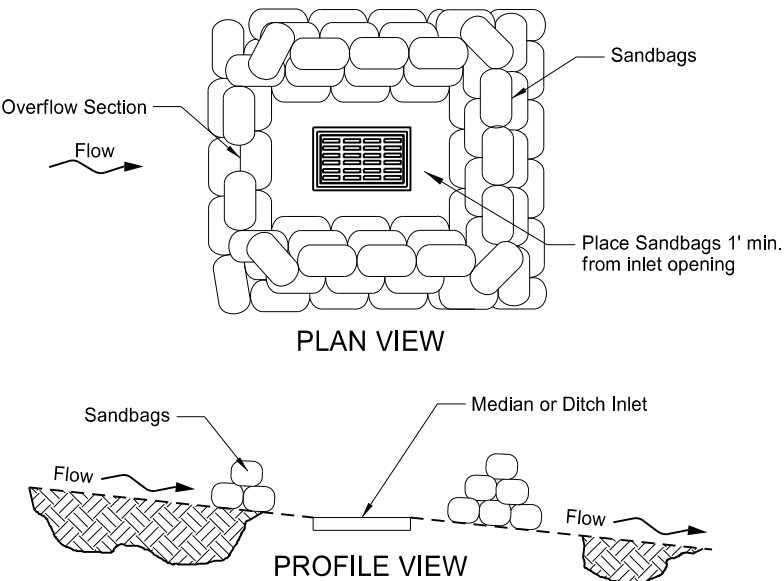
SILT FENCE PROTECTION
(MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION
(MEDIAN OR DITCH INLET)



SANDBAG PROTECTION
(LOW POINT)

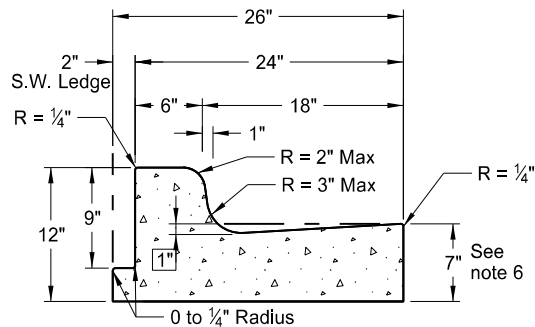


SANDBAG PROTECTION
(ON SLOPE)

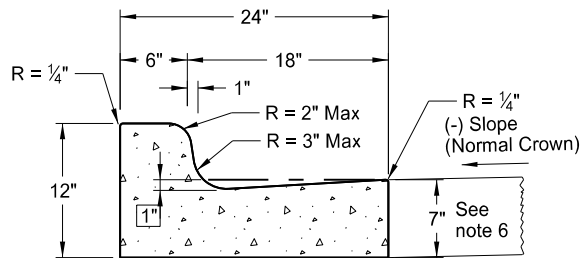
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

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

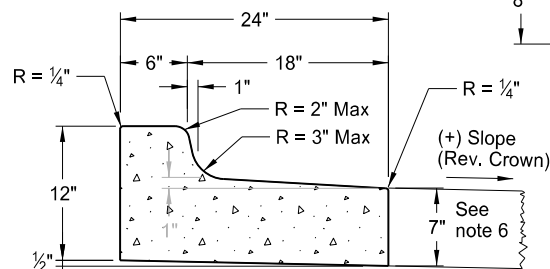
Curb & Gutter and Valley Gutter



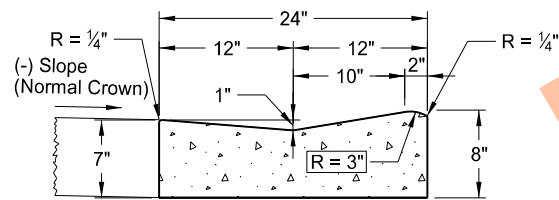
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk,
Median, or Parking Lot.
(Sec. A shown. See Sec B for
additional details.)



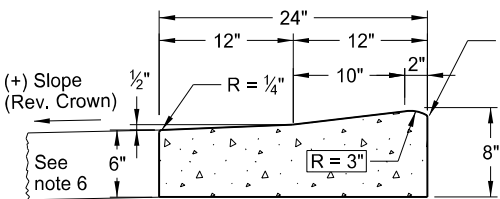
Curb & Gutter Type 1 (Sec. A)



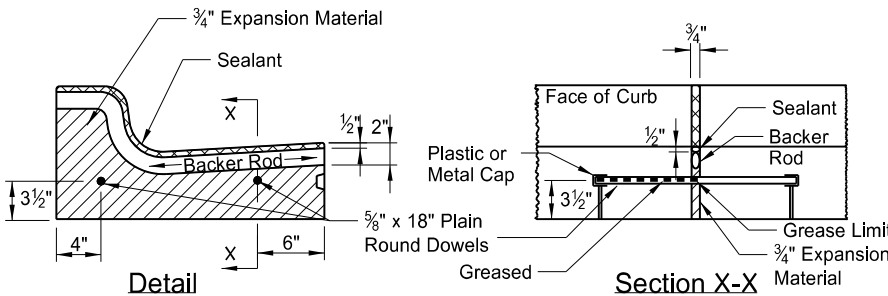
Curb & Gutter Type 1 (Sec. B)



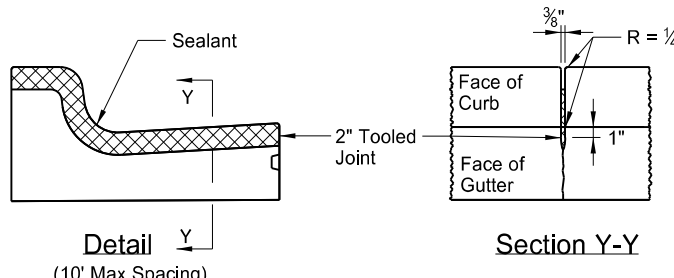
Mountable Curb & Gutter Type 1 (Sec. A)



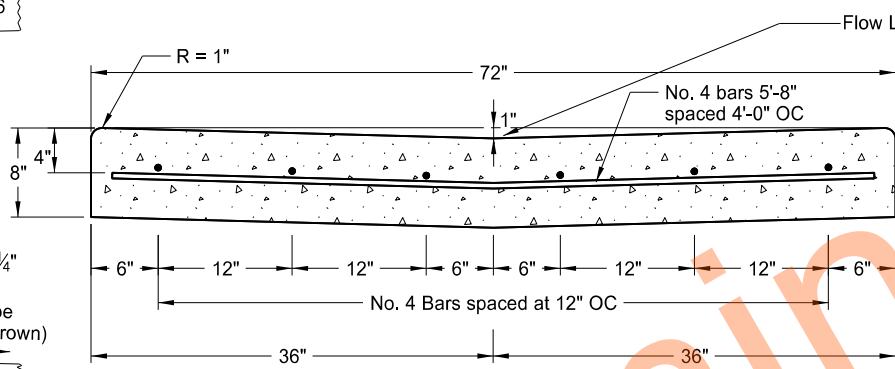
Mountable Curb & Gutter Type 1 (Sec. B)



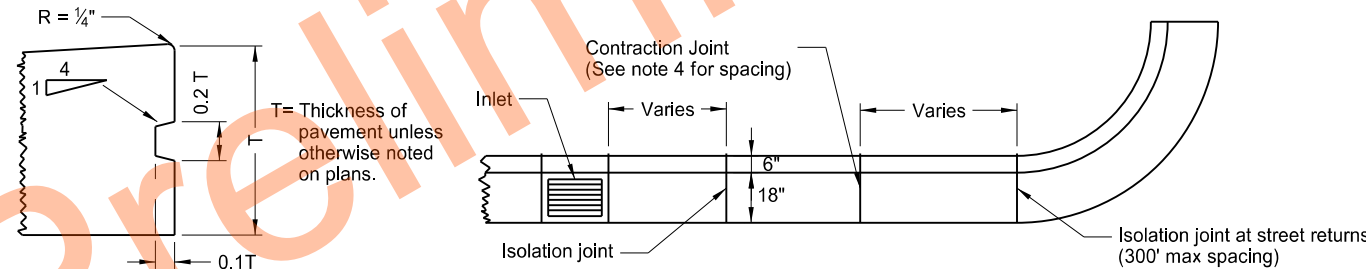
Isolation Joint



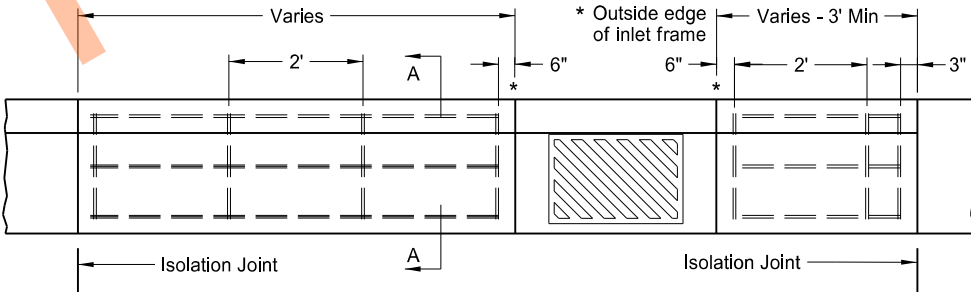
Contraction Joint



72" Concrete Valley Gutter Detail

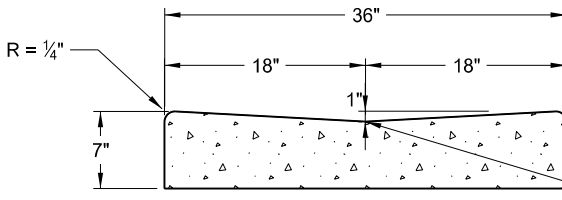


Joint Location Detail

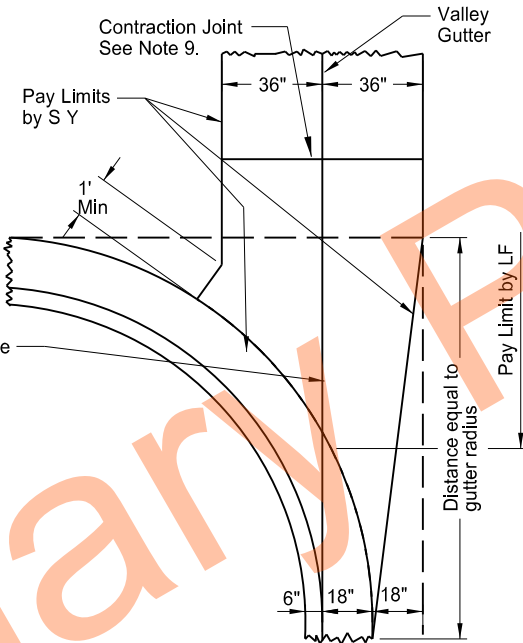


Curb & Gutter Reinforcing at Inlets

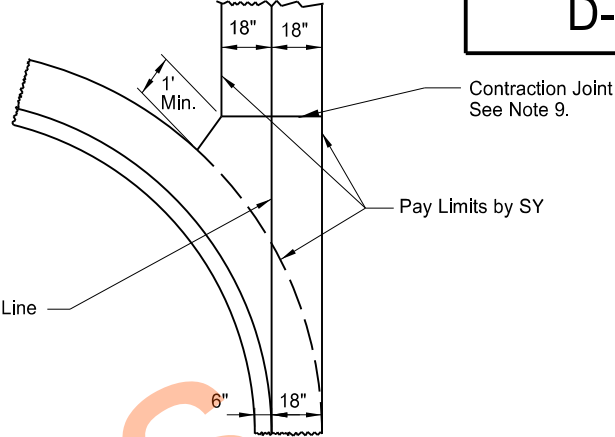
NOTE: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlet locations (even inlets located on radii) in the price bid for "Curb and Gutter - Type 1." Extend reinforcement to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.



36" Concrete Valley Gutter Detail



72" Concrete Valley Gutter Plan



36" Concrete Valley Gutter Plan

NOTES:

1. Use Curb and Gutter Type 1 (Sec. A & B). Use section "A" with (-) pavement slopes and section "B" with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Use 3/4" expansion joint filler for isolation joint material. Form the backer rod and joint sealant opening with a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint. Install plastic or metal caps and greased dowels in the cold joint for the second pour.
4. Joint Spacing: For hot bituminous pavements use a 10' max joint spacing for the curb and gutter with panels on each side of the inlets. For concrete pavements match the joint spacing for the curb and gutter to the pavement joint on PCC Pavements (approximately 15' spacing.)
5. Joint sealing: Seal contraction and isolation joints as shown in the details. Use joint sealant for contraction joints that conforms to section 826.02B. Use sealant for expansion joints specified in note 3 above. Tool and install sealant in accordance with the manufacturer's recommendations.
6. Face of Gutter Depth: For hot bituminous pavement use 7" gutter depth as shown. For PCC pavements, match the gutter depth to the depth of adjacent PCC pavement or to construct a 7" depth as shown.
7. Tie curb and gutter to abutting PCC pavement with No. 3 bars, 1'-6" in length, spaced at 4' centers.
8. On street returns and other locations where new curb and gutter ends and does not abut existing curb and gutter, taper the last two (2) feet of the curb from 6" in height to 0". Install a 1/2" premolded full depth isolation joint, the same shape as the curb and gutter just ahead of the taper. Install an 18" tie bar across the joint.
9. Valley Gutter Joints: Form, saw, or score 1/8" min. to 3/8" max. width contraction joints (a minimum 2" depth) at approx 10' intervals. Seal the joints with hot poured elastic type joint sealer (Section 826.02A.2 of the Standard Specifications.) Include all costs for the joint and sealant in the price bid for Valley Gutter.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engr PE Stamp.

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

SIDEWALK

D-750-2

NOTES:

1. Curb ramp and detectable warning panel layouts for informational purposes only. See Standard Drawing D-750-3 for curb ramp and detectable warning panel details.
2. Joint Spacing: Vary transverse contraction joint spacing from 4' to 6' to create approximate square panels.

Use longitudinal contraction joints when sidewalk width is 8' or greater, and space at half the sidewalk width.

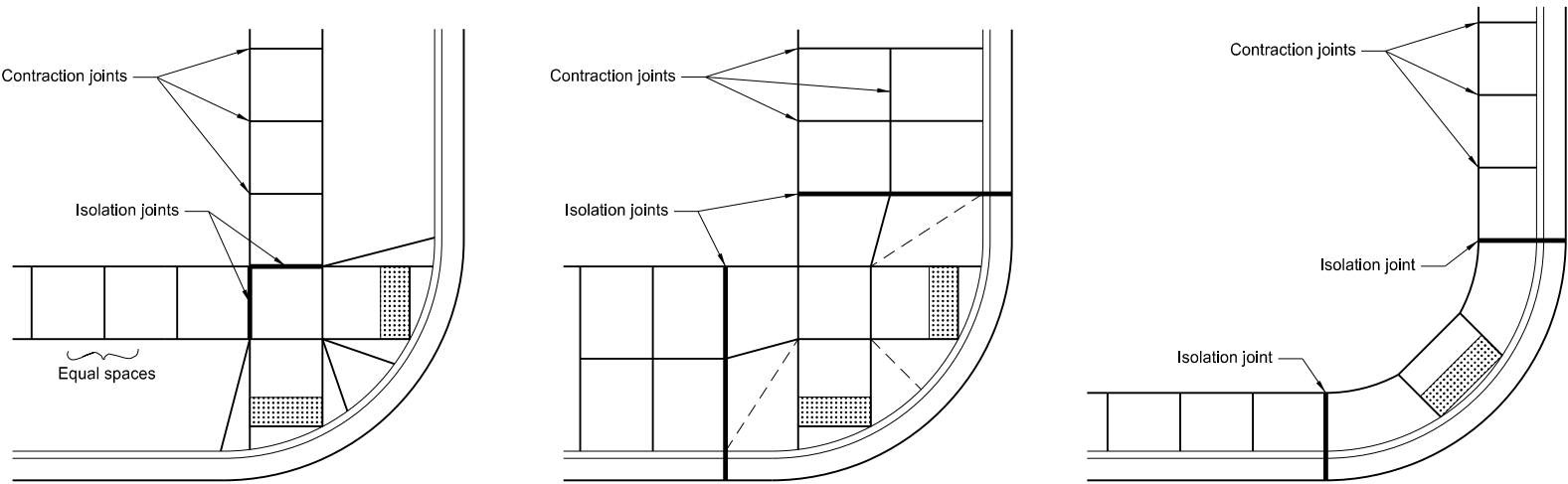
Saw or groove contraction joints to a minimum depth of 1/3 the depth of the concrete.

When sidewalk is adjacent to curb & gutter, vary the sidewalk joint spacing to match curb & gutter joints.

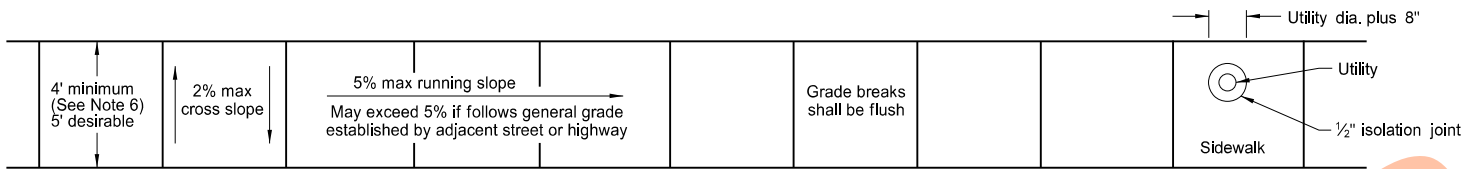
Use isolation joints between separate concrete pours, or between old and new concrete.
3. Include all costs for labor, equipment, and material necessary to construct contraction and isolation joints in the price bid for sidewalk concrete.
4. Use 4" sidewalk concrete thickness unless otherwise specified.
5. Use 4" base material thickness unless otherwise specified. Include all costs for labor and materials necessary to place the base material in the price bid for "Salvage Base Course" or "Aggregate Base Course CL 5."

Modify existing ground slope with landscaping as needed. If not possible, such as adjacent buildings, use a vertical curb as shown in the detail below. The Engineer will measure curb at the unit price bid for "Curb - Type I" per lineal foot.
6. Sidewalk Width & Grade: Provide a continuous 4' min clear width pedestrian access route with max 2% concrete cross slope, excluding flares. The width of the curb cannot be counted as part of the pedestrian access route.

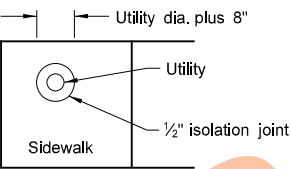
When clear width of pedestrian access routes is less than 5.0', provide passing spaces at a maximum of 200' with a minimum size of 5.0' by 5.0'.



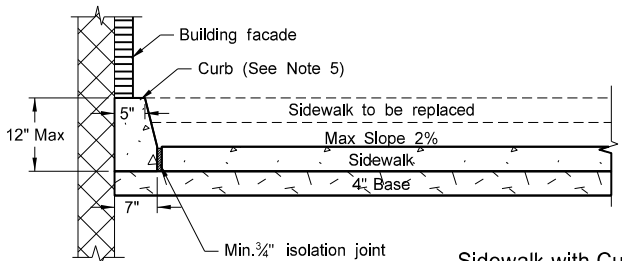
Typical Joint Layouts



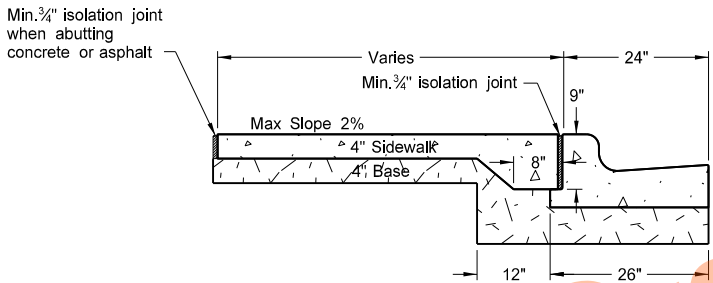
Sidewalk Width and Grade



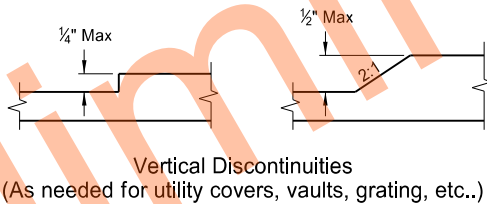
Utility Blockout



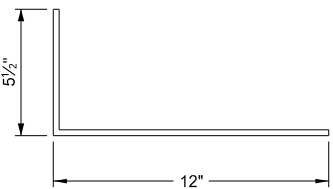
Sidewalk with Curb Detail
(Building face application)



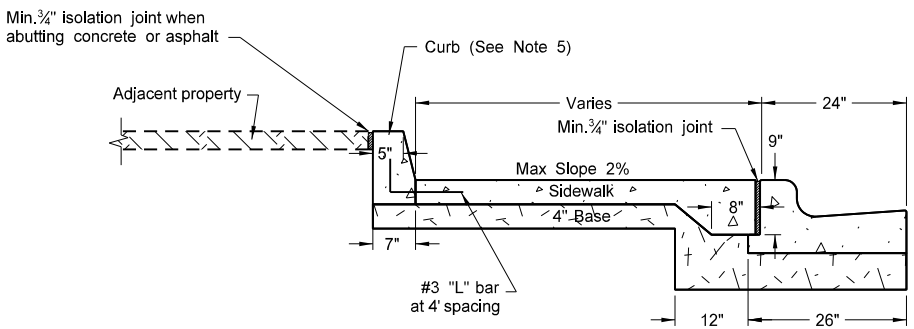
Sidewalk Detail
(Installed adjacent to curb and gutter)



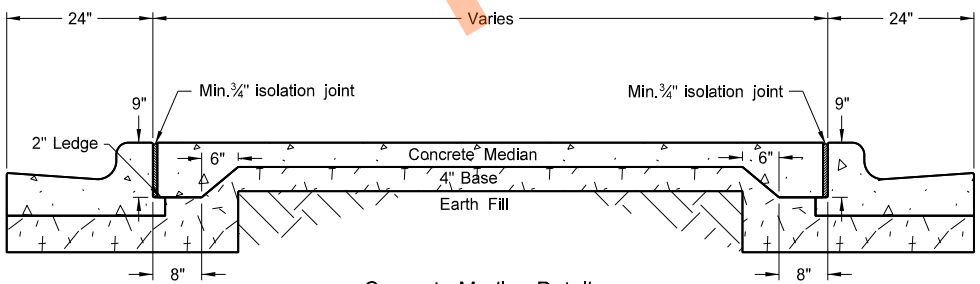
Vertical Discontinuities
(As needed for utility covers, vaults, grating, etc..)



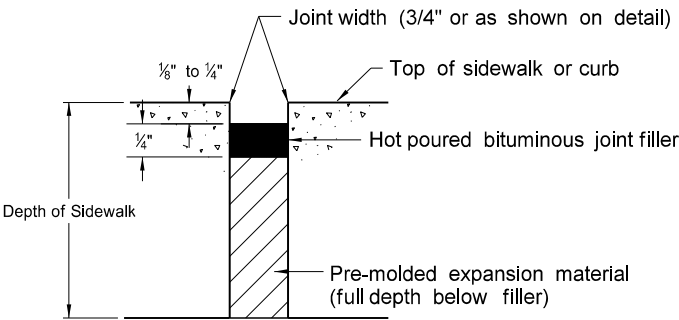
"L" Bar Detail
#3 Bar



Sidewalk with Curb Detail
(Adjacent property application)



Concrete Median Detail



Typical Isolation Joint Seal
(longitudinal and transverse)

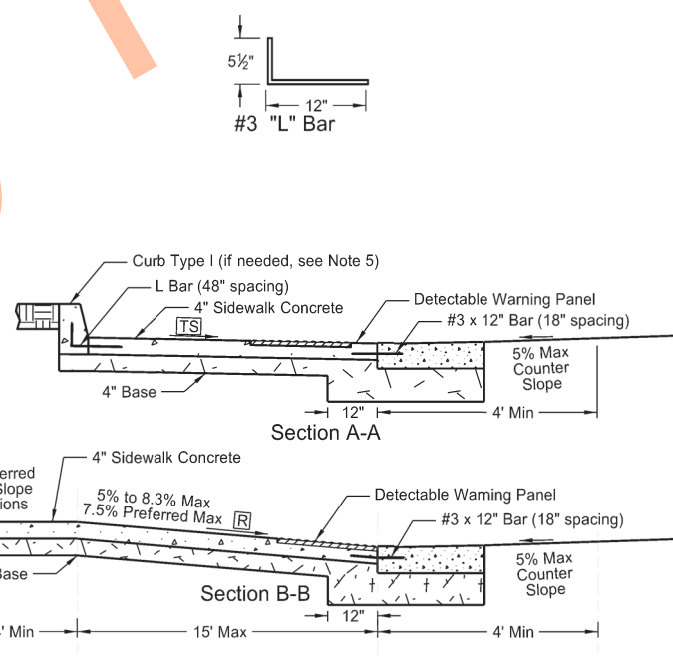
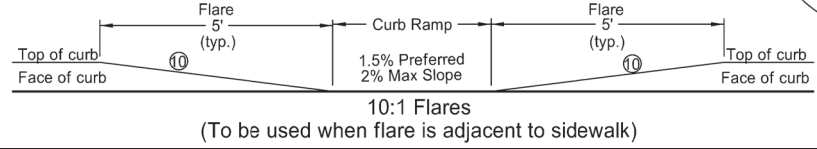
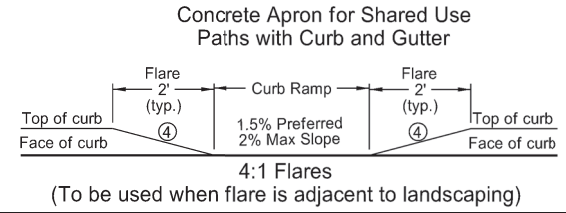
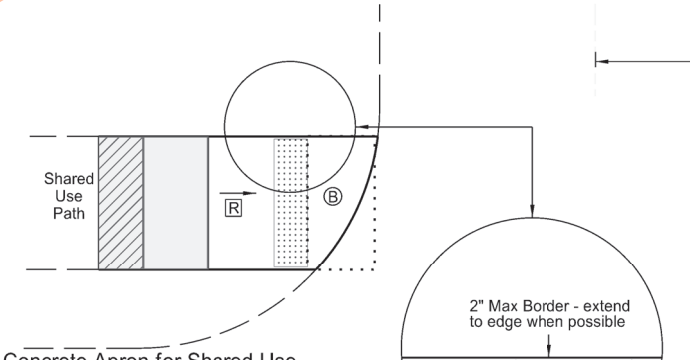
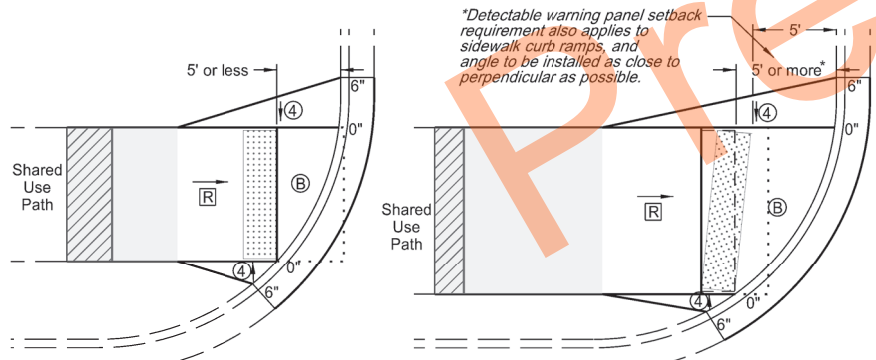
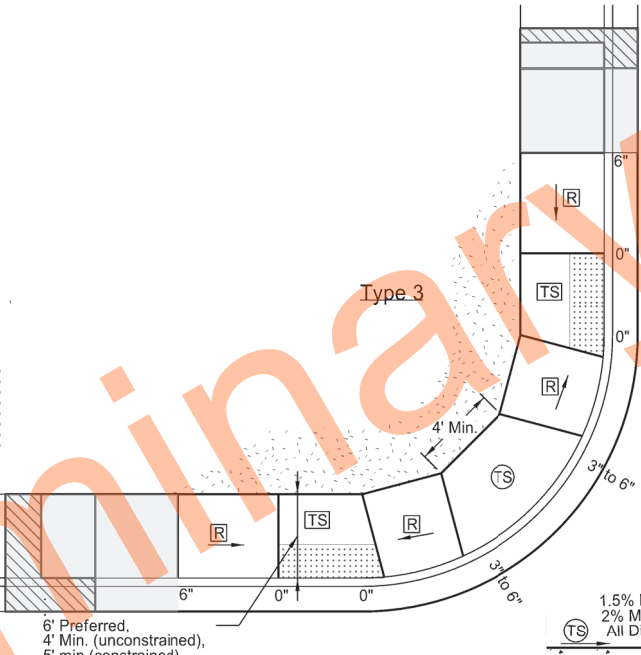
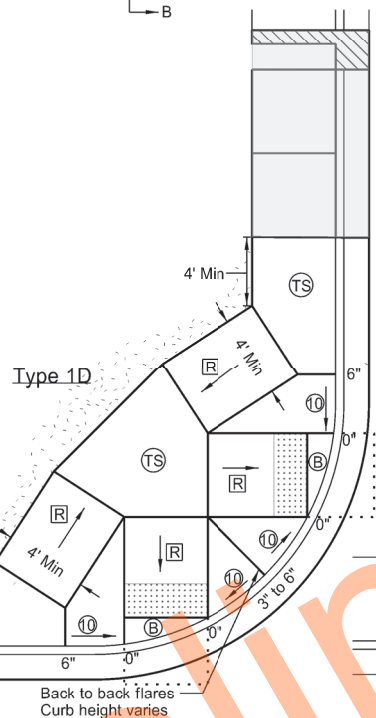
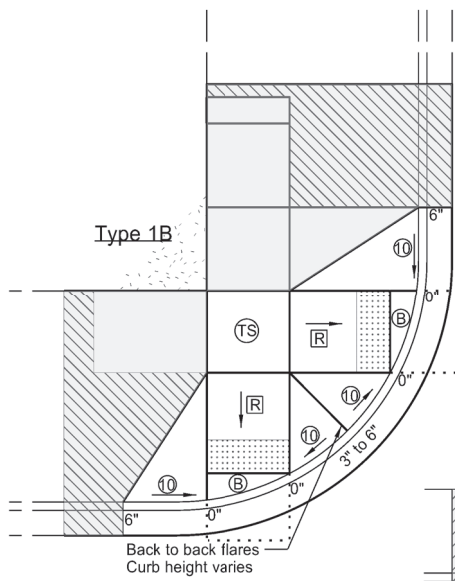
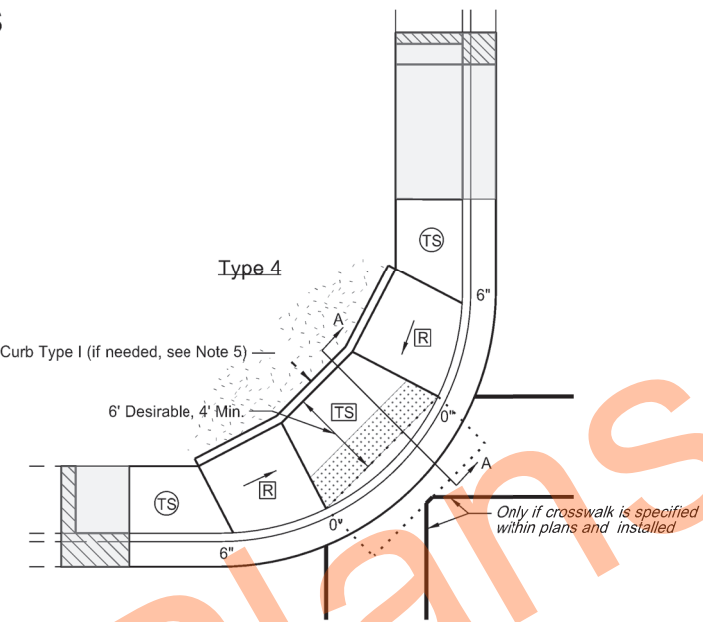
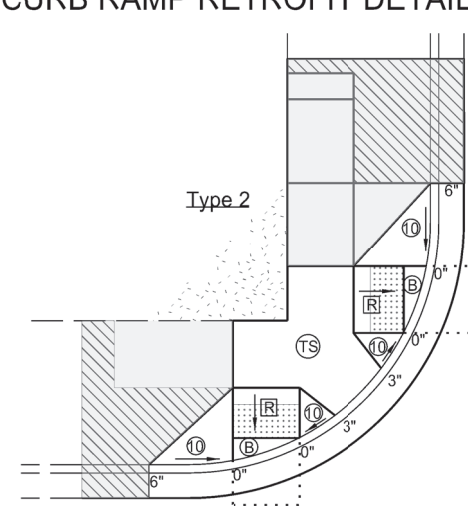
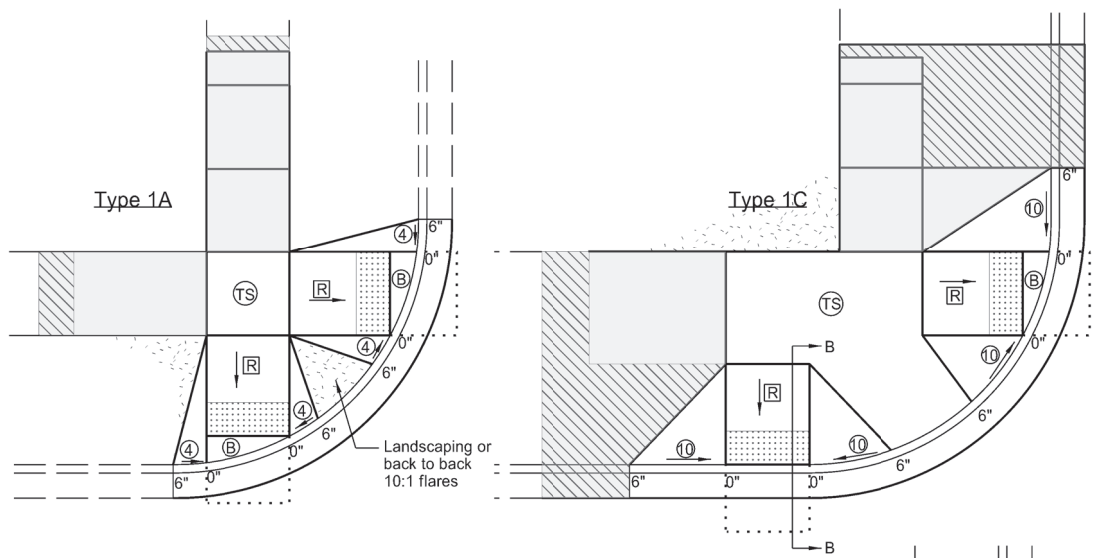
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-26-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
09-05-18	Added sidewalk details for width and grade and passing lane requirements.
08-27-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by

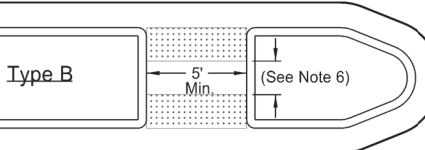
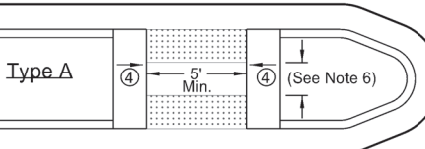
Kirk J Hoff,
Registration Number
PE- 4683,
on 08/27/19 and the original document is stored at the
North Dakota Department
of Transportation

CURB RAMP RETROFIT DETAILS

D-750-3



Median Refuge Islands (Cut-Through)



NOTES:

1. Ramp width is the useable portion of the ramp, excluding flares. Match curb ramp width to Existing Pedestrian Facility (EPF) width (4' minimum or 5' for island ramps.) Match ramp width to existing shared use path width. Maximum ramp length is 15'.
2. Provide turning space with desirable 5' x 5' size or larger and minimum 4' x 4' unconstrained size, for any change of direction. Provide landing 5' long x width of path at the bottom and top of parallel ramps and at the top of perpendicular ramps. Turning spaces and Landings may overlap.
3. Match detectable warning panel width to ramp width. Radial panels are allowed. Place detectable warning panel within the lower turning space.
4. Provide a continuous 4' minimum width EPF with 1.5% preferred cross slope and max 2% constructed cross slope.
5. Modify existing ground slope with landscaping, as needed. If not possible, use a vertical curb as detailed on Standard D-750-2. The Engineer will measure curb at the unit price bid for "Curb - Type 1" per lineal foot.
6. Islands: If the profile of the island curb ramp is 2% or less, provide a minimum distance of 2' between warning panels. If the profile of the island curb ramp is steeper than 2%, provide a turning space between the ramps.
7. Provide generally planar vertical alignments. Provide grade breaks, perpendicular to the direction of the pedestrian travel, at the top and bottom of curb ramps (1.5% preferred, 2% max constructed cross slope).
8. See Curb Ramp Retrofit Transition Details Standard D-750-4 for additional information. Also See PROWAG for full compliance in the curb ramp area.
9. Grade transitions shall be flush.

LEGEND:

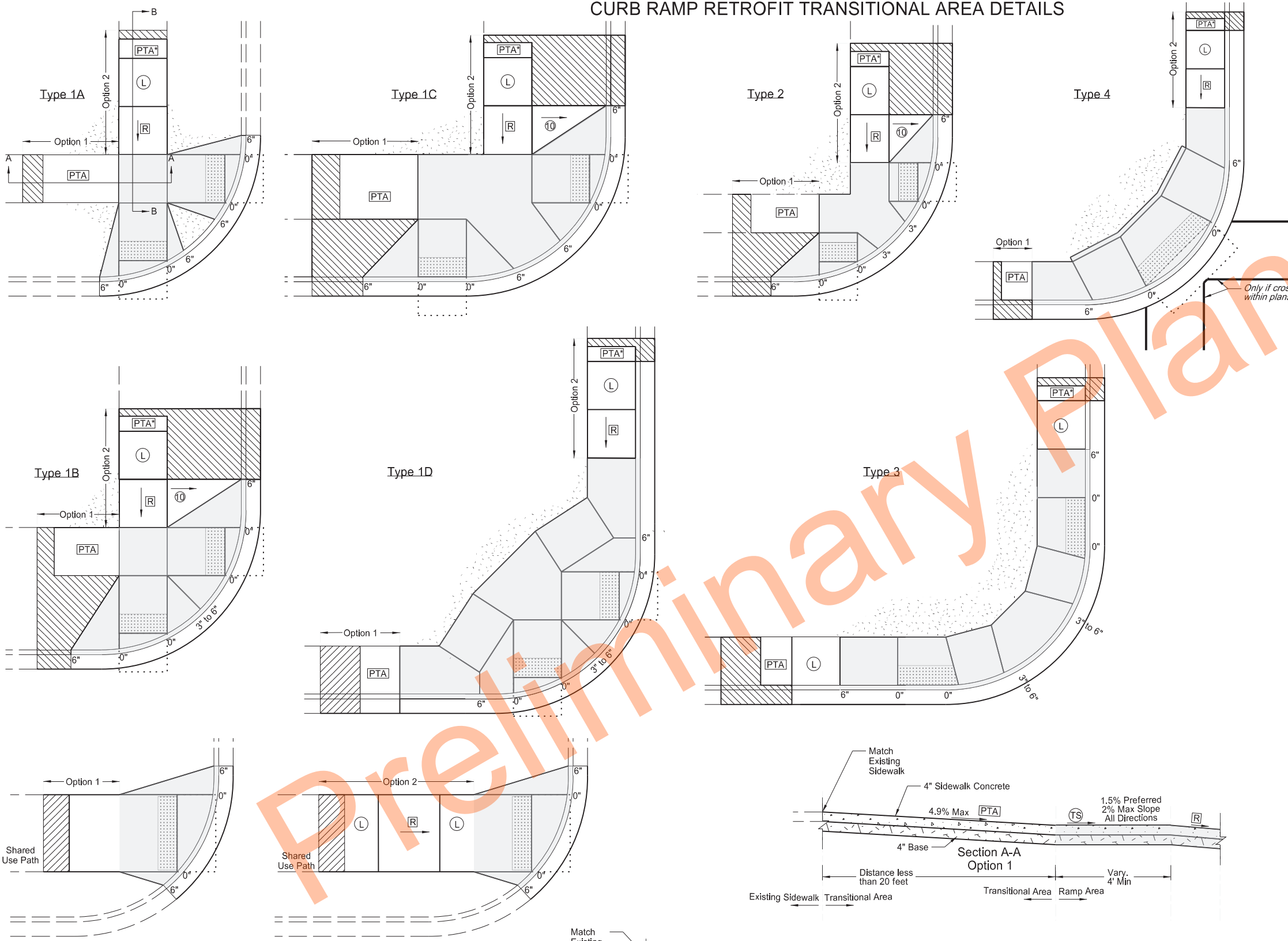
- Detectable Warning Panel.
- Landscaping.
- Transitional tie-in to nearest joint, if needed.
- Curb Ramp Retrofit Transitional Area (See Standard Drawing D750-4)
- 4' long x width of EPF or 4' minimum Clear space outside traffic lanes of travel. 1.5% preferred cross slope 2% maximum cross slope 4.7% preferred running and counter slope 5% maximum running and counter slope
- (TS) : Turning Space Use at top of ramp or when changing directions. 1.5% preferred slope (2% maximum) all directions.
- (R) : Preferred Ramp Grade = 5% to 7.5%. Maximum Constructed Grade = 8.3%. Preferred Cross Slope = 1.5%. Maximum Constructed Cross Slope = 2%.
- (B) : 1.5% preferred cross slope 2% maximum constructed cross slope running slope consistent with the EPF 4.7% preferred max counter slope 5.0% max constructed counter slope
- (10) : 10:1 maximum constructed slope.
- (4) : 4:1 maximum constructed slope.
- 0", 3", or 6" : Curb Height.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-26-13 REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
09-05-18	Revised Notes, Revision for Turning Space, Added Passing Space Requirements, Turned Detectable Warning Panel
03-15-21	Slope & other clarifications.
05-19-21	Separate Curb Ramp Transition Area from Curb Ramp area



CURB RAMP RETROFIT TRANSITIONAL AREA DETAILS

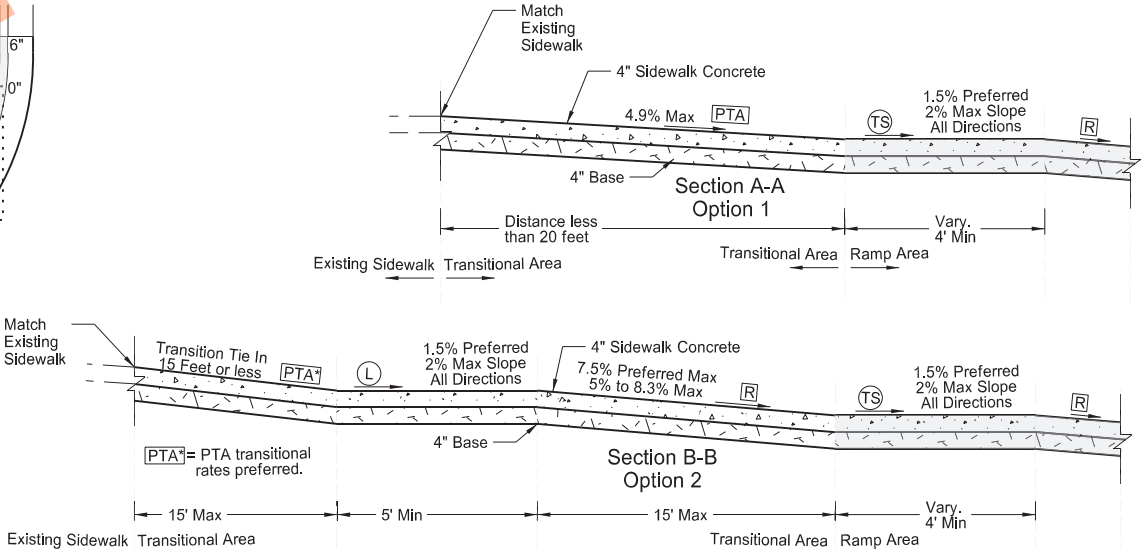
D-750-4



- NOTES:
- Curb Ramp Transitional Areas are to transition from the Curb Ramp area into the Existing Pedestrian Facility (EPF). Each layout shows example transitions. Use any combination for transitions from the Ramp Area into the EPF that allows for similar or gentler slopes to that of the existing condition, yet transitions in the shortest distance possible. In some cases, if grades allow, the Ramp area can immediately transition into the EPF and no transitional area is needed.
 - Option 1: Use this transition when existing running slope grades are less than 5%. Transition from the ramp area to the EPF using the Pedestrian Access Transition Area (PTA) transition rates and in less than 20 feet.
 - Option 2: Use this transition when existing running slopes are greater than 5% and option 1 is not able to be met.
- Add a ramp and a landing immediately after the ramp area. Then transition from the compliant landing into the EPF using the PTA rates (preferred), or in less than 15 feet (which ever is shorter).
- Transitional Areas for Shared Use Paths can be concrete or asphalt.
 - See Curb Ramp Retrofit Details Standard D-750-3 for additional information.

- LEGEND:
- [Pattern] : Detectable Warning Panel.
 - [Pattern] : Landscaping.
 - [Pattern] : Transitional tie-in to nearest joint, if needed.
 - [Pattern] : Curb Ramp Retrofit Area (See Standard Drawing D750-3)
 - [Pattern] : 4' long x width of EPF or 4' minimum Clear space outside traffic lanes of travel. 1.5% preferred cross slope 2% maximum cross slope 4.7% preferred running slope 5% maximum running slope
 - [PTA] : Pedestrian Access Transition Area Running Slope less than 4.9%. Transition Cross Section at 1/2 percent per foot from the from Ramp Area to EPF.
 - [L] [TS] : Turning Space/Landing Use at top of ramp or when changing directions. 1.5% preferred slope (2% maximum) all directions.
 - [R] : Preferred Ramp Grade = 5% to 7.5%. Maximum Constructed Grade = 8.3%. Preferred Cross Slope = 1.5%. Maximum Constructed Cross Slope = 2% Maximum Length = 15 feet
 - [10] : 10:1 maximum constructed slope.
 - [4] : 4:1 maximum constructed slope.
 - 0", 3", or 6" : Curb Height.

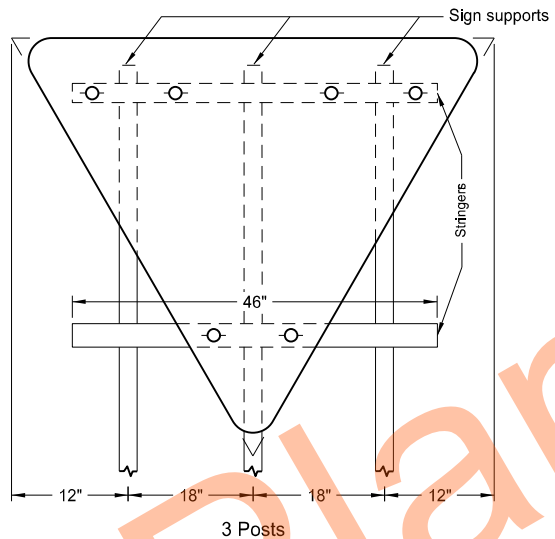
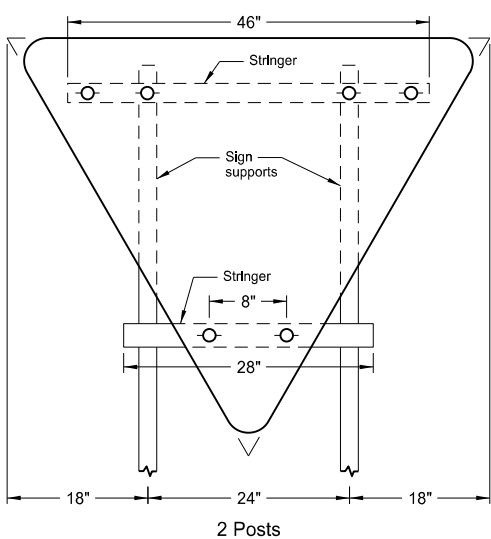
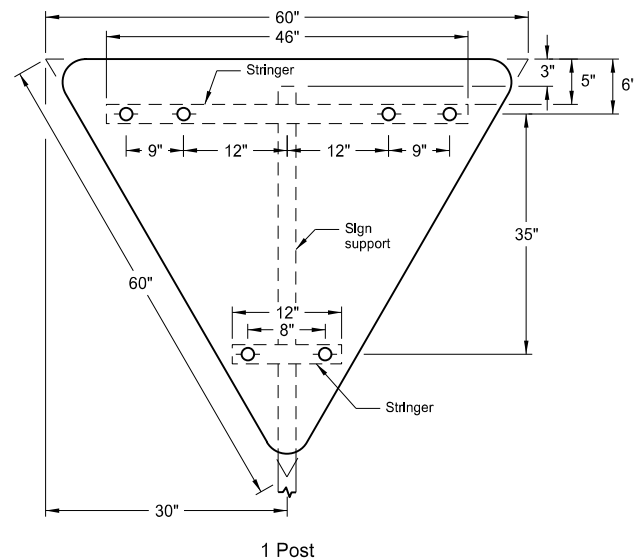
Transition Areas for Shared Use Paths



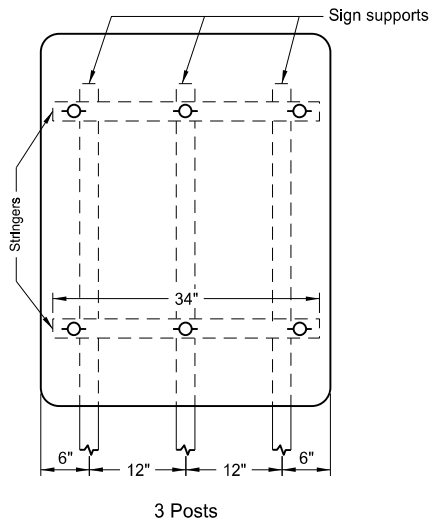
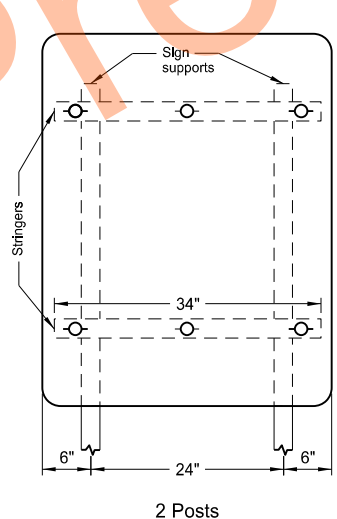
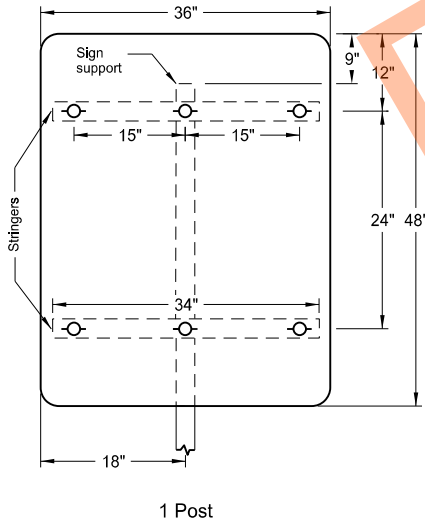
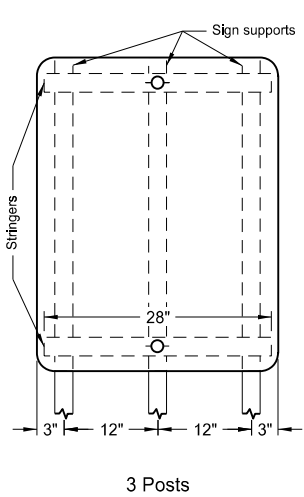
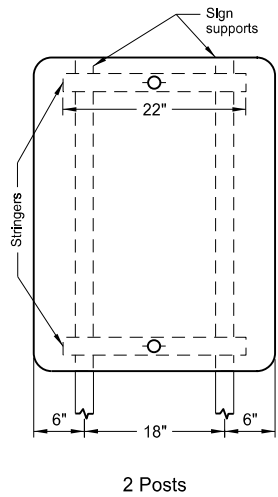
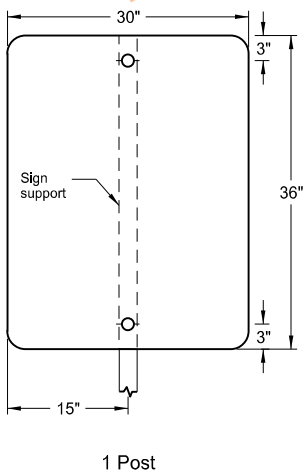
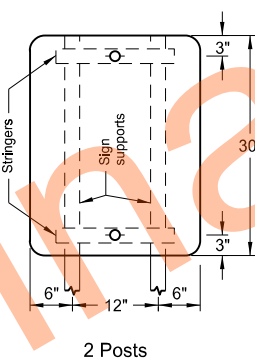
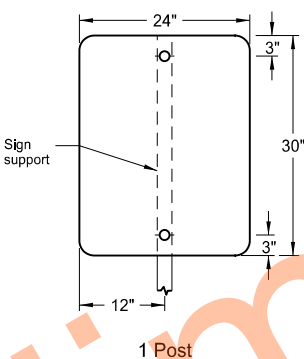
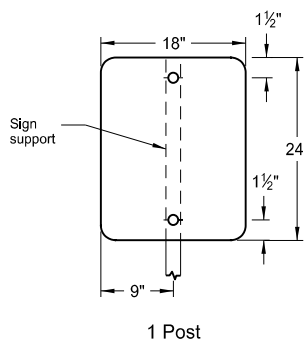
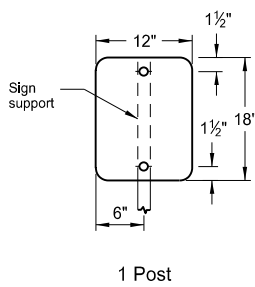
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-19-21	
REVISIONS	
DATE	CHANGE

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
05 19 2021

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



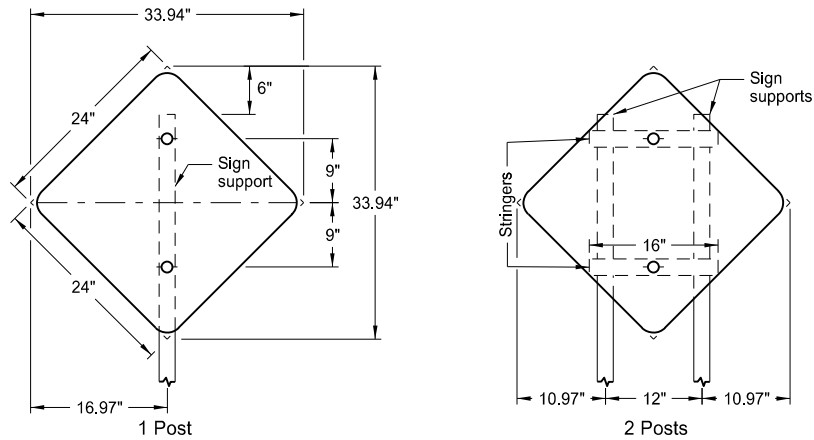
- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1½" x 1½" perforated square tube stringers.
 3. Punch holes round for ⅝" bolt.



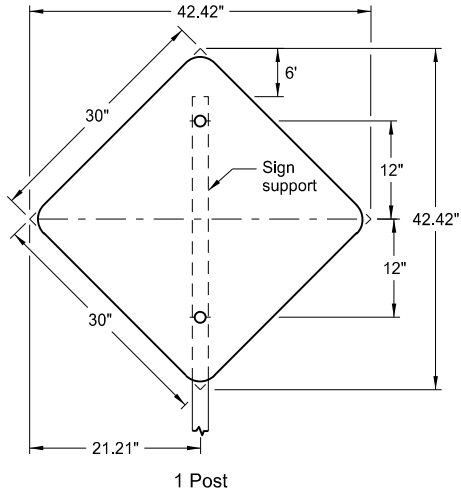
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 8/30/19 and the original document is stored at the
North Dakota Department
of Transportation

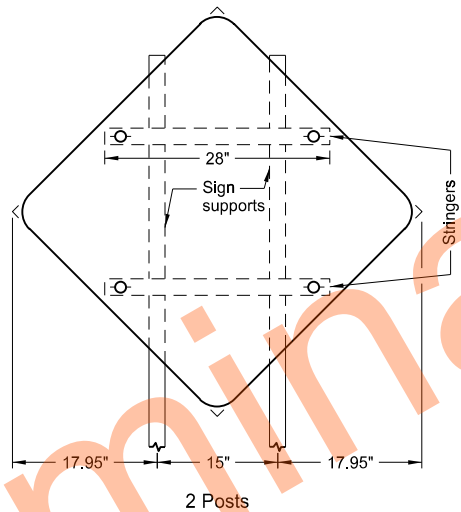
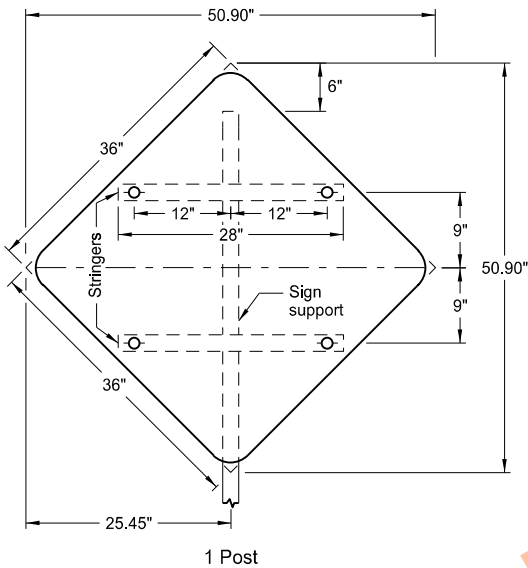
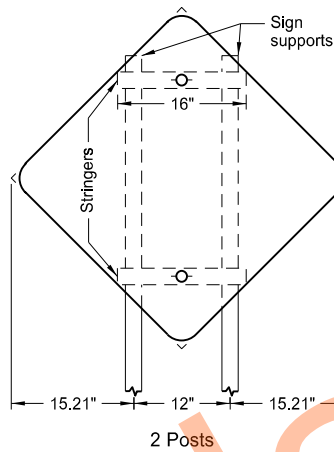
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



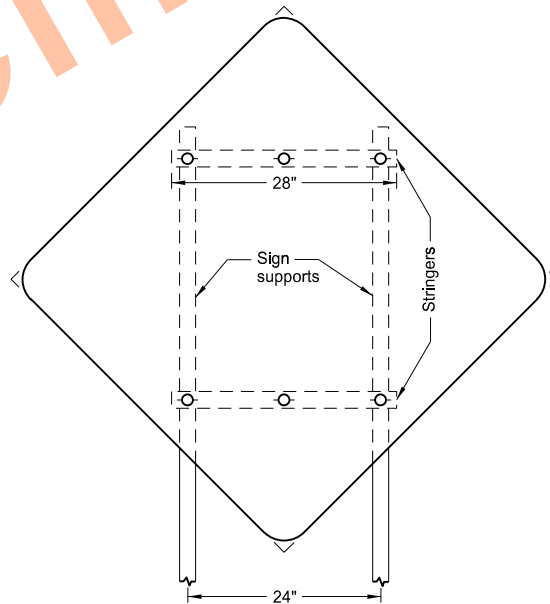
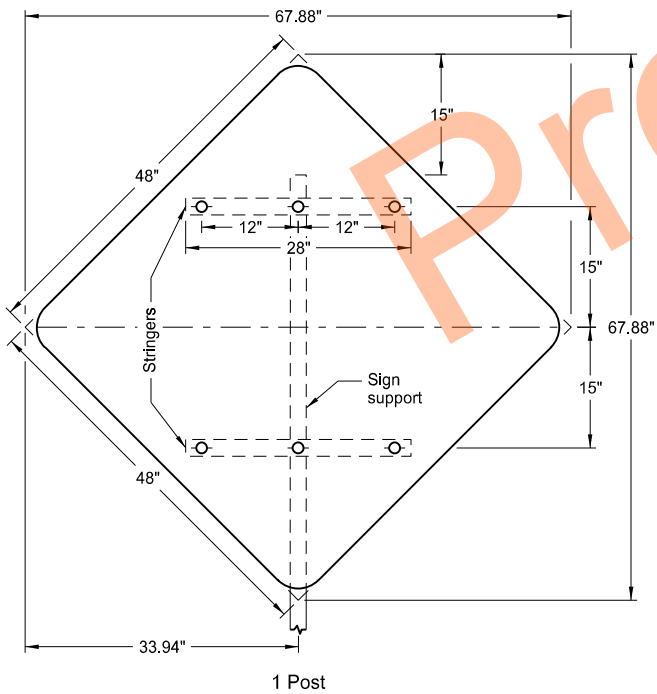
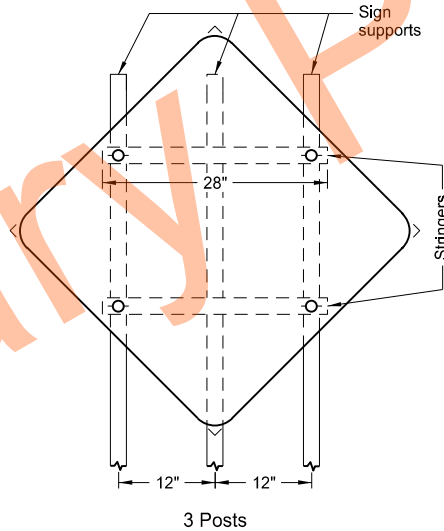
Assembly No. 18



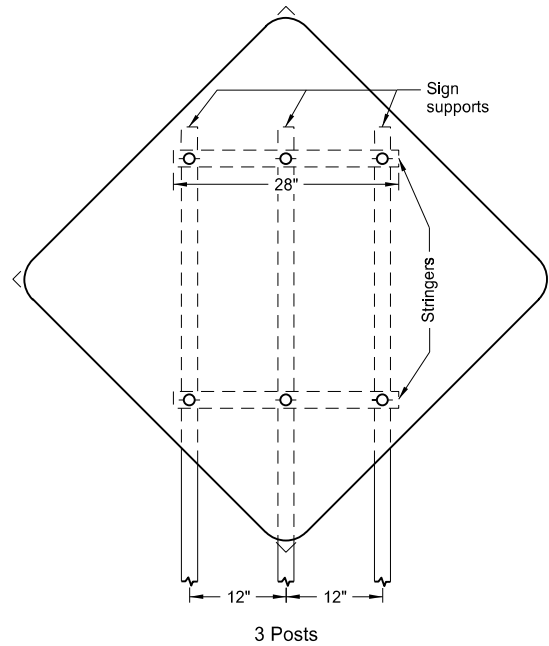
Assembly No. 19



Assembly No. 20



Assembly No. 21

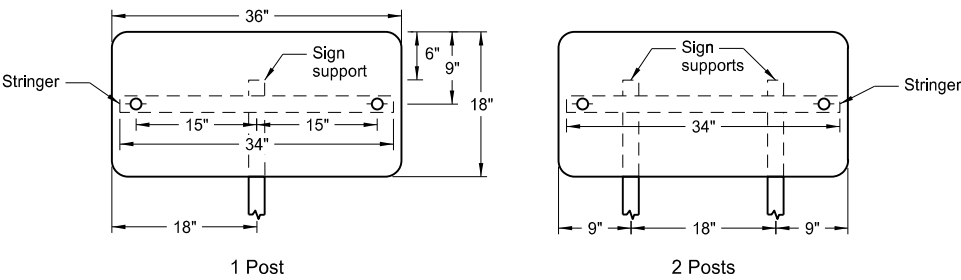


- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1½" x 1½" perforated square tube stringers.
 3. Punch holes round for ⅜" bolt.

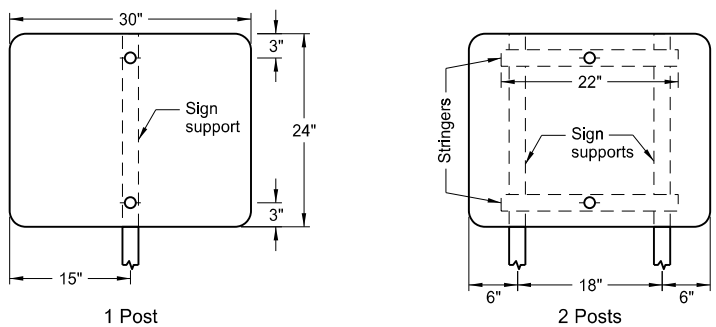
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 8/30/19 and the original document is stored at the
North Dakota Department
of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

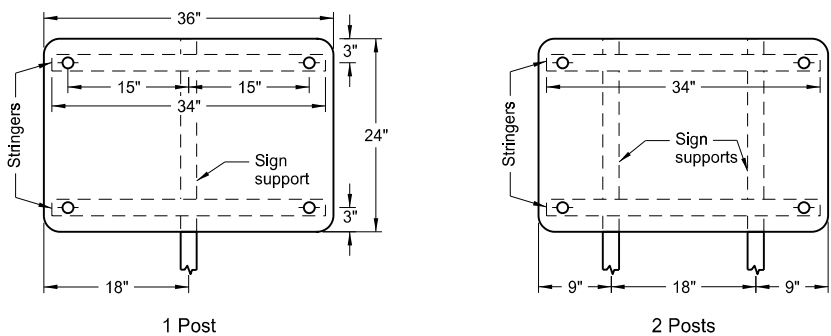


Assembly No. 31

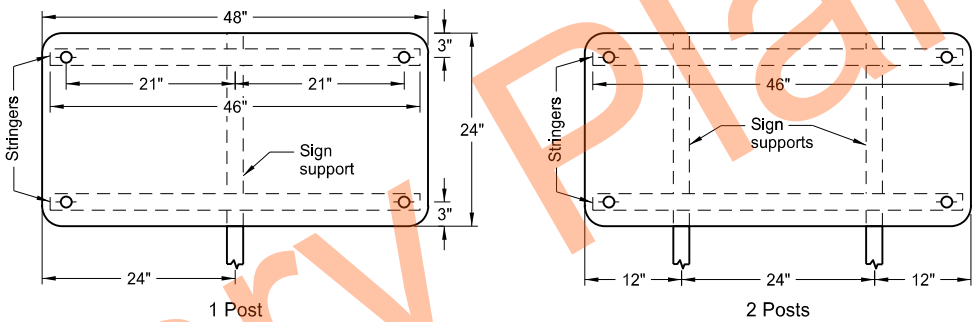


Assembly No. 32

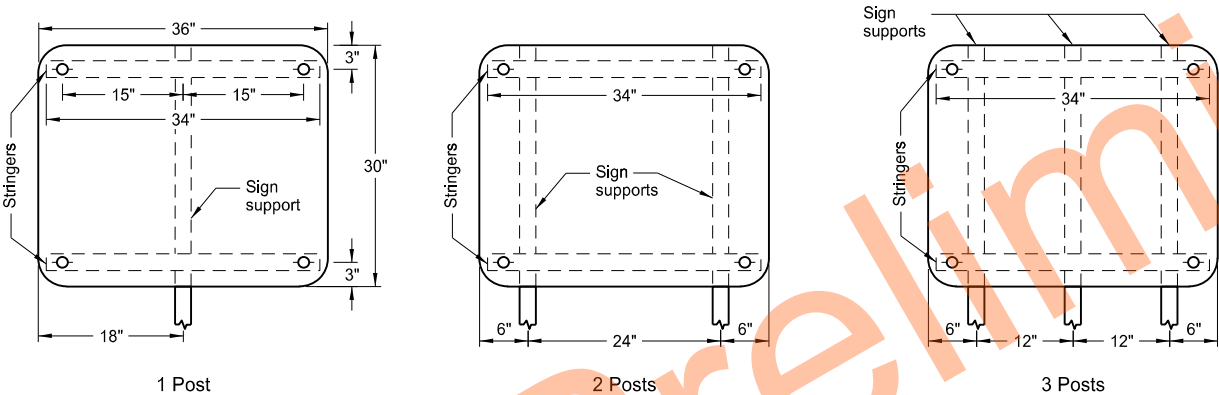
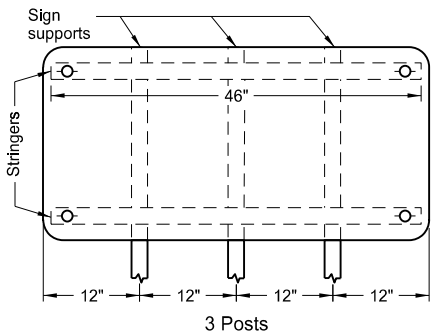
- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1½" x 1½" perforated square tube stringers.
 3. Punch holes round for ⅜" bolt.



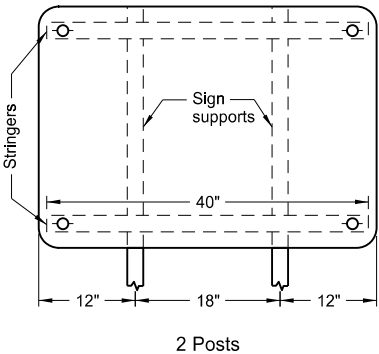
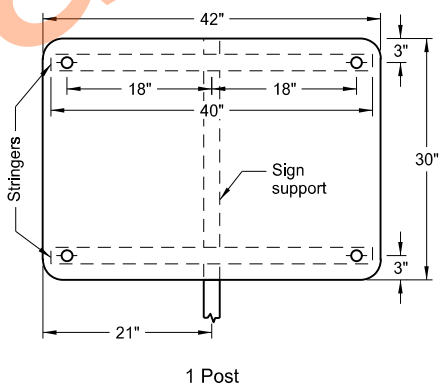
Assembly No. 33



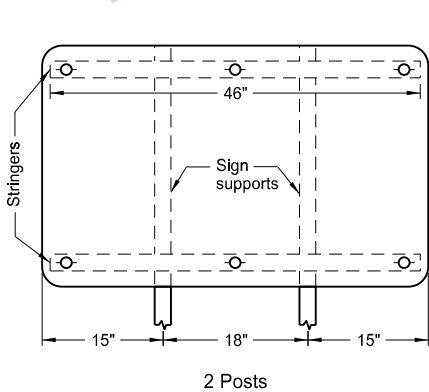
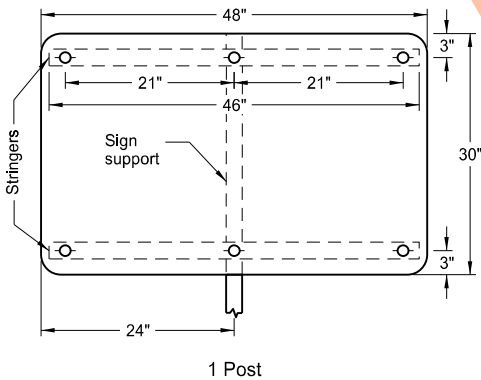
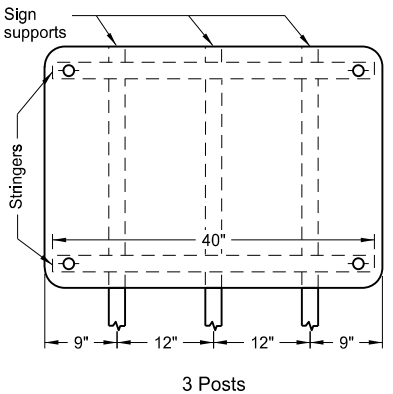
Assembly No. 34



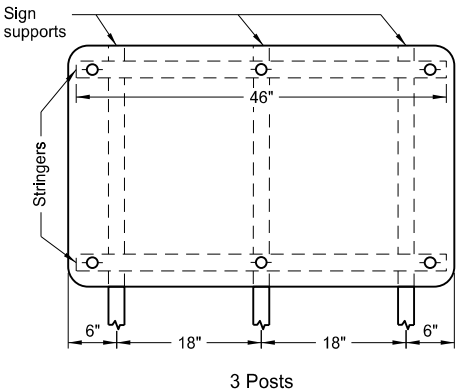
Assembly No. 35



Assembly No. 36



Assembly No. 37



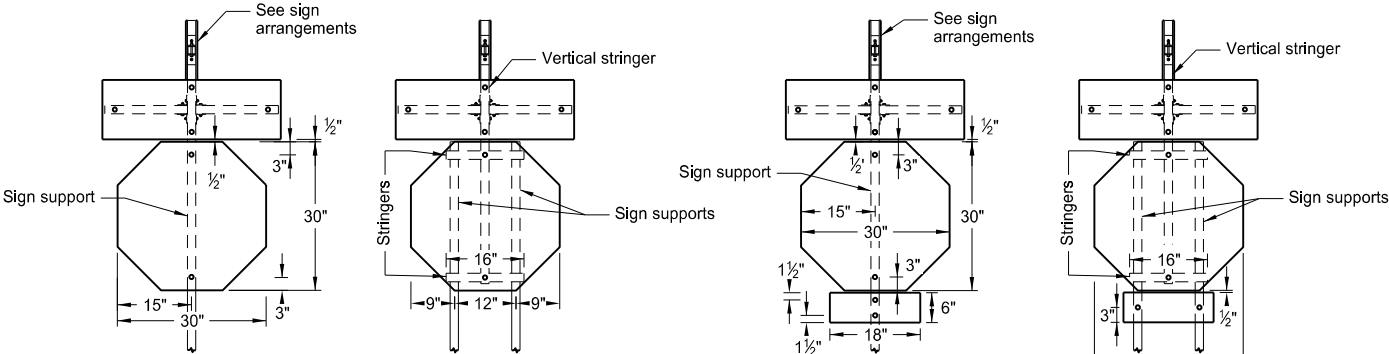
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 8/30/19 and the original document is stored at the
North Dakota Department
of Transportation

The diagram illustrates two methods of sign placement:

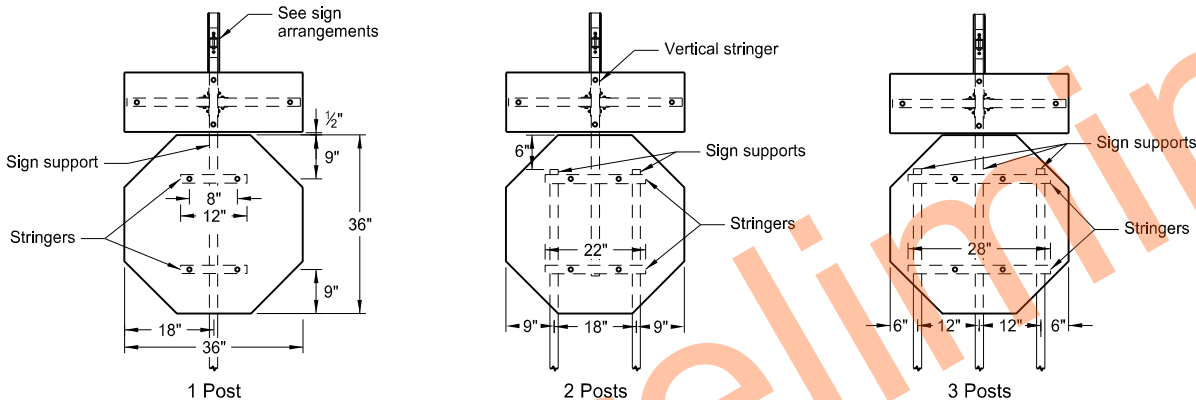
- 1 Post:** A single vertical post supports a rectangular sign. The sign is divided into two sections. The left section is labeled "Sign with least area" and the right section is labeled "Sign with greatest area". The width of the sign is indicated as "Varies". The post is labeled "Sign support". Above the sign, a label "See sign arrangements" points to a small inset showing a sign with a cross-section.
- 2 Posts:** Two vertical posts support a rectangular sign. The sign is divided into two sections. The left section is labeled "Sign with least area" and the right section is labeled "Sign with greatest area". The width of the sign is indicated as "Varies". The posts are labeled "Sign support nearest roadway" and "Sign support". Above the sign, a label "See sign arrangements" points to a small inset showing a sign with a cross-section.

Special Assembly 1 (A, B, C, D or E)

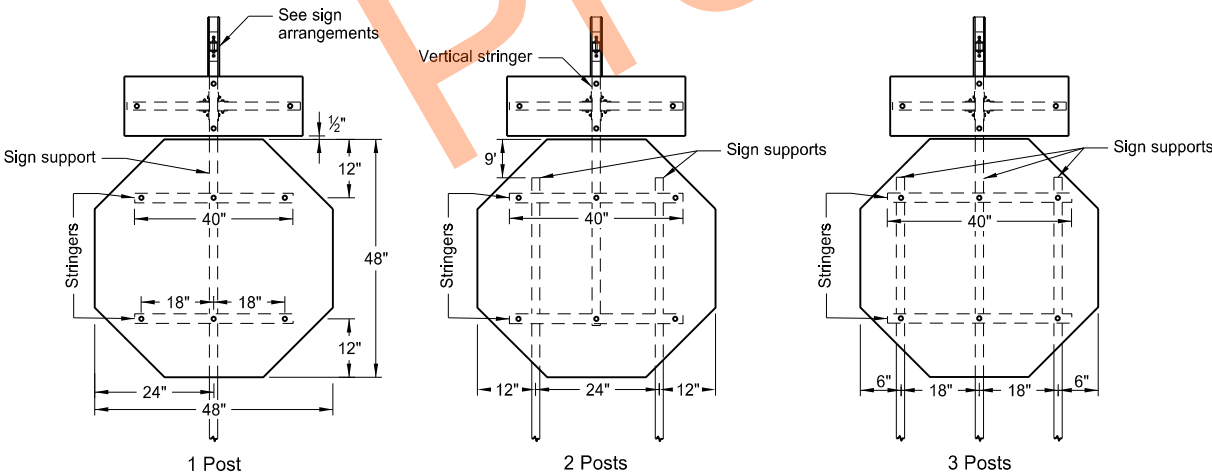


Special Assembly 2 (A, B, C, D or E)

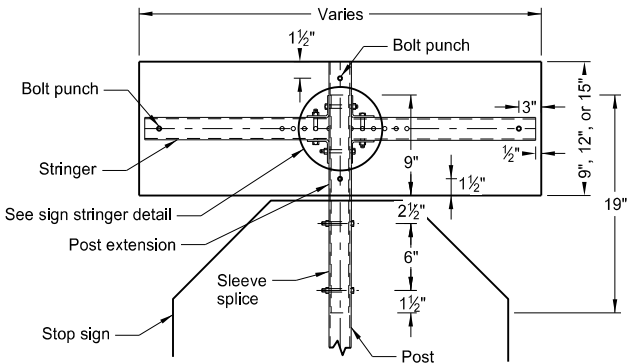
Special Assembly 3 (A, B, C, D or E)



Special Assembly 4 (A, B, C, D or E)

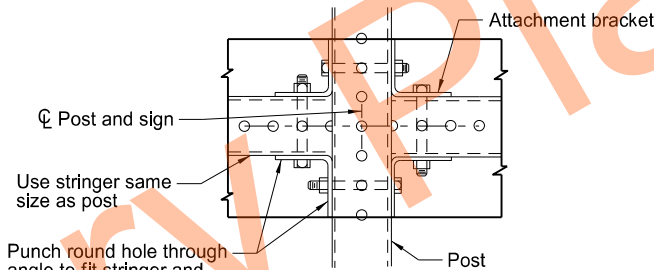


Special Assembly 5 (A, B, C, D or E)



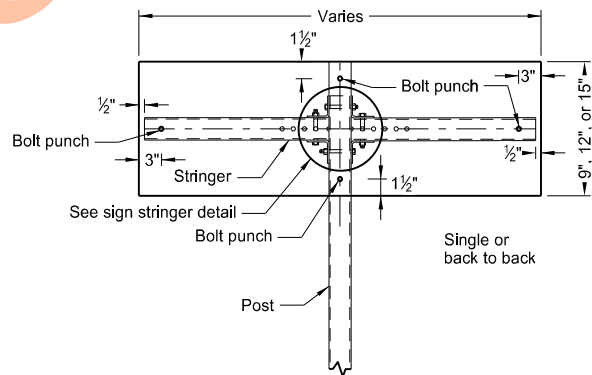
Front View Sleeve Splice Detail

Note: Only use splice method with approval of engineer.

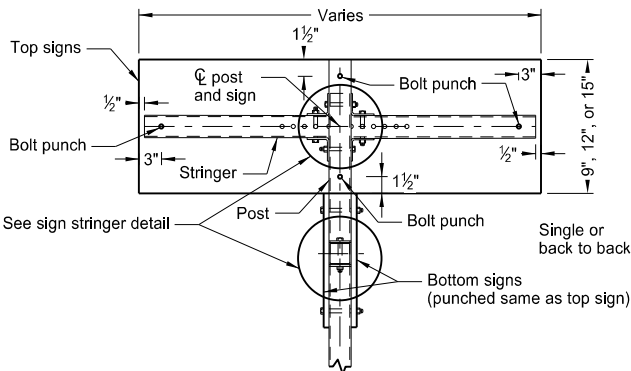


Sign Stringer Detail

Punch round hole through angle to fit stringer and post holes.



Detail A or B



Detail D or E

Face of curb or edge of driving lane

Edge of finished shoulder

14'

20' min.
30' max.

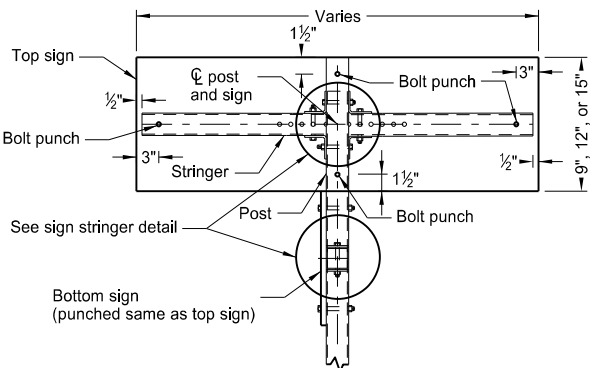
Stop sign

Street Name or 911 Signs

Q of roadway

Intersection Layout

Note: Use layout for street name signs or 911 signs with Special Assembly 1



Detail C

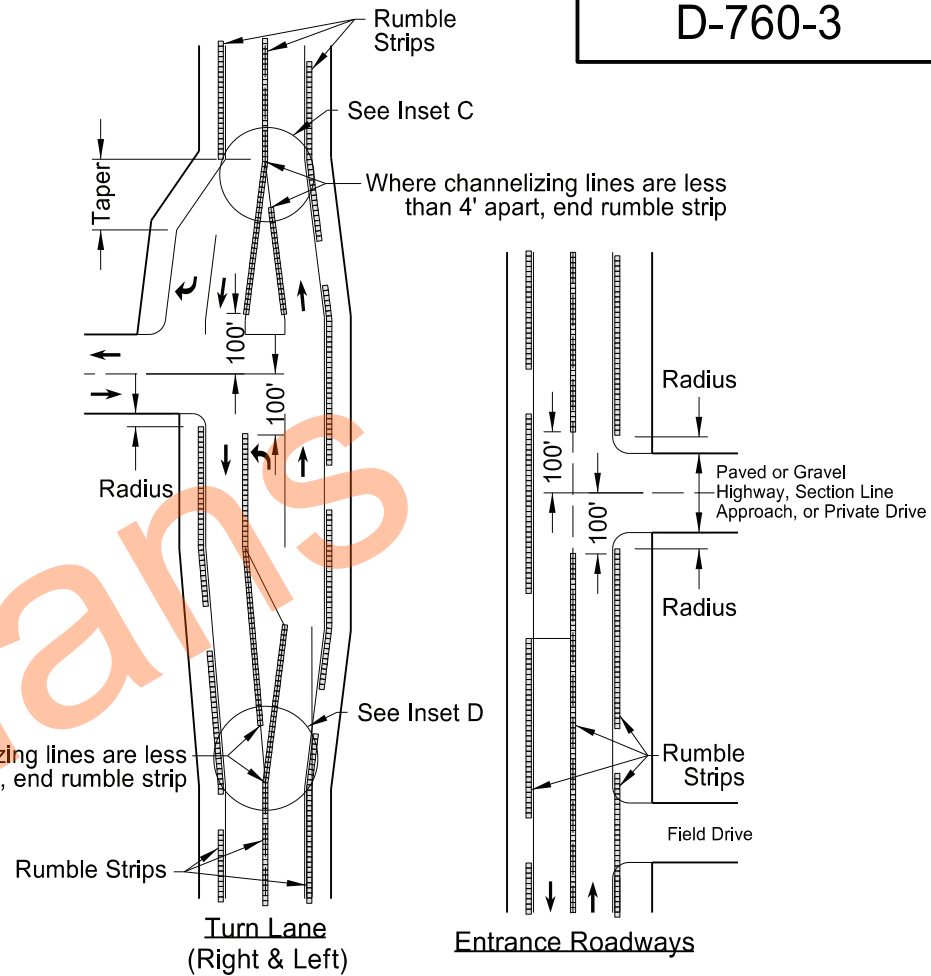
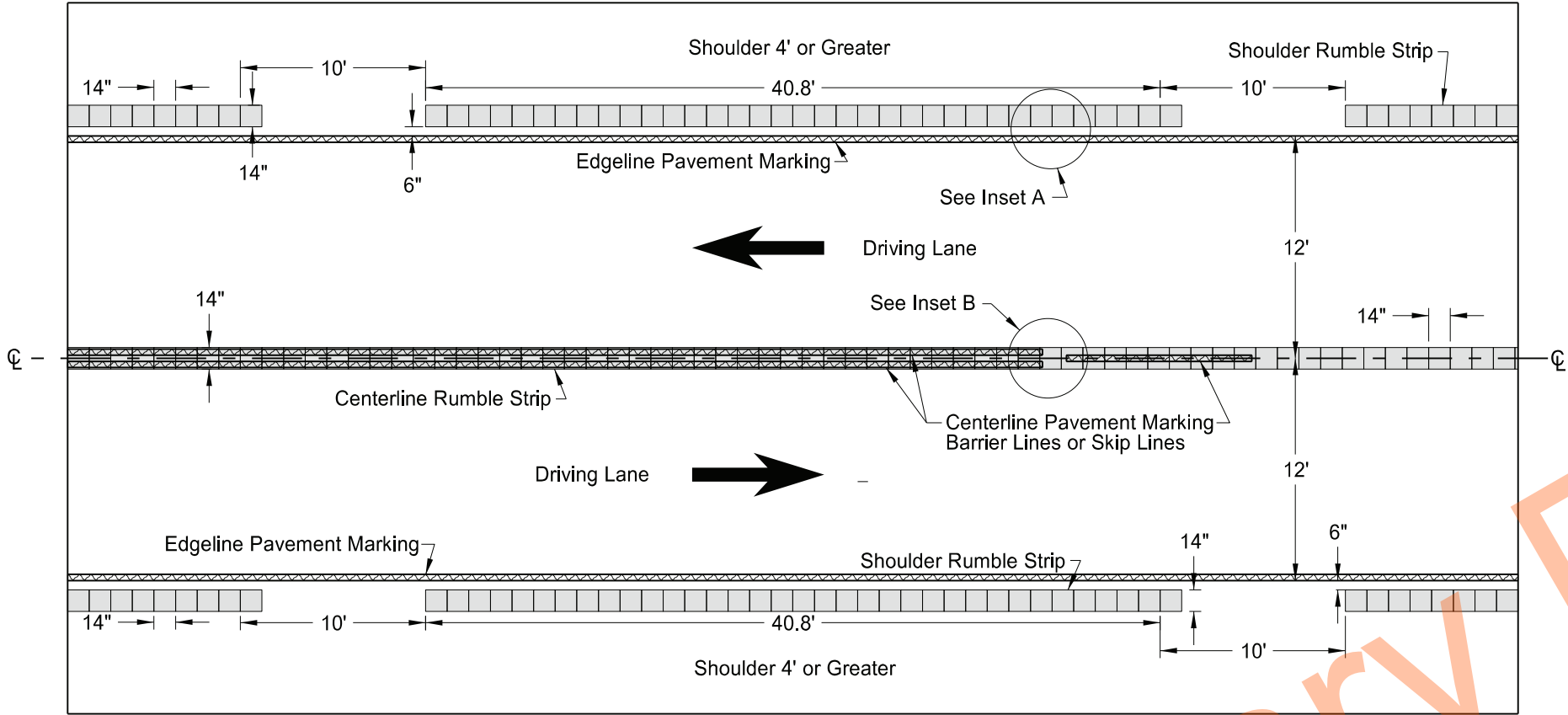
Sign Arrangements

NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
8-30-18	Added 2 post layout for SA1 and Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

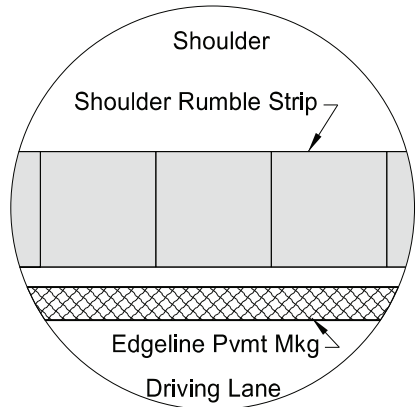
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 9/05/19 and the original document is stored at the
North Dakota Department
of Transportation

RUMBLE STRIPS UNDIVIDED HIGHWAYS (SHOULDER 4' OR GREATER)

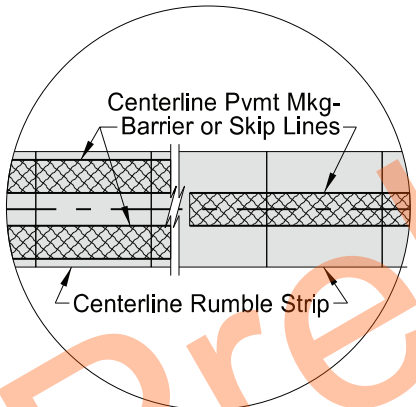
D-760-3



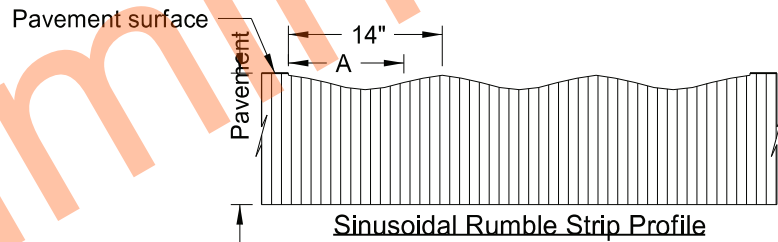
Undivided Highways (Shoulders 4' or Greater)



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

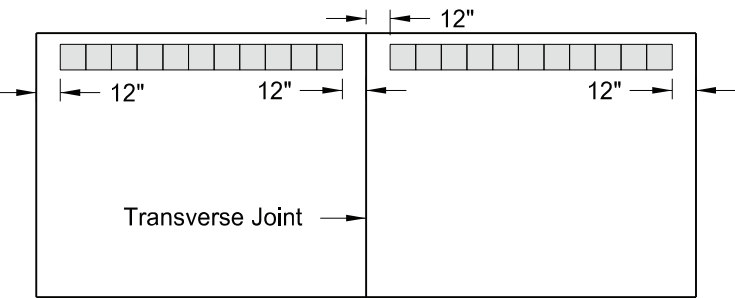


Inset B - Centerline Rumble Strip

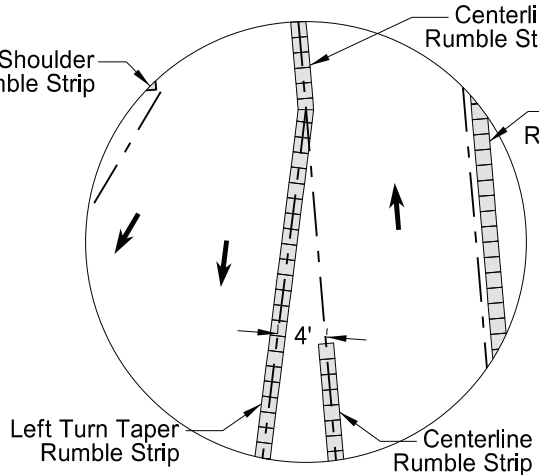


Milling Depths		
Location A (in)	MIL	Depth in
0	62.5	1/16
1 3/4	156	5/32
3 1/2	281	9/32
5 1/4	438	7/16
7	500	1/2
8 3/4	438	7/16
10 1/2	281	9/32
12 1/4	156	5/32
14	62.5	1/16

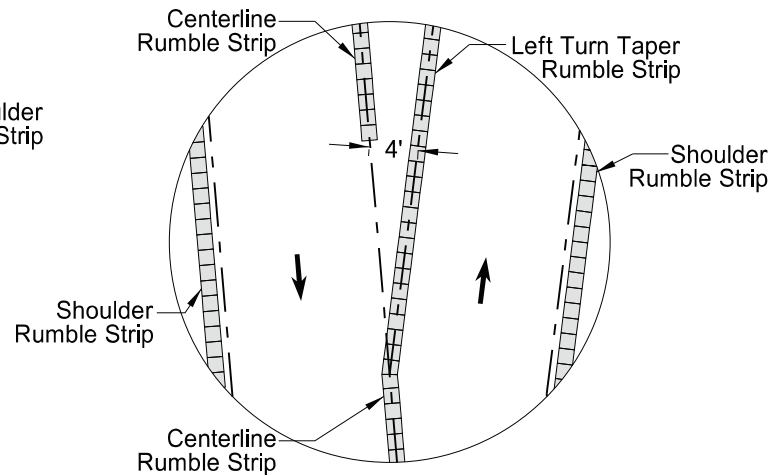
- NOTES:
- 1) Discontinue shoulder rumble strips through the entire length of right turn lanes and tapers, and at the radius of paved or gravel highways, section line approaches, or private drives.
 - 2) Discontinue centerline rumble strips 100' before and after paved or gravel highways, section line 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



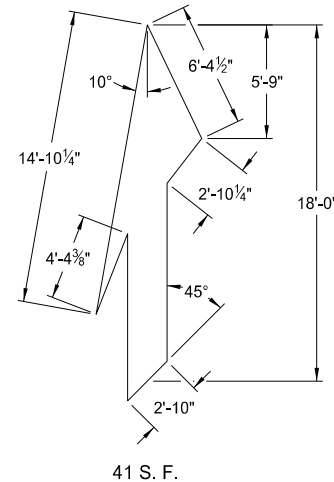
Inset D

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

D-762-1

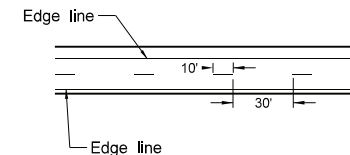


41 S. F.

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

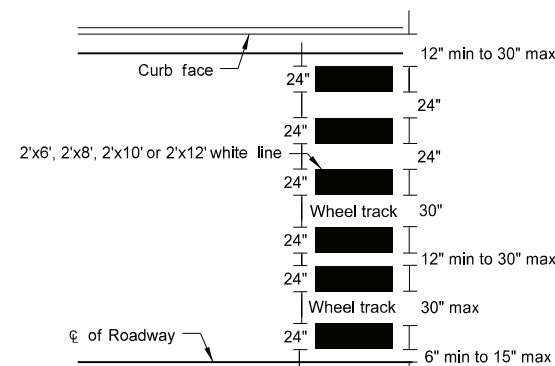
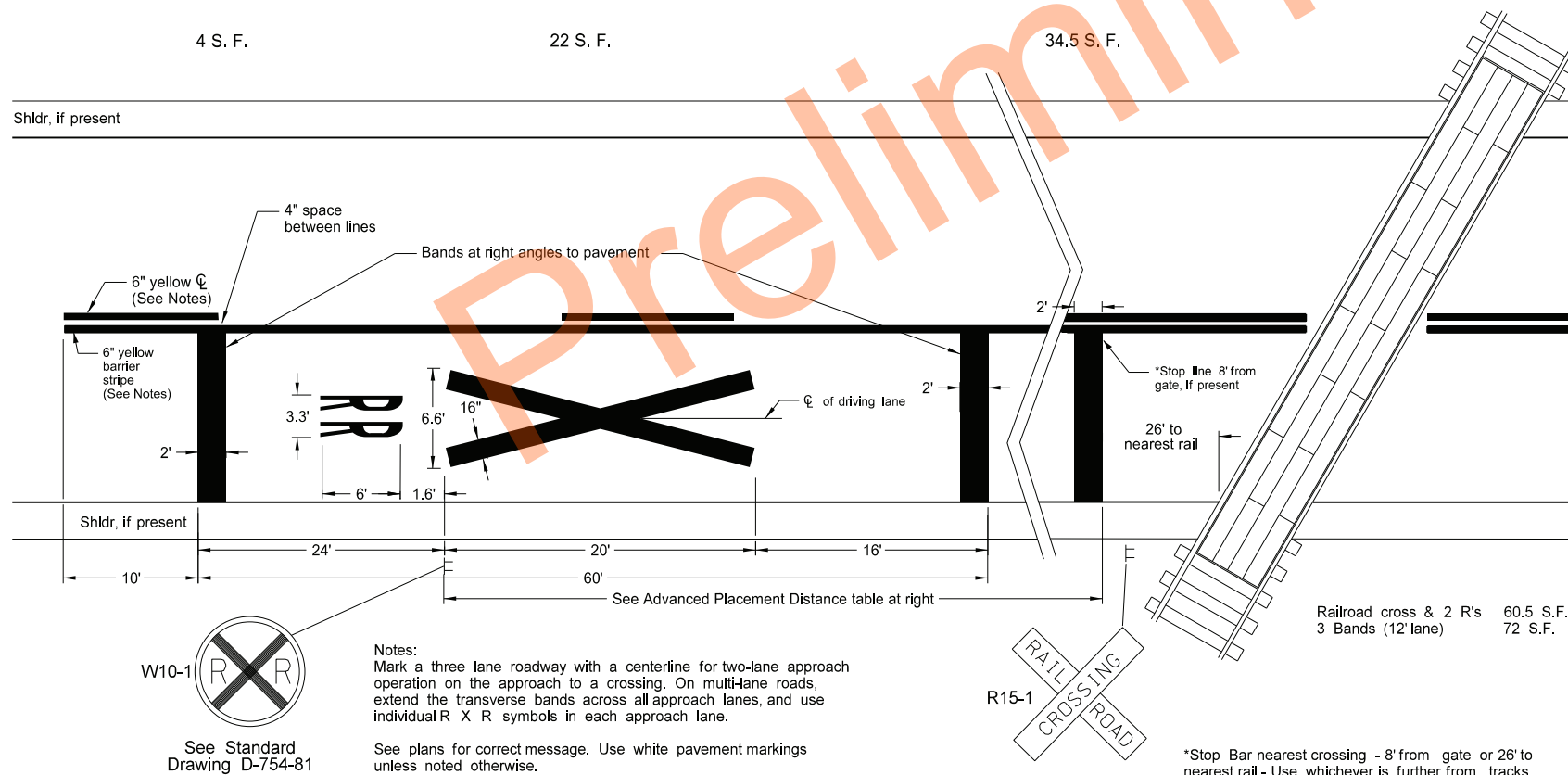
Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

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



Continental Crosswalk Detail

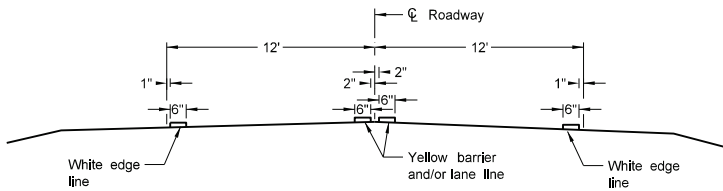
- NOTES:
1. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph,
 2. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.

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.
01-29-2020	Revised min Stop Bar distance to rail
11-22-2023	Revised pavement marking widths.

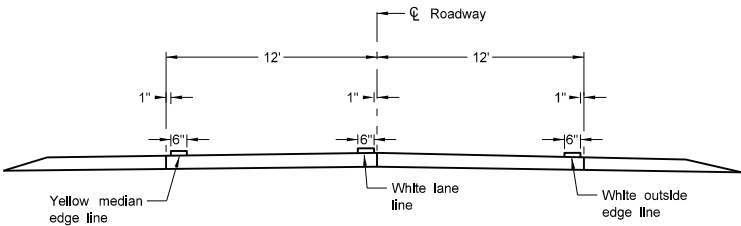


PAVEMENT MARKING

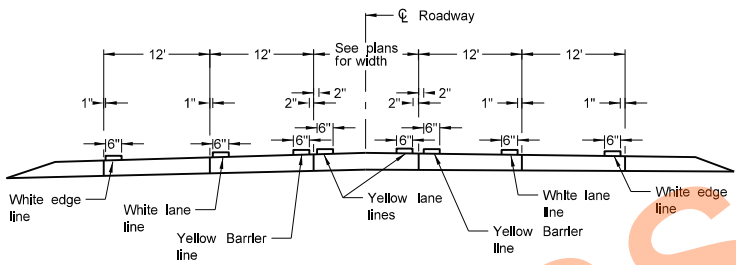
D-762-4



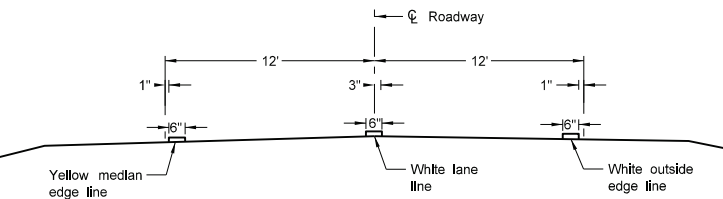
Two Lane Two Way
RURAL ROADWAY



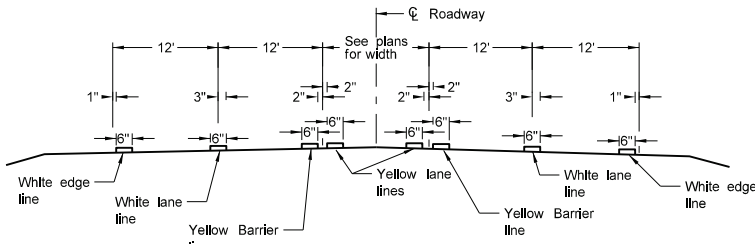
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



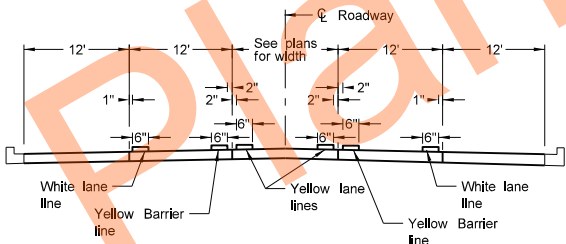
RURAL FIVE LANE ROADWAY
Concrete Section



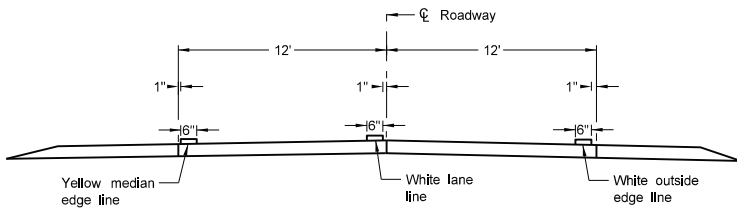
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



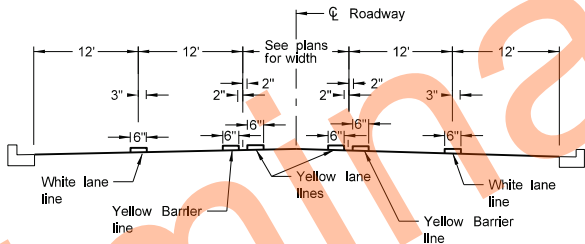
RURAL FIVE LANE ROADWAY
Asphalt Section



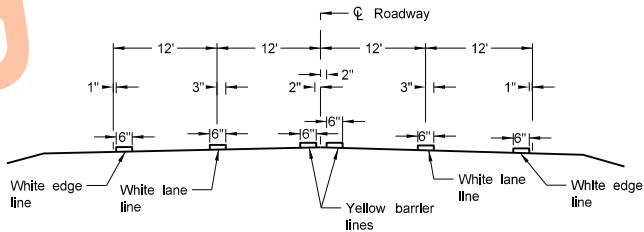
URBAN FIVE LANE SECTION
Concrete Section



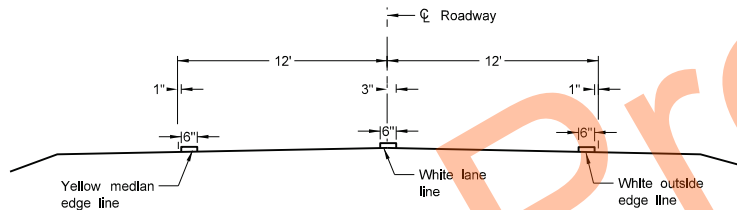
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



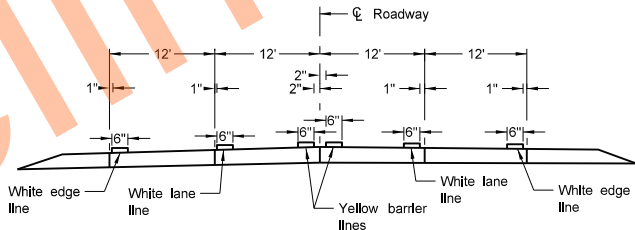
URBAN FIVE LANE SECTION
Asphalt Section



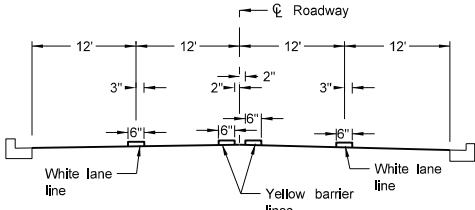
RURAL FOUR LANE ROADWAY
Asphalt Section



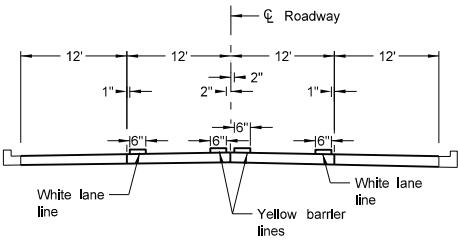
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



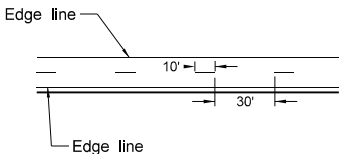
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:

1. Continue edge lines through private drives and field drives. Break edge lines for intersections.
2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.

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



PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION

(No Center Left Turn Lane on Major Road)

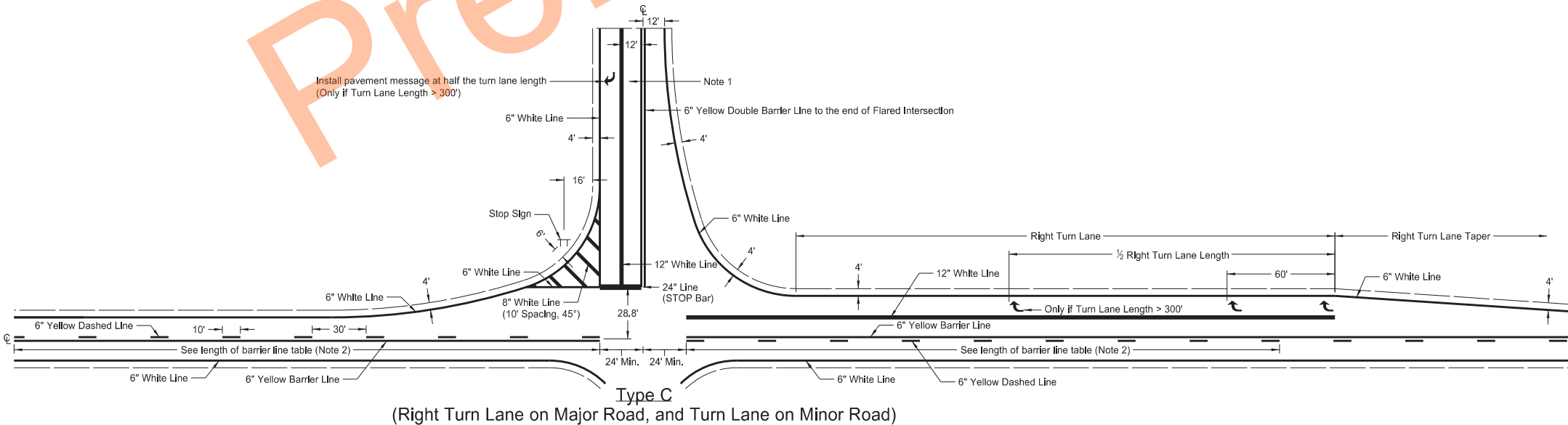
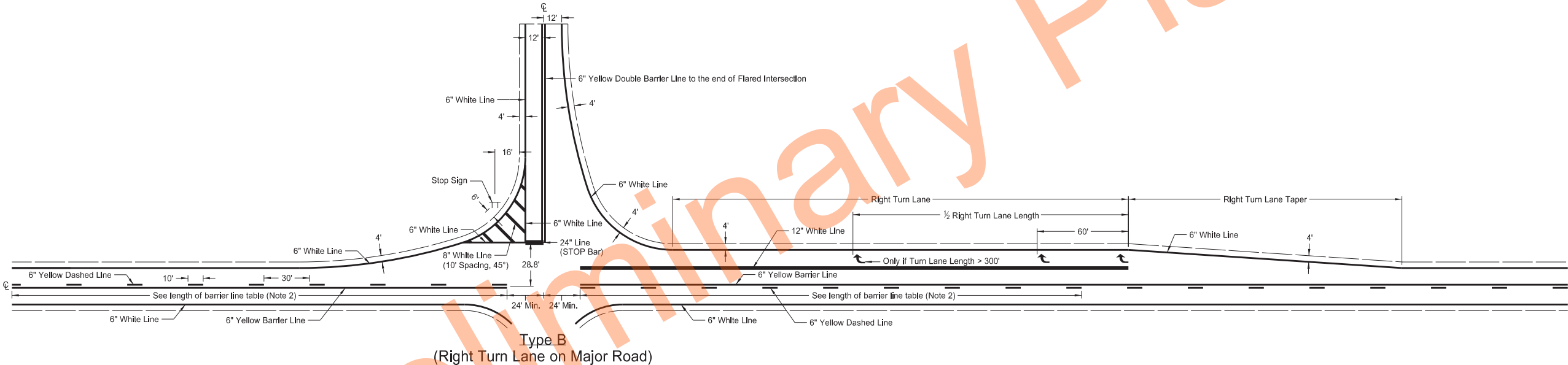
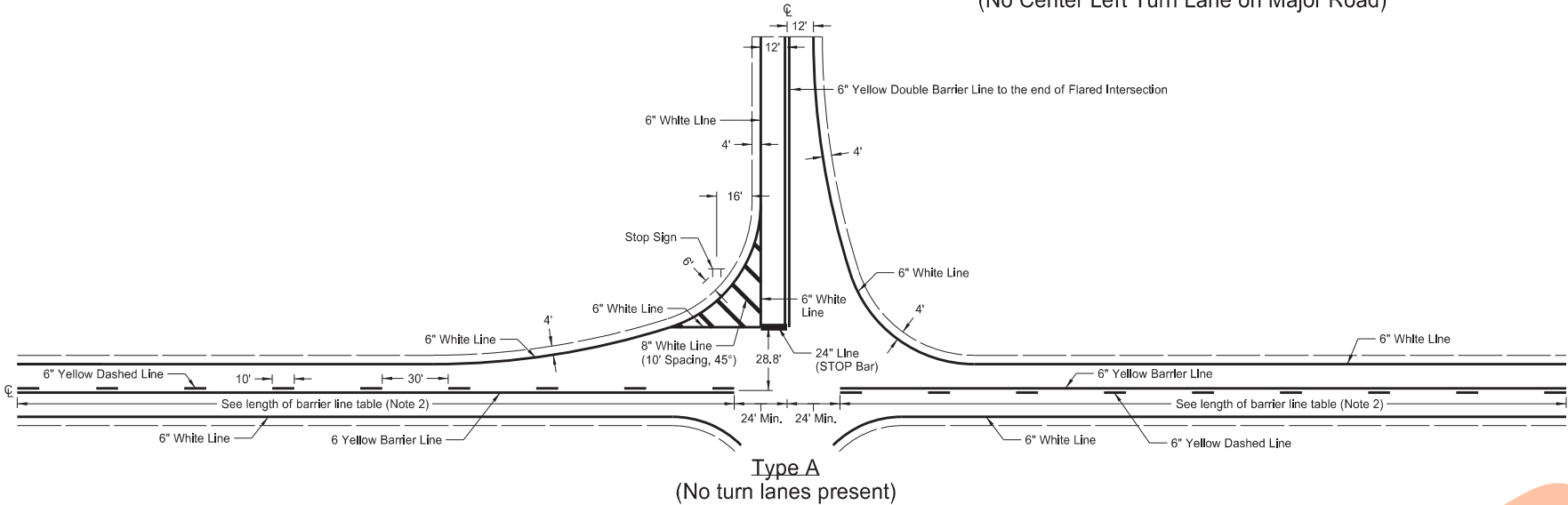
D-762-5

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.)
- 3. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
- 4. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40.
- 5. Wide line - 8 inches wide if 4 inch normal width lines are used and 12 inches wide if 6 inch normal width lines are used.

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'



- 6" Marking
- 8" Marking
- 12" Marking
- 24" Marking

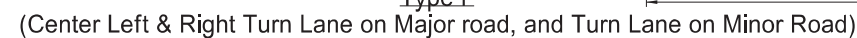
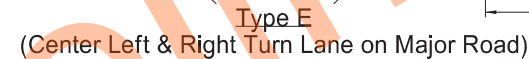
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17	Updated note & dimensioning.
8-30-18	Corrected pvmt mkg placement.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
1-17-24	Revised wide pvmt mkg width.



(Center Left Turn Lane on Major Road)



1. At "T" intersections (3-leg), additionally install left turn pavement marking message arrow.
2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 .
4. Wide line - 8 inches wide if 4 inch normal width lines are used and 12 inches wide if 6 inch normal width lines are used.



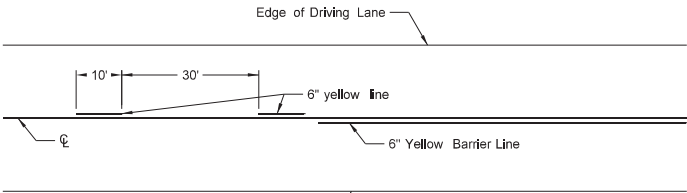
- 6" Marking
- 8" Marking
- 12" Marking
- 24" Marking

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17	Updated dimensioning.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths
1-17-24	Revised wide pvmnt mkg width.

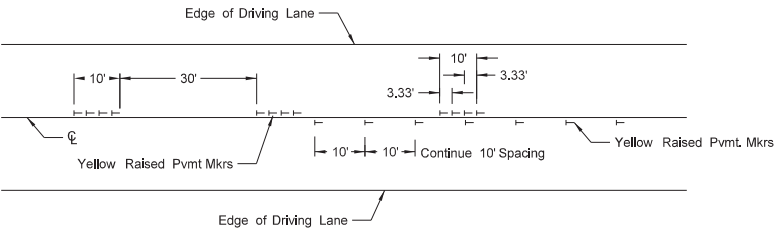


SHORT-TERM PAVEMENT MARKING

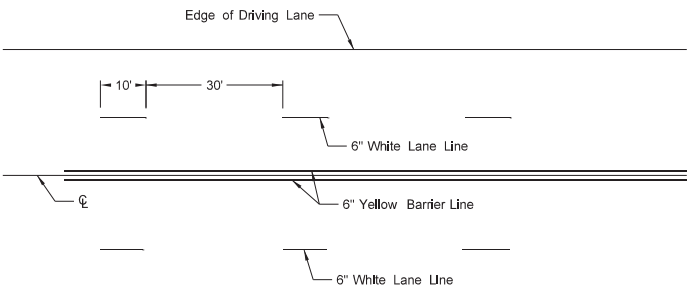
D-762-11



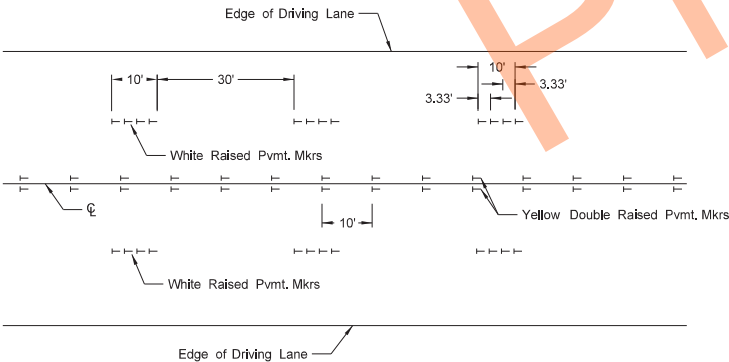
Painted or Tape Lines



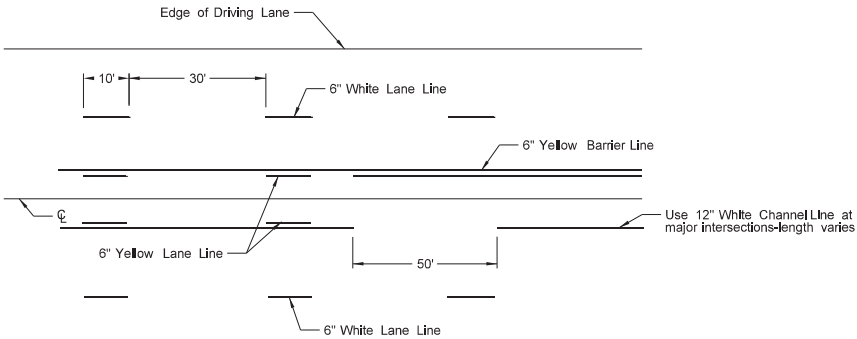
Raised Pavement Markers
TWO-LANE TWO-WAY ROADWAY



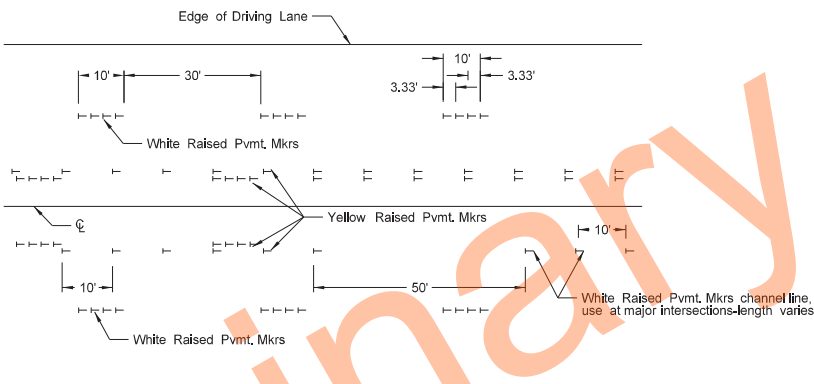
Painted or Tape Lines



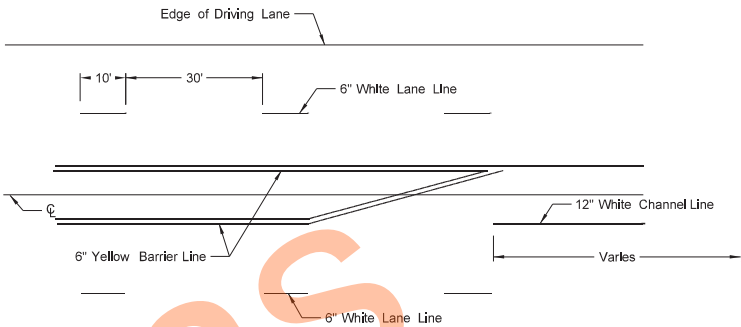
Raised Pavement Markers
FOUR LANE ROADWAY



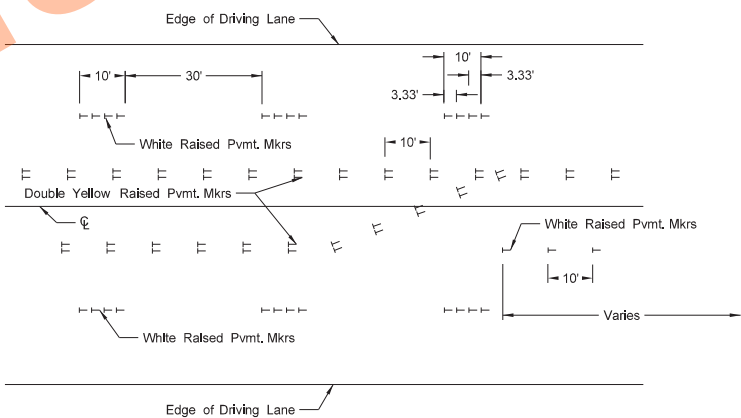
Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY WITH MARKED ISLANDS

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

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

