Docusign Envelope ID: 05B7DAFA-0F51-45AC-9C87-FE4E59087630

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:						

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NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

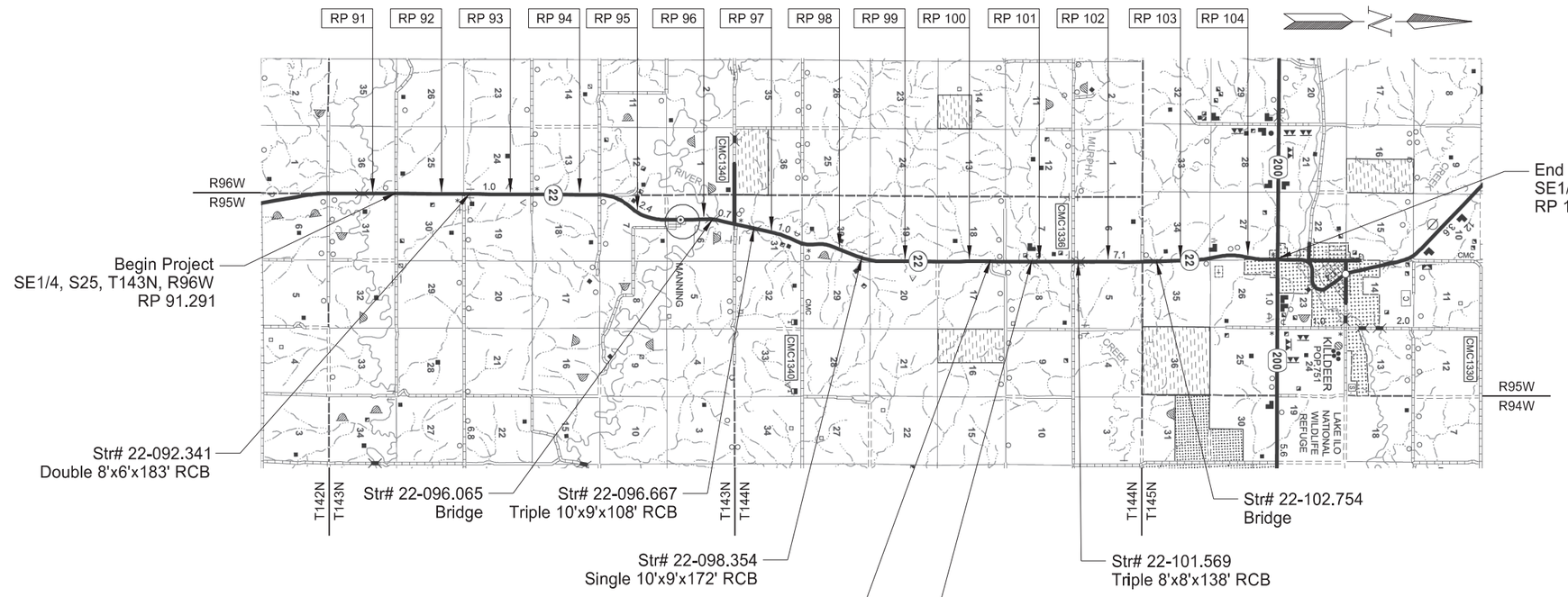
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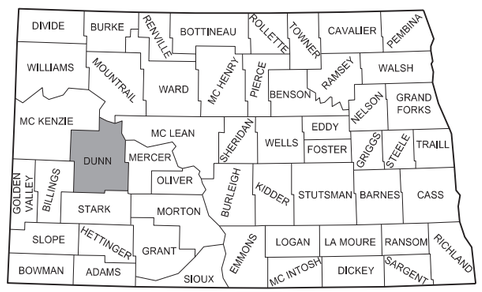
Dunn County
From 17th St SW to Jct ND 200

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

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
XA-SS-5-022(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

Kirk Hoff
11/18/24

BROSZ ENGINEERING, INC.
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE
11/14/24
NORTH DAKOTA

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100	1 - 8	Work Zone Traffic Control
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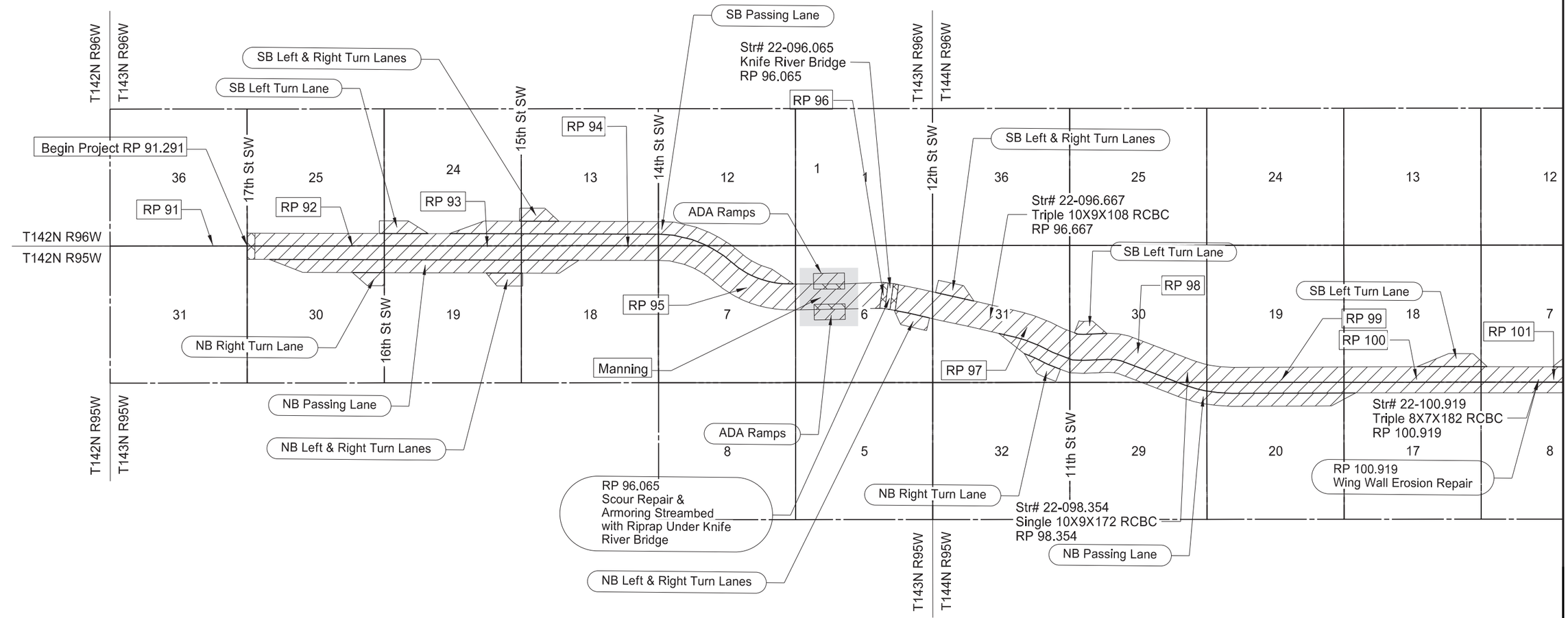
SPECIAL PROVISIONS

Number	Description
SSP 2	Federal Migratory Bird Treaty Act
SSP 4	Longitudinal Joint Density
PSP 140(23)	Permits and Environmental Considerations
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
SP 658(23)	Box Culvert Joint Repair

LIST OF STANDARD DRAWINGS

Number	Description
D-101-1, 2,3,4	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31,32,33	Symbols
D-101-40	Cross Section Legend
D-261-1	Erosion Control - Fiber Roll Placement Details
D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems For Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details - Terminal And Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
D-704-11, 11A	Construction Sign Details - Warning Signs
D-704-12	Shoulder Closure Tapers
D-704-13	Barricade And Channelizing Device Details
D-704-14	Construction Sign Punching And Mounting Details
D-704-15	Road Closure Layouts
D-704-16	Lane Closure On A Two Lane Road Using Traffic Control Signals
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
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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

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LEGEND

MILLING TRANSITION

3" HMA OVERLAY

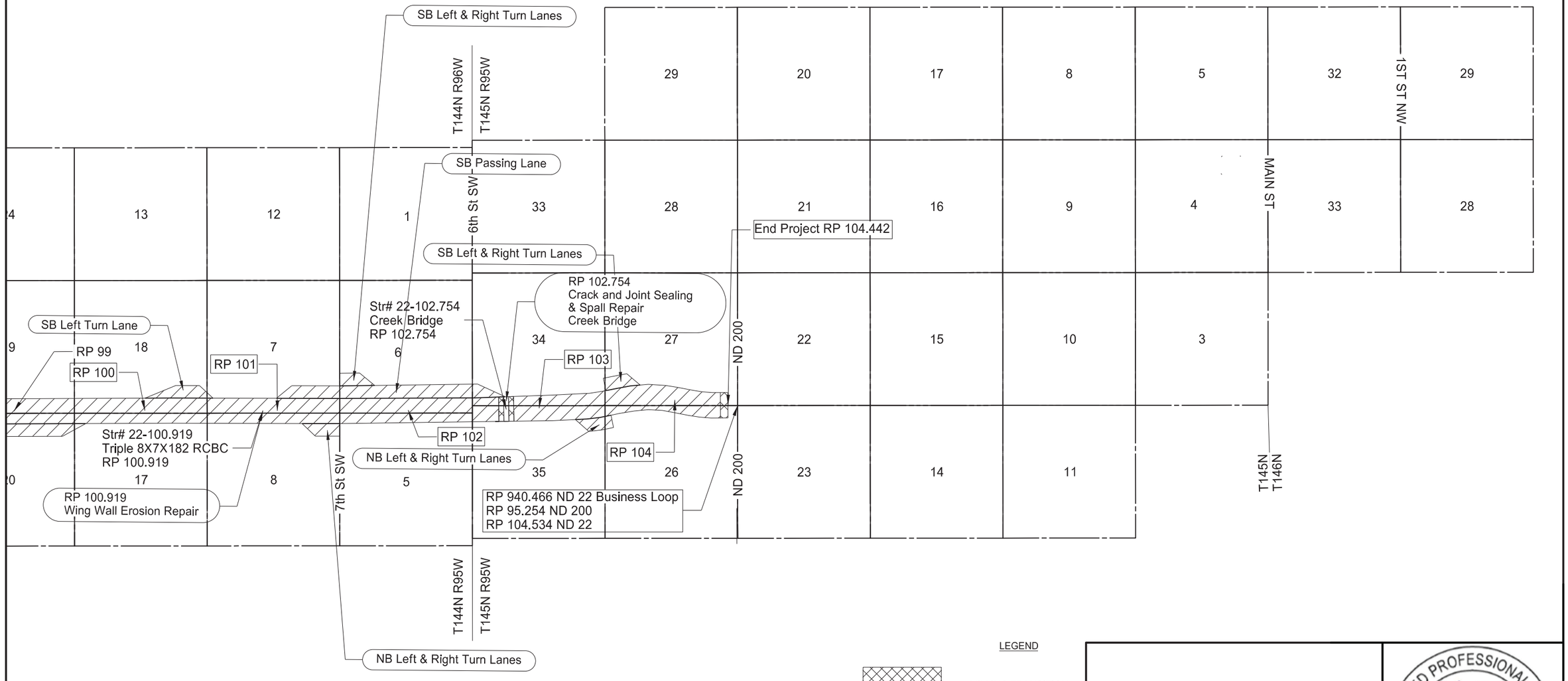
City of Manning

ND Highway 22
17th St SW to Jct ND 200

Scope of Work

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

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LEGEND

MILLING TRANSITION

3" HMA OVERLAY

City of Manning

ND Highway 22
17th St SW to Jct ND 200

Scope of Work

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

100-P01 COORDINATION OF PROJECTS: The following projects are under contract for the 2027 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 Cl 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.

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
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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.

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



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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.

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/25/26
NORTH DAKOTA

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ENVIRONMENTAL NOTES

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.



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Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline:				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
706	0400	FIELD OFFICE	EA	1				1
706	0500	AGGREGATE LABORATORY	EA	1				1

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Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline:				TOTAL
706	0550	BITUMINOUS LABORATORY	EA	1				1
706	0600	CONTRACTOR'S LABORATORY	EA	1				1
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	464				464
714	9900	INSTALL CONCRETE PIPE TIES	SET	22				22
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
900	1000	TEMPORARY STREAM DIVERSION	EA	4				4
930	3640	HIGH EXPANSION POLYURETHANE FOAM	GAL	410				410
930	8644	SILICONE SEALANT	LF	82				82
930	9223	CRACK SEALING	LF	1163				1163
930	9671	BOX CULVERT JOINT REPAIR	EA	12				12
930	9672	BOX CULVERT JOINT REPAIR - FLOOR	EA	6				6

	STATE	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		
	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
Surfacing Quantities	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
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		
	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
Surfacing Quantities	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
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		
	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
Surfacing Quantities	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
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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	10	2

Basis of Estimate ND 22		Transition: Typ1 to Typ2 & Typ2 to Typ1			Transition: Typ1 to Typ12			Transition: Typ1 to Typ16 & Typ16 to Typ1			Transition: Typ1 to Typ10 & Typ10 to Typ1			Transition: Typ2 to Typ3			Transition: Typ2 to Typ5			Transition: Typ3 to Typ4		
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
		91.459 to 91.705		0.246	103.256 to 103.329		0.073	96.593 to 96.669		0.076	95.173 to 95.353		0.180	92.046 to 92.139		0.093	92.809 to 93.017		0.208	92.291 to 92.356		0.065
		96.960 to 97.145		0.185				100.039 to 100.118		0.079	101.017 to 101.104		0.087	97.211 to 97.317		0.106				97.459 to 97.493		0.034
		99.471 to 99.562		0.091				100.448 to 100.523		0.075												
		Total =		0.522	Total =		0.073	Total =		0.230	Total =		0.267	Total =		0.199	Total =		0.208	Total =		0.099
Material	Unit	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	44.0	1290.7	673.73	46.0	1349.3	98.50	44.0	1290.7	296.85	44.0	1290.7	344.61	60.0	1760.0	350.24	52.0	1525.3	317.27	66.0	1936.0	191.66
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	44.0	1290.7	673.73	46.0	1349.3	98.50	44.0	1290.7	296.85	44.0	1290.7	344.61	60.0	1760.0	350.24	52.0	1525.3	317.27	66.0	1936.0	191.66
Superpave FAA 45 (2 Ton/CY)	Ton	41.9	4156.0	2,169.43	43.8	4351.5	317.66	41.9	4156.0	955.88	41.9	4156.0	1,109.65	57.9	5720.0	1,138.28	50.0	4938.0	1,027.10	63.9	6306.5	624.34
PG 58H-34 Asphalt Cement (6.0%)	Ton	41.9	249.4	130.16	43.8	261.1	19.06	41.9	249.4	57.35	41.9	249.4	66.58	57.9	343.2	68.30	50.0	296.3	61.62	63.9	378.4	37.46

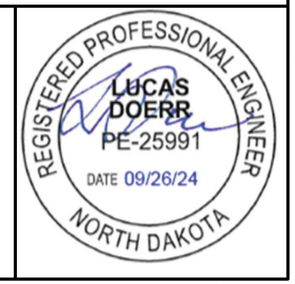
Basis of Estimate ND 22		Transition: Typ4 to Typ2			Transition: Typ5 to Typ6			Transition: Typ5 to Typ10			Transition: Typ6 to Typ7			Transition: Typ8 to Typ9			Transition: Typ9 to Typ5			Transition: Typ10 to Typ17		
Surfacing Quantities		Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP
		92.468 to 92.544		0.076	93.036 to 93.116		0.080	93.642 to 93.869		0.227	93.141 to 93.174		0.033	93.413 to 93.446		0.033	93.467 to 93.547		0.080	101.218 to 101.296		0.078
		97.612 to 97.688		0.076																		
		Total =		0.152	Total =		0.080	Total =		0.227	Total =		0.033	Total =		0.033	Total =		0.080	Total =		0.078
Material	Unit	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	54.0	1584.0	240.77	62.0	1818.7	145.49	52.0	1525.3	346.25	74.0	2170.7	71.63	74.0	2170.7	71.63	62.0	1818.7	145.49	54.0	1584.0	123.55
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	54.0	1584.0	240.77	62.0	1818.7	145.49	52.0	1525.3	346.25	74.0	2170.7	71.63	74.0	2170.7	71.63	62.0	1818.7	145.49	54.0	1584.0	123.55
Superpave FAA 45 (2 Ton/CY)	Ton	51.9	5133.5	780.29	60.0	5915.5	473.24	50.0	4938.0	1,120.93	72.0	7088.5	233.92	72.0	7089.0	233.94	60.0	5916.0	473.28	51.9	5133.5	400.41
PG 58H-34 Asphalt Cement (6.0%)	Ton	51.9	308.0	46.82	60.0	354.9	28.39	50.0	296.3	67.25	72.0	425.3	14.03	72.0	425.4	14.04	60.0	355.0	28.40	51.9	308.0	24.02

Basis of Estimate ND 22		Transition: Typ12 to Typ13			Transition: Typ13 to Typ14			Transition: Typ14 to Typ15			Transition: Typ15 to Typ16			Transition: Typ15 to Typ22			Transition: Typ17 to Typ18			Transition: Typ18 to Typ19		
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
		96.233 to 96.271		0.038	96.337 to 96.376		0.039	96.433 to 96.490		0.057	96.543 to 96.562		0.019	103.620 to 103.648		0.028	101.329 to 101.356		0.027	101.417 to 101.452		0.035
		103.357 to 103.381		0.024	103.450 to 103.492		0.042	103.523 to 103.573		0.050												
		Total =		0.062	Total =		0.081	Total =		0.107	Total =		0.019	Total =		0.028	Total =		0.027	Total =		0.035
Material	Unit	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	56.0	1642.7	101.85	64.0	1877.3	152.06	64.0	1877.3	200.87	54.0	1584.0	30.10	56.0	1642.7	45.99	64.0	1877.3	50.69	74.0	2170.7	75.97
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	56.0	1642.7	101.85	64.0	1877.3	152.06	64.0	1877.3	200.87	54.0	1584.0	30.10	56.0	1642.7	45.99	64.0	1877.3	50.69	74.0	2170.7	75.97
Superpave FAA 45 (2 Ton/CY)	Ton	53.9	5329.0	330.40	62.0	6111.0	494.99	62.0	6111.0	653.88	51.9	5133.5	97.54	53.9	5329.0	149.21	62.0	6111.0	165.00	72.0	7089.0	248.11
PG 58H-34 Asphalt Cement (6.0%)	Ton	53.9	319.8	19.82	62.0	366.7	29.70	62.0	366.7	39.23	51.9	308.0	5.85	53.9	319.8	8.95	62.0	366.7	9.90	72.0	425.4	14.89

Basis of Estimate ND 22		Transition: Typ19 to Typ20			Transition: Typ20 to Typ21			Transition: Typ21 to Typ10			Transition: Typ22 to Typ1			
Surfacing Quantities		Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	Reference Point		# of RP	
		101.487 to 101.542		0.055	101.595 to 101.626		0.031	101.653 to 101.727		0.074	103.673 to 103.754		0.081	
		Total =		0.055	Total =		0.031	Total =		0.074	Total =		0.081	
Material	Unit	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Average Width (ft)	Quantity per Mile	Average Total Per Section	Total
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	76.0	2229.3	122.61	66.0	1936.0	60.02	54.0	1584.0	117.22	46.0	1349.3	109.30	18,043
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	76.0	2229.3	122.61	66.0	1936.0	60.02	54.0	1584.0	117.22	46.0	1349.3	109.30	18,043
Superpave FAA 45 (2 Ton/CY)	Ton	74.0	7284.5	400.65	63.9	6306.0	195.49	51.9	5133.0	379.84	43.8	4351.5	352.47	58,327
PG 58H-34 Asphalt Cement (6.0%)	Ton	74.0	437.1	24.04	63.9	378.4	11.73	51.9	308.0	22.79	43.8	261.1	21.15	3,499

ND Highway 22
17th St SW to Jct ND 200

Basis of Estimate



Material - Project Summary	Unit	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	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**

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

HBP Cored Samples

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

HBP Cored Samples

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

Sinusoidal Rumble Strips

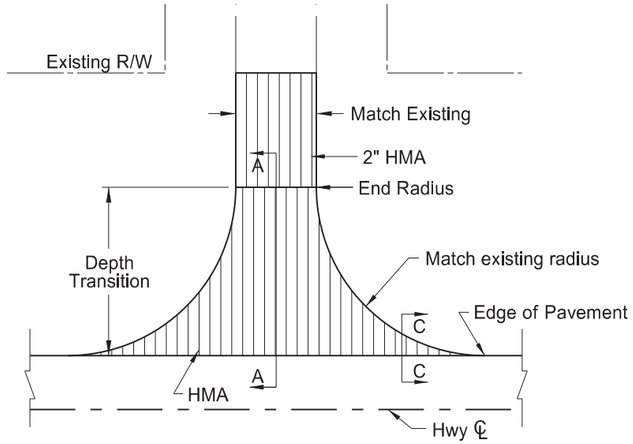
Type	Start RP	End RP	Length (LF)	Basis	Quantity
Asphalt Centerline	91.291	104.442	69,437	1 / Mile	13.2 Miles
Asphalt Shoulder	91.291	104.442	69,437	2 / Mile	26.3 Miles

ND Highway 22
17th St SW to Jct ND 200

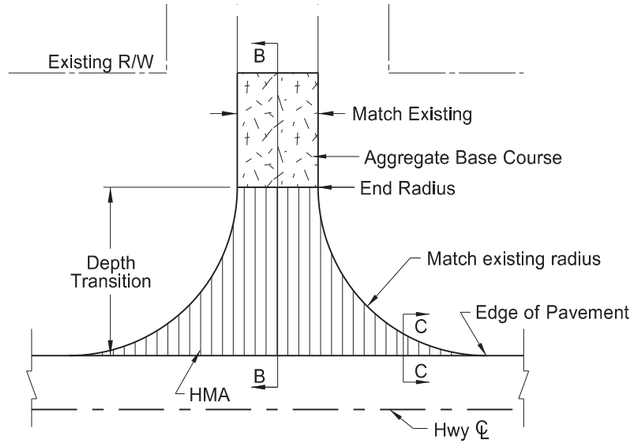
Basis of Estimate

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

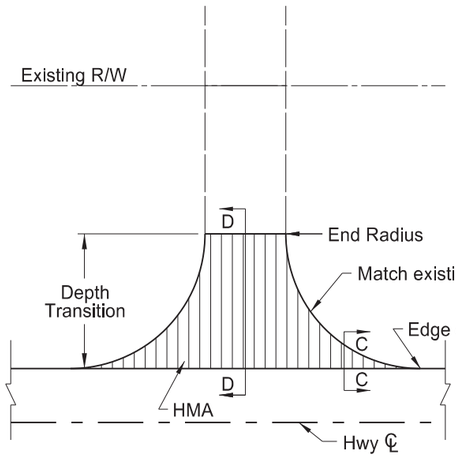
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	20	1



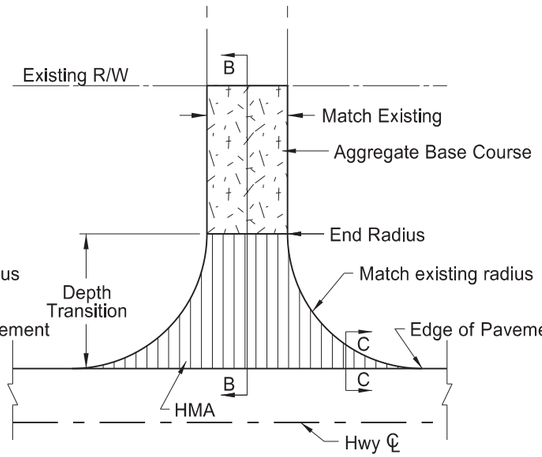
(1) Paved Section Line, County Road, or Street Approach



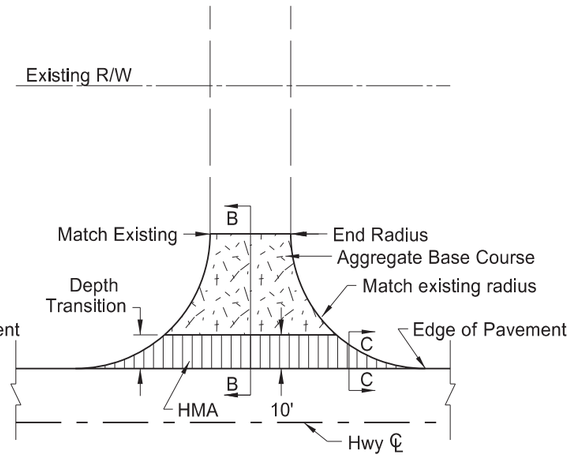
(2) Gravel Section Line, County Road, or Street Approach



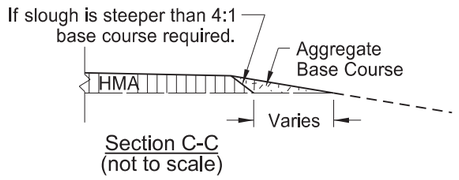
(3) Paved Private Drive Approach



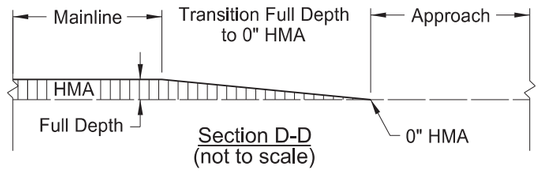
(4) Gravel Private Drive Approach



(5) Field Drive Approach



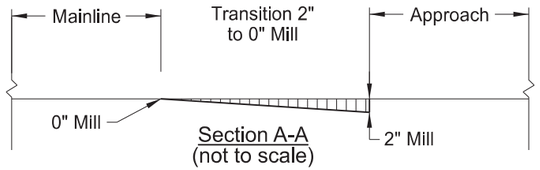
Section C-C
(not to scale)



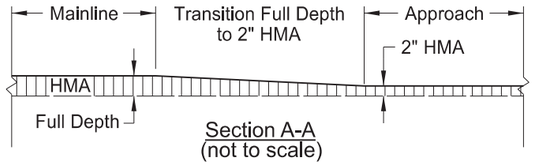
Section D-D
(not to scale)

Notes:

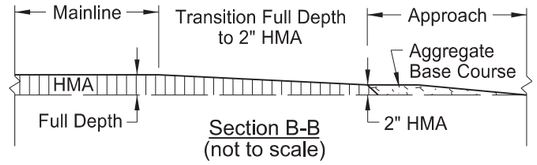
1. Actual HMA paving and aggregate base course locations may vary in the field, as approved by the Engineer.
2. Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.
3. Aggregate base course has been provided in the quantities to fill in around the radii. This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



Section A-A
(not to scale)



Section A-A
(not to scale)



Section B-B
(not to scale)

BASIS OF ESTIMATE		1	2	3	4	5	
		Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Private Drive	Field Drive	
NUMBER OF APPROACH TYPE		2	21	3	22	32	
Material	UNIT	Quantity Per Location	Quantity Per Location	Quantity Per Location	Quantity Per Location	Quantity Per Location	TOTAL
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

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LUCAS DOERR
PE-25991
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Locations For Apporaches				
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

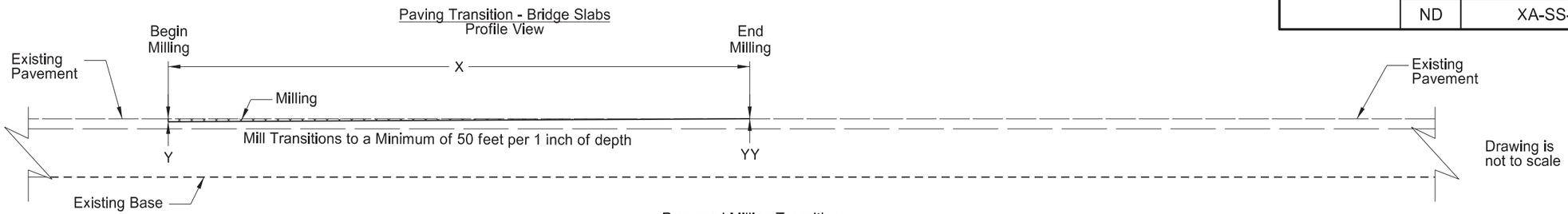
ND Highway 22
17th St SW to Jct ND 200

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

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

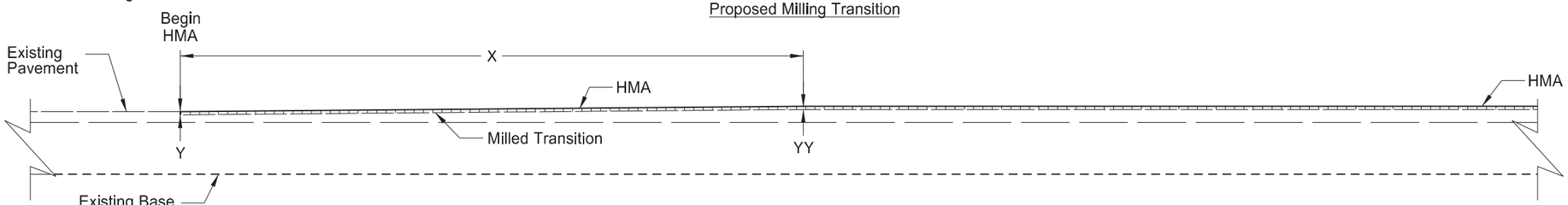
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Paving Transition - Bridge Slabs
Profile View



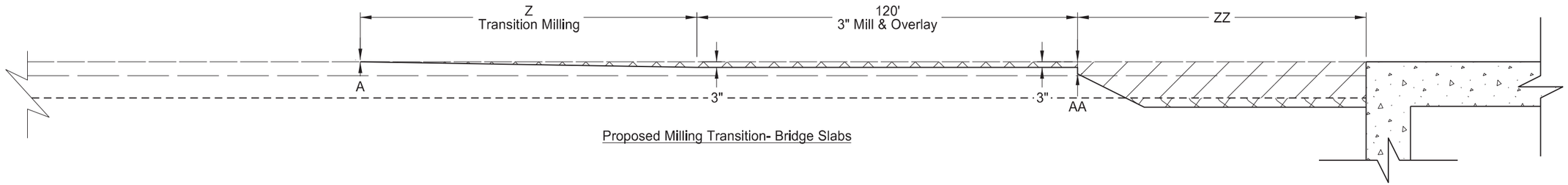
Drawing is not to scale

Proposed Milling Transition



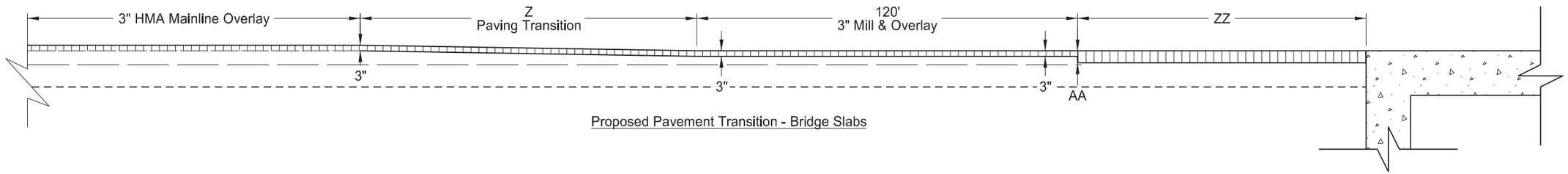
Drawing is not to scale

Proposed Pavement Transition



Drawing is not to scale

Proposed Milling Transition- Bridge Slabs



Drawing is not to scale

Proposed Pavement Transition - Bridge Slabs

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 Qauntities 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	--	

NOTE:
- Cross-sectional view of bridge tie-in shown on Sec 30 Sheet 13.

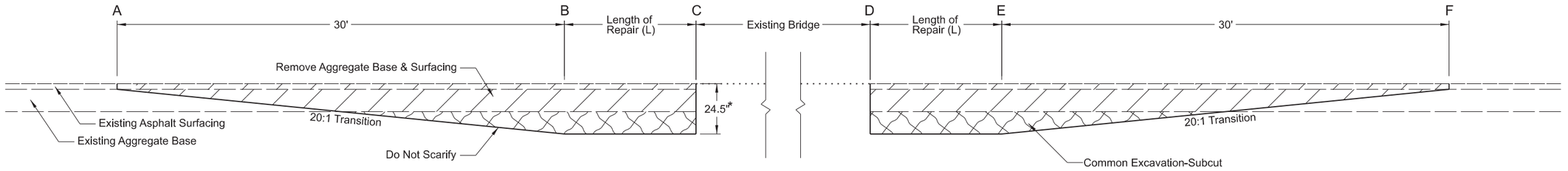
- All bridge tie-ins must be milled out and the bottom lift repaved within the same working day.

ND Highway 22
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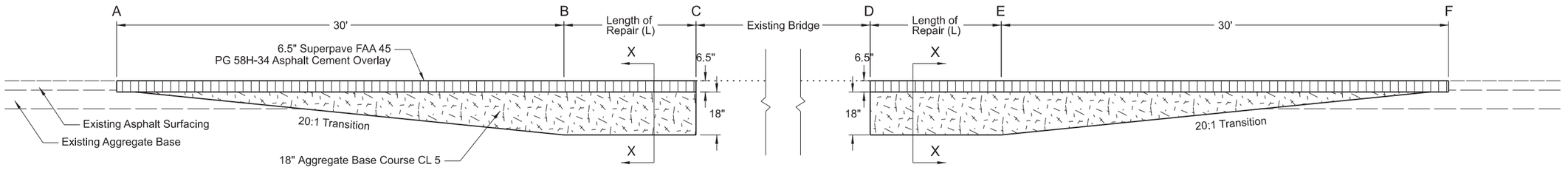
General Details
Milling and Paving Transitions

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

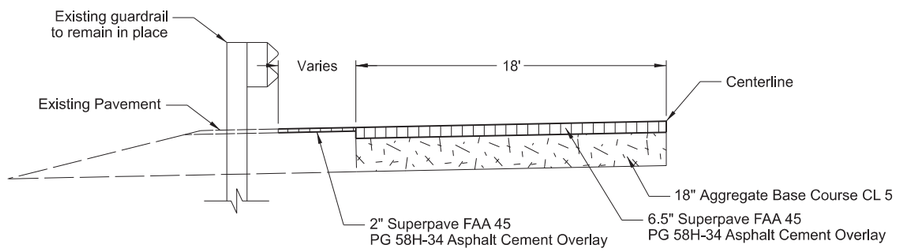
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Bridge Approach Repair
Removal Detail
(Not to Scale)



Bridge Approach Repair
Backfill/Paving Detail
(Not to Scale)



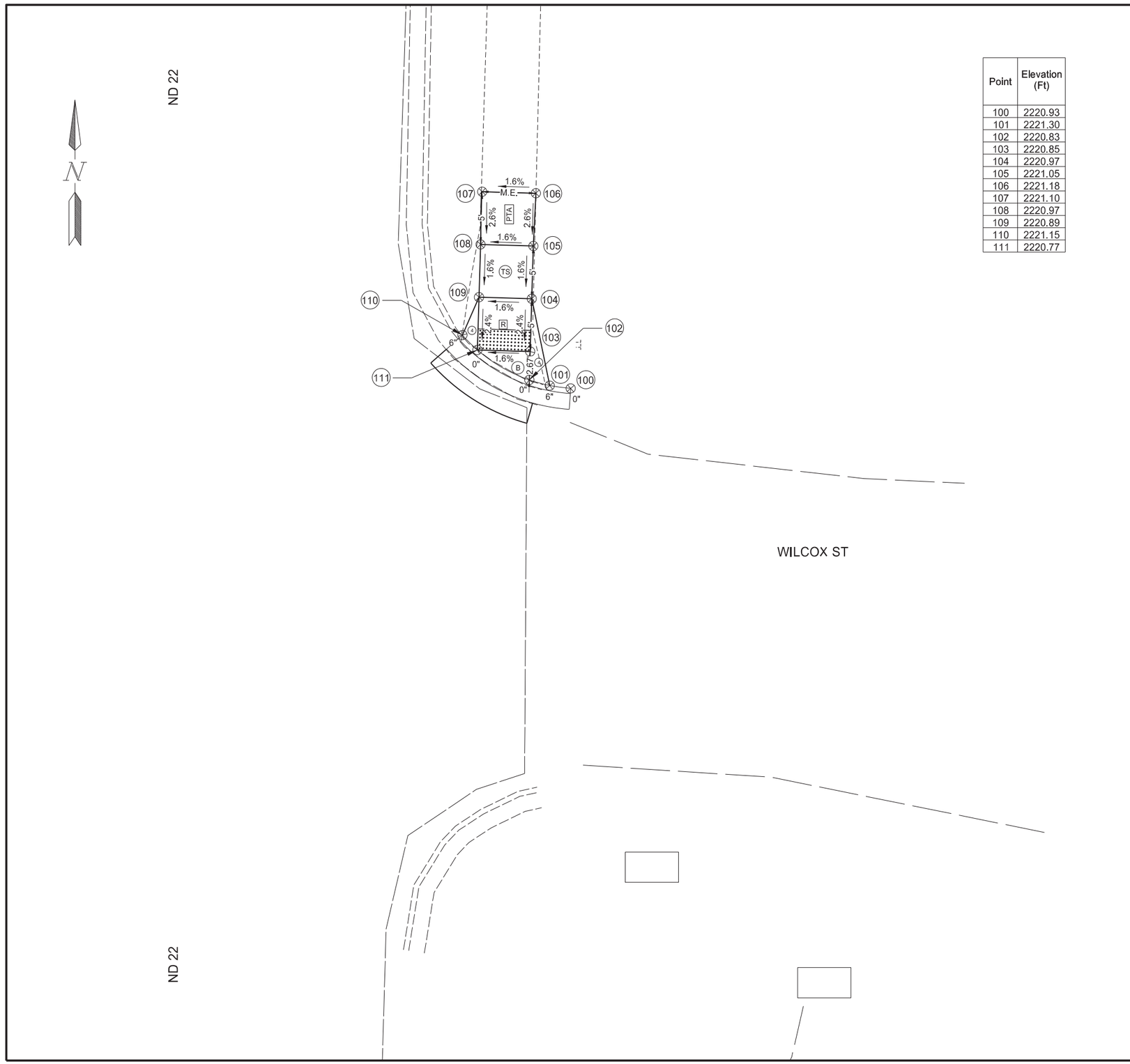
Section X-X Bridge Approach Repair
(not to scale)

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

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Point	Elevation (Ft)
100	2220.93
101	2221.30
102	2220.83
103	2220.85
104	2220.97
105	2221.05
106	2221.18
107	2221.10
108	2220.97
109	2220.89
110	2221.15
111	2220.77

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SPEC	CODE	BID ITEM	QUANTITY	UNIT
302	120	AGGREGATE BASE COURSE CL 5		
		RP 95.523	7.3	TON
401	0050	TACK COAT		
		RP 95.523	0.4	GAL
430	0045	SUPERPAVE FAA 45		
		RP 95.523	1.4	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		RP 95.523	0.1	TON
748	0140	CURB & GUTTER-TYPE 1		
		RP 95.523	12	LF
750	0115	SIDEWALK CONCRETE 4IN		
		RP 95.523	10.8	SY
750	2115	DETECTABLE WARNING PANELS		
		RP 95.523	10	SF

LEGEND

(TS) (L) :Turning Space/Landing
Use at top of ramp or when changing directions
1.5% prefeered 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

0", 3", 6" :Curb Height

[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.

(10) :10:1 Max Slope
(4) :4:1 Max Slope

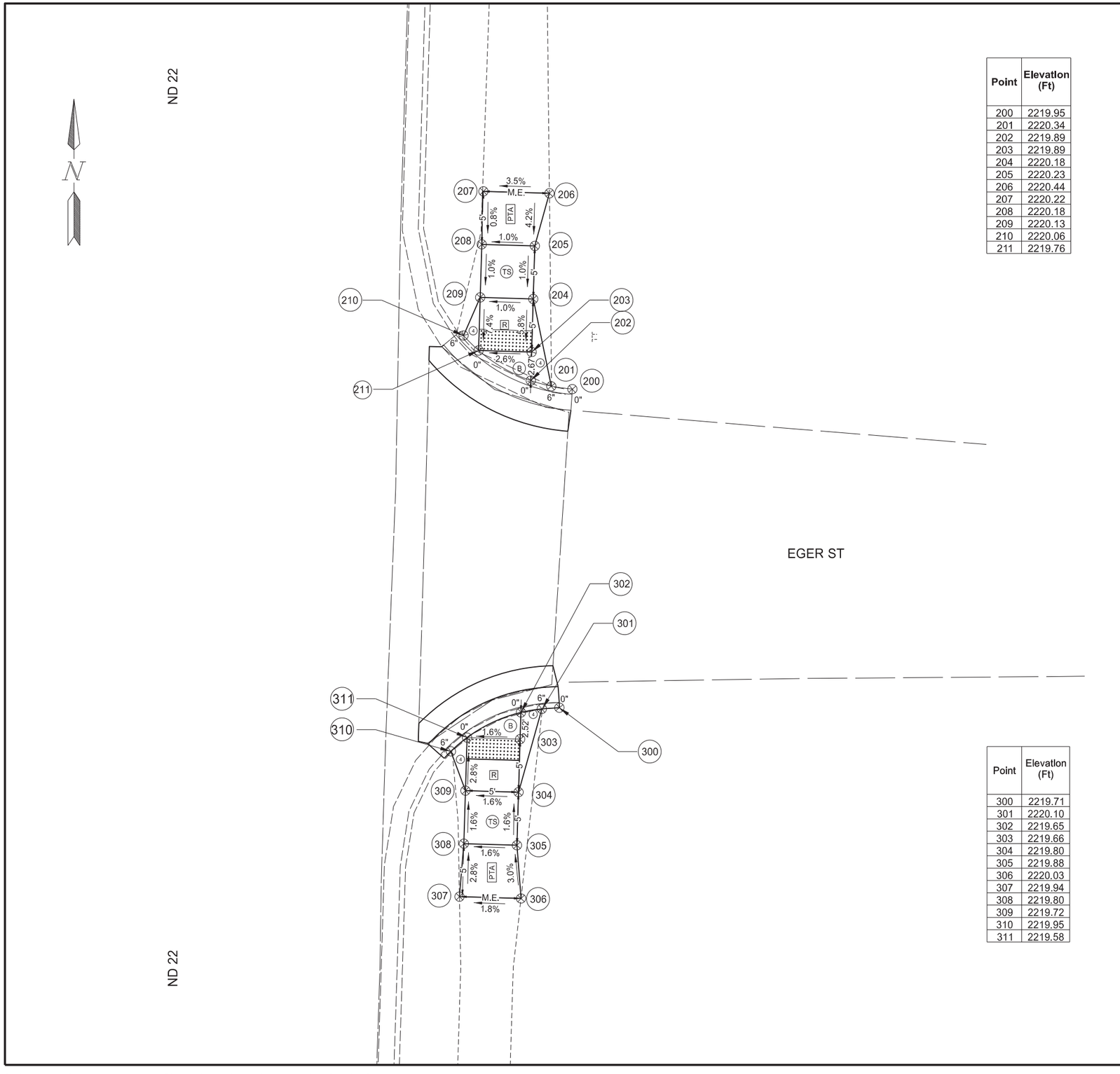
:Detectable Warning Panel

H.P: High Point
L.P: Low Point
M.E.: Match Existing

ND Highway 22
17th St SW to Jct ND 200

General Details
ADA Ramps
Manning, ND - Dunn County
RP 95.523

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Point	Elevation (Ft)
200	2219.95
201	2220.34
202	2219.89
203	2219.89
204	2220.18
205	2220.23
206	2220.44
207	2220.22
208	2220.18
209	2220.13
210	2220.06
211	2219.76

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

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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

LEGEND

TS L :Turning Space/Landing
Use at top of ramp or when changing directions
1.5% prefeered 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

0", 3", 6" :Curb Height

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.

10 :10:1 Max Slope
4 :4:1 Max Slope

H.P: High Point
L.P: Low Point
M.E.: Match Existing

:Detectable Warning Panel

ND Highway 22
17th St SW to Jct ND 200

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

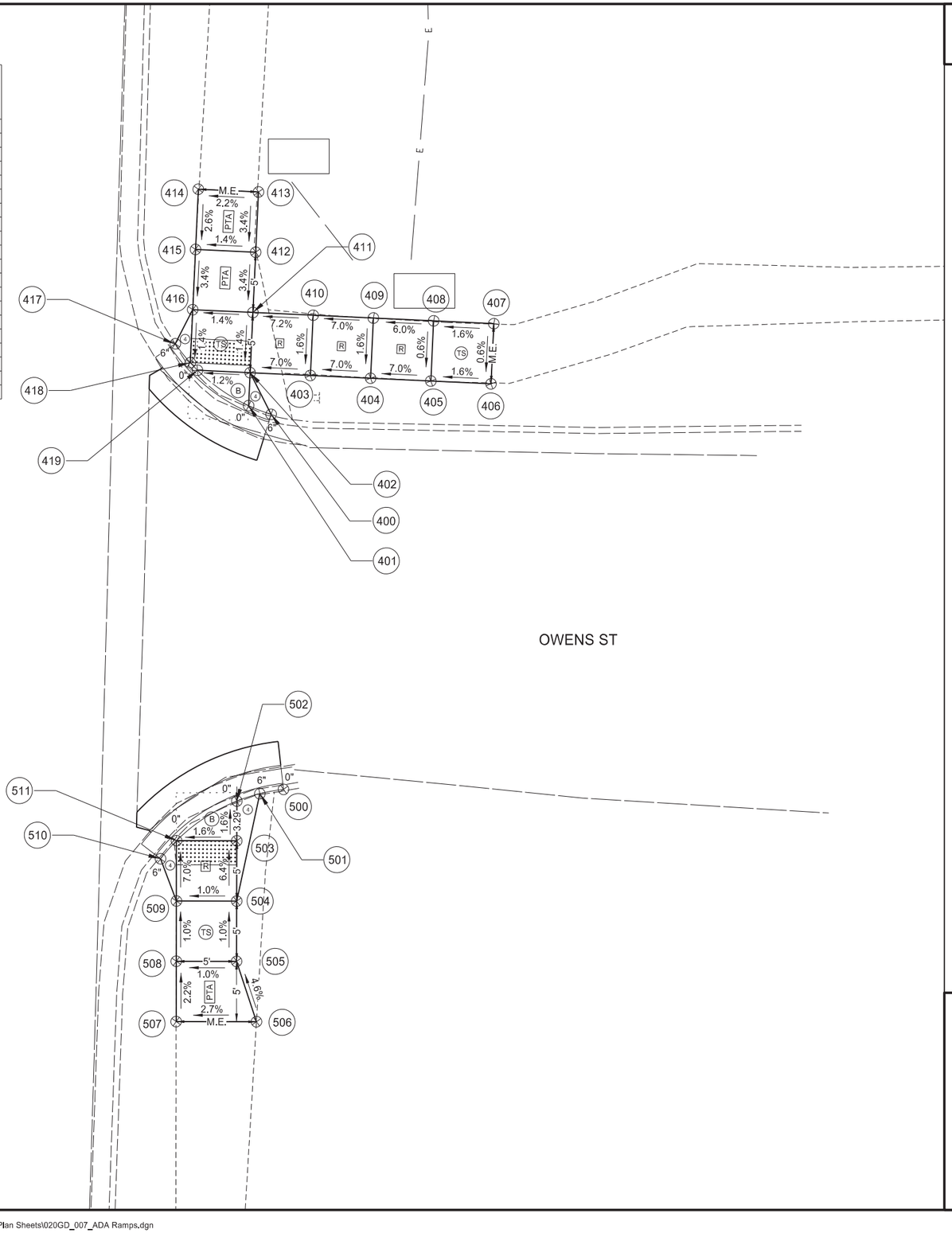
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PE-25991
DATE 09/26/24
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	20	7

SPEC	CODE	BID ITEM	QUANTITY	UNIT
302	120	AGGREGATE BASE COURSE CL 5		
		RP 95.654	7.2	TON
		RP 95.663	9.5	TON
401	0050	TACK COAT		
		RP 95.654	0.3	GAL
		RP 95.663	0.3	GAL
430	0045	SUPERPAVE FAA 45		
		RP 95.654	1.3	TON
		RP 95.663	1.1	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		RP 95.654	0.1	TON
		RP 95.663	0.1	TON
748	0140	CURB & GUTTER-TYPE 1		
		RP 95.654	13	LF
		RP 95.663	11	LF
750	0115	SIDEWALK CONCRETE 4IN		
		RP 95.654	11.2	SY
		RP 95.663	20.8	SY
750	2115	DETECTABLE WARNING PANELS		
		RP 95.654	10	SF
		RP 95.663	10	SF

ND 22

Point	Elevation (Ft)
400	2220.60
401	2220.04
402	2220.06
403	2220.41
404	2220.76
405	2221.11
406	2221.19
407	2221.22
408	2221.14
409	2220.84
410	2220.49
411	2220.13
412	2220.30
413	2220.47
414	2220.36
415	2220.23
416	2220.06
417	2220.37
418	2220.00
419	2220.01



Point	Elevation (Ft)
500	2220.32
501	2220.68
502	2220.20
503	2220.22
504	2220.54
505	2220.59
506	2220.83
507	2220.65
508	2220.54
509	2220.49
510	2220.59
511	2220.14

ND 22

LEGEND

TS L :Turning Space/Landing
Use at top of ramp or when changing directions
1.5% prefeered 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

0", 3", 6" :Curb Height

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.

10 :10:1 Max Slope
4 :4:1 Max Slope

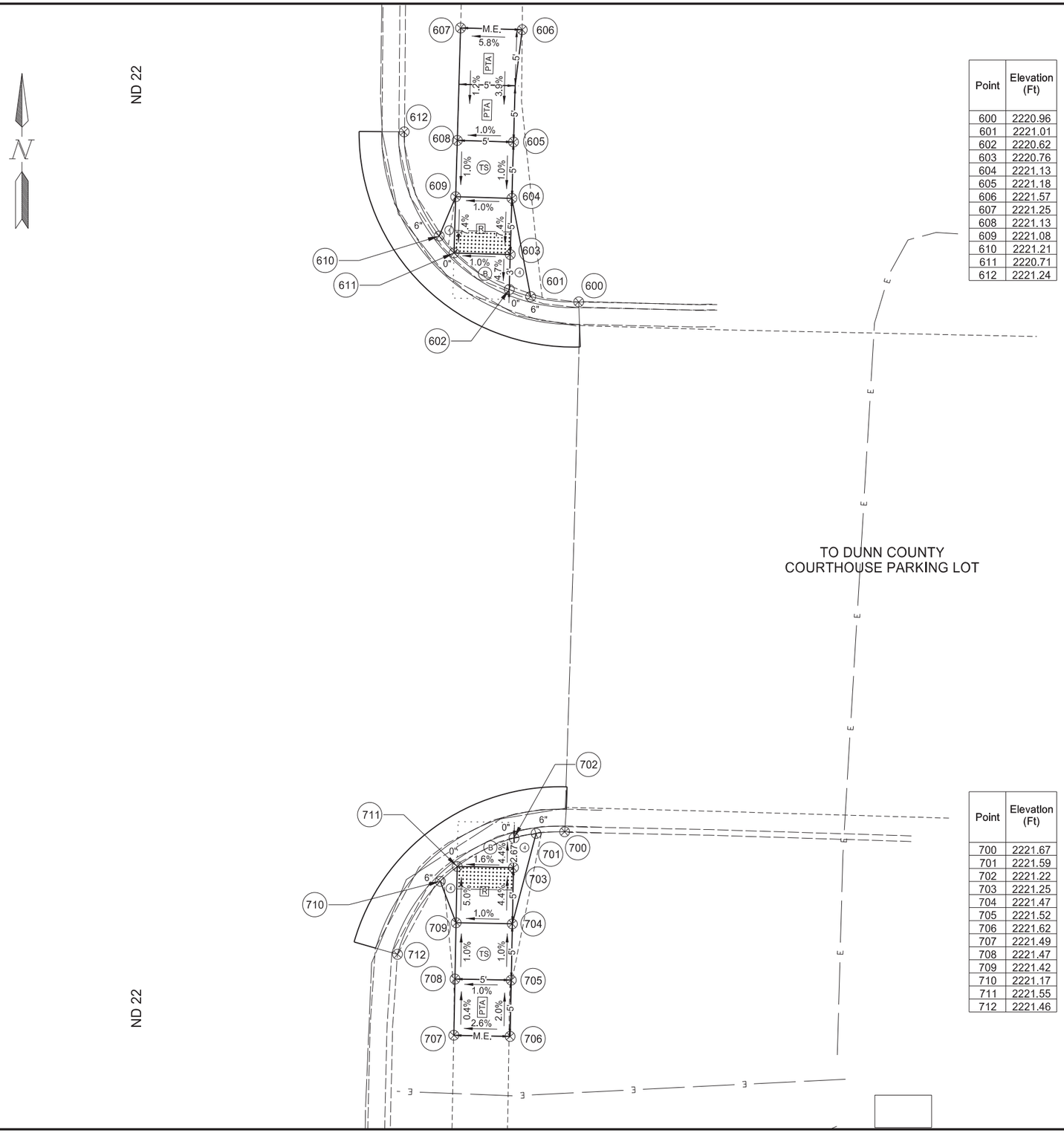
:Detectable Warning Panel

H.P: High Point
L.P: Low Point
M.E.: Match Existing

ND Highway 22
17th St SW to Jct ND 200

General Details
ADA Ramps
Manning, ND - Dunn County
RP 95.654 & RP 95.663

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



Point	Elevation (Ft)
600	2220.96
601	2221.01
602	2220.62
603	2220.76
604	2221.13
605	2221.18
606	2221.57
607	2221.25
608	2221.13
609	2221.08
610	2221.21
611	2220.71
612	2221.24

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

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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

LEGEND

TS L :Turning Space/Landing
Use at top of ramp or when changing directions
1.5% prefeered 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

0", 3", 6" :Curb Height

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.

10 :10:1 Max Slope
4 :4:1 Max Slope

H.P: High Point
L.P: Low Point
M.E.: Match Existing

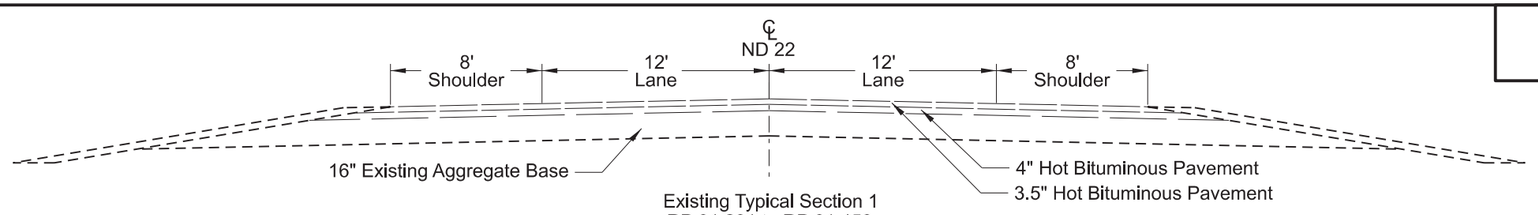
:Detectable Warning Panel

ND Highway 22
17th St SW to Jct ND 200

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

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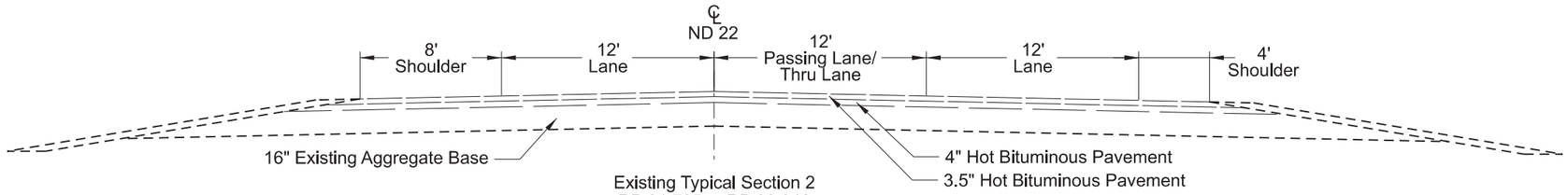
Existing Typical Section 1
RP 91.291 to RP 91.459
RP 95.353 to RP 95.516
RP 95.810 to RP 96.123
RP 96.669 to RP 96.960
RP 99.562 to RP 100.039
RP 100.523 to RP 101.017
RP 102.709 to RP 103.256
RP 103.754 to RP 104.442

Transition Typ1 to Typ2
RP 91.459 to RP 91.705
RP 96.960 to RP 97.145

Transition Typ1 to Typ12
RP 96.123 to RP 96.195
RP 103.256 to RP 103.329

Transition Typ1 to Typ16
RP 100.039 to RP 100.118

Transition Typ1 to Typ10
RP 101.017 to RP 101.104

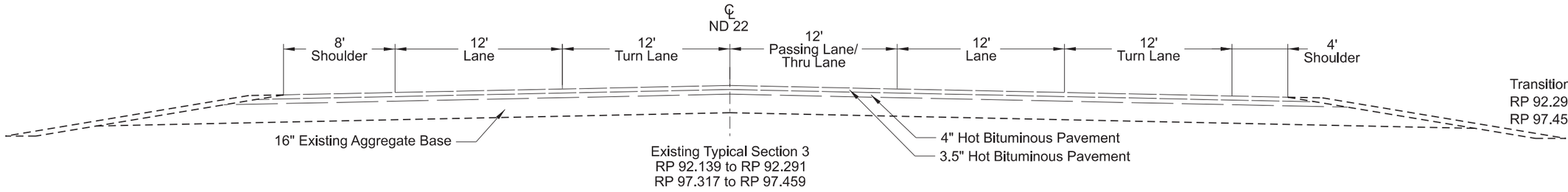


Existing Typical Section 2
RP 91.705 to RP 92.046
RP 92.544 to RP 92.809
RP 97.145 to RP 97.211
RP 97.688 to RP 99.471

Transition Typ2 to Typ3
RP 92.046 to RP 92.139
RP 97.211 to RP 97.317

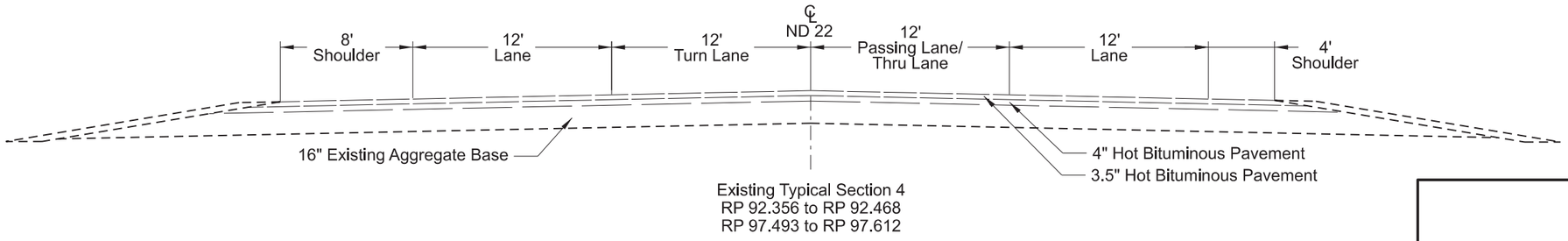
Transition Typ2 to Typ5
RP 92.809 to RP 93.017

Transition Typ2 to Typ1
RP 99.471 to RP 99.562



Existing Typical Section 3
RP 92.139 to RP 92.291
RP 97.317 to RP 97.459

Transition Typ3 to Typ4
RP 92.291 to RP 92.356
RP 97.459 to RP 97.493



Existing Typical Section 4
RP 92.356 to RP 92.468
RP 97.493 to RP 97.612

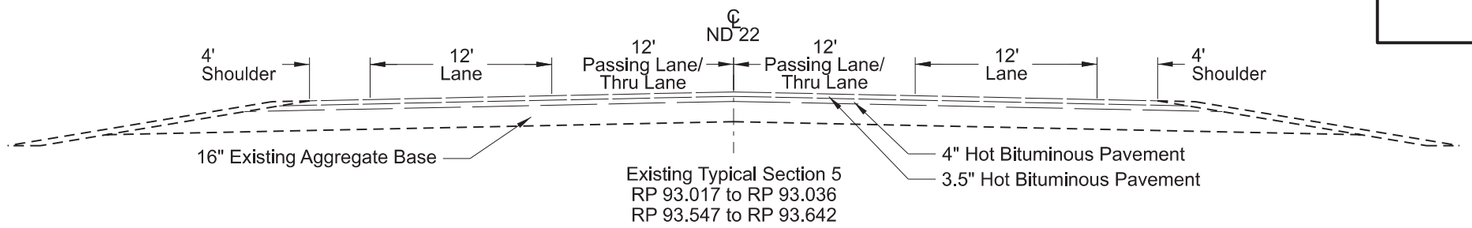
Transition Typ4 to Typ2
RP 92.468 to RP 92.544
RP 97.612 to RP 97.688

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Existing Typical Sections

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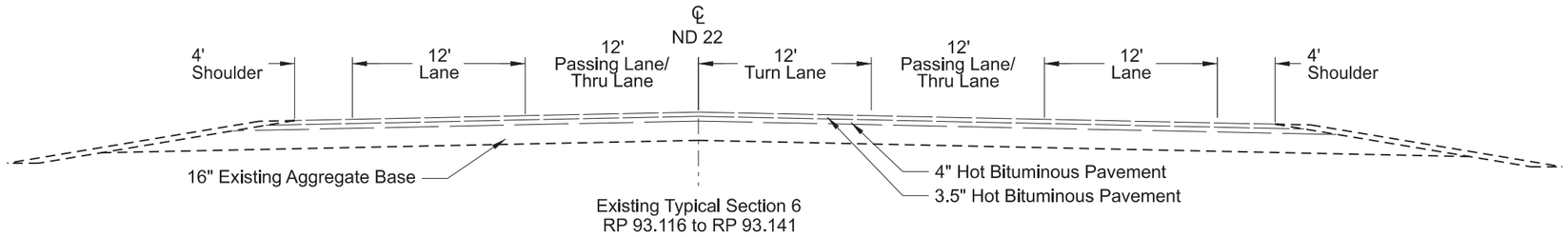
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Existing Typical Section 5
RP 93.017 to RP 93.036
RP 93.547 to RP 93.642

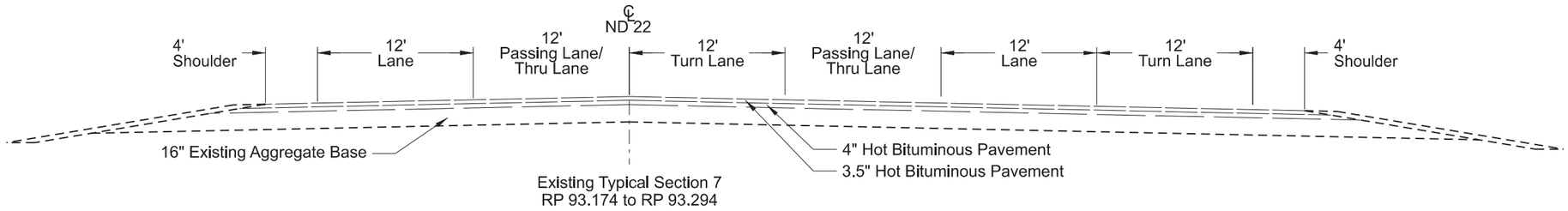
Transition Typ5 to Typ6
RP 93.036 to RP 93.116

Transition Typ5 to Typ10
RP 93.642 to RP 93.869

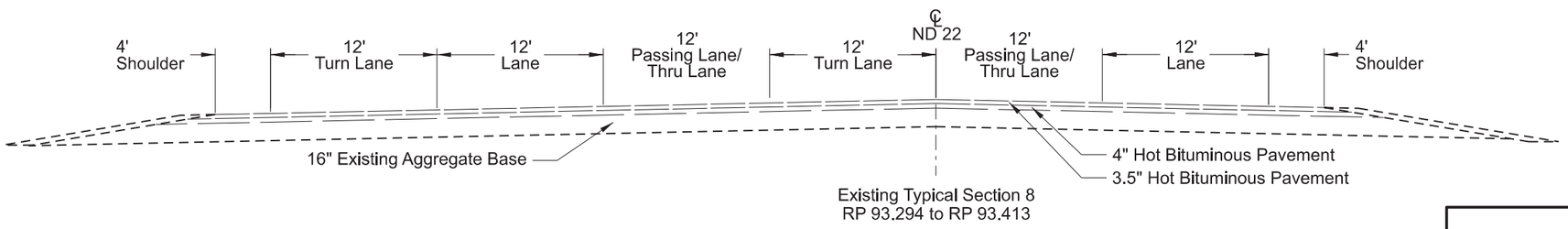


Existing Typical Section 6
RP 93.116 to RP 93.141

Transition Typ6 to Typ7
RP 93.141 to RP 93.174



Existing Typical Section 7
RP 93.174 to RP 93.294



Existing Typical Section 8
RP 93.294 to RP 93.413

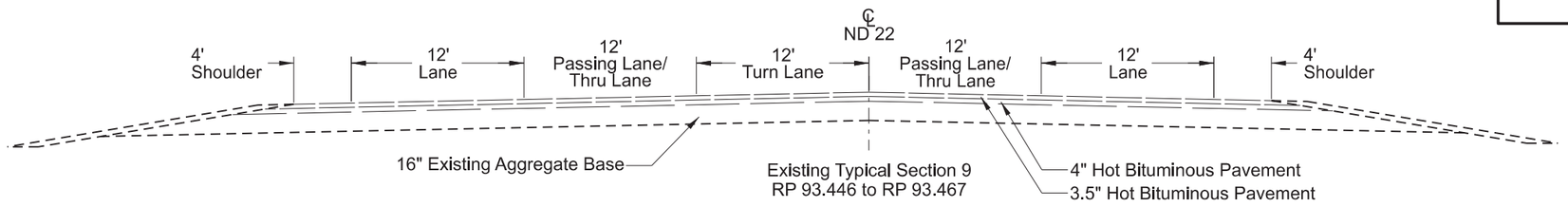
Transition Typ8 to Typ9
RP 93.413 to RP 93.446

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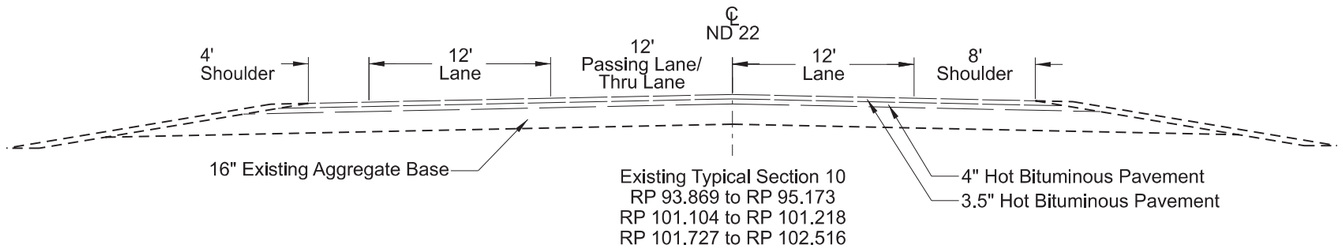
Existing Typical Sections

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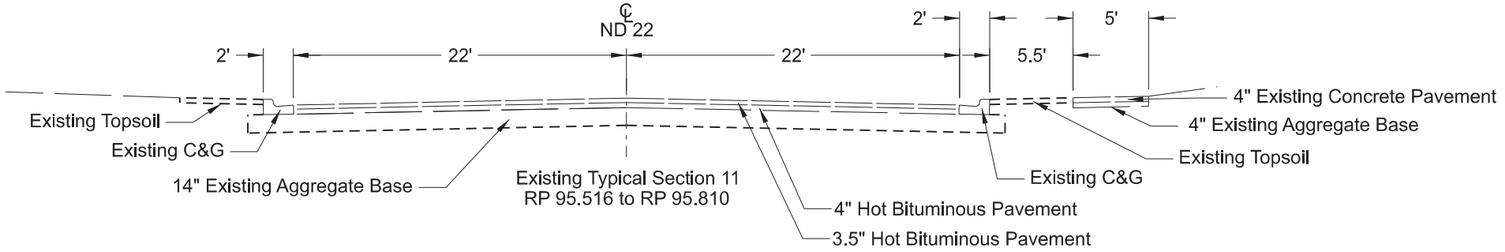


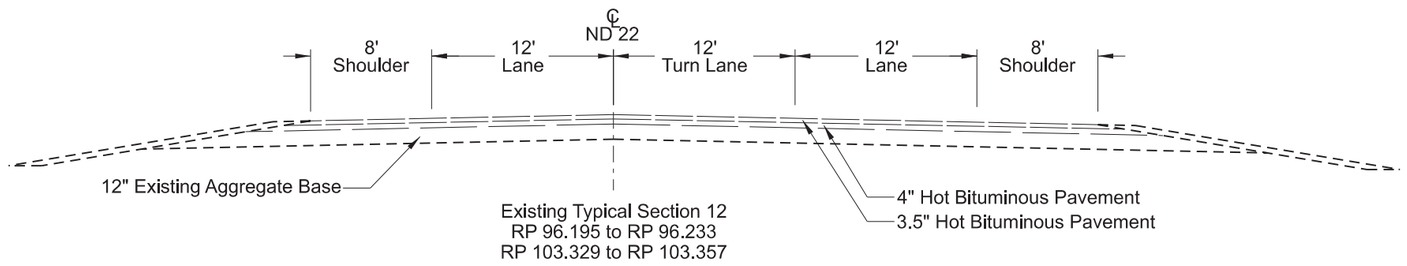
Transition Typ9 to Typ5
RP 93.467 to RP 93.547



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

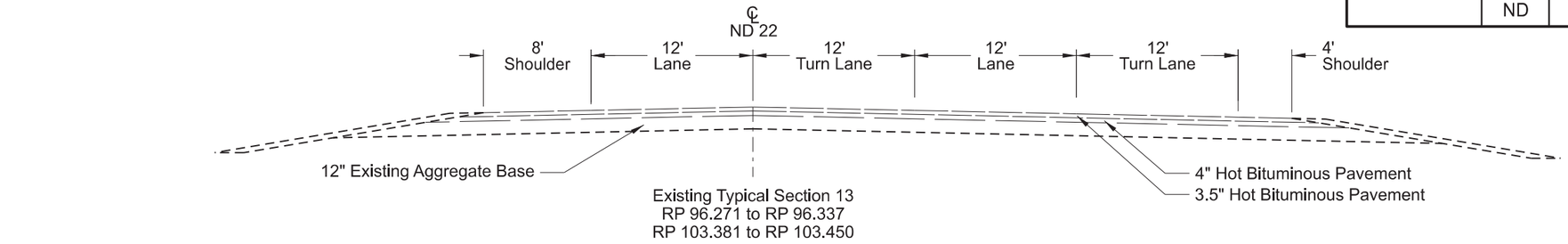
Transition Typ12 to Typ

ND Highway 22
17th St SW to Jct ND 200

Existing Typical Sections

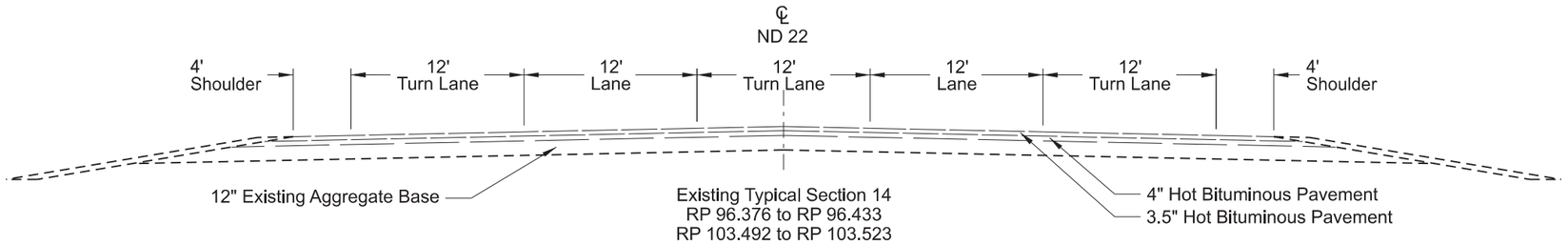
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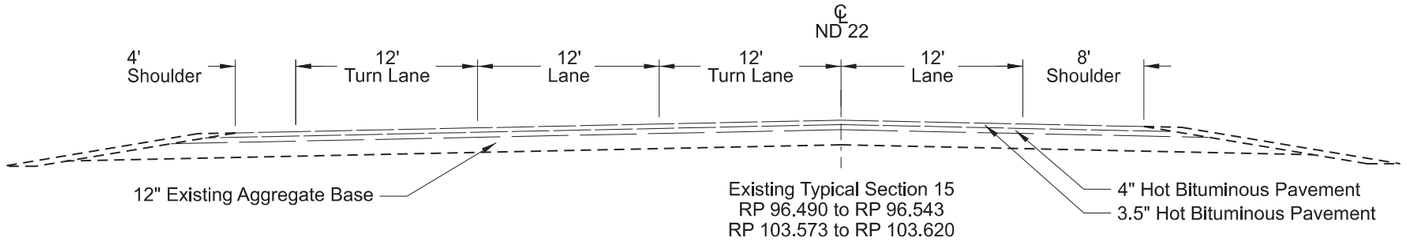


Transition Typ13 to Typ14
RP 96.337 to RP 96.376
RP 103.450 to RP 103.492

Transition Typ13 to Typ

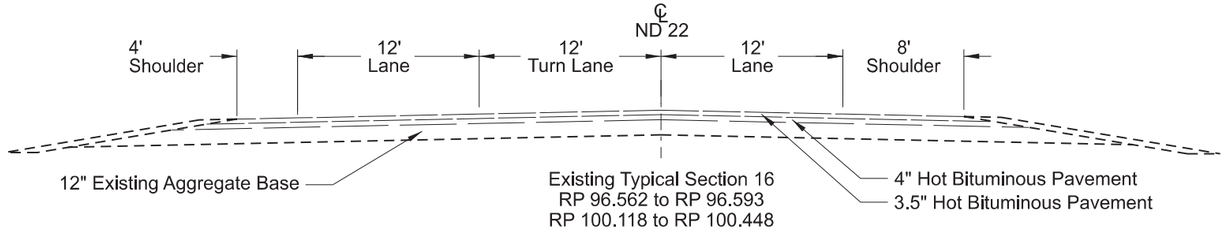


Transition Typ14 to Typ15
RP 96.433 to RP 96.490
RP 103.523 to RP 103.573



Transition Typ15 to Typ16
RP 96.543 to RP 96.562

Transition Typ15 to Typ22
RP 103.620 to RP 103.648



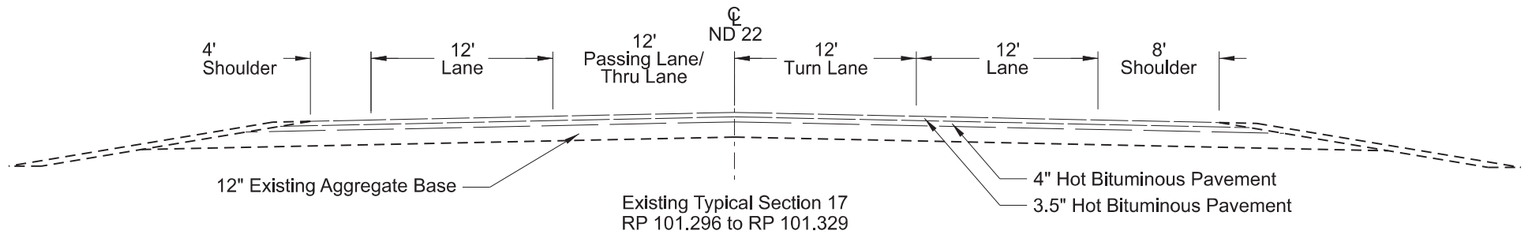
Transition Typ16 to Typ1
RP 96.593 to RP 96.669
RP 100.448 to RP 100.523

ND Highway 22
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Existing Typical Sections

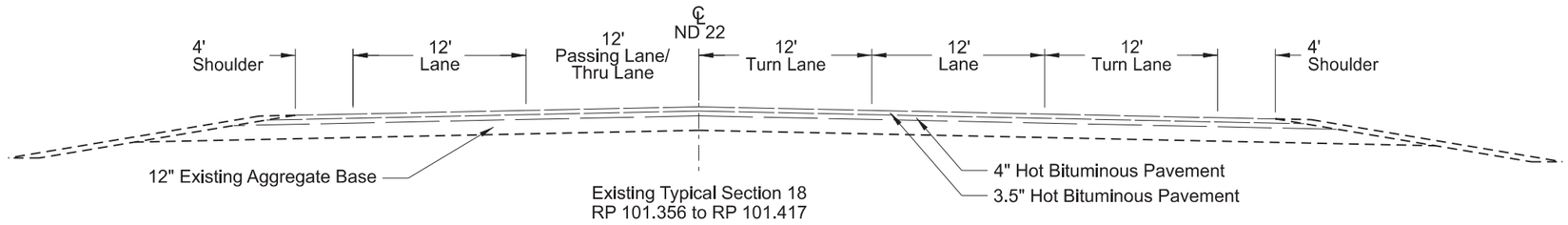
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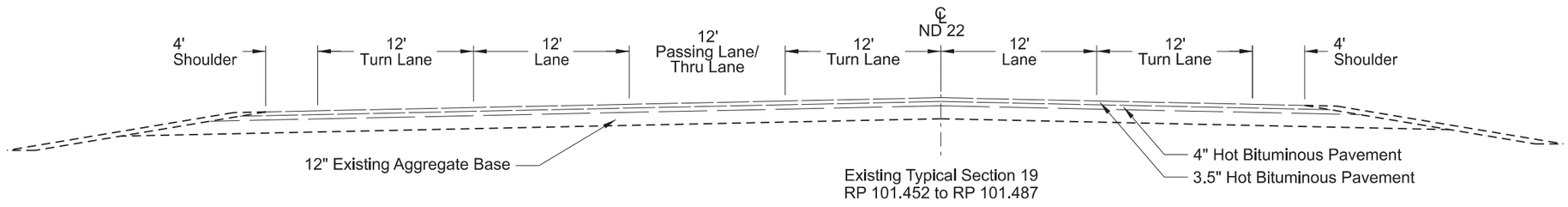
Existing Typical Section 17
RP 101.296 to RP 101.329

Transition Typ17 to Typ18
RP 101.329 to RP 101.356



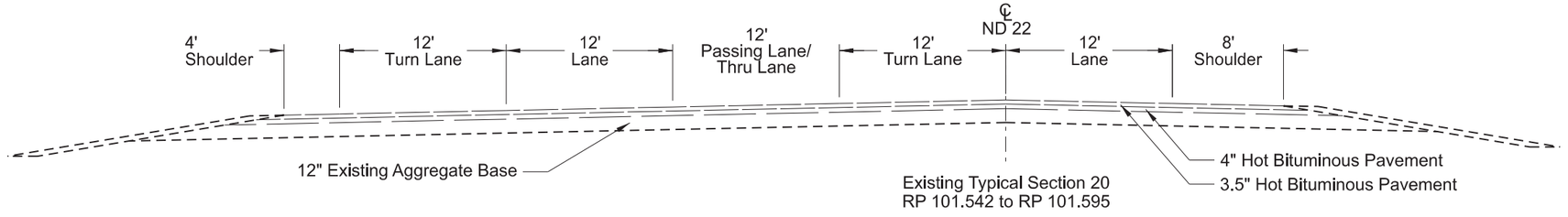
Existing Typical Section 18
RP 101.356 to RP 101.417

Transition Typ18 to Typ19
RP 101.417 to RP 101.452



Existing Typical Section 19
RP 101.452 to RP 101.487

Transition Typ19 to Typ20
RP 101.487 to RP 101.542



Existing Typical Section 20
RP 101.542 to RP 101.595

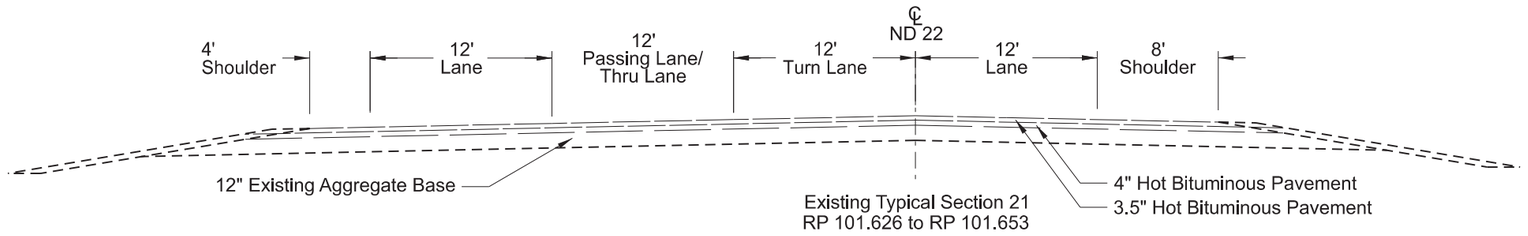
Transition Typ20 to Typ21
RP 101.595 to RP 101.626

ND Highway 22
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Existing Typical Sections

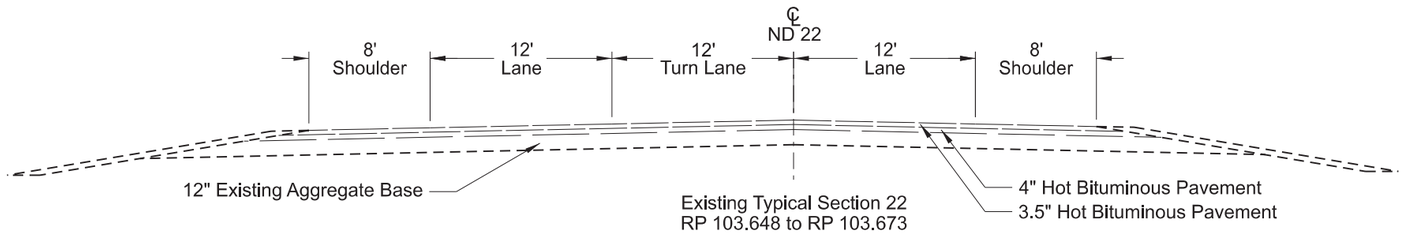
REGISTERED PROFESSIONAL ENGINEER
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Existing Typical Section 21
RP 101.626 to RP 101.653

Transition Typ21 to Typ10
RP 101.653 to RP 101.727



Existing Typical Section 22
RP 103.648 to RP 103.673

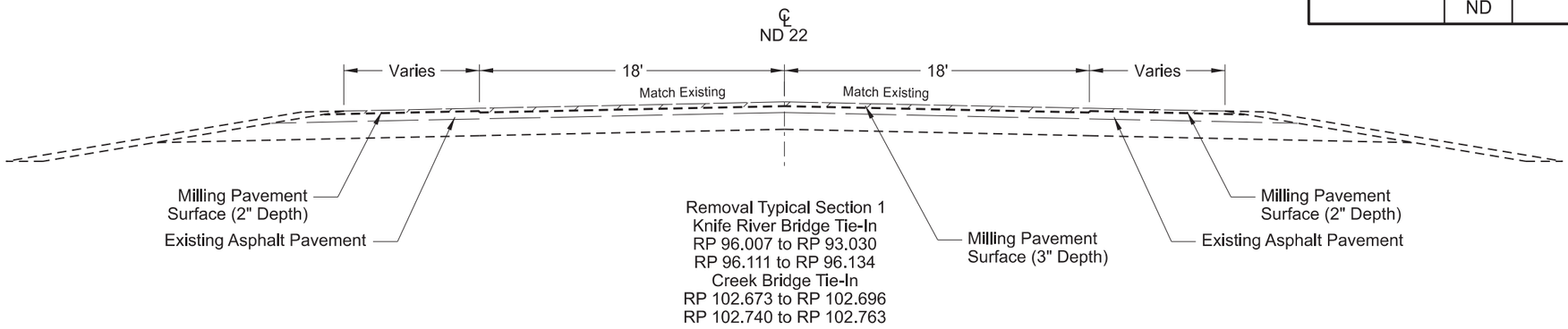
Transition Typ22 to Typ1
RP 103.673 to RP 103.754

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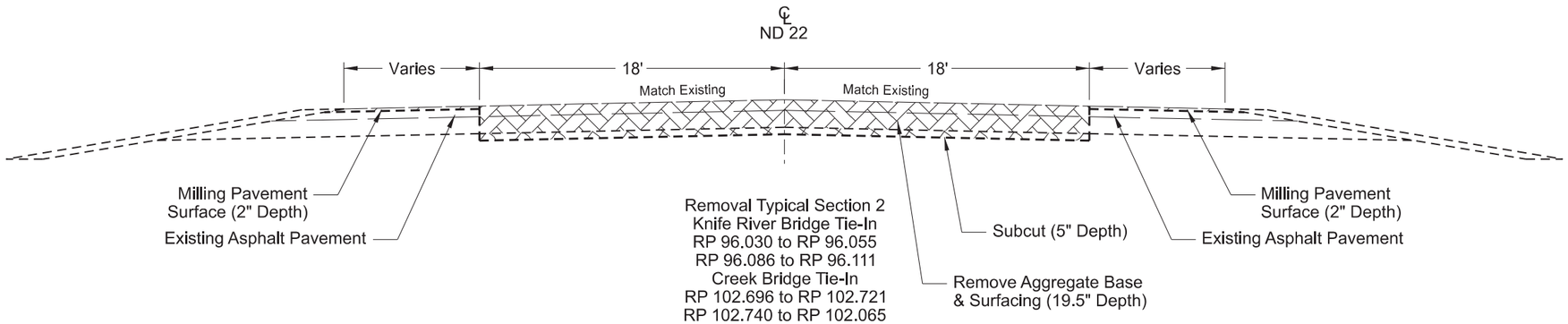
Existing Typical Sections

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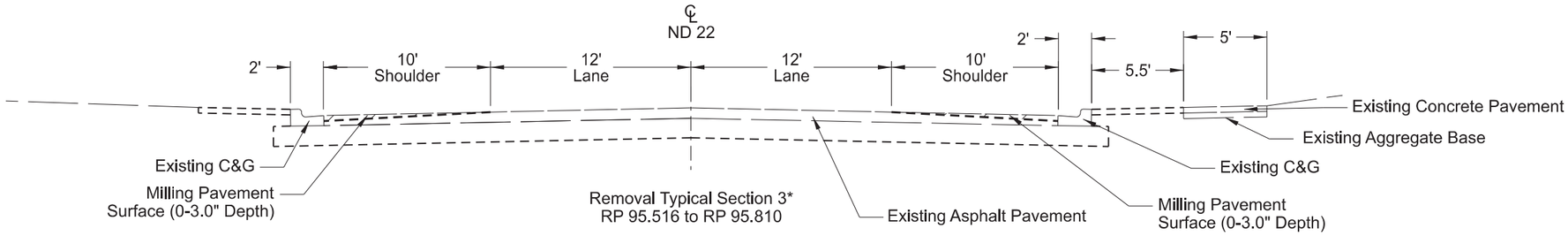
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Removal Typical Section 1
Knife River Bridge Tie-In
RP 96.007 to RP 93.030
RP 96.111 to RP 96.134
Creek Bridge Tie-In
RP 102.673 to RP 102.696
RP 102.740 to RP 102.763



Removal Typical Section 2
Knife River Bridge Tie-In
RP 96.030 to RP 96.055
RP 96.086 to RP 96.111
Creek Bridge Tie-In
RP 102.696 to RP 102.721
RP 102.740 to RP 102.065



Removal Typical Section 3*
RP 95.516 to RP 95.810

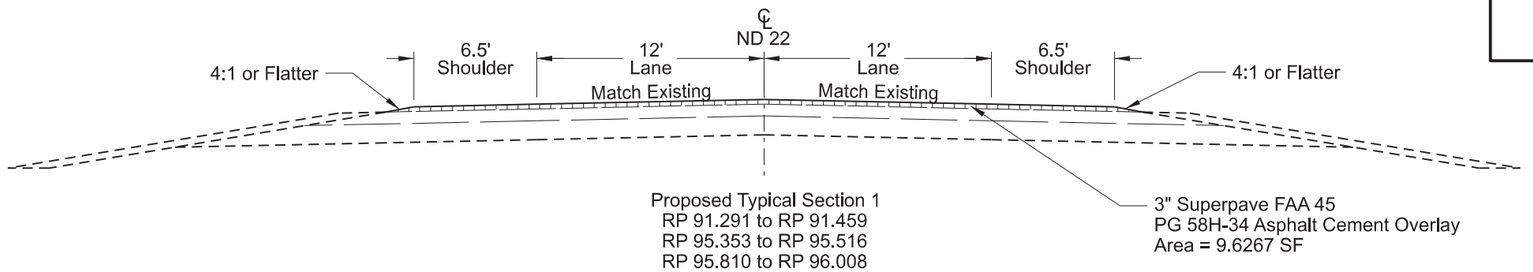
* Driving lanes will not be milled.
Milling depth of shoulder will vary from 0.0-Inch at driving lane edge to a depth that is 3.0-Inches below the top of the curb and gutter face.

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Removal Typical Sections

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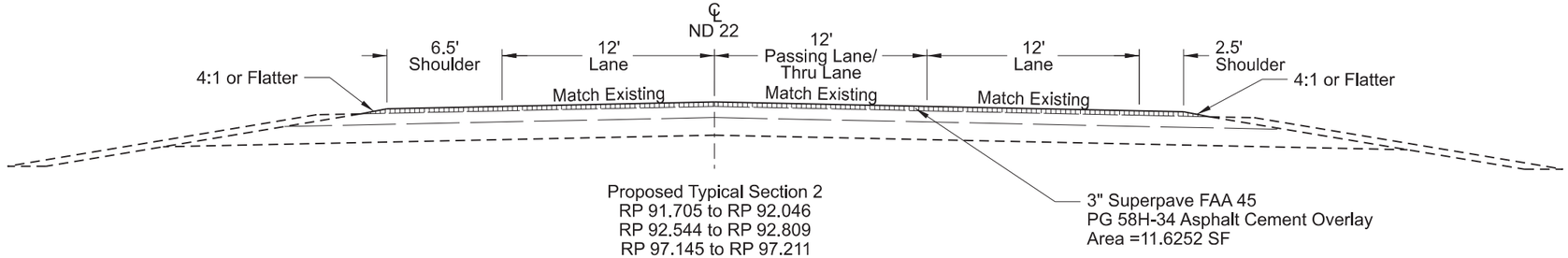
Proposed Typical Section 1
RP 91.291 to RP 91.459
RP 95.353 to RP 95.516
RP 95.810 to RP 96.008
RP 96.669 to RP 96.960
RP 99.562 to RP 100.039
RP 100.523 to RP 101.017
RP 102.778 to RP 103.256
RP 103.754 to RP 104.442

Transition Typ1 to Typ2
RP 91.459 to RP 91.705
RP 96.960 to RP 97.145

Transition Typ1 to Typ12
RP 96.123 to RP 96.195
RP 103.256 to RP 103.329

Transition Typ1 to Typ16
RP 100.039 to RP 100.118

Transition Typ1 to Typ10
RP 101.017 to RP 101.104

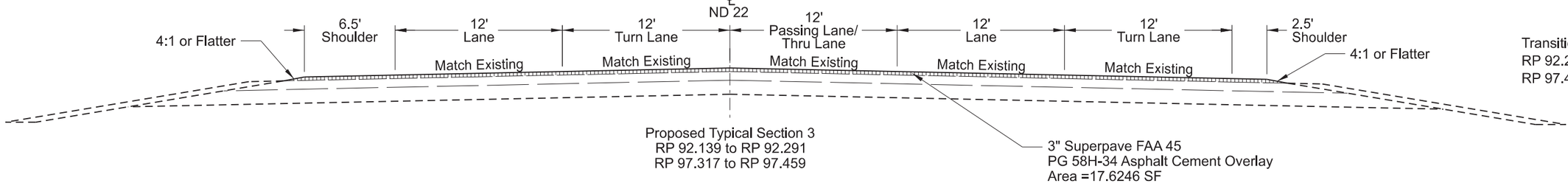


Proposed Typical Section 2
RP 91.705 to RP 92.046
RP 92.544 to RP 92.809
RP 97.145 to RP 97.211
RP 97.688 to RP 99.471

Transition Typ2 to Typ3
RP 92.046 to RP 92.139
RP 97.211 to RP 97.317

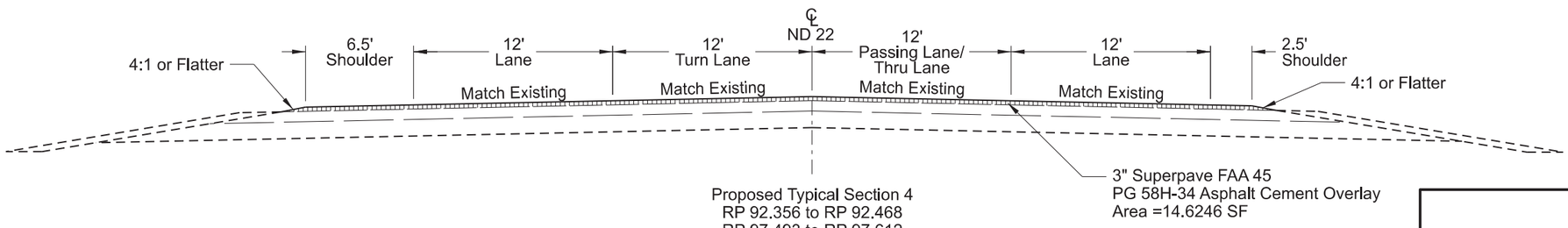
Transition Typ2 to Typ5
RP 92.809 to RP 93.017

Transition Typ2 to Typ1
RP 99.471 to RP 99.562



Proposed Typical Section 3
RP 92.139 to RP 92.291
RP 97.317 to RP 97.459

Transition Typ3 to Typ4
RP 92.291 to RP 92.356
RP 97.459 to RP 97.493



Proposed Typical Section 4
RP 92.356 to RP 92.468
RP 97.493 to RP 97.612

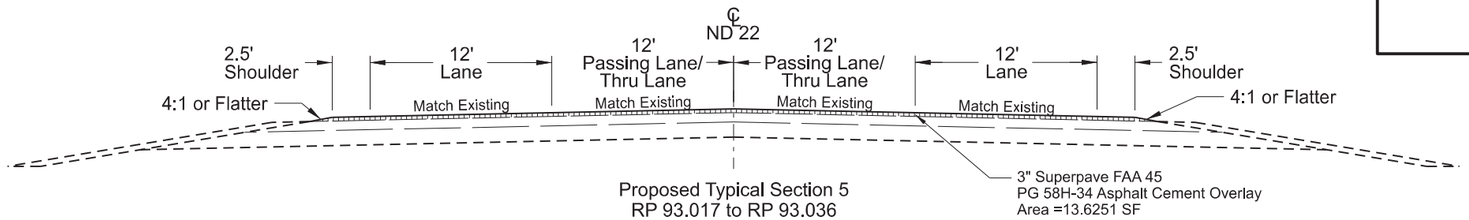
Transition Typ4 to Typ2
RP 92.468 to RP 92.544
RP 97.612 to RP 97.688

ND Highway 22
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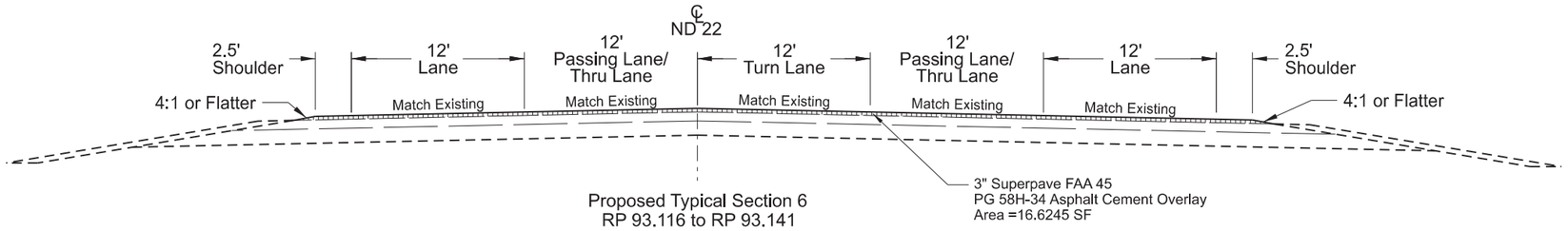
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Proposed Typical Section 5
RP 93.017 to RP 93.036
RP 93.547 to RP 93.642

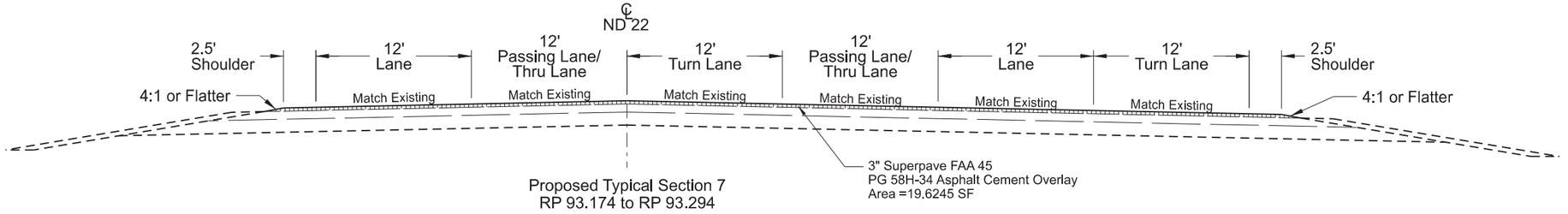
Transition Typ5 to Typ6
RP 93.036 to RP 93.116

Transition Typ5 to Typ10
RP 93.642 to RP 93.869

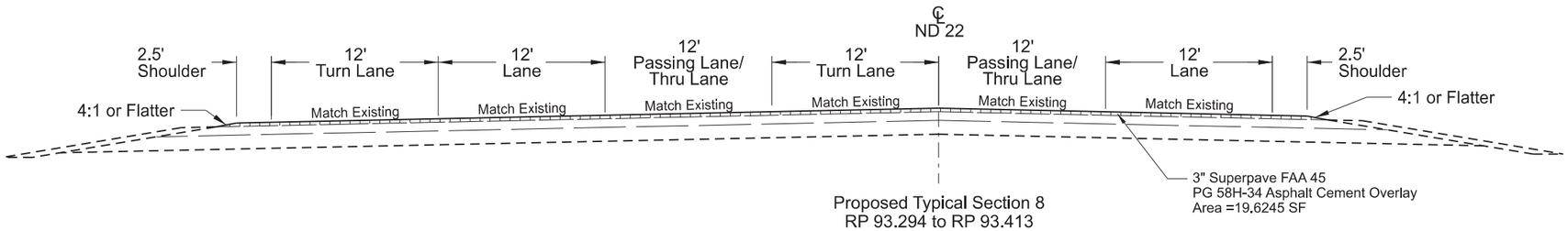


Proposed Typical Section 6
RP 93.116 to RP 93.141

Transition Typ6 to Typ7
RP 93.141 to RP 93.174



Proposed Typical Section 7
RP 93.174 to RP 93.294



Proposed Typical Section 8
RP 93.294 to RP 93.413

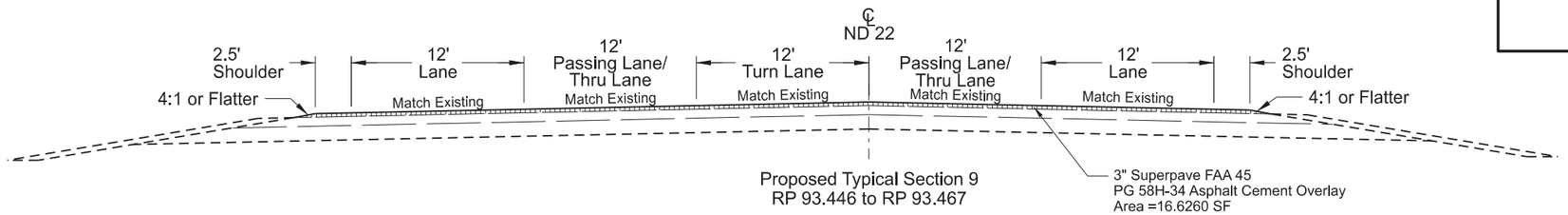
Transition Typ8 to Typ9
RP 93.413 to RP 93.446

ND Highway 22
17th St SW to Jct ND 200

Proposed Typical Sections

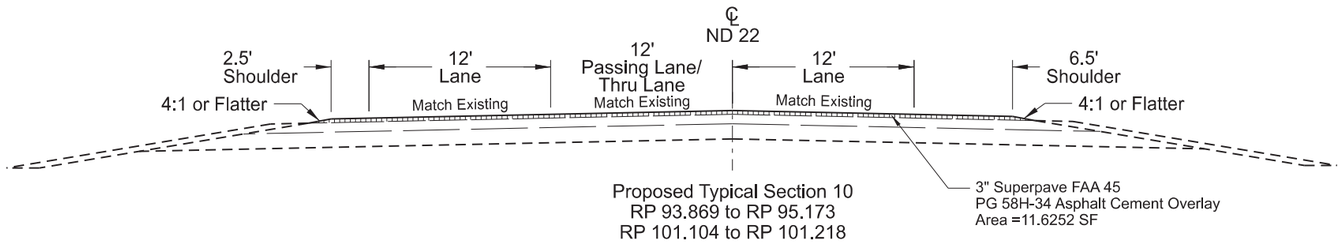
REGISTERED PROFESSIONAL ENGINEER
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	ND	XA-SS-5-022(141)091	30	10



Proposed Typical Section 9
RP 93.446 to RP 93.467

Transition Typ9 to Typ5
RP 93.467 to RP 93.547

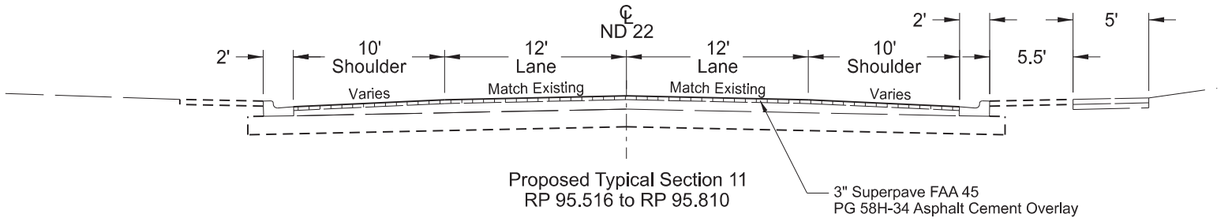


Proposed Typical Section 10
RP 93.869 to RP 95.173
RP 101.104 to RP 101.218
RP 101.727 to RP 102.516

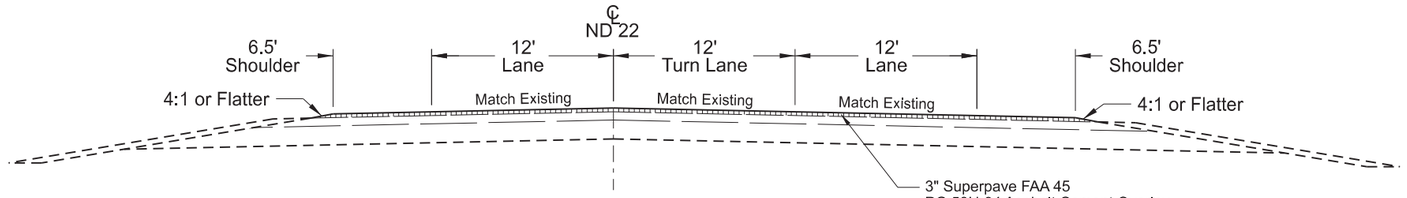
Transition Typ10 to Typ1
RP 95.173 to RP 95.353

Transition Typ10 to Typ17
RP 101.218 to RP 101.296

Transition Typ10 to Typ23
RP 102.516 to RP 102.670



Proposed Typical Section 11
RP 95.516 to RP 95.810



Proposed Typical Section 12
RP 96.195 to RP 96.233
RP 103.329 to RP 103.357

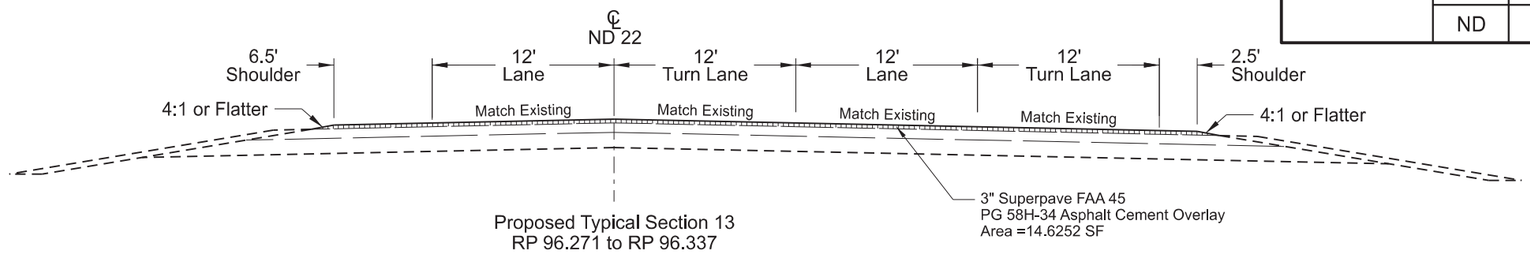
Transition Typ12 to Typ13
RP 96.233 to RP 96.271
RP 103.357 to RP 103.381

ND Highway 22
17th St SW to Jct ND 200

Proposed Typical Sections

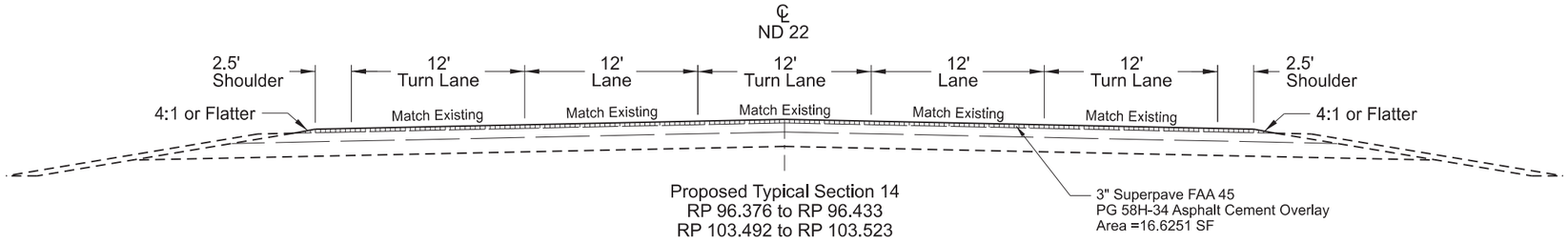
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
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DATE 09/26/24
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	11



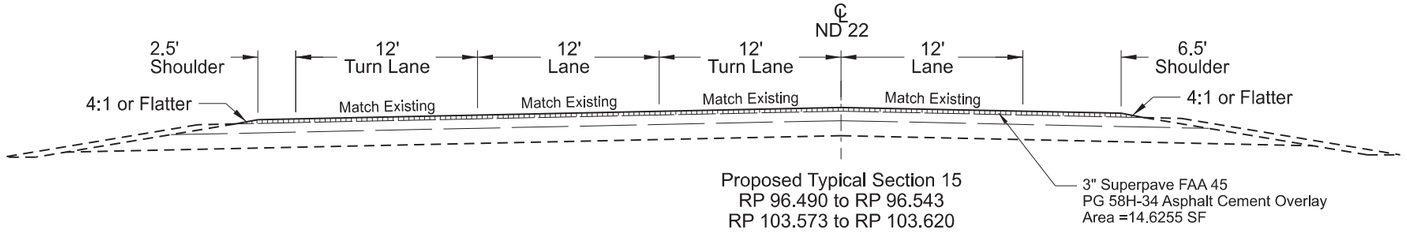
Proposed Typical Section 13
RP 96.271 to RP 96.337
RP 103.381 to RP 103.450

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



Proposed Typical Section 14
RP 96.376 to RP 96.433
RP 103.492 to RP 103.523

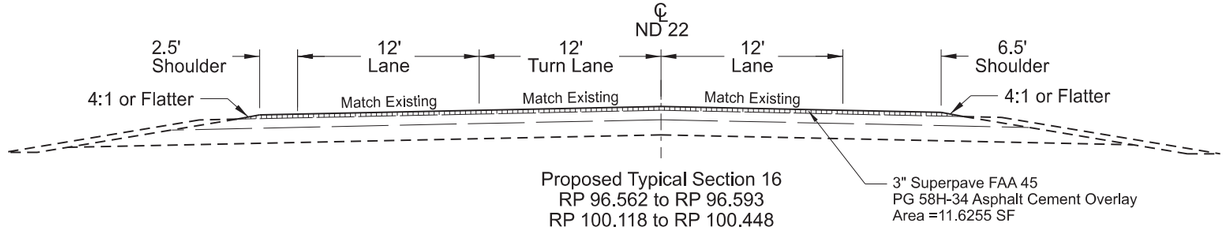
Transition Typ14 to Typ15
RP 96.433 to RP 96.490
RP 103.523 to RP 103.573



Proposed Typical Section 15
RP 96.490 to RP 96.543
RP 103.573 to RP 103.620

Transition Typ15 to Typ16
RP 96.543 to RP 96.562

Transition Typ15 to Typ22
RP 103.620 to RP 103.648



Proposed Typical Section 16
RP 96.562 to RP 96.593
RP 100.118 to RP 100.448

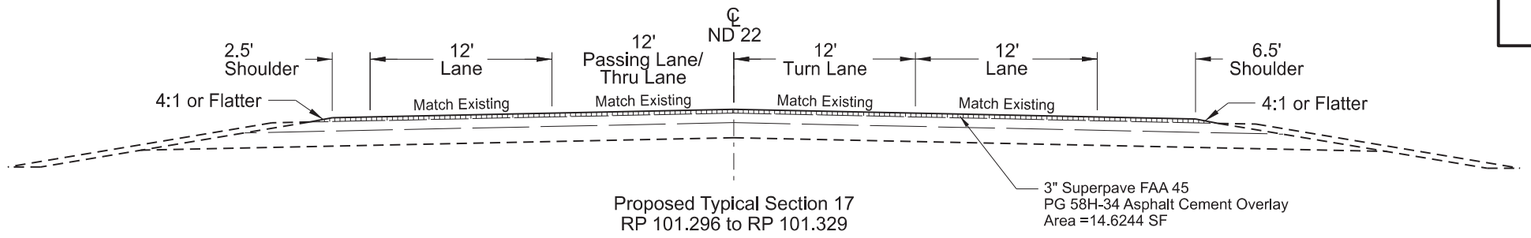
Transition Typ16 to Typ1
RP 96.593 to RP 96.669
RP 100.448 to RP 100.523

ND Highway 22
17th St SW to Jct ND 200

Proposed Typical Sections

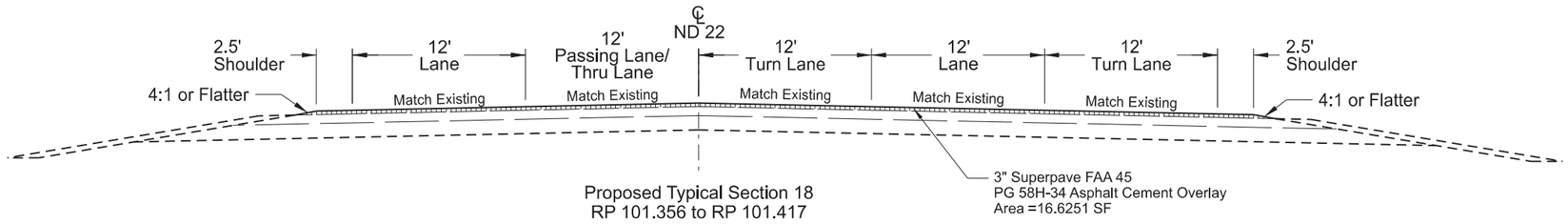
REGISTERED PROFESSIONAL ENGINEER
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	ND	XA-SS-5-022(141)091	30	12



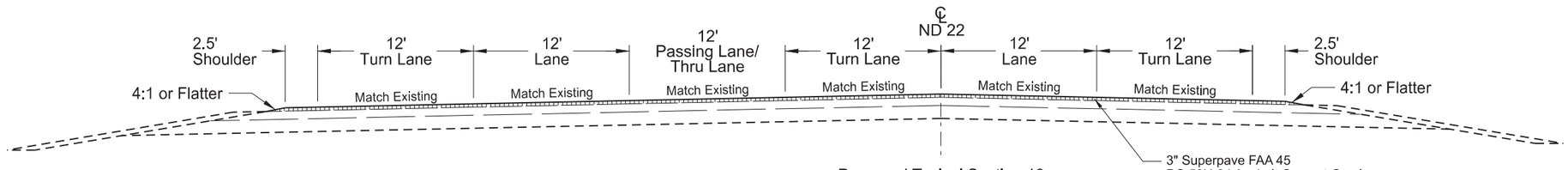
Proposed Typical Section 17
RP 101.296 to RP 101.329

Transition Typ17 to Typ18
RP 101.329 to RP 101.356



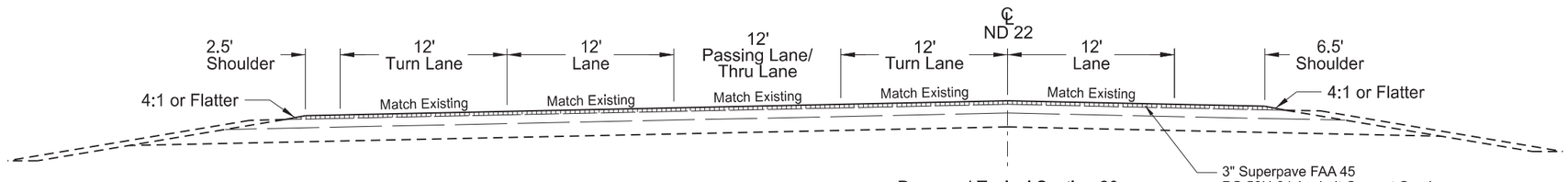
Proposed Typical Section 18
RP 101.356 to RP 101.417

Transition Typ18 to Typ19
RP 101.417 to RP 101.452



Proposed Typical Section 19
RP 101.452 to RP 101.487

Transition Typ19 to Typ20
RP 101.487 to RP 101.542



Proposed Typical Section 20
RP 101.542 to RP 101.595

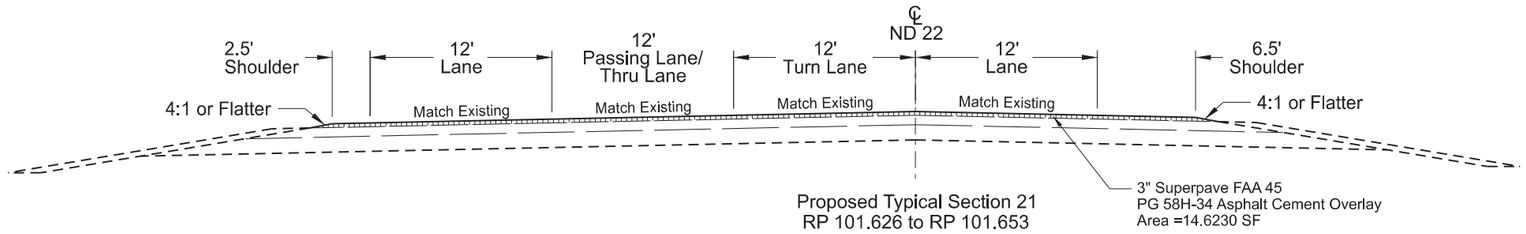
Transition Typ20 to Typ21
RP 101.595 to RP 101.626

ND Highway 22
17th St SW to Jct ND 200

Proposed Typical Sections

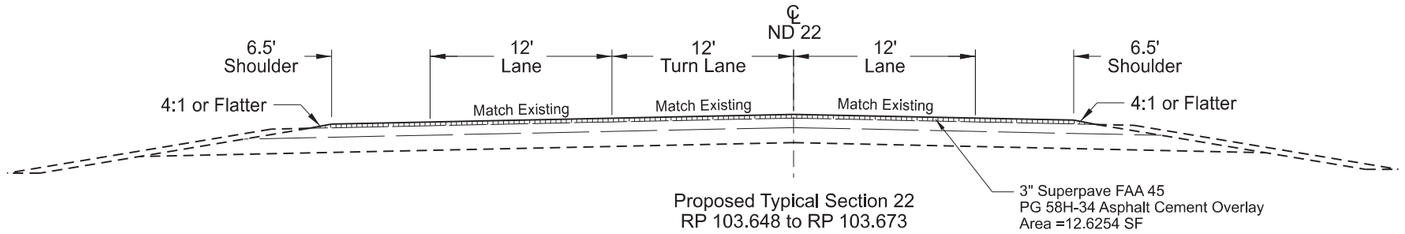
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	30	13



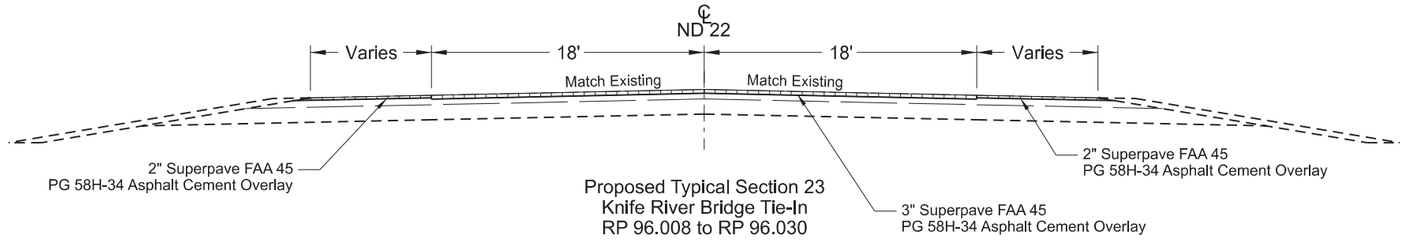
Proposed Typical Section 21
RP 101.626 to RP 101.653

Transition Typ21 to Typ10
RP 101.653 to RP 101.727



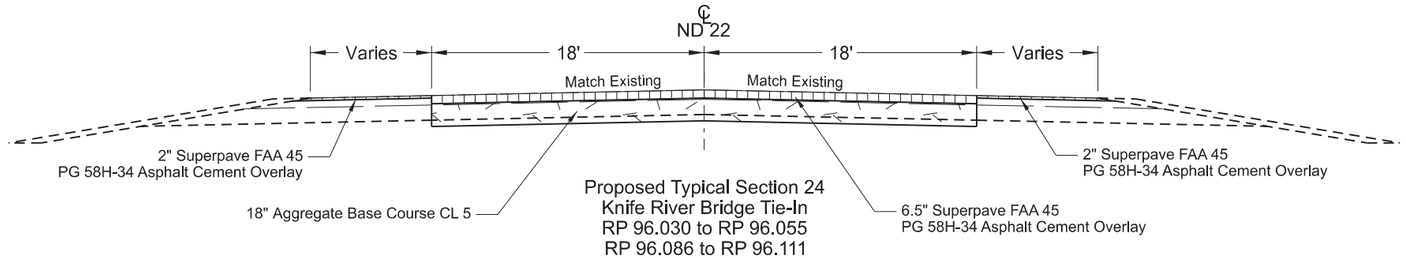
Proposed Typical Section 22
RP 103.648 to RP 103.673

Transition Typ22 to Typ1
RP 103.673 to RP 103.754



Proposed Typical Section 23
Knife River Bridge Tie-In
RP 96.008 to RP 96.030
RP 96.111 to RP 96.134
Creek Bridge Tie-In
RP 102.670 to RP 102.696
RP 102.740 to RP 102.763

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

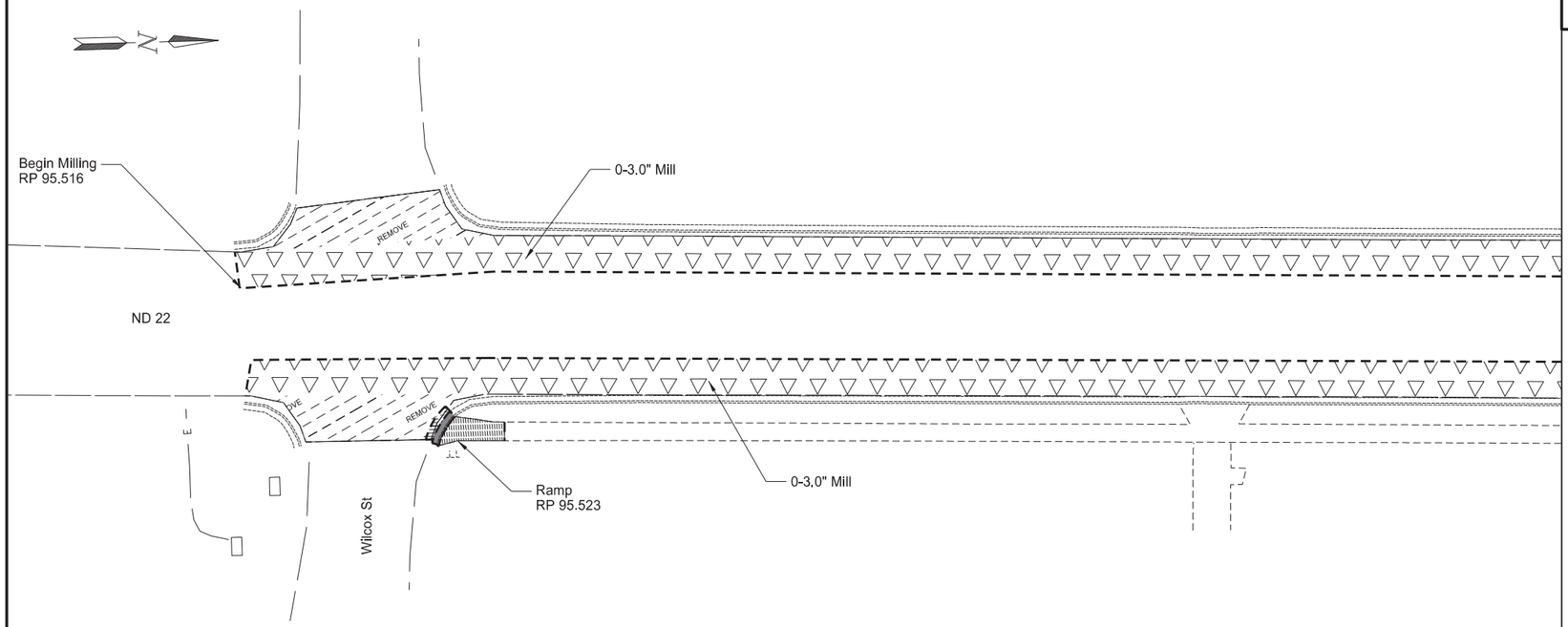


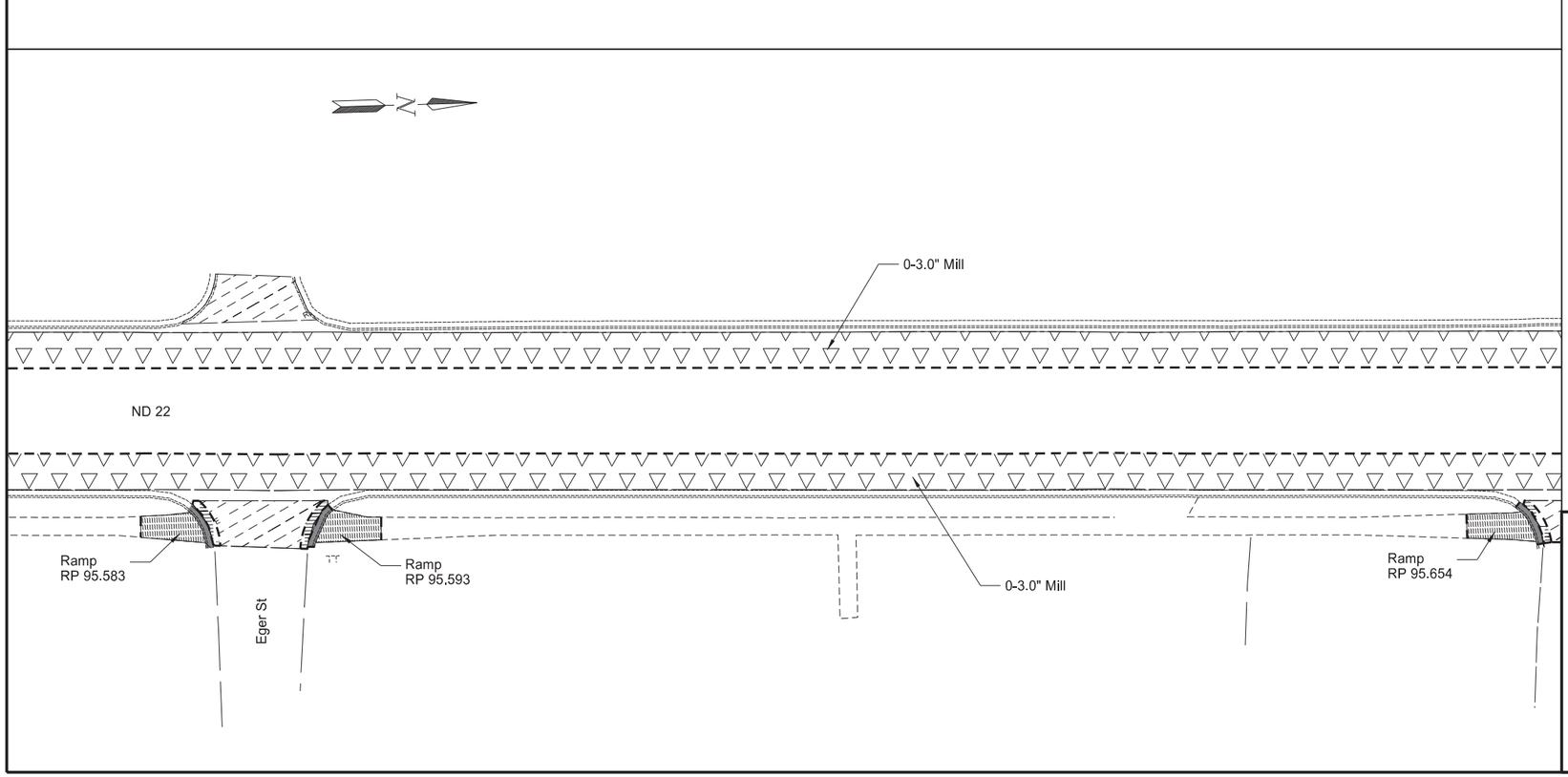
Proposed Typical Section 24
Knife River Bridge Tie-In
RP 96.030 to RP 96.055
RP 96.086 to RP 96.111
Creek Bridge Tie-In
RP 102.696 to RP 102.721
RP 102.740 to RP 102.065

ND Highway 22
17th St SW to Jct ND 200

Proposed Typical Sections

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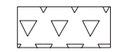


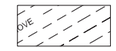


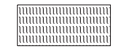
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	40	1

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





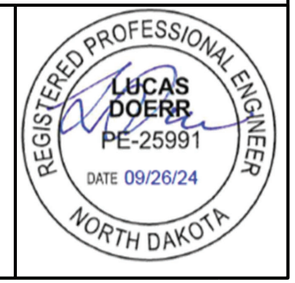


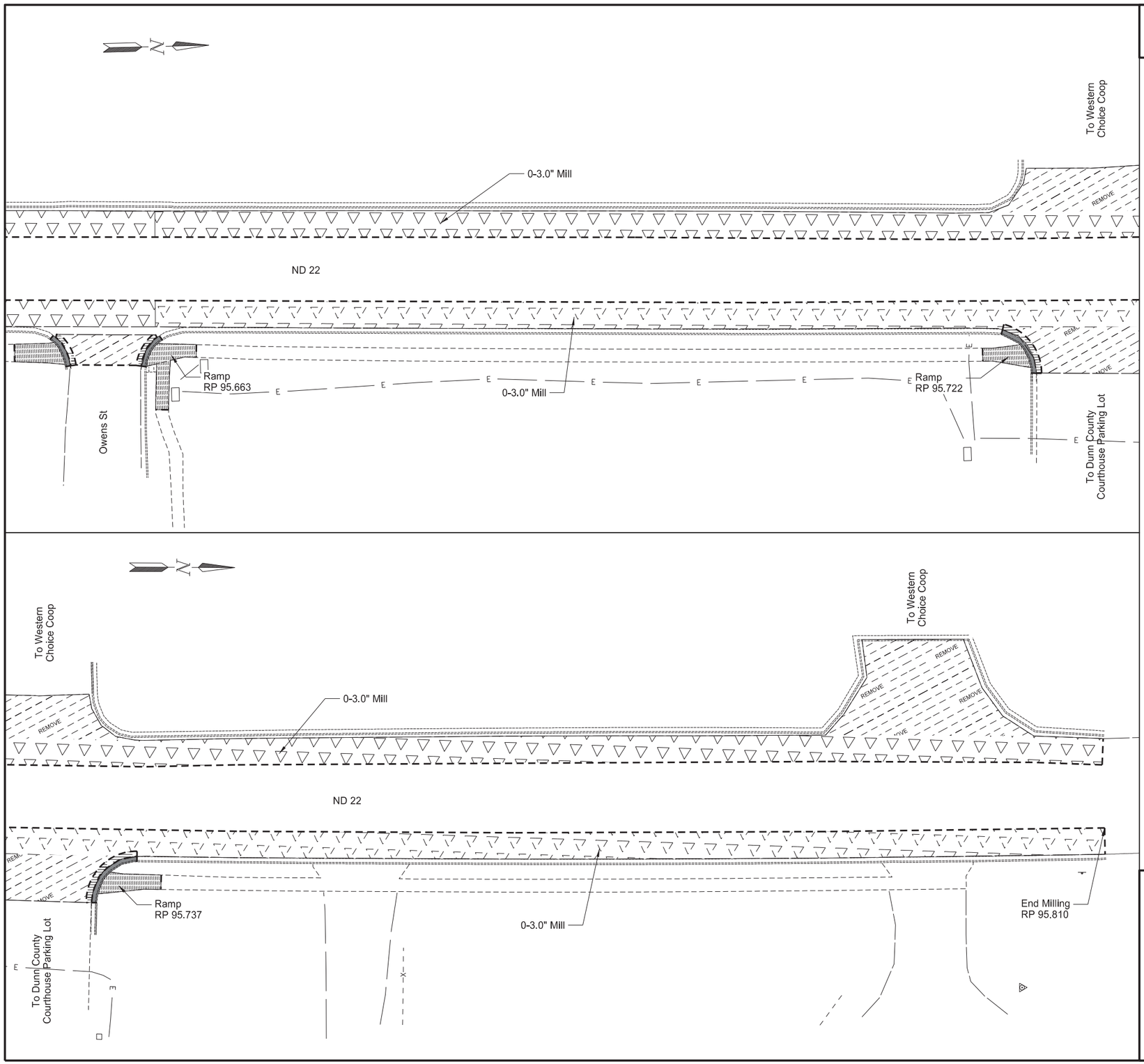




NOTE:
- Refer to Section 30 Sheet 7 for typical-section view of removal location.
- Driving lanes will not be milled.
- Milling depth of shoulder will vary from 0.0-Inch at driving lane edge to a depth that is 3.0-Inches below the top of the curb and gutter face.

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Manning
Removals
RP 95.516 to RP 95.654





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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

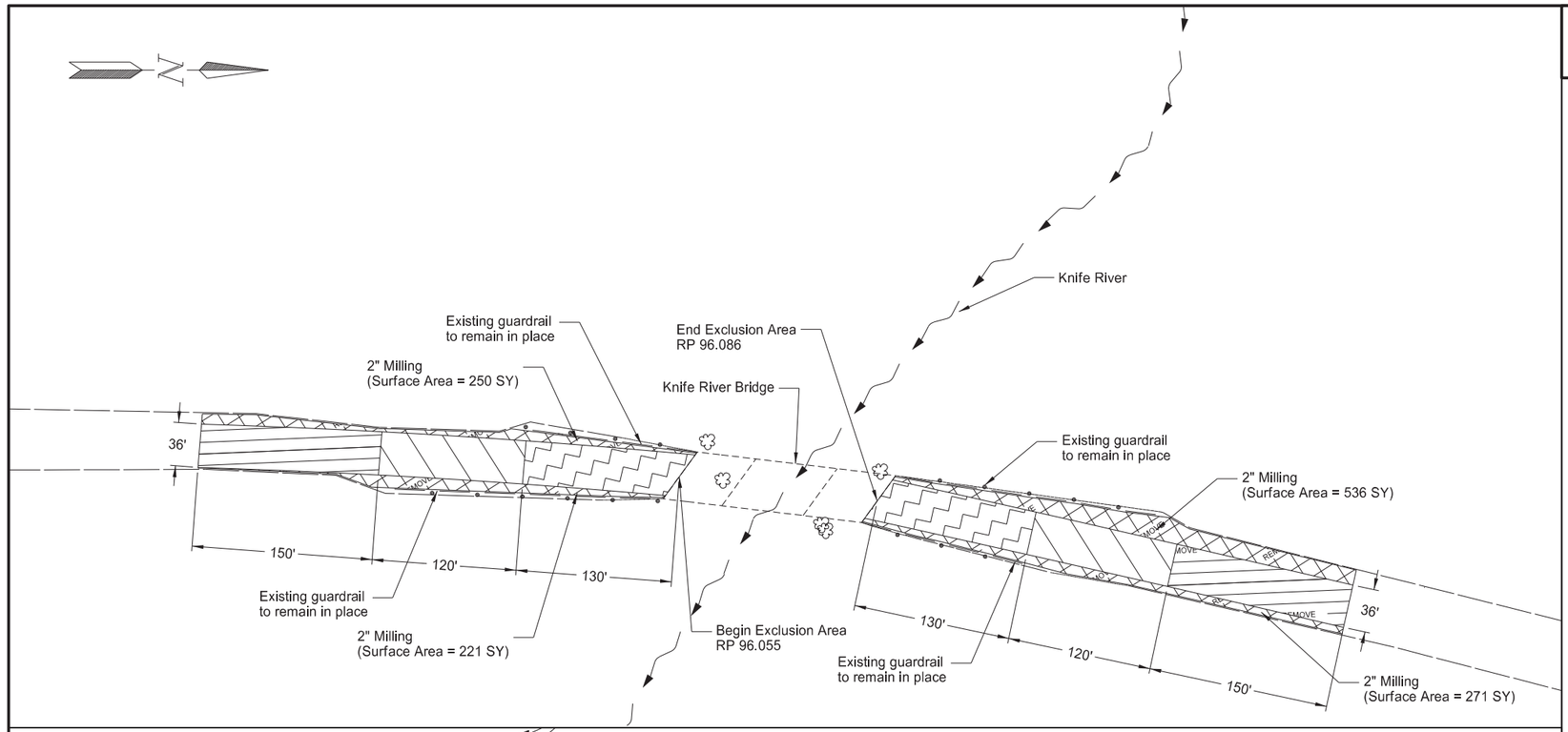
Removal of Bituminous Surfacing

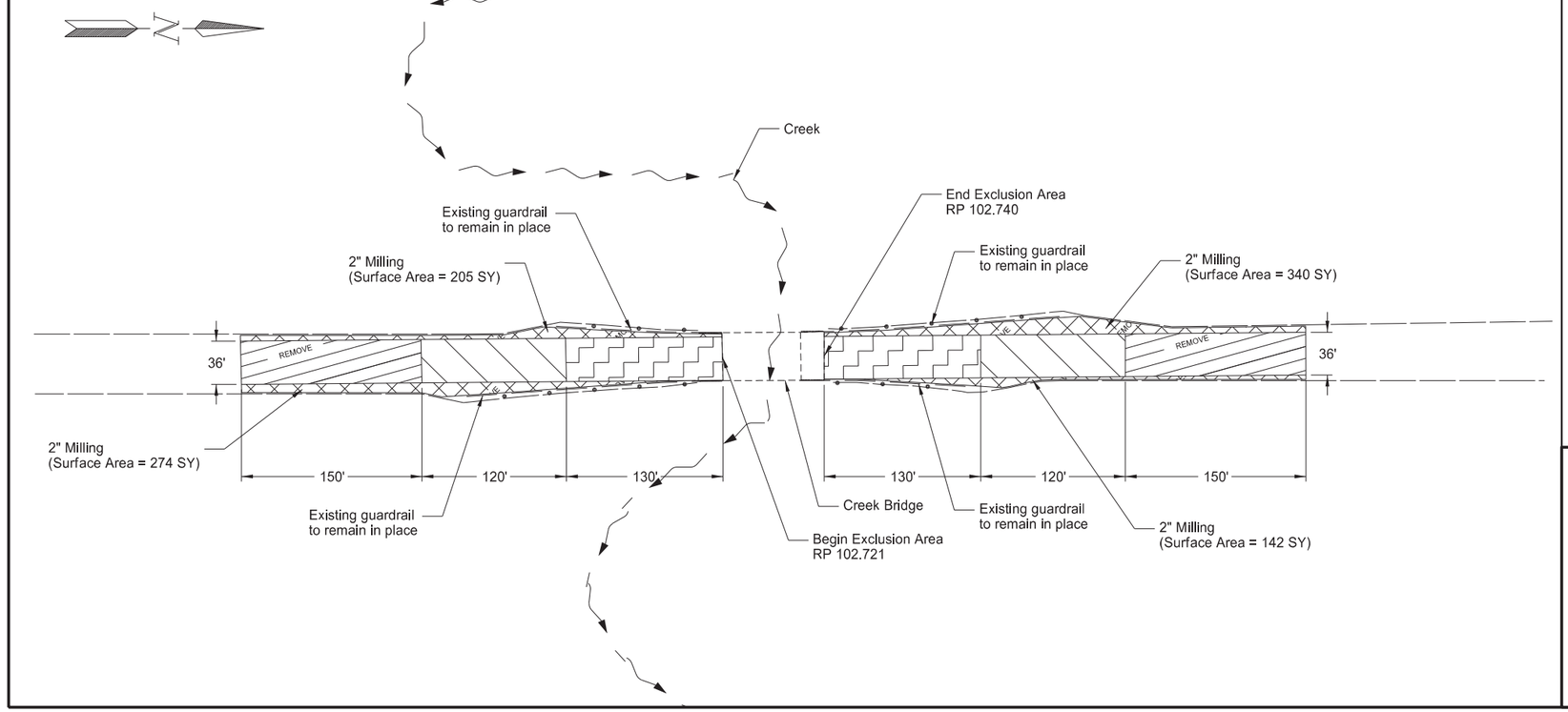
Removal of Curb & Gutter

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
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Manning
Removals
RP 95.654 to RP 95.810

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	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.

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Removals

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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 Mitigation Required		
					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				
			Size				Impacts to Other Waters						Mitigation Required				
							Acres			Linear Feet							
Number	Location	Type	Acre(s)	Linear Feet	Feature	USACE Jurisdictional[1]	Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm. (Fill/Drain)	Perm. (Cut)	EO 11990	USACE	USFWS	Mitigation Location; ratio	Method
#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

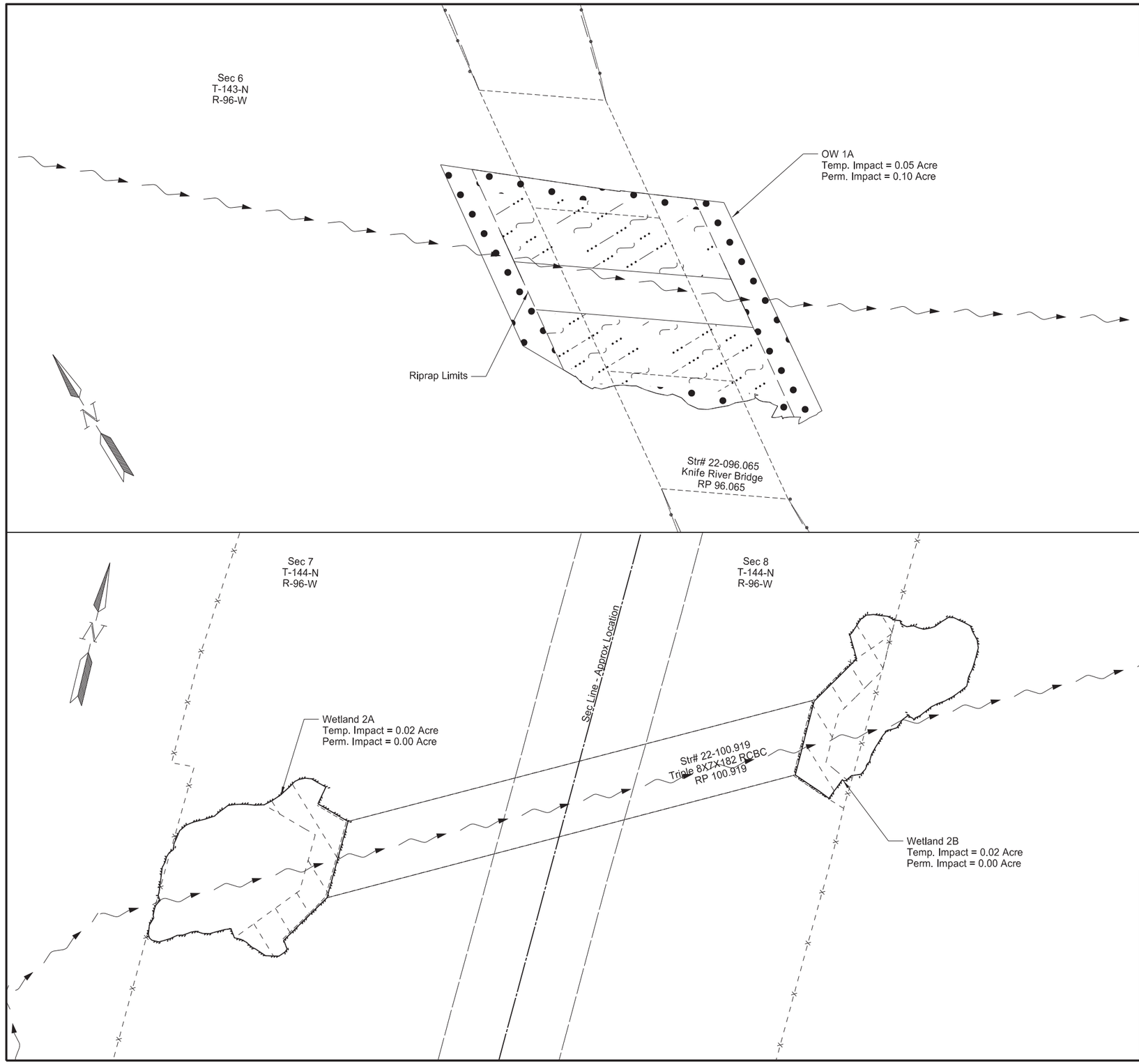
	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)	DUCKS UNLIMITED CREDITS Acre(s)
USACE Only	NA					
EO 11990 Only	NA					
USACE/11990	NA					
USFWS	NA					
	Total	**0**	**0**	**0**	**0**	**0**

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Wetland Impacts Table

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	ND	XA-SS-5-022(141)091	75	2



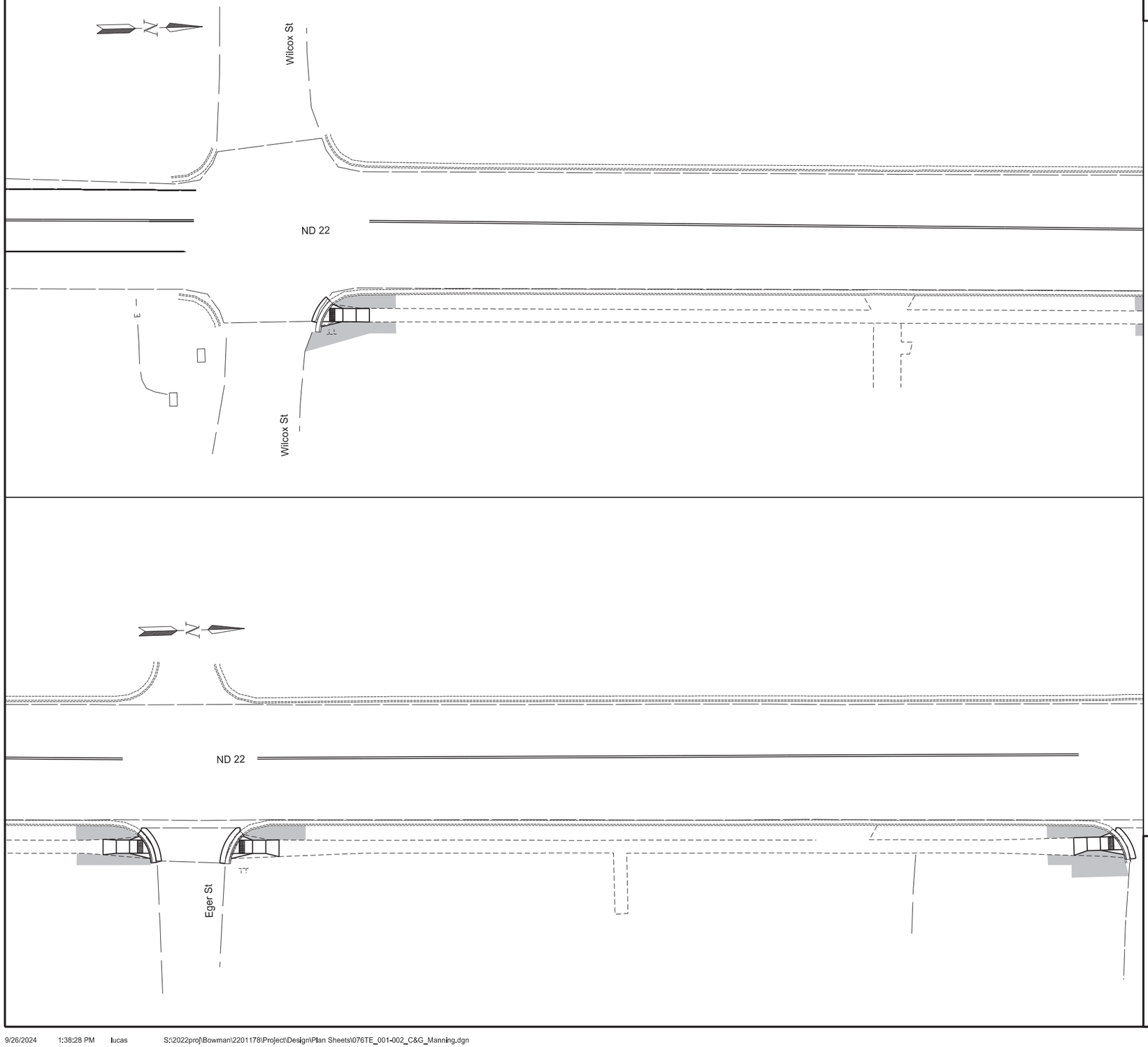
LEGEND

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

ND Highway 22
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Wetland Impacts
RP 96.065 & RP 100.919

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	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
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Temporary Sediment and Erosion Control
RP 95.516 to RP 95.654

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	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

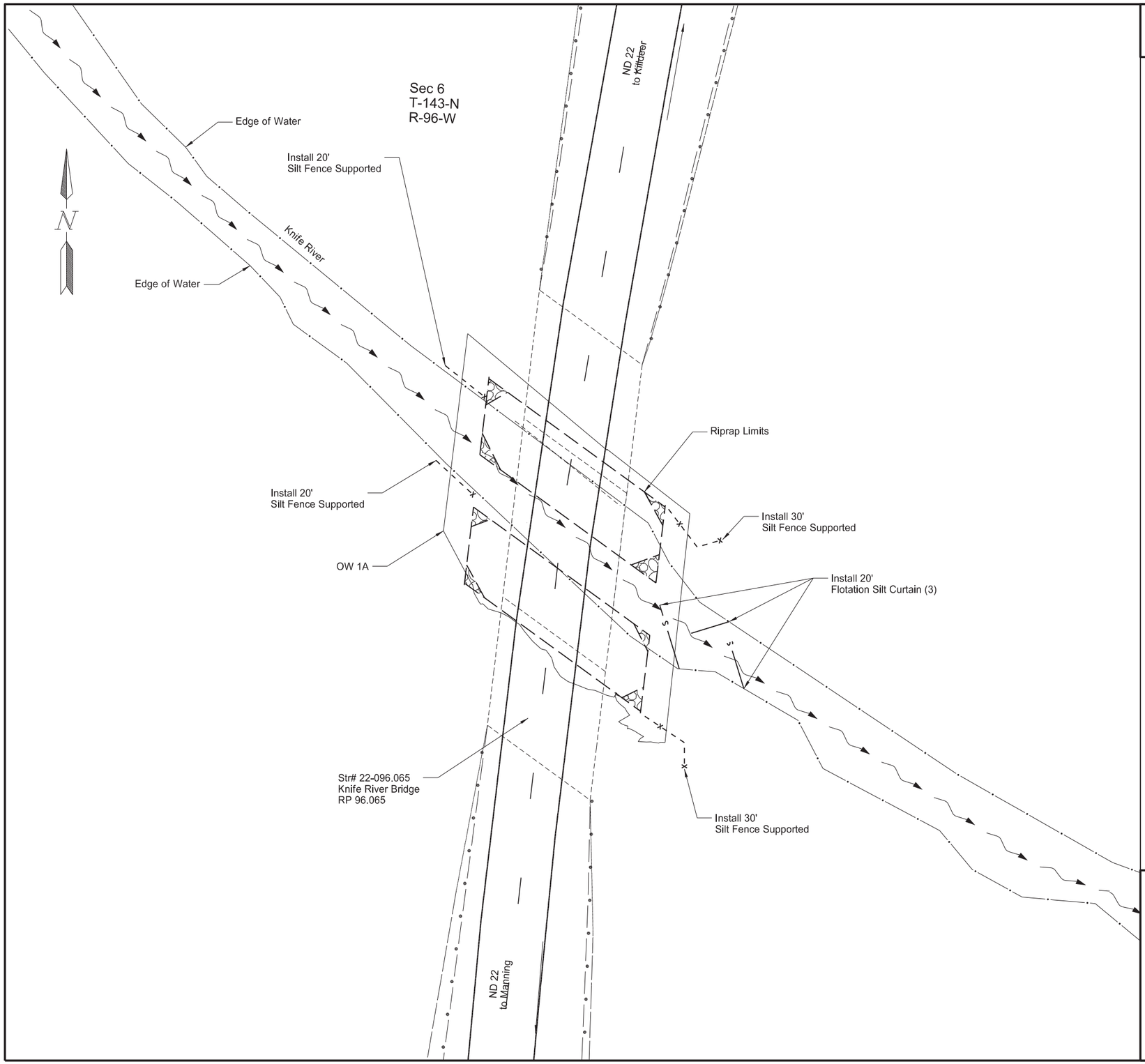
LEGEND

Hydraulic Mulch

ND Highway 22
17th St SW to Jct ND 200

Temporary Sediment and Erosion Control
RP 95.654 to RP 95.810

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	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

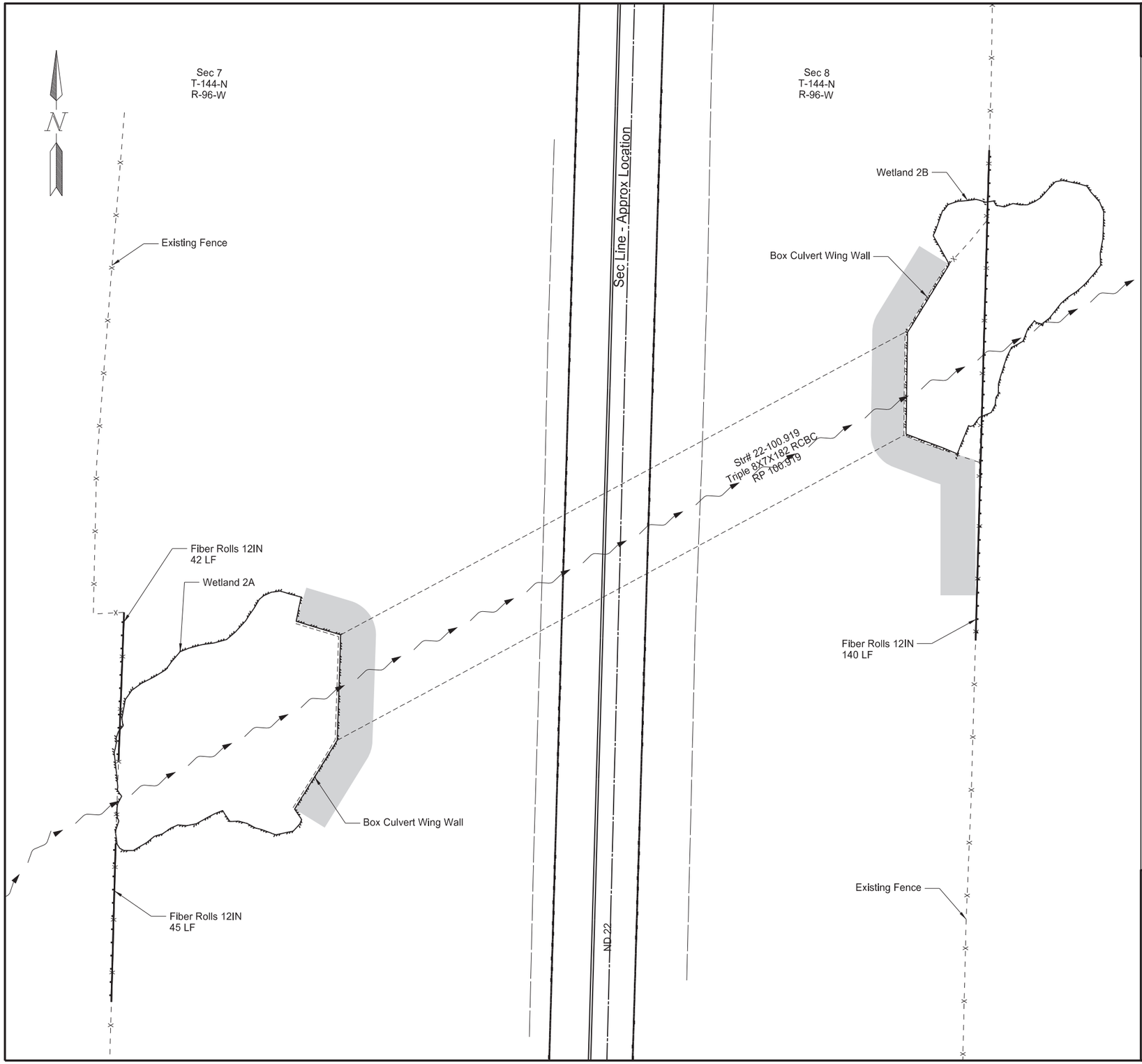
Flow Direction

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

ND Highway 22
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Temporary Sediment and Erosion Control

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	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

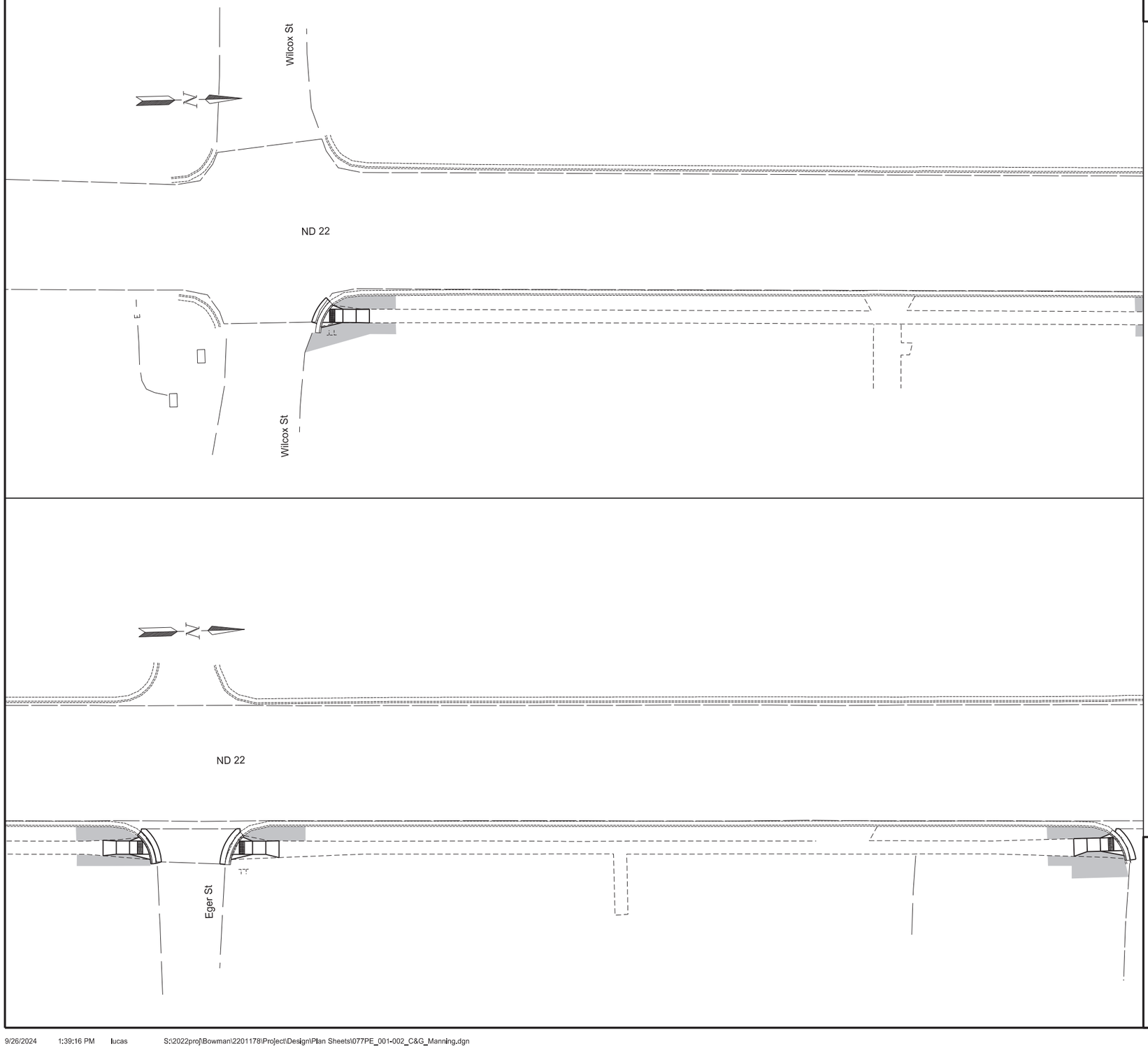
Hydraulic Mulch & Temporary Cover Crop

ND Highway 22
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Temporary Sediment and Erosion Control

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	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

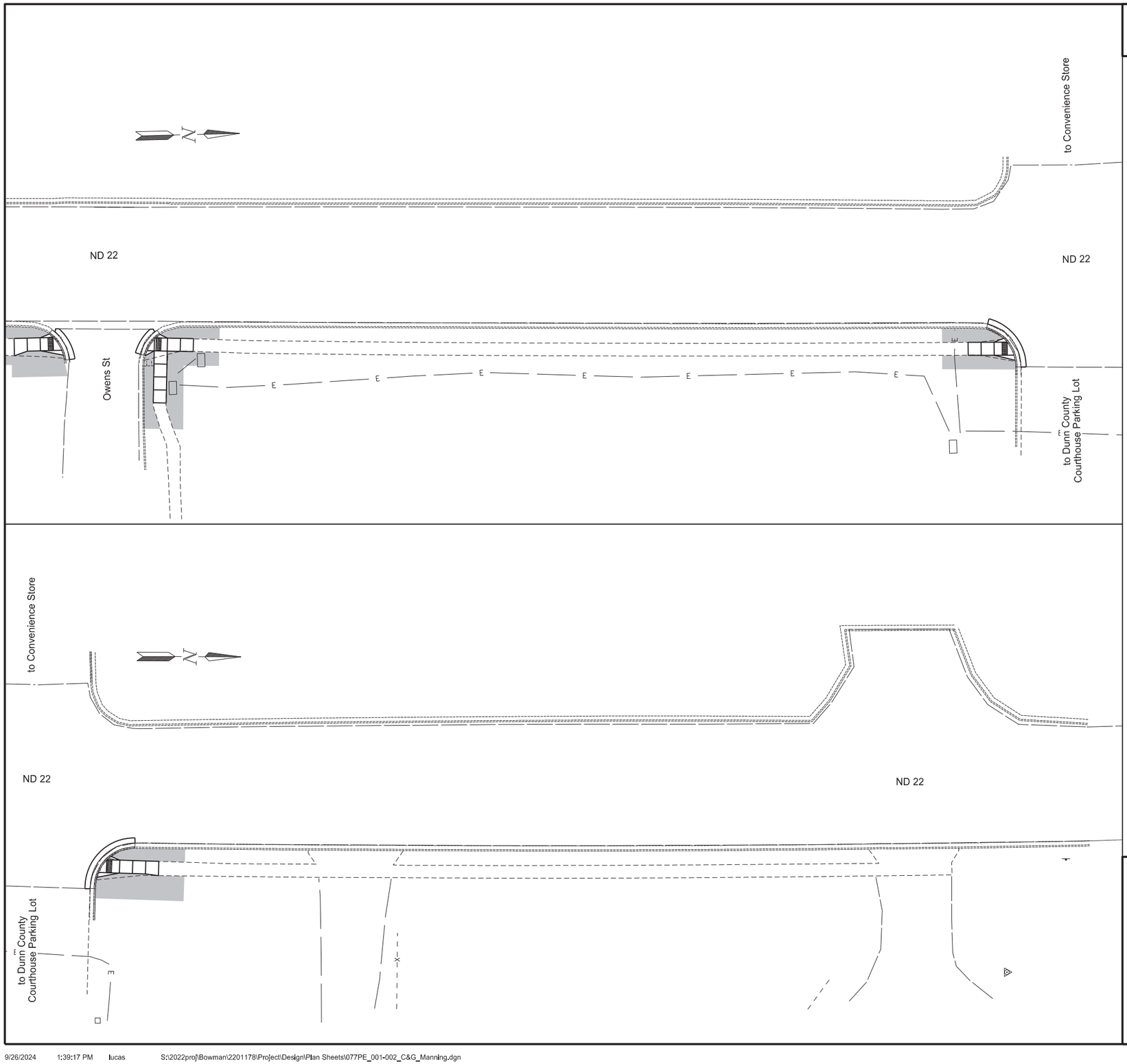
Seeding Class I & Hydraulic Mulch

ND Highway 22
17th St SW to Jct ND 200

Permanent Sediment and Erosion Control
RP 95.516 to RP 95.654

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	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

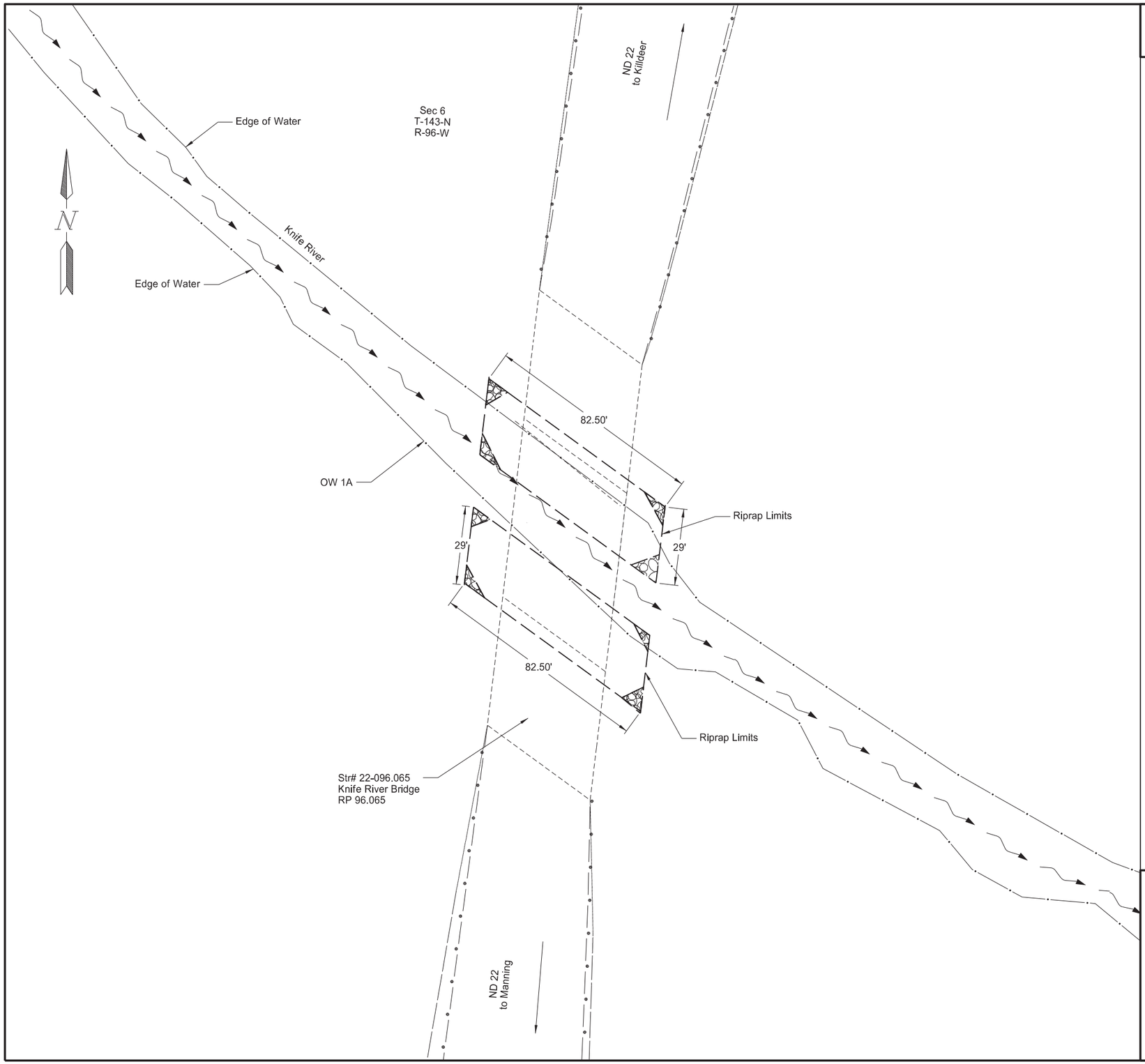
ND Highway 22
17th St SW to Jct ND 200

Permanent Sediment and Erosion Control
RP 95.654 to RP 95.810

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PE-25991
DATE 09/26/24
NORTH DAKOTA

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



LEGEND

Riprap Grade II

Flow Direction

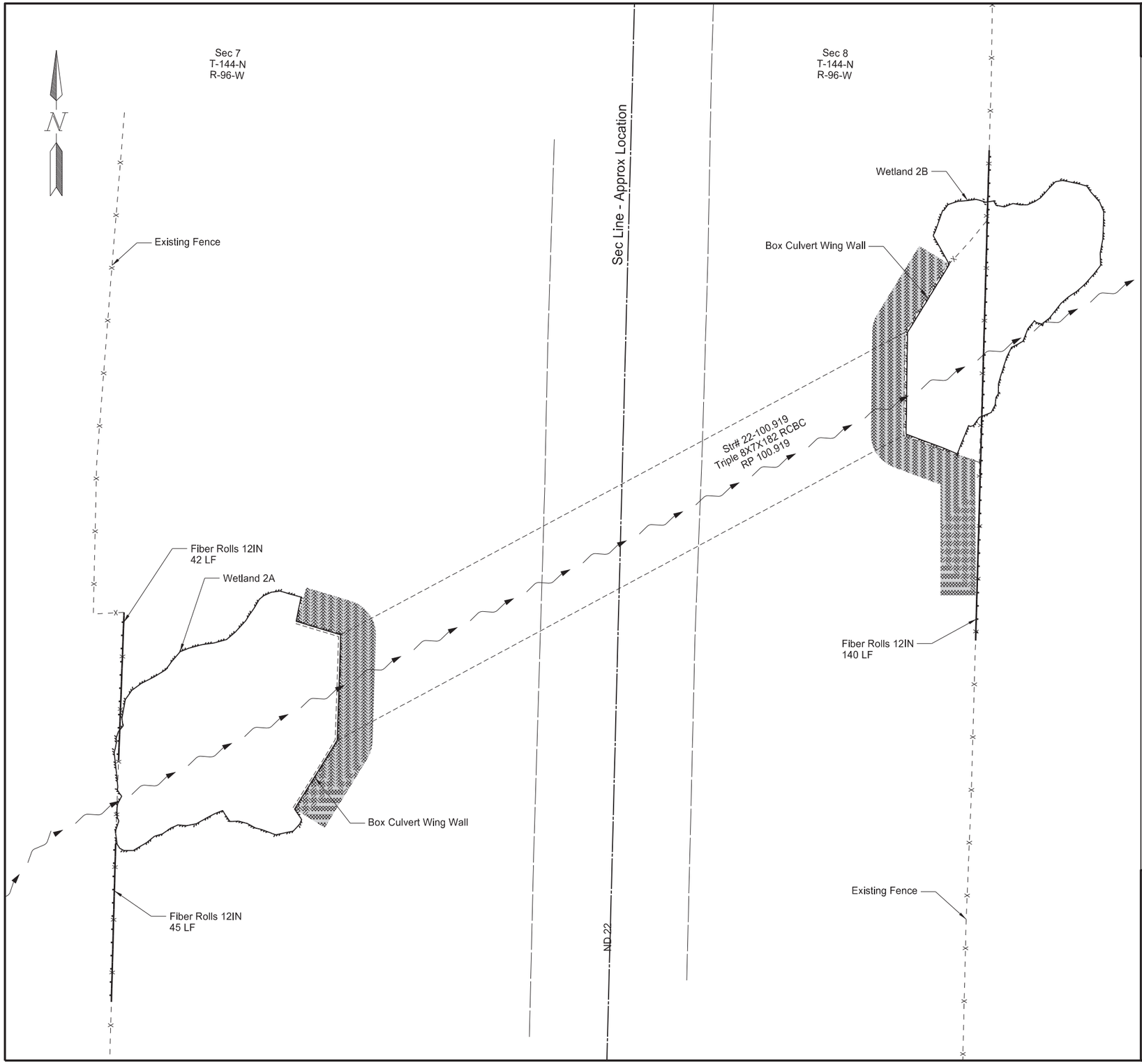
NOTE:
- *DRAWING NOT TO SCALE
- Water Level may vary in field.
- See Section 170 Sheet 2 for Quantities

ND Highway 22
17th St SW to Jct ND 200

Permanent Sediment and Erosion Control

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	77	4

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0200	**SEEDING CLASS II**		
		RP 100.896	0.1	ACRE
253	0210	**HYDRAULIC MULCH WITH TACKIFIER**		
		RP 100.896	204	SY
255	0102	**ECB TYPE 2**		
		RP 100.896	204	SY
261	0112	**FIBER ROLLS 12IN**		
		RP 100.896	227	LF

LEGEND

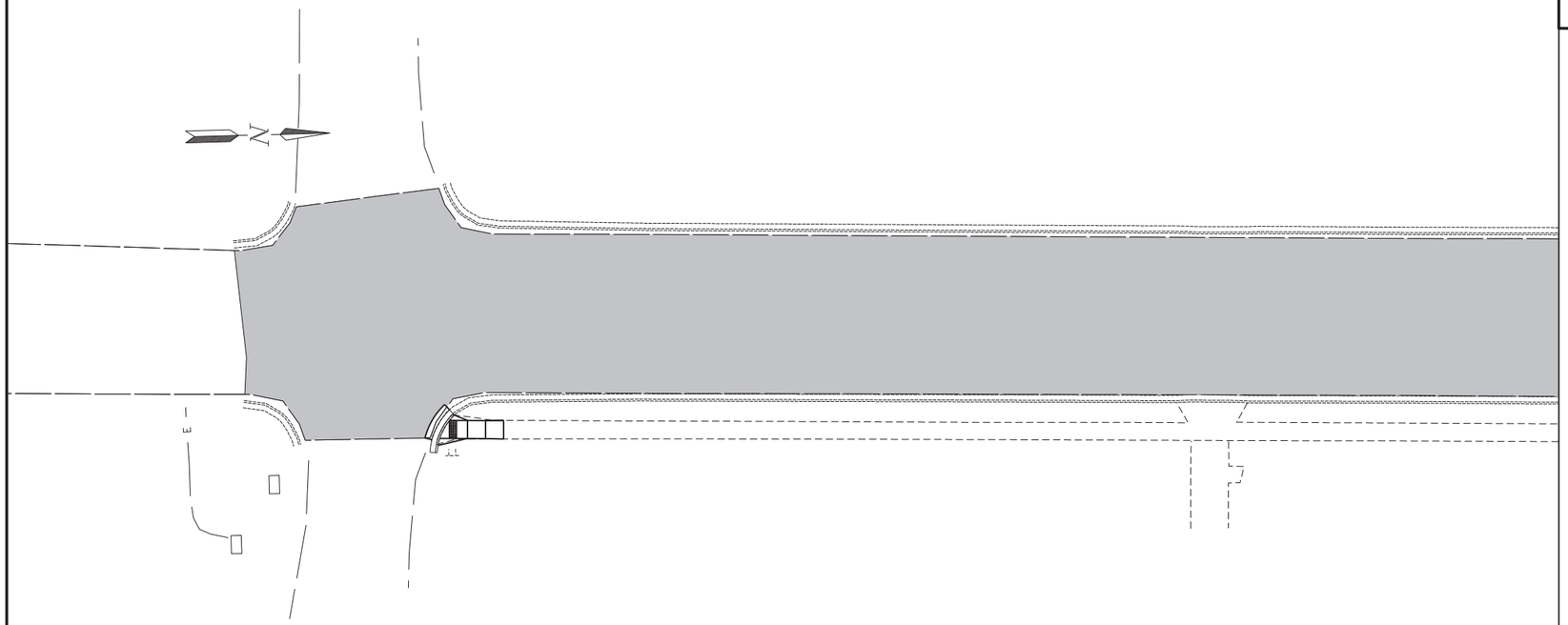
Seeding Class II, Hydraulic Mulch & ECB Type 2

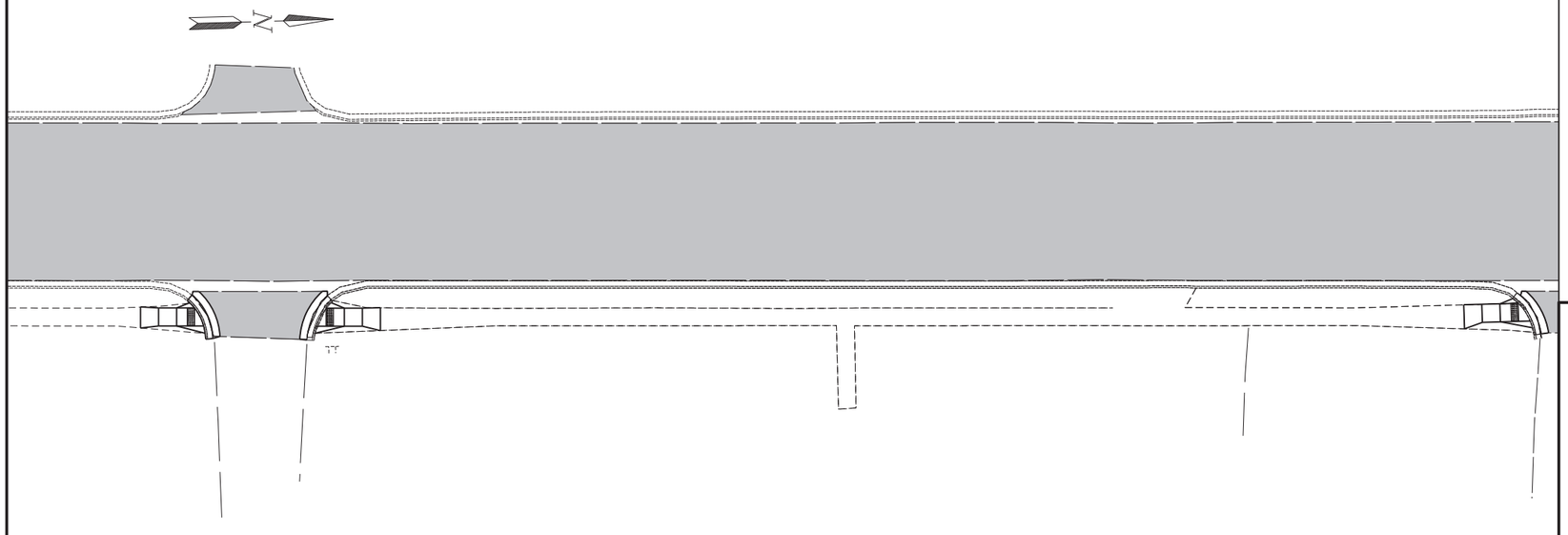
ND Highway 22
17th St SW to Jct ND 200

Permanent Sediment and Erosion Control

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PE-25991
DATE 09/26/24
NORTH DAKOTA

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	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

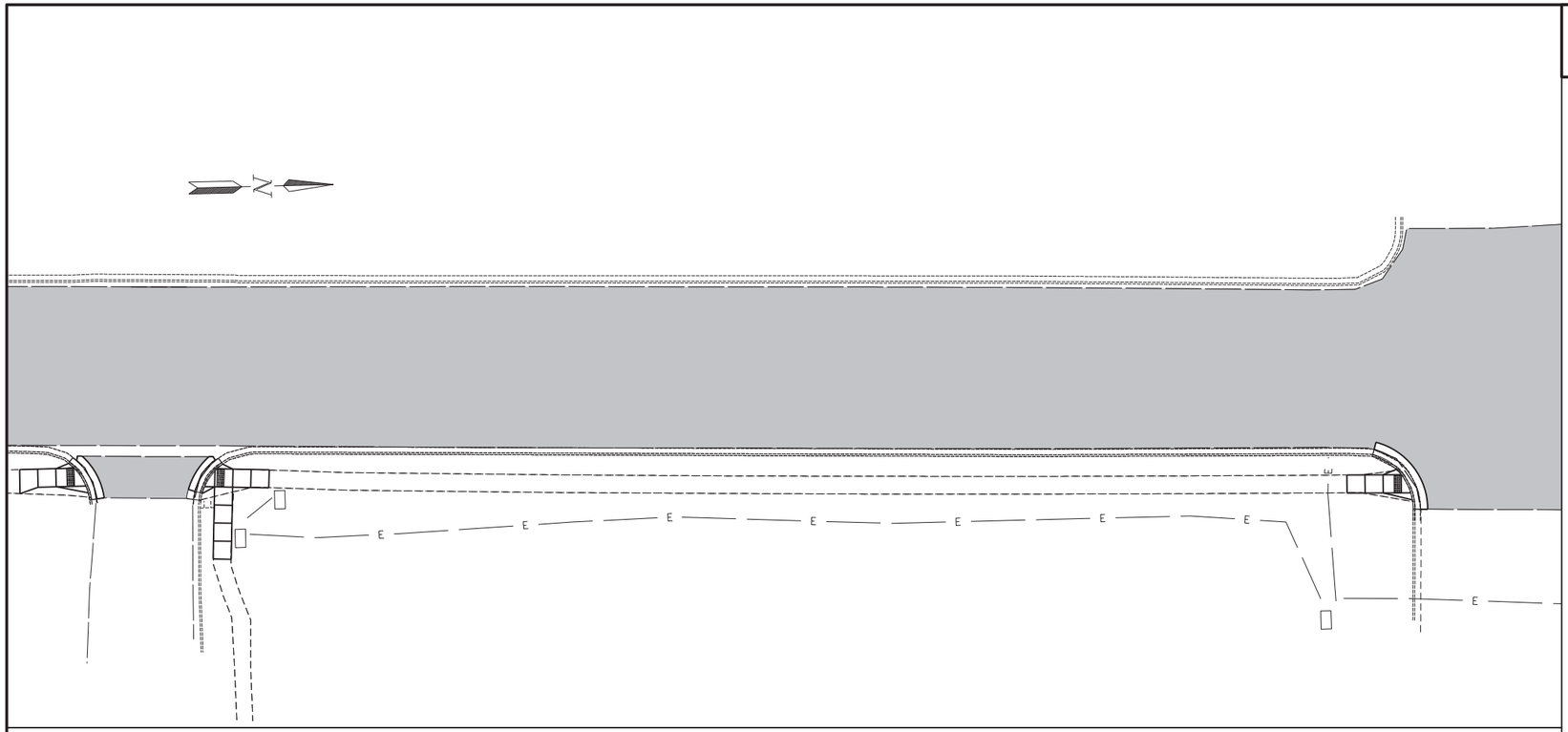
ND Highway 22
17th St SW to Jct ND 200

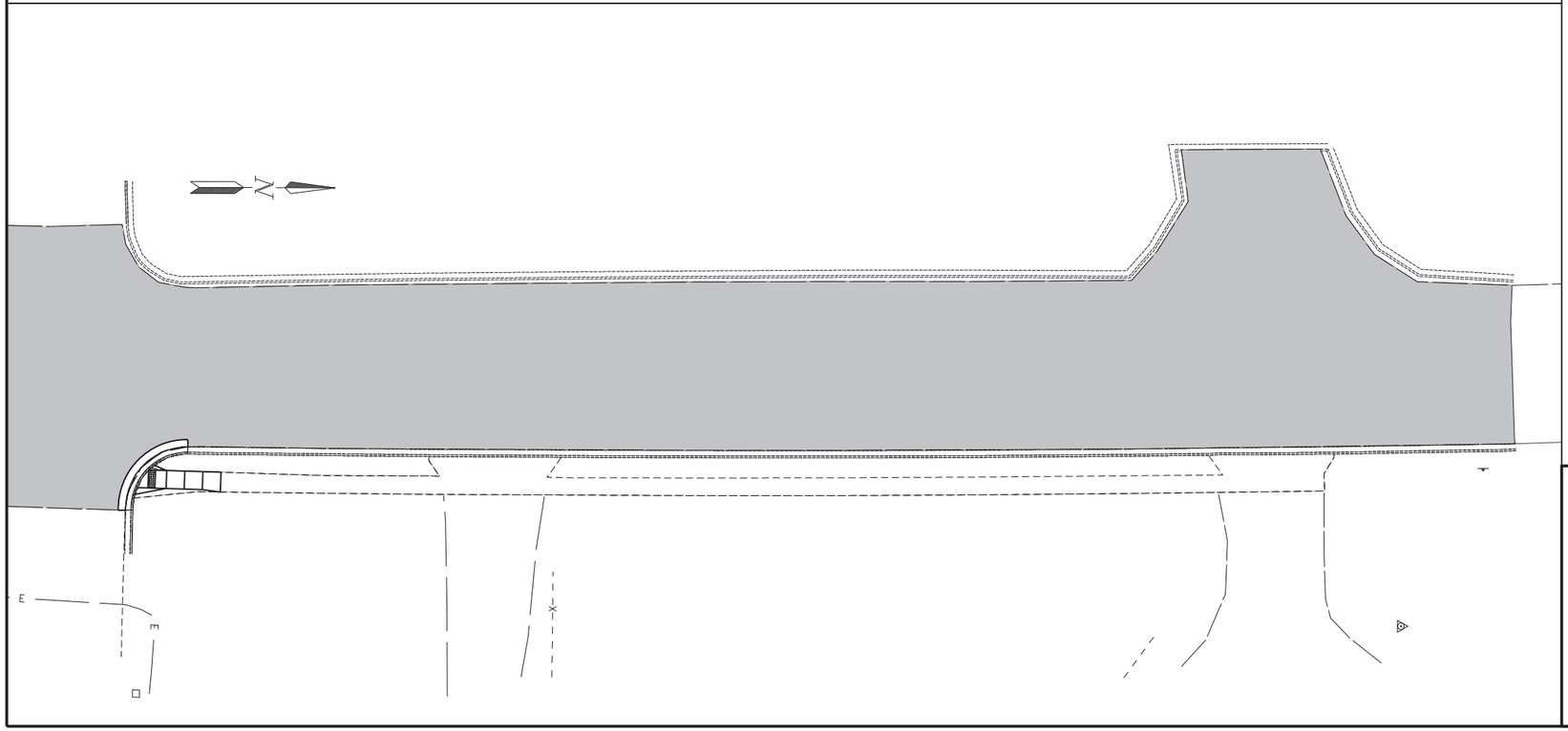
Paving Layout
RP 95.516 to RP 95.654

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

9/26/2024 1:40:02 PM lucas S:\2022proj\Bowman\2201178\Project\Design\Plan Sheets\090PL_001.dgn

	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

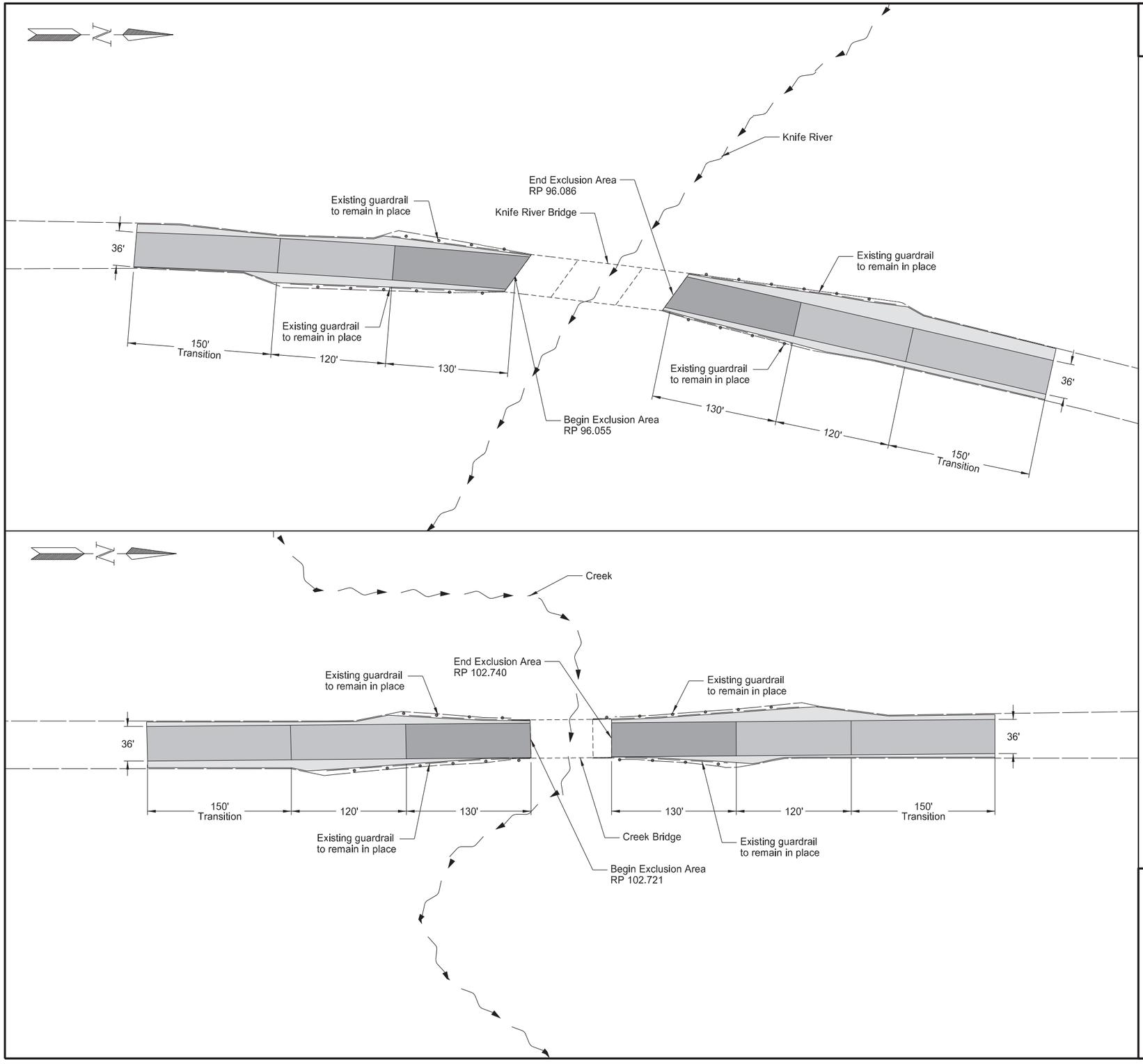
2" Superpave FAA 45, PG 58H-34 Asphalt Cement

ND Highway 22
17th St SW to Jct ND 200

Paving Layout
RP 95.654 to RP 95.810

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	90	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
302	**120**	**AGGREGATE BASE COURSE CL 5**		
		RP 95.979 to RP 96.162	862.5	TON
		RP 102.645 to RP 102.816	862.5	TON
401	**50**	**TACK COAT**		
		RP 95.979 to RP 96.162	327.9	GAL
		RP 102.645 to RP 102.816	312.1	GAL
430	**0045**	**SUPERPAVE FAA 45**		
		RP 95.979 to RP 96.162	778	TON
		RP 102.645 to RP 102.816	742	TON
430	**5818**	**PG 58H-34 ASPHALT CEMENT**		
		RP 95.979 to RP 96.162	47	TON
		RP 102.645 to RP 102.816	45	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

NOTES:

- Refer to Section 20, Sheet 3 for Paving Transitions.
- Refer to Section 20, Sheet 4 for Bridge Repair Sections.

ND Highway 22
17th St SW to Jct ND 200

Paving Layout

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	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 $150 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 $150 (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	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-6-48	48"x48"	SURVEY CREW		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-52-48	48"x48"	PAVEMENT BREAKS		35	
W21-53-48	**48"x48"**	**RUMBLE STRIPS AHEAD**	**4**	**35**	**140**
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE		35	

SPECIAL SIGNS

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**2959**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**1300**
704-1018	**LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL**	**EACH**	**1**
704-1048	**PORTABLE RUMBLE STRIPS**	**EACH**	**4**
704-1050	TYPE I BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**8**
704-1054	**SIDEWALK BARRICADE**	**EACH**	**8**
704-1058	**PEDESTRIAN WALKWAY**	**LF**	**473**
704-1060	**DELINEATOR DRUMS**	**EACH**	**30**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**400**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	**STACKABLE VERTICAL PANELS**	**EACH**	**64**
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
704-1185	**PILOT CAR**	**HR**	**308**
704-1500	**OBLITERATION OF PVMT MK**	**SF**	**267**
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	

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/

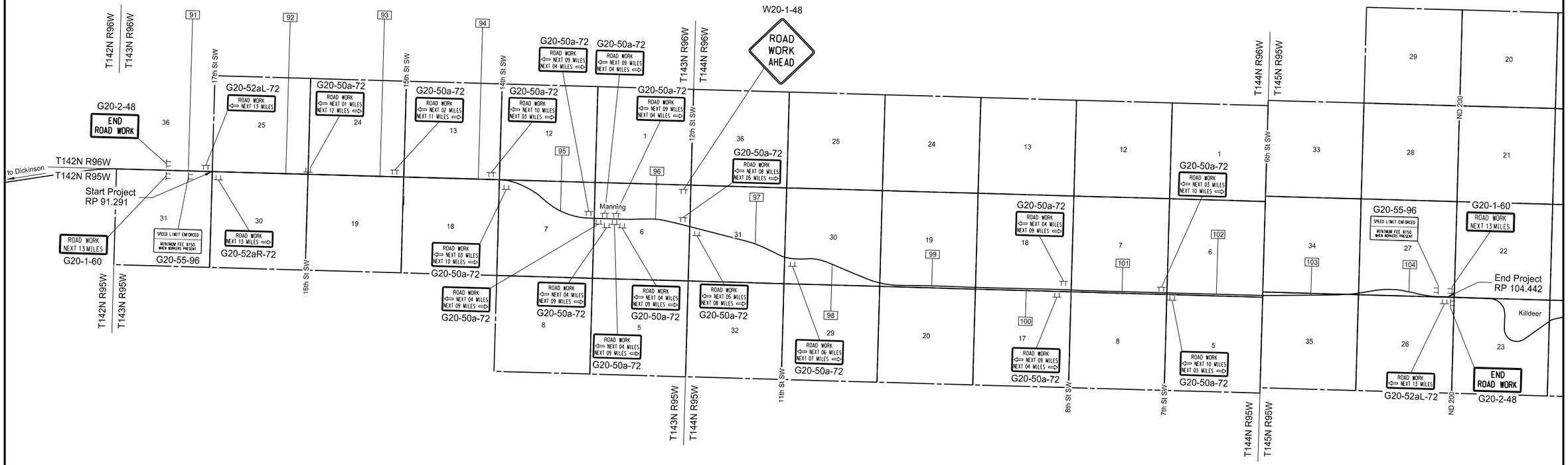
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/25/26
NORTH DAKOTA

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

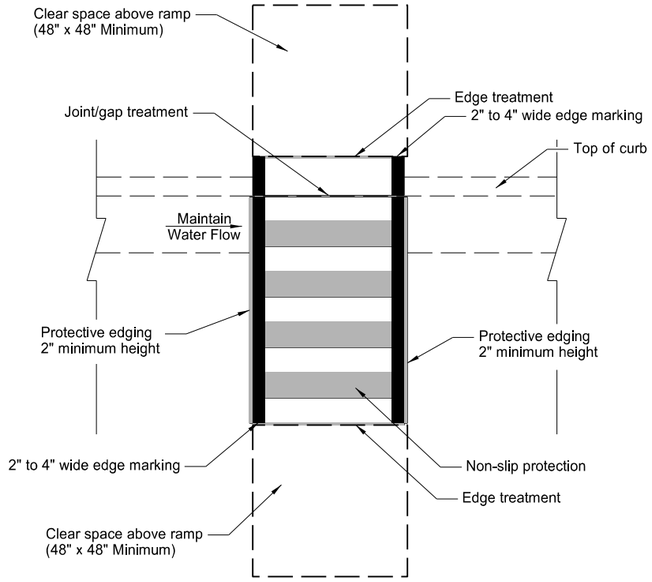


ND Highway 22
17th St SW to Jct ND 200

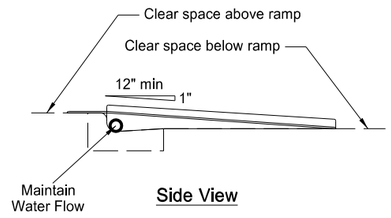
Work Zone Traffic Control

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/25/26
NORTH DAKOTA

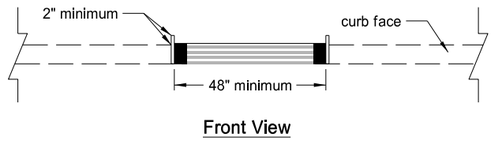
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	100	3



Top View

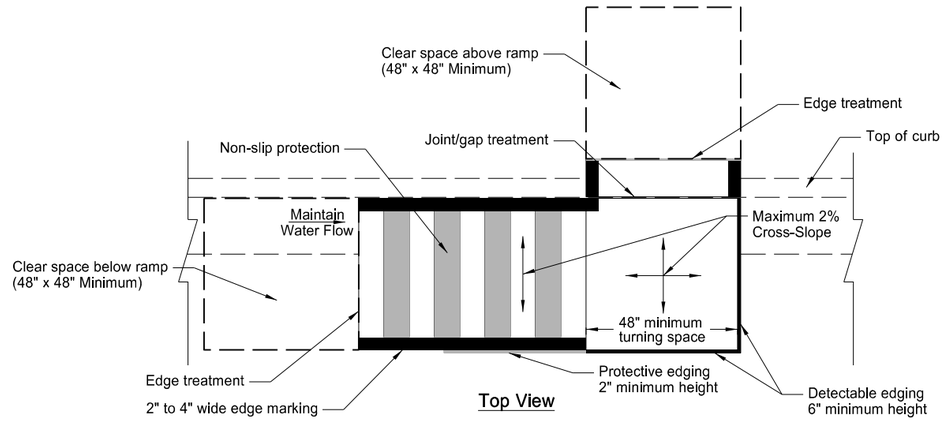


Side View

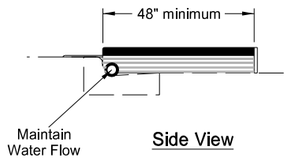


Front View

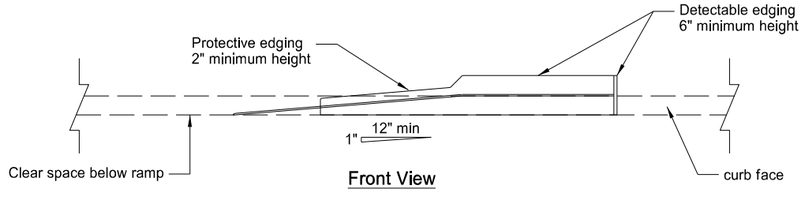
Temporary Perpendicular Curb Ramp



Top View



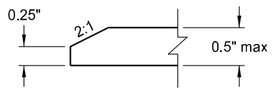
Side View



Front View

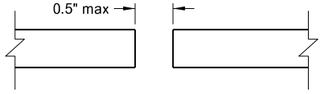
Temporary Parallel Curb Ramp

Edge Treatment



Maximum Surface
Height Change Detail

Joint/Gap Treatment



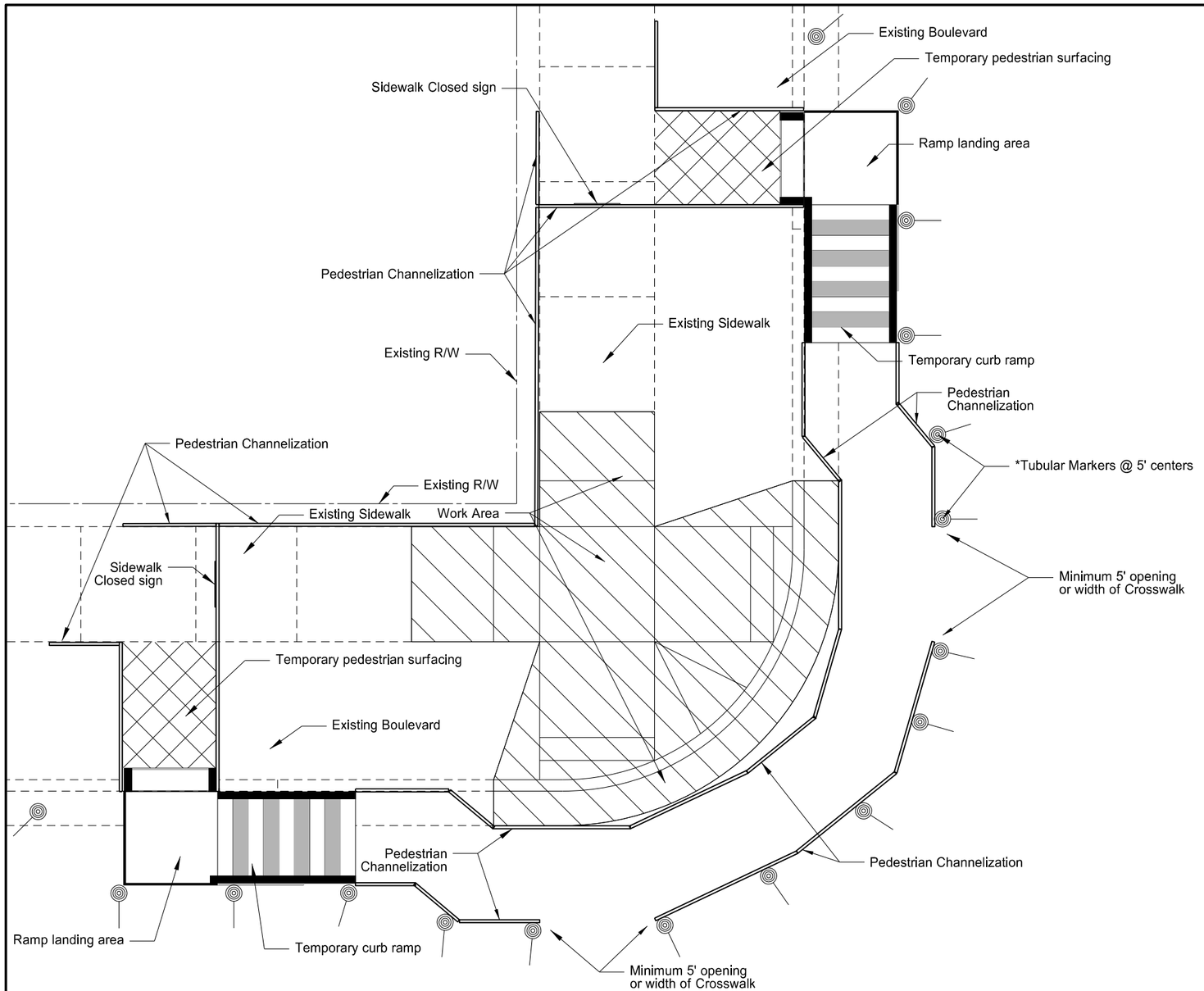
Maximum Width
Lateral Joints or Gaps

ND Highway 22
17th St SW to Jct ND 200

Temporary Pedestrian Curb Ramp Details

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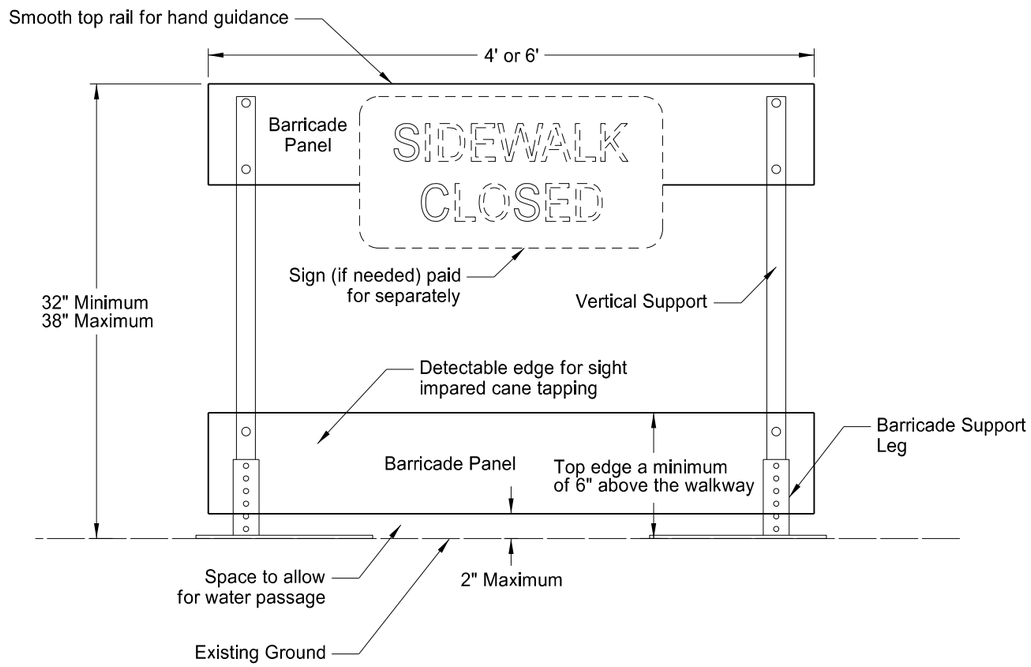
*NOTE: Eliminate tubular markers if pedestrian channelization is retro-reflective

ND Highway 22
17th St SW to Jct ND 200

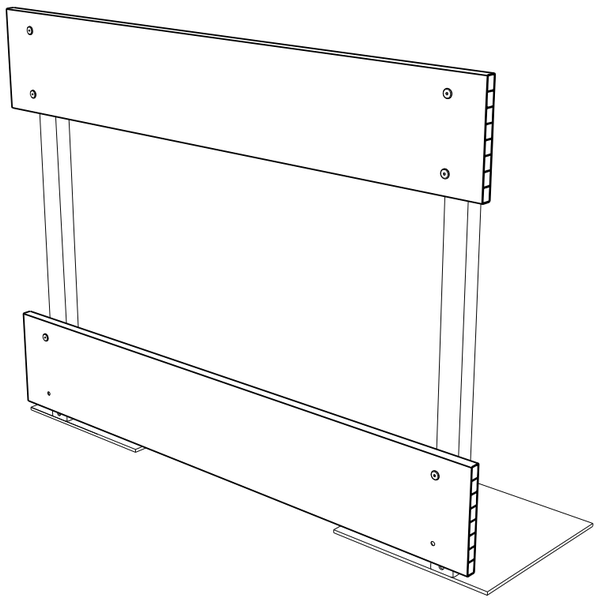
Temporary Pedestrian Access Route

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NORTH DAKOTA

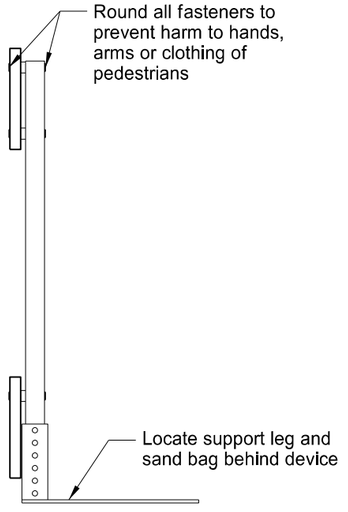
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Front View



Perspective View



End View

NOTES:

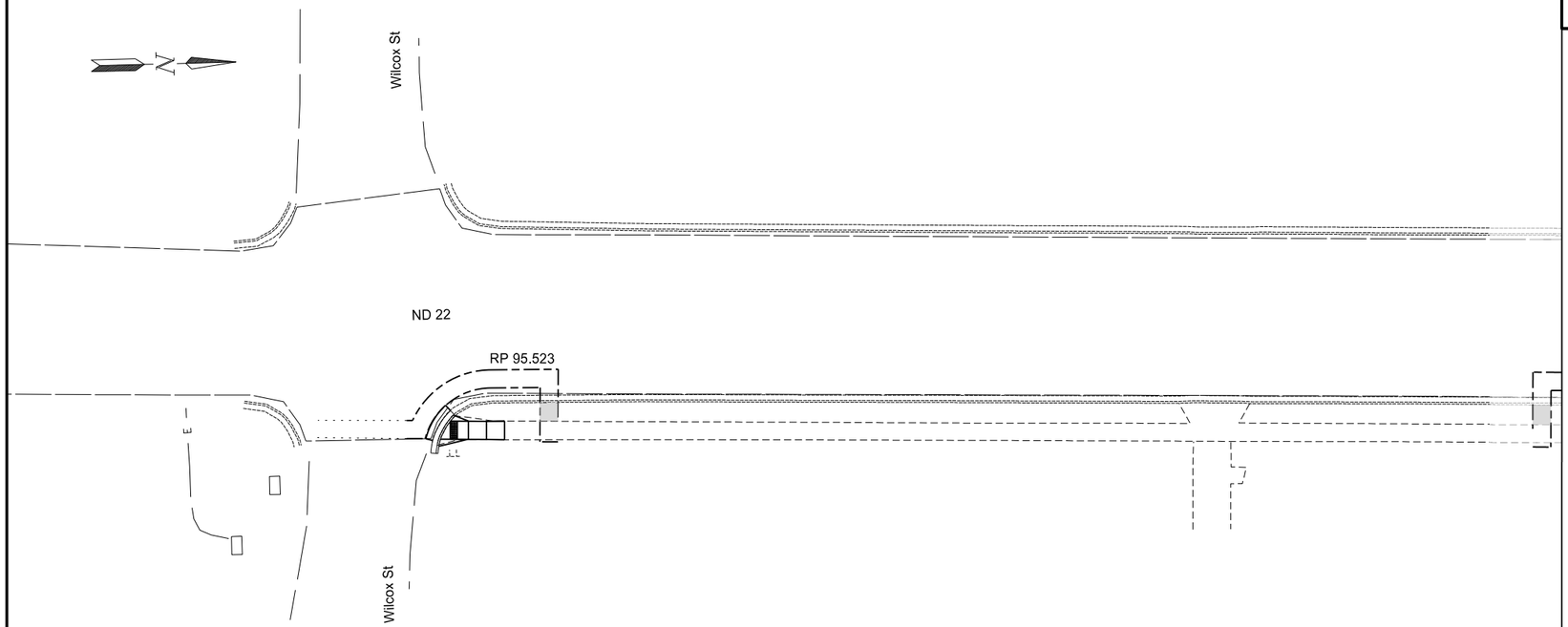
Sidewalk Barricades

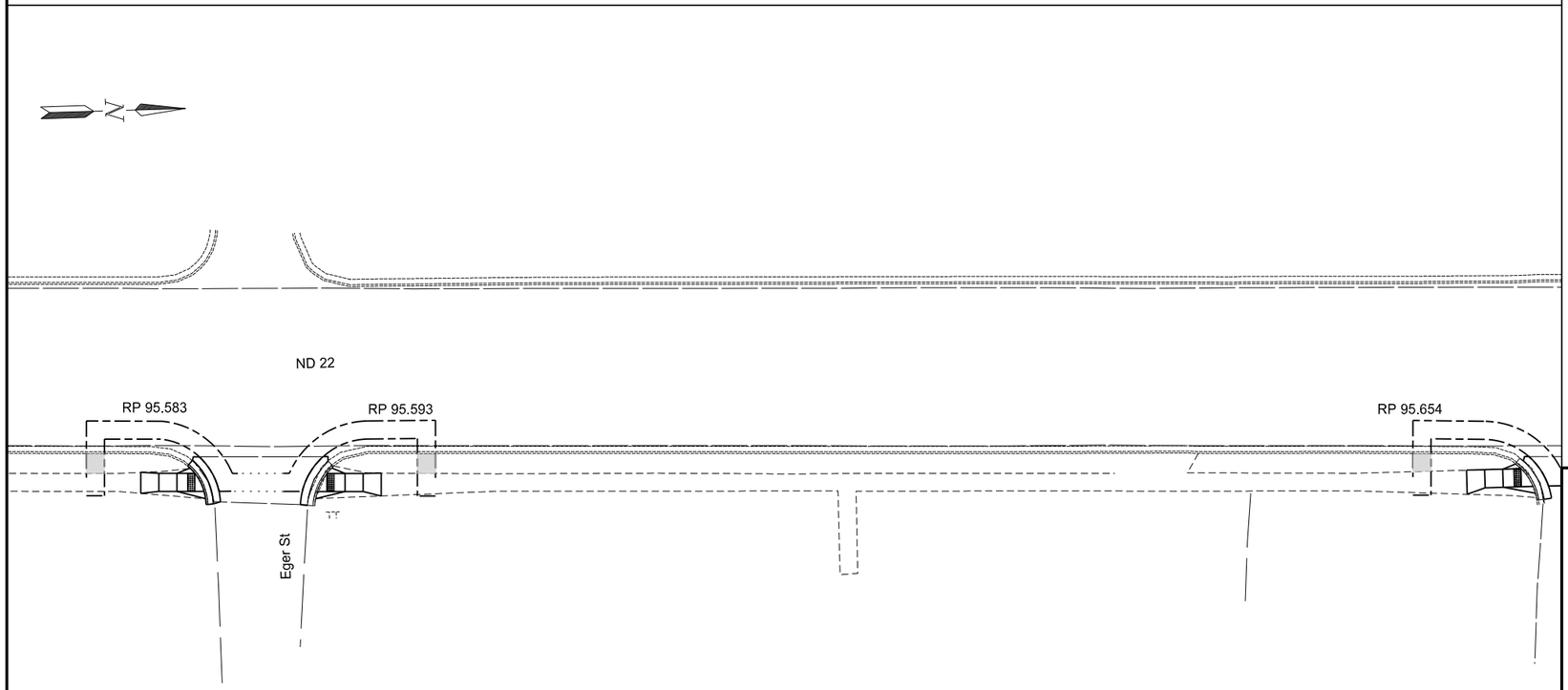
1. Provide self standing sidewalk barricade with no supports extending into the pedestrians path.
2. Use orange or orange and white diagonal striped barricade panels contrasting with the walkway surface.
3. Provide ADA compliant and NCHRP 350 or Mash Test Level 3 (TL3) approved sidewalk barricades.
4.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

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Sidewalk Barricade

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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

LEGEND

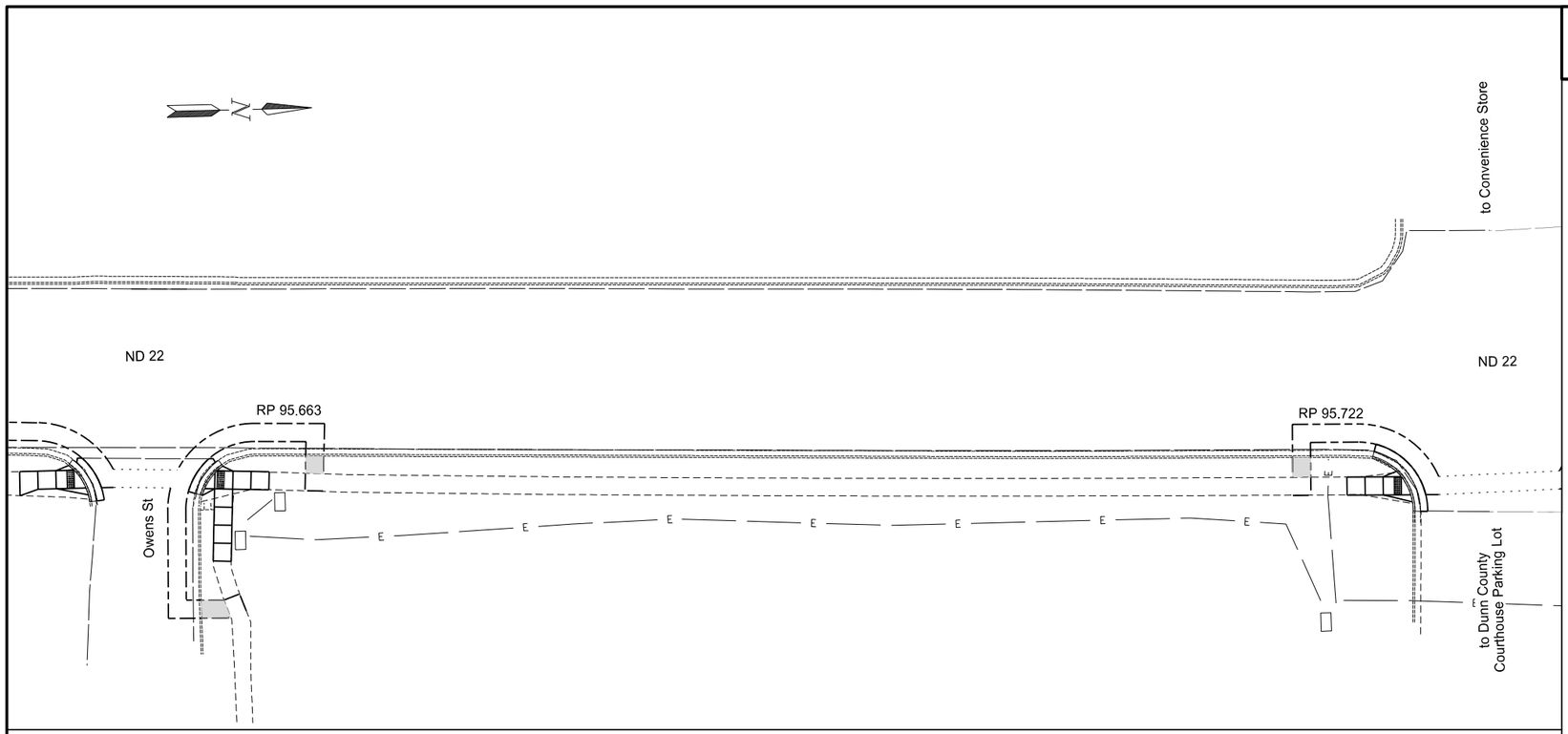
- Pedestrian Crossing
- Pedestrian Channelization
- Temporary Pedestrian Surfacing

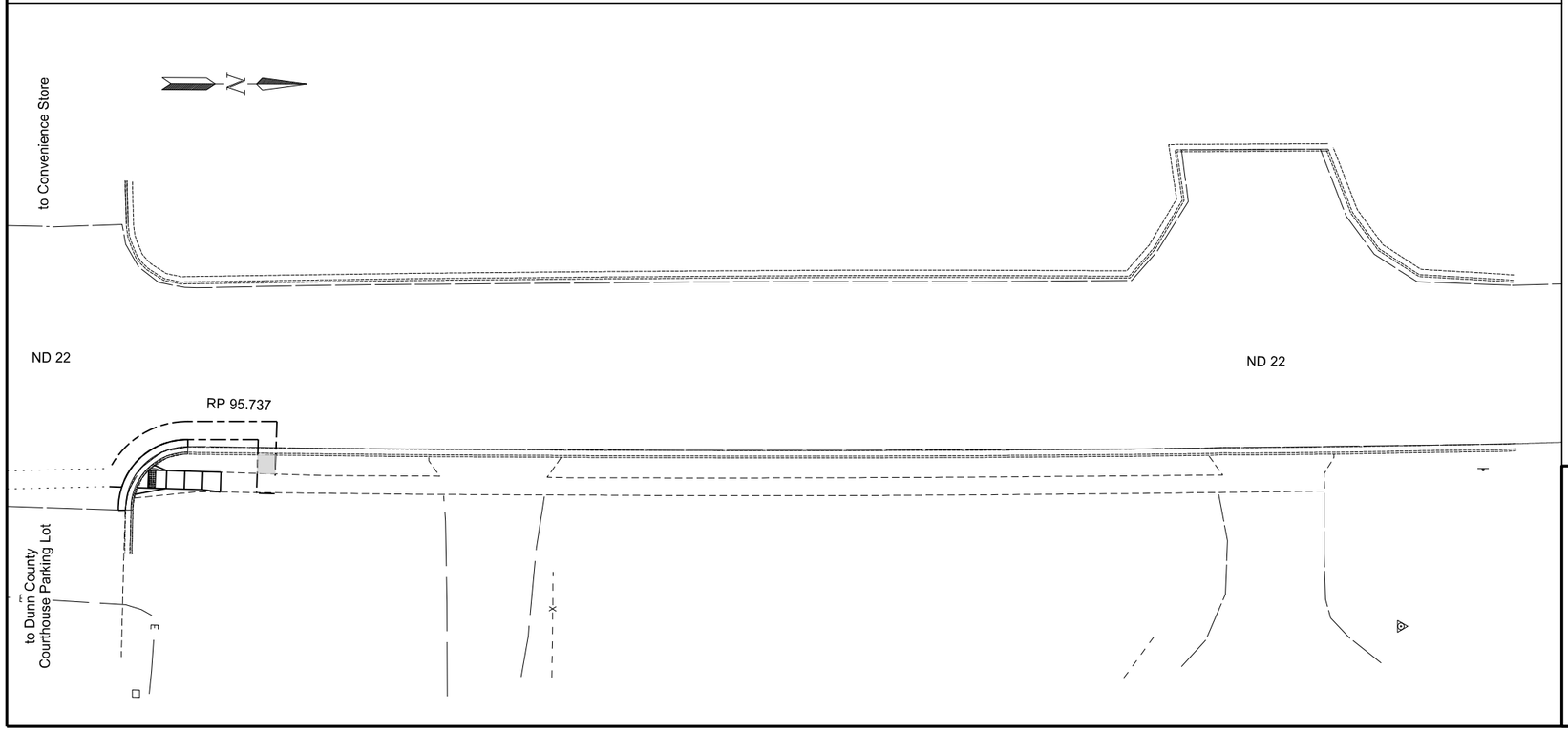
ND Highway 22
17th St SW to Jct ND 200

Work Zone Traffic Control
RP 95.516 to RP 95.654

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SPEC	CODE	BID ITEM	QUANTITY	UNIT
704	**1054**	**SIDEWALK BARRICADE**		
		RP 95.663	2	EA
		RP 95.722	1	EA
		RP 95.737	1	EA
704	**1058**	**PEDESTRIAN WALKWAY**		
		RP 95.663	112	LF
		RP 95.722	61	LF
		RP 95.737	66	LF
704	**2108**	**TEMPORARY CURB RAMP**		
		RP 95.663	1	EA
		RP 95.722	1	EA
		RP 95.737	1	EA

LEGEND

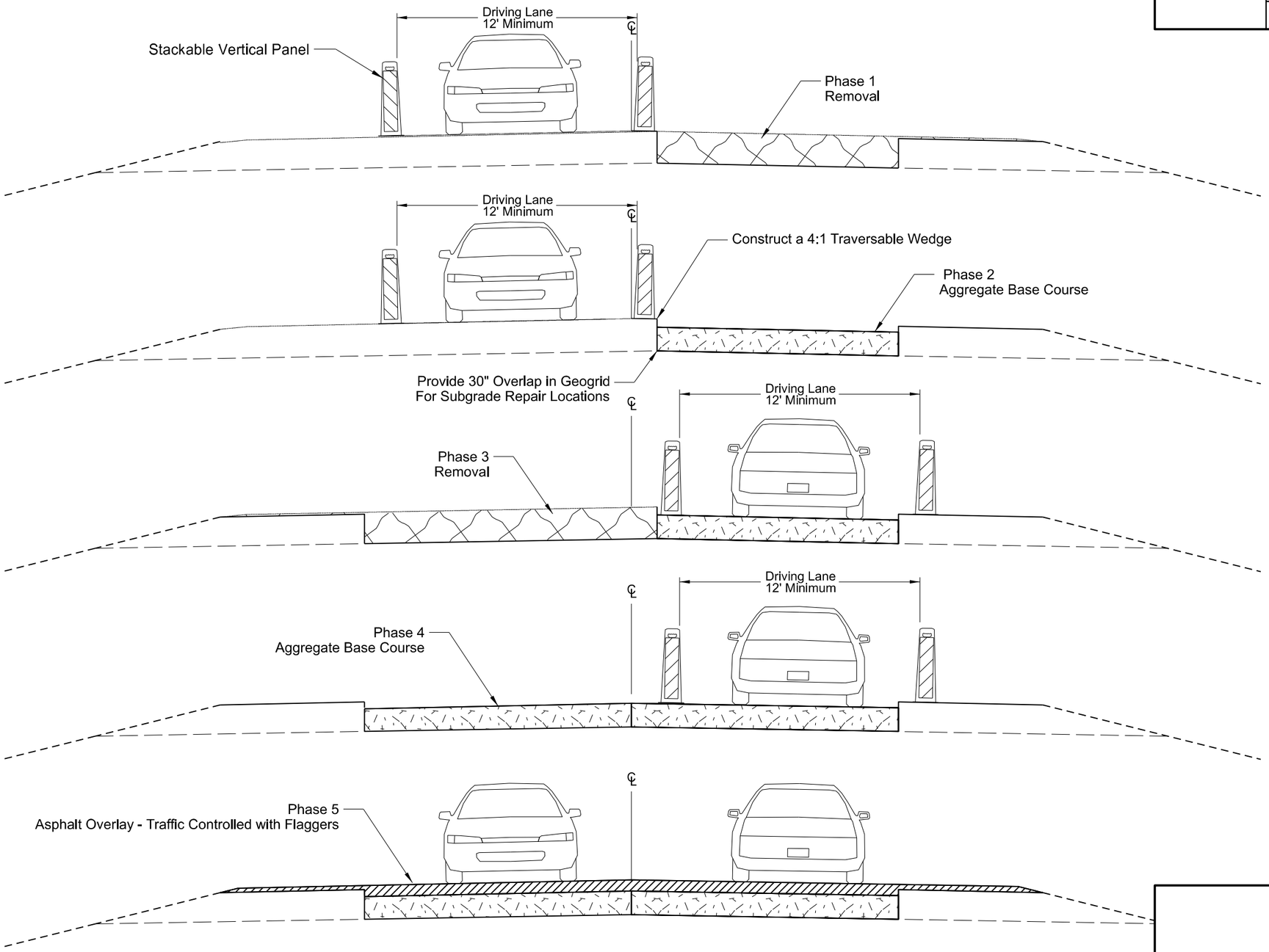
- Pedestrian Crossing
- Pedestrian Channelization
- Temporary Pedestrian Surfacing

ND Highway 22
17th St SW to Jct ND 200

Work Zone Traffic Control
RP 95.654 to RP 95.810

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	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
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Work Zone Traffic Control Phasing
for Bridge Approach Repair
RP 96.065 & RP 102.754

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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**

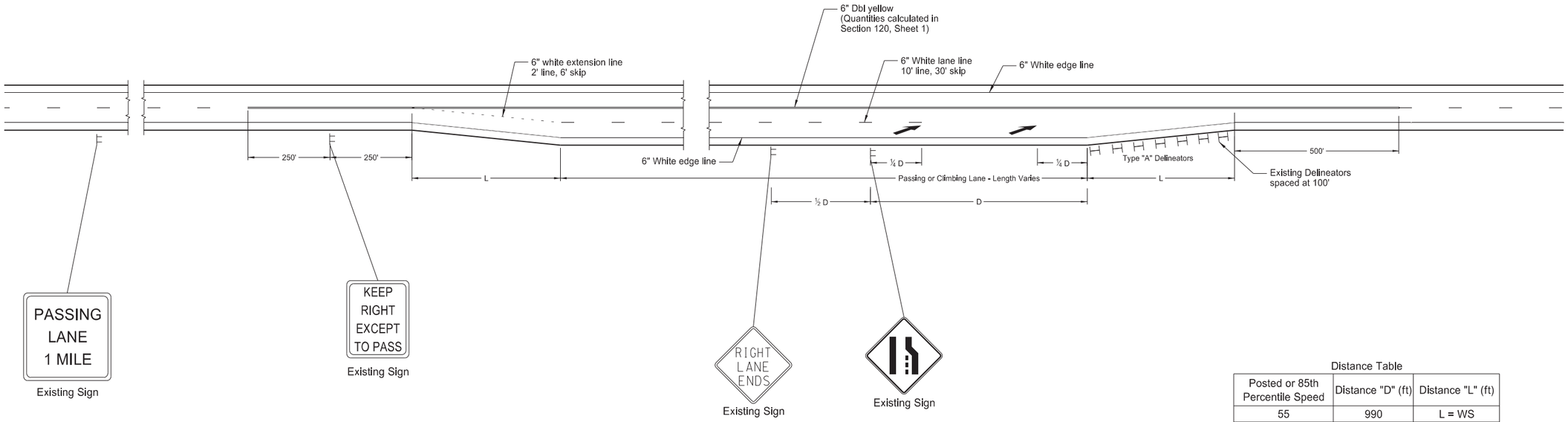
ND Highway 22
17th St SW to Jct ND 200

Pavement Markings

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NORTH DAKOTA

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SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0112	EPOXY PVMT MK MESSAGE	328	SF
762	0114	EPOXY PVMT 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)

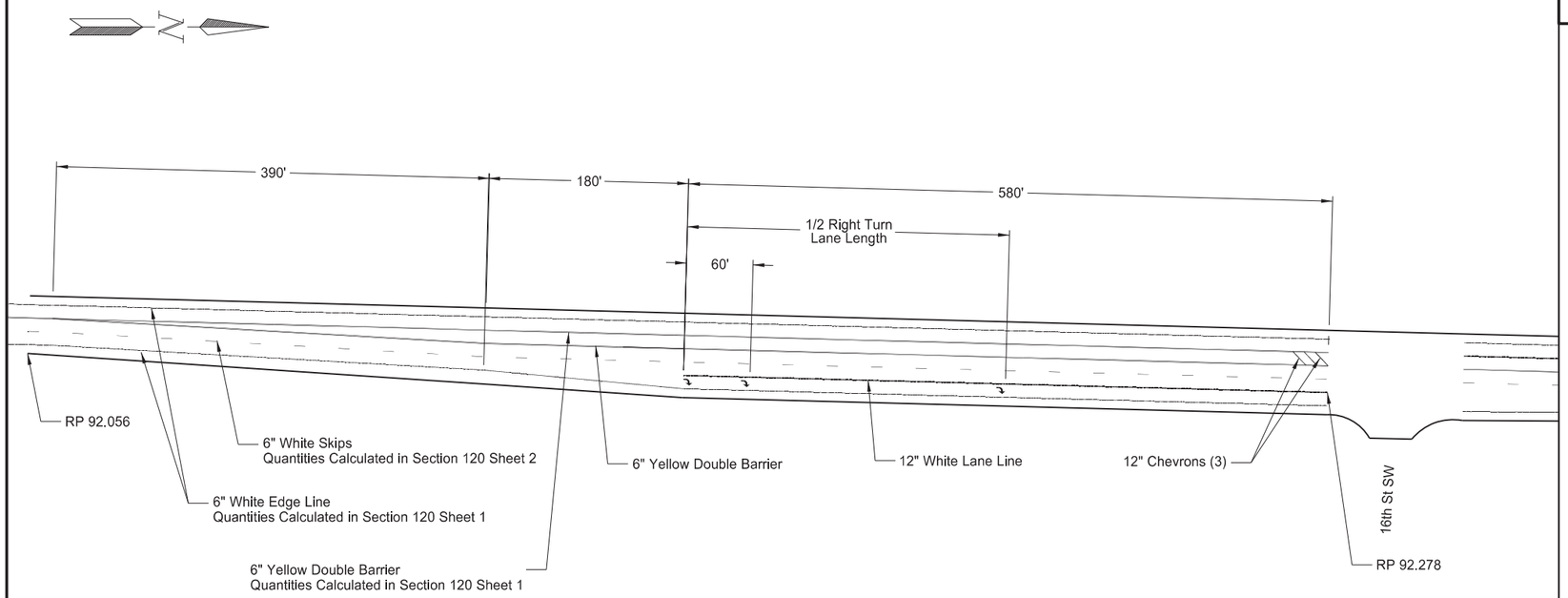
PASSING / CLIMBING LANE LOCATIONS							6" WHITE CL SKIPS LENGTH (FT)	6" WHITE SHORT SKIPS LEGNTH (FT)	DIRECTIONAL ARROW MESSAGE
	(RP)		FULL WIDTH		(RP)				
DIRECTION	BEGIN TAPER	END TAPER	BEGIN	END	BEGIN TAPER	END TAPER			
NB	91.49	91.71	91.71	93.47	93.47	93.83	9,293	1,162	2
SB	92.84	93.13	93.13	95.18	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

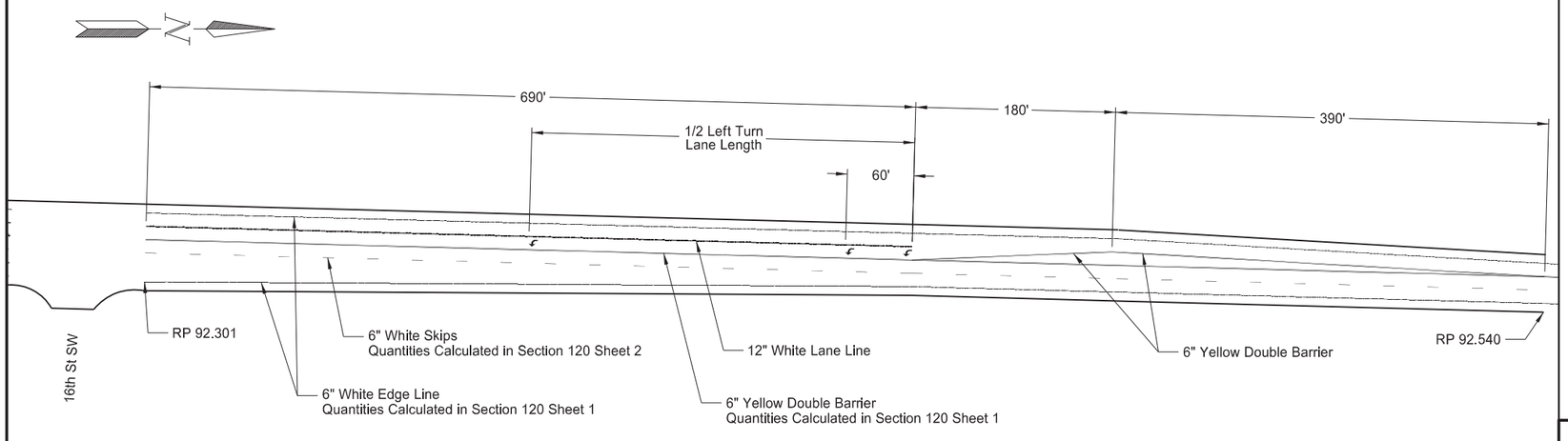
ND Highway 22
17th St SW to Jct ND 200

Pavement Markings

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	ND	XA-SS-5-022(141)091	120	3





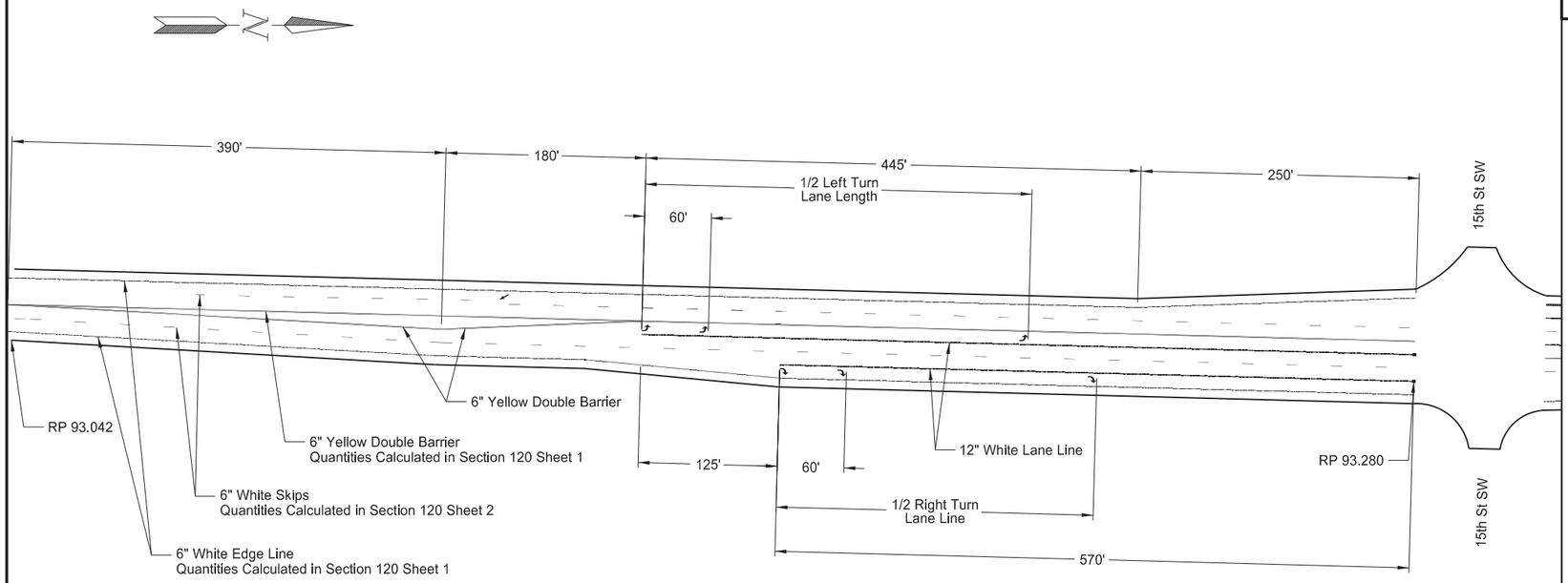
SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	**0111**	**EPOXY PVMT MK 12IN LINE**		
		White Lane Line	1270	LF
		Yellow Chevrons (3)	51	LF
762	**0112**	**EPOXY PVMT MK MESSAGE**		
		Turn Lane Arrows (6)	96	SF
762	**0114**	**EPOXY PVMT MK 6IN LINE**		
		Yellow Double Barrier	3550	LF
762	**0432**	**SHORT TERM 6IN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

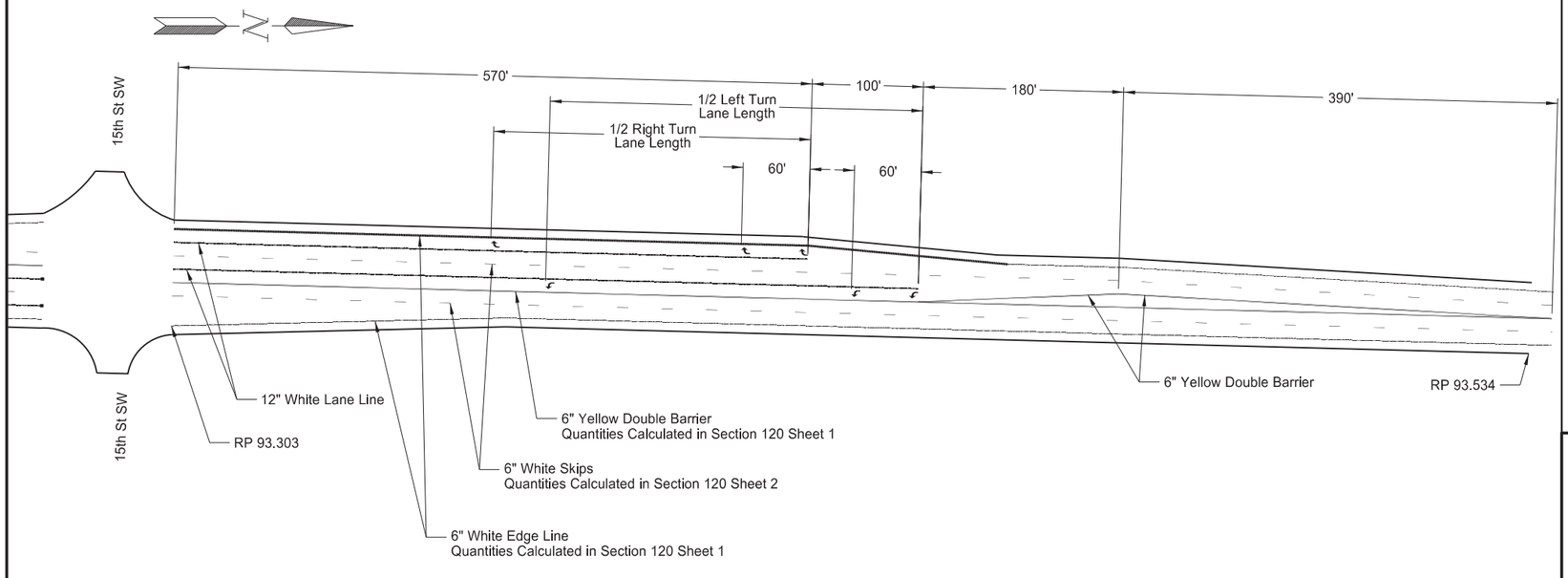
ND Highway 22
17th St SW to Jct ND 200

Pavement Markings
16th St SW

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ND	XA-SS-5-022(141)091	120	4



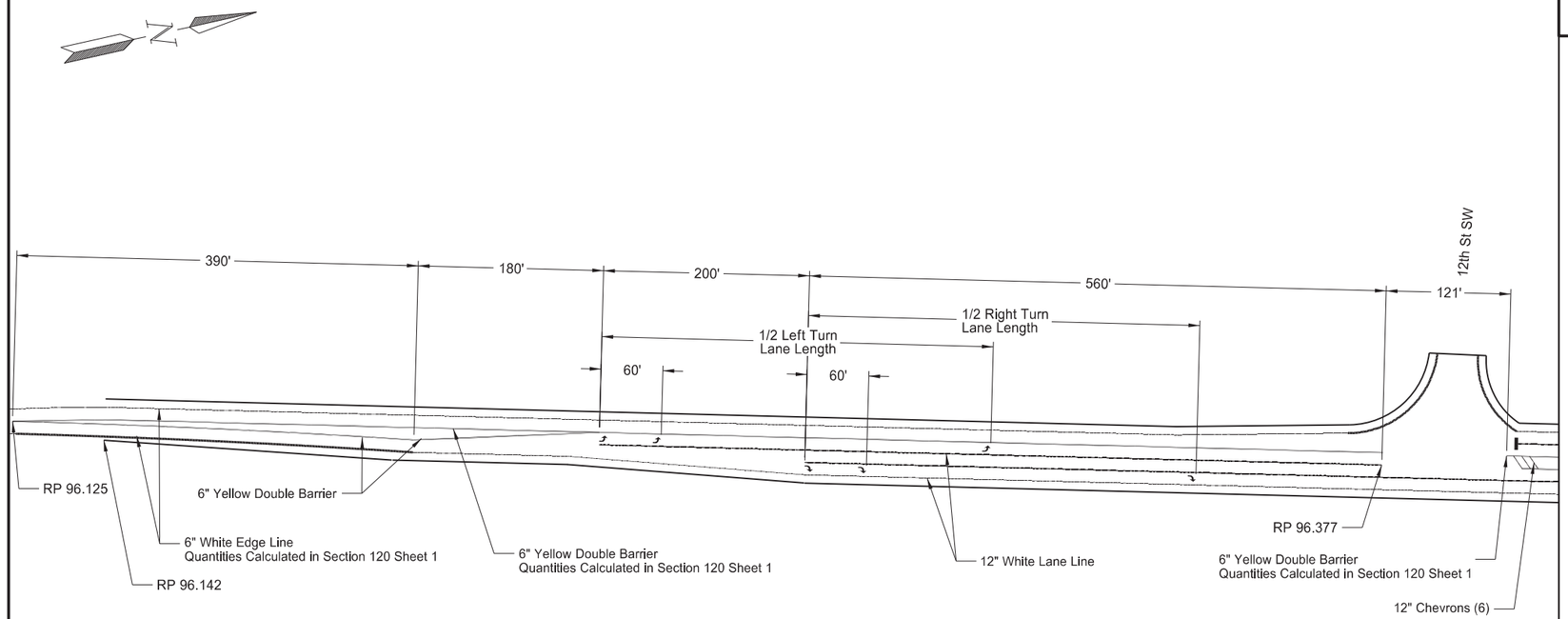


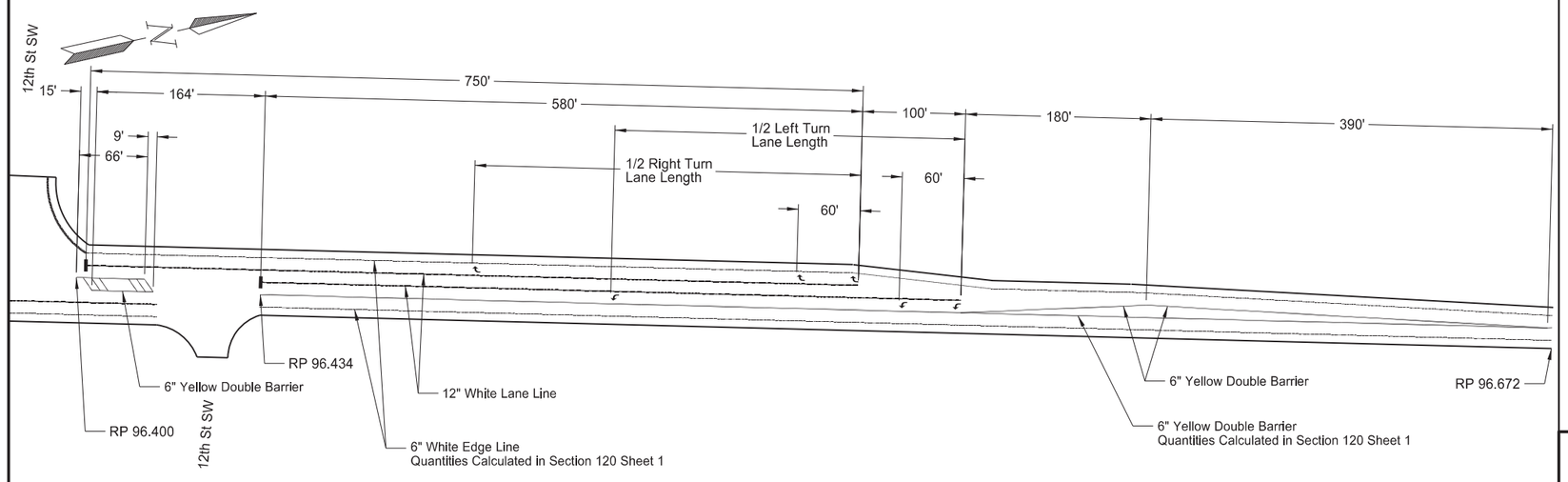
SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	**EPOXY PVMT MK 12IN LINE**		
		White Lane Line	2500	LF
762	0112	**EPOXY PVMT MK MESSAGE**		
		Turn Lane Arrows (12)	192	SF
762	0114	**EPOXY PVMT MK 6IN LINE**		
		Yellow Double Barrier	2280	LF
762	0432	**SHORT TERM 6IN LINE - TYPE NR**		
		Yellow Double Barrier (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

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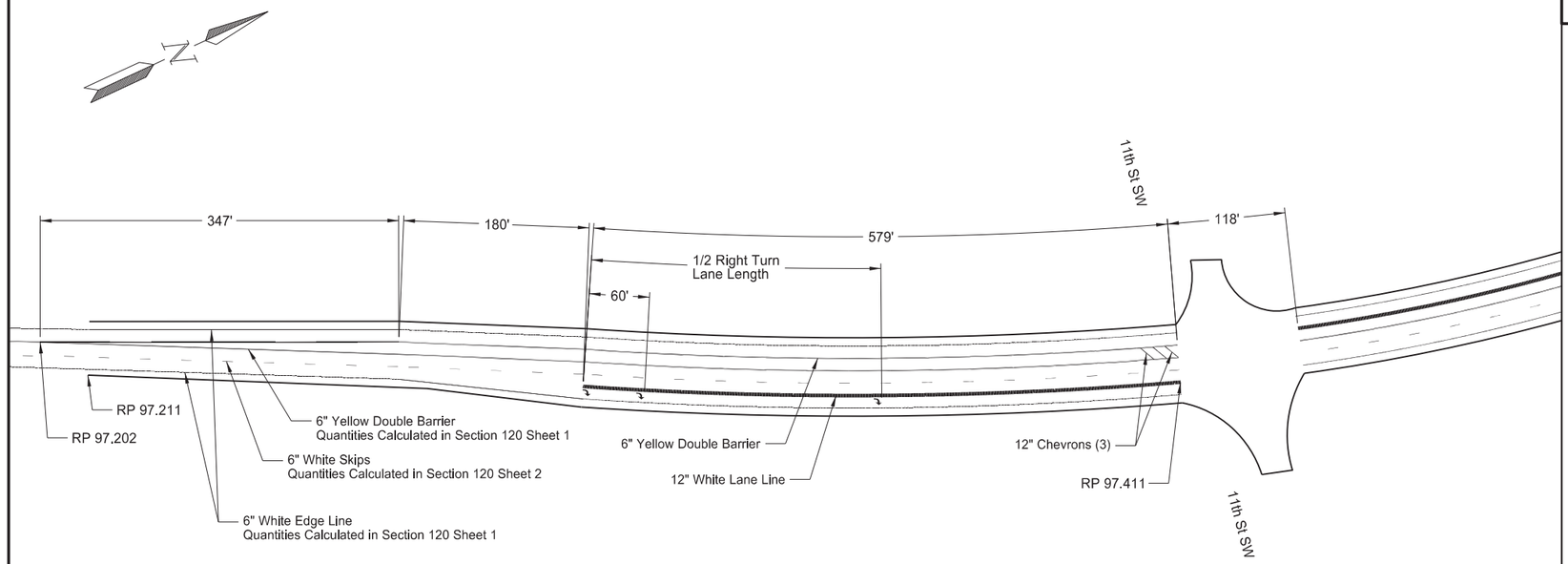
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	XA-SS-5-022(141)091	120	5

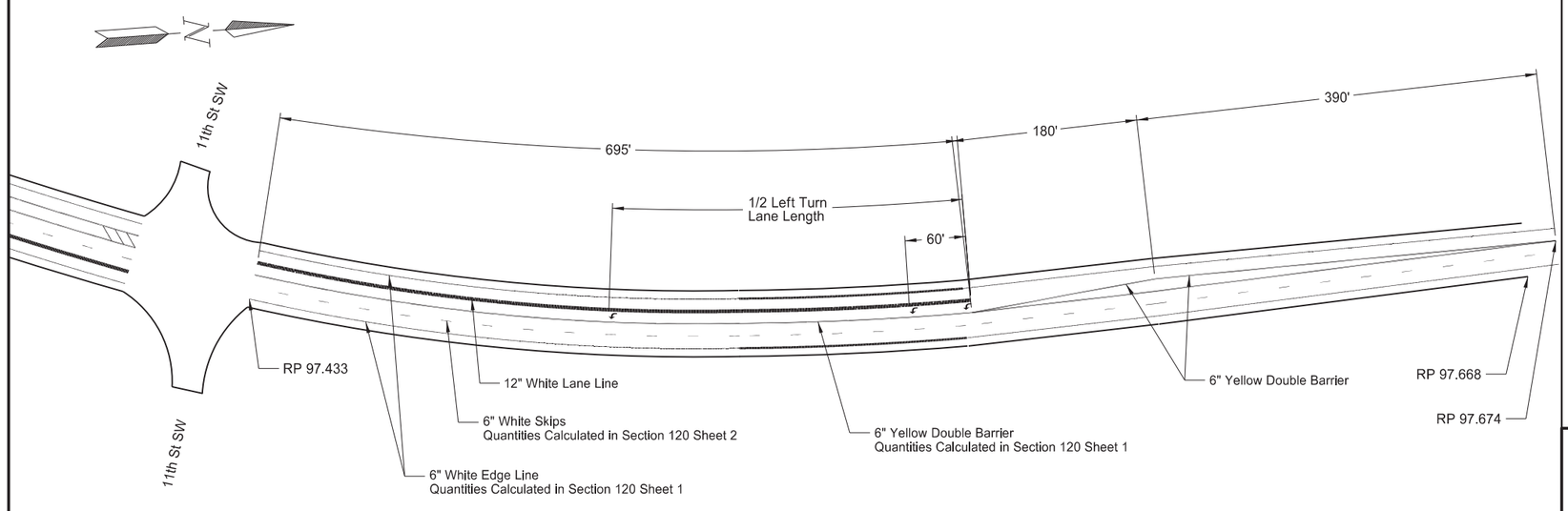
SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	**0111**	**EPOXY PVMT MK 12IN LINE**		
		White Lane Line	2950	LF
		Yellow Chevrons (6)	90	LF
762	**0112**	**EPOXY PVMT MK MESSAGE**		
		Turn Lane Arrows (12)	192	SF
762	**0114**	**EPOXY PVMT MK 6IN LINE**		
		Yellow Double Barrier	2280	LF
762	**0432**	**SHORT TERM 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

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	ND	XA-SS-5-022(141)091	120	6

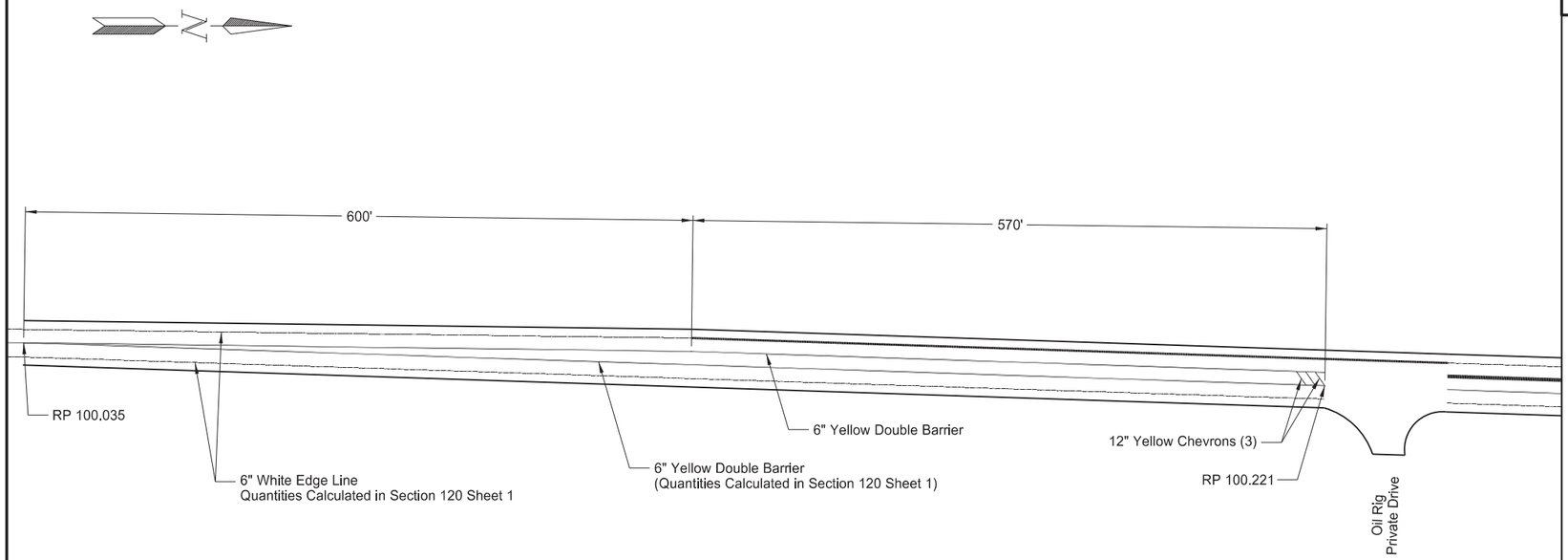
SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	**0111**	**EPOXY PVMT MK 12IN LINE**		
		White Lane Line	1275	LF
		Yellow Chevrons (3)	51	LF
762	**0112**	**EPOXY PVMT MK MESSAGE**		
		Turn Lane Arrows (6)	96	SF
762	**0114**	**EPOXY PVMT MK 6IN LINE**		
		Yellow Double Barrier	3345	LF
762	**0432**	**SHORT TERM 6IN 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

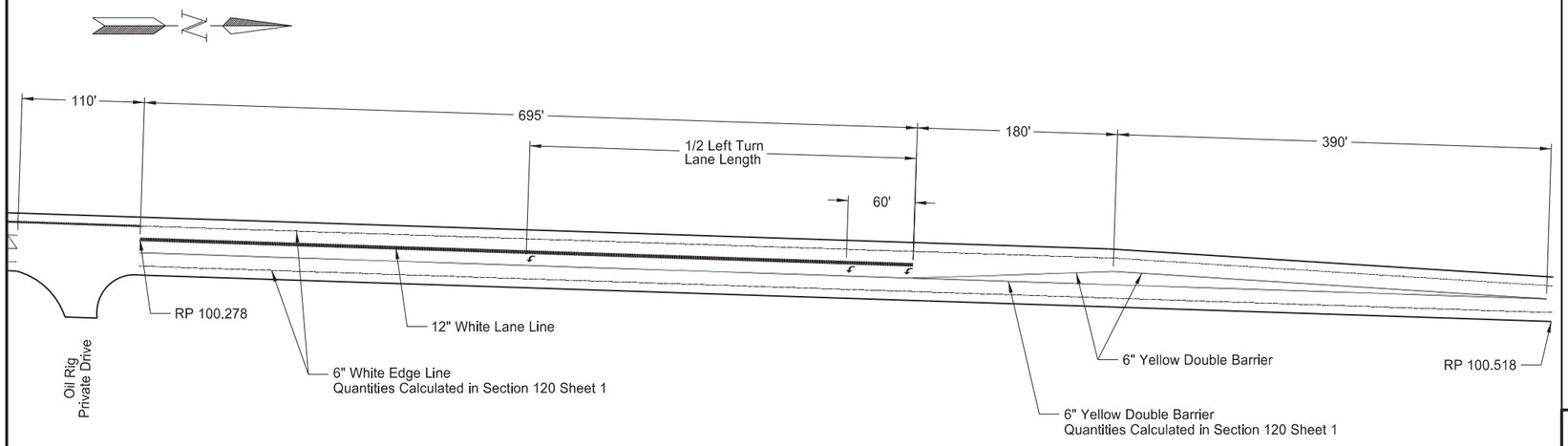
ND Highway 22
17th St SW to Jct ND 200

Pavement Markings
11th St SW

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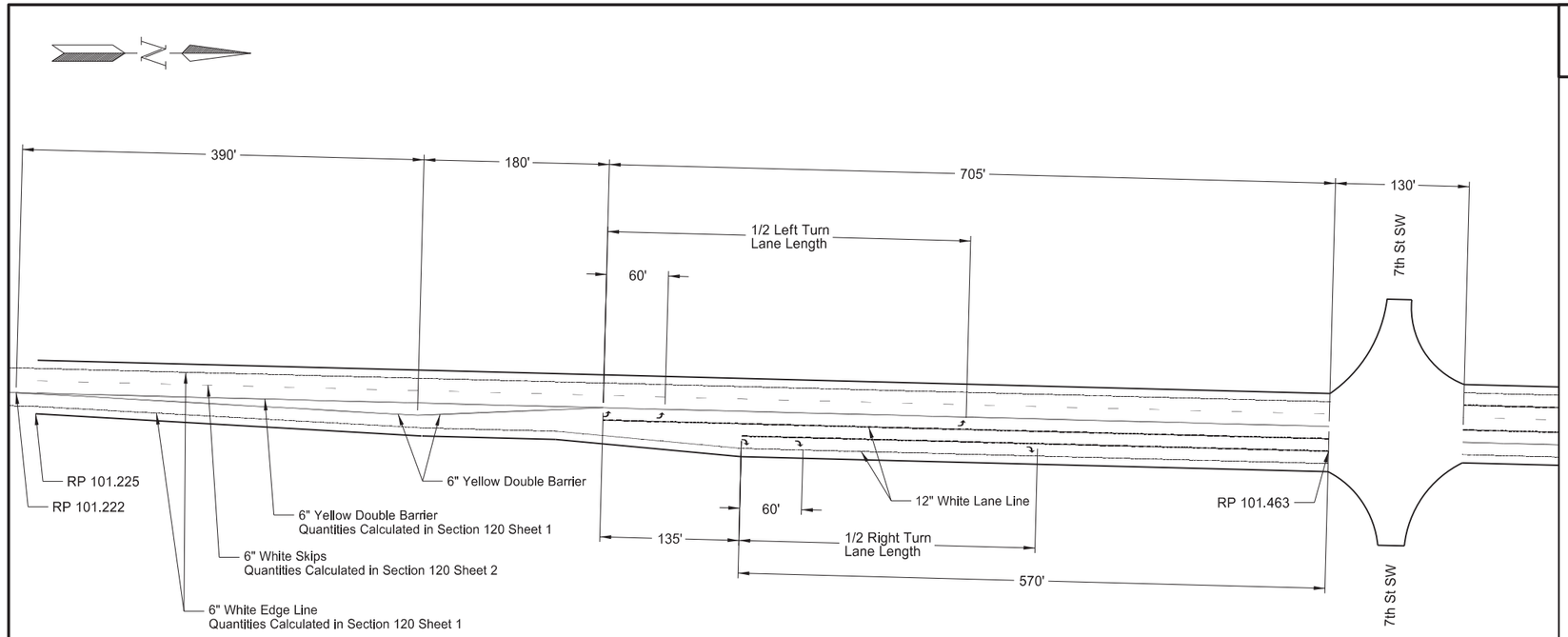


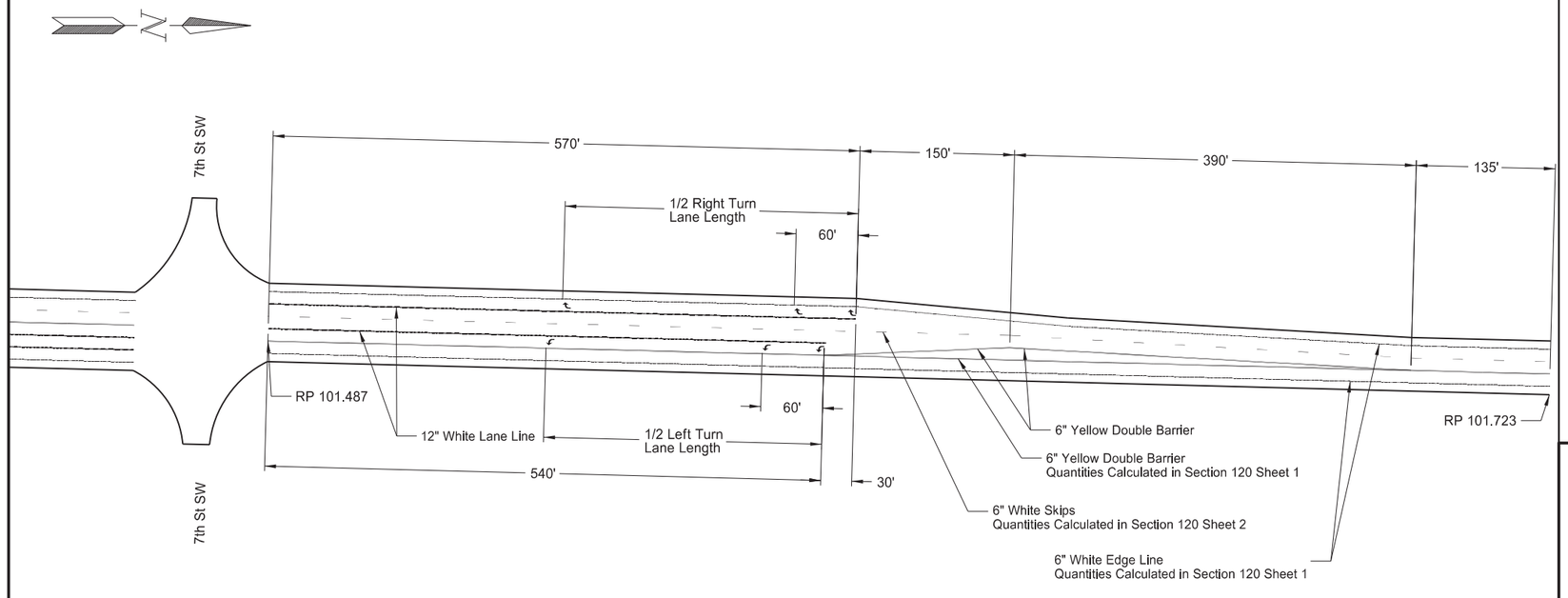
SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	**EPOXY PVMT MK 12IN LINE**		
		White Lane Line	695	LF
		Yellow Chevrons (3)	45	LF
762	0112	**EPOXY PVMT MK MESSAGE**		
		Turn Lane Arrows (3)	48	SF
762	0114	**EPOXY PVMT MK 6IN LINE**		
		Yellow Double Barrier	3480	LF
762	0432	**SHORT TERM 6IN LINE - TYPE NR**		
		Yellow Double Barrier (3 Applications)	10440	LF
762	0437	**SHORT TERM 12IN LINE - TYPE NR**		
		White Lane Line (2 Applications)	1390	LF
		Yellow Chevrons (3)	45	LF

ND Highway 22
17th St SW to Jct ND 200

Pavement Markings

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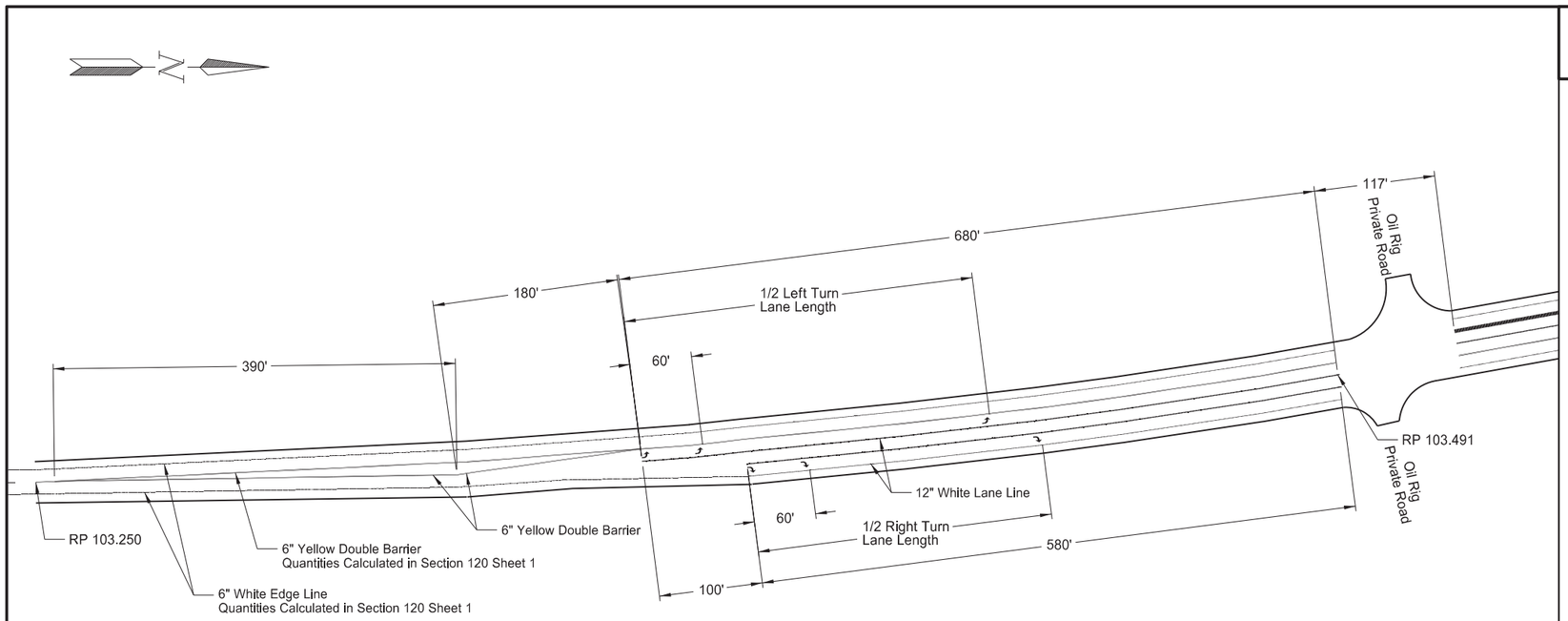
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	120	8

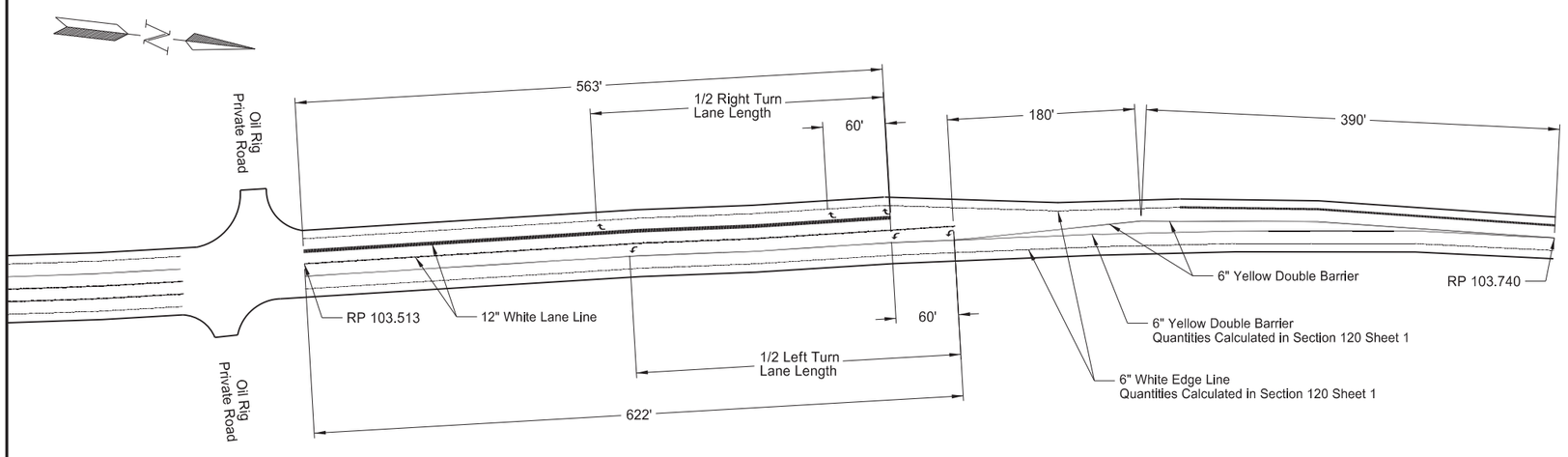
SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0111	**EPOXY PVMT MK 12IN LINE**		
		White Lane Line	2385	LF
762	0112	**EPOXY PVMT MK MESSAGE**		
		Turn Lane Arrows (12)	192	SF
762	0114	**EPOXY PVMT MK 6IN LINE**		
		Yellow Double Barrier	2280	LF
762	0432	**SHORT TERM 6IN LINE - TYPE NR**		
		Yellow Double Barrier (3 Applications)	6840	LF
762	0437	**SHORT TERM 12IN LINE - TYPE NR**		
		White Lane Line (2 Applications)	4770	LF

ND Highway 22
17th St SW to Jct ND 200

Pavement Markings
7th St SW

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	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 PVMT MK 12IN LINE**		
		White Lane Line	2445	LF
762	0112	**EPOXY PVMT MK MESSAGE**		
		Turn Lane Arrows (12)	192	SF
762	0114	**EPOXY PVMT 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

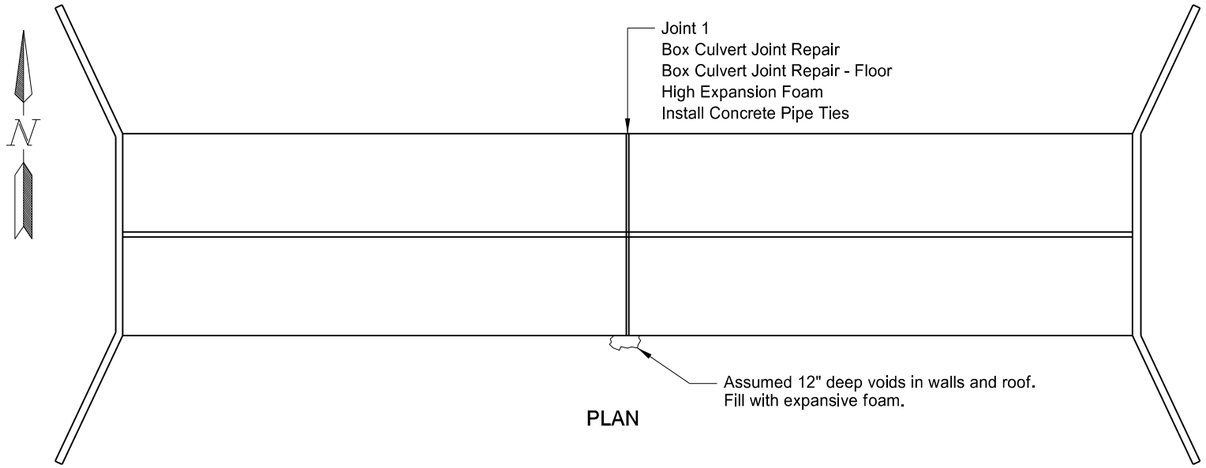
Pavement Markings

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

Docusign Envelope ID: 5C29B220-B363-87AD-8007-C968BD2078A0

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

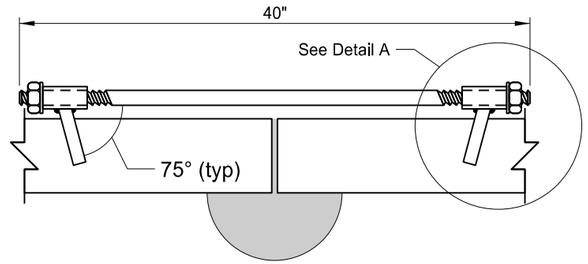
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	1

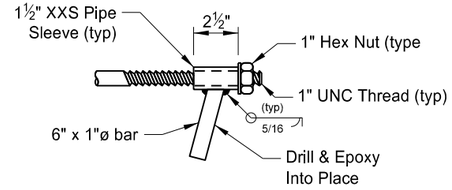


PLAN

BOX CULVERT BID ITEMS

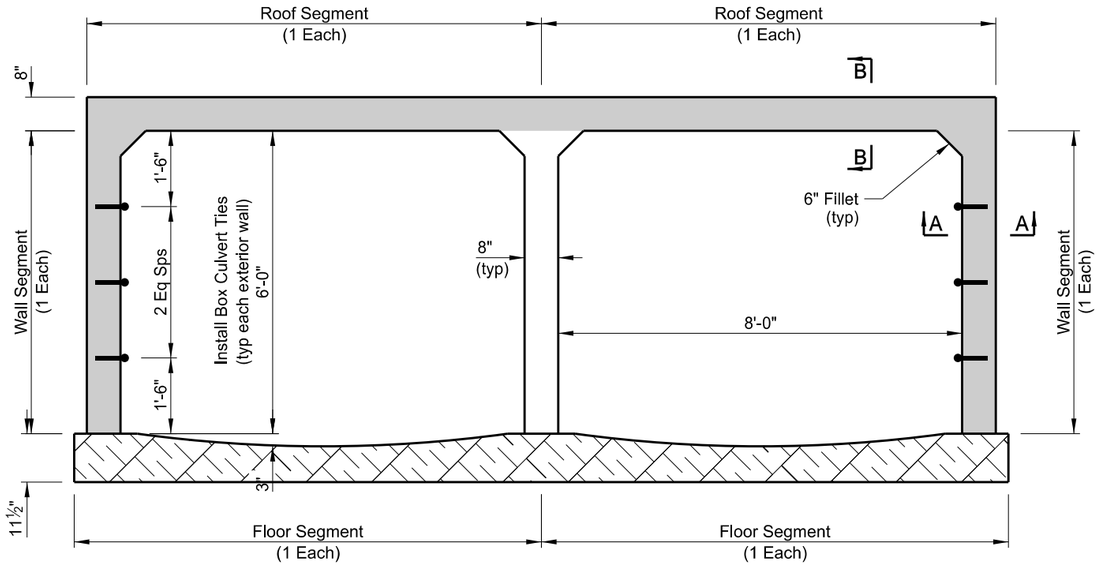
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
714	9900	INSTALL CONCRETE PIPE TIES	SET	6
900	1000	TEMPORARY STREAM DIVERSION	EA	1
930	3640	HIGH EXPANSION POLYURETHANE FOAM	GAL	30
930	9671	BOX CULVERT JOINT REPAIR	EA	4
930	9672	BOX CULVERT JOINT REPAIR - FLOOR	EA	2





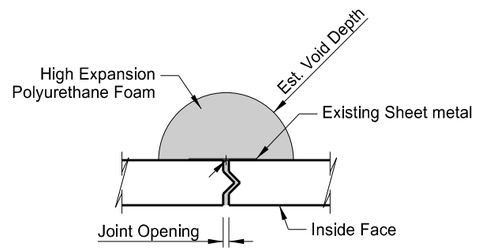
DETAIL A

BOX CULVERT TIE DETAIL



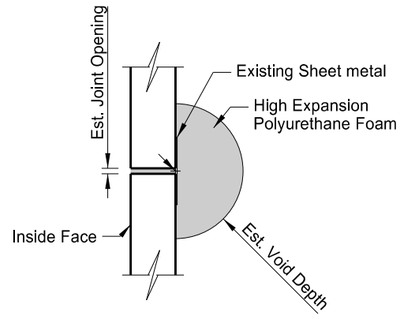
(AT CONSTRUCTION JOINT)

BARREL SECTION



(SECTION USED FOR QTY CALCS)

SECTION B-B



(SECTION USED FOR QTY CALCS)

SECTION A-A

SPECIAL PROVISIONS	
SP 324(23)	TEMPORARY WATER DIVERSION
SP 658(23)	BOX CULVERT JOINT REPAIR

CREEK
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

Box Culvert Joint Repair

Box Culvert Joint Repair - Floor

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE
08/20/26
NORTH DAKOTA

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
08/20/26

Docusign Envelope ID: 5C29B220-B363-87AD-8007-C968BD2078A0

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

NOTES

100 SCOPE OF WORK: Work at this site consists of repairing an existing construction joint in the barrel of the box culvert, filling voids with high expansion foam, and installing pipe ties at the joint.

714 INSTALL CONCRETE PIPE TIES: Install pipe ties at the joint locations as shown in the plans. Use tie bolts meeting ASTM A36. Use heavy hex nuts meeting ASTM A563 and washers meetings ASTM F436, Type 1. Galvanize all materials and hardware per Section 854.

Drill into the existing box culverts to accept the new ties. Install the ties into the holes using an epoxy adhesive meeting Section 806. Tighten the nuts at each end of the tie after the epoxy has cured.

Include all costs for labor, equipment and materials required to furnish and install the box culvert ties in the prices bid for “Install Concrete Pipe Ties”. Each fully installed pipe tie will be paid for as one set.

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: Complete repairs to the box culvert joints noted in the table below in accordance with the Special Provision for Box Culvert Joint Repairs.

Existing plans indicate steel plates were installed on the outside of the box culvert to minimize fill loss through the joints. Fill loss is estimated to have occurred at joints where a foam quantity is provided in the table. The estimated foam quantities listed are prior to expansion and assume a 16x foam expansion rate. Foam quantities shown in the table have been increased by 25% to account for irregularities in the voids. Do not exceed the estimated quantity of foam without the permission of the Engineer.

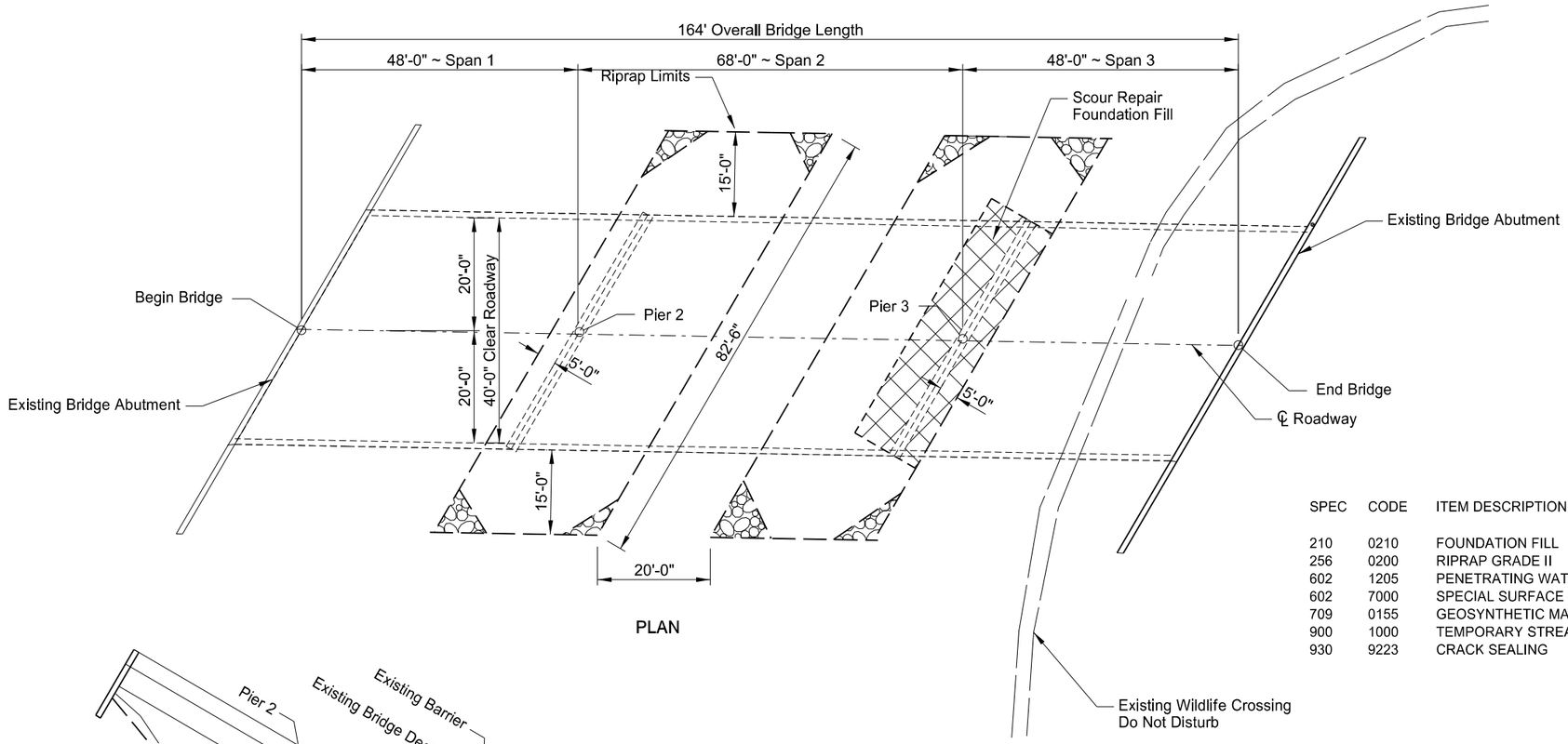
Joint Number	Install Concrete Pipe Ties	Approx. Joint Opening	Est. Void Depth	Box Culvert Joint Repair (Roof & Walls)	Box Culvert Joint Repair – Floor	Estimated Qty High Expansion Foam
Joint 1	Yes	2”	12” - Roof 12” - North Wall 12” - South Wall	4 Segments	2 Segments	30 gallons

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/20/26
NORTH DAKOTA

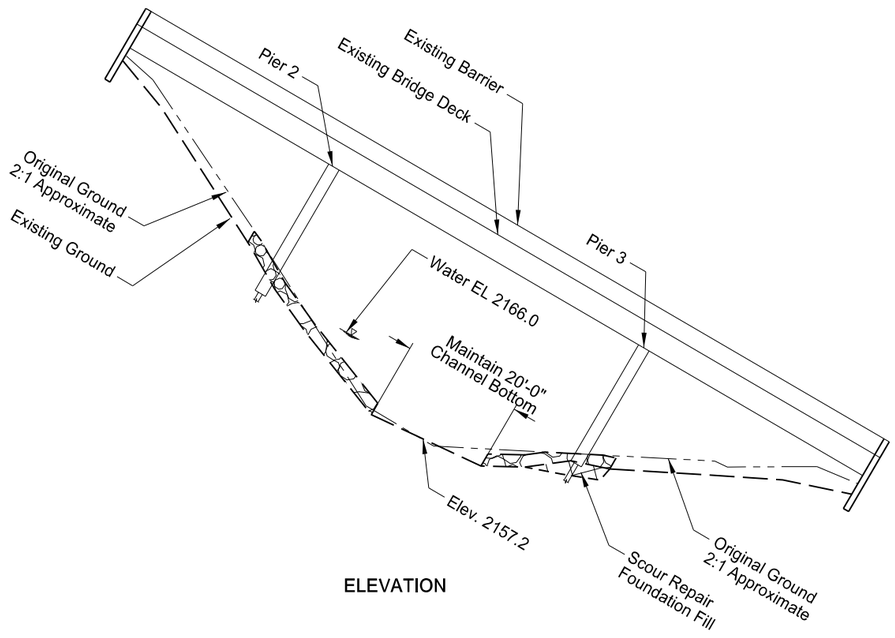
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	3



PLAN



ELEVATION

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	1000	TEMPORARY STREAM DIVERSION	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

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/20/26
NORTH DAKOTA

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
08/20/26

Docusign Envelope ID: 5C29B220-B363-87AD-8007-C968BD2078A0

NOTES

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

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

100 SCOPE OF WORK: Work at this site consists of crack sealing, penetrating water repellent, special surface finish, erosion repair and riprap installation.

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.

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 0.012” 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 0.012” 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 surfaces that are to receive the Tex-Cote surface finish using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, and laitance. Ensure any curing compounds and release agents have been completely removed from the surfaces to receive the Tex-Cote surface finish.

Apply Tex-Cote XL 70 Bridge Cote with Silane to the inside and top surfaces of the existing concrete barriers. Apply the surface finish in accordance with the manufacturer's recommended application procedures to attain a dry film thickness of 15 mils.

Finish the surface with a uniform texture, color, and appearance free from fins, projections, cavities, and porous areas. Use a “sand” textured finish. Use a gray surface finish color number 36424 meeting AMS-STD-595.

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.

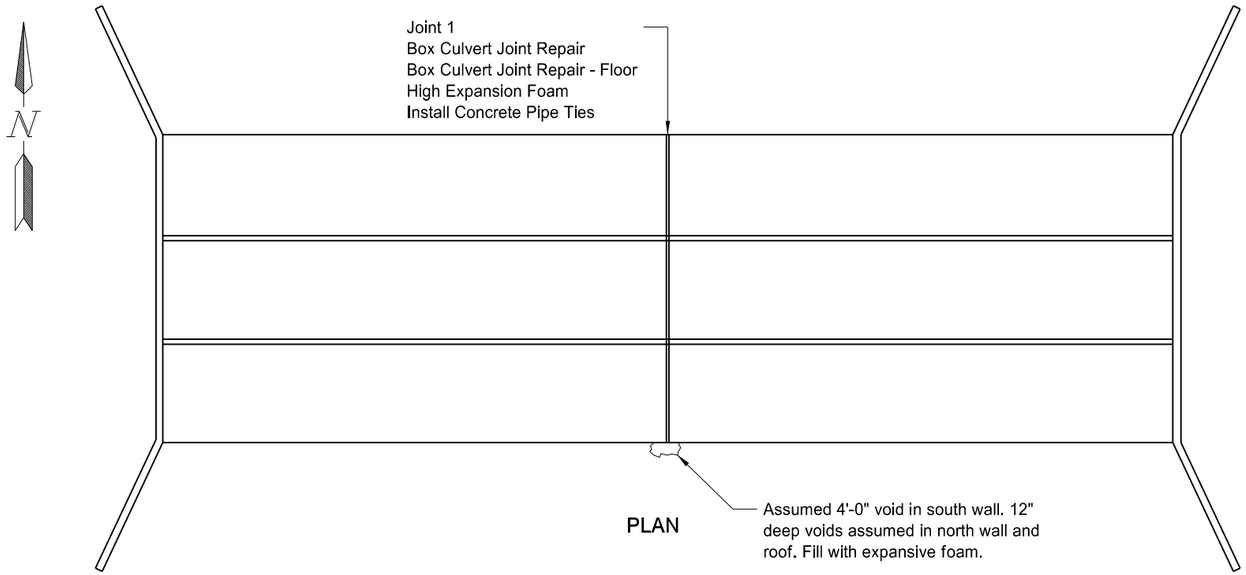
Do not construct a temporary stream diversion if the Contractor and Engineer agree that no diversion is required at this site. No payment will be made for a temporary stream diversion at this site if the diversion is eliminated by agreement of the Contractor and Engineer.

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/20/26
NORTH DAKOTA

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

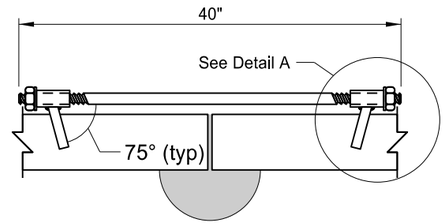
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	5

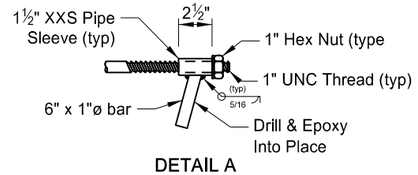


PLAN

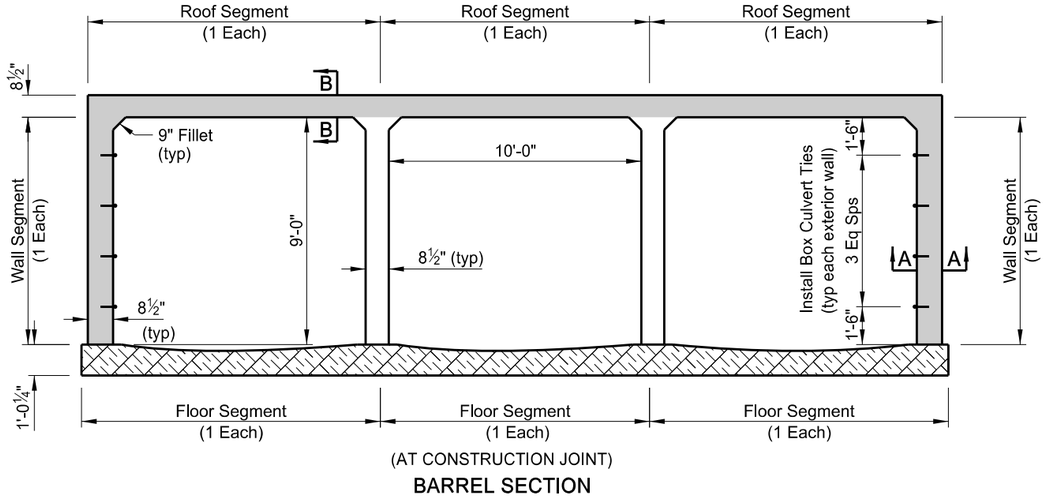
BOX CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
714	9900	INSTALL CONCRETE PIPE TIES	SET	8
900	1000	TEMPORARY STREAM DIVERSION	EA	1
930	3640	HIGH EXPANSION POLYURETHANE FOAM	GAL	200
930	9671	BOX CULVERT JOINT REPAIR	EA	5
930	9672	BOX CULVERT JOINT REPAIR - FLOOR	EA	3

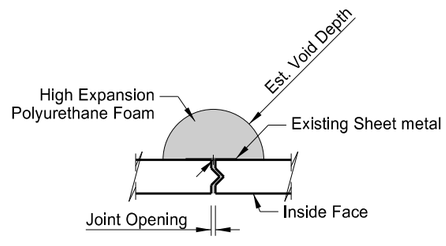




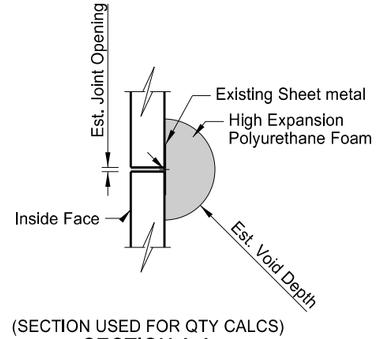
DETAIL A
BOX CULVERT TIE DETAIL



(AT CONSTRUCTION JOINT)
BARREL SECTION



(SECTION USED FOR QTY CALCS)
SECTION B-B



(SECTION USED FOR QTY CALCS)
SECTION A-A

Box Culvert Joint Repair

Box Culvert Joint Repair - Floor

SPECIAL PROVISIONS	
SP 324(23)	TEMPORARY WATER DIVERSION
SP 658(23)	BOX CULVERT JOINT REPAIR

CREEK
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/20/26
NORTH DAKOTA

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
08/20/26

Docusign Envelope ID: 5C29B220-B363-87AD-8007-C968BD2078A0

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	6

NOTES

100 SCOPE OF WORK: Work at this site consists of repairing an existing construction joint in the barrel of the box culvert, filling voids with high expansion foam, and installing pipe ties at the joint.

714 INSTALL CONCRETE PIPE TIES: Install pipe ties at the joint locations as shown in the plans. Use tie bolts meeting ASTM A36. Use heavy hex nuts meeting ASTM A563 and washers meetings ASTM F436, Type 1. Galvanize all materials and hardware per Section 854.

Drill into the existing box culverts to accept the new ties. Install the ties into the holes using an epoxy adhesive meeting Section 806. Tighten the nuts at each end of the tie after the epoxy has cured.

Include all costs for labor, equipment and materials required to furnish and install the box culvert ties in the prices bid for “Install Concrete Pipe Ties”. Each fully installed pipe tie will be paid for as one set.

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: Complete repairs to the box culvert joints noted in the table below in accordance with the Special Provision for Box Culvert Joint Repairs.

Existing plans indicate steel plates were installed on the outside of the box culvert to minimize fill loss through the joints. Fill loss is estimated to have occurred at joints where a foam quantity is provided in the table. The estimated foam quantities listed are prior to expansion and assume a 16x foam expansion rate. Foam quantities shown in the table have been increased by 25% to account for irregularities in the voids. Do not exceed the estimated quantity of foam without the permission of the Engineer.

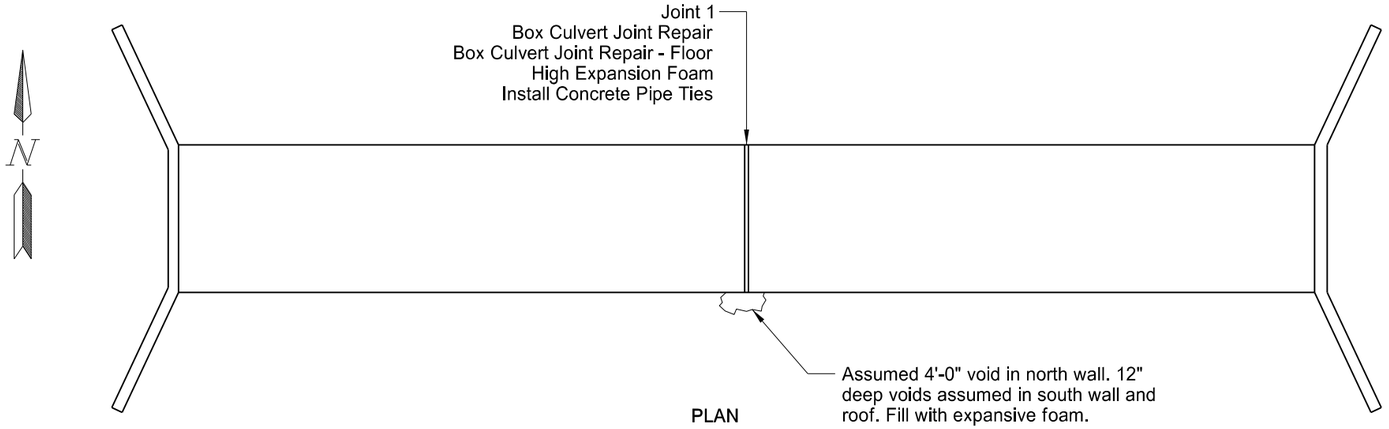
Joint Number	Install Concrete Pipe Ties	Approx. Joint Opening	Est. Void Depth	Box Culvert Joint Repair (Roof & Walls)	Box Culvert Joint Repair – Floor	Estimated Qty High Expansion Foam
Joint 1	Yes	2.5”	12” - Roof 12” - North Wall 48” - South Wall	5 Segments	3 Segments	200 gallons



Docusign Envelope ID: 5C29B220-B363-87AD-8007-C968BD2078A0

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

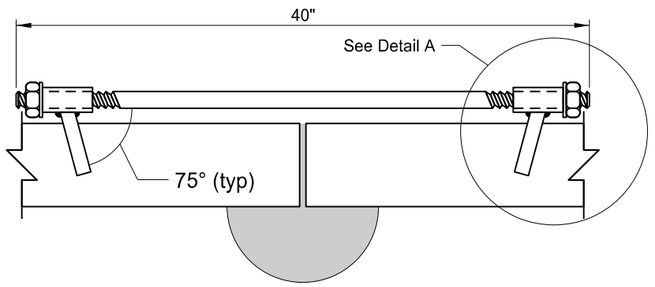
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	7

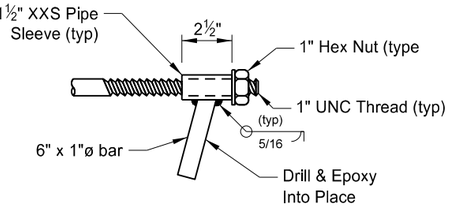


PLAN

BOX CULVERT BID ITEMS

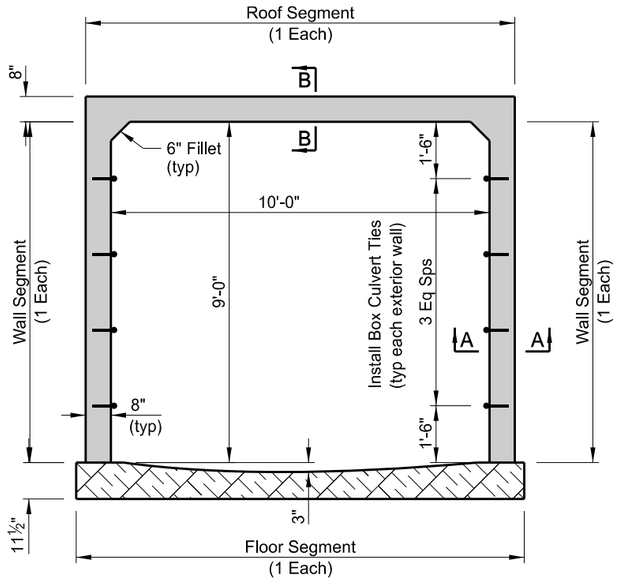
SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
714	9900	INSTALL CONCRETE PIPE TIES	SET	8
900	1000	TEMPORARY STREAM DIVERSION	EA	1
930	3640	HIGH EXPANSION POLYURETHANE FOAM	GAL	180
930	9671	BOX CULVERT JOINT REPAIR	EA	3
930	9672	BOX CULVERT JOINT REPAIR - FLOOR	EA	1





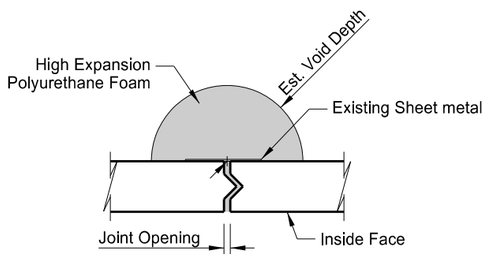
DETAIL A

BOX CULVERT TIE DETAIL



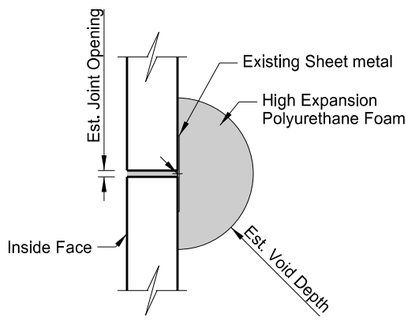
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BARREL SECTION



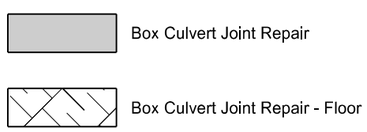
(SECTION USED FOR QTY CALCS)

SECTION B-B



(SECTION USED FOR QTY CALCS)

SECTION A-A



SPECIAL PROVISIONS	
SP 324(23)	TEMPORARY WATER DIVERSION
SP 658(23)	BOX CULVERT JOINT REPAIR

CREEK
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/20/26
NORTH DAKOTA

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
08/20/26

Docusign Envelope ID: 5C29B220-B363-87AD-8007-C968BD2078A0

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	8

NOTES

100 SCOPE OF WORK: Work at this site consists of repairing an existing construction joint in the barrel of the box culvert, filling voids with high expansion foam, and installing pipe ties at the joint.

714 INSTALL CONCRETE PIPE TIES: Install pipe ties at the joint locations as shown in the plans. Use tie bolts meeting ASTM A36. Use heavy hex nuts meeting ASTM A563 and washers meetings ASTM F436, Type 1. Galvanize all materials and hardware per Section 854.

Drill into the existing box culverts to accept the new ties. Install the ties into the holes using an epoxy adhesive meeting Section 806. Tighten the nuts at each end of the tie after the epoxy has cured.

Include all costs for labor, equipment and materials required to furnish and install the box culvert ties in the prices bid for “Install Concrete Pipe Ties”. Each fully installed pipe tie will be paid for as one set.

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: Complete repairs to the box culvert joints noted in the table below in accordance with the Special Provision for Box Culvert Joint Repairs.

Existing plans indicate steel plates were installed on the outside of the box culvert to minimize fill loss through the joints. Fill loss is estimated to have occurred at joints where a foam quantity is provided in the table. The estimated foam quantities listed are prior to expansion and assume a 16x foam expansion rate. Foam quantities shown in the table have been increased by 25% to account for irregularities in the voids. Do not exceed the estimated quantity of foam without the permission of the Engineer.

Joint Number	Install Concrete Pipe Ties	Approx. Joint Opening	Est. Void Depth	Box Culvert Joint Repair (Roof & Walls)	Box Culvert Joint Repair – Floor	Estimated Qty High Expansion Foam
Joint 1	Yes	2”	12” - Roof 48” - North Wall 12” - South Wall	3 Segments	1 Segments	200 gallons

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/20/26
NORTH DAKOTA

Docusign Envelope ID: 5C29B220-B363-87AD-8007-C968BD2078A0

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	9

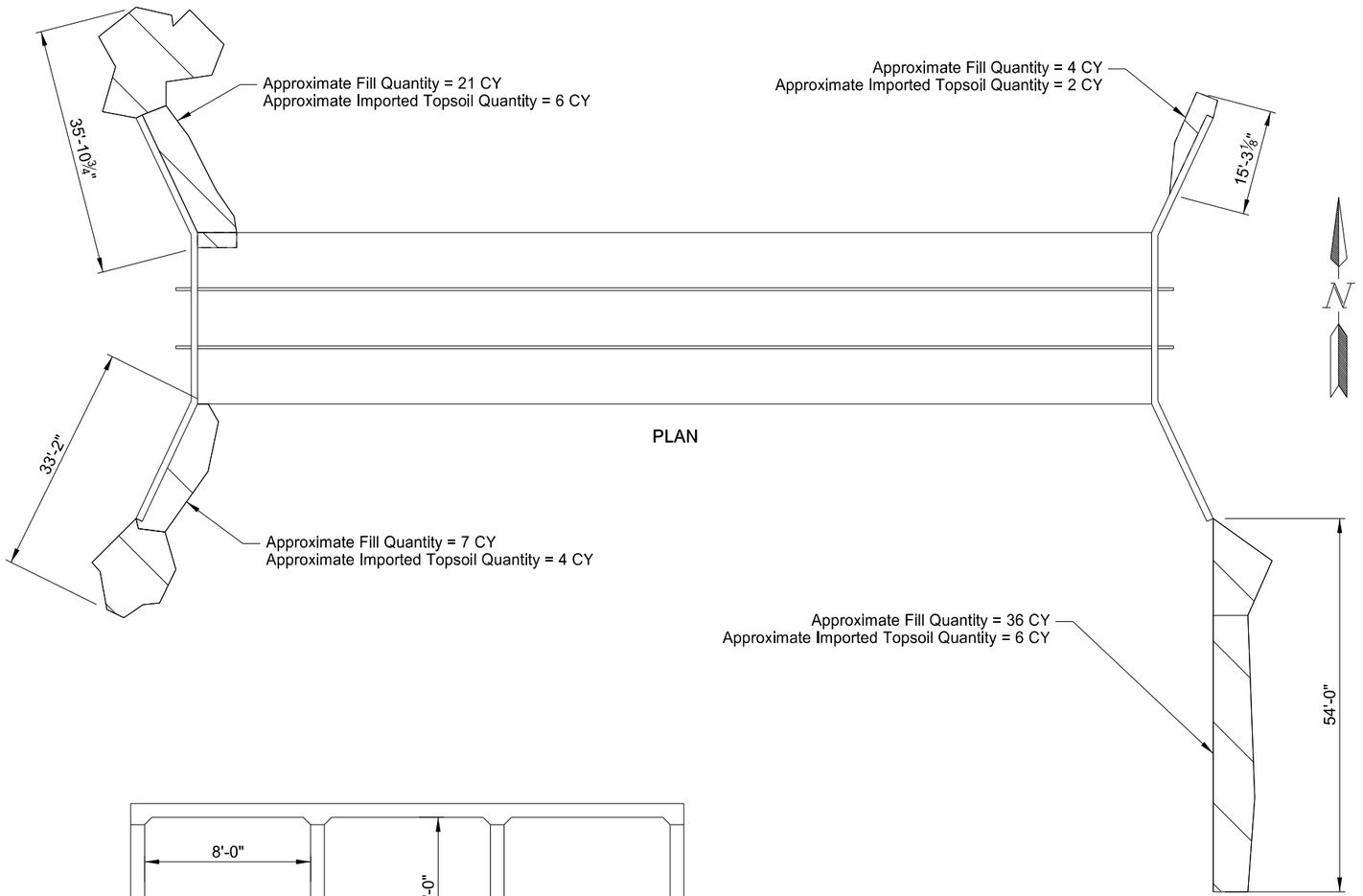
Notes:

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



PLAN

BARREL SECTION

LEGEND

EROSION REPAIR

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

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE
08/20/26
NORTH DAKOTA

CREEK
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

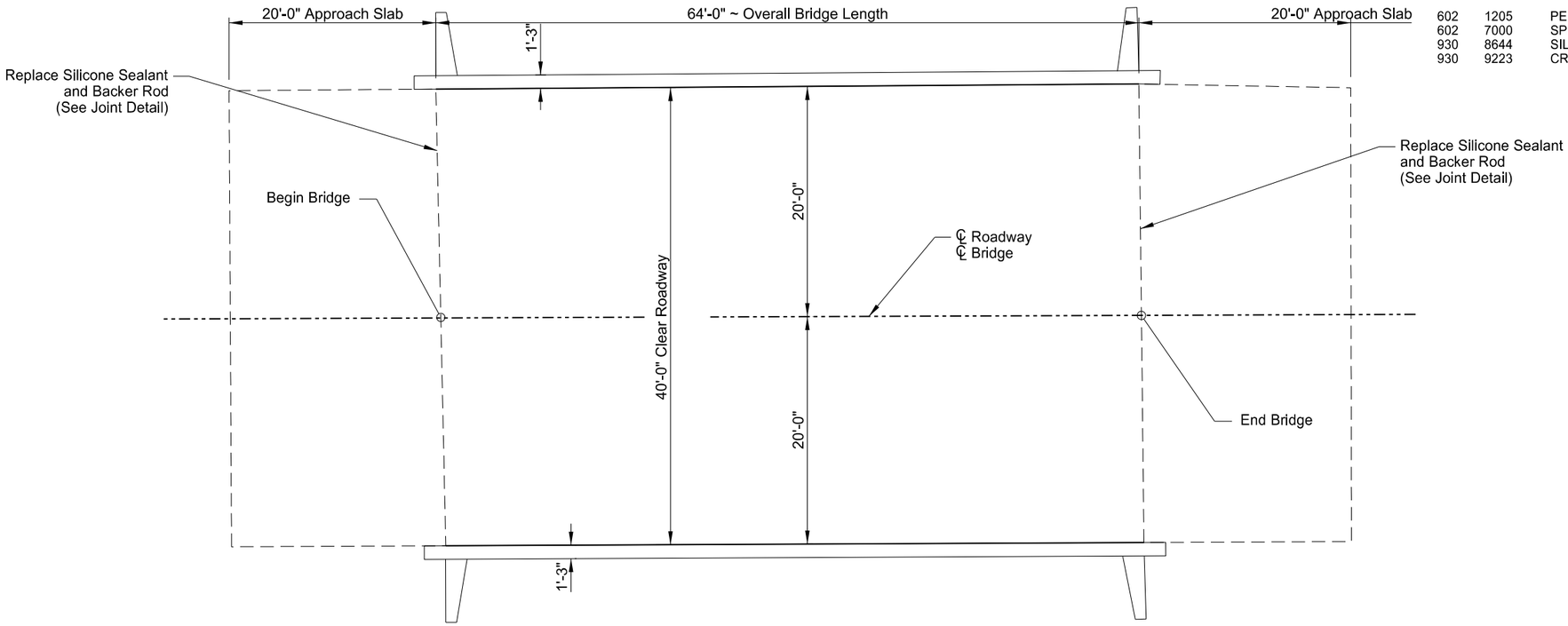
Jason Thorenson
08/20/26

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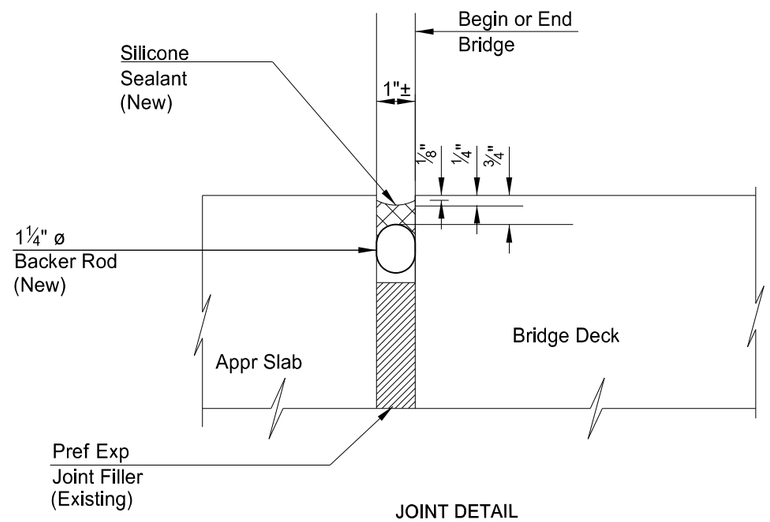
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	10

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



PLAN



JOINT DETAIL

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 08/20/26
NORTH DAKOTA

CREEK
17TH ST SW TO JCT ND 200

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
08/20/26

Docusign Envelope ID: 5C29B220-B363-87AD-8007-C968BD2078A0

NOTES

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

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	XA-SS-5-022(141)091	170	11

100 SCOPE OF WORK: Work at this site consists of resealing bridge end joints, 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 0.012” 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 0.012” 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: Clean the surfaces that are to receive the Tex-Cote surface finish using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, and laitance. Ensure any curing compounds and release agents have been completely removed from the surfaces to receive the Tex-Cote surface finish.

Apply Tex-Cote XL 70 Bridge Cote with Silane to the inside and top surfaces of the existing concrete barriers. Apply the surface finish in accordance with the manufacturer's recommended application procedures to attain a dry film thickness of 15 mils.

Finish the surface with a uniform texture, color, and appearance free from fins, projections, cavities, and porous areas. Use a “sand” textured finish. Use gray surface finish color number 36424 meeting AMS-STD-595.

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”.



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
Abut	abutment
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	automatic traffic recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Bk	back
BF	back face
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
BI	beehive inlet
Beg	begin
BG	below grade
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
BH	bore hole
Bot	bottom
Blvd	Boulevard
Bndry	boundary
Brkwy	breakaway
Br	bridge
Bldg	building
Bus.	business
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
CL or ℄	centerline
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
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
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSFES	corrugated steel flared end section
CSP	corrugated steel pipe
CSTES	corrugated steel traversable end section
Co	County
Crse	course
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	crossroad
Crn	crown
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia or ø	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
Fl	flange
Flrd	flared
FES	flared end section
F Bcn	flashing beacon
FA	flight auger sample
FL	flow line
Ftg	footing
FM	force main
Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser
FFP	fuel filler pipes
FLS	fuel leak sensor
Furn	furnish/ed

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

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NDDOT ABBREVIATIONS

D-101-2

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

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NDDOT ABBREVIATIONS

Salv	salvage(d)
San	sanitary sewer line
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw or Sdwk	sidewalk
SD	sight distance
SN	sign number
Sig	signal
Sgl	single
SRCP	slotted reinforced concrete pipe
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SA	special assembly
SP	special provisions
G	specific gravity
Spk	spike
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
Stm L	steam line
SEC	steel encased concrete
SMA	stone matrix asphalt
SSD	stopping sight distance
SD	storm drain
St	street
SPP	structural plate pipe
SPPA	structural plate pipe arch
Str	structure
Subd	subdivision
Sub	subgrade
Sub Prep	subgrade preperation
Ss	subsoil
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical

Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	thinwall tube sample
Ts	topsoil
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
Trans	transition
TT	transmission tower
TES	traversable end section
Trans	transverse
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	tribal employment rights ordinance
Tpl	triple
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VCP	vitrified clay pipe
Vol	volume
VSFS	vehicle speed feedback sign
Wkwy	walkway
W	water content
WGV	water gate valve
WL	water line
WM	water main
WMV	water main valve
W Mtr	water meter
WSV	water service valve
WW	water well
Wrng	wearing
WIM	weigh in motion
W	west
WB	westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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08-03-15	General Revisions
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NDDOT ABBREVIATIONS

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	
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DATE	CHANGE
12-18-20	Sheet Added - Continued from D-101-3

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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

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ENGINEER
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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 12-18-20	Added and Revised Items, Organized by Functional Groups General Revisions

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12 18 2020

LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

- Existing Ground
- Existing Topsoil (Cross Section View)
- Existing Ground Void (Not Surveyed) (void — void — void — v)
- 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 (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — 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 (S — S)
- Silt Fence (SF — SF)
- 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

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SYMBOLS

D-101-30

North Arrow (Half Scale)

Alignment Data Point

Alignment Monument

Spot Elevation

Existing Miscellaneous Spot

Existing Access Control Arrow

Existing Benchmark

Reset USGS Marker

Iron Monument Found

Iron Pin R/W Monument

Property Corner

Iron Pin Reference Monument

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

Existing Bush or Shrub

Existing Large Evergreen Tree

Existing Small Evergreen Tree

Existing Large Tree

Existing Small Tree

Existing Tree Trunk

Cairn or Stone Circle

Existing Artifact

Existing Satellite Dish

Existing Weather Station

Existing Windmill or Tower

Reinforced Pavement

CSB Continuous Split Barrel Sample

FA Flight Auger Sample

SB Split Barrel Sample

T Thinwall Tube Sample

N Standard Penetration Test

Incl Inclinometer Tube

Excavation Unit

Existing Ground Water Well Bore Hole

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

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12 18 2020

SYMBOLS

D-101-31

- Flexible Delineator
- Flexible Delineator Type A (Exst, Ppsd)
- Flexible Delineator Type B (Exst, Ppsd)
- Flexible Delineator Type C (Exst, Ppsd)
- Flexible Delineator Type D (Exst, Ppsd)
- Flexible Delineator Type E (Exst, Ppsd)
- Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type C (Exst, Ppsd, Diamond Grade)
- Delineator Type D (Exst, Ppsd, Diamond Grade)
- Delineator Type E (Exst, Ppsd, Diamond Grade)
- Barricade (Type I, Type II, Type III}
- Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)
- Attenuation Device
- Truck Mounted Attenuator
- Delineator Drums
- Flagger
- Tubular Marker
- Traffic Cone
- Back to Back Vertical Panel Sign

- Highway Sign (Exst, Ppsd)
- Mile Post Type A (Exst-Ppsd-Reset)
- Mile Post Type B (Exst, Ppsd)
- Mile Post Type C (Exst, Ppsd)
- Object Marker Type I (Exst, Ppsd)
- Object Marker Type II (Exst, Ppsd)
- Object Marker Type III (Exst, Ppsd)
- Existing Reference Marker
- Road Closure Gate 18 Ft (Exst, Ppsd)
- Road Closure Gate 28 Ft (Exst, Ppsd)
- Road Closure Gate 40 Ft (Exst, Ppsd)
- Existing Railroad Battery Box
- Existing RR Profile Spot
- Existing Railroad Crossbuck
- Existing Railroad Frog
- Existing Mailbox (Private, Federal)

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

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SYMBOLS

D-101-32

- Existing Luminaire
- Luminaire LED
- Existing Light Standard Luminaire
- Relocate Light Standard
- Light Standard Light LED Luminaire
- Light Standard 35 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 50 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 70 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 200 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 250 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 310 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 400 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 700 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Emergency Vehicle Detector
- Video Detection Camera

- High Mast Light Standard 3 Luminaire (Exst, Ppsd)
- High Mast Light Standard 4 Luminaire (Exst, Ppsd)
- High Mast Light Standard 5 Luminaire (Exst, Ppsd)
- High Mast Light Standard 6 Luminaire (Exst, Ppsd)
- High Mast Light Standard 7 Luminaire (Exst, Ppsd)
- High Mast Light Standard 8 Luminaire (Exst, Ppsd)
- High Mast Light Standard 9 Luminaire (Exst, Ppsd)
- High Mast Light Standard 10 Luminaire (Exst, Ppsd)
- Overhead Sign Structure Load Center (Exst, Ppsd)
- Traffic Signal Controller (Exst, Ppsd)
- Pad Mounted Traffic Signal Controller (Exst, Ppsd)
- Flashing Beacon (Exst, Ppsd)
- Concrete Foundation (Exst, Ppsd)
- Pipe Mounted Flasher (Exst, Ppsd)
- Pad Mounted Feed Point (Exst, Ppsd)
- Pipe Mounted Feed Point with Pad (Exst, Ppsd)
- Pole Mounted Feed Point (Exst, Ppsd)
- Junction Box (Exst, Ppsd)
- Existing Pedestrian Head with Number
- Existing Signal Head
- Pole Mounted Head
- Existing Lighting Standard Pole

- Existing Traffic Signal Standard
- Pull Box (Exst-Ppsd-Undefined)
- Intelligent Transportation Pull Box (Exst, Ppsd)
- Transformer (Exst, Ppsd)
- Power Pole (Exst-Ppsd-with Transformer)
- Wood Pole (Exst, Ppsd)
- Pedestrian Push Button Post (Exst, Ppsd)
- Existing Pole
- Existing Telephone Pole
- Existing Post
- Connection Conductor (Ground, Neutral, Phase 1, Phase 2)

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

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12 18 2020

SYMBOLS

D-101-33

Existing Manhole (Electrical, Gas, Telephone)

Water Manhole (Exst, Exst with Valve)

Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)

Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)

Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)

Force Main Storm Drain Manhole (Exst, Exst with Valve)

Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)

Existing Water Appurtenance

Sprinkler Head (Exst, Ppsd)

Fire Hydrant (Exst, Ppsd)

Cleanout (Exst Sanitary, Underdrain)

Existing Catch Basin Inlet (Round, Square)

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 Vegitation Barrier, Ppsd Double with Vegitation Barrier)

Cap or Stub
Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water

Existing Pedestal
Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined

Existing Pipe Vent
Gas, Fuel, Sanitary, Storm Drain, Water, Undefined

Valve
Exst Gas, Exst Water, Ppsd Water, Exst Undefined

Pump
Sanitary, Storm Drain, Exst Water

Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Existing Utility Marker

Existing Meter

Existing Fuel Dispensers

Existing Fuel Filler Pipes

Existing Fuel Leak Sensors

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

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NORTH DAKOTA
12 18 2020

Cross Section Legend

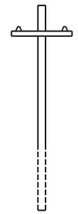
D-101-40

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Cable Line	CBL1	CBL2
Conduit Line	CDU1	CDU2
Electric Line	E1	E2
Fiber Optic Line	F1	F2
Gas Main Line	GM1	GM2
Gas Service Line	GS1	GS2
Gas Transmission Line	GT1	GT2
Fuel Pipeline	PL1	PL2
Sanitary Sewer Force Main	SSF1	SSF2
Sanitary Sewer	SS1	SS2
Steam Line	STE1	STE2
Storm Drain (Assumed Depth)	SD1	SD2
Telephone Line	T1	T2
TV Line	TV1	TV2
Water Main Line	WM1	WM2
Water Service Line	WS1	WS2

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Overhead Power Transmission Line	OHT1	OHT2
Overhead Line	OH1	OH2

Light Standard - Multiple Variations
- Concrete
- Steel
- Wood
- with Traffic Signal

Pole - Multiple Variations
- Utility
- Brace
- Feed Point
- Guy
- Power
- Power Structure
- Power with Light
- Power with Transformer



Manhole - Multiple Variations
- Electric
- Fiber Optic
- Gas
- Inlet
- Sanitary Force Main
- Sanitary
- Sanitary with Valve
- Steam
- Storm
- Storm Force Main
- Storm with Valve
- Telephone
- Water
- Water with Meter
- Water with Valve
- Water with Air Release Valve



Anchor

High Tension Cable Guardrail

* Usually the transverse utilities are shown on a cross section with 2 or more symbols. The utility runs from one symbol to the other, but the connection may not be shown.



Connection to infer that probably will not be displayed

When storm drain invert elevations are NOT used to draw pipe, they will appear as shown to the left. When invert elevations are used to draw pipe, they will be a cross section similar to the graphics shown below.

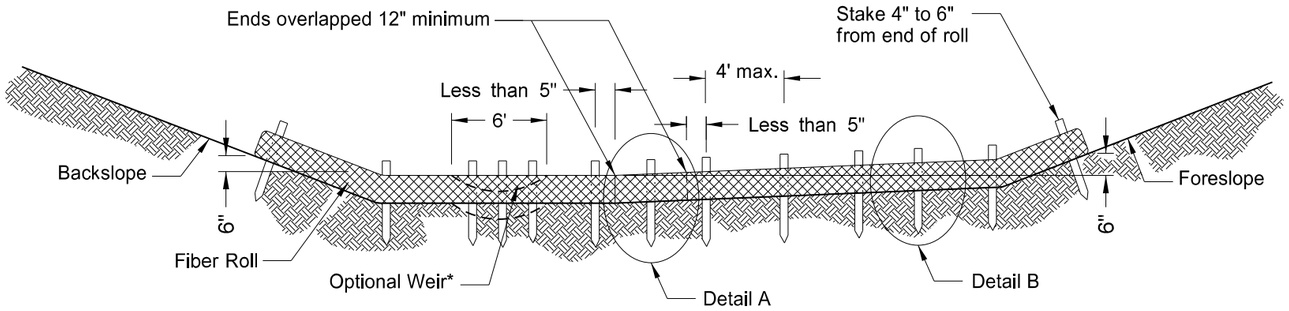


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update

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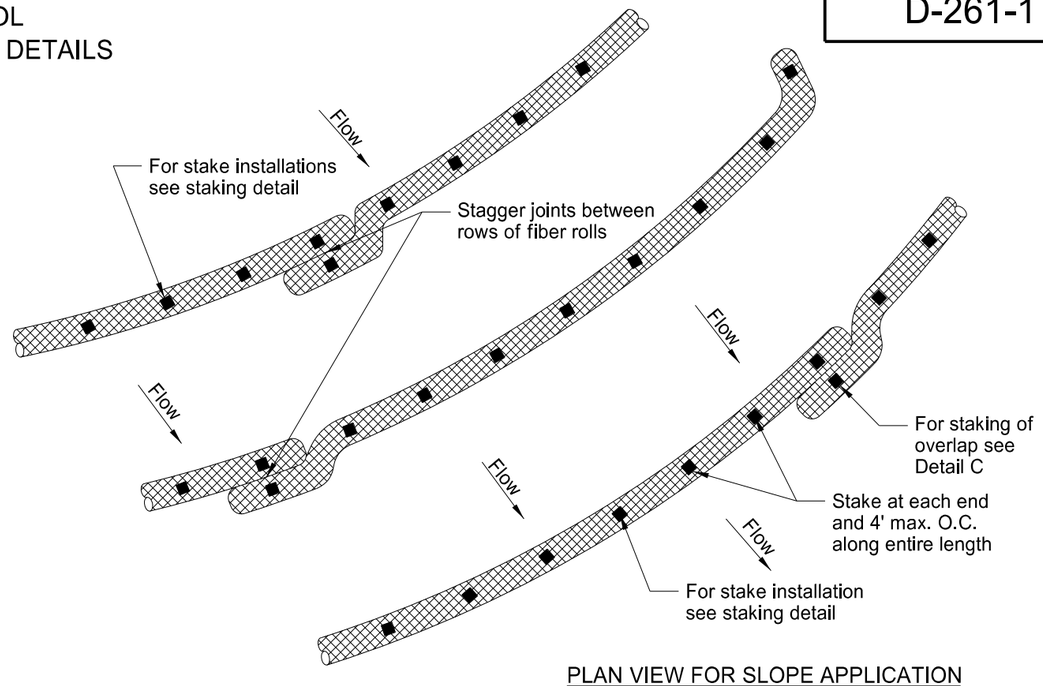
06/14/23

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

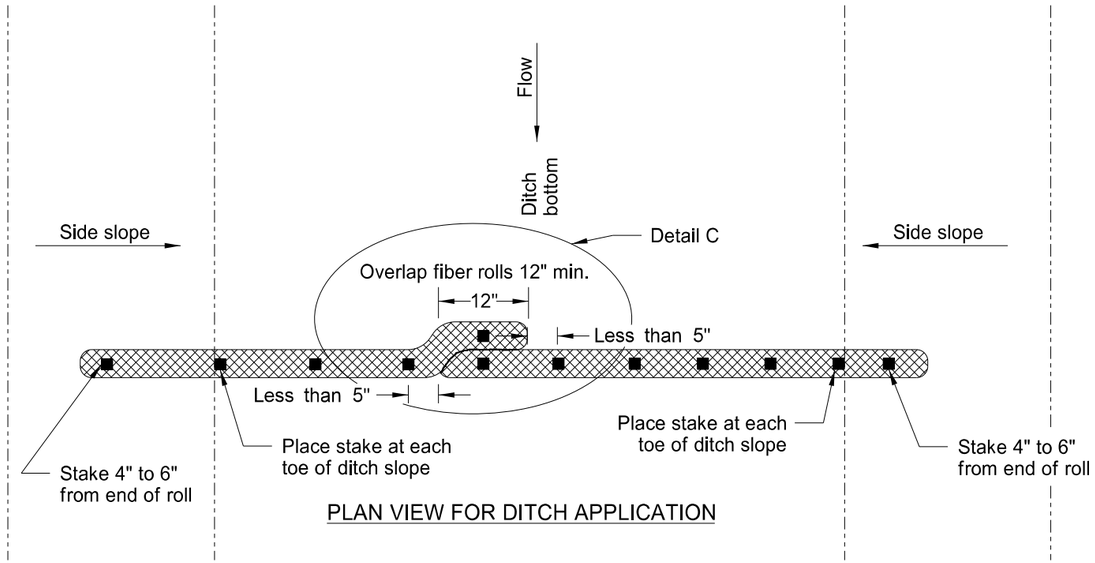


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

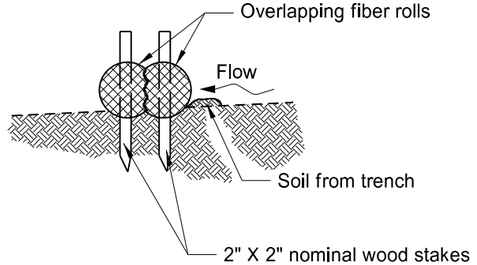
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

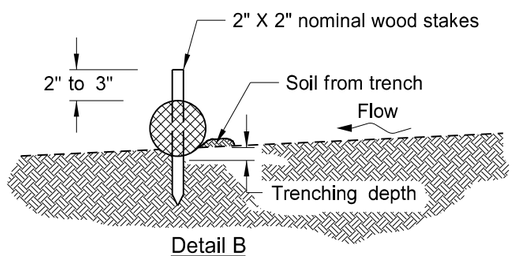


PLAN VIEW FOR DITCH APPLICATION



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

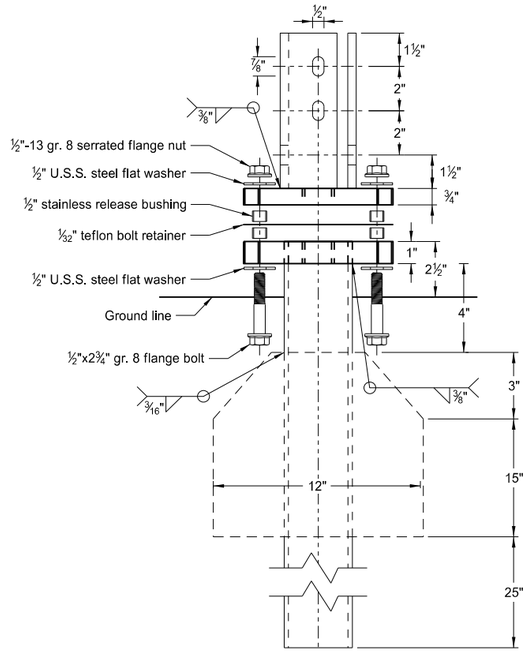
REVISIONS

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

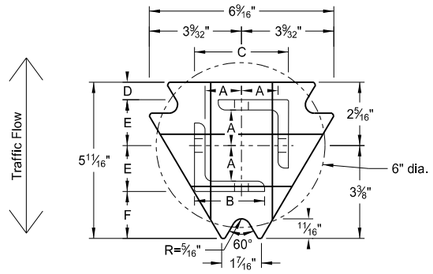
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

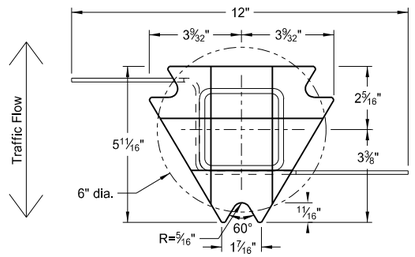


Multi-Directional
Slip Base Assembly

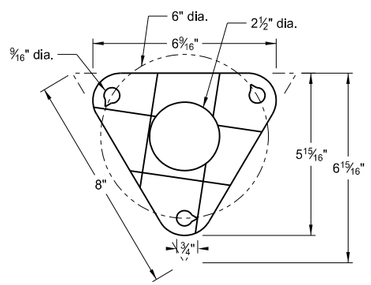
Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50



Bolt Retainer for Base Connection
Bolt Retainer- 1/32" Reprocessed Teflon

Notes:

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

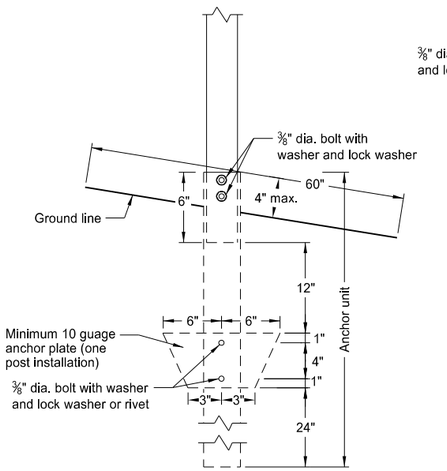
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³/16	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
1½ x 1½	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
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³/16 x 2³/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.785

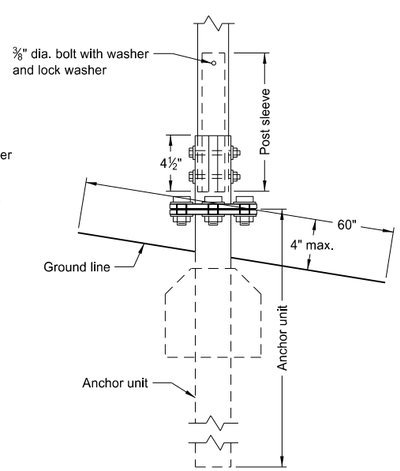
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³/16"x10 ga.	1⁹/64"	2½"	3¹/32"	2⁵/32"	1³³/64"	1⅞"
2½"x10 ga.	1⁹/32"	2½"	3⁵/16"	⅝"	1²¹/32"	1¾"

(A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.

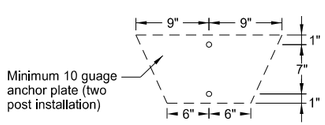
(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



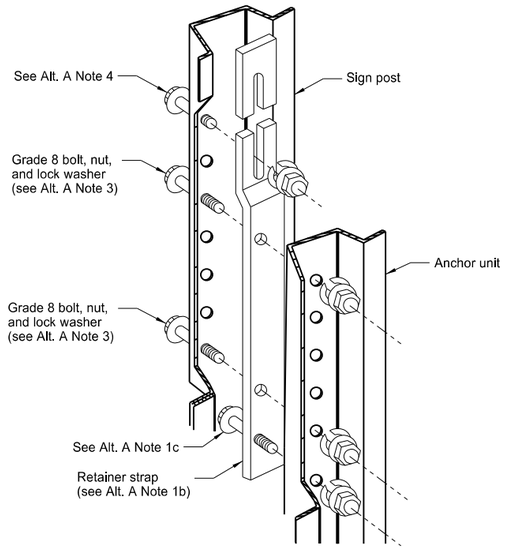
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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

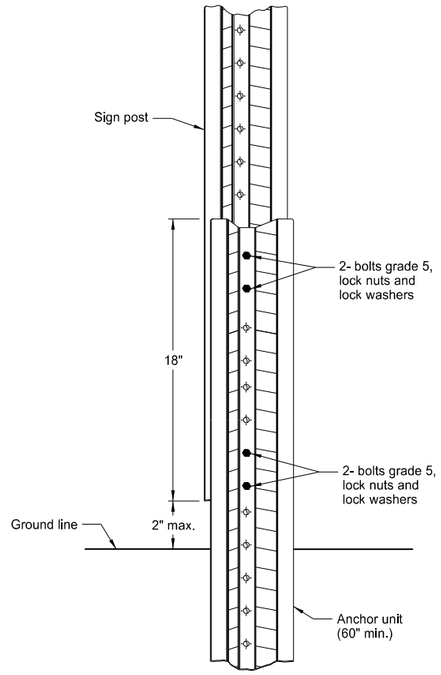
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

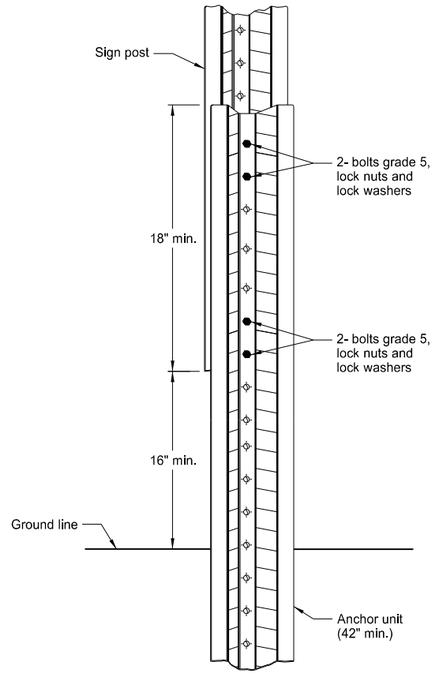


Detail A



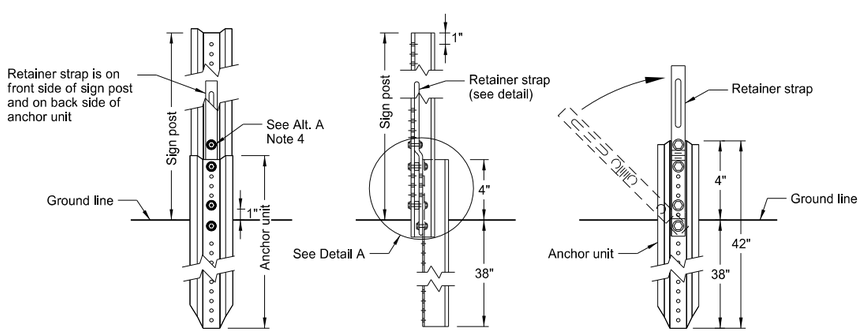
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



Breakaway U-Channel Splice Detail
Alternate C
(2.5 and 3 lb/ft)

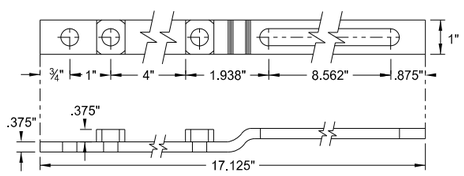
Install a maximum of 3 posts within 7'.



Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



Retainer Strap Detail

Alternate A Steps of Installation:

1. 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.
2. a) Drive anchor unit to 4" above ground.
   b) Rotate strap to vertical position.
3. 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.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. Properly nest base post, strap, and sign post. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

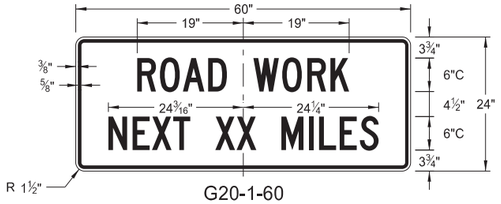
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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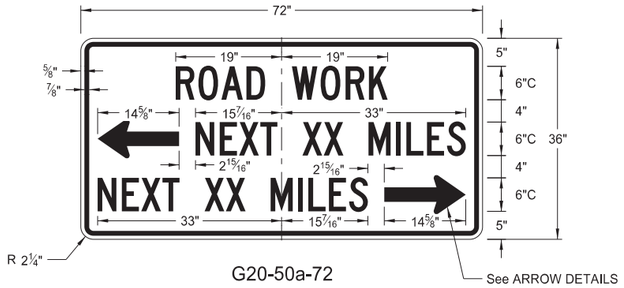
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

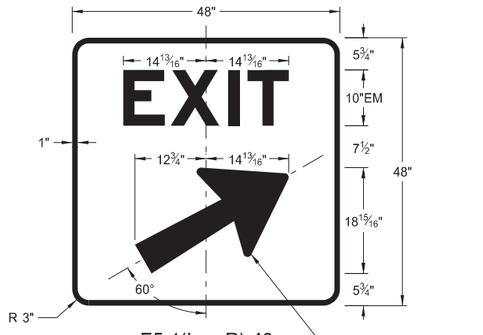
D-704-9



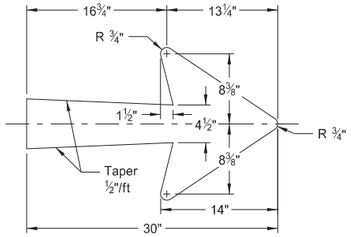
G20-1-60
Legend: black (non-refl)
Background: orange



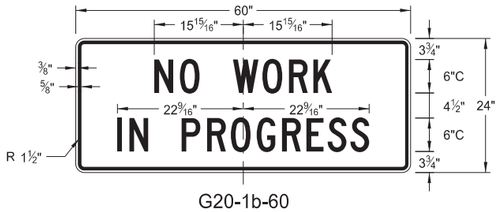
G20-50a-72
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Background: orange



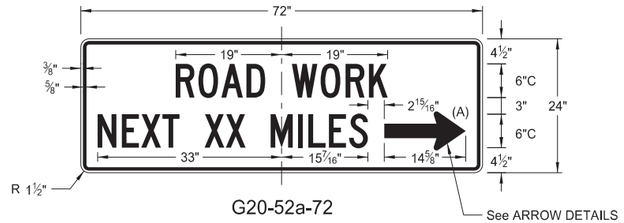
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



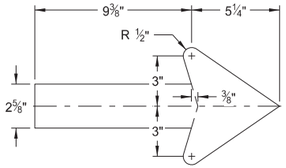
E5-1-48



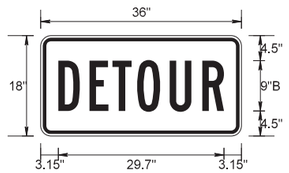
G20-1b-60
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Background: orange



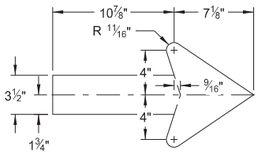
G20-52a-72
Legend: black (non-refl)
Background: orange



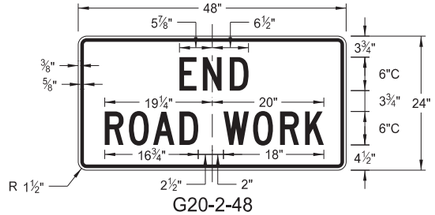
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G20-52a-72



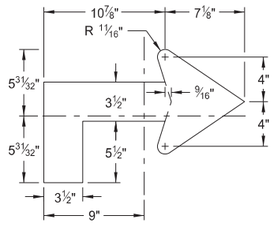
M4-8-36
Legend: black (non-refl)
Background: orange



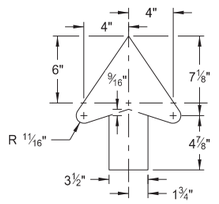
M4-9(L or R)-30
Right or Left



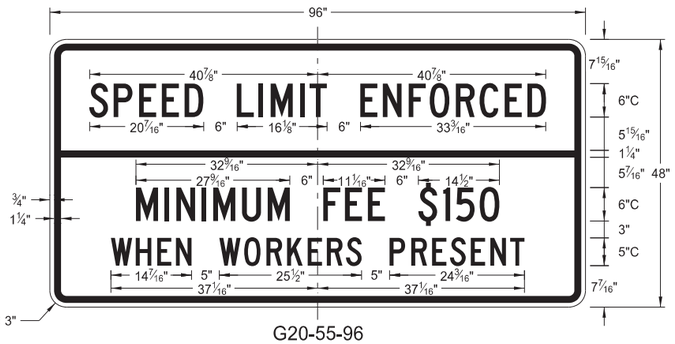
G20-2-48
Legend: black (non-refl)
Background: orange



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



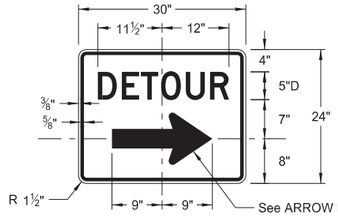
M4-9-30
Straight



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



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:

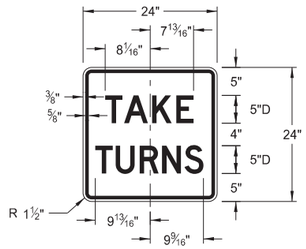
(A) Arrow may be right or left of the legend to Indicate construction to the right or left.

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

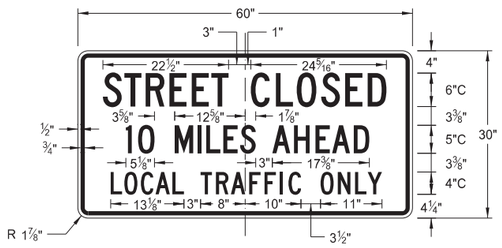
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
06/30/25
ENGINEER
NORTH DAKOTA

Docusign Envelope ID: 2F5C9714-A0E1-42BB-B36B-42204844BFCB

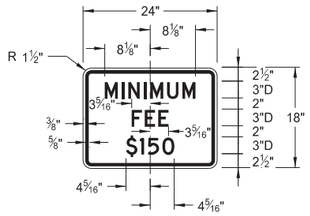
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



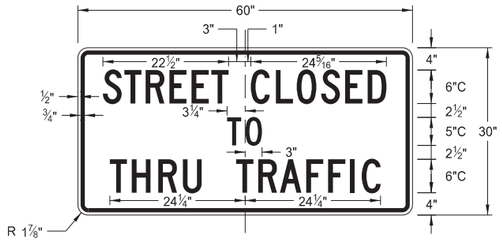
R1-50P-24
Legend: black (non-refl)
Background: white



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



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



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

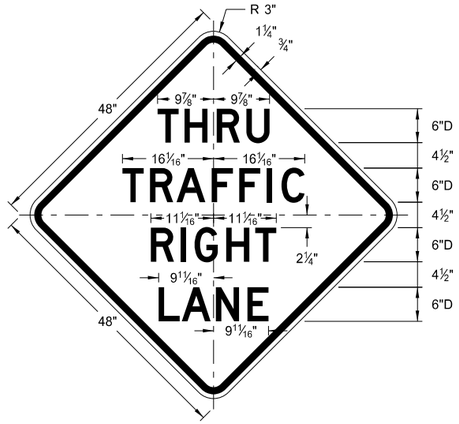


R11-2a-48
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Background: white

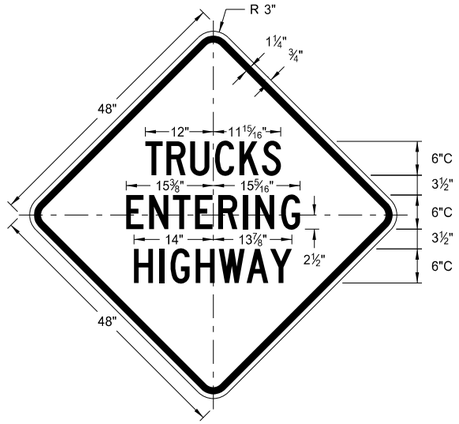
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
06/30/25
ENGINEER
NORTH DAKOTA

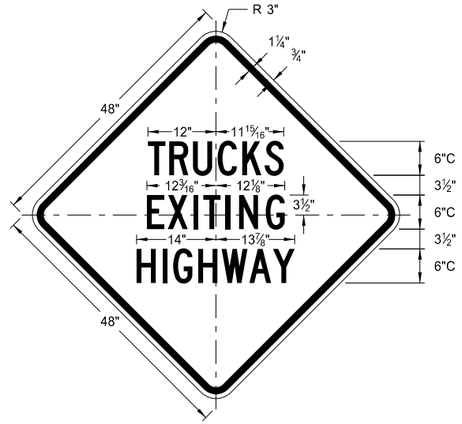
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



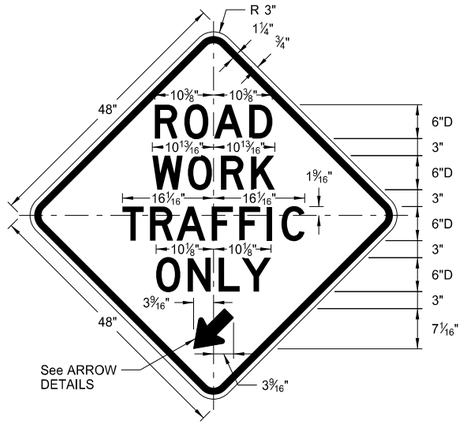
W5-8-48
Legend: black (non-refl)
Background: orange



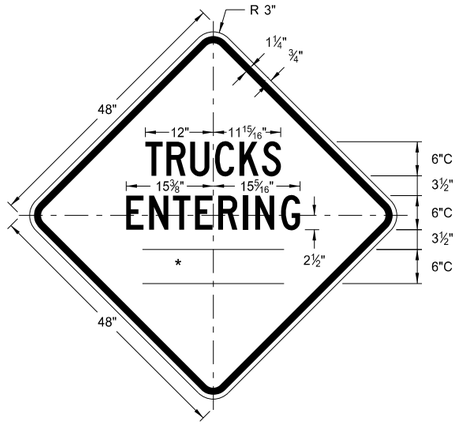
W8-53-48
Legend: black (non-refl)
Background: orange



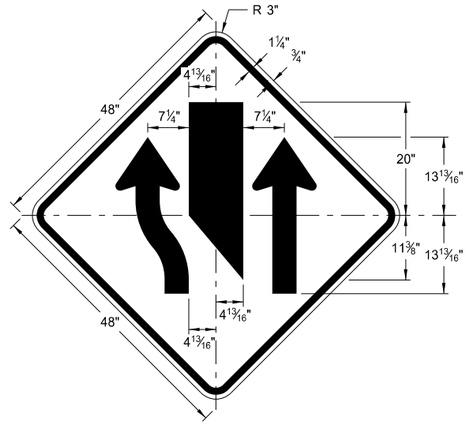
W8-56-48
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Background: orange



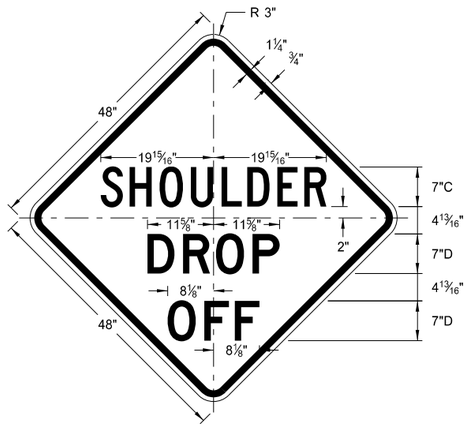
W5-9-48
Legend: black (non-refl)
Background: orange



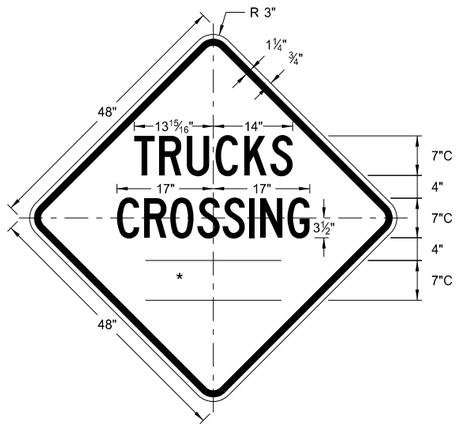
W8-54-48
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Background: orange



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



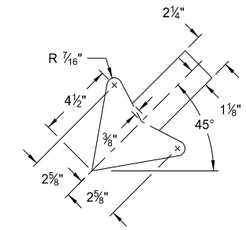
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Background: orange



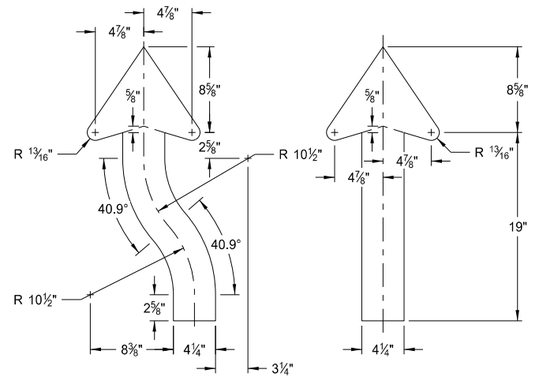
W8-55-48
Legend: black (non-refl)
Background: orange

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



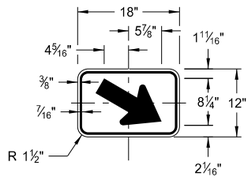
W9-3a-48

ARROW DETAILS

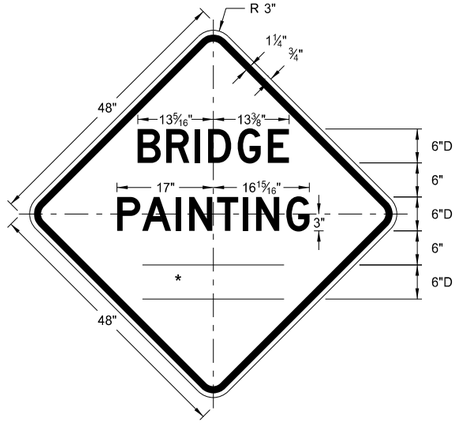
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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

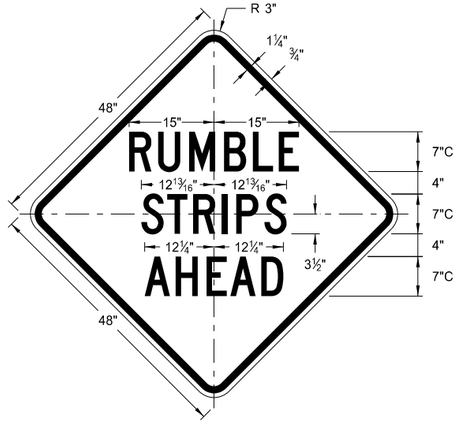
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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



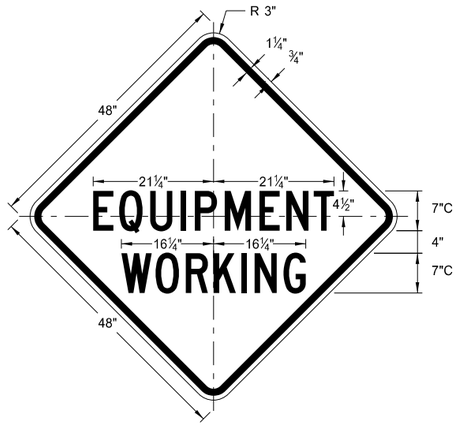
W21-50-48
Legend: black (non-refl)
Background: orange



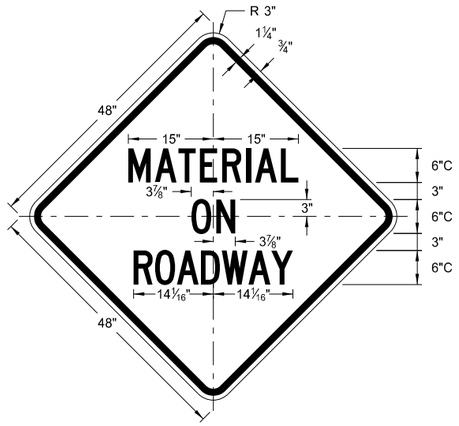
W21-53-48
Legend: black (non-refl)
Background: orange

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

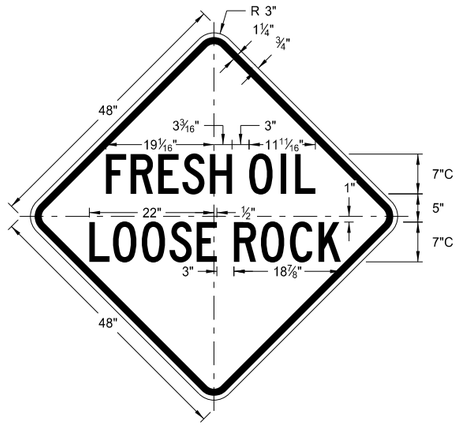
* DISTANCE MESSAGES



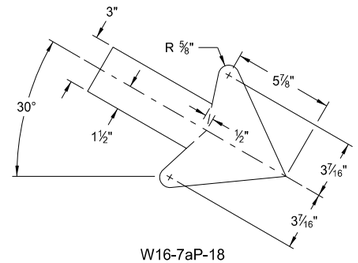
W20-51-48
Legend: black (non-refl)
Background: orange



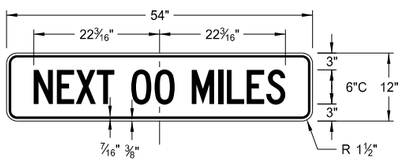
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Background: orange



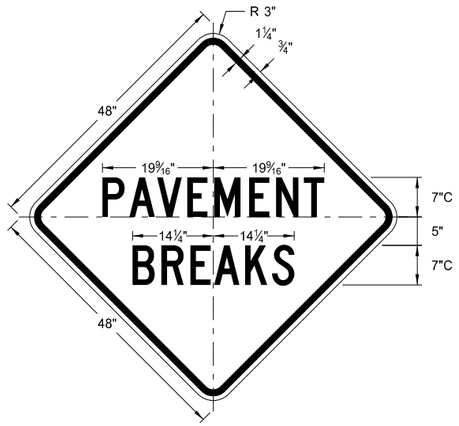
W22-8-48
Legend: black (non-refl)
Background: orange



W16-7aP-18



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



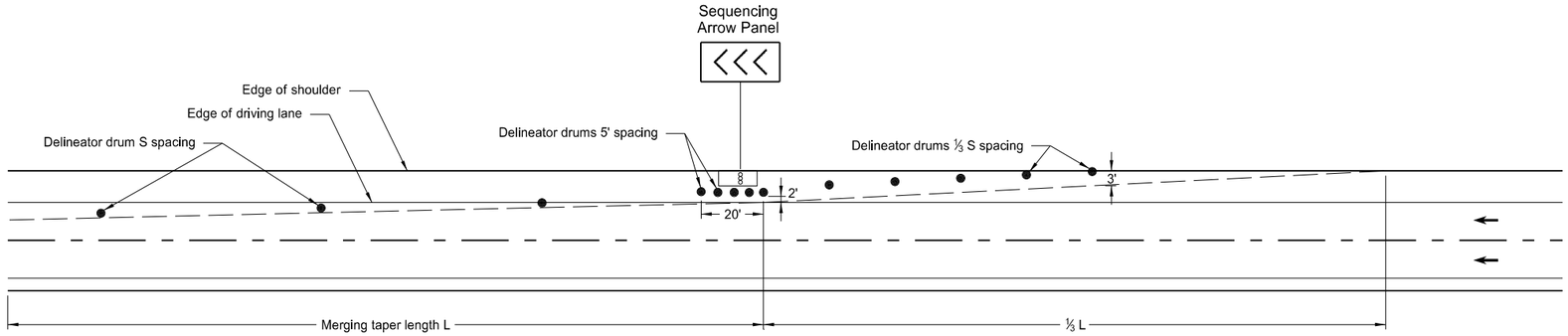
W21-52-48
Legend: black (non-refl)
Background: orange

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

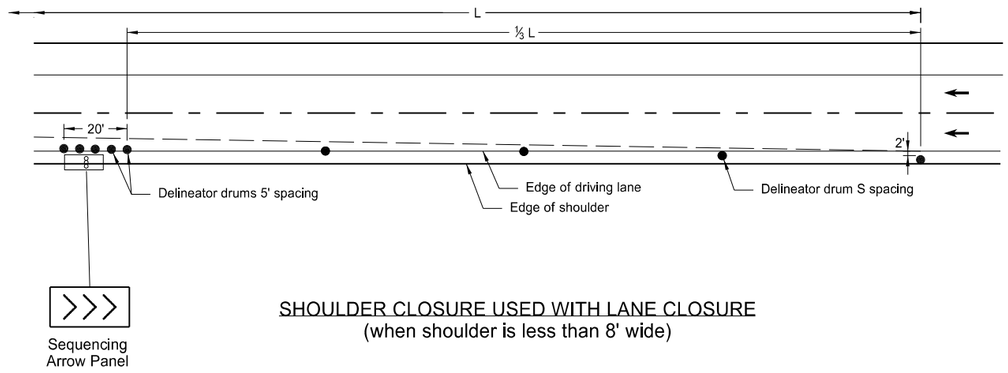
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SHOULDER CLOSURE TAPERS

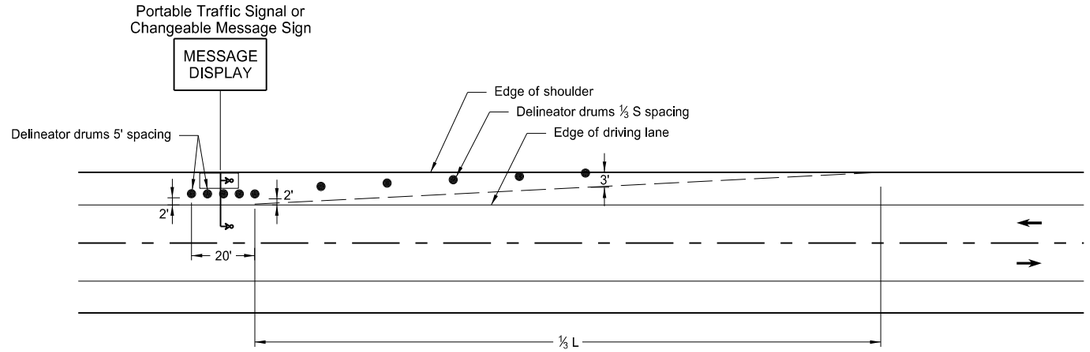
D-704-12



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



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY	
● Delineator Drum	∞ Sequencing Arrow Panel
° Message Display	Portable Traffic Signal

Notes:

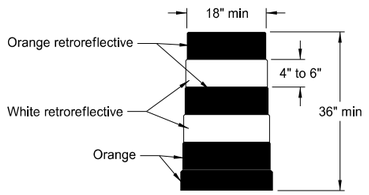
1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   L = $WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, use a length of approximately ⅓L. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
3. When 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

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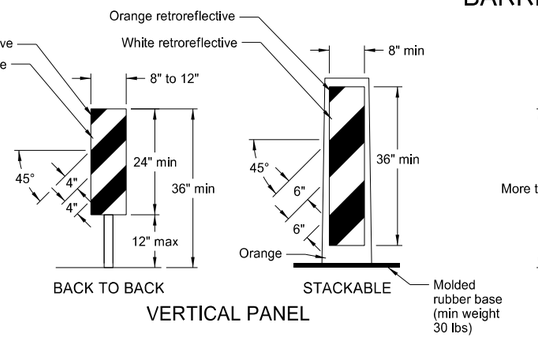
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



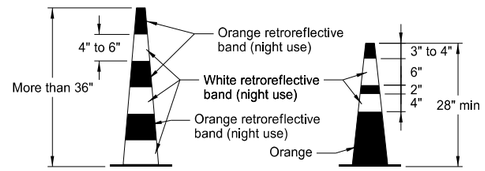
DELINEATOR DRUM

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.



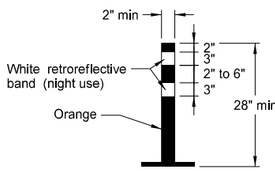
VERTICAL PANEL

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



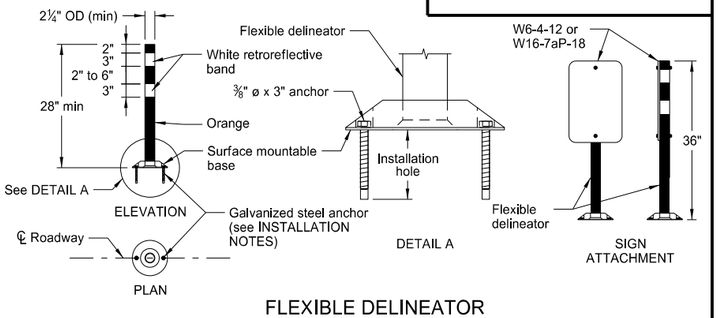
TRAFFIC CONE

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



TUBULAR MARKER

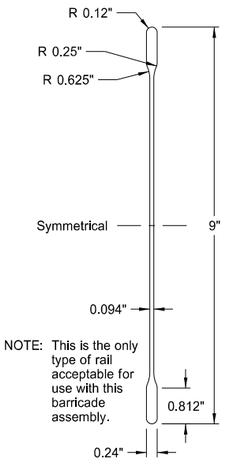
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

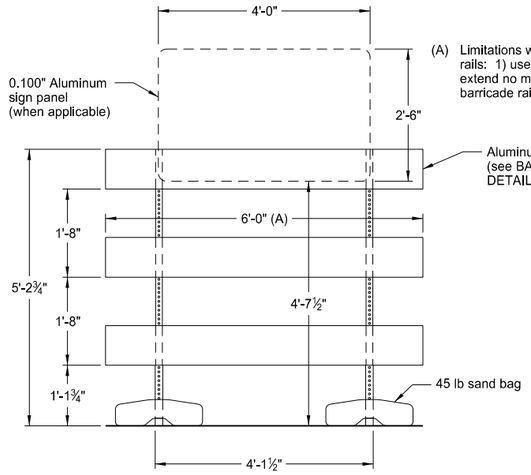
INSTALLATION NOTES:

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



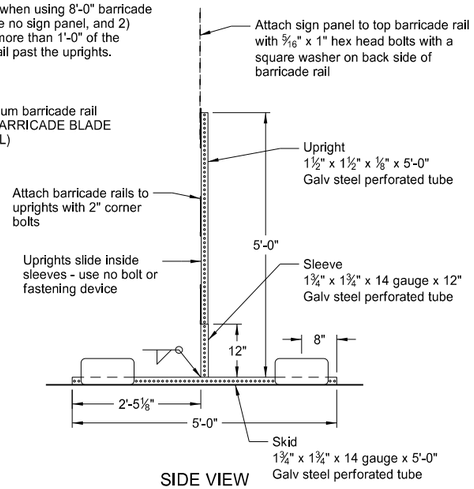
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



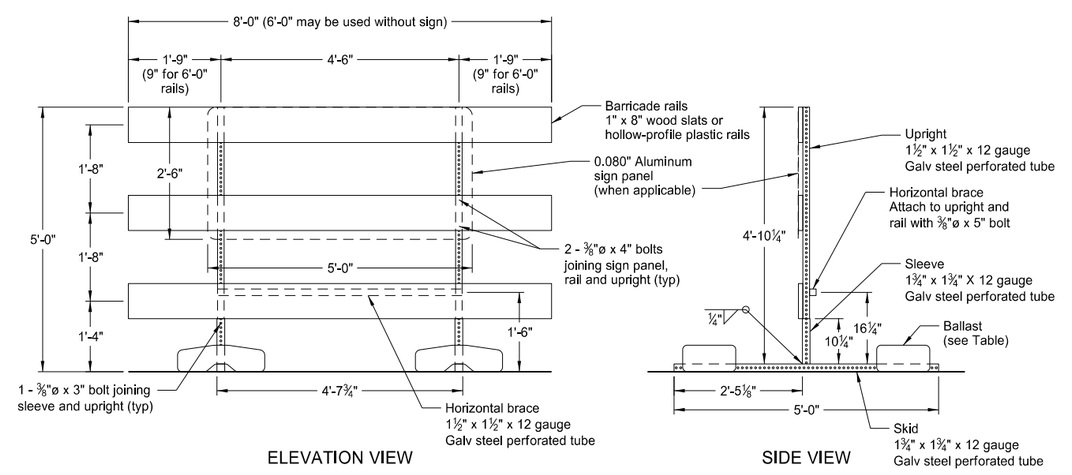
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW



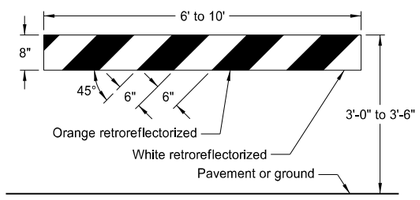
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

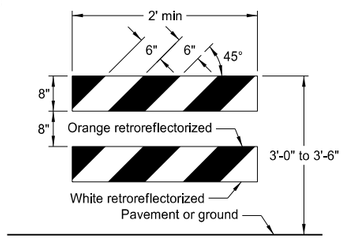


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

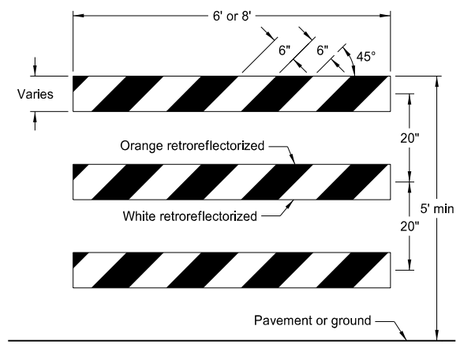
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

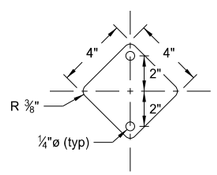


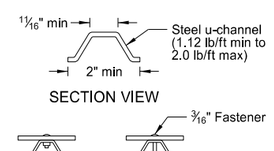
TYPE II BARRICADE

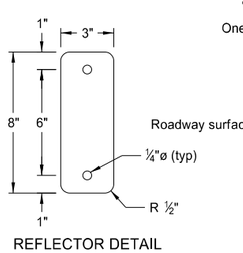


TYPE III BARRICADE

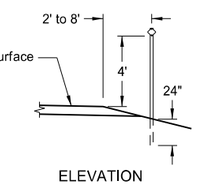
BARRICADE RAIL DETAILS







REFLECTOR DETAIL



ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

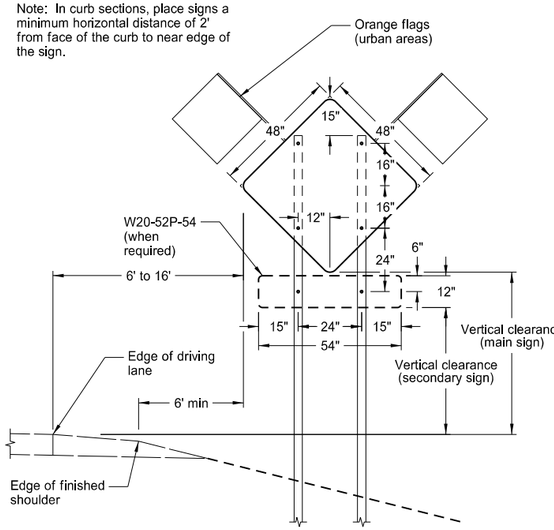
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

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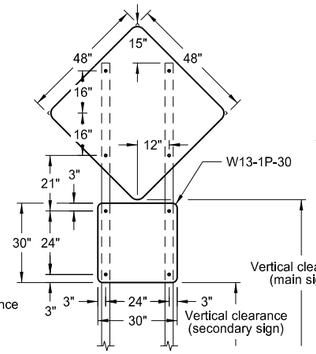
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

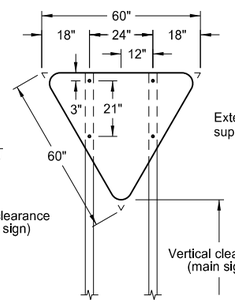
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



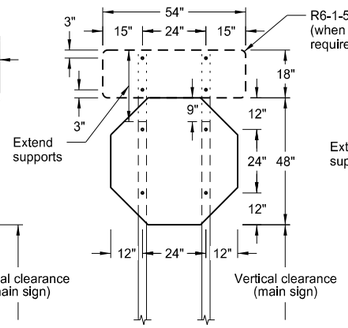
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



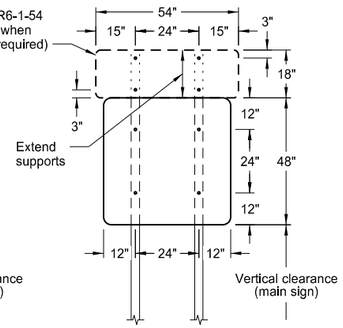
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



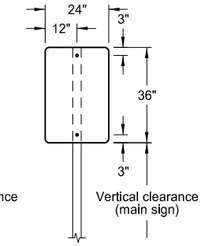
R1-2-60 - YIELD SIGN



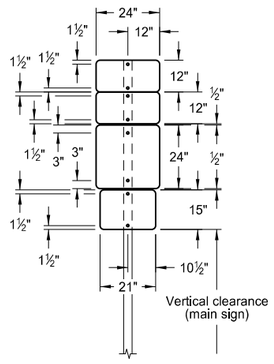
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



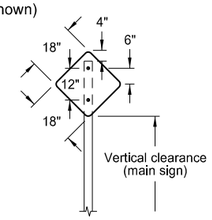
48" x 48" SIGN
(with R6-1-54 sign as required)



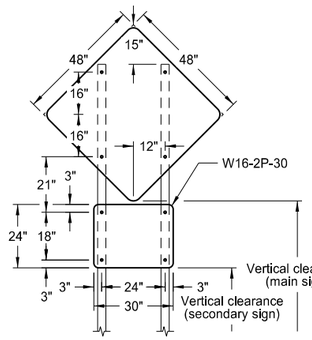
24" x 36" SIGN



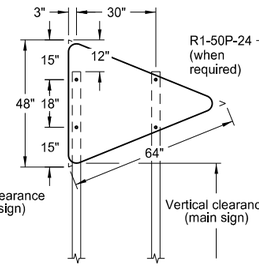
24" x 24"
ROUTE MARKER
ASSEMBLY



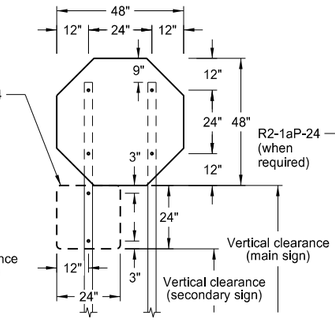
18" x 18"
DIAMOND SIGN



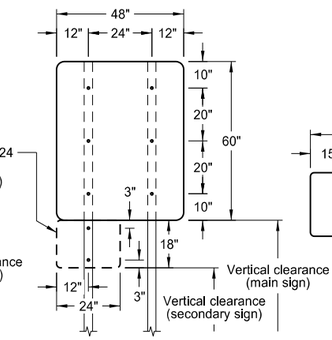
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



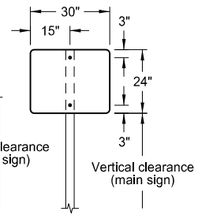
W14-3-64 - PENNANT SIGN



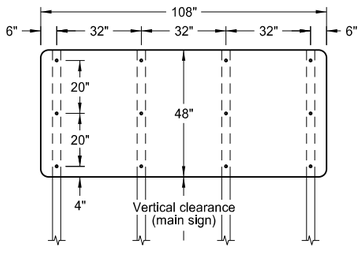
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



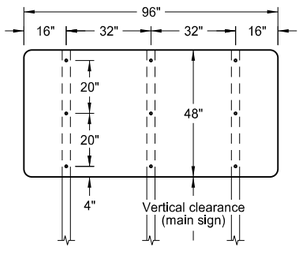
48" x 48" SIGN
(with R2-1aP-24 sign as required)



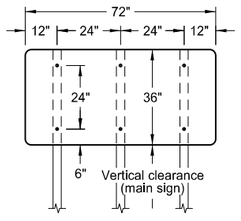
30" x 24" SIGN



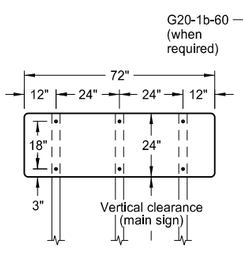
108" x 48" SIGN



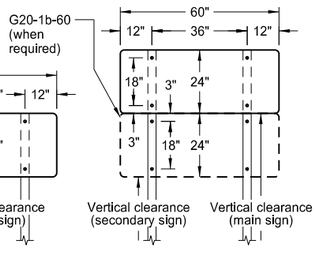
96" x 48" SIGN



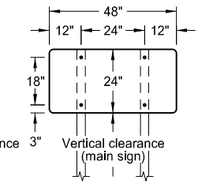
72" x 36" SIGN



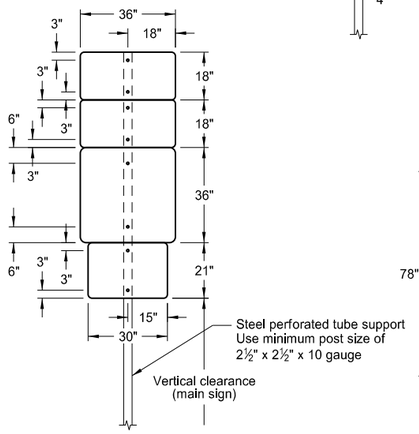
72" x 24" SIGN



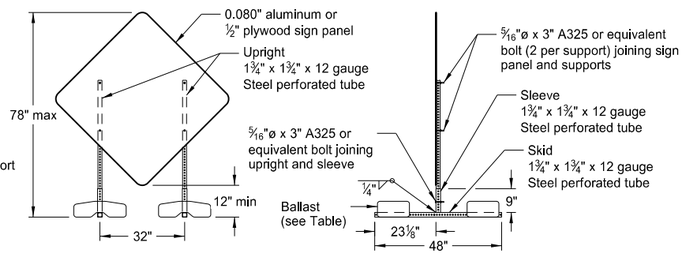
60" x 24" SIGN



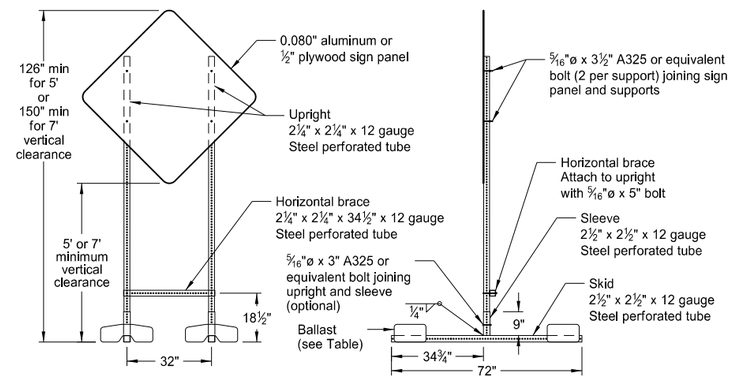
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



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 ⅜" 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 unforseen 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

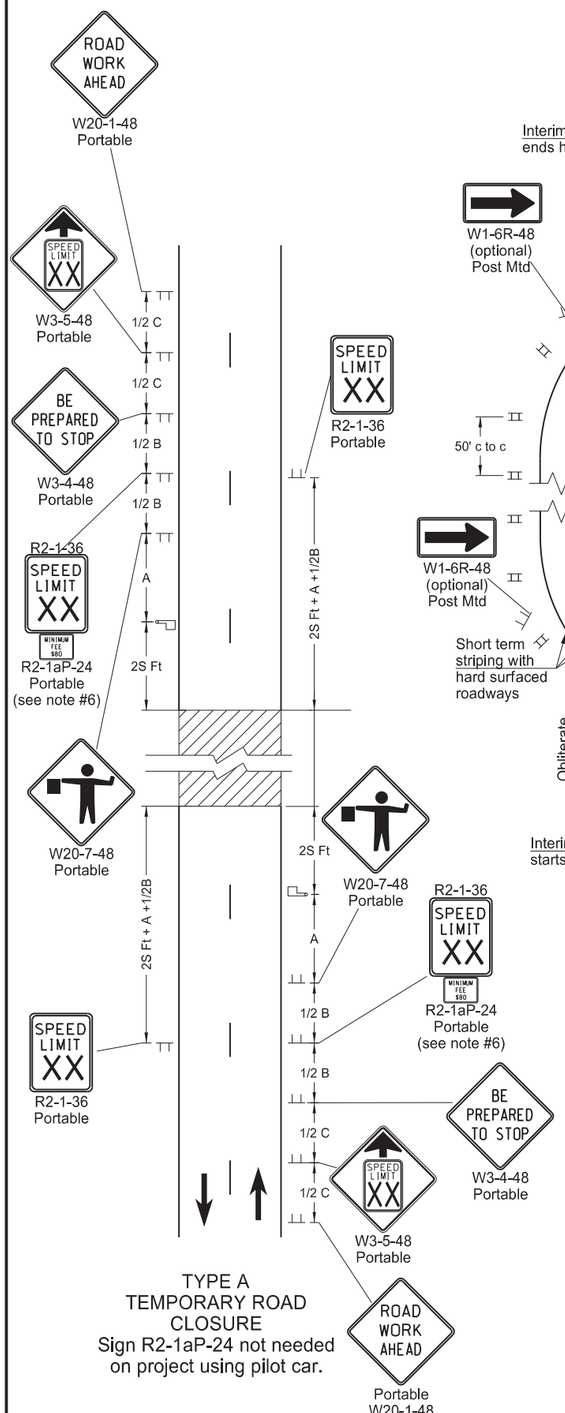
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

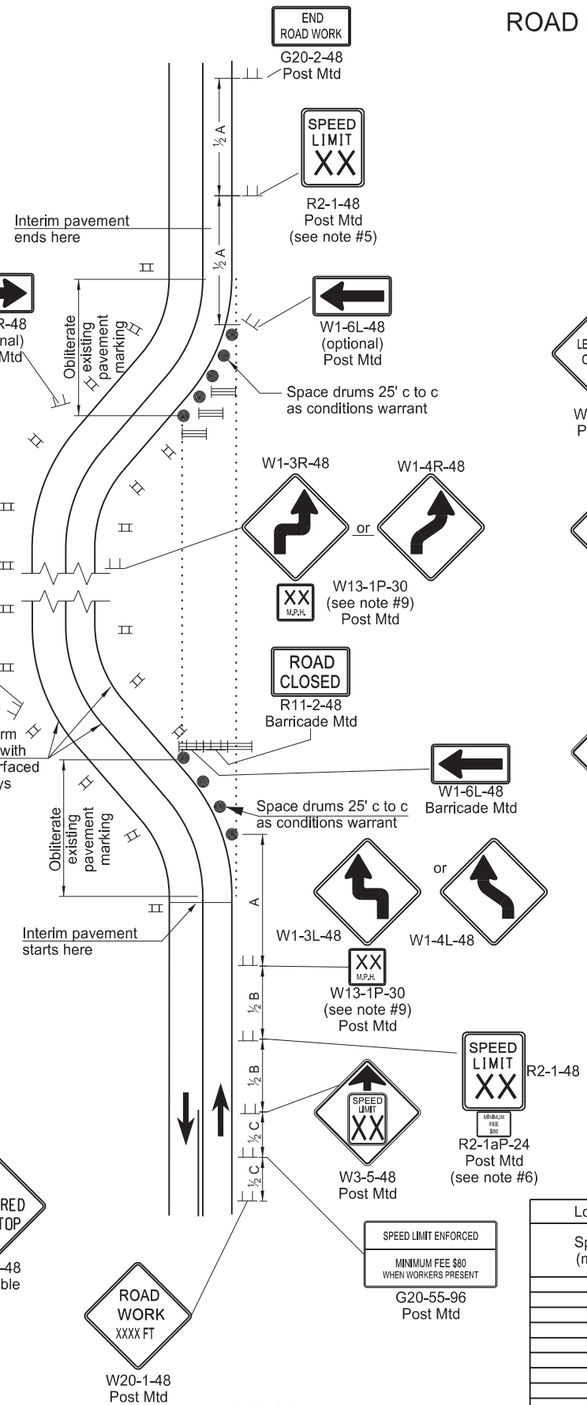
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ROAD CLOSURE LAYOUTS

D-704-15

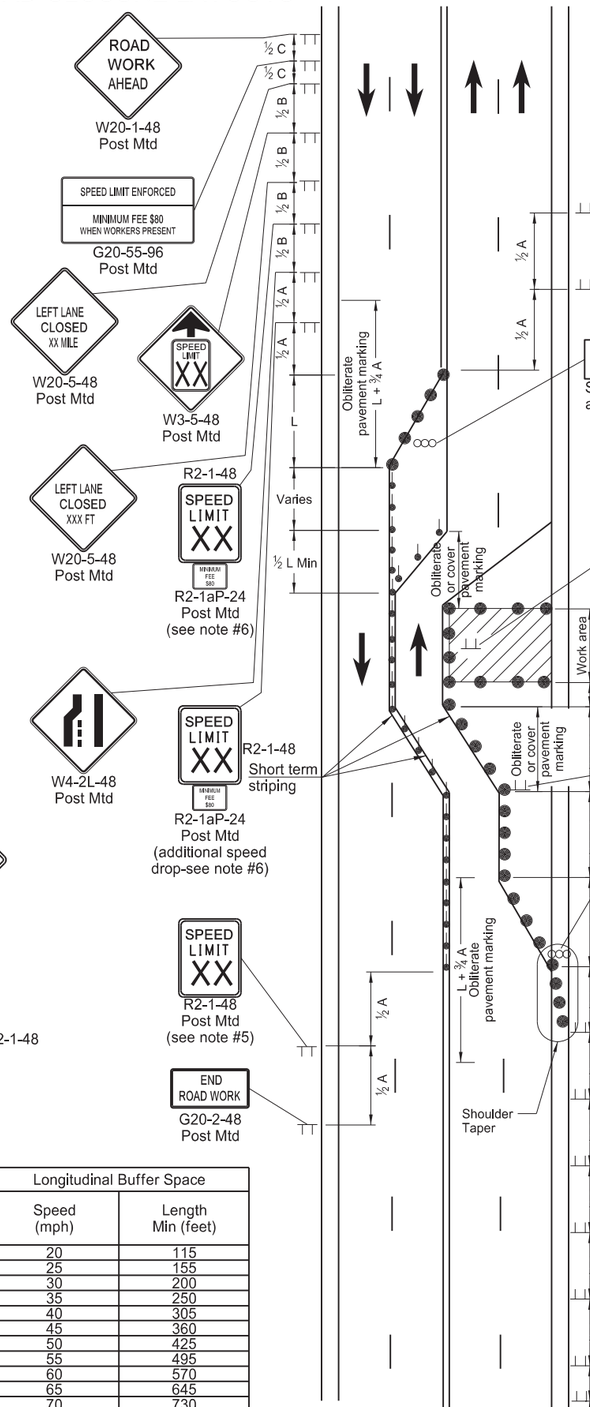


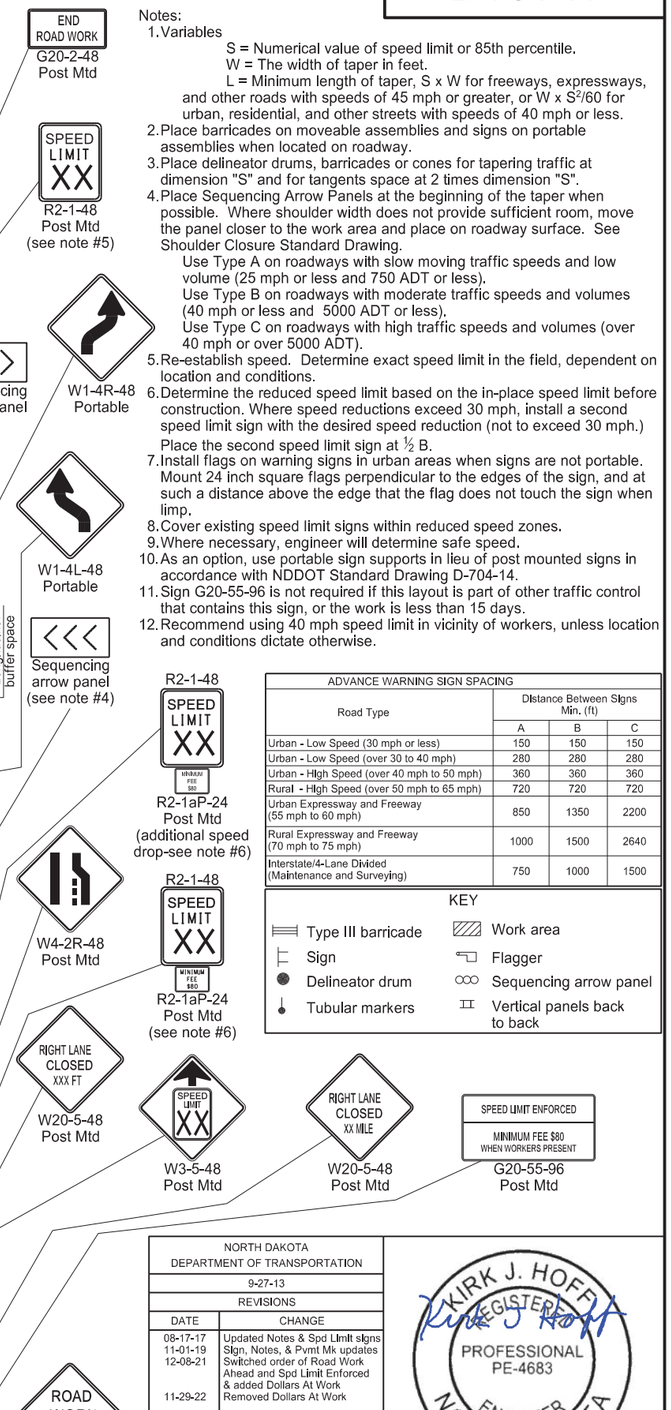
TYPE A
TEMPORARY ROAD CLOSURE
Sign R2-1aP-24 not needed on project using pilot car.



TYPE B
ROAD CLOSURE WITH A DIVERSION
Two lane highway where roadway is closed and detour provided (signing shown for one direction only). Use on bridge and culvert installation with ½ mile or less closure.

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





TYPE C
HALF ROAD CLOSURE ON A MULTI-LANE, HIGH SPEED HIGHWAY
4 lane undivided highway with half the roadway closed.

Notes:
1. 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 S^2/60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
4. 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).
5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
6. 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 ½ B.
7. 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.
8. Cover existing speed limit signs within reduced speed zones.
9. Where necessary, engineer will determine safe speed.
10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
11. 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.
12. 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

KEY

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

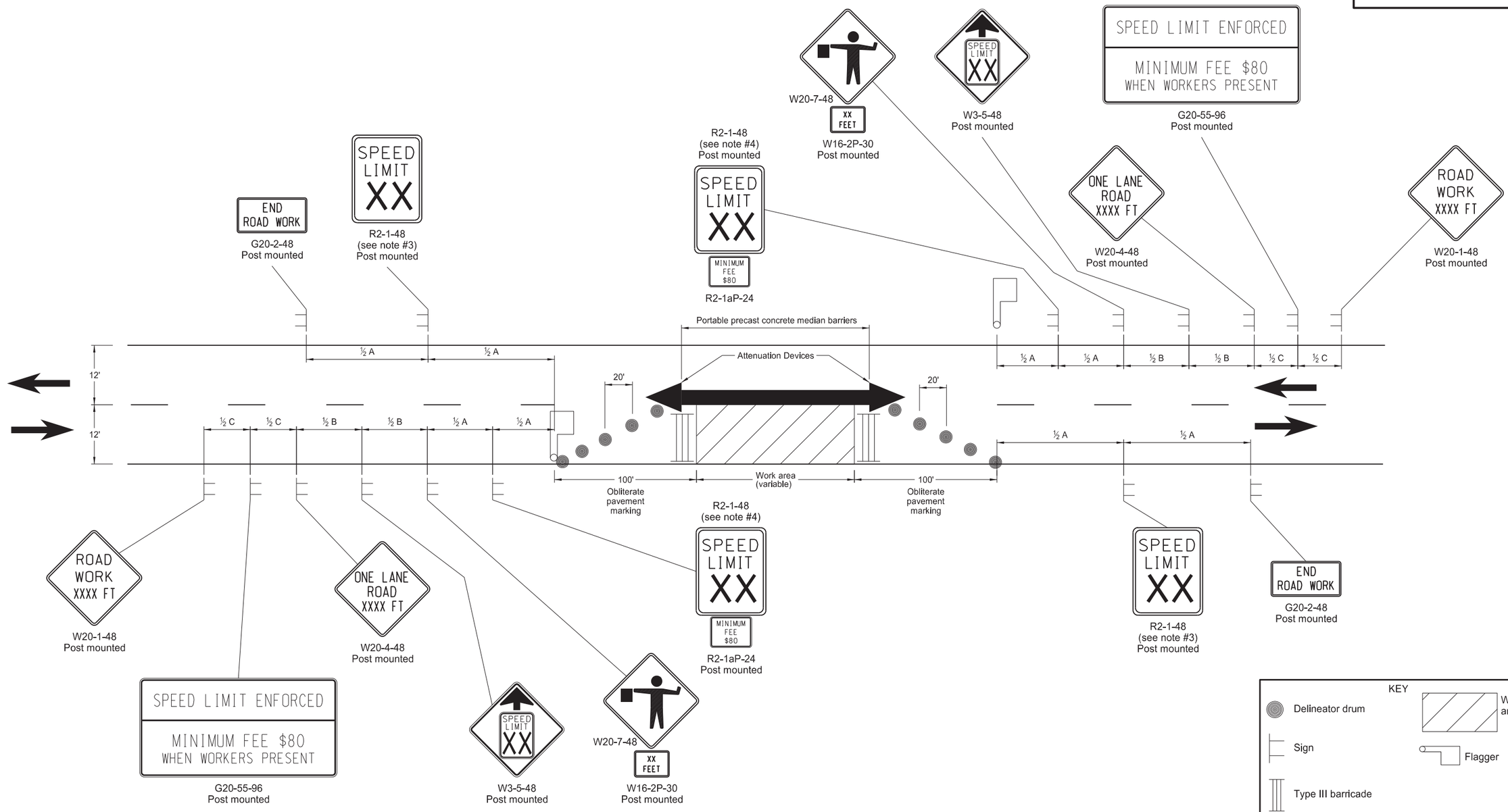
DATE	CHANGE
08-17-17	Updated Notes & Spd Limit signs
11-01-19	Sign, Notes, & Pvmt Mk updates
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

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11/29/22

SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



KEY

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

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. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. 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.
3. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
4. 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 ½B.
5. 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.
6. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
7. Cover existing speed limit signs within a reduced speed zone.
8. 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.
9. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

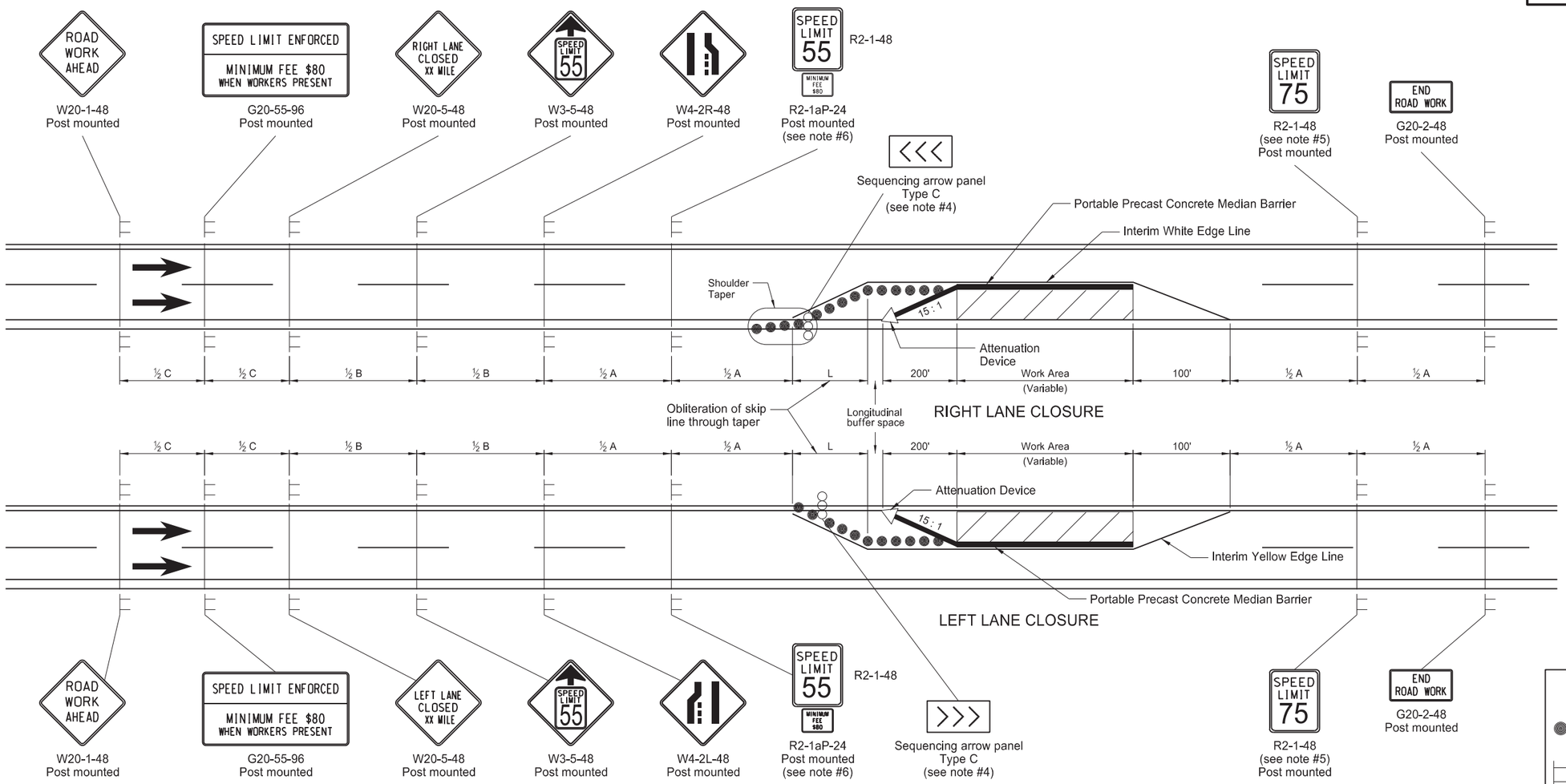
DATE	CHANGE
08-17-17	Note update & sign numbers
11-01-19	Removed signs & revised note
12-08-21	Switched order of Road Work XXXX and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

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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:

1. 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 x W for freeways, expressways, and roads with speeds of 45 mph or greater, or
   W x S^2 /60 for urban, residential, and streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
3. Space delineator drums used for tapering traffic and on tangent at dimension "S".
4. 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).
5. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
6. 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 ½ B.
7. 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.
8. Cover existing speed limit signs within a reduced speed zone.
9. As an option, use portable sign supports in lieu of post mounted signs in accordance with the Standard D-704-14.
10. 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.
11. 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

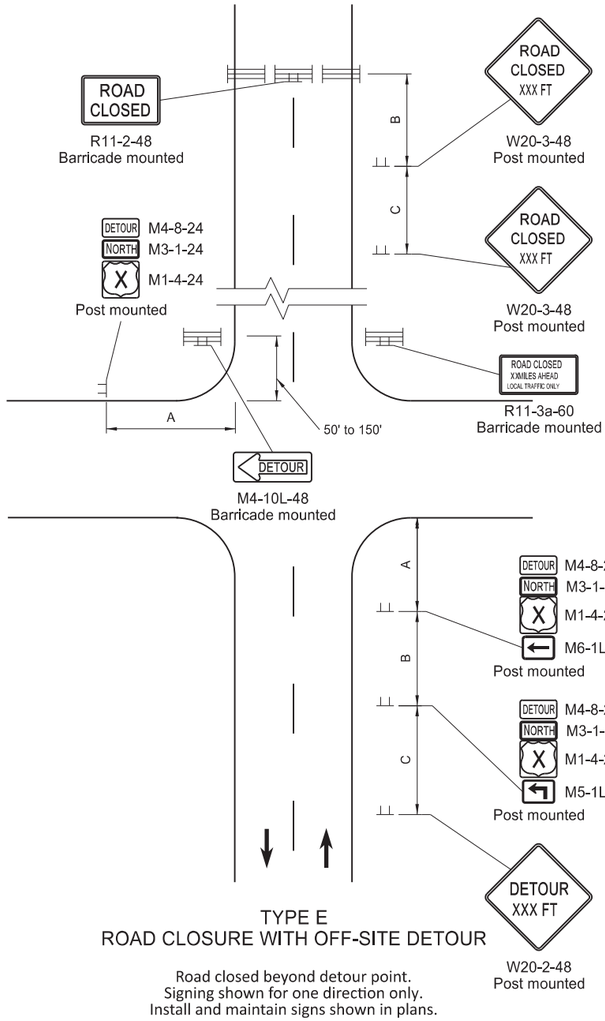
DATE	CHANGE
01-13-16	Changed to Interim yellow edge line
03-15-16	Removed Do Not Pass signs & updated notes
08-17-17	Updated notes & sign numbers
11-01-19	Note, sign #, & pvmt oblit change
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars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

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11/29/22

ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

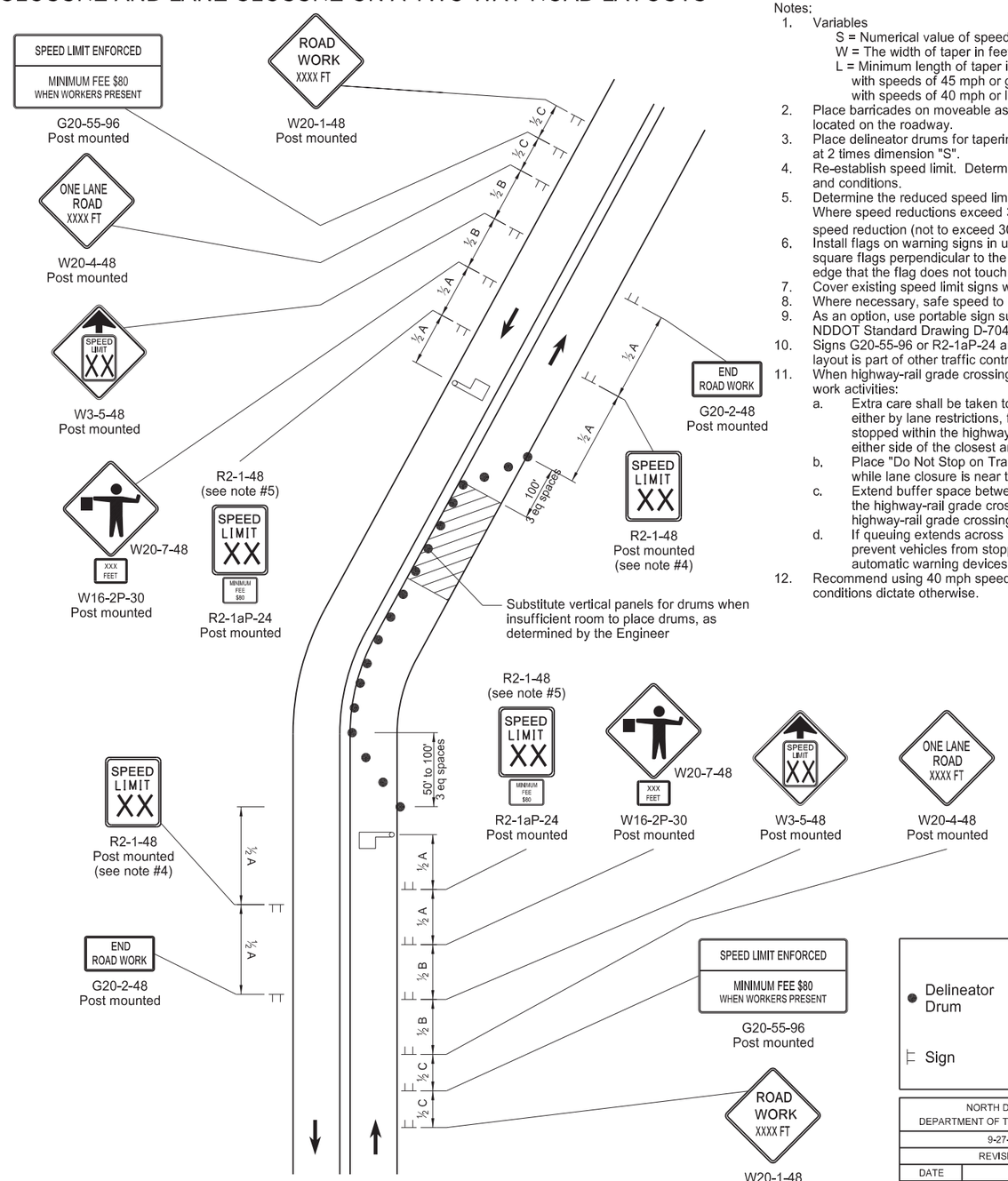
D-704-19



TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

Road closed beyond detour point.
Signing shown for one direction only.
Install and maintain signs shown in plans.

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



TYPE F
LANE CLOSURE ON A TWO LANE ROAD USING FLAGGERS

Two lane highway with one lane closed.
Flagger at point visible to approaching traffic.

Notes:

1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet
   L = Minimum length of taper in feet. S x W for freeways, expressways, and roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
3. Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. 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 second speed limit sign at ½B.
6. 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.
7. Cover existing speed limit signs within a reduced speed zone.
8. Where necessary, safe speed to be determined by the Engineer.
9. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
10. Signs G20-55-96 or R2-1aP-24 are not required when pilot car operation is used, if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
11. When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
    a. Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
    b. Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
    c. Extend buffer space between work zone and lane closure transition upstream of the highway-rail grade crossing to prevent flagging queue from extending across highway-rail grade crossing.
    d. If queuing extends across highway-rail crossing, provide flagger at crossing to prevent vehicles from stopping within the crossing (even when automatic warning devices are in place.)
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

KEY

- Delineator Drum
- Type III Barricade
- Flagger
- Sign
- Work/Hazard Area

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

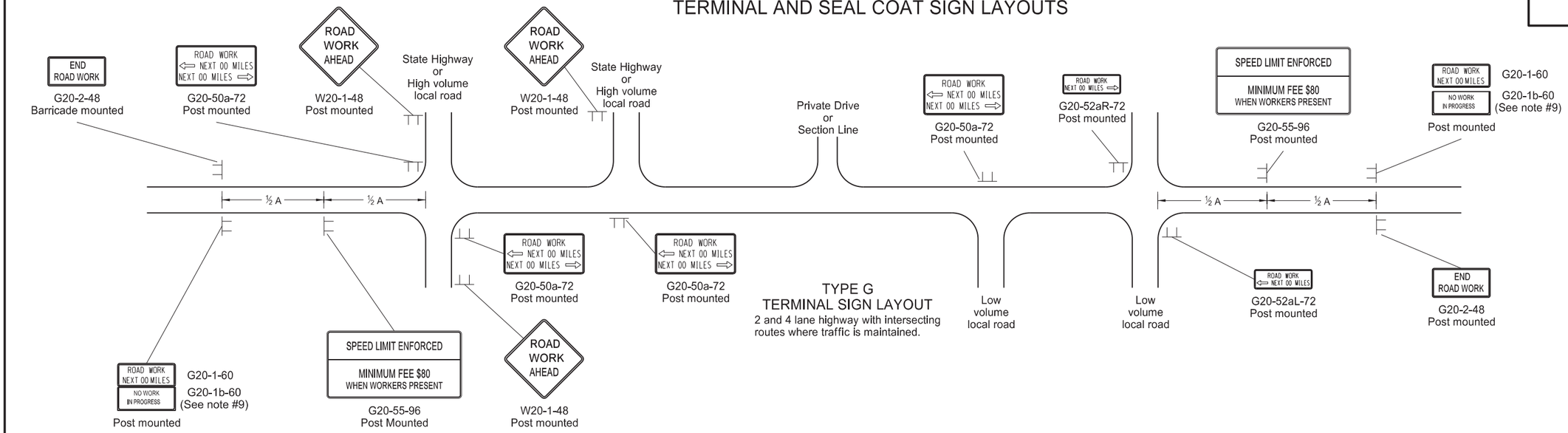
DATE	CHANGE
03-13-14	Revised Sign Cell "ROAD WORK XXX FT"
08-17-17	Update notes & sign numbers
11-01-19	Revised signs, sign #s, & notes
12-08-21	Switched order of Road Work XXX and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

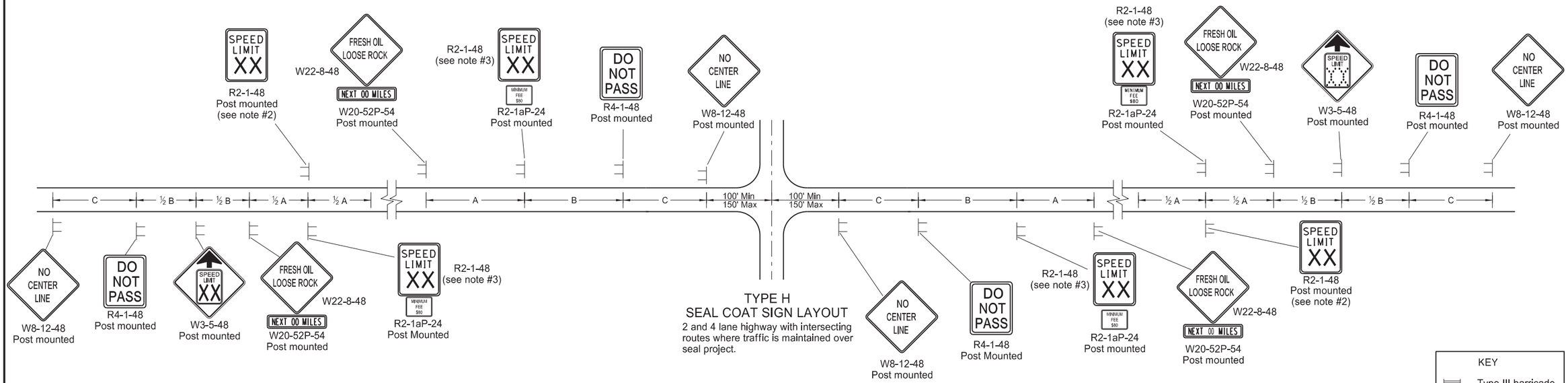
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11/29/22

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20





KEY
- Type III barricade
- Sign

Notes:
1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Determine the exact speed limit in the field, based on location and conditions.
3. 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 ½ B.
4. 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.
5. Cover existing speed limit signs within a reduced speed zone.
6. 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.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
8. Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
9. Install sign G20-1b-60 when work is suspended for winter.
10. Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
11. 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.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
08-17-17	Updated notes & sign numbers
11-01-19	Updated note & sign
12-08-21	Switched order of Road Work and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

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

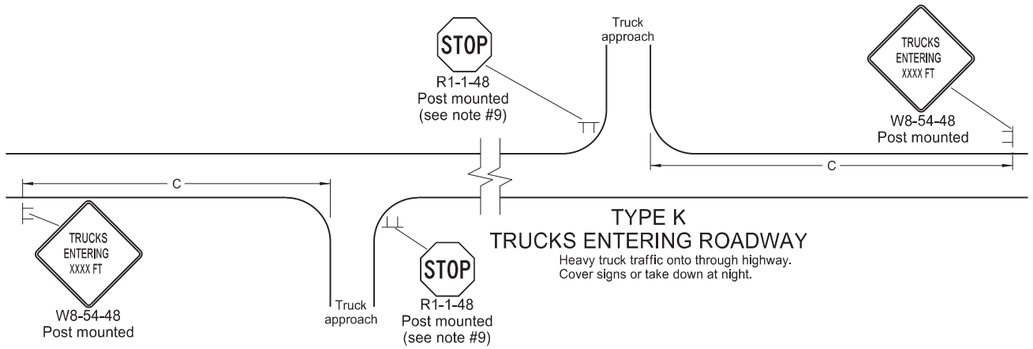
Kirk J. Hoff

11/29/22

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

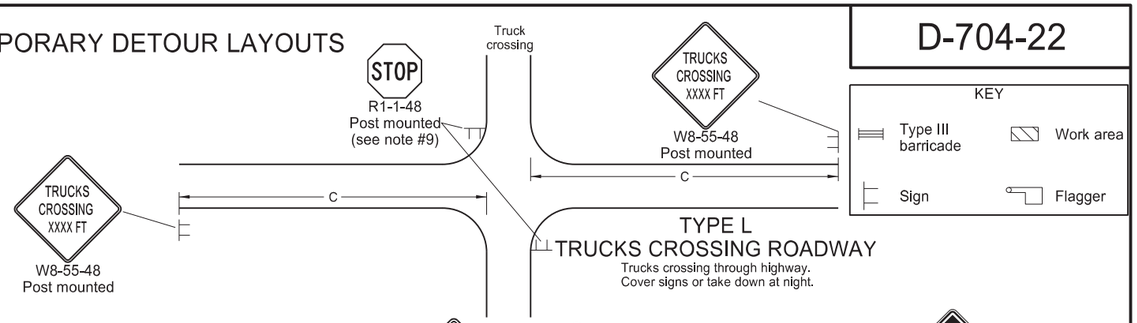
D-704-22

KEY: Type III barricade; Work area; Sign; Flagger



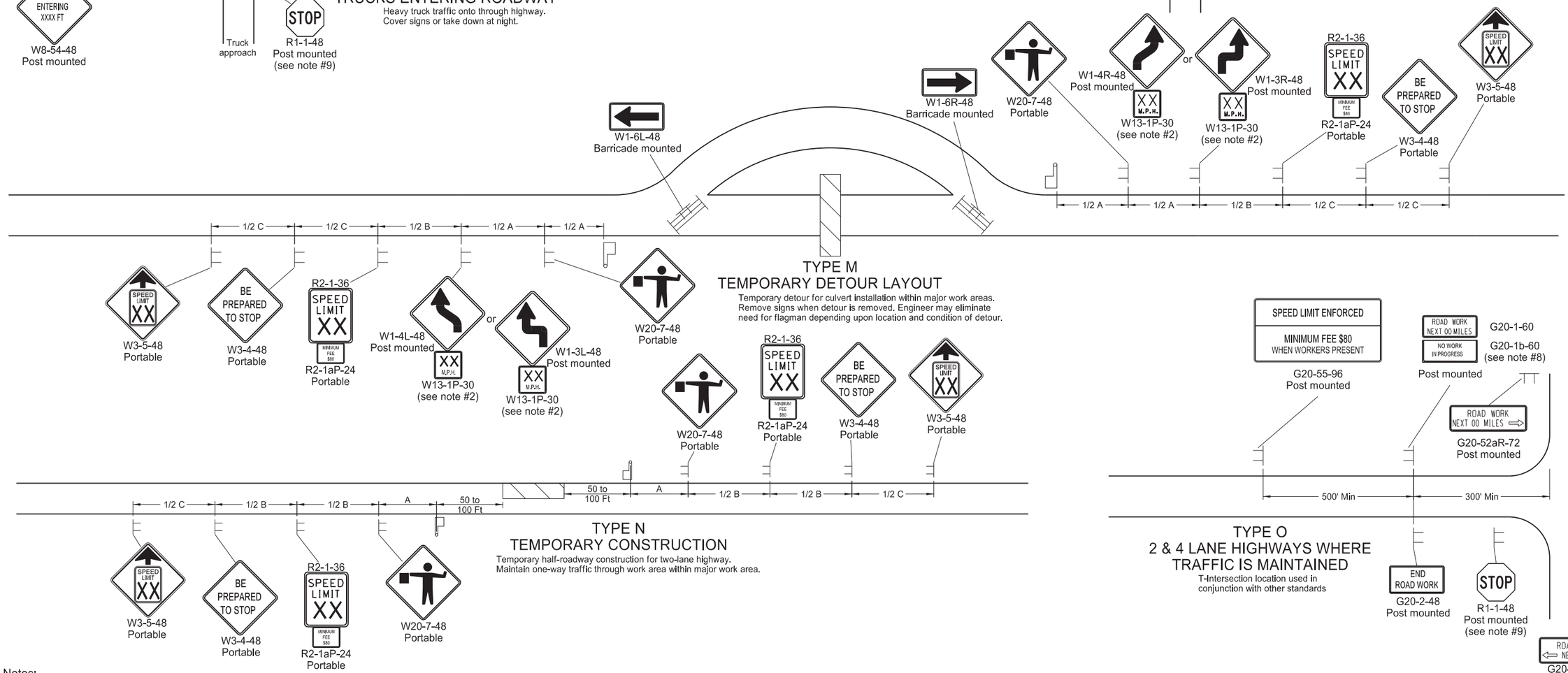
TYPE K
TRUCKS ENTERING ROADWAY

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:

1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. 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 ½ B.
4. 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.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
8. Install sign G20-1b-60 when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. 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.
11. 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

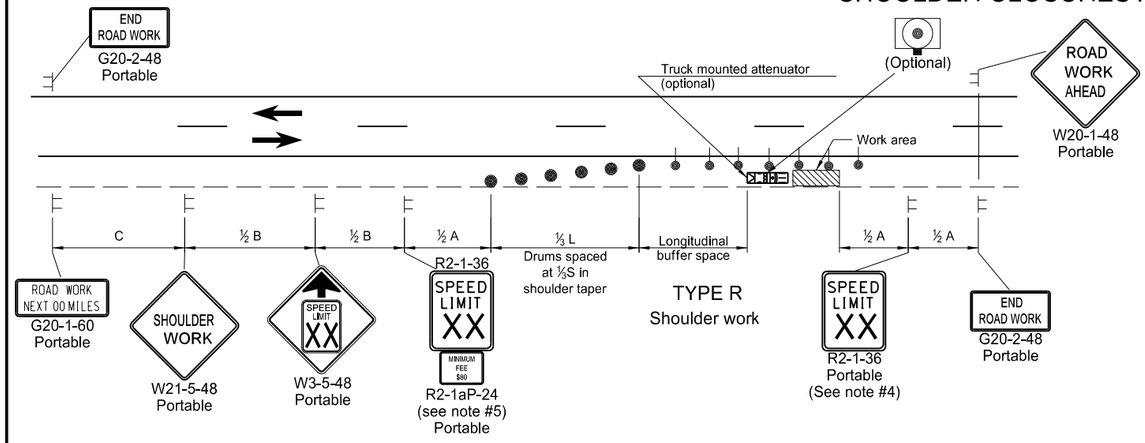
DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs
11-29-22	Removed Dollars At Work

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NORTH DAKOTA

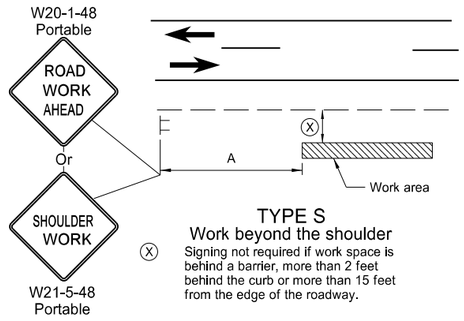
11/29/22

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

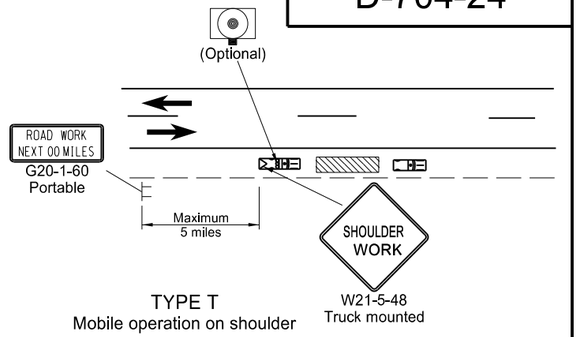
D-704-24



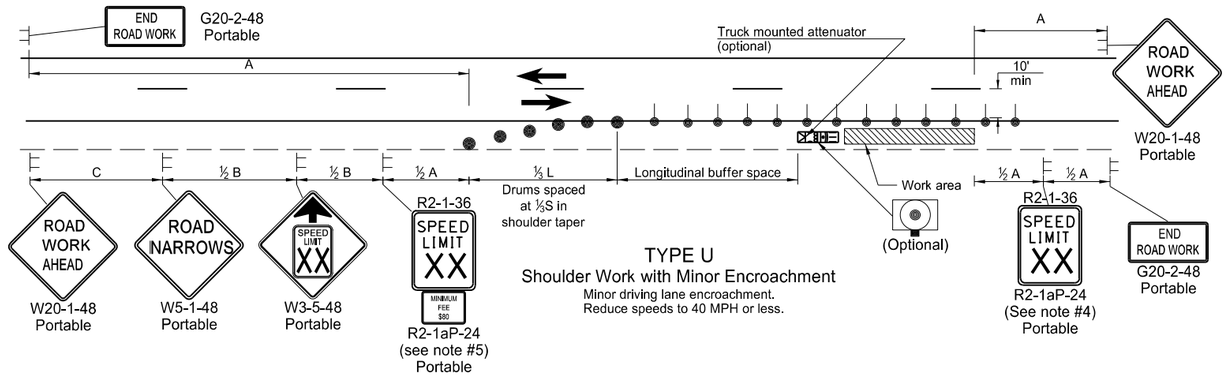
TYPE R
Shoulder work



TYPE S
Work beyond the shoulder
Signing not required if work space is behind a barrier, more than 2 feet behind the curb or more than 15 feet from the edge of the roadway.

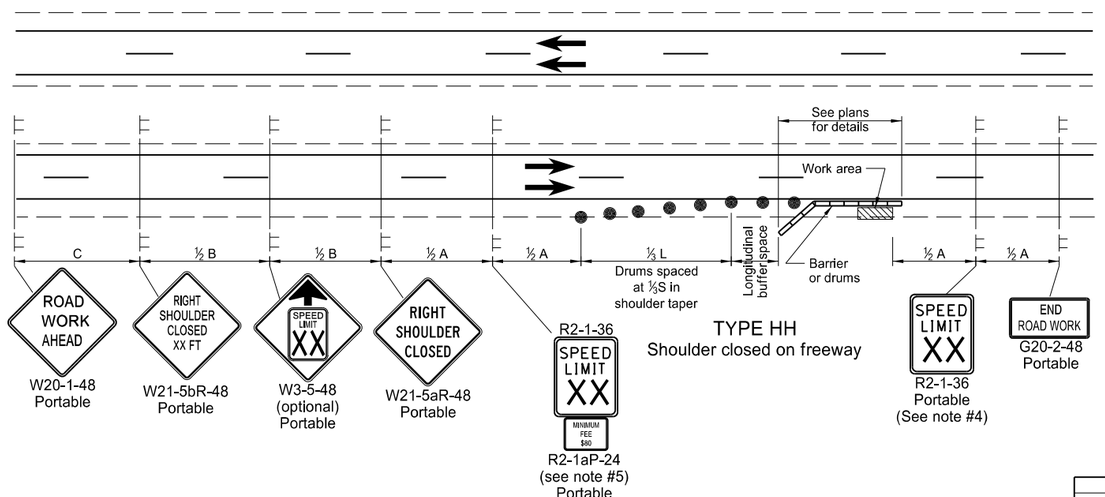


TYPE T
Mobile operation on shoulder

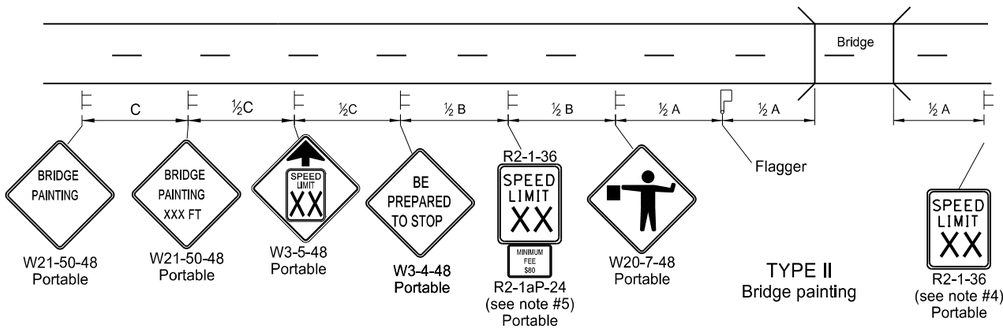


TYPE U
Shoulder Work with Minor Encroachment
Minor driving lane encroachment.
Reduce speeds to 40 MPH or less.

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of the taper in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
3. Sequencing Arrow Panels
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   UseType 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).
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. 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 ½B.
6. 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.
7. Cover existing speed limit signs within a reduced speed zone.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
9. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.



TYPE HH
Shoulder closed on freeway



TYPE II
Bridge painting

KEY

Sign	Work area
Delineator Drum	Tubular Marker
Sequencing Arrow Panel (Caution Mode)	

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	Updated notes & revised signs
11-01-19	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

C

$^{1}_{2}$ C

$^{1}_{2}$ B

$^{1}_{2}$ B

$^{1}_{2}$ A

$^{1}_{2}$ A

ROAD

MACHINERY
XXX FT

SPEED
LIMIT
XX

BE

XXX
FEET

SPEED
LIMIT
XX
MINIMUM
FEE
980

R2-1aP-24

road

$^{1}_{2}$ A

SPEED
LIMIT
XX

TYPE Y

R2-1-48

LIMIT
XX
MINIMUM
FEE
980

$^{1}_{2}$ B

SPEED
LIMIT
XX

W3-5-48

$^{1}_{2}$

Other

$^{1}_{2}$ B

TYPE Z

C

$^{1}_{2}$C

$^{1}_{2}$B

$^{1}_{2}$B

A

2S Ft + A +$^{1}_{2}$B

SURVEY
CREW

W21-6-48
Portable

LIMIT
XX

W3-5-48
Portable

BE

TO STOP

SPEED
LIMIT
XX
MINIMUM
FEE

R2-1aP-24

SPEED
LIMIT
XX

W20-7-48

Portable

TYPE AA

Low
Shoulder
or
Shoulder

W21-5-48

Fresh
Oil

Road

WORK

A

or

LOW
SHOULDER

A

ROAD

A

OIL

Portable

TYPE CC

$^{1}_{2}$A

W8-1-48

B

W8-3-48

$^{1}_{2}$A

$^{1}_{2}$A

UNEVEN

TYPE FF

TYPE GG

DO

PASS

$^{1}_{2}$A

PAVEMENT

00

TYPE JJ

KEY

Sign

1.
2.
3.
4.
5.
6.
7.
8.
9.

$^{1}_{2}$B.

TYPE KK

	Min. (ft)			(mph)	Length
A	B	C		
	150	150	25	115
	280		30	155
360		360		200
	720	720	40	250
850	1350	2200	45	305
			50	360
1000		2640	55	425
	1000		60	
			65	570
			70	645
				820

*

NORTH DAKOTA

9-27-13

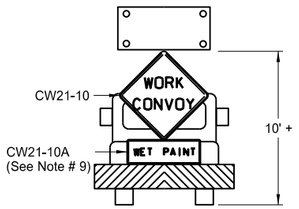
DATE

11-01-19

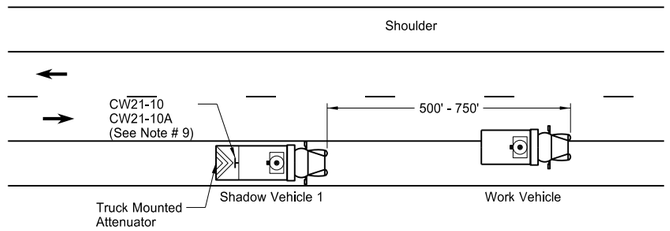
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

02/23/23

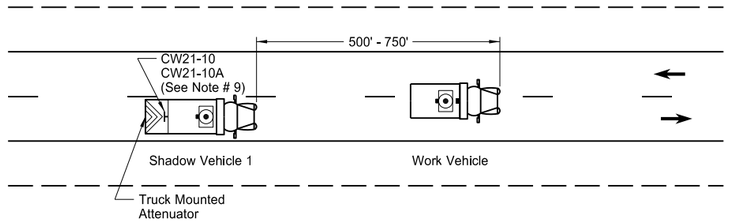
MOBILE OPERATION
(PAVEMENT MARKING)



Typical Shadow Vehicle 1
Two-Way Roaday

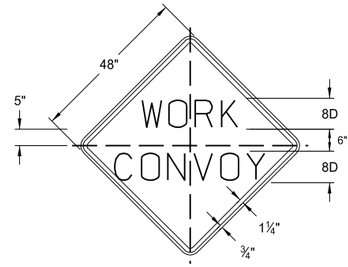


Two-Way Roadway with Paved Shoulders

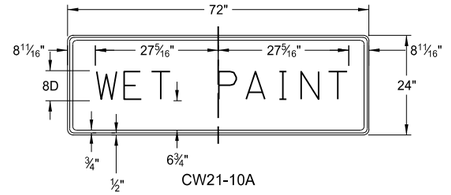


Two-Way Roadway without Paved Shoulders

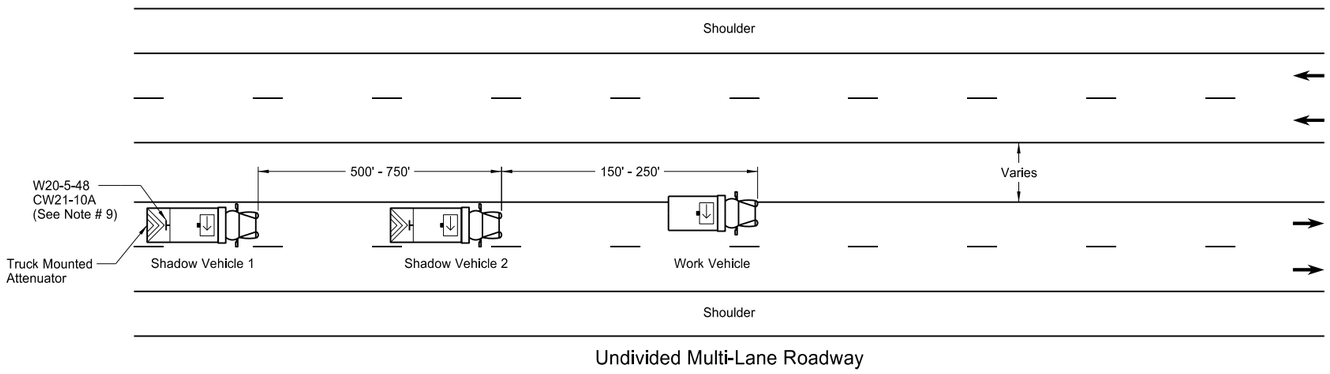
Sign Details



CW21-10

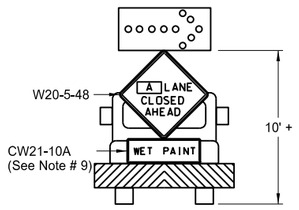


CW21-10A



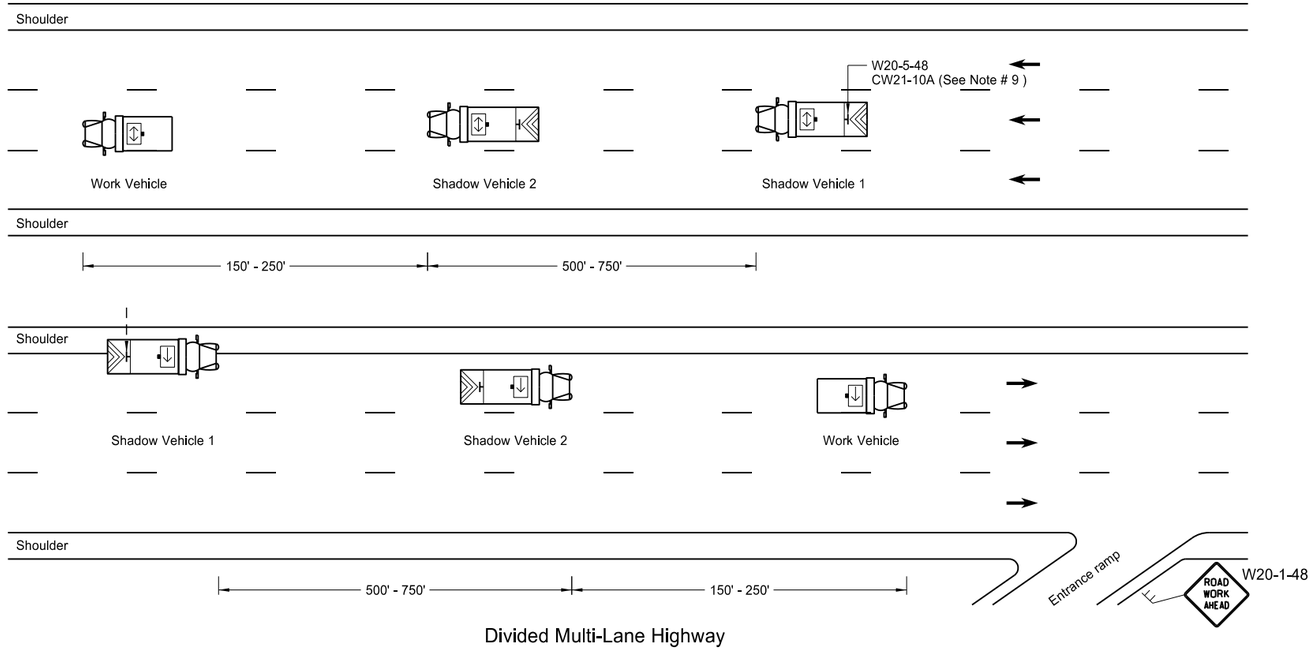
Undivided Multi-Lane Roadway

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 stobe 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.



Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center



Divided Multi-Lane Highway

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

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KEY

Sign

Min. (ft)

A	B	C
	360	
720	720	

ROAD
WORK
AHEAD

RUMBLE

SPEED
XX

BE

TO STOP

R2-1-36

LIMIT
XX
MINIMUM

W20-7-48

Flagger

1/2 C

1/2 C

1/2 C

1/2 C

1/2 B

Portable

A

2S Ft + A + $^1/_2$ B

SPEED
LIMIT
XX

R2-1-36
Portable

3' Max.

2' Max.

10' Min.

2S Ft + A + $^1/_2$ B

LIMIT
XX

2S Ft

W20-7-48

R2-1-36

SPEED
LIMIT
XX
MINIMUM
FEE
$80

A

BE

1/2 B

TO STOP

W3-4-48

1/2 C

SPEED
LIMIT
XX

W3-5-48

RUMBLE

1/2 C

WORK
AHEAD

1.
2.
3.
4.

NORTH DAKOTA

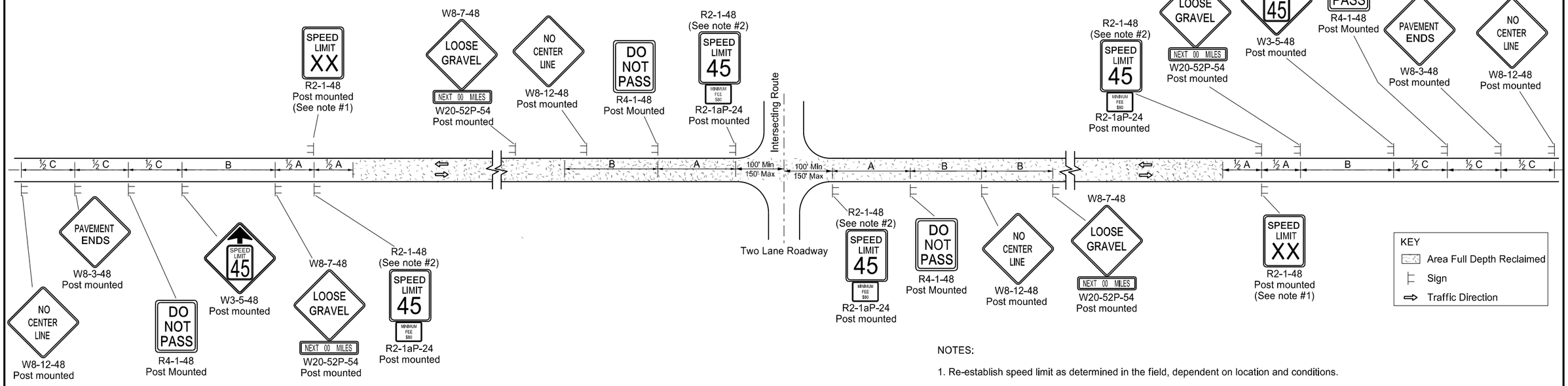
DATE

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REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

03/07/23

MAINTAINING TRAFFIC THROUGH AREA ALREADY FULL DEPTH RECLAIMED

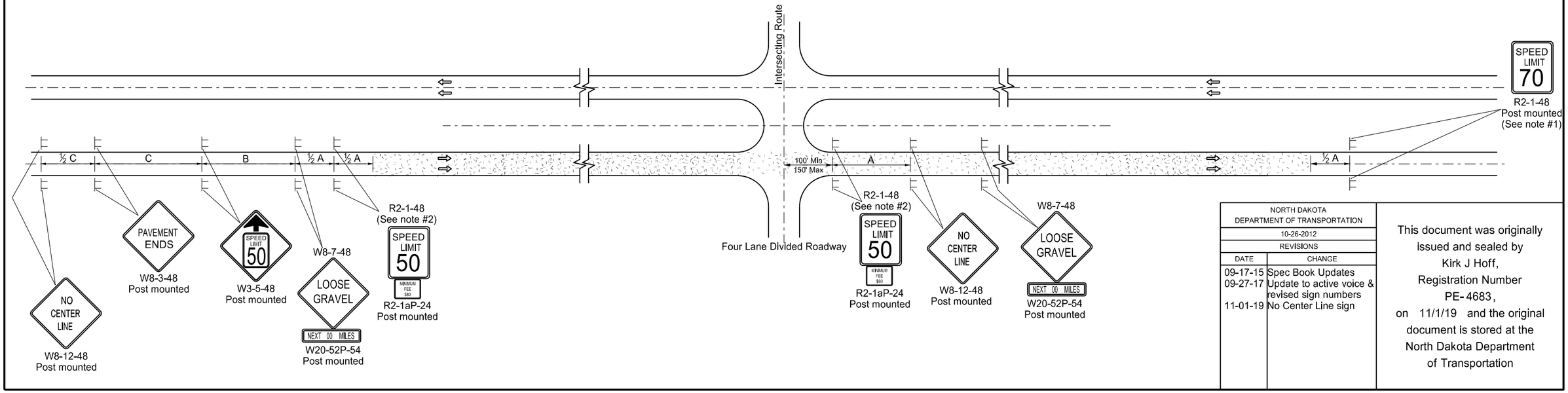
D-704-37



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 ½ B after the first speed limit sign and ½A 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.

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

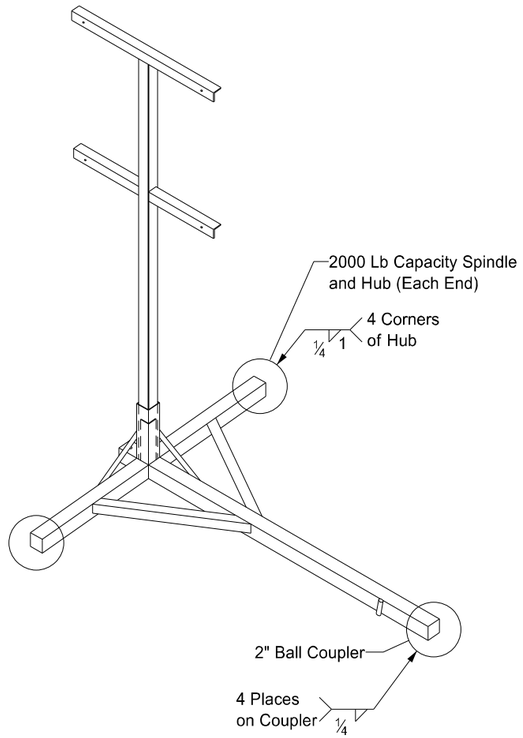


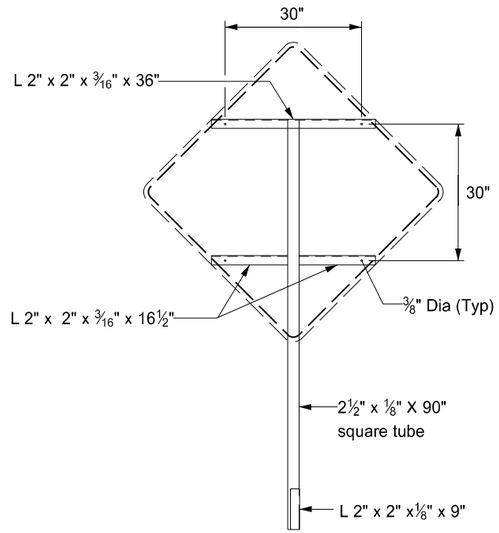
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-26-2012	
REVISIONS	
DATE	CHANGE
09-17-15	Spec Book Updates
09-27-17	Update to active voice & revised sign numbers
11-01-19	No Center Line sign

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

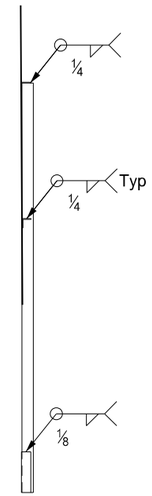
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50





FRONT

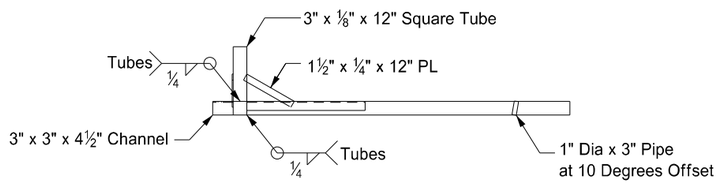


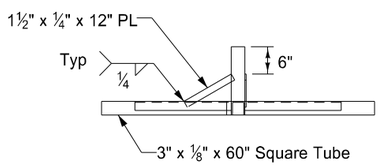
RIGHT

SIGN SUPPORT

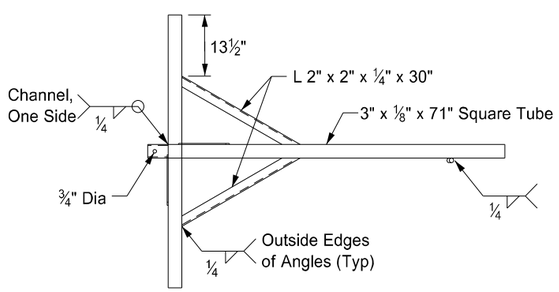
Notes:

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.





RIGHT



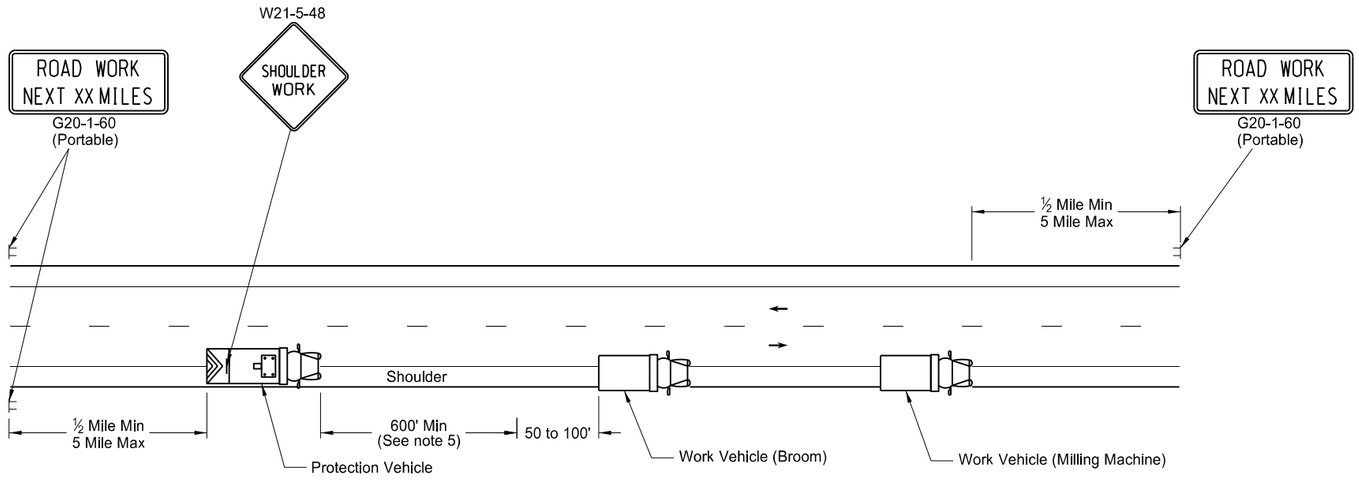
TOP

TRAILER

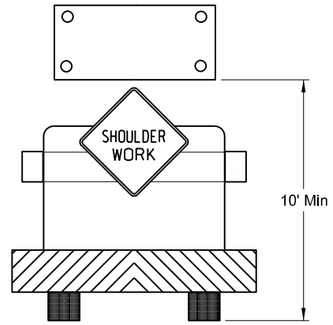
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

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PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

MOBILE OPERATION
Grinding Shoulder Rumble Strips



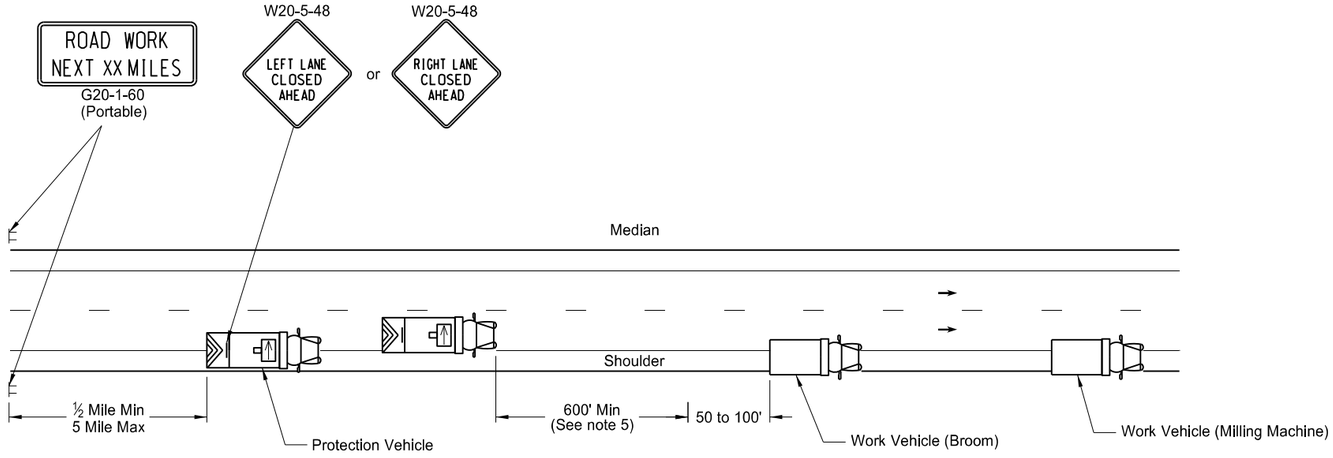
TWO LANE - TWO WAY ROADWAY



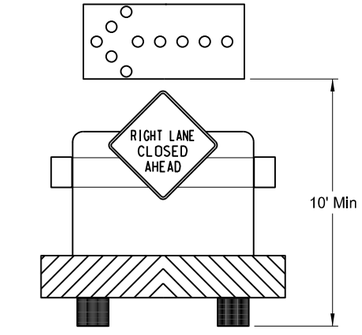
TWO LANE - TWO WAY ROADWAY

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.

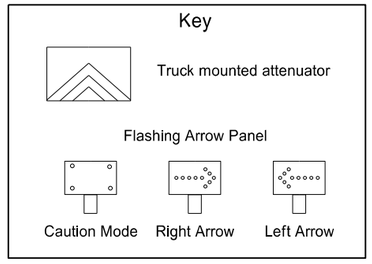


INTERSTATE & 4 LANE DIVIDED HIGHWAY



INTERSTATE & 4 LANE DIVIDED HIGHWAY

Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode

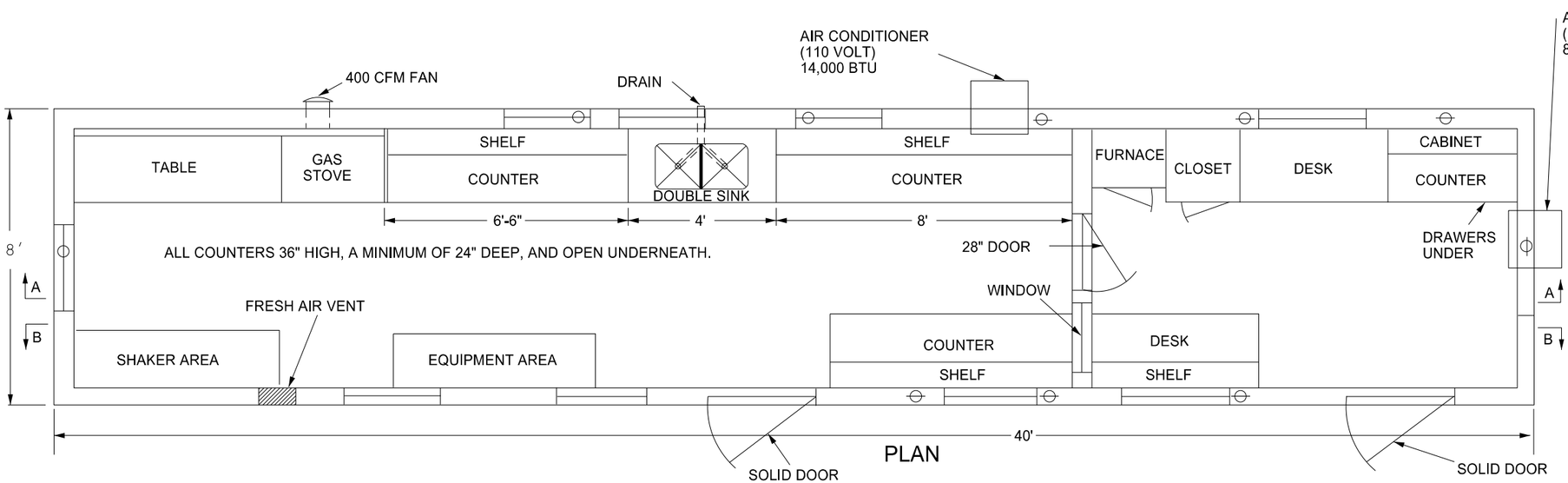


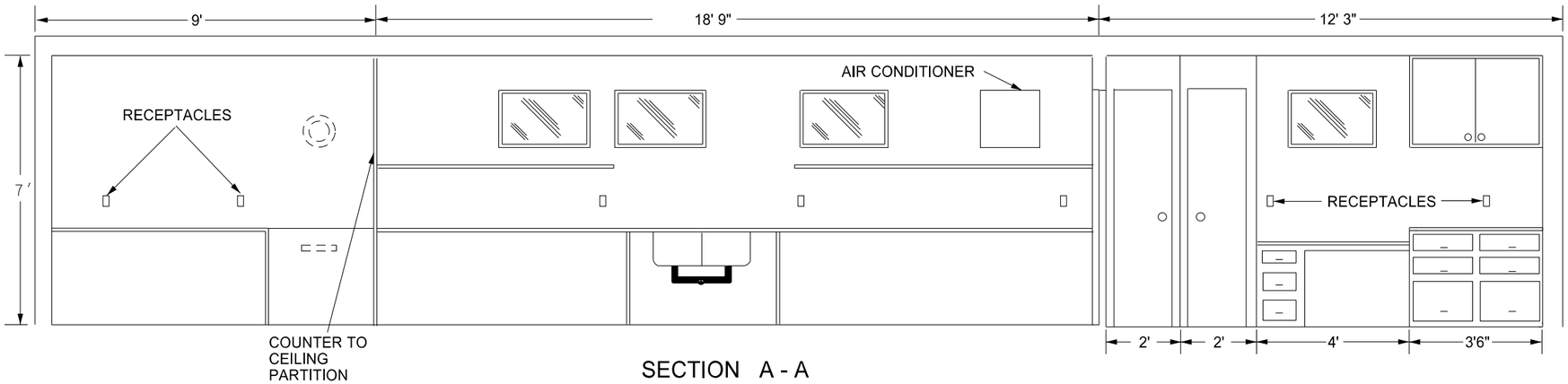
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & signs
10-03-19	New Design Engineer PE Stamp

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

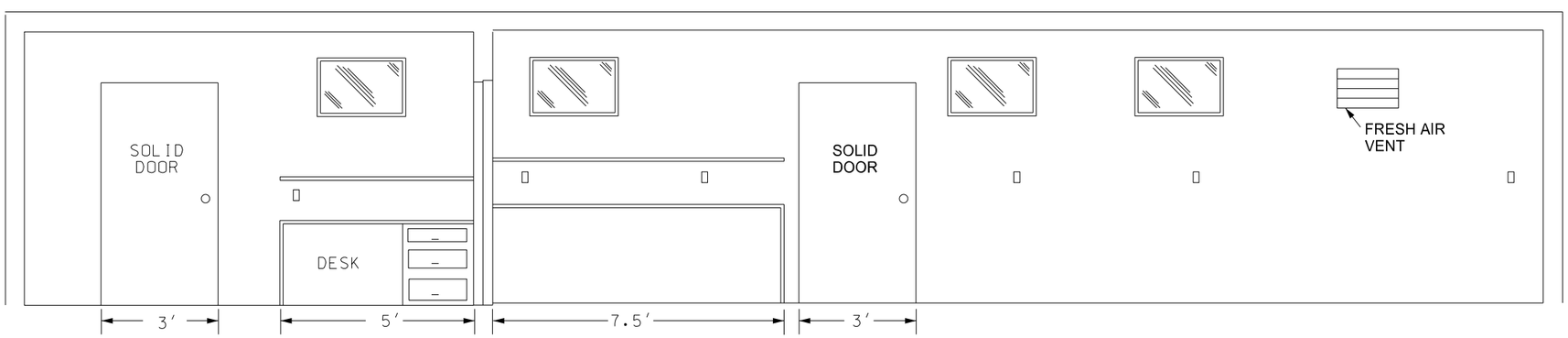
BITUMINOUS LABORATORY

D-706-1





SECTION A - A



SECTION B - B

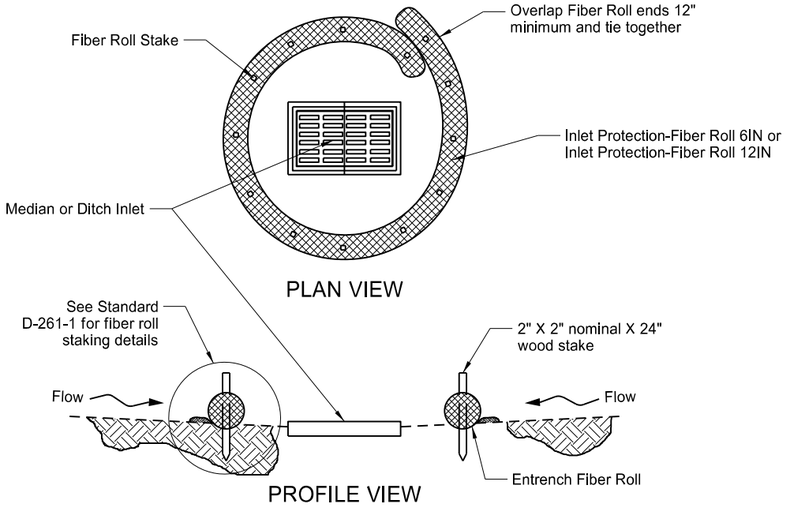
Provide a laboratory with the following:

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 ½ 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.

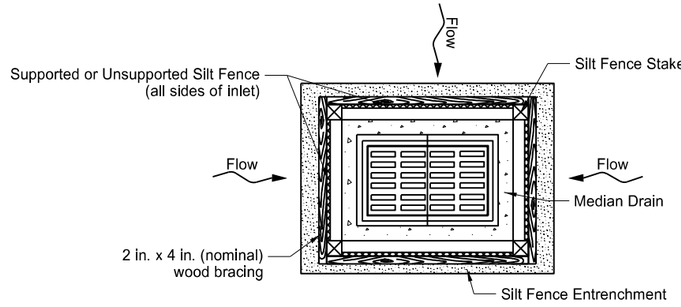
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.
08-27-19	New Design Engineer PE Stamp

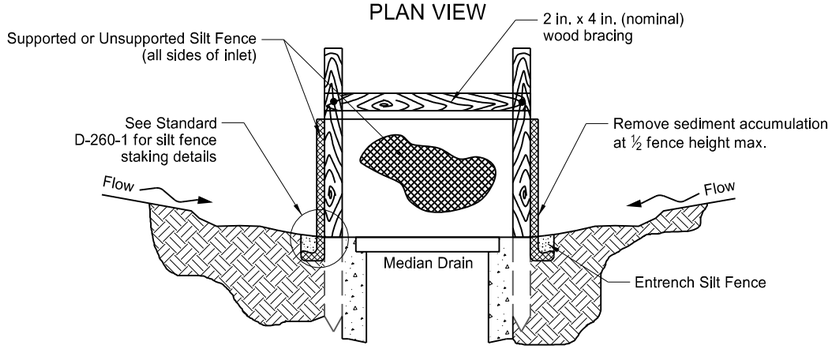
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 08/27/19 and the original document is stored at the North Dakota Department of Transportation

EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION

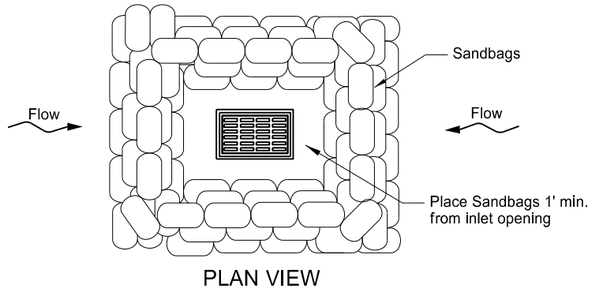


FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)

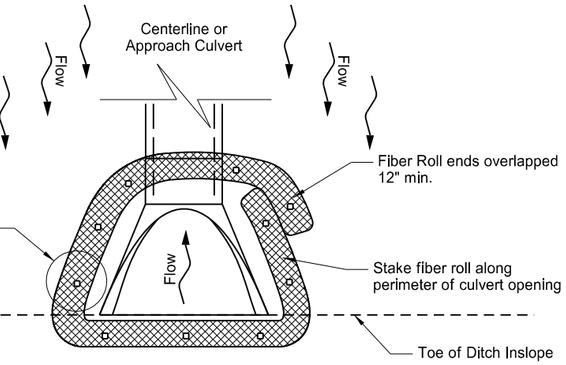




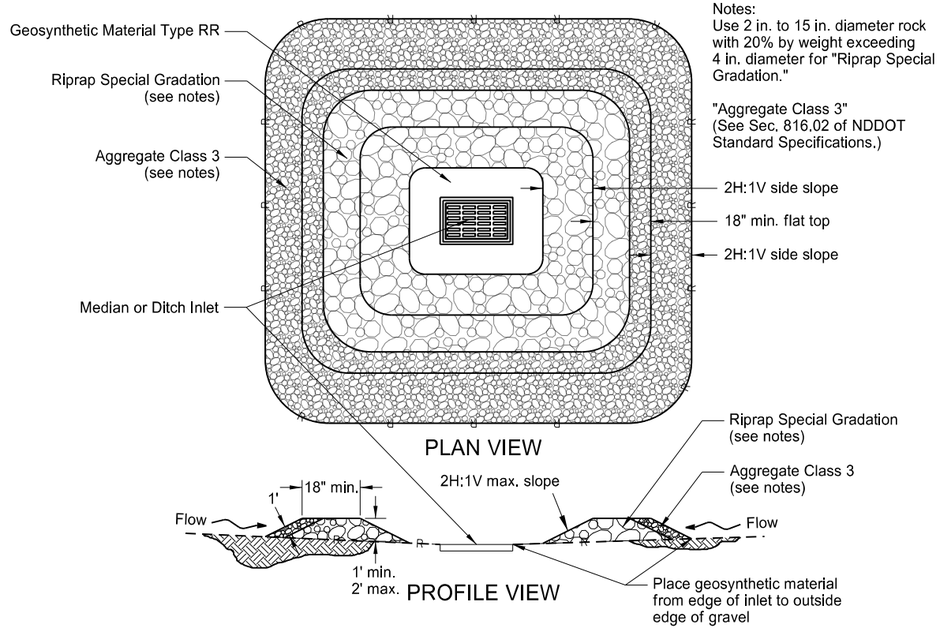
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



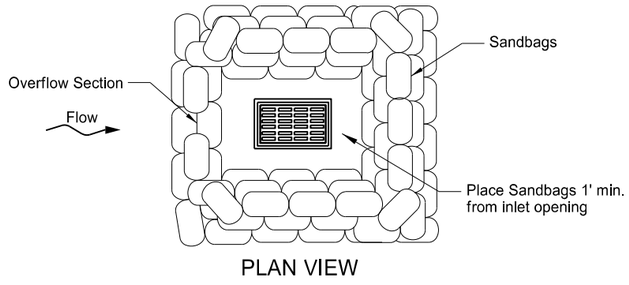
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



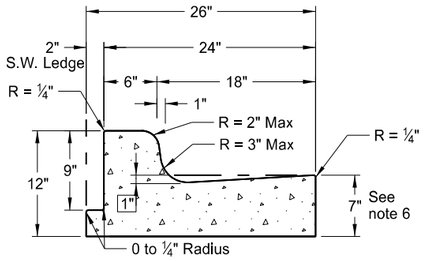
SANDBAG PROTECTION (ON SLOPE)

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.

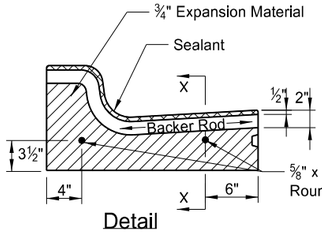
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8-27-19 and the original document is stored at the North Dakota Department of Transportation

Curb & Gutter and Valley Gutter

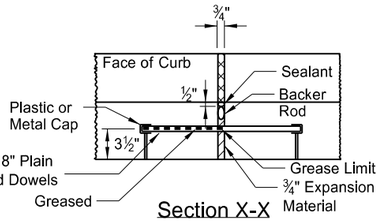
D-748-1



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

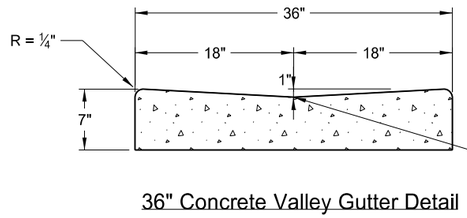


Detail

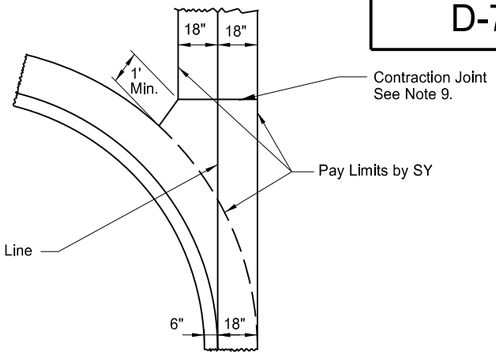


Section X-X

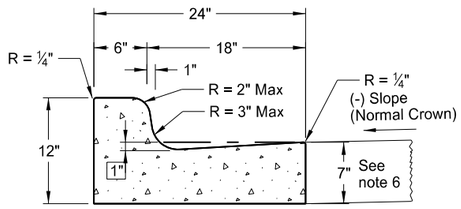
Isolation Joint



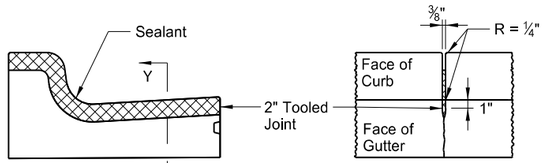
36" Concrete Valley Gutter Detail



36" Concrete Valley Gutter Plan



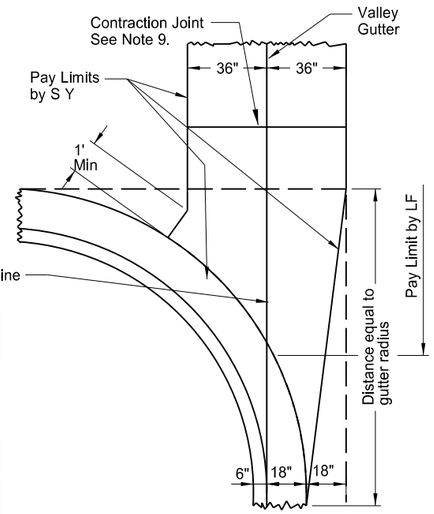
Curb & Gutter Type 1 (Sec. A)



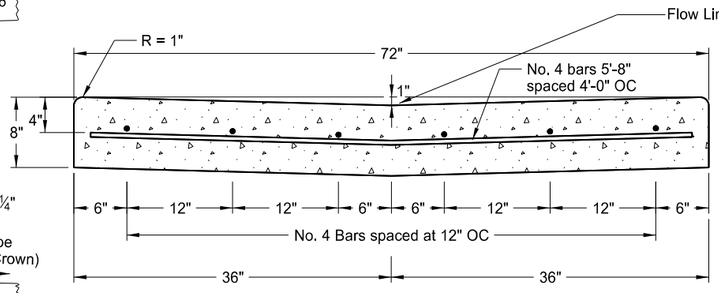
Detail
(10' Max Spacing)

Section Y-Y

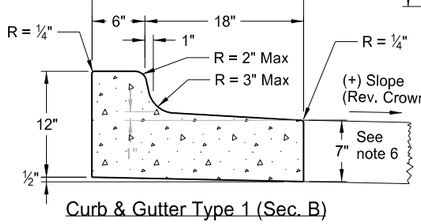
Contraction Joint



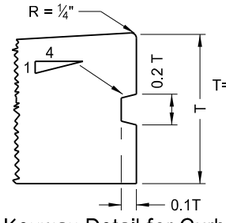
72" Concrete Valley Gutter Plan



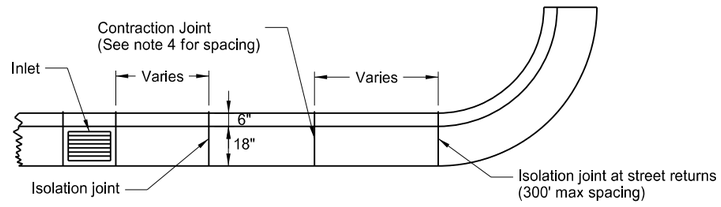
72" Concrete Valley Gutter Detail



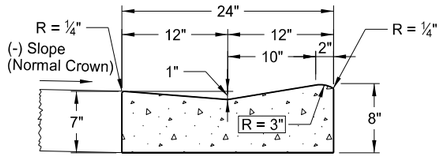
Curb & Gutter Type 1 (Sec. B)



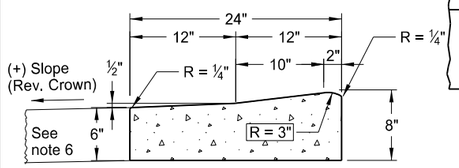
Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)



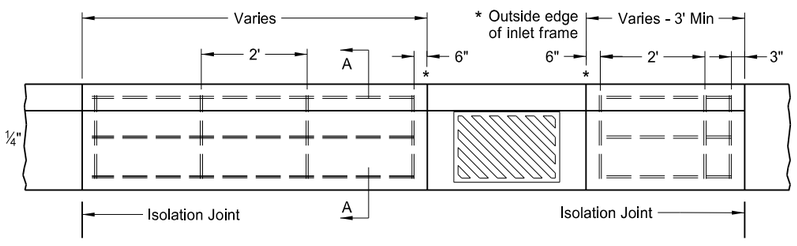
Joint Location Detail



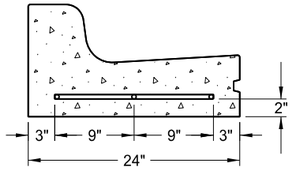
Mountable Curb & Gutter Type 1 (Sec. A)



Mountable Curb & Gutter Type 1 (Sec. B)



Curb & Gutter Reinforcing at Inlets



Section A-A

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.

NOTES:

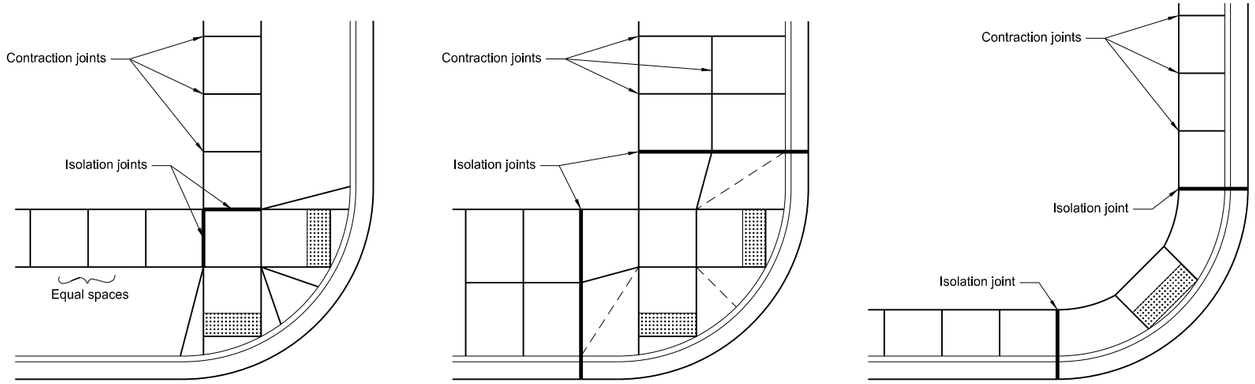
1. Use Curb and Gutter Type 1 (Sec. A & B). Use section "A" with (-) pavement slopes and section "B" with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Use ¾" expansion joint filler for isolation joint material. Form 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 ⅛" min. to ⅜" 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.

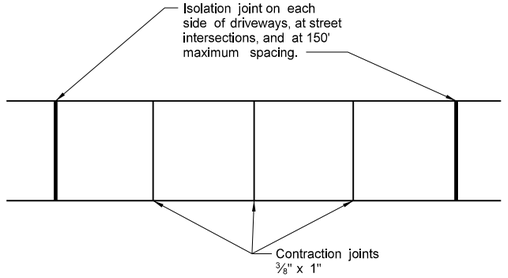
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8-27-19 and the original document is stored at the North Dakota Department of Transportation

SIDEWALK

D-750-2



Typical Joint Layouts



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.

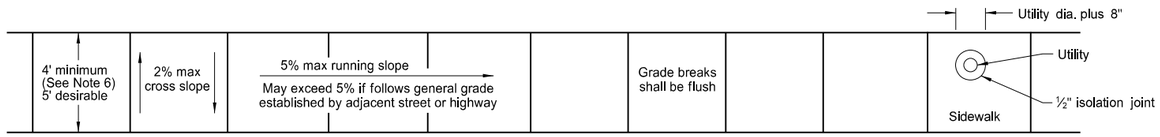
   Saw or groove contraction joints to a minimum depth of 1/3 the depth of the concrete.

   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."

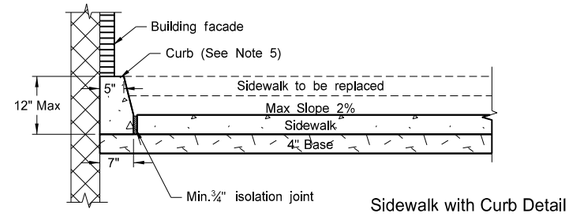
   Modify existing ground slope with landscaping as needed. If not possible, such as adjacent buildings, use a vertical curb as shown in the detail below. The Engineer will measure curb at the unit price bid for "Curb - Type I" per lineal foot.
6. Sidewalk Width & Grade: Provide a continuous 4' min clear 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'.

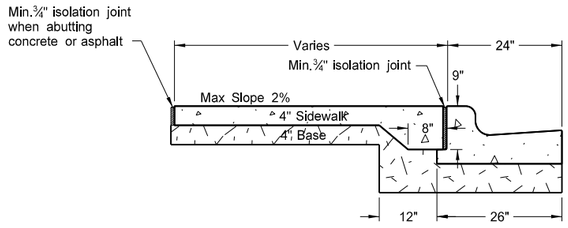


Sidewalk Width and Grade

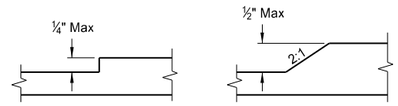
Utility Blockout



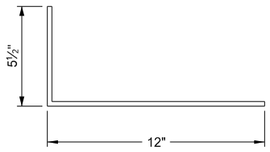
Sidewalk with Curb Detail
(Building face application)



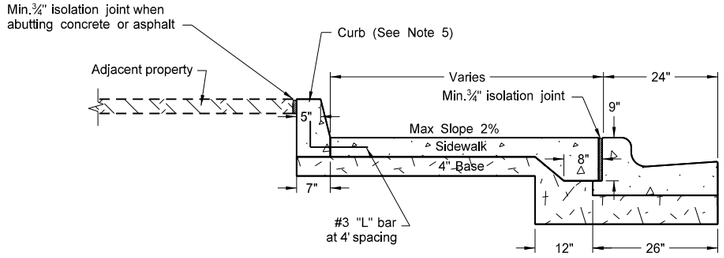
Sidewalk Detail
(Installed adjacent to curb and gutter)



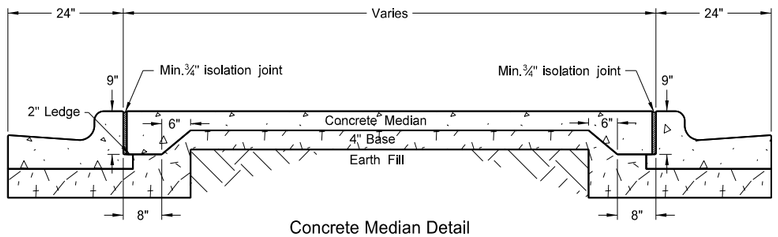
Vertical Discontinuities
(As needed for utility covers, vaults, grating, etc..)



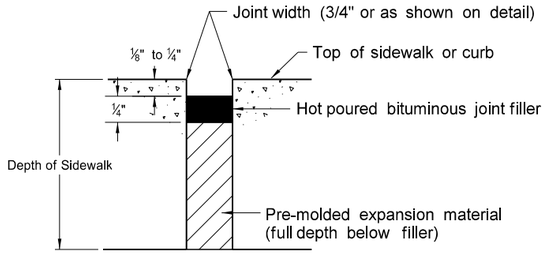
"L"Bar Detail
#3 Bar



Sidewalk with Curb Detail
(Adjacent property application)



Concrete Median Detail



Typical Isolation Joint Seal
(longitudinal and transverse)

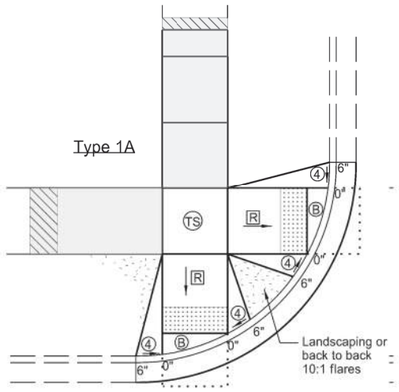
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-26-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
09-05-18	Added sidewalk details for width and grade and passing lane requirements.
08-27-19	New Design Engineer PE Stamp.

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

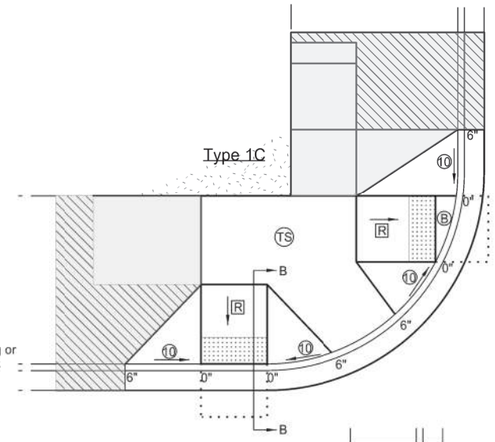
CURB RAMP RETROFIT DETAILS

D-750-3

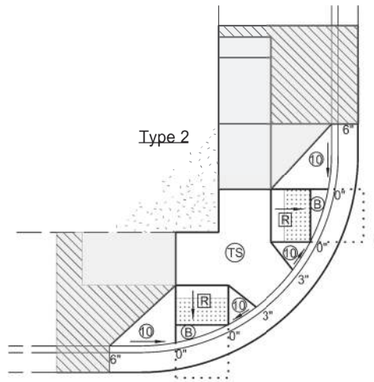
Type 1A



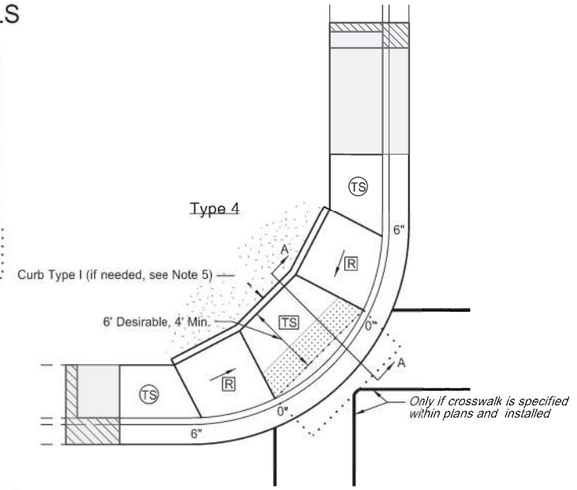
Type 1C



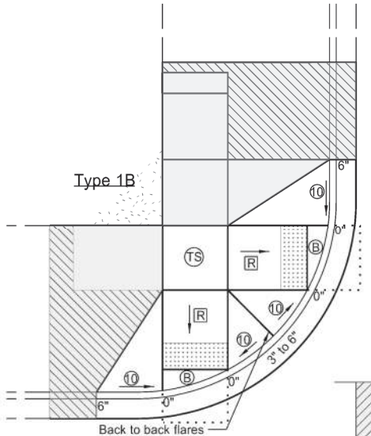
Type 2



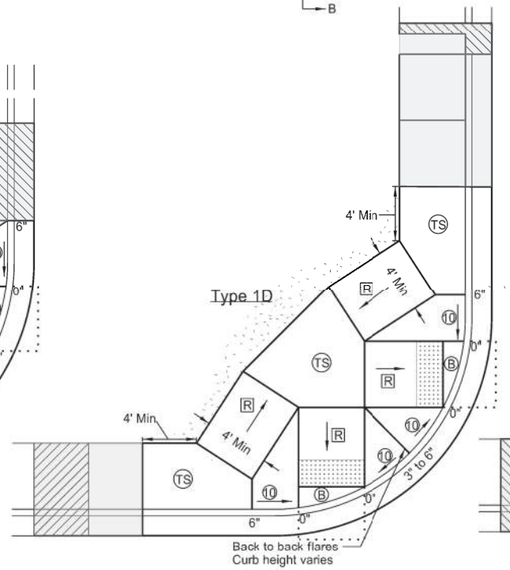
Type 4



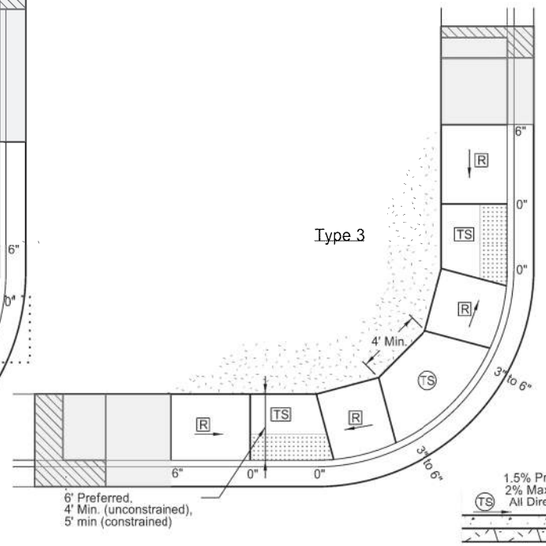
Type 1B

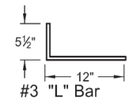


Type 1D



Type 3





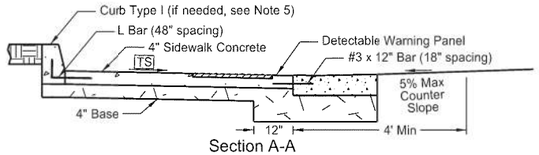
NOTES:

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 I" 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.

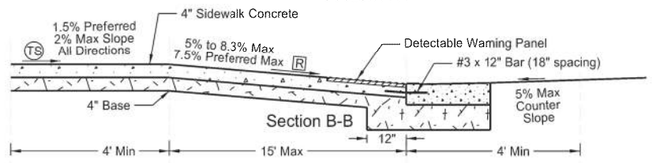
LEGEND:

- : 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.

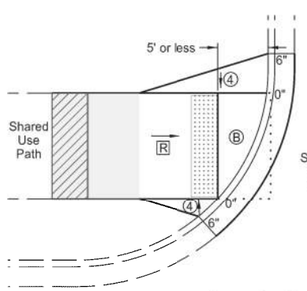
0", 3", or 6" : Curb Height.

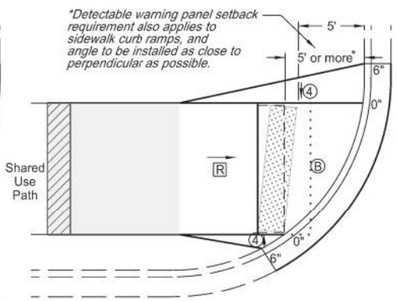


Section A-A

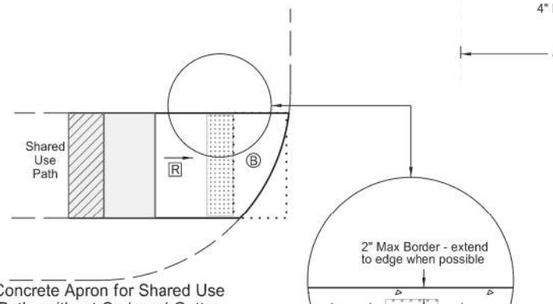


Section B-B



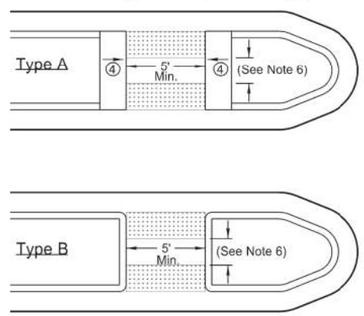


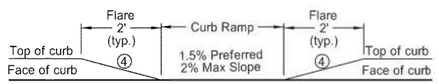
Concrete Apron for Shared Use Paths with Curb and Gutter



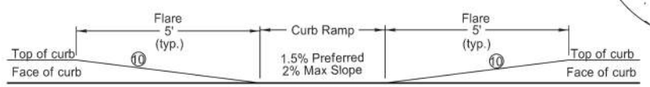
Concrete Apron for Shared Use Paths without Curb and Gutter

Median Refuge Islands (Cut-Through)





4:1 Flares
(To be used when flare is adjacent to landscaping)



10:1 Flares
(To be used when flare is adjacent to sidewalk)

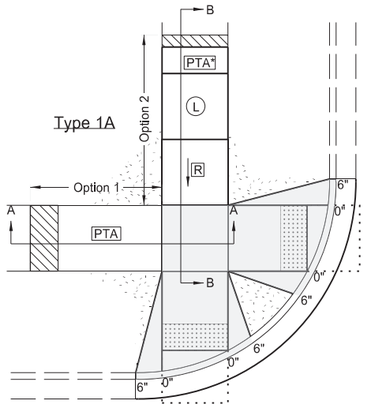
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-26-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
09-05-18	Revised Notes, Revision for Turning Space, Added Passing Space Requirements, Turned Detectable Warning Panel
03-15-21	Slope & other clarifications.
05-19-21	Separate Curb Ramp Transition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

KIRK J. HOFF
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PROFESSIONAL
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ENGINEER
NORTH DAKOTA
Kirk J Hoff
05 19 2021

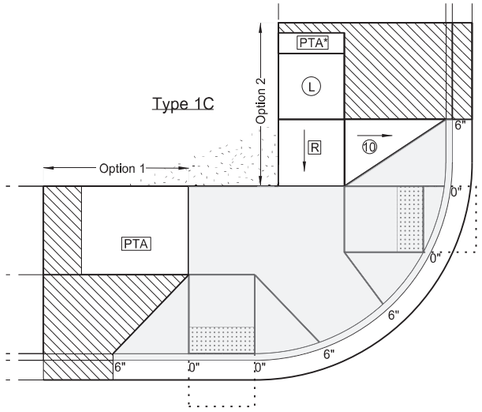
CURB RAMP RETROFIT TRANSITIONAL AREA DETAILS

D-750-4

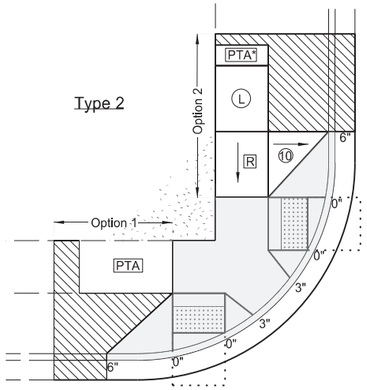
Type 1A



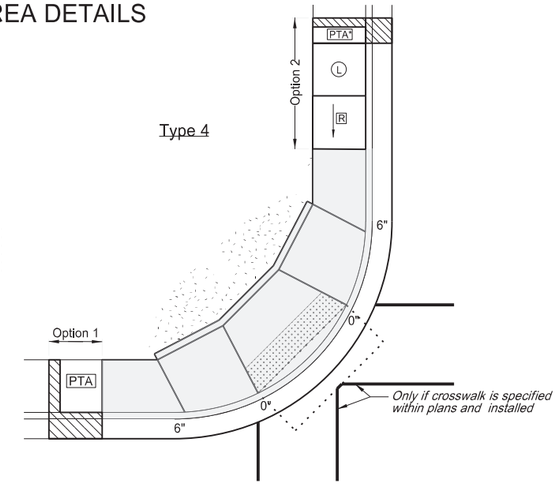
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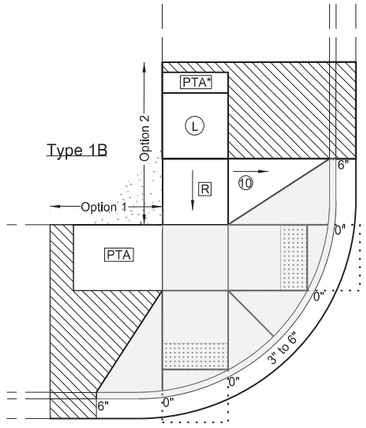
Type 2



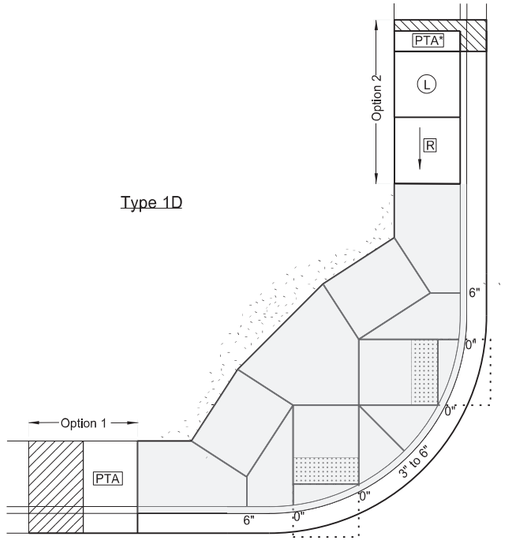
Type 4



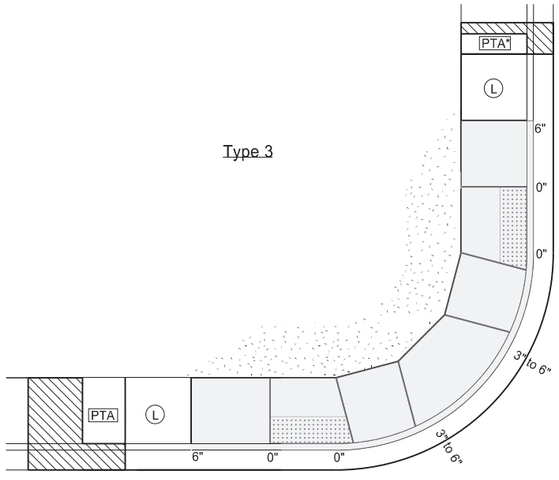
Type 1B

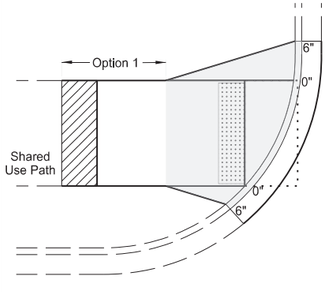


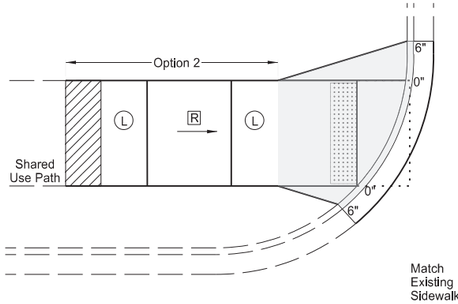
Type 1D



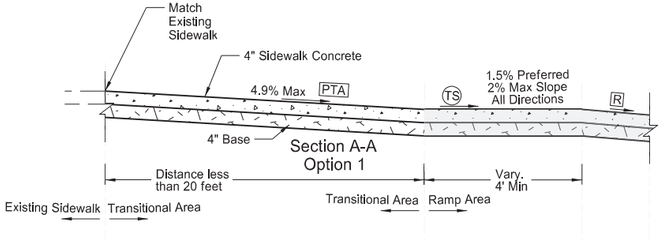
Type 3

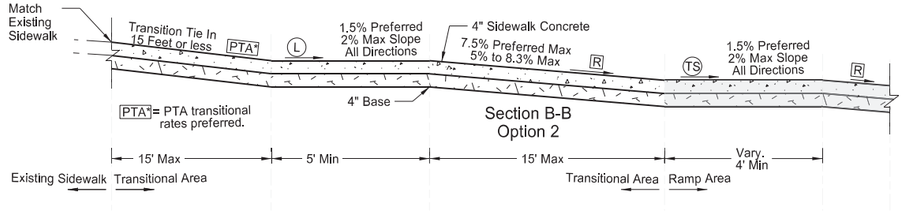






Transition Areas for Shared Use Paths





NOTES:

1. 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.
2. 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.
3. 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).
4. Transitional Areas for Shared Use Paths can be concrete or asphalt.
5. See Curb Ramp Retrofit Details Standard D-750-3 for additional information.

LEGEND:

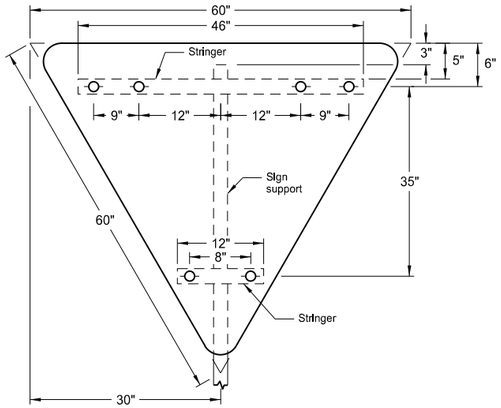
- : Detectable Warning Panel.
- : Landscaping.
- : Transitional tie-in to nearest joint, if needed.
- : Curb Ramp Retrofit Area (See Standard Drawing D750-3)
- : 4' long x width of EPF or 4' minimum Clear space outside traffic lanes of travel.
  1.5% preferred cross slope
  2% maximum cross slope
  4.7% 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.

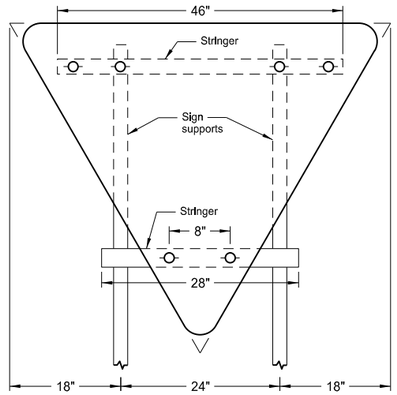
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-19-21	
REVISIONS	
DATE	CHANGE

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

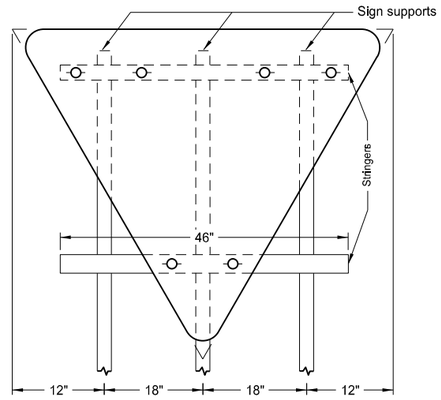
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

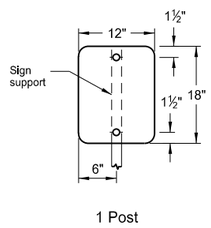


3 Posts

Assembly No. 6

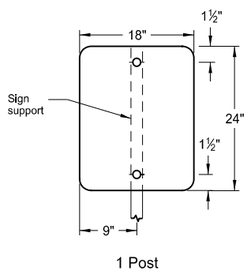
Notes:

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.



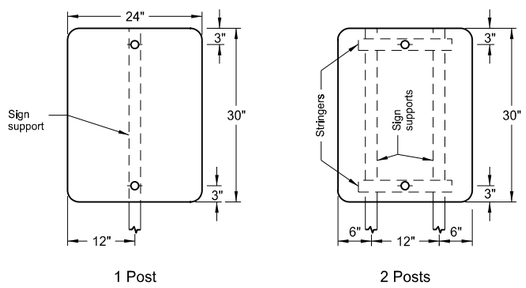
1 Post

Assembly No. 7



1 Post

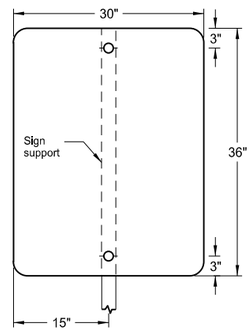
Assembly No. 8



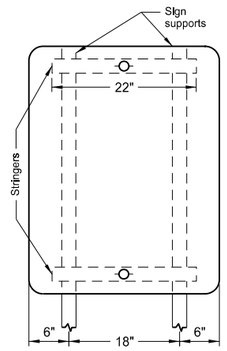
1 Post

2 Posts

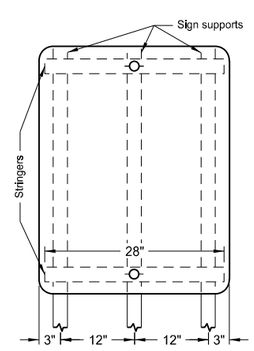
Assembly No. 9



1 Post

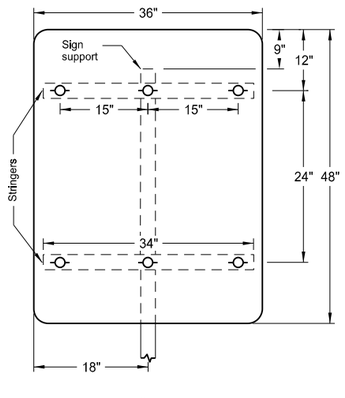


2 Posts

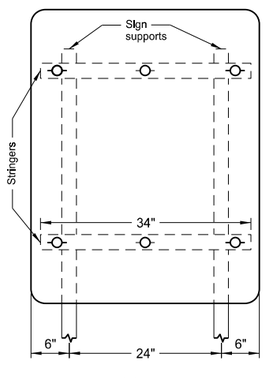


3 Posts

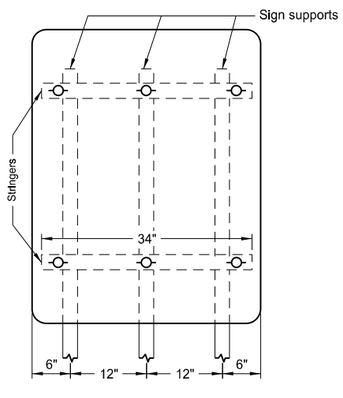
Assembly No. 10



1 Post



2 Posts



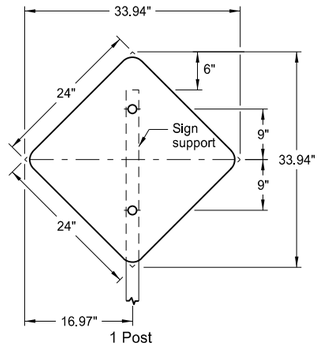
3 Posts

Assembly No. 11

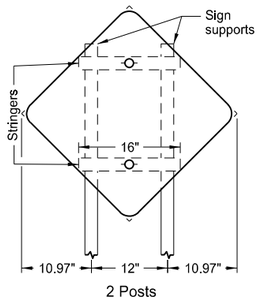
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

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

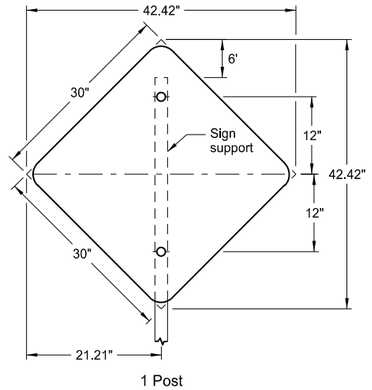


1 Post

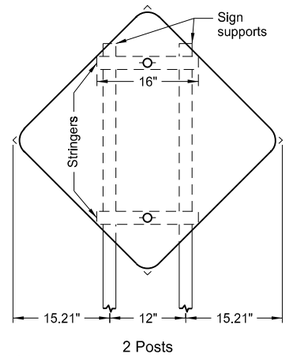


2 Posts

Assembly No. 18

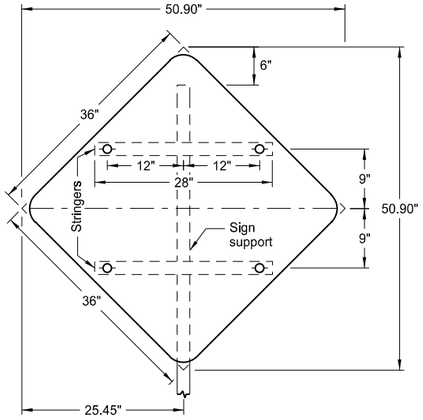


1 Post

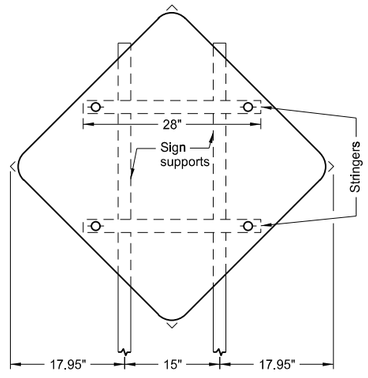


2 Posts

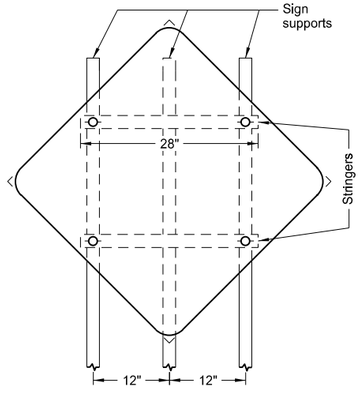
Assembly No. 19



1 Post

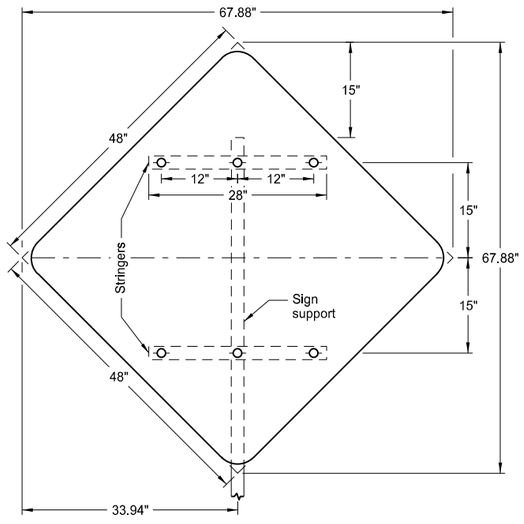


2 Posts

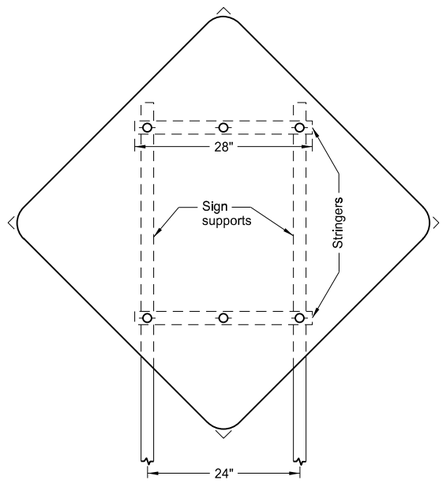


3 Posts

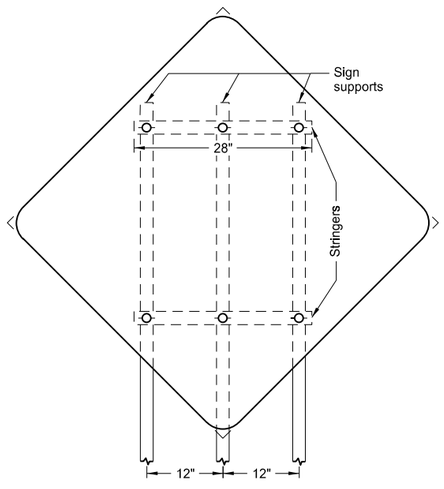
Assembly No. 20



1 Post



2 Posts



3 Posts

Assembly No. 21

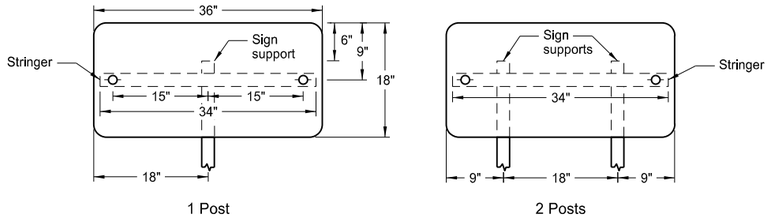
Notes:

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.

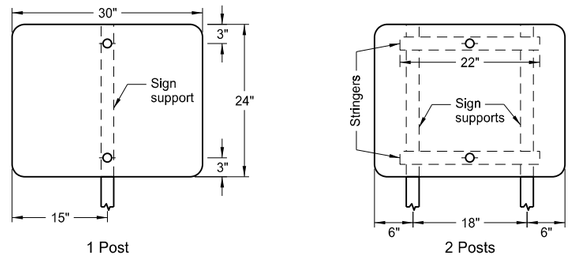
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post 2 Posts

Assembly No. 31

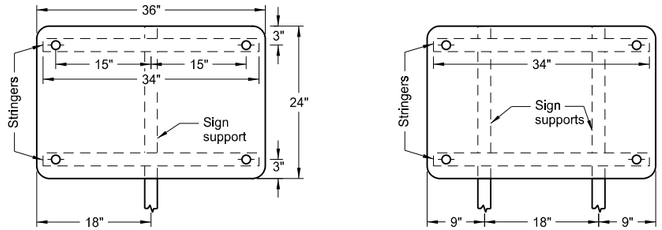


1 Post 2 Posts

Assembly No. 32

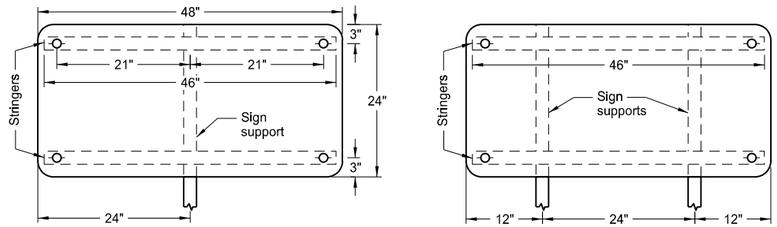
Notes:

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.



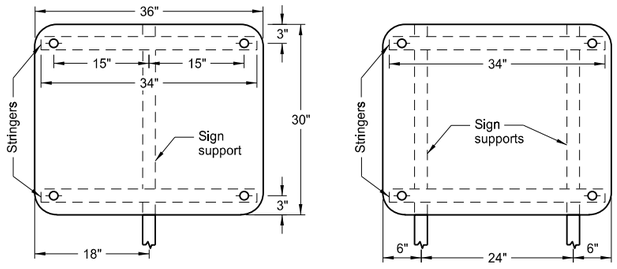
1 Post 2 Posts

Assembly No. 33



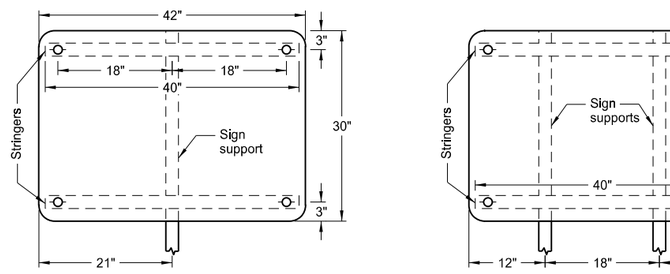
1 Post 2 Posts 3 Posts

Assembly No. 34



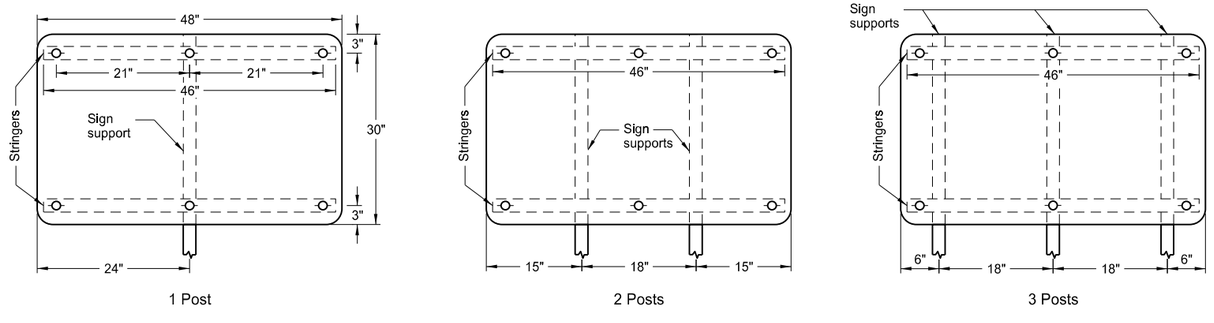
1 Post 2 Posts 3 Posts

Assembly No. 35



1 Post 2 Posts 3 Posts

Assembly No. 36



1 Post 2 Posts 3 Posts

Assembly No. 37

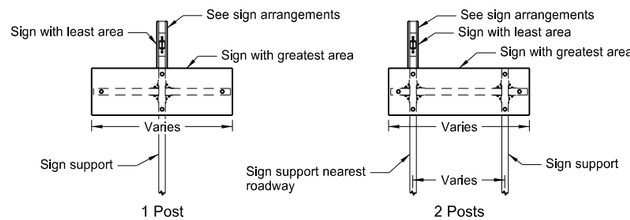
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

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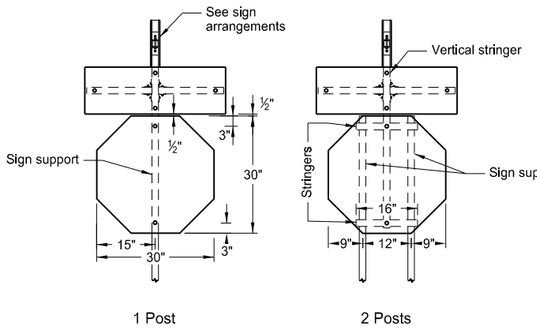
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

D-754-87

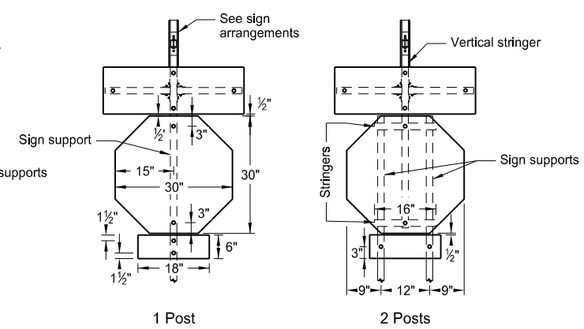
A - Single sign
B - Single sign back to back
C - Single sign each direction
D - Single sign one direction, back to back other direction
E - Back to back both directions



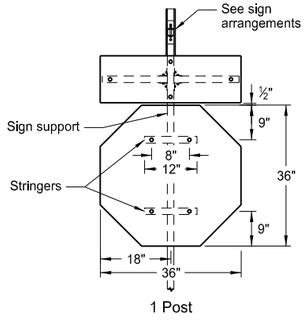
Special Assembly 1 (A, B, C, D or E)



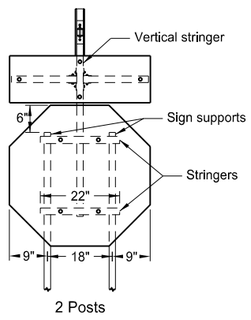
Special Assembly 2 (A, B, C, D or E)



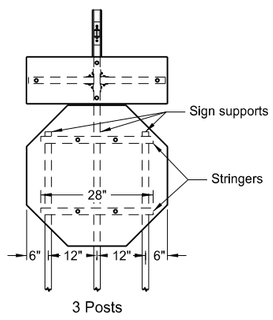
Special Assembly 3 (A, B, C, D or E)



1 Post

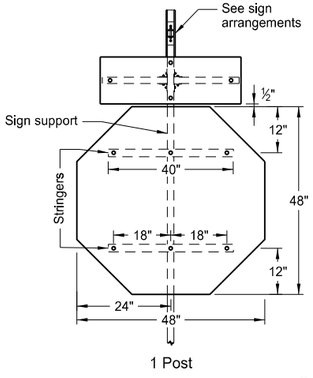


2 Posts

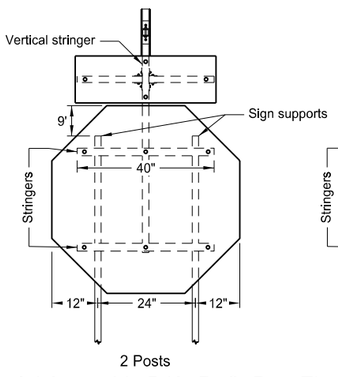


3 Posts

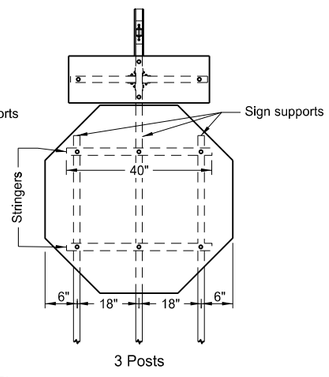
Special Assembly 4 (A, B, C, D or E)



1 Post

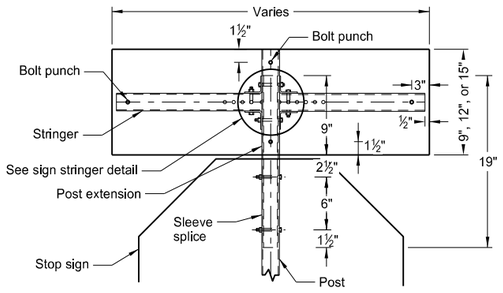


2 Posts



3 Posts

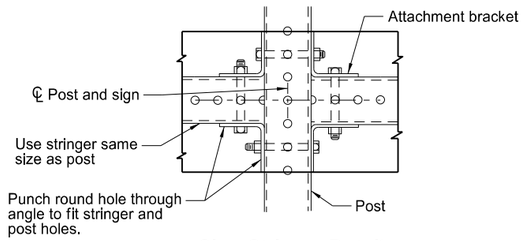
Special Assembly 5 (A, B, C, D or E)



Front View

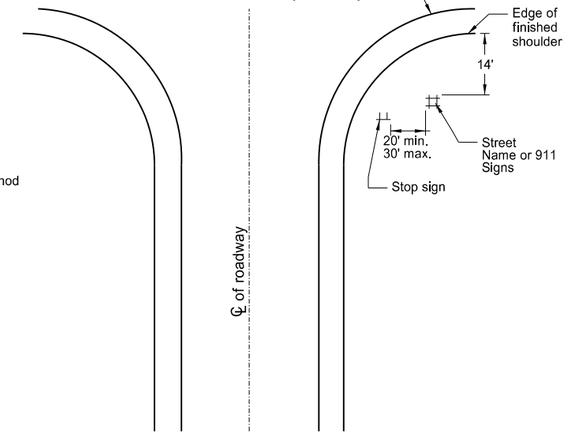
Sleeve Splice Detail

Note: Only use splice method with approval of engineer.



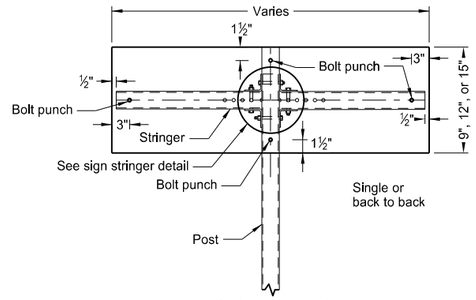
Sign Stringer Detail

Note: See Standard Drawing D-754-86 for 911 support information and sign layout details.

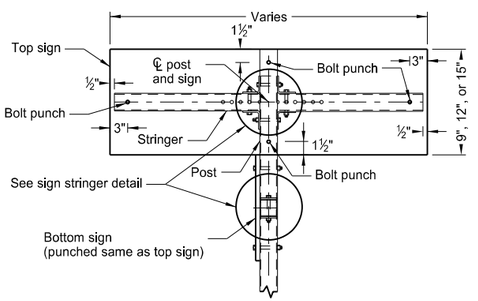


Intersection Layout

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

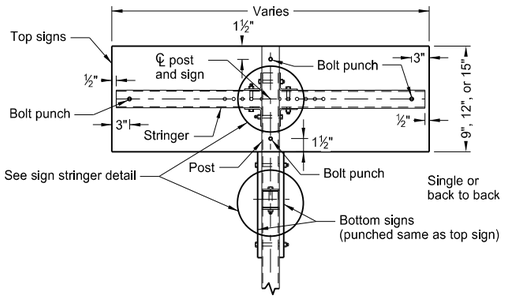


Detail A or B



Detail C

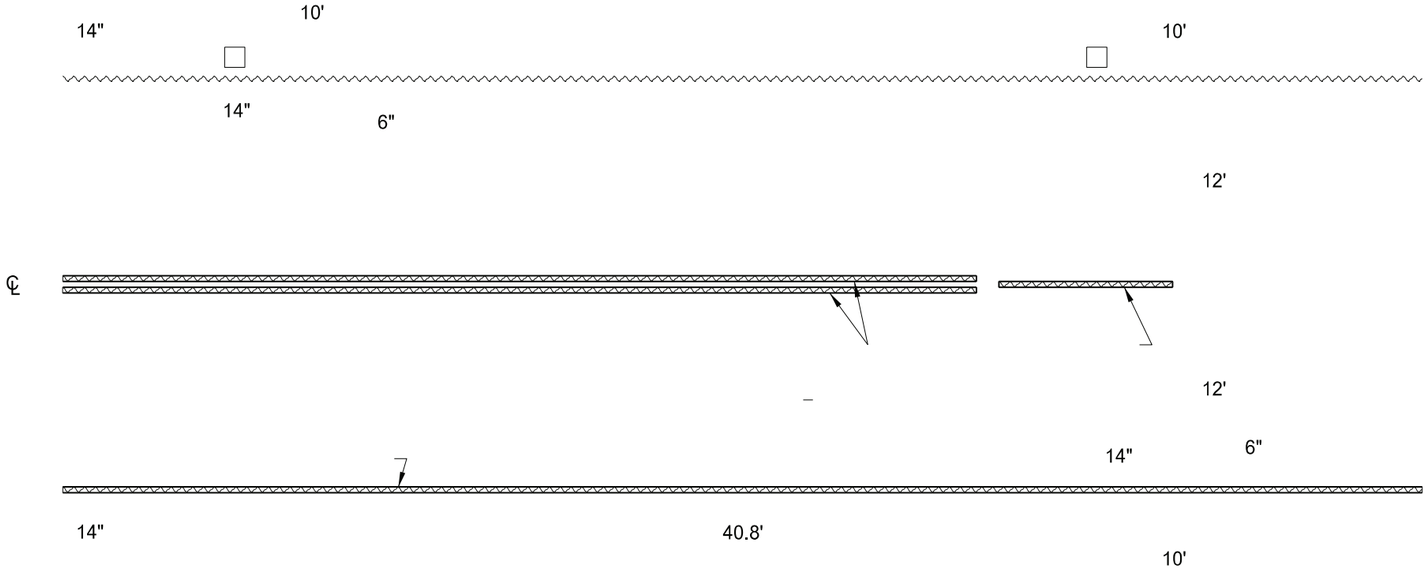
Sign Arrangements

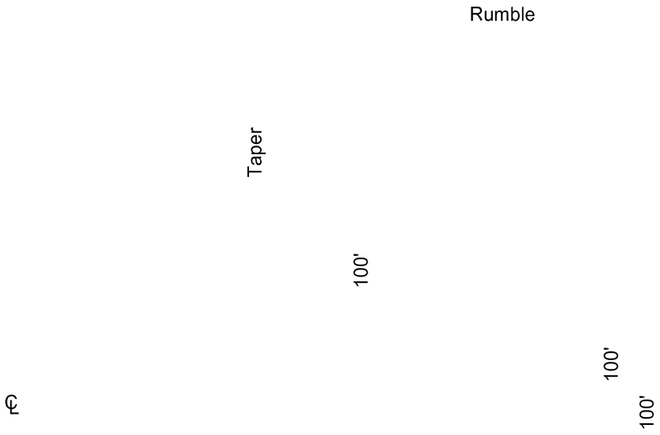


Detail D or E

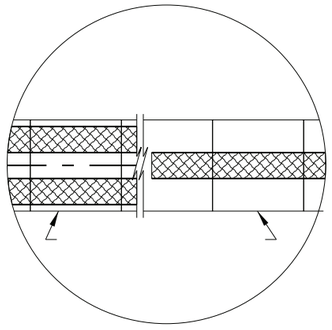
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
8-30-18	Added 2 post layout for SA1 and Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

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









12"

12" 12"

4'



Inset D

Depth	MIL	in
0	62.5	1/16
	156	
3 1/2	281	9/32
5 1/4		7/16
7	500	1/2
8 3/4		7/16
10 1/2	281	9/32
	156	
14	62.5	

NOTES:

NORTH DAKOTA

DATE
4-19-10
9-08-11 10-25-19
3-07-23 5-26-23

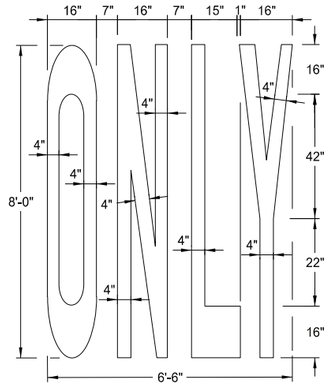
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

05/26/23

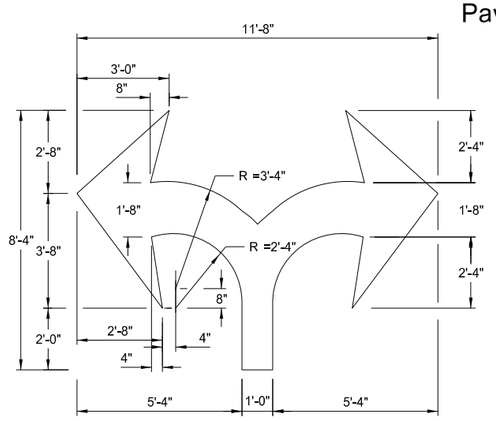
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Pavement Marking Message Details

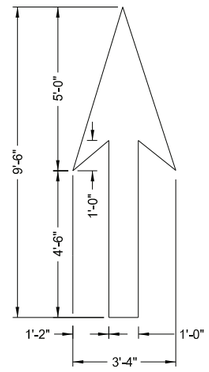
D-762-1



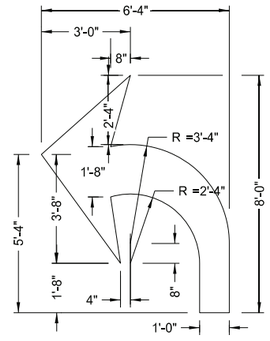
22 S. F.



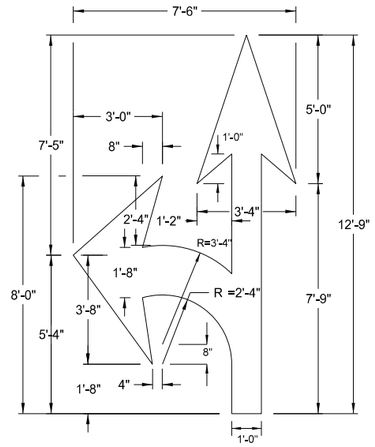
29 S. F.



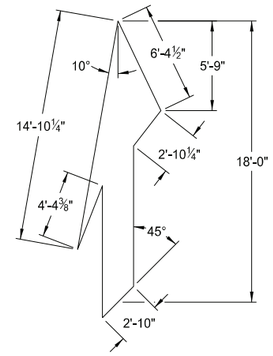
12 S. F.



16 S. F.

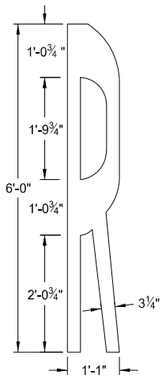


27 S. F.

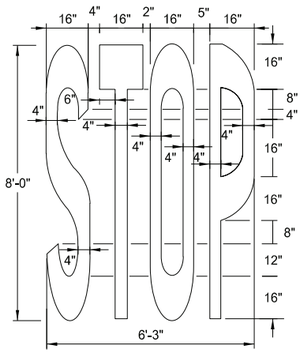


41 S. F.

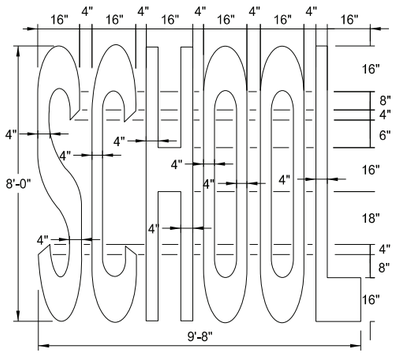
Note: Rotate merge arrow 20° from edge of roadway.



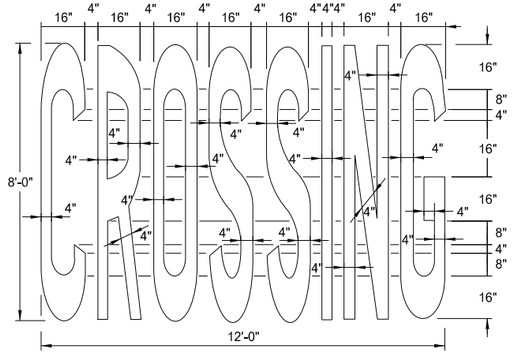
4 S. F.



22 S. F.



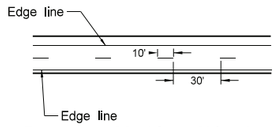
34.5 S. F.



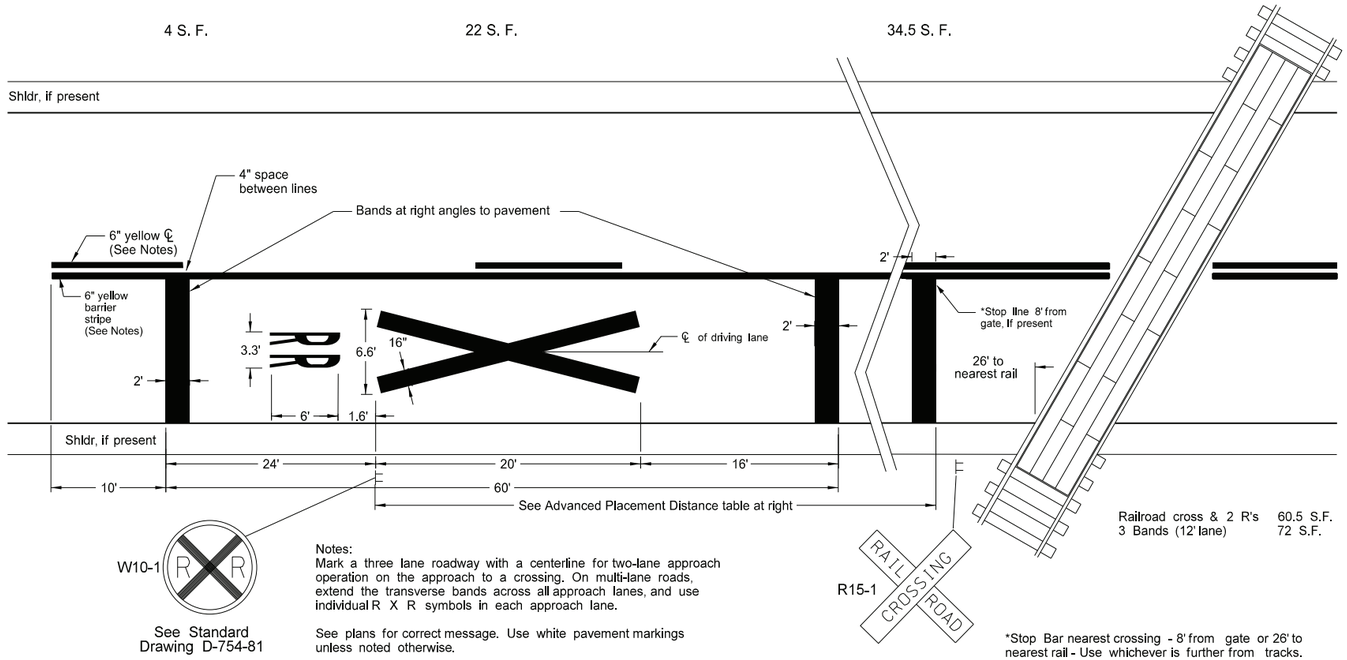
46 S. F.

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

Chevron Crosshatching Table



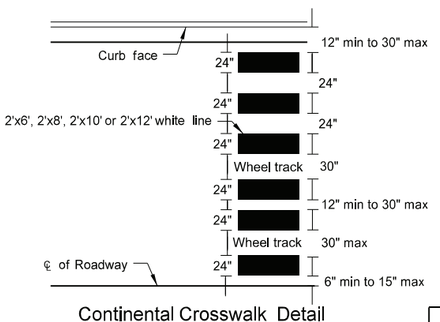
Centerline Pavement Marking Skip Spacing Detail



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

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

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

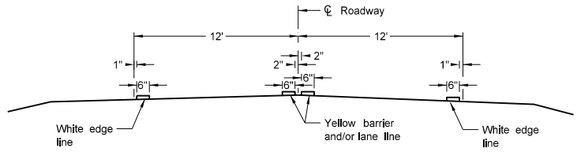
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
01-28-2020	Revised min Stop Bar distance to rail.
11-22-2023	Revised pavement marking widths.

KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 11/22/23 ENGINEER NORTH DAKOTA

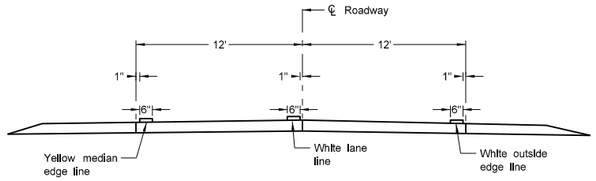
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PAVEMENT MARKING

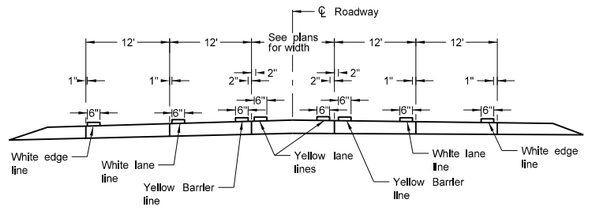
D-762-4



Two Lane Two Way
RURAL ROADWAY



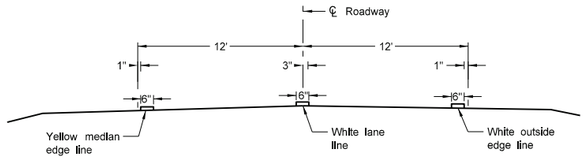
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



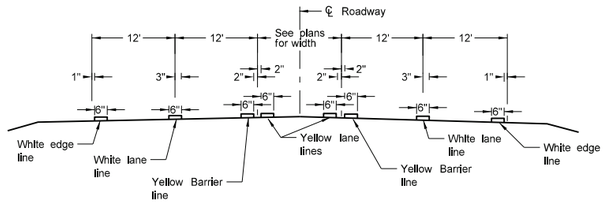
RURAL FIVE LANE ROADWAY
Concrete Section

NOTES:

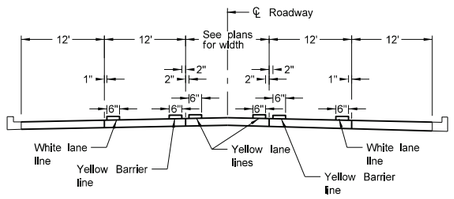
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.
2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph,
3. Use 4 or 6 inch wide pavement marking for all other roadways with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



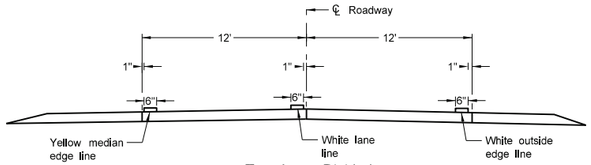
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



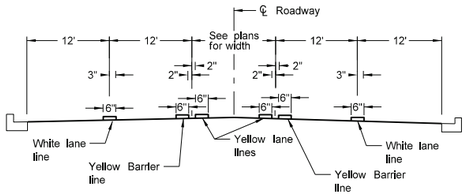
RURAL FIVE LANE ROADWAY
Asphalt Section



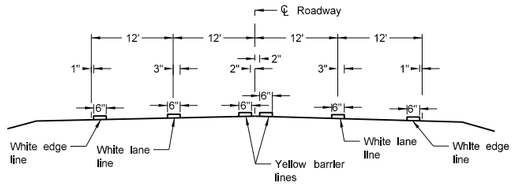
URBAN FIVE LANE SECTION
Concrete Section



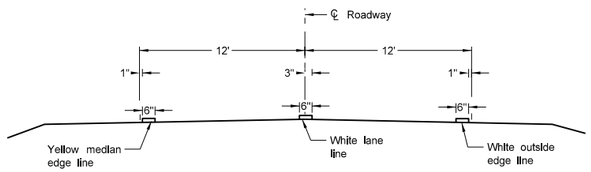
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



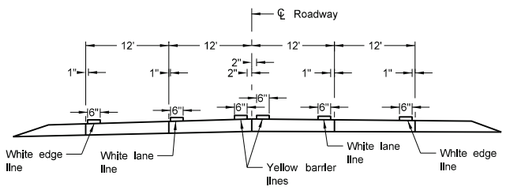
URBAN FIVE LANE SECTION
Asphalt Section



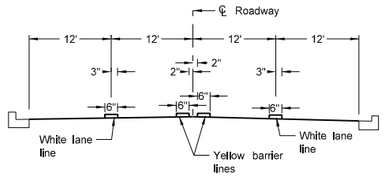
RURAL FOUR LANE ROADWAY
Asphalt Section



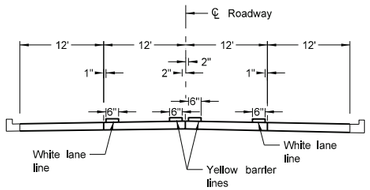
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



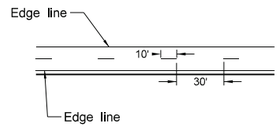
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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.

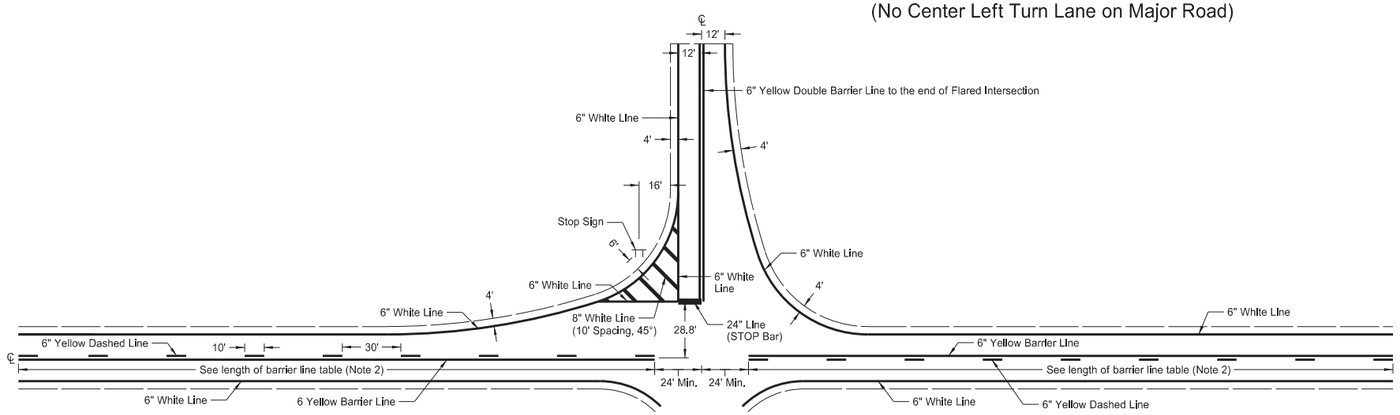
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
11/22/23
ENGINEER
NORTH DAKOTA

DocuSign Envelope ID: 09EA856C-BD61-42B6-B726-BC2420A5CEC1

PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION

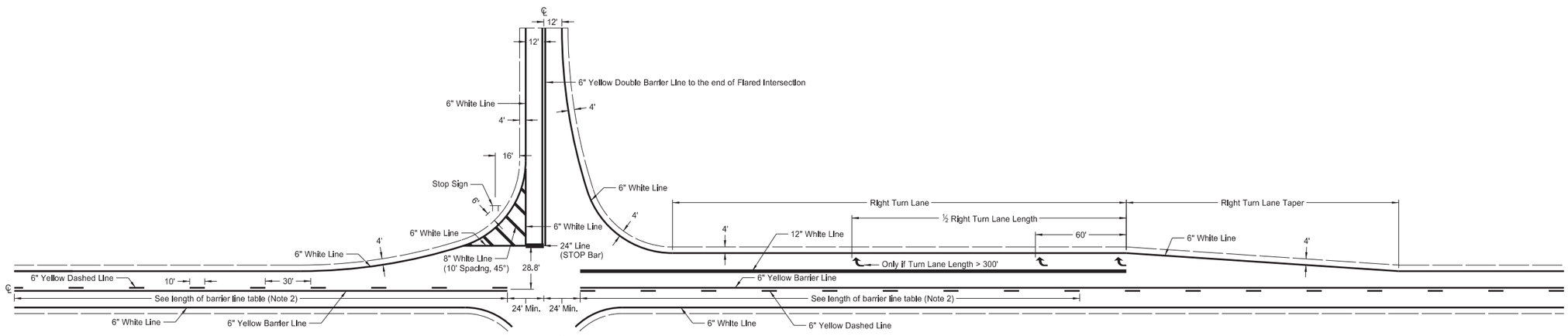
D-762-5

(No Center Left Turn Lane on Major Road)



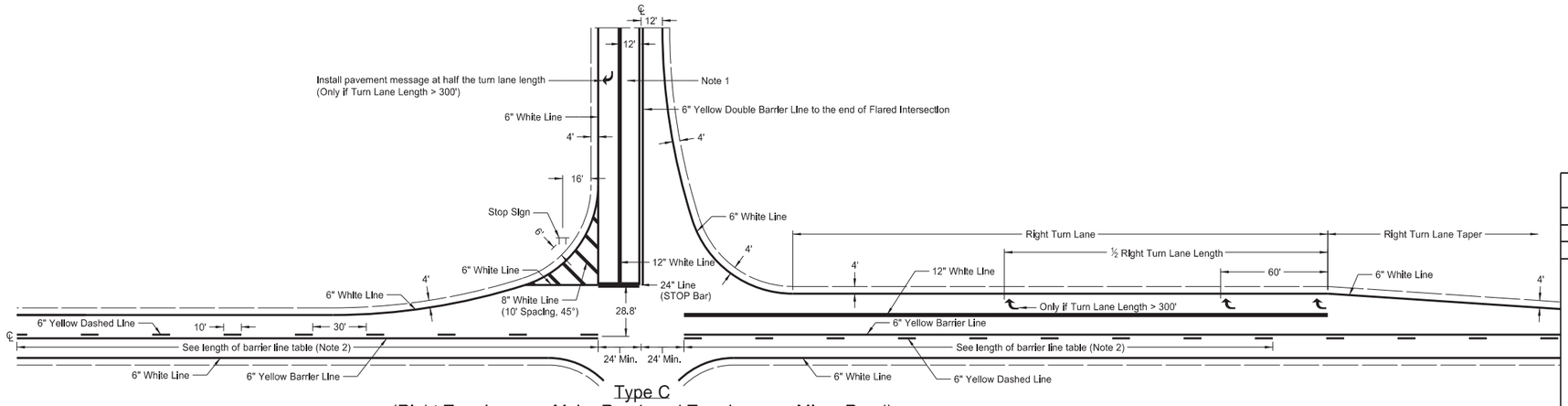
Type A

(No turn lanes present)



Type B

(Right Turn Lane on Major Road)



Type C

(Right Turn Lane on Major Road, and Turn Lane on Minor Road)

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.

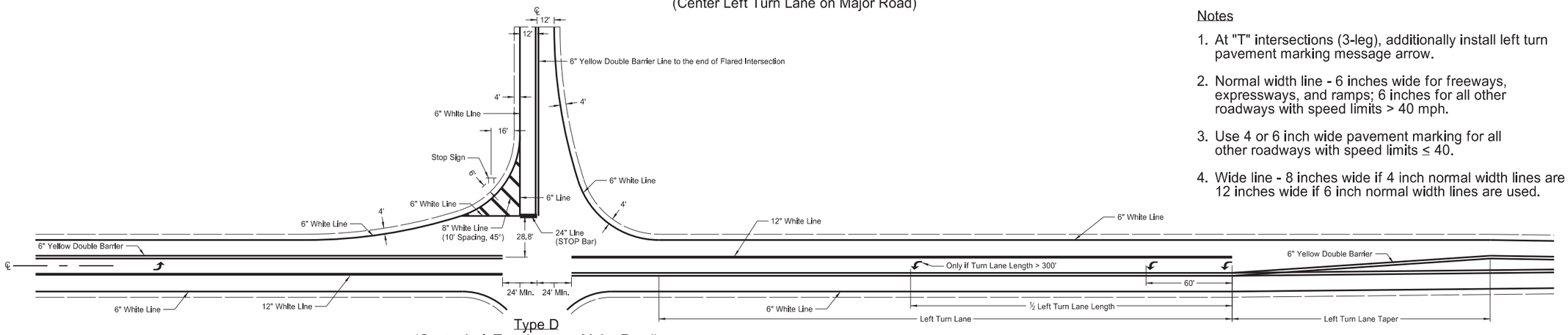
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
01/17/24
ENGINEER
NORTH DAKOTA

DocuSign Envelope ID: 09EA856C-BD61-42B6-B726-BC2420A5CEC1

PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION

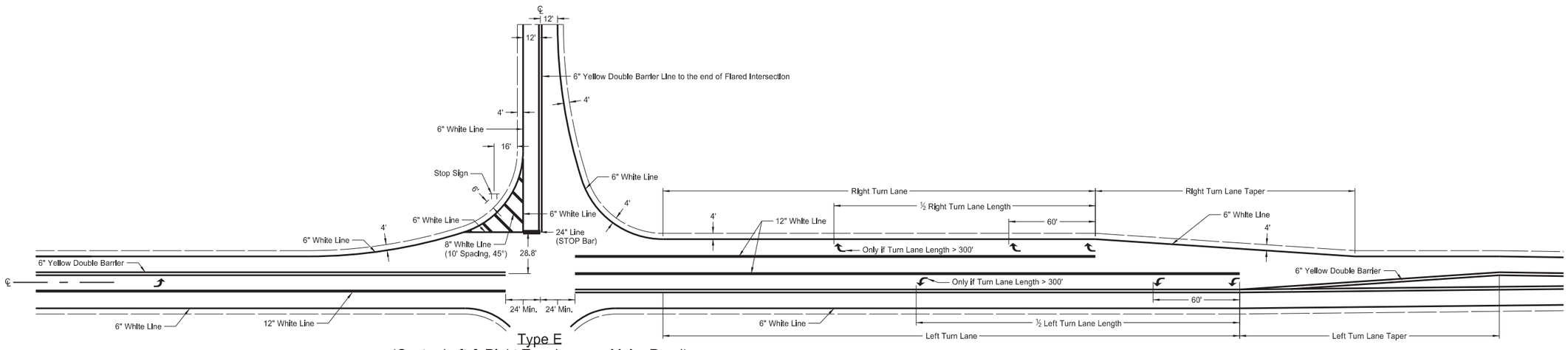
D-762-6

(Center Left Turn Lane on Major Road)



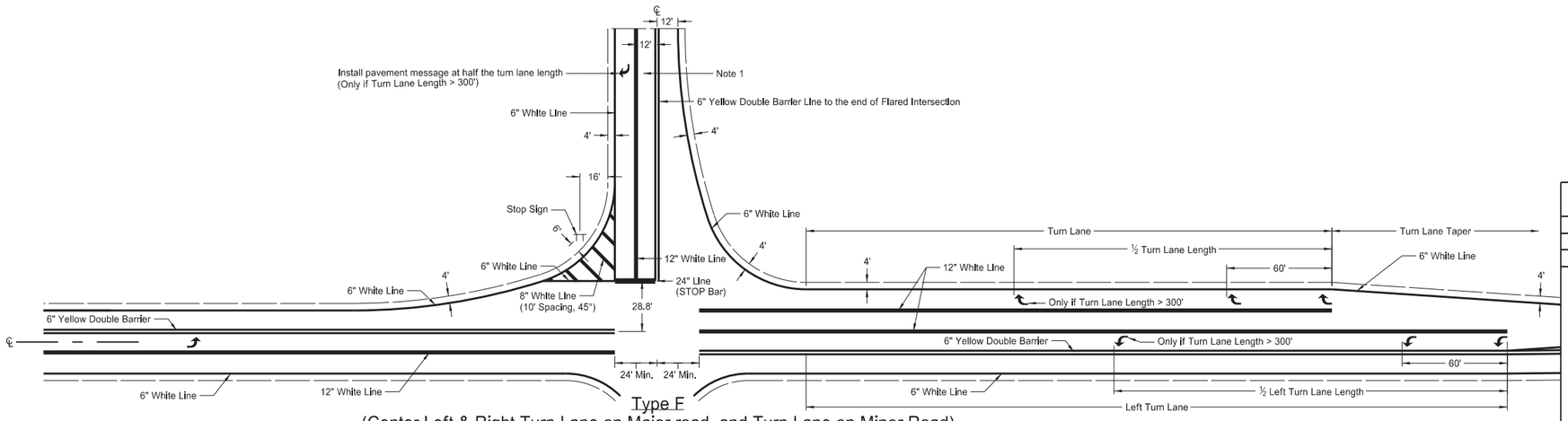
Type D

(Center Left Turn Lane on Major Road)



Type E

(Center Left & Right Turn Lane on Major Road)



Type F

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

6" Marking

8" Marking

12" Marking

24" Marking

Notes

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.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

3-29-16

REVISIONS

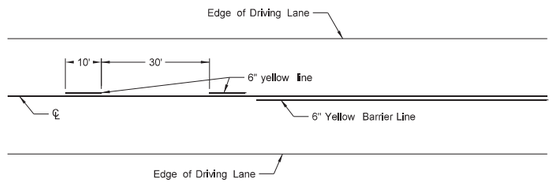
DATE	CHANGE
8-17-17	Updated dimensioning.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
1-17-24	Revised wide pvmt mkg width.

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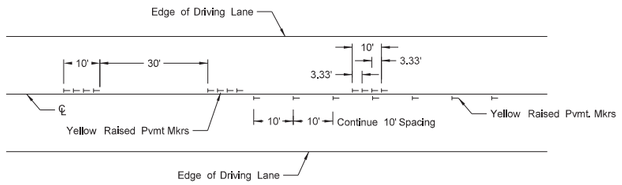
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SHORT-TERM PAVEMENT MARKING

D-762-11

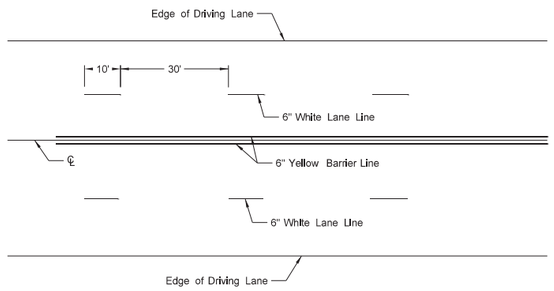


Painted or Tape Lines

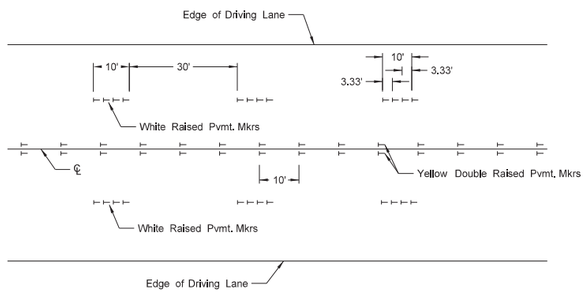


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

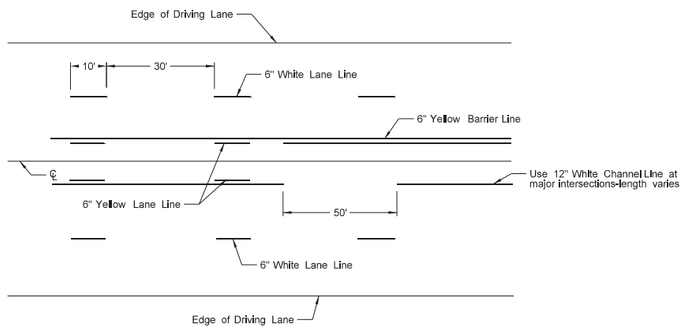


Painted or Tape Lines

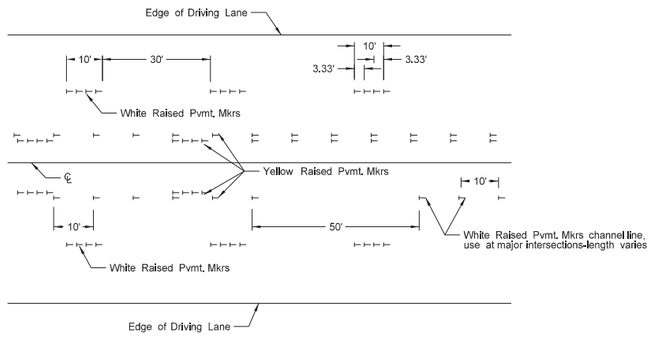


Raised Pavement Markers

FOUR LANE ROADWAY

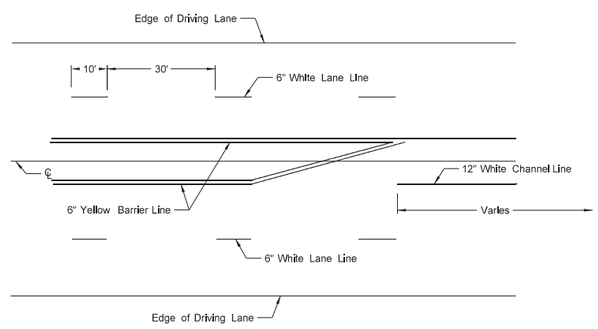


Painted or Tape Lines

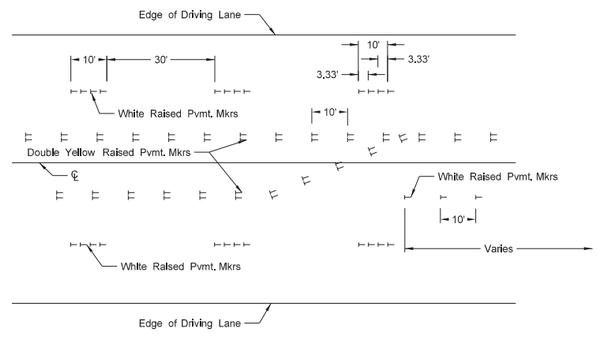


Raised Pavement Markers

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.

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