DESIGN DATA				
Traffic	Average Daily			
Current	Pass: 2,542	Trucks: 594	Total: 3,136	
Forecast	Pass: 2,647	Trucks: 564	Total: 3,211	
Clear Zone Distance: 32 ft		Design Speed: 70		
Minimum Sight Dist. for Stopping: N/A		Bridges: N/A		
Limited Access Control				
Pavement Design Life 20 (years)				
Design Accumulated One-way Flexible ESALs: 5,174,709				

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	18842	1	1

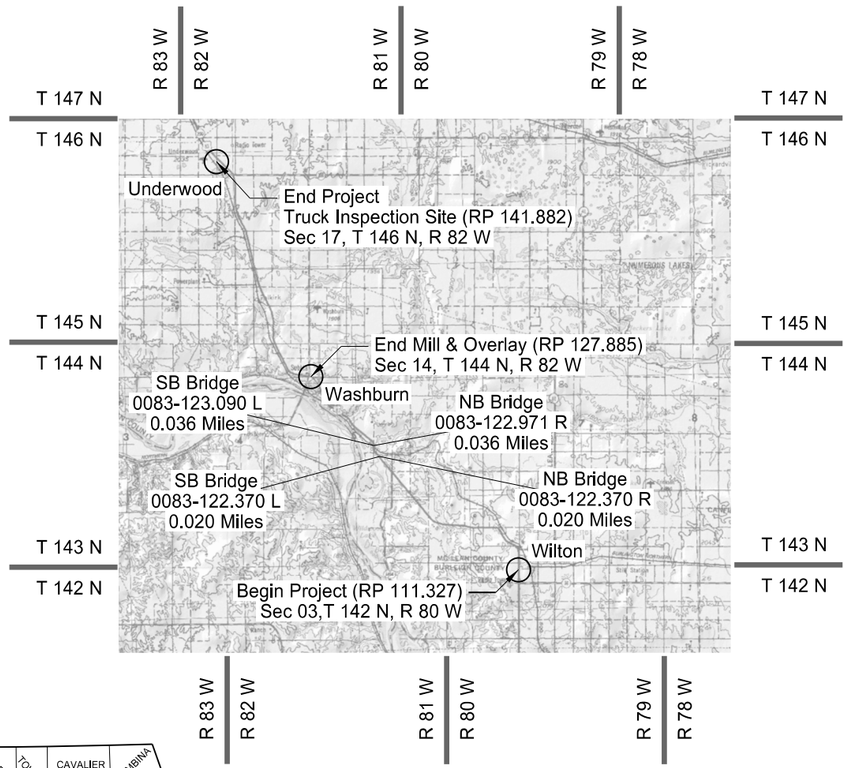
JOB # 15
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

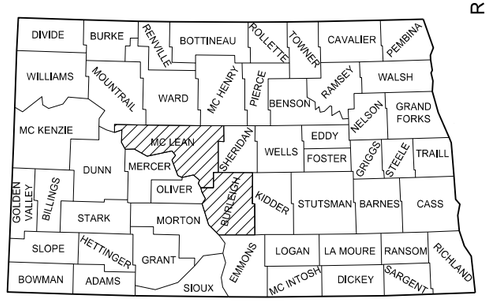
SNH-1-083(111)111

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
SNH-1-083(111)111	16.502	30.555

McLean & Burleigh County
US 83 Wilton to Underwood
RP 111.327 - RP 141.882
Mill & HMA Overlay





STATE COUNTY MAP

DESIGNERS

Aaron Murra

Joe Wagner

APPROVED DATE 3/10/16

Roger Weigel
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 3/10/16

James Rath
NDDOT - DESIGN DIVISION

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3/10/2016 4:11:10 PM jmwagner R:\project\10083111.111\design\DOTSC\Plan\001TS_001_TITLE.dgn

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	2	1

INDEX OF DRAWINGS

SPECIAL PROVISIONS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	2	2

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LIST OF STANDARD DRAWINGS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	4	1

End Project
Truck Inspection Site (RP 141.882)
Sec 17,T 146 N, R 82 N

Exception Area

End Mill & Overlay (RP 127.885)
Sec 14, T 144 N, R 82 W

Subcut RP 125.872 SB
(RP 125.881 to 125.863)

Subcut RP 120.043 NB
(RP 120.033 to 120.052)

Subcut RP 117.413 SB
(RP 117.422 to 117.403)

Subcut RP 114.417 NB
(RP 114.407 to 114.426)

Begin Project
Begin Mill & Overlay (RP 111.327)
Sec 03, T 142 N, R 80 W

Underwood
Falkirk
Washburn
Wilton
Powerplant
NUMEROUS LAKES
BURLEIGH COUNTY
MCLEAN COUNTY
LEWIS AND CLARK TRAIL

R 83 W
R 82 W
R 81 W
R 80 W
R 79 W

T 146 N
T 145 N
T 144 N
T 143 N
T 142 N

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Scope of Work

Wilton to Underwood
US 83 - HMA Mill & Overlay

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	6	1

NOTES

107-710 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."

302-P01 TEMPORARY AGGREGATE WEDGES: Place temporary aggregate wedges at subcut locations prior to the placement of pavement. Include all costs with installing, removing, & maintaining wedges in the price bid for "Aggregate Base Course CL 5."

411-P01 TEMPORARY ASPHALT WEDGES: Place temporary asphalt wedges at milled locations. Do not use milled bituminous material as wedges. The wedges will measure at least 4 feet in length for a 2" milling transition. Include all costs associated with installing, removing, and maintaining wedges in the price bid for "Milling Pavement Surface."

411-P02 WEIGH-IN-MOTION (WIM): A WIM site is located within the project limits at RP 120.6. The loops and sensors in both roadways will be disconnected by the Department. This equipment will be abandoned in the roadway.

411-P03 MILLED MATERIAL: Use the milled bituminous material and material from sub-cut locations as recycle for "RAP - Superpave FAA 45." Handle excess millings as follows:

76 tons used as "Aggregate Base Course CL 5" at the approach locations shown in Section 20.

Remainder to the NDDOT - Underwood Maintenance Yard (N edge of Underwood). Contractor will provide a loader and an operator to stockpile the millings at this location.

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 6-mile limitation for each direction (12-miles total) and the list below. Provide additional devices at no cost to the Department.

1. Standard D-704-22, layouts K and L;
2. Standard D-704-26, layouts CC, EE, and GG; and
3. Standard D-704-34.

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."

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	6	2

ENVIRONMENTAL COMMITMENTS

ENVIRONMENTAL COMMITMENTS (EC): The North Dakota Department of Transportation and the Federal Highway Administration have 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.							
TOTALS:				0		0	0

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
202	0121	REMOVE & SALVAGE BITUMINOUS SURFACING	TON	4,706	4,706
203	0109	TOPSOIL	CY	952	952
203	0138	COMMON EXCAVATION-SUBCUT	CY	4,044	4,044
251	0200	SEEDING CLASS II	ACRE	1.56	1.56
251	2000	TEMPORARY COVER CROP	ACRE	1.56	1.56
253	0101	STRAW MULCH	ACRE	3.12	3.12
302	0120	AGGREGATE BASE COURSE CL 5	TON	12,623	12,623
401	0050	TACK COAT	GAL	70,482	70,482
411	0105	MILLING PAVEMENT SURFACE	SY	617,537	617,537
430	0145	RAP - SUPERPAVE FAA 45	TON	109,354	109,354
430	1000	CORED SAMPLE	EA	738	738
430	6428	PG 64-28 ASPHALT CEMENT	TON	4,702	4,702
702	0100	MOBILIZATION	L SUM	1	1
704	0100	FLAGGING	MHR	1,200	1,200
704	1000	TRAFFIC CONTROL SIGNS	UNIT	4,609	4,609
704	1052	TYPE III BARRICADE	EA	28	28
704	1060	DELINEATOR DRUMS	EA	118	118
704	1067	TUBULAR MARKERS	EA	528	528
704	1080	STACKABLE VERTICAL PANELS	EA	8	8
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	4	4
706	0550	BITUMINOUS LABORATORY	EA	1	1
706	0600	CONTRACTOR'S LABORATORY	EA	1	1
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	4,209	4,209
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	78	78
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	198	198
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	753	753
754	0214	GALV STEEL POSTS-W-SHAPE POSTS(TWO OR MORE)	LF	124	124
754	0534	PANEL FOR SIGNS-TYPE IV REFLECTIVE SHEETING	SF	143	143
754	0592	RESET SIGN PANEL	EA	1	1
754	1104	REMOVE SIGN FOUNDATION	EA	2	2
760	0005	RUMBLE STRIPS - ASPHALT SHOULDER	MILE	52.942	52.942
762	0112	EPOXY PVMT MK MESSAGE	SF	1,536	1,536

ESTIMATE NUMBER: 16626 RUN DATE: 03/09/2016 TIME: 10:21:49

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	8	2

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
762	0113	EPOXY PVMT MK 4IN LINE	LF	393,418	393,418
762	0115	EPOXY PVMT MK 8IN LINE	LF	12,170	12,170
762	0117	EPOXY PVMT MK 24IN LINE	LF	36	36
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	131,142	131,142
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	1	1
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	13	13
764	2081	REMOVE END TREATMENT & TRANSITION	EA	1	1

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	10	1

Description	Unit	NB Length = 868.262 Sta RP 111.327 to RP 127.885			NB Paving Transitions Length= 1 Sta/Ea Begin Project End Project		Length= 1 Sta/Ea Begin Bridge End Bridge	
		Width(ft)	Quantity/Sta		Width(ft)	Quantity	Width(ft)	Quantity
Milling Pavement Surface	SY	30	334.54		30	334.54	30	334.54
Tack Coat @ 0.05 Gal/SY (1st lift)	Gal	25	13.89		25	13.89	24	13.89
Tack Coat @ 0.05 Gal/SY (2nd lift)	Gal	27	15.00		27	15.00	24	15.00
RAP - Superpave FAA 45	Ton	26.1	48.30		26.1	42.34	24	42.34
PG 64-28 Asphalt Cement @ 4.3% of HBP	Ton		2.08			2.08		2.08
Tack Coat @ 0.05 Gal/SY (Shldr)	Gal	7.5	4.17		7.5	4.17	11	4.17
RAP - Superpave FAA 45	Ton	7.2	10.60		7.2	10.60	9.3	10.60
PG 64-28 Asphalt Cement @ 4.3% of HBP	Ton		0.46			0.46		0.46

HBP Cored Samples							
	A	B	C	D			
Specification Section	Distance (Ft) /2000	Lanes	Lifts	Sublots (AxBxC)	Quantity (Dx2)	Quantity (1 per mile)	Unit
430.04 I.2.b(1), "General"	44.0	2	2.0	176.0	352	-	EA
430.04 I.2.b(2), "Pavement Thickness Determination Cores"					N/A	17	EA
				Total	369		EA

Permanent Pavement Marking			
Location - Type	Basis	Quantity	Total
Centerline - Epoxy Pvmt MK 4 IN Line	1,320 LF/mile	21,857	196,709 LF
Edge Line Yellow - Epoxy Pvmt MK 4 IN Line	5,280 LF/mile	87,426	
Edge Line White - Epoxy Pvmt MK 4 IN Line	5,280 LF/mile	87,426	
Epoxy Pvmt Message	Right/Left Arrows - 16 SF/EA	960	960 SF
Epoxy Pvmt Mk 8 IN Line	5,280 LF/mile	8,280	8,280 LF
Epoxy Pvmt Mk 24 IN Line	5,280 LF/mile	24	24 LF

Short Term 4 IN Line - Type NR		
Location	Basis	Quantity
Centerline - Top of Milled Surace	Centerline Skips 1,320 LF/mile	21,857
Centerline - Top of 1st Lift	Centerline Skips 1,320 LF/mile	21,857
Centerline - Top of 2nd Lift	Centerline Skips 1,320 LF/mile	21,857
	Total	65,571 LF

Rumble Strips - Asphalt Shoulder	
Right Shoulder - 5,280 LF/mile	13.224
Left Shoulder - 5,280 LF/mile	13.224
Total	26.448 Mile

Milled Bituminous Material Available	
Mainline	14,602
Lt Turn Lanes	400
Rt Turn Lanes	596
Total	15,598 TON

Salvaged Bituminous Needed For:	
20% RAP for RHBP	11,016 TON

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Basis of Estimate

Northbound

Wilton to Underwood
US 83 - HMA Mill & Overlay

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	10	2

Description	Unit	SB Length = 868.262 Sta RP 111.327 to RP 127.885			SB Paving Transitions Length= 1 Sta/Ea Begin Project End Project		Length= 1 Sta/Ea Begin Bridge End Bridge	
		Width(ft)	Quantity/Sta		Width(ft)	Quantity	Width(ft)	Quantity
Milling Pavement Surface	SY	30	334.54		30	334.54	30	334.54
Tack Coat @ 0.05 Gal/SY (1st lift)	Gal	25	13.89		25	13.89	24	13.89
Tack Coat @ 0.05 Gal/SY (2nd lift)	Gal	27	15.00		27	15.00	24	15.00
RAP - Superpave FAA 45	Ton	26.1	48.30		26.1	42.34	24	42.34
PG 64-28 Asphalt Cement @ 4.3% of HBP	Ton		2.08			2.08		2.08
Tack Coat @ 0.05 Gal/SY (Shldr)	Gal	7.5	4.17		7.5	4.17	11	4.17
RAP - Superpave FAA 45	Ton	7.2	10.60		7.2	10.60	9.3	10.60
PG 64-28 Asphalt Cement @ 4.3% of HBP	Ton		0.46			0.46		0.46

HBP Cored Samples							
	A	B	C	D			
Specification Section	Distance (Ft) /2000	Lanes	Lifts	Sublots (AxBxC)	Quantity (Dx2)	Quantity (1 per mile)	Unit
430.04 I.2.b(1), "General"	44.0	2	2.0	176.0	352	-	EA
430.04 I.2.b(2), "Pavement Thickness Determination Cores"					N/A	17	EA
				Total	369		EA

Permanent Pavement Marking			
Location - Type	Basis	Quantity	Total
Centerline - Epoxy Pvmt MK 4 IN Line	1,320 LF/mile	21,857	196,709 LF
Edge Line Yellow - Epoxy Pvmt MK 4 IN Line	5,280 LF/mile	87,426	
Edge Line White - Epoxy Pvmt MK 4 IN Line	5,280 LF/mile	87,426	
Epoxy Pvmt Message	Right/Left Arrows - 16 SF/EA	576	576 SF
Epoxy Pvmt Mk 8 IN Line	5,280 LF/mile	3,890	3,890 LF
Epoxy Pvmt Mk 24 IN Line	5,280 LF/mile	12	12 LF

Short Term 4 IN Line - Type NR		
Location	Basis	Quantity
Centerline - Top of Milled Surace	Centerline Skips 1,320 LF/mile	21,857
Centerline - Top of 1st Lift	Centerline Skips 1,320 LF/mile	21,857
Centerline - Top of 2nd Lift	Centerline Skips 1,320 LF/mile	21,857
	Total	65,571 LF

Rumble Strips - Asphalt Shoulder	
Right Shoulder - 5,280 LF/mile	13.247
Left Shoulder - 5,280 LF/mile	13.247
Total	26.494 Mile

Milled Bituminous Material Available	
Mainline	14,276
Lt Turn Lanes	390
Rt Turn Lanes	157
Total	14,823 TON

Salvaged Bituminous Needed For:	
20% RAP for RHBP	10,856 TON

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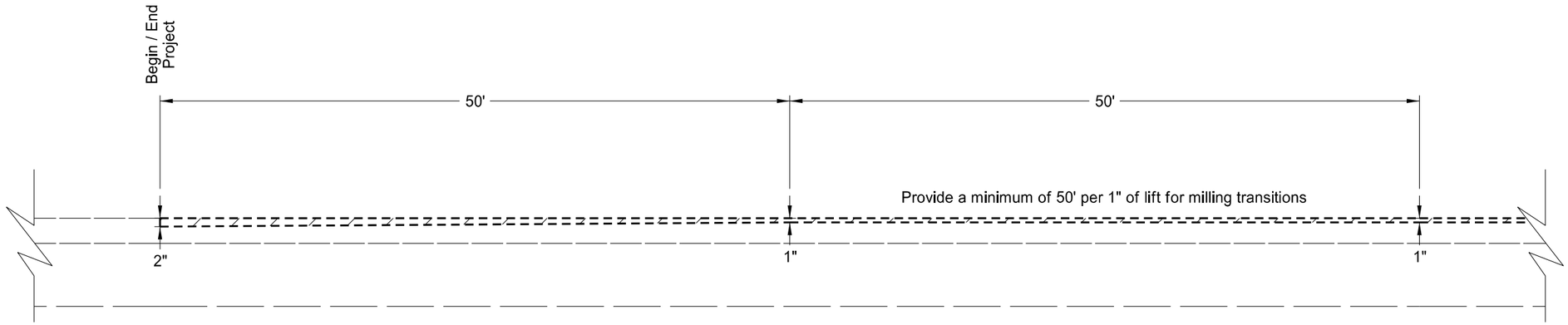
Basis of Estimate

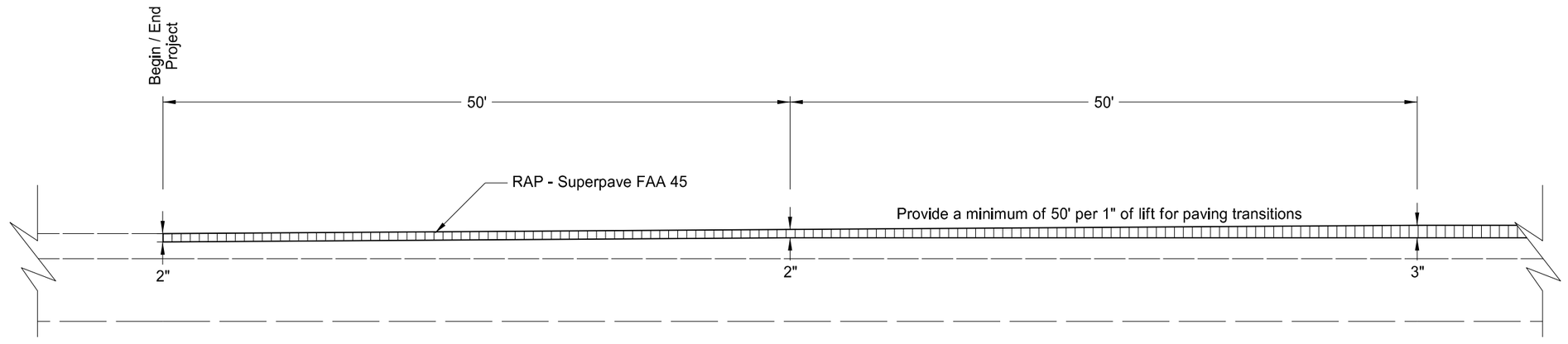
Southbound

Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	20	1



Milling Transition



Paving Transition

NOTE: Drawing is not to scale

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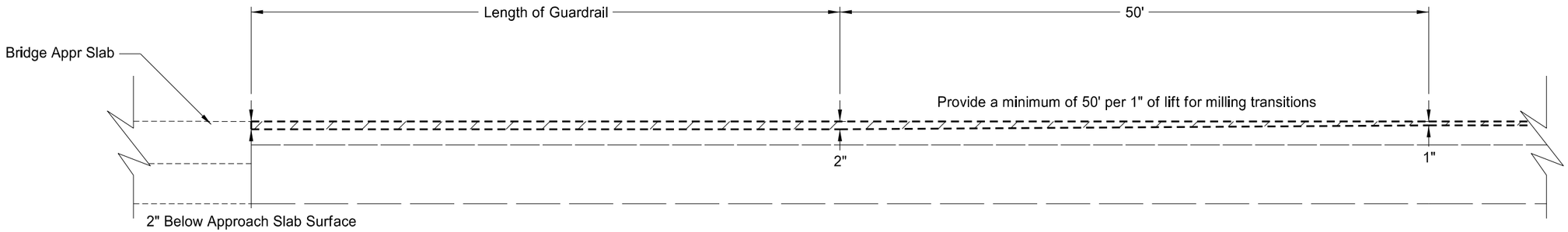
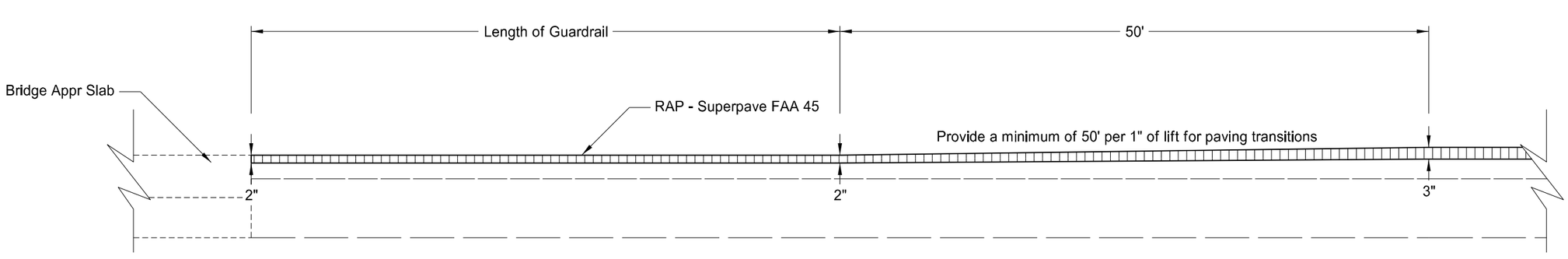
Milling and Paving Transitions at Begin/End of the Project

RP 111.327 and RP 127.885
Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	20	2



Milling Transition



Paving Transition

NOTE: Drawing is not to scale

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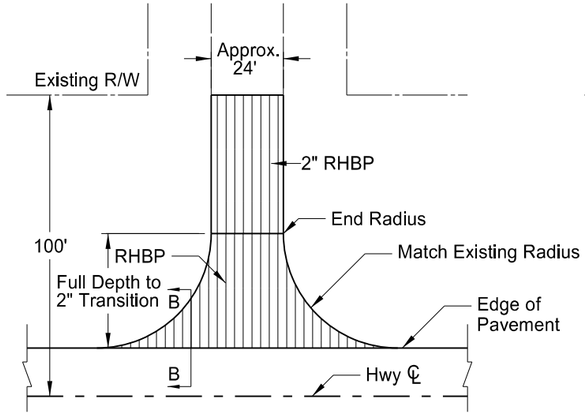
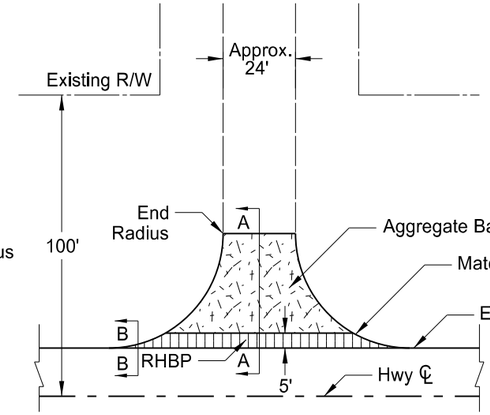
Milling and Paving Transitions at Bridges

RP 122.176 and RP 122.875
Wilton to Underwood
US 83 - HMA Mill & Overlay

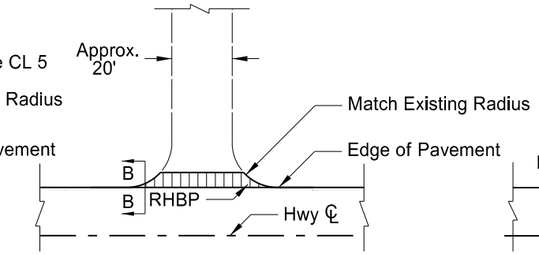
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	20	3



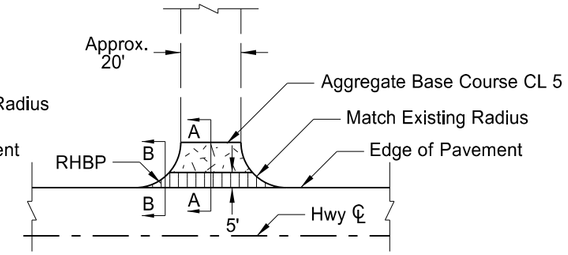
(1) Paved Section Line, County Road, or Street Approach



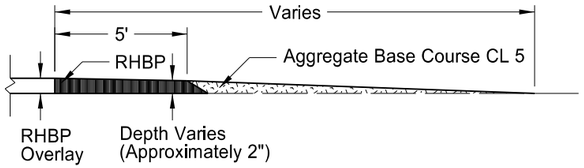
(2) Gravel Section Line, County Road, or Street Approach



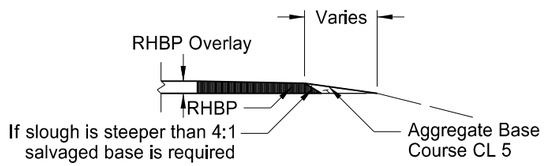
(3) Paved Private Drive Approach



(4) Gravel Private Drive or Field Drive Approach



Section A-A



Section B-B

Notes:

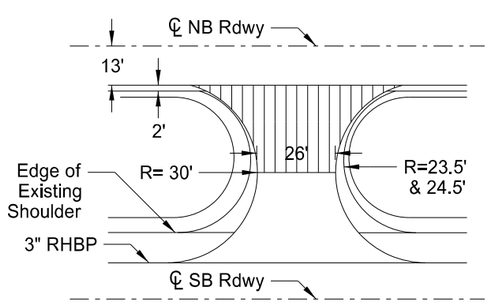
1. A longer HBP wedge may be needed if an existing elevation difference between the mainline and the approach exists. Actual HBP paving and salvaged base locations may vary in the field for situations, as approved by the Engineer.

2. Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.

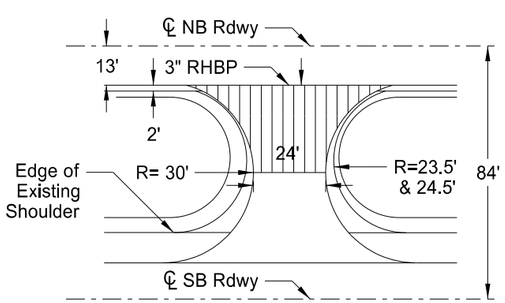
3. Approximately 100 tons of Aggregate Base Course CL 5 have been provided to fill in around the radii. This material will be required when sloughs are steeper than 4:1. See B-B.

BASIS OF ESTIMATE		1	2	3	4	5	6	7	
ITEM	UNIT	Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Field/ Private Drive	Section Line X-Over	Private Drive X-Over	Field Drive X-Over	TOTALS
Number of Locations	#	9	1	1	23	14	34	1	83
*Aggregate Base Course CL 5	TON	N/A	7	N/A	0.999	N/A	N/A	1	31
Tack Coat	GAL	15	2	0.959	0.959	2	2	N/A	233
RAP - Superpave FAA 45	TON	33	5	1	2	2	2	N/A	438
PG 64-28 Asphalt Cement	TON	1	0.205	0.047	0.095	0.079	0.076	N/A	19
Milling Pavement	SY	293	N/A	N/A	N/A	N/A	N/A	N/A	2,636

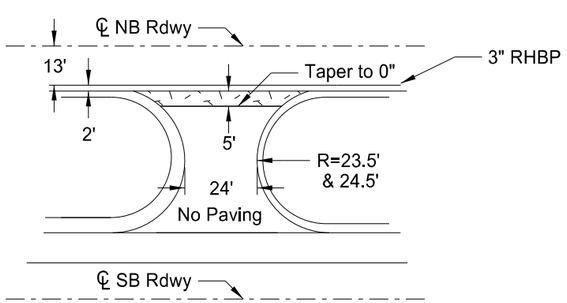
*See Section 6



(5) Section Line X-Over



(6) Private Drive Line X-Over



(7) Field Drive Line X-Over

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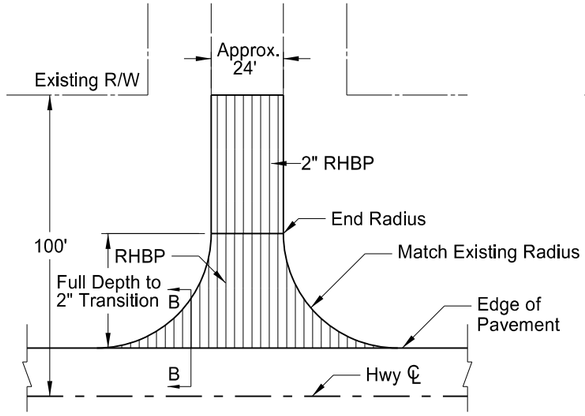
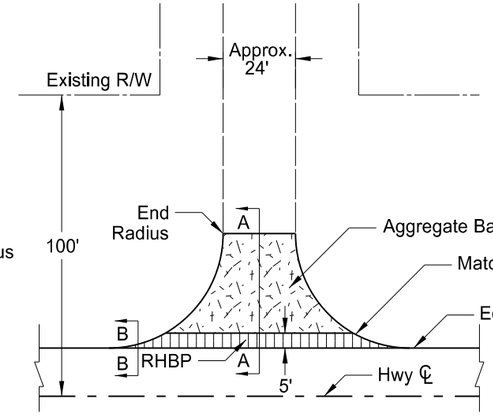
Approach Paving Details
Northbound

Wilton to Underwood
US 83 - HMA Mill & Overlay

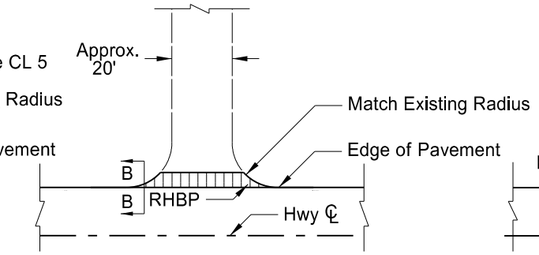
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	20	4



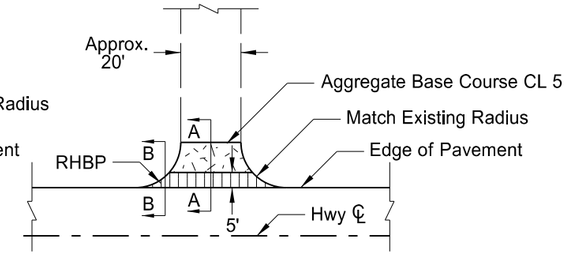
(1) Paved Section Line, County Road, or Street Approach



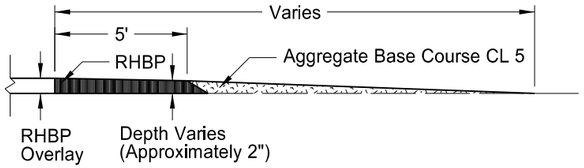
(2) Gravel Section Line, County Road, or Street Approach



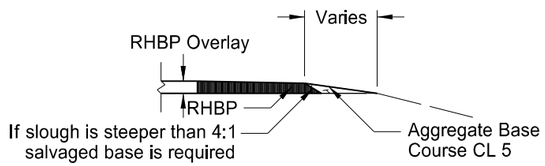
(3) Paved Private Drive Approach



(4) Gravel Private Drive or Field Drive Approach



Section A-A



Section B-B

Notes:

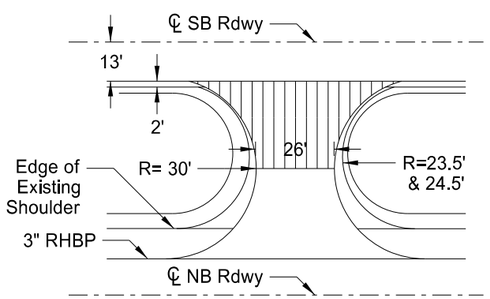
1. A longer HBP wedge may be needed if an existing elevation difference between the mainline and the approach exists. Actual HBP paving and salvaged base locations may vary in the field for situations, as approved by the Engineer.

2. Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.

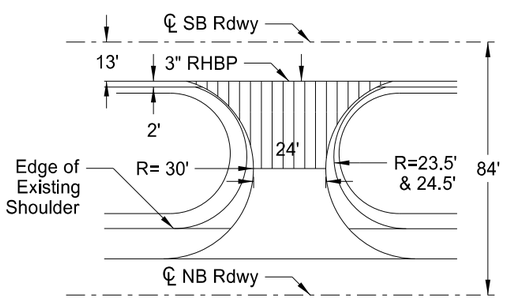
3. Approximately 100 tons of Aggregate Base Course CL 5 have been provided to fill in around the radii. This material will be required when sloughs are steeper than 4:1. See B-B.

BASIS OF ESTIMATE		1	2	3	4	5	6	7	
ITEM	UNIT	Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Field/ Private Drive	Section Line X-Over	Private Drive X-Over	Field Drive X-Over	TOTALS
Number of Locations	#	9	2	5	30	13	33	1	93
*Aggregate Base Course CL 5	TON	N/A	7	N/A	0.999	N/A	N/A	1	45
Tack Coat	GAL	15	2	0.959	0.959	2	2	N/A	243
RAP - Superpave FAA 45	TON	33	5	1	2	2	2	N/A	459
PG 64-28 Asphalt Cement	TON	1	0.205	0.047	0.095	0.079	0.076	N/A	20
Milling Pavement	SY	293	N/A	N/A	N/A	N/A	N/A	N/A	2,636

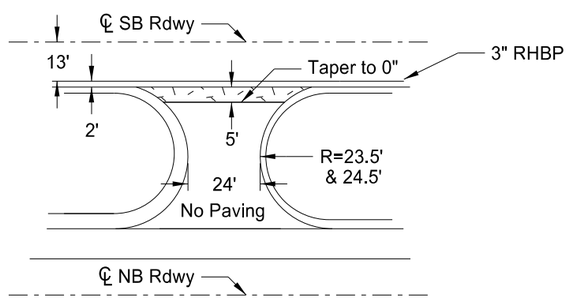
*See Section 6



(5) Section Line X-Over



(6) Private Drive Line X-Over



(7) Field Drive Line X-Over

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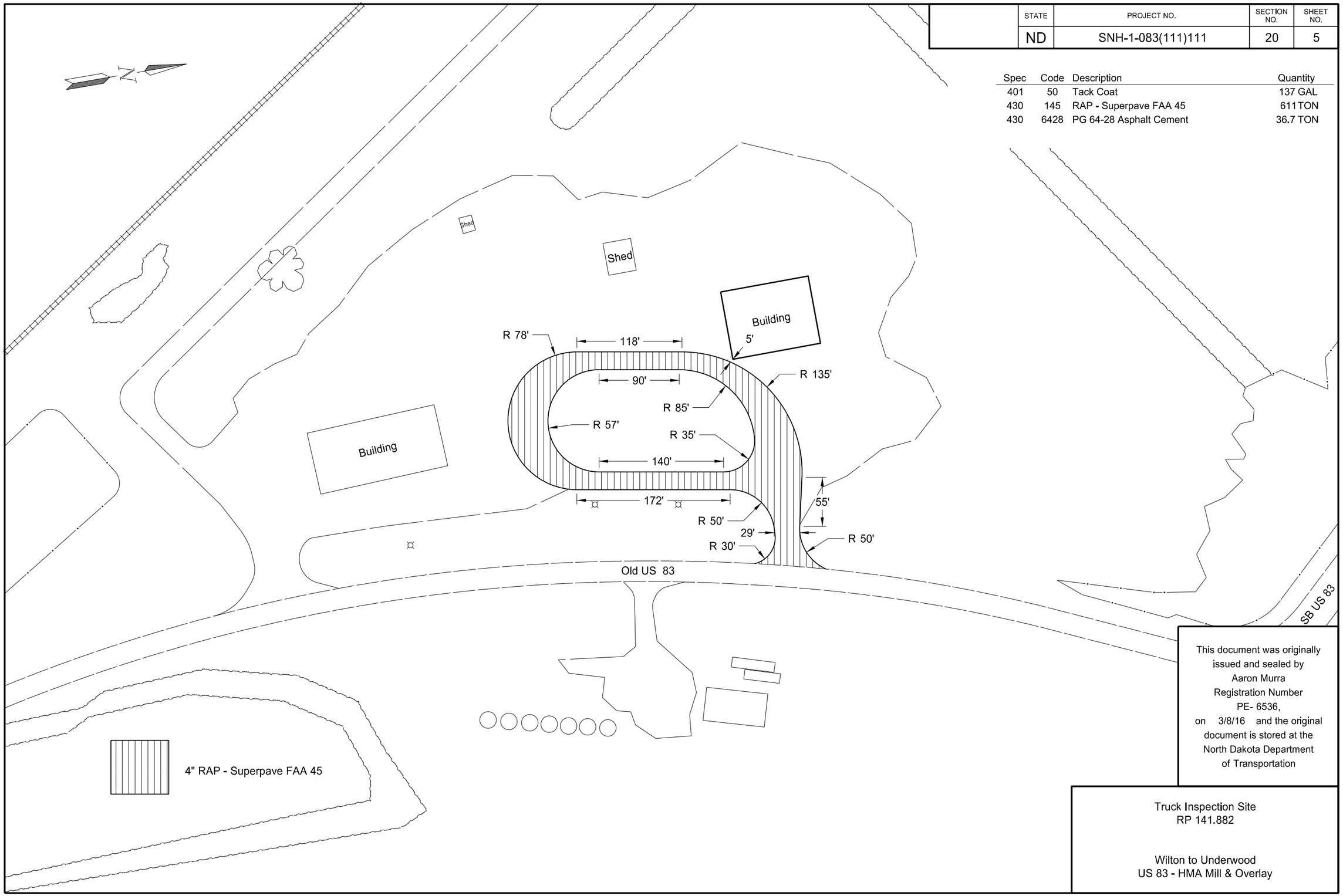
Approach Paving Details
Southbound

Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	20	5

Spec	Code	Description	Quantity
401	50	Tack Coat	137 GAL
430	145	RAP - Superpave FAA 45	611 TON
430	6428	PG 64-28 Asphalt Cement	36.7 TON



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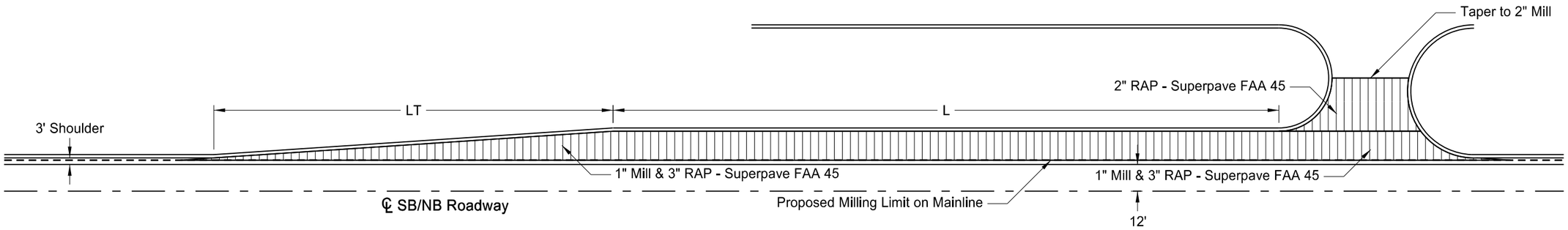
Truck Inspection Site
RP 141.882

Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	20	6



			1" Mill and 3" RAP - Superpave FAA 45					Taper 2" and 2" RAP - Superpave FAA 45			
Left Turn Lane	L (FT)	LT (LF)	Mill (SY)	1st LiftTack (GAL)	2nd Lift, Tack (GAL)	RHBP (TON)	PG (TON)	Mill (SY)	Tack (GAL)	RHBP (TON)	PG (TON)
RP 111.67 NB	360	150	668.5	33	33	111.4	6.68	108.3	7	12.0	0.72
RP 121.26 NB	375	180	687.0	34	34	114.5	6.87	108.3	7	12.0	0.72
RP 121.83 NB	310	165	587.0	29	29	97.8	5.87	108.3	7	12.0	0.72
RP 126.17 NB	345	215	723.4	36	36	120.6	7.23	108.3	7	12.0	0.72
RP 126.57 NB	350	180	721.7	36	36	120.3	7.22	108.3	7	12.0	0.72
RP 126.79 NB	340	160	714.1	36	36	119.0	7.14	108.3	7	12.0	0.72
RP 127.15 NB	355	200	710.3	36	36	118.4	7.10	108.3	7	12.0	0.72
RP 127.40 NB	375	240	735.0	37	37	122.5	7.35	108.3	7	12.0	0.72
RP 127.59 NB	350	180	678.2	34	34	113.0	6.78	108.3	7	12.0	0.72
RP 111.53 SB	375	160	909.0	45	45	151.5	9.09	108.3	7	12.0	0.72
RP 111.67 SB	330	170	772.3	39	39	128.7	7.72	108.3	7	12.0	0.72
RP 111.97 SB	340	200	653.7	33	33	108.9	6.54	108.3	7	12.0	0.72
RP 112.71 SB	270	200	560.5	28	28	93.4	5.61	108.3	7	12.0	0.72
RP 123.00 SB	605	180	987.0	49	49	164.5	9.87	108.3	7	12.0	0.72
RP 126.57 SB	270	180	629.8	31	31	105.0	6.30	108.3	7	12.0	0.72
RP 126.79 SB	205	115	445.3	22	22	74.2	4.45	108.3	7	12.0	0.72
RP 127.15 SB	230	190	595.2	30	30	99.2	5.95	108.3	7	12.0	0.72
RP 127.59 SB	240	130	468.6	23	23	78.1	4.69	108.3	7	12.0	0.72

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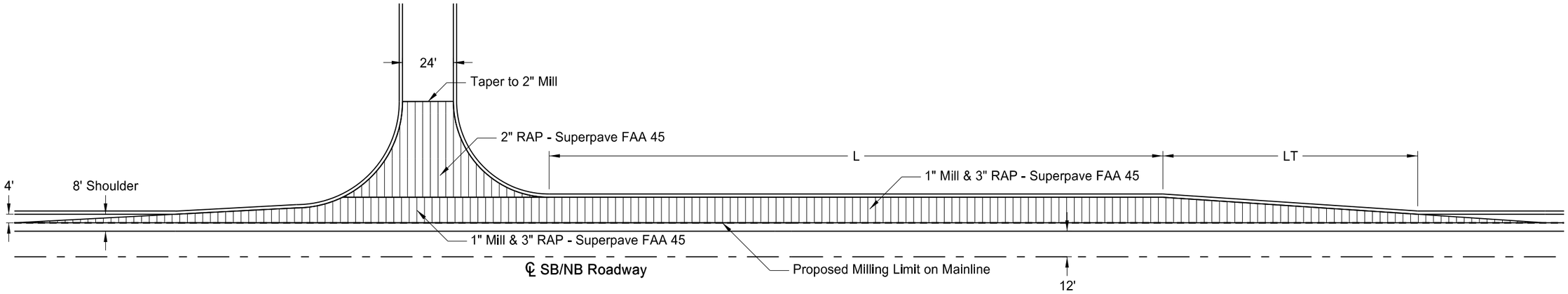
Left Turn Lane Detail

Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	20	7



			1" Mill and 3" RAP - Superpave FAA 45					Taper 2" and 2" RAP - Superpave FAA 45			
Right Turn Lane	L (FT)	LT (LF)	Mill (SY)	1st Lift, Tack (GAL)	2nd Lift, Tack (GAL)	RHBP (TON)	PG (TON)	Mill (SY)	Tack (GAL)	RHBP (TON)	PG (TON)
RP 111.53 NB	330	250	1427.8	71	71	238.0	14.28	208.5	10	23.2	1.39
RP 111.67 NB	350	150	678.7	34	34	113.1	6.79	208.5	10	23.2	1.39
RP 111.97 NB	355	200	716.1	36	36	119.4	7.16	208.5	10	23.2	1.39
RP 112.71 NB	335	165	753.3	38	38	125.5	7.53	208.5	10	23.2	1.39
RP 121.26 NB	350	180	717.1	36	36	119.5	7.17	208.5	10	23.2	1.39
RP 123.00 NB	335	130	619.3	31	31	103.2	6.19	208.5	10	23.2	1.39
RP 126.57 NB	355	180	760.5	38	38	126.8	7.61	208.5	10	23.2	1.39
RP 126.79 NB	345	215	697.1	35	35	116.2	6.97	208.5	10	23.2	1.39
RP 127.15 NB	350	200	705.7	35	35	117.6	7.06	208.5	10	23.2	1.39
RP 127.40 NB	345	200	699.8	35	35	116.6	7.00	208.5	10	23.2	1.39
RP 127.59 NB	360	180	659.3	33	33	109.9	6.59	208.5	10	23.2	1.39
RP 121.26 SB	365	210	800.3	40	40	133.4	8.00	208.5	10	23.2	1.39
RP 126.57 SB	350	215	754.4	38	38	125.7	7.54	208.5	10	23.2	1.39
RP 127.15 SB	330	145	649.9	32	32	108.3	6.50	208.5	10	23.2	1.39

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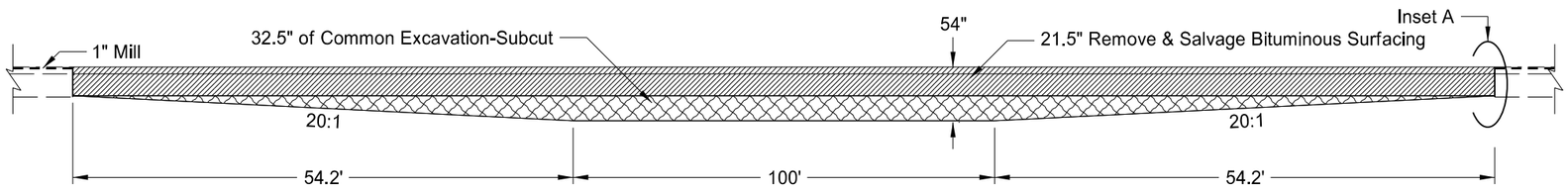
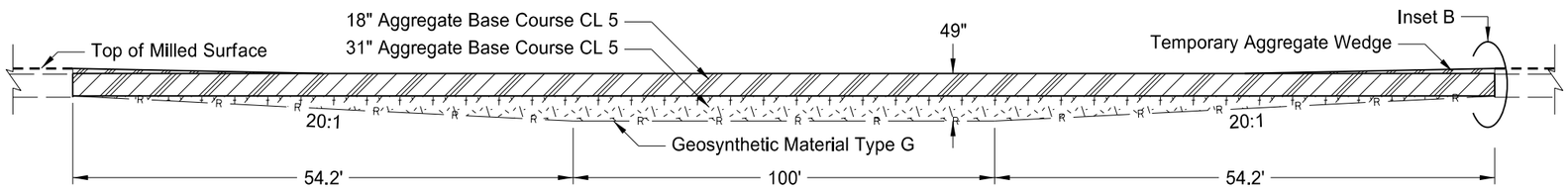
Right Lane Detail

Wilton to Underwood
US 83 - HMA Mill & Overlay

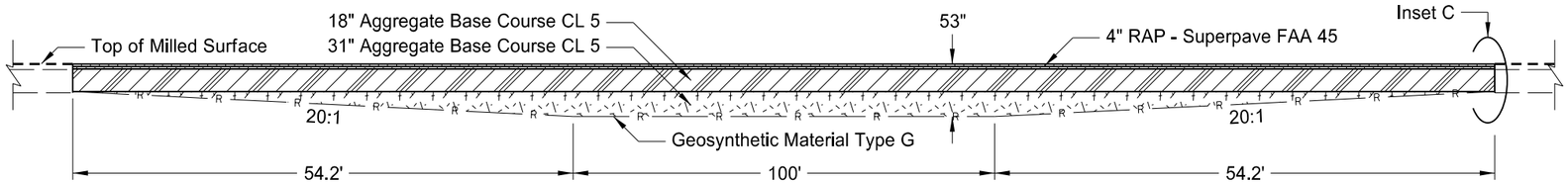
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	20	8



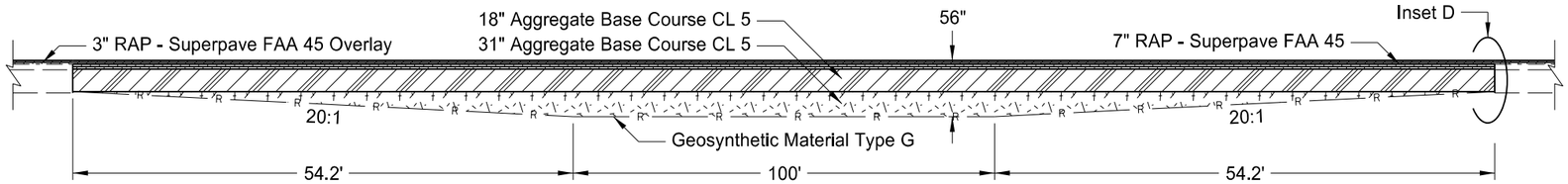
Subcut Removal Detail



Proposed Subcut before paving



Proposed Subcut before 3" Overlay

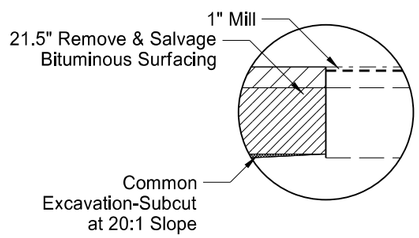


Proposed Subcut after 3" Overlay

Spec	Code	Description	Quantity
202	121	Remove & Salvage Bituminous Surfacing	2,791 TON
		RP 114.417 NB, 117.413 SB, 120.043 NB	920 TON
		RP 125.872 SB	1,871 TON
203	109	Topsoil (Four Locations @ 238 CY Per Location)	952 CY
203	138	Common Excavation-Subcut	1,804 CY
		RP 114.417 NB, 117.413 SB, 120.043 NB	1,120 CY
		RP 125.872 SB	685 CY
251	200	Seeding Class II (Four Locations @ 0.390 ACRE Per Location)	1.560 ACRE
251	2000	Temporary Cover Crop (Four Locations @ 0.390 ACRE Per Location)	1.560 ACRE
253	101	Straw Mulch (Four Locations @ 0.780 ACRE Per Location)	3.120 ACRE
302	120	Aggregate Base Course CL 5 (Four Locations @ 3087 TON Per Location)	12,348 TON
*401	50	Tack Coat (Four Locations @ 40 GAL Per Location)	160 GAL
*430	145	RAP-Superpave FAA 45 (Four Locations @ 179 TON Per Location)	716 TON
*430	6428	PG 64-28 Asphalt Cement (Four Locations @ 8 TON Per Location)	32 TON
709	100	Geosynthetic Material Type G (Four Locations @ 1052 SY Per Location)	4,209 SY

*Quantities for 4" of HMA below 1" mill

Inset A



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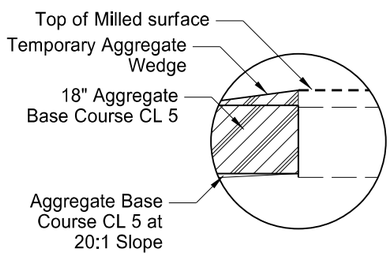

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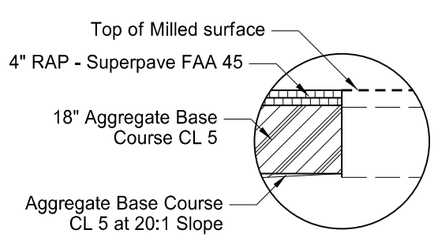

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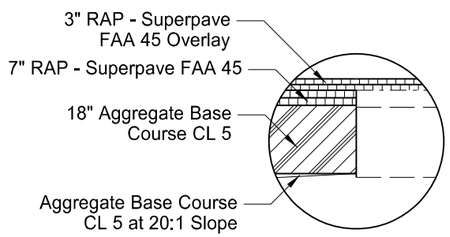

Not to scale

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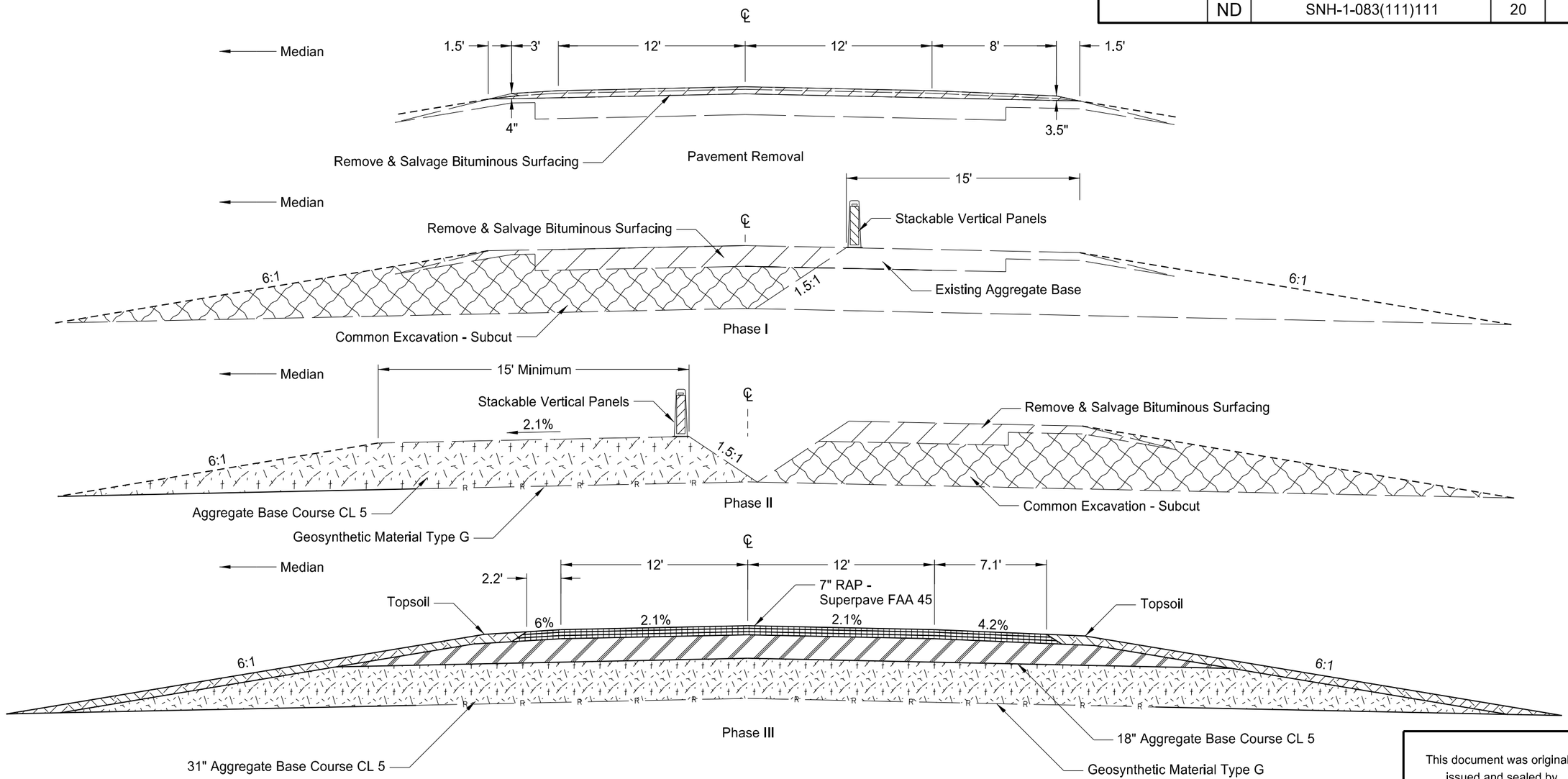
Subcut Details
RP 114.417 NB, RP 117.413 SB
RP 120.043 NB, RP 125.872 SB

Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	20	9



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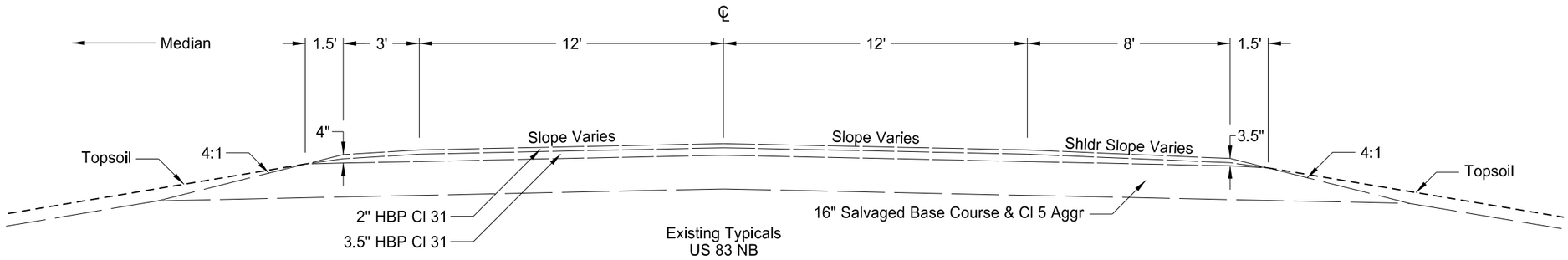
Construction Phases for Subcut Areas
RP 114.417 NB, 117.413 SB,
120.043 NB, 125.872 SB

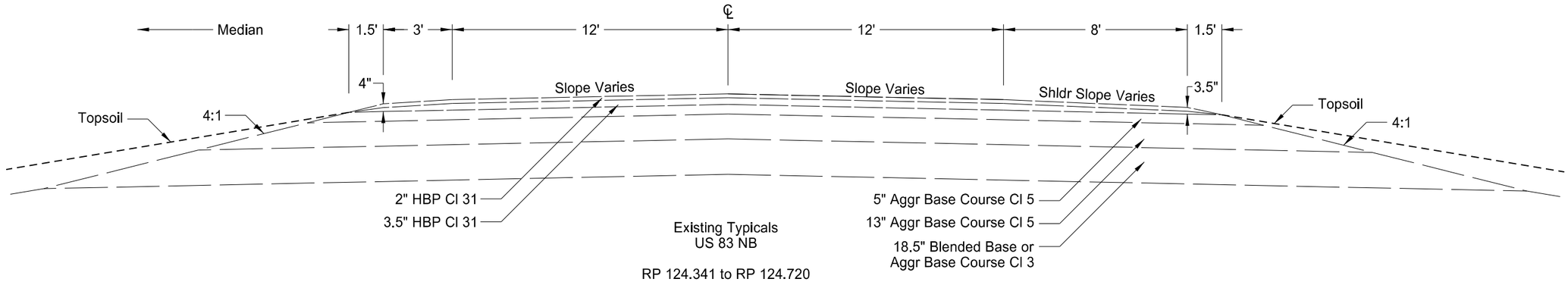
Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	1



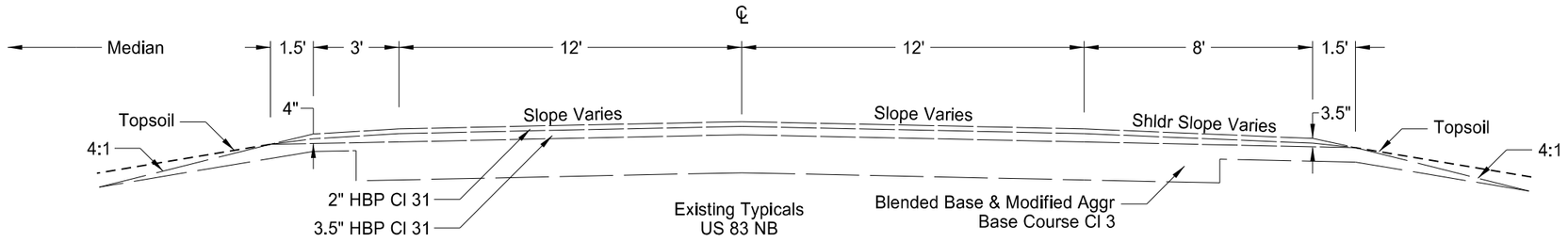
Existing Typicals
US 83 NB

RP 121.827 to RP 123.370



Existing Typicals
US 83 NB

RP 124.341 to RP 124.720



Existing Typicals
US 83 NB

RP 111.344 to RP 121.827
RP 123.370 to RP 124.341
RP 124.720 to RP 128.179

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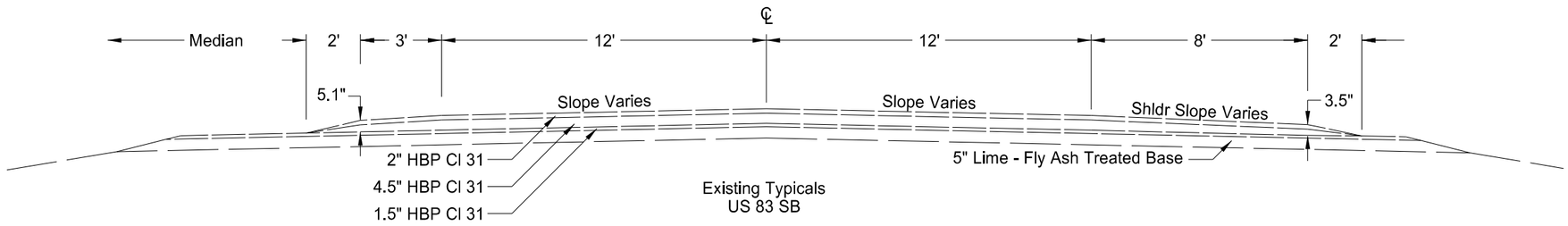
Existing Typical Sections
Northbound

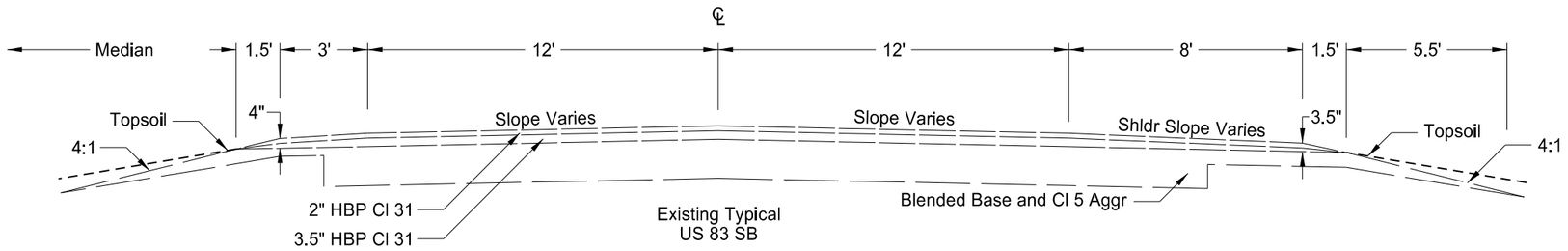
Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	2



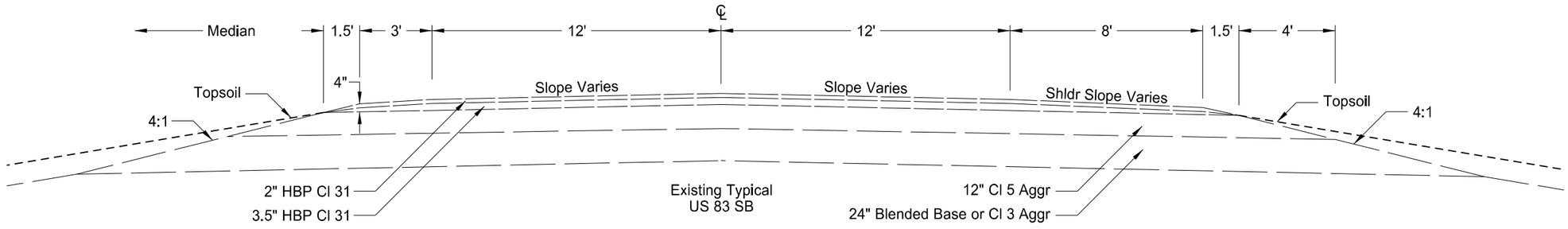
Existing Typicals
US 83 SB

RP 128.179 to RP 126.000



Existing Typical
US 83 SB

RP 125.331 to RP 123.984
RP 123.747 to RP 123.390
RP 122.085 to RP 111.344



Existing Typical
US 83 SB

RP 126.000 to RP 125.331
RP 124.647 to RP 124.504
RP 123.984 to RP 123.747
RP 123.390 to RP 122.085

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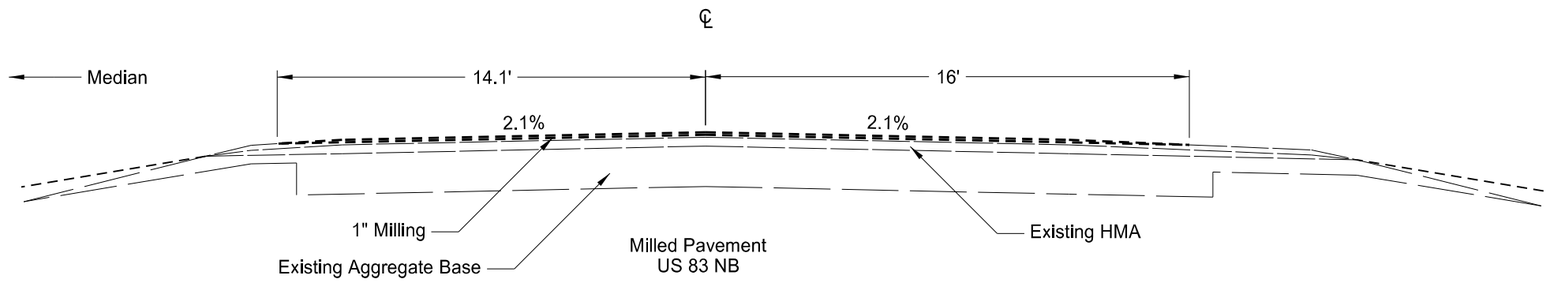
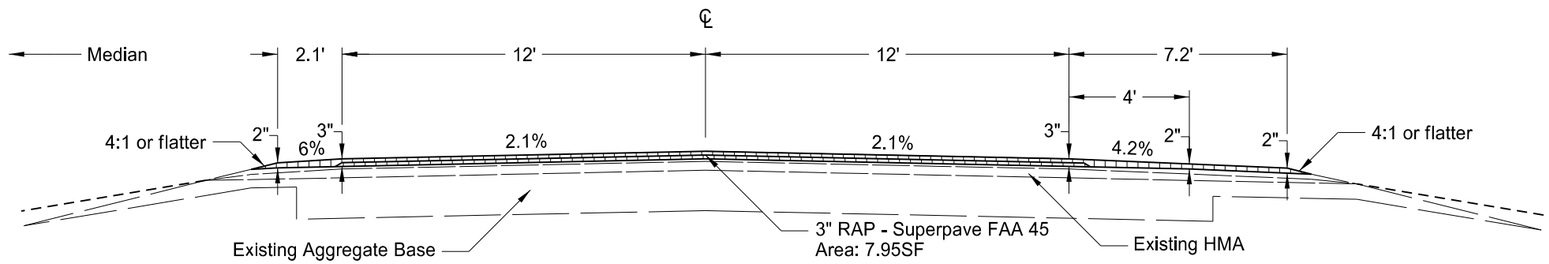
Existing Typical Sections
Southbound

Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	3



RP 111.344 to RP 121.827
RP 123.370 to RP 124.341
RP 124.720 to RP 128.179



Proposed Typical Section
US 83 NB

RP 111.344 to RP 121.827
RP 123.370 to RP 124.341
RP 124.720 to RP 128.179

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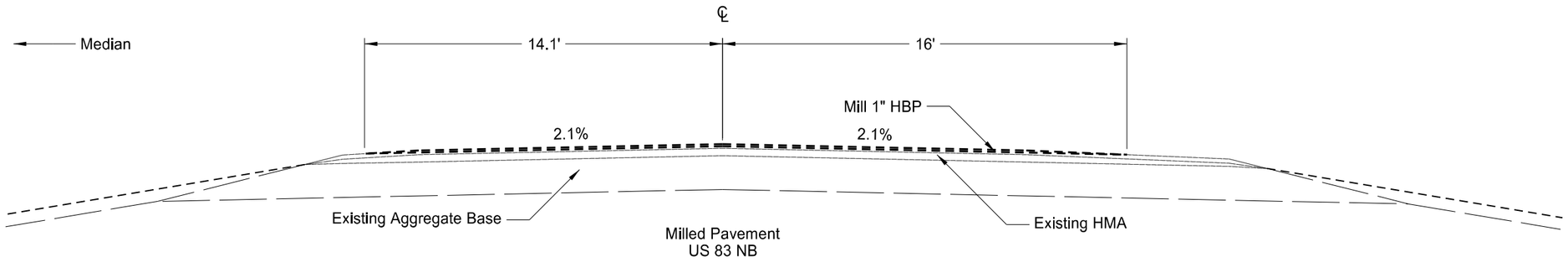
Proposed Typical Sections
Northbound

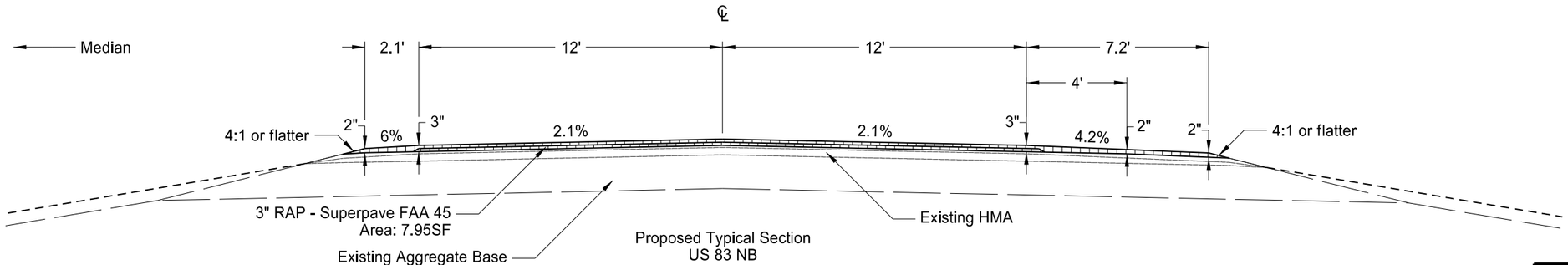
Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	4



Milled Pavement
US 83 NB

RP 121.827 to RP 123.370



Proposed Typical Section
US 83 NB

RP 121.827 to RP 123.370

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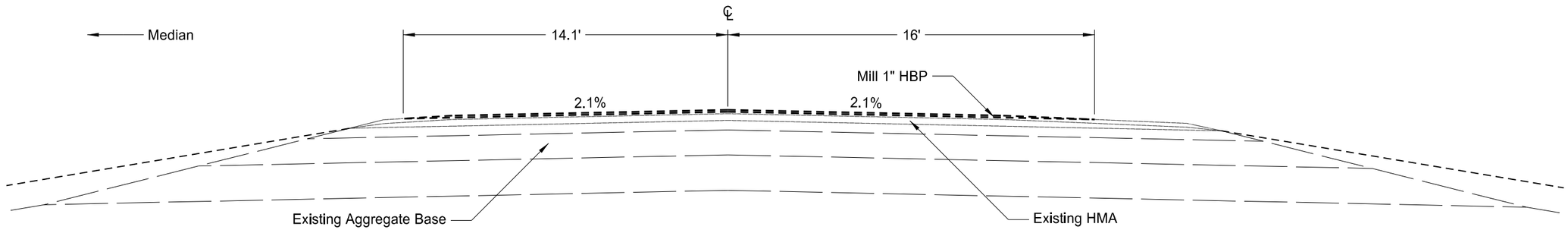
Proposed Typical Sections
Northbound

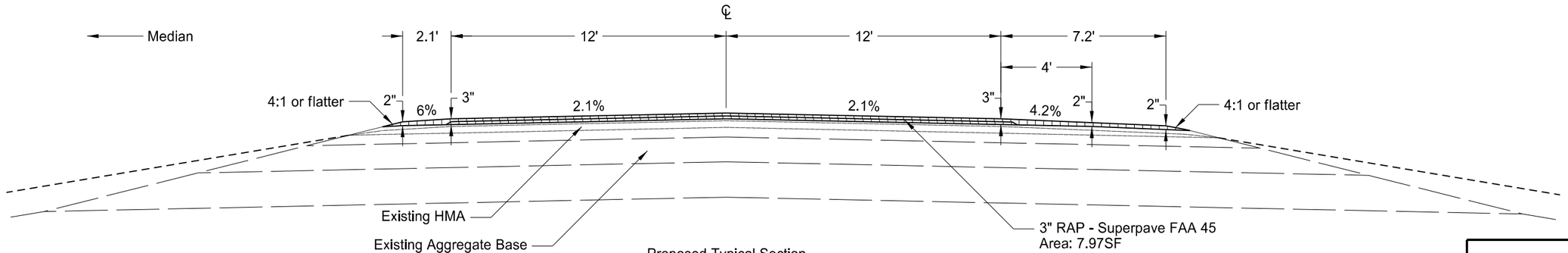
Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	5



Milled Pavement
US 83 NB

RP 124.341 to RP 124.720



Proposed Typical Section
US 83 NB

RP 124.341 to RP 124.720

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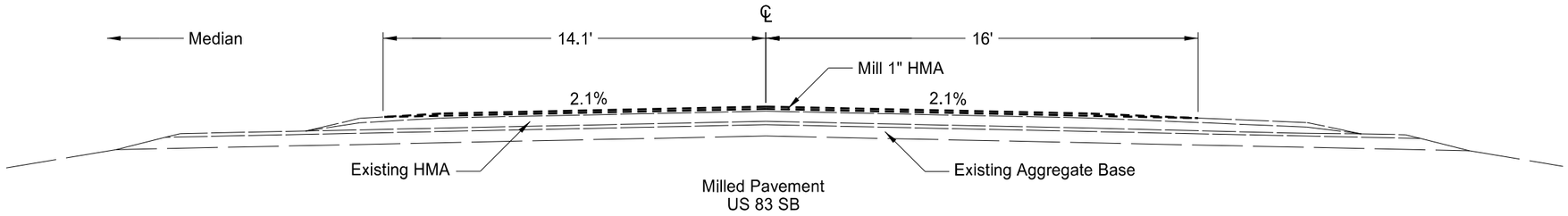
Proposed Typical Sections
Northbound

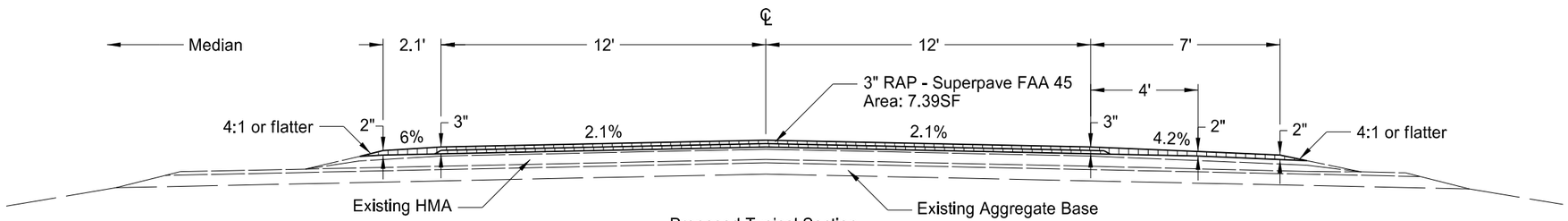
Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	6



Milled Pavement
US 83 SB

RP 128.179 to RP 126.001



Proposed Typical Section
US 83 SB

RP 128.179 to RP 126.001

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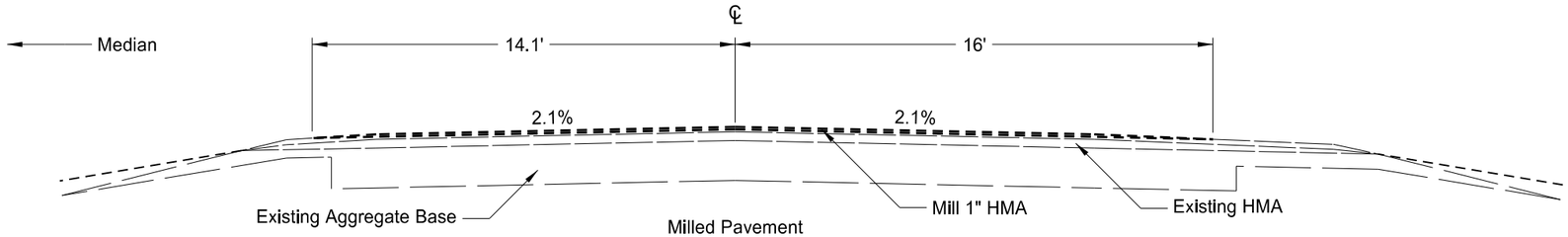
Proposed Typical Sections
Southbound

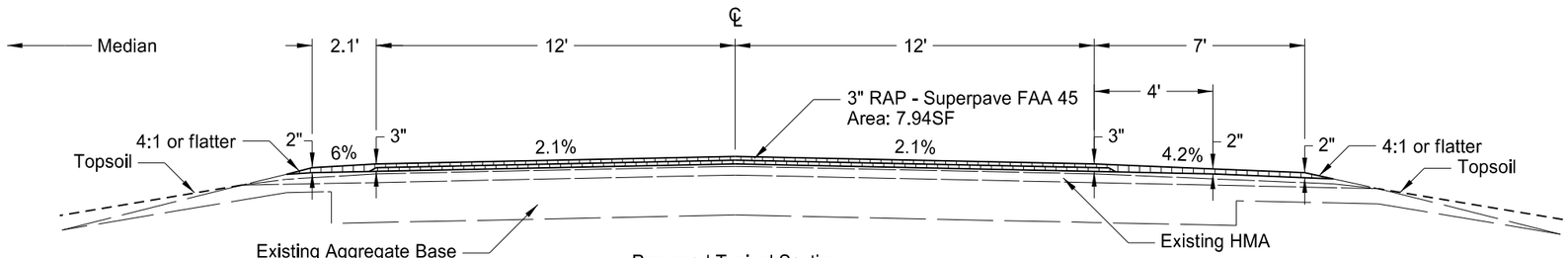
Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	7



Milled Pavement
US 83 SB

RP 125.331 to RP 124.647
RP 124.504 to RP 123.983
RP 123.747 to RP 123.390
RP 122.728 to RP 122.187
RP 122.160 to RP 111.344



Proposed Typical Section
US 83 SB

RP 125.331 to RP 124.647
RP 124.504 to RP 123.983
RP 123.747 to RP 123.390
RP 122.728 to RP 122.187
RP 122.160 to RP 111.344

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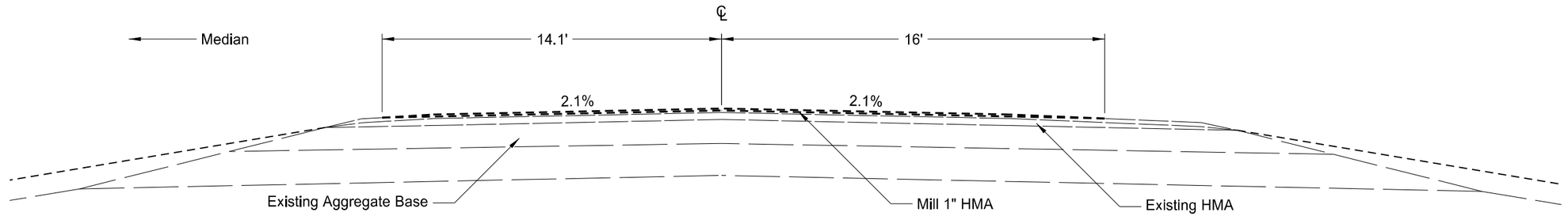
Proposed Typical Sections
Southbound

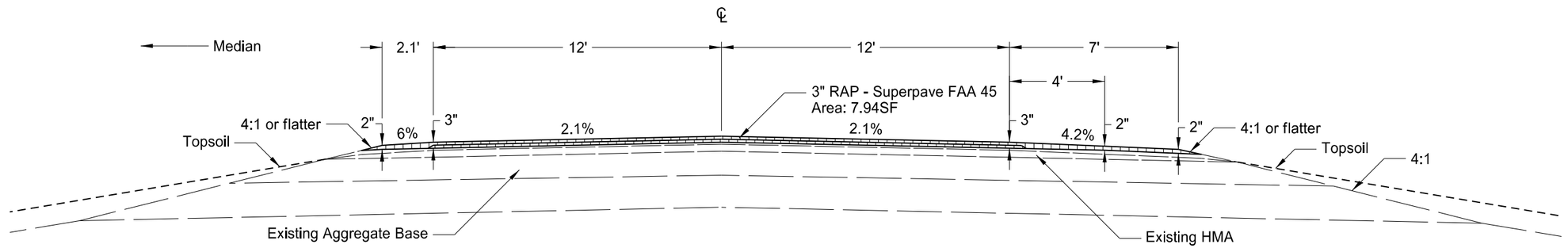
Wilton to Underwood
US 83 - HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	8



Milled Pavement
US 83 SB

RP 125.999 to RP 125.669
RP 124.647 to RP 124.504
RP 123.984 to RP 123.747
RP 123.390 to RP 122.085



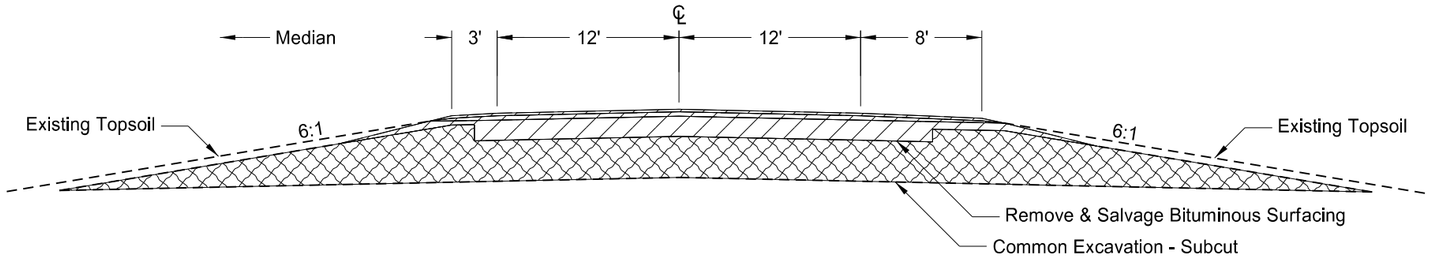
Proposed Typical Section
US 83 SB

RP 125.999 to RP 125.669
RP 124.647 to RP 124.504
RP 123.984 to RP 123.747
RP 123.390 to RP 122.085

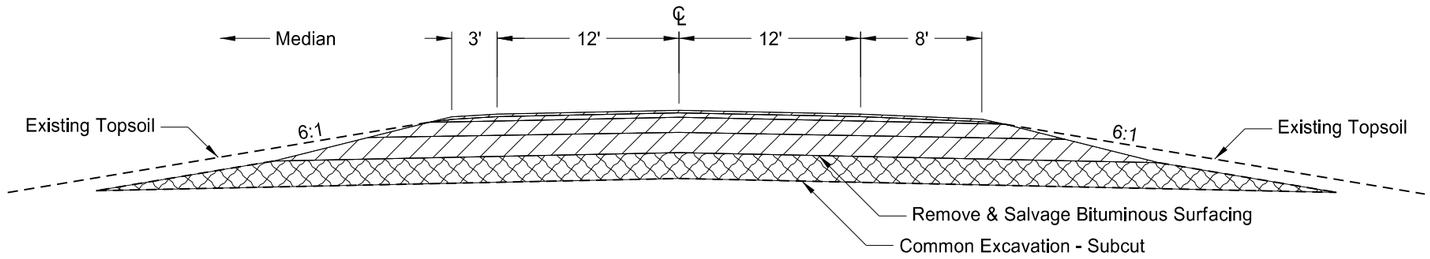
Proposed Typical Sections
Southbound

Wilton to Underwood
US 83 - HMA Mill & Overlay

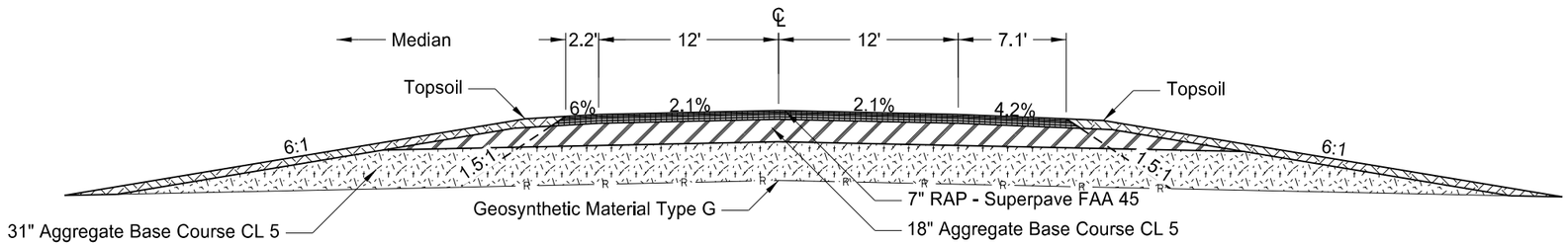
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	30	9



US 83 - Removal
RP 114.417 NB, RP 117.413 SB, RP 120.043 NB



US 83 - Removal
RP 125.872 SB



US 83 - Proposed Subcut
RP 114.417 NB, RP 117.413 SB, RP 120.043 NB, RP 125.872 SB

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Proposed Subcuts

Wilton to Underwood
US 83 - HMA Mill & Overlay

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
CW21-10A	**72"x24"**	**Wet Paint**	**2**	**14**	**28**
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	**60"x24"**	**ROAD WORK NEXT __ MILES**	**4**	**34**	**136**
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**	**8**	**19**	**152**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**2**	**64**	**128**
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	**72"x24"**	**ROAD WORK NEXT __ MILES RT or LT ARROW**	**16**	**30**	**480**
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**	**12**	**32**	**384**
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**4**	**5**	**20**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**28**	**39**	**1092**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**14**	**10**	**140**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**4**	**39**	**156**
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**	**6**	**35**	**210**
W4-2-48	**48"x48"**	**RIGHT or LEFT LANE TRANSITION SYMBOL**	**6**	**35**	**210**
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**	**4**	**35**	**140**
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	**48"x48"**	**UNEVEN LANES**	**4**	**35**	**140**
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
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**	**11**	**35**	**385**
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.**	**8**	**35**	**280**
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**2**	**35**	**70**
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
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)**	**1**	**12**	**12**
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

SPEC & CODE			
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**4609**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**1200**
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**	**28**
704-1060	**DELINEATOR DRUMS**	**EACH**	**118**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**528**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	**STACKABLE VERTICAL PANELS**	**EACH**	**8**
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**	**4**
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
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	
762-0430	**SHORT TERM 4IN LINE - TYPE NR**	**LF**	**131142**
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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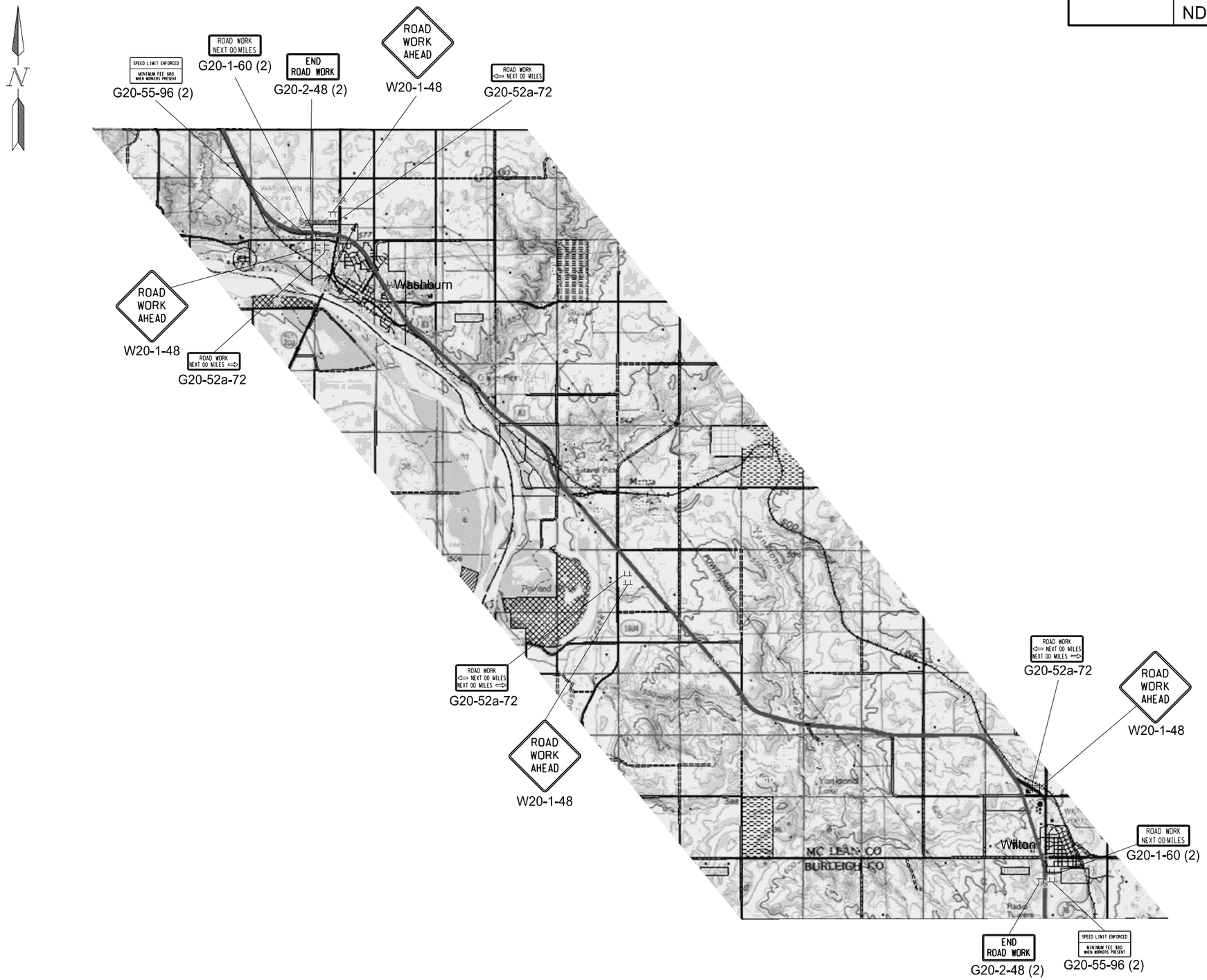
Traffic Control Devices List

Wilton to Underwood

US - 83 HMA Mill & Overlay

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	100	2



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Traffic Control Layout

Wilton to Underwood
US 83 - HMA Mill & Overlay

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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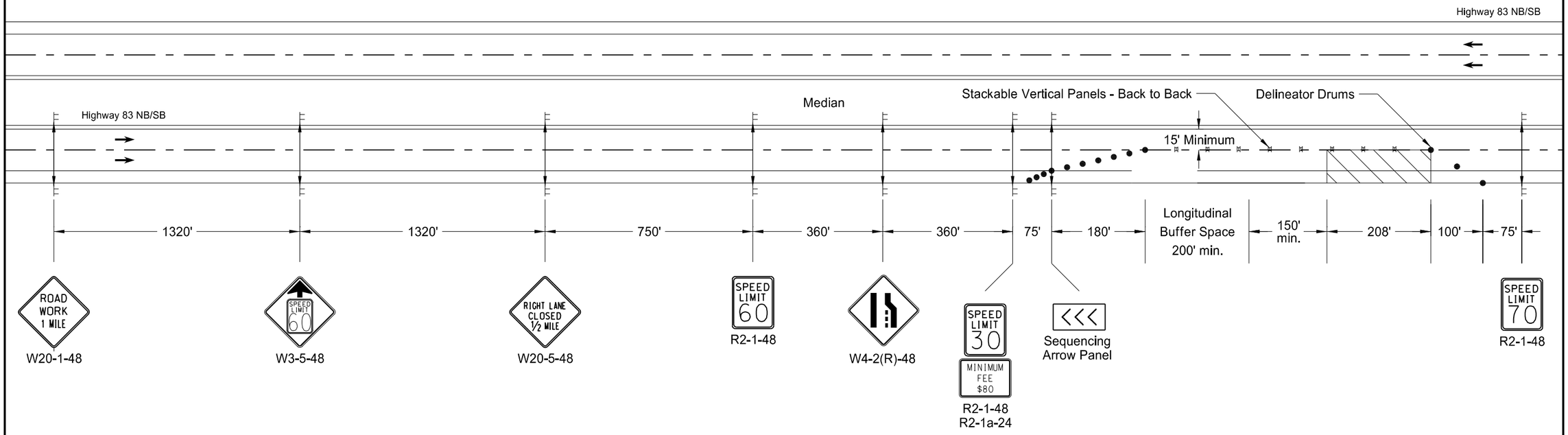

Stackable Vertical Panels

Delineator Drums

Sign

Workzone

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Construction Sign Layout
Subcut Lane Closure

Wilton to Underwood
US 83 - HMA Mill & Overlay

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	SNH-1-083(111)111	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
US Hwy 83																						
111.582 Rt	SA G		3.8		15.3				2.5 x 2.5 10 ga	17.1	4.7				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
111.666 Lt	SA G		3.8		15.3				2.5 x 2.5 10 ga	17.1	4.7				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
111.692 Rt	SN 1		19.3		14.3	14.4	14.4		2.5 x 2.5 10 ga	17.1						3	4	3 x 3 7 ga			3	
111.712 Lt	SN 2		22.8		14.3	14.4	14.5		2.25 x 2.25 12 ga	16.1	4.6	4.6	4.7		2 x 2 12 ga	3	4	3 x 3 7 ga			3	
112.406 Lt		21		16.0	15.8	15.8			2.5 x 2.5 12 ga	20.0	3.8	3.9			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
112.406 Lt mdn		21		16.0	15.7	15.8			2.5 x 2.5 12 ga	20.0	3.7	3.8			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
114.840 Rt	SA 1E				13.2				2 x 2 12 ga	19.7						1	4	2.25 x 2.25 12 ga	1			
120.769 Rt	SA A		17.8		17.7	17.8	17.9		2.5 x 2.5 10 ga	21.4						3	4	3 x 3 7 ga			3	
120.941 Rt	SA C		29.0		16.1	16.2	16.3		2.5 x 2.5 10 ga	17.1	5.3	5.4	5.5		2.19 x 2.19 10 ga	3	4	3 x 3 7 ga			3	
121.214 Lt	SA B		15.6		16.0	16.1	16.2		2.5 x 2.5 12 ga	19.3						3	4	3 x 3 7 ga			3	
121.414 Lt	SA A		17.8		17.7	17.8	17.9		2.5 x 2.5 10 ga	21.4						3	4	3 x 3 7 ga			3	
122.994 Lt		20		9.0	15.1				2.5 x 2.5 10 ga	17.4	4.5				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
123.536 Lt		20		9.0	15.1				2.5 x 2.5 10 ga	17.4	4.5				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
126.097 Rt mdn		21		16.0	15.8	15.8			2.5 x 2.5 12 ga	20.0	3.8	3.9			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
126.129 Lt	SA E		13.5		15.8				2.5 x 2.5 10 ga	16.2	5.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
126.250 Rt	SN 12	11		12.0	14.4	14.6			2.5 x 2.5 12 ga	16.0						2	4	3 x 3 7 ga			2	
127.232 Lt	SN 8		28.0		14.8	14.9	15.1		2.5 x 2.5 10 ga	16.9	4.4	4.6	4.7		2.19 x 2.19 10 ga	3	4	3 x 3 7 ga			3	
127.792 Rt	SA F		20.1		17.4	17.6	17.7		2.5 x 2.5 10 ga	19.2						3	4	3 x 3 7 ga			3	
Sub Total			191.5	78.0		**Total**	600.9									**Total**	152		1	0	37	
Grand Total			191.5	78.0		**Total**	600.9									**Total**	152		1	0	37	

Basis of Estimate
Sign Support Lengths

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

Areas where parking and/or pedestrian movement will occur - 84"
Urban/rural expressway and freeway - 84" (Offset - 60")
Rural Roadway - 60"
Bike route - 60"

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Sign Summary
Perforated Tube

US Hwy 83
Wilton N to Washburn
Burleigh and McLean Counties

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	SNH-1-083(111)111	110	2

Sta/RP	Sign/ Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Panel For Signs IV SF	Panel For Signs XI SF	Overlay Panel IV SF	Overlay Panel XI SF	Galv Steel Post Standard Pipe 1st LF	Galv Steel Post Standard Pipe 2nd LF	Size	Galv Steel Post W-Shape Posts 1st LF	Galv Steel Post W-Shape Posts 2nd LF	Galv Steel Post W-Shape Posts 3rd LF	Max Post Len LF	Post Space FT	Revise Fuse Joint EA	Std Pipe Fdn Dia FT	Std Pipe Fdn Dep FT	Std Pipe Fdn Vol CY	W-Shape Pile LF	Remove Sign Fdns Conc Fdn EA	Remove Sign Fdns W-Shape Pile EA	Reset Sign Panel EA	Reset Sign Support EA	Stub Post EA	Multi Dir Base EA	Comments
US Hwy 83																											
127.664 Rt	SN 3	6.3		77.0						W5x16	16.9	17.2		17.6	7.0					28		2					
127.850 Rt	SN 7			66.0						W5x16	16.9	17.1		20.1	6.0					28							
Sub Total		6.3	0.0	143.0	0.0	0.0	0.0	**Total**	0.0		**Total**	68.2							0.0	56	0	2	0	0	0	0	
Grand Total		6.3	0.0	143.0	0.0	0.0	0.0	**Total**	0.0		**Total**	68.2							0.0	56	0	2	0	0	0	0	

Basis of Estimate
Sign Support Lengths

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

Areas where parking and/or pedestrian movement will occur - 84"
Urban/rural expressway and freeway - 84" (Offset - 60")
Rural Roadway - 60"

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Sign Summary
Round Steel Pipe and W-Shape

US Hwy 83
Wilton N to Washburn
Burleigh and McLean Counties

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	110	3

RP 120.941 rt
Remove

RP 120.941 rt
Special Assembly C
M1-5-45
M1-4-36
M5-1(R)-30 (Black and white)
M6-3-30 (Black and white)

Sign 4
Sign 5
M6-1(L)-30
Yellow legend/border on blue background
RP 121.414 lt
Special Assembly A

RP 120.769 rt
Special Assembly A
Sign 4
Sign 5
M6-1(R)-30 Yellow legend/border on blue background

RP 120.769 rt
Remove

RP 114.840 rt
Reset signs from RP 114.840 rt on new support, remove existing support
Special Assembly 1-E
28 ST NW (2)
US HWY 83 (2)

M1-5-45
M5-1(R)-30 (Black and white)
RP 121.214 lt
Special Assembly B

RP 121.214 lt
Remove

In place to remain
In place to remain
In place to remain
Remove
Remove
RP 121.123 lt
Remove county route marker with arrow.
Others in place to remain.

W3-5-48
RP 112.406 lt mdn
Assembly 21

RP 112.406 lt mdn
Remove

W3-5-48
RP 112.406 lt
Assembly 21

RP 112.406 lt
Remove

RP 112.104 lt
Remove tree city sign and deliver to city of Wilton.
In place to remain
Remove

Sign 2
RP 111.712 lt

Burleigh County
RP 111.712 lt
Remove

RP 111.692 rt
Remove
McLean County

RP 111.692 rt
McLean County
Sign 1

RP 111.582 rt
Remove

RP 111.582 rt
Special Assembly G
To be installed by NDDOT (See Note A)
Sign 10

RP 111.438 rt
Remove tree city sign and deliver to city of Wilton.
In place to remain
Remove

RP 111.666 lt
Remove

To be installed by NDDOT (See Note A)
Sign 11
RP 111.666 lt
Special Assembly G

Note A :
The Adopt-A-Highway signs shall be furnished and installed by NDDOT. Furnish and install the remaining signs and supports as shown in the special assembly details.

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Sign Layout
US Hwy 83
Wilton N to Washburn
Burleigh and McLean Counties

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	110	4

RP 127.792 rt
Special Assembly F

JCT — Sign 9

ALTERNATE — Sign 6

NORTH DAKOTA 200 — M1-5-45

RP 127.850 rt
New sign panel on new
support and footings

← Cross Ranch
State Park 14

Sign 7

RP 127.850 rt
Remove

Cross Ranch
State Park
← 14 Miles

RP 127.792 rt
Remove

JCT
ALTERNATE
N 200

RP 127.232 lt

Sign 8 — BUSINESS DISTRICT →

RP 127.664 rt
New sign panel on new
support and footings

← Lewis and Clark
Interpertive Center

← REST AREA

Sign 3

D9-22-30

RP 127.232 lt
Remove

BUSINESS
DISTRICT
→

RP 127.664 rt
Remove sign, support
and footings (2)

← LEWIS AND CLARK
INTERPRETIVE CENTER

← REST AREA

RP 126.129 lt
Special Assembly E

M3-3-36 SOUTH

M1-4-36 83

RP 126.129 lt
Remove

SOUTH
83

RP 126.250 rt
Assembly 11

Sign 12 — NO ENGINE BRAKES

RP 126.250 rt
Remove

VEHICLE NOISE ORDINANCE ENFORCED

W1-2R-36

RP 123.536 lt
Assembly 20

SPEED LIMIT 55 — W3-5-48

RP 126.097 rt mdn
Assembly 21

RP 123.536 lt
Remove

SPEED LIMIT 55

RP 126.097 rt mdn
Remove

W1-2L-36

RP 122.994 lt
Assembly 20

RP 122.994 lt
Remove

N

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Sign Layout

US Hwy 83

Wilton N to Washburn

Burleigh and McLean Counties

2/8/2016 3:42:36 PM kaltepeter R:\project\10083111.111\traffic\110SN_004_LSIGN.dgn

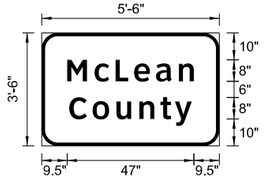
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	110	5

SIGN NUMBER	Sign 1
WIDTH x HEIGHT	5'-6" x 3'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
RP 111.692 rt

AREA: 19.3 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Boundary.ssl

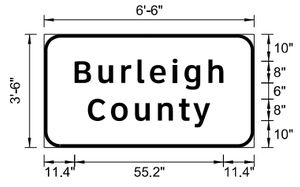
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
M	c	L	e	a	n													47	8/6.5	ClearviewHwy-5-W
9.5	19.6	27.5	34.3	42.5	51															
C	o	u	n	t	y													45.4	8/6.5	ClearviewHwy-5-W
10.3	18.9	27.8	36.3	44.1	49.5															

SIGN NUMBER	Sign 2
WIDTH x HEIGHT	6'-6" x 3'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
RP 111.712 lt

AREA: 22.8 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Boundary.ssl

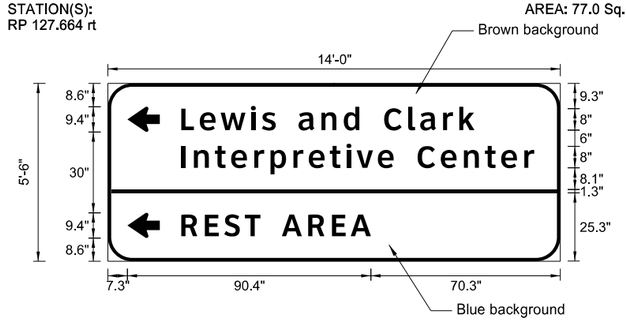
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
B	u	r	l	e	i	g	h											55.2	8/6.5	ClearviewHwy-5-W
11.4	20.2	28.7	34.7	39.3	47.8	52.2	61.1													
C	o	u	n	t	y													45.4	8/6.5	ClearviewHwy-5-W
16.3	24.9	33.8	42.3	50.1	55.5															

SIGN NUMBER	Sign 3
WIDTH x HEIGHT	14'-0" x 5'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Brown / Blue
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ARDD	7.3	48	9.4	12	180
ARDD	7.3	8.6	9.4	12	180

STATION(S):
RP 127.664 rt

AREA: 77.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Recreation.ssl

LETTER POSITION (X)																												LENGTH	SIZE	SERIES
L	e	w	i	s		a	n	d		C	l	a	r	k														108.9	8/6.5	ClearviewHwy-5-W
27.3	34.1	41.9	53.1	57.2	62.3	70.8	79.3	87.6	93.4	102.6	111.5	116	124.5	130.5																
l	n	t	e	r	p	r	e	t	i	v	e		C	e	n	t	e	r										131	8/6.5	ClearviewHwy-5-W
27.3	32	39.8	45.8	54.4	60.4	68.9	74.6	82.4	88.6	92.4	100.2	106.1	115	123.6	132.2	140	146	154.6												
R	E	S	T		A	R	E	A																				70.4	8	ClearviewHwy-5-W
27.3	36.1	43.2	50.9	56.7	64.6	74.4	83.2	90.1																						

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Sign Details

US Hwy 83

Wilton N to Washburn

Burleigh and McLean Counties

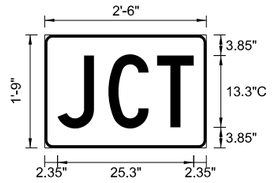
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	110	6

SIGN NUMBER	Sign 4
WIDTH x HEIGHT	2'-6" x 1'-9"
BORDER WIDTH	0.5" (inset 0")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Blue
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: Yellow

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
RP 121.414 lt
RP 120.769 rt

AREA: 4.4 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Guide.ssl

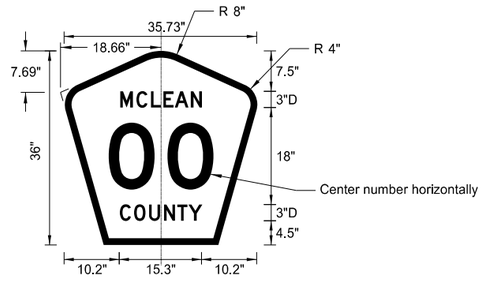
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
J	C	T																25.3	13.3	C 2000
2.4	11.8	20.9																		

SIGN NUMBER	Sign 5
WIDTH x HEIGHT	3'-0" x 3'-0"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	Varies
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Blue
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: Yellow

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
RP 121.414 lt
RP 120.769 rt

AREA: 9.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Guide.ssl

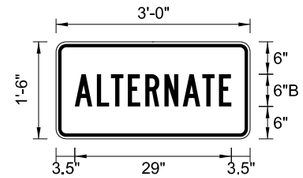
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
M	C	L	E	A	N													15.2	3	D 2000
10.3	13.3	16	18.3	20.4	23.4															
0	0																		12	D 2000
C	O	U	N	T	Y													15,3	3	D 2000
10.2	12.9	15.6	18.4	20.9	22.9															

SIGN NUMBER	Sign 6
WIDTH x HEIGHT	3'-0" x 1'-6"
BORDER WIDTH	0.63" (inset 0.38")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: White
LEGEND/BORDER	TYPE: Non-Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
RP 127.792 rt

AREA: 4.5 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Guide.ssl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
A	L	T	E	R	N	A	T	E										29	6	B 2000
3.5	7.6	10.2	13.3	16.6	20.1	23.5	27.1	30.2												

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Sign Details

US Hwy 83

Wilton N to Washburn

Burleigh and McLean Counties

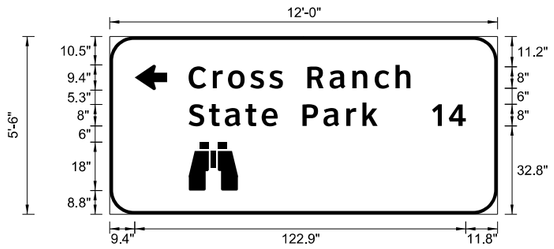
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	110	7

SIGN NUMBER	Sign 7
WIDTH x HEIGHT	12'-0" x 5'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Brown
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ARDD	9.4	46.1	9.4	12	180
RS-076	29.4	8.8	18.3	18	0

STATION(S): RP 127.850 rt

AREA: 66.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Recreation.ssl

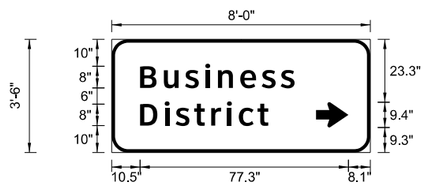
LETTER POSITION (X)																				LENGTH	SIZE	SERIES
C	r	o	s	s		R	a	n	c	h										82.4	8/6.5	ClearviewHwy-5-W
29.4	38.3	44	52.2	59.3	64.4	73.4	81.6	90.1	98.4	106.2												
S	t	a	t	e		P	a	r	k											70.2	8/6.5	ClearviewHwy-5-W
29.4	36.9	42.8	50.5	56.5	62.4	71.6	79.4	87.9	93.9													
1	4																			12.5	8	ClearviewHwy-5-W
119.8	125.9																					

SIGN NUMBER	Sign 8
WIDTH x HEIGHT	8'-0" x 3'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ARDD	75.9	9.3	9.4	12	0

STATION(S): RP 127.232 lt

AREA: 28.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Destination.ssl

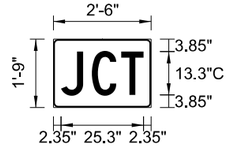
LETTER POSITION (X)																				LENGTH	SIZE	SERIES
B	u	s	i	n	e	s	s													57.3	8/6.5	ClearviewHwy-5-W
10.5	19.3	27.2	34.7	39.5	47.7	55.7	62.7															
D	i	s	t	r	i	c	t													47.5	8/6.5	ClearviewHwy-5-W
10.5	19.6	23.7	30.6	36.9	42.8	47.2	54.1															

SIGN NUMBER	Sign 9
WIDTH x HEIGHT	2'-6" x 1'-9"
BORDER WIDTH	0.5" (inset 0")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: White
LEGEND/BORDER	TYPE: Non-Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): RP 127.792 rt

AREA: 4.4 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Guide.ssl

LETTER POSITION (X)																				LENGTH	SIZE	SERIES
J	C	T																		25.3	13.3	C 2000
2.4	11.8	20.9																				

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Sign Details

US Hwy 83

Wilton N to Washburn

Burleigh and McLean Counties

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	110	8

SIGN NUMBER	Sign 10
WIDTH x HEIGHT	2'-6" x 1'-6"
BORDER WIDTH	0.5" (inset 0")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Blue
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): RP 111.582 rt

AREA: 3.8 Sq.Ft.

Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Adopt-a-Highway.ssl

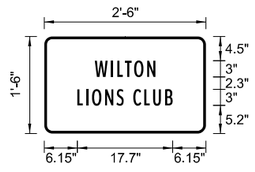
LETTER POSITION (X)																			LENGTH	SIZE	SERIES
C	E	N	T	R	A	L		D	A	K	O	T	A						26.4	3	ClearviewHwy-1-W
1.8	3.9	5.6	7.7	9.5	11.4	13.7	14.7	16.5	18.5	20.8	22.7	24.9	26.5								
H	A	R	L	E	Y		O	W	N	E	R	S							25.3	3	ClearviewHwy-1-W
2.4	4.4	6.7	8.7	10.4	11.9	13.4	15.1	17.4	20.4	22.7	24.5	26.4									
G	R	O	U	P															10.2	3	ClearviewHwy-1-W
9.9	12.2	14.1	16.6	18.8																	

SIGN NUMBER	Sign 11
WIDTH x HEIGHT	2'-6" x 1'-6"
BORDER WIDTH	0.5" (inset 0")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Blue
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): RP 111.666 lt

AREA: 3.8 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Adopt-a-Highway.ssl

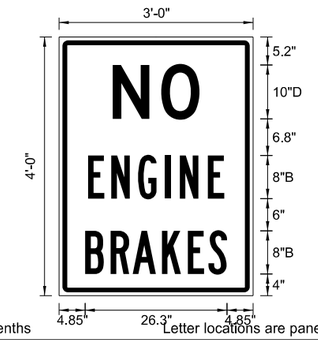
LETTER POSITION (X)																			LENGTH	SIZE	SERIES
W	I	L	T	O	N														11.3	3	ClearviewHwy-1-W
9.4	12.4	13.6	15	16.7	19.1																
L	I	O	N	S		C	L	U	B										17.7	3	ClearviewHwy-1-W
6.2	7.8	8.9	11.3	13.4	14.8	16.5	18.6	20.2	22.4												

SIGN NUMBER	Sign 12
WIDTH x HEIGHT	3'-0" x 4'-0"
BORDER WIDTH	0.88" (inset 0.63")
CORNER RADIUS	1"
MOUNTING	Ground
BACKGROUND	TYPE: XI Reflective
	COLOR: White
LEGEND/BORDER	TYPE: Non-Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): RP 126.250 rt

AREA: 12.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Regulatory.ssl

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
N	O																		16.1	10	D 2000
10	19																				
E	N	G	I	N	E														25.3	8	B 2000
5.4	9.7	14.6	19.6	22.4	27.6																
B	R	A	K	E	S														26.3	8	B 2000
4.8	9.6	13.6	19.1	23.9	27.7																

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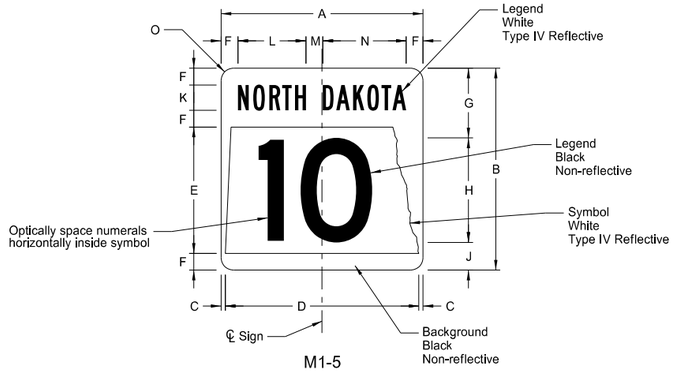
Sign Details

US Hwy 83

Wilton N to Washburn

Burleigh and McLean Counties

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	110	9

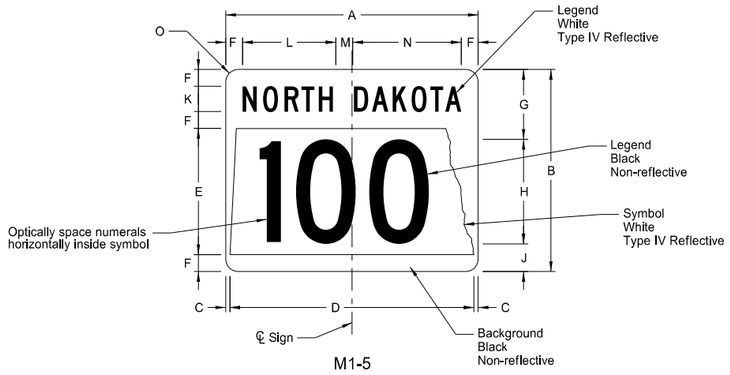


M1-5

STATE ROUTE MARKER

SIGN	DIMENSION (INCHES)													
	A	B	C	D	E	F	G	H	J	K	L	M	N	O
1, 2 digits	18*	18*	0.38	17.25	11.25	1.5	6.38	9 D**	2.63	2.25 B	6.1	1.5	7.4	1.5
1, 2 digits	24	24	0.5	23	15	2	8.5	12 D**	3.5	3 B	8.1	2	9.9	1.5
1, 2 digits	36	36	0.75	34.5	22.5	3	12.75	18 D**	5.25	4.5 B	12.1	3	14.9	2.25
1, 2 digits	48*	48*	1	46	30	4	17	24 D**	7	6 B	16.2	4	19.8	3

* Size not for independent use (only for use within a guide sign)
** Reduce numeral spacing by 25%

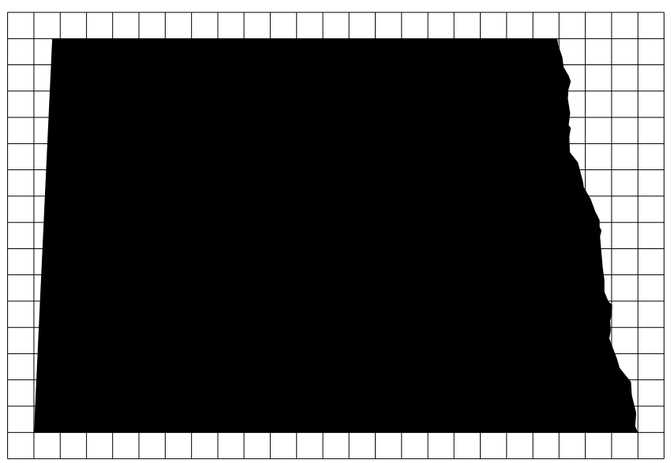


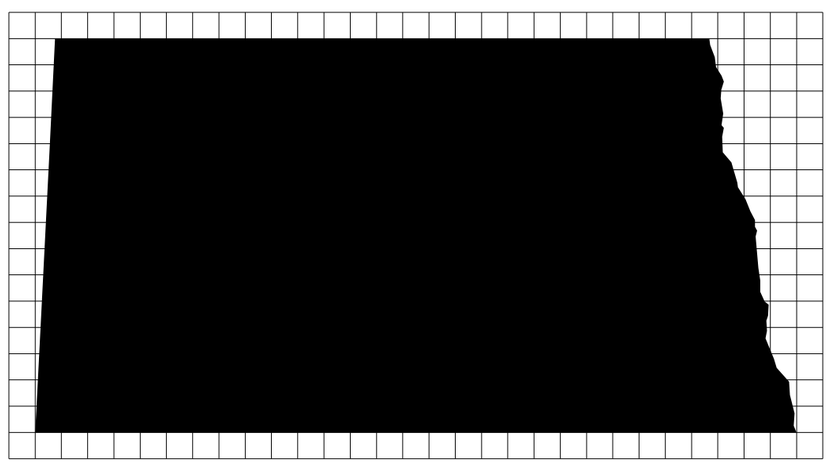
M1-5

STATE ROUTE MARKER

SIGN	DIMENSION (INCHES)													
	A	B	C	D	E	F	G	H	J	K	L	M	N	O
3 digits	24*	18*	1.13	21.75	11.25	1.5	6.38	9 C**	2.63	2.25 C	8.8	2	10.2	1.5
3 digits	30	24	0.5	29	15	2	8.5	12 C**	3.5	3 C	10.7	2.5	12.8	1.5
3 digits	45	36	0.75	43.5	22.5	3	12.75	18 C**	5.25	4.5 C	16.1	3.8	19.1	2.25
3 digits	60*	48*	1	58	30	4	17	24 C**	7	6 C	21.5	5	25.5	3
4 digits	24*	18*	1.13	21.75	11.25	1.5	6.38	9 B***	2.63	2.25 C	8.8	2	10.2	1.5
4 digits	30	24	0.5	29	15	2	8.5	12 B***	3.5	3 C	10.7	2.5	12.8	1.5
4 digits	45	36	0.75	43.5	22.5	3	12.75	18 B***	5.25	4.5 C	16.1	3.8	19.1	2.25
4 digits	60*	48*	1	58	30	4	17	24 B***	7	6 C	21.5	5	25.5	3

* Size not for independent use (only for use within a guide sign)
** Reduce numeral spacing by 25%
*** Reduce numeral spacing by 50%





Note: North Dakota symbol graphics file can be obtained from the Design Division of North Dakota Department of Transportation.

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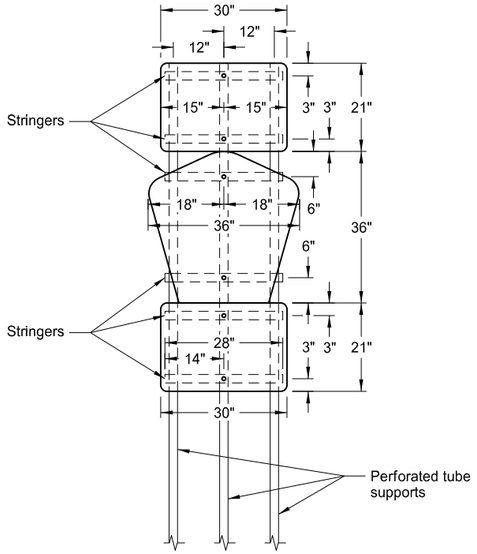
ND Highway Shield Details for Route Markers and Guide Signs

US Hwy 83
Wilton T to Washburn
Burleigh and McLean Counties

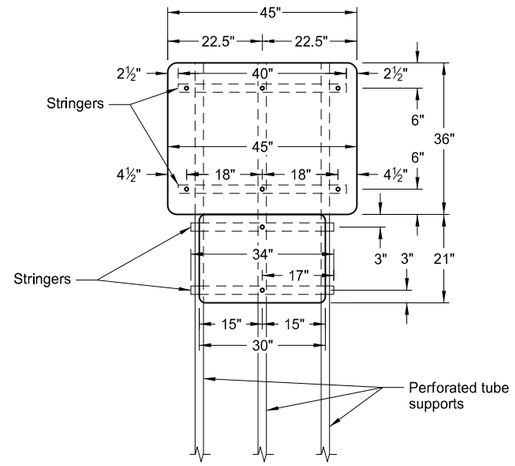
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	110	10



Special Assembly A

RP 121.414 lt
RP 120.769 rt

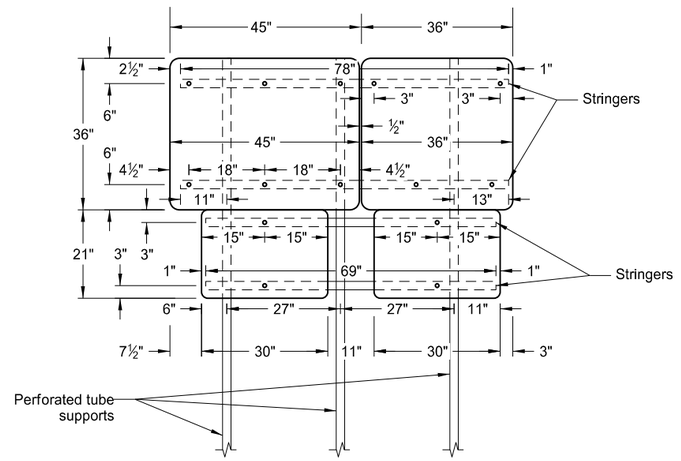
Area: 17.8 SF



Special Assembly B

RP 121.214 lt

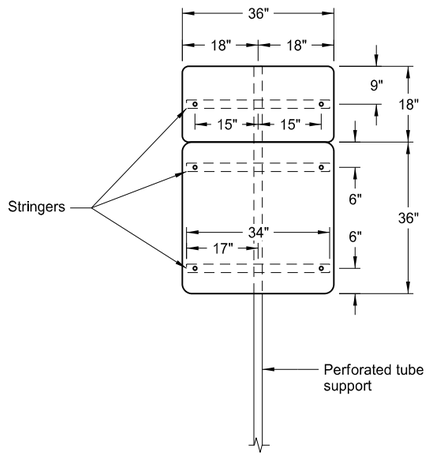
Area: 15.63 SF



Special Assembly C

RP 120.941 rt

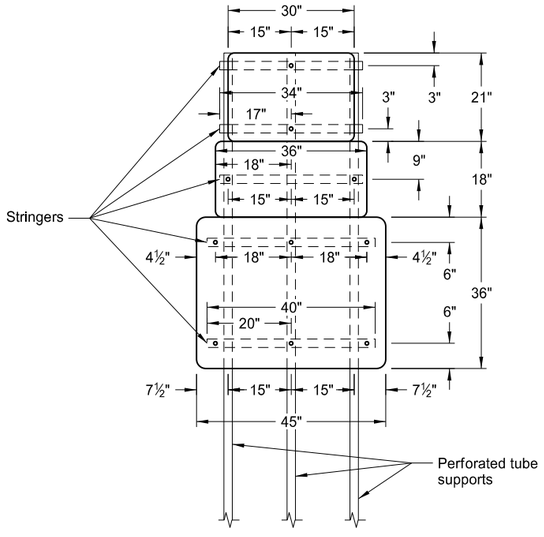
Area: 29.00 SF



Special Assembly E

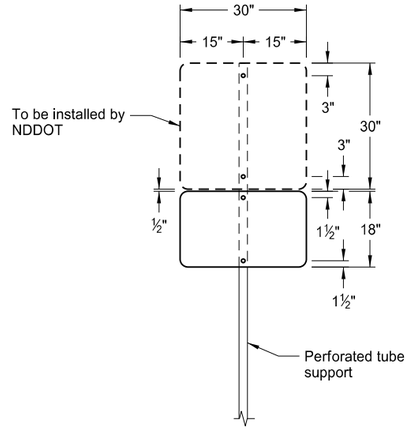
RP 126.129 lt

Area: 13.5 SF



Special Assembly F

RP 127.792 rt
Area: 20.125 SF



Special Assembly G

RP 111.582 rt
RP 111.666 lt

Area: 10.00 SF
Pay Area: 3.8 SF

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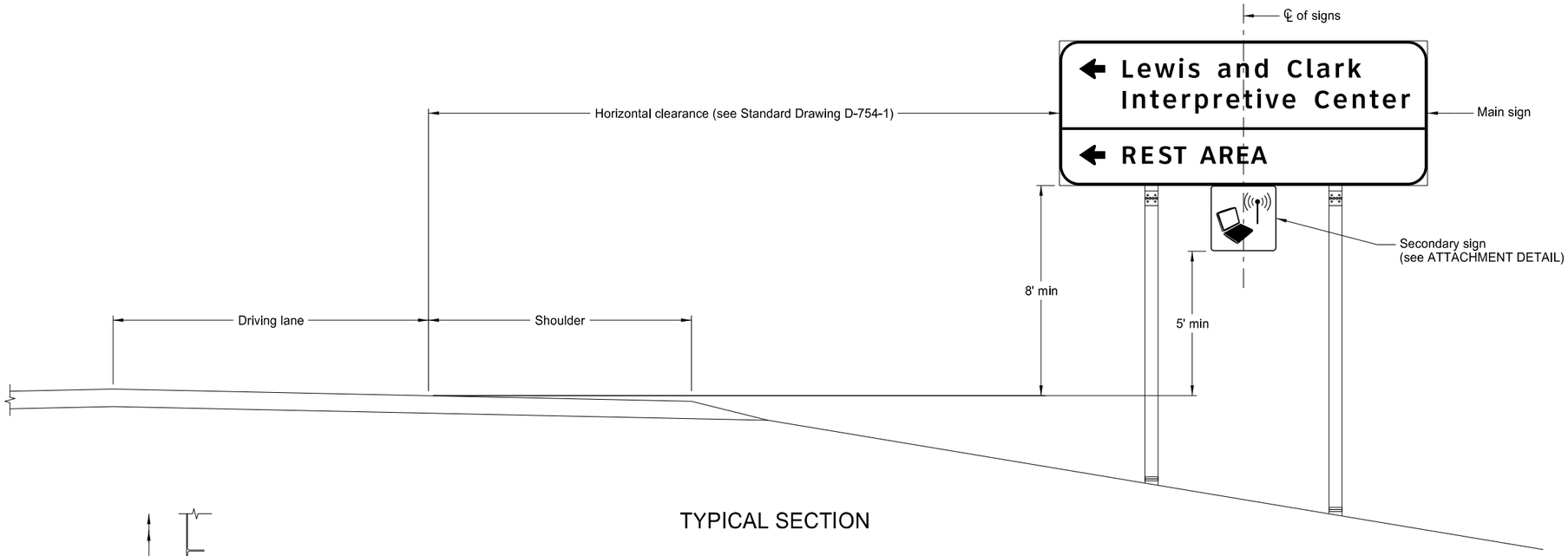
Special Assemby Details

US Hwy 83

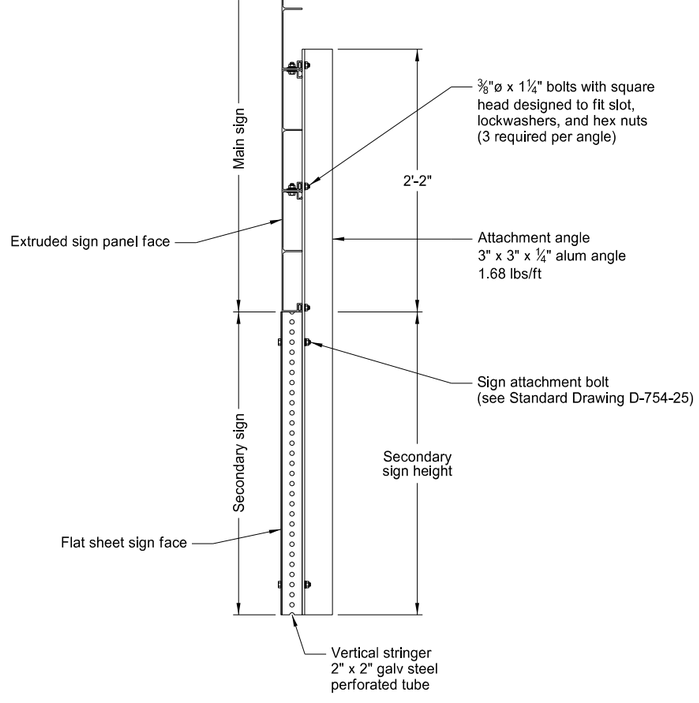
Wilton N to Washburn

Burleigh and McLean Counties

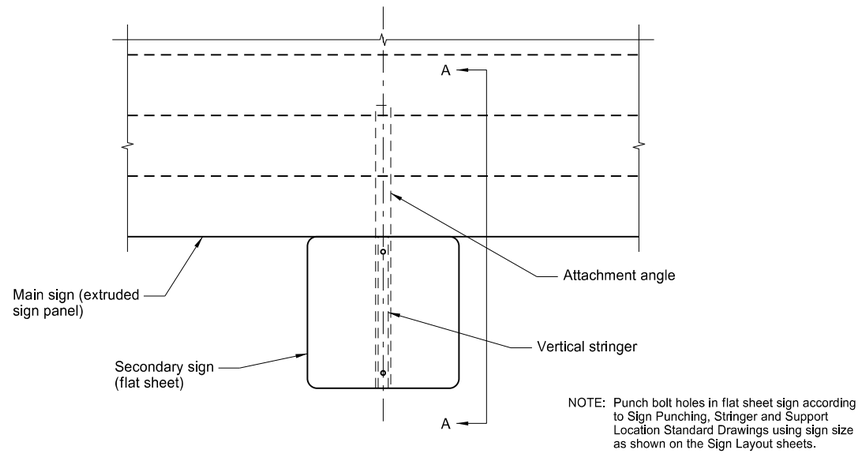
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	110	11



TYPICAL SECTION



SECTION A-A



ELEVATION VIEW

NOTE: Punch bolt holes in flat sheet sign according to Sign Punching, Stringer and Support Location Standard Drawings using sign size as shown on the Sign Layout sheets.

ATTACHMENT DETAIL

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Sign Details
Secondary Sign Attachment Detail

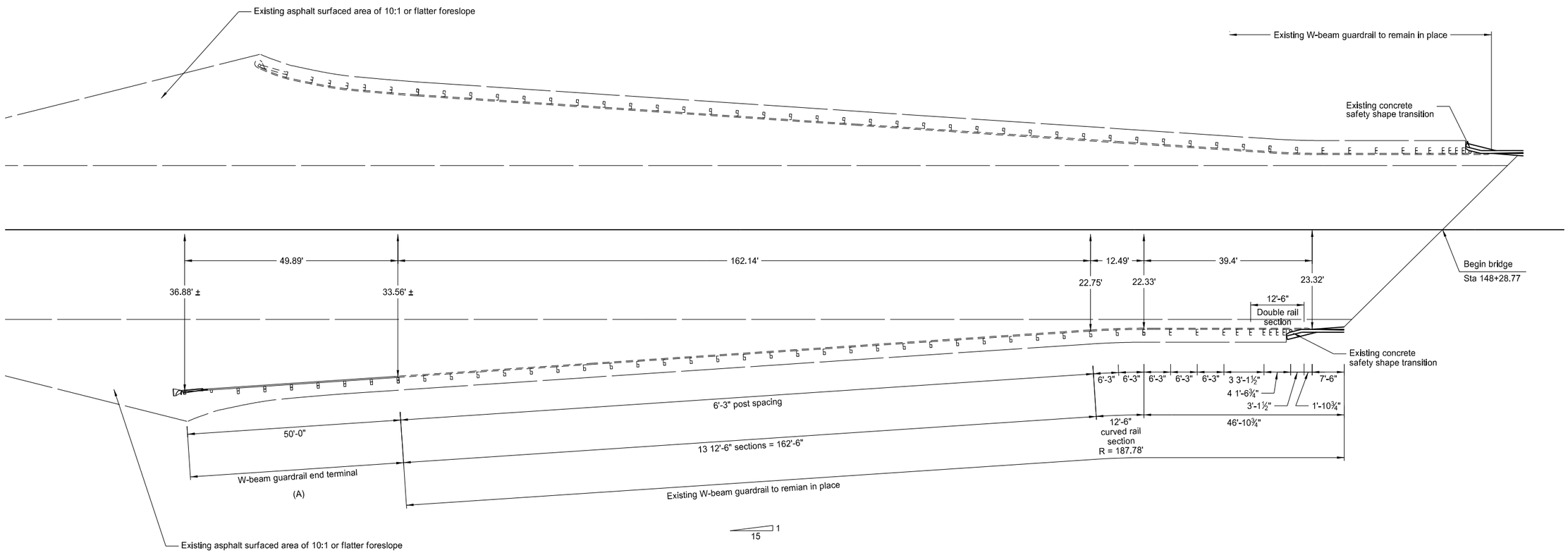
US Hwy 83

Wilton N to Washburn

Burleigh and McLean Counties

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	130	1



(A) Install a FLEAT end terminal at this location.

Remove W-beam guardrail & posts
Sta 145+71.72 to 145+84.19 Rt 12.5 LF

Remove end treatment & transition
Sta 145+34.71 to 145+71.72 Rt 1 ea

W-beam guardrail end terminal
Sta 145+34.30 to 145+84.19 Rt 1 ea

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W-Beam Guardrail Layout

CP Railway Bridge
RP 123.090

Southbound US 83

2/8/2016 3:42:46 PM kaltepeter R:\project\10083111.111\traffic\130GR_001_LGdrl_083_123.090L.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SNH-1-083(111)111	180	1

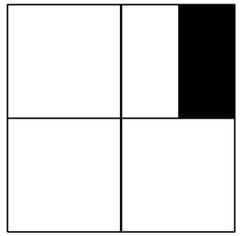
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

TEST HOLE PLAT

Location: E1/2NE1/4 4-145-79 County: MCLEAN

Ownership: Denny Portra

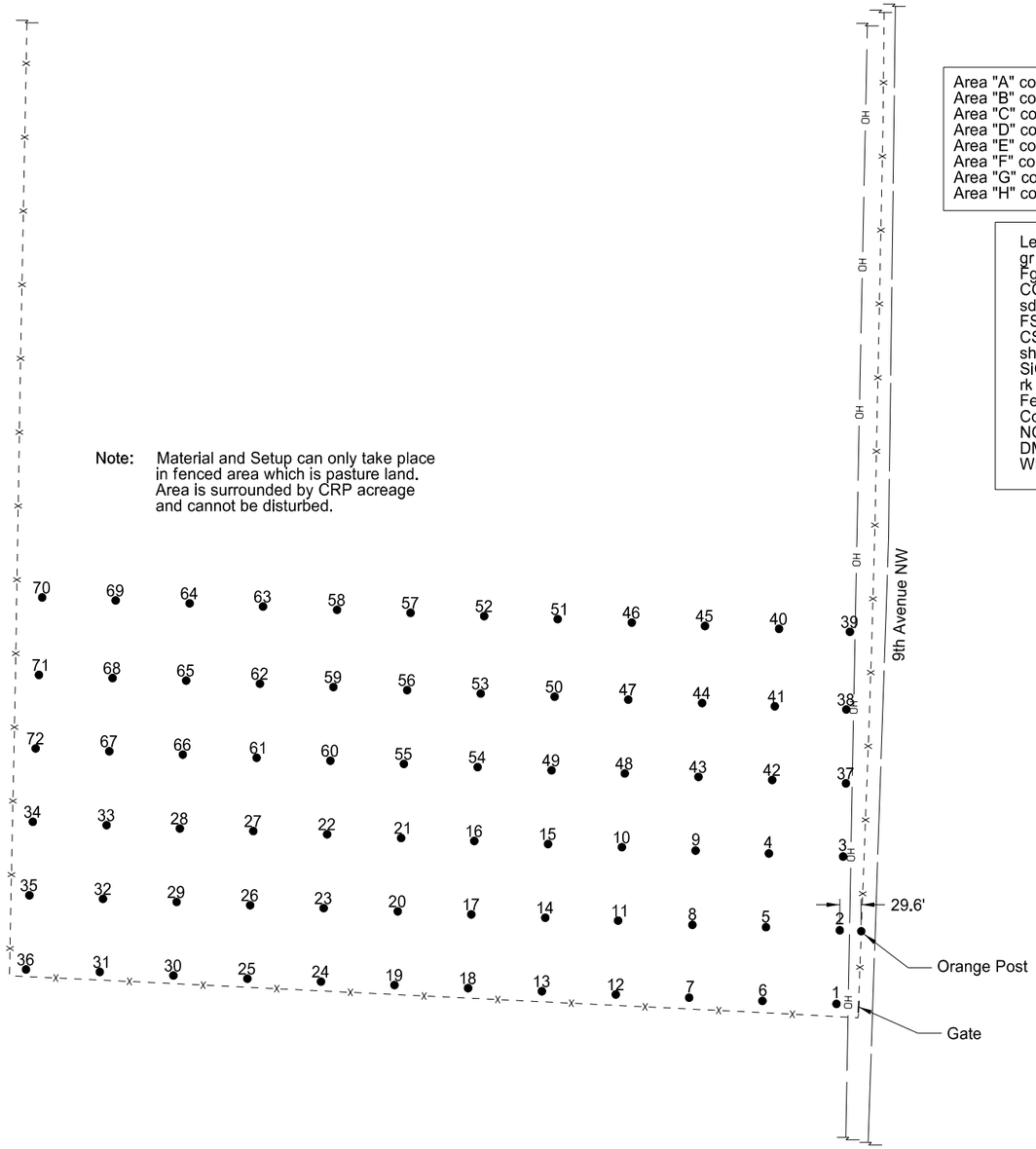
LOCATION OF PIT IN SECTION



Area "A" consists of test holes 1-9
Area "B" consists of test holes 10-18
Area "C" consists of test holes 19-27
Area "D" consists of test holes 28-36
Area "E" consists of test holes 37-45
Area "F" consists of test holes 46-54
Area "G" consists of test holes 55-63
Area "H" consists of test holes 64-72

Legend
gr = gravel
Fgr = fine gravel
CGr = coarse gravel
sd = sand
FS = fine sand
CS = coarse sand
sh = shale
SiCl = silt clay
rk = rock
FeO = iron oxide
CoS = coal slack
NG = no gravel
DM = disturbed material
WL = water line

Note: Material and Setup can only take place in fenced area which is pasture land. Area is surrounded by CRP acreage and cannot be disturbed.



Scale 1" = 200'

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	180	2

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
1	1.0	8.0 Fgr	2	10	20	30	+gr
		6.0 gr					
		3.0 Fgr					
		2.0 gr					
2	3.0	1.0 sd	0	7	17	27	+gr
		1.0 gr					
		1.0 Fgr					
		1.0 gr					
		3.0 Fgr					
		0.5 sd					
3	3.0	7.0 Fgr	3	18	27	37	+gr
		1.0 gr					
		4.0 Fgr					
		5.0 gr					
4	2.5	0.5 FgrSiCl	1	9	23	33	+gr
		1.0 Fgr					
		1.0 sd					
		2.0 Fgr					
		1.0 gr					
		3.0 Fgr					
		9.0 gr					
5	1.0	1.0 Fgr	1	9	19	29	+gr
		3.0 sd					
		3.0 Fgr					
		5.0 gr					
		4.0 sd					
		3.0 gr					
6	1.0	3.0 Fgr	1	12	23	33	rk
		1.0 CS					
		3.0 Fgr					
		1.0 sd					
		4.0 gr					
		2.0 Fgr					
		4.0 gr					
7	1.0	1.0 sd	0	5	14	25	+gr
		1.0 Fgr					
		2.0 sd					
		2.0 Fgr					
		1.0 sd					
		2.0 gr					
		1.0 Fgr					
		2.0 gr					
		1.0 Fgr					
		1.0 gr					
		2.0 Fgr					
		3.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
8	1.0	1.0 Fgr	0	8	18	28	+cave
		1.0 gr					
		7.0 sd					
		3.0 gr					
		1.0 FS					
		2.0 gr					
9	1.0	8.0 Fgr	2	12	24	35	rk
		9.0 gr					
10	1.5	0.5 FgrSiCl	0	4	15	24	+gr
		1.0 sd					
		1.0 gr					
		1.0 Fgr					
		1.0 gr					
		1.0 sd					
		1.0 Fgr					
		2.0 gr					
		3.0 gr					
11	1.0	2.0 Fgr	1	10	21	31	+cave
		3.0 sd					
		1.0 Fgr					
		2.0 sd					
		3.0 gr					
		2.0 sd					
		2.0 FS					
		3.0 gr					
12	0.5	2.5 Fgr	3	18	32	43	rk
		1.0 sd					
		3.0 Fgr					
		11.0 gr					
13	1.0	1.0 sd	0	10	22	32	+gr
		1.0 Fgr					
		1.0 gr					
		2.0 sd					
		1.0 Fgr					
		13.0 gr					
14	1.0	6.0 Fgr	3	22	34	43	+gr
		1.0 gr					
		1.0 Fgr					
		2.0 gr					
		2.0 Fgr					
		2.0 gr					
		1.0 Fgr					
		1.0 gr					
		1.0 CS					
		1.0 Fgr					
		1.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
15	1.0	1.0 Fgr	0	7	17	28	+gr
		2.0 FS					
		3.0 Fgr					
		2.0 sd					
		7.0 gr					
		1.0 sd					
		3.0 gr					
16	0.5	0.5 gr	1	8	20	31	+gr
		4.5 Fgr					
		0.5 gr					
		1.0 Fgr					
		1.0 sd					
		5.0 gr					
		1.0 sd					
		2.0 gr					
		1.0 Fgr					
		1.0 CS					
		2.0 Fgr					
		4.0 gr					
		1.0 Fgr					
		1.0 FS					
		1.0 Fgr					
		2.0 gr					
		3.0 Fgr					
		1.0 gr					
		1.0 Fgr					
		1.0 gr					
17	2.0	1.0 sd	2	13	25	35	+gr
		1.0 Fgr					
		1.0 CS					
		2.0 Fgr					
		4.0 gr					
		1.0 Fgr					
		1.0 FS					
		1.0 Fgr					
		2.0 gr					
18	3.5	2.5 Fgr	0	12	26	37	WL
		1.0 sd					
		2.0 gr					
		1.0 FS					
		6.0 gr					
19	3.0	1.0 gr SiCl	0	9	19	29	WL
		4.0 gr					
		1.5 sd					
		4.5 gr					
20	2.0	6.0 Fgr	2	18	29	39	WL
		1.5 gr					
		2.0 Fgr					
		0.5 Fgr SiCl					
		2.0 gr					
		1.0 Fgr					
		1.0 gr					
		1.0 Fgr					
		2.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	
21	1.0	1.0 sd	0	10	20	30	+gr
		1.0 gr					
		3.0 FS					
		3.0 sd					
		3.0 gr					
		2.0 sd					
		4.0 gr					
		1.0 sd					
		1.0 gr					
22	2.0	2.0 gr	1	11	23	32	+gr
		1.0 Fgr					
		1.0 sd					
		2.0 Fgr					
		1.5 gr					
		0.5 sd					
		10.0 gr					
23	3.0	2.0 Fgr	1	10	22	32	WL
		1.0 sd					
		3.0 Fgr					
		1.0 gr					
		2.0 gr					
		1.0 Fgr					
		3.5 gr					
		0.5 Fgr SiCl					
		1.0 Fgr					
		2.0 gr					
24	3.0	6.0 sd	0	9	18	29	WL
		5.5 gr					
25	2.0	1.0 gr SiCl	0	14	27	38	WL
		2.0 gr					
		1.0 sd					
		11.0 gr					
26	1.0	6.0 Fgr	6	22	35	46	+gr
		7.0 gr					
		1.0 Fgr					
		5.0 gr					

RANGE 79 **TWP** 145 **SEC** NE 1/4 4

COUNTY Mclean Oct-15

PROSPECTED BY Rogstad/Usher

INSPECTED & APPROVED Jeffrey Swank Nov-15

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	**SNH-1-083(111)111**	**180**	**3**

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
27	1.0	2.0 gr	5	14	25	36	+gr
		3.0 Fgr					
		1.0 FS					
		1.0 Fgr					
		3.0 gr					
		1.0 Cgr					
		4.0 gr					
		1.0 Fgr					
		3.0 gr					
28	1.0	7.0 Fgr	3	21	34	44	+gr
		3.0 gr					
		1.0 Fgr					
		5.0 gr					
		2.0 Fgr					
		1.0 gr					
29	0.5	2.5 gr	3	14	24	36	+gr
		4.0 Fgr					
		8.0 gr					
		1.0 Fgr					
		4.0 gr					
30	1.5	1.5 Fgr	4	17	28	38	+gr
		1.0 sd					
		1.0 Fgr					
		1.0 sd					
		5.0 gr					
		2.0 Fgr					
		1.0 gr					
		1.0 Fgr					
		1.0 sd					
		4.0 gr					
31	1.0	4.5 Fgr	3	14	27	39	+gr
		14.5 gr					
32	1.5	3.5 Fgr	3	14	25	35	+gr
		1.0 sd					
		3.0 Fgr					
		7.0 gr					
		2.0 Fgr					
		2.0 gr					
33	1.0	2.0 gr	3	18	29	41	+gr
		4.0 Fgr					
		4.0 gr					
		3.0 Fgr					
		6.0 gr					
34	1.0	6.0 Fgr	3	14	25	36	+gr
		4.0 gr					
		1.0 Fgr					
		8.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
35	1.5	3.5 Fgr	3	13	24	34	+gr
		1.0 FS					
		2.0 Fgr					
		7.0 gr					
		2.0 Fgr					
		3.0 gr					
36	1.0	2.0 Fgr	3	18	29	39	+gr
		1.0 gr					
		3.0 Fgr					
		1.0 gr					
		2.0 sd					
		1.0 Fgr					
		5.0 gr					
		1.0 sd					
		4.0 gr					
37	0.5	1.5 Fgr	4	13	23	33	SiCl
		1.0 gr					
		3.0 Fgr					
		1.0 CS					
		1.0 Fgr					
		8.0 gr					
		1.0 Fgr					
38	2.5	2.5 gr	3	13	22	30	+gr
		4.0 Fgr					
		3.0 sd					
		1.0 sd SiCl					
		1.0 FgrSiCl					
		2.0 Fgr					
		4.0 gr					
39	4.0	3.0 gr SiCl	2	11	22	32	SiCl
		4.0 Fgr					
		2.0 FS					
		2.0 gr					
		1.0 Fgr					
		2.5 gr					
40	3.5	1.5 Fgr	2	13	22	31	+gr
		2.0 gr					
		6.0 sd					
		3.0 Fgr					
41	0.5	1.5 gr	2	11	23	33	+gr
		5.0 Fgr					
		4.0 gr					
		1.0 Fgr					
		3.0 gr					
		1.0 FS					
		4.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
42	2.0	6.0 Fgr	2	14	25	35	+gr
		1.0 sd					
		6.0 gr					
		1.0 Fgr					
		1.0 sd					
		2.0 Fgr					
		1.0 gr					
43	1.0	1.0 gr	3	13	24	35	+gr
		4.0 Fgr					
		1.0 gr					
		2.0 sd					
		1.0 Fgr					
		7.0 gr					
		1.0 Fgr					
		2.0 gr					
44	1.0	3.5 Fgr	2	13	23	34	+gr
		2.5 sd					
		1.0 Fgr					
		6.0 gr					
		3.0 Fgr					
		0.5 sd SiCl					
		2.5 Fgr					
45	2.0	9.0 Fgr	1	13	24	33	+gr
		4.0 gr					
		2.0 Fgr					
		3.0 gr					
46	1.5	2.5 Fgr	2	18	30	38	+gr
		1.0 sd					
		1.0 Fgr					
		1.0 sd					
		2.5 Fgr					
		1.0 sd					
		8.0 gr					
		2.0 Fgr					
		3.0 gr					
47	5.0	2.0 Fgr	1	12	23	32	+gr
		1.0 FS					
		8.0 Fgr					
		4.0 gr					
48	5.0	1.0 sd	0	14	22	30	+gr
		2.0 Fgr					
		1.0 sd					
		2.0 Fgr					
		1.5 sd					
		2.5 Fgr					
		5.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
49	1.0	3.0 Fgr	1	9	19	29	+gr
		1.0 FS					
		4.0 Fgr					
		3.0 gr					
		1.0 Fgr					
		2.0 gr					
		2.0 Fgr					
		3.0 gr					
50	2.0	3.0 Fgr	0	13	23	32	+gr
		1.0 sd					
		2.0 Fgr					
		3.0 sd					
		3.0 Fgr					
		6.0 gr					
51	1.0	5.0 Fgr	0	13	23	32	+gr
		1.0 FS					
		1.0 Fgr					
		4.0 gr					
		2.0 Fgr					
		1.0 gr					
		1.0 FS					
		4.0 Fgr					
52	1.0	3.0 Fgr	1	15	26	35	+gr
		1.0 sd					
		1.0 Fgr					
		3.0 sd					
		5.0 gr					
		4.0 Fgr					
		2.0 gr					
53	4.0	2.0 Fgr	0	10	17	27	+gr
		2.0 gr					
		4.0 Fgr					
		1.0 gr					
		5.0 Fgr					
		2.0 gr					

RANGE 79 **TWP** 145 **SEC** NE 1/4 4

COUNTY Mclean Oct-15

PROSPECTED BY Rogstad/Usher

INSPECTED & APPROVED Jeffrey Swank Nov-15

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SNH-1-083(111)111	180	4

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
54	2.0	3.0 Fgr	1	13	24	34	+gr
		3.0 sd					
		2.0 Fgr					
		2.0 gr					
		1.0 sd					
		7.0 gr					
55	0.5	1.5 gr	2	13	25	34	+gr
		6.0 Fgr					
		3.5 gr					
		0.5 Fgr					
		8.0 gr					
56	2.0	4.0 Fgr	1	13	23	34	+gr
		2.0 sd					
		7.0 Fgr					
		2.0 gr					
		1.5 Fgr					
		1.5 gr					
57	0.5	3.5 gr	3	15	28	37	+gr
		5.0 Fgr					
		5.0 gr					
		2.0 Fgr					
		4.0 gr					
58	1.0	3.0 gr	2	13	23	33	+gr
		1.0 Fgr					
		2.0 sd					
		2.0 Fgr					
		1.0 gr					
		5.0 Fgr					
		1.0 CS					
		1.0 FS					
		1.0 Fgr					
		1.0 gr					
		1.0 FS					
59	1.0	1.0 gr	0	9	21	31	+gr
		2.0 Fgr					
		1.0 CS					
		5.0 Fgr					
		5.0 gr					
		1.0 FS					
		4.0 gr					
60	1.0	1.0 gr	3	13	25	35	+gr
		1.0 sd					
		3.0 Fgr					
		2.0 sd					
		1.0 Fgr					
		5.0 gr					
		1.0 sd					
		3.0 Fgr					
		2.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
61	1.0	1.0 gr	1	11	21	31	+gr
		7.0 Fgr					
		3.0 gr					
		2.0 Fgr					
		6.0 gr					
62	2.0	1.0 gr	1	10	22	32	+gr
		3.0 Fgr					
		2.0 sd					
		1.0 Fgr					
		4.0 gr					
		3.5 Fgr					
		0.5 sd					
		3.0 Fgr					
63	1.0	5.0 Fgr	3	13	28	38	+gr
		1.0 FS					
		1.0 gr					
		1.0 Fgr					
		12.0 gr					
64	2.0	5.0 Fgr	1	18	28	38	+gr
		10.0 gr					
		2.0 Fgr					
		1.0 gr					
		2.0 Fgr					
		1.0 gr					
65	1.5	1.5 gr	2	13	25	36	+gr
		3.0 Fgr					
		1.5 sd					
		4.5 gr					
		1.0 Fgr					
		1.0 sd					
		6.0 gr					
66	1.0	6.0 Fgr	2	12	24	34	+gr
		4.0 gr					
		3.0 Fgr					
		6.0 gr					
67	1.5	2.5 Fgr	1	13	24	33	+gr
		2.0 sd					
		3.0 Fgr					
		1.0 gr					
		1.0 CS					
		3.0 gr					
		1.0 sd					
		1.0 CS					
		3.0 Fgr					
68	1.0	6.0 Fgr	2	14	25	35	+gr
		4.0 gr					
		2.0 Fgr					
		4.0 gr					
		1.0 Fgr					
		2.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole
69	3.0	4.0 Fgr	0	12	22	30	+gr
		1.0 sd					
		2.0 gr					
		1.0 sd					
		4.0 gr					
		1.0 Fgr					
		2.0 sd					
		2.0 Fgr					
70	2.0	1.0 sd	0	7	18	27	+gr
		4.0 Fgr					
		2.0 gr					
		1.0 Fgr					
		3.0 gr					
		3.0 Fgr					
		1.5 gr					
		2.5 Fgr					
71	1.0	2.0 Fgr	2	12	24	33	+gr
		2.0 sd					
		7.0 Fgr					
		1.0 gr					
		2.0 Fgr					
		5.0 gr					
72	4.0	2.0 Fgr	2	14	26	36	+gr
		4.0 gr					
		1.0 Fgr					
		2.0 gr					
		1.0 sd					
		6.0 gr					

PIT LOGGING BY TEST HOLES

Test Hole No.	Depth of Stripping (Ft)	Depth of Material (Ft)	% Retained on 1½" Screen	% Retained on ¾" Screen	% Retained on 3/8" Screen	% Retained on #4 Screen	Bottom of Test Hole

RANGE 79 **TWP** 145 **SEC** NE 1/4 4

COUNTY Mclean Oct-15

PROSPECTED BY Rogstad/Usher

INSPECTED & APPROVED Jeffrey Swank Nov-15

NDDOT ABBREVIATIONS

D-101-1

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

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

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NDDOT ABBREVIATIONS

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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D-101-20

Line Styles

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

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D-101-21

Line Styles

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

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Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

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Symbols

D-101-31

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

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Symbols

D-101-32

- Pad Mounted Feed Point
- Pipe Mounted Feed Point with Pad
- Pole Mounted Feed Point
- Headwall
- Double Headwall with Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate 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 (CSB)
- Flight Auger Sample (FA)
- Split Barrel Sample (SB)
- Thinwall Tube Sample
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- Standard Penetration Test (N)
- Transformer
- Inclinometer Tube (Incl)
- Underdrain Cleanout
- Excavation Unit
- Water Valve

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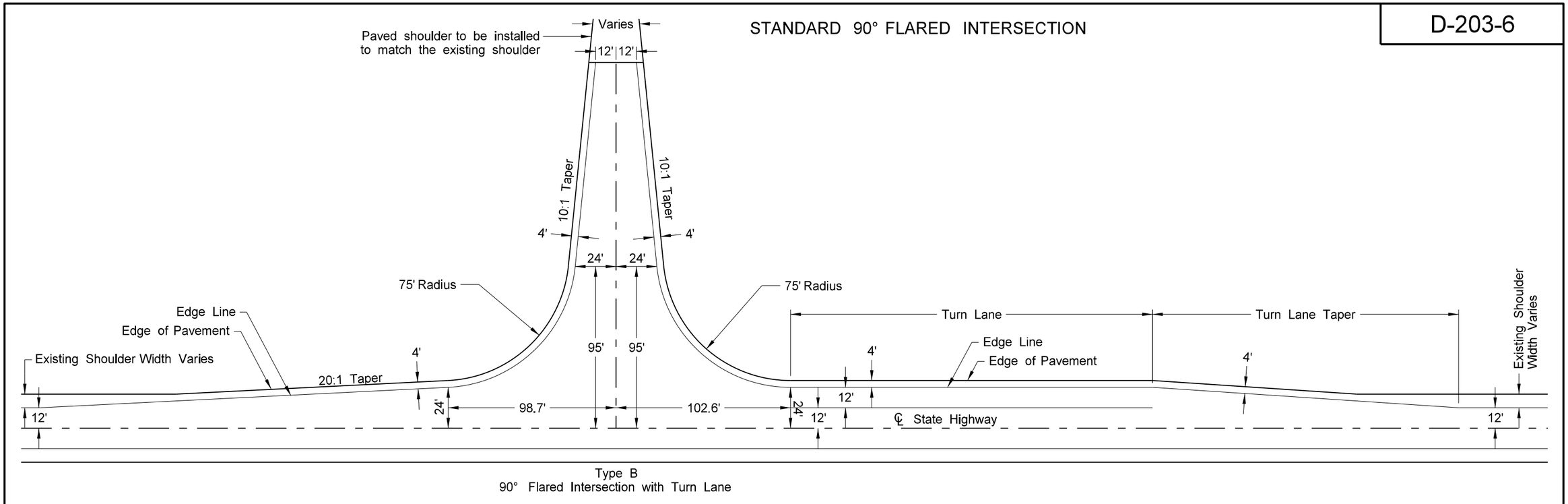
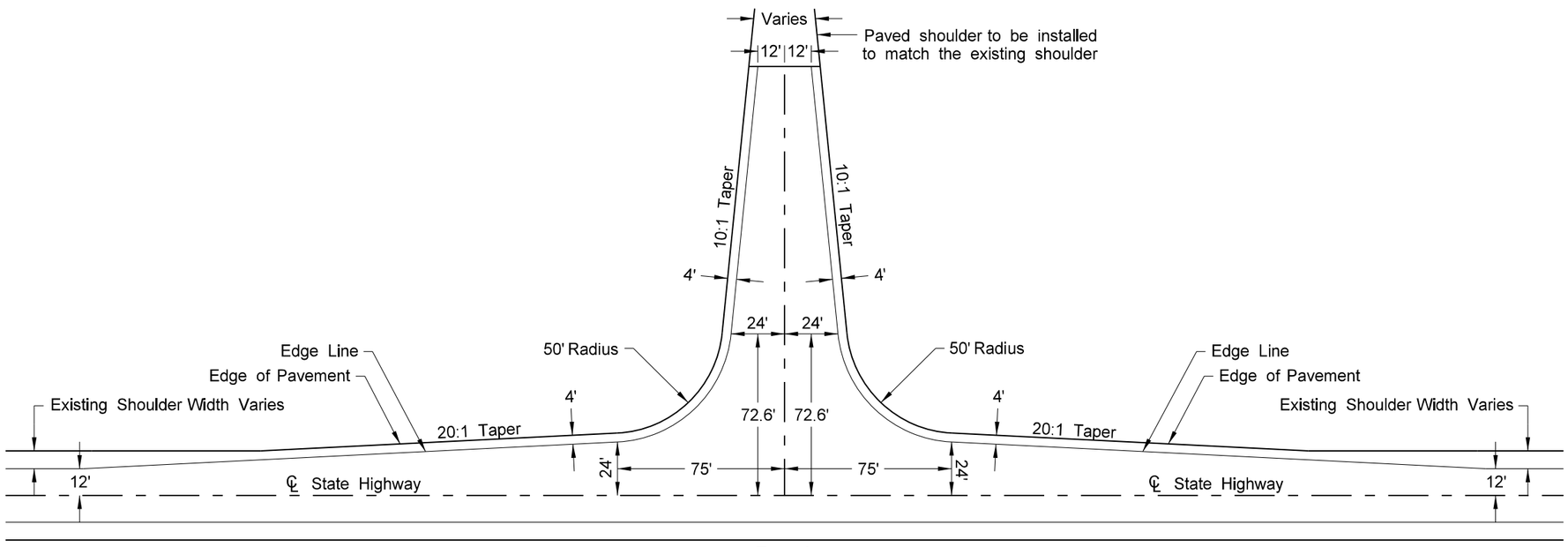
STANDARD 90° FLARED INTERSECTION

D-203-6



Type B
90° Flared Intersection with Turn Lane



Type A
90° Flared Intersection

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-19-09	
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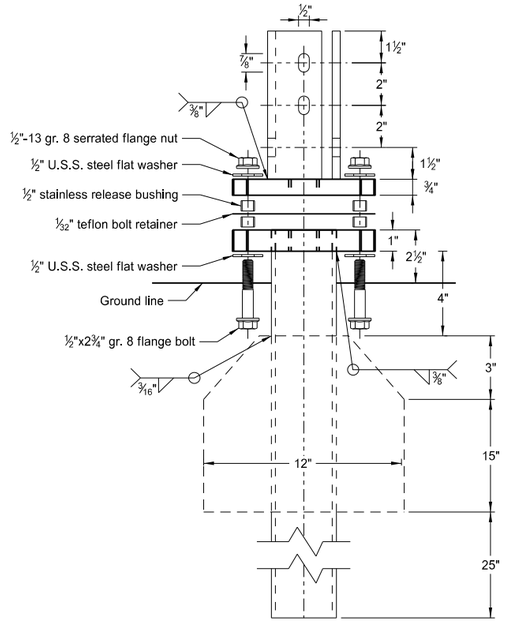
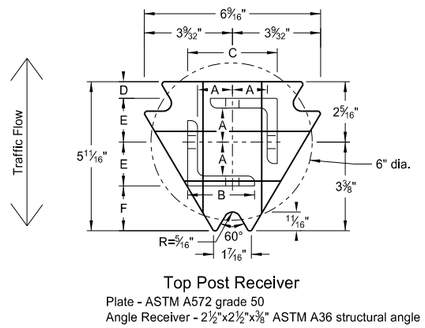
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

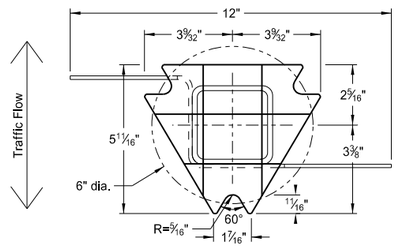


Multi-Directional
Slip Base Assembly

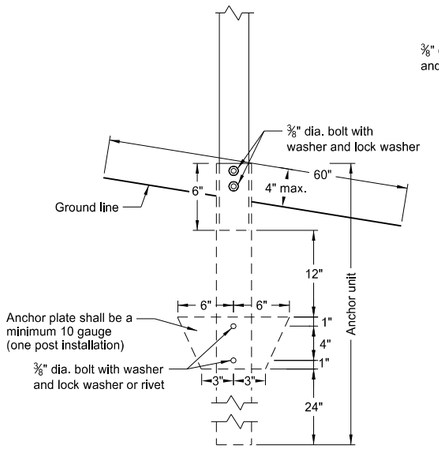
Perforated Tube



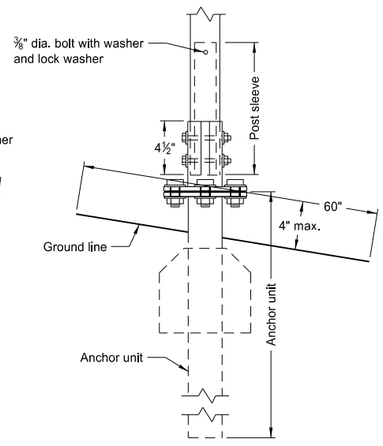
Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



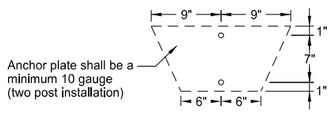
Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

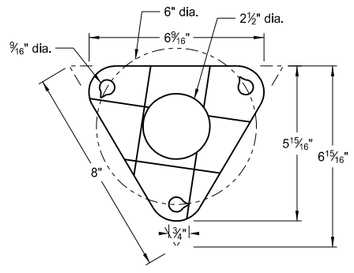


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





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

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 Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³⁄₁₆	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia $in.^4$	Cross Sec. Area $in.^2$	Section Modulus $in.^3$
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³⁄₁₆ x 2³⁄₁₆	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.785

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

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

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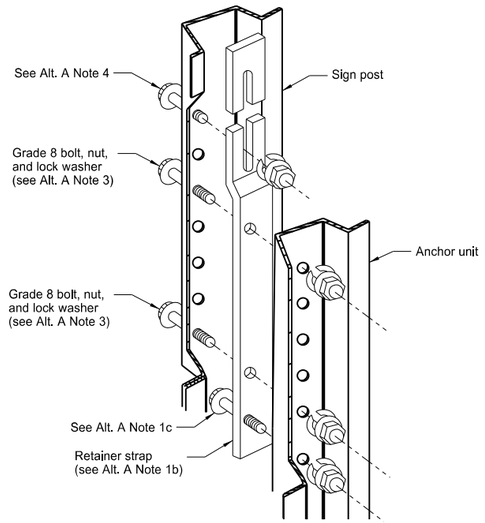
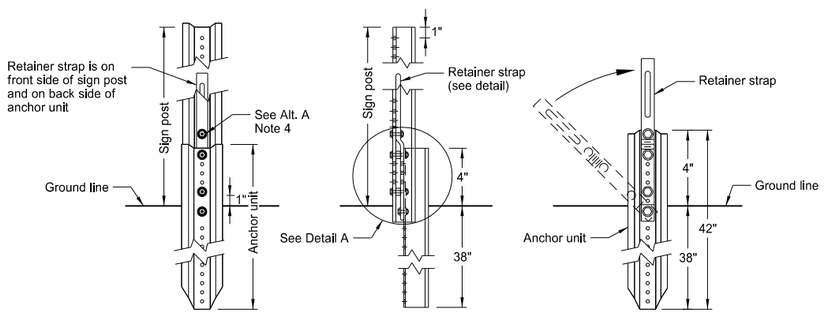
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



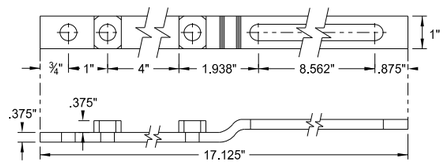
Detail A



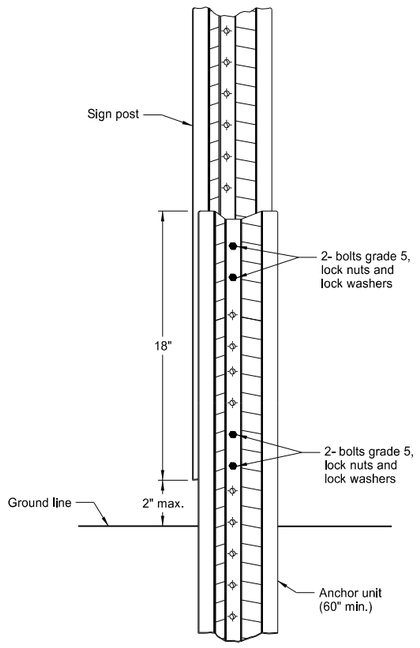
Front View | Side View | Back View

Breakaway U-Channel Detail
Alternate A

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

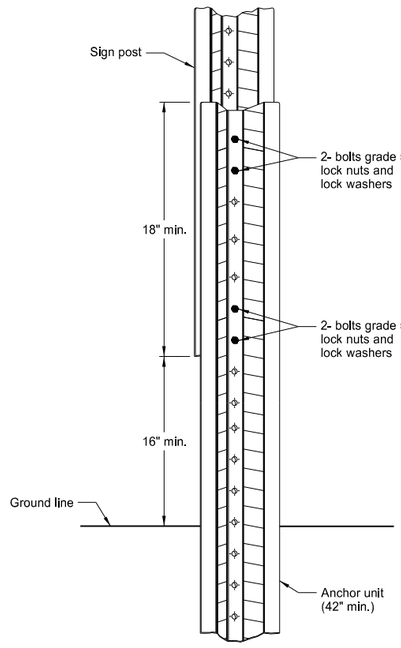


Retainer Strap Detail



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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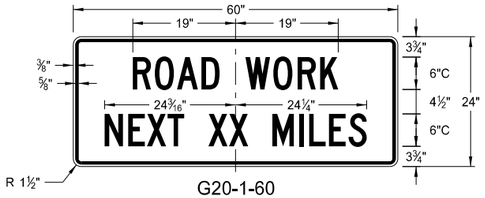
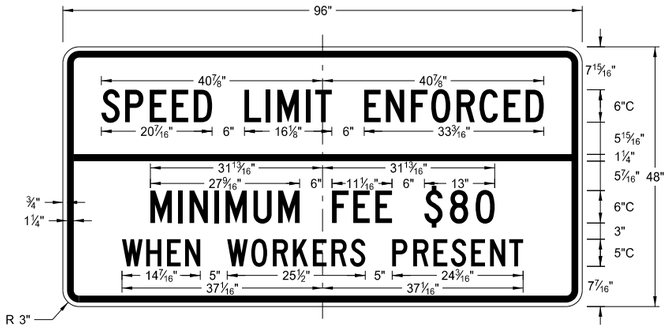
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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

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



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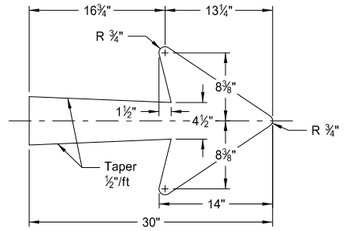
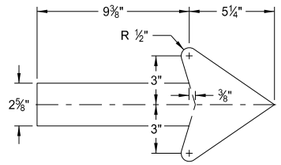
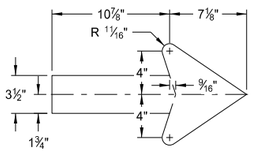
Background: orange



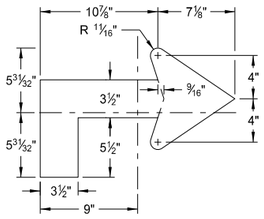
E5-1-48



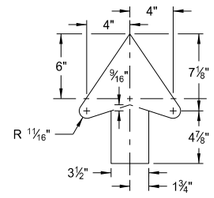
G20-50a-72
G20-52a-72



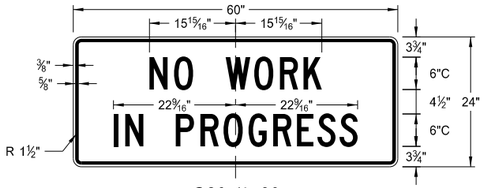
M4-9(L or R)-30
Right or Left



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



M4-9-30
Straight



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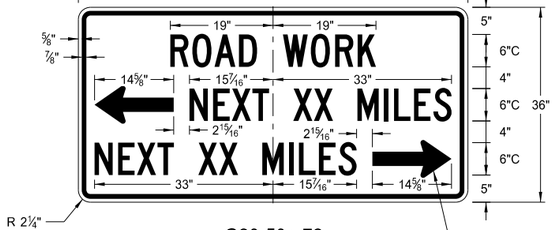
Background: orange



G20-50a-72
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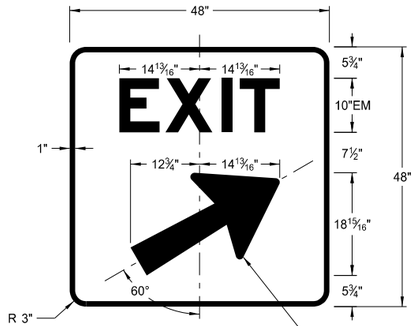
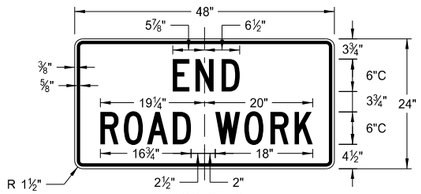
Background: orange

See ARROW DETAILS



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

See ARROW DETAILS



G20-2-48
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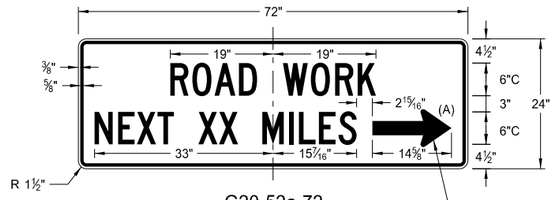
Background: orange



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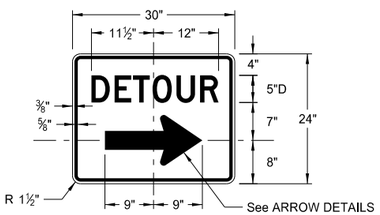
Background: orange

See ARROW DETAILS



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

See ARROW DETAILS

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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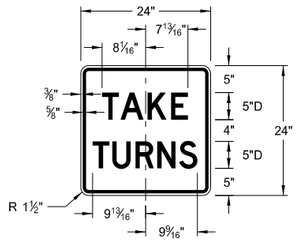
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50-24
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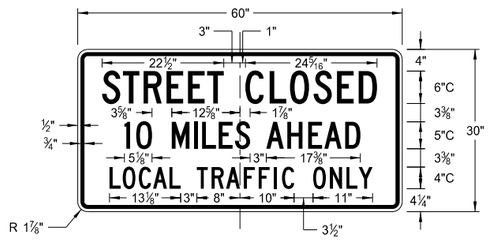
Background: white



R11-3c-60
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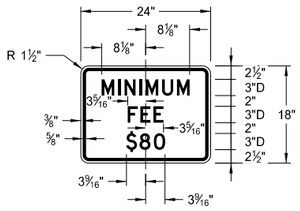
Background: white



R2-1a-24
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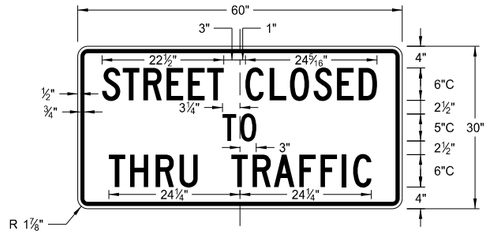

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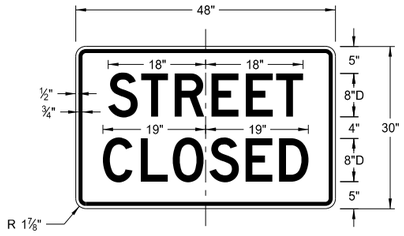

R11-2a-48
Legend: black (non-refl)
Background: white

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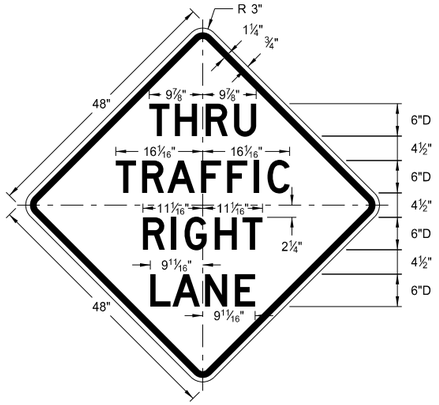
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W5-8-48
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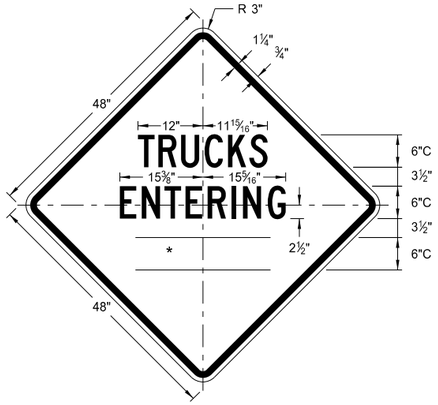
Background: orange



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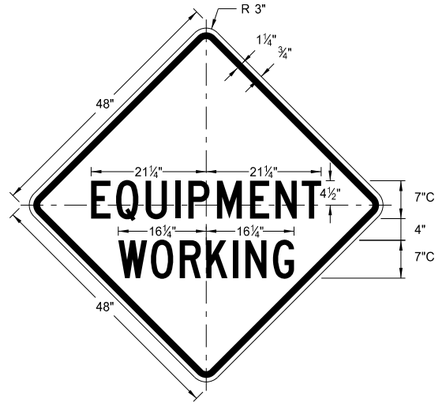
Background: orange



W20-51-48
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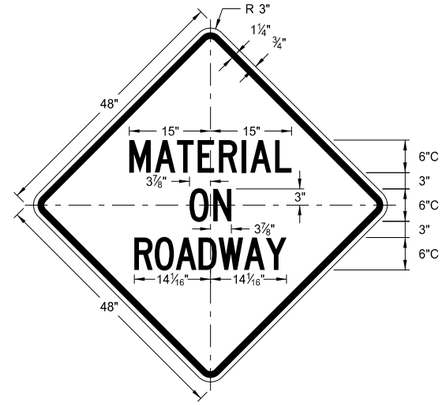
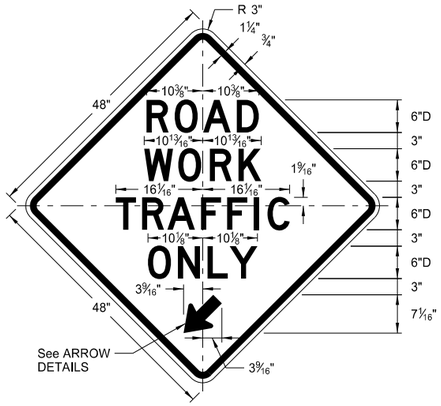
Background: orange



W21-51-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48
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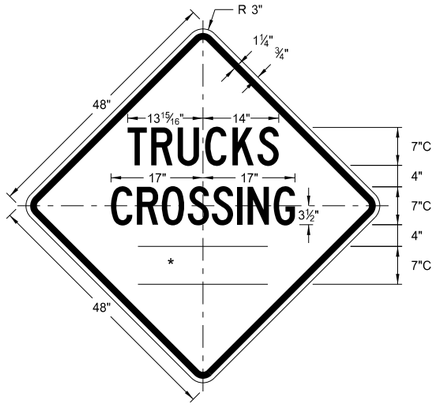
Background: orange



W8-55-48
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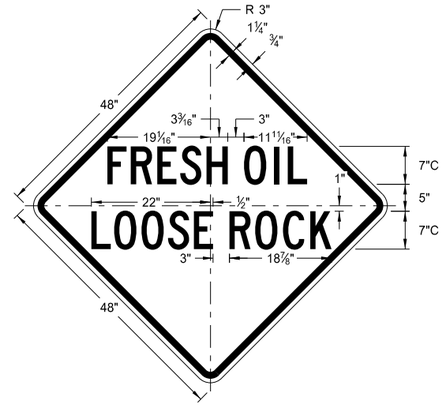
Background: orange

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



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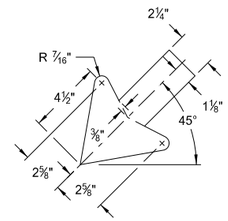
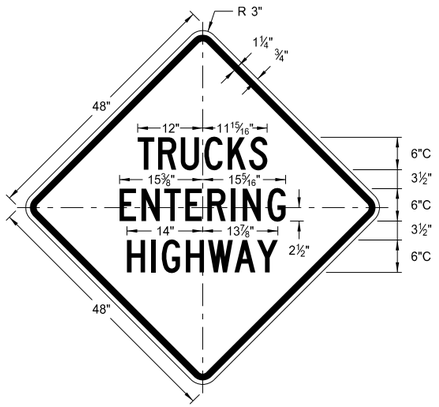


W5-9-48

ARROW DETAILS



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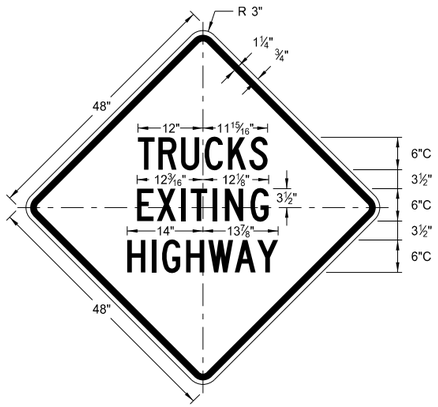

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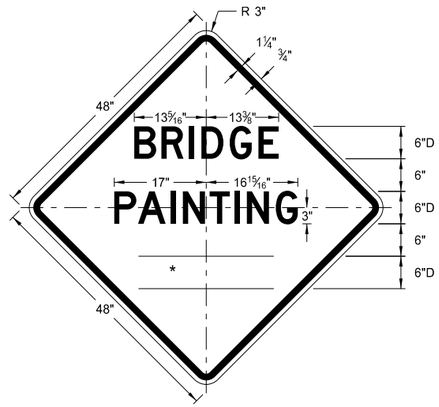

W21-50-48
Legend: black (non-refl)
Background: orange

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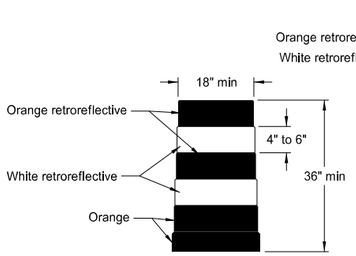
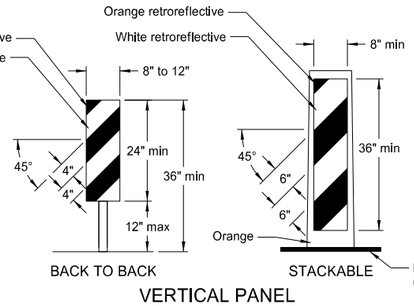
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



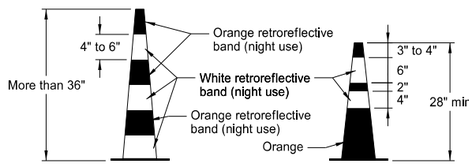
DELINEATOR DRUM

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.



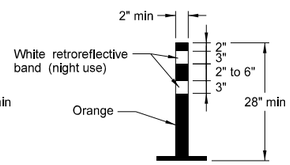
VERTICAL PANEL

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.



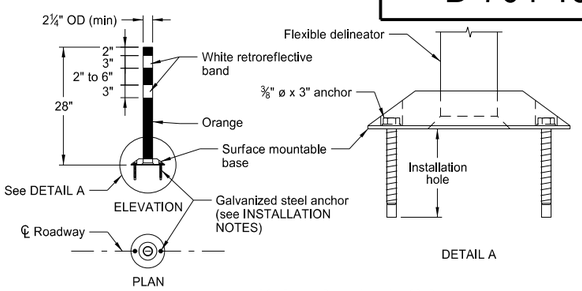
TRAFFIC CONE

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.



TUBULAR MARKER

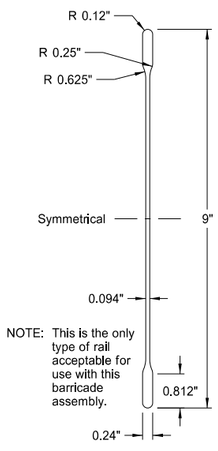
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

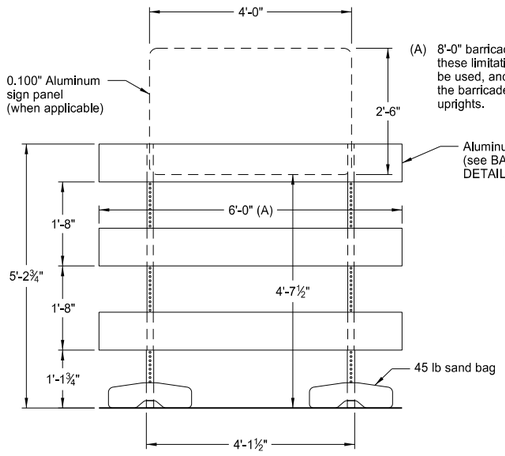
INSTALLATION NOTES:

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.



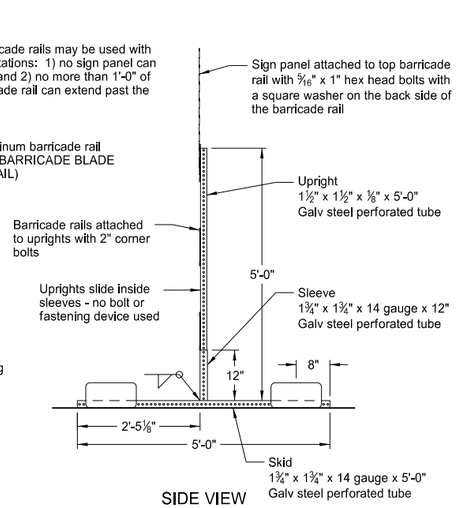
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



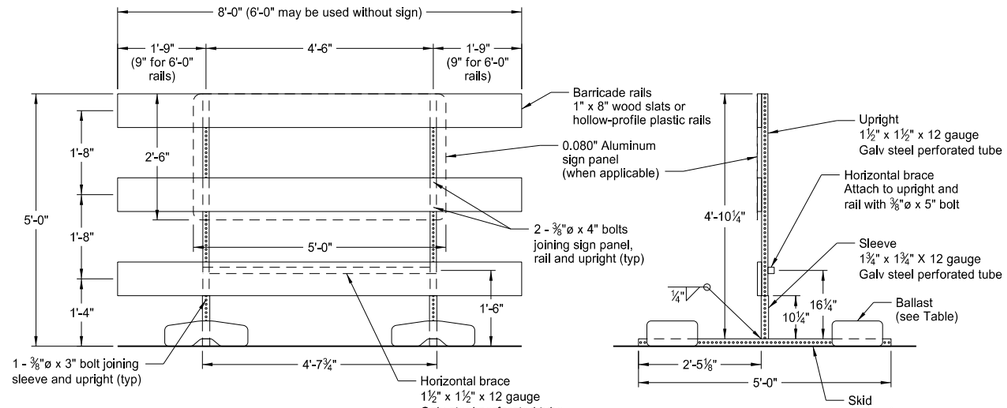
(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.

ELEVATION VIEW



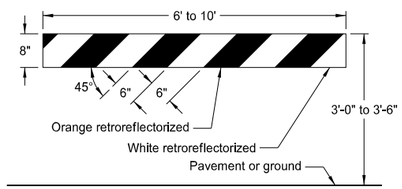
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

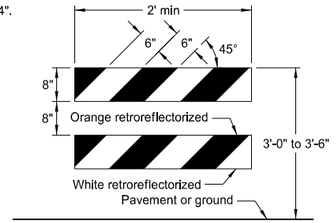


BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

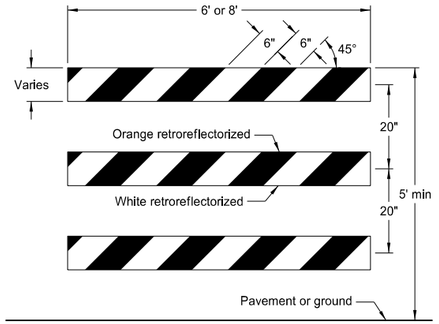
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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



TYPE I BARRICADE

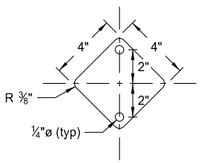


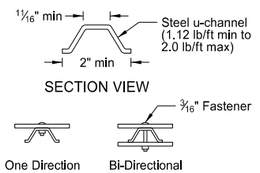
TYPE II BARRICADE

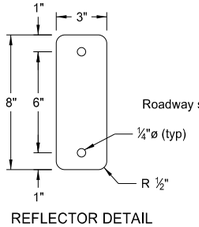


TYPE III BARRICADE

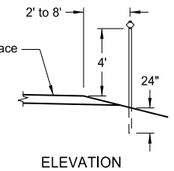
BARRICADE RAIL DETAILS







REFLECTOR DETAIL



ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

Note: 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.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

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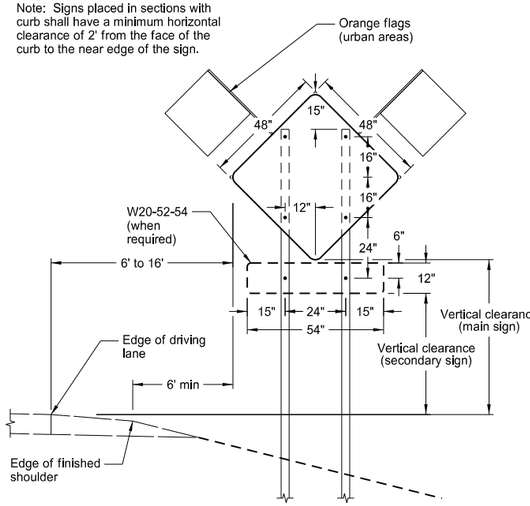
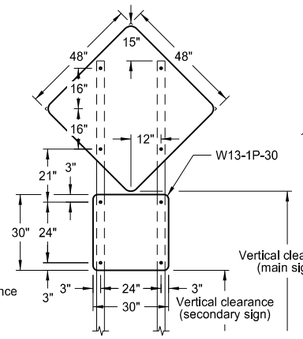
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

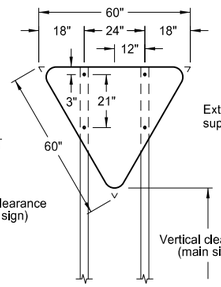
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



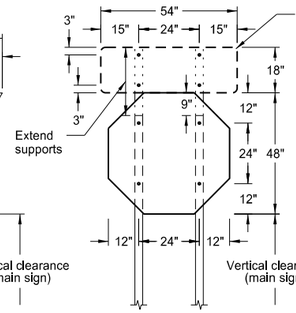
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



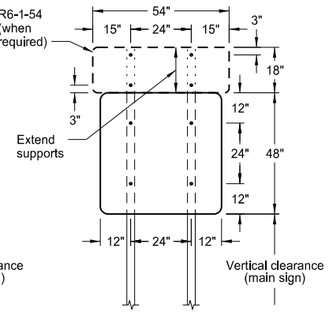
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



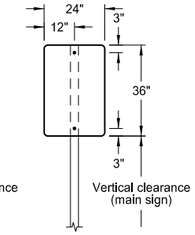
R1-2-60 - YIELD SIGN



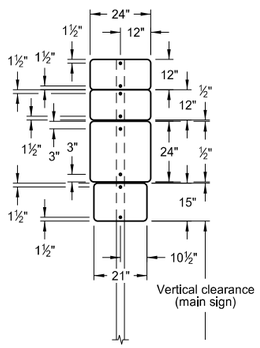
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



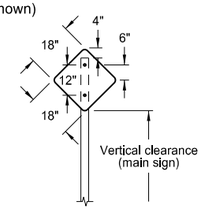
48" x 48" SIGN
(with R6-1-54 sign as required)



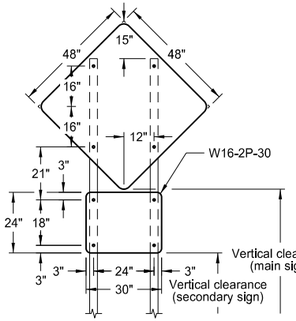
24" x 36" SIGN



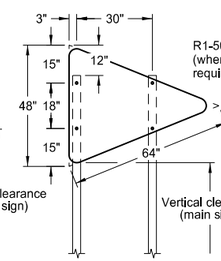
24" x 24"
ROUTE MARKER
ASSEMBLY



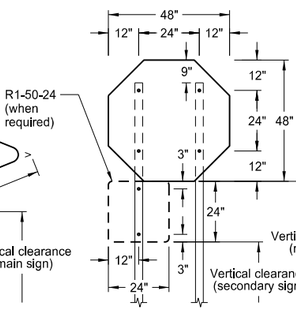
18" x 18"
DIAMOND SIGN



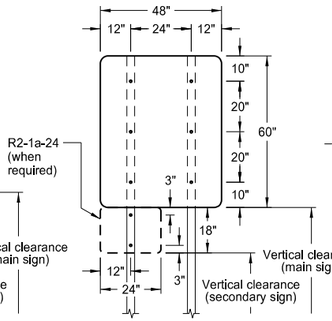
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



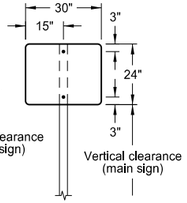
W14-3-64 - PENNANT SIGN



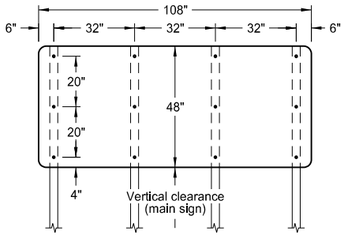
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



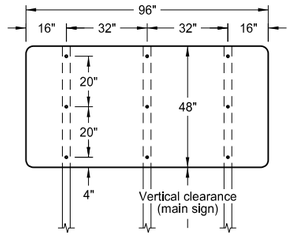
48" x 48" SIGN
(with R2-1a-24 sign as required)



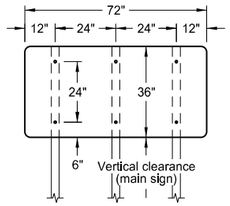
30" x 24" SIGN



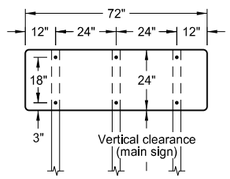
108" x 48" SIGN



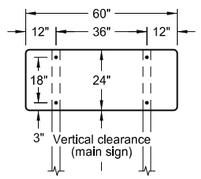
96" x 48" SIGN



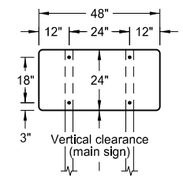
72" x 36" SIGN



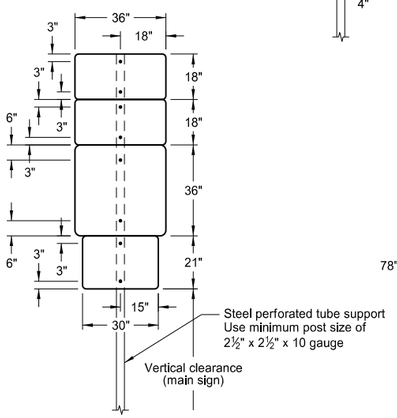
72" x 24" SIGN



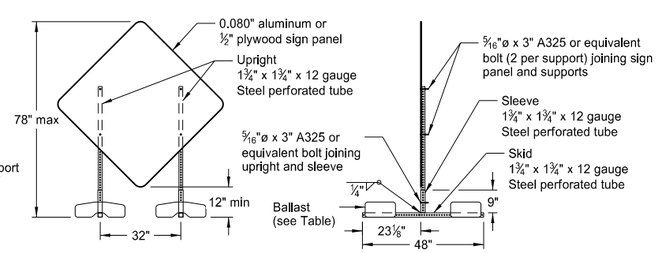
60" x 24" SIGN



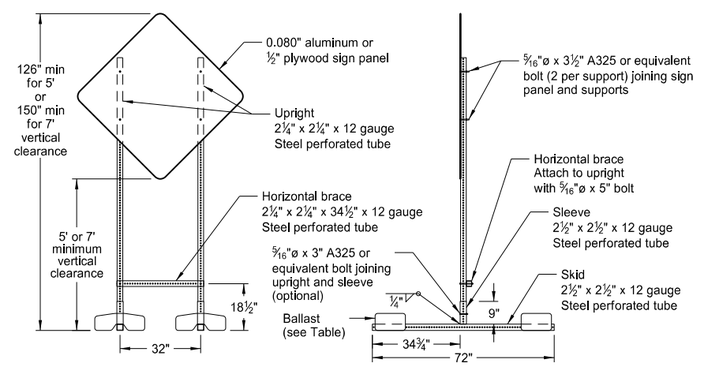
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: 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 2½" x 2½" 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, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" 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 unforseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-6 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.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

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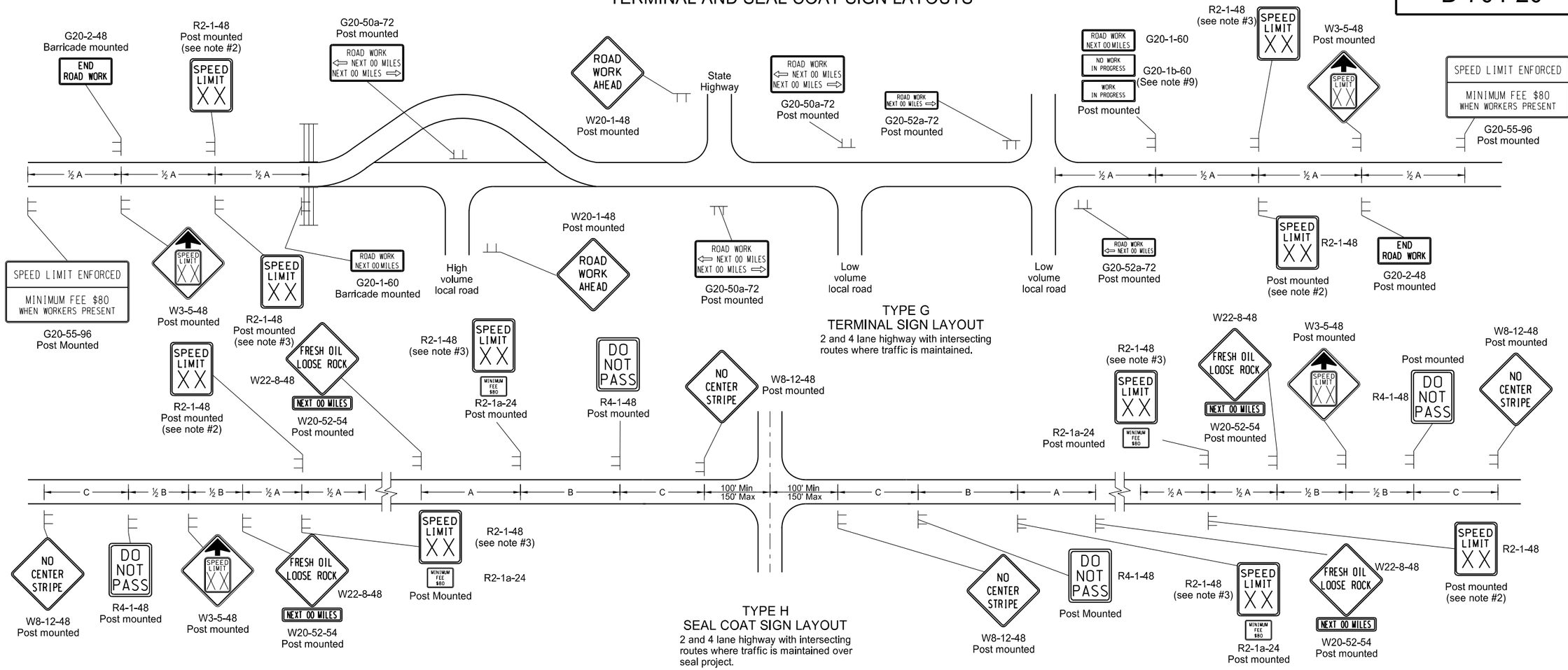
TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
2. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
3. 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 ½ B.
4. 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.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. 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.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
9. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
10. 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.
11. G20-55-96 sign is not required if 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 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

KEY

Type III barricade

Sign

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE

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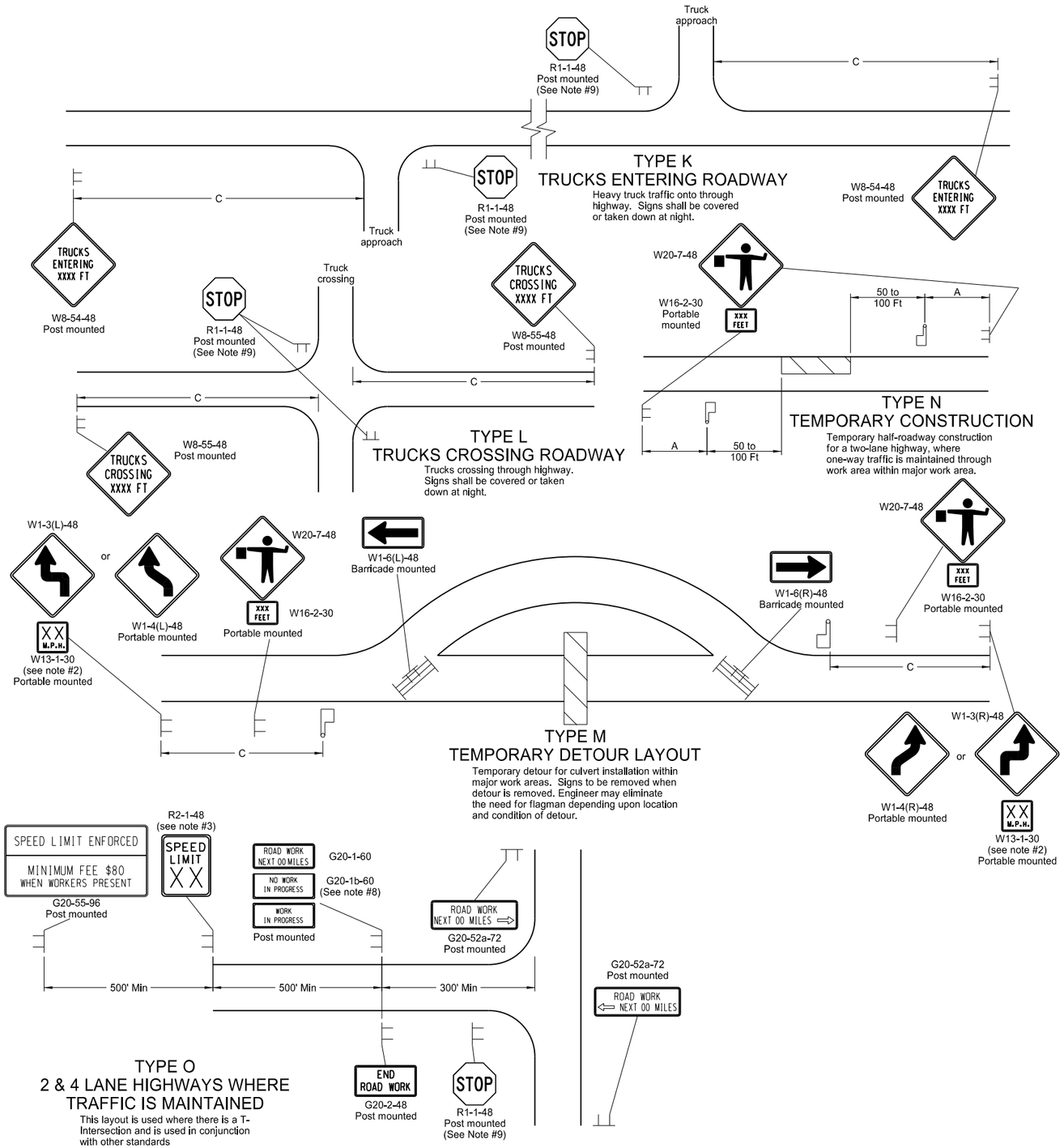
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

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.
2. Where necessary, safe speed to be determined by the Engineer.
3. 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 ½ B.
4. 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.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. 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.

KEY

Type III barricade — Work area

Sign — Flagger

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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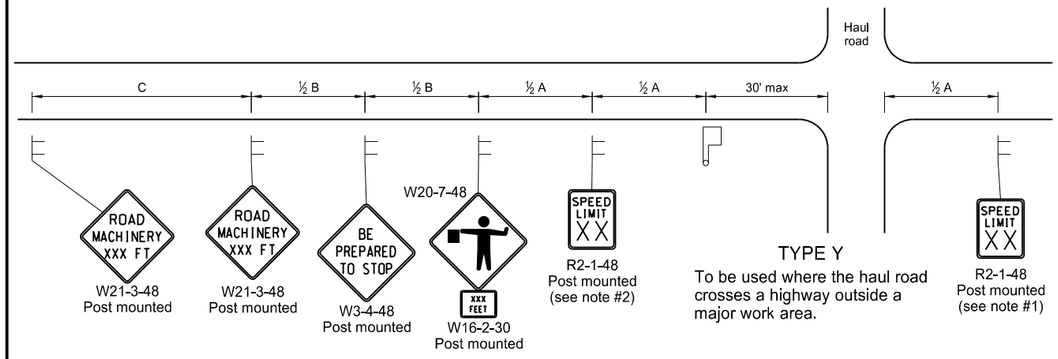
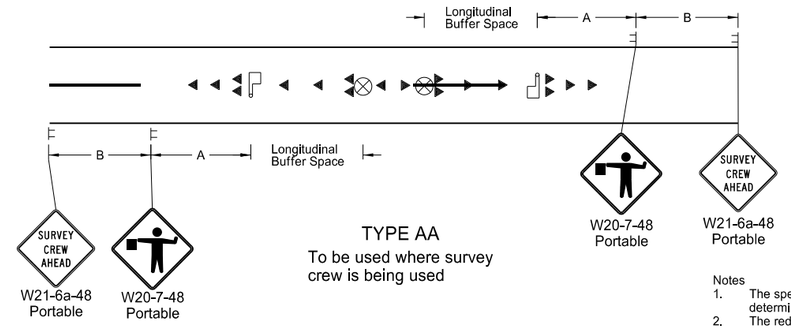
MISCELLANEOUS SIGN LAYOUTS

D-704-26



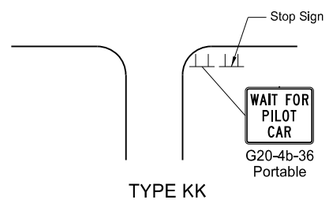
TYPE Y

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

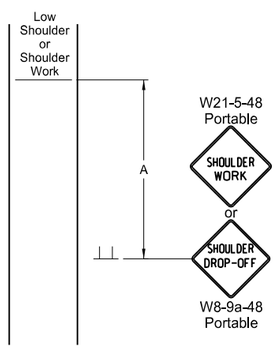


TYPE KK

To be used at major intersections within pilot car control area

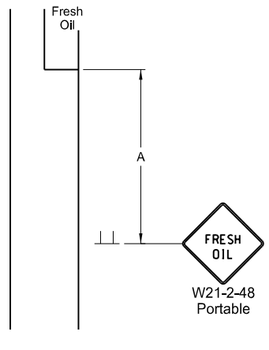
Notes

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 ½ 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.



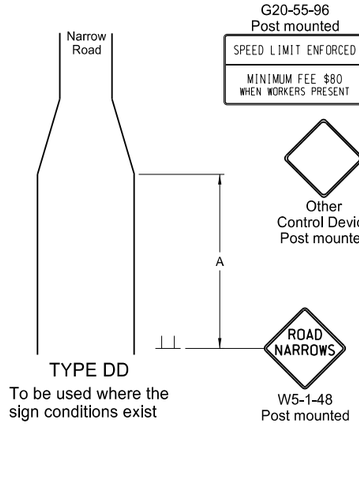
TYPE BB

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



TYPE CC

To be used where the sign conditions exist

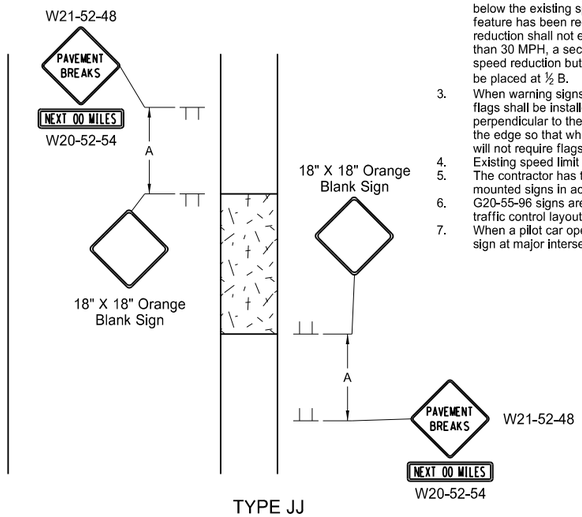


TYPE DD

To be used where the sign conditions exist

TYPE Z

To be used where speed zone is needed

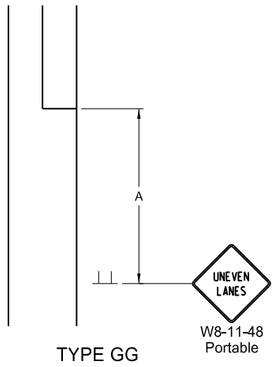


TYPE JJ

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.

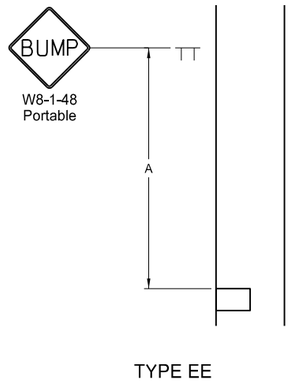
Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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



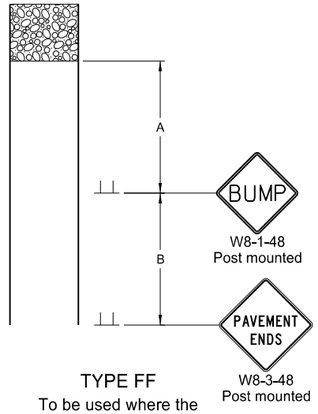
TYPE GG

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

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

KEY

Sign — Flagger

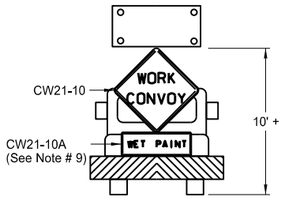
Cones

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

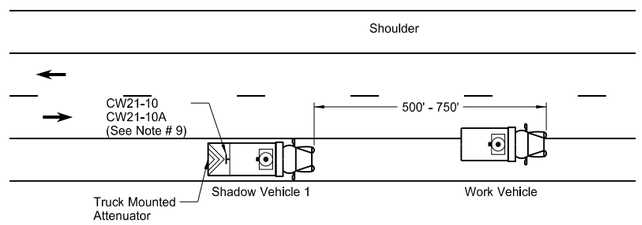
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 09/27/13 and the original document is stored at the North Dakota Department of Transportation

TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

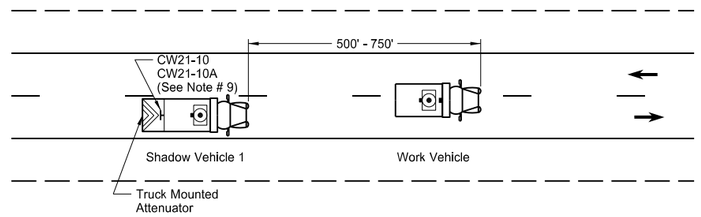
D-704-27



Typical Shadow Vehicle 1
Two-Way Roaday



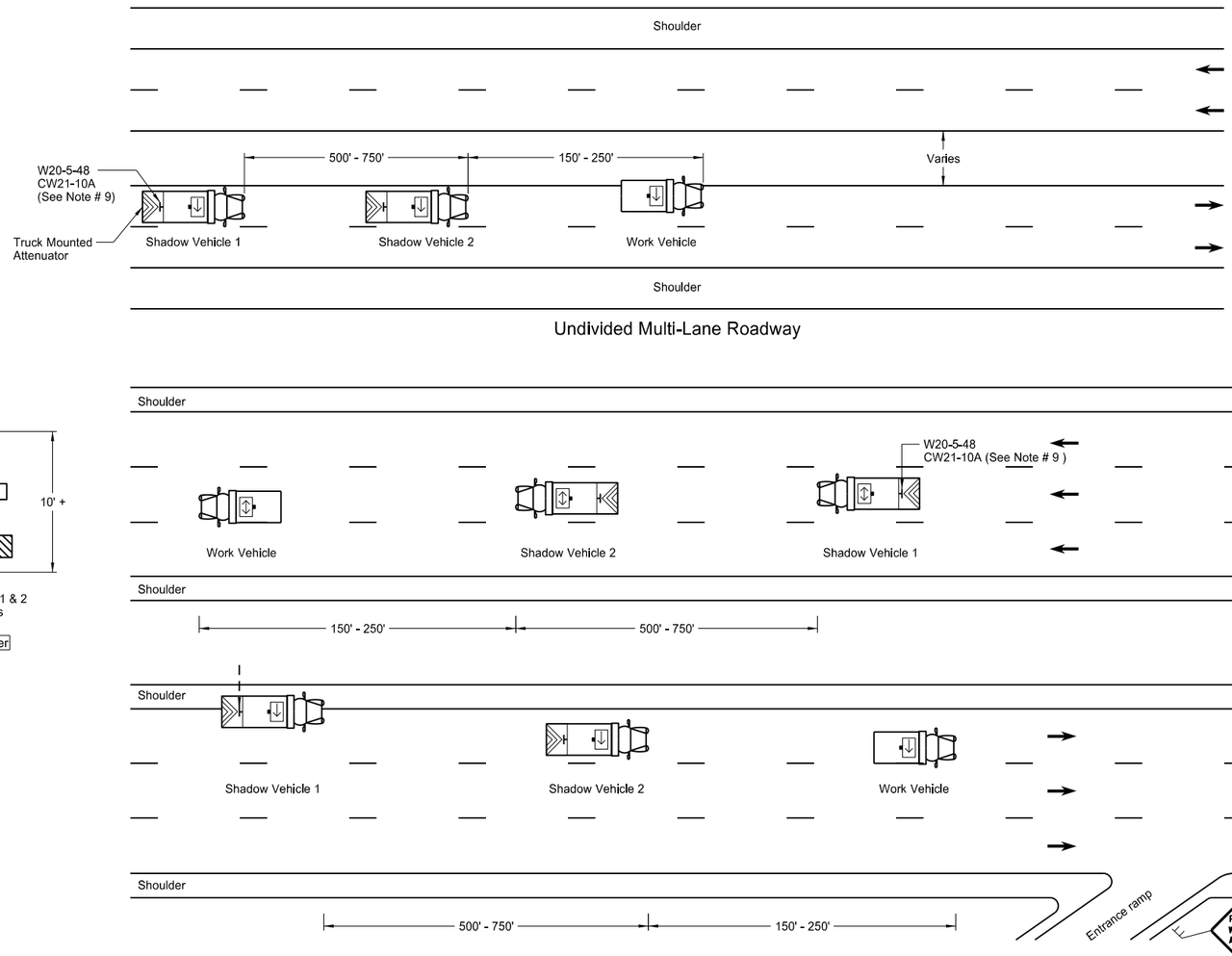
Two-Way Roadway with Paved Shoulders



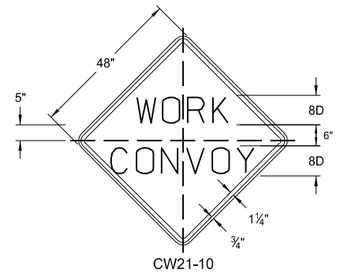
Two-Way Roadway without Paved Shoulders

Notes

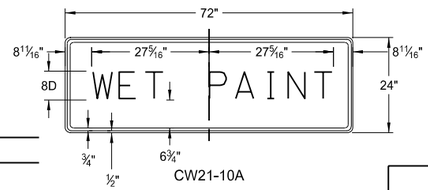
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
2. Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
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. When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
6. Vehicle spacing between the shadow vehicle 1 and shadow vehicle 2 will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the trail vehicle in time to slow down and/or change lanes as they approach the shadow vehicle.
7. Sign Colors
   Letters = Black
   Border = Black
   Background = Orange
8. Shadow vehicle 2 may be used as the paint tender vehicle.
9. Sign CW21-10A shall only be used during a painting operation.
10. On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.



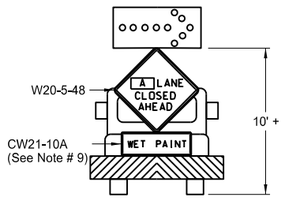
Sign Details



CW21-10



CW21-10A



Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center

KEY

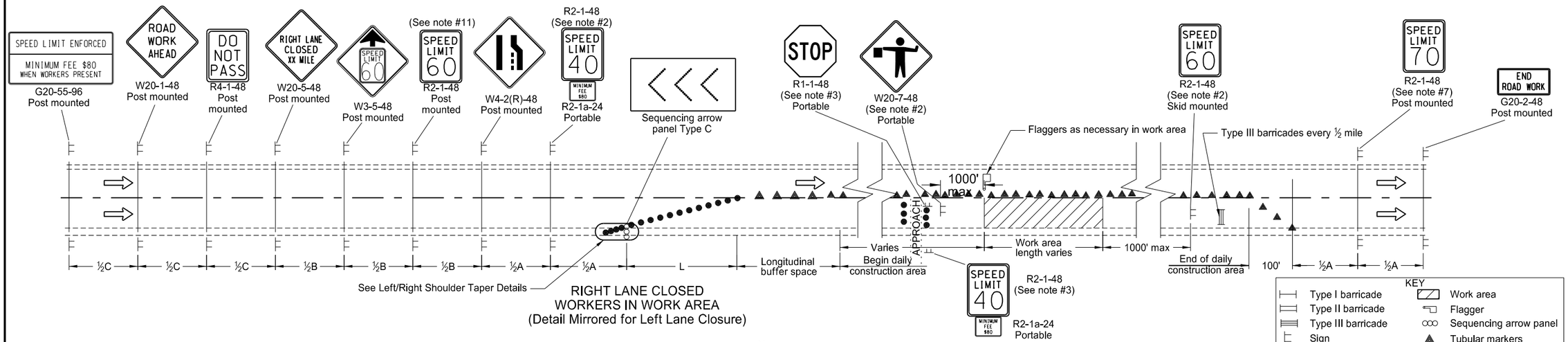
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
  - Right directional
  - Left directional
  - Double arrow directional
  - Caution Mode

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 06/18/14 and the original document is stored at the North Dakota Department of Transportation

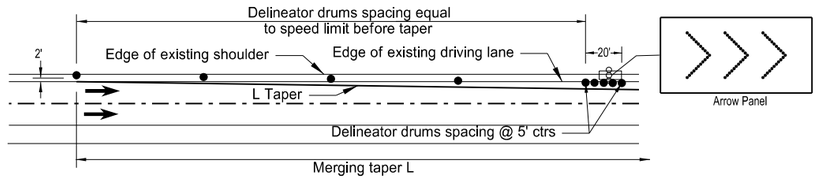
SIGN LAYOUT FOR ONE LANE CLOSURE

D-704-34

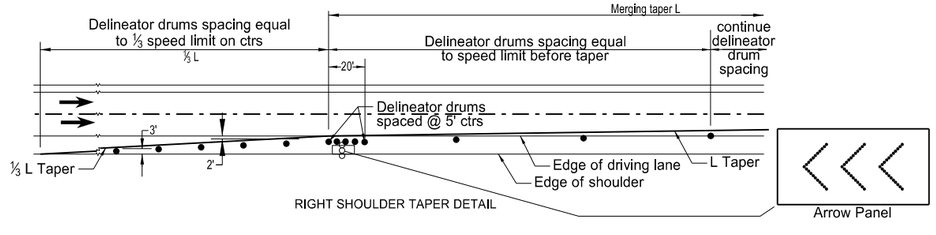


Notes:

1. Advance signs for flagging should be installed when flaggers are present.
2. 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 ½A 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.
3. 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.
4. 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.
5. 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".
6. 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).
7. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. 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.
10. 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 ½B.
11. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
12. 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.



LEFT SHOULDER TAPER DETAIL



RIGHT SHOULDER TAPER DETAIL

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

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-26-2012

REVISIONS

DATE	CHANGE

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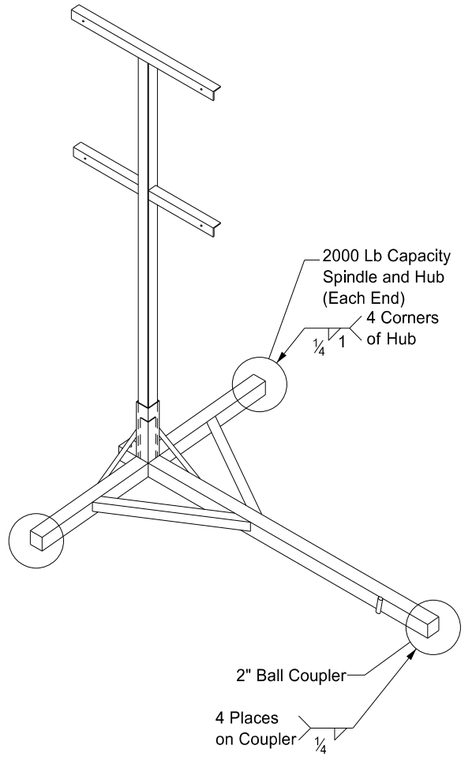
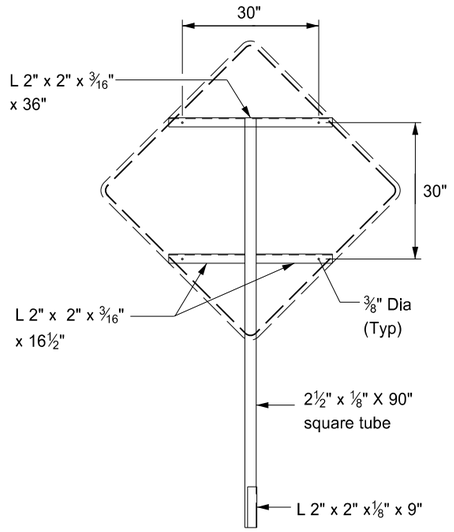
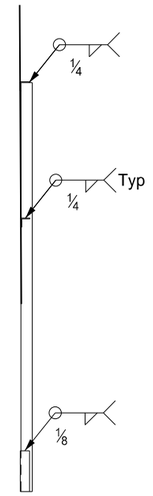
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



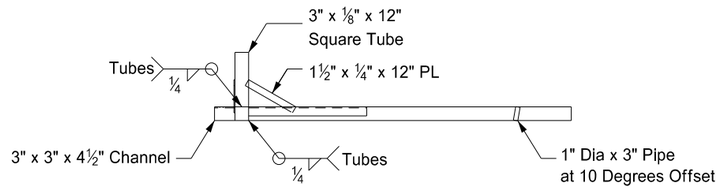


FRONT

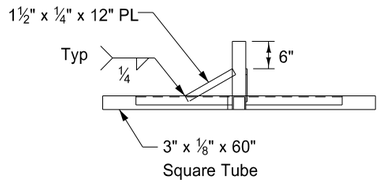


RIGHT

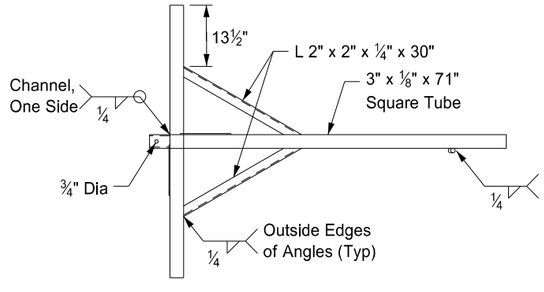
SIGN SUPPORT



FRONT



RIGHT



TOP

TRAILER

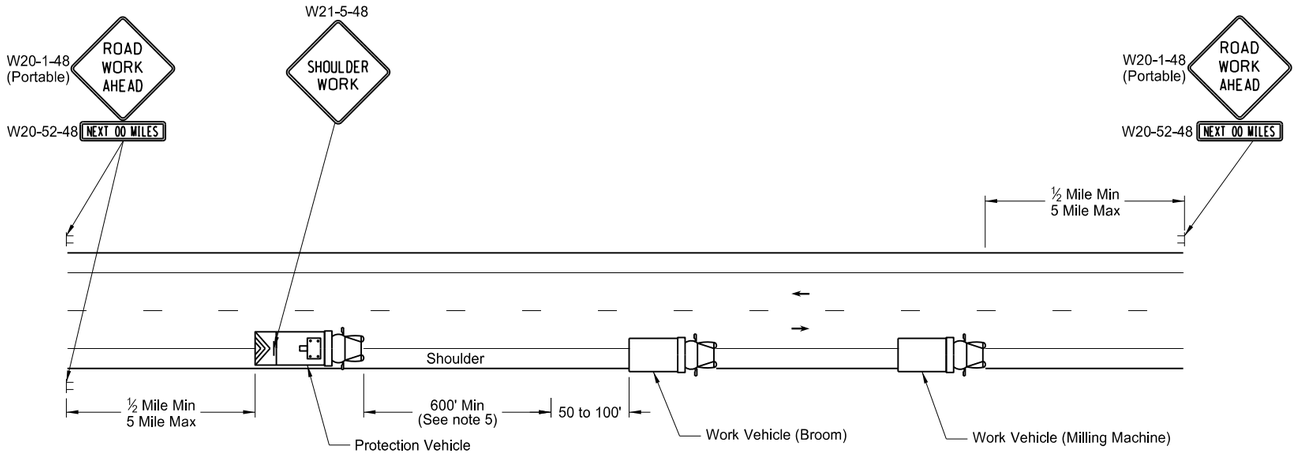
Notes:

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.

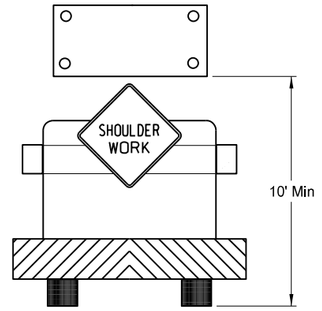
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

MOBILE OPERATION
Grinding Shoulder Rumble Strips



TWO LANE - TWO WAY ROADWAY

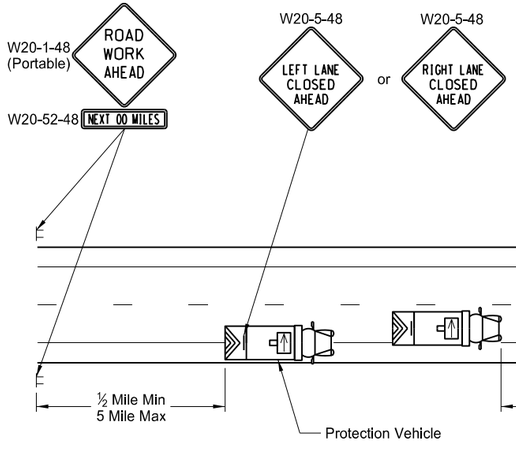


TWO LANE - TWO WAY ROADWAY

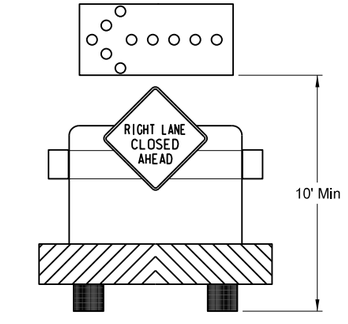
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

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.

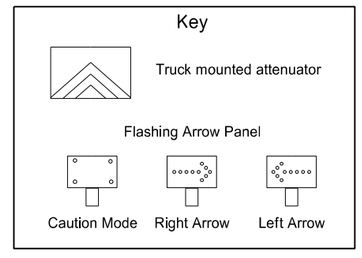


INTERSTATE & 4 LANE DIVIDED HIGHWAY



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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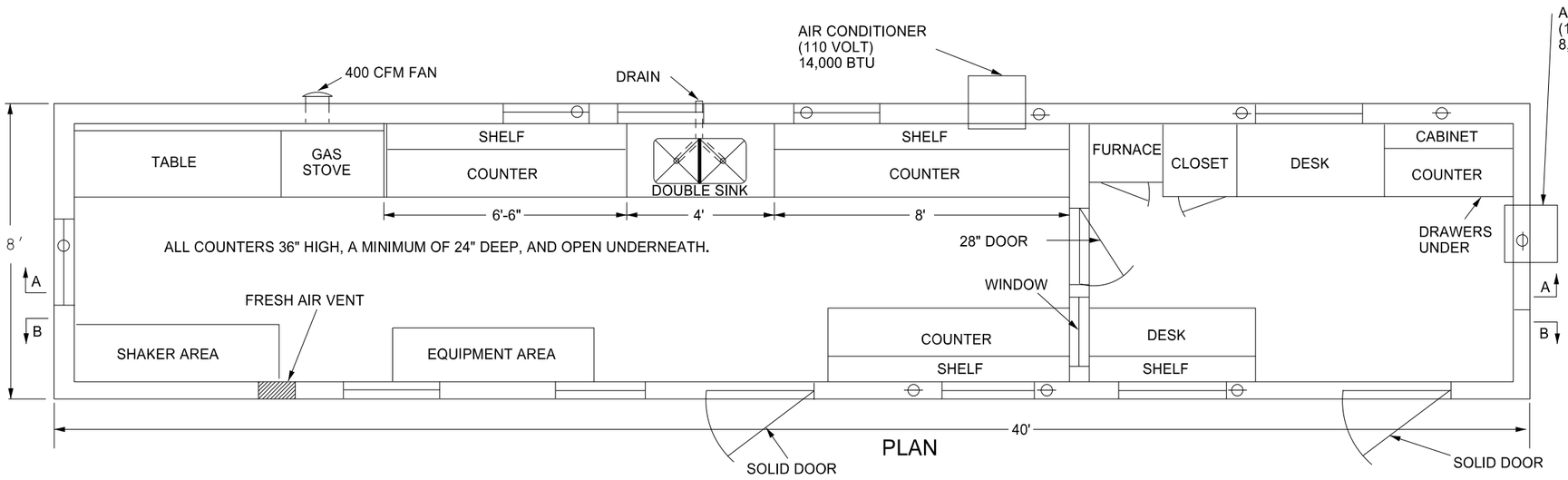
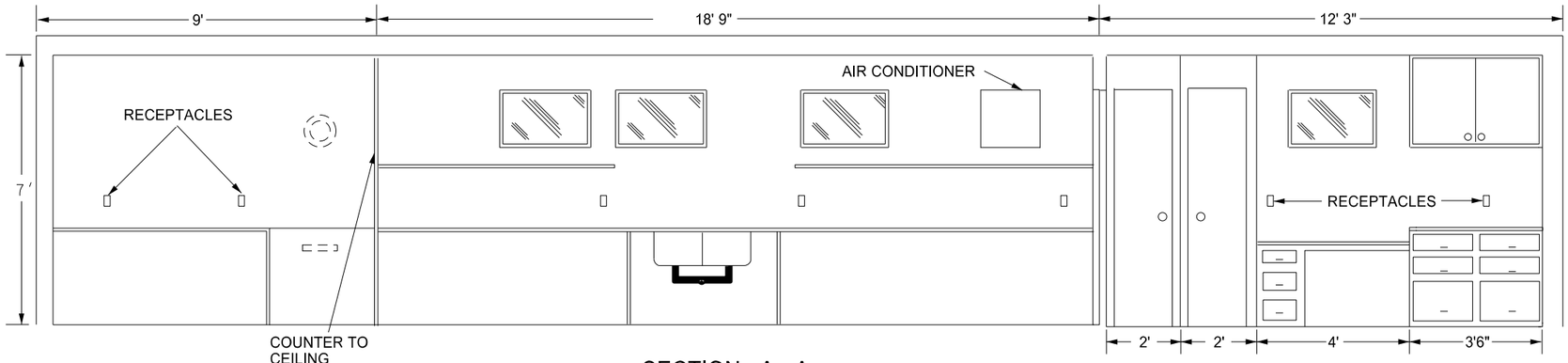
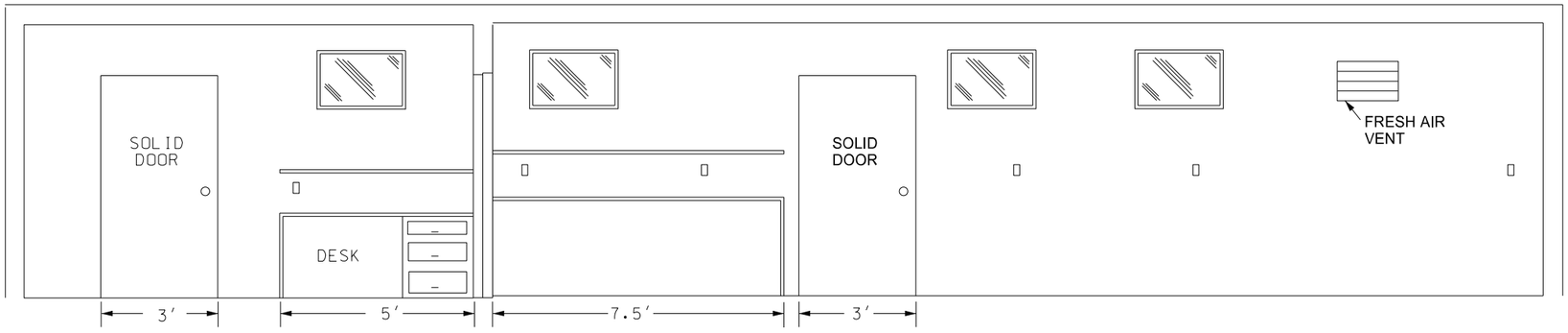
BITUMINOUS LABORATORY

D-706-1





SECTION A - A



SECTION B - B

Provide a laboratory with the following:

1. A 1'x1' shelf at 36" above the regular countertop.
2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of ½ inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.

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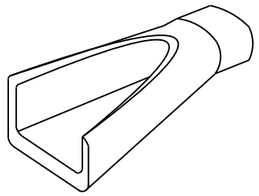
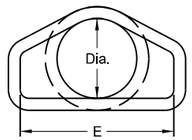
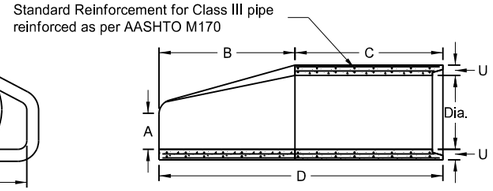
REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)



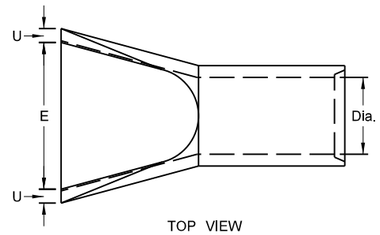
PERSPECTIVE



END VIEW



SIDE VIEW



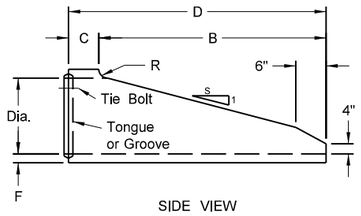
TOP VIEW

REINFORCED CONCRETE PIPE - FLARED END SECTION

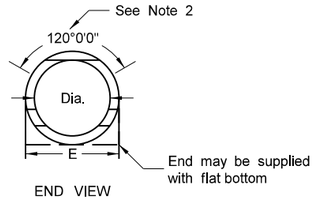
Reinforcement to be equivalent to Class III RCP

FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4½"
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"	5½"
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5½"
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6½"
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	6½"
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	6½"

TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4'	9"	4'-9"	1'-7½"	2¼"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	2½"	3"	6
24"	6'	1'	7'	2'-6"	3"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	4"	3"	4



SIDE VIEW



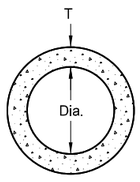
END VIEW

NOTES (Traversable End Section):

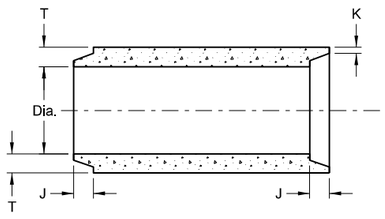
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

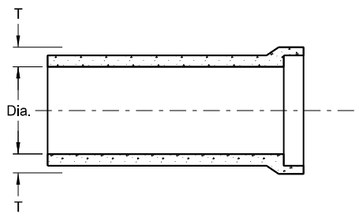
Reinforcement to be equivalent to Class III RCP



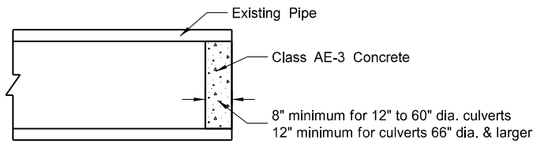
END VIEW



TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT



CONCRETE PIPE PLUG

CIRCULAR PIPE

JOINTS FOR REINFORCED CONCRETE PIPE

All Classifications of Round Concrete Pipe					
Internal Dia. of pipe in inches	Cross-Sectional Water Area	Weight per lin. foot of Pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue End Min.	Minimum Wall Thickness (T)
Dia	Sq. ft.	Lbs.	In.	In.	In.
12	0.79	92	1⅛-2⅛	¾	2
15	1.23	127	1⅛-2¾	⅞	2¼
18	1.77	168	1⅛-2⅛	1	2½
21	2.40	214	1⅛-3⅛	1⅛	2¾
24	3.14	265	2¼-3¾	1⅛	3
27	3.98	322	2¾-4	1¼	3¼
30	4.91	384	3¼-4¼	1¼	3½
33	5.94	452	3¼-4¼	1½	3¾
36	7.07	524	3¼-4¼	1½	4
42	9.62	685	3¾-4¾	1¾	4½
48	12.57	685	3⅞-4¾	1⅞	5
54	15.90	1070	4⅛-5½	2	5½
60	19.63	1296	4½-5½	2¼	6
66	23.76	1542	5-6	2⅝	6½
72	28.27	1810	5⅝-6¾	2⅝	7
78	33.18	2098	6¼-7¼	2⅝	7½
84	38.48	2410	5⅝-7¾	3⅜	8
90	44.18	2793	6¾-8½	3⅛	8½
96	50.27	3092	7-8¼	3½	9
102	56.75	3466	7-8¼	3½	9½
108	63.62	3864	7¼-8½	3¾	10

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

NOTES:

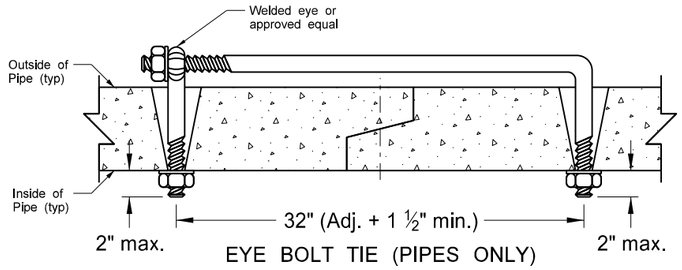
1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66"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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5

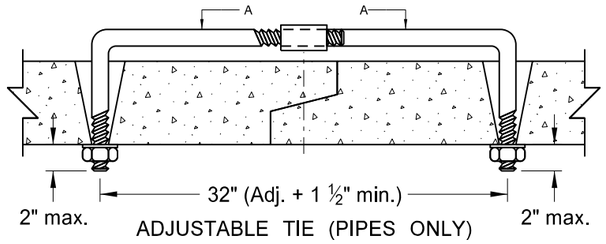
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 01/21/15 and the original document is stored at the North Dakota Department of Transportation

CONCRETE PIPE OR PRECAST CONCRETE BOX CULVERT TIES

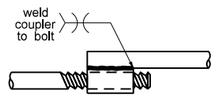
D-714-22



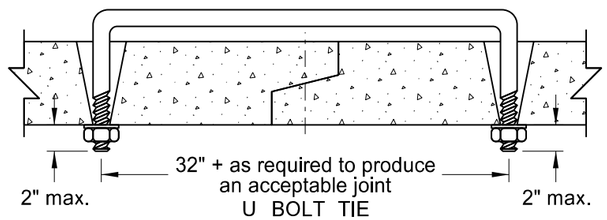
EYE BOLT TIE (PIPES ONLY)



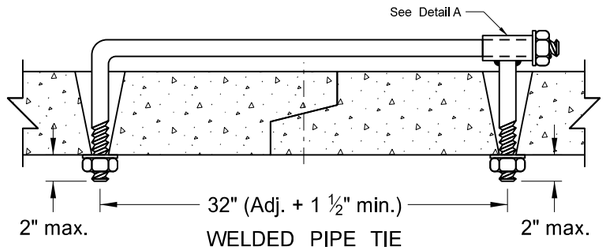
ADJUSTABLE TIE (PIPES ONLY)



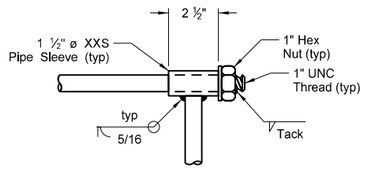
SECTION A-A



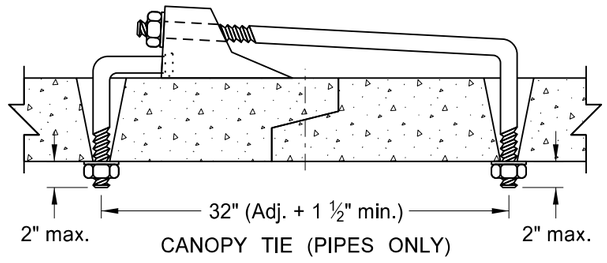
U BOLT TIE



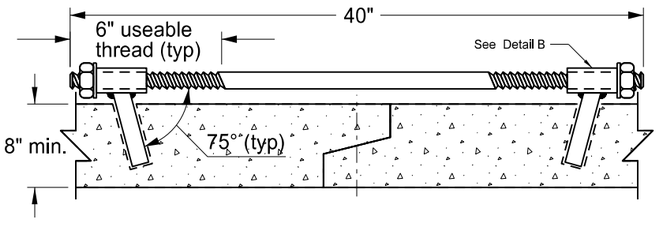
WELDED PIPE TIE



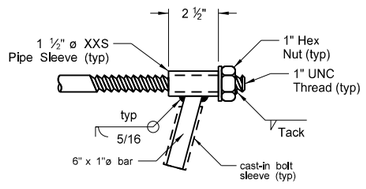
DETAIL A



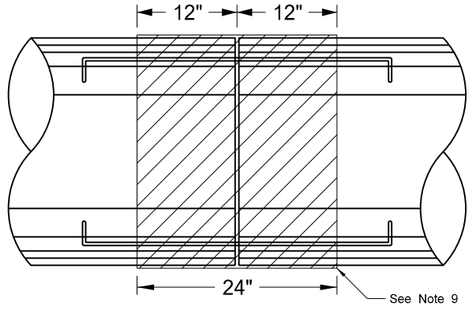
CANOPY TIE (PIPES ONLY)



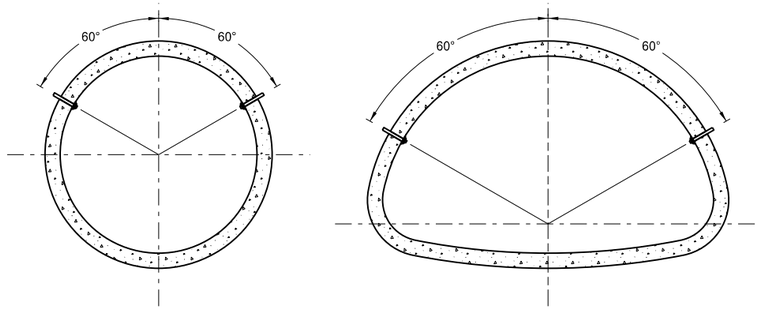
HIDDEN TIE (RCB ONLY)



DETAIL B



PLAN VIEW



END VIEW

REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ø	XXS Pipe Sleeve Inner ø
18" - 24"	⅝" See note 2	¾"
30" - 66"	¾"	1"
72" - 78"	1"	1 ¼"
RCB		

NOTES:

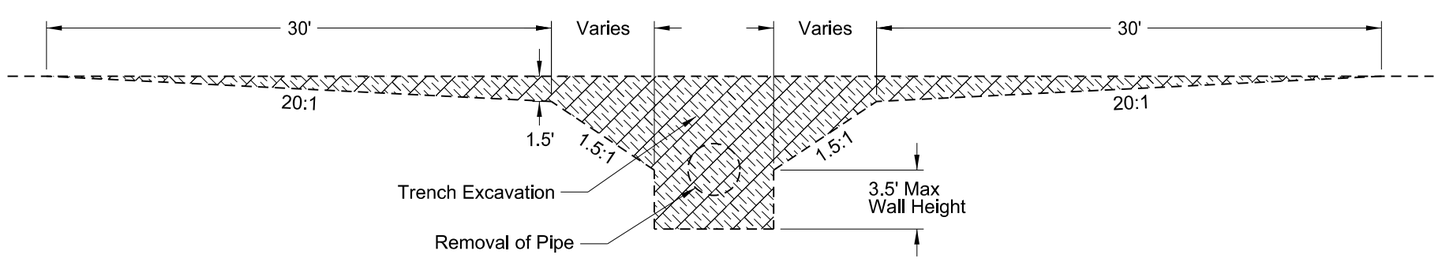
1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
3. Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
4. Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
5. Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter ¼" larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1 ¼".
6. The contractor has the option of selecting the type of tie bolt used from those shown.
7. The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
8. All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
9. When joint wrap is specified in the plans, place wrap beneath ties. Overlap the joint by 12" in both directions.
10. Tie bolts shall conform to ASTM A 36. Nuts shall be be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
11. Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
12. RCB tie locations shall be as shown on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8

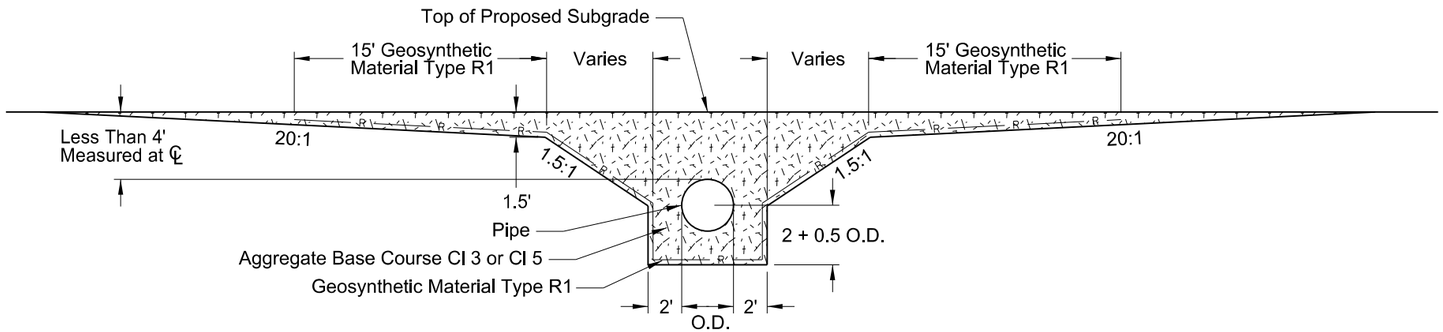
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 07/21/15 and the original document is stored at the North Dakota Department of Transportation

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

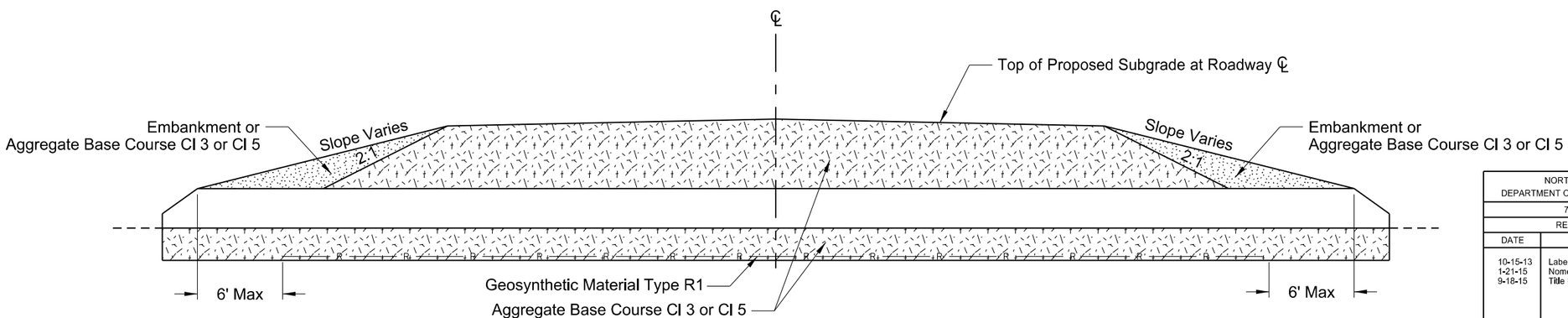
D-714-26



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items
1) Pipe*
2) Geosynthetic Material Type R1
3) Removal of Pipe (if required)

*Included in Pipe Pay Item
1) Pipe
2) Trench Excavation
3) Aggregate Base Course CI 3 or CI 5
4) Embankment

NOTES:

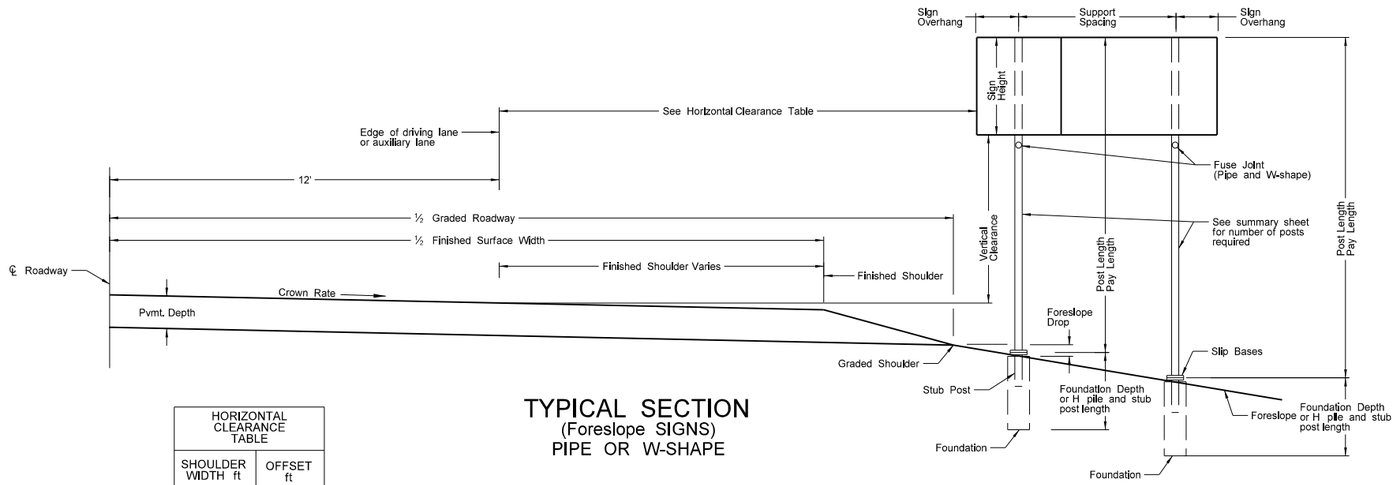
1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.
2) Embankment may be either Borrow Excavation or Common Excavation - Type A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13	Label Formatting
1-21-15	Nomenclature
9-18-15	Title Rewording

This document was originally issued and sealed by Ron Horner, Registration Number PE-2087, on 9/18/2015 and the original document is stored at the North Dakota Department of Transportation

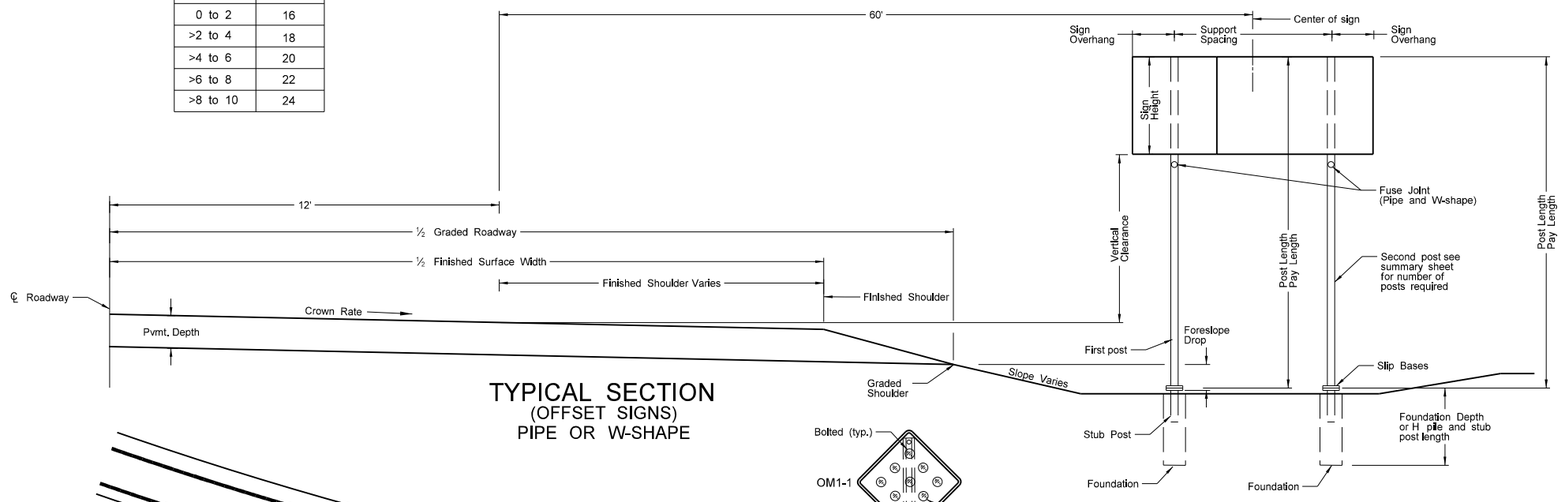
PIPE OR W-SHAPE ASSEMBLY DETAILS

D-754-1

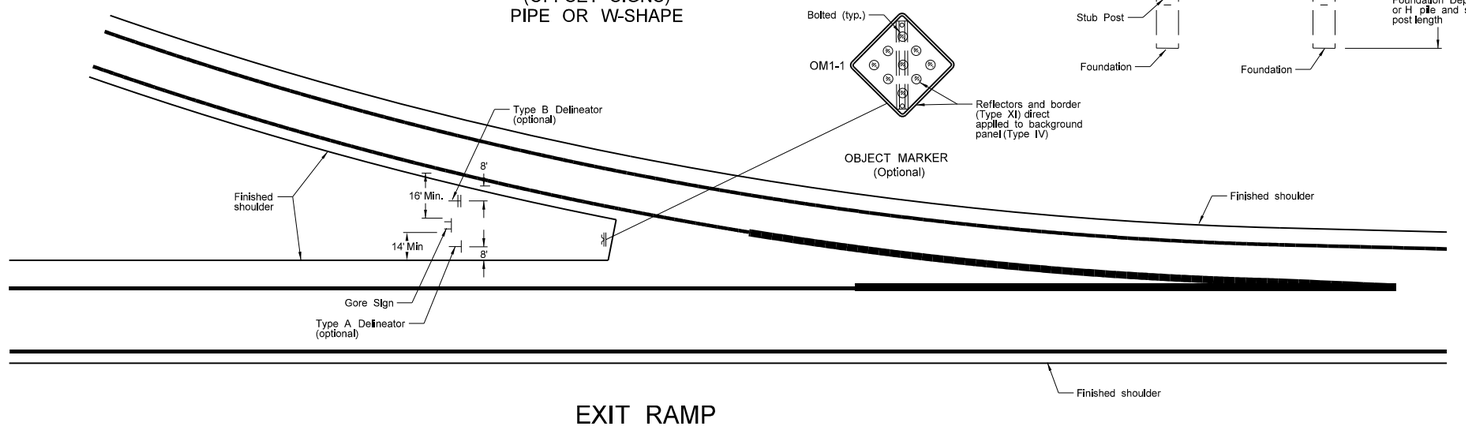


TYPICAL SECTION
(Foreslope SIGNS)
PIPE OR W-SHAPE

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
(OFFSET SIGNS)
PIPE OR W-SHAPE



EXIT RAMP
GORE SIGN PLACEMENT

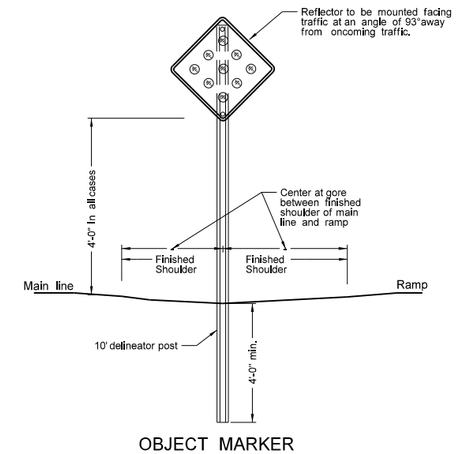
NOTES:

MINIMUM VERTICAL CLEARANCE:
Signs installed at the side of the road in rural districts shall be at least 5 feet measured from the bottom of the sign to the edge of driving lane, or Auxiliary Lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7 feet.

Signs on freeways, expressways, and multi-lane conventional roadways shall be installed with a minimum height of 7 feet.

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 feet above the edge of driving lane.

Signs may be placed a maximum of 6" above the vertical clearance specified above.



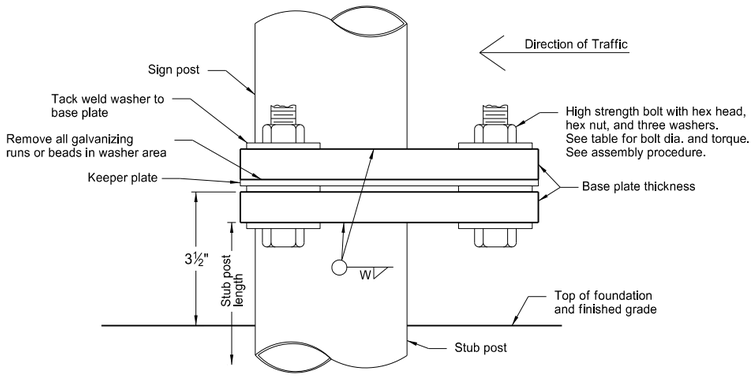
OBJECT MARKER
INSTALLATION
(Posts shall conform to section 894.04 A of Standard Specifications.)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
7-18-14	Modify notes and update reflective sheeting for object marker. Add correct section number for object marker post.

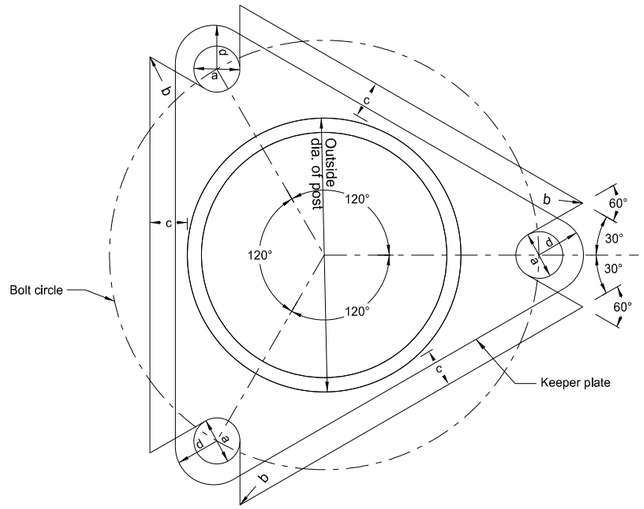
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/18/14 and the original document is stored at the North Dakota Department of Transportation

Multi-Directional Breakaway System for Standard Pipe Stub Post

D-754-4



Stub Post Connection - Type D
Elevation View
(Single Post)

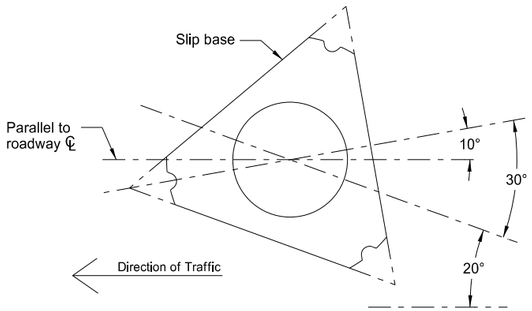


Stub Post Detail
Top View

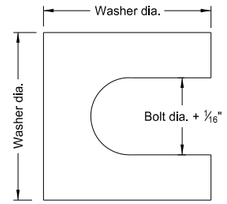
Notes:
When the base plate is fabricated in aluminum, the aluminum base plate washers shown shall be tack welded to the base as shown.

Use standard drawing D-754-6 for fuse plate, hinge plate, and foundation details.

Assembly Procedure:
1. Assemble post to stub with bolts and with one flat washer between base plates and keeper plate.
2. Shim as required.
3. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and shims and to clean bolt threads, then loosen.
4. Retighten bolts in a systematic order to prescribed torque. (see table)
5. Loosen each bolt and apply thread locking liquid resin. The liquid locking resin shall conform to ASTM D5363-03 (2008). The thread locker shall secure the entire assembly from vibration, pressure and corrosion. The thread locker shall fill the gaps between the thread and the mating surface to form solid, one part assemblies.
6. Retighten each bolt to prescribed torque in the same order as initial retightening.



Slip Base Orientation
Top View



Shim Detail

Furnish 2 each ±.012" thick and 2 each ±.032" thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.

Base Data Table

Nominal Post Size dia.	Outside Post dia.	Bolt Circle	a rad.	b rad.	c rad.	Bolt Size (dia. x length)	Base Plate Thickness	W	Base Bolt Torque ft. lb.	d rad.	Stub Post Length
Steel											
3½"	4"	7"	1 1/16"	⅛"	1⅛"	1"x4"	1¼"	5/16"	55	1⅛"	1'-6"
4"	4.5"	7½"	1 1/16"	⅛"	1⅛"	1"x4½"	1½"	⅜"	98	1⅛"	1'-6"
5"	5.563"	9½"	1 5/16"	⅛"	1⅛"	1¼"x5"	1½"	⅜"	167	1⅜"	2'-0"
Aluminum											
3½"	4"	7"	13/16"	⅛"	⅞"	¾"x3½"	1"	5/16"	43	⅞"	1'-6"
4"	4.5"	7½"	13/16"	⅛"	¾"	¾"x4"	1¼"	5/16"	76	⅞"	1'-6"
5"	5.563"	9½"	1 1/16"	⅛"	1⅛"	1"x4"	1¼"	5/16"	98	1⅛"	2'-0"
6"	6.625"	10¼"	1 1/16"	⅛"	¾"	1"x4½"	1½"	⅜"	134	1⅛"	2'-0"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

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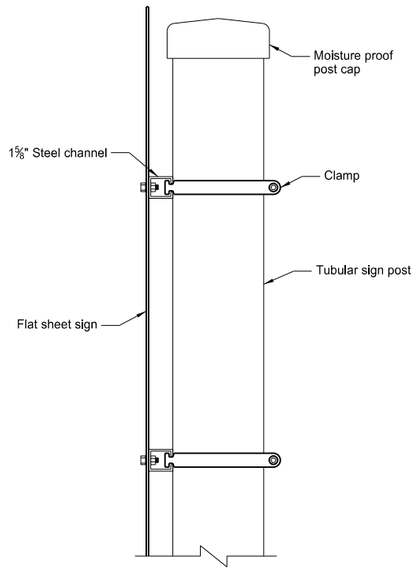
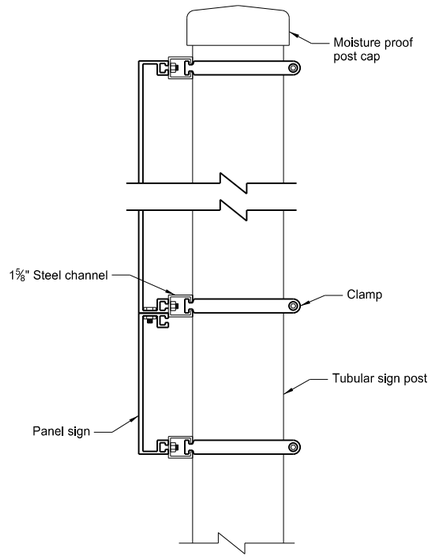
PIPE SUPPORT AND SIGN MOUNTING DETAILS

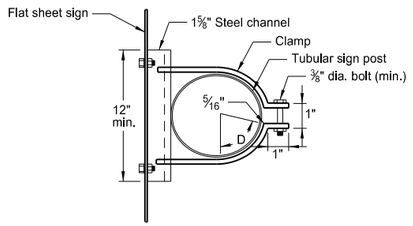
D-754-7



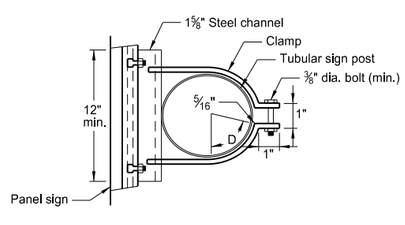
Side View



Side View



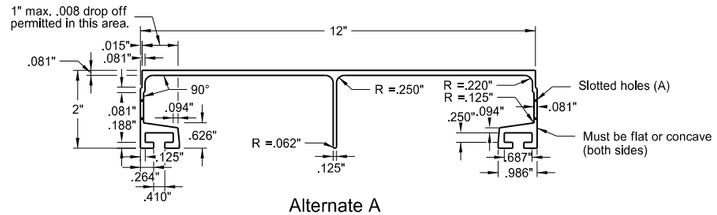
Top View



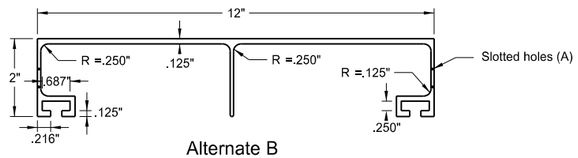
Top View

Flat Sheet Sign Clamp Mounting Details

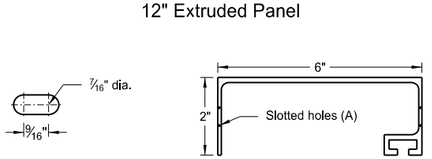
Panel Sign Clamp Mounting Details



Alternate A
12" Extruded Panel



Alternate B
12" Extruded Panel



Slotted Hole Detail

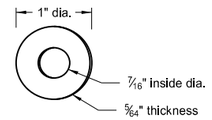
6" Extruded Panel

Aluminum Panel Details

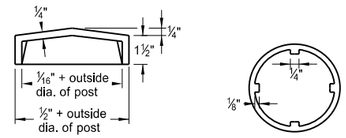
(A) Slotted holes shall be punched in the aluminum panels at 1'-0" on center, spacing from end as listed below:

12" even length panels	4'-0" etc.
9" odd + 6" length panels	5'-6" etc.
6" odd length panels	5'-0" etc.
3" even + 6" length panels	4'-6" etc.

Wall thickness = .078" unless specified otherwise.
All inside and outside corners = .031" radius unless specified otherwise.



Flat Washer Detail

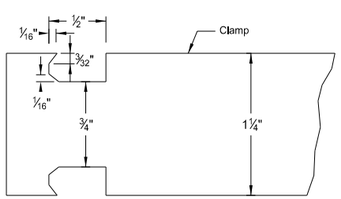


Side View

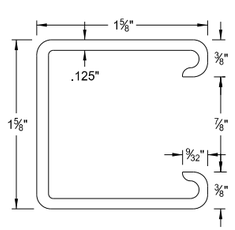
Top View

Post Cap Detail

Post caps shall be furnished for all steel or aluminum posts.
In place of post cap, a ⅛" plate welded all around may be used.



Clamp Detail



Steel Channel Detail

Post Size dia.	Clamp Gauge min.
3½" to 5"	11
6" to 12"	10

Post Size dia. in.	D in.
3½	3
4	3 3/16
5	5⅛
6	7 7/16
8	13 1/16
10	20¾
12	29⅝

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-21-14	
REVISIONS	
DATE	CHANGE

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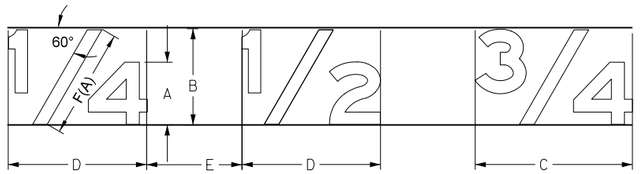
LETTER AND ARROW DETAILS FOR VARIABLE LENGTH SIGNS

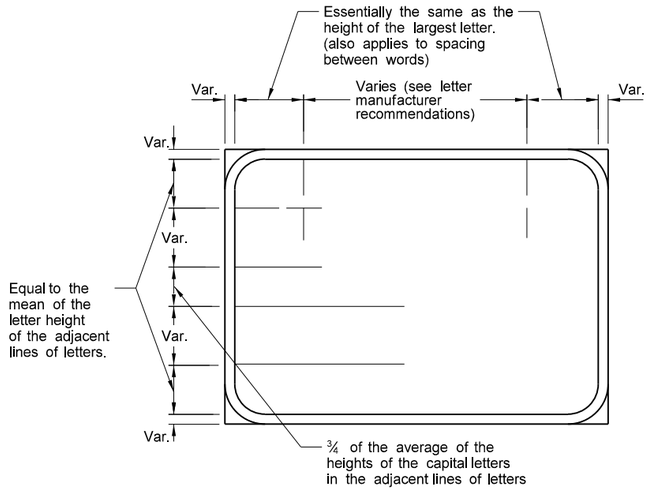
D-754-9



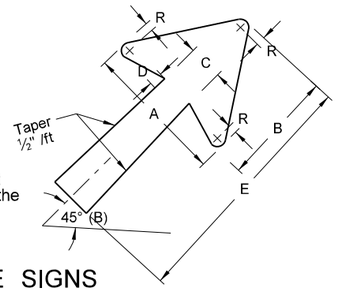
SIZE OF THE FRACTION IS DETERMINED AS FOLLOWS:

SYMBOL	TITLE	RATIO TO HEIGHT OF CAPITAL OR UPPER CASE
A	Letter height	1.0 of capital or upper case
B	Fraction height	1.5 X A
C	Fraction width	2.5 X A
D	Fraction width	2 X A
E	Space to next character	1 to 1.5 X A
F(A)	Length of diagonal	1.75 X A

(A) Diagonal stroke of fraction is to be centered optically.



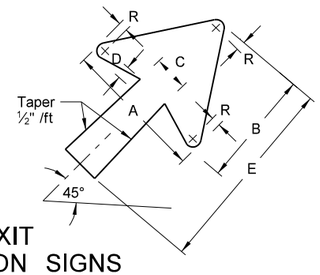
TYPICAL SPACING



(B) When there is no exit number in the sign face, the arrow shall be at 30°

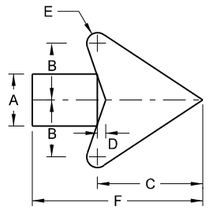
GORE SIGNS

"EXIT" LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15⅛"	11 9/16"	3¾"	1 5/16"	25"	13/16"
10" - 13⅓"	18¼"	14"	4½"	1½"	30"	¾"



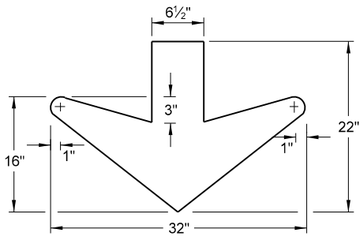
EXIT DIRECTION SIGNS

LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15⅛"	11 9/16"	3¾"	1 5/16"	17"	13/16"
10" - 13⅓"	18¼"	14"	4½"	1½"	20"	¾"
16" - 20"	22¼"	17"	5⅜"	1¾"	25"	1"



DISTANCE AND DESTINATION SIGNS

LETTER SIZE (Upper Case)	A	B	C	D	E	F
4"	1¾"	2"	3 9/16"	5/16"	⅜"	6"
6"	2¾"	3"	5 9/16"	7/16"	9/16"	9"
8"	3½"	4"	7⅛"	9/16"	11/16"	12"
12"	5¼"	6"	10⅝"	13/16"	1 1/16"	18"



DOWN ARROW

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE
7-8-14	Revised gore sign and added 4" D & D arrow

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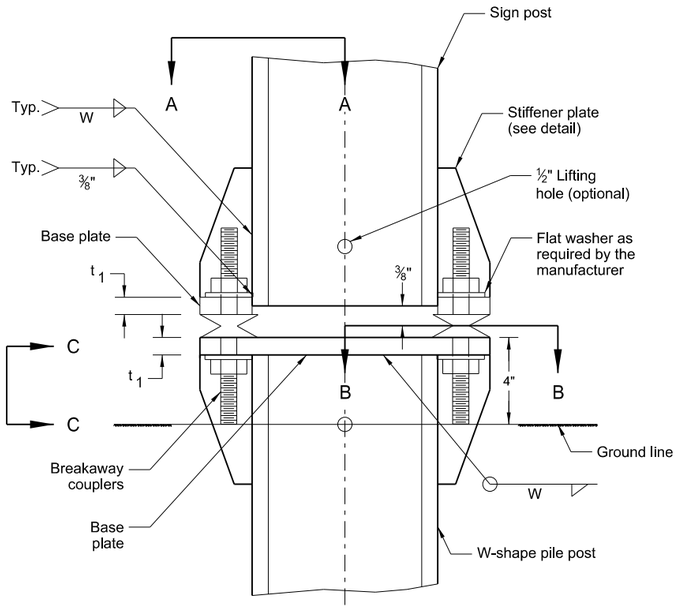
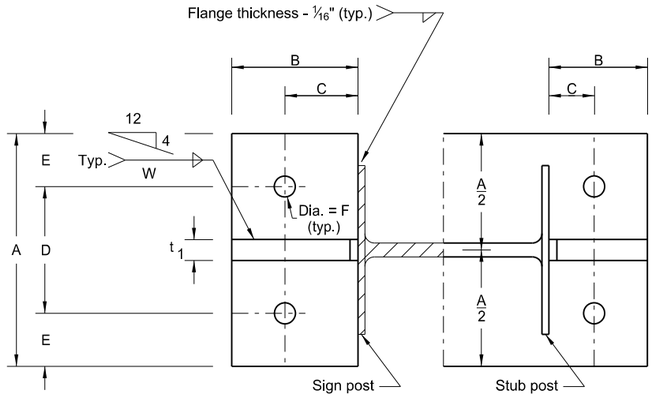
Breakaway Coupler System
Structural Details
for W-Shape Supports

D-754-12



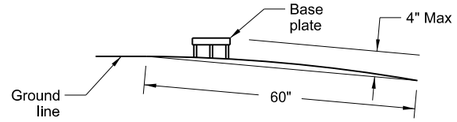
Sign Post and Stub Post
Elevation



Section A - A Section B - B
(See Table for Dimensions)

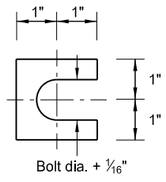
Notes:

1. In lieu of the breakaway base system shown on standard D-754-13 the breakaway coupling system may be used. The breakaway coupling 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 requirements of NCHRP Report 350.
2. Structural steel shall conform to Sec. 894.03 B.6. High strength bolts shall conform to ASTM - A325. Refer to"Sign Summary" sheet for specific data on each individual sign installation.
3. Assembly procedure according to the manufacturer's recommendations.

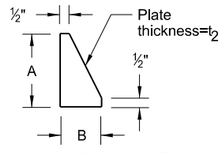


Section C - C

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.



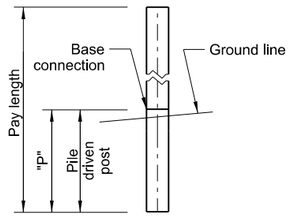
Shim Detail



Stiffener Plate Detail
(See Table for Dimensions)

Furnish 2 - .012"± thick and 2 - .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.

Sections shown are for installations on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations on left shoulder.



W-Shape - Pile Footing

W-Shape Post & Pile Size	Base Connection Data										Footing Data
	Bolt Size	A	B	C	D	E	t_1	t_2	W	F	W-Shape Pile Post "P"
W4X13	3/4" x 5 1/4"	6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	13/16"	14'
W5X16											14'
W6X20	7/8" x 5 1/4"	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/16"	14'
W8X24											14'
W8X28	1" x 5 1/4"	8"	3"	2"	4"	2"	1 1/2"	3/4"	5/16"	1 1/16"	14'

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-2013	
REVISIONS	
DATE	CHANGE
7-8-14	Revised notes 2 and 3

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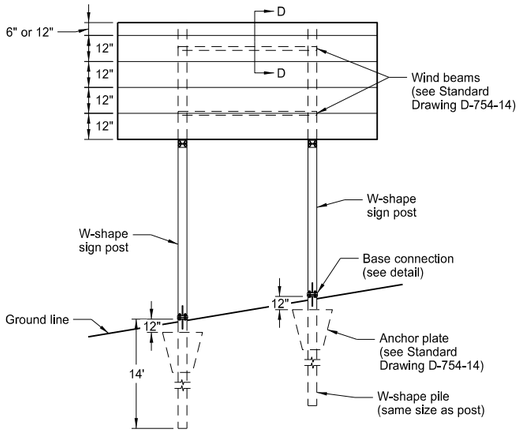
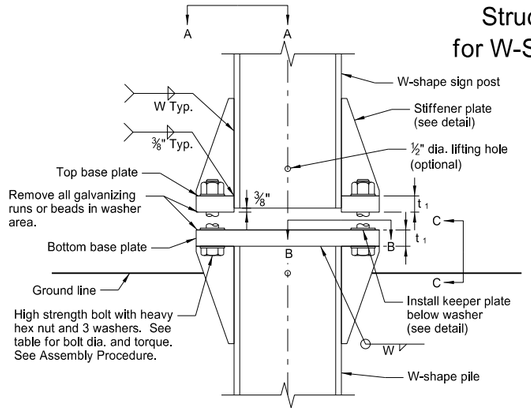
Breakaway System Structural Details for W-Shape Supports

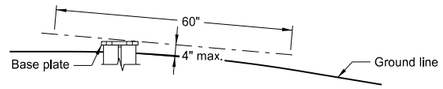
D-754-13



Typical Panel Mounting on W-shape Sign Posts

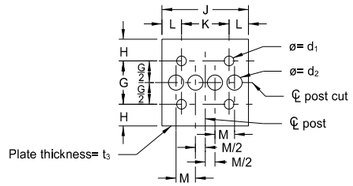


Base Connection Detail

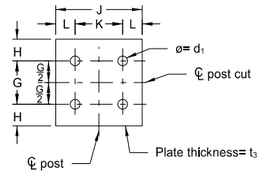


Section C-C
Stub Height Requirements

Maximum projection of base plate shall not extend above a line 4" parallel to any chord, which is perpendicular to, or aligned radially to, the center line of the highway and has the chord's end points on the ground surface on opposite sides of the stub post.



Perforated Fuse Plate



Hinge Plate

Notes:

Structural steel shall conform to Section 894.03 B.6 of the Standard Specifications. High strength bolts shall conform to ASTM A325.

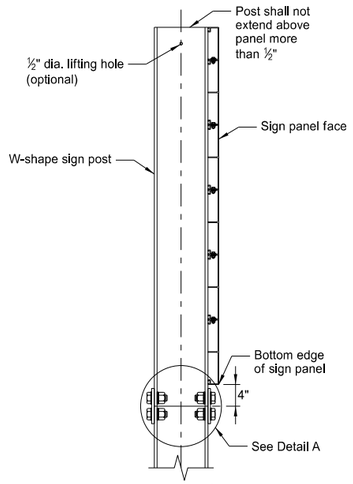
Refer to Sign Summary sheet for specific data on each individual sign installation.

Perforated fuse plate shall be installed on side of post facing traffic.

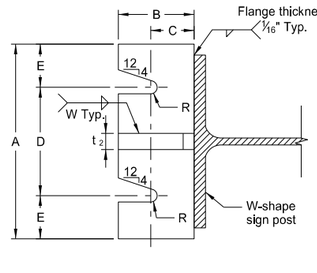
All posts shall be saw cut. Plates may be sheared or flame cut using a mechanically guided cutting torch in accordance with Section 754.04 D.4.b of the Standard Specifications. Edge preparation shall be in accordance with Section 754.04 D.4.c of the Standard Specifications.

Assembly Procedure:

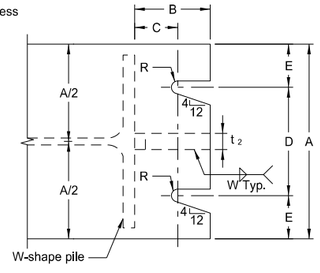
1. Assemble base plates together with bolts and with one flat washer between top base plate and the keeper plate.
2. Shim as required to plumb post.
3. Tighten all base connection bolts the maximum possible with 12" to 15" wrench to bed washers and shims and to clean bolt threads.
4. Loosen each bolt in turn and retighten in a systematic order to the prescribed torque (see table).
5. Assemble perforated fuse and hinge plates to post with bolts and with one flat washer and lock washer under nut.



Fuse Joint
(Side View)

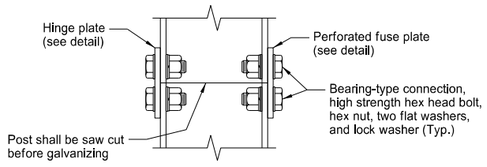


Section A-A

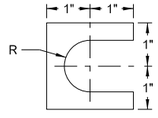


Section B-B

Sections shown are for installations on right shoulder. Installations on the left shoulder shall have the plate slot bevels reversed.

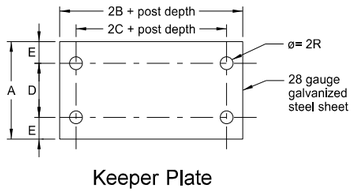


Detail A

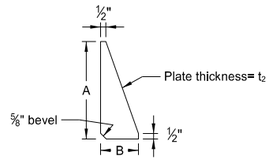


Shim Detail

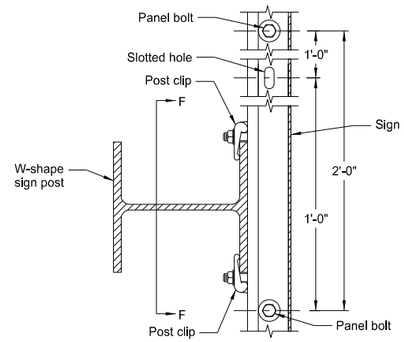
Furnish 2 each .012"± thick and 2 each .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



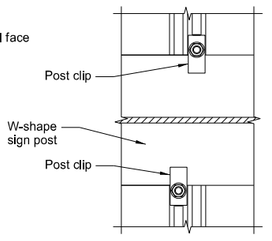
Keeper Plate



Stiffener Plate

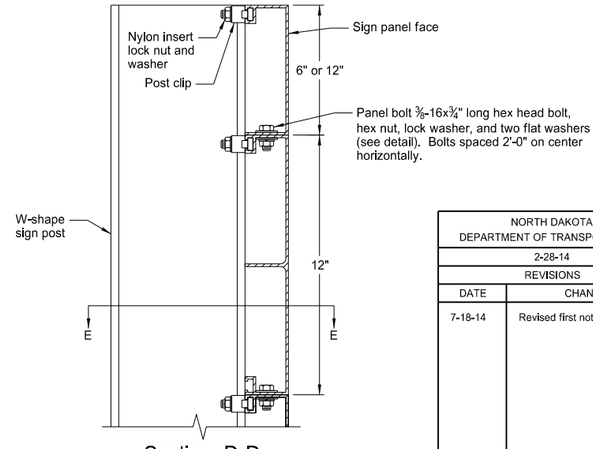


Section E-E

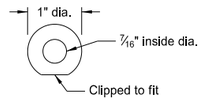


Section F-F

Post clips shall be installed on both sides of each post at each panel joint as indicated.



Section D-D



Flat Washer Detail
Thickness = 5/64"

W-Shape Post and Pile Size	Base Connection Dimensions										Fuse and Hinge Plate Dimensions									
	Bolt Size and Torque	A	B	C	D	E	t_1	t_2	W	R	G	H	J	K	L	M	d_1	d_2	t_3	Bolt dia.
W4x13	3/4" ø x 3 1/2" Torque = 600 in-lb	6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	13/32"	2"	1 1/4"	4"	2 1/4"	7/8"	1"	11/16"	3/4"	3/8"	5/8"
W5x16	3/4" ø x 3 1/2" Torque = 600 in-lb	6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	13/32"	2 1/2"	1 1/4"	5"	2 3/4"	1 1/8"	1 1/8"	13/16"	7/8"	3/8"	3/4"
W6x20	7/8" ø x 4 1/4" Torque = 800 in-lb	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/32"	2 1/2"	1 1/4"	6"	3 1/2"	1 1/4"	1 3/8"	13/16"	1 1/8"	3/8"	3/4"
W8x24	7/8" ø x 4 1/4" Torque = 800 in-lb	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/32"	2 1/2"	1 1/2"	6 1/2"	3 1/2"	1 1/2"	1 1/2"	15/16"	1 1/4"	1/2"	7/8"
W8x28	1" ø x 5" Torque = 1000 in-lb	8"	3"	2"	4"	2"	1 1/2"	3/4"	5/16"	17/32"	2 1/2"	1 1/2"	6 1/2"	3 1/2"	1 1/2"	1 5/8"	1 1/16"	1 1/8"	1/2"	1"
W8x31	1 1/8" ø x 5" Torque = 1200 in-lb	9"	3 1/2"	2"	5"	2"	1 1/2"	3/4"	5/16"	19/32"	3"	1 3/4"	8"	5 1/2"	1 1/4"	2"	1 1/16"	1 1/2"	1/2"	1"
W10x39	1 1/8" ø x 5" Torque = 1200 in-lb	9"	3 1/2"	2"	5"	2"	1 1/2"	3/4"	5/16"	19/32"	3"	1 3/4"	8"	5 1/2"	1 1/4"	1 7/8"	1 3/16"	1 3/8"	1/2"	1 1/8"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
7-18-14	Revised first note

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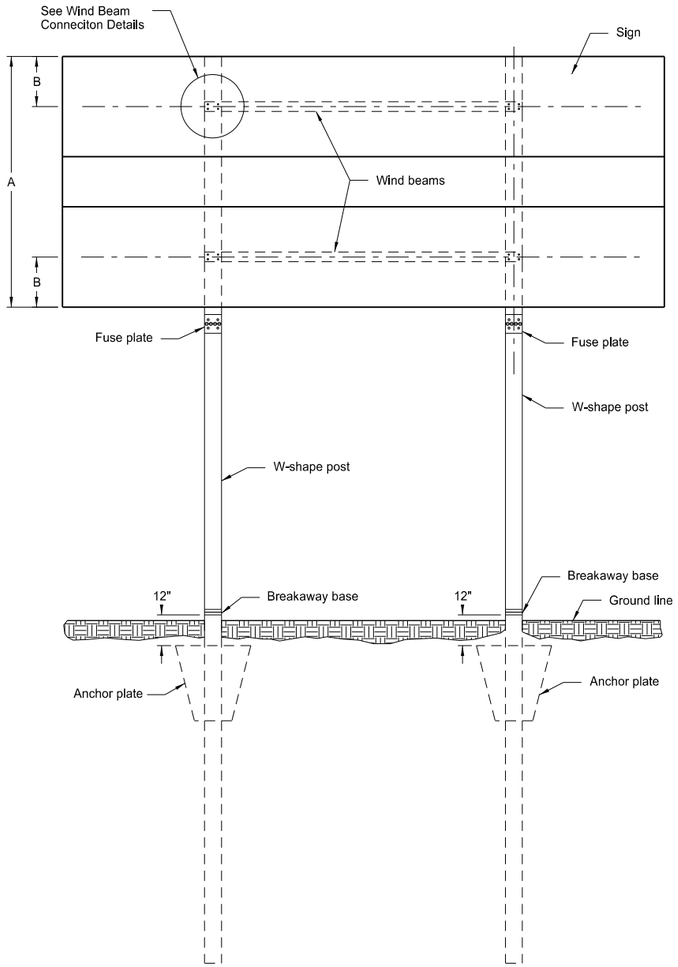
WIND BEAMS AND ANCHOR PLATES FOR W-SHAPE SUPPORTS



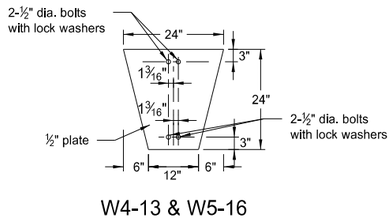
ASSEMBLY DETAIL FOR WIND BEAMS AND ANCHOR PLATES

Notes:

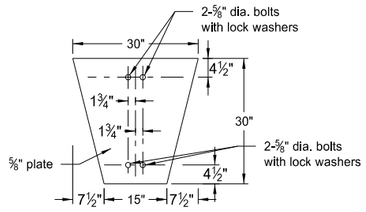
The B distance is calculated by the following formula, B=A/4.

The wind beam shall conform to Section 894.03 B.6 of the Standard Specifications.

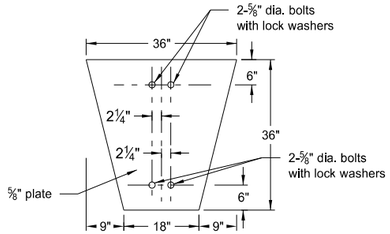
The bolts shall conform to requirements of ASTM A307 and galvanized according to ASTM A153.



W4-13 & W5-16

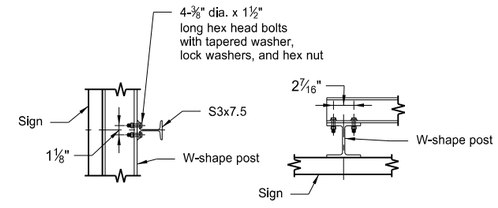


W6-20, W8-24 & W8-28

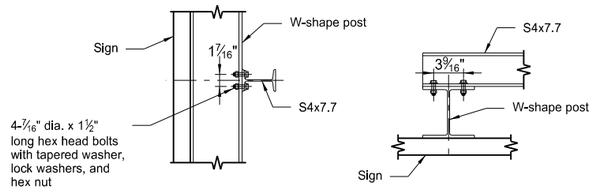


W8-31 & W10-39

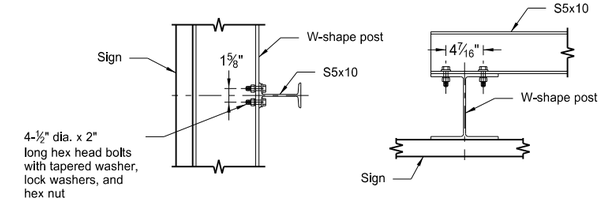
ANCHOR PLATE DETAILS



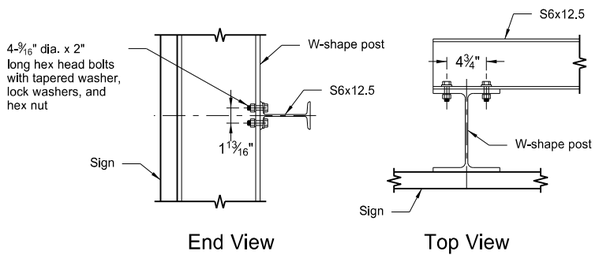
W4-13 & W5-16



W6-20, W8-24 and W8-28

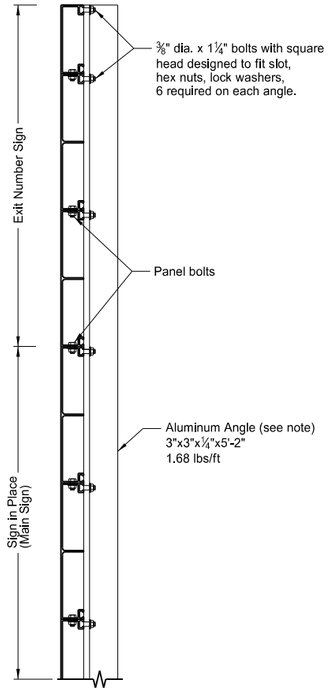


W8-31



W10-39

WIND BEAM CONNECTION DETAILS



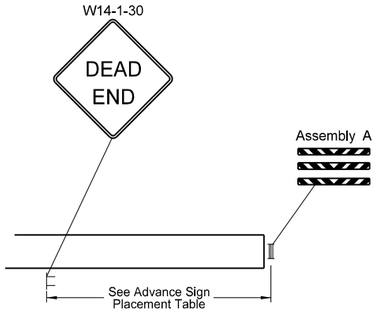
ASSEMBLY DETAIL FOR EXIT NUMBER SIGNS

Note: Two aluminum angles required on each sign. The distance between angles varies depending on post spacing of sign in place. Angles shall be placed as near as possible to posts. The Engineer shall determine the exact location.

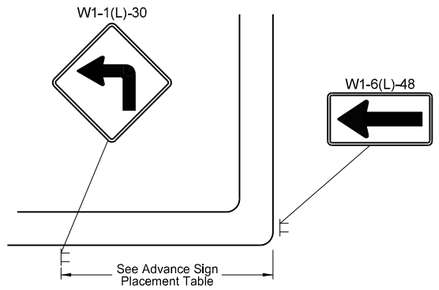
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised second note

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 7/8/14 and the original document is stored at the North Dakota Department of Transportation

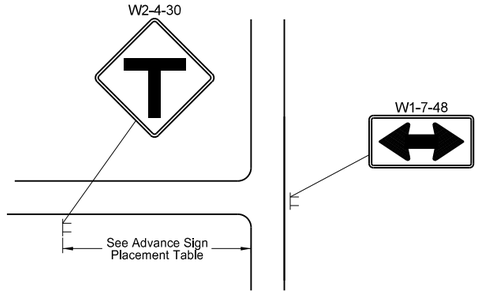
BARRICADE AND ADVANCE SIGNS FOR FORWARD ROADWAY TERMINATION



Roadway Termination with Dead End Type A



Roadway Termination with Right or Left Turn Type B



Roadway Termination with T-Intersection Type C

Notes:

Barricade Rails: Rails shall be 8" or 9" x 120". Barricade rail shall be fabricated from anodized aluminum and shall be attached to the perforated tube posts with ⅜" diameter bolts placed between the reinforcing ribs, two bolts per post.

Barricade Supports: Barricade supports shall be made of material as specified for sign supports.

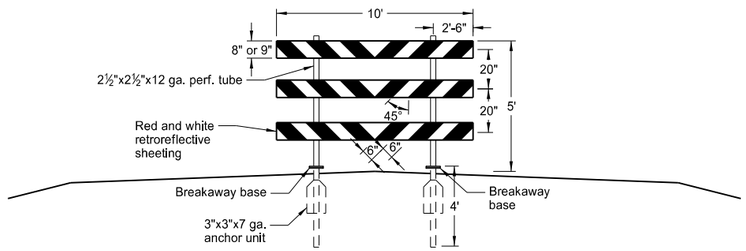
Method of Measurement: The number of each location completed, in place, and accepted by the Engineer.

Basis of Payment: The number of locations. The unit price bid for each location shall be full compensation for furnishing, delivering, and installing all necessary signs and barricades at each location shown on the plans or directed by the Engineer.

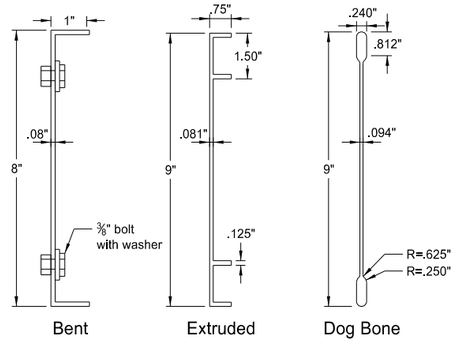
Vertical Clearance: 5' minimum, 7' residential and business districts where parking and/or pedestrian movements will occur.

Breakaway base and anchor unit as shown on D-754-24 or D-754-24A.

Reflective sheeting shall be Type XI.



Type III Barricade Assembly A



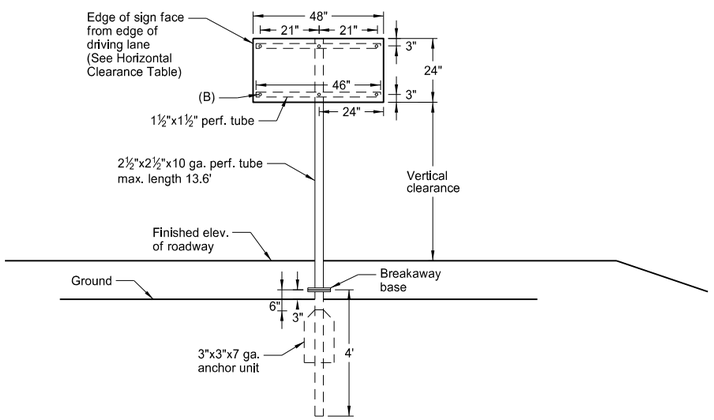
Barricade Bar Details

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

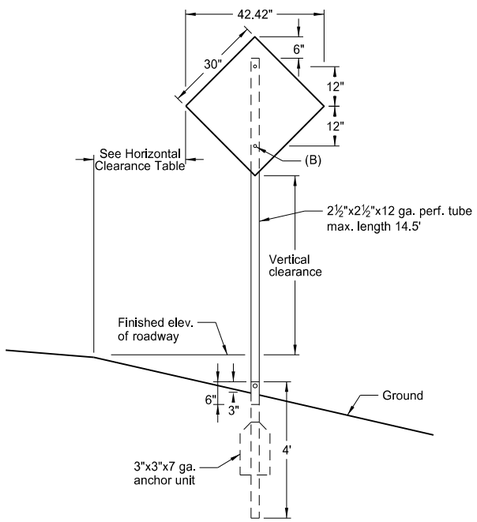
Advance Sign Placement Table (A)	
Posted or 85th Percentile Speed	Minimum Distance
0 to 40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft
75 mph	650 ft

(A) If roadway termination is ½ mile or less from a section line road, the advanced warning sign shall be placed just after the section line road.

(B) Holes to be punched round for ⅜" fasteners.



Assembly Detail for Directional Arrow Signs



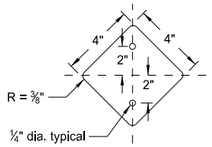
Assembly Detail for 30" Signs

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
11-4-13	Non bkwy base for 30" signs
7-8-14	Note added for Refl. sheeting and revised Assembly detail for directional arrow signs.

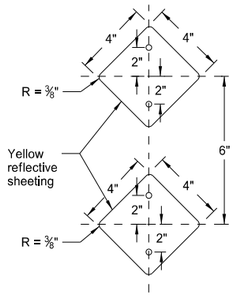
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 7/8/14 and the original document is stored at the North Dakota Department of Transportation

REFLECTORIZED DELINEATORS

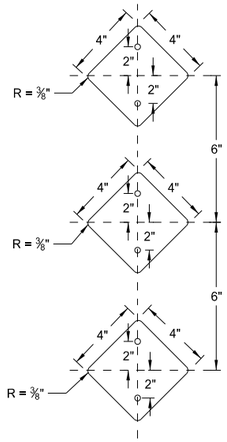
D-754-21



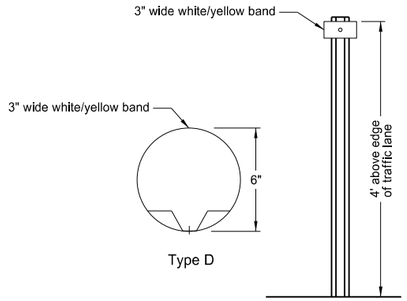
Main line
One reflector
(Type A delineator)



Ramps
Two reflectors
(Type B delineator)

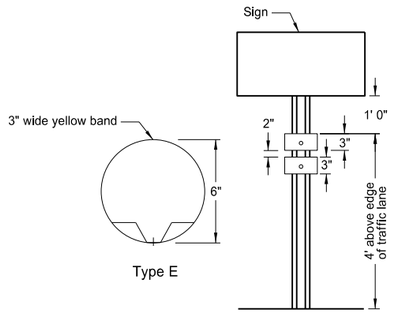


Narrow Bridges
Three reflectors
(Type C delineator)



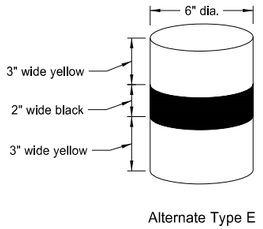
Type D

Median
One reflector
(Type D delineator)

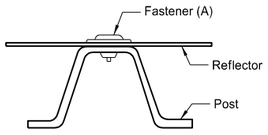


Type E

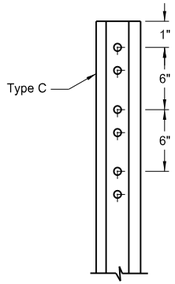
Median
One or Two reflectors
(Type E delineator)

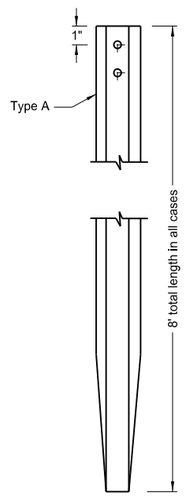


Alternate Type E

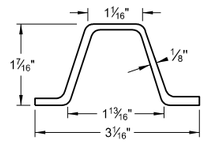


Delineator Attachment Detail

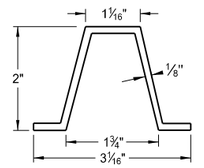




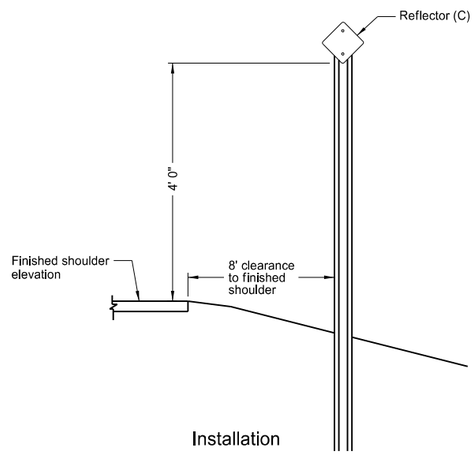
U-type Post



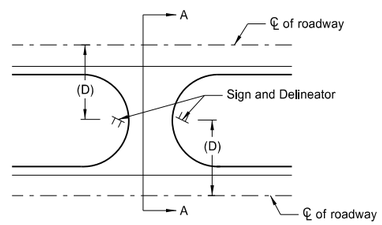
Steel Post Detail
Approx. 2.0 lbs/ft

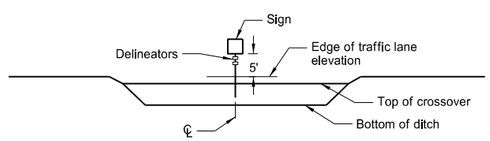


Aluminum Post Detail
Approx. 0.88 lbs/ft



Installation





Section A - A

Median Crossovers
Signing and Delineation system

Delineator Details

Type A, B, and C

Installation: Posts are to be installed along the right shoulder line unless shown otherwise on the plans.

Reflectors: Reflector shall be the same color as the adjacent pavement marking.

Spacing: Delineator spacing along main line tangents and curves with radius greater than 11500' (less than 0° 30') shall be at 528' centers. Curves with a radius less than 11500' but greater than 1200' the spacing shall be at 264' centers. With curves less than 1200' use spacing (S) = 3*√R-50

Type E

Alternate: One unit band consisting of two yellow stripes separated by a 2" black stripe may be used in place of two 3" yellow bands.

(A) The fastener shall be ⅜" dia. with flat washer having a min. outside dia. of 13/16". Fasteners shall be tension pin type or other non-rust vandal resistant fastener.

(B) The contractor may drill only those holes required to attach the number of reflectors on that post, or drill all the posts the same so that any number of reflectors may be added.

(C) Reflector to be mounted facing traffic at an angle of 93° away from oncoming traffic.

(D) The median width may vary. The sign and delineator assembly shall be placed in the median crossover an equal distance from each roadway.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised reflective sheeting

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/18/14 and the original document is stored at the North Dakota Department of Transportation

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'.

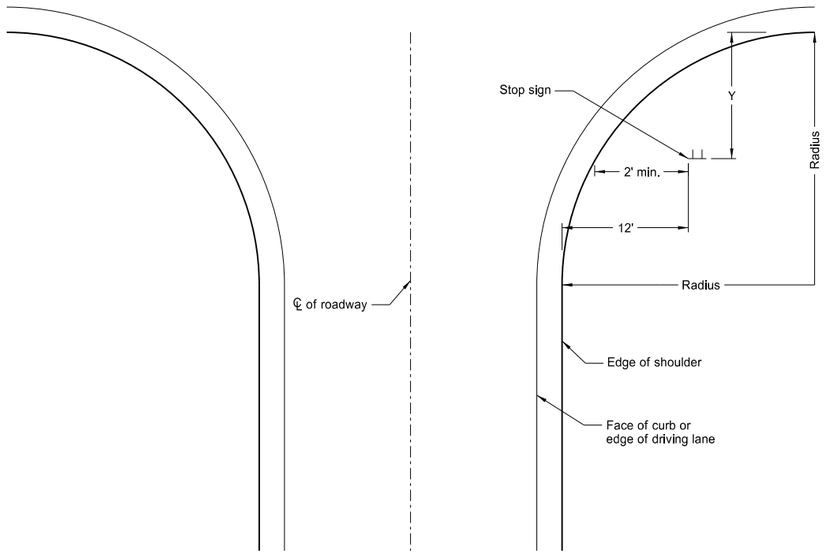
   Signs on expressways shall be installed with a minimum height of 7'.

   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.

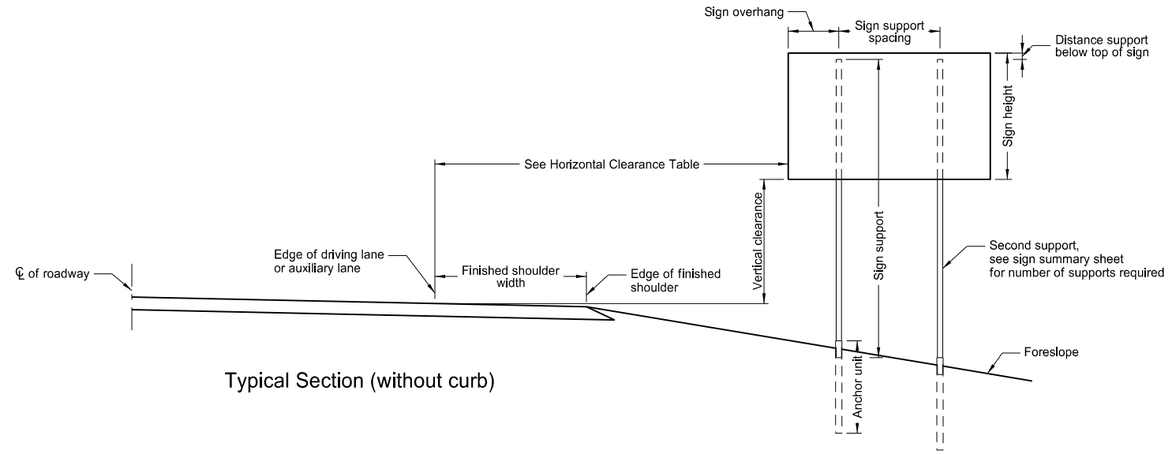
4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.



Stop Sign Location
Wide Throat Intersection

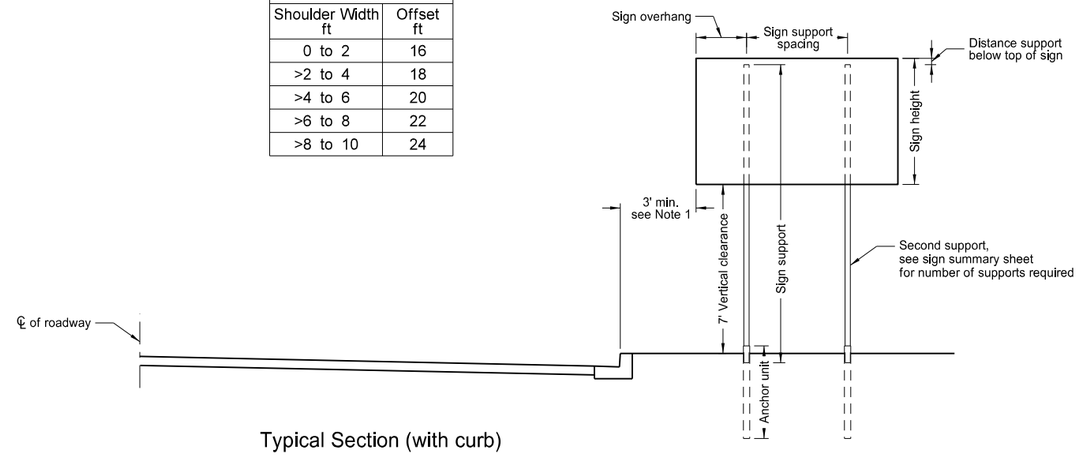
This layout is to be used for the placement of "Stop" signs.

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



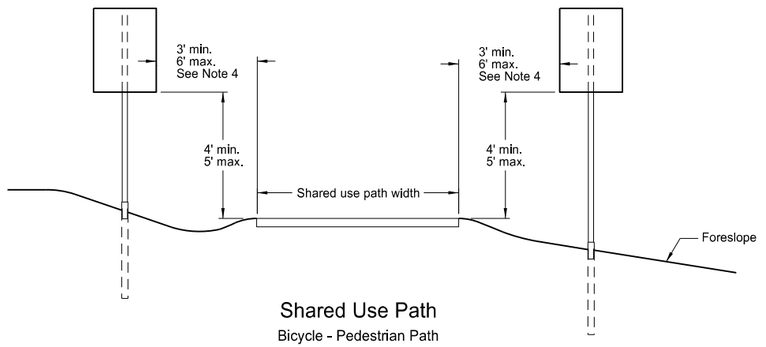
Typical Section (without curb)

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



Shared Use Path

Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.

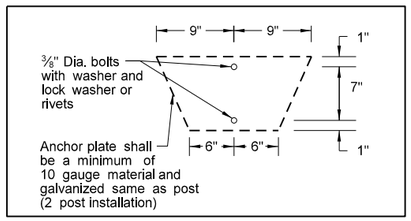
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 7/8/14 and the original document is stored at the North Dakota Department of Transportation

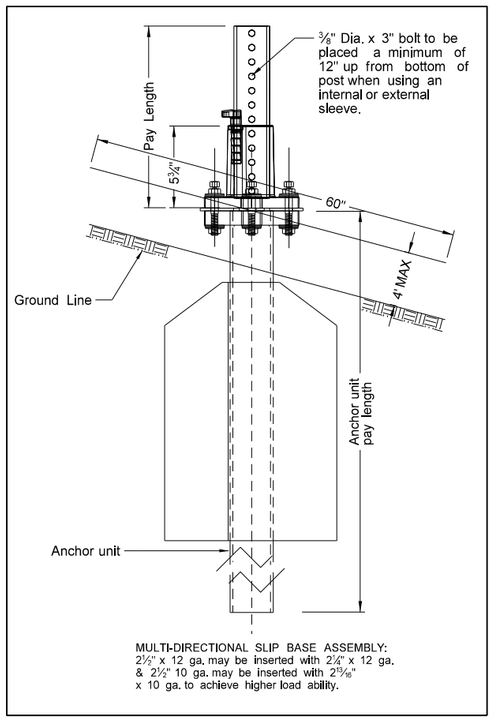
Mounting Details Perforated Tube

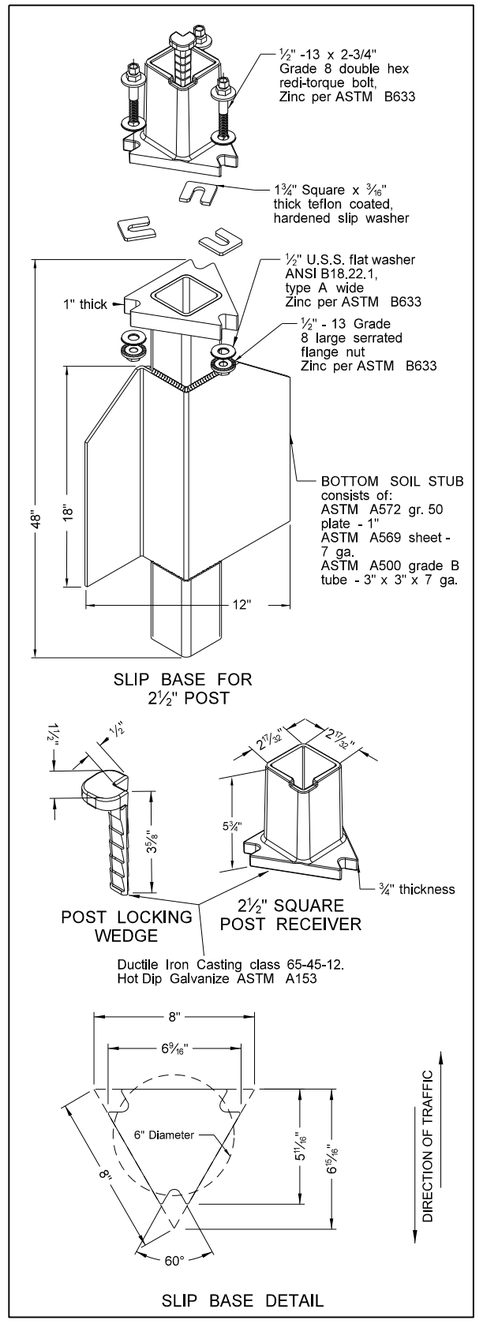
D-754-24

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2⁹⁄₁₆	10	Yes		7

(B) - The 2½", 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) - 2½" x 12 ga. x 18" minimum length external sleeve required.





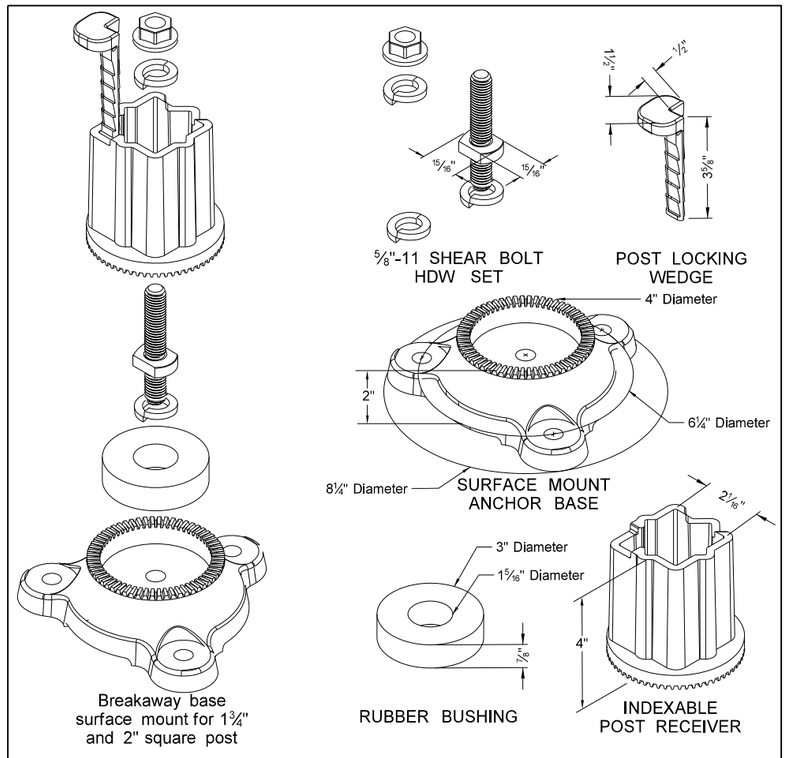


Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulus In.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2⅜ x 2⅜	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 ¾" size 10 gauge is shown as 2.19" size on the plans; The 2½" size is shown as 2.51" size on the plans.

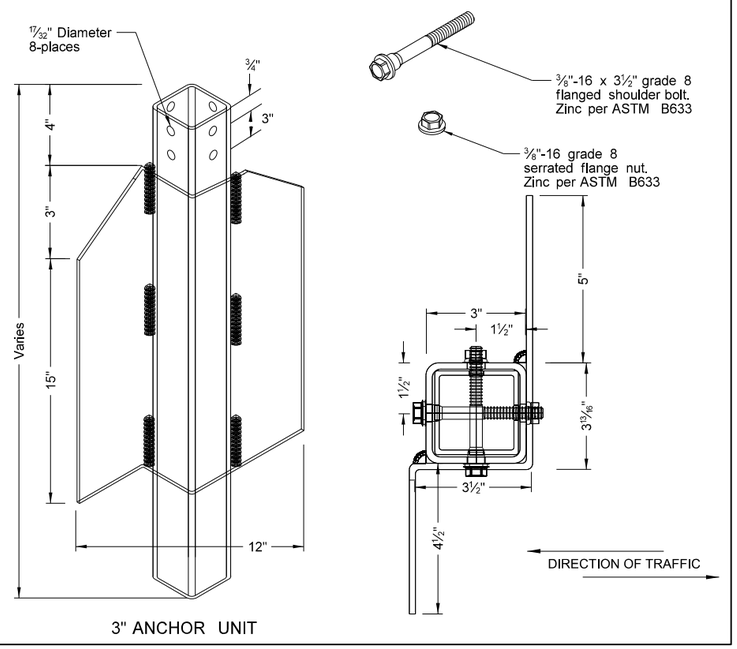
NOTE:

1. 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.
2. Anchor material shall be 7 guage H.R.P.O. Commmercial quality ASTM A569 and 3" x 3" x 7" guage 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.
3. When used in concrete sidewalk, anchor shall be the same concept without the wings
4. Four post signs shall have over 8' between the first and fourth posts.
5. Installation procedures as per manufacturers recommendation.
6. Concrete fasteners for surface mount breakaway base shall be a minimum ½" diameter x 4" grade 8.



SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2½" post.
(standard ⅞" diameter grade 8 bolt may be used with proper shim)



3" ANCHOR UNIT

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

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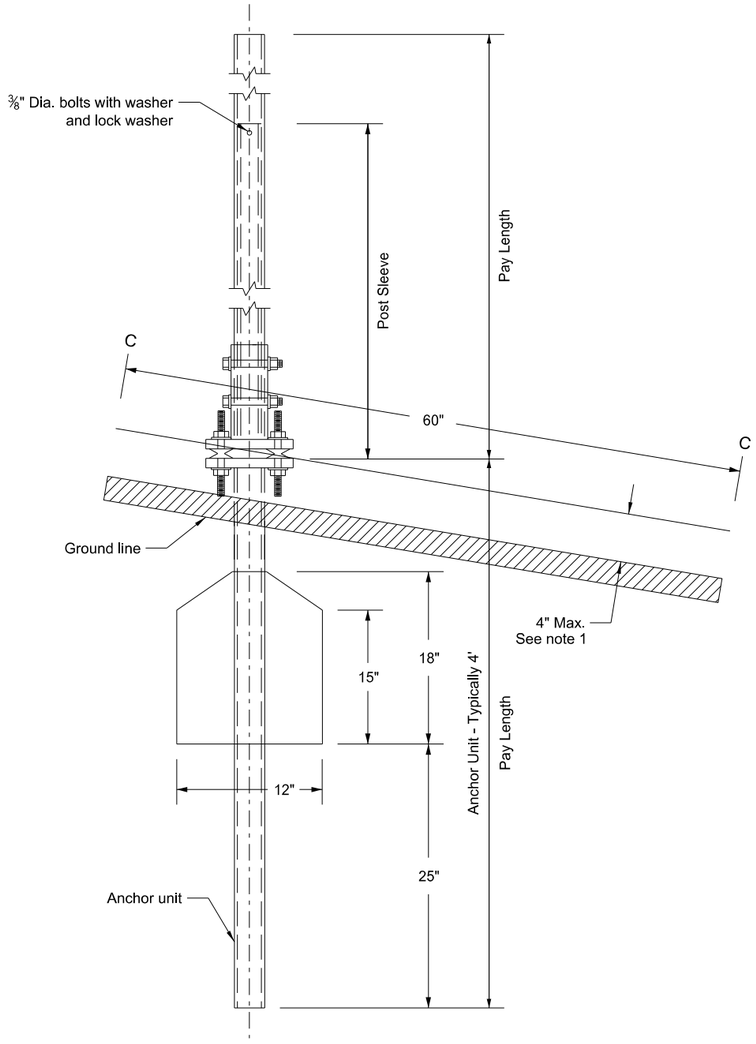
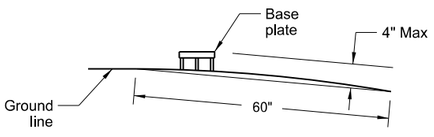
D-754-24A

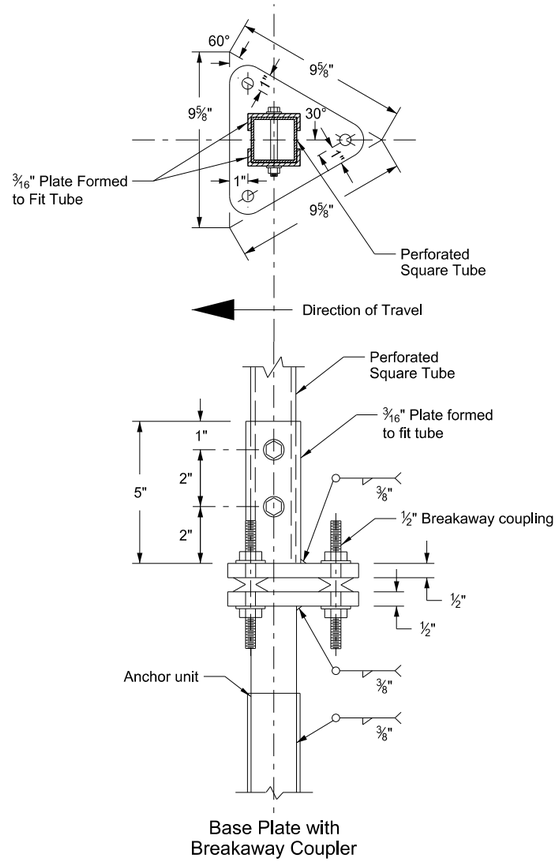




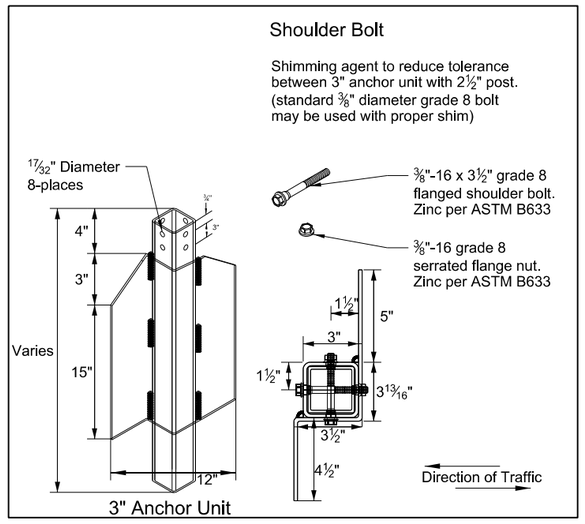
Section C-C

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.

Breakaway Coupler System for Perforated Tubes



Base Plate with Breakaway Coupler



3" Anchor Unit

Notes:

1. 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.
2. Anchor unit shall be the same size as the post and shall have the same specification as the post.
3. Four post signs shall have over 8' between the first and fourth post.
4. 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 Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - The 2½" 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

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

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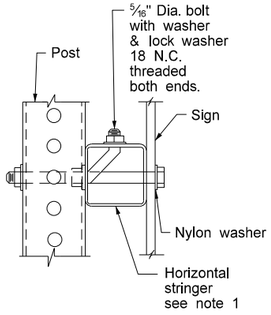
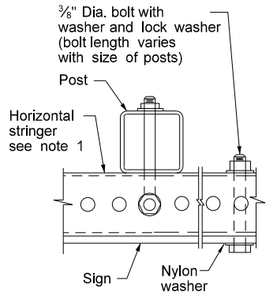
Mounting Details Perforated Tube

D-754-25

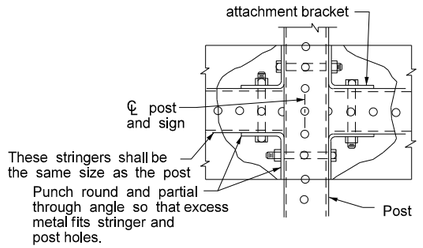


Side View



Top View

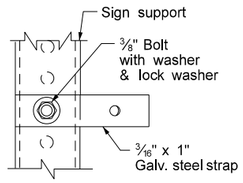
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



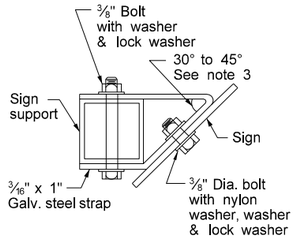
STREET NAME SIGNS
AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR
BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
2. Metal washers used on sign face shall have a minimum outside diameter of 15/16" ± 1/16" and 10 gauge thickness.
3. 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.
4. 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.
5. 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.

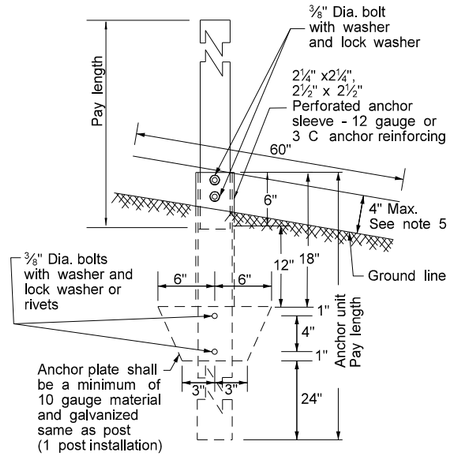


Side View



Top View

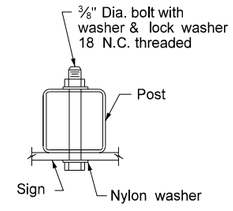
STRAP DETAIL



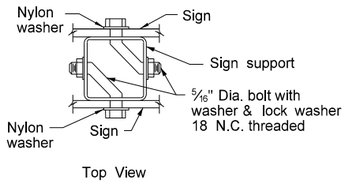
ANCHOR UNIT AND
POST ASSEMBLY

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - The 2½", 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) - 2½" x 12 ga. x 18" minimum length external sleeve required.

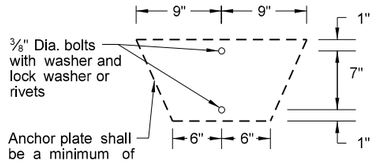


BOLT MOUNTING



Top View

BACK TO BACK
MOUNTING



Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia $In.^4$	Cross Sect. area $In.^2$	Section Modulus $In.^3$
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

8-6-09

REVISIONS

DATE	CHANGE
7-8-14	Revised Note 3

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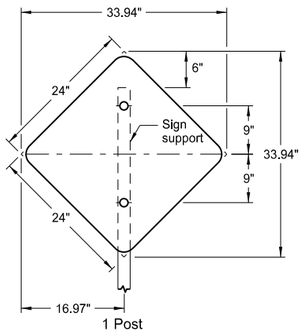
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



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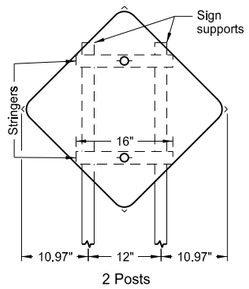
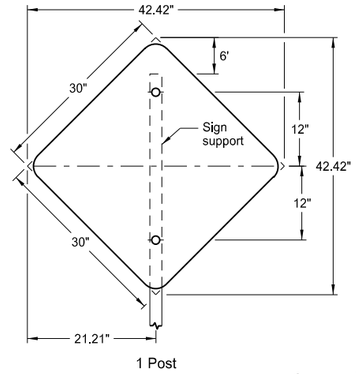


2 Posts

Assembly No. 18



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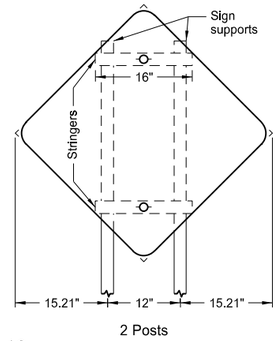
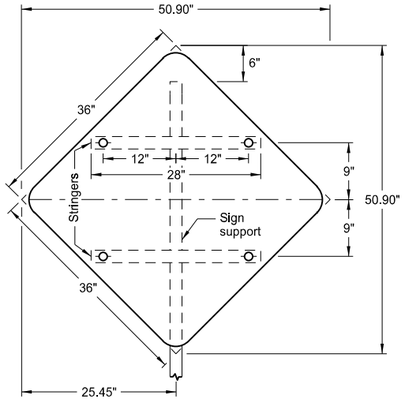


2 Posts

Assembly No. 19



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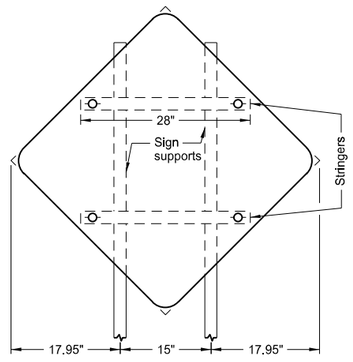

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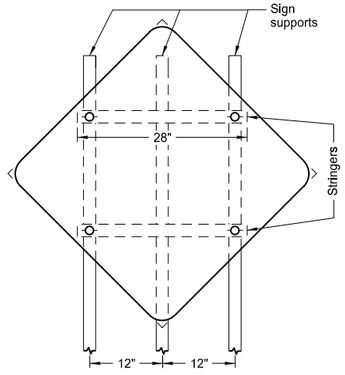
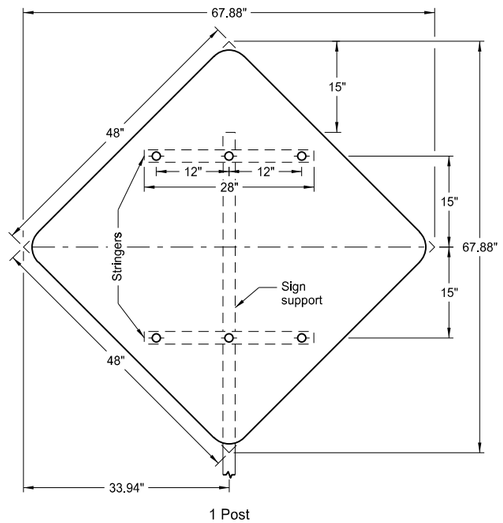
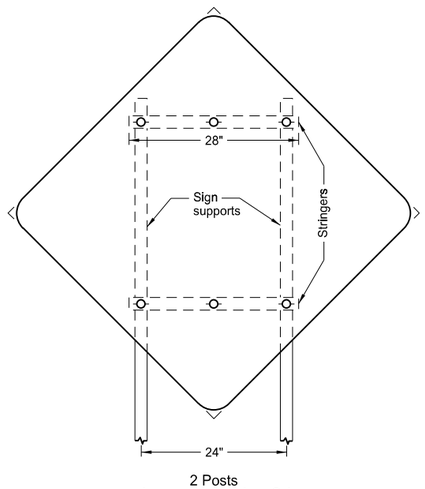


3 Posts

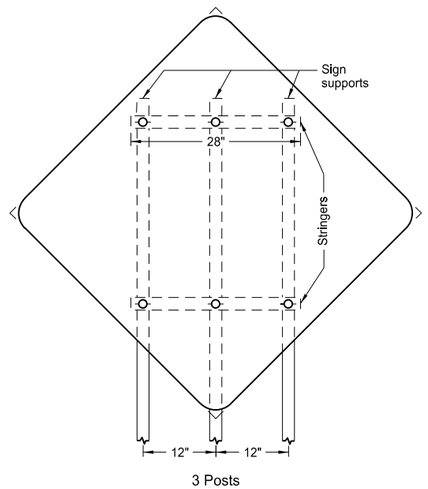
Assembly No. 20



1 Post



2 Posts



3 Posts

Assembly No. 21

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.

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

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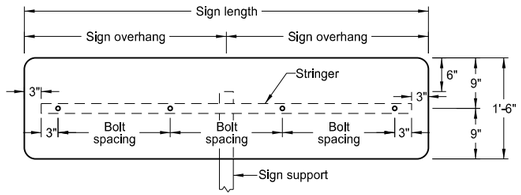
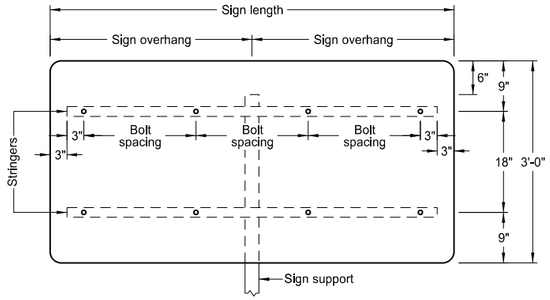
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

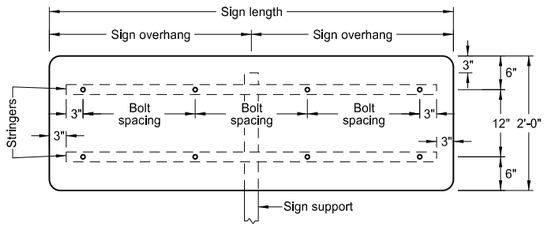
D-754-47



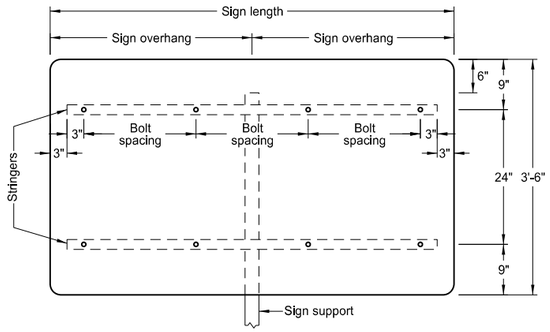
VARIES X 1'-6"



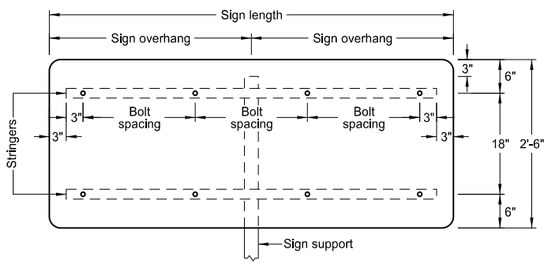
VARIES X 3'-0"



VARIES X 2'-0"



VARIES X 3'-6"



VARIES X 2'-6"

1 POST		
Sign Length	Sign Overhang	Bolt Spacing
4'-0"	2'-0"	18"
4'-6"	2'-3"	21"
5'-0"	2'-6"	24"
5'-6"	2'-9"	18"
6'-0"	3'-0"	20"
6'-6"	3'-3"	22"
7'-0"	3'-6"	24"
7'-6"	3'-9"	2-20" & 2-19"
8'-0"	4'-0"	21"
8'-6"	4'-3"	2-22" & 2-23"
9'-0"	4'-6"	24"
9'-6"	4'-9"	4-20" & 1-22"
10'-0"	5'-0"	2-21" & 3-22"
10'-6"	5'-3"	4-23" & 1-22"
11'-0"	5'-6"	24"
11'-6"	5'-9"	21"
12'-0'	6'-0"	22"

Notes:

1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½" x 1½".
3. All holes shall be punched round for ⅜" bolt.
4. Single stringer and single post signs shall have stringers attached to the post using the special stringer angle, shown on the "Mounting Details Perforated Tube" standard drawing.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

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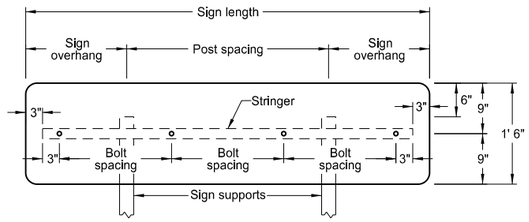
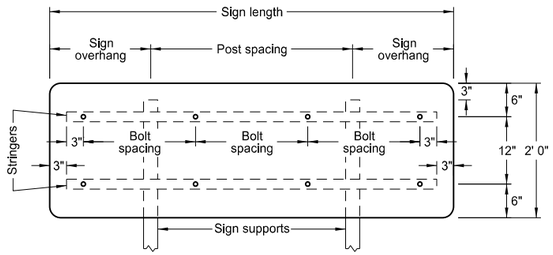
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

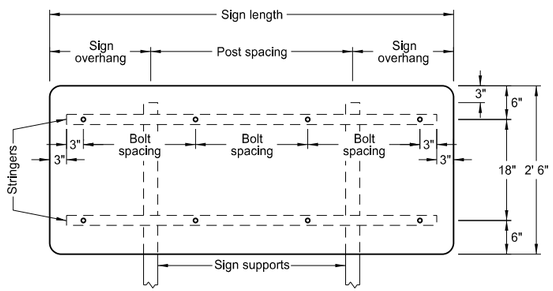
D-754-48



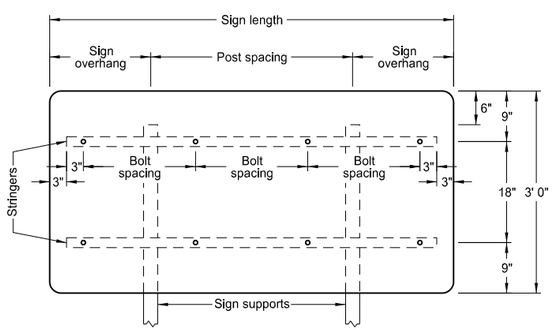
VARIES X 1'-6"



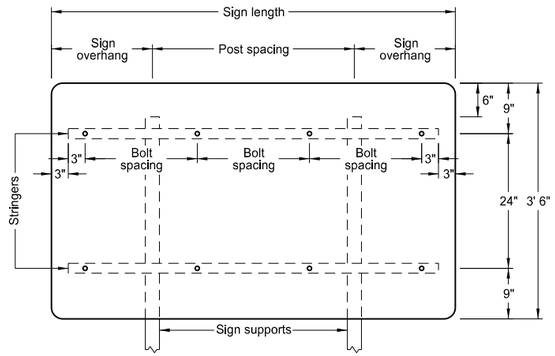
VARIES X 2'-0"



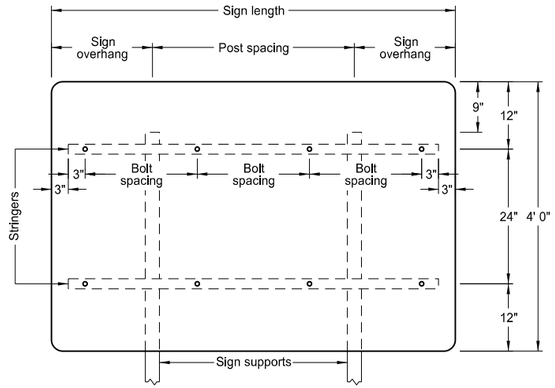
VARIES X 2'-6"



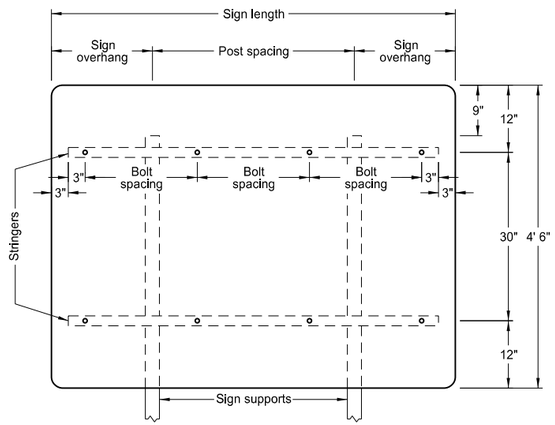
VARIES X 3'-0"



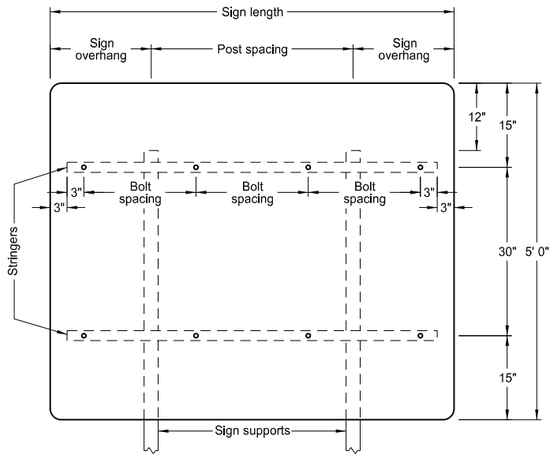
VARIES X 3'-6"



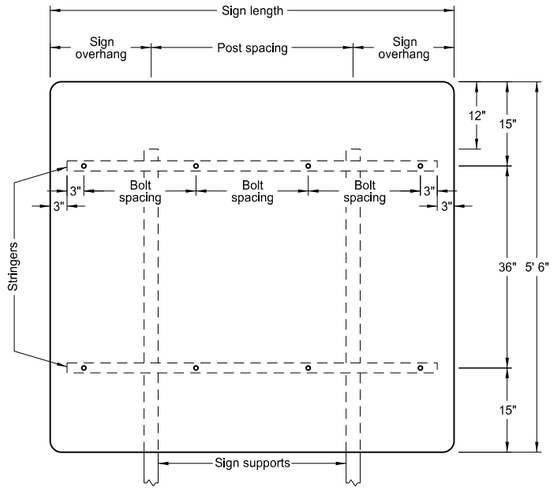
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

2 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	1'-0"	2'-0"	18"
4'-6"	1'-3"	2'-0"	21"
5'-0"	1'-0"	3'-0"	24"
5'-6"	1'-3"	3'-0"	18"
6'-0"	1'-6"	3'-0"	20"
6'-6"	1'-3"	4'-0"	22"
7'-0"	1'-6"	4'-0"	24"
7'-6"	1'-9"	4'-0"	2-20" & 2-19"
8'-0"	2'-0"	4'-0"	21"
8'-6"	1'-9"	5'-0"	2-22" & 2-23"
9'-0"	2'-0"	5'-0"	24"
9'-6"	1'-9"	6'-0"	4-20" & 1-22"
10'-0"	2'-0"	6'-0"	2-21" & 3-22"
10'-6"	2'-3"	6'-0"	4-23" & 1-22"
11'-0"	2'-6"	6'-0"	24"
11'-6"	2'-9"	6'-0"	21"
12'-0"	2'-0"	8'-0"	22"
12'-6"	2'-3"	8'-0"	23"
13'-0"	2'-6"	8'-0"	24"
13'-6"	2'-9"	8'-0"	3-22" & 4-21"
14'-0'	3'-0"	8'-0"	2-23" & 5-22"
14'-6"	3'-3"	8'-0"	6-23" & 1-24"
15'-0"	3'-6"	8'-0"	24"
15'-6"	2'-9"	10'-0"	6-22" & 2-21"
16'-0"	3'-0"	10'-0"	4-23" & 4-22"
16'-6"	3'-3"	10'-0"	6-23" & 2-24"
17'-0"	3'-6"	10'-0"	24"
17'-6"	3'-9"	10'-0"	22"
18'-0"	3'-0"	12'-0"	6-23" & 3-22"
18'-6"	3'-3"	12'-0"	6-23" & 3-24"
19'-0"	3'-6"	12'-0"	24"
19'-6"	3'-9"	12'-0"	8-22" & 2-23"
20'-0"	4'-0"	12'-0"	8-23" & 2-22"

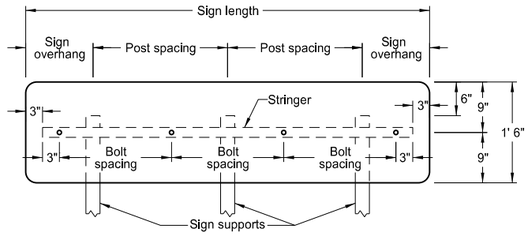
Notes:

1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½" x 1½".
3. All holes shall be punched round for ⅜" bolt.

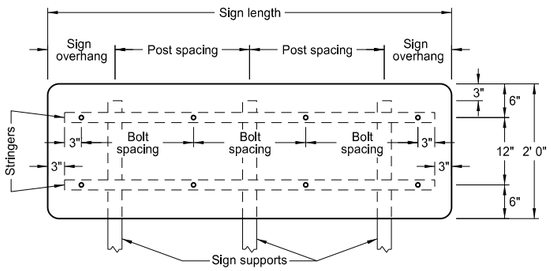
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 9/25/2012 and the original document is stored at the North Dakota Department of Transportation

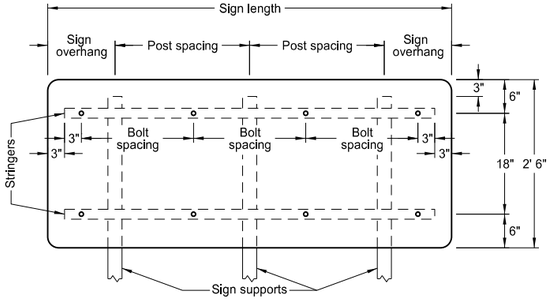
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS



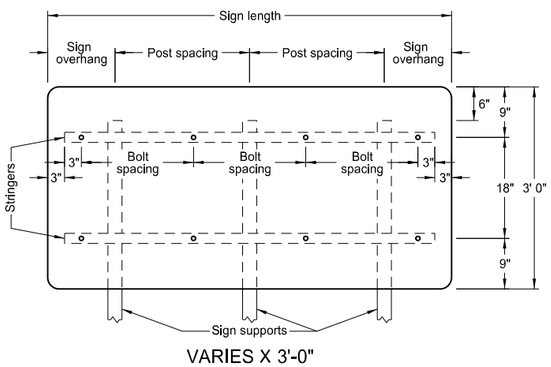
VARIES X 1'-6"



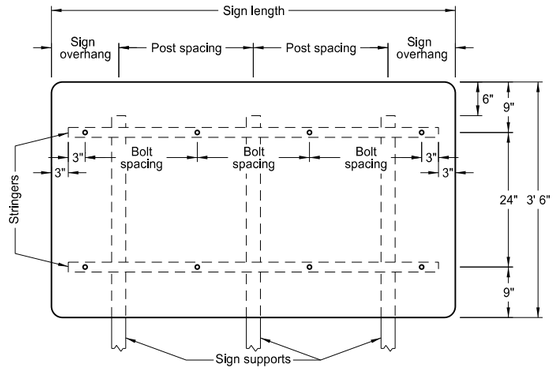
VARIES X 2'-0"



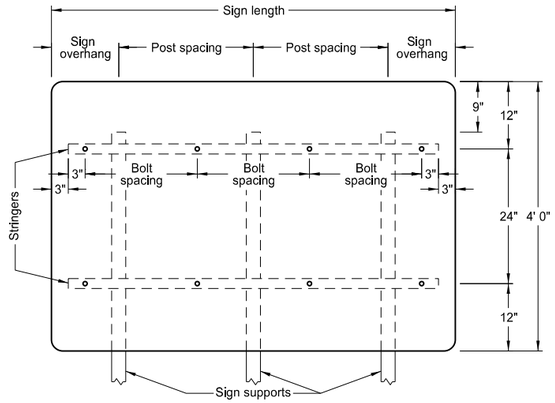
VARIES X 2'-6"



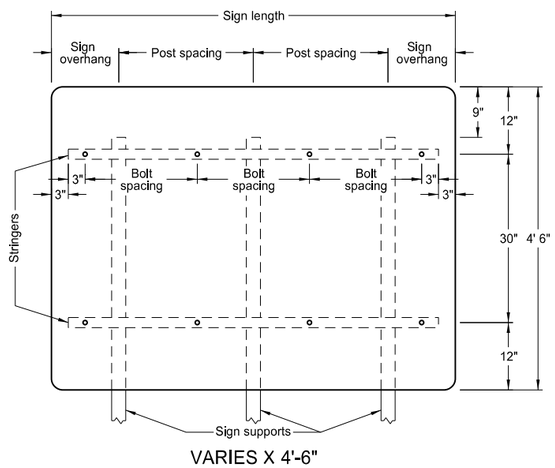
VARIES X 3'-0"



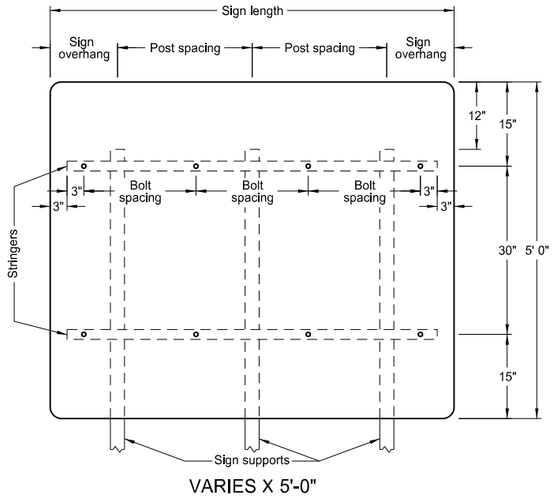
VARIES X 3'-6"



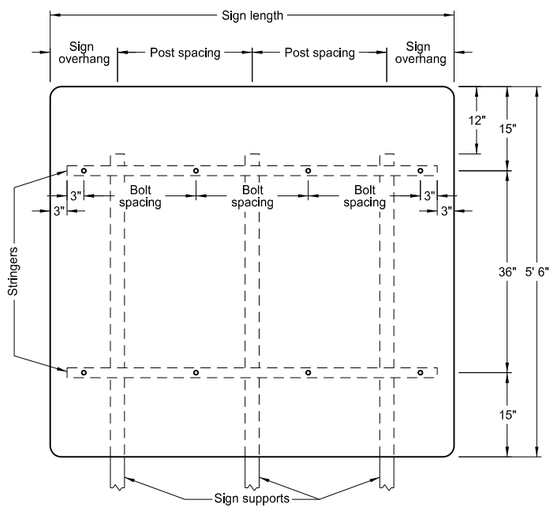
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

3 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	0'-6"	1'-6"	18"
4'-6"	0'-6"	1'-9"	21"
5'-0"	0'-6"	2'-0"	24"
5'-6"	1'-3"	1'-6"	18"
6'-0"	1'-0"	2'-0"	20"
6'-6"	1'-3"	2'-0"	22"
7'-0"	1'-6"	2'-0"	24"
7'-6"	1'-6"	2'-3"	2-20" & 2-19"
8'-0"	1'-9"	2'-3"	21"
8'-6"	2'-0"	2'-3"	2-22" & 2-23"
9'-0"	1'-6"	3'-0"	24"
9'-6"	1'-9"	3'-0"	4-20" & 1-22"
10'-0"	1'-9"	3'-3"	2-21" & 3-22"
10'-6"	1'-9"	3'-6"	4-23" & 1-22"
11'-0"	2'-0"	3'-6"	24"
11'-6"	2'-3"	3'-6"	21"
12'-0"	2'-4"	3'-8"	22"
12'-6"	2'-5"	3'-10"	23"
13'-0"	2'-6"	4'-0"	24"
13'-6"	2'-9"	4'-0"	3-22" & 4-21"
14'-0'	3'-0"	4'-0"	2-23" & 5-22"
14'-6"	3'-3"	4'-0"	6-23" & 1-24"
15'-0"	3'-6"	4'-0"	24"
15'-6"	2'-4"	5'-5"	6-22" & 2-21"
16'-0"	2'-5"	5'-7"	4-23" & 4-22"
16'-6"	2'-5"	5'-10"	6-23" & 2-24"
17'-0"	2'-6"	6'-0"	24"
17'-6"	3'-3"	5'-6"	22"
18'-0"	3'-6"	5'-6"	6-23" & 3-22"
18'-6"	3'-9"	5'-6"	6-23" & 3-24"
19'-0"	3'-6"	6'-0"	24"
19'-6"	4'-3"	5'-6"	8-22" & 2-23"
20'-0"	4'-4"	5'-8"	8-23" & 2-22"

Notes:

1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½" x 1½".
3. All holes shall be punched round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

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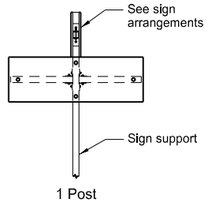
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

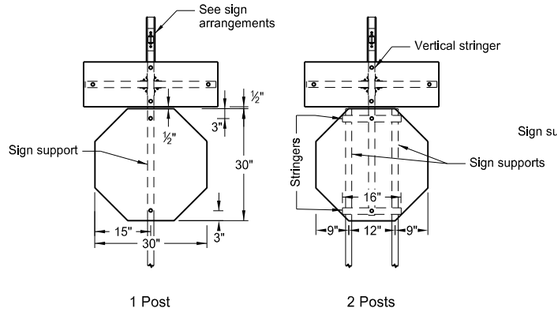
D-754-87

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



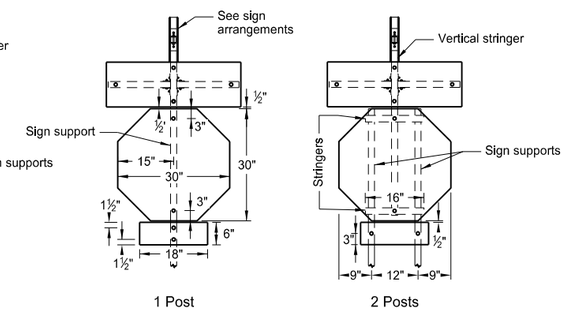
1 Post

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



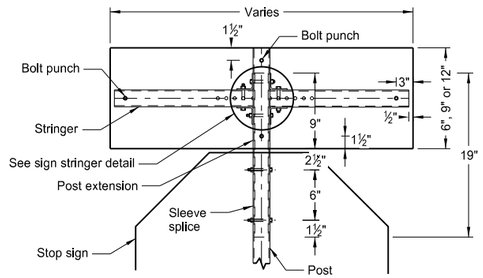
1 Post 2 Posts

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



1 Post 2 Posts

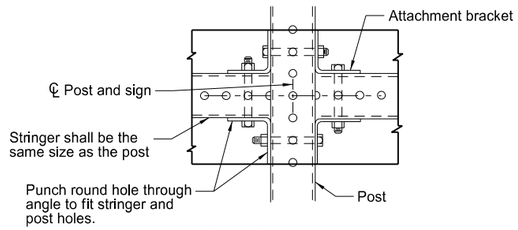
Special Assembly 3 (A, B, C, D or E)



Front View

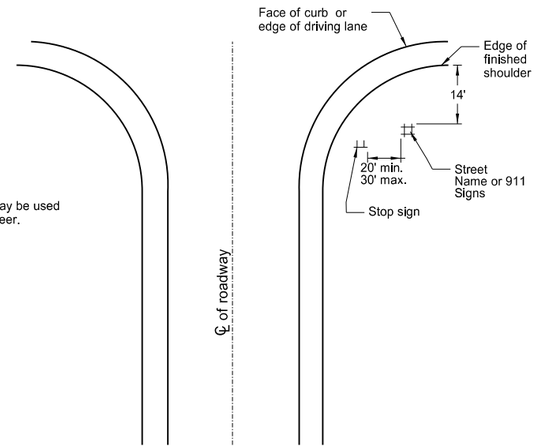
Sleeve Splice Detail

Note: The splice method may be used upon approval of the engineer.



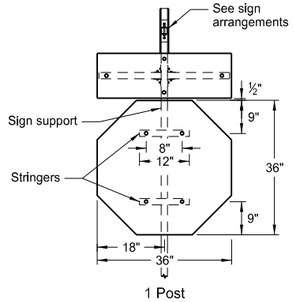
Sign Stringer Detail

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

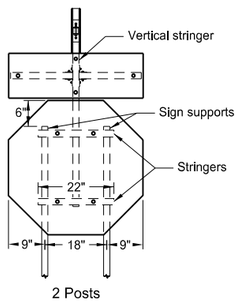


Intersection Layout

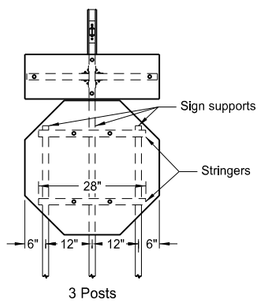
Note: This layout is to be used for street name signs or 911 signs that are used with Special Assembly 1 .



1 Post

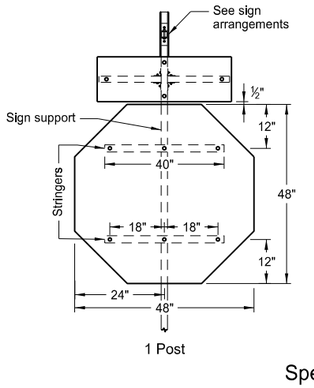


2 Posts

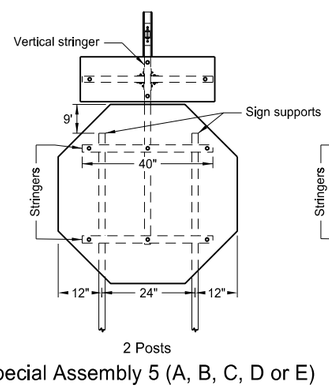


3 Posts

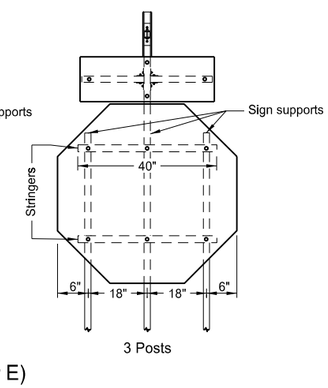
Special Assembly 4 (A, B, C, D or E)



1 Post

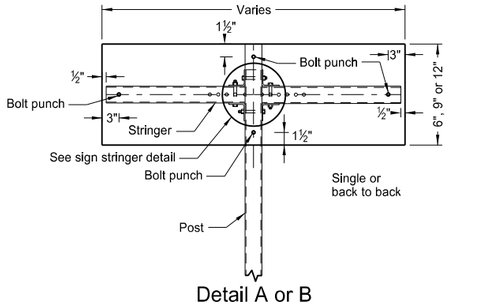


2 Posts

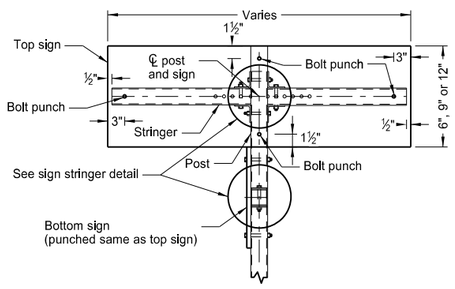


3 Posts

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

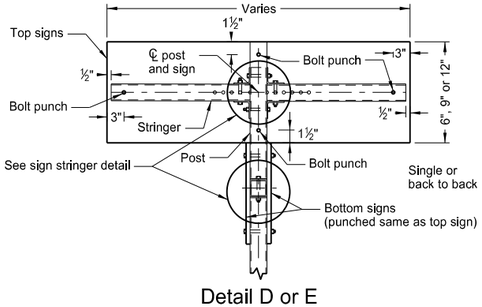


Detail A or B



Detail C

Sign Arrangements



Detail D or E

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

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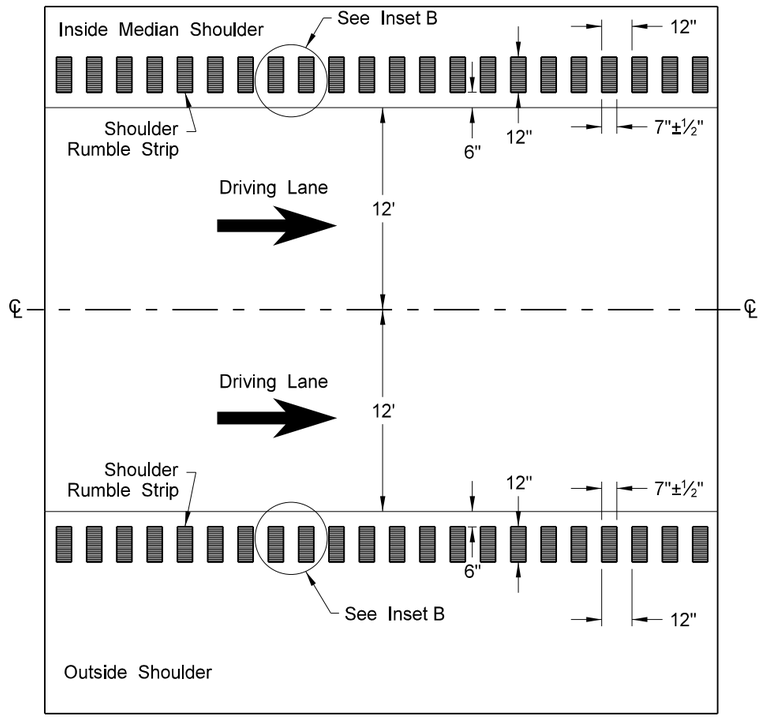
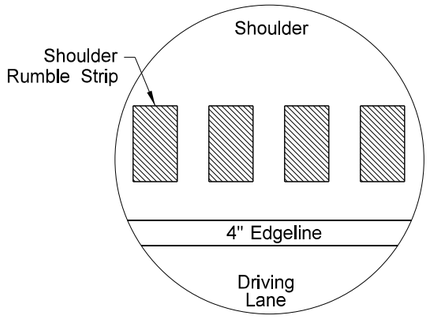
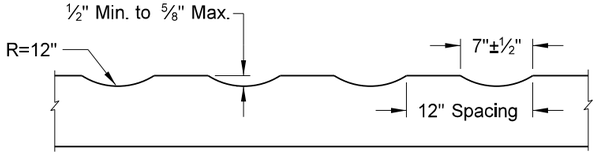
RUMBLE STRIPS
DIVIDED HIGHWAYS (NON-INTERSTATE)



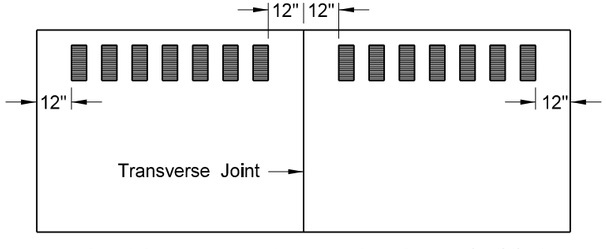
Divided Highways (Non-Interstate)



Inset B - Shoulder Rumble Strip



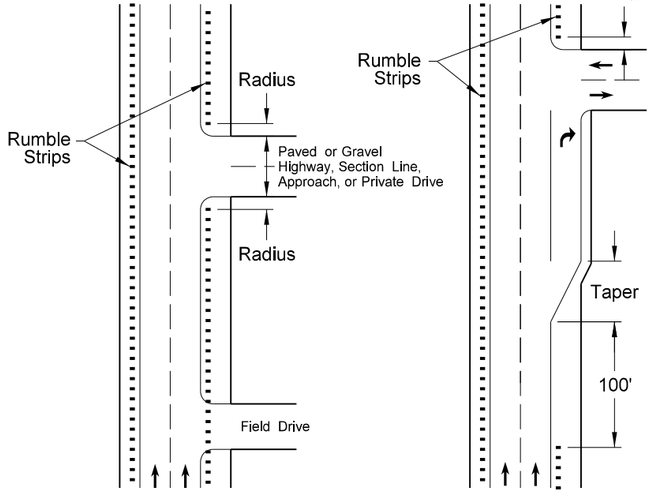
Profile of Rumble Strips - Bituminous and PCC Pavements



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

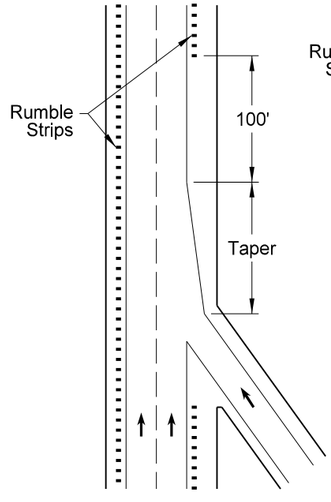
NOTES:

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.

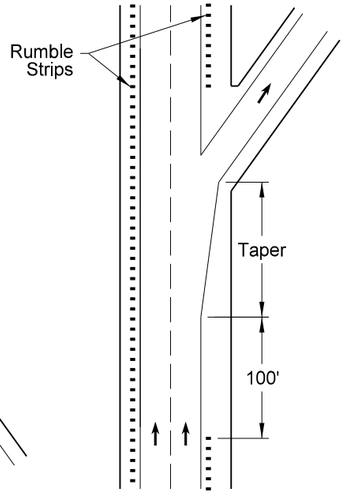


Entrance Roadways

Turn Lane (Right & Left)



Entrance Ramp



Exit Ramp

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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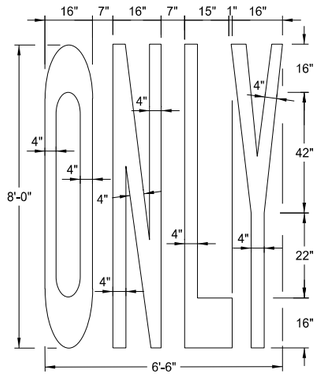
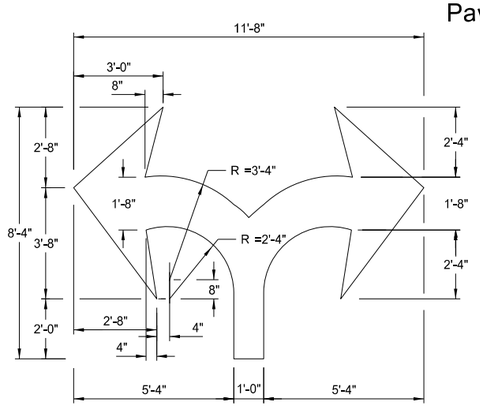
Pavement Marking Message Details

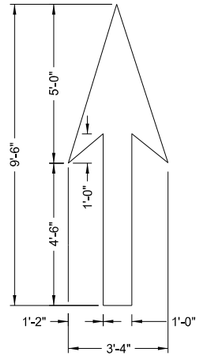
D-762-1



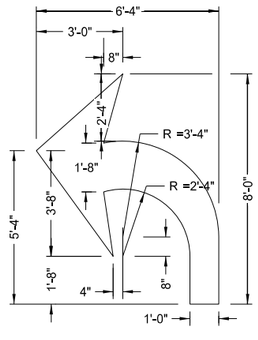
22 S. F.



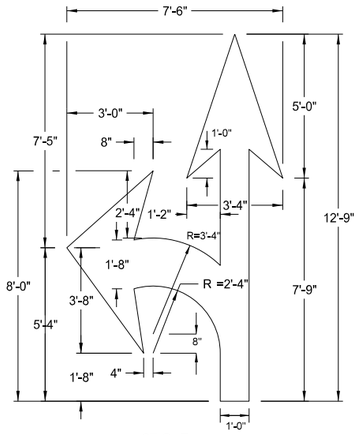
29 S. F.



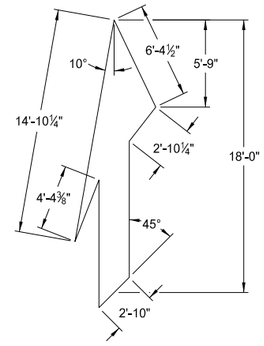
12 S. F.



16 S. F.

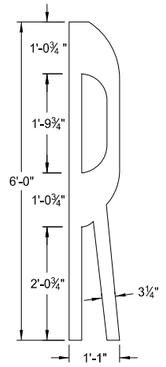


27 S. F.

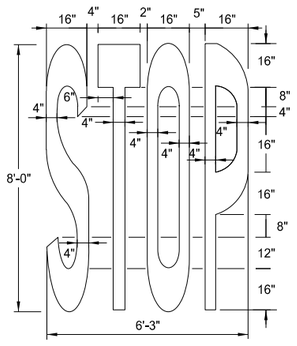


41 S. F.

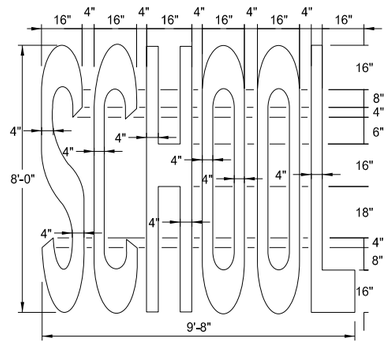
Note:
The merge arrow shall be rotated 20° from the edge of the roadway.



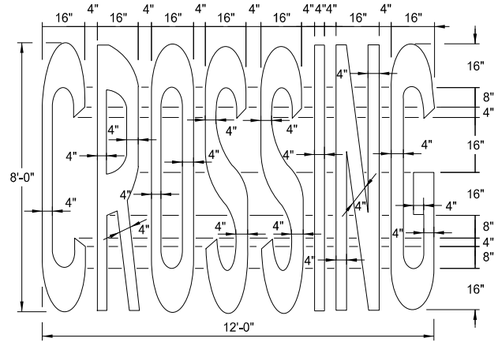
4 S. F.



22 S. F.



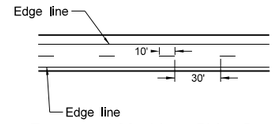
34.5 S. F.



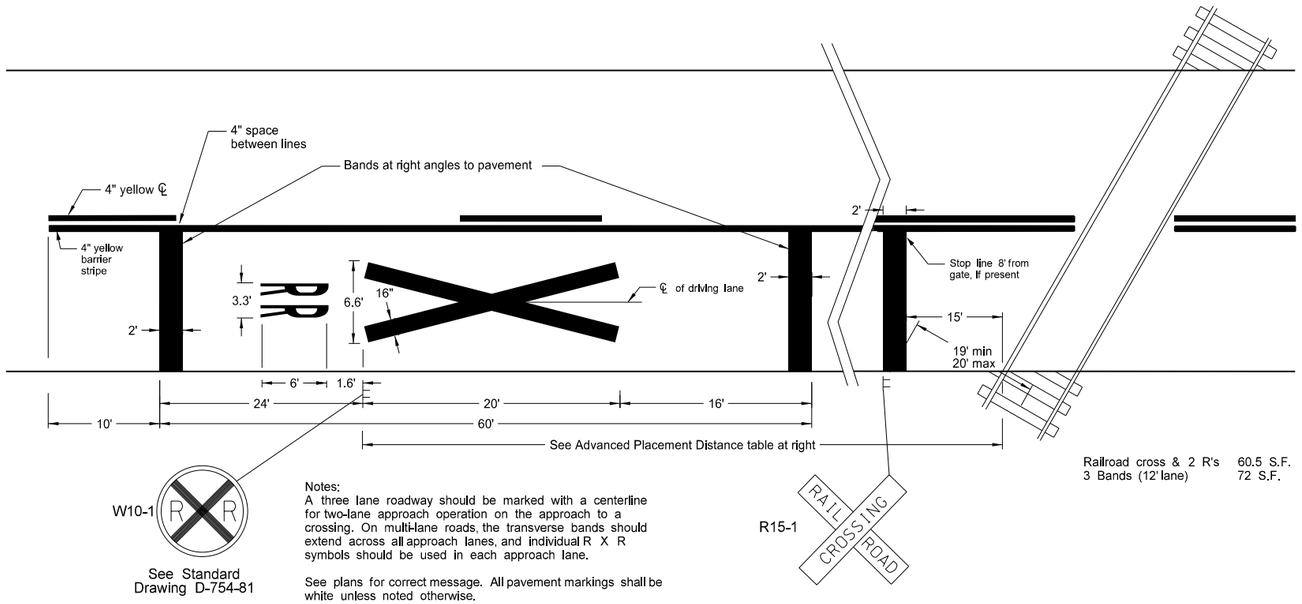
46 S. F.

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

Chevron Crosshatching Table



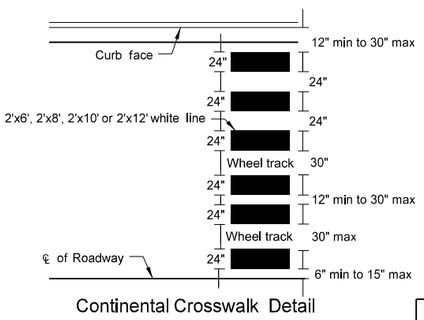
Centerline Pavement Marking Skip Spacing Detail



Railroad cross & 2 R's 60.5 S.F.
3 Bands (12' lane) 72 S.F.

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

See plans for correct message. All pavement markings shall be white unless noted otherwise.



Continental Crosswalk Detail

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-6-11	
REVISIONS	
DATE	CHANGE

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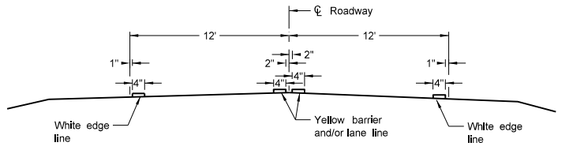
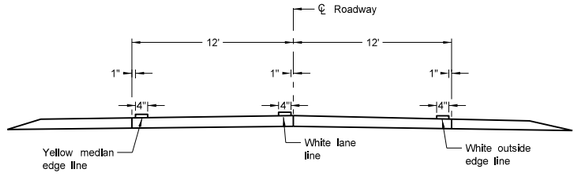
PAVEMENT MARKING

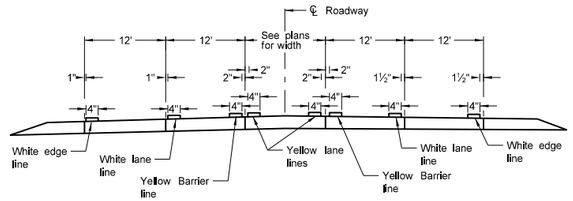
D-762-4



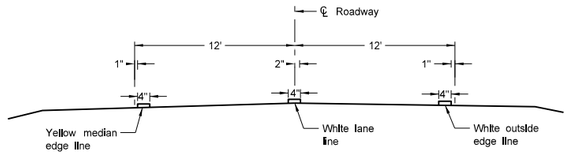
Two Lane Two Way
RURAL ROADWAY



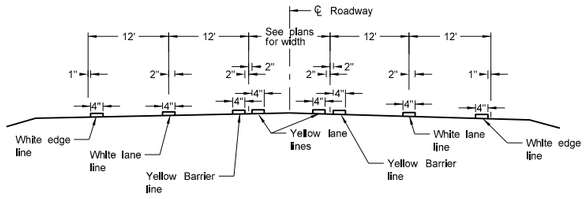
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



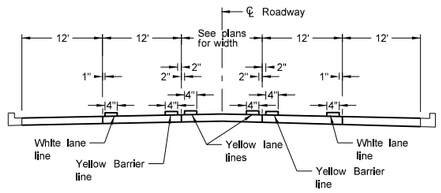
RURAL FIVE LANE ROADWAY
Concrete Section



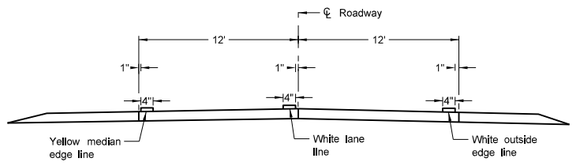
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



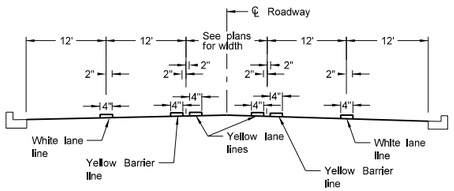
RURAL FIVE LANE ROADWAY
Asphalt Section



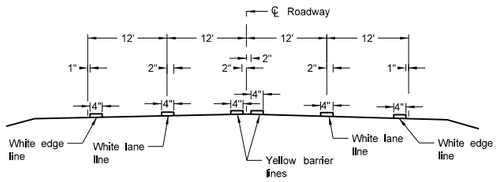
URBAN FIVE LANE SECTION
Concrete Section



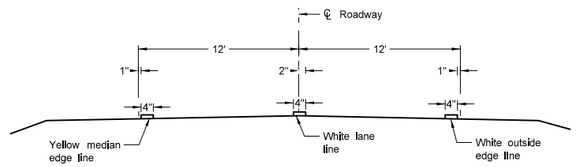
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



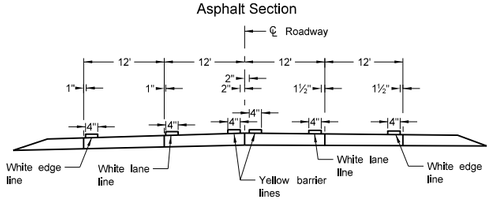
URBAN FIVE LANE SECTION
Asphalt Section



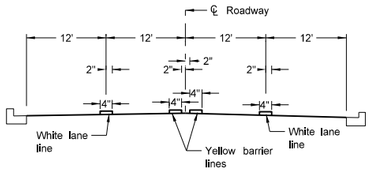
RURAL FOUR LANE ROADWAY
Asphalt Section



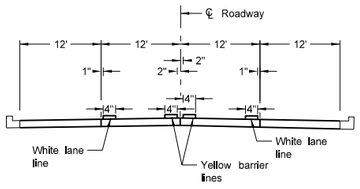
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



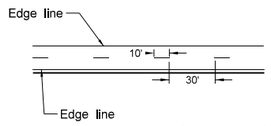
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:

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

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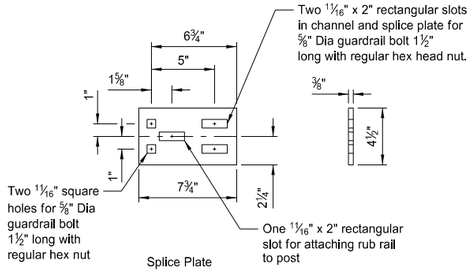
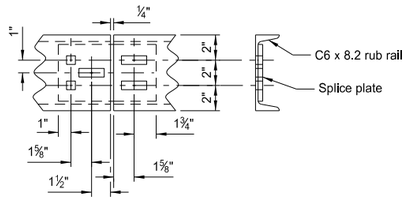
W-BEAM GUARDRAIL GENERAL DETAILS

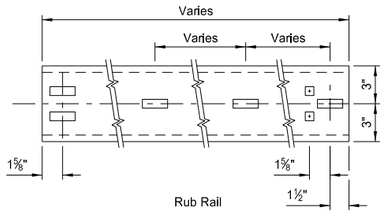
D-764-1



Splice Plate

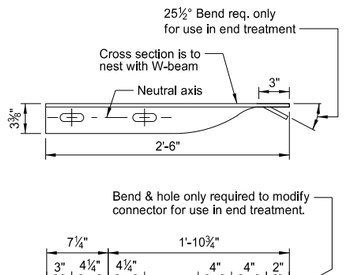


Splice Detail

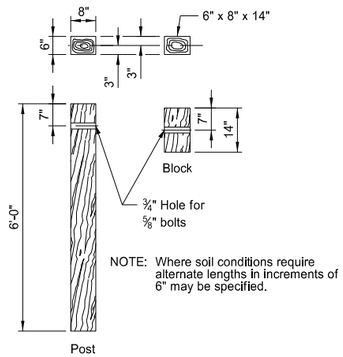


Rub Rail

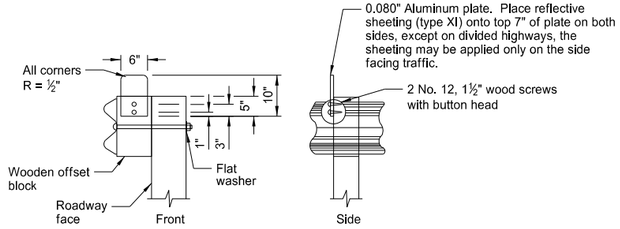
C6x8 RUB RAIL AND SPLICE PLATE



W BEAM TERMINAL CONNECTOR

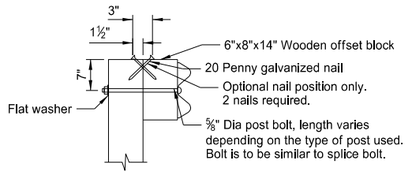


6"x8" TIMBER POST & BLOCK

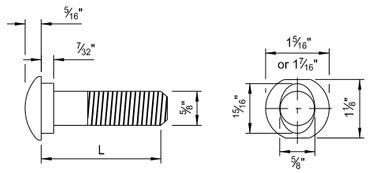


REFLECTORIZED PLATE DETAIL

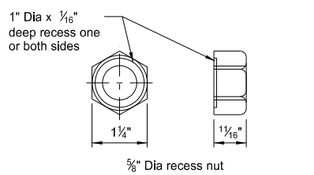
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



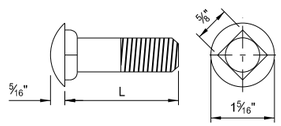
TYPICAL POST ATTACHMENT DETAIL



5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length

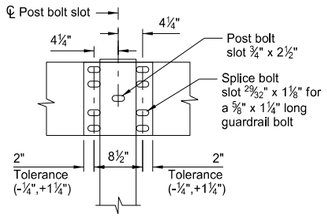


5/8" GUARDRAIL BOLT & RECESS NUT

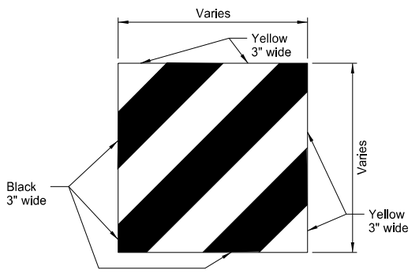


5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length

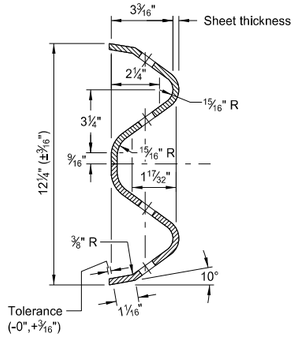
5/8" CARRIAGE BOLT & NUT



SPLICE DETAIL



IMPACT HEAD OBJECT MARKER



W-BEAM CROSS SECTION

NOTES:

1. Reflectorized plates: Reflector plates shall begin at the first post and be spaced at 25' centers on guardrail less than 250' in length and at 50' centers for guardrail over 250' in length. The reflector shall be the same color as the pavement marking adjacent to that reflector unless noted otherwise on the plans.
2. Manner of replacing bituminous material at guardrail post: All excess earth from excavations for guard posts shall be disposed of as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. The Object Marker shall fit within the vertical edges of the Impact Plate. The retroreflective sheeting shall be type XI sheeting meeting the requirements of Section 894.02.B of the standard specifications. The sheeting shall be applied to 0.100 Aluminum sheeting meeting the requirements Section 894.01.A. The Object Marker shall attach to the Impact Head Plate with rivets or some other attachment device. The rivets or attachment device shall be non-rust. The stripes shall slope downward toward the roadway side.
4. Guardrail installation height tolerance = - 1/4" , + 1".

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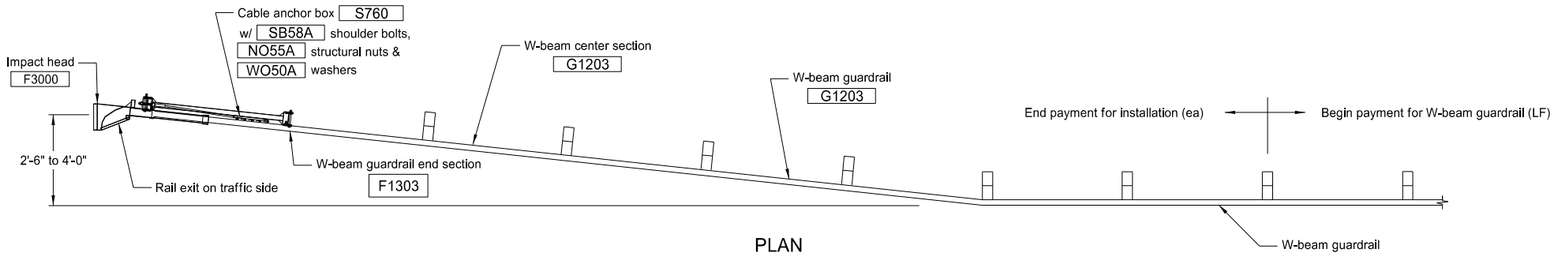
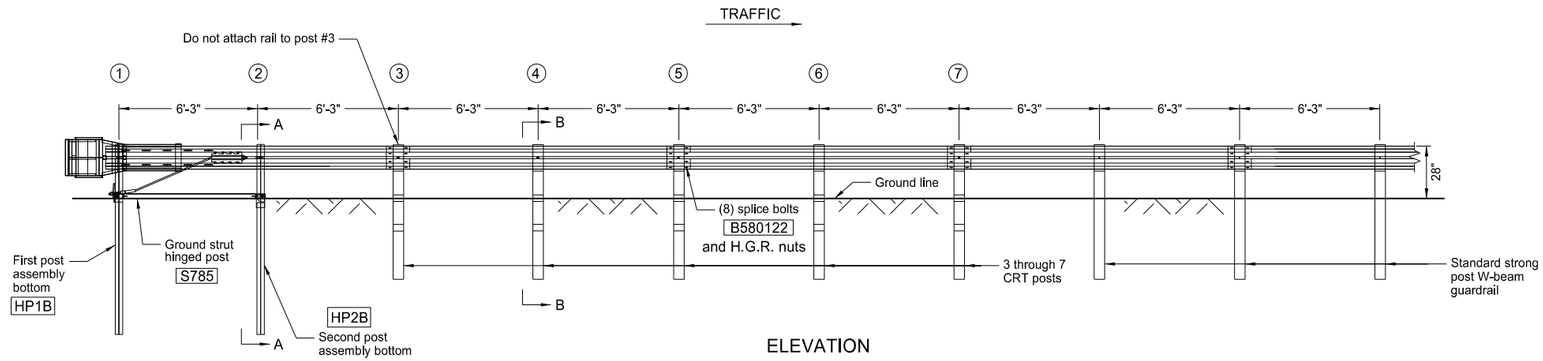
FLARED ENERGY ABSORBING TERMINAL

D-764-6



PLAN

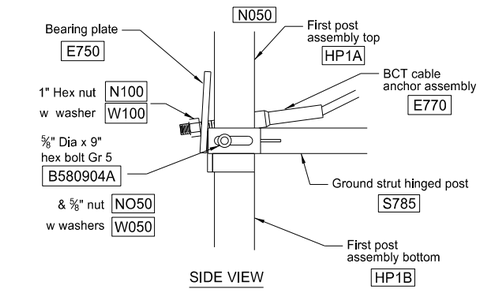


ELEVATION

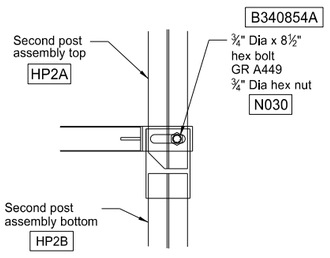
ITEM #	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA
G1203	2	W-BEAM GUARDRAIL, 12 GA
HP1A	1	FIRST POST ASSEMBLY TOP
HP1B	1	FIRST POST ASSEMBLY BOTTOM
HP2A	1	SECOND POST ASSEMBLY TOP
HP2B	1	SECOND POST ASSEMBLY BOTTOM
P671	5	WOOD CRT POST
P675	5	TIMBER BLOCKOUT OR RECYCLED EQUIVALENT
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT HINGED POST
		HARDWARE (ALL DIMENSIONS IN INCHES)
B140404	2	¼ Dia x 4 HEX BOLT
WO14	4	¼ WASHER
N014	2	¼ HEX NUT
B580122	17	⅝ Dia x 1¼ SPLICE BOLT
B581802	4	⅝ Dia x 10 H.G.R. BOLT (POSTS 3 THRU 6)
B580904A	1	⅝ Dia x 9 HEX BOLT GR 5
W050	5	⅝ WASHER
N050	22	⅝ Dia H.G.R. NUT
B340854A	1	¾ Dia x 8½ HEX BOLT GR A449
NO30	1	¾ Dia HEX NUT
N100	2	1 ANCHOR CABLE HEX NUT
W100	2	1 ANCHOR CABLE WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	½ A325 STRUCTURAL NUT
W050A	16	1 1/16 OD x 9/16 ID A325 STR. WASHER

GENERAL NOTES

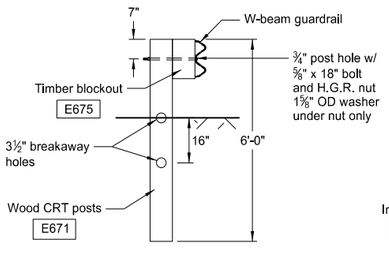
1. Wood posts are required with the Flared Energy Absorbing Terminal except posts #1 and #2.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The lower sections of the posts shall not protrude more than 4 inches above the ground (measured along a 60 inch cord). Site grading may be necessary to meet this requirement.
4. Lower post sections shall not be driven with the upper post attached. If the the post is placed in a drilled hole, the backfill material must be satisfactory compacted to prevent settlement.
5. When rock is encountered during excavation, a 12" diameter post hole 20" deep may be used if approved by the Engineer. Granular material will be placed in the bottom of the hole approximately 2½" deep to provide drainage. The soil tubes shall be field cut to length, placed in the hole and back filled with adequately compacted material excavated from the hole.
6. The breakaway cable assembly shall be taut. A locking device (vice grips or channel lock pliers) should be used to prevent cable from twisting when tightening nuts.
7. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when wood shrinks. The nail shall be 20 penny and galvanized.
8. The Flared Energy Absorbing Terminal shall be flared only when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, the Flared Energy Absorbing Terminal shall have only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, the Flared Energy Absorbing Terminal shall be turned parallel to the roadway.



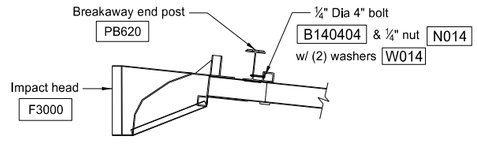
SIDE VIEW



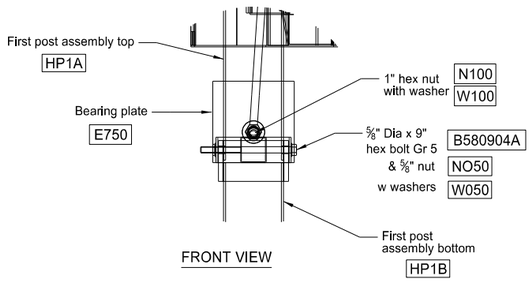
SIDE VIEW DETAIL OF POST #2



SECTION B-B
POST 3 THRU 7

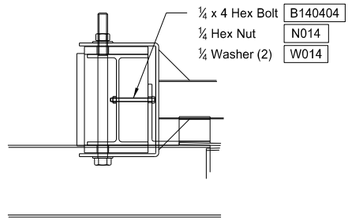


IMPACT HEAD CONNECTING DETAIL

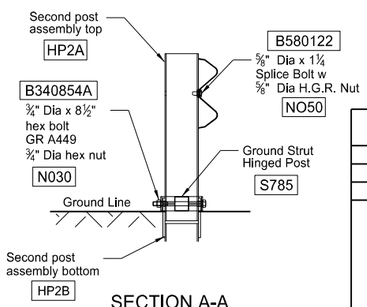


FRONT VIEW

POST #1 CONNECTION DETAILS



IMPACT HEAD CONNECTION DETAIL



SECTION A-A
at Post #2

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