

DESIGN DATA				
Current Traffic	Miles	Total	Design Speed	Sight Distance
CMC-3006 - CO 139	8.18	705	55	495
CMC-3006 - CO 139	5.81	535	55	495
CMC-3013 - CO 88	3.02	320	50	425
CMC-3027 - CO 86	9.91	325	55	495
CMC-3006 - CO 139	5.40	320	55	495
CMC-3033 - CO 85	3.31	190	40	305
CMC-3039 - CO 84	4.27	300	45	360
CMC-3039 - CO 84	5.89	80	35	225
CMC-3008 - CO 83	0.57	245	45	360
CMC-3008 - CO 139A	2.02	430	45	360
CMC-3002 - CO 140	2.04	335	50	425

JOB #12  
MORTON COUNTY  
NORTH DAKOTA

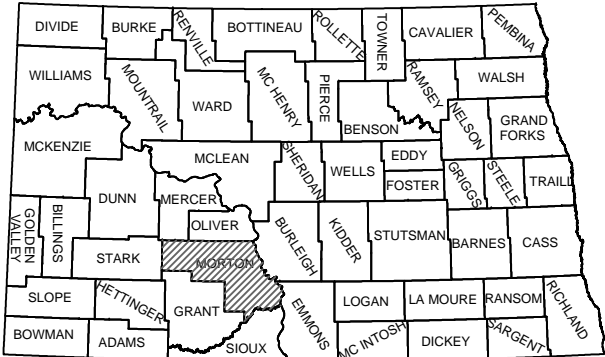
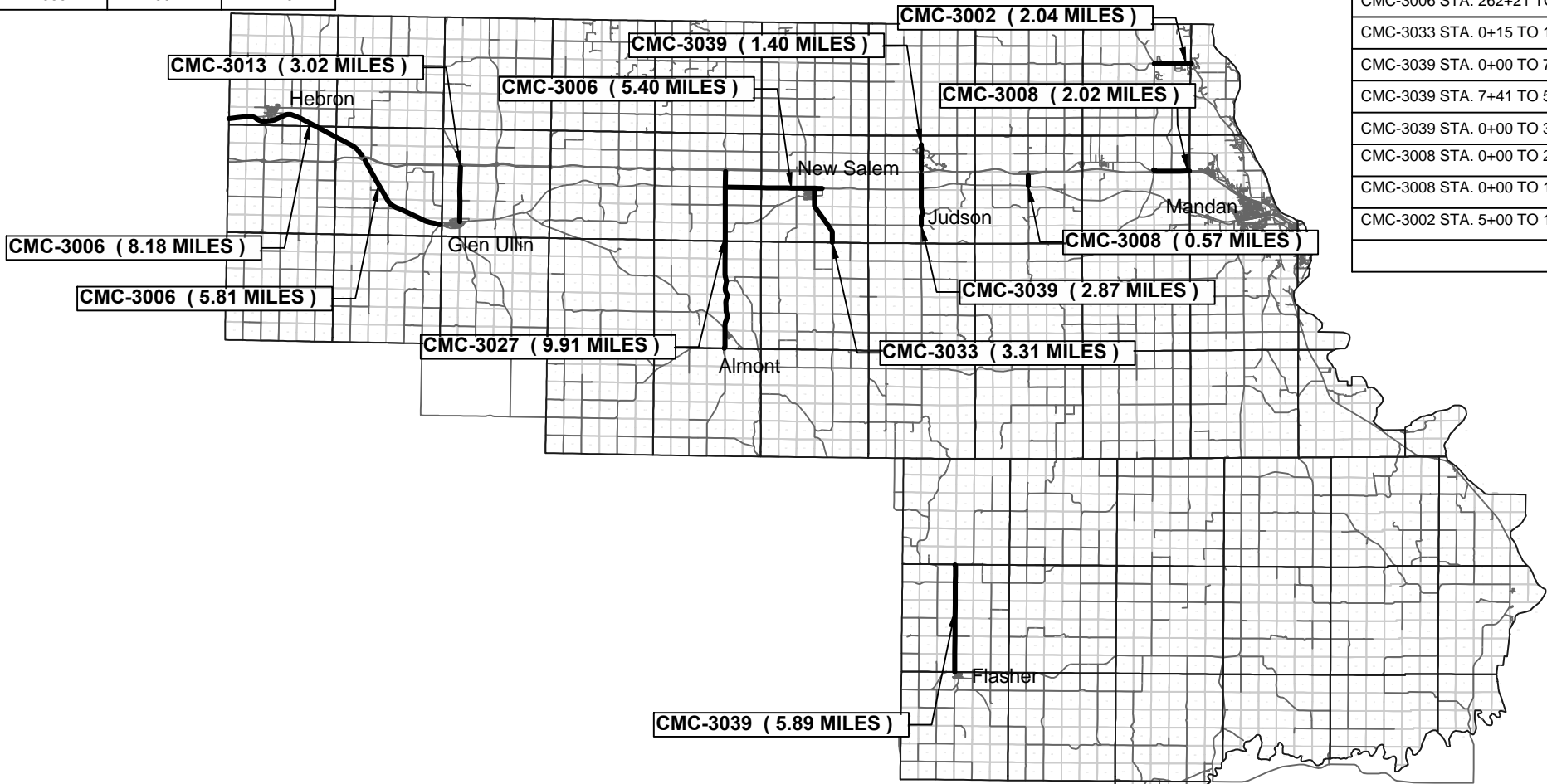
FEDERAL AID PROJECT SC-3000(011)  
CHIP SEAL COAT AND INCIDENTALS

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SC-3000(011)	21463	1	1

GOVERNING SPECIFICATIONS

STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, ADOPTED BY THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION, OCTOBER 2014, STANDARD DRAWINGS CURRENTLY IN EFFECT, AND OF TRANSPORTATION CONTRACTS, STANDARD DRAWINGS CURRENTLY IN ALL OTHER CONTRACT PROVISIONS SUBMITTED HEREIN.

PROJECT LENGTHS	MILES
CMC-3006 STA. 0+00 TO 431+79	8.18
CMC-3006 STA. 55+00 TO 361+71	5.81
CMC-3013 STA. 2+50 TO 162+00	3.02
CMC-3027 STA. 21+00 TO 28+00(BK)-0+00(AH) TO 37+27.6(BK)-0+00(AH) TO 479+12	9.91
CMC-3006 STA. 262+21 TO 498+33(BK)-0+00(AH) TO 49+20	5.40
CMC-3033 STA. 0+15 TO 175+15	3.31
CMC-3039 STA. 0+00 TO 73+70	1.40
CMC-3039 STA. 7+41 TO 51+02(BK)-0+00(AH) TO 72+20.2(BK)-72+28.6(AH) TO 108+20	2.87
CMC-3039 STA. 0+00 TO 311+03.40	5.89
CMC-3008 STA. 0+00 TO 29+90	0.57
CMC-3008 STA. 0+00 TO 106+68	2.02
CMC-3002 STA. 5+00 TO 112+68	2.04
TOTAL	50.42



STATE COUNTY MAP

MORTON COUNTY  
HIGHWAY DEPARTMENT

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

APPROVED DATE

MIKE AUBOL, P.E.  
MORTON COUNTY ENGINEER

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SC-3000(011)	2	1

TABLE OF CONTENTS

Section No.	Sheet No.	Description
1	1	Title Sheet
2	1	Table of Contents
4	1-4	Scope of Work
6	1	Notes
8	1	Quantities
10	1	Basis of Estimate
30	1	Typical Sections
100	1-4	Traffic Control

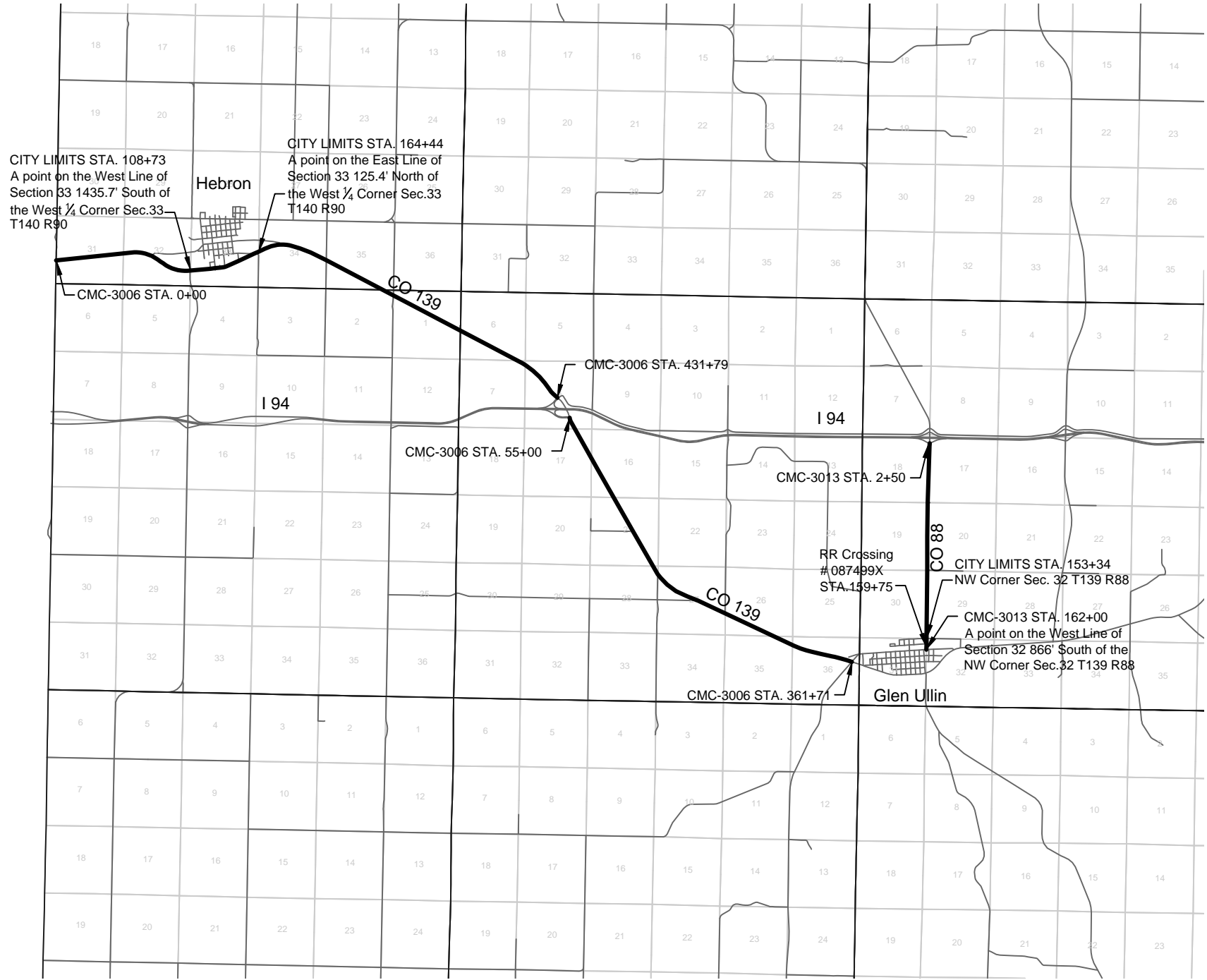
LIST OF STANDARD DRAWINGS

Standard No.	Description
D-704-3	Lane Markers (Spotting Tab for Seal Projects Only)
D-704-7	Breakaway Systems for Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems for Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details - Terminal and Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
D-704-11	Construction Sign Details - Warning Signs
D-704-13	Barricade and Channelizing Device Details
D-704-14	Construction Sign Punching and Mounting Details
D-704-20	Terminal and Seal Coat Sign Layouts
D-704-22	Construction Truck and Temporary Detour Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-27	Traffic Control Plan for Moving Operations
D-704-50	Portable Sign Support Assembly
D-762-4	Pavement Marking
D-762-11	Short Term Pavement Marking

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Table of Contents

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	ND	SC-3000(011)	4	1

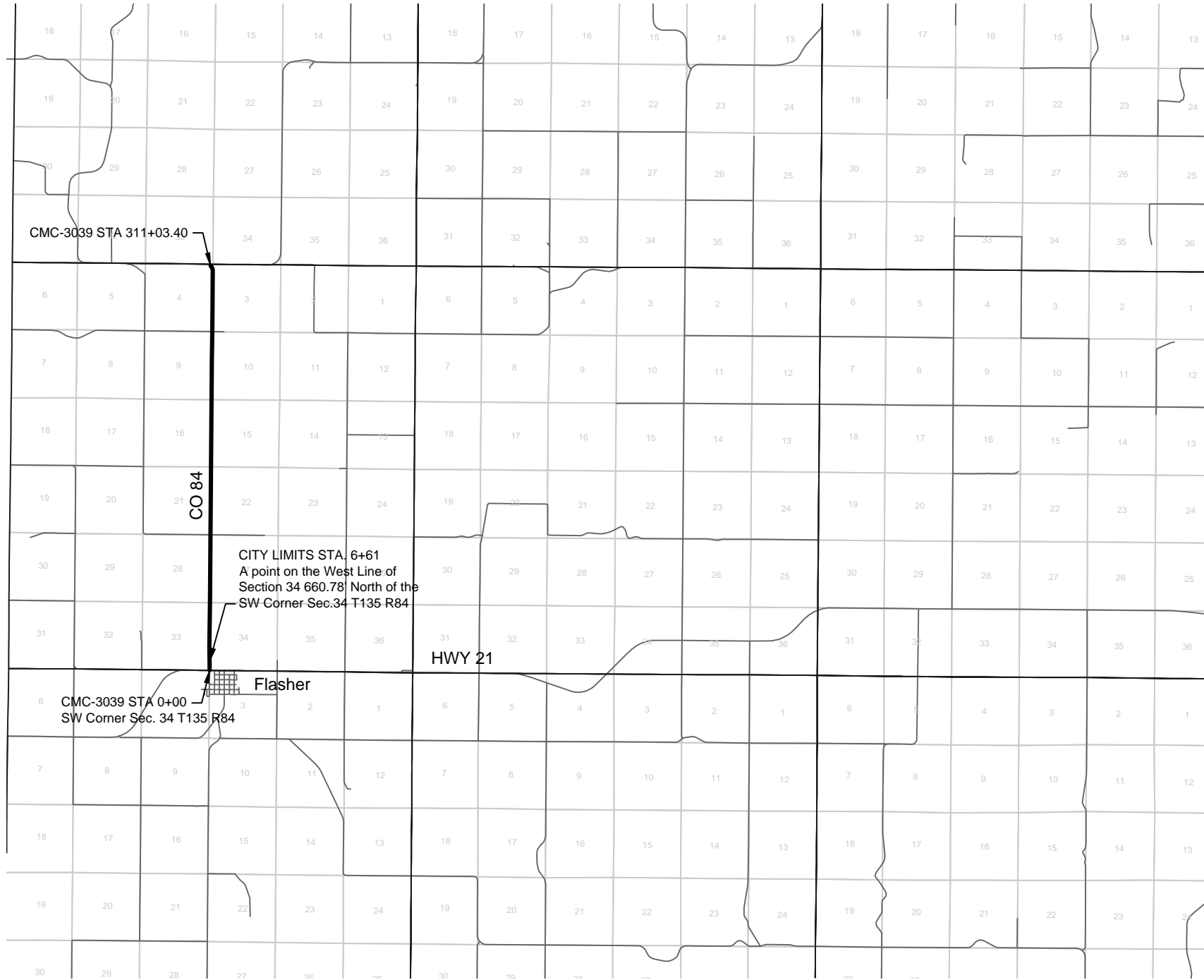


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Scope of Work



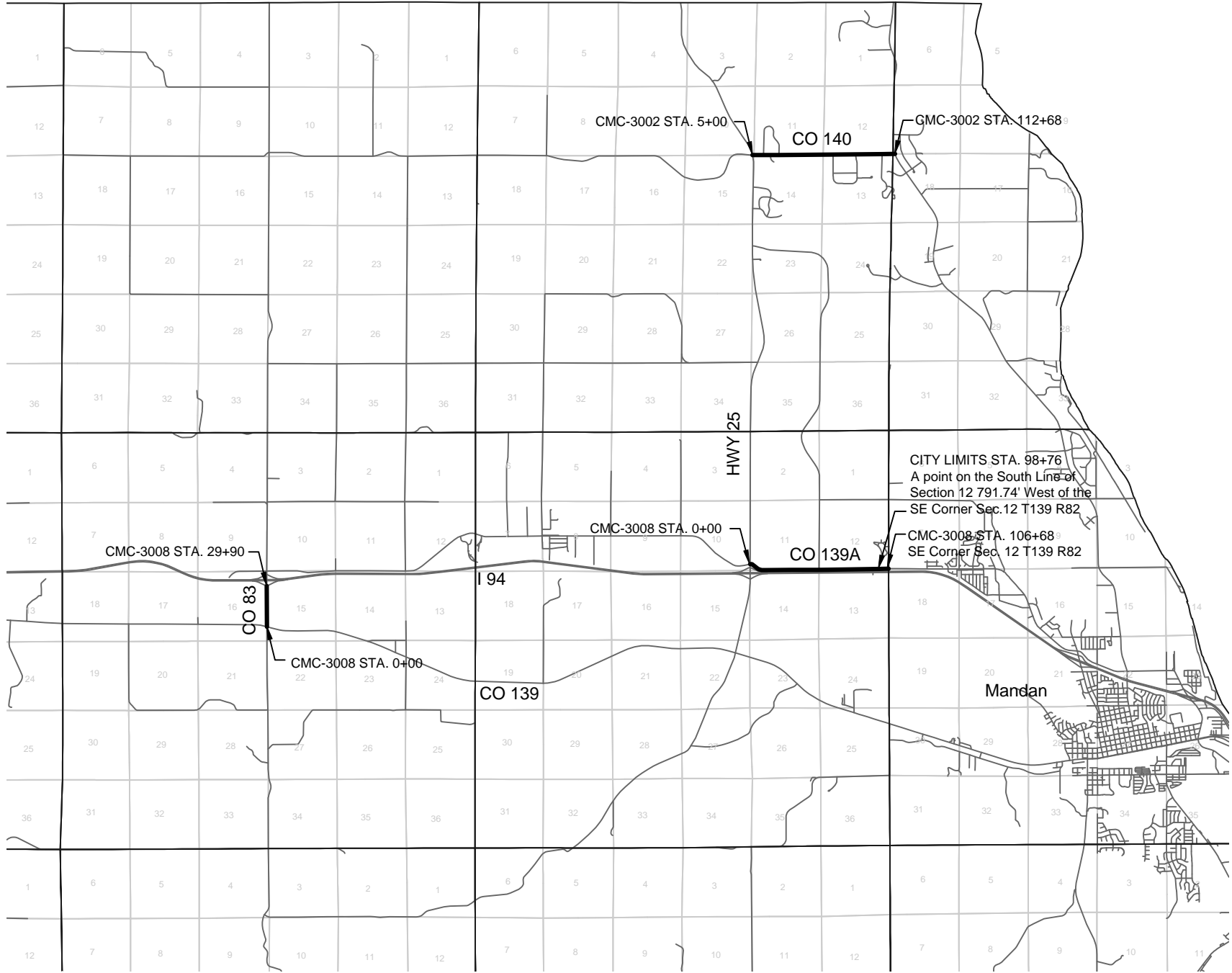
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SC-3000(011)	4	3



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Scope of Work

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SC-3000(011)	4	4



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Scope of Work

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SC-3000(011)	6	1

NOTES

**100-P01**  
Railroad Protective Liability Insurance.  
BNSF Contact - Richard Scott, Manager of Public Projects, Richard.Scott2@BNSF.com, office (763) 782-3492.  
Railroad Insurance Contact - MARSH USA Inc. Dallas, PO Box 973770, Dallas TX, 75397-3770, Rosa M Martinez, Rosa.M.Martinez@marsh.com ph-(214) 303-8519.

4 crossing locations and numbers located on scope of work sheets.

**401-P01**  
Fog Coat use CSS-1H Emulsified Asphalt. Apply Fog coat at the rate shown in the Basis of Estimate after the final brooming. Dilute the fog seal at a 50/50 ratio.

**704-P01**  
Traffic control for seal coats shall consist of lane closures, flagging, and pilot car. Traffic Control Devices shall comply with the following Standard Drawings:

1. Standard D-704-15, Layout A:

2. Standard D-704-20, Layout H:

3. Standard D-704-22: For traffic control plan moving operations The required traffic control signs and devices are included in the "Traffic Control Devices List" and will be measured and paid at the contract unit price for each device. Traffic control devices will be paid one time. No additional payment will be made for moving traffic control devices during phase progression. Additional devices required to accommodate the contractor's operation shall be the contractor's responsibility.

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Notes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SC-3000(011)	8	1

ESTIMATE OF QUANTITIES

SPEC NO.	CODE NO.	ITEM	UNIT	QUANTITY
103	0100	CONTRACT BOND	LSUM	1
107	0100	RAILWAY PROTECTION INSURANCE	LSUM	1
401	0070	FOG SEAL	GAL	37111
420	0111	CRS2P EMULSIFIED ASPHALT	GAL	297029
420	0127	COVER COAT MATERIAL CL 41-M	TON	9266
702	0100	MOBILIZATION	LSUM	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	8092
762	0430	SHORT TERM 4IN LINE - TYPE NR	LF	243477
762	1104	PVMT MK PAINTED 4IN LINE	LF	771067

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Estimate of Quantities



BASIS OF ESTIMATE-ROADWAY

TYPICAL 1				
ITEM DESCRIPTION	BASIS	UNIT	WIDTH	PER MILE
CSS1H EMULSIFIED ASPHALT - FOG SEAL	0.05 GAL / SY	GAL	25 FEET	733 GAL
CRS2P EMULSIFIED ASPHALT - MAINLINE	0.40 GAL / SY	GAL	25 FEET	5867 GAL
COVER COAT MATERIAL CL 41-M	25 LBS / SY	TON	25 FEET	183 TON

TYPICAL 2				
ITEM DESCRIPTION	BASIS	UNIT	WIDTH	PER MILE
CSS1H EMULSIFIED ASPHALT - FOG SEAL	0.05 GAL / SY	GAL	27 FEET	792 GAL
CRS2P EMULSIFIED ASPHALT - MAINLINE	0.40 GAL / SY	GAL	27 FEET	6336 GAL
COVER COAT MATERIAL CL 41-M	25 LBS / SY	TON	27 FEET	198 TON

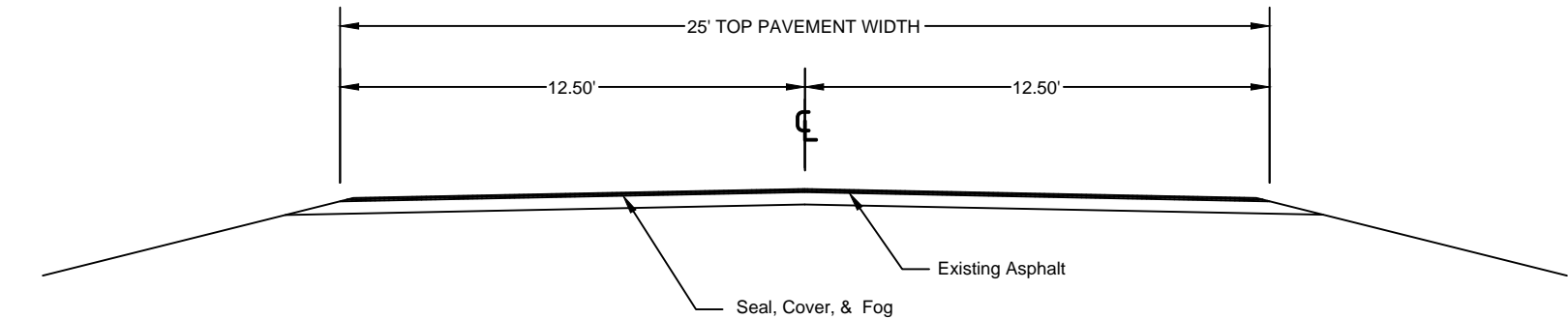
BASIS OF ESTIMATE-MARKING

CENTERLINE SKIP - 4" YELLOW, 10' LINE, 30' SKIP, 1,320'/MILE CENTER LINE BARRIER LINES - 4" YELLOW, 4" BETWEEN LINES
PAVEMENT MARKING PAINTED LINE (PERMANENT) CENTERLINE SKIP - 4" YELLOW, 10' LINE, 30' SKIP, 1,320'/MILE CENTER LINE BARRIER LINES - 4" YELLOW, 4" BETWEEN LINES EDGE LINE - 4" WHITE, 10,560'/MILE

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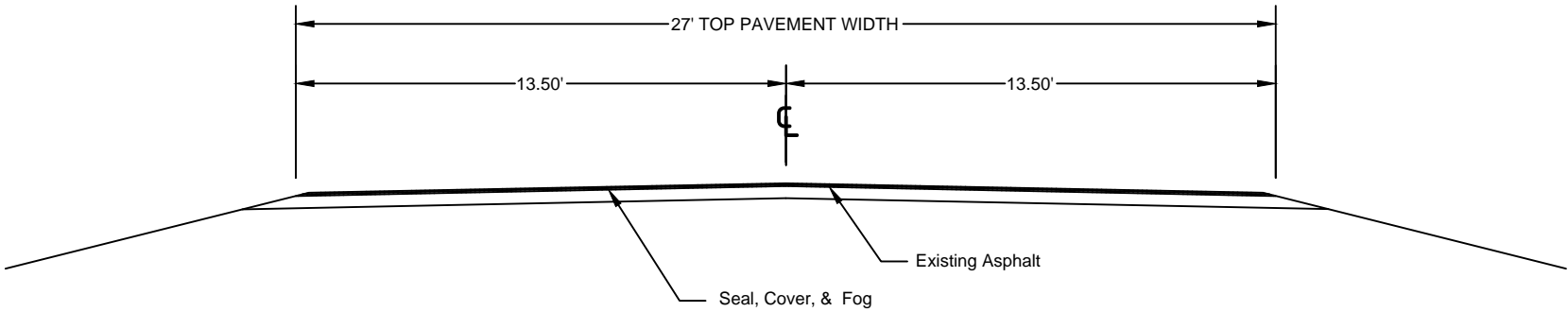
Basis of Estimate

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SC-3000(011)	30	1



TYPICAL CROSS SECTION 1

STATIONS	MILES
CMC-3006 STA. 0+00 TO 431+79	8.18
CMC-3006 STA. 55+00 TO 361+71	5.81
CMC-3013 STA. 2+50 TO 162+00	3.02
CMC-3027 STA. 21+00 TO 28+00(BK)-0+00(AH) TO 37+27.6(BK)-0+00(AH) TO 479+12	9.91
CMC-3006 STA. 262+21 TO 498+33(BK)-0+00(AH) TO 49+20	5.40
CMC-3033 STA. 0+15 TO 175+15	3.31
CMC-3039 STA. 0+00 TO 73+70	1.40
CMC-3039 STA. 7+41 TO 51+02(BK)-0+00(AH) TO 72+20.2(BK)-72+28.6(AH) TO 108+20	2.87
CMC-3039 STA. 0+00 TO 311+03.40	5.89
CMC-3002 STA. 5+00 TO 112+68	2.04
TOTAL	47.83



TYPICAL CROSS SECTION 2

STATIONS	MILES
CMC-3008 STA. 0+00 TO 29+90	0.57
CMC-3008 STA. 0+00 TO 106+68	2.02
TOTAL	2.59

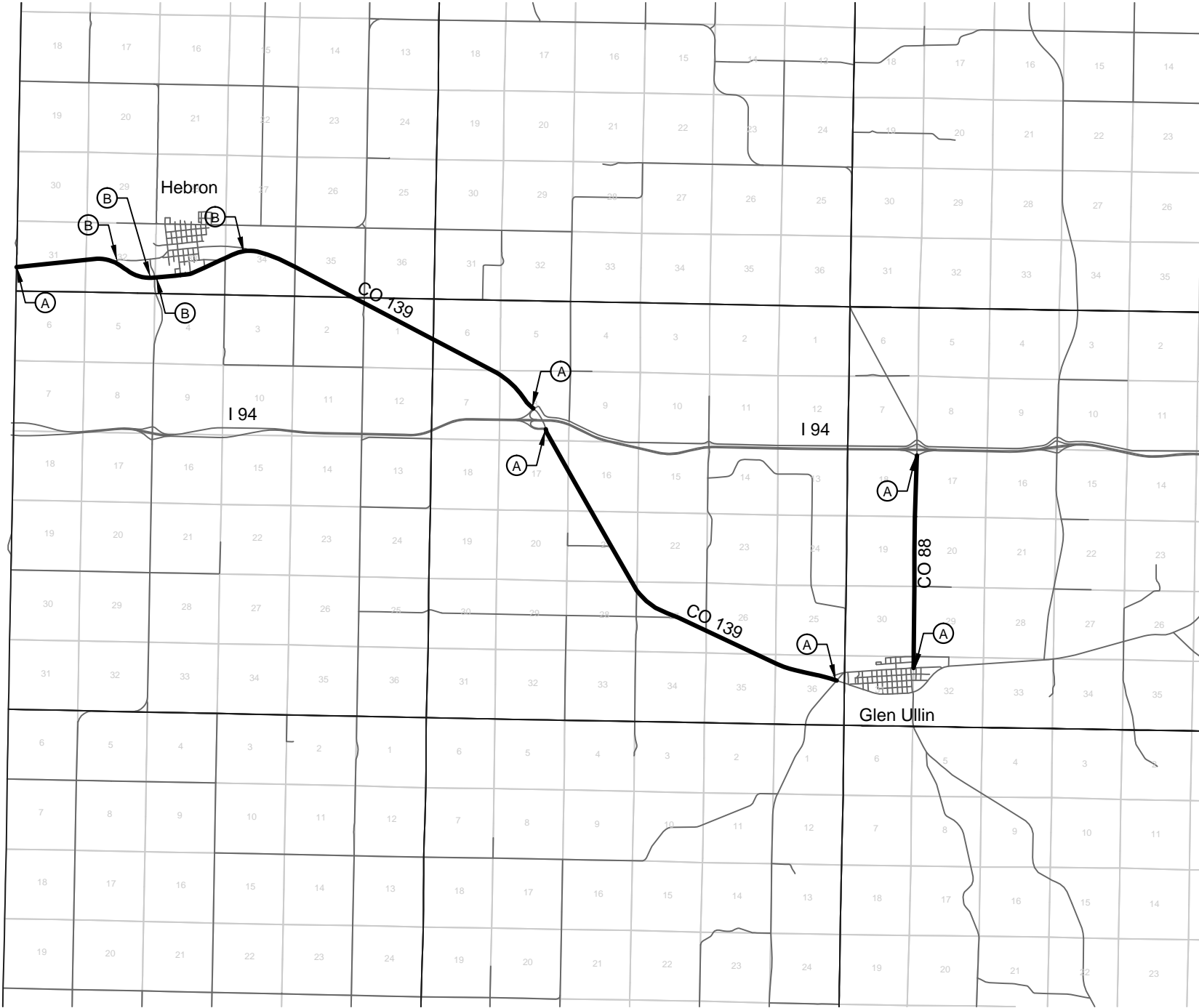


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Typical Sections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SC-3000(011)	100	1

SIGN LIST						
LO.	SIGN NO	DESCRIPTION	NO.	UNITS EA	PAY FACTOR	TOTAL UNITS
(A)	G20-1-60	ROAD WORK NEXT <u>MILES</u>	6	34	1	204
(B)	G20-50a-72	ROAD WORK NEXT <u>MILES</u> RT AND LT	4	37	1	148
(C)	G20-52a-72	ROAD WORK NEXT <u>MILES</u> RT OR LT	0	30	1	0
(D)	W20-1-48	ROAD WORK AHEAD (PORTABLE)	4	35	1	140
(E)	W20-7b-48	BE PREPARED TO STOP (PORTABLE)	4	35	1	140
(F)	W20-7a-48	FLAGGING SYMBOL (PORTABLE)	4	35	1	140
(G)	W8-12-48	NO CENTER STRIPE (PORTABLE)	8	34	1	272
(H)	R4-1-48	DO NOT PASS (PORTABLE)	8	39	1	312
(I)	W3-5-48	SPEED REDUCTION AHEAD (PORTABLE)	8	35	1	280
(J)	W22-8-48	FRESH OIL LOOSE ROCK (PORTABLE)	8	35	1	280
(K)	R2-1-48	SPEED LIMIT (PORTABLE)	8	39	1	312
TOTAL						2228



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Traffic Control

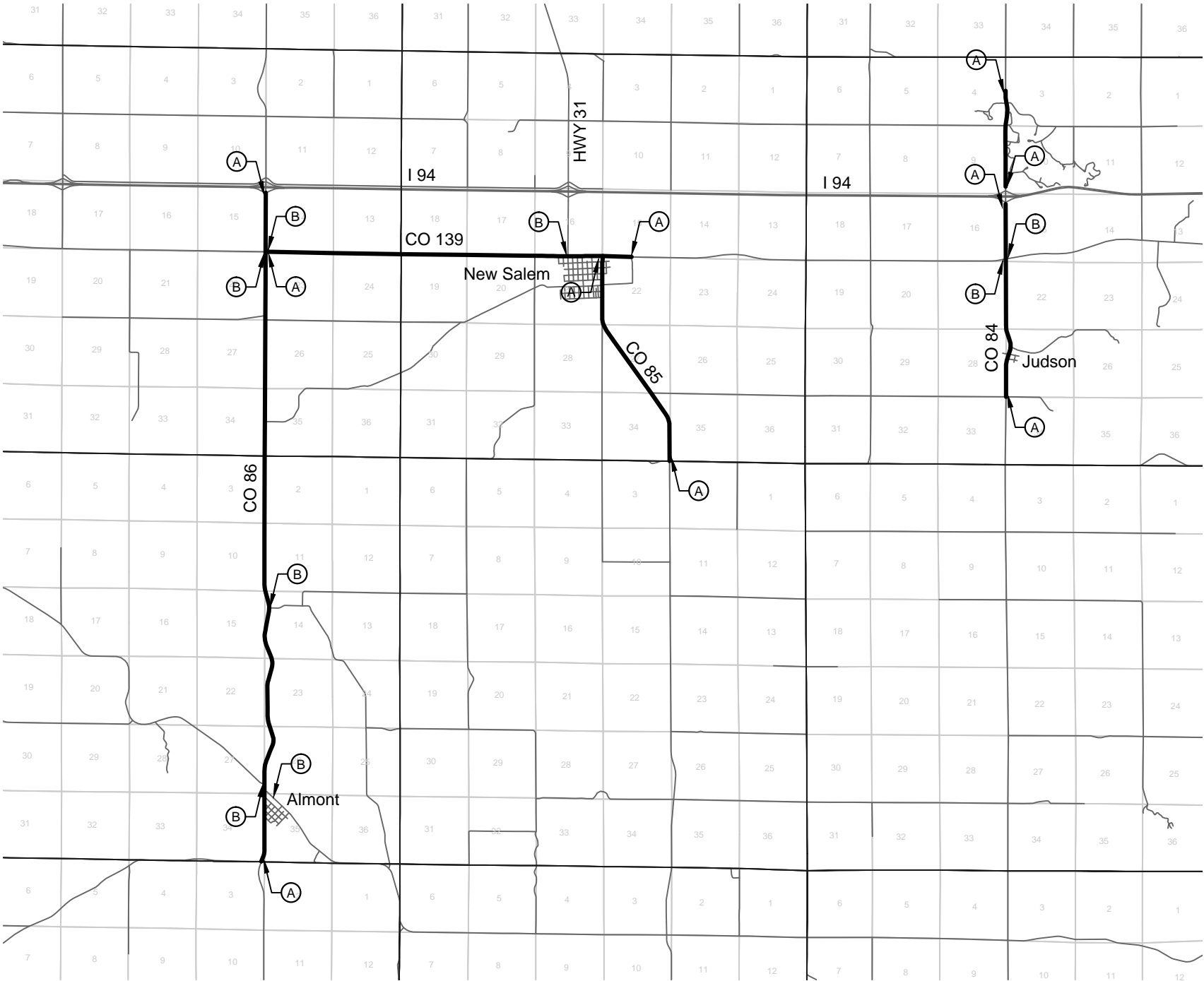
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	ND	SC-3000(011)	100	2

SIGN LIST						
LO.	SIGN NO	DESCRIPTION	NO.	UNITS EA	PAY FACTOR	TOTAL UNITS
(A)	G20-1-60	ROAD WORK NEXT <u>MILES</u>	10	34	1	340
(B)	G20-50a-72	ROAD WORK NEXT <u>MILES</u> RT AND LT	8	37	1	296
(C)	G20-52a-72	ROAD WORK NEXT <u>MILES</u> RT OR LT	0	30	1	0
(D)	W20-1-48	ROAD WORK AHEAD (PORTABLE)	4	35	1	140
(E)	W20-7b-48	BE PREPARED TO STOP (PORTABLE)	4	35	1	140
(F)	W20-7a-48	FLAGGING SYMBOL (PORTABLE)	4	35	1	140
(G)	W8-12-48	NO CENTER STRIPE (PORTABLE)	12	34	1	408
(H)	R4-1-48	DO NOT PASS (PORTABLE)	12	39	1	468
(I)	W3-5-48	SPEED REDUCTION AHEAD (PORTABLE)	12	35	1	420
(J)	W22-8-48	FRESH OIL LOOSE ROCK (PORTABLE)	12	35	1	420
(K)	R2-1-48	SPEED LIMIT (PORTABLE)	12	39	1	468
TOTAL						3240



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Traffic Control



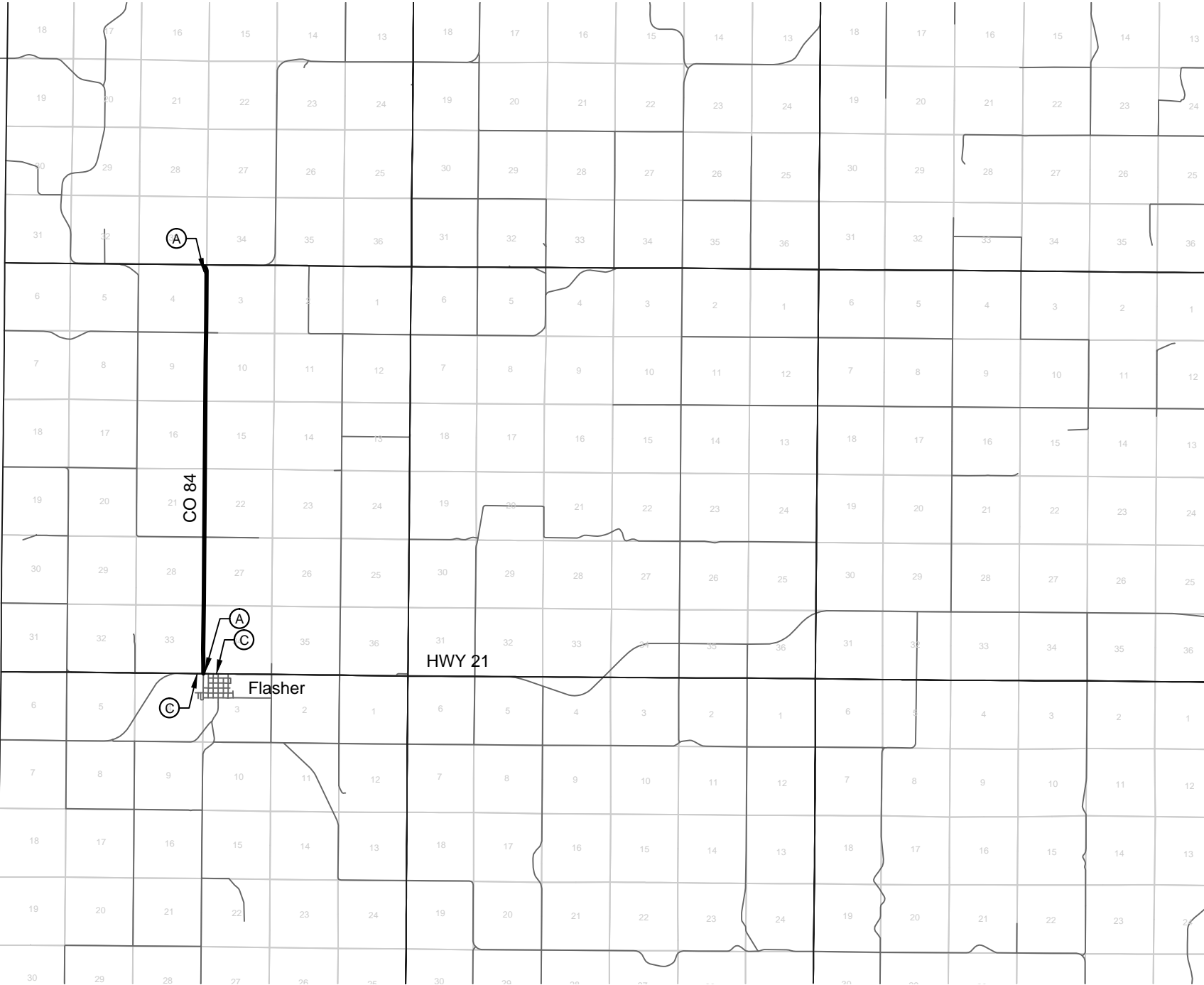
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	ND	SC-3000(011)	100	3

SIGN LIST						
LO.	SIGN NO	DESCRIPTION	NO.	UNITS EA	PAY FACTOR	TOTAL UNITS
A	G20-1-60	ROAD WORK NEXT <u>MILES</u>	2	34	1	68
B	G20-50a-72	ROAD WORK NEXT <u>MILES</u> RT AND LT	0	37	1	0
C	G20-52a-72	ROAD WORK NEXT <u>MILES</u> RT OR LT	2	30	1	60
D	W20-1-48	ROAD WORK AHEAD (PORTABLE)	2	35	1	70
E	W20-7b-48	BE PREPARED TO STOP (PORTABLE)	2	35	1	70
F	W20-7a-48	FLAGGING SYMBOL (PORTABLE)	2	35	1	70
G	W8-12-48	NO CENTER STRIPE (PORTABLE)	2	34	1	68
H	R4-1-48	DO NOT PASS (PORTABLE)	2	39	1	78
I	W3-5-48	SPEED REDUCTION AHEAD (PORTABLE)	2	35	1	70
J	W22-8-48	FRESH OIL LOOSE ROCK (PORTABLE)	2	35	1	70
K	R2-1-48	SPEED LIMIT (PORTABLE)	2	39	1	78
TOTAL						702



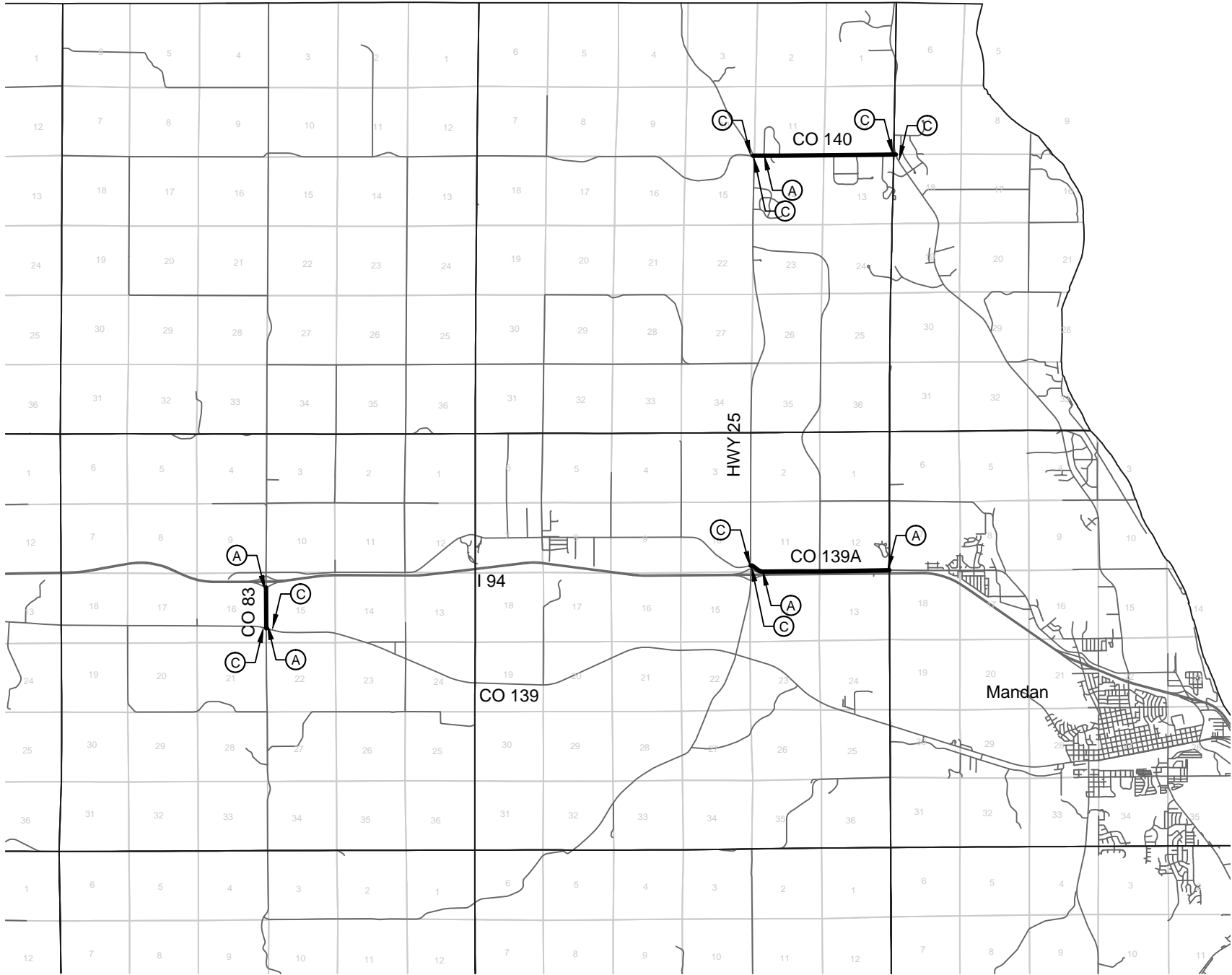
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Traffic Control



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SC-3000(011)	100	4

SIGN LIST						
LO.	SIGN NO	DESCRIPTION	NO.	UNITS EA	PAY FACTOR	TOTAL UNITS
A	G20-1-60	ROAD WORK NEXT <u>MILES</u>	5	34	1	170
B	G20-50a-72	ROAD WORK NEXT <u>MILES</u> RT AND LT	0	37	1	0
C	G20-52a-72	ROAD WORK NEXT <u>MILES</u> RT OR LT	8	30	1	240
D	W20-1-48	ROAD WORK AHEAD (PORTABLE)	4	35	1	140
E	W20-7b-48	BE PREPARED TO STOP (PORTABLE)	4	35	1	140
F	W20-7a-48	FLAGGING SYMBOL (PORTABLE)	4	35	1	140
G	W8-12-48	NO CENTER STRIPE (PORTABLE)	6	34	1	204
H	R4-1-48	DO NOT PASS (PORTABLE)	6	39	1	234
I	W3-5-48	SPEED REDUCTION AHEAD (PORTABLE)	6	35	1	210
J	W22-8-48	FRESH OIL LOOSE ROCK (PORTABLE)	6	35	1	210
K	R2-1-48	SPEED LIMIT (PORTABLE)	6	39	1	234
TOTAL						1922

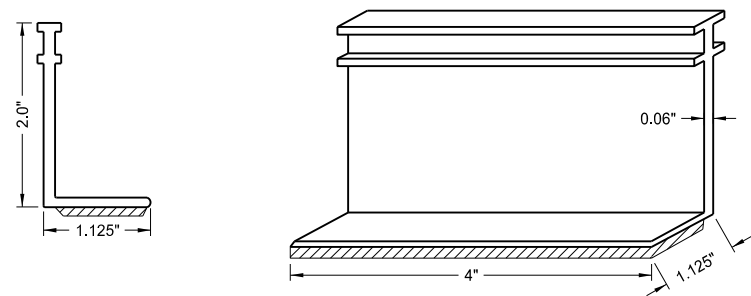


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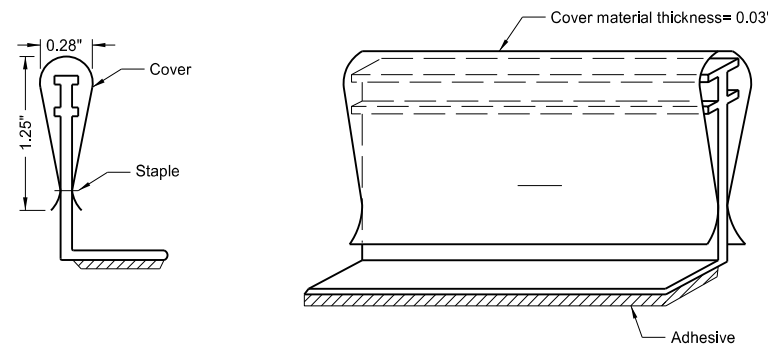
Traffic Control

LANE MARKERS  
(Spotting Tab for Seal Projects only)

D-704-3



Marker Body



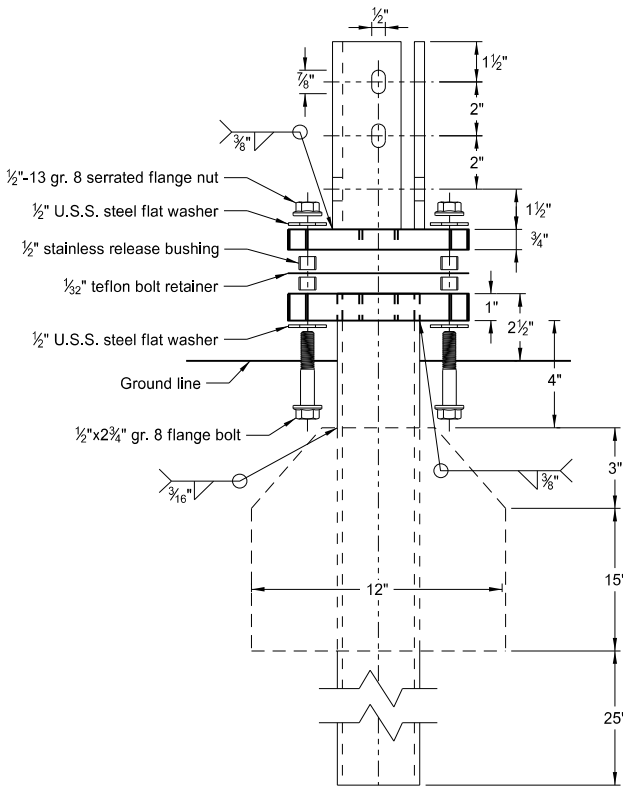
Marker Body with Protective Cover

Notes:

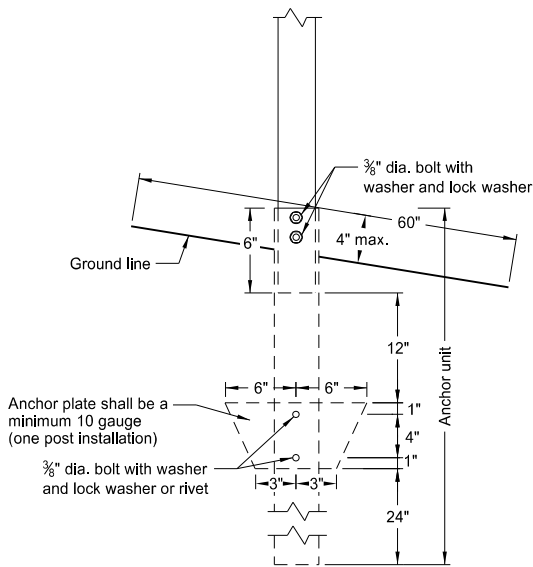
1. The lane line markers shall be installed as shown, prior to the beginning of the seal coat.
2. The cover shall be attached to the vertical part of the marker in such a way that traffic will not cause it to detach and so that it may be easily removed manually.
3. The protective covers shall be removed, immediately after the seal coat is applied.
4. The markers shall be removed after permanent pavement marking has been installed.
5. The marker body and cover shall be manufactured from polyurethane material.
6. Marker types:  
Type Y - Yellow body and cover with yellow reflective tape on both sides.  
Type W - White body and cover with white reflective tape on one side.
7. The reflective tape shall be a retroreflective material. The tape shall have a minimum reflectance of 1200 candle power per foot-candle per square foot, using a .1 degree observation angle and 0 degree entrance angle.
8. The adhesive shall conform to AASHTO M 237.

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

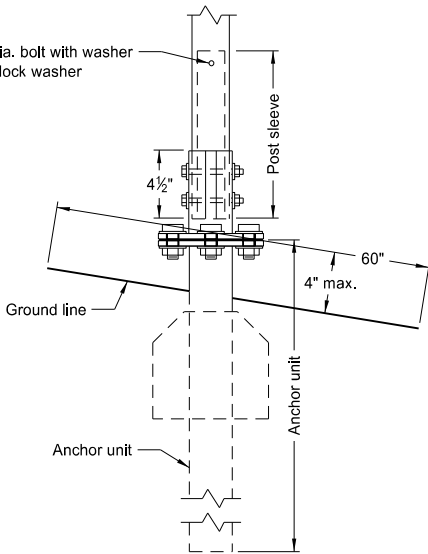
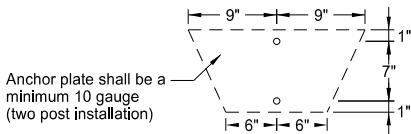
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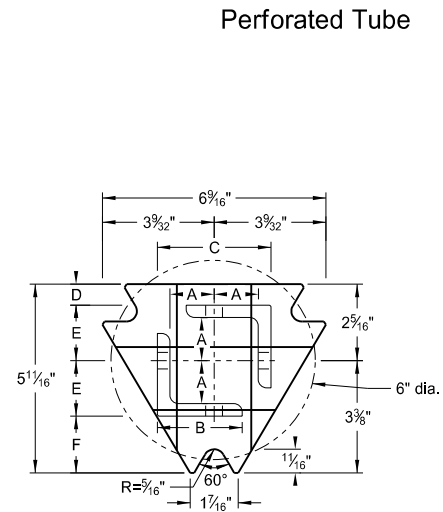
Multi-Directional Slip Base Assembly



Anchor Unit and Post Assembly

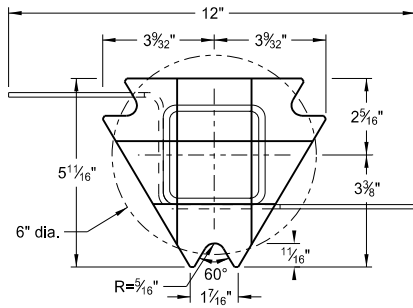


Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



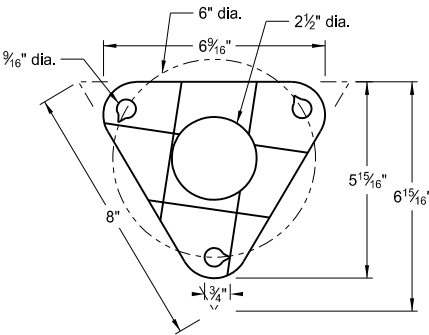
Top Post Receiver

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



Bottom Soil Stub

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



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

Notes:

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

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

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

Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 7/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

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

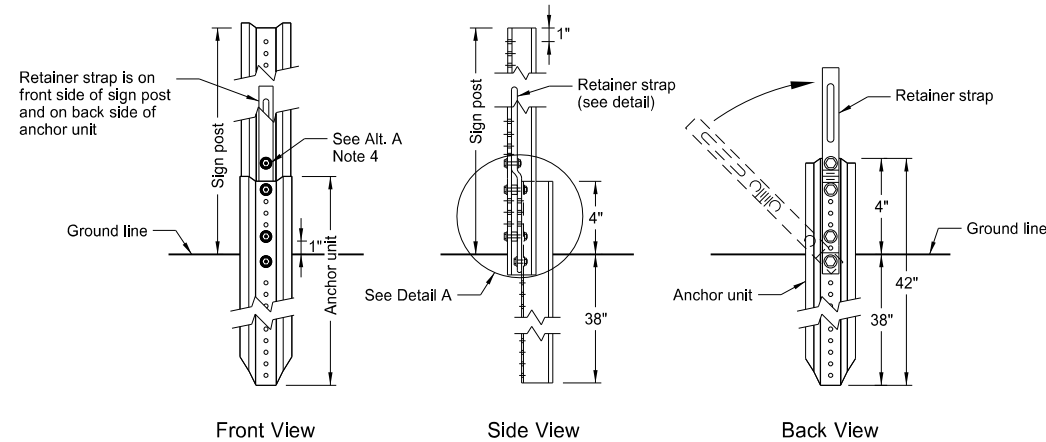
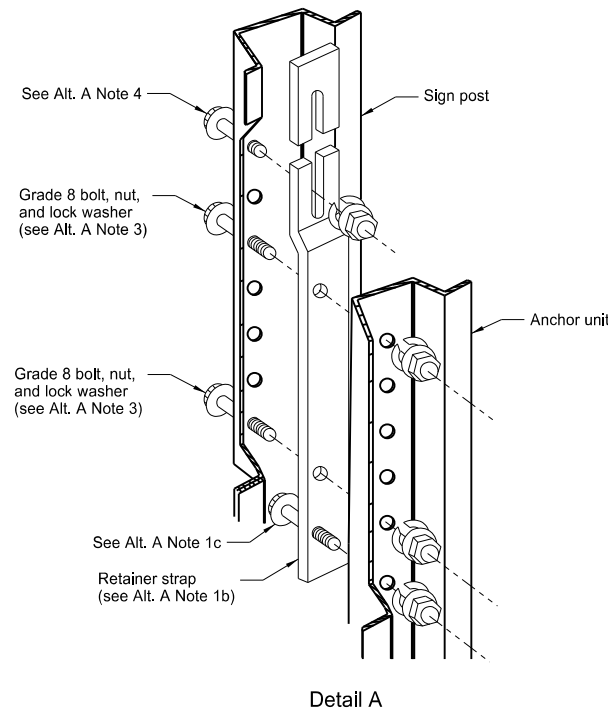
(B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.

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

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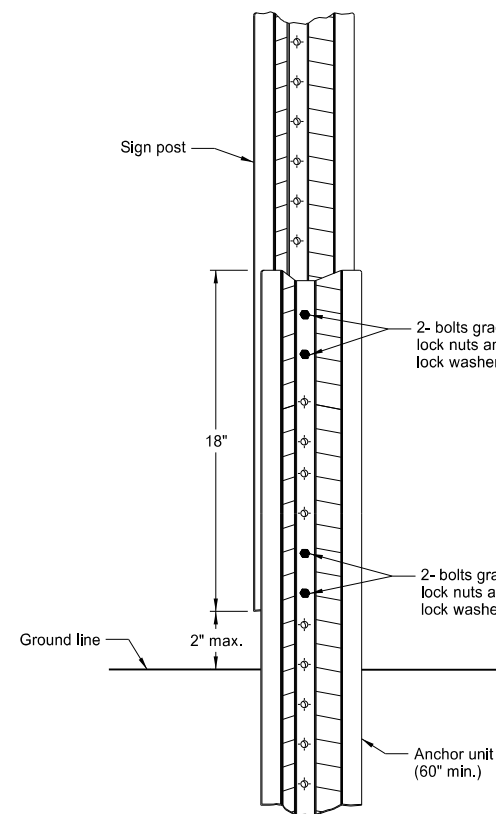
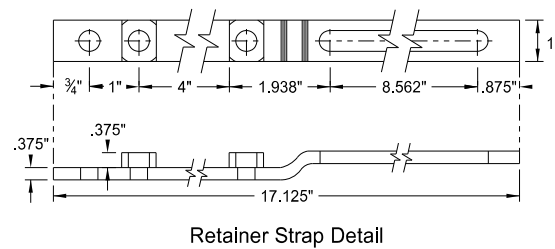


U-Channel Post



Breakaway U-Channel Detail Alternate A

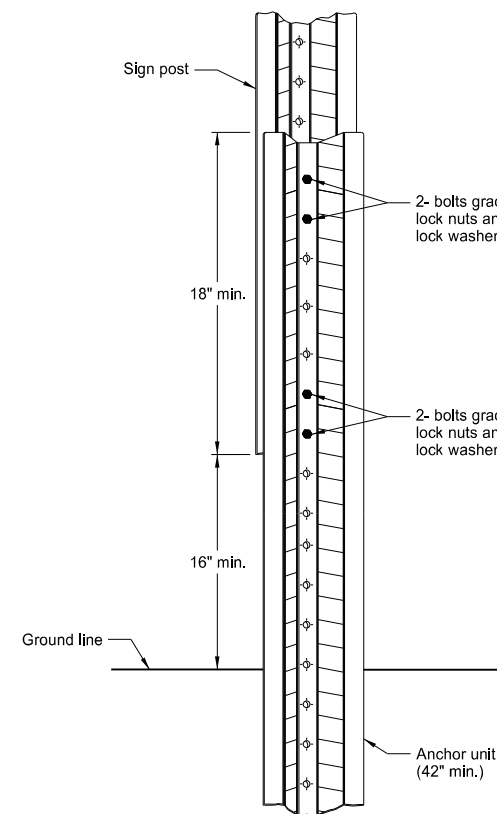
A maximum of 2 posts shall be installed within 7'.



Breakaway U-Channel Splice Detail Alternate B

(2.5 and 3 lb/ft)

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



Breakaway U-Channel Splice Detail Alternate C

(2.5 and 3 lb/ft)

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

Alternate A Steps of Installation:

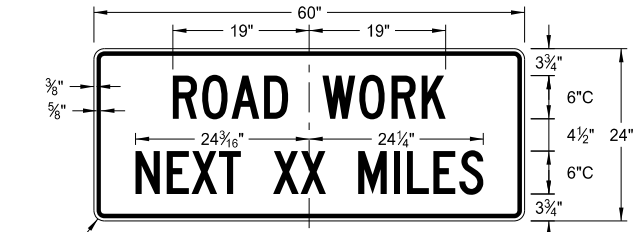
- a) Drive anchor unit to within 12" of ground level.  
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.  
c) Assemble strap to back of anchor unit using  $\frac{5}{16}$ "x2" bolt, lock washer and nut.  
d) Rotate strap 90°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

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2-28-14	
REVISIONS	
DATE	CHANGE

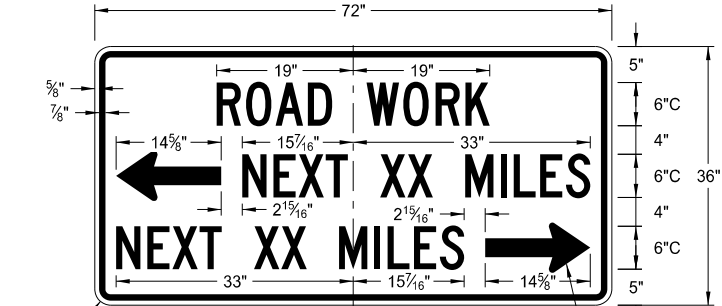
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CONSTRUCTION SIGN DETAILS  
TERMINAL AND GUIDE SIGNS

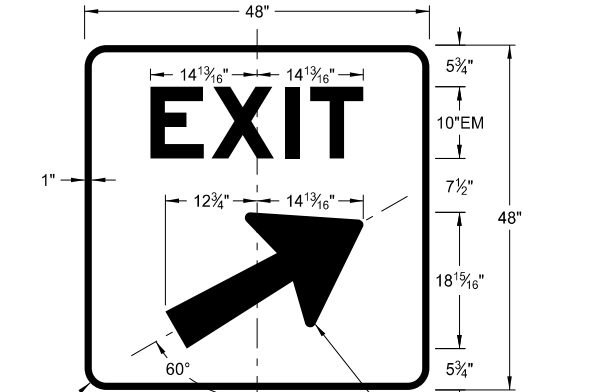
D-704-9



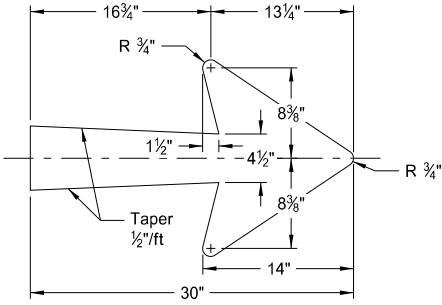
G20-1-60  
Legend: black (non-refl)  
Background: orange



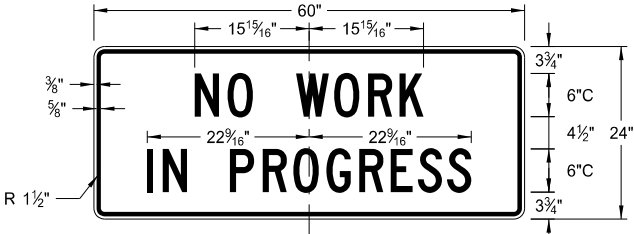
G20-50a-72  
Legend: black (non-refl)  
Background: orange



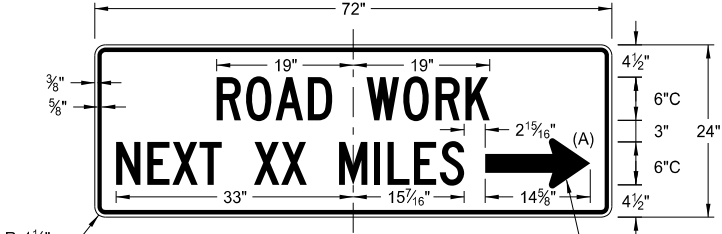
E5-1(L or R)-48  
Legend: white  
Background: green (orange optional)



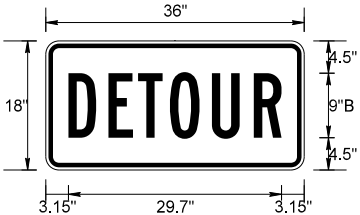
E5-1-48



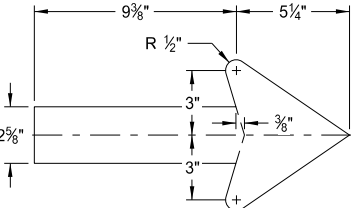
G20-1b-60  
Legend: black (non-refl)  
Background: orange



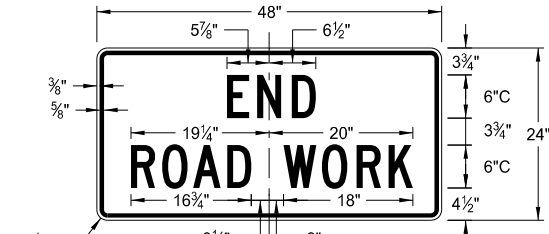
G20-52a-72  
Legend: black (non-refl)  
Background: orange



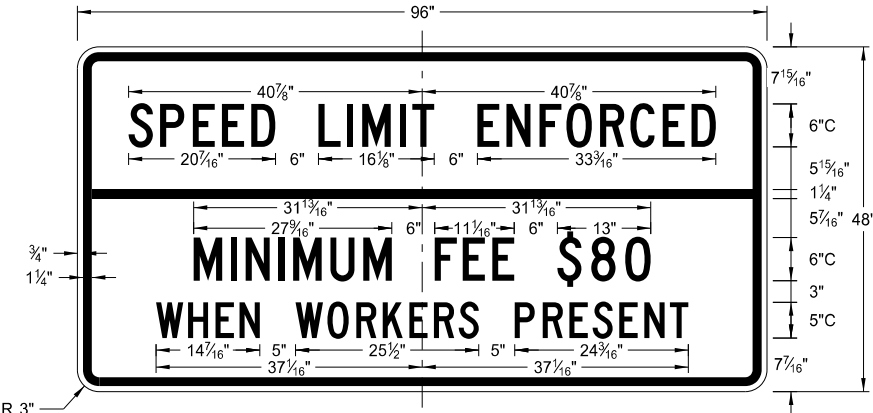
M4-8-36  
Legend: black (non-refl)  
Background: orange



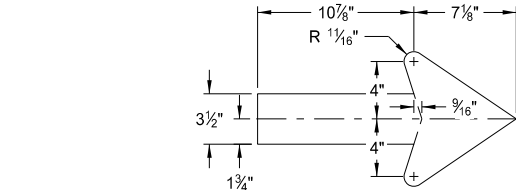
G20-50a-72  
G20-52a-72



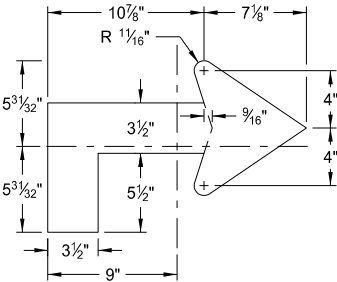
G20-2-48  
Legend: black (non-refl)  
Background: orange



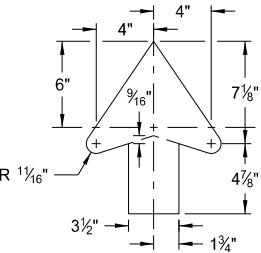
G20-55-96  
Legend: black (non-refl)  
Background: orange



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



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



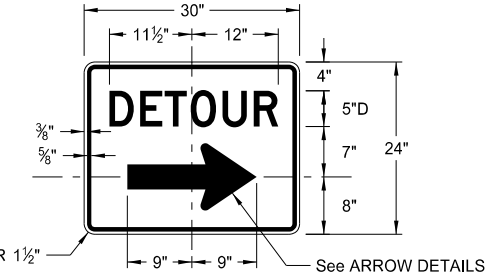
M4-9-30  
Straight

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	Added sign & background color

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

## D-704-10

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

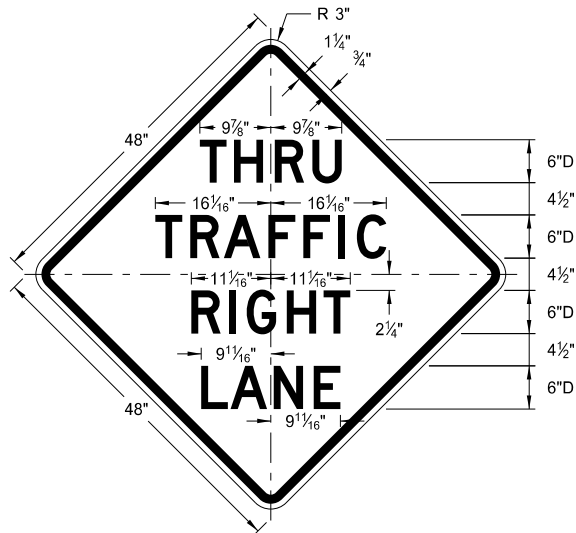
R11-4a-60  
Legend: black (non-refl)  
Background: white

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		<p>This document was originally issued and sealed by</p> <p>Roger Weigel,</p> <p>Registration Number</p> <p>PE- 2930 ,</p> <p>on 8/17/17 and the original document is stored at the</p> <p>North Dakota Department of Transportation</p>
8-13-13		
REVISIONS		
DATE	CHANGE	
8-17-17	Revised sign number	

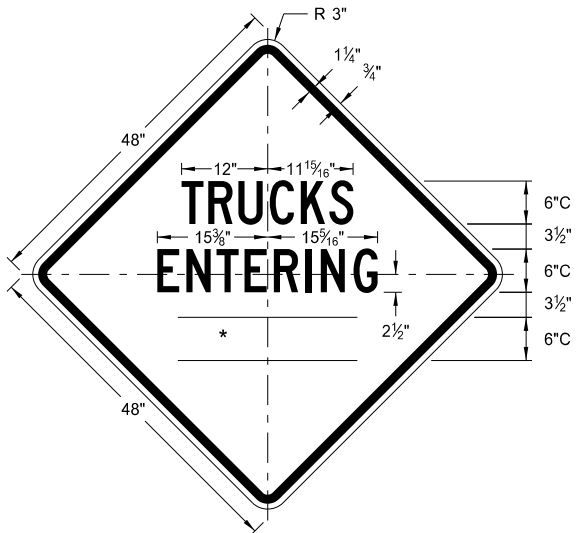
CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

D-704-11



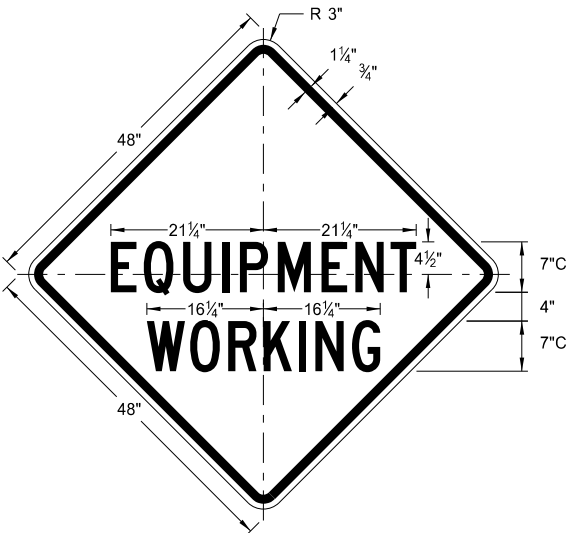
W5-8-48

Legend: black (non-refl)  
Background: orange



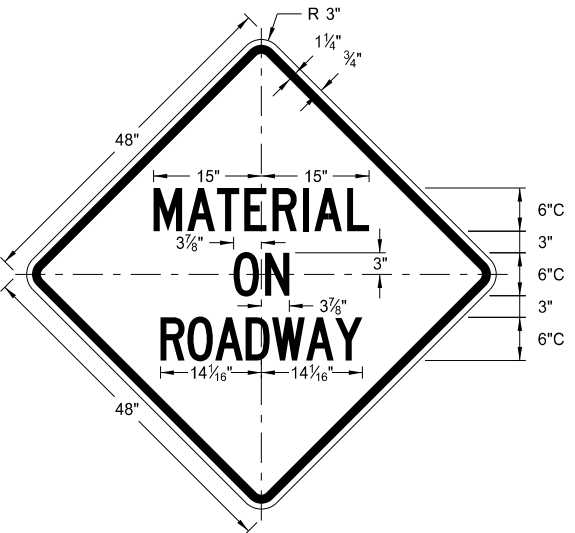
W8-54-48

Legend: black (non-refl)  
Background: orange



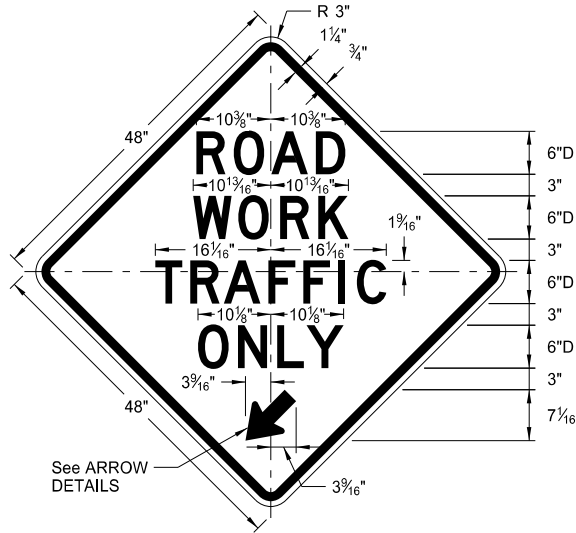
W20-51-48

Legend: black (non-refl)  
Background: orange



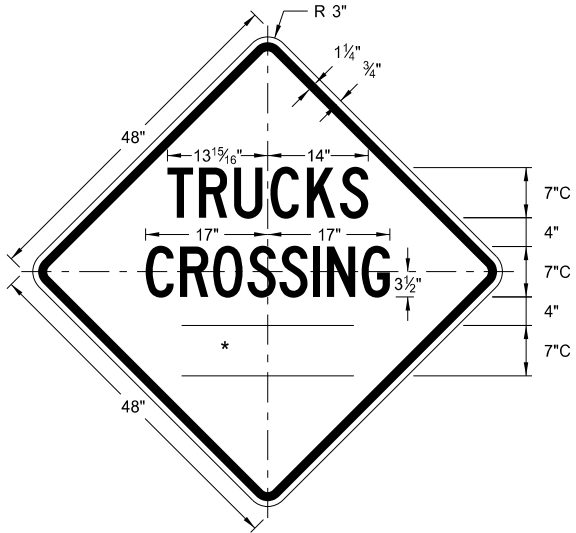
W21-51-48

Legend: black (non-refl)  
Background: orange



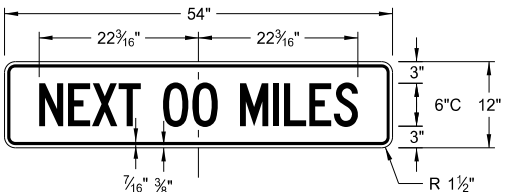
W5-9-48

Legend: black (non-refl)  
Background: orange



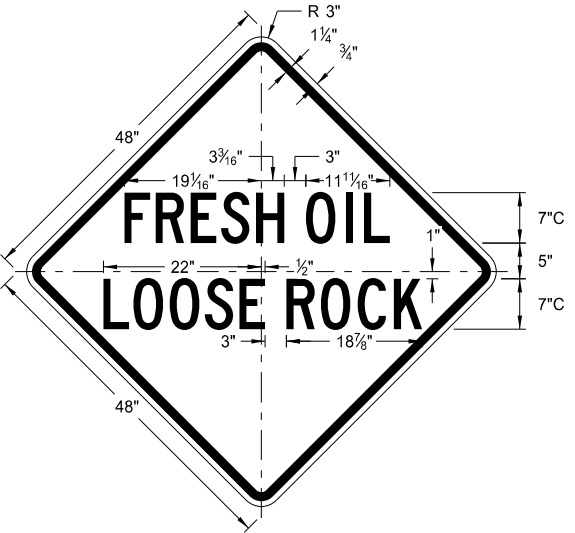
W8-55-48

Legend: black (non-refl)  
Background: orange



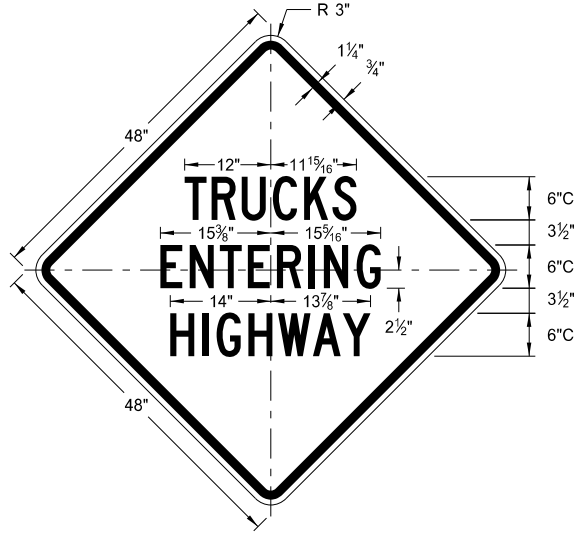
W20-52P-54

Legend: black (non-refl)  
Background: orange



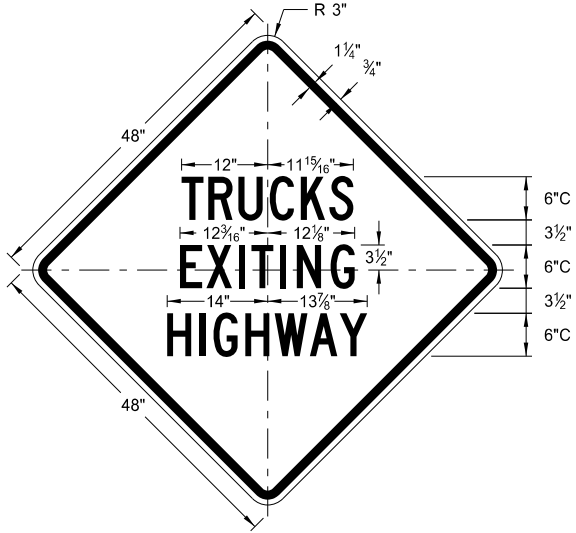
W22-8-48

Legend: black (non-refl)  
Background: orange



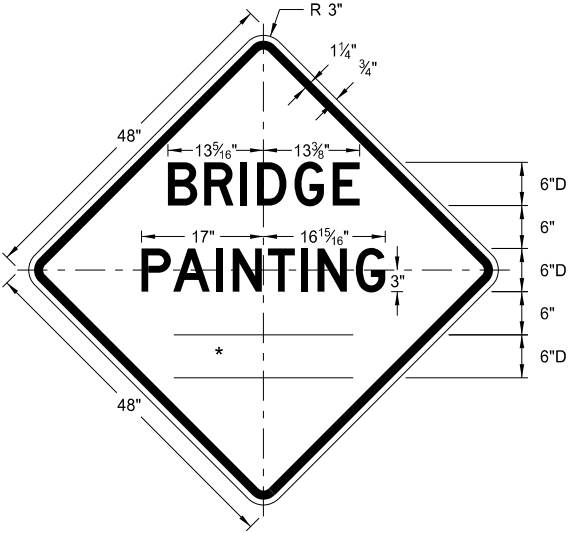
W8-53-48

Legend: black (non-refl)  
Background: orange



W8-56-48

Legend: black (non-refl)  
Background: orange

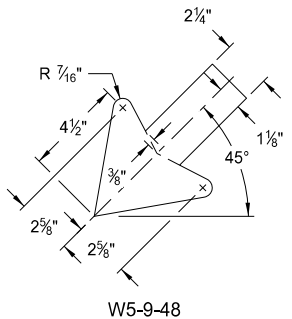


W21-50-48

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

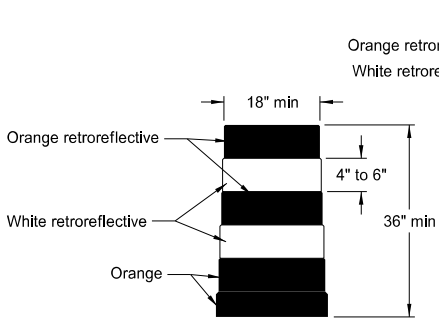
ARROW DETAILS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number

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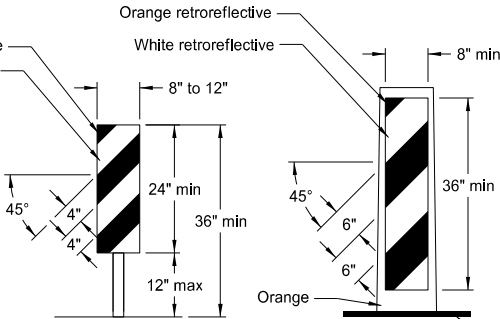
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



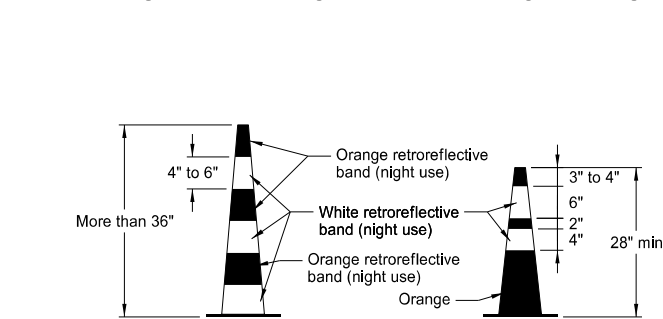
DELINEATOR DRUM

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



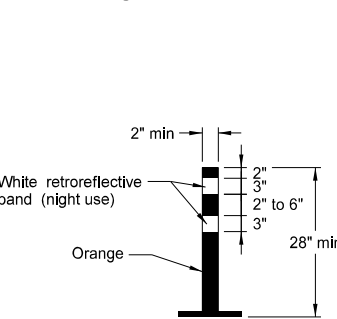
VERTICAL PANEL

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



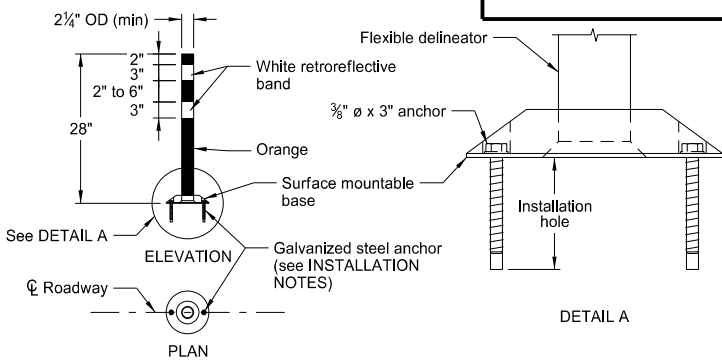
TRAFFIC CONE

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



TUBULAR MARKER

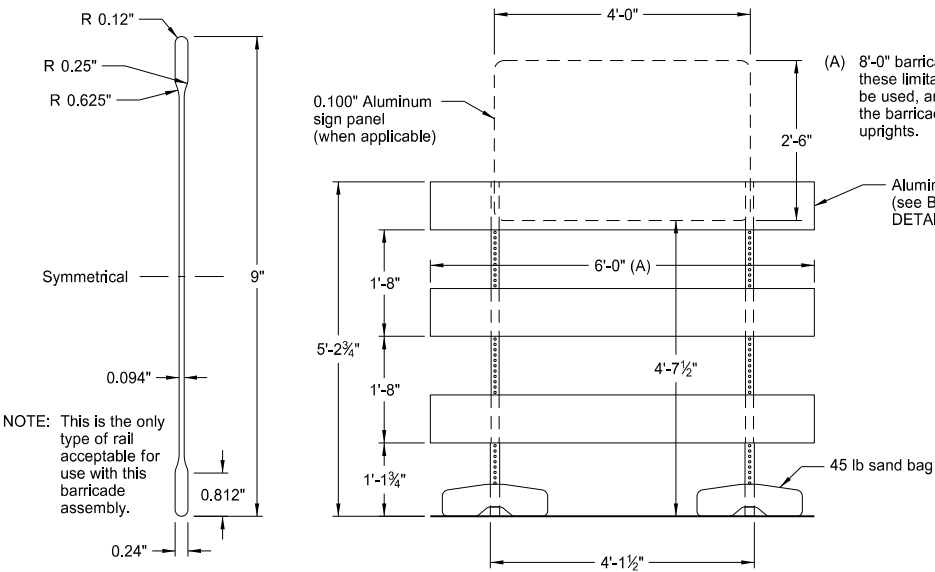
RetroreflectORIZATION of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

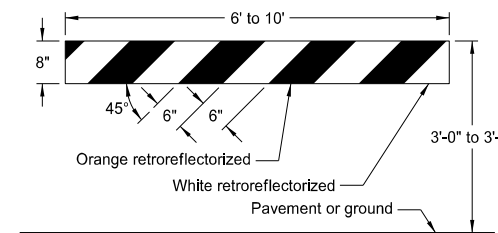
INSTALLATION NOTES:

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

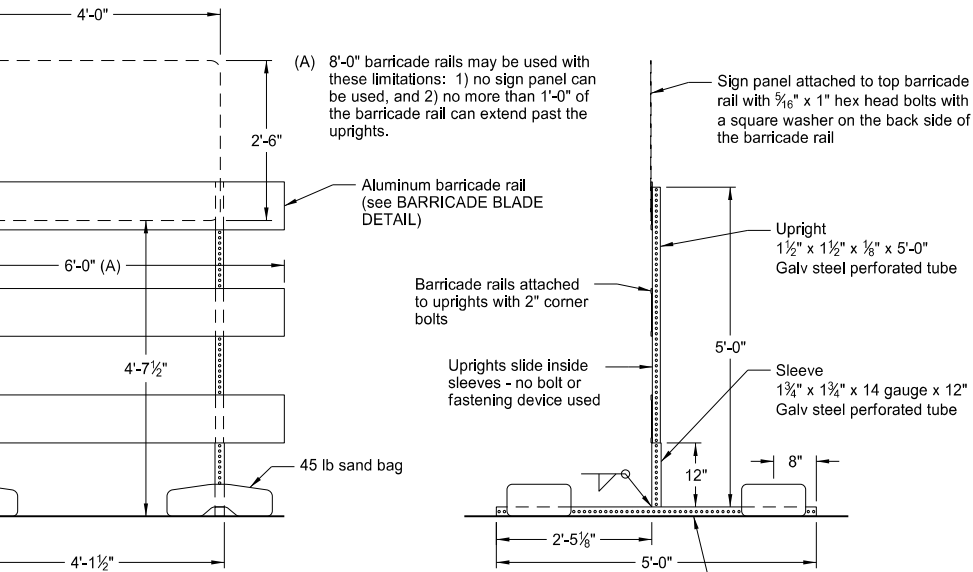


BARRICADE BLADE DETAIL

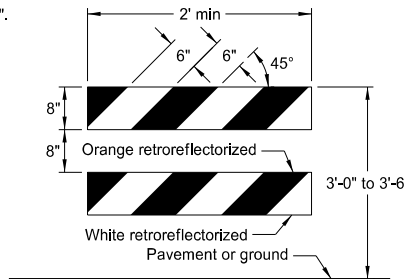
NOTE: This is the only type of rail acceptable for use with this barricade assembly.



TYPE I BARRICADE

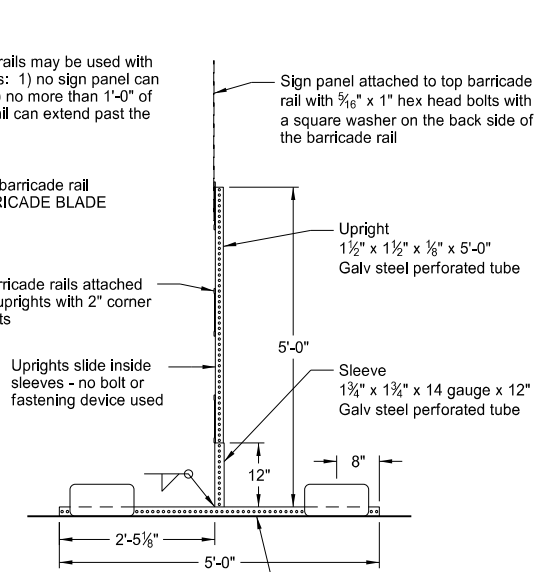


BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

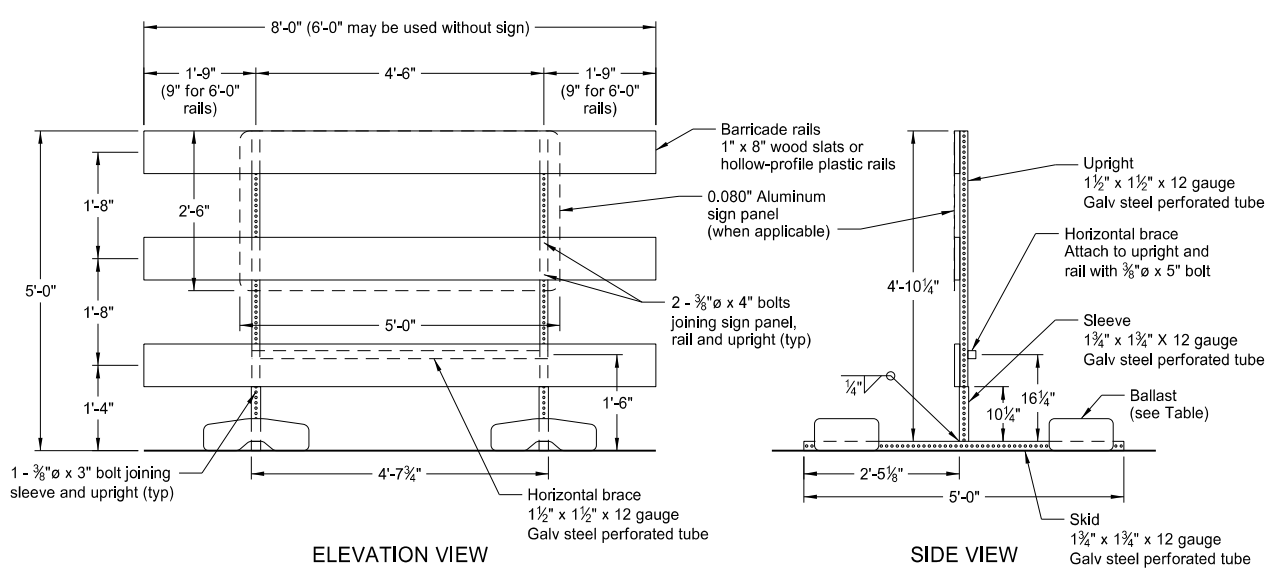


TYPE II BARRICADE

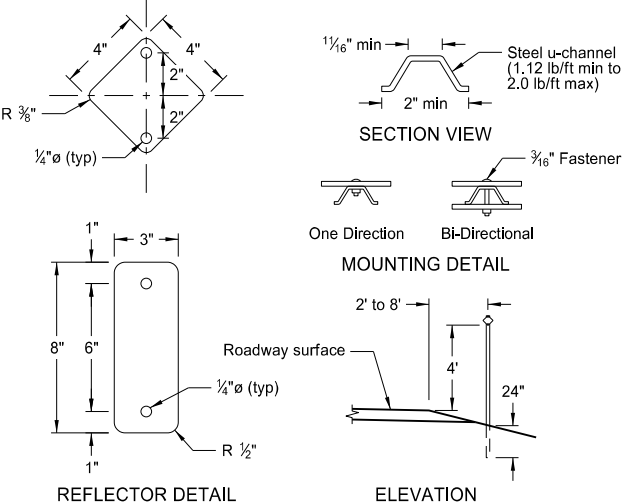
BARRICADE RAIL DETAILS



TYPE III BARRICADE



BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)



DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

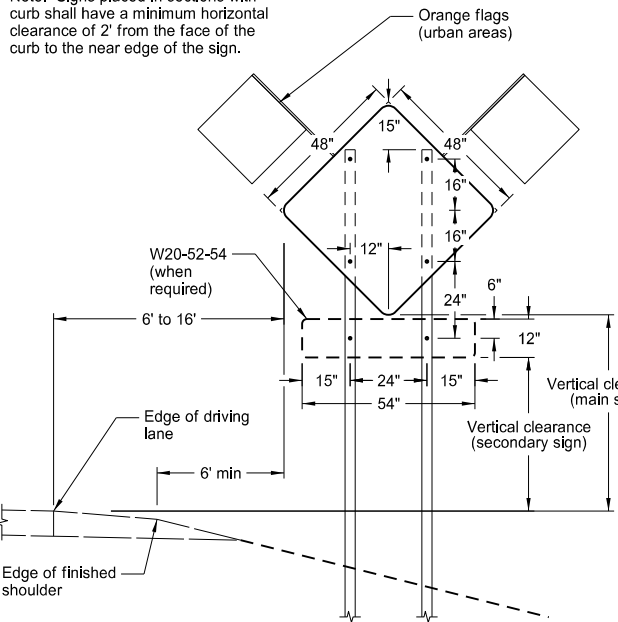
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

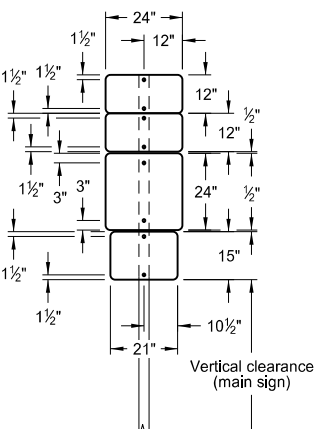
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# CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

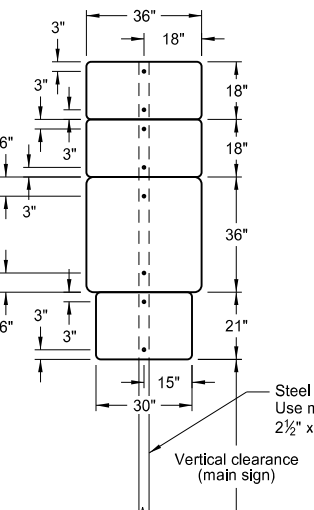
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



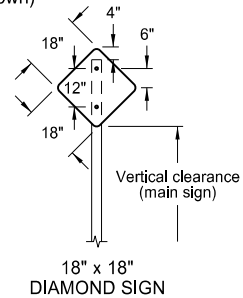
TYPICAL SECTION  
(48" x 48" diamond warning sign shown)



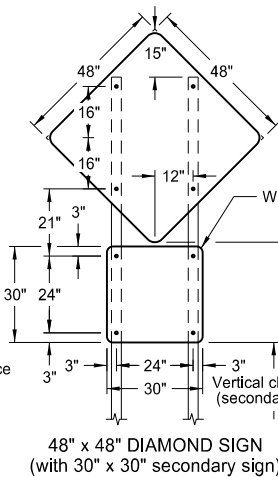
24" x 24"  
ROUTE MARKER  
ASSEMBLY



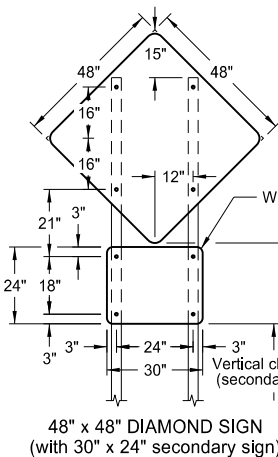
36" x 36"  
ROUTE MARKER  
ASSEMBLY



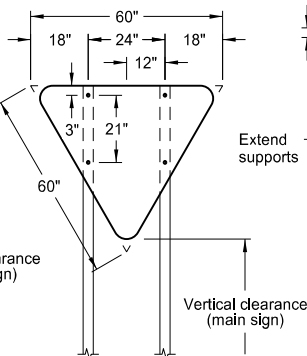
18" x 18"  
DIAMOND SIGN



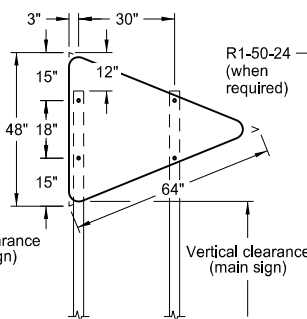
48" x 48" DIAMOND SIGN  
(with 30" x 30" secondary sign)



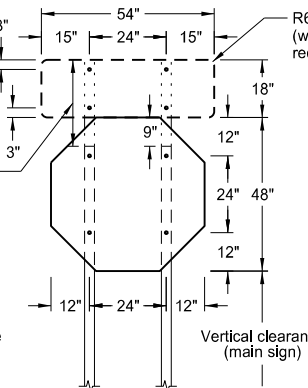
48" x 48" DIAMOND SIGN  
(with 30" x 24" secondary sign)



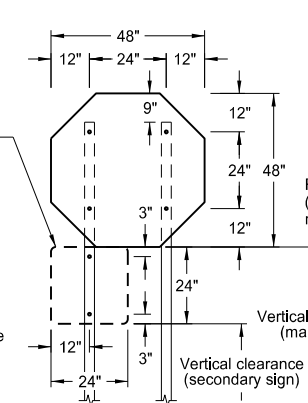
R1-2-60 - YIELD SIGN



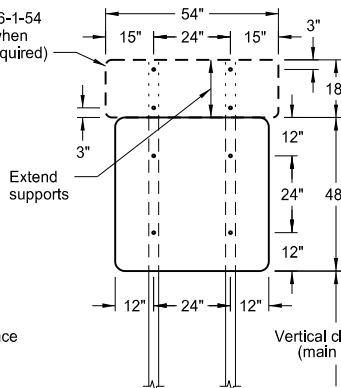
W14-3-64 - PENNANT SIGN



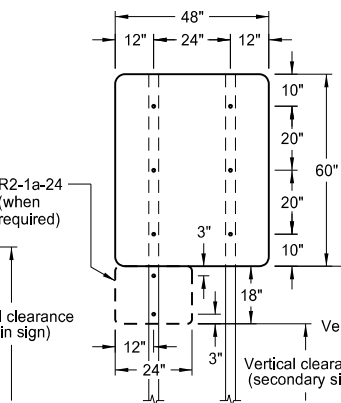
R1-1-48 - STOP SIGN  
(with R6-1-54 sign as required)



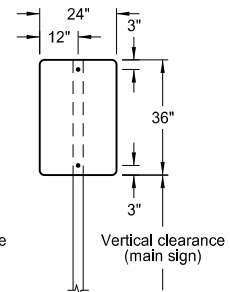
R1-1-48 - STOP SIGN  
(with R1-50-24 sign as required)



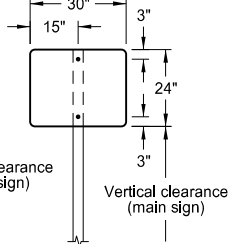
48" x 48" SIGN  
(with R6-1-54 sign as required)



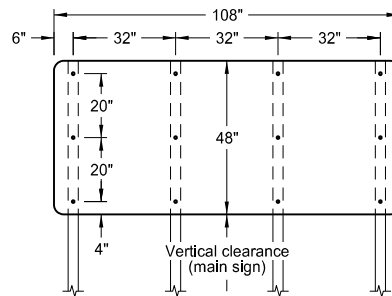
48" x 48" SIGN  
(with R2-1a-24 sign as required)



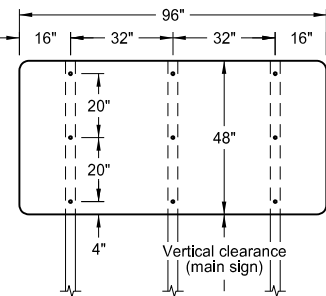
24" x 36" SIGN



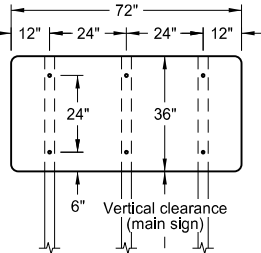
30" x 24" SIGN



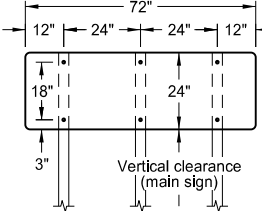
108" x 48" SIGN



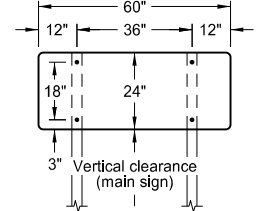
96" x 48" SIGN



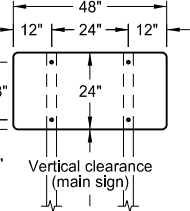
72" x 36" SIGN



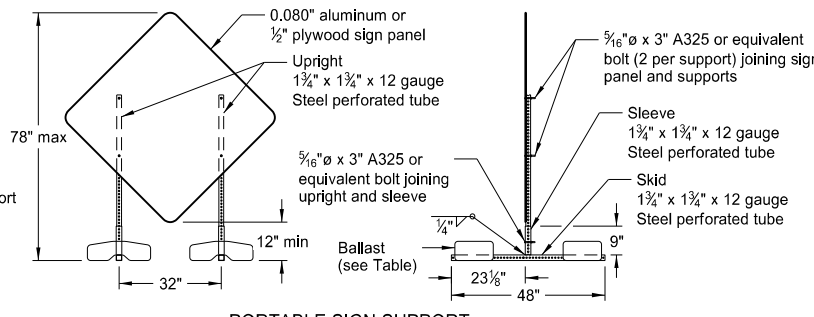
72" x 24" SIGN



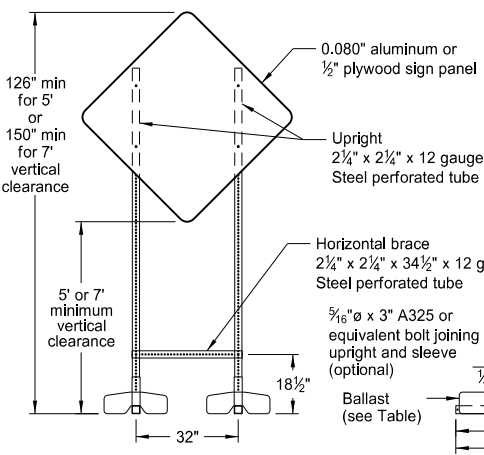
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT  
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT  
HIGH-MOUNTING HEIGHT

## NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

## MINIMUM BALLAST (For each side of sign support base)

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

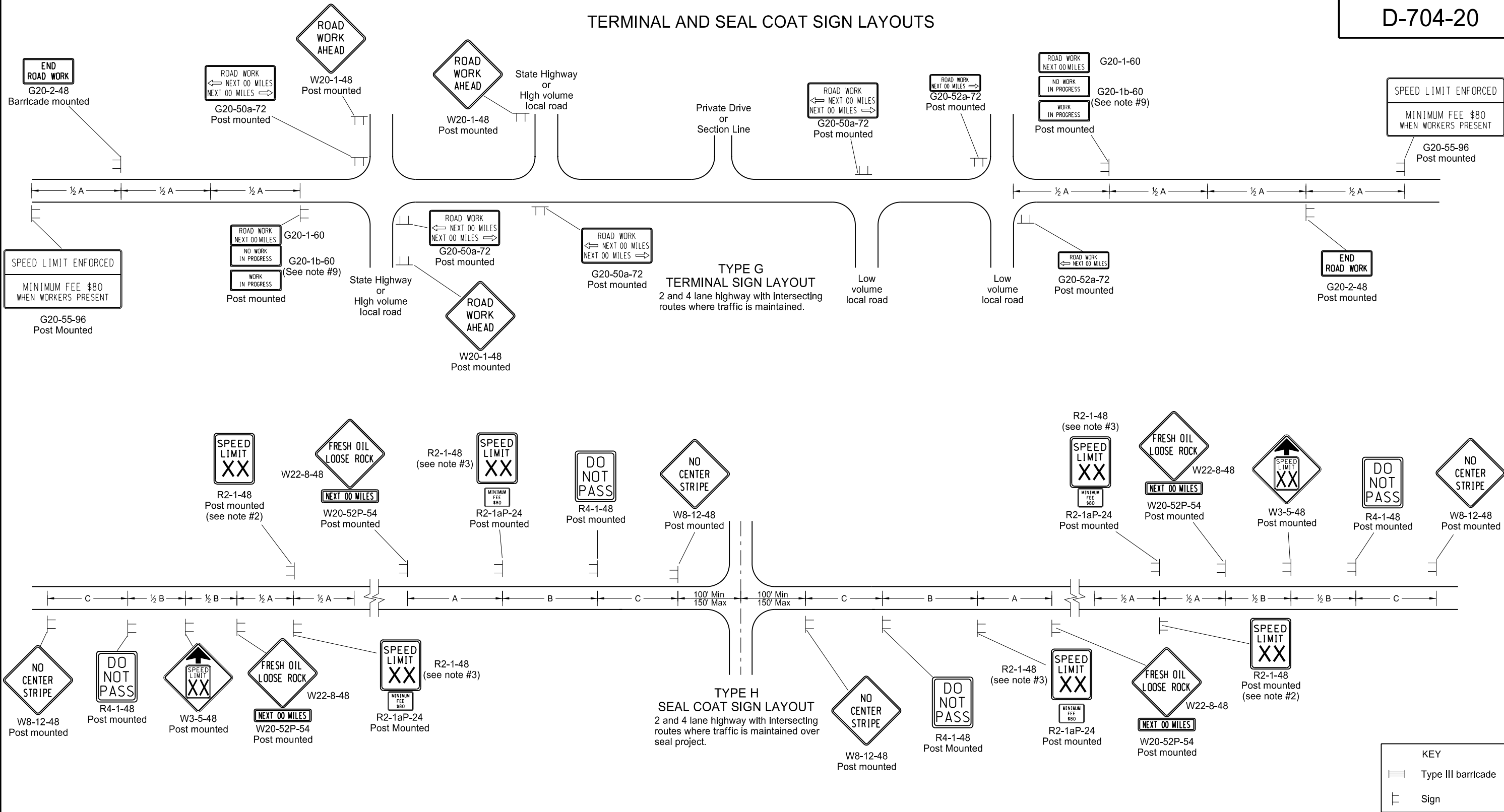
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

This document was originally issued and sealed by  
Roger Weigel,  
Registration Number  
PE-2930,  
on 11/14/13 and the original document is stored at the  
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of Transportation

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



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

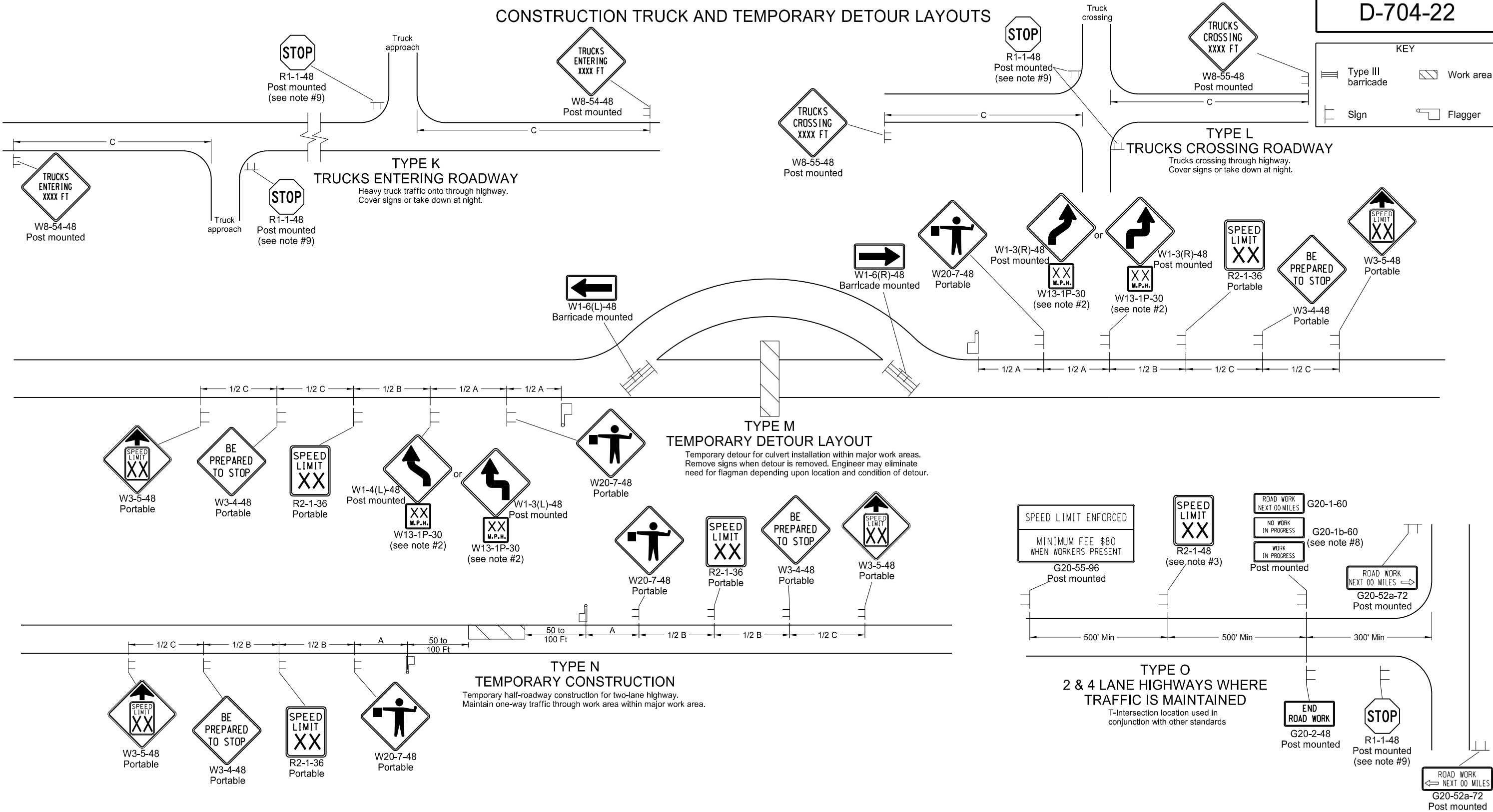
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & sign numbers

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 Roger Weigel  
 Registration Number  
 PE- 2930,  
 on 08/17/17 and the original document is stored at the  
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 of Transportation

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



Notes

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

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

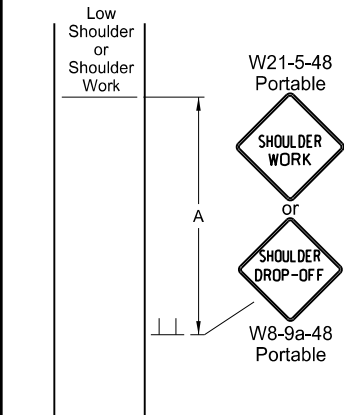
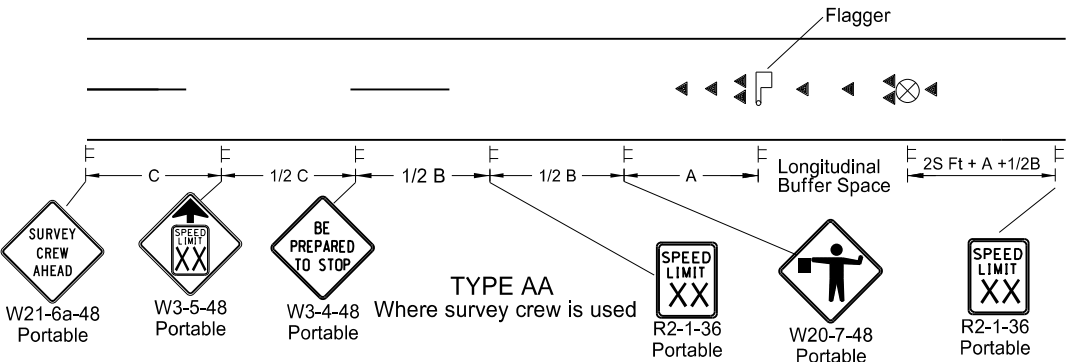
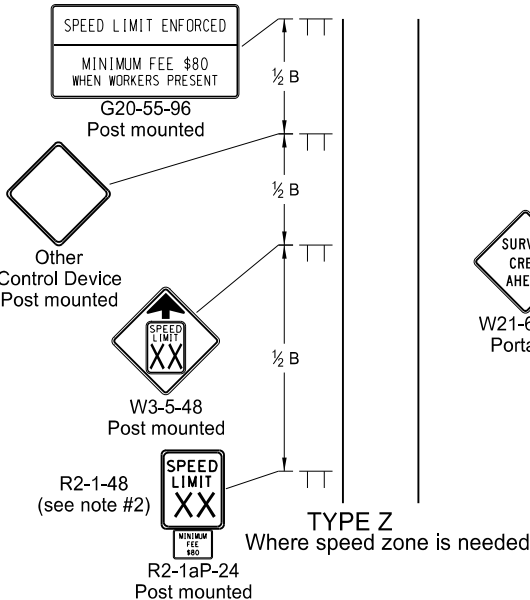
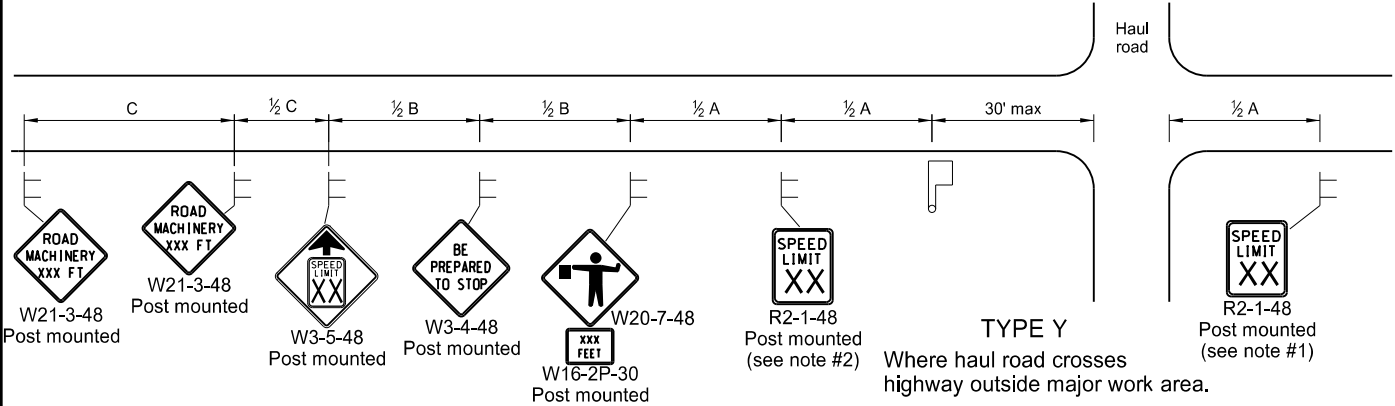
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Update notes & sign numbers

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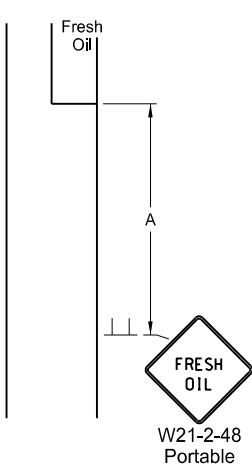


MISCELLANEOUS SIGN LAYOUTS

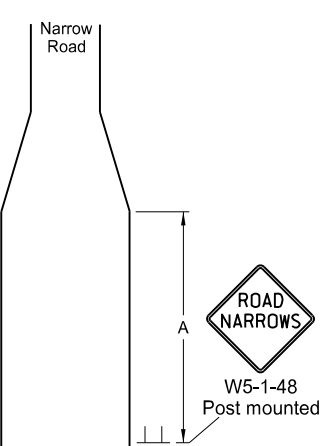
D-704-26



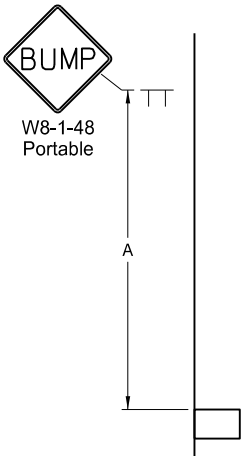
TYPE BB  
Within major work area  
where sign conditions exist



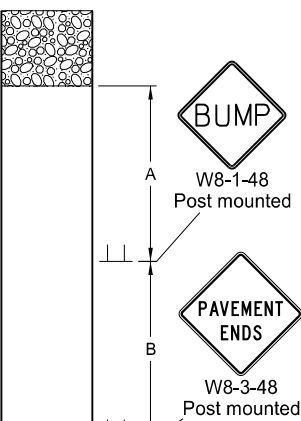
TYPE CC  
Where sign conditions exist



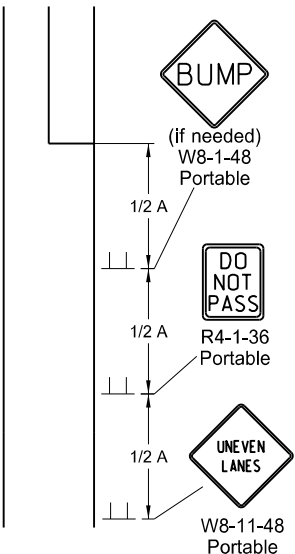
TYPE DD  
Where sign conditions exist



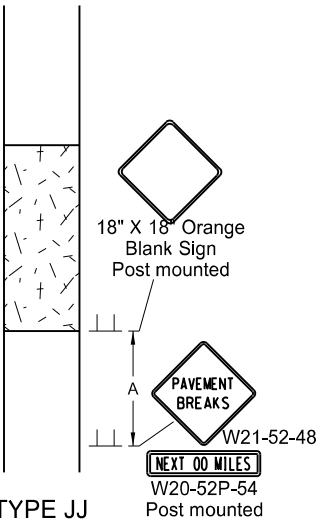
TYPE EE  
Where sign conditions exist



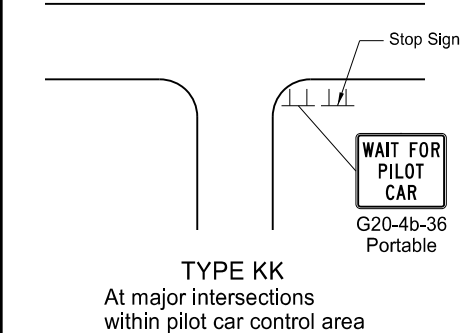
TYPE FF  
Where sign conditions exist



TYPE GG  
Where elevation difference  
exists between lanes



TYPE JJ  
For break in pavement.  
Install signs when conditions exist  
and remove when not applicable.



TYPE KK  
At major intersections  
within pilot car control area

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

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.

KEY

Sign      Flagger      Cones

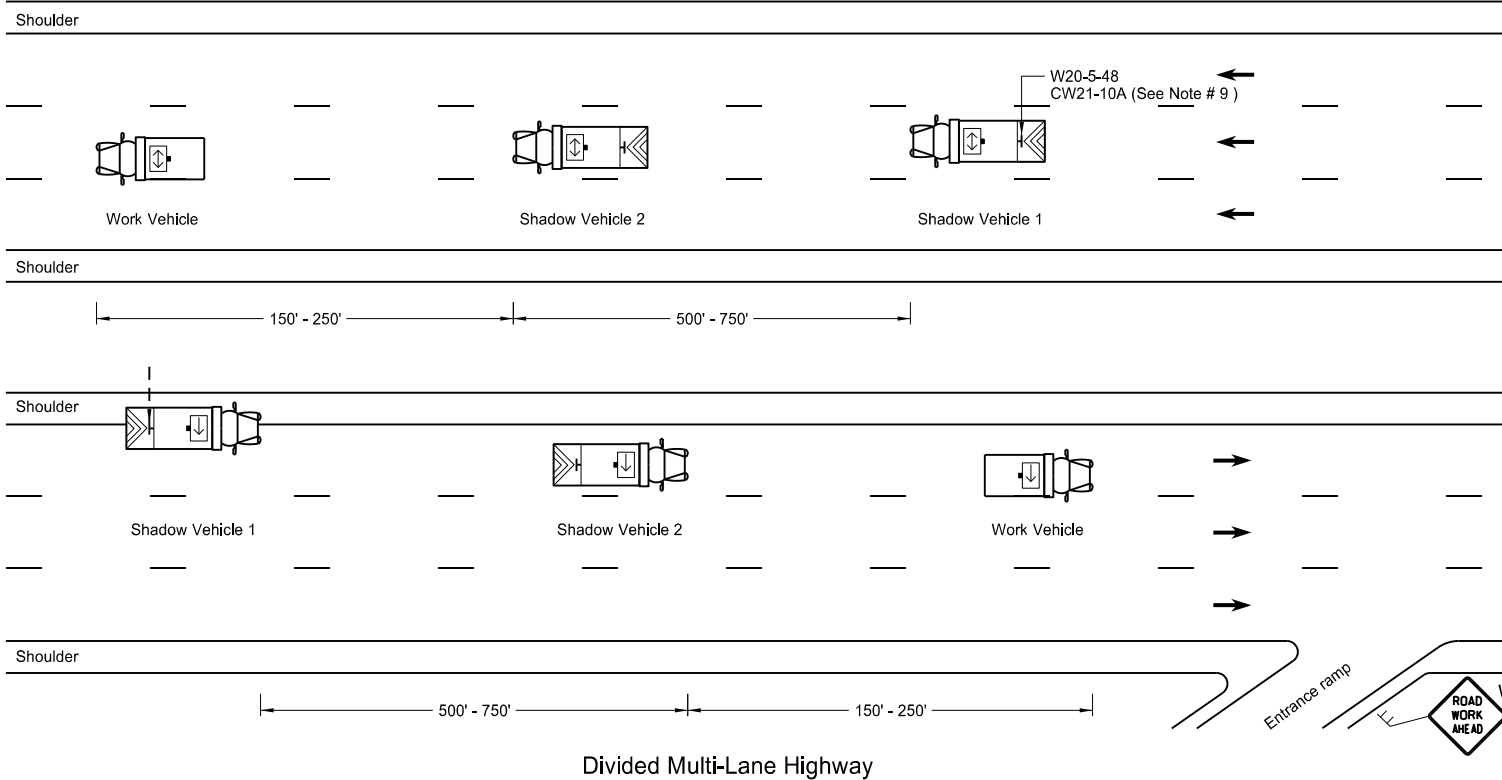
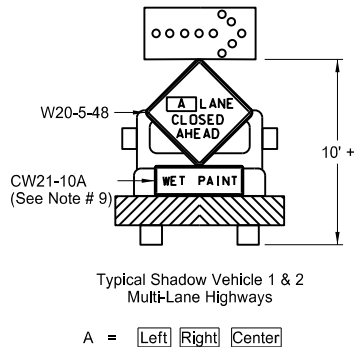
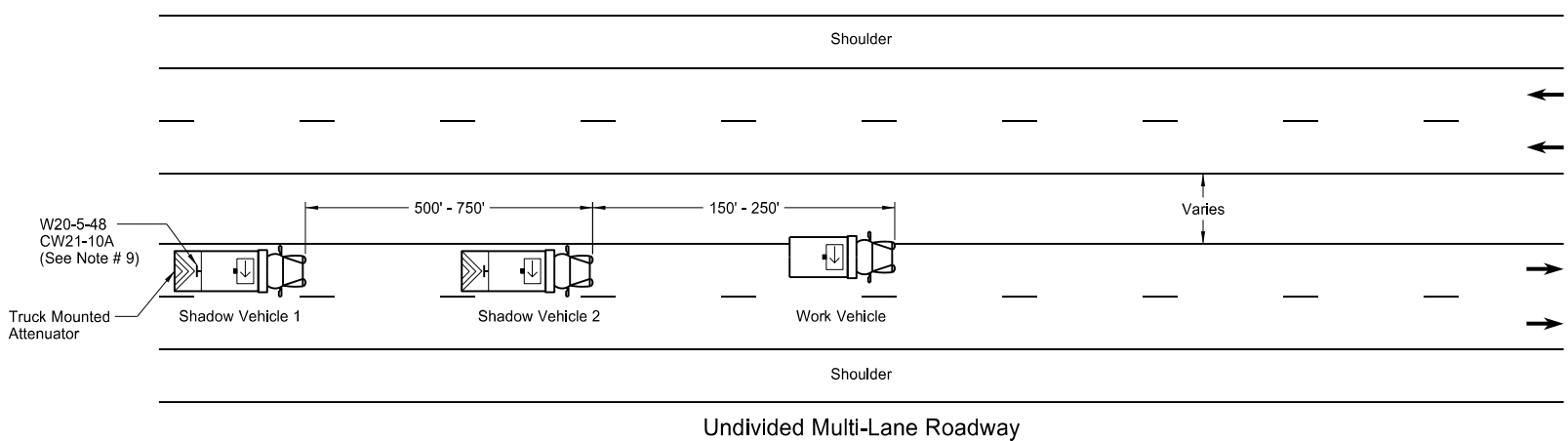
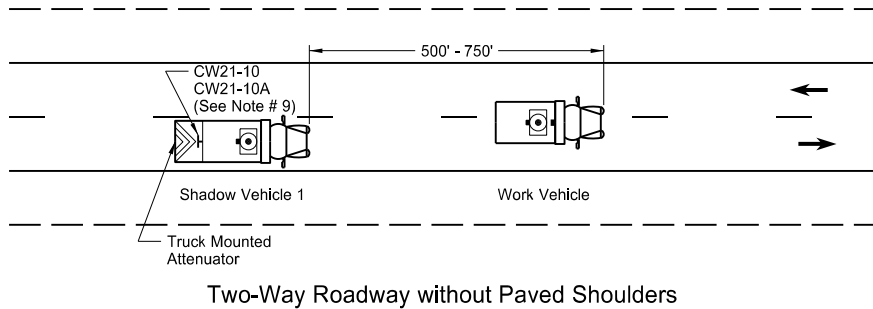
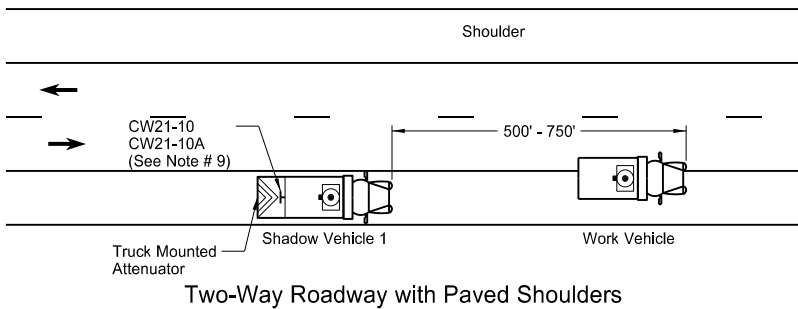
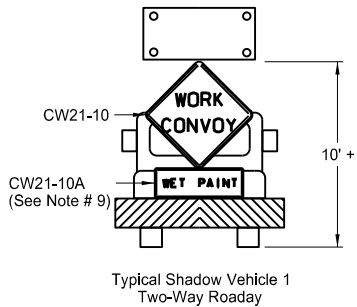
S = Numerical value of speed limit or 85th percentile.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers

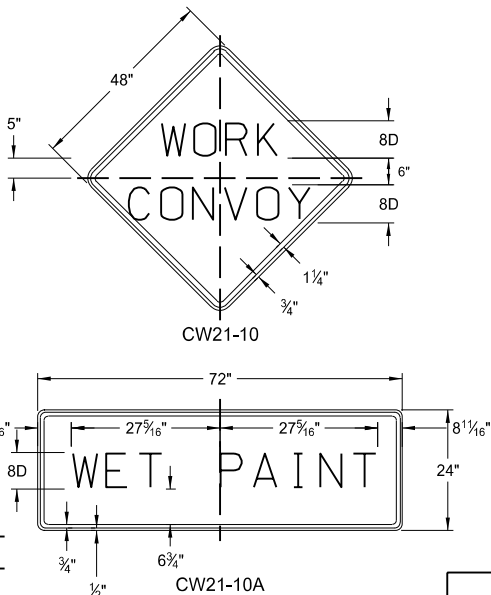
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TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

D-704-27



Sign Details



Notes

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

KEY

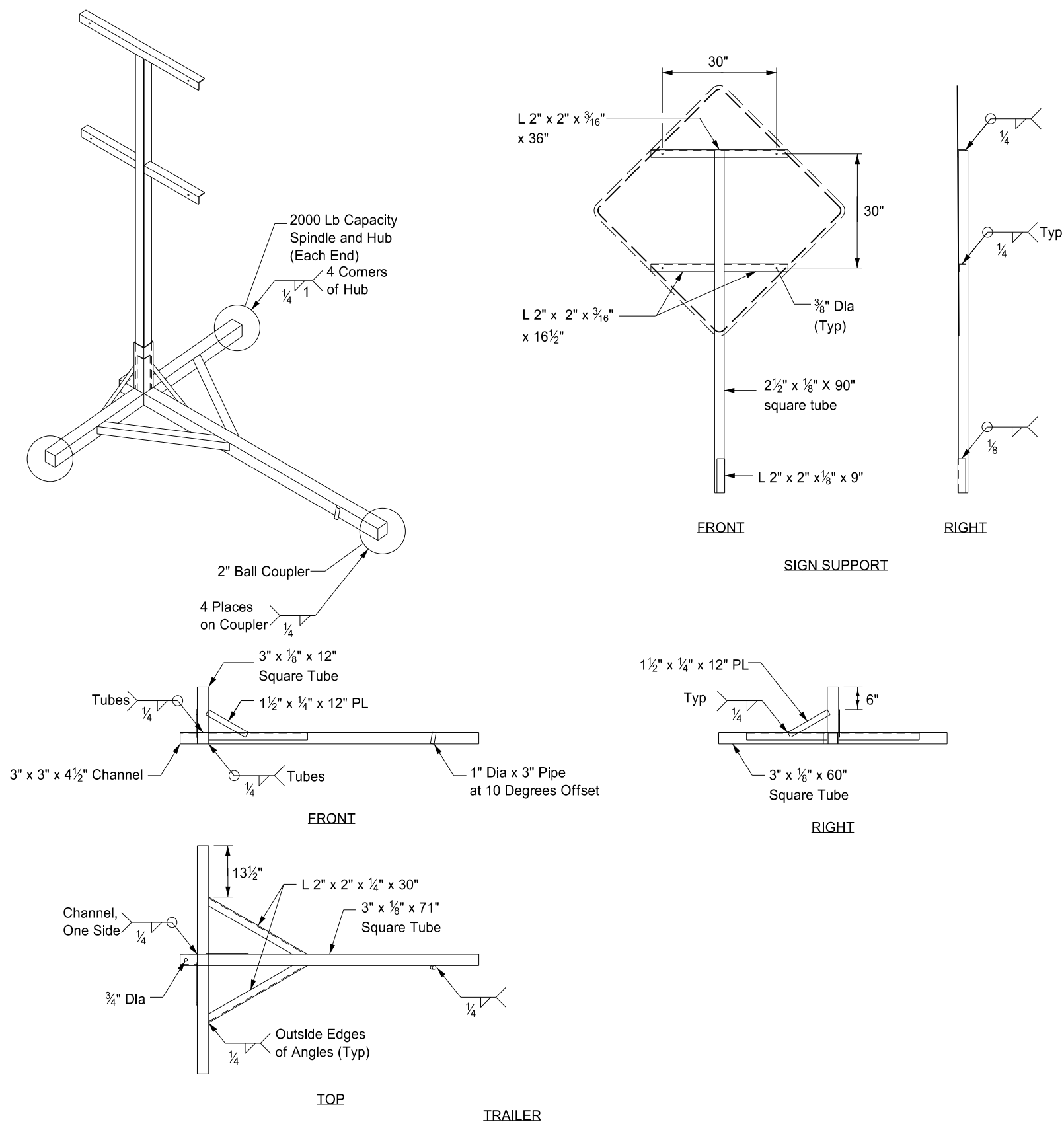
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
- Right directional
  - Left directional
  - Double arrow directional
  - Caution Mode

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

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PE- 2930,  
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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

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

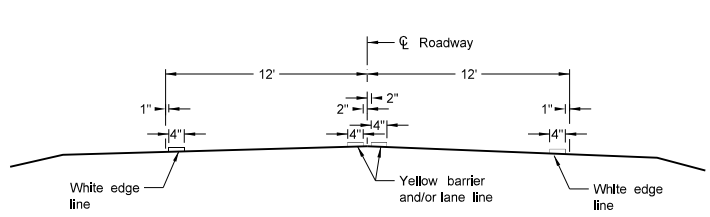
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

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PE- 2930 ,  
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of Transportation

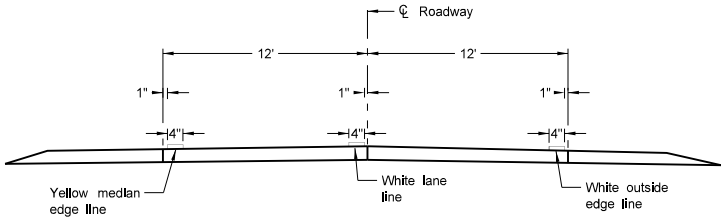
PAVEMENT MARKING

D-762-4

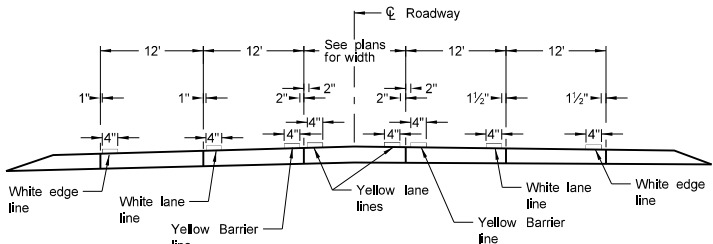
NOTES:  
1. Edge lines shall be continued through private drives and field drives and broken for intersections.



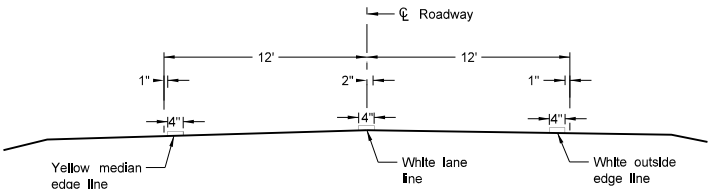
Two Lane Two Way  
RURAL ROADWAY



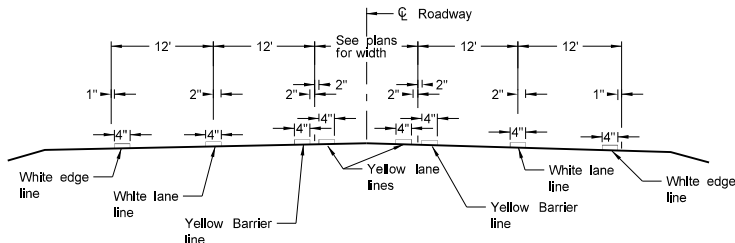
Two Lane Roadway  
INTERSTATE HIGHWAY  
Concrete Section



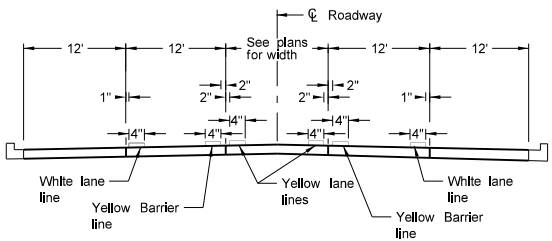
RURAL FIVE LANE ROADWAY  
Concrete Section



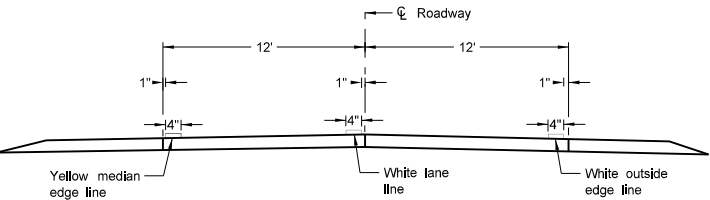
Two Lane Divided  
Rural Roadway  
PRIMARY HIGHWAY  
Asphalt Section



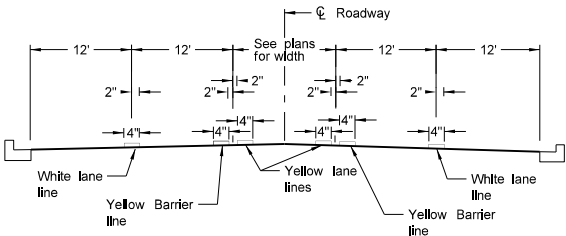
RURAL FIVE LANE ROADWAY  
Asphalt Section



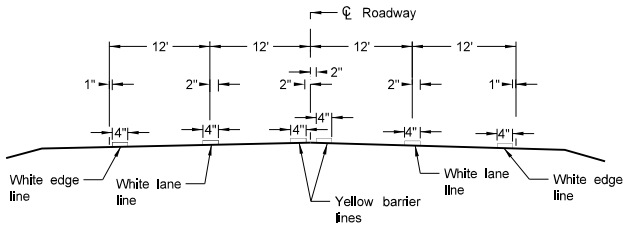
URBAN FIVE LANE SECTION  
Concrete Section



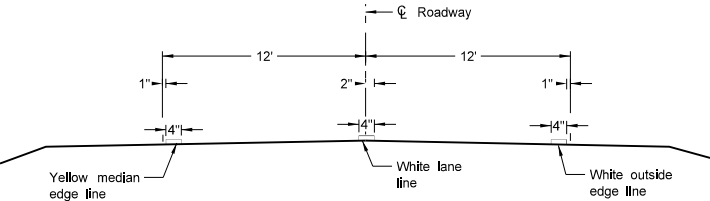
Two Lane Roadway  
PRIMARY HIGHWAY  
Concrete Section



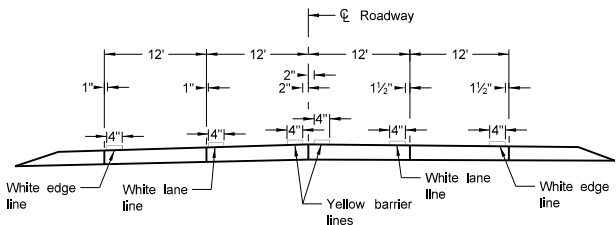
URBAN FIVE LANE SECTION  
Asphalt Section



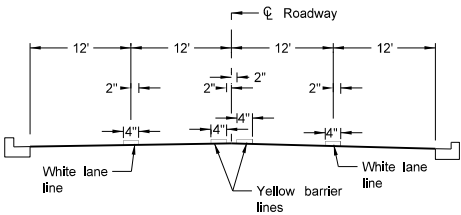
RURAL FOUR LANE ROADWAY  
Asphalt Section



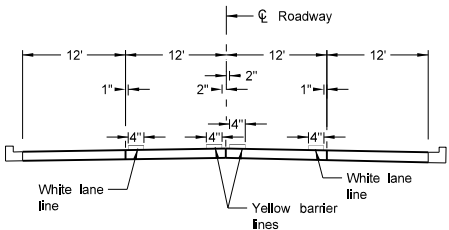
Two Lane Roadway  
INTERSTATE HIGHWAY  
Asphalt Section



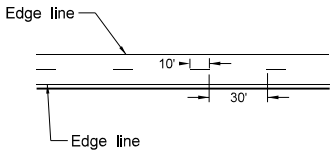
RURAL FOUR LANE ROADWAY  
Concrete Section



URBAN FOUR LANE SECTION  
Asphalt Section



URBAN FOUR LANE SECTION  
Concrete Section



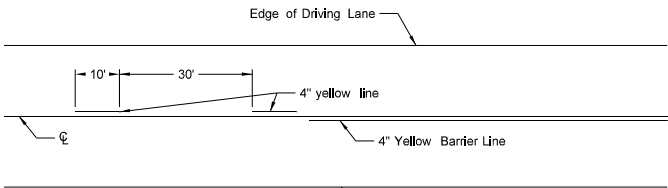
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

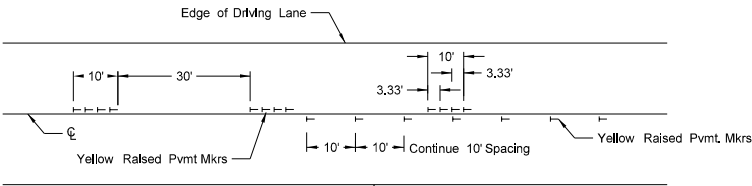
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SHORT-TERM PAVEMENT MARKING

D-762-11

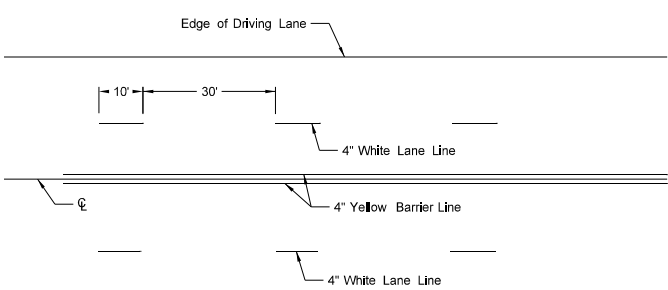


Painted or Tape Lines

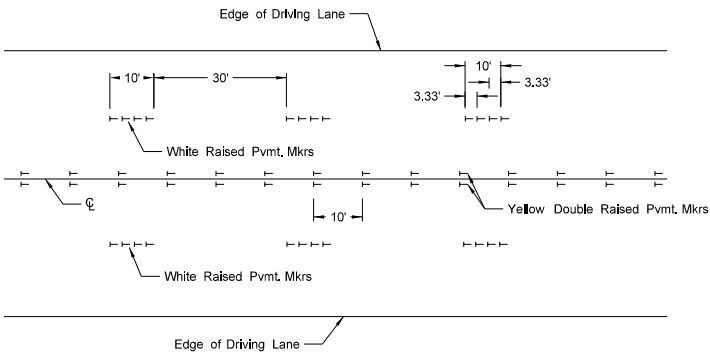


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

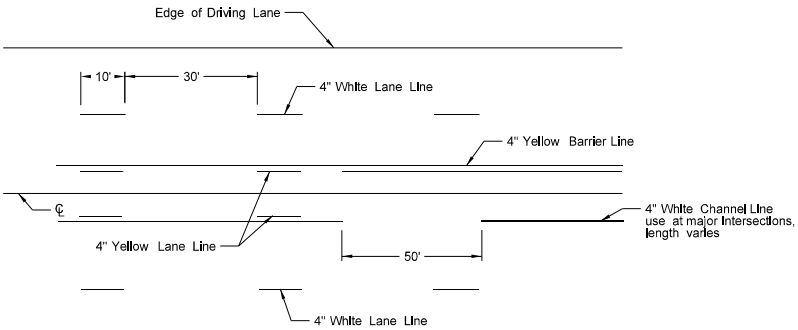


Painted or Tape Lines

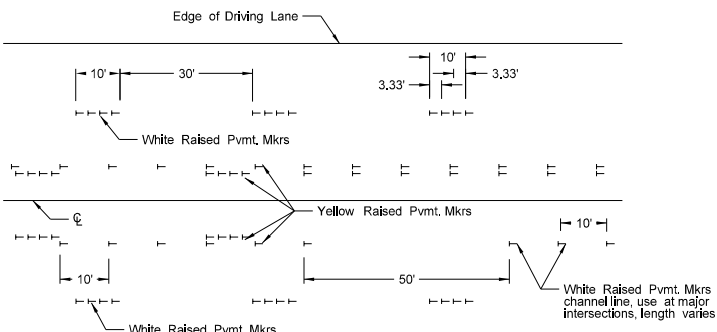


Raised Pavement Markers

FOUR LANE ROADWAY

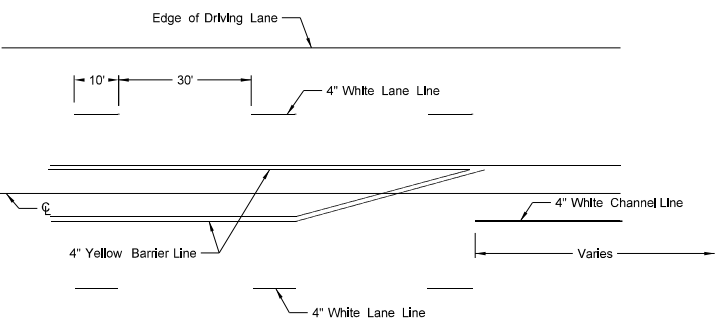


Painted or Tape Lines

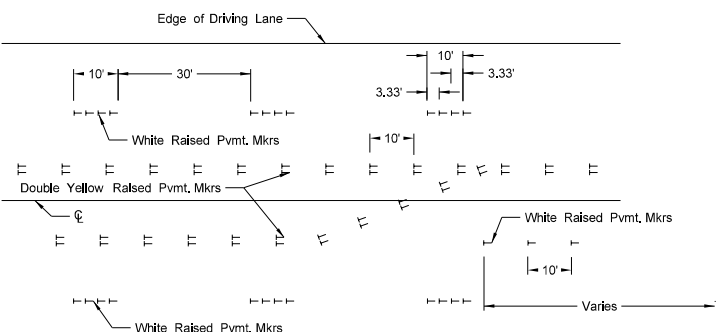


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)

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Roger Weigel,  
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