

DESIGN DATA			
Traffic	Average Daily		
Current 2015	Pass: 6,335	Trucks: 355	Total: 6,690
Forecast 2035	Pass: 9,440	Trucks: 585	Total: 10,025
Clear Zone Distance: Use Existing		Design Speed: *55 mph, **70 mph, & ***65 mph	
Minimum Sight Dist. for Stopping: Use Existing		Bridges:	
Limited Access Control		*Beg to RP 204.6 & RP 211.7 to RP 213.8	
Pavement Design Life (years)		**RP 204.6 to RP 211.7	
Design Accumulated One-way ESALs:		***RP 213.8 to End	

# JOB # 24 NORTH DAKOTA

## DEPARTMENT OF TRANSPORTATION

SOIB-4-083(103)203

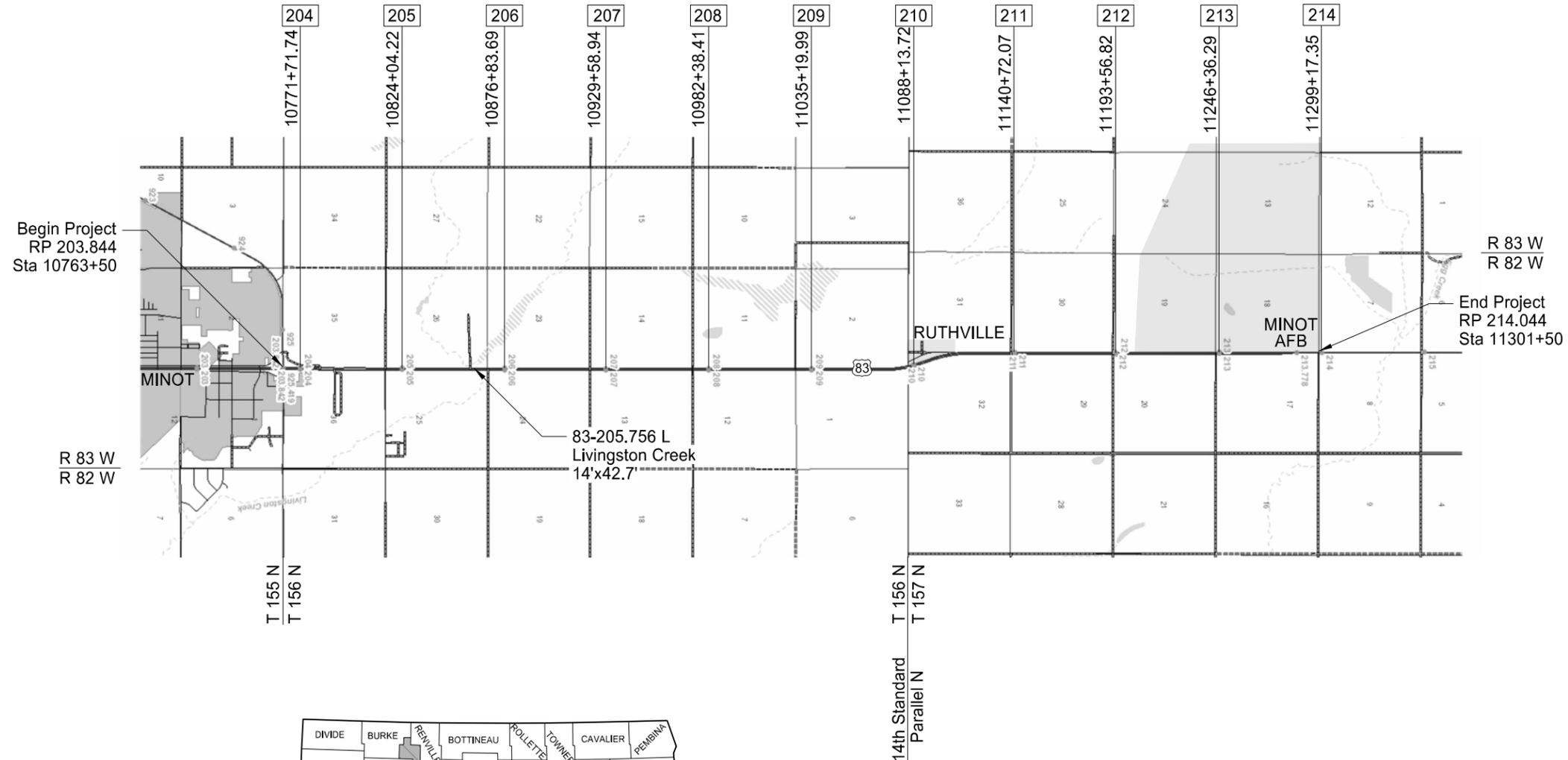
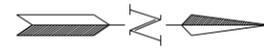
Ward County  
Minot to Minot AFB - West Roadway (SB)  
HMA Overlay

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	18221	1	1

**GOVERNING SPECIFICATIONS:**

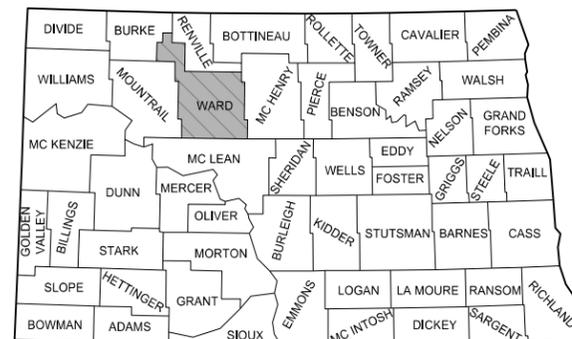
2014 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SOIB-4-083(103)203	10.19	10.19



**DESIGNERS**

Monte Deis



STATE COUNTY MAP

APPROVED DATE 2/09/2016

Roger Weigel /s/  
for OFFICE OF PROJECT DEVELOPMENT  
ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 2/09/2016

James Douglas Rath /s/  
Design Division

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30	1 - 2	Typical Sections
90	1 - 3	Paving Layouts
100	1 - 3	Work Zone Traffic Control
110	1 - 3	Signing
120	1 - 5	Pavement Marking

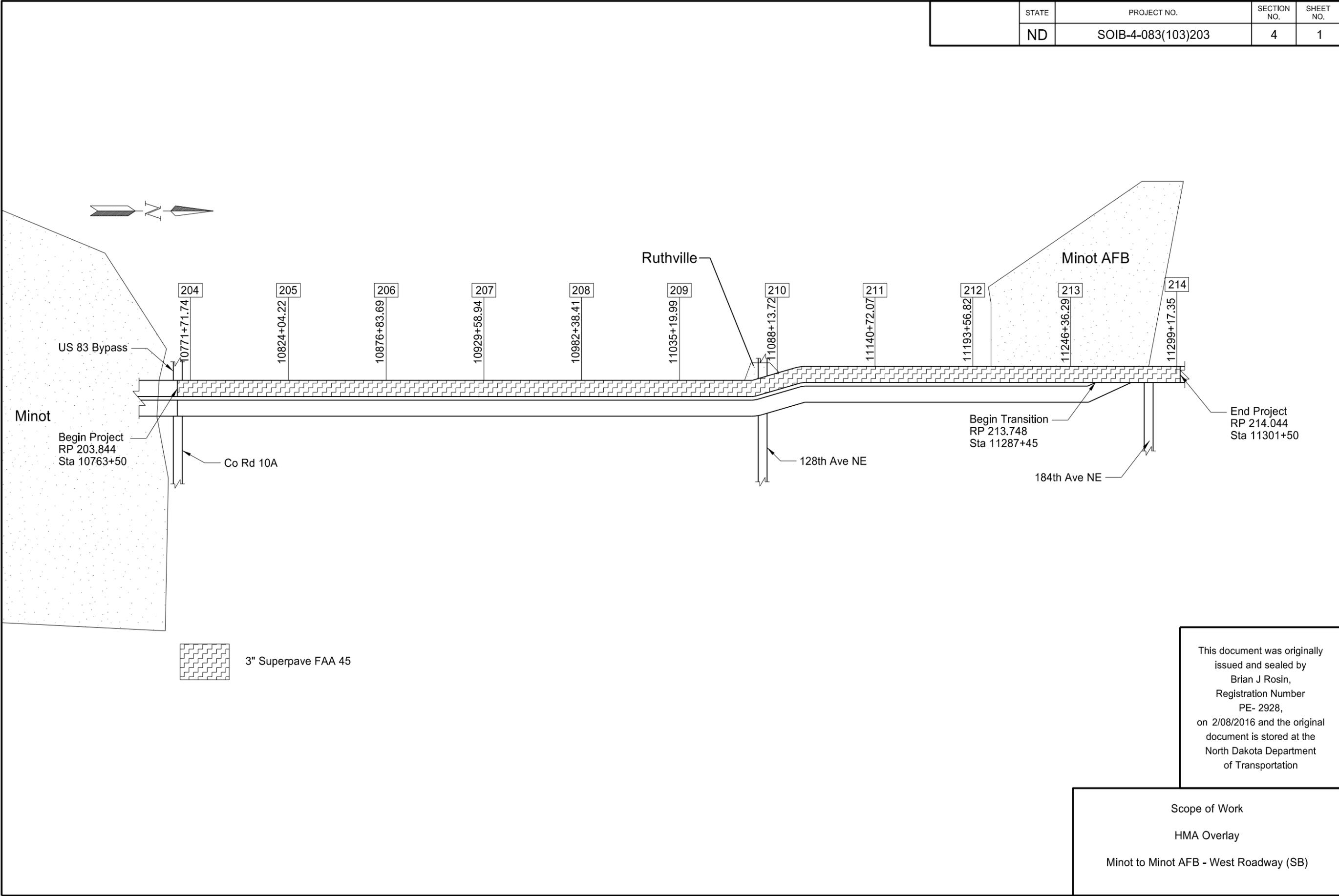
**LIST OF STANDARD DRAWINGS**

Number	Description
D-101-1, 2, 3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31, 32	Symbols
D-704-2	Traffic Control For Coring of Hot Bituminous Pavement
D-704-5	Construction Sign Detail
D-704-7	Breakaway Systems for Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems for Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details - Terminal and Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
D-704-11	Construction Sign Details - Warning Signs
D-704-12	Shoulder Closure Tapers
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-20	Terminal and Seal Coat Sign Layouts
D-704-22	Construction Truck and Temporary Detour Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-34	Sign Layout for One Lane Closure
D-704-50	Portable Sign Support Assembly
D-704-56	Mobile Operation - Grinding Shoulder Rumble Strips
D-706-1	Bituminous Laboratory
D-754-23	Perforated Tube Assembly Details
D-754-24, 25	Mounting Details Perforated Tube
D-754-24A	Breakaway Coupler System for Perforated Tubes
D-754-27	Sign Punching, Stringer and Support Location Details Regulatory, Warning, and Guide Signs
D-760-2	Rumble Strips Divided Highways (Non-Interstate)
D-762-1	Pavement Marking Message Details
D-762-3	Pavement Marking for Standard 90 Degree Flared Intersection
D-762-4	Pavement Marking
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**SPECIAL PROVISIONS**

Number	Description
SP 280(14)	Flexible Pavement Surface Tolerance

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Scope of Work  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

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## NOTES

### GENERAL NOTES

- 107-P01 HAUL ROADS: The Engineer will not designate paved roads off the state system as haul roads.
- HAUL ROADS: Before submitting a proposal, contact the appropriate State, County, Township, or City officials to determine if there are any roadways that will be designated as "no haul routes".
- 411-P01 MILLING: Notify project engineer 72 hours prior to milling. Deliver milled material to the NDDOT Maintenance yard in Minot at 1305 Hwy 2 Bypass east.
- 430-P01 LEVELING COURSE: Blade lay leveling course in advance of the 1<sup>st</sup> lift of asphalt. Compact leveling course with a pneumatic roller. Paver lay 1" first lift as shown in the typical sections. Paver lay 2" second lift as shown in the typical sections. Take tonnage for the leveling course from the mainline tonnage. Include all costs for the leveling course in the price bid for Superpave FAA 45.
- 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. W8-9a-48 "Shoulder Drop Off" and supplemental plate Sign No. W20-52-54 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-P01 TRAFFIC CONTROL FOR BITUMINOUS PAVEMENT: Provide traffic control consisting of a temporary lane closure and flagging.
- Traffic control device quantities are based on a 10 mile limitation and the list below. The Department will pay for delineator drums used for approach access within the 10 mile limitation at the contract unit price. Provide additional devices at no cost to the Department.
1. Standard D-704-20, layout G. Signing will be required at junctions: Co Road 10, Co Road 8, and Air Base Entrances;
  2. Standard D-704-22, layouts K and L;
  3. Standard D-704-26, layout CC, EE, and GG;
  4. Standard D-704-34; quantities include 46 delineator drums for approaches.
- If the lane closure is removed and uneven lanes exist, provide traffic control as specified in Section 704.04 O, "Traffic Control for Uneven Pavement".
- 704-P02 MAINTAINING MAINLINE TRAFFIC: Provide one lane for traffic in each direction at all times. Arrange work so no construction activity encroaches onto the open traffic lane during daily peak hour traffic of 3:30 pm to 6:00 pm (southbound).
- Arrange work so no construction activity encroaches onto the open traffic lane during daily peak hour traffic of 6:00 am to 9:00 am (northbound).
- 704-P03 TRAFFIC CONTROL: At various times throughout the construction, missile convoys to or from the Minot Air Force Base will occur. The timing of the convoys may be announced with extremely short or no notification. Cease all operations and remove equipment and personnel from the roadway during this operation. Do not impede the missile convoys. No additional compensation shall be made to the contractor for delays caused by missile convoys.
- 704-P04 MAINTAINING MINOT AIR FORCE BASE ENTRANCE TRAFFIC: Overlay the entrance gates into the air base one at a time. There will be no construction activity at one gate while the other gate is being overlaid. A single gate may be closed between the hours of 9 am to 3 pm only. Coordinate these gate closures with the Minot Air Force Base two weeks prior to any work on entrances. The Minot Air Force Base contact personnel is Dan Lewis; Civil Engineering, Phone 701-723-4834. Provide notice 48 hours prior to any gate closure. Inform the project engineer of these dates.

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## ENVIRONMENTAL COMMITMENTS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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**ENVIRONMENTAL COMMITMENTS (EC):** The North Dakota Department of Transportation has made environmental commitments to secure approval of this project. The environmental commitments are as follows:

Based on the NEPA documentation, no additional permits or environmental commitments have been identified beyond what is covered by the NDDOT's Standard Specification of Road and Bridge Construction.

Wetland Number	Cowardin Classification	Wetland Type	Wetland Size (acres)	Wetland Feature	USACE Jurisdictional Wetlands	Impacts to Wetlands	
						Temp.	Perm.
There are a number of adjacent wetlands within the project limits; however, no impacts are anticipated within the limits of construction.							
<b>TOTALS:</b>				0.00		0.00	0.00

# ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
<b>ND</b>	SOIB-4-083(103)203	<b>8</b>	<b>1</b>

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	0.5	0.5
216	0100 WATER	M GAL	263	263
302	0120 AGGREGATE BASE COURSE CL 5	TON	369	369
401	0050 TACK COAT	GAL	23,894	23,894
411	0105 MILLING PAVEMENT SURFACE	SY	3,347	3,347
430	0045 SUPERPAVE FAA 45	TON	40,957.2	40,957.2
430	1000 CORED SAMPLE	EA	122	122
430	6428 PG 64-28 ASPHALT CEMENT	TON	2,458	2,458
702	0100 MOBILIZATION	L SUM	0.5	0.5
704	0100 FLAGGING	MHR	500	500
704	1000 TRAFFIC CONTROL SIGNS	UNIT	2,578	2,578
704	1052 TYPE III BARRICADE	EA	20	20
704	1060 DELINEATOR DRUMS	EA	122	122
704	1067 TUBULAR MARKERS	EA	401	401
704	1087 SEQUENCING ARROW PANEL-TYPE C	EA	1	1
706	0550 BITUMINOUS LABORATORY	EA	0.5	0.5
706	0600 CONTRACTOR'S LABORATORY	EA	0.5	0.5
754	0110 FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	18	18
754	0206 STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	52	52
754	0592 RESET SIGN PANEL	EA	8	8
754	0593 RESET SIGN SUPPORT	EA	2	2
760	0005 RUMBLE STRIPS - ASPHALT SHOULDER	MILE	17.74	17.74
762	0110 EPOXY PVMT MK 4IN LINE-GROOVED	LF	17,679	17,679
762	0113 EPOXY PVMT MK 4IN LINE	LF	108,076	108,076
762	0132 EPOXY PVMT MK 8IN LINE-GROOVED	LF	7,395	7,395
762	0134 EPOXY PVMT MK 12IN LINE-GROOVED	LF	149	149
762	0136 EPOXY PVMT MK MESSAGE-GROOVED	SF	864	864
762	0420 SHORT TERM 4IN LINE-TYPE R	LF	154	154
762	0430 SHORT TERM 4IN LINE-TYPE NR	LF	35,358	35,358
762	0434 SHORT TERM 8IN LINE-TYPE NR	LF	14,790	14,790
762	0436 SHORT TERM 24IN LINE-TYPE NR	LF	25	25
762	0437 SHORT TERM 12IN LINE-TYPE NR	LF	149	149
762	0442 SHORT TERM MESSAGE-TYPE NR	SF	864	864

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Material	Unit	268.22 Stations		36.38 Stations		227.20 Stations		2.64 Stations		6.00 Stations	
		RP 203.894 to RP 207.002		RP 207.002 to RP 207.691		RP 209.663 to RP 213.966		RP 213.966 to RP 214.016		Frontage Road	
		RP 207.691 to RP 209.663		Width (ft)	Quantity per Station	Width (ft)	Quantity per Station	Width (ft)	Quantity per Station	Width (ft)	Quantity per Station
Water @ 25 Mgal/Mile for dust palliative	Mgal		0.473		0.473		0.473		0.473		0.473
Tack @ 0.05 Gal/SY (Leveling Course)	Gal	38	21.11	38	21.11	37	20.56	46.6	25.89	24	13.33
Superpave FAA 45 (Leveling Course)	Gal	35.8	34.67	36.3	34.20	35.8	33.74	41.5	42.45	22.7	28.81
PG 64-28 @ 6.0% of Superpave FAA 45	Ton		2.080		2.052		2.024		2.547		1.728
Tack @ 0.05 Gal/SY (Top Lift)	Ton	35.8	19.89	36.3	20.17	35.8	19.89	41.5	23.06		
Superpave FAA 45 (Top Lift)	Ton	33.6	33.65	34.6	32.17	34.6	32.61	40	37.75		
PG 64-28 @ 6.0% of Superpave FAA 45	Ton		2.019		1.930		1.957		2.265		

**Rumble Strips-Asphalt Shoulders**

RP 203.844 to RP 212.71

Left Shoulder	8.866	Miles
Right Shoulder	8.866	Miles
<b>Total</b>	<b>17.74</b>	<b>Miles</b>

HBP Cored Samples							
Specification Section	A	B	C	D	Quantity (D x 2)	Quantity (1 per mile)	Unit
	Distance (Ft)/2000	Lanes	Lifts	Sublots (A x B x C)			
430.04 I.2.b(1), "General"	28	2	1	56	112	N/A	EA
430.04 I.2.b(2), "Pavement Thickness Determination Cores"					N/A	10	EA
<b>Total</b>					<b>112</b>	<b>10</b>	<b>EA</b>

Material Summary						
Location	Water (Mgal)	Aggregate Base Course CI 5 (Ton)	Milling (SY)	Tack (Gal)	Superpave FAA 45 (Ton)	PG 64-28 (Ton)
RP 203.894 to RP 207.002	77.7			6,728.2	11,211.4	672.7
RP 207.691 to RP 209.663	49.3			4,269.0	7,113.5	426.8
RP 207.002 to RP 207.691	17.2			1,501.7	2,414.4	144.9
RP 209.663 to RP 213.966	107.6			9,188.9	15,074.5	904.5
RP 213.966 to RP 214.016	1.2			129.2	211.7	12.7
RP 213.861 to RP 213.975	2.8			80.0	172.8	10.4
Milling & Paving Transitions			1811.1	109.4	253.7	15.2
Turn Lane Detail Sheet				467.0	1,556.7	93.4
Additional Surfacing Layout			1535.8	605.3	2,017.8	121.0
Median Transition				237.0	43.9	2.6
Approach Paving Detail Sheet	7.4	369.0		578.2	886.8	53.2
<b>Totals</b>	<b>263.3</b>	<b>369.0</b>	<b>3,346.9</b>	<b>23,893.9</b>	<b>40,957.2</b>	<b>2,457.3</b>

**Water**  
25 Mgal/Mile for Dust Palliative  
20 Gal/Ton of Aggregate

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Basis of Estimate  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

PERMANENT PAVEMENT MARKING

<u>Epoxy Pavement Mark 4IN Line</u>		
Sta 10764+60 to Sta 11250+00 (White edge line)	48,540	LF
Sta 10764+60 to Sta 11250+00 (Yellow edge line)	48,540	LF
Sheet 120-1	488	LF
Sheet 120-2	400	LF
Sheet 120-3	3,868	LF
Sheet 120-4	3,376	LF
Sheet 120-5	1,262	LF
Sta 11294+38 to Sta 11301+50 (White edge line)	1,602	LF
<b>Total</b>	<b>108,076</b>	<b>LF</b>

<u>Epoxy Pavement Mark 4IN Line-Grooved</u>		
Sta 10764+60 to Sta 11250+00 (White centerline skip)	12,135	LF
Sheet 120-1	1,115	LF
Sheet 120-3	2,233	LF
Sheet 120-4	1,952	LF
Sta 11291+76 to Sta 11301+50 (Yellow centerline skip)	244	LF
<b>Total</b>	<b>17,679</b>	<b>LF</b>

<u>Epoxy Pavement Mark 8IN Line-Grooved</u>		
10764+00 Lt Turn Lane	640	LF
10764+00 Rt Turn Lane	400	LF
10775+00 Rt Turn Lane	270	LF
10790+00 Lt Turn Lane	180	LF
10805+00 Lt Turn Lane	180	LF
10815+00 Lt Turn Lane	180	LF
10815+00 Rt Turn Lane	365	LF
10842+25 Rt Turn Lane	310	LF
10868+44 Lt Turn Lane	215	LF
10921+24 Lt Turn Lane	335	LF
10965+25 Lt Turn Lane	350	LF
10974+00 Lt Turn Lane	360	LF
10974+00 Rt Turn Lane	320	LF
11025+85 Lt Turn Lane	360	LF
11085+20 Lt Turn Lane	400	LF
11085+20 Rt Turn Lane	320	LF
11107+00 Rt Turn Lane	285	LF
Sheet 120-1	629	LF
Sheet 120-2	200	LF
Sheet 120-3	1,096	LF
<b>Total</b>	<b>7,395</b>	<b>LF</b>

<u>Epoxy Pavement Mark 12IN Line-Grooved</u>		
Sheet 120-3	149	LF

<u>Epoxy Pavement Mark 24IN Line-Grooved</u>		
Sheet 120-1	13	LF
Sheet 120-3	12	LF
<b>Total</b>	<b>25</b>	<b>LF</b>

<u>Epoxy Pavement Mark Message-Grooved</u>		
10764+00 Lt Turn Lane	48	SF
10764+00 Rt Turn Lane	48	SF
10775+00 Rt Turn Lane	48	SF
10790+00 Lt Turn Lane	48	SF
10805+00 Lt Turn Lane	48	SF
10815+00 Lt Turn Lane	48	SF
10815+00 Rt Turn Lane	48	SF
10842+25 Rt Turn Lane	48	SF
10868+44 Lt Turn Lane	48	SF
10921+24 Lt Turn Lane	48	SF
10965+25 Lt Turn Lane	48	SF
10974+00 Lt Turn Lane	48	SF
10974+00 Rt Turn Lane	48	SF
11025+85 Lt Turn Lane	48	SF
11085+20 Lt Turn Lane	48	SF
11085+20 Rt Turn Lane	48	SF
11107+00 Rt Turn Lane	48	SF
Sheet 120-3	48	SF
<b>Total</b>	<b>864</b>	<b>SF</b>

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SHORT-TERM PAVEMENT MARKING

<u>Short Term 4IN Line-Type R</u>		
Sta 11260+13 to Sta 11261+67 (taper)	154	LF

<u>Short Term 4IN Line-Type NR</u>		
Sta 10764+60 to Sta 11250+00 (White centerline skip)	12,135	LF
Sheet 120-1	1,115	LF
Sheet 120-3	2,233	LF
Sheet 120-4	1,952	LF
Sta 11291+76 to Sta 11301+50 (Yellow centerline skip)	244	LF
<b>Total (each of 2 lifts)</b>	<b>17,679</b>	<b>LF</b>

<u>Short Term 8IN Line-Type NR</u>		
10764+00 Lt Turn Lane	640	LF
10764+00 Rt Turn Lane	400	LF
10775+00 Rt Turn Lane	270	LF
10790+00 Lt Turn Lane	180	LF
10805+00 Lt Turn Lane	180	LF
10815+00 Lt Turn Lane	180	LF
10815+00 Rt Turn Lane	365	LF
10842+25 Rt Turn Lane	310	LF
10868+44 Lt Turn Lane	215	LF
10921+24 Lt Turn Lane	335	LF
10965+25 Lt Turn Lane	350	LF
10974+00 Lt Turn Lane	360	LF
10974+00 Rt Turn Lane	320	LF
11025+85 Lt Turn Lane	360	LF
11085+20 Lt Turn Lane	400	LF
11085+20 Rt Turn Lane	320	LF
11107+00 Rt Turn Lane	285	LF
Sheet 120-1	629	LF
Sheet 120-2	200	LF
Sheet 120-3	1,096	LF
<b>Total (each of 2 lifts)</b>	<b>7,395</b>	<b>LF</b>

<u>Short Term 12IN Line-Type NR</u>		
Sheet 120-3 (top lift only)	149	LF

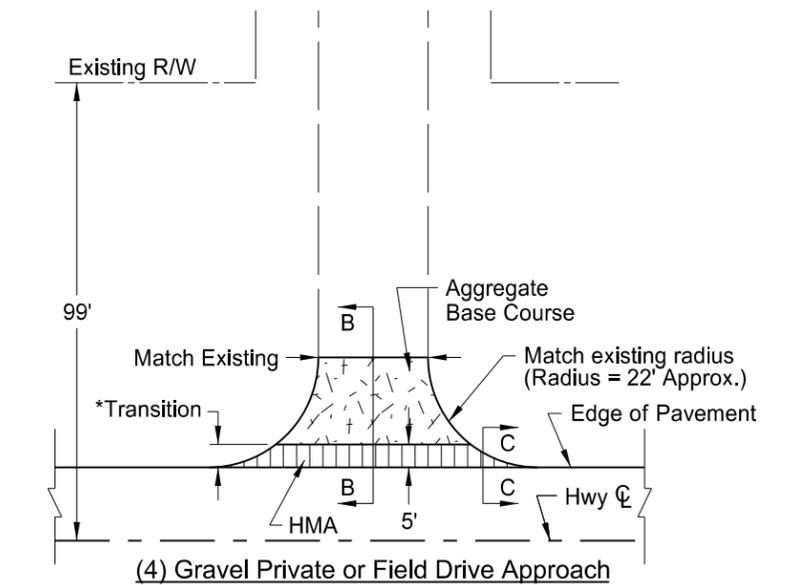
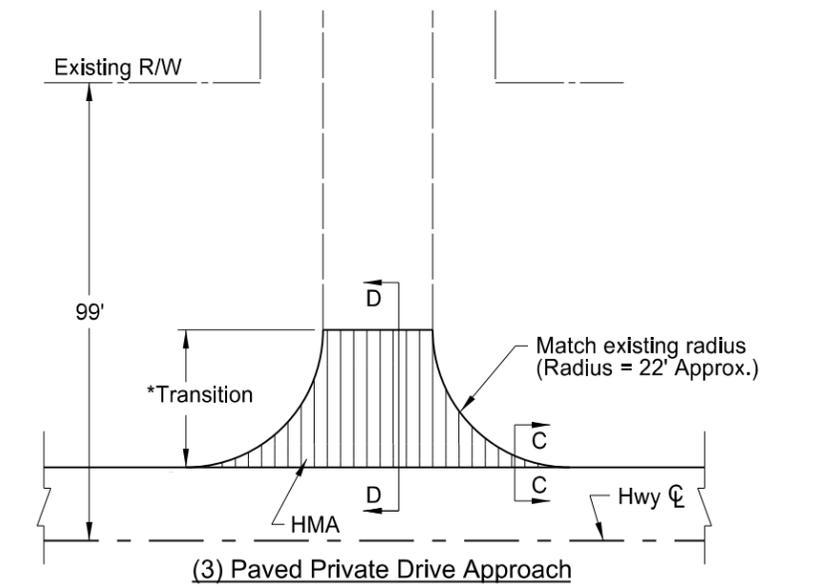
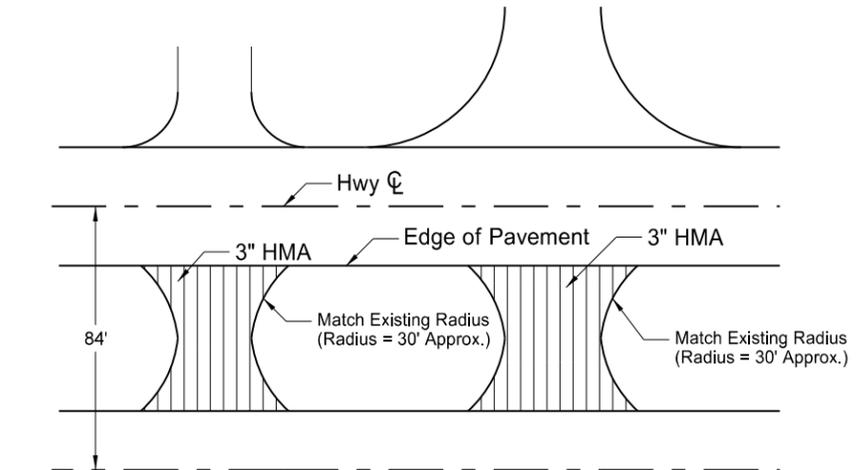
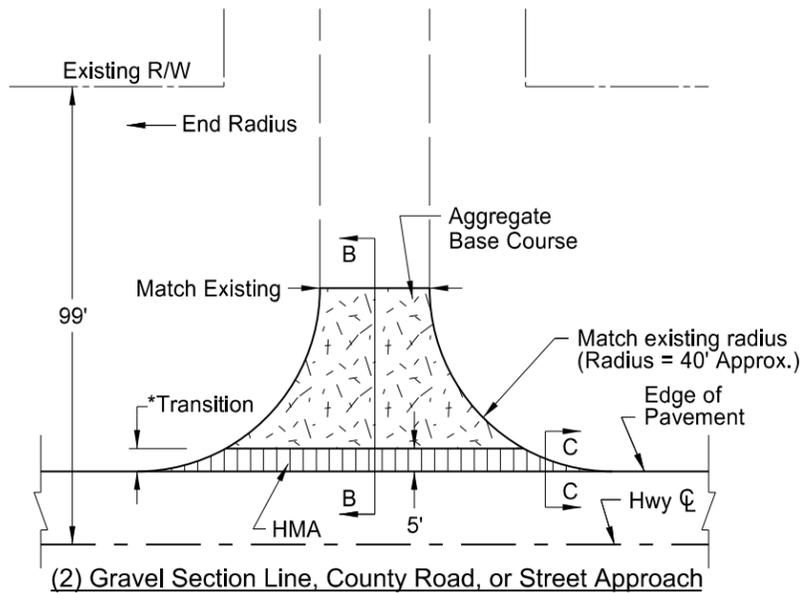
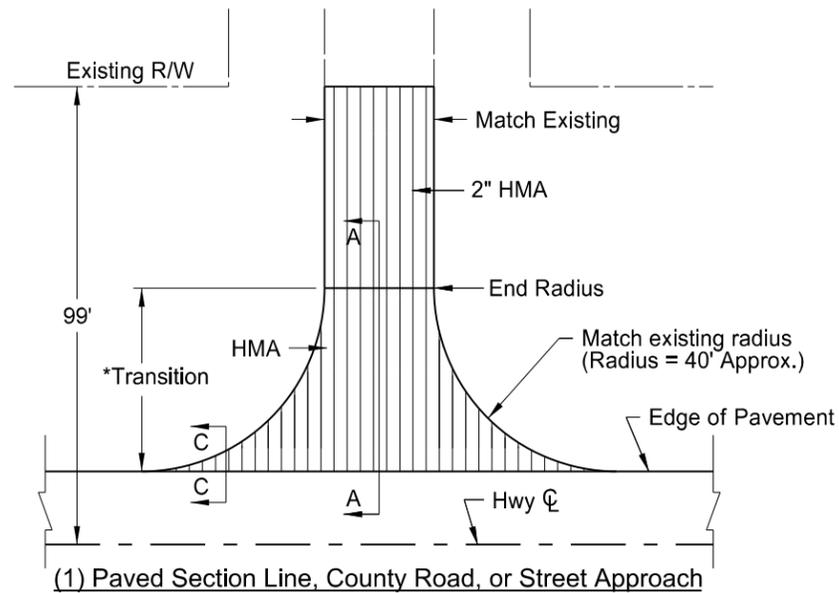
<u>Short Term 24IN Line-Type NR</u>		
Sheet 120-1	13	LF
Sheet 120-3	12	LF
<b>Total (top lift only)</b>	<b>25</b>	<b>LF</b>

<u>Short Term Message-Type NR</u>		
10764+00 Lt Turn Lane	48	SF
10764+00 Rt Turn Lane	48	SF
10775+00 Rt Turn Lane	48	SF
10790+00 Lt Turn Lane	48	SF
10805+00 Lt Turn Lane	48	SF
10815+00 Lt Turn Lane	48	SF
10815+00 Rt Turn Lane	48	SF
10842+25 Rt Turn Lane	48	SF
10868+44 Lt Turn Lane	48	SF
10921+24 Lt Turn Lane	48	SF
10965+25 Lt Turn Lane	48	SF
10974+00 Lt Turn Lane	48	SF
10974+00 Rt Turn Lane	48	SF
11025+85 Lt Turn Lane	48	SF
11085+20 Lt Turn Lane	48	SF
11085+20 Rt Turn Lane	48	SF
11107+00 Rt Turn Lane	48	SF
Sheet 120-3	48	SF
<b>Total (top lift only)</b>	<b>864</b>	<b>SF</b>

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Pavement Marking Basis of Estimate  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

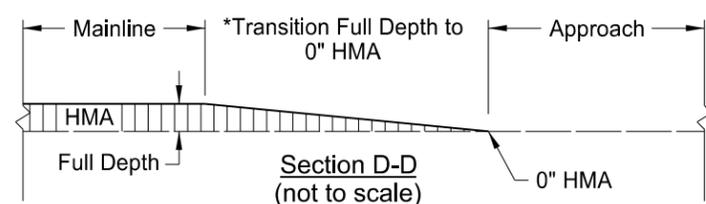
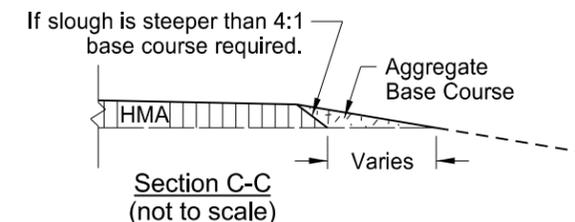
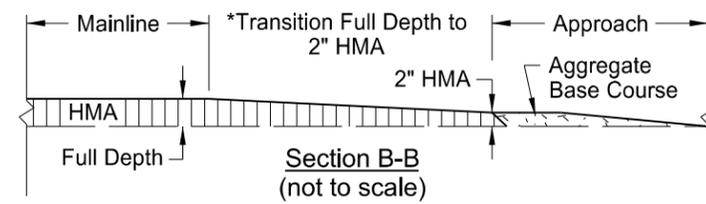
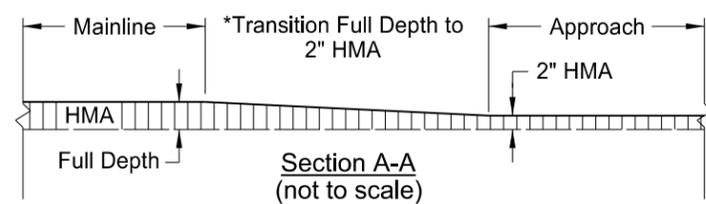
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(5) Median X-Overs at Private Drive or Field Drive Approach (6) Median X-Overs at Section Line, County Road, or Street Approach

Notes:

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

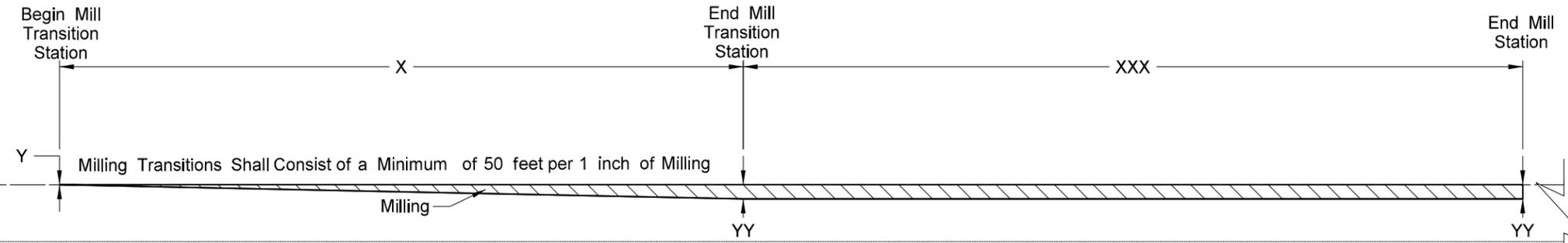


BASIS OF ESTIMATE		(1)	(2)	(3)	(4)	(5)	(6)	TOTALS
ITEM	UNIT	Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Field/Private Drive	Private Drive Median	Section Line Median	
Number of Locations	#	5	5	3	17	15	18	64
Aggregate Base Course CL 5	TON	N/A	4	N/A	2	N/A	N/A	54
Tack Coat	GAL	23.9	3.8	2.2	2.2	11.1	12.8	578.2
Superpave FAA 45	TON	25.4	6.0	3.5	3.5	18.4	21.3	886.8
PG 64-28 Asphalt Cement	TON	1.52	.36	.21	.21	1.11	1.28	53.21

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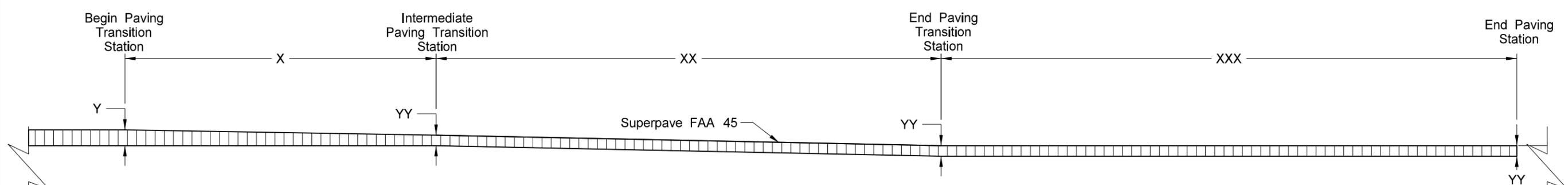
Approach Details  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	20	2



Milling Transition

Milling							
X	Begin Mill Transition Station	Y	End Mill Transition Station	YY	XXX	End Mill Station	Milling
100 ft	10765+60.0	0 in	10764+60.0	2 in	110 ft	10763+50.0	1,811.1 SY
100 ft	11300+50.0	0 in	11301+50.0	2 in	0 ft	11301+50.0	444.4 SY



Paving Transition

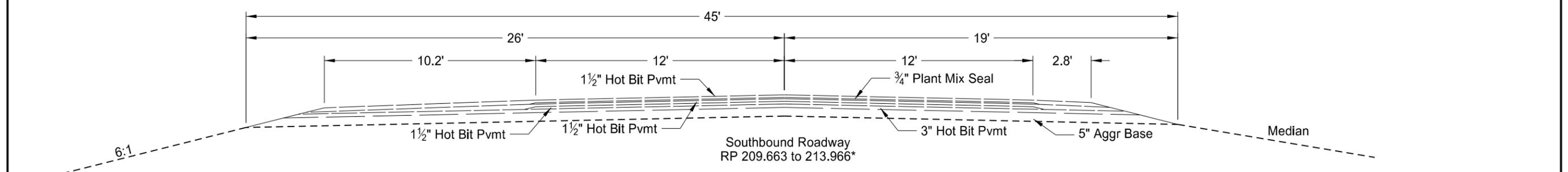
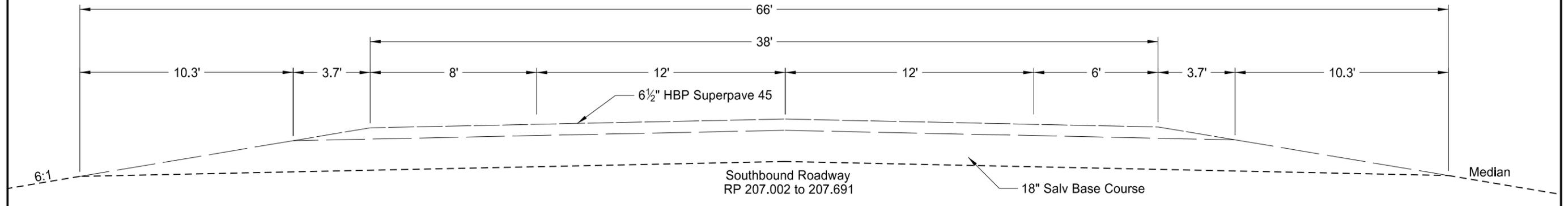
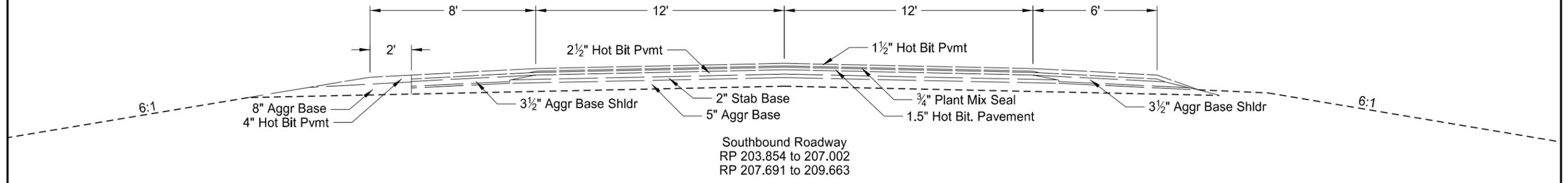
Paving											
Y	Begin Paving Transition Station	X	YY	Intermediate Paving Transition Station	XX	End Paving Transition Station	XXX	End Paving Station	Tack (Gal)	Superpave FAA 45	PG 64-28 (Ton)
3 in	10766+10.0	50 ft	2 in	10765+60.0	100 ft	10764+60.0	110 ft	10763+50.0	109.4	253.7 Ton	15.22
3 in	11300+00.0	50 ft	2 in	11300+50.0	100 ft	11301+50.0	0 ft	11301+50.0	66.7	80.2 Ton	4.82

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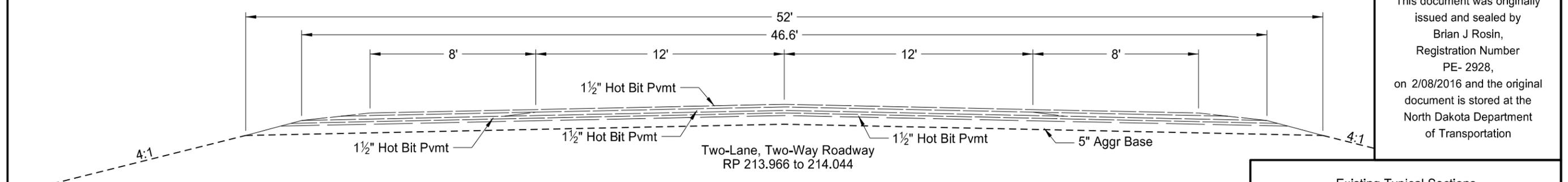
\*Drawing is not to scale  
\*See northbound plans for remaining transitions

Milling and Paving Transitions  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	30	1



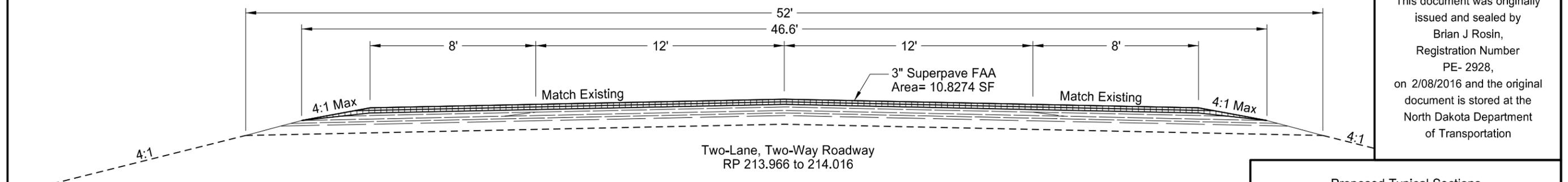
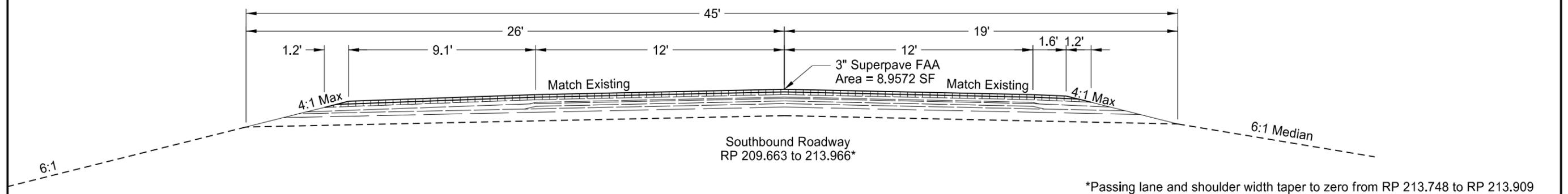
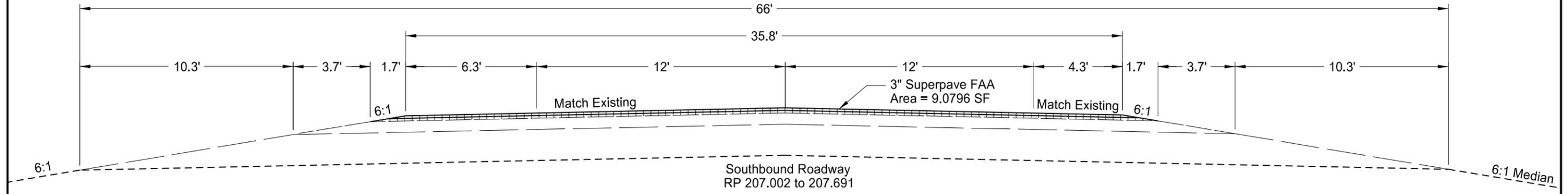
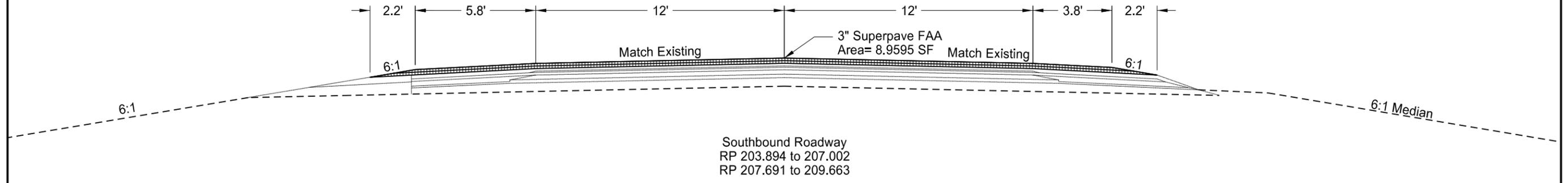
\*Passing lane and shoulder width taper to zero from RP 213.748 to RP 213.909



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Existing Typical Sections  
 HMA Overlay  
 Minot to Minot AFB - West Roadway (SB)

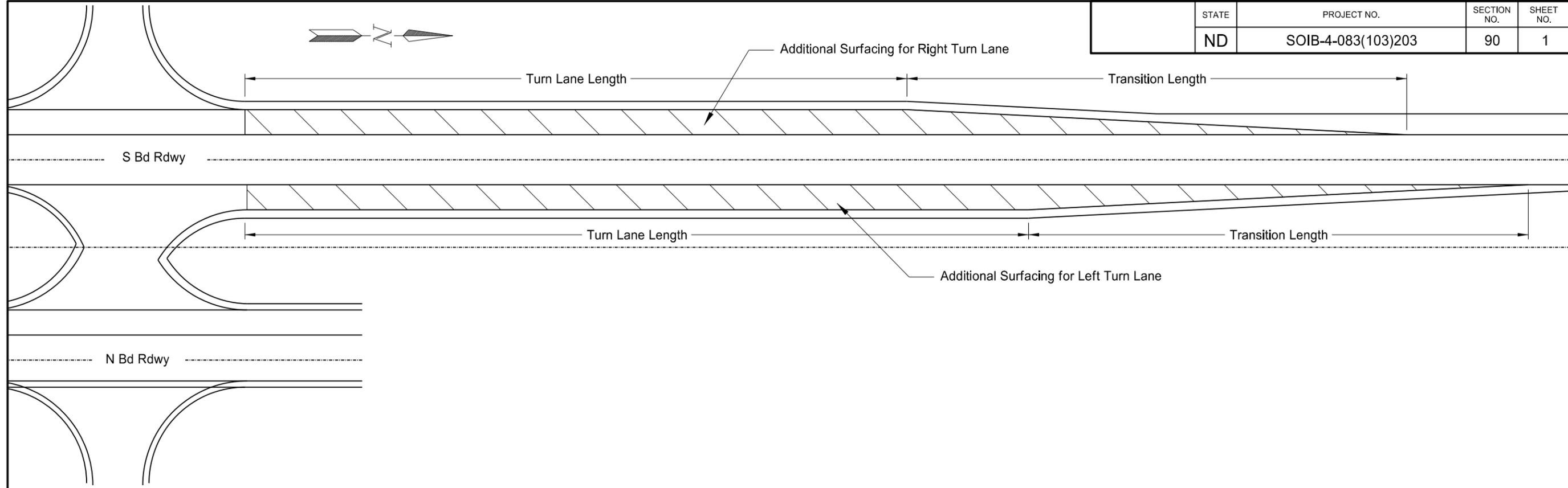
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	30	2



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Proposed Typical Sections  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	90	1



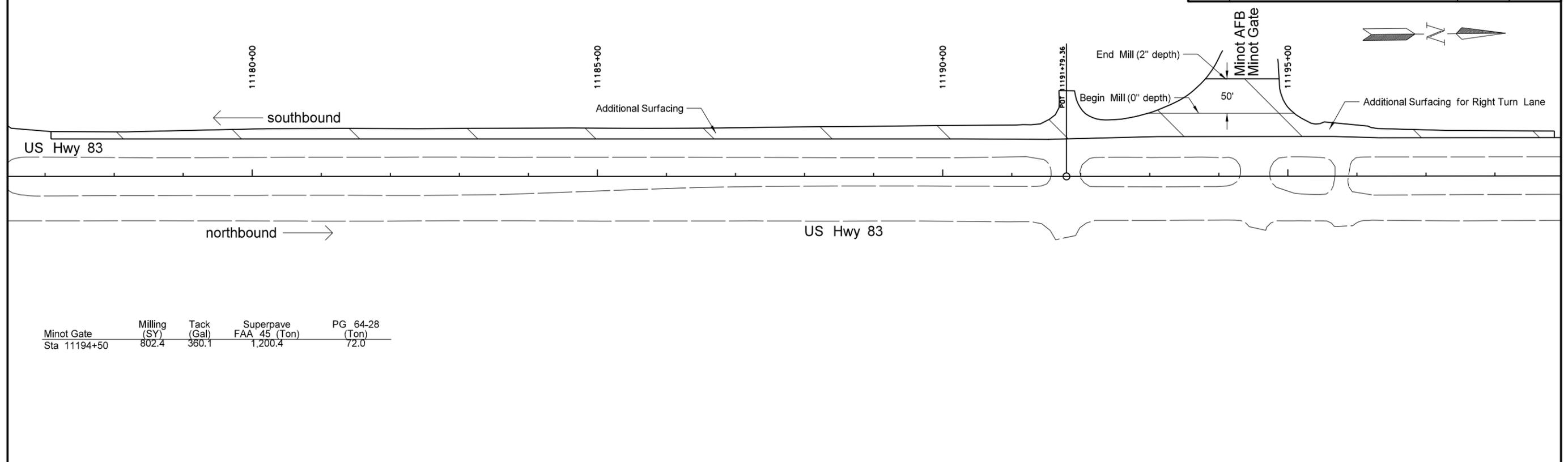
Left Turn Lane	Turn Lane Length (Ft)	Transition Length (Ft)	Tack (Gal)	Superpave FAA 45 (Ton)	PG 64-28 (Ton)
10764+00	640	240	50.7	168.9	10.1
10790+00	180	125	16.2	53.9	3.2
10805+00	180	100	15.3	51.1	3.1
10815+00	180	125	16.2	53.9	3.2
10868+44	215	100	17.7	58.9	3.5
10921+24	335	180	28.3	94.4	5.7
10965+25	350	180	29.3	97.8	5.9
10974+00	360	180	30.0	100.0	6.0
11026+85	360	180	30.0	100.0	6.0
11085+20	400	180	32.7	108.9	6.5
Totals			266.3	887.8	53.3

Right Turn Lane	Turn Lane Length (Ft)	Transition Length (Ft)	Tack (Gal)	Superpave FAA 45 (Ton)	PG 64-28 (Ton)
10764+00	400	200	33.3	111.1	6.67
10775+00	270	240	26.0	86.7	5.20
10815+00	365	230	32.0	106.7	6.40
10842+25	310	240	28.7	95.6	5.73
10974+00	320	180	27.3	91.1	5.47
11085+20	320	240	29.3	97.8	5.87
11107+00	285	150	24.0	80.0	4.80
Totals			200.7	668.9	40.1

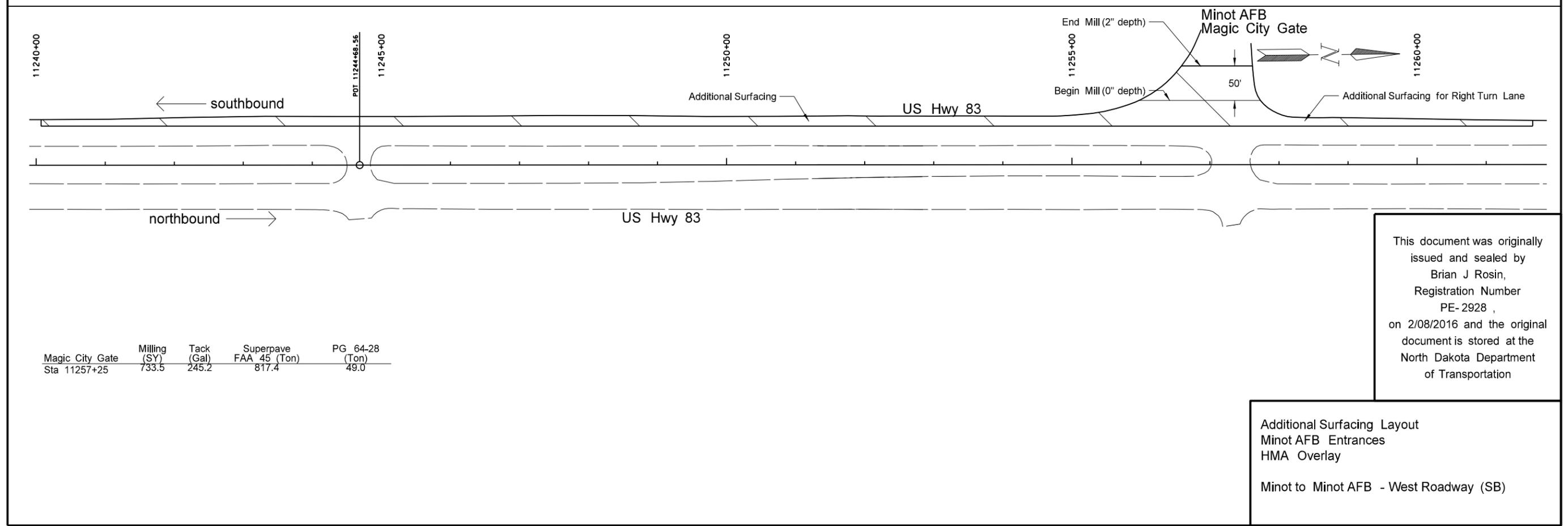
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Turn Lane Paving Layout  
 HMA Overlay  
 Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	90	2



Minot Gate	Milling (SY)	Tack (Gal)	Superpave FAA 45 (Ton)	PG 64-28 (Ton)
Sta 11194+50	802.4	360.1	1,200.4	72.0

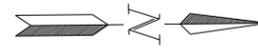


Magic City Gate	Milling (SY)	Tack (Gal)	Superpave FAA 45 (Ton)	PG 64-28 (Ton)
Sta 11257+25	733.5	245.2	817.4	49.0

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Additional Surfacing Layout  
 Minot AFB Entrances  
 HMA Overlay  
 Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	90	3



- 2" Superpave FAA
- 3" Superpave FAA

11285+00

11290+00

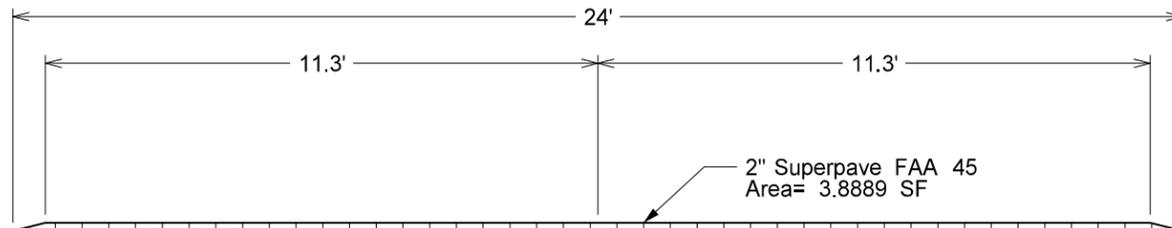
11295+00

POT 11300+00.00

RP 213.748

RP 213.833

Median Transition	Tack Coat (Gal)	Superpave FAA 45 (Ton)	PG 64-28 (Ton)
RP 213.748 to RP 213.833	237.0	43.9	2.6



Proposed Typical Section  
(Basis of Estimate provided on Basis of Estimate Sheet)

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Frontage Rd & Median Transition Paving Layout  
Sta 11291+85 to Sta 11297+85  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	60"x24"	ROAD WORK NEXT ___ MILES	1	34	34
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	48"x24"	END ROAD WORK	1	19	19
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	108"x48"	CONTRACTOR SIGN	1	64	64
G20-50a-72	72"x36"	ROAD WORK NEXT ___ MILES RT & LT ARROWS	5	37	185
G20-52a-72	72"x24"	ROAD WORK NEXT ___ MILES RT or LT ARROW	1	30	30
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE \$80 WHEN WORKERS PRESENT	4	59	236
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 ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT (Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP	7	32	224
R1-1a-18	18"x18"	STOP and SLOW PADDLE Back to Back	1	5	5
R1-2-60	60"x60"	YIELD		29	
R2-1-48	48"x60"	SPEED LIMIT ___	14	39	546
R2-1a-24	24"x18"	MINIMUM FEE \$80 (Mounted on Speed Limit post)	5	10	50
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	48"x60"	DO NOT PASS	2	39	78
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED		28	
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	60"x30"	ROAD CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-60	60"x30"	STREET CLOSED ___ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	48"x48"	SPEED REDUCTION AHEAD	4	35	140
W4-2-48	48"x48"	RIGHT or LEFT LANE TRANSITION SYMBOL	2	35	70
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 SYMBOL		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	
W8-9a-48	48"x48"	SHOULDER DROP-OFF	6	35	210
W8-11-48	48"x48"	UNEVEN LANES	2	35	70
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY	2	35	70
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or ___ FT.	2	35	70
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or ___ FT.	2	35	70
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	___ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	48"x48"	ROAD WORK AHEAD or ___ FT or ___ MILE	1	35	35
W20-2-48	48"x48"	DETOUR AHEAD or ___ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or ___ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or ___ FT.		35	
W20-5-48	48"x48"	RIGHT or LEFT LANE CLOSED AHEAD or ___ FT.	2	35	70
W20-7-48	48"x48"	FLAGGING SYMBOL		35	
W20-7a-48	48"x48"	FLAGGING SYMBOL	2	35	70
W20-7k-24	24"x18"	___ FEET (Mounted on warning sign post)	2	10	20
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT ___ MILES (Mounted on warning sign post)	6	12	72
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL	2	35	70

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or ___ FT			35
W21-5-48	48"x48"	SHOULDER WORK			35
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED			35
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or ___ FT.			35
W21-6a-48	48"x48"	SURVEY CREW AHEAD			35
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or ___ FT.			35
W21-51-48	48"x48"	MATERIAL ON ROADWAY			35
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK			35
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)			11

**SPECIAL SIGNS**

G20-4b-36	36"x30"	WAIT FOR PILOT CAR			25
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**SPEC & CODE**

704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	2578
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SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	500
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	TYPE III BARRICADES	EACH	20
704-1060	DELINEATOR DRUMS	EACH	122
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	401
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	1
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-1185	PILOT CAR	HR	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	154
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	35358
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

NOTE:  
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.  
<http://www.dot.nd.gov/>

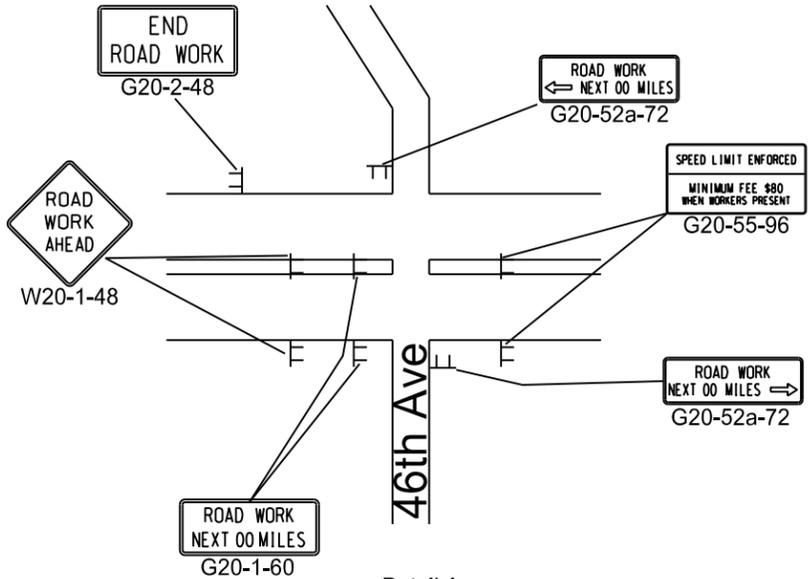
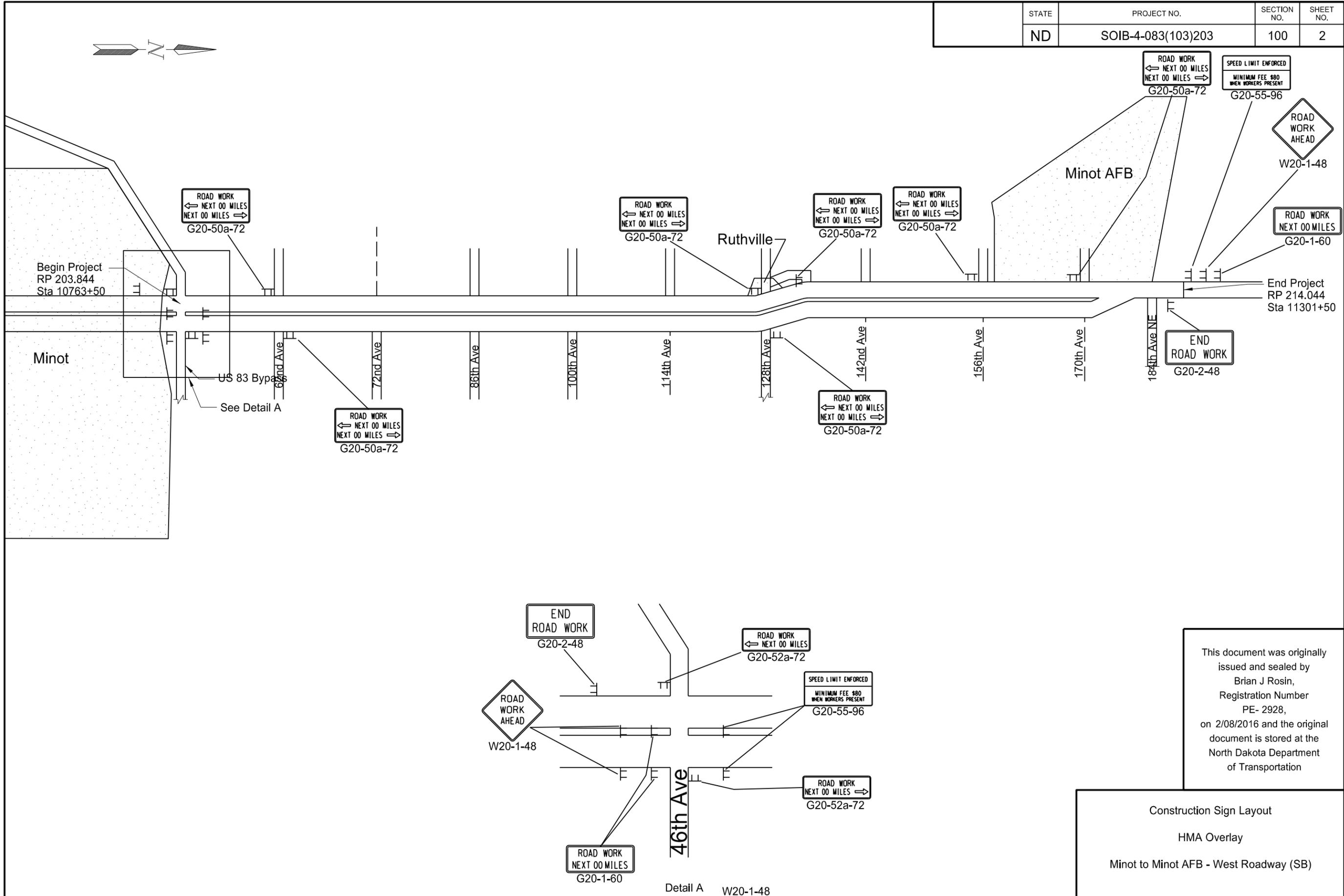
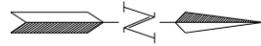
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Traffic Control Devices List

HMA Overlay

Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	100	2

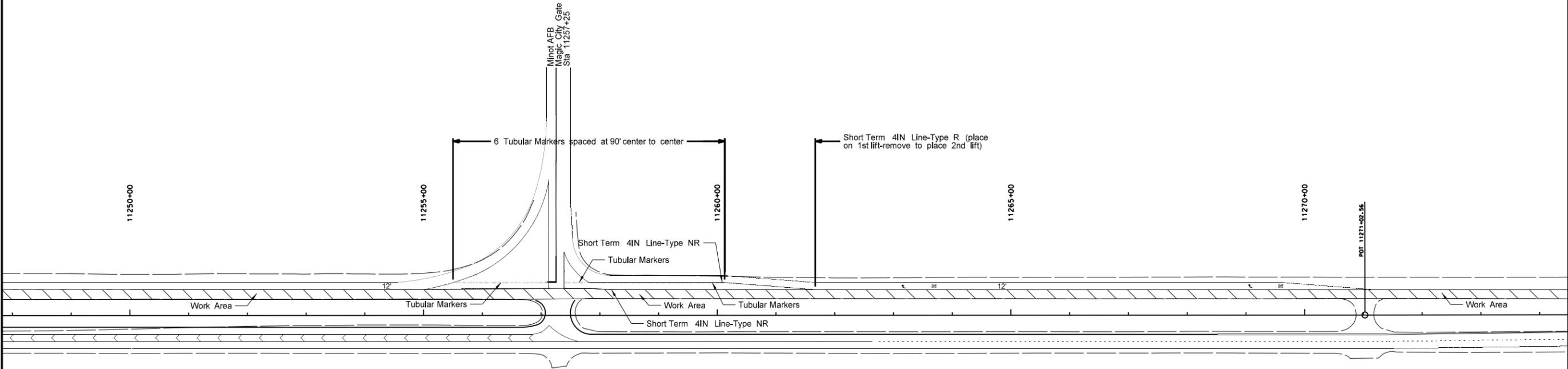
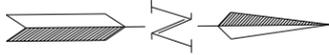


Detail A W20-1-48

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Construction Sign Layout  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	100	3



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Work Zone Traffic Control  
 HMA Overlay  
 Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	SOIB-4-083(103)203	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Support Size	Max Post Len	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF		LF	1st LF	2nd LF	3rd LF	4th LF								
210.075 Lt	S.A.A			17.8	12.7	13.3	14.0		2.5 x 2.5 12 ga	15.4					3	4	3 x 3 7 ga			3		
212.011 Lt									2 x 2 12 ga									4	1			
213.199 Lt									2 x 2 12 ga									4	1			
<b>Sub Total</b>			0.0	17.8	<b>Total</b> 39.9										<b>Total</b> 12			8	2	3		
<b>Grand Total</b>			0.0	17.8	<b>Total</b> 39.9										<b>Total</b> 12			8	2	3		

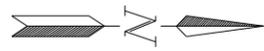
Basis of Estimate  
Sign Support Lengths

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

Urban/rural expressway and freeway - 84" (Offset - 60")

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE-5047, on 2/8/2016 and the original document is stored at the North Dakota Department of Transportation	Sign Summary Perforated Tube
	West Lane - Minot to AFB ND Hwy 83

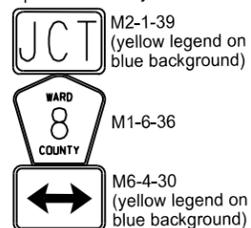
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-4-083(103)203	110	2



RP 210.075 Lt  
Remove



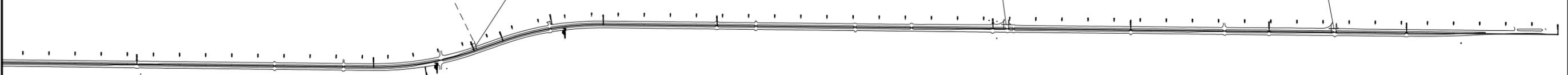
RP 210.075 Lt  
Special Assembly A



RP 212.011 Lt  
Reset sign and support



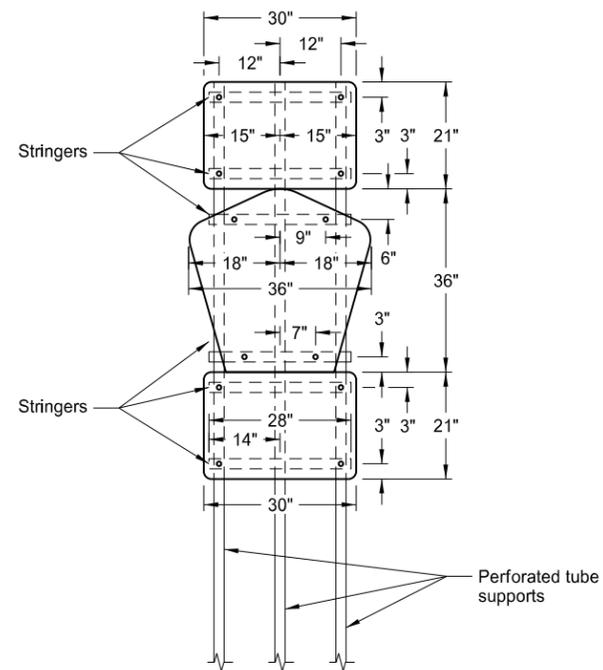
RP 213.199 Lt  
Reset sign and supports



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Sign Layout  
West Lane - Minot to AFB  
ND Hwy 83

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SOIB-4-083(103)203	110	3

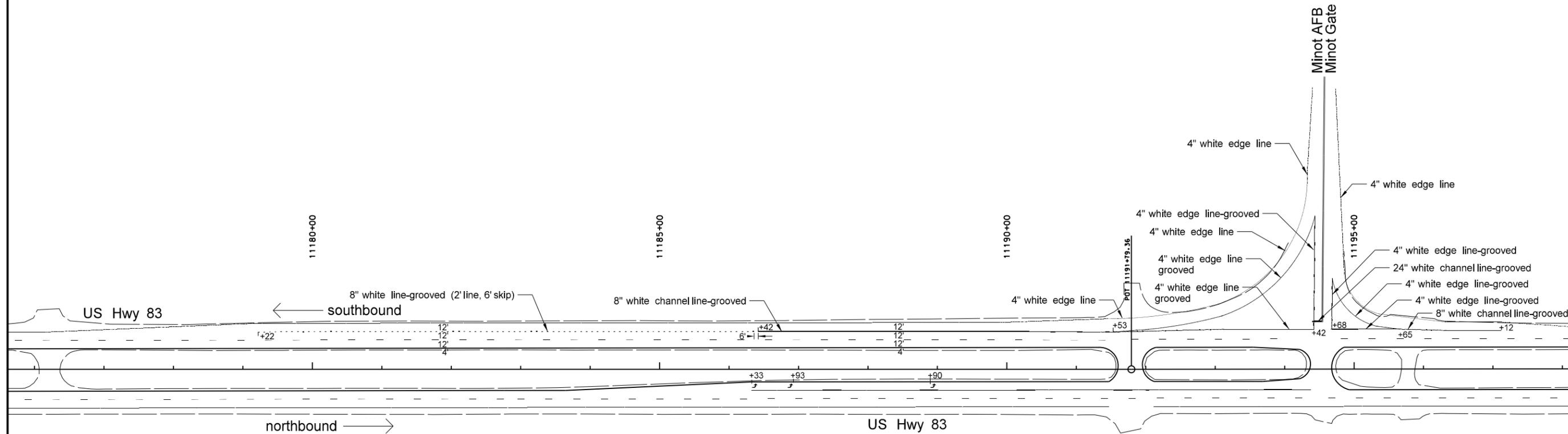
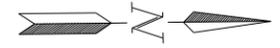


Special Assembly A  
 RP 210.075 Lt  
 Pay Area: 17.8 SF

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Sign Layout  
 West Lane - Minot to AFB  
 ND Hwy 83

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	120	1



<u>Epoxy Pavement Mark 4IN Line</u>	
white edge line (SB-Sta 11186+42 to Sta 11197+12)	488 LF

Note: Pavement marking not labeled on this sheet has been included in the basis of estimate.

<u>Epoxy Pavement Mark 4IN Line-Grooved</u>	
white edge line (SB-Sta 11191+53 to Sta 11194+42)	813 LF
white edge line (SB-Sta 11194+68 to Sta 11195+65)	302 LF
<b>Total</b>	<b>1,115 LF</b>

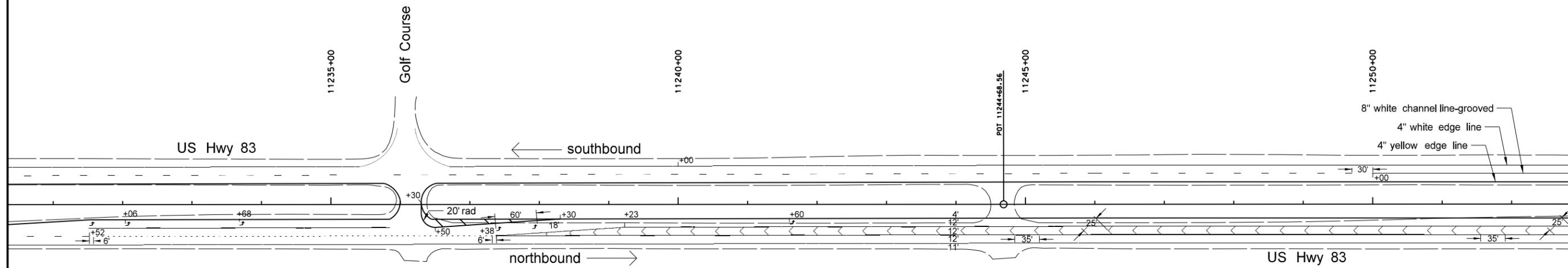
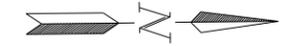
<u>Epoxy Pavement Mark 8IN Line-Grooved</u>	
white line (2' line, 6' skip) (SB-Sta 11179+22 to Sta 11186+36)	180 LF
white channel line (SB-Sta 11186+42 to Sta 11191+53)	302 LF
white channel line (SB-Sta 11195+65 to Sta 11197+12)	147 LF
<b>Total</b>	<b>629 LF</b>

<u>Epoxy Pavement Mark 24IN Line-Grooved</u>	
white stop line (SB-Sta 11194+42 to Sta 11194+55)	13 LF

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Pavement Marking Layout  
Sta 11179+22 to Sta 11197+12  
HMA Overlay  
Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	120	2



Epoxy Pavement Mark 4IN Line	
white edge line (SB-Sta 11250+00 to Sta 11252+00)	200 LF
yellow edge line (SB-Sta 11250+00 to Sta 11252+00)	200 LF
Total	400 LF

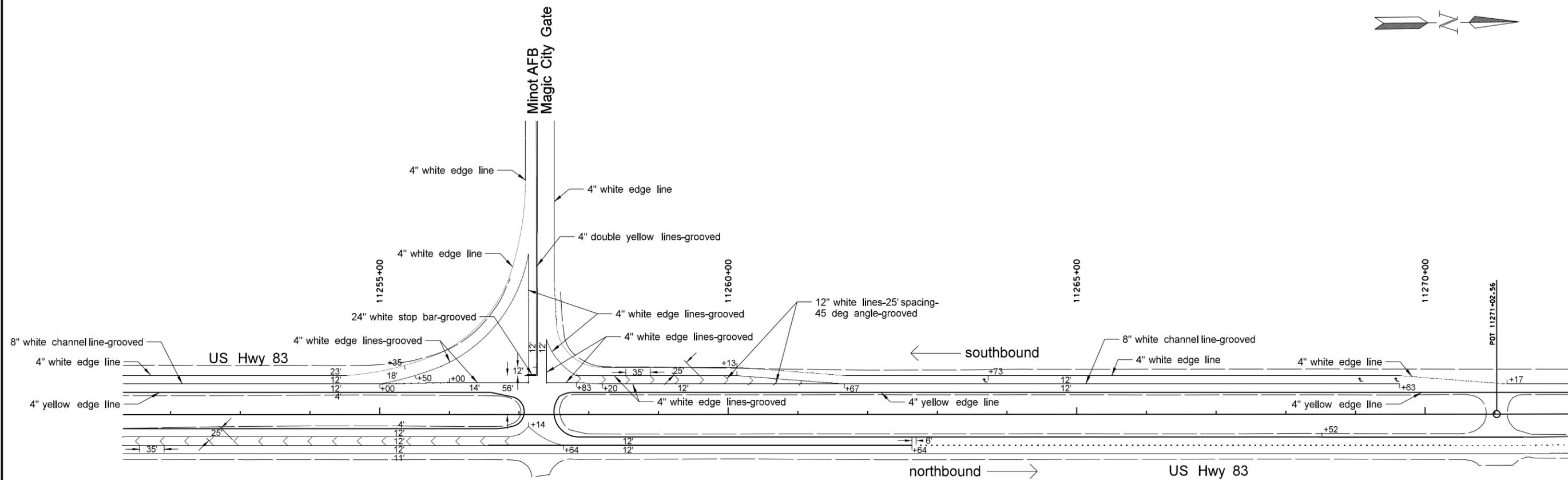
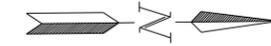
Note: Pavement marking not labeled on this sheet has been included in the basis of estimate.

Epoxy Pavement Mark 8IN Line-Grooved	
white channel line (SB-Sta 11250+00 to Sta 11252+00)	200 LF

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Pavement Marking Layout  
 Sta 11231+52 to Sta 11252+00  
 HMA Overlay  
 Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	120	3



Epoxy Pavement Mark 4IN Line	
white edge line (SB-Sta 11252+00 to Sta 11258+20)	794 LF
white edge line (SB-Sta 11257+26 to Sta 11270+00)	1,274 LF
yellow edge line (SB-Sta 11252+00 to Sta 11270+00)	1,800 LF
<b>Total</b>	<b>3,868 LF</b>

Note: Pavement marking not labeled on this sheet has been included in the basis of estimate.

Epoxy Pavement Mark 4IN Line-Grooved	
white edge line (SB-Sta 11255+00 to Sta 11257+14) (Island)	700 LF
double yellow lines (SB-Sta 11257+26)	690 LF
white edge line (SB-Sta 11257+38 to Sta 11261+67) (Island)	843 LF
<b>Total</b>	<b>2,233 LF</b>

Epoxy Pavement Mark 8IN Line-Grooved	
white channel line (SB-Sta 11252+00 to Sta 11255+00)	300 LF
white channel line (SB-Sta 11261+67 to Sta 11269+63)	796 LF
<b>Total</b>	<b>1,096 LF</b>

Epoxy Pavement Mark 12IN Line-Grooved	
white edge line (SB-Sta 11257+83 to Sta 11261+06)	149 LF

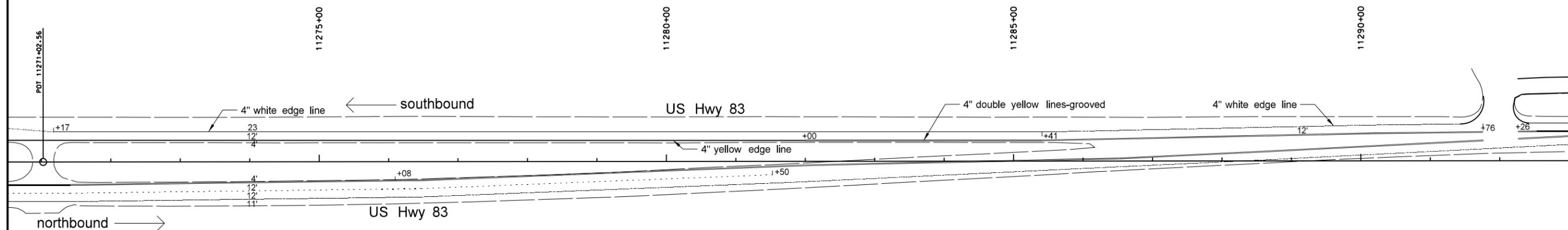
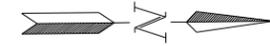
Epoxy Pavement Mark 24IN Line-Grooved	
white stop bar (Sta 11257+14 to Sta 11257+26)	12 LF

Epoxy Pavement Mark Message-Grooved	
right arrow (3)	48 SF

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Pavement Marking Layout  
 Sta 11252+00 to Sta 11271+00  
 HMA Overlay  
 Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	120	4



Epoxy Pavement Mark 4IN Line	
white edge line (SB-Sta 11270+00 to Sta 11291+76)	2,176 LF
yellow edge line (SB-Sta 11270+00 to Sta 11282+00)	1,200 LF
<b>Total</b>	<b>3,376 LF</b>

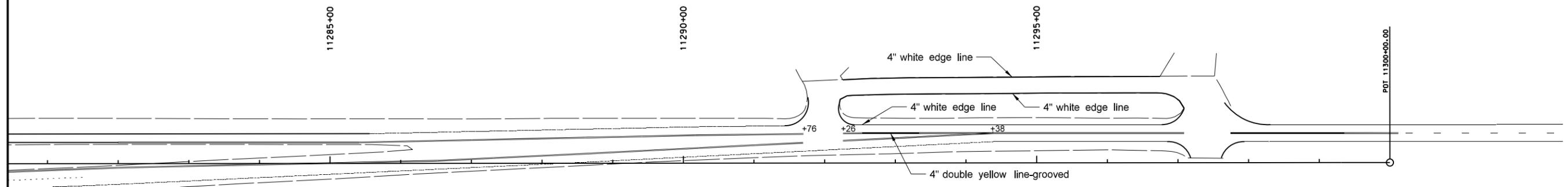
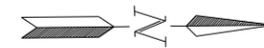
Note: Pavement marking not labeled on this sheet has been included in the basis of estimate.

Epoxy Pavement Mark 4IN Line-Grooved	
double yellow lines (SB-Sta 11282+00 to Sta 11291+76)	1,952 LF

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Pavement Marking Layout  
 Sta 11271+00 to Sta 11291+76  
 HMA Overlay  
 Minot to Minot AFB - West Roadway (SB)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SOIB-4-083(103)203	120	5



Epoxy Pavement Mark 4IN Line	
white edge line (Sta 11292+25 Lt to Sta 11297+25 Lt)	1,000 LF
white edge line (Sta 11291+76 to Sta 11294+38)	262 LF
Total	1,262 LF

Note: Pavement marking not labeled on this sheet has been included elsewhere.

Epoxy Pavement Mark 4IN Line-Grooved	
double yellow lines (Sta 11292+26 to Sta 11294+38)	424 LF

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Pavement Marking Layout  
 Sta 11292+26 to Sta 11297+25  
 HMA Overlay  
 Minot to Minot AFB - West Roadway (SB)

NDDOT ABBREVIATIONS

? This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.

Abn abandoned  
 Abut abutment  
 Ac acres  
 Adj adjusted  
 Aggr aggregate  
 Ahd ahead  
 ARV air release valve  
 Align alignment  
 Al alley  
 Alt alternate  
 Alum aluminum  
 ADA Americans with Disabilities Act  
 A ampere  
 & and  
 Appr approach  
 Approx approximate  
 ACP asbestos cement pipe  
 Asph asphalt  
 AC asphalt cement  
 Assmd assumed  
 @ at  
 Atten attenuation  
 ATR automatic traffic recorder  
 Ave Avenue  
 Avg average  
 ADT average daily traffic  
 Az azimuth  
 Bk back  
 BF back face  
 Bs backsight  
 Balc balcony  
 B Wire barbed wire  
 Barr barricade  
 Btry battery  
 Brg bearing  
 BI beehive inlet  
 Beg begin  
 BM bench mark  
 Bkwy bikeway  
 Bit bituminous  
 Blk block  
 Bd Ft board feet  
 BH bore hole  
 BS both sides  
 Bot bottom  
 Blvd Boulevard  
 Bndry boundary  
 BC brass cap  
 Brkwy breakaway  
 Br bridge  
 Bldg building

BV butterfly valve  
 Byp bypass  
 C Gdrl cable guardrail  
 Calc calculate  
 Cd candela  
 CIP cast iron pipe  
 CB catch basin  
 CRS cationic rapid setting  
 C Gd cattle guard  
 C To C center to center  
 Cl or C centerline  
 Cm centimeter  
 Ch chain  
 Chnlk chain-link  
 Ch Blk channel block  
 Ch Ch channel change  
 Chk check  
 Chsld chiseled  
 Cir circle  
 Cl class  
 Cl clay  
 Cl F clay fill  
 Cl Hvy clay heavy  
 Cl Lm clay loam  
 Clnt clean-out  
 Clr clear  
 Cl&gr clearing & grubbing  
 Co S coal slack  
 Comb. combination  
 Coml commercial  
 Compr compression  
 CADD computer aided drafting & design  
 Conc concrete  
 Cond conductor  
 Const construction  
 Cont continuous  
 CSB continuous split barrel sample  
 Contr contraction  
 Contr contractor  
 CP control point  
 Coord coordinate  
 Cor corner  
 Corr corrected  
 CAES corrugated aluminum end section  
 CAP corrugated aluminum pipe  
 CMES corrugated metal end section  
 CMP corrugated metal pipe  
 CPVCP corrugated poly-vinyl chloride pipe  
 CSES corrugated steel end section  
 CSP corrugated steel pipe  
 C coulomb  
 Co County  
 Crse course  
 C Gr course gravel  
 CS course sand

Ct Court  
 Xarm cross arm  
 Xbuck cross buck  
 Xsec cross sections  
 Xing crossing  
 Xrd Crossroad  
 Crn crown  
 CF cubic feet  
 M3 cubic meter  
 M3/s cubic meters per second  
 CY cubic yard  
 Cy/mi cubic yards per mile  
 Culv culvert  
 C&G curb & gutter  
 CI curb inlet  
 CR curb ramp  
 CS curve to spiral  
 C cut  
 Dd Ld dead load  
 Defl deflection  
 Defm deformed  
 Deg or D degree  
 DInt delineate  
 DIntr delineator  
 Depr depression  
 Desc description  
 Det detail  
 DWP detectable warning panel  
 Dtr detour  
 Dia diameter  
 Dir direction  
 Dist distance  
 DM disturbed material  
 DB ditch block  
 DG ditch grade  
 Dbl double  
 Dn down  
 Dwg drawing  
 Dr drive  
 Drwy driveway  
 DI drop inlet  
 D dry density  
 Ea each  
 Esmt easement  
 E East  
 EB Eastbound  
 Elast elastomeric  
 EL electric locker  
 E Mtr electric meter  
 Elec electric/al  
 EDM electronic distance meter  
 Elev or El elevation  
 Ellipt elliptical  
 Emb embankment  
 Emuls emulsion/emulsified

ES end section  
 Engr engineer  
 ESS environmental sensor station  
 Eq equal  
 Eq equation  
 Evgr evergreen  
 Exc excavation  
 Exst existing  
 Exp expansion  
 Expy Expressway  
 E external of curve  
 Extru extruded  
 FOS factor of safety  
 F Fahrenheit  
 FS far side  
 F farad  
 Fed Federal  
 FP feed point  
 Ft feet/foot  
 Fn fence  
 Fn P fence post  
 FO fiber optic  
 FB field book  
 FD field drive  
 F fill  
 FAA fine aggregate angularity  
 FS fine sand  
 FH fire hydrant  
 Fl flange  
 Flrd flared  
 FES flared end section  
 F Bcn flashing beacon  
 FA flight auger sample  
 FL flow line  
 Ftg footing  
 FM force main  
 Fs foresight  
 Fnd found  
 Fdn foundation  
 Frac fractional  
 Frwy freeway  
 Frt front  
 FF front face  
 F Disp fuel dispenser

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

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NDDOT ABBREVIATIONS

D-101-2

FFP	fuel filler pipes	IPn	Iron Pin	MC	medium curing	Ped	pedestal
FLS	fuel leak sensor	IP	iron Pipe	M	mega	Ped	pedestrian
Furn	furnish/ed	Jt	joint	Mer	meridian	PPP	pedestrian pushbutton post
Gal	gallon	J	joule	M	meter	Pen.	penetration
Galv	galvanized	Jct	junction	M/s	meters per second	Perf	perforated
Gar	garage	K	kelvin	M	mid ordinate of curve	Per.	perimeter
Gs L	gas line	Kn	kilo newton	Mi	mile	PL	pipeline
G Reg	gas line regulator	Kpa	kilo pascal	MM	mile marker	PI	place
GMV	gas main valve	Kg	kilogram	MP	mile post	P&P	plan & profile
G Mtr	gas meter	Kg/m3	kilogram per cubic meter	MI	milliliter	PL	plastic limit
GSV	gas service valve	Km	kilometer	Mm	millimeter	PI	plate
GVP	gas vent pipe	K	Kip(s)	Mm/hr	millimeters per hour	Pt	point
GV	gate valve	LS	Land Surveyor (licensed)	Min	minimum	PCC	point of compound curve
Ga	gauge	LSIT	Land Surveyor In Training	Misc	miscellaneous	PC	point of curve
Geod	geodetic	Ln	lane	Mon	monument	PI	point of intersection
GIS	Geographical Information System	Lg	large	Mnd	mound	PRC	point of reverse curvature
G	giga	Lat	latitude	Mtbl	mountable	PT	point of tangent
GPS	Global Positioning System	Lt	left	Mtd	mounted	POC	point on curve
Gov	government	L	length of curve	Mtg	mounting	POT	point on tangent
Grd	graded/grade	Lens	lenses	Mk	muck	PE	polyethylene
Gr	gravel	Lvl	level	Mun	municipal	PVC	polyvinyl chloride
Grnd	ground	LB	level book	N	nano	PCC	Portland Cement concrete
GWM	ground water monitor	Lvng	leveling	NGS	National Geodetic Survey	Lb or #	pounds
Gdrl	guardrail	Lht	light	NS	near side	PP	power pole
Gtr	gutter	LP	light pole	Neop	neoprene	Preempt	preemption
H Plg	H piling	Ltg	lighting	Ntwk	network	Prefab	prefabricated
Hdwl	headwall	Lig Co	lignite coal	N	newton	Prfmd	performed
Ha	hectare	Lig Sl	lignite slack	N	North	Prep	preparation
Ht	height	LF	linear foot	NE	North East	Press.	pressure
HI	height of instrument	Liq	liquid	NW	North West	PRV	pressure relief valve
Hel	helical	LL	liquid limit	NB	Northbound	Prestr	prestressed
H	henry	L	litre	No. or #	number	Pvt	private
HZ	hertz	Lm	loam	Obsc	obscure(d)	PD	private drive
HDPE	high density polyethylene	Loc	location	Obsn	observation	Prod.	production/produce
HM	high mast	LC	long chord	Ocpd	occupied	Prog	programmed
HP	high pressure	Long.	longitude	Ocpy	occupy	Prop.	property
HPS	high pressure sodium	Lp	loop	Off Loc	office location	Prop Ln	property line
Hwy	highway	LD	loop detector	O/s	offset	Ppsd	proposed
Hor	horizontal	Lm	lumen	OC	on center	PB	pull box
HBP	hot bituminous pavement	Lum	luminaire	C	one dimensional consolidation		
HMA	hot mix asphalt	L Sum	lump sum	OC	organic content		
Hr	hour(s)	Lx	lux	Orig	original		
Hyd	hydrant	ML	main line	O To O	out to out		
Ph	hydrogen ion content	M Hr	man hour	OD	outside diameter		
Id	identification	MH	manhole	OH	overhead		
In or "	inch	Mkd	marked	PMT	pad mounted transformer		
Incl	inclinometer tube	Mkr	marker	Pg	pages		
IMH	inlet manhole	Mkg	marking	Pntd	painted		
ID	inside diameter	MA	mast arm	Pr	pair		
Inst	instrument	Matl	material	Pnl	panel		
Intchg	interchange	Max	maximum	Pk	park		
Intmdt	intermediate	MC	meander corner	PK	Parker-Kalon nail		
Intscn	intersection	Meas	measure	Pa	pascal		
Inv	invert	Mdn	median	PSD	passing sight distance		
IM	iron monument	MD	median drain	Pvmt	pavement		

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

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NDDOT ABBREVIATIONS

D-101-3

Qty	quantity	SN	sign number	Tan	tangent	Wb	weber
Qtr	quarter	Sig	signal	T	tangent (semi)	WIM	weigh in motion
Rad or R	radius	Si Cl	silt clay	TS	tangent to spiral	W	west
RR	railroad	Si Cl Lm	silty clay loam	Tel	telephone	WB	westbound
Rlwy	railway	Si Lm	silty loam	Tel B	Telephone Booth	Wrng	wiring
Rsd	raised	Sgl	single	Tel P	telephone pole	W/	with
RTP	random traverse point	SC	slow curing	Tv	television	W/o	without
Rge or R	range	SS	slow setting	Temp	temperature	WC	witness corner
RC	rapid curing	Sm	small	Temp	temporary	WGS	world geodetic system
Rec	record	S	South	TBM	temporary bench mark	Z	zenith
Rcy	recycle	SE	South East	T	tesla		
RAP	recycled asphalt pavement	SW	South West	T	thinwall tube sample		
RPCC	recycled portland cement concrete	SB	Southbound	T/mi	tons per mile		
Ref	reference	Sp	spaces	Ts	topsoil		
R Mkr	reference marker	Spcl	special	Twp or T	township		
RM	reference monument	SA	special assembly	Traf	traffic		
Refl	reflectorized	SP	special provisions	TSCB	traffic signal control box		
RCB	reinforced concrete box	G	specific gravity	Tr	trail		
RCES	reinforced concrete end section	Spk	spike	Transf	transformer		
RCP	reinforced concrete pipe	SC	spiral to curve	TB	transit book		
RCPS	reinforced concrete pipe sewer	ST	spiral to tangent	Trans	transition		
Reinf	reinforcement	SB	split barrel sample	TT	transmission tower		
Res	reservation	SH	sprinkler head	Trans	transverse		
Ret	retaining	SV	sprinkler valve	Trav	traverse		
Rev	reverse	Sq	square	TP	traverse point		
Rt	right	SF	square feet	Trtd	treated		
R/W	right of way	Km2	square kilometer	Trmt	treatment		
Riv	river	M2	square meter	Qc	triaxial compression		
Rd	road	SY	square yard	TERO	tribal employment rights ordinance		
Rdbd	road bed	Stk	stake	Tpl	triple		
Rdwy	roadway	Std	standard	TP	turning point		
RWIS	roadway weather information system	N	standard penetration test	Typ	typical		
Rk	rock	Std Specs	standard specifications	Qu	unconfined compressive strength		
Rt	route	Sta	station	Ugrnd	underground		
Salv	salvage(d)	Sta Yd	station yards	USC&G	US Coast & Geodetic Survey		
Sd	sand	Stm L	steam line	USGS	US Geologic Survey		
Sdy Cl	sandy clay	SEC	steel encased concrete	Util	utility		
Sdy Cl Lm	sandy clay loam	SMA	stone matrix asphalt	VG	valley gutter		
Sdy Fl	sandy fill	SSD	stopping sight distance	Vap	vapor		
Sdy Lm	sandy loam	SD	storm drain	Vert	vertical		
San	sanitary sewer line	St	street	VC	vertical curve		
Sc	scoria	SPP	structural plate pipe	VCP	vitrified clay pipe		
Sec	seconds	SPPA	structural plate pipe arch	V	volt		
Sec	section	Str	structure	Vol	volume		
SL	section line	Subd	subdivision	Wkwy	walkway		
Sep	separation	Sub	subgrade	W	water content		
Seq	sequence	Sub Prep	subgrade preperation	WGV	water gate valve		
Serv	service	Ss	subsoil	WL	water line		
Sh	shale	SE	superelevation	WM	water main		
Sht	sheet	SS	supplement specification	WMV	water main valve		
Shtng	sheeting	Supp	supplemental	W Mtr	water meter		
Shldr	shoulder	Surf	surfacing	WSV	water service valve		
Sw	sidewalk	Surv	survey	WW	water well		
S	siemens	Sym	symmetrical	W	watt		
SD	sight distance	SI	systems international	Wrng	wearing		

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07-01-14	
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08-03-15	General Revisions

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications	GT PLNS NAT GAS	Great Plains Natural Gas Company	RED RIV TEL	Red River Rural Telephone
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 Coop
All PI	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	RSR ELEC	R.S.R. Electric Cooperative
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	MID-CONT CABLE	Mid-Continent Cable	SW PL PRJ	Southwest Pipeline Project
BURK-DIV ELEC	Burke-Divide Electric Cooperative	MIDSTATE TEL	Midstate Telephone Company	T M C	Turtle Mountain Communications
BURL WU	Burleigh Water Users	MINOT CABLE	Minot Cable Television	TCI	TCI of North Dakota
Cable One	Cable One	MINOT TEL	Minot Telephone Company	TESORO GHG PLNS PL	Tesoro High Plains Pipeline
CABLE SERV	Cable Services	MISS W W S	Missouri West Water System	TRI-CNTY WU	Tri-County Water Users Incorporated
CAP ELEC	Capital Electric Cooperative Incorporat	MNKOTA PWR	Minnkota Power	TRL CO RWU	Traill County Rural Water Users
CASS CO ELEC	Cass County Electric Cooperative	MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative	UNTD TEL	United Telephone
CASS RWU	Cass Rural Water Users Incorporated	MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative	UPPR SOUR WUA	Upper Souris Water Users Association
CAV ELEC	Cavalier Rural Electric Cooperative	MRE LBTY TEL	Moore & Liberty Telephone	US SPRINT	U.S. Sprint
CBLCOM	Cablecom Of Fargo	MUNICIPAL	City Water And Sewer	USAF MSL CABLE	U.S.A.F. Missile Cable
CENEX PL	Cenex Pipeline	MUNICIPAL	City Of '.....'	USFWS	US Fish and Wildlife Service
CENT PL WATER DIST	Central Pipe Line Water District	N CENT ELEC	North Central Electric Cooperative	USW COMM	U.S. West Communications
CENT PWR ELEC	Central Power Electric Cooperative	N VALL W DIST	North Valley Water District	VRNDRY ELEC	Verendrye Electric Cooperative
COE	Corps of Engineers	ND PKS & REC	North Dakota Parks And Recreation	W RIV TEL	West River Telephone Incorporated
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		
DOPE PL	Dome Pipeline Company	NW COMM	Northwest Communication Cooperation		
DVELEC	Dakota Valley Electric Cooperative	ONEOK	Oneok gas		
DVMW	Dakota, Missouri Valley & Western	OSHA	Occupational Safety and Health Administration		
ENBRDG	Enbridge Pipelines Incorporated	OTTR TL PWR	Otter Tail Power Company		
ENVENTIS	Enventis Telephone	P L E M	Prairielands Energy Marketing		
FALK MNG	Falkirk Mining Company	POLAR COM	Polar Communications		
FHWA	Federal Highway Administration	PVT ELEC	Private Electric		
G FKS-TRL WD	Grand Forks-traill Water District	QWEST	Qwest Communications		
GETTY TRD & TRAN	Getty Trading & Transportation	R&T W SUPPLY	R & T Water Supply Association		
GLDN W ELEC	Golden West Electric Cooperative	RAMSEY R SEW	Ramsey Rural Sewer Association		
GRGS CO TEL	Griggs County Telephone	RAMSEY RW	Ramsey Rural Water Association		
		RAMSEY UTIL	Ramsey County Rural Utilities		

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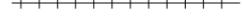
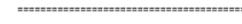
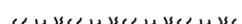
Line Styles

.....	Limits of Const Transition Line	—— s —— s ——	Floating Silt Curtain	—— ——— ———	Existing Aggregate (Cross Section View)	- - - - -	Existing Centerline
.....	Bale Check	—— ——— T ——	Existing Telephone Line	—— ——— ———	Existing Curb and Gutter (Cross Section View)	- - - - -	Supplemental Contour
.....	Rock Check	—— ——— TV ——	Existing TV Line	—— ——— ———	Existing Riprap	—— - - - - -	Right of Way
.....	Sight Distance Triangle Line	Void — void — void — v	Existing Assumed Ground (Not Surveyed)	—— ——— ———	Existing Underground Vault or Lift Station	—— - - - - -	Existing Right of Way
- - - - -	Small Hidden Object	Void — void — void — v	Tentative Ground Line	—— ——— ———	Tangent Line	—— - - - - -	Existing Right of Way Railroad
- - - - -	Dimension Leader	—— ——— w ——	Existing Water or Steam Line	- - - - -	Hidden Object	- - - - -	Failure Line
- - - - -	Existing Ground	=====	Existing Under Drain	—— ——— ———	Existing Dirt Surface	- - - - -	Existing Conditions
- - - - -	Existing Topsoil (Cross Section View)	=====	Under Drain	—— ——— ———	Existing Conduit	- - - - -	Existing Ground (Details)
—— ——— ———	Large Hidden Object	=====	Wall	—— ——— ———	Topsoil Profile	—— - - - - -	Existing Sixteenth Section Line
—— ——— ———	Edge Drain	=====	Existing Slotted Drain	- - - - -	Existing Conductor	- - - - -	Existing Right of Way Not State Owned
—— D —— D ——	Geotextile Fabric Type D	—— + —— + ——	Existing Cemetary Boundary	- - - - -	Conductor	- - - - -	Phantom Object
—— ——— E ——	Existing Electrical	—— ——— ———	Centerline Pavement Marking	- - - - -	Fiber Optic	- - - - -	Centerline Main
—— ——— FO ——	Existing Fiber Optic Line	=====	Barrier with Centerline Pavement Marking	- - - - -	Existing Loop Detector	- . . . .	Existing Guardrail Cable
—— ——— FO ——	Existing TV Fiber Optic	=====	Barrier Pavement Marking	- - - - -	Subgrade, Subcut or Ditch Grade	— . — . — . — .	Existing Guardrail Metal
—— ——— G ——	Existing Gas Pipe	- - - - -	Stripe 4 IN Dotted Extension White	—— ——— ———	Existing Asphalt Surface	—— . ——— . ——— .	Existing Edge of Water
—— <b>Geo</b> —— <b>Geo</b> ——	Geogrid	- - - - -	Stripe 8 IN Dotted Extension White	—— ——— ———	Existing Asphalt (Cross Section View)	- - - - -	Excavation Limits
—— ——— OH ——	Existing Overhead Utility Line	- - - - -	Stripe 8 IN Lane Drop	—— ——— ———	Existing Reinforcement Rebar	—— . . . . .	Existing Government Lot Line
—— ——— P ——	Existing Power	—— v v v v ——	Wetland Mitigation	—— ——— ———	Existing Tie Point Line	.....	Existing Adjacent Block Lines
—— ——— PL ——	Existing Fuel Pipeline	- - - - -	Existing Box Culvert Bridge	—— ——— ———	Existing State or International Line	.....	Existing Adjacent Lot Lines
—— ——— <b>PL</b> ——	Existing Undefined Above Ground Pipe Line	- - - - -	Existing Concrete Surface	—— ——— ———	Existing Quarter Section Line	.....	Existing Adjacent Property Line
—— ——— R —— R ——	Geotextile Fabric Type R	- - - - -	Existing Drainage Structure	—— ——— ———	Existing County	.....	Existing Adjacent Subdivision Lines
—— ——— R —— R ——	Geotextile Fabric Type R1	- - - - -	Easement	—— ——— ———	Existing Section Line		
—— REMOVE —— REMOVE ——	Remove Line	- - - - -	Existing Concrete	—— ——— ———	Existing Township		
—— RR —— RR ——	Geotextile Fabric Type RR	- - - - -	Existing Easement	—— ——— ———	Existing Railroad Centerline		
—— S —— S ——	Geotextile Fabric Type S	—— ——— ———	Existing Gravel Surface	—— - - - - -	Centerline		

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Line Styles

	Subgrade Reinforcement		Existing Railroad Switch		Sheet Piling
	Existing Down Guy Wire Down Guy		Overhead Sign Structure Cantilever		W-Beam w Posts
	Existing Fence		24 Inch Pipe		Existing W-Beam Guardrail with Posts
	Existing Railroad		Reinforced Concrete Pipe		Exst Wet Area-Vegetation Break
	Existing Sanitary Sewer		Signal Head with Mast Arm		Existing Wetland Delineated
	Existing Sanitary Force Main		Existing Signal Head with Mast Arm		
	Existing Storm Drain		Tie Bar at Random Spacing		
	Existing Storm Drain Force Main		3-Cable w Posts		
	Fence		Existing 3-Cable w Posts		
	Silt Fence		Site Boundary		
	Existing Field Line		Fiber Rolls		
	Exst Flow		Doweled Joint		
	Flow		Tie Bar 30 Inch 4 Foot Center to Center		
	Existing Culvert		Tie Bar 18 Inch 3 Foot Center to Center		
	Existing Curb		Existing Berm, Dike, Pit, or Earth Dam		
	Existing Valley Gutter		Existing Ditch Block		
	Existing Driveway Gutter		Depression Contours		
	Existing Curb and Gutter		Existing City Corporate Limits or Reservation Boundary		
	Existing Mountable Curb and Gutter		Gravel Pit - Borrow Area		
	Existing Double Micro Loop Detector		Existing Tree Boundary		
	Micro Loop Detector Double		Tree Row		
	Existing Overhead Sign Structure		Existing Brush or Shrub Boundary		
	Existing Micro Loop Detector		Existing Retaining Wall		
	Micro Loop Detector		Existing Planter or Wall		
	Existing Overhead Sign Structure Cantilever		Retaining Wall (Plan View)		

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Symbols

	North Arrow (Half Scale)		Attenuation Device		Existing Railroad Battery Box		Existing Delineator Type E
	Truck Mounted Attenuator		Diamond Grade Delineator Type A		Existing Bush or Shrub		Existing EFB Misc
	Type I Barricade		Diamond Grade Delineator Type B		Existing Gas Cap or Stub		Existing Flashing Beacon
	Type II Barricade		Diamond Grade Delineator Type C		Existing Sanitary Cap or Stub		Existing Pipe Mounted Flasher
	Type III Barricade		Diamond Grade Delineator Type D		Existing Storm Drain Cap or Stub		Existing Pad Mounted Feed Point
	Catch Basin		Diamond Grade Delineator Type E		Existing Water Cap or Stub		Existing Pipe Mounted Feed Point with Pad
	Cairn or Stone Circle		Flexible Delineator		Existing Sanitary Cleanout		Existing Pole Mounted Feed Point
	Video Detection Camera		Flexible Delineator Type A		Existing Concrete Foundation		Existing Railroad Frog
	Storm Drain Cap or Stub		Flexible Delineator Type B		Existing Traffic Signal Controller		Existing Snow Gate 18
	Corrugated Metal End Section 18 Inch		Flexible Delineator Type C		Existing Pad Mounted Signal Controller		Existing Snow Gate 28
	Corrugated Metal End Section 24 Inch		Flexible Delineator Type D		Existing Sixteenth Section Corner		Existing Snow Gate 40
	Corrugated Metal End Section 30 Inch		Flexible Delineator Type E		Existing Quarter Section Corner		Existing Headwall
	Corrugated Metal End Section 36 Inch		Delineator Type A		Existing Section Corner		Existing Pedestrian Head with Number
	Corrugated Metal End Section 42 Inch		Delineator Type A Reset		Existing Railroad Crossbuck		Existing Signal Head
	Corrugated Metal End Section 48 Inch		Delineator Type B		Existing Satellite Dish		Existing Sprinkler Head
	Concrete Foundation		Delineator Type B Reset		Existing Fuel Dispensers		Existing Fire Hydrant
	Ground Connection Conductor		Delineator Type C		Existing Flexible Delineator Type A		Existing Catch Basin Drop Inlet
	Neutral Connection Conductor		Delineator Type D		Existing Flexible Delineator Type B		Existing Curb Inlet
	Phase 1 Connection Conductor		Delineator Type E		Existing Flexible Delineator Type C		Existing Manhole Inlet
	Phase 2 Connection Conductor		Delineator Drums		Existing Flexible Delineator Type D		Existing Junction Box
	Traffic Cone		Spot Elevation		Existing Flexible Delineator Type E		
	Signal Controller		Existing Access Control Arrow		Existing Delineator Type A		
	Pad Mounted Signal Controller		Existing Artifact		Existing Delineator Type B		
	Alignment Data Point		Existing Flashing Beacon		Existing Delineator Type C		
	Emergency Vehicle Detector		Existing Benchmark		Existing Delineator Type D		

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Symbols

	Existing Light Standard		Existing Manhole with Valve Water		Existing Telephone Pole		Existing Undefined Manhole
	Existing High Mast Light Standard 10 Luminaire		Existing Water Manhole		Existing Wood Pole		Existing Undefined Pull Box
	Existing High Mast Light Standard 3 Luminaire		Existing Mile Post Type A		Existing Post		Existing Undefined Pedestal
	Existing High Mast Light Standard 4 Luminaire		Existing Mile Post Type B		Existing Pedestrian Push Button Post		Existing Undefined Valve
	Existing High Mast Light Standard 5 Luminaire		Existing Mile Post Type C		Existing Control Point CP		Existing Undefined Pipe Vent
	Existing High Mast Light Standard 6 Luminaire		Existing Reference Marker		Existing Control Point GPS-RTK		Existing Gas Valve
	Existing High Mast Light Standard 7 Luminaire		Existing RW Marker		Existing Control Point TRI		Existing Water Valve
	Existing High Mast Light Standard 8 Luminaire		Existing Utility Marker		Existing Reference Marker Point NGS		Existing Fuel Pipe Vent
	Existing High Mast Light Standard 9 Luminaire		Iron Monument Found		Existing Pull Box		Existing Gas Pipe Vent
	Existing Overhead Sign Structure Load Center		Iron Pin R/W Monument		Existing Intelligent Transportation Pull Box		Existing Sanitary Pipe Vent
	Existing Luminaire		Existing Object Marker Type I		Existing Water Pump		Existing Storm Drain Pipe Vent
	Existing Light Standard Luminaire		Existing Object Marker Type II		Existing Slotted Reinforced Concrete Pipe		Existing Water Pipe Vent
	Existing Federal Mailbox		Existing Object Marker Type III		Existing RR Profile Spot		Existing Weather Station
	Existing Private Mailbox		Existing Electrical Pedestal		Existing Fuel Leak Sensors		Existing Ground Water Well Bore Hole
	Existing Meander Section Corner		Existing Telephone Pedestal		Existing Highway Sign		Existing Windmill or Tower
	Existing Meter		Existing Fiber Optic Telephone Pedestal		Existing Miscellaneous Spot		Existing Witness Corner
	Existing Electrical Manhole		Existing TV Pedestal		Existing Lighting Standard Pole		Flashing Beacon
	Existing Gas Manhole		Existing Fiber Optic TV Pedestal		Existing Traffic Signal Standard		Flagger
	Existing Sanitary Manhole		Existing Fuel Filler Pipes		Existing Transformer		Pipe Mounted Flasher
	Existing Sanitary Force Main Manhole		Existing Traverse PI Aerial Panel		Existing Large Evergreen Tree		Sanitary Force Main with Valve
	Existing Sanitary Manhole with Valve		Existing Pole		Existing Small Evergreen Tree		
	Existing Storm Drain Manhole		Existing Power Pole		Existing Large Tree		
	Existing Force Main Storm Drain Manhole		Existing Power Pole with Transformer		Existing Small Tree		
	Existing Force Main Storm Drain Manhole with Valve				Existing Tree Trunk		
	Existing Telephone Manhole				Existing Pad Mounted Traffic Signal Control Box		

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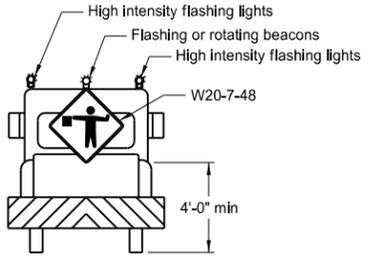
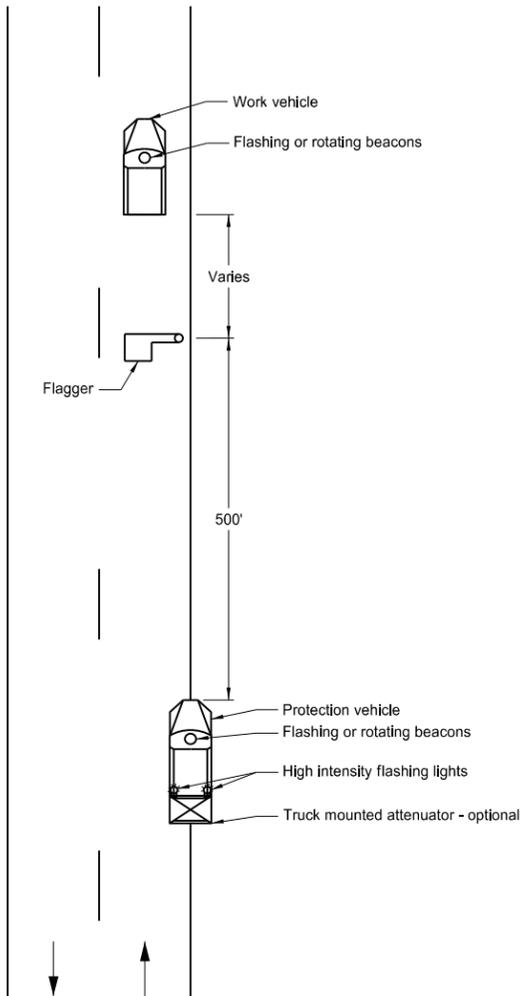
D-101-32

 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Gate Type 2  Junction Box  High Mast Light Standard 10 Luminaire  High Mast Light Standard 3 Luminaire  High Mast Light Standard 4 Luminaire  High Mast Light Standard 5 Luminaire  High Mast Light Standard 6 Luminaire  High Mast Light Standard 7 Luminaire  High Mast Light Standard 8 Luminaire  High Mast Light Standard 9 Luminaire  Relocate Light Standard  Overhead Sign Structure Load Center  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire	 Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 175 Watt High Pressure Sodium Vapor Luminaire  Light Standard 200 Watt High Pressure Sodium Vapor Luminaire  Light Standard 250 Watt High Pressure Sodium Vapor Luminaire  Light Standard 310 Watt High Pressure Sodium Vapor Luminaire  Light Standard 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 50 Watt High Pressure Sodium Vapor Luminaire  Light Standard 70 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Manhole  Manhole 48 Inch  Sanitary Force Main Manhole  Sanitary Sewer Manhole  Storm Drain Manhole  Storm Drain Manhole with Inlet  Reset Mile Post  Mile Post Type A  Mile Post Type B  Mile Post Type C  Right of Way Marker  Tubular Marker  Alignment Monument  Iron Pin Reference Monument	 Object Marker Type I  Object Marker Type II  Object Marker Type III  Caution Mode Arrow Panel  Back to Back Vertical Panel Sign  Double Direction Arrow Panel  Left Directional Arrow Panel  Right Directional Arrow Panel  Sequencing Arrow Panel  Truck Mounted Arrow Panel  Power Pole  Wood Pole  Pedestrian Push Button Post  Property Corner  Pull Box  Intelligent Transportation Pull Box  Sanitary Pump  Storm Drain Pump  Reinforced Pavement  Reinforced Concrete End Section 15 Inch  Reinforced Concrete End Section 18 Inch  Reinforced Concrete End Section 24 Inch  Reinforced Concrete End Section 30 Inch  Reinforced Concrete End Section 36 Inch  Reinforced Concrete End Section 42 Inch	 Reinforced Concrete End Section 48 Inch  Reinforced Concrete End Section 54 Inch  Reset Right of Way Marker  Reset USGS Marker  Right of Way Markers  Riser 30 Inch  Continuous Split Barrel Sample  Flight Auger Sample  Split Barrel Sample  Thinwall Tube Sample  Highway Sign  SNOW GATE 18 FT  SNOW GATE 28 FT  SNOW GATE 40 FT  Standard Penetration Test  Transformer  Inclinometer Tube  Underdrain Cleanout  Excavation Unit  Water Valve
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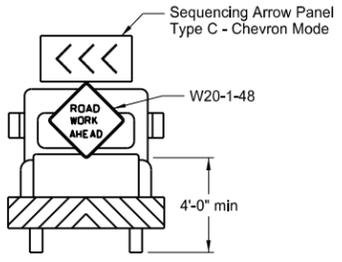
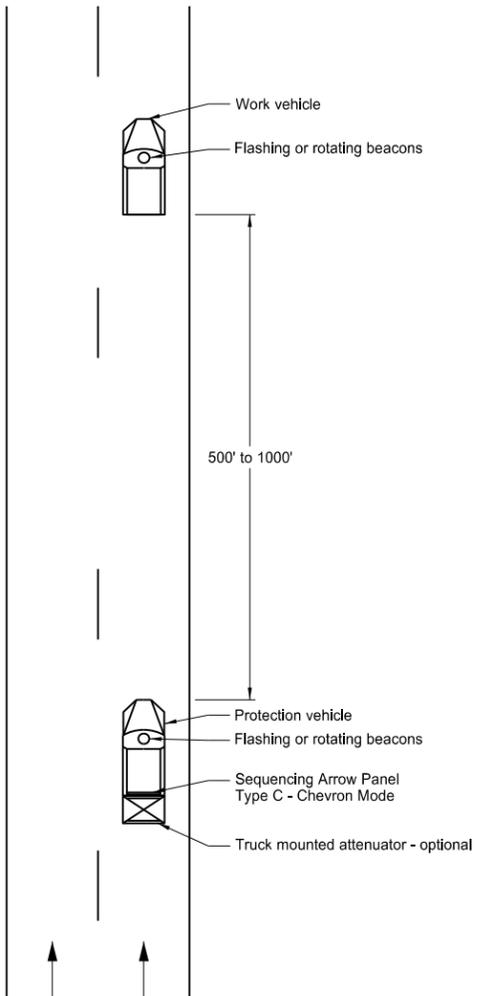
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Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways



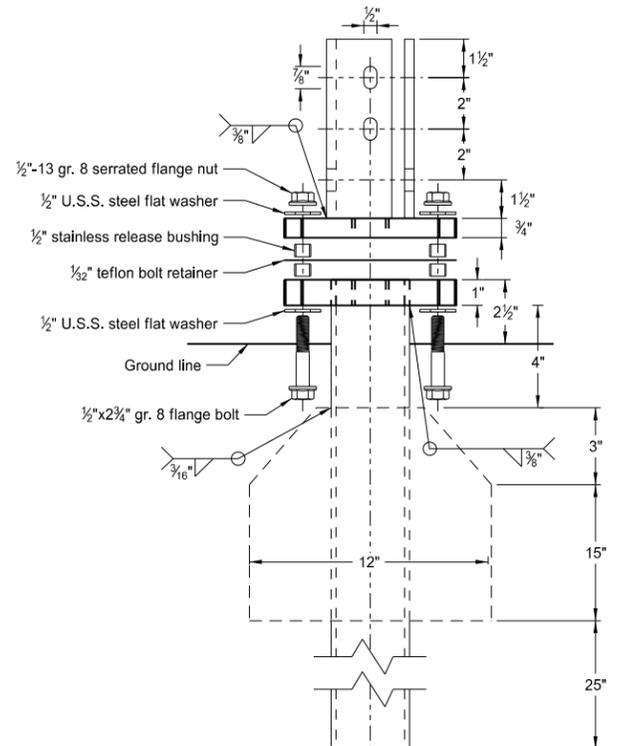
Typical Protection Vehicle

- Notes:
1. The working vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light.
  2. The shadow vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light. The shadow vehicle for Multilane Roadway shall also have a sequencing arrow panel Type C operated in the chevron mode.
  3. This application is for use during daylight hours and in areas of good visibility only.
  4. Two lane, two way roadway, a flagger shall be used to protect the work area and warn oncoming traffic.

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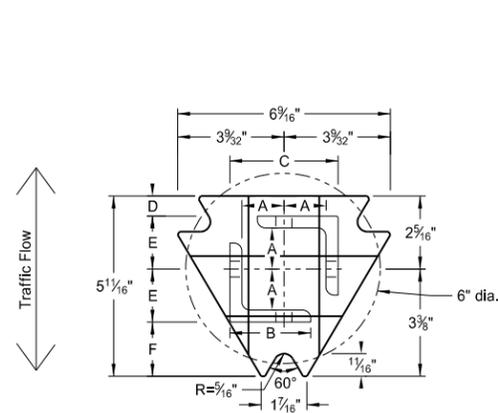
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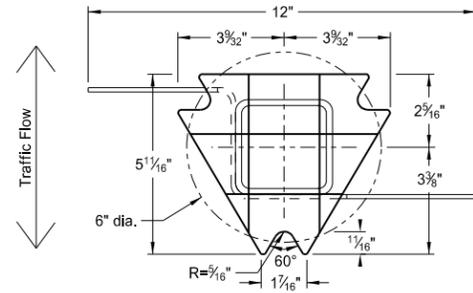


Multi-Directional Slip Base Assembly

Perforated Tube



Top Post Receiver  
Plate - ASTM A572 grade 50  
Angle Receiver - 2 1/2 x 2 1/2 x 3/8 ASTM A36 structural angle



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

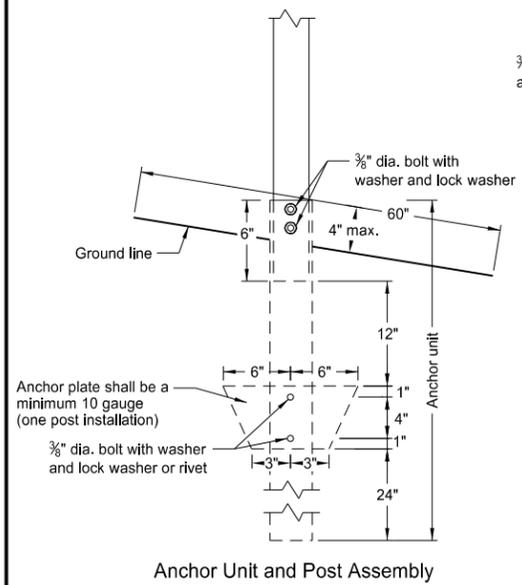
Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

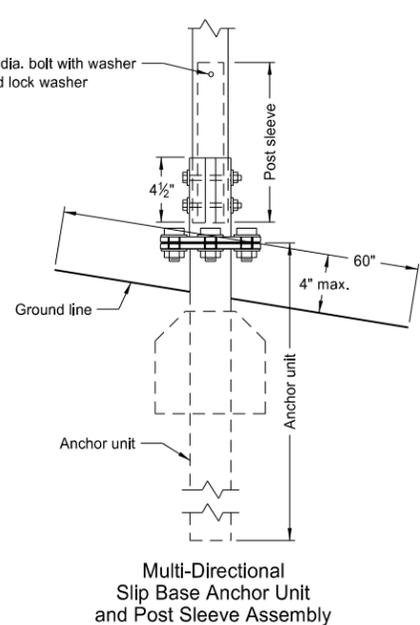
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. <sup>4</sup>	Cross Sec. 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 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

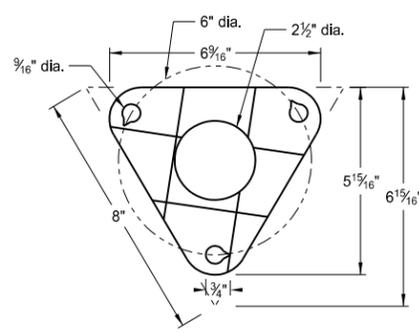
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



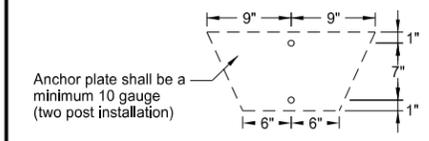
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



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

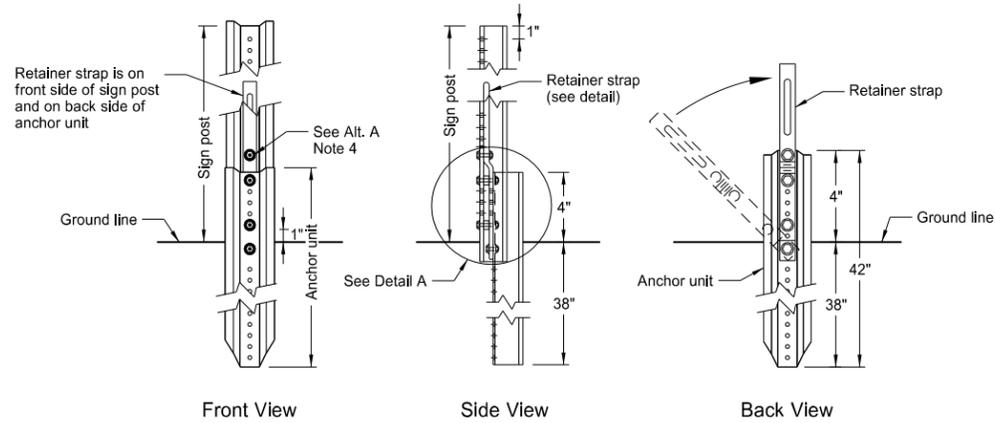
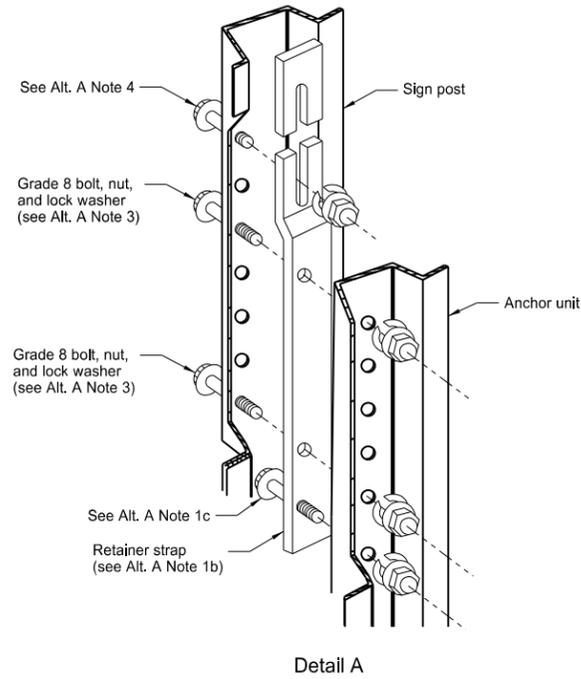


Anchor plate shall be a minimum 10 gauge (two post installation)

- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.  
 (B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.

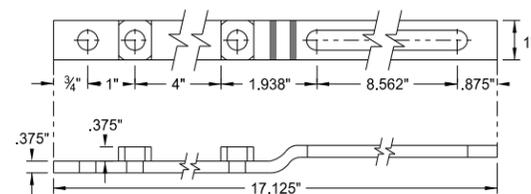
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U-Channel Post

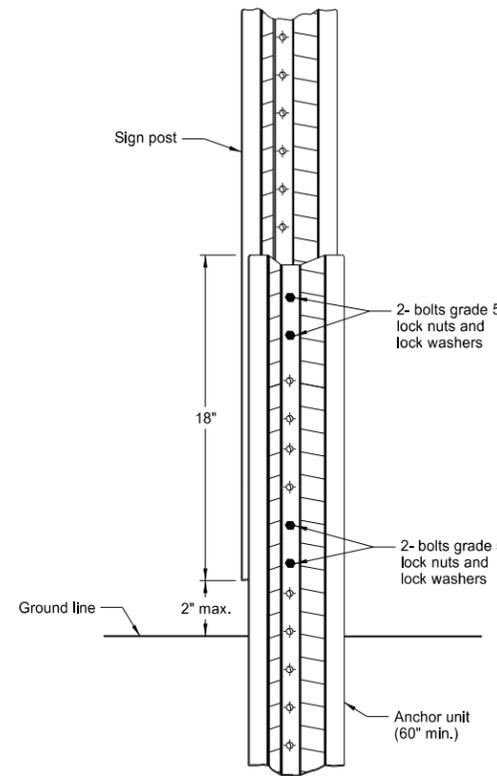


Breakaway U-Channel Detail Alternate A

A maximum of 2 posts shall be installed within 7'.

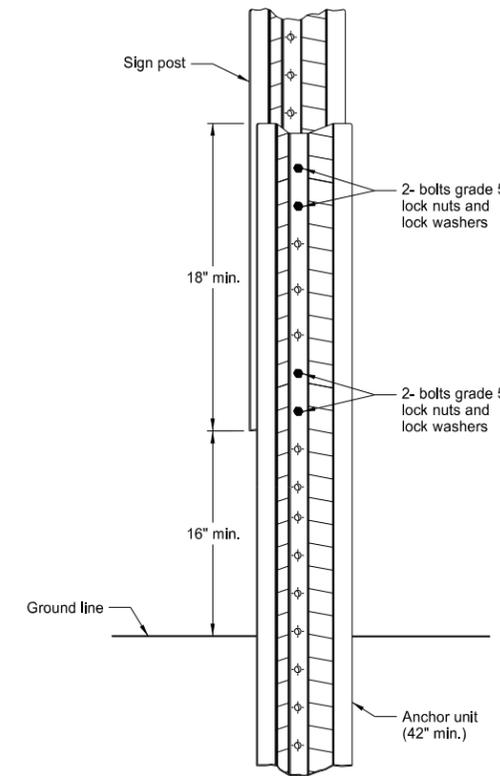


Retainer Strap Detail



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

A maximum of 3 posts shall be installed within 7'.



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

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

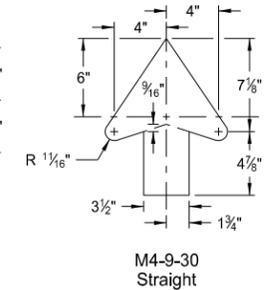
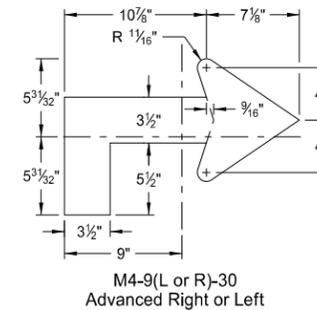
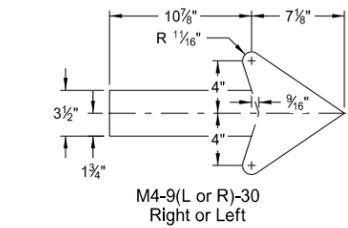
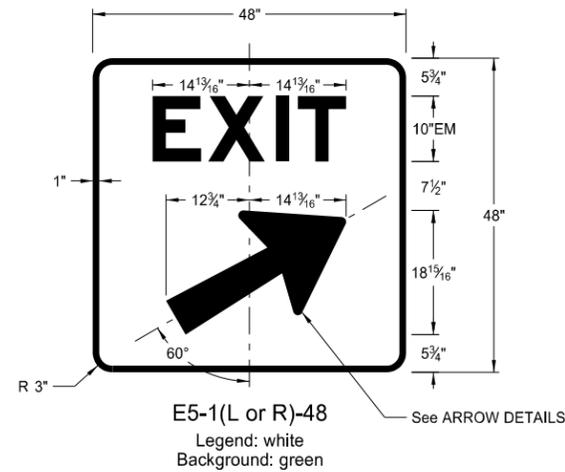
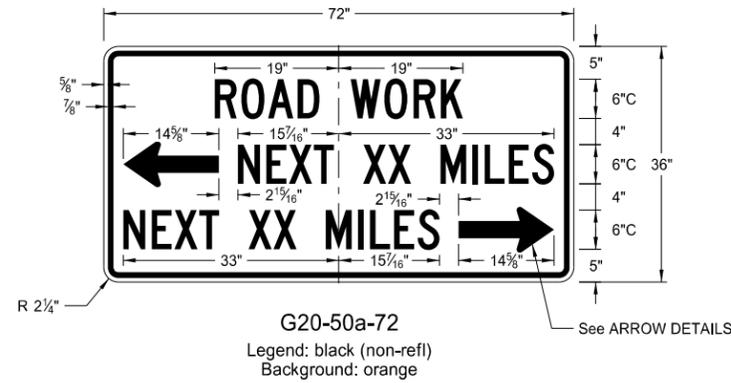
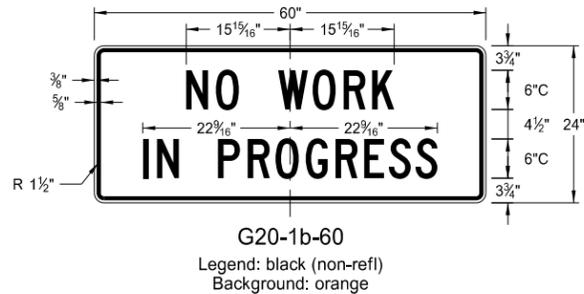
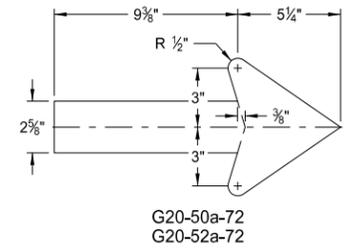
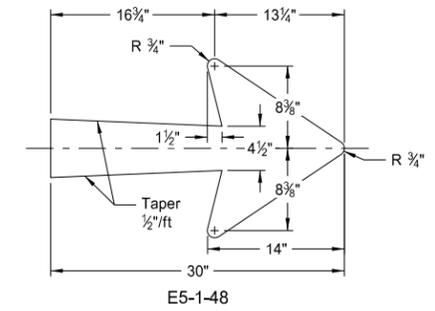
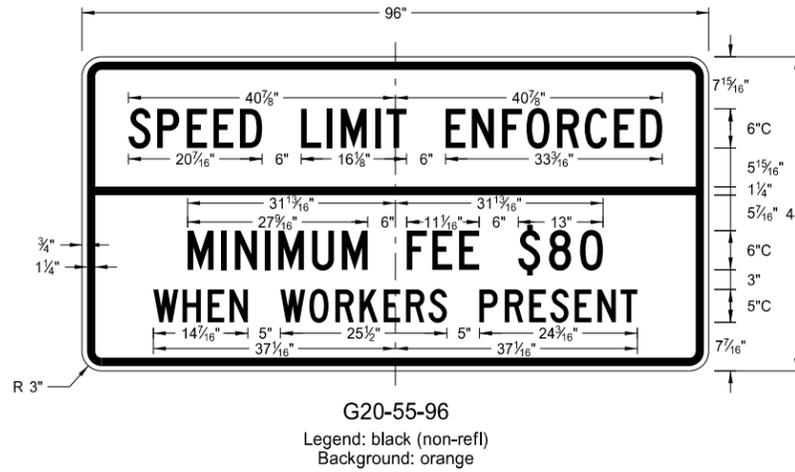
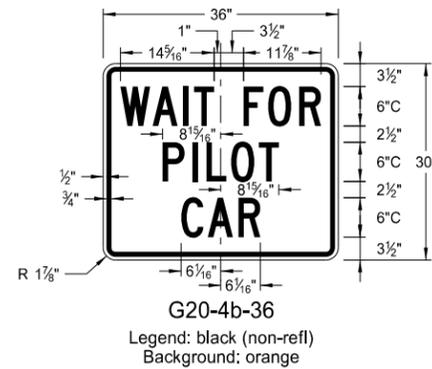
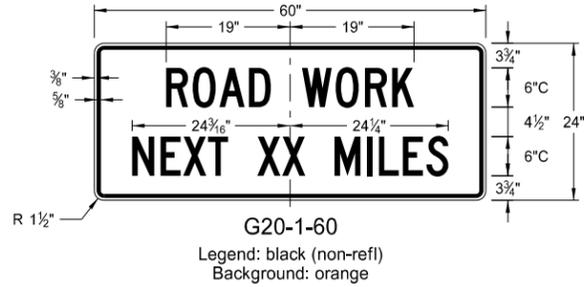
1. a) Drive anchor unit to within 12" of ground level.  
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.  
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.  
d) Rotate strap 90° to left.
2. a) Drive anchor unit to 4" above ground.  
b) Rotate strap to vertical position.
3. a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.  
b) Alternately tighten two connector bolts.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. The base post, strap and sign post shall be properly nested. 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.

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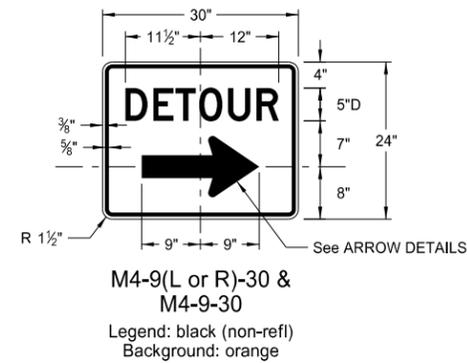
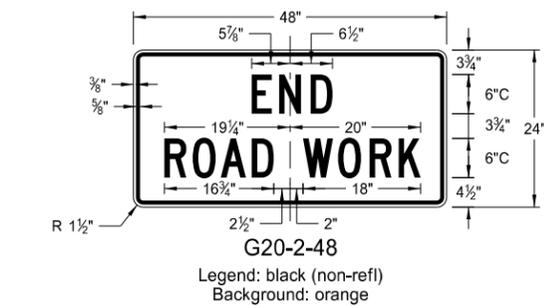
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CONSTRUCTION SIGN DETAILS  
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

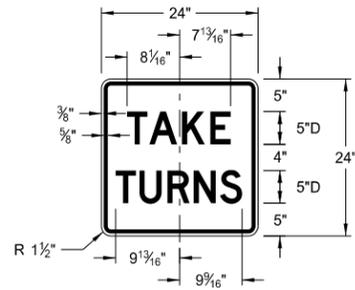
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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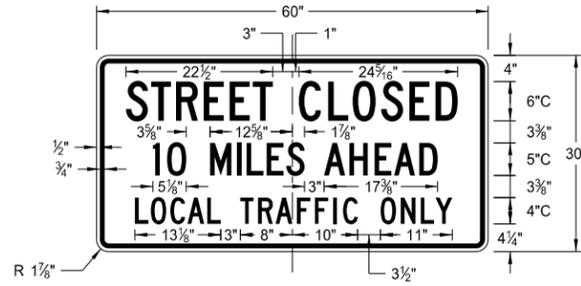
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 of Transportation

CONSTRUCTION SIGN DETAILS  
REGULATORY SIGNS

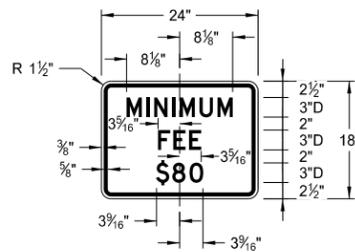
D-704-10



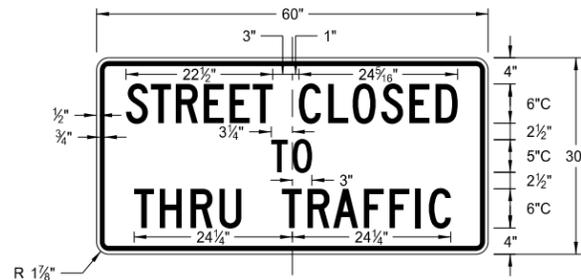
R1-50-24  
Legend: black (non-refl)  
Background: white



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



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



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



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

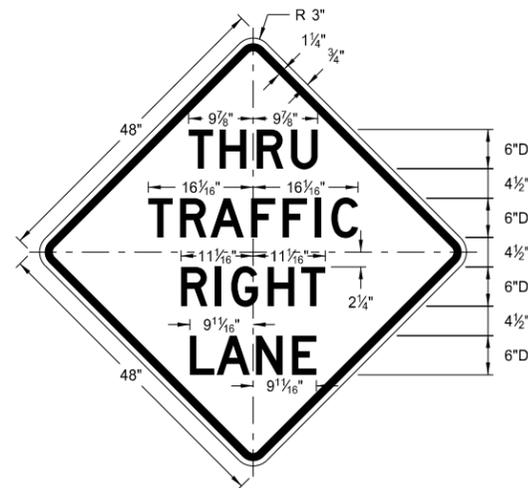
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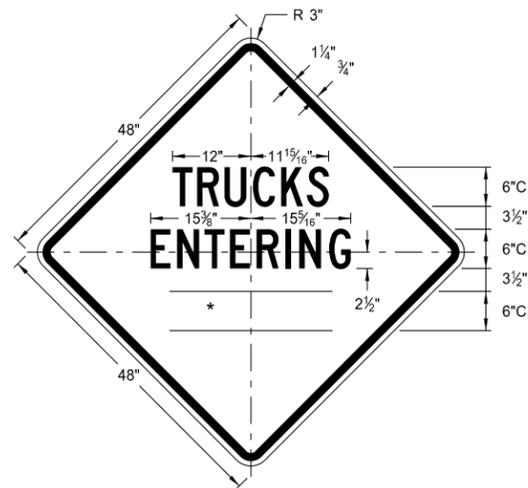
CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

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

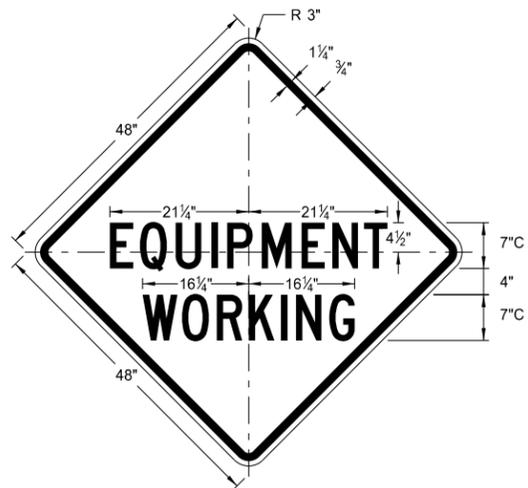
\* DISTANCE MESSAGES



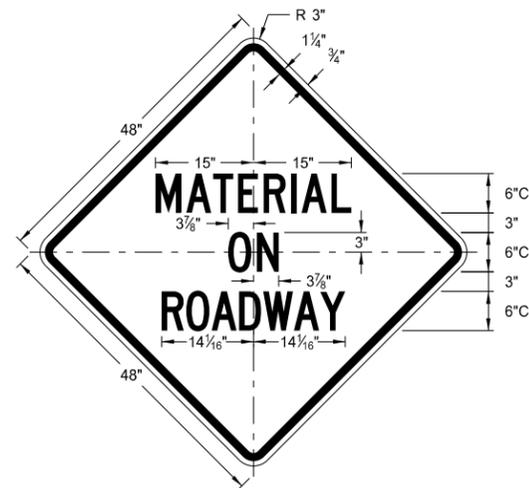
W5-8-48  
Legend: black (non-refl)  
Background: orange



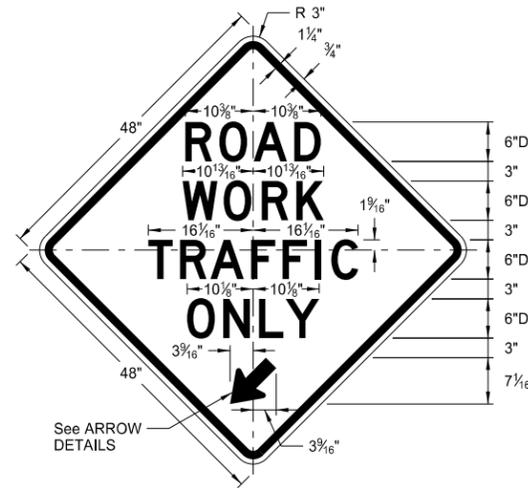
W8-54-48  
Legend: black (non-refl)  
Background: orange



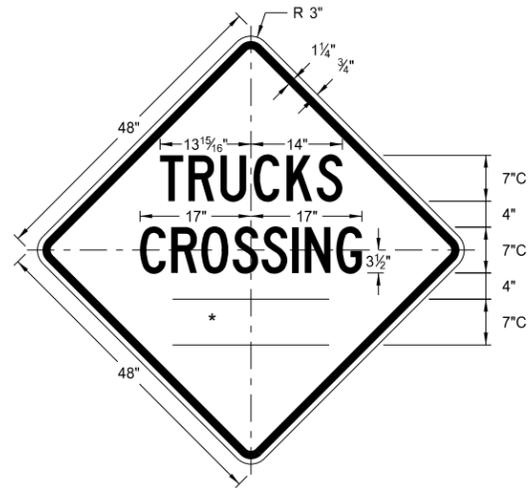
W20-51-48  
Legend: black (non-refl)  
Background: orange



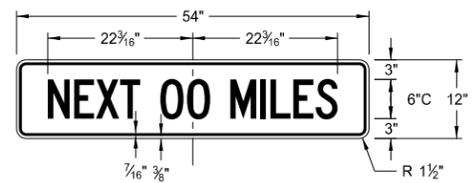
W21-51-48  
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Background: orange



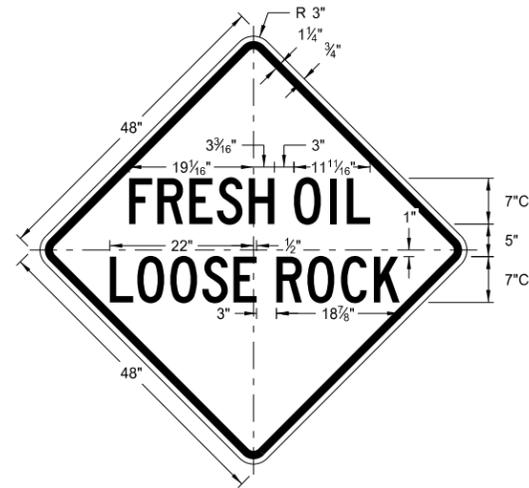
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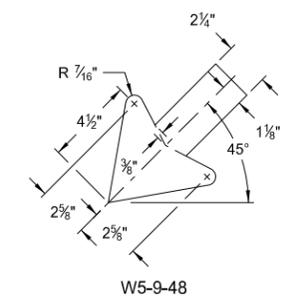
W8-55-48  
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Background: orange



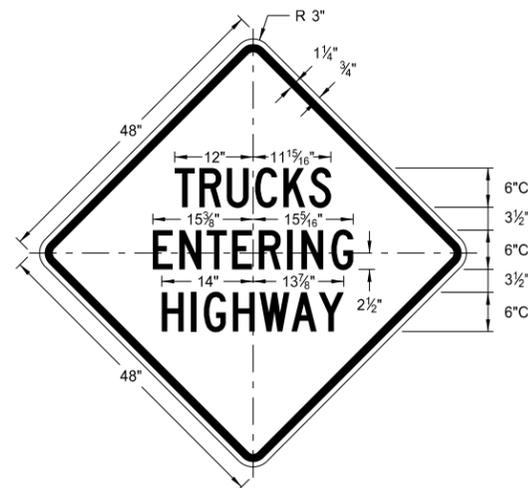
W20-52-54  
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Background: orange



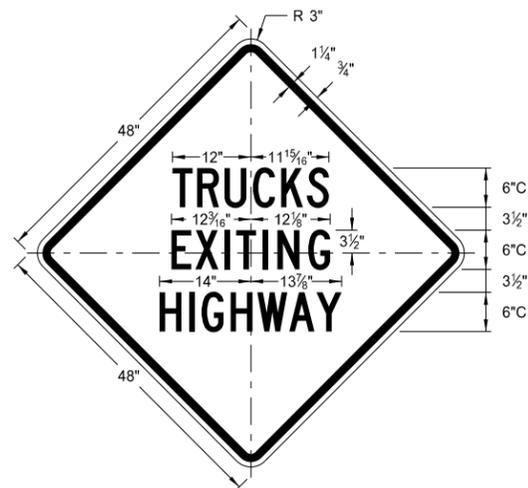
W22-8-48  
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Background: orange



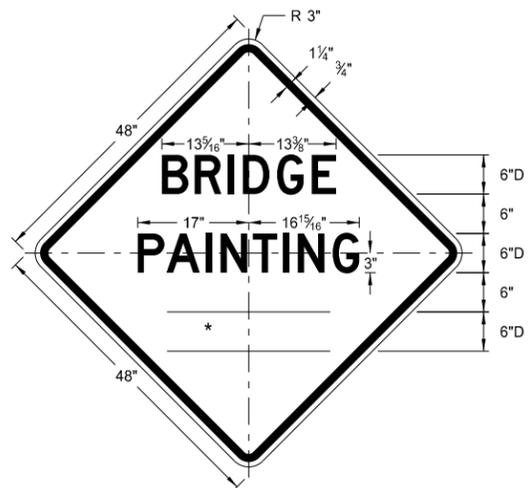
W5-9-48  
ARROW DETAILS



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



W8-56-48  
Legend: black (non-refl)  
Background: orange



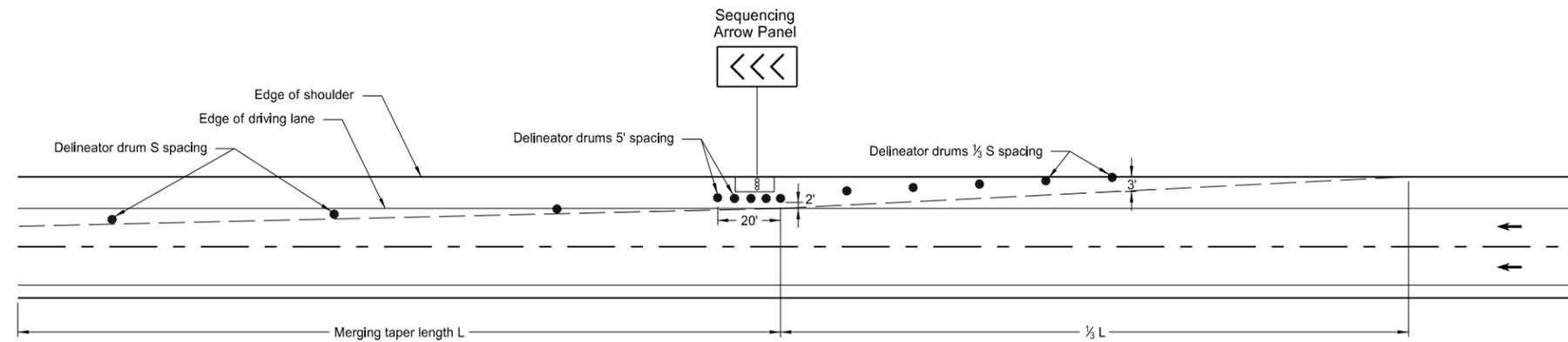
W21-50-48  
Legend: black (non-refl)  
Background: orange

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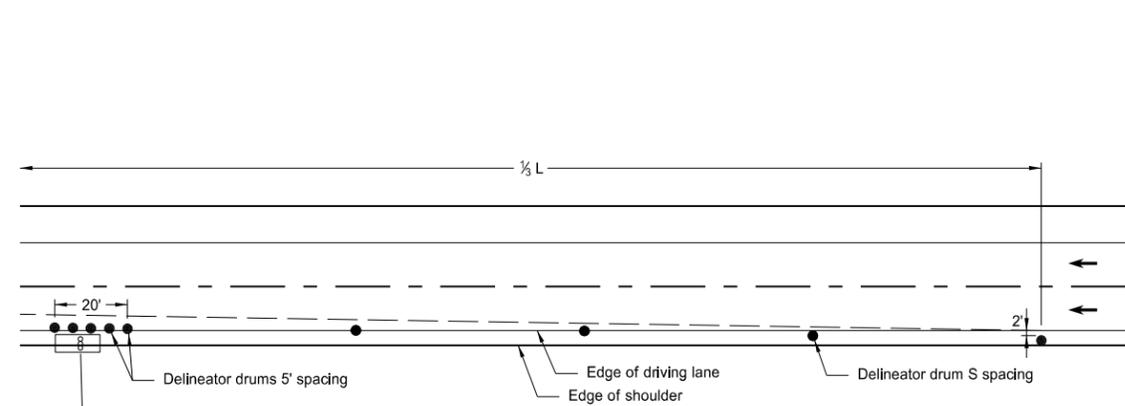
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# SHOULDER CLOSURE TAPERS

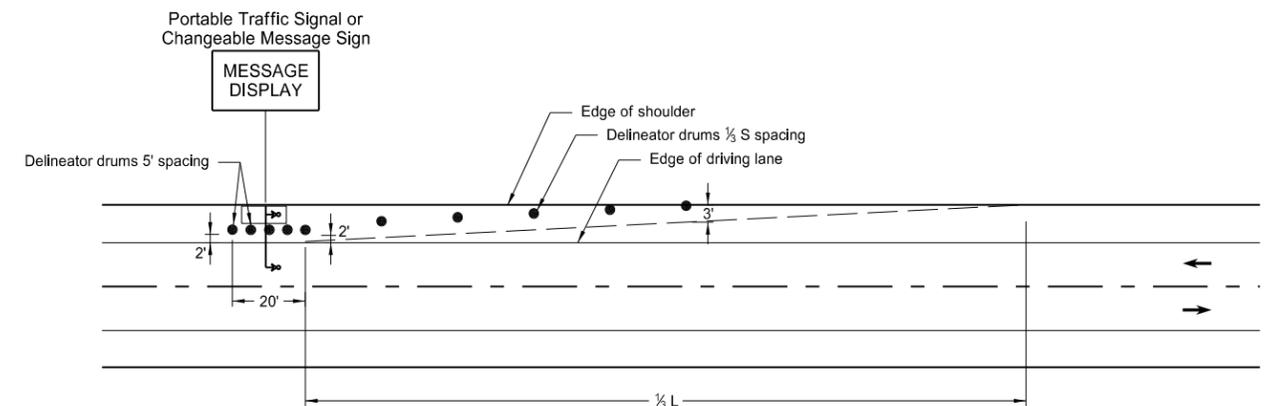
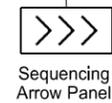
D-704-12



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



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

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

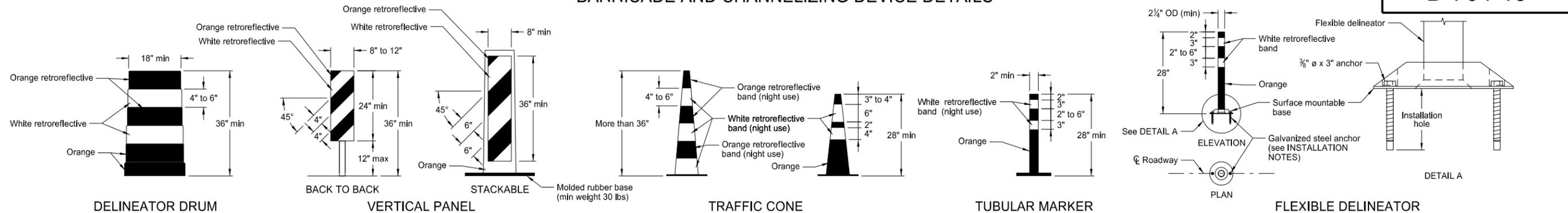
Notes:

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

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BARRICADE AND CHANNELIZING DEVICE DETAILS



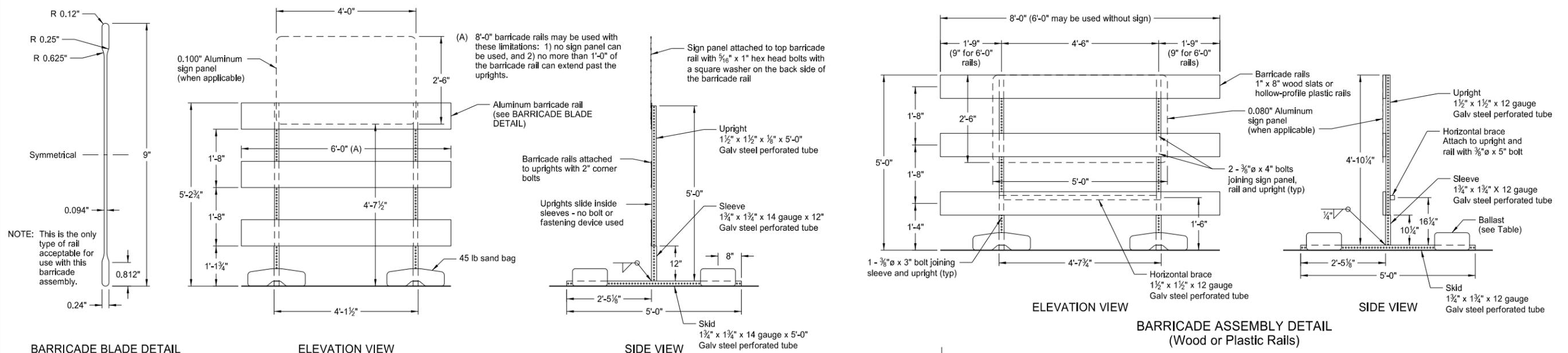
The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have 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, a stripe width of 6 inches shall be used.

RetroreflectORIZATION of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED space between the orange and white stripes shall not exceed 3" wide.

RetroreflectORIZATION of tubular markers more than 42" in height shall be provided 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 as 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, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.



NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".

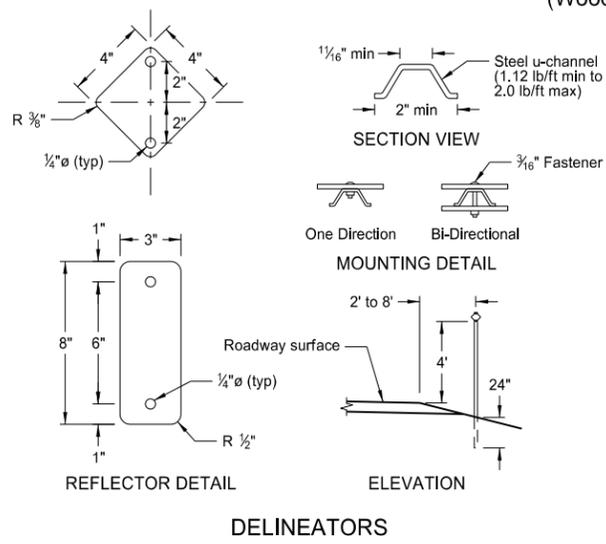
**MINIMUM BALLAST**  
(For each side of barricade support)

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

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

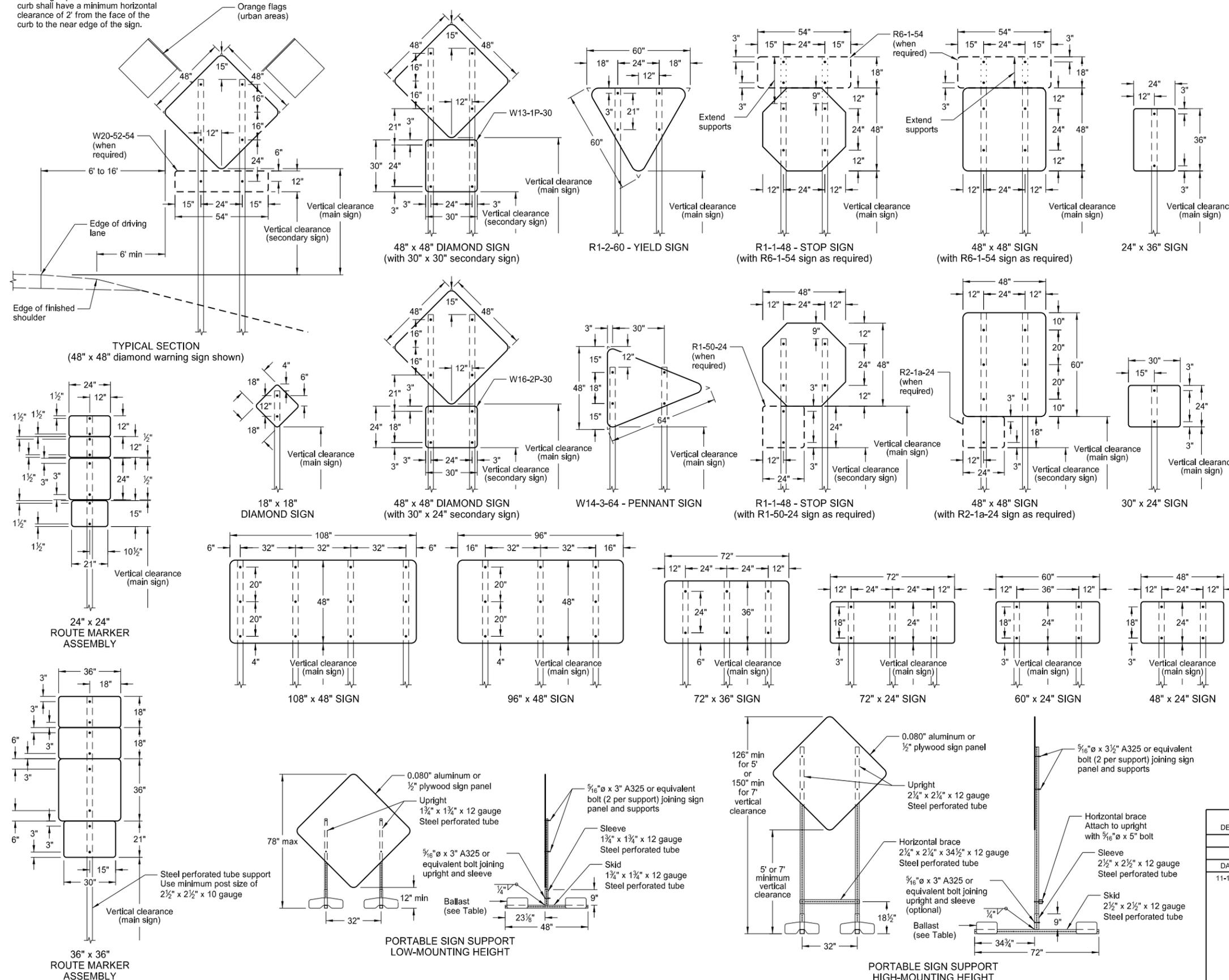
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



- NOTES:
1. Sign Supports: Supports shall be galvanized or painted. 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, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

Signs over 50 square feet should be installed on 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a 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 as stated above.

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

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

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used 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. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have 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

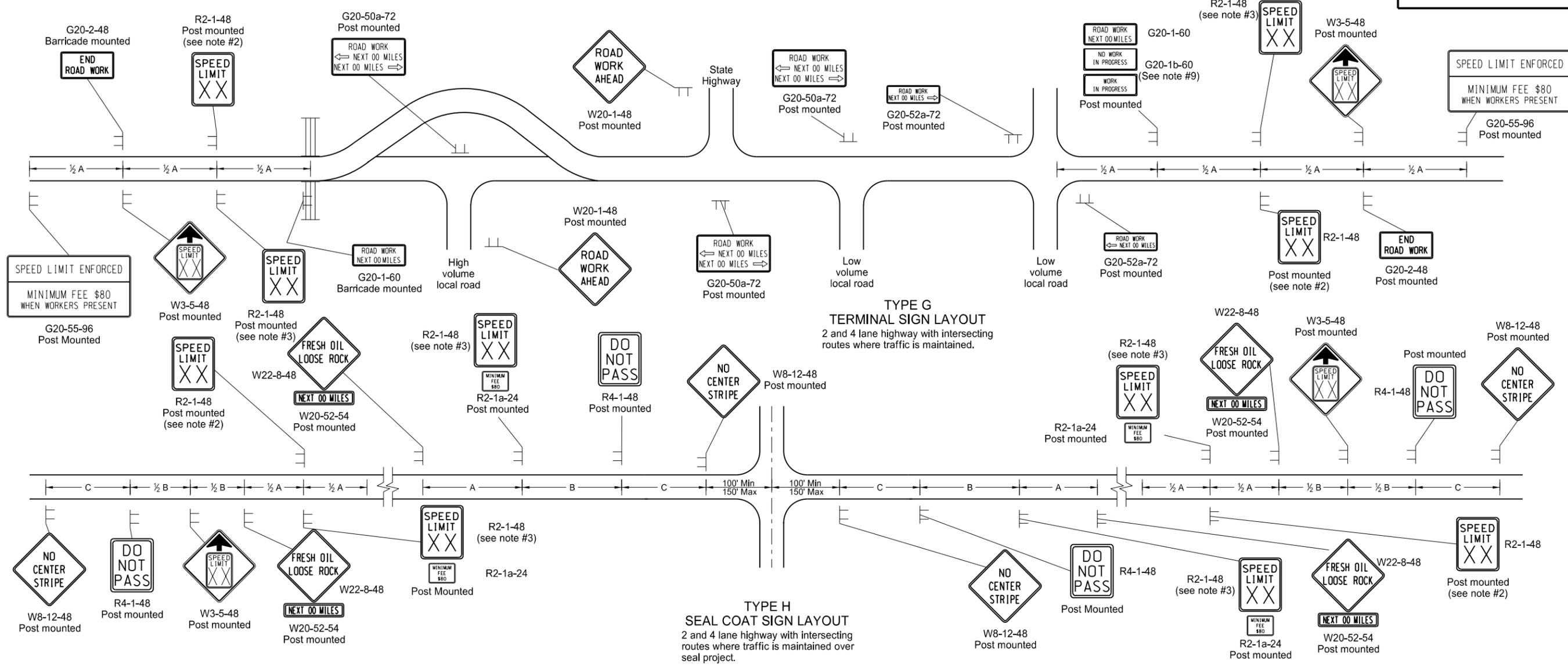
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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11-14-13	Revised Note 6.

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# TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



- Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- On seal projects, signs R2-1-48, R2-1a-24, R4-1-48, W22-8-48 and W20-52-54 shall be placed just after all important intersections and at five mile intervals thereafter. Sign W8-12-48 shall be placed just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. No short term pavement markings are placed when traffic volumes are 750 ADT or less.

- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
- G20-55-96 sign is not required if work is less than 15 days.

**KEY**

≡ Type III barricade

⊥ Sign

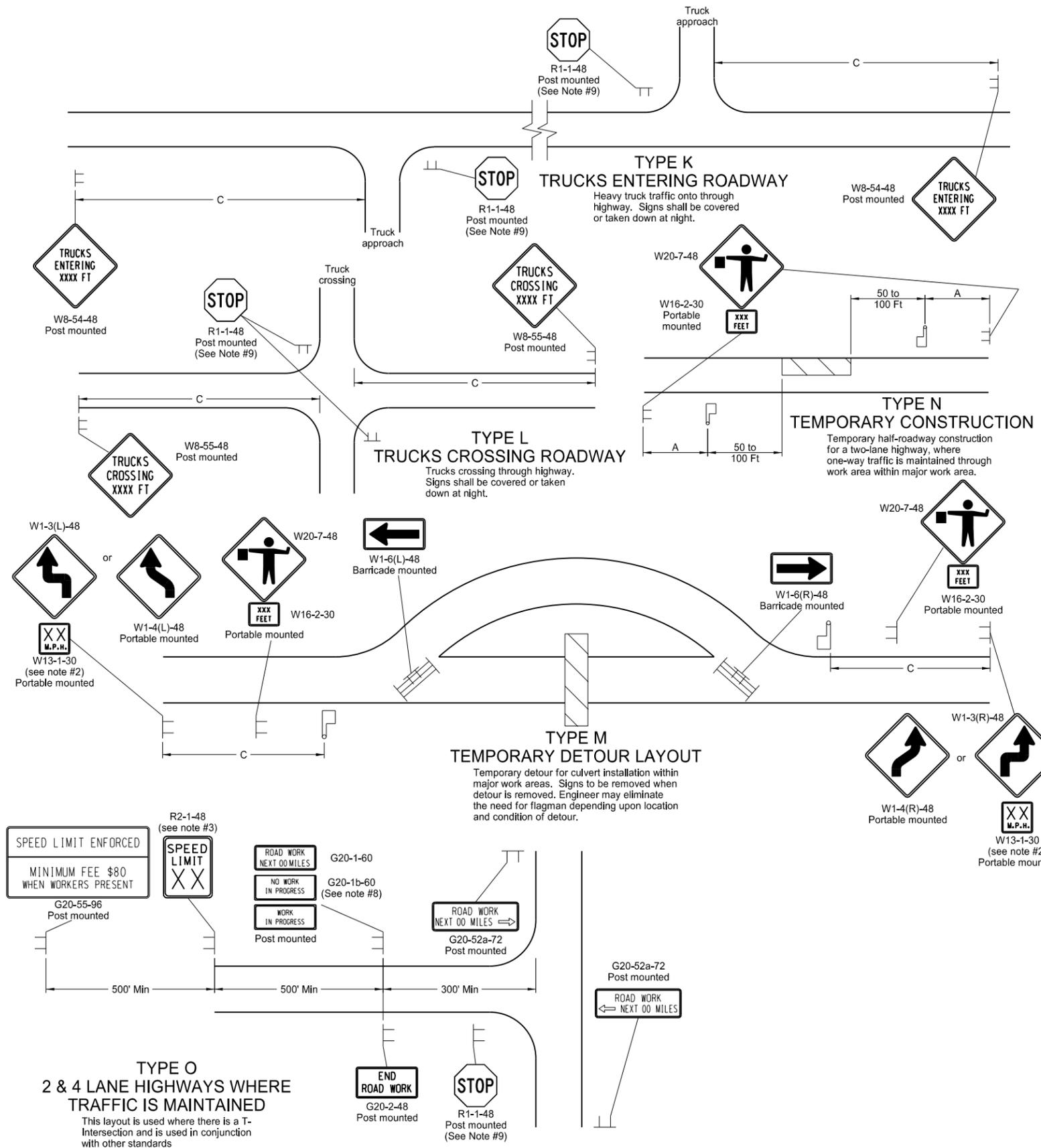
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

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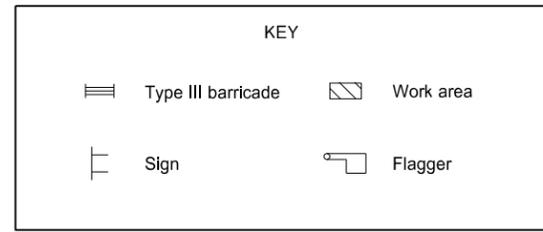
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# CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



- Notes
1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies. Where necessary, safe speed to be determined by the Engineer.
  2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
  3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
  4. Existing speed limit signs within a reduced speed zone shall be covered. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
  5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
  6. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
  7. If existing stop sign is in place, a 48" stop sign is not required.
  8. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.



ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

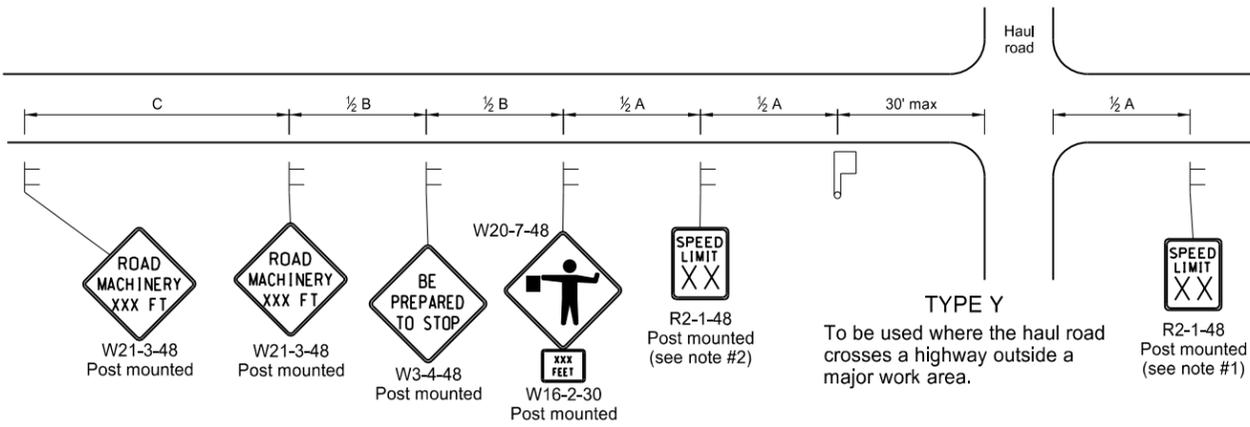
REVISIONS

DATE	CHANGE

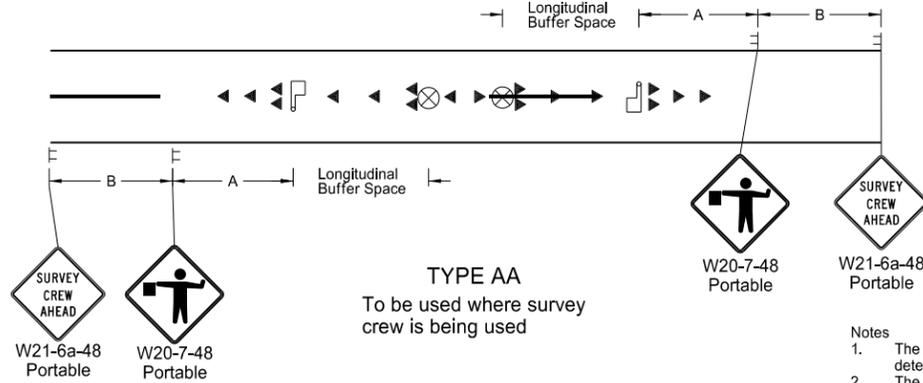
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MISCELLANEOUS SIGN LAYOUTS

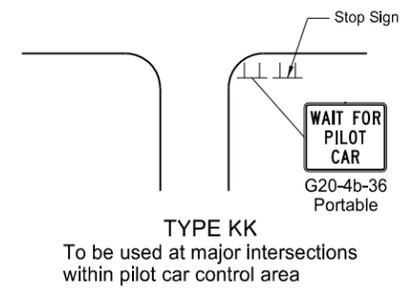
D-704-26



**TYPE Y**  
To be used where the haul road crosses a highway outside a major work area.

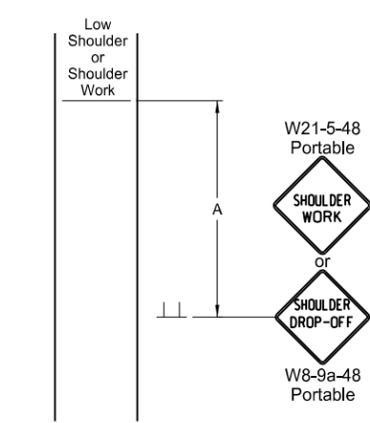


**TYPE AA**  
To be used where survey crew is being used

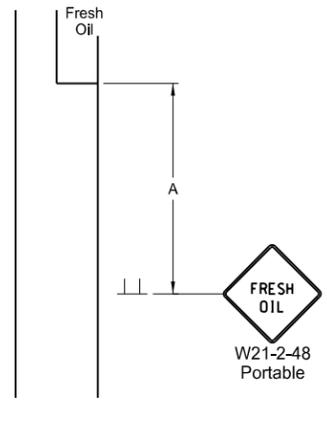


**TYPE KK**  
To be used at major intersections within pilot car control area

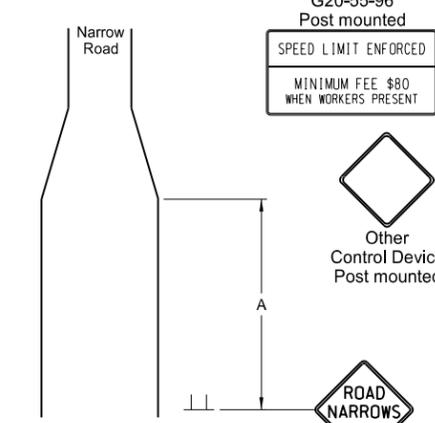
- Notes
1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
  2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
  3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
  4. Existing speed limit signs within a reduced speed zone shall be covered.
  5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
  6. G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
  7. When a pilot car operation is used, place a G20-4b-36 "Wait For Pilot Car" sign at major intersections within pilot car control area.



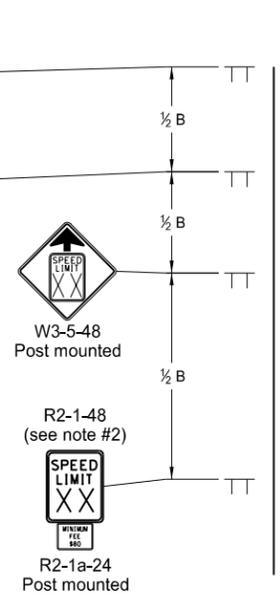
**TYPE BB**  
To be used within a major work area where the sign conditions exist



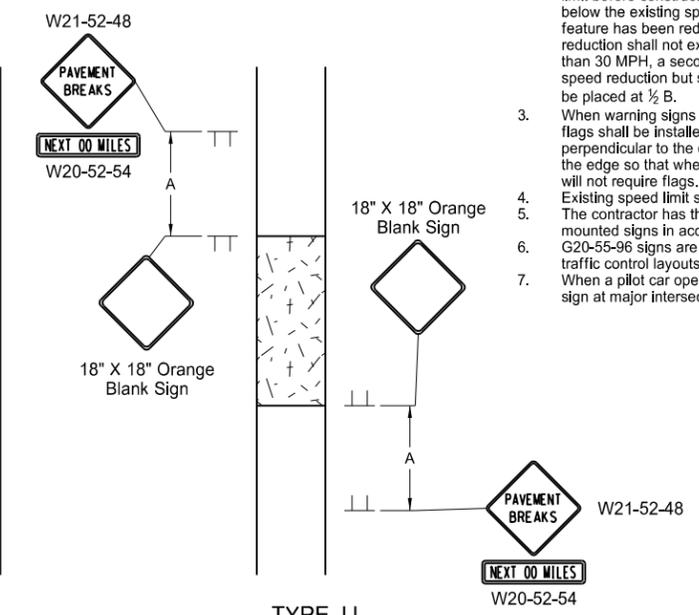
**TYPE CC**  
To be used where the sign conditions exist



**TYPE DD**  
To be used where the sign conditions exist



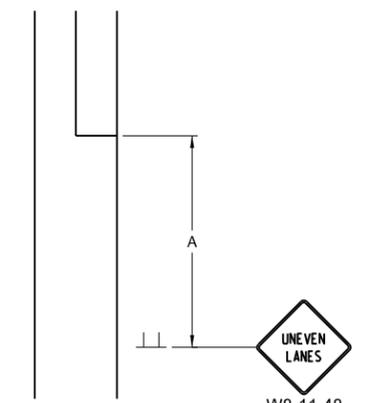
**TYPE Z**  
To be used where speed zone is needed



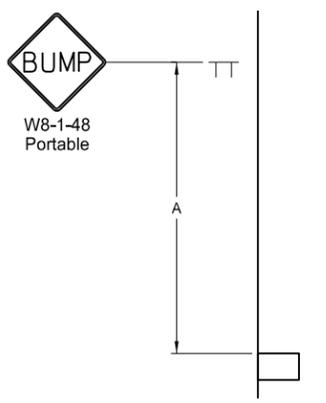
**TYPE JJ**  
To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.

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

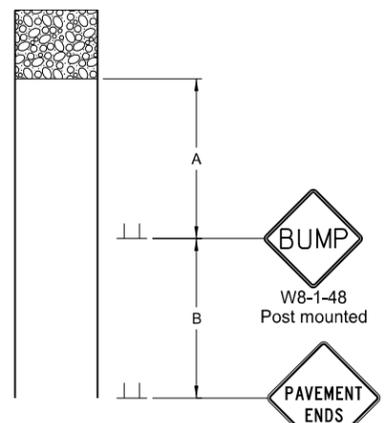
\* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.



**TYPE GG**  
To be used where a difference of elevation between lanes exist



**TYPE EE**  
To be used where the sign conditions exist



**TYPE FF**  
To be used where the sign conditions exist

**KEY**

Sign (represented by a vertical line with a horizontal bar)

Cones (represented by a triangle)

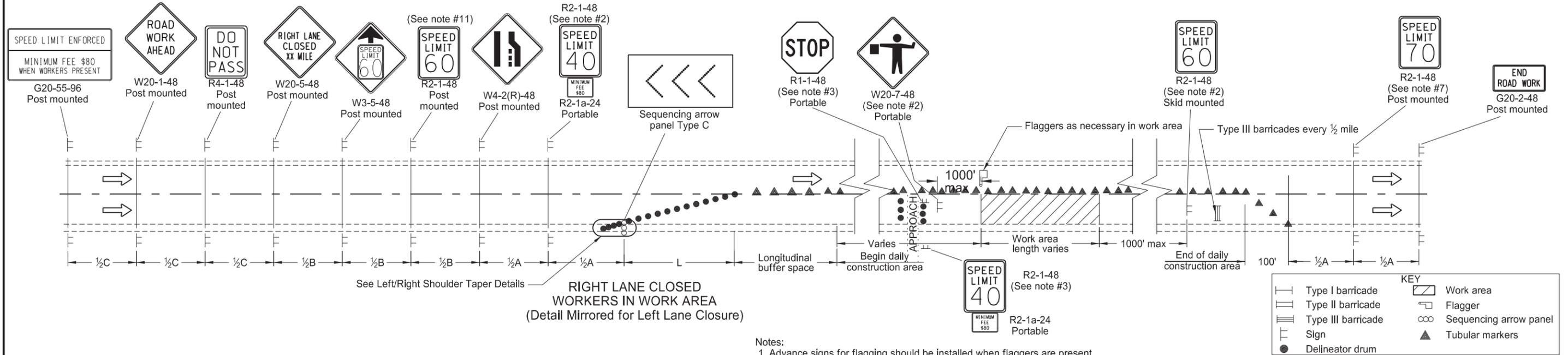
Flagger (represented by a square)

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

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9-27-13	
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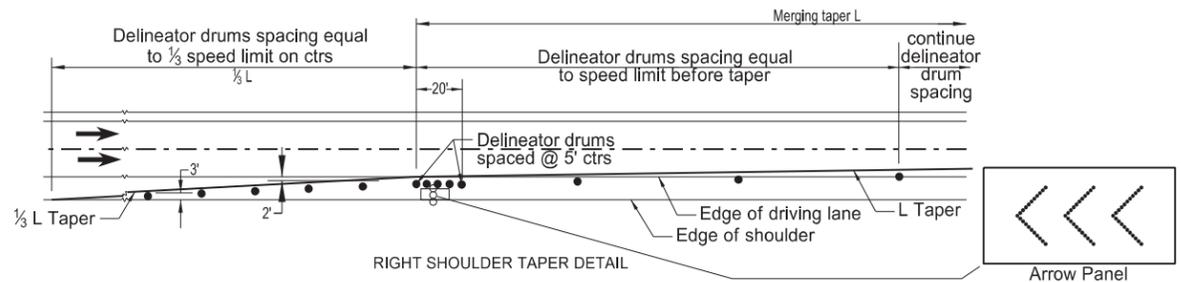
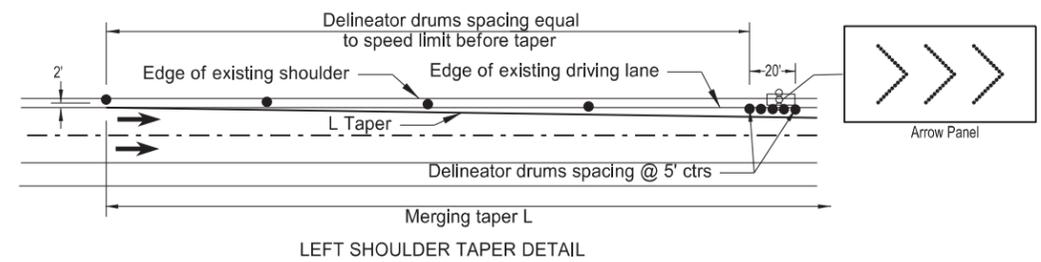
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SIGN LAYOUT FOR ONE LANE CLOSURE



RIGHT LANE CLOSED WORKERS IN WORK AREA (Detail Mirrored for Left Lane Closure)

- Notes:
- Advance signs for flagging should be installed when flaggers are present.
  - The advanced flagger sign and the speed limit signs shall be moved as the work area moves through the construction zone. When the work area is not visible from the flagger, the flagger station shall be placed so the work area is visible. The 40 mph speed limit sign shall be spaced at 1/2 A in advance of the flagger sign. The 60 mph speed limit sign shall also be moved. Upon completion of the work day or when workers are not present, the 40 mph speed limit and the Minimum Fee \$80 signs shall be covered or removed. The exact speed limit shall be determined in the field, dependent on location and conditions.
  - Approaches: When the work area encompasses an approach, the approach shall be controlled by installing a 40 mph speed limit sign. If this approach is on the side of the lane closure, the existing stop sign shall be covered and a new portable stop sign shall be installed. When the main line 40 mph speed zone is moved past the approach, the approach speed limit sign shall be removed.
  - Variables:
    - S=Numerical value of speed limit or 85th percentile
    - W=The width of taper.
    - L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or (WxSxS)/60 for urban, residential, and other streets with speeds of 40 mph or less.
  - Delineator drums, used for tapering traffic shall be spaced at the dimension "S". Tubular markers used for tangents shall be spaced at 2 times dimension "S".
  - Sequencing arrow panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
    - Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
    - Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
    - Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
  - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
  - Existing speed limit signs within a reduced speed zone shall be covered.
  - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
  - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 mph. Where speed limits are to be reduced more than 30 mph, a second speed limit sign shall be installed with the desired speed reduction, but shall not exceed 30 mph. The second speed limit sign shall be placed at 1/2 B.
  - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
  - Sign G20-55-96 is not required if this standard is part of other traffic control layouts or the work is less than 15 days.



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

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

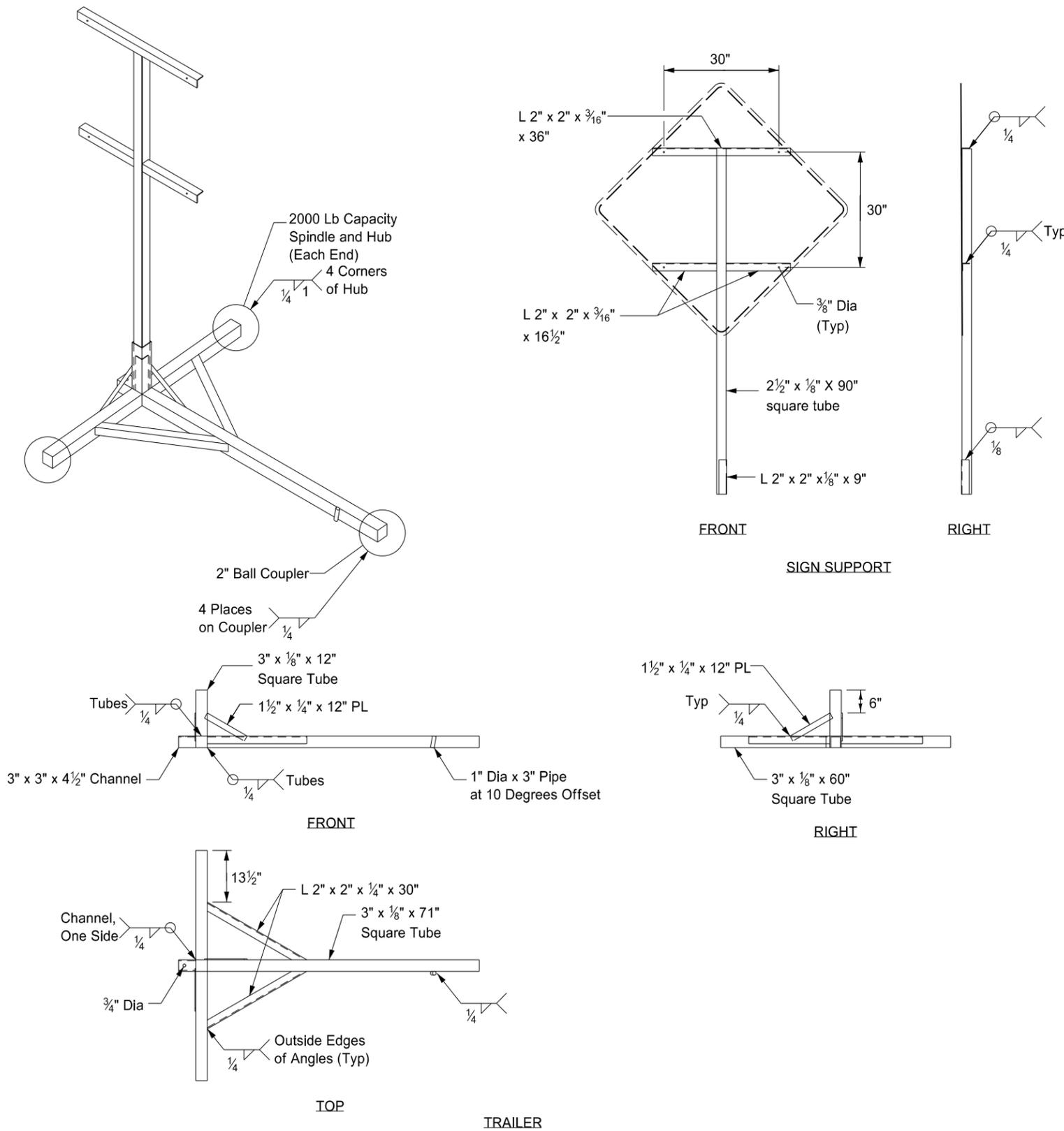
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
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Urban Expressway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

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



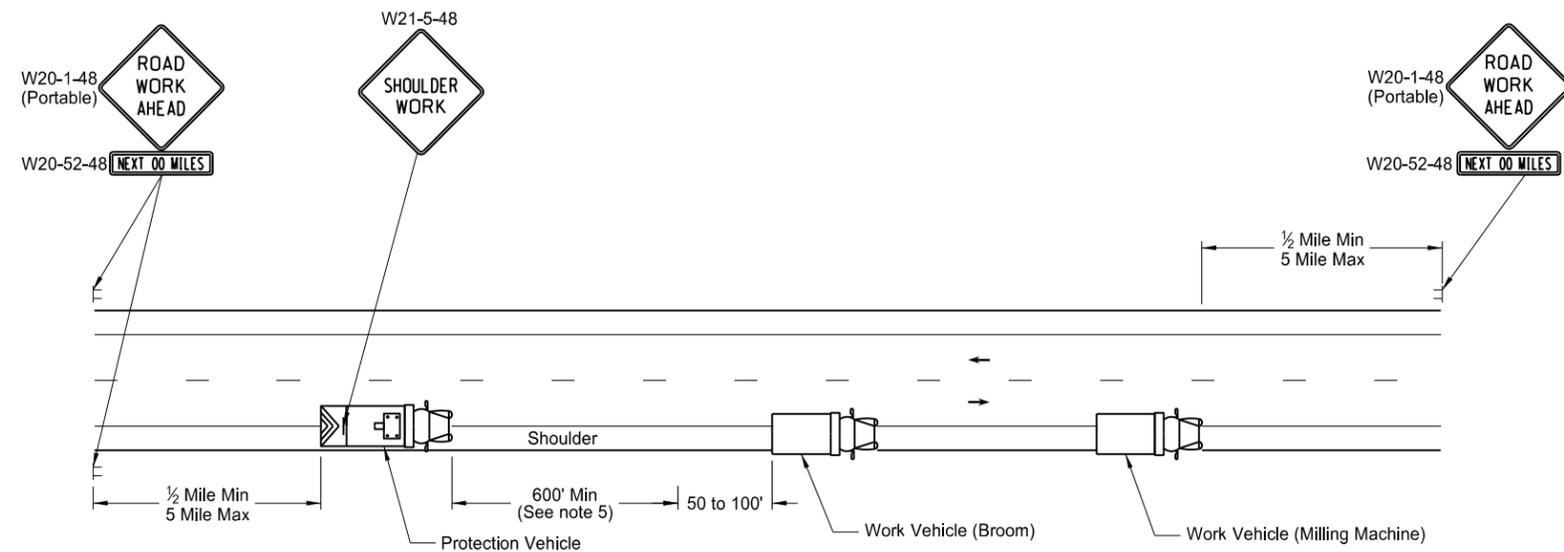
Notes:

- ① The maximum weight of the assembly is 250 pounds.
- ② Use a 14" wheel and tire.
- ③ Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
- ④ Other NCHRP 350 crash tested assemblies are acceptable.

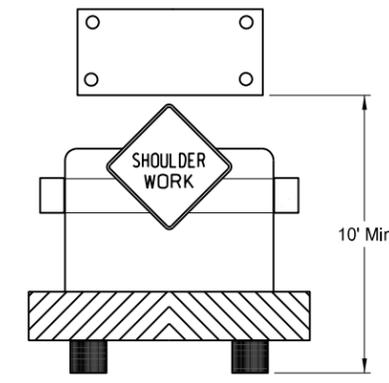
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
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MOBILE OPERATION  
Grinding Shoulder Rumble Strips



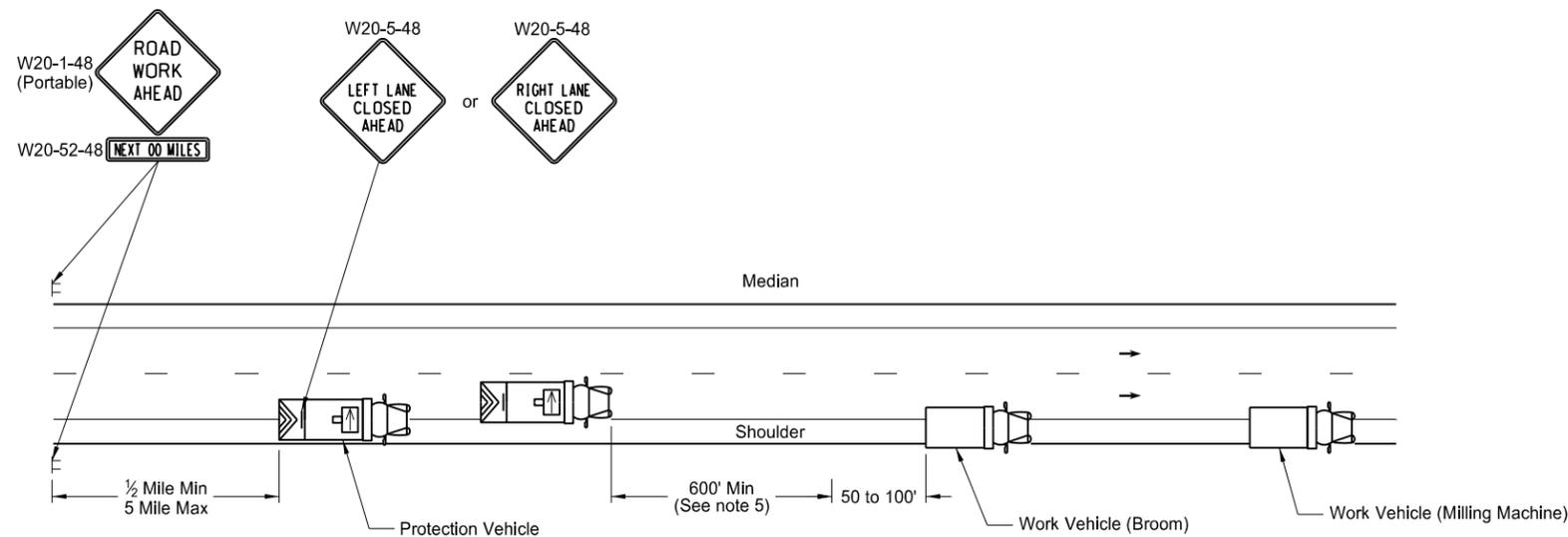
TWO LANE - TWO WAY ROADWAY



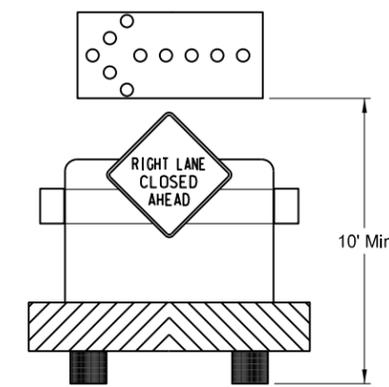
TWO LANE - TWO WAY ROADWAY  
Typical Protection Vehicle with  
Flashing Arrow Panel In Caution Mode

Notes:

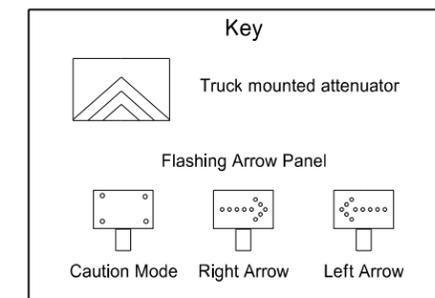
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
2. Vehicles shall have a rotating, flashing, oscillating or strobe lights.
3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
4. Each vehicle shall have two - way electronic communication capability.
5. Vehicle spacing between the protection vehicle and work vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the protection vehicle in time to slow down and safely pass the work vehicles.
6. ROAD WORK AHEAD SIGN: Advance Road Work Ahead signs shall be moved as the work area moves through the construction zone.
7. Next XX Miles sign required when the distance from Road Work Ahead sign to the work location is two miles or greater.



INTERSTATE & 4 LANE DIVIDED HIGHWAY



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

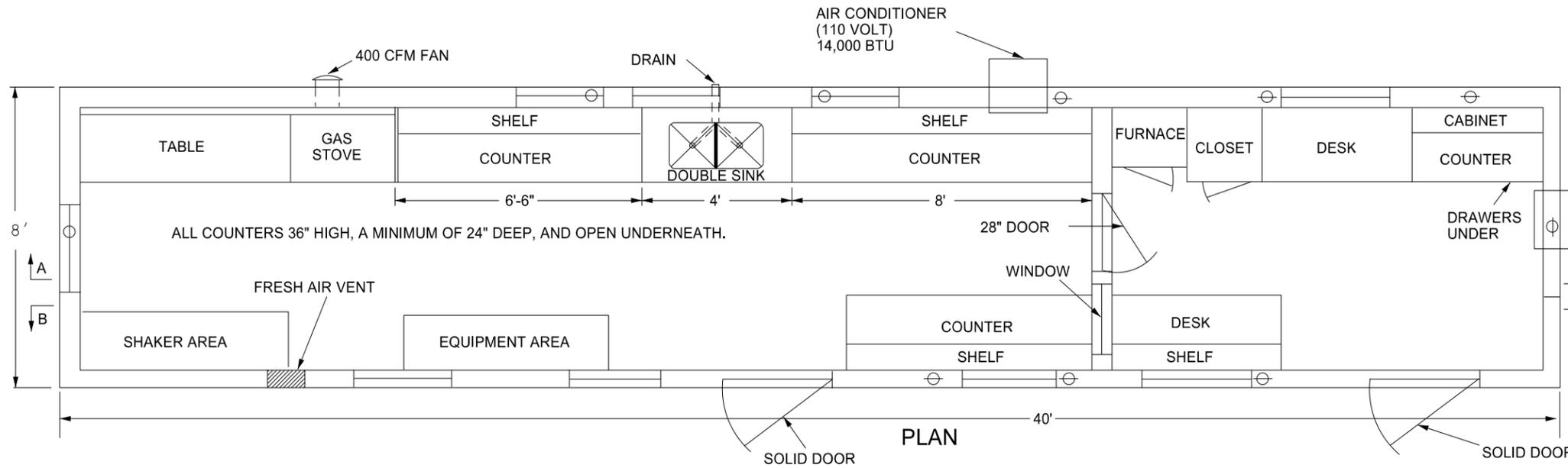


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

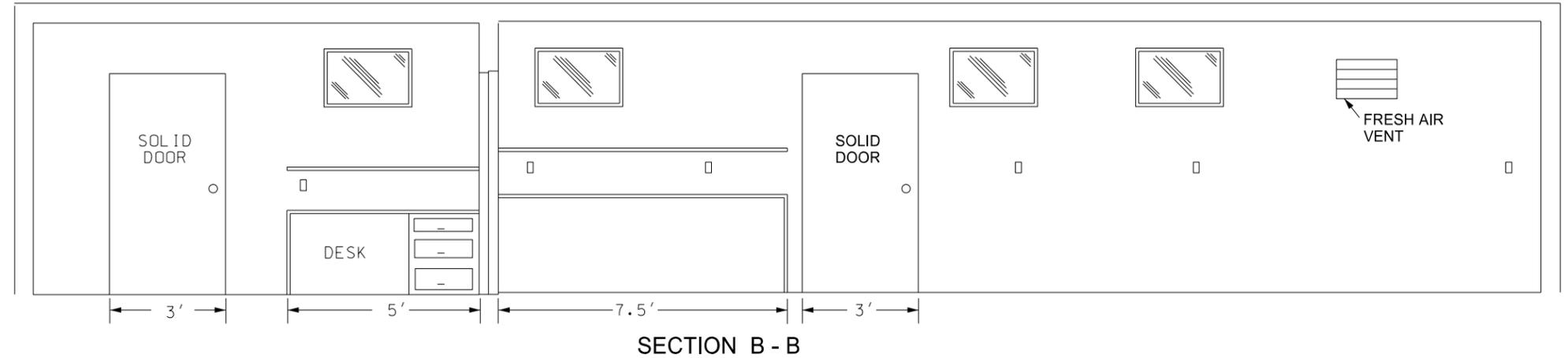
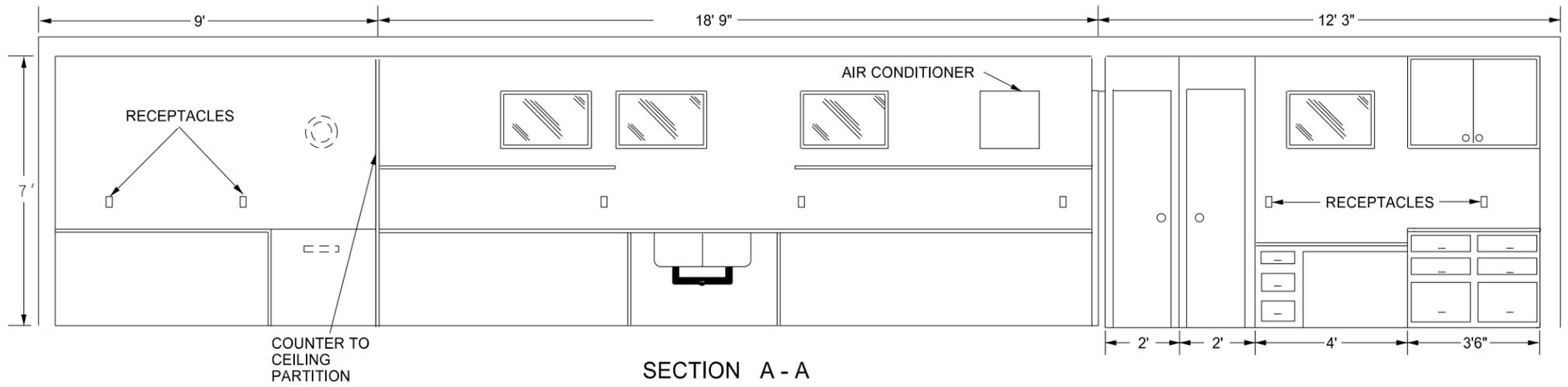
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BITUMINOUS LABORATORY

D-706-1



PLAN



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.

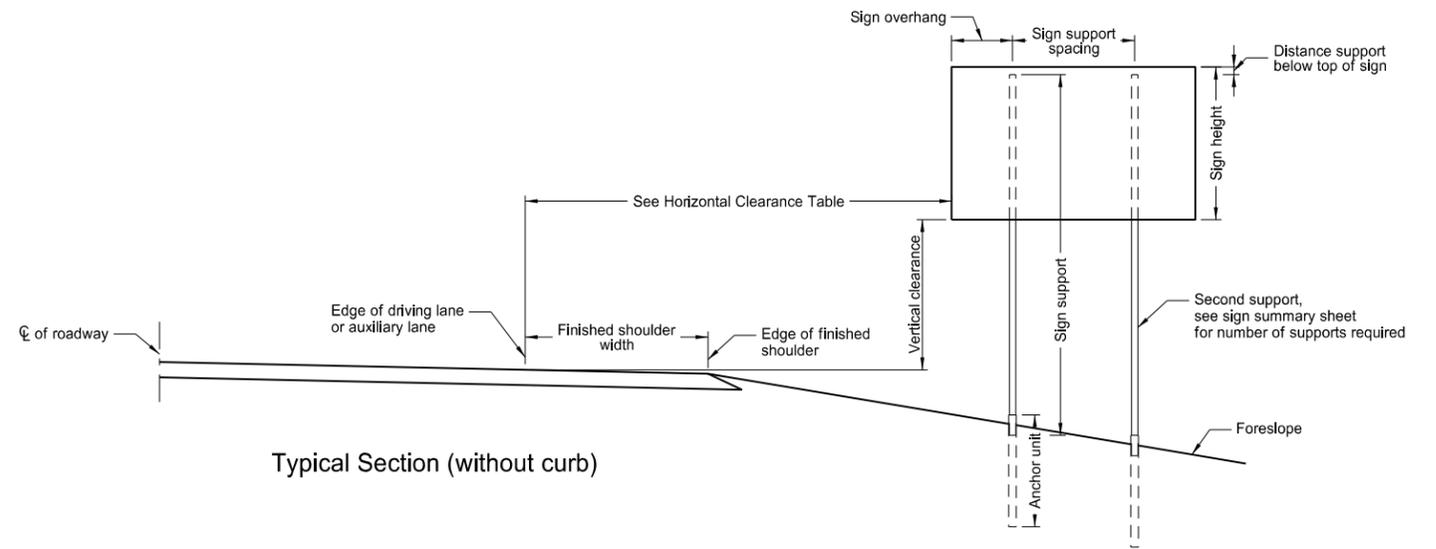
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# PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

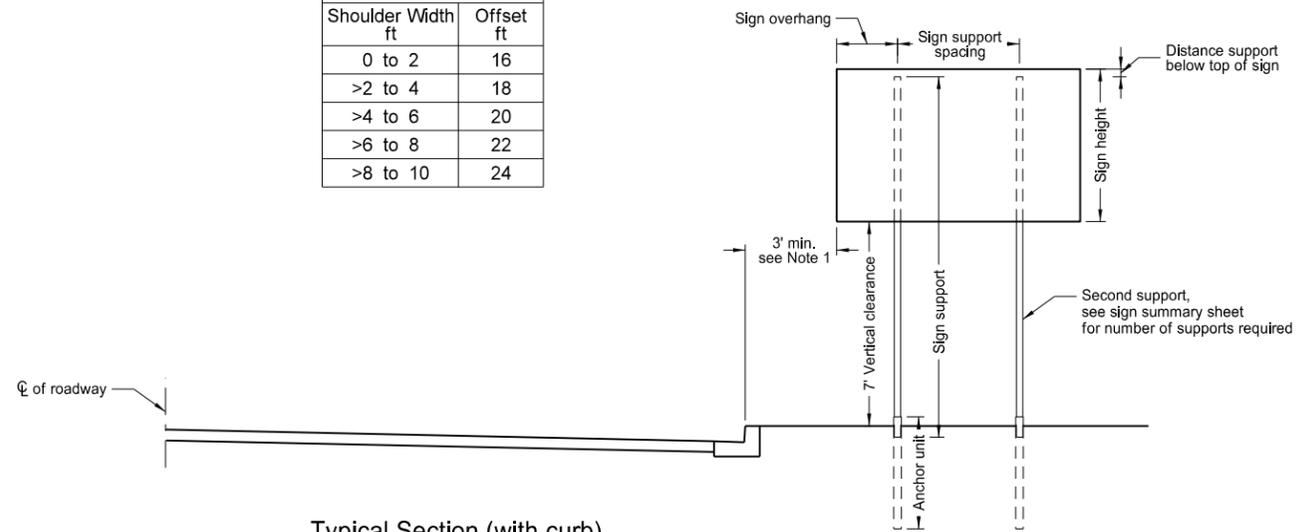
**Notes:**

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
2. Minimum vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.
- Signs on expressways shall be installed with a minimum height of 7'.
- Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.
- The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.
3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.
4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.

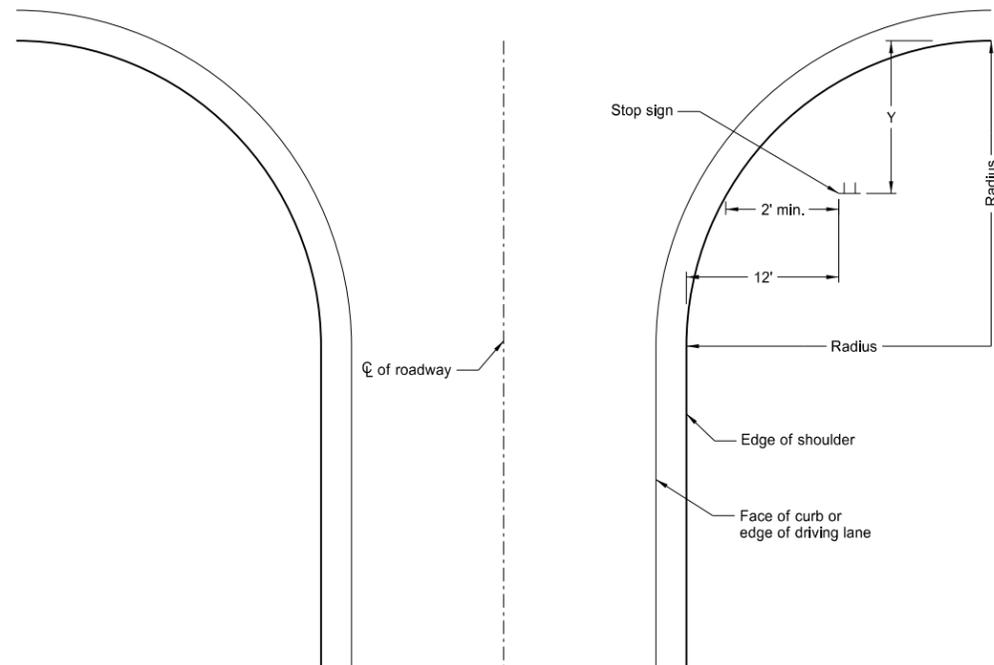


Typical Section (without curb)

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



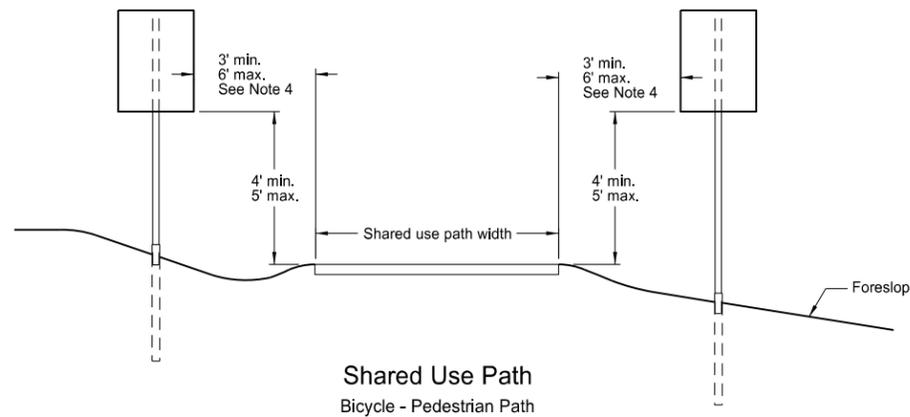
Typical Section (with curb)  
Residential or Business District



Stop Sign Location  
Wide Throat Intersection

This layout is to be used 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



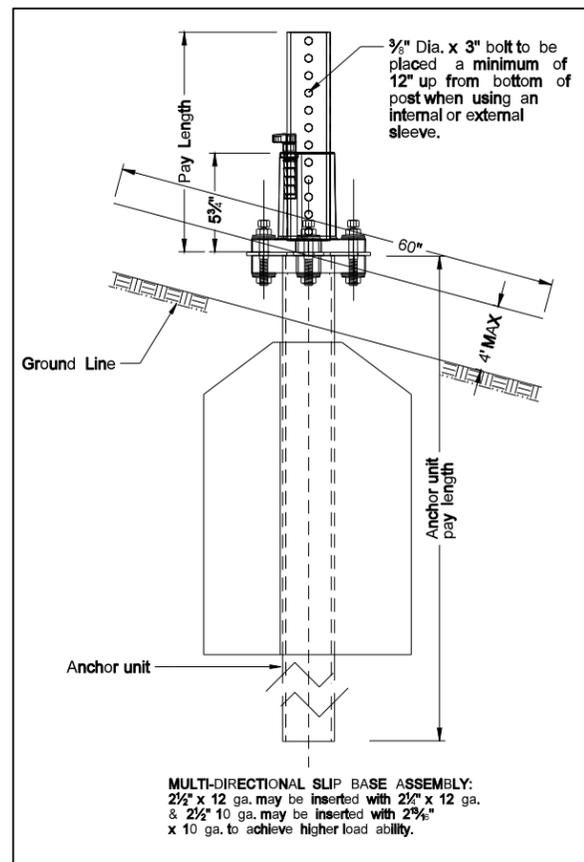
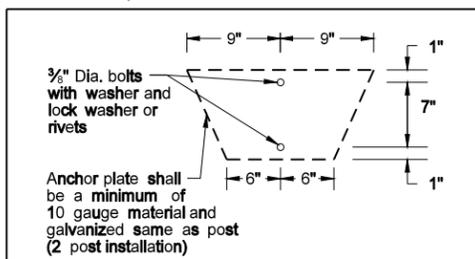
Shared Use Path  
Bicycle - Pedestrian Path

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10-3-13	
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DATE	CHANGE
7-8-14	Revised note 2, added note 4.

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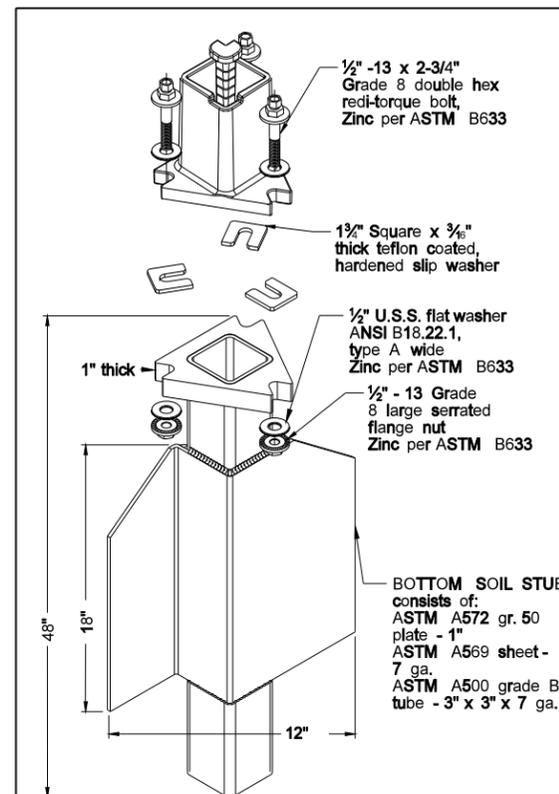
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)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

(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall 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.

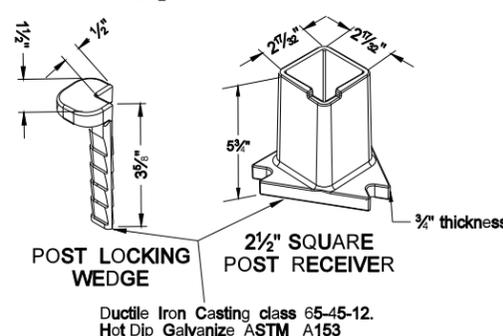


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:  
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube



SLIP BASE FOR 2 1/2" POST



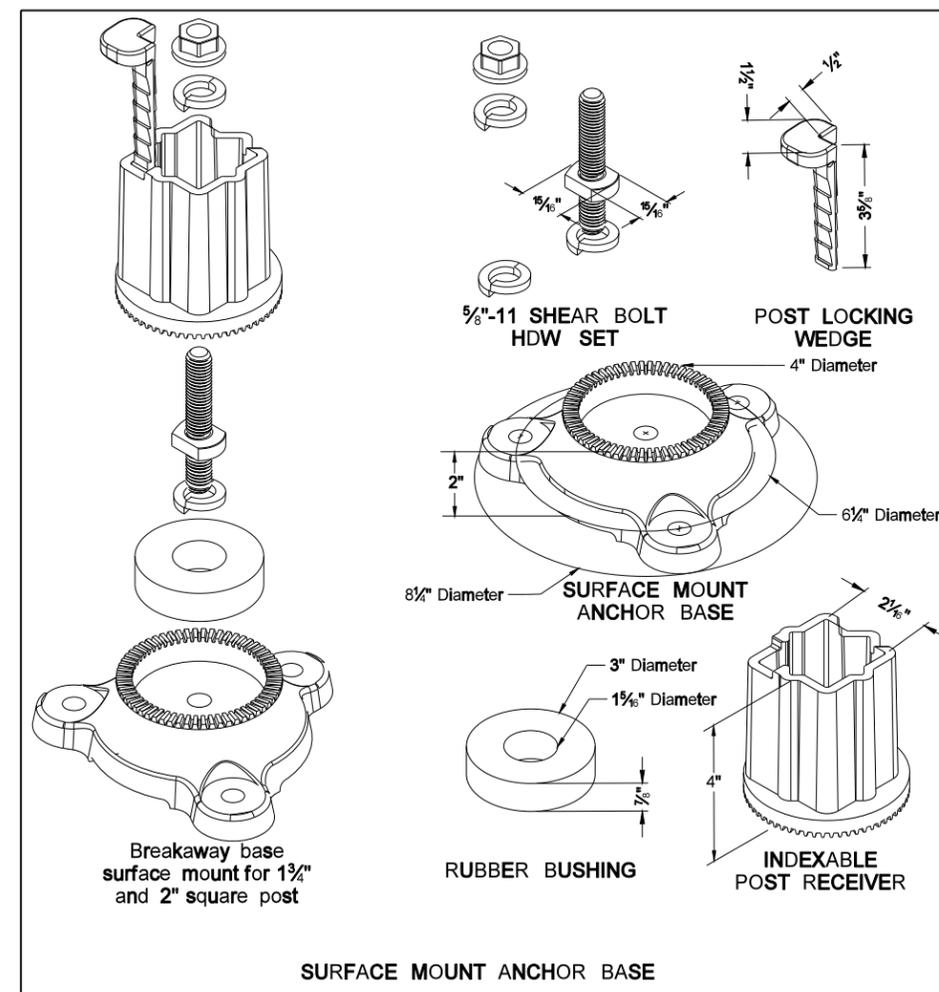
SLIP BASE DETAIL

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 1/2 x 2 1/2	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 shall be made above and below post location and also back and ahead of post.
- Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3" x 3" x 7" gauge ASTM A500 grade B. Anchor shall have a yield strength 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
- When used in concrete sidewalk, anchor shall be the same concept without the wings.
- Four post signs shall have over 8" between the first and fourth posts.
- Installation procedures as per manufacturers recommendation.
- Concrete fasteners for surface mount breakaway base shall be a minimum 1/2" diameter x 4" grade 8.



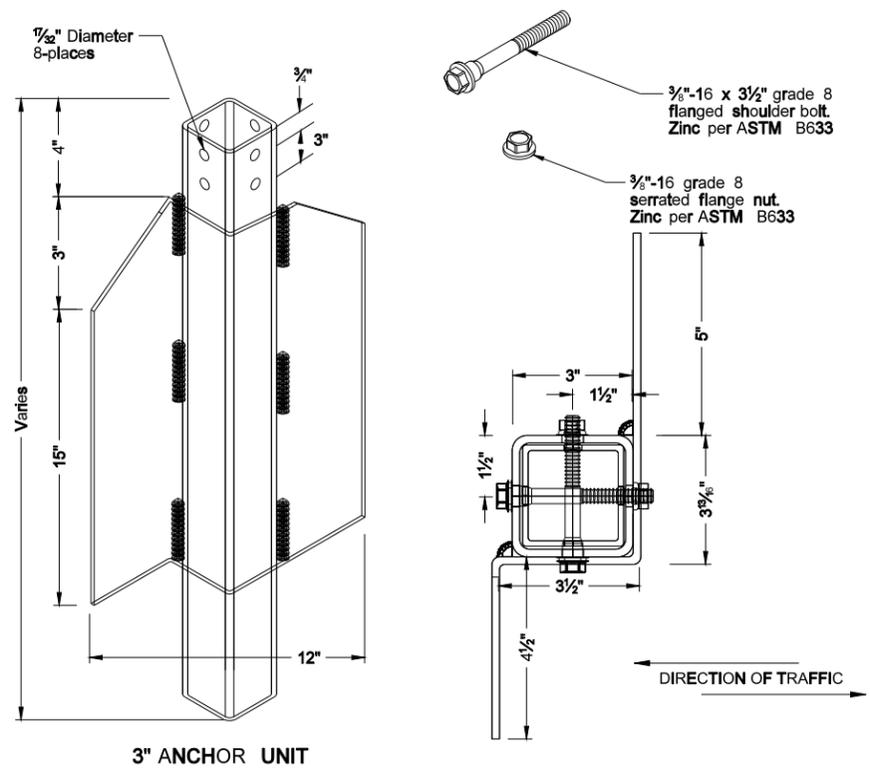
SURFACE MOUNT ANCHOR BASE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE

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SHOULDER BOLT

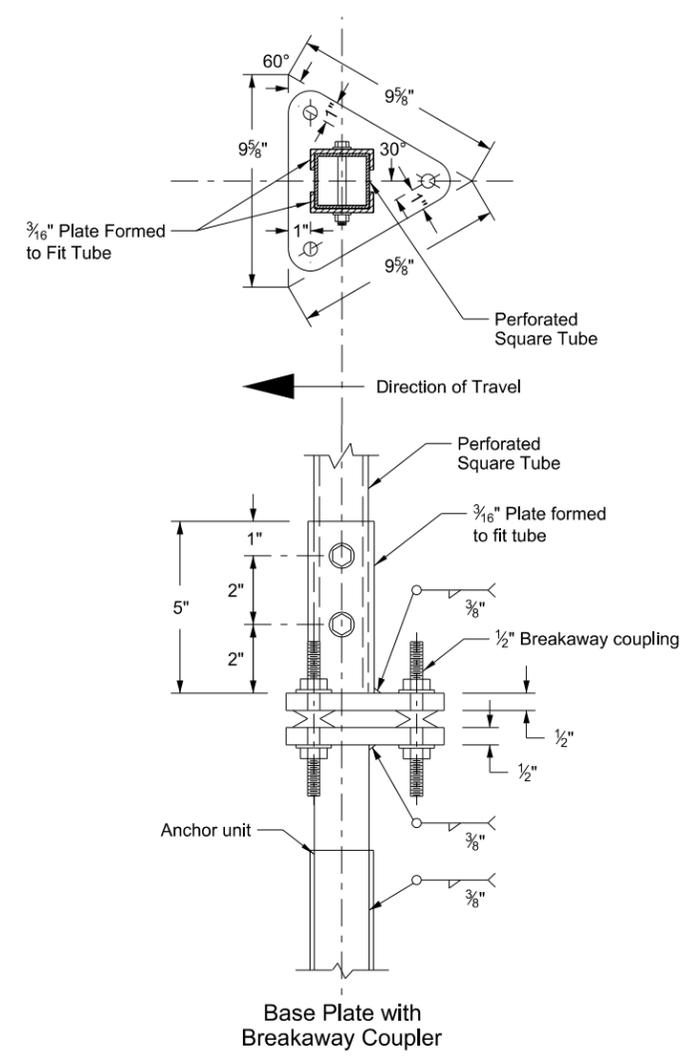
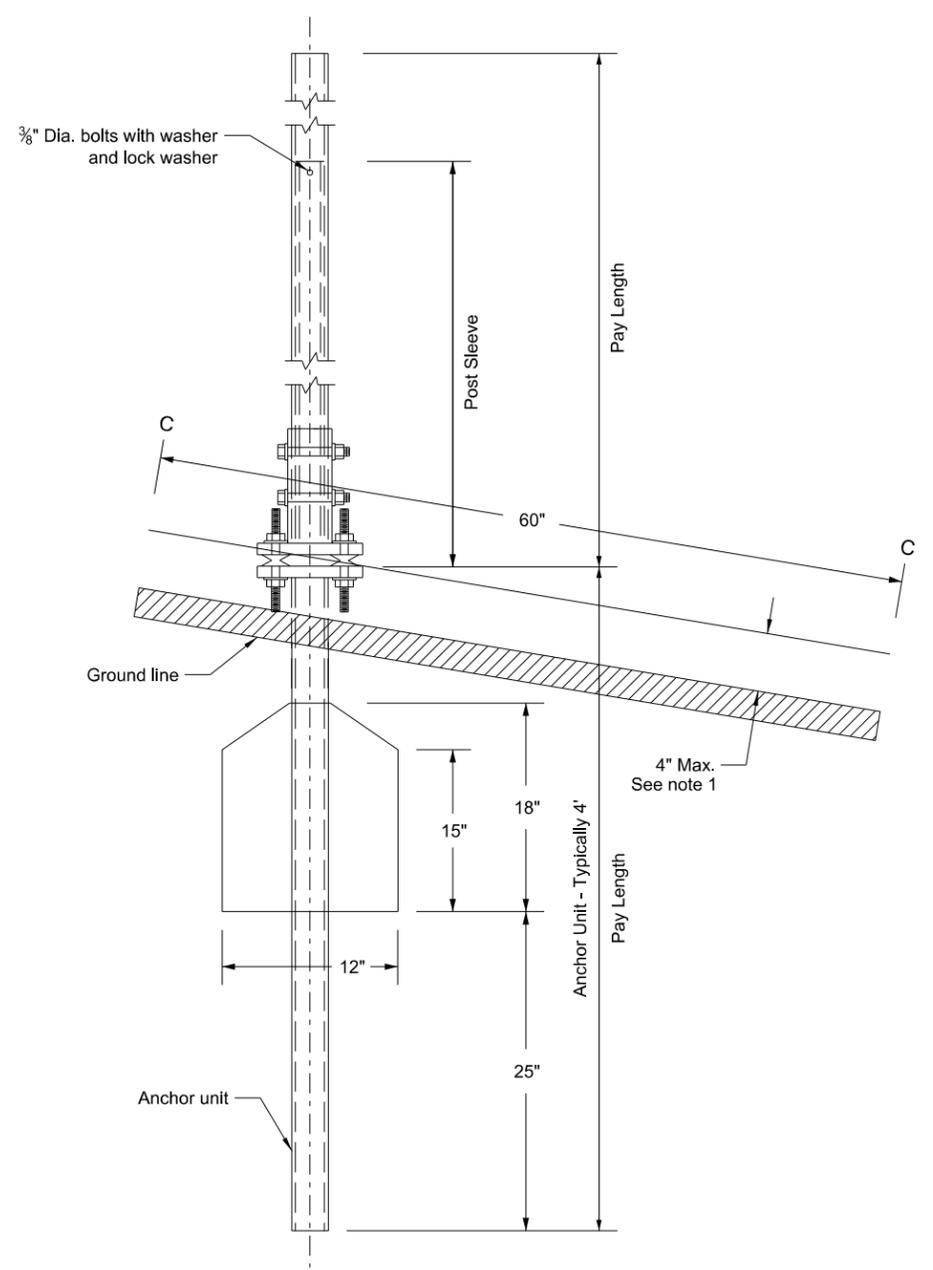
Shimming agent to reduce tolerance between 3" anchor unit and 2 1/2" post. (standard 3/8" diameter grade 8 bolt may be used with proper shim)



3" ANCHOR UNIT

Breakaway Coupler System for Perforated Tubes

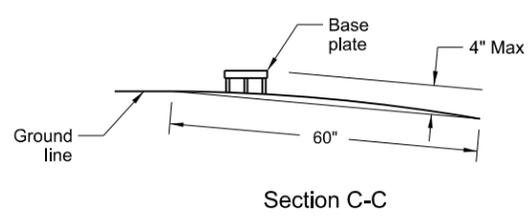
- Notes:
- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
  - Anchor unit shall be the same size as the post and shall have the same specification as the post.
  - Four post signs shall have over 8' between the first and fourth post.
  - In lieu of the breakaway base system on standard D-754-24 the breakaway coupling system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.



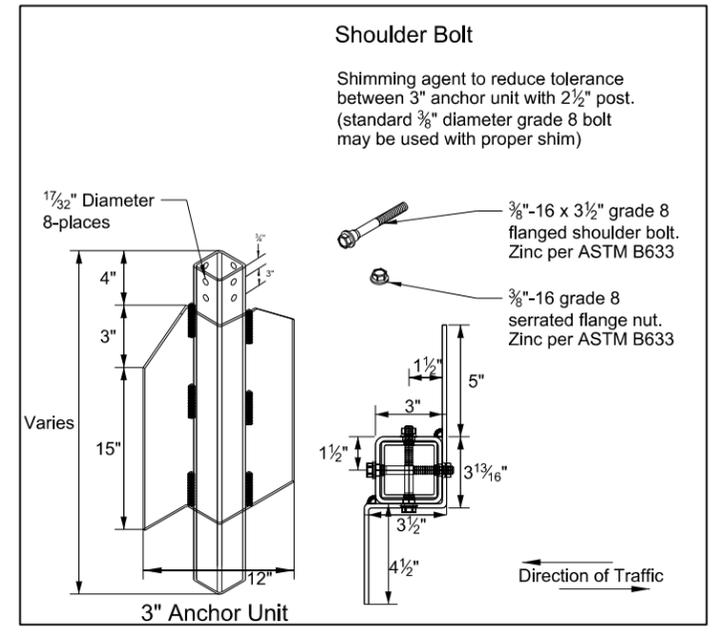
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2	12	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	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	12	Yes		7
3 & 4	2 1/2	10	2 3/16	10	Yes		7

(B) - The 2 1/2" 12 gauge posts do not need breakaway bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

(C) - 3" anchor unit



Max. protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.



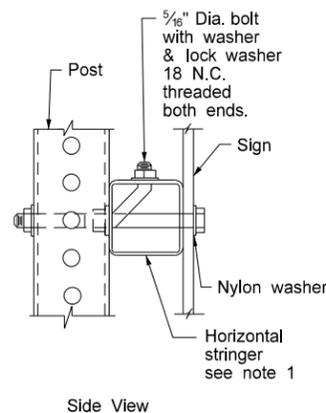
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE

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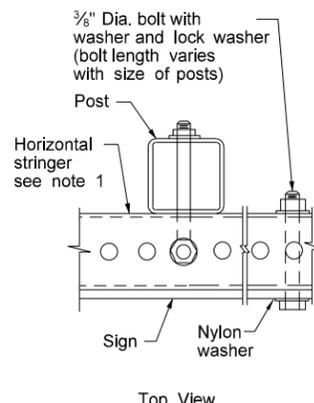
Mounting Details Perforated Tube

Note:

- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 1/2" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
- Metal washers used on sign face shall have a minimum outside diameter of 5/16" ± 1/64" and 10 gauge thickness.
- No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers.
- In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
- 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.

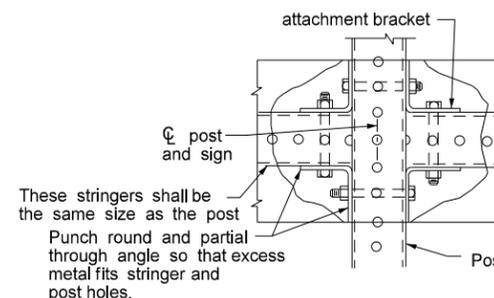


Side View



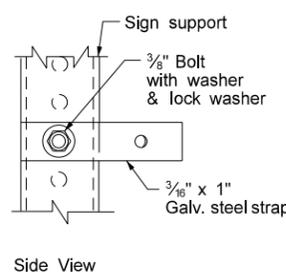
Top View

STRINGER MOUNTING  
(WITH STRINGER IN FRONT OF POST)

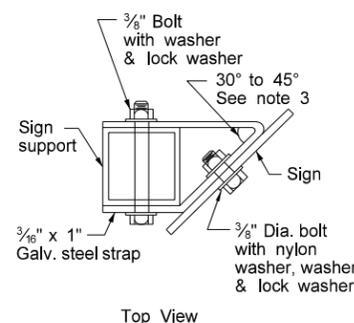


These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.

STREET NAME SIGNS  
AND ONE WAY SIGNS  
SINGLE POST ASSEMBLY  
ONE STRINGER OR  
BACK TO BACK MOUNTING

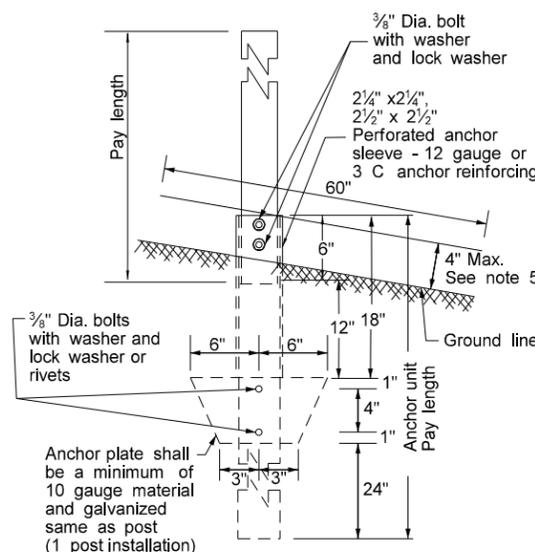


Side View

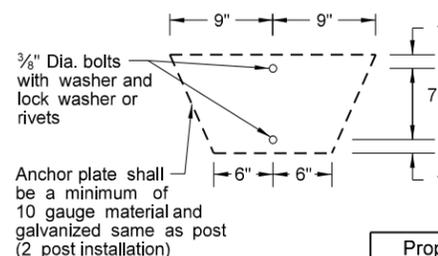


Top View

STRAP DETAIL



ANCHOR UNIT AND  
POST ASSEMBLY

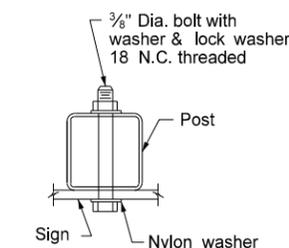


Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. <sup>4</sup>	Cross Sect. area In. <sup>2</sup>	Section Modulus In. <sup>3</sup>
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	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

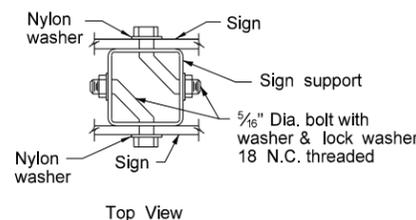
The 2 3/8" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size is shown as 2.51" size on the plans.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/8	10	Yes		7

(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall 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.



BOLT MOUNTING

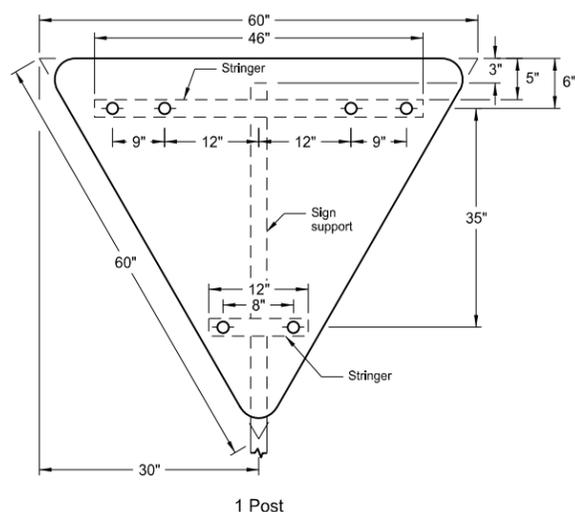


Top View

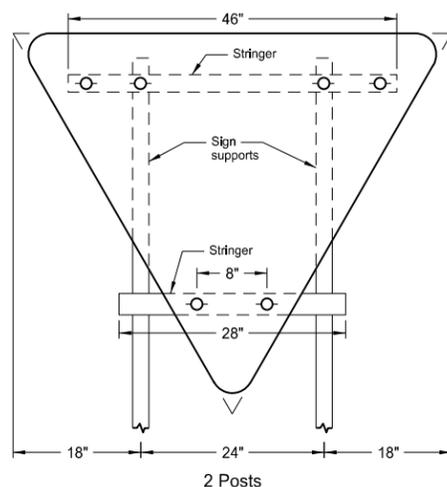
BACK TO BACK  
MOUNTING

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 8-6-09		This document was originally issued and sealed by <b>Roger Weigel,</b> Registration Number PE- 2930 , on 7/8/14 and the original document is stored at the North Dakota Department of Transportation
REVISIONS		
DATE	CHANGE	
7-8-14	Revised Note 3	

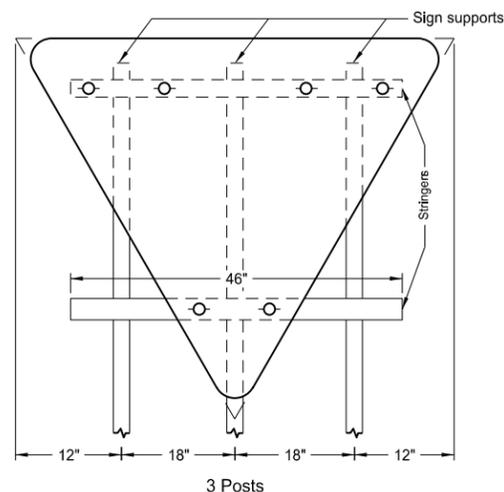
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION  
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

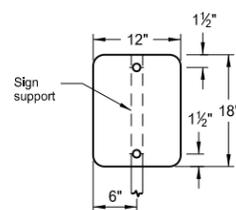


3 Posts

Assembly No. 6

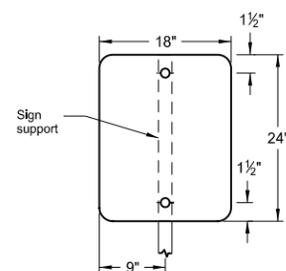
Notes:

1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



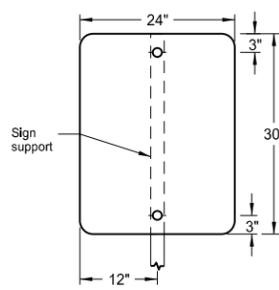
1 Post

Assembly No. 7



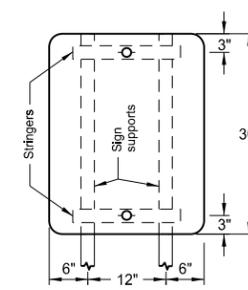
1 Post

Assembly No. 8

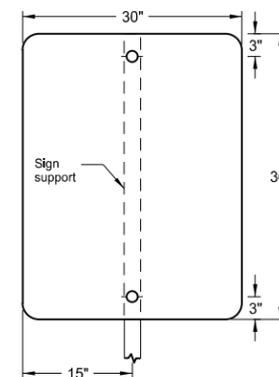


1 Post

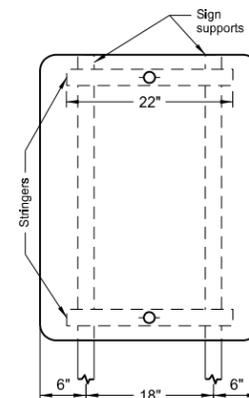
Assembly No. 9



2 Posts

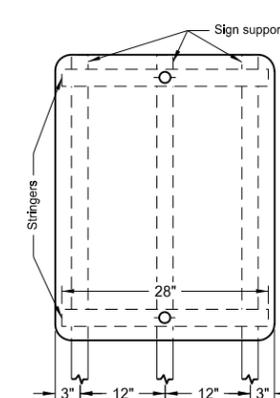


1 Post

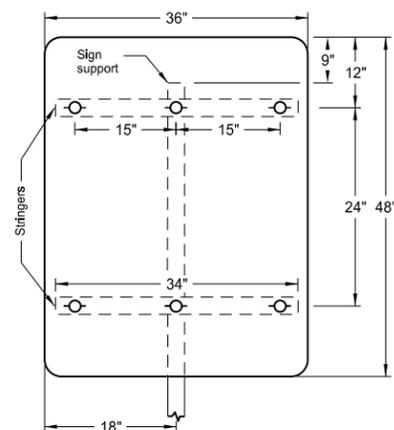


2 Posts

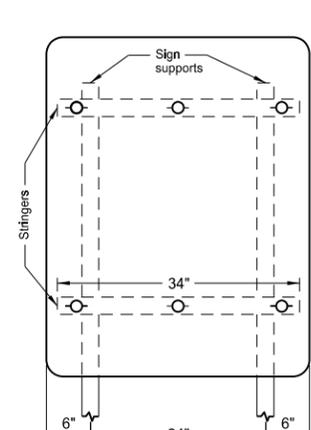
Assembly No. 10



3 Posts

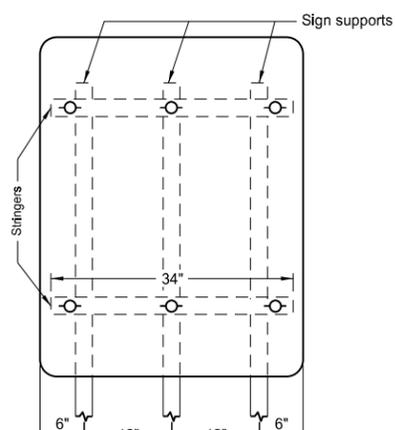


1 Post



2 Posts

Assembly No. 11

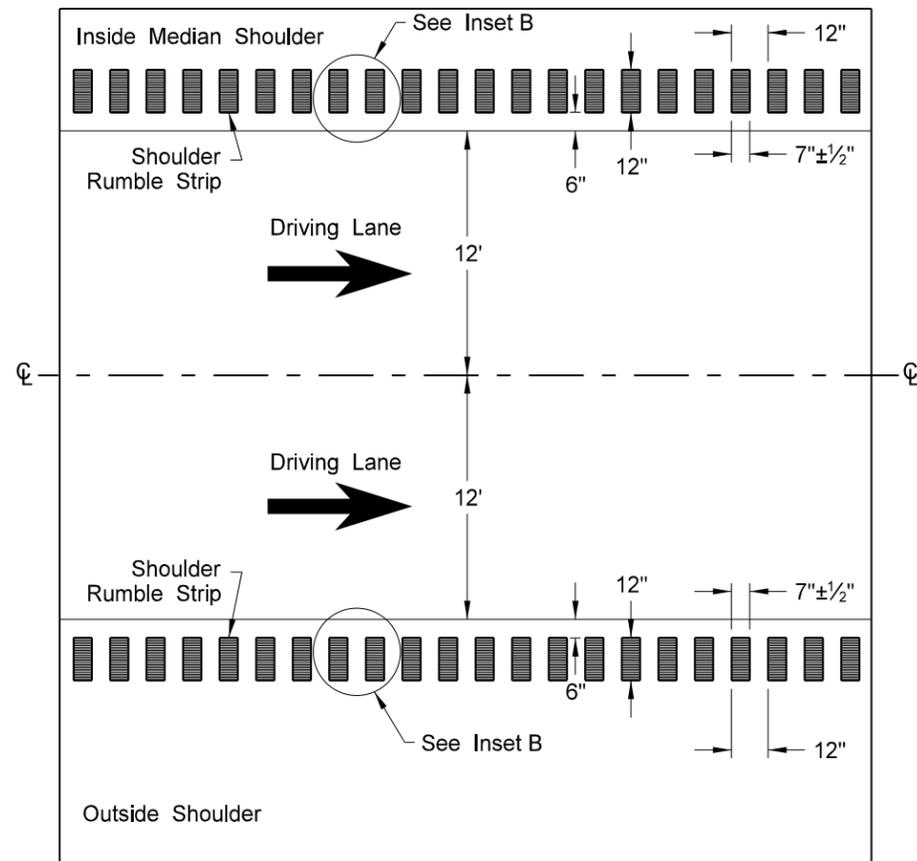


3 Posts

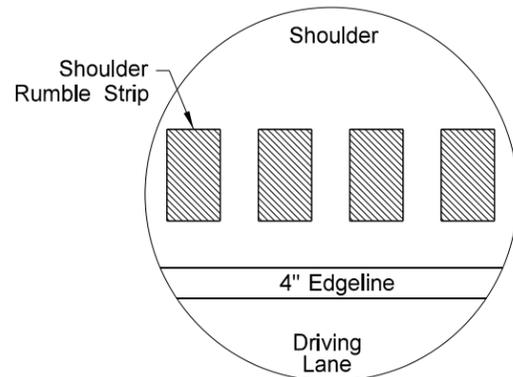
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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**RUMBLE STRIPS  
DIVIDED HIGHWAYS (NON-INTERSTATE)**



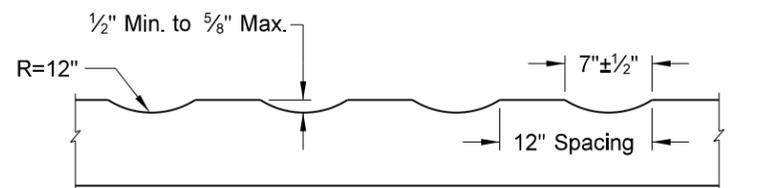
**Divided Highways (Non-Interstate)**



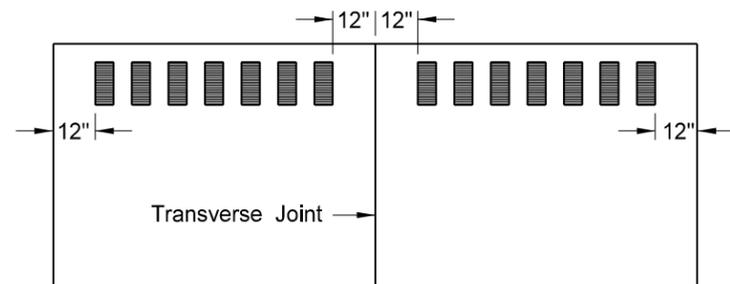
**Inset B - Shoulder Rumble Strip**

**NOTES:**

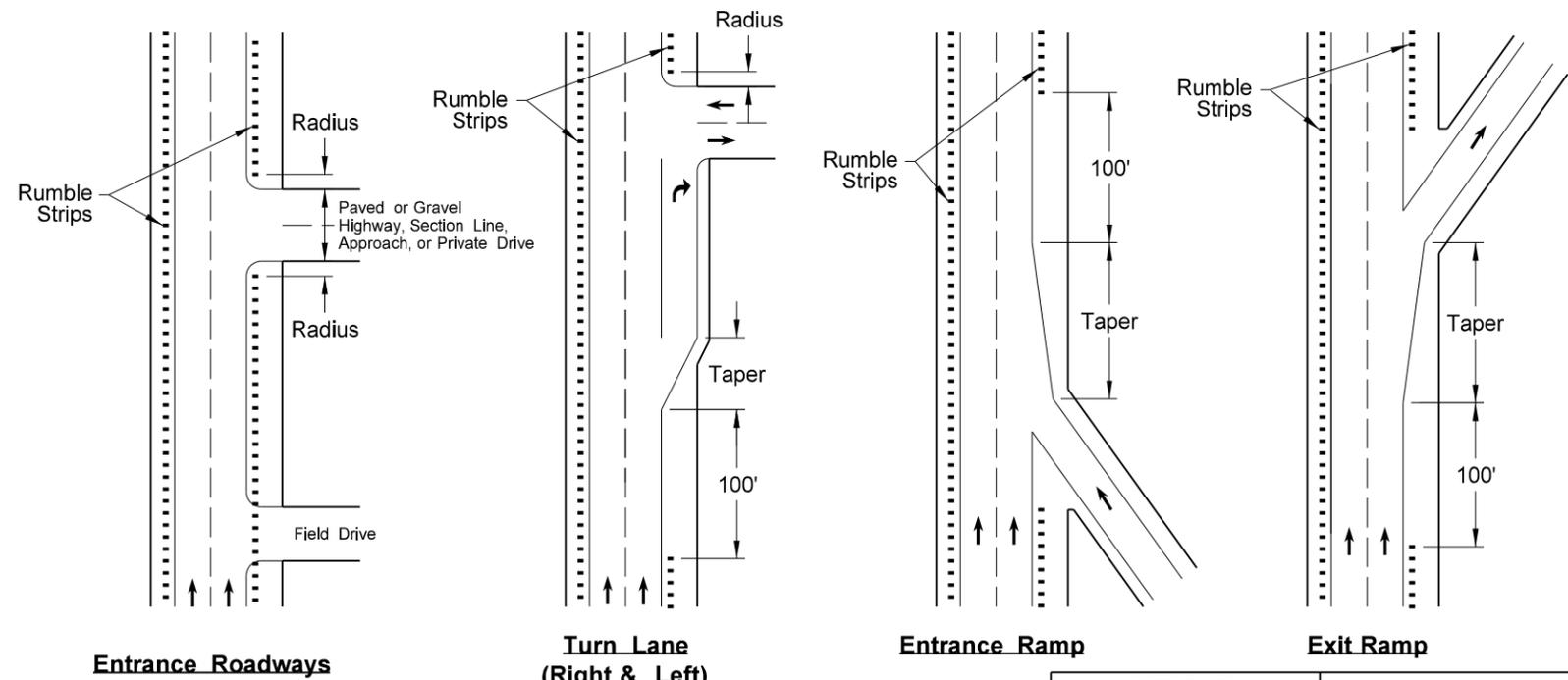
1) Discontinue rumble strips through the entire length of turn lanes & ramps, 100' before turn lane tapers, 100' before or after ramp tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive as shown below.



**Profile of Rumble Strips - Bituminous and PCC Pavements**



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



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
9-8-11	Revised Notes and D-760-2.

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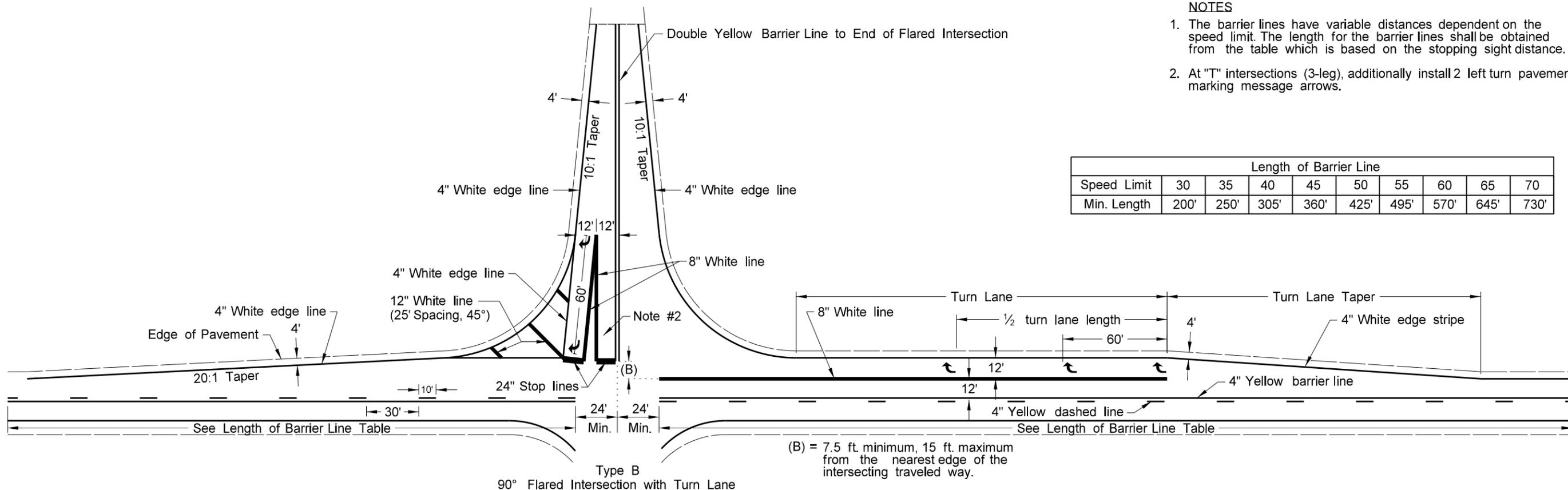
PAVEMENT MARKING FOR STANDARD 90° FLARED INTERSECTION

D-762-3

NOTES

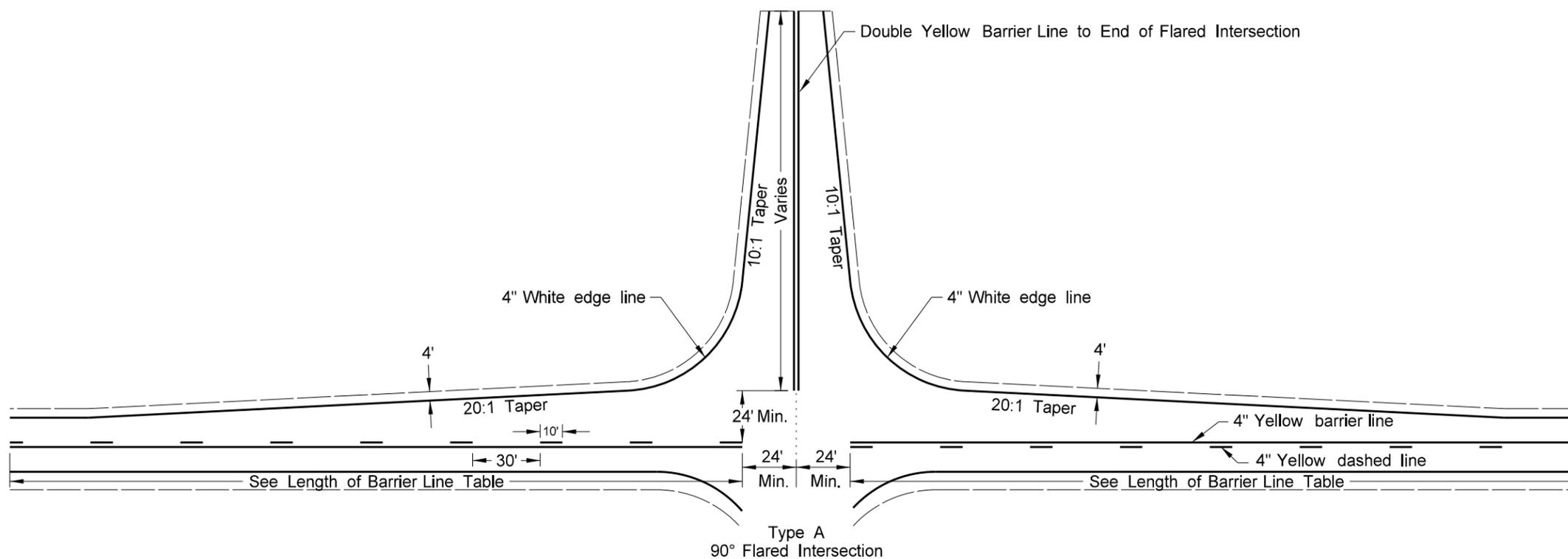
1. The barrier lines have variable distances dependent on the speed limit. The length for the barrier lines shall be obtained from the table which is based on the stopping sight distance.
2. At "T" intersections (3-leg), additionally install 2 left turn pavement marking message arrows.

Length of Barrier Line									
Speed Limit	30	35	40	45	50	55	60	65	70
Min. Length	200'	250'	305'	360'	425'	495'	570'	645'	730'



Legend

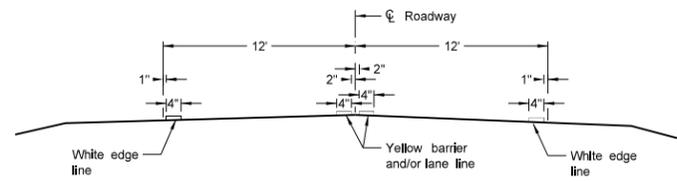
- 4" Line
- 8" Line
- 12" Line
- 24" Line



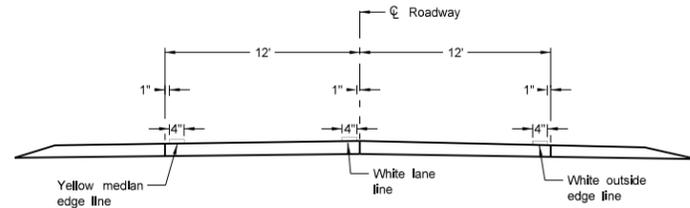
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-9-09	
REVISIONS	
DATE	CHANGE
9-24-09	Barrier Stripe Correction
9-21-11	Revised Turn Lane Markings
11-25-13	Revised Type B Layout

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 of Transportation

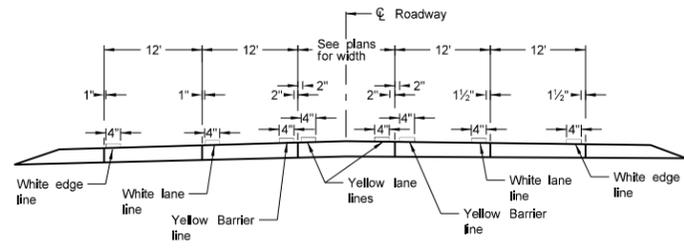
PAVEMENT MARKING



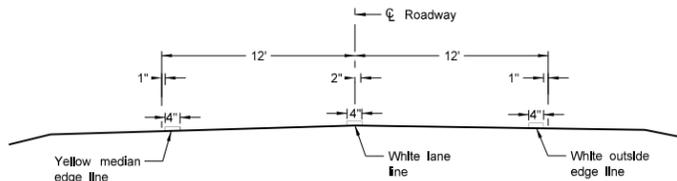
Two Lane Two Way  
RURAL ROADWAY



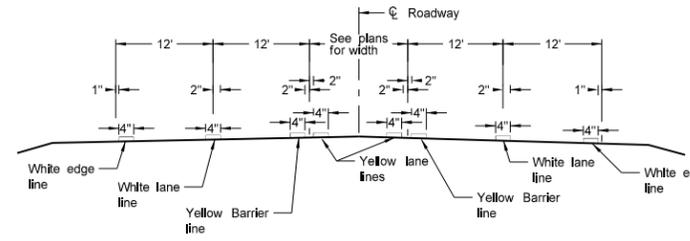
Two Lane Roadway  
INTERSTATE HIGHWAY  
Concrete Section



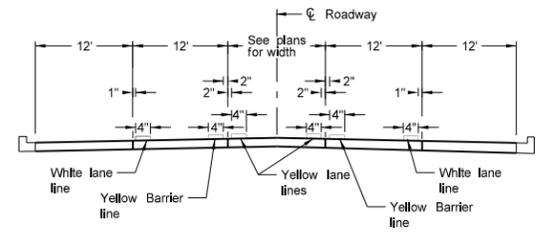
RURAL FIVE LANE ROADWAY  
Concrete Section



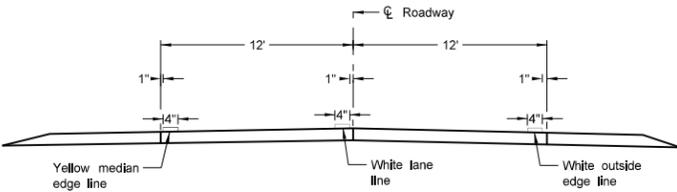
Two Lane Divided  
Rural Roadway  
PRIMARY HIGHWAY  
Asphalt Section



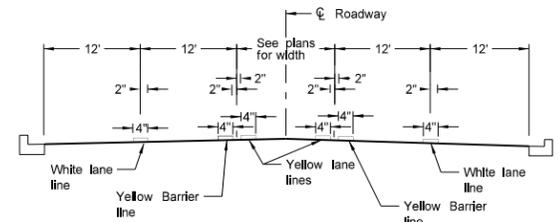
RURAL FIVE LANE ROADWAY  
Asphalt Section



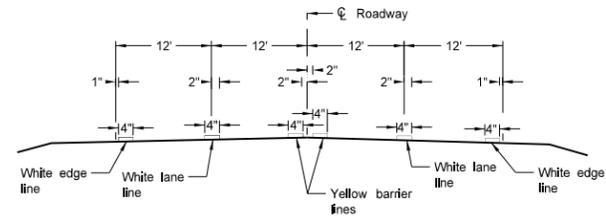
URBAN FIVE LANE SECTION  
Concrete Section



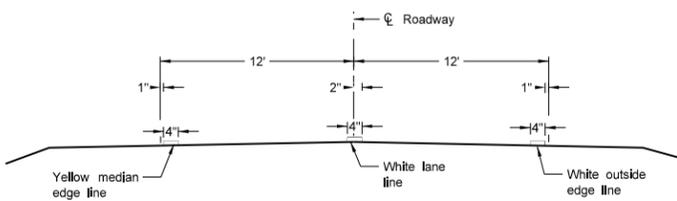
Two Lane Roadway  
PRIMARY HIGHWAY  
Concrete Section



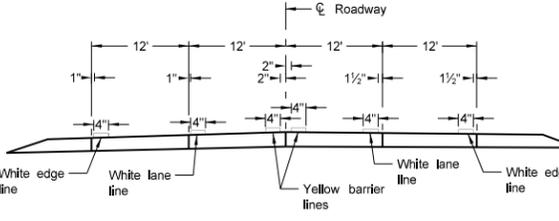
URBAN FIVE LANE SECTION  
Asphalt Section



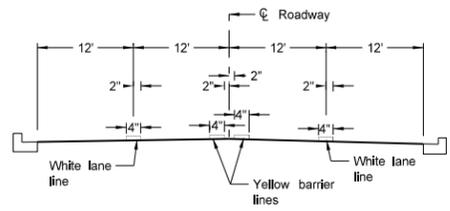
RURAL FOUR LANE ROADWAY  
Asphalt Section



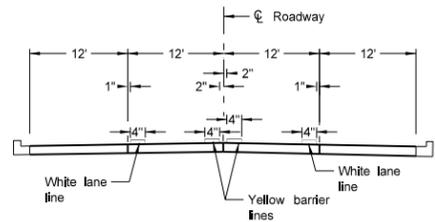
Two Lane Roadway  
INTERSTATE HIGHWAY  
Asphalt Section



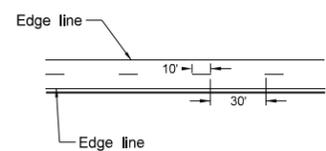
RURAL FOUR LANE ROADWAY  
Concrete Section



URBAN FOUR LANE SECTION  
Asphalt Section



URBAN FOUR LANE SECTION  
Concrete Section



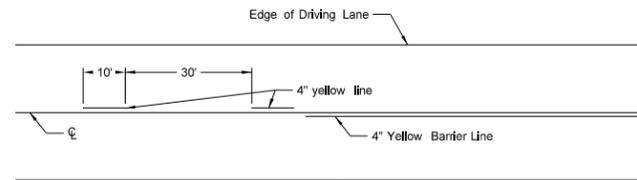
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:  
1. Edge lines shall be continued through private drives and field drives and broken for intersections.

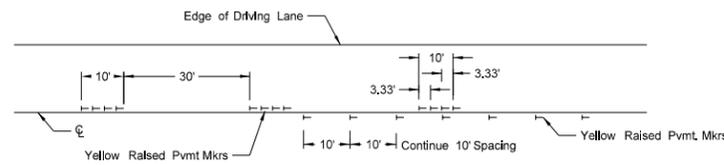
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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SHORT-TERM PAVEMENT MARKING

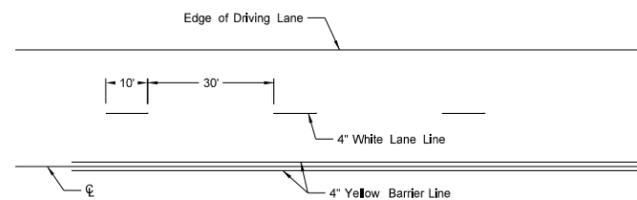


Painted or Tape Lines

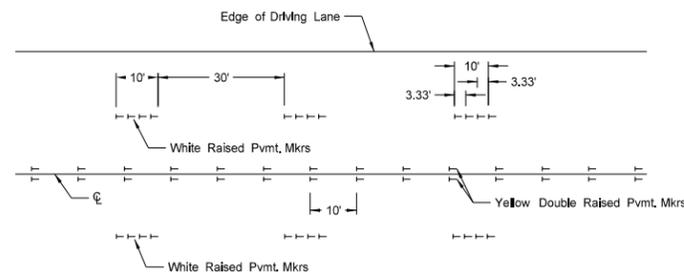


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

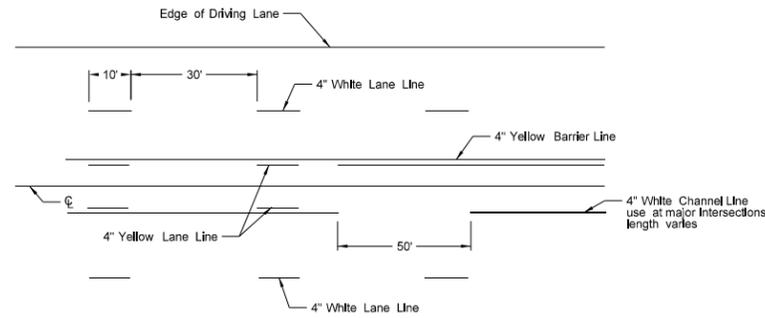


Painted or Tape Lines

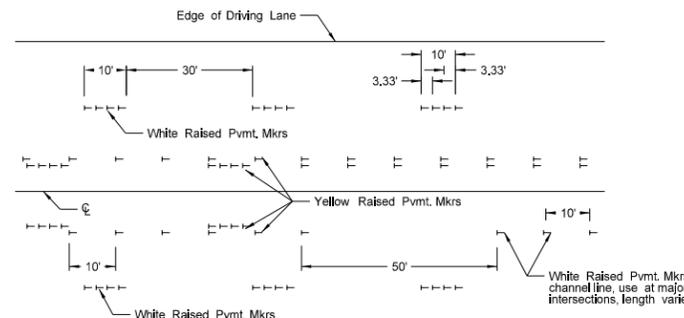


Raised Pavement Markers

FOUR LANE ROADWAY

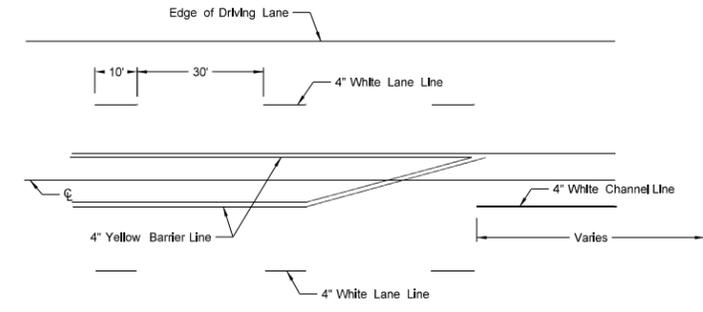


Painted or Tape Lines

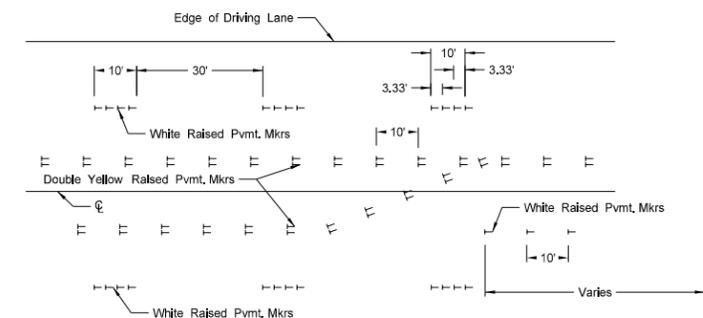


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

- Two-lane two-way roadways shall have no passing zones placed as shown. No passing zone signs may be placed in lieu of short term no passing zone pavement markings. These signs will be allowed to remain in place for three days, at which time the short term no passing zone pavement marking shall be placed.
- Short term center line stripe (paint) on top lift shall be carefully placed with exact spacing so that the permanent stripe will match when applied.
- Raised markers and tape markings shall be removed after permanent pavement marking has been installed. Removed markings shall become the property of the contractor.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 12-1-10 and the original document is stored at the North Dakota Department of Transportation