

DESIGN DATA			
Traffic		Average Daily	
Current 2023	Pass: 829	Trucks: 218	Total: 1047
Preventive Maintenance			

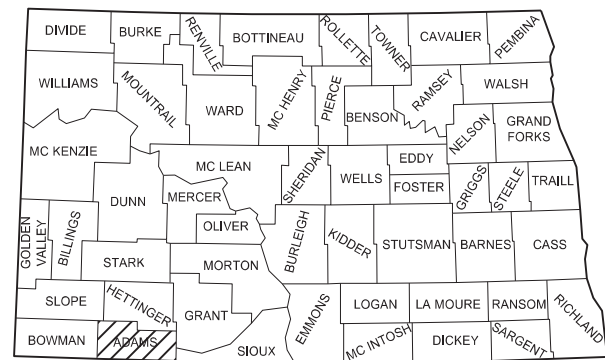
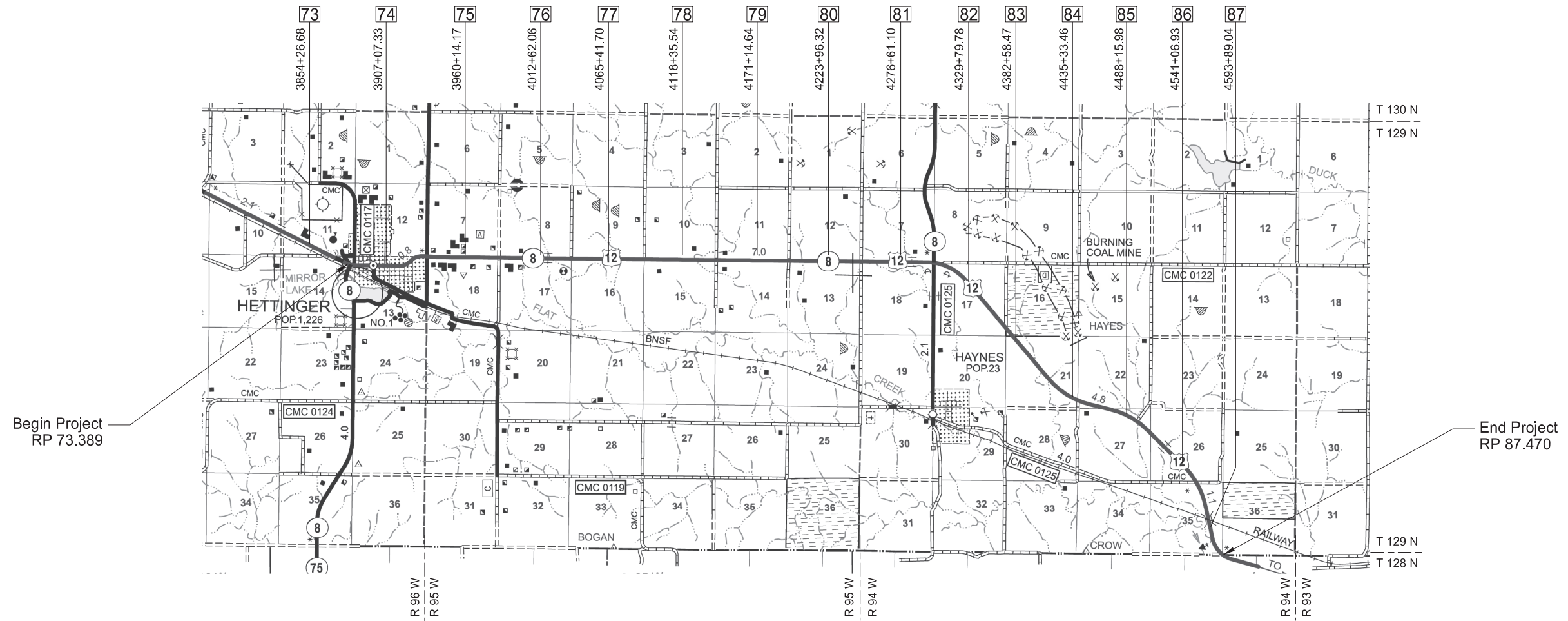
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	NH-5-012(055)073	24048	1	1

# NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

NH-5-012(055)073  
Adams County  
Hettinger to State Line  
Micro Mill & Micro Surfacing

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	7/1/2024
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-5-012(055)073 Micro Mill & Micro Surfacing	14.081	14.048



Structure #	Type	Exception
12-073.490	RCB	NO
12-076.269	RCB	NO
12-078.728	RCB	NO
12-081.150	SPPA	NO
12-085.689	RCB	NO
12-086.932	BRIDGE	YES (0.033)

DESIGNER Brandon Eslinger
DESIGNER
DESIGNER

ND DEPARTMENT OF TRANSPORTATION  
DICKINSON DISTRICT ENGINEER

*Robert R. Ray*  
Rob Rayhorn  
08/15/24

NDDOT DICKINSON DISTRICT

REGISTERED PROFESSIONAL ENGINEER  
JASON R. FISCHER  
PE-6865  
08/15/24  
DATE  
NORTH DAKOTA

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**PLAN SECTIONS**

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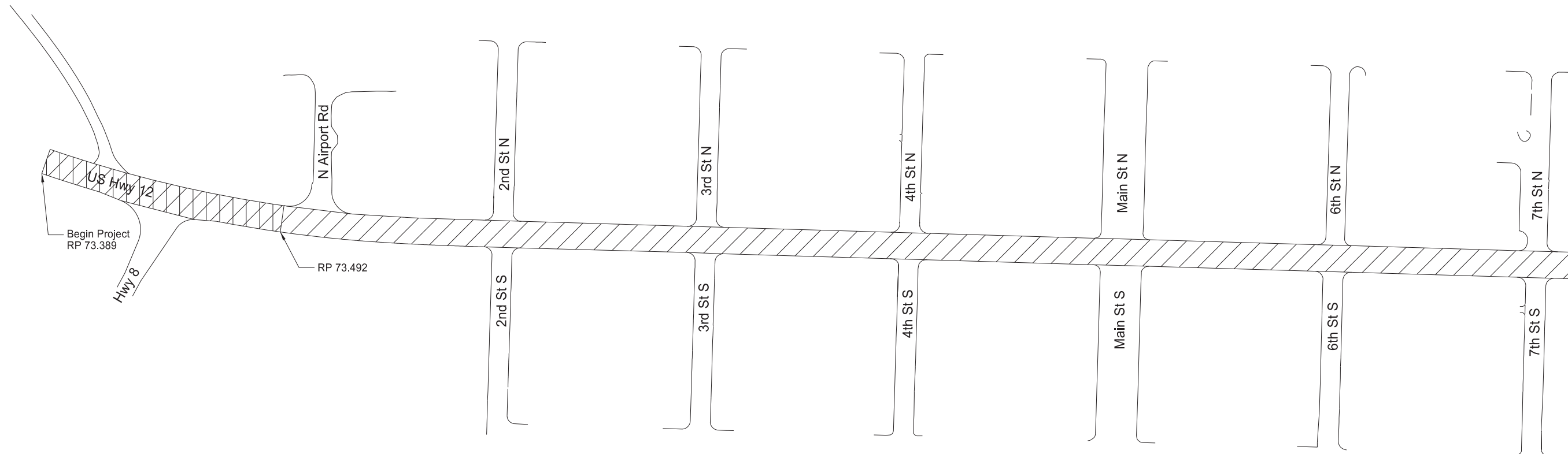
Section	Page(s)	Description
1	1	Title Sheet
2	1	Table of Contents
4	1 - 3	Scope of Work
6	1 - 2	Notes
8	1	Quantities
10	1 - 2	Basis of Estimate
20	1 - 5	General Details
30	1 - 4	Typical Sections
100	1 - 5	Work Zone Traffic Control


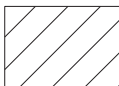
Number	Description
D-101-1, 2,3,4	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31, 32,33	Symbols
D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems For Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details - Terminal And Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
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D-704-13	Barricade And Channelizing Device Details
D-704-14	Construction Sign Punching And Mounting Details
D-704-20	Terminal And Seal Coat Sign Layouts
D-704-22	Construction Truck And Temporary Detour Layouts
D-704-23	Short Term Urban Detour And Lane Closure On A Divided Highway Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-27	Mobile Operation (Pavement Marking)
D-704-33	Two-Lane Roadway Portable Rumble Strips
D-704-50	Portable Sign Support Assembly
D-704-56	Mobile Operation - Grinding Shoulder Rumble Strips
D-760-4	Rumble Strips Undivided Highways (Shoulders Less Than 4')
D-762-1	Pavement Marking Message Details
D-762-4	Pavement Marking
D-762-11	Short-Term Pavement Marking


**SPECIAL PROVISIONS**

Number	Description
SP 360(23)	Railroad Requirements BNSF

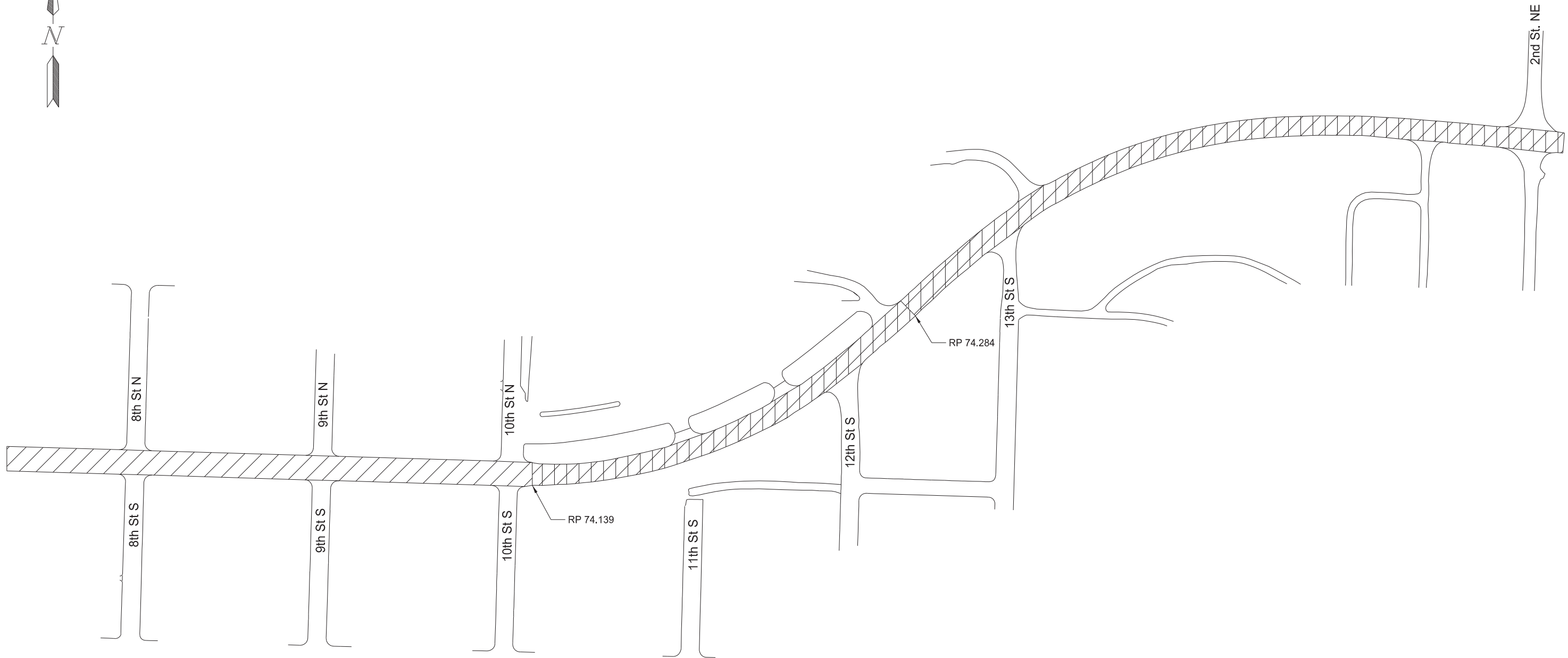
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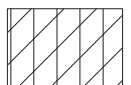



-  Micro Mill & Micro Surfacing
-  Micro Surfacing

Urban & Rural Scope of Work  Micro Mill & Micro Surfacing  Hettinger to State Line	
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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-  Micro Mill & Micro Surfacing
-  Micro Surfacing

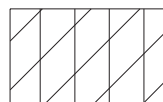
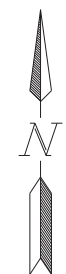
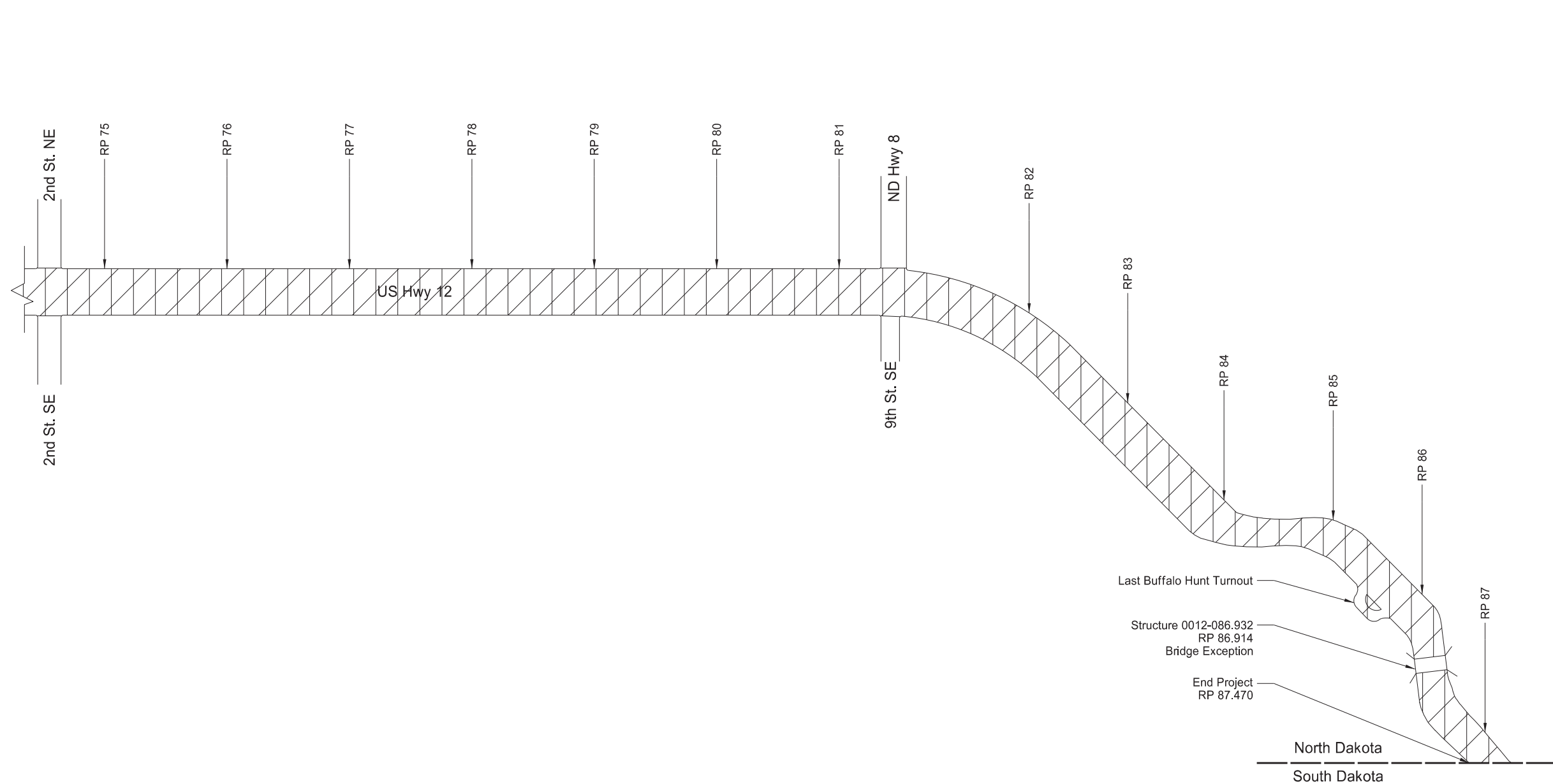
Urban & Rural Scope of Work

Micro Mill & Micro Surfacing

Hettinger to State Line



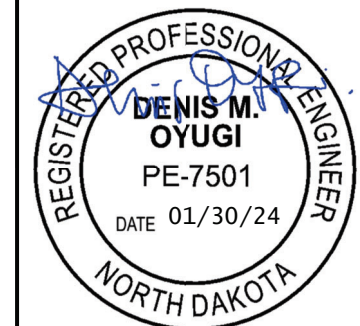
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Micro Mill & Micro Surfacing

\* Drawing not to scale \*

Rural Scope of Work  
 Micro Mill & Micro Surfacing  
 Hettinger to State Line



**NOTES**

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100-P01 COORDINATION OF WORK: Coordinate Micro-milling and Micro Surfacing operations so that no section of milled roadway has public or construction traffic operating on it for more than 30 days. If public or construction traffic operates on the milled surface for more than 30 days, liquidated damages in the amount of \$1,600 per calendar day will be assessed until the Micro Surfacing is completed.

100-P02 SCHEDULE: No work is permitted July 3<sup>rd</sup> through the 7<sup>th</sup> for the 4<sup>th</sup> of July Holiday, and August 1<sup>st</sup> through the 4<sup>th</sup> for the Adams County Fair.

100-P03 SEQUENCE OF WORK: Keep the following streets open at all times:

- N Airport Road
- 308 Adams Ave (Ambulance garage)
- Main Street, or 4<sup>th</sup> and 6<sup>th</sup> Street
- 8<sup>th</sup> Street, or 7<sup>th</sup> and 9<sup>th</sup> Street
- 9<sup>th</sup> Street North
- 2 of the 4 entrances to the Hettinger Hospital located at 1000 Highway 12.

Micro Surface through the closed intersections, while maintaining traffic with Flaggers at the intersections listed (and shown in Section 100 Sheets 3-5). Micro Surface half the intersections at a time while maintaining traffic.

All side streets will be open to traffic at the end of the workday.

107-115 RAILROAD PROTECTIVE LIABILITY INSURANCE: This project crosses the BNSF Railway Company at RP 915.486. The type of work that will be performed within the railroad right of way is Micro-Milling and Micro-Surfacing. Direct inquiries regarding protective liability insurance to:

Rosa Martinez  
Marsh USA Inc.  
4400 Comerica Bank Tower  
1717 Main Street  
Dallas, TX 75201-7357, USA  
214-303-8519  
[Rosa.M.Martinez@marsh.com](mailto:Rosa.M.Martinez@marsh.com)

Obtain information regarding crossing number DOT# 393985E from the Federal Administration website: <http://safetydata.fra.dot.gov/Officeofsafety/>

401-P01 FOG SEAL: Dilute fog seal and apply at a rate of 0.12 Gal/SY (0.06 Gal/SY undiluted.) Fog Seal oil to be diluted by the supplier.

411-P01 MICRO-MILL: The roadway width may vary. Extend the micro-milling through the top of the slough as shown in the typical sections so that no vertical lip exists along the edge of the roadway prior to micro surfacing. Extend milling into the approaches up to

4 feet so there is no vertical lip between the mainline and approaches as shown in Section 20, sheet 2. Transition Micro-milling at both ends of the project and bridge ends from 1/4" to 1/2" over a 25 ft stretch to ensure the Micro Surfacing is flush with the existing pavement.

411-P02 MICRO-MILL: Use micro-milling equipment equipped with:

- Elevation controls that are accurate to within 1-16 inch;
- A cutting head that will create grooves that are a maximum of 1/8 deep and with ridges between grooves that are 0.2 inches wide;
- A minimum of 60 teeth per foot.

Such payment for "Micro Mill" is full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

421-P01 MICRO SURFACING SEAMS: There are rumble strips on this roadway installed according to Standard Drawing D-760-4. Conduct Micro Surfacing application operations so that the edge of the screed is not on a rumble strip.

Ensure that the seam of the Micro Surfacing is not in a wheel path.

704-P01 TRAFFIC CONTROL FOR MICRO MILL/MICRO SURFACING: Provide traffic control consisting of a lane closure and flagging.

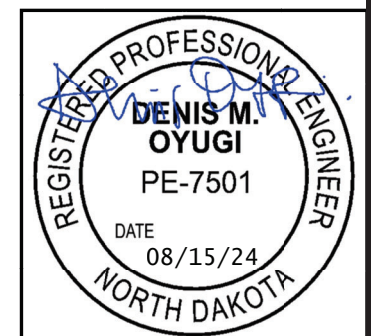
The traffic control device list is based on a 6-mile work zone and the following list:

1. Layout in section 100, sheet 2 and Standard D-704-33 for maintaining traffic during Micro Mill/Micro Surfacing.
2. Standard D-704-22, Types K and L; for trucks entering roadway.
3. Standard D-704-23, Type Q for street closures.
4. Standard D-704-26, Types KK and EE; for intersections within work zone and where conditions exist, respectively.
5. Standard D-704-33; for grinding centerline rumble strips.
6. Standard D-704-56; for grinding shoulder rumble strips.

704-P02 TRAFFIC CONTROL FOR FOG SEAL: Provide traffic control according to Standard D-704-27 for Fog Seal.

704-P03 TRAFFIC CONTROL FOR UNEVEN LANES: The contents of this note replace Section 704.04 O.2, "Two Lane Roadways" in the Standard Specifications.

If the pavement in adjacent lanes is uneven at the completion of a day's work, install traffic control as described in this note. For the purposes of this note, use of a notched wedge during asphalt paving is considered greater than 1 inch and less than 2 inches.



**NOTES**

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If the difference in elevation between the lanes is less than 1 inch install the following signs:

- "Uneven Lanes" sign (W8-11-48) and a supplementary plaque identifying the length of the uneven pavement (W20-52-54). Place this assembly on the right shoulder, in both directions, in advance of the uneven pavement.

If the difference in elevation between the lanes is greater than 1 inch and less than 2 inches install the following signs:

- "Uneven Lanes" sign (W8-11-48) and a supplementary plaque identifying the length of uneven pavement (W20-52-54). Place this assembly on the right shoulder, in both directions, in advance of the uneven pavement.
- Between the "Uneven Lanes" sign and the beginning of the uneven pavement, install a "Do Not Pass" sign (R4-4-48) on the right shoulder in both directions.

If the difference in elevation between the lanes is 2 inches or greater install the following traffic control devices:

- "Uneven Lanes" sign (W8-11-48) and a supplementary plaque identifying the length of uneven pavement (W20-52-54). Place this assembly on the right shoulder, in both directions, in advance of the uneven pavement.
- Between the "Uneven Lanes" sign and the beginning of the uneven pavement, install a "Do Not Pass" sign (R4-4-48) on the right shoulder in both directions.
- Install tubular markers spaced at 2 times the posted speed limit through the uneven lane area.

In all instances install "Uneven Lanes" signs and a supplementary plaque identifying the length of the uneven pavement at the following intersections:

- County Major Collectors;
- State Highways;
- US Highways; and
- Interstate Ramps.

704-P04 NO PARKING SIGNS: Install "No Parking" signs along Highway 12 (Adams Ave.) through town, to prevent on-street parking during the Work.

Base spacing of signs on legibility with at least one sign per block using a maximum sign spacing of 400 feet. Use R7-1-12 signs. Signs must be installed a minimum of forty-eight (48) hours, but no more than seventy-two (72) hours prior to the expected beginning of operations. Signs must be removed within twenty-four (24) hours after Micro Surfacing is complete, or whenever construction operations cease in an area for more than seventy-two (72) hours, unless otherwise directed by the Engineer.

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

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

Use individual PRS constructed in one of the following manners:

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

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

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

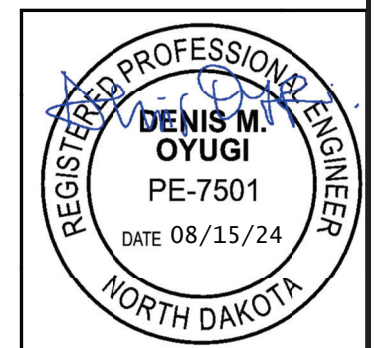
The Engineer will count and measure each array as one unit. Include the cost of providing, installing, maintaining, and relocating PRS in the unit price bid for "Portable Rumble Strips".

722-P01 UTILITY APPURTENANCES: There are utility appurtenances consisting of manholes and Water Main Valves at locations listed in Section 10 Sheet 2.

760-P01 MICRO SURFACING CURE PRIOR TO PLACING RUMBLE STRIPS: Allow the Micro Surfacing to cure for a minimum of 14 days prior to placing rumble strips.

762-P01 SHORT TERM PAVEMENT MARKINGS: The plan quantity includes 4 applications of short-term pavement markings as shown in the basis of estimate; one application after milling pavement surface, two applications for Micro Surfacing and the last application after fog sealing rumble strips.

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



# ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	1	1
107	0100 RAILWAY PROTECTION INSURANCE	L SUM	1	1
107	0140 RAILROAD COORDINATION	L SUM	1	1
401	0070 FOG SEAL	GAL	1,577	1,577
411	0150 MICRO-MILL	SY	295,518	295,518
421	0010 AGGREGATE FOR MICROSURFACING TYPE II	TON	2,797	2,797
421	0020 ASPHALT EMULSION FOR MICROSURFACING	GAL	91,493	91,493
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	340	340
704	1000 TRAFFIC CONTROL SIGNS	UNIT	3,558	3,558
704	1048 PORTABLE RUMBLE STRIPS	EA	4	4
704	1052 TYPE III BARRICADE	EA	14	14
704	1060 DELINEATOR DRUMS	EA	56	56
704	1067 TUBULAR MARKERS	EA	100	100
704	1185 PILOT CAR	HR	85	85
760	0025 SINUSOIDAL RUMBLE STRIP - ASPHALT SHOULDER	MILE	24.98	24.98
760	0027 SINUSOIDAL RUMBLE STRIP - ASPHALT CENTERLINE	MILE	12.49	12.49
762	0432 SHORT TERM 6IN LINE-TYPE NR	LF	177,064	177,064
762	0436 SHORT TERM 24IN LINE-TYPE NR	LF	936	936
762	1106 PVMT MK PAINTED 6IN LINE	LF	185,337	185,337
762	1124 PVMT MK PAINTED 24IN LINE	LF	936	936

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**Design Calculations - Mainline**

		RP 73.389 to RP 73.492 RP 74.284 to RP 81.004 Net Length = 6.823		RP 73.492 to RP 74.139 Net Length = 0.647		RP 74.139 to RP 74.284 Net Length = 0.145		RP 81.004 to RP 87.470 Net Length = 6.433*	
Material	Unit	Width	Qty/Mile	Width	Qty/Mile	Width	Qty/Mile	Width	Qty/Mile
Micro Mill	SY	36.4	21,354.67	-	0	36.2	21,237.33	38.4	22,528.00
Aggregate for Micro Surface Type II @ 18 lbs/SY	TON	36.4	192.19	45	237.60	36.2	191.14	38.4	202.75
Asphalt Emulsion for Micro-Surfacing @ 14% by Weight at 8.56 lbs/Gal	GAL	36.4	6,286.65	45	7,771.96	36.2	6,252.11	38.4	6,632.07
Fog Seal @ 0.06 Gal/SY	GAL	3.6	126.72	-	0	1.8	63.36	1.6	56.32

\*Bridge Exception = 0.033 Miles @ RP 86.932

**Design Calculations - Section 20 Detail Sheets**


		Section 20 Sheets 2 & 3 Approaches	Section 20 Sheet 4 Buffalo Turn Out	Section 20 Sheet 5 Guardrail Widening
Material	Unit			
Micro Mill	SY	1,759	54	-
Fog Seal @ 0.06 Gal/SY	GAL	282	45	14

**Quantity Summary**

Material	Unit	Mainline	Approaches	Turn Out	Guardrail	Total
Micro Mill	SY	293,705	1,759	54	-	295,518
Aggregate for Micro Surface Type II @ 18 lbs/SY	TON	2,797	-	-	-	2,797
Asphalt Emulsion for Micro-Surfacing @ 14% by Weight at 8.56 lbs/Gal	GAL	91,493	-	-	-	91,493
Fog Seal @ 0.06 Gal/SY	GAL	1,236	282	45	14	1,577

**Rumble Strips**

	Unit	Qty
Centerline: RP 74.980 to RP 87.470	Miles	12.490
Shoulders: RP 74.980 to RP 87.470	Miles	24.980

Basis of Estimate  Micro Mill & Micro Surfacing  Hettinger to State Line	
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**Short Term Pavement Marking (Paint)**

Location - RP 73.389 to RP 87.470	Unit	Basis	Quantity	Applications	Total Quantity
6" Centerline Skips	LF	Measured	16,905	4	67,620
6" Centerline Barrier	LF	Measured	27,361	4	109,444
Continental Crosswalk	LF	Measured	936	1	936

**Permanent Pavement Marking (Paint)**

Location - RP 73.389 to RP 87.470	Unit	Basis	Quantity	Applications	Total Quantity
6" Centerline Skips	LF	Measured	16,905	1	16,905
6" Centerline Barrier	LF	Measured	27,361	1	27,361
6" Edgeline	LF	Measured	141,071	1	141,071
Continental Crosswalk	LF	Measured	936	1	936

**Crosswalk Locations**

Street	Continental	Location
3rd	72	ML - W
4th	144	ML - E & W
Main	144	ML - E & W
6th	144	ML - E & W
7th	144	ML - E & W
8th	144	ML - E & W
9th	144	ML - E & W

ML = Mainline

E or W = East or West

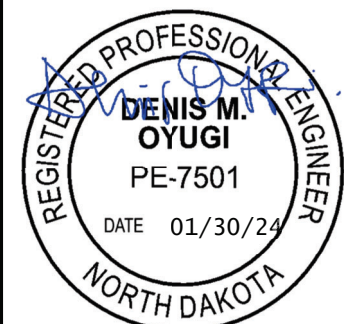
**Utility Appurtenances**

Manholes		Water Valve
73.572 - RT	73.781 - CL	74.116 - LT
73.577 - LT	73.856 - CL	
73.602 - LT	73.926 - CL	
73.642 - CL	73.996 - CL	
73.642 - LT	74.066 CL	
73.707 - LT	74.131 - CL	
73.712 - CL		

Basis of Estimate

Micro Mill & Micro Surfacing

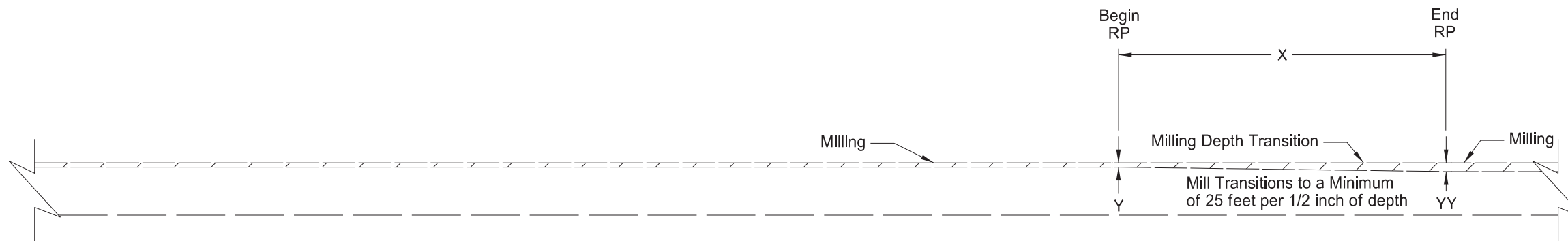
Hettinger to State Line



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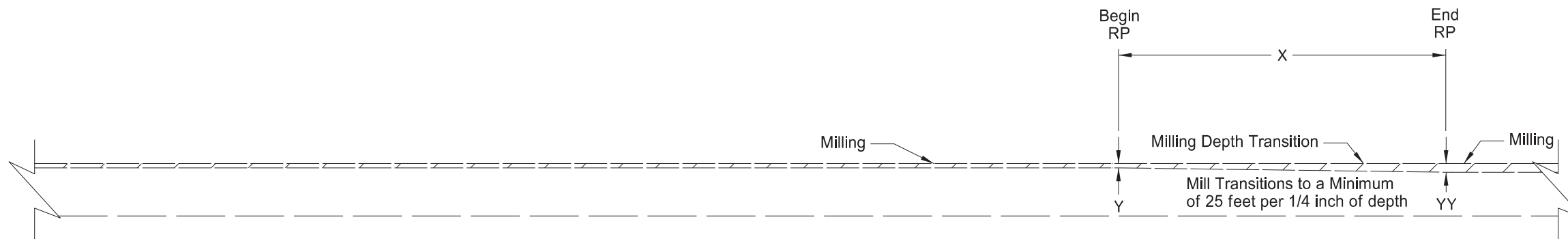
Notes:

- 1) Milling transition at RP 74.139 will be 0" to 1/2" in the driving lane and South Shoulder, and will transition from 0" to 1/4" along the curb and gutter on the North Shoulder. See Section 30 Sheet 3 for typical.
- 2) Transition milling to 1/2" deep across the entire roadway at RP 74.284. See Section 30 Sheet 4 for typical.



Milling Transition - Urban

X	Begin RP	Y	End RP	YY
25 ft	73.487	1/2 in	73.492	0 in
25 ft	74.139	0 in	74.144	1/2 in



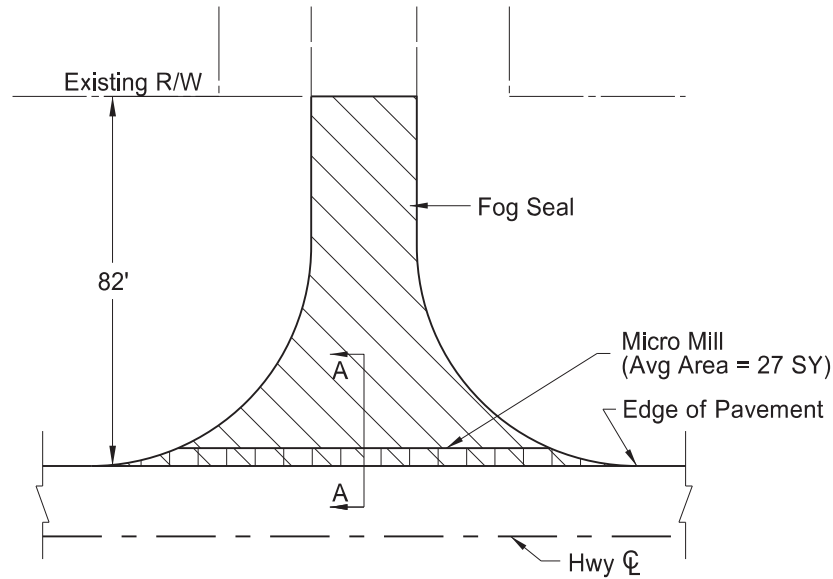
Milling Transition - Project Limits / Bridge Ends

X	Begin RP	Y	End RP	YY
25 ft	73.389	1/4 in	73.394	1/2 in
25 ft	86.911	1/2 in	86.916	1/4 in
25 ft	86.949	1/4 in	86.954	1/2 in
25 ft	87.465	1/2 in	87.470	1/4 in

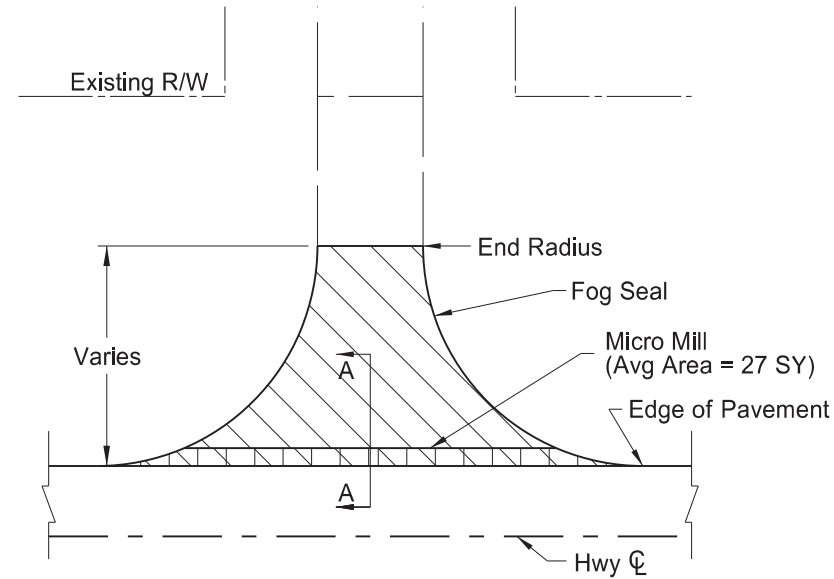
\*Drawing is not to scale

Milling Transition Detail  Micro Mill & Micro Surfacing  Hettinger to State Line	
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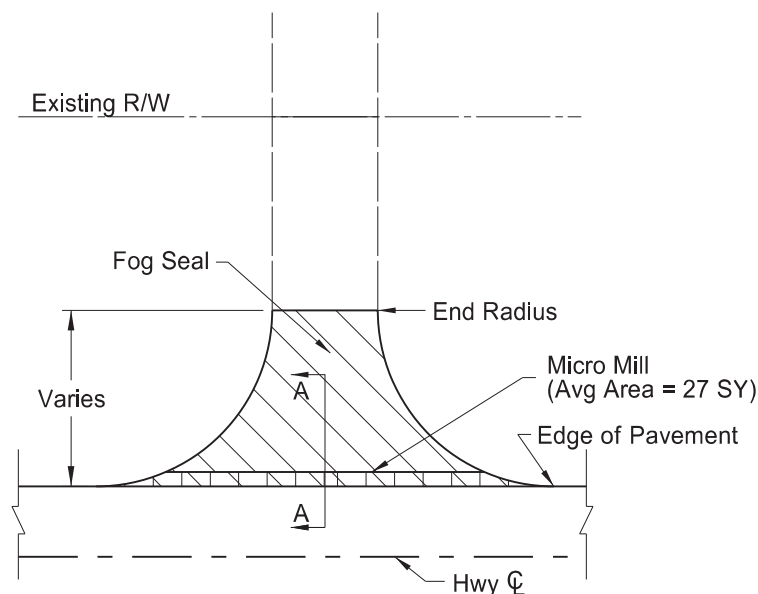
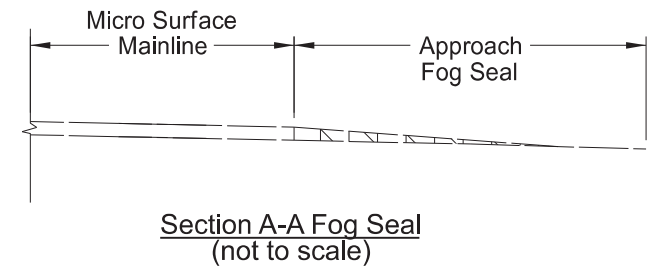
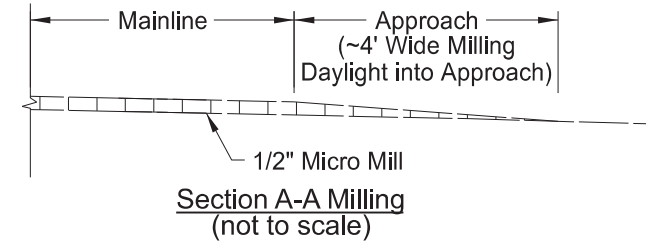
(1) Paved Section Line Approaches  
See Section 20, Sheet 3 for locations and Quantities



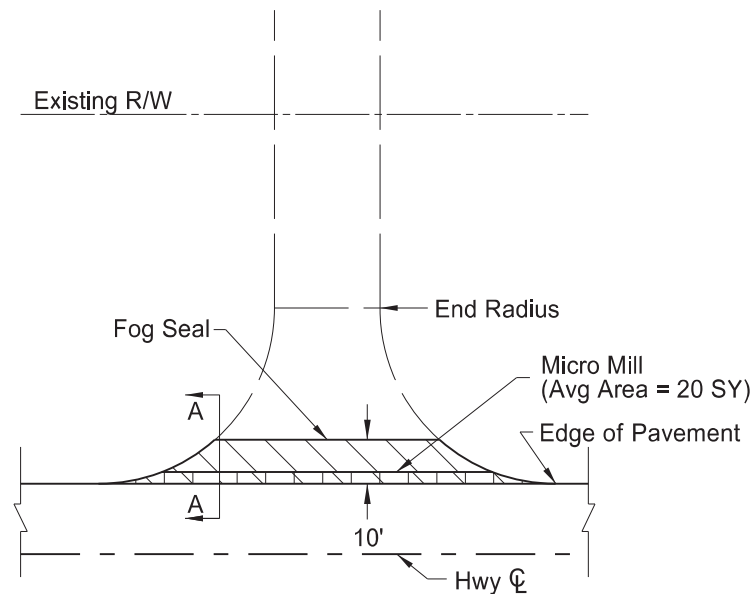
(2) Gravel Section Line Approaches  
See Section 20, Sheet 3 for locations and Quantities

Notes:

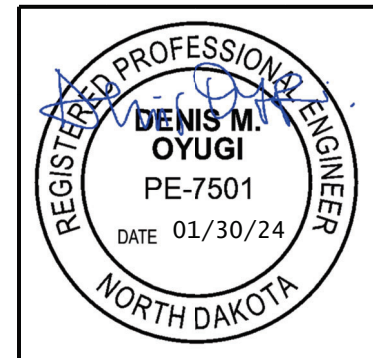
- Actual Micro Mill & Fog Seal locations may vary in the field, as approved by the Engineer.
- Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.



(3) Private Drive Approaches  
See Section 20, Sheet 3 for locations and Quantities



(4) Field Drive Approaches  
See Section 20, Sheet 3 for locations and Quantities



Rural Approach Details  
Micro Mill & Micro Surfacing  
Hettinger to State Line

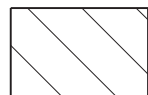
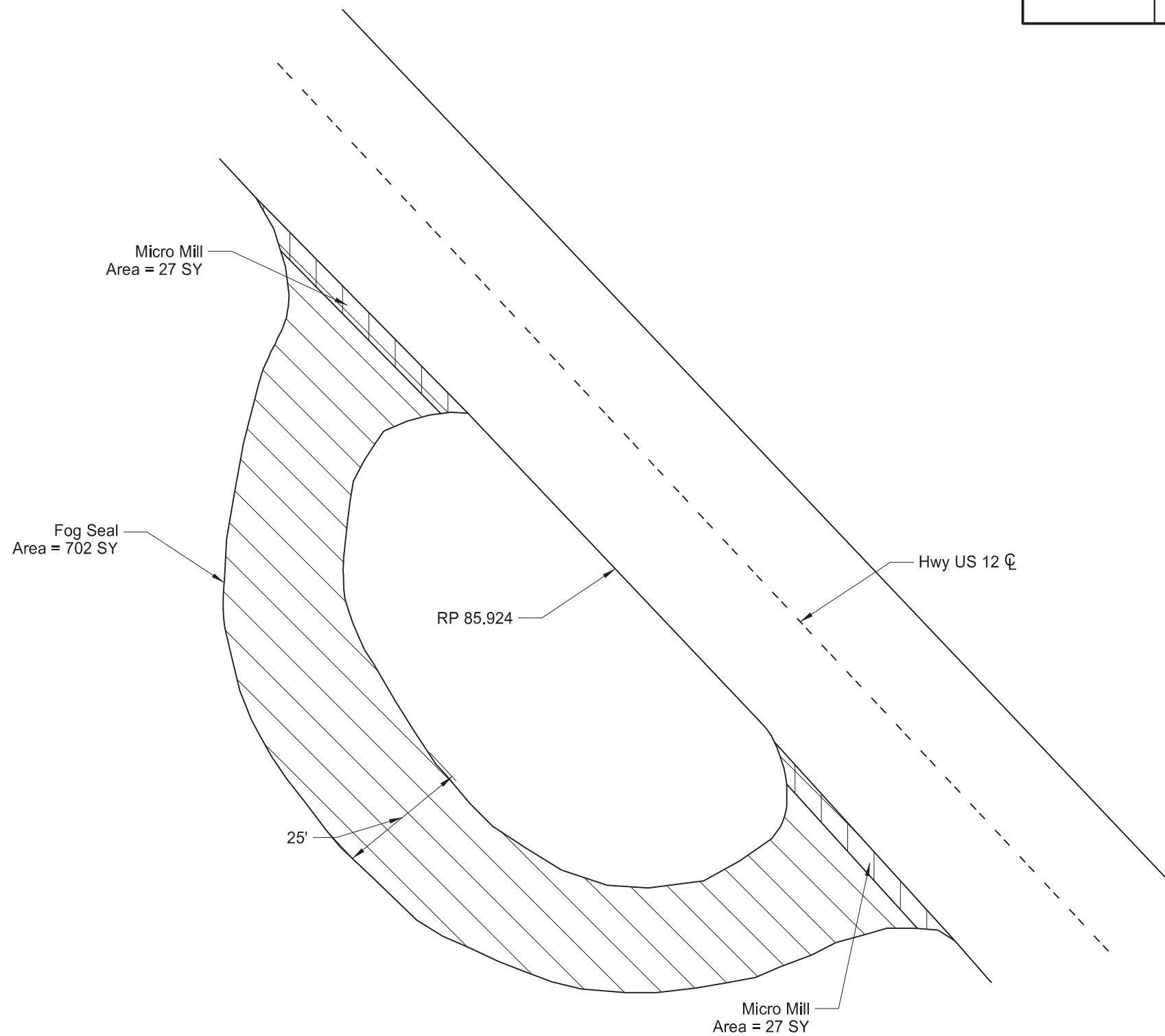
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**Rural Approaches**

Reference Point	Right or Left	Approach Type	Micro Mill (SY)	Avg Area (SY)	Fog Seal @ 0.06 Gal/SY (Gal)	Reference Point	Right or Left	Approach Type	Micro Mill (SY)	Avg Area (SY)	Fog Seal @ 0.06 Gal/SY (Gal)
74.250	RT	1	27	245	14.7	79.571	LT	2	27	73	4.4
74.337	RT	1	27	245	14.7	79.824	RT	3	27	73	4.4
74.545	RT	1	27	245	14.7	80.564	RT	2	27	73	4.4
74.545	LT	1	27	245	14.7	80.564	LT	2	27	73	4.4
74.666	LT	3	27	73	4.4	80.805	LT	4	20	30	1.8
74.815	RT	3	27	73	4.4	81.045	RT	4	20	30	1.8
74.896	LT	3	27	73	4.4	81.256	RT	4	20	30	1.8
75.026	RT	3	27	73	4.4	81.256	LT	3	27	73	4.4
75.060	LT	3	27	73	4.4	81.384	RT	4	20	30	1.8
75.341	RT	3	27	73	4.4	81.669	LT	3	27	73	4.4
75.542	RT	2	27	73	4.4	81.995	RT	4	20	30	1.8
75.542	LT	3	27	73	4.4	81.995	LT	4	20	30	1.8
75.590	RT	3	27	73	4.4	82.904	LT	4	20	30	1.8
75.703	RT	3	27	73	4.4	82.929	RT	4	20	30	1.8
75.733	LT	3	27	73	4.4	83.059	LT	4	20	30	1.8
75.854	LT	3	27	73	4.4	83.425	RT	4	20	30	1.8
76.244	RT	4	20	30	1.8	83.425	LT	4	20	30	1.8
76.540	RT	4	20	30	1.8	83.736	RT	4	20	30	1.8
76.540	LT	3	27	73	4.4	83.736	LT	4	20	30	1.8
77.058	LT	4	20	30	1.8	84.332	RT	2	27	73	4.4
77.347	RT	4	20	30	1.8	84.332	LT	4	20	30	1.8
77.547	RT	4	20	30	1.8	84.396	RT	4	20	30	1.8
77.547	LT	2	27	73	4.4	84.697	RT	4	20	30	1.8
77.792	RT	3	27	73	4.4	84.887	LT	4	20	30	1.8
77.792	LT	4	20	30	1.8	85.200	RT	4	20	30	1.8
77.976	RT	3	27	73	4.4	85.200	LT	3	27	73	4.4
78.211	LT	3	27	73	4.4	85.436	LT	4	20	30	1.8
78.211	RT	4	20	30	1.8	85.456	RT	4	20	30	1.8
78.401	LT	4	20	30	1.8	85.720	RT	4	20	30	1.8
78.543	RT	2	27	73	4.4	85.720	LT	4	20	30	1.8
78.543	LT	2	27	73	4.4	85.919	LT	4	20	30	1.8
78.634	RT	3	27	73	4.4	86.372	RT	2	27	73	4.4
78.634	LT	3	27	73	4.4	86.372	LT	2	27	73	4.4
79.038	LT	4	20	30	1.8	87.233	RT	4	20	30	1.8
79.054	RT	4	20	30	1.8	87.233	LT	4	20	30	1.8
79.489	RT	4	20	30	1.8	87.470	RT	1	27	245	14.7
79.489	LT	4	20	30	1.8	87.470	LT	4	20	30	1.8
79.571	RT	2	27	73	4.4						
Total:			942	-	176.8	Total:			817	-	105.3

Rural Approach Table  Micro Mill & Micro Surfacing  Hettinger to State Line	<p>REGISTERED PROFESSIONAL ENGINEER  <b>DENIS M. OYUGI</b>                  PE-7501                  DATE 01/30/24                  NORTH DAKOTA</p>
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-012(055)073	20	4



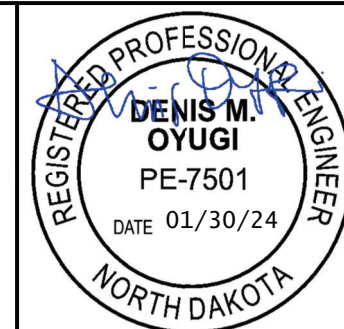
Fog Seal



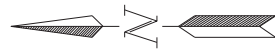
Fog Seal & Micro Mill

ESTIMATED QUANTITIES		
ITEMS	UNIT	Last Buffalo Hunt Turnout
Micro Mill	SY	54
Fog Seal @ 0.06 Gal/SY	GAL	45

Detail Section  
 Last Buffalo Hunt Turn Out  
 Micro Mill & Micro Surfacing  
 Hettinger to State Line

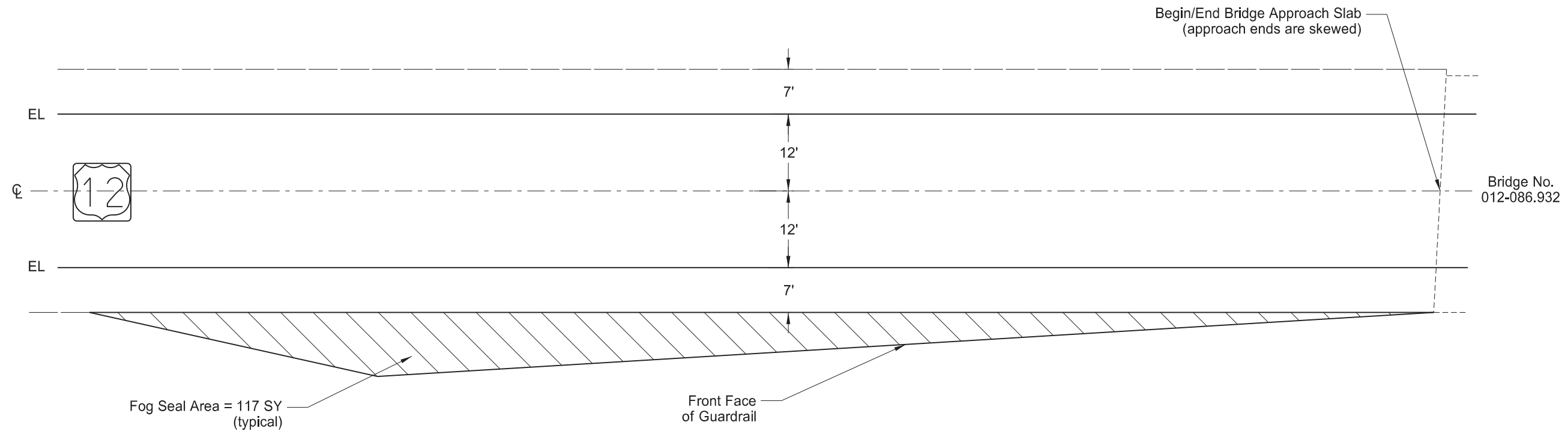


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-012(055)073	20	5



Note:

- 1) Milling & Microsurfacing quantities for the mainline are included on Section 10 Sheet 1.
- 2) Fog Seal Guardrail Widening areas at the NW & SE of structure No. 012-086.932. These areas shall be sealed at a rate of 0.12 gal/SY from the edge of the Micro surface to the front face of the railing.
- 3) Ensure there is no vertical edge left in the guardrail widening after completing all work.



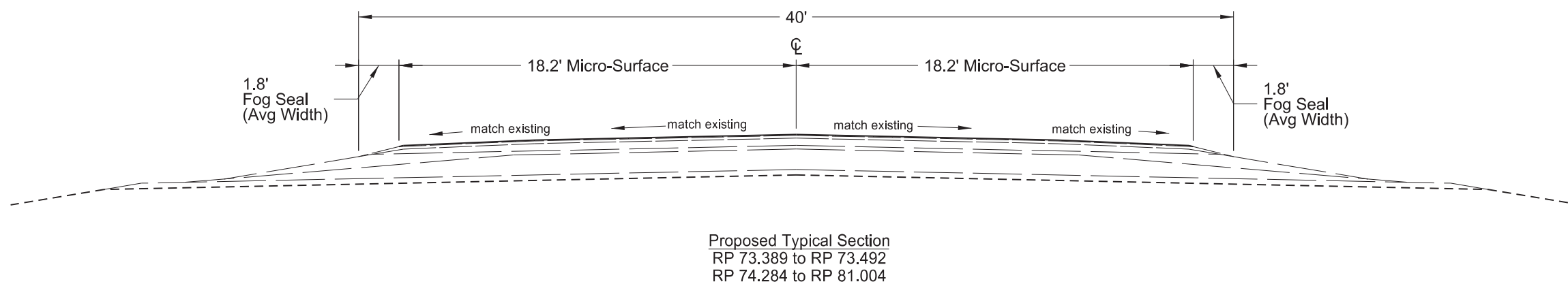
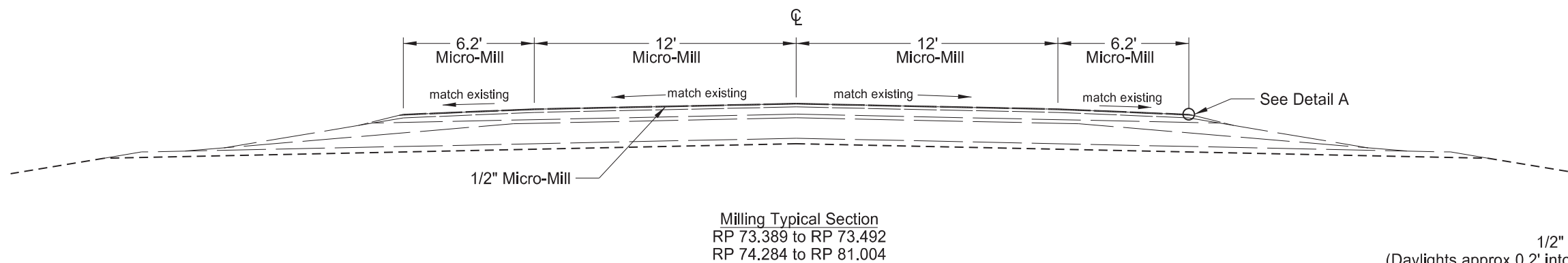
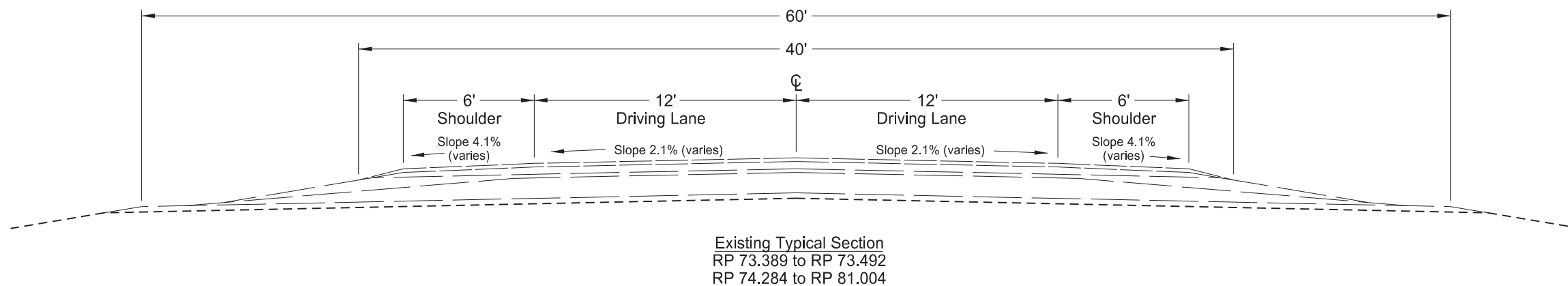
Fog Seal

ESTIMATED QUANTITIES		
ITEMS	UNIT	Guardrail Widening
Fog Seal @ 0.06 Gal/SY	GAL	14

Guardrail Detail  
 Micro Mill & Micro Surfacing  
 Hettinger to State Line

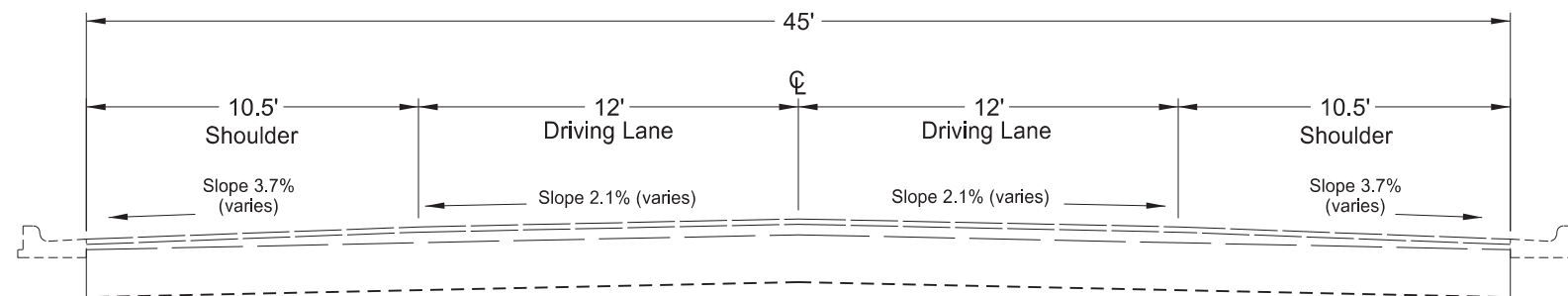


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-012(055)073	30	1

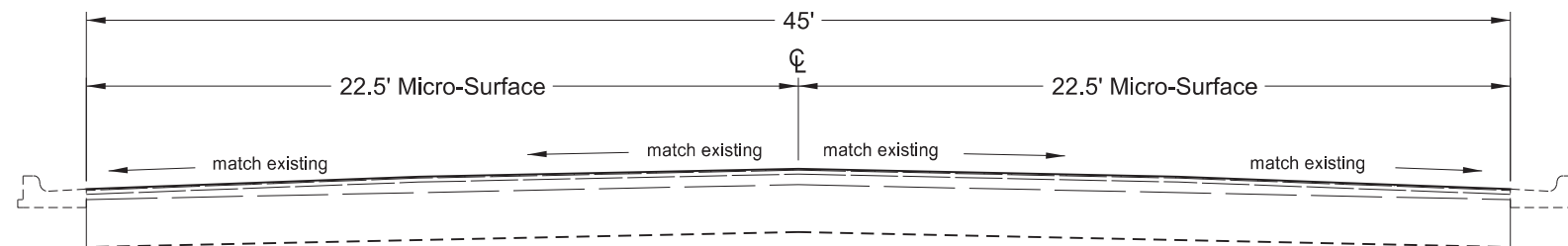


Typical Sections Micro Mill & Micro Surfacing Hettinger to State Line	<p>REGISTERED PROFESSIONAL ENGINEER                  DENIS M. OYUGI                  PE-7501                  DATE 01/30/24                  NORTH DAKOTA</p>
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-012(055)073	30	2



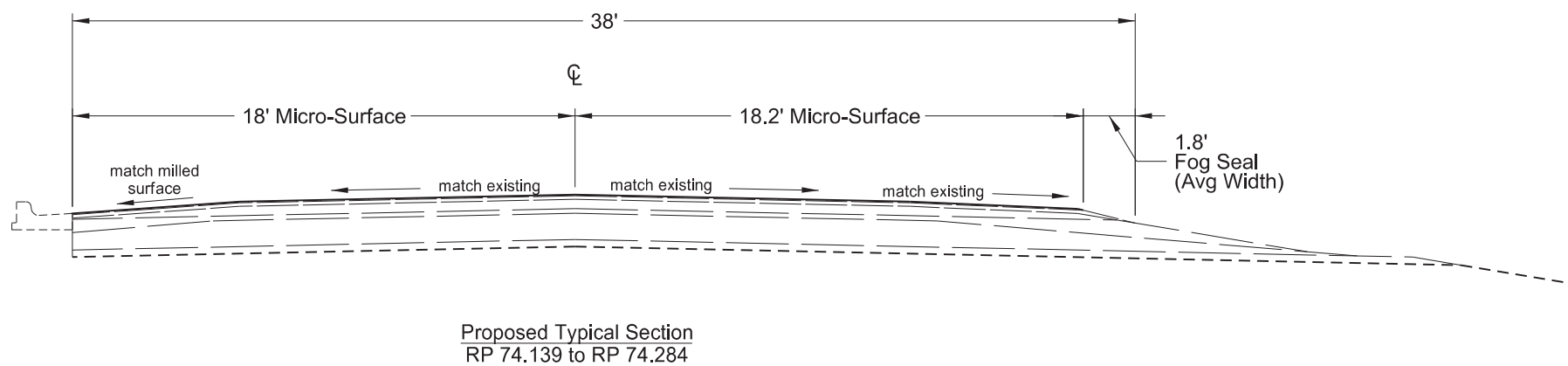
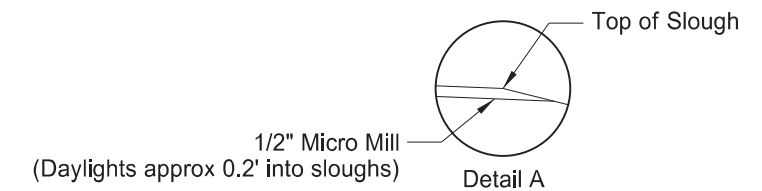
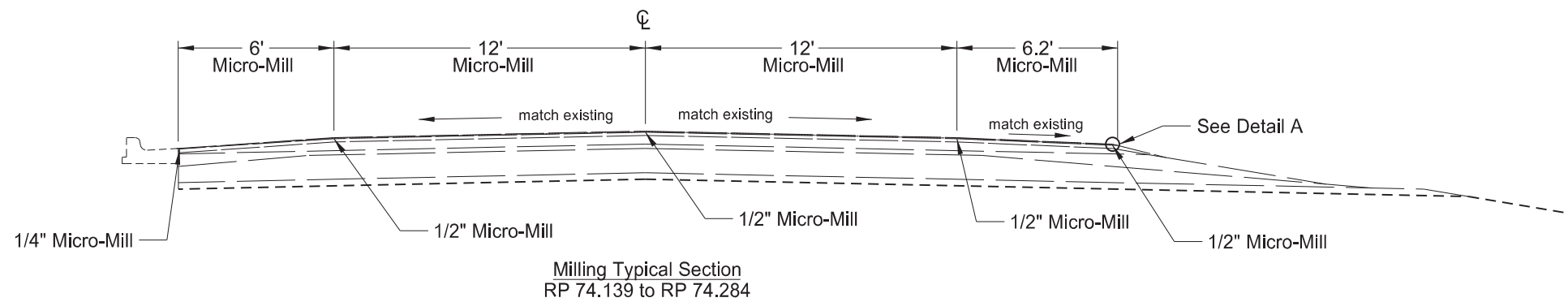
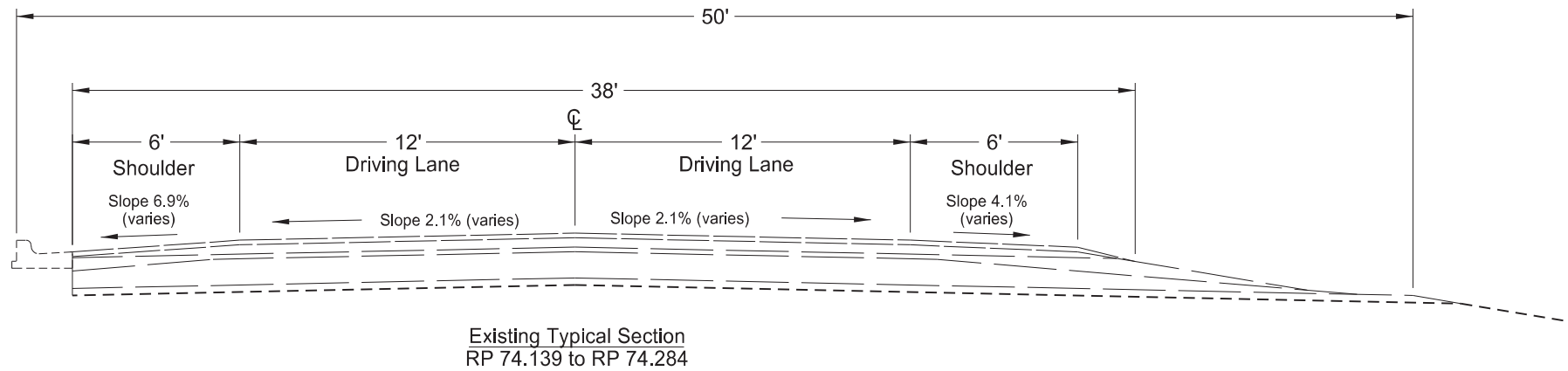
Existing Typical Section  
RP 73.492 to RP 74.139



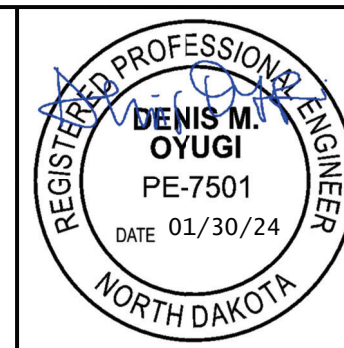
Proposed Typical Section  
RP 73.492 to RP 74.139

<p>Typical Sections</p> <p>Micro Mill &amp; Micro Surfacing</p> <p>Hettinger to State Line</p>	<p>REGISTERED PROFESSIONAL ENGINEER DENIS M. OYUGI PE-7501 DATE 01/30/24 NORTH DAKOTA</p>
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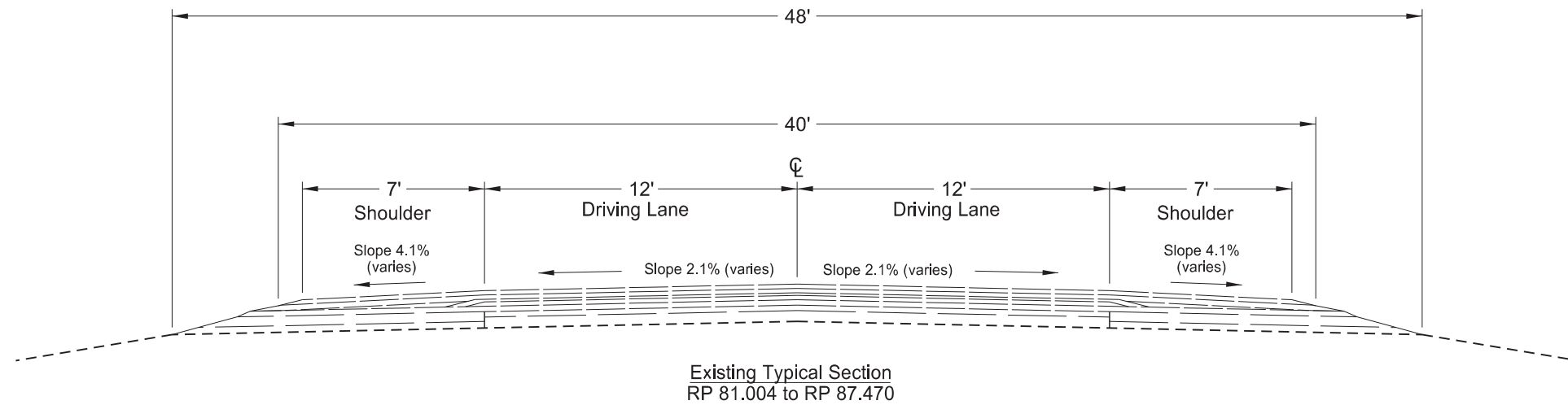
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-012(055)073	30	3



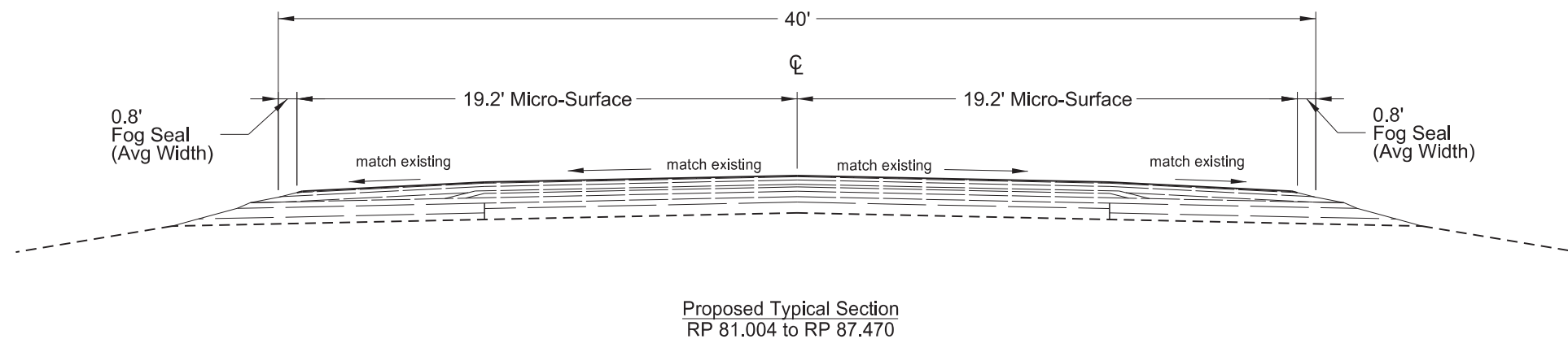
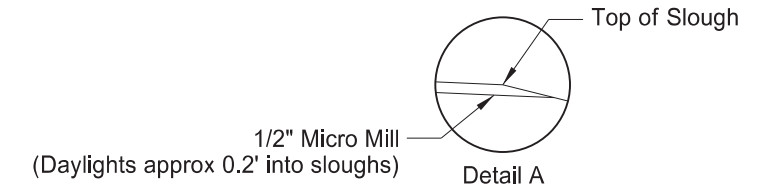
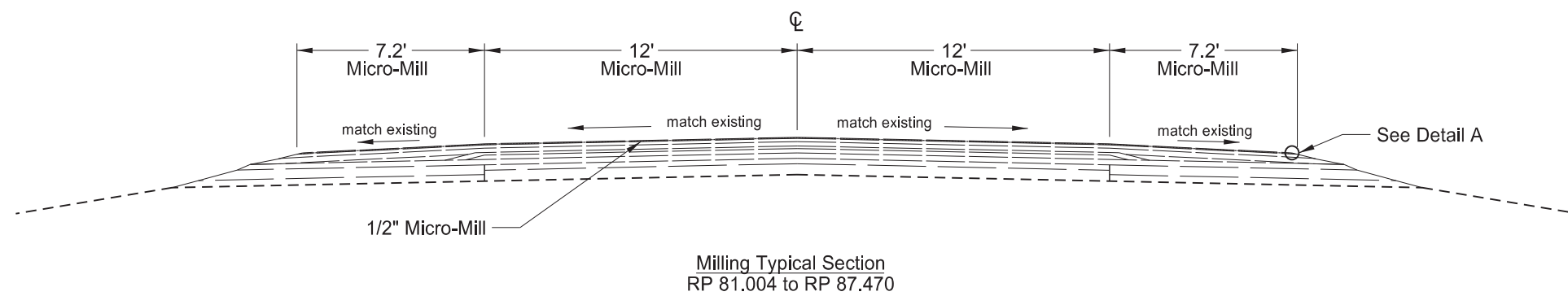
Typical Sections  
Micro Mill & Micro Surfacing  
Hettinger to State Line



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-012(055)073	30	4



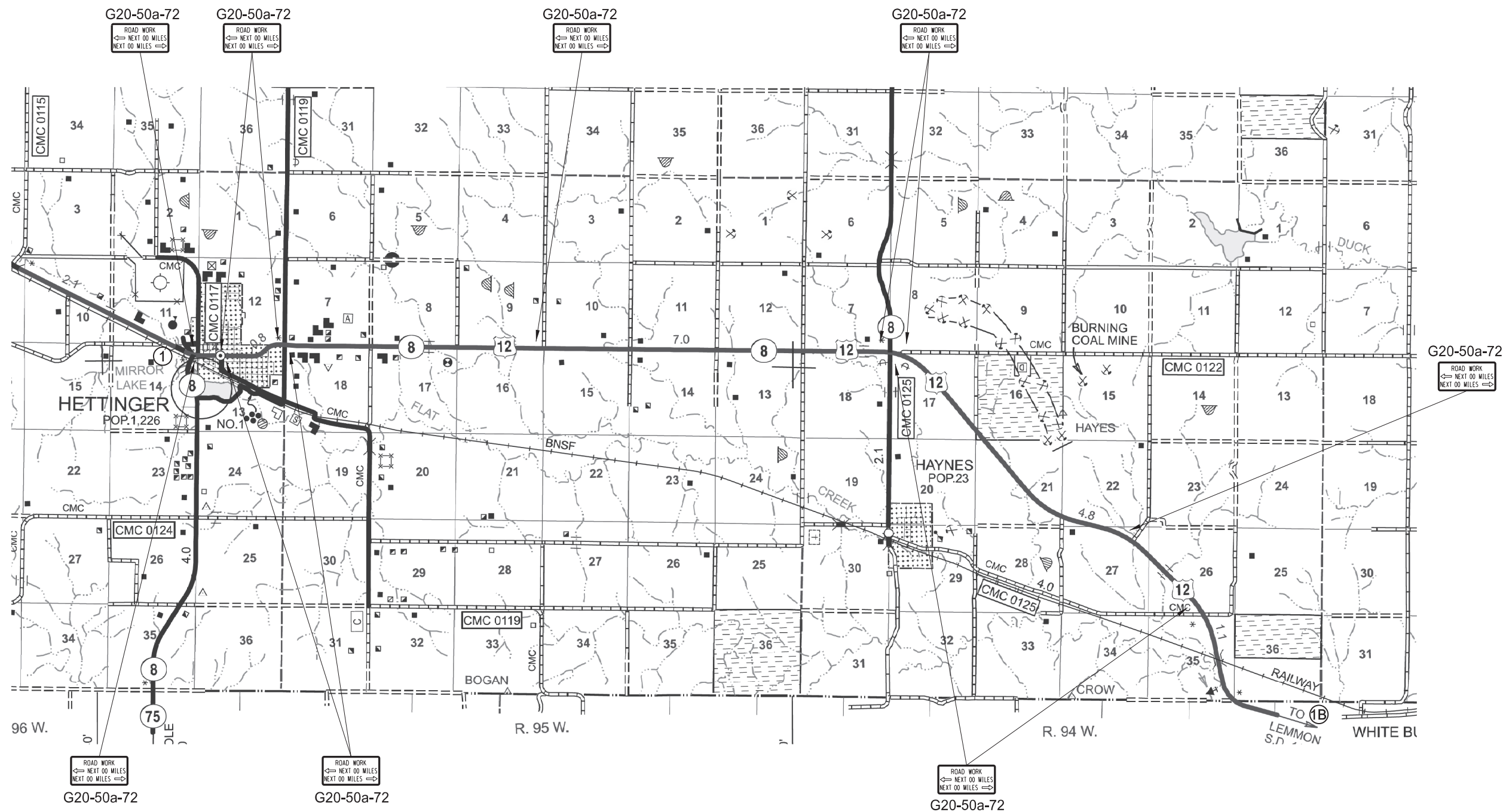
Note:  
Shoulder Rumble strips are 12.5' from CL of Roadway



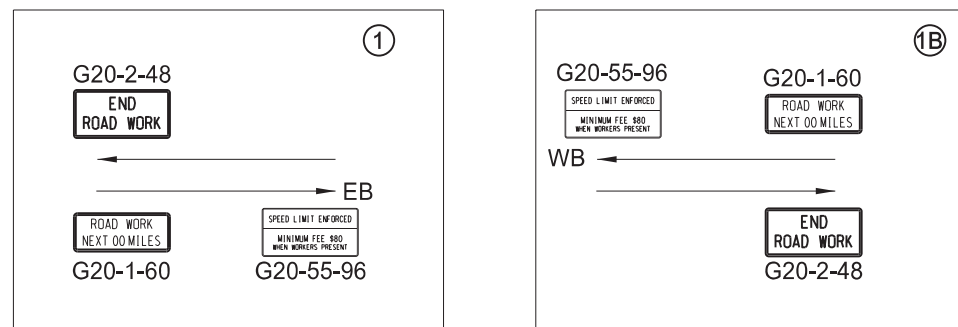
Typical Sections  Micro Mill & Micro Surfacing  Hettinger to State Line	<p>REGISTERED PROFESSIONAL ENGINEER <b>DENIS M. OYUGI</b> PE-7501 DATE 01/30/24 NORTH DAKOTA</p>
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-012(055)073	100	2

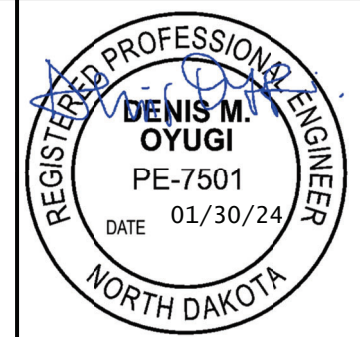


Note: Use D-704-20 for sign spacing.

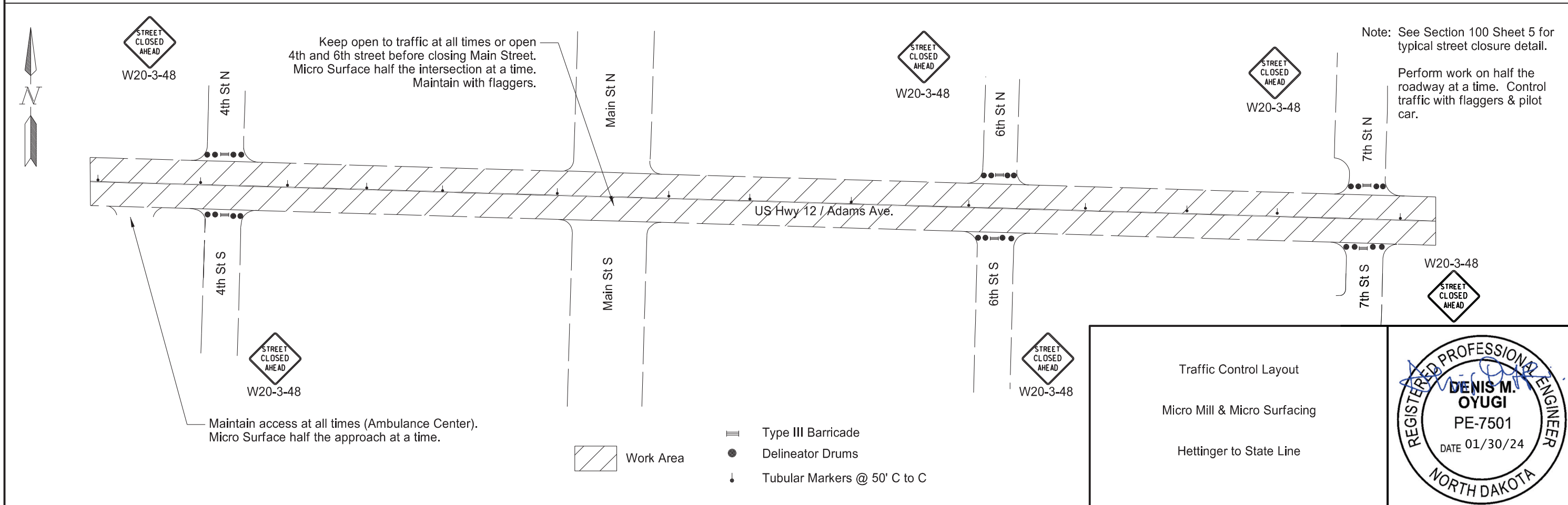
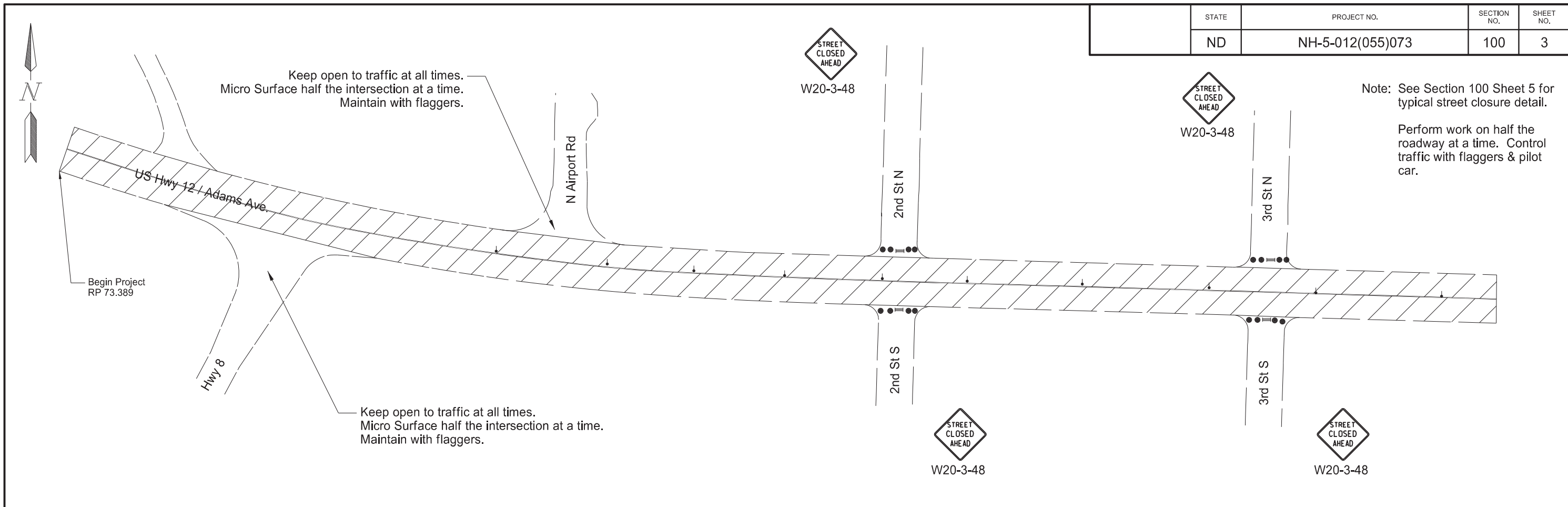






W8-12-48  
Place according to  
D-704-20 Note #6  
Skid Mount Sign

Construction Sign Layout  
(Post Mounted Signs)  
Micro Mill & Micro Surfacing  
Hettinger to State Line



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-012(055)073	100	3

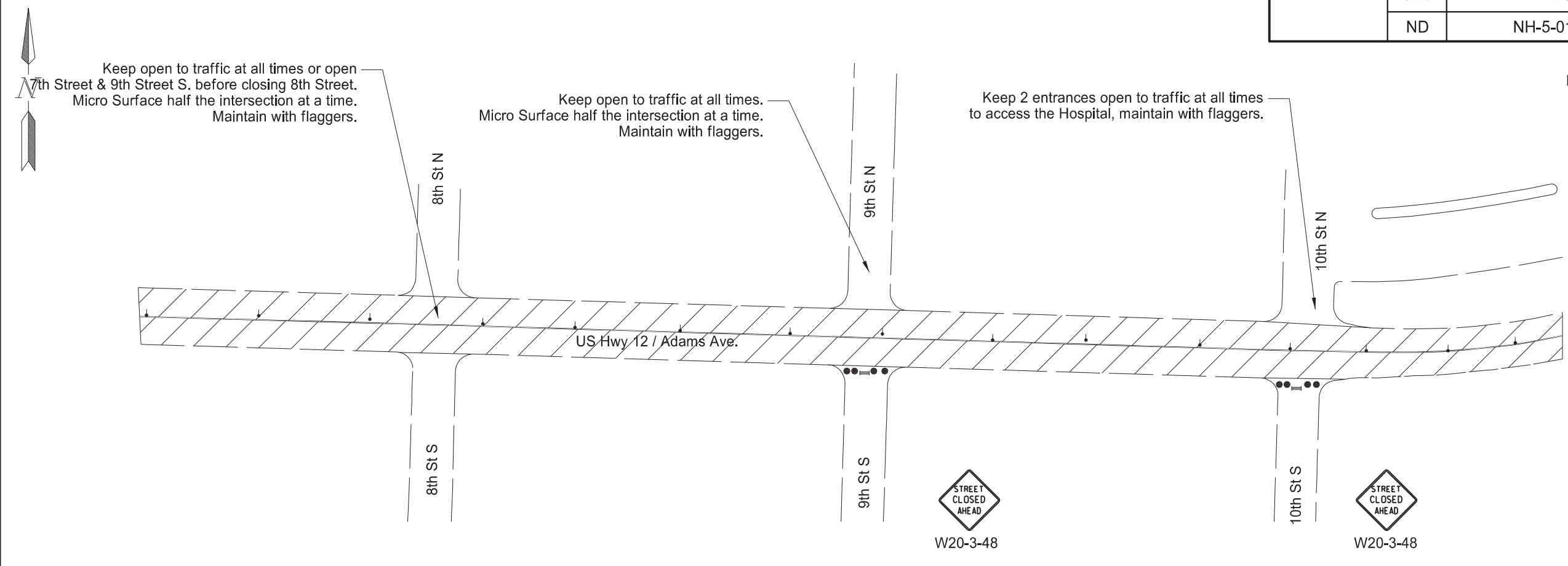


-  Work Area
-  Type III Barricade
-  Delineator Drums
-  Tubular Markers @ 50' C to C

Traffic Control Layout  
 Micro Mill & Micro Surfacing  
 Hettinger to State Line

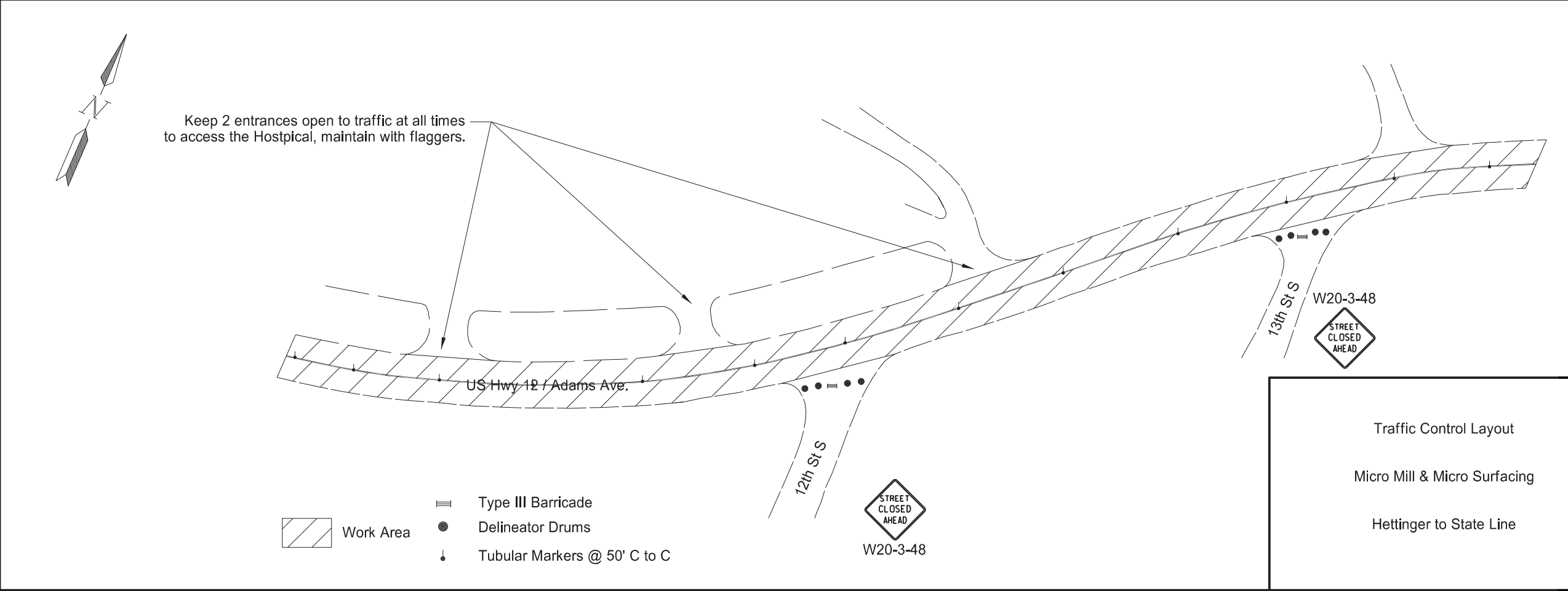


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-012(055)073	100	4







Note: See Section 100 Sheet 5 for typical street closure detail.

Perform work on half the roadway at a time. Control traffic with flaggers & pilot car.



Note: See Section 100 Sheet 5 for typical street closure detail.

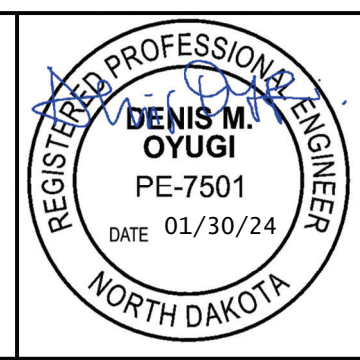
Perform work on half the roadway at a time. Control traffic with flaggers & pilot car.

-  Work Area
-  Type III Barricade
-  Delineator Drums
-  Tubular Markers @ 50' C to C

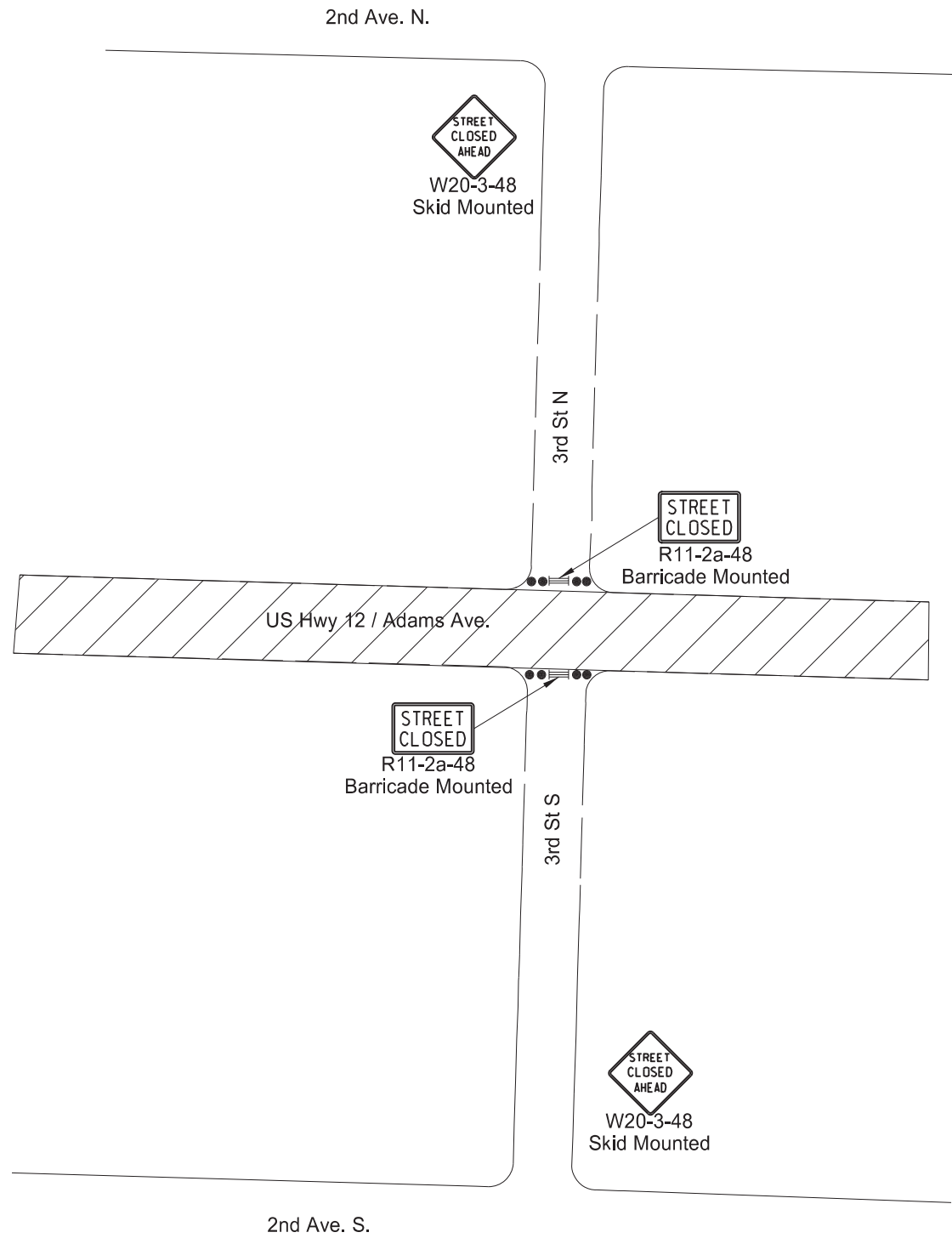
Traffic Control Layout




Micro Mill & Micro Surfacing


Hettinger to State Line



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-012(055)073	100	5



-  Work Area
-  Type III Barricade
-  Delineator Drum

Street Closure Typical Micro Mill & Micro Surfacing Hettinger to State Line	
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NDDOT ABBREVIATIONS

D-101-1

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

Abn abandoned  
 Abut abutment  
 Adj adjusted  
 Aggr aggregate  
 Ahd ahead  
 ARV air release valve  
 Align alignment  
 Al alley  
 Alt alternate  
 Alum aluminum  
 ADA Americans with Disabilities Act  
 & 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

Bk back  
 BF back face  
 Balc balcony  
 B Wire barbed wire  
 Barr barricade  
 Btry battery  
 BI beehive inlet  
 Beg begin  
 BG below grade  
 BM bench mark  
 Bkwy bikeway  
 Bit bituminous  
 Blk block  
 BH bore hole  
 Bot bottom  
 Blvd Boulevard  
 Bndry boundary  
 Brkwy breakaway  
 Br bridge  
 Bldg building  
 Bus. business  
 BV butterfly valve  
 Byp bypass

C Gdrl cable guardrail  
 Calc calculate  
 CIP cast iron pipe  
 CB catch basin  
 CRS cationic rapid setting  
 C Gd cattle guard  
 C To C center to center  
 CL or  $\text{C}$  centerline  
 Ch chain  
 Chnlk chain-link  
 Ch Blk channel block  
 Ch Ch channel change  
 Chk check  
 Chsld chiseled  
 Cir circle  
 Cl class  
 Clnt clean-out  
 Clr clear  
 Cl&gr clearing & grubbing  
 Comb. combination  
 Coml commercial  
 Compr compression  
 CADD computer aided drafting & design  
 Conc concrete  
 CECB concrete erosion control blanket  
 Cond conductor  
 Const construction  
 Cont continuous  
 CSB continuous split barrel sample  
 Contr contraction  
 Contr contractor  
 CP control point  
 Coord coordinate  
 Cor corner  
 Corr corrected  
 CAES corrugated aluminum end section  
 CAP corrugated aluminum pipe  
 CMES corrugated metal end section  
 CMP corrugated metal pipe  
 CPVCP corrugated poly-vinyl chloride pipe  
 CSES corrugated steel end section  
 CSFES corrugated steel flared end section  
 CSP corrugated steel pipe  
 CSTES corrugated steel traversable end section  
 Co County  
 Crse course  
 Ct Court  
 Xarm cross arm  
 Xbuck cross buck  
 Xsec cross sections  
 Xing crossing  
 Xrd crossroad  
 Crn crown

Culv culvert  
 C&G curb & gutter  
 CI curb inlet  
 CR curb ramp  
 C cut  
 Dd Ld dead load  
 Defl deflection  
 Defm deformed  
 DInt delineate  
 DIntr delineator  
 Depr depression  
 Desc description  
 Det detail  
 DWP detectable warning panel  
 Dtr detour  
 Dia or  $\emptyset$  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  
 Evgr evergreen  
 Exc excavation  
 Exst existing  
 Exp expansion  
 Expy Expressway  
 E external of curve  
 Extru extruded

FOS factor of safety  
 Fed Federal  
 FP feed point  
 Fn fence  
 Fn P fence post  
 FO fiber optic  
 FD field drive  
 F fill  
 FAA fine aggregate angularity  
 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  
 Fnd found  
 Fdn foundation  
 Frac fractional  
 Frwy freeway  
 Frt front  
 FF front face  
 F Disp fuel dispenser  
 FFP fuel filler pipes  
 FLS fuel leak sensor  
 Furn furnish/ed

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
05-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions



NDDOT ABBREVIATIONS

Galv	galvanized	Ln	lane	Obsc	obscure(d)	Qty	quantity
Gar	garage	Lg	large	Ocpd	occupied	Qtr	quarter
Gs L	gas line	Lat	latitude	Ocpy	occupy		
G Reg	gas line regulator	Lt	left	O/s	offset		
GMV	gas main valve	Lens	lenses	OC	on center	Rad or R	radius
G Mtr	gas meter	Lvl	level	C	one dimensional consolidation	RR	railroad
GSV	gas service valve	Lvng	leveling	OC	organic content	Rlwy	railway
GVP	gas vent pipe	Lht	light	Orig	original	Rsd	raised
GV	gate valve	LP	light pole	O To O	out to out	RC	rapid curing
Ga	gauge	Ltg	lighting	OD	outside diameter	Rec	record
Gov	government	Liq	liquid	OH	overhead	Recy	recycle
Grd	graded/grade	LL	liquid limit			RAP	recycled asphalt pavement
Grnd	ground	Loc	location			RPCC	recycled portland cement concrete
GWM	ground water monitor	Long.	longitude	PMT	pad mounted transformer	Ref	reference
Gdrl	guardrail	Lp	loop	Pg	pages	R Mkr	reference marker
Gtr	gutter	LD	loop detector	Pntd	painted	RM	reference monument
		Lum	luminaire	Pr	pair	RP	reference point
				Pnl	panel	Refl	reflectorized
				Pk	park	RCB	reinforced concrete box
H Plg	H piling			PSD	passing sight distance	RCES	reinforced concrete end section
Hdwl	headwall	Mb	mailbox	Pvmt	pavement	RCFES	reinforced concrete flared end section
Ht	height	ML	main line	Ped	pedestal	RCP	reinforced concrete pipe
Hel	helical	MH	manhole	Ped	pedestrian	RCPS	reinforced concrete pipe sewer
HDPE	high density polyethylene	Mkd	marked	PPP	pedestrian pushbutton post	RCTES	reinforced concrete traversable end section
HM	high mast	Mkr	marker	Pen.	penetration	Reinf	reinforcement
HP	high pressure	Mkg	marking	Perf	perforated	Res	reservation
HPS	high pressure sodium	MA	mast arm	Per.	perimeter	Res	residence
HTCG	high tension cable guardrail	Matl	material	Perm	permanent	Ret	retaining
Hwy	highway	Max	maximum	PL	pipeline	Rev	reverse
Hor	horizontal	MC	meander corner	PI	place	Rt	right
HBP	hot bituminous pavement	Meas	measure	P&P	plan & profile	R/W	right of way
HMA	hot mix asphalt	Mdn	median	PL	plastic limit	Riv	river
Hyd	hydrant	MD	median drain	Pl or $\bar{P}$	plate	Rd	road
Ph	hydrogen ion content	MC	medium curing	Pt	point	Rdbd	road bed
		MGS	Midwest Guardrail System	PE	polyethylene	Rdwy	roadway
		MM	mile marker	PVC	polyvinyl chloride	RWIS	roadway weather information system
Id	identification	MP	mile post	PCC	Portland Cement concrete	Rk	rock
Incl	inclinometer tube	Min	minimum	PP	power pole	Rt	route
IMH	inlet manhole	Misc	miscellaneous	Preempt	preemption		
ID	inside diameter	Mon	monument	Prefab	prefabricated		
Inst	instrument	Mnd	mound	Prfmd or Pref	performed		
Intchg	interchange	Mtbl	mountable	Prep	preparation		
Intmdt	intermediate	Mtd	mounted	Press.	pressure		
Intscn	intersection	Mtg	mounting	PRV	pressure relief valve		
Inv	invert	Mk	muck	Prestr	prestressed		
IP	iron pipe			Pvt	private		
				PD	private drive		
Jt	joint	Neop	neoprene	Prod.	production/produce		
Jct	junction	Ntwk	network	Prog	programmed		
		N	North	Prop.	property		
		NE	North East	Prop Ln	property line		
		NW	North West	Ppsd	proposed		
		NB	Northbound	PB	pull box		
		No. or #	number				

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

08/16/22

NDDOT ABBREVIATIONS

D-101-3

Salv	salvage(d)	Tel	telephone
San	sanitary sewer line	Tel B	Telephone Booth
Sec	section	Tel P	telephone pole
SL	section line	Tv	television
Sep	separation	Temp	temperature
Seq	sequence	Temp	temporary
Serv	service	TBM	temporary bench mark
Sht	sheet	T	thinwall tube sample
Shtng	sheeting	Ts	topsoil
Shldr	shoulder	Traf	traffic
Sw or Sdwk	sidewalk	TSCB	traffic signal control box
SD	sight distance	Tr	trail
SN	sign number	Transf	transformer
Sig	signal	Trans	transition
Sgl	single	TT	transmission tower
SRCP	slotted reinforced concrete pipe	TES	traversable end section
SC	slow curing	Trans	transverse
SS	slow setting	Trtd	treated
Sm	small	Trmt	treatment
S	South	Qc	triaxial compression
SE	South East	TERO	tribal employment rights ordinance
SW	South West	Tpl	triple
SB	Southbound	Typ	typical
Sp	spaces		
Spcl	special	Qu	unconfined compressive strength
SA	special assembly	Ugrnd	underground
SP	special provisions	Util	utility
G	specific gravity		
Spk	spike	VG	valley gutter
SB	split barrel sample	Vap	vapor
SH	sprinkler head	Vert	vertical
SV	sprinkler valve	VCP	vitrified clay pipe
Sq	square	Vol	volume
Stk	stake	VSFS	vehicle speed feedback sign
Std	standard		
N	standard penetration test	Wkwy	walkway
Std Specs	standard specifications	W	water content
Stm L	steam line	WGV	water gate valve
SEC	steel encased concrete	WL	water line
SMA	stone matrix asphalt	WM	water main
SSD	stopping sight distance	WMV	water main valve
SD	storm drain	W Mtr	water meter
St	street	WSV	water service valve
SPP	structural plate pipe	WW	water well
SPPA	structural plate pipe arch	Wrng	wearing
Str	structure	WIM	weigh in motion
Subd	subdivision	W	west
Sub	subgrade	WB	westbound
Sub Prep	subgrade preparation	Wrng	wiring
Ss	subsoil	W/	with
SS	supplement specification	W/o	without
Supp	supplemental	WC	witness corner
Surf	surfacing		
Surv	survey		
Sym	symmetrical		

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08/16/22

MEASUREMENTS

ac acres  
 A ampere  
 Bd Ft board feet  
 Cd candela  
 cm centimeter  
 C coulomb  
 CF cubic feet  
 m3 cubic meter  
 m3/s cubic meters per second  
 CY cubic yard  
 CY/mi cubic yards per mile  
 D or Deg degree  
 F Fahrenheit  
 F farad  
 ft feet/foot  
 Gal gallon  
 G giga  
 Ha hectare  
 H henry  
 Hz hertz  
 hr hour(s)  
 in inch  
 J joule  
 K kelvin  
 kN kilo newton  
 kPa kilo pascal  
 kg kilogram  
 kg/m3 kilogram per cubic meter  
 km kilometer  
 K Kip(s)  
 LF linear foot  
 L litre  
 Lm lumen  
 L sum lump sum  
 Lx lux  
 M Hr man hour  
 M mega  
 m meter  
 m/s meters per second  
 mi mile  
 mL milliliter  
 mm millimeter  
 mm/hr millimeters per hour  
 n nano  
 N newton  
 Pa pascal  
 lb pounds  
 sec seconds  
 S siemens  
 SF square feet  
 km2 square kilometer  
 m2 square meter  
 SY square yard  
 Sta Yd station yards  
 SI Systems International

T tesla  
 T/mi tons per mile  
 V volt  
 W watt  
 Wb weber

SURVEY DESCRIPTIONS

Az azimuth  
 Bs backsight  
 Brg bearing  
 BP Cap blue plastic cap  
 BS both sides  
 BC brass cap  
 CS curve to spiral  
 Eq equation  
 E external of curve  
 FS far side  
 FB field book  
 Fs foresight  
 Geod geodetic  
 GIS Geographical Information System  
 GPS Global Positioning System  
 HI height of instrument  
 IM iron monument  
 I Pn iron pin  
 LS Land Surveyor (licensed)  
 LSIT Land Surveyor In Training  
 L length of curve  
 LC long chord  
 LB level book  
 Mer meridian  
 M mid ordinate of curve  
 NGS National Geodetic Survey  
 NS near side  
 Obsn observation  
 Off Loc office location  
 OP Cap orange plastic cap  
 PK Parker-Kalon nail  
 P Cap plastic cap  
 PP Cap pink plastic cap  
 PCC point of compound curve  
 PC point of curve  
 PI point of intersection  
 PRC point of reverse curvature  
 PT point of tangent  
 POC point on curve  
 POT point on tangent  
 RTP random traverse point  
 Rge range  
 RP Cap red plastic cap  
 SC spiral to curve  
 ST spiral to tangent  
 Sta station  
 SE superelevation  
 Tan tangent  
 T tangent (semi)  
 TS tangent to spiral  
 Twp township  
 TB transit book  
 TP traverse point  
 TP turning point  
 USC&G US Coast & Geodetic Survey  
 USGS US Geologic Survey  
 VC vertical curve  
 WGS World Geodetic System  
 YP Cap yellow plastic cap  
 Z zenith

SOIL TYPES

Cl clay  
 Cl F clay fill  
 Cl Hvy clay heavy  
 Cl Lm clay loam  
 Co S coal slack  
 C Gr coarse gravel  
 CS coarse sand  
 FS fine sand  
 Gr gravel  
 Lig Co lignite coal  
 Lig Sl lignite slack  
 Lm loam  
 Rk rock  
 Sd sand  
 Sdy Cl sandy clay  
 Sdy Cl Lm sandy clay loam  
 Sdy Fl sandy fill  
 Sdy Lm sandy loam  
 Sc scoria  
 Sh shale  
 Si Cl silt clay  
 Si Cl Lm silty clay loam  
 Si Lm silty loam

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

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# LINE STYLES

D-101-20

## Existing Topography

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

## Proposed Topography

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

## Existing Utilities

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

## Proposed Utilities

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

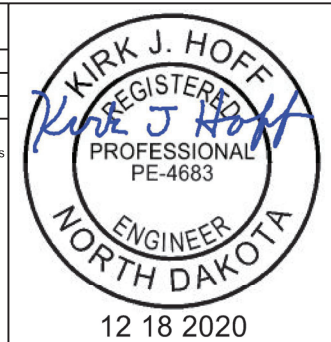
## Traffic Utilities

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

## Sign Structures

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

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# LINE STYLES

D-101-21

## Right Of Way

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

## Boundary Control

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

## Cross Sections and Typical

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

## Geotechnical

- D ----- D ----- Geotextile Fabric Type D
- **Geo** ----- **Geo** ----- Geogrid
- R ----- R ----- Geotextile Fabric Type R
- R ----- R ----- Geotextile Fabric Type R1
- RR ----- RR ----- Geotextile Fabric Type RR
- S ----- S ----- Geotextile Fabric Type S

## Countours

- Depression Contours
- Supplemental Contour

## Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

## Striping

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

## Pavement Joints

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

## Bridge Details

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

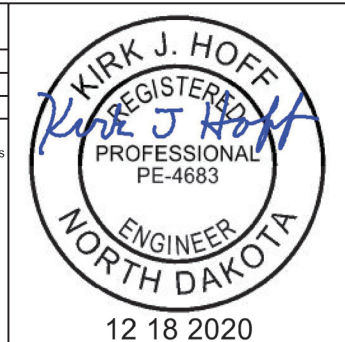
## Erosion Control

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

## Environmental

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

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SYMBOLS



North Arrow (Half Scale)



Alignment Data Point



Alignment Monument



Spot Elevation



Existing Miscellaneous Spot



Existing Access Control Arrow



Existing Benchmark



Reset USGS Marker



Iron Monument Found



Iron Pin R/W Monument



Property Corner



Iron Pin Reference Monument



Right of Way Marker (Exst, Ppsd, Reset)



Existing Federal Reference Corner



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



Existing Witness Corner



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



Existing Traverse PI Aerial Panel



Existing Reference Marker Point NGS



Existing EFB Misc



Existing Bush or Shrub



Existing Large Evergreen Tree



Existing Small Evergreen Tree



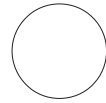
Existing Large Tree



Existing Small Tree



Existing Tree Trunk



Cairn or Stone Circle



Existing Artifact



Existing Satellite Dish



Existing Weather Station



Existing Windmill or Tower



Reinforced Pavement



Continuous Split Barrel Sample



Flight Auger Sample



Split Barrel Sample



Thinwall Tube Sample



Standard Penetration Test



Inclinometer Tube



Excavation Unit



Existing Ground Water Well Bore Hole

















































































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# SYMBOLS

D-101-32

 Existing Luminaire  Luminaire LED  Existing Light Standard Luminaire  Relocate Light Standard  Light Standard Light LED Luminaire  Light Standard 35 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 100 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 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 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Emergency Vehicle Detector  Video Detection Camera	  High Mast Light Standard 3 Luminaire (Exst, Ppsd)   High Mast Light Standard 4 Luminaire (Exst, Ppsd)   High Mast Light Standard 5 Luminaire (Exst, Ppsd)   High Mast Light Standard 6 Luminaire (Exst, Ppsd)   High Mast Light Standard 7 Luminaire (Exst, Ppsd)   High Mast Light Standard 8 Luminaire (Exst, Ppsd)   High Mast Light Standard 9 Luminaire (Exst, Ppsd)   High Mast Light Standard 10 Luminaire (Exst, Ppsd)   Overhead Sign Structure Load Center (Exst, Ppsd)   Traffic Signal Controller (Exst, Ppsd)   Pad Mounted Traffic Signal Controller (Exst, Ppsd)   Flashing Beacon (Exst, Ppsd)   Concrete Foundation (Exst, Ppsd)   Pipe Mounted Flasher (Exst, Ppsd)   Pad Mounted Feed Point (Exst, Ppsd)   Pipe Mounted Feed Point with Pad (Exst, Ppsd)   Pole Mounted Feed Point (Exst, Ppsd)   Junction Box (Exst, Ppsd)  Existing Pedestrian Head with Number  Existing Signal Head  Pole Mounted Head  Existing Lighting Standard Pole	 Existing Traffic Signal Standard    Pull Box (Exst-Ppsd-Undefined)   Intelligent Transportation Pull Box (Exst, Ppsd)   Transformer (Exst, Ppsd)    Power Pole (Exst-Ppsd-with Transformer)   Wood Pole (Exst, Ppsd)   Pedestrian Push Button Post (Exst, Ppsd)  Existing Pole  Existing Telephone Pole  Existing Post     Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
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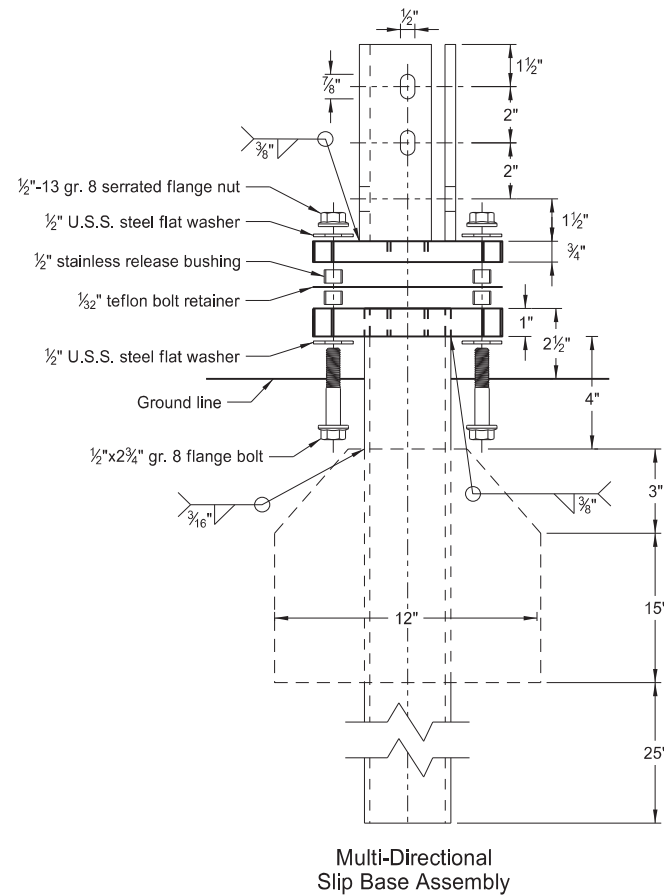
**KIRK J. HOFF**  
REGISTERED  
PROFESSIONAL  
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PE-4683

12 18 2020



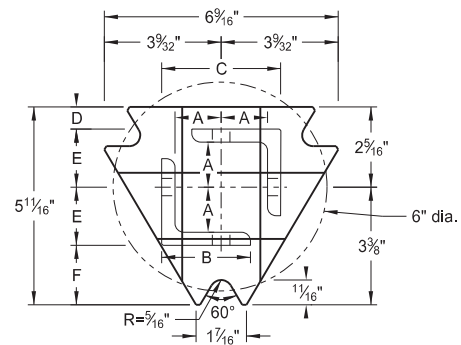
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

Perforated Tube



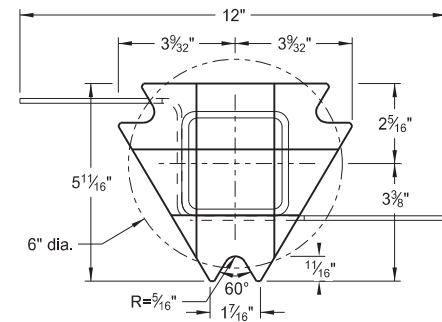
Multi-Directional Slip Base Assembly

Traffic Flow

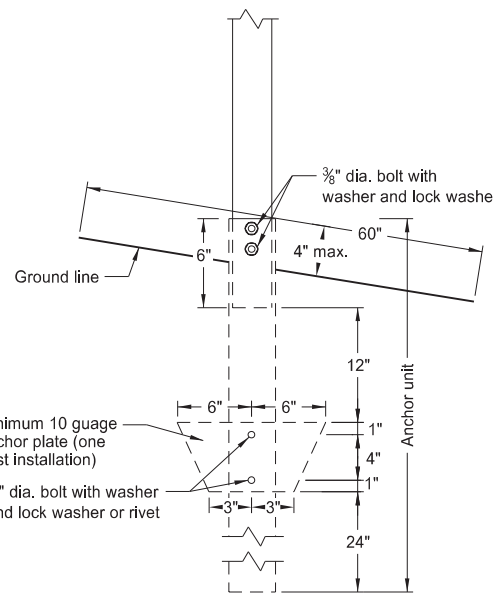


Top Post Receiver  
Plate - ASTM A572 grade 50  
Angle Receiver - 2 1/2" x 2 1/2" x 3/8" ASTM A36 structural angle

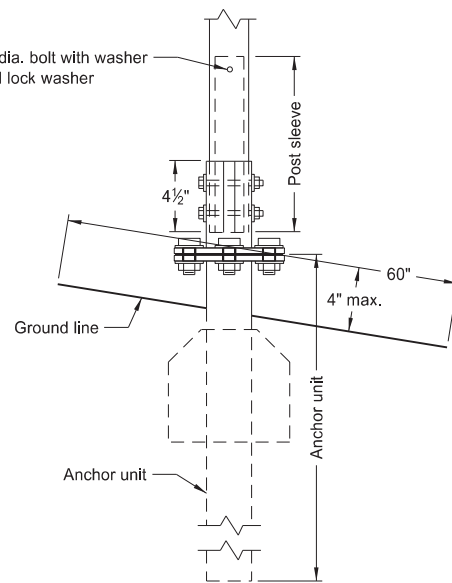
Traffic Flow



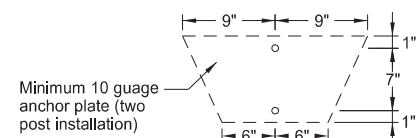
Bottom Soil Stub  
Tube - 3"x3"x7 gauge ASTM A500 grade B tube  
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011  
Plate - ASTM A572 grade 50



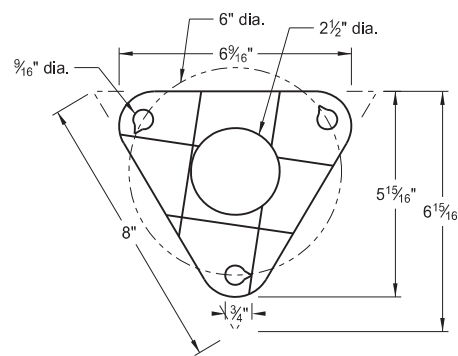
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



Minimum 10 gauge anchor plate (two post installation)



Bolt Retainer for Base Connection  
Bolt Retainer - 1/2" Reprocessed Teflon

Notes:

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

Telescoping Perforated Tube

Number of Posts	Post Size in.	Wall 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 1/2	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube

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

Top Post Receiver Data Table

Square Post Sizes (B)	A	B	C	D	E	F
2 3/16" x 10 ga.	1 5/16"	2 1/2"	3 1/2"	2 5/32"	1 3 3/64"	1 7/8"
2 1/2" x 10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 2 1/32"	1 3/4"

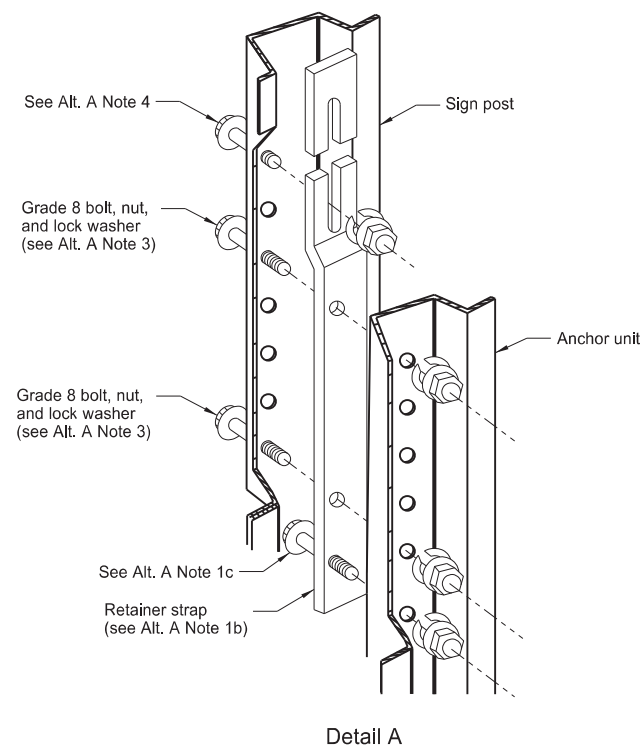
(A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.

(B) For additional wind load, insert the 2 3/16" x 10 ga. into 2 1/2" x 10 ga.

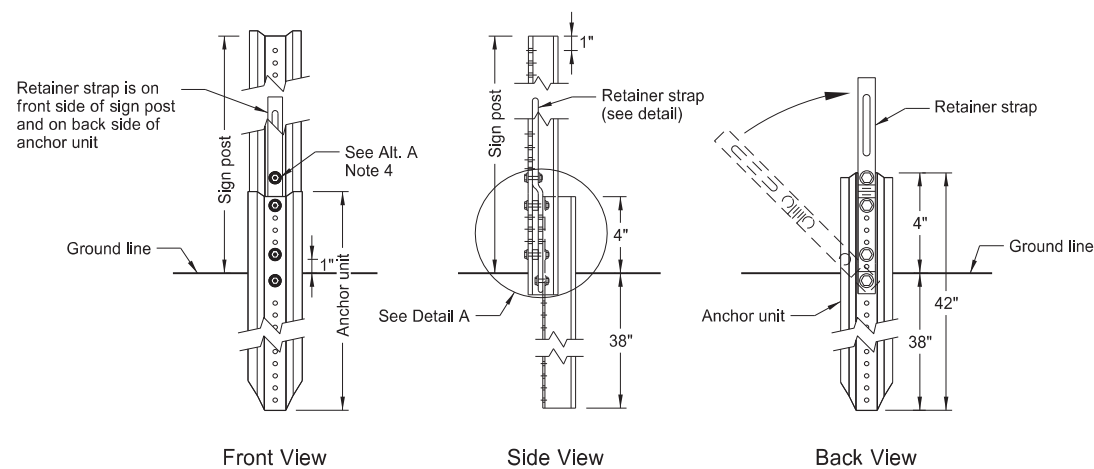
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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U-Channel Post



Detail A



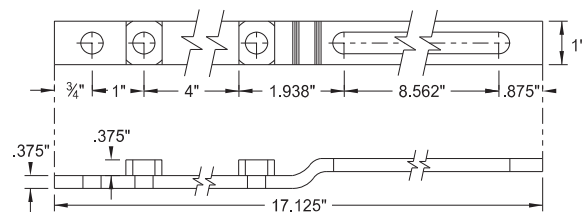
Front View

Side View

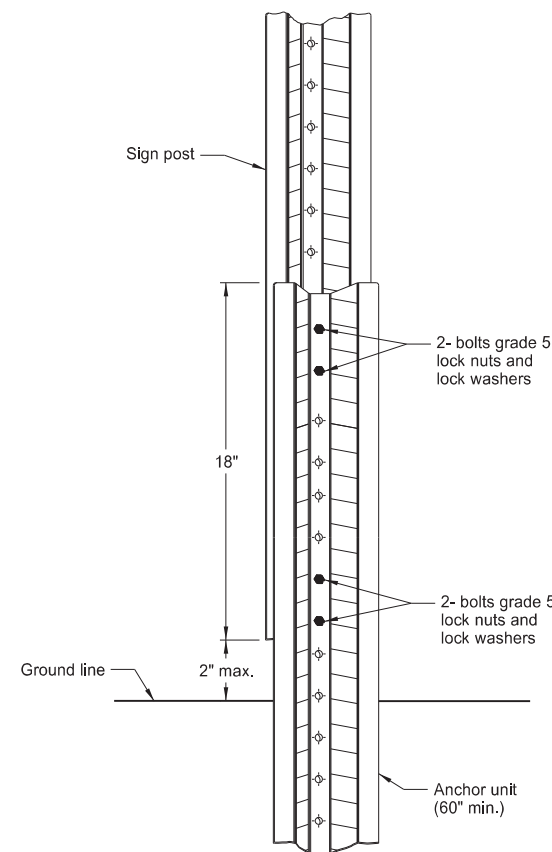
Back View

Breakaway U-Channel Detail Alternate A

Install a maximum of 2 posts within 7'.

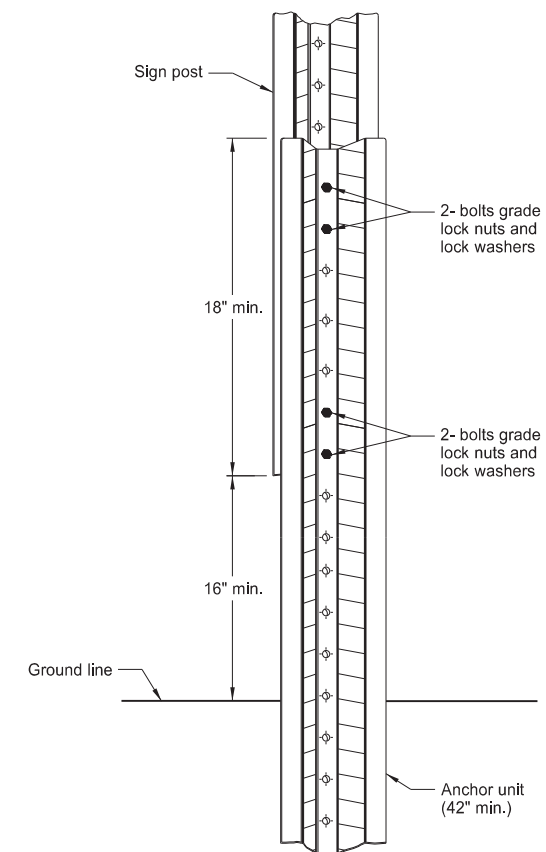


Retainer Strap Detail



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

Install a maximum of 3 posts within 7'.



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

Install a maximum of 3 posts within 7'.

Alternate A Steps of Installation:

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

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

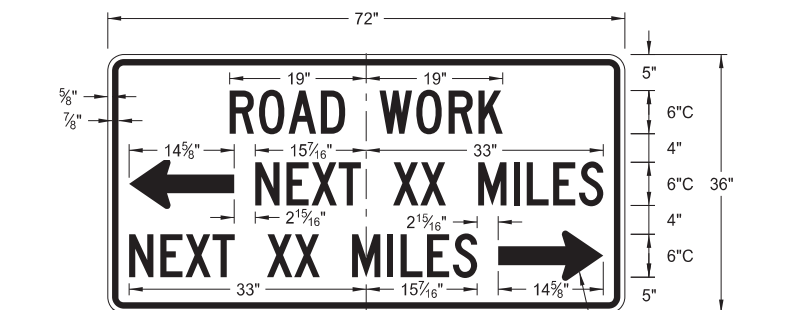
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CONSTRUCTION SIGN DETAILS  
TERMINAL AND GUIDE SIGNS

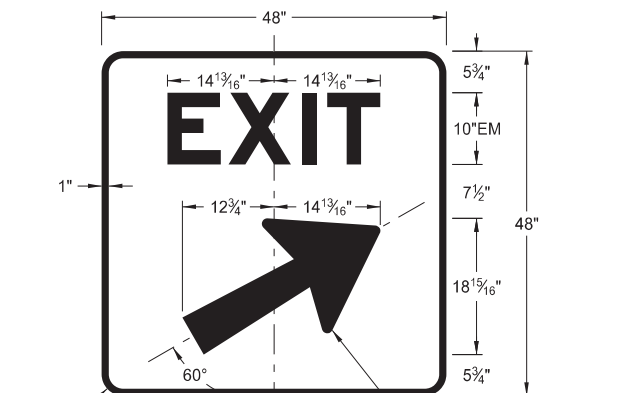
D-704-9



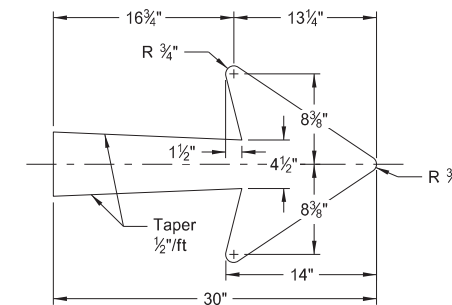
G20-1-60  
Legend: black (non-refl)  
Background: orange



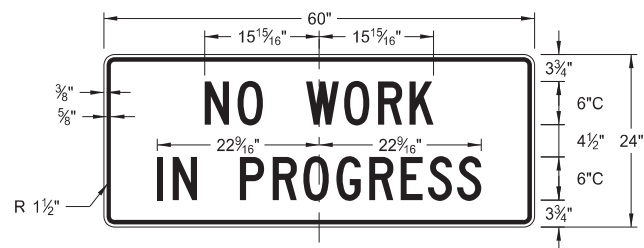
G20-50a-72  
Legend: black (non-refl)  
Background: orange



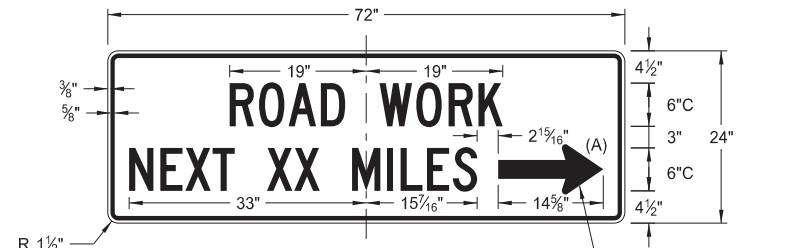
E5-1(L or R)-48  
Legend: white  
Background: green (orange optional)



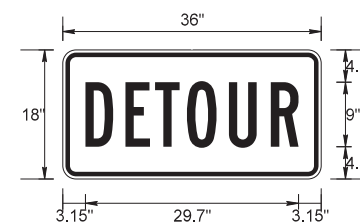
E5-1-48



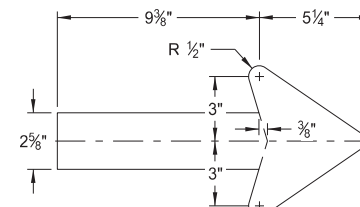
G20-1b-60  
Legend: black (non-refl)  
Background: orange



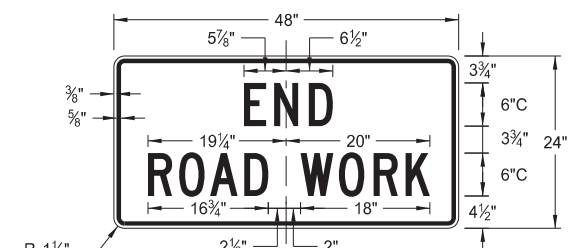
G20-52a-72  
Legend: black (non-refl)  
Background: orange



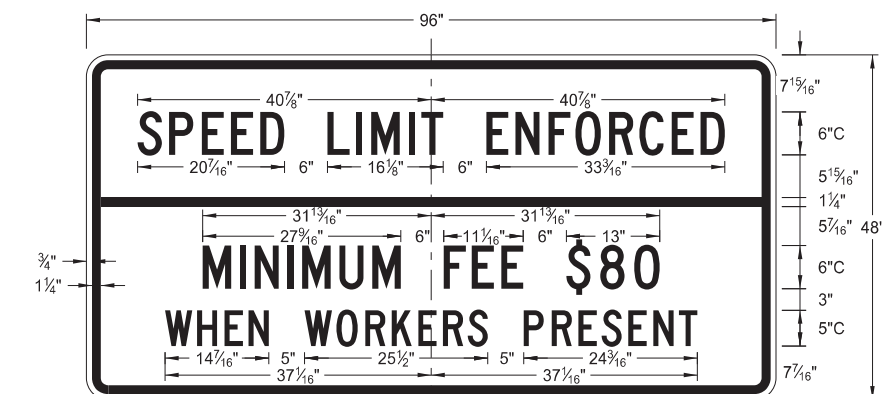
M4-8-36  
Legend: black (non-refl)  
Background: orange



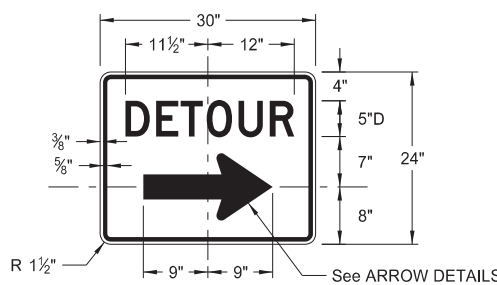
G20-50a-72  
G20-52a-72



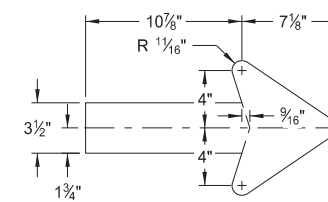
G20-2-48  
Legend: black (non-refl)  
Background: orange



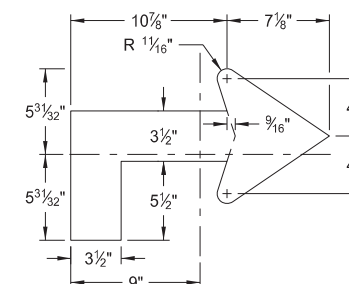
G20-55-96  
Legend: black (non-refl)  
Background: orange



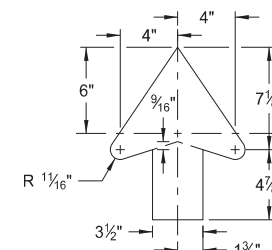
M4-9(L or R)-30 &  
M4-9-30  
Legend: black (non-refl)  
Background: orange



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



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



M4-9-30  
Straight

ARROW DETAILS

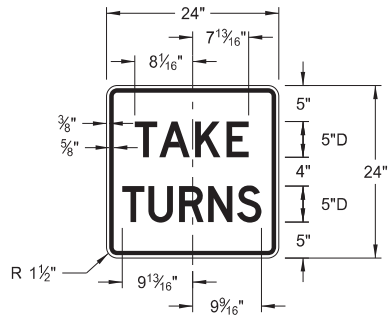
NOTES:

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

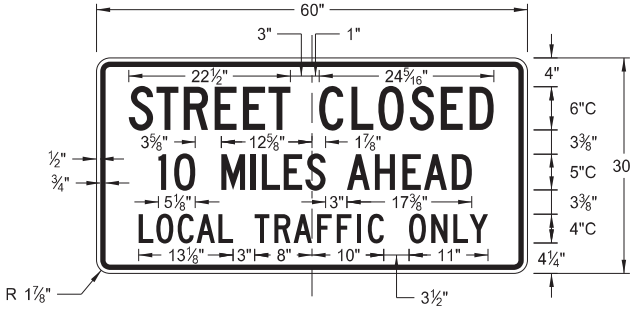
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17 10-03-19	Added sign & background color New Design Engineer PE Stamp

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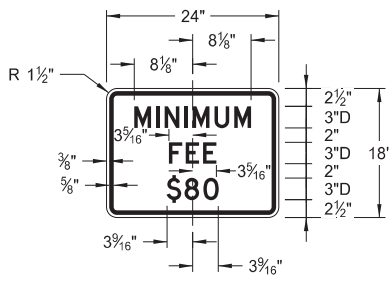
CONSTRUCTION SIGN DETAILS  
REGULATORY SIGNS



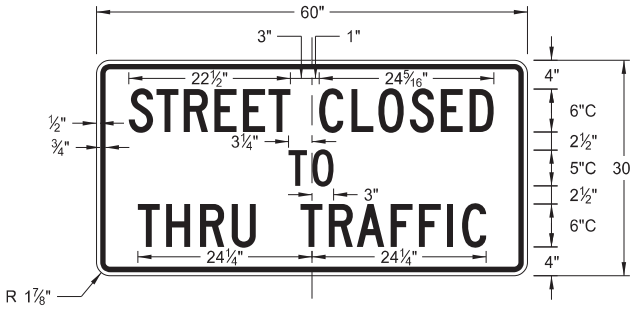
R1-50P-24  
Legend: black (non-refl)  
Background: white



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



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



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

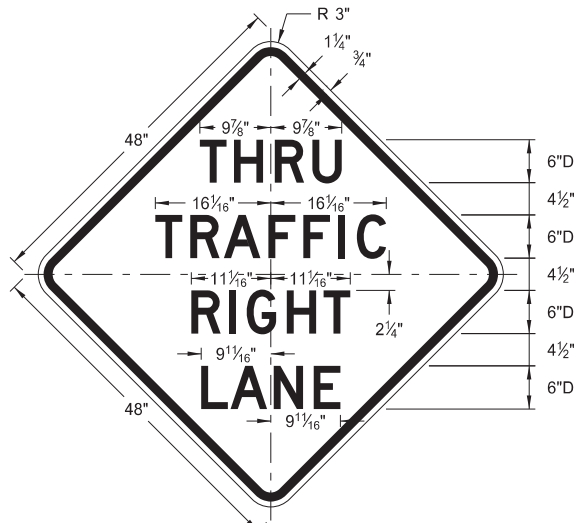


R11-2a-48  
Legend: black (non-refl)  
Background: white

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

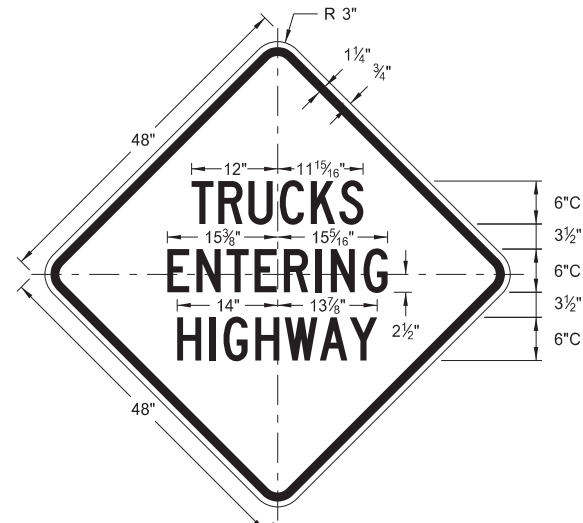
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CONSTRUCTION SIGN DETAILS  
WARNING SIGNS



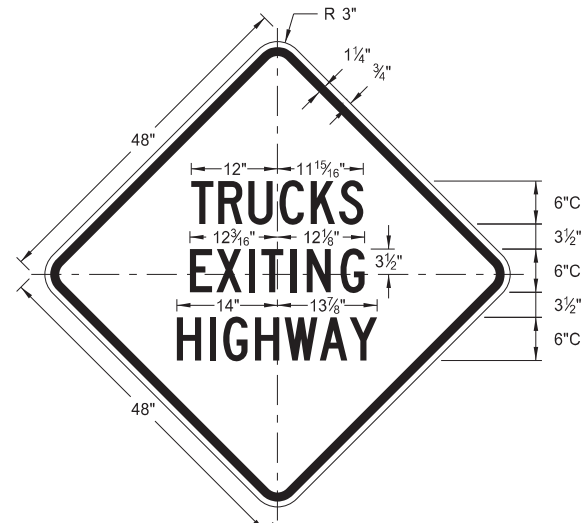
W5-8-48

Legend: black (non-refl)  
Background: orange



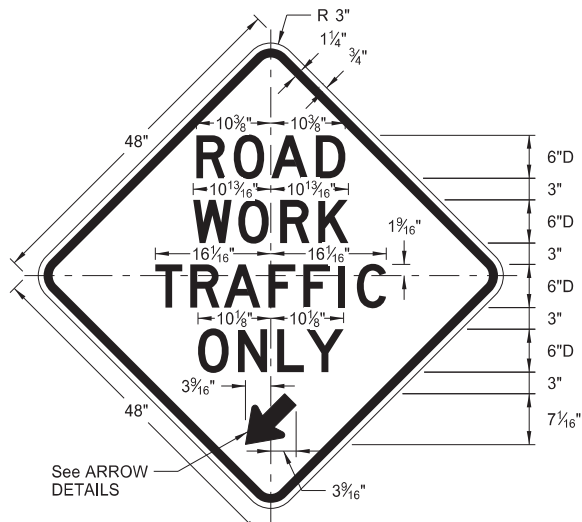
W8-53-48

Legend: black (non-refl)  
Background: orange



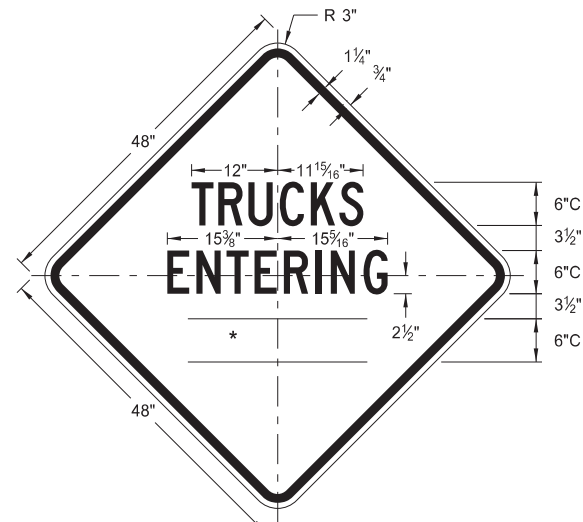
W8-56-48

Legend: black (non-refl)  
Background: orange



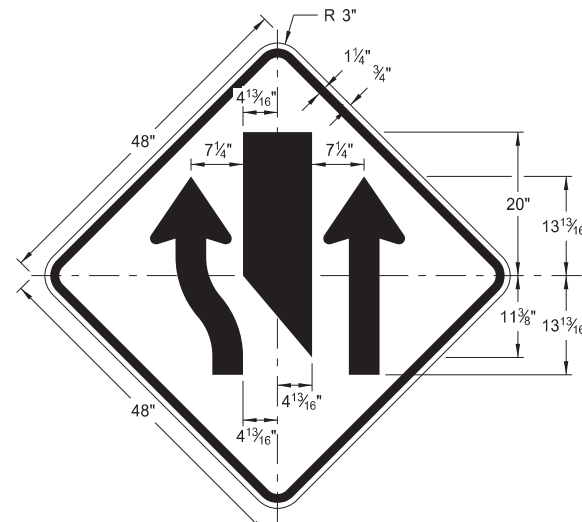
W5-9-48

Legend: black (non-refl)  
Background: orange



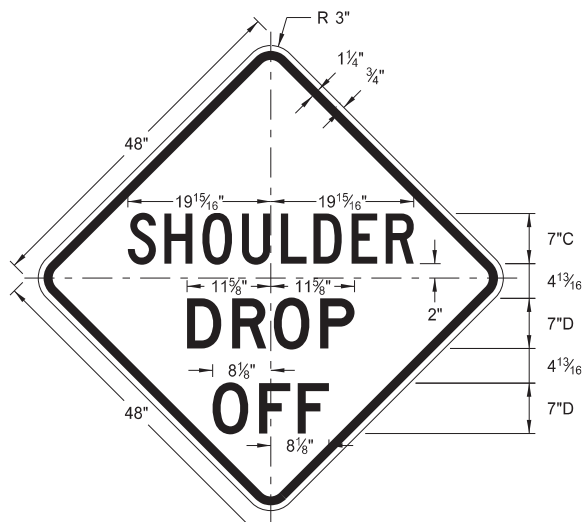
W8-54-48

Legend: black (non-refl)  
Background: orange



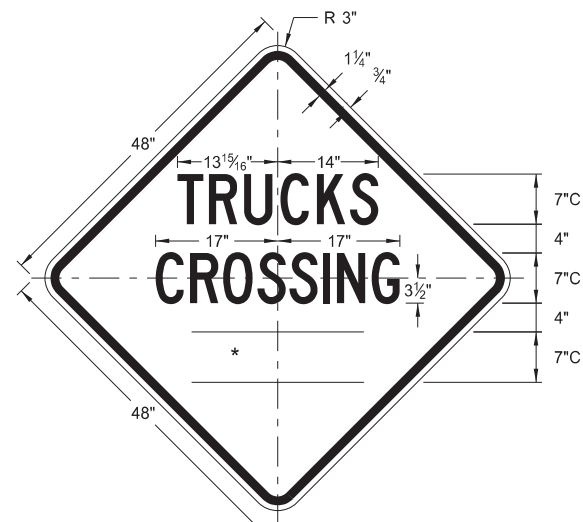
W9-3a-48

Legend: black (non-refl)  
Background: orange



W8-9a-48

Legend: black (non-refl)  
Background: orange

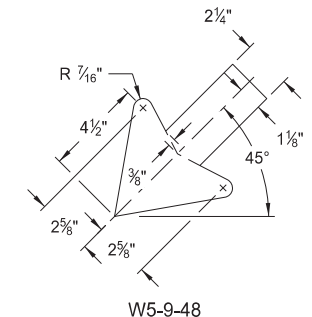


W8-55-48

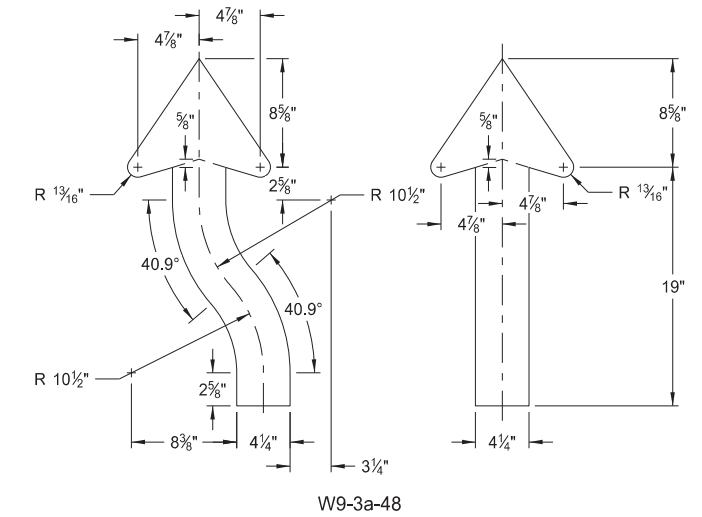
Legend: black (non-refl)  
Background: orange

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
1/2 MILE	Reduce 50%
1 MILE	Standard

\* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

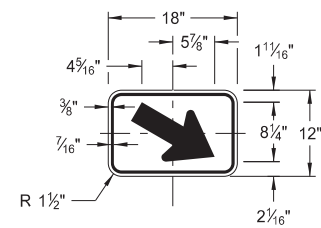
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

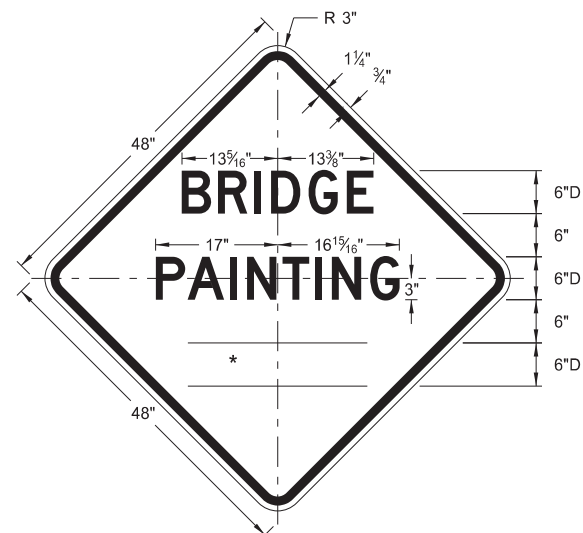
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

\* DISTANCE MESSAGES



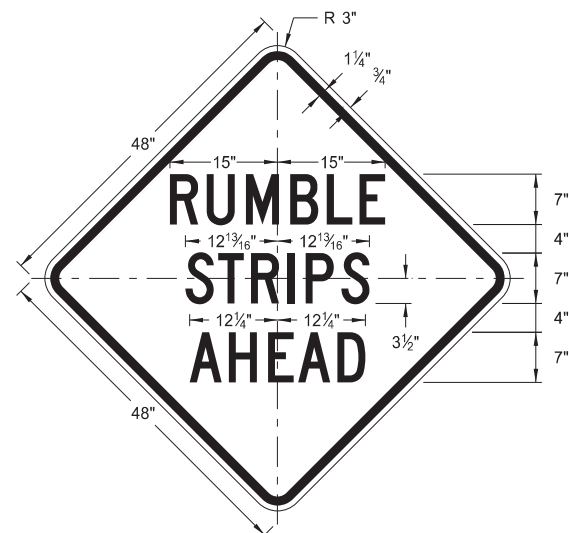
W16-7aP-18

Legend: black (non-refl)  
Background: orange



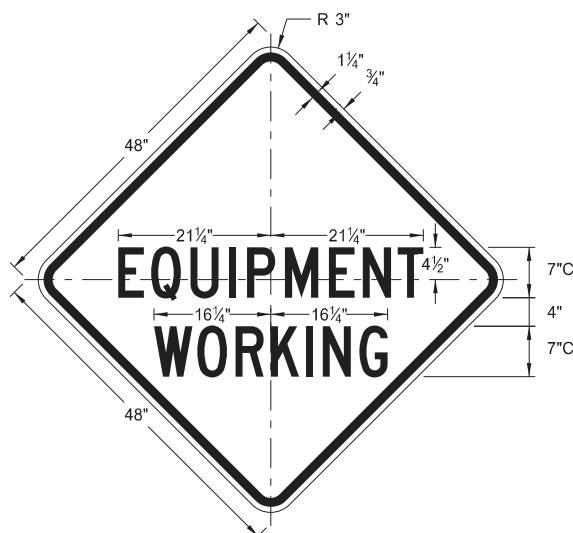
W21-50-48

Legend: black (non-refl)  
Background: orange



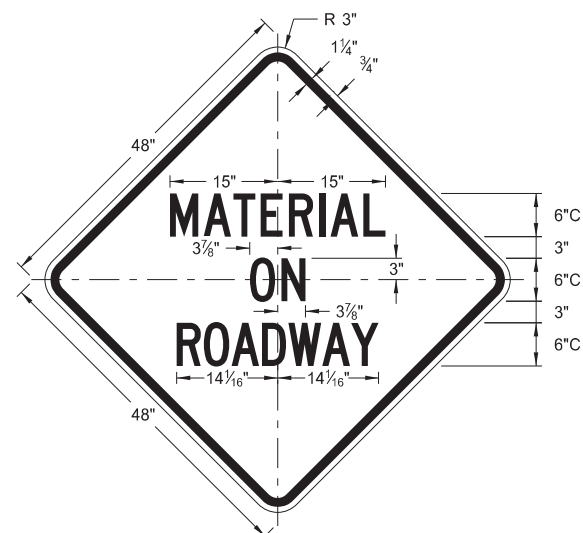
W21-53-48

Legend: black (non-refl)  
Background: orange



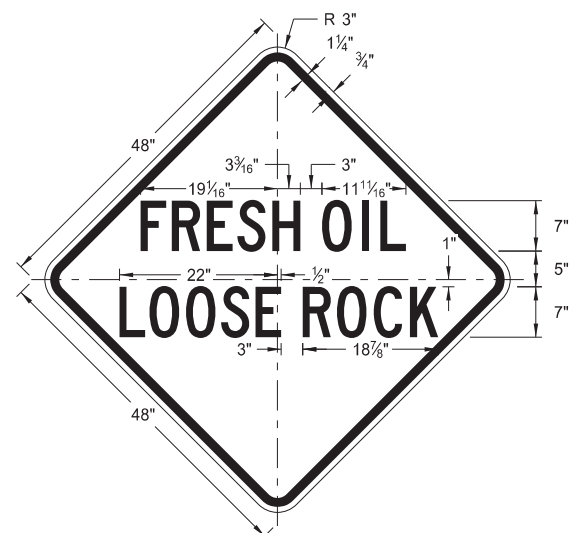
W20-51-48

Legend: black (non-refl)  
Background: orange



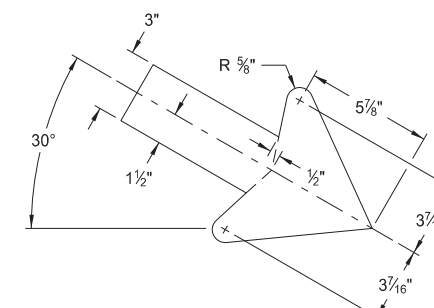
W21-51-48

Legend: black (non-refl)  
Background: orange

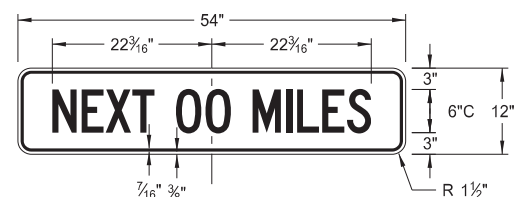


W22-8-48

Legend: black (non-refl)  
Background: orange

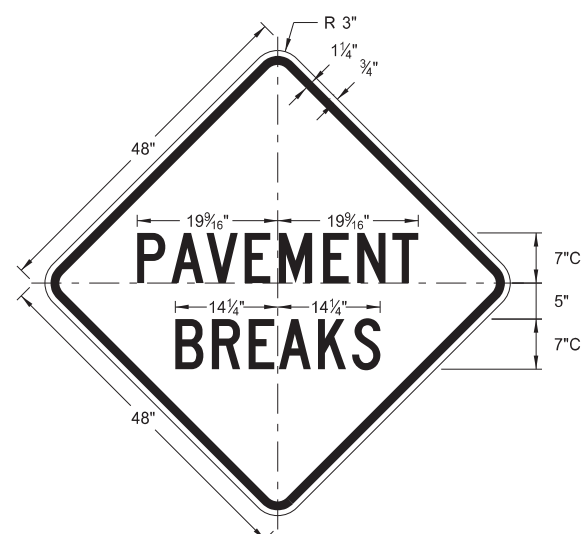


W16-7aP-18



W20-52P-54

Legend: black (non-refl)  
Background: orange



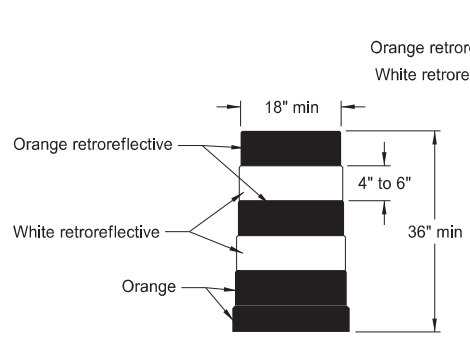
W21-52-48

Legend: black (non-refl)  
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE
11-01-19	Added details for sign W16-7aP-18.

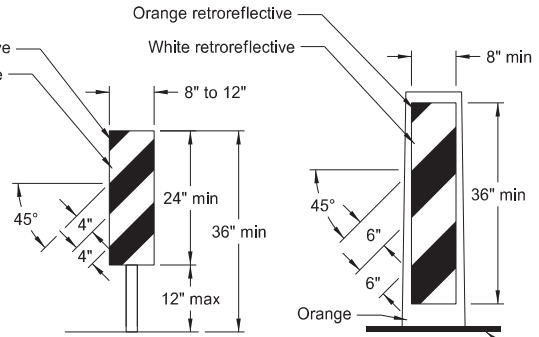
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BARRICADE AND CHANNELIZING DEVICE DETAILS



DELINEATOR DRUM

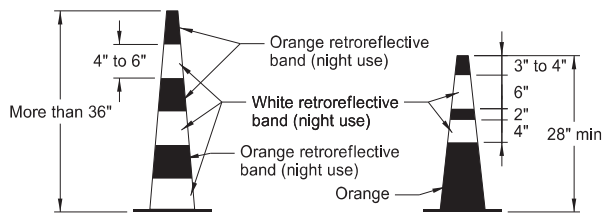
Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and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



BACK TO BACK VERTICAL PANEL STACKABLE

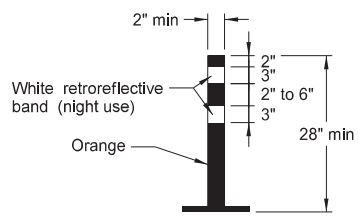
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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

Molded rubber base (min weight 30 lbs)



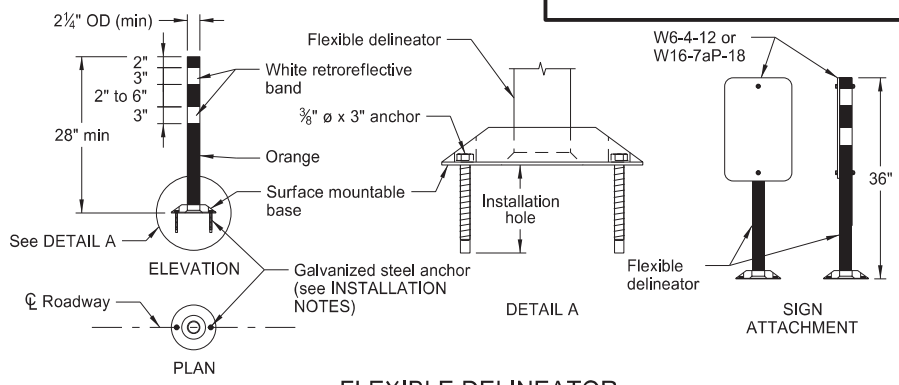
TRAFFIC CONE

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



TUBULAR MARKER

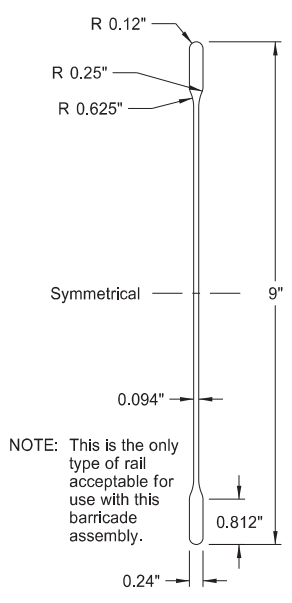
Provide retroreflectORIZATION of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

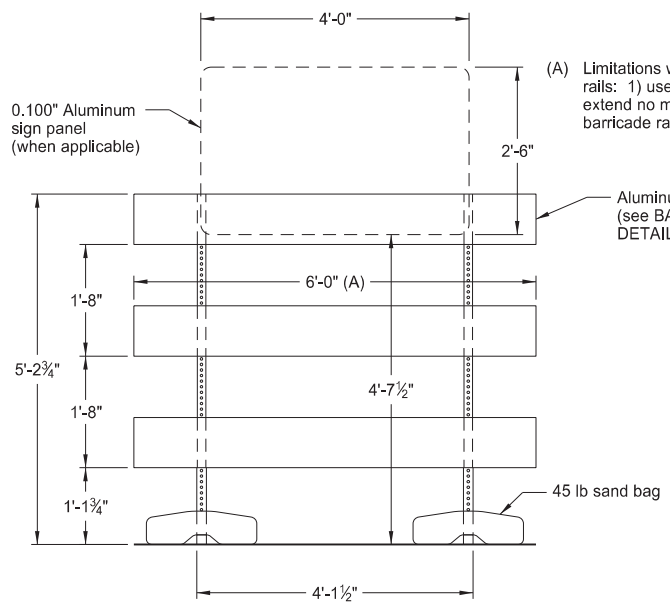
INSTALLATION NOTES:

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

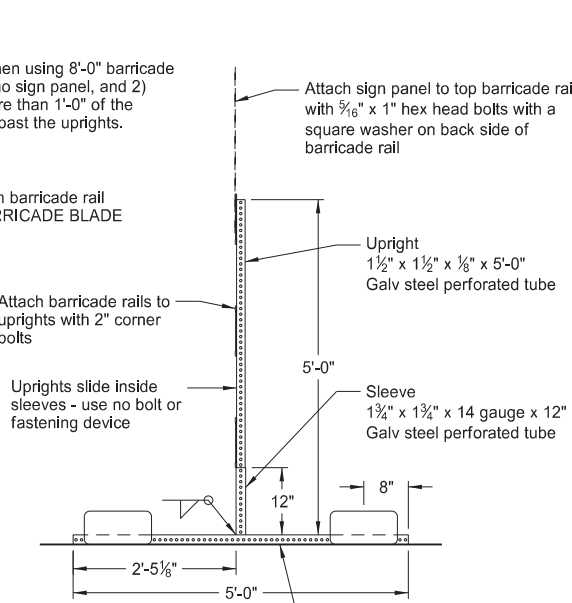


BARRICADE BLADE DETAIL

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

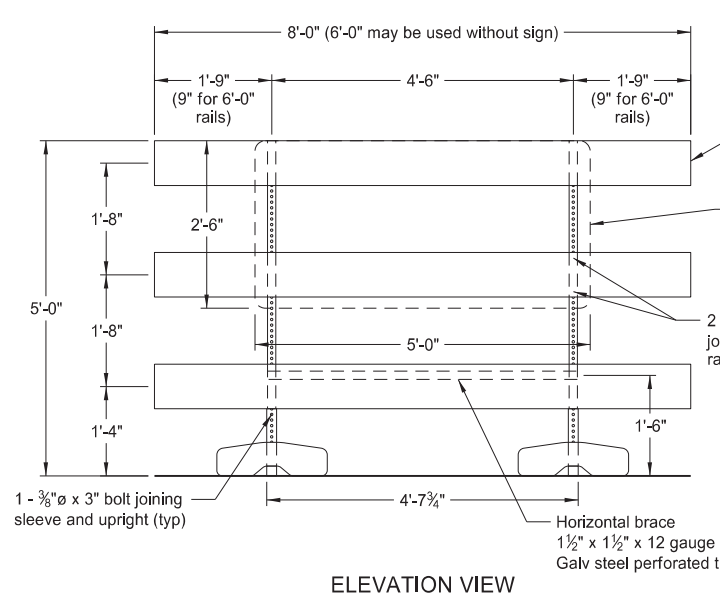


ELEVATION VIEW BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)



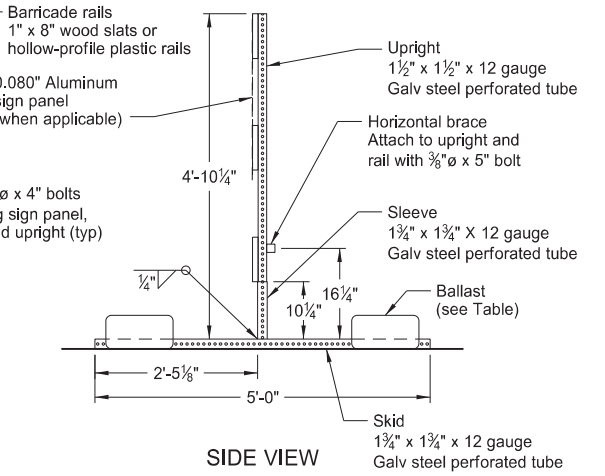
SIDE VIEW

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



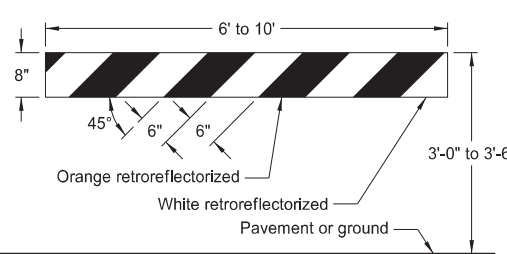
ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

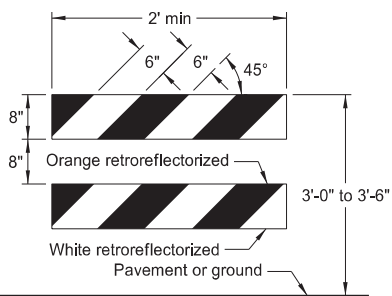


SIDE VIEW

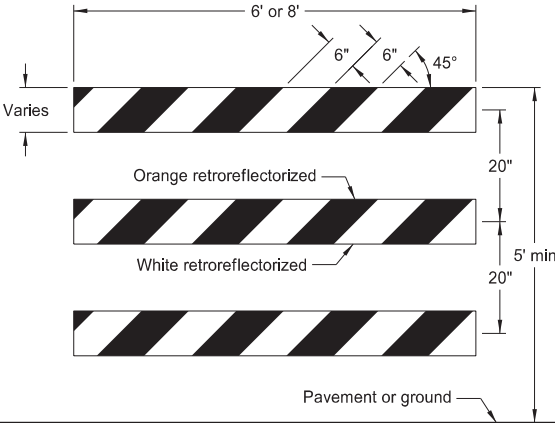
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

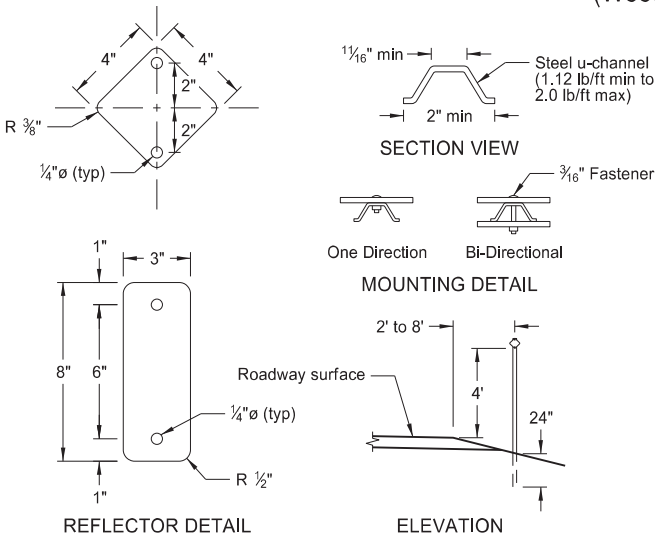


TYPE II BARRICADE



TYPE III BARRICADE

BARRICADE RAIL DETAILS



REFLECTOR DETAIL

ELEVATION

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

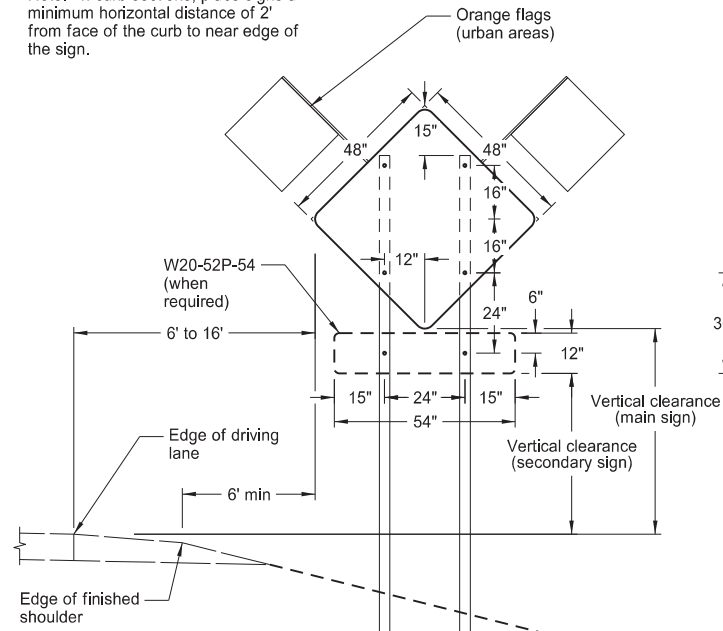
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

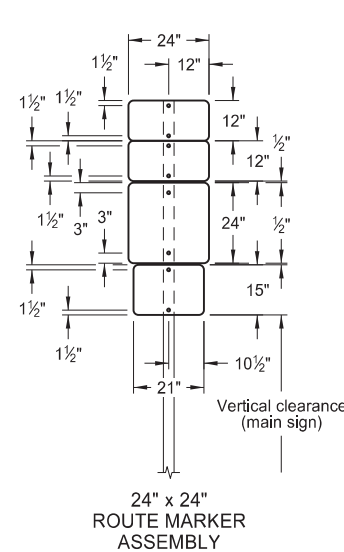
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

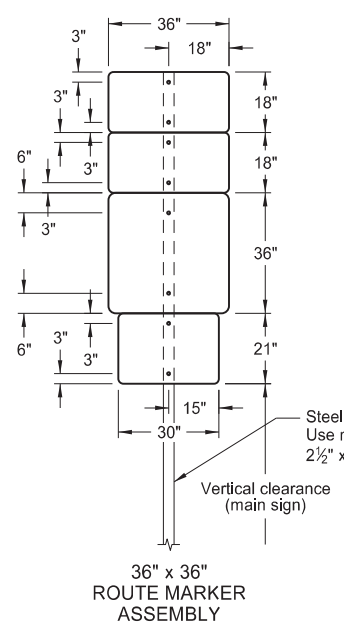
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



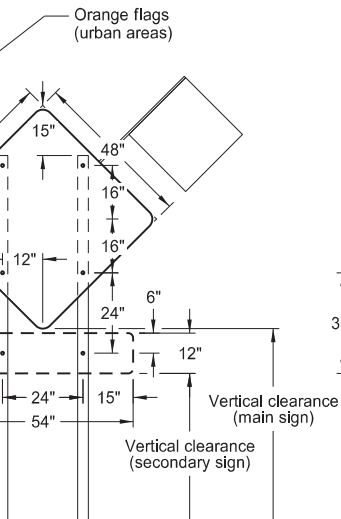
TYPICAL SECTION  
(48" x 48" diamond warning sign shown)



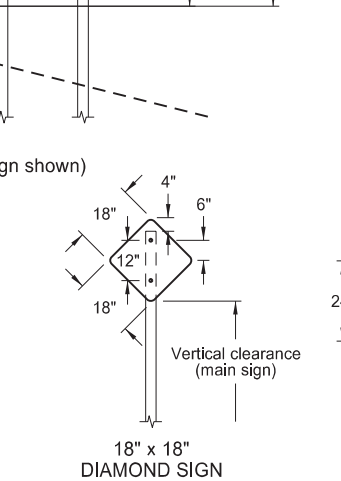
24" x 24" ROUTE MARKER ASSEMBLY



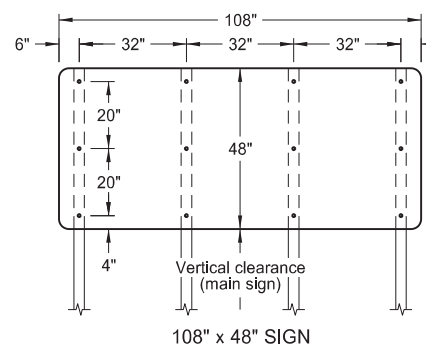
36" x 36" ROUTE MARKER ASSEMBLY



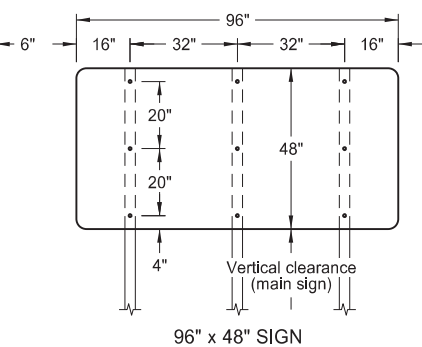
18" x 18" DIAMOND SIGN



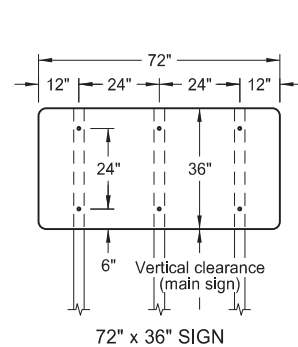
48" x 48" DIAMOND SIGN  
(with 30" x 24" secondary sign)



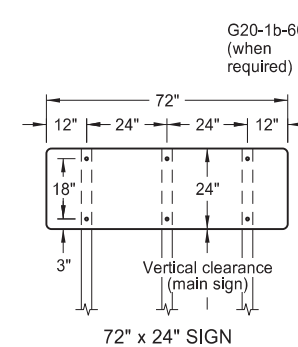
108" x 48" SIGN



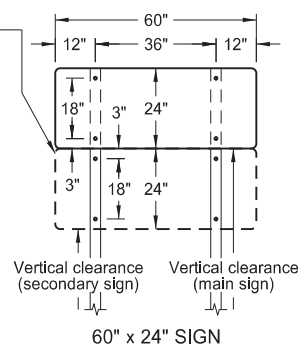
96" x 48" SIGN



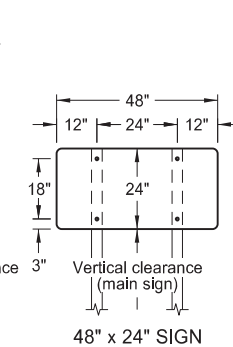
72" x 36" SIGN



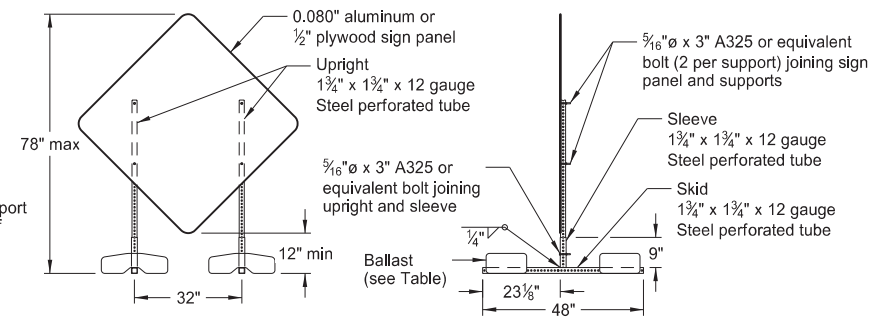
72" x 24" SIGN



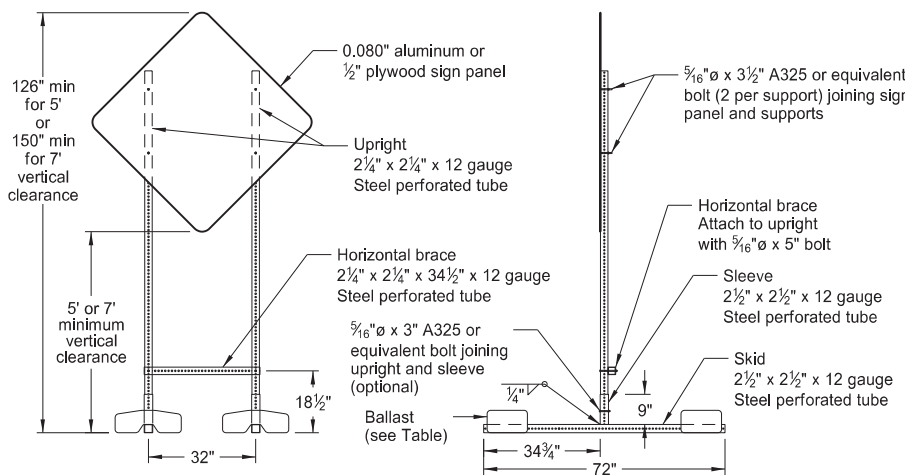
60" x 24" SIGN



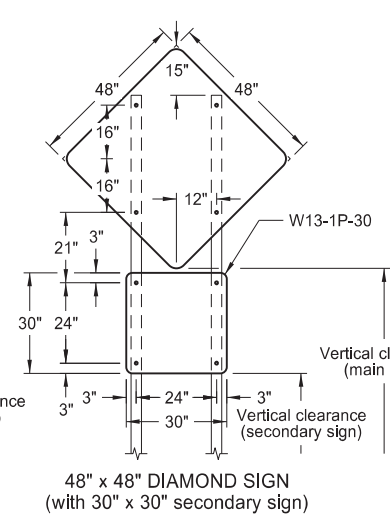
48" x 24" SIGN



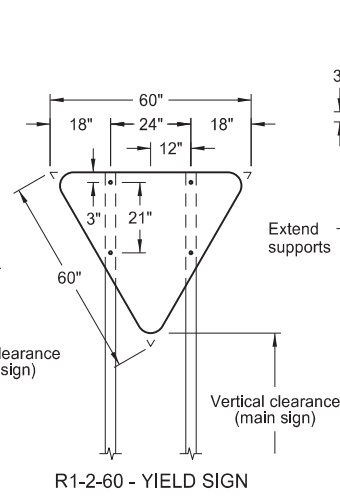
PORTABLE SIGN SUPPORT  
LOW-MOUNTING HEIGHT



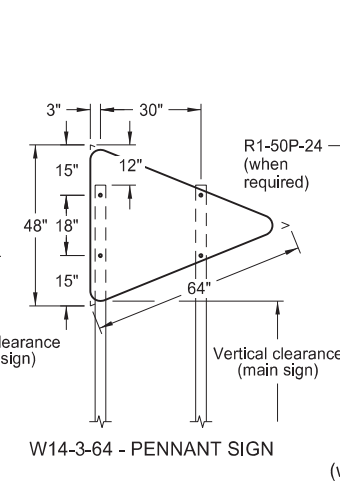
PORTABLE SIGN SUPPORT  
HIGH-MOUNTING HEIGHT



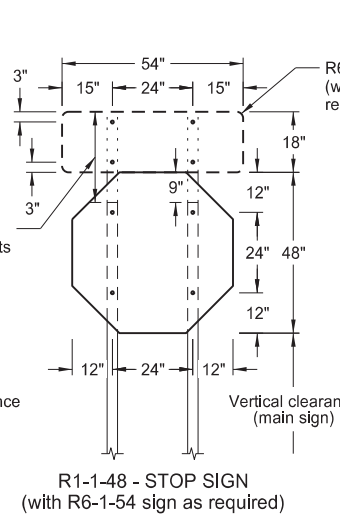
48" x 48" DIAMOND SIGN  
(with 30" x 30" secondary sign)



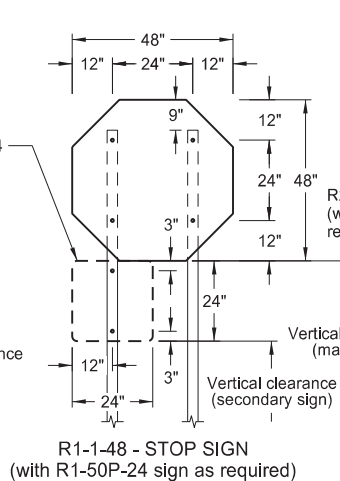
R1-2-60 - YIELD SIGN



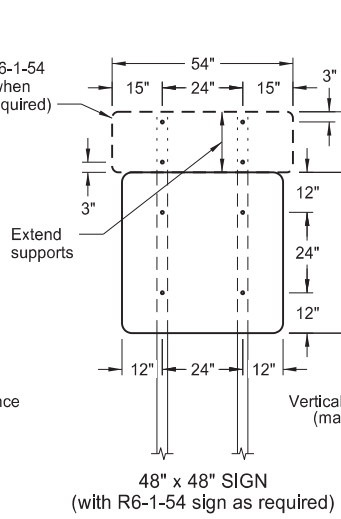
W14-3-64 - PENNANT SIGN



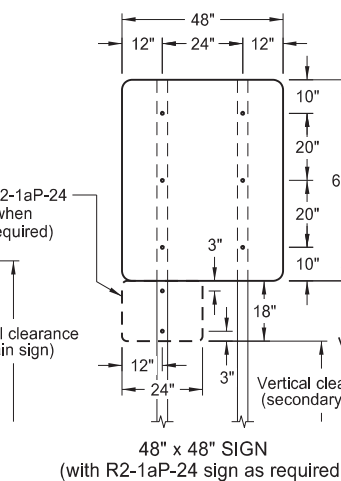
R1-1-48 - STOP SIGN  
(with R6-1-54 sign as required)



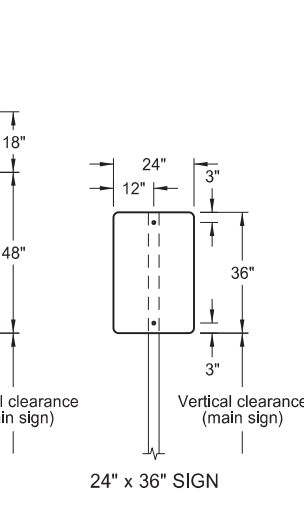
R1-1-48 - STOP SIGN  
(with R1-50P-24 sign as required)



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



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



24" x 36" SIGN

NOTES:

- Sign Supports: Galvanize or paint supports. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.  
  
Place signs over 50 square feet on 2 1/2" x 2 1/2" perforated tube supports as a minimum.  
  
Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
- Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 5/16" bolts.
- Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
- Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:  
  
Interstate - white legend on blue background  
Interstate Business Loop - white legend on green background  
US and State - black legend on white background  
County - yellow legend on blue background

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

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

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

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

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

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

MINIMUM BALLAST  
(For each side of sign support base)

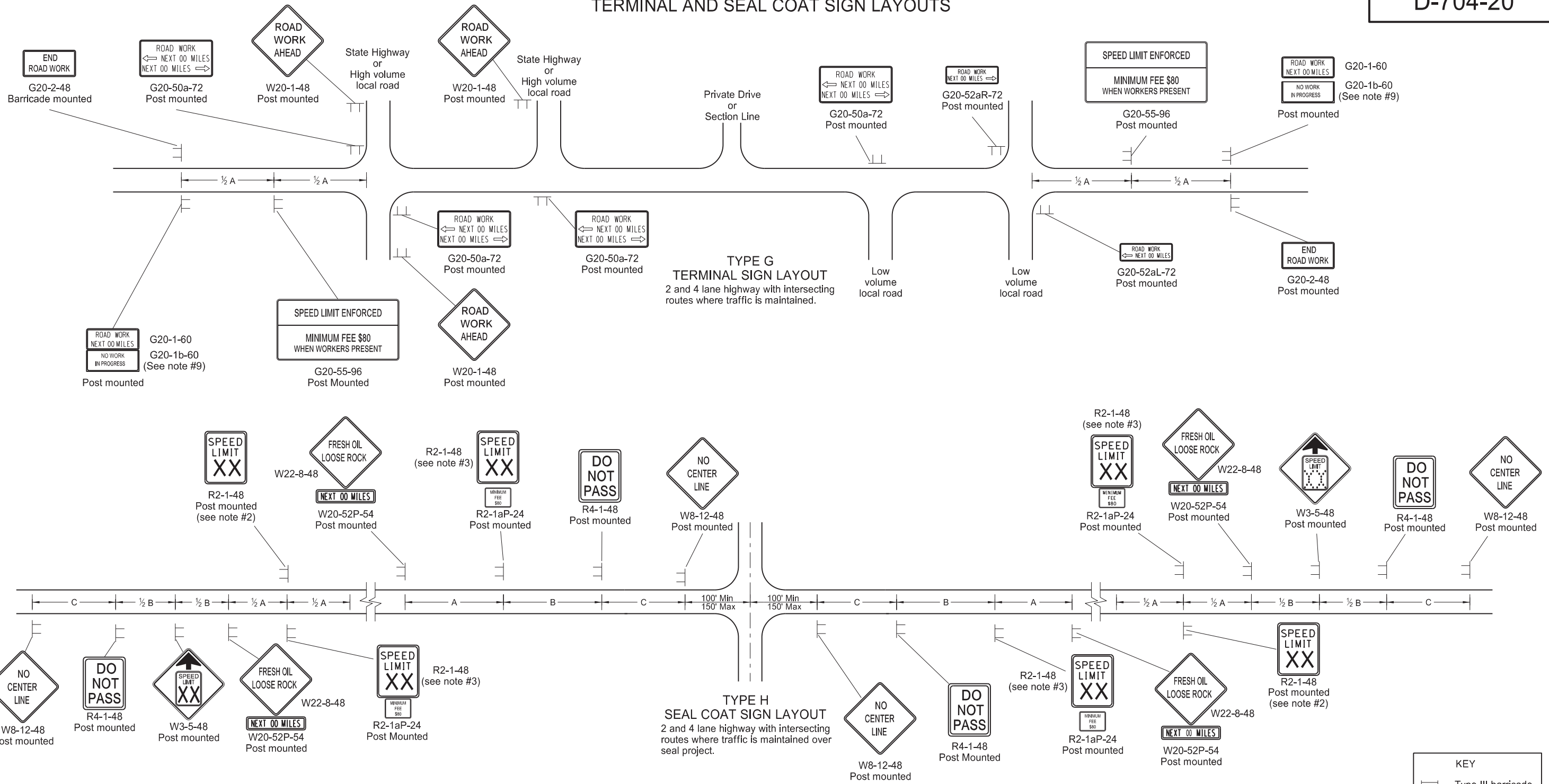
Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

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

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

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

TERMINAL AND SEAL COAT SIGN LAYOUTS



**TYPE G  
TERMINAL SIGN LAYOUT**  
2 and 4 lane highway with intersecting routes where traffic is maintained.

**TYPE H  
SEAL COAT SIGN LAYOUT**  
2 and 4 lane highway with intersecting routes where traffic is maintained over seal project.

**KEY**

- ≡ Type III barricade
- ⊥ Sign

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Updated notes & sign numbers
11-01-19	Updated note & sign
12-08-21	Switched order of Road Work and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

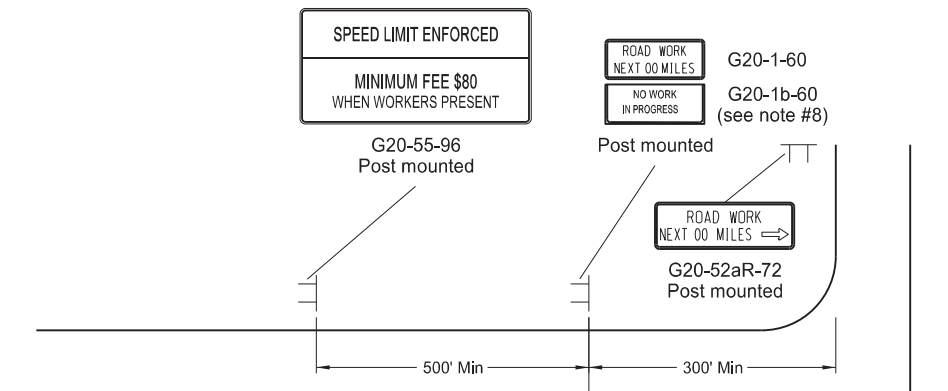
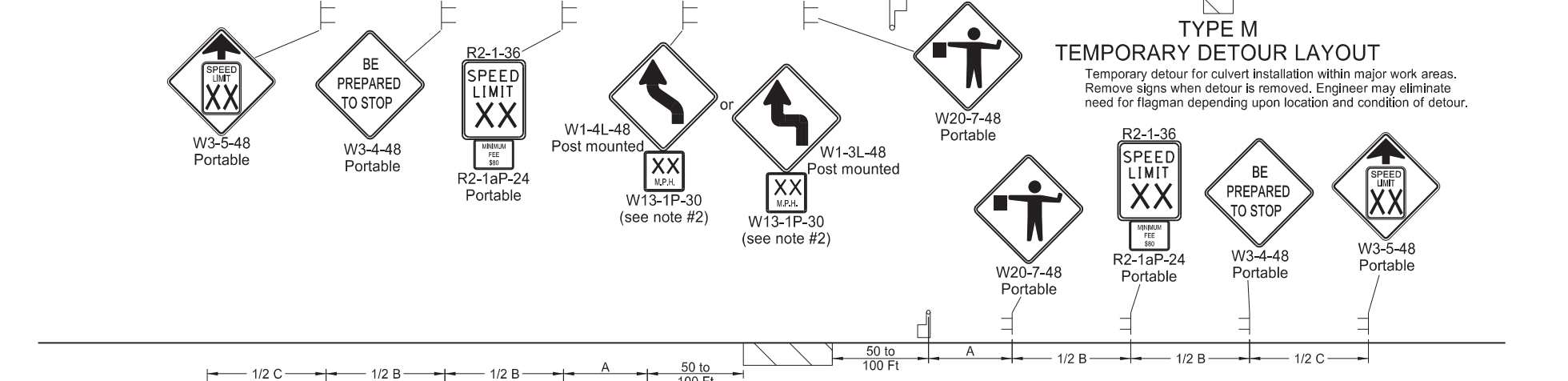
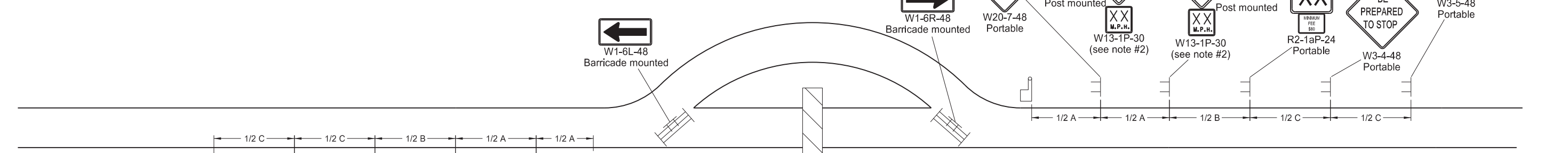
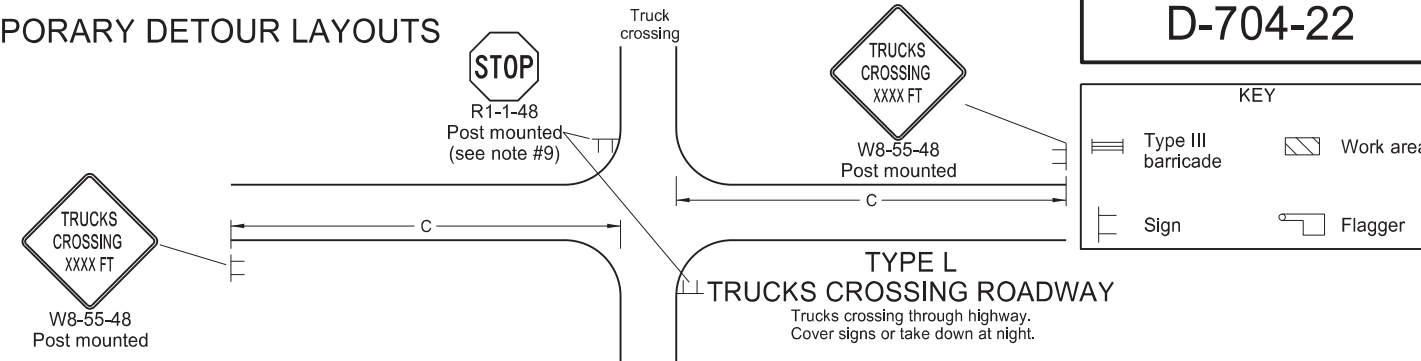
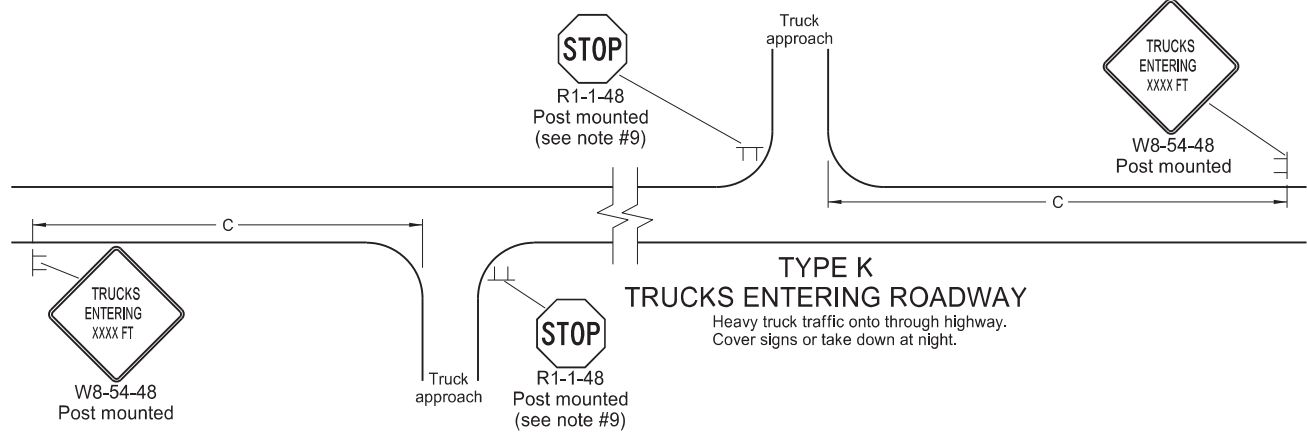


# CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22

**KEY**

- Type III barricade
- Sign
- Work area
- Flagger



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

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

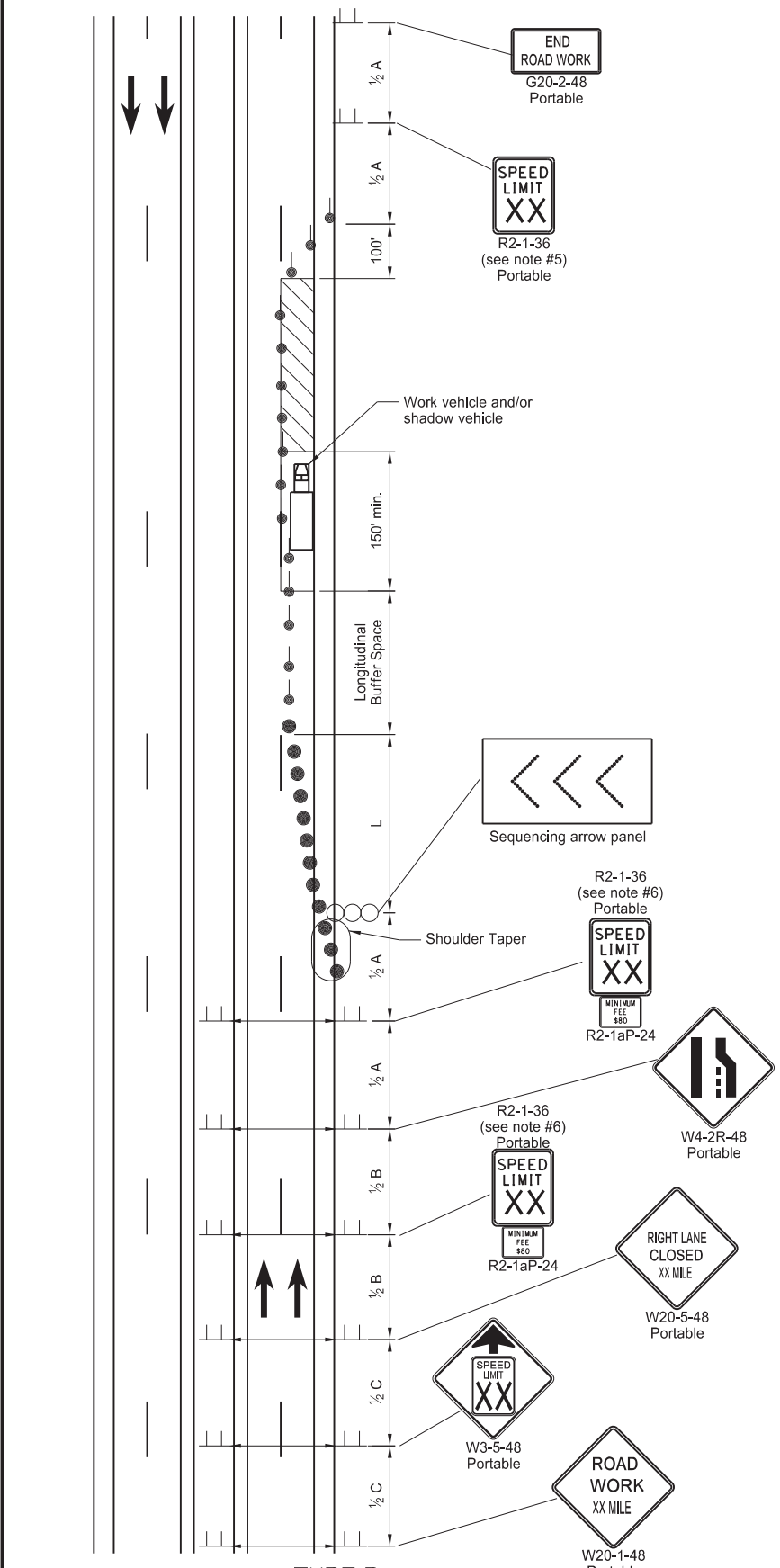
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs
11-29-22	Removed Dollars At Work



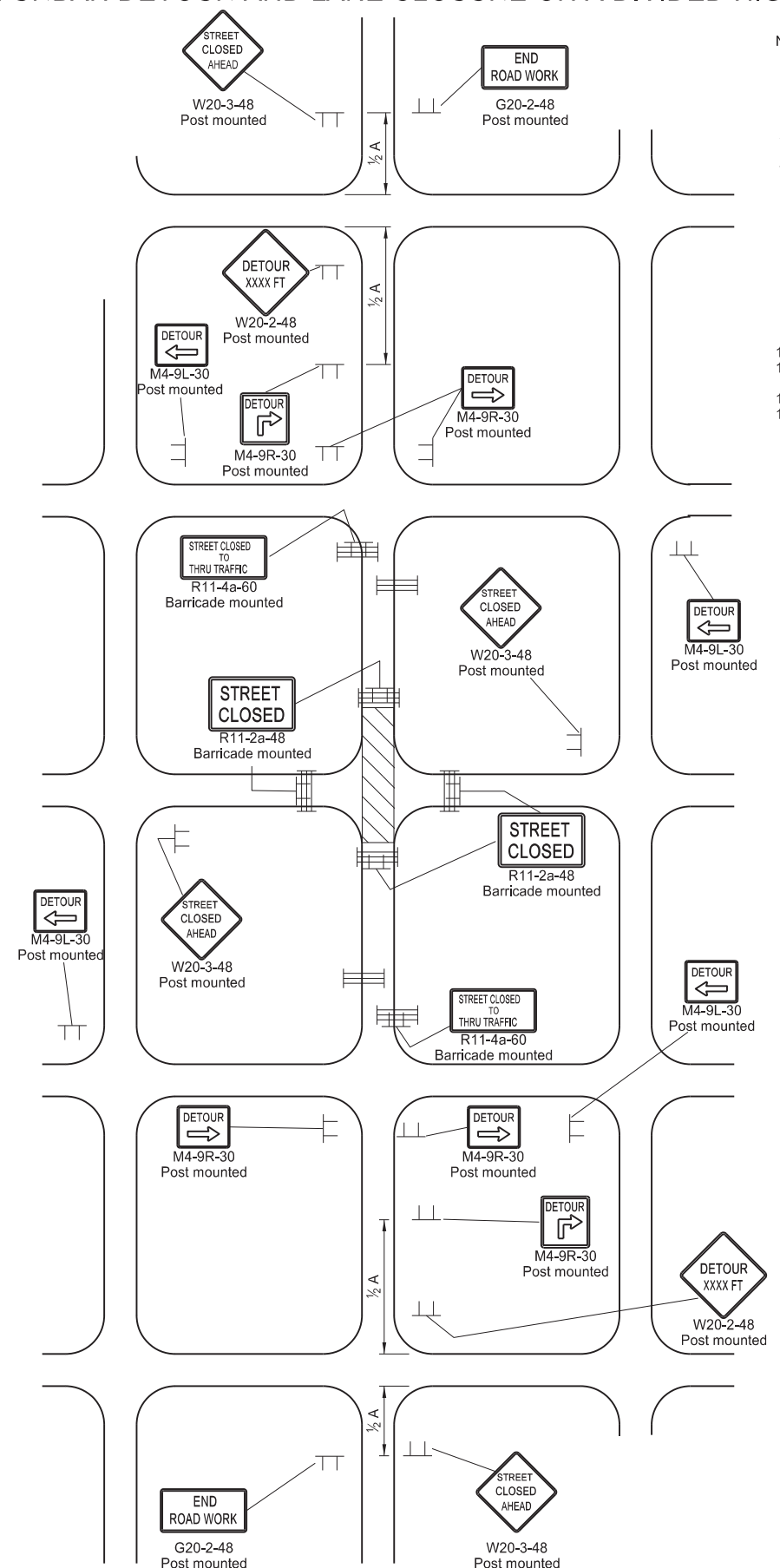
11/29/22

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

D-704-23



**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.)



**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 R2-1aP-24 signs.

- Notes:
- Variables
    - S = Numerical value of speed limit or 85th percentile.
    - W = The width of taper in feet
    - L = Minimum length of taper,  $S \times W$  for freeways, expressways, and all other roads with speeds of 45 mph or greater, or  $W \times S^2 / 60$  for urban, residential, and other streets with speeds of 40 mph or less.
  - Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
  - Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
  - Place Sequencing Arrow Panels at the beginning of taper. Where shoulder width does not provide sufficient room, move panel closer to the work area and place on roadway surface.
    - Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
    - Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
    - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
  - Re-established speed limit. Determine exact speed limit in the field, dependent on location and conditions.
  - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
  - Cover existing speed limit signs within a reduced speed zone.
  - Covered (when approved by engineer) or obliterated payment marking measured as as Obliteration of Pavement Marking.
  - Change intersection control on detour for Type Q when determined necessary by the engineer.
  - Engineer to determine safe speed where necessary. When parking is present, place signs so they are entirely visible above parked vehicles or at the edge of the parking area so they are visible to oncoming traffic.
  - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
  - Recommend using 40 mph speed limit in vicinity of workers for Layout Type P, unless location and conditions dictate otherwise.

**KEY**

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

**ADVANCE WARNING SIGN SPACING**

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

**Longitudinal Buffer Space**

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

NORTH DAKOTA  
 DEPARTMENT OF TRANSPORTATION  
 9-27-13

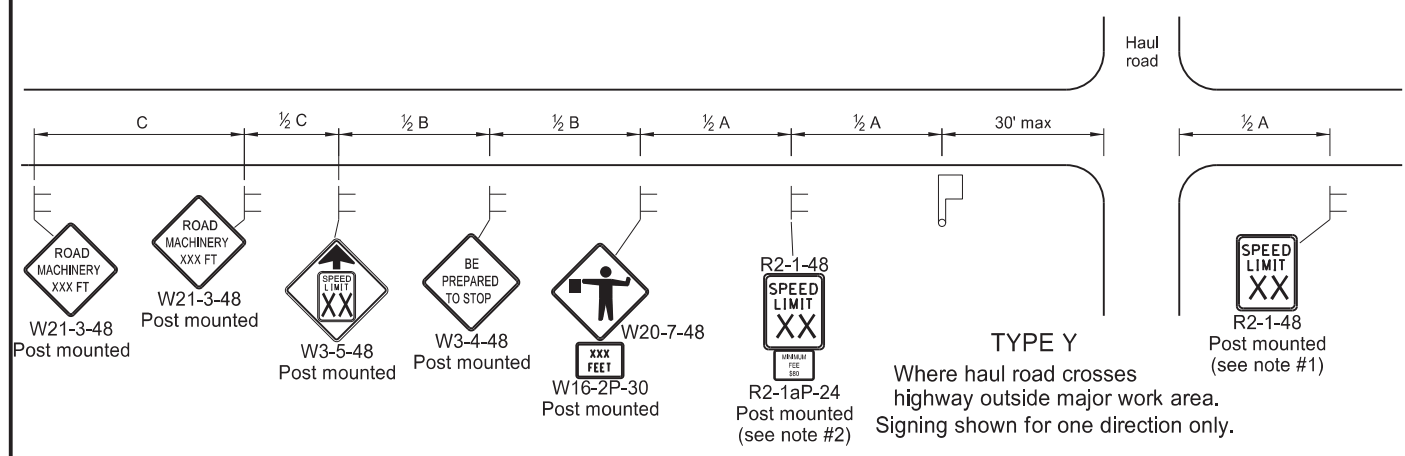
REVISIONS

DATE	CHANGE
08-17-17	Removed speed limit signs, & updated notes & sign numbers
11-01-19	Revised sign numbers & note
12-08-21	Added Dollars At Work sign
11-29-22	Removed Dollars At Work

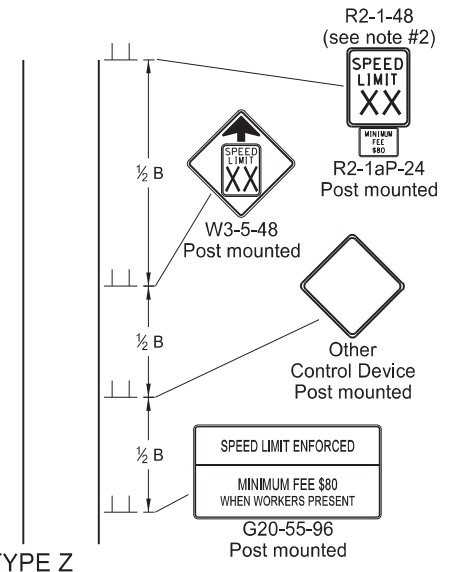


11/29/22

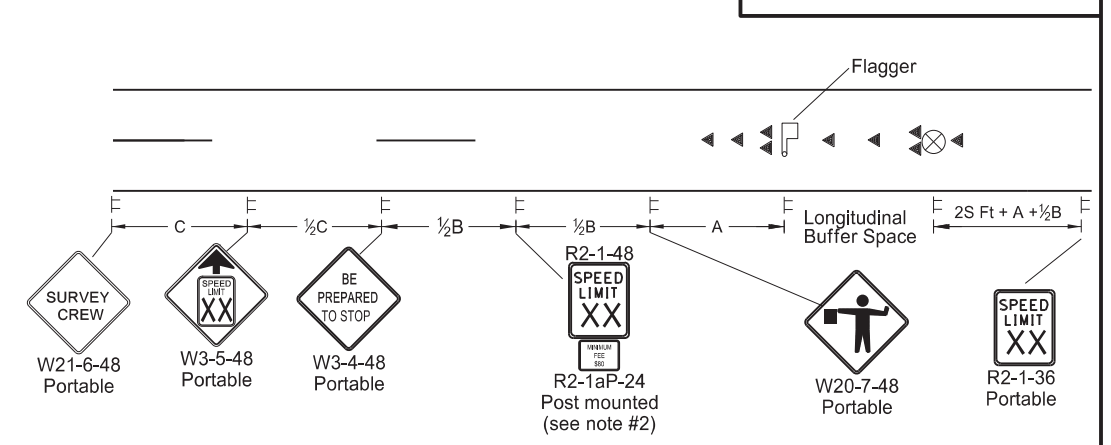
MISCELLANEOUS SIGN LAYOUTS



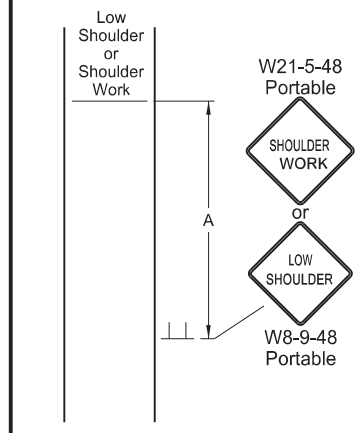
**TYPE Y**  
Where haul road crosses highway outside major work area. Signing shown for one direction only.



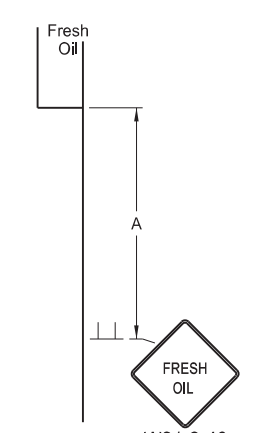
**TYPE Z**  
Where speed zone is needed. Signing shown for one direction only.



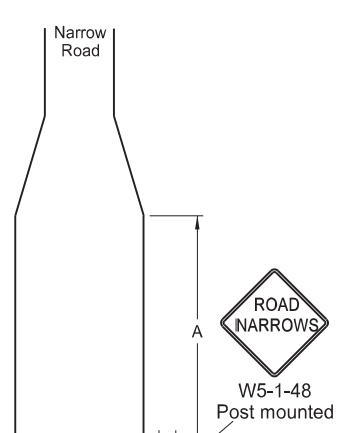
**TYPE AA**  
Where survey crew is used. Signing shown for one direction only.



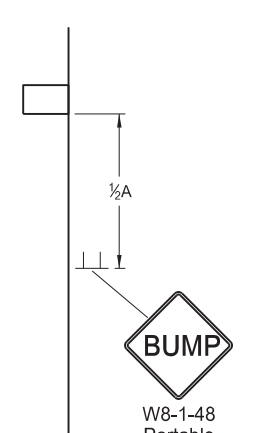
**TYPE BB**  
Within major work area where sign conditions exist



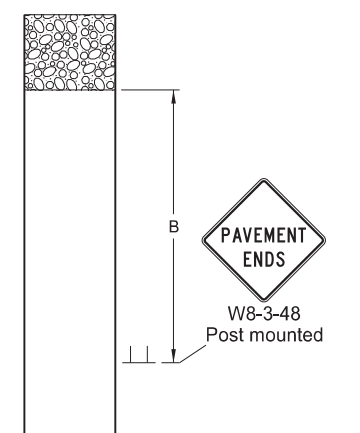
**TYPE CC**  
Where sign conditions exist



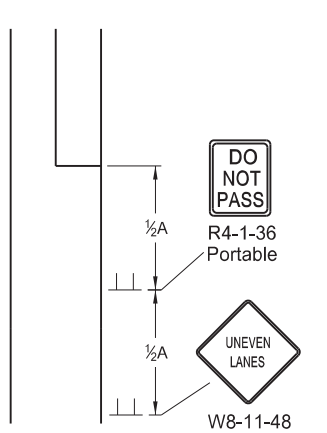
**TYPE DD**  
Where sign conditions exist



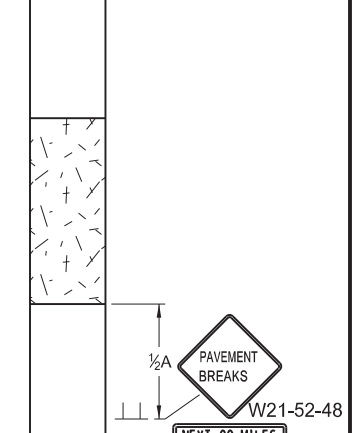
**TYPE EE**  
Where sign conditions exist



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



**TYPE GG**  
Where elevation difference exists between lanes

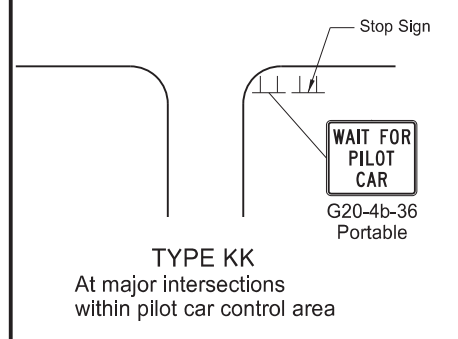


**TYPE JJ**  
For break in pavement. Install signs when conditions exist and remove when not applicable. Signing shown for one direction only.

**KEY**

- Flagger
- Sign
- Cones
- Survey Equipment

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



**TYPE KK**  
At major intersections within pilot car control area

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

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

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

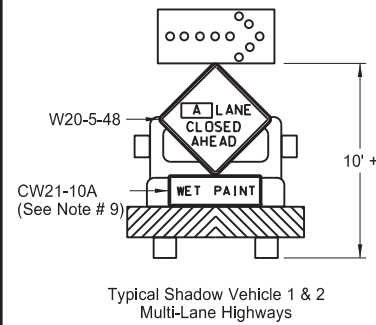
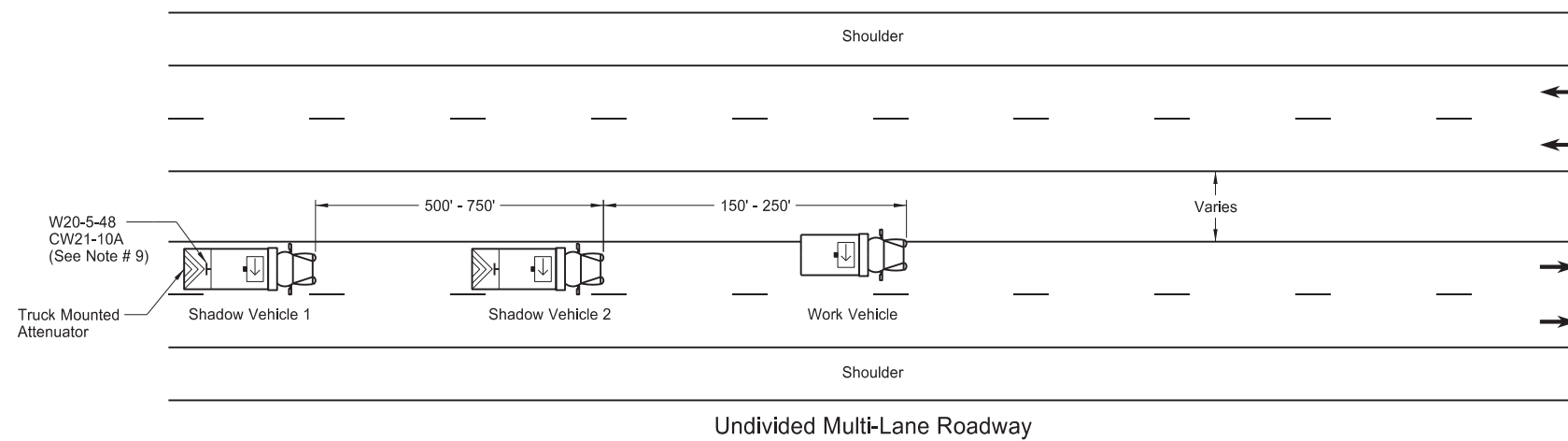
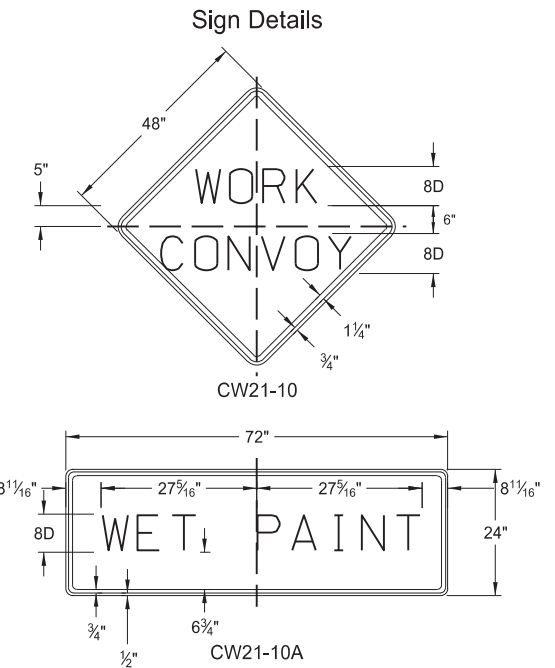
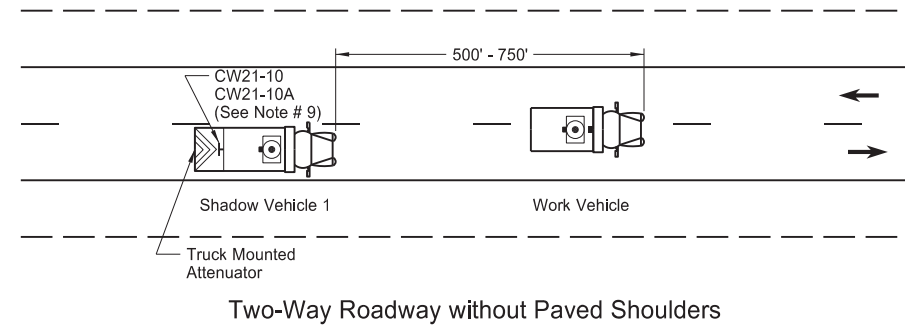
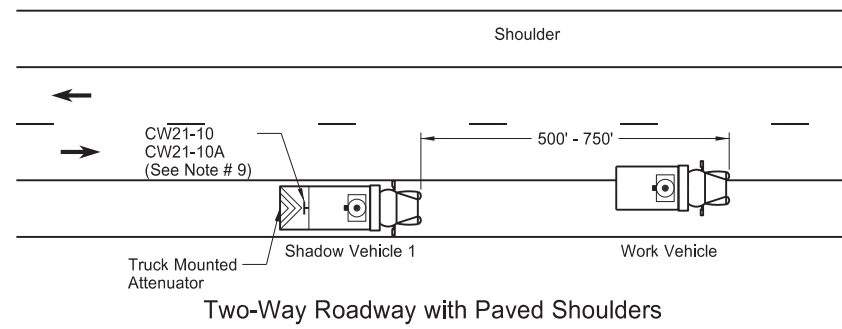
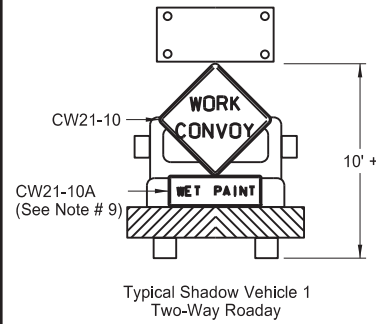
\* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers.
11-01-19	Revised note 5 & sign numbers.
2-23-23	Revised distance & removed signs.

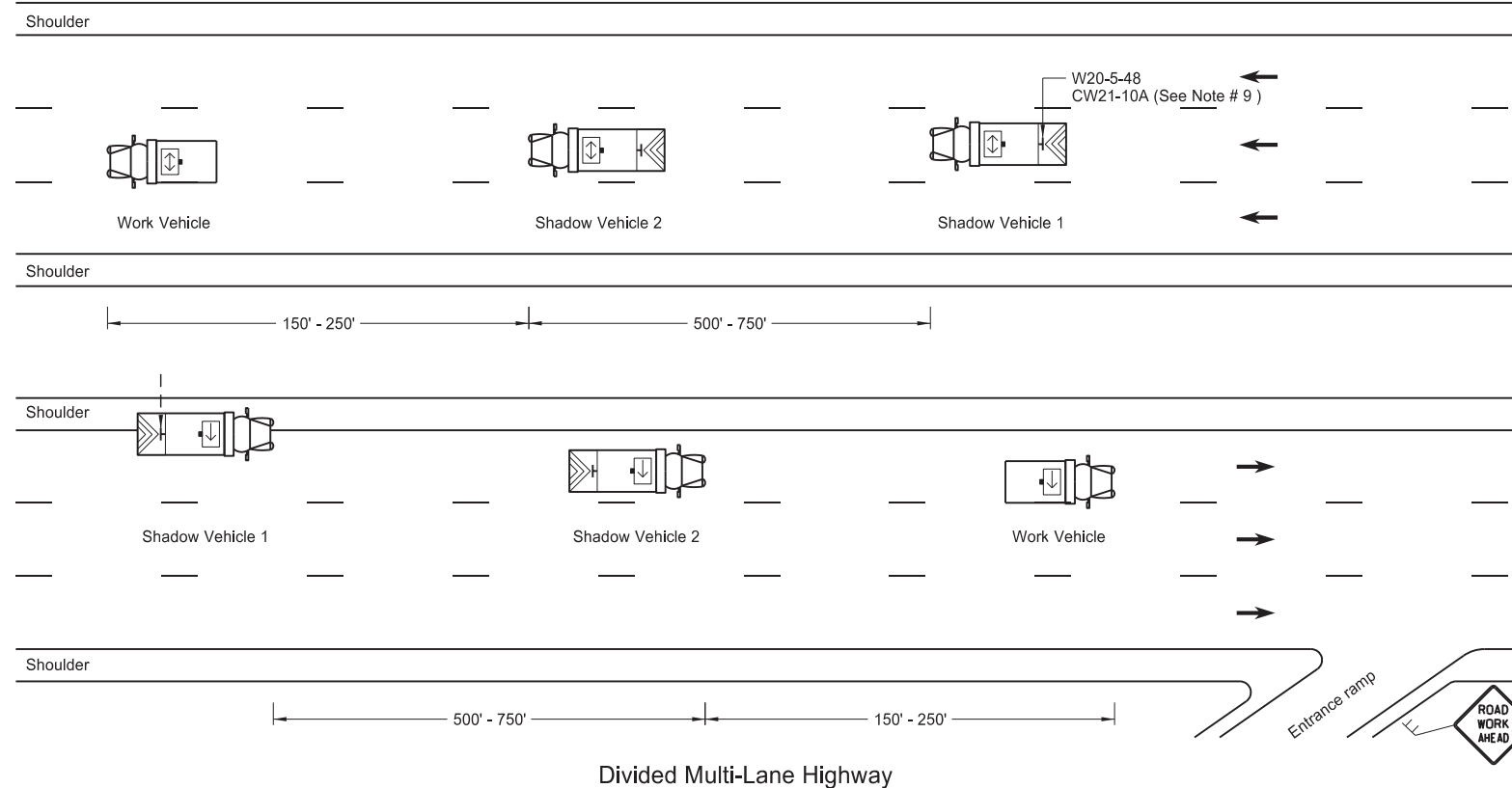


02/23/23

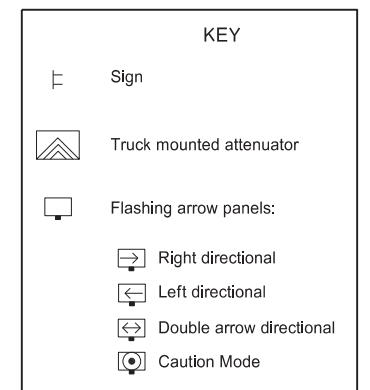
MOBILE OPERATION  
(PAVEMENT MARKING)



A = Left Right Center



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



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

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

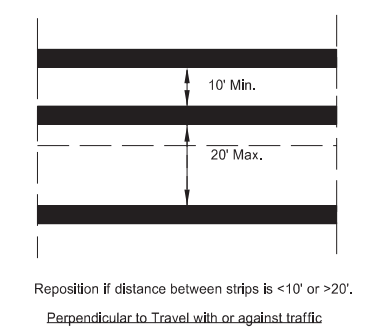
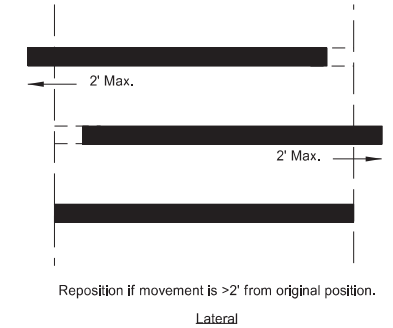
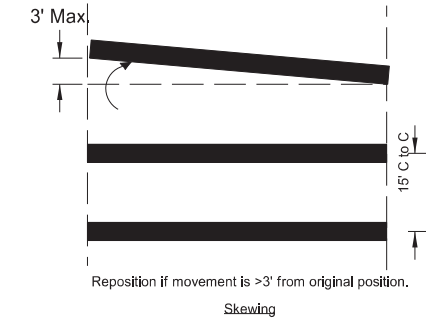
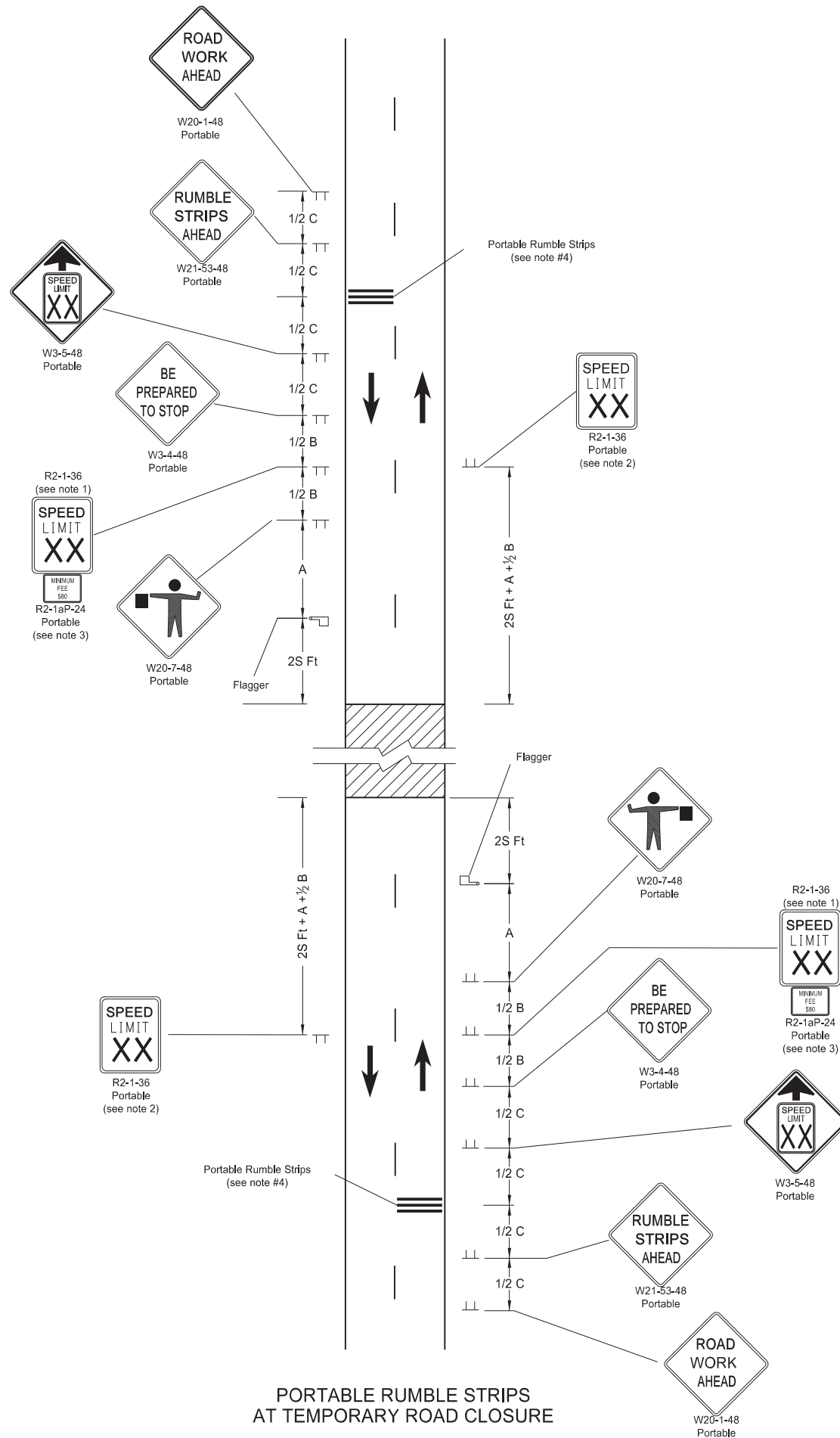
Two-Lane Roadway Portable Rumble Strips

KEY

	Work area
	Flagger
	Sign

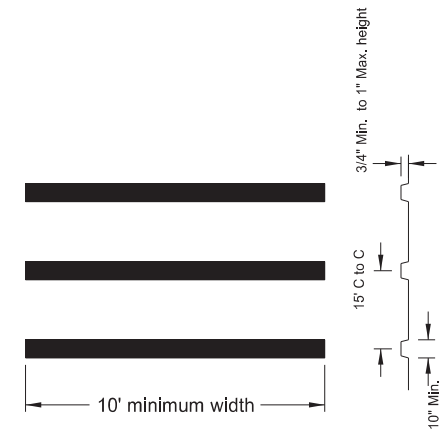
S = Numerical value of speed limit or 85th percentile.

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - High Speed (over 45 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720



PORTABLE RUMBLE STRIPS ARRAY TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

- Notes:
- Determine speed in the field based on location and conditions.
  - Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
  - Sign R2-1aP-24 is not required when pilot car operation is used.
  - Do not use rumble strips on a non paved surface or in a pre-construction speed zone of 45 mph or less.



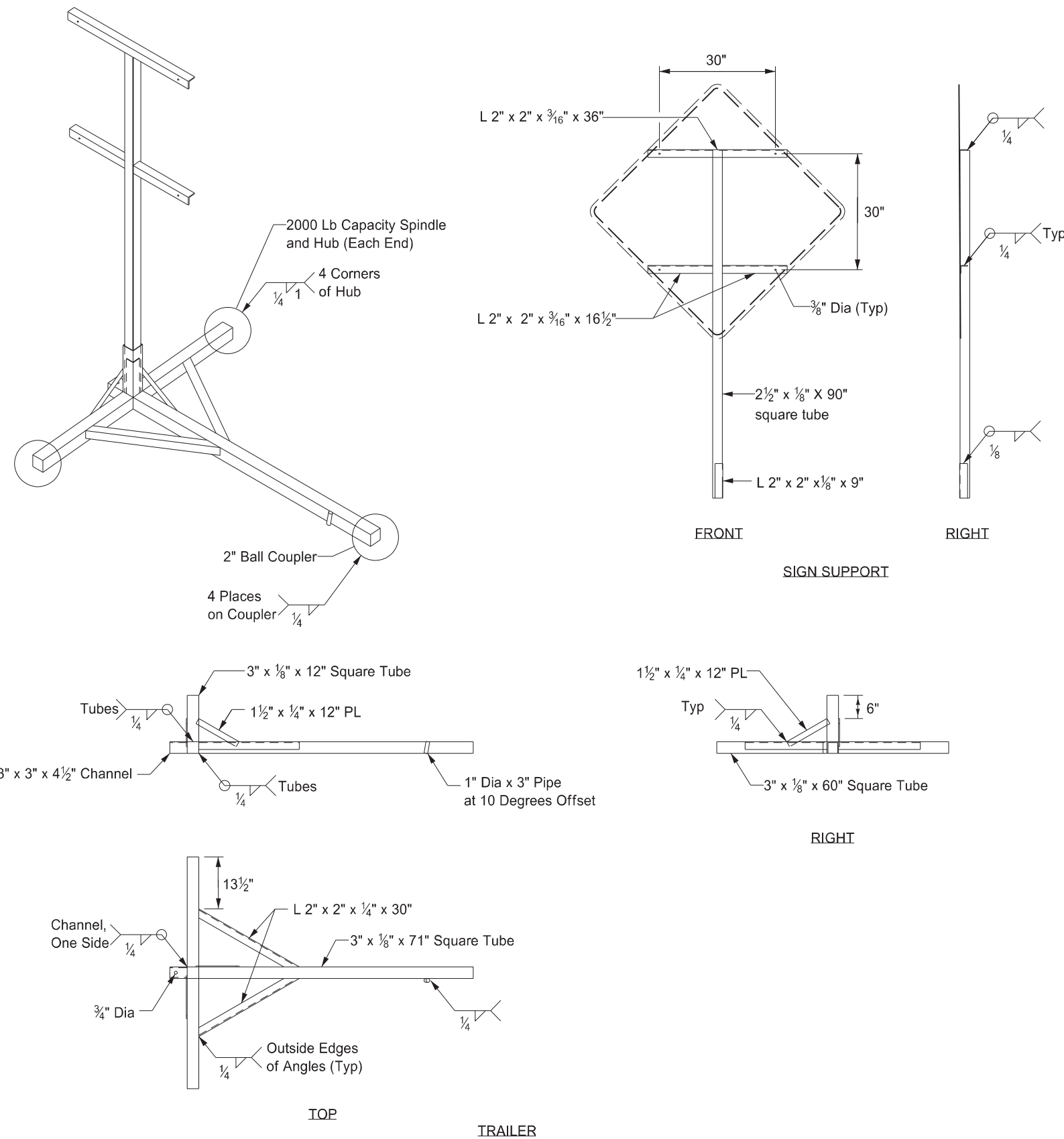
PORTABLE RUMBLE STRIPS AT TEMPORARY ROAD CLOSURE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		
02-22-22 REVISIONS		
DATE	CHANGE	<p>03/07/23 Use changed to min 45 mph.</p>
03/07/23		

03/07/23

PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



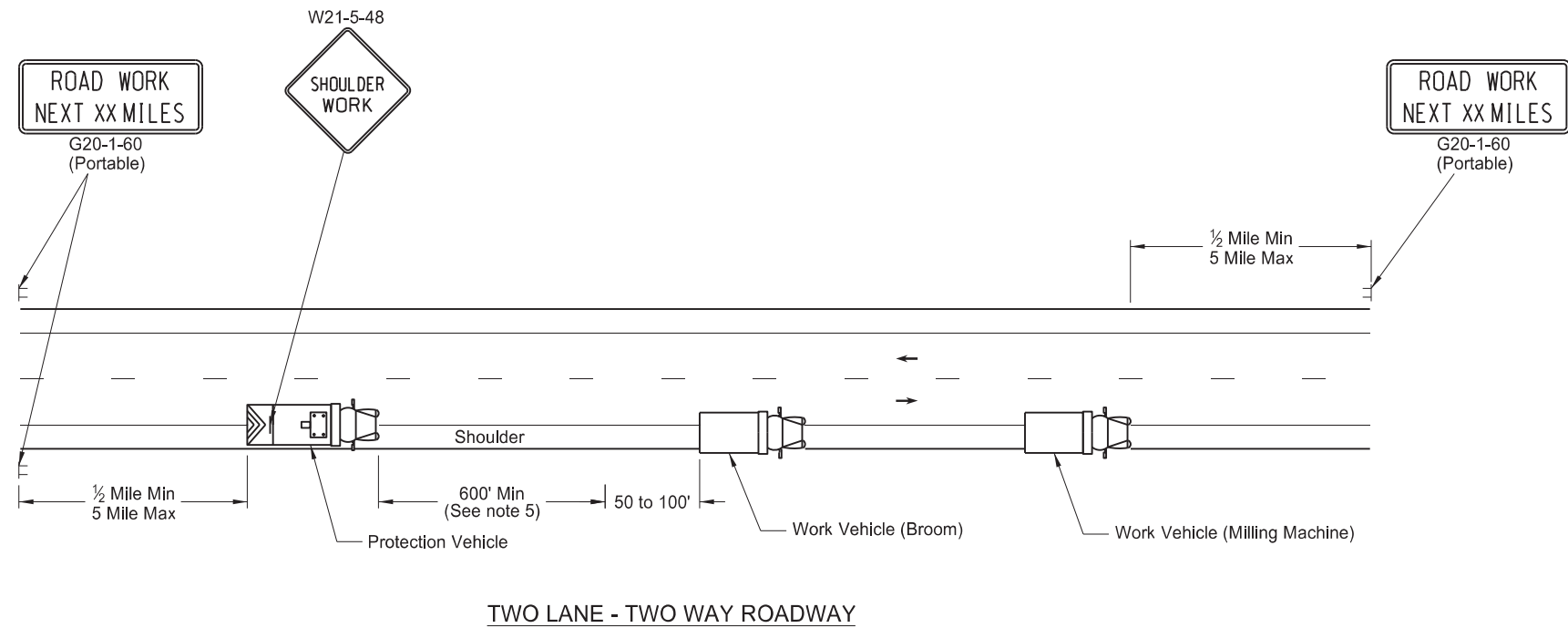
Notes:

- ① Maximum 250 pound weight of assembly.
- ② Use a 14" wheel and tire.
- ③ Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
- ④ Other NCHRP 350 or MASH crash tested assemblies are acceptable.

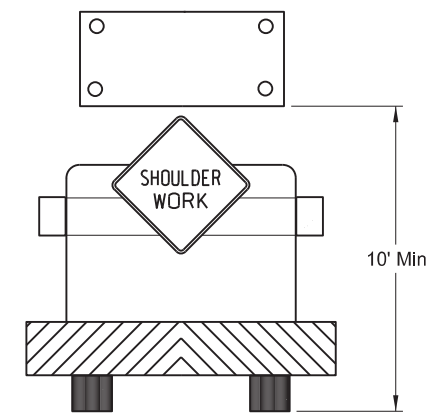
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

KIRK J. HOFF  
 REGISTERED  
*Kirk J Hoff*  
 PROFESSIONAL  
 PE-4683  
 ENGINEER  
 NORTH DAKOTA  
 12 02 2020

MOBILE OPERATION  
Grinding Shoulder Rumble Strips



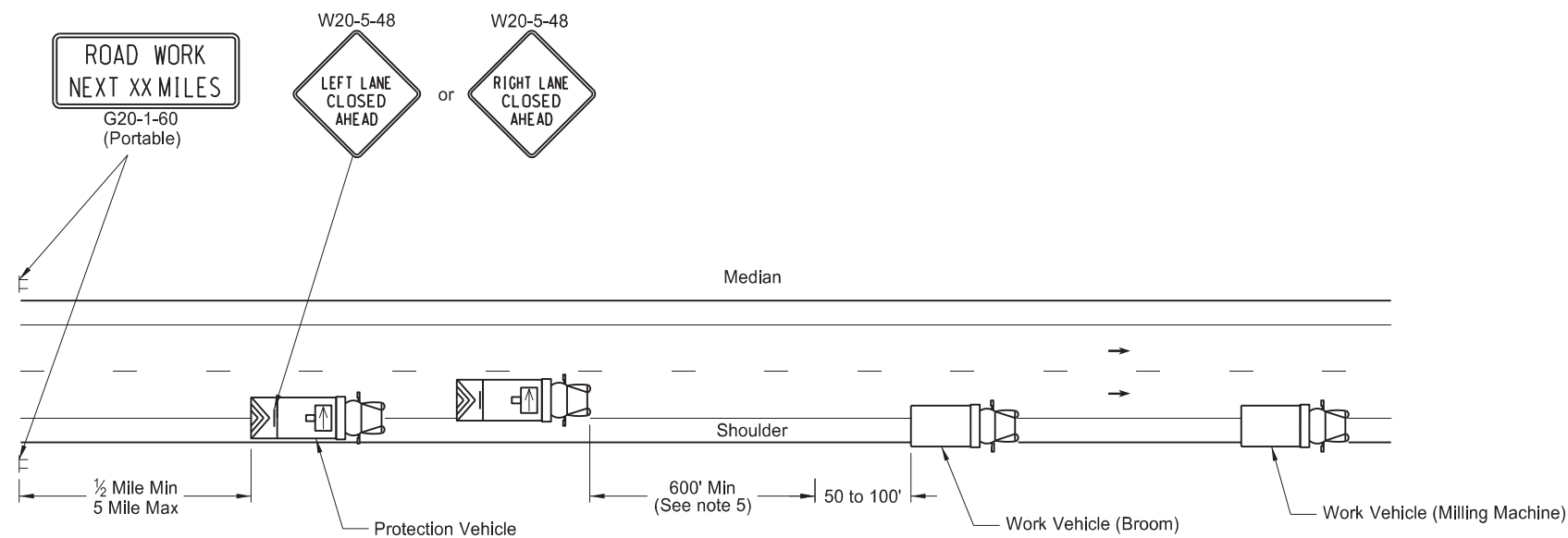
TWO LANE - TWO WAY ROADWAY



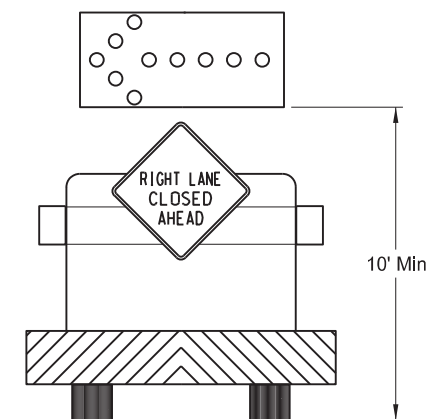
TWO LANE - TWO WAY ROADWAY  
Typical Protection Vehicle with  
Flashing Arrow Panel In Caution Mode

Notes:

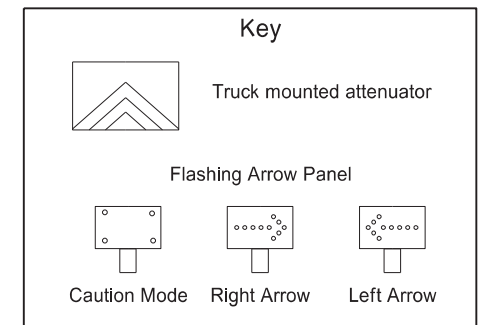
1. Provide truck mounted attenuators on additional vehicles in the convoy, at no additional cost.
2. Provide rotating, flashing, oscillating, or strobe lights on vehicles.
3. Provide Type B or Type C flashing arrow panels that are controlled from inside the vehicle.
4. Provide two - way electronic communication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



INTERSTATE & 4 LANE DIVIDED HIGHWAY

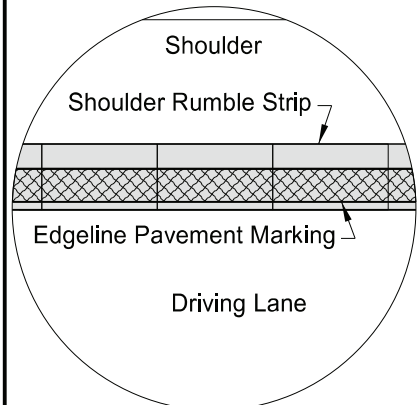


INTERSTATE & 4 LANE DIVIDED HIGHWAY  
Typical Protection Vehicle with Flashing Arrow  
Panel In Flashing Arrow Mode

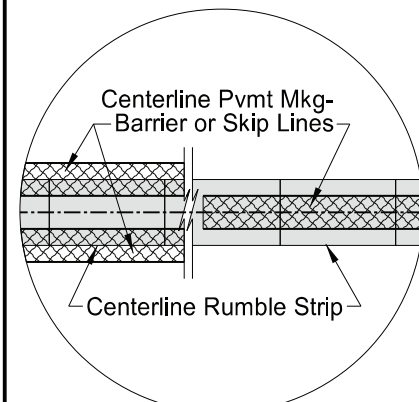


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & signs
10-03-19	New Design Engineer PE Stamp

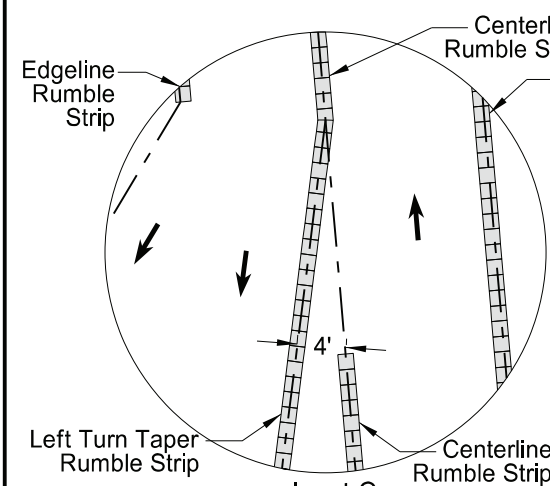
This document was originally issued and sealed by  
Kirk J Hoff,  
Registration Number  
PE- 4683,  
on 10/3/19 and the original document is stored at the  
North Dakota Department  
of Transportation



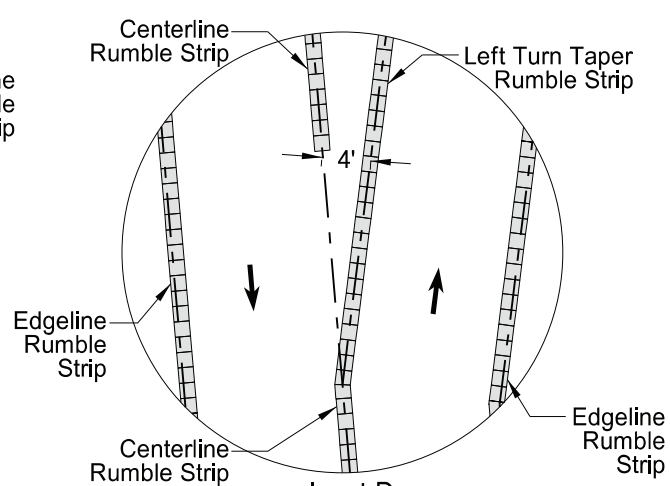
**Inset A - Edgeline Rumble Strip**  
(Layout for opposite shoulder reversed)



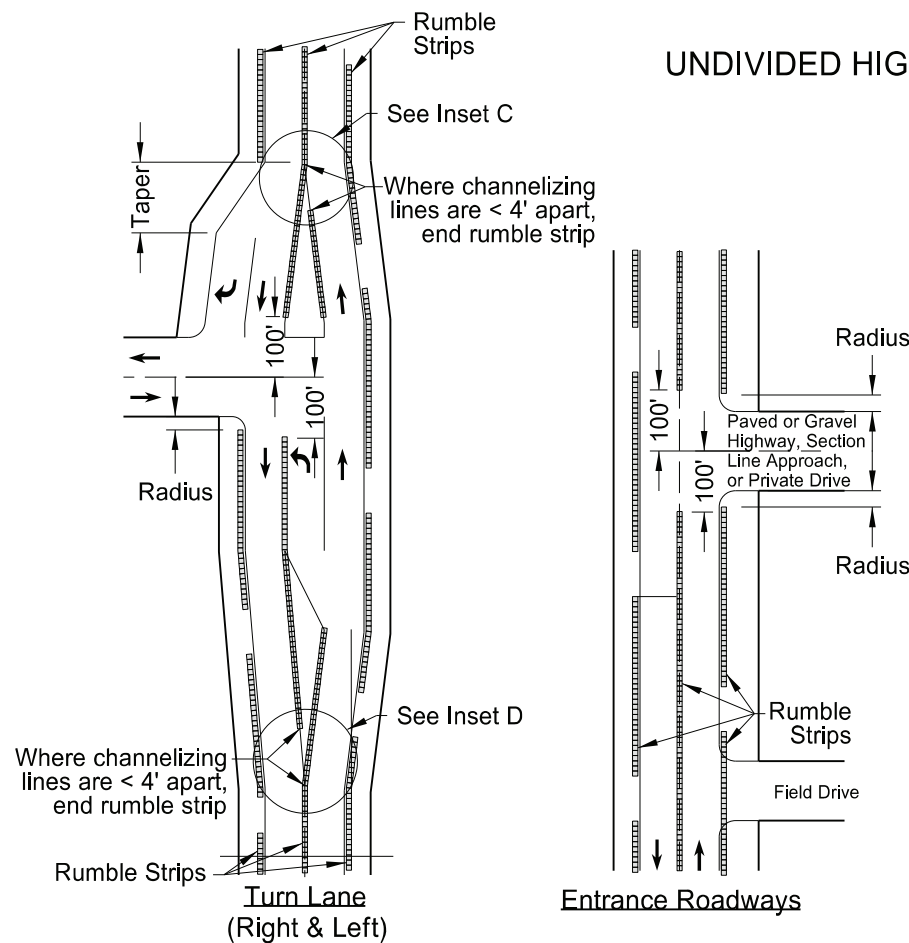
**Inset B - Centerline Rumble Strip**



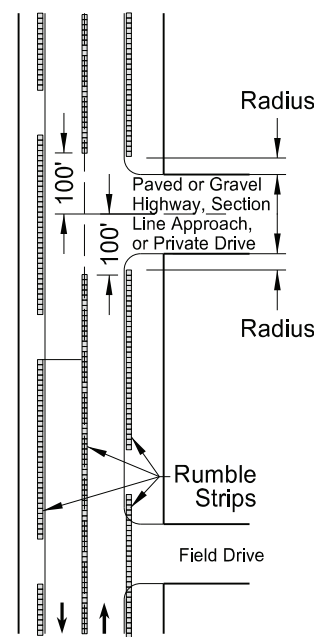
**Inset C**



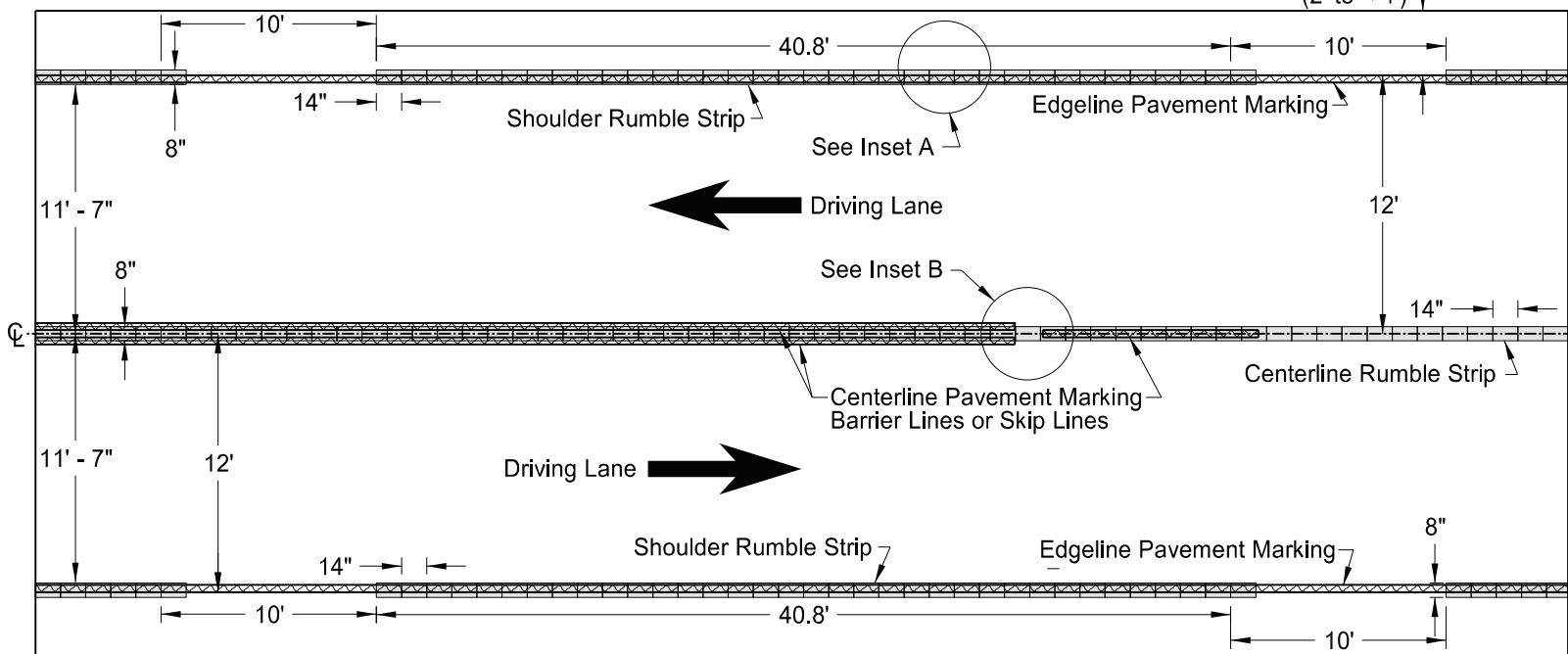
**Inset D**



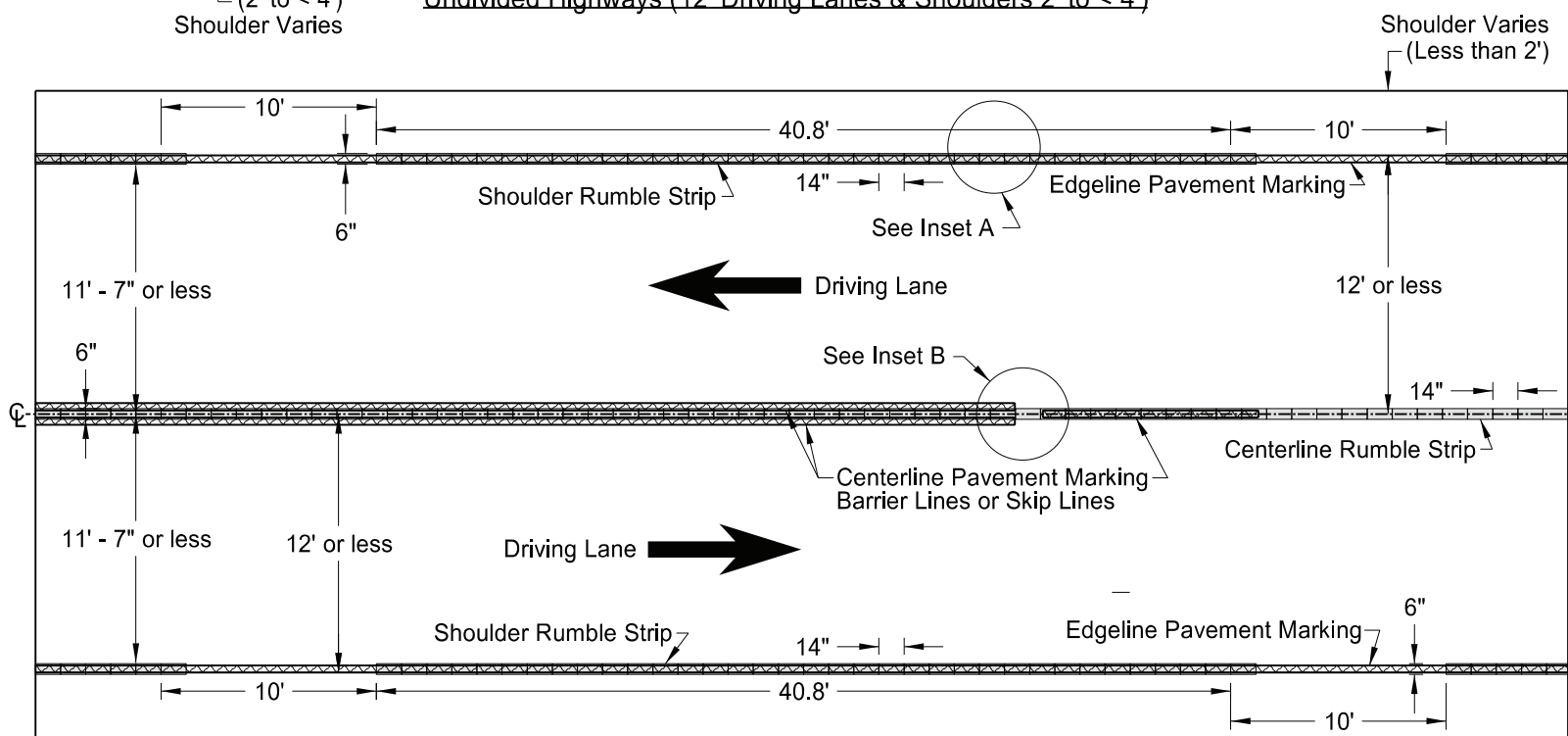
**Entrance Roadways**



**RUMBLE STRIPS**  
**UNDIVIDED HIGHWAYS (SHOULDERS LESS THAN 4')**

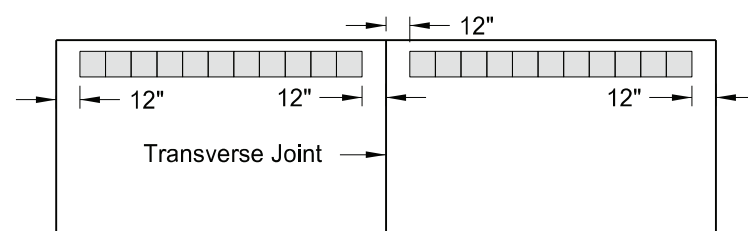
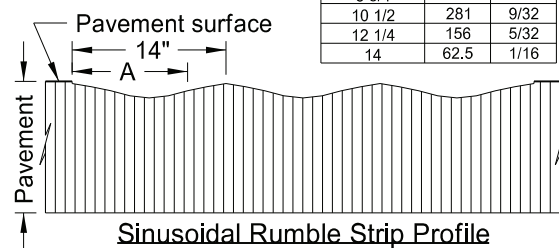


**Undivided Highways (12' Driving Lanes & Shoulders 2' to < 4')**



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

Milling Depths		
Location A (in)	MIL	Depth in
0	62.5	1/16
1 3/4	156	5/32
3 1/2	281	9/32
5 1/4	438	7/16
7	500	1/2
8 3/4	438	7/16
10 1/2	281	9/32
12 1/4	156	5/32
14	62.5	1/16



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

**NOTES:**

1) Discontinue shoulder rumble strips through the entire length of right turn lanes and tapers, and at the radius of paved or gravel highways, section line approaches, or private drives.

2) Discontinue centerline rumble strips 100' before and after paved or gravel highways, section line approaches, or private drives. Place rumble strips at left turn lanes as shown below.

3) No additional quantity provided for centerline rumble strips on left turn tapers. Include all costs for centerline rumble strips on left turn tapers in the price bid for "Sinusoidal Rumble Strip - Asphalt Centerline" or "Sinusoidal Rumble Strip - Concrete Centerline".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-08-11	Revised Notes and D-760-4. Revised details for rumble strip widths and dimensions.
1-26-12	Added missing dimensions.
10-25-19	Revised turn lane rumble layout.
11-16-21	Added Note 3.
3-07-23	Rumble Strips made Sinusoidal.
5-26-23	

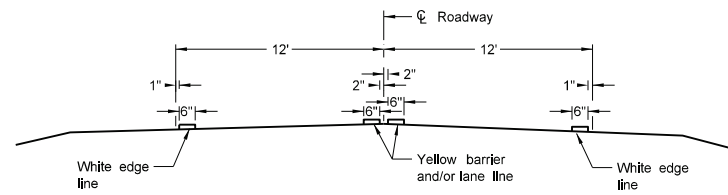


05/26/23

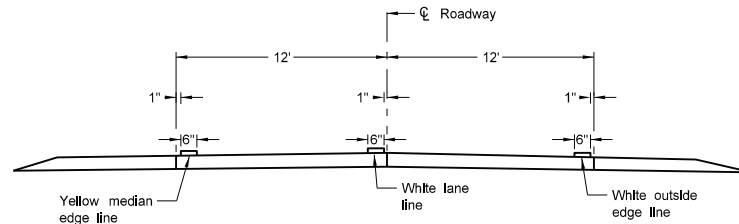


# PAVEMENT MARKING

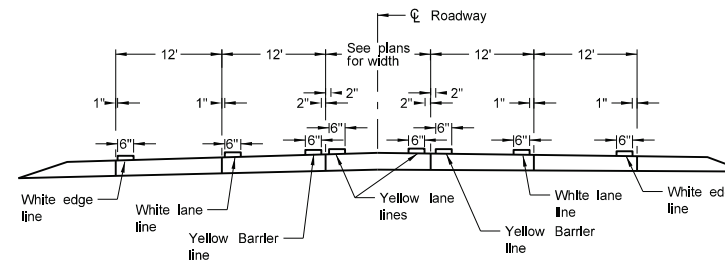
D-762-4



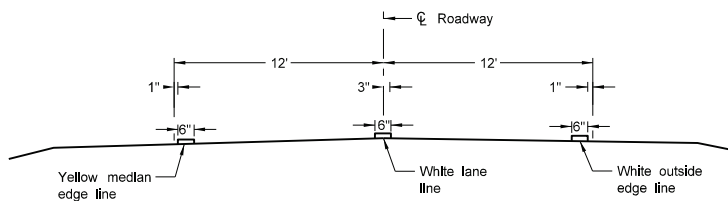
Two Lane Two Way  
RURAL ROADWAY



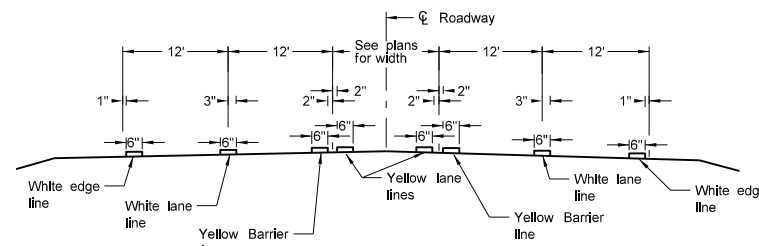
Two Lane Roadway  
INTERSTATE HIGHWAY  
Concrete Section



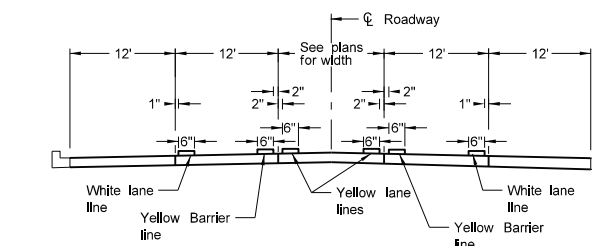
RURAL FIVE LANE ROADWAY  
Concrete Section



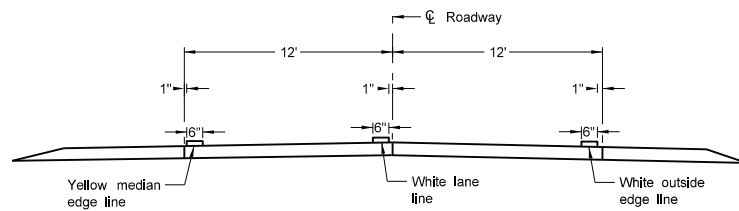
Two Lane Divided  
Rural Roadway  
PRIMARY HIGHWAY  
Asphalt Section



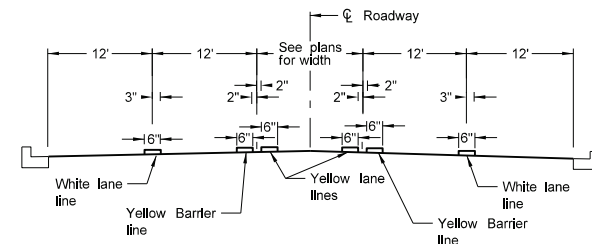
RURAL FIVE LANE ROADWAY  
Asphalt Section



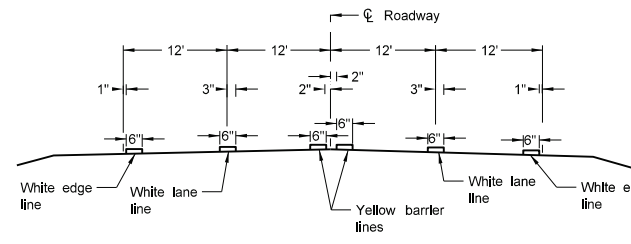
URBAN FIVE LANE SECTION  
Concrete Section



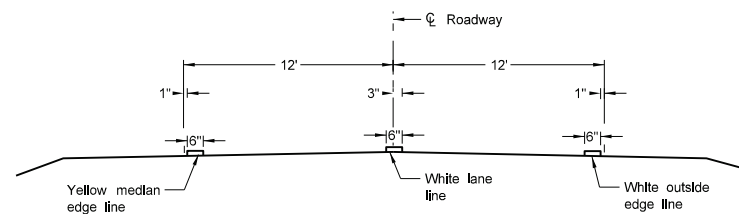
Two Lane Divided  
Rural Roadway  
PRIMARY HIGHWAY  
Concrete Section



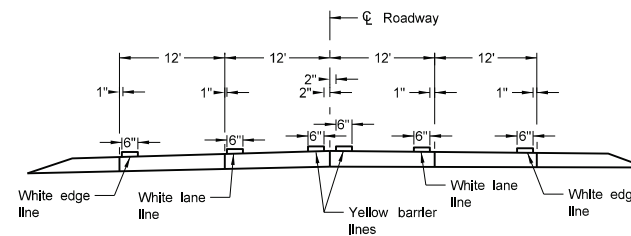
URBAN FIVE LANE SECTION  
Asphalt Section



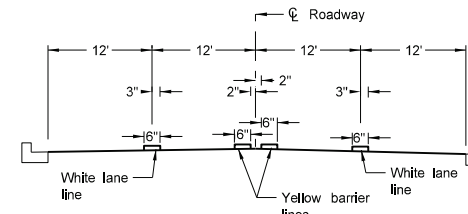
RURAL FOUR LANE ROADWAY  
Asphalt Section



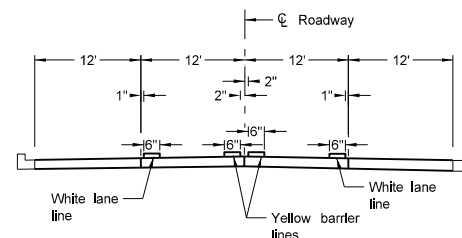
Two Lane Roadway  
INTERSTATE HIGHWAY  
Asphalt Section



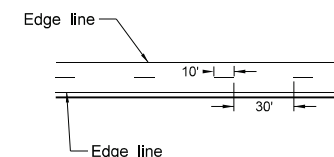
RURAL FOUR LANE ROADWAY  
Concrete Section



URBAN FOUR LANE SECTION  
Asphalt Section



URBAN FOUR LANE SECTION  
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:

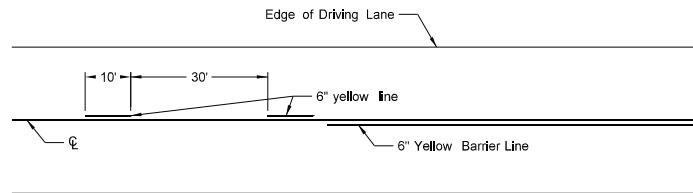
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.
2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.

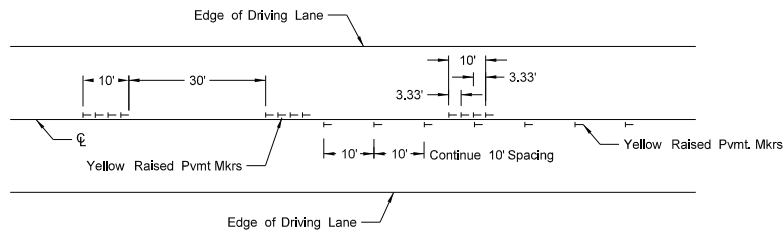


# SHORT-TERM PAVEMENT MARKING

D-762-11

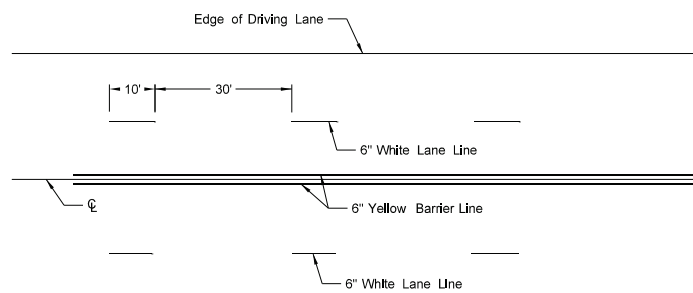


Painted or Tape Lines

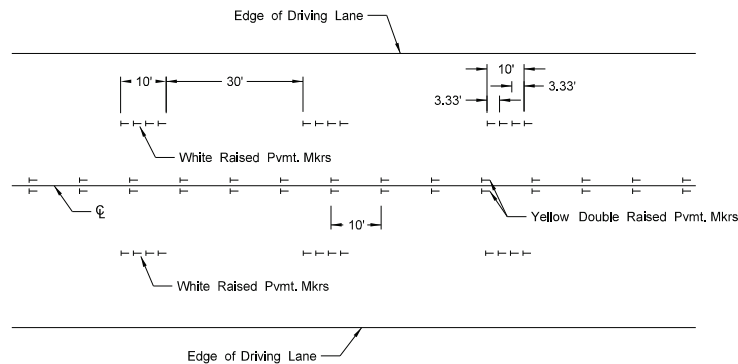


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

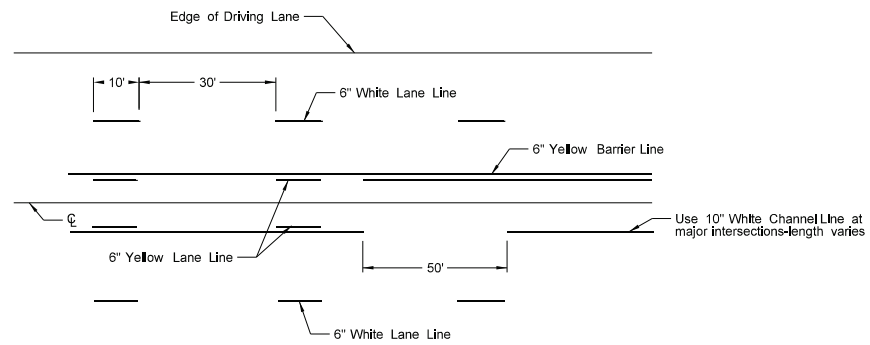


Painted or Tape Lines

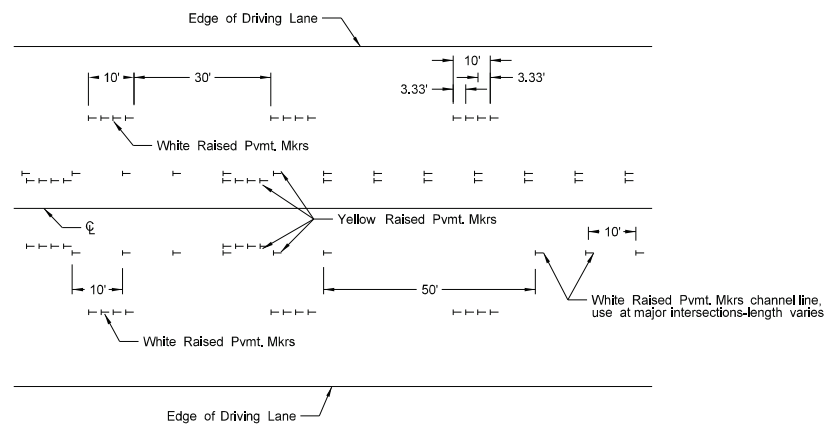


Raised Pavement Markers

FOUR LANE ROADWAY

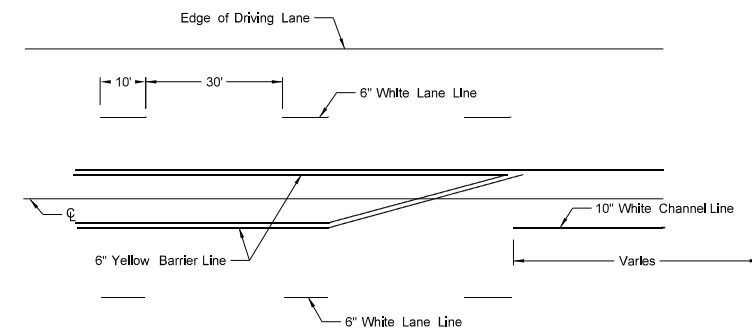


Painted or Tape Lines

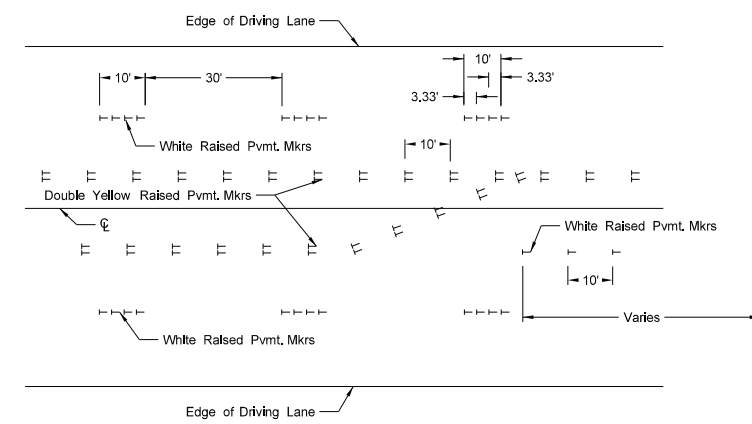


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

**NOTES:**

1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.
4. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
5. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
6. Wide lines - 8 inches wide if 4 inch normal width lines are used and 10 inches wide if 6 inch normal width lines are used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths

