

DESIGN DATA			
Traffic	Average Daily		
Current 2015	Pass: 29,790	Trucks: 1,205	Total: 30,995
Preventative Maintenance			

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	20600	1	1

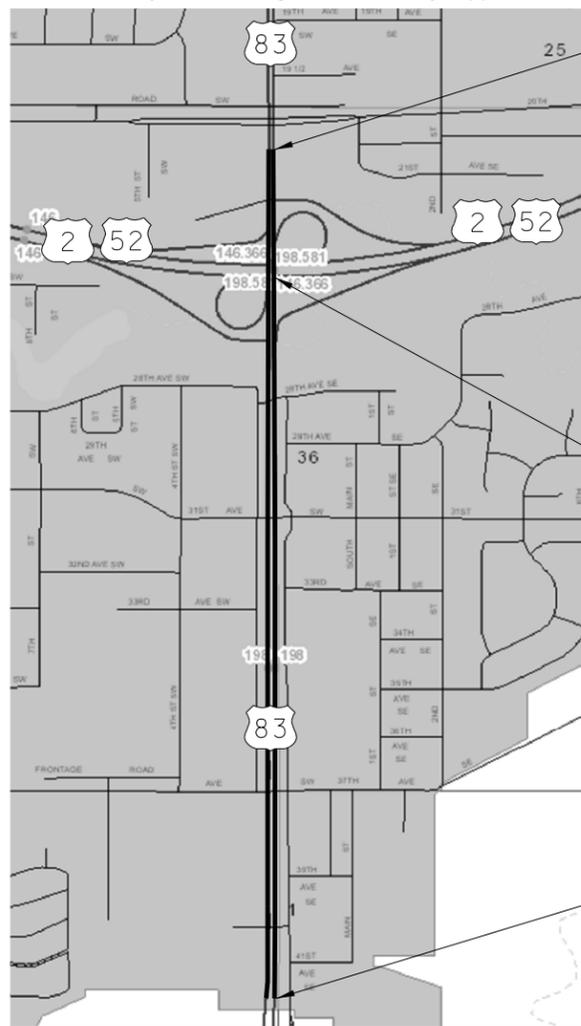
JOB # 24
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

NHU-4-083(128)197

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NHU-4-083(128)197	1.254	1.254

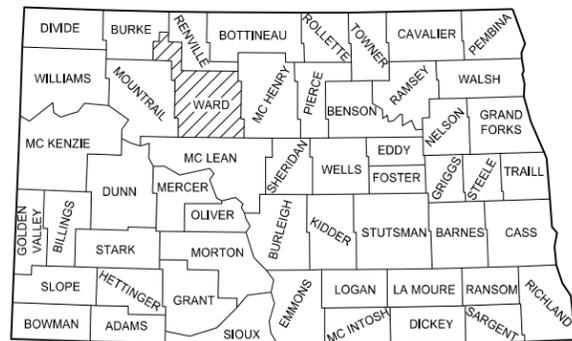
Ward County
 US 83 from South Urban Limits North to 20th Ave SW in Minot
 Northbound and Southbound Lanes
 Selective Mill & Overlay, HMA, Bridge Deck Overlay, Approach Slab Repair



End Project
 RP 198.776
 Sta. 10485+36

Br. # 0002-146.366
 Included in Project
 RP 198.581
 Sta. 10475+08

Begin Project
 RP 197.522
 Sta. 10419+25



STATE COUNTY MAP

DESIGNERS
Dan Green, PE
Andrew Gottsman, PE
Josh Forsgren, EI

APPROVED DATE 3/23/16
 Robert Fode /s/
 OFFICE OF PROJECT DEVELOPMENT
 ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.
 APPROVED DATE 3/22/16
 Daniel N. Green /s/
 BARTLETT & WEST, INC.

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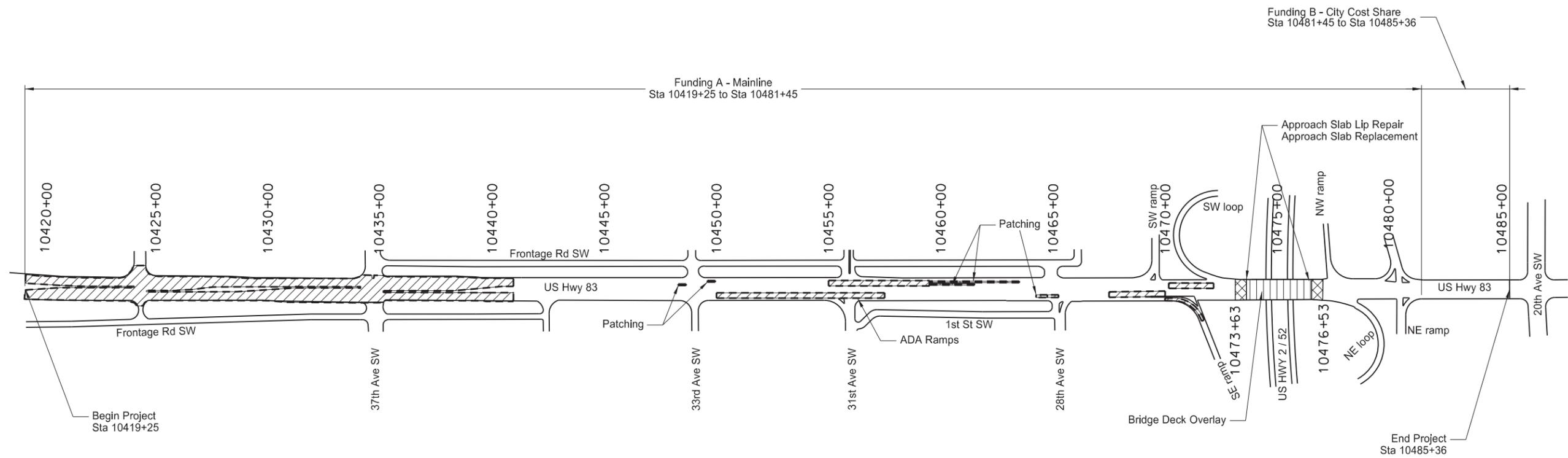
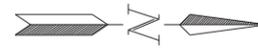
PLAN SECTIONS

Section	Page(s)	Description
1	1	Title Sheet
2	1	Table of Contents
4	1	Scope of Work
6	1	Notes
8	1	Estimate of Quantities
10	1	Basis of Estimate
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100	2 - 7	Work Zone Traffic Control
120	1 - 4	Pavement Marking
120	5 - 6	Pavement Marking Quantity List
170	1 - 7	Bridges and Box Culverts

LIST OF STANDARD DRAWINGS

Number	Description
D-101-1, 2, 3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31, 32	Symbols
D-704-1	Attenuation Device
D-704-2	Traffic Control For Coring of Hot Bituminous Pavement
D-704-5	Construction Sign Detail
D-704-7	Breakaway Systems for Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems for Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details - Terminal and Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
D-704-11	Construction Sign Details - Warning Signs
D-704-12	Shoulder Closure Tapers
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-20	Terminal and Seal Coat Sign Layouts
D-704-23	Short Term Urban Detour and Lane Closure on a Divided Highway Layouts
D-704-25	Lane Closures on Urban Streets Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-34	Sign Layout for One Lane Closure
D-704-50	Portable Sign Support Assembly
D-704-51	Portable Precast Concrete Median Barrier (Temporary Usage)
D-706-1	Bituminous Laboratory
D-748-1	Curb & Gutter and Valley Gutter
D-750-2	Sidewalk
D-750-3	Curb Ramp Details
D-762-1	Pavement Marking Message Details
D-762-4	Pavement Marking
D-762-6	Short-Term Pavement Marking

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-  MILLING PAVEMENT SURFACE - 2" & 2" SUPERPAVE FAA 45
-  PATCHING
-  BRIDGE MILLING TRANSITION & 2" SUPERPAVE FAA 45
-  BRIDGE DECK OVERLAY

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Scope of Work

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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- 107-700 HAUL ROADS:** The Engineer will not designate paved roads off the state system as haul roads.
- 107-710 HAUL ROADS:** Before submitting a proposal, contact the appropriate State, County, Township, or City officials to determine if there are any roadways that will be designated as "no haul routes".
- 411-P01 MILLING PAVEMENT SURFACE:** Deliver and stockpile milled material in the NDDOT – Minot District maintenance yard at 1305 Highway 2 Bypass East, Minot, ND 58701. Do not drive any equipment on the stockpiled material. Notify the Minot District Maintenance Department 48 hours prior to stockpiling milled material. (1-701-857-6925) Include all costs to perform this work in the contract unit price for "Milling Pavement Surface".
- 411-P02 TEMPORARY ASPHALT WEDGES:** Place and maintain temporary asphalt wedges at the beginning and ending of milled sections. Place wedges at these milled areas prior to traffic being allowed on the milled roadway section. Include all costs associated with labor, materials, and equipment for the installation, maintenance and removal of the asphalt wedges in the contract unit price for "Milling Pavement Surface".
- 430-P01 PG 64-28 ASPHALT CEMENT:** Use a PG 64-28 asphalt binder that meets the following additional PG specifications: MSCR, TP-70: Heavy Traffic "H" Grade, J_{nr} 3.2, max 2.0 kPa – J_{nr} diff, max 75%, test temp, 64°C.
- 704-100 TRAFFIC CONTROL SUPERVISOR:** Provide a Traffic Control Supervisor.
- 704-200 PRECAST CONCRETE MEDIAN BARRIERS – STATE FURNISHED:** Obtain 91 barriers from the Stanley NDDOT storage yard. Return barriers to the Stanley NDDOT storage yard.
- Some 4 inch x 4 inch boards are available at the return location. Provide any additional 4 inch x 4 inch boards necessary to stack barriers. The boards will become property of the Department. Include the cost of boards in the contract unit price for "Precast Concrete Median Barrier – State Furnished".
- 704-P01 TRAFFIC CONTROL FOR BITUMINOUS SURFACING:** While milling and overlay paving is underway Traffic Control Devices will be in compliance with the following Standard Drawings:
1. Standard D-704-20, layout G. For project terminal signing during paving operations. Sign G20-1b-60 will be required. Signs G20-2a-48 & R2-1-48 are included in D-34.
 2. Standard D-704-26, layout G: For paving operations.
 3. Standard D-704-34.
- Quantities have been developed based on the full length of the project. The required traffic control signs and devices are included in the "Traffic Control Device List" and will be measured and paid at the contract Unit Price for each device. Additional devices required to accommodate the contractor's operation will be at the contractor's cost.
- 704-P02 CONSTRUCTION TRAFFIC:** The contractor's construction traffic will only be allowed to access at intersections and crossovers only. Construction traffic cannot operate in the median and also will not be permitted to cross through the median to access other roads.
- 704-P03 WORK HOURS:** There are no work hour restrictions for lane closures on this project. Night work is allowed.
- 704-P04 SIDEWALK CLOSURES:** Follow Section 6F.14 of the MUTCD. Signs for sidewalk closures have been added to the Traffic Control Devices List.

- 706-P01 BITUMINOUS LABORATORY:** Supply a copy machine with reduction capabilities for the field laboratory, as well as the toner. The payment for these items to be included in the bid price for "Bituminous Laboratory".
- 750-P01 SIDEWALK CONCRETE 4IN:** Include all costs associated with labor, materials, and equipment for the installation of Salvaged Base Course for the sidewalks in the contract unit price for "Sidewalk Concrete 4IN".
- 885-001 CAST IRON DETECTABLE WARNING PANELS:** If cast iron detectable warning panels are used, provide cast iron panels with a minimum thickness of 0.2 inches.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC	CODE	ITEM DESCRIPTION	UNIT	FUNDING A - MAINLINE	FUNDING B - CITY COST SHARE	TOTAL QUANTITY
103	0100	CONTRACT BOND	L SUM	0.99	0.01	1
202	0114	REMOVAL OF CONCRETE PAVEMENT	SY	73.4	-	73.4
202	0119	SAW CONCRETE	LF	119	-	119
202	0130	REMOVAL OF CURB & GUTTER	LF	28	-	28
401	0050	TACK COAT	GAL	2,928	-	2,928
411	0100	MILLING PAVEMENT SURFACE	TON	3,217	-	3,217
430	0045	SUPERPAVE FAA 45	TON	3,245	-	3,245
430	1000	CORED SAMPLE	EA	10	-	10
430	2000	PATCHING	TON	173	-	173
430	6428	PG 64-28 ASPHALT CEMENT	TON	189	-	189
602	0130	CLASS AAE - 3 CONCRETE	CY	6.0	-	6.0
602	1135	BRIDGE APPROACH SLAB - REMOVE & REPLACE	SY	404.4	-	404.4
624	3002	DOUBLE BOX BEAM RAIL RETROFIT - E-RAIL	LF	503.9	-	503.9
650	0704	OVERLAY CONCRETE	CY	150	-	150
650	0720	CLASS 1 REMOVAL	SY	2,500	-	2,500
650	0721	CLASS 2 REMOVAL	SY	500	-	500
650	0722	CLASS 2-A REMOVAL	LF	900	-	900
650	0723	CLASS 3 REMOVAL	SY	125	-	125
650	0724	CLASS 4 REMOVAL	SY	25	-	25
702	0100	MOBILIZATION	L SUM	0.99	0.01	1
704	0100	FLAGGING	MHR	376	24	400
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1,622	85	1,707
704	1035	ATTENUATION DEVICE - TYPE B-25	EA	2	-	2
704	1052	TYPE III BARRICADE	EA	10	-	10
704	1060	DELINEATOR DRUMS	EA	114	10	124
704	1067	TUBULAR MARKERS	EA	130	10	140
704	1087	SEQUENCING ARROW - TYPE C	EA	2	-	2
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	5,000	-	5,000
704	3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EA	91	-	91
706	0550	BITUMINOUS LABORATORY	EA	1	-	1
706	0600	CONTRACTOR'S LABORATORY	EA	1	-	1
722	6200	ADJUST MANHOLE	EA	1	-	1
748	0140	CURB AND GUTTER - TYPE 1	LF	28	-	28
750	0115	SIDEWALK CONCRETE 4IN	SY	73.4	-	73.4
750	2115	DETECTABLE WARNING PANELS	SF	80	-	80
762	0110	EPOXY PVMT MK 4IN LINE-GROOVED	LF	22,853	2,715	25,568
762	0131	EPOXY PVMT MK 6IN LINE-GROOVED	LF	470	-	470
762	0132	EPOXY PVMT MK 8IN LINE-GROOVED	LF	12,763	515	13,278
762	0135	EPOXY PVMT MK 24IN LINE-GROOVED	LF	435	45	480
762	0136	EPOXY PVMT MK MESSAGE-GROOVED	SF	1,088	96	1,184
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	2,680	-	2,680
762	0434	SHORT TERM 8IN LINE-TYPE NR	LF	1,648	-	1,648
930	9639	APPROACH SLAB LIP REPAIR	LF	182	-	182

Estimate of Quantities

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

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BASIS OF ESTIMATE

Milling Pavement Surface

Measured by the ton, 2 Ton/CY of millings, see Sec 90

Hot Mix Asphalt

Superpave FAA 45 @ 2.0 Ton/CY, see Sec 90

PG 64-28 Asphalt Cement @ 5.8%

Tack Coat @ 0.10 Gal/SY for milled areas (29,340 SY)

Patching

Quantity estimate based on 6" replacement depth, see Sec 90

Coring

Sta. 10419+25 to Sta. 10440+95 = 2170'

HBP Cored Samples							
	A	B	C	D			
Specification Section	Distance (Ft)÷2000	Lanes	Lifts	Sublots (A x B x C)	Quantity (D x 2)	Quantity (1 per mile)	Unit
430.04 I.2.b(1), "General"	1	4	1	4	8	N/A	EA
430.04 I.2.b(2), "Pavement Thickness Determination Cores"					N/A	2	EA
				Total	8	2	EA

Short Term Line – Type NR

4" White Line, 10' Line, 30' Skip

1,320 LF/Mile

4" Double Yellow Barrier Line

10,560 LF/Mile

8" White Line

5,280 LF/Mile

Epoxy PVMT MK Line - Grooved

4" White Line, 10' Line, 30' Skip

1,320 LF/Mile

4" White Edge Line

5,280 LF/Mile

4" Guide Lines, 2' Line, 6' Skip

1,320 LF/Mile

4" Yellow Edge Line

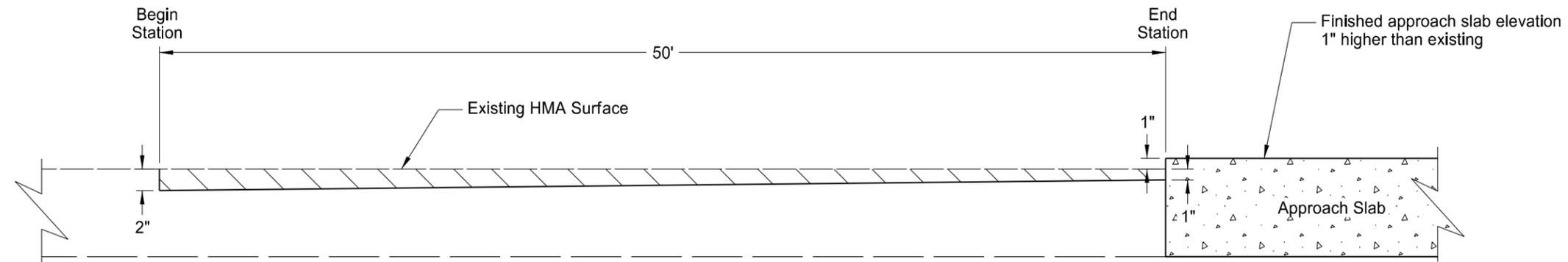
5,280 LF/Mile

4" Double Yellow Barrier Line

10,560 LF/Mile

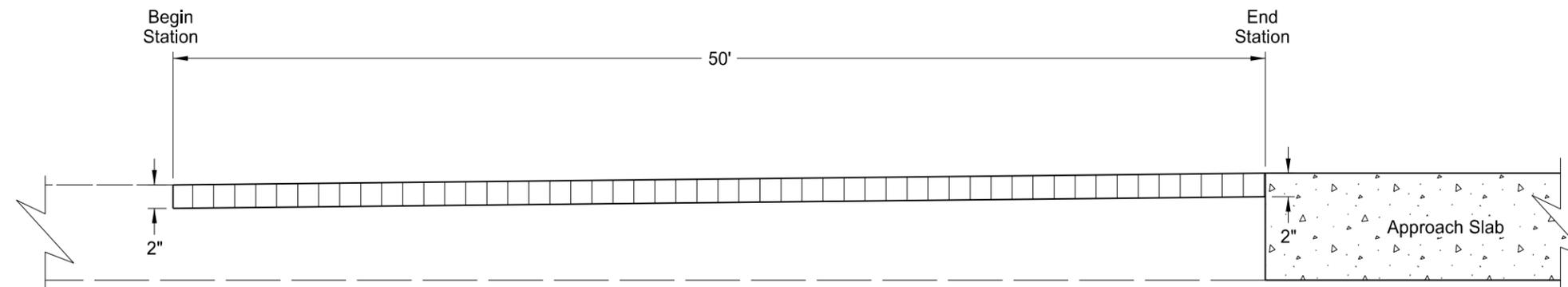
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Milling Transition

Begin Station	End Station
10473+13	10473+63
10477+03	10476+53



Paving Transition

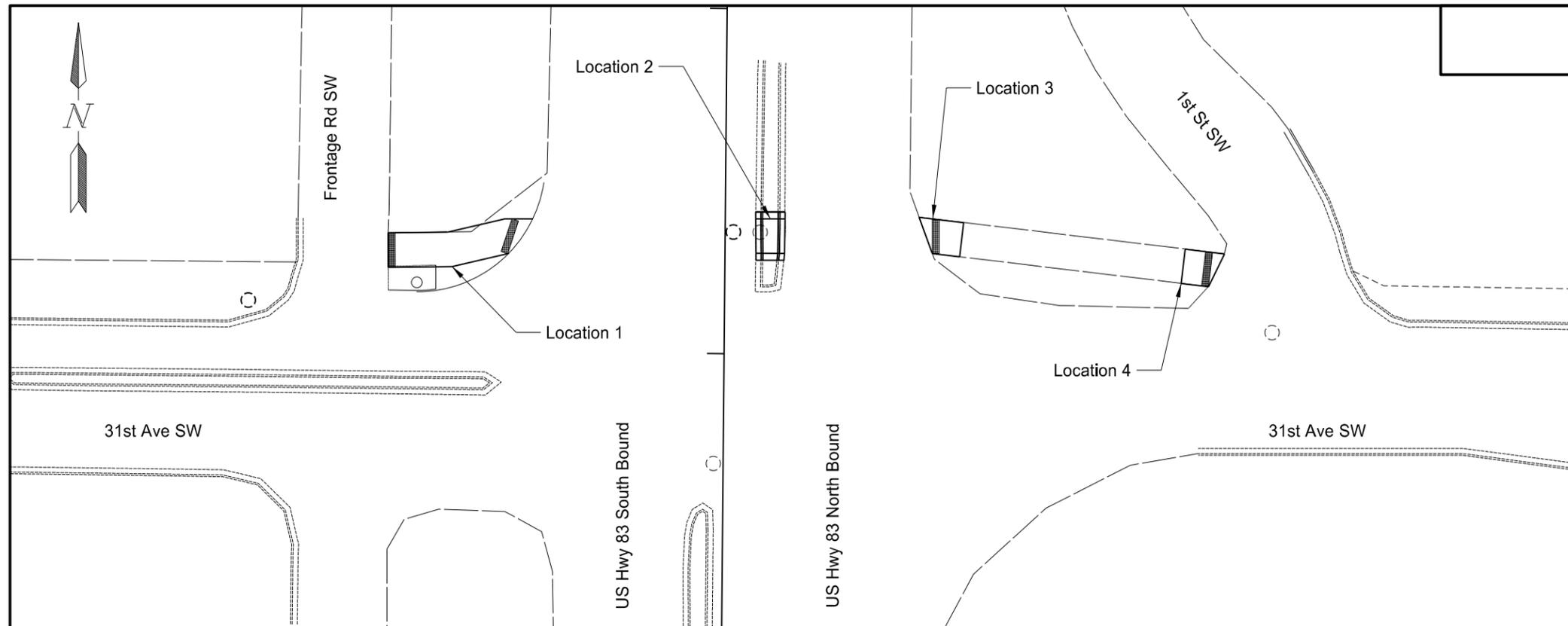
- Milling Pavement Surface
- Superpave FAA 45

Note: Drawing not to scale

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Milling Detail
 Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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REMOVAL OF CONCRETE PAVEMENT

LOCATION 1	43.8 SY
LOCATION 2	7.0 SY
LOCATION 3	11.7 SY
LOCATION 4	10.9 SY

SAW CONCRETE

LOCATION 1	60 LF
LOCATION 2	17 LF
LOCATION 3	21 LF
LOCATION 4	21 LF

REMOVAL OF CURB & GUTTER

LOCATION 2	28 LF
------------	-------

ADJUST MANHOLE

LOCATION 2	1 EA
------------	------

CURB & GUTTER - TYPE 1

LOCATION 2	28 LF
------------	-------

SIDEWALK CONCRETE 4IN

LOCATION 1	43.8 SY
LOCATION 2	7.0 SY
LOCATION 3	11.7 SY
LOCATION 4	10.9 SY

DETECTABLE WARNING PANELS

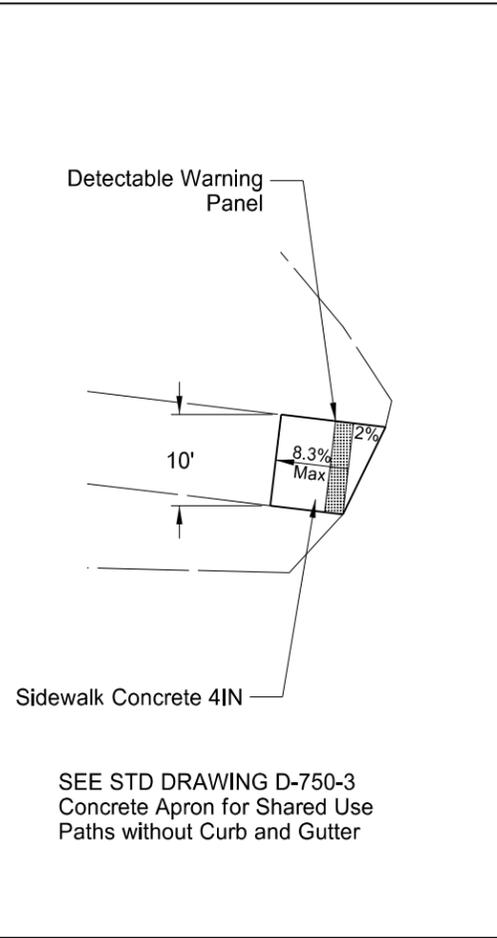
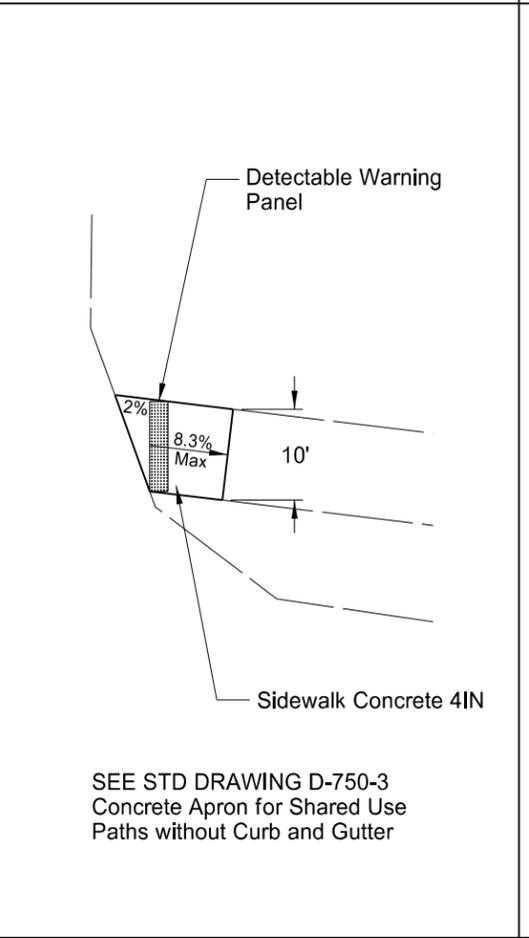
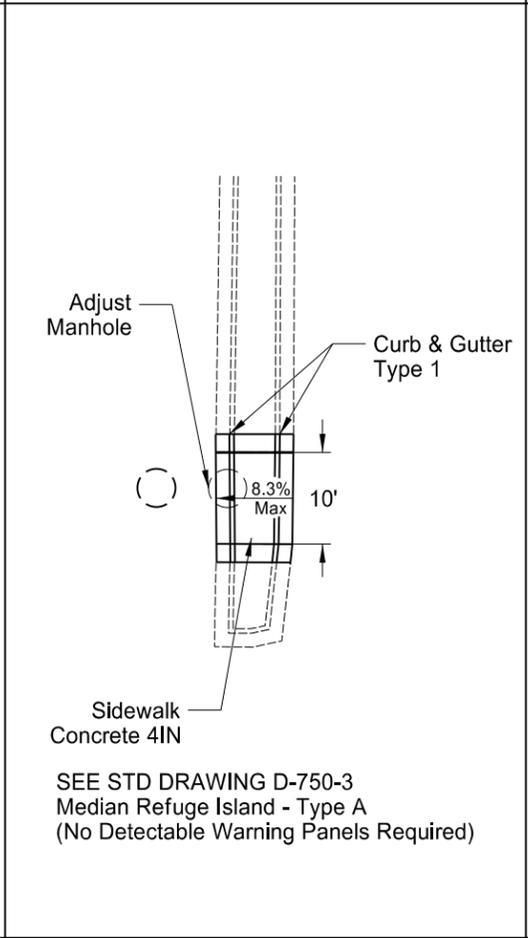
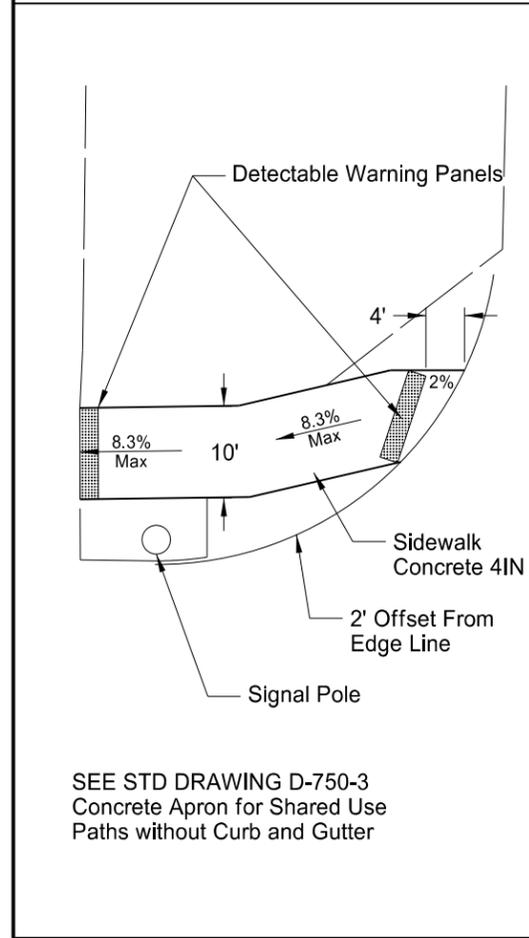
LOCATION 1	40 SF
LOCATION 3	20 SF
LOCATION 4	20 SF

LOCATION 1
US 83 & 31st Ave SW - NW Quadrant

LOCATION 2
US 83 Median

LOCATION 3
US 83 & 31st Ave - NE Quadrant

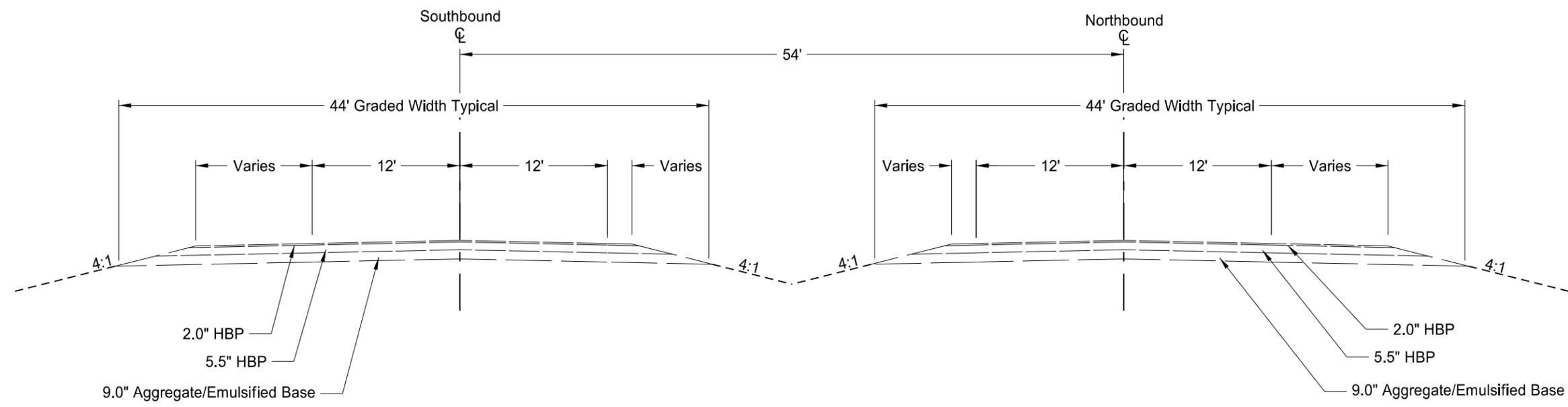
LOCATION 4
31st Ave SW & 1st St SW - NW Quadrant



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ADA Details
Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

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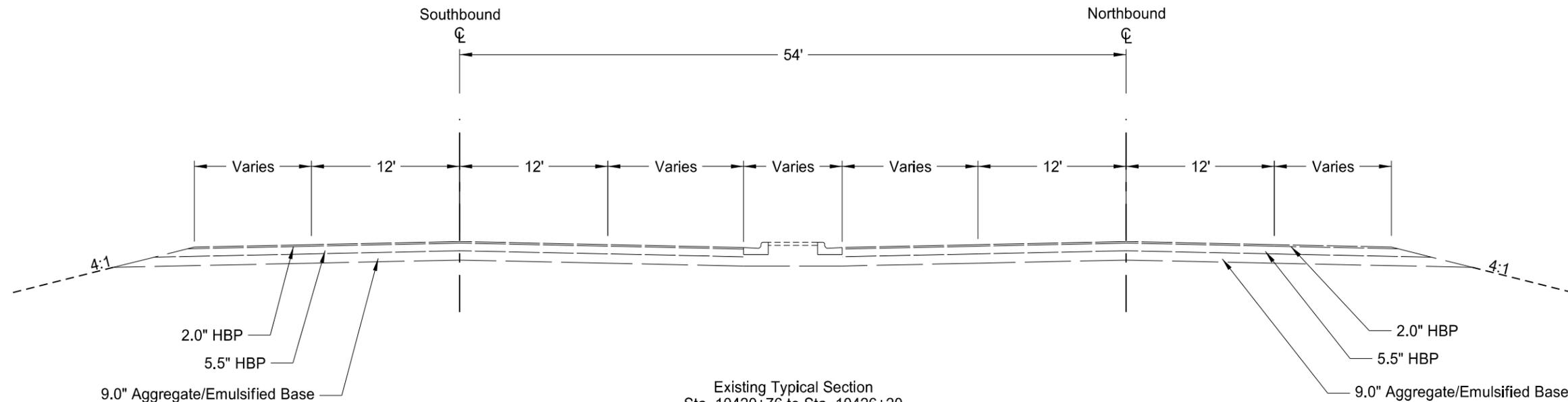
Existing Typical Section
 Sta. 10419+25 to Sta. 10420+76
 Sta. 10426+20 to Sta. 10431+02
 Sta. 10458+14 to Sta. 10465+74

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Existing Typical Section

Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

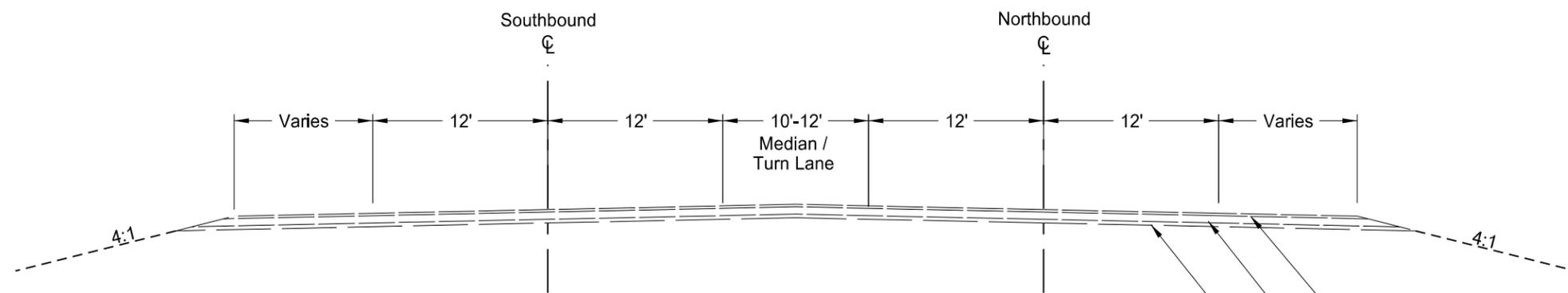
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Existing Typical Section
 Sta. 10420+76 to Sta. 10426+20
 Sta. 10431+02 to Sta. 10458+14
 Sta. 10465+74 to Sta. 10471+47

2.0" HBP
 5.5" HBP
 9.0" Aggregate/Emulsified Base

2.0" HBP
 5.5" HBP
 9.0" Aggregate/Emulsified Base



Existing Typical Section
 Sta. 10471+47 to Sta. 10473+63
 Sta. 10476+53 to Sta. 10485+36

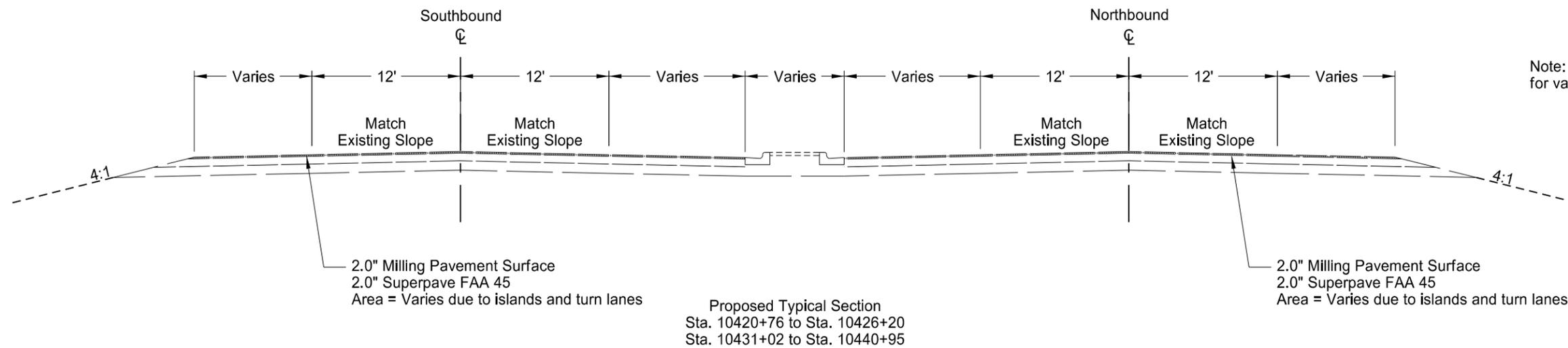
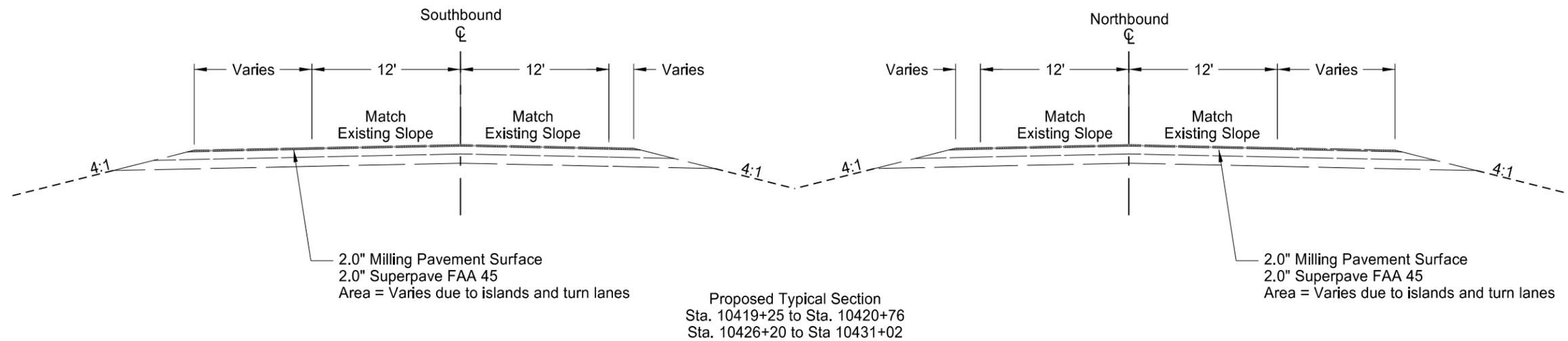
2.0" HBP
 6.0" HBP
 3.0" Aggregate Base

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See Sec. 170 sheets for Typical Sections
 Sta. 10473+63 to Sta. 10476+53

Existing Typical Sections
 Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
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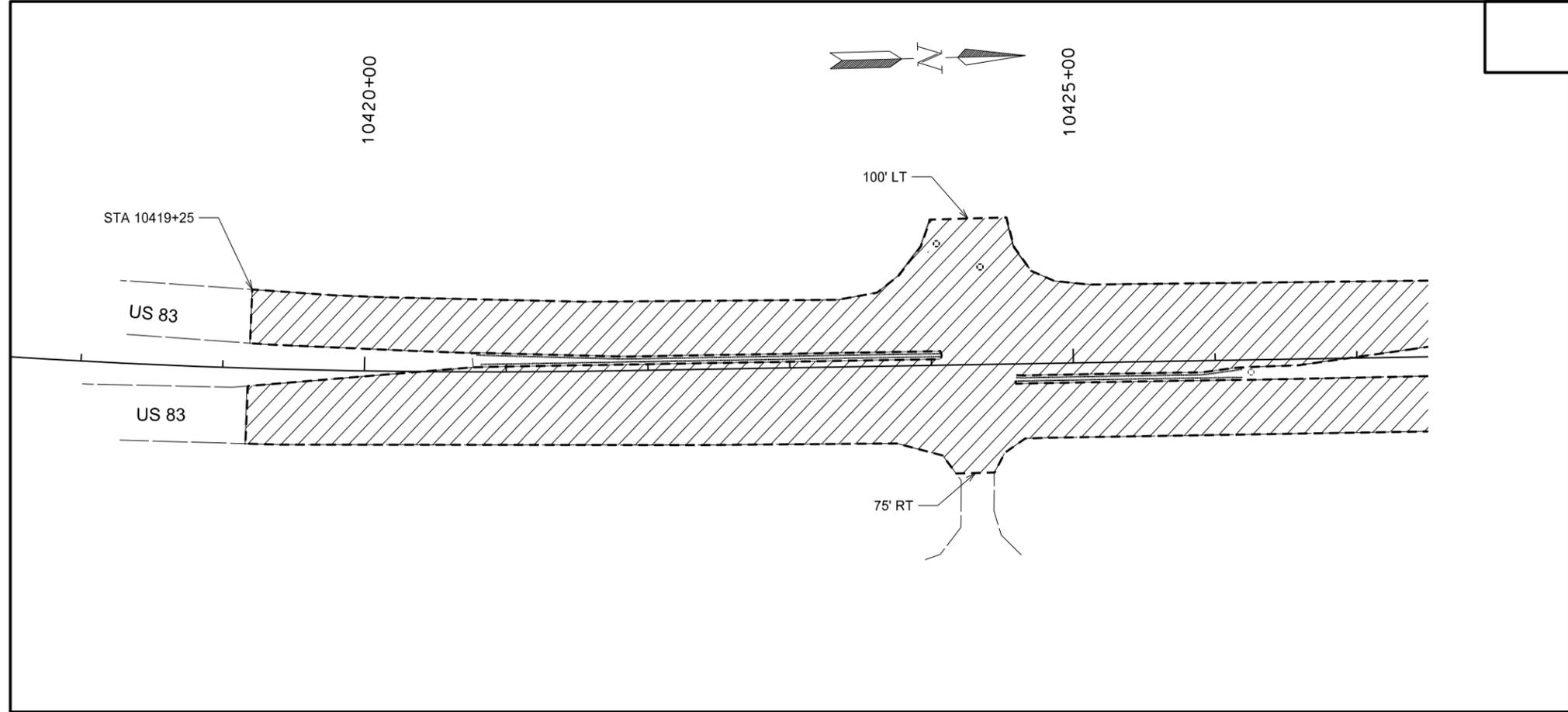
Note: See Sec. 90 & Sec. 120 Sheets for variable widths

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Proposed Typical Sections

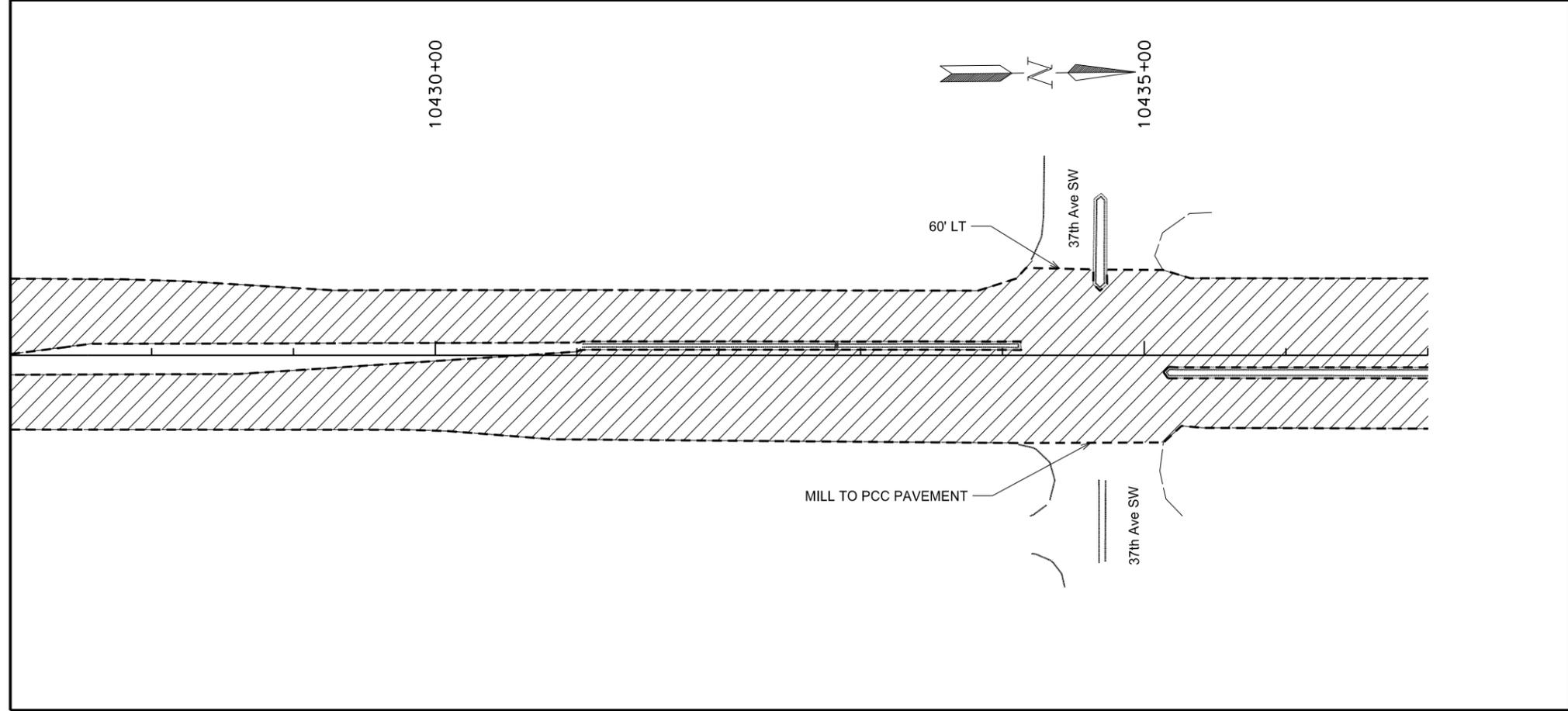
Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	90	1



MILLING PAVEMENT SURFACE
 STA 10419+25 TO 10437+00 LT & RT 2175 TON

SUPERPAVE FAA 45
 STA 10419+25 TO 10437+00 LT & RT 2175 TON



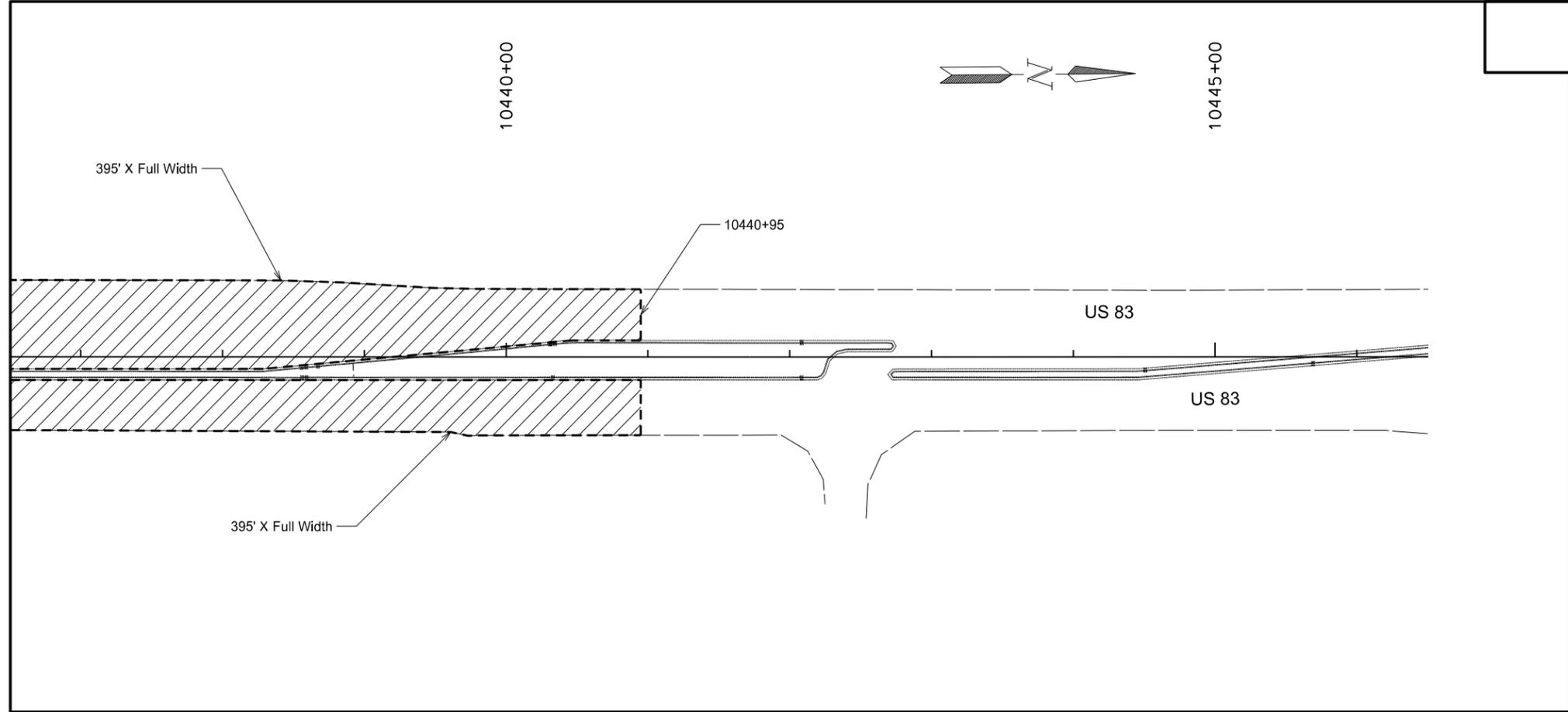
 MILLING PAVEMENT SURFACE - 2" & 2" SUPERPAVE FAA 45

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Paving Layout

Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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MILLING PAVEMENT SURFACE

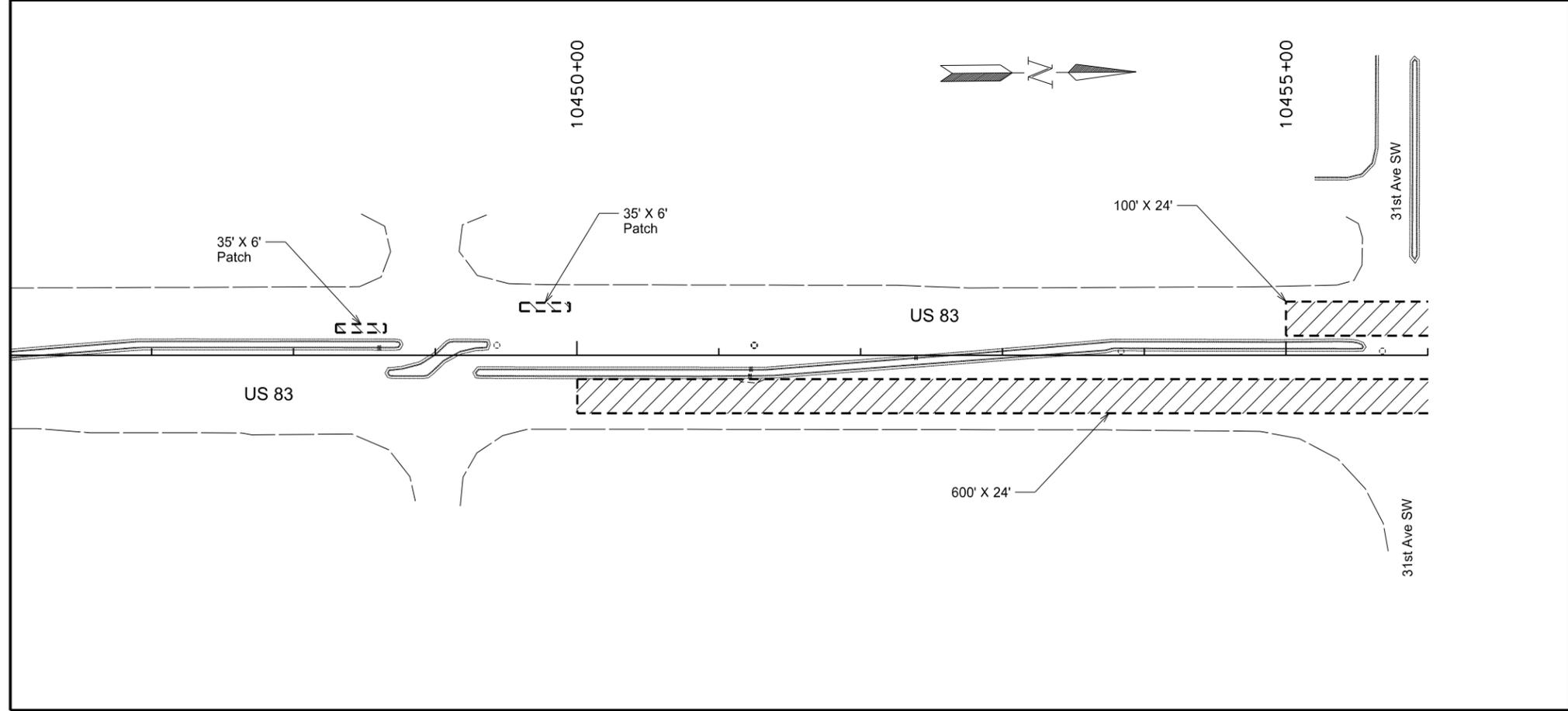
STA 10437+00 TO 10440+95 LT	250 TON
STA 10437+00 TO 10440+95 RT	181 TON
STA 10450+00 TO 10456+00 RT	178 TON
STA 10455+00 TO 10456+00 LT	30 TON

SUPERPAVE FAA 45

STA 10437+00 TO 10440+95 LT	250 TON
STA 10437+00 TO 10440+95 RT	181 TON
STA 10450+00 TO 10456+00 RT	178 TON
STA 10455+00 TO 10456+00 LT	30 TON

PATCHING

STA 10448+30 TO 10448+65 LT	8 TON
STA 10449+60 TO 10449+95 LT	8 TON

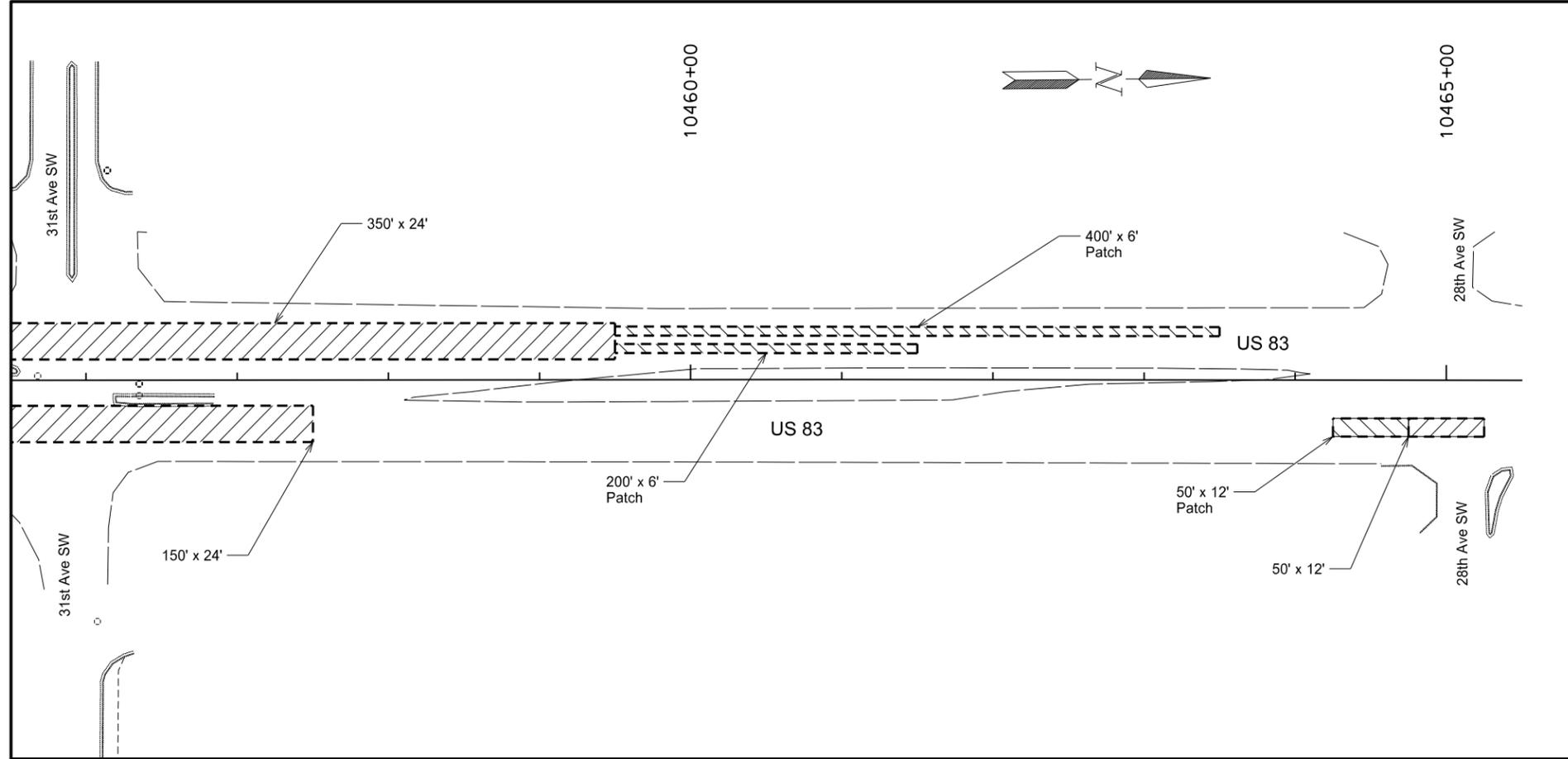


-  MILLING PAVEMENT SURFACE - 2" & 2" SUPERPAVE FAA 45
-  PATCHING

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Paving Layout
 Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	90	3



MILLING PAVEMENT SURFACE

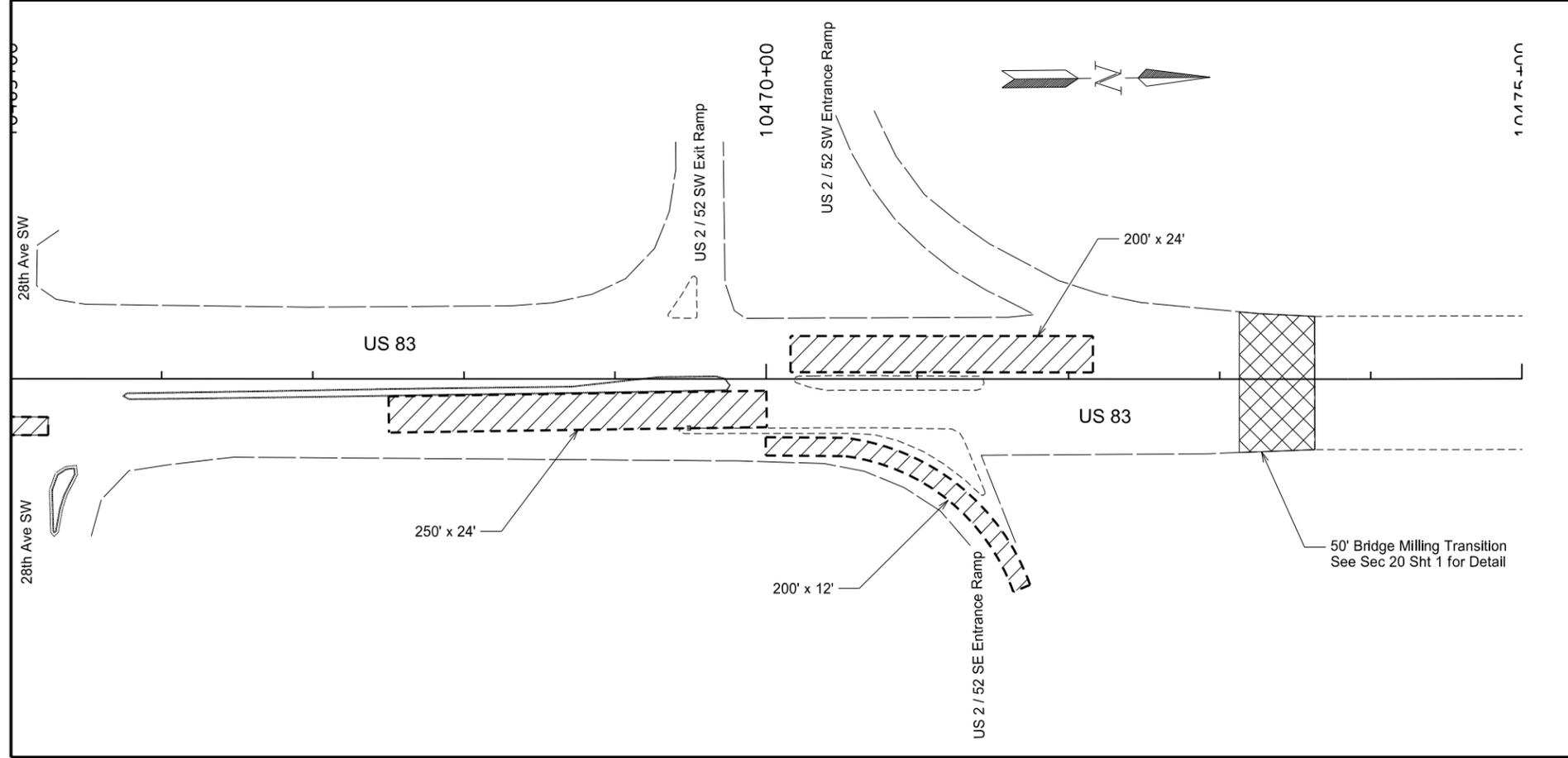
STA 10456+00 TO 10549+50 LT	104 TON
STA 10456+00 TO 10457+00 RT	45 TON
STA 10464+75 TO 10465+25 RT	8 TON
STA 10467+45 TO 10469+95 RT	74 TON
HWY 2 / 52 SE RAMP	30 TON
STA 10470+15 TO 10472+15 LT	59 TON
SOUTH BRIDGE TRANSITION	42 TON

SUPERPAVE FAA 45

STA 10456+00 TO 10549+50 LT	104 TON
STA 10456+00 TO 10457+00 RT	45 TON
STA 10464+25 TO 10465+25 RT	8 TON
STA 10467+45 TO 10469+95 RT	74 TON
HWY 2 / 52 SE RAMP	30 TON
STA 10470+15 TO 10472+15 LT	59 TON
SOUTH BRIDGE TRANSITION	56 TON

PATCHING

STA 10459+50 TO 10461+50 LT	45 TON
STA 10459+50 TO 10463+50 LT	89 TON
STA 10464+25 TO 10464+75 RT	23 TON



 MILLING PAVEMENT SURFACE - 2" & 2" SUPERPAVE FAA 45

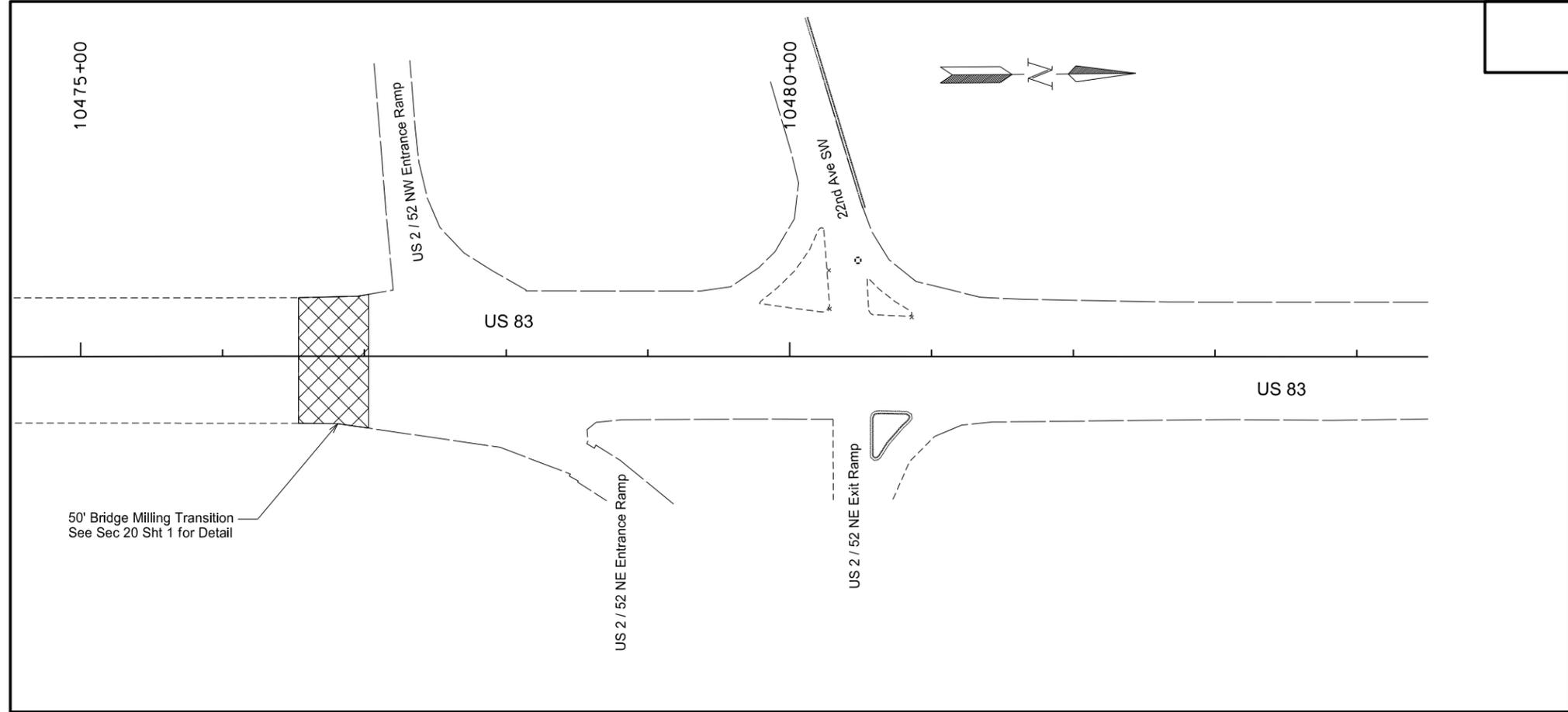
 BRIDGE MILLING TRANSITION & 2" SUPERPAVE FAA 45

 PATCHING

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Paving Layout
 Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	90	4



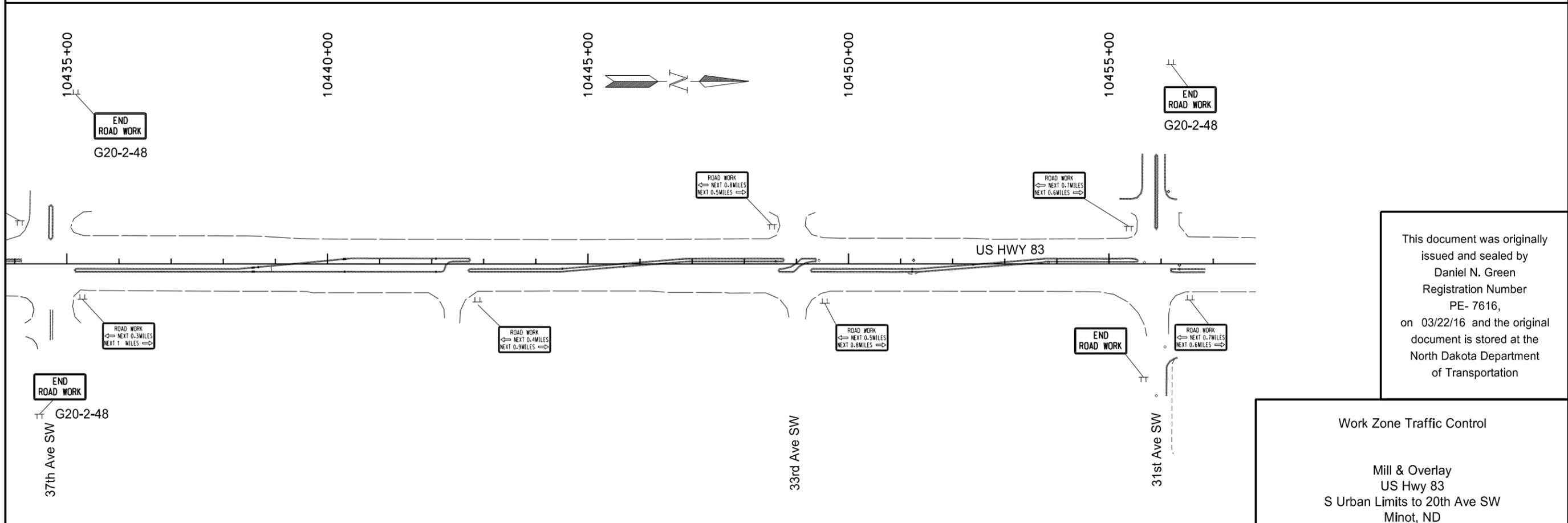
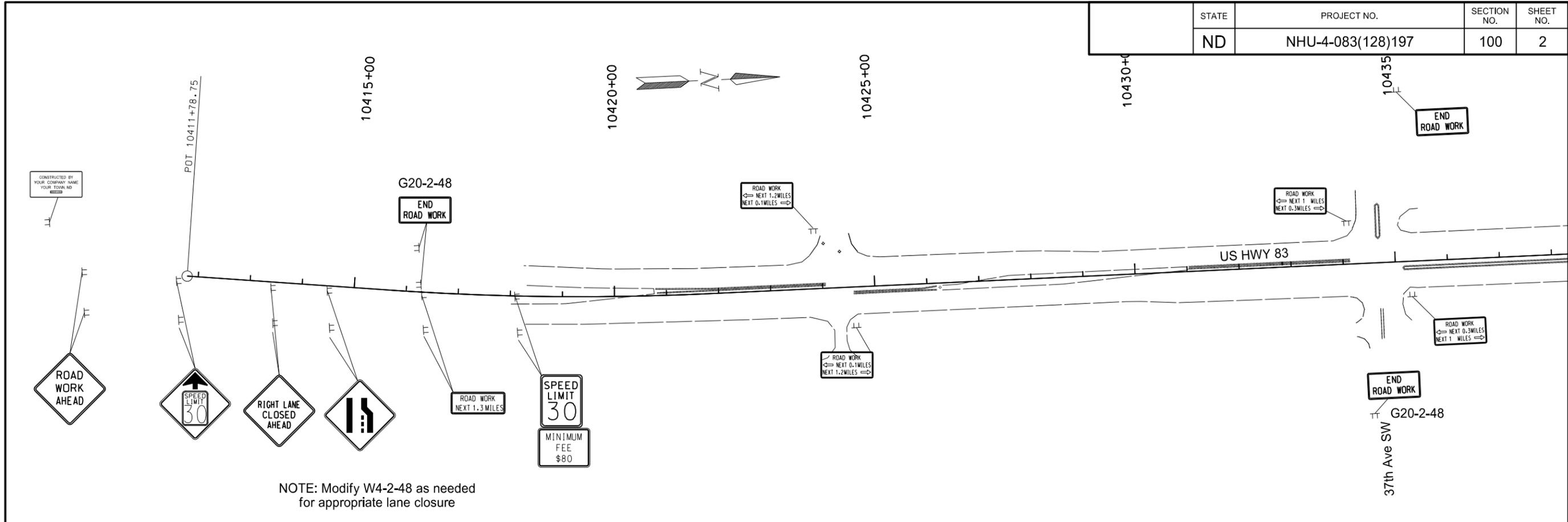
MILLING PAVEMENT SURFACE	
NORTH BRIDGE TRANSITION	41 TON
SUPERPAVE FAA 45	
NORTH BRIDGE TRANSITION	55 TON

 BRIDGE MILLING TRANSITION & 2" SUPERPAVE FAA 45

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Paving Layout
 Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

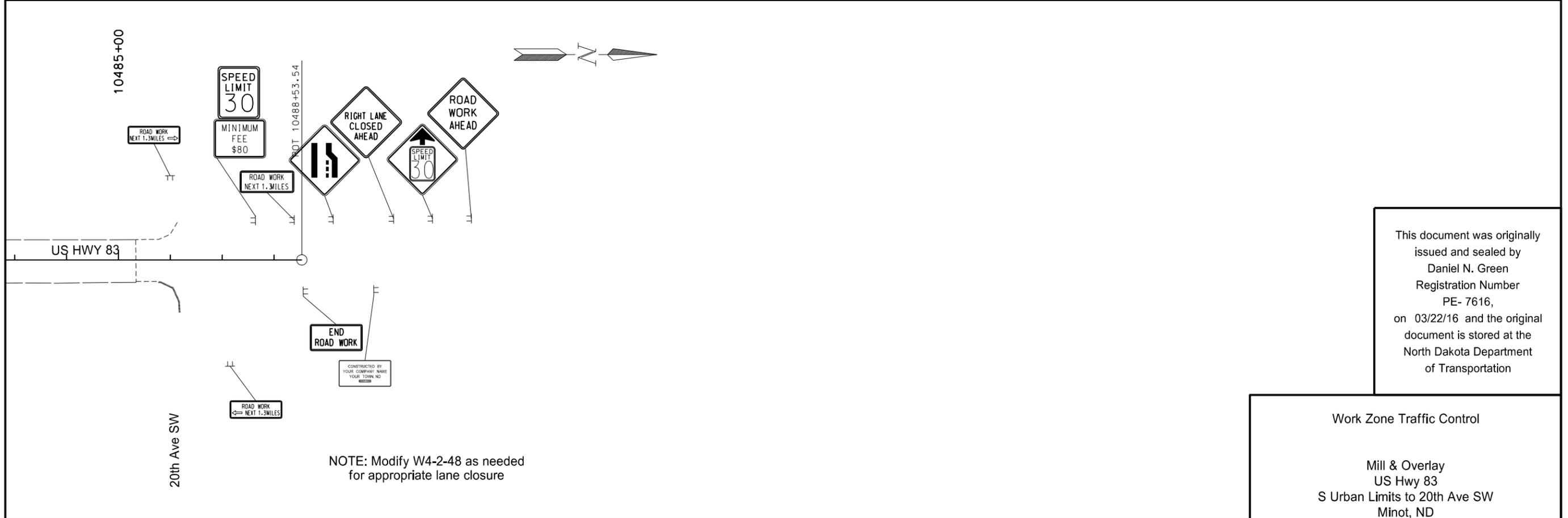
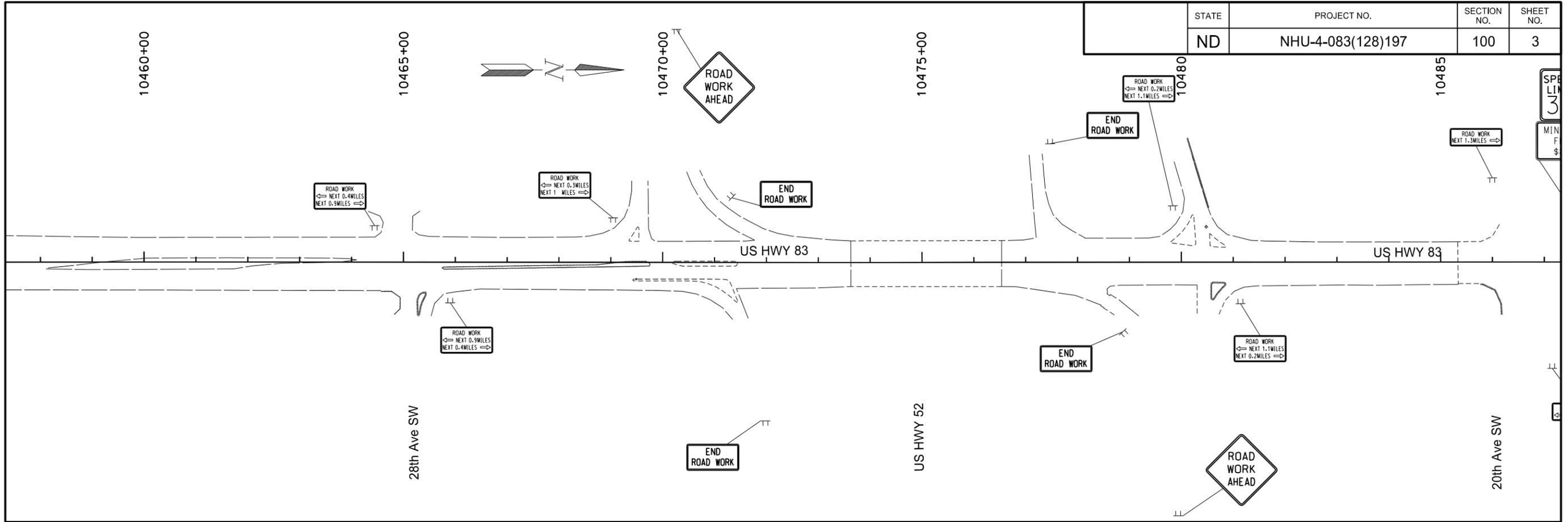
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	100	2



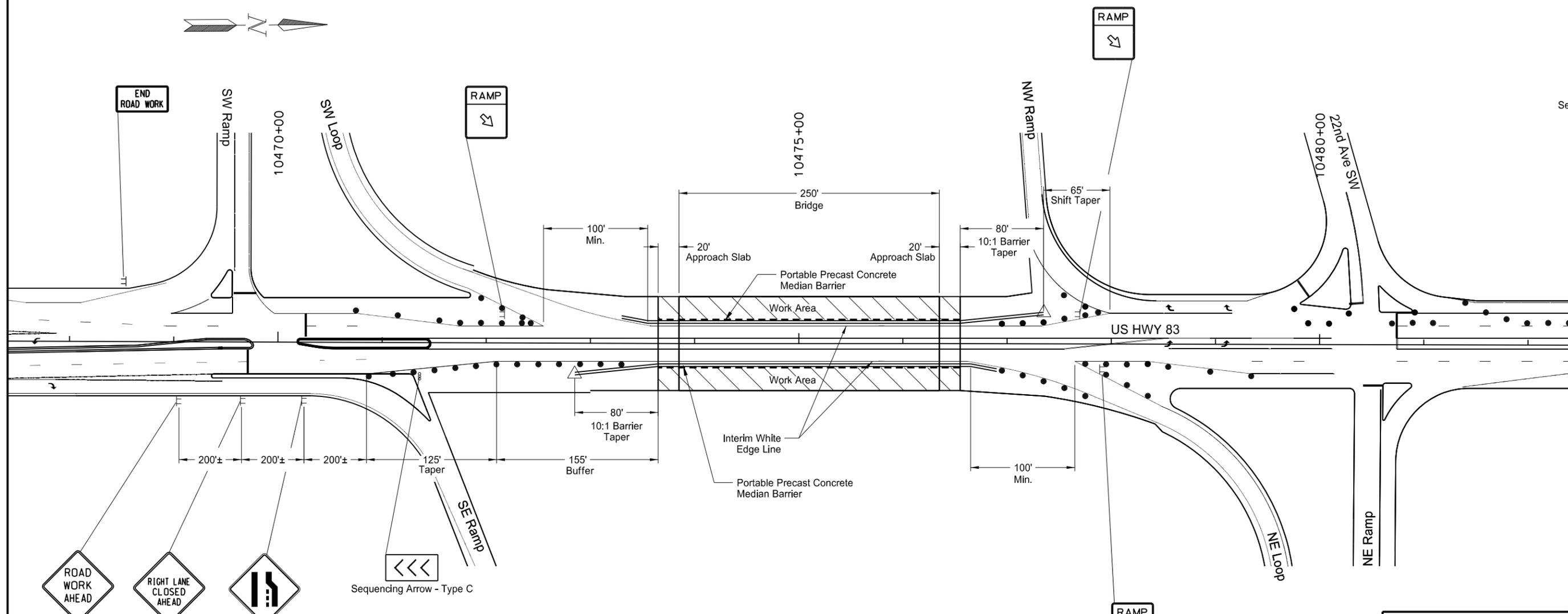
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Work Zone Traffic Control
 Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

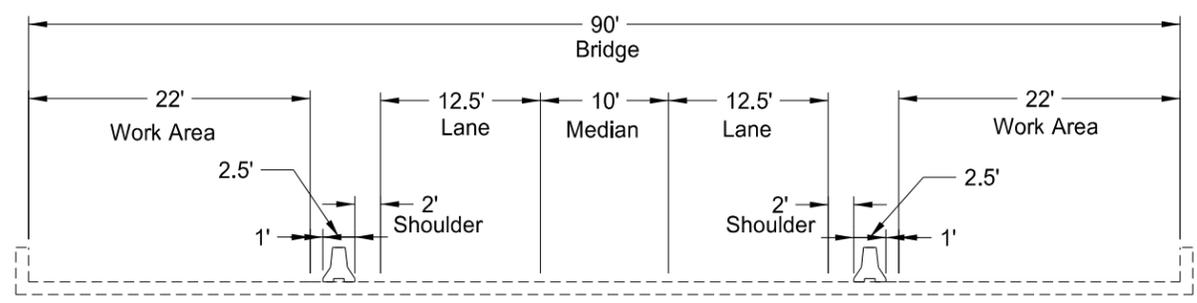
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	100	3



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	100	4



- LEGEND**
- Sign
 - Delineator Drum
 - ⊞ Sequencing Arrow Panel
 - △ Attenuation Device
 - ▭ Work Area

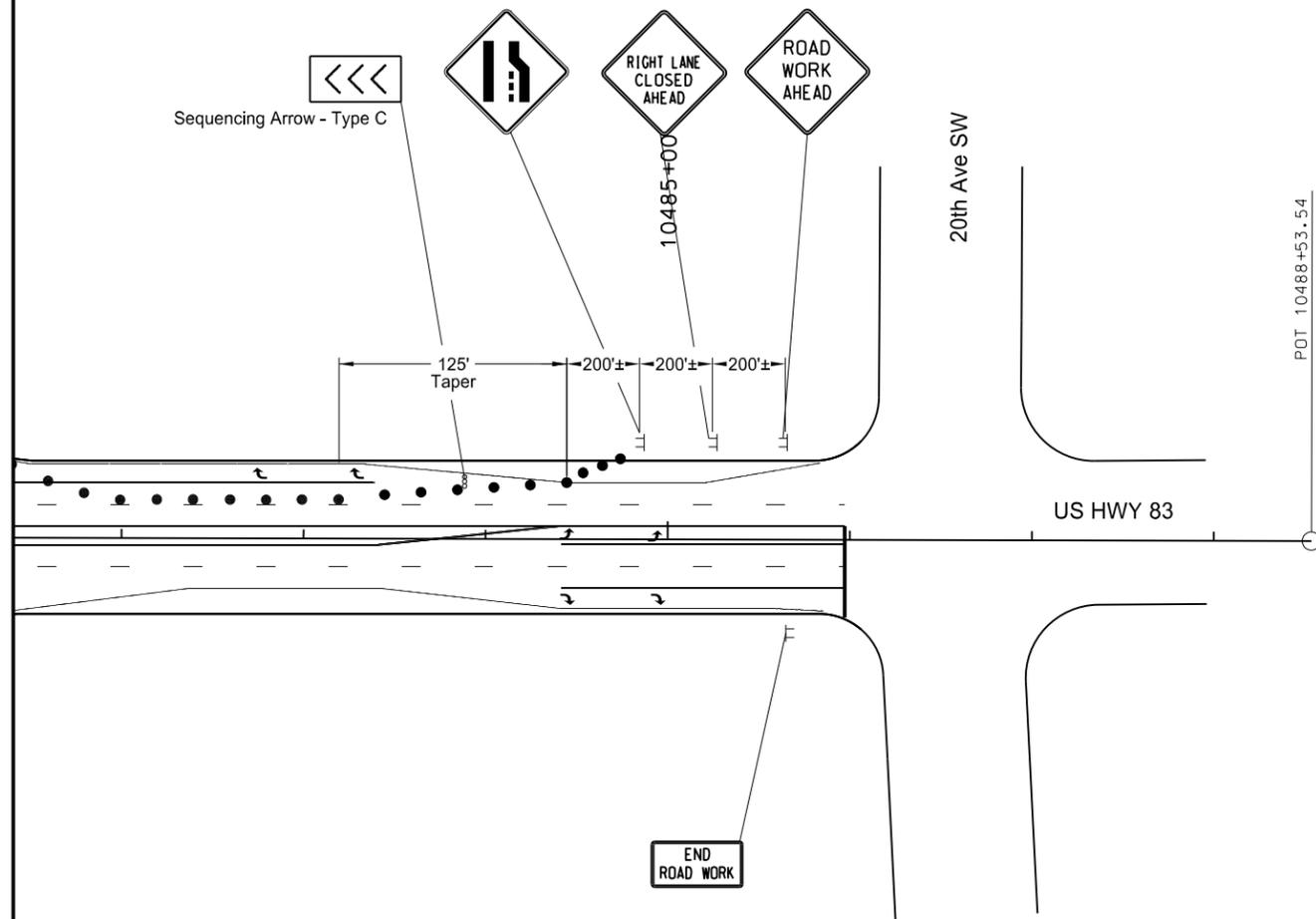
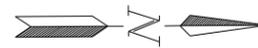


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Work Zone Traffic Control Bridge Stage 1

Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	100	5

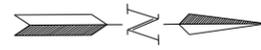


- LEGEND**
- ⊢ Sign
 - Delineator Drum
 - ⊞ Sequencing Arrow Panel
 - △ Attenuation Device
 - ▭ Work Area

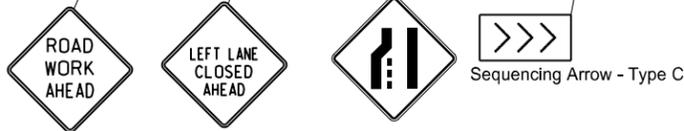
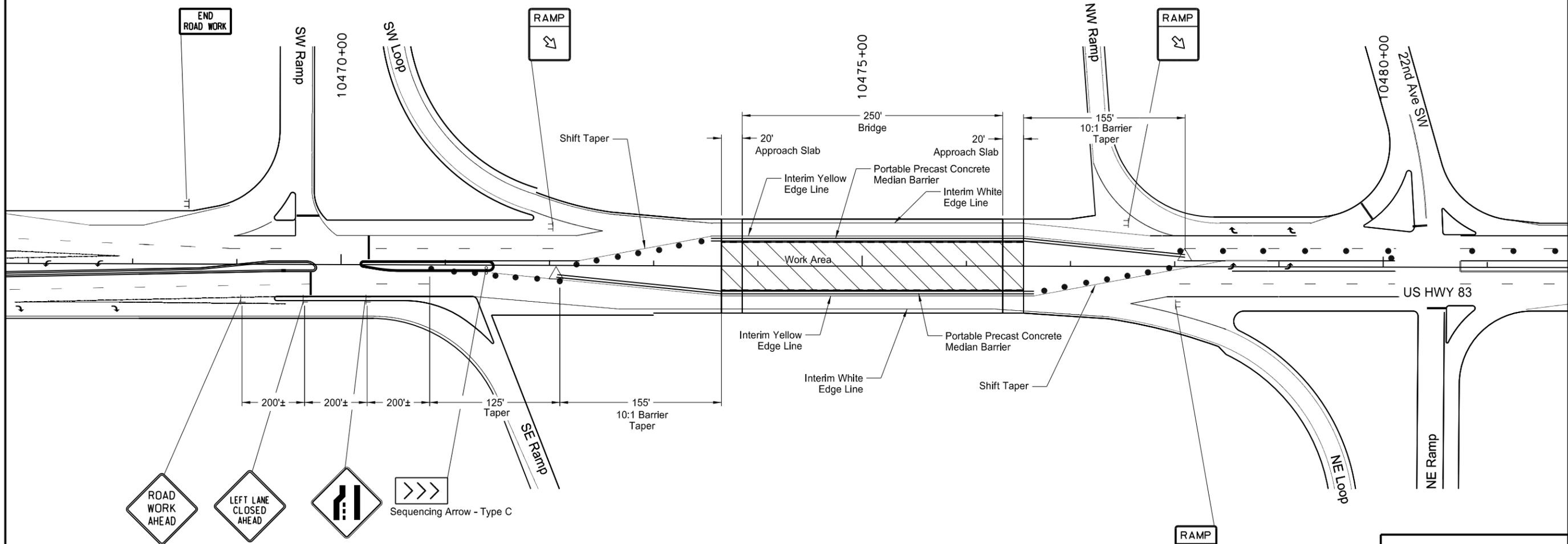
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Work Zone Traffic Control
 Bridge Stage 1
 Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

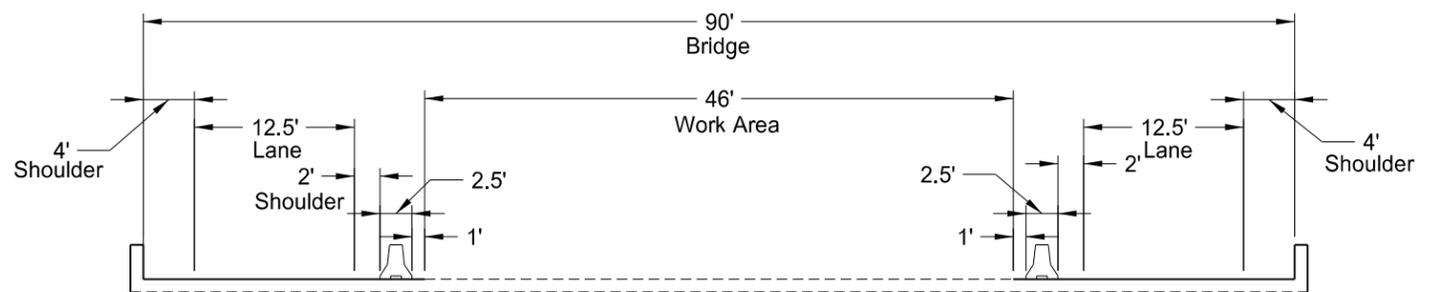
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	100	6



Sequenci



- LEGEND**
- ⊠ Sign
 - Delineator Drum
 - ⊞ Sequencing Arrow Panel
 - △ Attenuation Device
 - ▨ Work Area

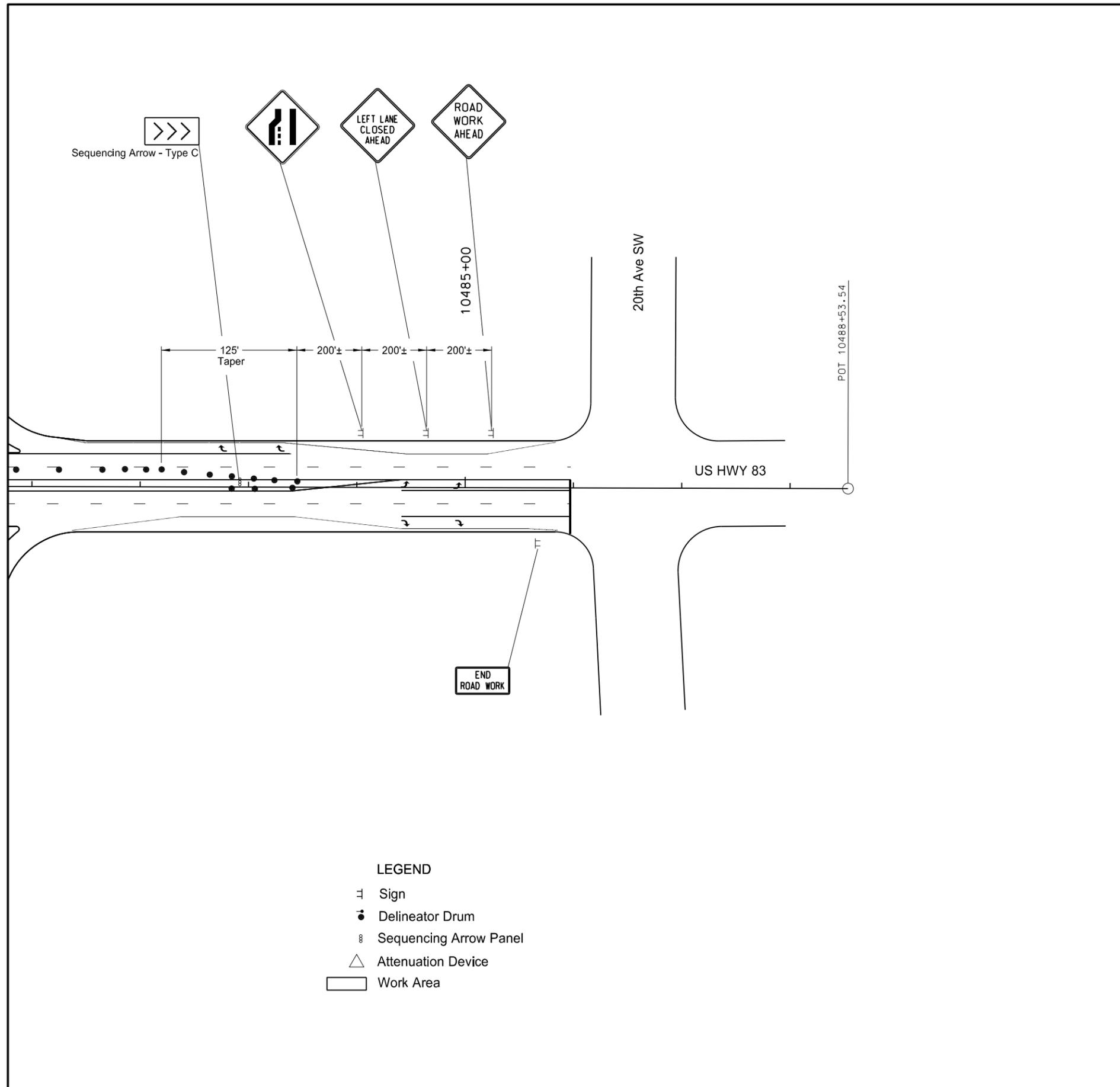


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**Work Zone Traffic Control
Bridge Stage 2**

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	100	7

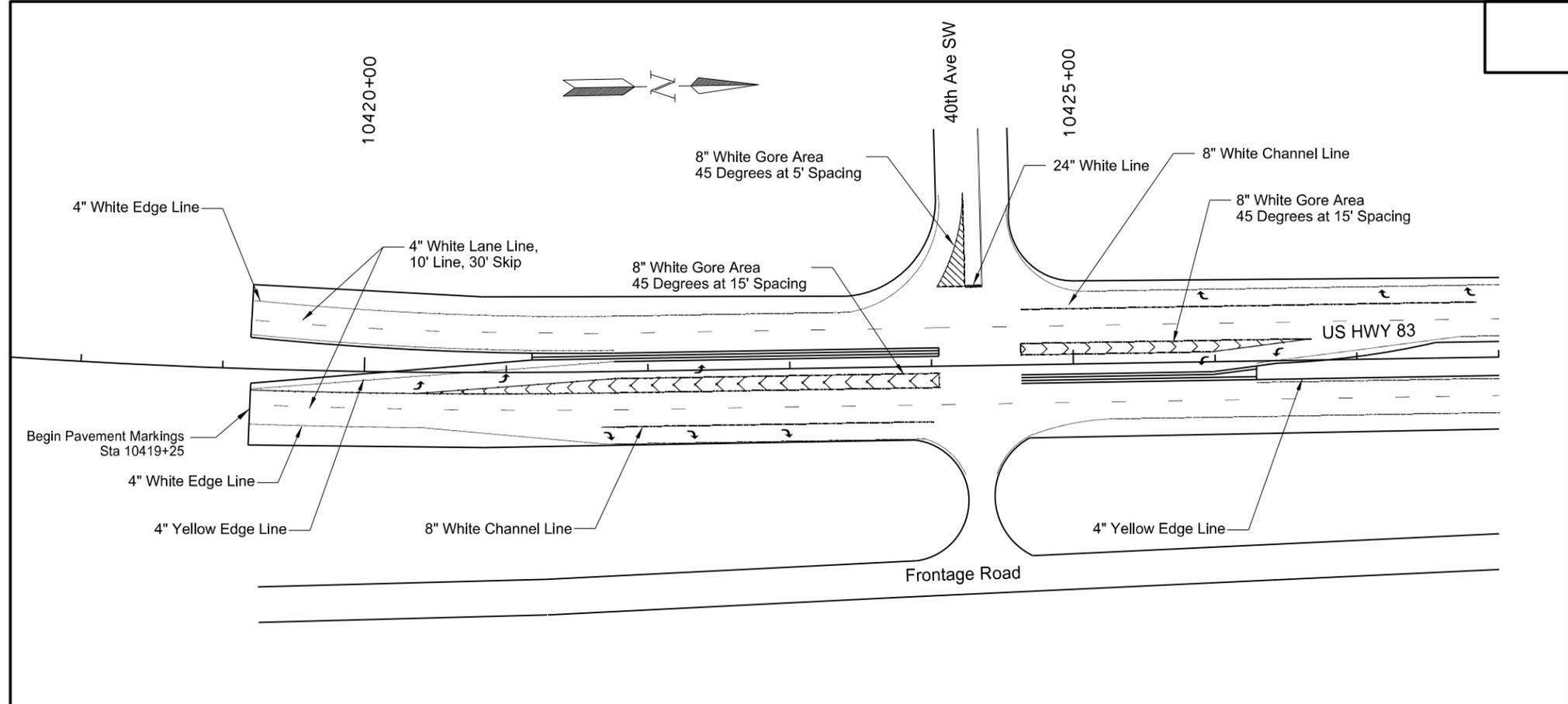


- LEGEND**
- ⊥ Sign
 - Delineator Drum
 - ⊞ Sequencing Arrow Panel
 - △ Attenuation Device
 - ▭ Work Area

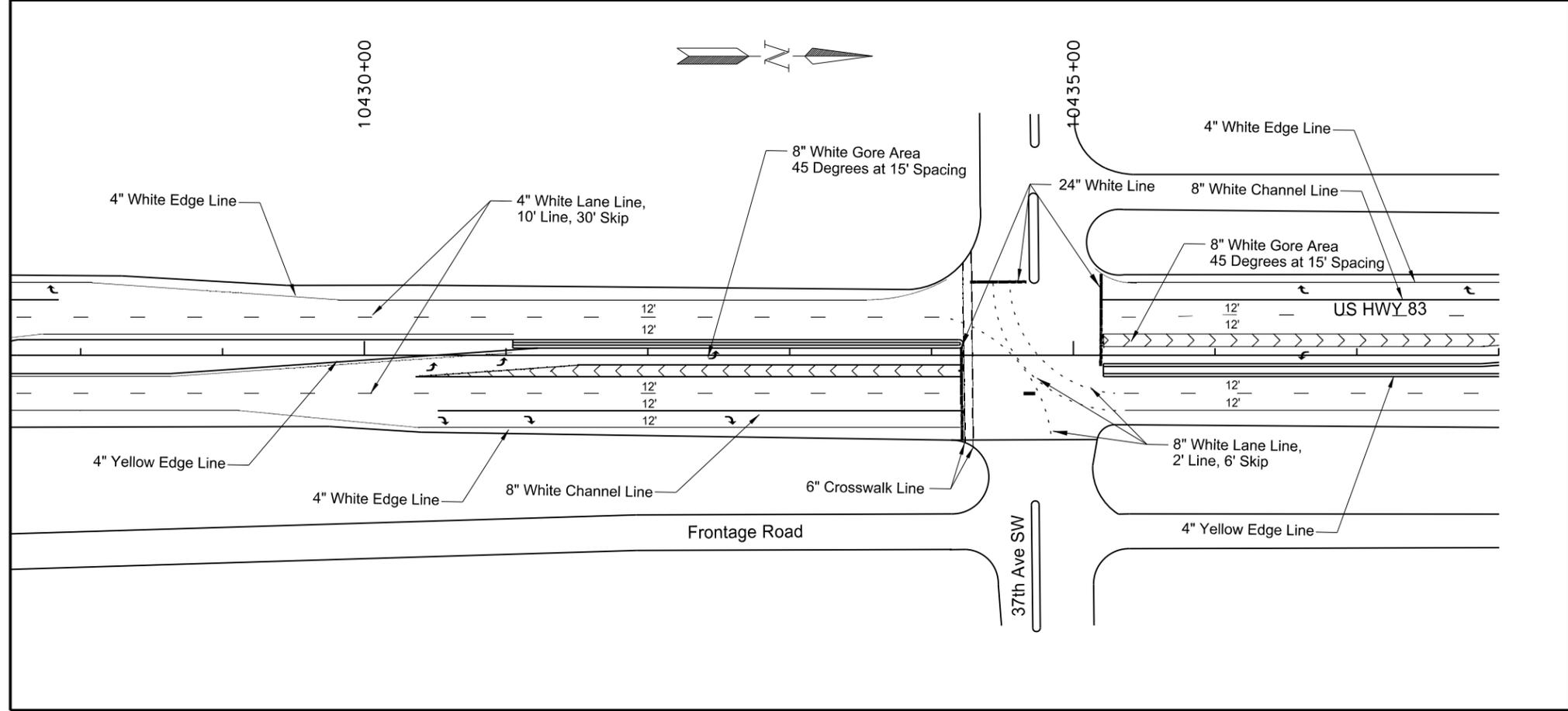
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Work Zone Traffic Control
 Bridge Stage 2
 Mill & Overlay
 US Hwy 83
 S Urban Limits to 20th Ave SW
 Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	120	1



Pavement Marking Quantities
and Locations Located on:
120 - 5 & 6

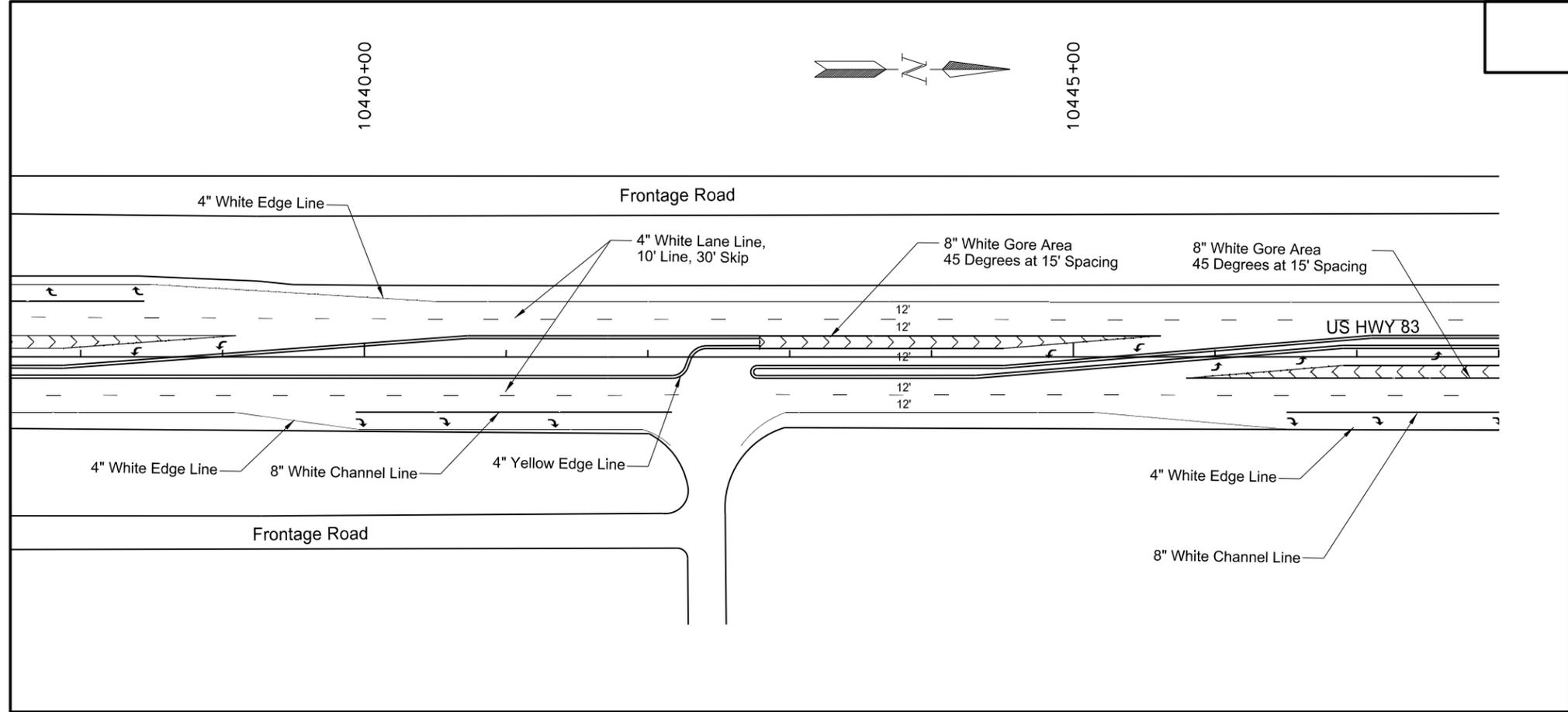


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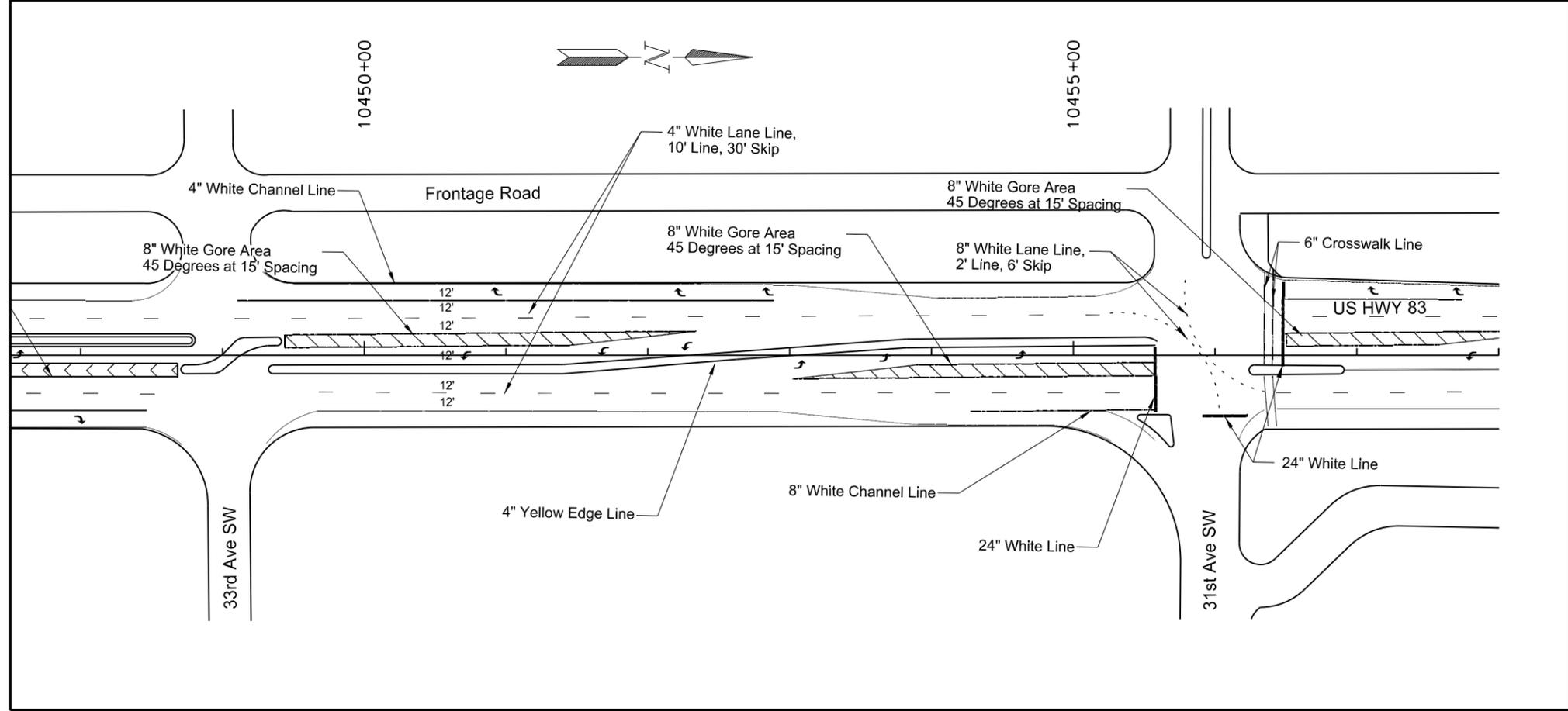
Pavement Marking

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	120	2



Pavement Marking Quantities
and Locations Located on:
120 - 5 & 6

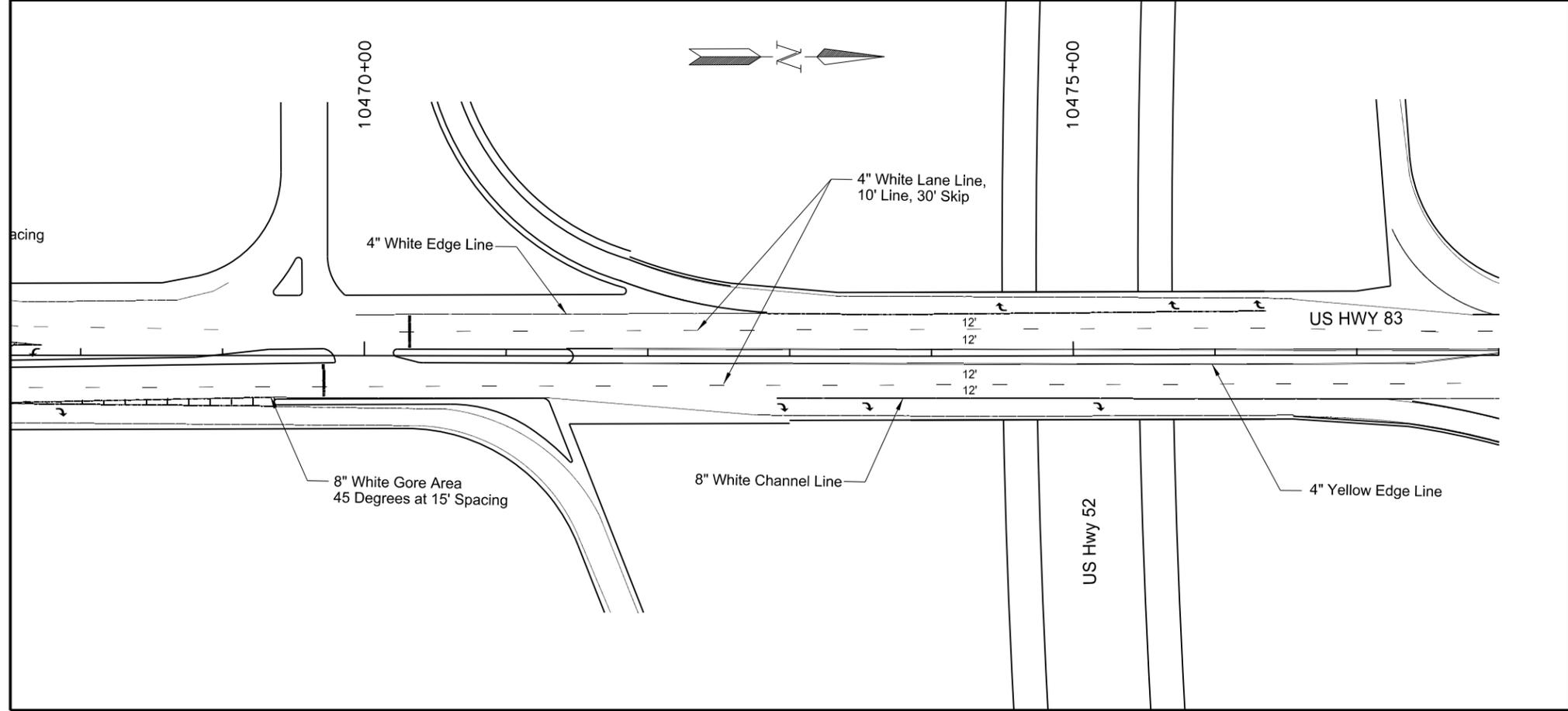
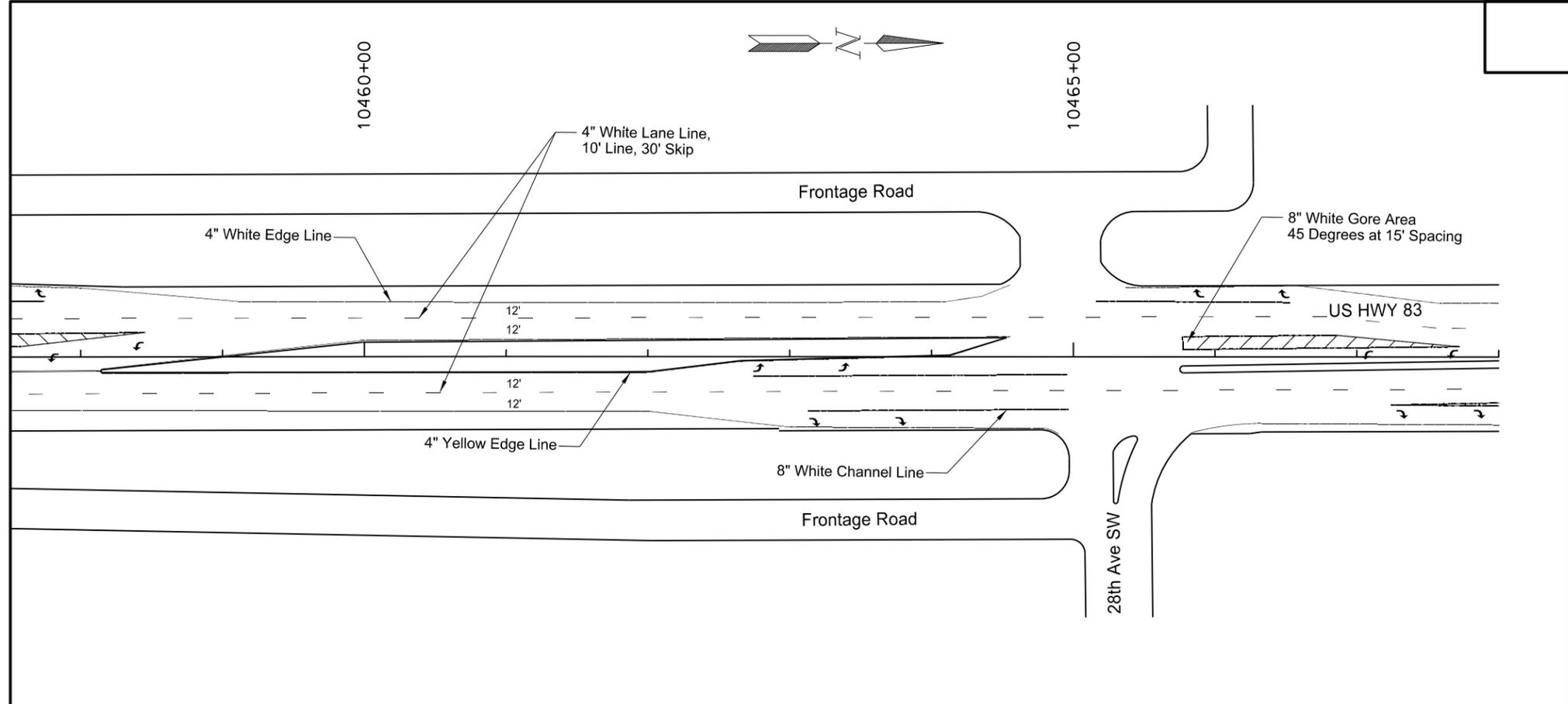


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Pavement Marking

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	120	3



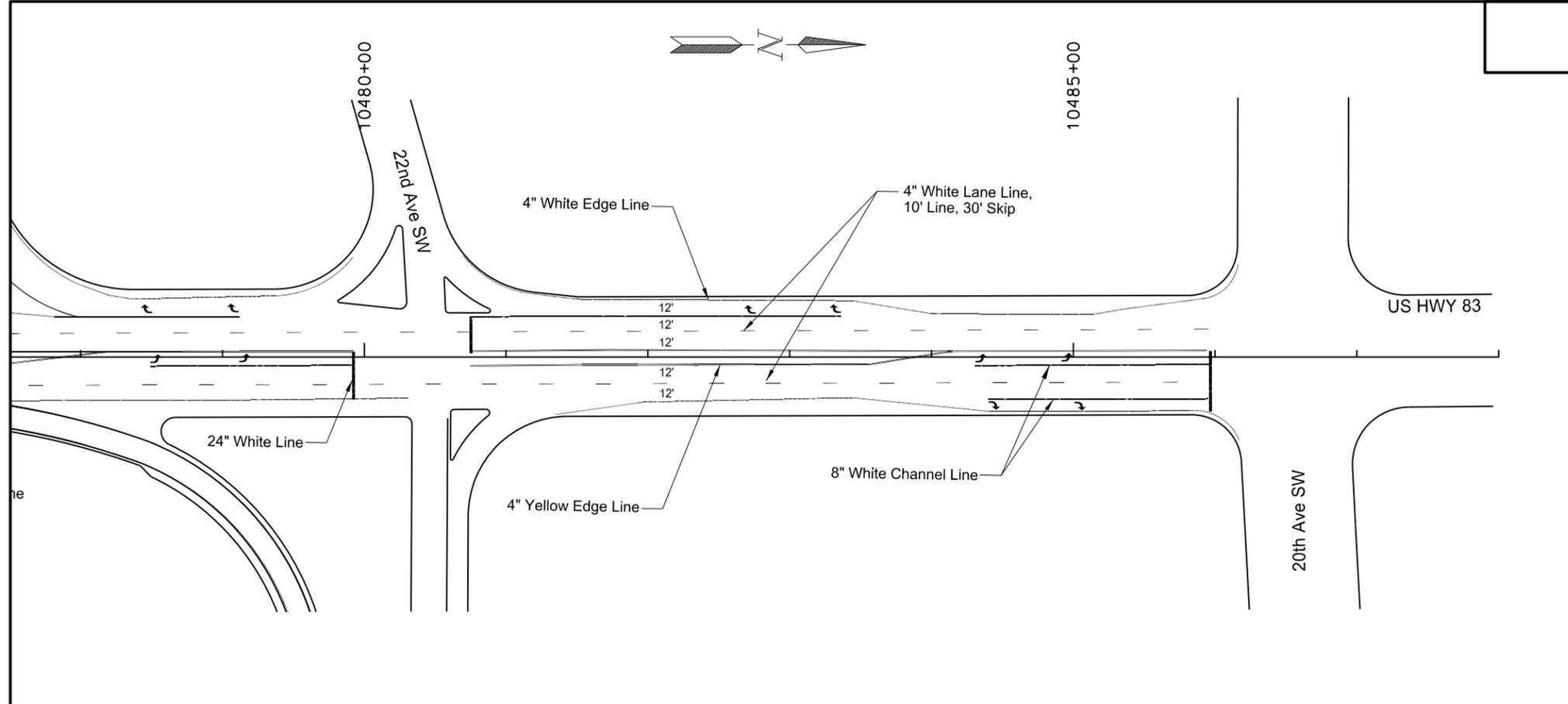
Pavement Marking Quantities
and Locations Located on:
120 - 5 & 6

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Pavement Marking

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	120	4



Pavement Marking Quantities
and Locations Located on:
120 - 5 & 6

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Pavement Marking

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

EPOXY PVMT MK GROOVED - 4IN WHITE LINE					
Start		End		Quantity	
10419+20	RT	10424+23	RT	510	LF
10424+45	RT	10428+00	RT	369	LF
10419+21	LT	10424+07	LT	533	LF
10424+55	LT	10428+00	LT	385	LF
10428+00	RT	10434+21	RT	621	LF
10428+00	LT	10434+11	LT	610	LF
10435+37	RT	10438+00	RT	263	LF
10435+15	LT	10438+00	LT	292	LF
10438+00	RT	10442+16	RT	419	LF
10438+00	LT	10448+00	LT	1000	LF
10442+20	RT	10442+29	RT	60	LF
10442+55	RT	10448+00	RT	672	LF
10448+00	RT	10448+70	RT	73	LF
10448+00	LT	10448+74	LT	77	LF
10449+31	RT	10455+27	RT	605	LF
10449+27	LT	10455+57	LT	641	LF
10456+1	RT	10458+00	RT	185	LF
10456+17	LT	10458+00	LT	176	LF
10458+00	RT	10464+90	RT	690	LF
10458+00	LT	10464+56	LT	658	LF
10465+54	RT	10468+00	RT	217	LF
10465+41	LT	10468+00	LT	264	LF
10468+00	RT	10471+74	RT	440	LF
10468+00	LT	10469+04	LT	107	LF
10469+37	RT	10471+93	RT	332	LF
10469+37	RT	10478+00	RT	864	LF
10469+95	LT	10472+85	LT	290	LF
10471+80	LT	10472+85	LT	107	LF
10471+86	LT	10477+82	LT	598	LF
10477+20	RT	10478+00	RT	82	LF
10477+20	LT	10478+00	LT	155	LF
10478+00	RT	10479+46	RT	195	LF
10478+00	RT	10479+46	RT	220	LF
10478+00	RT	10480+31	RT	230	LF
10478+00	LT	10479+92	LT	206	LF
10481+35	RT	10486+17	RT	492	LF
10480+70	LT	10486+16	LT	569	LF
TOTAL				14207	LF

EPOXY PVMT MK GROOVED - 4IN YELLOW LINE					
Start		End		Quantity	
10419+20	RT	10421+76	RT	257	LF
10419+19	LT	10421+76	LT	256	LF
10426+30	RT	10431+04	RT	475	LF
10426+30	LT	10431+05	LT	477	LF
10455+22	RT	10455+74	RT	42	LF
10456+23	RT	10456+92	RT	145	LF
10458+14	RT	10464+55	LT	1289	LF
TOTAL				2941	LF

EPOXY PVMT MK GROOVED - 4IN DOUBLE YELLOW LINE					
Start		End		Quantity	
10424+35	LT	10434+35	LT	222	LF
10456+91	RT	10458+14	RT	246	LF
10471+43	RT	10478+18	RT	1352	LF
10471+18	LT	10479+92	LT	1700	LF
10480+75	RT	10484+15	RT	680	LF
10480+75	LT	10485+94	LT	1040	LF
TOTAL				5240	LF

EPOXY PVMT MK GROOVED - 6IN WHITE LINE					
Start		End		Quantity	
10434+22	LT	10434+22	RT	127	LF
10434+31	LT	10434+31	RT	140	LF
10456+33	LT	10456+33	RT	65	LF
10456+32	RT	10456+35	RT	35	LF
10456+41	LT	10456+41	RT	68	LF
10456+41	RT	10456+43	RT	35	LF
TOTAL				470	LF

EPOXY PVMT MK GROOVED - 8" WHITE 2' GUIDE SKIPS					
Start		End		Quantity	
10434+06	LT	10434+85	RT	20	LF
10434+44	LT	10435+41	RT	40	LF
10434+55	LT	10435+29	RT	30	LF
10455+26	LT	10456+03	RT	30	LF
10455+79	LT	10456+39	RT	30	LF
TOTAL				150	LF

EPOXY PVMT MK GROOVED - 8IN WHITE LINE					
Station to		Station		Quantity	
10421+67	RT	10424+01	RT	235	LF
10424+57	LT	10427+85	LT	320	LF
10430+52	RT	10434+20	RT	368	LF
10435+21	LT	10438+45	LT	324	LF
10439+94	RT	10442+24	RT	230	LF
10446+50	RT	10448+46	RT	196	LF
10449+10	LT	10452+88	LT	378	LF
10454+28	RT	10455+57	RT	129	LF
10456+49	LT	10457+75	LT	126	LF
10462+74	RT	10464+96	RT	222	LF
10463+13	RT	10464+97	RT	184	LF
10465+16	LT	10466+53	LT	137	LF
10469+57	LT	10469+57	LT	134	LF
10472+85	LT	10476+35	LT	350	LF
10472+91	RT	10477+39	RT	448	LF
10477+82	LT	10479+12	LT	130	LF
10478+49	RT	10479+91	RT	142	LF
10480+75	LT	10483+35	LT	260	LF
10484+30	RT	10485+36	RT	105	LF
10484+40	RT	10485+36	RT	95	LF
TOTAL				4513	LF

EPOXY PVMT MK GROOVED - 8IN GORE AREA					
Start		End		Quantity	
10420+35	RT	10424+05	RT	1040	LF
10424+24	LT	10424+05	LT	277	LF
10424+63	LT	10426+49	LT	550	LF
10430+33	RT	10434+20	RT	1112	LF
10435+21	LT	10439+03	LT	1060	LF
10442+79	LT	10445+51	LT	770	LF
10445+98	RT	10448+68	RT	785	LF
10449+44	LT	10452+33	LT	800	LF
10453+03	RT	10455+57	RT	700	LF
10456+50	LT	10458+45	LT	529	LF
10465+77	LT	10467+72	LT	520	LF
10467+24	RT	10469+36	RT	472	LF
TOTAL				8615	LF

EPOXY PVMT MK GROOVED - 24IN WHITE LINE					
Start		End		Quantity	
10424+24	LT	10424+36	LT	12	LF
10434+21	RT	10434+21	RT	63	LF
10434+29	LT	10434+67	LT	38	LF
10435+20	LT	10435+20	LT	63	LF
10455+58	RT	10455+58	RT	46	LF
10455+91	RT	10456+23	RT	32	LF
10456+47	LT	10456+47	LT	57	LF
10469+57	LT	10469+80	LT	23	LF
10469+71	RT	10469+71	RT	23	LF
10470+32	LT	10470+32	LT	23	LF
10479+91	RT	10479+91	RT	34	LF
10480+75	LT	10480+75	LT	24	LF
10485+96	RT	10485+96	RT	42	LF
TOTAL				480	LF

EPOXY PVMT MK GROOVED - 4IN CENTERLINE SKIPS					
Start		End		Quantity	
10419+25	RT	10434+20	RT	370	LF
10419+25	LT	10434+20	LT	370	LF
10435+21	RT	10455+57	RT	500	LF
10435+21	LT	10455+57	LT	500	LF
10456+49	RT	10485+36	RT	720	LF
10456+49	LT	10458+36	LT	720	LF
TOTAL				3180	LF

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Pavement Marking Quantity List

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-4-083(128)197	120	6

EPOXY PVMT MK MESSAGE - RIGHT TURN ARROW			
Station		Quantity	
10421+67	RT	16	SF
10422+27	RT	16	SF
10422+94	RT	16	SF
10424+17	LT	16	SF
10425+96	LT	16	SF
10427+24	LT	16	SF
10427+64	LT	16	SF
10430+52	RT	16	SF
10431+12	RT	16	SF
10432+54	RT	16	SF
10436+66	LT	16	SF
10438+43	LT	16	SF
10439+03	LT	16	SF
10439+94	RT	16	SF
10440+54	RT	16	SF
10441+30	RT	16	SF
10446+51	RT	16	SF
10447+11	RT	16	SF
10447+96	RT	16	SF
10450+97	LT	16	SF
10452+26	LT	16	SF
10452+86	LT	16	SF
10457+15	LT	16	SF
10457+75	LT	16	SF
10463+14	RT	16	SF
10463+74	RT	16	SF
10465+92	LT	16	SF
10466+52	LT	16	SF
10467+24	RT	16	SF
10467+84	RT	16	SF
10472+91	RT	16	SF
10473+51	RT	16	SF
10474+53	LT	16	SF
10475+14	RT	16	SF
10475+75	LT	16	SF
10476+35	LT	16	SF
10478+50	LT	16	SF
10479+10	LT	16	SF
10482+76	LT	16	SF
10483+36	LT	16	SF
10484+40	RT	16	SF
10485+00	RT	16	SF
TOTAL		672	SF

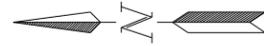
EPOXY PVMT MK MESSAGE - LEFT TURN ARROW			
Station		Quantity	
10420+35	RT	16	SF
10420+95	RT	16	SF
10422+33	RT	16	SF
10425+96	LT	16	SF
10426+48	LT	16	SF
10430+33	RT	16	SF
10430+93	RT	16	SF
10432+43	RT	16	SF
10436+66	LT	16	SF
10438+50	LT	16	SF
10439+00	LT	16	SF
10444+90	LT	16	SF
10445+50	LT	16	SF
10445+97	RT	16	SF
10446+57	RT	16	SF
10447+52	RT	16	SF
10450+75	LT	16	SF
10451+73	LT	16	SF
10452+33	LT	16	SF
10453+03	RT	16	SF
10453+63	RT	16	SF
10454+59	RT	16	SF
10457+84	LT	16	SF
10458+44	LT	16	SF
10462+74	RT	16	SF
10463+34	RT	16	SF
10467+11	LT	16	SF
10467+71	LT	16	SF
10478+50	RT	16	SF
10479+10	RT	16	SF
10484+31	RT	16	SF
10484+91	RT	16	SF
TOTAL		512	SF

SUMMARY OF PVMT MARKING			
SPEC-CODE	ITEM	Quantity	
762-0110	EPOXY PVMT MK GROOVED - 4IN	25568	LF
762-0131	EPOXY PVMT MK GROOVED - 6IN	470	LF
762-0132	EPOXY PVMT MK GROOVED - 8IN	13278	LF
762-0135	EPOXY PVMT MK GROOVED - 24IN	480	LF
762-0136	EPOXY PVMT MK MESSAGE - MESSAGE	1184	SF

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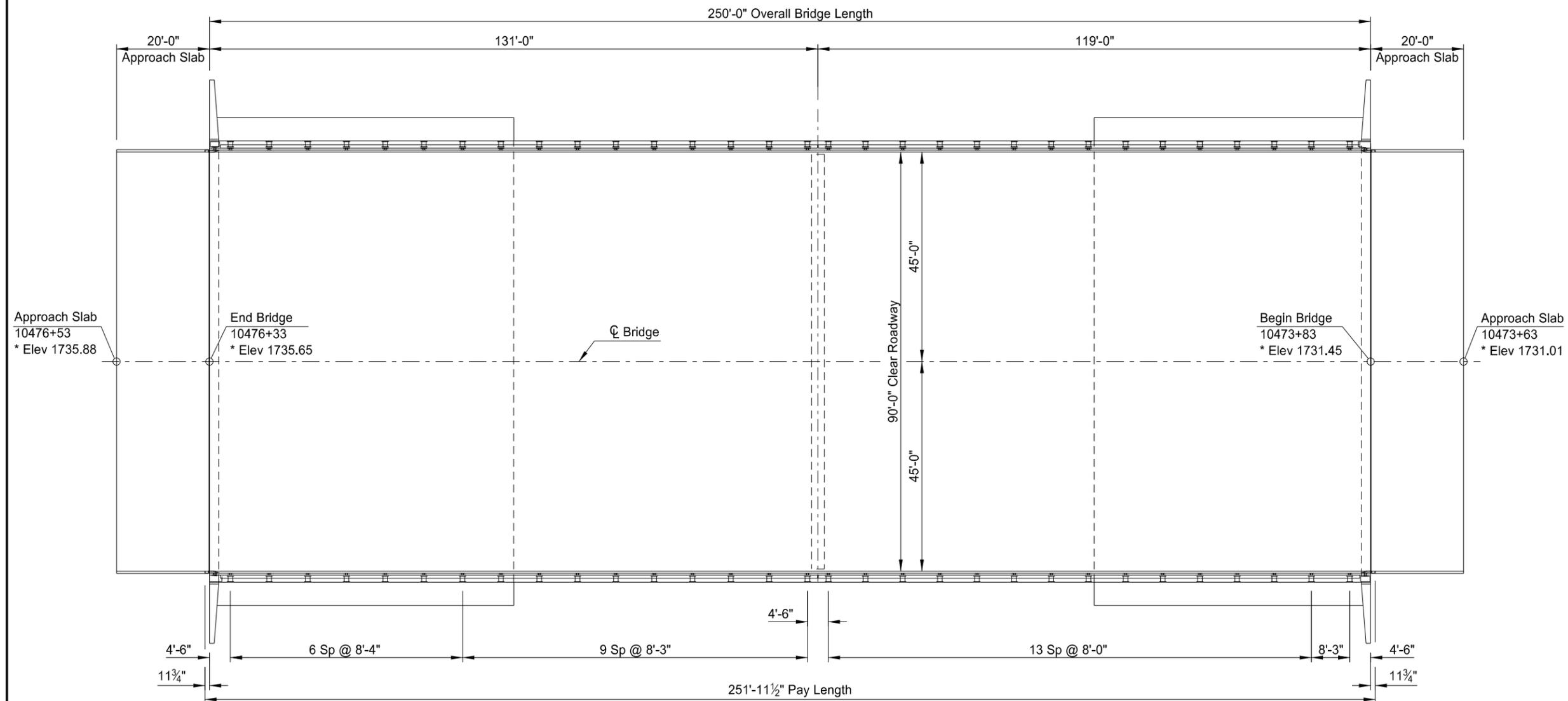
Pavement Marking Quantity List

Mill & Overlay
US Hwy 83
S Urban Limits to 20th Ave SW
Minot, ND



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

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	170	1



PLAN

* Elevations shown are from original plans and are listed so approach slab can be built to the correct grade.

NOTES:

- 100 SCOPE OF WORK: Work at this site consists of placing a bridge deck overlay, installing an E Rail Retrofit and removing and replacing approach slabs and repairing approach slab lips.
- 602 BRIDGE APPROACH SLAB-REMOVE AND REPLACE: Remove and replace the approach slabs at each end of the bridge. Provide aggregate for concrete that meets the requirements of section 802.01 C.2, "Coarse Aggregate" and Section 802.01 C.3, "Fine Aggregate". Mechanical finish the approach slabs as specified in Section 602.04D. Wet cure all concrete surfaces not covered by forms. Cover the concrete with a double thickness of burlap. Maintain surface moisture between the final finish and placement of burlap by periodic application of a light fog spray of water. Keep the burlap continuously moist until the end of the curing period. Cure approach slab concrete as specified in Section 602.04 F.2, "Deck Slab Concrete".

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	0130	CLASS AAE-3 CONCRETE	CY	6.0
602	1135	BRIDGE APPROACH SLAB-REMOVE AND REPLACE	SY	404.4
624	3002	DOUBLE BOX BEAM RAIL RETROFIT - E-RAIL	LF	503.9
650	0704	OVERLAY CONCRETE	CY	150
650	0720	CLASS 1 REMOVAL	SY	2,500
650	0721	CLASS 2 REMOVAL	SY	500
650	0722	CLASS 2-A REMOVAL	LF	900
650	0723	CLASS 3 REMOVAL	SY	125
650	0724	CLASS 4 REMOVAL	SY	25
930	9639	APPROACH SLAB LIP REPAIR	LF	182

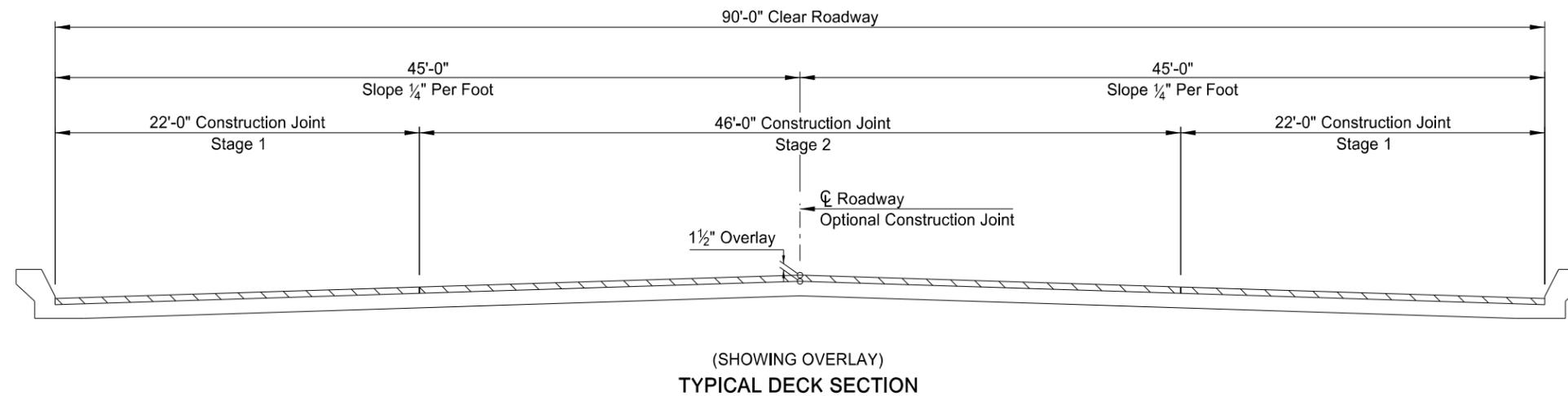
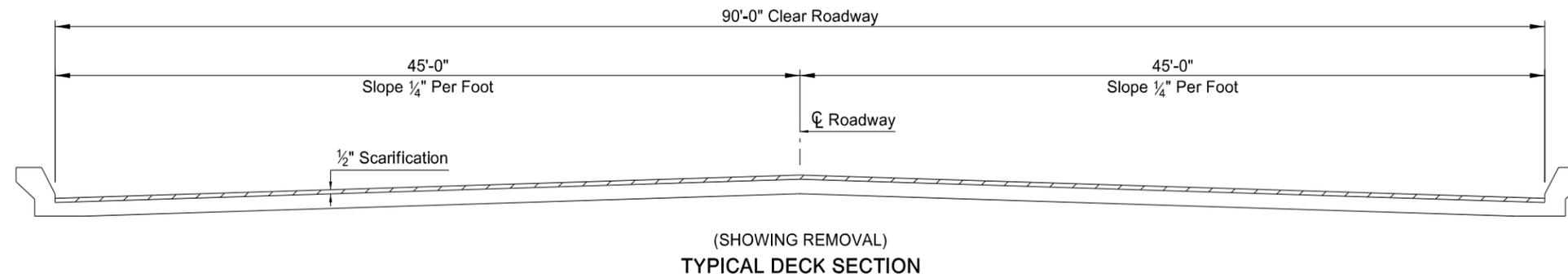
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NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
MINOT
JCT US 83 & US 2-52
BRIDGE LAYOUT

PROJECT: NHU-4-083(128)197
STATION: 10475+08
WARD COUNTY

DATE: 03/22/16 ENGINEER: Terrence R. Udland

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	170	2

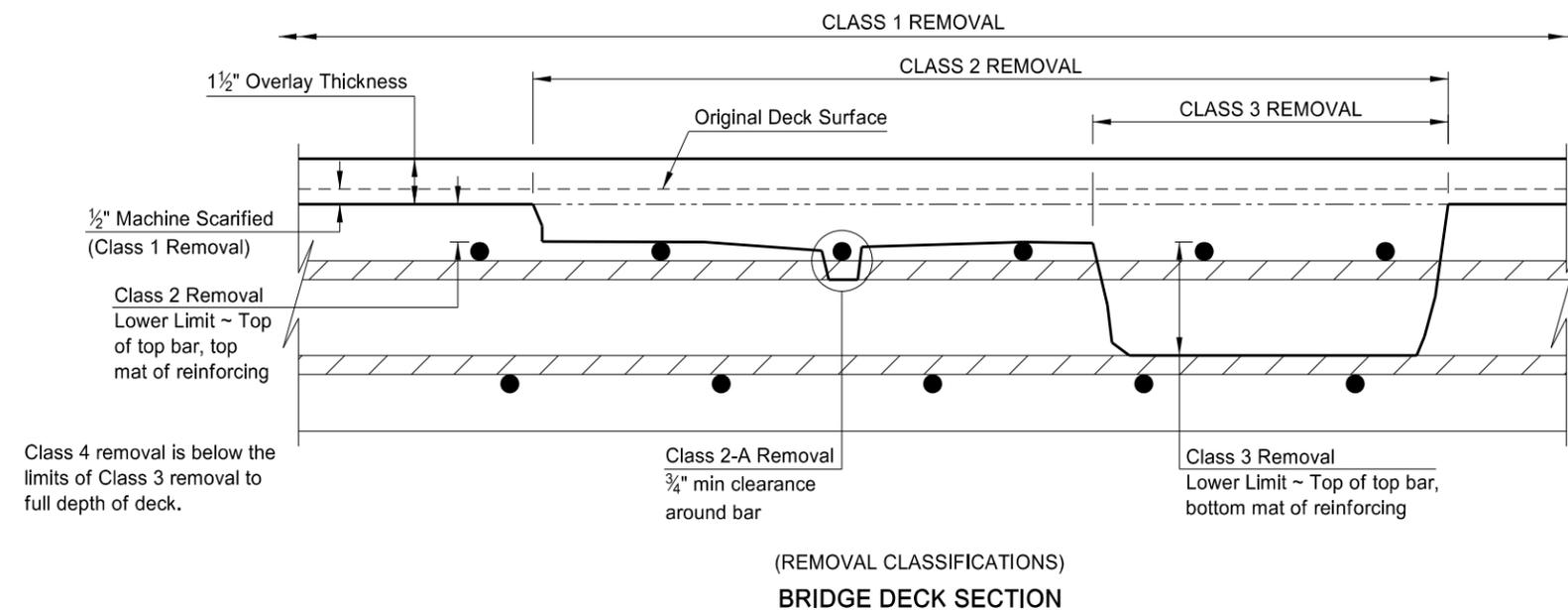


NOTES:

650 OVERLAY CONCRETE: Place overlay concrete before September 15 unless authorized by the Bridge Engineer.

OVERLAY CONCRETE: Use Size 5 coarse aggregate composed of crushed stone. Use crushed stone that has at least one fractured face on 75 percent of the particles retained on the number 4 sieve.

CLASS 2-A REMOVAL: Class 2-A removal is paid for the top bar in the top mat of reinforcing only. If a bar that is identified for 2-A is in an area that becomes Class 3 or Class 4, it will not be paid for as 2-A removal.



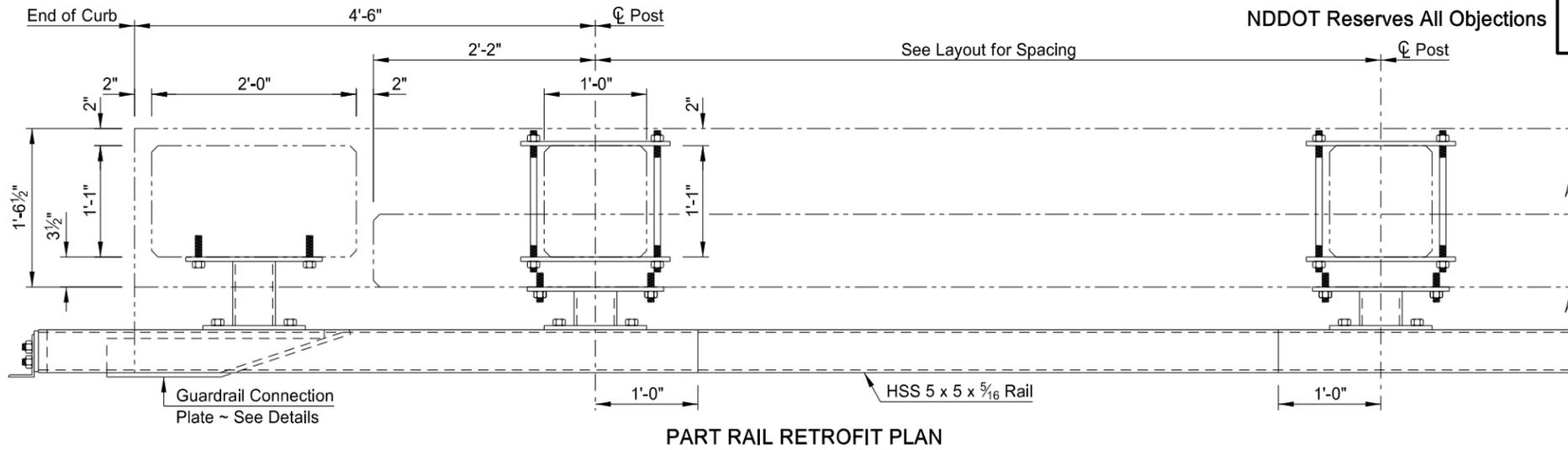
QUANTITIES	
OVERLAY CONCRETE	150 CY
CLASS 1 REMOVAL	2,500 SY
CLASS 2 REMOVAL	500 SY
CLASS 2-A REMOVAL	900 LF
CLASS 3 REMOVAL	125 SY
CLASS 4 REMOVAL	25 SY

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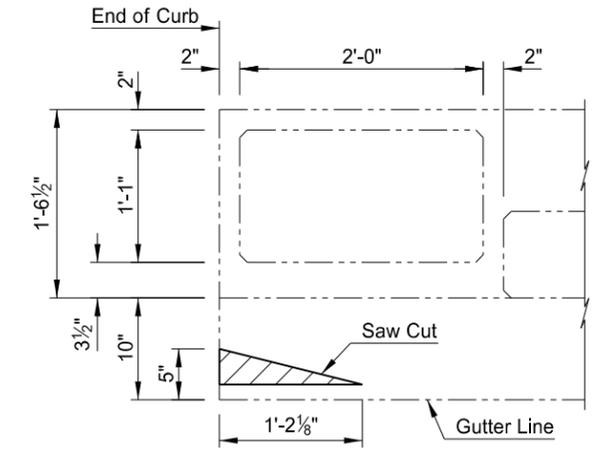
JCT US 83 & US 2-52

DECK OVERLAY DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	170	3



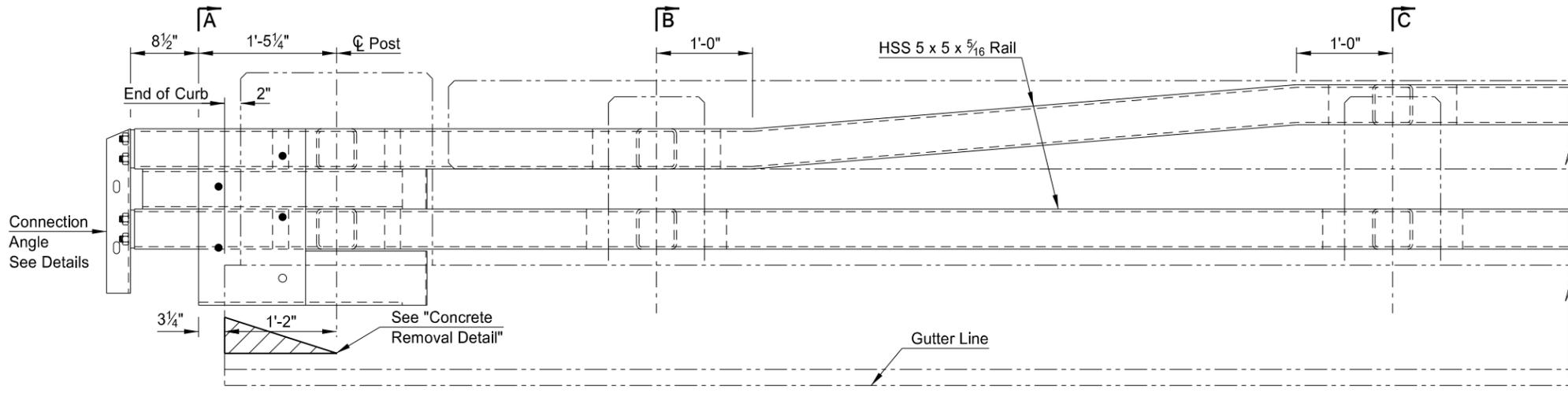
PART RAIL RETROFIT PLAN



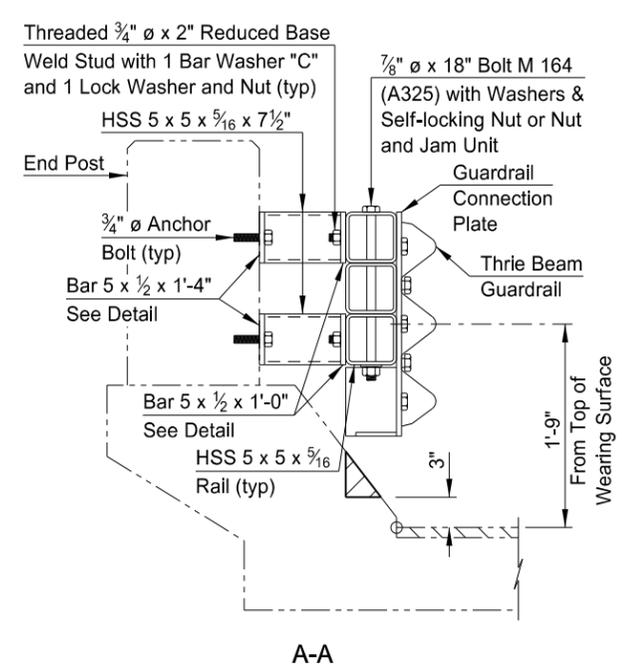
PLAN CONCRETE REMOVAL DETAIL

- Indicates Concrete Removal
- Indicates Overlay Concrete

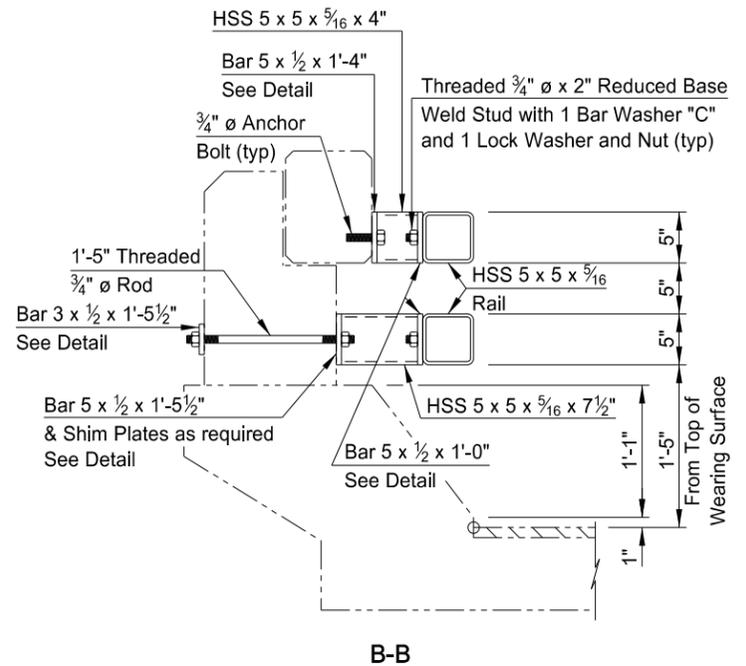
NOTE:
See Dwg 2-146.366-5 for notes and details not shown on this drawing.



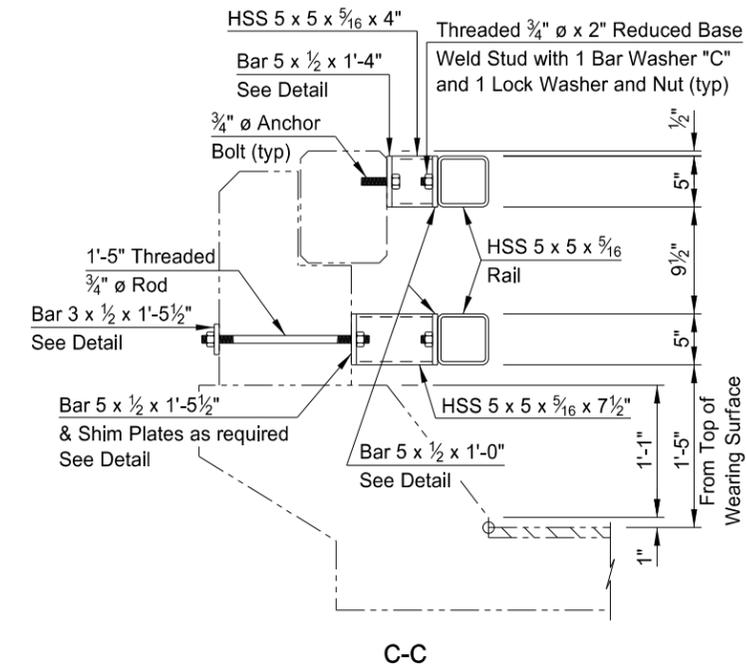
PART RAIL RETROFIT ELEVATION



A-A



B-B



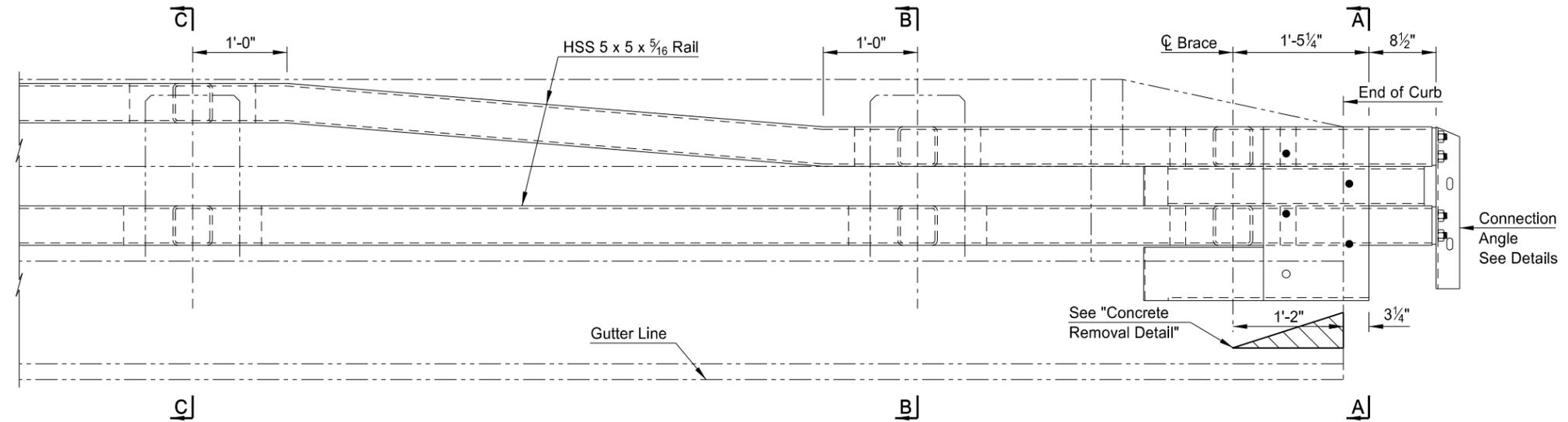
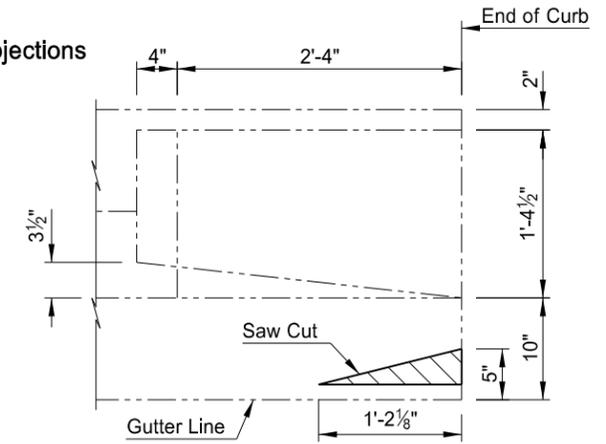
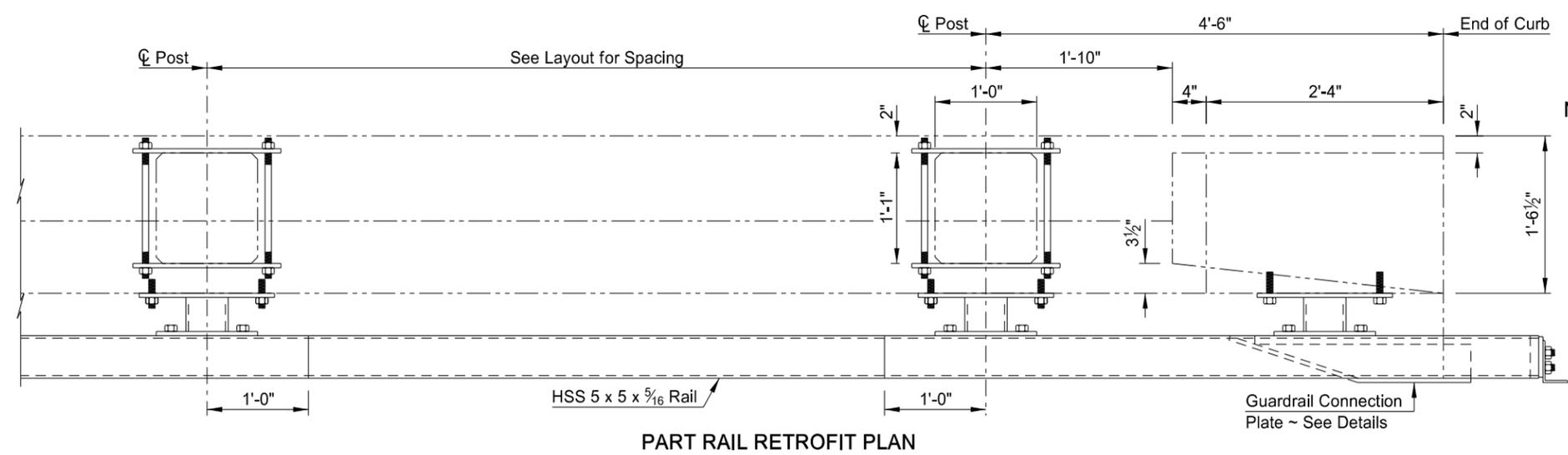
C-C

QUANTITIES
SEE DWG 2-146.366-5
JCT US 83 & US 2-52
DOUBLE BOX BEAM E-RAIL RETROFIT DETAILS

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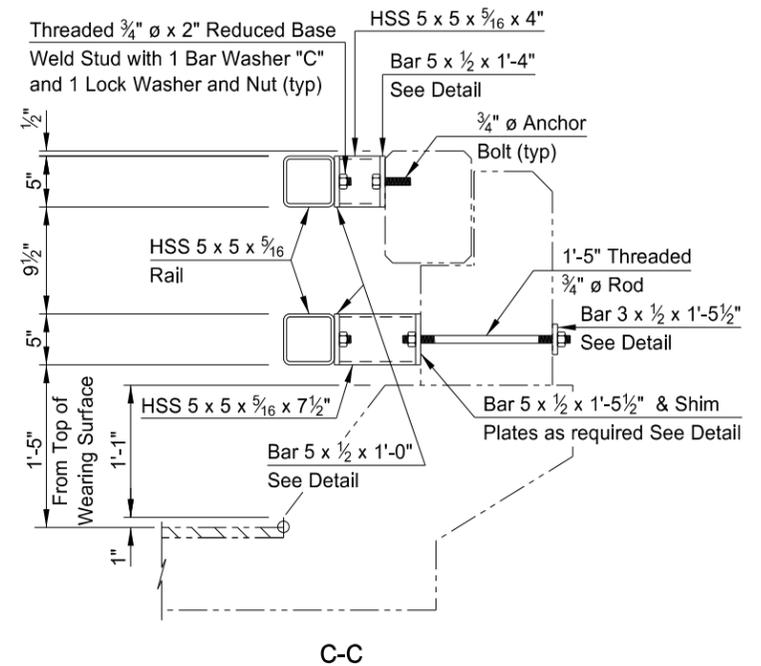
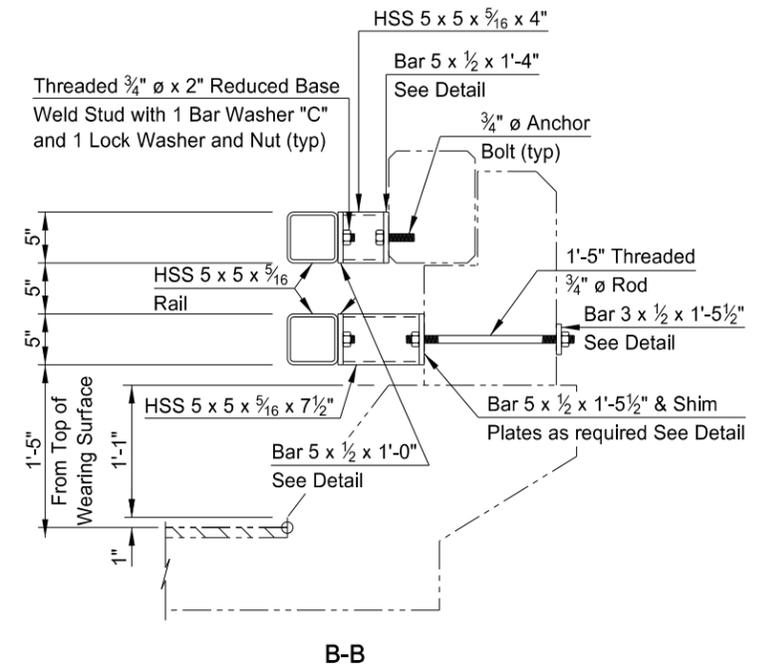
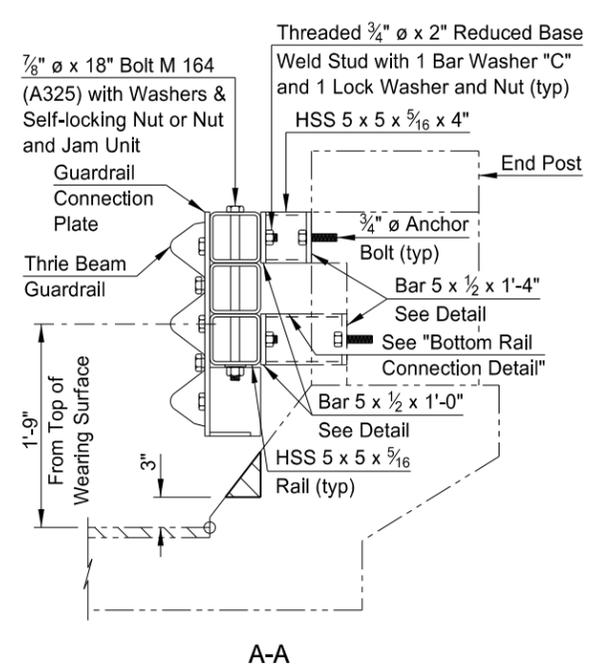
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	170	4

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



- Indicates Concrete Removal
- Indicates Overlay Concrete

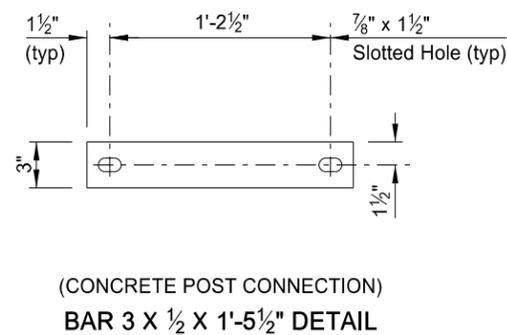
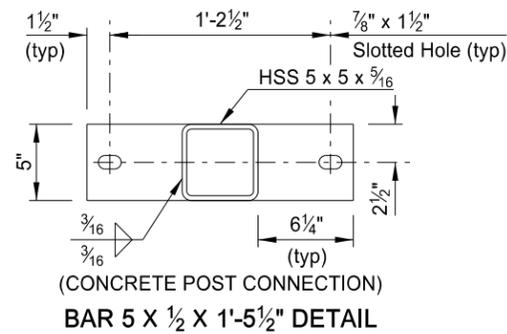
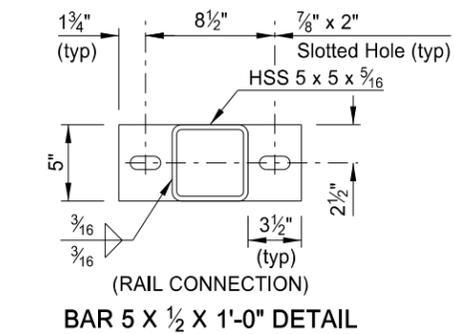
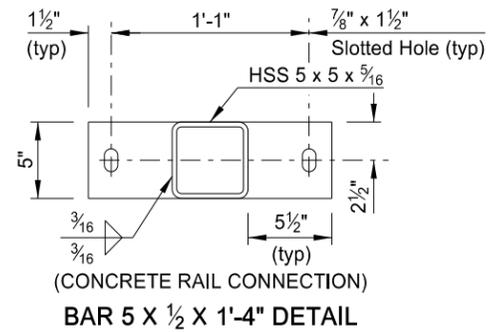
NOTE:
See Dwg 2-146.366-5 for notes and details not shown on this drawing.



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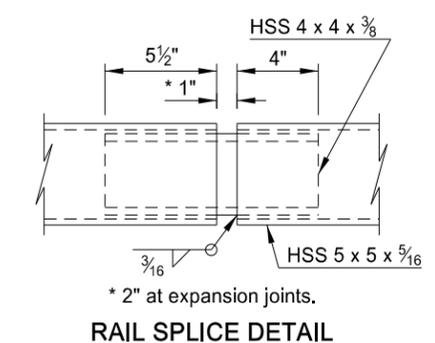
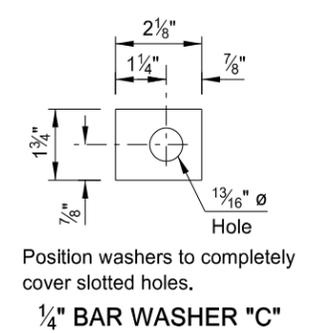
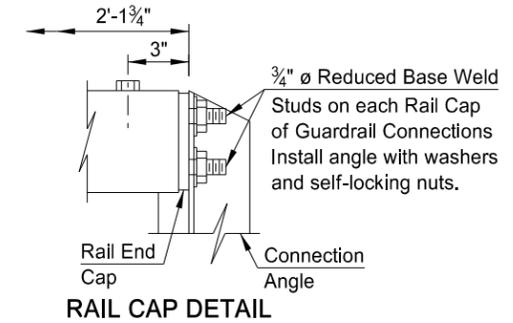
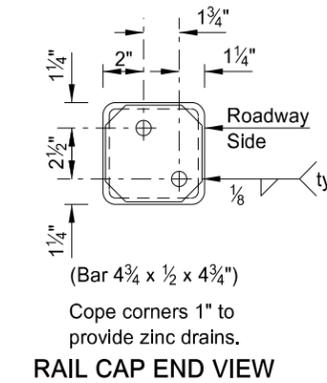
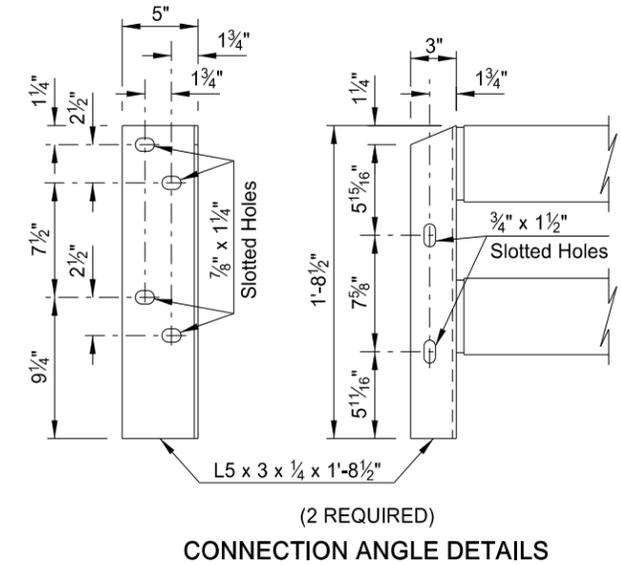
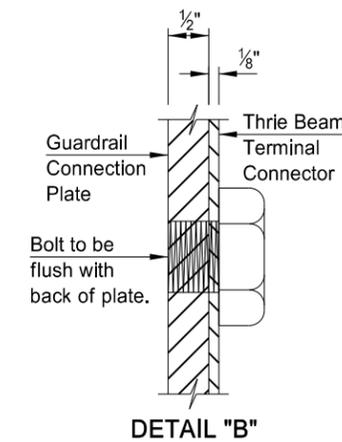
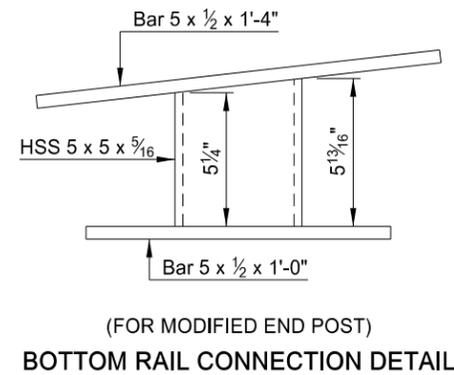
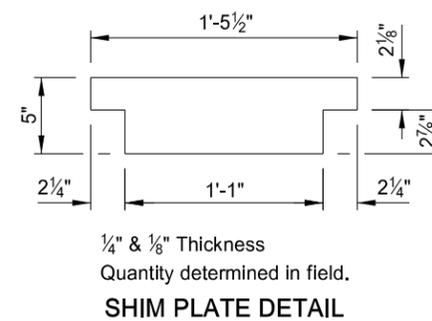
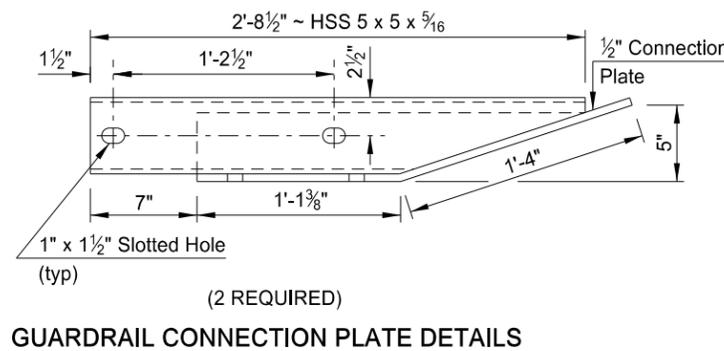
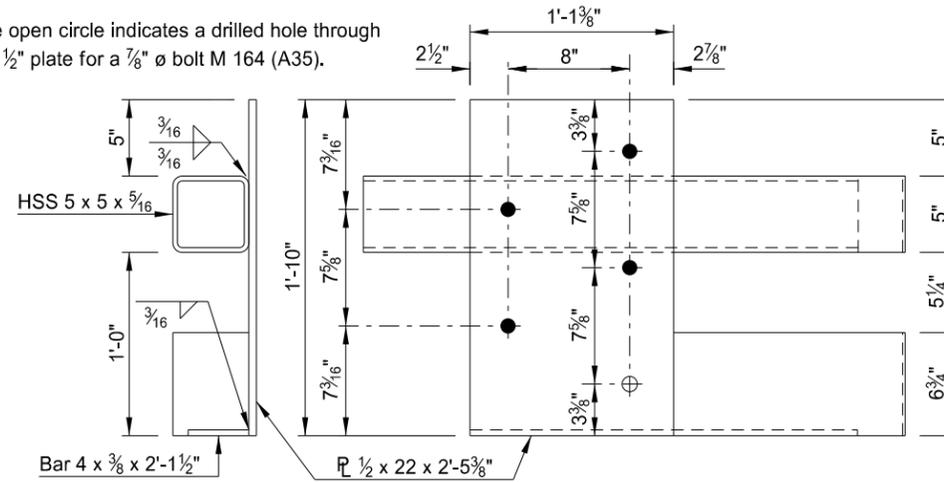
QUANTITIES
SEE DWG 2-146.366-5
JCT US 83 & US 2-52
DOUBLE BOX BEAM E-RAIL RETROFIT DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
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The filled circles indicate drilled and tapped holes for 7/8" ø bolts M 164 (A325). See Detail "B"

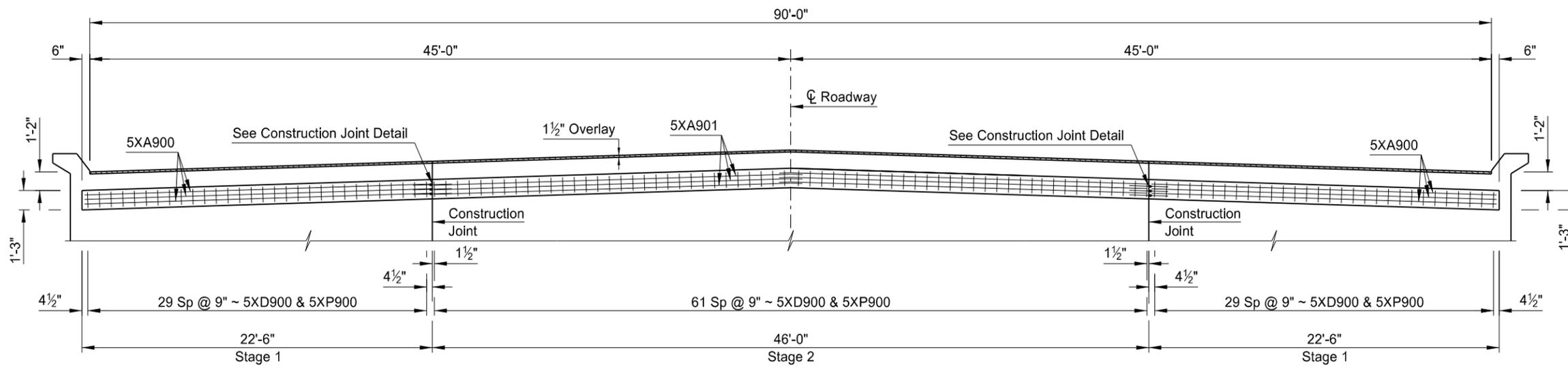
The open circle indicates a drilled hole through the 1/2" plate for a 7/8" ø bolt M 164 (A35).



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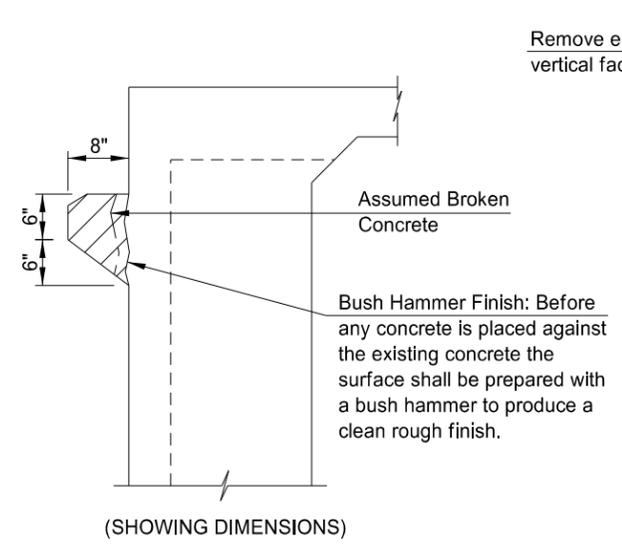
QUANTITIES	
E-RAIL RETROFIT	503.9 LF
JCT US 83 & US 2-52	
DOUBLE BOX BEAM E-RAIL RETROFIT DETAILS	

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	NHU-4-083(128)197	170	6

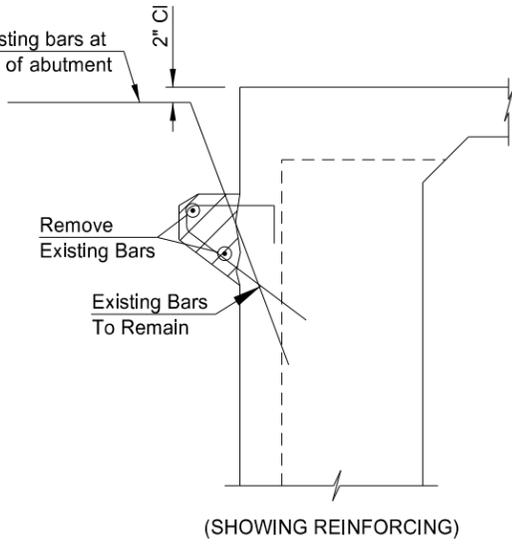


(SHOWING ONLY NEW REINFORCING)
ELEVATION

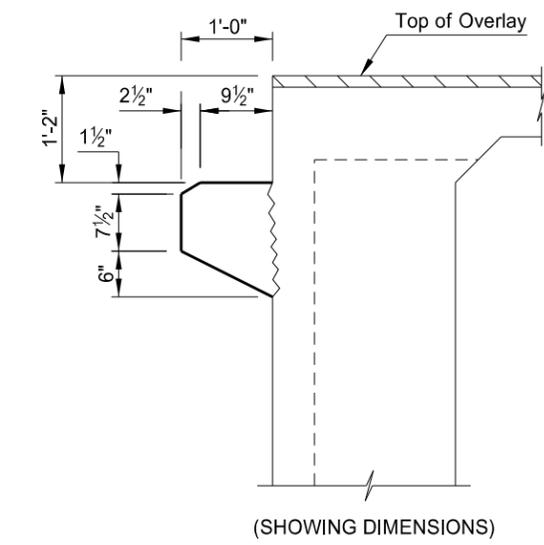
Hatched Area Indicates Removal



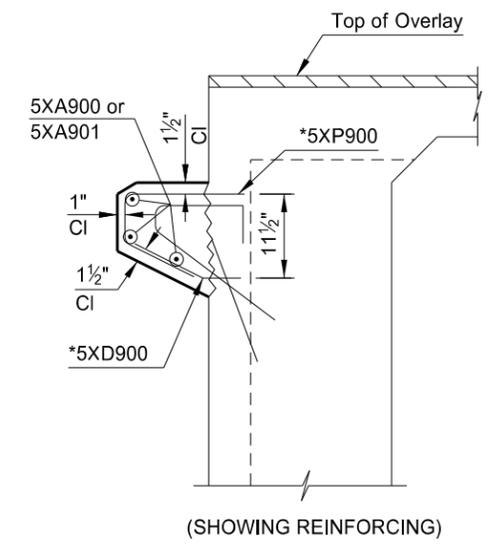
(SHOWING DIMENSIONS)



(SHOWING REINFORCING)



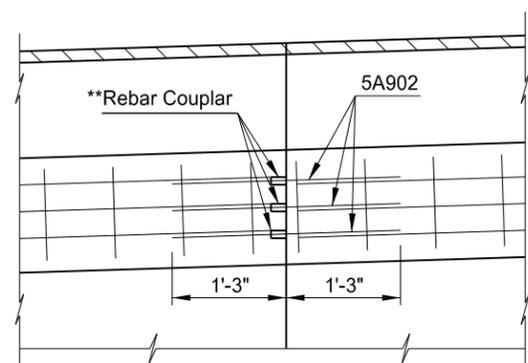
(SHOWING DIMENSIONS)



(SHOWING REINFORCING)

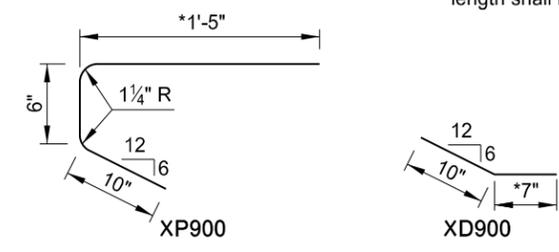
EXISTING APPROACH SLAB LIP

NEW APPROACH SLAB LIP



CONSTRUCTION JOINT DETAIL

** Use approved mechanical connectors for the couplers capable of developing 125% of the reinforcing steel specified yield strength. Provide epoxy coated couplers according to Section 836.02 A and repair any damaged epoxy coating according to Section 612.04 E.



(DIMENSIONS SHOWN ARE OUT TO OUT)
BENT BAR DETAILS

* Length may vary depending on manufacturer's recommendations for anchorage. The anchorage length shall be a minimum of 6 inches.

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NOTES:

5XD900 and 5XP900 bars shall be installed according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage, in accordance with Sec. 806.02 of the NDDOT Standard Specifications. The concrete shall be Class AAE-3 and the reinforcing steel shall be grade 60.

Quantities shown are for informational purposes only.

Class AAE-3 Concrete, reinforcing steel, excavation & backfilling, labor and equipment required to remove the existing approach lip and to build the new approach lip shall be included in the bid item "Approach Slab Lip Repair".

The bar marks beginning with an "X" indicate an epoxy coated bar.

SKEW ANGLE = 0°			
BAR LIST - ONE SLAB			
SIZE	MARK	NO.	LENGTH
5	XA900	6	22'-2"
5	XA901	6	23'-7"
5	XD900	122	*1'-5"
5	XP900	122	*2'-9"
5	A902	6	2'-6"

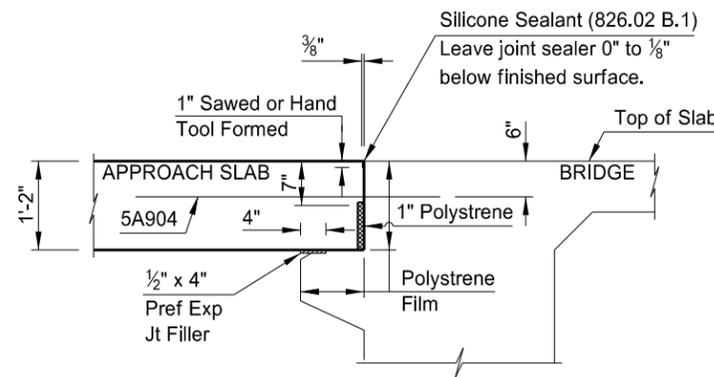
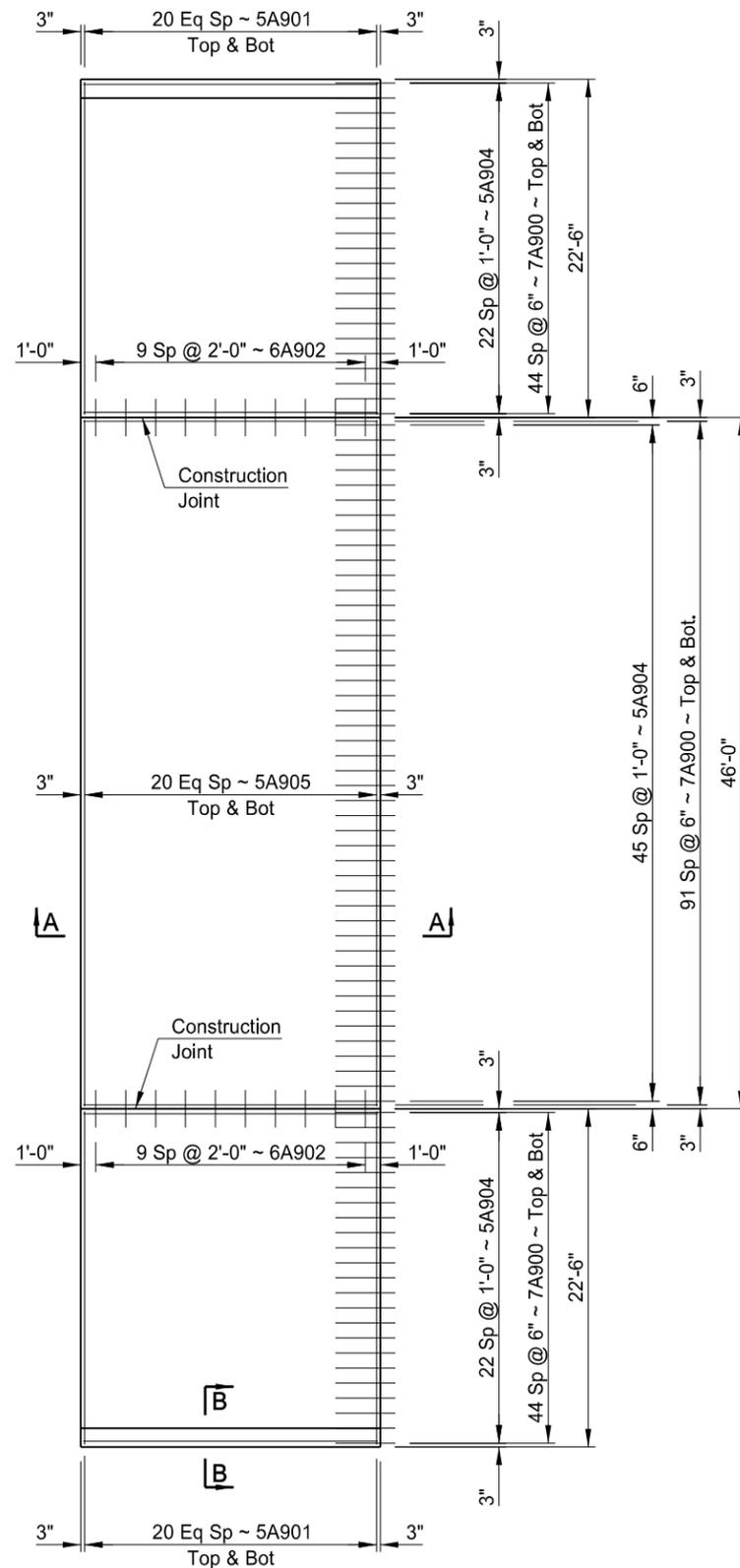
ESTIMATED MATERIAL QUANTITIES	
REINFORCING STEEL (LBS)	CONCRETE (CY)
832	3.4

QUANTITIES	(ONE ABUTMENT)
APPROACH SLAB LIP REPAIR	91 LF

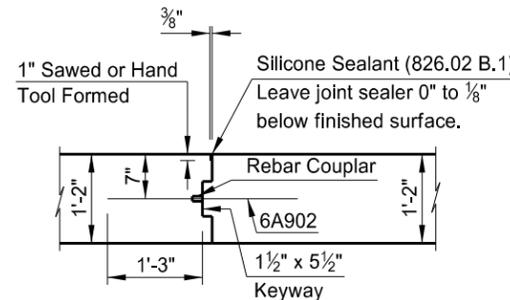
JCT US 83 & US 2-52

APPROACH SLAB LIP REPAIR DETAILS

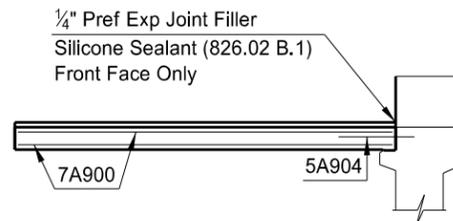
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
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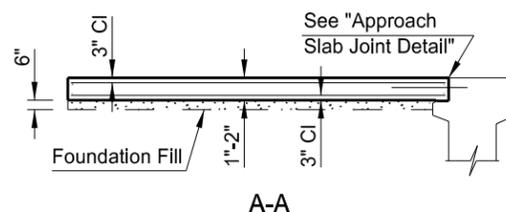
APPROACH SLAB JOINT DETAIL



CONSTRUCTION JOINT DETAIL



ELEVATION



A-A

NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, rebar coupler, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, foundation fill, silicone sealant, and labor required to build the approach slabs and barriers in the pay item "Bridge Approach Slab-Remove & Replace." Use Class AE-3 concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612 and foundation fill that meets the requirements of Section 210. Use polyethylene film that meets the requirements of ASTM C171.

The bar marks beginning with an "X" indicate an epoxy coated bar. The dimensions shown in the "Bent Bar Details" are out to out.

Install 5A904 according to manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage, in accordance with Sec. 806.02 of the NDDOT Standard Specification. Embed the bars 1'-0" minimum into the abutment.

Use approved mechanical connectors for the couplers capable of developing 125% of the reinforcing steel specified yield strength. Provide epoxy coated couplers according to Section 836.02 A and repair any damaged epoxy coating according to Section 612.04 E.

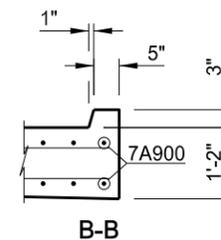
Remove and replace the approach slabs at each end of the bridge.

Provide aggregate for concrete that meets the requirements of Section 802.01 C.2, "Coarse Aggregate" and Section 802.01 C.3, "Fine Aggregate."

Mechanical finish the approach slabs as specified in Section 602.04 D.

Cure approach slab concrete as specified in Section 602.04 F.2, "Deck Slab Concrete".

Wet cure all concrete surfaces not covered by forms. Cover the concrete with a double thickness of burlap. Maintain surface moisture between the final finish and placement of burlap by periodic application of a light fog spray of water. Keep the burlap continuously moist until the end of the curing period.



B-B

SKEW ANGLE = 0°

BAR LIST - ONE SLAB

SIZE	MARK	NO.	LENGTH
7	A900	364	19'-8"
5	A901	84	22'-2"
6	A902	20	2'-6"
5	A904	92	4'-0"
5	A905	42	45'-8"

ESTIMATED MATERIAL QUANTITIES

REINFORCING STEEL (LBS)	CONCRETE (CY)
19,034	78.8

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QUANTITIES	(ONE END)
APPROACH SLAB	202.2 SY

JCT US 83 & US 2-52

APPROACH SLAB DETAILS

NDDOT ABBREVIATIONS

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

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

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

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

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

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

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NDDOT ABBREVIATIONS

D-101-2

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

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

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NDDOT ABBREVIATIONS

D-101-3

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

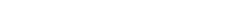
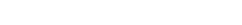
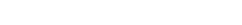
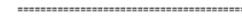
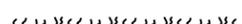
D-101-10

702COM	702 Communications	GT PLNS NAT GAS	Great Plains Natural Gas Company	RED RIV TEL	Red River Rural Telephone
ACCENT	Accent Communications	HALS TEL	Halstad Telephone Company	RESVTN TEL	Reservation Telephone
AGASSIZ WU	Agassiz Water Users Incorporated	IDEA1	Idea1	ROBRTS TEL	Roberts Company Telephone
AGC	Associated General Contractors of America	INT-COMM TEL	Inter-Community Telephone Company	R-RIDER ELEC	Roughrider Electric Coop
All PI	Alliance Pipeline	KANEB PL	Kaneb Pipeline Company	RRVW	Red River Valley & Western Railroad
ALL SEAS WU	All Seasons Water Users Association	KEM ELEC	Kem Electric Cooperative Incorporated	RSR ELEC	R.S.R. Electric Cooperative
AMOCO PI	Amoco Pipeline Company	KOCH GATH SYS	Koch Gathering Systems Incorporated	S E W U	South East Water Users Incorporated
AMRDA HESS	Amerada Hess Corporation	LKHD PL	Lakehead Pipeline Company	SCOTT CABLE	Scott Cable Television Dickinson
AT&T	AT&T Corporation	LNGDN RWU	Langdon Rural Water Users Incorporated	SHERDN ELEC	Sheridan Electric Cooperative
B PAW	Bear Paw Energy Incorporated	LWR YELL R ELEC	Lower Yellowstone Rural Electric	SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
BAKER ELEC	Baker Electric	MCKNZ CON	McKenzie Consolidated Telcom	SKYTECH	Skyland Technologies Incorporated
BASIN ELEC	Basin Electric Cooperative Incorporated	MCKNZ ELEC	McKenzie Electric Cooperative	SLOPE ELEC	Slope Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative	MCKNZ WRD	McKenzie County Water Resource District	SOURIS RIV TELCOM	Souris River Telecommunications
BELLE PL	Belle Fourche Pipeline Company	MCLEOD	McLeod USA	ST WAT COMM	State Water Commission
BLM	Bureau of Land Management	MCLN ELEC	McLean Electric Cooperative	STATE LN WATER	State Line Water Cooperative
BNSF	Burlington Northern Santa Fe Railway	MCLN-SHRDN R WAT	McLean-Sheridan Rural Water	STER ENG	Sterling Energy
BOEING	Boeing	MDU	Montana-dakota Utilities	STUT RWU	Stutsman Rural Water Users
BRNS RWD	Barnes Rural Water District	MID-CONT CABLE	Mid-Continent Cable	SW PL PRJ	Southwest Pipeline Project
BURK-DIV ELEC	Burke-Divide Electric Cooperative	MIDSTATE TEL	Midstate Telephone Company	T M C	Turtle Mountain Communications
BURL WU	Burleigh Water Users	MINOT CABLE	Minot Cable Television	TCI	TCI of North Dakota
Cable One	Cable One	MINOT TEL	Minot Telephone Company	TESORO GHG PLNS PL	Tesoro High Plains Pipeline
CABLE SERV	Cable Services	MISS W W S	Missouri West Water System	TRI-CNTY WU	Tri-County Water Users Incorporated
CAP ELEC	Capital Electric Cooperative Incorporat	MNKOTA PWR	Minnkota Power	TRL CO RWU	Traill County Rural Water Users
CASS CO ELEC	Cass County Electric Cooperative	MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative	UNTD TEL	United Telephone
CASS RWU	Cass Rural Water Users Incorporated	MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative	UPPR SOUR WUA	Upper Souris Water Users Association
CAV ELEC	Cavalier Rural Electric Cooperative	MRE LBTY TEL	Moore & Liberty Telephone	US SPRINT	U.S. Sprint
CBLCOM	Cablecom Of Fargo	MUNICIPAL	City Water And Sewer	USAF MSL CABLE	U.S.A.F. Missile Cable
CENEX PL	Cenex Pipeline	MUNICIPAL	City Of '.....'	USFWS	US Fish and Wildlife Service
CENT PL WATER DIST	Central Pipe Line Water District	N CENT ELEC	North Central Electric Cooperative	USW COMM	U.S. West Communications
CENT PWR ELEC	Central Power Electric Cooperative	N VALL W DIST	North Valley Water District	VRNDRY ELEC	Verendrye Electric Cooperative
COE	Corps of Engineers	ND PKS & REC	North Dakota Parks And Recreation	W RIV TEL	West River Telephone Incorporated
CONS TEL	Consolidated Telephone	ND TEL	North Dakota Telephone Company	WEB	W. E. B. Water Development Association
CONT RES	Continental Resource Inc	NDDOT	North Dakota Department of Transportation	WILLI RWA	Williams Rural Water Association
CPR	Canadian Pacific Railway	NDSU SOIL SCI DEPT	NDSU Soil Science Department	WILSTN BAS PL	Williston Basin Interstate Pipeline Company
D O E	Department Of Energy	NEMONT TEL	Nemont Telephone	WLSH RWD	Walsh Water Rural Water District
DAK CARR	Dakota Carrier Network	NODAK R ELEC	Nodak Rural Electric Cooperative	WOLVRTN TEL	Wolverton Telephone
DAK CENT TEL	Dakota Central Telephone	NOON FRMS TEL	Noonan Farmers Telephone Company	XLENER	Xcel Energy
DAK RWD	Dakota Rural Water District	NPR	Northern Plains Railroad	YSVR	Yellowstone Valley Railroad
DGC	Dakota Gasification Company	NSP	Northern States Power		
DICKEY R NET	Dickey Rural Networks	NTH PRAIR RW	Northern Prairie Rural Water Association		
DICKEY RWU	Dickey Rural Water Users Association	NTHN BRDR PL	Northern Border Pipeline		
DICKEY TEL	Dickey Telephone	NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated		
DNRR	Dakota Northern Railroad	NTHWSTRN REF	Northwestern Refinery Company		
DOME PL	Dome Pipeline Company	NW COMM	Northwest Communication Cooperation		
DVELEC	Dakota Valley Electric Cooperative	ONEOK	Oneok gas		
DVMW	Dakota, Missouri Valley & Western	OSHA	Occupational Safety and Health Administration		
ENBRDG	Enbridge Pipelines Incorporated	OTTR TL PWR	Otter Tail Power Company		
ENVENTIS	Enventis Telephone	P L E M	Prairielands Energy Marketing		
FALK MNG	Falkirk Mining Company	POLAR COM	Polar Communications		
FHWA	Federal Highway Administration	PVT ELEC	Private Electric		
G FKS-TRL WD	Grand Forks-traill Water District	QWEST	Qwest Communications		
GETTY TRD & TRAN	Getty Trading & Transportation	R&T W SUPPLY	R & T Water Supply Association		
GLDN W ELEC	Golden West Electric Cooperative	RAMSEY R SEW	Ramsey Rural Sewer Association		
GRGS CO TEL	Griggs County Telephone	RAMSEY RW	Ramsey Rural Water Association		
		RAMSEY UTIL	Ramsey County Rural Utilities		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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Line Styles

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

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Symbols

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

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Symbols

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

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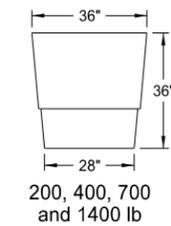
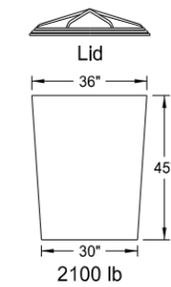
D-101-32

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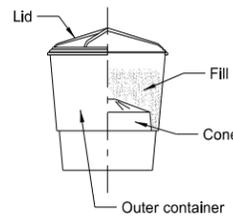
ATTENUATION DEVICE



Outer Containers

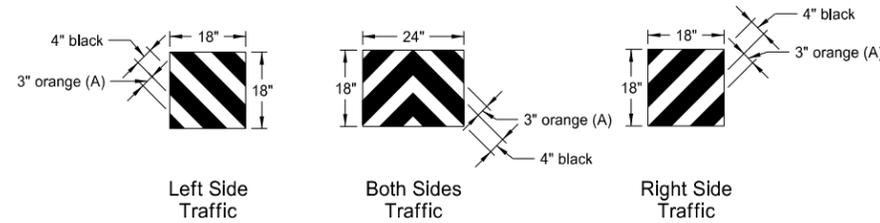


Cones



Typical Assembly

Typical Module Construction Detail

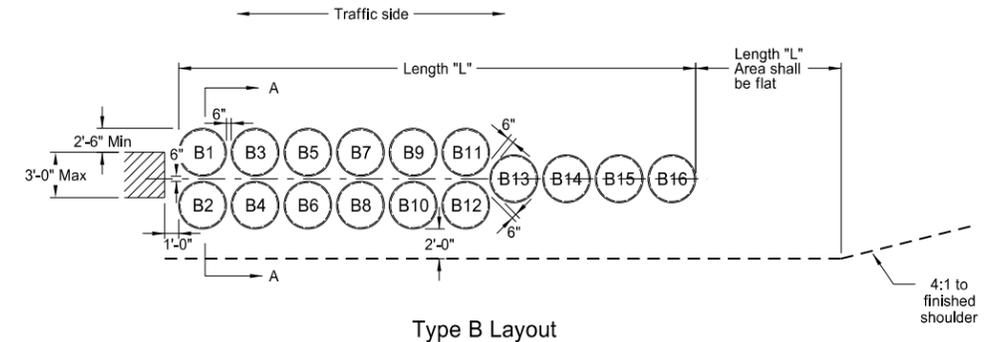


Reflective Sheet Detail

Note:
The last attenuation device facing traffic shall have a reflective sheet, following the details above, directly applied to the outer container. The sheet may also be applied to a metallic sheet and attached to the container with approved fasteners. The reflective sheeting shall be Type IV as specified in NDDOT Standard Specifications.

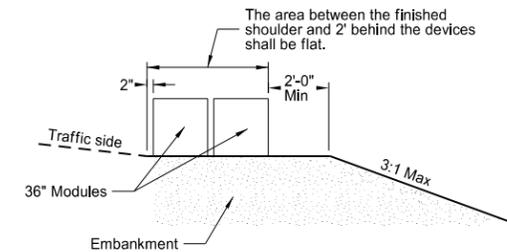
(A) 3" orange sheeting shall be used for temporary installations, and 3" yellow sheeting shall be used for permanent installations.

	Fill Chart				
	Module Weights (LBS)				
Distance from top edge	200	400	700	1400	2100
	8 1/2"	5"	4"	3"	0"



Type B Layout

Note:
When attenuation devices are placed at piers offset from roadway, they shall be angled 10 degrees towards traffic.



Section A-A (Type B Layout)

Type B Attenuation Device											
Module Number	Dash Number										
	75	70	65	60	55	50	45	40	35	30	25
Module Weights (LBS)											
B1	2100										
B2	2100										
B3	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B4	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B5	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400
B16	200	200	200	200	200	200	200	200	200	200	200
Length (L)	34.2'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	27.2'	27.2'
Module Weights (LBS)	Replacement Module										
	2100	1400	700	400	200	2100	1400	700	400	200	2100
2100	1	1	1	1	1	1	1	1	1	1	1
1400	1	1	1	1	1	1	1	1	1	1	1
700	2	2	2	2	2	2	2	2	2	2	2
400	1	1	1	1	1	1	1	1	1	1	1
200	2	2	2	1	1	1	1	1	1	1	1

Notes:

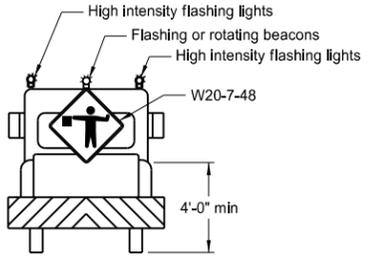
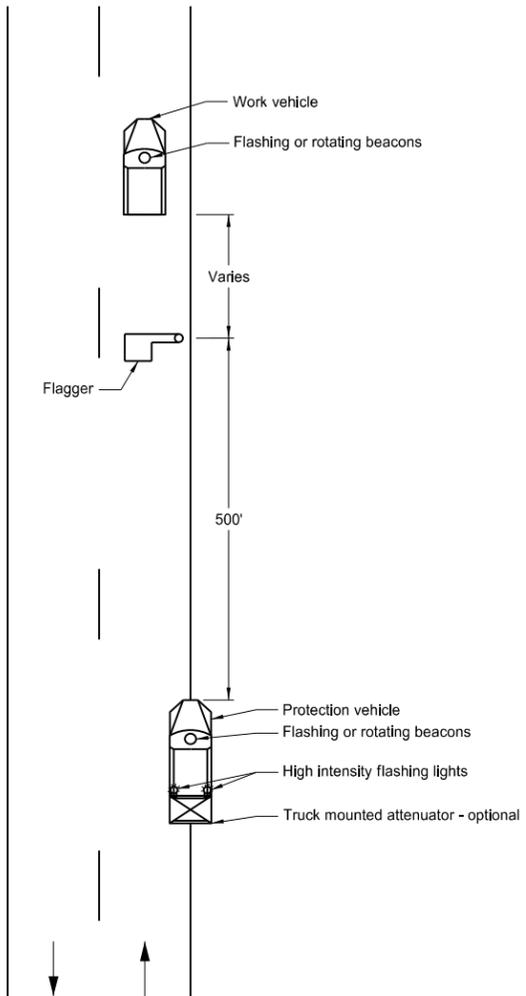
- Materials
 - A) Modules shall be manufactured from a frangible polyethylene material which will shatter upon impact.
 - B) Modules shall be filled with class 43 aggregate meeting the requirements for aggregate according to NDDOT Standard Specifications. The fill unit weight shall be at least 100 pounds per cubic foot. Fill left over winter shall have a moisture content of 2% or less.
- Modules
 - The modules shall be provided in two sizes to contain volumes of either 2, 4, 7, 14, or 21 cubic feet as a minimum.
 - A) The module for the 2, 4 or 7 cubic foot container shall consist of three components:
 - 1) A 14 C.F., yellow outer container.
 - 2) A black lid which locks securely over the top lip of the container.
 - 3) A cone-shaped supporting insert. The insert shall be varied to allow for the three sizes of modules and capable of supporting 200, 400, or 700 pounds of sand mass. The cone inserts shall be placed inside the 14 cubic foot container.
 - B) The module for the 21 cubic foot container shall consist of two components:
 - 1) A 36" height X 36" width yellow outer container.
 - 2) A black lid which locks securely over the top of the container.
- For temporary use: The modules shall be Energite or Fitch attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or an approved equal. The attenuation devices may be placed on pallets to facilitate maintenance. Pallets shall have a maximum thickness of 3 1/2".
- For permanent use: Barrel Attenuation Device installations, the outer sand container portion of the modules shall consist of a one-piece container with separate detachable lid. The modules which meet these requirements are Energite attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or an approved equal. Modules having outer sand containers assembled from multiple pieces shall not be accepted for permanent installations.

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9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised sheeting in reflective sheet detail

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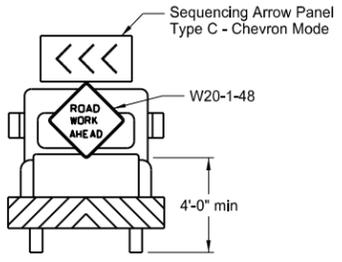
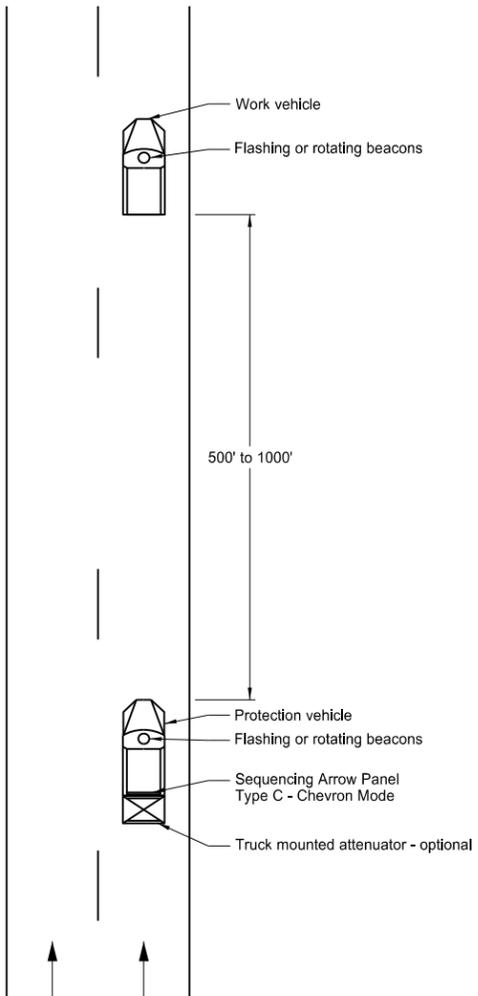
TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways

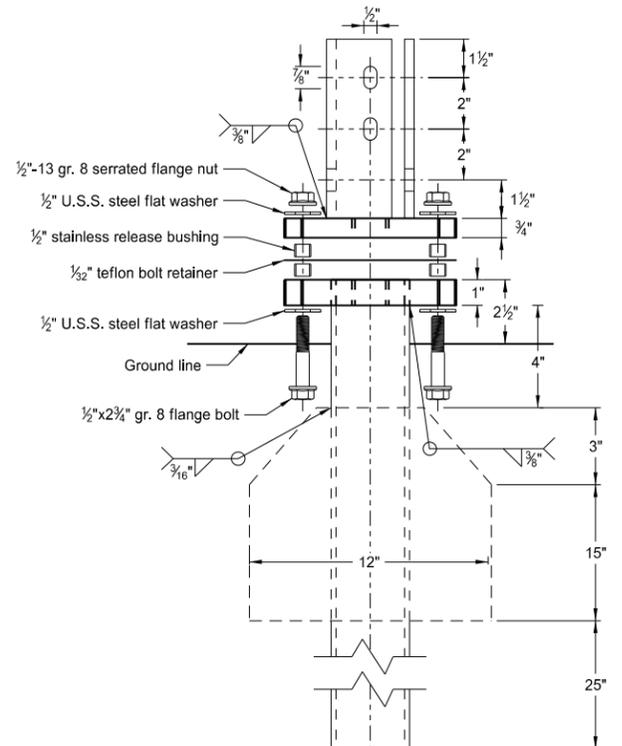


Typical Protection Vehicle

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

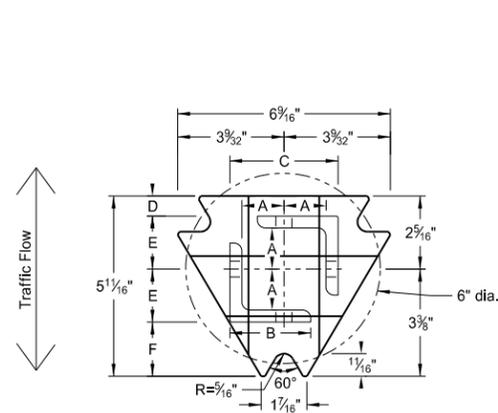
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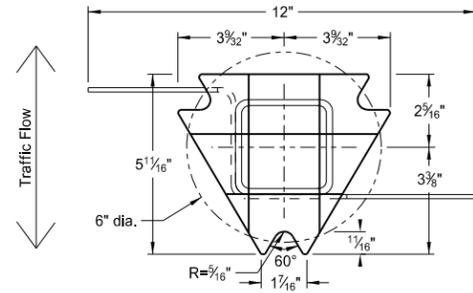


Multi-Directional Slip Base Assembly

Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2"x2 1/2"x3/8" ASTM A36 structural angle



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

Notes:

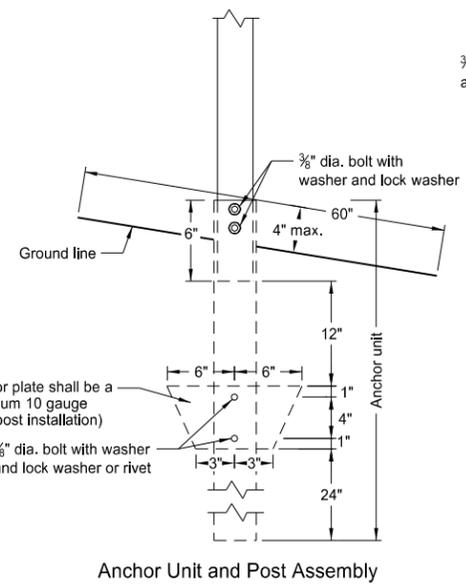
1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also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

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

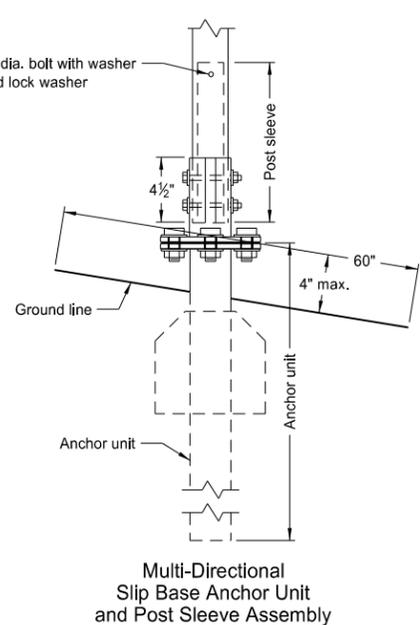
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

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

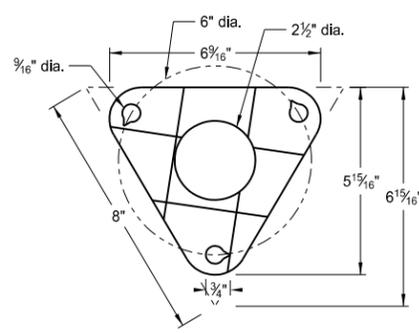
- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.
 (B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.



Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly

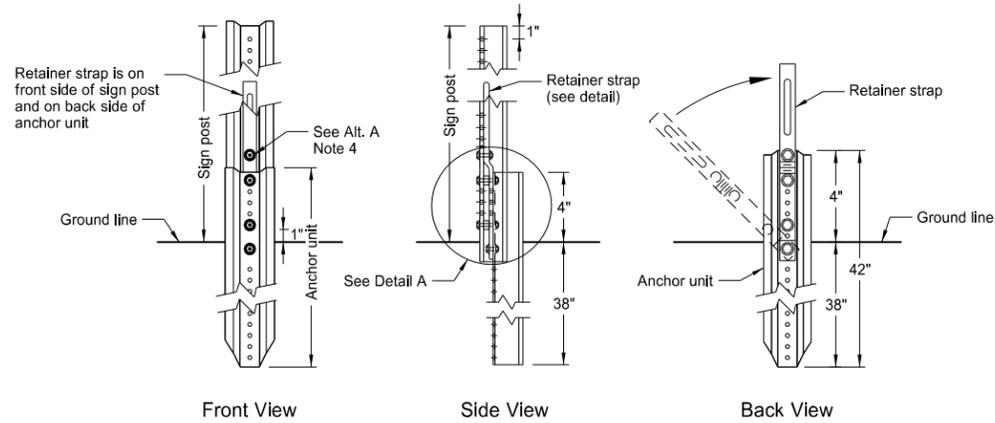
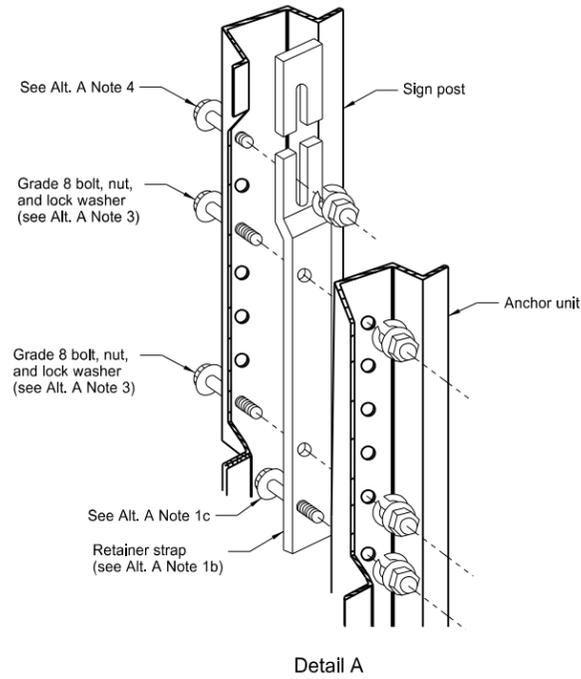


Bolt Retainer for Base Connection
Bolt Retainer - 1/32" Reprocessed Teflon

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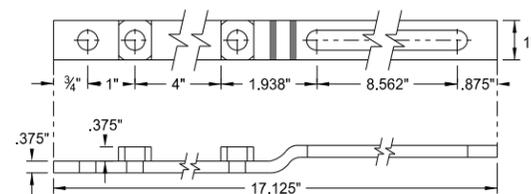
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U-Channel Post

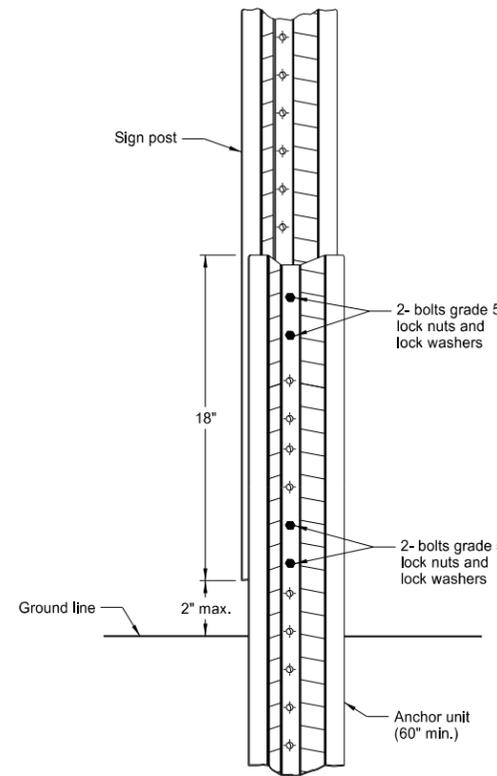


Breakaway U-Channel Detail Alternate A

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

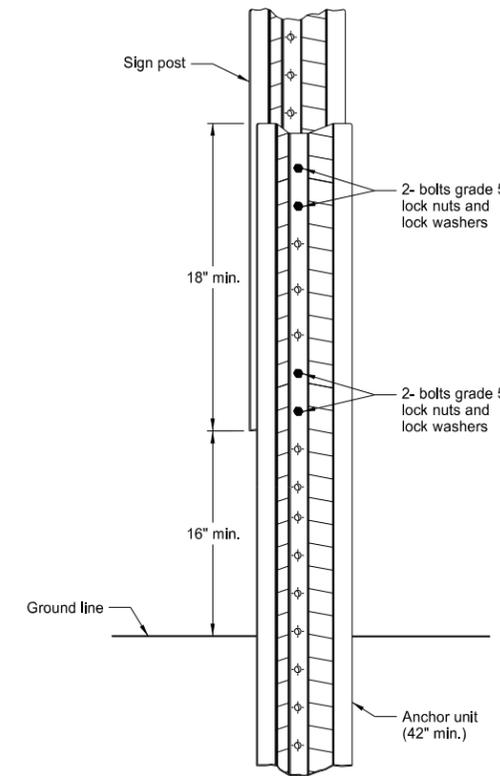


Retainer Strap Detail



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

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



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

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

Alternate A Steps of Installation:

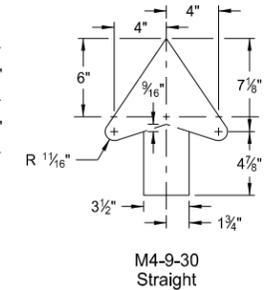
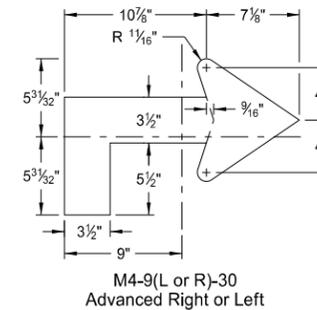
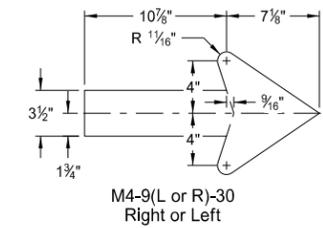
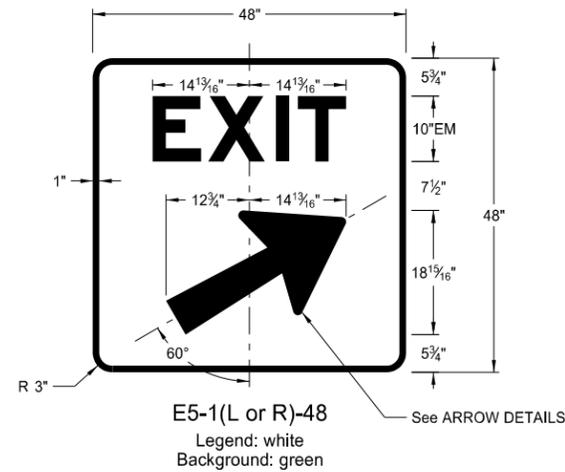
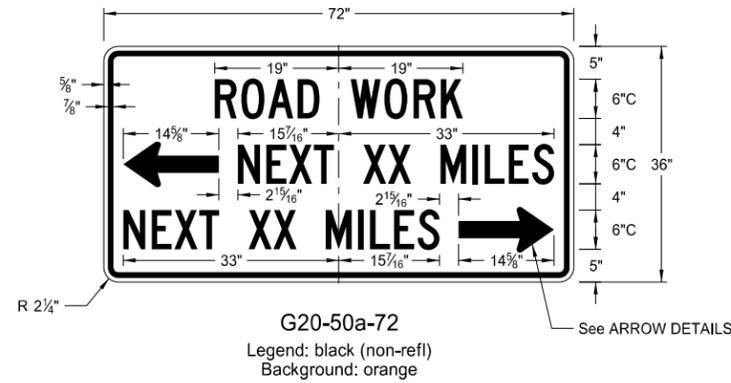
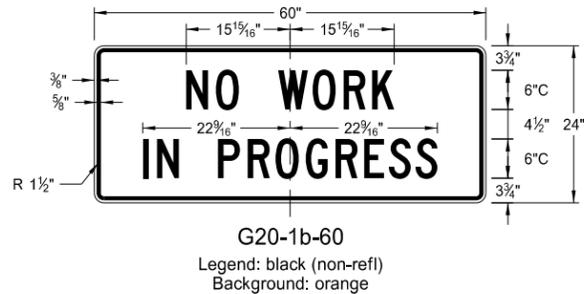
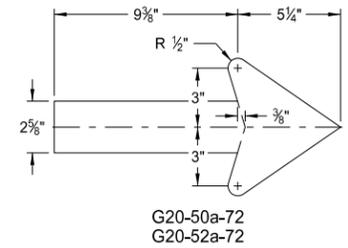
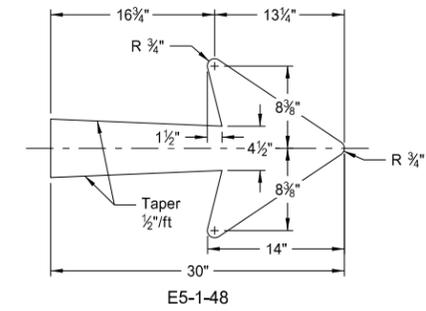
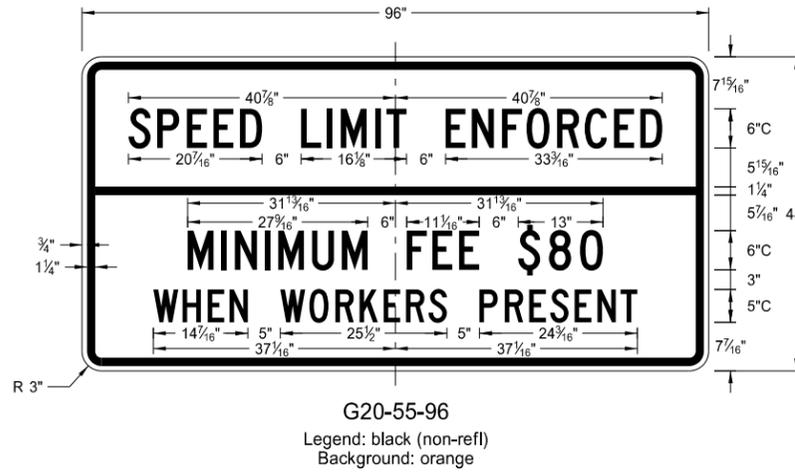
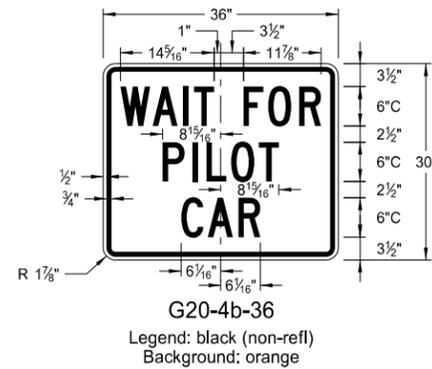
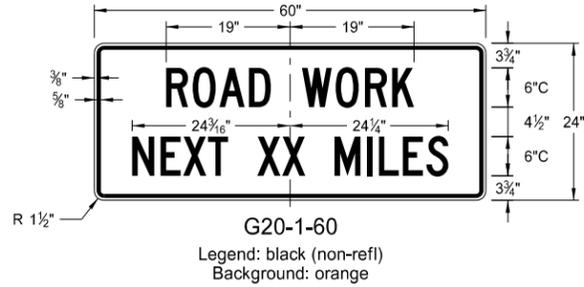
1. a) Drive anchor unit to within 12" of ground level.
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
2. a)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

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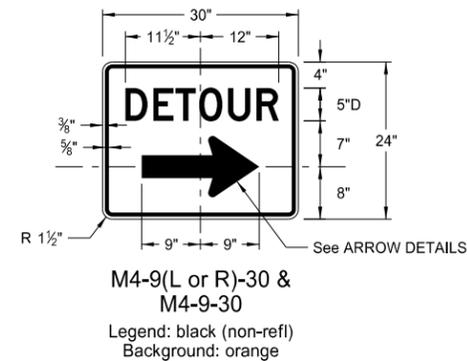
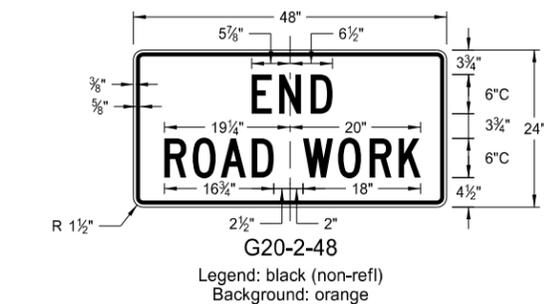
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CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

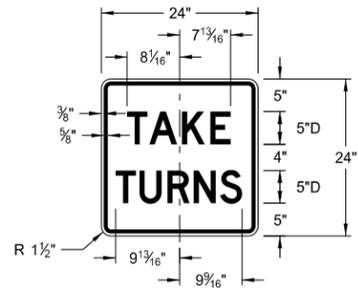
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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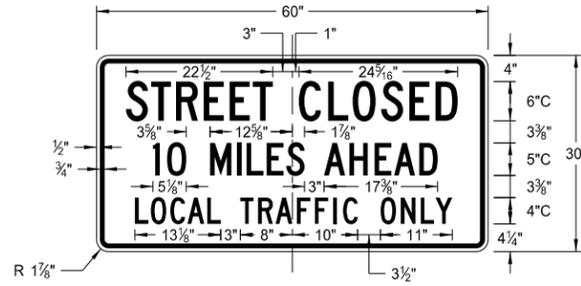
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

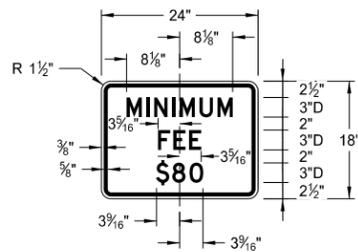
D-704-10



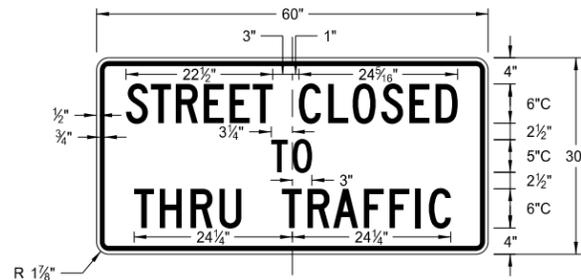
R1-50-24
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Background: white



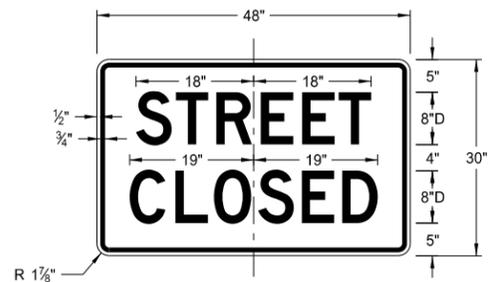
R11-3c-60
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R2-1a-24
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R11-4a-60
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R11-2a-48
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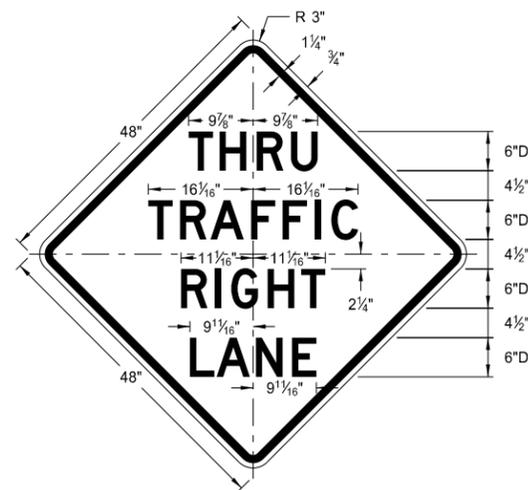
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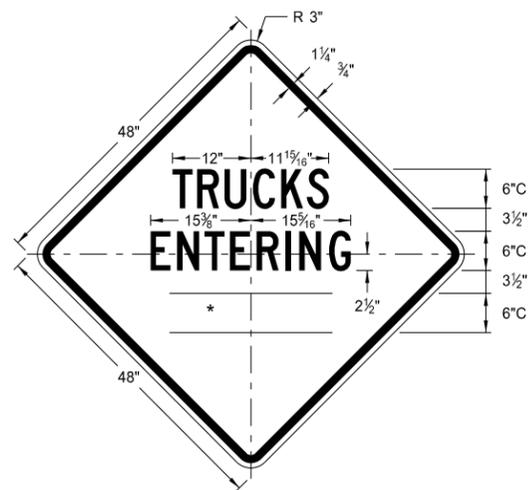
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

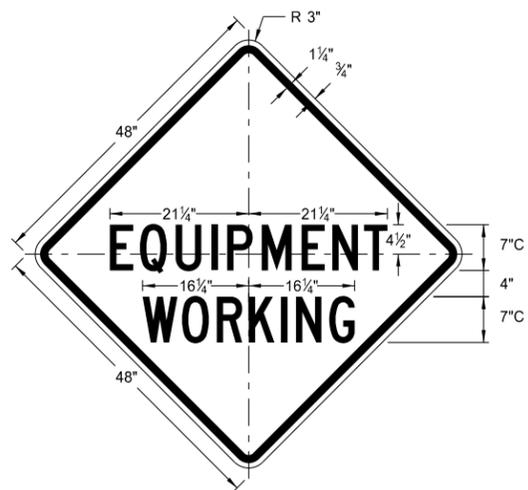
* DISTANCE MESSAGES



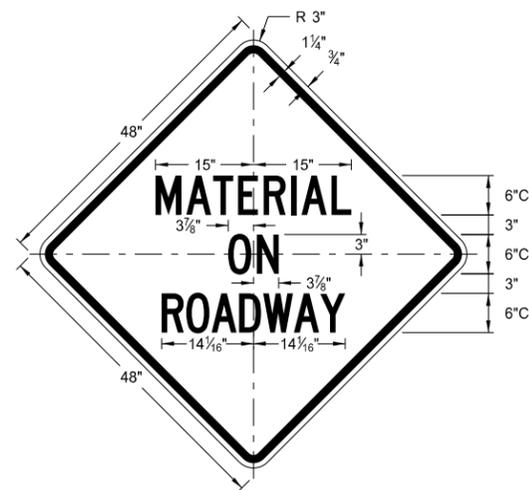
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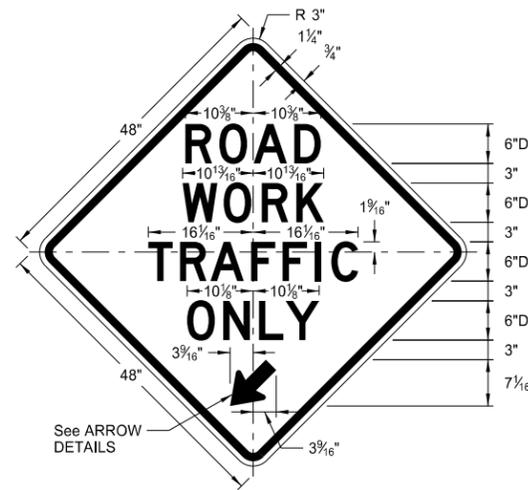
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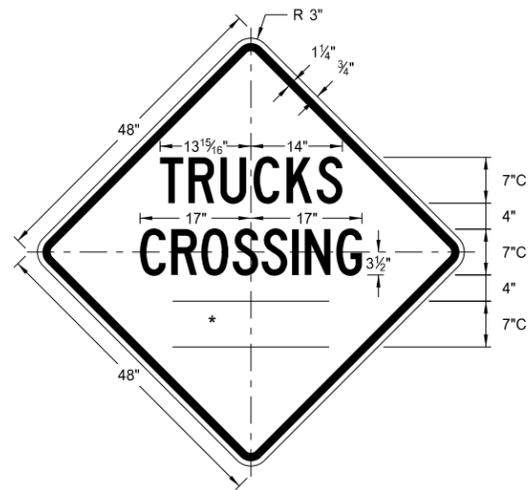
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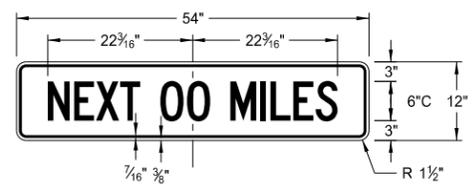
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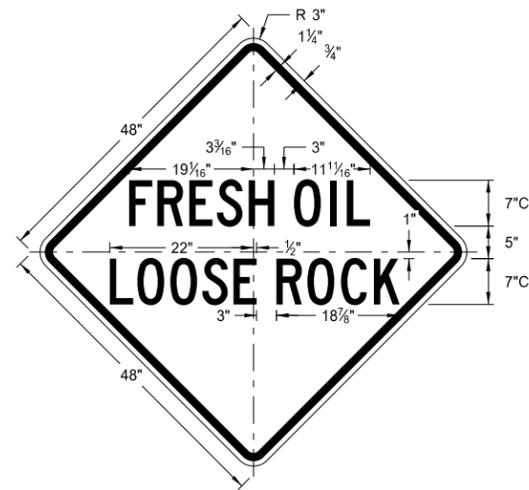
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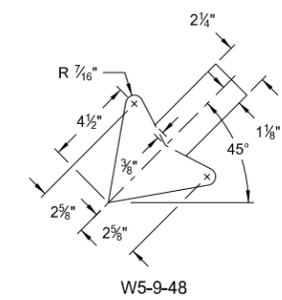
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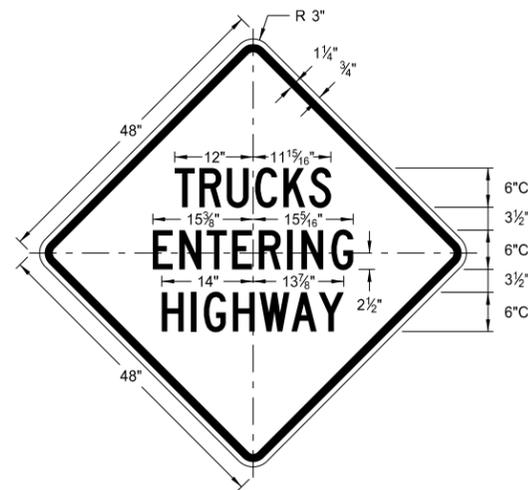
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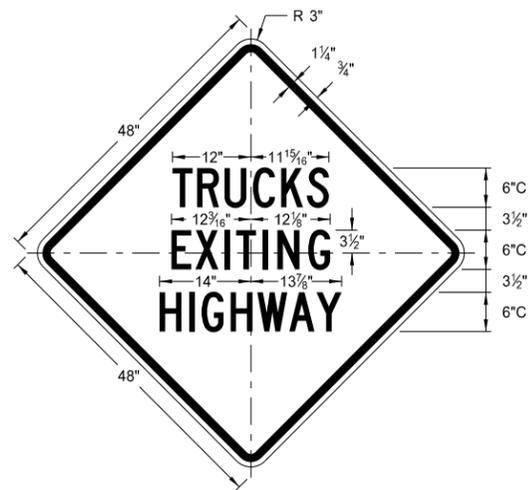
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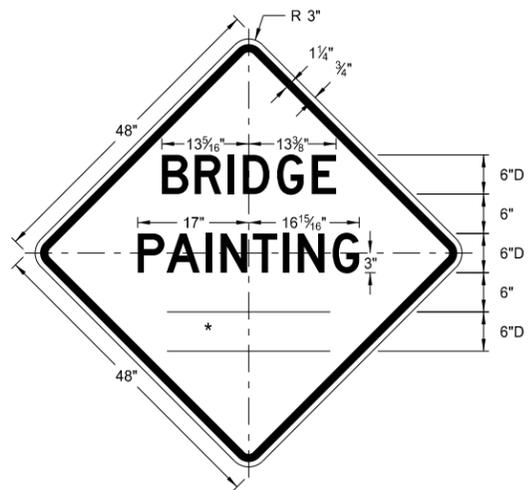
W5-9-48
ARROW DETAILS



W8-53-48
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W8-56-48
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Background: orange



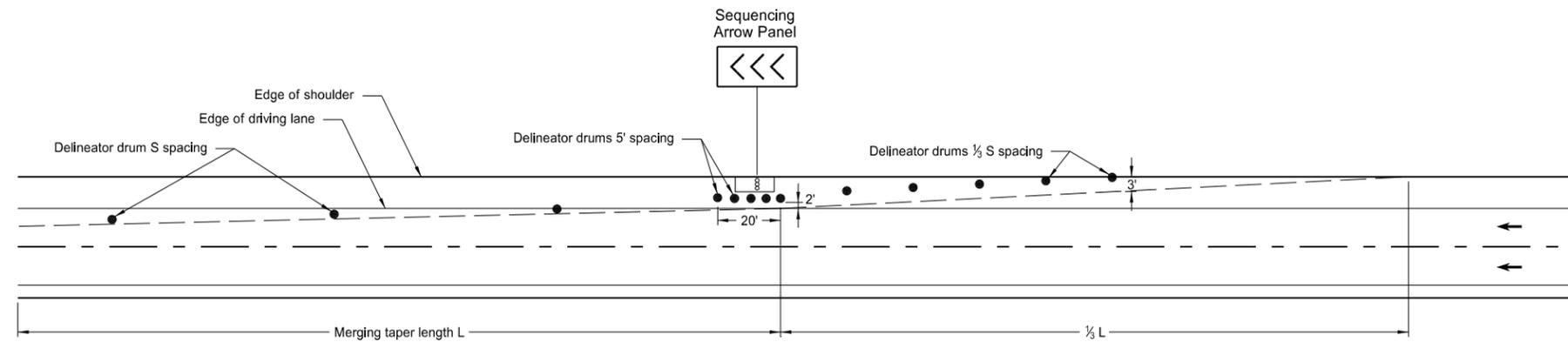
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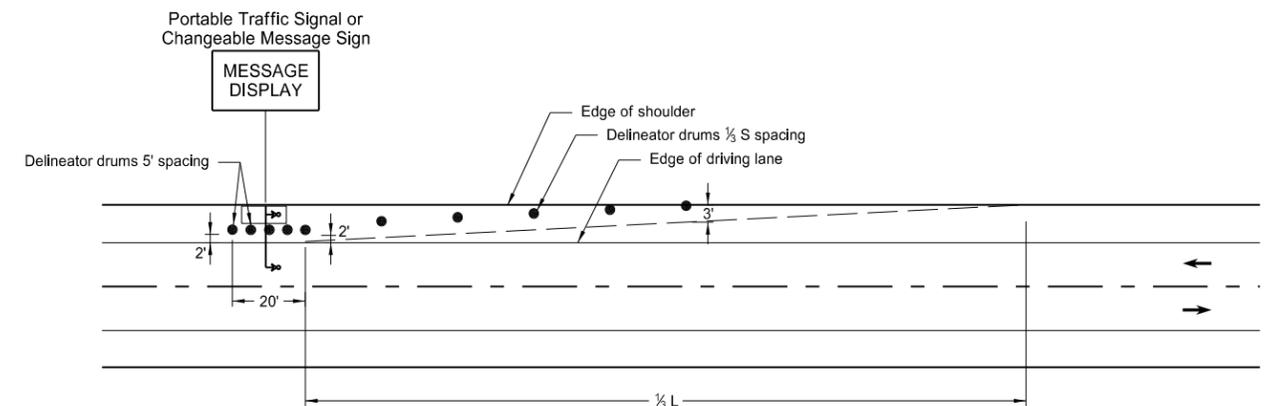
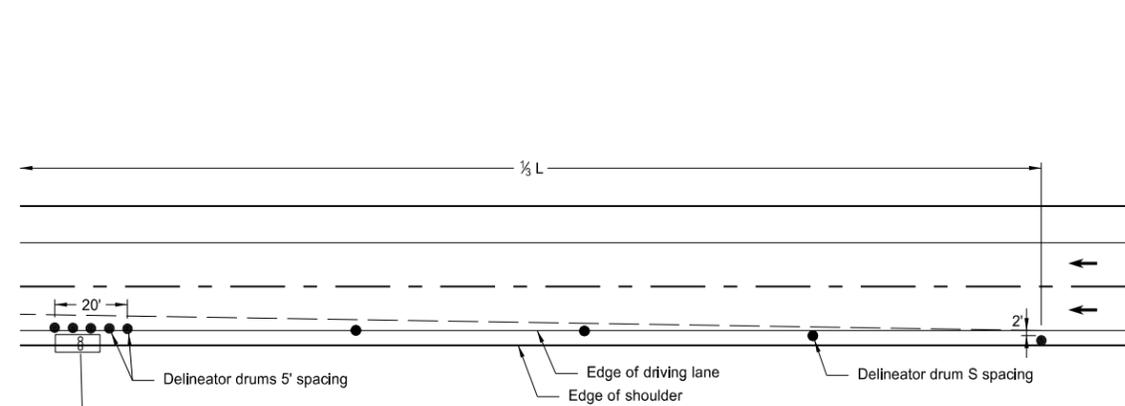
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SHOULDER CLOSURE TAPERS

D-704-12

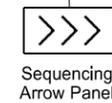


SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



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

PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER



Sequencing
Arrow Panel

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

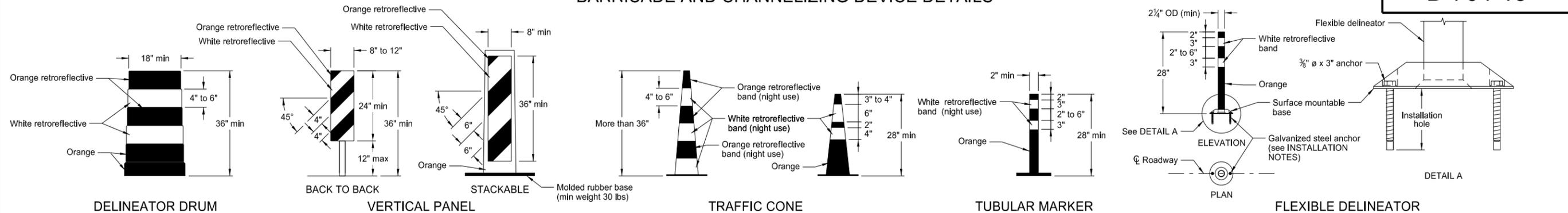
Notes:

- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
L = WS²/60 (40mph or less)
L = WS (45mph or more)
- If a shoulder taper is used, it should have a length of approximately 1/2 L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
- When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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

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BARRICADE AND CHANNELIZING DEVICE DETAILS



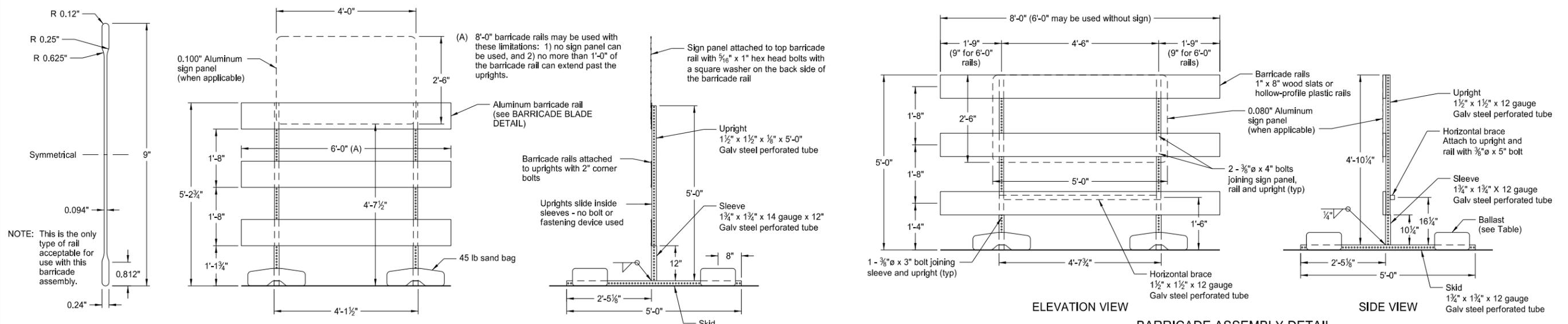
- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl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

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

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.

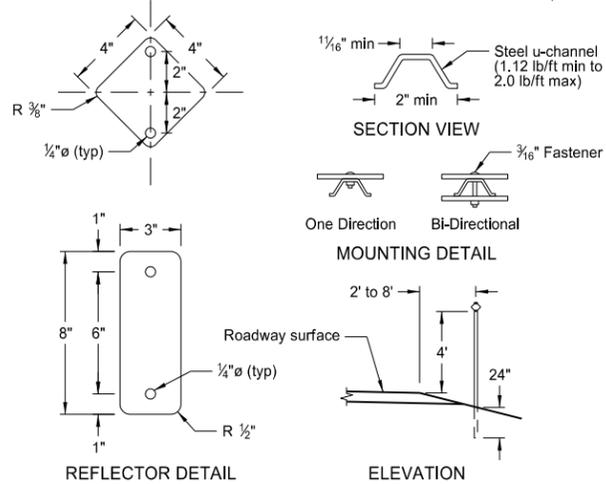
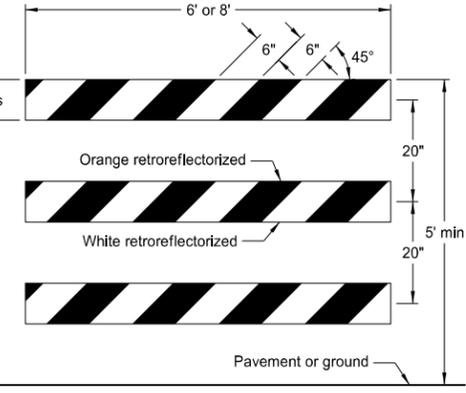
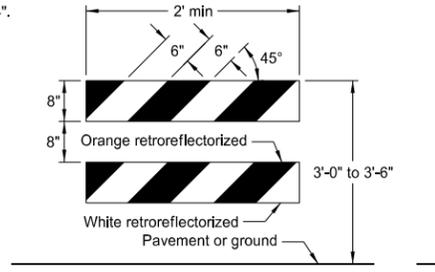
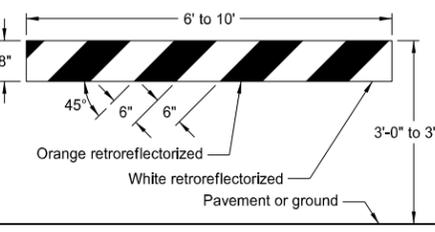
RetroreflectORIZATION of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED space between the orange and white stripes shall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

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



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

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



MINIMUM BALLAST
 (For each side of barricade support)

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

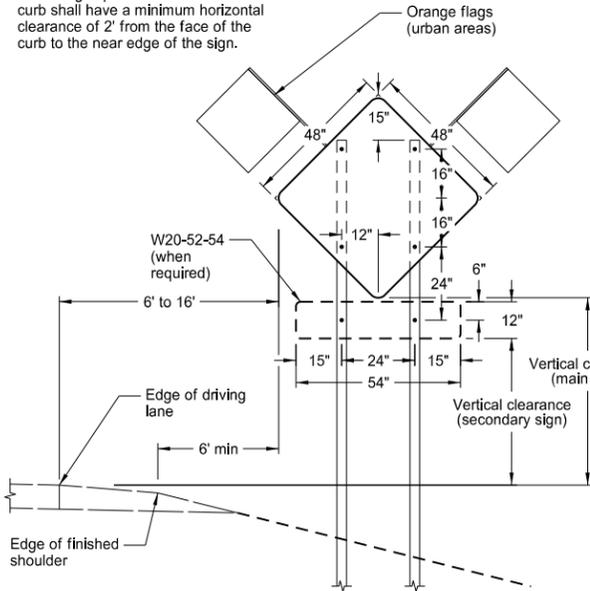
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

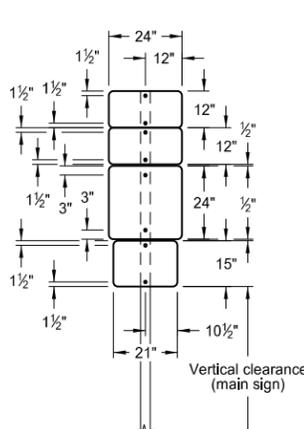
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

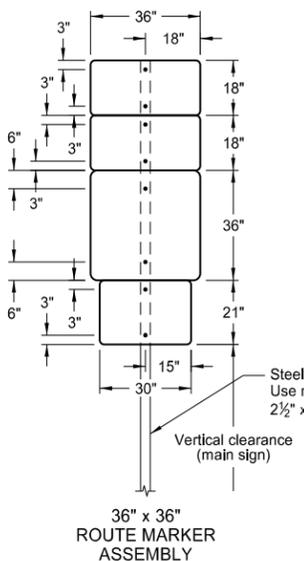
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



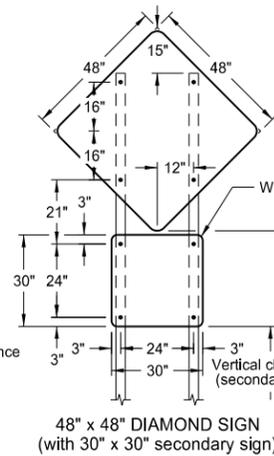
TYPICAL SECTION (48" x 48" diamond warning sign shown)



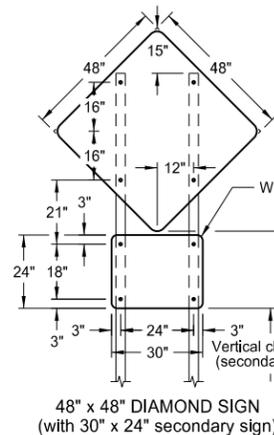
24" x 24" ROUTE MARKER ASSEMBLY



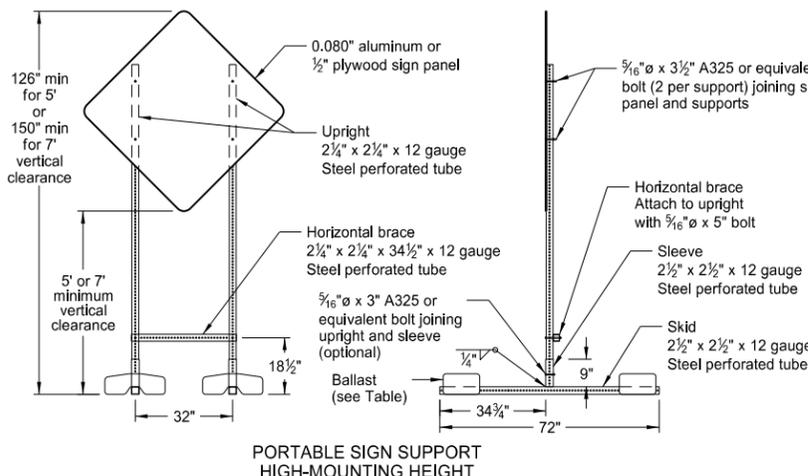
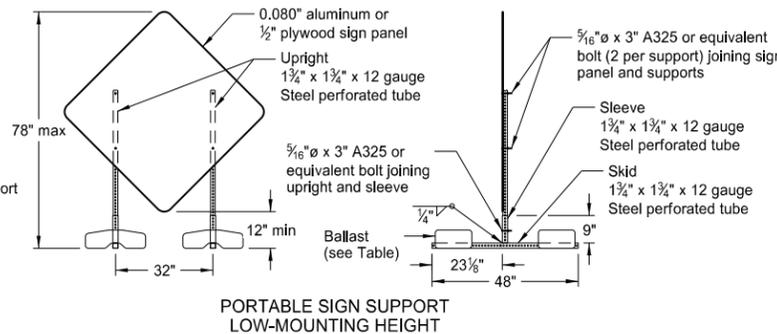
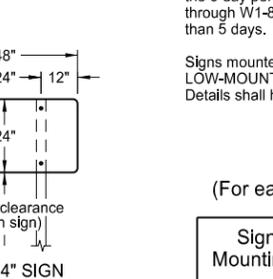
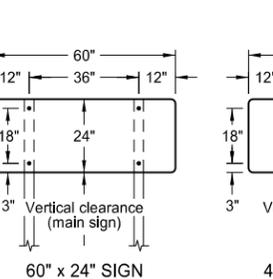
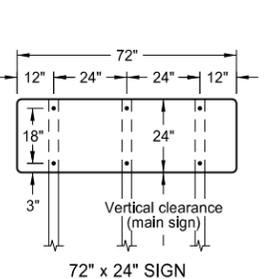
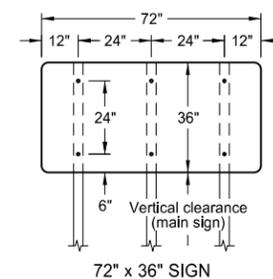
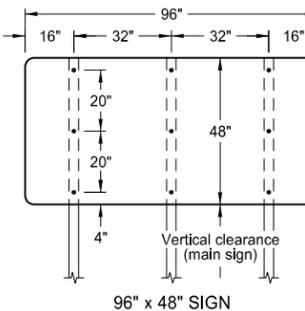
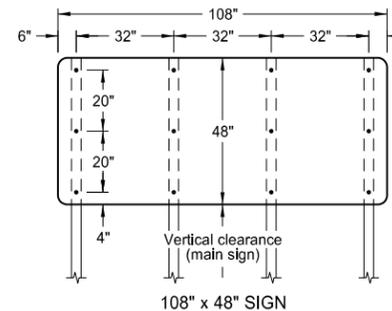
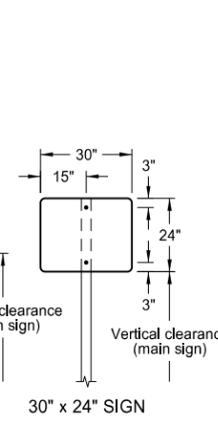
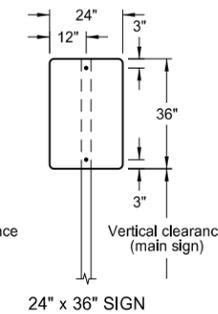
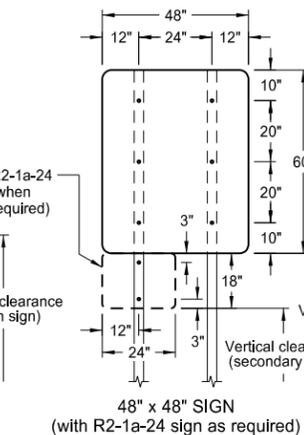
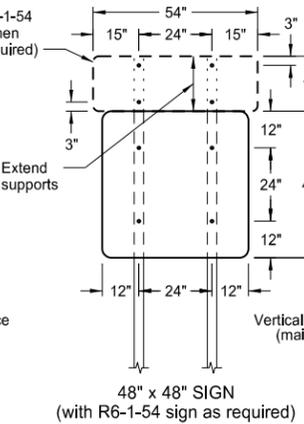
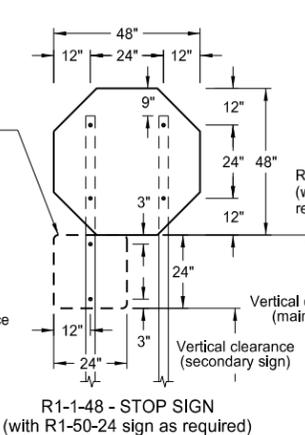
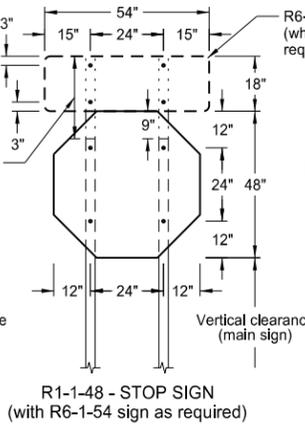
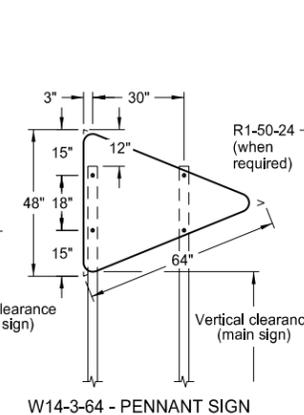
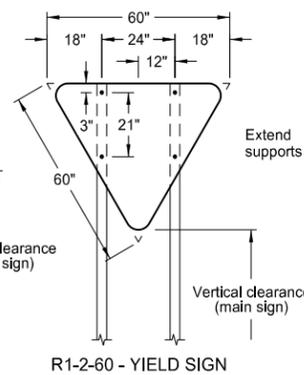
36" x 36" ROUTE MARKER ASSEMBLY



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



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



NOTES:

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

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

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
- Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.
- Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
- 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
- Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

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

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.
- Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

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

Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST (For each side of sign support base)

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

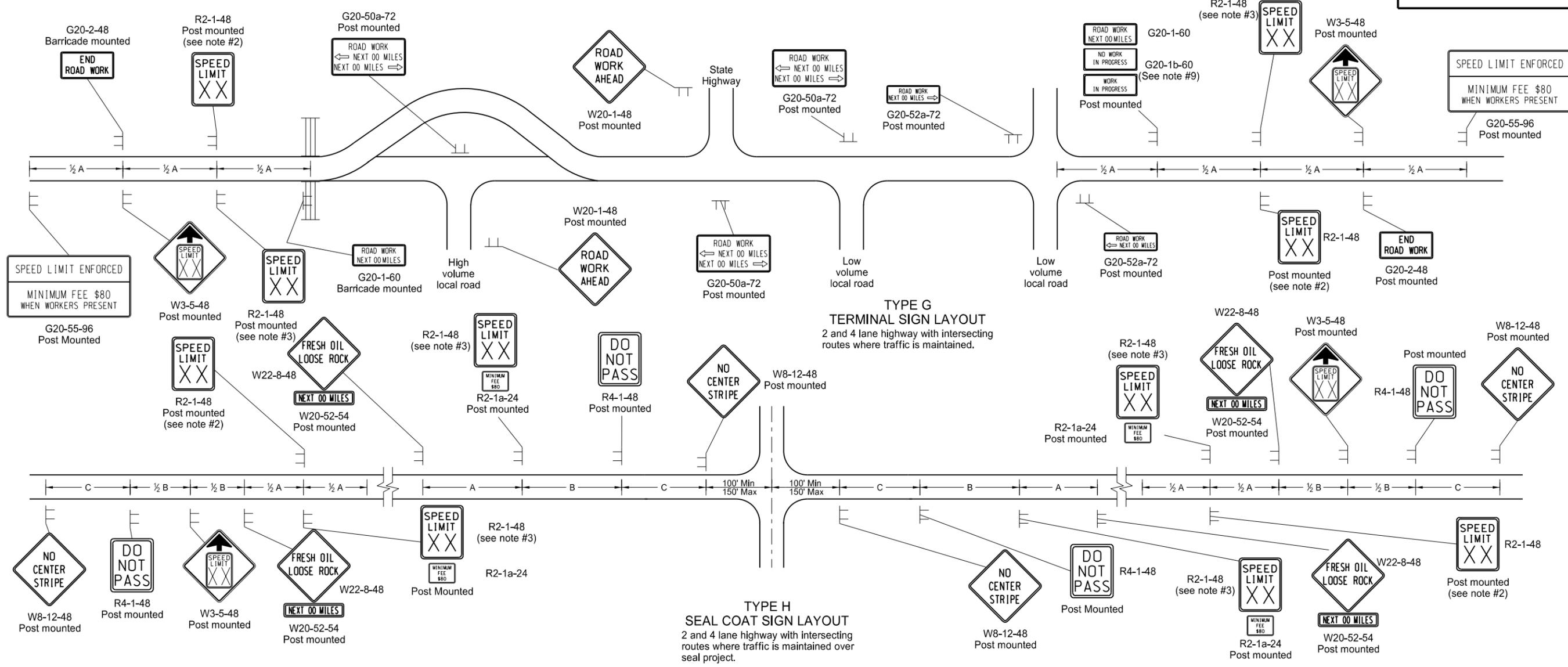
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

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TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



- Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- On seal projects, signs R2-1-48, R2-1a-24, R4-1-48, W22-8-48 and W20-52-54 shall be placed just after all important intersections and at five mile intervals thereafter. Sign W8-12-48 shall be placed just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. No short term pavement markings are placed when traffic volumes are 750 ADT or less.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
- G20-55-96 sign is not required if work is less than 15 days.

KEY

≡ Type III barricade

┌ Sign

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

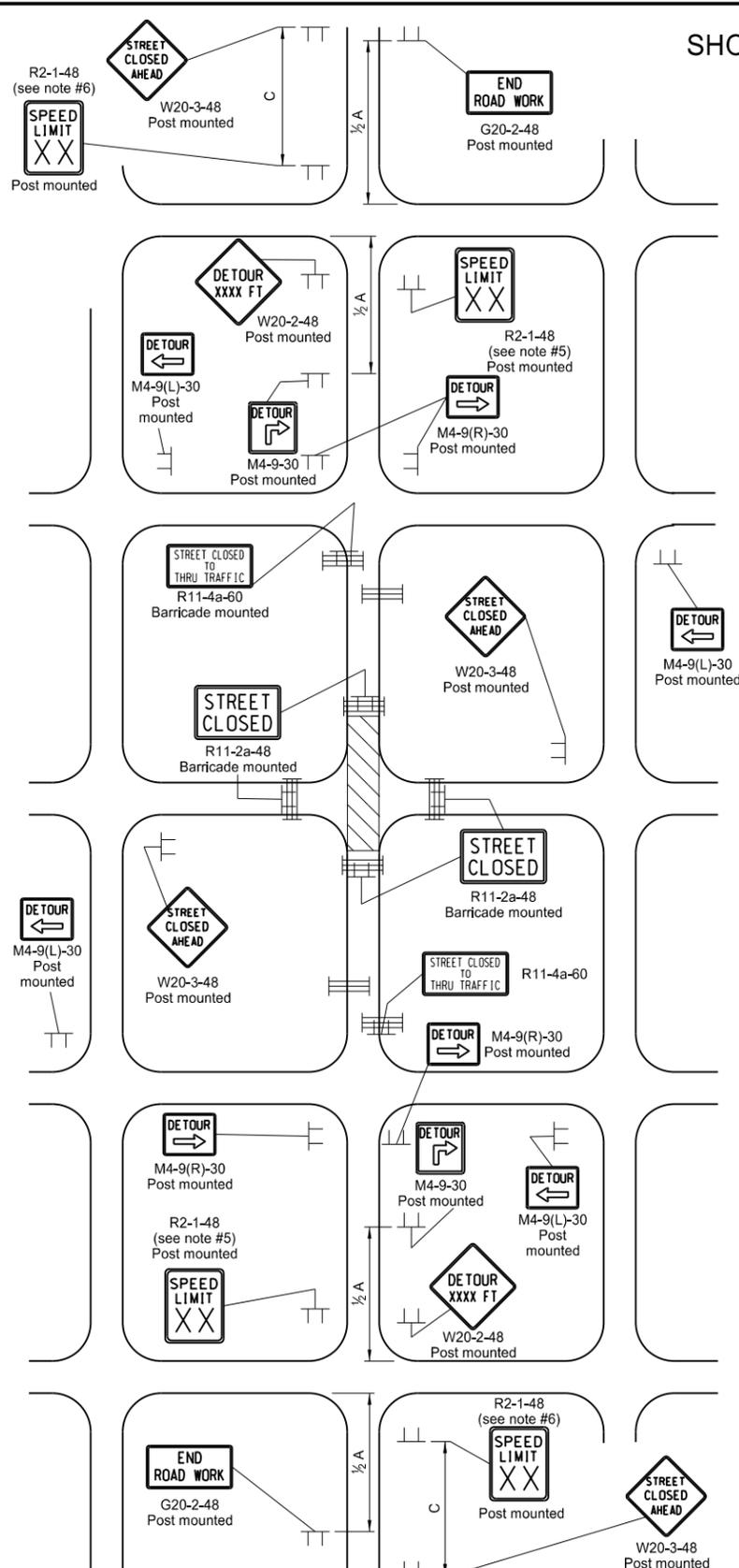
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13
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DATE	CHANGE

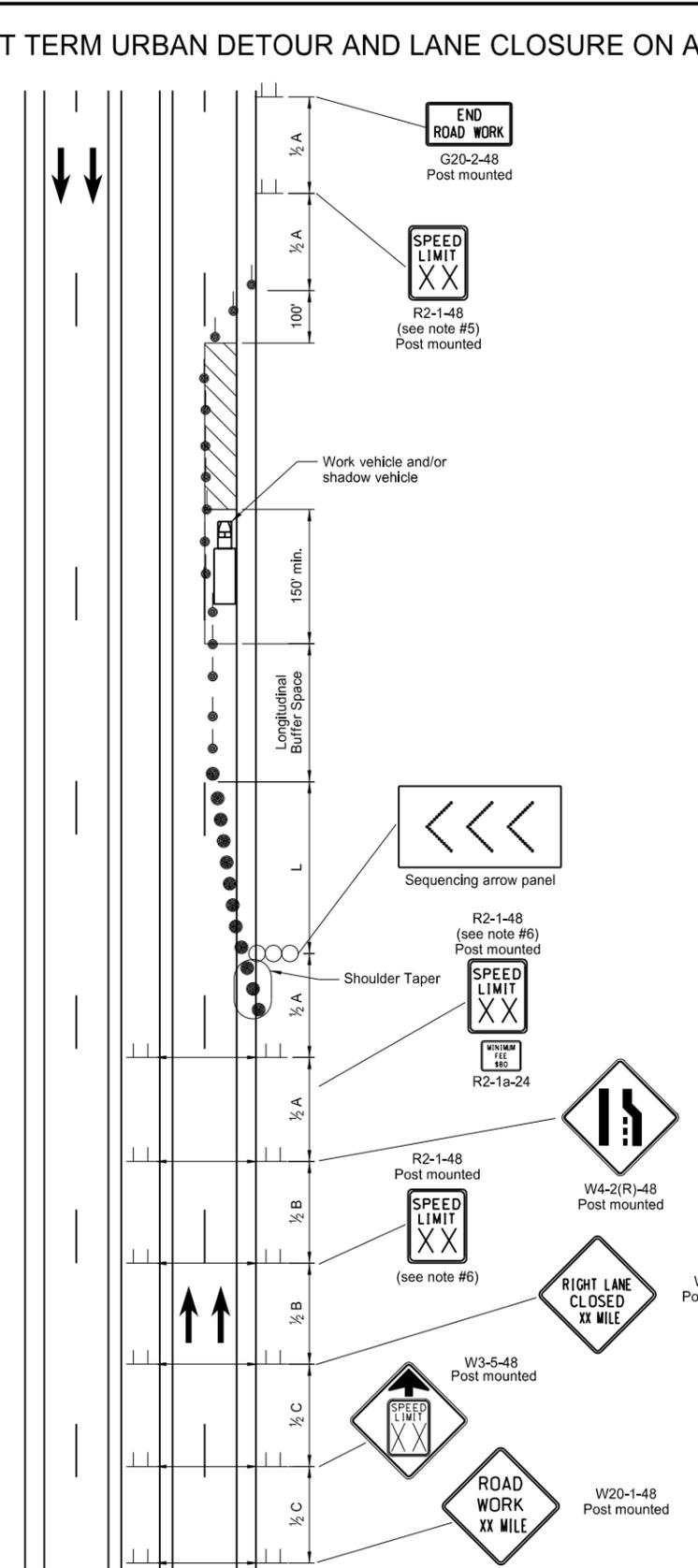
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SHORT TERM URBAN DETOUR AND LANE CLOSURE ON A DIVIDED HIGHWAY LAYOUTS

D-704-23



TYPE Q
DETOUR FOR A CLOSED STREET
 Where city streets are used for detouring traffic.
 Urban projects do not require the G20-55-96 and R2-1a-24 signs.



TYPE P
STATIONARY LANE CLOSURE ON A DIVIDED HIGHWAY
 4 lane divided roadway where 1/2 of roadway is closed.
 Short-term (more than 1 hour within a single daylight period.)

- Notes
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper
 - L = Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
 - Delineator drums used for tapering traffic shall be spaced at dimension "S". Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
 - Sequencing Arrow Panels
 - Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room the panel should be moved closer to the work area so that it can be placed on the roadway surface.
 - Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
 - Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
 - Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 - Intersection control for Type Q may have to be changed on detour. The Engineer in the field shall determine what control is necessary.
 - Where necessary, safe speed to be determined by the Engineer. When parking is present, signs shall be placed so they are entirely visible above parked vehicles or placed at the edge of the parking area so they are visible to oncoming traffic. These signs may be skid mounted when placed on the roadway surface.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

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

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

KEY

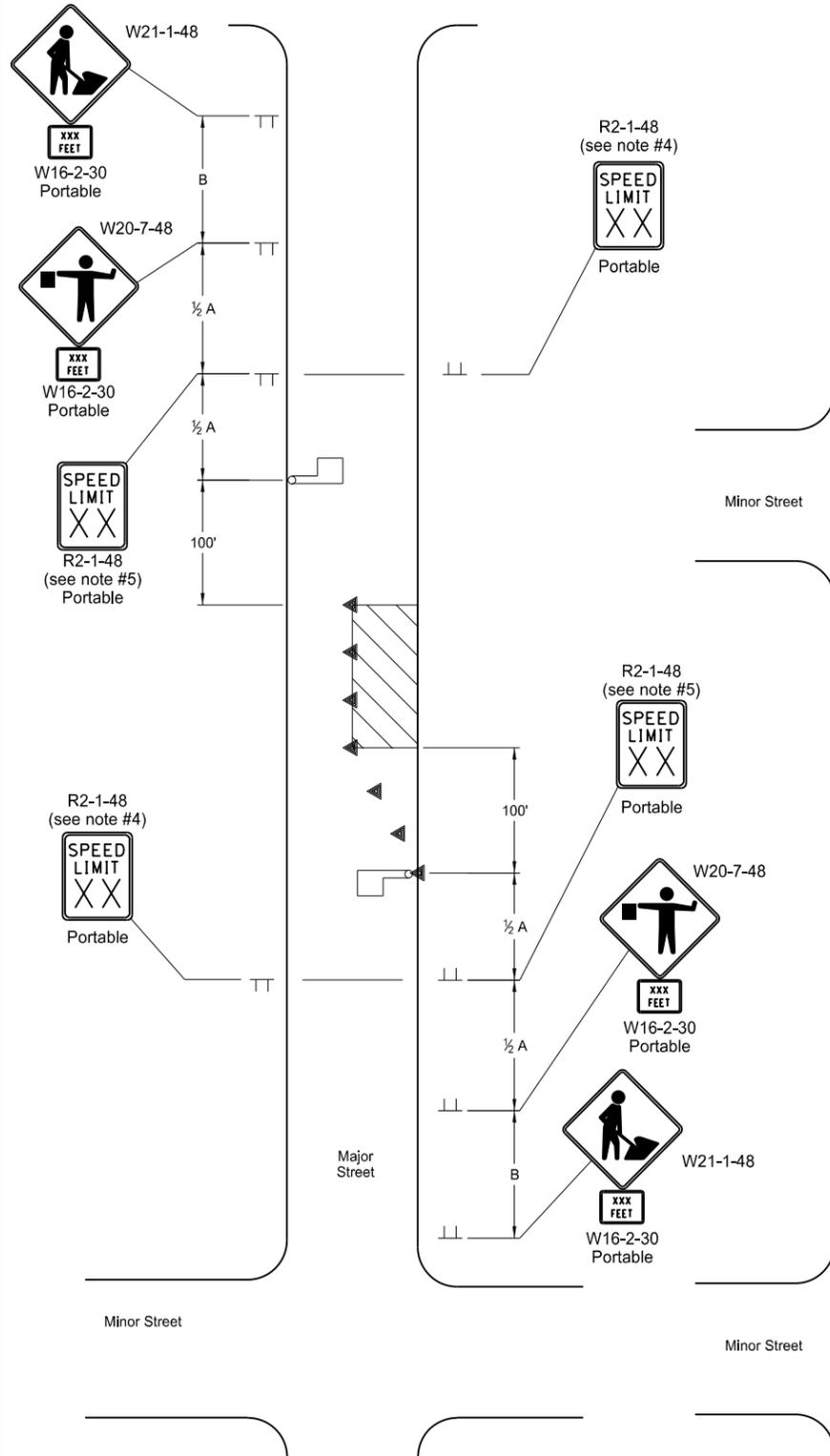
	Type III barricade		Work area
	Sign		Sequencing arrow panel
	Delineator Drum		Tubular Markers

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9-27-13	
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LANE CLOSURES ON URBAN STREETS LAYOUTS

D-704-25

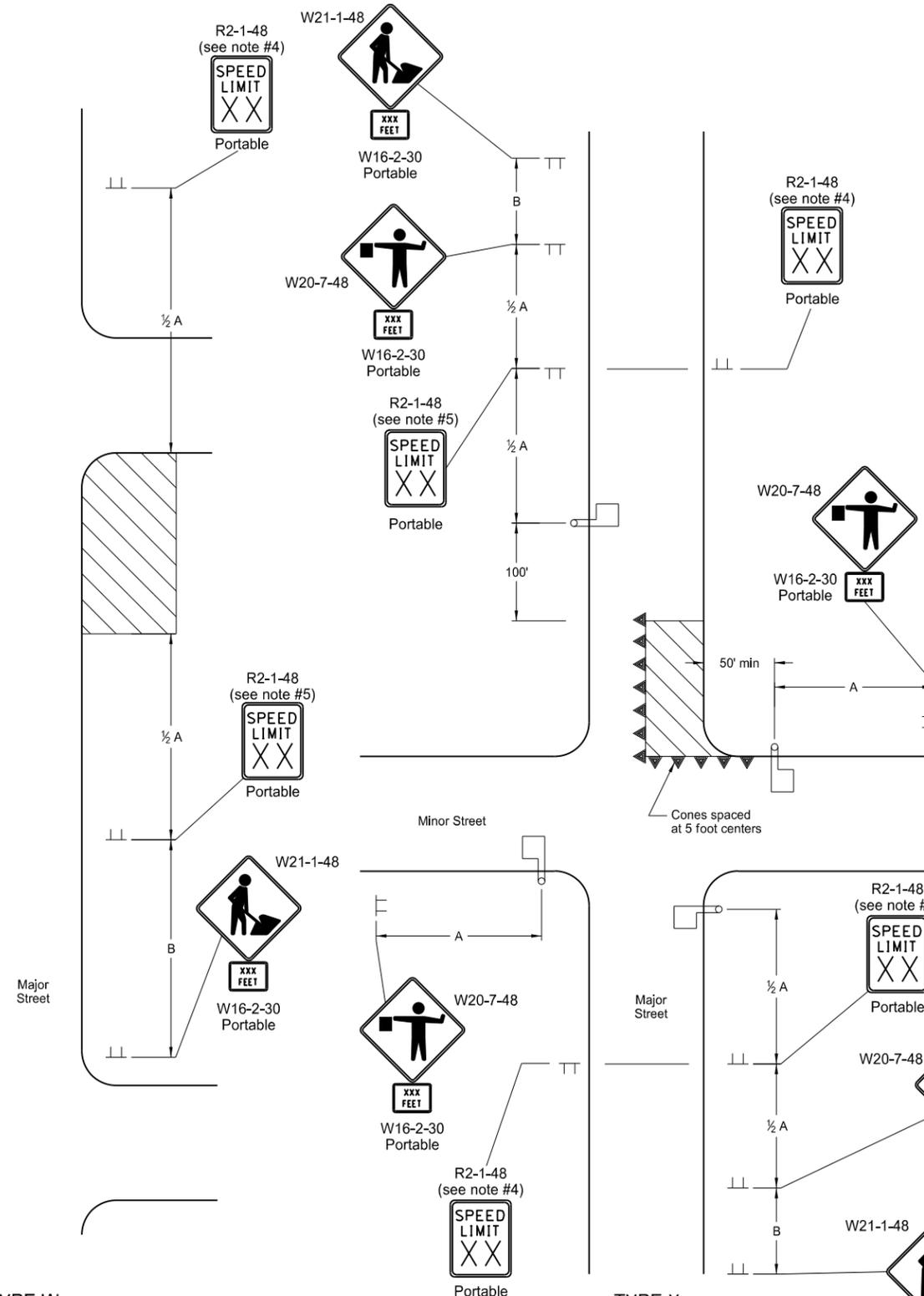


TYPE V
LANE CLOSURE ON URBAN STREET

When portion of roadway is closed to traffic only during daylight hours (mid block location).

TYPE W
WORK BEYOND CURB ON URBAN STREET

When work area is outside of driving lane and no closure is necessary

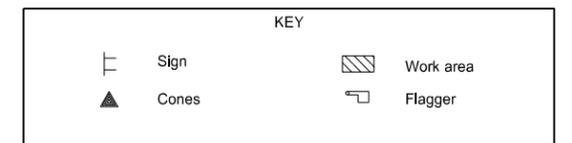


TYPE X
LANE CLOSURE NEAR INTERSECTION ON URBAN STREET

When portion of roadway is closed to traffic only during daylight hours (end block location).

- Notes
1. For Type V: The contractor will be allowed to work only on one side of the roadway at a time so as not to block off any more than one lane of traffic.
 2. When parking is present, the signs shall be placed so they are entirely visible above the parked vehicles or placed at the edge of the parking area so they are visible to oncoming traffic. These signs may be skid mounted when placed on the roadway surface.
 3. Delineator cones used for tapering traffic shall be placed at 3 equal spaces. Delineator cones for tangents shall be spaced at dimension "S". "S" = the numerical value of speed limit.
 4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 5. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 6. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 7. Existing speed limit signs within a reduced speed zone shall be covered.
 8. Where necessary, safe speed to be determined by the Engineer.
 9. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 10. Urban projects do not need the G20-55-96 and R2-1a-24 signs.

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

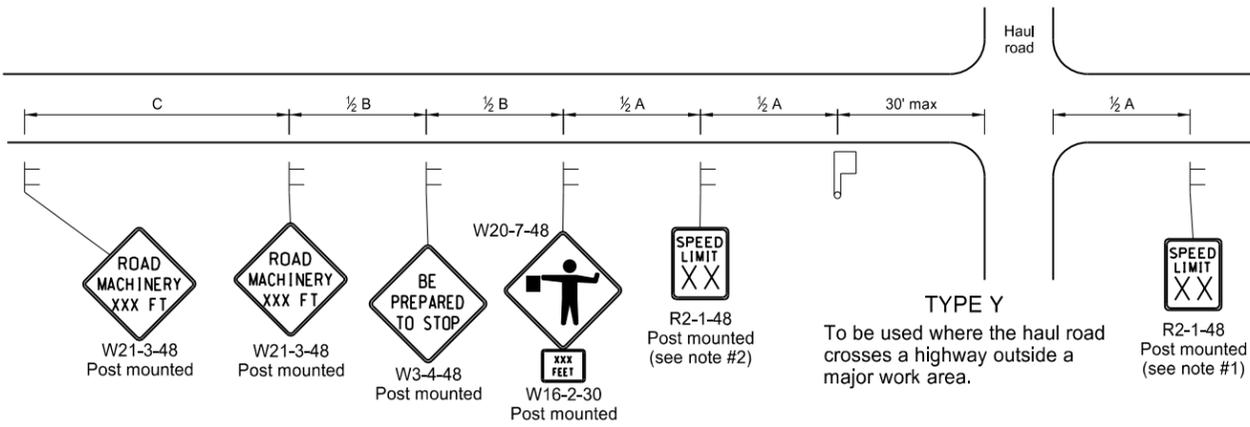


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9-27-13	
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DATE	CHANGE

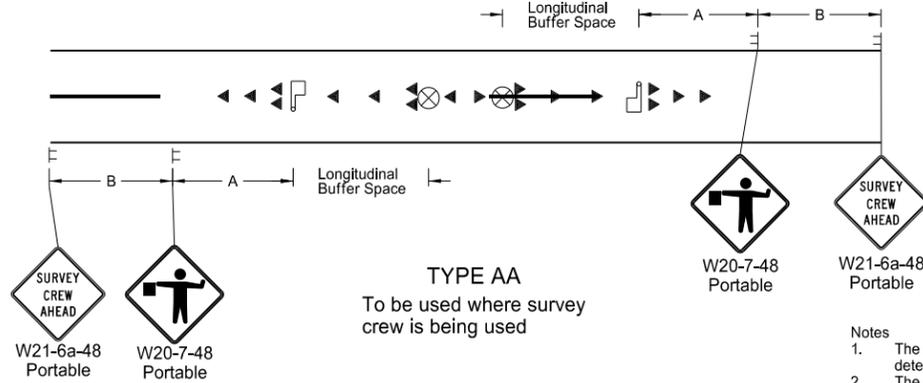
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 of Transportation

MISCELLANEOUS SIGN LAYOUTS

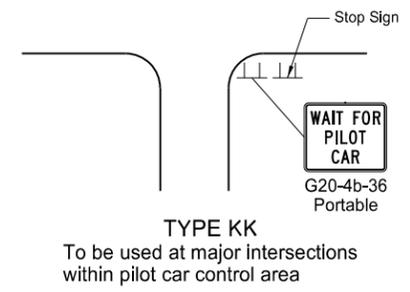
D-704-26



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

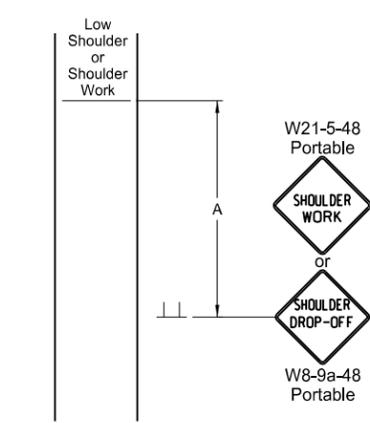


TYPE AA
To be used where survey crew is being used

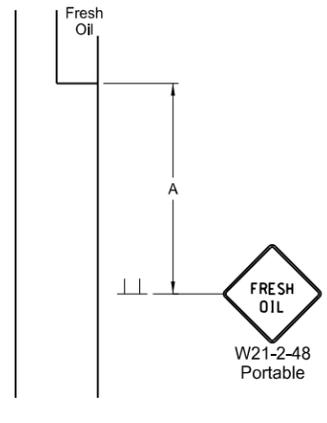


TYPE KK
To be used at major intersections within pilot car control area

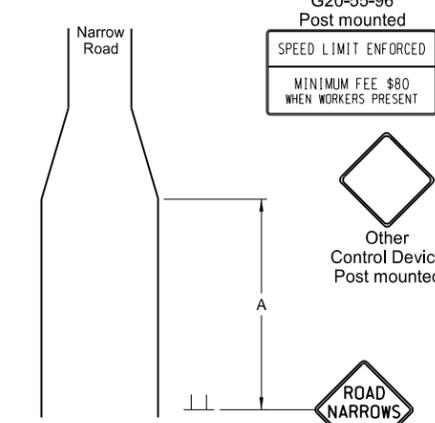
- Notes
1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph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



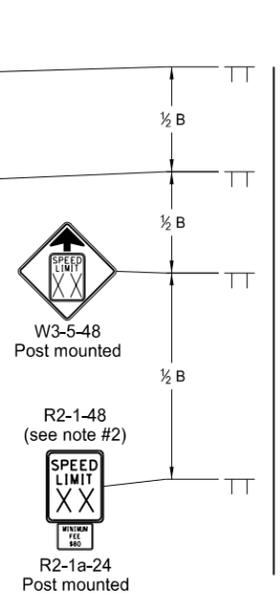
TYPE BB
To be used within a major work area where the sign conditions exist



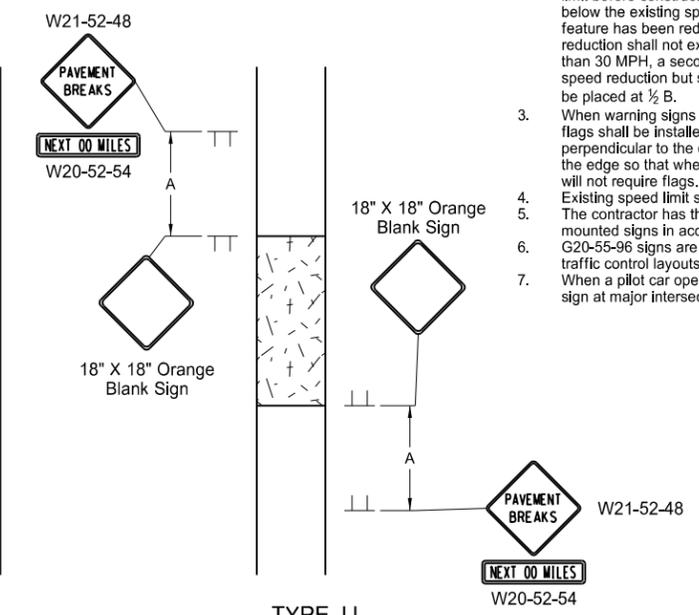
TYPE CC
To be used where the sign conditions exist



TYPE DD
To be used where the sign conditions exist



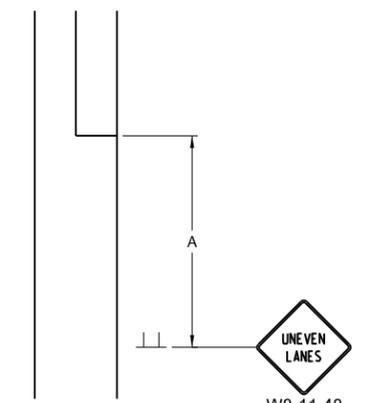
TYPE Z
To be used where speed zone is needed



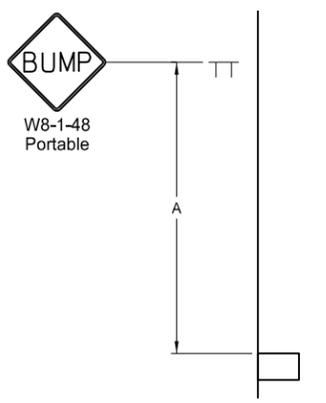
TYPE JJ
To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.

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

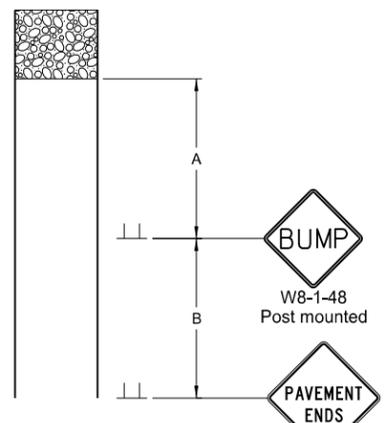
* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.



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



TYPE EE
To be used where the sign conditions exist



TYPE FF
To be used where the sign conditions exist

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

KEY

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

Flagger (represented by a square with a diagonal line)

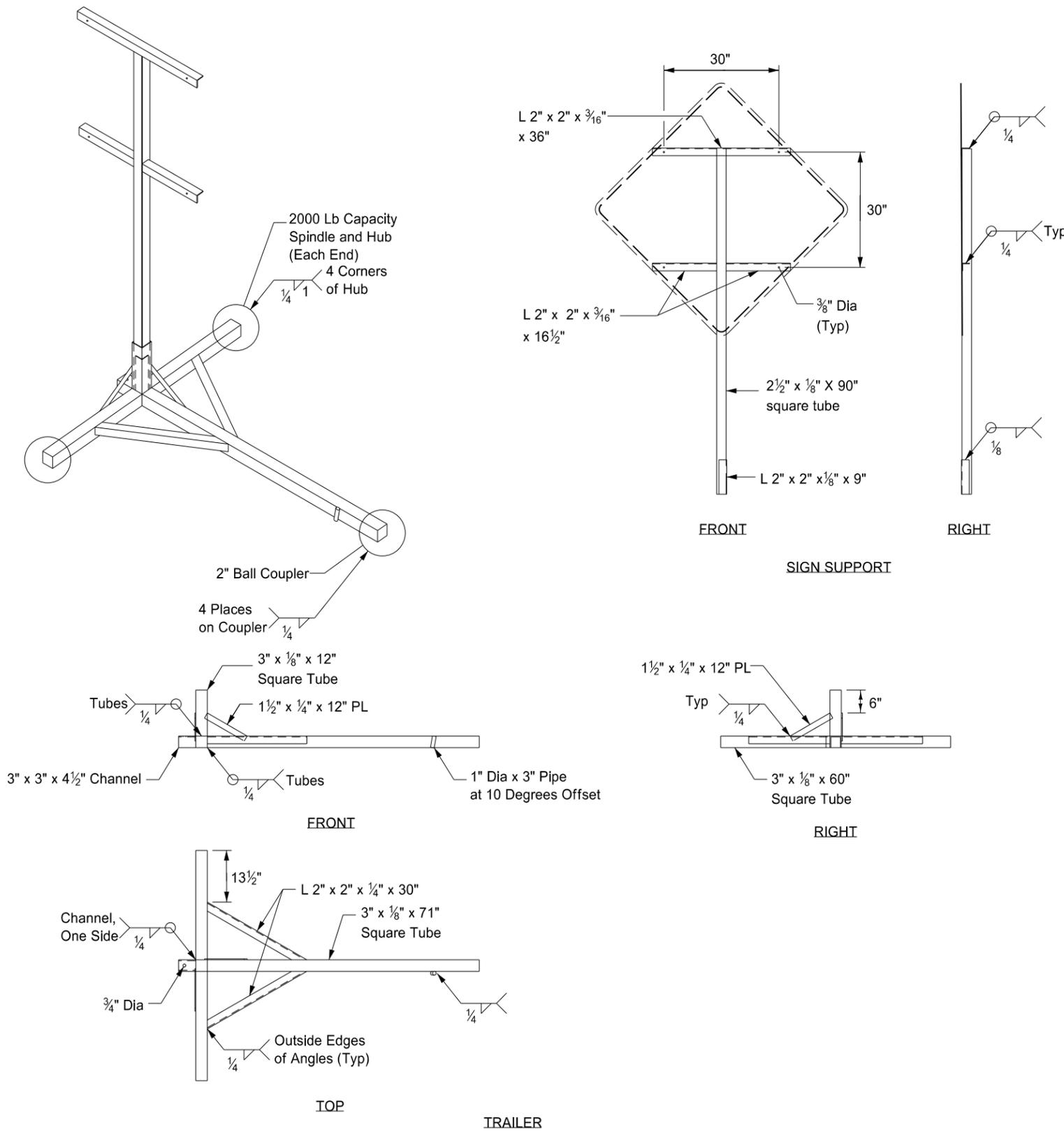
Cones (represented by a triangle)

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9-27-13	
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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



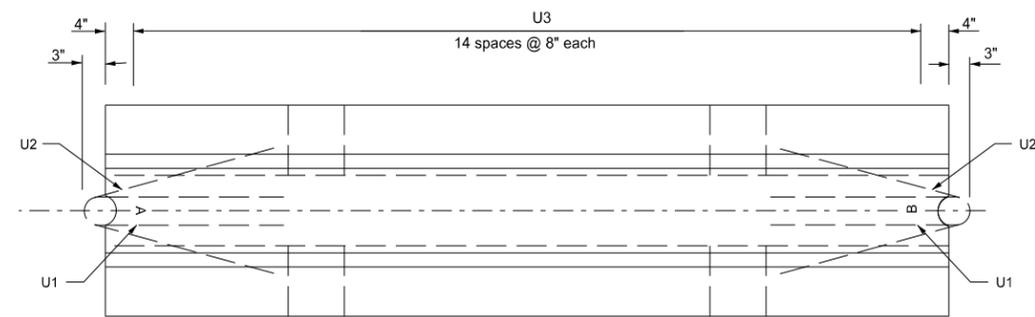
Notes:

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

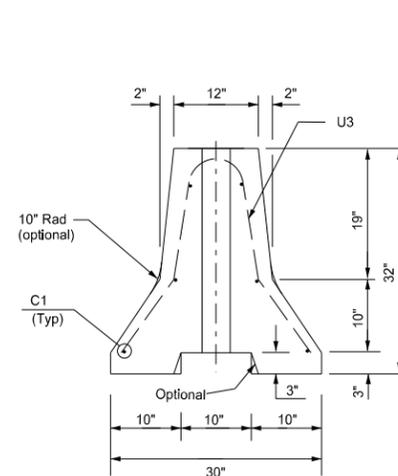
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

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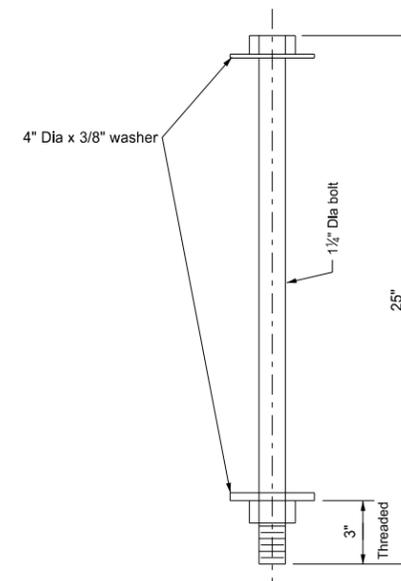
PORTABLE PRECAST CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)



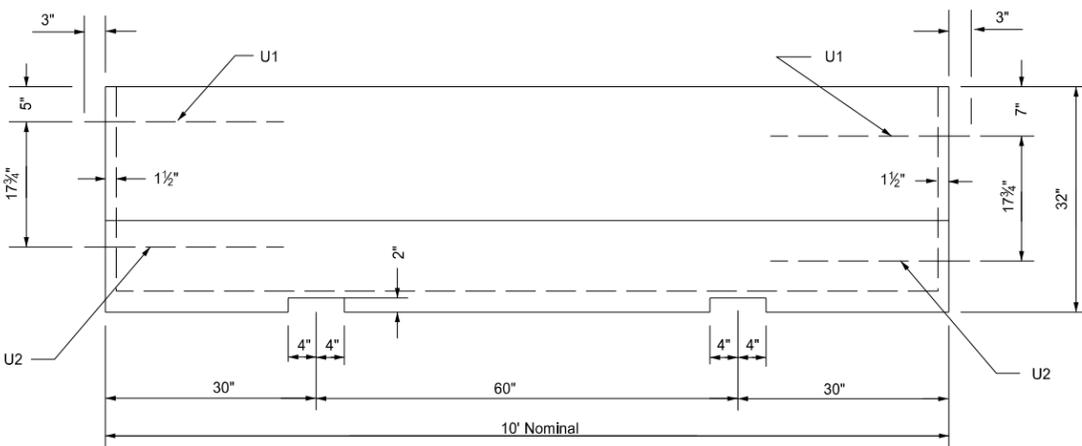
Plan View



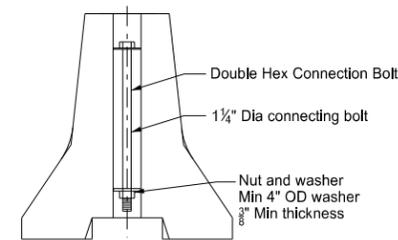
End View



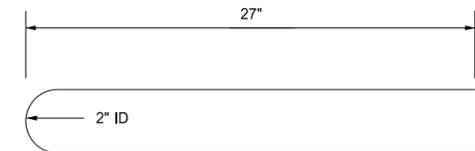
Connecting Bolt Detail
(One per 10 Ft section)



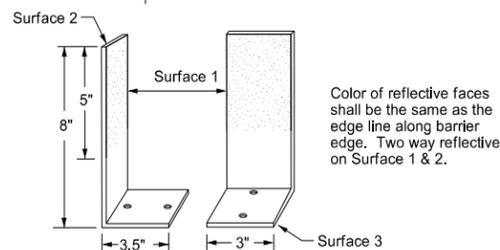
Side View



Bolt Connection Detail



U1 Bar Detail



Barrier Marker Detail

Color of reflective faces shall be the same as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

Marker Body
The marker shall be made of a high impact, weatherable engineering thermo-plastic material which conforms to the following:

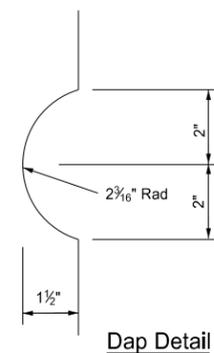
Property	Result	ASTM Test Method
Thickness (min)	.090"	—
Tensile strength (min psi) @ yield	5,500	D638
Impact strength @ -20°F (ft-lbs/in of notch)	3.2	D256 Method A
Impact strength @ 73°F (ft-lbs/in of notch)	14.0	D256 Method A
Flexural strength, PSI 1/4" @ 73°F	8,000	D790
Flexural modulus, PSI 1/4" @ 73°F	300,000	D790
Elongation @ yield	30%	D638

Reflective Tape
The reflector shall be a retroreflective, acrylic microprism material with acrylic backing, 3" wide, providing the following minimum optical performance with an observation angle of 0.1° measured in candlepower:

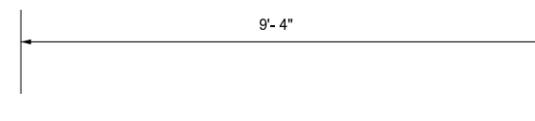
Entrance Angle	Specific Intensity
Yellow - 4"	136
White - 4"	200

Adhesive
Markers shall be temporarily mounted to the portable concrete barrier with factory applied solid butyl rubber 1/8" thick, 2" wide on 2 1/4" wide release paper on surface 3.

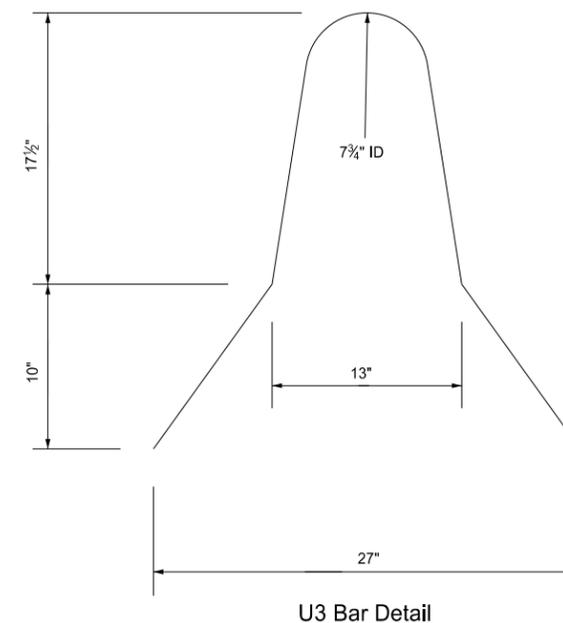
Bar List				
Mark	Size	No.	Length	Shape
C1	4	6	9'- 4"	Straight
U1	4	2	4'- 8"	Bent
U2	4	2	4'- 10 1/4"	Bent
U3	4	15	5'- 4"	Bent



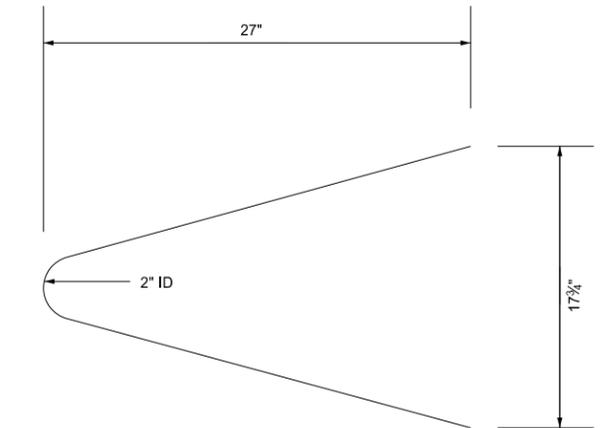
Dap Detail



C1 Bar Detail



U3 Bar Detail



U2 Bar Detail

Notes:

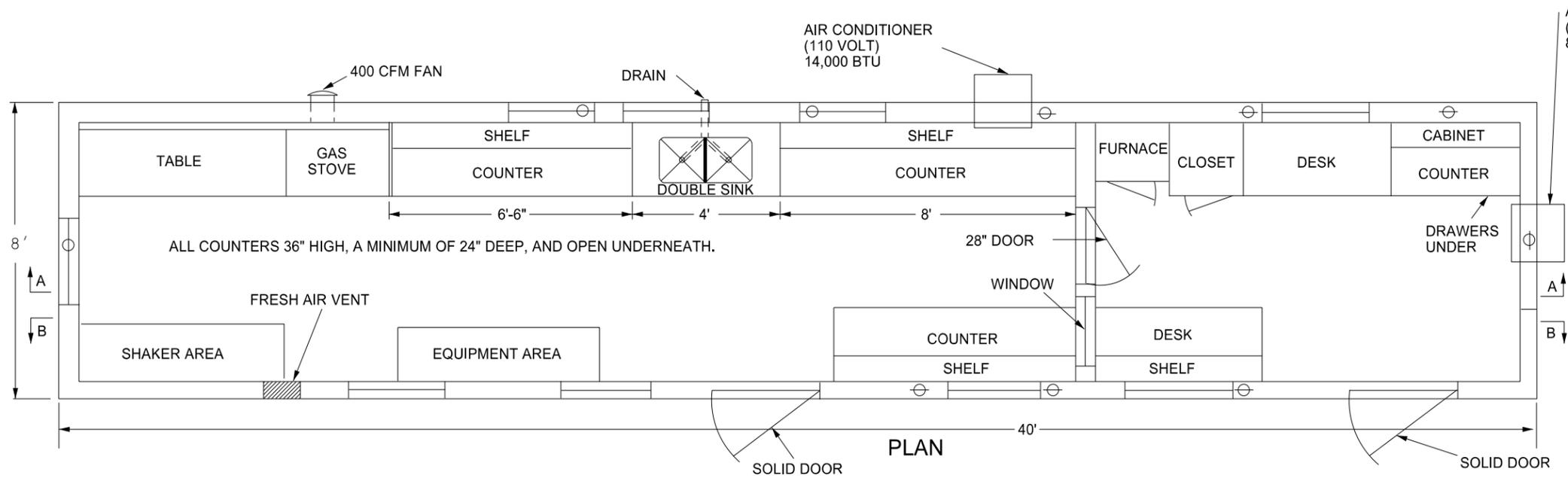
- All exposed hardware shall be galvanized as per ASTM A153, except for the loop inserts.
- Concrete shall be Class AAE-3.
- All steel shall conform to Section 612 of the NDDOT Standard Specifications.
- Barrier ends shall be imprinted A and B as shown with 4 inch letters. Field placement shall match the A end with the B end.
- Barrier markers shall be placed at the center of the barrier at 20' centers.
- Barrier sections shall be connected together with the 1 1/4" Dia A-307 double hex connecting bolt. The bottom nut and washer connection shall be maintained by the contractor for the duration of the barrier installation.
- Barrier shall be placed such that openings between individual sections shall be kept to a minimum.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE

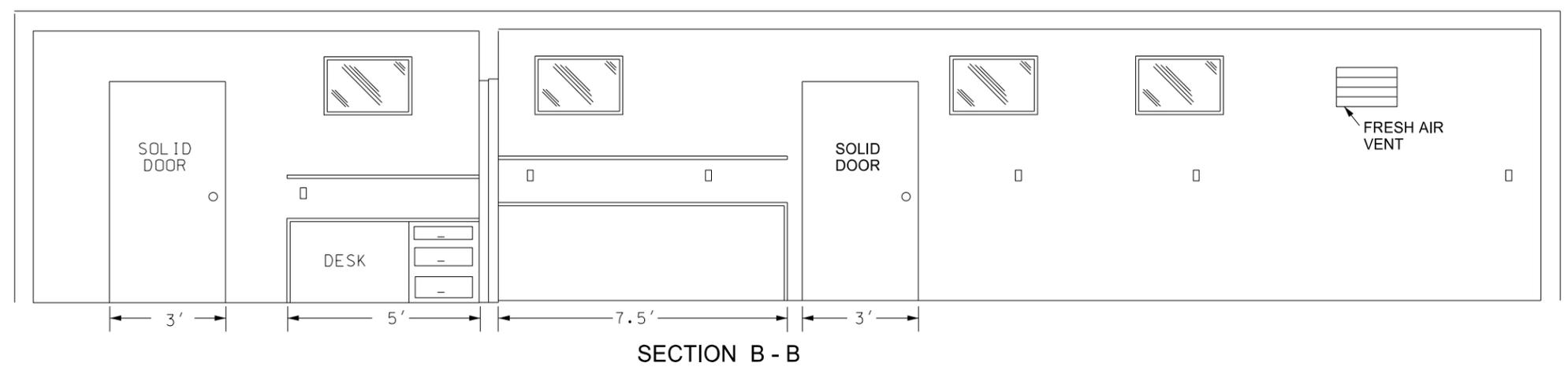
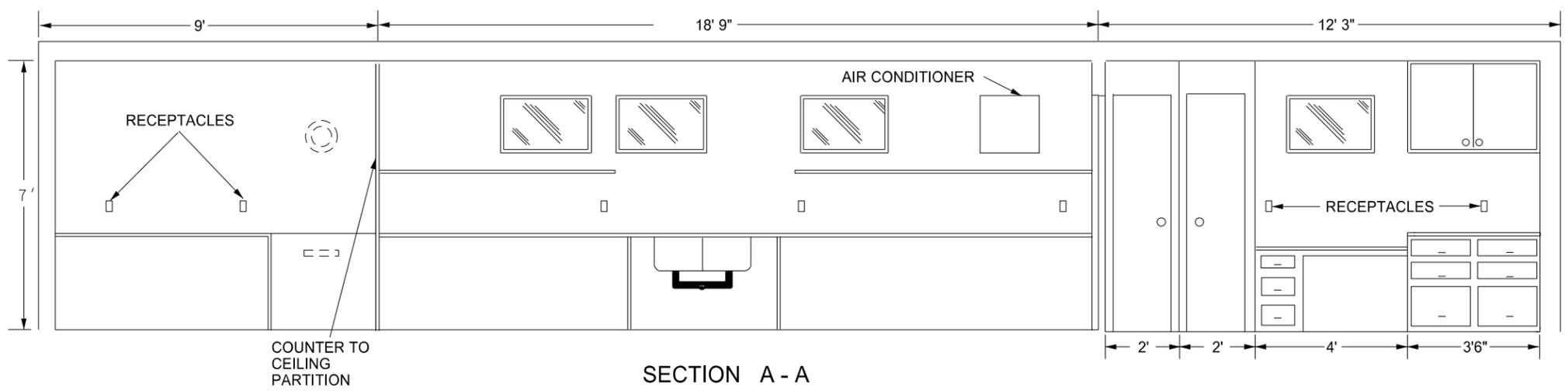
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BITUMINOUS LABORATORY

D-706-1



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



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

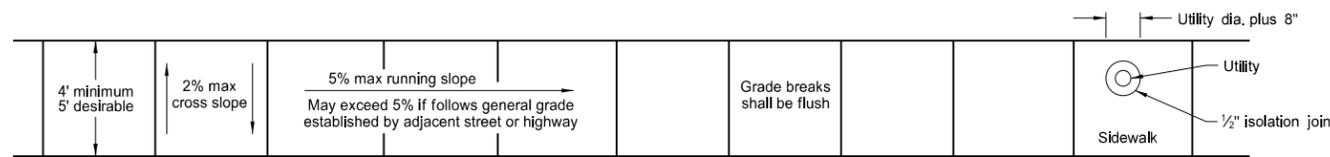
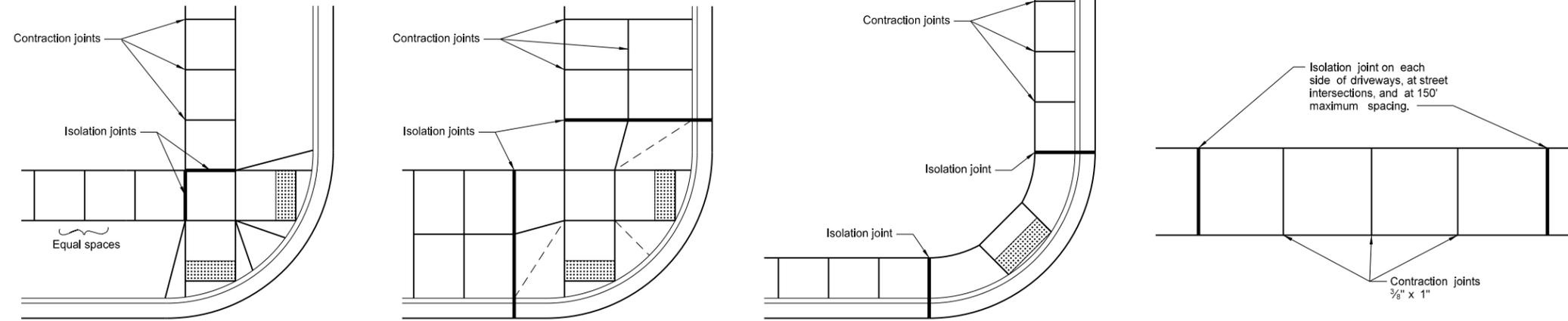
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SIDEWALK

D-750-2

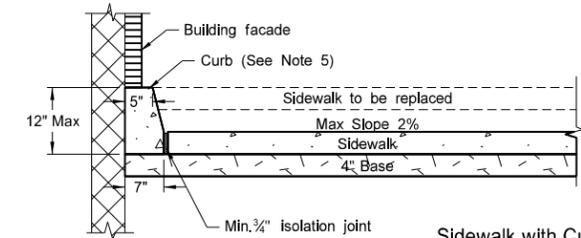
NOTES:

1. Curb ramp and detectable warning panel layouts are for informational purposes only. See Standard Drawing D-750-3 for curb ramp and detectable warning panel details.
2. Joint Spacing: Transverse contraction joint spacing shall vary from 4' to 6' to create approximate square panels. Longitudinal contraction joints shall be used where the sidewalk width is 8' or greater, and shall be spaced at half the sidewalk width. The contraction joints may be sawed or a grooved joint, and shall be a minimum of 1/3 the depth of the concrete. When the sidewalk is adjacent to the curb & gutter, the sidewalk joint spacing shall be varied to match up with the curb & gutter joints. Isolation joints should also be used between separately poured concretes, or between old and new concrete. The cost for all labor, equipment, and material necessary to construct contraction and isolation joints shall be included in the price bid for sidewalk concrete.
3. 4" sidewalk concrete thickness to be used unless otherwise specified in the plans.
4. 4" base material thickness to be used unless otherwise specified in the plans. All labor and materials necessary to place the base material shall be included in the price bid for "Salvage Base Course" or "Aggregate Base Course CL 5."
5. Landscaping is preferred to modify existing ground slope changes as needed. If not possible, such as adjacent buildings, a vertical curb may be used as shown in the detail below. The curb will be paid for at the unit price bid for the item "Curb - Type I" per lineal foot.

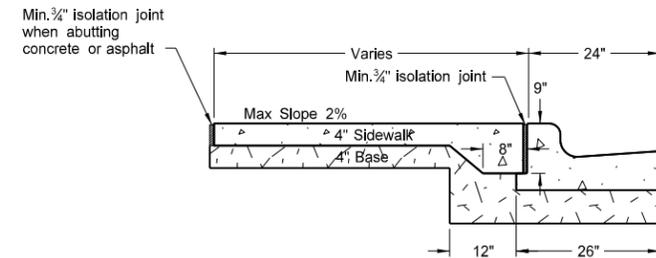


Sidewalk Width and Grade

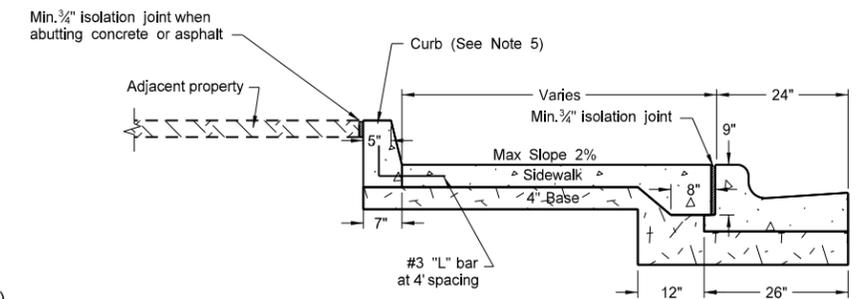
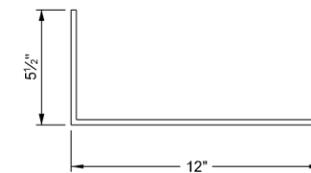
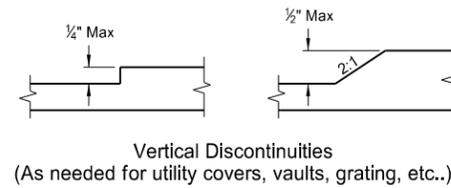
Utility Blockout



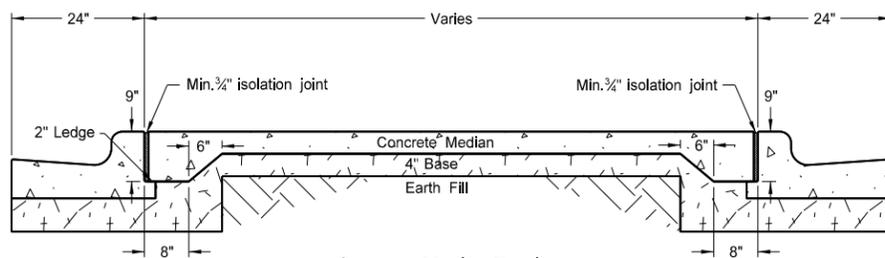
Sidewalk with Curb Detail (Building face application)



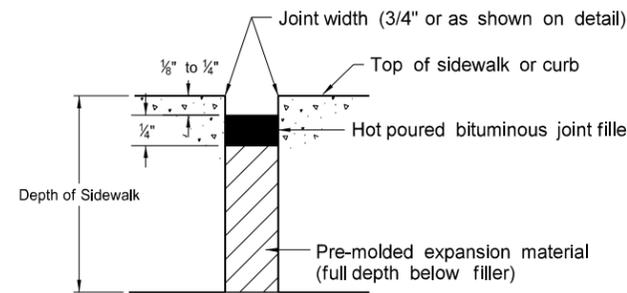
Sidewalk Detail (Installed adjacent to curb and gutter)



Sidewalk with Curb Detail (Adjacent property application)



Concrete Median Detail



Typical Isolation Joint Seal (longitudinal and transverse)

NORTH DAKOTA	
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11-26-13	
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CURB RAMP DETAILS

D-750-3

+More Right of Way

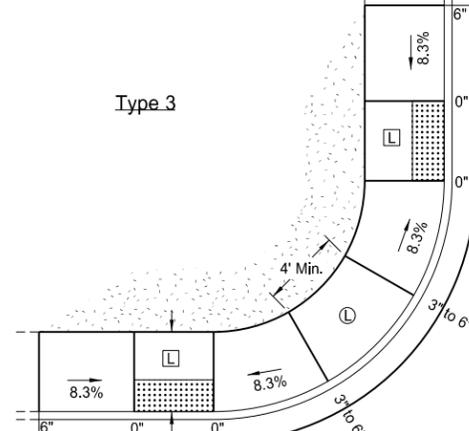
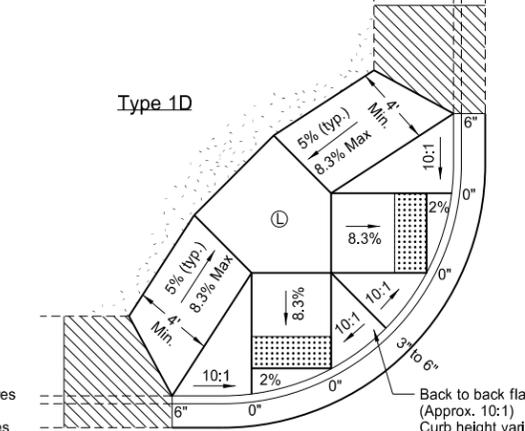
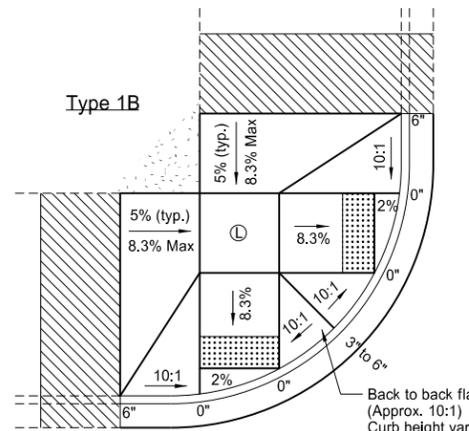
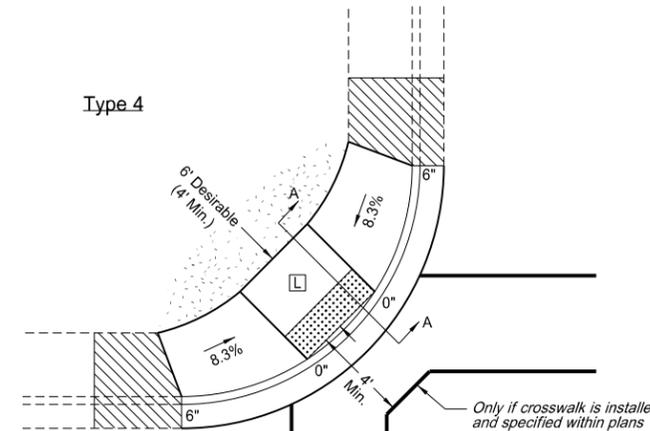
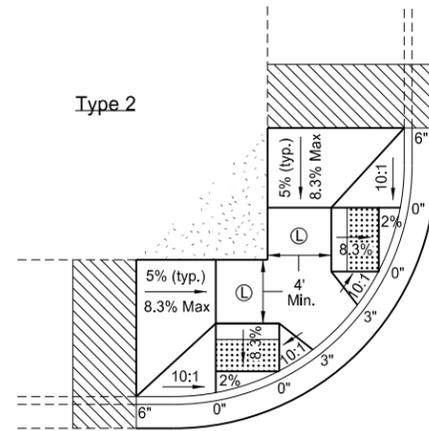
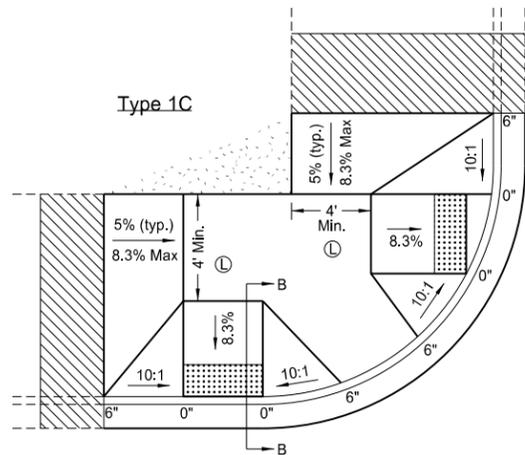
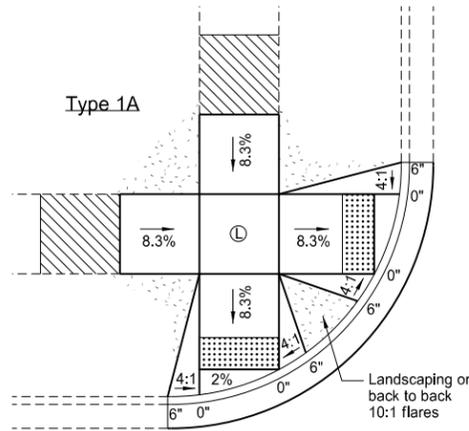
Less Right of Way

NOTES:

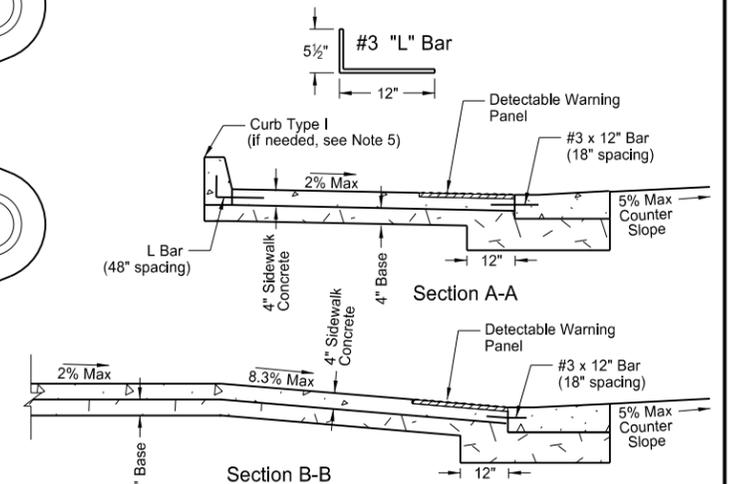
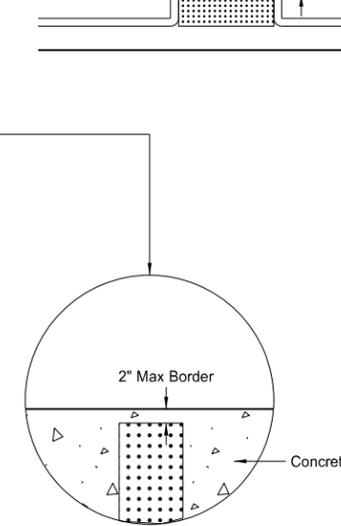
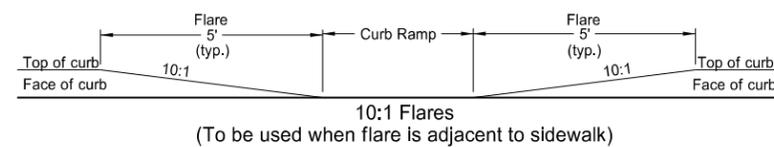
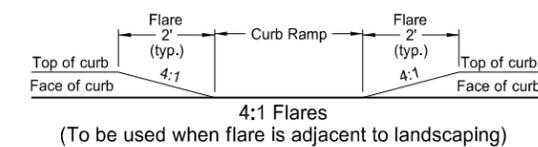
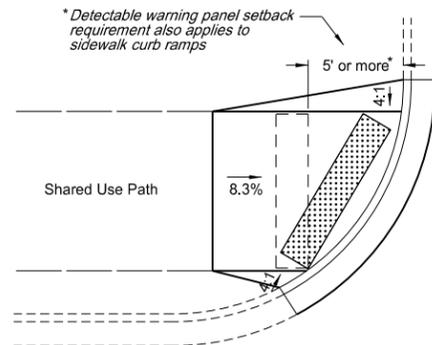
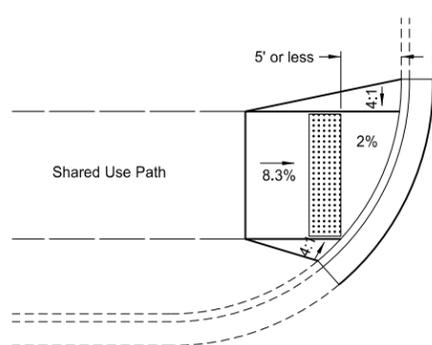
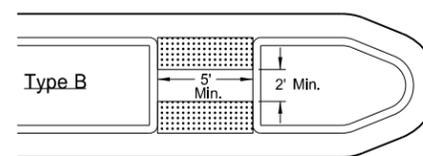
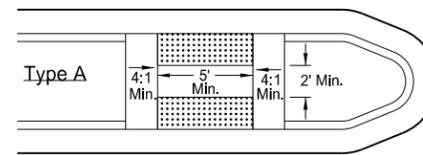
- Ramp width is defined as the useable portion of the ramp, excluding flares if used.
Curb ramp width should match the existing sidewalk width. 4' width minimum.
Ramp width for shared-use paths should match the existing shared use path width.
Ramp length shall be maximum of 15'.
- Landings shall be a minimum of 4' x 4' and shall have a max 2% slope in any direction. Landings are desirably 5' x 5' or larger.
- Detectable warning panels shall match the ramp width. Radial panels may also be used. The detectable warning panel may be located within the lower landing.
- The pedestrian access route shall be continuous 4' min. width. Max 2% cross slope applies to all concrete, excluding flares.
- Landscaping is preferred to modify existing ground slope changes as needed. If not possible, such as adjacent buildings, a vertical curb may be used as shown in the detail below. The curb will be paid for at the unit price bid for the item "Curb - Type I" per lineal foot.

LEGEND:

- : Detectable Warning Panel
- : Landscaping
- : Transitional tie-in segment if needed for retrofits. Max grade slope 8.3%.
- : Upper Landing
- : Lower Landing
- 0", 3", or 6" : Curb Height
- 8.3% : All slopes shown are max grades. Flatter slopes may be used.



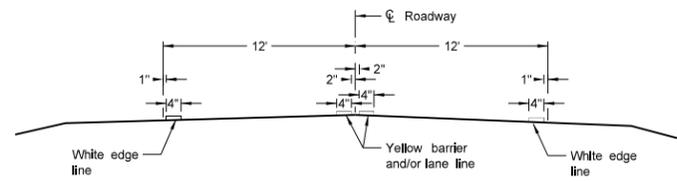
Median Refuge Islands (Cut-Through)



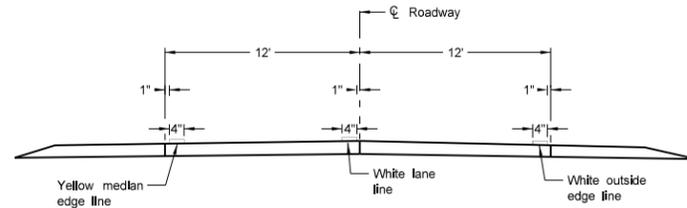
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-26-13	
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DATE	CHANGE

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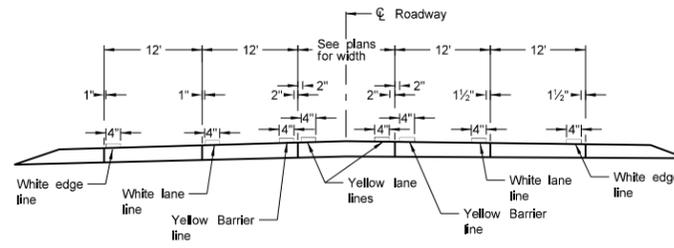
PAVEMENT MARKING



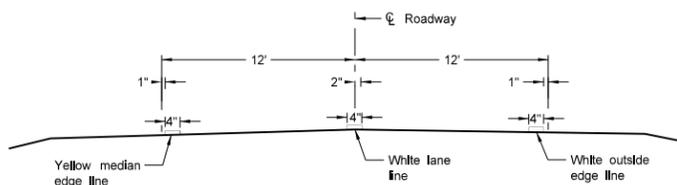
Two Lane Two Way
RURAL ROADWAY



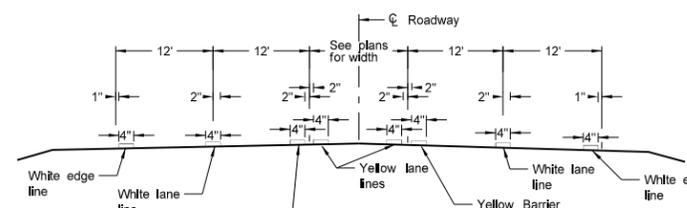
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



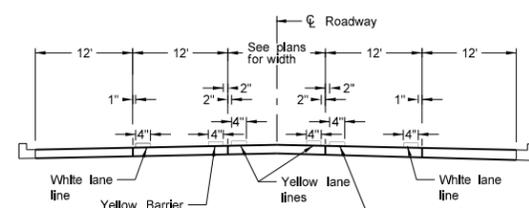
RURAL FIVE LANE ROADWAY
Concrete Section



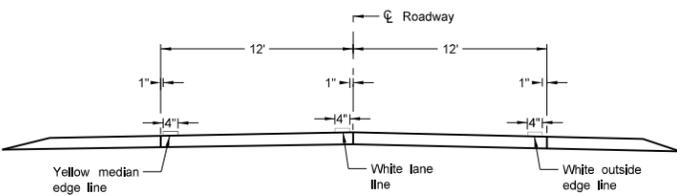
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



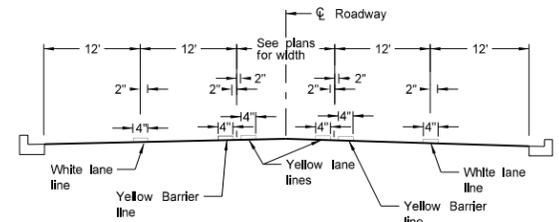
RURAL FIVE LANE ROADWAY
Asphalt Section



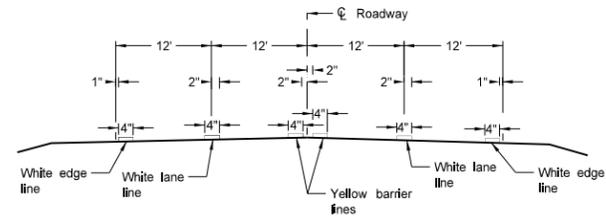
URBAN FIVE LANE SECTION
Concrete Section



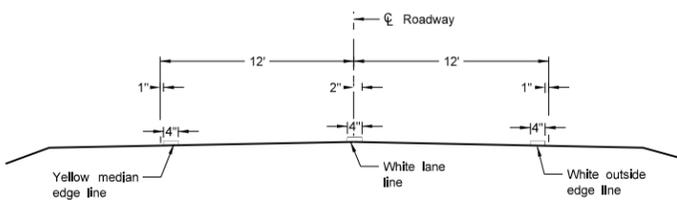
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



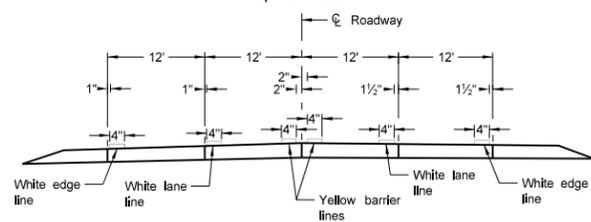
URBAN FIVE LANE SECTION
Asphalt Section



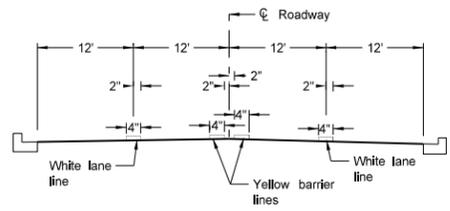
RURAL FOUR LANE ROADWAY
Asphalt Section



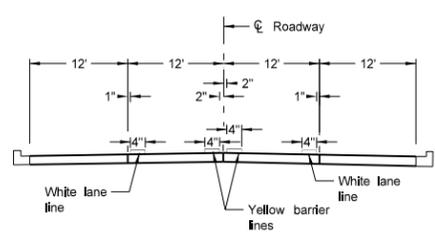
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



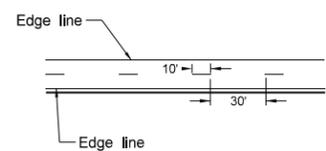
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



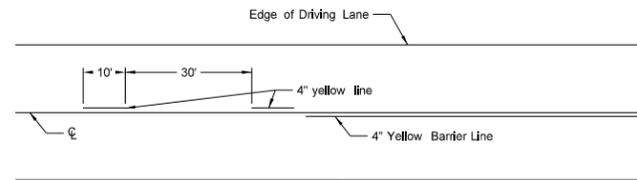
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

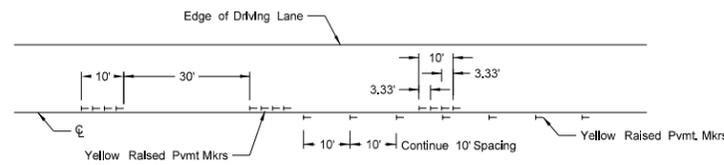
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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SHORT-TERM PAVEMENT MARKING

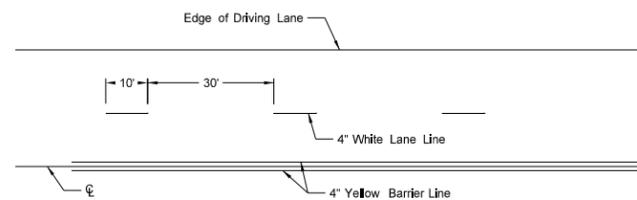


Painted or Tape Lines

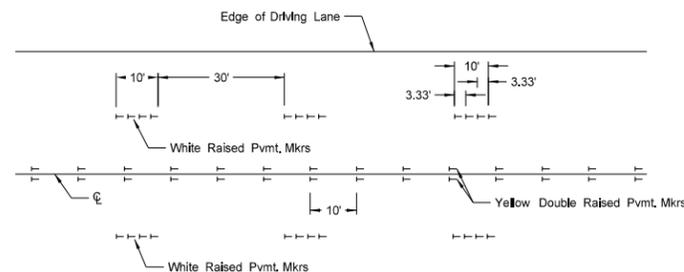


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

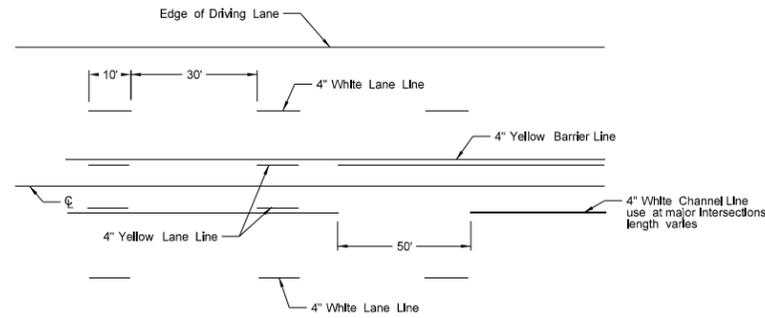


Painted or Tape Lines

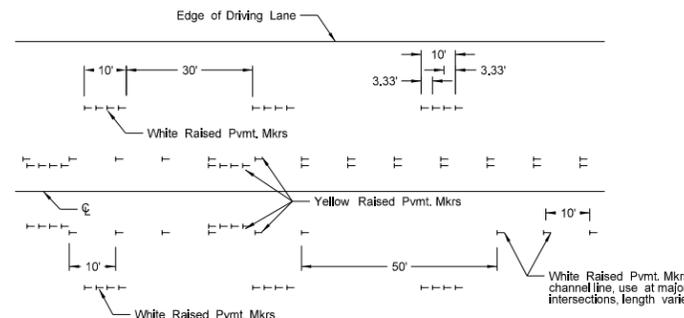


Raised Pavement Markers

FOUR LANE ROADWAY

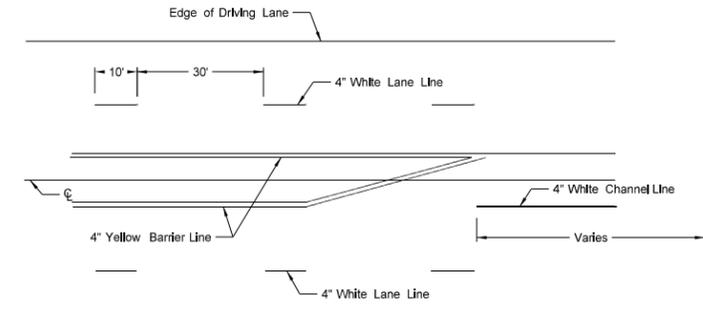


Painted or Tape Lines

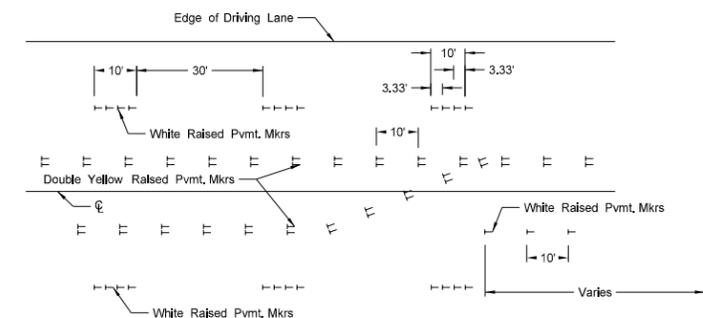


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

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

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