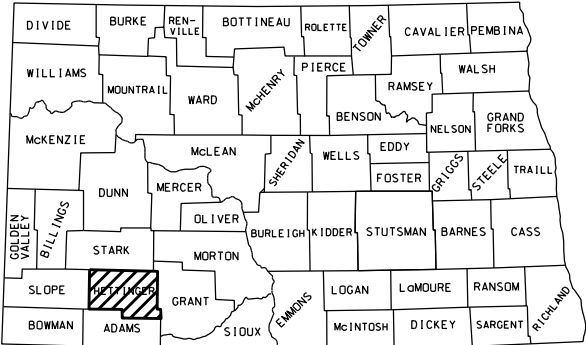


STATE	PROJECT NUMBER	PCN	SECTION NO.	SHEET NO.
ND	SC-2117(059)	21127	001	1



STATE OF NORTH DAKOTA

HETTINGER COUNTY NORTH DAKOTA

Plans for Federal Aid
Project No. SC-2117(059)
CMC 2117 from Regent, North 14.49 Miles to the Hettinger/Stark County Line
Chip Seal

GOVERNING SPECIFICATIONS

Standard Specifications for Road and Bridge Construction adopted by the North Dakota Department of Transportation, October 2014; Supplemental Specifications effective on the date the project is advertised; Standard drawings currently in effect; and other Contract Provisions submitted herein.

LENGTH OF PROJECT

MILES - GROSS	MILES - NET
14.49	14.49

DESIGN DATA

TRAFFIC	PASS.	TRUCKS	TOTAL	EST 30TH MAX HR	ESAL'S
CURRENT 2017	300	55	355	--	--

PREVENTIVE MAINTENANCE

SURVEYED BY: SCD & CDS DATE: JUNE 2017
DESIGNED BY: SCD DATE: AUG 2017
P.S. & E. REVISIONS BY: SCD DATE: AUG 2017

CERTIFICATION

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 North Dakota.

ENGINEER: Steven C. Dorval, P.E.

SIGNATURE: Steven C. Dorval, P.E. /s/

APPROVAL DATE: 08-26-17

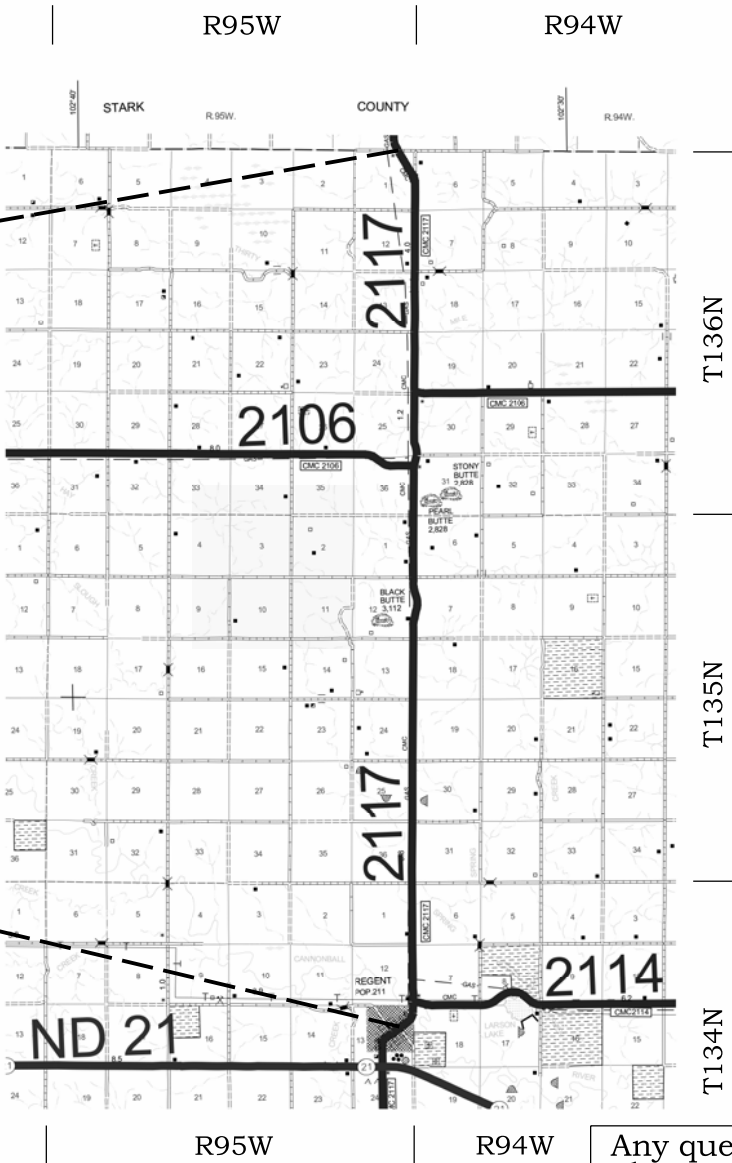


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Heartland Engineering, Inc.

End Project at MP 15.35. A point at the Hettinger/Stark County Line

Begin Project at MP 0.86. A point approximately 450 feet north of Railway St. in Regent.



Any questions regarding these plans may be directed to:

Steven C. Dorval, P.E.
Heartland Engineering, Inc.
PO Box 6
New England, ND 58647
Phone: (701)-426-3387

TABLE OF CONTENTS & LIST OF STANDARD DRAWINGS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	SC-2117(059)	002	1

TABLE OF CONTENTS

<i>Section</i>	<i>Sheet</i>	<i>Description</i>
001	1	Title Sheet
002	1	Table of Contents & List of Standard Drawings
006	1	Plan Notes
008	1	Summary of Quantities & Basis of Estimate
030	1	Typical Sections - Mainline
030	2	Typical Sections - Approaches
100	1	Traffic Control Devices List
100	2	Traffic Control Devices Layout

LIST OF STANDARD DRAWINGS

<i>Standard #</i>	<i>Description</i>
D-704-3	Lane Markers (Spotting Tab For Seal Projects Only)
D-704-8	Breakaway System for Construction Zone Signs
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 Details and Channelizing Devices
D-704-14	Punching and Mounting Details
D-704-15	Road Closure Layouts
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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SC-2117(059)
HETTINGER COUNTY, ND



TABLE OF CONTENTS
&
LIST OF STD. DRAWINGS

PROJECT NO.	DRAWN BY	CHECKED BY	DATE
17-012	SCD	SCD	08-26-17

Heartland Engineering, Inc.

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	SC-2117(059)	006	1

PLAN NOTES

108-P01 **Delays:** The contractor shall not hold the owner responsible for any delays to project operations caused by other construction activities within the area. It is the contractor’s responsibility to familiarize their staff with any surrounding construction that may be completed during the life of this project.

No additional time or compensation will be granted for changes to schedules or routes due to other construction activity.

420-P01 **Sweeping:** All excess cover coat material shall be swept and removed from the entire surface by the end of the day. This initial sweeping shall be completed prior to the application of the short term pavement markings.

704-P01 **Traffic Control:** The construction signing shall be an integral part of the work being performed. At no time shall the project be closed to the traveling public. All traffic control devices shall be installed as per the NDDOT standard drawings and the “Manual on Uniform Traffic Control Devices” (MUTCD) current edition.

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 bid for “Traffic Control Signs”.

All costs associated with supplying, placing, maintaining and removing traffic control items shall be included in the price bid for “Traffic Control Signs”.

Any additional devices required to accommodate the contractor's operation shall be the contractor's responsibility.

704-P02 **Construction Signing:** Traffic control for this project shall consist of a temporary lane closure, flagging, and a pilot car. Traffic Control Devices shall comply with the following Standard Drawings:

- 1. Standard D-704-15, layout A: For temporary roadway closure for seal operations.
- 2. Standard D-704-20, layout H: For construction zone signing. The 2nd and 3rd sentences of note #6 are eliminated. Sign W8-12-48, “No Center Stripe” will not be used and short term pavement marking shall be applied as indicated in the plans.
- 3. Standards D-704-8, 9, 10, 11, 13, 14, 22, 26, 27 and 50 are applicable.
- 4. Standard D-704-3 Lane Markers for Seal Jobs (Spotting Tabs) are required.

Quantities have been developed based on a 5 mile limitation for the seal coat operations.

762-P01 **Pavement Markings:** Pavement markings will not be measured, but will be paid according to plan quantity unless changes approved by the engineer are made in the field. Quantities are based on one application each for short term and permanent striping. Edge lines shall be continued through private drives and field drives and broken for major intersections.

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SC-2117(059)
HETTINGER COUNTY, ND



PLAN NOTES

PROJECT NO.	DRAWN BY	CHECKED BY	DATE
17-012	SCD	SCD	08-26-17

Heartland Engineering, Inc.

SUMMARY OF QUANTITIES & BASIS OF ESTIMATE

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	SC-2117(059)	008	1

BASIS OF ESTIMATE

CRS2P Emulsified Asphalt (0.38 Gal/SY)

Mainline (MP 0.86 to 6.24): (28,406 LF x 26' W) / 9 SF/SY x 0.38 Gal/SY = 31,183 Gal
Mainline (MP 6.24 to 15.35): (48,101 LF x 25' W) / 9 SF/SY x 0.38 Gal/SY = 50,773 Gal
Section Line Approaches (25): 207 SF / 9 SF/SY x 0.38 Gal/SY = 219 Gal
Private Drive Approaches (18): 207 SF / 9 SF/SY x 0.38 Gal/SY = 157 Gal
Field Drive Approaches (48): 187 SF / 9 SF/SY x 0.38 Gal/SY = 379 Gal
Total: 82,711 Gal

Cover Coat Material CI 43 (25 Lbs/SY)

Mainline (MP 0.86 to 6.24): (28,406 LF x 24' W) / 9 SF/SY x 25 Lbs/SY / 2000 Lbs/Ton = 947 Ton
Mainline (MP 6.24 to 15.35): (48,101 LF x 23' W) / 9 SF/SY x 25 Lbs/SY / 2,000 Lbs/Ton = 1.537 Ton
Section Line Approaches (25): 207 SF / 9 SF/SY x 25 Lbs/SY / 2,000 Lbs/Ton = 7 Ton
Private Drive Approaches (18): 207 SF / 9 SF/SY x 25 Lbs/SY / 2,000 Lbs/Ton = 5 Ton
Field Drive Approaches (48): 187 SF / 9 SF/SY x 25 Lbs/SY / 2,000 Lbs/Ton = 12 Ton
Total: 2,508 Ton

Short Term 4IN Line - Type NR (1 Application)

Yellow 4" Centerline Skips (10' Line, 30' Skip Less Dbl NPZ's: 1,320 LF/Mile x (14.49 Miles - 1.17 Miles) = 17,582 LF
Yellow 4" Centerline Barrier: 25,296 LF
Total: 42,878 LF

Pvmt Mk Painted 4IN Line (1 Application)

Yellow 4" Centerline Skips (10' Line, 30' Skip Less Dbl NPZ's: 1,320 LF/Mile x (14.49 Miles - 1.17 Miles) = 17,582 LF
Yellow 4" Centerline Barrier: 25,296 LF
White 4" Edgeline: 10,560 LF/Mile x 14.49 Miles = 153,014 LF
Total: 195,892 LF

NO PASSING ZONES				
SOUTHBOUND (LT)		NORTHBOUND (RT)		
Location	Length (FT)	Location	Length (FT)	Double NPZ
MP 0.86 - 1.18	1,690	MP 0.86 - 1.18	1,690	1,690
MP 1.43 - 1.56	686	MP 1.30 - 1.37	370	
MP 2.43 - 2.56	686	MP 2.29 - 2.37	422	
MP 3.68 - 3.81	686	MP 3.48 - 3.66	950	
MP 4.54 - 4.72	950	MP 4.39 - 4.57	950	158
MP 5.94 - 6.23	1,531	MP 5.80 - 6.06	1,373	634
MP 6.86 - 7.12	1,373	MP 6.68 - 6.94	1,373	422
MP 7.81 - 8.03	1,162	MP 7.63 - 7.88	1,320	370
MP 10.94 - 11.18	1,267	MP 10.78 - 10.99	1,109	264
MP 11.56 - 11.75	1,003	MP 11.40 - 11.52	634	
MP 12.79 - 13.06	1,426	MP 12.61 - 12.84	1,214	2,654
MP 14.42 - 14.56	739	MP 14.25 - 14.40	792	
SUBTOTAL	13,199		12,197	6,192
TOTAL			25,396	6,192

SUMMARY OF QUANTITIES

Item	Spec	Code	Description	Total Quantity	Units	Acceptance
1	103	0100	CONTRACT BOND	1	L SUM	Paid Invoice
2	420	0111	CRS2P EMULSIFIED ASPHALT	82,711	GAL	Certification
3	420	0145	COVER COAT MATERIAL CL 43	2,508	TON	Testing
4	702	0100	MOBILIZATION	1	L SUM	
5	704	1000	TRAFFIC CONTROL SIGNS	2,040	UNIT	Certification
6	704	1052	TYPE III BARRICADE	4	EA	Certification
7	762	0430	SHORT TERM 4IN LINE - TYPE NR	42,878	LF	Certification
8	762	1104	PVMT MK PAINTED 4IN LINE	195,892	LF	Certification

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SC-2117(059)
HETTINGER COUNTY, ND



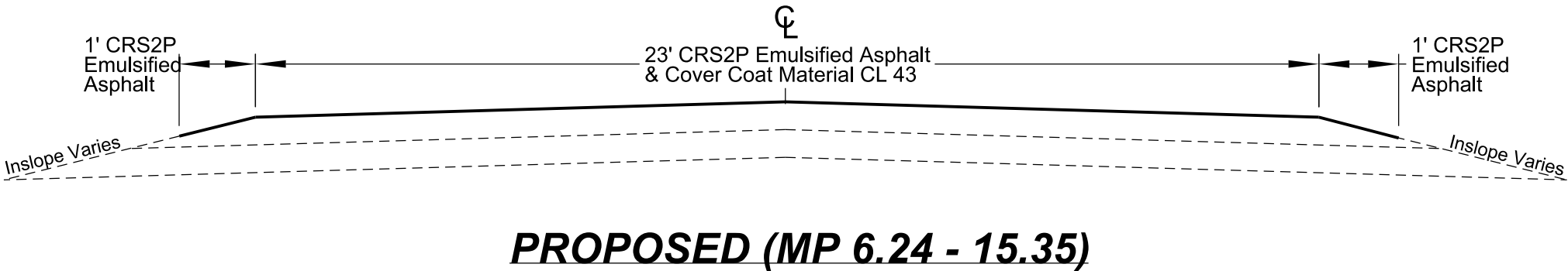
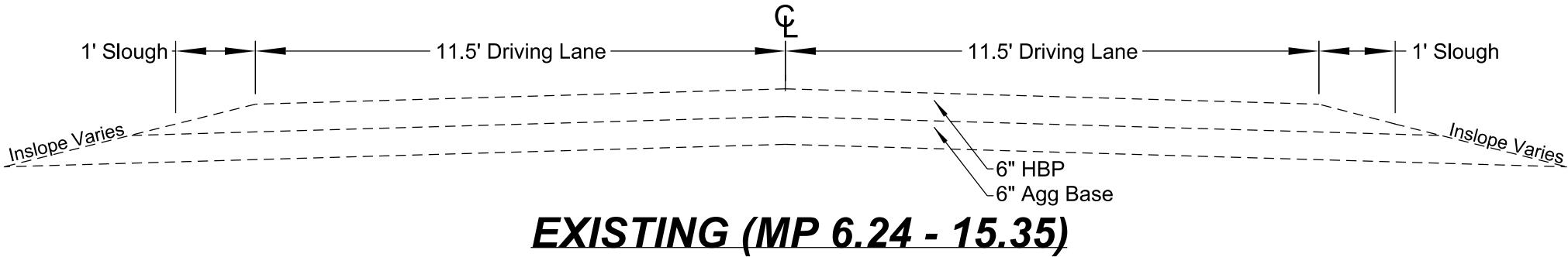
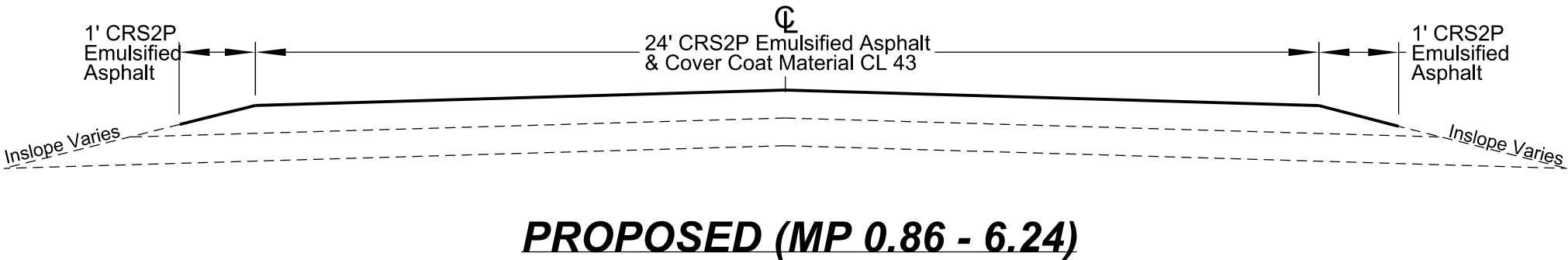
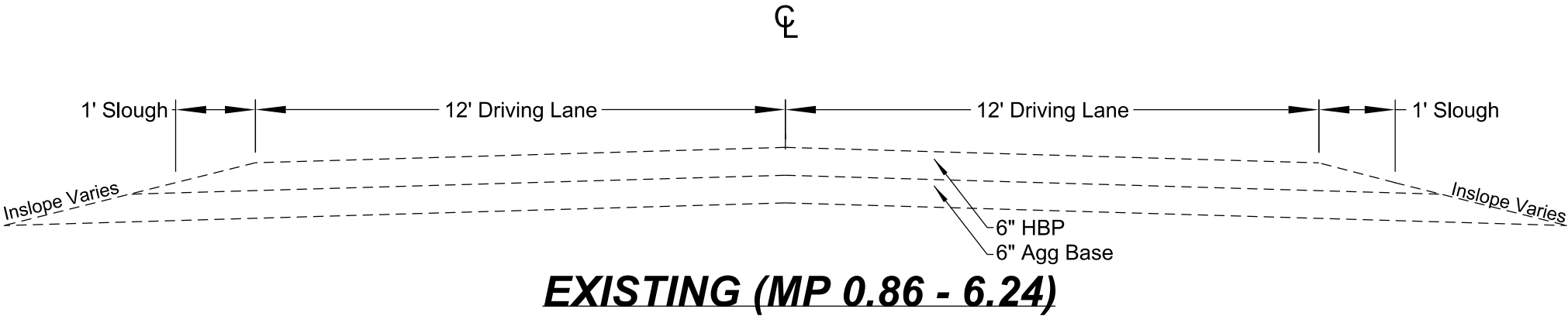
SUMMARY OF QUANTITIES
&
BASIS OF ESTIMATE

PROJECT NO.	DRAWN BY	CHECKED BY	DATE
17-012	SCD	SCD	08-26-17

Heartland Engineering, Inc.

TYPICAL SECTIONS - MAINLINE

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	SC-2117(059)	030	1



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SC-2117(059)
HETTINGER COUNTY, ND.



TYPICAL SECTIONS
MAINLINE

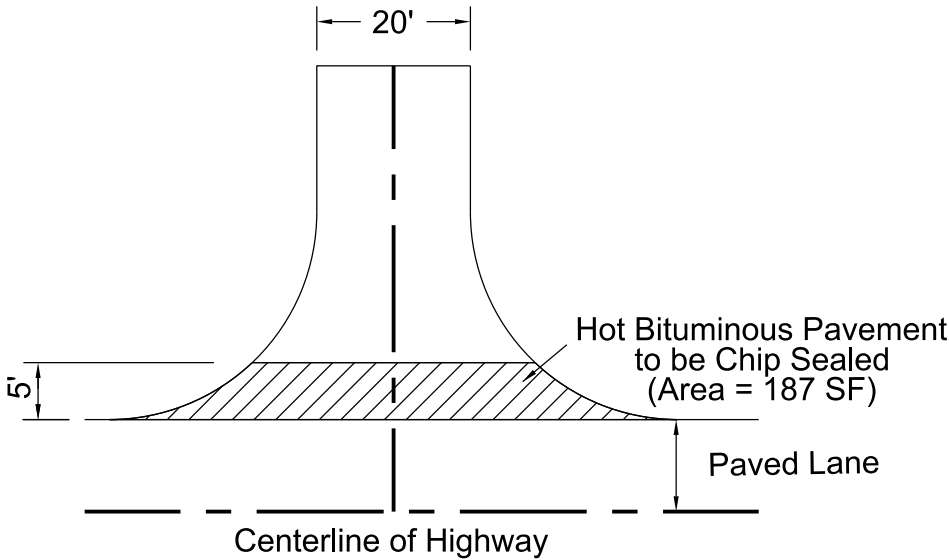
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17-012	SCD	SCD	08-26-17

Heartland Engineering, Inc.

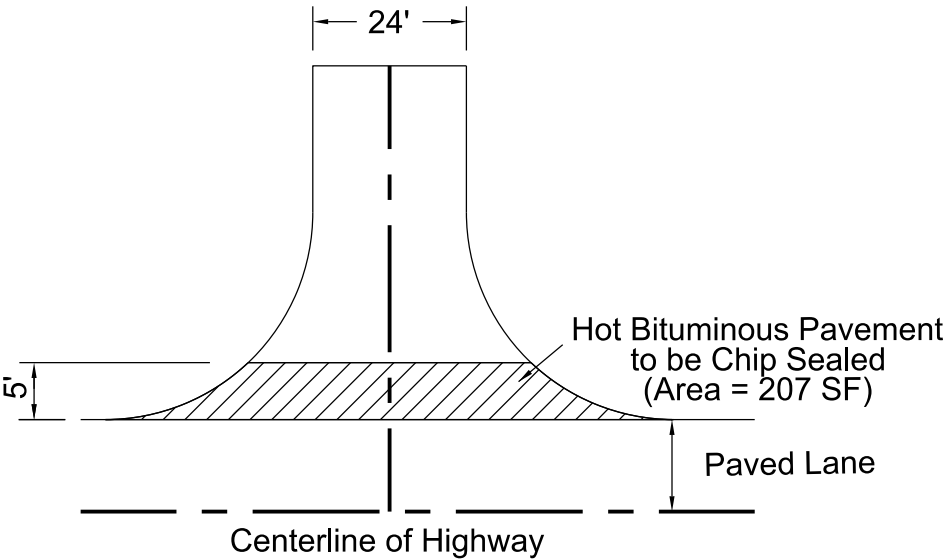
Not to Scale

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	SC-2117(059)	030	2

TYPICAL SECTIONS - APPROACHES



FIELD DRIVE APPROACH



SECTION LINE & PRIVATE DRIVE APPROACH

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SC-2117(059)
HETTINGER COUNTY, ND



TYPICAL SECTIONS
APPROACHES

PROJECT NO.	DRAWN BY	CHECKED BY	DATE
17-012	SCD	SCD	08-26-17

Heartland Engineering, Inc.

TRAFFIC CONTROL DEVICES LAYOUT

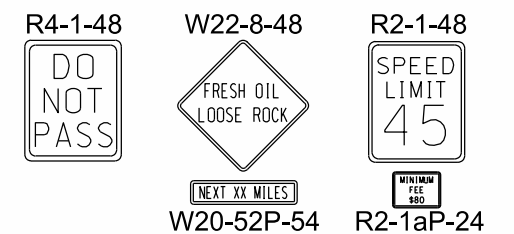
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	SC-2117(059)	100	2

NOTES:

The sign layout as shown is for general information only.

Installation of the Traffic Control Devices shall conform to the Manual on Uniform Traffic Control Devices (MUTCD), NDDOT Standard Drawings and Specifications.

Standard Drawing D-704-20 Layout G applies to this drawing.



W20-52P-54 R2-1aP-24

SIGN SEQUENCE A

Standard Drawing D-704-20 Layout H applies to sign sequence A.

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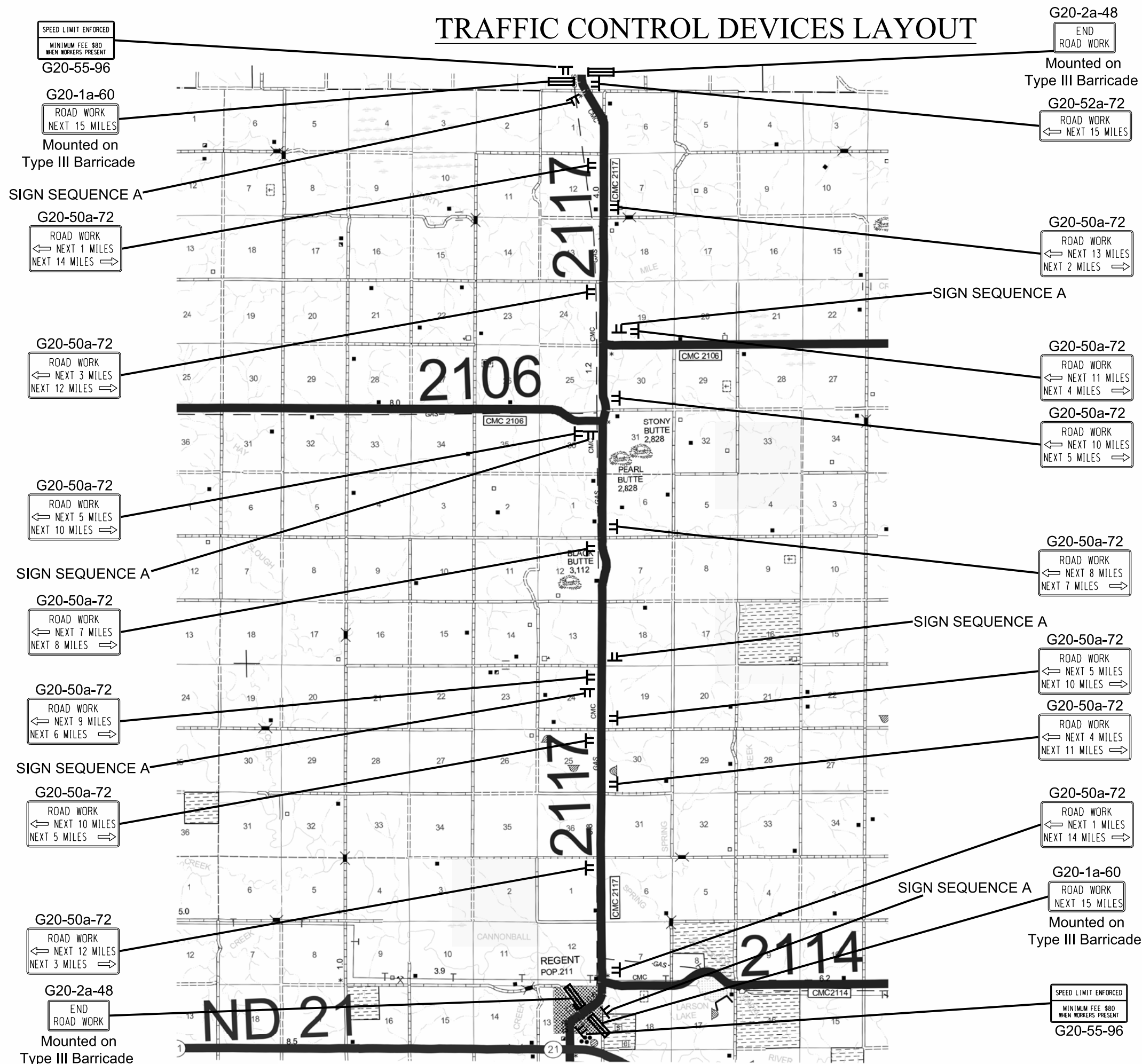
SC-2117(059)
HETTINGER COUNTY, ND



TRAFFIC CONTROL DEVICES LAYOUT

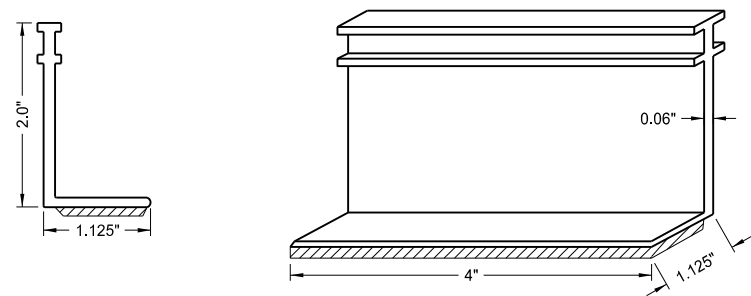
PROJECT NO. 17-012 DRAWN BY SCD CHECKED BY SCD DATE 08-26-17

Heartland Engineering, Inc.

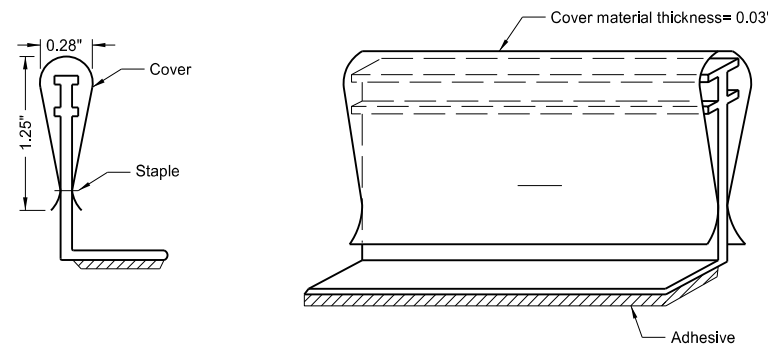


LANE MARKERS
(Spotting Tab for Seal Projects only)

D-704-3



Marker Body



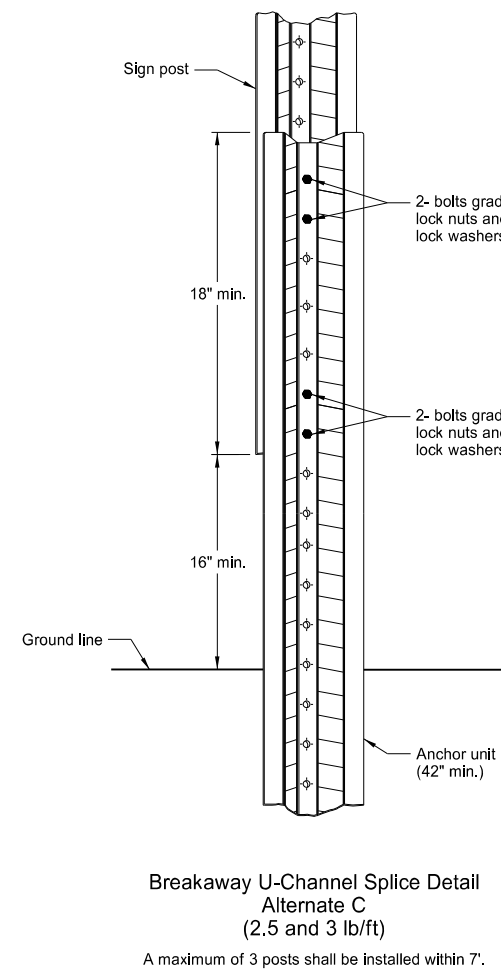
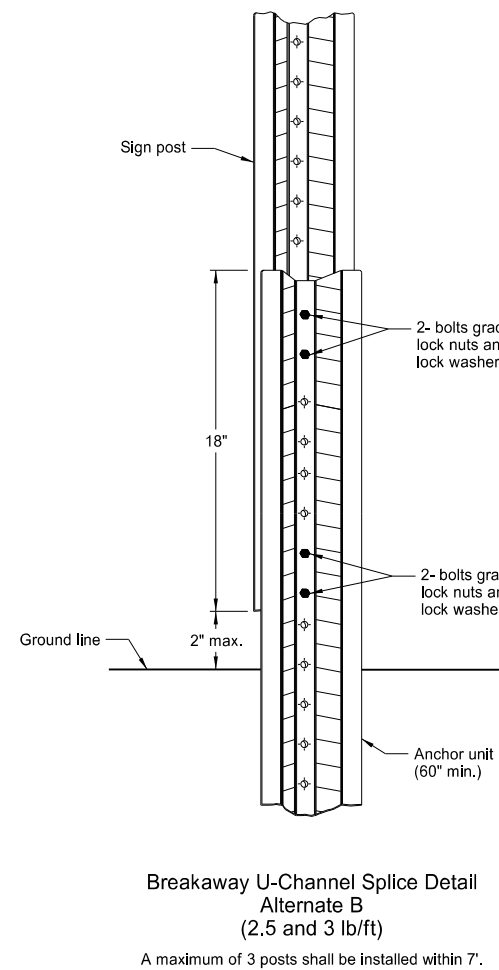
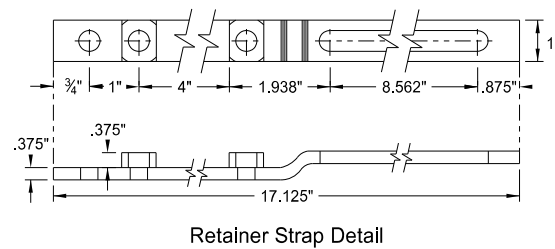
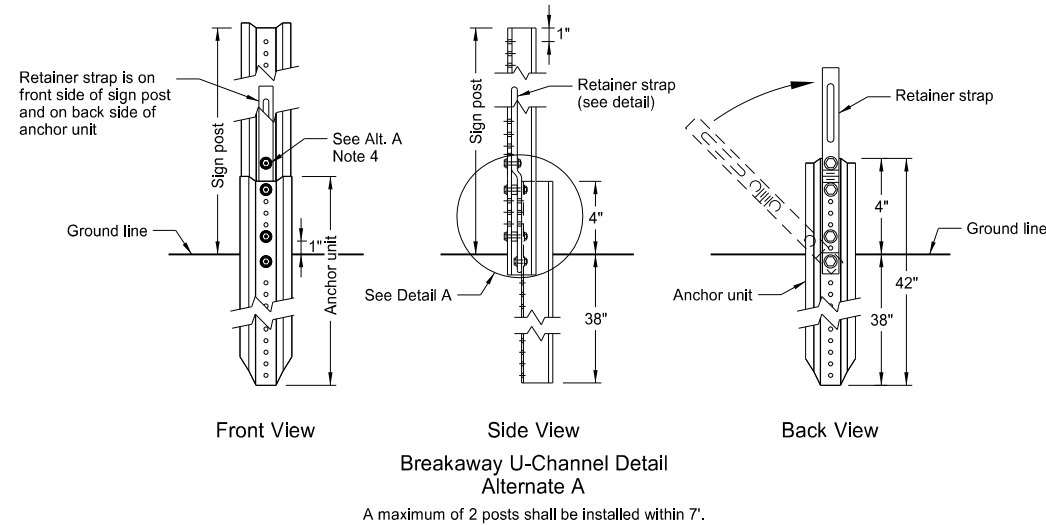
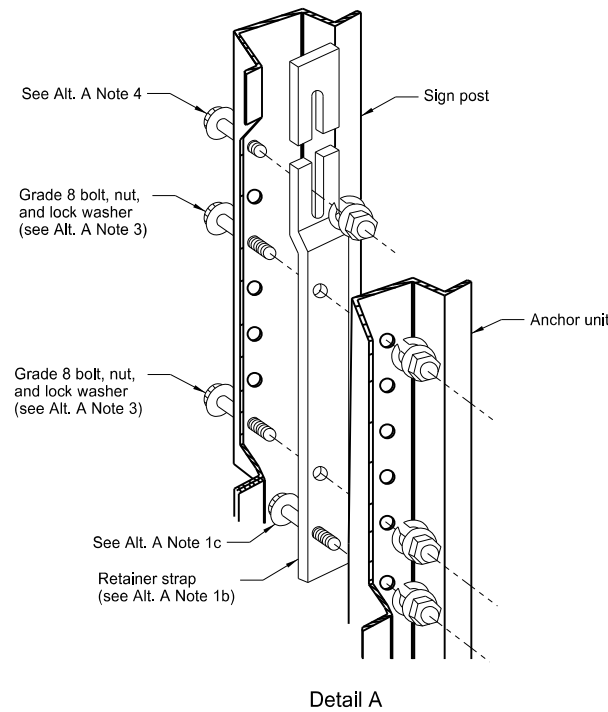
Marker Body with Protective Cover

- 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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U-Channel Post



Alternate A Steps of Installation:

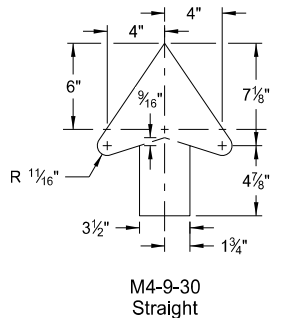
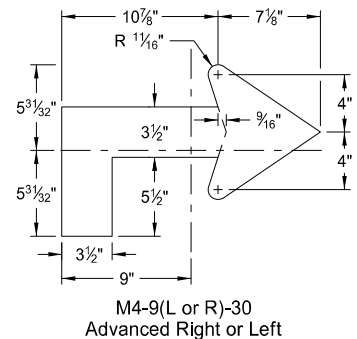
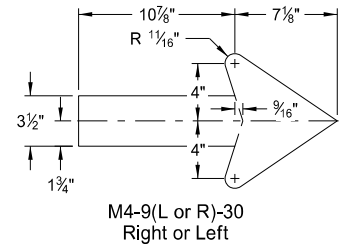
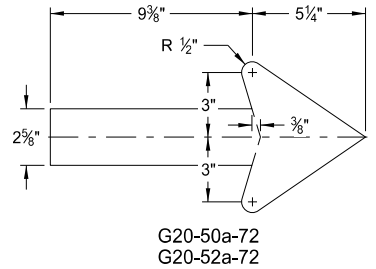
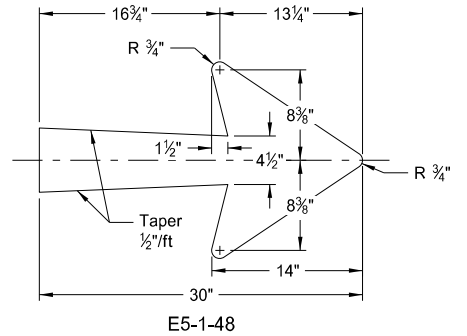
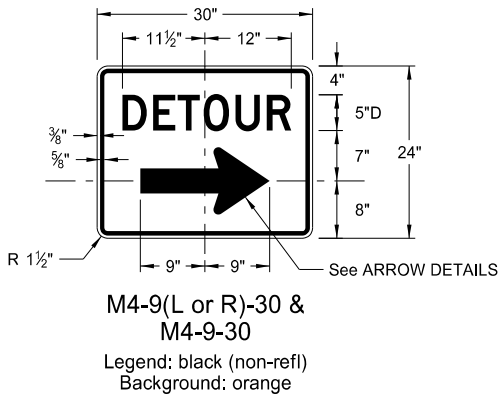
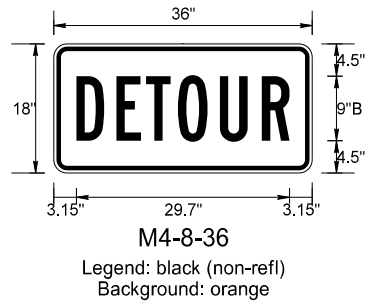
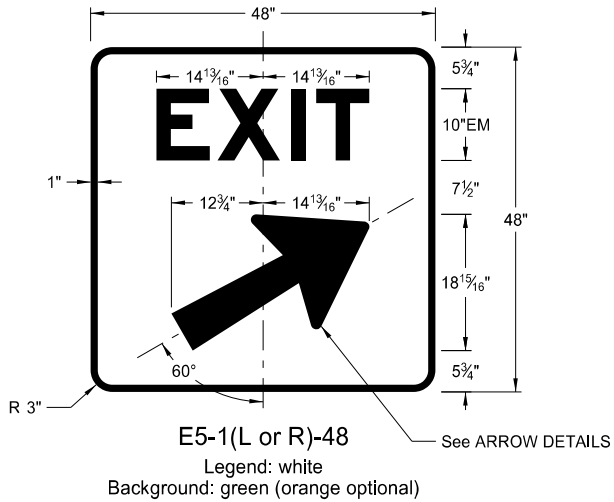
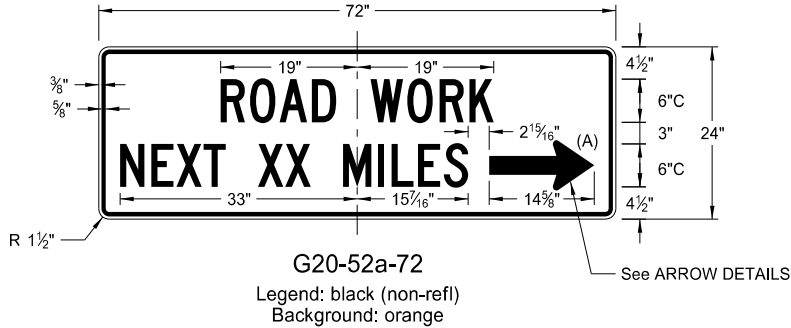
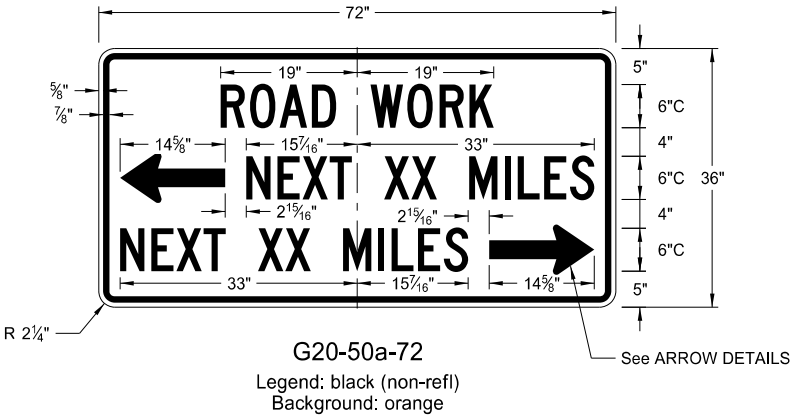
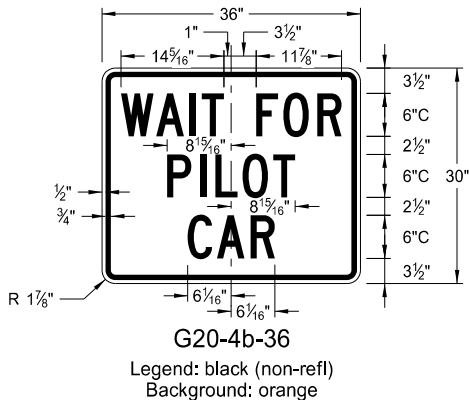
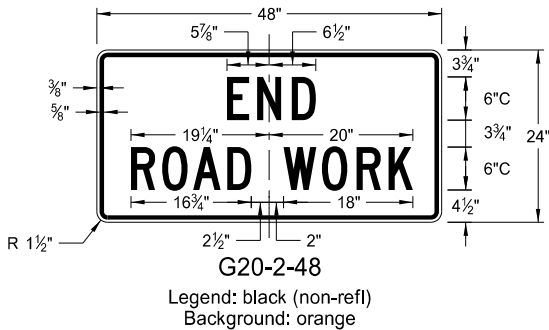
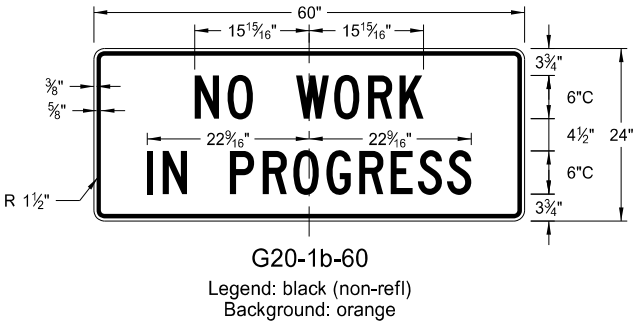
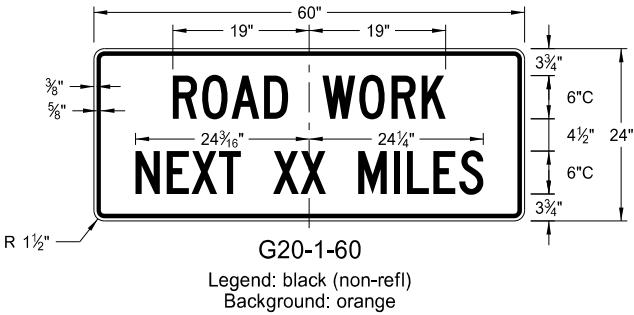
- Drive anchor unit to within 12" of ground level.
 - Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
 - Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
 - Rotate strap 90° to left.
- Drive anchor unit to 4" above ground.
 - Rotate strap to vertical position.
- 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.
 - Alternately tighten two connector bolts.
- Complete assembly by tightening 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.

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

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Registration Number
PE- 2930 ,
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North Dakota Department
of Transportation

CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS

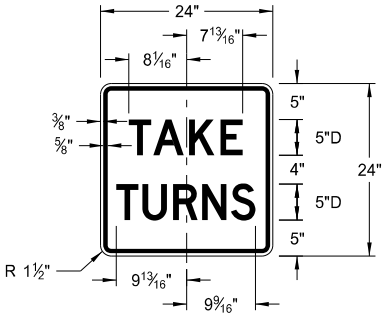
NOTES:
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added sign & background color

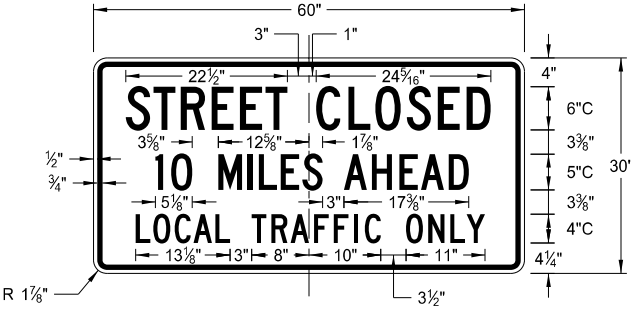
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

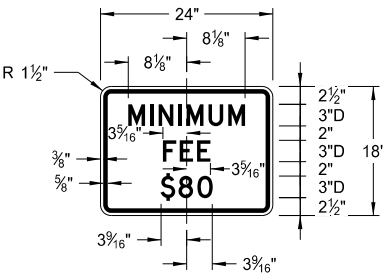
D-704-10



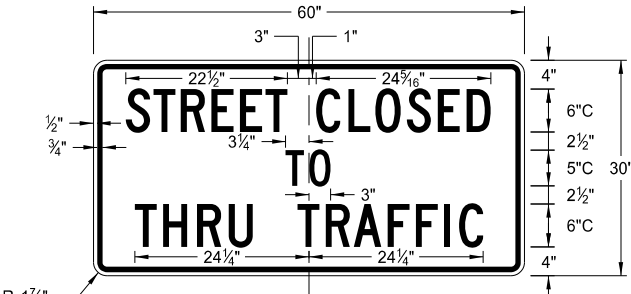
R1-50P-24
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Background: white



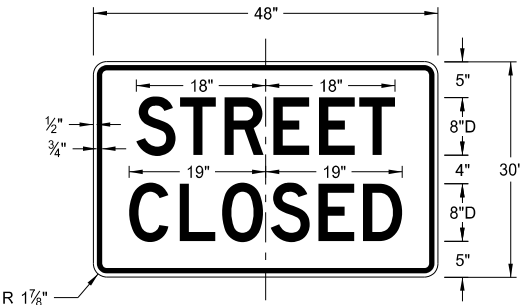
R11-3c-60
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R2-1aP-24
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R11-4a-60
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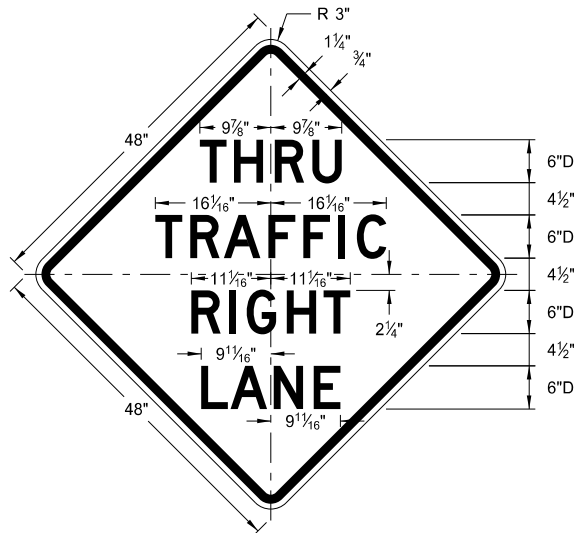


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Background: white

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

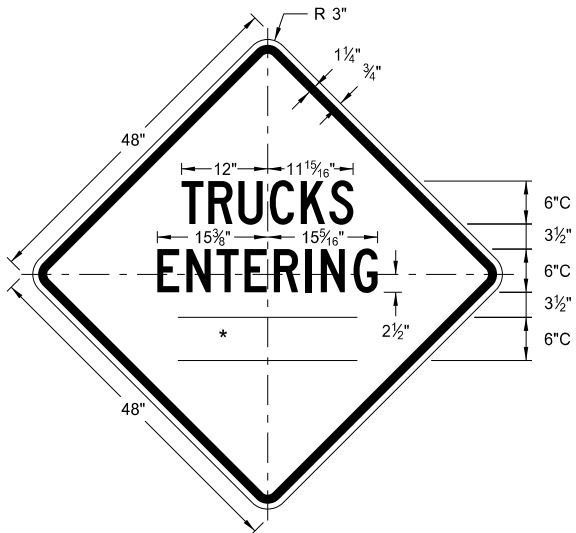
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

D-704-11



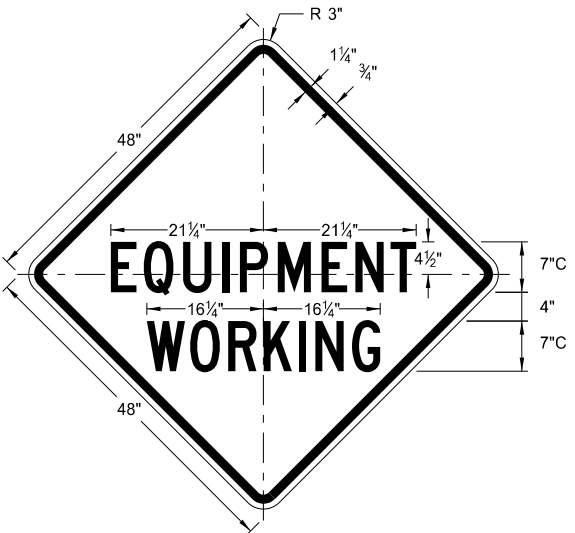
W5-8-48

Legend: black (non-refl)
Background: orange



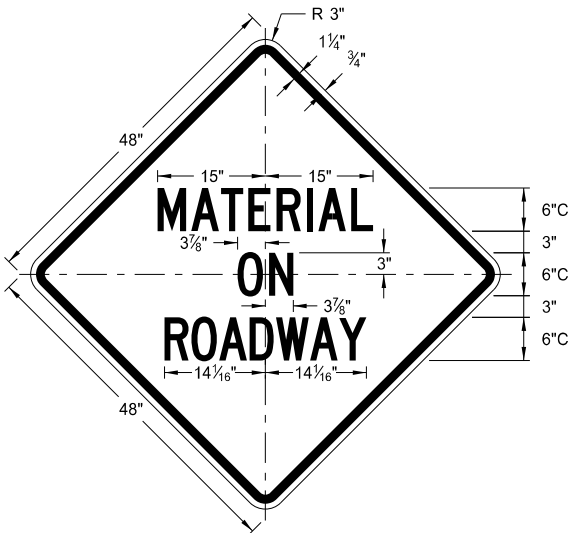
W8-54-48

Legend: black (non-refl)
Background: orange



W20-51-48

Legend: black (non-refl)
Background: orange

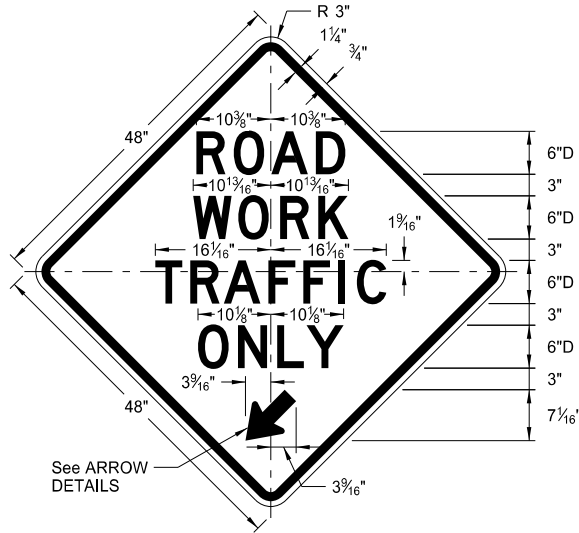


W21-51-48

Legend: black (non-refl)
Background: orange

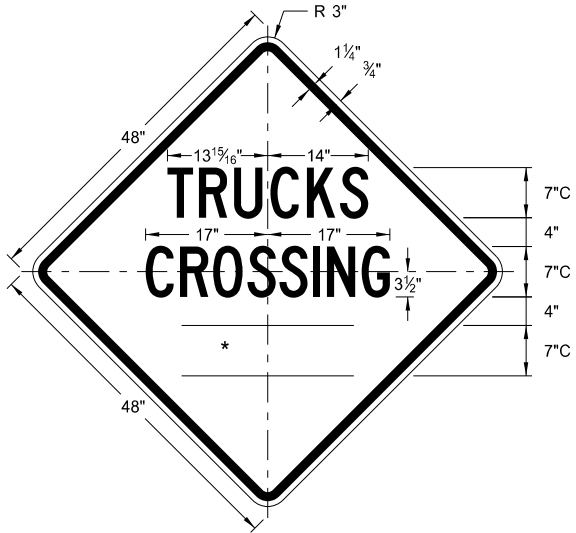
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
1/2 MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



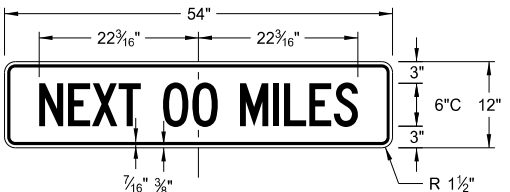
W5-9-48

Legend: black (non-refl)
Background: orange



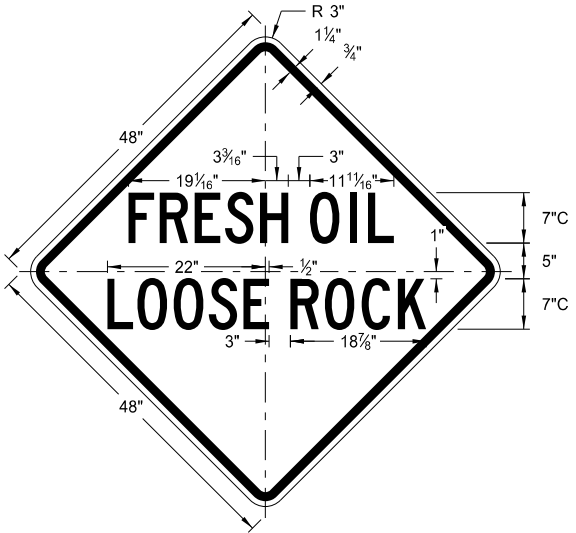
W8-55-48

Legend: black (non-refl)
Background: orange



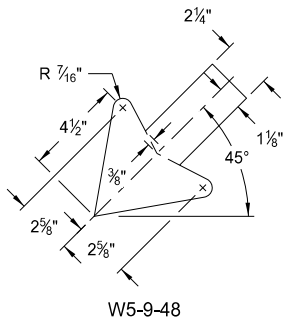
W20-52P-54

Legend: black (non-refl)
Background: orange

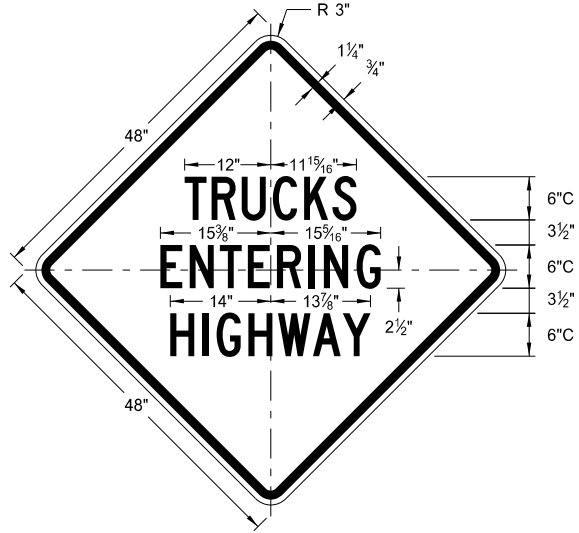


W22-8-48

Legend: black (non-refl)
Background: orange

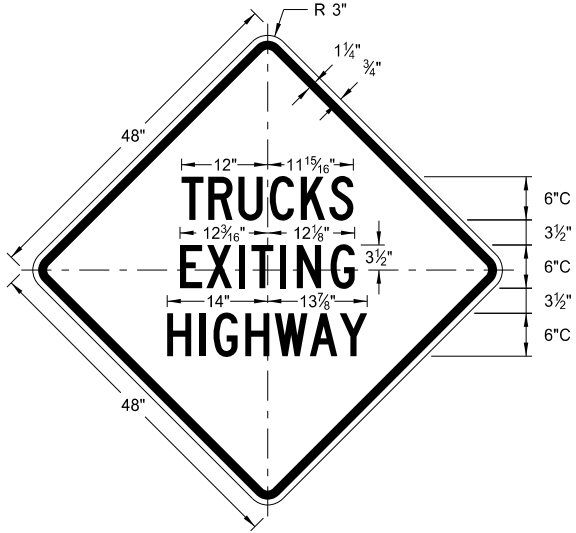


ARROW DETAILS



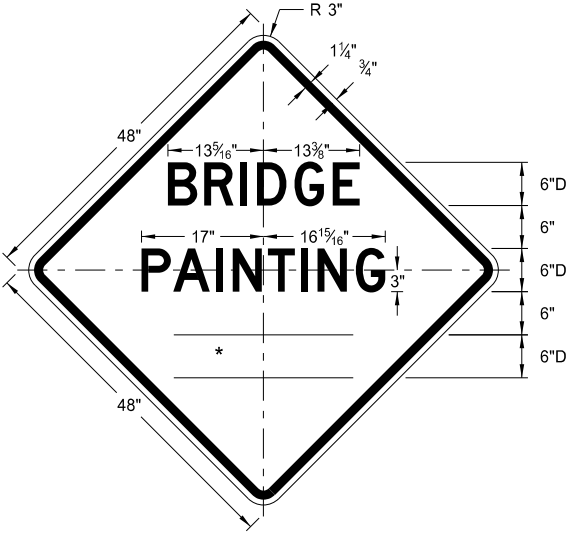
W8-53-48

Legend: black (non-refl)
Background: orange



W8-56-48

Legend: black (non-refl)
Background: orange



W21-50-48

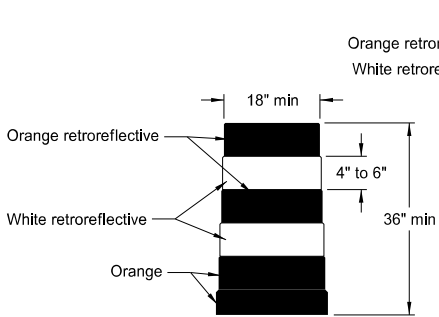
Legend: black (non-refl)
Background: orange

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

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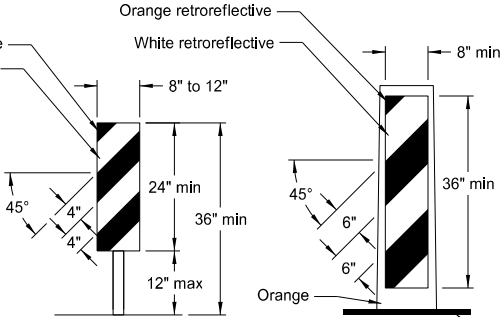
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



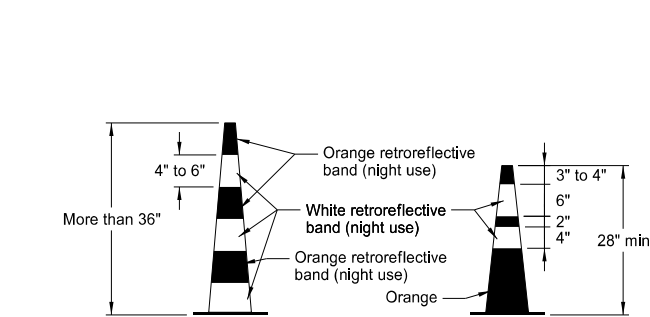
DELINEATOR DRUM

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.



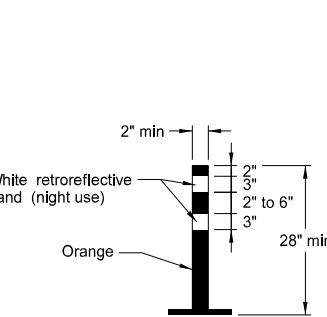
VERTICAL PANEL

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.



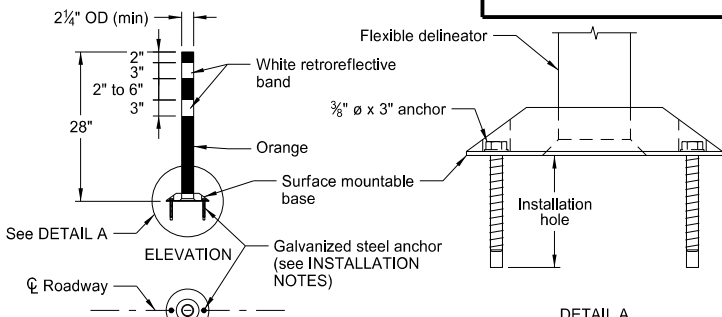
TRAFFIC CONE

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

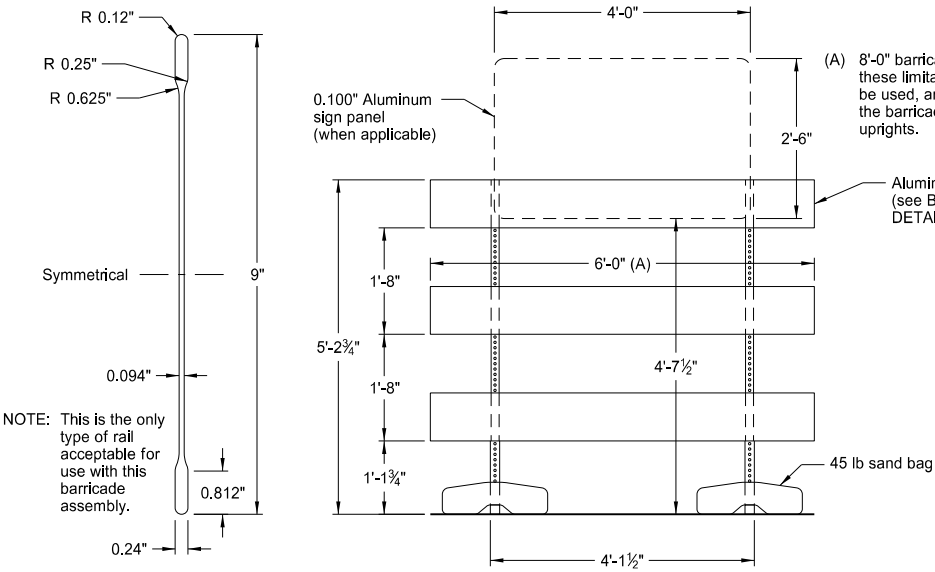
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

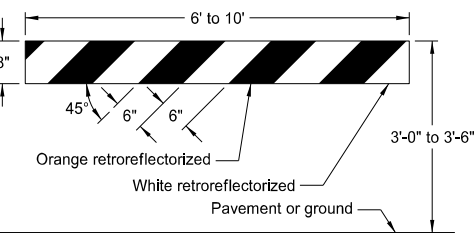
INSTALLATION NOTES:

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.

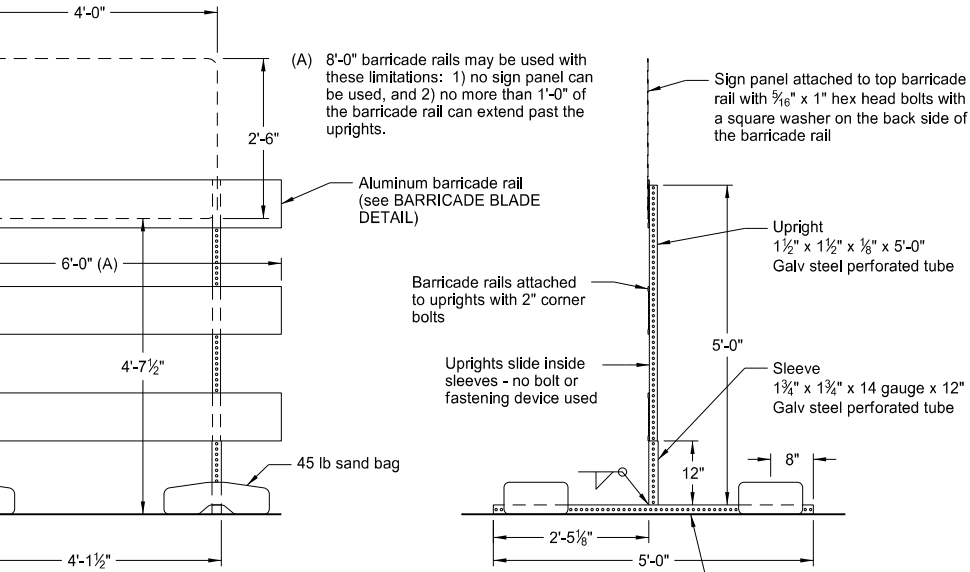


BARRICADE BLADE DETAIL

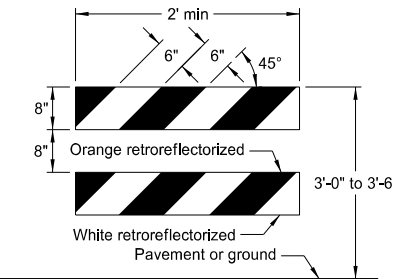
NOTE: This is the only type of rail acceptable for use with this barricade assembly.



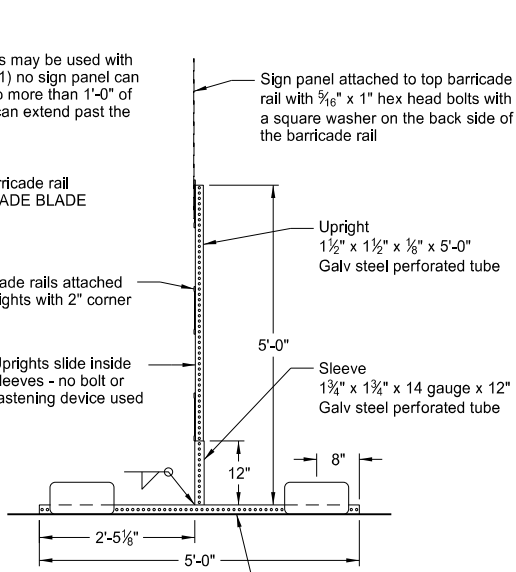
TYPE I BARRICADE



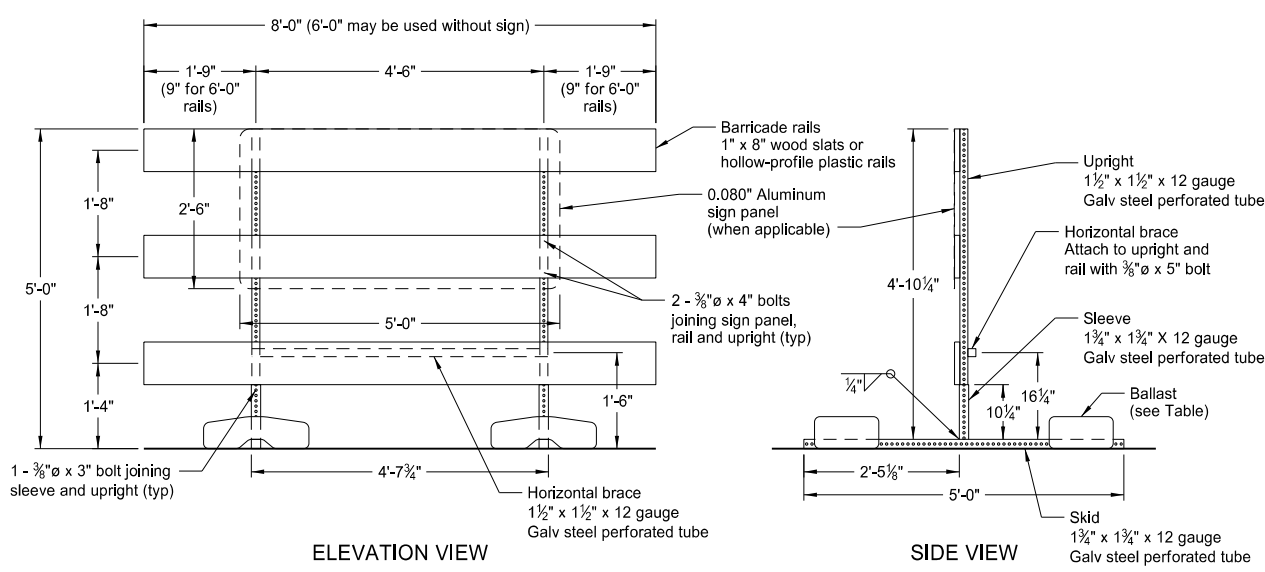
ELEVATION VIEW
BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)



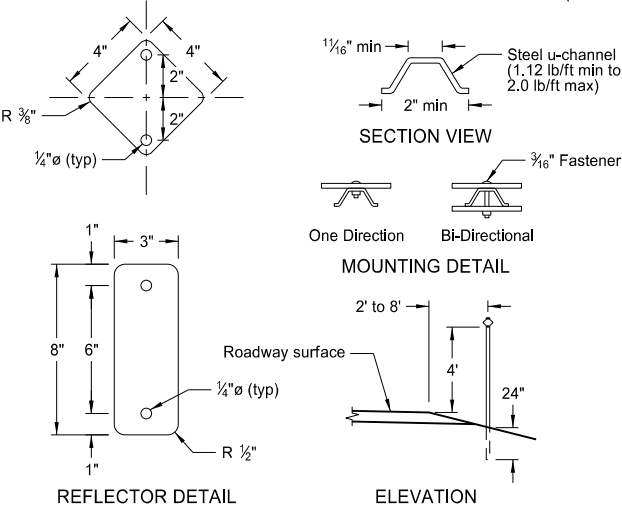
TYPE II BARRICADE
BARRICADE RAIL DETAILS



TYPE III BARRICADE



ELEVATION VIEW
BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)



REFLECTOR DETAIL
DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

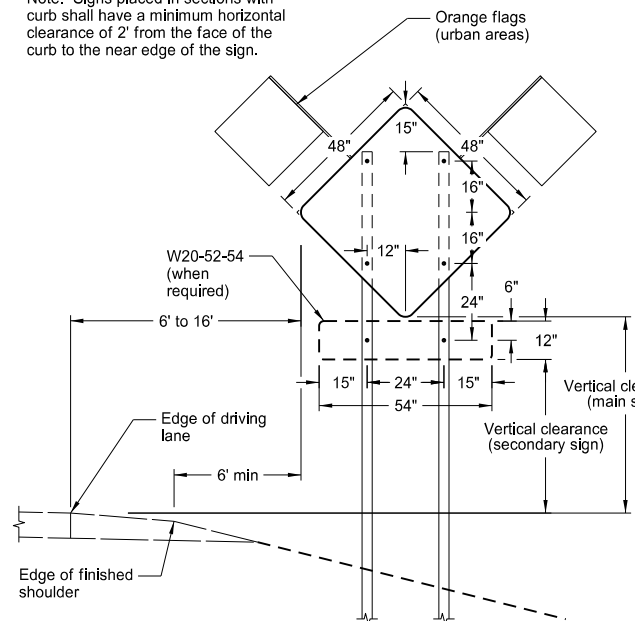
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

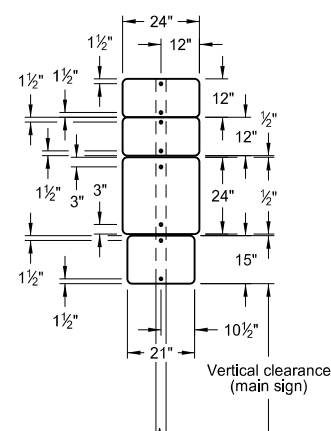
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Roger Weigel,
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on 10/3/13 and the original document is stored at the
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

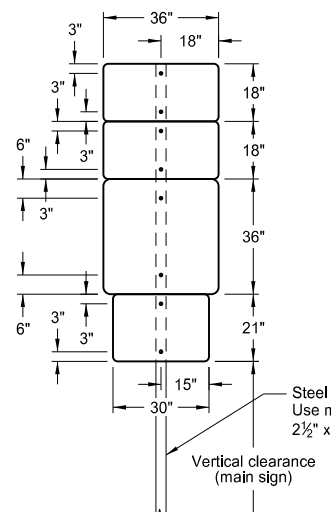
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



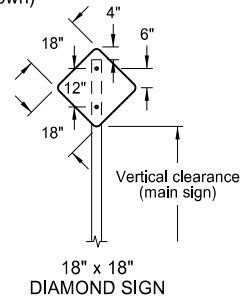
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



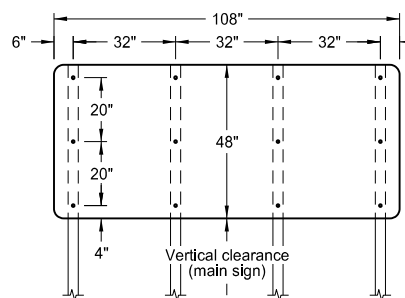
24" x 24" ROUTE MARKER ASSEMBLY



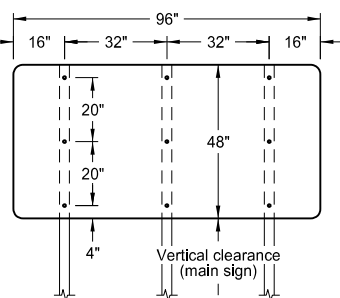
36" x 36" ROUTE MARKER ASSEMBLY



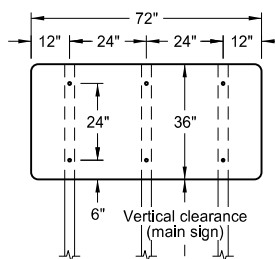
18" x 18" DIAMOND SIGN



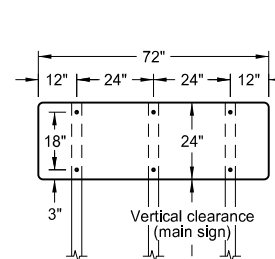
108" x 48" SIGN



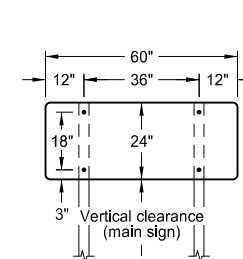
96" x 48" SIGN



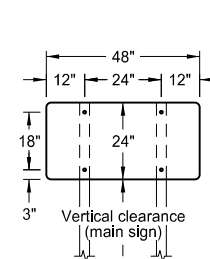
72" x 36" SIGN



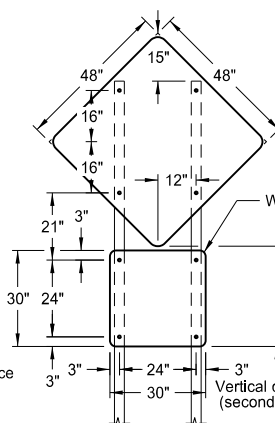
72" x 24" SIGN



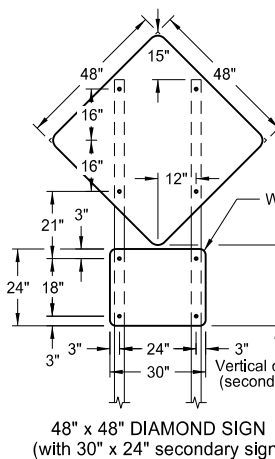
60" x 24" SIGN



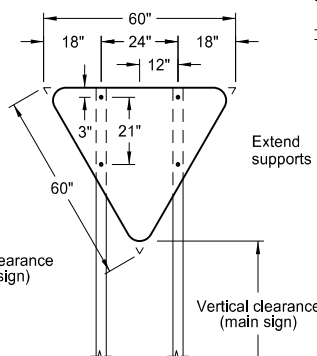
48" x 24" SIGN



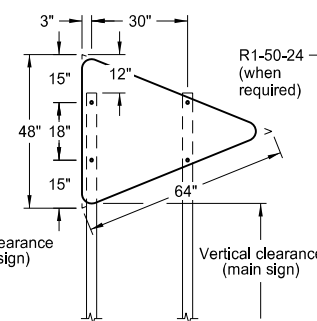
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



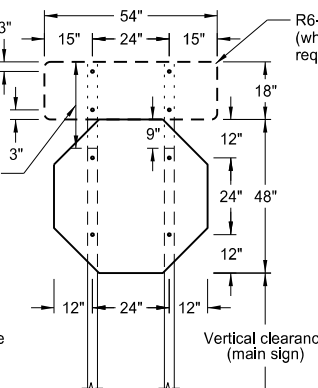
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



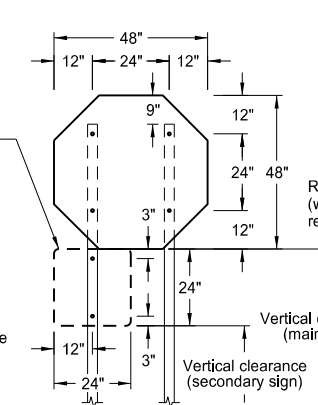
R1-2-60 - YIELD SIGN



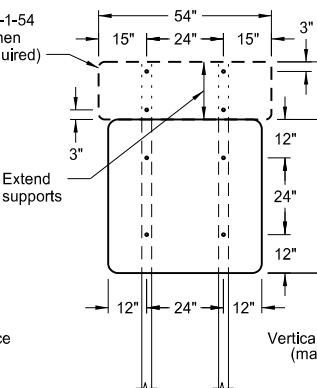
W14-3-64 - PENNANT SIGN



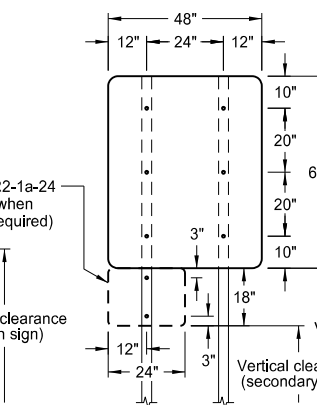
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



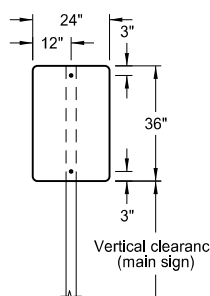
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



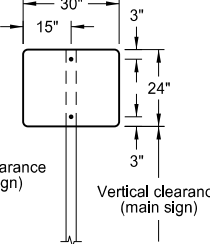
48" x 48" SIGN
(with R6-1-54 sign as required)



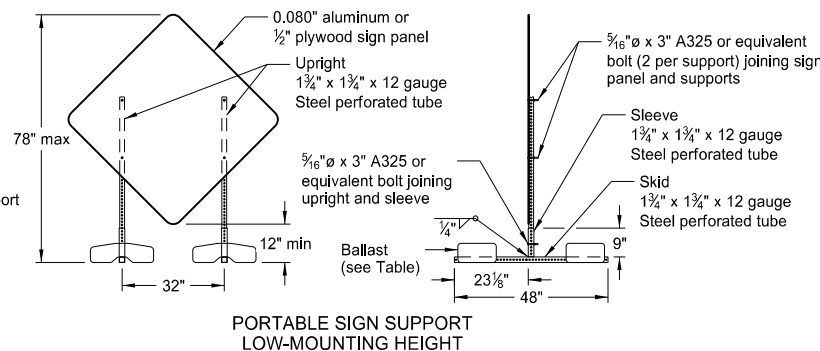
48" x 48" SIGN
(with R2-1a-24 sign as required)



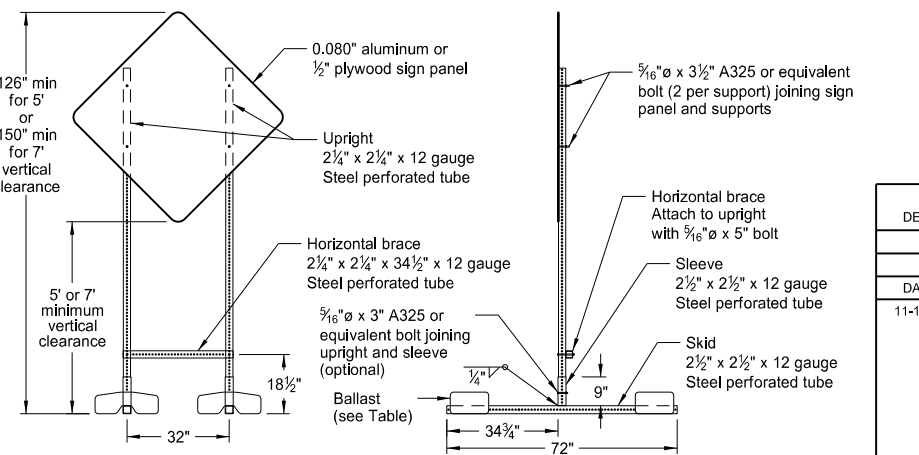
24" x 36" SIGN



30" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.

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

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.
3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)

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

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

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

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

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

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

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by 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.

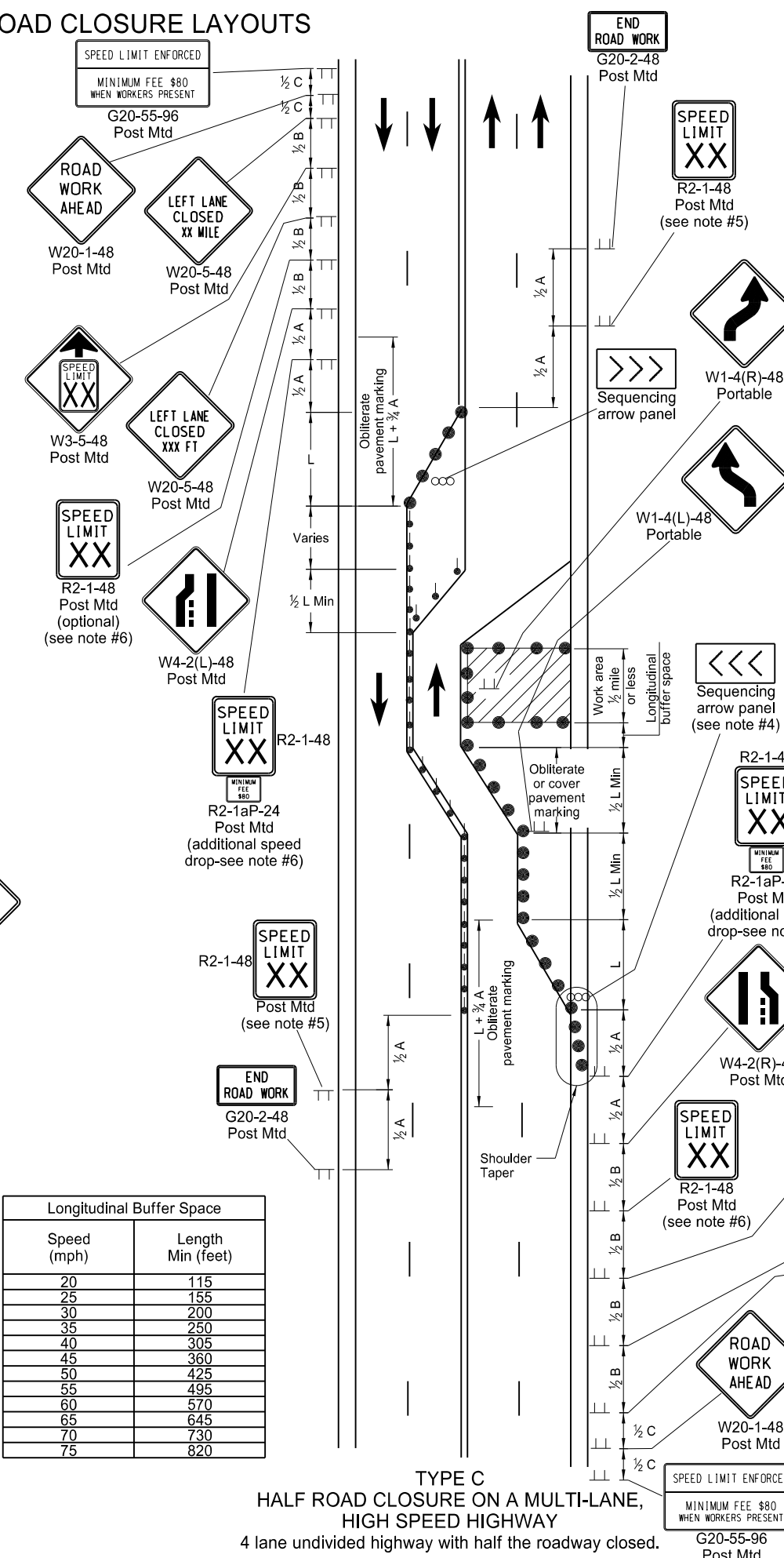
MINIMUM BALLAST
(For each side of sign support base)

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



D-704-15

Notes

1. Variables

S = Numerical value of speed limit or 85th percentile.
W = The width of taper in feet.
L = Minimum length of taper, S x W for freeways, expressways, and other roads with speeds of 45 mph or greater, or W x S²/60 for urban, residential, and other streets with speeds of 40 mph or less.

2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.

3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".

4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.

Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).

5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.

6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.

7. Use when work area is 1 mile or longer.

8. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flag 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.

9. Cover existing speed limit signs within reduced speed zones.

10. Where necessary, engineer will determine safe speed.

11. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.

12. Sign G20-55-96 is not required if this standard is part of other traffic control, or the work is less than 15 days.

13. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

KEY

Type III barricade

Sign

Delineator drum

Tubular markers

Work area

Flagger

Sequencing arrow panel

Vertical panels back to back

W20-5-48
Post Mtd

W3-5-48
Post Mtd

W20-5-48
Post Mtd

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & Speed Limit signs

This document was originally issued and sealed by

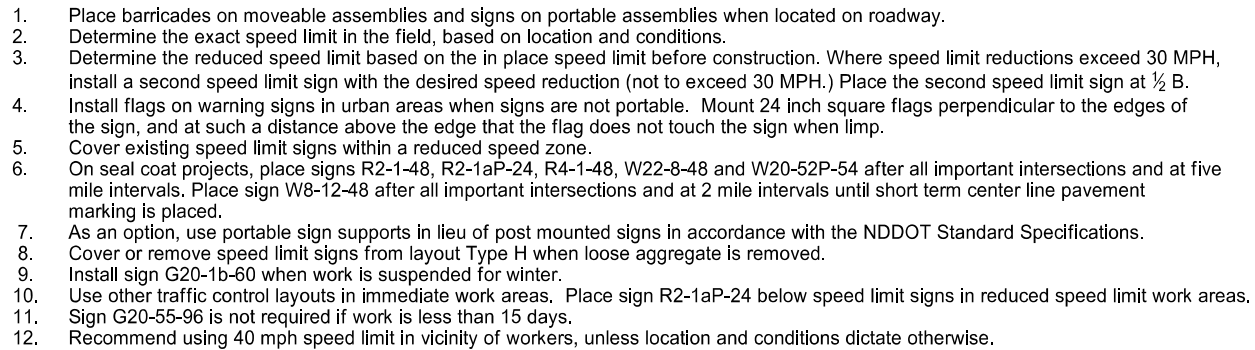
Roger Weigel

Registration Number

PE- 2930,

on 08/17/17 and the original document is stored at the

North Dakota Department of Transportation



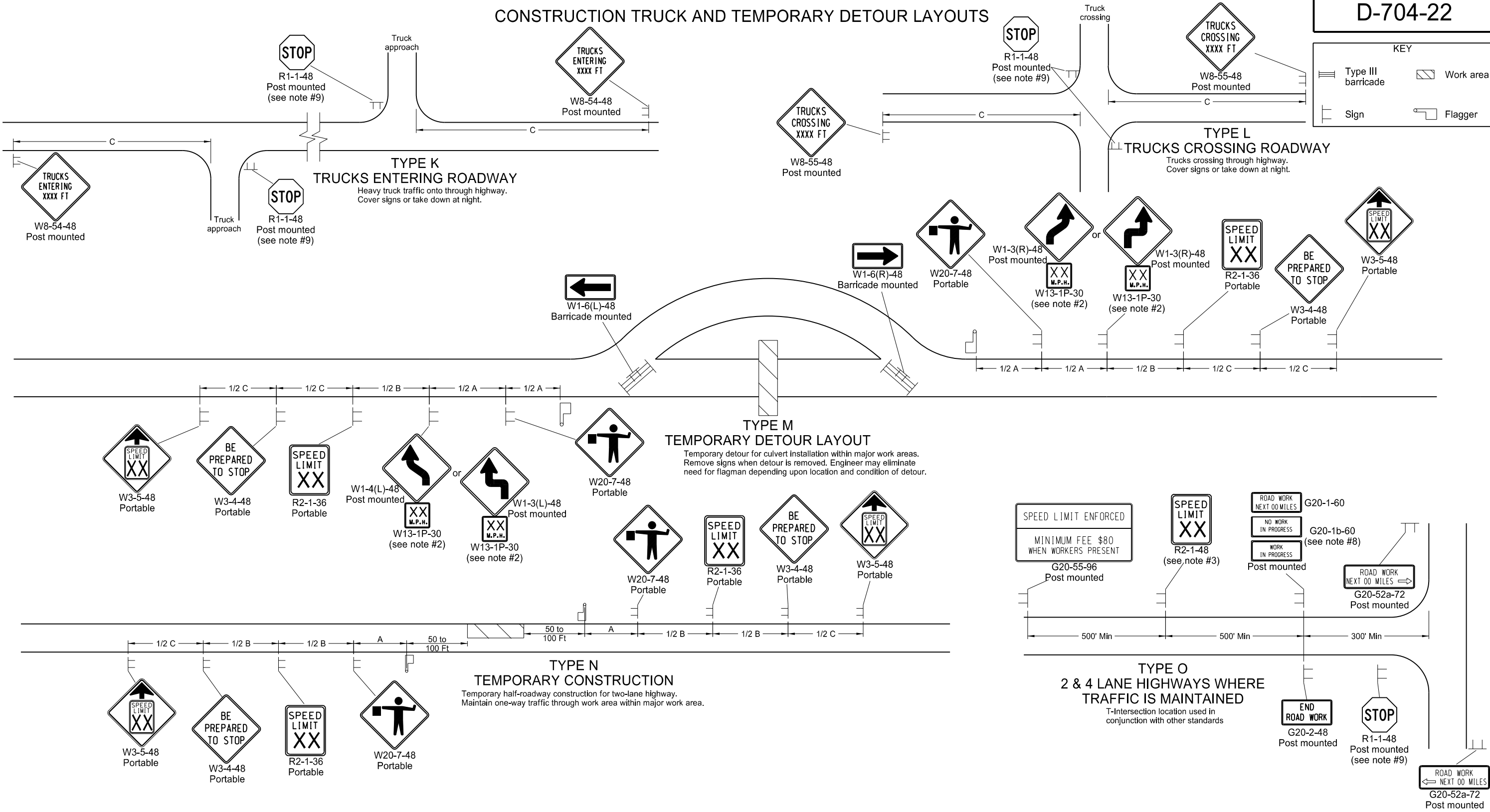
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway 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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Registration Number
PE- 2930 ,
on 08/17/17 and the original
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CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



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 Specifications.
- 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 or if work is less than 15 days.
- Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

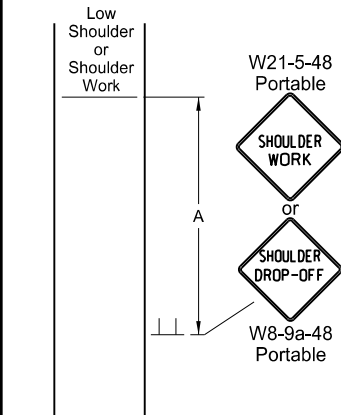
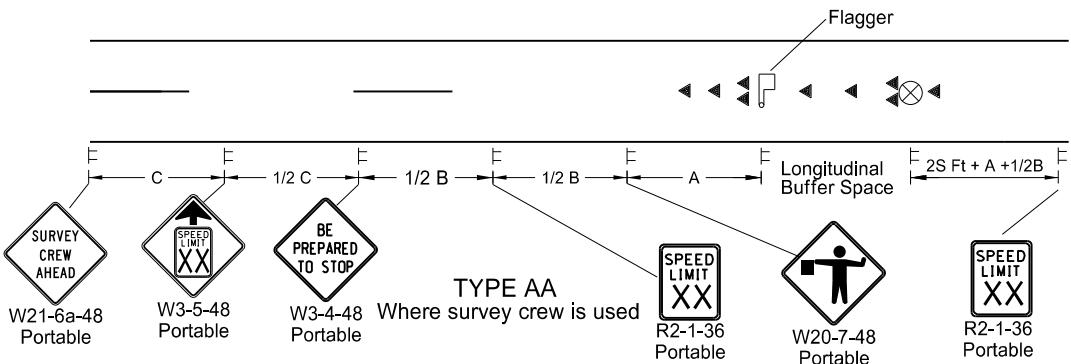
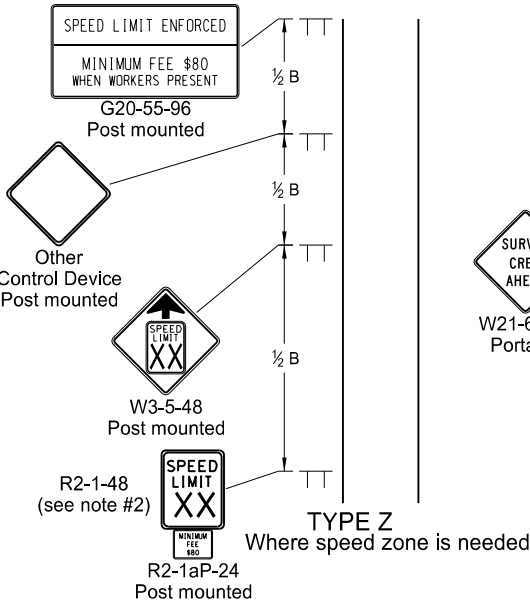
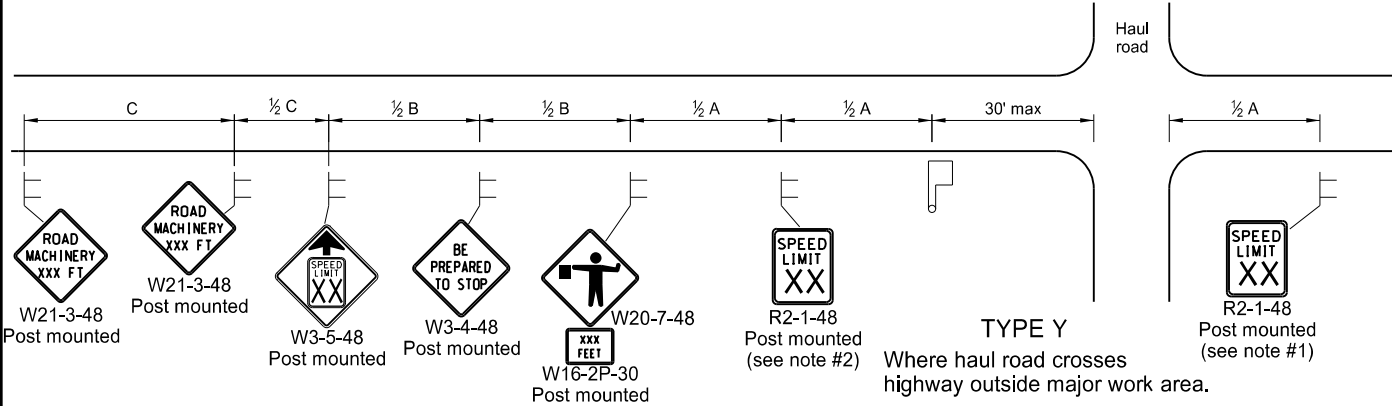
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and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

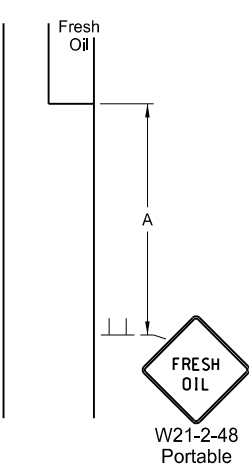
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MISCELLANEOUS SIGN LAYOUTS

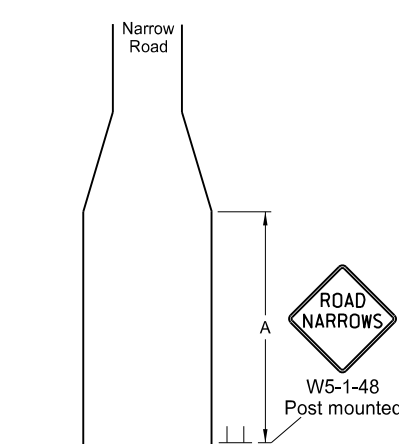
D-704-26



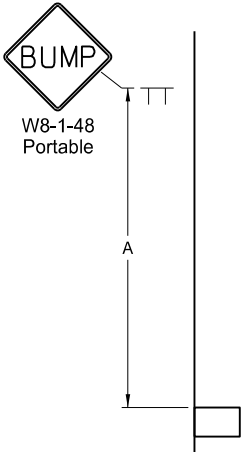
TYPE BB
Within major work area
where sign conditions exist



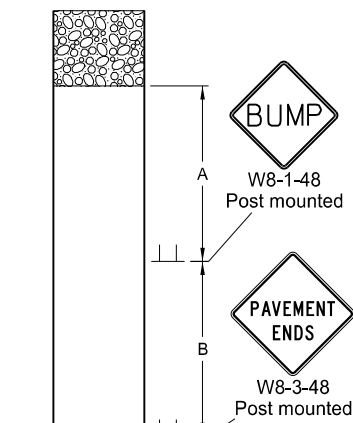
TYPE CC
Where sign conditions exist



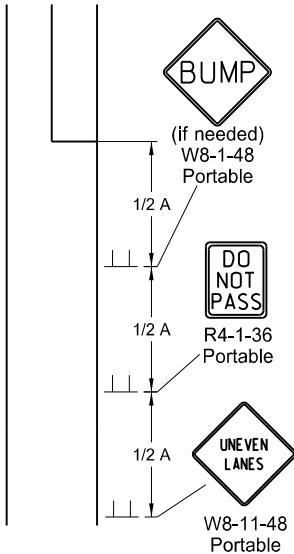
TYPE DD
Where sign conditions exist



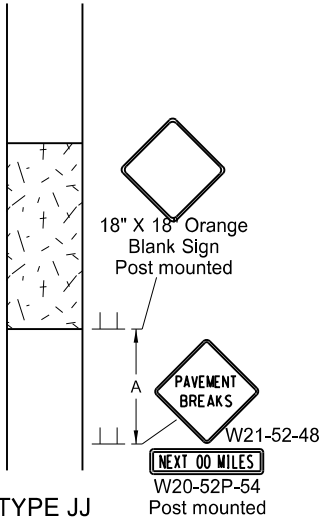
TYPE EE
Where sign conditions exist



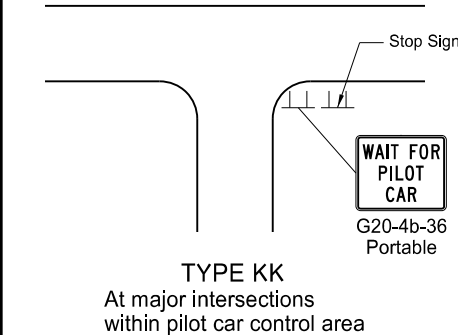
TYPE FF
Where sign conditions exist



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

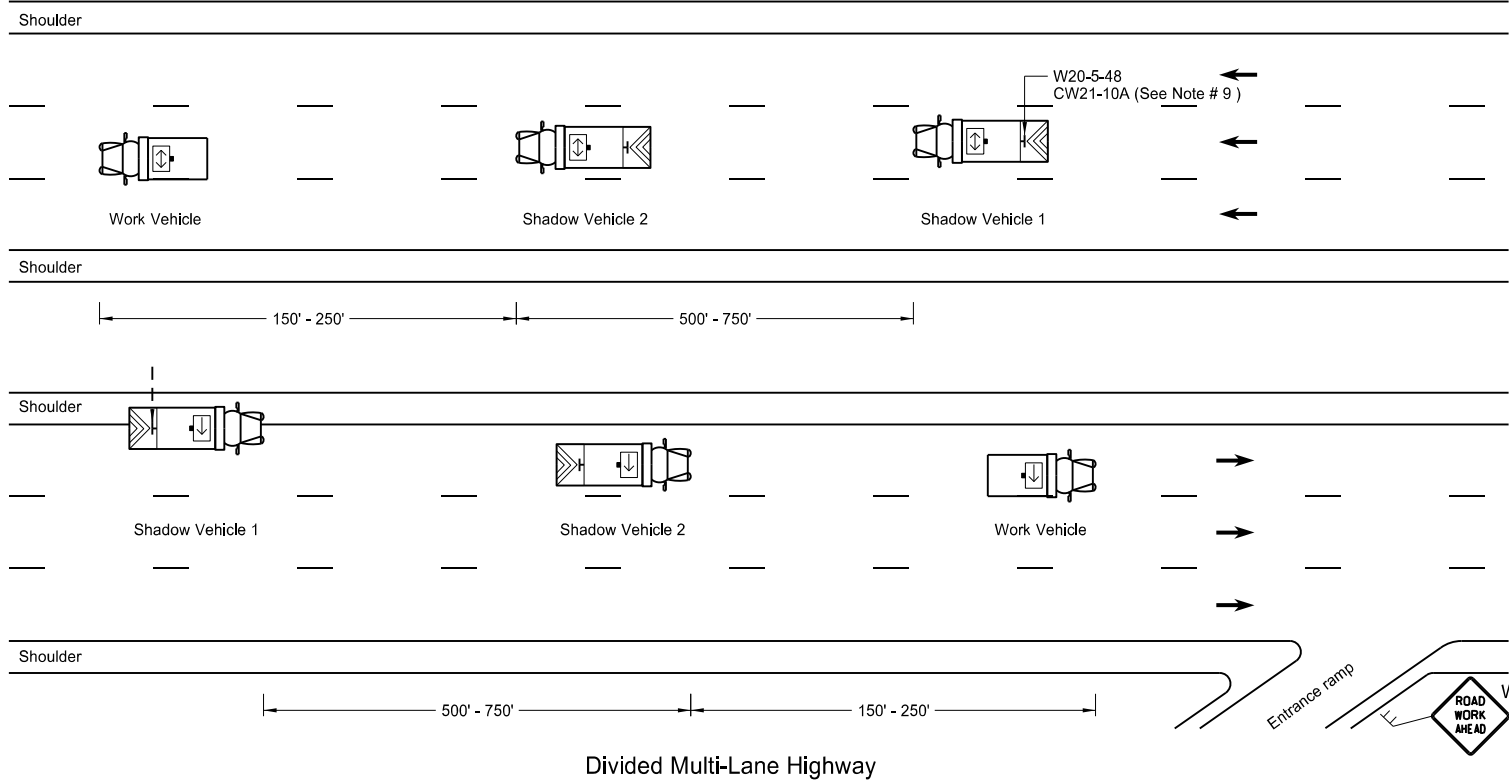
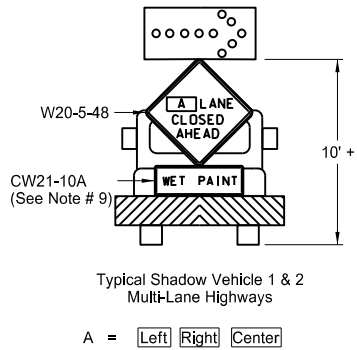
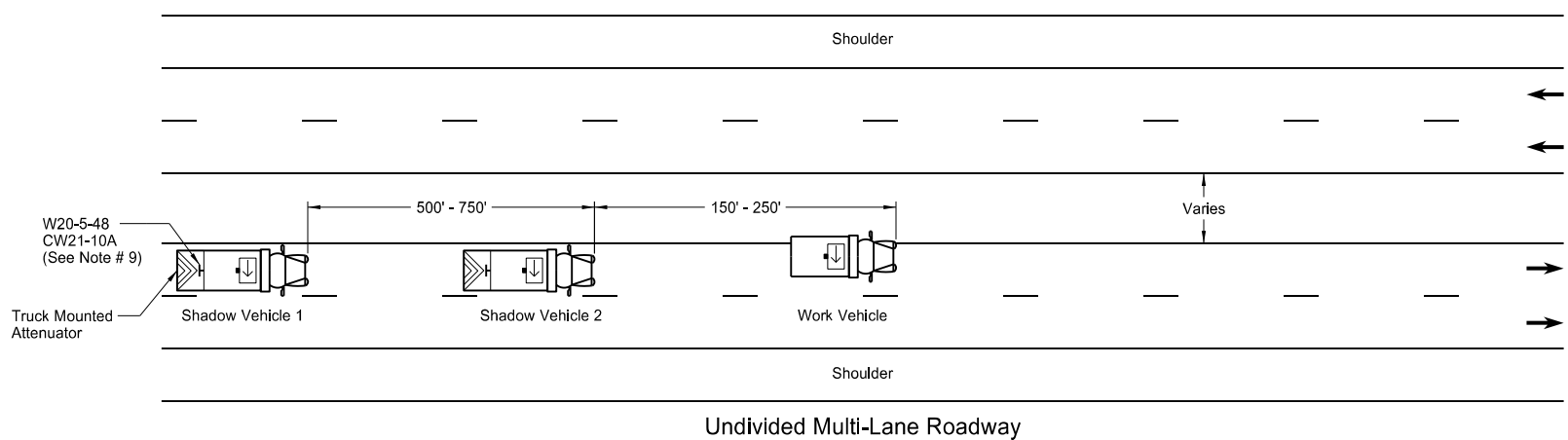
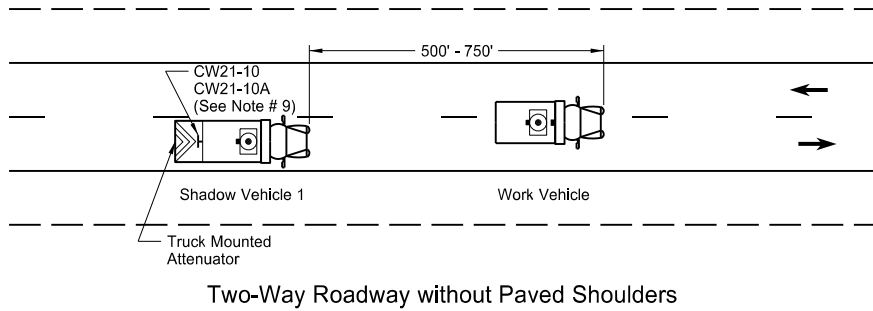
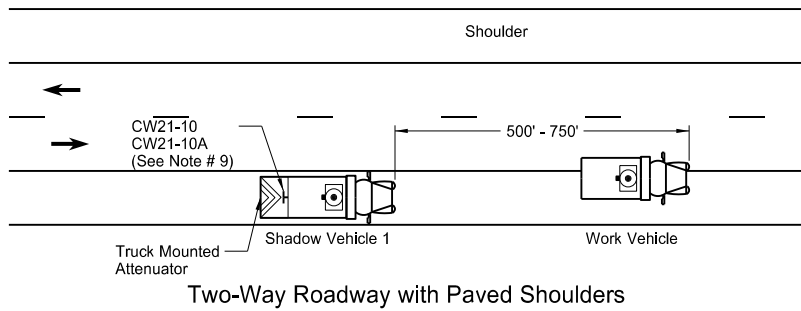
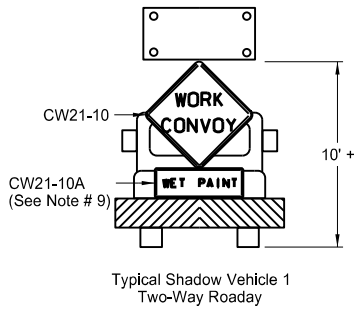
S = Numerical value of speed limit or 85th percentile.

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

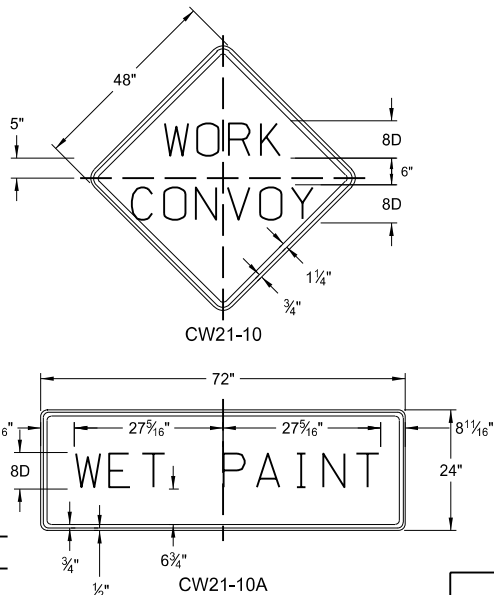
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TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

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

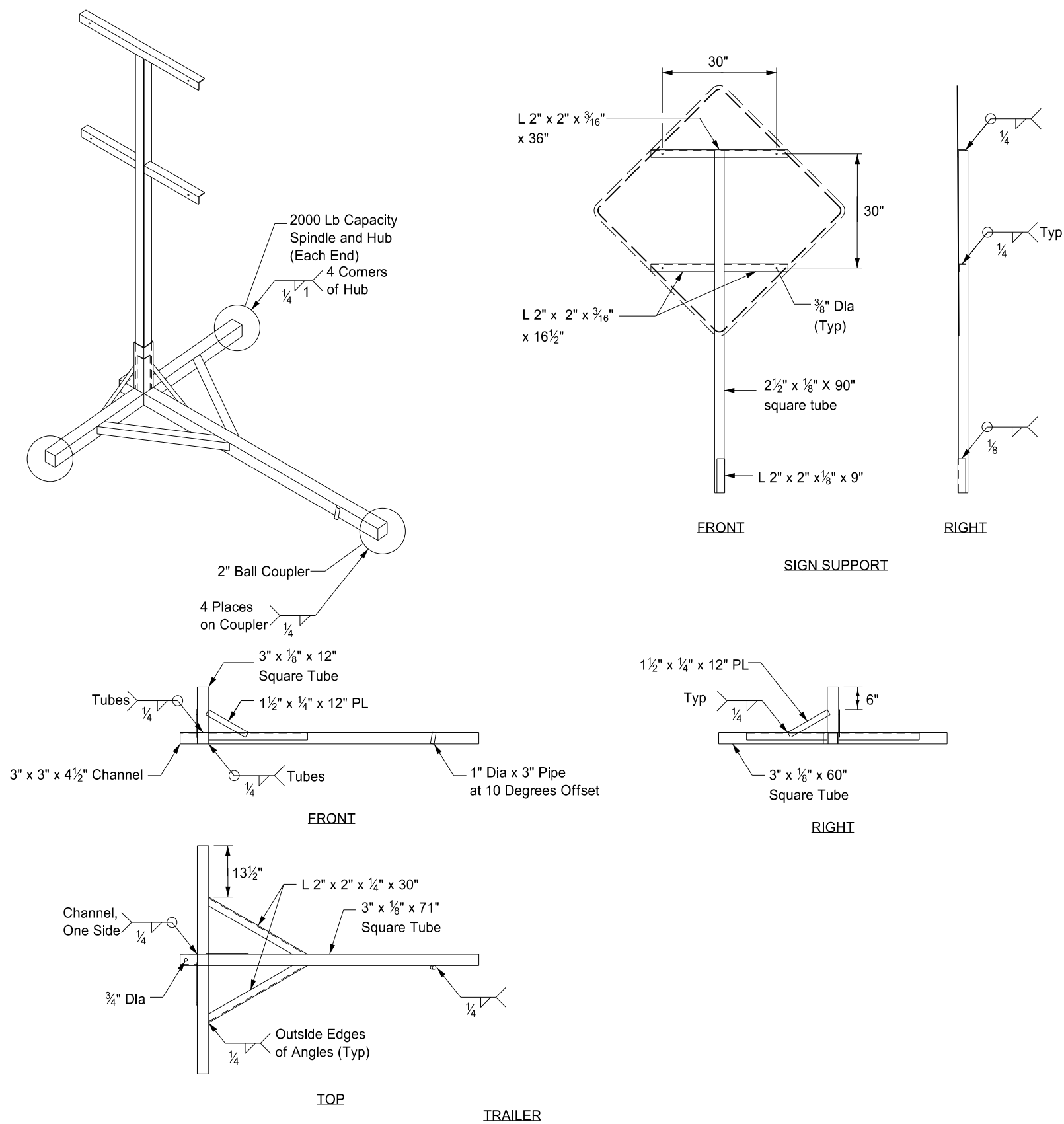
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
 - Right directional
 - Left directional
 - Double arrow directional
 - Caution Mode

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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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.

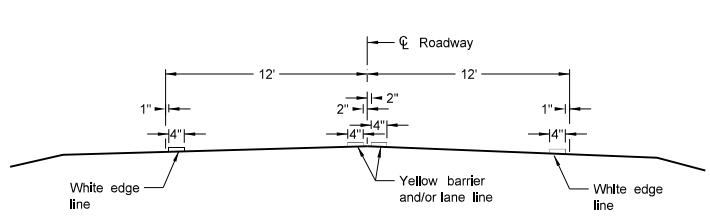
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

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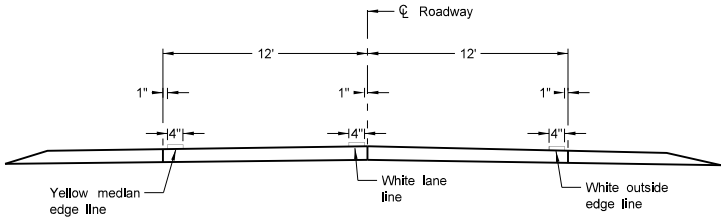
PAVEMENT MARKING

D-762-4

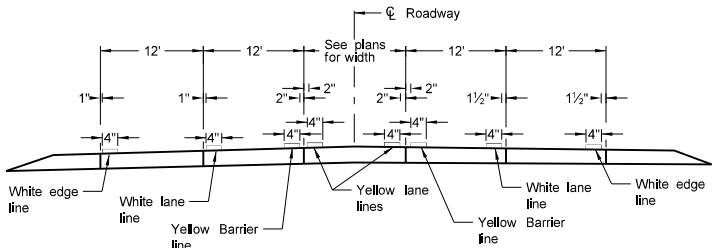
NOTES:
1. Edge lines shall be continued through private drives and field drives and broken for intersections.



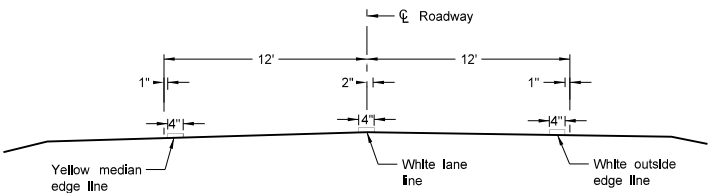
Two Lane Two Way
RURAL ROADWAY



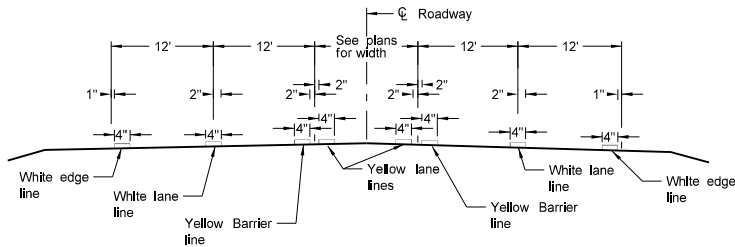
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



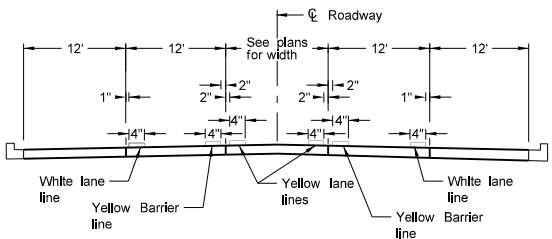
RURAL FIVE LANE ROADWAY
Concrete Section



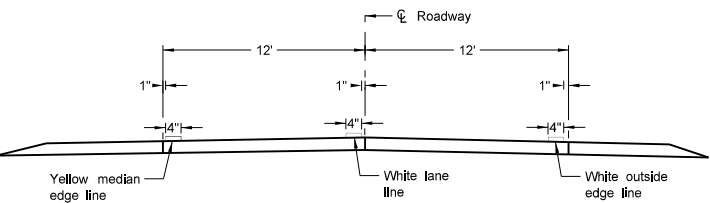
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



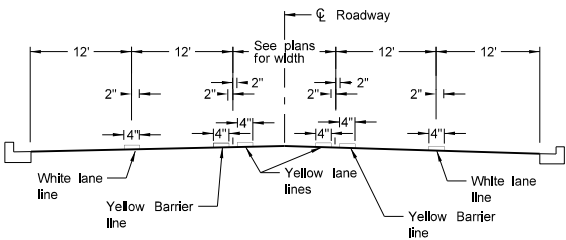
RURAL FIVE LANE ROADWAY
Asphalt Section



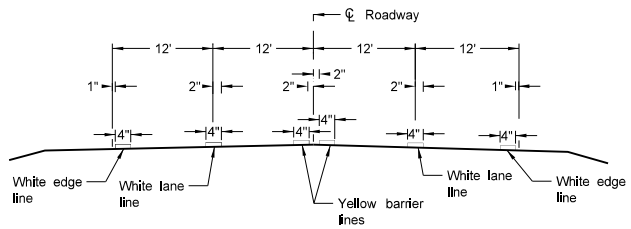
URBAN FIVE LANE SECTION
Concrete Section



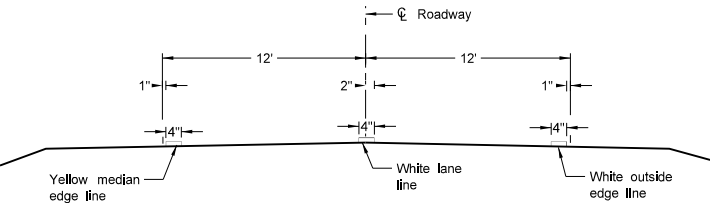
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



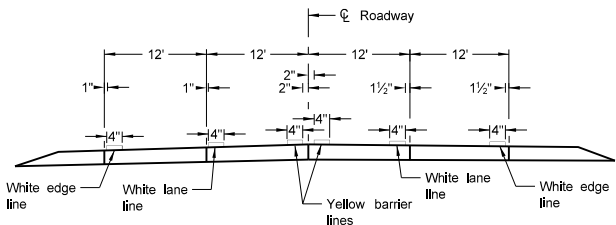
URBAN FIVE LANE SECTION
Asphalt Section



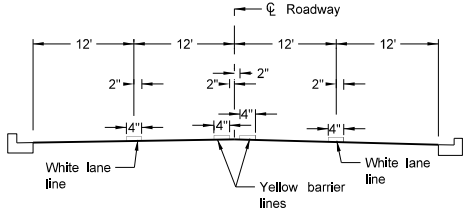
RURAL FOUR LANE ROADWAY
Asphalt Section



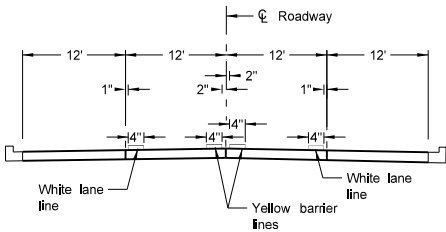
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



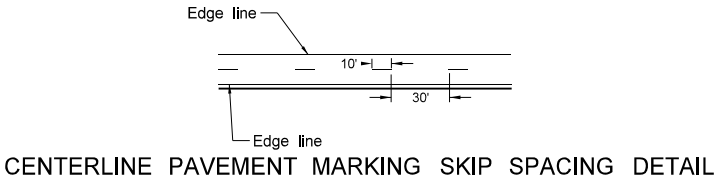
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



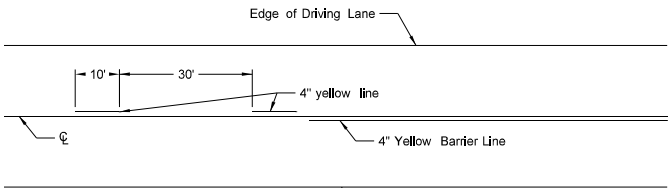
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

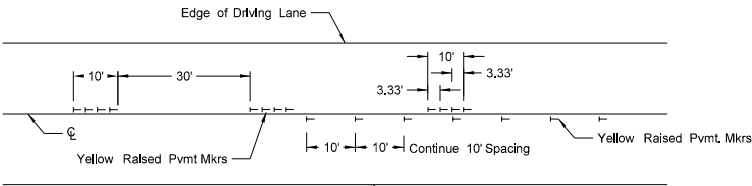
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SHORT-TERM PAVEMENT MARKING

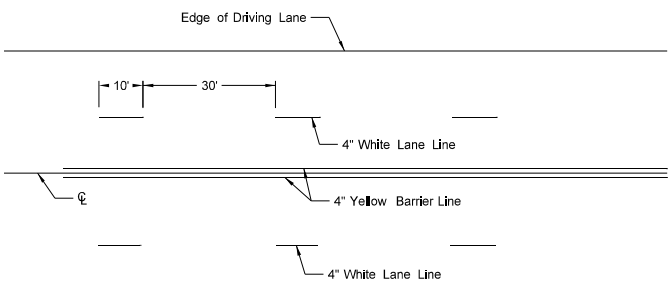
D-762-11



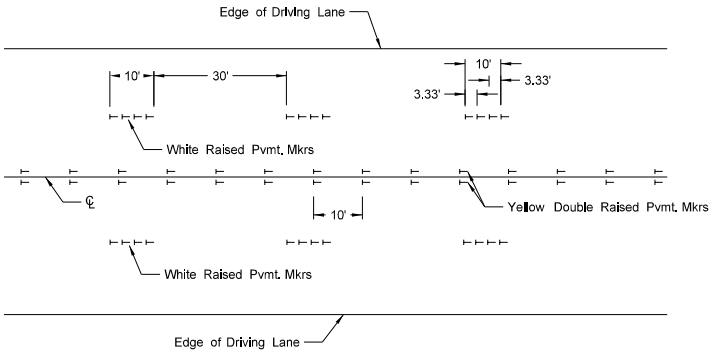
Painted or Tape Lines



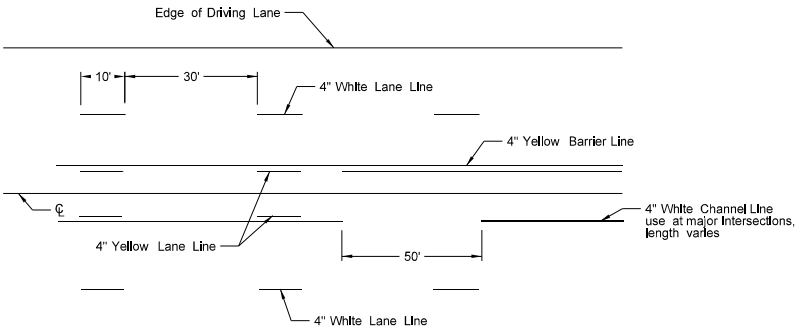
Raised Pavement Markers
TWO-LANE TWO-WAY ROADWAY



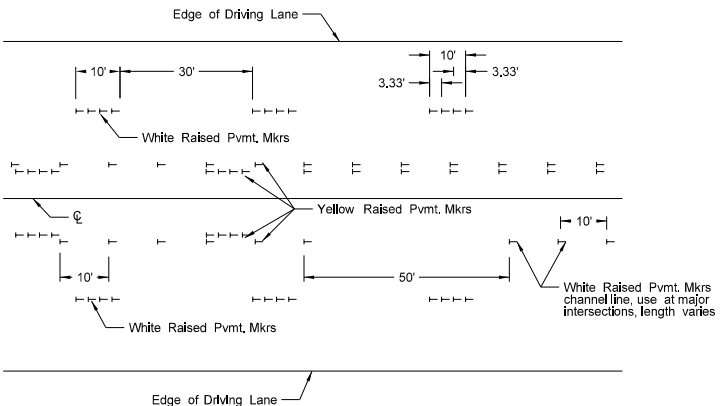
Painted or Tape Lines



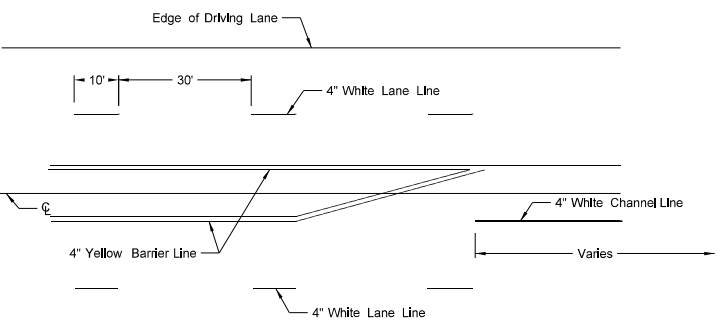
Raised Pavement Markers
FOUR LANE ROADWAY



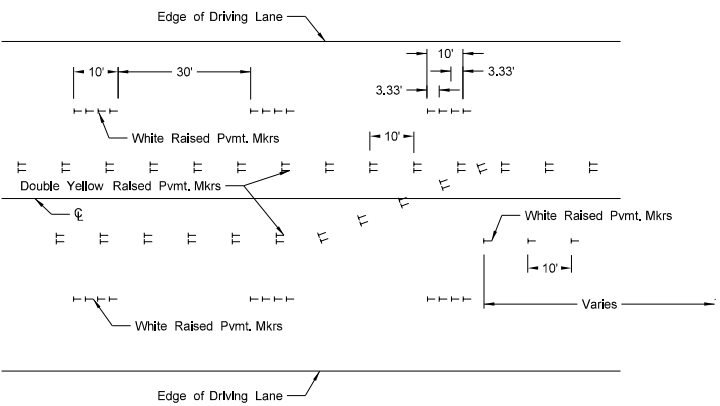
Painted or Tape Lines



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	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)

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