

DESIGN DATA			
Traffic	Average Daily		
Current 2020	Pass: 1305	Trucks: 630	Total: 1935
Forecast 2040	Pass: 1765	Trucks: 905	Total: 2670
Clear Zone Distance: 42'		Design Speed: 65 MPH	
Minimum Sight Dist. for Stopping: 645'		Bridges: N/A	
Sight Dist. for No Passing Zone: 1100'			
Pavement Design Life 20 (years)			
Design Accumulated One-way ESALs: 2,173,513			

JOB #
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	22832	1	1

HEN-5-085(081)073

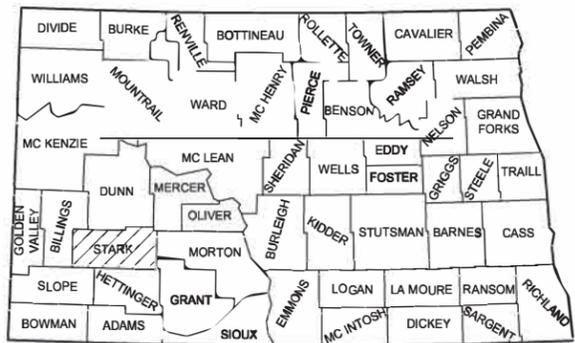
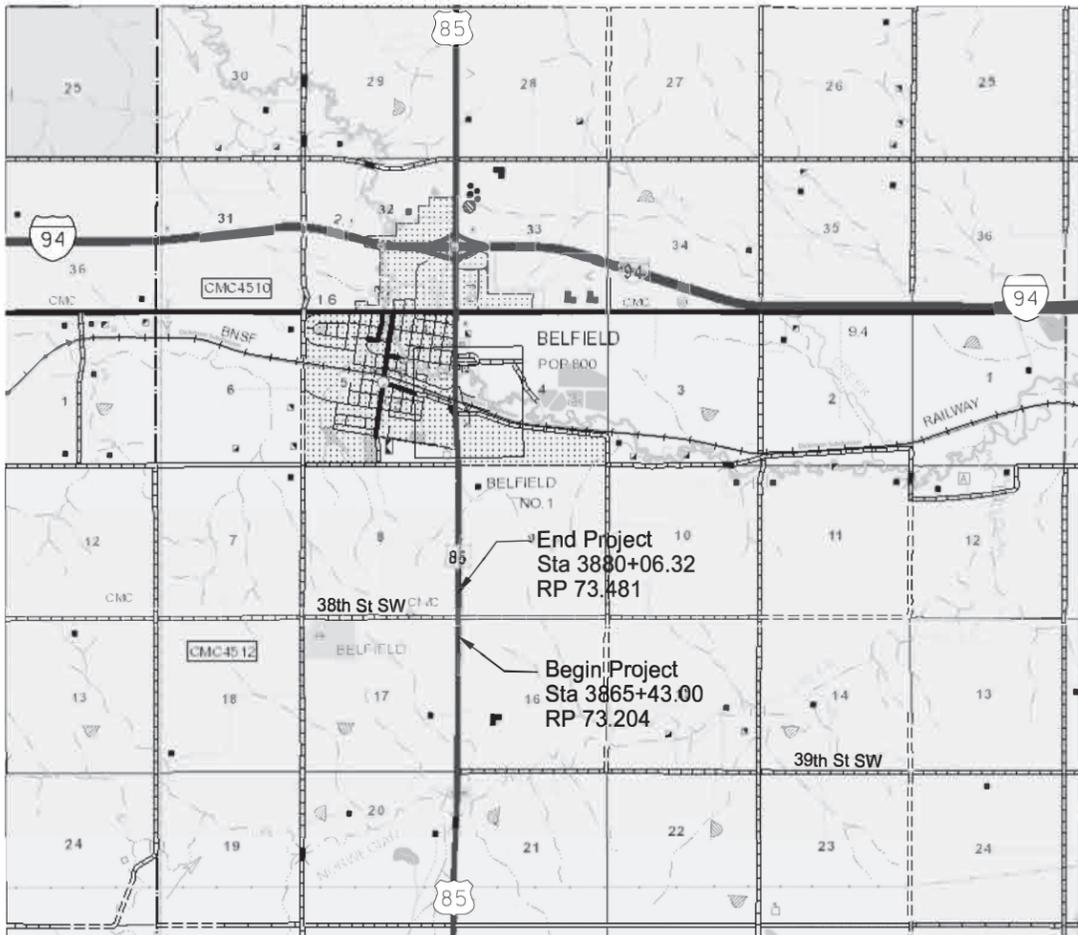
Stark
US 85 & 38th St SW
Turn Lane

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	10/1/2020
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
HEN-5-085(081)073	0.277	0.277



T-140-N
T-139-N



STATE COUNTY MAP

DESIGNER Daniel N Green, PE
DESIGNER Andrew C Gottsman, PE
DESIGNER Joshua H Forsgren, EI

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT
Hoff, Kirk J.
11/24/21

BARTLETT & WEST, INC

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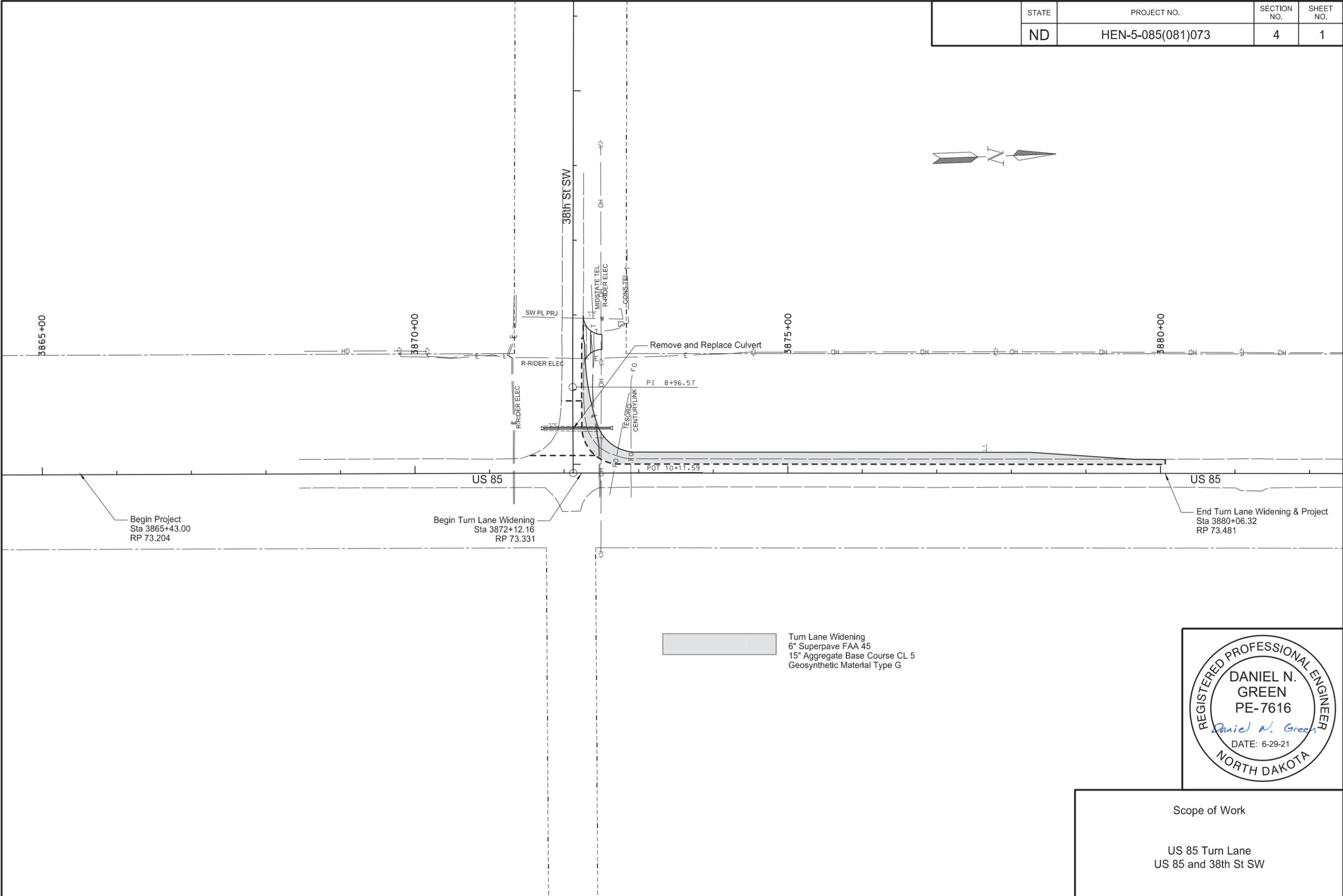
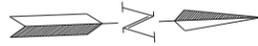
SPECIAL PROVISIONS

Number	Description
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SP 451(20)	Soil Stabilizer
SP 452(20)	Hydraulic Mulch with Tackifier
SSP 1	Temporary Erosion and Sediment Best Management Practices

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D-704-22	Construction Truck And Temporary Detour Layouts
D-704-24	Shoulder Closures And Bridge Painting Layouts
D-704-26	Miscellaneous Sign Layouts
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Begin Project
Sta 3865+43.00
RP 73.204

Begin Turn Lane Widening
Sta 3872+12.16
RP 73.331

End Turn Lane Widening & Project
Sta 3880+06.32
RP 73.481

Turn Lane Widening
6" Superpave FAA 45
15" Aggregate Base Course CL 5
Geosynthetic Material Type G



Scope of Work

US 85 Turn Lane
US 85 and 38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	6	1

NOTES

GENERAL NOTES

100-P01 COORDINATION OF PROJECTS: This project is tied to NH-5-085(077)074. Common Excavation – Waste from this project will be used as embankment on the other project.

107-P01 MAINTAINING TRAFFIC –DROP-OFFS: 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 a drop-off or steep slope; or
- Close the lane adjacent to the drop-off or steep slope and provide 24-hour flagging & 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 E.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 & pilot car operations and associated traffic control at no additional cost to the Department.

The requirements of Section 704.04 O, "Traffic Control for Uneven Pavement" apply to drop-offs created by milling or the placement of hot mix asphalt.

203-010 SHRINKAGE: 25% percent additional volume is included for shrinkage in earth embankment.

704-255 TRAFFIC CONTROL FOR SHOULDER DROP-OFF: If the shoulder and adjacent driving lane are not even at the end of the day, the following criteria will apply:

Place the following sign assembly at the locations listed below.

Sign Assembly: Sign No. W8-17-48 "Shoulder Drop Off" and supplemental plate Sign No. W20-52P-54 to identify the distance.

Locations:

- In advance of the drop off;
- Spaced at each mile from the advance sign; and
- At major intersections (CMC routes, state and US highways, and Interstate Ramps).

If the difference in elevation between the shoulder and the driving lane is 2" or greater, construct a slough on the driving lane that is 4:1 or flatter.

If the difference in elevation between the shoulder and driving lane is less than 2", no slough is required.

Sign assemblies will be measured and paid for according to Section 704 "Temporary Traffic Control".

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

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

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

Install PRS that meet the following criteria:

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

Use individual PRS constructed in one of the following manners:

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

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

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



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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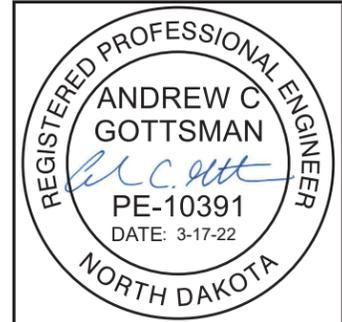
NOTES

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 CONSTRUCTION ACTIVITIES: Provide traffic control consisting of a temporary road closure, flagging, and/or pilot car for each phase of the work.

Traffic control device quantities are based on the list below.

1. Standard D-704-15, layout A for removals, earthwork, aggregate base, and paving work; utilize flaggers & traffic control devices on 38th St SW when work causes a closure to the roadway.
2. Standard D-704-20, layout G; and
3. Standard D-704-26, layout BB for shoulder work, layout EE where bump conditions exist, and layout GG where uneven lane conditions exist.



Estimated Quantities

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT		TOTAL
103	0100	CONTRACT BOND	L SUM	0.25	0.25
202	0135	REMOVAL OF BITUMINOUS SURFACING	TON	1559	1559
202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF	74	74
203	0101	COMMON EXCAVATION-TYPE A	CY	1536	1536
203	0109	TOPSOIL	CY	942	942
203	0113	COMMON EXCAVATION-WASTE	CY	1250	1250
216	0100	WATER	M GAL	60	60
251	0200	SEEDING CLASS II	ACRE	1.45	1.45
251	2000	TEMPORARY COVER CROP	ACRE	1.45	1.45
253	0051	SOIL STABILIZER	ACRE	1.45	1.45
253	0201	HYDRAULIC MULCH	ACRE	1.45	1.45
261	0112	FIBER ROLLS 12IN	LF	420	420
261	0113	REMOVE FIBER ROLLS 12IN	LF	210	210
302	0120	AGGREGATE BASE COURSE CL 5	TON	2170	2170
401	0050	TACK COAT	GAL	149	149
430	0045	SUPERPAVE FAA 45	TON	496	496
430	1000	CORED SAMPLE	EA	7	7
430	5806	PG 58H-28 ASPHALT CEMENT	TON	29.3	29.3
702	0100	MOBILIZATION	L SUM	0.25	0.25
704	0100	FLAGGING	MHR	180	180
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1606	1606
704	1048	PORTABLE RUMBLE STRIPS	EA	2	2
704	1067	TUBULAR MARKERS	EA	80	80
704	1080	STACKABLE VERTICAL PANELS	EA	40	40
704	1185	PILOT CAR	HR	80	80
706	0500	AGGREGATE LABORATORY	EA	0.25	0.25
706	0550	BITUMINOUS LABORATORY	EA	0.25	0.25
706	0600	CONTRACTOR'S LABORATORY	EA	0.25	0.25
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	2531	2531
714	4105	PIPE CONDUIT 24IN	LF	86	86
754	0592	RESET SIGN PANEL	EA	3	3
754	0593	RESET SIGN SUPPORT	EA	3	3
762	0103	PVMT MK PAINTED-MESSAGE	SF	48	48
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	1792	1792
762	0434	SHORT TERM 8IN LINE-TYPE NR	LF	1770	1770
762	1104	PVMT MK PAINTED 4IN LINE	LF	3039	3039
762	1108	PVMT MK PAINTED 8IN LINE	LF	621	621
762	1124	PVMT MK PAINTED 24IN LINE	LF	12	12

BASIS OF ESTIMATE

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ND	HEN-5-085(081)073	10	1

HMA Cored Samples							
Specification Section	A	B		C	Quantity (A x B x C)	Quantity (1 per mile)	Unit
	Cores per subplot	Lanes	Joints	Lifts			
430.04 I.2.b(1), "General"	2	1	N/A	3	6	N/A	EA
SSP 4 Longitudinal Joint Density in HMA Pavements (Centerline)	N/A	N/A	N/A	N/A	N/A	N/A	EA
430.04 I.2.b(2), "Pavement Thickness Determination Cores"					N/A	1	EA
				Total	6	1	EA

Water

25 MGal/Mile for Dust Palliative	4 MGAL
20 Gal/Ton for Aggregates	44 MGAL
10 Gal/CY for Embankment	12 MGAL
	60 MGAL

Materials

Aggregate Base Course	1.875 Ton/CY
Tack Coat	0.05 Gal/SY
Superpave FAA 45	2.0 Ton/CY
PG 58H-28 Asphalt Cement	5.9%

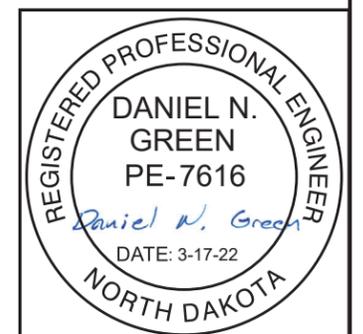
Earthwork Summary

Location	Excavation	Pvmt Removal from Excavation Area	Topsoil (Pay Item)	Common Excavation Type A (Pay Item)	Embankment Required	Embankment Adjusted*	Common Excavation - Waste (Pay Item)**
	(CY)	(CY)	(CY)	(CY)	(CY)	(CY)	(CY)
	A	B	C	D = A - (B + C)	E	F = E x 1.25	G = D - E
US 85 (Sta. 3872+12.16 to Sta. 3880+06.32)	3100	593	942	1536	286	358	1250

Note: This computation report is not a balance sheet and is for informational purposes only. The contractor shall calculate their own balance of materials.

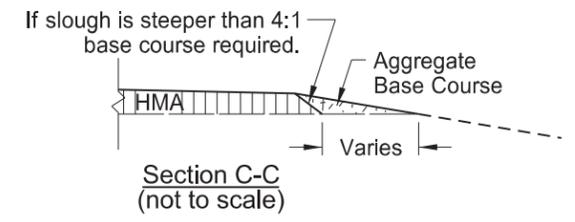
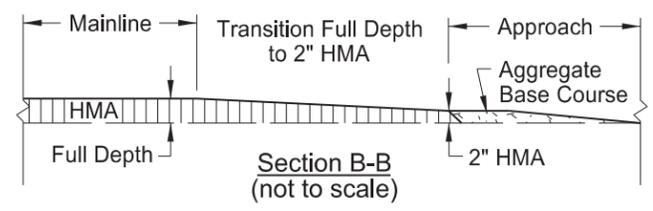
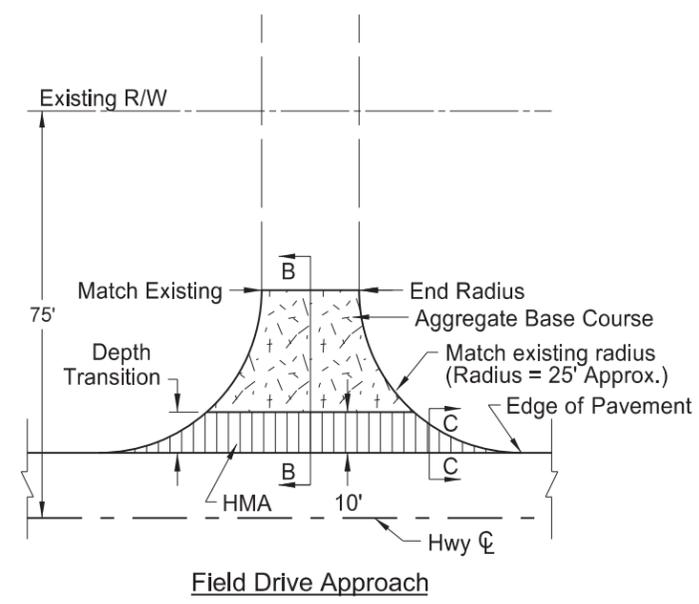
* 25% additional volume is included for shrinkage in earth embankment

** Common Excavation – Waste material is intended to be used as embankment on project NH-5-085(077)074

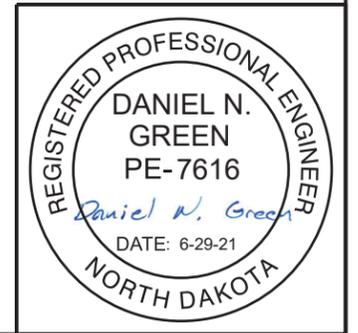


Notes:

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



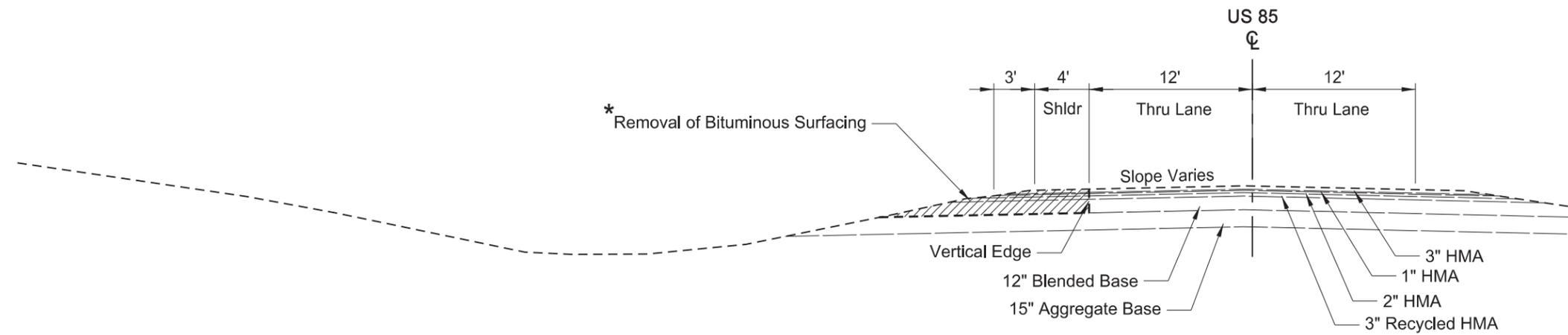
BASIS OF ESTIMATE		
ITEM	UNIT	Field Drive
Number of Locations	#	1
Aggregate Base Course CL 5	TON	4
Tack Coat	GAL	1
Superpave FAA 45	TON	5
PG 58H-28 Asphalt Cement	TON	0.3



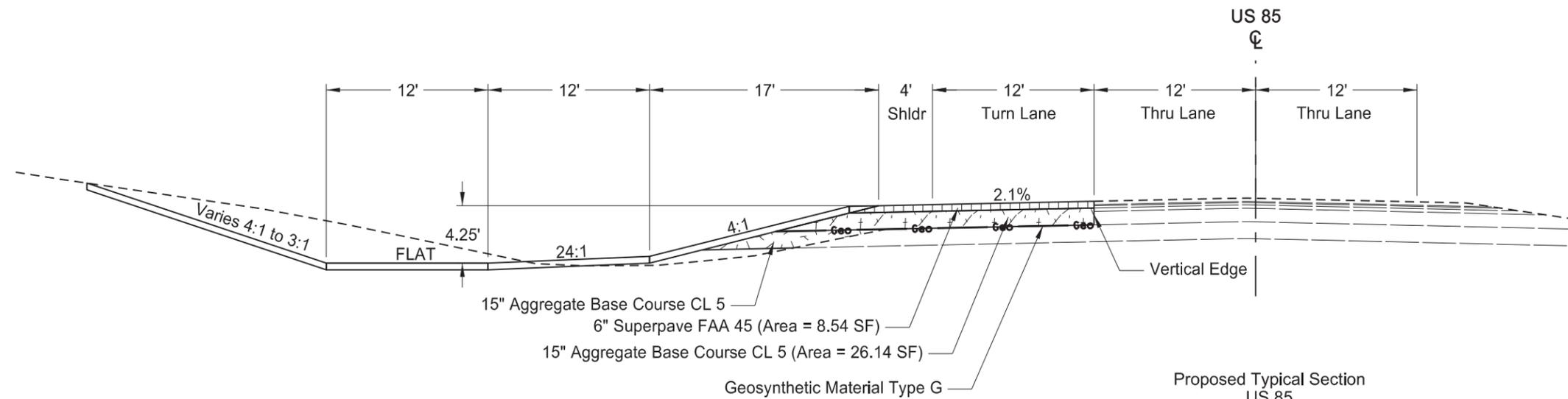
Approach Paving Detail for Existing Rural Approach
(No Approach Grading)

US 85 Turn Lane
US 85 and 38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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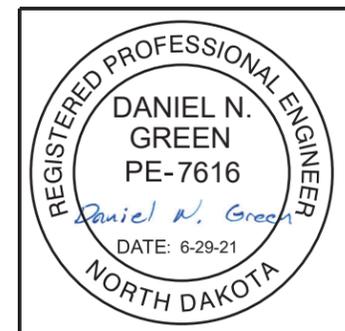


Removal Typical Section
US-85
Sta. 3872+12.16 to Sta. 3880+06.32



Proposed Typical Section
US 85
Sta. 3872+12.16 to Sta. 3880+06.32

* Note: Aggergate is included in Removal of Bitumious Surfacing Quantity

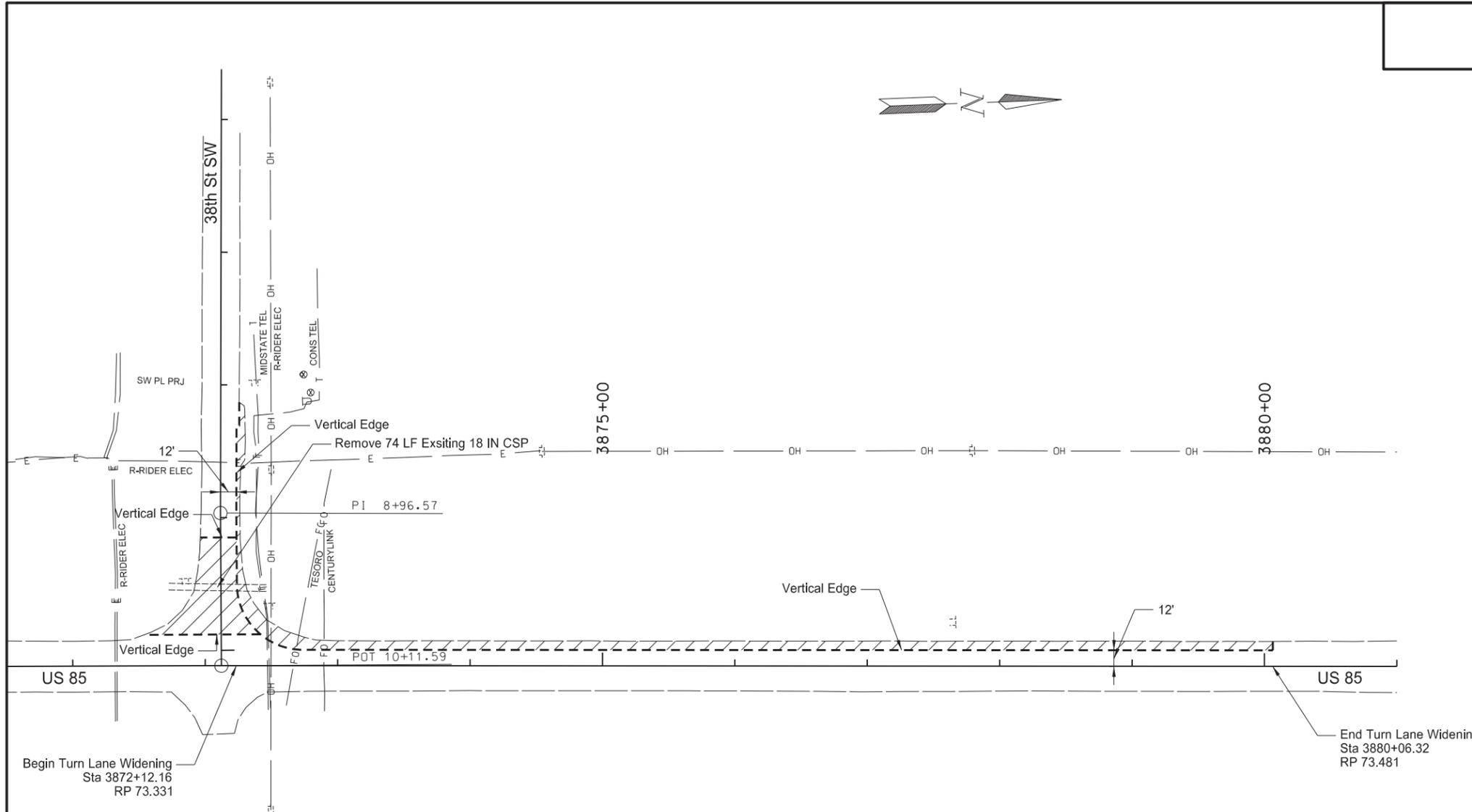


Typical Sections

US 85 Turn Lane
US 85 and 38th St SW

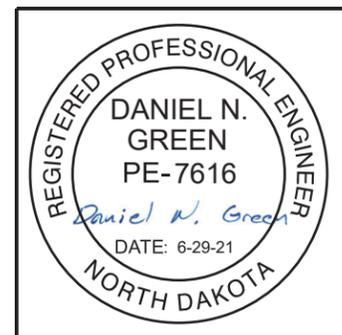
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	40	1

SPEC CODE	BID ITEM	QTY	UNIT
202 0135	REMOVAL OF BITUMINOUS SURFACING 3871+53.82 23.45' LT to 3880+06.32 18.73' LT	1559	TON
202 0170	REMOVAL OF CULVERTS - ALL TYPES & SIZES 3871+72.30 59.4' LT to 3872+46.10 58.5' LT	74	LF



See Sec 082 for Survey Data Points of vertical edge

 Remove Bituminous Surfacing



Removals

US 85 Turn Lane
US 85 and 38th St SW

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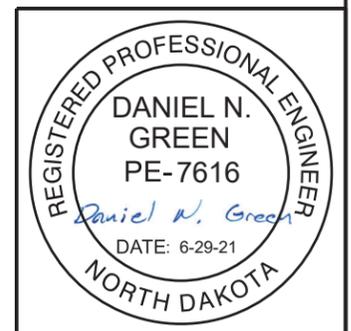
Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)		Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	Geosynthetic Material - Type G	(*) End Sections		Applicable Backfill	
				In	LF							Begin EA	End EA		
3871+74	60' Lt	3872+60	60' Lt	24	Pipe Conduit 24IN	86'	Reinforced Concrete Pipe - Class III (barrel length = 81 LF)	24			55	FES	FES	Standard D-714-26	
							Corrugated Steel Pipe	24	P	2					0.064
							Spiral Rib Steel Pipe	24	P	3/4, 1					0.064

Corrugations: 2 = 2-2/3"x1/2"
3 = 3"x1"
5 = 5"x1"

Coatings: Z = Zinc
A = Aluminum
P = Polymeric (over Zinc or Aluminum)

Spiral Ribs: 3/4 = 3/4"x3/4"@7-1/2"
1 = 3/4"x1"@11-1/2"

(*) End sections are measured and paid for separately for pipe extensions.
FES = Flared End Section
TES = Traversable End Section

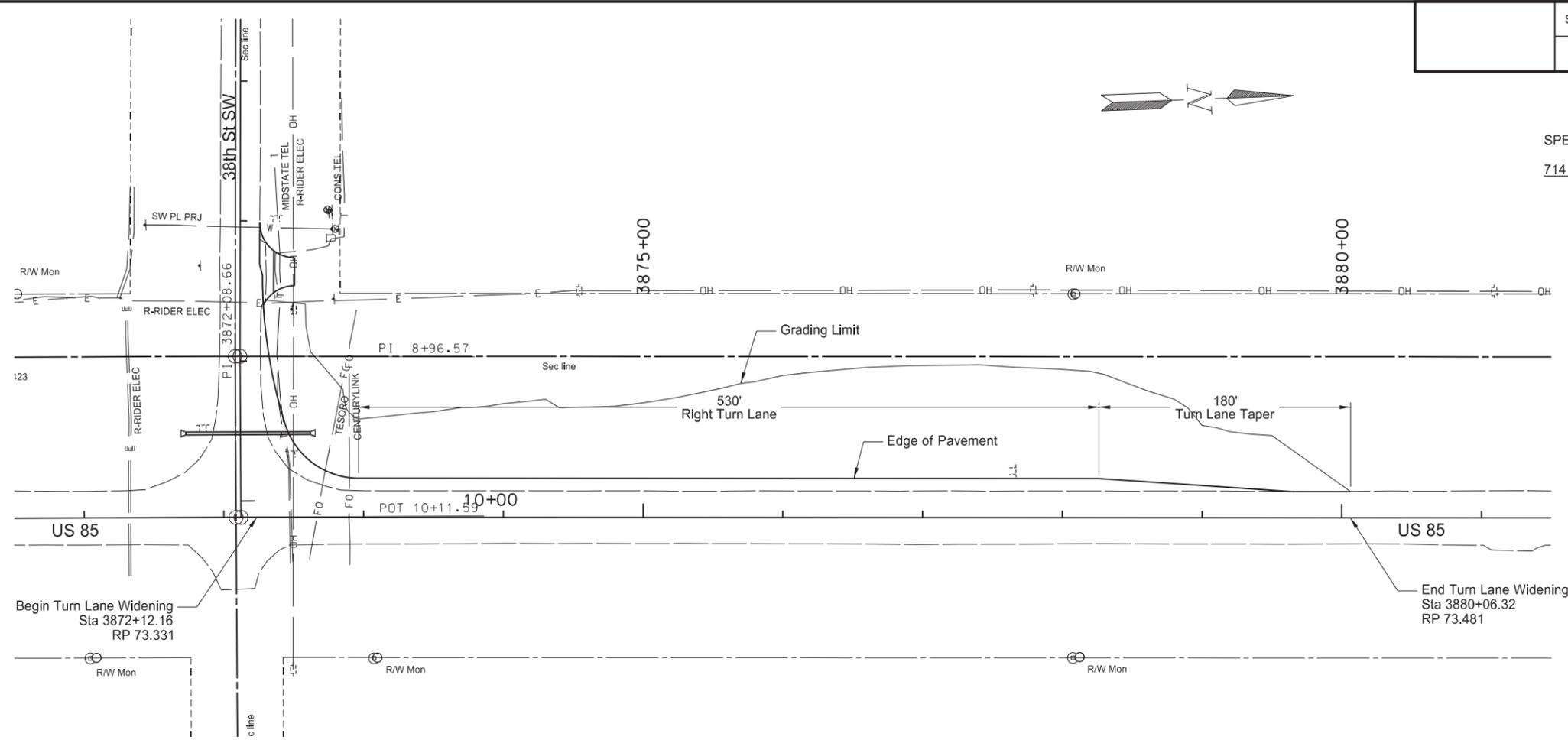
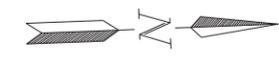


Allowable Pipe List

US 85 Turn Lane
US 85 and 38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	60	1

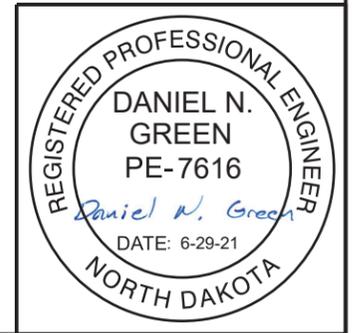
SPEC	CODE	BID ITEM	QTY	UNIT
714	4105	PIPE CONDUIT 24IN - APPROACH	86	LF
3871+74 60' LT to 3872+60 60' LT				



Station	2675	2670	2665	2660	2655	2650	2645	2640
3871+00								
3872+00								
3873+00								
3874+00								
3875+00								
3876+00								
3877+00								
3878+00								
3879+00								
3880+00								
3881+00								

3872+18 60' Lt
 24 In Pipe Conduit - Approach
 Install 88 LF
 Inlet N 2652.31
 Outlet S 2650.74

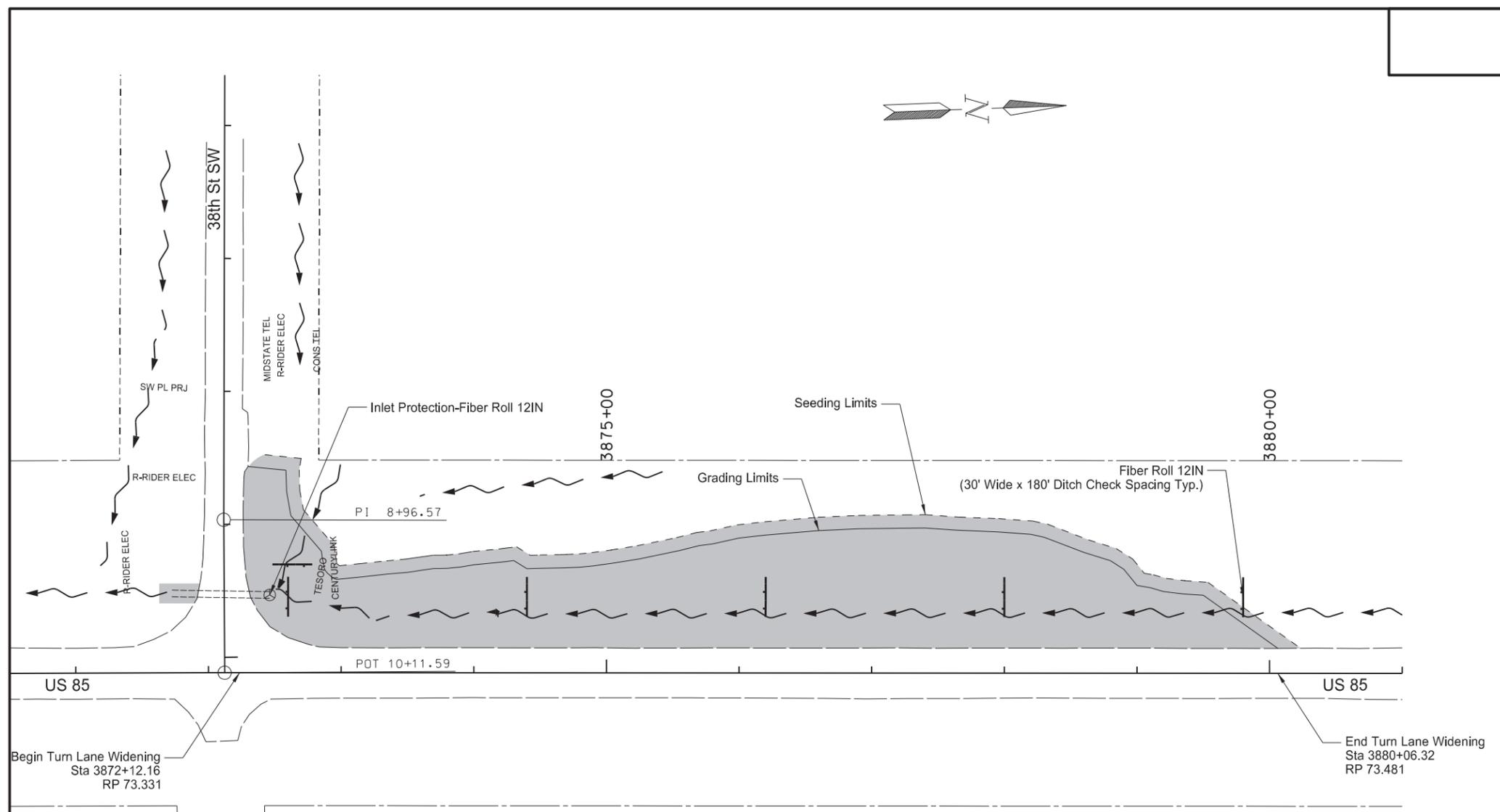
Existing US 85 C Profile



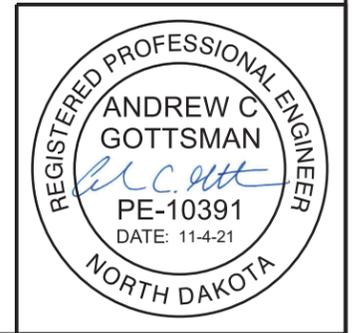
Plan & Profile
 US 85 Turn Lane
 US 85 and 38th St SW

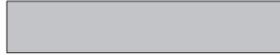
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	76	1

SPEC CODE	BID ITEM	QTY	UNIT
251 2000	TEMPORARY COVER CROP 3871+67 LT to 3880+73 LT	1.45	ACRE
253 0050	SOIL STABILIZER 3871+67 LT to 3880+73 LT	1.45	ACRE
261 0112	FIBER ROLL 12IN 3871+67 LT to 3880+73 LT	210	LF
261 0113	REMOVE FIBER ROLLS 12IN 3871+67 LT to 3880+73 LT	210	LF



Stationing of erosion control measures are estimated.
Placement of fiber rolls must meet field conditions.



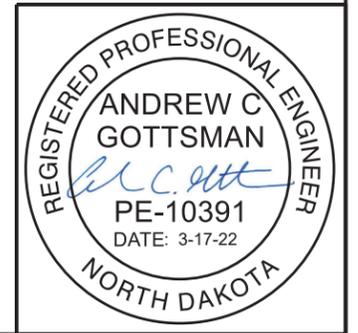
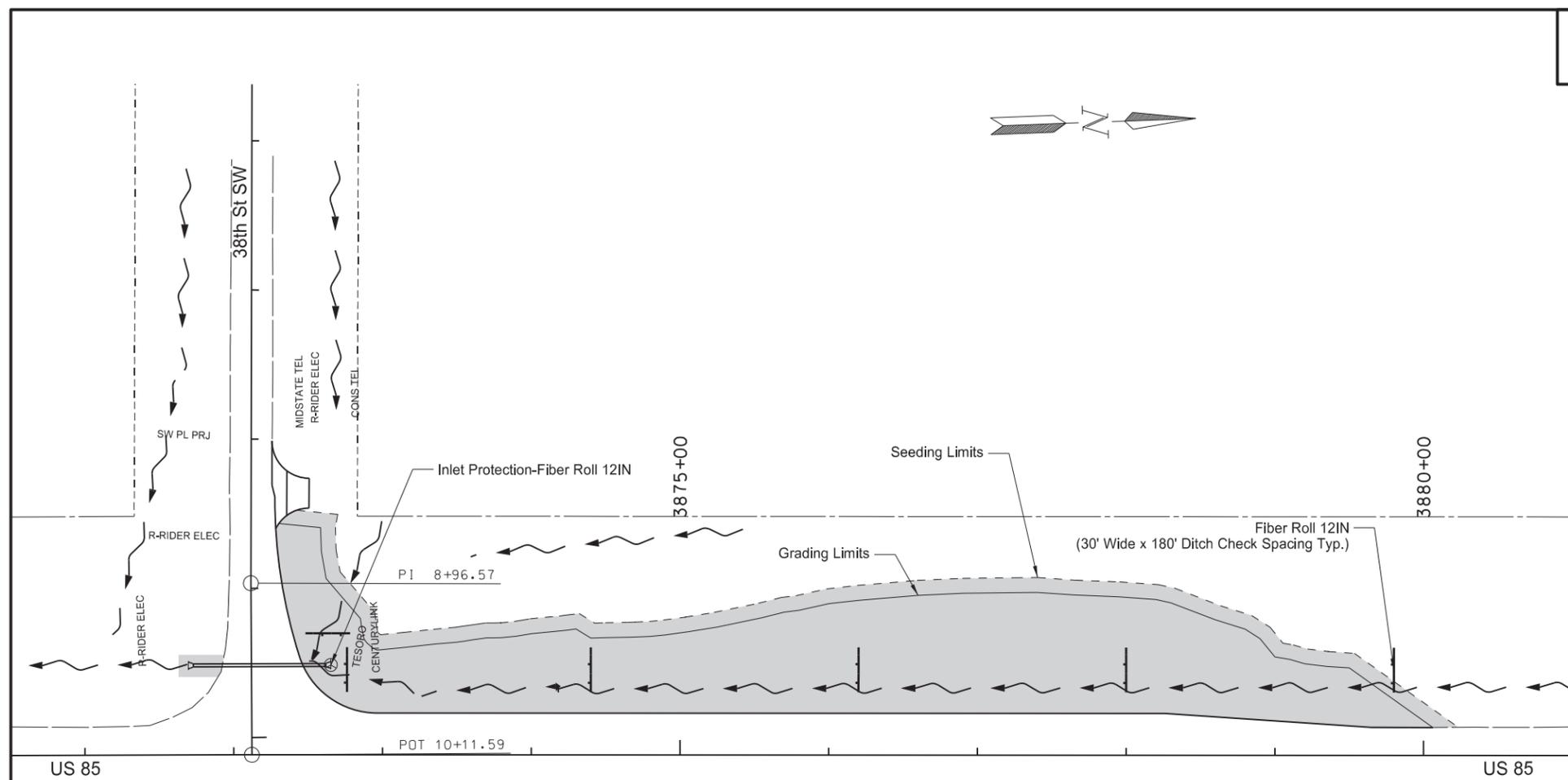
-  Temporary Cover Crop, Soil Stabilizer
-  Fiber Rolls 12 In

Temporary Erosion Control

US 85 Turn Lane
US 85 and 38th St SW

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SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II 3871+67 LT to 3880+73 LT	1.45	ACRE
253	0201	HYDRAULIC MULCH 3871+67 LT to 3880+73 LT	1.45	ACRE
261	0112	FIBER ROLL 12IN 3871+67 LT to 3880+73 LT	210	LF



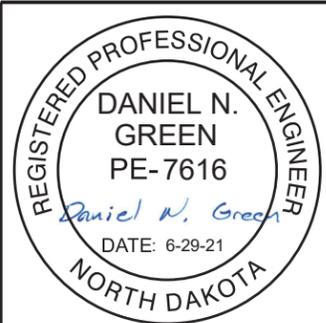
Permanent Erosion Control

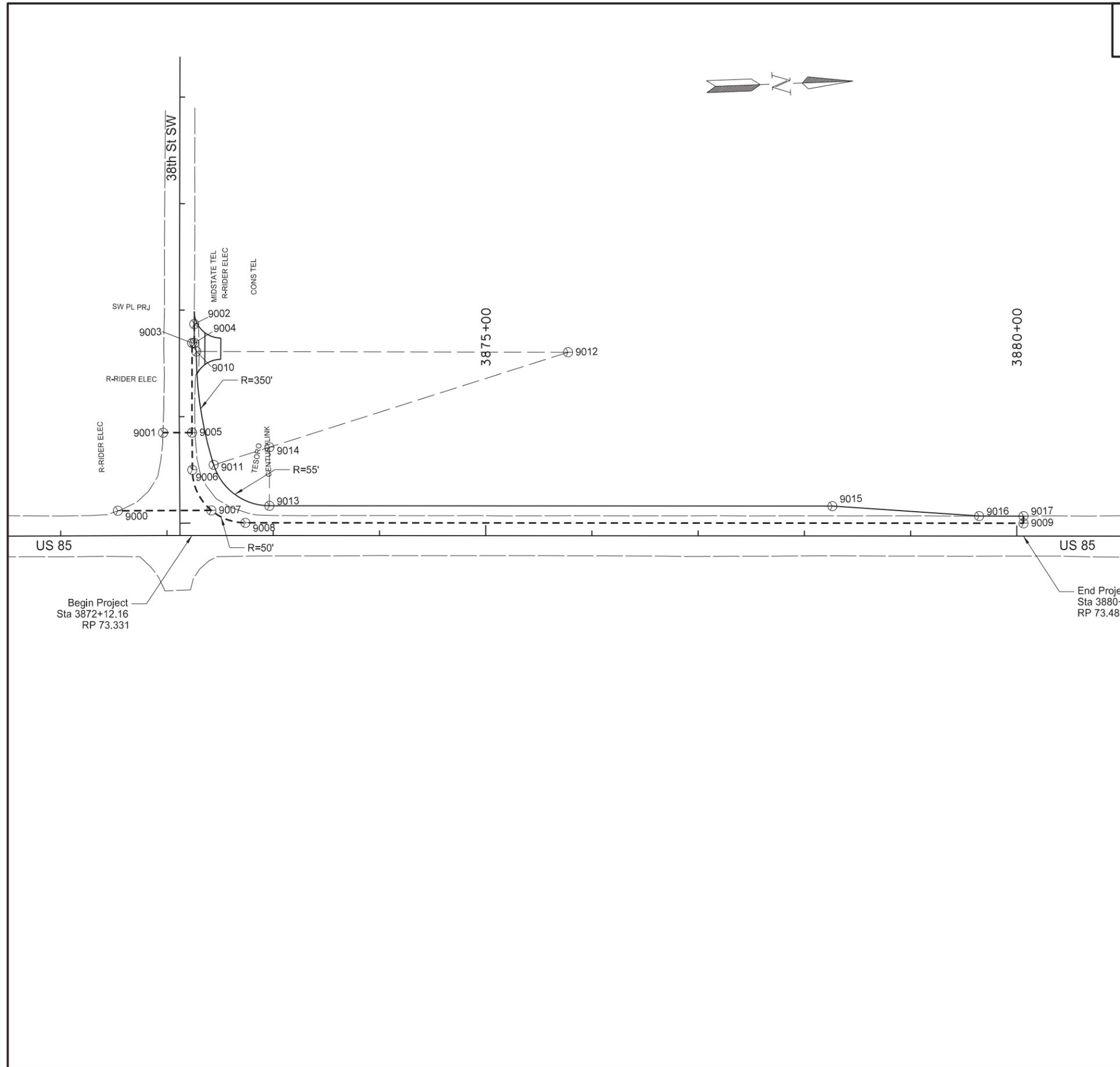
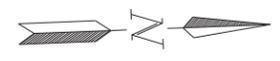
US 85 Turn Lane
US 85 and 38th St SW

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - US 85 AT 38TH ST SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	81	1

HORIZONTAL ALIGNMENT				CURVE DATA		US PUBLIC LAND SURVEY DATA				SURVEY CONTROL POINTS					
PNT	STATION	NORTHING	EASTING	ARC DEFINITION		CORNER	IRN	NORTHING	EASTING	PNT	NORTHING	EASTING	ELEV	STATION	OFFSET
US 85 (Chain: SCL85)						T-139-N R-99-W				MONUMENT DESCRIPTION					
Begin	3845+64.37	444774.09	1296021.94			NW Sec Cor 8	3-C	452911.34	1290920.13						
Station equation US 85 (SCL85) at 38 ST SE (SCL38TH) Sec line Xing						SW Sec Cor 8	3-E	447632.25	1290705.18	Primary Control					
38 ST SE	1054+11.59	447416.83	1296112.48			SW Sec Cor 4	5-C	452708.70	1296201.26	GPS1	447422.30	1295119.33	2674.57'	3871+80	993' Lt
US 85	3872+08.66	447416.83	1296112.48			SE Sec Cor 8	5-E	447420.49	1295997.55	#5 Rebar w/Alum cap stamped GPS#1 (SCL85)					
End	3918+45.54	452050.27	1296290.97			W 1/4 Cor 16	5-F	444778.02	1295907.01	GPS2	452076.55	1296377.39	2646.31'	3918+46	85' Rt
						N 1/4 Cor 16	6-E	447336.03	1298647.53	#5 Rebar w/Alum cap stamped GPS#2 (SCL85)					
38 ST SE (Chain: SCL38TH) Survey \hat{C} on Section Line															
Begin/Rec Sec Cor	1000+00.00	447632.25	1290705.18												
Rec Sec Cor	1052+96.60	447420.49	1295997.55												
Station equation 38 ST SE (SCL38TH) at US 85 (SCL85)															
US 85	3872+08.66	447416.83	1296112.48												
38 ST SE	1054+11.59	447416.83	1296112.48												
End/Rec 1/4 Cor	1079+47.93	447336.03	1298647.53												
38 ST SE (Chain: EX38TH) Existing Roadway \hat{C} Used for Construction															
Begin/POT	1+00.00	447455.84	1295201.73												
PI	8+96.57	447423.99	1295997.66												
Station equation 38 ST SE (EX38TH) at US 85 (SCL85)															
US 85	3872+12.16	447420.33	1296112.62												
38 ST SE	10+11.59	447420.33	1296112.62												
End/POT	10+11.59	447420.33	1298647.53												
NOTES: Sheet 1 of 1				Date Survey Completed 10/08/20		<input type="checkbox"/> Assumed Coordinates <input checked="" type="checkbox"/> All coordinates on this sheet are Stark County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998175				All coordinates and measurements on this document derived from the International Foot definition. INITIALIZING BENCH MARK NDGPS Stations (OPUS) <input checked="" type="checkbox"/> NAVD-88 <input type="checkbox"/> _____ <input type="checkbox"/> GEOID12B <input type="checkbox"/> _____ <input checked="" type="checkbox"/> GEOID18					





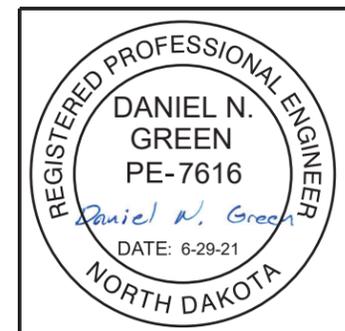
Vertical Sawcut Points

Point	North	East	Station	Offset
9000	447362.8174	1296087.1694	3871+53.82	-23.45
9001	447408.0976	1296015.5778	3871+96.62	-96.55
9002	447441.3177	1295914.7555	3872+25.52	-198.52
9003	447440.6092	1295932.4626	3872+25.50	-180.80
9004	447438.6108	1295932.3826	3872+23.50	-180.81
9005	447435.3945	1296016.5130	3872+23.52	-96.61
9006	447434.2813	1296051.4422	3872+23.75	-61.67
9007	447450.7894	1296090.1833	3872+41.74	-23.59
9008	447482.3312	1296102.9980	3872+73.75	-12.00
9009	448214.3547	1296131.1966	3880+06.32	-12.00

Edge of Pavement and Radius Points

Point	North	East	Station	Offset
9010	447442.2877	1295940.5362	3872+27.49	-172.80
9011	447454.5913	1296047.5343	3872+43.90	-66.35
9012	447792.0079	1295954.5290	3875+77.48	-172.28
9013	447505.4968	1296087.8785	3872+96.32	-28.00
9014	447507.6139	1296032.9192	3872+96.32	-83.00
9015	448035.1040	1296108.2798	3878+26.32	-28.00
9016	448172.8163	1296122.8028	3879+64.49	-18.79
9017	448214.6139	1296124.4676	3880+06.32	-18.73

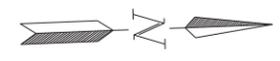
Stations and Offsets listed are measured from Chain: SCL83
Survey Data Points are listed for the top of the final pavement lift.



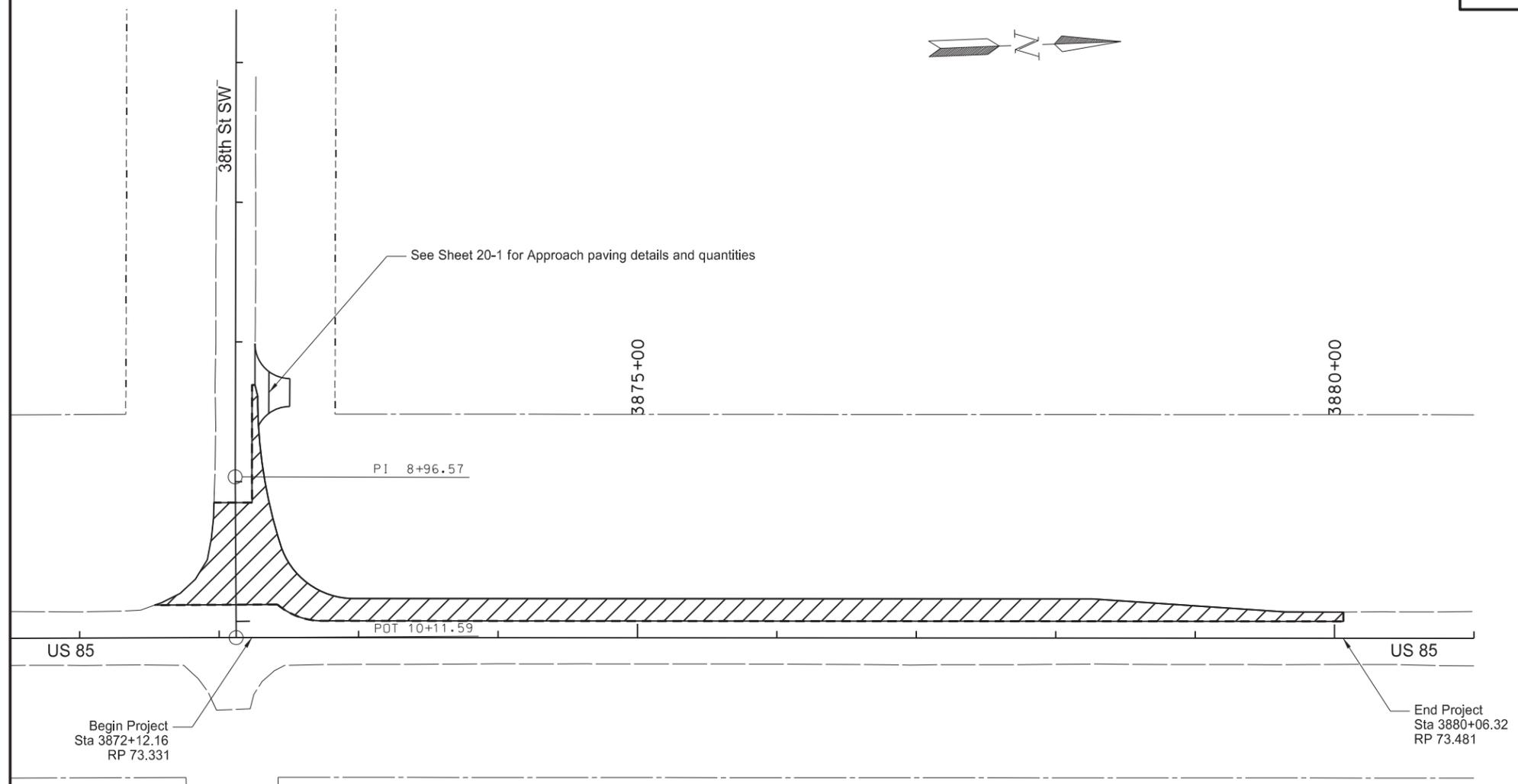
Survey Data Layout

US 85 Turn Lane
US 85 and 38th St SW

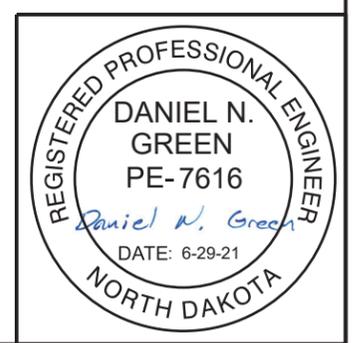
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	90	1



SPEC	CODE	BID ITEM	QTY	UNIT
320	0120	AGGREGATE BASE COURSE CL5		
		3871+53.82 23.45' LT to 3880+06.32 12.00' LT	2166	TON
401	0050	TACK COAT		
		3871+53.82 23.45' LT to 3880+06.32 12.00' LT	148	GAL
430	0045	SUPERPAVE FAA 45		
		3871+53.82 23.45' LT to 3880+06.32 12.00' LT	491	TON
430	5806	PG 58H-28 ASPHALT CEMENT		
		3871+53.82 23.45' LT to 3880+06.32 12.00' LT	29.0	TON
709	0100	GEOSYNTHETIC MATERIAL TYPE G		
		3871+53.82 23.45' LT to 3880+06.32 12.00' LT	2476	SY



See Sheet 82-1 for all paving points

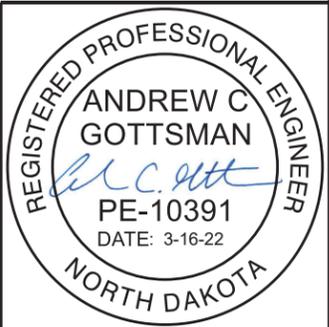
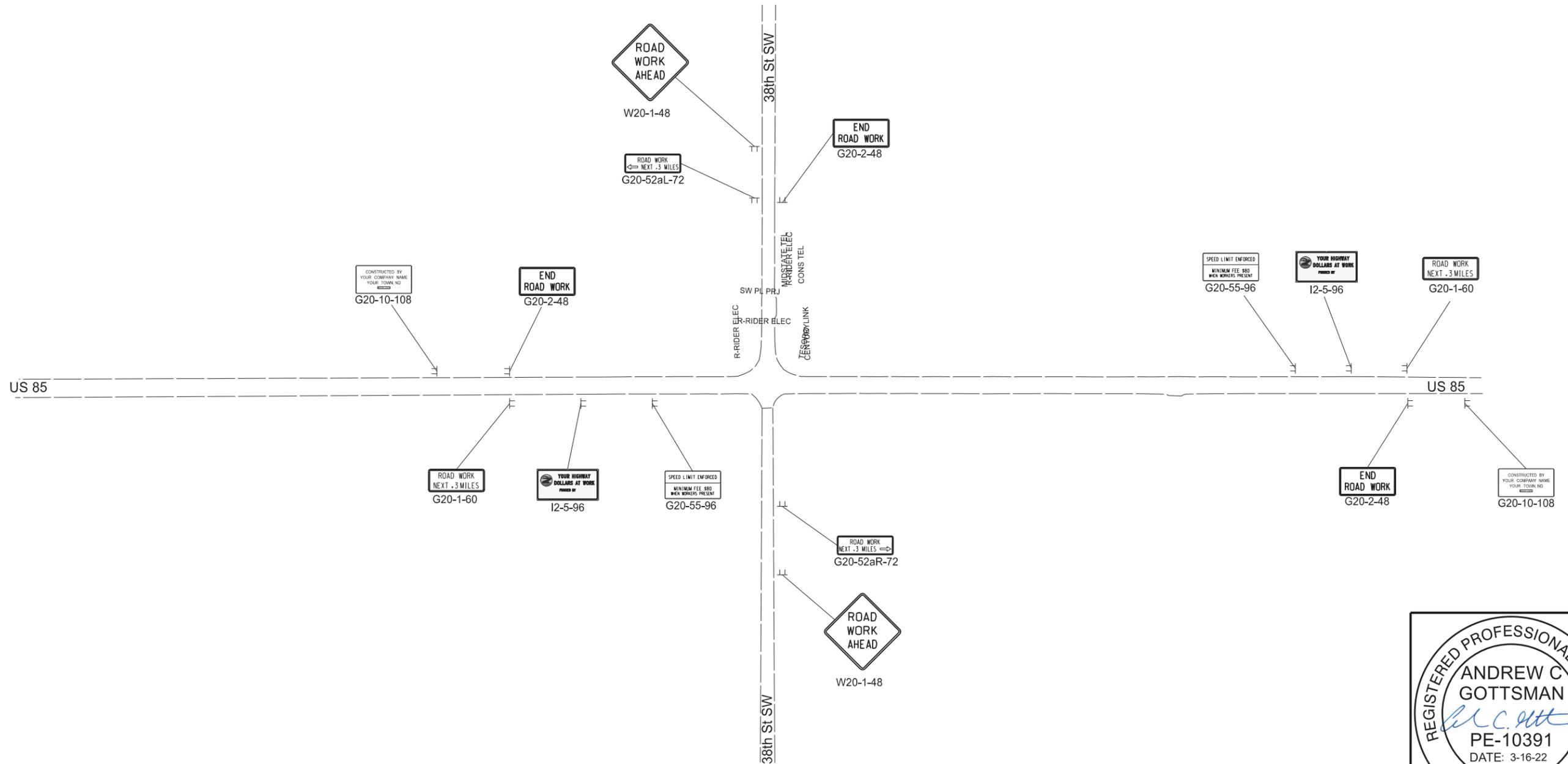
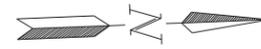


 6' Superpave FAA 45
15" Aggregate Base Course CL 5

Paving

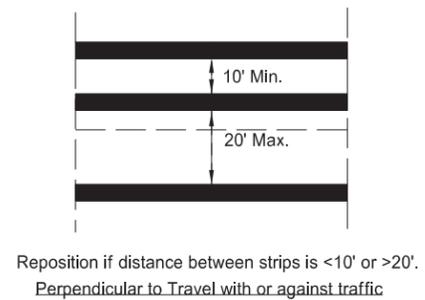
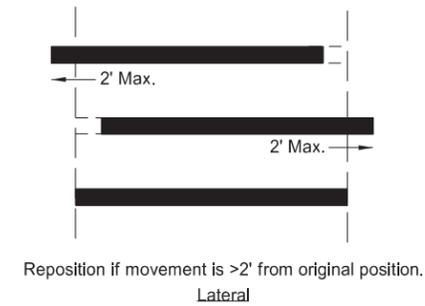
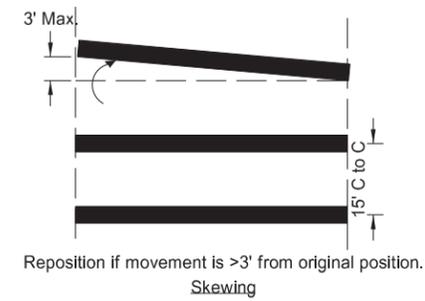
US 85 Turn Lane
US 85 and 38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	100	2



Work Zone Traffic Control

US 85 Turn Lane
US 85 and 38th St SW

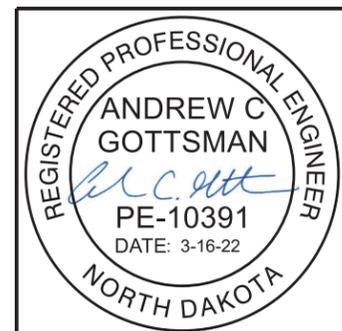


**PORTABLE RUMBLE STRIPS ARRAY
TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES**

Notes:

1. Number of devices were calculated using 40 mph. Speed determined in the field based on location and conditions.
2. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
3. Sign R2-1aP-24 is not required when pilot car operation is used.
4. Rumble strips are not used on a non paved surface or in a pre-construction speed zone of 25 mph or less.

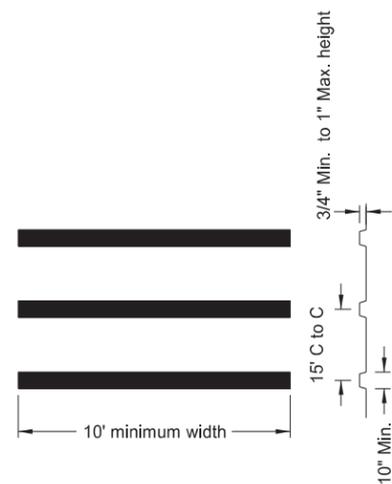
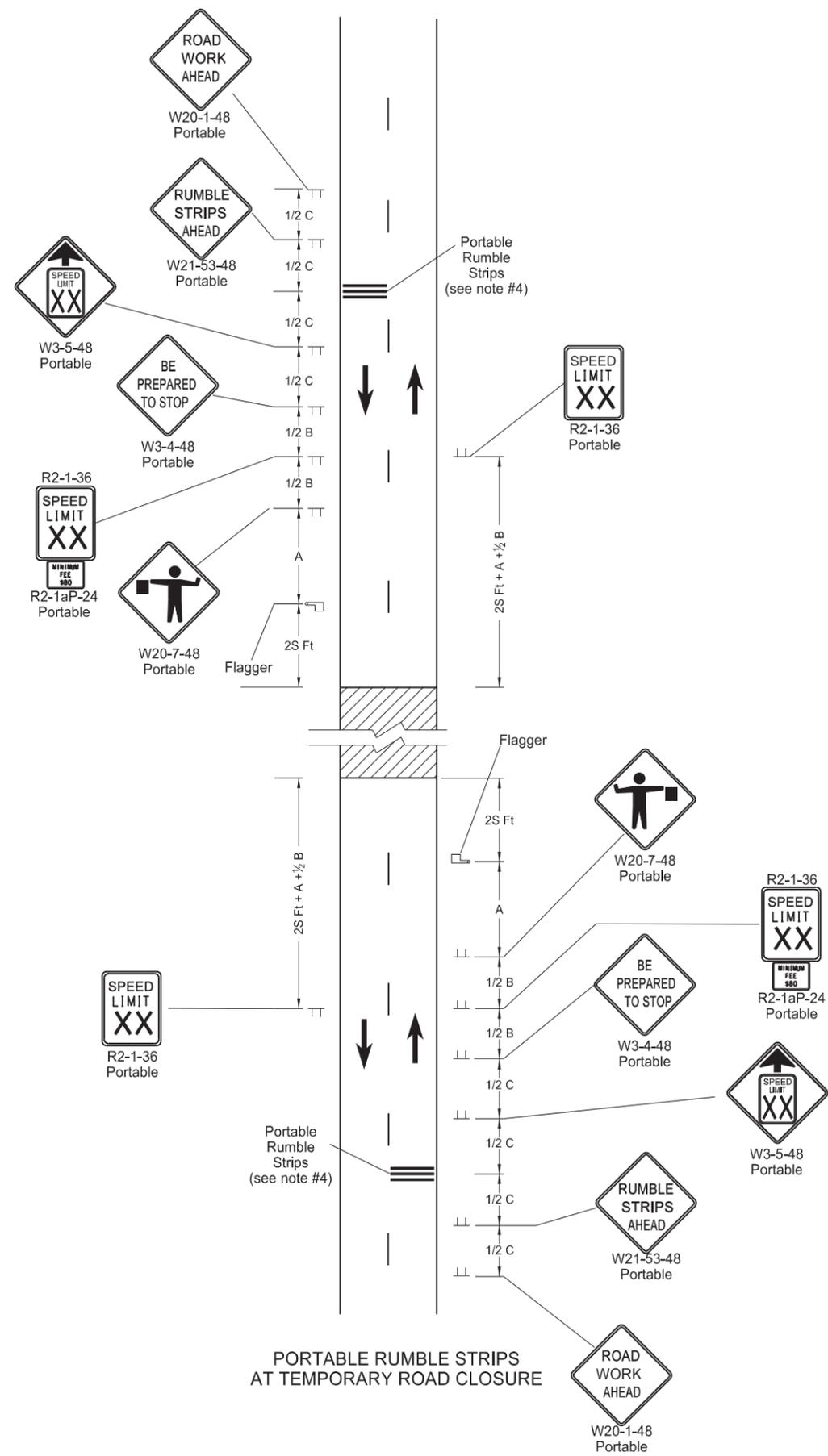
Road Type	ADVANCE WARNING SIGN SPACING		
	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720



KEY	
	Work area
	Flagger
	Sign
S = Numerical value of speed limit or 85th percentile.	

TWO-LANE PORTABLE RUMBLE STRIPS

US 85 Turn Lane
US 85 and 38th St SW



PORTABLE RUMBLE STRIPS ARRAY DETAIL

**PORTABLE RUMBLE STRIPS
AT TEMPORARY ROAD CLOSURE**

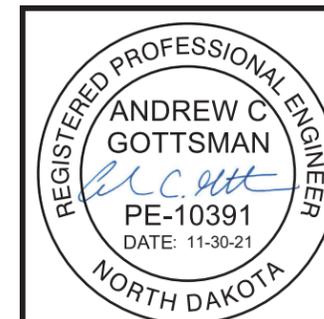
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	HEN-5-085(081)073	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Support Size	Max Post Len LF	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF			1st LF	2nd LF	3rd LF	4th LF								
3871+85 Lt	R1-1	448							2 x 2 12 ga										1	1		
3872+64 Lt	M1-4	42							2 x 2 12 ga										1	1		
3877+67 Lt	W2-1	57							2 x 2 12 ga										1	1		
Sub Total			0.0	0.0	Total 0.0						Total 0								3	3	0	
Grand Total			0.0	0.0	Total 0.0						Total 0								3	3	0	

Basis of Estimate
Sign Support Lengths

The sign support lengths have been calculated using the following vertical clearances:

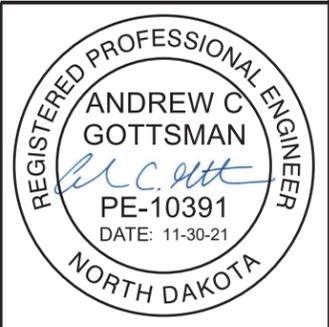
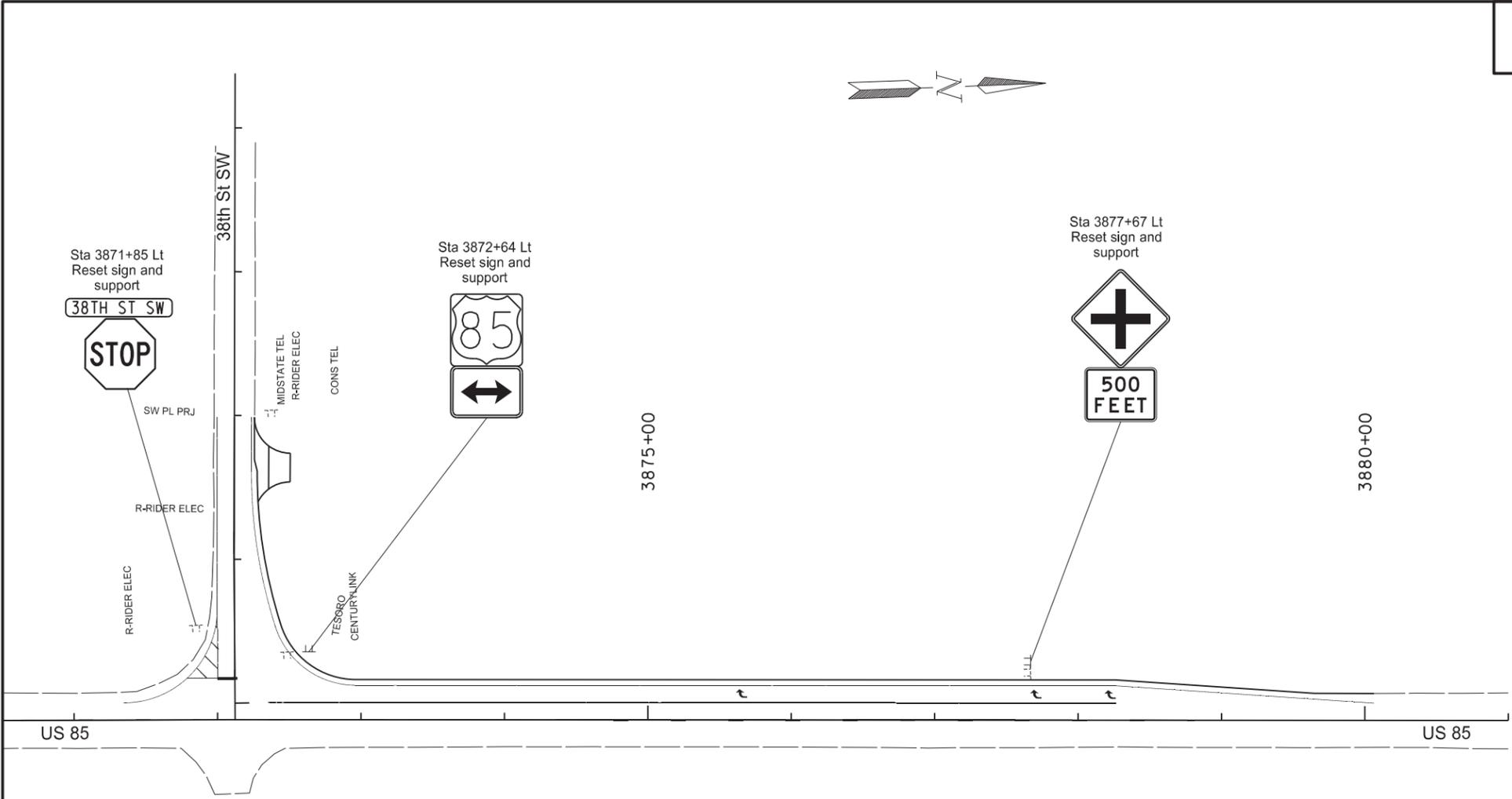
Rural Roadway - 60"



Sign Summary
Perforated Tube

Sign Summary
US 85 Turn Lane
US 85 & 38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	110	2

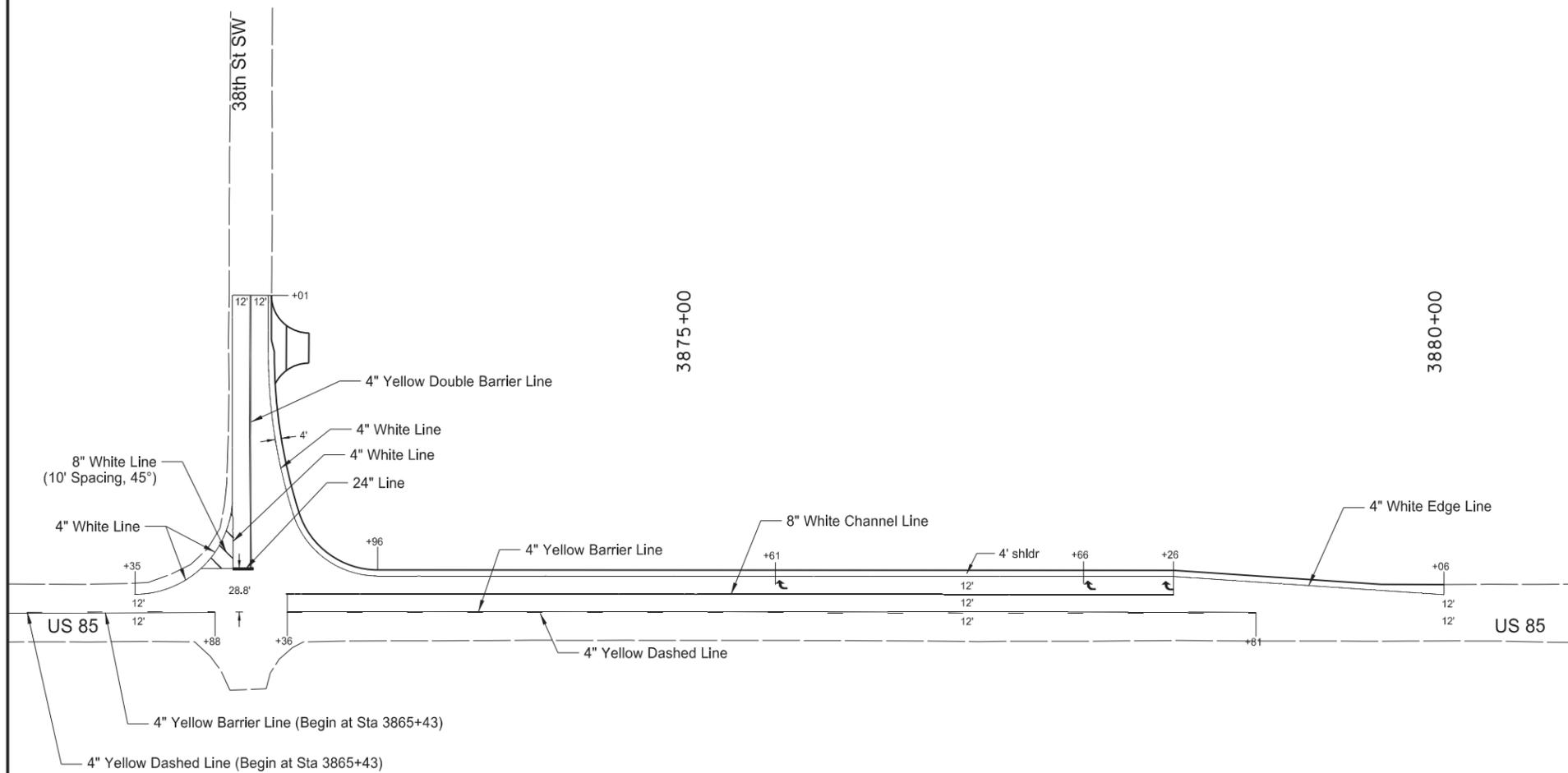


Signing

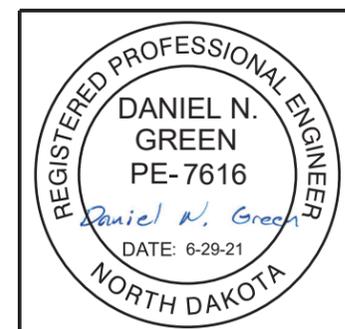
US 85 Turn Lane
US 85 and 38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	120	1

SPEC	CODE	BID ITEM	QTY	UNIT
762	0103	PVMT MK PAINTED - MESSAGE Right Turn Arrow (x3)	48	SF
762	1104	PVMT MK PAINTED 4IN LINE 4" White Line 4" Double Yellow Barrier Line 4" Yellow Barrier Line 4" Yellow Dashed Line	1247 172 1290 330	LF LF LF LF
762	1108	PVMT MK PAINTED 8IN LINE 8" White Line 8" White Line (10' Spacing, 45°)	590 31	LF LF
762	1124	PVMT MK PAINTED 24IN LINE 4" White Line (STOP Line)	12	LF
762	0430	SHORT TERM 4IN LINE-TYPE NR 4" Double Yellow Barrier Line 4" Yellow Barrier Line 4" Yellow Dashed Line	172 1290 330	LF LF LF
762	0434	SHORT TERM 8IN LINE-TYPE NR 8" White Line (3 paving lifts)	1770	LF



NOTE: See D-762-5 for additional details.

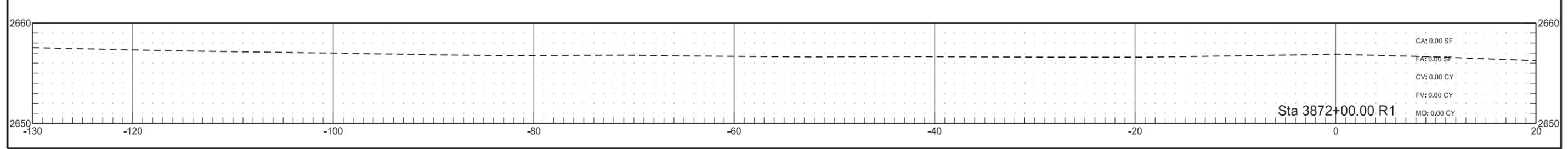
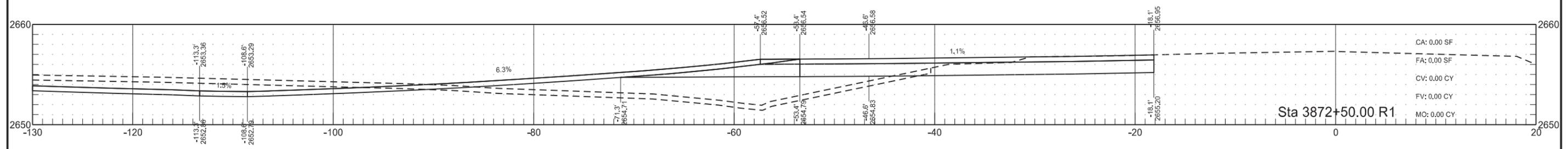
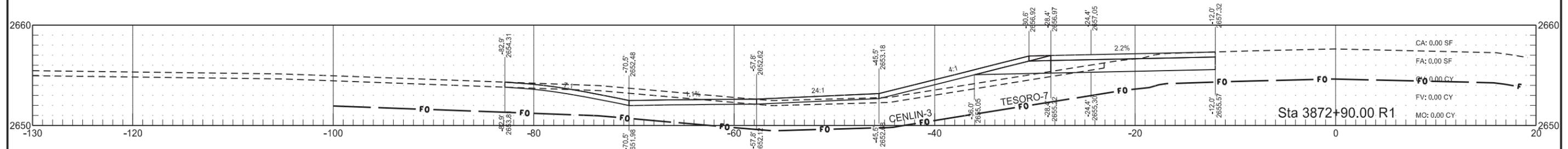
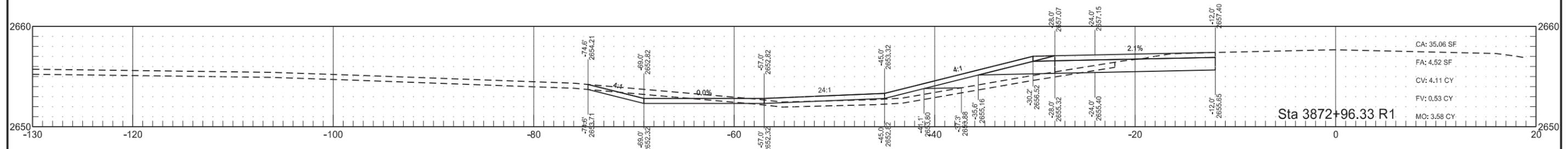
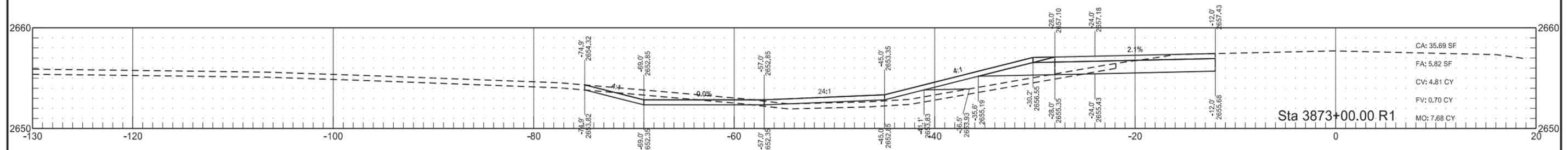


Pavement Markings

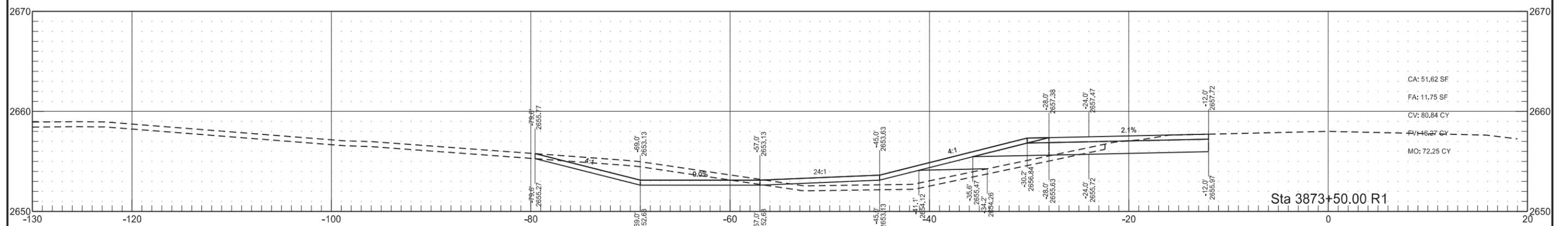
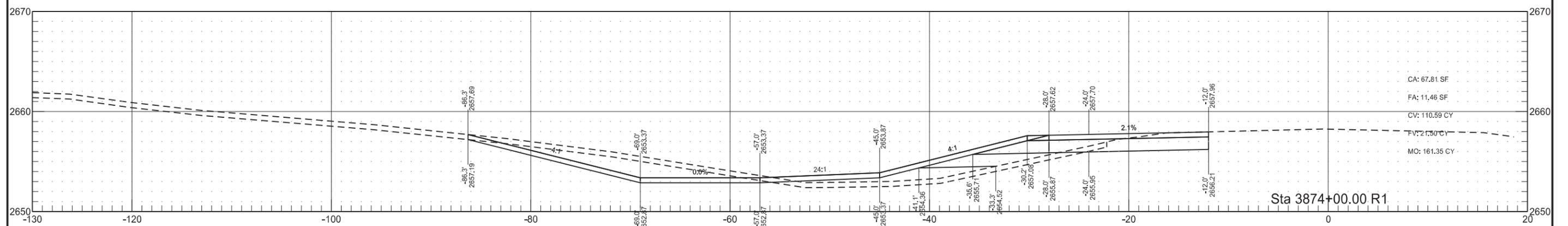
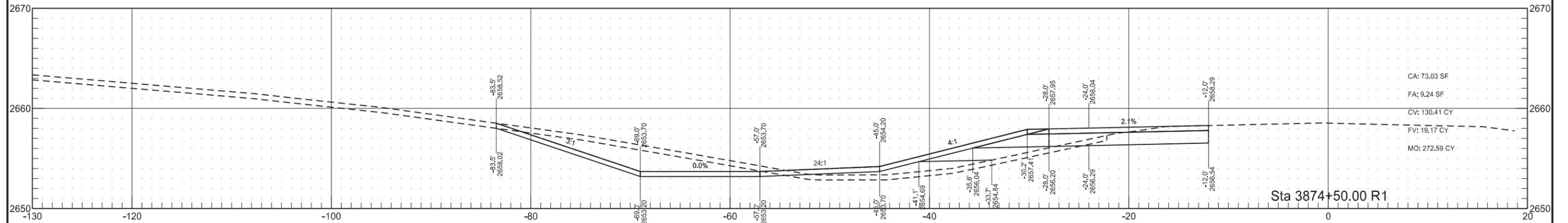
US 85 Turn Lane
US 85 and 38th St SW

US 85

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	1

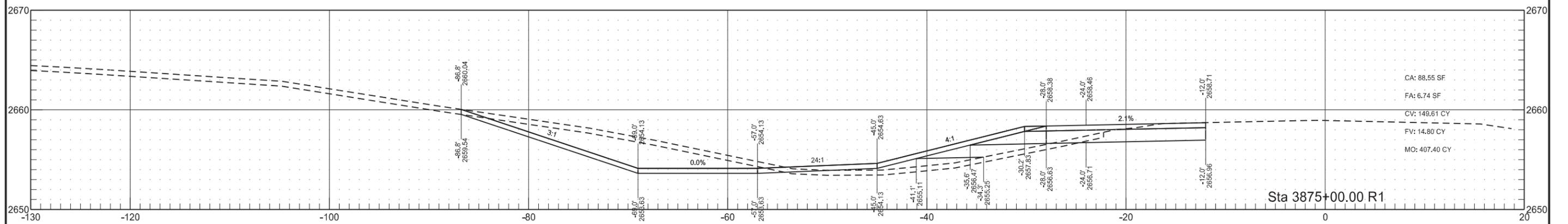
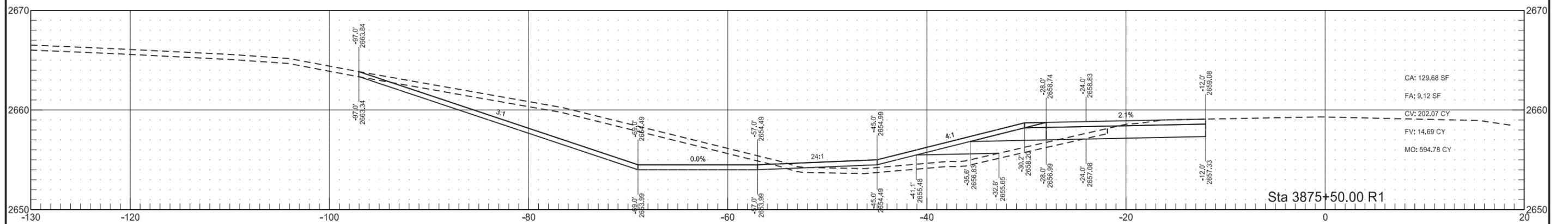
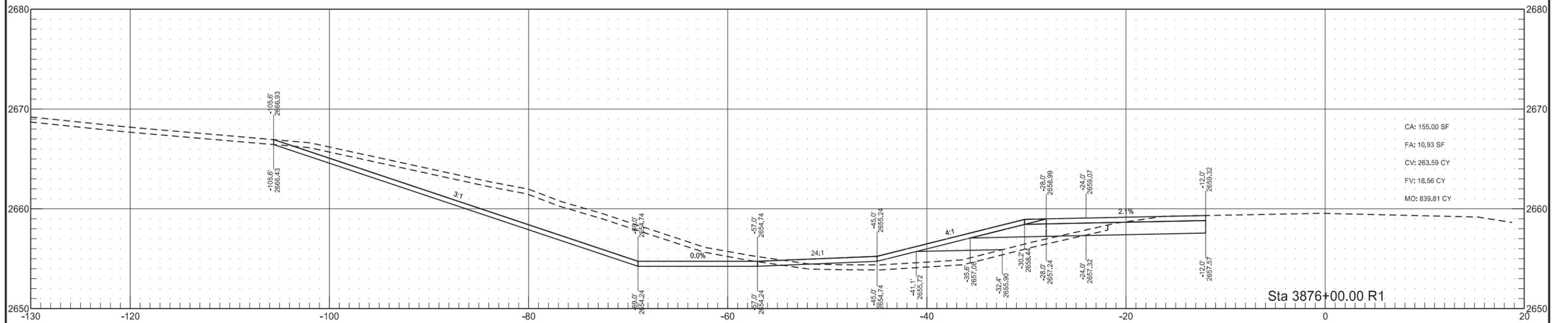


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	2



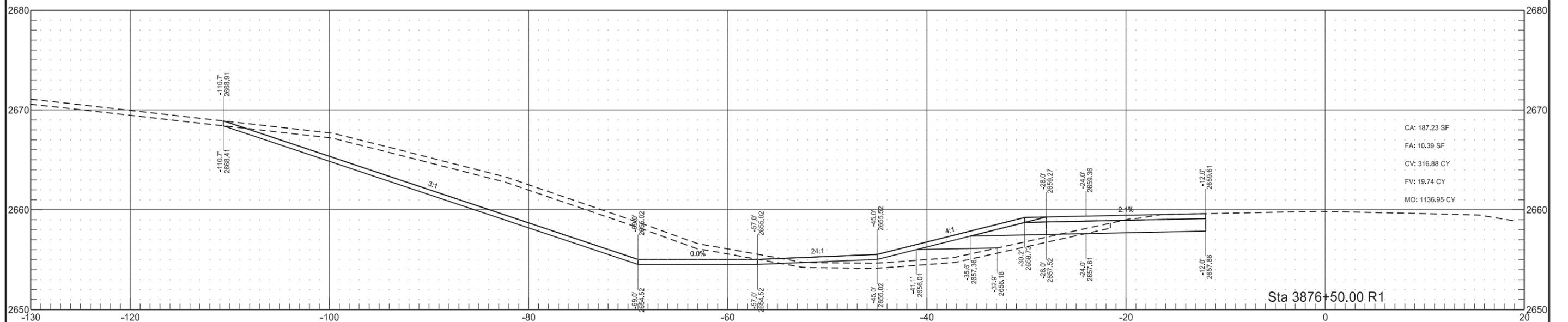
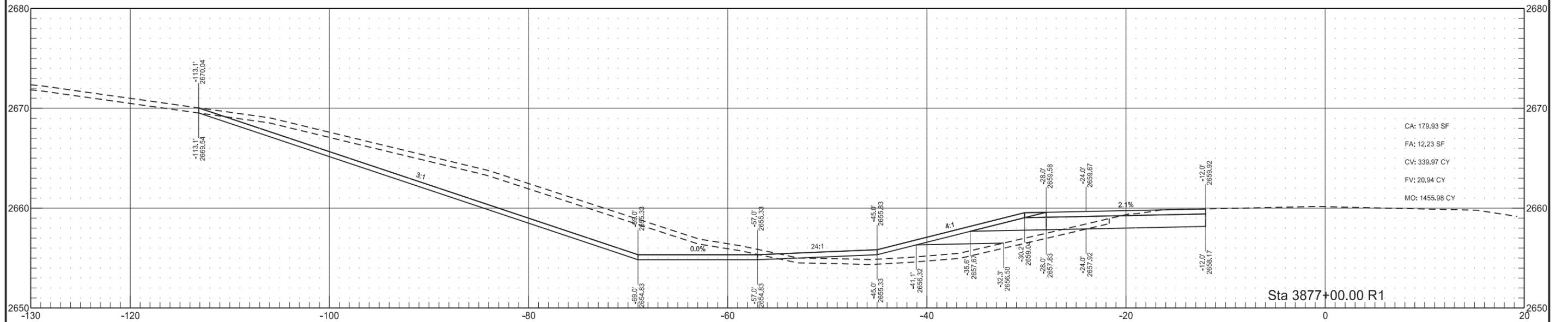
US 85

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	3



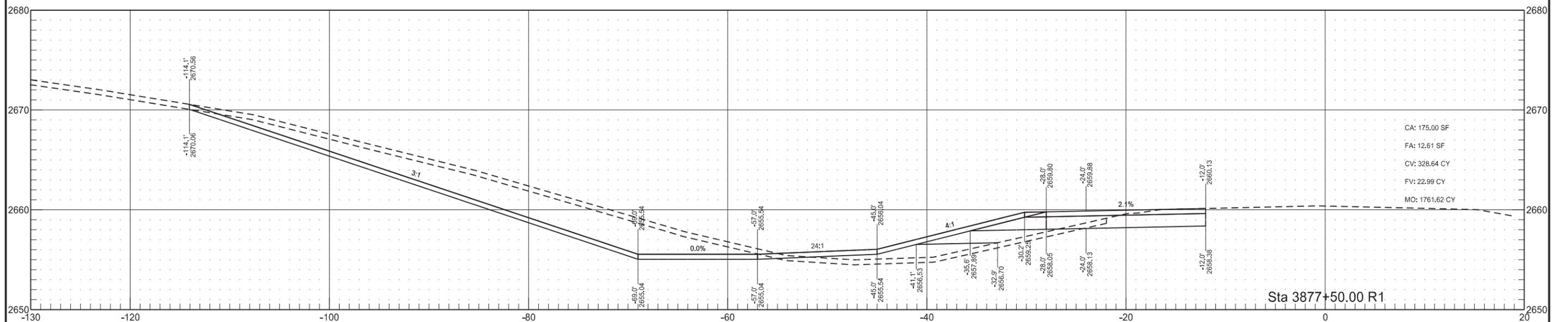
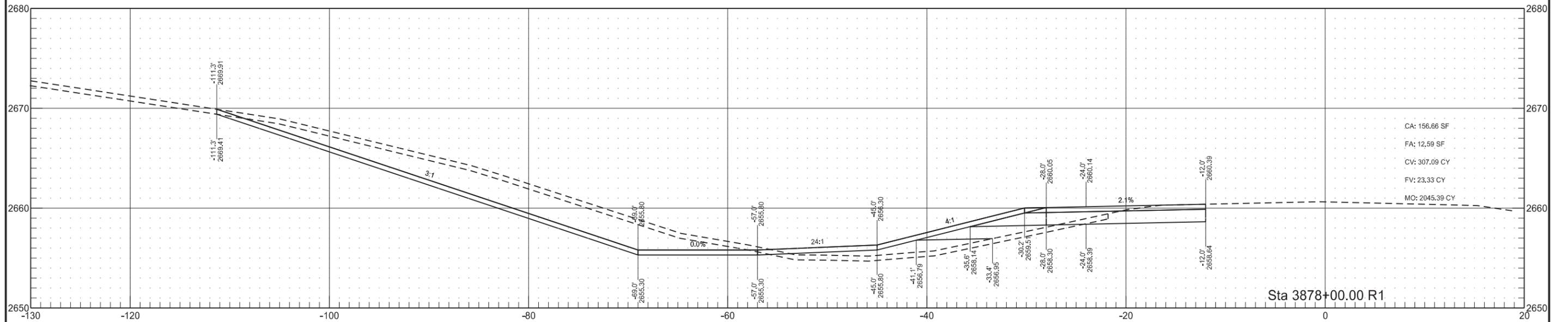
US 85

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	4



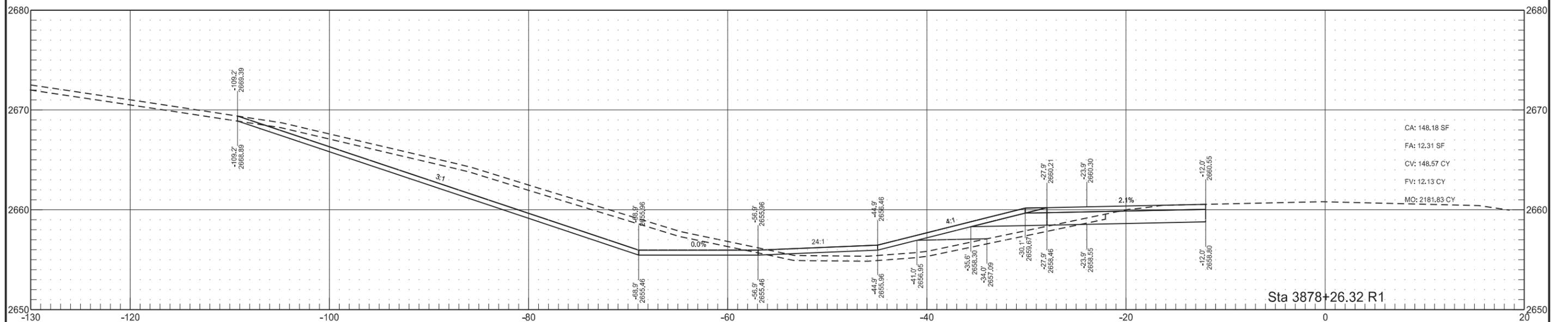
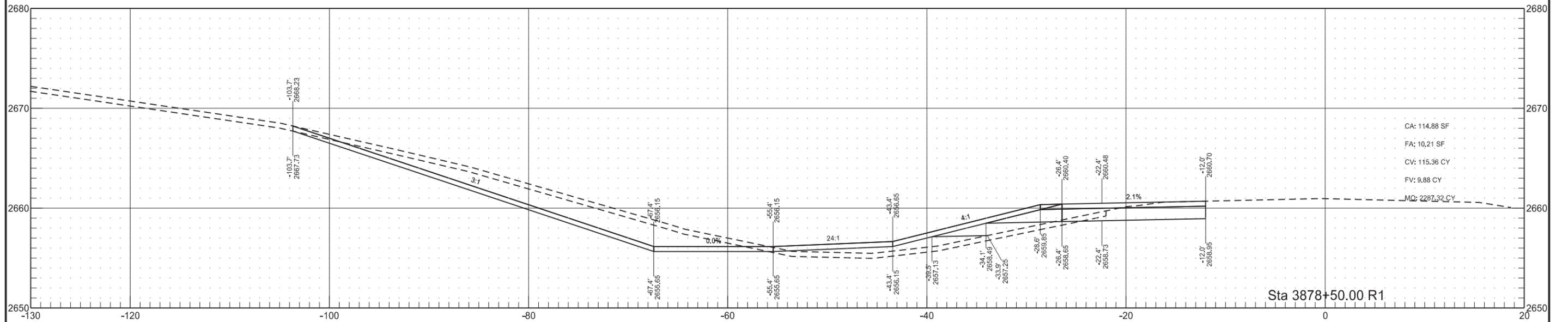
US 85

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	5



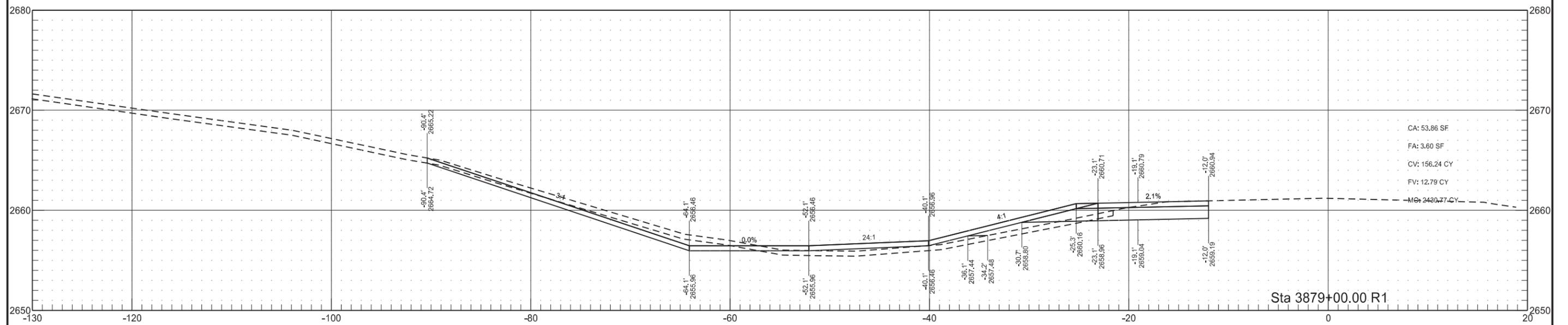
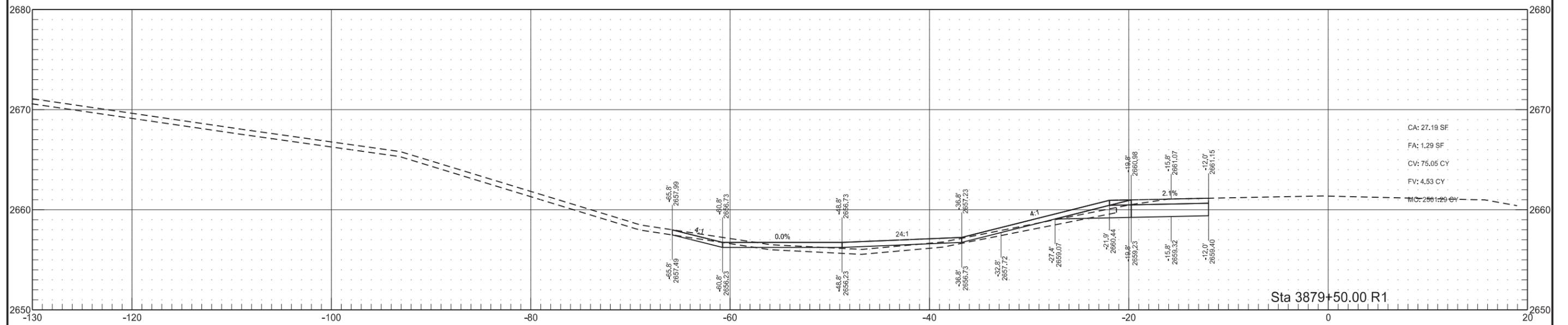
US 85

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	6



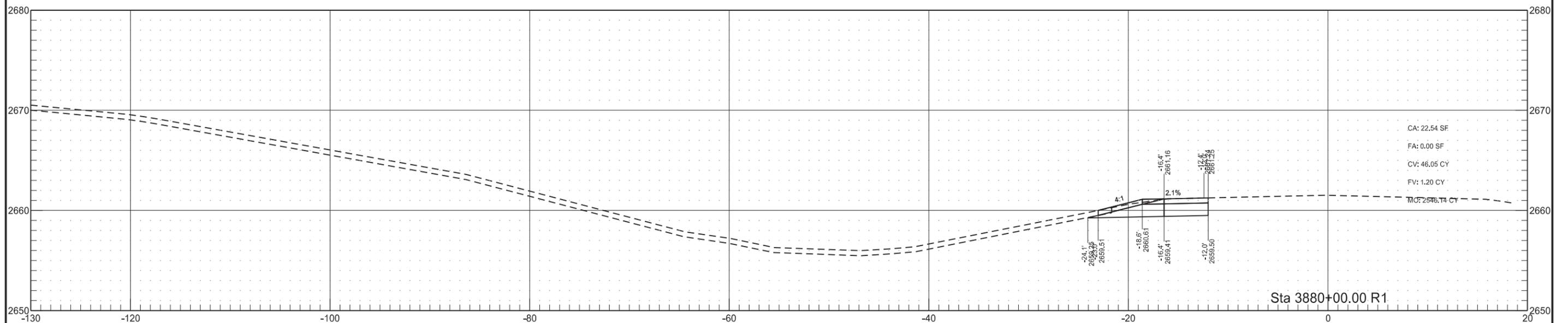
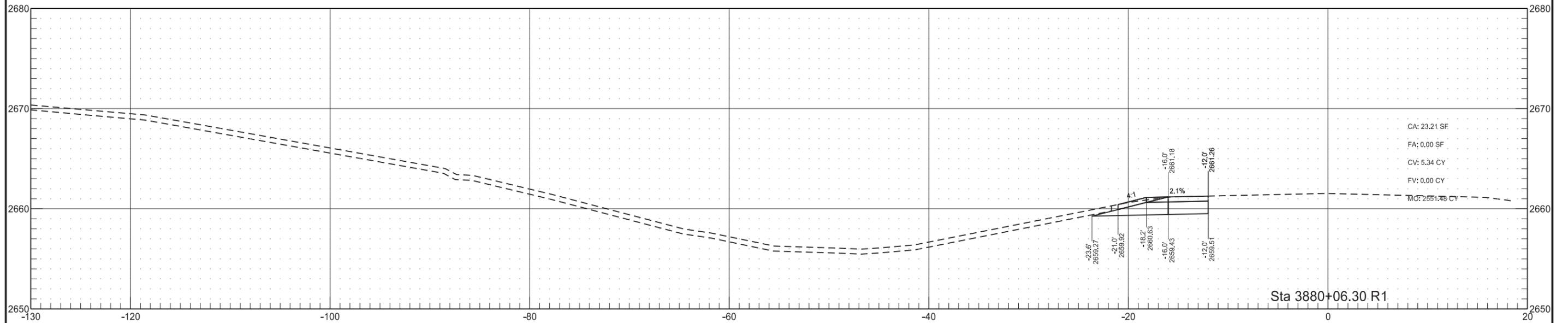
US 85

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	7



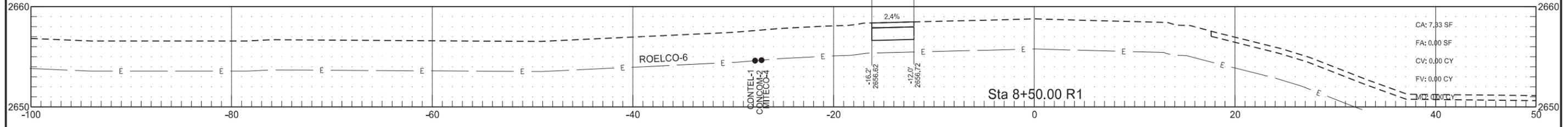
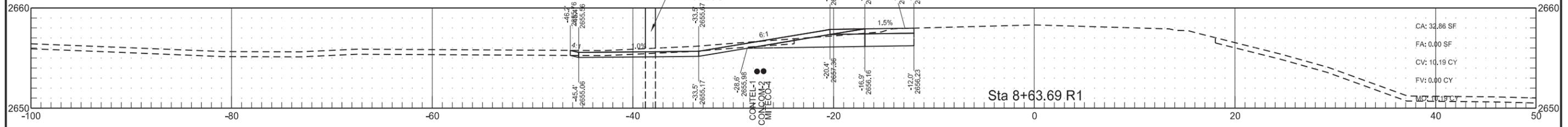
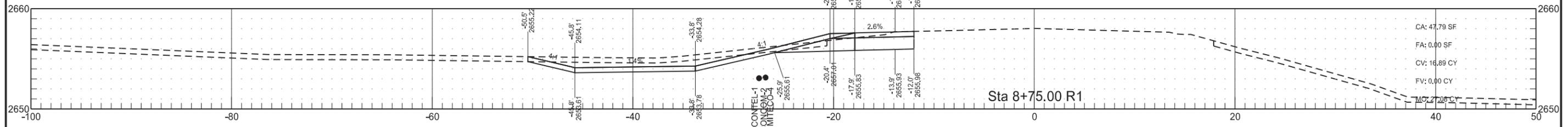
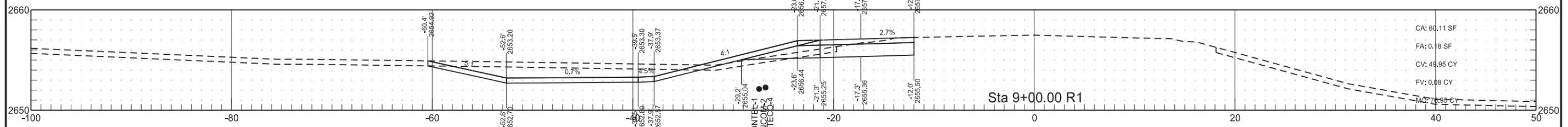
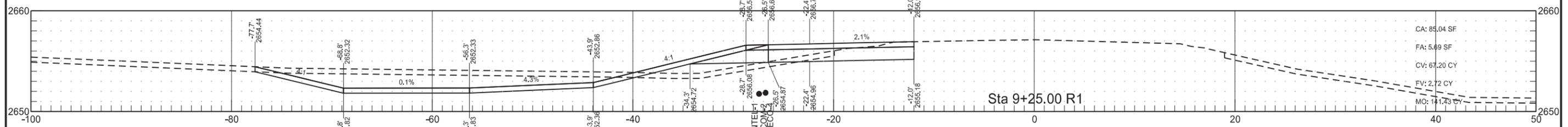
US 85

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-5-085(081)073	200	8



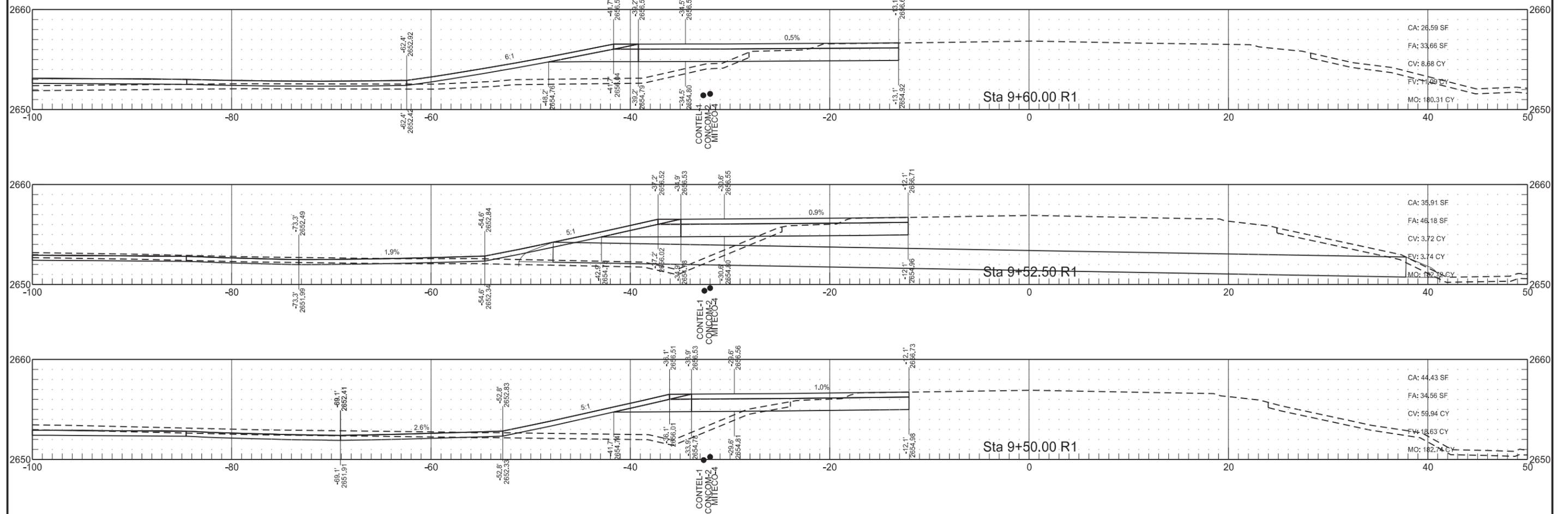
38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	9



38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	200	10



NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated 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 Incorporated
 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
 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
 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
 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



LINE STYLES

D-101-20

Existing Topography

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

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

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

- 24 Inch Pipe
- Reinforced Concrete Pipe
- Under Drain
- Edge Drain

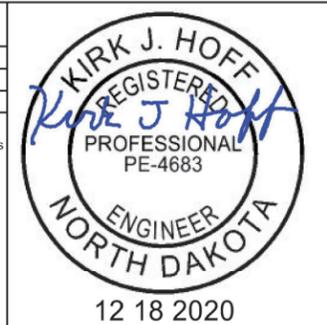
Traffic Utilities

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

Sign Structures

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

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



LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typical

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

Geotechnical

- D ----- D ----- Geotextile Fabric Type D
- **Geo** ----- **Geo** ----- Geogrid
- R ----- R ----- Geotextile Fabric Type R
- R ----- R ----- Geotextile Fabric Type R1
- RR ----- RR ----- Geotextile Fabric Type RR
- S ----- S ----- Geotextile Fabric Type S

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

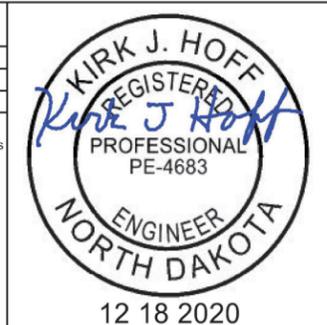
Erosion Control

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

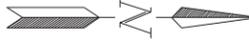
Environmental

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

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



SYMBOLS

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

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



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

12 18 2020

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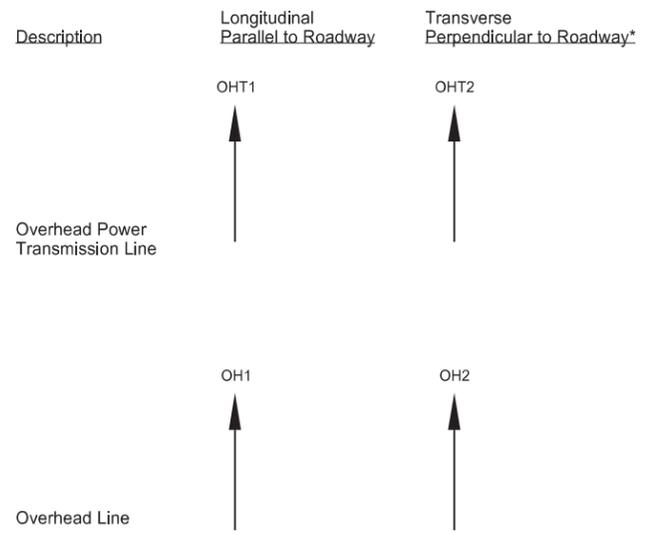
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions



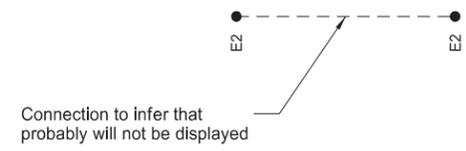
12 18 2020

Cross Section Legend

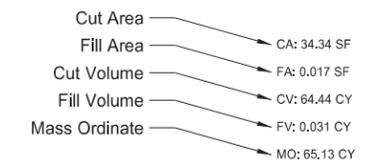
Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Cable Line	● CBL1	● CBL2
Conduit Line	● CDU1	● CDU2
Electric Line	● E1	● E2
Fiber Optic Line	● F1	● F2
Gas Main Line	● GM1	● GM2
Gas Service Line	● GS1	● GS2
Gas Transmission Line	● GT1	● GT2
Fuel Pipeline	● PL1	● PL2
Sanitary 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



* 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.



On the right side of most cross sections there is an earthwork table. The following example (values not related to project) details the earthwork table layout.



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.

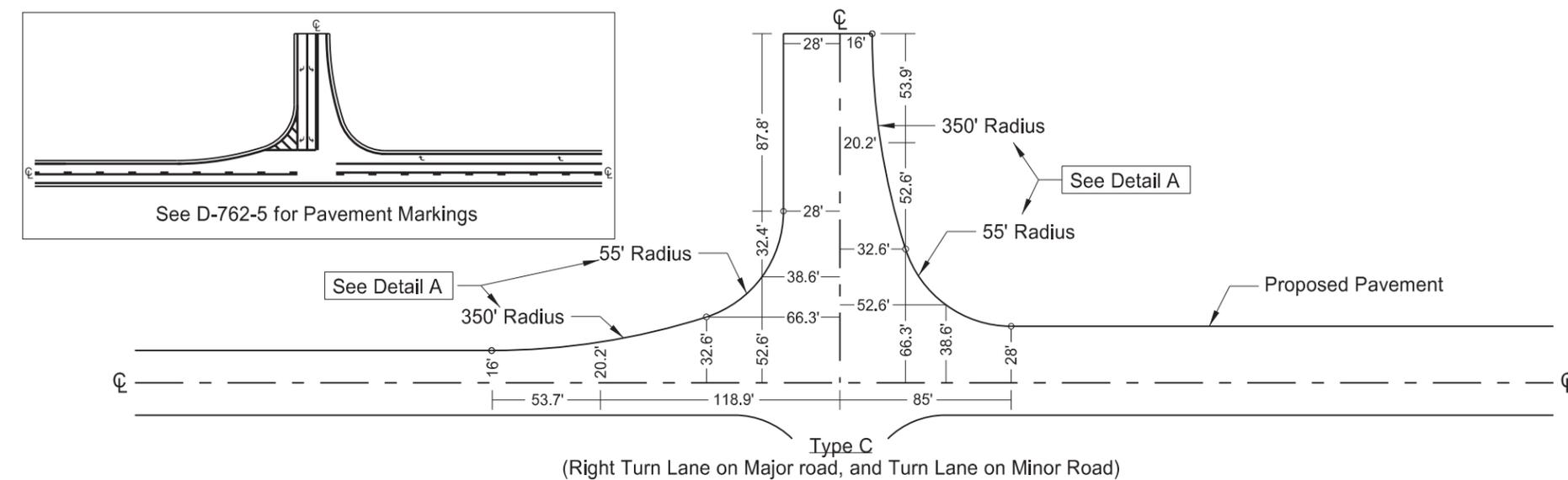
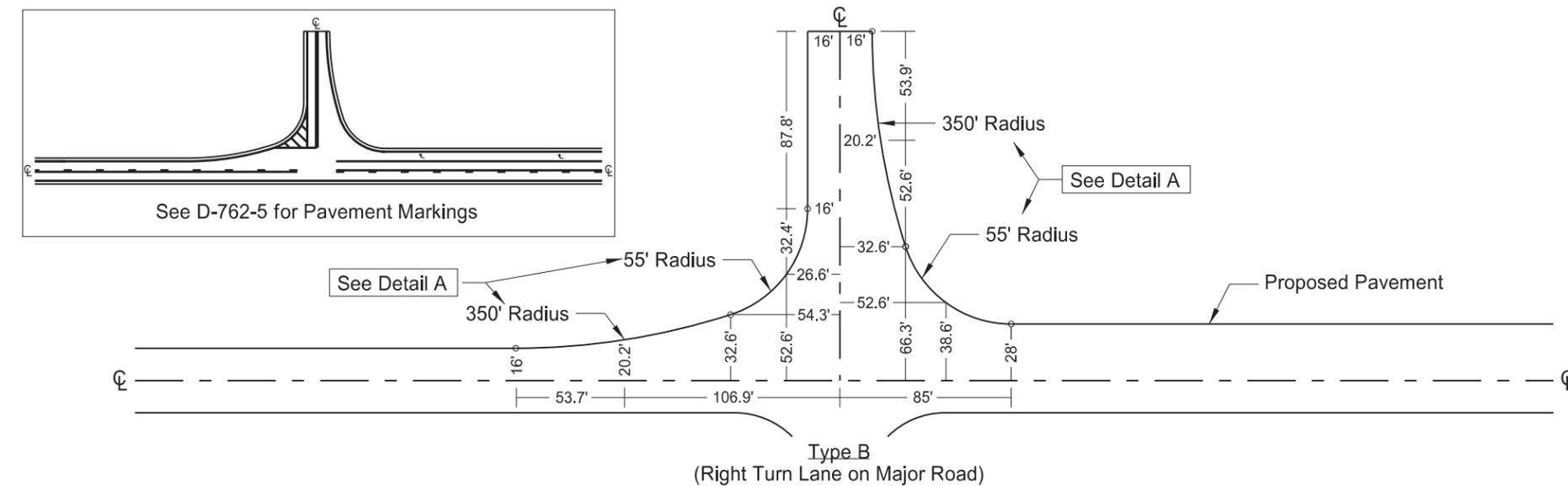
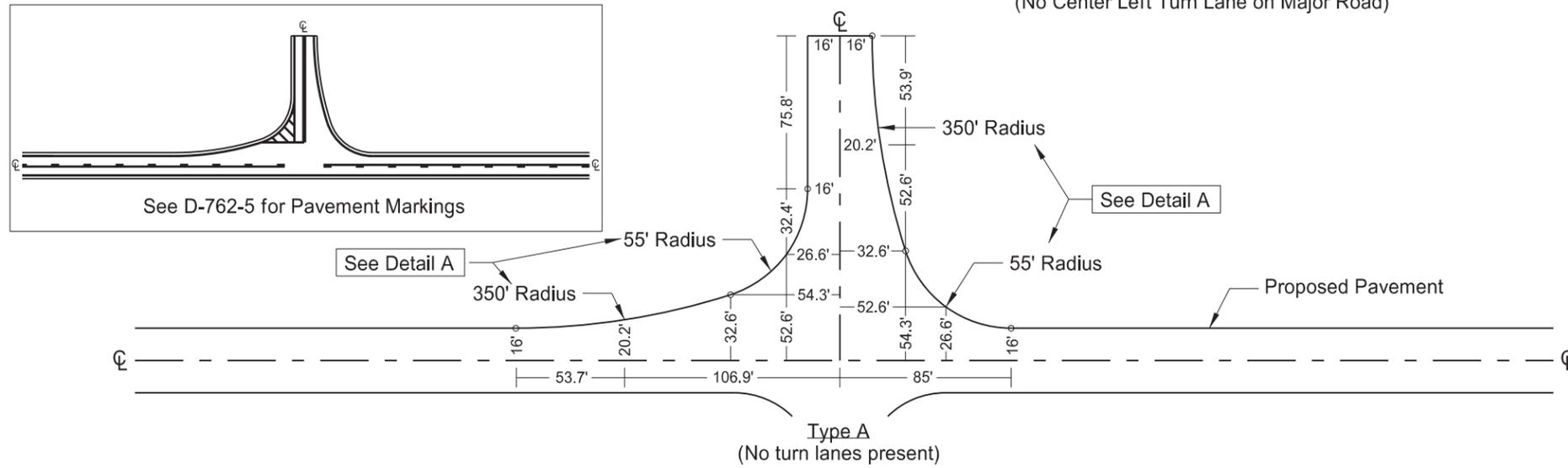


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE

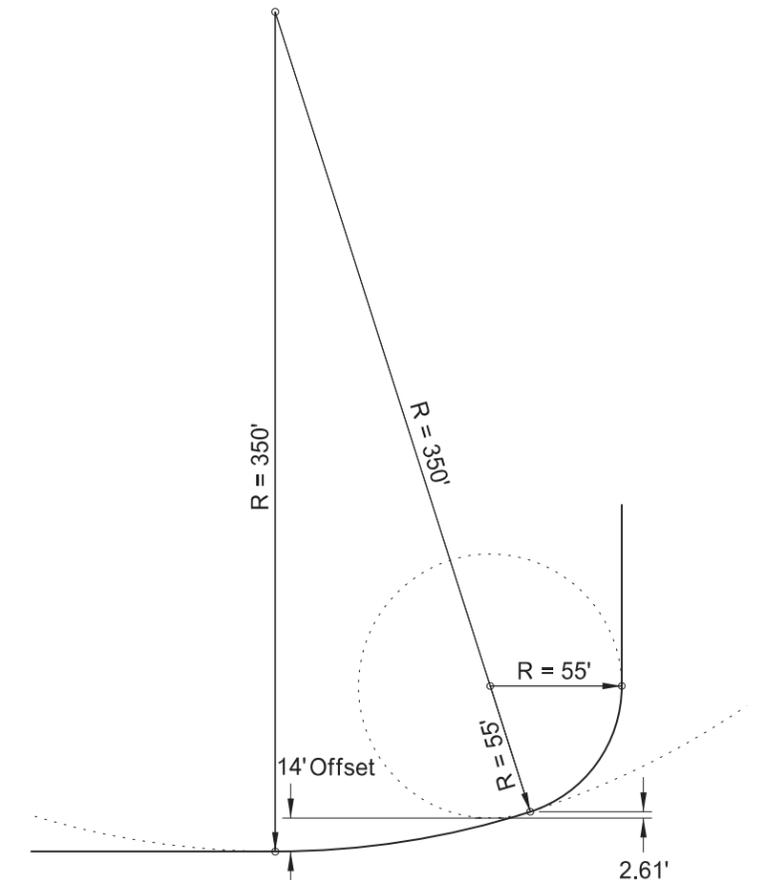
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STANDARD 90 DEGREE FLARED INTERSECTION

(No Center Left Turn Lane on Major Road)



Detail A
Compound Curve (350' Radius, 55' Radius, 14' Offset)

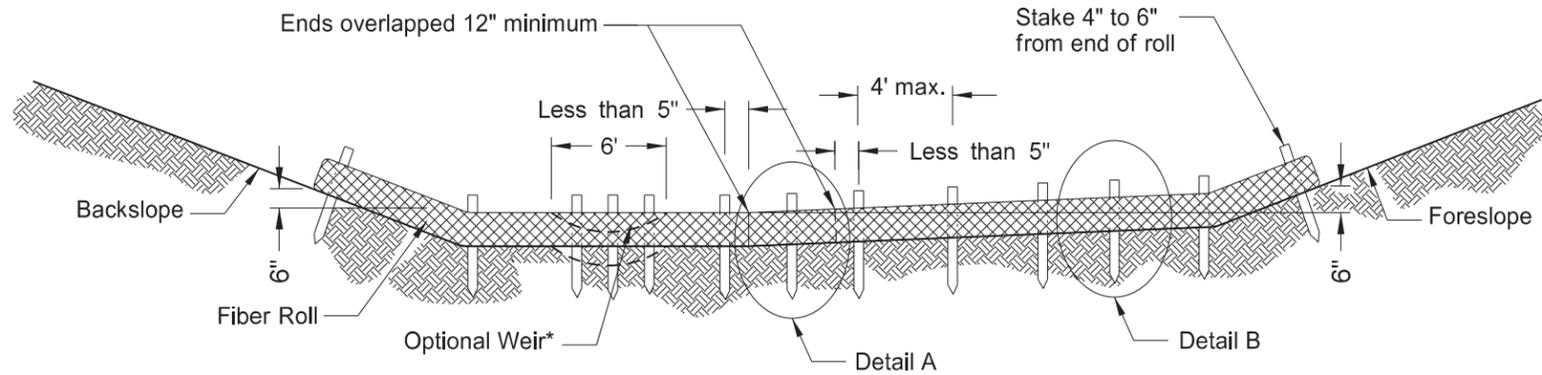


- Radius Tangent Point
- xx.x' — Pavement widths
- Proposed Pavement

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17	Corrected Pvm1 Mkg Std reference
8-30-18	Corrected pvm1 mkg layouts.
10-25-19	Added Detail A ref to appr left slide

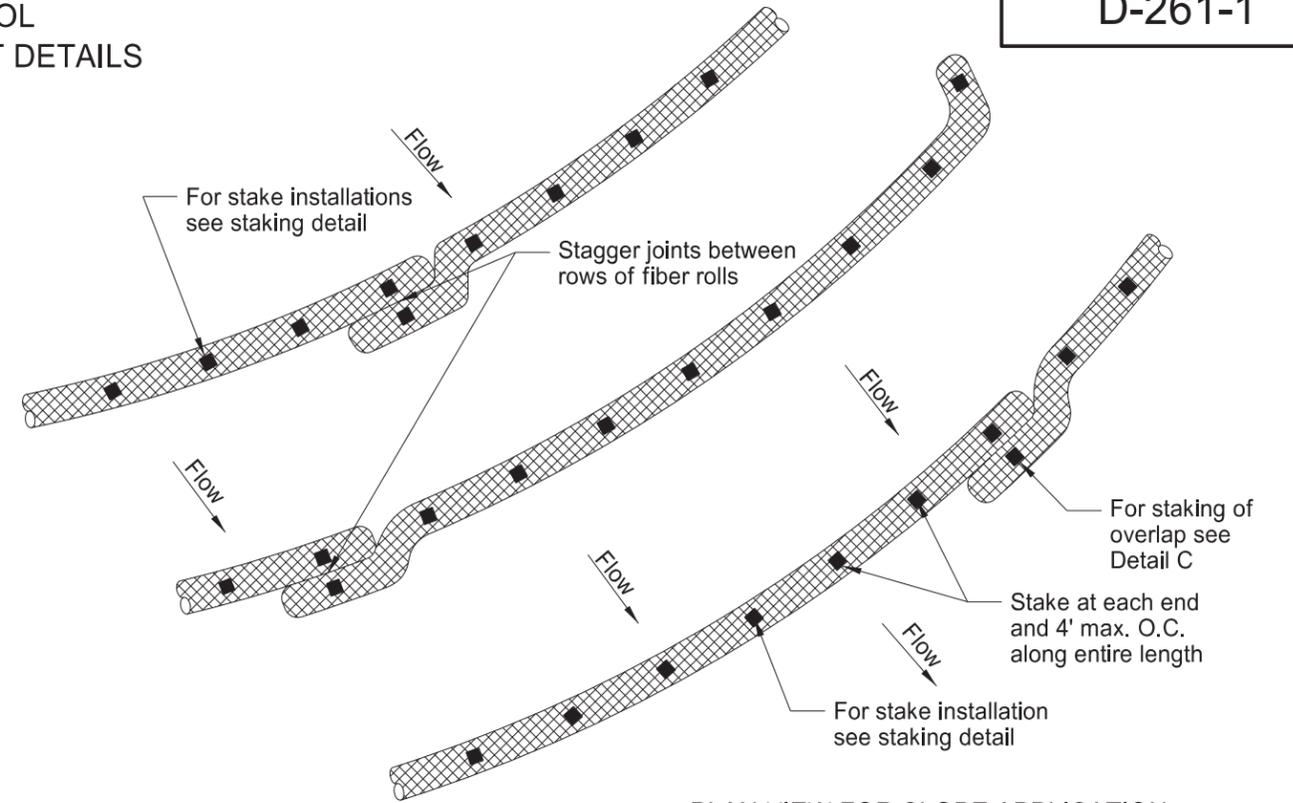
This document was originally issued and sealed by
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Registration Number
PE- 4683,
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

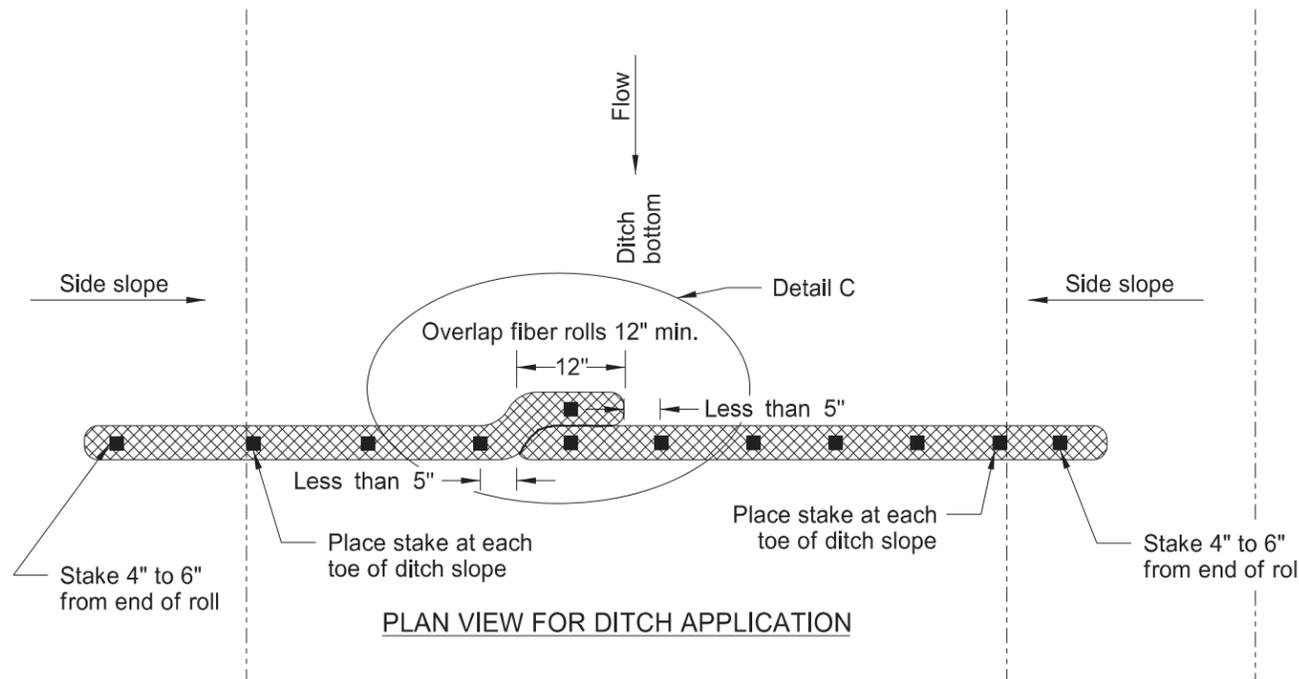


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

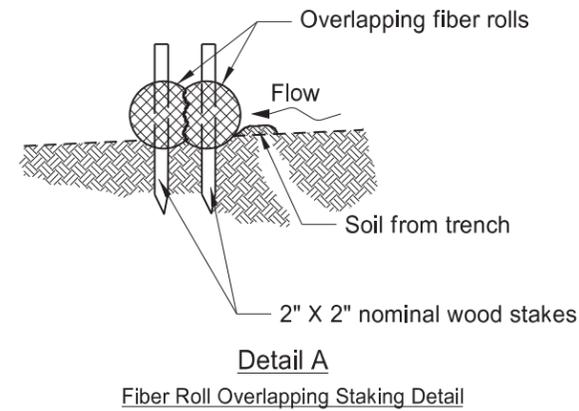
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



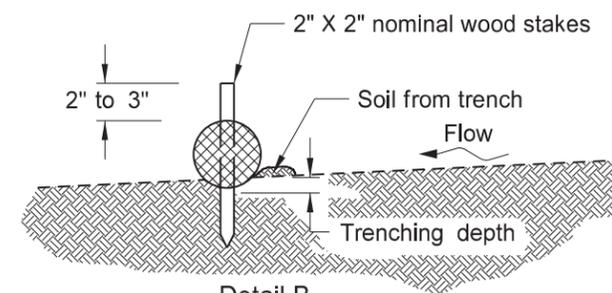
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

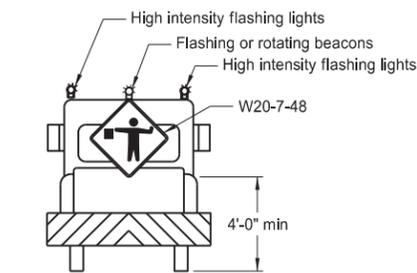
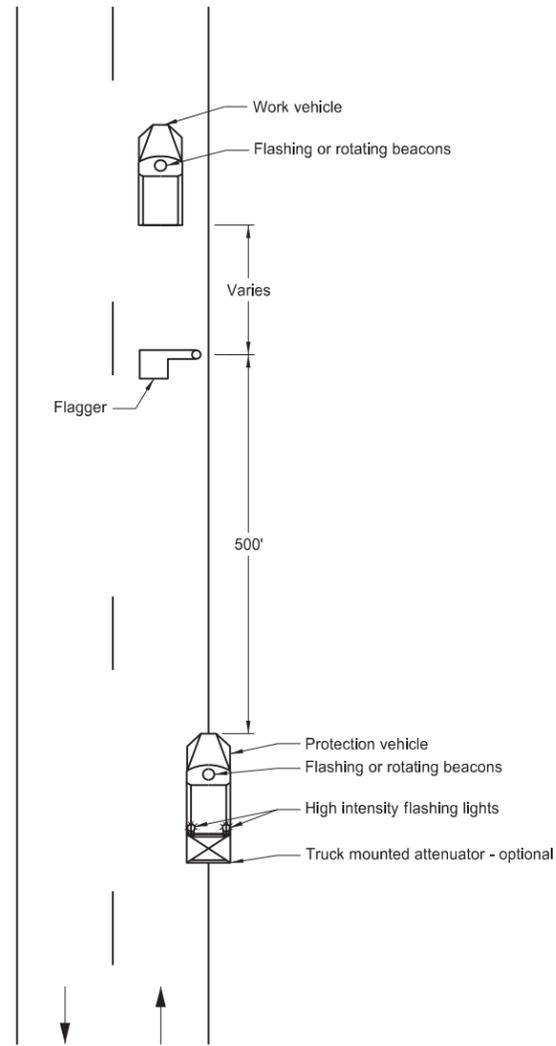
FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

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

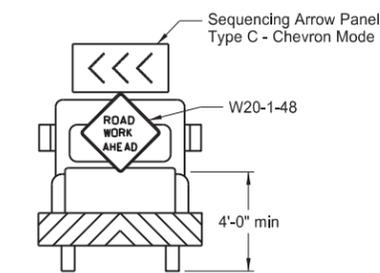
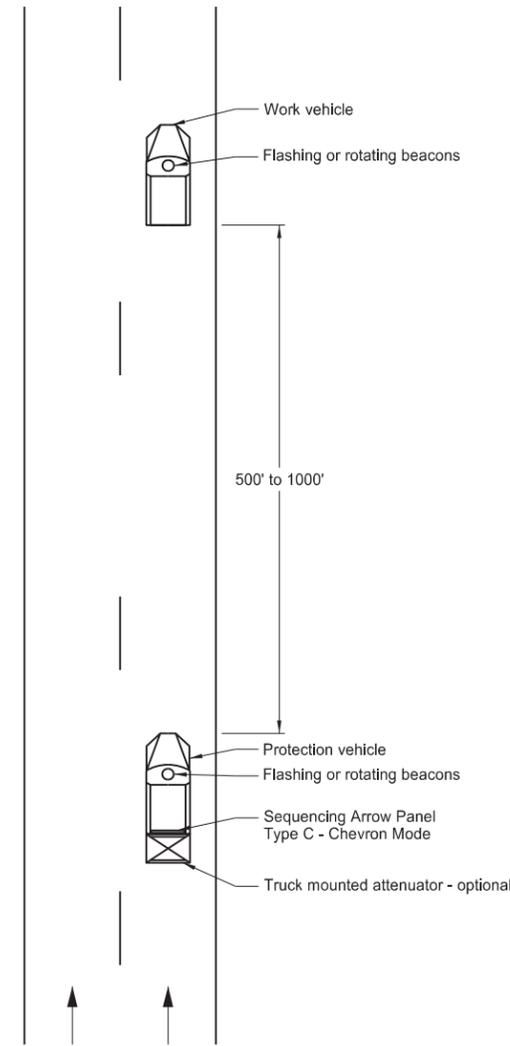
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Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways



Typical Protection Vehicle

Notes:

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

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

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 Registration Number
 PE- 4683,
 on 10/03/19 and the original document is stored at the
 North Dakota Department
 of Transportation

CONSTRUCTION SIGN DETAIL

D-704-5

SIGN NUMBER	G20-10-108				
WIDTH x HEIGHT	9'-0" x 4'-0"				
BORDER WIDTH	1.25" (inset 0.75")				
CORNER RADIUS	3"				
MOUNTING	Ground				
BACKGROUND	TYPE: IV Reflective				
	COLOR: Fluorescent Orange				
LEGEND/BORDER	TYPE: Non-Refl				
	COLOR: Black				
SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S):

AREA: 36.0 Sq.Ft.

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

LETTER POSITION (X)															LENGTH	SIZE	SERIES		
C	O	N	S	T	R	U	C	T	E	D	B	Y			69.7	6	D 2000		
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7						
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E	91.5	6	D 2000
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96			
Y	O	U	R		T	O	W	N				N	D				64.6	6	D 2000
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2							

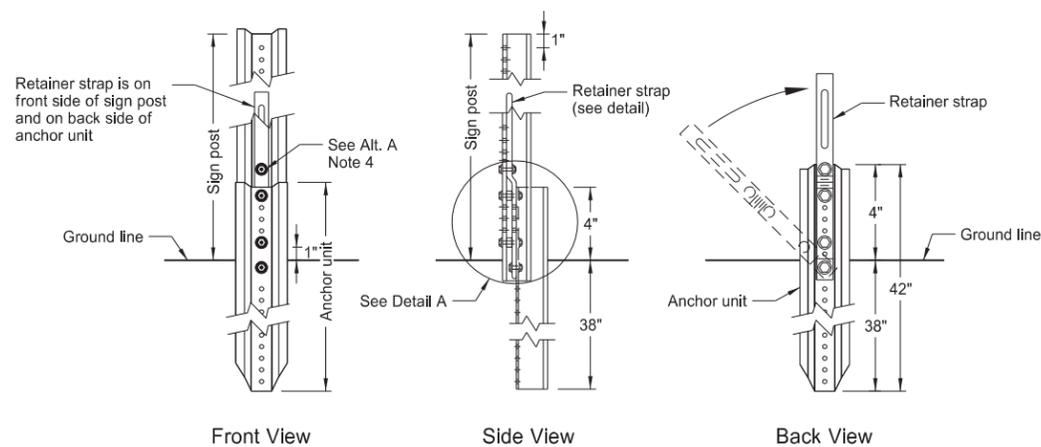
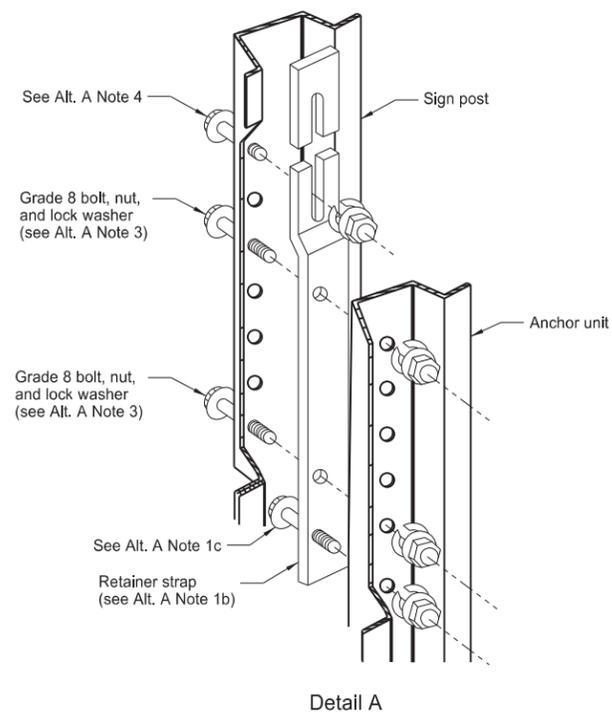
Notes:

1. Post mount sign a distance of 1/2A following the End Road Work (G20-2-48) sign (maximum 2 signs per project.)
2. Use sign on rural projects with a 30 day or longer duration (not required on seal coats or other short duration projects.)
3. Do not place sign in urban areas or within city limits.

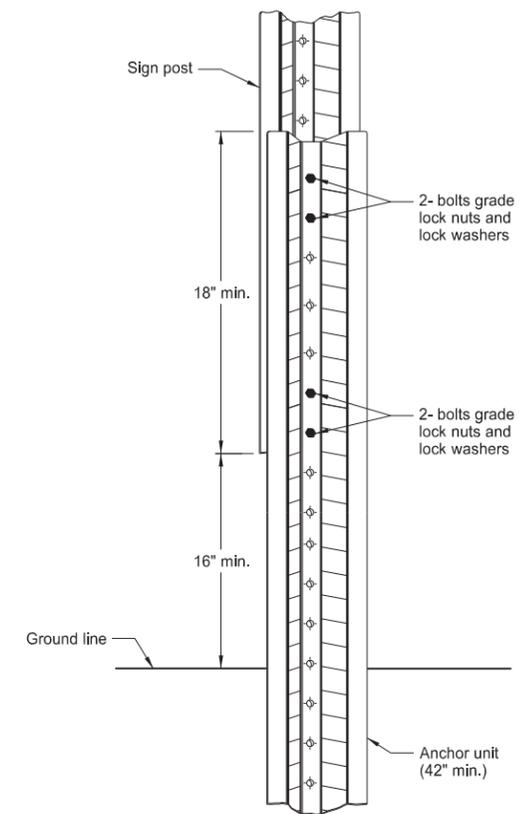
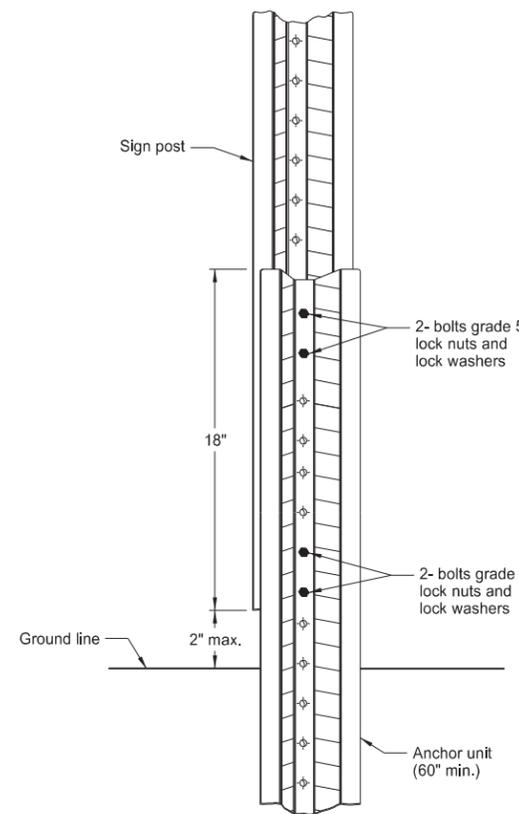
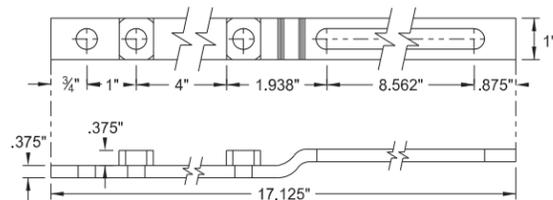
Advance Warning Sign Spacing (A)			
Road Type	Distance between signs min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban 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		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
8-22-12		
REVISIONS		
DATE	CHANGE	
7-18-14 9-27-17 8-30-18 10-03-19	Revise sheeting to type IV. Updated to active voice. Updated sign number in note 1. New Design Engineer PE Stamp.	

U-Channel Post



Breakaway U-Channel Detail
Alternate A
Install a maximum of 2 posts within 7'.



Alternate A Steps of Installation:

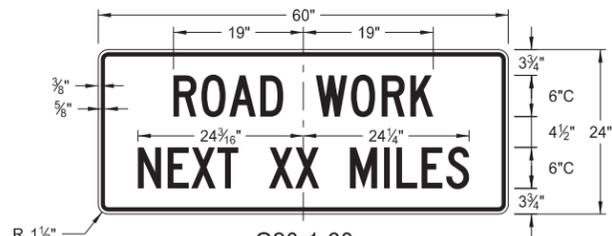
1. a) Drive anchor unit to within 12" of ground level.
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
2. a) Drive anchor 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 10-03-19	Updated to active voice New Design Engr PE Stamp

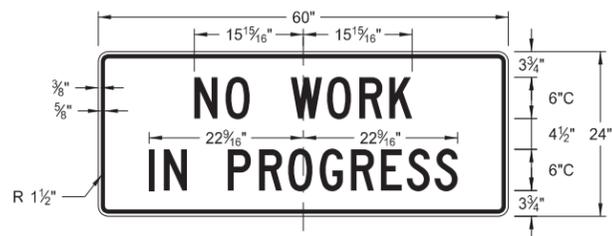
This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

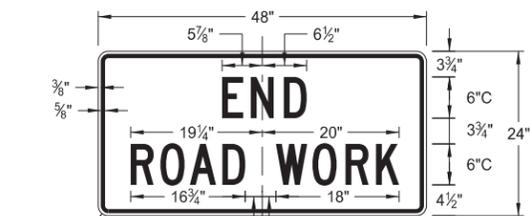
D-704-9



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



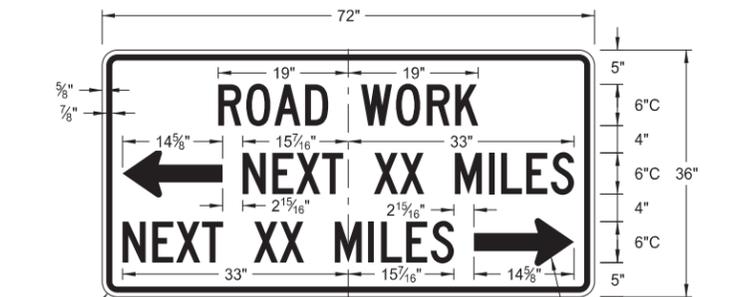
G20-1b-60
Legend: black (non-refl)
Background: orange



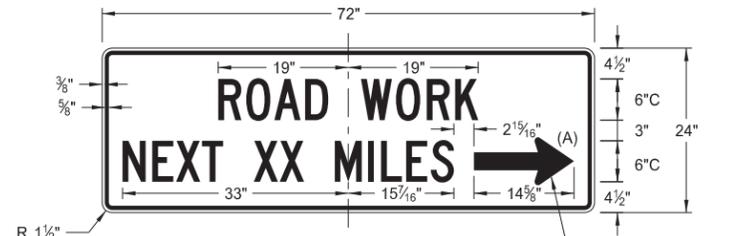
G20-2-48
Legend: black (non-refl)
Background: orange



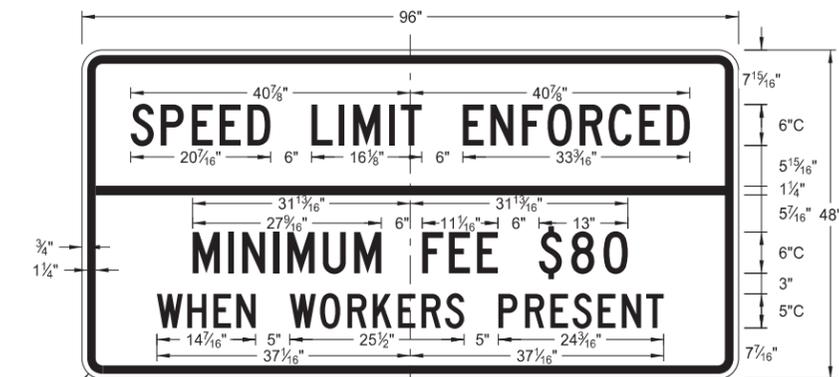
G20-4b-36
Legend: black (non-refl)
Background: orange



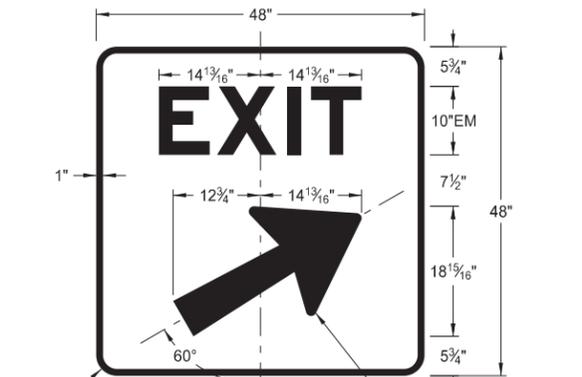
G20-50a-72
Legend: black (non-refl)
Background: orange



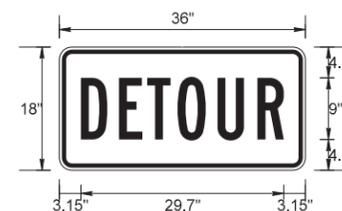
G20-52a-72
Legend: black (non-refl)
Background: orange



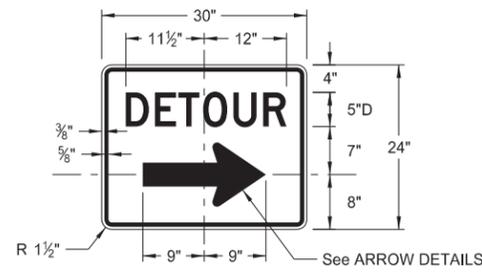
G20-55-96
Legend: black (non-refl)
Background: orange



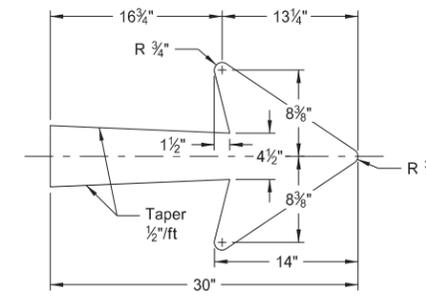
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



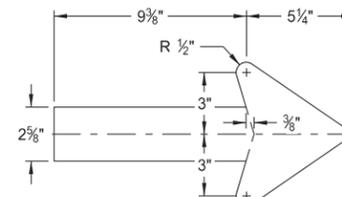
M4-8-36
Legend: black (non-refl)
Background: orange



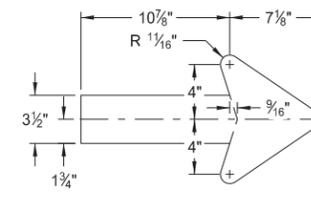
M4-9(L or R)-30 & M4-9-30
Legend: black (non-refl)
Background: orange



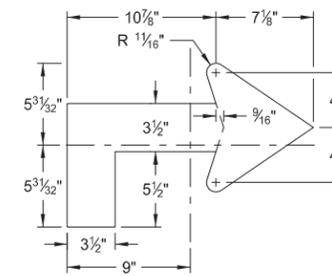
E5-1-48



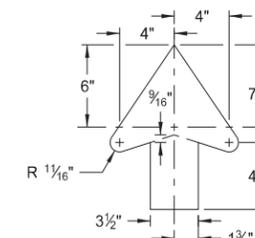
G20-50a-72
G20-52a-72



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



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



M4-9-30
Straight

ARROW DETAILS

NOTES:

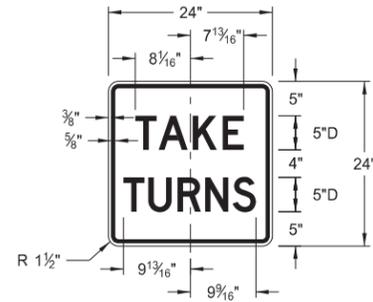
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

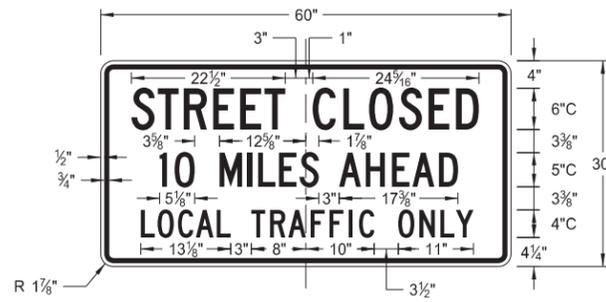
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

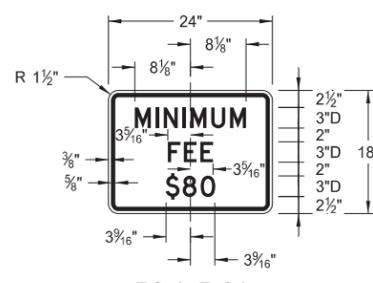
D-704-10



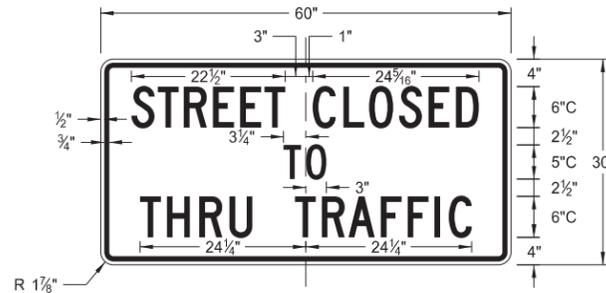
R1-50P-24
Legend: black (non-refl)
Background: white



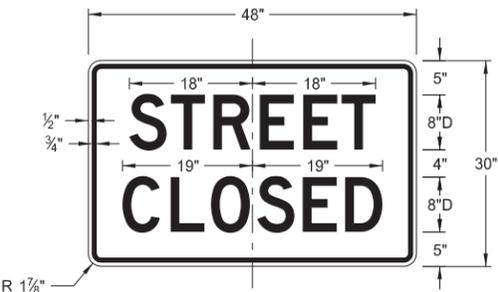
R11-3c-60
Legend: black (non-refl)
Background: white



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



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

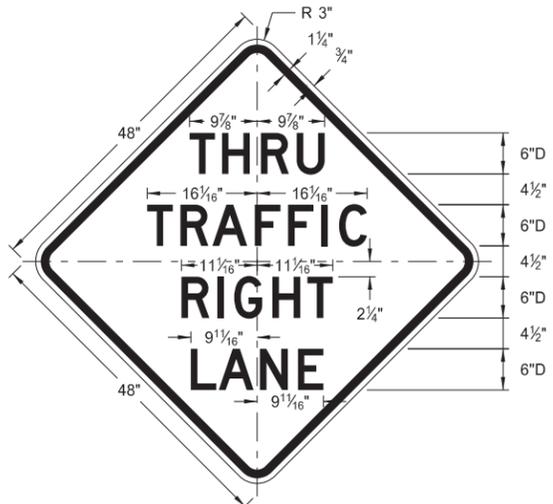


R11-2a-48
Legend: black (non-refl)
Background: white

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

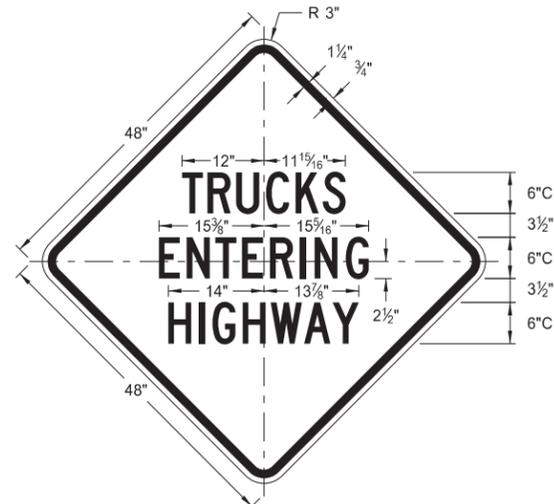
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS



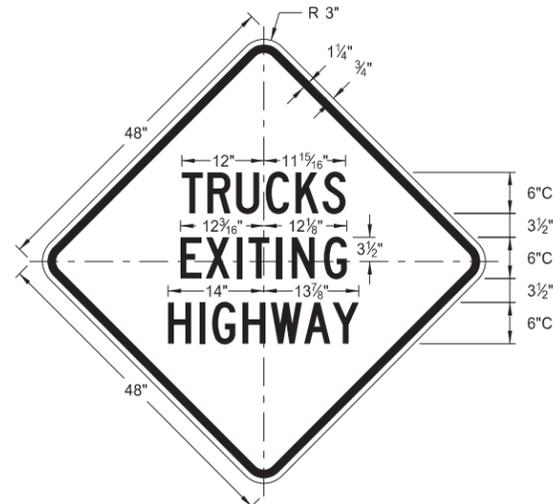
W5-8-48

Legend: black (non-refl)
Background: orange



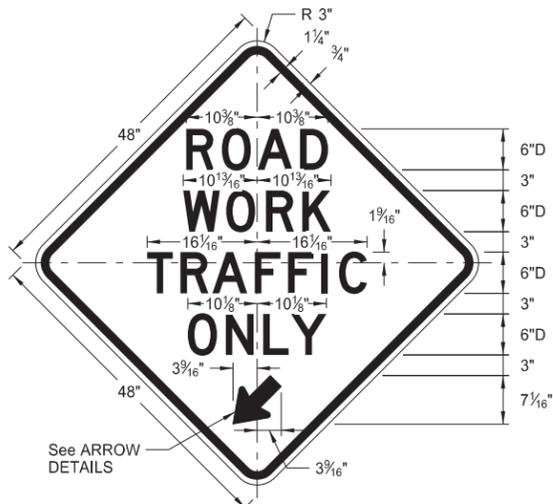
W8-53-48

Legend: black (non-refl)
Background: orange



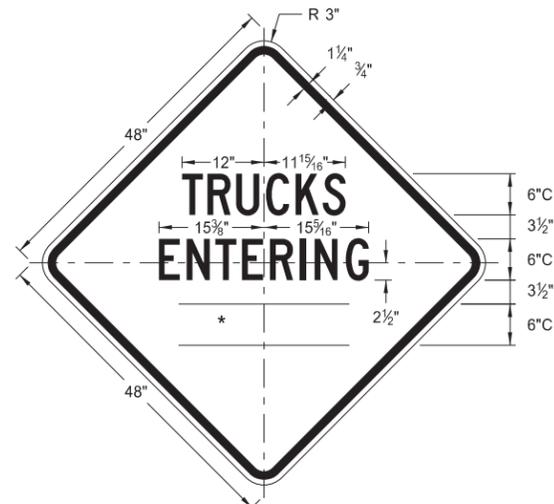
W8-56-48

Legend: black (non-refl)
Background: orange



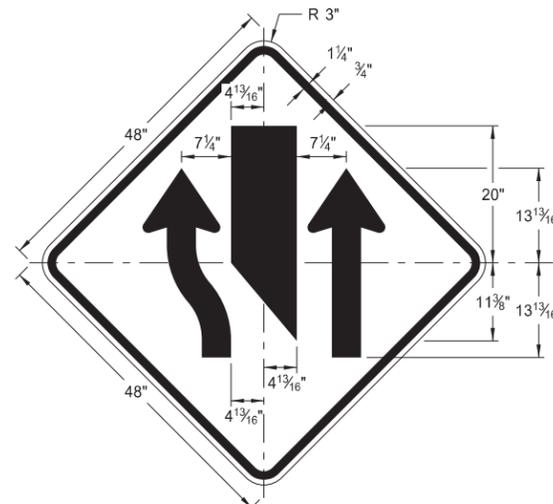
W5-9-48

Legend: black (non-refl)
Background: orange



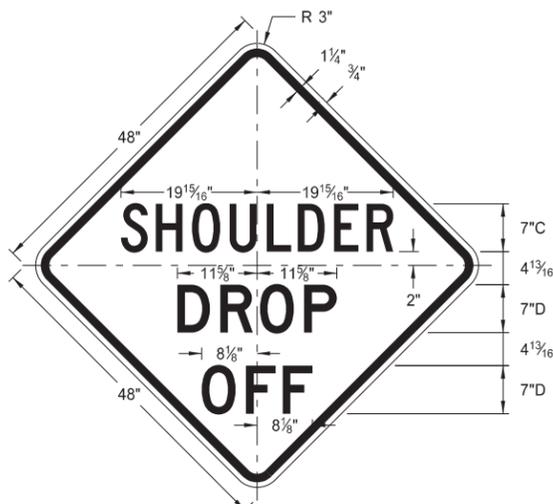
W8-54-48

Legend: black (non-refl)
Background: orange



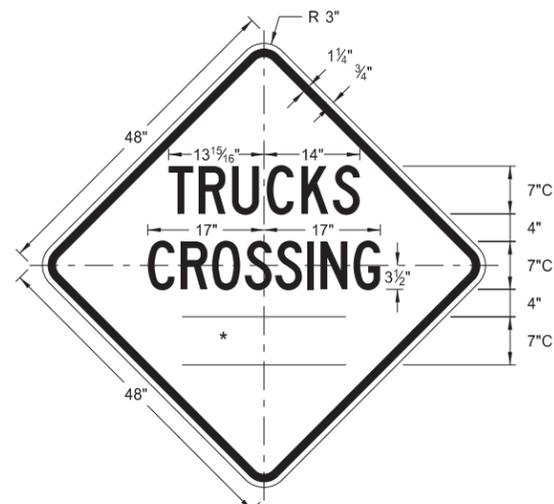
W9-3a-48

Legend: black (non-refl)
Background: orange



W8-9a-48

Legend: black (non-refl)
Background: orange

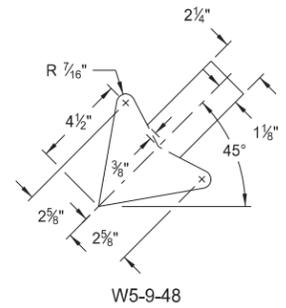


W8-55-48

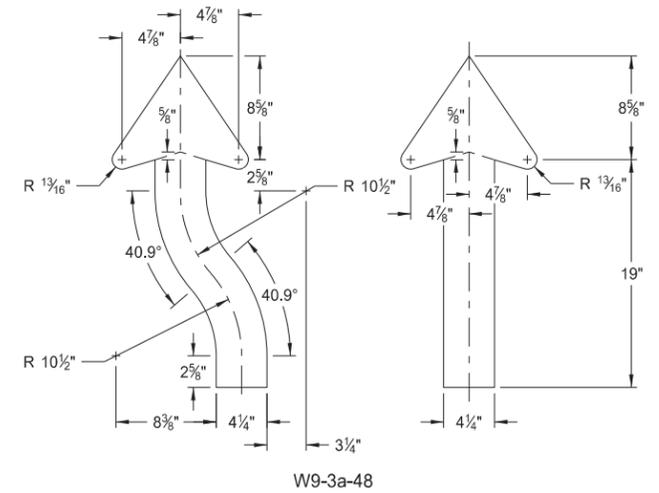
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

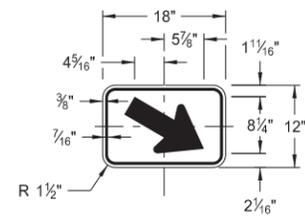
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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

CONSTRUCTION SIGN DETAILS
WARNING SIGNS

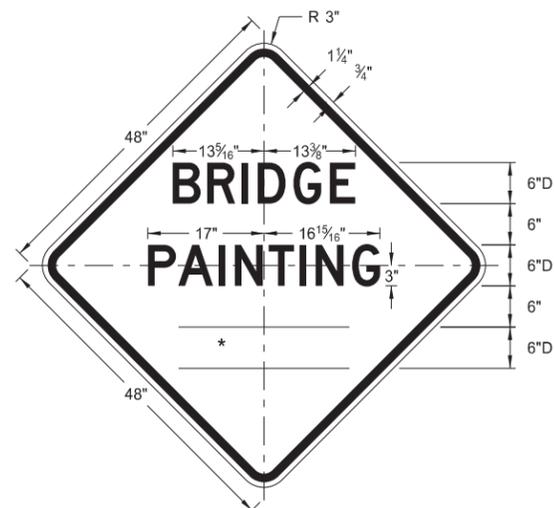
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



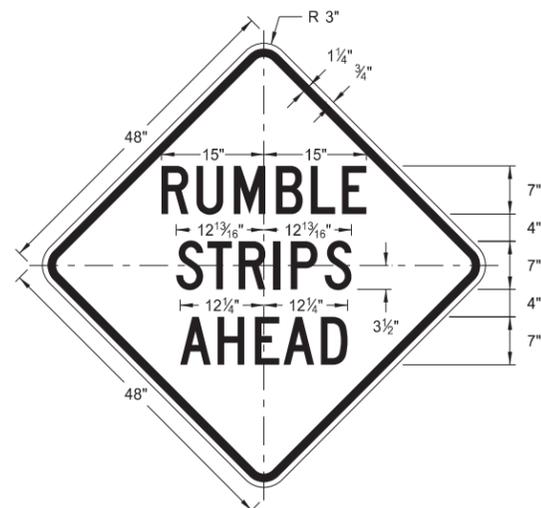
W16-7aP-18

Legend: black (non-refl)
Background: orange



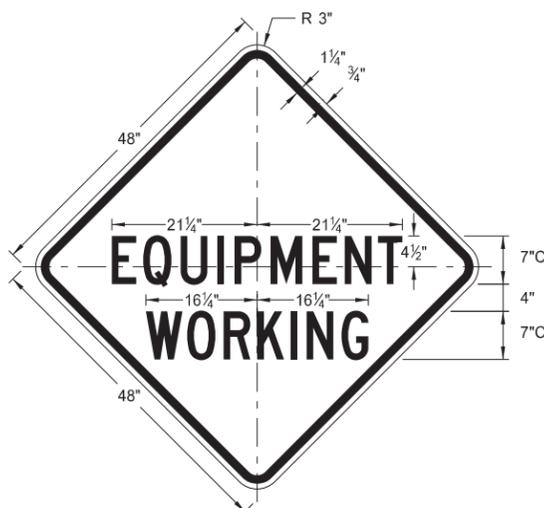
W21-50-48

Legend: black (non-refl)
Background: orange



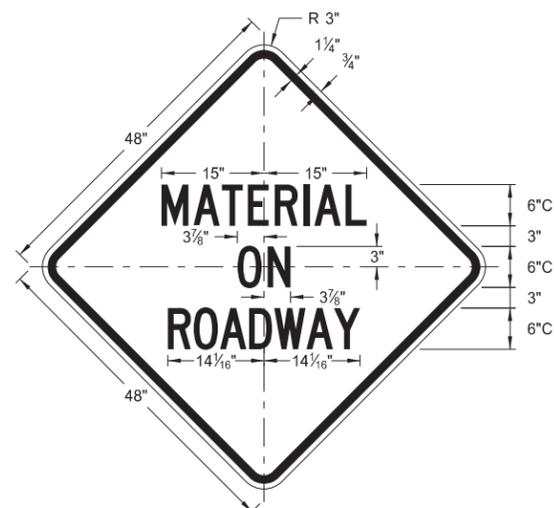
W21-53-48

Legend: black (non-refl)
Background: orange



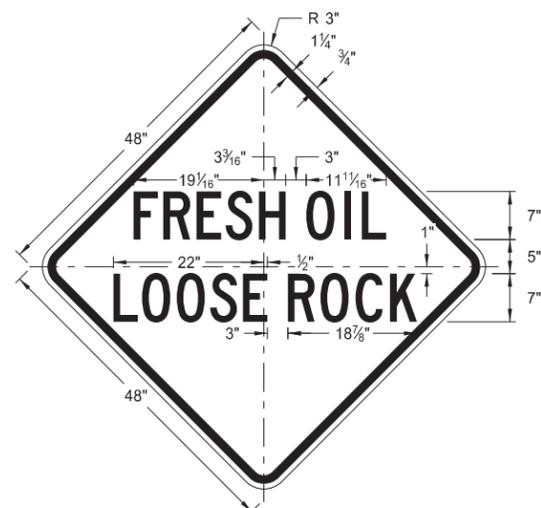
W20-51-48

Legend: black (non-refl)
Background: orange



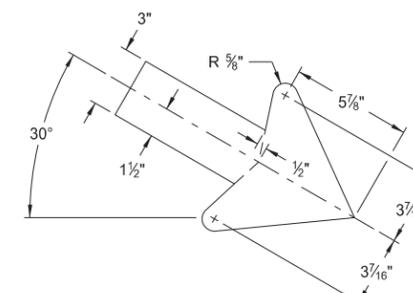
W21-51-48

Legend: black (non-refl)
Background: orange

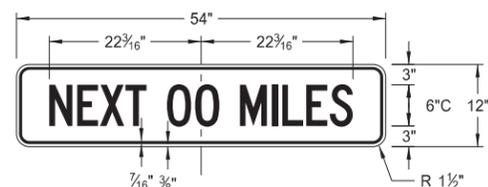


W22-8-48

Legend: black (non-refl)
Background: orange

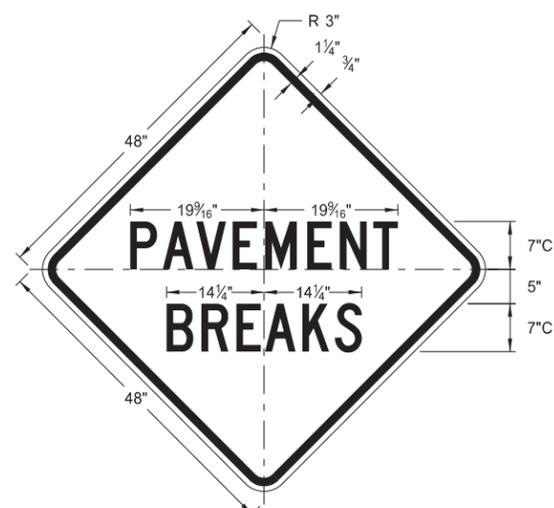


W16-7aP-18



W20-52P-54

Legend: black (non-refl)
Background: orange



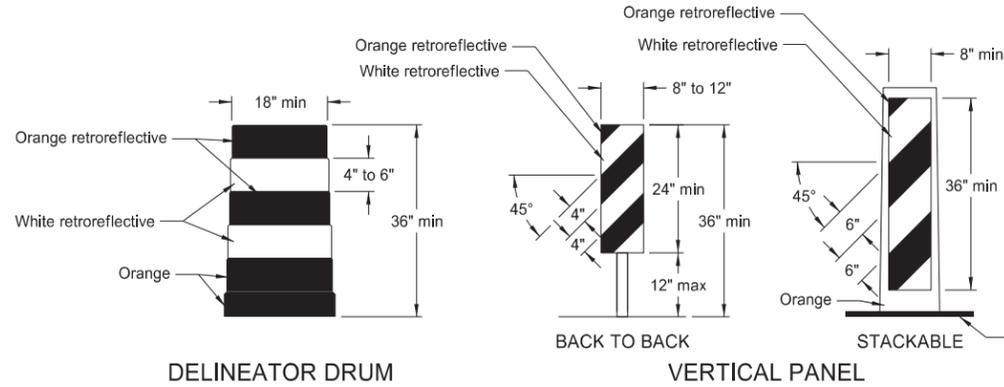
W21-52-48

Legend: black (non-refl)
Background: orange

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

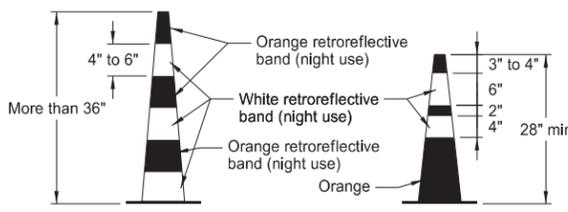
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BARRICADE AND CHANNELIZING DEVICE DETAILS

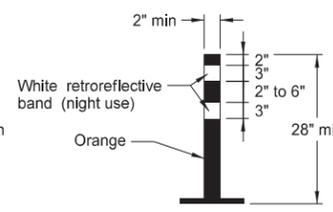


DELINEATOR DRUM

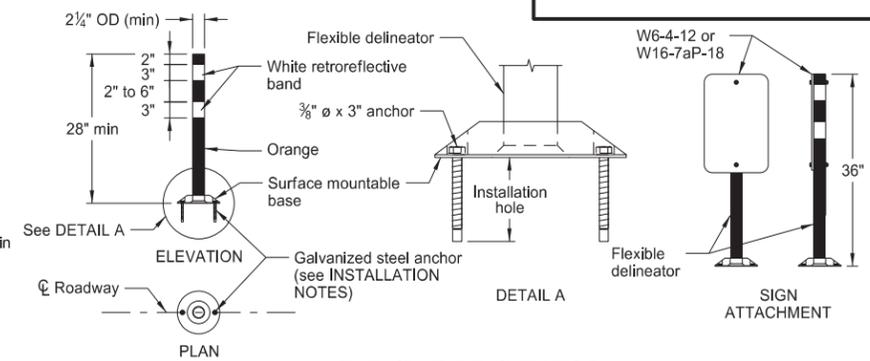
VERTICAL PANEL



TRAFFIC CONE



TUBULAR MARKER



FLEXIBLE DELINEATOR

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

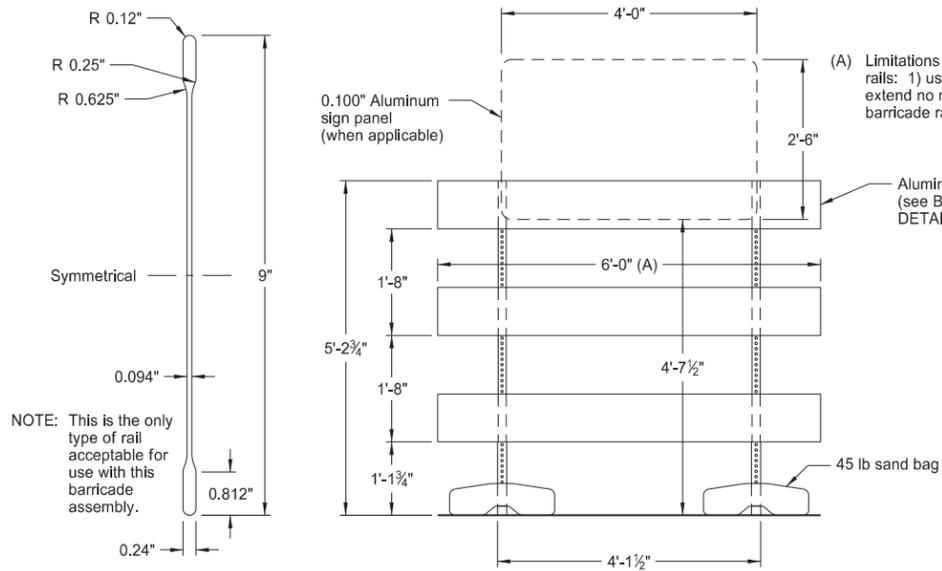
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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

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

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

INSTALLATION NOTES:

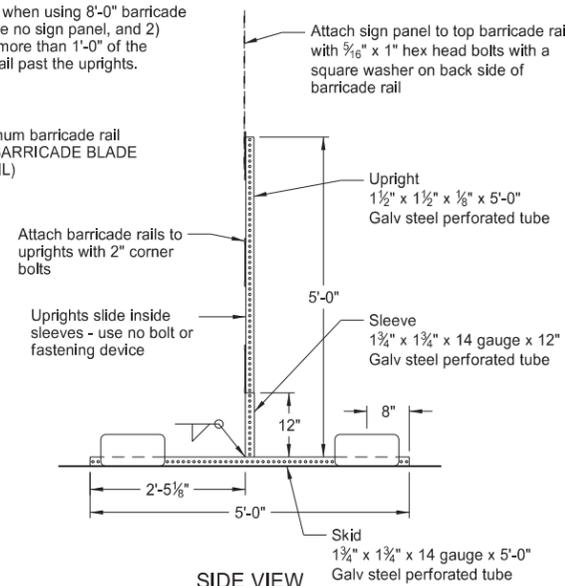
1. Drill installation holes to diameter and depth required by manufacturer's specifications.
2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
3. In lieu of bolted down base, use an 8" x 8" butyl pad or hot melt butyl. Remove butyl as close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



BARRICADE BLADE DETAIL

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

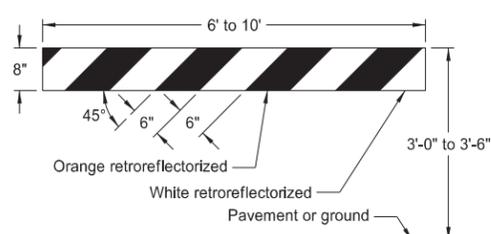


ELEVATION VIEW

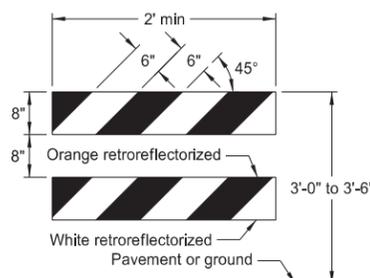
BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

SIDE VIEW

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

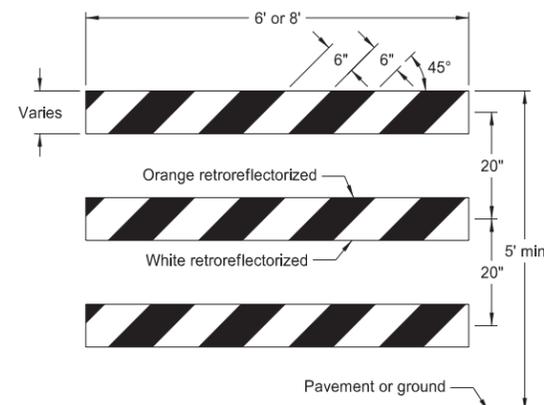


TYPE I BARRICADE

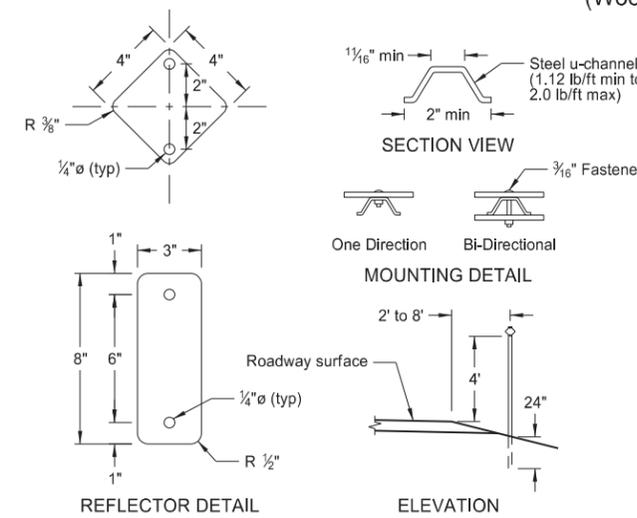


TYPE II BARRICADE

BARRICADE RAIL DETAILS



TYPE III BARRICADE



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

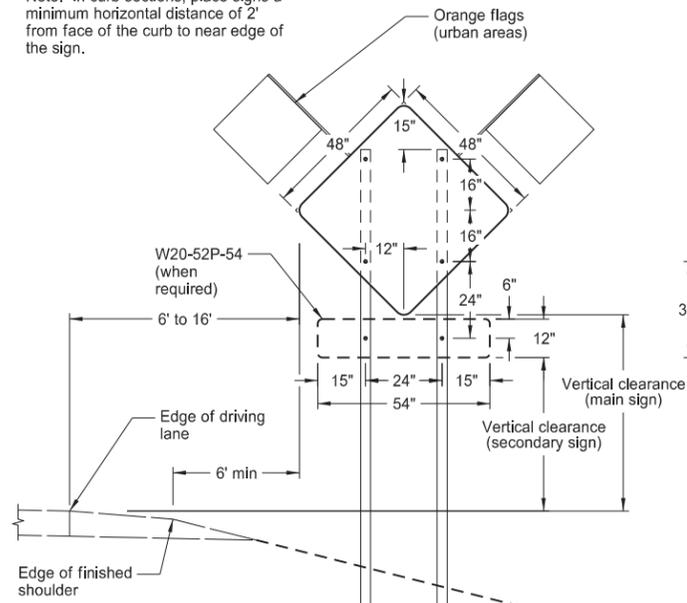
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

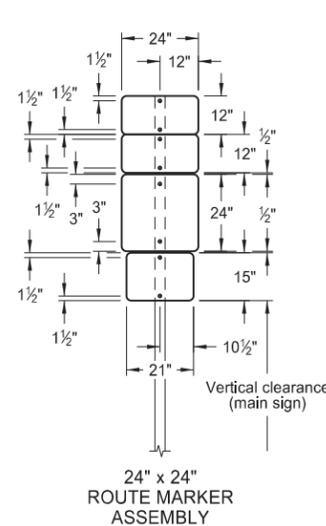
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

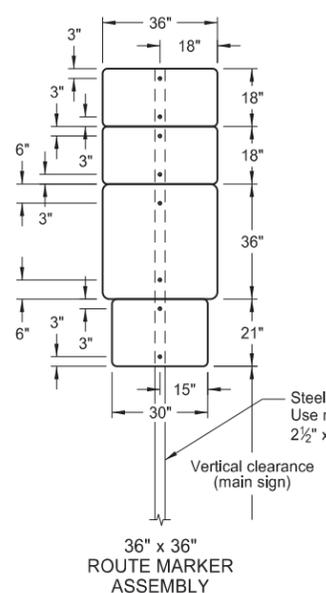
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



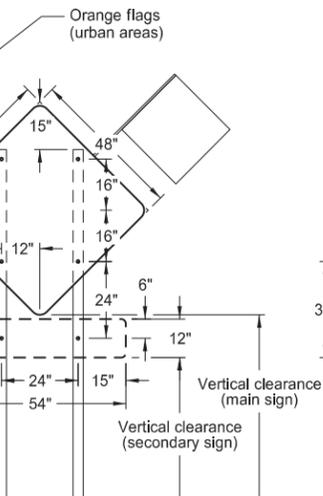
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



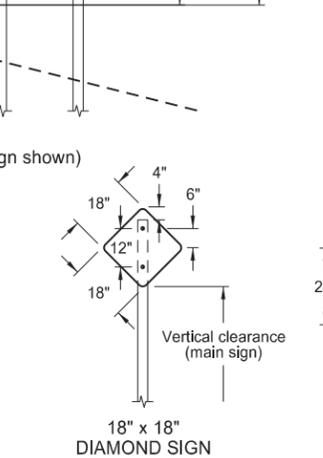
24" x 24" ROUTE MARKER ASSEMBLY



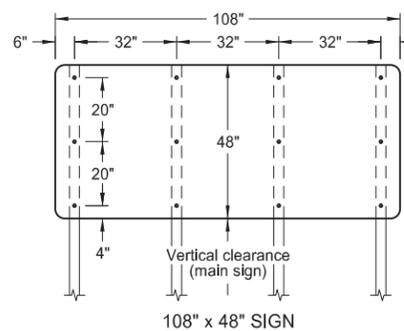
36" x 36" ROUTE MARKER ASSEMBLY



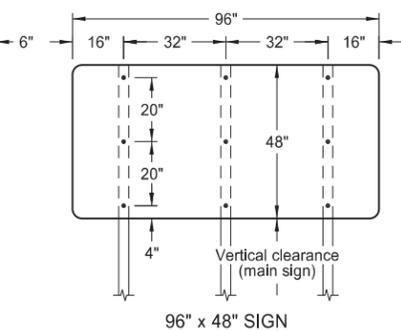
18" x 18" DIAMOND SIGN



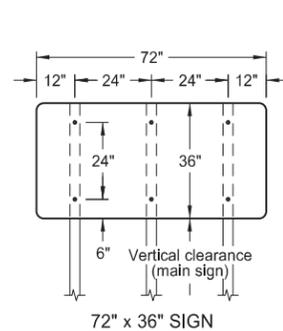
18" x 48" DIAMOND SIGN (with 30" x 24" secondary sign)



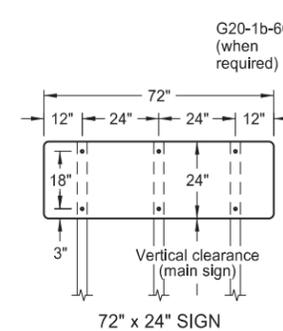
108" x 48" SIGN



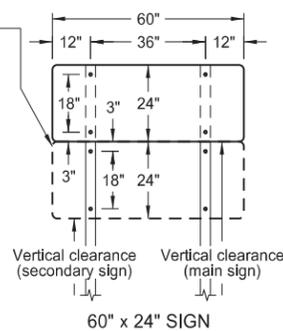
96" x 48" SIGN



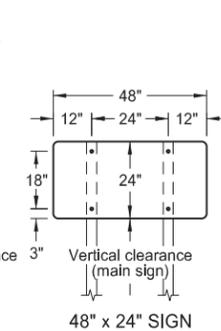
72" x 36" SIGN



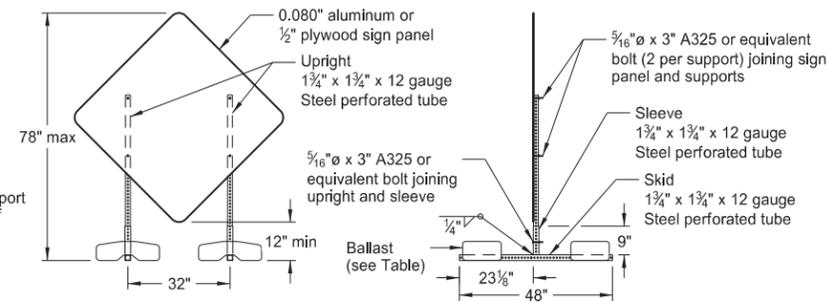
72" x 24" SIGN



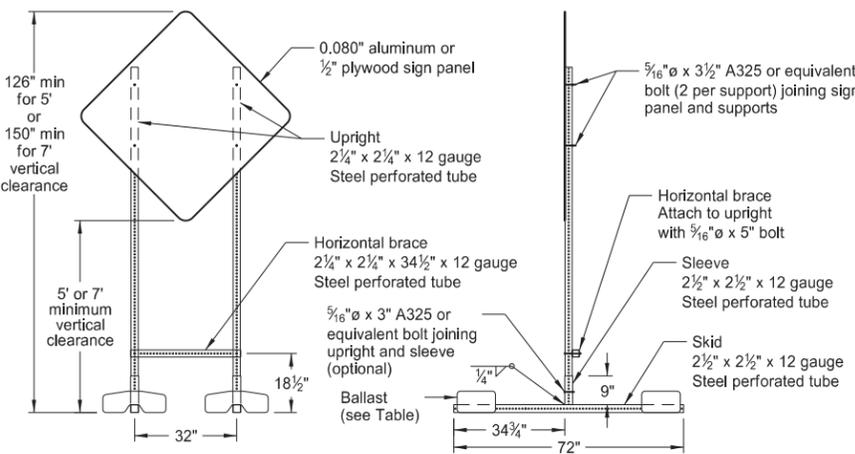
60" x 24" SIGN



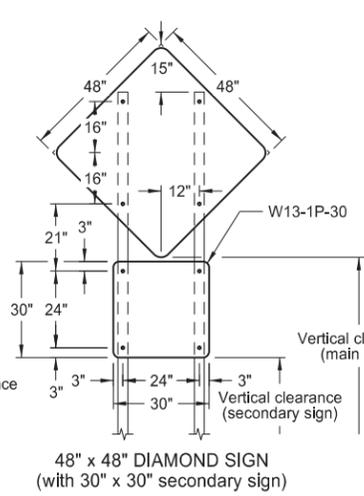
48" x 24" SIGN



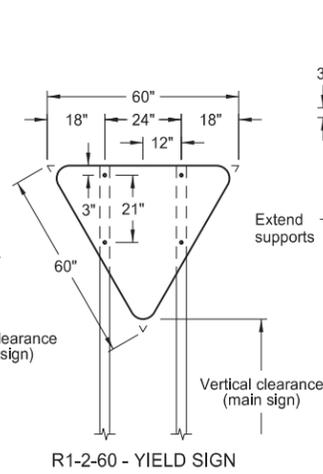
PORTABLE SIGN SUPPORT LOW-MOUNTING HEIGHT



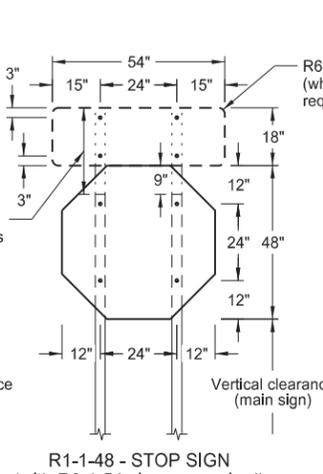
PORTABLE SIGN SUPPORT HIGH-MOUNTING HEIGHT



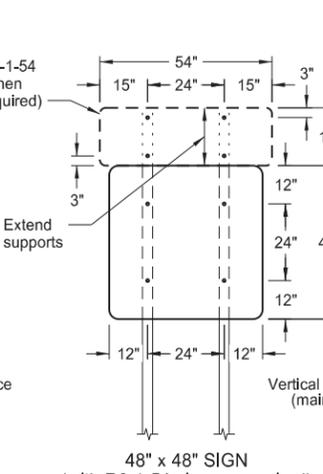
48" x 48" DIAMOND SIGN (with 30" x 30" secondary sign)



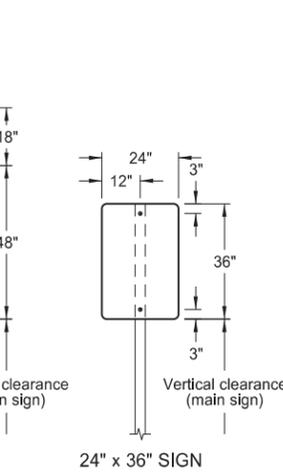
R1-2-60 - YIELD SIGN



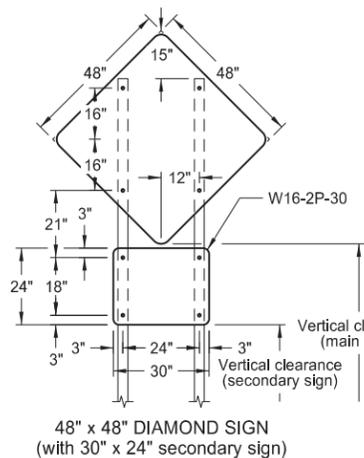
R1-1-48 - STOP SIGN (with R6-1-54 sign as required)



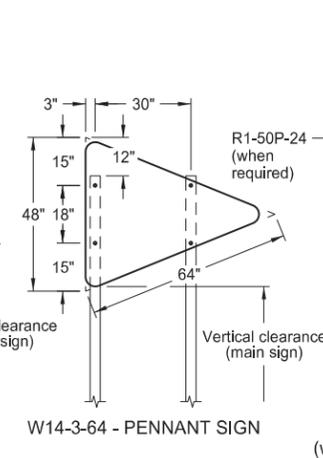
48" x 48" SIGN (with R6-1-54 sign as required)



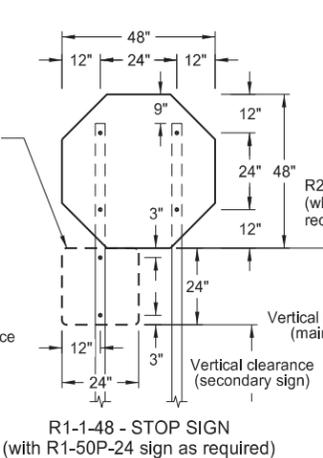
24" x 36" SIGN



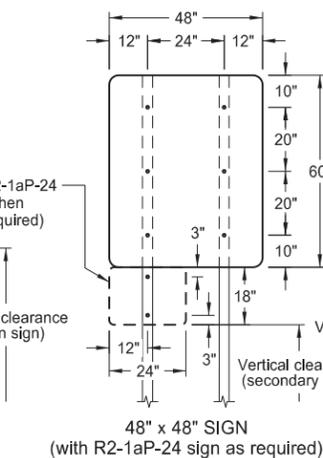
48" x 48" DIAMOND SIGN (with 30" x 24" secondary sign)



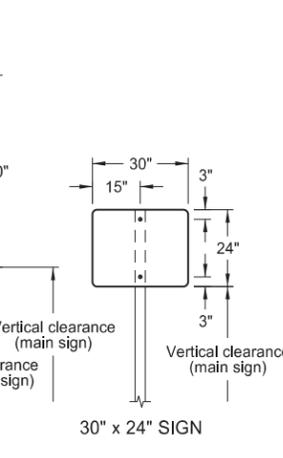
W14-3-64 - PENNANT SIGN



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



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



30" x 24" SIGN

NOTES:

- 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 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
- Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 5/16" bolts.
- 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)
- Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

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

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

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

ROAD CLOSURE LAYOUTS

- Notes:
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper in feet.
 - L = Minimum length of taper, $S \times W$ for freeways, expressways, and other roads with speeds of 45 mph or greater, or $W \times S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
 - Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
 - Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.
 - Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
 - Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
 - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
 - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at $\frac{1}{2}$ B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within reduced speed zones.
 - Where necessary, engineer will determine safe speed.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 - Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

ADVANCE WARNING SIGN SPACING

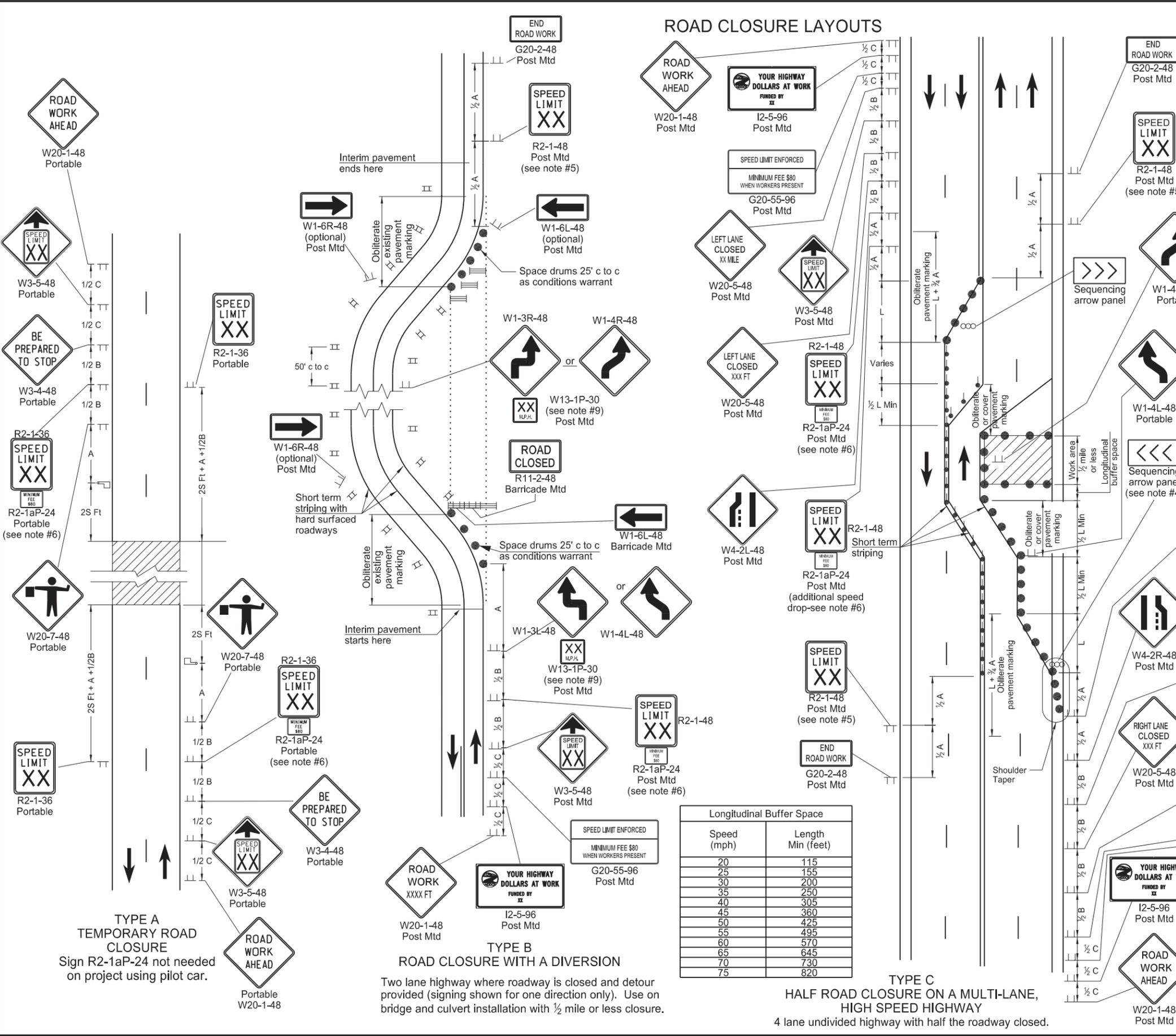
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 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		Work area
	Sign		Flagger
	Delineator drum		Sequencing arrow panel
	Tubular markers		Vertical panels back to back

Longitudinal Buffer Space

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



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

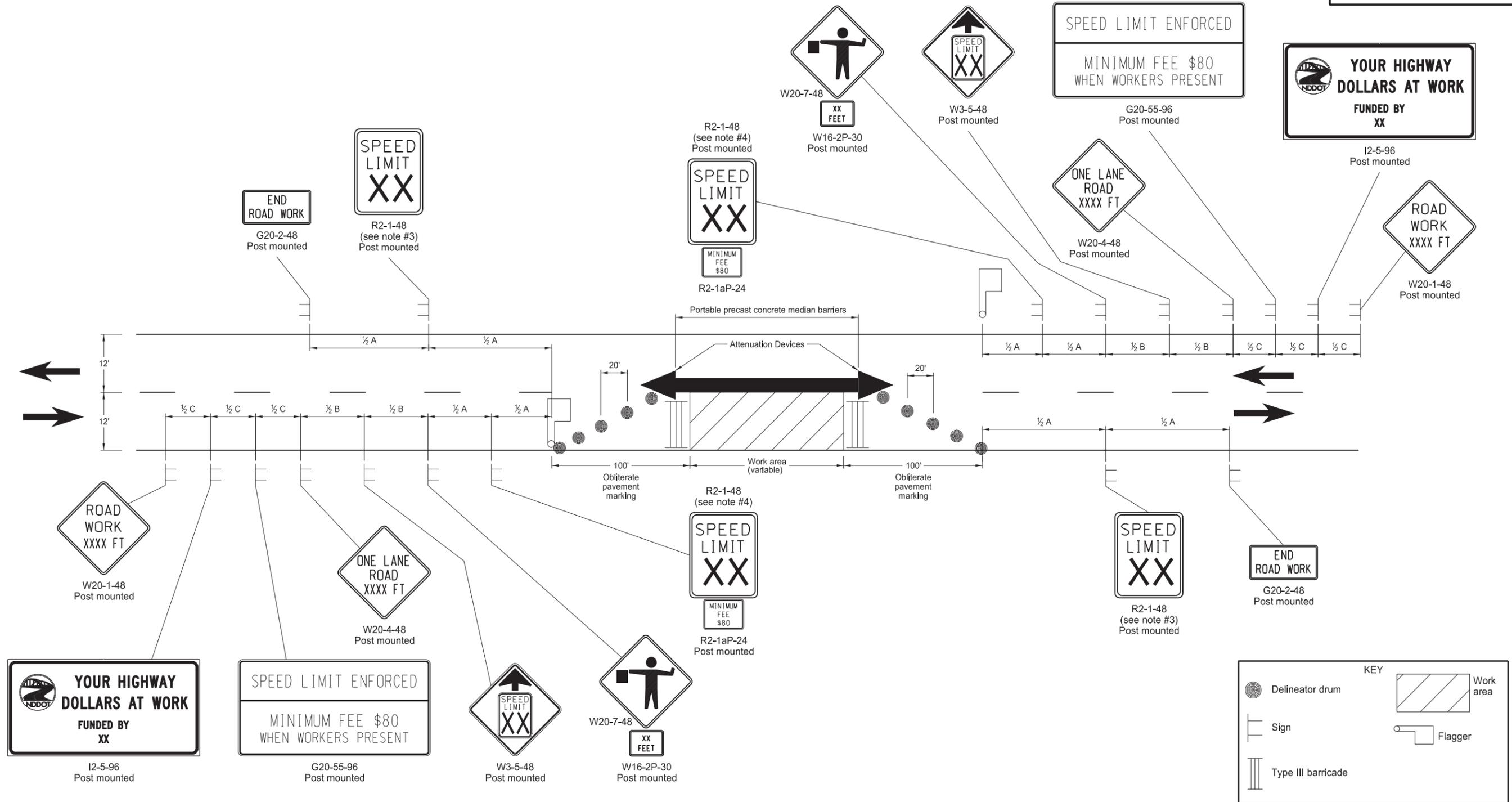
REVISIONS

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



SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



KEY

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

Notes:

- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
- Remove existing striping as required. Use back to back delineators when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Place back to back vertical panels when roadways have steep slopes and alignment is not visible to approaching traffic.
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
- Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at 1/2B.
- Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- Cover existing speed limit signs within a reduced speed zone.
- Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
- Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
- Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

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

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

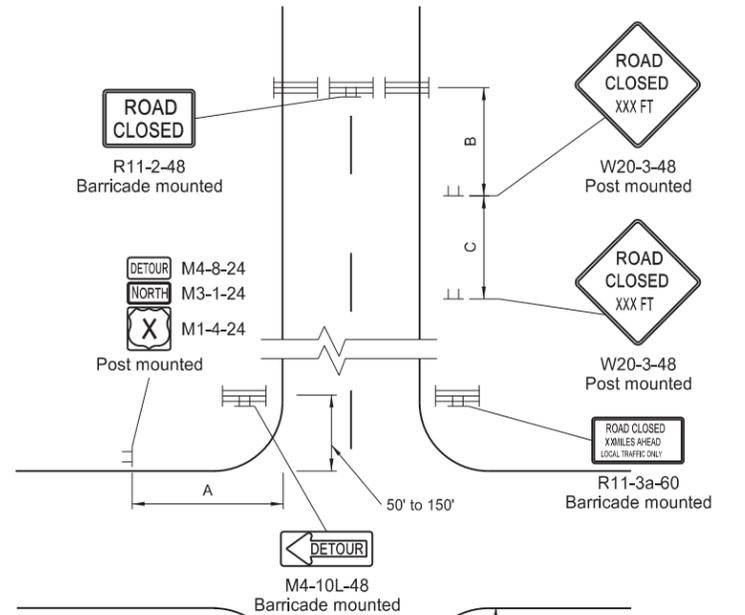


12/08/21

ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

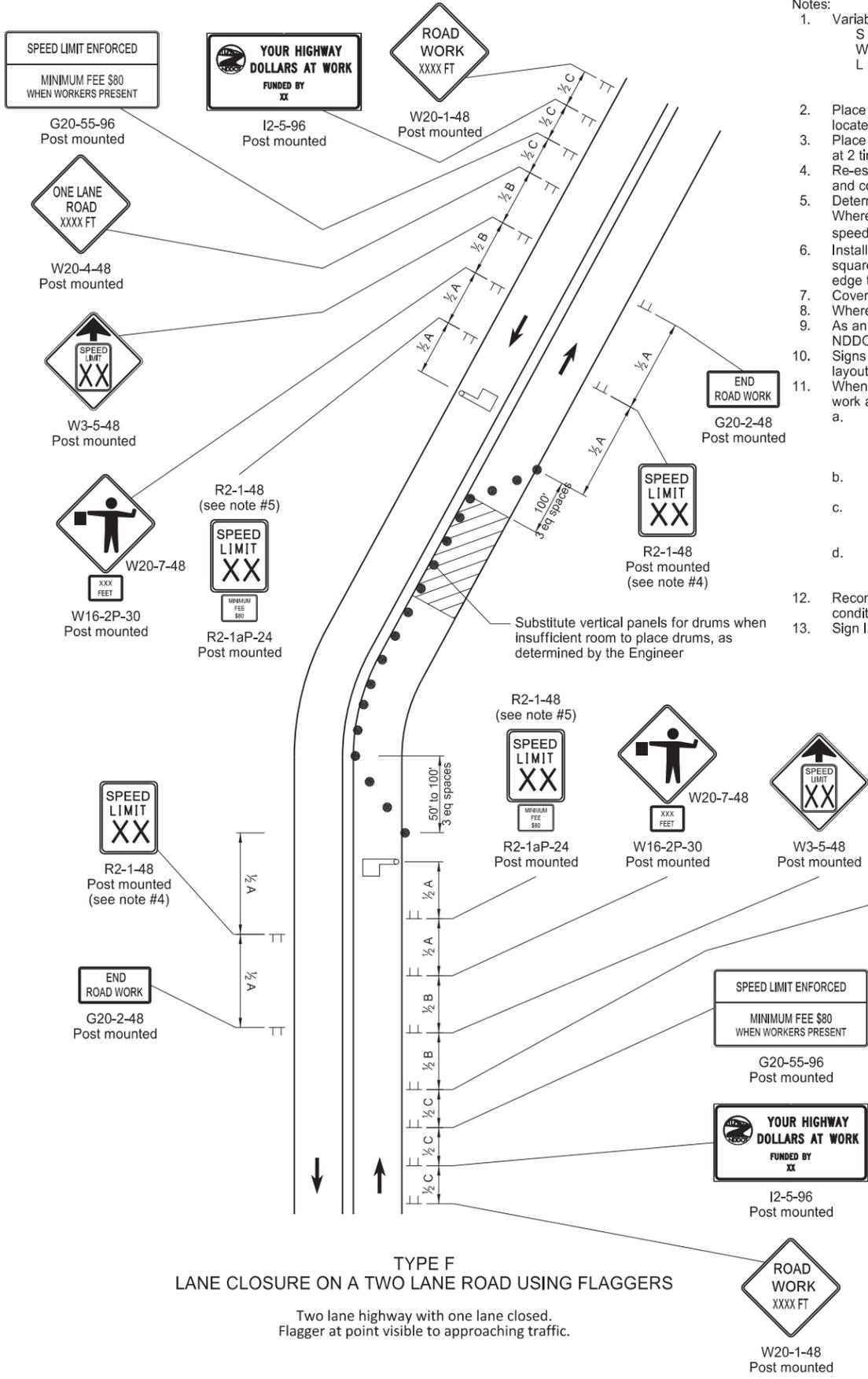
Notes:

- 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 S²/60 for urban, residential, and streets with speeds of 40 mph or less.
- Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
- Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
- Determine the reduced speed limit based on the in place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place second speed limit sign at 1/2B.
- Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
- Cover existing speed limit signs within a reduced speed zone.
- Where necessary, safe speed to be determined by the Engineer.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- 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.
- When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
 - 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.) Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
 - 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.
 - 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.)
- Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
- Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.



TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

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



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.

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

KEY

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

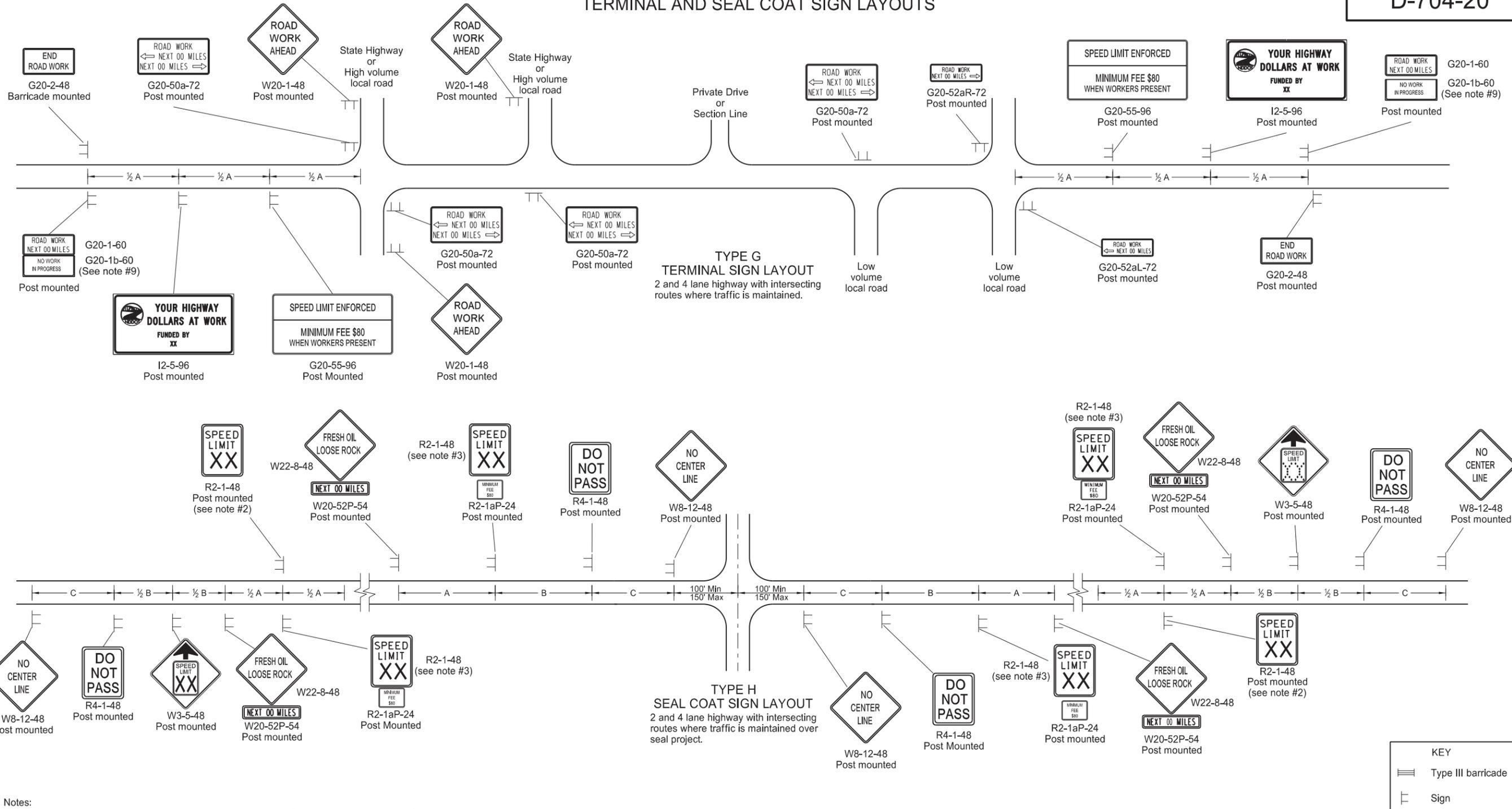
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 9-27-13	
REVISIONS	
DATE	CHANGE
03-13-14	Revised Sign Call "ROAD WORK XXX FT"
08-17-17	Update notes & sign numbers
11-01-19	Revised signs, sign #s, & notes
12-08-21	Switched order of Road Work XXX and Spd Limit Enforced & added Dollars At Work



12/08/21

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



- Notes:
- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
 - Determine the exact speed limit in the field, based on location and conditions.
 - Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at 1/2 B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
 - Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
 - Install sign G20-1b-60 when work is suspended for winter.
 - Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
 - Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 - Sign I2-5-96 is not required if this layout is a part of other traffic control that contains this sign.

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

KEY
 Type III barricade
 Sign

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

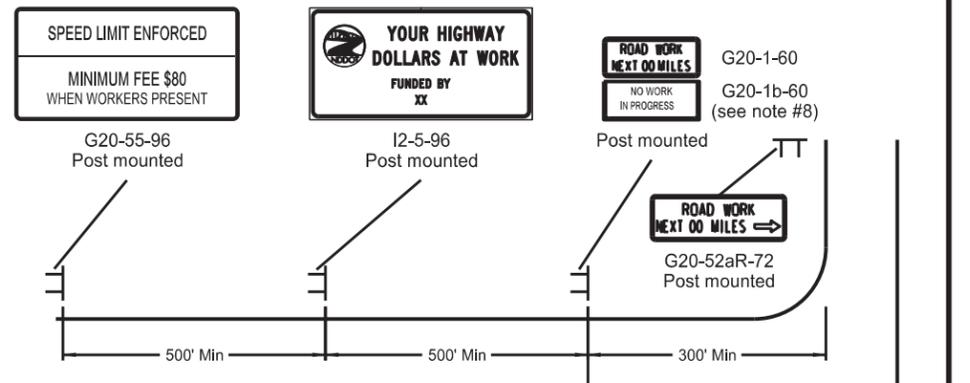
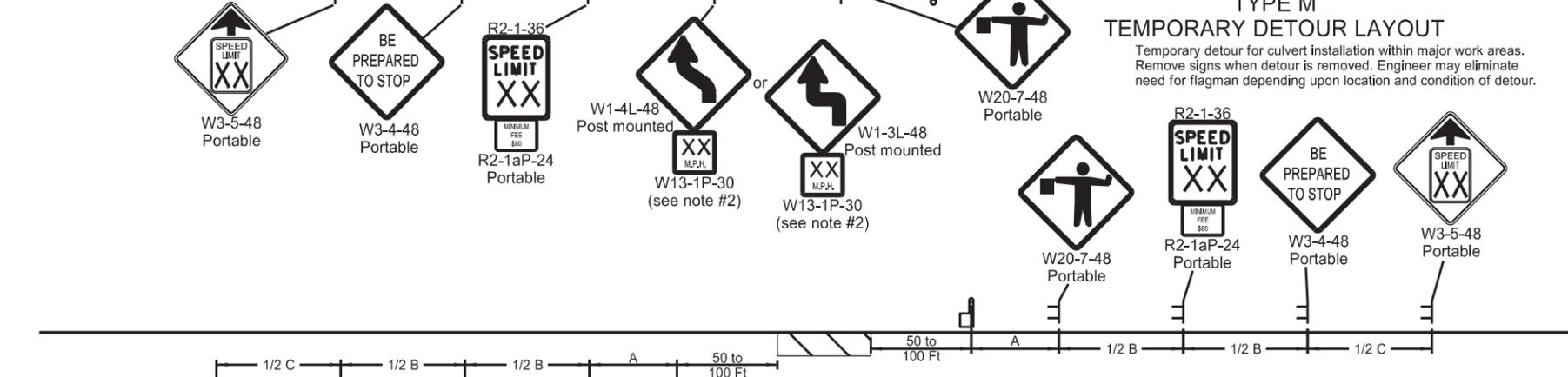
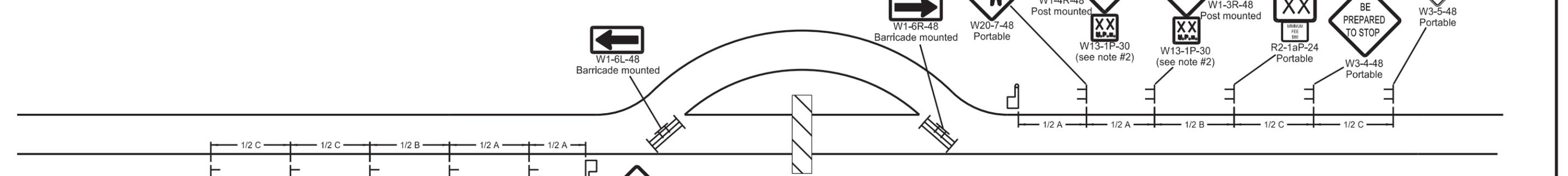
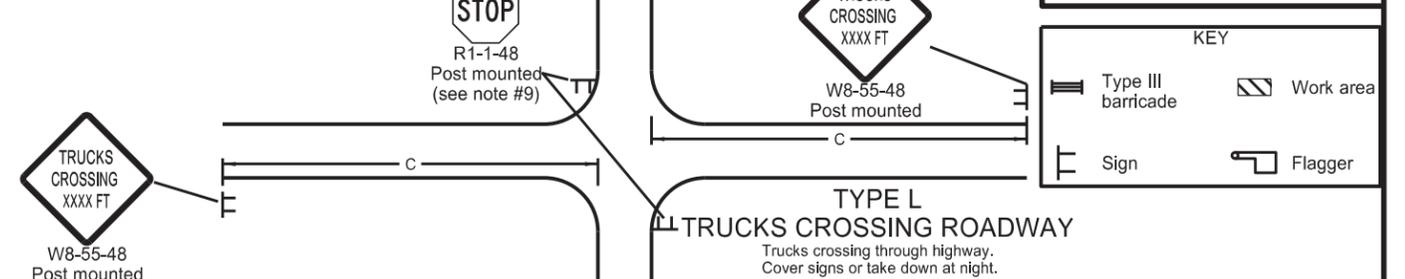
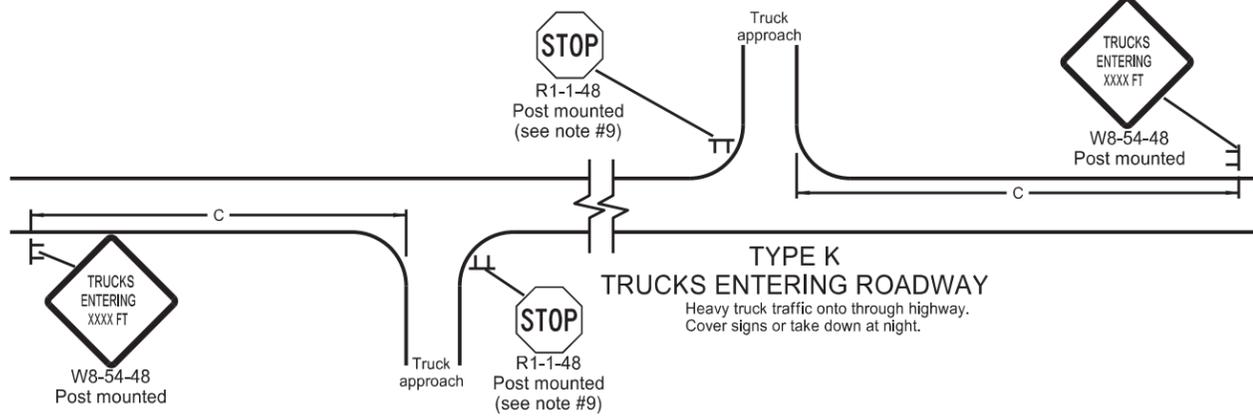
12/08/21

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22

KEY

- Type III barricade
- Sign
- Work area
- Flagger



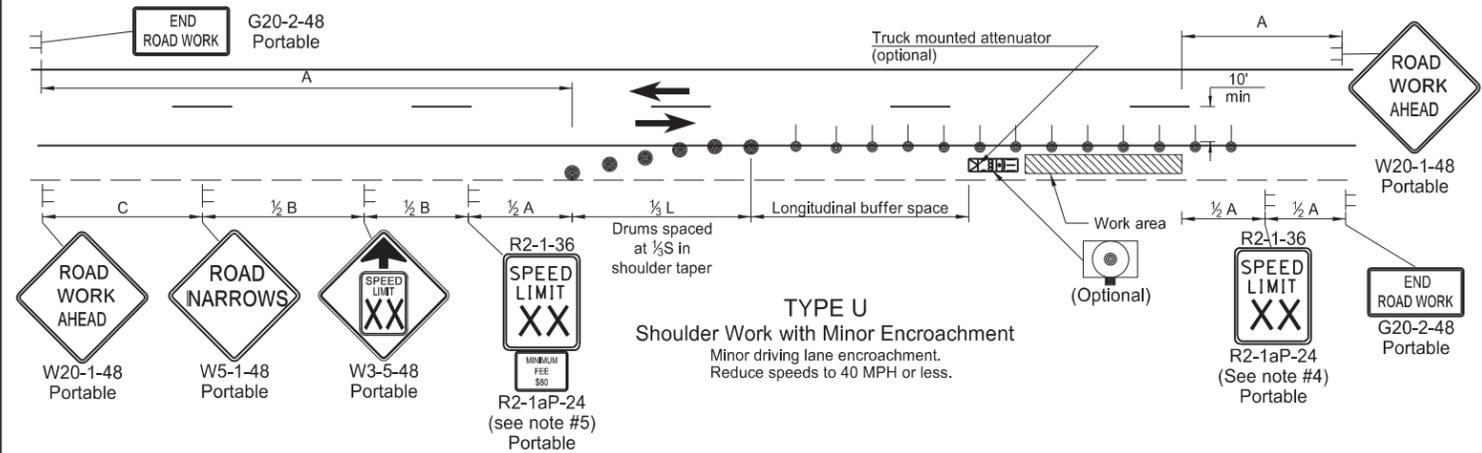
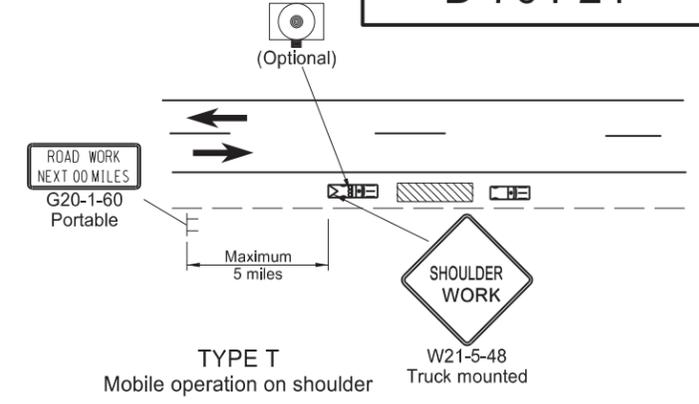
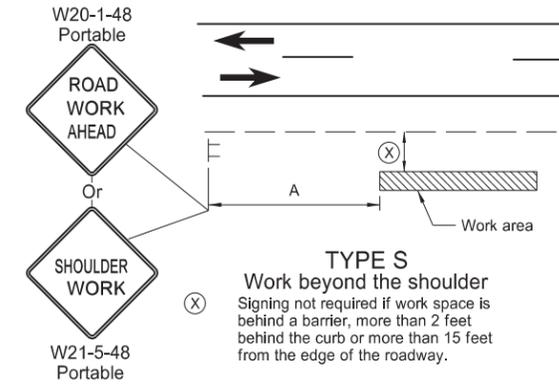
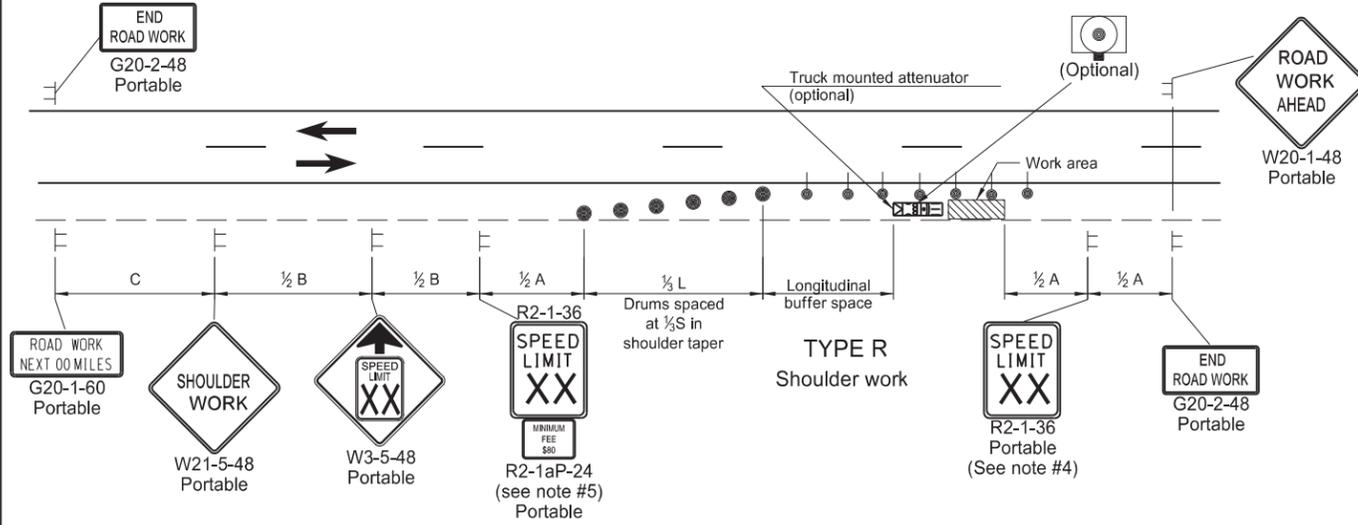
- Notes:**
- Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
 - Where necessary, safe speed to be determined by the Engineer.
 - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Install sign G20-1b-60 when work is suspended for winter.
 - If existing stop sign is in place, a 48" stop sign is not required.
 - Sign G20-55-96 is not required if layout is part of other traffic control that contains this sign, or if work is less than 15 days.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 - Sign I2-5-96 is not required if layout is part of other traffic control that contains this sign.

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

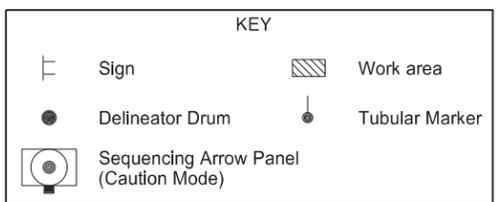
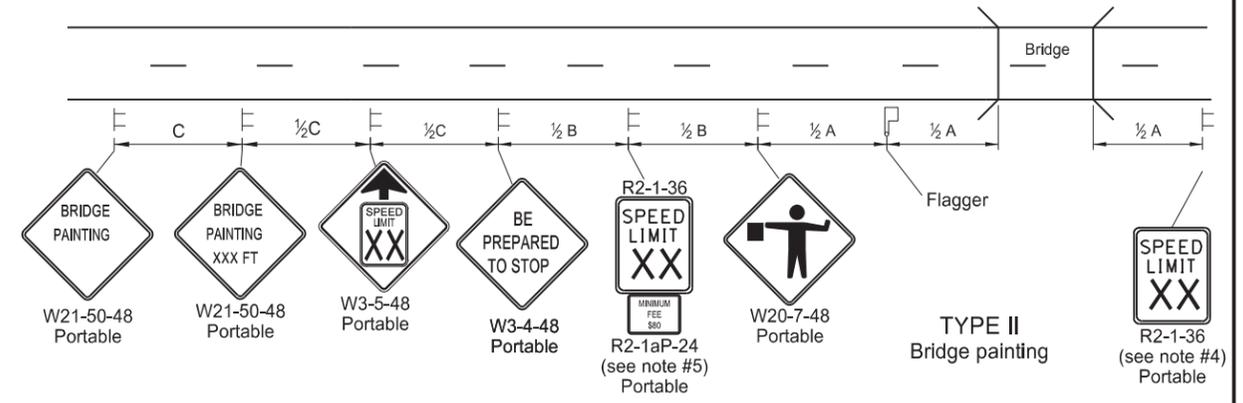
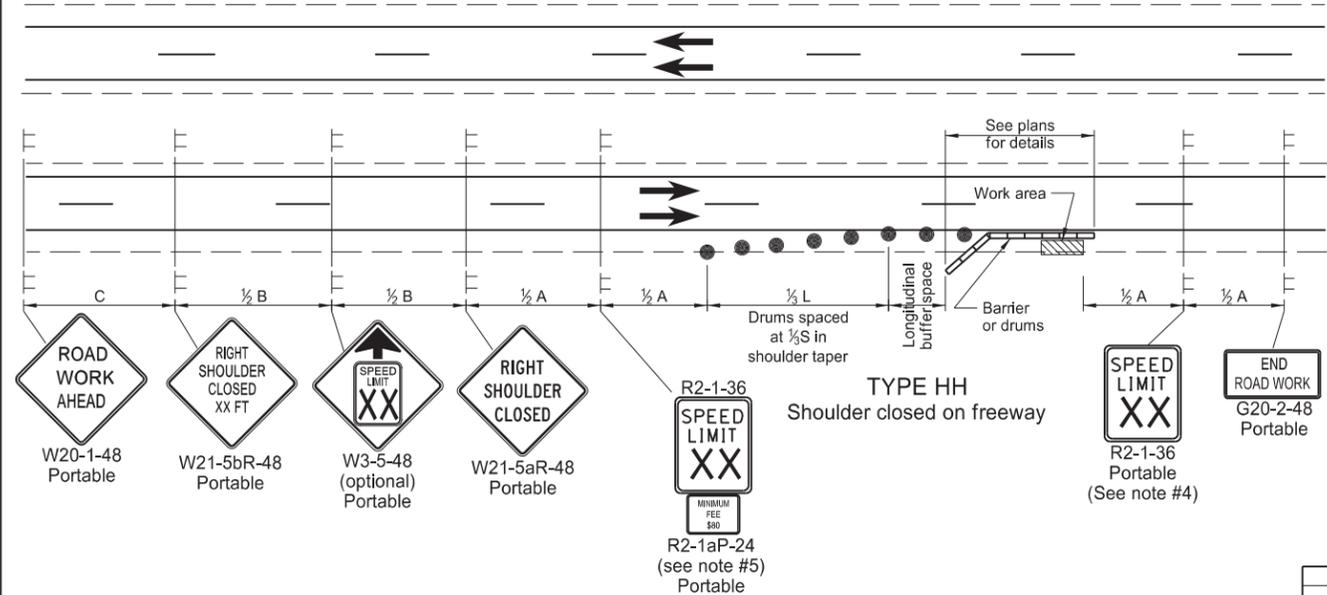
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12/09/21

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS



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



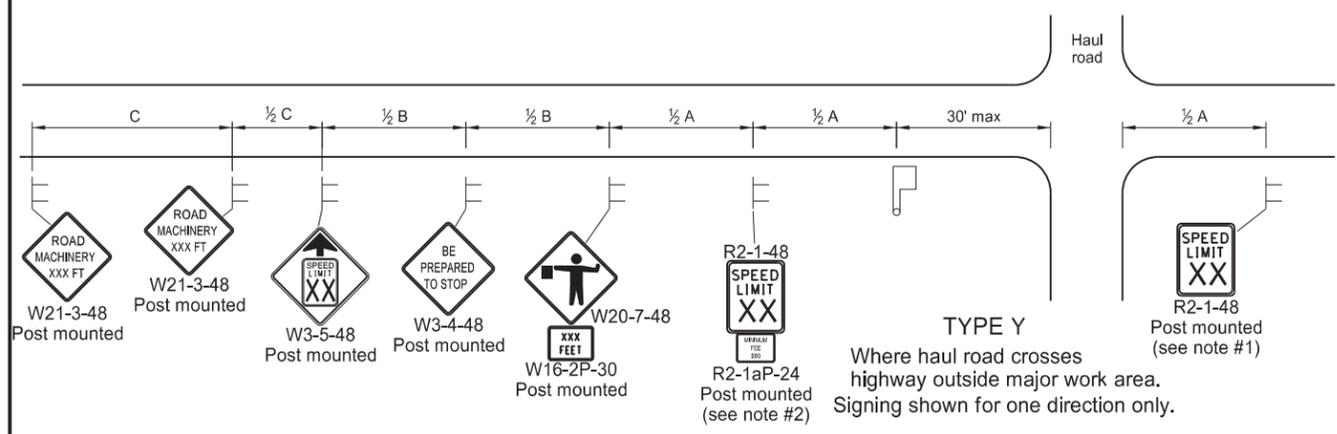
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

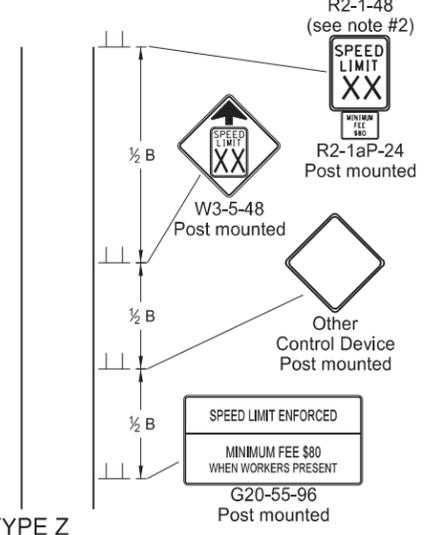
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & revised signs
11-01-19	Revised drum spacing & signs nos.

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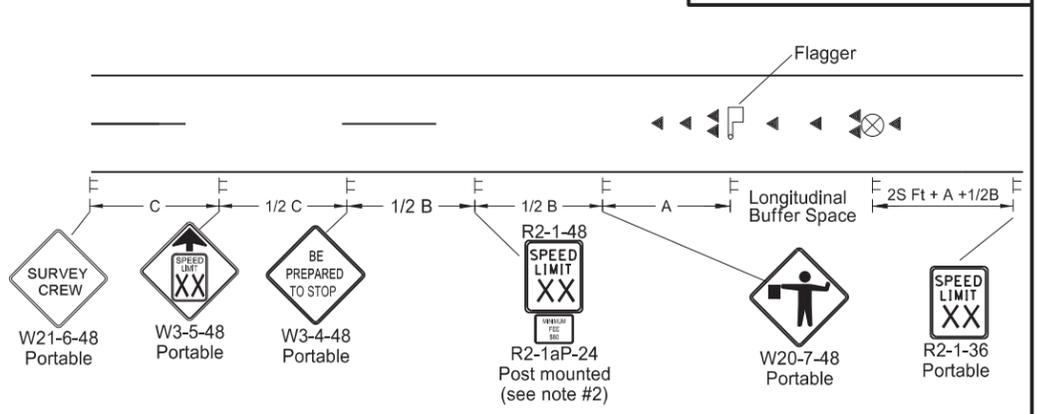
MISCELLANEOUS SIGN LAYOUTS



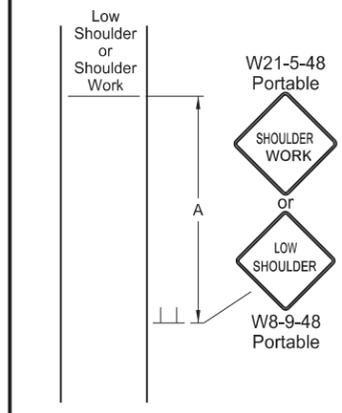
TYPE Y
Where haul road crosses highway outside major work area. Signing shown for one direction only.



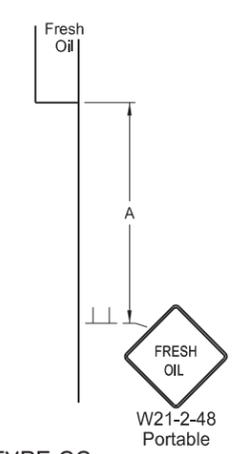
TYPE Z
Where speed zone is needed. Signing shown for one direction only.



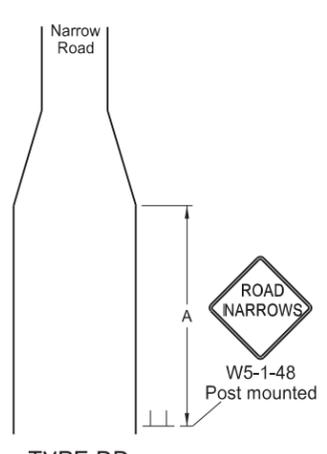
TYPE AA
Where survey crew is used. Signing shown for one direction only.



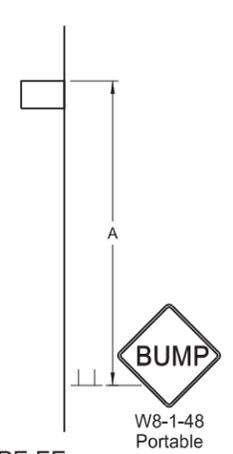
TYPE BB
Within major work area where sign conditions exist



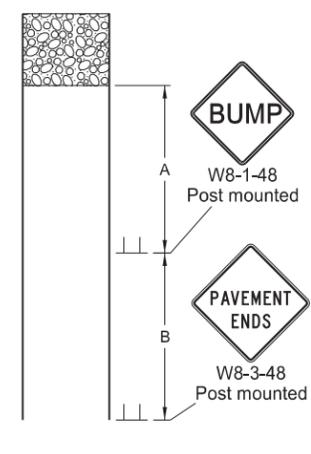
TYPE CC
Where sign conditions exist



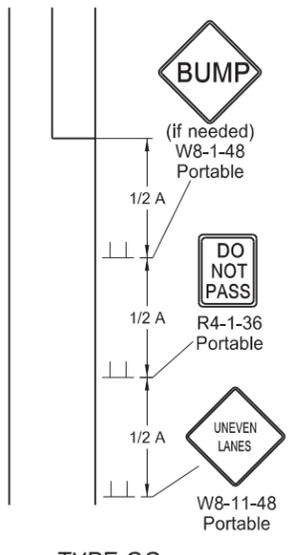
TYPE DD
Where sign conditions exist



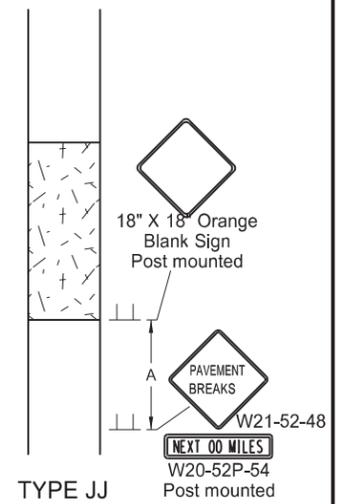
TYPE EE
Where sign conditions exist



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



TYPE GG
Where elevation difference exists between lanes

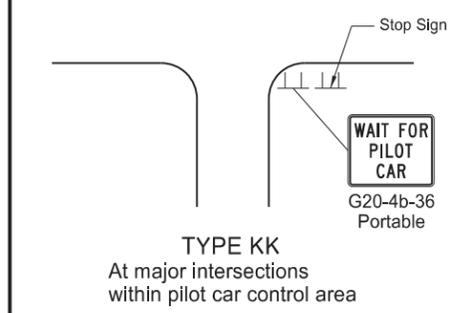


TYPE JJ
For break in pavement. Install signs when conditions exist and remove when not applicable. Signing shown for one direction only.

KEY

- Flagger
- Sign
- Cones
- Survey Equipment

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



TYPE KK
At major intersections within pilot car control area

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

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

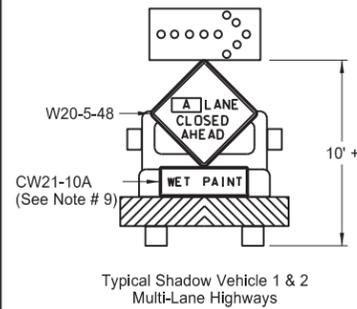
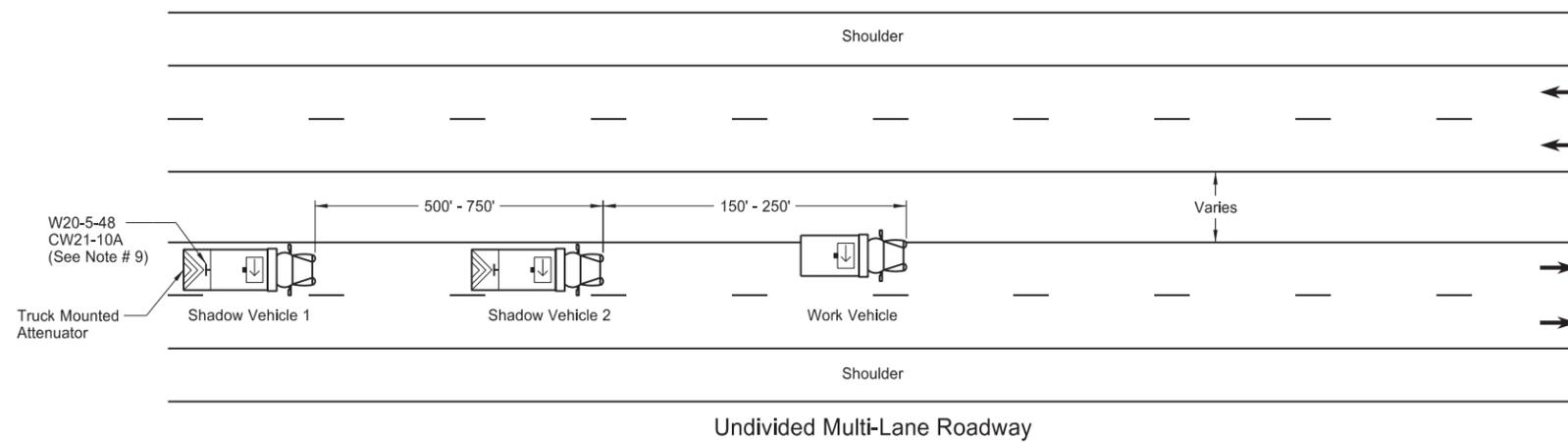
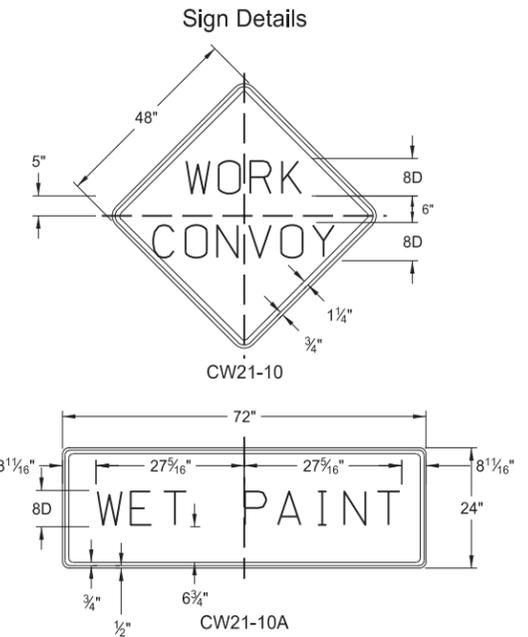
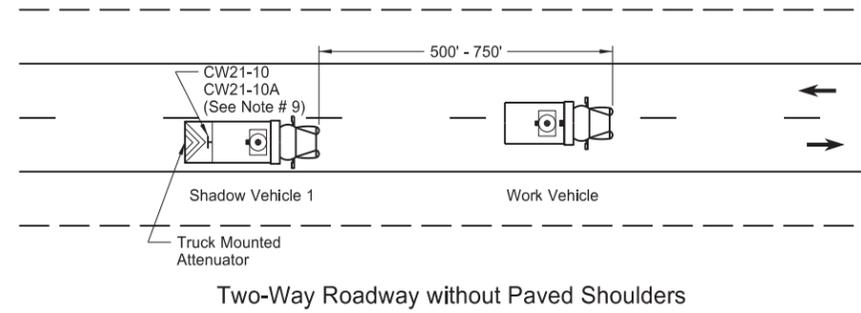
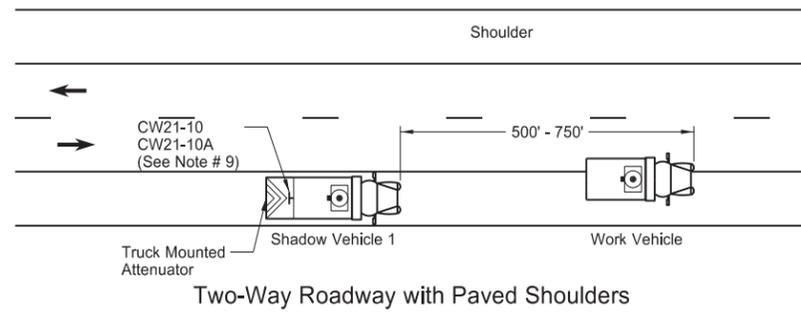
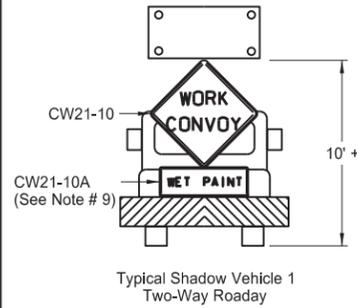
Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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

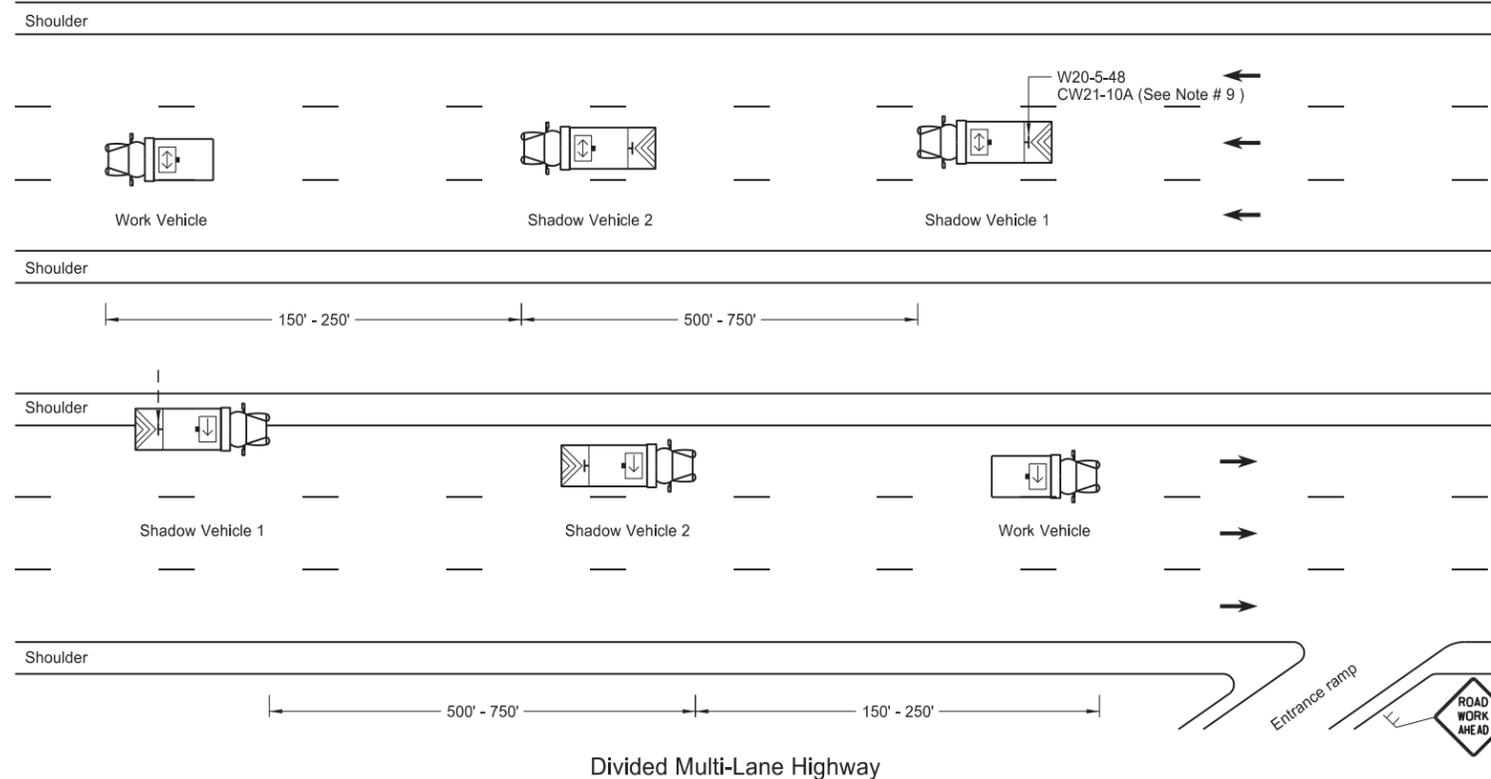
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers
11-01-19	Revised note 5 & sign numbers

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 Registration Number PE-4683,
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MOBILE OPERATION
(PAVEMENT MARKING)

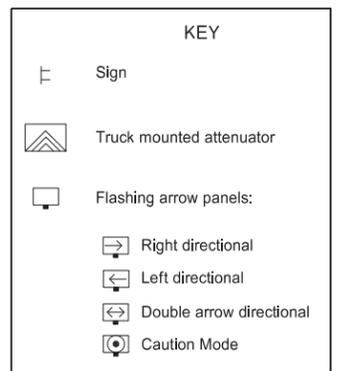


A = Left Right Center



Notes

- Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
- Display yellow rotating beacons or strobe lights on shadow and work vehicles, unless otherwise stated in the plans.
- Use Type B or Type C flashing arrow panels controlled from inside the vehicle.
- Provide each vehicle with two-way electronic communication capability.
- Move shadow vehicle 1 first to shadow other convoy vehicles when convoy changes lane.
- 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.
- Sign Colors
Letters = Black
Border = Black
Background = Orange
- As an option, use shadow vehicle 2 the paint tender vehicle.
- Use sign CW21-10A only during painting operation.
- Pull over work and shadow vehicles periodically to allow motor vehicle traffic to pass on two lane - two way roadways.

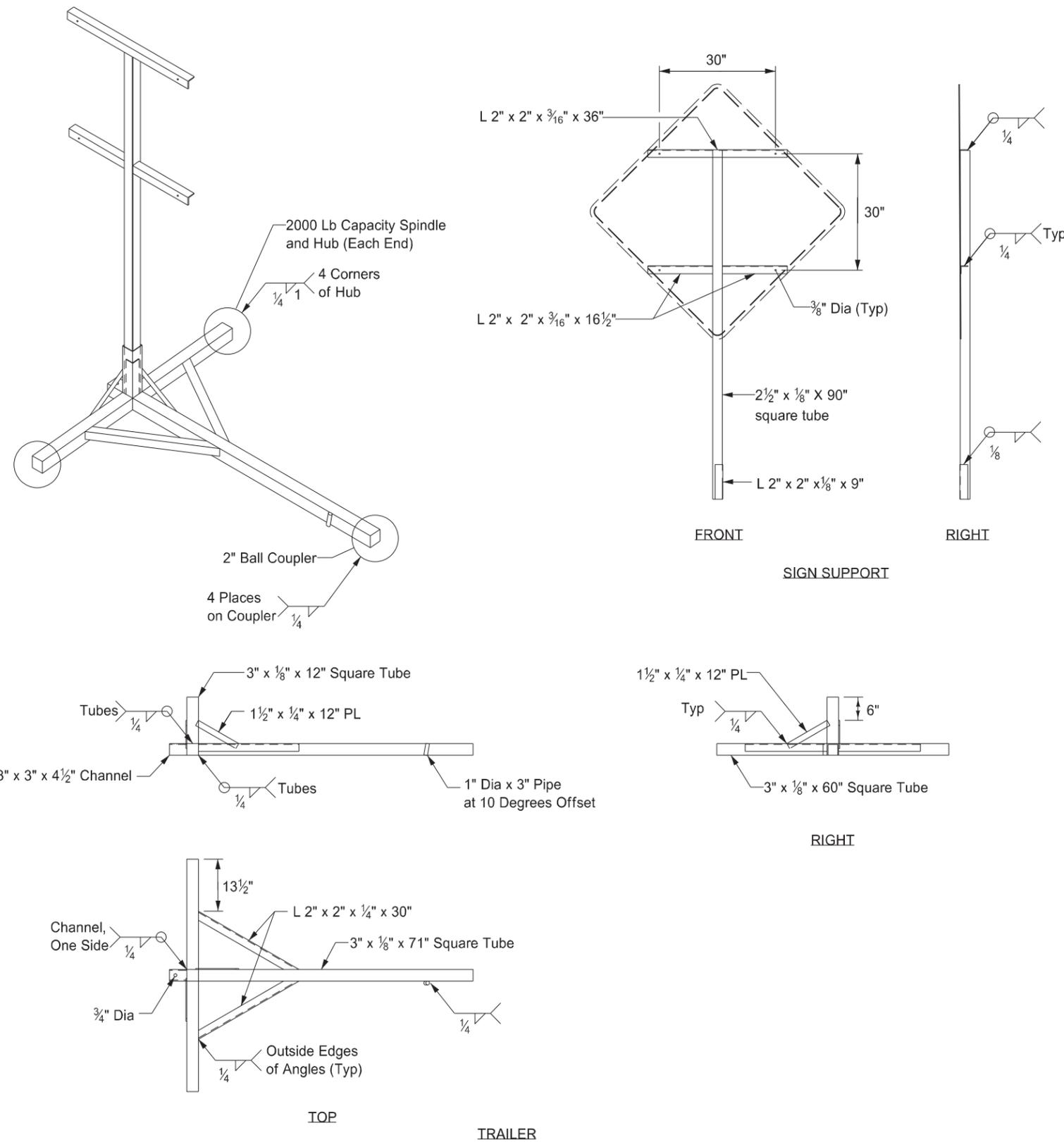


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways
9-27-17	Updated to active voice
11-08-19	Changed Standard Heading

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

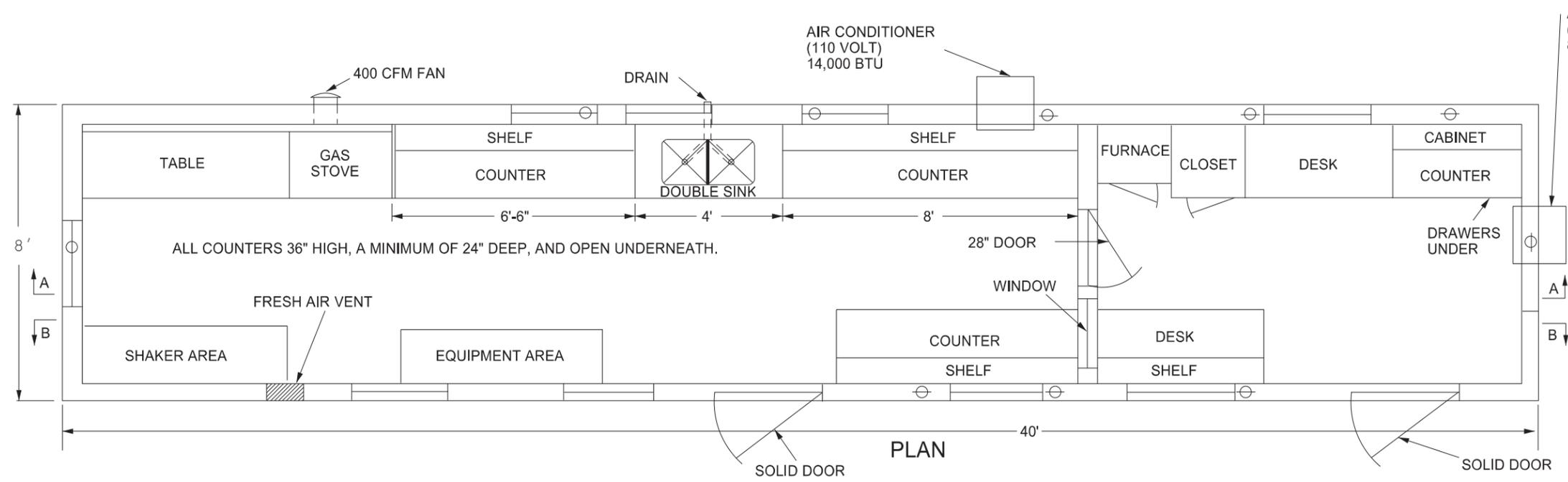
- ① Maximum 250 pound weight of assembly.
- ② Use a 14" wheel and tire.
- ③ Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
- ④ Other NCHRP 350 or MASH crash tested assemblies are acceptable.

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

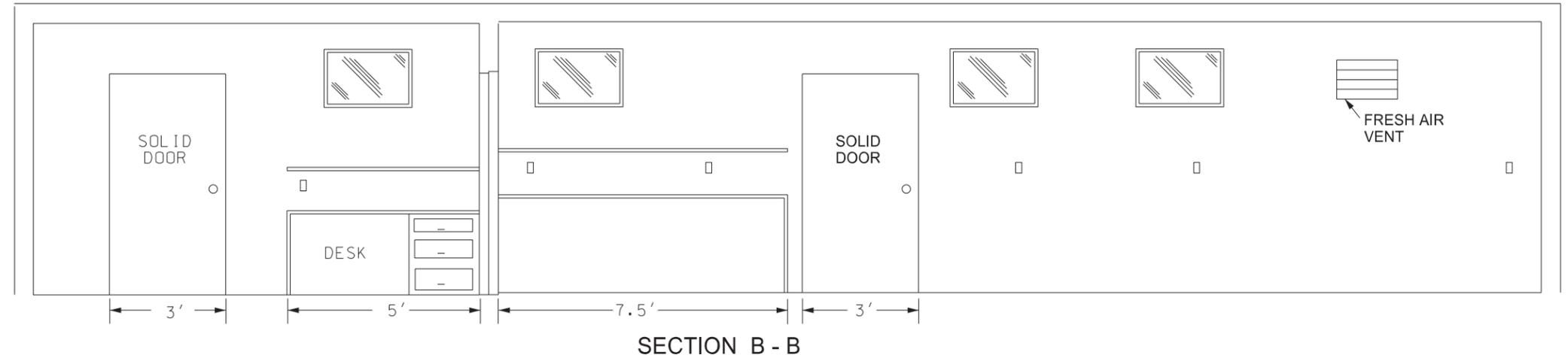
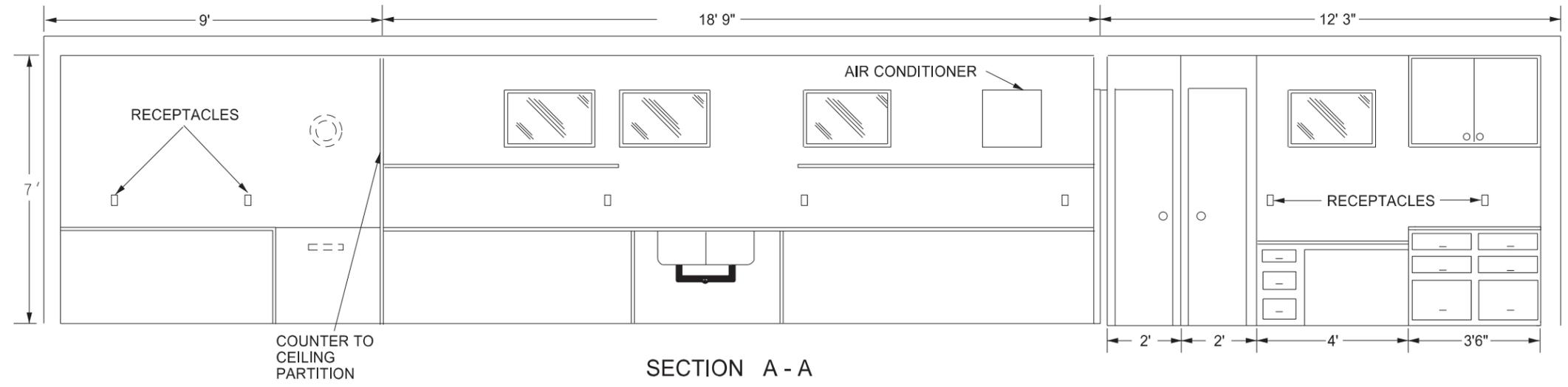
KIRK J. HOFF
 REGISTERED
Kirk J Hoff
 PROFESSIONAL
 PE-4683
 ENGINEER
 NORTH DAKOTA
 12 02 2020

BITUMINOUS LABORATORY

D-706-1



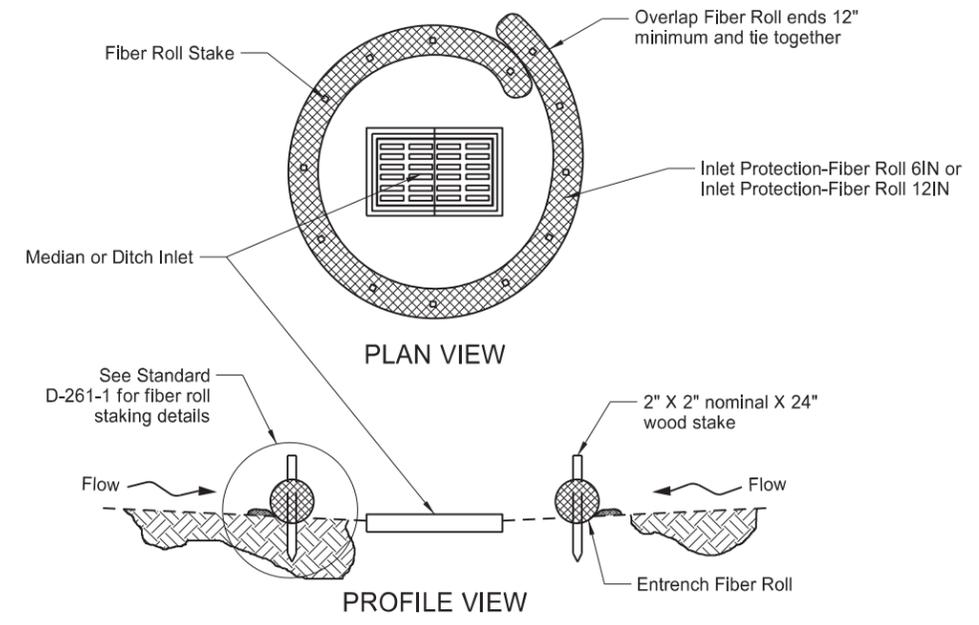
- Provide a laboratory with the following:
1. A 1'x1' shelf at 36" above the regular countertop.
 2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of 1/2 inch.
 3. An exhaust fan capable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



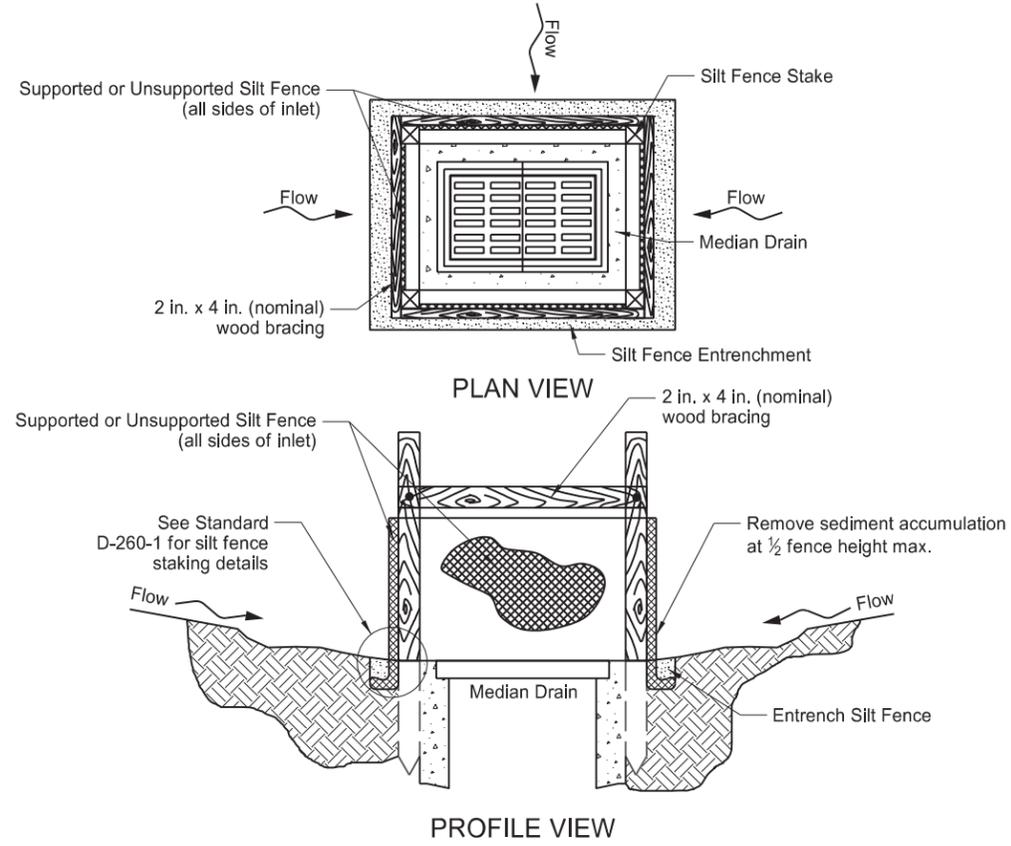
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.
08-27-19	New Design Engineer PE Stamp

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

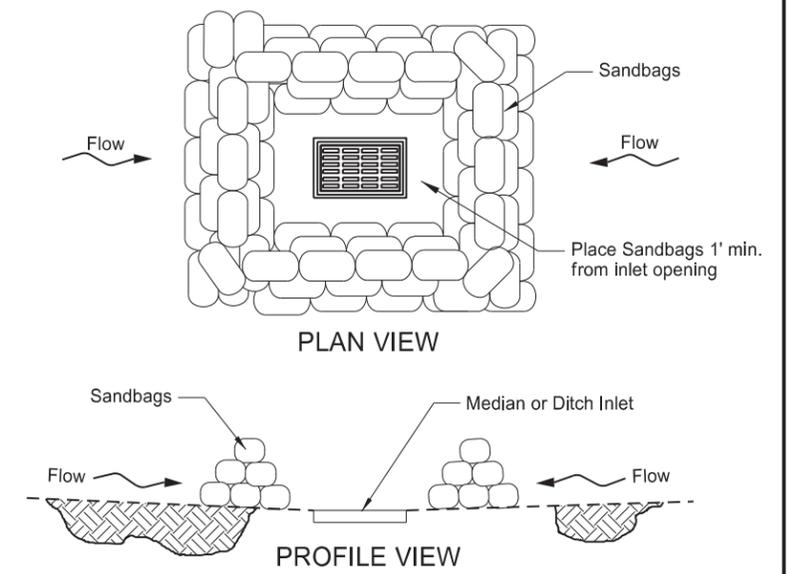
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



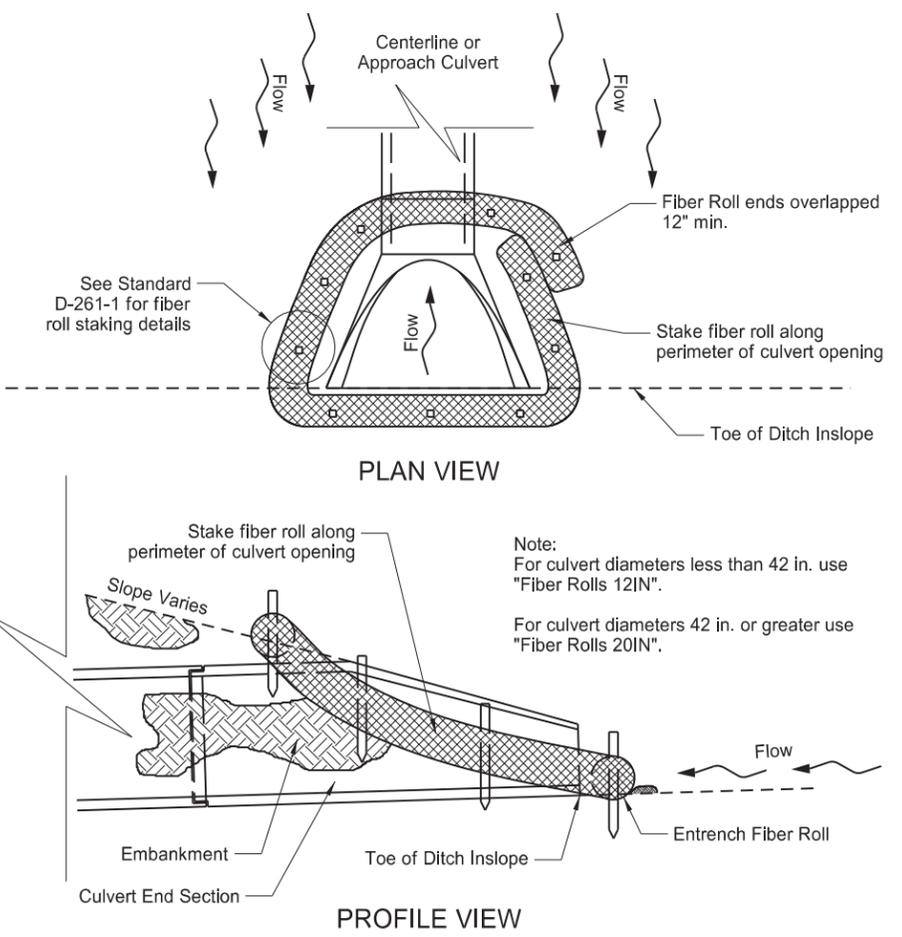
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



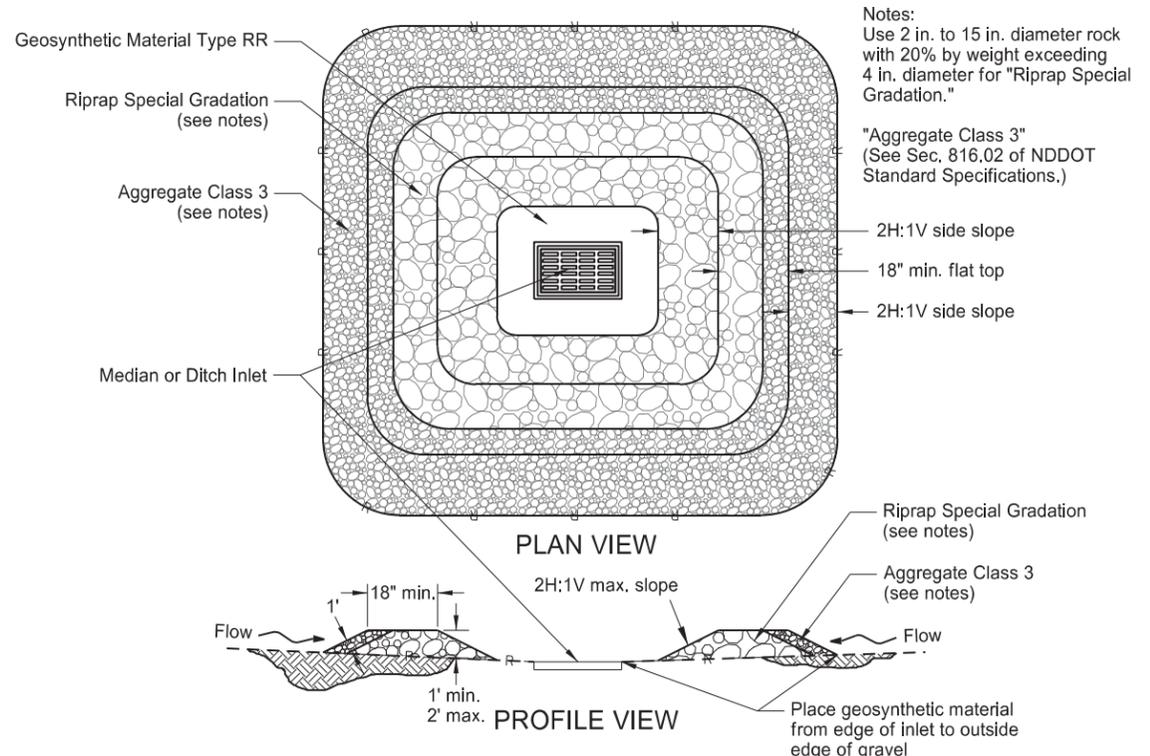
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



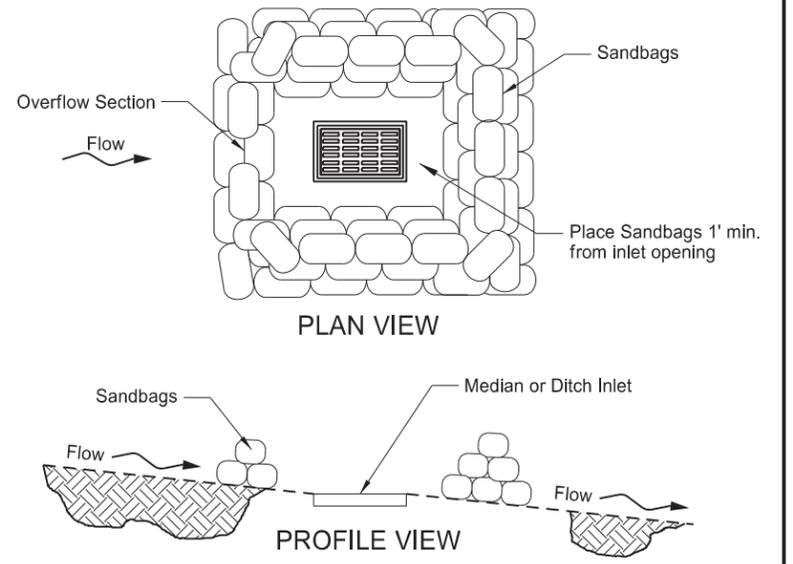
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



SANDBAG PROTECTION (ON SLOPE)

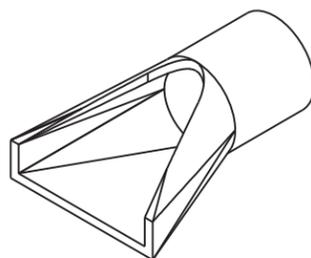
Notes:
 Use 2 in. to 15 in. diameter rock with 20% by weight exceeding 4 in. diameter for "Riprap Special Gradation."
 "Aggregate Class 3" (See Sec. 816.02 of NDDOT Standard Specifications.)

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.

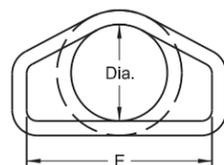
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REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

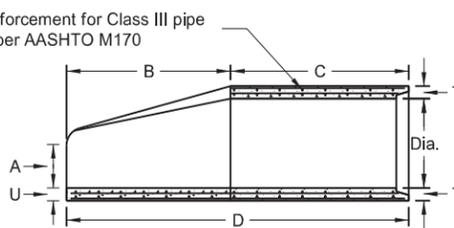
FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0 ⁷ / ₈ "	6'-0 ⁷ / ₈ "	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2 ¹ / ₄ "
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2 ¹ / ₂ "
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2 ¹ / ₂ "
24	0'-9 ¹ / ₂ "	3'-7 ¹ / ₂ "	2'-6"	6'-1 ¹ / ₂ "	4'-0"	3"
27	0'-10 ¹ / ₂ "	4'-0"	2'-1 ¹ / ₂ "	6'-1 ¹ / ₂ "	4'-6"	3 ¹ / ₂ "
30	1'-0"	4'-6"	1'-7 ¹ / ₄ "	6'-1 ³ / ₄ "	5'-0"	3 ¹ / ₂ "
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4 ¹ / ₂ "
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9 ¹ / ₄ "	8'-2 ¹ / ₄ "	7'-6"	5 ¹ / ₂ "
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5 ¹ / ₂ "
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6 ¹ / ₂ "
84	3'-0"	7'-6 ¹ / ₂ "	1'-9"	9'-3 ¹ / ₂ "	10'-0"	6 ¹ / ₂ "
90	3'-5"	7'-3 ¹ / ₂ "	2'-0"	9'-3 ¹ / ₂ "	11'-0"	6 ¹ / ₂ "



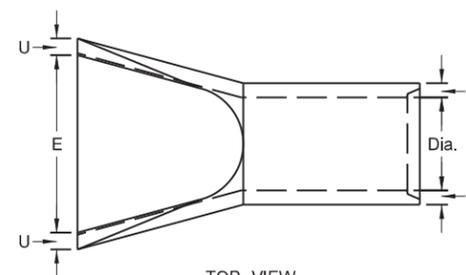
PERSPECTIVE



END VIEW



SIDE VIEW



TOP VIEW

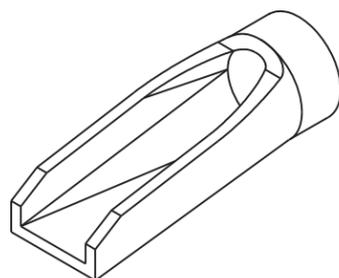
REINFORCED CONCRETE PIPE - FLARED END SECTION
Reinforcement to be equivalent to Class III RCP

Standard Reinforcement for Class III pipe reinforced as per AASHTO M170

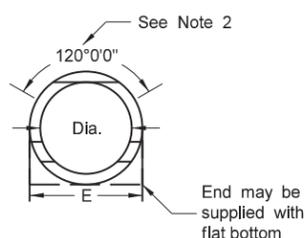
NOTES:

- All reinforcing steel shall meet AASHTO M170 requirements.
- All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
- Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
66" to 108" (incl.) = not less than 6 feet
- Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
- For Class IV and Class V reinforced concrete pipe and end section sizes which do not have reinforcement specified by AASHTO M170, shop drawings and design calculations shall be prepared and sealed by a Professional Engineer and submitted for the Engineer's review.

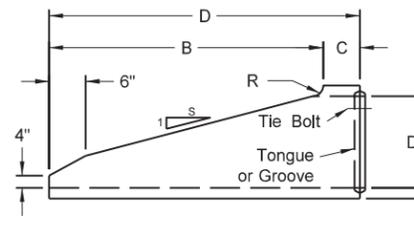
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7 ¹ / ₂ "	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3 ¹ / ₂ "	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



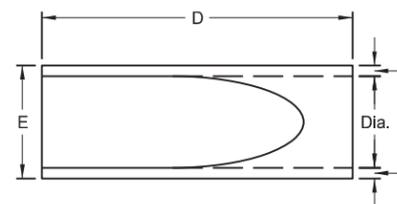
PERSPECTIVE



END VIEW



SIDE VIEW



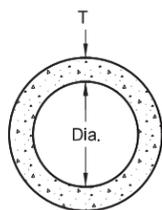
TOP VIEW

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION
Reinforcement to be equivalent to Class III RCP

NOTES (Traversable End Section):

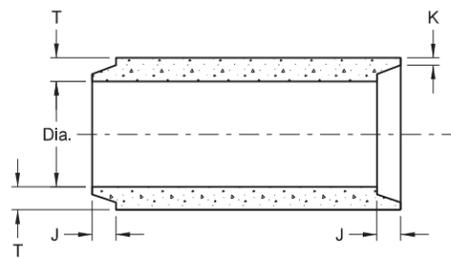
- Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
- Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

All Classifications of Round Concrete Pipe						
Internal Dia. of pipe in Inches	Cross-Sectional Water Area	Weight per Lin. Foot of pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue End Min.	Minimum Wall Thickness (T)	
Dia	Sq. ft.	Lbs.	In.	In.	In.	
12	0.79	92	1 ¹ / ₈ -2 ³ / ₈	3/4	2	
15	1.23	127	1 ³ / ₈ -2 ³ / ₄	7/8	2 ¹ / ₄	
18	1.77	168	1 ⁷ / ₈ -2 ⁷ / ₈	1	2 ¹ / ₂	
21	2.40	214	1 ⁷ / ₈ -3 ¹ / ₈	1 ¹ / ₈	2 ³ / ₄	
24	3.14	265	2 ³ / ₄ -3 ¹ / ₄	1 ¹ / ₂	3	
27	3.98	322	2 ³ / ₄ -4	1 ¹ / ₄	3 ¹ / ₄	
30	4.91	384	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	3 ¹ / ₂	
33	5.94	452	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	3 ³ / ₄	
36	7.07	524	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	4	
42	9.62	685	3 ³ / ₄ -4 ³ / ₄	1 ³ / ₄	4 ¹ / ₂	
48	12.57	885	3 ³ / ₄ -4 ³ / ₄	1 ³ / ₄	5	
54	15.90	1070	4 ¹ / ₈ -5 ¹ / ₄	2	5 ¹ / ₂	
60	19.63	1296	4 ¹ / ₂ -5 ¹ / ₂	2 ¹ / ₄	6	
66	23.76	1542	5-6	2 ³ / ₈	6 ¹ / ₂	
72	28.27	1810	5 ⁵ / ₈ -6 ³ / ₄	2 ³ / ₈	7	
78	33.18	2098	6 ¹ / ₄ -7 ¹ / ₄	2 ³ / ₈	7 ¹ / ₂	
84	38.48	2410	5 ⁵ / ₈ -7 ¹ / ₄	3 ³ / ₈	8	
90	44.18	2793	6 ³ / ₄ -8 ¹ / ₂	3 ³ / ₈	8 ¹ / ₂	
96	50.27	3092	7-8 ¹ / ₄	3 ¹ / ₂	9	
102	56.75	3466	7-8 ¹ / ₄	3 ¹ / ₂	9 ¹ / ₂	
108	63.62	3864	7 ¹ / ₄ -8 ¹ / ₂	3 ³ / ₄	10	

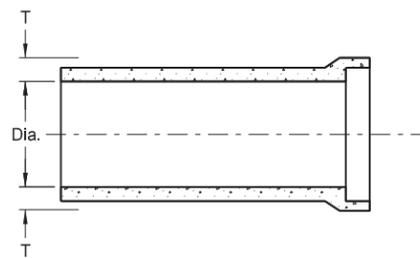


END VIEW

CIRCULAR PIPE

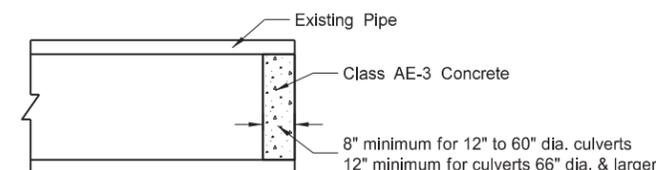


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



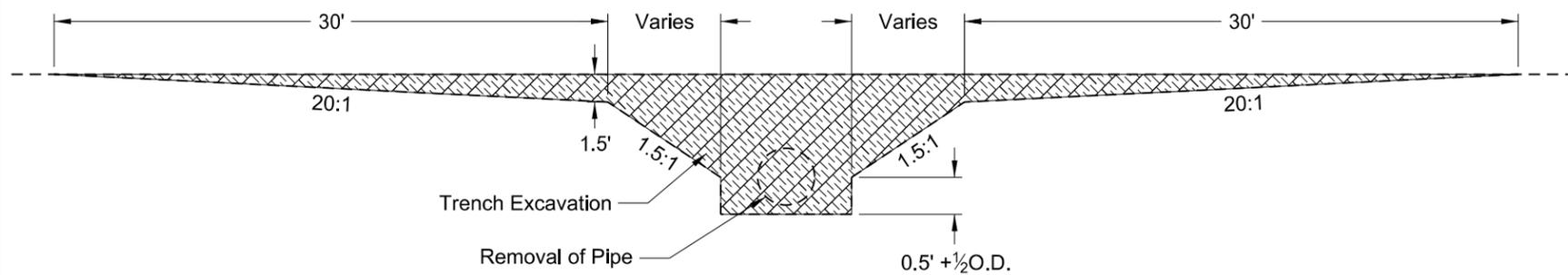
CONCRETE PIPE PLUG

SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

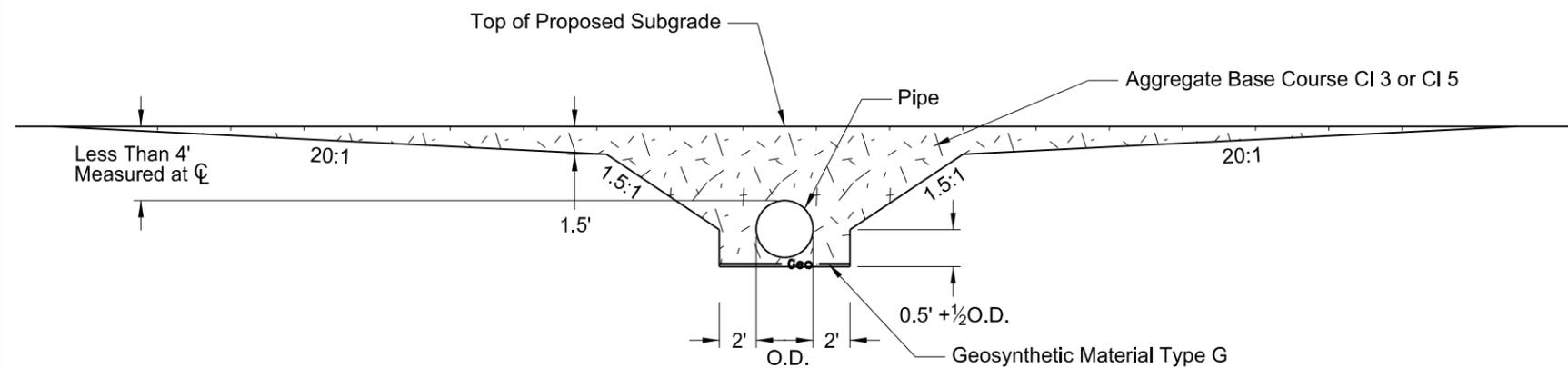
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5
11-21-16	Revised End Section Dimensions
09-18-19	Updated Perspective View Details

This document was originally issued and sealed by
Jon Ketterling
Registration Number PE-4684,
on 9/18/19 and the original document is stored at the North Dakota Department of Transportation

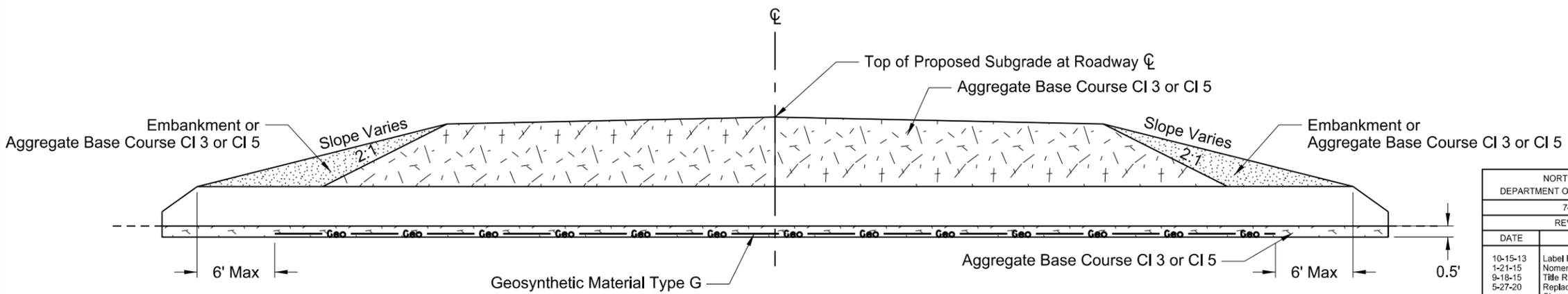
TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL
PIPES 4 FEET OR LESS BELOW TOP OF SUBGRADE



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items

- 1) Pipe*
- 2) Geosynthetic Material Type G
- 3) Removal of Pipe (if required)

*Included in Pipe Pay Item

- 1) Pipe
- 2) Trench Excavation
- 3) Aggregate Base Course CI 3 or CI 5
- 4) Embankment

NOTES:

- 1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.
- 2) Embankment may be either borrow Excavation or Common Excavation - Type A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13	Label Formatting
1-21-15	Nomenclature
9-18-15	Title Rewording
5-27-20	Replaced R1 Fabric with Geogrid Changed bedding depth

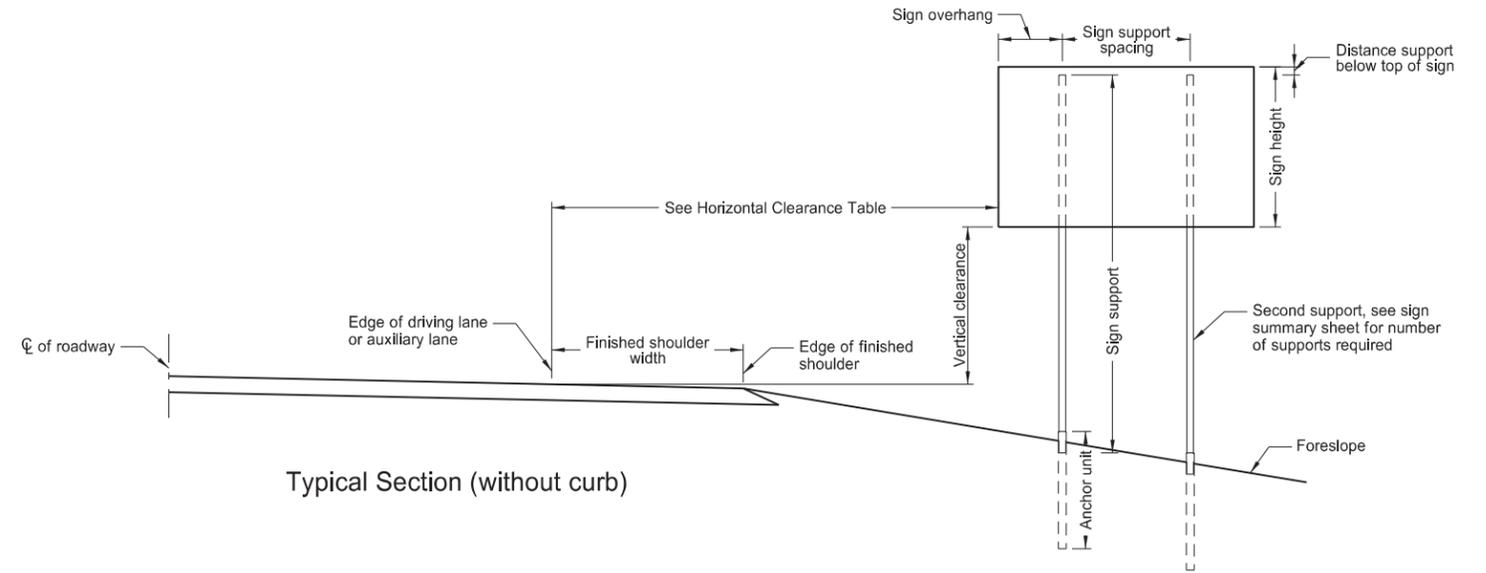


PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

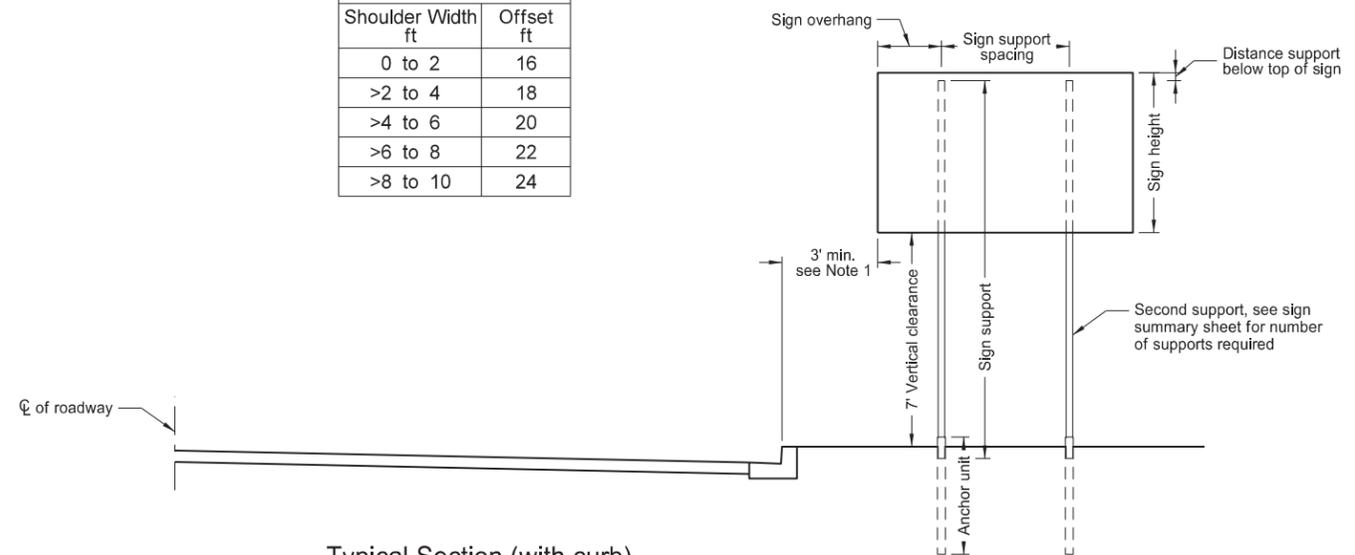
Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
2. Minimum vertical clearance: Provide at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane at the side of the road in rural districts. Provide at least 7' clearance to the bottom of the sign, where parking or pedestrian movements occur.
Install signs on expressways a minimum height of 7'.
Install adopt-a-highway signs on Freeways at least 7' above the edge of the driving lane.
Maximum vertical clearance is 6" greater than the minimum vertical clearance.
3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.

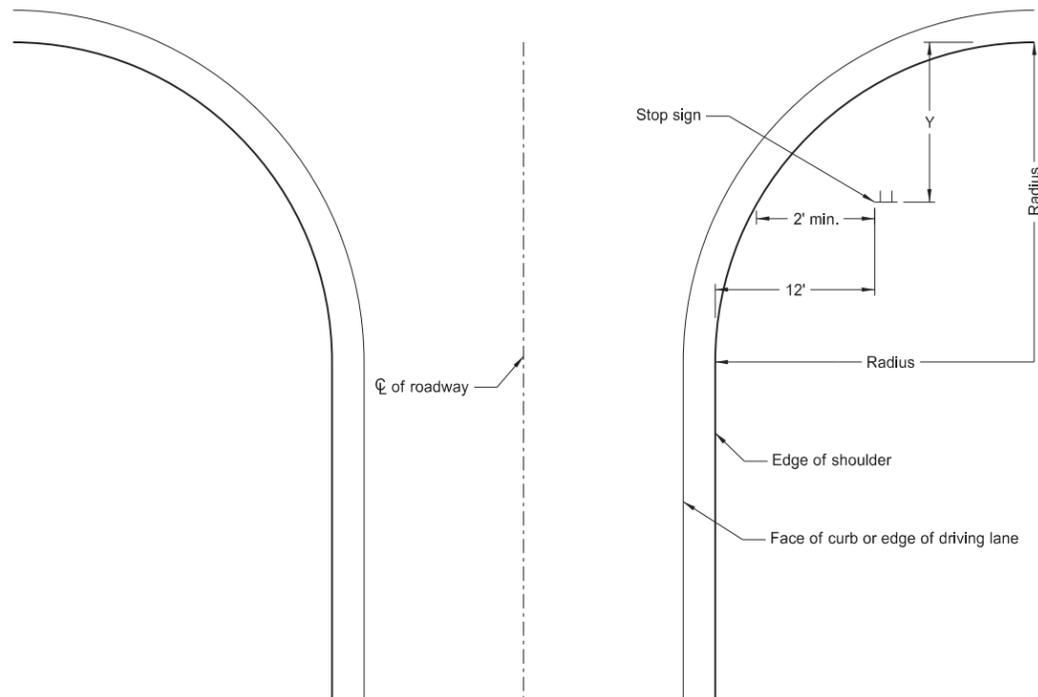


Typical Section (without curb)

Horizontal Clearance Table	
Shoulder Width ft	Offset ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24



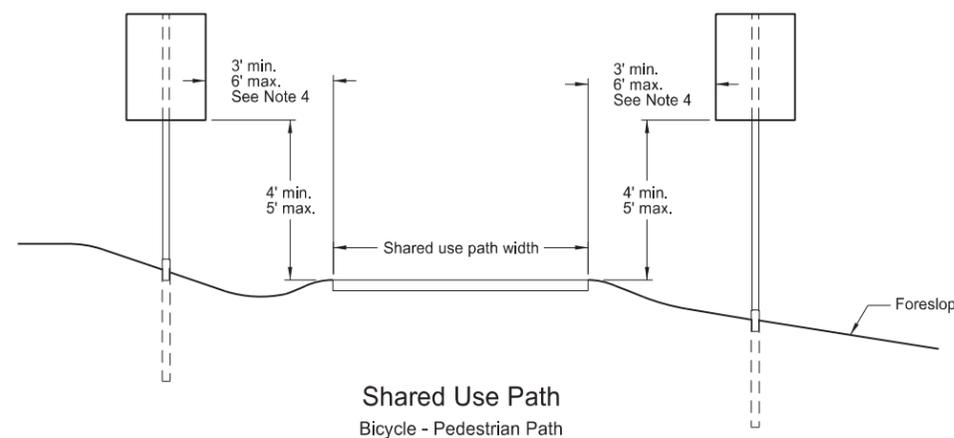
Typical Section (with curb)
Residential or Business District



Stop Sign Location
Wide Throat Intersection

Use layout for the placement of "Stop" signs.

Radius ft.	Y-max. ft.	Y-min. ft.
40	50	15
45	50	18
50	50	21
55	50	25
60	50	28
65	50	32
70	50	35
75	50	39
80	50	43



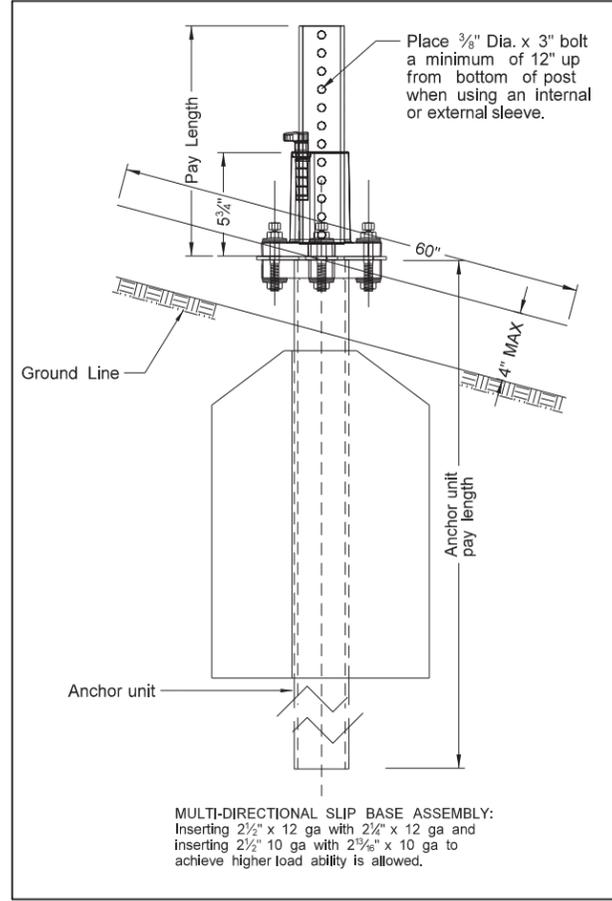
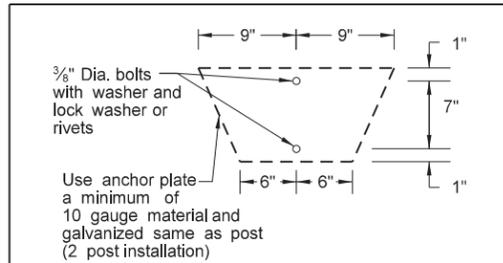
Shared Use Path
Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.
8-30-18	Updated notes to active volcs.
8-29-19	New Design Engineer PE Stamp.

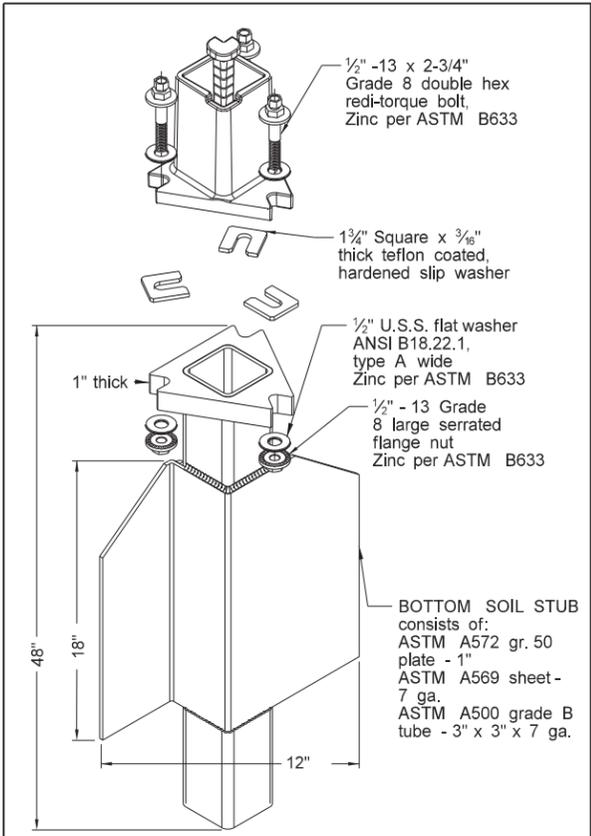
This document was originally issued and sealed by
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Registration Number
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Telescoping Perforated Tube							
Number of Posts	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/8	10	Yes		7

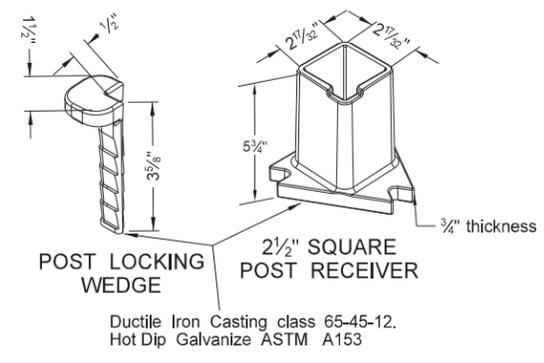
(B) - Provide a shim as specified by the manufacturer when placing 2 1/2", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
 (C) - 3" anchor unit
 (D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.



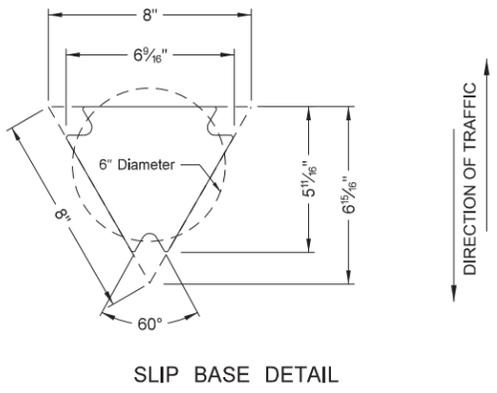
Mounting Details Perforated Tube



SLIP BASE FOR 2 1/2" POST



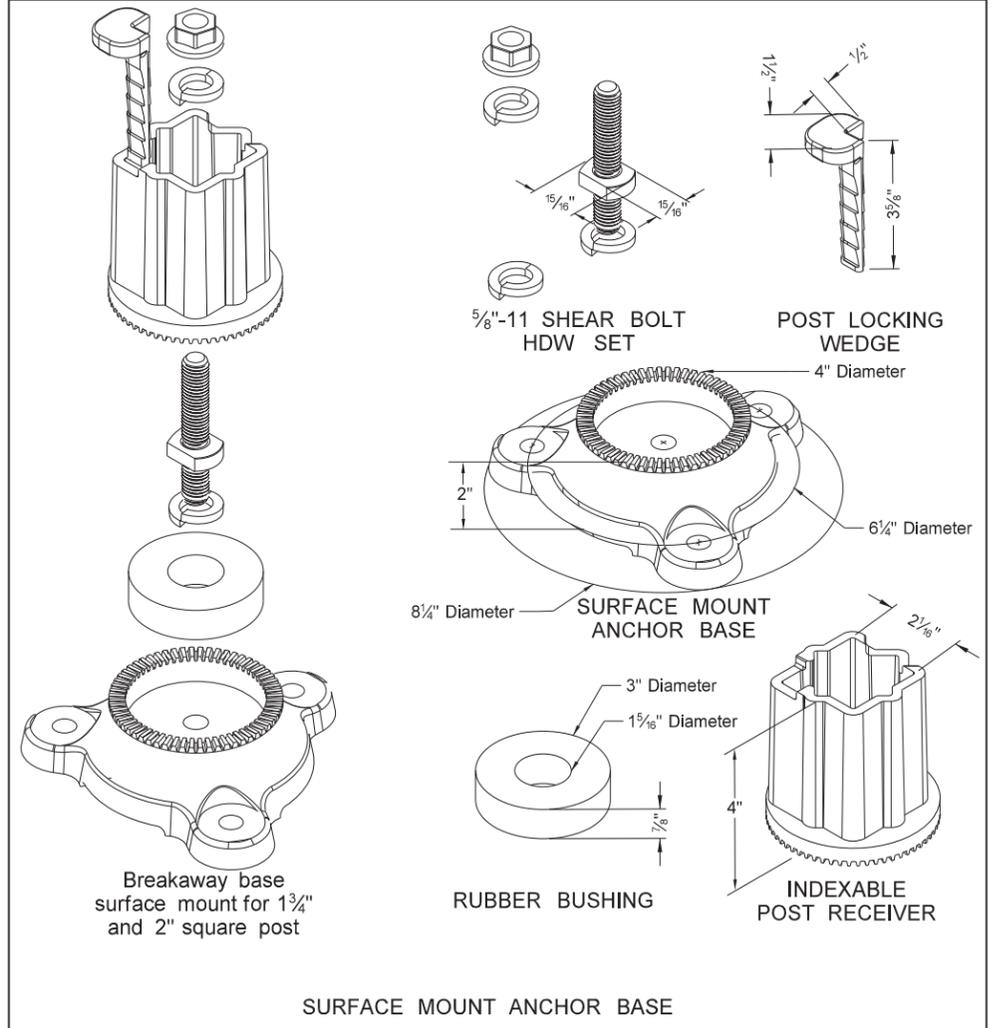
SLIP BASE DETAIL



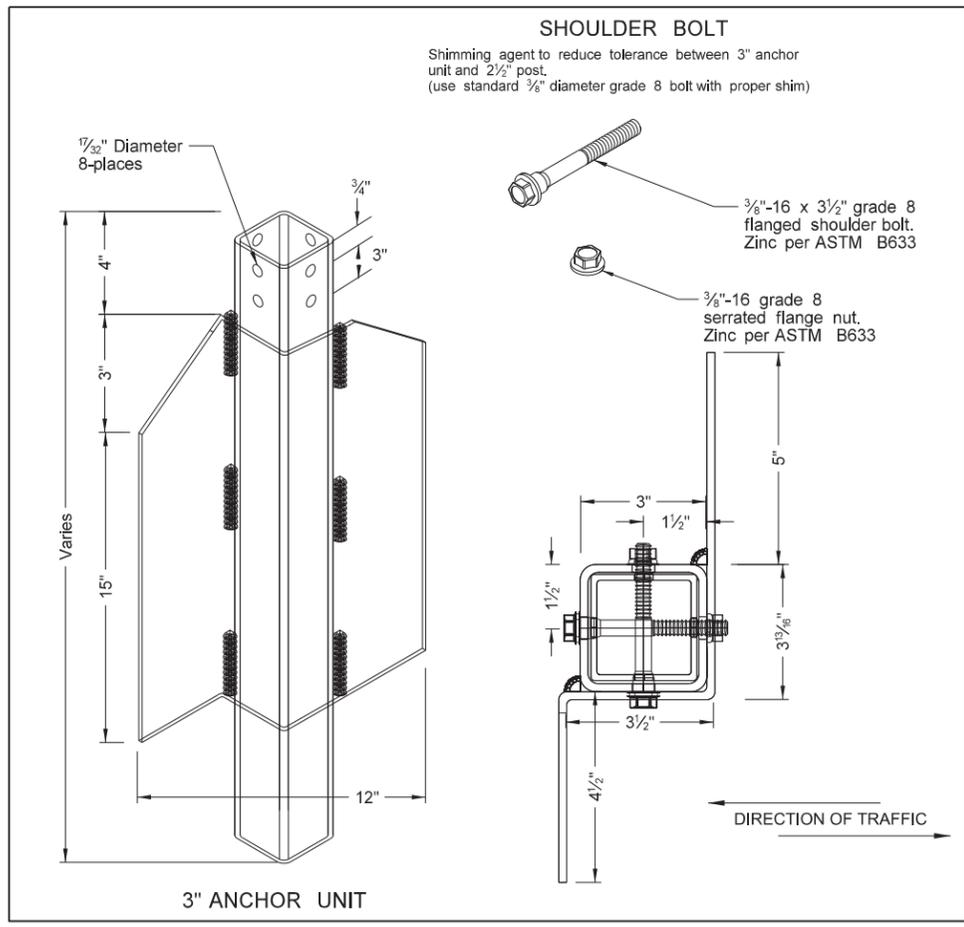
Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. Area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

The 2 3/8" size 10 gauge is shown as 2.19" size on the plans;
 The 2 1/2" size is shown as 2.51" size on the plans.

- NOTE:
- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
 - Provide 7 gauge HRPO commercial quality ASTM A569 and 3" x 3" x 7" gauge ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
 - Eliminate wings when anchor is used in concrete sidewalk.
 - Provide a minimum 8" distance between the first and fourth post on four post signs.
 - Install in accordance with manufacturers recommendation.
 - Use a minimum 1/2" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.



SURFACE MOUNT ANCHOR BASE



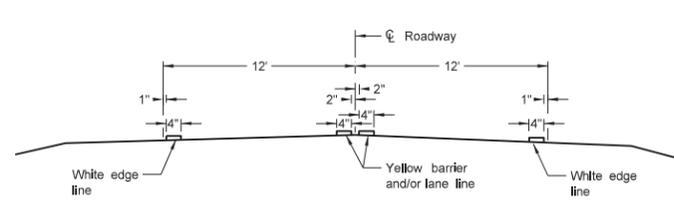
3" ANCHOR UNIT

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.

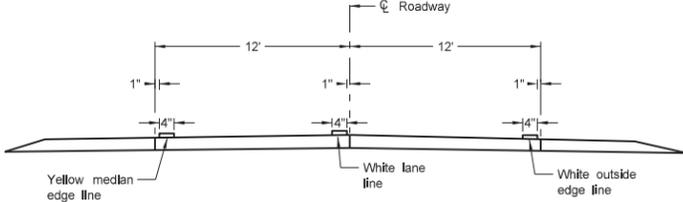
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PAVEMENT MARKING

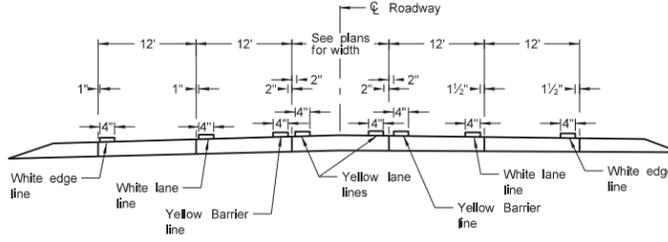
D-762-4



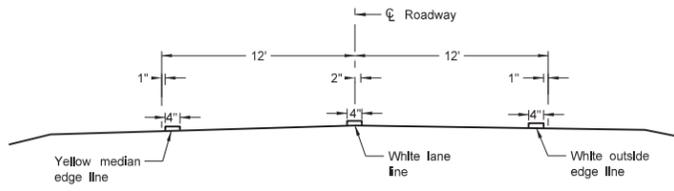
Two Lane Two Way
RURAL ROADWAY



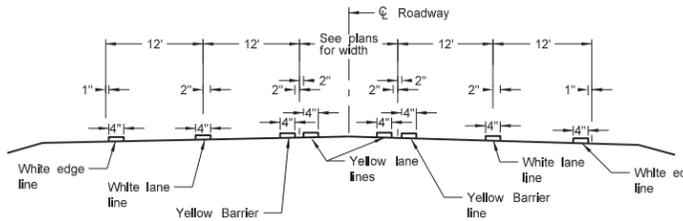
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



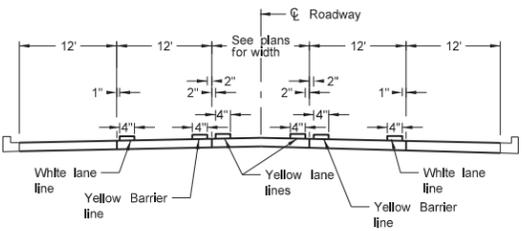
RURAL FIVE LANE ROADWAY
Concrete Section



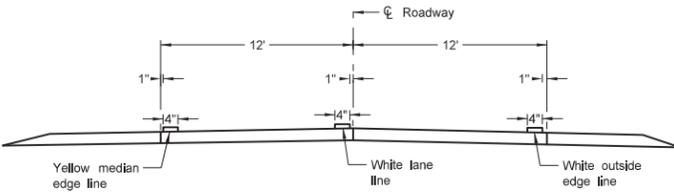
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



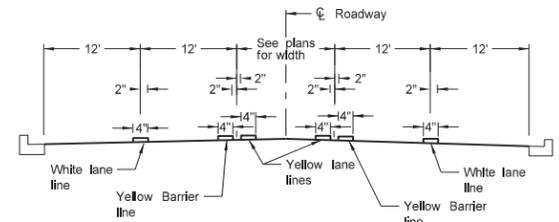
RURAL FIVE LANE ROADWAY
Asphalt Section



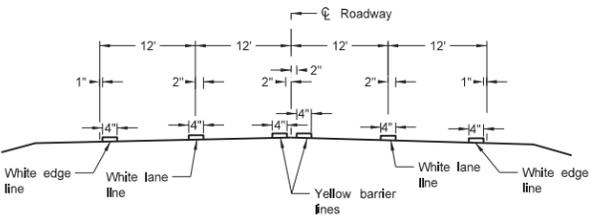
URBAN FIVE LANE SECTION
Concrete Section



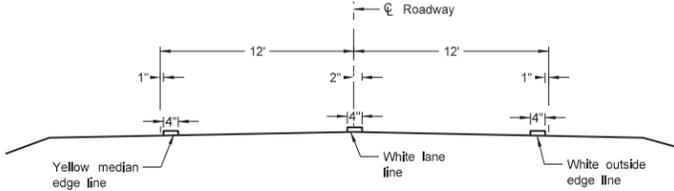
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



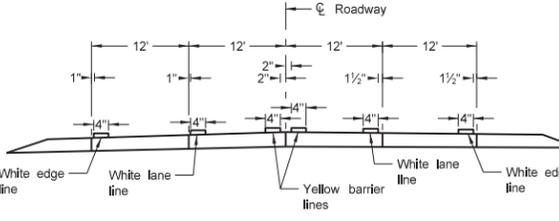
URBAN FIVE LANE SECTION
Asphalt Section



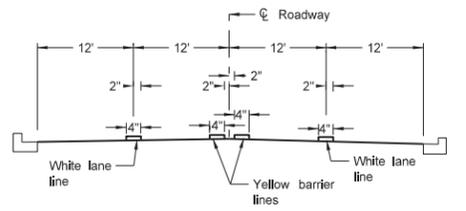
RURAL FOUR LANE ROADWAY
Asphalt Section



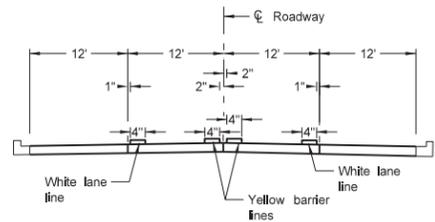
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



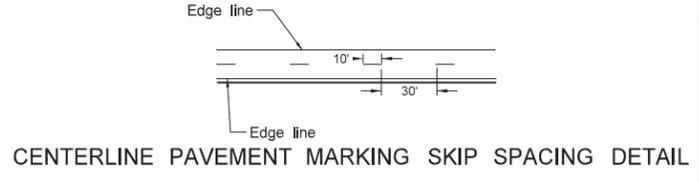
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.

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.

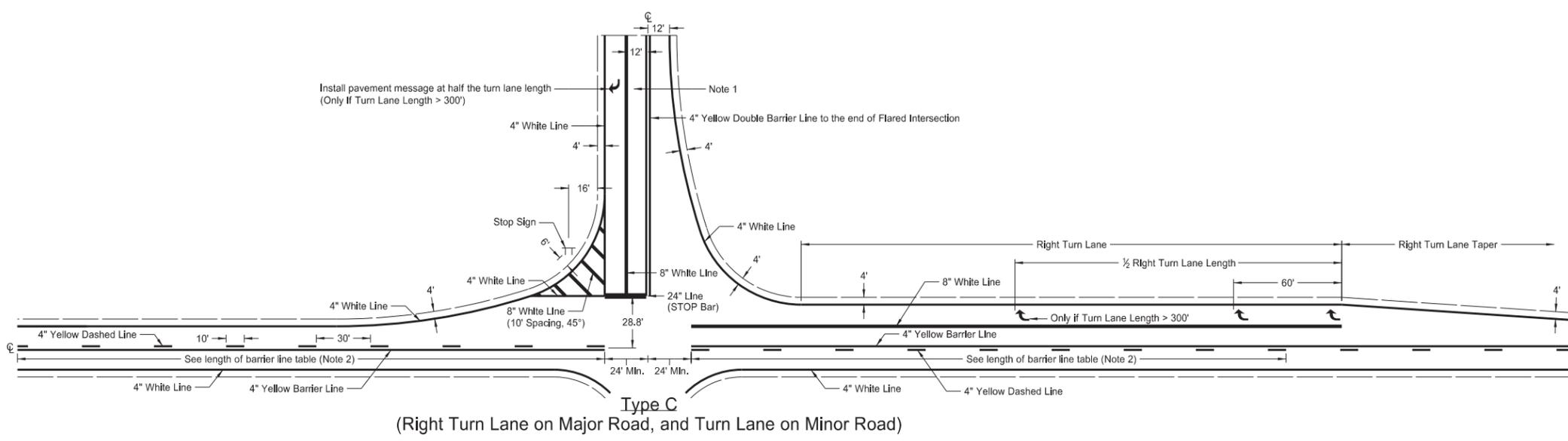
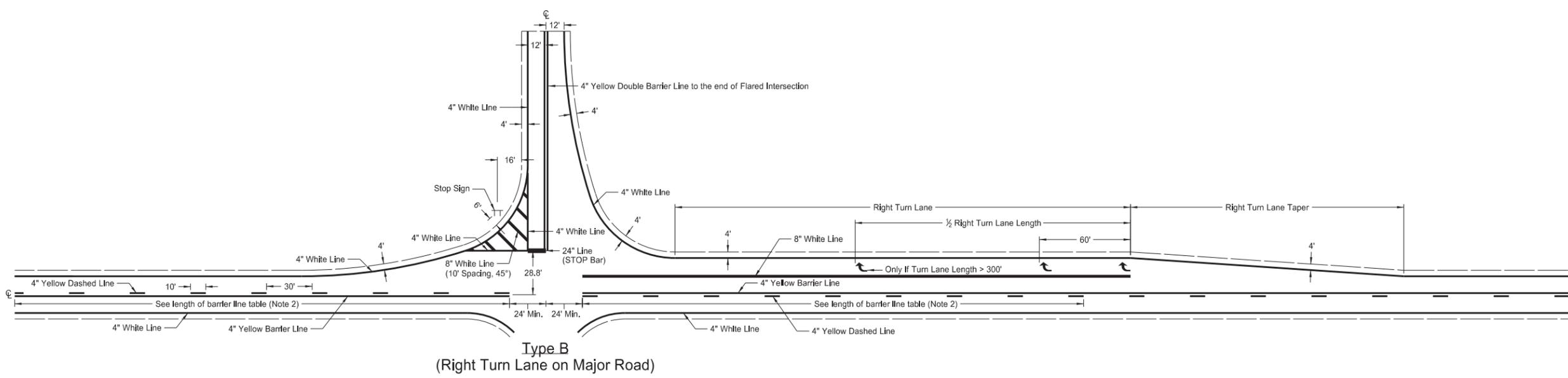
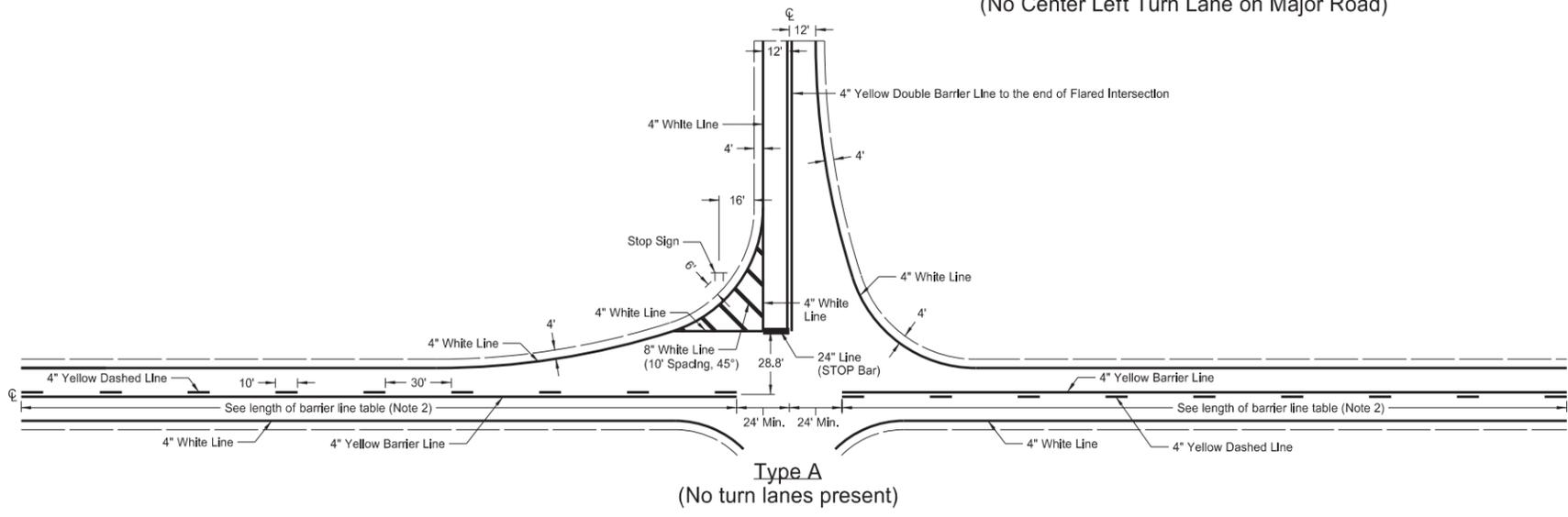
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Registration Number
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on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

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

Notes

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

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

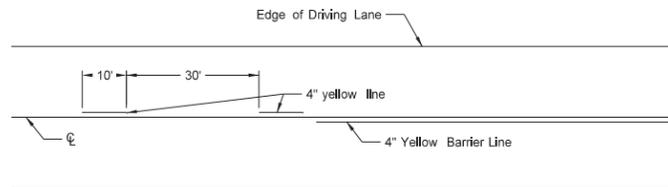


—— 4" Marking
 ——— 8" Marking
 ——— 24" Marking

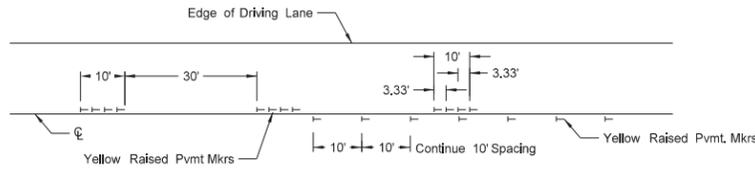
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17	Updated note & dimensioning.
8-30-18	Corrected pvt mkg placement.
8-27-19	New Design Engineer PE Stamp.

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 of Transportation

SHORT-TERM PAVEMENT MARKING

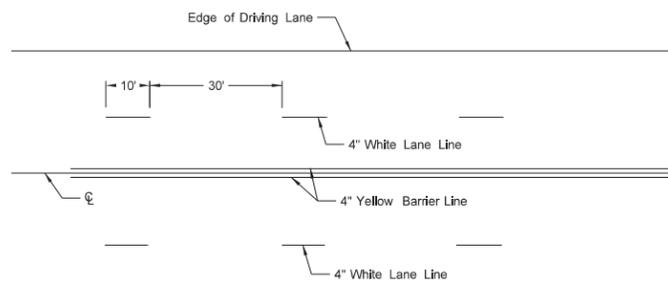


Painted or Tape Lines

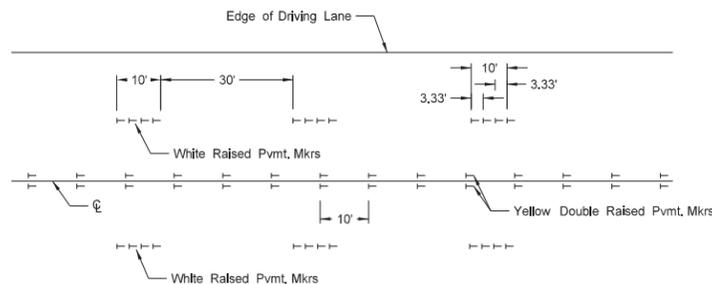


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

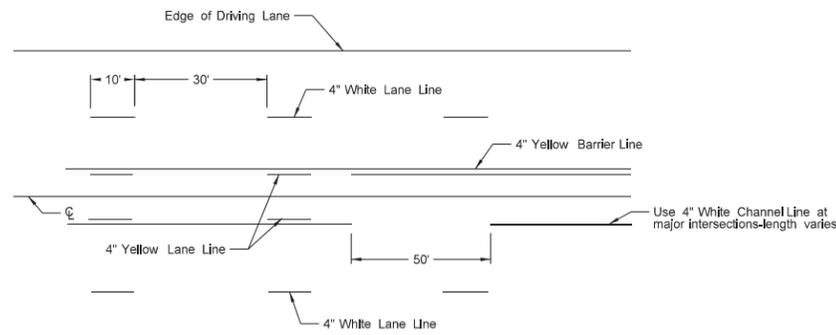


Painted or Tape Lines

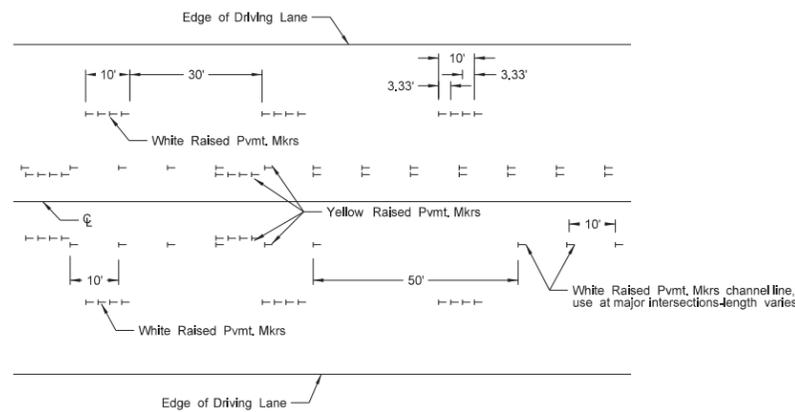


Raised Pavement Markers

FOUR LANE ROADWAY

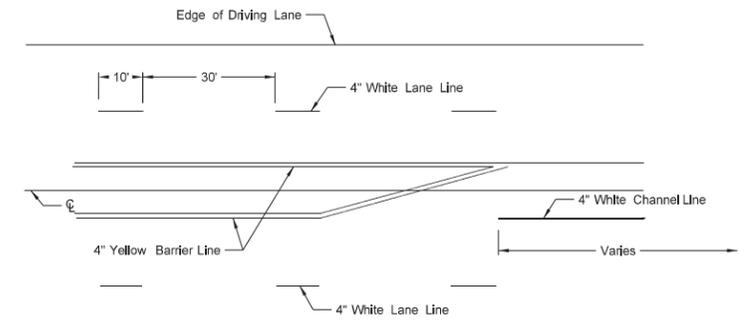


Painted or Tape Lines

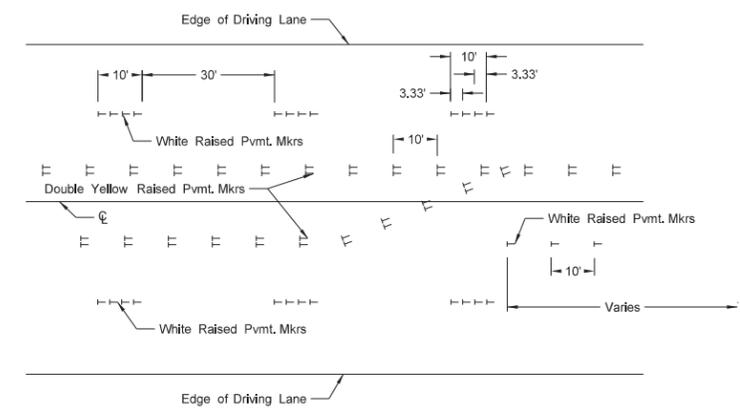


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.

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

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