DESIGN DATA - ND 8 (RP 12.119 - RP 37.816)				
Traffic	Average Daily			
Current 2015	Pass: 330	Trucks: 55	Total: 385	
Forecast 2035	Pass: 450	Trucks: 40	Total: 530	
Clear Zone Distance: NA		Design Speed: NA		
Minimum Sight Dist. for Stopping: NA		Bridges: NA		
Sight Dist. for No Passing Zone: NA				
Pavement Design Life: NA				

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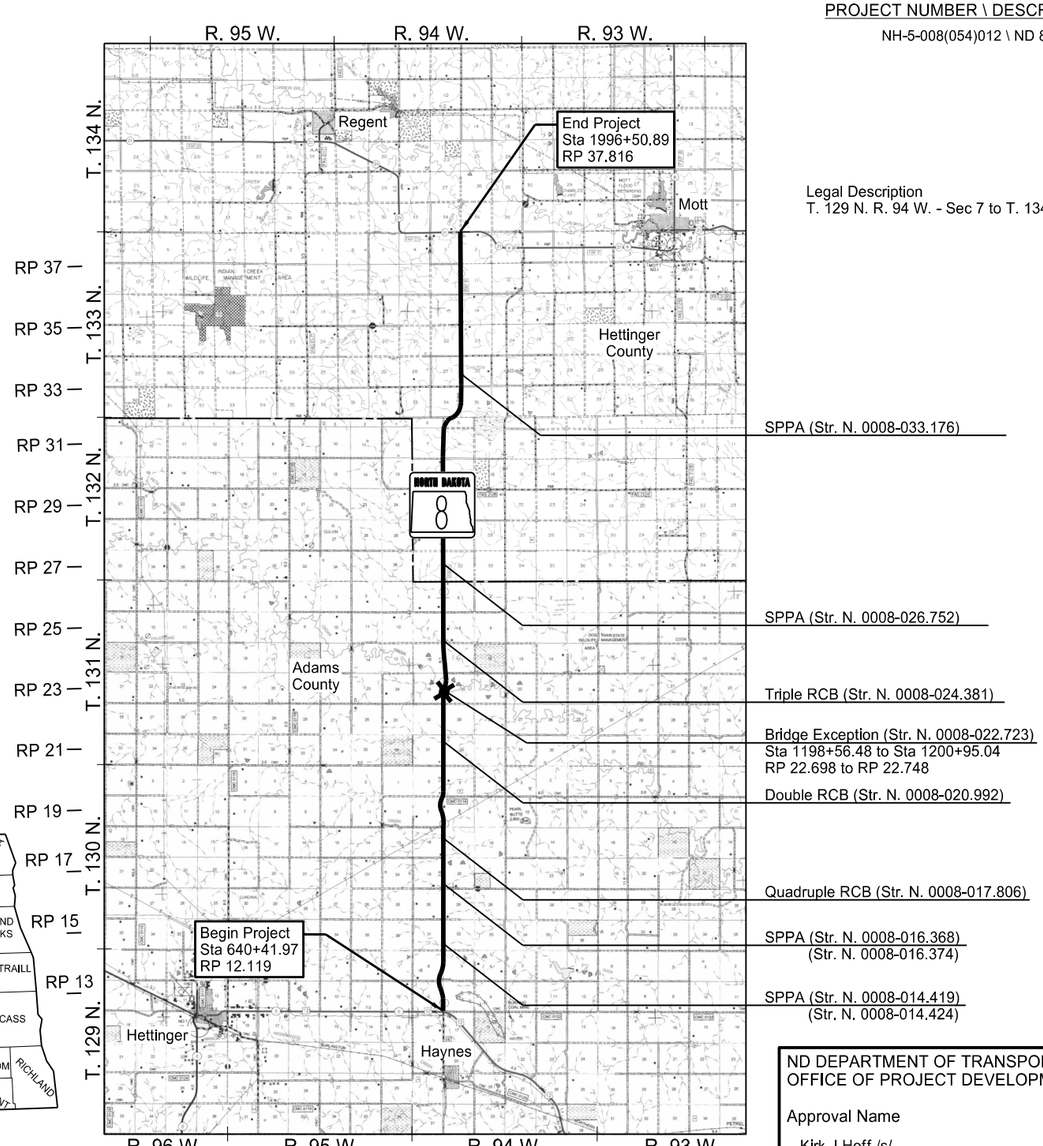
JOB 26
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

NH-5-008(054)012

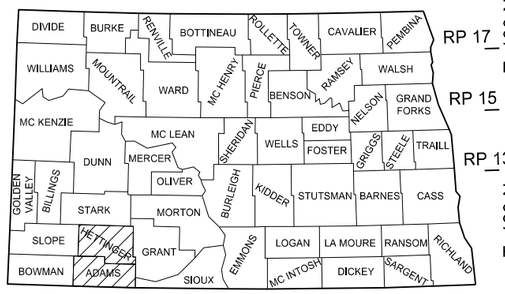
Adams and Hettinger Counties
JCT ND 12 to W JCT ND 21
Cold In-Place Recycle, HMA, Culverts, & Incidentals

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-5-008(054)012 \ ND 8	25.638	25.684



Legal Description
T. 129 N. R. 94 W. - Sec 7 to T. 134 N. R. 94 W. - Sec 34



STATE COUNTY MAP

N

DESIGNER
Zach Hudgik, PE
DESIGNER Taylor Olson, PE
DESIGNER Matthew Isley, PE
DESIGNER Jeff Daley, PE
DESIGNER Emily Fisher, PE

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Approval Name	Date Signed
Kirk J Hoff /s/	12/4/2020

KLJ

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PLAN SECTIONS

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LIST OF STANDARD DRAWINGS

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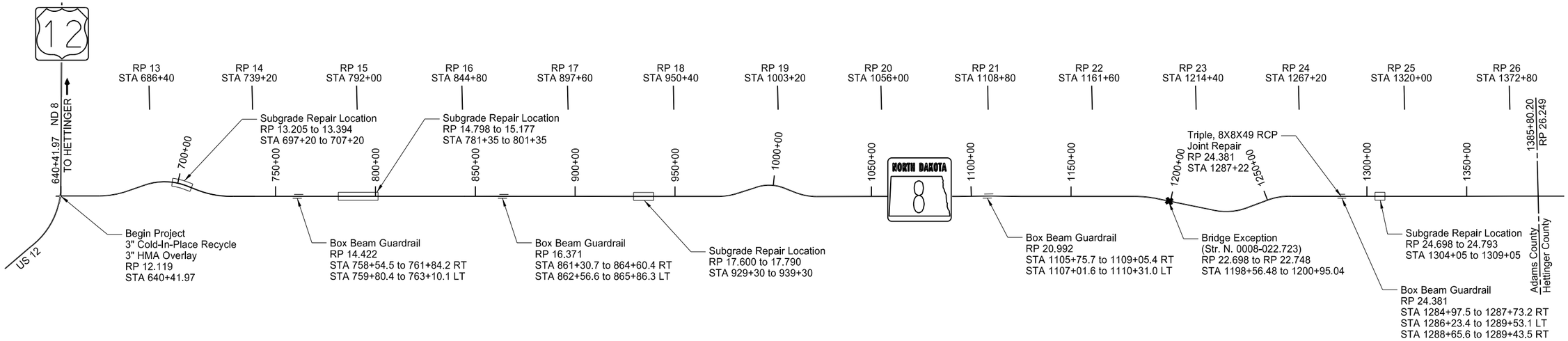

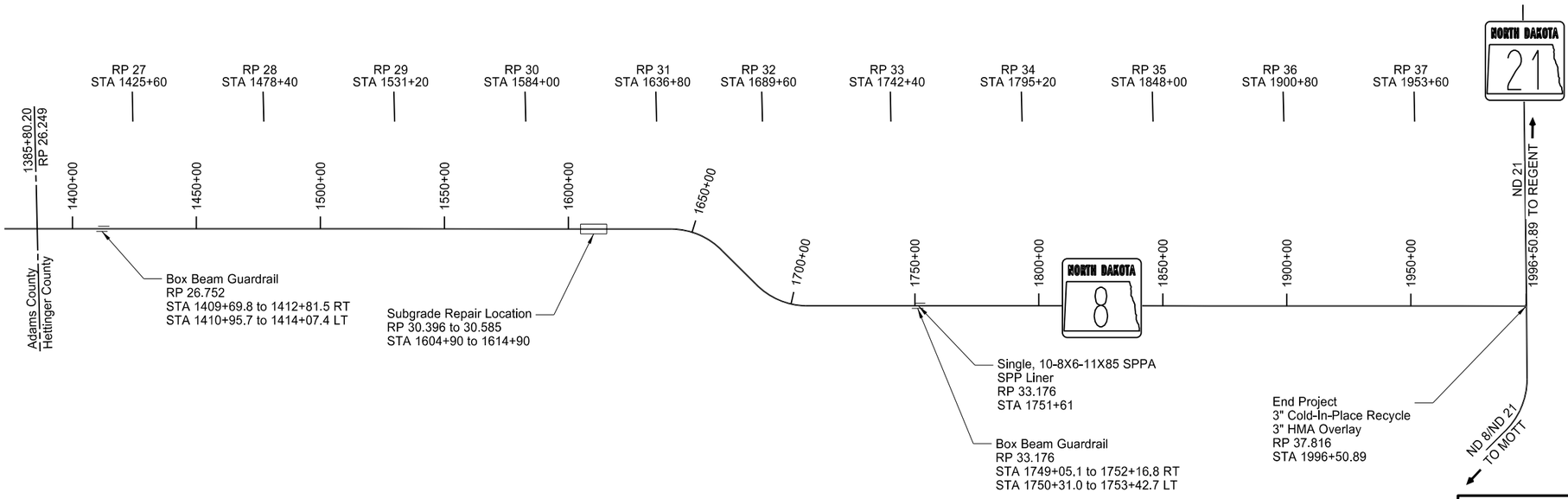

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ND 8 Cold In-Place Recycle

Scope of Work

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NOTES

GENERAL NOTES

108-100 WEEKLY PLANNING & REPORTING MEETING: A weekly planning and reporting meeting is required.

203-P01 APPROACH FORESLOPE RECONSTRUCTION: Grade approach inslopes steeper than 6:1 to be 8:1. Use “Type C” compaction for embankment placement. Include all costs for materials, equipment, and labor in the contract unit price for “BORROW EXCAVATION.” See Detail 20-2.

Strip topsoil from inslopes prior to embankment placement and stockpile. After embankment placement is complete, respread the topsoil evenly over the disturbed area. Include all costs associated with topsoil handling in the contract unit price for “BORROW EXCAVATION.”

203-P02 GUARDRAIL EMBANKMENT: Each side of the road will be measured as one unit. Include all costs for materials, equipment, and labor to place the embankment, and topsoil in the unit price for “GUARDRAIL EMBANKMENT.”

203-P03 COMMON EXCAVATION - SUBCUT: Excavated material will be paid for at the planned quantity unless otherwise directed by the Engineer. The Contractor may use excavated material as “BORROW – EXCAVATION” for approach foreslope reconstruction or as “GUARDRAIL EMBANKMENT.”

203-P04 SUBGRADE REPAIR: Perform repair work on half of the roadway at a time while maintaining one lane of traffic on the other half as shown in Section 100. Do not load trucks on the lane used to maintain one lane traffic. It is allowable to dump Aggregate Base Course CL 5 directly into the repair area with side dumps from the travel lane provided the trucks stay in the pilot car line and travels through the work zone with the public traffic. Public traffic is not allowed on the repair area until the base section is at finished grade. Use only low ground pressure construction equipment in the repair area until the first lift of material is placed.

253-P01 MULCHING: Mulch may be either straw mulch or hydraulic mulch. Include all costs for materials, equipment, and labor for either straw mulch or hydraulic mulch in the contract unit price for STRAW MULCH. If hydraulic mulch is used, drill seed before applying the hydraulic mulch. Section 253.04 B.2 “Temporary Care Maintenance” will not be required.

411-P01 TEMPORARY ASPHALT WEDGES: A temporary asphalt or milled material wedge will be placed at the milled taper locations to allow for a smooth passage of vehicles. Sawing required to construct a straight vertical edge in milling areas will not be paid for separately.

Include all costs for materials, equipment, and labor to install, maintain, and remove the wedges in the contract unit price for “MILLING PAVEMENT SURFACE.”

411-P02 PROPOSED BRIDGE MILLING TRANSITION AND PAVING SEQUENCE:

1. Mill the existing pavement and taper as shown (Section 20 Sheet 4). 25' for every 0.5 inches of HMA. Place a wearing course matching the roadway surface elevation at the bridge exception and the beginning & end of the project.

2. The same day that the 6" milling at the bridge ends takes place, pave 3" of HMA so that the maximum vertical discontinuity is 3". Place a temporary asphalt wedge at the locations with the 3" lip. See note 411-P01.

430-P01 HOT MIX ASPHALT: Place the top 3-inches of mainline Hot Mix Asphalt (HMA) in two 1.5-inch lifts.

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

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

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

Install PRS that meet the following criteria:

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

Use individual PRS constructed in one of the following manners:

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

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

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

The Engineer will count and measure each array as one unit. Include the cost of providing, installing, maintaining, and relocating PRS in the unit price bid for "PORTABLE RUMBLE STRIPS".

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NOTES

704-P01 TRAFFIC CONTROL FOR BITUMINOUS PAVEMENT: Provide traffic control consisting of a temporary road closure, flagging, and a pilot car. The traffic control device list has been developed using the layouts shown in the plans and the following layouts shown in the Standard Drawings.

1. Standard D-704-2 for coring of hot bituminous pavement;
2. Standard D-704-15, layout A: for the subgrade repairs, placement of aggregate base, CIP and paving;
3. Standard D-704-19, layout F: for guardrail construction and embankment placement for guardrail;
4. Standard D-704-20, layout G: as the basis of the terminal signing and intersecting routes;
5. Standard D-704-22, layouts K and L: for construction trucks hauling material;
6. Standard D-704-24, Type U: for approach embankment work;
7. Standard D-704-26, Type GG: for uneven lanes when paving (each bound);
8. Standard D-704-26, Type JJ: for 5 repair locations (each bound);
9. Standard D-704-26, Type CC, EE, and KK;
10. Standard D-704-27: for pavement marking; and
11. Standard D-704-56: for installation of rumble strips.

Place flaggers and traffic control devices as shown on Standard D-704-15, layout A at the following intersections when the lane closure spans across them:

1. 8th Ave NE/ND HWY 8

704-P02 TRAFFIC CONTROL FOR REPAIR WORK: Perform subgrade repair on one half of the roadway while maintaining traffic on a single 12’ minimum width lane with pilot car and flagging operations on the adjacent half. Resume two-way traffic by the end of the working day or continue to maintain one lane traffic with pilot car and flagging operations. Payment will only be made for pilot car and flagging while the contractor is actively working in the repair area. Do not exceed 15-minute wait time in flagging zones. See Section 100 of the plans for additional traffic control details.

Remove bituminous surfacing, excavate material, install aggregate base to finished grade, and construct a 4:1 traversable wedge between the edge of existing pavement and top of aggregate base prior to resuming two-way traffic.

706-P01 BITUMINOUS LABORATORY: In the bituminous Laboratory, provide a LAN/Wireless laser printer capable of scanning and producing photocopies. Supply ink or toner for the duration of the project. Use a Window 10 compatible printer/drivers.

762-050 PAVEMENT MARKING: If the Engineer and Contractor agree, plan quantity will be used as the measurement for payment for pavement marking items.

762-200 PERMANENT WATER BASED PAVEMENT MARKING: Replace the first paragraph of 762.04 C.2.a “Method of Application” with the following:

Allow new bituminous treatment to cool to a temperature below 125 °F and cure for a period of 72 hours before applying permanent pavement marking.

762-P01 PAVEMENT MARKING: Barrier stripes will be located by the contractor’s surveyor prior to work commencing. New pavement markings will the placed based off of existing locations.

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ENVIRONMENTAL NOTES

ENVIRONMENTAL NOTES (EN): The North Dakota Department of Transportation have made environmental commitments to secure approval of this project. The following environmental notes are requirements to comply with these commitments:

EN-1 SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN: The Contractor will comply with the EPA SPCC Rule and complete an SPCC Plan if oil of any kind or in any form is stored on site in capacities that trigger compliance with SPCC regulations (i.e., cumulative above ground storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons).

EN-2 AVOIDANCE OF WETLANDS AND OTHER WATERS: Known wetlands and other waters, and permanent impacts to these resources are incorporated into the plans for this project. Avoid all wetlands and other waters (i.e., do not fill, excavate or work within permanent or temporary), except where impacts are incorporated into the plans for this project.

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Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline: Funding A				TOTAL
103	0100	CONTRACT BOND	L SUM	1				1
202	0135	REMOVAL OF BITUMINOUS SURFACING	TON	3218				3218
203	0138	COMMON EXCAVATION-SUBCUT	CY	5766				5766
203	0140	BORROW-EXCAVATION	CY	14448				14448
203	0218	GUARDRAIL EMBANKMENT	EA	13				13
216	0100	WATER	M GAL	468				468
230	0125	SHOULDER PREPARATION	MILE	51.2				51.2
251	0200	SEEDING CLASS II	ACRE	27.1				27.1
251	2000	TEMPORARY COVER CROP	ACRE	27.1				27.1
253	0101	STRAW MULCH	ACRE	27.1				27.1
256	0200	RIPRAP GRADE II	CY	171				171
260	0200	SILT FENCE SUPPORTED	LF	80				80
260	0201	REMOVE SILT FENCE SUPPORTED	LF	80				80
261	0112	FIBER ROLLS 12IN	LF	1260				1260
261	0113	REMOVE FIBER ROLLS 12IN	LF	1260				1260
302	0120	AGGREGATE BASE COURSE CL 5	TON	11787				11787
401	0050	TACK COAT	GAL	24686				24686
401	0060	PRIME COAT	GAL	6120				6120
401	0070	FOG SEAL	GAL	42115				42115
401	0160	BLOTTER MATERIAL CL 44	TON	105				105
411	0105	MILLING PAVEMENT SURFACE	SY	2800				2800
430	0043	SUPERPAVE FAA 43	TON	76133				76133
430	1000	CORED SAMPLE	EA	366				366
430	5803	PG 58S-28 ASPHALT CEMENT	TON	4569				4569
550	2040	PORTLAND CEMENT	TON	351				351
702	0100	MOBILIZATION	L SUM	1				1
704	0100	FLAGGING	MHR	2800				2800
704	1000	TRAFFIC CONTROL SIGNS	UNIT	5057				5057
704	1048	PORTABLE RUMBLE STRIPS	EA	6				6
704	1060	DELINEATOR DRUMS	EA	40				40
704	1067	TUBULAR MARKERS	EA	408				408
704	1185	PILOT CAR	HR	1250				1250
706	0550	BITUMINOUS LABORATORY	EA	1				1
706	0600	CONTRACTOR'S LABORATORY	EA	1				1
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	19982				19982
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	220				220
714	3990	SPPA CULVERT LINER	LF	85				85
714	4099	PIPE CONDUIT 18IN-APPROACH	LF	1994				1994
714	4106	PIPE CONDUIT 24IN-APPROACH	LF	558				558
714	4113	PIPE CONDUIT 30IN-APPROACH	LF	156				156
714	4116	PIPE CONDUIT 36IN-APPROACH	LF	38				38
714	6500	END SECT METAL 18IN	EA	8				8
714	6501	END SECT-TRAVERSABLE METAL 18IN	EA	82				82
714	6505	END SECT METAL 24IN	EA	16				16
714	6506	END SECT-TRAVERSABLE METAL 24IN	EA	12				12
714	6510	END SECT METAL 30IN	EA	4				4
714	6515	END SECT METAL 36IN	EA	4				4

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Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline: Funding A				TOTAL
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	53				53
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	73				73
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	229				229
760	0005	RUMBLE STRIPS - ASPHALT SHOULDER	MILE	51.2				51.2
760	0007	RUMBLE STRIPS - ASPHALT CENTERLINE	MILE	25.6				25.6
760	0010	RUMBLE STRIPS - INTERSECTION	SET	2				2
762	0103	PVMT MK PAINTED-MESSAGE	SF	52				52
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	300700				300700
762	1104	PVMT MK PAINTED 4IN LINE	LF	346535				346535
762	1108	PVMT MK PAINTED 8IN LINE	LF	260				260
762	1124	PVMT MK PAINTED 24IN LINE	LF	24				24
764	0118	BOX BEAM GUARDRAIL	LF	3600				3600
764	0146	BOX BEAM END TERMINAL	EA	26				26
764	2020	REMOVE 3-CABLE GUARDRAIL & POSTS	LF	3070				3070
764	2080	REMOVE BOX BEAM GUARDRAIL	LF	598				598
766	0100	MAILBOX-ALL TYPES	EA	7				7
900	1000	TEMPORARY STREAM DIVERSION	EA	1				1
910	0900	GROUT	CF	2425				2425
930	9671	BOX CULVERT JOINT REPAIR	EA	8				8
950	9722	ASPHALT EMULSION	TON	2132				2132
950	9760	COLD IN-PLACE RECYCLED ASPHALT PAVEMENT	SY	421147				421147

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BASIS OF ESTIMATE

Description	Unit	STA 640+41.97 to 1198+56.48/RP 12.119 to 37.816 STA 1200+95.04 to 1995+50.89/RP 22.748 to RP 37.816			Paving Around Guardrails	Subcut Quantities (See Section 20 Sheet 5)	Additional Quantities (See Section 20 Sheet 1)	Total
		Width/Area	Quantity/Mile	Subtotal	Subtotal	Subtotal	Subtotal	
MILLING PAVEMENT SURFACE	SY	28.0’		2,800	-	-	-	2,800
COLD IN-PLACE RECYCLED ASPHALT PAVEMENT	SY	28.0’	16,427	421,147	-	-	-	421,147
FOG SEAL @ 0.1 Gal/SY	Gal	28.0’	1,643	42,115	-	-	-	42,115
PRIME COAT @ 0.35 Gal/SY	Gal	-	-	-	-	6,120	-	6,120
TACK COAT @ 0.05 Gal/SY	Gal	30.8’	904	23,177	-	874	635	24,686
SUPERPAVE FAA 43 @ 2 Ton/CY	Ton	7.35 SF	2,695	69,094	348	5,100	1,591	76,133
PG 58S-28 ASPHALT CEMENT @ 6.0%	Ton	-	162	4,146	21	306	96	4,569
AGGREGATE BASE COURSE CL 5 @ 1.875 Ton/CY	Ton	-	-	-	976	10,811	-	11,787
PORTLAND CEMENT (0.5% Weight of RAP)	Ton	-	13.7	351	-	-	-	351

Seeding

Location - Type	Basis	Quantity
Seeding CL 2	Approach Foreslope Reconstruction 0.2 ACRE/approach Guardrail Embankment 0.25 ACRE/location	27.1 ACRE
Temporary Cover Crop	Approach Foreslope Reconstruction 0.2 ACRE/approach Guardrail Embankment 0.25 ACRE/location	27.1 ACRE

Erosion Control

Location - Type	Basis	Quantity
Fiber Rolls 12IN	20 LF/Inlet Culvert	1,240 LF
Straw Mulch	Approach Foreslope Reconstruction 0.2 ACRE/approach Guardrail Embankment 0.25 ACRE/location	27.1 ACRE

Asphalt Emulsion for Cold In-Place Recycle (CSS-1h)

Length	Basis	Quantity
24.638 Miles	3” Thickness @ 3% Application Rate	2,023.6 Tons
1.000 Miles	4” Thickness @ 3% Application Rate	108.4 Tons
	Total	2,132.0 Tons

HMA Cored Samples

Specification Section	A Distance (Ft)/2000	B Lanes	B Joints	C Lifts	Quantity (A x B x C)	Quantity (1 per mile)	Unit
430.04 I.2.b(1), "General"	68	2	N/A	2	272	N/A	EA
SSP 4 Longitudinal Joint Density in HMA Pavements (Centerline)	68	N/A	1	1	68	N/A	EA
430.04 I.2.b(2),”Pavement Thickness Determination Cores"					N/A	26	EA
				Total	340	26	EA

Rumble Strips

Location	Quantity	
Centerline	25.6 MILE	-
Shoulder	51.2 MILE	-
Intersection	-	2 SET
Total	76.8 MILE	2 SET

Materials

Material Description	Material Use	Rate
Water	Aggregates	20 Gal/Ton
	Embankment	10 Gal/CY
	Dust Palliative	25MGal/Mile
	Subgrade Preparation	25 MGal/Mile
Aggregate Base Course CL 5	Base	1.875 Ton/CY
MC70 or 250 Liquid Asphalt	Prime Coat	0.35 Gal/SY
Blotter Material CL 44	Prime Coat	15 lbs/SY
SS-1h or CSS-1h or MS1 Emulsified Asphalt	Tack Coat	0.05 Gal/SY
Superpave FAA 43	Surfacing	2 Ton/CY
PG 58S-28 Asphalt Cement	Surfacing	6.0% of HMA
Cold In-Place Recycle	Portland Cement CSS-1h	0.5% of RAP 3.0% of RAP

MAILBOX-ALL TYPES

Station / RP	Type	Work
800+97 / 15.175 – LT	Single	Replace
800+97 / 15.175 – LT	Single	Replace
913+61 / 17.302 – RT	Single	Replace
1288+11 / 24.398 – RT	Single	Replace
1338+61 / 25.353 – RT	Single	Replace
1491+54 / 28.252 – LT	Single	Replace
1843+12 / 34.911 – RT	Single	Replace

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BASIS OF ESTIMATE

Permanent Pavement Marking		
Location - Type	Basis	Quantity
Centerline – PVMT MK PAINTED 4IN LINE	Centerline Skips 1,320 LF/mile	33,840 LF
Barrier Stripe – PVMT MK PAINTED 4IN LINE	Measured	41,335 LF
Edge Lines – PVMT MK PAINTED 4IN LINE	10,560 LF/mile	271,360 LF
Hatch Lines – PVMT MK PAINTED 8IN LINE	Begin Project & End Project 130 LF/Intersection	260 LF
Stop Bars – PVMT MK PAINTED 24IN LINE	Begin Project & End Project 12 LF/Intersection	24 LF
“STOP AHEAD” – PVMT MK PAINTED-MESSAGE	Begin Project	52 SF

Temporary Pavement Marking		
Location - Type	Basis	Quantity
Centerline – SHORT TERM 4IN LINE-TYPE NR (CIR)	Centerline Skips 1,320 LF/mile Barrier Stripe 1,612 LF/mile	75,175 LF
Centerline – SHORT TERM 4IN LINE-TYPE NR (1st Lift)	Centerline Skips 1,320 LF/mile Barrier Stripe 1,612 LF/mile	75,175 LF
Centerline – SHORT TERM 4IN LINE-TYPE NR (Top Lift)	Centerline Skips 1,320 LF/mile Barrier Stripe 1,612 LF/mile	75,175 LF
Centerline – SHORT TERM 4IN LINE-TYPE NR (Rumble Strips)	Centerline Skips 1,320 LF/mile Barrier Stripe 1,612 LF/mile	75,175 LF
	Total	300,700 LF

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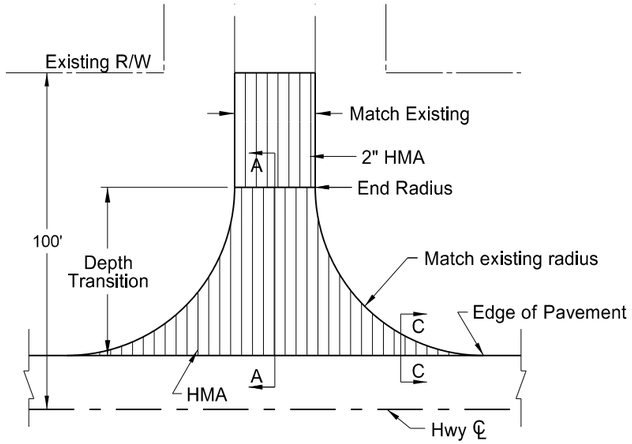
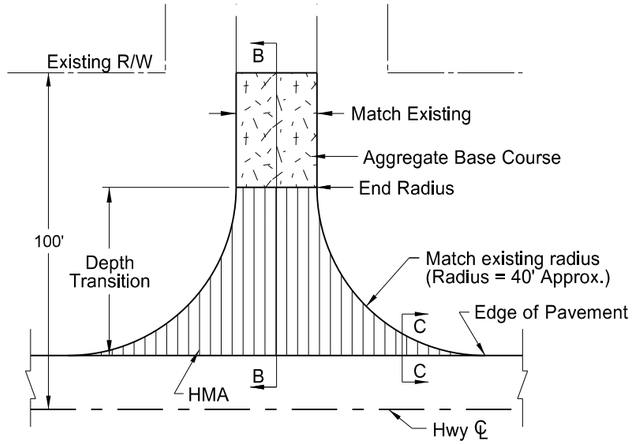


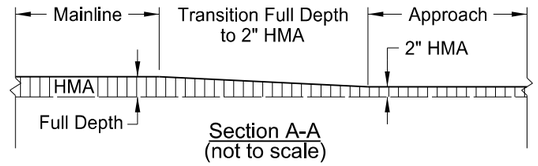
(1) Paved Section Line, County Road, or Street Approach



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

Notes:

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



Section A-A
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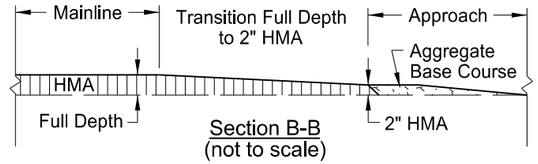

Section B-B
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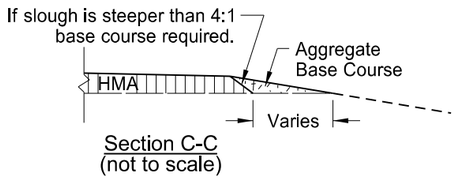

Section C-C
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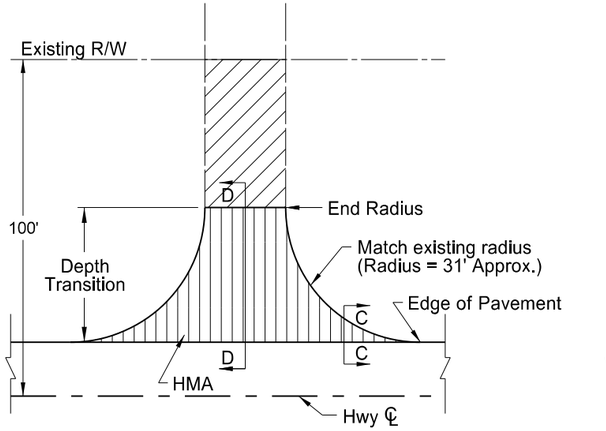
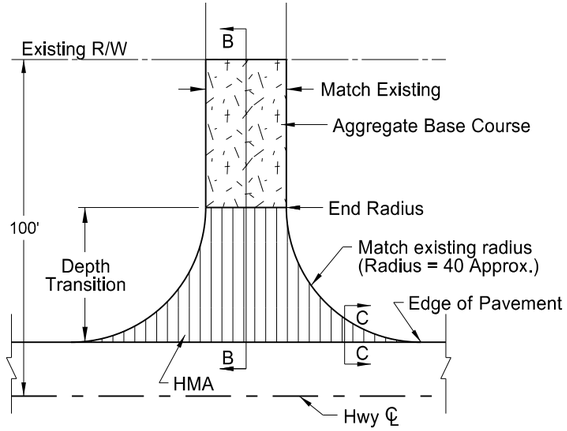
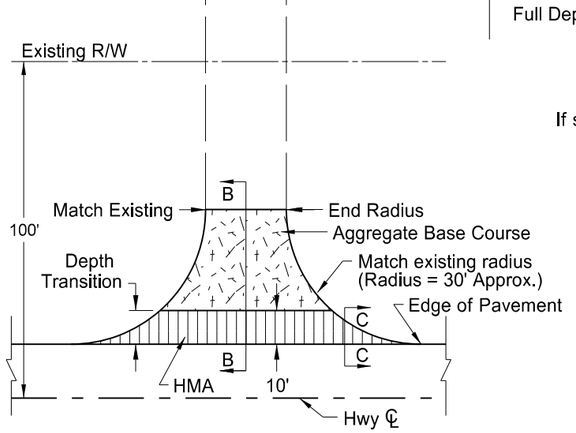


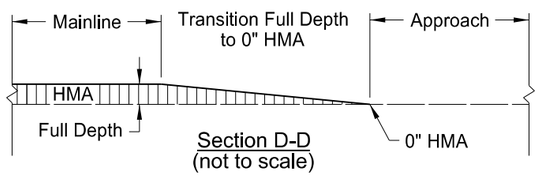
(3) Paved Private Drive Approach



(4) Gravel Private Drive Approach



(5) Field Drive Approach



Section D-D
(not to scale)

BASIS OF ESTIMATE		(1)	(2)	(3)	(4)	(5)	
ITEM	UNIT	Paved Section Line	Gravel Section Line	Paved Private Drive	Gravel Private Drive	Field Drive	TOTALS
Number of Locations	#	-	41	1	11	75	128
Tack Coat	GAL	-	8	5	7	3	635
Superpave FAA 43	TON	-	19	14	18	8	1,591
PG 58S-28 Asphalt Cement	TON	-	1.1	0.9	1.1	0.5	95.6

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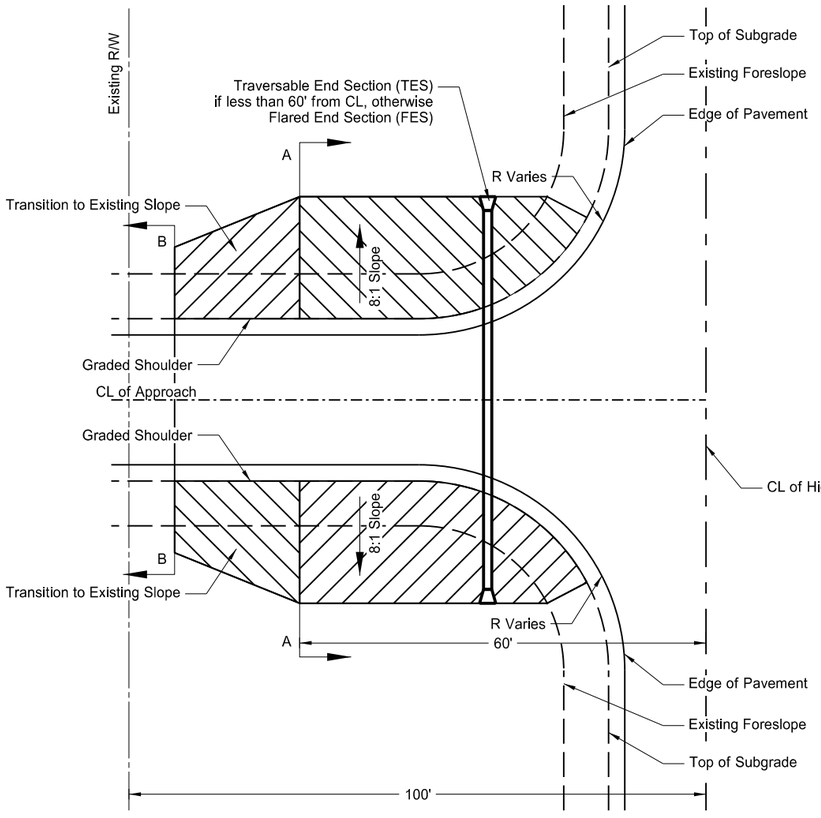
ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

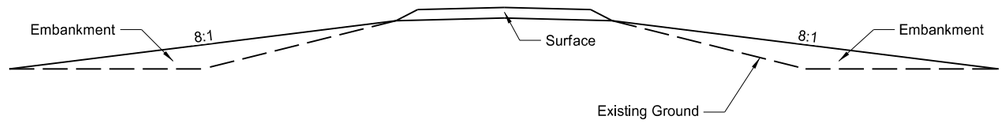
General Details

Approach Paving Details for Existing Rural Approaches

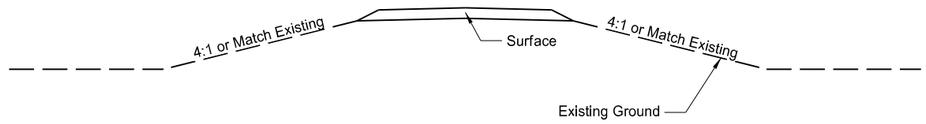
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	20	2



PLAN VIEW APPROACH



SECTION A-A
(TYPICAL)



SECTION B-B
(TYPICAL)

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ND 8 Cold In-Place Recycle

With Overlay and Structure repair

General Details

Approach Inslope Detail

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	20	3

(2) Gravel Section Line, County Road, or Street Approach			
Approach Foreslope Reconstruction (BORROW EXCAVATION)*			
Station / RP	Quantity (CY)	Station / RP	Quantity (CY)
694+19/13.145 LT	61	1332+97/25.247 LT	16
696+93/13.175 RT	103	1332+97/25.247 RT	109
748+18/14.166 LT	71	1491+65/28.254 LT	663
748+18/14.166 RT	55	1491+65/28.254 RT	1,125
801+20/15.177 LT	44	1544+41/29.254 LT	61
801+20/15.177 RT	55	1544+41/29.254 RT	242
853+87/16.174 LT	133	1597+36/30.257 LT	112
853+87/16.174 RT	79	1597+36/30.257 RT	98
906+71/17.173 LT	123	1650+33/30.849 LT	138
906+71/17.173 RT	89	1650+61/31.264 RT	37
959+60/18.170 LT	190	1673+77/31.706 LT	215
959+60/18.170 RT	205	1674+35/31.717 RT	124
1013+88/19.199 LT	59	1732+16/32.811 LT	336
1013+88/19.199 RT	98	1732+16/32.811 RT	154
1066+74/20.202 LT	103	1785+10/33.813 LT	183
1066+7420.202 RT	39	1785+10/33.813 RT	174
1172+58/22.207 LT	197	1837+96/34.813 LT	184
1172+58/22.207 RT	77	1890+87/35.816 LT	52
1225+98/23.222 LT	221	1890+87/35.816 RT	222
1225+98/23.222 RT	204	1943+76/36.818 LT	61
1280+12/24.246 LT	66		
		Total	6,578

(3) Paved Private Drive Approach			
Approach Foreslope Reconstruction (BORROW EXCAVATION)*			
Station / RP	Quantity (CY)	Station / RP	Quantity (CY)
1175+54/22.260 RT	146		
		Total	146

(4) Gravel Private Drive Approach			
Approach Foreslope Reconstruction (BORROW EXCAVATION)*			
Station / RP	Quantity (CY)	Station / RP	Quantity (CY)
805+31/15.281 RT	189	1309+70/24.807 RT	89
913+54/17.319 LT	35	1338+75/25.356 LT	30
992+87/18.806 RT	224	1385+80/26.251 LT	43
1040+51/19.704 RT	40	1385+80/26.251 RT	85
1106+03/20.957 LT	253	1837+96/34.813 RT	54
1288+22/24.400 RT	236		
		Total	1,278

(5) Field Drive Approach					
Approach Foreslope Reconstruction (BORROW EXCAVATION)*					
Station / RP	Quantity (CY)	Station / RP	Quantity (CY)	Station / RP	Quantity (CY)
667+06/12.629 LT	45	1194+31/22.614 LT	114	1600+87/30.324 LT	177
671+16/12.706 RT	75	1203+10/22.802 RT	56	1600+87/30.324 RT	77
673+27/12.748 RT	75	1209+76/22.928 LT	131	1628+41/30.845 LT	66
735+84/13.953 RT	42	1253+54/23.740 LT	156	1628+41/30.845 RT	126
764+07/14.488 RT	38	1253+54/23.740 RT	56	1718+70/32.555 LT	87
774+77/14.672 LT	38	1280+12/24.246 RT	51	1718+70/32.555 RT	122
805+26/15.281 LT	117	1306+65/24.749 LT	127	1758+90/33.318 LT	10
827+18/15.674 RT	57	1306+65/24.749 RT	65	1758+90/33.318 RT	95
846+68/16.039 RT	4	1341+06/25.401 LT	207	1796+62/34.030 LT	104
893+44/16.944 LT	81	1341+06/25.401 RT	158	1796+62/34.030 RT	104
913+54/17.319 RT	45	1345+81/25.492 RT	60	1806+61/34.220 LT	85
946+00/17.913 RT	95	1372+15/25.990 LT	118	1806+61/34.220 RT	113
953+40/18.056 LT	105	1399+47/26.510 LT	111	1829+64/34.655 LT	121
953+40/18.056 RT	86	1399+47/26.510 RT	39	1843+24/34.913 LT	60
974+23/18.456 RT	99	1438+84/27.253 LT	170	1843+24/34.913 RT	71
998+44/18.917 LT	0	1438+84/27.253 RT	172	1867+64/35.375 LT	72
1027+11/19.450 LT	118	1451+98/27.501 LT	34	1917+23/36.316 LT	45
1092+90/20.701 LT	86	1451+98/27.501 RT	102	1917+23/36.316 RT	75
1092+90/20.701 RT	44	1465+47/27.757 LT	181	1922+67/36.418 RT	132
1118+31/21.170 RT	200	1465+47/27.757 RT	65	1943+76/36.818 RT	109
1119+87/21.208 LT	96	1498+18/28.379 LT	20	1953+64/37.006 LT	119
1132+32/21.444 LT	105	1503+26/28.475 RT	16	1953+64/37.006 RT	68
1139+81/21.586 RT	82	1518+30/28.761 LT	39	1971+99/37.353 LT	47
1184+53/22.434 LT	84	1518+30/28.761 RT	101	1971+99/37.353 RT	36
1184+53/22.434 RT	18	1568+48/29.708 LT	111	1991+69/37.726 RT	30
				Total	6,446

Approach Foreslope Reconstruction (BORROW EXCAVATION)*	
Approach Type	Total (CY)
2	6,578
3	146
4	1,278
5	6,446
Total	14,448

* See Note 203-P01

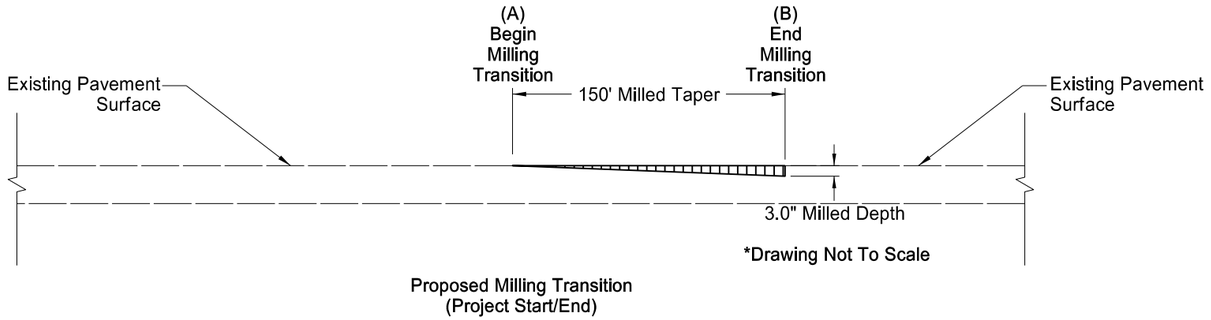
ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

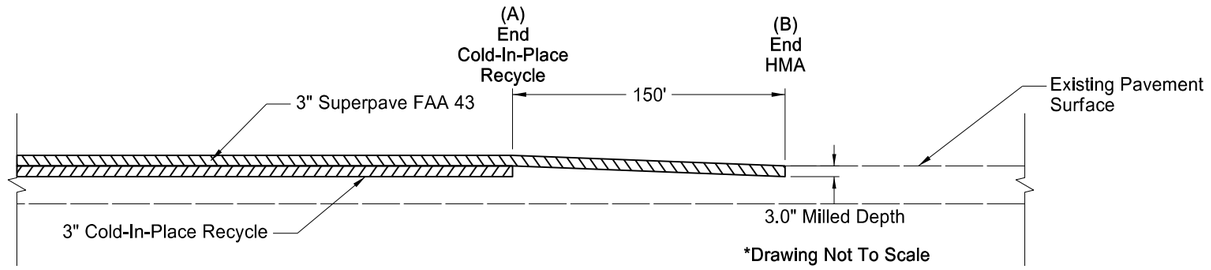
General Details

Approach Table

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	20	4

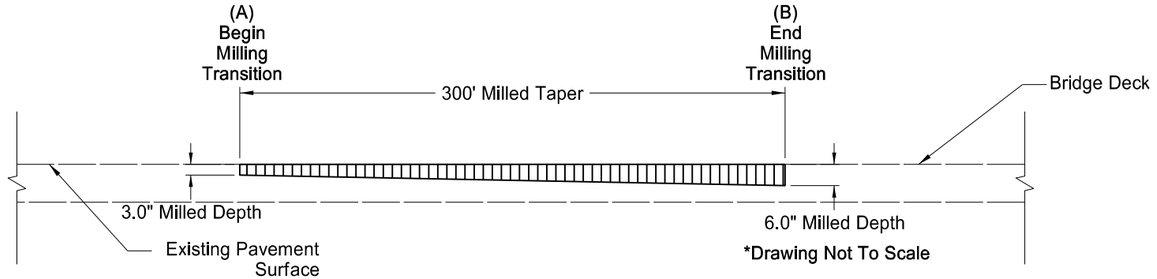


Proposed Milling Transition
(Project Start/End)

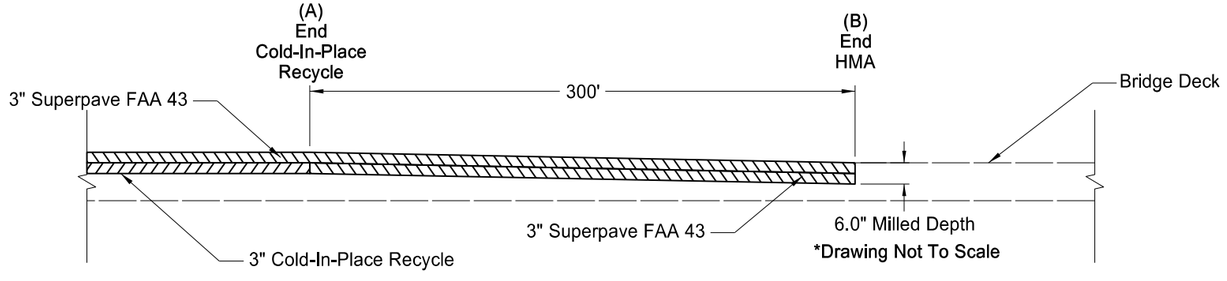


Proposed Pavement Transition
(Project Start/End)

LOCATION	A	B
Start of Project	641+91.97	640+41.97
Bridge South End	1195+56.48	1198+56.48
Bridge North End	1203+95.04	1200+95.04
End of Project	1995+00.89	1996+50.89



Proposed Bridge Milling Transition



Proposed Bridge Pavement Transition

NOTES:
1. Mill the existing pavement and taper as shown. 25' for every 0.5 inches of HMA. Place a wearing course matching the roadway surface elevation at the bridge exception and the beginning & end of the project.
2. The same day that the 6" milling at the bridge ends takes place, pave 3" of HMA so that the maximum vertical discontinuity is 3". Place a temporary asphalt wedge at the locations with the 3" lip. See note 411-P01.

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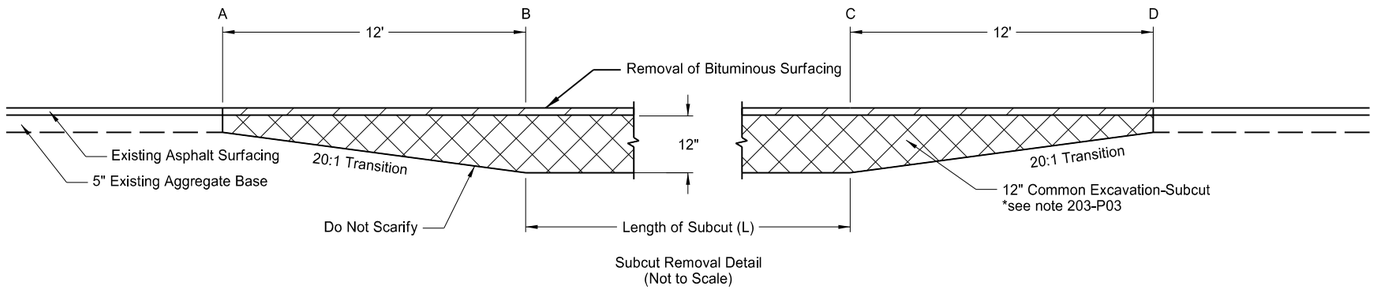
ND 8 Cold In-Place Recycle

With Overlay and Structure repair

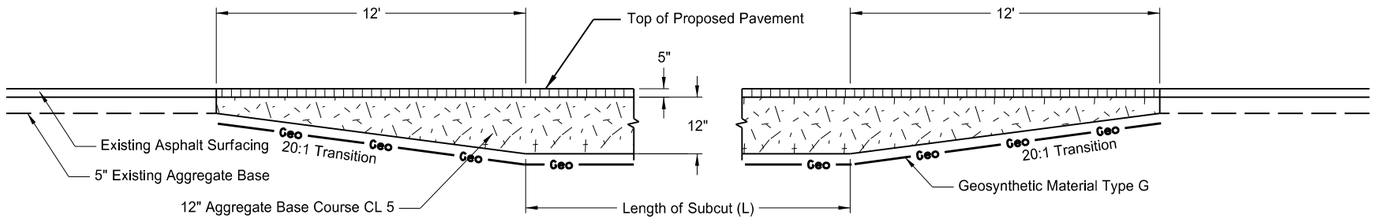
General Details

Milled Taper

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	20	5



Subcut Removal Detail
(Not to Scale)



Subcut Backfill Detail
(Not to Scale)

SPEC	CODE	BID ITEM	QTY	UNIT
202	0135	REMOVAL OF BITUMINOUS SURFACING		
		TOTAL	3,218	TON
203	0138	COMMON EXCAVATION-SUBCUT		
		TOTAL	5,766	CY
302	0120	AGGREGATE BASE COURSE CL 5		
		TOTAL	10,811	TON
401	0050	TACK COAT		
		TOTAL	874	GAL
401	0060	PRIME COAT		
		TOTAL	6,120	GAL
401	0160	BLOTTER MATERIAL CL 44		
		TOTAL	105	TON
430	0043	SUPERPAVE FAA 43		
		TOTAL	5,100	TON
430	5803	PG 58S-28 ASPHALT CEMENT		
		TOTAL	306	TON
709	0100	GEOSYNTHETIC MATERIAL TYPE G		
		TOTAL	19,982	SY

NOTE:
1. Do not place HMA until the Cold In-Place Recycle work has passed the subcut area.

SUBGRADE REPARE LOCATION				LENGTH (L)	ASPHALT DEPTH *	REMOVAL OF BITUMINOUS SURFACING	COMMON EXCAVATION-SUBCUT	AGGREGATE BASE COURSE CL 5	TACK COAT	PRIME COAT	BLOTTER MATERIAL CL 44	SUPERPAVE FAA 43	PG 58S-28 ASPHALT CEMENT	GEOSYNTHETIC MATERIAL TYPE G
A	B	C	D	FT	IN	TON	CY	TON	GAL	GAL	TON	TON	TON	SY
697+08	697+20	707+20	707+32	1,000	8.5-9.5	586	1,049	1,968	159	1,115	19	929	56	3,641
781+23	781+35	801+35	801+47	2,000	8,5	1,159	2,087	3,912	315	2,204	38	1,837	110	7,196
929+18	929+30	939+30	939+42	1,000	6.5-9.0	586	1,049	1,968	159	1,115	19	929	56	3,641
1303+93	1304+05	1309+05	1309+17	500	8.5-9.0	300	531	996	82	571	10	475	29	1,863
1604+78	1604+90	1614+90	1615+02	1,000	8.0-11.0	586	1,049	1,968	159	1,115	19	929	56	3,641
TOTALS						3,218	5,766	10,811	874	6,120	105	5,100	306	19,982

* Asphalt depth based off coring logs from 10/27/2016, provided by NDDOT - Dickinson District

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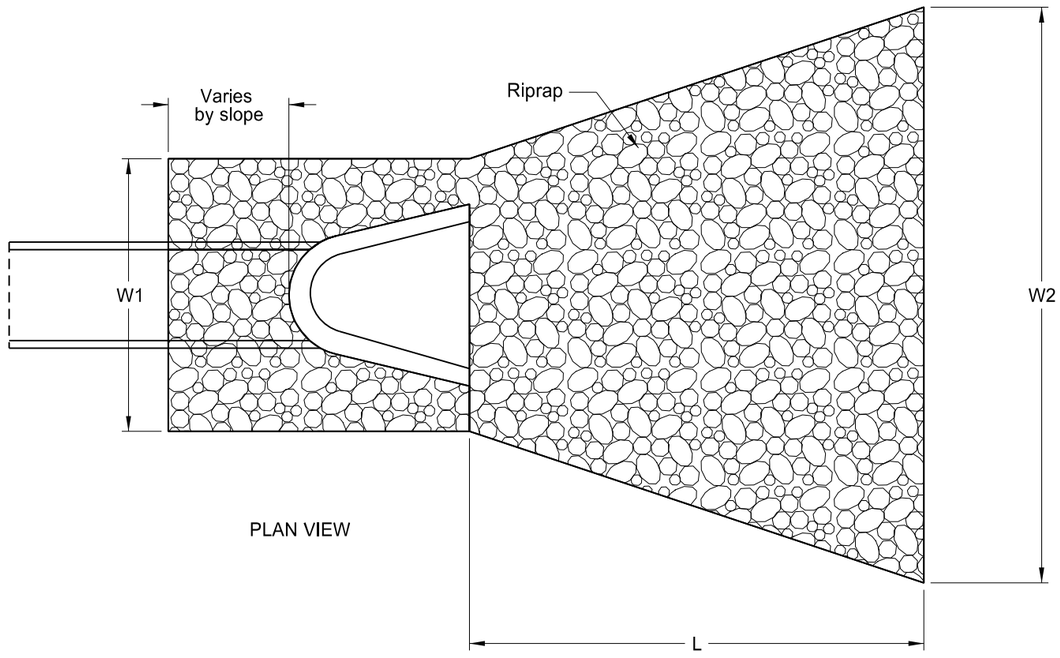
ND 8 Cold In-Place Recycle

With Overlay and Structure repair

General Details

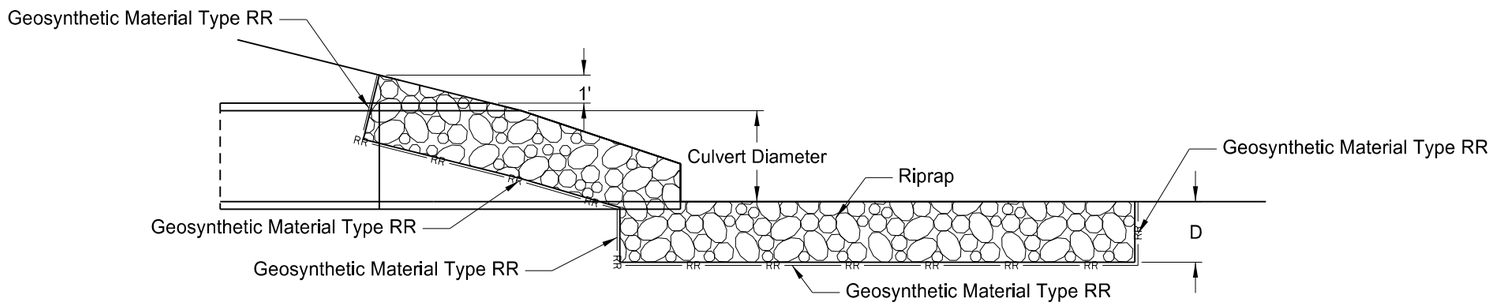
Subgrade Repair

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	20	6



PLAN VIEW

Dimensions							Quantities	
Location	Culvert Diameter (inches)	L (feet)	W1 (feet)	W2 (feet)	Riprap Depth, D (feet)	Riprap Grade	Geosynthetic Material Type RR (SY)	Riprap Grade II (CY)
1751+61 33.176	83"x57" SPPA	35	21	44	3.333	II	220	171
TOTAL							220	171



PROFILE VIEW

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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

General Details

Riprap at Pipe Outlets

23 U.S.C. 409
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	20	7

NOTES:

SCOPE OF WORK:
Work at this site includes removal of the culvert bracing and lining the existing structural plate pipe arch (SPPA) culvert with a new SPPA or Corrugated Steel Pipe - Arch (CSP-A) culvert. Concrete grout will be used to fill the void between culverts. The liner pipe will be a 83" x 57" Polymeric Coated Steel SPPA or CSP-A at the Contractor's option (2 2/3" x 1/2" Corrugations, 8 Gauge).

LINER PIPE:
Perform the "SPPA CULVERT LINER" work as follows: After the existing SPPA culvert has been de-watered, remove the existing bracing that is located inside the SPPA. This material will become property of the Contractor and disposed of off site. Do not remove culvert bracing until the liner pipe is assembled and ready to be installed.

Insert the liner pipe through the existing SPPA culvert. Position liner pipe to maintain a minimum clear of 1" at the buckled location and sloped to drain downstream. Brace the liner pipe against the existing SPPA so the new pipe will remain in-place during the grouting operation. Do not construct bracing that will impede the flow of grout between the pipes. Take necessary steps to counter the buoyancy of the liner pipe during the grouting process to assure the liner pipe does not "float". Clean all silt and debris out of the existing pipe before installing the liner pipe.

Include all costs for performing the SPPA culvert liner repair including equipment, labor, materials, site dewatering, removal of strut & and any incidentals in the price bid for the bid item "SPPA CULVERT LINER".

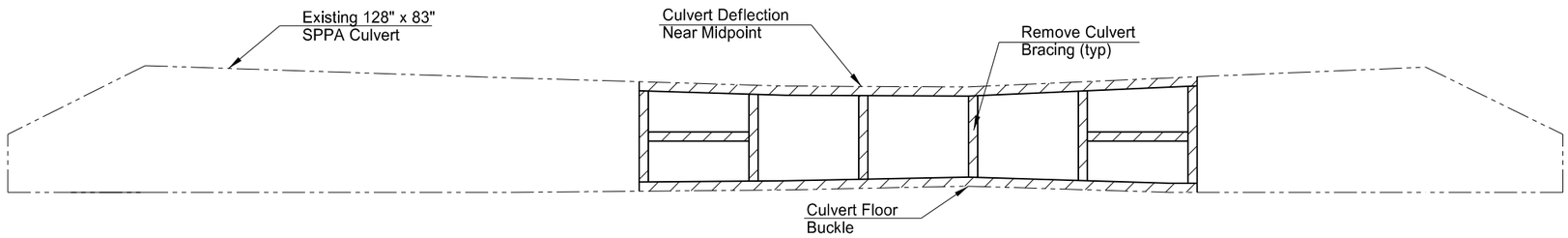
GROUT
Use the pressure grout method to fill the void between the existing SPPA and the liner pipe. Form the opening at the inlet and outlet ends of the pipe to provide a smooth, even surface between the liner and the existing SPPA.

Use a grout mixture of one-part cement and five parts fine aggregate, by volume, with 7 pounds of bentonite added for each sack of cement (based on a 200-barrel yield bentonite). Adjust the amount of bentonite added per scak of cement proportionally, if the yield of bentonite varies. Use the minimum slump necessary to facilitate placement. Use grout materials that meet the following requirements.

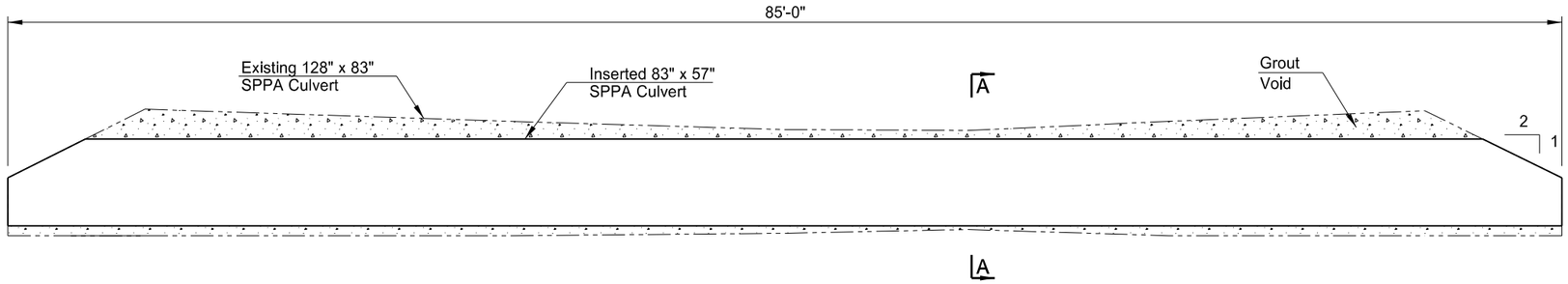
1. Cement as specified in Section 804 of the Standard Specifications.
2. Fine aggregate meeting the requirements of Subsection 802.01 C.3 of the Standard Specifications.
3. Commercially packaged bentonite.

Maintain grout injection pressure to fill the void without causing deformation of the liner. Include mixing and batching facilities, a pump specifically designed for pressure injection of grout, pipe, hose, and fixtures to convey the grout into the void in the grouting equipment. Calibrate all equipment before beginning work. Continually monitor grout pump pressures with a liquid-filled diaphragm in-line gauge.

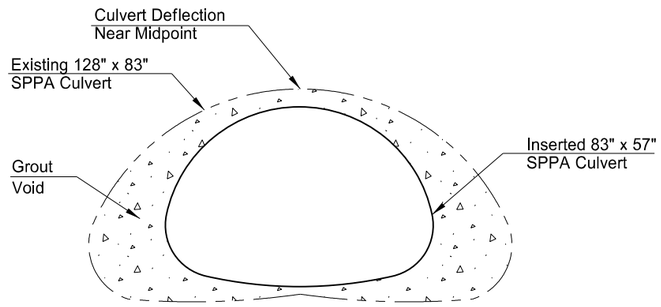
Include all costs of materials, equipment, and labor to pressure grout the void in the price bid for the bid item "GROUT".



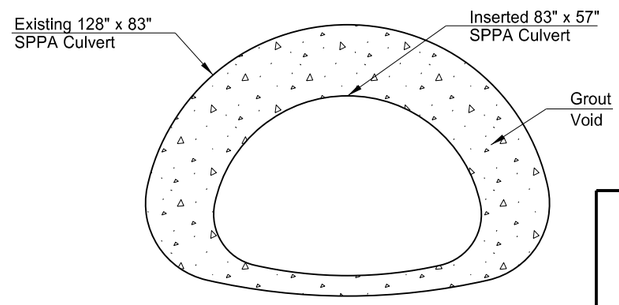
(Showing Removal)
ELEVATION



(Showing Liner Placement)
ELEVATION



SECTION A-A



END SECTION

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CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
714	3990	SPPA CULVERT LINER	LF	85
910	0900	GROUT	CF	2425

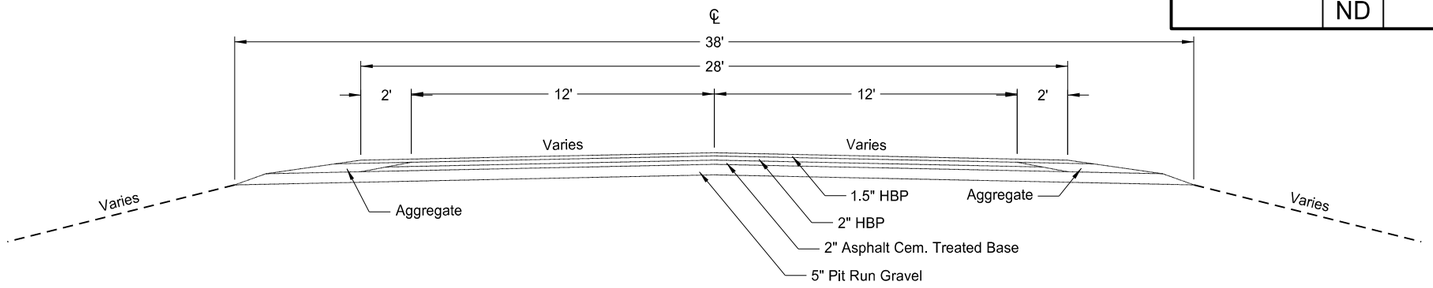
ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

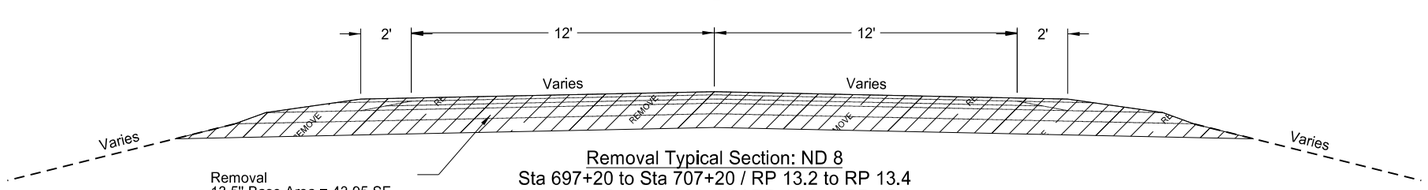
General Details

SPPA Pipe Liner

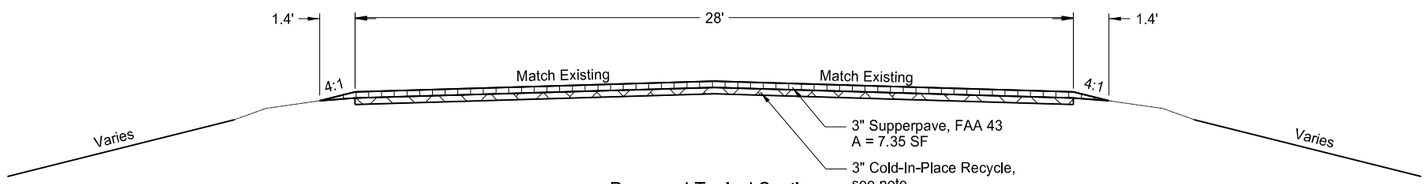
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	30	1



Existing Typical Section: ND 8
Sta 640+41.97 to Sta 1996+50.89 / RP 12.1 to RP 37.8

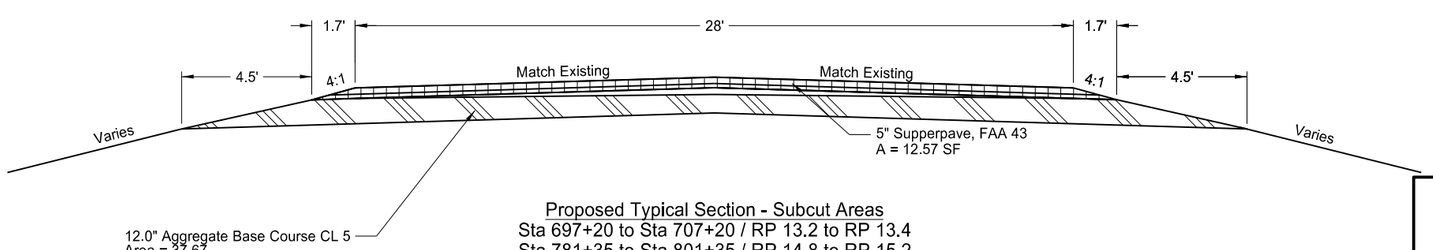


Removal Typical Section: ND 8
Sta 697+20 to Sta 707+20 / RP 13.2 to RP 13.4
Sta 781+35 to Sta 801+35 / RP 14.8 to RP 15.2
Sta 929+30 to Sta 939+30 / RP 17.6 to RP 17.8
Sta 1304+05 to Sta 1309+05 / RP 24.7 to RP 24.8
Sta 1604+90 to 1614+90 / RP 30.4 to RP 30.6



Proposed Typical Section
Sta 640+41.97 to Sta 697+20 / RP 12.1 to RP 13.2
Sta 707+20 to Sta 781+35 / RP 13.2 to RP 14.8
Sta 801+35 to Sta 929+30 / RP 15.2 to RP 17.6
Sta 939+30 to Sta 198+58.48 / RP 17.8 to RP 22.7
Sta 1200+95.04 to Sta 1304+05 / RP 22.7 to RP 24.7
Sta 1309+05 to Sta 1604+09 / RP 24.8 to RP 30.4
Sta 1614+90 to Sta 1996+50.89 / RP 30.6 to RP 37.8

NOTE:
1. Increase the depth of the Cold In-Place Recycle to 4" from Station 1108+80 to 1161+60 (RP 21 to RP 22)



Proposed Typical Section - Subcut Areas
Sta 697+20 to Sta 707+20 / RP 13.2 to RP 13.4
Sta 781+35 to Sta 801+35 / RP 14.8 to RP 15.2
Sta 929+30 to Sta 939+30 / RP 17.6 to RP 17.8
Sta 1304+05 to Sta 1309+05 / RP 24.7 to RP 24.8
Sta 1604+90 to 1614+90 / RP 30.4 to RP 30.6

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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Existing/Proposed Typical Sections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	50	1

HYDRAULIC DATA FOR NH-5-008(054)012 (A)

STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	25-YEAR DATA				100-YEAR DATA	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	100-YEAR DISCHARGE (CFS)	100-YEAR STAGE (NAVD 88)
Sta 1751+60	128"x83" SPPA	83"x57" (B)	2471.0	213.0	5.99	10.56	2581.79	339.7	2586.71

(A) Hydraulic data provided is for corrugated (Manning's n=0.024) type conduits.
(B) Centerline culvert at RP 33.176 is a culvert liner.

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Culvert Hydraulic Data

ND 8, JCT ND 12 to W JCT ND 21

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)			Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	(*) End Sections		Applicable Backfill
				In	Bid Item	LF		In	Type		In	Begin EA	End EA	
STA 666+76 RP 12.6	50 Lt	STA 667+35 RP 12.6	50 Lt	18	18IN Extension	26	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 670+77 RP 12.7	46 Rt	STA 671+56 RP 12.7	46 Rt	18	18IN Extension	42	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 696+54 RP 13.2	50 Rt	STA 697+33 RP 13.2	50 Rt	18	18IN Extension	42	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 763+80 RP 14.5	45 Rt	STA 764+35 RP 14.5	45 Rt	18	18IN Extension	24	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 774+50 RP 14.7	45 Lt	STA 775+03 RP 14.7	45 Lt	18	18IN Extension	22	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 800+86 RP 15.2	47 Lt	STA 801+53 RP 15.2	47 Lt	18	18IN Extension	26	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 800+85 RP 15.2	47 Rt	STA 801+51 RP 15.2	47 Rt	18	18IN Extension	26	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 853+45 RP 16.2	46 Lt	STA 854+30 RP 16.2	46 Lt	18	18IN Extension	44	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 853+47 RP 16.2	48 Rt	STA 854+26 RP 16.2	48 Rt	18	18IN Extension	38	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 893+07 RP 16.9	47 Lt	STA 893+81 RP 16.9	47 Lt	18	18IN Extension	38	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 906+25 RP 17.2	46 Lt	STA 907+18 RP 17.2	46 Lt	18	18IN Extension	52	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 906+73 RP 17.2	46 Rt	STA 907+13 RP 17.2	46 Rt	18	18IN Extension	44	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 913+17 RP 17.3	50 Lt	STA 913+89 RP 17.3	50 Lt	24	24IN Extension	20	Corrugated Steel Pipe	24	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 945+66 RP 17.9	51 Rt	STA 946+35 RP 17.9	51 Rt	18	18IN Extension	38	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 953+04 RP 18.1	44 Lt	STA 953+76 RP 18.1	44 Lt	18	18IN Extension	36	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 953+01 RP 18.1	47 Rt	STA 953+77 RP 18.1	47 Rt	18	18IN Extension	40	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 959+13 RP 18.2	54 Lt	STA 960+06 RP 18.2	54 Lt	18	18IN Extension	54	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 959+07 RP 18.2	49 Rt	STA 960+12 RP 18.2	49 Rt	18	18IN Extension	66	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 973+87 RP 18.5	55 Rt	STA 974+57 RP 18.5	55 Rt	18	18IN Extension	40	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 992+31 RP 18.8	50 Rt	STA 993+43 RP 18.8	50 Rt	18	18IN Extension	60	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1013+54 RP 19.2	62 Lt	STA 1014+22 RP 19.2	62 Lt	30	Pipe Conduit - Approach	68	Corrugated Steel Pipe	30	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
							Reinforced Concrete Pipe - Class III (Barrel Length = 66 LF)	30						
STA 1066+32 RP 20.2	61 Lt	STA 1067+16 RP 20.2	61 Lt	18	Pipe Conduit - Approach	84	Corrugated Steel Pipe	18	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
							Reinforced Concrete Pipe - Class III (Barrel Length = 78 LF)	18						
STA 1092+50 RP 20.7	50 Lt	STA 1093+30 RP 20.7	50 Lt	18	18IN Extension	44	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1092+60 RP 20.7	49 Rt	STA 1093+21 RP 20.7	49 Rt	18	18IN Extension	28	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1105+55 RP 21.0	55 Lt	STA 1106+54 RP 21.0	55 Lt	18	18IN Extension	64	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1117+87 RP 21.2	50 Rt	STA 1118+76 RP 21.2	50 Rt	18	18IN Extension	52	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1119+49 RP 21.2	34 Lt	STA 1120+26 RP 21.2	34 Lt	18	18IN Extension	36	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1131+97 RP 21.4	46 Lt	STA 1132+68 RP 21.4	46 Lt	18	18IN Extension	40	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1139+46 RP 21.6	61 Rt	STA 1140+18 RP 21.6	61 Rt	18	Pipe Conduit - Approach	72	Corrugated Steel Pipe	18	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
							Reinforced Concrete Pipe - Class III (Barrel Length = 66 LF)	18						
STA 1184+16 RP 22.4	53 Lt	STA 1184+87 RP 22.4	53 Lt	18	18IN Extension	34	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1184+28 RP 22.4	51 Rt	STA 1184+79 RP 22.4	51 Rt	18	18IN Extension	12	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1209+36 RP 22.9	56 Lt	STA 1210+16 RP 22.9	56 Lt	24	24IN Extension	38	Corrugated Steel Pipe	24	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1225+51 RP 23.2	48 Lt	STA 1226+44 RP 23.2	48 Lt	24	24IN Extension	58	Corrugated Steel Pipe	24	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1225+53 RP 23.2	51 Rt	STA 122+42 RP 23.2	51 Rt	24	24IN Extension	54	Corrugated Steel Pipe	24	Z, A, P	2	0.064	TES	TES	Specification 714.04 A

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

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

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

(*) The price bid for "Pipe Conduit" bid items includes end sections. Pipe Extensions shall pay for end sections separately.
FES = Flared End Section
TES = Traversable End Section

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	51	1

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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Allowable Pipe List

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)			Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	(*) End Sections		Applicable Backfill
				In	Bid Item	LF		In	Type		In	Begin EA	End EA	
STA 1253+14 RP 23.7	46 Lt	STA 1253+95 RP 23.7	46 Lt	18	18IN Extension	48	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1253+20 RP 23.7	46 Rt	STA 1253+87 RP 23.7	46 Rt	18	18IN Extension	34	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1287+78 RP 24.38	62 Rt	STA 1288+66 RP 24.38	62 Rt	30	Pipe Conduit - Approach	88	Corrugated Steel Pipe	30	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
							Reinforced Concrete Pipe - Class III (Barrel Length = 86 LF)	30						
STA 1306+25 RP 24.7	46 Lt	STA 1307+06 RP 24.7	46 Lt	18	18IN Extension	48	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1306+35 RP 24.7	46 Rt	STA 1306+95 RP 24.7	46 Rt	18	18IN Extension	28	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1309+33 RP 24.79	61 Rt	STA 1310+07 RP 24.79	61 Rt	18	Pipe Conduit - Approach	74	Corrugated Steel Pipe	18	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
							Reinforced Concrete Pipe - Class III (Barrel Length = 68 LF)	18						
STA 1340+58 RP 25.4	49 Lt	STA 1341+53 RP 25.4	49 Lt	18	18IN Extension	60	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1340+62 RP 25.4	49 Rt	STA 1341+50 RP 25.4	49 Rt	18	18IN Extension	54	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1371+74 RP 26.0	44 Lt	STA 1372+58 RP 26.0	44 Lt	18	18IN Extension	44	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1428+44 RP 27.3	61 Lt	STA 1429+22 RP 27.3	61 Lt	36	36IN Extension	38	Corrugated Steel Pipe	36	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1428+37 RP 27.3	64 Rt	STA 1429+31 RP 27.3	64 Rt	24	24IN Extension	46	Corrugated Steel Pipe	24	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1543+74 RP 29.3	65 Rt	STA 1545+07 RP 29.3	65 Rt	24	24IN Extension	40	Corrugated Steel Pipe	24	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1596+94 RP 30.3	52 Lt	STA 1597+77 RP 30.3	52 Lt	18	18IN Extension	34	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1600+41 RP 30.3	50 Lt	STA 1601+33 RP 30.3	50 Lt	18	18IN Extension	48	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1649+87 RP 30.8	54 Lt	STA 1650+79 RP 30.8	54 Lt	18	18IN Extension	48	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1673+31 RP 31.7	70 Lt	STA 1674+22 RP 31.7	70 Lt	24	24IN Extension	50	Corrugated Steel Pipe	24	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1673+98 RP 31.7	72 Rt	STA 1674+75 RP 31.7	72 Rt	24	24IN Extension	36	Corrugated Steel Pipe	24	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1731+55 RP 32.8	62 Lt	STA 1732+77 RP 32.8	62 Lt	18	18IN Extension	74	Corrugated Steel Pipe	18	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1751+61 RP 33.2	42 Lt	STA 1751+61 RP 33.2	43 Rt	83 x 57	83IN x 57IN Culvert Liner	85	Corrugated Steel Pipe	83 x 57	P	2 2/3 x 1/2	0.128	N/A	N/A	Section 20 Sheet 7
							Structural Plate Pipe Arch	83 x 57	P	2 2/3 x 1/2	0.128			
STA 1758+58 RP 33.3	75 Rt	STA 1759+23 RP 33.3	75 Rt	24	24IN Extension	32	Corrugated Steel Pipe	24	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1784+67 RP 33.8	53 Lt	STA 1785+53 RP 33.8	53 Lt	36	36IN Extension	46	Corrugated Steel Pipe	36	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1784+67 RP 33.8	53 Rt	STA 1785+54 RP 33.8	53 Rt	24	24IN Extension	44	Corrugated Steel Pipe	24	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1796+21 RP 34.0	51 Lt	STA 1797+04 RP 34.0	51 Lt	18	18IN Extension	42	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1796+19 RP 34.0	51 Rt	STA 1797+04 RP 34.0	51 Rt	18	18IN Extension	44	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1837+60 RP 34.81	61 Rt	STA 1838+34 RP 34.81	61 Rt	24	Pipe Conduit - Approach	74	Corrugated Steel Pipe	24	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
							Reinforced Concrete Pipe - Class III (Barrel Length = 70 LF)	24						
STA 1842+96 RP 34.9	77 Lt	STA 1843+51 RP 34.9	77 Lt	24	24IN Extension	18	Corrugated Steel Pipe	24	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1867+35 RP 35.4	64 Lt	STA 1867+94 RP 35.4	64 Lt	24	24IN Extension	24	Corrugated Steel Pipe	24	Z, A, P	2	0.064	FES	FES	Specification 714.04 A
STA 1890+51 RP 35.8	50 Lt	STA 1891+22 RP 35.8	50 Lt	24	24IN Extension	24	Corrugated Steel Pipe	24	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1890+33 RP 35.8	48 Rt	STA 1891+36 RP 35.8	48 Rt	18	18IN Extension	52	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A
STA 1943+32 RP 36.8	48 Rt	STA 1944+17 RP 36.8	48 Rt	18	18IN Extension	38	Corrugated Steel Pipe	18	Z, A, P	2	0.064	TES	TES	Specification 714.04 A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	51	2

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A = Aluminum
P = Polymeric (over Zinc or Aluminum)

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

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

(*) The price bid for "Pipe Conduit" bid items includes end sections. Pipe Extensions shall pay for end sections separately.
FES = Flared End Section
TES = Traversable End Section

ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Allowable Pipe List

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	75	1

Wetland Impact Table

Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impacts Acre(s)			Wetland Mitigation			
								Mitigation Required		11990 Bank	
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	EO 11990	USACE	Location	Acre(s)
12a	Sec 26, T133N, R94W	Riverine	Natural	Y	0.014	0.019	–	0.019	–	Vollrath 15/21	0.019
12b	Sec 27, T133N, R94W	Riverine	Natural	Y	0.098	–	–	–	–	–	–
12c	Sec 27, T133N, R94W	Riverine	Natural	Y	–	–	–	–	–	–	–
				Totals	**0.112**	**0.019**	–				**0.019**

[1] A wetland Jurisdictional Determination was issued by the USACE on March 4, 2020; NWO-2020-00170-BIS.

Impact Summary Table

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD (Fill/Drain)	0.019	Temporary JD	0.112
Natural/Non-JD (Fill/Drain)	–	Non-JD Temporary	–
Artificial/JD (Fill/Drain)	–	Permanent JD > 0.10	–
Artificial /Non-JD (Fill/Drain))	–	Permanent OW	–
Total	0.019	Temporary OW	–
JD Natural (Cut)	–		
JD Artificial (Cut)	–		
Non-JD Natural (Cut)	–		
Non-JD Artificial (Cut)	–		
Total	0.00		

Mitigation Summary Table

	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only	–	–		–	
EO 11990 Only	Vollrath 15/21	–	0.019		
USACE/11990	–	–		–	
USFWS	–				–
	Total	0	0.019	0	0

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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Wetlands Impacts

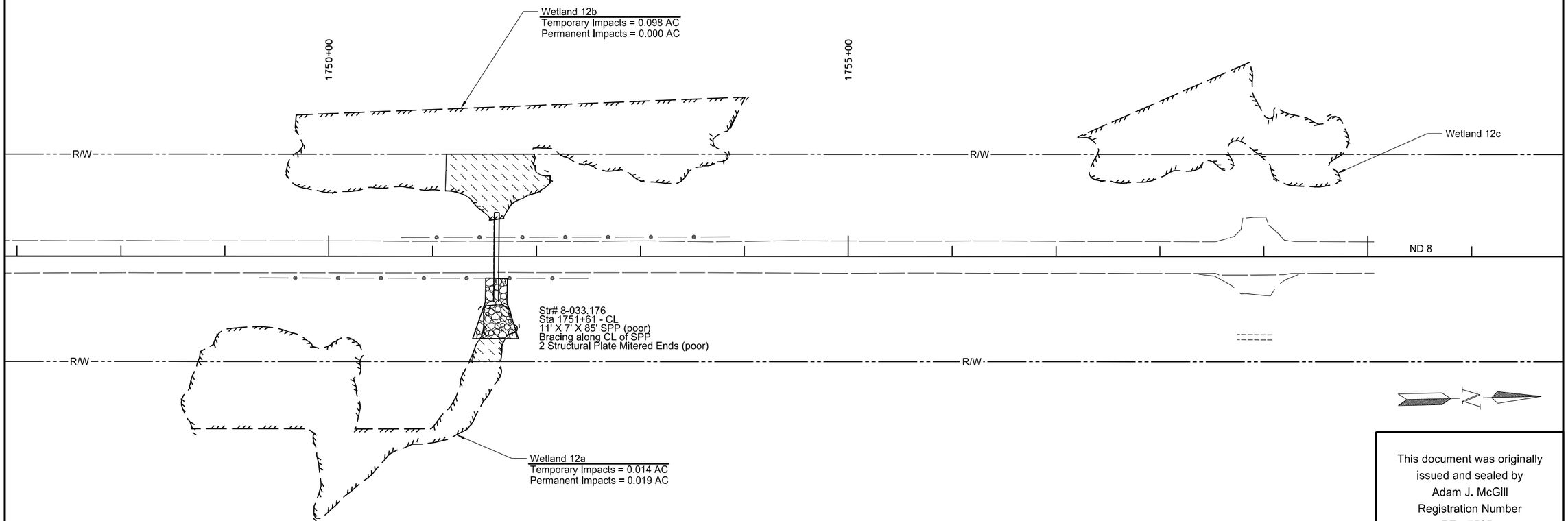
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	75	2

Wetland Delineated Existing

Wetland Impacts Permanent

Wetland Impacts Temporary

Riprap



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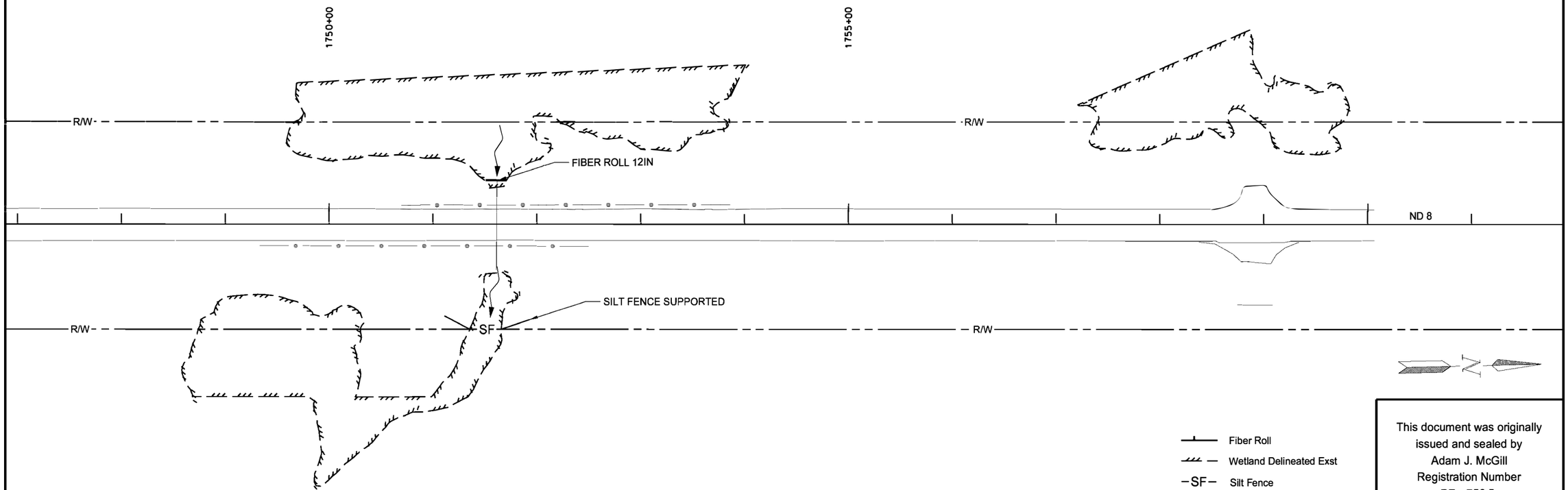
ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Wetland Impacts

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	76	1

SPEC	CODE	BID ITEM	QTY	UNIT
260	0200	SILT FENCE SUPPORTED		
Sta 1751+17/33.171 to Sta 1751+93/33.185 Rt			80	LF
260	0201	REMOVE SILT FENCE SUPPORTED		
Sta 1751+17/33.171 to Sta 1751+93/33.185 Rt			80	LF
261	0112	FIBER ROLLS 12IN		
Sta 1751+61/33.176 Lt			20	LF
261	0113	REMOVE FIBER ROLLS 12IN		
Sta 1751+61/33.176 Lt			20	LF



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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Temporary Erosion Control

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - ND 8 - Jct US 12 N to W Jct ND 21 (Adams County)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING

CURVE DATA

ARC DEFINITION	

US PUBLIC LAND SURVEY DATA

CORNER	IRN	NORTHING	EASTING

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET
MONUMENT DESCRIPTION					
Primary Control					
RTK1	134309.76	1465957.21	2704.90	N/A	N/A
1/2" x 18" Rebar & 1.5" Aluminum Cap, marked "1"					
GPS2	145292.27	1466919.23	2673.66	N/A	N/A
5/8" x 24" Rebar & 2" Aluminum Cap, marked "GPS 2"					
RTK3	164477.86	1466658.89	2609.01	N/A	N/A
1/2" x 18" Rebar & 1.5" Aluminum Cap, marked "3"					
RTK4	180540.22	1467561.03	2577.89	N/A	N/A
1/2" x 18" Rebar & 1.5" Aluminum Cap, marked "4"					
GPS5	198467.85	1468198.28	2600.52	N/A	N/A
5/8" x 24" Rebar & 2" Aluminum Cap, marked "GPS 5"					

REFERENCE MARKERS

R Mkr #	NORTHING	EASTING	STATION	O\S	ALIGNMENT
13	133515.06	1465923.02	N/A	N/A	N/A
14	138665.91	1466700.82	N/A	N/A	N/A
15	143901.74	1466827.98	N/A	N/A	N/A
16	149176.09	1466955.90	N/A	N/A	N/A
17	154465.06	1467084.07	N/A	N/A	N/A
18	159763.52	1467213.22	N/A	N/A	N/A
19	164983.15	1466854.55	N/A	N/A	N/A
20	170155.55	1467464.92	N/A	N/A	N/A
21	175500.39	1467565.10	N/A	N/A	N/A
22	180710.19	1467716.72	N/A	N/A	N/A
23	185911.13	1468377.02	N/A	N/A	N/A
24	191065.66	1467961.66	N/A	N/A	N/A
25	196344.78	1468085.85	N/A	N/A	N/A
26	201620.84	1468205.50	N/A	N/A	N/A

NOTES: Sheet 1 of 2 (Adams County)

Date Survey Completed 10/23/19

☐ Assumed Coordinates

☒ All coordinates on this sheet are Adams County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998875

All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK
NDGPS Stations OPUS (VRS)

☒ NAVD-88

☐ _____

☒ GEOID12B ☐ _____

☐ GEOID18

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PRELIMINARY SURVEY COORDINATE AND CURVE DATA - ND 8 - Jct US 12 N to W Jct ND 21 (Hettinger County)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	81	2

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
ND 8 (Chain: SCL8)			
Begin Rec Sec Cor	1732+12.15	236459.48	1472184.11
End Rec Sec Cor	1785+10.97	241756.86	1472308.18

CURVE DATA

ARC DEFINITION

US PUBLIC LAND SURVEY DATA

CORNER	IRN	NORTHING	EASTING
T-133-N R-94-W			
NW Cor Sec 26	9-J	241756.86	1472308.18
SW Cor Sec 26	9-L	236459.48	1472184.11

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET
MONUMENT DESCRIPTION					
Primary Control					
RTK6	216189.29	1468494.79	2718.02	N/A	N/A
1/2" x 18" Rebar & 1.5" Aluminum Cap, marked "6"					
RTK7	229400.97	1468913.46	2667.90	N/A	N/A
1/2" x 18" Rebar & 1.5" Aluminum Cap, marked "7"					
GPS8	243923.34	1472269.68	2621.40	N/A	N/A
5/8" x 24" Rebar & 2" Aluminum Cap, marked "GPS 8"					
RTK9	253063.23	1472483.50	2575.83	N/A	N/A
1/2" x 18" Rebar & 1.5" Aluminum Cap, marked "9"					

REFERENCE MARKERS

R Mkr #	NORTHING	EASTING	STATION	O\S	ALIGNMENT
27	206904.42	1468402.72	N/A	N/A	N/A
28	212180.13	1468528.56	N/A	N/A	N/A
29	217456.00	1468656.78	N/A	N/A	N/A
30	222740.01	1468787.26	N/A	N/A	N/A
31	228014.19	1468917.51	N/A	N/A	N/A
32	232282.16	1471615.09	N/A	N/A	N/A
33	237461.43	1472241.45	1742+15	34' Rt	SCL8
34	242746.38	1472366.36	N/A	N/A	N/A
35	248024.13	1472497.23	N/A	N/A	N/A
36	253300.96	1472626.70	N/A	N/A	N/A
37	258574.90	1472757.78	N/A	N/A	N/A

NOTES: Sheet 2 of 2 (Hettinger County)

Date Survey Completed 10/23/19

☐ Assumed Coordinates

☒ All coordinates on this sheet are Hettinger County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998390

All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK
NDGPS Stations OPUS (VRS)

☒ NAVD-88

☐ _____

☒ GEOID12B ☐ _____

☐ GEOID18

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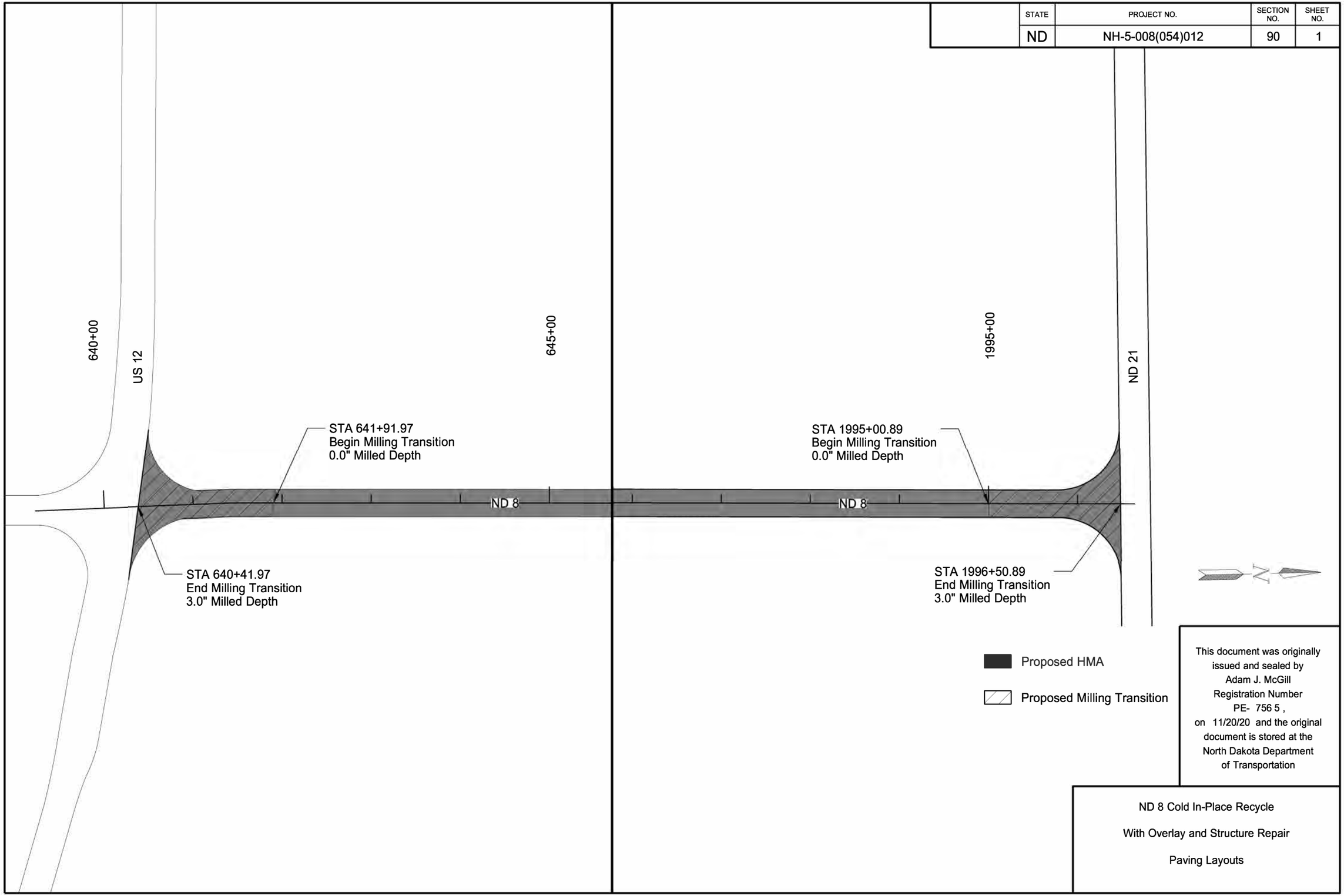
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	90	1



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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Paving Layouts

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED BY PHASE NO. 1	2		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE					35	
G20-1-60	**60"x24"**	**ROAD WORK NEXT __ MILES**	**2**			**2**	**28**	**56**
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)					18	
G20-2-48	**48"x24"**	**END ROAD WORK**	**6**			**6**	**26**	**156**
G20-4-36	**36"x18"**	**PILOT CAR FOLLOW ME (Mounted to back of pilot car)**	**2**	**1**		**2**	**18**	**36**
G20-4b-36	**30"X36"**	**WAIT FOR PILOT CAR**	**17**	**17**		**17**	**26**	**442**
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**2**			**2**	**70**	**140**
G20-50a-72	**72"x36"**	**ROAD WORK NEXT __ MILES RT & LT ARROWS**	**17**			**17**	**43**	**731**
G20-52a-72	**72"x24"**	**ROAD WORK NEXT __ MILES RT or LT ARROW**	**4**			**4**	**36**	**144**
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT**	**4**			**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 (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)					7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)					7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)					9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)					7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)					9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)					7	
R1-1-48	**48"x48"**	**STOP**	**4**			**4**	**32**	**128**
R1-2-60	60"x60"	YIELD					29	
R2-1-36	**36"x48"**	**SPEED LIMIT __ (Portable only)**	**16**	**4**		**16**	**30**	**480**
R2-1-48	48"x60"	SPEED LIMIT __					39	
R2-1aP-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**16**	**4**		**16**	**10**	**160**
R3-2-48	48"x48"	NO LEFT TURN					35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**2**			**2**	**39**	**78**
R4-7-48	48"x60"	KEEP RIGHT					39	
R5-1-48	48"x48"	DO NOT ENTER					35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)					14	
R7-1-12	12"x18"	NO PARKING ANY TIME					11	
R10-6-24	24"x36"	STOP HERE ON RED					16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)					12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)					12	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)					15	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)					15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)					15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT					35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT					35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT					35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW					26	
W3-1-48	48"x48"	STOP AHEAD					35	
W3-3-48	48"x48"	SIGNAL AHEAD					35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**	**4**	**2**		**4**	**35**	**140**
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**8**	**2**		**8**	**35**	**280**
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT					35	
W5-1-48	**48"x48"**	**ROAD NARROWS**	**2**			**2**	**35**	**70**
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE					35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW					35	
W6-3-48	48"x48"	TWO WAY TRAFFIC					35	
W8-1-48	48"x48"	BUMP					35	
W8-3-48	48"x48"	PAVEMENT ENDS					35	
W8-7-48	48"x48"	LOOSE GRAVEL					35	
W8-11-48	**48"x48"**	**UNEVEN LANES**	**2**			**2**	**35**	**70**
W8-12-48	48"x48"	NO CENTER LINE					35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL					35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY					35	
W8-54-48	**48"x48"**	**TRUCKS ENTERING AHEAD or __ FT or _ MILE**	**2**			**2**	**35**	**70**
W8-55-48	**48"x48"**	**TRUCKS CROSSING AHEAD or __ FT or _ MILE**	**2**			**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					35	
W13-1P-30	**30"x30"**	**__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)**	**10**			**10**	**14**	**140**
W14-3-64	64"x48"	NO PASSING ZONE					28	
W16-2P-30	**30"x24"**	**__ FEET PLAQUE (Mounted on warning sign post)**	**2**			**2**	**10**	**20**
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**10**	**2**		**10**	**35**	**350**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT or _ MILE					35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT or _ MILE					35	
W20-4-48	**48"x48"**	**ONE LANE ROAD AHEAD or __ FT or _ MILE**	**2**			**2**	**35**	**70**
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE					35	
W20-7-48	**48"x48"**	**FLAGGER**	**6**	**2**		**6**	**35**	**210**
W20-8-18	**18"x18"**	**STOP - SLOW PADDLE Back to Back**	**6**	**2**		**6**	**5**	**30**
W20-52P-54	**54"x12"**	**NEXT __ MILES (Mounted on warning sign post)**	**10**			**10**	**12**	**120**
W21-1-48	48"x48"	WORKERS					35	
W21-2-48	**48"x48"**	**FRESH OIL**	**2**			**2**	**35**	**70**
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE					35	
W21-5-48	48"x48"	SHOULDER WORK					35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED BY PHASE NO. 1	2		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED					35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE					35	
W21-6-48	48"x48"	SURVEY CREW					35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT					35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY					35	
W21-52-48	**48"x48"**	**PAVEMENT BREAKS**	**10**			**10**	**35**	**350**
W21-53-48	**48"x48"**	**RUMBLE STRIPS AHEAD**	**6**	**2**		**6**	**35**	**210**
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK					35	

SPECIAL SIGNS

SPEC & CODE

SPEC & CODE	DESCRIPTION	TOTAL UNITS
704-1000	**TRAFFIC CONTROL SIGNS**	**5057**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY BY PHASE NO. 1	2		TOTAL QUANTITY
704-0100	**FLAGGING**	MHR	**2300**	**500**		**2800**
704-1048	**PORTABLE RUMBLE STRIPS**	EACH	**6**	**2**		**6**
704-1050	TYPE I BARRICADES	EACH				
704-1052	TYPE III BARRICADES	EACH				
704-1060	**DELINEATOR DRUMS**	EACH	**40**			**40**
704-1065	TRAFFIC CONES	EACH				
704-1067	**TUBULAR MARKERS**	EACH	**408**	**320**		**408**
704-1070	DELINEATOR	EACH				
704-1072	FLEXIBLE DELINEATORS	EACH				
704-1080	STACKABLE VERTICAL PANELS	EACH				
704-1081	VERTICAL PANELS - BACK TO BACK	EACH				
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH				
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH				
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH				
704-1185	**PILOT CAR**	HR	**1000**	**250**		**1250**
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	**75175**	**225525**		**300700**

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

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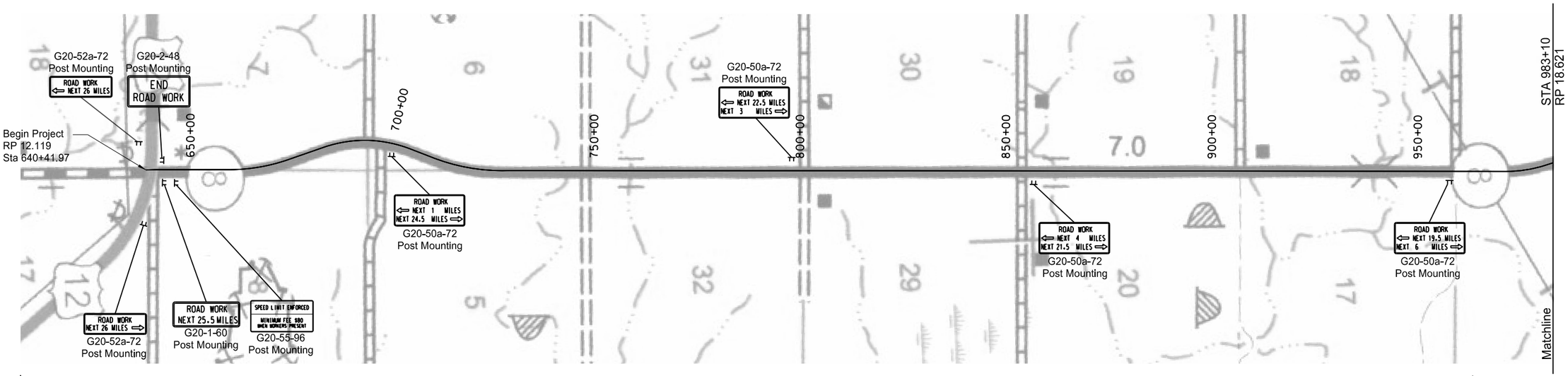
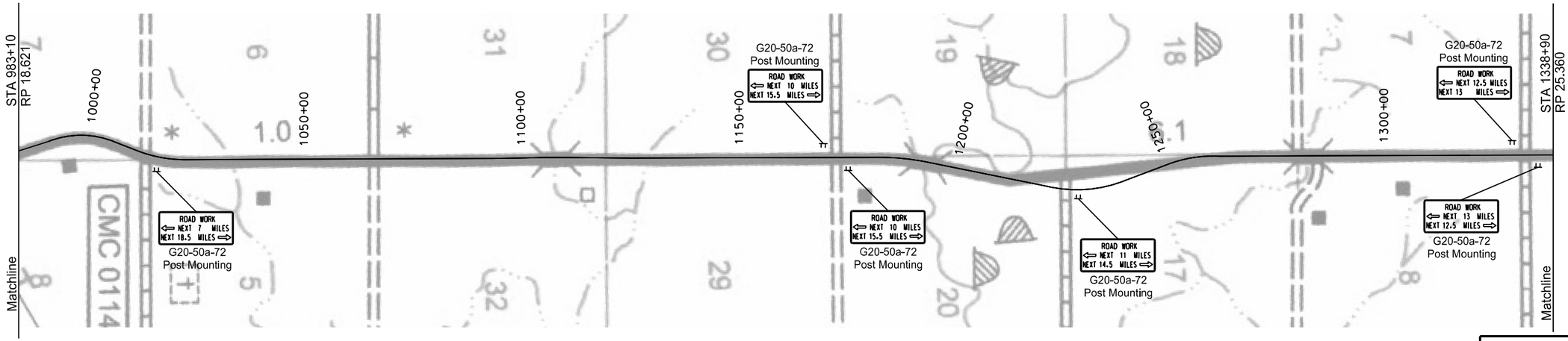
Traffic Control Devices List
ND 8 Cold In-Place Recycle
With Overlay and Structure Repair

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	100	2





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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Work Zone Traffic Control

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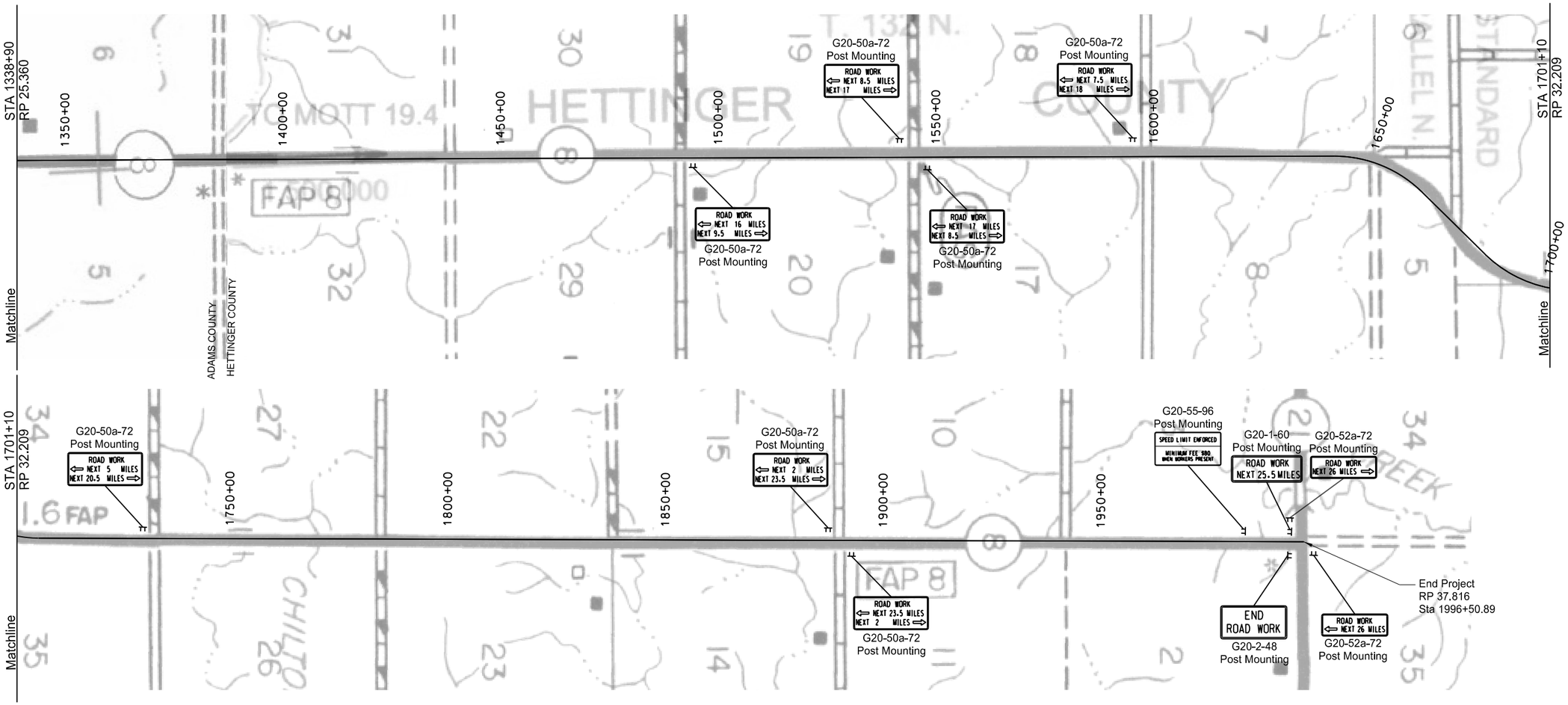
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	100	3



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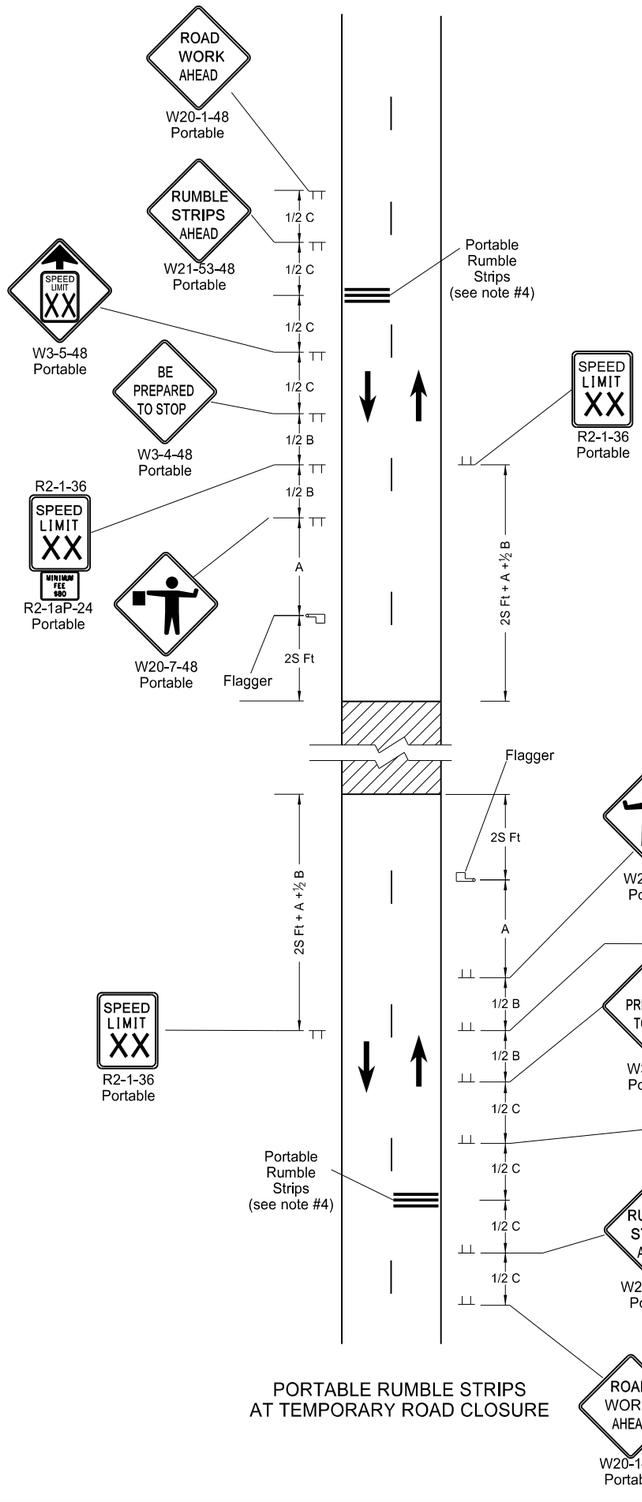
ND 8 Cold In-Place Recycle

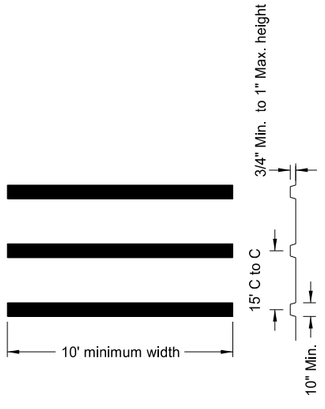
With Overlay and Structure Repair

Work Zone Traffic Control

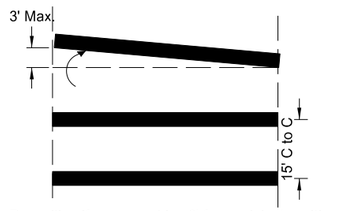
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	100	4



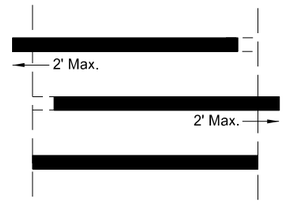
PORTABLE RUMBLE STRIPS AT TEMPORARY ROAD CLOSURE



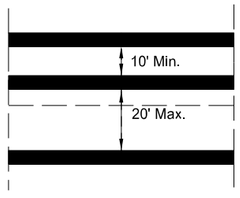
PORTABLE RUMBLE STRIPS ARRAY DETAIL



Reposition if movement is >3' from original position.
Skewing



Reposition if movement is >2' from original position.
Lateral



Reposition if distance between strips is <10' or >20'.
Perpendicular to Travel with or against traffic

PORTABLE RUMBLE STRIPS ARRAY
TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

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

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

KEY
- Work area
- Flagger
- Sign

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

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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Two-Lane Portable Rumble Strips

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	NH-5-008(054)012	110	1

Station / 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	Vert Clear-ance FT	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
ND 8																							
639+78/12.135 Lt	M1-4-24 M1-5-24 M6-4-21 M6-1-21	405		12.4	12.1				5.0	2.5 x 2.5 12 ga	13.5	3.8				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
642+16/12.175 Lt	SS1		22.8		11.7	12.7			5.0	2.5 x 2.5 12 ga	14.7	2.6	3.6			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
645+68/12.221 Rt	R2-1-24	9		5.0	13.1				5.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga				
697+15/13.205 Rt	R1-1-30	1		5.2	11.3				5.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga				
853+59/16.170 Lt	R1-1-30	1		5.2	11.3				5.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga				
959+32/18.167 Lt	R1-1-30	1		5.2	11.3				5.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga				
1386+36/26.257 Rt	SS2		11.3		11.8				5.0	2.5 x 2.5 12 ga	14.3	3.2				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
1386+21/26.254 Lt	SS4		8.8		11.8				5.0	2.5 x 2.5 12 ga	14.3	3.2				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
1979+44/37.497 Rt	W2-4-30	19		6.3	13.7				5.0	2.5 x 2.5 12 ga	14.5						1	4	3 x 3 7 ga				
1994+51/37.772 Rt	SS3		29.8		12.8	13.3	13.9		5.0	2.5 x 2.5 12 ga	16.4	2.8	3.3	3.9		2.25 x 2.25 12 ga	3	4	3 x 3 7 ga			3	
1995+80/37.798 Rt	R1-1-48	3		13.3	11.9				5.0	2.5 x 2.5 12 ga	12.4	4.4				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
Sub Total			72.7	52.6		**Total**	172.7										**Total**	56.0		0	0	9	
Grand Total			**72.7**	**52.6**		**Total**	**172.7**										**Total**	**56**	**0**	**0**	**0**	**9**	

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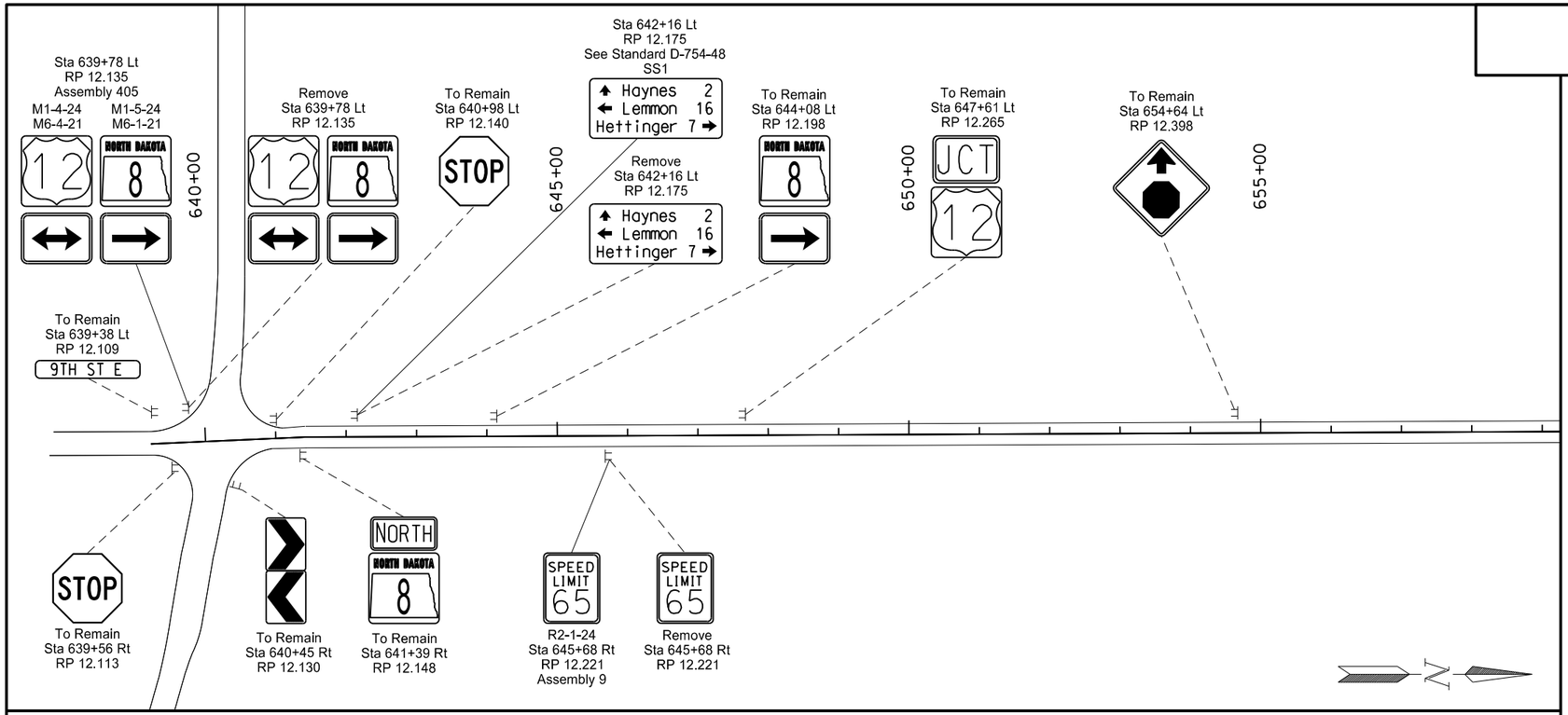
Sign Summary
Perforated Tube

ND 8 Cold In-Place Recycle
With Overlay and Structure Repair

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	110	2



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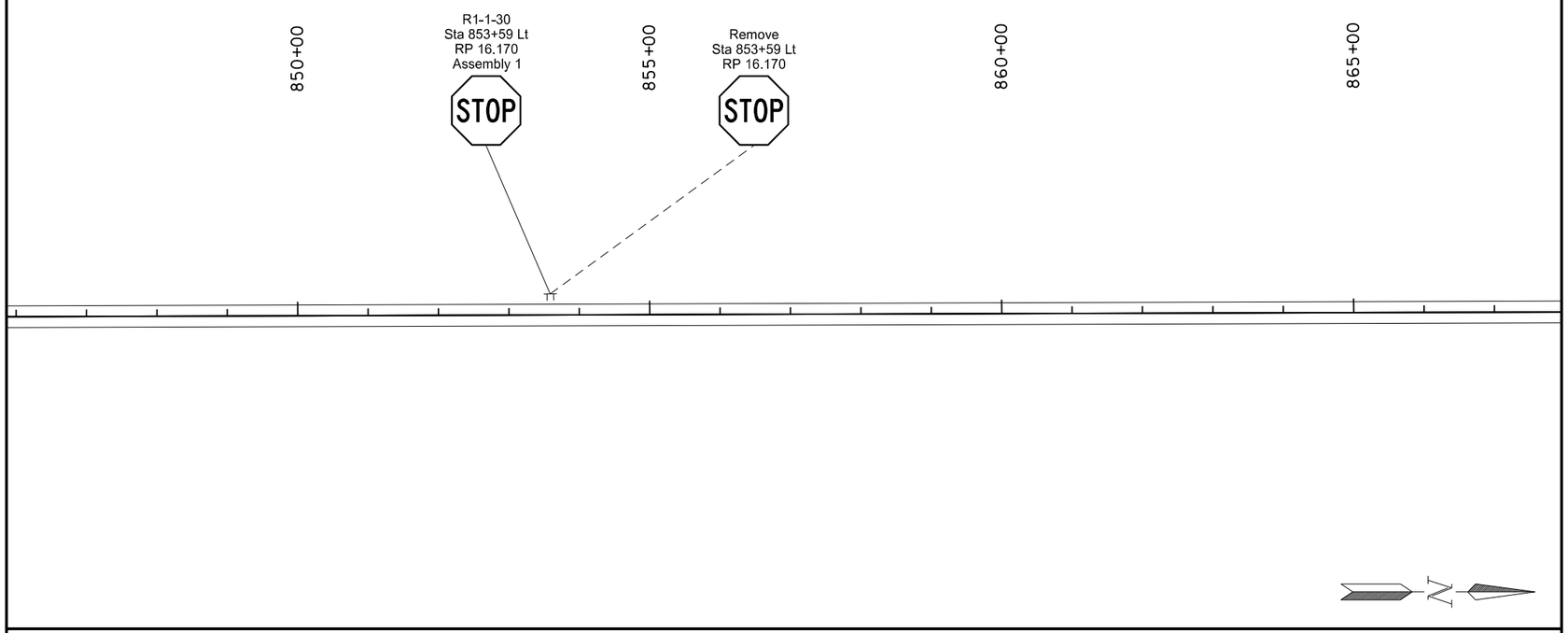
ND 8 Cold In-Place Recycle

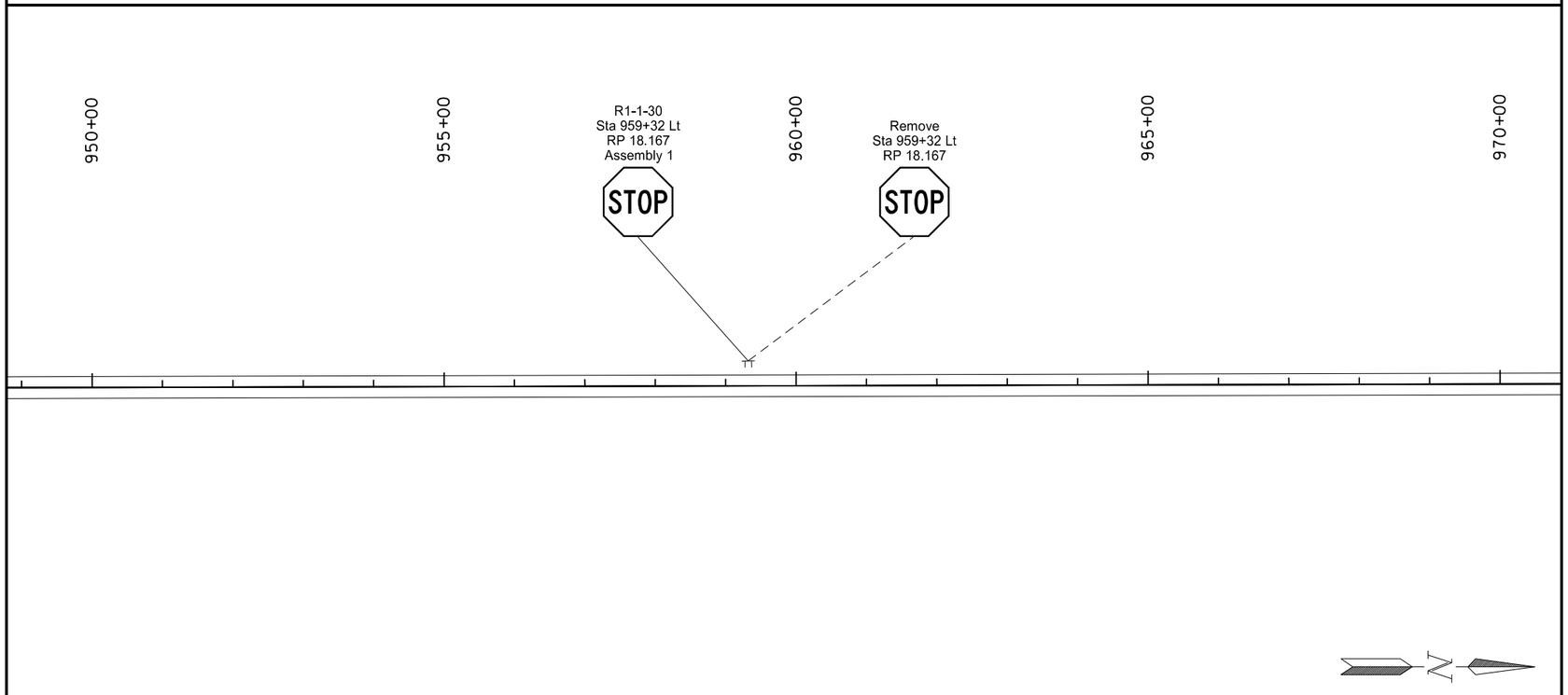
With Overlay and Structure Repair

Permanent Signing Layout

11/20/2020 12:48:31 PM derekflaten K:\Projects\State\ND\DOT\2002-00634 ND_8_CIR_and_Structures\CAD\Design\Plans\Sections\110\110SN_002.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	110	3





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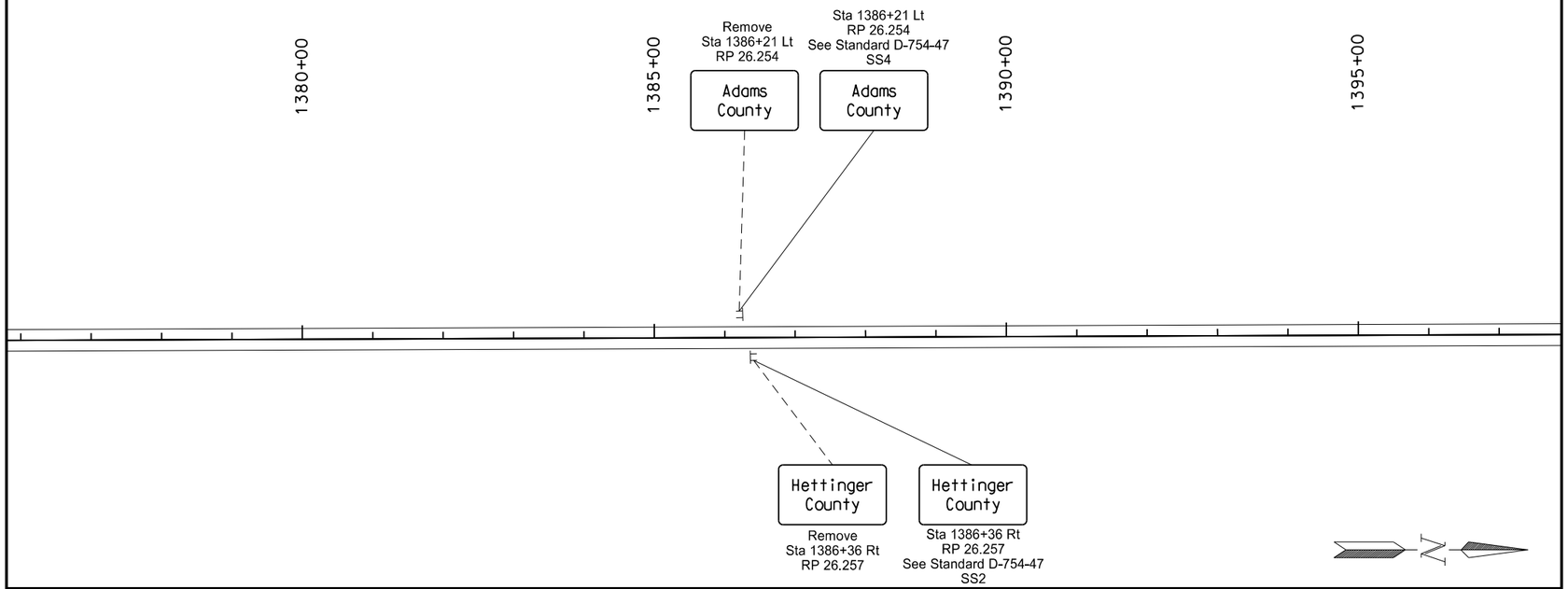
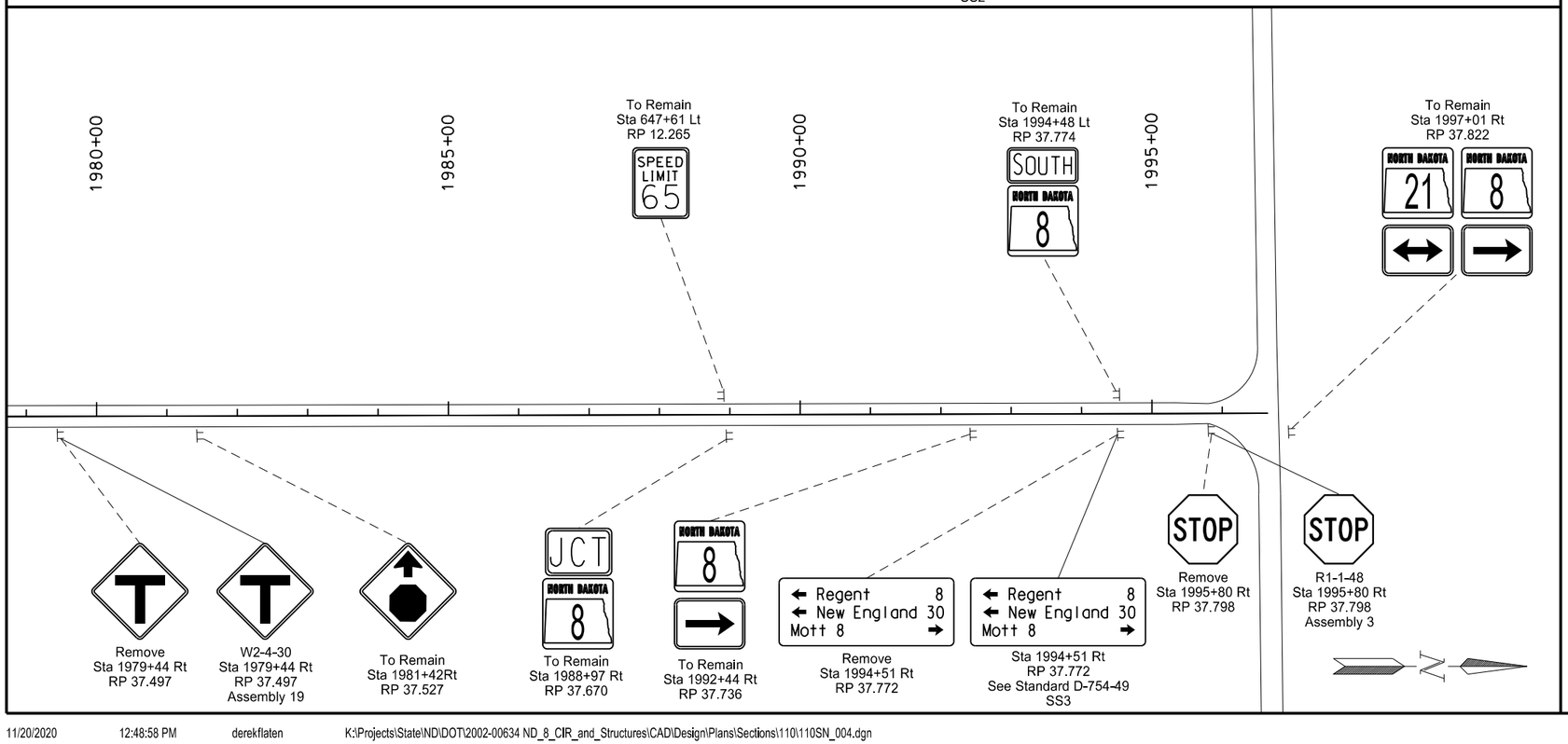
ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Permanent Signing Layout

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	110	4





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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Permanent Signing Layout

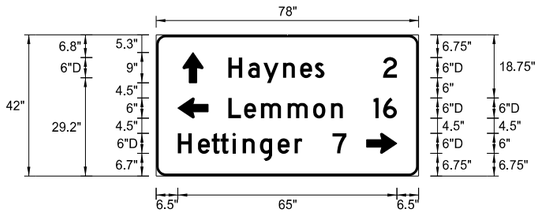
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	110	5

SIGN NUMBER	SS1
WIDTH X HEIGHT	6'-6" x 3'-6"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ND_6IN_TYPE D	8	27.8	6	9	0
ND_6IN_TYPE D	6.5	17.3	6	9	90
ND_6IN_TYPE D	62.5	6.8	6	9	270

STATION(S):
642+16 Lt

AREA: 22.8 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Destination.sst

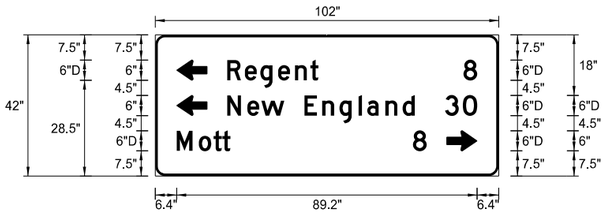
LETTER POSITION (X)																				LENGTH	SIZE	SERIES
H	a	y	n	e	s															28.5	6/4.5	D 2000
21.5	27.4	31.9	37.7	42.8	47.2																	
2																				4.1	6	D 2000
67.4																						
L	e	m	m	o	n															34	6/4.5	D 2000
21.5	26.2	31.2	39.1	46.6	52																	
1	6																			6.9	6	D 2000
64.6	67.4																					
H	e	t	t	i	n	g	e	r												36.9	6/4.5	D 2000
6.5	12.5	16.5	19.1	22.7	25.7	30.9	36.1	41.1														
7																				4.1	6	D 2000
52.4																						

SIGN NUMBER	SS3
WIDTH X HEIGHT	8'-6" x 3'-6"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ND_6IN_TYPE D	6.4	28.5	6	9	90
ND_6IN_TYPE D	6.4	18	6	9	90
ND_6IN_TYPE D	86.6	7.5	6	9	270

STATION(S):
1994+51 Rt

AREA: 29.8 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Destination.sst

LETTER POSITION (X)																				LENGTH	SIZE	SERIES
R	e	g	e	n	t															27.1	6/4.5	D 2000
21.4	26.6	31.2	36.5	41.5	46.1																	
8																				4.1	6	D 2000
91.5																						
N	e	w		E	n	g	l	a	n	d										55.7	6/4.5	D 2000
21.4	27.4	31.5	38.3	44.3	49.6	54.7	60.4	62.9	68.4	73.5												
3	0																			9.5	6	D 2000
86.1	91.4																					
M	o	t	t																	16	6/4.5	D 2000
6.4	13	17.3	20																			
8																				4.1	6	D 2000
76.5																						

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ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Sign Details

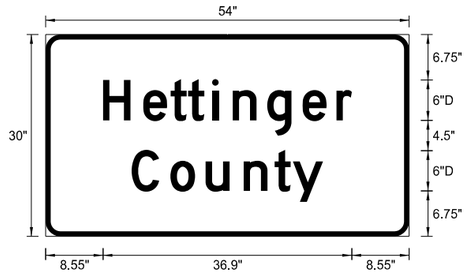
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	110	6

SIGN NUMBER	SS2
WIDTH X HEIGHT	4'-6" x 2'-6"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	2.25"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
1386+36 Rt

AREA: 11.3 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Boundary.ssl

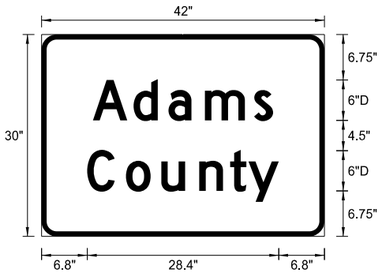
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
H	e	t	t	i	n	g	e	r										36.9	6/4.5	D 2000
8.5	14.5	18.6	21.2	24.7	27.8	32.9	38.2	43.2												
C	o	u	n	t	y													28.4	6/4.5	D 2000
12.8	18.5	23.8	29.4	34	36.7															

SIGN NUMBER	SS4
WIDTH X HEIGHT	3'-6" x 2'-6"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	2.25"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
1386+21 Lt

AREA: 8.8 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Boundary.ssl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
A	d	a	m	s														26.8	6/4.5	D 2000
7.6	13.7	18.8	24.3	31.6																
C	o	u	n	t	y													28.4	6/4.5	D 2000
6.8	12.5	17.8	23.4	28	30.7															

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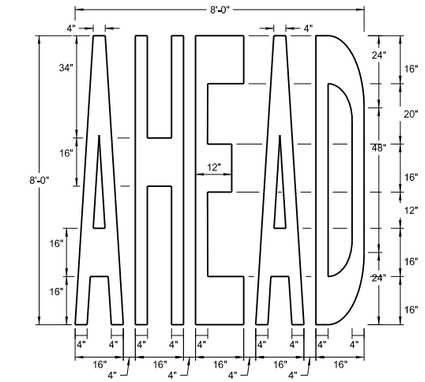
ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

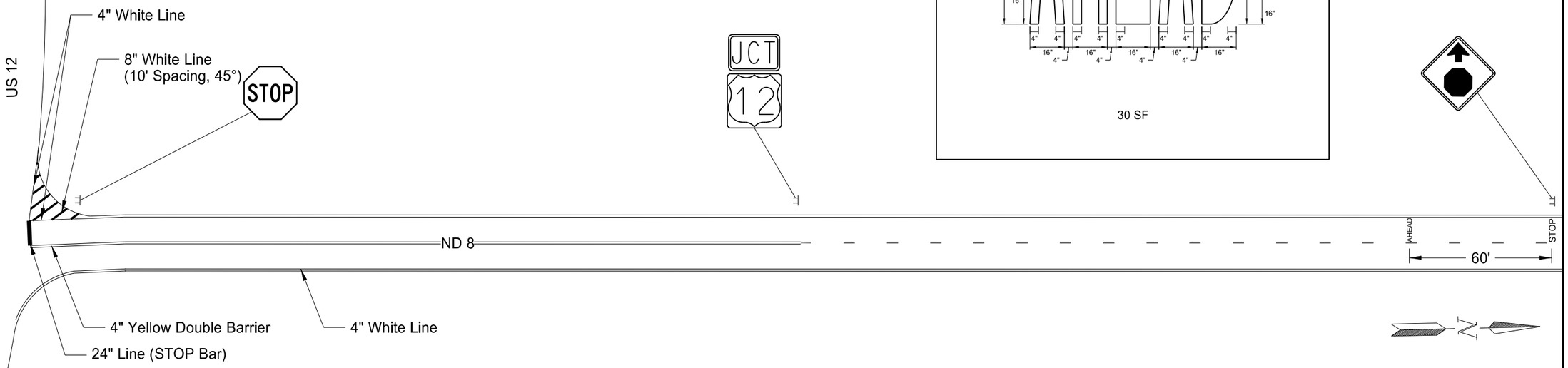
Sign Details

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	120	1

"AHEAD" Pavement Marking Detail



30 SF



NOTE:

1. Intersection striping will be placed per Standard Drawing D-762-5.

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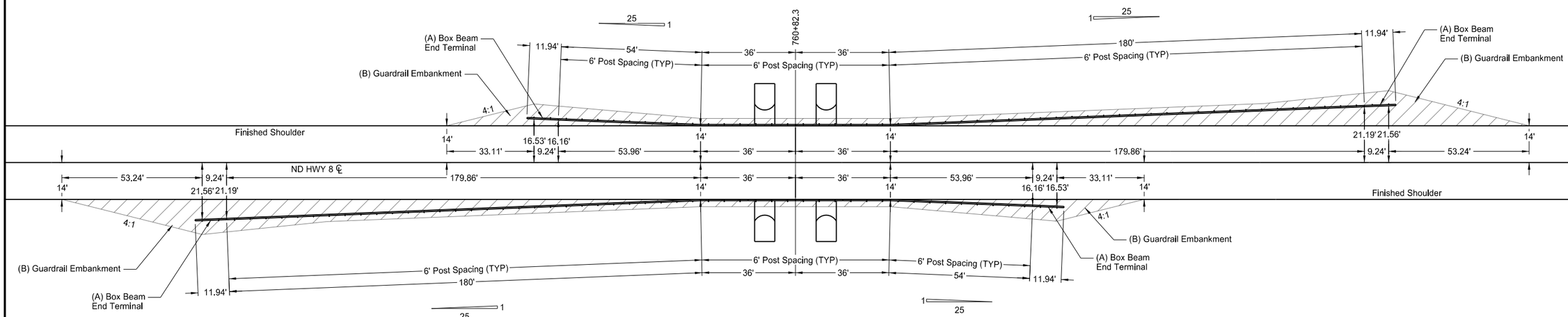
ND 8 Cold In-Place Recycle

With Overlay and Structure Repair

Pavement Markings

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	1

23 USC § 409 Documents
NDDOT Reserves All Objections



(A) Install an MBEAT end terminal at this location.

(B) Install 6" Aggregate Base Course CL 5 and 2" HMA in areas of 10:1 or flatter foreslopes. See Typical Grading at Obstructions with Box Beam Guardrail for more details. Include all costs associated with the Guardrail Embankment in the unit price for the item "GUARDRAIL EMBANKMENT".

(C) Dimensions are to front face of guardrail.

(D) Center the gap between posts to allow for the full 3' embedment over drainage structure.

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Box Beam Guardrail Layout

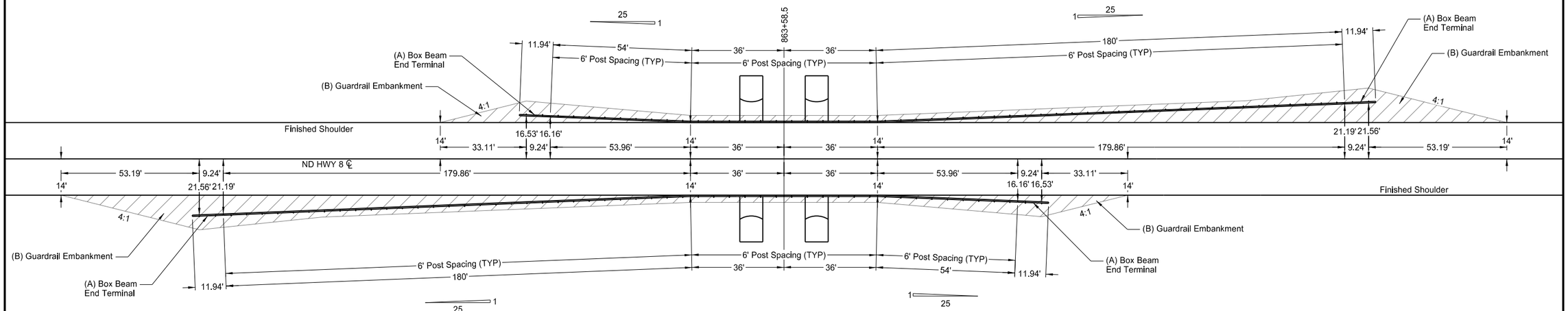
Double 7'8" x 5'5" x 60'

Structural Plate Pipe Arch

ND 8 RP 14.422

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	2

23 USC § 409 Documents
NDDOT Reserves All Objections



(A) Install an MBEAT end terminal at this location.

(B) Install 6" Aggregate Base Course CL 5 and 2" HMA in areas of 10:1 or flatter foreslope. See Typical Grading at Obstructions with Box Beam Guardrail for more details. Include all costs associated with the Guardrail Embankment in the unit price for the item "GUARDRAIL EMBANKMENT".

(C) Dimensions are to front face of guardrail.

(D) Center the gap between posts to allow for the full 3' embedment over the drainage structure.

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Box Beam Guardrail Layout

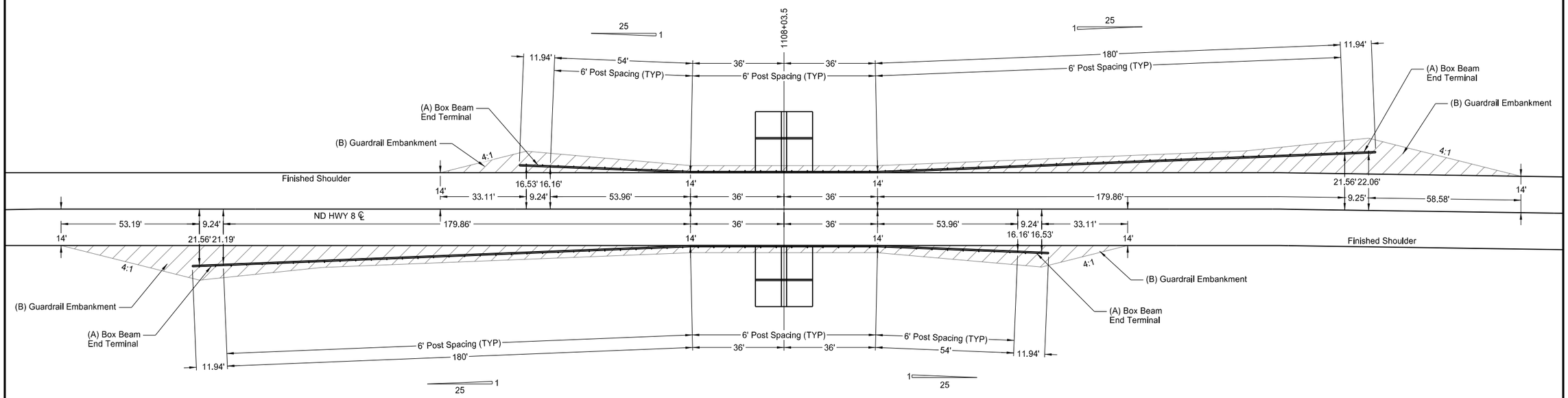
Double 8'-10" x 6'-1" x 64'

Structural Plate Pipe Arch

ND 8 RP 16.371

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	3

23 USC § 409 Documents
NDDOT Reserves All Objections



(A) Install an MBEAT end terminal at this location.

(B) Install 6" Aggregate Base Course CL 5 and 2" HMA in areas of 10:1 or flatter foreslopes, see Typical Grading at Obstructions with Box Beam Guardrail for more details. Include all costs associated with the Guardrail Embankment in the unit price for the item "GUARDRAIL EMBANKMENT".

(C) Dimensions are to front face of guardrail.

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Box Beam Guardrail Layout

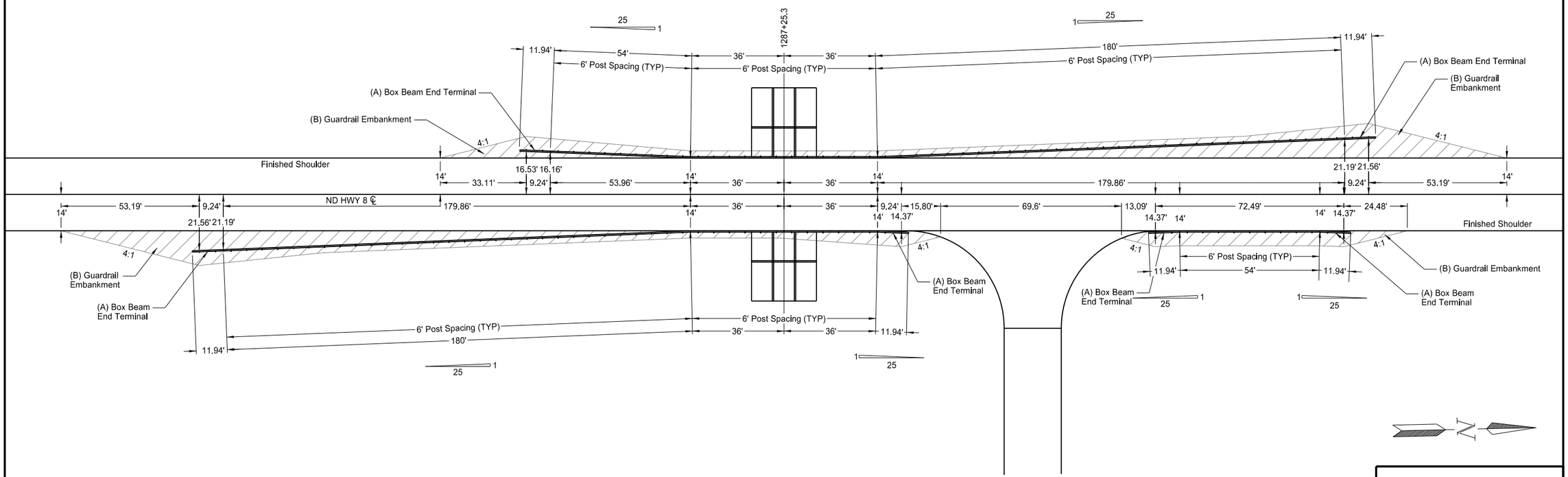
Double 10' x 5' x 75'

Reinforced Concrete Box

ND 8 RP 20.992

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	4

23 USC § 409 Documents
NDDOT Reserves All Objections



(A) Install an MBEAT end terminal at this location.

(B) Install 6" Aggregate Base Course CL 5 and 2" HMA in areas of 10:1 or flatter foreslopes, see Typical Grading at Obstructions with Box Beam Guardrail for more details. Include all costs associated with the Guardrail Embankment in the unit price for the item "GUARDRAIL EMBANKMENT".

(C) Dimensions are to front face of guardrail.

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Box Beam Guardrail Layout

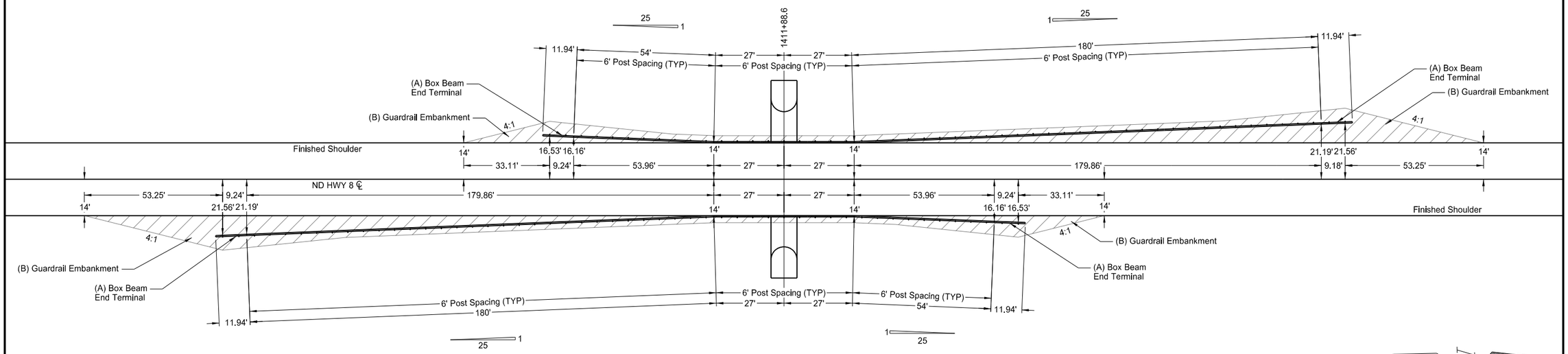
Triple 8' x 8' x 49'

Reinforced Concrete Box

ND 8 RP 24.381

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	5

23 USC § 409 Documents
NDDOT Reserves All Objections



(A) Install an MBEAT end terminal at this location.

(B) Install 6" Aggregate Base Course CL 5 and 2" HMA in areas of 10:1 or flatter foreslopes, see Typical Grading at Obstructions with Box Beam Guardrail for more details. Include all costs associated with the Guardrail Embankment in the unit price for the item "GUARDRAIL EMBANKMENT".

(C) Dimensions are to front face of guardrail.

(D) Center the gap between posts to allow for the full 3' embedment over the drainage structure.

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Box Beam Guardrail Layout

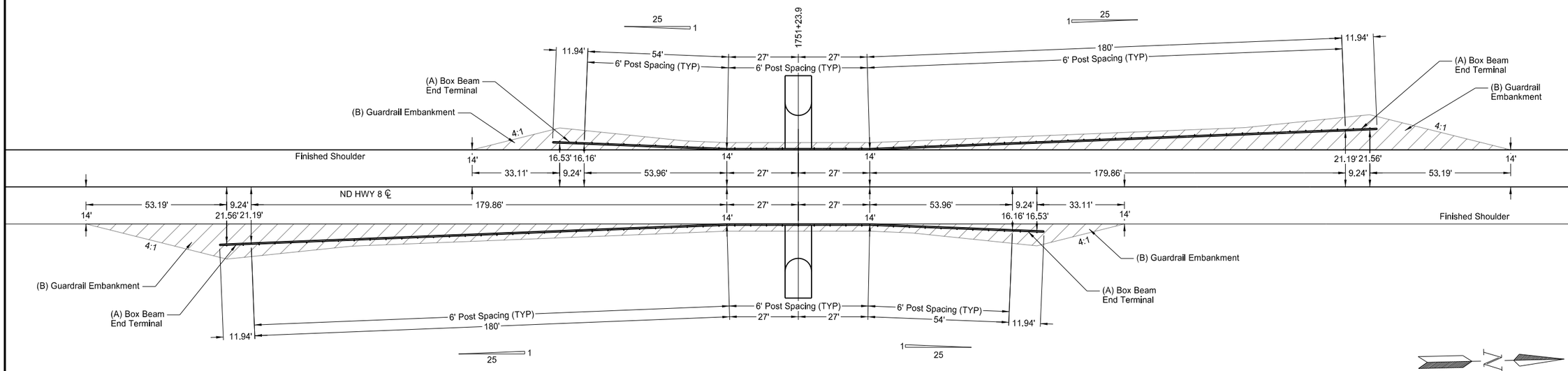
10'-3" x 6'-9" x 76'

Structural Plate Pipe Arch

ND 8 RP 26.752

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	6

23 USC § 409 Documents
NDDOT Reserves All Objections



(A) Install an MBEAT end terminal at this location.

(B) Install 6" Aggregate Base Course CL 5 and 2" HMA in areas of 10:1 or flatter foreslopes, see Typical Grading at Obstructions with Box Beam Guardrail for more details. Include all costs associated with the Guardrail Embankment in the unit price for the item "GUARDRAIL EMBANKMENT".

(C) Dimensions are to front face of guardrail.

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Box Beam Guardrail Layout

10'-8" x 6'-11" x 84'

Structural Plate Pipe Arch

ND 8 RP 33.176

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	7

SPEC CODE	BID ITEM	QTY	UNIT
203 218	GUARDRAIL EMBANKMENT		
	Sta 758+66.44 to 761+72.26 RT	1	EA
	Sta 759+92.34 to 762+98.16 LT	1	EA
	Sta 861+42.64 to 864+48.46 RT	1	EA
	Sta 862+68.54 to 865+74.36 LT	1	EA
	Sta 1105+87.64 to 1108+93.46 RT	1	EA
	Sta 1107+13.54 to 1110+19.36 LT	1	EA
	Sta 1285+09.43 to 1287+61.30 RT	1	EA
	Sta 1286+35.34 to 1289+41.15 LT	1	EA
	Sta 1288+77.56 to 1289+31.56 RT	1	EA
	Sta 1409+81.74 to 1412+69.56 RT	1	EA
	Sta 1411+07.64 to 1413+95.46 LT	1	EA
	Sta 1749+17.04 to 1752+04.86 RT	1	EA
	Sta 1750+42.94 to 1753+30.76 LT	1	EA
		13	EA

SPEC CODE	BID ITEM	QTY	UNIT
764 2020	REMOVE 3-CABLE GUARDRAIL & POSTS		
	Sta 861+28.5 to 864+43.5 RT	315	LF
	Sta 862+73.5 to 865+88.5 LT	315	LF
	Sta 1105+77.5 to 1108+92.5 RT	315	LF
	Sta 1107+14.5 to 1110+29.5 LT	315	LF
	Sta 1284+97.8 to 1287+72.8 RT	275	LF
	Sta 1286+77.8 to 1289+52.8 LT	275	LF
	Sta 1409+58.6 to 1412+73.60 RT	315	LF
	Sta 1411+03.6 to 1414+18.60 LT	315	LF
	Sta 1748+98.9 to 1752+13.9 RT	315	LF
	Sta 1750+33.9 to 1753+48.9 LT	315	LF
		3,070	LF

SPEC CODE	BID ITEM	QTY	UNIT
764 0118	BOX BEAM GUARDRAIL		
	Sta 758+66.44 to 761+72.26 RT	306	LF
	Sta 759+92.34 to 762+98.16 LT	306	LF
	Sta 861+42.64 to 864+48.46 RT	306	LF
	Sta 862+68.54 to 865+74.36 LT	306	LF
	Sta 1105+87.64 to 1108+93.46 RT	306	LF
	Sta 1107+13.54 to 1110+19.36 LT	306	LF
	Sta 1285+09.43 to 1287+61.30 RT	252	LF
	Sta 1286+35.34 to 1289+41.15 LT	306	LF
	Sta 1288+77.56 to 1289+31.56 RT	54	LF
	Sta 1409+81.74 to 1412+69.56 RT	288	LF
	Sta 1411+07.64 to 1413+95.46 LT	288	LF
	Sta 1749+17.04 to 1752+04.86 RT	288	LF
	Sta 1750+42.94 to 1753+30.76 LT	288	LF
		3,600	LF

SPEC CODE	BID ITEM	QTY	UNIT
764 2080	REMOVE BOX BEAM GUARDRAIL		
	Sta 758+88.80 to 761+87.80 RT	299	LF
	Sta 759+76.80 to 762+75.80 LT	299	LF
		598	LF

SPEC CODE	BID ITEM	QTY	UNIT
764 0146	BOX BEAM END TERMINAL		
	Sta 758+54.51 to 758+66.44 RT	1	EA
	Sta 759+80.41 to 759+92.34 LT	1	EA
	Sta 761+72.76 to 761+84.19 RT	1	EA
	Sta 762+98.16 to 763+10.09 LT	1	EA
	Sta 861+30.71 to 861+42.64 RT	1	EA
	Sta 862+56.61 to 862+68.54 LT	1	EA
	Sta 864+48.46 to 864+60.39 RT	1	EA
	Sta 865+74.36 to 865+86.29 LT	1	EA
	Sta 1105+75.71 to 1105+87.64 RT	1	EA
	Sta 1107+01.61 to 1107+13.54 LT	1	EA
	Sta 1108+93.46 to 1109+05.39 RT	1	EA
	Sta 1110+19.36 to 1110+30.97 LT	1	EA
	Sta 1284+97.50 to 1285+09.43 RT	1	EA
	Sta 1286+23.41 to 1286+35.34 LT	1	EA
	Sta 1287+61.30 to 1287+73.23 RT	1	EA
	Sta 1288+65.63 to 1288+77.56 RT	1	EA
	Sta 1289+31.56 to 1289+43.49 RT	1	EA
	Sta 1289+41.15 to 1289+53.08 LT	1	EA
	Sta 1409+69.81 to 1409+81.74 RT	1	EA
	Sta 1410+95.71 to 1411+07.64 LT	1	EA
	Sta 1412+69.56 to 1412+81.49 RT	1	EA
	Sta 1413+95.46 to 1414+07.39 LT	1	EA
	Sta 1749+05.11 to 1749+17.04 RT	1	EA
	Sta 1750+31.01 to 1750+42.94 LT	1	EA
	Sta 1752+04.86 to 1752+16.79 RT	1	EA
	Sta 1753+30.76 to 1753+42.69 LT	1	EA
		26	EA

BOX BEAM GUARDRAIL SUMMARY OF QUANTITIES

BOX BEAM GUARDRAIL AT OBSTRUCTIONS

LOCATION	(A) 3/8" ø x 7-1/2" HEX A307 BOLT	(A) 1/2" ø x 1/2" HEX A307 BOLT	(A) TS6" x 6" x 3/16" x 17'-11-1/2" ASTM A500 GRADE B STRAIGHT BOX BEAM RAIL	(A) S3 x 5.7# x 5'-4" ASTM A992 TYPE A POST	(A) L 5" x 3-1/2" x 3/8" BOX BEAM SUPPORT ANGLE ASTM A36	(A) 5-3/8" x 5/8" x 27" STANDARD BOX BEAM SPLICE PLATE ASTM A36	(A) 5-3/8" x 5/8" x 27" 25:1 FLARE BOX BEAM SPLICE PLATE ASTM A36	(A) 3/4" ø x 2" HEX A325 BOLT	(A) REFLECTIVE TAB
	EA	EA	EA	EA	EA	EA	EA	EA	EA
Sta 758+66.44 to 761+72.26 RT	51	102	17	51	51	28	4	136	7
Sta 759+92.34 to 762+98.16 LT	51	102	17	51	51	28	4	136	7
Sta 861+42.64 to 864+48.46 RT	51	102	17	51	51	28	4	136	7
Sta 862+68.54 to 865+74.36 LT	51	102	17	51	51	28	4	136	7
Sta 1105+87.64 to 1108+93.46 RT	51	102	17	51	51	28	4	136	7
Sta 1107+13.54 to 1110+19.36 LT	51	102	17	51	51	28	4	136	7
Sta 1285+09.43 to 1287+61.30 RT	42	84	14	42	42	24	2	112	6
Sta 1286+35.34 to 1289+41.15 LT	51	102	17	51	51	28	4	136	7
Sta 1288+77.56 to 1289+31.56 RT	9	18	3	9	9	2	0	24	3
Sta 1409+81.74 to 1412+69.56 RT	48	96	16	48	48	26	4	128	7
Sta 1411+07.64 to 1413+95.46 LT	48	96	16	48	48	26	4	128	7
Sta 1749+17.04 to 1752+04.86 RT	48	96	16	48	48	26	4	128	7
Sta 1750+42.94 to 1753+30.76 LT	48	96	16	48	48	26	4	128	7
TOTAL	**600**	**1200**	**200**	**600**	**600**	**326**	**46**	**1600**	**86**

(A) Include these items in the contract unit price for "BOX BEAM GUARDRAIL".

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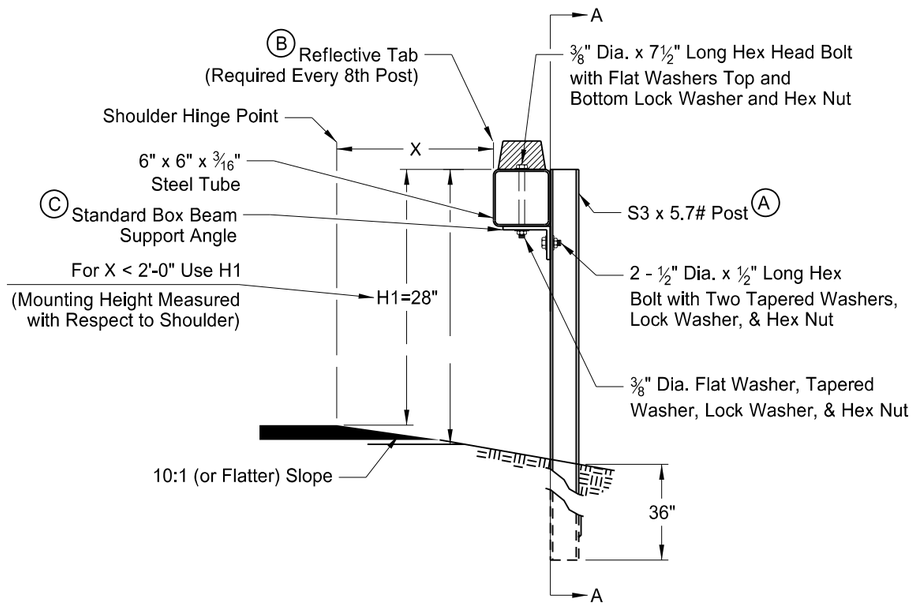
ND 8 Box Beam Guardrail Quantities

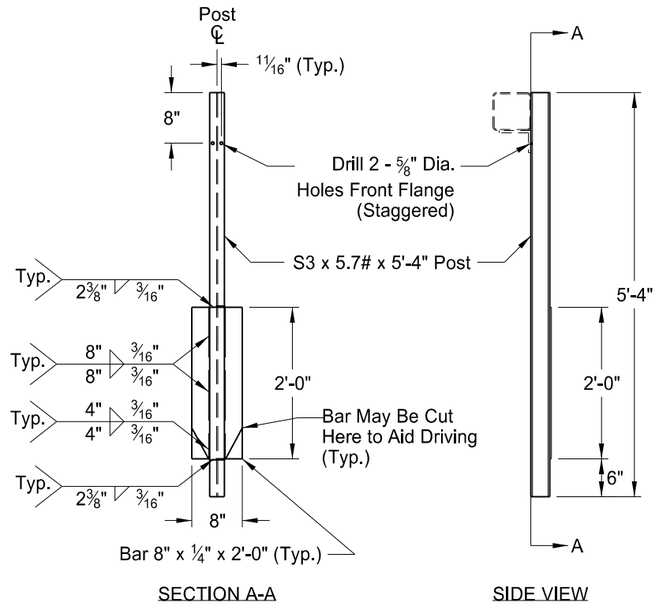
RP 14.422 - Double 7'-8" x 5'-5"x 60' SPPA
RP 16.371 - Double 8'-10" x 6'1" x 64' SPPA
RP 20.992 - Double 10' x 5' x 75' RCB
RP 24.381 - Triple 8' x 8' x 49' RCB
RP 26.752 - 10'-3" x 6'-9" x 76' SPPA
RP 33.176 - 10'-8" x 6'-11" x 84' SPPA

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	8



STANDARD BOX BEAM POST (TYPICAL)
S3 x 5.7# Post Assembly



SECTION A-A SIDE VIEW

POST DETAIL
S3 x 5.7# with Soil Plate

Notes:

(A) Refer to "POST DETAIL - S3 x 5.7# with Soil Plate".

(B) Refer to "REFLECTIVE TAB DETAIL" on sheet Box Beam Guardrail General Details for additional details.

(C) Refer to "STANDARD BOX BEAM SUPPORT ANGLE" on sheet Box Beam Guardrail General Details for additional details.

(D) Complete all welds prior to galvanizing.

(E) Include all items in the unit price for BOX BEAM GUARDRAIL.

(F) Incorporate only components that conform to Section 764 of the Standard Specifications into the project.

(G) Field verify all dimensions and incorporate the dimensions into the guardrail shop drawings. Submit guardrail shop drawings to the Engineer for approval prior to guardrail fabrication.

(H) Standard Post Spacing = 6'-0" unless otherwise shown.

(I) Drawing not to scale

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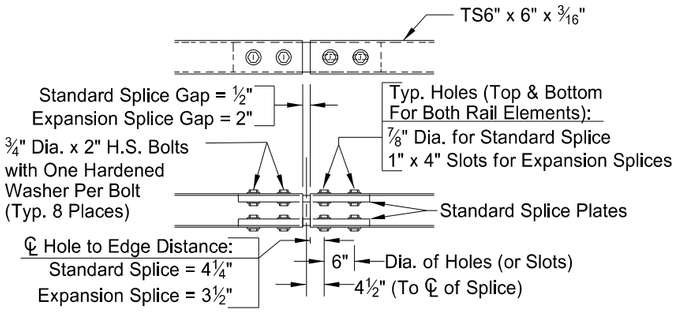
Box Beam Guardrail

Post Details

ND 8

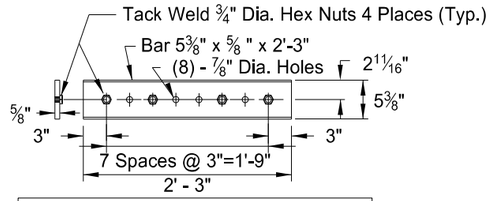
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	9

23 USC § 409 Documents
NDDOT Reserves All Objections

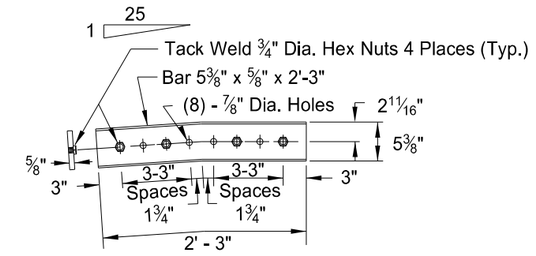


Splices Shall Be Centered Between Posts

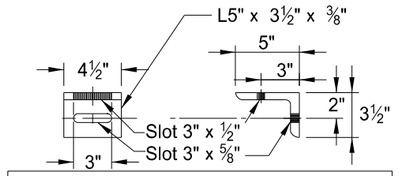
STANDARD RAIL SPLICE DETAIL



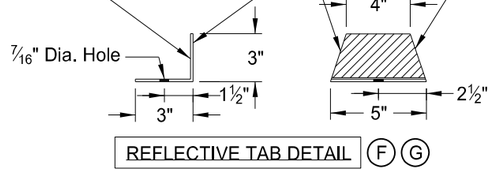
STANDARD BOX BEAM SPLICE PLATE
(2 Req'd per straight splice)



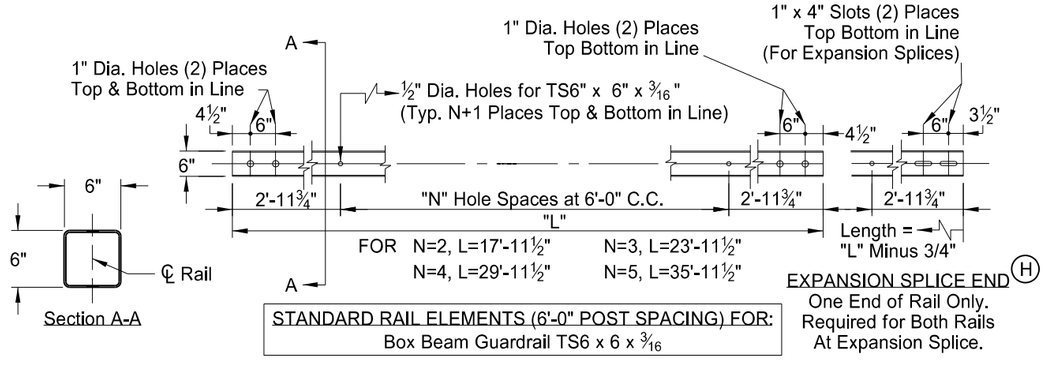
25 : 1 FLARE BOX BEAM SPLICE PLATE
(2 Req'd per 25 :1 splice, 46 Required Total)



STANDARD BOX BEAM SUPPORT ANGLE



REFLECTIVE TAB DETAIL (F) (G)



STANDARD RAIL ELEMENTS (6'-0" POST SPACING) FOR:
Box Beam Guardrail TS6 x 6 x 3/16

EXPANSION SPLICE END (H)
One End of Rail Only.
Required for Both Rails
At Expansion Splice.

Notes:

(A) Include all items in the unit price for BOX BEAM GUARDRAIL.

(B) Incorporate only components that conform to Section 764 of the Standard Specifications into the project.

(C) Field verify all dimensions and incoporate the dimensions into the guardrail shop drawings. Submit guardrail shop drawings to the Engineer for approval prior to guardrail fabrication.

(D) Standard Post Spacing = 6'-0" unless otherwise shown.

(E) Place expansion splices on all box beam installations over 300' in intervals not to exceed 500'.

(F) Place reflective tabs at a 48' spacing (every eighth post) and angle slightly toward traffic. Do not place reflective tabs on MBEAT terminals.

(G) Use materials that meet the requirements for Type III or Type IV reflective sheeting. Use reflectors that are the same color as the adjacent pavement marking unless noted otherwise on the plans.

(H) The minimum nominal rail length must be 18', unless approved otherwise.

(I) Complete all welds prior to galvanizing.

(J) Provide rail lengths so that a joint occurs at the P.T. of the flare. The first rail element must be 18' long (nominal).

(K) Drawing not to scale

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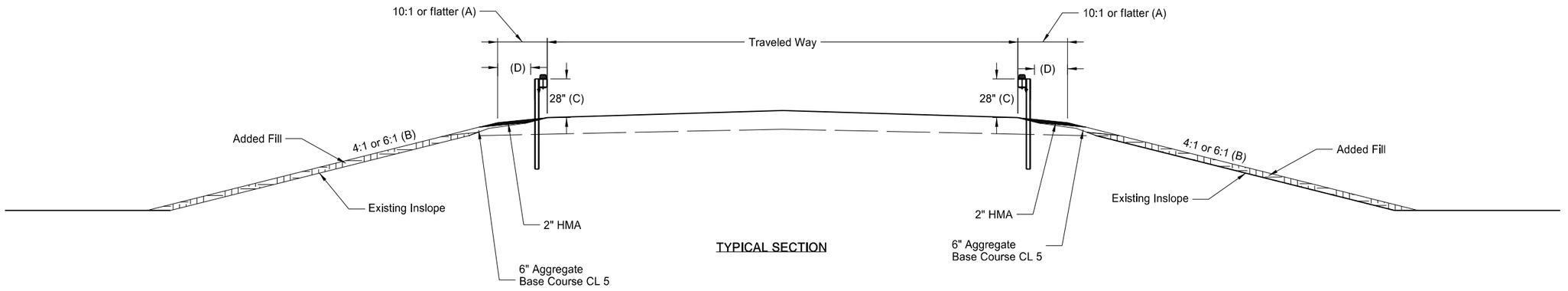
Box Beam Guardrail

General Details

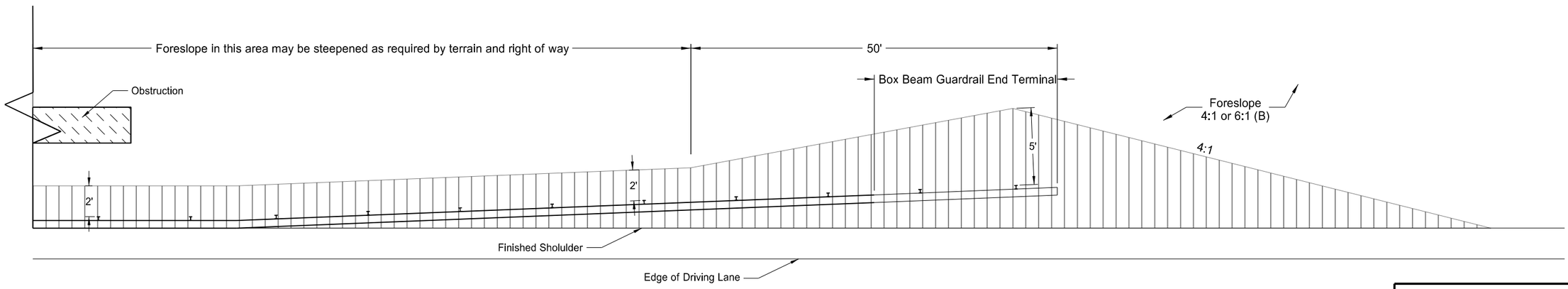
ND 8

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	130	10

23 USC § 409 Documents
NDDOT Reserves All Objections



TYPICAL SECTION



PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL

NOTES

(A) Slope flatter than 10:1 may be required to provide proper guardrail height.

(B) Match the constructed inslope to the existing inslope at all guardrail embankment aeras. Existing inslopes may vary. Include all costs associated with the Guardrail Embankment in the unit price for the item "GUARDRAIL EMBANKMENT".

(C) Measured from top of guardrail to top of surfacing at front face of guardrail.

(D) Dimension varies from 2'-5'.

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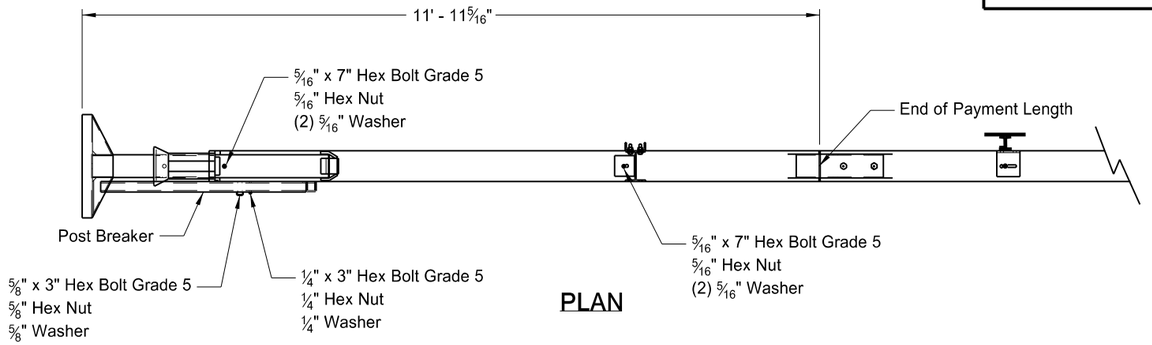
Typical Grading at Obstructions

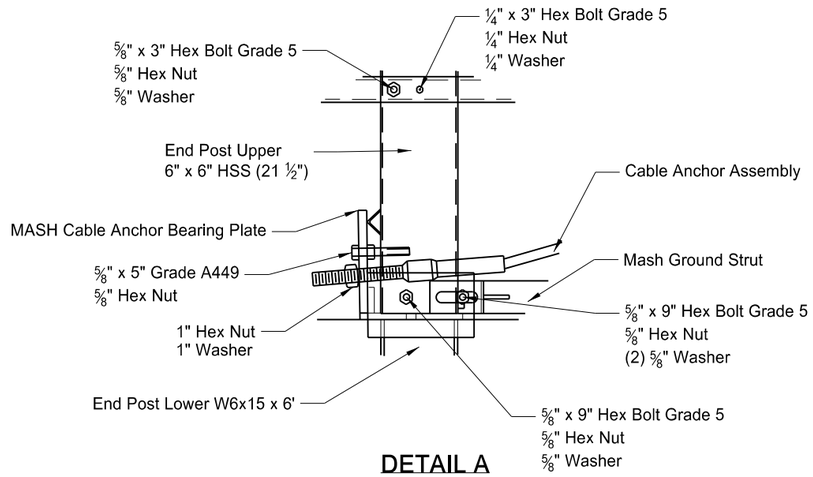
with Box Beam Guardrail

ND 8

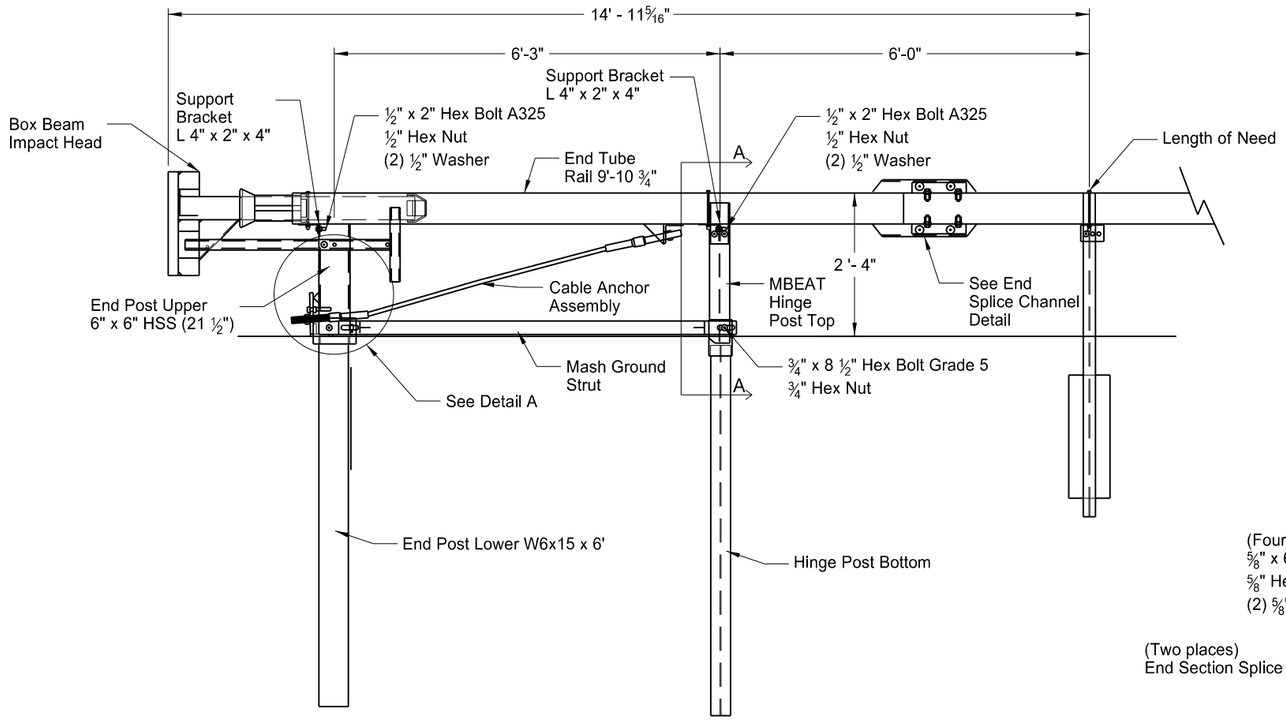
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-008(054)012	130	11



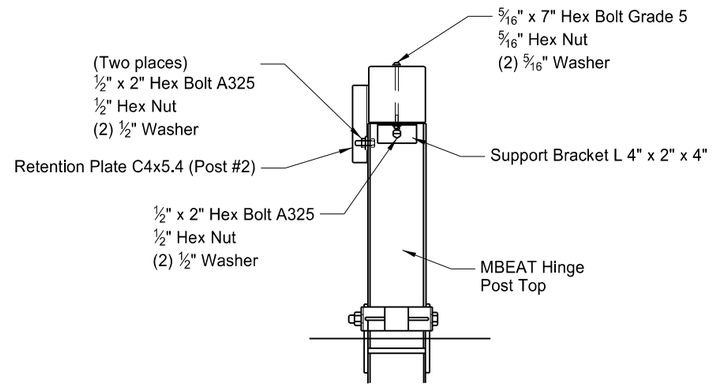
PLAN



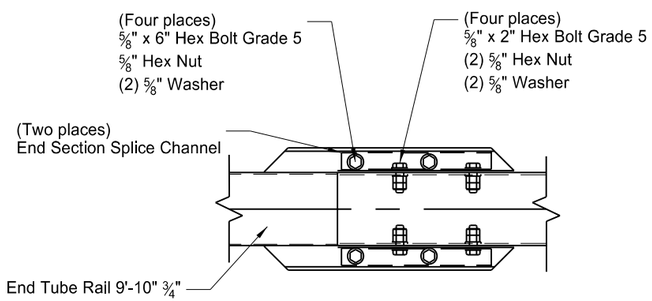
DETAIL A



ELEVATION



SECTION A-A



END SPLICE CHANNEL DETAIL

Box Beam Guardrail

End Terminal Details

ND 8

23 U.S.C. 409
NDDOT Reserves All Objections

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	NH-5-008(054)012	170	1

NOTES:

Work at this site includes a joint repair as detailed here for the concrete cold joint in the walls, roof slab & floor slab near the west end of the box culvert.

If the box culvert needs to be dewatered, include the price in the "BOX CULVERT JOINT REPAIR" bid item.

Perform the "BOX CULVERT JOINT REPAIR" work as follows:

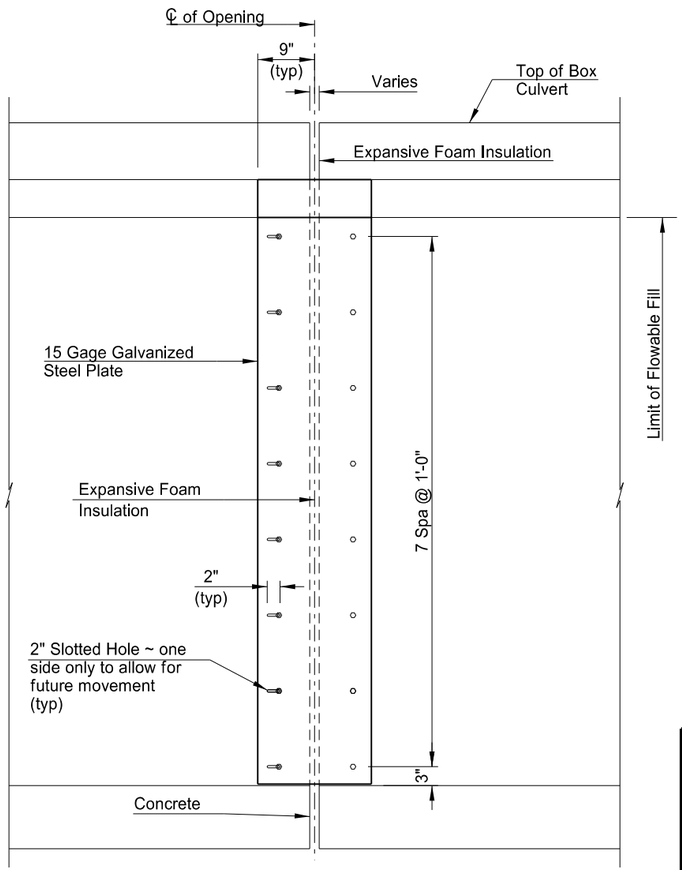
Clean all loose debris from joint and fill the voids along the box culvert floor with concrete. Next fill the side wall voids and roof voids and joints with sprayed expansive foam insulation.

Cut all expansive foam insulation flush with the interior of the box culvert after it has dried. Attach an 18" wide, 15 gauge galvanized steel plate to both side wall joints using3#8" galvanized anchors.

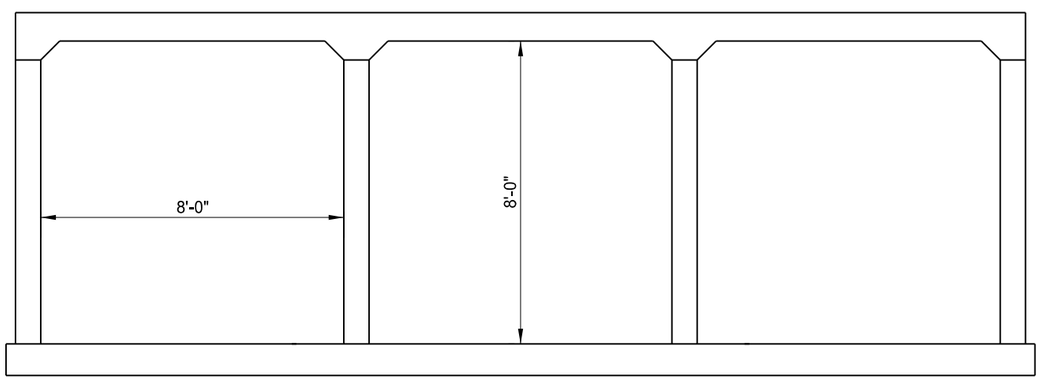
Install the anchorage system according to manufacturers recommendation with a high strength adhesive specifically intended for concrete anchorage, in accordance with Section 806.02 of the NDDOT Standard Specifications.

The bid item "BOX CULVERT JOINT REPAIR" applies to all different types of joint segments in a box culvert. At this site, a total of 8 joint segments will be paid for at the construction joint: 2 exterior walls, 3 floor segments, and 3 roof segments. The voids will not be filled on the interior walls.

Include the cost of all equipment, labor and materials required for the joint repair work, at each segment, in the price bid for "BOX CULVERT JOINT REPAIR."



JOINT REPAIR DETAIL



BARREL SECTION

BOX CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
930	9671	BOX CULVERT JOINT REPAIR	EA	8

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NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

BOX CULVERT JOINT REPAIR

CLEAR SPAN 3 x 8 CLEAR HEIGHT 8'

PROJECT: NH-5-008(054)012

ADAMS COUNTY

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
BG	below grade
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
C Gr	coarse gravel
CS	coarse sand
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
CECB	concrete erosion control blanket
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSFES	corrugated steel flared end section
CSP	corrugated steel pipe
CSTES	corrugated steel traversable end section
C	coulomb
Co	County
Crse	course
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 or ø	diameter
Dir	direction
Dist	distance
DM	disturbed material
DB	ditch block
DG	ditch grade
Dbl	double
Dn	down
Dwg	drawing
Dr	drive
Drwy	driveway
DI	drop inlet
D	dry density
DSDS	dynamic speed display sign
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

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

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NDDOT ABBREVIATIONS

D-101-2

Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser
FFP	fuel filler pipes
FLS	fuel leak sensor
Furn	furnish/ed
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
Mb	mailbox
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
MGS	Midwest Guardrail System
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
P Cap	plastic cap
Pl or ℙ	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 or Pref	preformed
Prep	preperation
Press.	pressure

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 04/23/18 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-101-3

PRV	pressure relief valve
Prestr	prestressed
Pvt	private
PD	private drive
Prod.	production/produce
Prog	programmed
Prop.	property
Prop Ln	property line
Ppsd	proposed
PB	pull box
Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
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
RP	reference point
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCFES	reinforced concrete flared end section
RCTES	reinforced concrete traversable end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
Reinf	reinforcement
Res	reservation
Rs	residence
Ret	retaining
Rev	reverse
Rt	right
R/W	right of way
Riv	river
Rd	road
Rdbd	road bed
Rdwy	roadway
RWIS	roadway weather information system
Rk	rock
Rt	route
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 or Sdwk	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
SRCP	slotted reinforced concrete pipe
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SA	special assembly
SP	special provisions
G	specific gravity
Spk	spike
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
TES	traversable end section
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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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
GTR RAMSEY WD	Greater Ramsey Water District
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
IDEA1	Idea1
INT-COMM TEL	Inter-Community Telephone Company
KANEB PL	Kaneb Pipeline Company
KEM ELEC	Kem Electric Cooperative Incorporated
KOCH GATH SYS	Koch Gathering Systems Incorporated
LKHD PL	Lakehead Pipeline Company
LNGDN RWU	Langdon Rural Water Users Incorporated
LWR YELL R ELEC	Lower Yellowstone Rural Electric
MCKNZ CON	McKenzie Consolidated Telcom
MCKNZ ELEC	McKenzie Electric Cooperative
MCKNZ WRD	McKenzie County Water Resource District
MCLEOD	McLeod USA
MCLN ELEC	McLean Electric Cooperative
MCLN-SHRDN R WAT	McLean-Sheridan Rural Water
MDU	Montana-dakota Utilities
MID-CONT CABLE	Mid-Continent Cable
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
MISS VALL COMM	Missouri Valley Communications
MISS W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative
MRE LBTY TEL	Moore & Liberty Telephone
MUNICIPAL	City Water And Sewer
MUNICIPAL	City Of '.....'
N CENT ELEC	North Central Electric Cooperative
N VALL W DIST	North Valley Water District
ND PKS & REC	North Dakota Parks And Recreation
ND TEL	North Dakota Telephone Company
NDDOT	North Dakota Department of Transportation
NDSU SOIL SCI DEPT	NDSU Soil Science Department
NEMONT TEL	Nemont Telephone
NODAK R ELEC	Nodak Rural Electric Cooperative
NOON FRMS TEL	Noonan Farmers Telephone Company
NPR	Northern Plains Railroad
NSP	Northern States Power
NTH PRAIR RW	Northern Prairie Rural Water Association
NTHN BRDR PL	Northern Border Pipeline
NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated
NTHWSTRN REF	Northwestern Refinery Company
NW COMM	Northwest Communication Cooperation
NWRWD	Northwest Rural Water District
ONEOK	Oneok gas
OSHA	Occupational Safety and Health Administration
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
PVT ELEC	Private Electric
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Cooperative
RRVW	Red River Valley & Western Railroad
S CENT REG WD	South Central Regional Water District
S E W U	South East Water Users Incorporated
SCOTT CABLE	Scott Cable Television Dickinson
SHERDN ELEC	Sheridan Electric Cooperative
SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
SKYTECH	Skyland Technologies Incorporated
SLOPE ELEC	Slope Electric Cooperative Incorporated
SOURIS RIV TELCOM	Souris River Telecommunications
ST WAT COMM	State Water Commission
STATE LN WATER	State Line Water Cooperative
STER ENG	Sterling Energy
STUT RWU	Stutsman Rural Water Users
SW PL PRJ	Southwest Pipeline Project
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
TESORO HGH PLNS PL	Tesoro High Plains Pipeline
TRI-CNTY WU	Tri-County Water Users Incorporated
TRL CO RWU	Traill County Rural Water Users
UNTD TEL	United Telephone
UPPR SOUR WUA	Upper Souris Water Users Association
US SPRINT	U.S. Sprint
USAF MSL CABLE	U.S.A.F. Missile Cable
USFWS	US Fish and Wildlife Service
USW COMM	U.S. West Communications
VRNDRY ELEC	Verendrye Electric Cooperative
W RIV TEL	West River Telephone Incorporated
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

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04-23-18	General Revisions
09-20-18	General Revisions

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Line Styles

D-101-20

Existing Topography

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

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

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

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

Traffic Utilities

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

Sign Structures

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups

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Line Styles

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

- Geotextile Fabric Type D (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — S)
- Subgrade Reinforcement
- Failure Line

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

- Hidden Object
- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Centerline Main
- Centerline
- Existing Ground (Details)
- Existing Conditions
- Sheet Piling

Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Floating Silt Curtain (S — S)
- Silt Fence (SF — SF)
- Excavation Limits
- Fiber Rolls

Environmental

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

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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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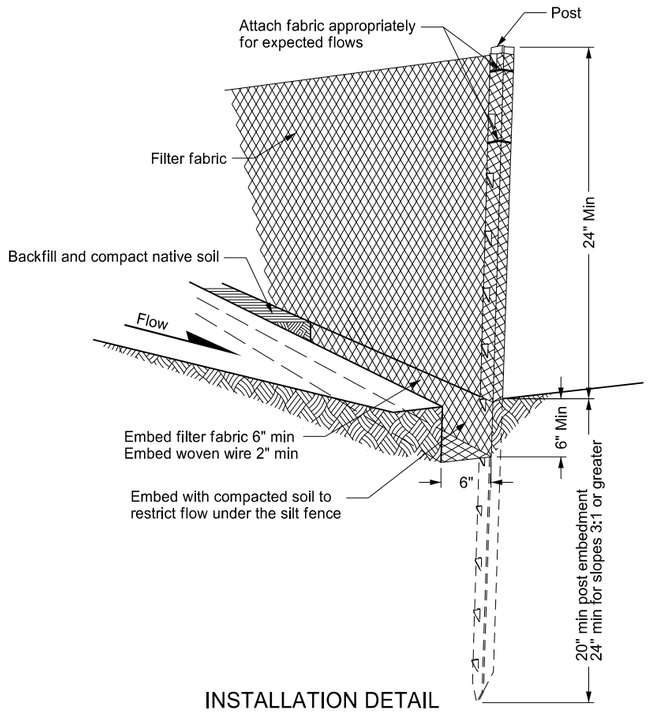
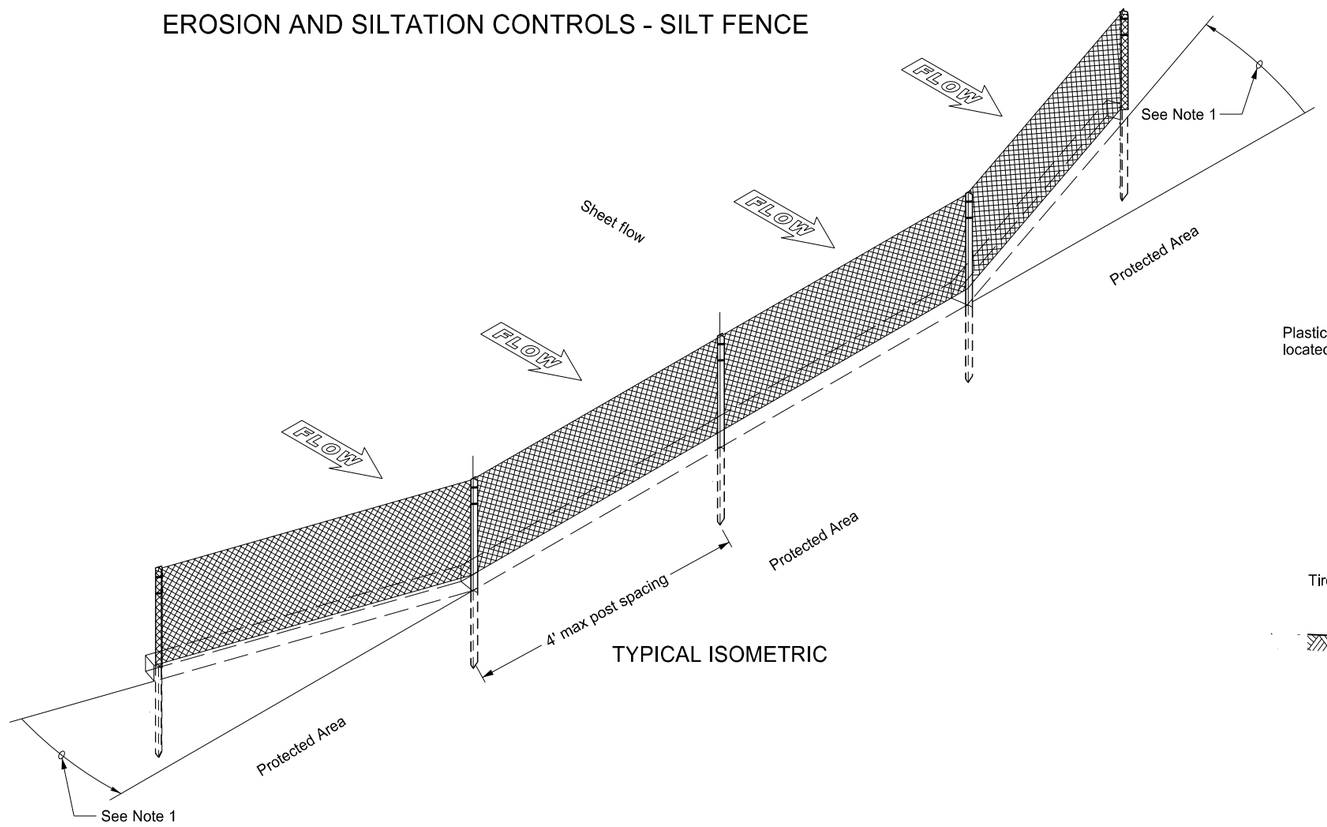
EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1

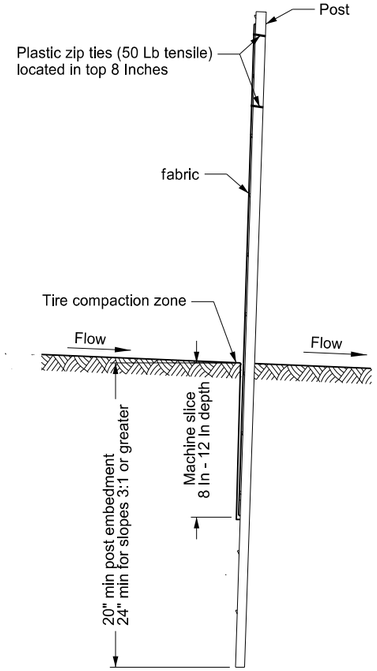


INSTALLATION DETAIL

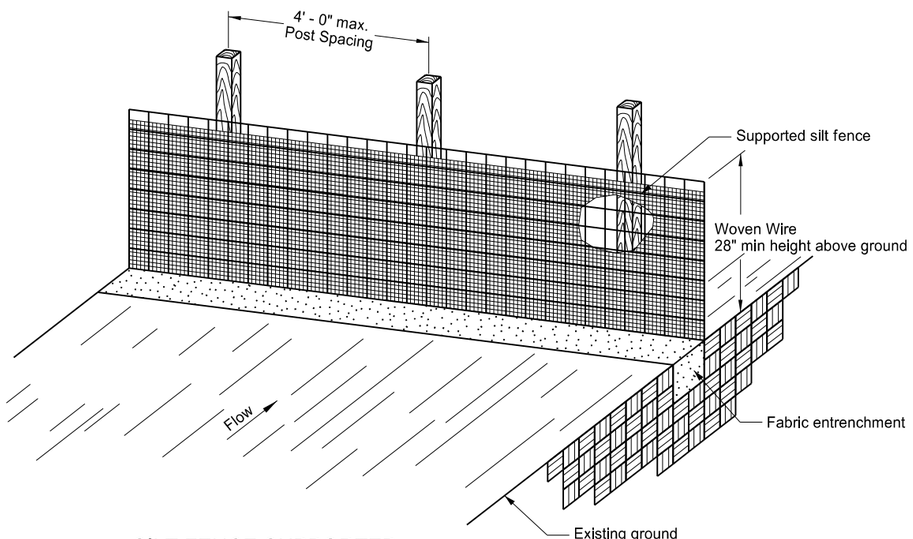
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.



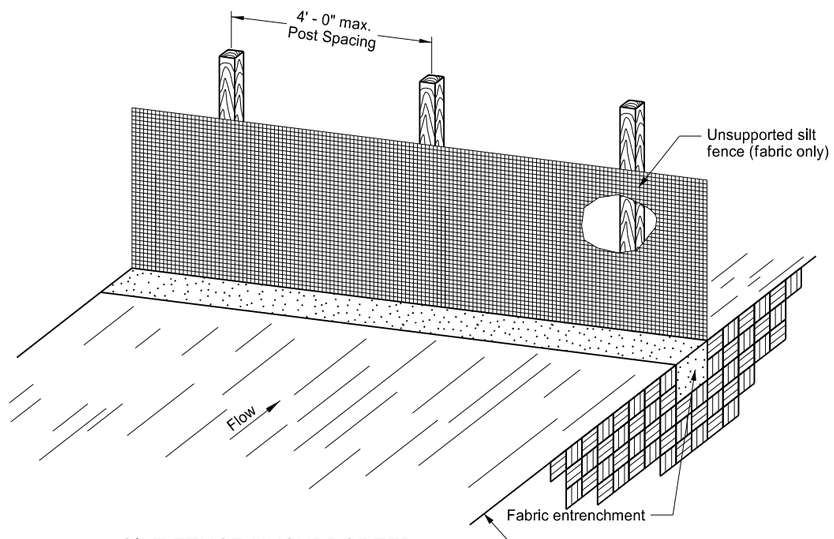
TYPICAL ISOMETRIC



MACHINE SLICED SILT FENCE



SILT FENCE SUPPORTED



SILT FENCE UNSUPPORTED

NOTES:
1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Place splices outside low spots.
3. Install silt fencing parallel to contour lines.
4. Do not embed silt fence when placed in standing water.
5. Silt fence material does not need to reach the top of woven wire support.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2.
06-27-16 08-27-19	Revised details & added new ones. New Design Engineer PE Stamp.

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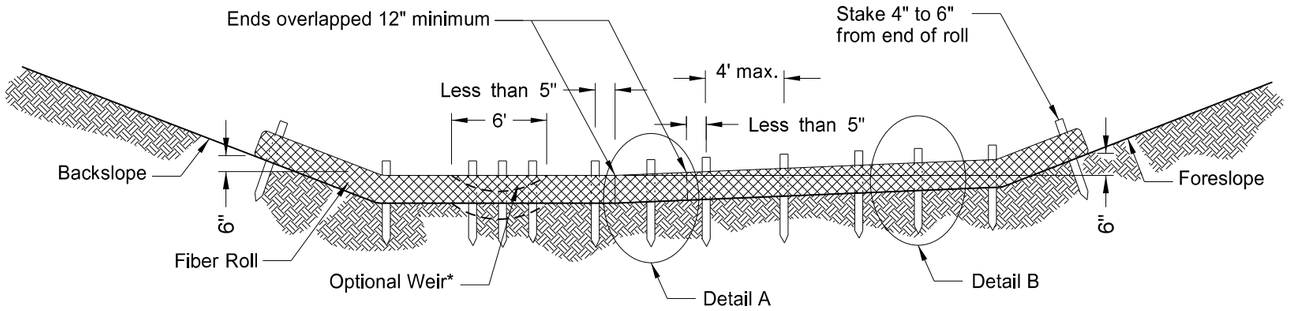
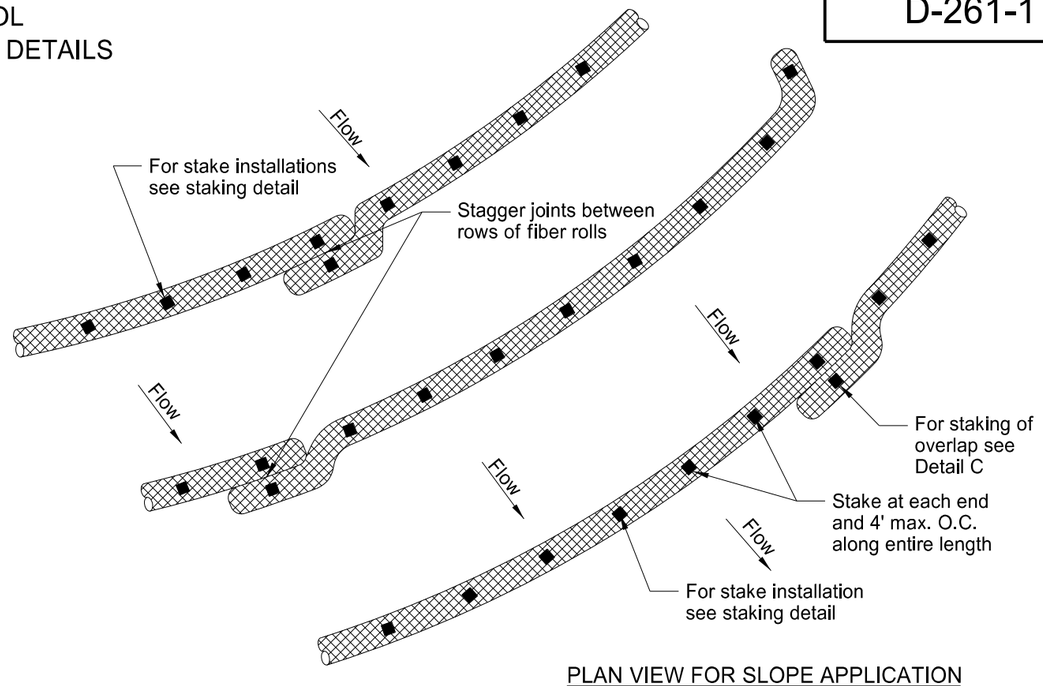
EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

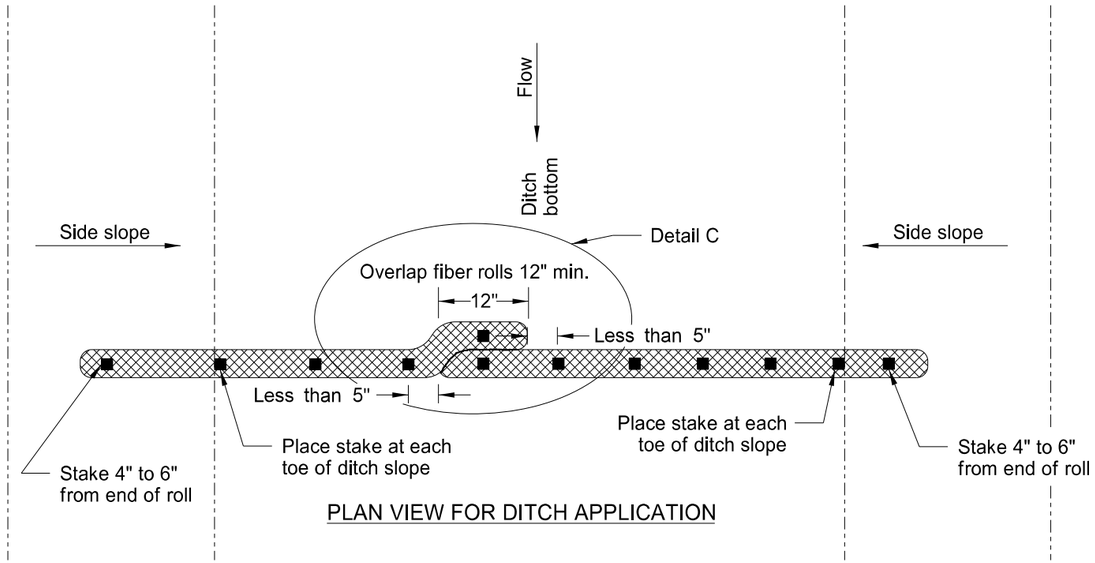


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

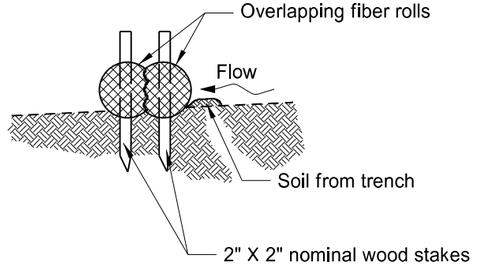
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

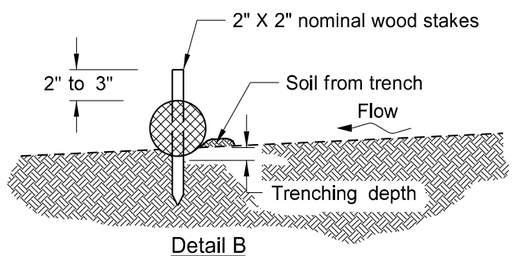


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-18-10

REVISIONS

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

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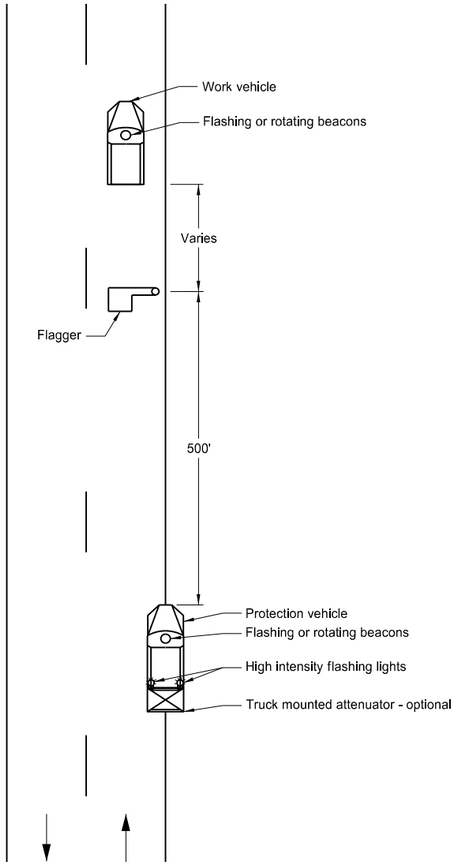
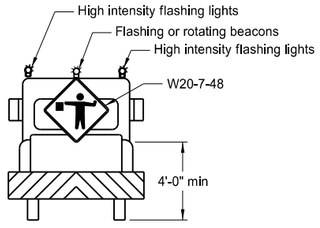
TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

D-704-2

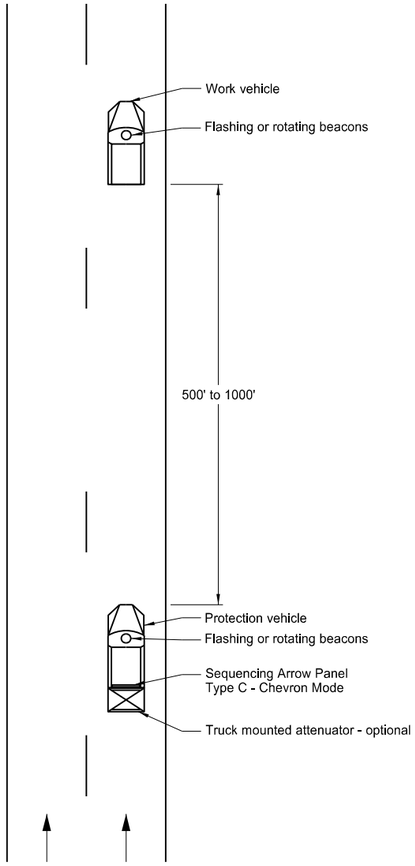
Two Lane, Two Way Roadways

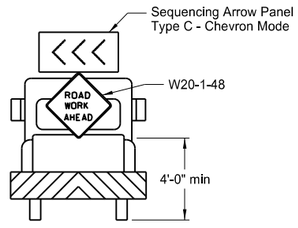




Typical Protection Vehicle

Multilane Roadways





Typical Protection Vehicle

Notes:

1. Display a 360 degree rotating, flashing, oscillating or strobe light on the working vehicle.

2. Display a 360 degree rotating, flashing, oscillating or strobe light on the shadow vehicle. Operate a sequencing arrow panel Type C in chevron mode on the shadow vehicle for Multilane Roadway.

3. Use these layouts during daylight hours and in areas of good visibility only.

4. Use flagger to protect the work area and warn oncoming traffic for two lane, two way roadway.

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

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CONSTRUCTION SIGN DETAIL

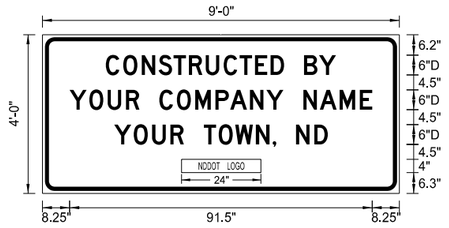
D-704-5

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

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S):

AREA: 36.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

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

Notes:

1. Post mount sign a distance of ½A following the End Road Work (G20-2-48) sign (maximum 2 signs per project.)

2. Use sign on rural projects with a 30 day or longer duration (not required on seal coats or other short duration projects.)

3. Do not place sign in urban areas or within city limits.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV.
9-27-17	Updated to active voice.
8-30-18	Updated sign number in note 1.
10-03-19	New Design Engineer PE Stamp.

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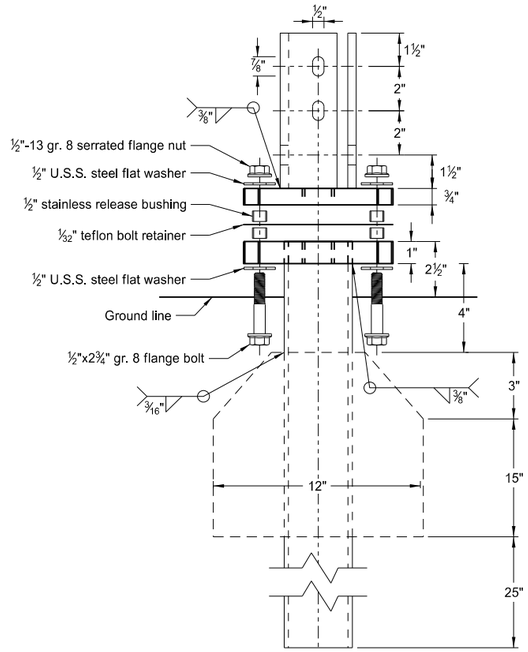
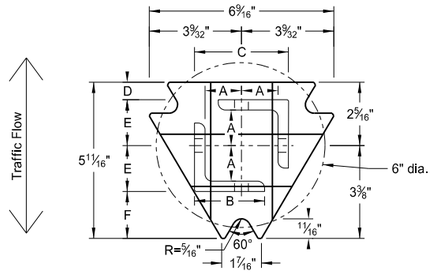
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

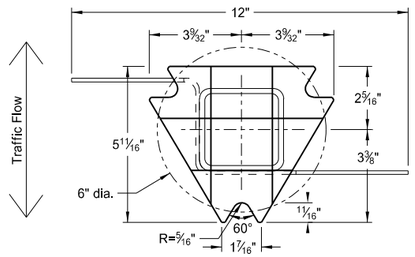


Multi-Directional
Slip Base Assembly

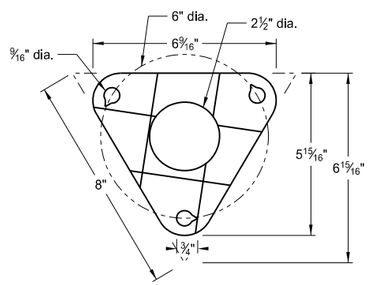
Perforated Tube



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



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

Notes:

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

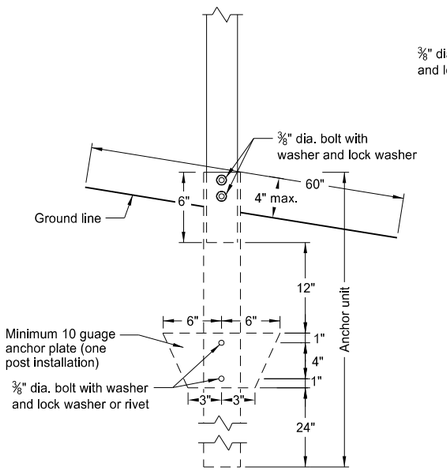
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³/16	10	Yes	

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

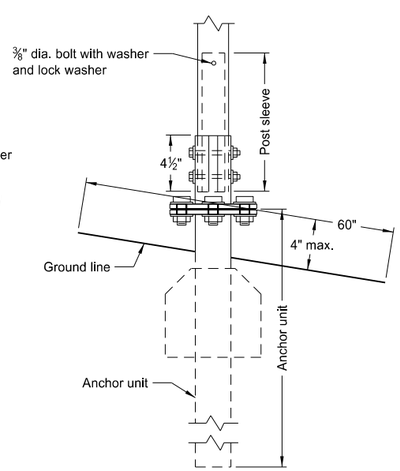
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³/16"x10 ga.	1⁹/64"	2½"	3¹/32"	2⁵/32"	1³³/64"	1⅞"
2½"x10 ga.	1⁹/32"	2½"	3⁵/16"	⅝"	1²¹/32"	1¾"

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

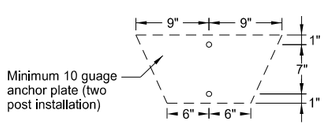
(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



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

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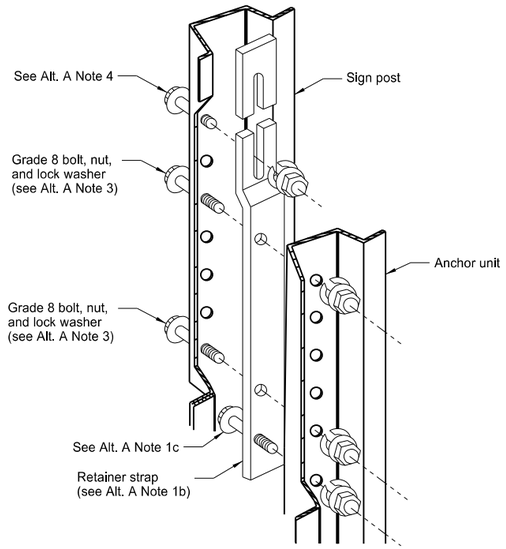
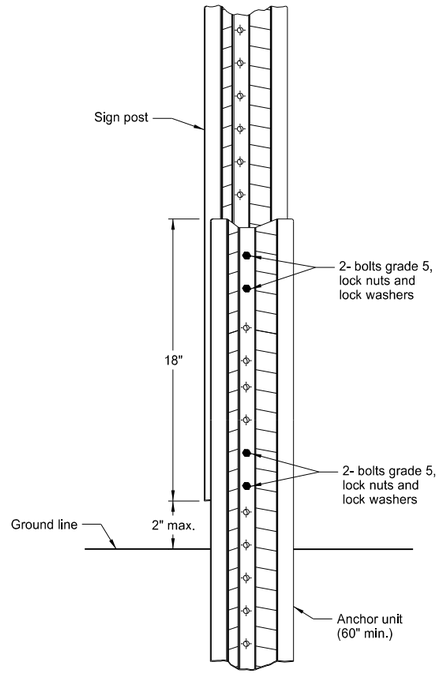
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

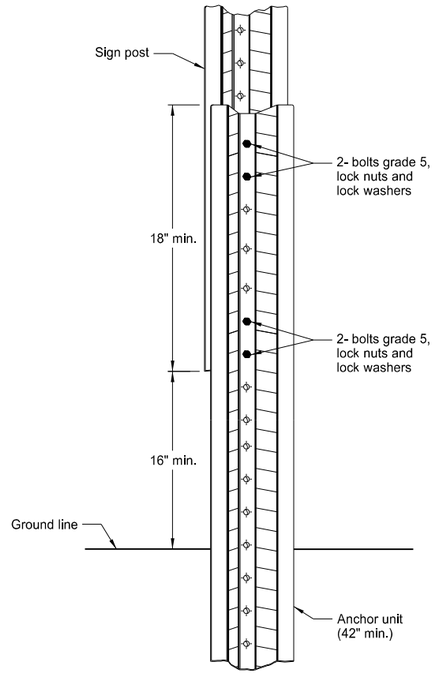


Detail A



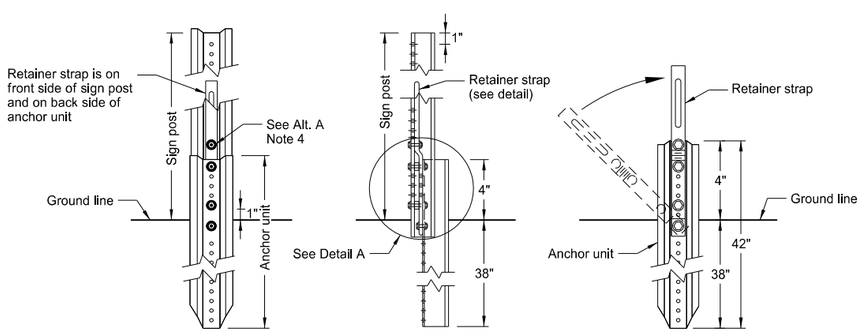
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



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

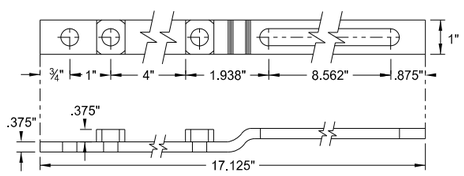
Install a maximum of 3 posts within 7'.



Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



Retainer Strap Detail

Alternate A Steps of Installation:

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

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

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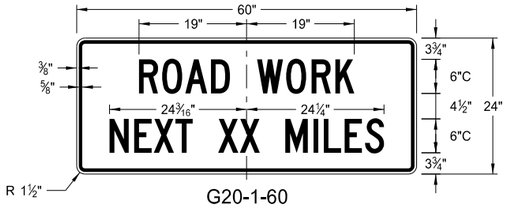
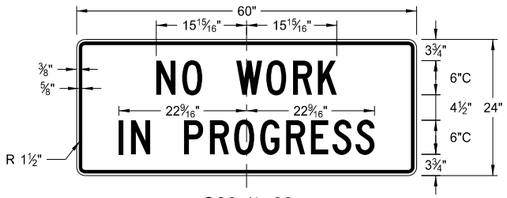
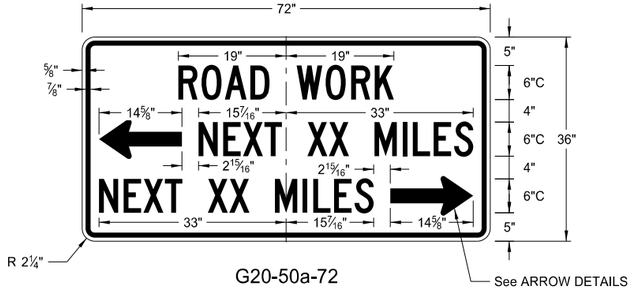
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



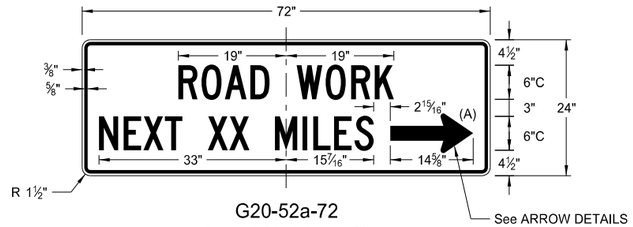
G20-1-60
Legend: black (non-refl)
Background: orange



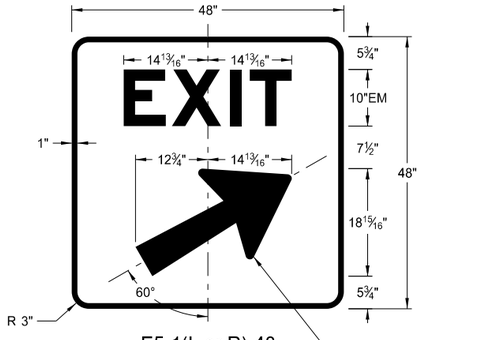
G20-1b-60
Legend: black (non-refl)
Background: orange



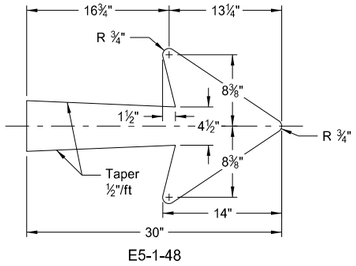
G20-50a-72
Legend: black (non-refl)
Background: orange



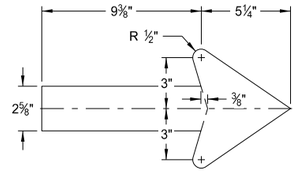
G20-52a-72
Legend: black (non-refl)
Background: orange



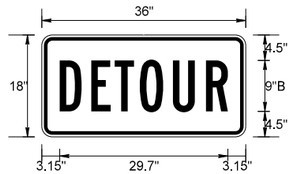
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



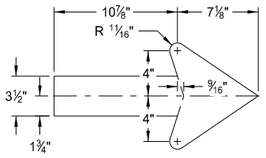
E5-1-48



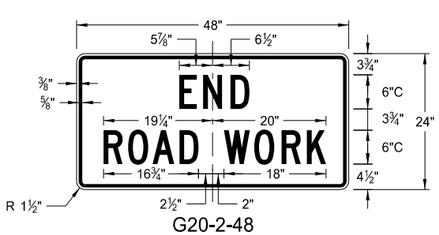
G20-50a-72
G20-52a-72



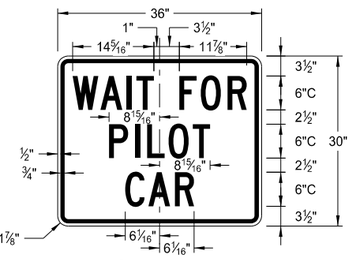
M4-8-36
Legend: black (non-refl)
Background: orange



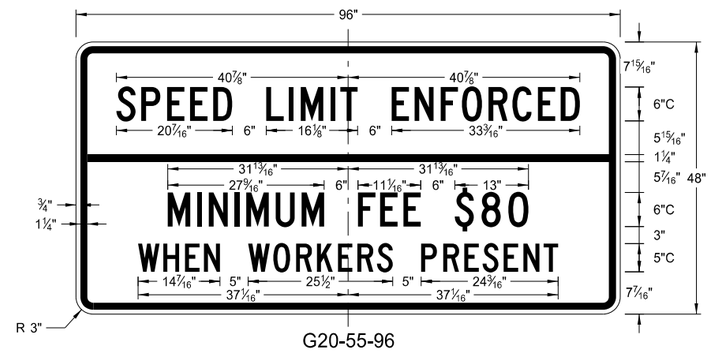
M4-9(L or R)-30
Right or Left



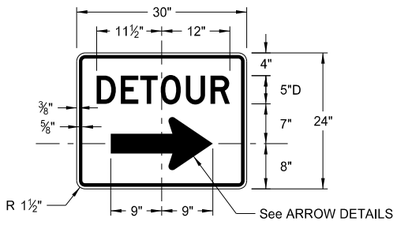
G20-2-48
Legend: black (non-refl)
Background: orange



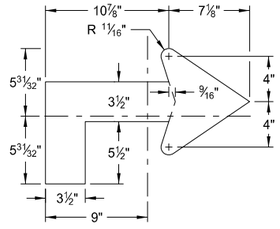
G20-4b-36
Legend: black (non-refl)
Background: orange



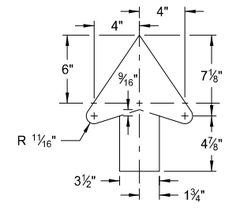
G20-55-96
Legend: black (non-refl)
Background: orange



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



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



M4-9-30
Straight

ARROW DETAILS

NOTES:

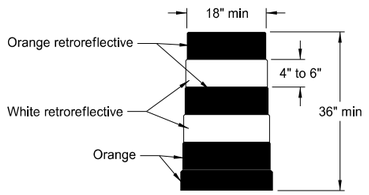
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

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

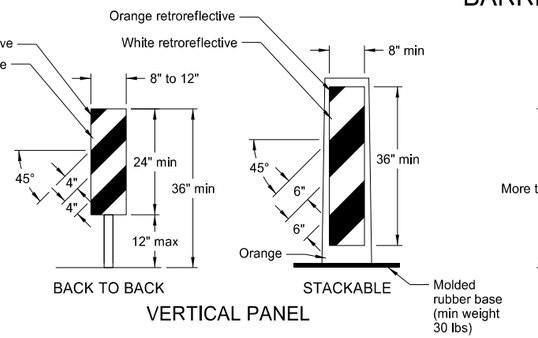
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



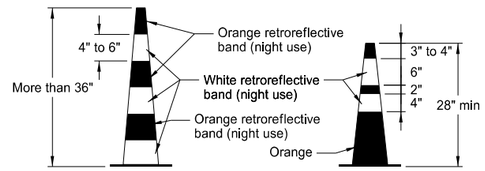
DELINEATOR DRUM

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



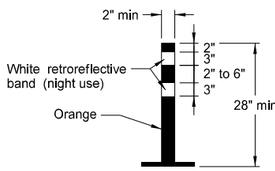
VERTICAL PANEL

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



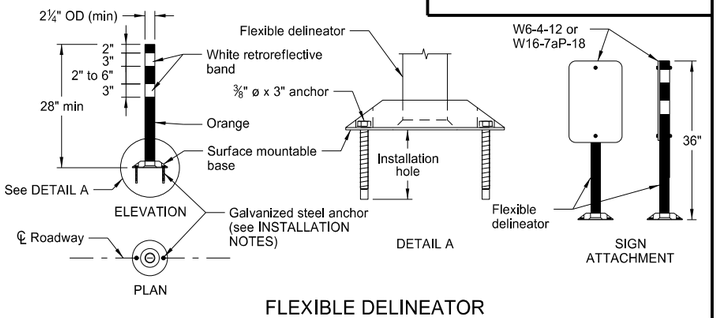
TRAFFIC CONE

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



TUBULAR MARKER

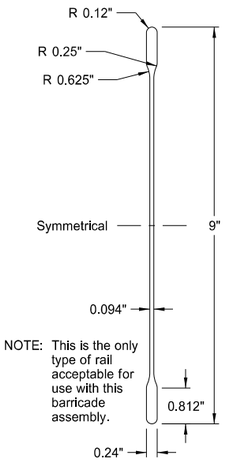
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

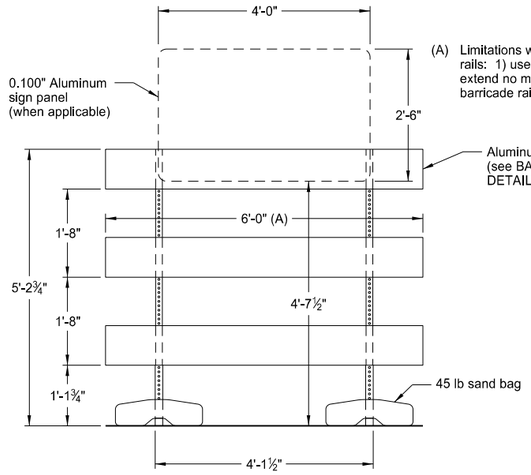
INSTALLATION NOTES:

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



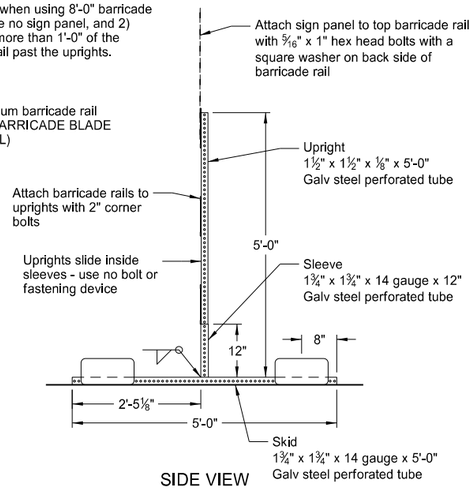
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



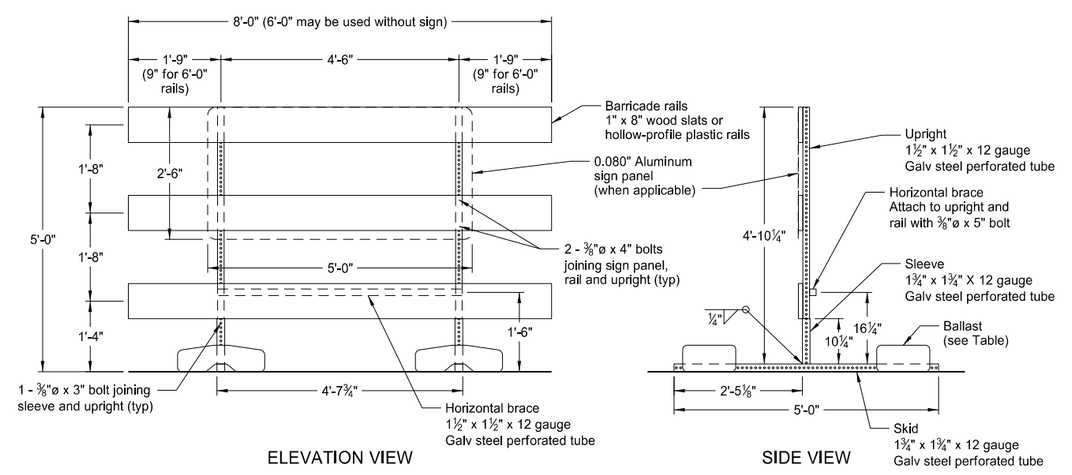
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW



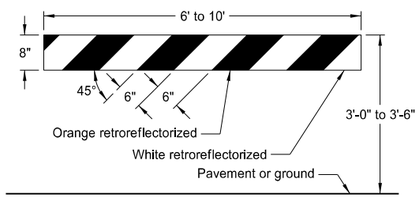
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

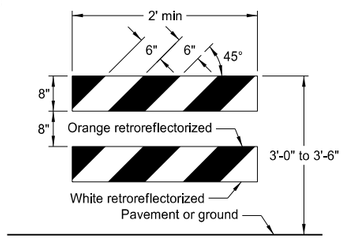


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

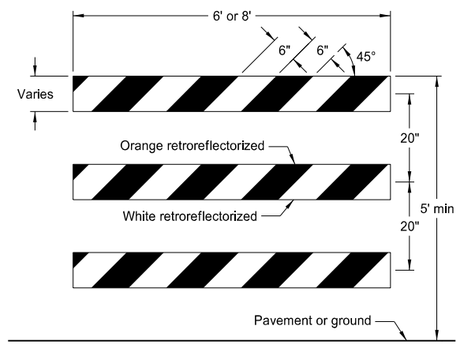
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

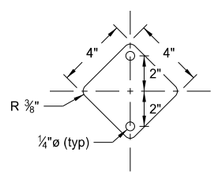


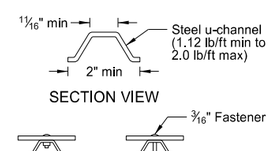
TYPE II BARRICADE

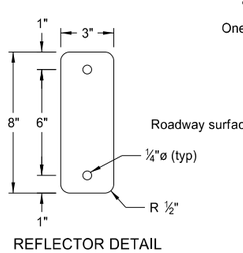


TYPE III BARRICADE

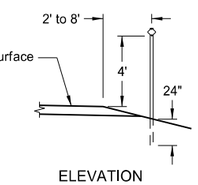
BARRICADE RAIL DETAILS







REFLECTOR DETAIL



ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

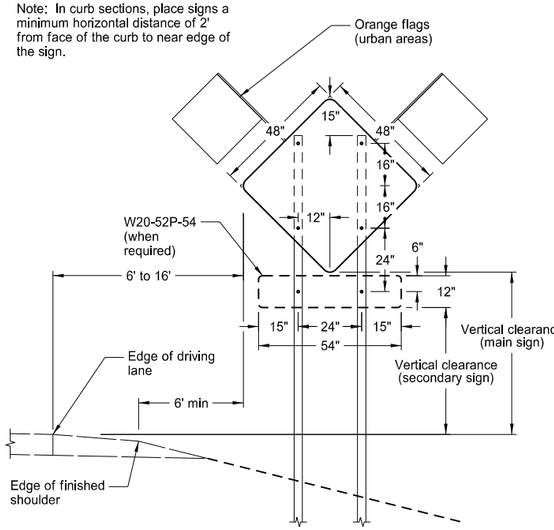
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

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

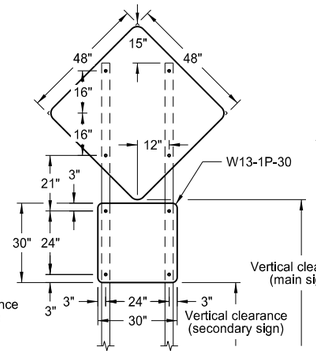
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

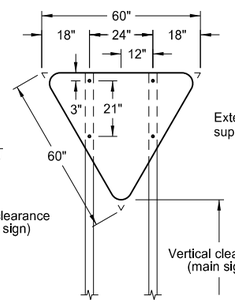
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



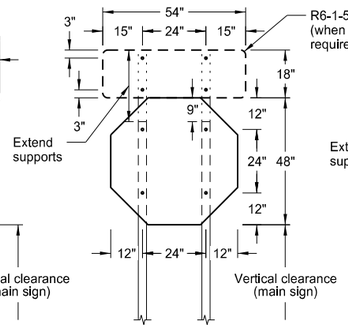
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



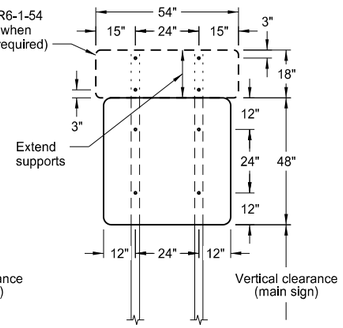
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



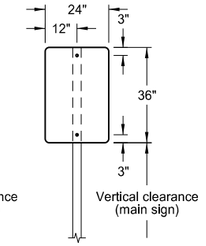
R1-2-60 - YIELD SIGN



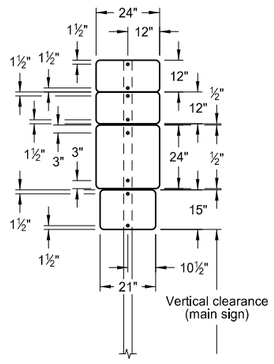
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



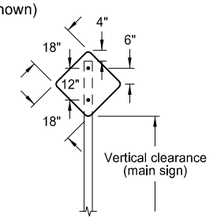
48" x 48" SIGN
(with R6-1-54 sign as required)



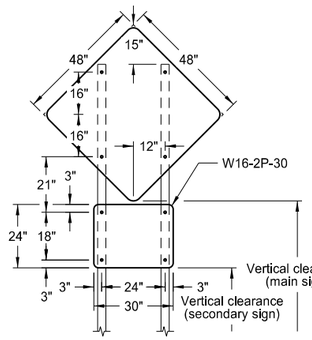
24" x 36" SIGN



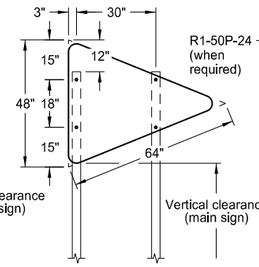
24" x 24"
ROUTE MARKER
ASSEMBLY



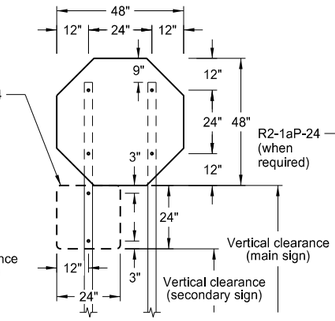
18" x 18"
DIAMOND SIGN



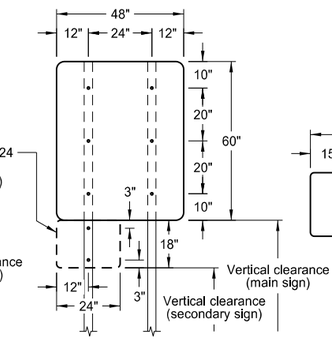
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



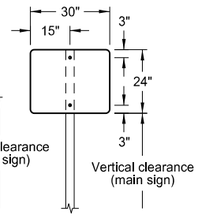
W14-3-64 - PENNANT SIGN



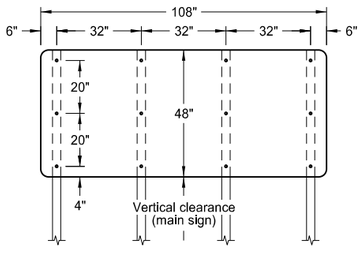
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



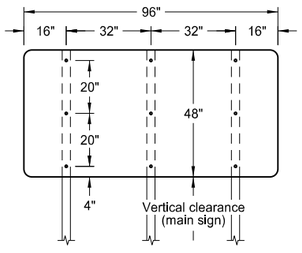
48" x 48" SIGN
(with R2-1aP-24 sign as required)



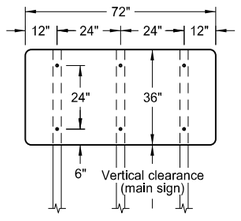
30" x 24" SIGN



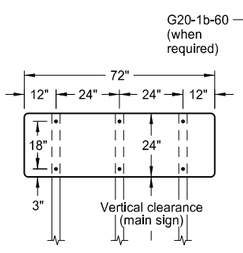
108" x 48" SIGN



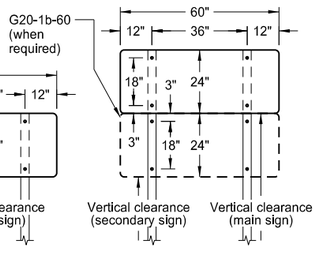
96" x 48" SIGN



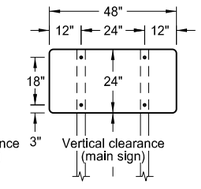
72" x 36" SIGN



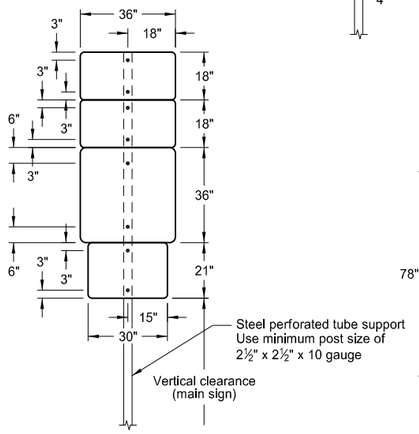
72" x 24" SIGN



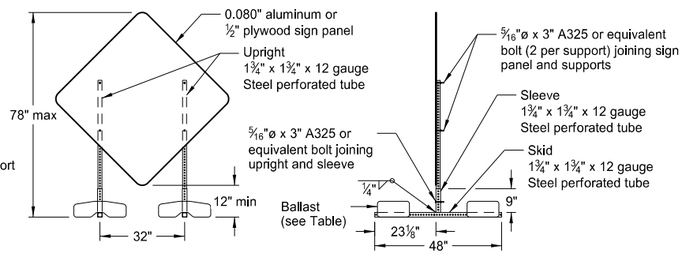
60" x 24" SIGN



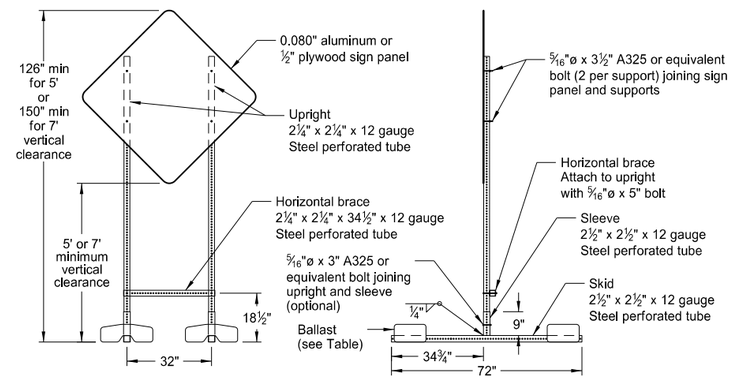
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Galvanize or paint supports. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.

   Place signs over 50 square feet on 2½" x 2½" perforated tube supports as a minimum.

   Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅜" bolts.

3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)

4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

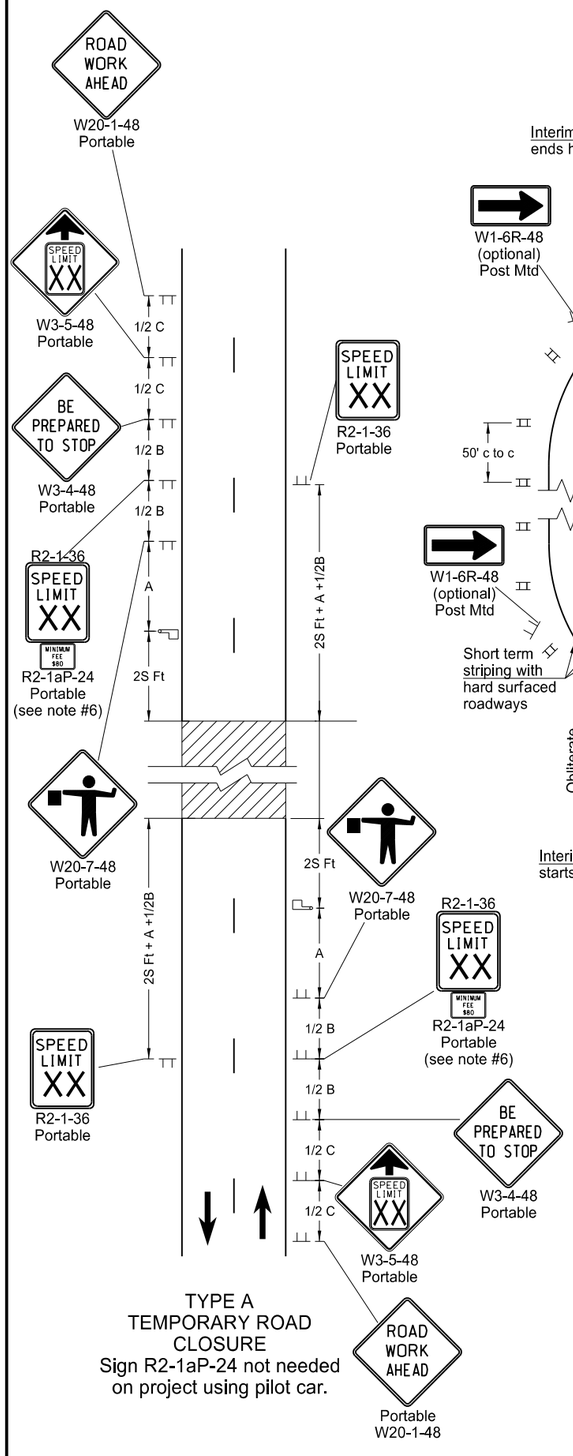
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

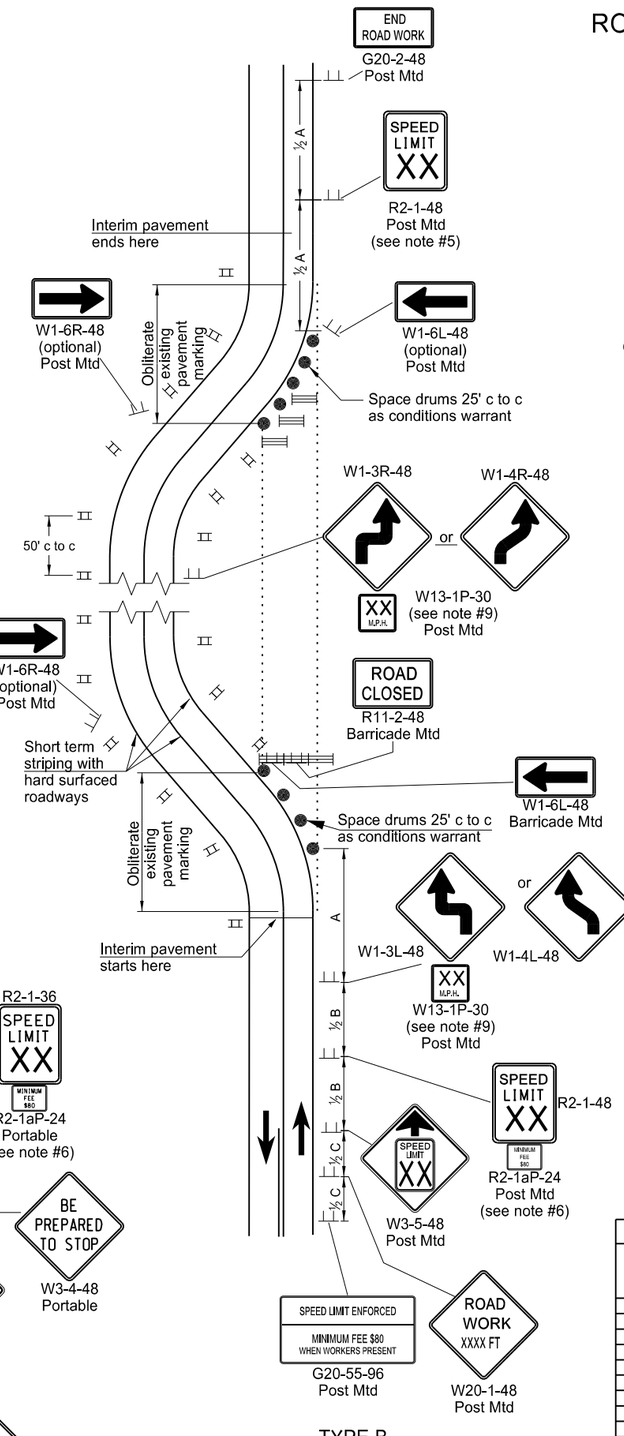
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

ROAD CLOSURE LAYOUTS

D-704-15

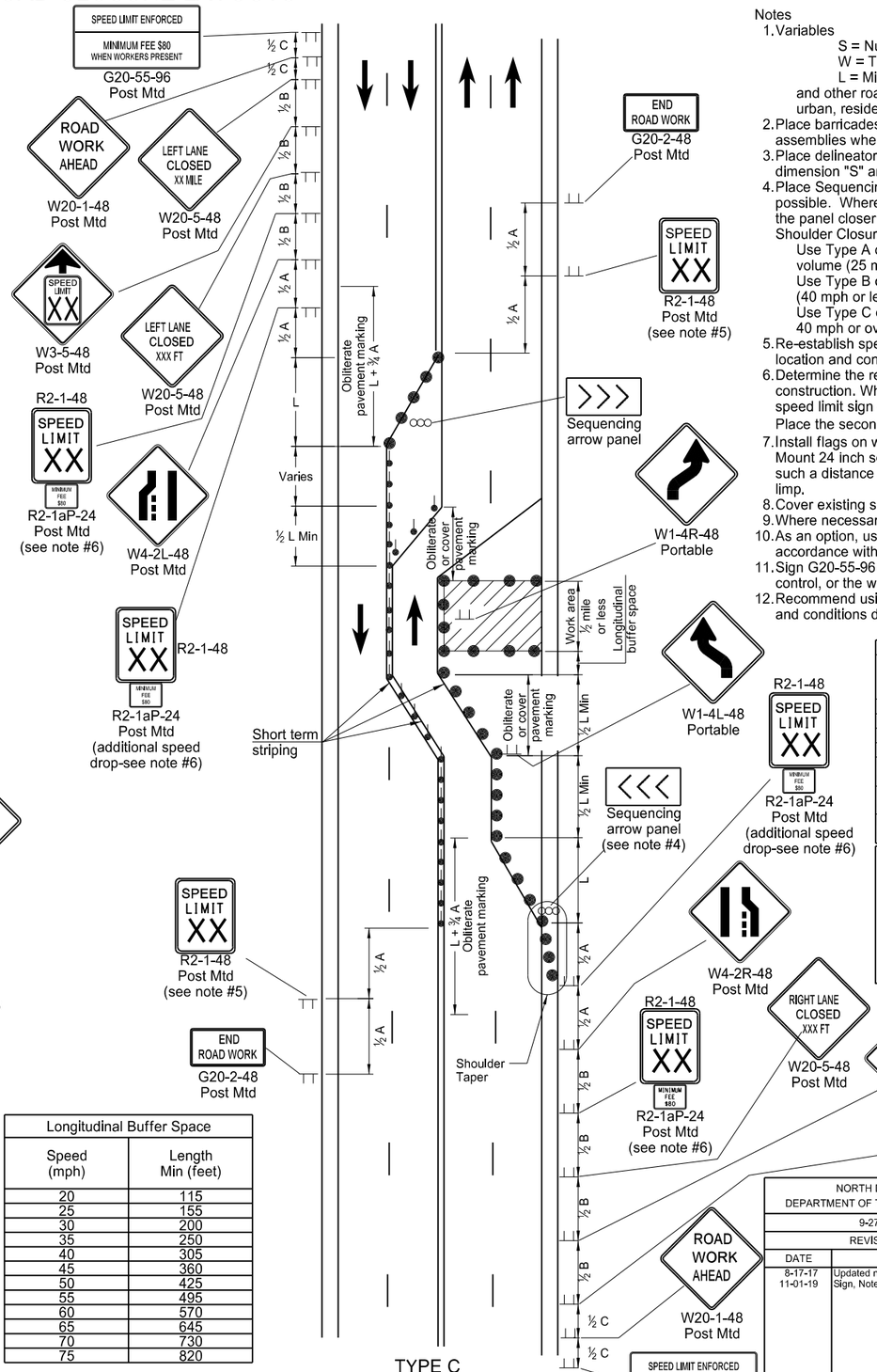


TYPE A
TEMPORARY ROAD CLOSURE
Sign R2-1aP-24 not needed on project using pilot car.



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

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



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

Notes

1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and other roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
8. Cover existing speed limit signs within reduced speed zones.
9. Where necessary, engineer will determine safe speed.
10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
11. Sign G20-55-96 is not required if this standard is part of other traffic control, or the work is less than 15 days.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

ADVANCE WARNING SIGN SPACING

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

KEY

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

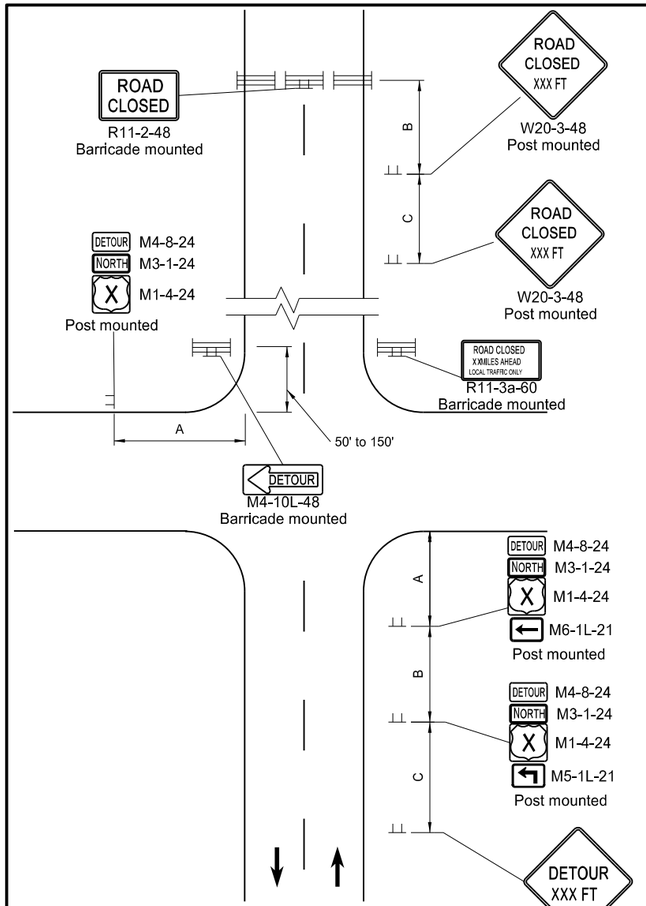
REVISIONS

DATE	CHANGE
8-17-17	Updated notes & Speed Limit signs
11-01-19	Sign, Notes, and Pvmt Mkg updates

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/01/19 and the original document is stored at the North Dakota Department of Transportation

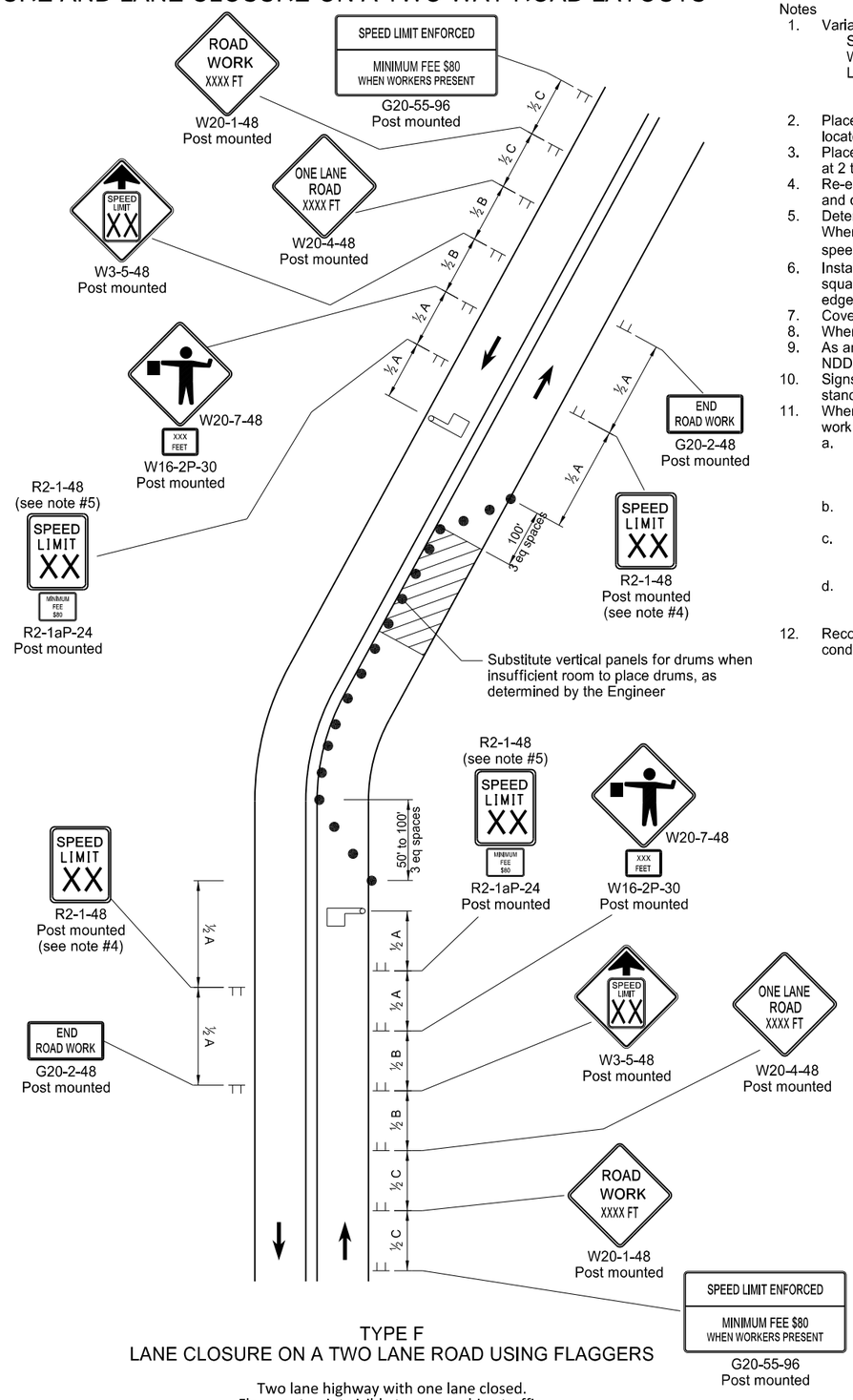
ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19



TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

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



TYPE F
LANE CLOSURE ON A TWO LANE ROAD USING FLAGGERS

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

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet
   L = Minimum length of taper in feet. S x W for freeways, expressways, and roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
3. Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. Determine the reduced speed limit based on the in place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place second speed limit sign at ½B.
6. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
7. Cover existing speed limit signs within a reduced speed zone.
8. Where necessary, safe speed to be determined by the Engineer.
9. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
10. Signs G20-55-96 or R2-1aP-24 are not required when pilot car operation is used, if this standard is part of other traffic control layouts, or if work is less than 15 days.
11. When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
    a. Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
    b. Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
    c. Extend buffer space between work zone and lane closure transition upstream of the highway-rail grade crossing to prevent flagging queue from extending across highway-rail grade crossing.
    d. If queuing extends across highway-rail crossing, provide flagger at crossing to prevent vehicles from stopping within the crossing (even when automatic warning devices are in place.)
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

KEY

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
3-13-14	Revised Sign Cell "ROAD WORK XXX FT".
8-17-17	Update notes & sign numbers.
11-01-19	Revised signs, sign #s and notes.

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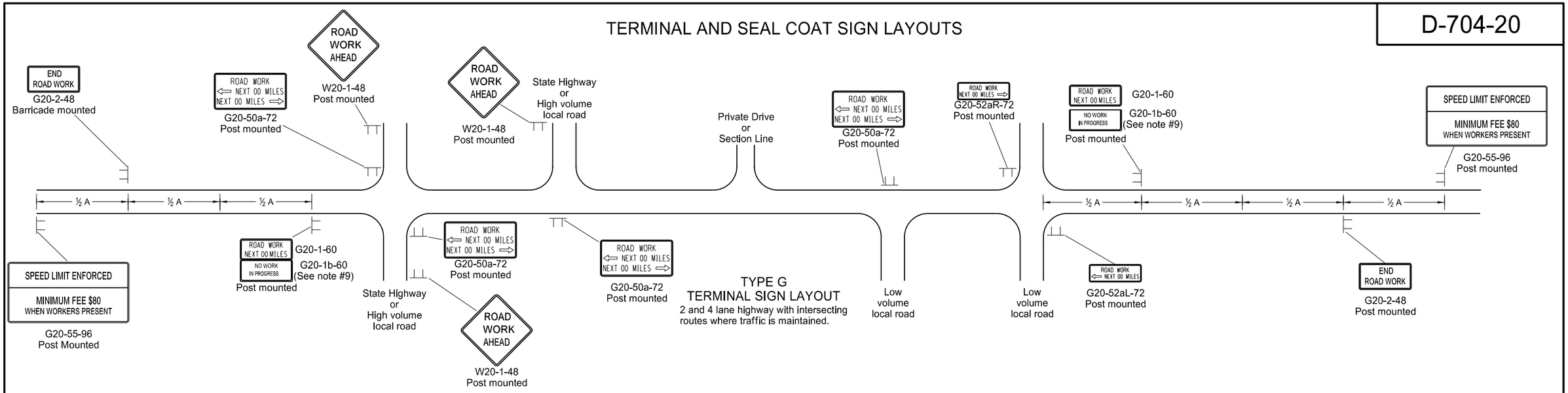
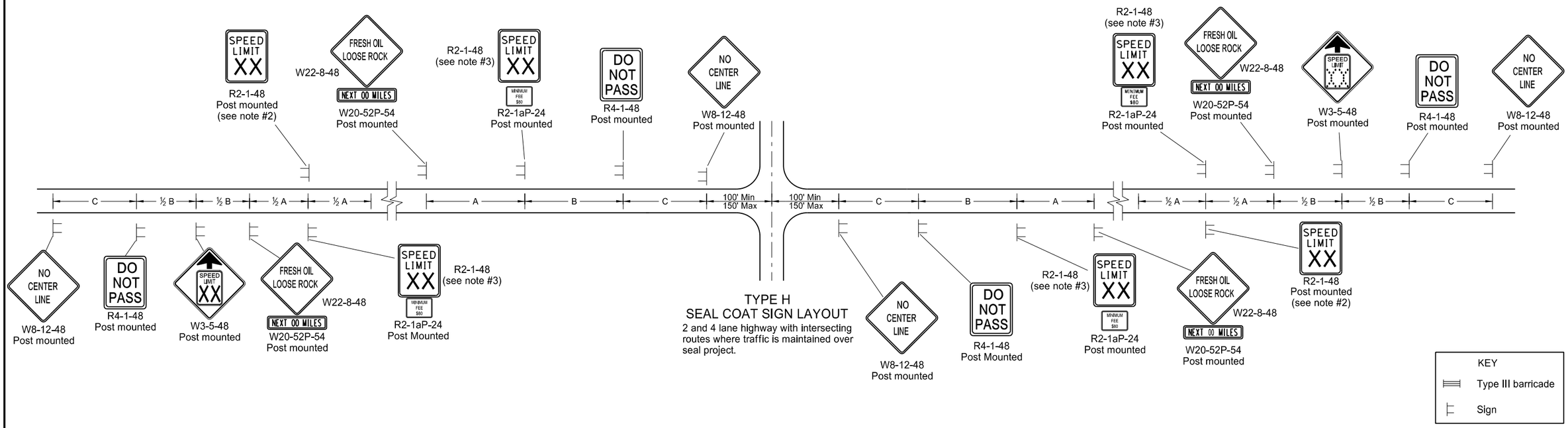
TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20





1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Determine the exact speed limit in the field, based on location and conditions.
3. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
8. Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
9. Install sign G20-1b-60 when work is suspended for winter.
10. Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
11. Sign G20-55-96 is not required if work is less than 15 days.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
8-17-17	Updated notes & sign numbers.
11-01-19	Note & sign updates.

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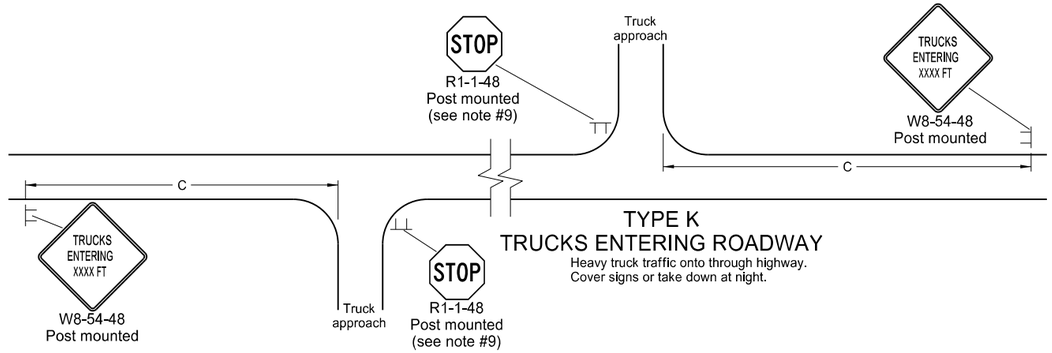
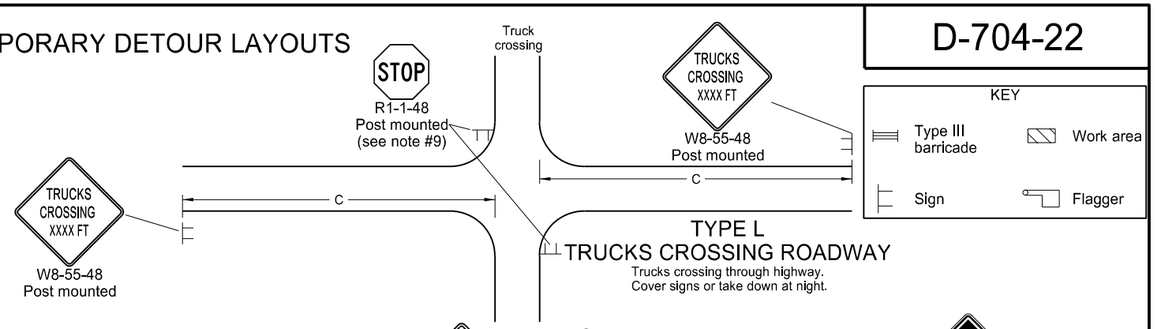
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



TYPE K
TRUCKS ENTERING ROADWAY

Heavy truck traffic onto through highway.
Cover signs or take down at night.

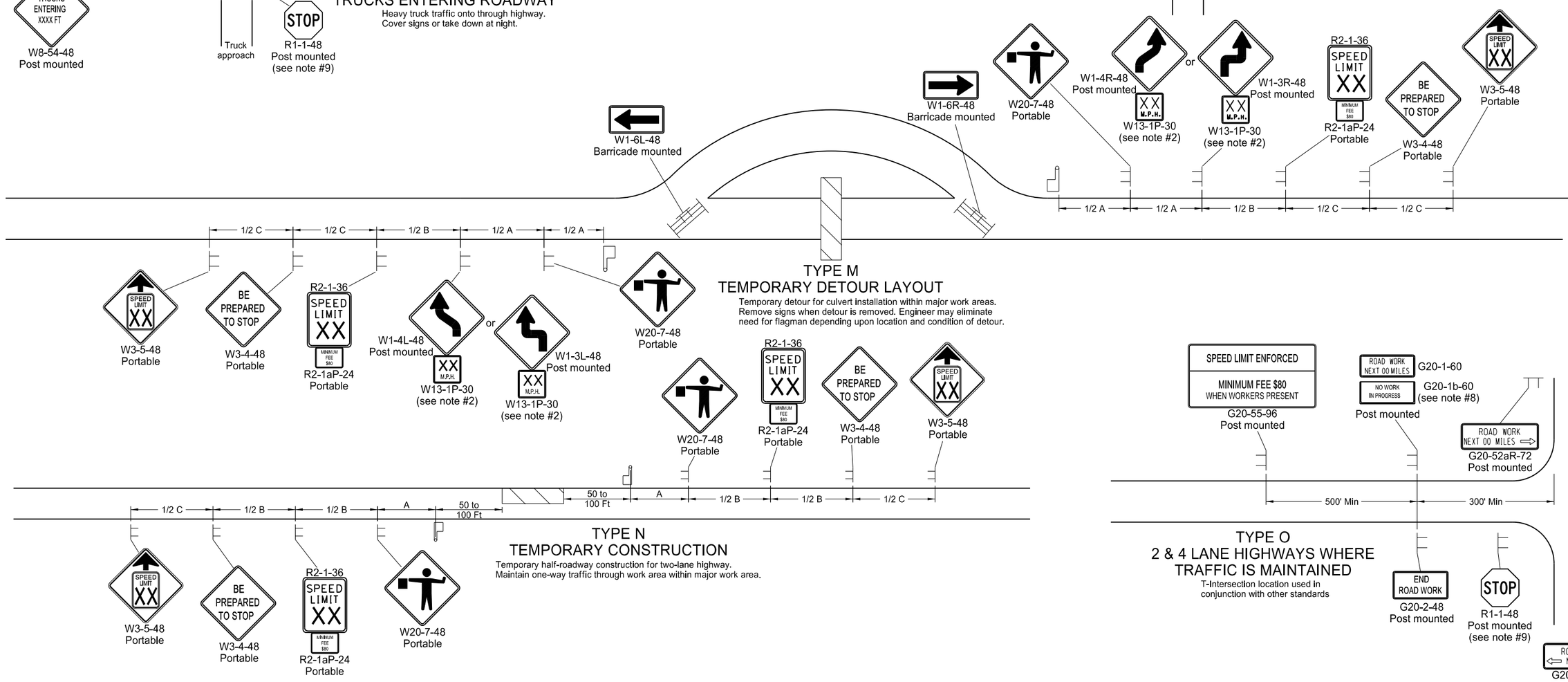


TYPE L
TRUCKS CROSSING ROADWAY

Trucks crossing through highway.
Cover signs or take down at night.

KEY

- Type III barricade
- Work area
- Sign
- Flagger



TYPE M
TEMPORARY DETOUR LAYOUT

Temporary detour for culvert installation within major work areas.
Remove signs when detour is removed. Engineer may eliminate need for flagman depending upon location and condition of detour.

TYPE N
TEMPORARY CONSTRUCTION

Temporary half-roadway construction for two-lane highway.
Maintain one-way traffic through work area within major work area.

TYPE O
2 & 4 LANE HIGHWAYS WHERE TRAFFIC IS MAINTAINED

T-Intersection location used in conjunction with other standards

Notes

1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
8. Install sign G20-1b-60 when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. Sign G20-55-96 is not required if layout is part of other traffic control or if work is less than 15 days.
11. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

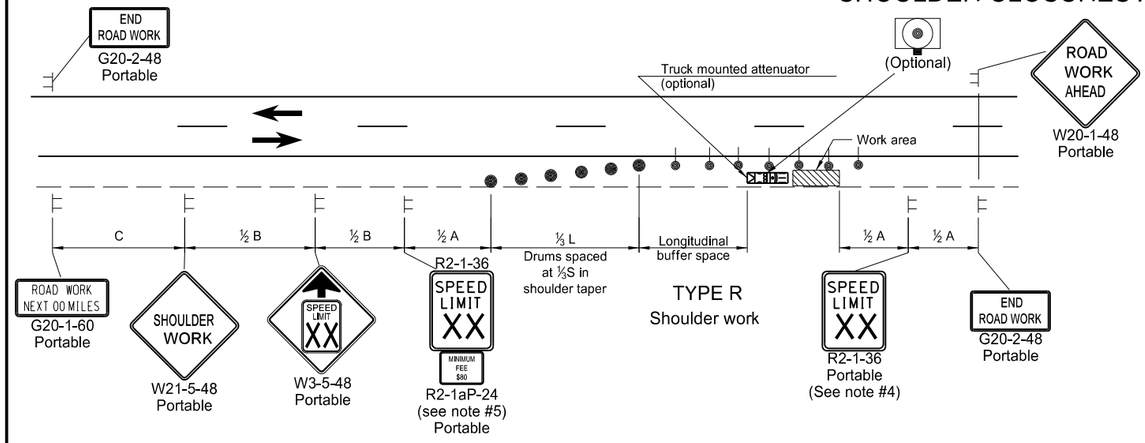
REVISIONS

DATE	CHANGE
8-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7

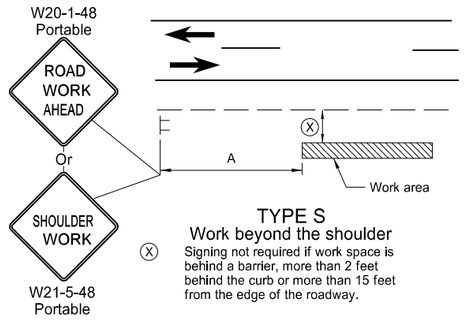
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

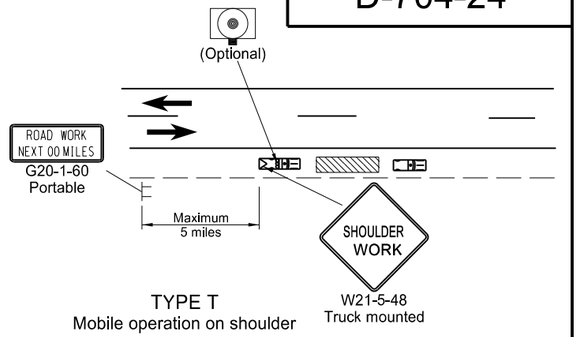
D-704-24



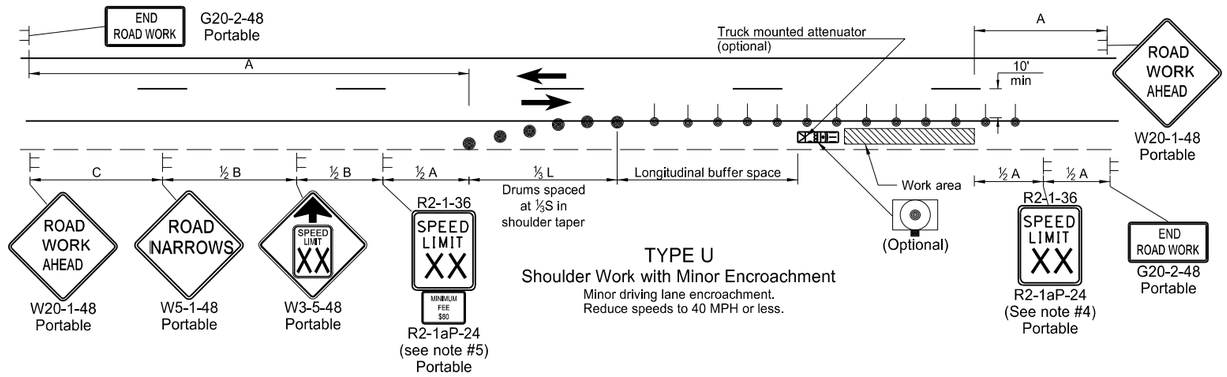
TYPE R
Shoulder work



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

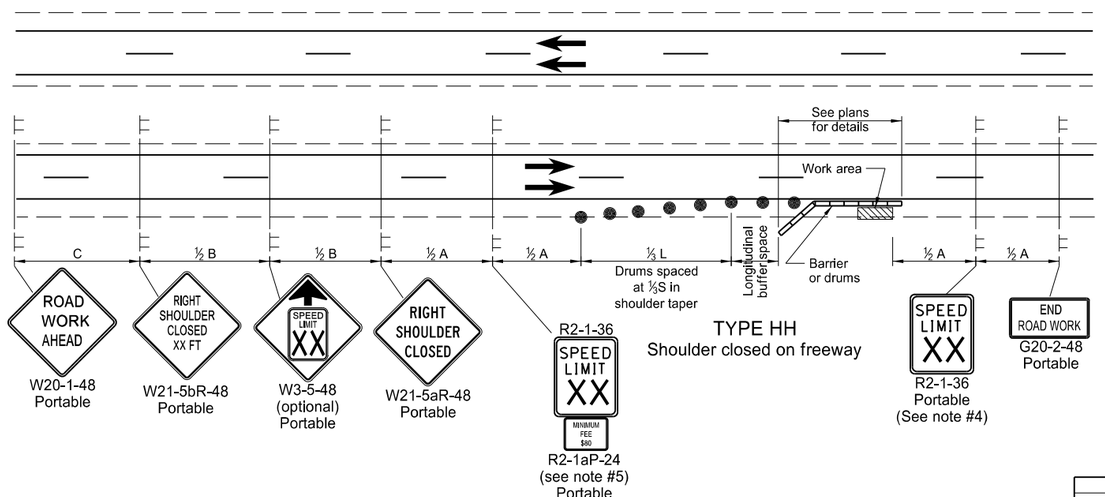


TYPE T
Mobile operation on shoulder

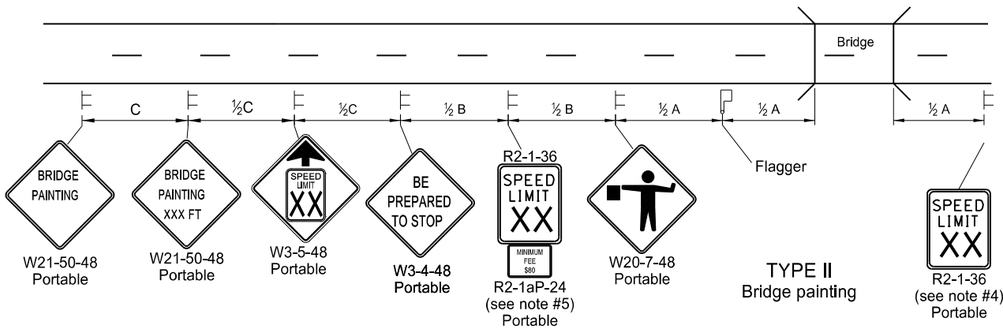


TYPE U
Shoulder Work with Minor Encroachment
Minor driving lane encroachment.
Reduce speeds to 40 MPH or less.

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of the taper in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
3. Sequencing Arrow Panels
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   UseType B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½B.
6. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
7. Cover existing speed limit signs within a reduced speed zone.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
9. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.



TYPE HH
Shoulder closed on freeway



TYPE II
Bridge painting

KEY

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

ADVANCE WARNING SIGN SPACING

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

Longitudinal Buffer Space

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
8-17-17	Updated notes & revised signs
11-01-19	Revised drum spacing & signs nos.

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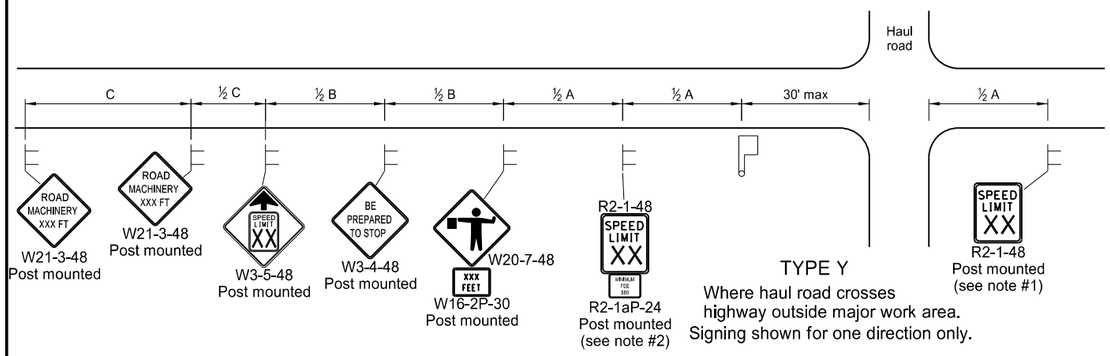
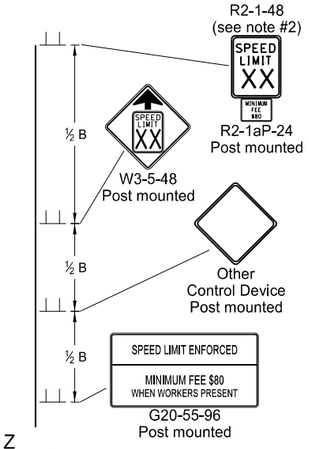
MISCELLANEOUS SIGN LAYOUTS

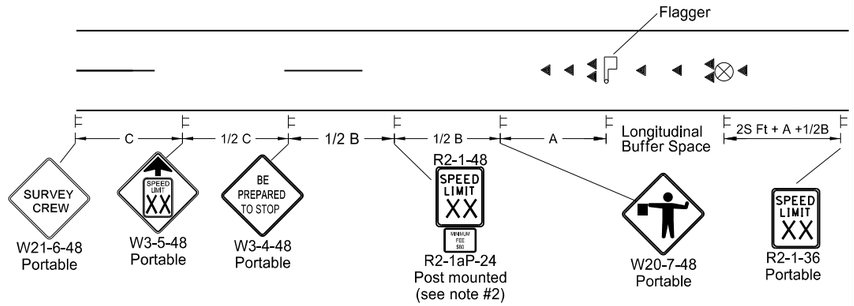
D-704-26



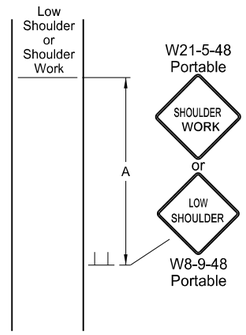
TYPE Y
Where haul road crosses highway outside major work area.
Signing shown for one direction only.



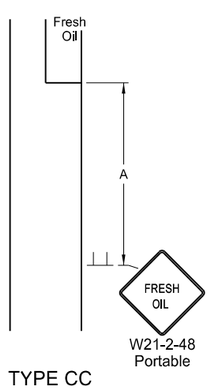
TYPE Z
Where speed zone is needed
Signing shown for one direction only.



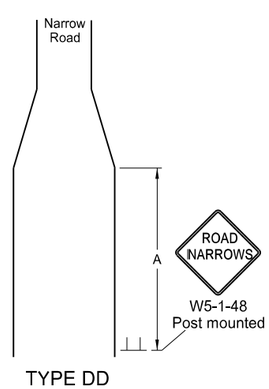
TYPE AA
Where survey crew is used
Signing shown for one direction only.



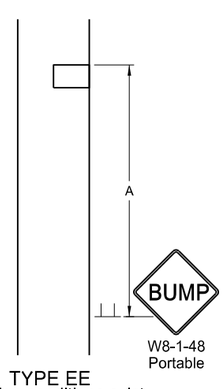
TYPE BB
Within major work area where sign conditions exist



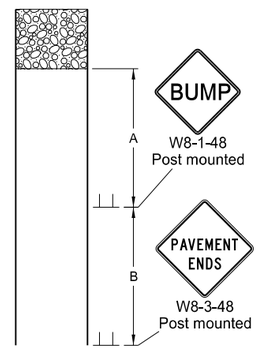
TYPE CC
Where sign conditions exist



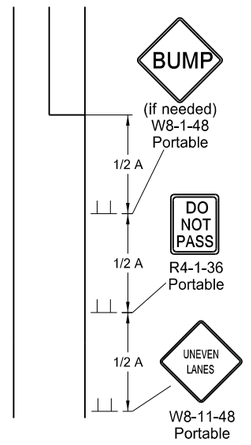
TYPE DD
Where sign conditions exist



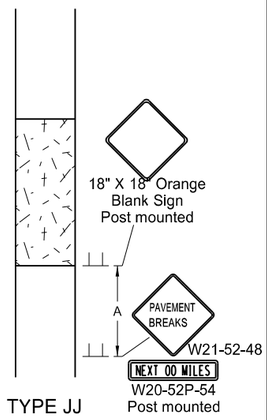
TYPE EE
Where sign conditions exist



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



TYPE GG
Where elevation difference exists between lanes

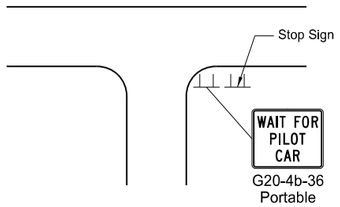


TYPE JJ
For break in pavement.
Install signs when conditions exist and remove when not applicable.
Signing shown for one direction only.

KEY

Flagger	Sign
Cones	Survey Equipment

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



TYPE KK
At major intersections within pilot car control area

Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
2. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½B.
3. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
4. Cover existing speed limit signs within reduced speed zones.
5. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
6. Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
7. When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
8. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
9. Layouts shown for one direction only.

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

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

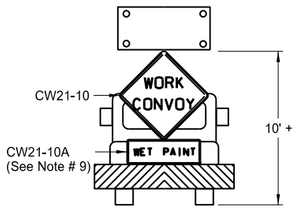
9-27-13

REVISIONS

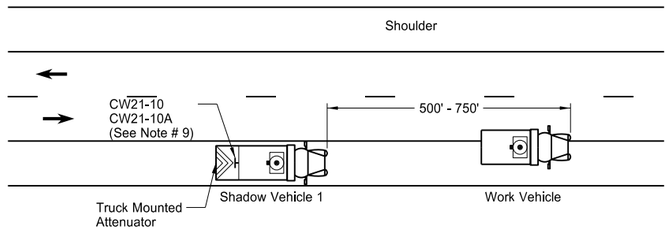
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers
11-01-19	Revised note 5 & sign numbers

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

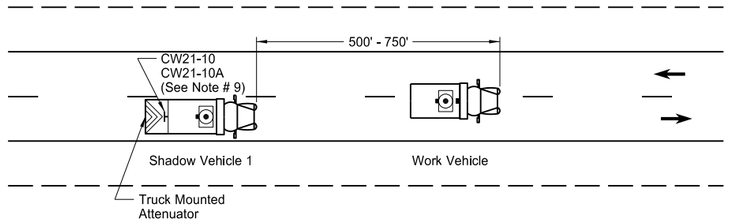
MOBILE OPERATION
(PAVEMENT MARKING)



Typical Shadow Vehicle 1
Two-Way Roaday

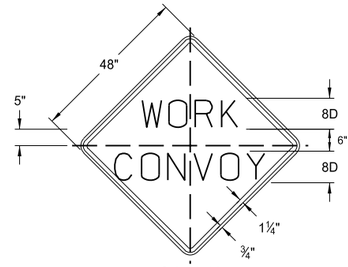


Two-Way Roadway with Paved Shoulders

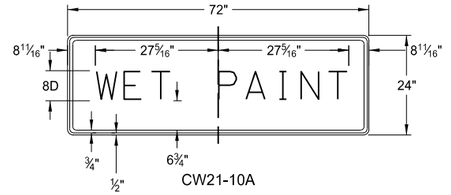


Two-Way Roadway without Paved Shoulders

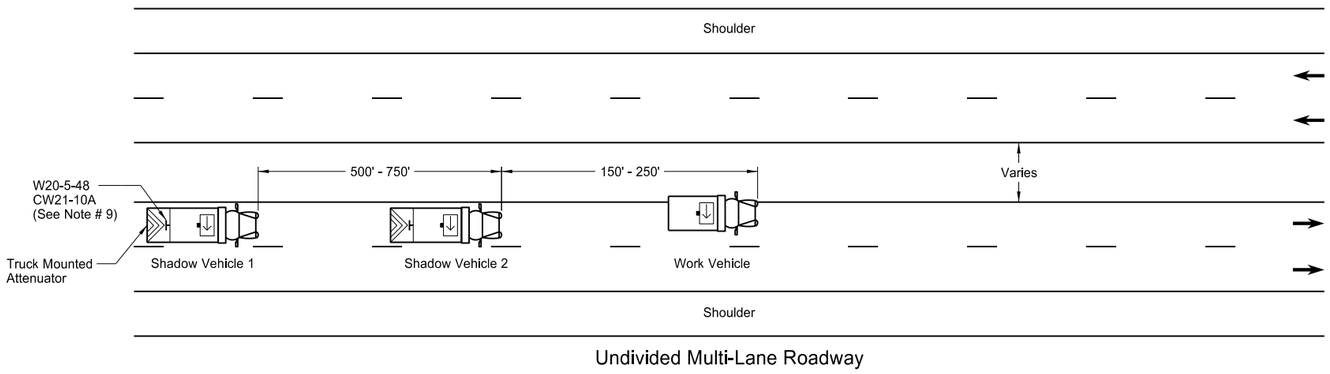
Sign Details



CW21-10

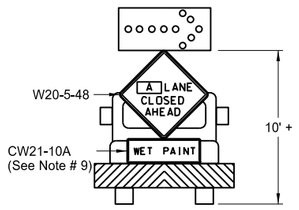


CW21-10A



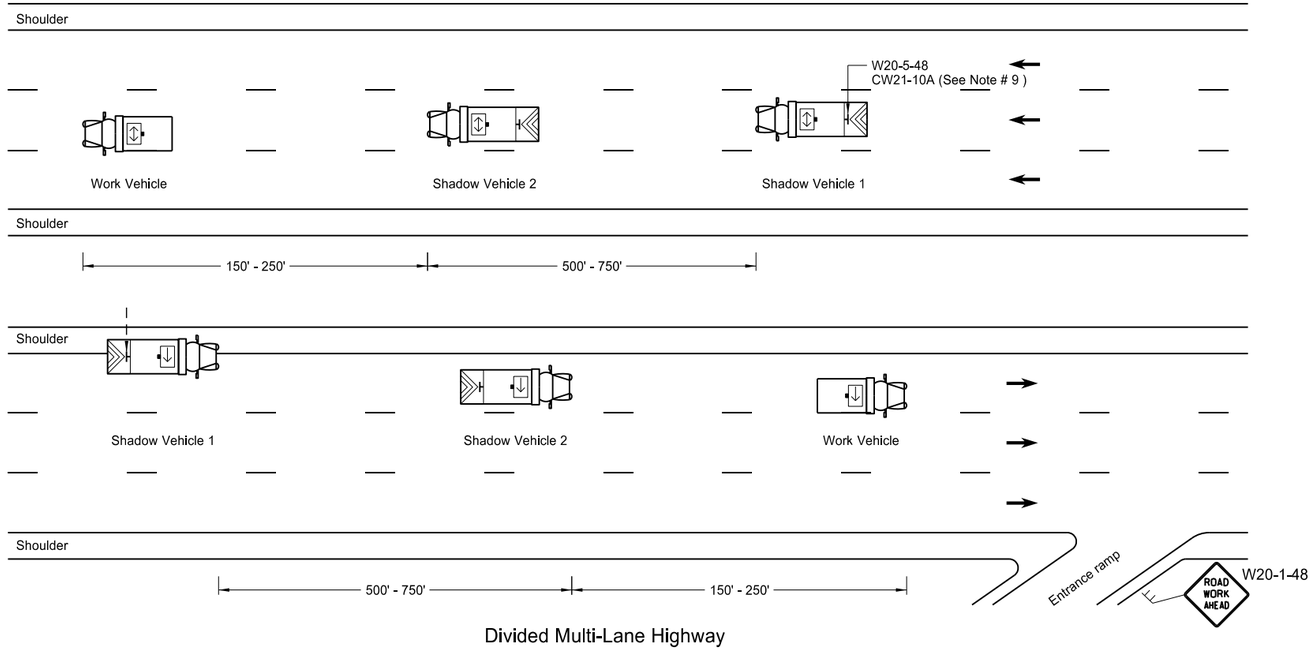
Undivided Multi-Lane Roadway

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



Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center



Divided Multi-Lane Highway

KEY

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

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

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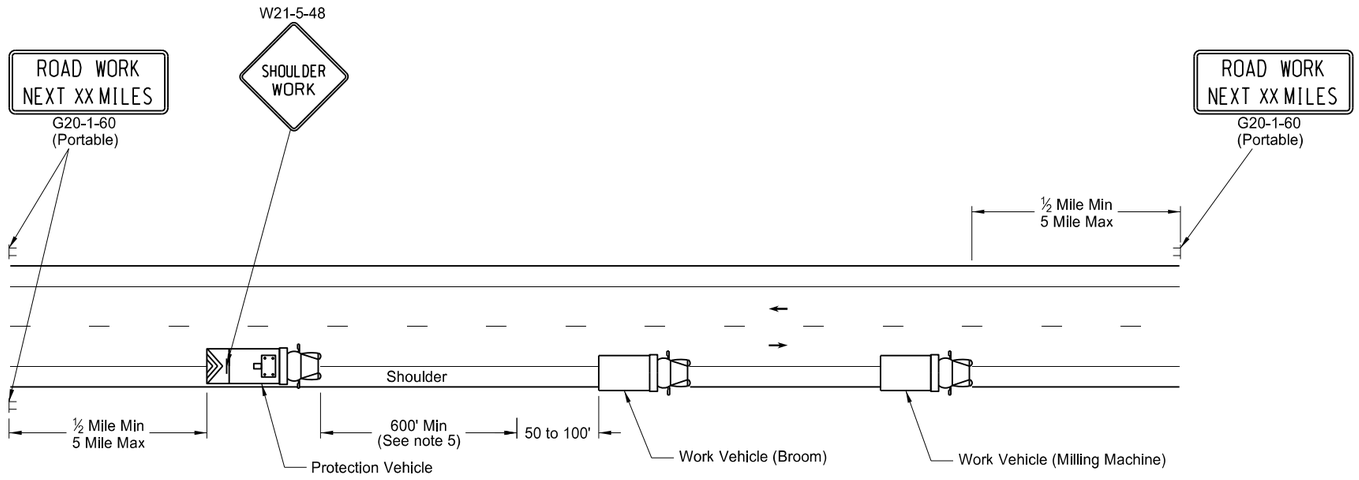
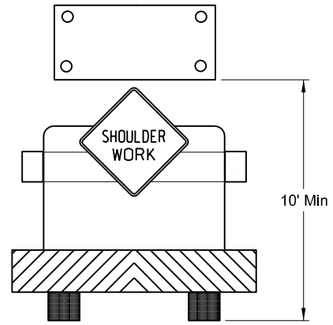
MOBILE OPERATION
Grinding Shoulder Rumble Strips



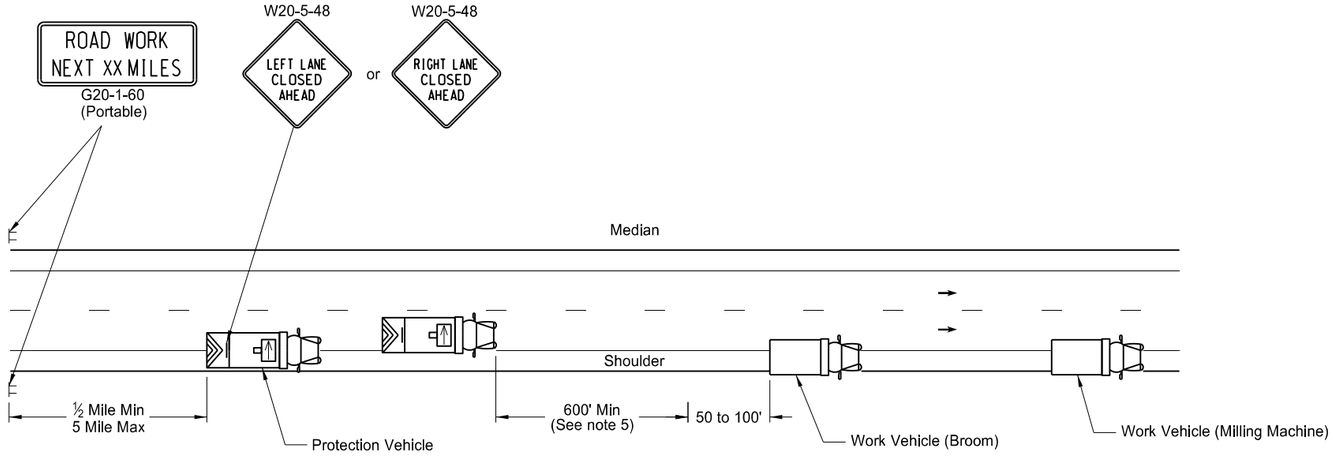
TWO LANE - TWO WAY ROADWAY



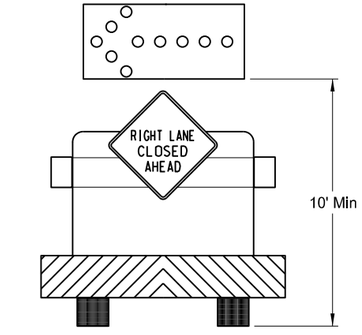
TWO LANE - TWO WAY ROADWAY

Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

Notes:
1. Provide truck mounted attenuators on additional vehicles in the convoy, at no additional cost.
2. Provide rotating, flashing, oscillating, or strobe lights on vehicles.
3. Provide Type B or Type C flashing arrow panels that are controlled from inside the vehicle.
4. Provide two - way electronic communication capability in each vehicle.
5. Vary vehicle spacing between the protection vehicle and work vehicle depending on sight distance restrictions. Keep the spacing of the convoy vehicles such that motorists approaching the work convoy can see the protection vehicle in time to slow down and safely pass the work vehicles.
6. Move advance Road Work Ahead signs as the work area moves through the construction zone.

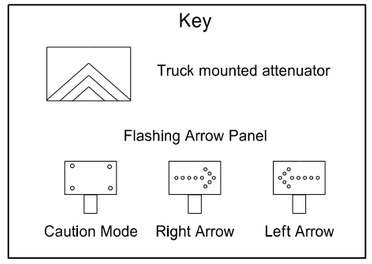


INTERSTATE & 4 LANE DIVIDED HIGHWAY



INTERSTATE & 4 LANE DIVIDED HIGHWAY

Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode



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

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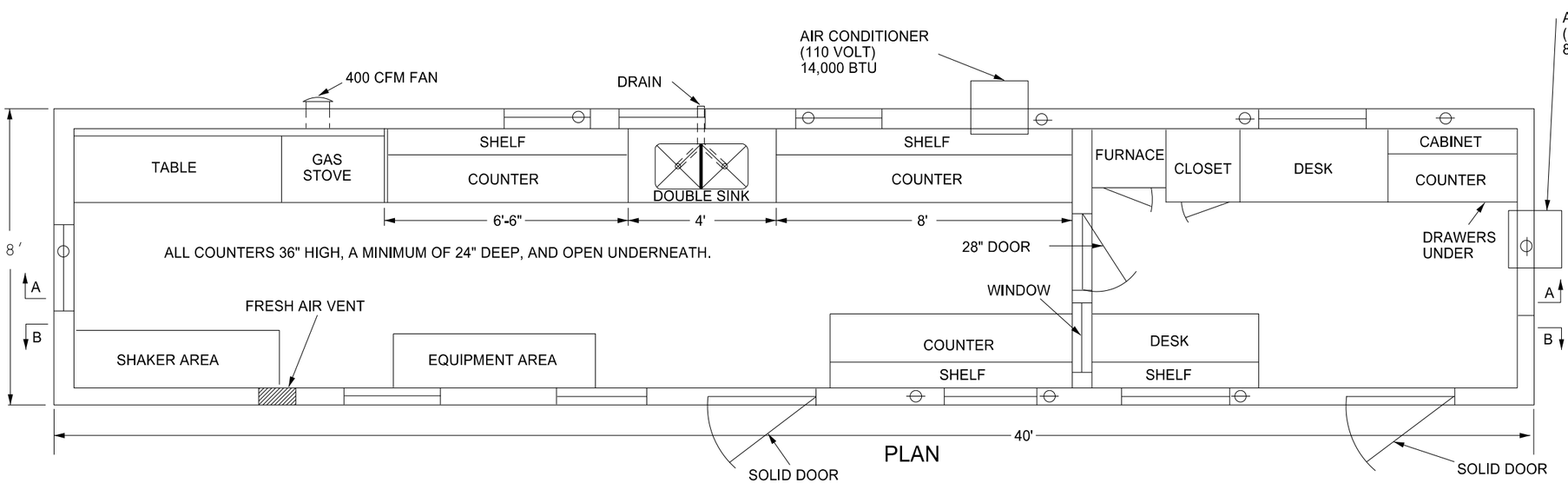
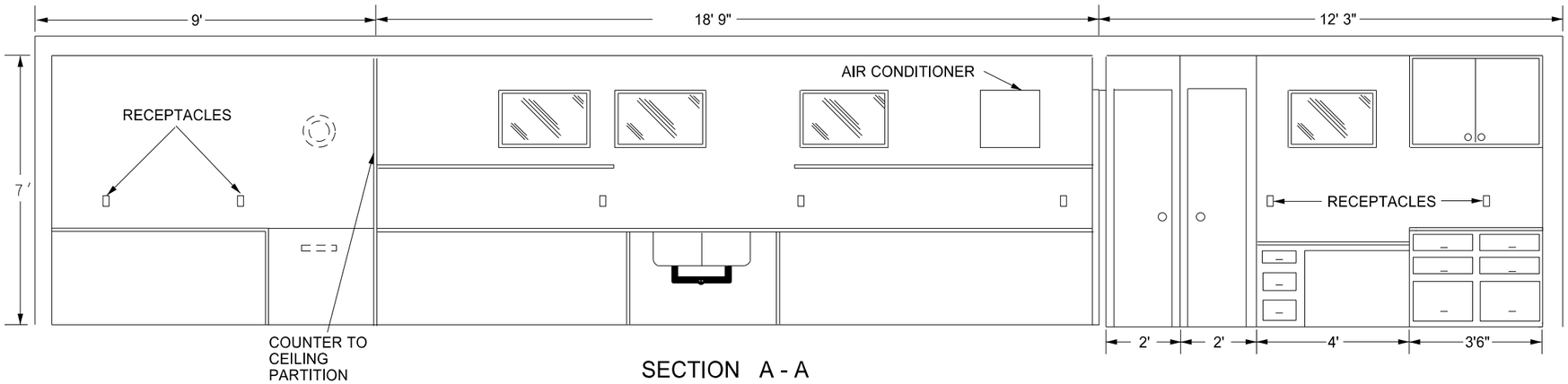
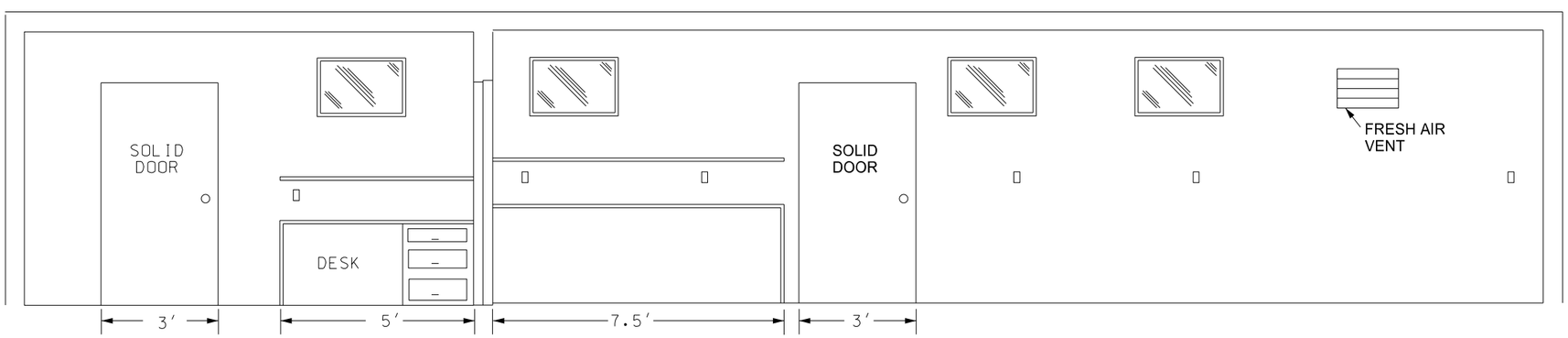
BITUMINOUS LABORATORY

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.
08-27-19	New Design Engineer PE Stamp

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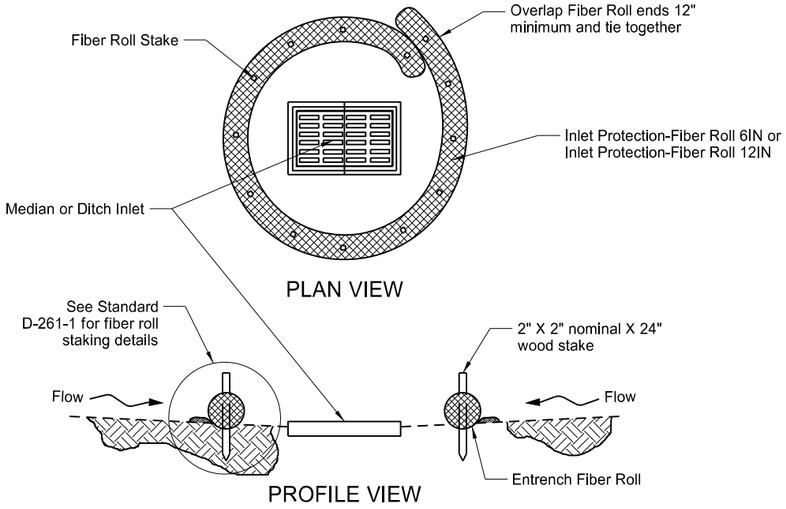
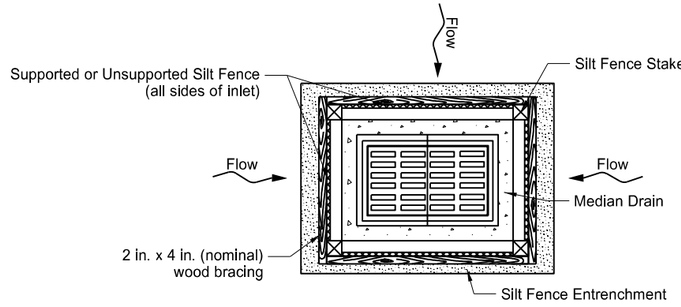
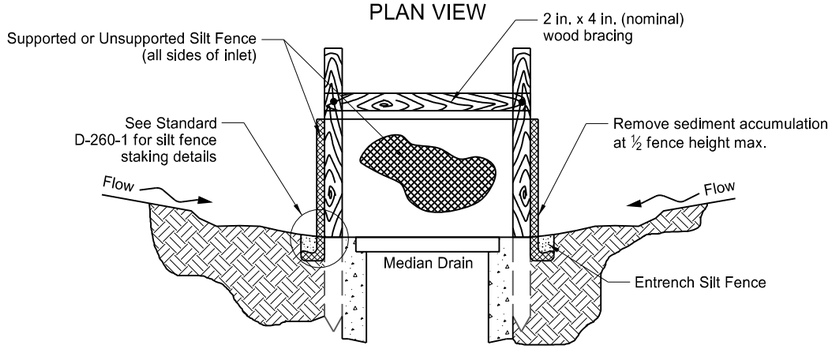
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION

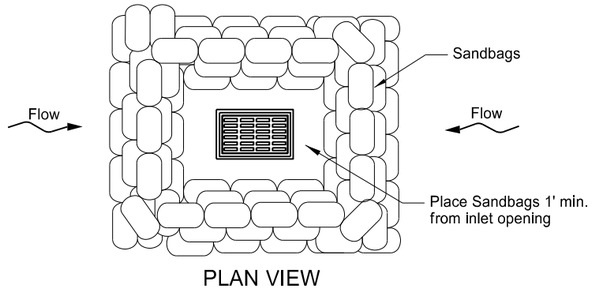


FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)

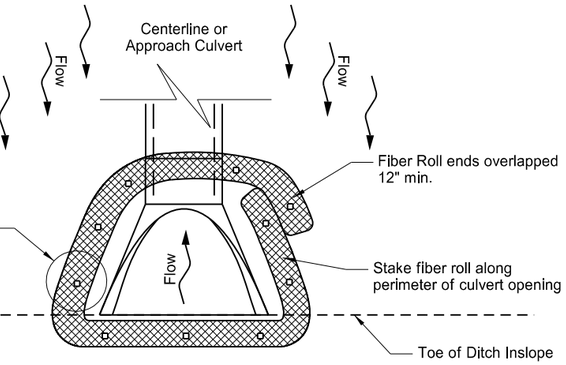




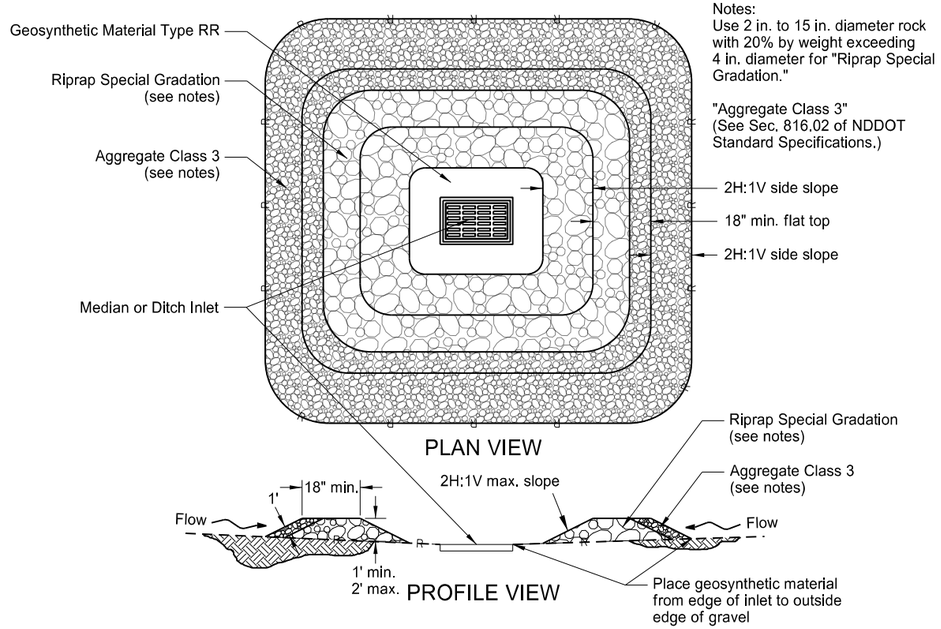
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



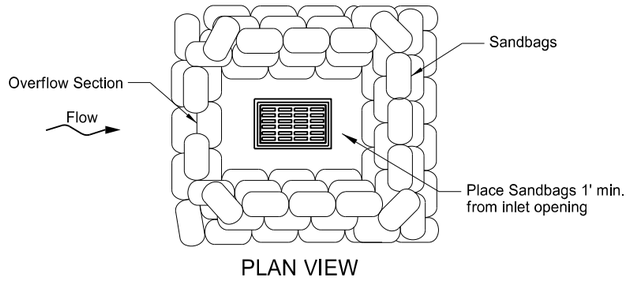
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



SANDBAG PROTECTION (ON SLOPE)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

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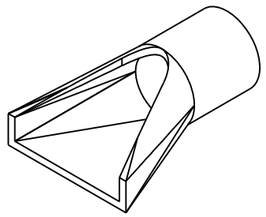
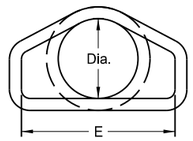
REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

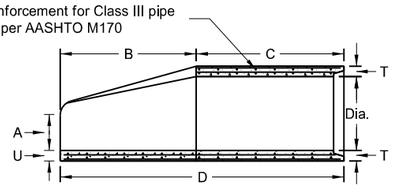
FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30	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"



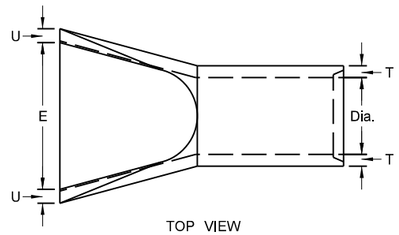
PERSPECTIVE



END VIEW



SIDE VIEW



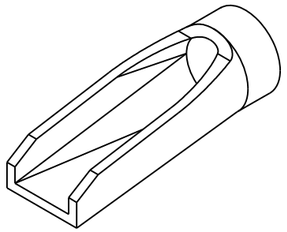
TOP VIEW

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

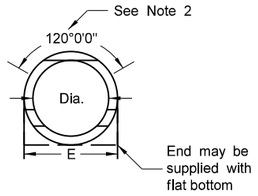
NOTES:

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.

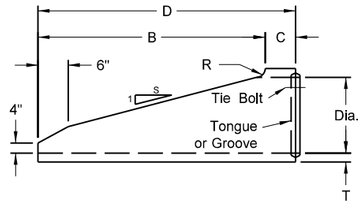
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



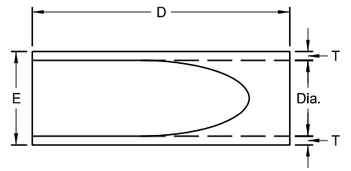
PERSPECTIVE



END VIEW



SIDE VIEW



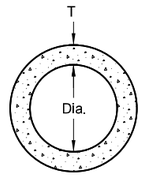
TOP VIEW

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

NOTES (Traversable End Section):

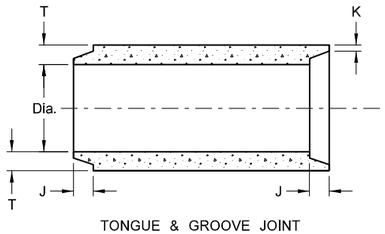
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

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	1⅛-2¼	⅞	2¼
18	1.77	168	1⅛-2⅛	1	2½
21	2.40	214	1⅛-3⅛	1⅛	2¾
24	3.14	265	2¾-3¾	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	4⅛-5¼	2	5½
60	19.63	1296	4½-5½	2¼	6
66	23.76	1542	5-6	2⅝	6½
72	28.27	1810	5⅛-6¾	2⅞	7
78	33.18	2098	6¼-7¼	2⅞	7½
84	38.48	2410	5⅛-7¾	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

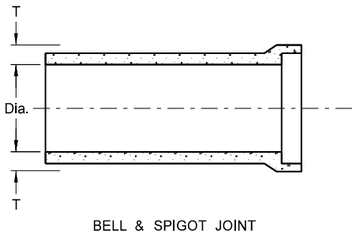


END VIEW

CIRCULAR PIPE

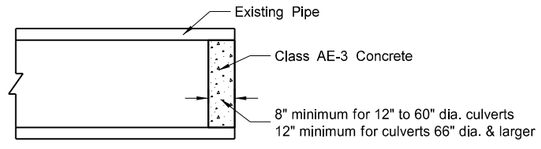


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

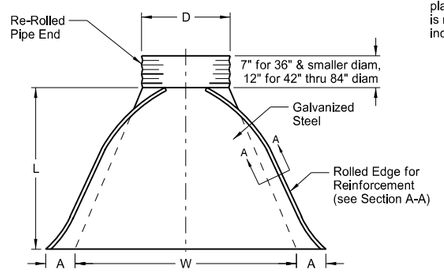
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

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

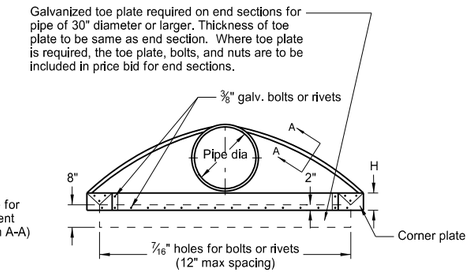
This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 9/18/19 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

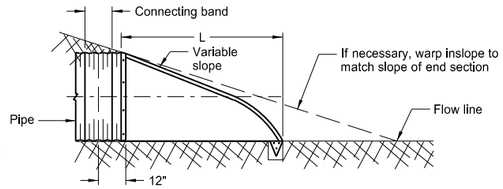
D-714-4



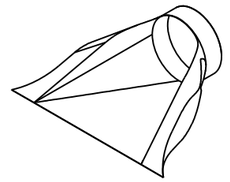
PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)



PERSPECTIVE VIEW

* * PIPE DIA.	GALV. THICK.	END SECTION DIMENSIONS A	B	H	L	W	APPROX. SLOPE	BODY PIECE
IN	IN	IN	IN	IN	IN	IN	RATE	
15	0.064	7	8	6	26	30	2½:1	1
18	0.064	8	10	6	31	36	2½:1	1
24	0.064	10	13	6	41	48	2½:1	1
30	0.079	12	16	8	51	60	2½:1	1 or 2
36	0.079	14	19	9	60	72	2½:1	2
42	0.109	16	22	11	69	84	2½:1	2
48	0.109	18	27	12	78	90	2¼:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1¾:1	3
* 66	0.109	18	36	12	87	120	1½:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1¼:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

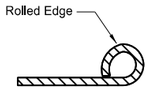
* These sizes have 0.109" sides and 0.138" center panels.

* * Pipe diameter is equal to dimension "D" of end section.

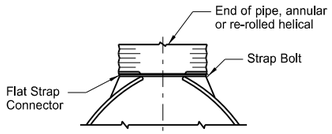
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

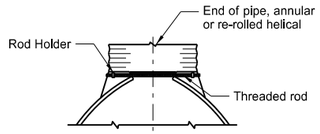
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



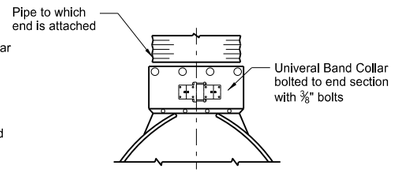
SECTION A-A



TYPE #1
For circular pipes with diameter 24" & smaller



TYPE #2
For circular pipes with diameter 30" through 36"

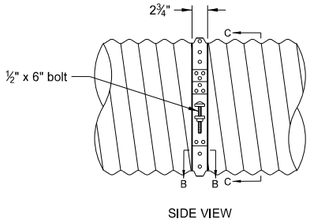


TYPE #3
For all pipe sizes

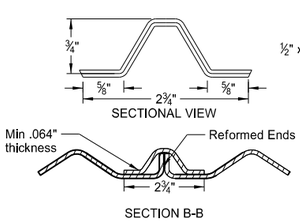
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"	.052"
		78" - 84"	10½"	.079"
	3" x 1" Rerolled End	48" - 120"	10½"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"

NOTES:

1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x ¼" galv. angle for 60" through 72" dia. and 2½" x 2½" x ¼" galv. angle for 78" and 84" dia.. Angles to be attached by galv. ⅜" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
5. ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four ½" bolts with maximum spacing of 5½" are used for the connection.
7. Length of spot welds shall be minimum ½".

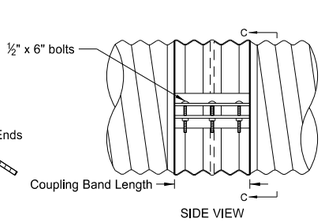


SIDE VIEW

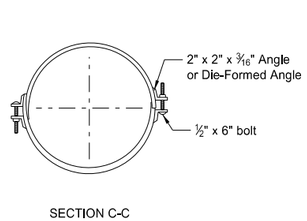


SECTION B-B

HAT BAND FOR FLANGED END PIPE

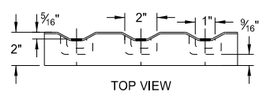


SIDE VIEW



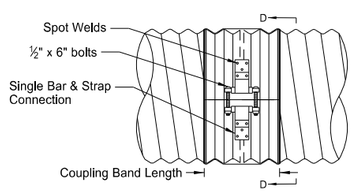
SECTION C-C
Angle Connection

ANNULAR BAND

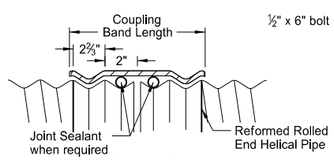


TOP VIEW

Die-Formed Angle Connector

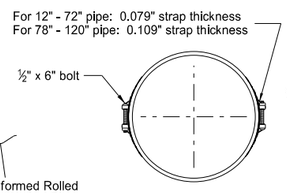


SIDE VIEW

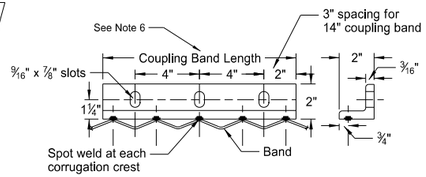


SECTIONAL VIEW

HUGGER COUPLING BAND

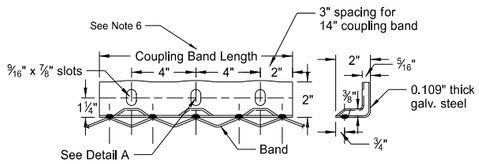


SECTION D-D
Bar & Strap Connection



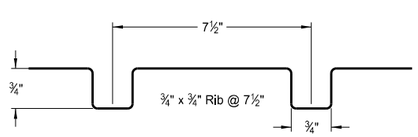
SIDE VIEW END VIEW

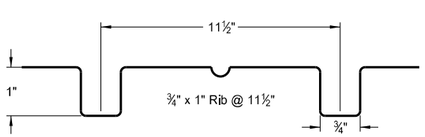
2" x 2" x 3/16" Angle Connector



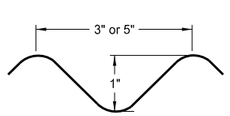
SIDE VIEW END VIEW

Die-Formed Angle Connector

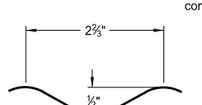




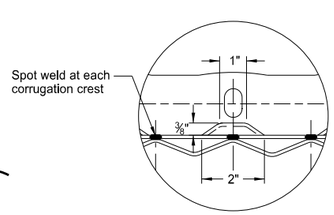
SPIRAL RIB CORRUGATIONS



3" x 1" CORRUGATIONS or
5" x 1" CORRUGATIONS



2⅔" x ½" CORRUGATIONS



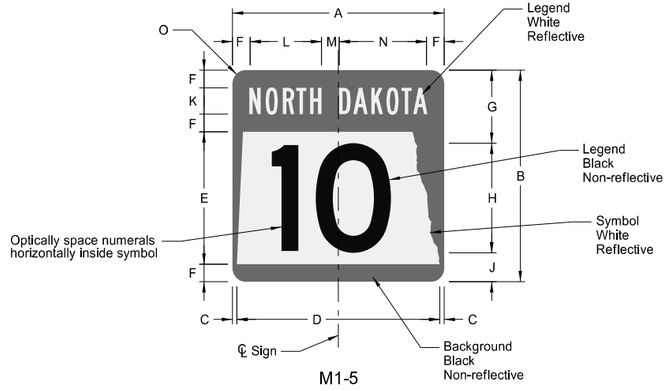
Detail A

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

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

STATE HIGHWAY ROUTE SHIELD DETAIL

D-754-11

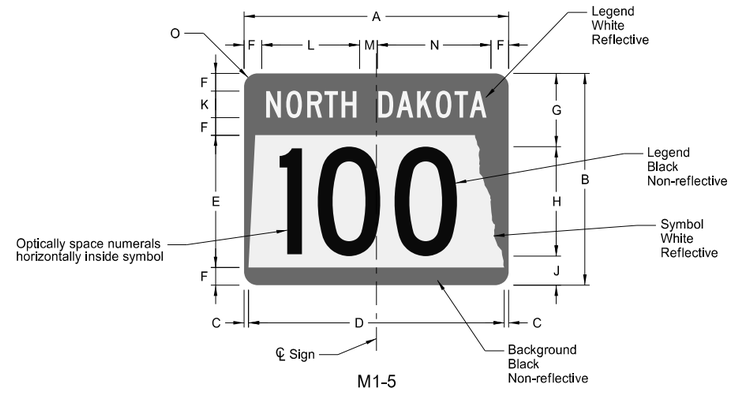


M1-5

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%

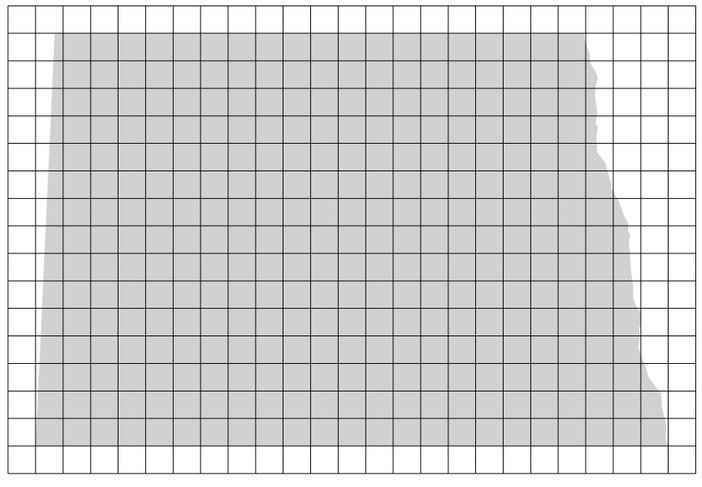


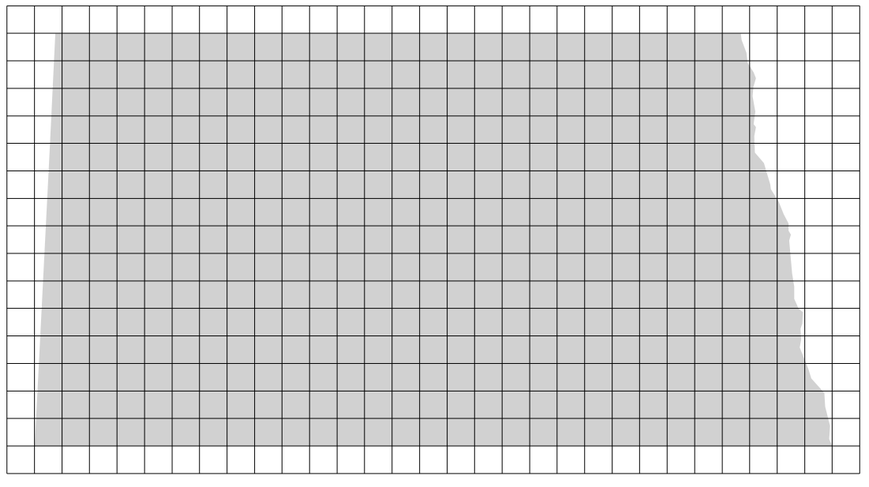
M1-5

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 may be obtained from the Design Division of North Dakota Department of Transportation.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-23-18	
REVISIONS	
DATE	CHANGE
8-29-19	New Design Engineer PE Stamp.

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

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

2. Minimum vertical clearance: Provide at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane at the side of the road in rural districts. Provide at least 7' clearance to the bottom of the sign, where parking or pedestrian movements occur.

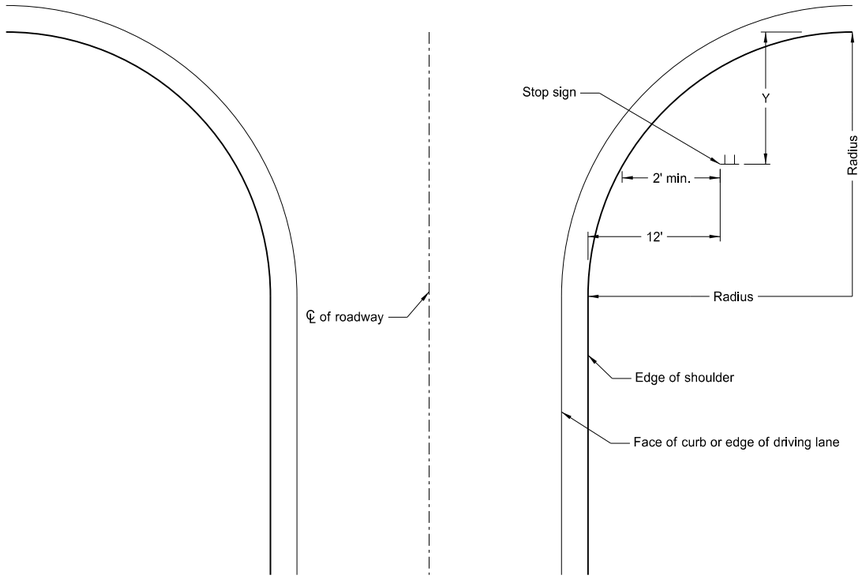
   Install signs on expressways a minimum height of 7'.

   Install adopt-a-highway signs on Freeways at least 7' above the edge of the driving lane.

   Maximum vertical clearance is 6" greater than the minimum vertical clearance.

3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.

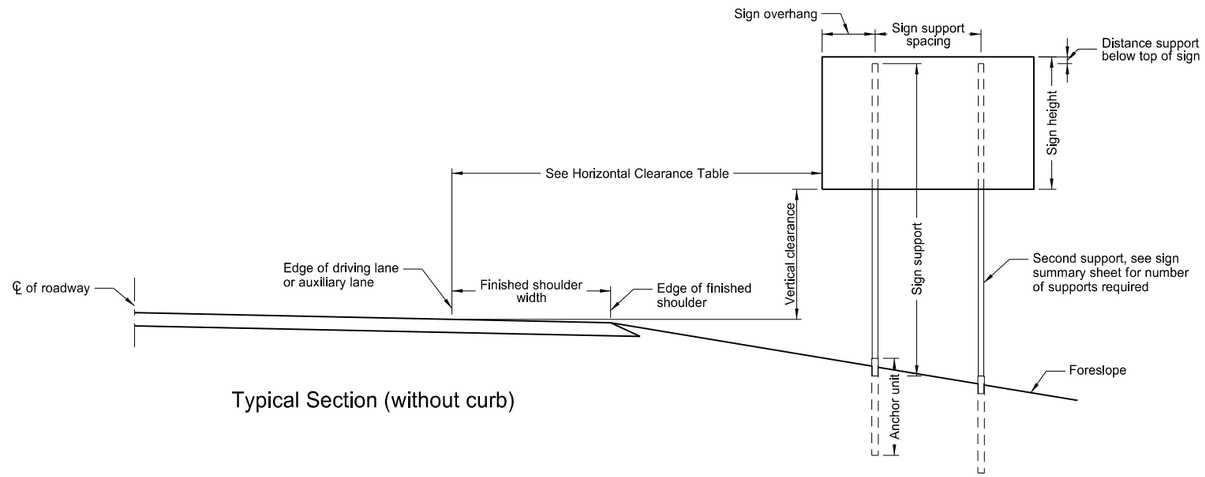
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

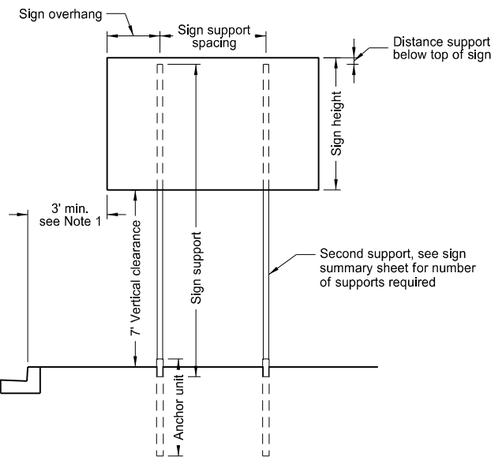
Use layout for the placement of "Stop" signs.

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



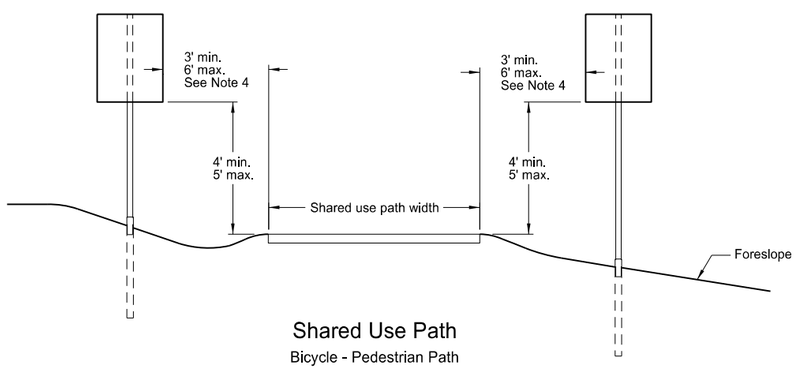
Typical Section (without curb)

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.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.

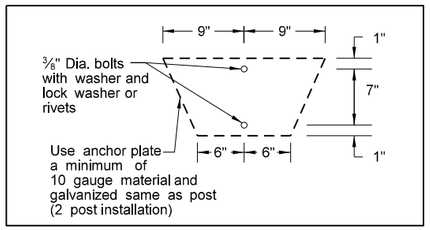
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

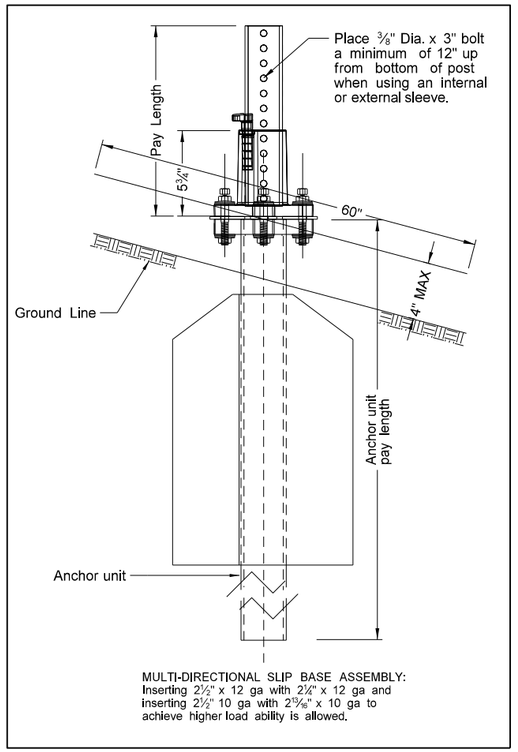
Mounting Details Perforated Tube

D-754-24

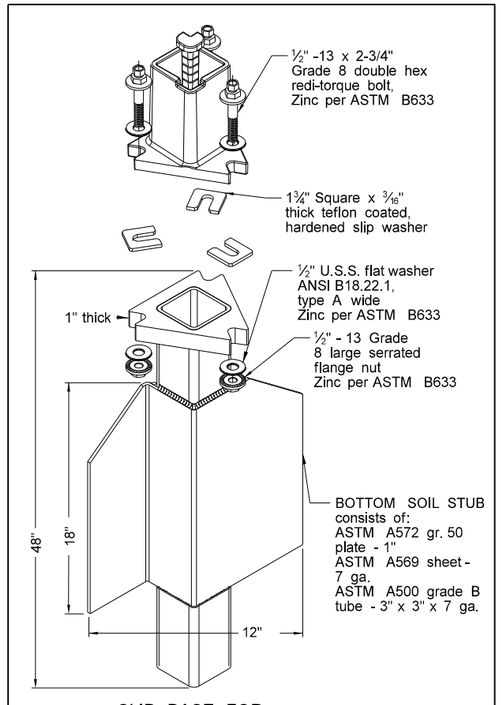
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	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	2⅜16	10	Yes		7

(B) - Provide a shim as specified by the manufacturer when placing 2½", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

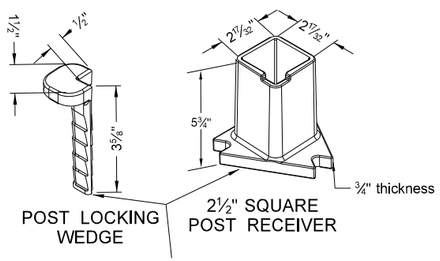




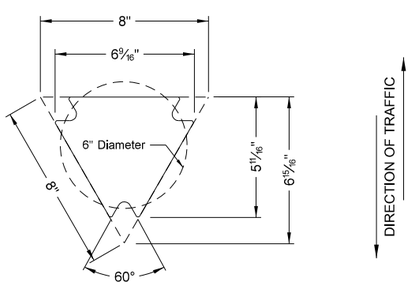
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
Inserting 2½" x 12 ga with 2¼" x 12 ga and inserting 2½" 10 ga with 2⅜16" x 10 ga to achieve higher load ability is allowed.



SLIP BASE FOR 2½" POST



Ductile Iron Casting class 65-45-12.
Hot Dip Galvanize ASTM A153



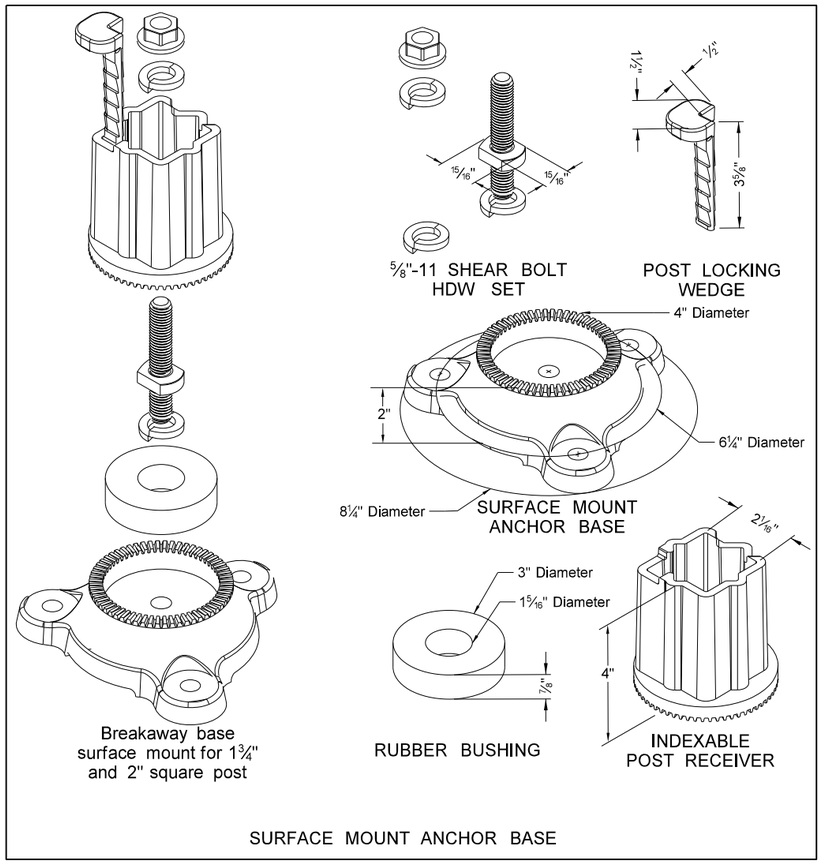
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulud 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
2⅜16 x 2⅜16	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 ⅜16" 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:

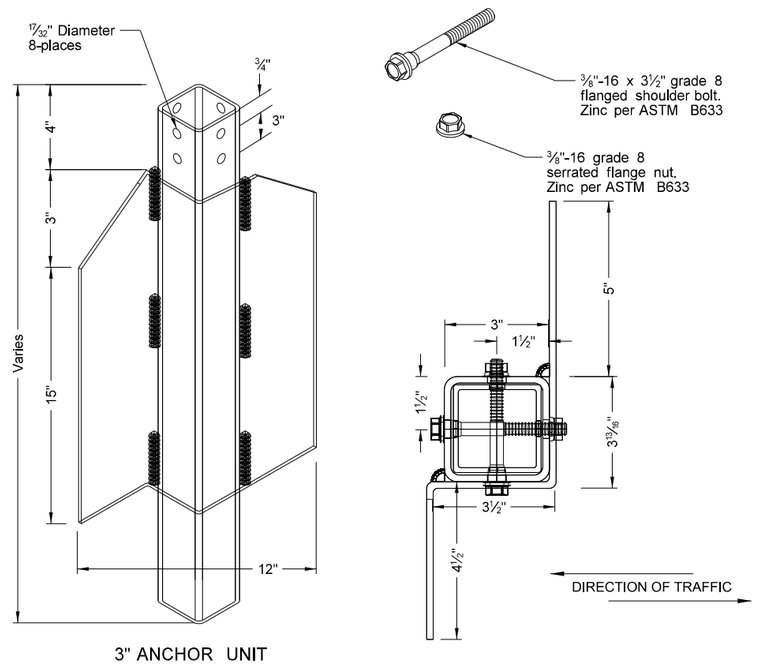
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless ortherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum ½" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.



SURFACE MOUNT ANCHOR BASE

SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2½" post.
(use standard ⅜" diameter grade 8 bolt with proper shim)



3" ANCHOR UNIT

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

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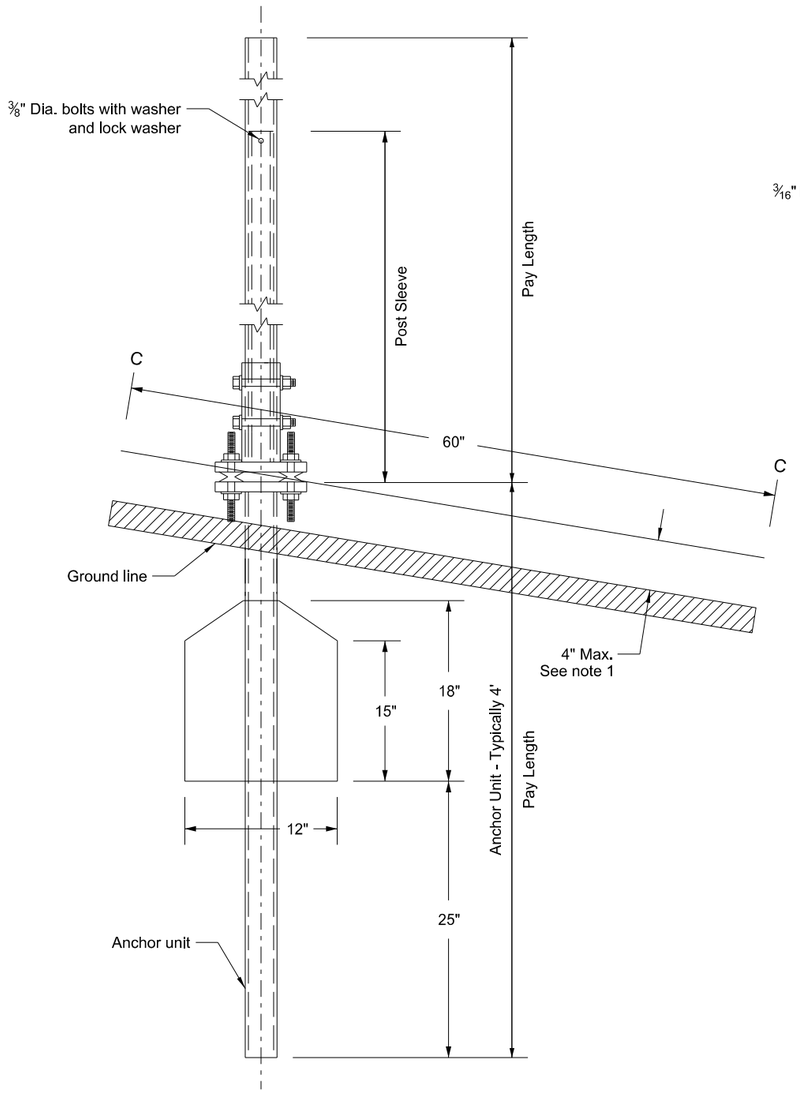
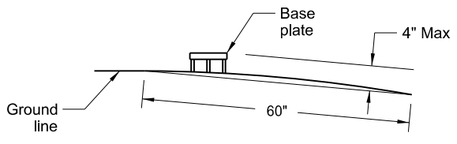
Breakaway Coupler System for Perforated Tubes

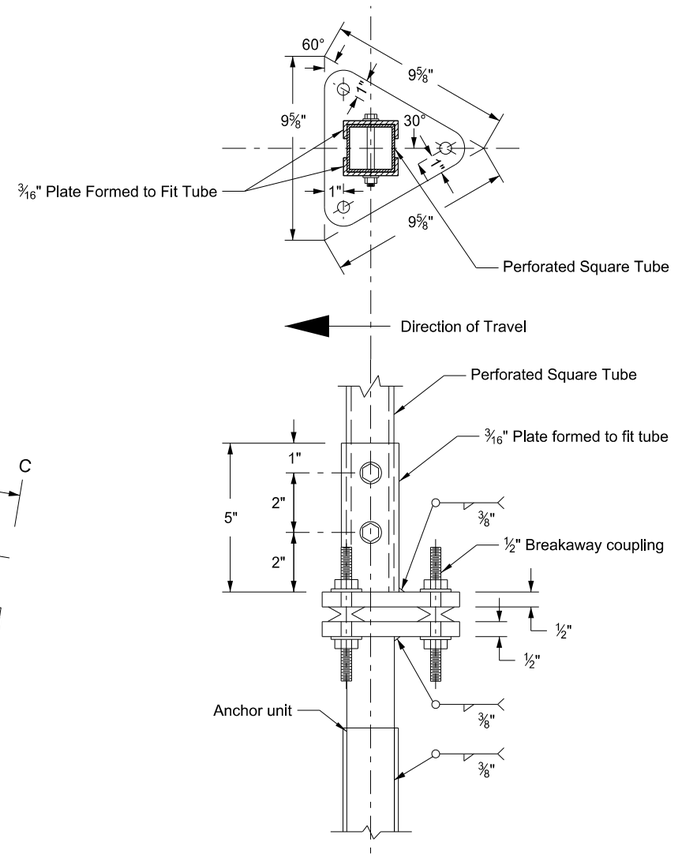
D-754-24A





Section C-C

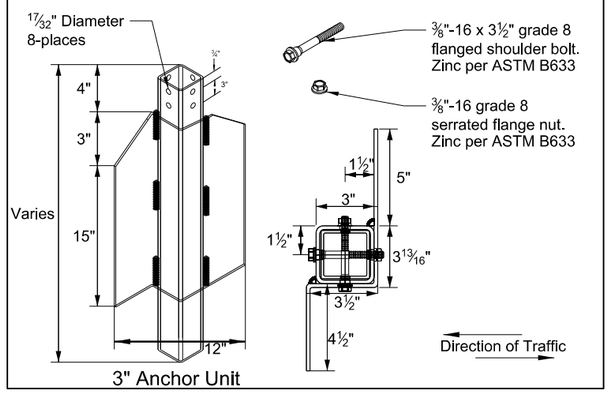
Max protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.



Base Plate with Breakaway Coupler

Shoulder Bolt

Shimming agent to reduce tolerance between 3" anchor unit with 2½" post. (use of standard ⅜" diameter grade 8 bolt allowed with proper shim)



3" Anchor Unit

Notes:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Use anchor unit of the same size and specification as the post.
3. Provide a minimum 8' distance between the first and fourth post on four post signs.
4. Use the breakaway base system on standard D-754-24 or the breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements 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) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

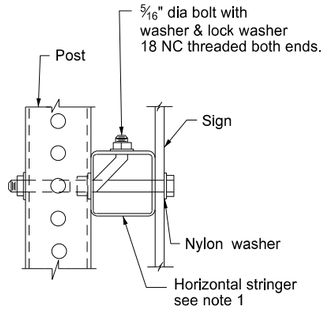
(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

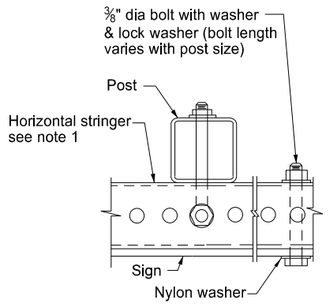
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

Mounting Details Perforated Tube

D-754-25

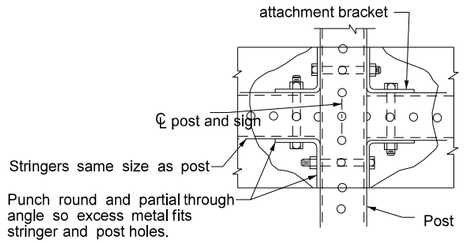


Side View



Top View

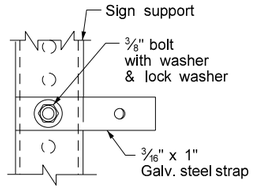
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



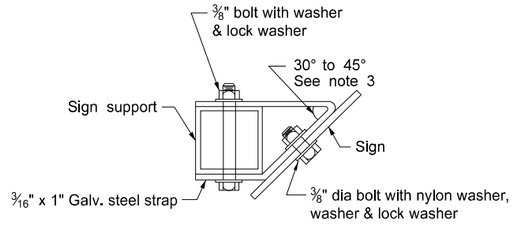
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - Use perforated tubes or 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 15/16" ±1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.

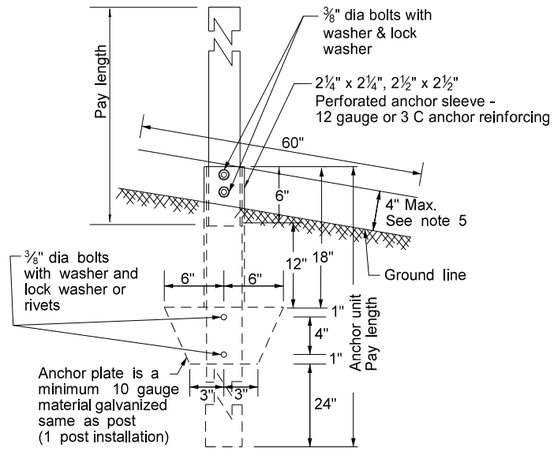


Side View



Top View

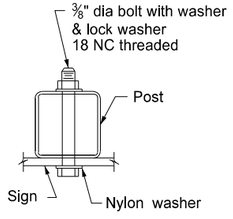
STRAP DETAIL



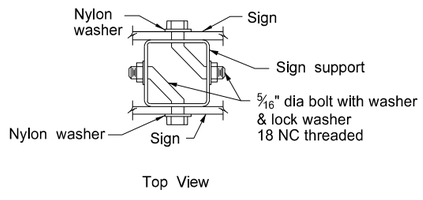
ANCHOR UNIT AND POST ASSEMBLY

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) - When placing 2½", 12 gauge posts in standard soils without breakaway bases, provide a shim as specified by the manufacturer. Provide breakaway base when placing the support in weak soils. Engineer will determine if 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.

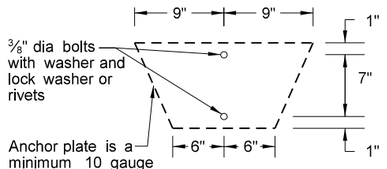


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



Properties of Telescoping Perforated Tubes						
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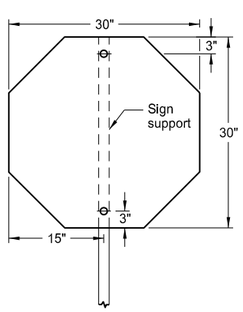
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

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.

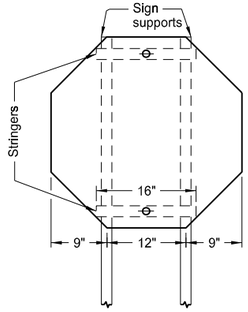
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3.
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 , on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

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

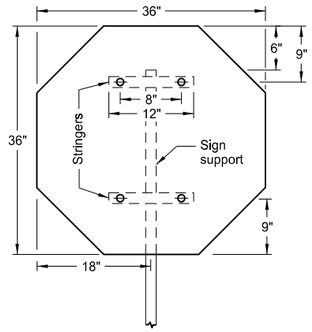


1 Post



2 Posts

Assembly No. 1



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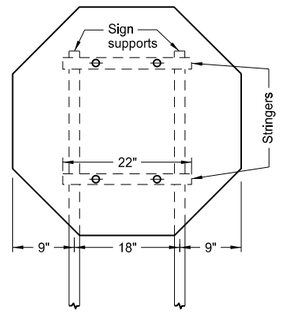
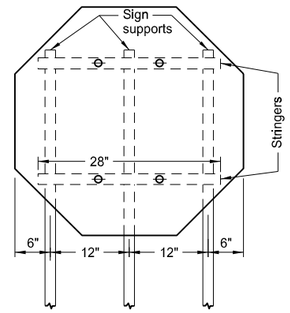


2 Posts

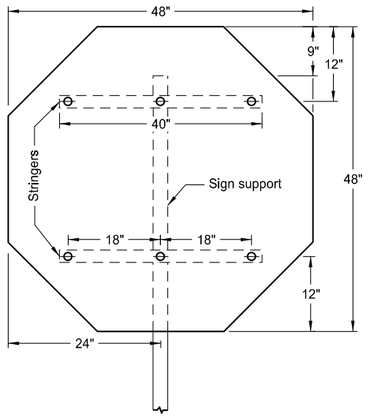


3 Posts

Assembly No. 2

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



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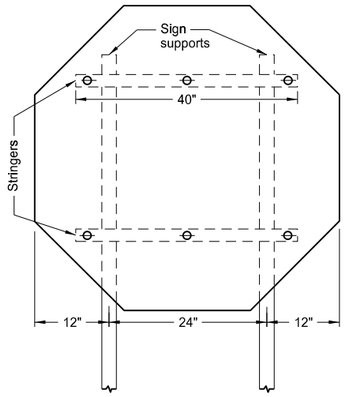
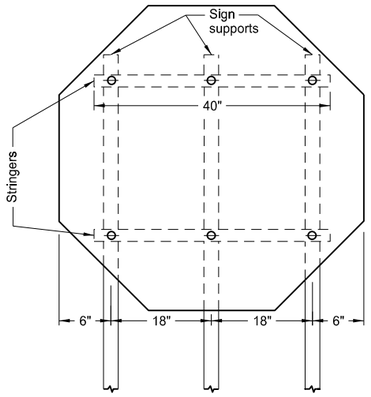
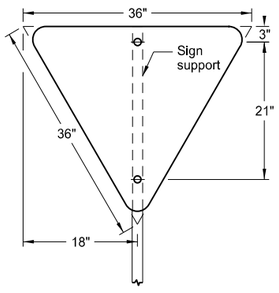


2 Posts



3 Posts

Assembly No. 3



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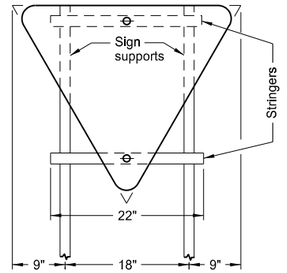
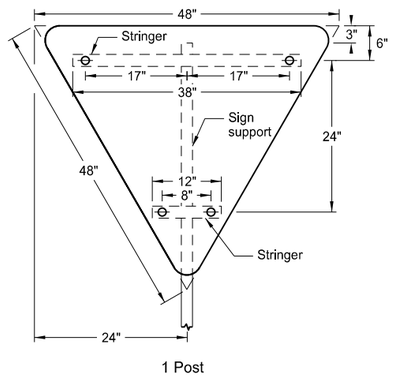
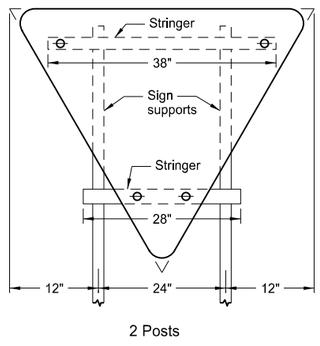


2 Posts

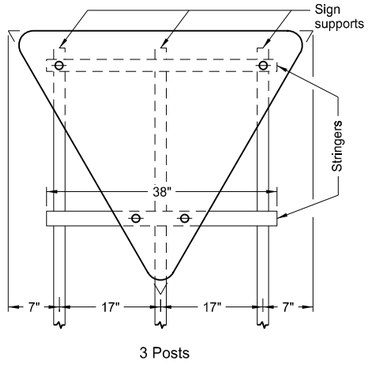
Assembly No. 4



1 Post



2 Posts



3 Posts

Assembly No. 5

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

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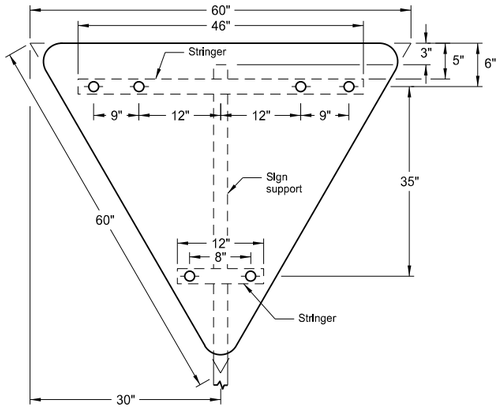
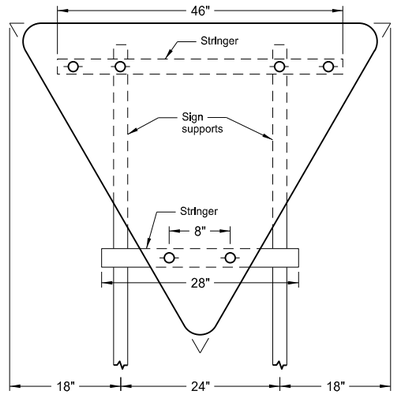
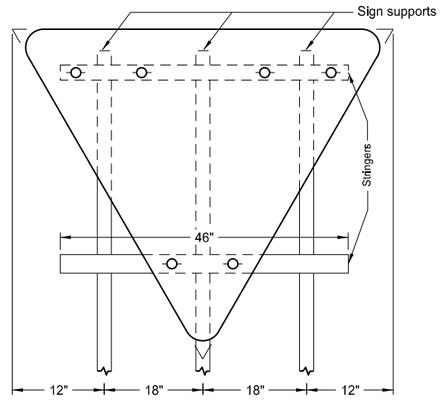
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

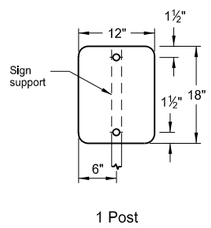


3 Posts

Assembly No. 6

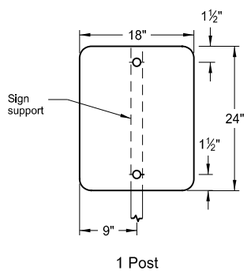
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



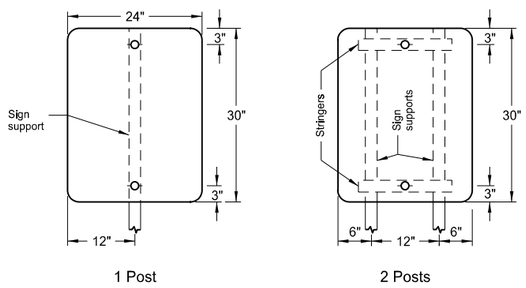
1 Post

Assembly No. 7



1 Post

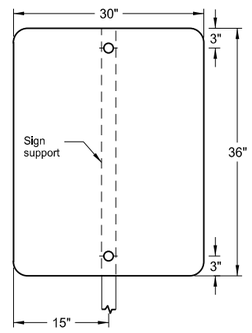
Assembly No. 8



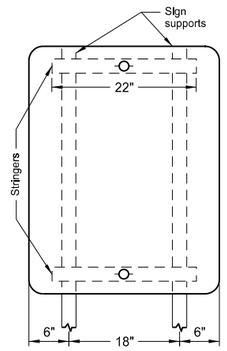
1 Post

2 Posts

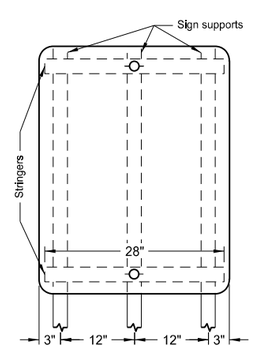
Assembly No. 9



1 Post

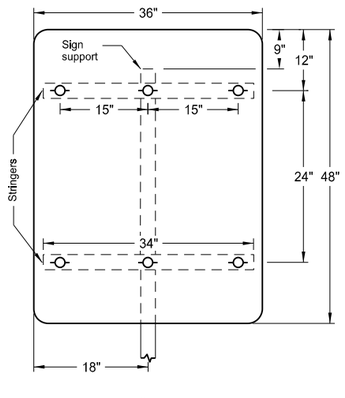


2 Posts

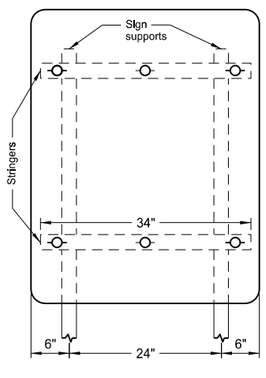


3 Posts

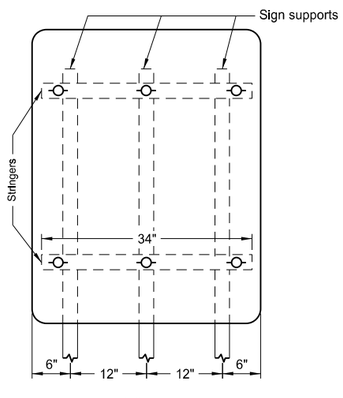
Assembly No. 10



1 Post



2 Posts



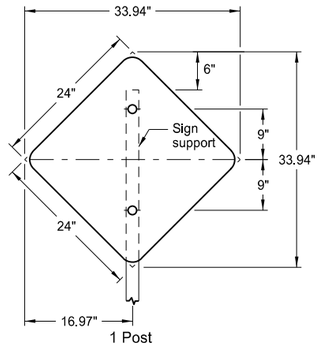
3 Posts

Assembly No. 11

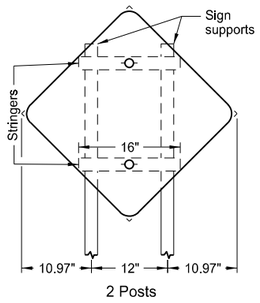
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

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

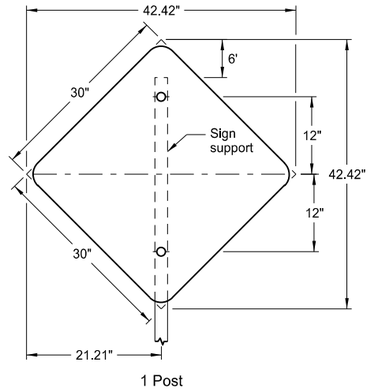


1 Post

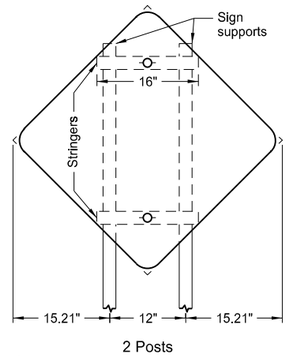


2 Posts

Assembly No. 18

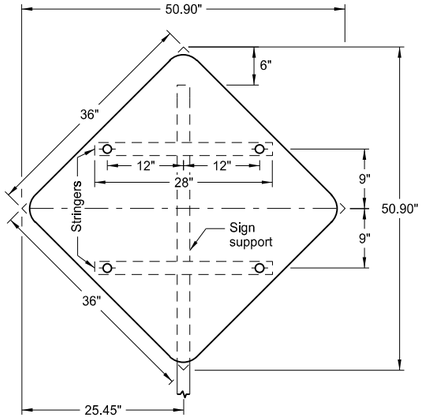


1 Post

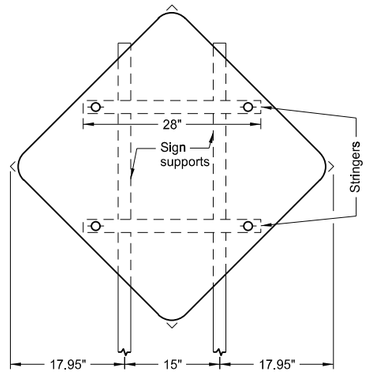


2 Posts

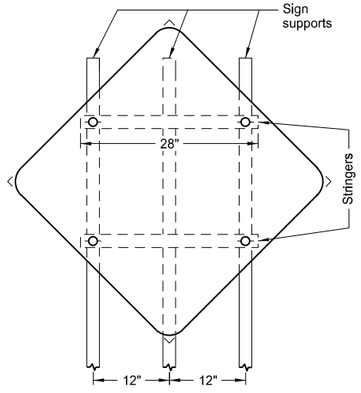
Assembly No. 19



1 Post

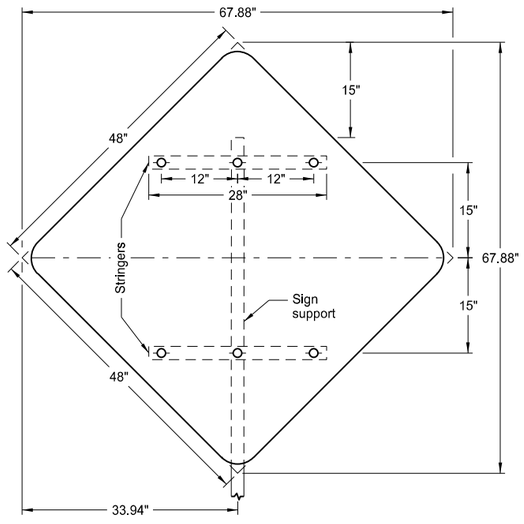


2 Posts

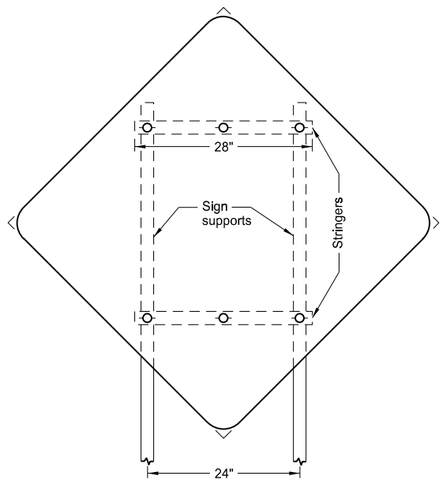


3 Posts

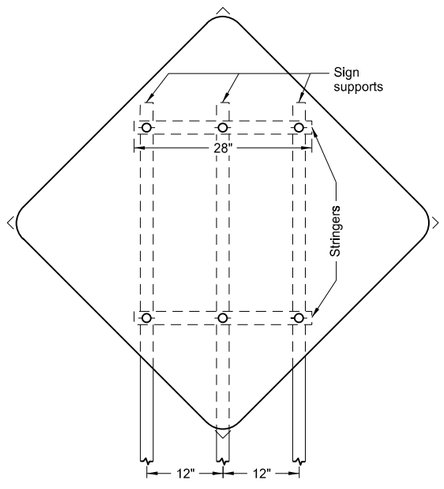
Assembly No. 20



1 Post



2 Posts



3 Posts

Assembly No. 21

Notes:

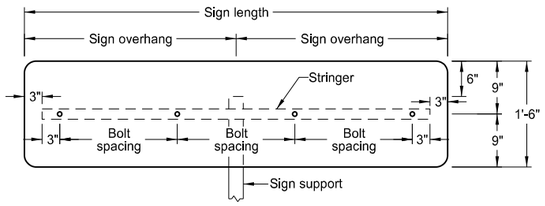
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

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

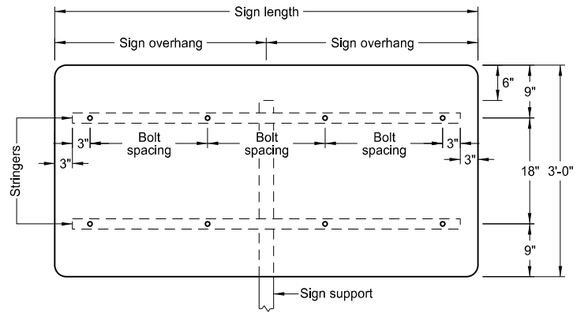
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

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

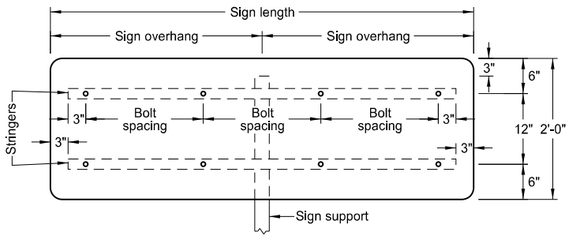
D-754-47



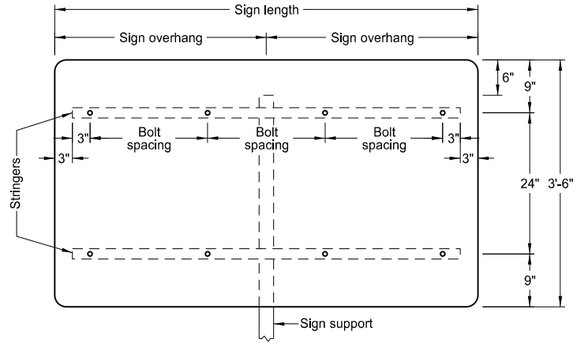
VARIES X 1'-6"



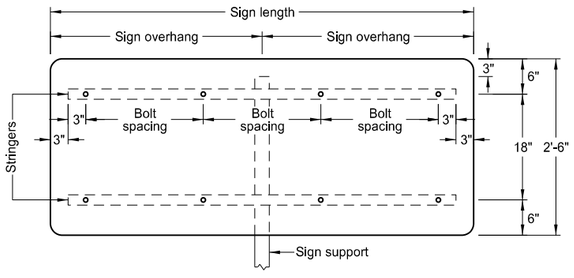
VARIES X 3'-0"



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:

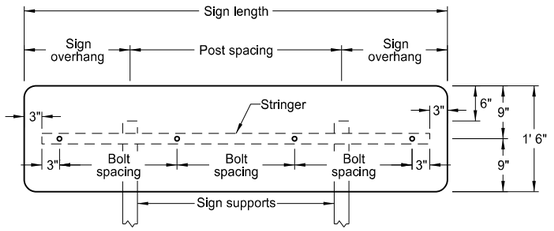
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.
4. Attach single stringer to single post signs with special stringer angle, shown on "Mounting Details Perforated Tube" standard drawing.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engr PE Stamp.

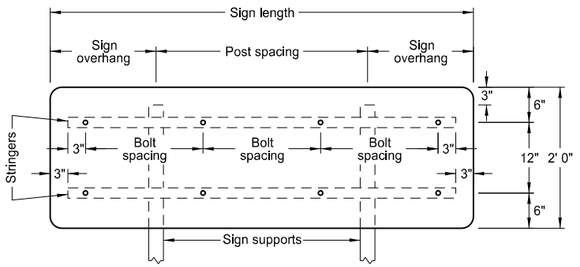
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/04/19 and the original document is stored at the North Dakota Department of Transportation

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

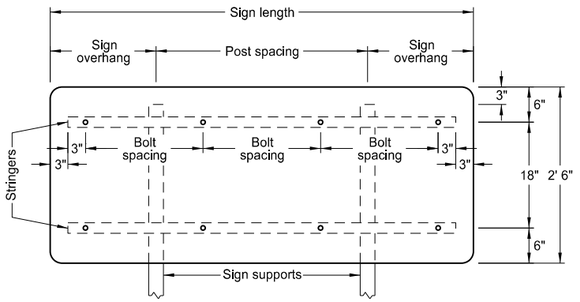
D-754-48



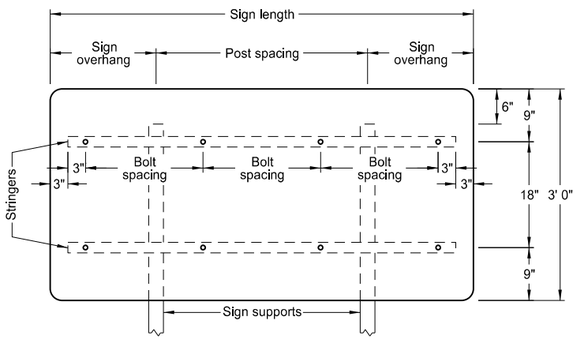
VARIES X 1'-6"



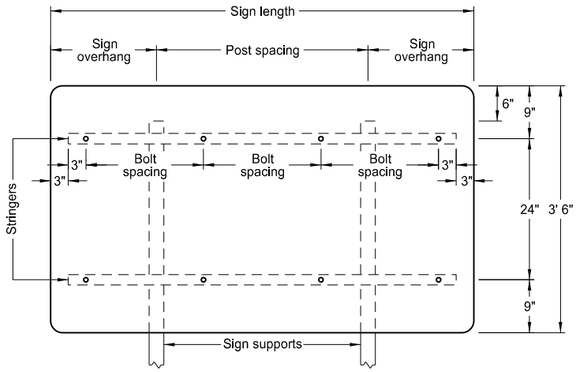
VARIES X 2'-0"



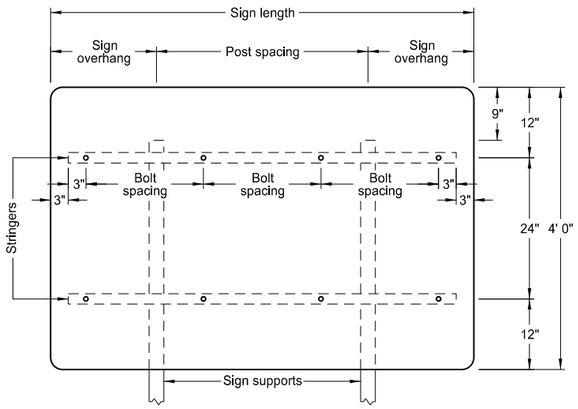
VARIES X 2'-6"



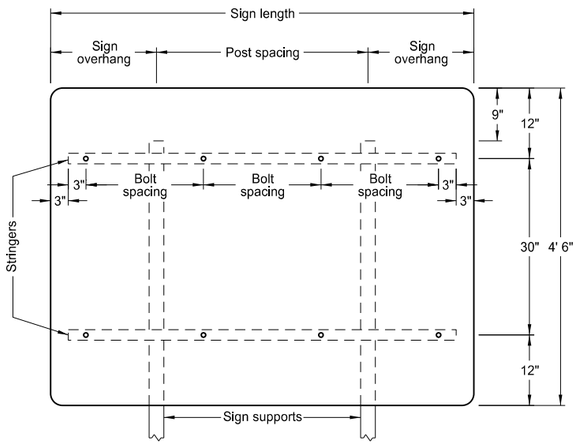
VARIES X 3'-0"



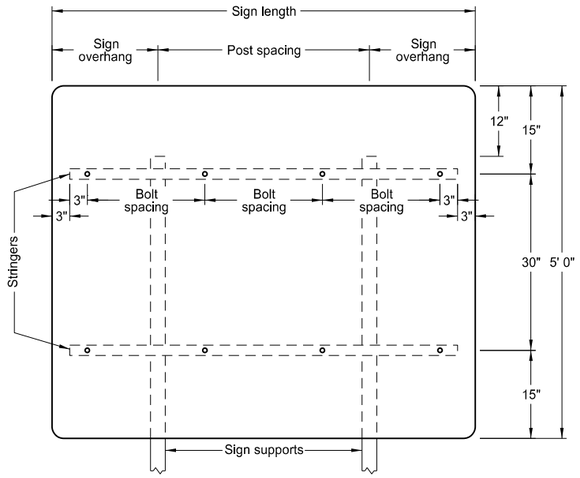
VARIES X 3'-6"



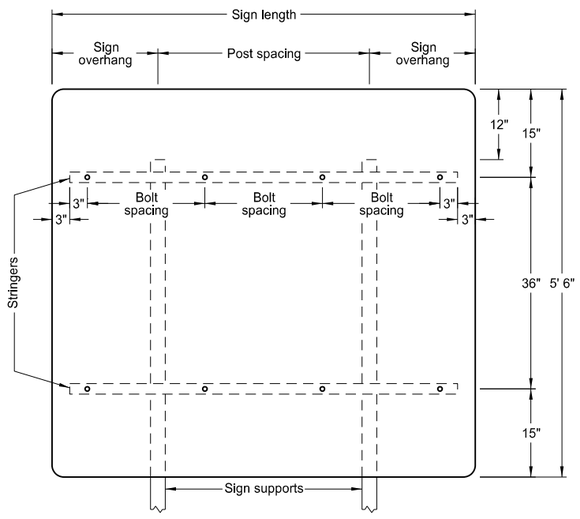
VARIES X 4'-0"



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. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18 9-04-19	Updated notes to active voice. New Design Engineer PE Stamp.

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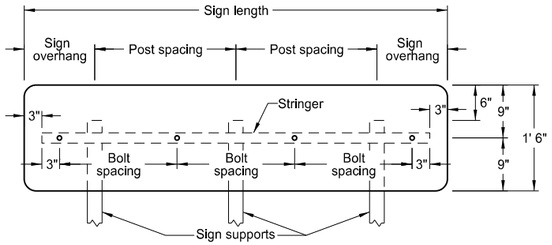
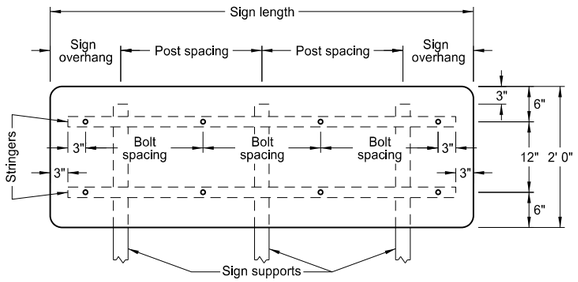
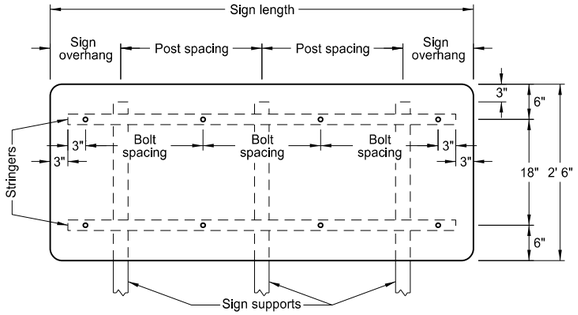
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS



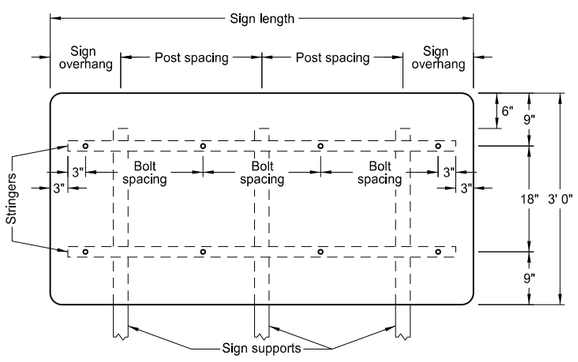
VARIES X 1'-6"



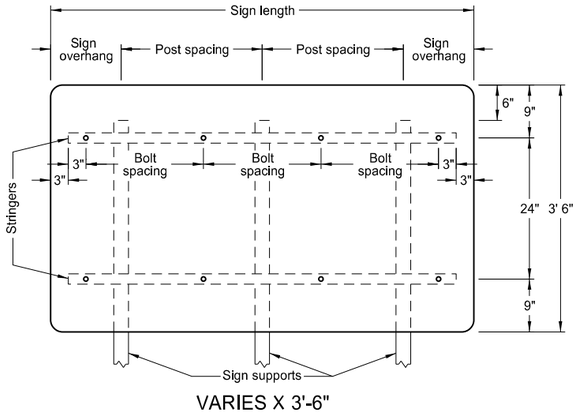
VARIES X 2'-0"



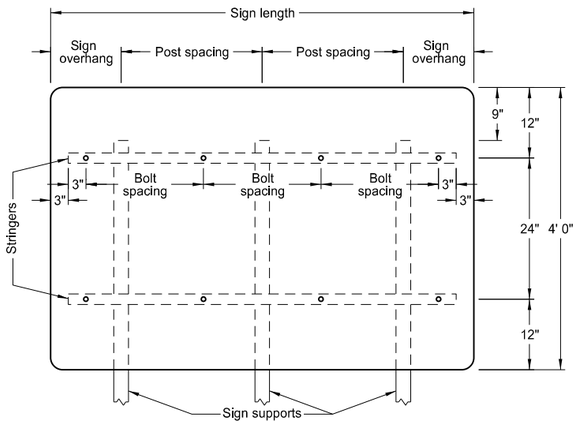
VARIES X 2'-6"



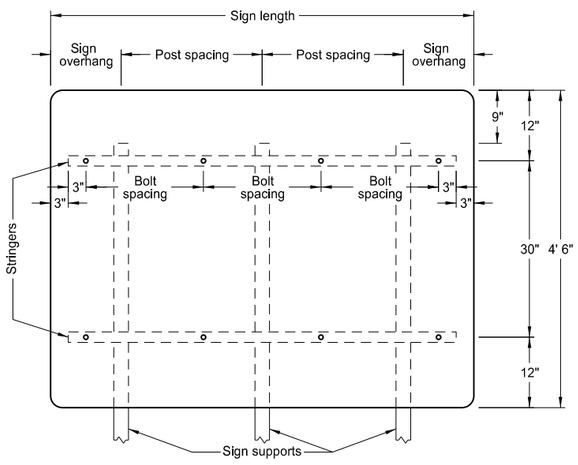
VARIES X 3'-0"



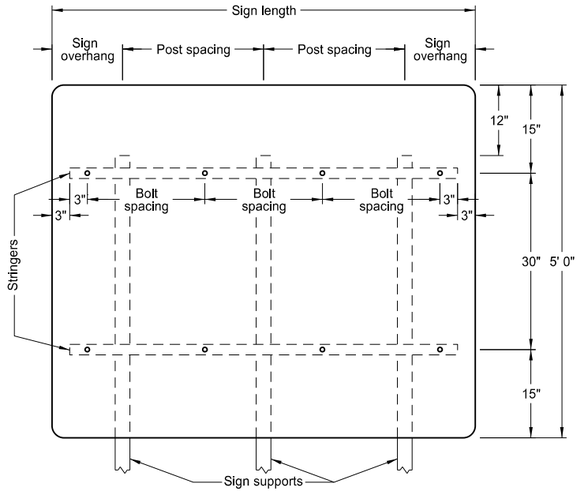
VARIES X 3'-6"



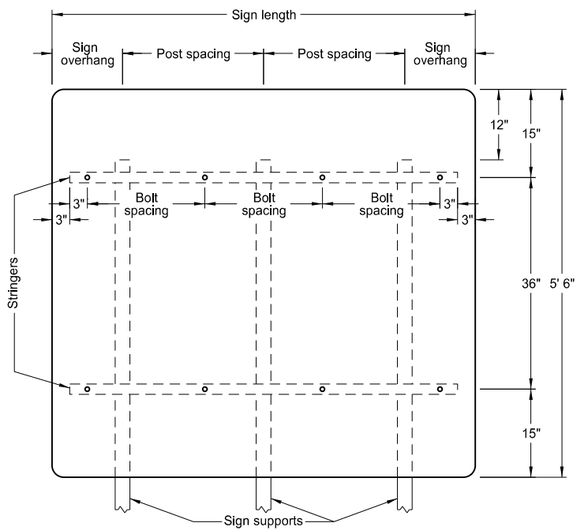
VARIES X 4'-0"



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:

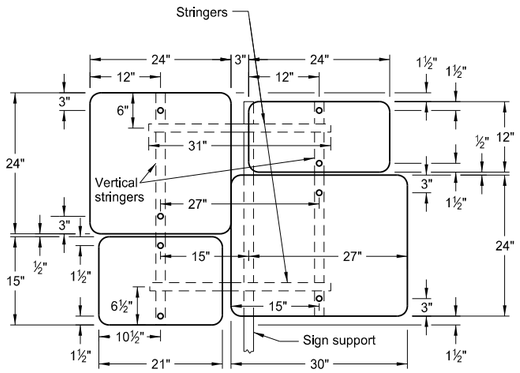
1. Use 0.100 minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.

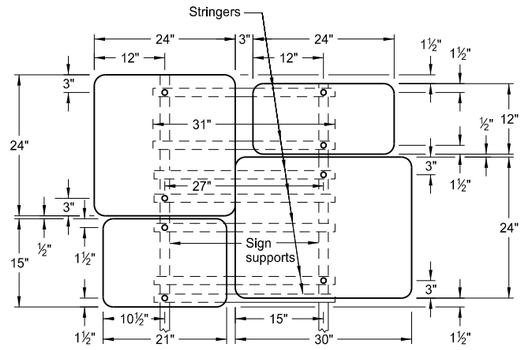
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/04/19 and the original document is stored at the North Dakota Department of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

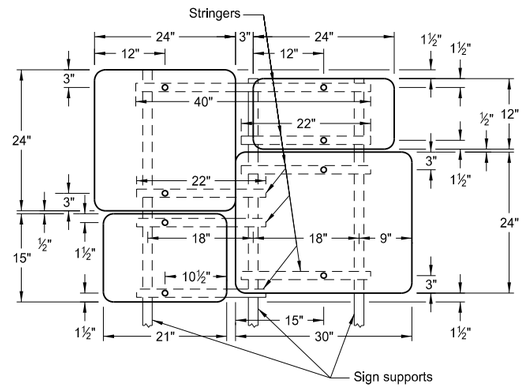
D-754-60



1 Post



2 Posts



3 Posts

ASSEMBLY NO. 403

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½"x1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

1 Post

2 Posts

3 Posts

ASSEMBLY NO. 404

1 Post

2 Posts

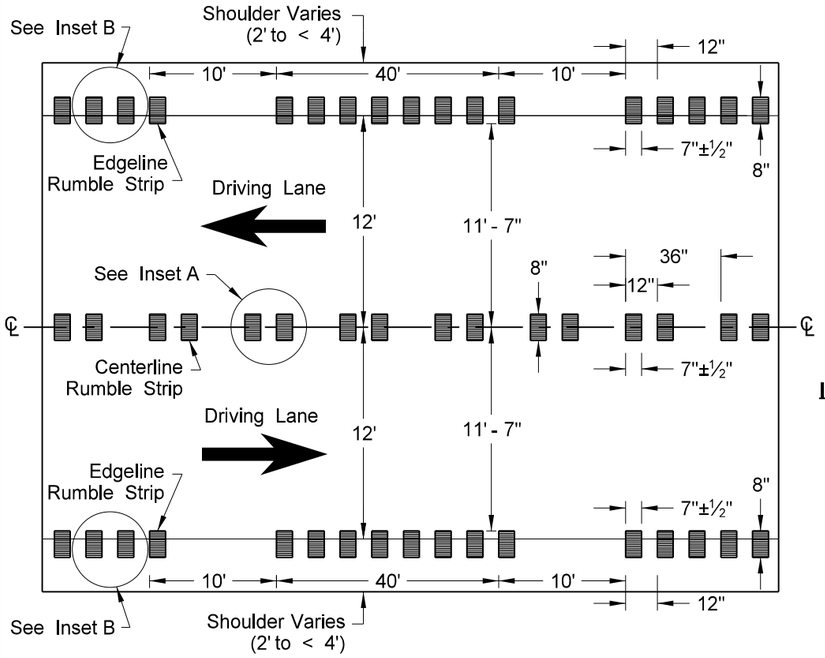
3 Posts

ASSEMBLY NO. 405

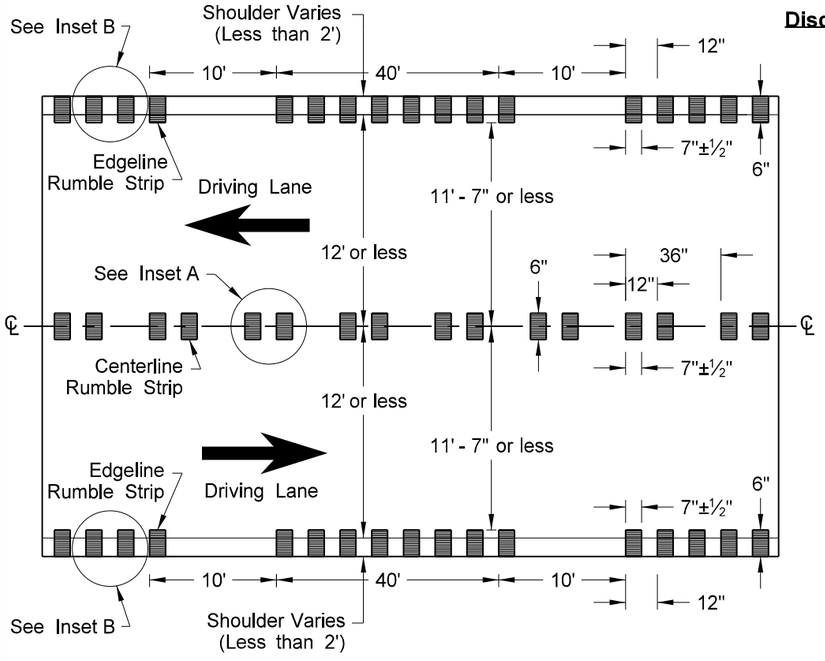
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/04/19 and the original document is stored at the North Dakota Department of Transportation

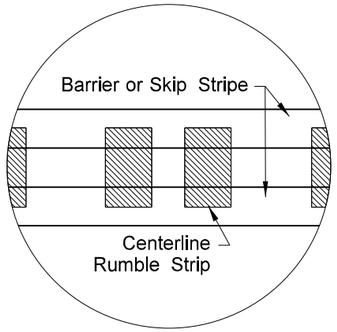
RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS LESS THAN 4')



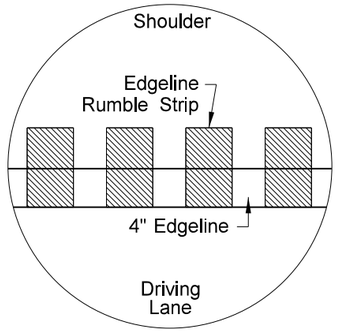
Undivided Highways (12' Driving Lanes & Shoulders 2' to < 4')



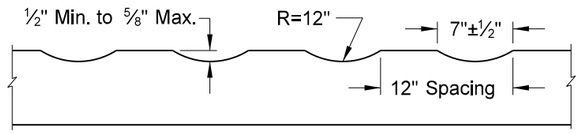
Undivided Highways (12' Driving Lanes or less & Shoulders Less than 2')



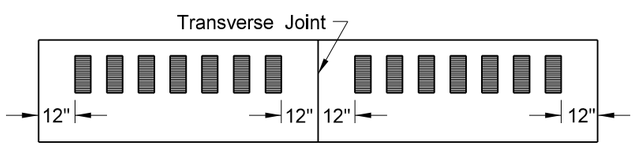
Inset A - Centerline Rumble Strip



Inset B - Edgeline Rumble Strip



Profile of Rumble Strips - Bituminous and PCC Pavements

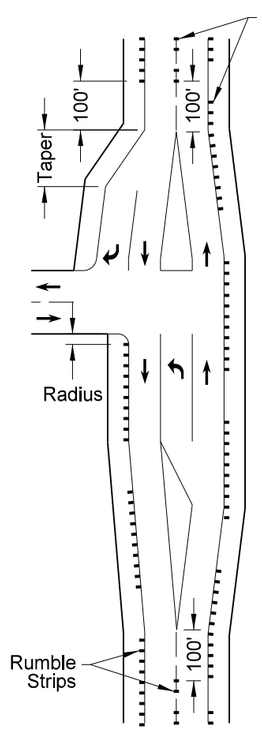


Discontinue rumble strip approx. 12" on both sides of PCC transverse joint

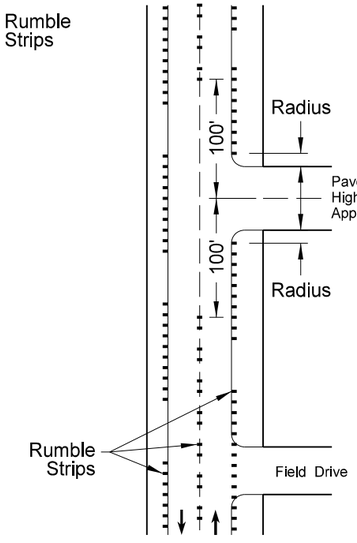
NOTES:

1) Discontinue edgeline rumble strips through the entire length of right turn lanes, 100' before right turn lane tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive.

2) Discontinue centerline rumble strips through the entire length of left turn lanes, 100' before left turn lane tapers and median islands, 100' before and after a paved or gravel highway, section line, approach, or private drive.



Turn Lane
(Right & Left)

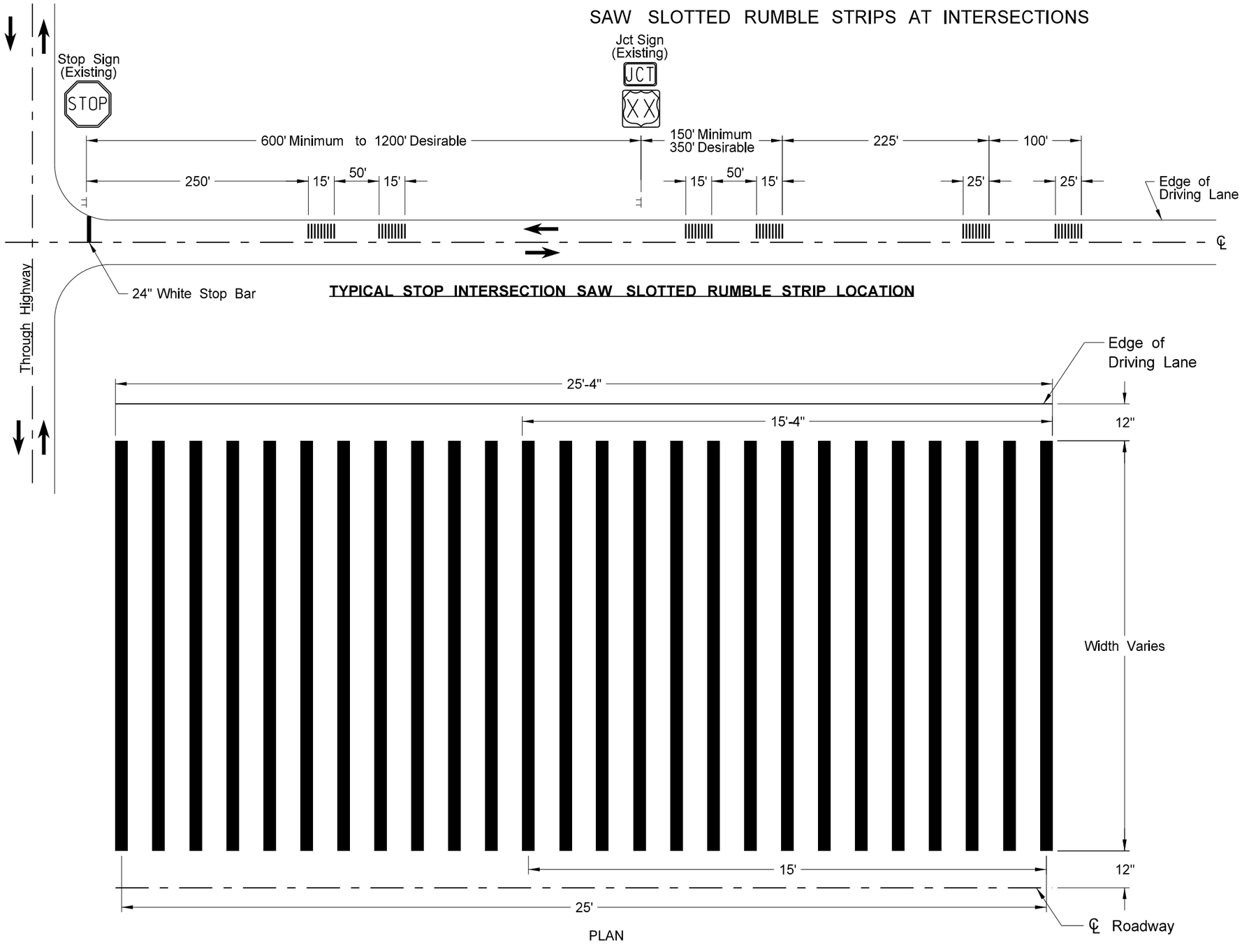


Entrance Roadways

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-08-11	Revised Notes and D-760-4.
1-26-12	Revised details for rumble strip widths and dimensions.
10-25-19	Added missing dimensions.

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

SAW SLOTTED RUMBLE STRIPS AT INTERSECTIONS



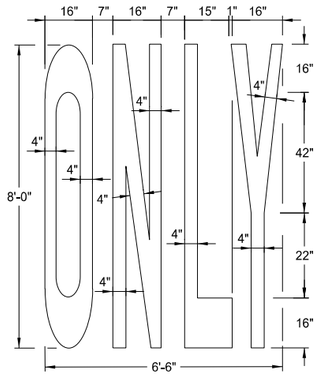
SAW SLOTTED RUMBLE STRIP DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-22-10	Saw Slotted width revised.
2-25-10	Note 7 was added.
9-8-11	Revised Notes and D-760-5.
7-7-14	Deleted Notes.
8-27-19	New Design Engr PE Stamp.

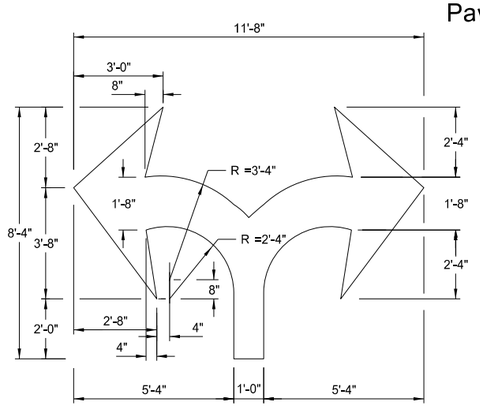
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 , on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

Pavement Marking Message Details

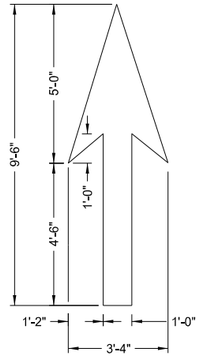
D-762-1



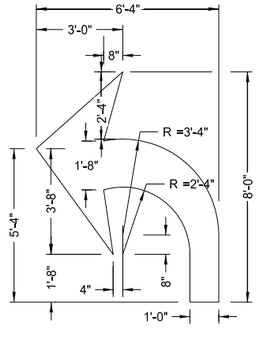
22 S. F.



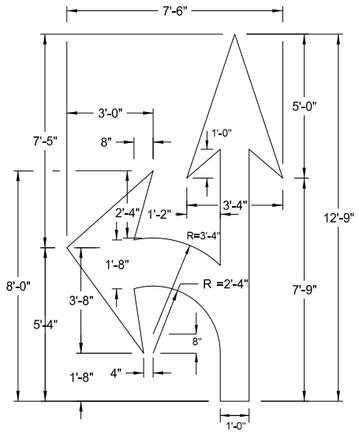
29 S. F.



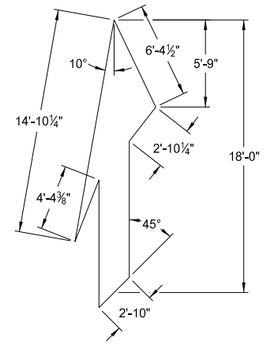
12 S. F.



16 S. F.

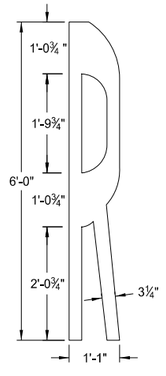


27 S. F.

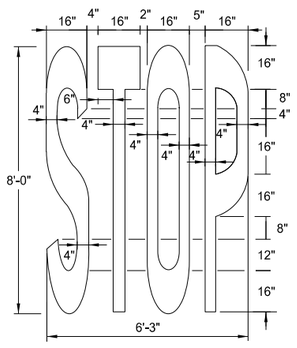


41 S. F.

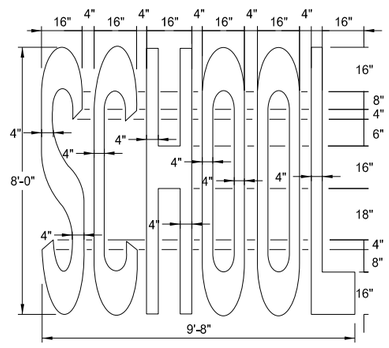
Note: Rotate merge arrow 20° from edge of roadway.



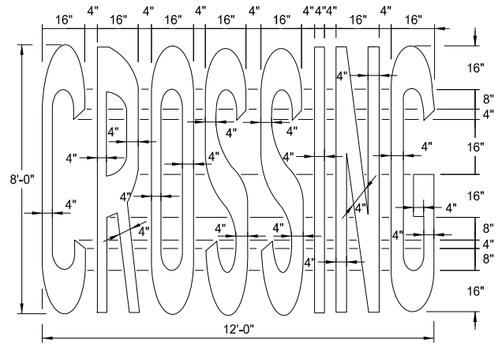
4 S. F.



22 S. F.



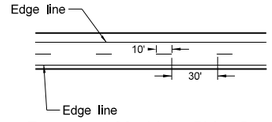
34.5 S. F.



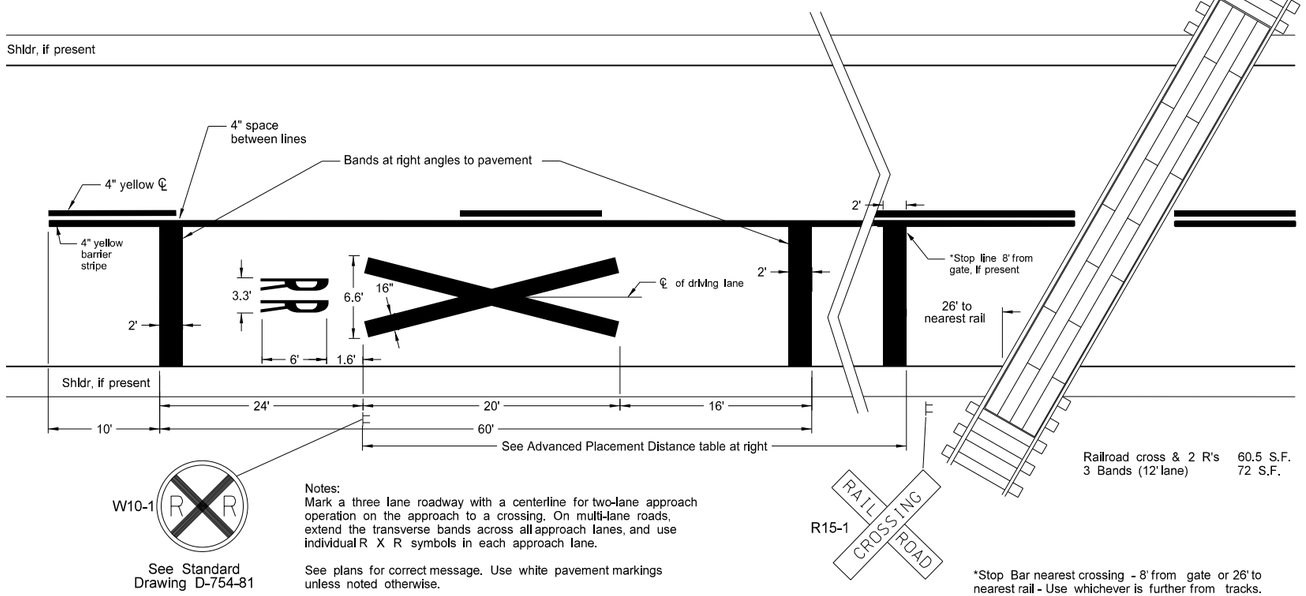
46 S. F.

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

Chevron Crosshatching Table



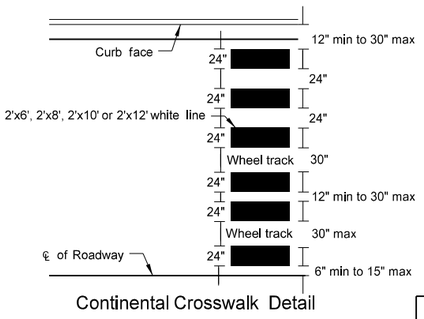
Centerline Pavement Marking Skip Spacing Detail



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

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

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



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

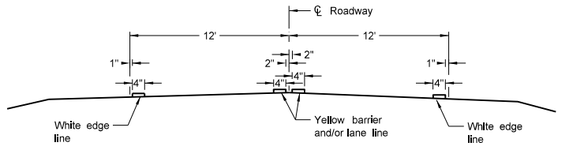
REVISIONS

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

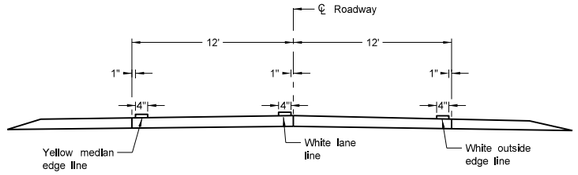
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 1/28/2020 and the original document is stored at the North Dakota Department of Transportation

PAVEMENT MARKING

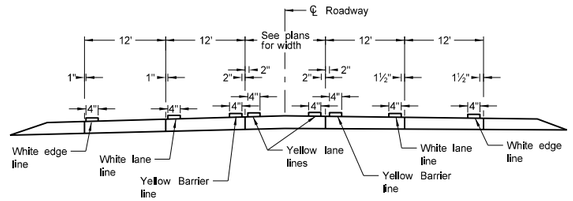
D-762-4



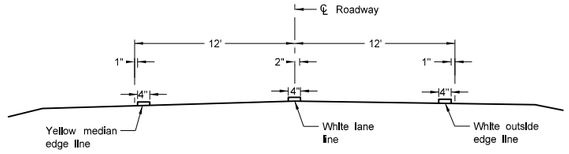
Two Lane Two Way
RURAL ROADWAY



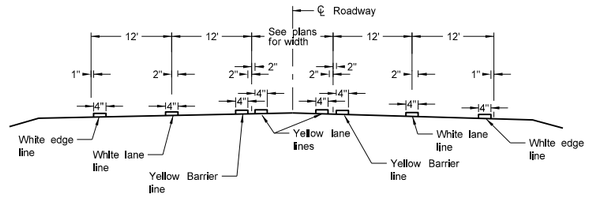
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



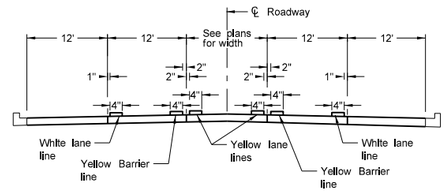
RURAL FIVE LANE ROADWAY
Concrete Section



Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



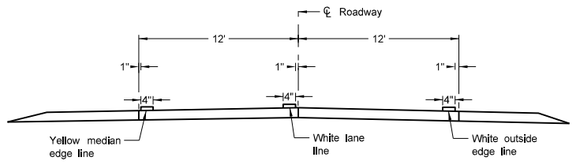
RURAL FIVE LANE ROADWAY
Asphalt Section



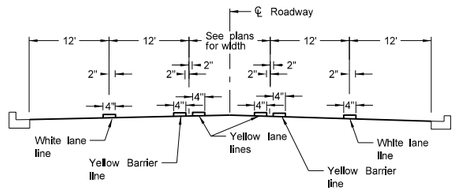
URBAN FIVE LANE SECTION
Concrete Section

NOTES:

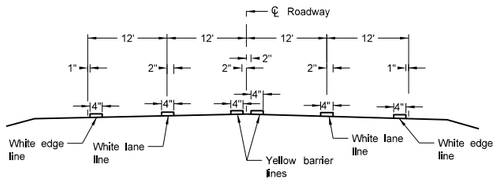
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.



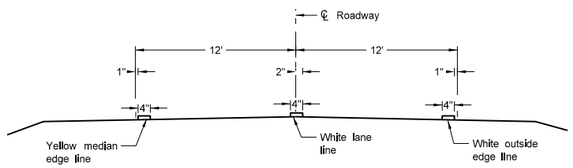
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



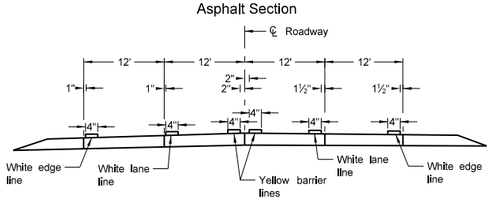
URBAN FIVE LANE SECTION
Asphalt Section



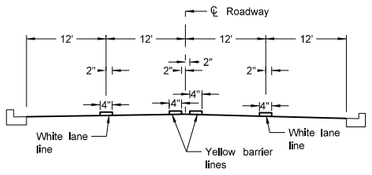
RURAL FOUR LANE ROADWAY
Asphalt Section



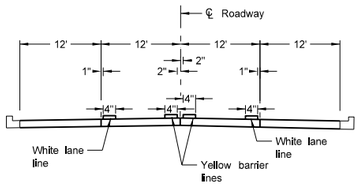
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



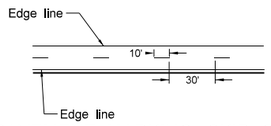
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



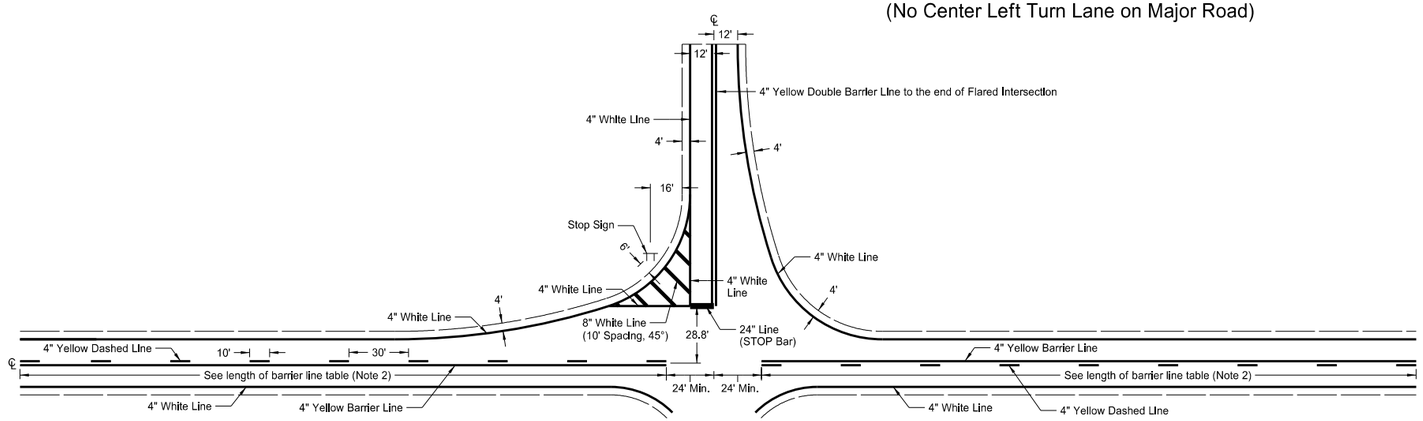
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

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

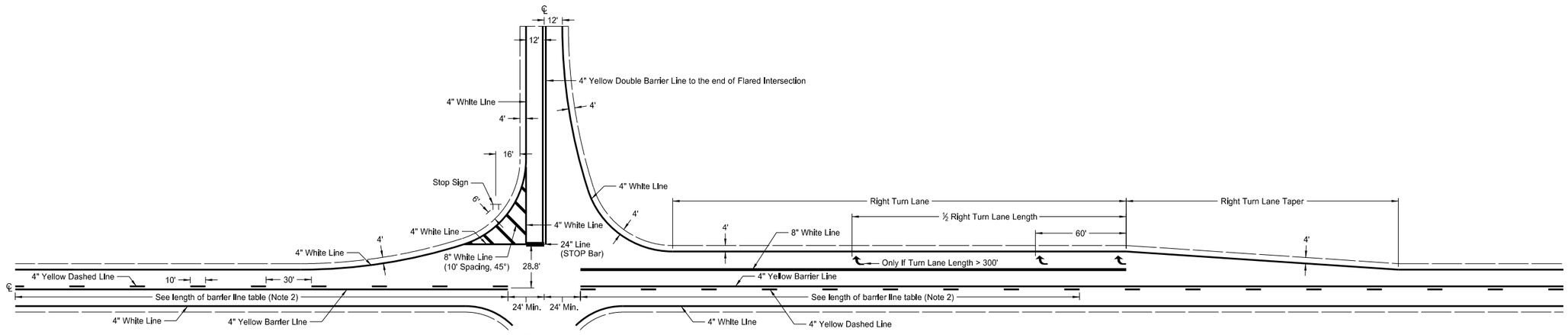
PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION

(No Center Left Turn Lane on Major Road)



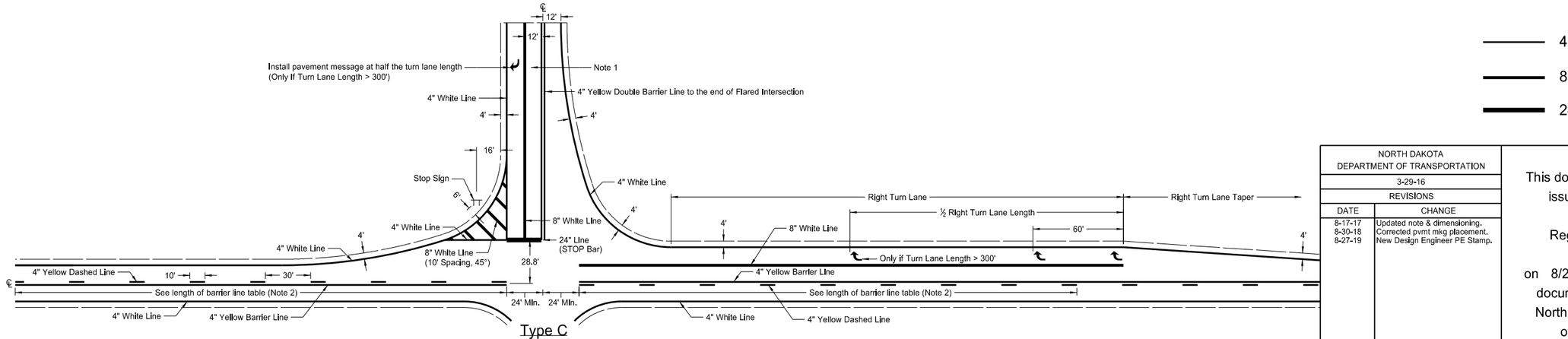
Type A

(No turn lanes present)



Type B

(Right Turn Lane on Major Road)



Type C

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

Notes

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

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

4" Marking

8" Marking

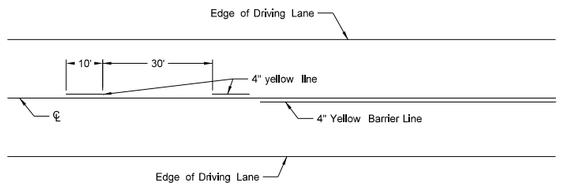
24" Marking

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

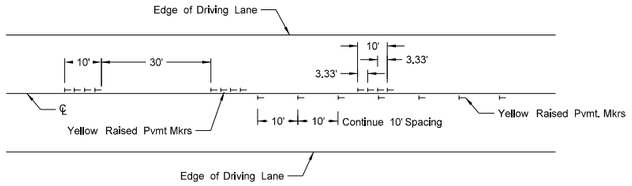
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

SHORT-TERM PAVEMENT MARKING

D-762-11

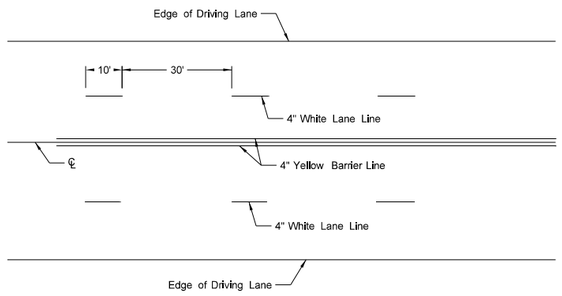


Painted or Tape Lines

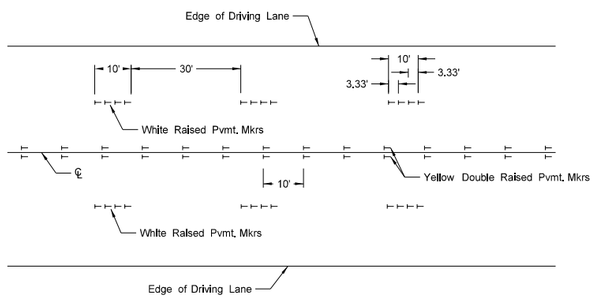


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

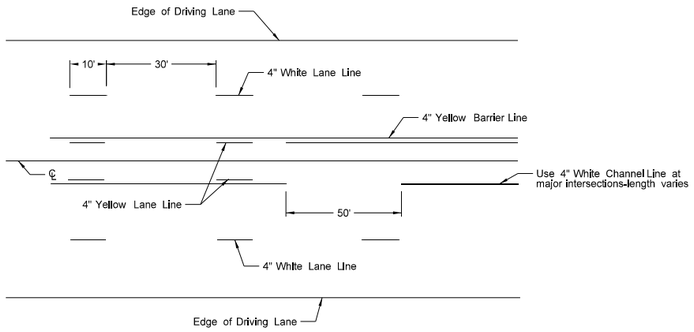


Painted or Tape Lines

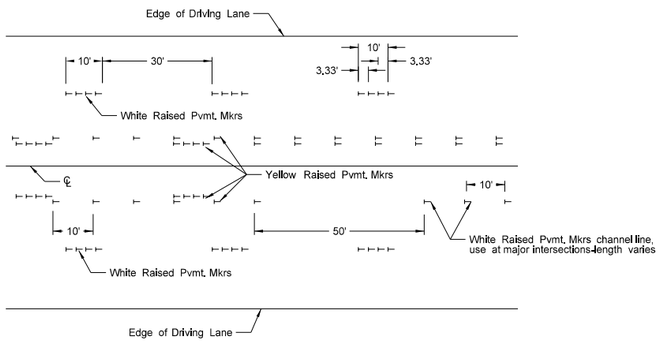


Raised Pavement Markers

FOUR LANE ROADWAY

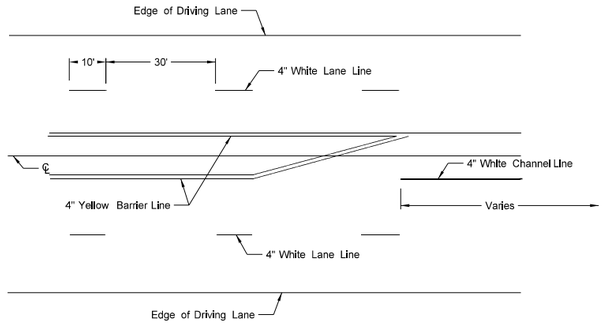


Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



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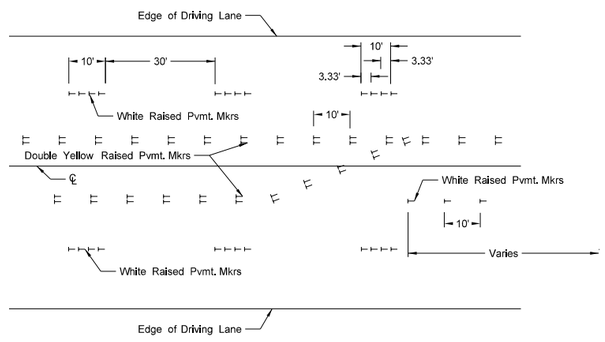

Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

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

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

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