

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  
HEN-5-085(081)073

Stark  
US 85 & 38th St SW  
Turn Lane

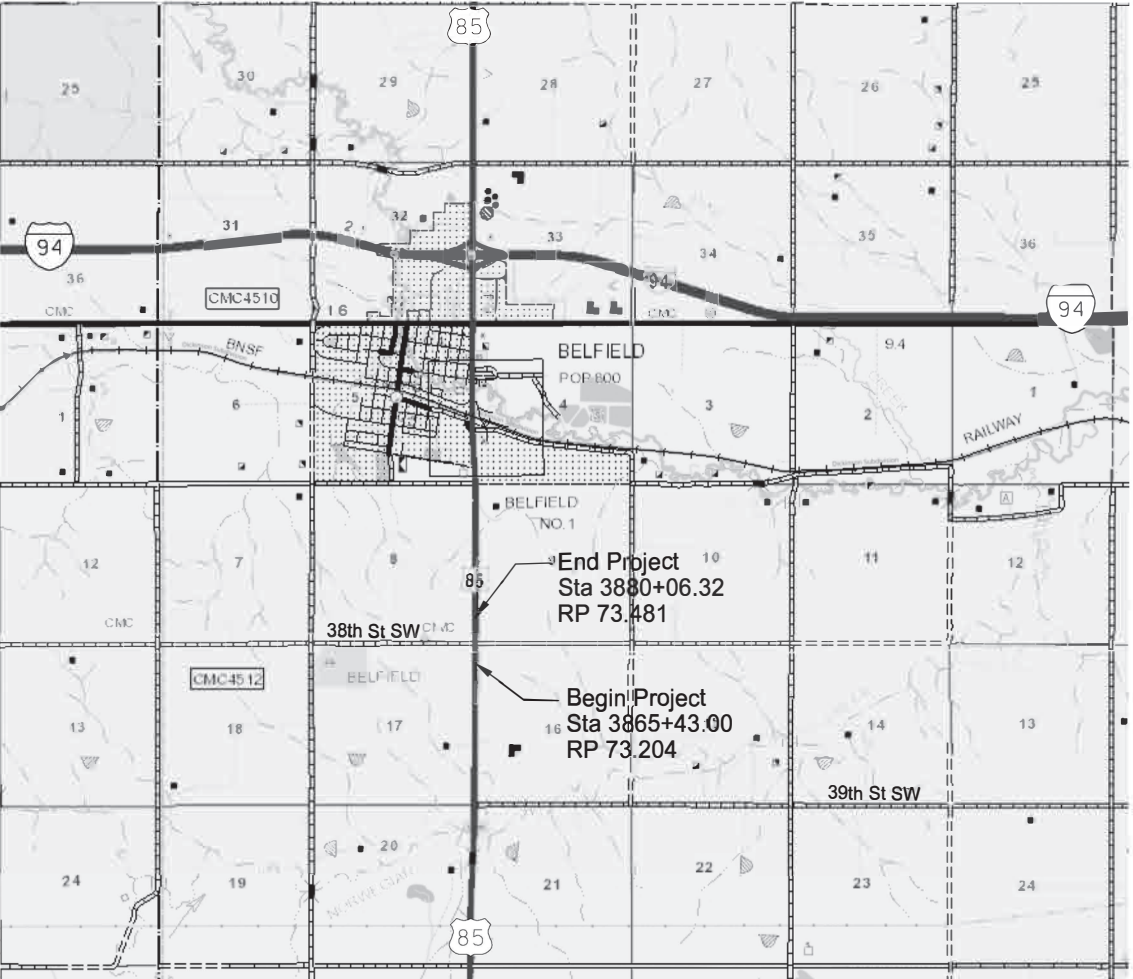
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	22832	1	1

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

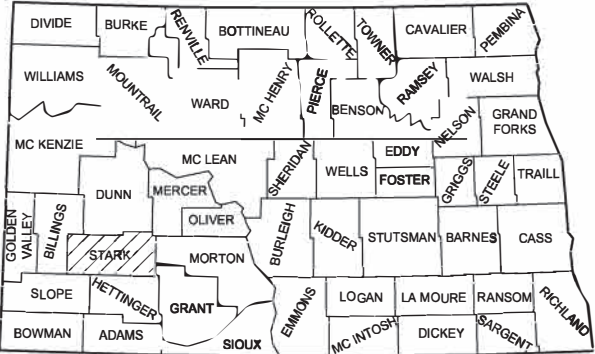


T-140-N  
T-139-N



R-100-W  
R-99-W

R-99-W  
R-98-W



STATE COUNTY MAP

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

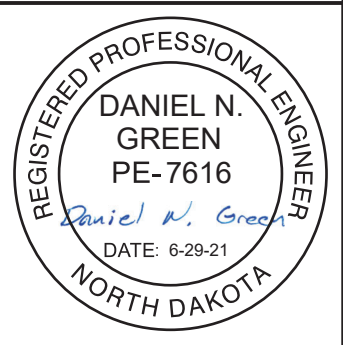
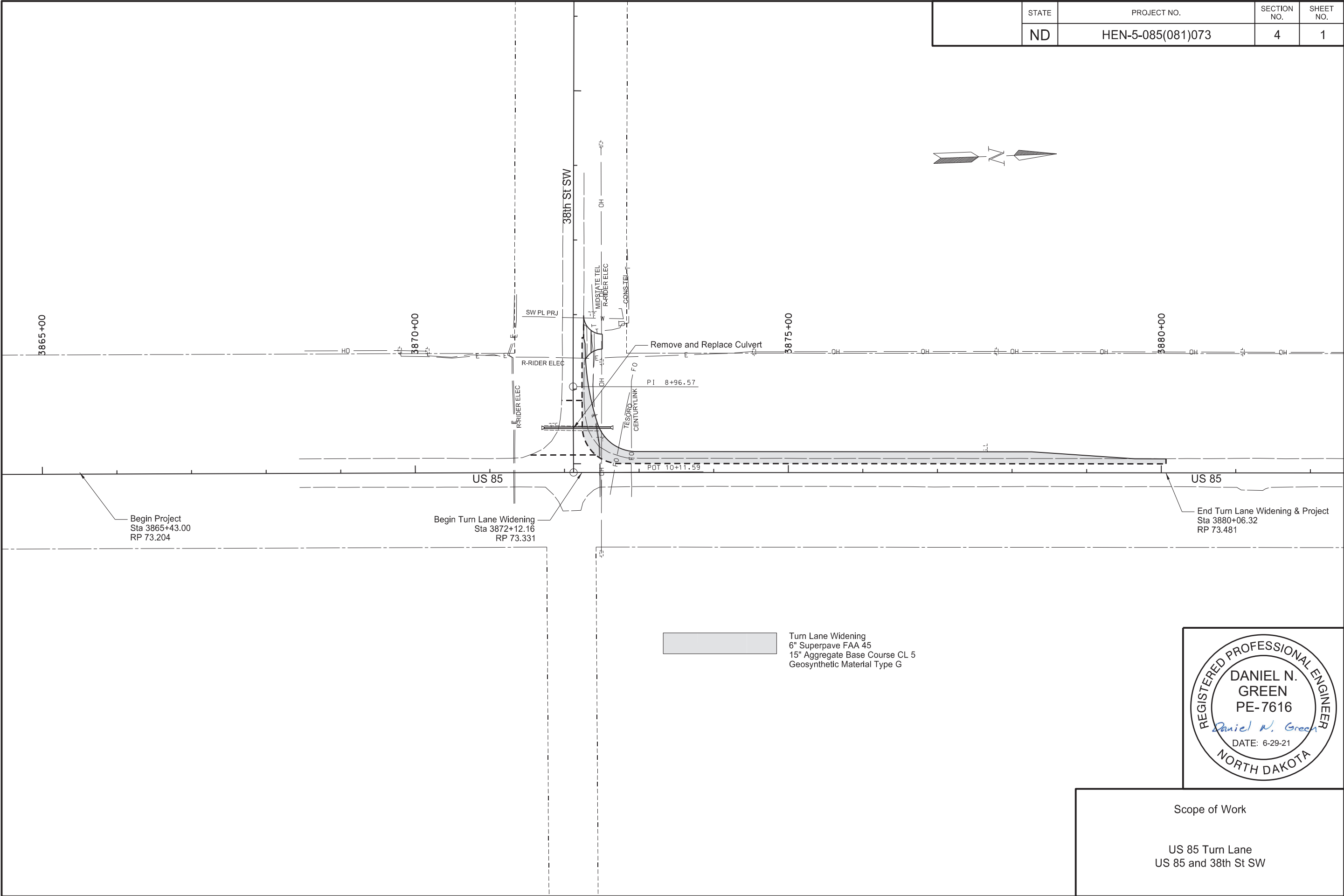
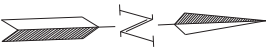
ND DEPARTMENT OF TRANSPORTATION  
OFFICE OF PROJECT DEVELOPMENT  
Hoff, Kirk J.  
11/24/21

BARTLETT & WEST, INC



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2	1	Table of Contents	D-101-20, 21	Line Styles					
4	1	Scope of Work	D-101-30, 31, 32, 33	Symbols					
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Scope of Work

US 85 Turn Lane  
US 85 and 38th St SW

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:

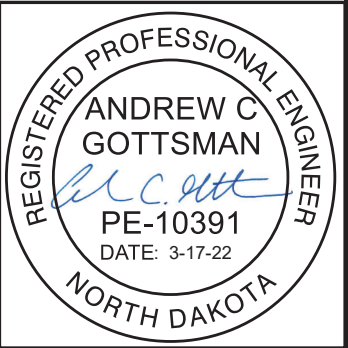
- Have no adhesives or fasteners required for placement;
- Have a manufacture's speed rating that meets or exceeds the posted speed limit; and
- Each strip in the array must weigh a minimum of 100 pounds.

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.





NOTES

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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 38<sup>th</sup> 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

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-5-085(081)073	10	1

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

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

<b>Materials</b>		
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

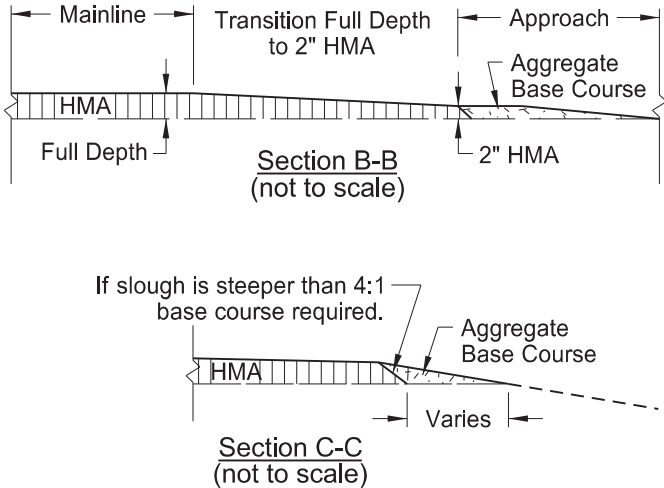
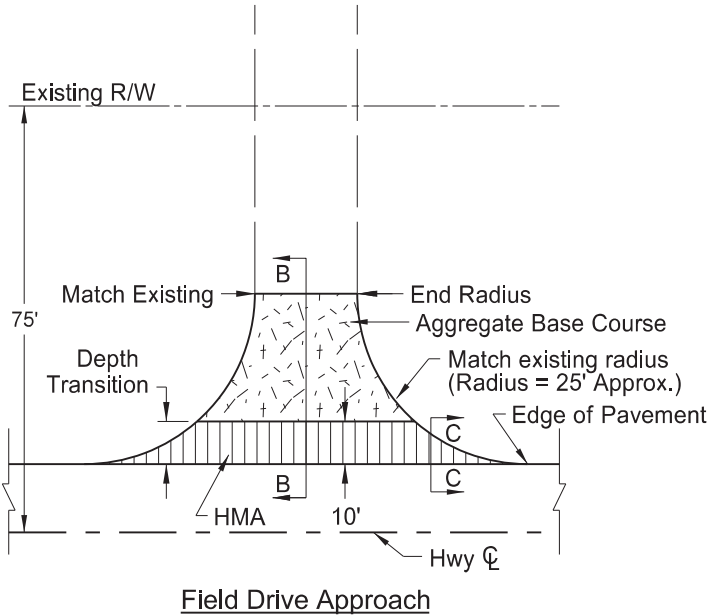
\*\* Common Excavation – Waste material is intended to be used as embankment on project NH-5-085(077)074



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-5-085(081)073	20	1

Notes:

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



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

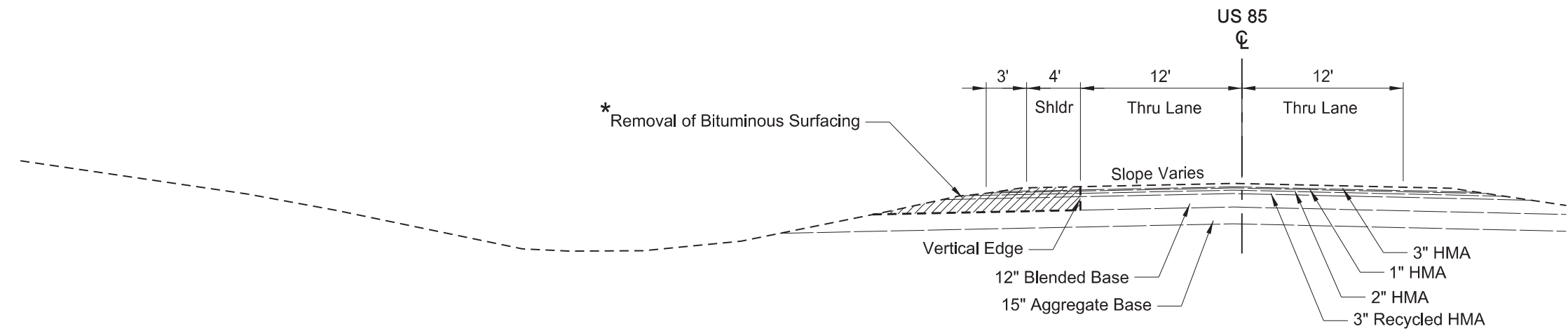


Approach Paving Detail for Existing Rural Approach  
(No Approach Grading)

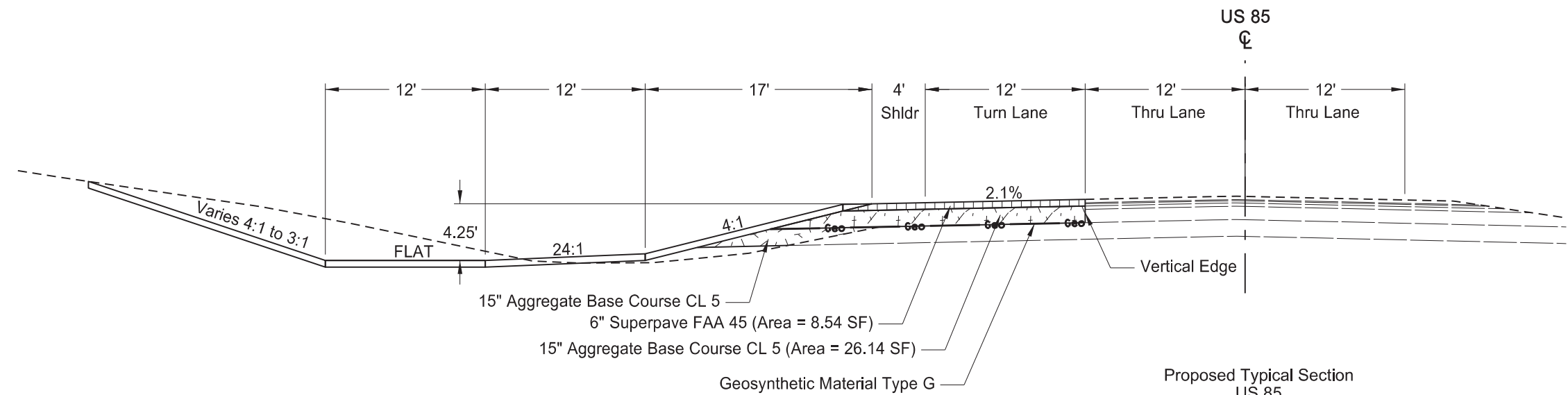
US 85 Turn Lane  
US 85 and 38th St SW



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-5-085(081)073	30	1



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

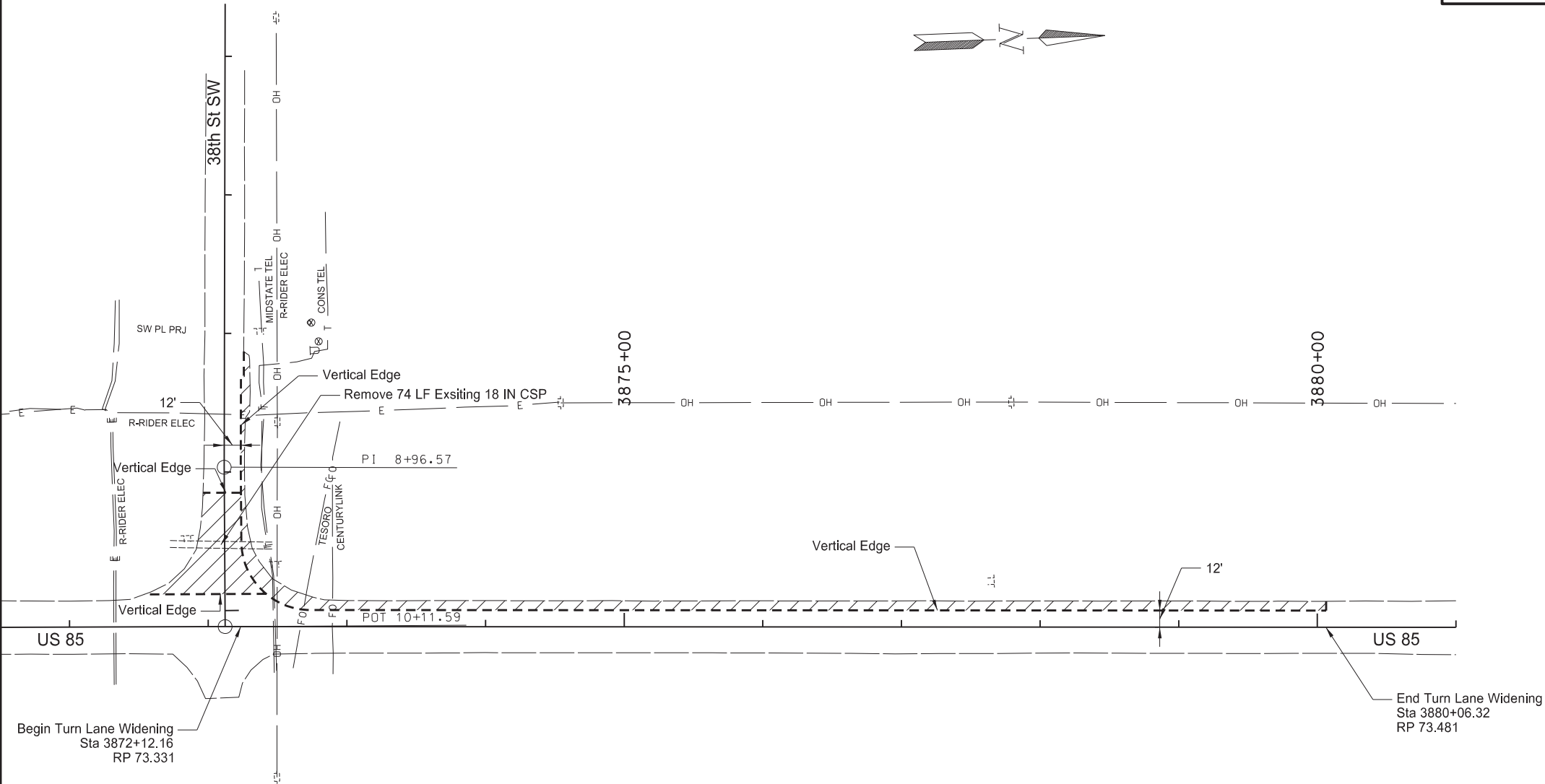


Typical Sections

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



Removals

US 85 Turn Lane  
US 85 and 38th St SW

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-5-085(081)073	51	1

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
													Begin	End	
				In	Bid Item	LF		In	Type		In	SY	EA	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

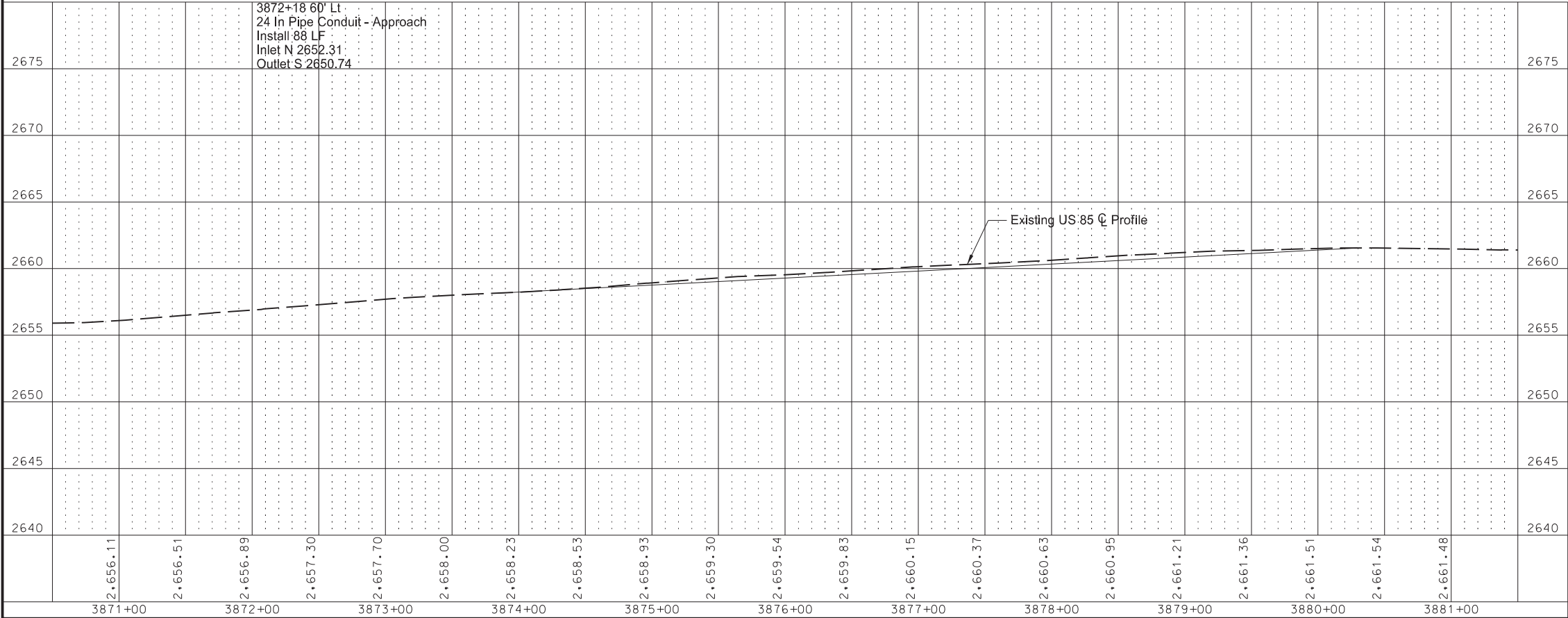
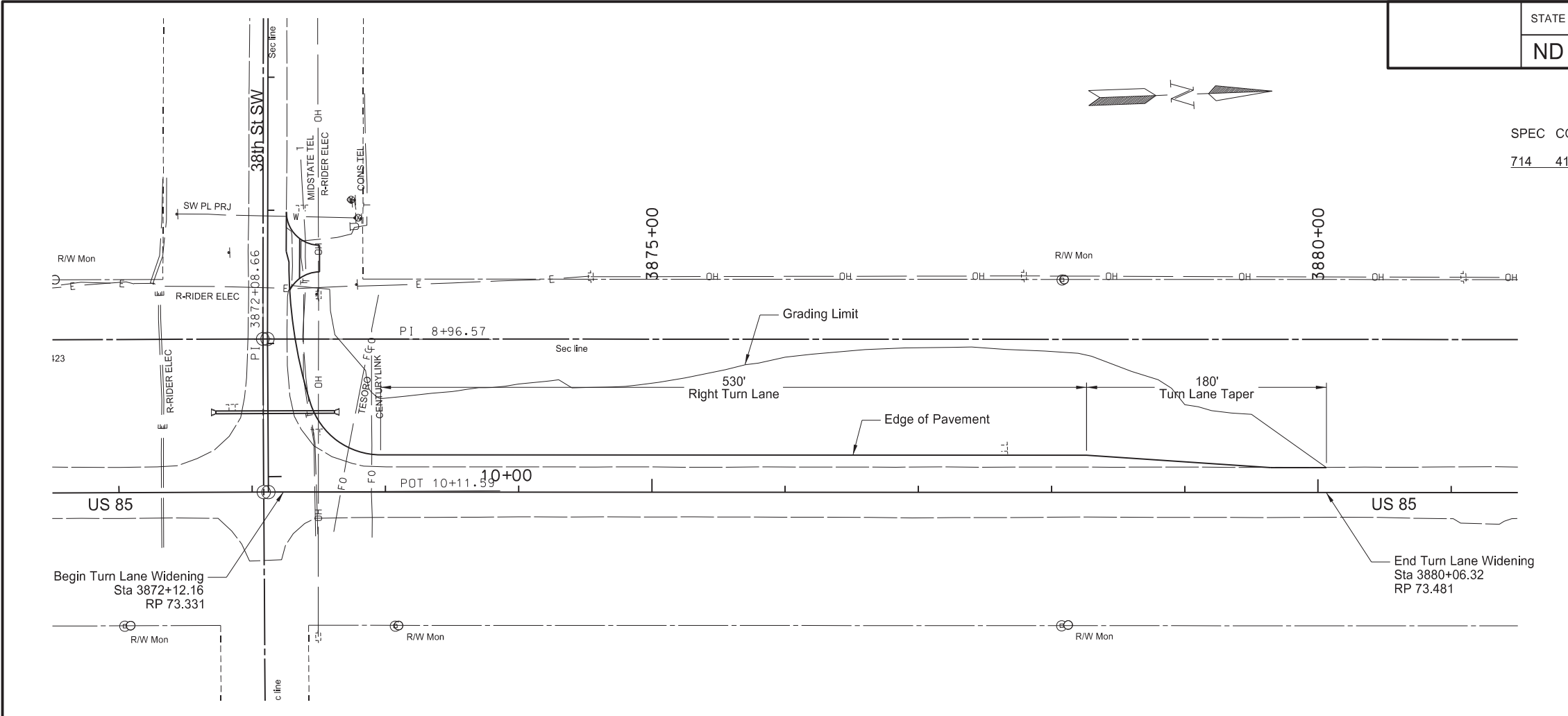


Allowable Pipe List

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		
		3871+74 60' LT to 3872+60 60' LT	86	LF



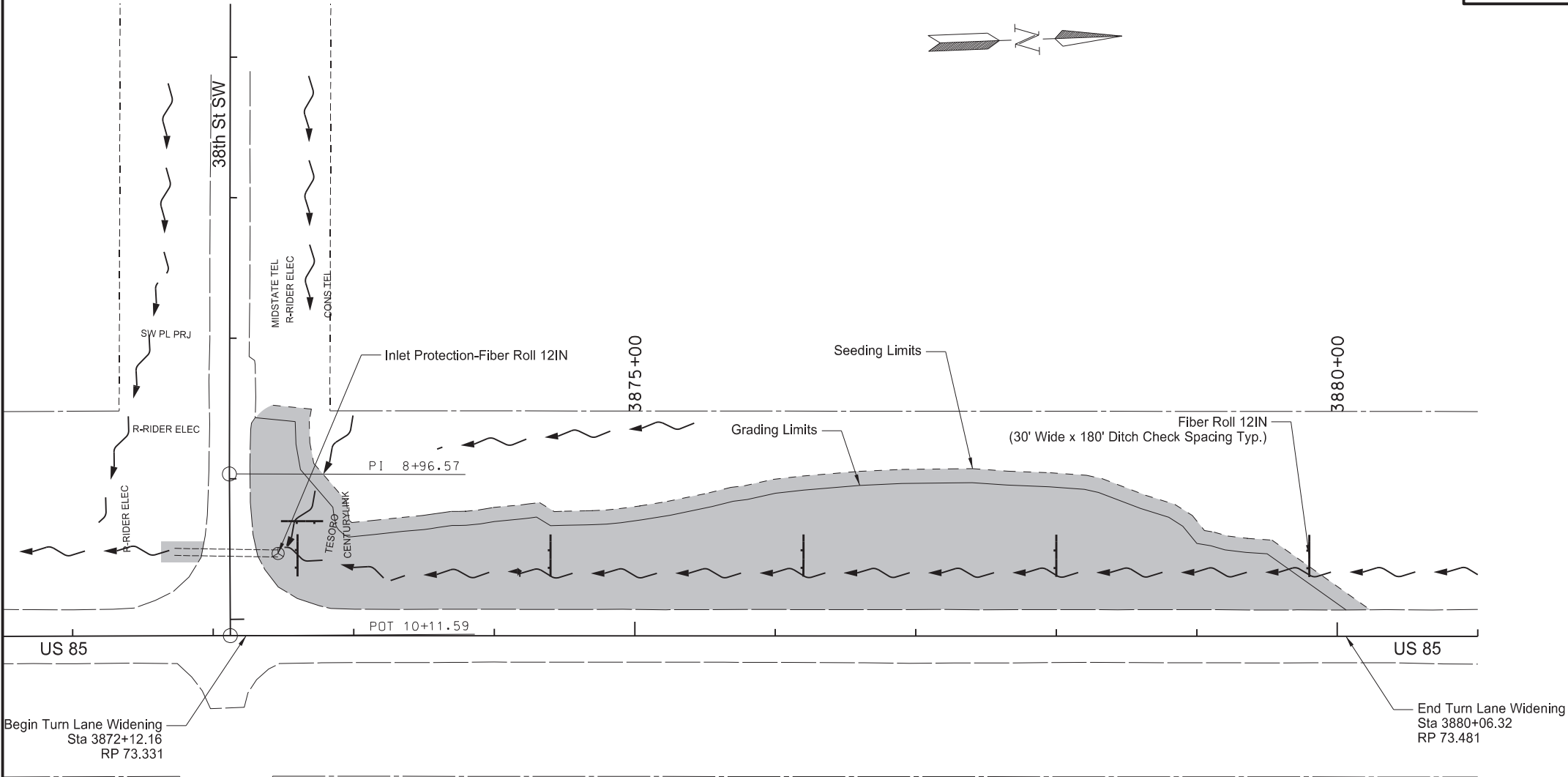
Plan & Profile

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.



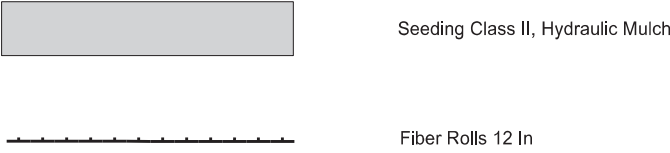
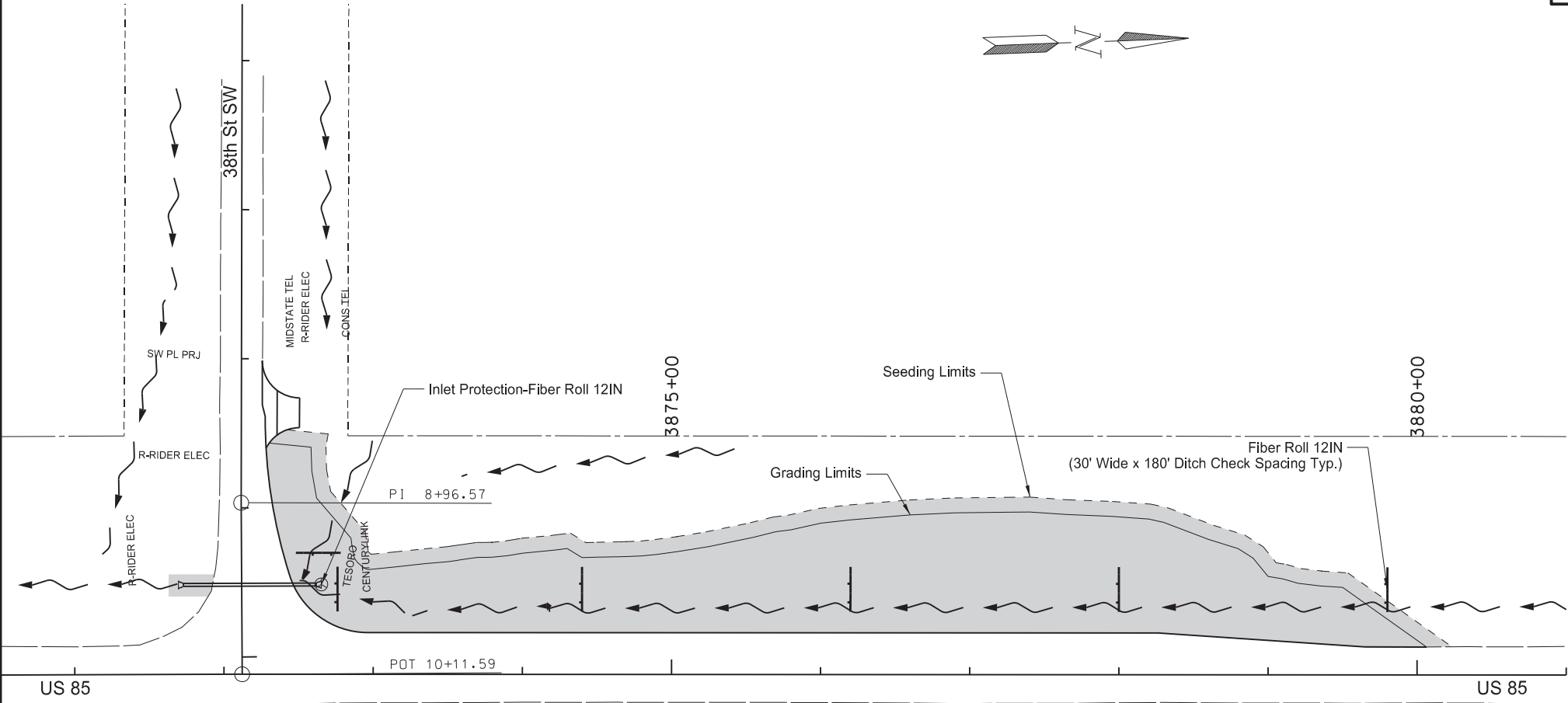
-  Temporary Cover Crop, Soil Stabilizer
-  Fiber Rolls 12 In

Temporary Erosion Control

US 85 Turn Lane  
US 85 and 38th St SW

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-5-085(081)073	77	1

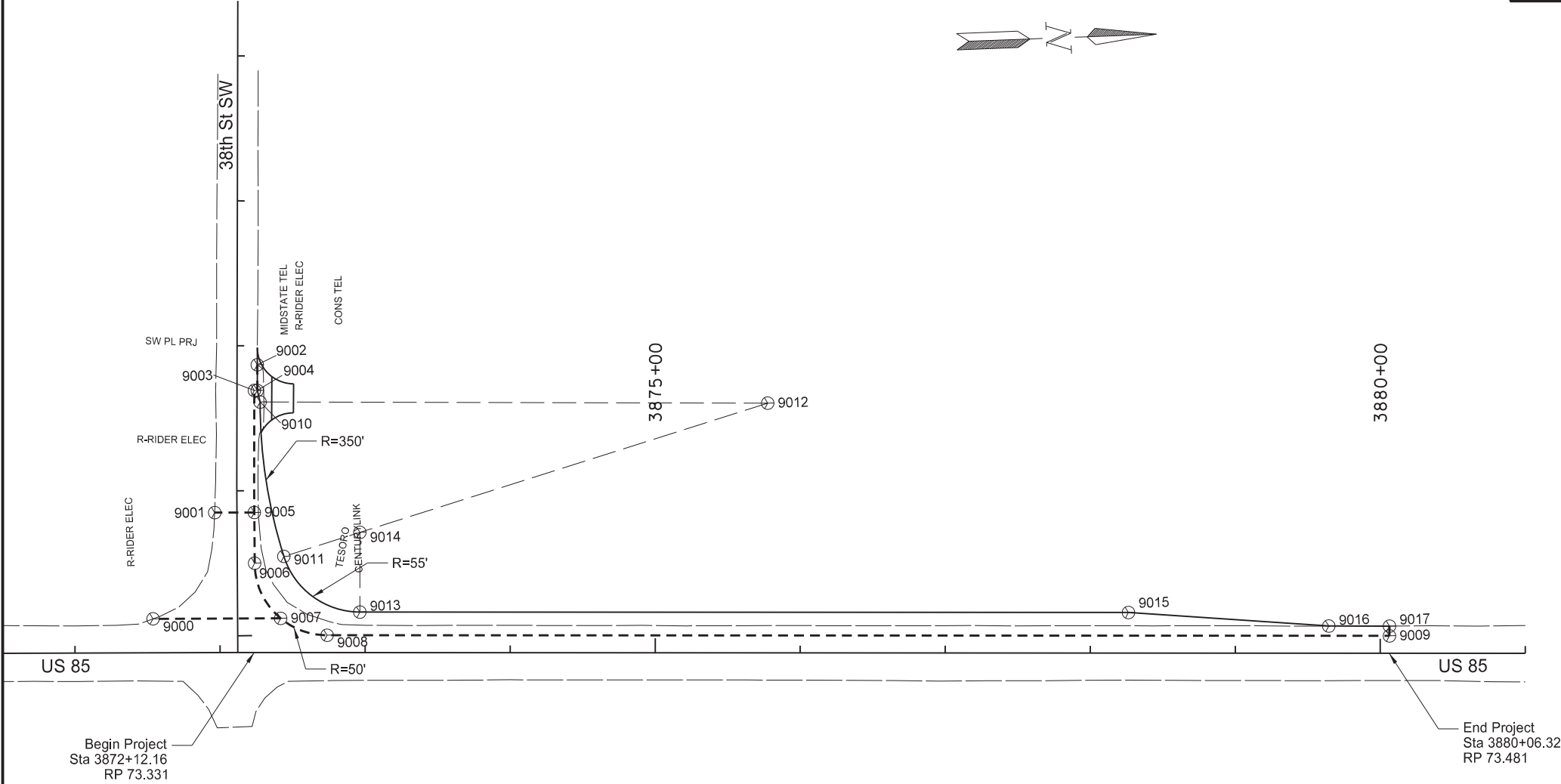
SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		3871+67 LT to 3880+73 LT	1.45	ACRE
253	0201	HYDRAULIC MULCH		
		3871+67 LT to 3880+73 LT	1.45	ACRE
261	0112	FIBER ROLL 12IN		
		3871+67 LT to 3880+73 LT	210	LF



Permanent Erosion Control

US 85 Turn Lane  
US 85 and 38th St SW





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.



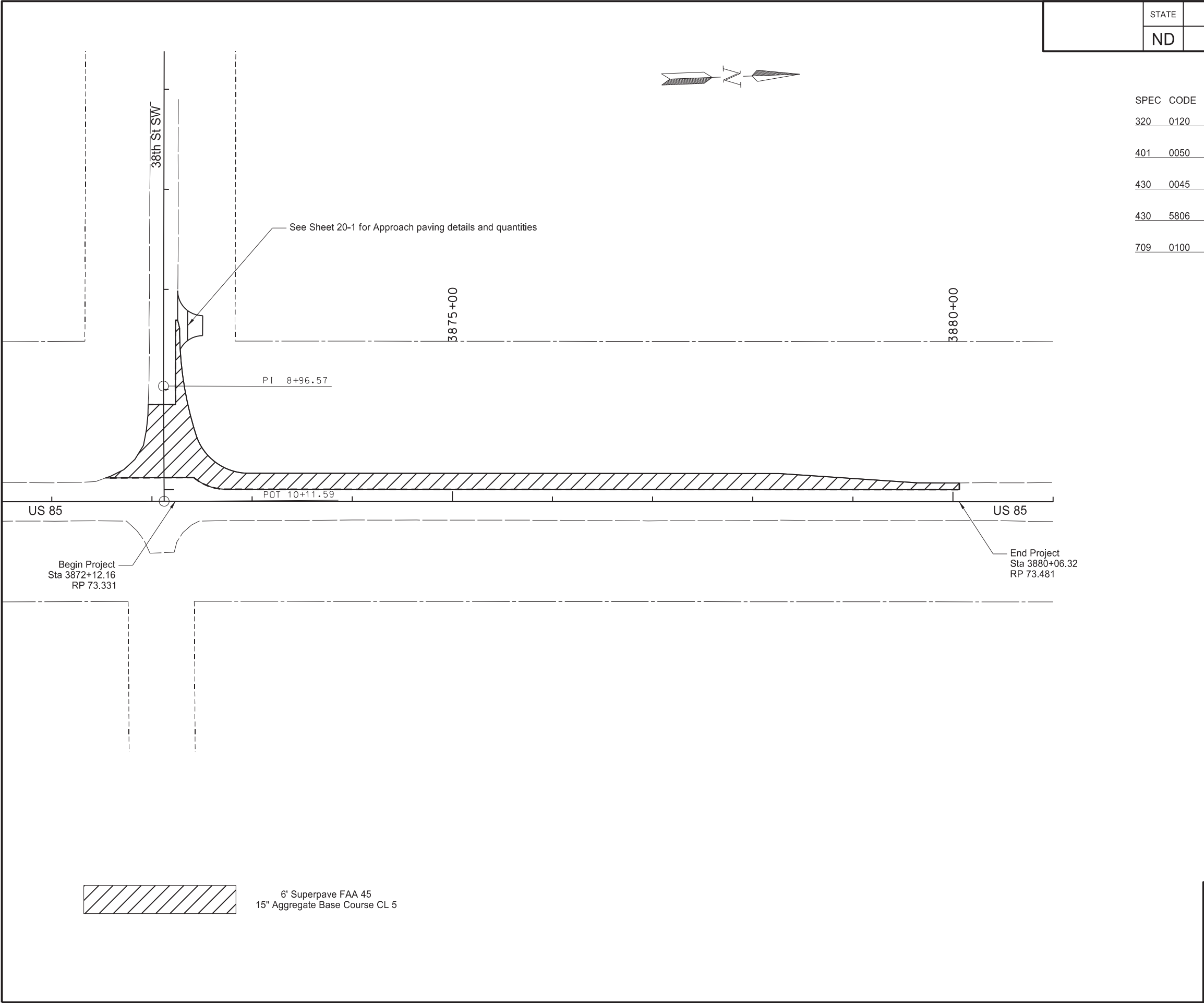
Survey Data Layout

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



Paving

US 85 Turn Lane  
US 85 and 38th St SW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
<b>ND</b>	<b>HEN-5-085(081)073</b>	<b>100</b>	<b>1</b>

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	60"x24"	ROAD WORK NEXT ___ MILES	2	28	56
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	48"x24"	END ROAD WORK	3	26	78
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)	1	18	18
G20-10-108	108"x48"	CONTRACTOR SIGN	2	70	140
G20-50a-72	72"x36"	ROAD WORK NEXT ___ MILES RT & LT ARROWS	2	43	86
G20-52a-72	72"x24"	ROAD WORK NEXT ___ MILES RT or LT ARROW		36	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$80 WHEN WORKERS PRESENT	3	59	177
I2-5-96	96"x48"	YOUR HIGHWAY DOLLARS AT WORK	2	59	118
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	36"x48"	SPEED LIMIT ___ (Portable only)	4	30	120
R2-1-48	48"x60"	SPEED LIMIT		39	
R2-1aP-24	24"x18"	MINIMUM FEE \$80 (Mounted on Speed Limit post)	2	10	20
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	48"x60"	DO NOT PASS	2	39	78
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)		12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)		12	
R11-3a-60	60"x30"	ROAD CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-3c-60	60"x30"	STREET CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)		15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT		35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT		35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT		35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD		35	
W3-3-48	48"x48"	SIGNAL AHEAD		35	
W3-4-48	48"x48"	BE PREPARED TO STOP	3	35	105
W3-5-48	48"x48"	SPEED REDUCTION AHEAD	2	35	70
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC		35	
W8-1-48	48"x48"	BUMP	2	35	70
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES	2	35	70
W8-12-48	48"x48"	NO CENTER LINE		35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or ___ FT or ___ MILE		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or ___ FT or ___ MILE		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W13-1P-30	30"x30"	___ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	___ FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	48"x48"	ROAD WORK AHEAD or ___ FT or ___ MILE	4	35	140
W20-2-48	48"x48"	DETOUR AHEAD or ___ FT or ___ MILE		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or ___ FT or ___ MILE		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or ___ FT or ___ MILE		35	
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or ___ FT or ___ MILE		35	
W20-7-48	48"x48"	FLAGGER	3	35	105
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back	3	5	15
W20-52P-54	54"x12"	NEXT ___ MILES (Mounted on warning sign post)		12	
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or ___ FT or ___ MILE		35	
W21-5-48	48"x48"	SHOULDER WORK	2	35	70
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	

[illegible][illegible]

SPEC & CODE			
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	1606

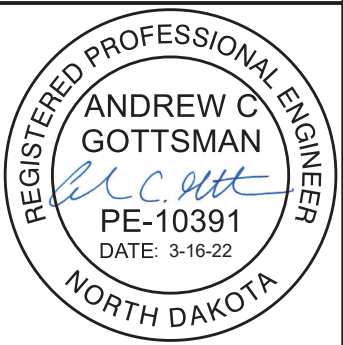
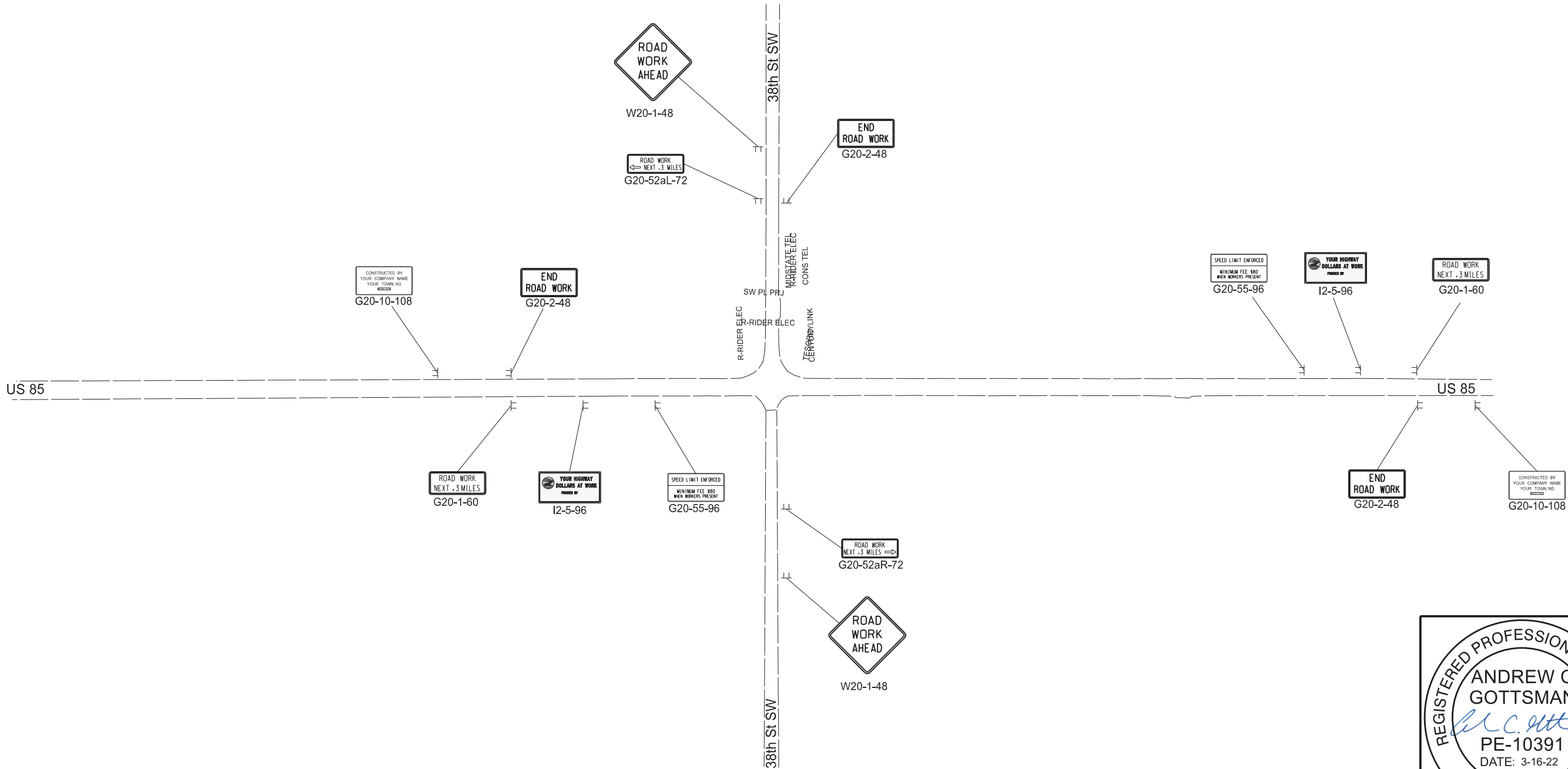
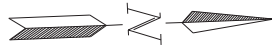
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**NOTE:**  
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.  
<http://www.dot.nd.gov/>



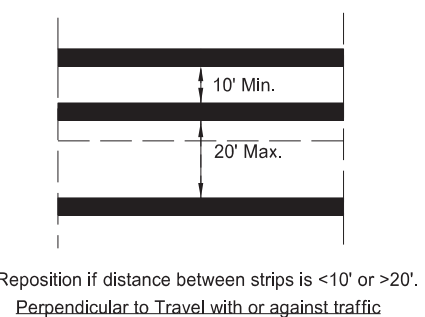
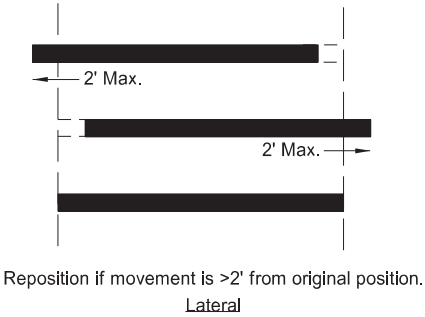
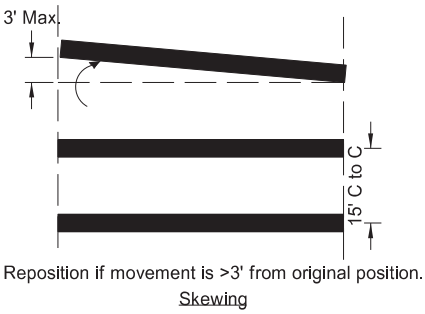
## Traffic Control Devices List

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



Work Zone Traffic Control

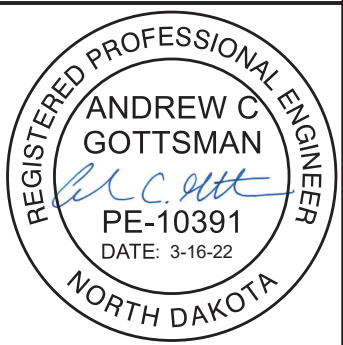
US 85 Turn Lane  
US 85 and 38th St SW



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.

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



KEY

Work area

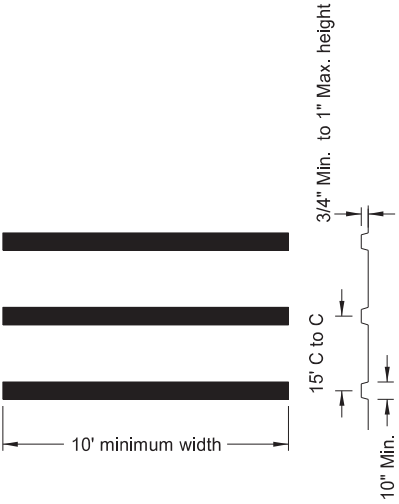
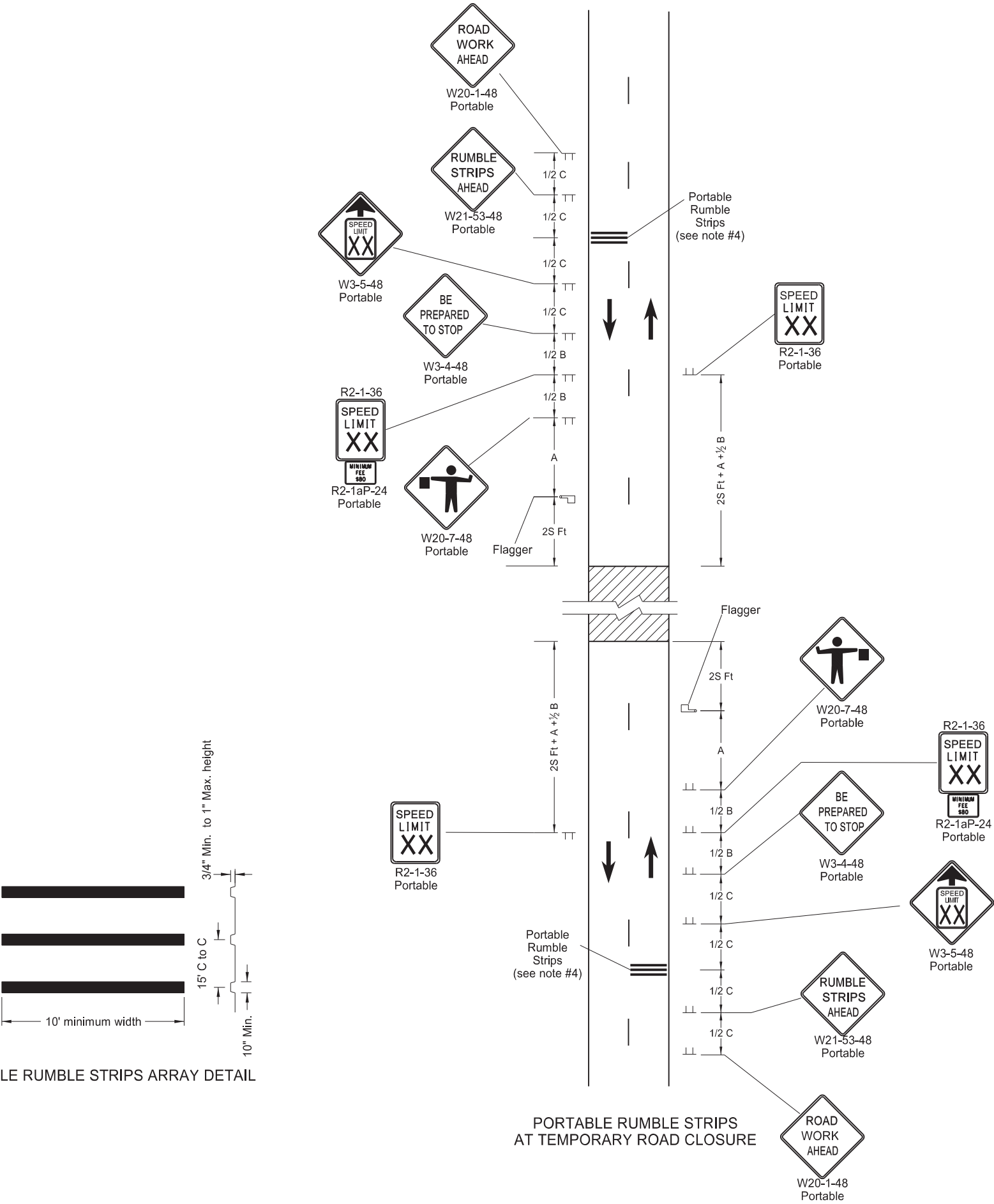
Flagger

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



Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
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:

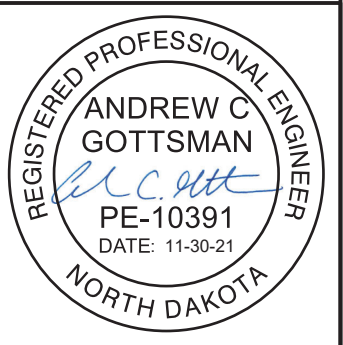
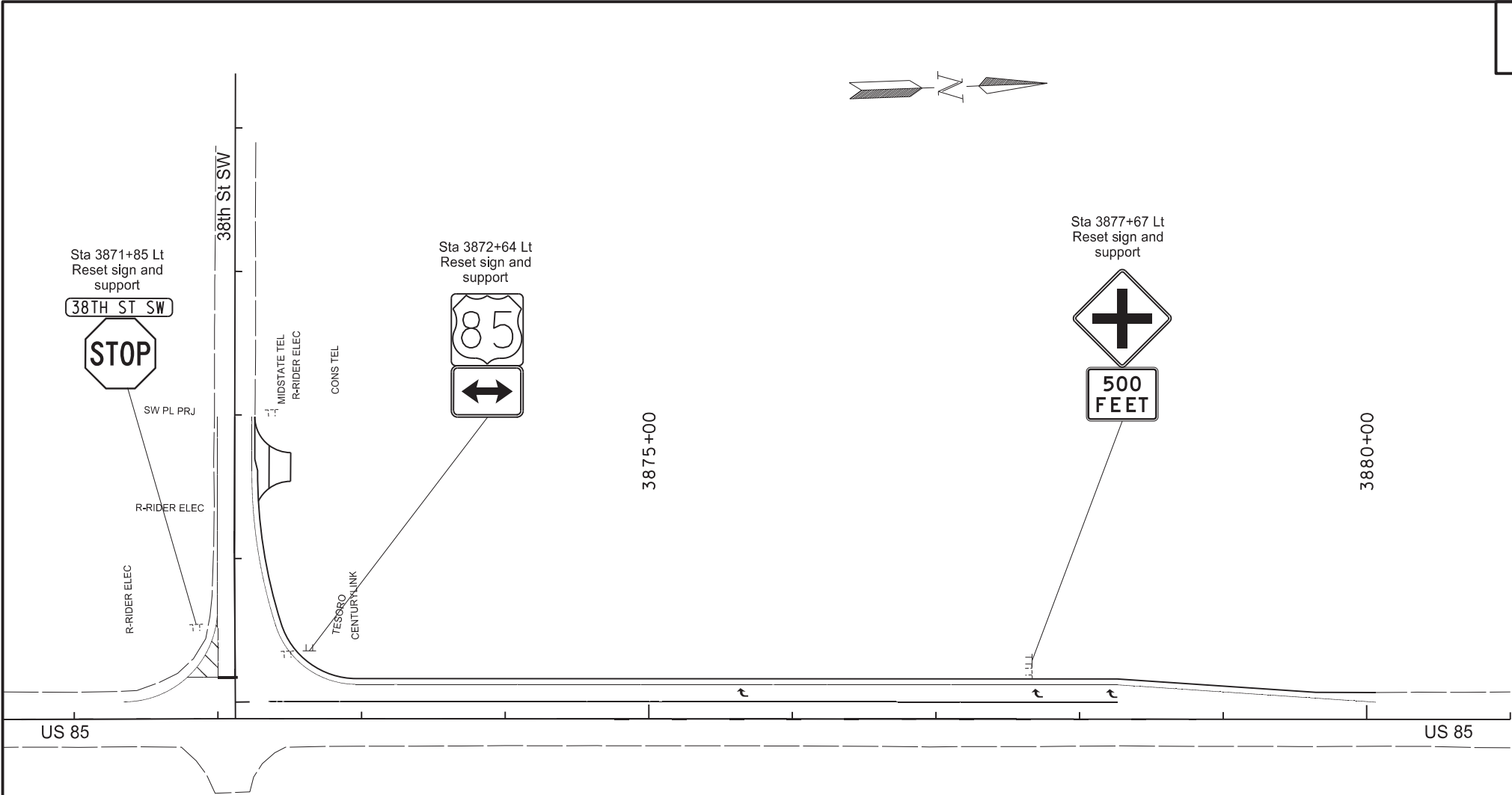
Rural Roadway - 60"



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



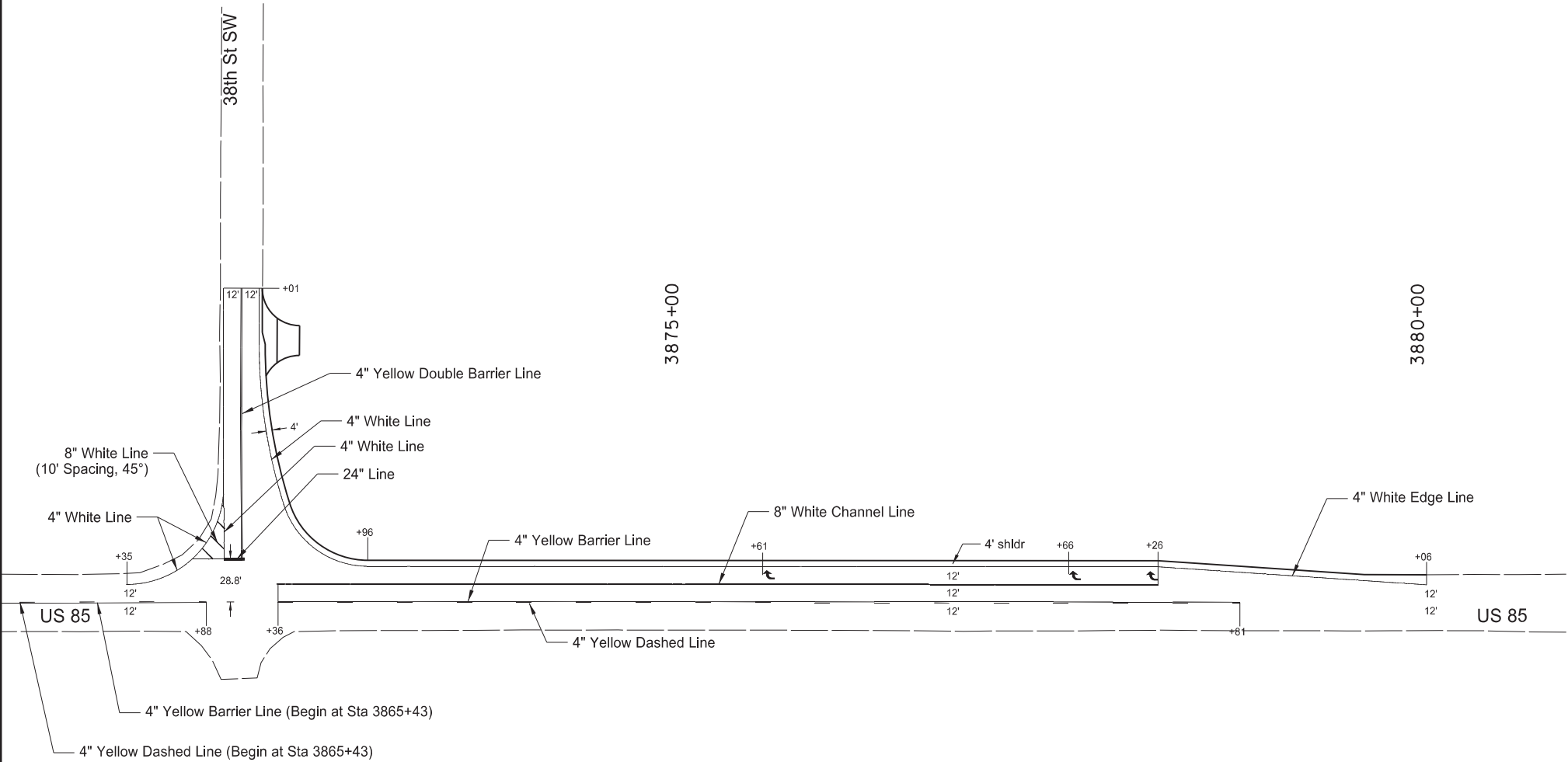
Signing

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.

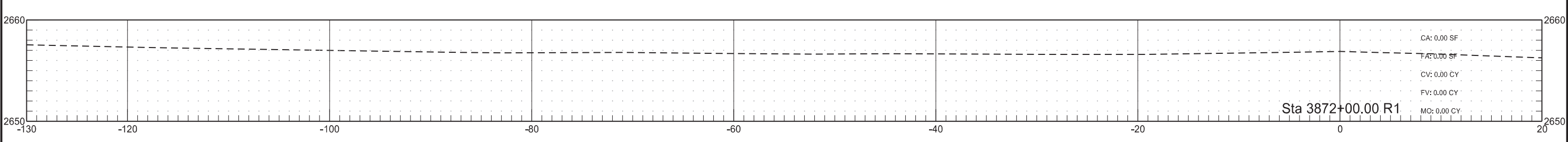
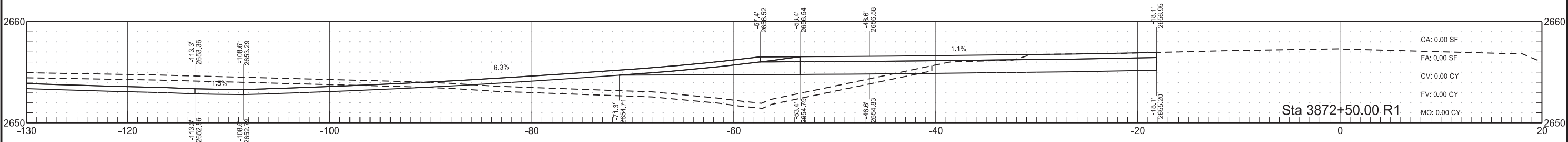
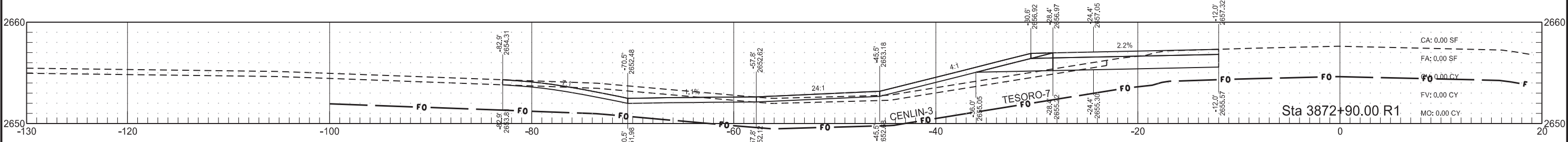
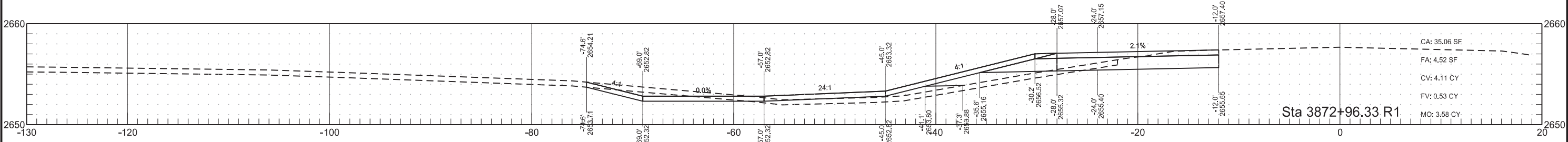
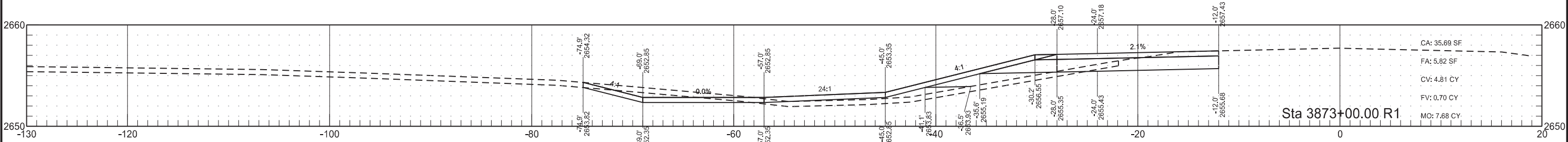
SHEET NO.

ND

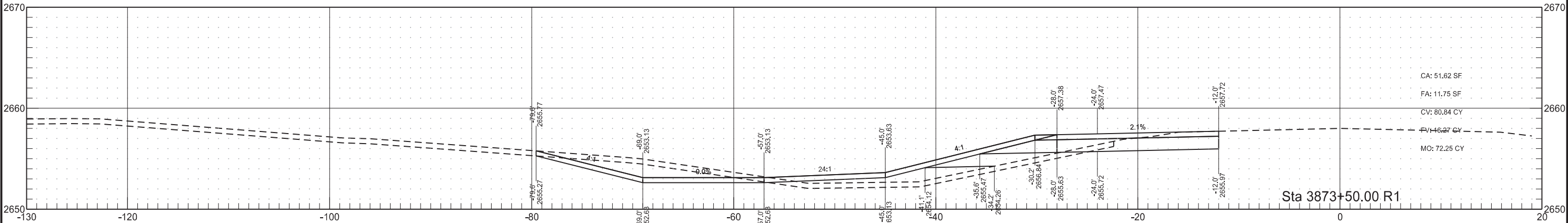
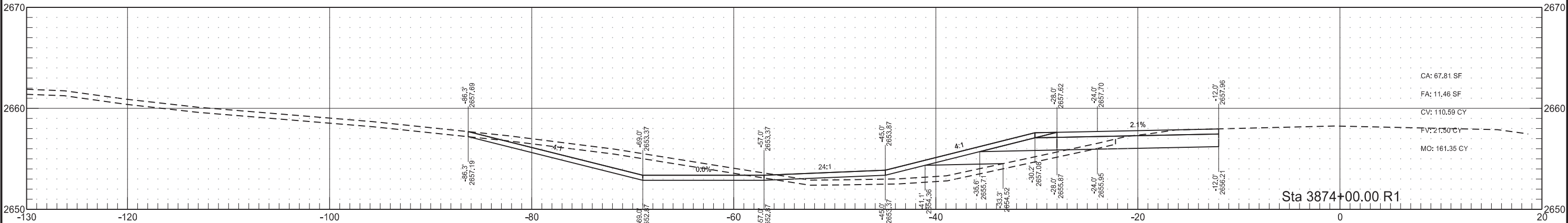
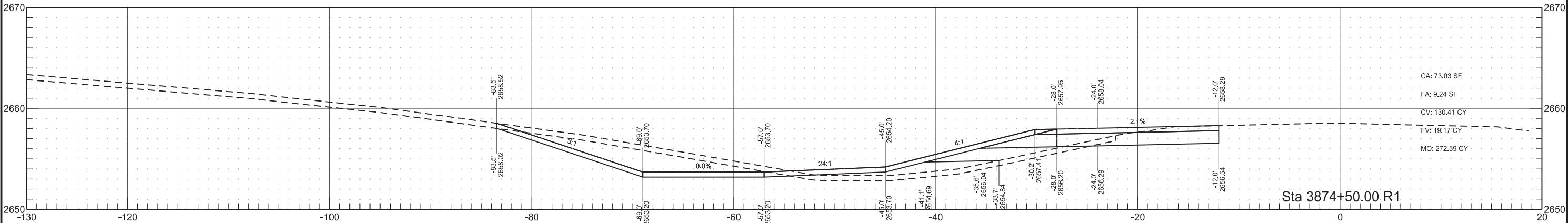
HEN-5-085(081)073

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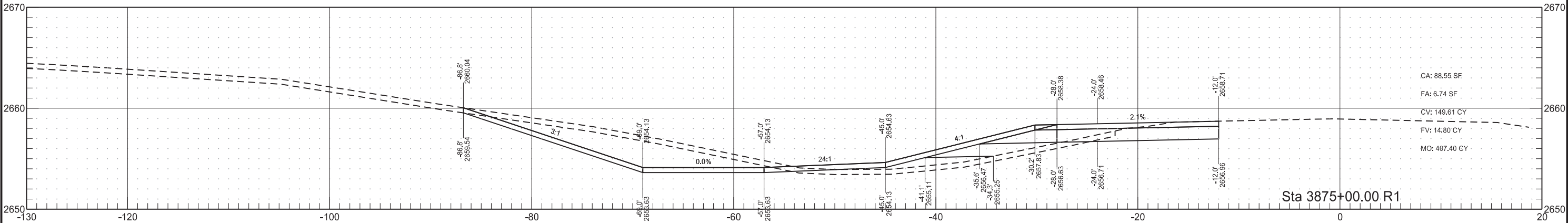
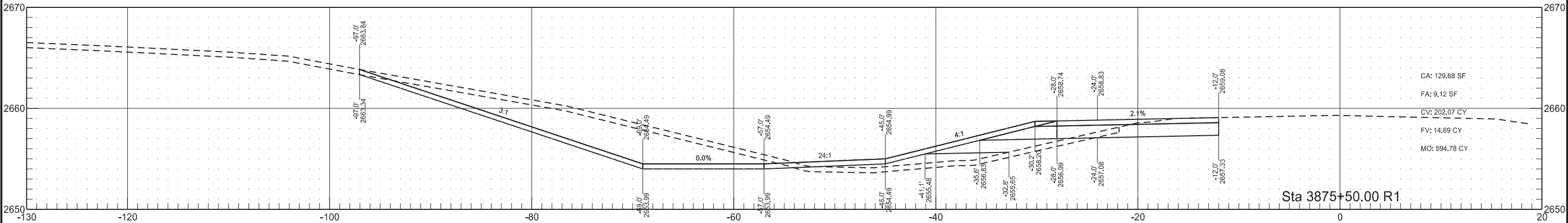
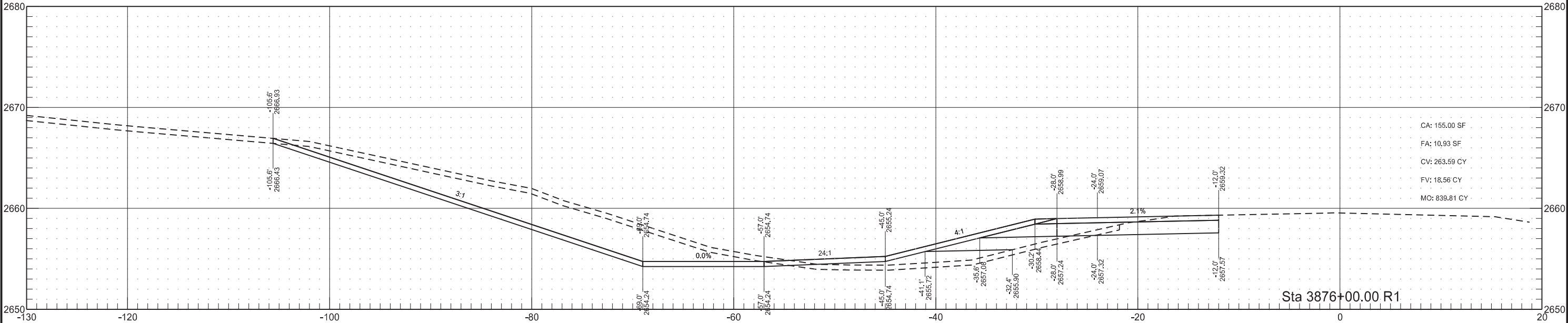
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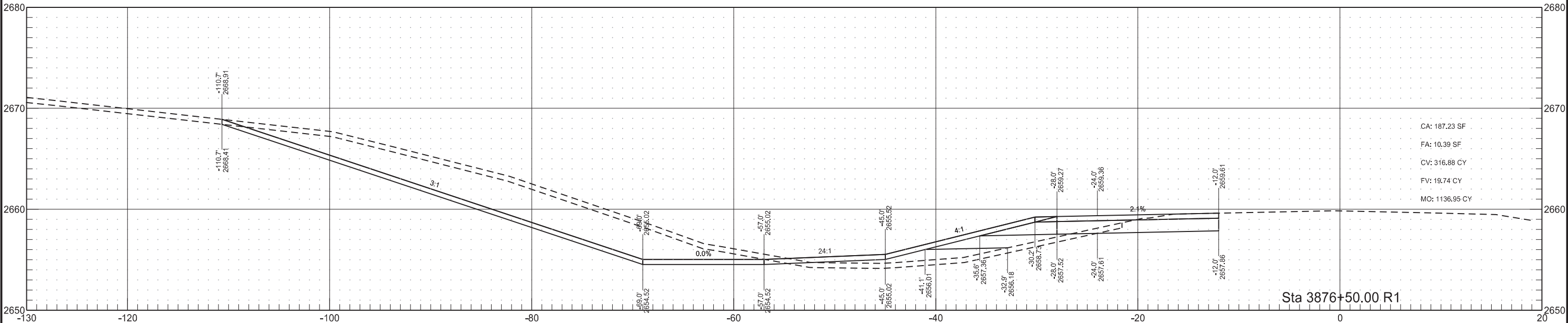
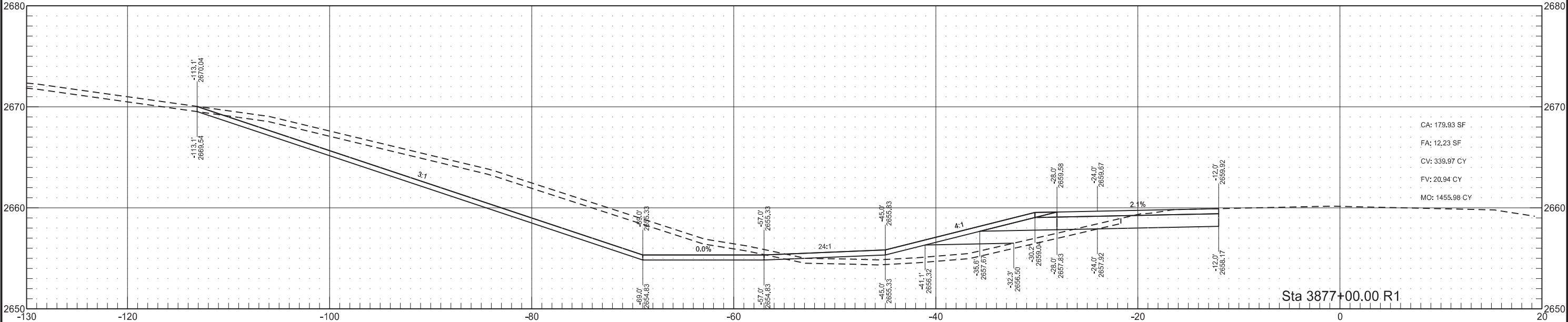
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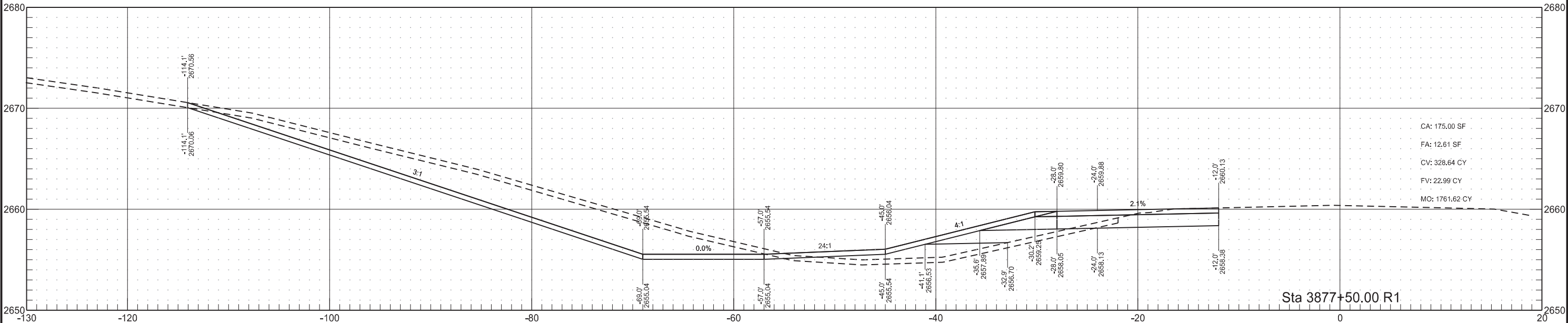
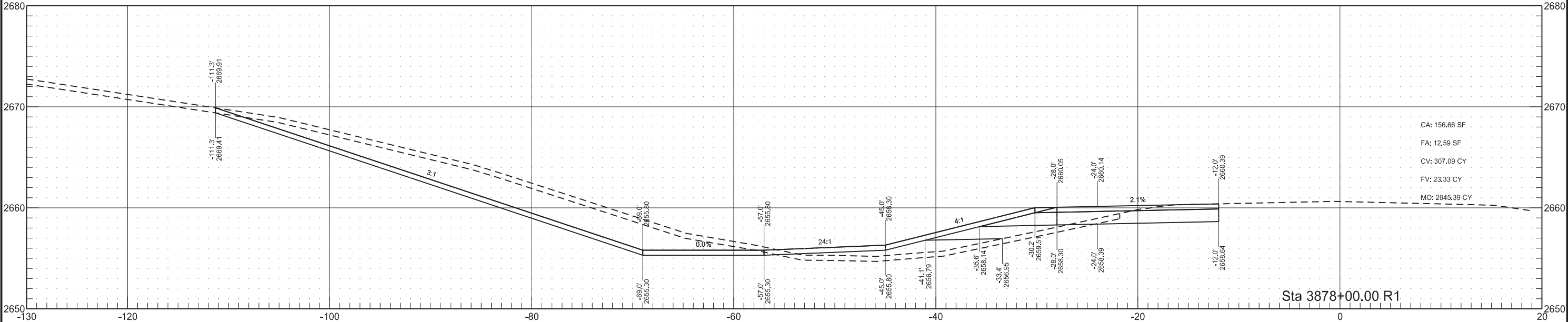


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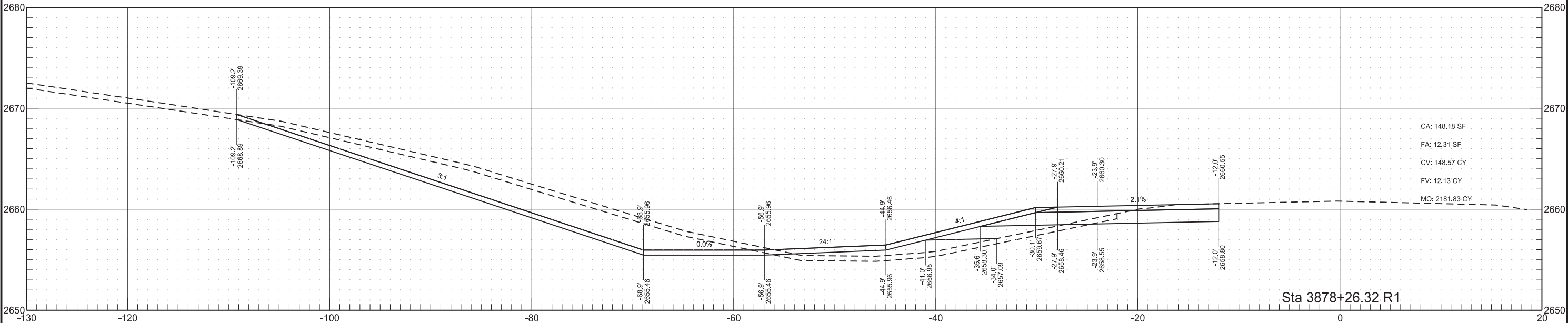
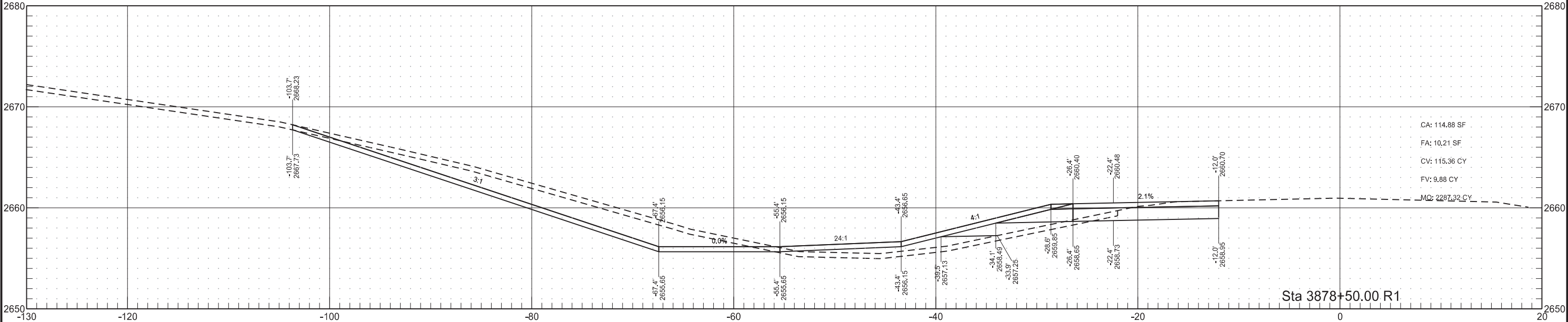


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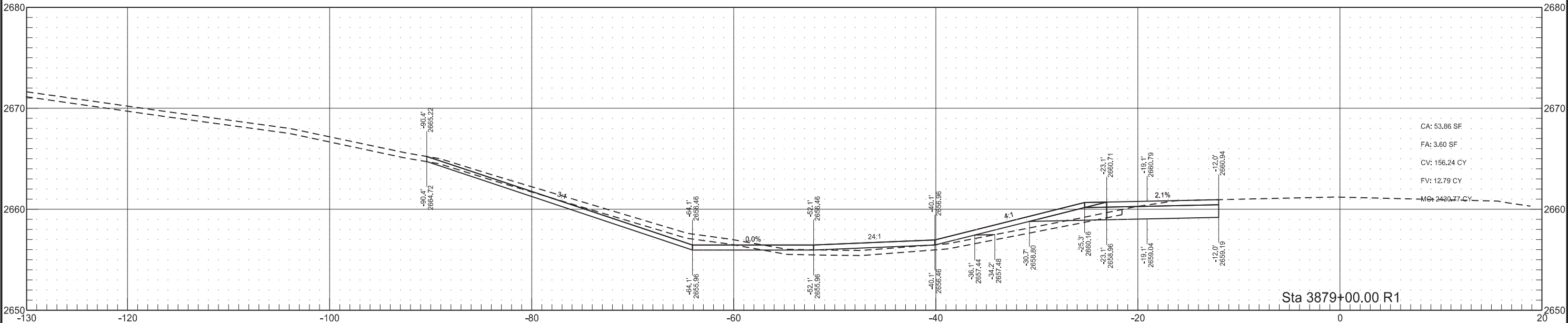
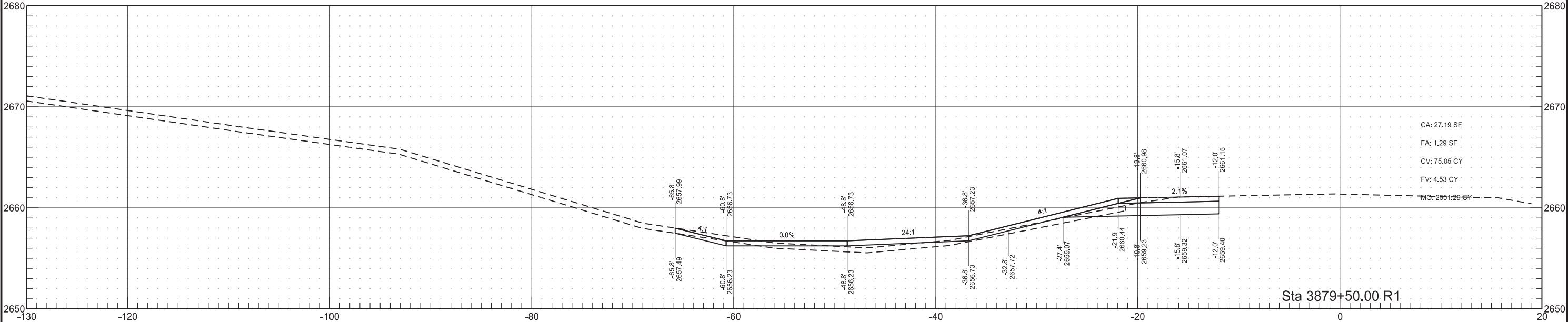


US 85

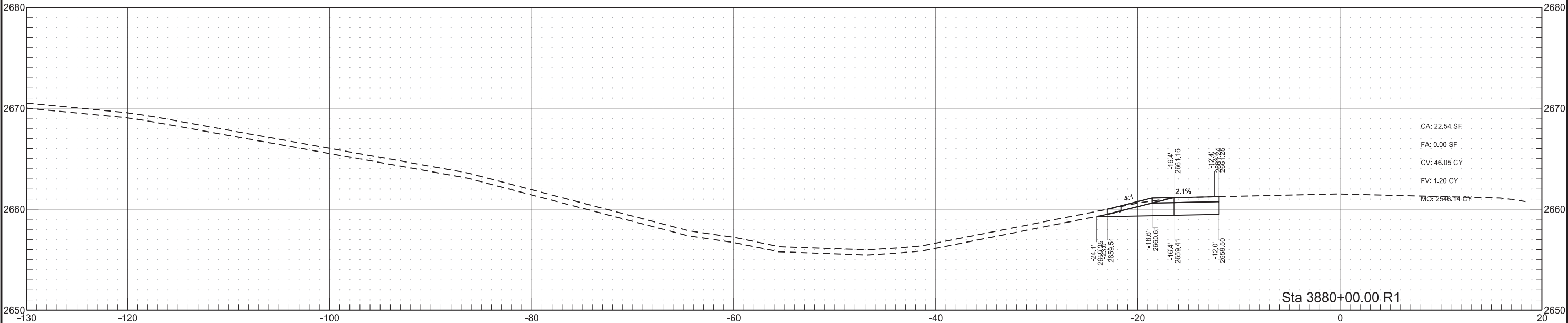
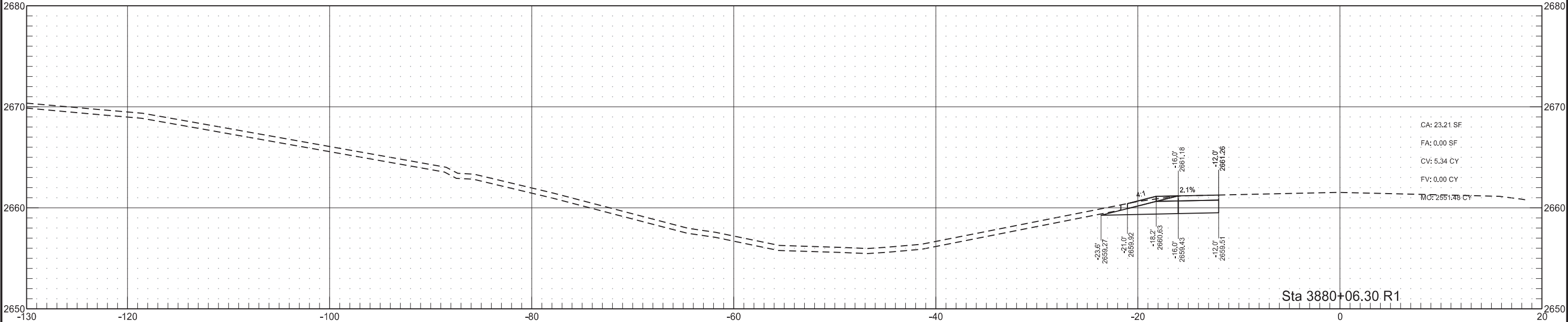
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-5-085(081)073	200	7



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



38th St SW

STATE

PROJECT NO.

SECTION NO.

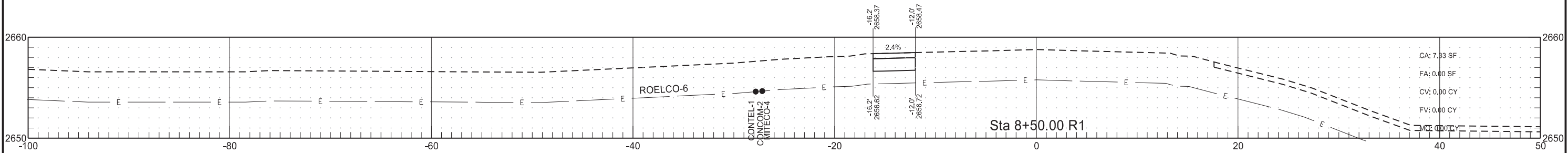
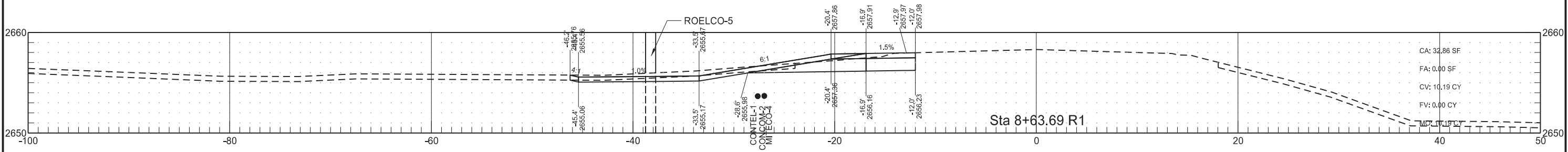
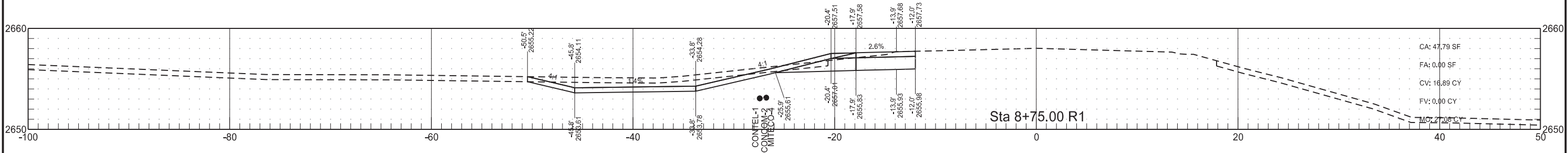
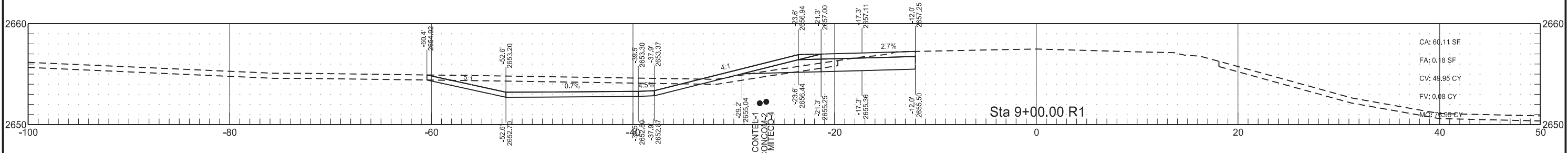
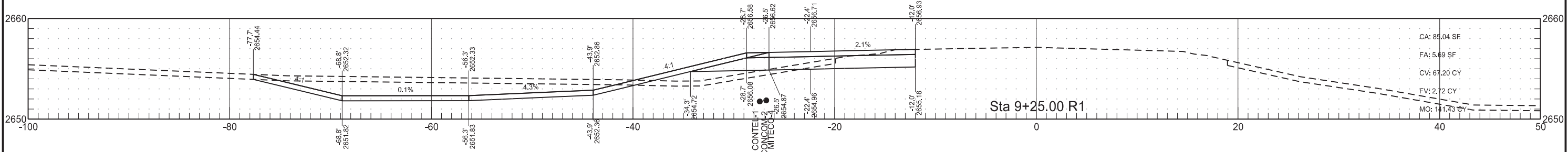
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HEN-5-085(081)073

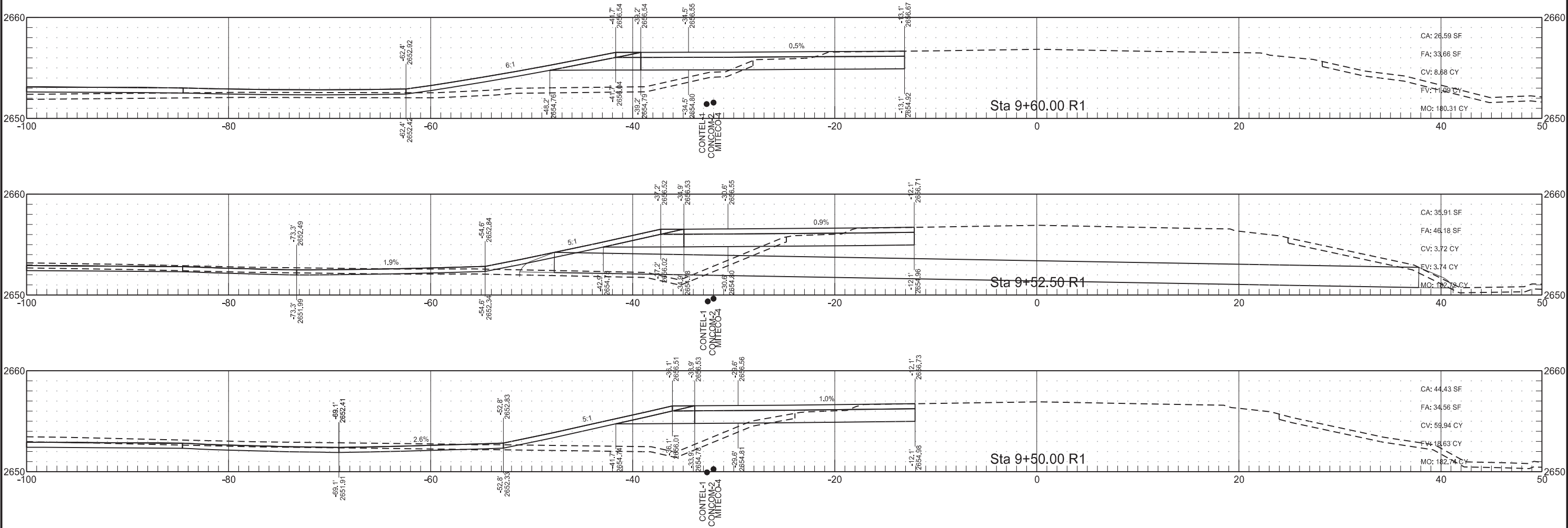
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9



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

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

KIRK J. HOFF

REGISTERED

PROFESSIONAL

PE-4683

ENGINEER

NORTH DAKOTA

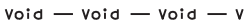






















12 18 2020






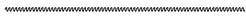
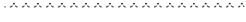









LINE STYLES



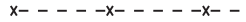





D-101-20

Existing Topography









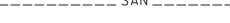













	Existing Ground Void
	Existing Cemetary Boundary
	Existing Box Culvert Bridge
	Existing Concrete Surface
	Existing Drainage Structure
	Existing Gravel Surface
	Existing Riprap
	Existing Dirt Surface
	Existing Asphalt Surface
	Existing Tie Point Line
	Existing Railroad Centerline
	Existing Guardrail Cable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

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




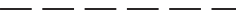
Proposed Topography

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










Existing Utilities

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




Proposed Utilities

	24 Inch Pipe
	Reinforced Concrete Pipe
	Under Drain
	Edge Drain


Traffic Utilities

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

Sign Structures

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

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






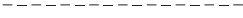









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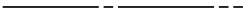




LINE STYLES

D-101-21



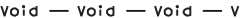





Right Of Way

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







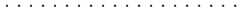
Boundary Control

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



Cross Sections and Typicals

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



Geotechnical

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







Countours

	Depression Contours
	Supplemental Contour


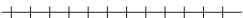

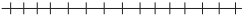
Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile










Striping

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








Pavement Joints

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





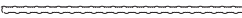
Bridge Details

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

Erosion Control

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

Environmental

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

NORTH DAKOTA  
DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

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

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NORTH DAKOTA

12 18 2020

SYMBOLS

D-101-30


 North Arrow (Half Scale)

 Alignment Data Point

 Alignment Monument

 Spot Elevation

 Existing Miscellaneous Spot

 Existing Access Control Arrow

 Existing Benchmark

 Reset USGS Marker

 Iron Monument Found

 Iron Pin R/W Monument

 Property Corner

 Iron Pin Reference Monument

   Right of Way Marker (Exst, Ppsd, Reset)

 Existing Federal Reference Corner

    Existing Section Corner (Full, Quarter, Sixteenth, Meander)

 Existing Witness Corner


   Existing Control Point (CP, GPS-RTK, TRI)

 Existing Traverse PI Aerial Panel

 Existing Reference Marker Point NGS

 Existing EFB Misc

 Existing Bush or Shrub

 Existing Large Evergreen Tree

 Existing Small Evergreen Tree

 Existing Large Tree

 Existing Small Tree

 Existing Tree Trunk

 Cairn or Stone Circle


 Existing Artifact

 Existing Satellite Dish

 Existing Weather Station

 Existing Windmill or Tower


 Reinforced Pavement


 Continuous Split Barrel Sample

 Flight Auger Sample

 Split Barrel Sample

 Thinwall Tube Sample

 Standard Penetration Test

 Inclinometer Tube

 Excavation Unit

 Existing Ground Water Well Bore Hole

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

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SYMBOLS

D-101-31

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

















































































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




12 18 2020

SYMBOLS


D-101-32

	Existing Luminaire			High Mast Light Standard 3 Luminaire (Exst, Ppsd)		Existing Traffic Signal Standard			
	Luminaire LED			High Mast Light Standard 4 Luminaire (Exst, Ppsd)				Pull Box (Exst-Ppsd-Undefined)	
	Existing Light Standard Luminaire			High Mast Light Standard 5 Luminaire (Exst, Ppsd)				Intelligent Transportation Pull Box (Exst, Ppsd)	
	Relocate Light Standard			High Mast Light Standard 6 Luminaire (Exst, Ppsd)				Transformer (Exst, Ppsd)	
	Light Standard Light LED Luminaire			High Mast Light Standard 7 Luminaire (Exst, Ppsd)				Power Pole (Exst-Ppsd-with Transformer)	
	Light Standard 35 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 8 Luminaire (Exst, Ppsd)				Wood Pole (Exst, Ppsd)	
	Light Standard 50 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 9 Luminaire (Exst, Ppsd)				Pedestrian Push Button Post (Exst, Ppsd)	
	Light Standard 70 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 10 Luminaire (Exst, Ppsd)				Existing Pole	
	Light Standard 100 Watt High Pressure Sodium Vapor Luminaire			Overhead Sign Structure Load Center (Exst, Ppsd)				Existing Telephone Pole	
	Light Standard 150 Watt High Pressure Sodium Vapor Luminaire			Traffic Signal Controller (Exst, Ppsd)				Existing Post	
	Light Standard 200 Watt High Pressure Sodium Vapor Luminaire			Pad Mounted Traffic Signal Controller (Exst, Ppsd)					Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
	Light Standard 250 Watt High Pressure Sodium Vapor Luminaire			Flashing Beacon (Exst, Ppsd)					
	Light Standard 310 Watt High Pressure Sodium Vapor Luminaire			Concrete Foundation (Exst, Ppsd)					
	Light Standard 400 Watt High Pressure Sodium Vapor Luminaire			Pipe Mounted Flasher (Exst, Ppsd)					
	Light Standard 700 Watt High Pressure Sodium Vapor Luminaire			Pad Mounted Feed Point (Exst, Ppsd)					
	Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire			Pipe Mounted Feed Point with Pad (Exst, Ppsd)					
	Emergency Vehicle Detector			Pole Mounted Feed Point (Exst, Ppsd)					
	Video Detection Camera			Junction Box (Exst, Ppsd)					
				Existing Pedestrian Head with Number					
				Existing Signal Head					
				Pole Mounted Head					
				Existing Lighting Standard Pole					

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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12-18-20	General Revisions



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



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SYMBOLS

D-101-33

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

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

12 18 2020

Cross Section Legend

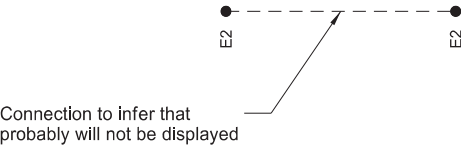
Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Cable Line	● CBL1	● CBL2
Conduit Line	● CDU1	● CDU2
Electric Line	● E1	● E2
Fiber Optic Line	● F1	● F2
Gas Main Line	● GM1	● GM2
Gas Service Line	● GS1	● GS2
Gas Transmission Line	● GT1	● GT2
Fuel Pipeline	● PL1	● PL2
Sanitary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

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



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.

\* 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 a earthwork table. The following example (values not related to project) details the earthwork table layout.

Cut Area	CA: 34.34 SF
Fill Area	FA: 0.017 SF
Cut Volume	CV: 64.44 CY
Fill Volume	FV: 0.031 CY
Mass Ordinate	MO: 65.13 CY

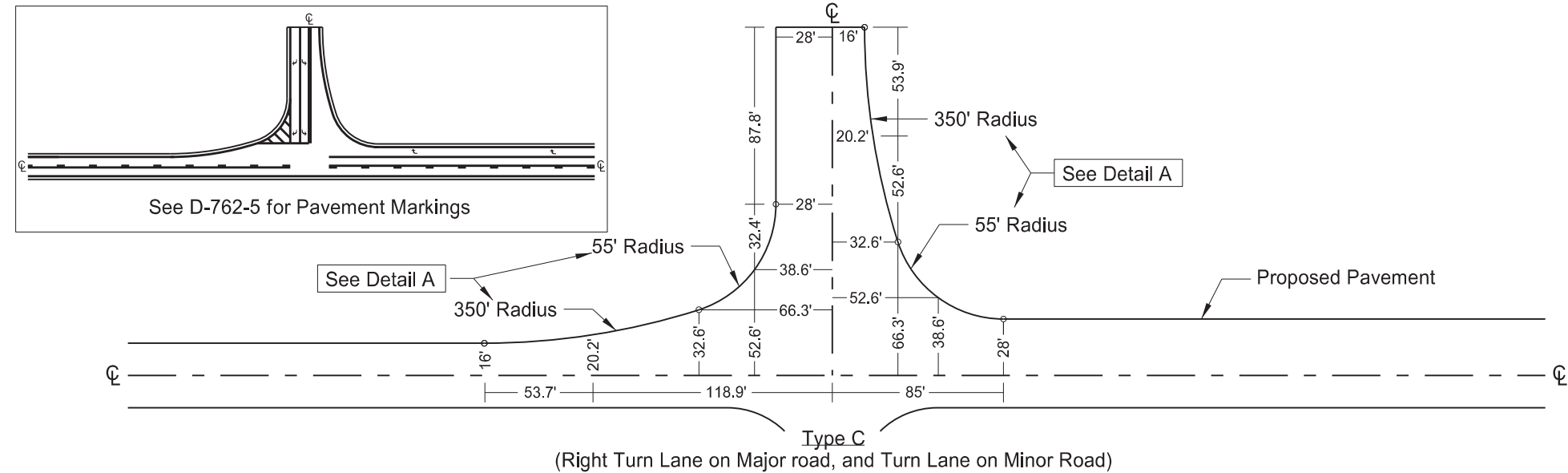
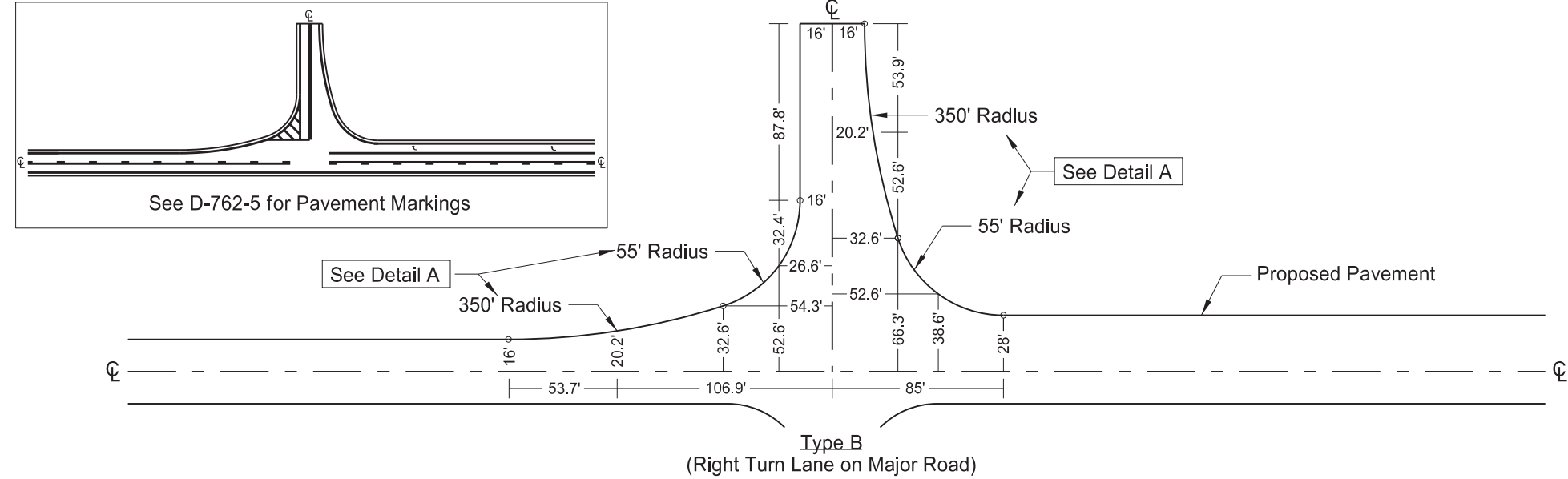
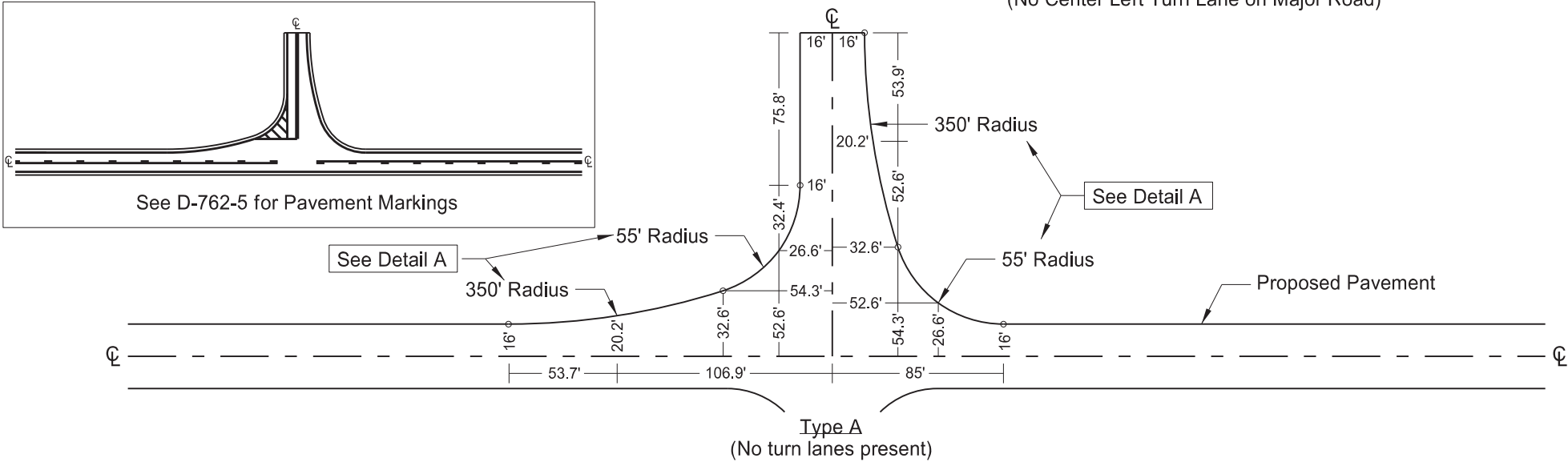
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by  
Roger Weigel,  
Registration Number  
PEPE-2930  
on 9/20/18 and the original document is stored at the  
North Dakota Department  
of Transportation

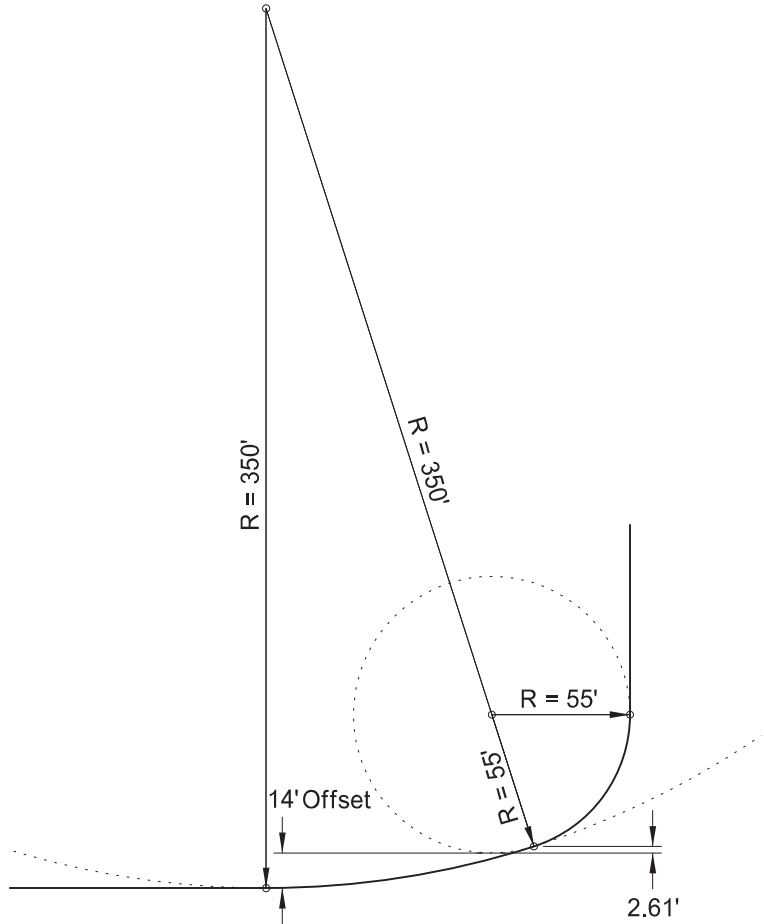


STANDARD 90 DEGREE FLARED INTERSECTION

(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

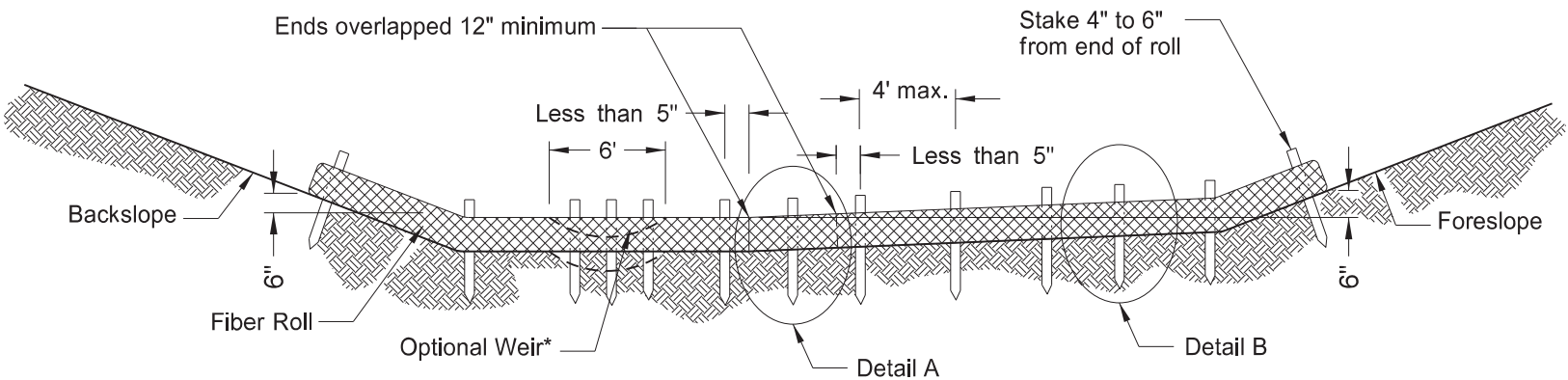
— Proposed Pavement

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

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

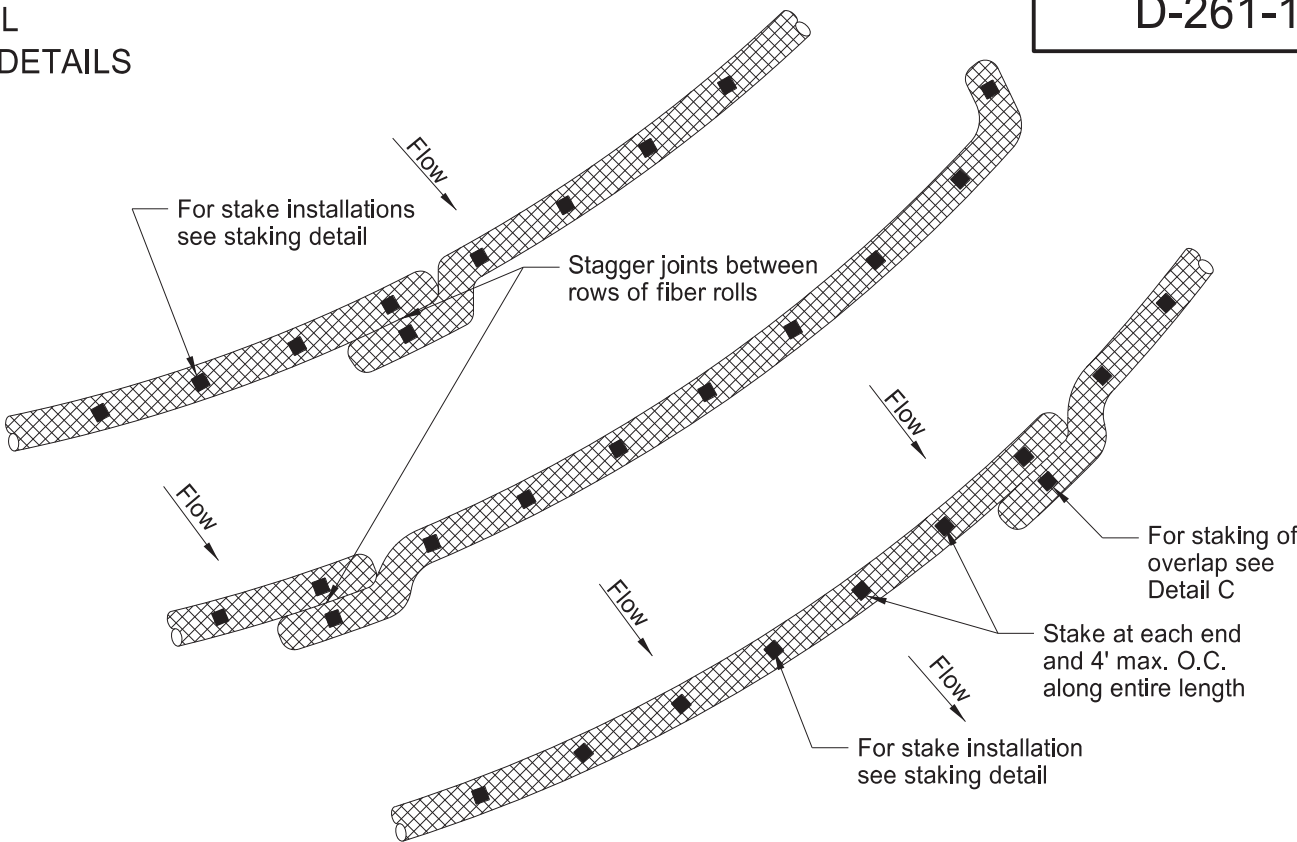
EROSION CONTROL  
FIBER ROLL PLACEMENT DETAILS

D-261-1

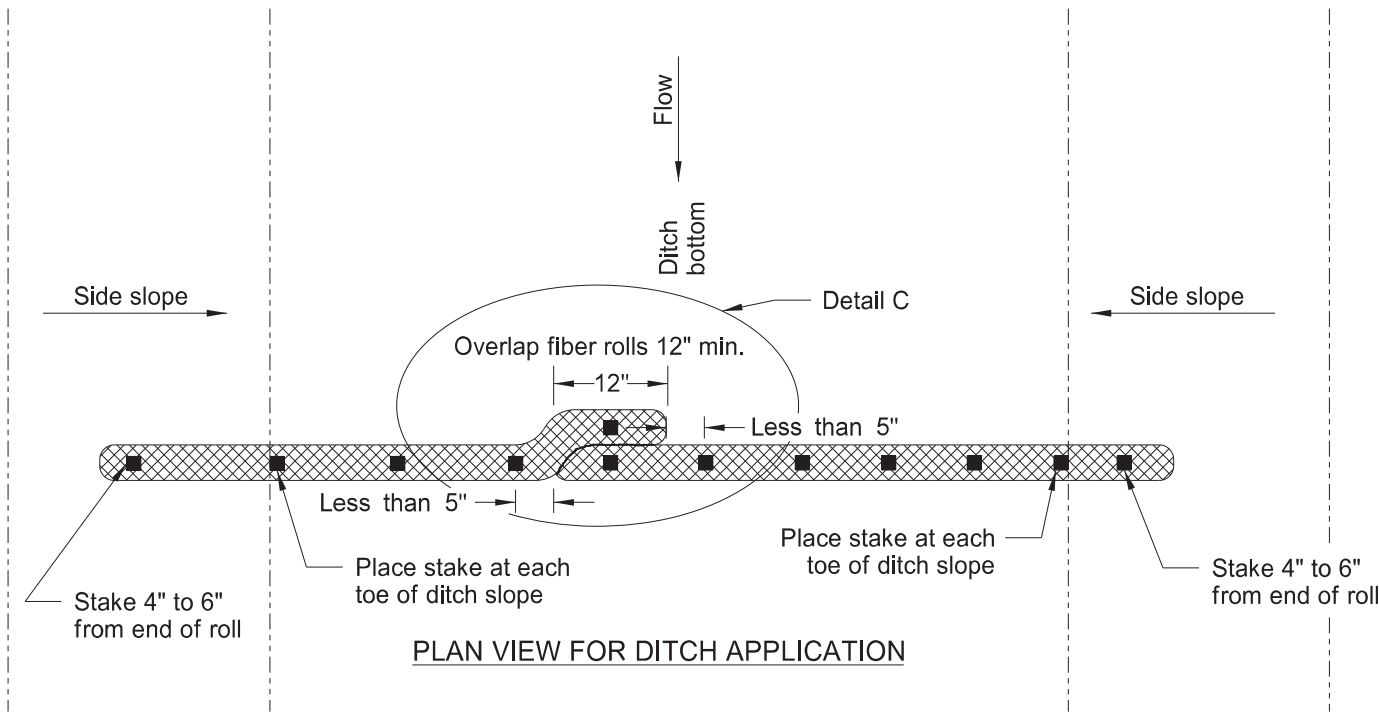


\*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back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

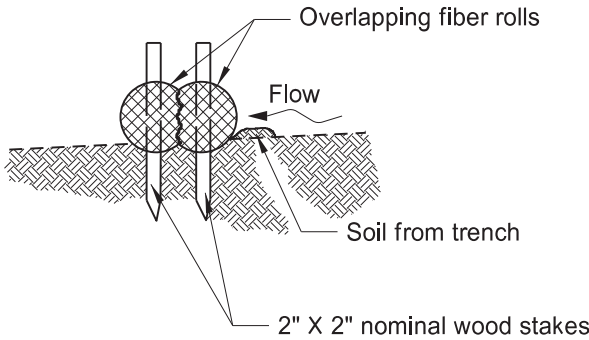
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



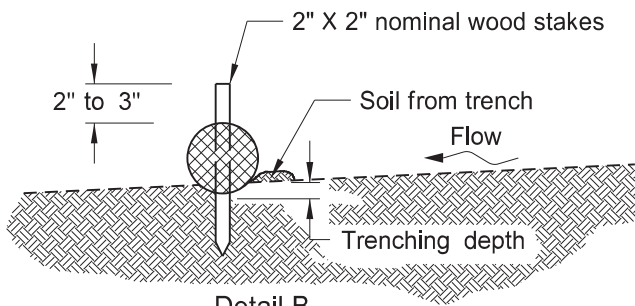
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A  
Fiber Roll Overlapping Staking Detail



Detail B  
Fiber Roll Staking Detail

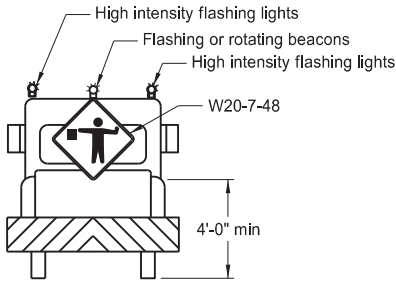
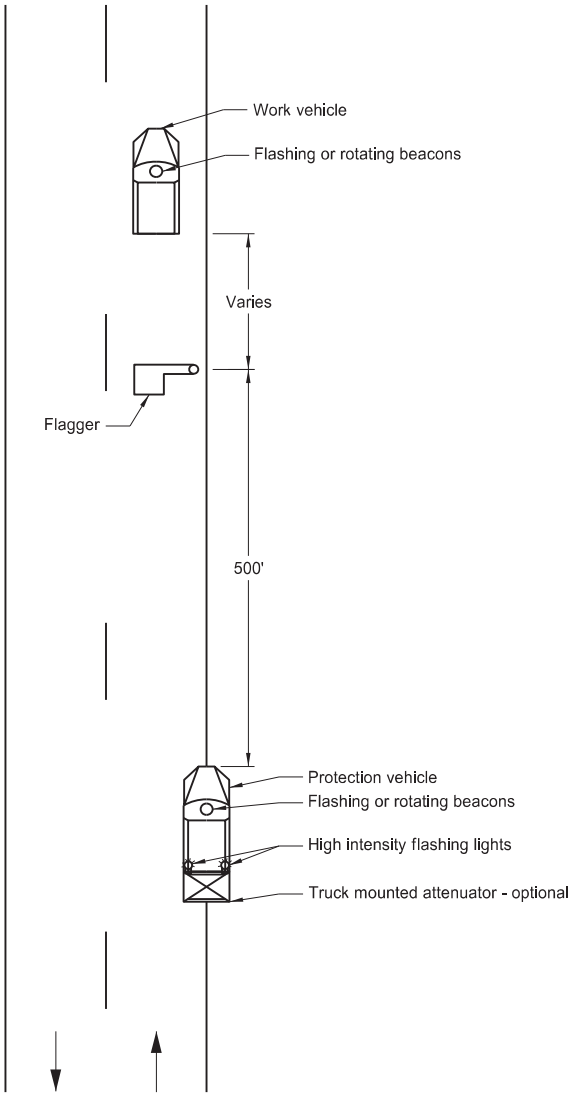
FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

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

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

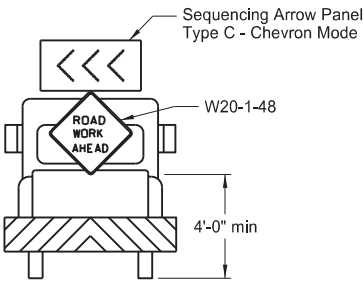
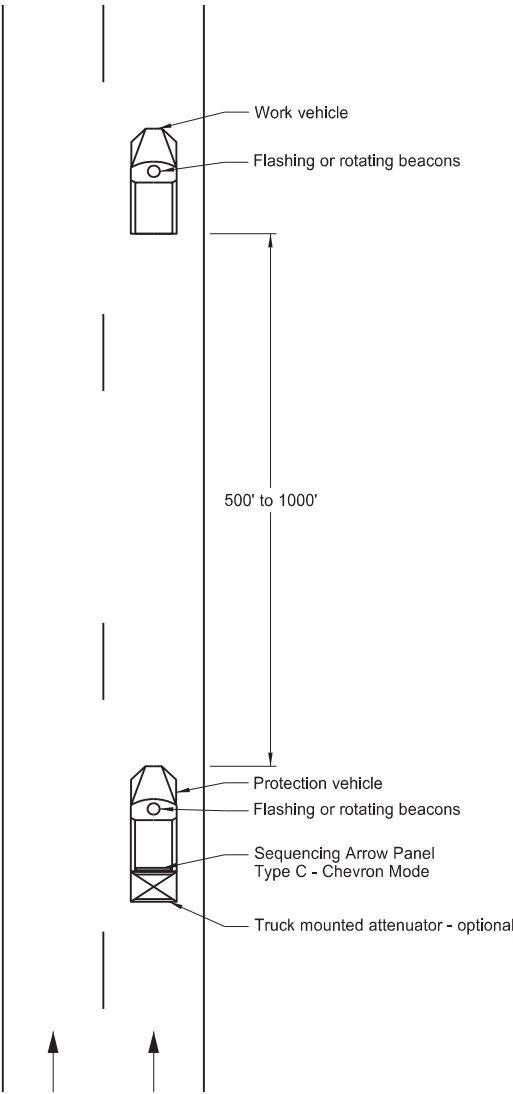
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of Transportation

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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D-704-5

Notes:

1. Post mount sign a distance of  $\frac{1}{2}A$  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.


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		<p>This document was originally issued and sealed by</p> <p>Kirk J Hoff,</p> <p>Registration Number</p> <p>PE- 4683,</p> <p>on 10/03/19 and the original document is stored at the North Dakota Department of Transportation</p>
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.	

D-704-6

[illegible]

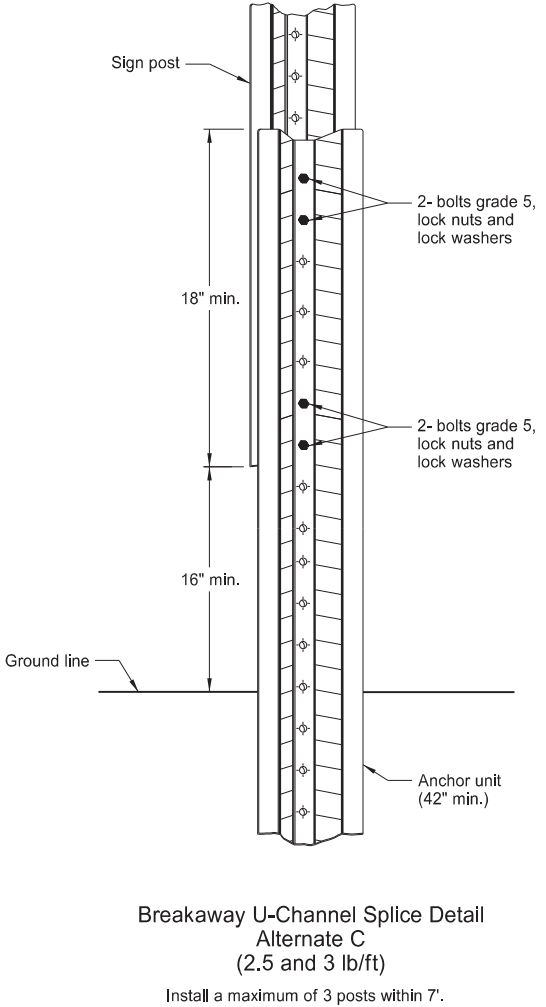
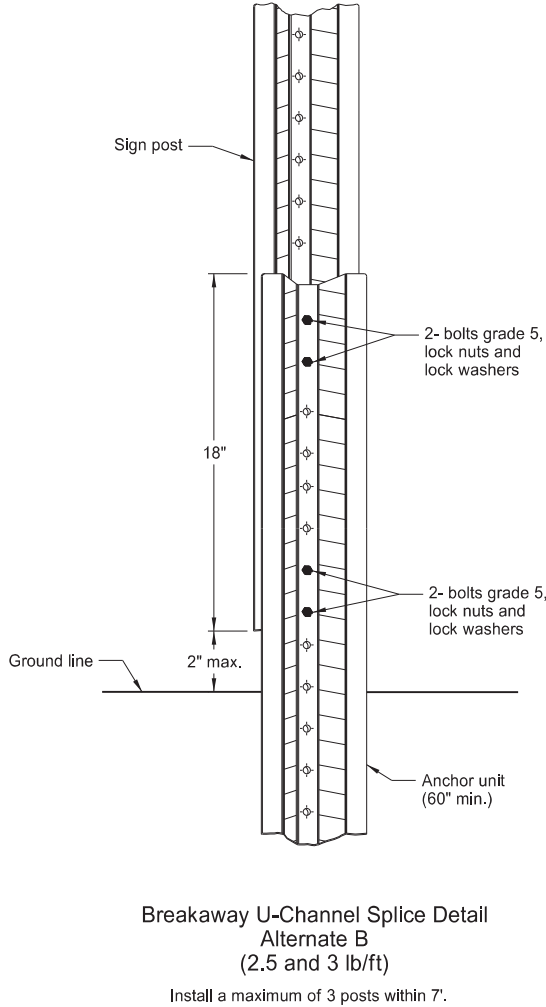
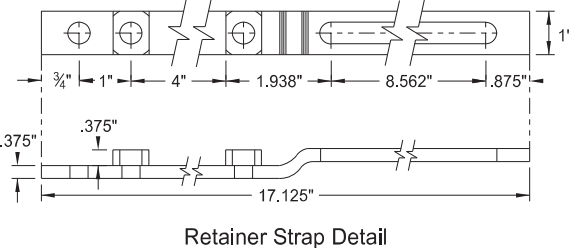
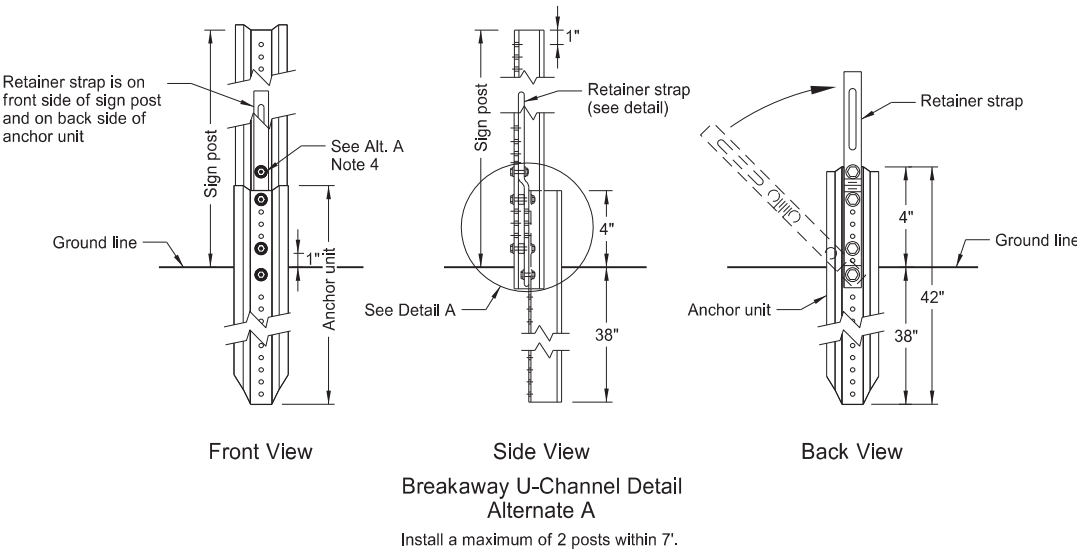
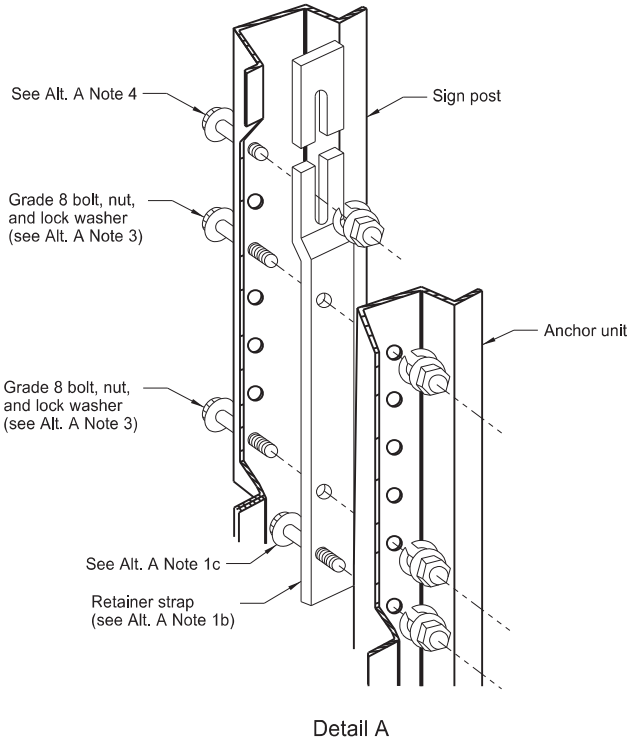
POSITION (X)										LENGTH	SIZE	SERIES
A	Y									50.3	6	C 2000
75.8	80											
W	O	R	K							62.6	6	C 2000
72.2	77.5	82.3	86.6									
										25	4	C 2000

Use a horizontal spacing of 3" between words and hyphens. Center message horizontally in sign panel.

- |  |        |
|--|--------|
| NORTH DAKOTA<br>DEPARTMENT OF TRANSPORTATION |        |
| 12-08-21                                     |        |
| REVISIONS                                    |        |
| DATE   | CHANGE |
|  |        |
- 

12/08/21

U-Channel Post



Alternate A Steps of Installation:

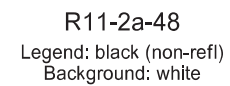
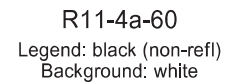
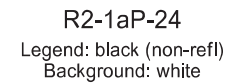
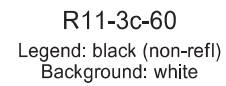
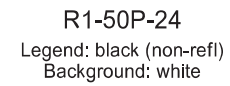
- a) Drive anchor unit to within 12" of ground level.  
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.  
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.  
d) Rotate strap 90° to left.
- a) Drive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

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

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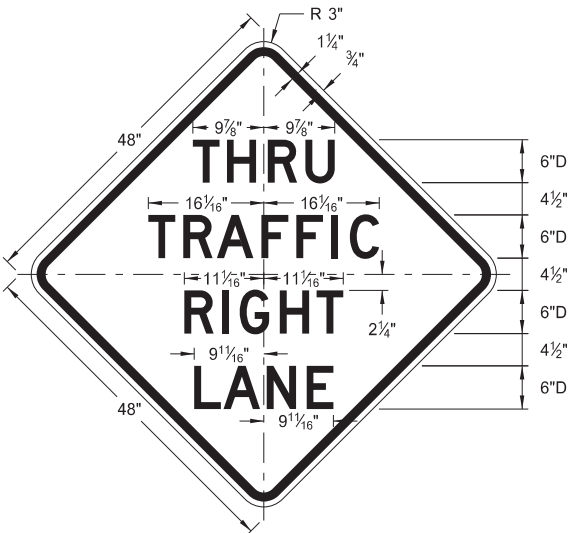


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17 10-03-19	Revised sign number New Design Engineer PE Stamp

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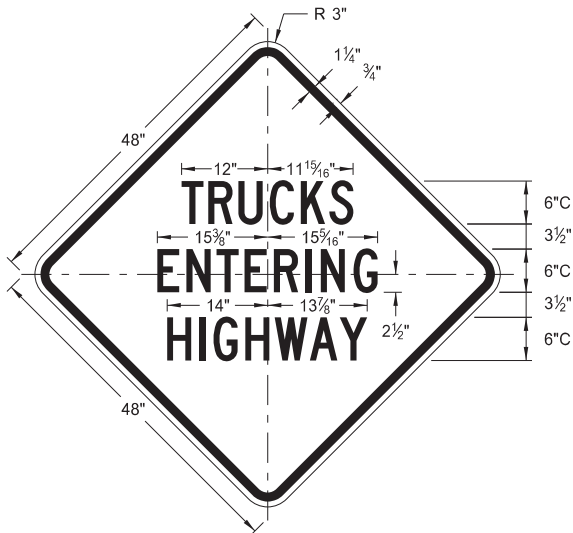
CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

D-704-11



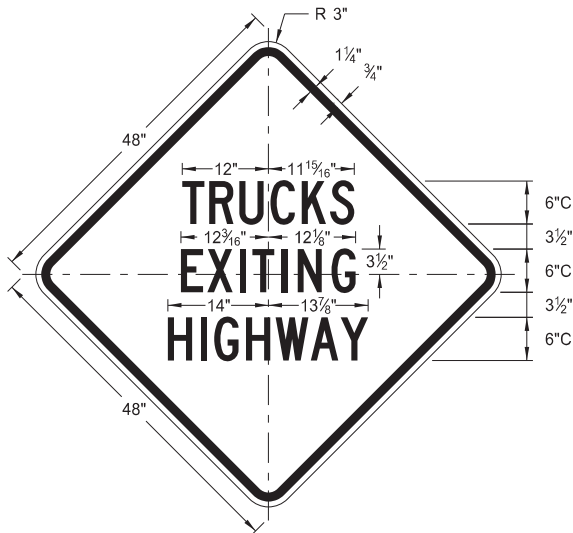
W5-8-48

Legend: black (non-refl)  
Background: orange



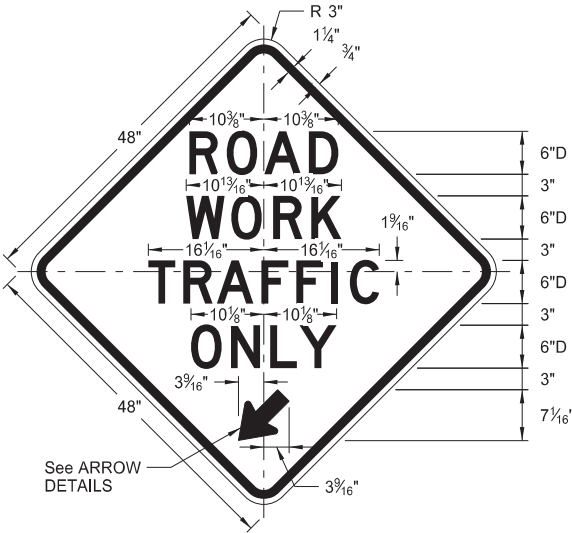
W8-53-48

Legend: black (non-refl)  
Background: orange



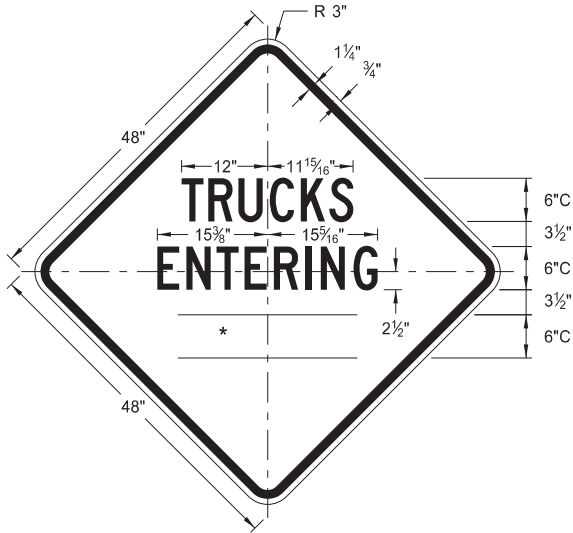
W8-56-48

Legend: black (non-refl)  
Background: orange



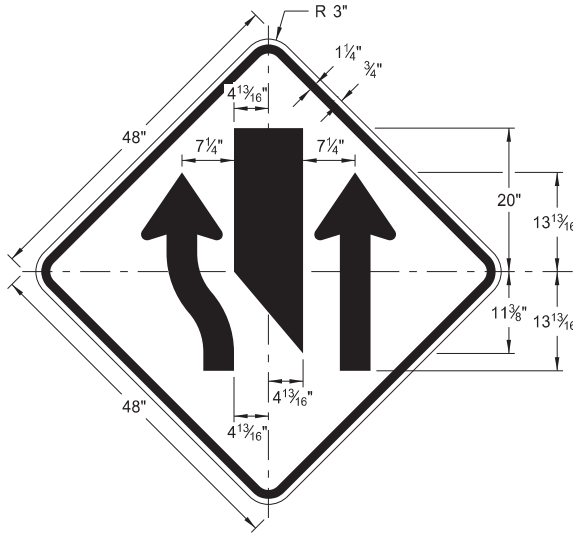
W5-9-48

Legend: black (non-refl)  
Background: orange



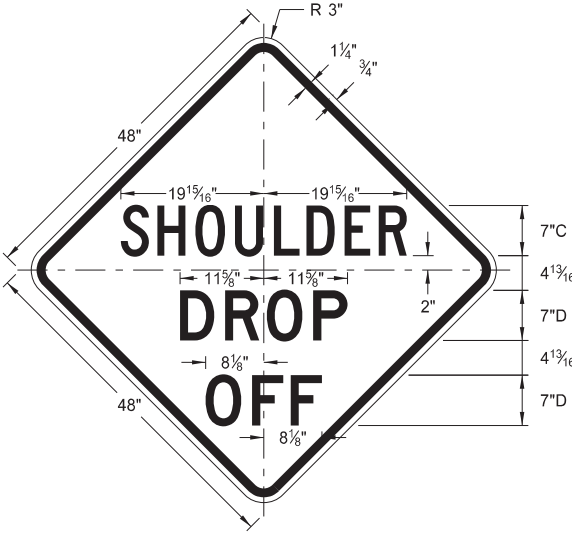
W8-54-48

Legend: black (non-refl)  
Background: orange



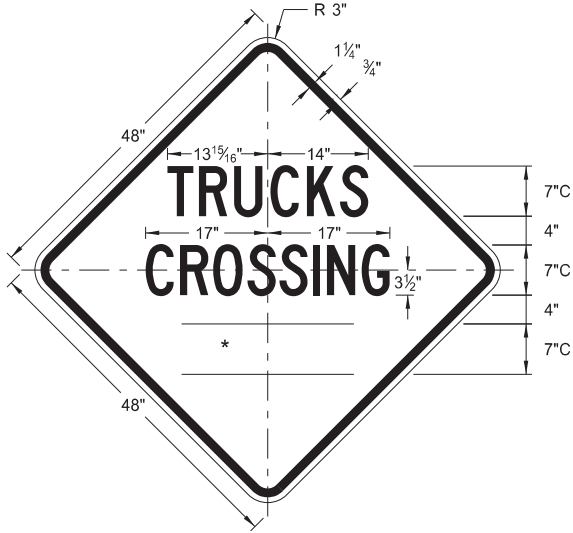
W9-3a-48

Legend: black (non-refl)  
Background: orange



W8-9a-48

Legend: black (non-refl)  
Background: orange

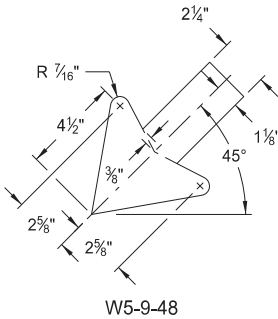


W8-55-48

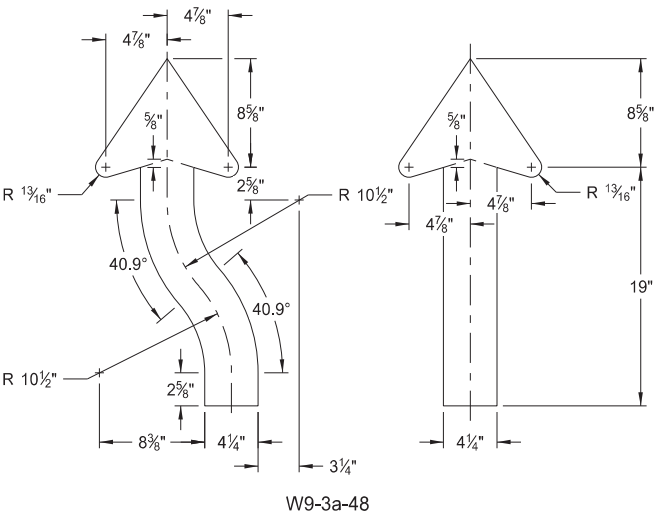
Legend: black (non-refl)  
Background: orange

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

\* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

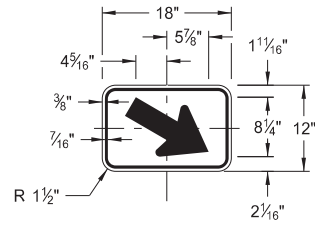
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

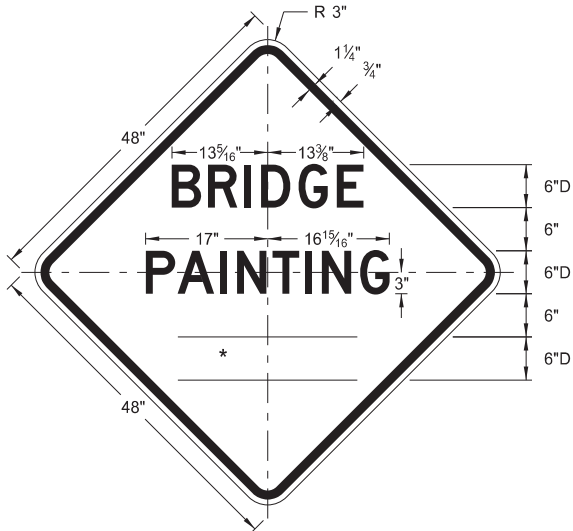
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

\* DISTANCE MESSAGES



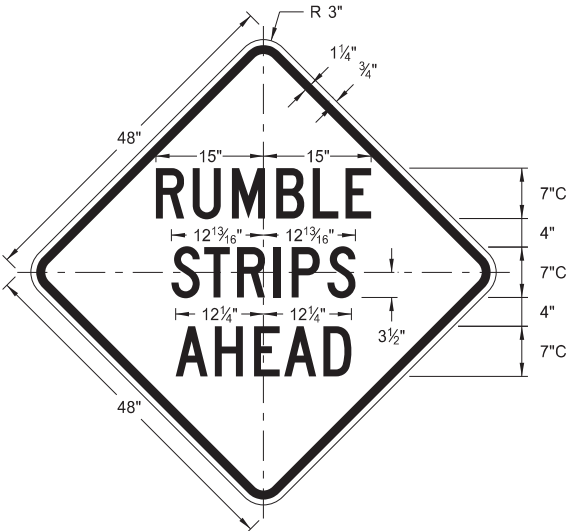
W16-7aP-18

Legend: black (non-refl)  
Background: orange



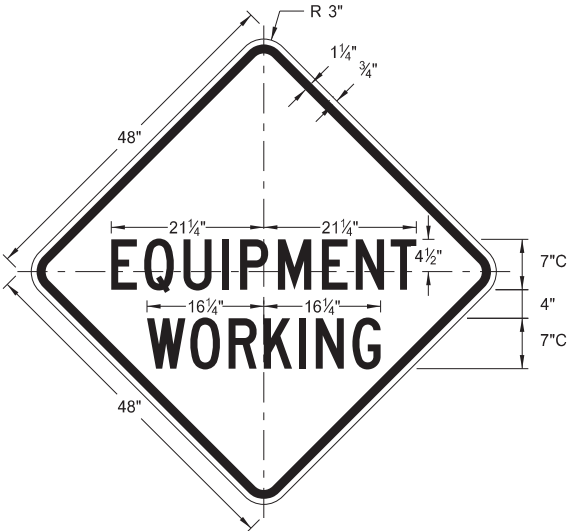
W21-50-48

Legend: black (non-refl)  
Background: orange



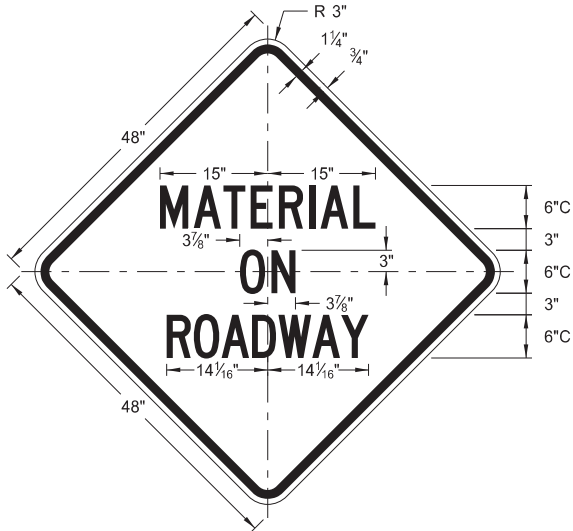
W21-53-48

Legend: black (non-refl)  
Background: orange



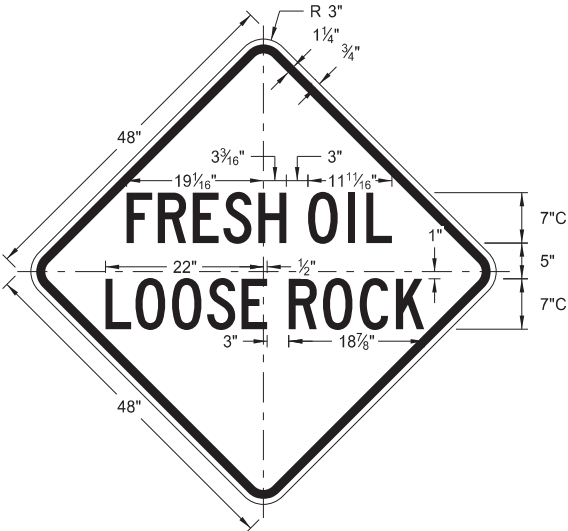
W20-51-48

Legend: black (non-refl)  
Background: orange



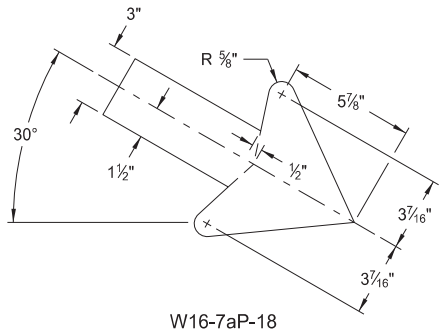
W21-51-48

Legend: black (non-refl)  
Background: orange

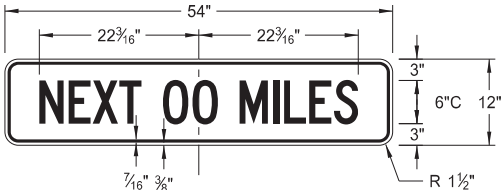


W22-8-48

Legend: black (non-refl)  
Background: orange

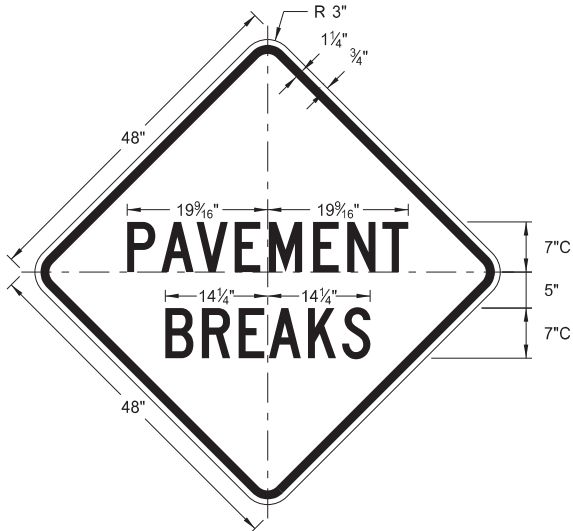


W16-7aP-18



W20-52P-54

Legend: black (non-refl)  
Background: orange

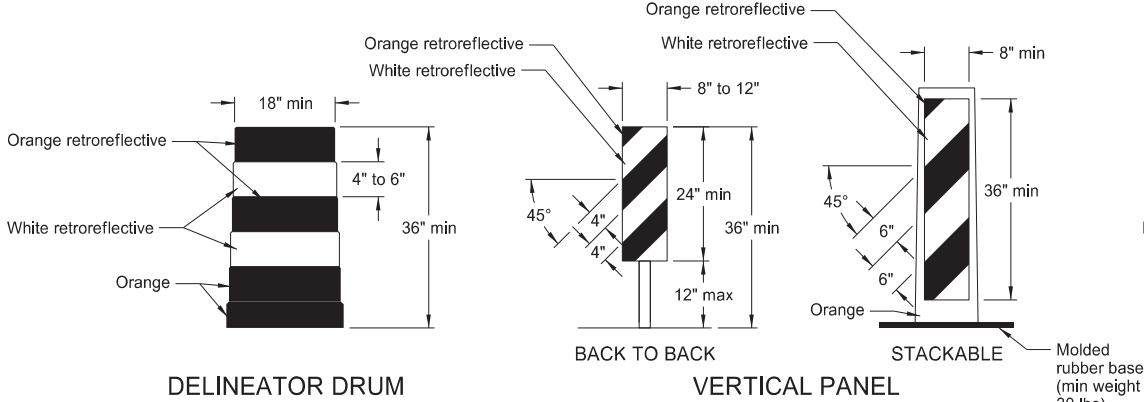


W21-52-48

Legend: black (non-refl)  
Background: orange

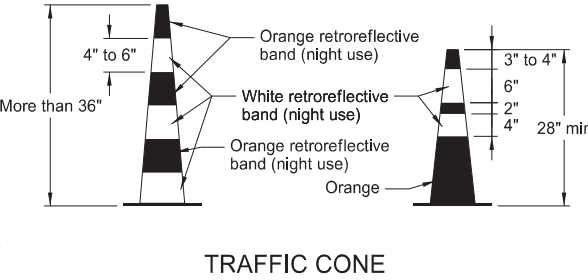
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by  Kirk J Hoff,  Registration Number PE- 4683,  on 11/1/19 and the original document is stored at the North Dakota Department of Transportation
5-31-18		
REVISIONS		
DATE	CHANGE	
11-01-19	Added details for sign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

BARRICADE AND CHANNELIZING DEVICE DETAILS

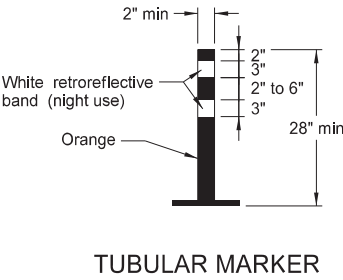


Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and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

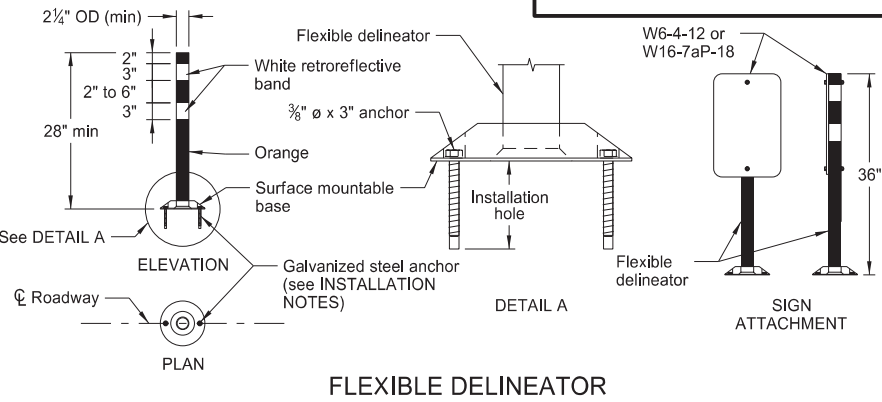
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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



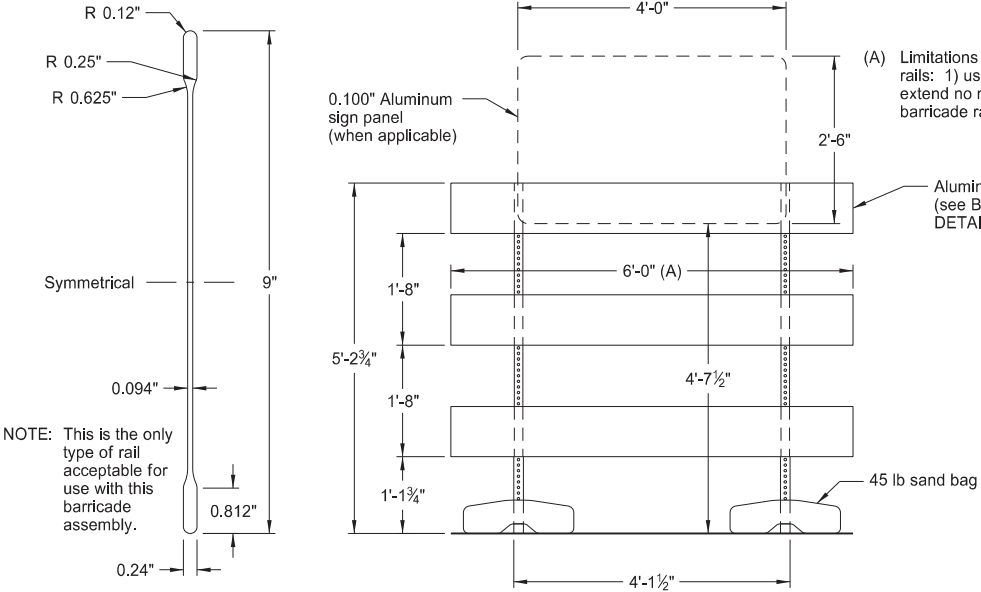
Provide retroreflectORIZATION of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectORIZED space between the orange and white stripes.



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



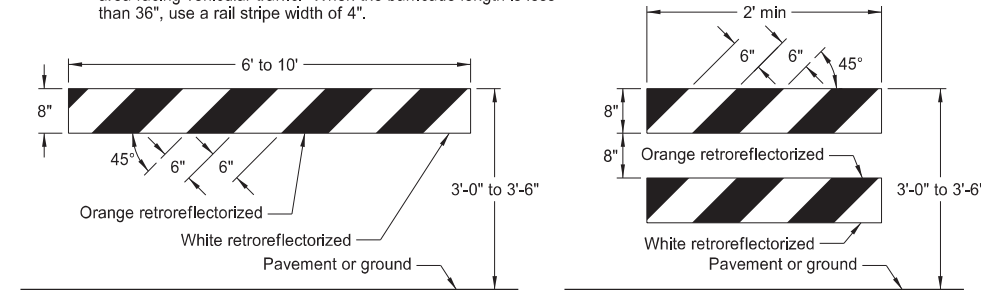
- INSTALLATION NOTES:
1. Drill installation holes to diameter and depth required by manufacturer's specifications.
  2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
  3. In lieu of bolted down base, use an 8" x 8" butyl pad or hot melt butyl.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



BARRICADE BLADE DETAIL

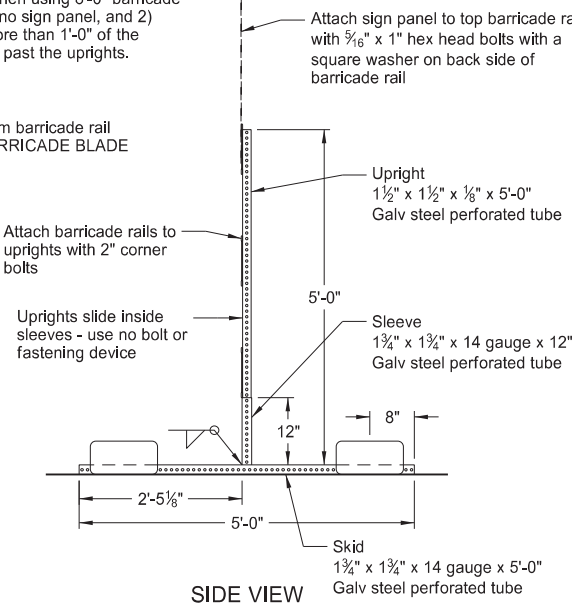
BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

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

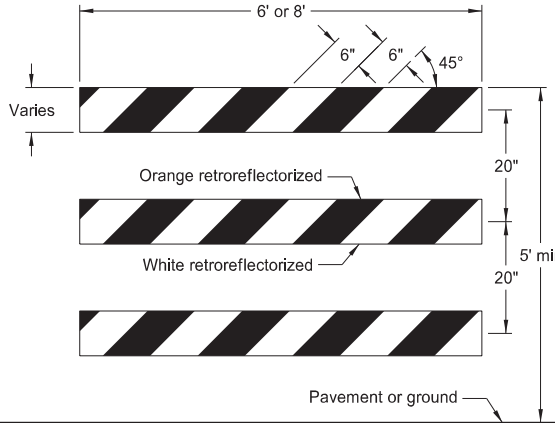


TYPE I BARRICADE

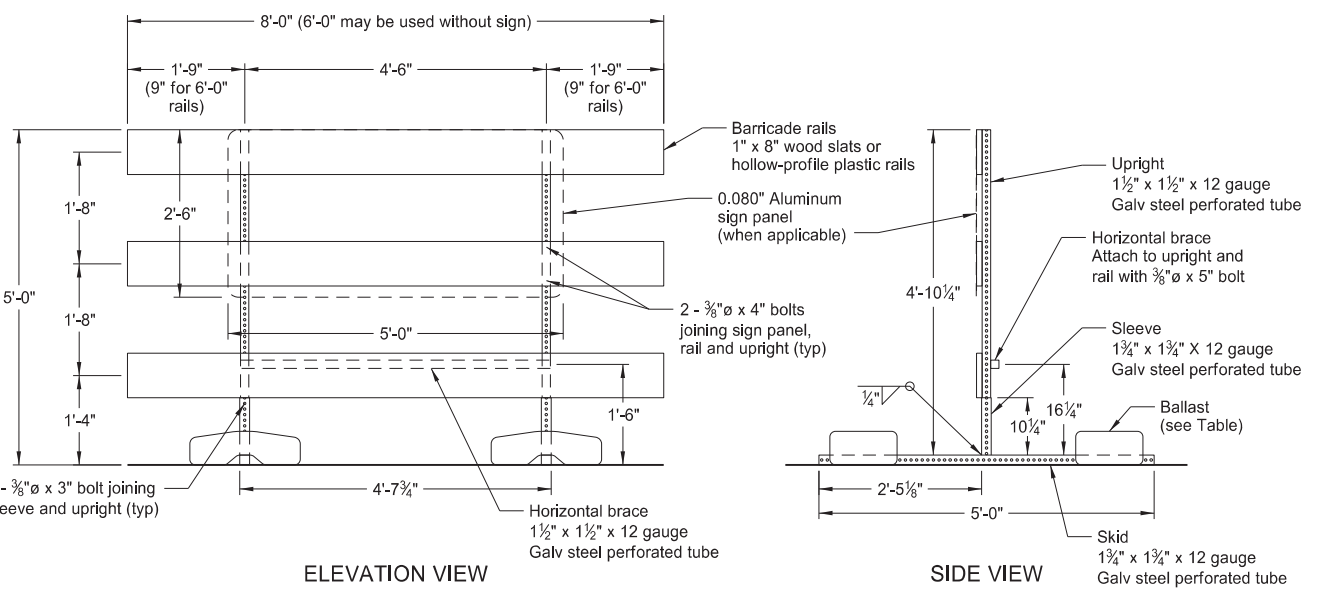
TYPE II BARRICADE  
BARRICADE RAIL DETAILS



SIDE VIEW



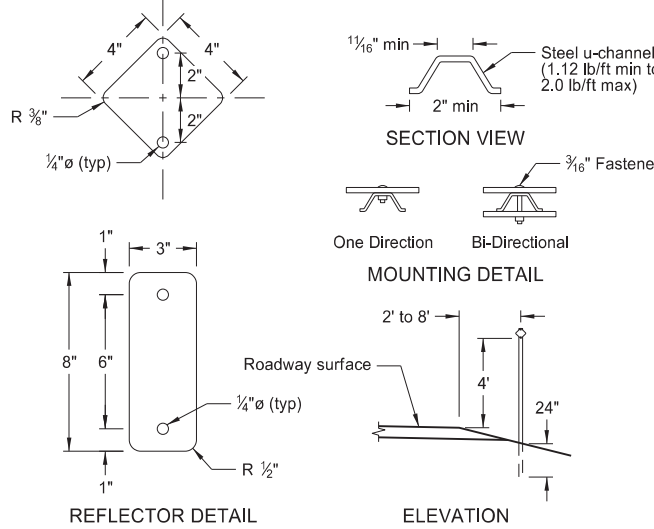
TYPE III BARRICADE



ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

SIDE VIEW



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

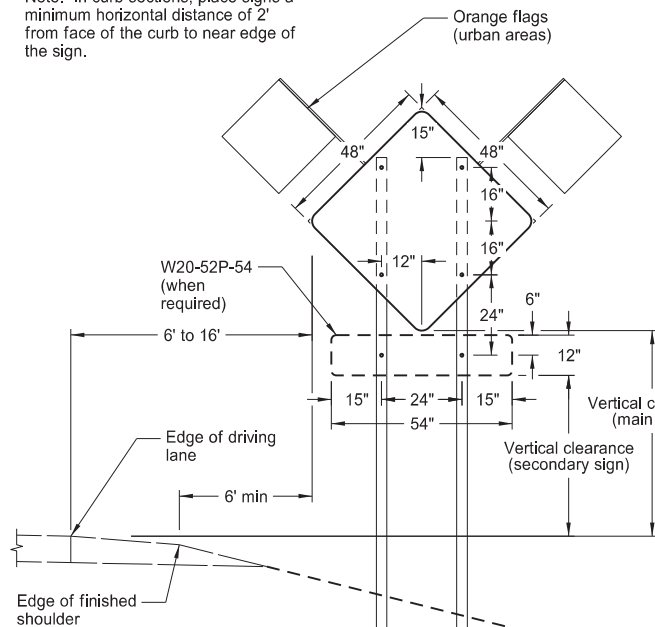
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

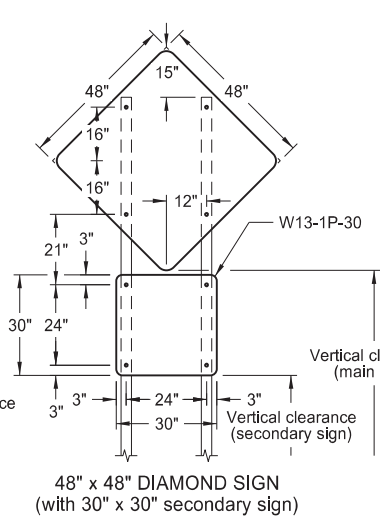
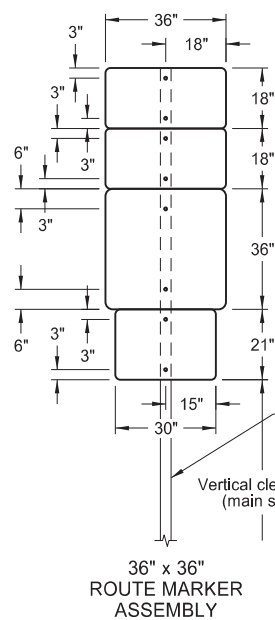
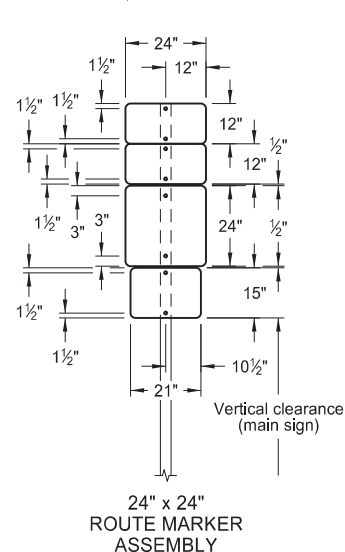
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

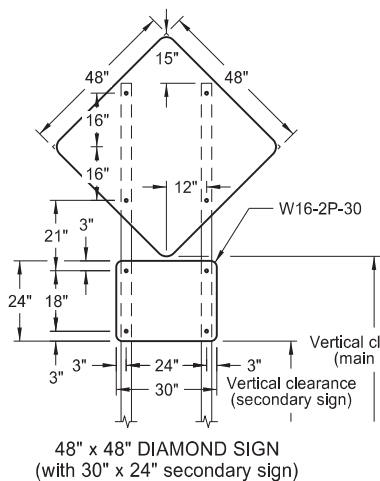
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



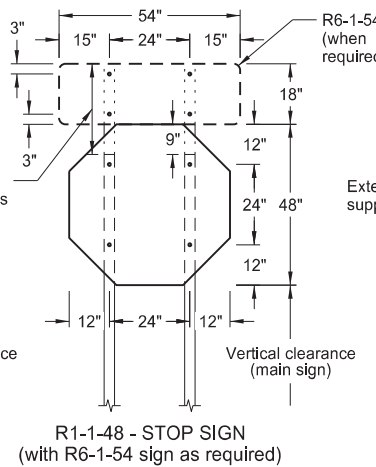
TYPICAL SECTION  
(48" x 48" diamond warning sign shown)



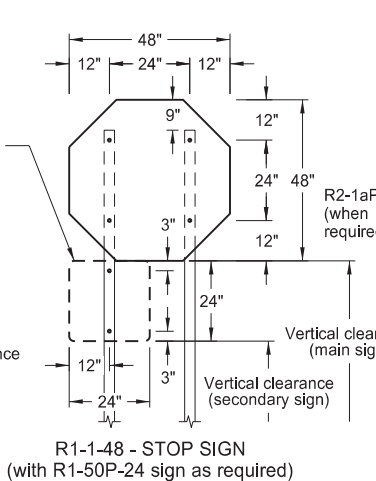
R1-2-60 - YIELD SIGN



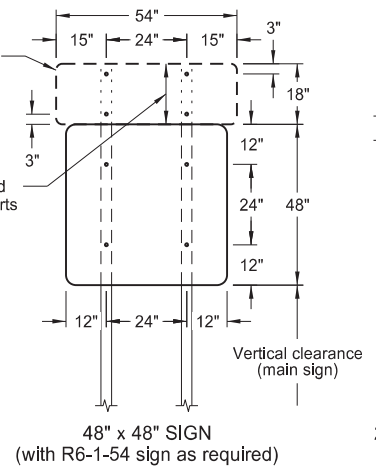
W14-3-64 - PENNANT SIGN



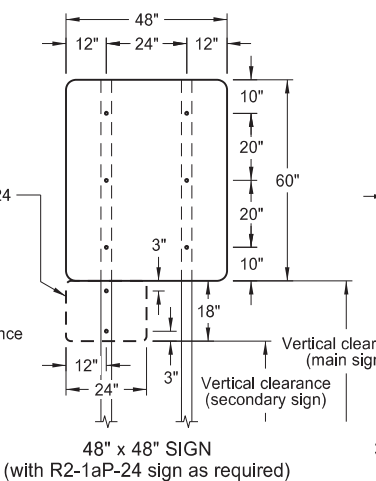
R1-1-48 - STOP SIGN  
(with R6-1-54 sign as required)



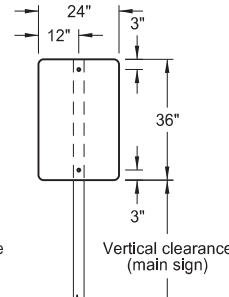
R1-1-48 - STOP SIGN  
(with R1-50P-24 sign as required)



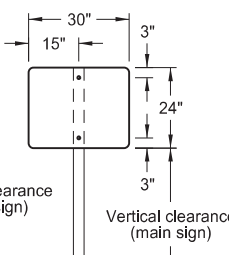
48" x 48" SIGN  
(with R6-1-54 sign as required)



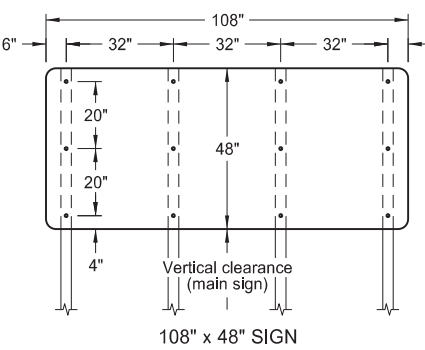
48" x 48" SIGN  
(with R2-1aP-24 sign as required)



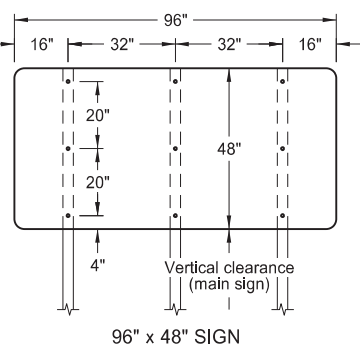
24" x 36" SIGN



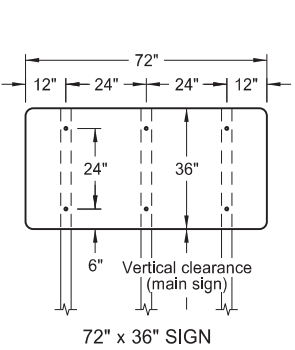
30" x 24" SIGN



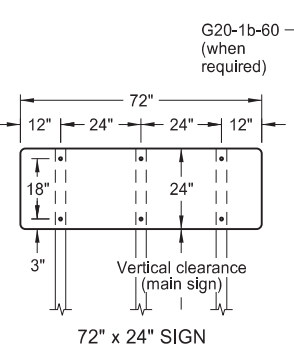
108" x 48" SIGN



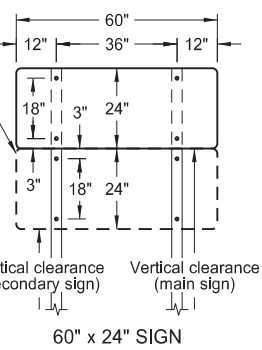
96" x 48" SIGN



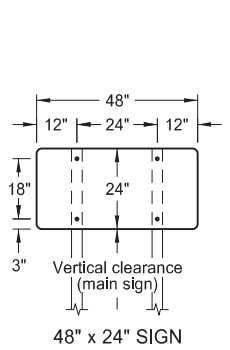
72" x 36" SIGN



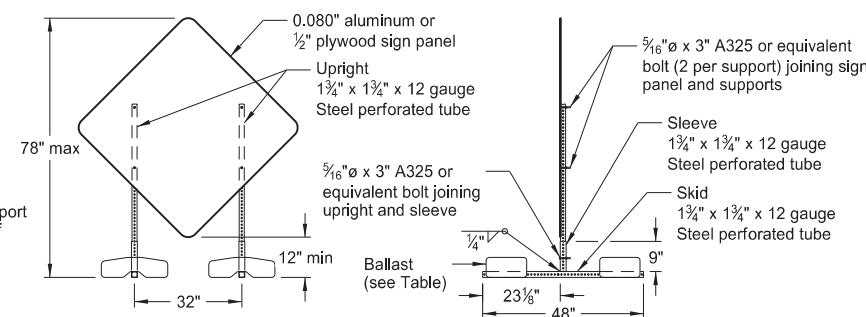
72" x 24" SIGN



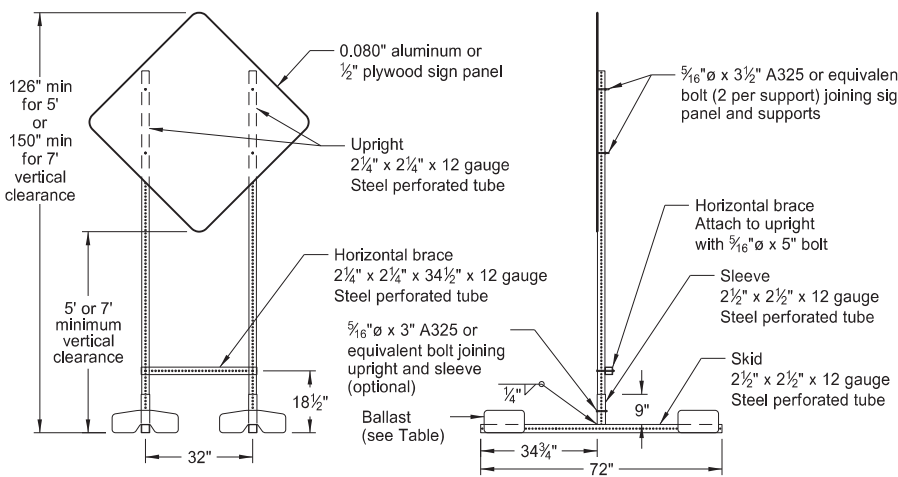
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT  
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT  
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Galvanize or paint supports. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.  
  
Place signs over 50 square feet on 2½" x 2½" perforated tube supports as a minimum.  
  
Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅝" bolts.
3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

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

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

MINIMUM BALLAST  
(For each side of sign support base)

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

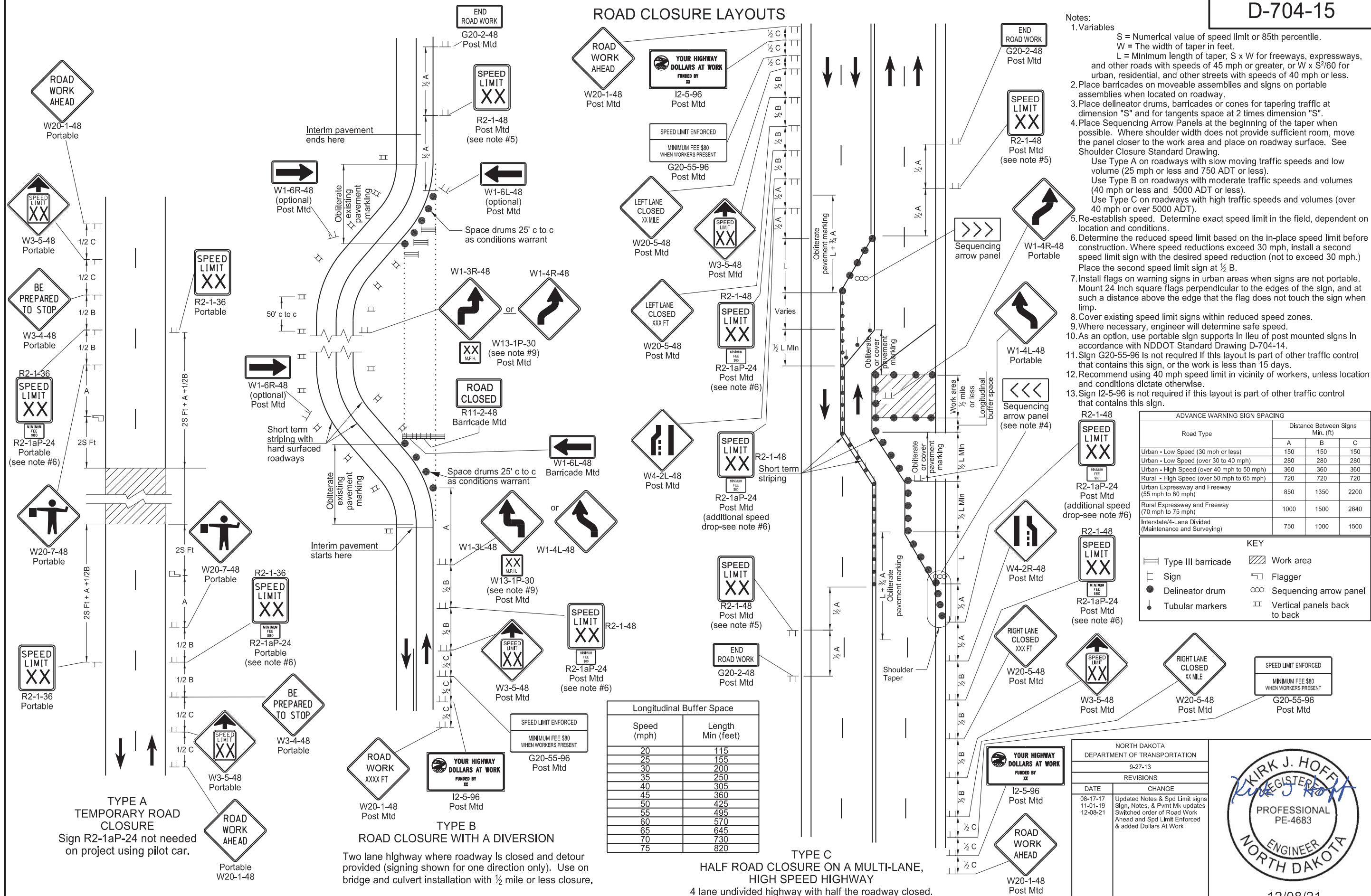
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

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



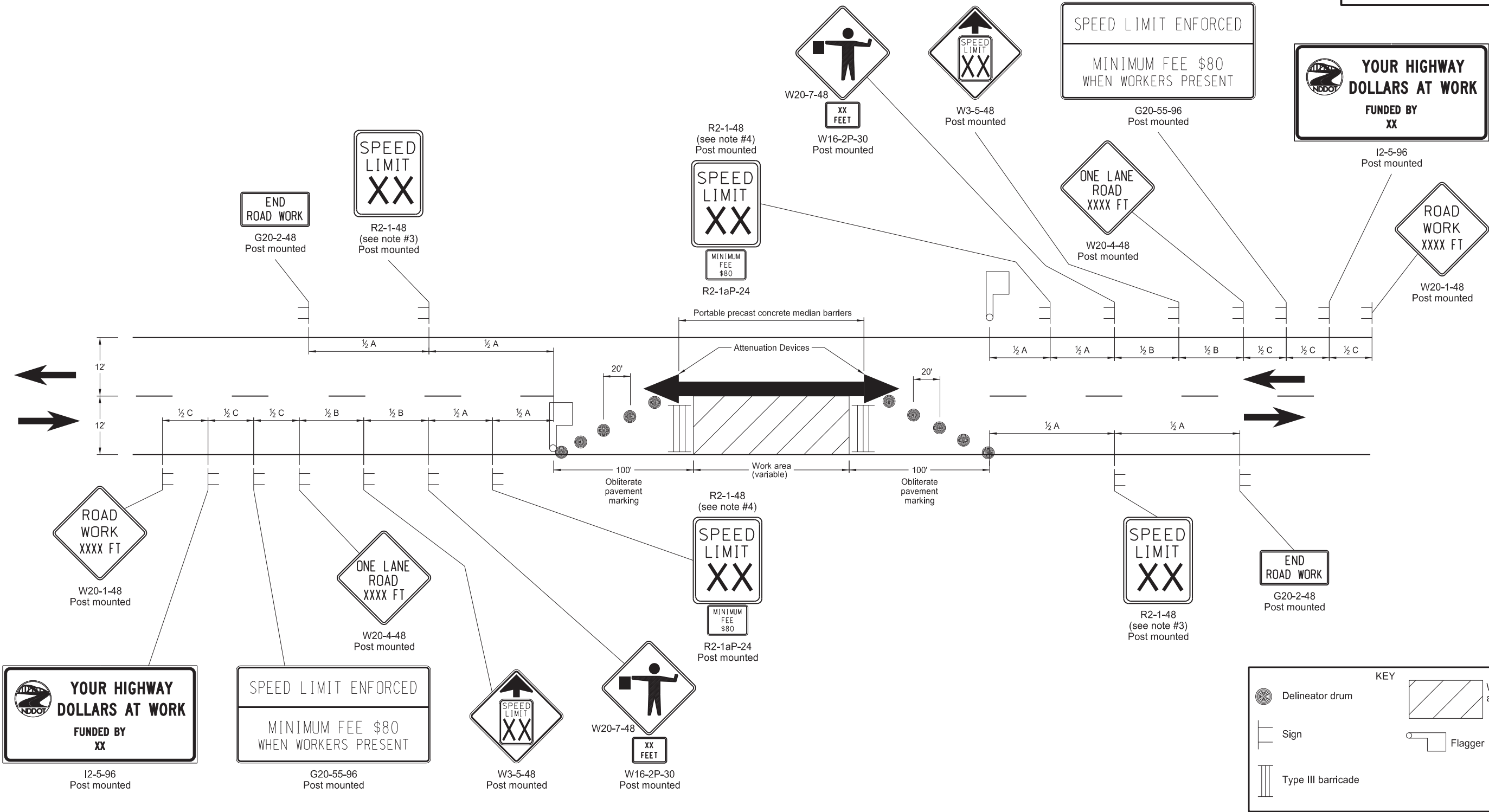
## ROAD CLOSURE LAYOUTS



12/08/21

SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



Notes:

1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Remove existing striping as required. Use back to back delineators when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Place back to back vertical panels when roadways have steep slopes and alignment is not visible to approaching traffic.
3. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
4. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at 1/2B.
5. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
6. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
7. Cover existing speed limit signs within a reduced speed zone.
8. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
9. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
10. 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		
	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

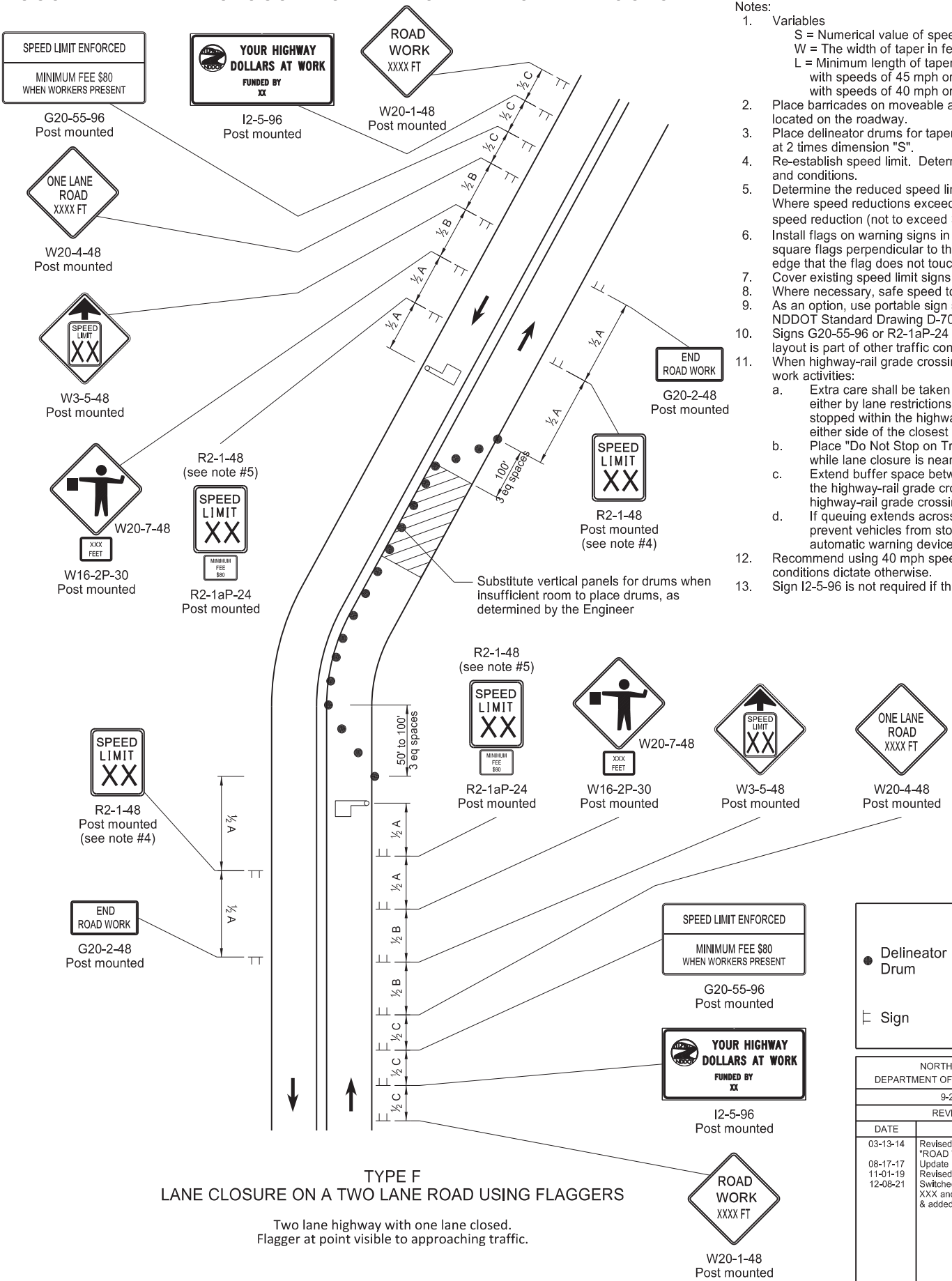
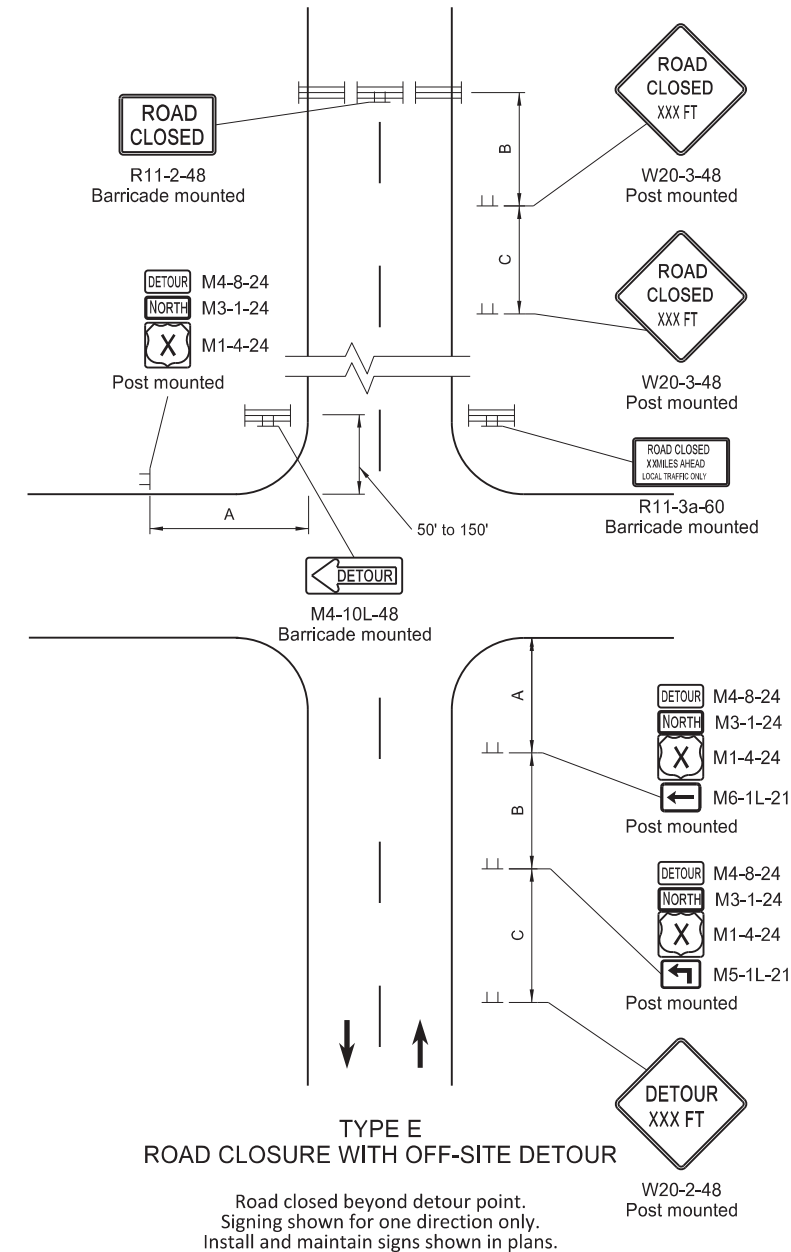


12/08/21



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 S<sup>2</sup>/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 ½B.
  - 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.



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

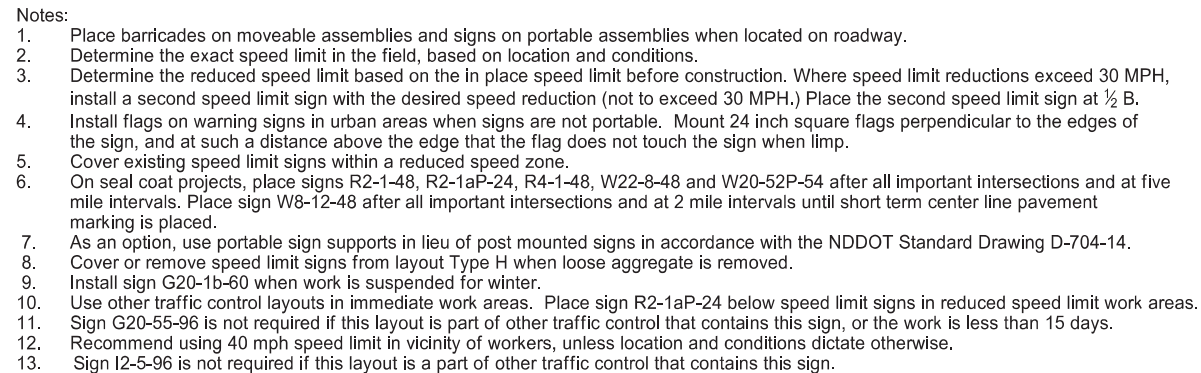
KEY

- 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

KIRK J. HOFF  
REGISTERED  
PROFESSIONAL  
PE-4683  
ENGINEER  
NORTH DAKOTA  
12/08/21

D-704-20



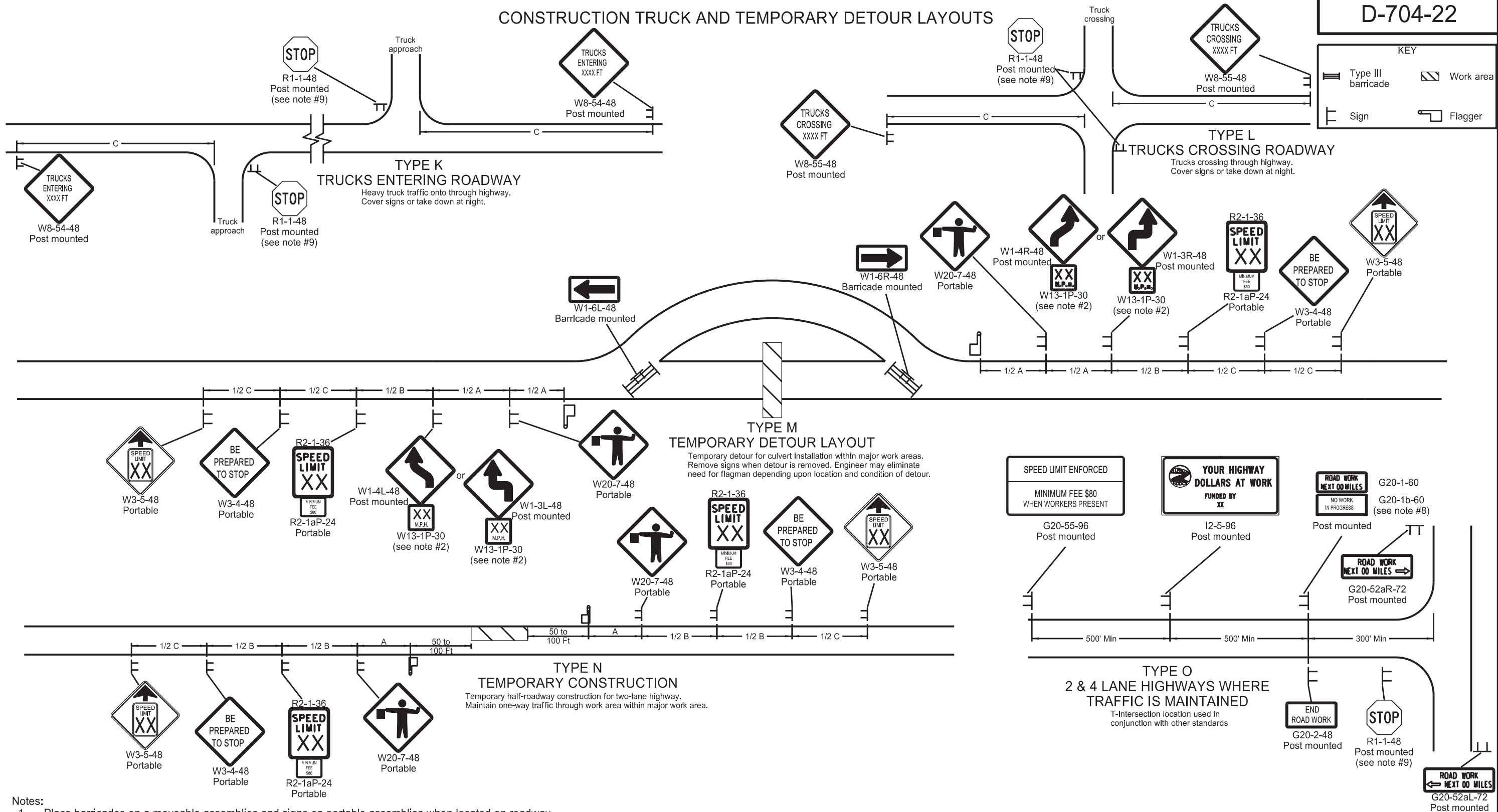
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

12/08/21

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



- 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.

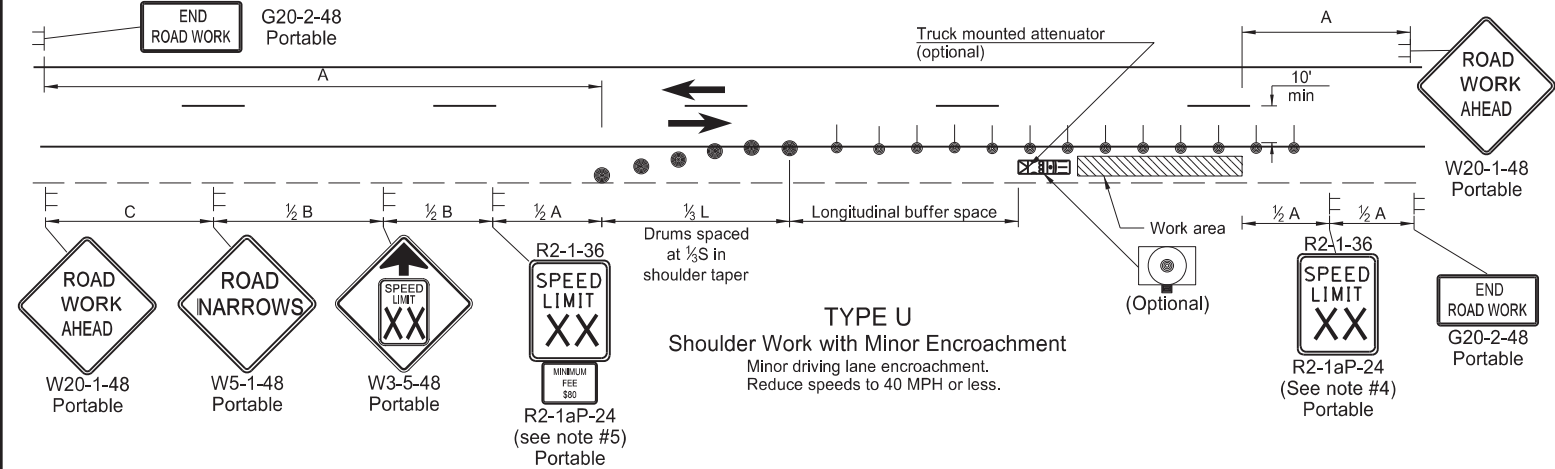
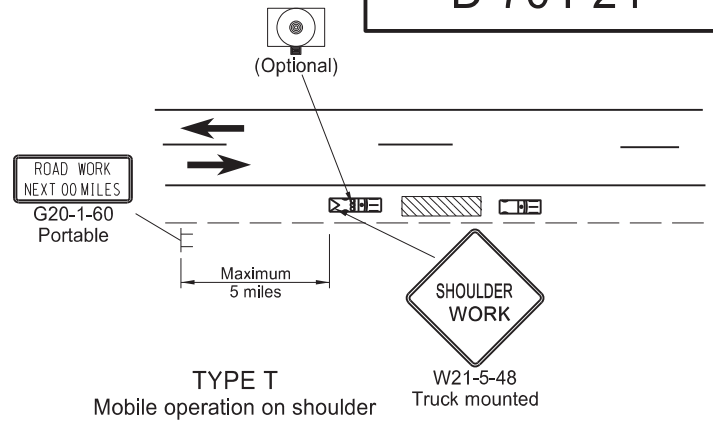
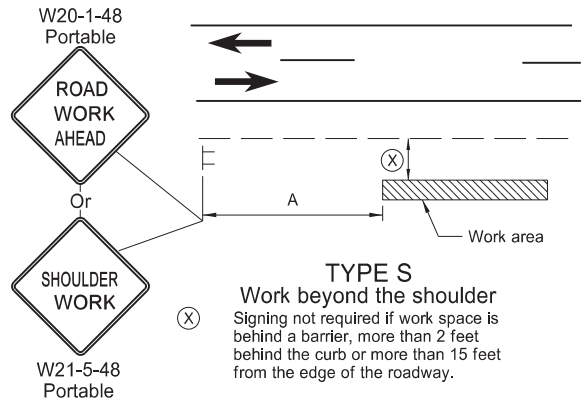
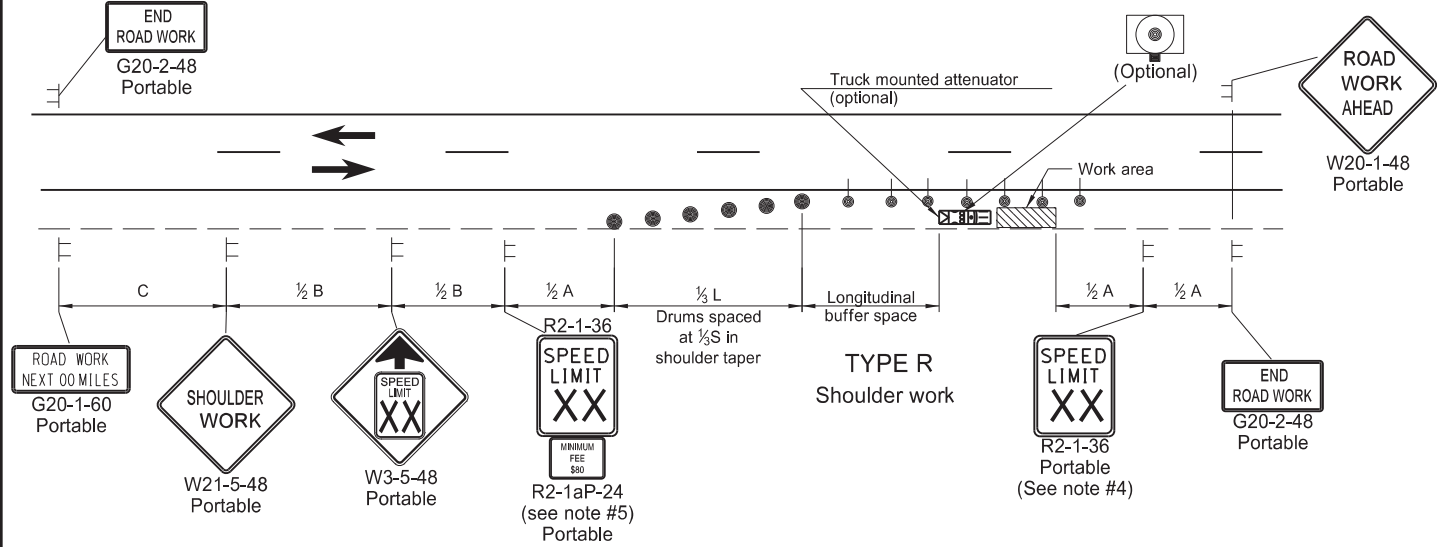
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs		
	Min. (ft)	A	B
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

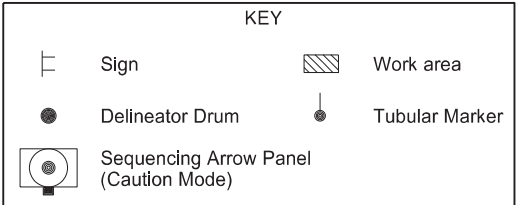
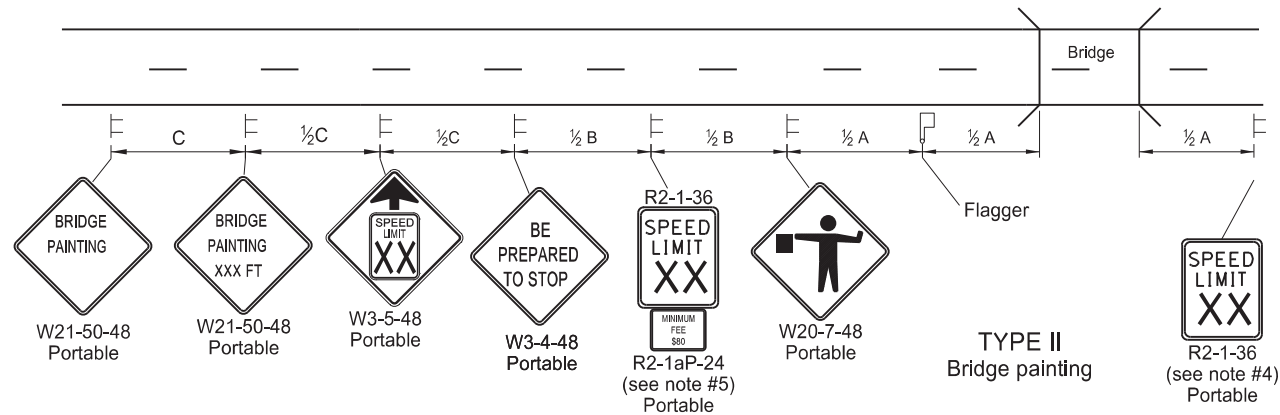
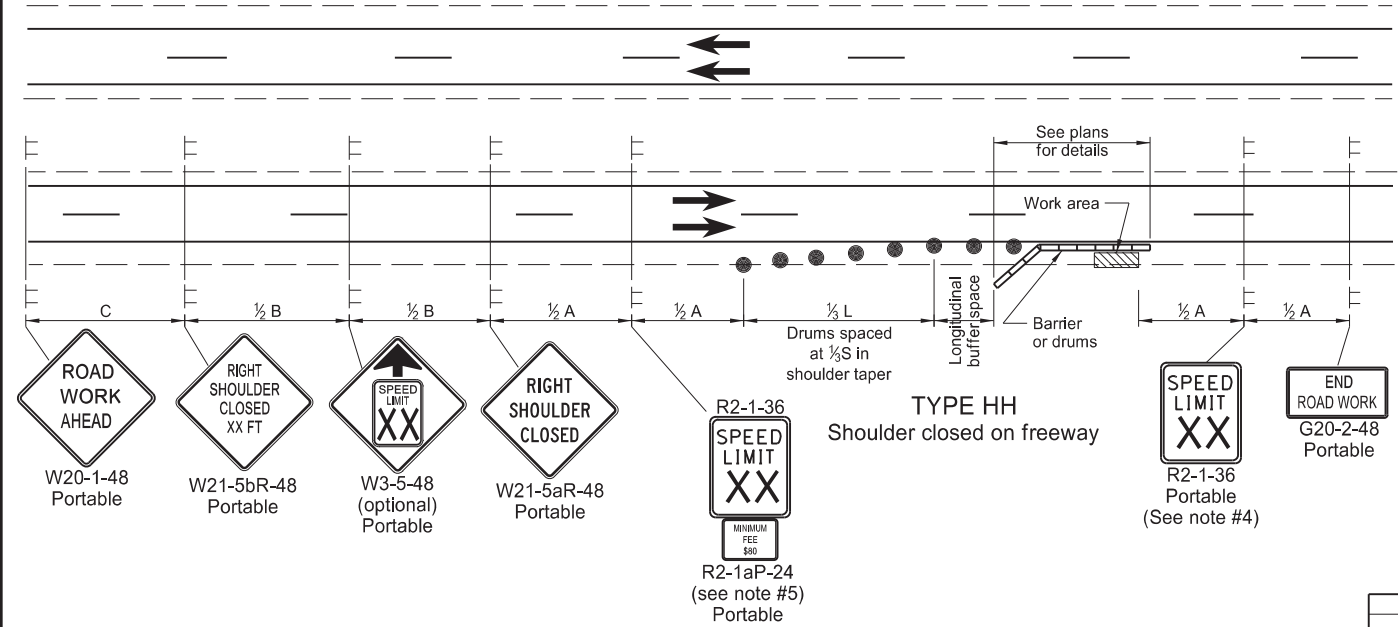
KIRK J. HOFF  
REGISTERED  
PROFESSIONAL  
PE-4683  
ENGINEER  
NORTH DAKOTA  
12/09/21



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

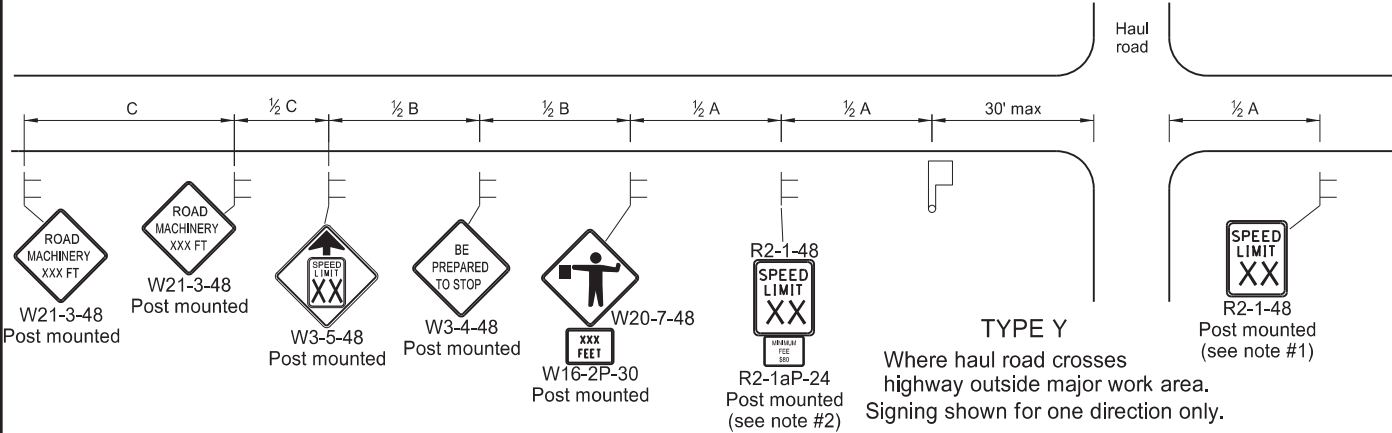
Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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

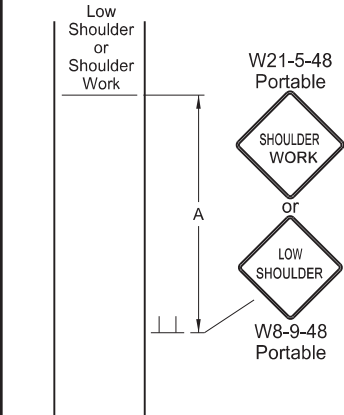
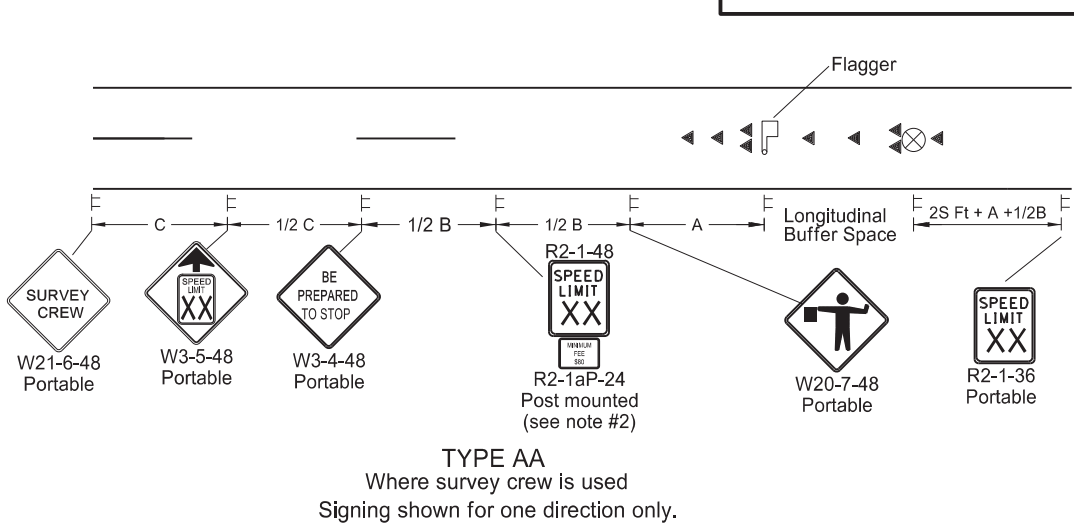
This document was originally issued and sealed by  
Kirk J Hoff,  
Registration Number  
PE- 4683,  
on 11/1/19 and the original document is stored at the  
North Dakota Department  
of Transportation

MISCELLANEOUS SIGN LAYOUTS

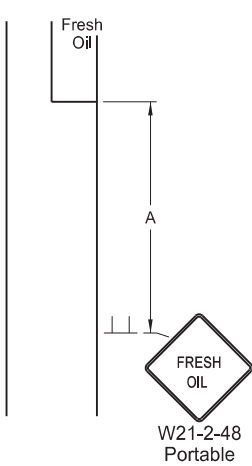
D-704-26



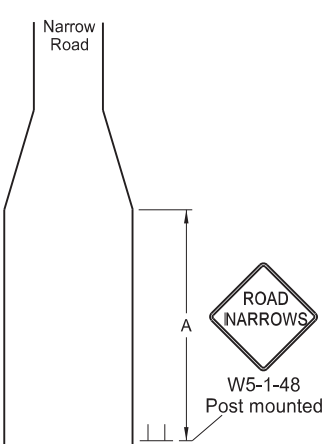
TYPE Z  
Where speed zone is needed  
Signing shown for one direction only.



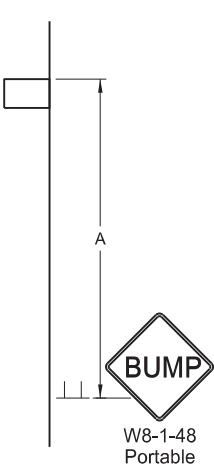
TYPE BB  
Within major work area  
where sign conditions exist



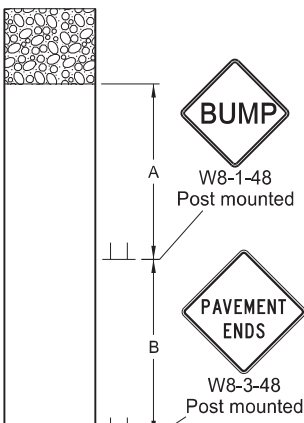
TYPE CC  
Where sign conditions exist



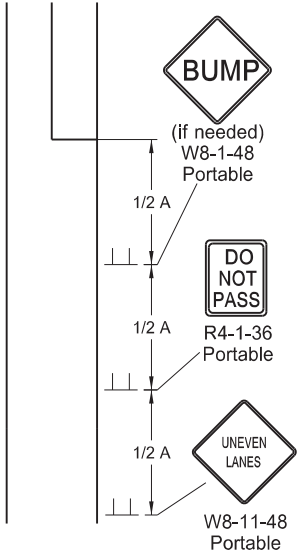
TYPE DD  
Where sign conditions exist



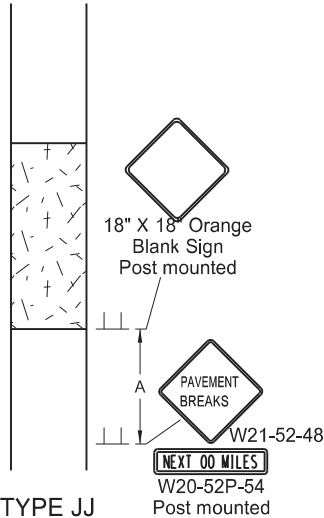
TYPE EE  
Where sign conditions exist



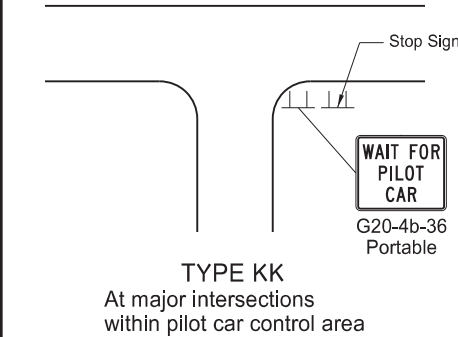
TYPE FF  
Where sign conditions exist  
Signing shown for one direction only.



TYPE GG  
Where elevation difference  
exists between lanes



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



TYPE KK  
At major intersections  
within pilot car control area

- Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
  2. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2B.
  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

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

KEY

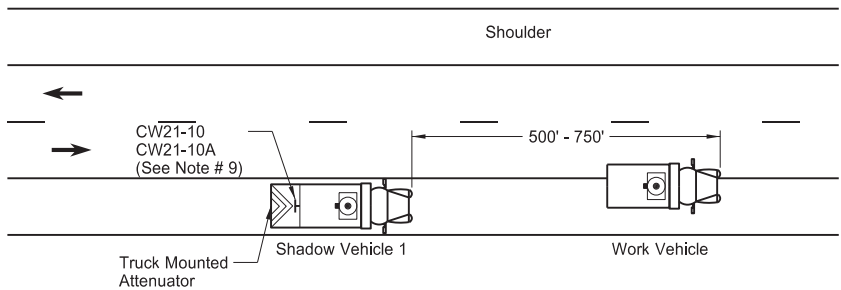
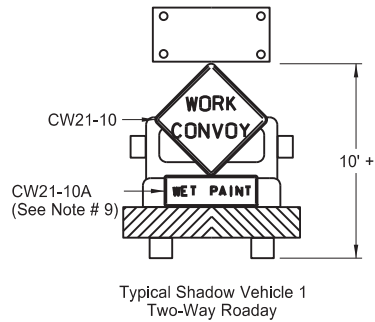
Flagger Sign

Cones Survey Equipment

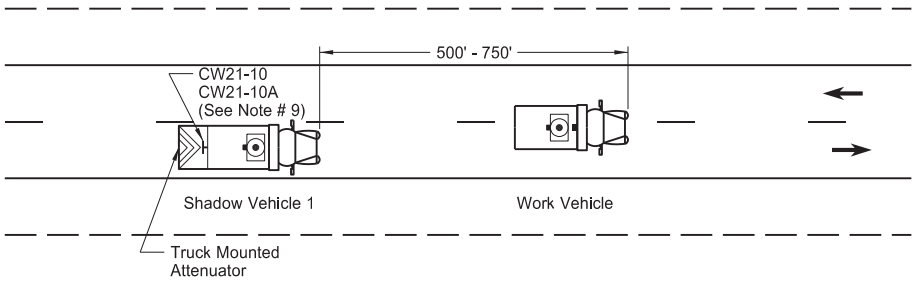
S = Numerical value of speed limit or 85th percentile.

MOBILE OPERATION  
(PAVEMENT MARKING)

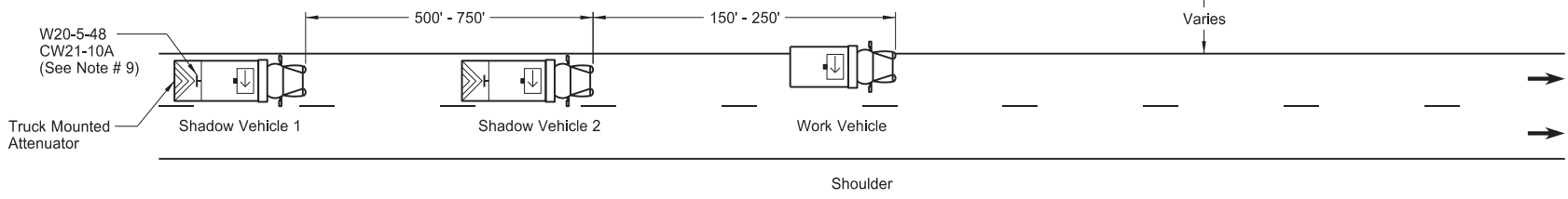
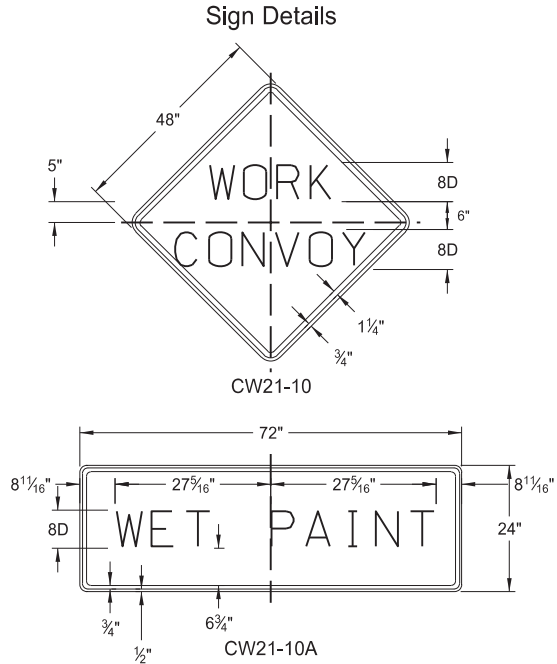
D-704-27



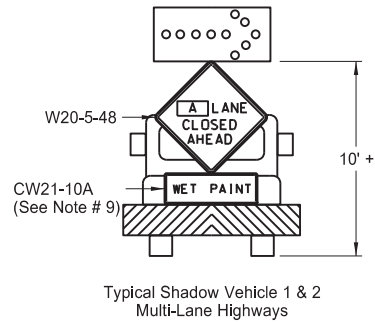
Two-Way Roadway with Paved Shoulders



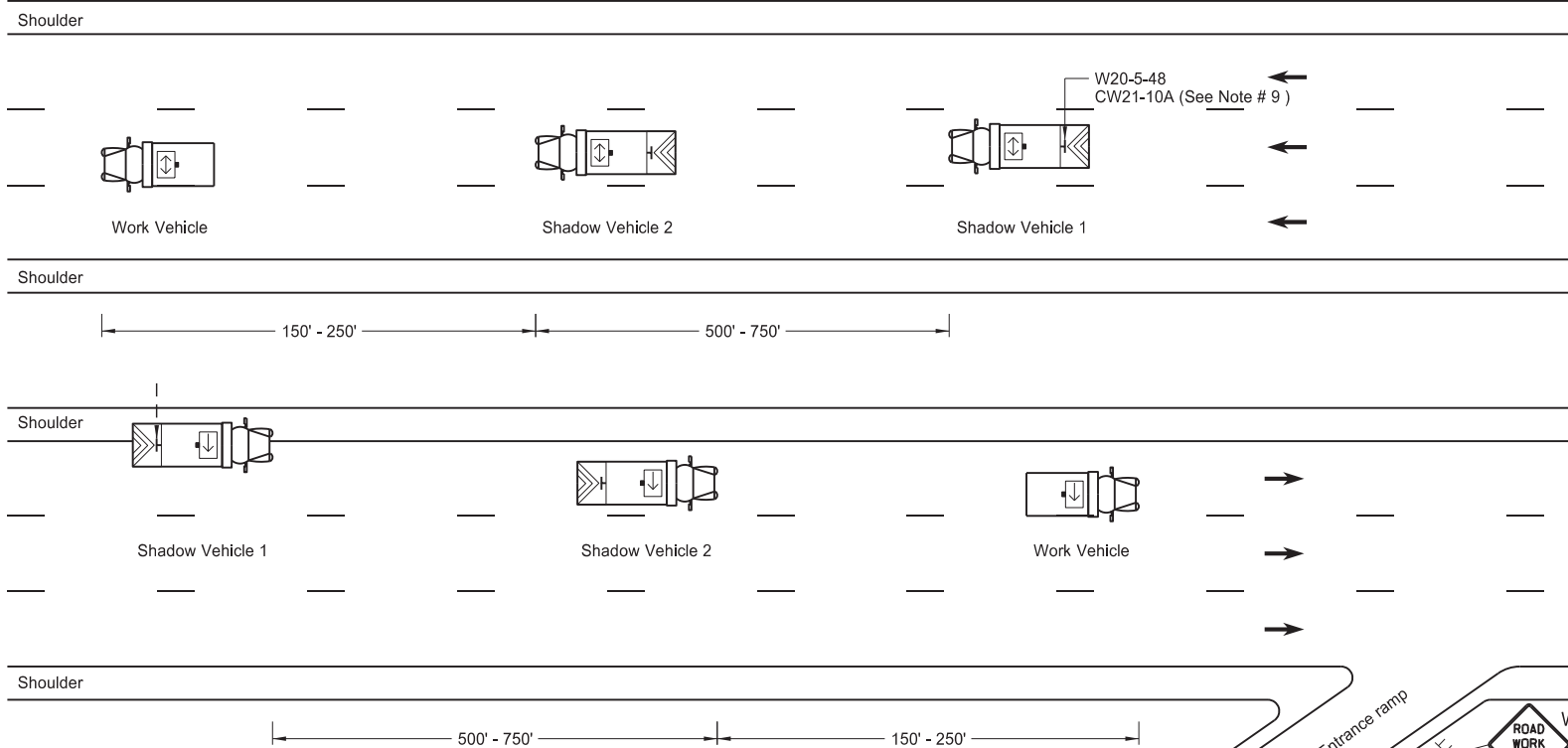
Two-Way Roadway without Paved Shoulders



Undivided Multi-Lane Roadway

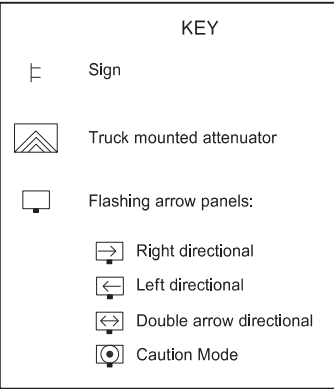


A = ☐ Left ☐ Right ☐ Center



Divided Multi-Lane Highway

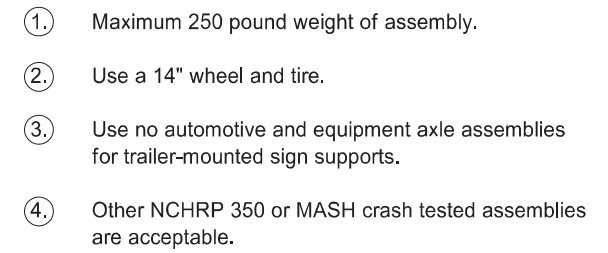
- Notes
1. Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
  2. Display yellow rotating beacons or strobe lights on shadow and work vehicles, unless otherwise stated in the plans.
  3. Use Type B or Type C flashing arrow panels controlled from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



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

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

D-704-50

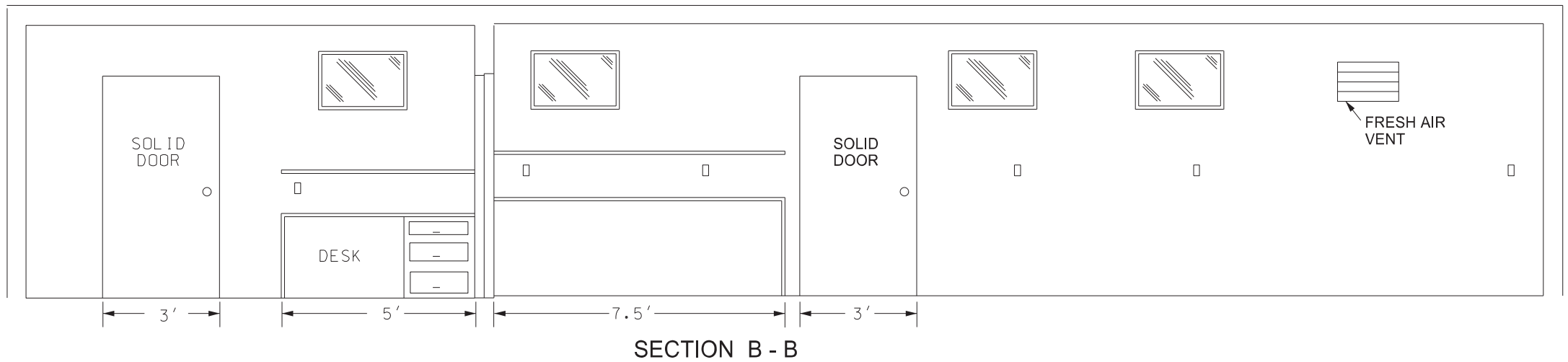
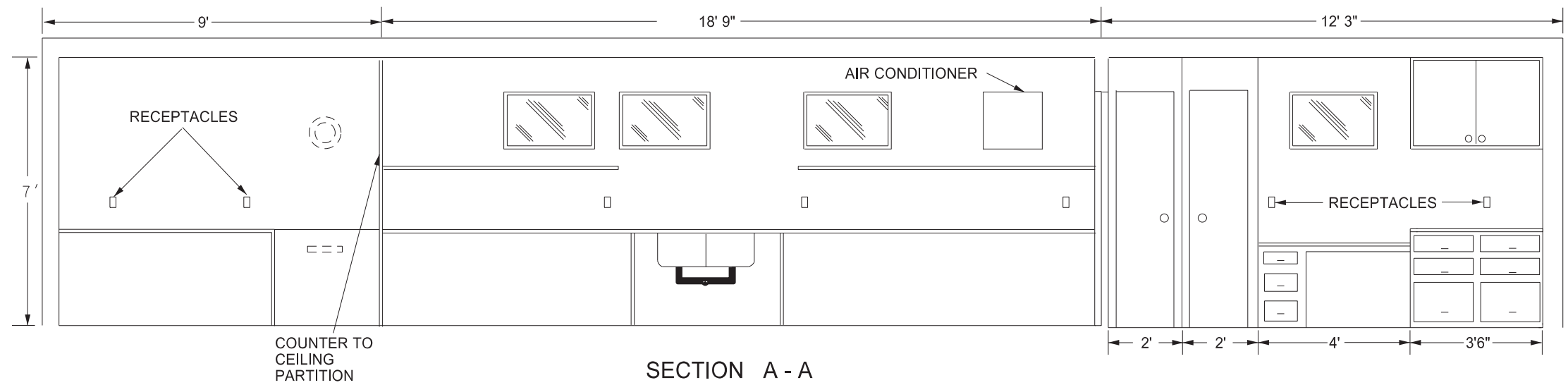
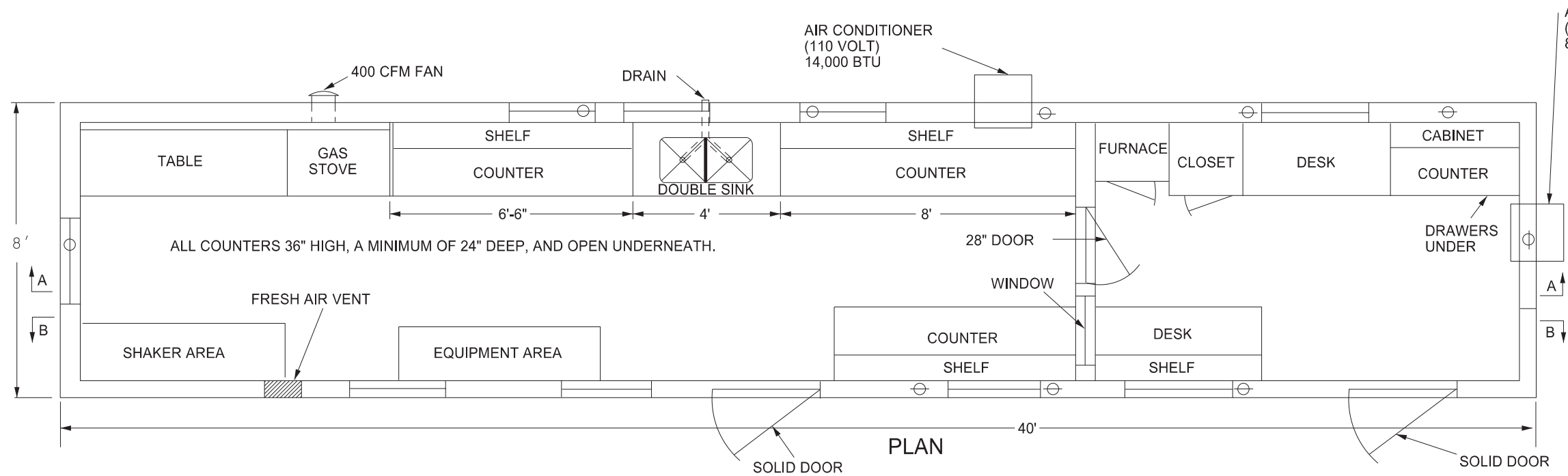


The seal is circular with a double-line border. The outer ring contains the text "KIRK J. HOFF" at the top and "NORTH DAKOTA" at the bottom. The inner circle contains the text "REGISTERED" at the top, "PROFESSIONAL" in the middle, and "PE-4683" at the bottom. A handwritten signature "Kirk J Hoff" is written across the center of the seal. Below the seal, the date "12 02 2020" is printed.



BITUMINOUS LABORATORY

D-706-1



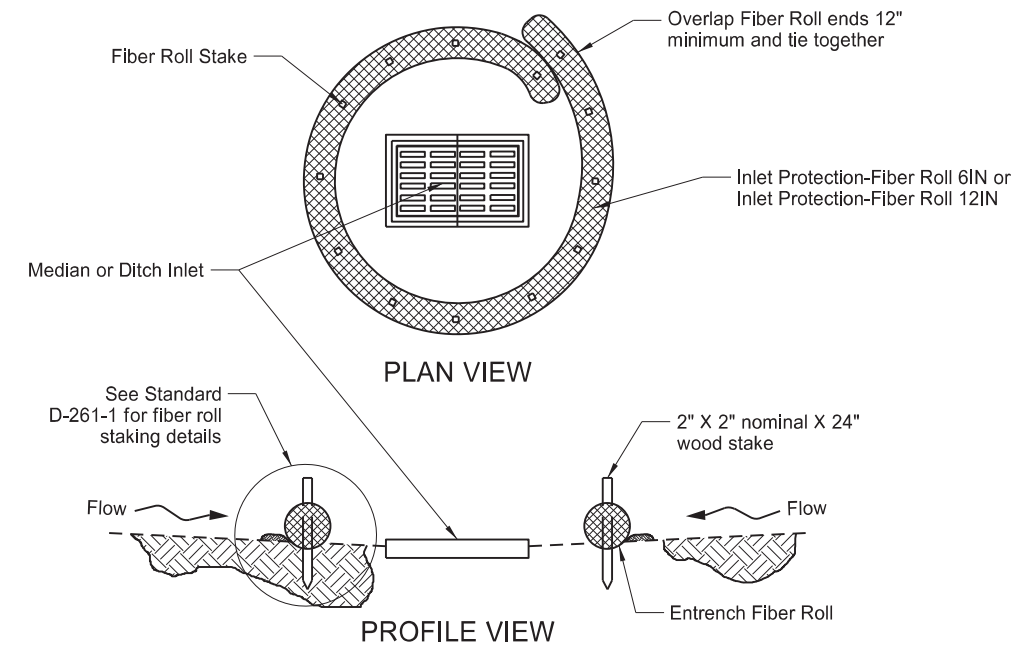
Provide a laboratory with the following:

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 ½ inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.

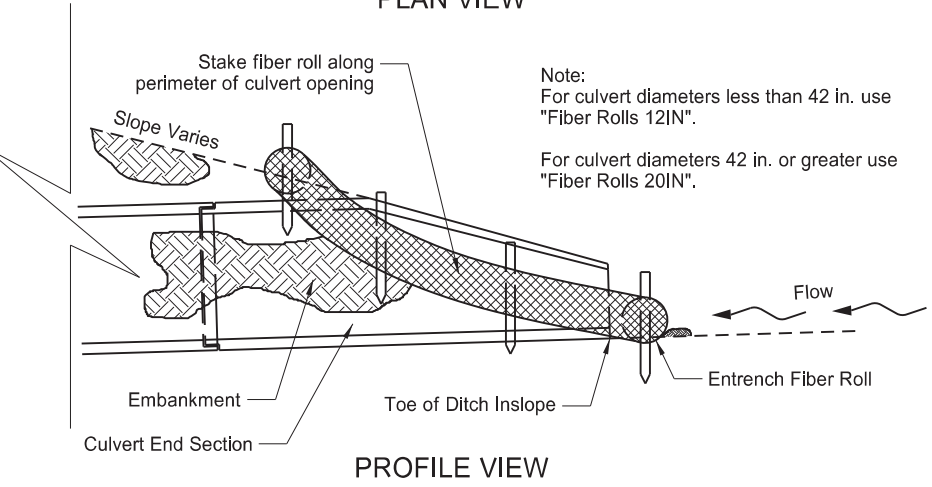
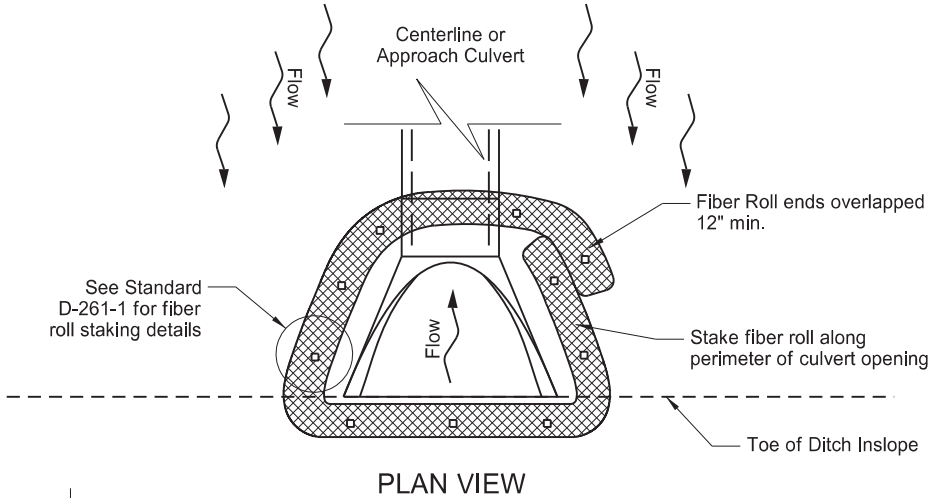
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.
08-27-19	New Design Engineer PE Stamp

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

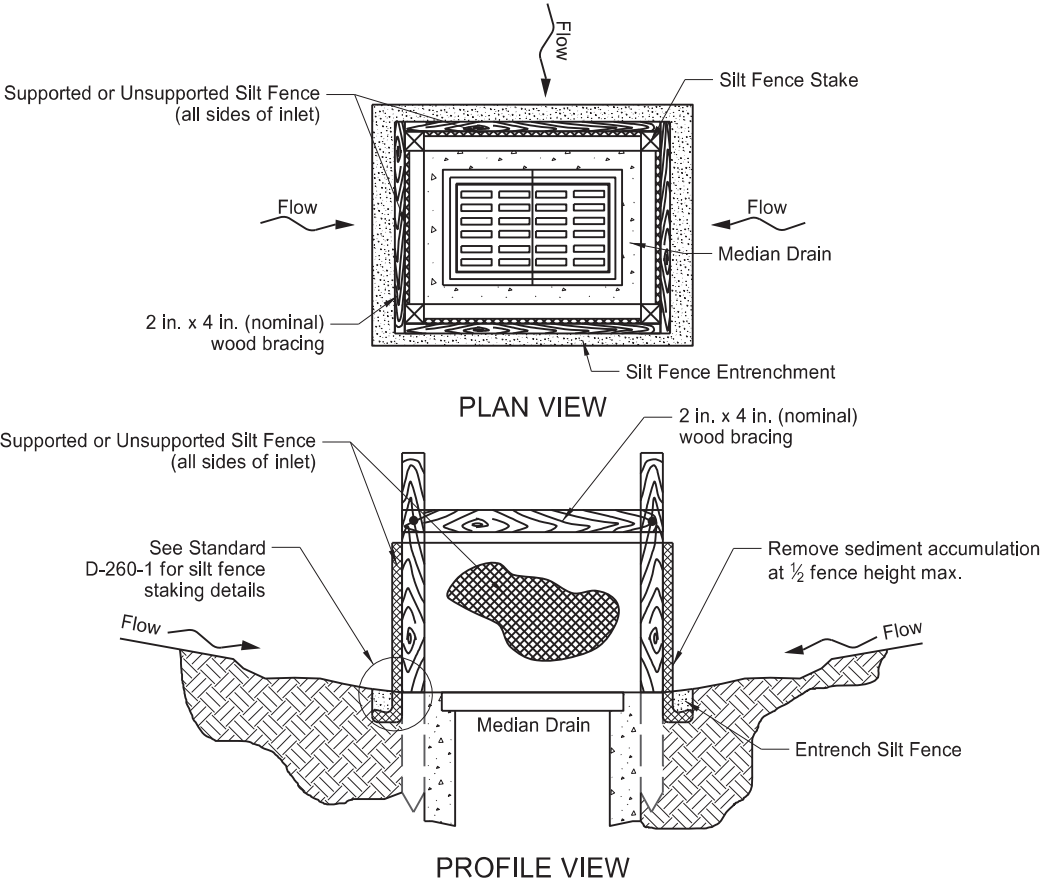
EROSION AND SILTATION CONTROLS  
MEDIAN OR DITCH INLET PROTECTION



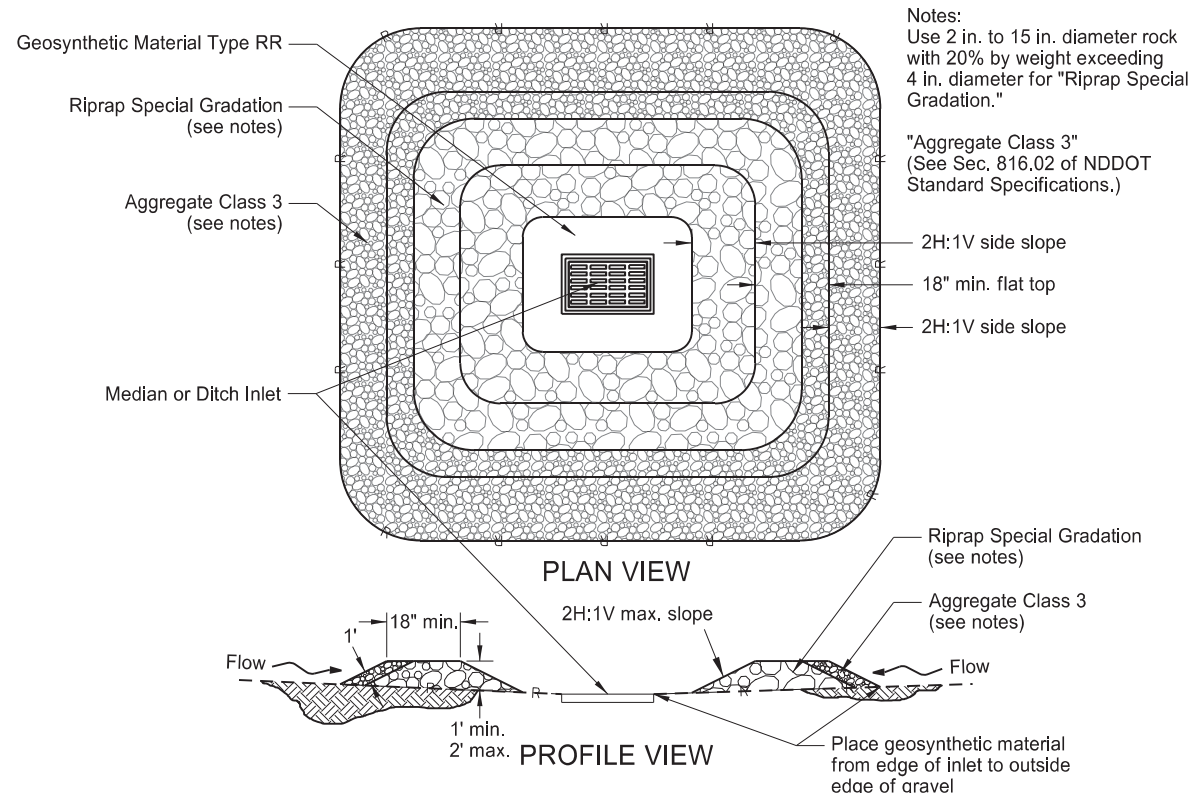
FIBER ROLL PROTECTION  
(MEDIAN OR DITCH INLET)



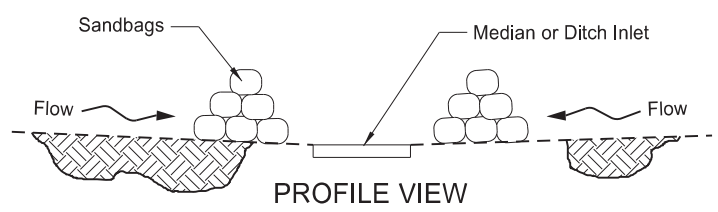
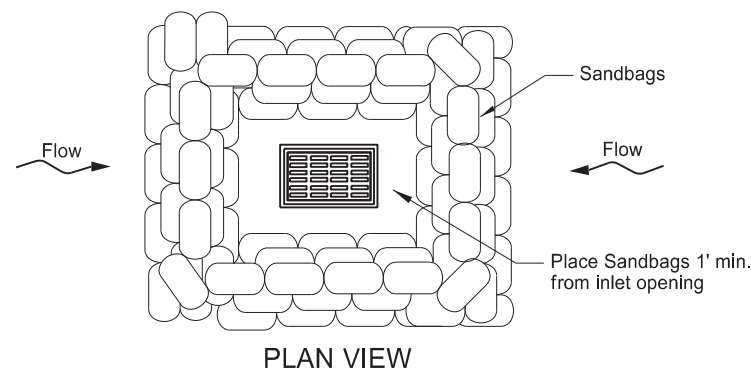
FIBER ROLL PROTECTION  
(INLET OF CULVERT)



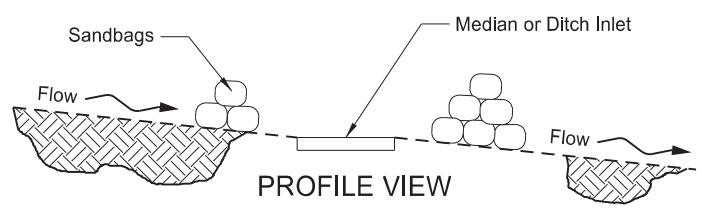
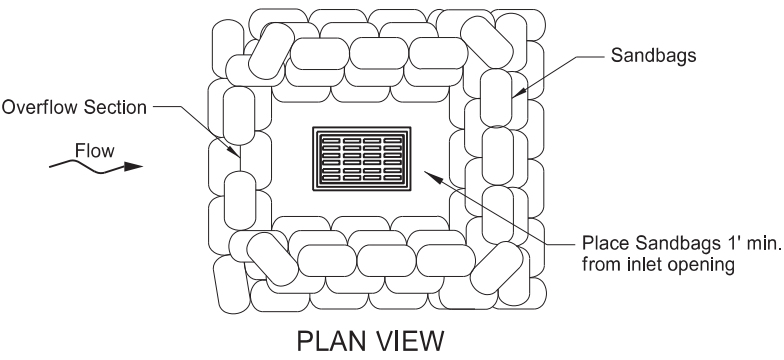
SILT FENCE PROTECTION  
(MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION  
(MEDIAN OR DITCH INLET)



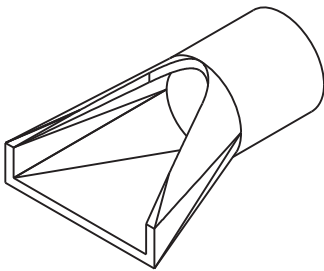
SANDBAG PROTECTION  
(LOW POINT)



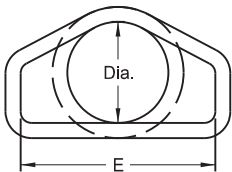
SANDBAG PROTECTION  
(ON SLOPE)

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

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

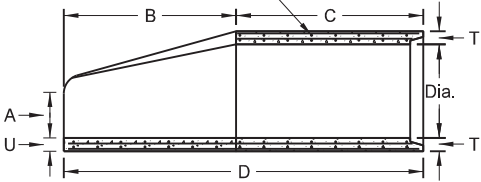


PERSPECTIVE

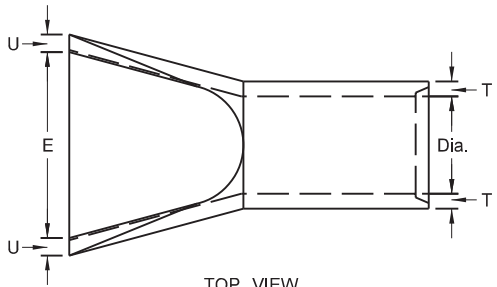


END VIEW

Standard Reinforcement for Class III pipe reinforced as per AASHTO M170



SIDE VIEW



TOP VIEW

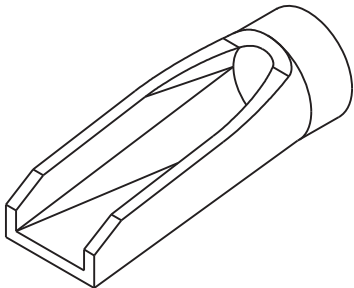
NOTES:

1. All reinforcing steel shall meet AASHTO M170 requirements.
2. 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.
3. Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet  
66" to 108" (incl.) = not less than 6 feet
4. Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
5. 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.

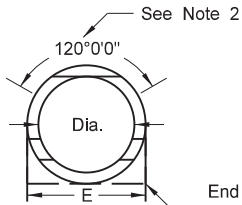
REINFORCED CONCRETE PIPE - FLARED END SECTION

Reinforcement to be equivalent to Class III RCP

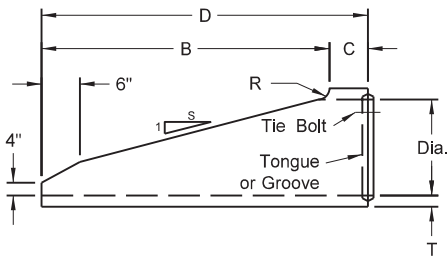
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7 <sup>1</sup> / <sub>2</sub> "	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3 <sup>1</sup> / <sub>2</sub> "	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



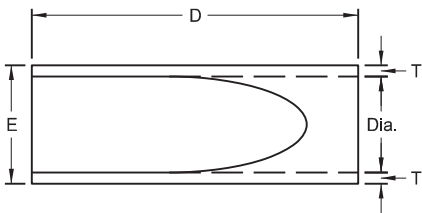
PERSPECTIVE



END VIEW



SIDE VIEW



TOP VIEW

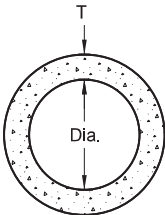
NOTES (Traversable End Section):

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

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

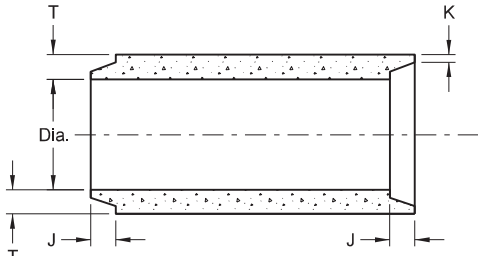
Reinforcement to be equivalent to Class III RCP

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 Min.	Minimum Wall Thickness (T)	
Dia	Sq. ft.	Lbs.	In.	In.	In.	
12	0.79	92	1 <sup>5</sup> / <sub>8</sub> -2 <sup>3</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>4</sub>	2	
15	1.23	127	1 <sup>3</sup> / <sub>4</sub> -2 <sup>1</sup> / <sub>4</sub>	7 <sup>5</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	
18	1.77	168	1 <sup>1</sup> / <sub>2</sub> -2 <sup>1</sup> / <sub>2</sub>	1	2 <sup>1</sup> / <sub>2</sub>	
21	2.40	214	1 <sup>1</sup> / <sub>8</sub> -3 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	
24	3.14	265	2 <sup>3</sup> / <sub>4</sub> -3 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>8</sub>	3	
27	3.98	322	2 <sup>3</sup> / <sub>4</sub> -4	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>4</sub>	
30	4.91	384	3 <sup>1</sup> / <sub>4</sub> -4 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>2</sub>	
33	5.94	452	3 <sup>1</sup> / <sub>4</sub> -4 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	
36	7.07	524	3 <sup>1</sup> / <sub>4</sub> -4 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	4	
42	9.62	685	3 <sup>3</sup> / <sub>4</sub> -4 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>2</sub>	
48	12.57	685	3 <sup>3</sup> / <sub>4</sub> -4 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	5	
54	15.90	1070	4 <sup>1</sup> / <sub>8</sub> -5 <sup>1</sup> / <sub>4</sub>	2	5 <sup>1</sup> / <sub>2</sub>	
60	19.63	1296	4 <sup>1</sup> / <sub>2</sub> -5 <sup>1</sup> / <sub>2</sub>	2 <sup>1</sup> / <sub>4</sub>	6	
66	23.76	1542	5-6	2 <sup>3</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>2</sub>	
72	28.27	1810	5 <sup>5</sup> / <sub>8</sub> -6 <sup>3</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>8</sub>	7	
78	33.18	2098	6 <sup>1</sup> / <sub>4</sub> -7 <sup>1</sup> / <sub>4</sub>	2 <sup>3</sup> / <sub>8</sub>	7 <sup>1</sup> / <sub>2</sub>	
84	38.48	2410	5 <sup>5</sup> / <sub>8</sub> -7 <sup>3</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>8</sub>	8	
90	44.18	2793	6 <sup>3</sup> / <sub>4</sub> -8 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	8 <sup>1</sup> / <sub>2</sub>	
96	50.27	3092	7-8 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>2</sub>	9	
102	56.75	3466	7-8 <sup>1</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	
108	63.62	3864	7 <sup>1</sup> / <sub>4</sub> -8 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>4</sub>	10	

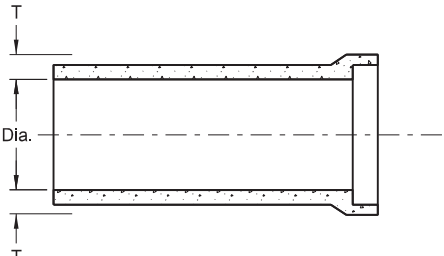


END VIEW

CIRCULAR PIPE

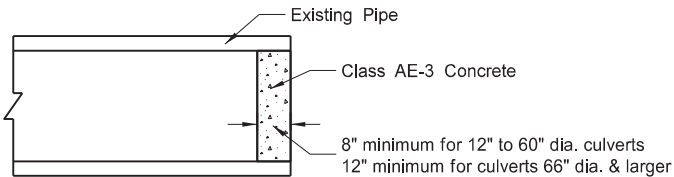


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

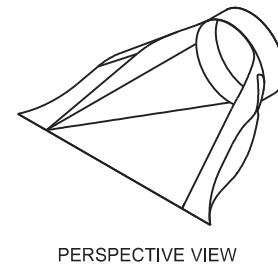
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

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

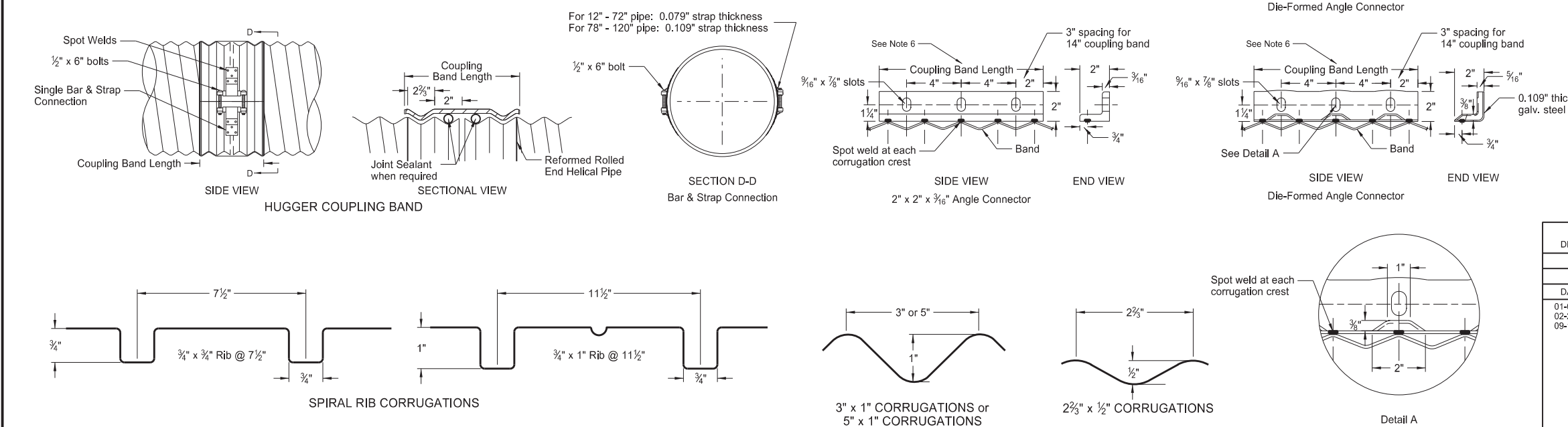
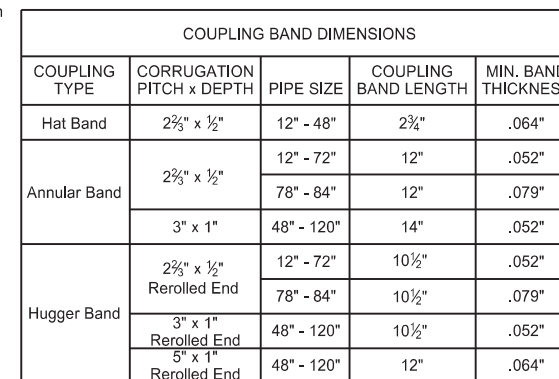


## D-714-4



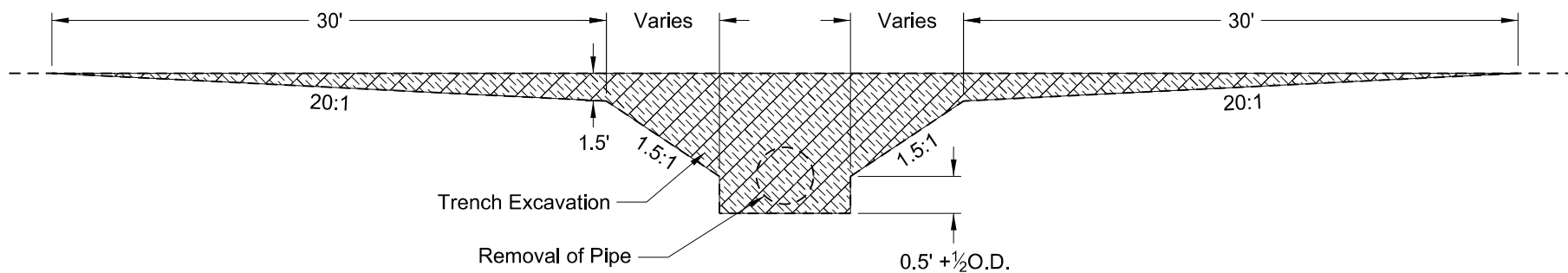
PIPE DIA.	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE RATE	BODY PIECE
		A IN	B IN	H IN	L IN	W IN		
15	0.064	7	8	6	26	30	2½:1	1
18	0.064	8	10	6	31	36	2½:1	1
24	0.064	10	13	6	41	48	2½:1	1
30	0.079	12	16	8	51	60	2½:1	1 or 2
36	0.079	14	19	9	60	72	2½:1	2
42	0.109	16	22	11	69	84	2½:1	2
48	0.109	18	27	12	78	90	2½:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1½:1	3
* 66	0.109	18	36	12	87	120	1½:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1½:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

7. Length of spot welds shall be minimum  $\frac{1}{2}$ ".

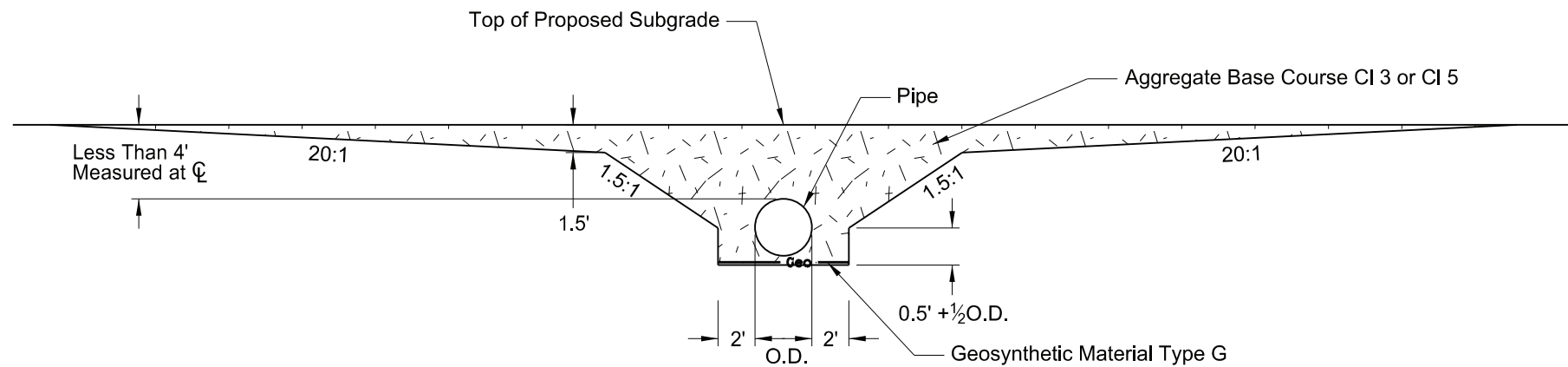


<b>NORTH DAKOTA</b>	
<b>DEPARTMENT OF TRANSPORTATION</b>	
<b>08-16-13</b>	
<b>REVISIONS</b>	
<b>DATE</b>	<b>CHANGE</b>
01-07-14 02-27-14 09-18-19	End Section Plan View 3' x 1" Corrugation Detail Added Perspective View Detail

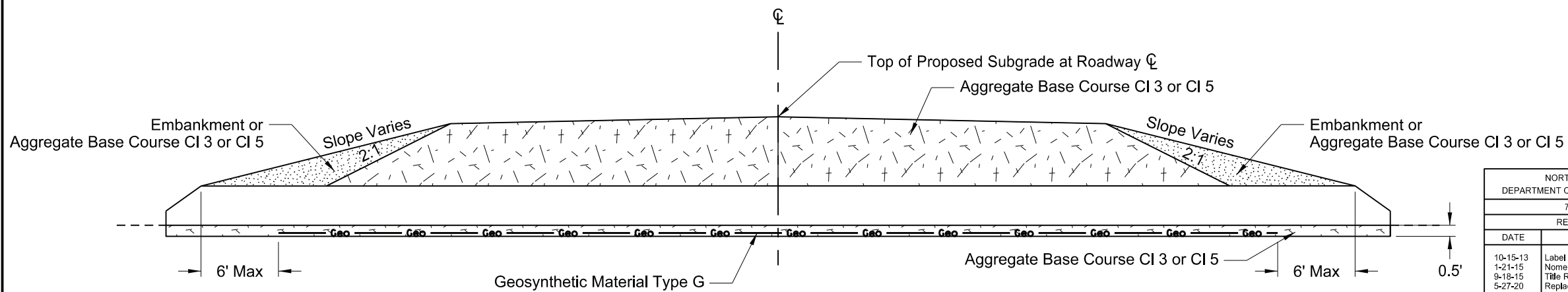
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Registration Number  
PE-4684,  
on 9/18/19 and the original  
document is stored at the  
North Dakota Department  
of Transportation

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:

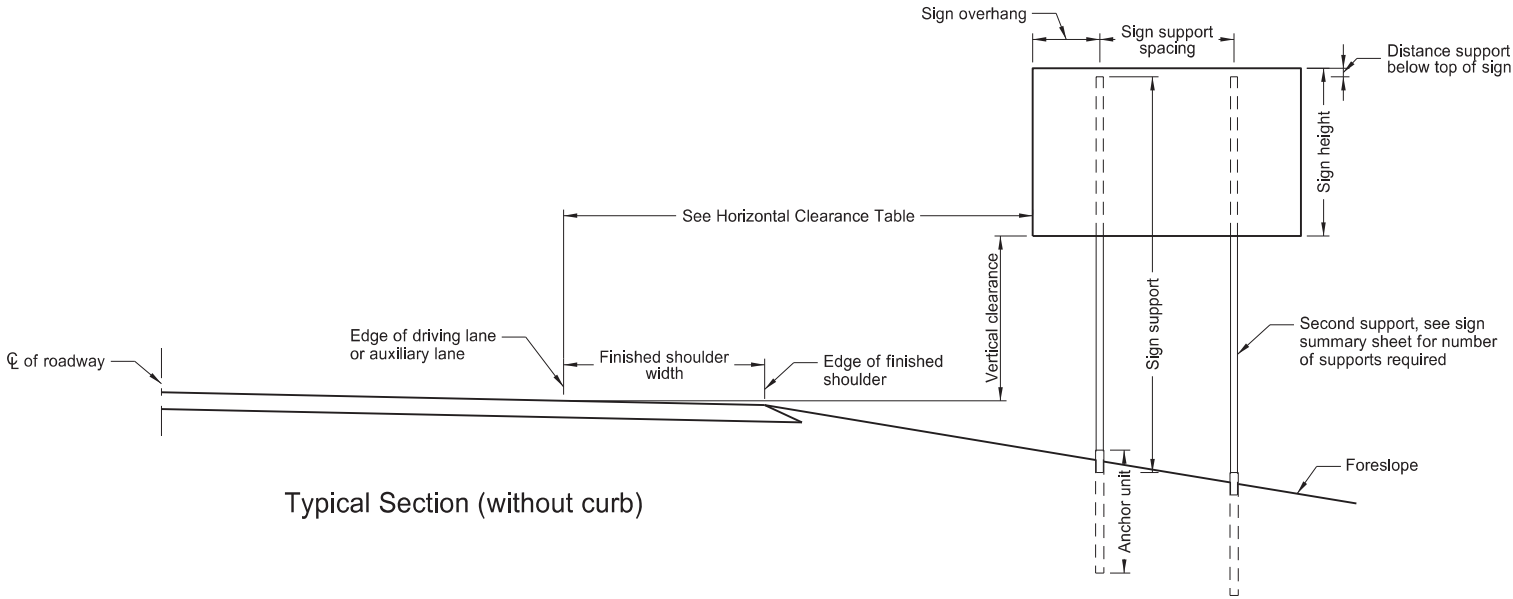
- 1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.
- 2) Embankment may be either borrow Excavation or Common Excavation - Type A

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



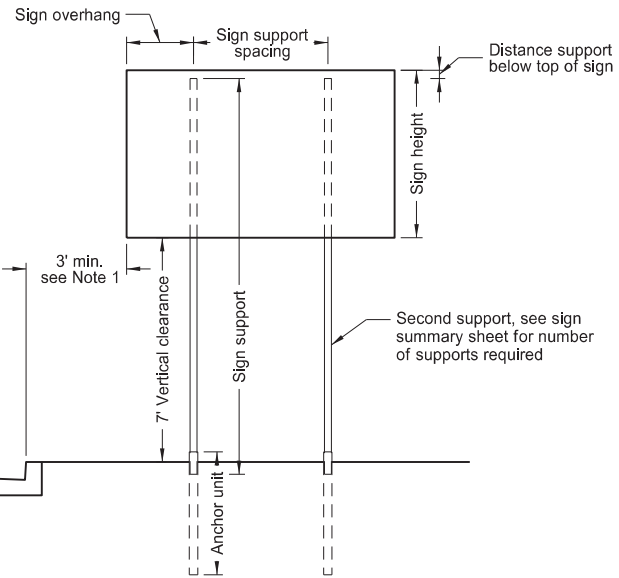
Notes:

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'.

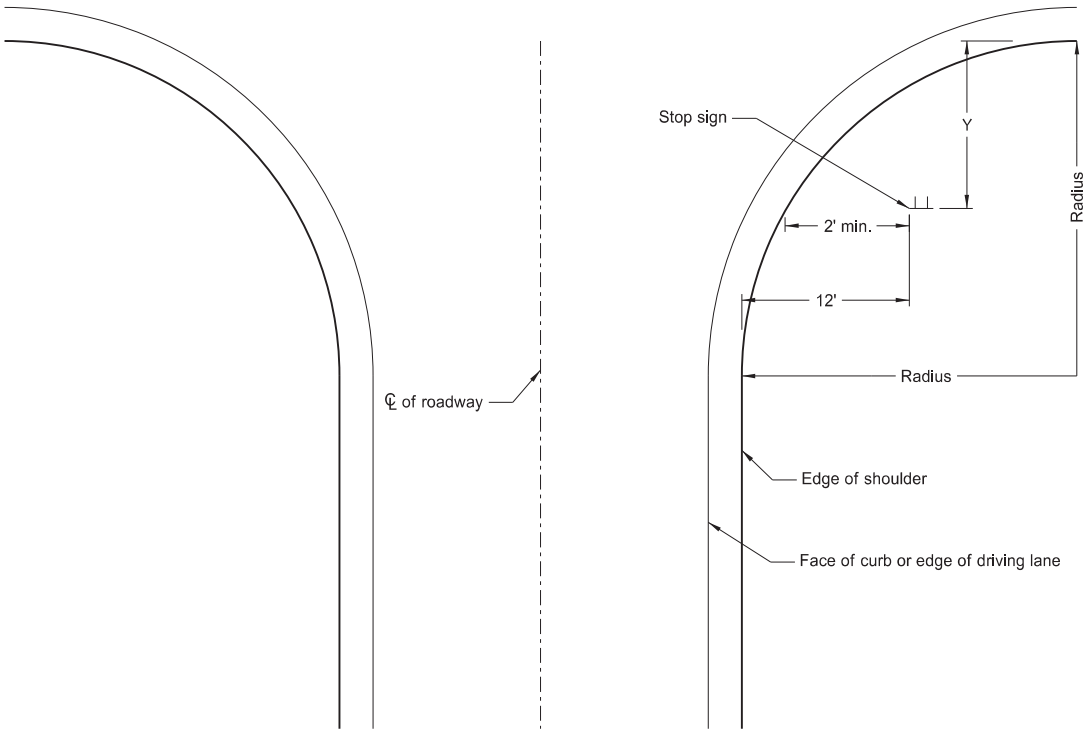


Typical Section (without curb)

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

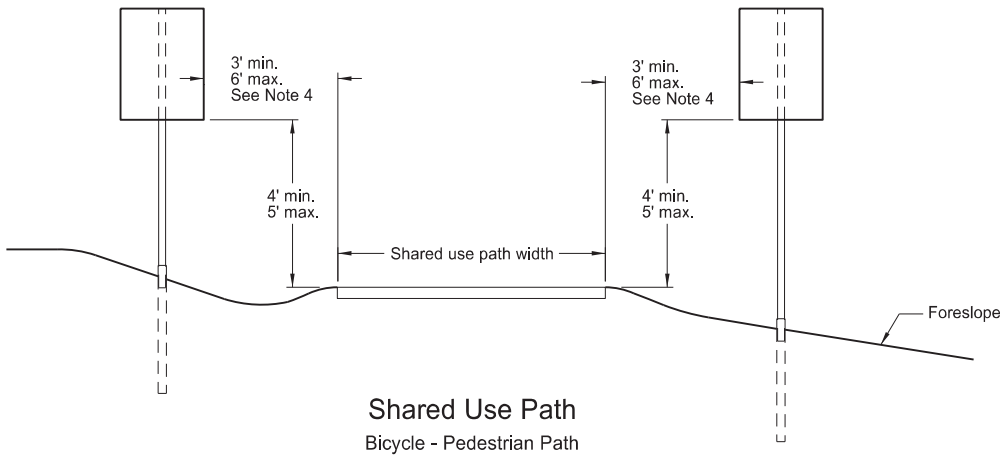


Typical Section (with curb)  
Residential or Business District



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



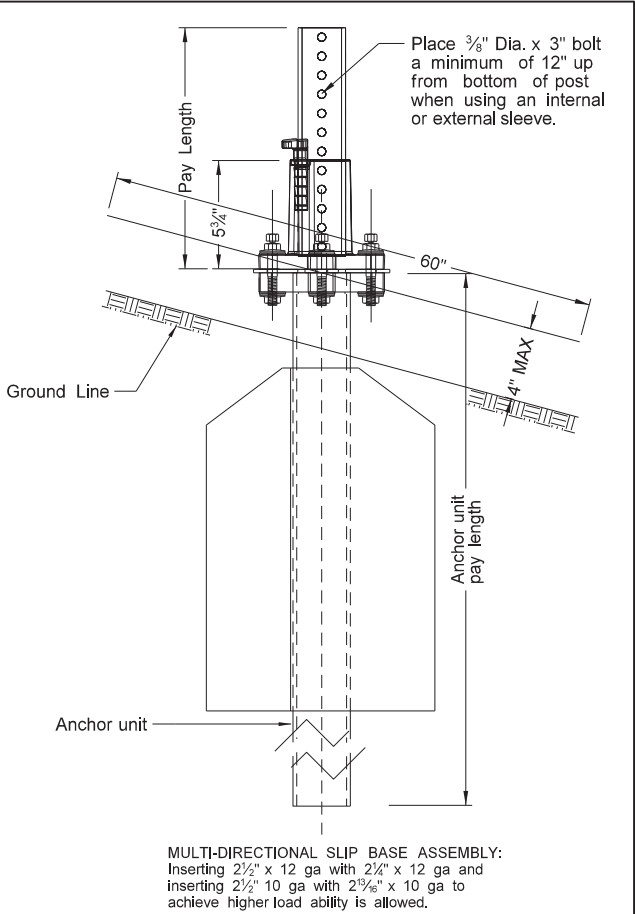
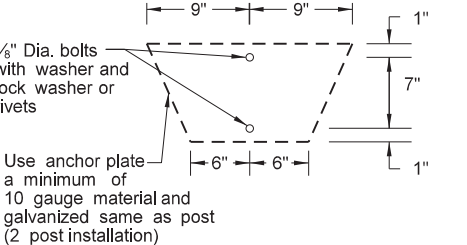
Shared Use Path  
Bicycle - Pedestrian Path

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 voice.
8-29-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by  
**Kirk J Hoff,**  
Registration Number  
**PE- 4683,**  
on **8/29/19** and the original document is stored at the  
North Dakota Department  
of Transportation

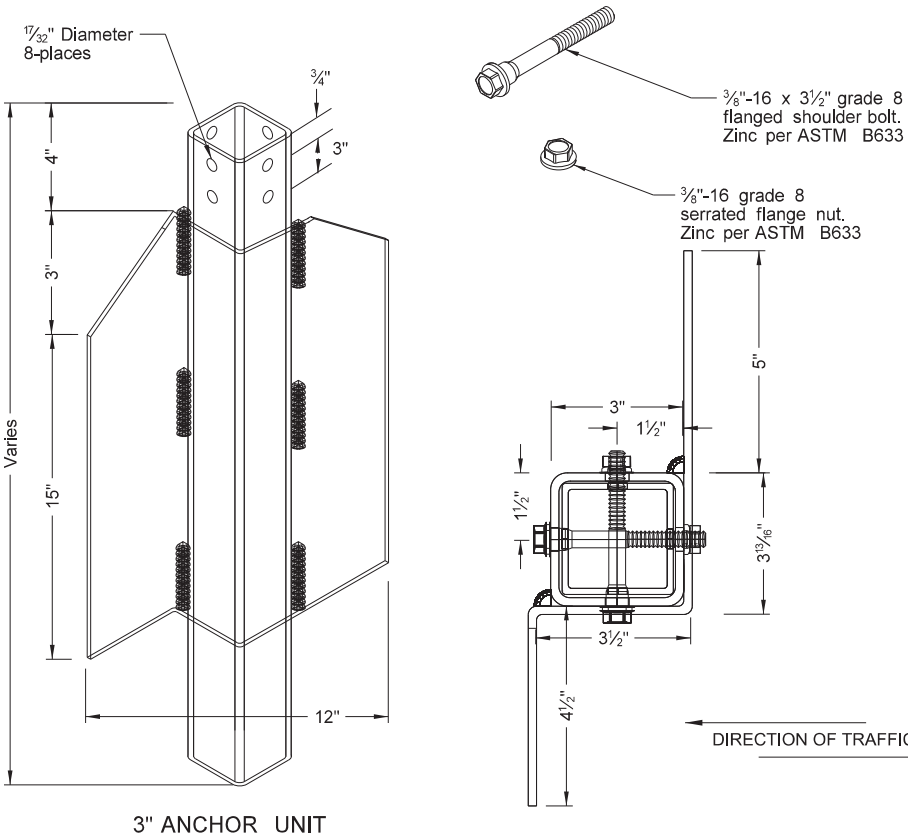
Telescoping Perforated Tube							
Number of Posts	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2 1/2	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 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.

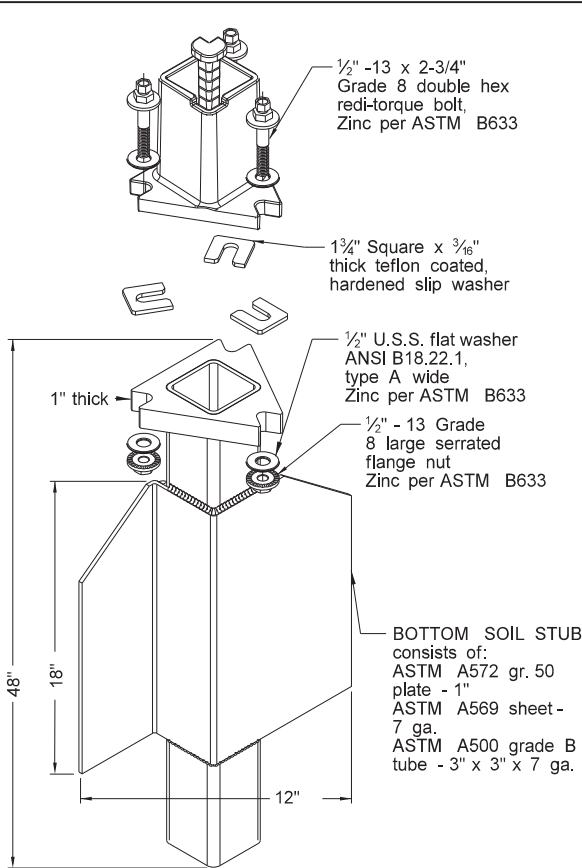


SHOULDER BOLT

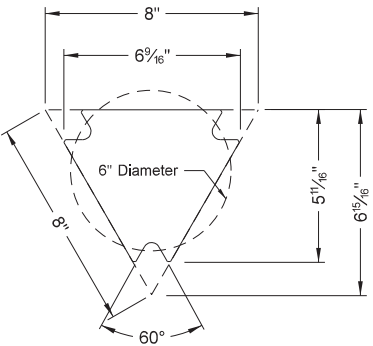
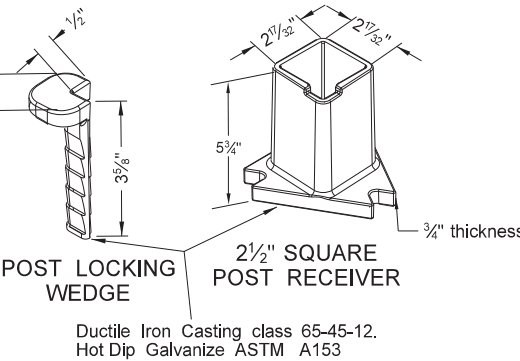
Shimming agent to reduce tolerance between 3" anchor unit and 2 1/2" post.  
(use standard 3/8" diameter grade 8 bolt with proper shim)



Mounting Details Perforated Tube



SLIP BASE FOR 2 1/2" POST



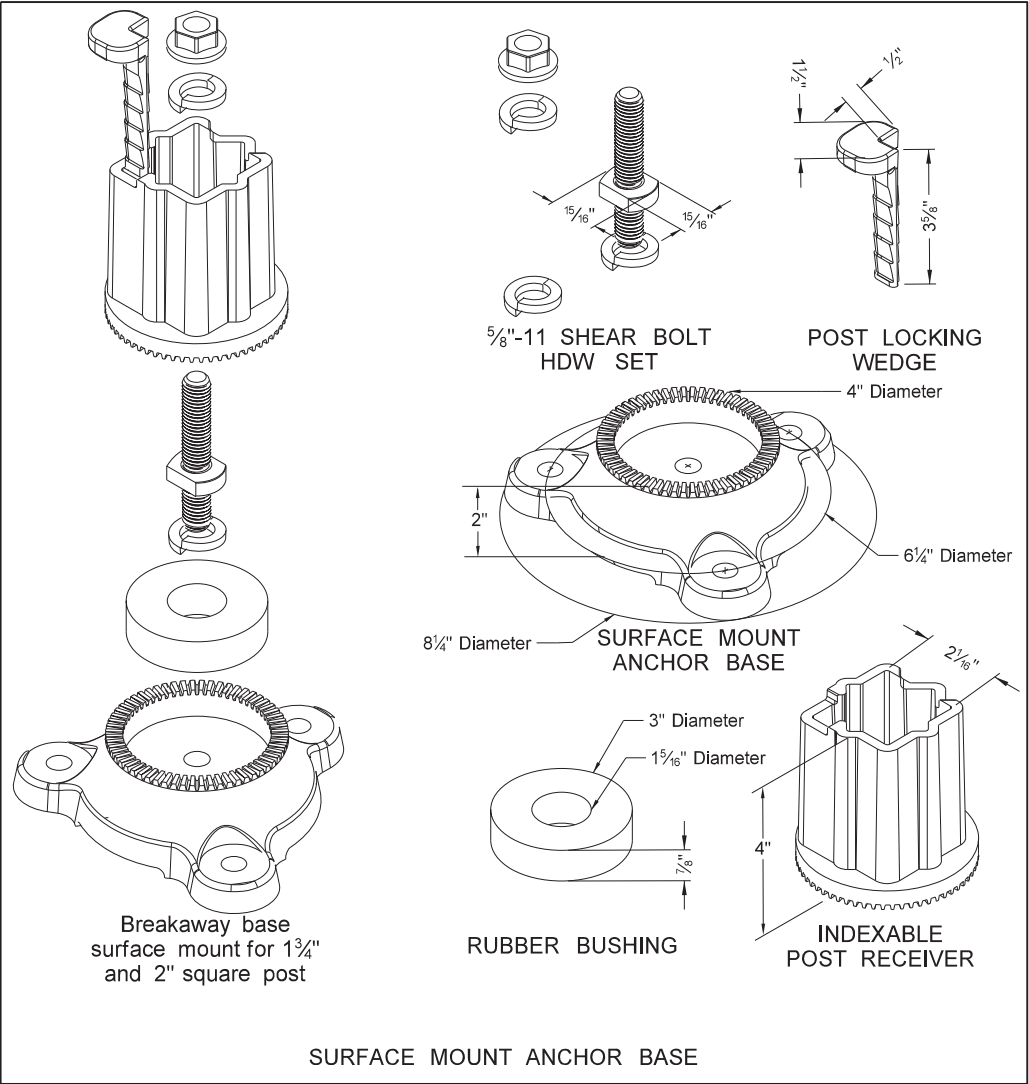
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. <sup>4</sup>	Cross Sect. Area In. <sup>2</sup>	Section Modulus In. <sup>3</sup>	
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.



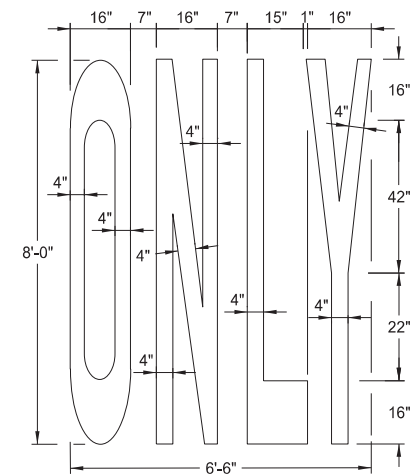
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.

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Registration Number  
PE- 4683  
on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

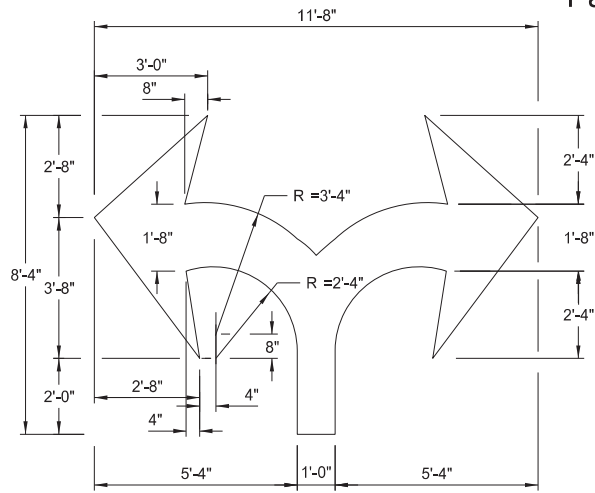


Pavement Marking Message Details

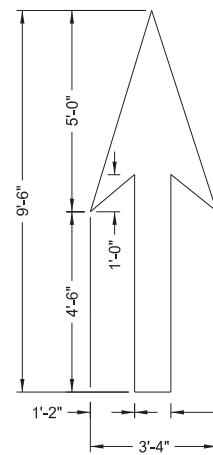
D-762-1



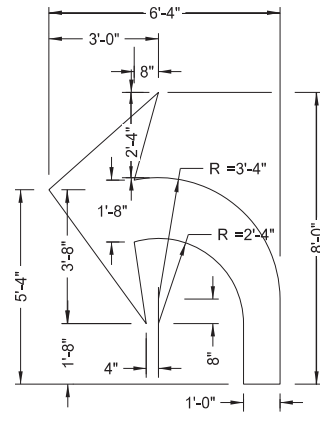
22 S. F.



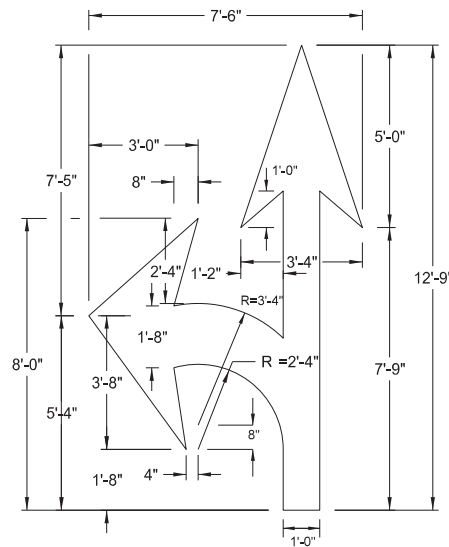
29 S. F.



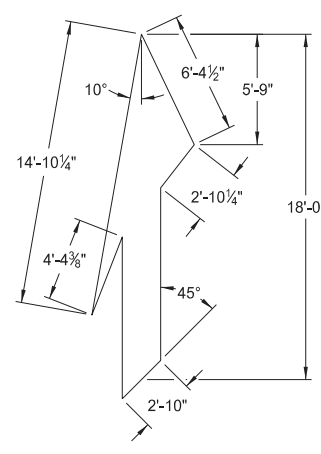
12 S. F.



16 S. F.

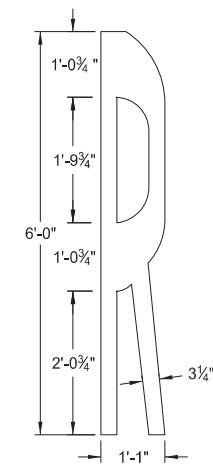


27 S. F.

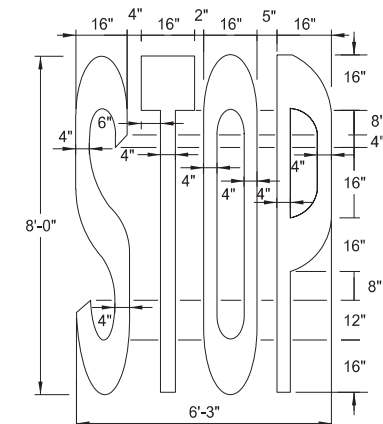


41 S. F.

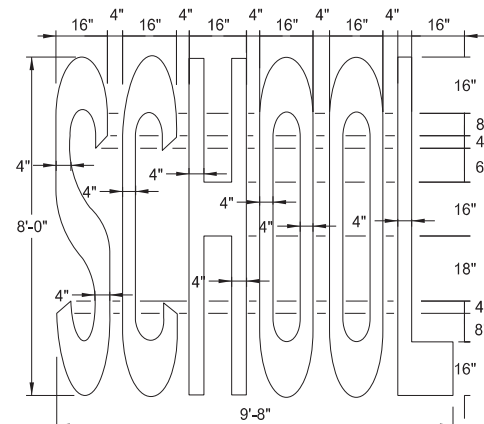
Note: Rotate merge arrow 20° from edge of roadway.



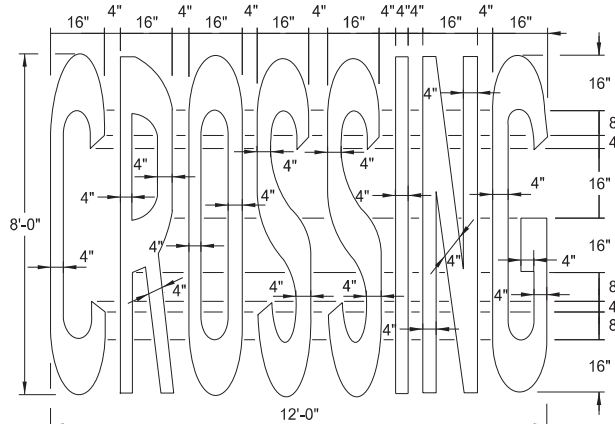
4 S. F.



22 S. F.



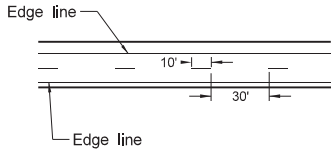
34.5 S. F.



46 S. F.

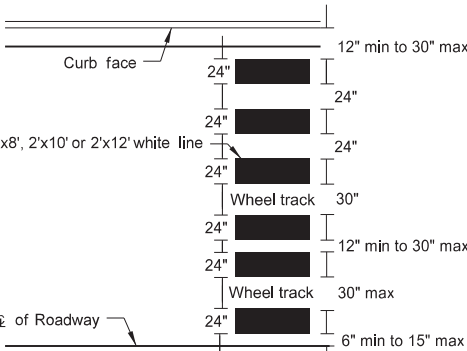
Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table

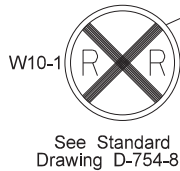
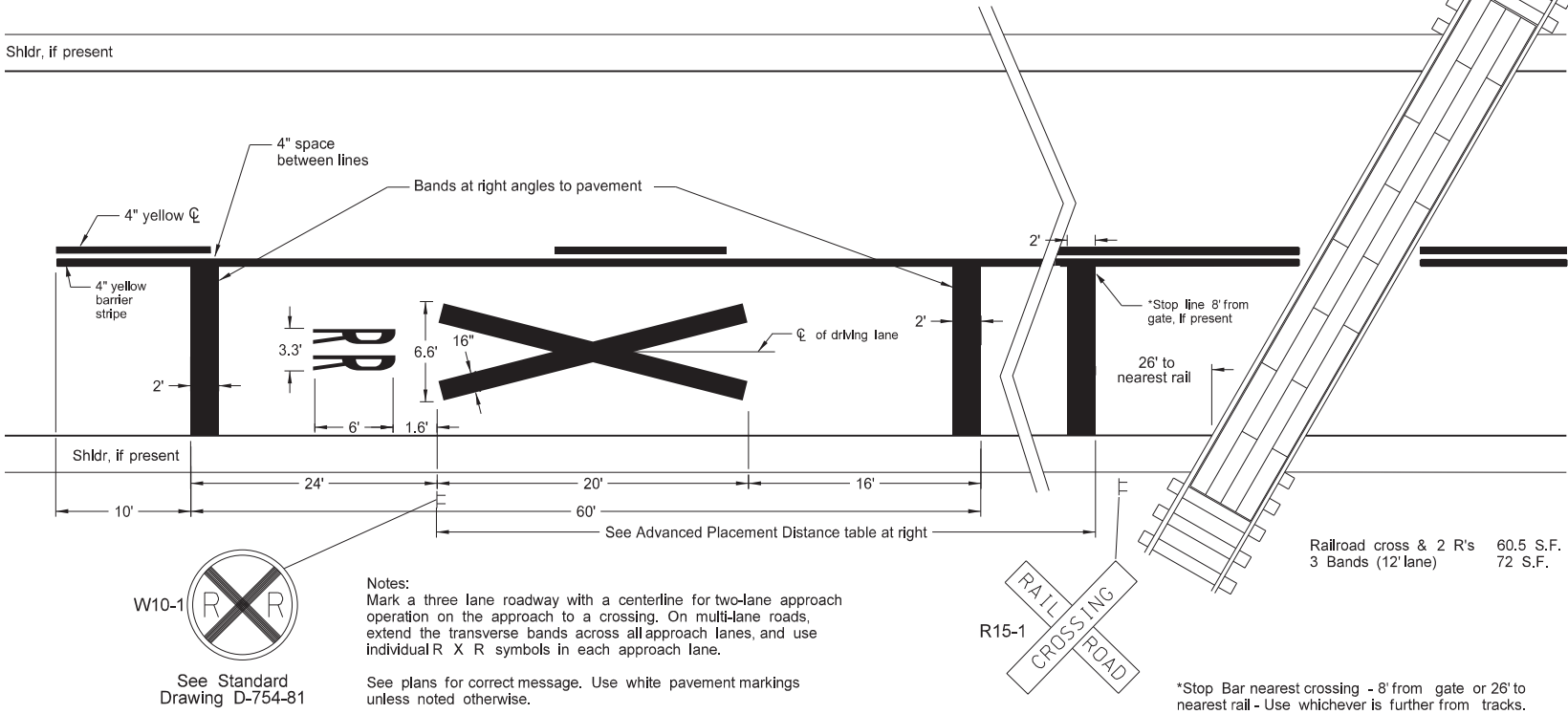


Centerline Pavement Marking Skip Spacing Detail

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



Continental Crosswalk Detail



Notes:  
Mark a three lane roadway with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, extend the transverse bands across all approach lanes, and use individual R X R symbols in each approach lane.  
See plans for correct message. Use white pavement markings unless noted otherwise.

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

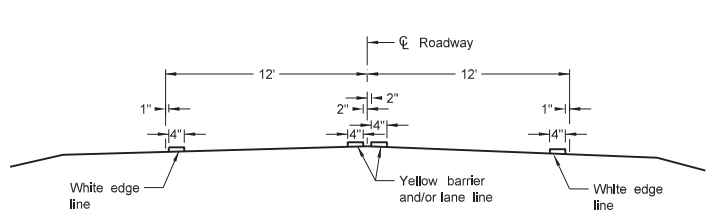
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-6-11	
REVISIONS	
DATE	CHANGE
10-17-17 08-27-19 01-28-2020	Updated to active voice. New Design Engineer PE Stamp. Revised min Stop Bar distance to rail.

This document was originally issued and sealed by  
Kirk J Hoff,  
Registration Number  
PE-4683,  
on 1/28/2020 and the original document is stored at the North Dakota Department of Transportation

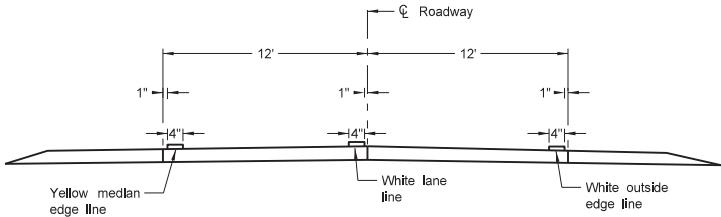
PAVEMENT MARKING

D-762-4

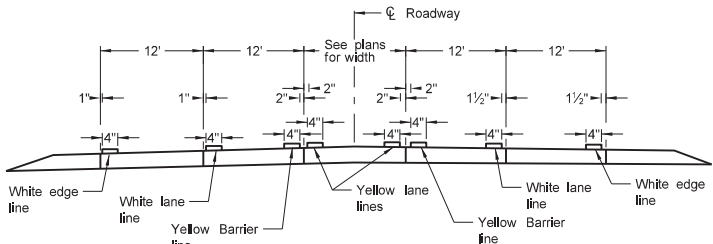
- NOTES:
- 1. Continue edge lines through private drives and field drives. Break edge lines for intersections.



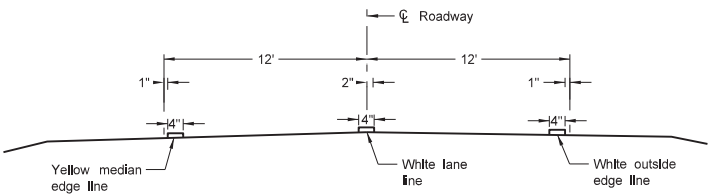
Two Lane Two Way  
RURAL ROADWAY



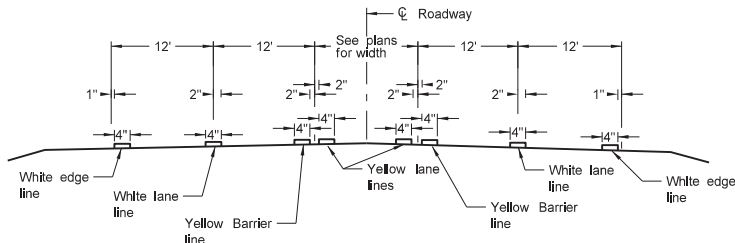
Two Lane Roadway  
INTERSTATE HIGHWAY  
Concrete Section



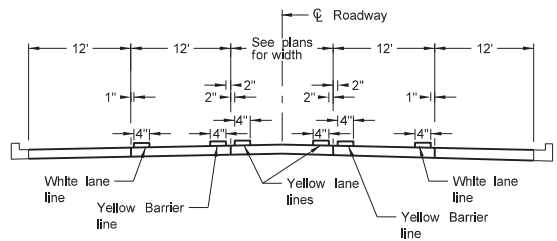
RURAL FIVE LANE ROADWAY  
Concrete Section



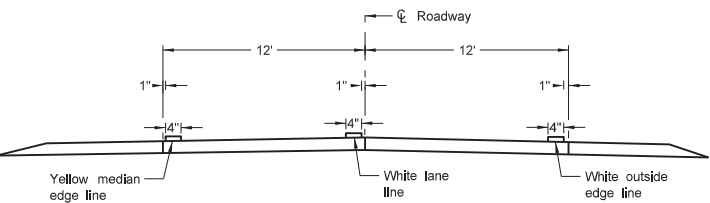
Two Lane Divided  
Rural Roadway  
PRIMARY HIGHWAY  
Asphalt Section



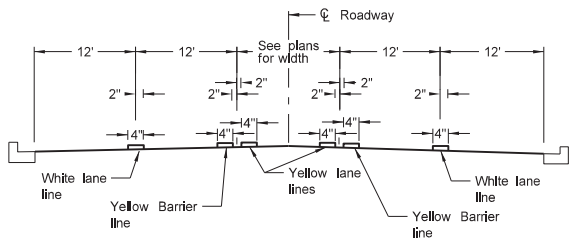
RURAL FIVE LANE ROADWAY  
Asphalt Section



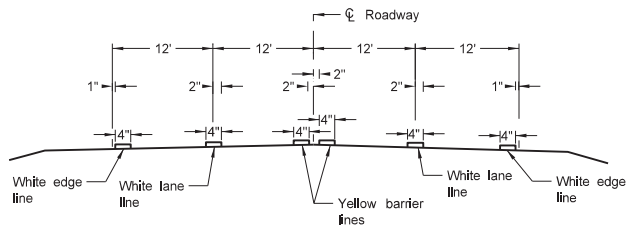
URBAN FIVE LANE SECTION  
Concrete Section



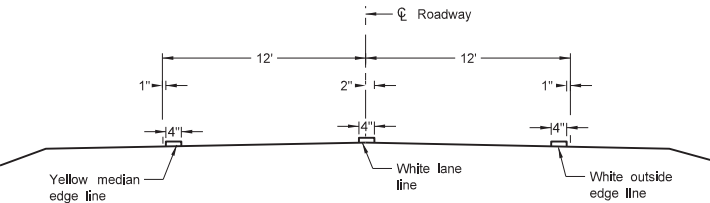
Two Lane Roadway  
PRIMARY HIGHWAY  
Concrete Section



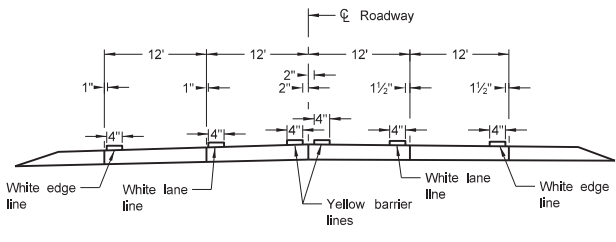
URBAN FIVE LANE SECTION  
Asphalt Section



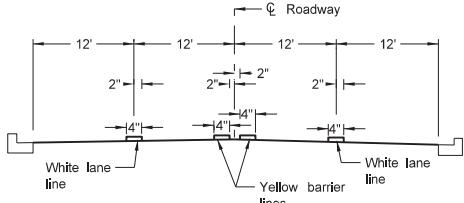
RURAL FOUR LANE ROADWAY  
Asphalt Section



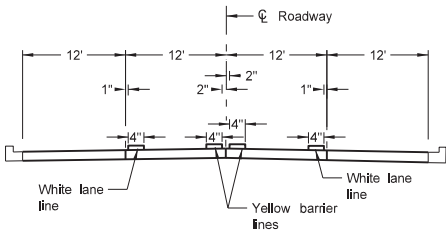
Two Lane Roadway  
INTERSTATE HIGHWAY  
Asphalt Section



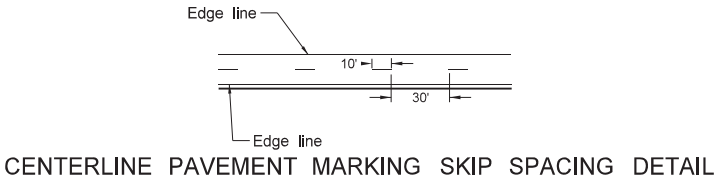
RURAL FOUR LANE ROADWAY  
Concrete Section



URBAN FOUR LANE SECTION  
Asphalt Section



URBAN FOUR LANE SECTION  
Concrete Section



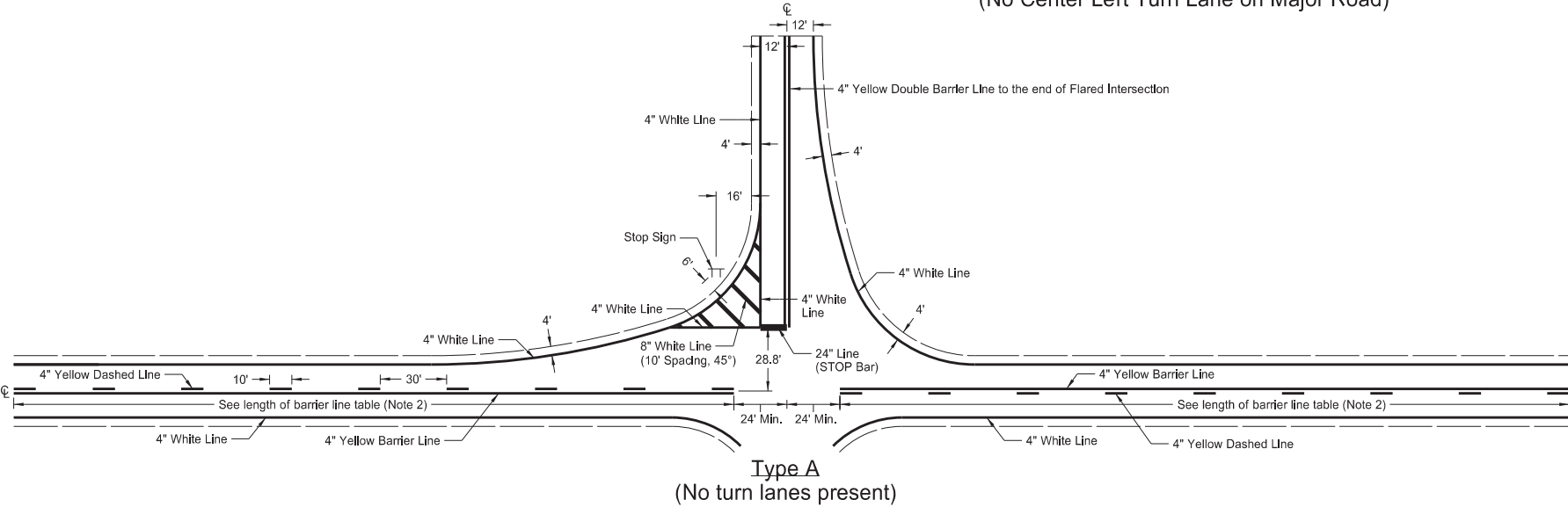
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

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Registration Number  
PE-4683,  
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PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION  
(No Center Left Turn Lane on Major Road)

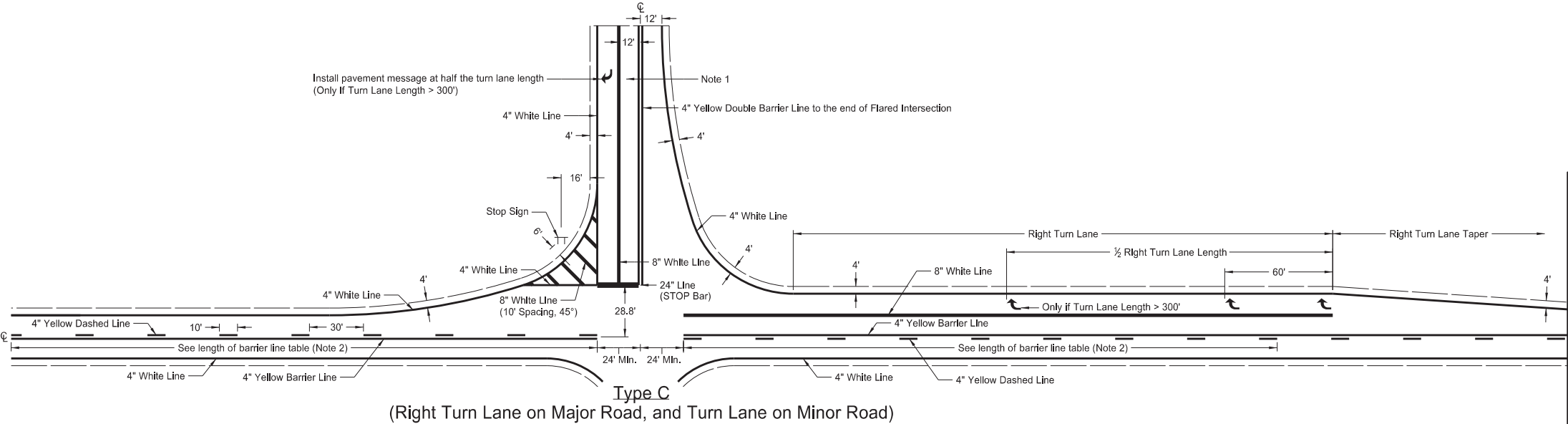
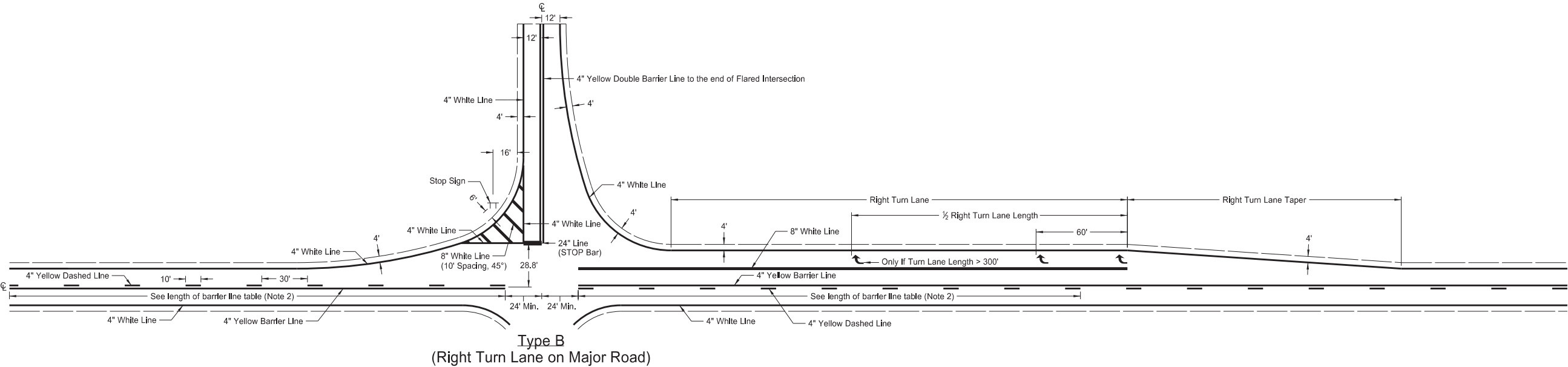
D-762-5



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'



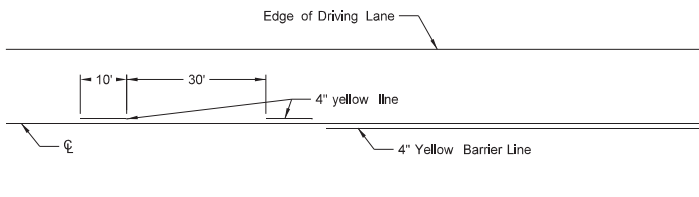
4" Marking  
8" Marking  
24" Marking

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

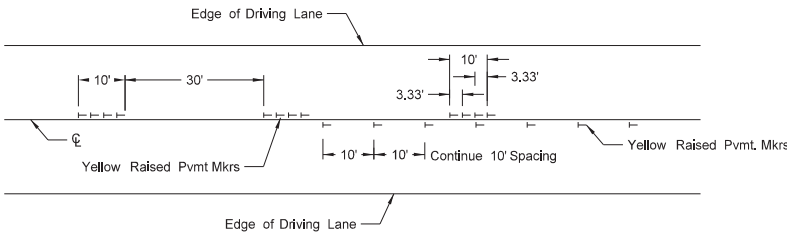
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of Transportation

SHORT-TERM PAVEMENT MARKING

D-762-11

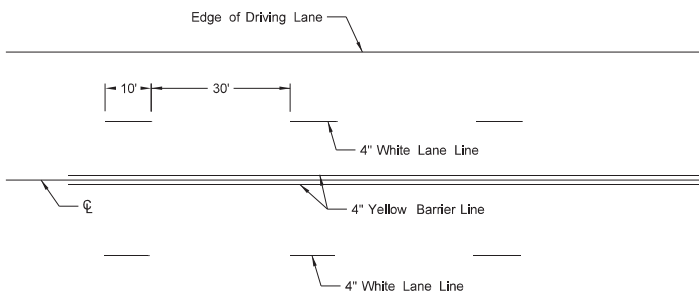


Painted or Tape Lines

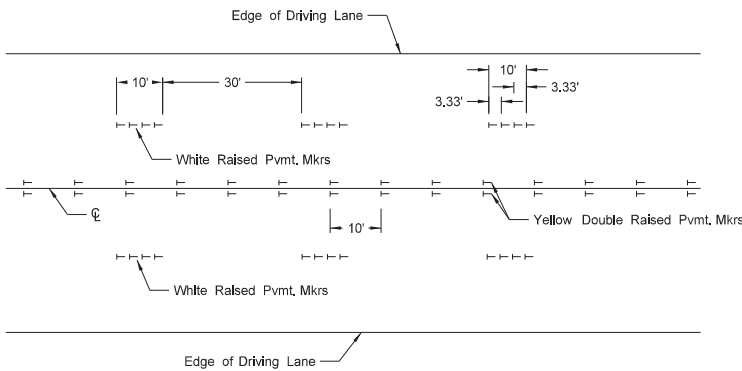


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

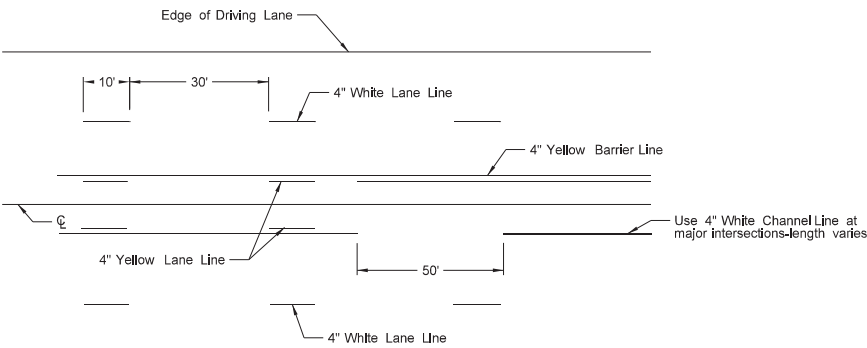


Painted or Tape Lines

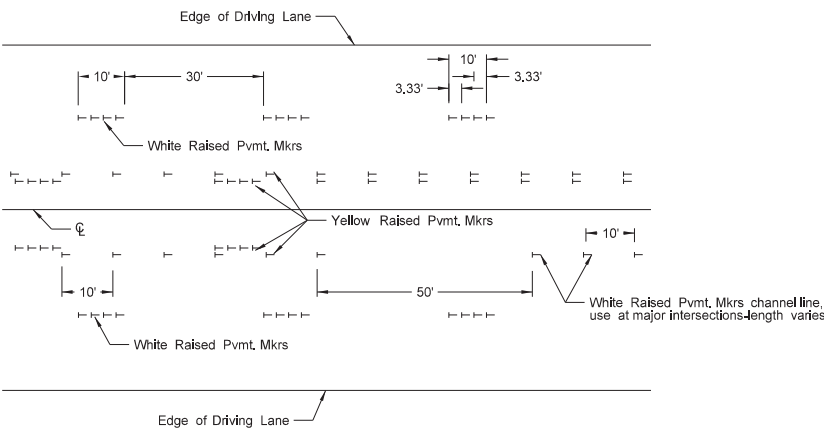


Raised Pavement Markers

FOUR LANE ROADWAY

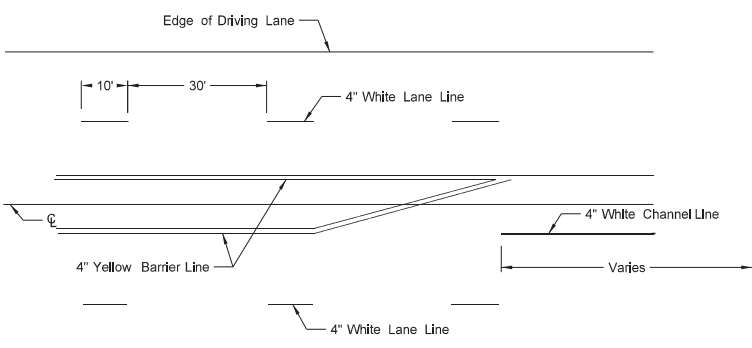


Painted or Tape Lines

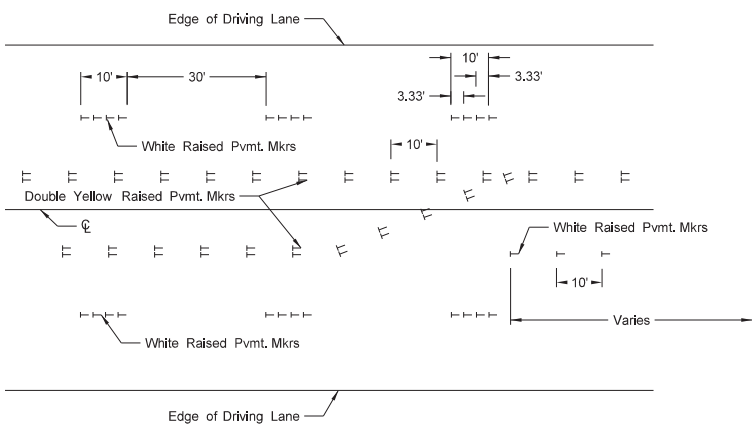


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

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

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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Kirk J Hoff,  
Registration Number  
PE- 4683,  
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