

DESIGN DATA - US Hwy 83				
Traffic	Average Daily			
Current 2026	Pass: 2000	Trucks: 480	Total: 2480	
Forecast 2046	Pass: 2700	Trucks: 690	Total: 3390	
Clear Zone Distance: 32 FT		Design Speed: 70 MPH		
DESIGN DATA - ND Hwy 37				
Traffic	Average Daily			
Current 2026	Pass: 1810	Trucks: 435	Total: 2245	
Forecast 2046	Pass: 2210	Trucks: 535	Total: 2745	
Clear Zone Distance: 32 FT		Design Speed: 65 MPH		

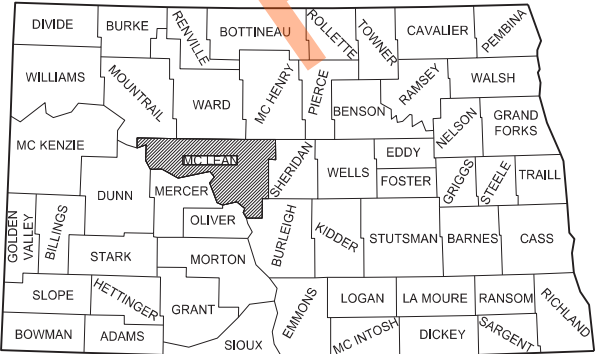
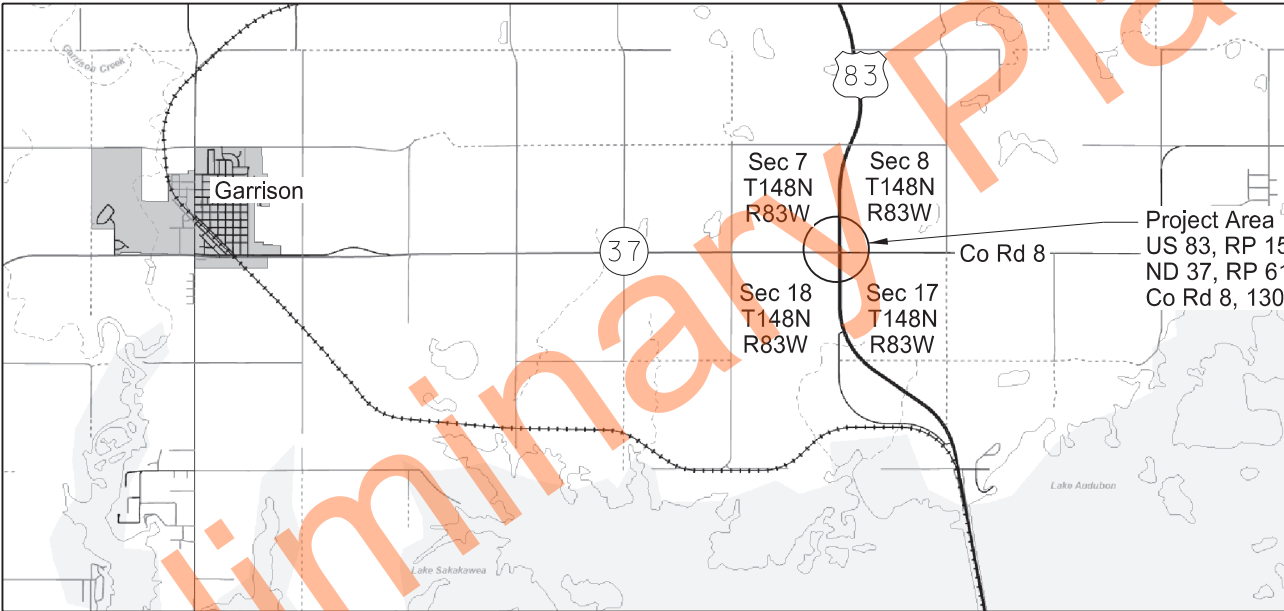
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

NH-4-083(172)158
McLean County
US Hwy 83 & ND Hwy 37 Intersection

Lighting & Signing

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	NH-7-083(172)158	25071	1	1
GOVERNING SPECIFICATIONS			Date Published and Adopted by the North Dakota Department of Transportation		
Standard Specifications			7/1/2025		
Supplemental Specifications			NONE		

PROJECT NUMBER \ DESCRIPTION NET MILES GROSS MILES



STATE COUNTY MAP

DESIGNER Spencer Ulvestad
DESIGNER
DESIGNER

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT
Kirk Hoff
08/28/26

NDDOT DESIGN DIVISION

REGISTERED PROFESSIONAL ENGINEER
MICHAEL E. JOHNSON
PE-6389
DATE 08/28/26
NORTH DAKOTA

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2	1	Table of Contents	D-101-10	NDDOT Utility Company and Organization Abbreviations				
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SP 554(25)	High Mast Lighting							
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NOTES

GENERAL NOTES

- 251-P01 SEEDING AND MULCHING: Regrade the topsoil after the work is completed. Ensure the soil around each foundation or any disturbed ground area ties in with the original grade. Compact the soil and restore the trenched areas to the original grade.

Plant Class II Grass Seed in all areas disturbed by this work. Provide Hydraulic Mulch after seeding is placed.

Include all cost associated with the seeding and mulching in the bid price for “Seeding Class II”.
- 704-P01 TRAFFIC CONTROL DEVICES: The Traffic Control Devices List has been developed using the traffic control layout sheets. They were developed using the following standard drawings.

1. Standard D-704-23, Type P, Lane Closure on Divided Highway.
2. Standard D-704-24, Type R, Shoulder Closure on Two Lane.
3. Standard D-704-24, Type HH, Shoulder Closure on Four Lane Divided Highway. Portable Median barriers are not needed.

The shoulder closure can be used in place of a lane closure if the Contractor chooses. Traffic control devices quantities are based on one set up of each closure listed.

SECTION 140

- 770-P01 BREAKAWAY LIGHT STANDARD: Provide light standards using the information below:

1. Provide breakaway aluminum transformer base when a breakaway base is specified in the plans.
2. Provide bases with a minimum of 4 anchor bolts.
3. Galvanize the light standards.
4. Provide davit style mast arms.

Include all costs associated with the light standard in the bid price for “Lighting System”.
- 770-P02 CONVENTIONAL LUMINAIRE: Provide the same model of luminaires throughout the project. Provide a luminaire listed below or an approved equal:

Conventional Luminaire	Catalog Number
American Electric Autobahn	ATB0-P451-MVOLT-R2-NR-NL-BAA
GE Evolve Cobra Head	ERNM-A-0-18-B1CA-40-1-GRAY-D1-NEMA Label

One of the conventional luminaires requires a house side shield. Refer to the light standard list in the plans.

The lighting system was designed using these values:

Photometric Requirements	
Roadway	US 83
Roadway Classification	Principal Arterial-Residential
Average Maintained Illuminance	0.8 foot-candles
Illuminance Uniformity Ratio	4.0:1
Minimum Illuminance	as uniformity allows
Light Loss Factor	0.81

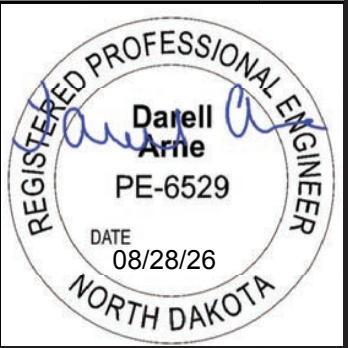
Photometric Requirements	
Roadway	ND 37/Co Rd 8
Roadway Classification	Minor Arterial-Residential
Average Maintained Illuminance	0.7 foot-candles
Illuminance Uniformity Ratio	4.0:1
Minimum Illuminance	as uniformity allows
Light Loss Factor	0.81

Alternative luminaires must meet the requirements below:

Alternate Luminaire Requirements	
Light Source	LED
Color Temperature	4000K ±300K
Operating Temperature Range	-40°C to + 40°C
Luminaire Housing	Die Cast Aluminum
Vibration Testing	ANSI/NEMA C136.31 Level 2, 3 G
Surge Suppression Rating	ANSI/IEEE C62.41 Cat C
Outdoor rating for housing, wiring, and drivers	ANSI C136.25 IP-65
Photo Control on each luminaire	No
Tool-less Access	Yes
NEMA Label	Yes
Qualified with DesignLights Consortium	Yes
Buy America Compliant	Yes

Provide a NEMA label with black letters on a white background. Size of label is 3 in. x 3 in. and 1.25 in. letter height. Label should be two lines with the input wattage “XXX” on the top line and “LED” on the bottom line.

Include all cost associated with the LED luminaire in the bid price for “Lighting System”.



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NOTES

770-P03 HIGH MAST LUMINAIRE: Provide the high mast luminaire listed below:

High Mast Luminaire	Catalog Number
Holophane High Mast LED	HMLED4-P3-40K-MVOLT-HGR-MAW

One of the high mast luminaires requires a house side shield. Refer to the light standard list in the plans.

The lighting system was designed using these values.

High Mast Photometric Requirements	
Roadway Classification	Principal Arterial - Residential
Average Maintained Illuminance	0.8 foot-candles min
Illuminance Uniformity Ratio	4.0:1
Minimum Illuminance	as uniformity allows
Light Loss Factor	0.81

Include the cost of the luminaire in the item “LED Luminaire – High Mast”.

770-P04 PORTABLE POWER UNIT: Provide 2 new portable power units specified in the High Mast Lighting Special Provision. Deliver unit to the address shown.

Chad Beggs
NDDOT Minot District
1305 Highway 2 Bypass East
Minot, ND
(701) 857-6918
cbeggs@nd.gov

Include the cost of the portable power units in the item “Portable Power Unit”.

772-P05 FEED POINTS: Install the new feed points as shown in the plans. Install the high mast lighting circuits at 480V and double phase and the conventional lighting circuits at 240V single phase.

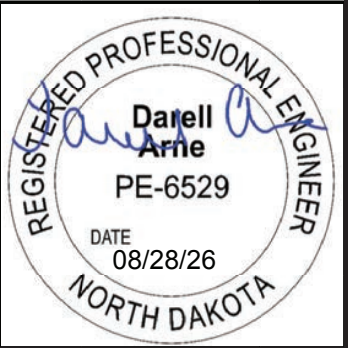
Contact McLean Electric Coop, at the address below to set up the electrical service.

Lucas Schaaf
McLean Electric Coop
(701) 463-6700
lucasjs@mcleanelectric.com

Contact the NDDOT Minot District for electrical service billing.

Amanda Merck
NDDOT Minot District
(701) 857-6952
amerck@nd.gov

Include all costs in the price bid for the item “Feed Point-Type V Pad Mounted”.



ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100 CONTRACT BOND	L SUM	1	1
251	0200 SEEDING CLASS II	ACRE	0.32	0.32
702	0100 MOBILIZATION	L SUM	1	1
704	1000 TRAFFIC CONTROL SIGNS	UNIT	1,153	1,153
704	1060 DELINEATOR DRUMS	EA	35	35
704	1067 TUBULAR MARKERS	EA	20	20
704	1087 SEQUENCING ARROW PANEL-TYPE C	EA	1	1
704	1500 OBLITERATION OF PAVEMENT MARKING	SF	126	126
754	0110 FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	123	123
754	0112 FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	254	254
754	0206 STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	985	985
754	0214 GALV STEEL POSTS-W-SHAPE POSTS(TWO OR MORE)	LF	116	116
754	0534 PANEL FOR SIGNS-TYPE IV REFLECTIVE SHEETING	SF	90	90
754	0592 RESET SIGN PANEL	EA	4	4
754	1104 REMOVE SIGN FOUNDATION	EA	4	4
762	1106 PVMT MK PAINTED 6IN LINE	LF	265	265
762	1108 PVMT MK PAINTED 8IN LINE	LF	61	61
762	1124 PVMT MK PAINTED 24IN LINE	LF	35	35
766	0100 MAILBOX-ALL TYPES	EA	3	3
770	0001 LIGHTING SYSTEM	EA	1	1
770	0030 CONCRETE FOUNDATION-HIGH MAST LIGHTING	EA	4	4
770	0220 CABLE TRENCH-TYPE II	LF	1,026	1,026
770	0330 2IN DIAMETER RIGID CONDUIT	LF	70	70
770	0464 MULTIPLE UNDERGROUND CABLE 3NO4-1NO6 STYLE USE	LF	1,559	1,559
770	0750 FEED POINT-TYPE V-PAD MOUNTED	EA	1	1
770	3720 HIGH MAST LIGHTING ASSEMBLY TYPE HM-80-3	EA	4	4
770	3790 PORTABLE POWER UNIT	EA	2	2
770	4280 LED LUMINAIRE - HIGH MAST	EA	12	12
770	4567 REMOVE LIGHTING SYSTEM	EA	1	1

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Mailboxes					
ND 37 RP	Station	New Station	New Support Type	Number of Mailboxes	Work
61.82 rt	3260+80 rt	3261+00 rt	Single	1	Replace support
61.86 rt	3264+71 rt	no change	Single	1	Replace support
61.75 rt	3266+13 rt	no change	Single	1	Replace support

SPEC	CODE	BID ITEM	QTY	UNIT
766	0100	Mailboxes-All Types	3	EA

Preliminary Plans

Mailbox Supports

US 83 & ND 37 Intersection

REGISTERED PROFESSIONAL ENGINEER

Darell Arne

PE-6529

DATE 08/28/26

NORTH DAKOTA

[illegible]

[illegible][illegible]

SPEC & CODE			
704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	1153

[illegible]

A circular professional engineer seal for the State of North Dakota. The outer ring contains the text "REGISTERED PROFESSIONAL ENGINEER" at the top and "NORTH DAKOTA" at the bottom. In the center, the name "Darell Arne" is printed above the license number "PE-6529". Below the license number is the date "DATE 08/28/26". A blue ink signature is written across the seal, overlapping the name and license number.

VERSION: 6.26.2025

																		STATE	PROJECT NO.			SECTION NO.	SHEET NO.							
																	N.D.	NH-4-083(172)158			110	1								
Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Vert Clear- ance	Support Size	Max Post Len	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments							
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF	FT		LF	1st LF	2nd LF	3rd LF	4th LF															
US 83																														
8411+77 Rt		395	10.2		13.0	13.6			7.0	2.25 x 2.25 12 ga	14.9	4.0	4.6			2.5 x 2.5 12 ga	2	4	3 x 3 7 ga			2								
8411+77 Lt		57			16.3	16.6			7.0	2.25 x 2.25 12 ga	23.1	2.3	2.7				2	4	3 x 3 7 ga	1		2								
8411+77 Lt mdn		57			16.3	16.6			7.0	2.25 x 2.25 12 ga	23.1	2.3	2.7			2.5 x 2.5 12 ga	2	4	3 x 3 7 ga	1		2								
8415+77 Lt		11		12.0	13.2				7.0	2.25 x 2.25 12 ga	14.3	4.6				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1								
8415+77 Lt mdn		11		12.0	13.2				7.0	2.25 x 2.25 12 ga	14.3	4.6				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1								
8419+77 Lt	SN 2		34.0		13.0	13.5	13.9	14.3	7.0	2.25 x 2.25 12 ga	15.0	4.0	4.4	4.9	5.3	2.5 x 2.5 12 ga	4	4	3 x 3 7 ga			4								
8419+77 Rt	SA C		8.4		14.7				7.0	2.5 x 2.5 10 ga	15.6	4.8				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1								
8423+77 Rt	SA A		25.8		16.4	16.7	17.0		7.0	2.5 x 2.5 10 ga	17.8	4.8	5.2	5.5		2.19 x 2.19 10 ga	3	4	3 x 3 7 ga			3								
8424+48 Rt		33		6.0	13.8				7.0	2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga											
8424+48 Rt mdn		33		6.0	13.8				7.0	2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga											
8426+29 Lt		372	7.0		13.1				7.0	2.5 x 2.5 10 ga	14.6	4.1				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1								
8427+98 Rt		16		9.0	14.0				7.0	2.25 x 2.25 12 ga	14.4	5.4				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1								
8427+98 Rt mdn		16		9.0	14.0				7.0	2.25 x 2.25 12 ga	14.4	5.4				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1								
8429+10 Lt		16		9.0	14.0				7.0	2.25 x 2.25 12 ga	14.4	5.4				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1								
8429+10 Lt mdn		16		9.0	14.0				7.0	2.25 x 2.25 12 ga	14.4	5.4				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1								
8429+61 Rt		372	7.0		13.1				7.0	2.5 x 2.5 10 ga	14.6	4.1				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1								
8431+60 Lt		33		6.0	13.8				7.0	2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga											
8431+60 Lt mdn		33		6.0	13.8				7.0	2.5 x 2.5 12 ga	14.8						1	4	3 x 3 7 ga											
8432+23 Lt	SA B		25.8		16.4	16.7	17.0		7.0	2.5 x 2.5 10 ga	17.8	4.8	5.2	5.5		2.19 x 2.19 10 ga	3	4	3 x 3 7 ga			3								
8436+23 Lt	SA C		8.4		14.7				7.0	2.5 x 2.5 10 ga	15.6	4.8				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1								
8436+23 Rt	SN 3		18.0		12.5	13.0			7.0	2.25 x 2.25 12 ga	14.0	4.1	4.6			2.5 x 2.5 12 ga	2	4	3 x 3 7 ga			2								
8440+23 Rt		11		12.0	13.2				7.0	2.25 x 2.25 12 ga	14.3	4.6				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1								
8440+23 Rt mdn		11		12.0	13.2				7.0	2.25 x 2.25 12 ga	14.3	4.6				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1								
8444+23 Lt		395	10.2		13.0	13.6			7.0	2.25 x 2.25 12 ga	14.9	4.0	4.6			2.5 x 2.5 12 ga	2	4	3 x 3 7 ga			2								
8448+23 Lt					13.6	14.3	15.0	15.6	7.0	2.25 x 2.25 12 ga	16.6	3.8	4.5	5.2	5.8	2.5 x 2.5 12 ga	4	4	3 x 3 7 ga	1		4								
Sub Total			154.8	108.0	Total		577.4										Total	160.0		3	0	36								
8/28/26 10:45:22AM Page 1 of 2																							REGISTERED PROFESSIONAL ENGINEER Darell Arne PE-6529 DATE 08/28/26 NORTH DAKOTA				Sign Summary Perforated Tube US 83 & ND 37 Intersection			

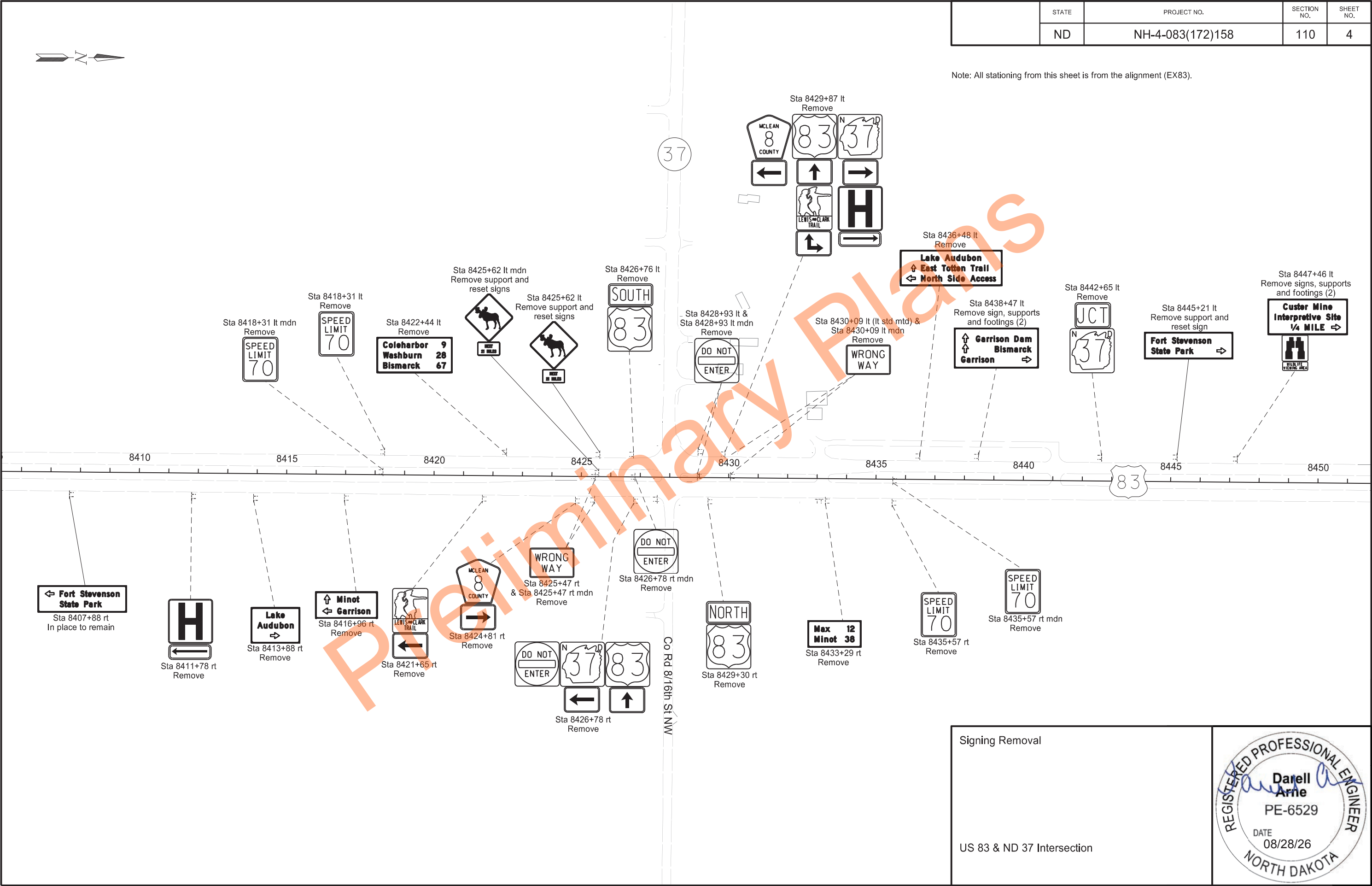
	Sign Summary Perforated Tube US 83 & ND 37 Intersection
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																					STATE	PROJECT NO.			SECTION NO.	SHEET NO.			
																					N.D.	NH-4-083(172)158			110	3			
Station / RP	Sign / Assembly No.	Flat Sheet For Signs		Panel For Signs		Overlay Panel		Vert Clear-ance FT	Galv Steel Sheet Standard Pipe		Size	Galv Steel Post W-Shape Posts			Max Post Len LF	Post Space FT	Revise Fuse Joint EA	Std Pipe Fdn			W-Shape Pile LF	Remove Sign Fdns		Reset Sign Panel EA	Reset Sign Support EA	Stub Post EA	Multi Dir Base EA	Comments	
		IV SF	XI SF	IV SF	XI SF	IV SF	XI SF		1st LF	2nd LF		1st LF	2nd LF	3rd LF				Dia FT	Dep FT	Vol CY		Conc Fdn EA	W-Shape Pile EA						
US 83																													
8415+77 Rt	SN 1			45.0				7.0			W4x13	14.6	15.5		18.6	5.0					28								
8438+47 Lt																													
8440+23 Lt	SN 4			45.0				7.0			W4x13	14.6	15.5		18.6	5.0					28								
8447+46 Lt																													
Sub Total				90.0				Total	0.0		Total	60.2							0.0	56	0	4	0	0	0	0			
Grand Total				90.0				Total	0.0		Total	60.2							0.0	56	0	4	0	0	0	0			
Preliminary Plans																													
																						Sign Summary Round Steel Pipe & W-Shape							
																						US 83 & ND 37 Intersection							

8/28/26 10:47:48AM
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Note: All stationing from this sheet is from the alignment (EX83).



Signing Removal

US 83 & ND 37 Intersection



Signing Removal

US 83 & ND 37 Intersection

A circular professional engineer seal for the state of North Dakota. The outer ring contains the text "REGISTERED PROFESSIONAL ENGINEER" at the top and "NORTH DAKOTA" at the bottom. In the center, the name "Darell Arne" is printed above the license number "PE-6529". Below the license number, the word "DATE" is printed above the expiration date "08/28/26". A blue ink signature is written across the seal, overlapping the name and license number.

NH-4-083(172)158

STATION(S):
8415+77 rt (EX83)

The diagram shows a rectangular directional sign with the following dimensions and content:

- Overall Dimensions:**
 - Width: 101.0 (9.5 + 10' + 9.5)
 - Height: 38.0 (8.0 + 8.0 + 22.0)
- Sign Content:**
 - Top section (8.0 high): Upward arrow, "Minot", and "Lake Audubon" with a rightward arrow.
 - Middle section (8.0 high): Leftward arrow and "Garrison".
 - Bottom section (22.0 high): Empty space.
- Spacing Dimensions (from top and bottom edges):**
 - 8.0 (to top of sign)
 - 8.0D (to top of sign)
 - 8.0 (to top of sign)
 - 8.0D (to top of sign)
 - 8.0 (to top of sign)
 - 8.0D (to top of sign)
 - 8.0 (to top of sign)

Dimensions are in inches tenths

Letter locations are panel edge to lower left corner

LENGTH	SIZE	SERIES
--------	------	--------

STATION(S):
8419+77 It (EX83)

Technical drawing of a rectangular sign. The sign is dark gray with white text. The text is arranged in three rows: "Coleharbor" with a large "9" to its right, "Washburn" with a large "28" to its right, and "Bismarck" with a large "67" to its right. The sign has a white border. Dimensions are indicated: the overall width is 8' 6" and the overall height is 4'. The sign itself is 84.7" wide and 24" high. The text is centered within the sign. The background is white with a light gray grid.

Dimension	Value
Overall Width	8' 6"
Overall Height	4'
Sign Width	84.7"
Sign Height	24"
Text Row 1: Coleharbor 9	
Text Row 2: Washburn 28	
Text Row 3: Bismarck 67	

Dimensions are in inches tenths

Letter locations are panel edge to lower left corner

LENGTH	SIZE	SERIES
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STATION(S):
8436+23 rt (EX83)

Diagram of a rectangular speed limit sign. The sign is 6' wide and 7.0' high. It displays the text "Max 12" and "Minot 38". The sign is mounted on a post. Dimensions are given in feet ('). The sign is 6' wide and 7.0' high. The text "Max 12" is at the top and "Minot 38" is at the bottom. The sign is mounted on a post. Dimensions are given in feet (').

Dimensions are in inches tenths

Letter locations are panel edge to lower left corner

LETTER POSITION (X)

LENGTH	SIZE	SERIES
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Sign Details

US 83 & ND 37 Intersection



Dimensions are in inches tenths Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Expwy_Destination.ssl

Dimensions are in inches tenths Letter locations are panel edge to lower left corner

Dimensions are in inches tenths Letter locations are panel edge to lower left corner

Dimensions are in inches tenths Letter locations are panel edge to lower left corner



SYMBOL	X	Y	WID	HT	ANGLE
Seat Belt	7.2	7.5	9.7	15.0	0.0

Technical drawing of a rectangular sign with a black border. The sign features a white background with a black silhouette of a person wearing a seatbelt. Above the silhouette, the text "BUCKLE UP" is written in bold, black, sans-serif capital letters. Below the silhouette, the text "ITS THE LAW" is written in bold, black, sans-serif capital letters. The drawing includes various dimensions in feet and inches:

- Overall width: 2' (24 inches)
- Overall height: 2'6" (30 inches)
- Top margin: 2.5" (3.0C)
- Bottom margin: 2.5" (3.0B)
- Left margin: 2.5" (3.0B)
- Right margin: 2.5" (3.0B)
- Text area height: 15.0"
- Text area width: 17.9"
- Sign thickness: 2.0" (3.0B)

Dimensions are in inches tenths Letter locations are panel edge to lower left corner

[illegible]

US 83 & ND 37 Intersection



Special Assembly A
Sta 8423+77 rt (EX83)
Pay Area=25.8

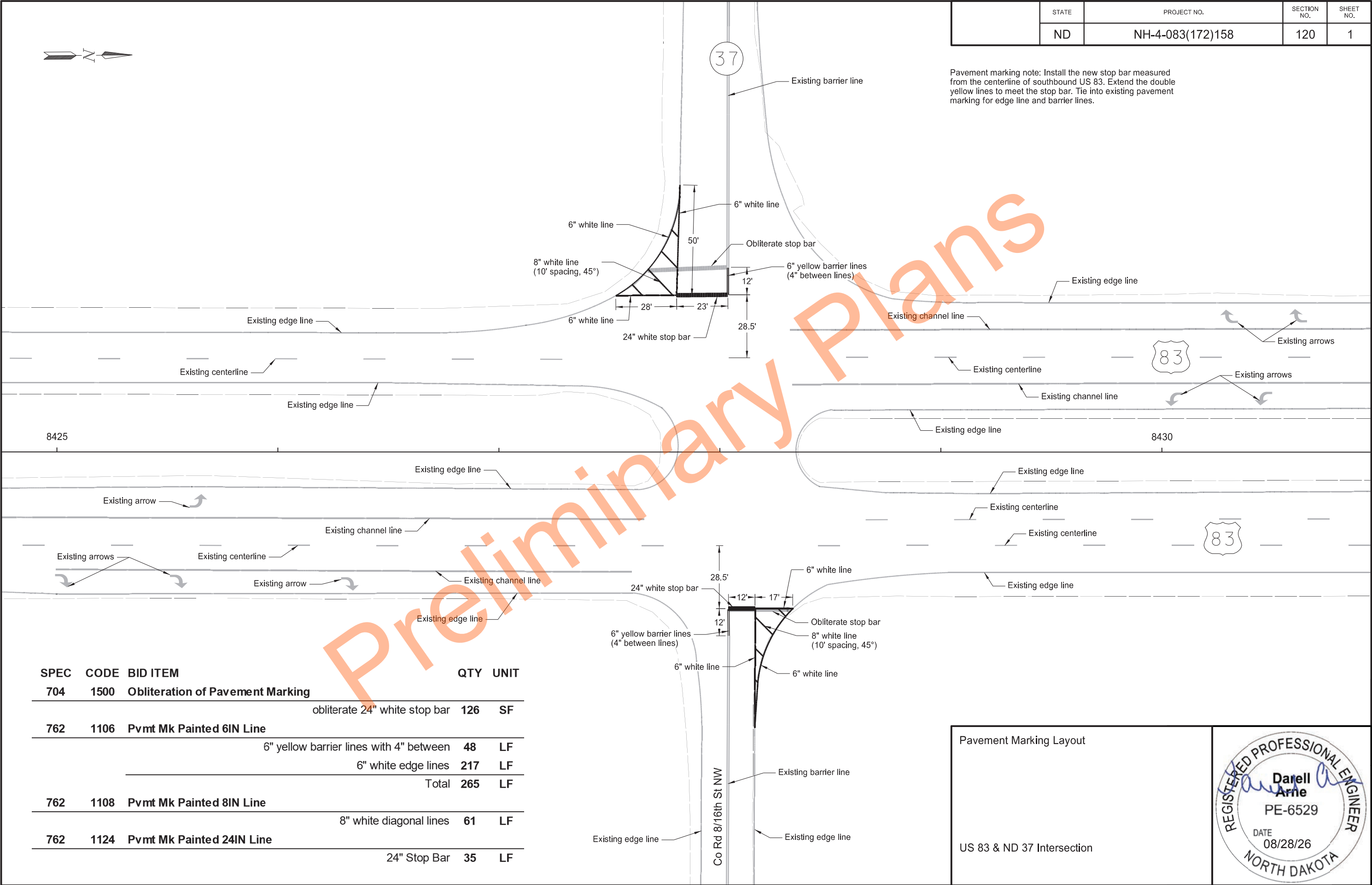
Special Assembly B
Sta 8432+23 It (EX83)
Pay Area=25.8

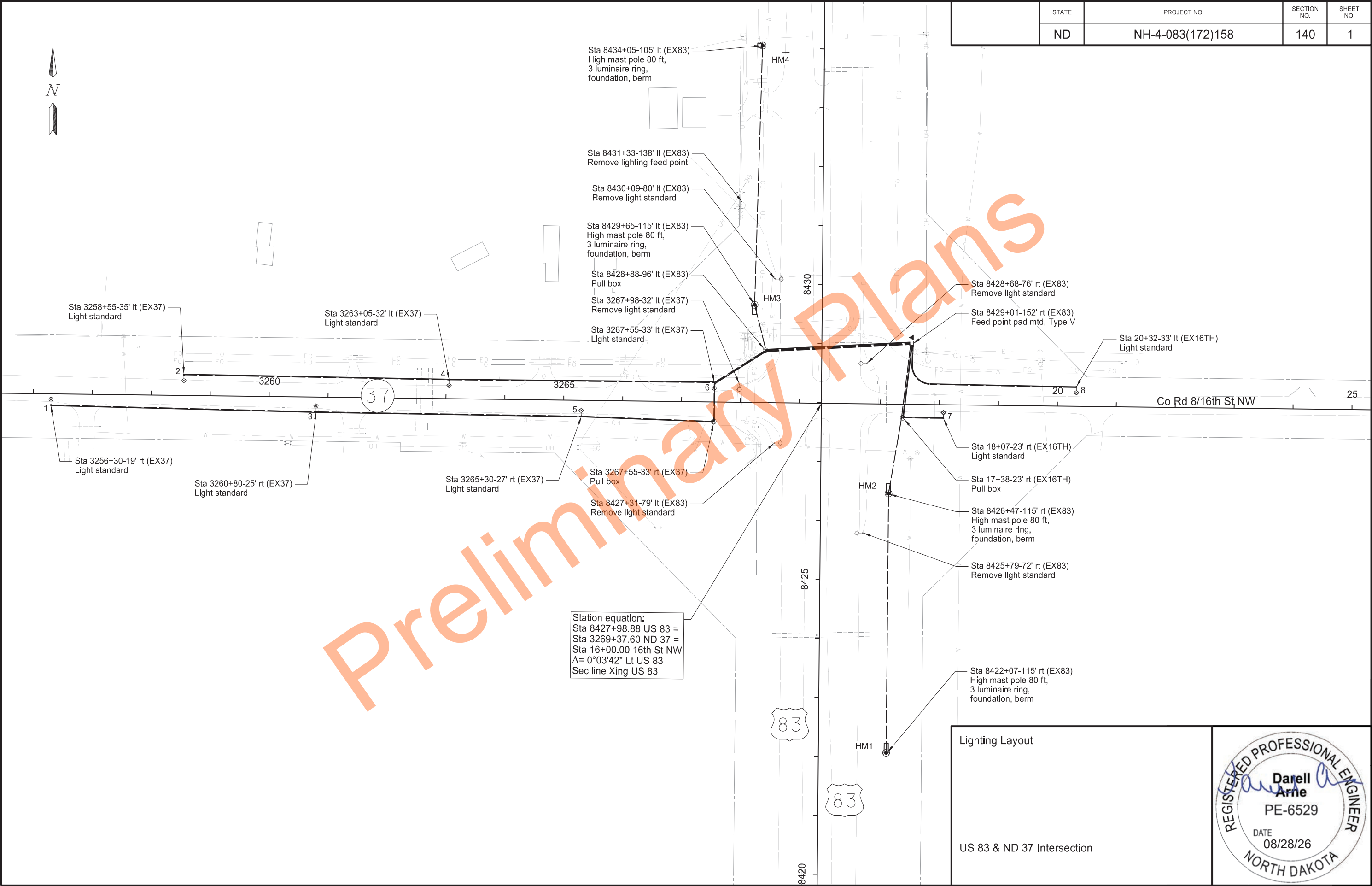
Special Assembly C
Sta 8419+77 rt (EX83)
Sta 8436+23 lt (EX83)
Pay Area=8.4 SF

Special Assembly

US 83 & ND 37 Intersection







Remove Lighting System - Quantities (A)		
Remove 40' Light Std and Mast Arm	EA	5
Remove Concrete Foundation	EA	5
Remove Feed Point	EA	1

Conventional Lighting Quantities (B)		
Description	Unit	Qty
Pull Box	EA	3
2 Inch Diameter Rigid Conduit	LF	2801
3 Inch Diameter Rigid Conduit	LF	331
Underground Conductor No 6 Type RHW	LF	6884
Underground Conductor No 6 Type THW	LF	3442
Light Std 8' MA 42' Pole Breakaway	EA	8
Concrete Foundation - Highway Lighting	EA	8
LED Luminaire	EA	8

Lighting Cable & Conduit Runs - Circuit 1						
Run		Conduit		Cable		
No	Station	Size IN	LF	# of Cables	Size/Type	LF
FP	8429+01-152' rt (EX83) to	3	258	2	Underground Conductor No 6-Type RHW	522
PB	8428+88-96' lt (EX83)			1	Underground Conductor No 6-Type THW	261
PB	8428+88-96' lt (EX83) to	2	104	2	Underground Conductor No 6-Type RHW	218
6	3267+55-33' lt (EX37)			1	Underground Conductor No 6-Type THW	109
6	3267+55-33' lt (EX37) to	2	67	2	Underground Conductor No 6-Type RHW	144
PB	3267+55-33' rt (EX37)			1	Underground Conductor No 6-Type THW	72
PB	3267+55-33' rt (EX37) to	2	229	2	Underground Conductor No 6-Type RHW	468
5	3265+30-27' rt (EX37)			1	Underground Conductor No 6-Type THW	234
5	3265+30-27' rt (EX37) to	2	454	2	Underground Conductor No 6-Type RHW	916
3	3260+80-25' rt (EX37)			1	Underground Conductor No 6-Type THW	458
3	3260-80-25' rt (EX37) to	2	454	2	Underground Conductor No 6-Type RHW	916
1	3256+30-19' rt (EX37)			1	Underground Conductor No 6-Type THW	458

Lighting Cable & Conduit Runs - Circuit 2						
Run		Conduit		Cable		
No	Station	Dia IN	LF	# of Cables	Size/Type	LF
FP	8429+01-152' rt (EX83) to		(C)	2	Underground Conductor No 6-Type RHW	522
PB	8428+88-96' lt (EX83)			1	Underground Conductor No 6-Type THW	261
PB	8428+88-96' lt (EX83) to	2	104	2	Underground Conductor No 6-Type RHW	218
6	3267+55-33' lt (EX37)			1	Underground Conductor No 6-Type THW	109
6	3267+55-33' lt (EX37) to	2	454	2	Underground Conductor No 6-Type RHW	916
4	3263+05-32' lt (EX37)			1	Underground Conductor No 6-Type THW	458
4	3263+05-32' lt (EX37) to	2	454	2	Underground Conductor No 6-Type RHW	916
2	3258+55-35' lt (EX37)			1	Underground Conductor No 6-Type THW	458

Light Standard Foundation Table				
Height FT	Footing Depth FT			
	24 IN Dia	30 IN Dia	36 IN Dia	42 IN Dia
40-42	6	6	5	5

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-083(172)158	140	2

SPEC	CODE	BID ITEM	QTY	UNIT
770	0001	Lighting System	1	EA
770	4567	Remove Lighting System	1	EA

(A) Include these quantities in the price bid for "Remove Lighting System."

(B) Include these quantities in the price bid for "Lighting System."

(C) This conduit was installed on a previous run.

Lighting Cable & Conduit Runs - Circuit 3						
Run		Conduit		Cable		
No	Station	Dia IN	LF	# of Cables	Size/Type	LF
FP	8429+01-152' rt (EX83) to	2	342	2	Underground Conductor No 6-Type RHW	688
8	20+32-33' lt (EX16TH)			1	Underground Conductor No 6-Type THW	344
FP	8429+01-152' rt (EX83) to	2	139	2	Underground Conductor No 6-Type RHW	284
PB	17+38-23' rt (EX16TH)			1	Underground Conductor No 6-Type THW	142
PB	17+38-23' rt (EX16TH) to	3	73	2	Underground Conductor No 6-Type RHW	156
7	18+07-23' rt (EX16TH)			1	Underground Conductor No 6-Type THW	78

Light Standard List								
No	Station	Circuit	Light Distribution Type	Wattage	Pole Height FT	Mast Arm FT	Break-away Pole	House Side Shield
1	3256+30-19' rt (EX37)	1	2	100-120	42	8	X	
2	3258+55-35' lt (EX37)	2	2	100-120	42	8	X	
3	3260+80-25' rt (EX37)	1	2	100-120	42	8	X	
4	3263+05-32' lt (EX37)	2	2	100-120	42	8	X	
5	3265+30-27' rt (EX37)	1	2	100-120	42	8	X	
6	3267+55-33' lt (EX37)	2	2	100-120	42	8	X	180°
7	18+07-23' rt (EX16TH)	3	2	100-120	42	8	X	
8	20+32-33' lt (EX16TH)	3	2	100-120	42	8	X	

Lighting Quantities

US 83 & ND 37 Intersection



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-083(172)158	140	3

High Mast Cable and Conduit Runs - Circuit 4						
No	Station	Conduit Runs		Cable Trench	Cable Runs	
		Dia IN	LF	LF	LF	Type
FP PB	8429+01-152' rt (EX83) to 17+38-23' rt (EX16TH)		(A)	70	142	3 No. 4, 1 No. 6 USE
PB HM2	17+38-23' rt (EX16TH) to 8426+47-115' rt (EX83)			128	143	3 No. 4, 1 No. 6 USE
HM2 HM1	8426+47-115' rt (EX83) to 8422+07-115' rt (EX83)			380	460	3 No. 4, 1 No. 6 USE

High Mast Cable and Conduit Runs - Circuit 5						
No	Station	Conduit Runs		Cable Trench	Cable Runs	
		Dia IN	LF	LF	LF	Type
FP PB	8429+01-152' rt (EX83) to 8428+88-96' lt (EX83)		(A)	(B)	261	3 No. 4, 1 No. 6 USE
PB HM3	8428+88-96' lt (EX83) to 8429+65-115' lt (EX83)			78	93	3 No. 4, 1 No. 6 USE
HM3 HM4	8429+65-115' lt (EX83) to 8434+05-105' lt (EX83)	2	70	370	460	3 No. 4, 1 No. 6 USE

SPEC	CODE	BID ITEM	QTY	UNIT
770	0220	Cable Trench-Type II		
		various locations (see Cable and Conduit Runs chart)	LF	1026
770	0330	2 Inch Diameter Rigid Conduit		
		various locations (see Cable and Conduit Runs chart)	LF	70
770	0464	Multiple Underground Cable 3 No. 4, 1 No. 6 Style USE		
		various locations (see Cable and Conduit Runs chart)	LF	1559
770	0750	Feed Point-Type V Pad Mounted		
			EA	1
770	3720	High Mast Lighting Assembly Type HM - 80-3		
			EA	4
770	3790	Portable Power Unit		
			EA	2
770	4280	LED Luminaire-High Mast		
			EA	12

(A) This conduit was installed on a previous run.
(B) This trench is on a previous table.

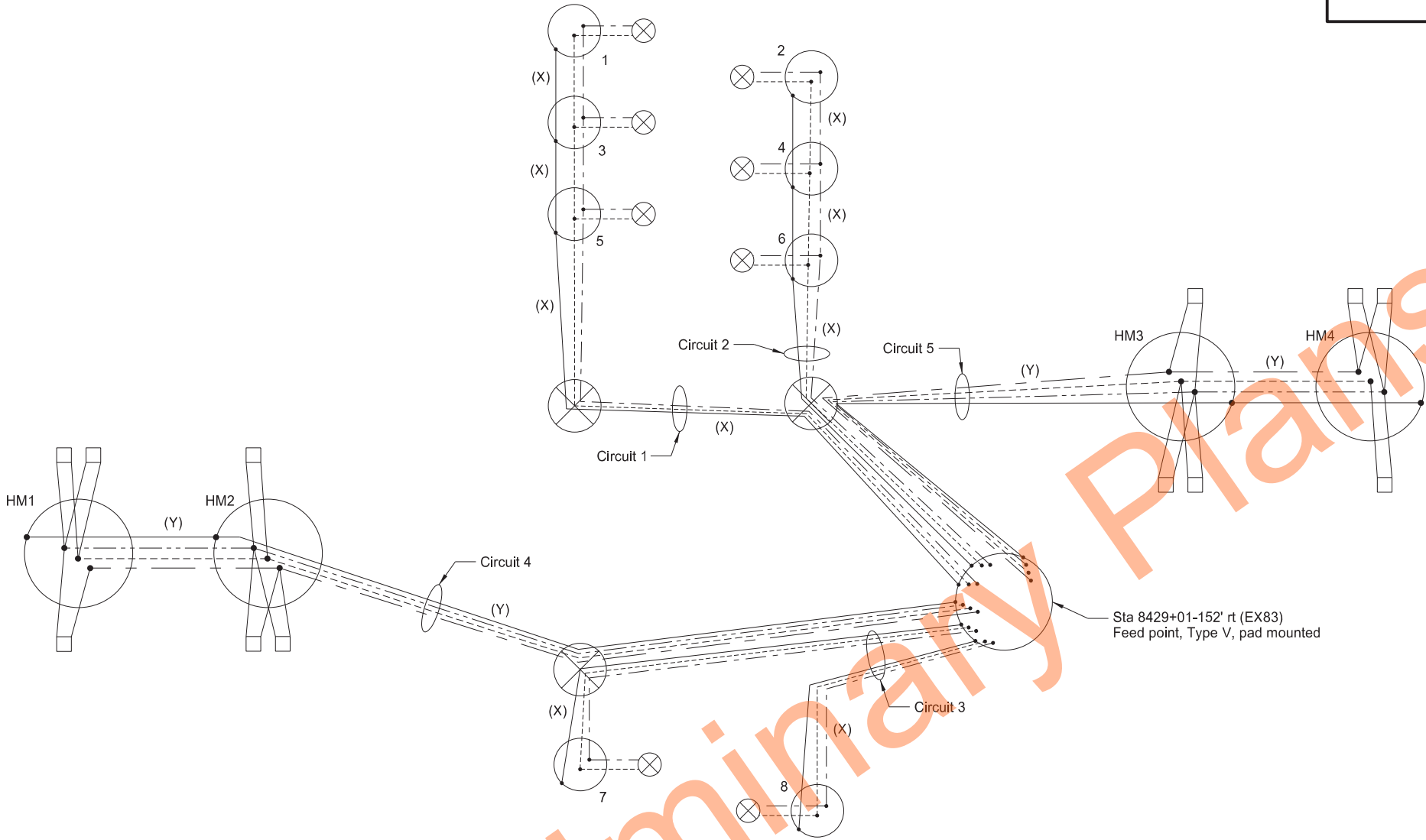
High Mast Light Standards List							
No	Station	High Mast Number	Circuit	Pole Height FT	Luminaires per pole	Light Distribution	House Side Shield
HM1	8422+07-115' rt (EX83)	HM 0083-159.520 R	4	80	3	Asymmetric Wide/Type III	
HM2	8426+47-115' rt (EX83)	HM 0083-159.603 R	4	80	3	Asymmetric Wide/Type III	
HM3	8429+65-115' lt (EX83)	HM 0083-159.663 L	5	80	3	Asymmetric Wide/Type III	180°
HM4	8434+05-105' lt (EX83)	HM 0083-159.747 L	5	80	3	Asymmetric Wide/Type III	

Lighting Quantities

US 83 & ND 37 Intersection



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	ND	NH-4-083(172)158	140	4



LEGEND

HM1	High Mast Light standard number				
1	Light standard number				
---	Phase conductor	⊗	LED luminaire 120v x 240v operated on 240v	○	Feed Point
---	Phase conductor				
- - - - -	Neutral conductor	○	Light Standard	⊗	Pull Box
---	Ground conductor				
(X)	Underground Conductor (2) No 6 RHW & (1) No 6 THW	□	LED High Mast Luminaire 240v x 480v operated on 240v		
(Y)	3 No. 4, 1 No. 6 Style USE				

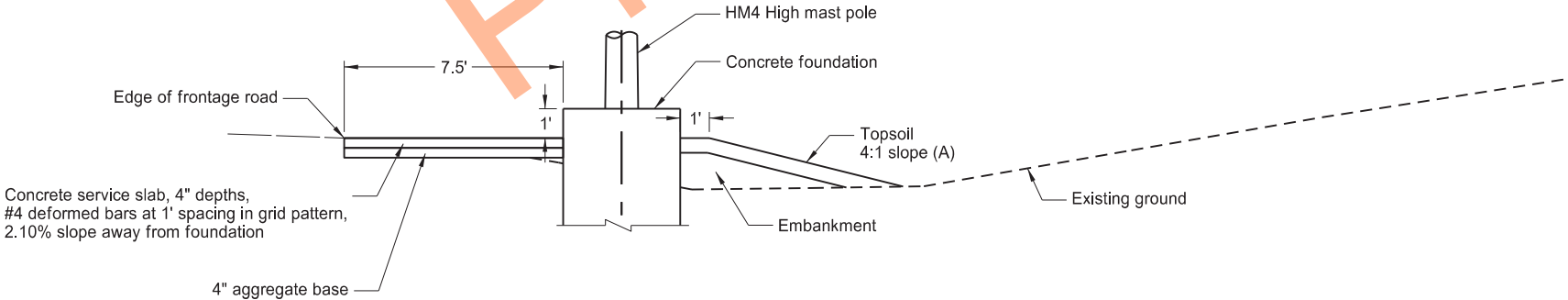
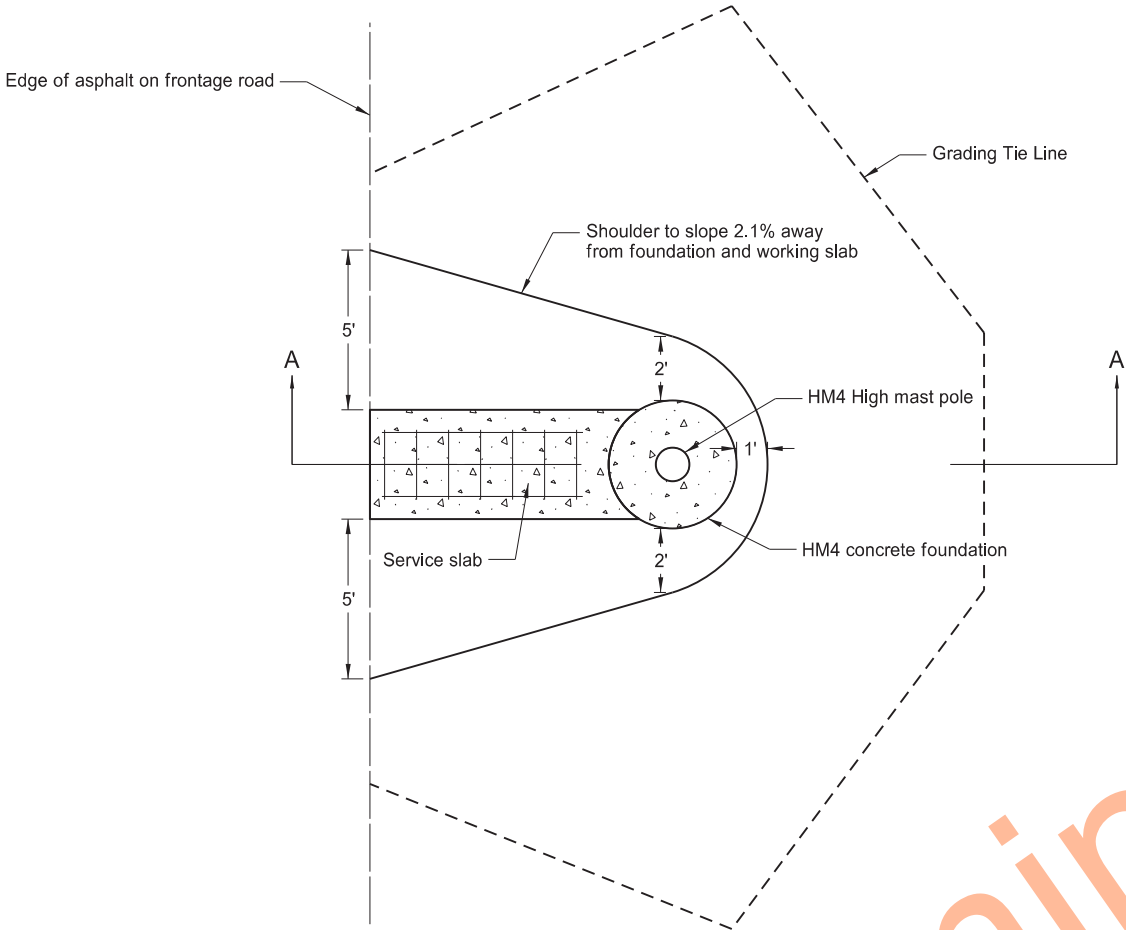
Lighting Schematic

US 83 & ND 37 Intersection



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-083(172)158	140	5

Note: Use this detail for HM4. Ensure the water drains properly around HM4 berm area.
For the other high mast berms use standard drawing D-770-10.



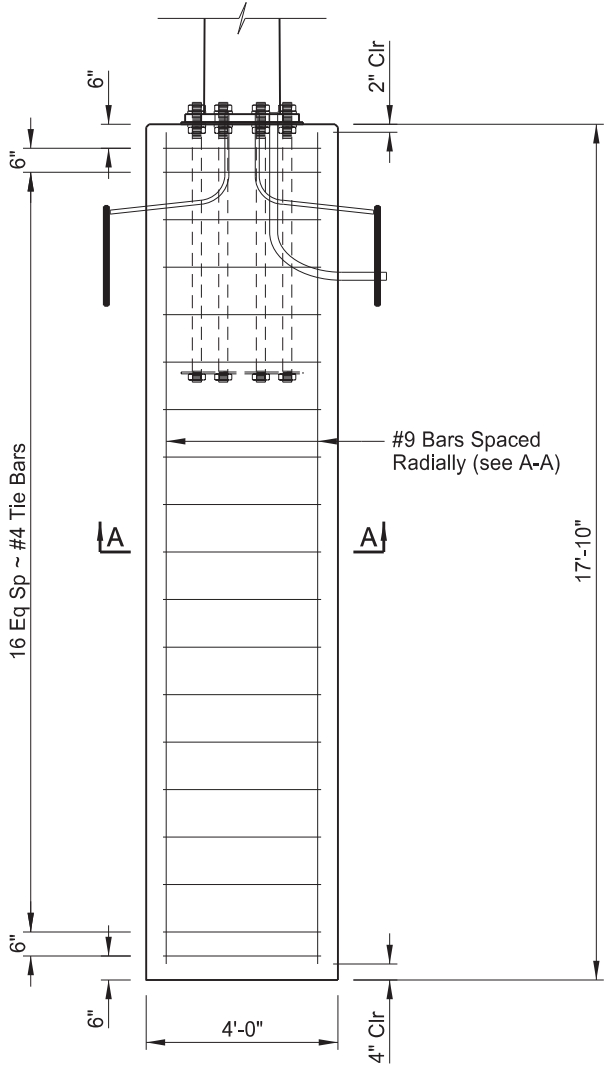
High Mast Berm Details

US 83 & ND 37 Intersection

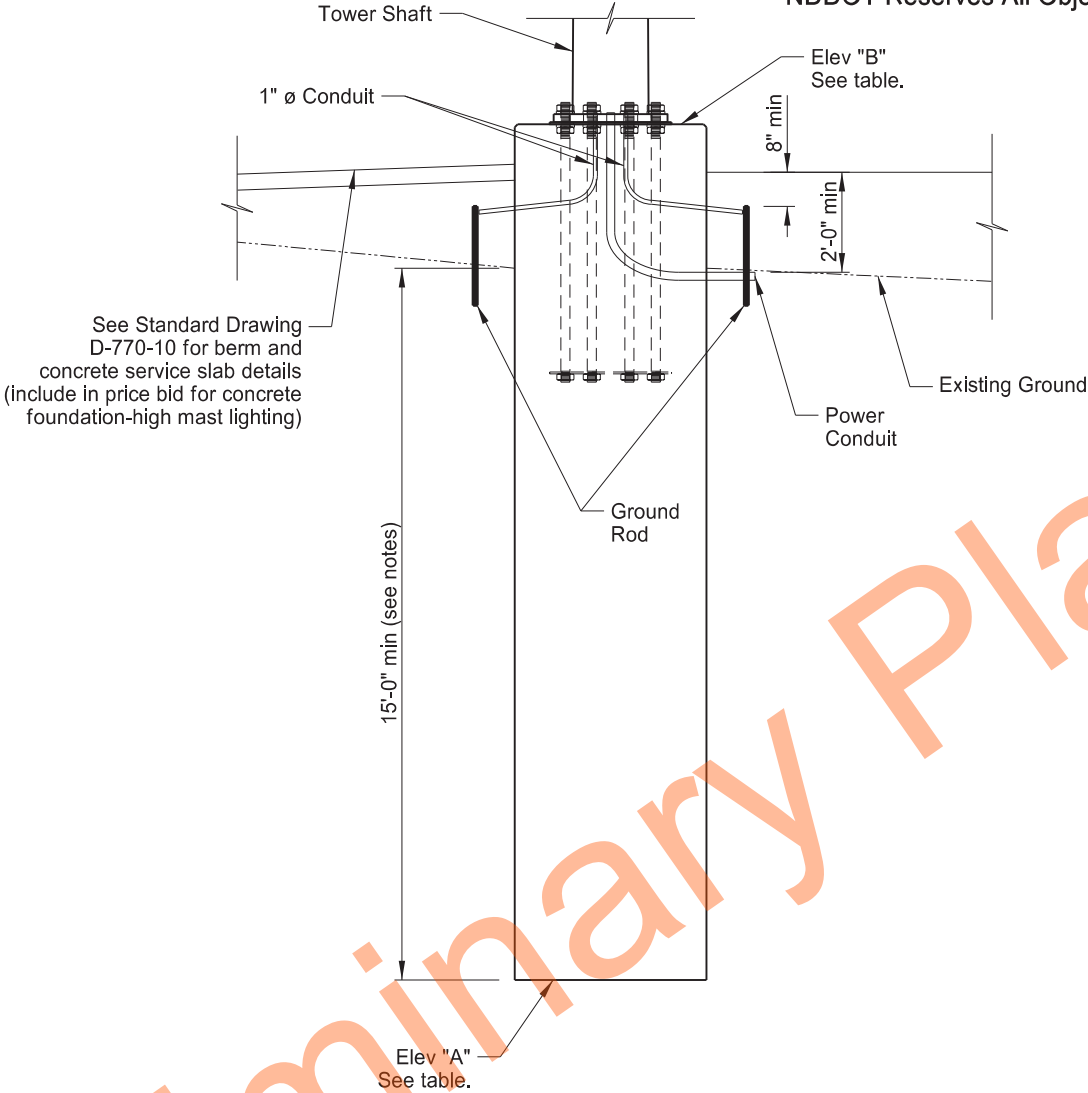


23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

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	ND	NH-4-083(172)158	140	6



DRILLED SHAFT ELEVATION



NOTES:

Include the concrete, reinforcing steel, excavation and labor required to build the foundation in the bid item "Concrete Foundation-High Mast Lighting."

High mast light tower and anchor rod system to be designed and furnished by the manufacturer of the high mast lighting.

Furnish and install preformed joint filler between the foundation and service slab. Seal the joint between the foundation and service slab with silicone sealant.

Estimated quantities (one 17'-10" foundation and service slab)

Class AE Concrete	9.7 CY
*Reinforcing Steel	1,120 LBS

*Includes wire fabric.

Provide 3/4" chamfer on the exposed top edge of the foundation.

Position foundation conduits inside the anchor rod assembly. Cap ends until cables are installed.

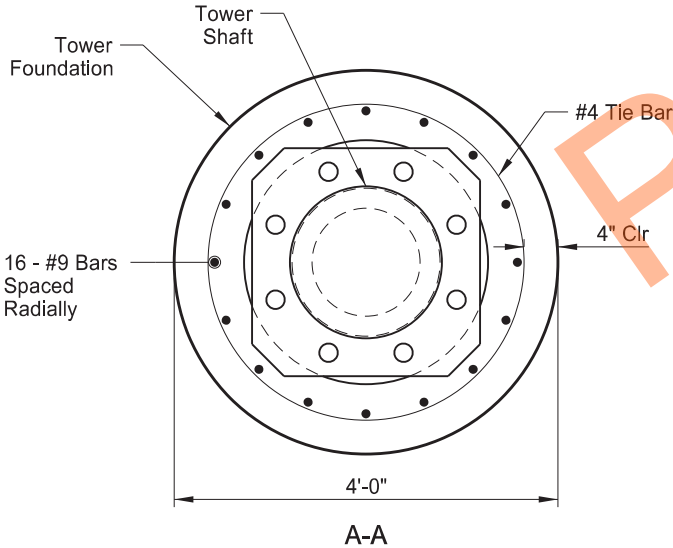
Allow the foundation to cure for at least 7 days before installing poles.

Concrete forms are required for the length of foundation above existing ground.

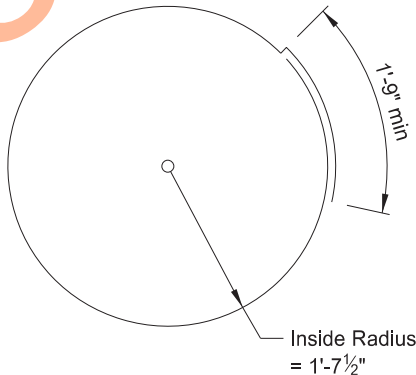
Station & Offset is to the center of the drilled shaft foundation.

The bottom of the drilled shaft foundation is required to reach elevation "A" listed in the table. Provide 15'-0" minimum drilled shaft embedment into existing ground. Field verify existing ground elevations prior to beginning drilled shaft construction. Contact the Engineer if adjustments to drilled shaft length or elevations are required.

HIGH MAST LIGHTING FOUNDATION US 83 STATIONING				
NO.	STATION/OFFSET	POLE HEIGHT	ELEV "A"	ELEV "B"
HM-1	8422+07 - 115' Rt	80'	1900'	1917.8333'
HM-2	8426+47 - 115' Rt	80'	1900'	1917.8333'
HM-3	8429+65 - 115' Lt	80'	1902'	1919.8333'
HM-4	8434+05 - 105' Lt	80'	1902'	1919.8333'



A-A



#4 TIE BAR

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
770	0030	CONCRETE FOUNDATION-HIGH MAST LIGHTING	EA	4



SPECIAL PROVISIONS	
SP 554(25)	DRILLED SHAFT FOUNDATIONS
US 83 & ND 37 INTERSECTION	
CONCRETE DRILLED SHAFT FOUNDATION HIGH MAST LIGHTING DETAILS	
DRAWING NO.	

NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.	C Gdrl	cable guardrail	Culv	culvert	FOS	factor of safety
Abn	abandoned	Calc	calculate	C&G	curb & gutter	Fed	Federal
Abut	abutment	CIP	cast iron pipe	CI	curb inlet	FP	feed point
Adj	adjusted	CB	catch basin	CR	curb ramp	Fn	fence
Aggr	aggregate	CRS	cationic rapid setting	C	cut	Fn P	fence post
Ahd	ahead	C Gd	cattle guard	Dd Ld	dead load	FO	fiber optic
ARV	air release valve	C To C	center to center	Defl	deflection	FD	field drive
Align	alignment	CL or $\varnothing$	centerline	Defm	deformed	F	fill
Al	alley	Ch	chain	DInt	delineate	FAA	fine aggregate angularity
Alt	alternate	Chnlk	chain-link	DIntr	delineator	FH	fire hydrant
Alum	aluminum	Ch Blk	channel block	Depr	depression	FI	flange
ADA	Americans with Disabilities Act	Ch Ch	channel change	Desc	description	Flrd	flared
&	and	Chk	check	Det	detail	FES	flared end section
Appr	approach	Chsld	chiseled	DWP	detectable warning panel	F Bcn	flashing beacon
Approx	approximate	Cir	circle	Dtr	detour	FA	flight auger sample
ACP	asbestos cement pipe	Cl	class	Dia or $\varnothing$	diameter	FL	flow line
Asph	asphalt	Clnt	clean-out	Dir	direction	Ftg	footing
AC	asphalt cement	Clr	clear	Dist	distance	FM	force main
Assmd	assumed	Cl&gr	clearing & grubbing	DM	disturbed material	Fnd	found
@	at	Comb.	combination	DB	ditch block	Fdn	foundation
Atten	attenuation	Coml	commercial	DG	ditch grade	Frac	fractional
ATR	automatic traffic recorder	Compr	compression	Dbl	double	Frwy	freeway
Ave	Avenue	CADD	computer aided drafting & design	Dn	down	Frt	front
Avg	average	Conc	concrete	Dwg	drawing	FF	front face
ADT	average daily traffic	CECB	concrete erosion control blanket	Dr	drive	F Disp	fuel dispenser
		Cond	conductor	Drwy	driveway	FFP	fuel filler pipes
		Const	construction	DI	drop inlet	FLS	fuel leak sensor
		Cont	continuous	D	dry density	Furn	furnish/ed
		CSB	continuous split barrel sample				
		Contr	contraction				
		Contr	contractor				
Bk	back	CP	control point	Ea	each		
BF	back face	Coord	coordinate	Esmt	easement		
Balc	balcony	Cor	corner	E	East		
B Wire	barbed wire	Corr	corrected	EB	Eastbound		
Barr	barricade	CAES	corrugated aluminum end section	Elast	elastomeric		
Btry	battery	CAP	corrugated aluminum pipe	EL	electric locker		
BI	beehive inlet	CMES	corrugated metal end section	E Mtr	electric meter		
Beg	begin	CMP	corrugated metal pipe	EVSE	electric vehicle supply equipment		
BG	below grade	CPVCP	corrugated poly-vinyl chloride pipe	Elec	electric/al		
BM	bench mark	CSES	corrugated steel end section	EDM	electronic distance meter		
Bkwy	bikeway	CSFES	corrugated steel flared end section	Elev or El	elevation		
Bit	bituminous	CSP	corrugated steel pipe	Ellipt	elliptical		
Blk	block	CSTES	corrugated steel traversable end section	Emb	embankment		
BH	bore hole	Co	County	Emuls	emulsion/emulsified		
Bot	bottom	Crse	course	ES	end section		
Blvd	Boulevard	Ct	Court	Engr	engineer		
Bndry	boundary	Xarm	cross arm	ESS	environmental sensor station		
Brkwy	breakaway	Xbuck	cross buck	Eq	equal		
Br	bridge	Xsec	cross sections	Evgr	evergreen		
Bldg	building	Xing	crossing	Exc	excavation		
Bus.	business	Xrd	crossroad	Exst	existing		
BV	butterfly valve	Crn	crown	Exp	expansion		
Byp	bypass			Expy	Expressway		
				E	external of curve		
				Extru	extruded		

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REVISIONS	
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04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions
04-14-25	General Revisions



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04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions
04-14-25	General Revisions

NDDOT ABBREVIATIONS

D-101-3

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

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08-16-22	General Revisions
04-14-25	General Revisions



NDDOT ABBREVIATIONS

D-101-4

MEASUREMENTS

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

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

SURVEY DESCRIPTIONS

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

SOIL TYPES

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

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12-18-20	Sheet Added
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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM
ACCENT
AGASSIZ WU
AGC
ALL PL
ALL SEAS WU
AMOCO PI
AMRDA HESS
AT&T
B PAW
BAKER ELEC
BASIN ELEC
BEK TEL
BELLE PL
BLM
BNSF
BOEING
BRNS RWD
BURK-DIV ELEC
BURL WRD
CABLE ONE
CABLE SERV
CAP ELEC
CASS CO ELEC
CASS RWU
CAV ELEC
CBLCOM
CENEX PL
CENT PL WATER DIST
CENT PWR ELEC
CENTURYLINK
COE
CONS COMM
CONS TELCOM
CONT RES
CPR
D O E
DAK CARR
DAK CENT TEL
DAK RWD
DGC
DICKY R NET
DICKY WRD
DICKY TEL
DNRR
DOME PL
DVELEC
DVMW
E CENT REG WD
ENBRDG
ENVENTIS
EQUINOR
FALK MNG
FHWA
G FKS-TRL WD
GETTY TRD & TRAN
GLDN W ELEC

702 Communications
Accent Communications
Agassiz Water Users District
Associated General Contractors of America
Alliance Pipeline
All Seasons Water Users District
Amoco Pipeline Company
Amerada Hess Corporation
AT&T Corporation
Bear Paw Energy Incorporated
Baker Electric
Basin Electric Cooperative Incorporated
Bek Communications Cooperative
Belle Fourche Pipeline Company
Bureau of Land Management
Burlington Northern Santa Fe Railway
Boeing
Barnes Rural Water District
Burke-Divide Electric Cooperative
Burleigh County Water Resource District
Cable One
Cable Services
Capital Electric Cooperative Incorporated
Cass County Electric Cooperative
Cass Rural Water Users District
Cavalier Rural Electric Cooperative
Cablecom Of Fargo
Cenex Pipeline
Central Pipe Line Water District
Central Power Electric Cooperative
CenturyLink
Corps of Engineers
Consolidated Communications
Consolidated Telcom
Continental Resource Inc
Canadian Pacific Railway
Department Of Energy
Dakota Carrier Network
Dakota Central Telephone
Dakota Rural Water District
Dakota Gasification Company
Dickey Rural Networks
Dickey County Water Resource District
Dickey Telephone
Dakota Northern Railroad
Dome Pipeline Company
Dakota Valley Electric Cooperative
Dakota, Missouri Valley & Western
East Central Water District
Enbridge Pipelines Incorporated
Enventis Telephone
Equinor Pipeline
Falkirk Mining Company
Federal Highway Administration
Grand Forks-traill Water District
Getty Trading & Transportation
Golden West Electric Cooperative

GTR RAMSEY WD
GT PLNS NAT GAS
HALS TEL
IDEA1
INT-COMM TEL
KANEB PL
KEM ELEC
KOCH GATH SYS
LKHD PL
LWR YELL R ELEC
LUMEN
MCKNZ CON
MCKNZ ELEC
MCKNZ WRD
MCLEOD
MCLN ELEC
MCLN-SHRDN R WAT
MDU
MIDCO
MIDSTATE TEL
MINOT CABLE
MINOT TEL
MISS VALL COMM
MISS W W S
MINKOTA PWR
MOR-GRAN-SOU ELEC
MOUNT-WILLI ELEC
MLGC
MUNICIPAL
MUNICIPAL
N CENT ELEC
N PRAIR REG WD
ND PKS & REC
ND TEL
NDDOT
NE REG WD
NDSU SOIL SCI DEPT
NEMONT TEL
NODAK R ELEC
NOON FRMS TEL
NPR
NSP
NTHN BRDR PL
NTHN PLNS ELEC
NTHWSTRN REF
NW COMM
NWRWD
ONEOK
OSHA
OTTR TL PWR
PAAP
P L E M
POLAR COM
PVT ELEC
QWEST
R&T REG WD

Greater Ramsey Water District
Great Plains Natural Gas Company
Halstad Telephone Company
Idea1
Inter-Community Telephone Company
Kaneb Pipeline Company
Kem Electric Cooperative Incorporated
Koch Gathering Systems Incorporated
Lakehead Pipeline Company
Lower Yellowstone Rural Electric
Lumen Technologies Incorporated
McKenzie Consolidated Telcom
McKenzie Electric Cooperative
McKenzie County Water Resource District
McLeod USA
McLean Electric Cooperative
McLean-Sheridan Rural Water District
Montana-dakota Utilities
MidContinent Communications
Midstate Telephone Company
Minot Cable Television
Minot Telephone Company
Missouri Valley Communications Incorporated
Missouri West Water System
Minnkota Power
Mor-gran-sou Electric Cooperative
Mountrail-williams Electric Cooperative
Moore & Liberty - Griggs County
City Water And Sewer
City Of '.....'
North Central Electric Cooperative
North Prairie Regional Water District
North Dakota Parks And Recreation
North Dakota Telephone Company
North Dakota Department of Transportation
Northeast Regional Water District
NDSU Soil Science Department
Nemont Telephone
Nodak Rural Electric Cooperative
Noonan Farmers Telephone Company
Northern Plains Railroad
Northern States Power
Northern Border Pipeline
Northern Plains Electric Cooperative Incorporated
Northwestern Refinery Company
Northwest Communication Cooperation
Northwest Rural Water District
Oneok gas
Occupational Safety and Health Administration
Otter Tail Power Company
Plains All American Pipeline
Praelandis Energy Marketing
Polar Communications
Private Electric
Qwest Communications
R & T Water District

RED RIV COMM
RESVTN TEL
ROBRTS TEL
R-RIDER ELEC
RRVW
S CENT REG WD
SE W U
SCOTT CABLE
SHERDN ELEC
SHEYN VLY ELEC
SKYTECH
SLOPE ELEC
SOURIS RIV TELCOM
ST WAT COMM
STATE LN WATER
STER ENG
STUT RWD
SW PL PRJ
SWWA
SUNOCO
T M C
TCI
TESORO GHG PLNS PL
TRI-CNTY WU
TRL CO WRD
UNTD TEL
UPPR SOUR WD
US SPRINT
USAF MSL CABLE
USFWS
USW COMM
VRNDRY ELEC
W RIV TEL
WAPA
WAWSA
WEB
WILLI WRD
WILSTN BAS PL
WLSH RWD
WOLVRTN TEL
XLENER
YSVR

Red River Communications
Reservation Telephone
Roberts Company Telephone
Roughrider Electric Cooperative
Red River Valley & Western Railroad
South Central Regional Water District
Southeast Water Users Incorporated
Scott Cable Television Dickinson
Sheridan Electric Cooperative
Sheyenne Valley Electric Cooperative
Skyland Technologies Incorporated
Slope Electric Cooperative Incorporated
Souris River Telecommunications
State Water Commission
State Line Water Cooperative
Sterling Energy
Stutsman Rural Water District
Southwest Pipeline Project
Southwest Water Authority
Sunoco LP
Turtle Mountain Communications
TCI of North Dakota
Tesoro High Plains Pipeline
Tri-County Water Users Incorporated
Traill County Water Resource District
United Telephone
Upper Souris Water District
U.S. Sprint
U.S.A.F. Missile Cable
US Fish and Wildlife Service
U.S. West Communications
Verendrye Electric Cooperative
West River Telephone Incorporated
Western Area Power Administration
Western Area Water Supply Authority
W. E. B. Water Development Association
Williams County Water Resource District
Williston Basin Interstate Pipeline Company
Walsh Water Rural Water District
Wolverton Telephone
Xcel Energy
Yellowstone Valley Railroad

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions
04-14-25	General Revisions



LINE STYLES

D-101-20

Existing Topography

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

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

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

	24 Inch Pipe
	Reinforced Concrete Pipe
	Under Drain
	Edge Drain

Traffic Utilities

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

Sign Structures

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups
12-18-20	General Revisions

LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

	Geotextile Fabric Type D
	Geogrid
	Geotextile Fabric Type R
	Geotextile Fabric Type R1
	Geotextile Fabric Type RR
	Geotextile Fabric Type S
	Subgrade Reinforcement
	Failure Line

Countours

	Depression Contours
	Supplemental Contour

Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

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

Erosion Control

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

Environmental

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups
12-18-20	General Revisions

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NORTH DAKOTA

12 18 2020

SYMBOLS

D-101-30

	North Arrow (Half Scale)		Existing Bush or Shrub		Continuous Split Barrel Sample
	Alignment Data Point		Existing Large Evergreen Tree		Flight Auger Sample
	Alignment Monument		Existing Small Evergreen Tree		Split Barrel Sample
	Spot Elevation		Existing Large Tree		Thinwall Tube Sample
	Existing Miscellaneous Spot		Existing Small Tree		Standard Penetration Test
	Existing Access Control Arrow		Existing Tree Trunk		Inclinometer Tube
	Existing Benchmark		Cairn or Stone Circle		Excavation Unit
	Reset USGS Marker		Existing Artifact		Existing Ground Water Well Bore Hole
	Iron Monument Found		Existing Satellite Dish		
	Iron Pin R/W Monument		Existing Weather Station		
	Property Corner		Existing Windmill or Tower		
	Iron Pin Reference Monument		Reinforced Pavement		
	Right of Way Marker (Exst, Ppsd, Reset)				
	Existing Federal Reference Corner				
	Existing Section Corner (Full, Quarter, Sixteenth, Meander)				
	Existing Witness Corner				
	Existing Control Point (CP, GPS-RTK, TRI)				
	Existing Traverse PI Aerial Panel				
	Existing Reference Marker Point NGS				
	Existing EFB Misc				

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

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NORTH DAKOTA

12 18 2020

SYMBOLS

D-101-31

	Flexible Delineator		Highway Sign (Exst, Ppsd)
 	Flexible Delineator Type A (Exst, Ppsd)	  	Mile Post Type A (Exst-Ppsd-Reset)
 	Flexible Delineator Type B (Exst, Ppsd)	 	Mile Post Type B (Exst, Ppsd)
 	Flexible Delineator Type C (Exst, Ppsd)	 	Mile Post Type C (Exst, Ppsd)
 	Flexible Delineator Type D (Exst, Ppsd)	 	Object Marker Type I (Exst, Ppsd)
 	Flexible Delineator Type E (Exst, Ppsd)	 	Object Marker Type II (Exst, Ppsd)
   	Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)	 	Object Marker Type III (Exst, Ppsd)
   	Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)		Existing Reference Marker
  	Delineator Type C (Exst, Ppsd, Diamond Grade)	 	Road Closure Gate 18 Ft (Exst, Ppsd)
  	Delineator Type D (Exst, Ppsd, Diamond Grade)	 	Road Closure Gate 28 Ft (Exst, Ppsd)
  	Delineator Type E (Exst, Ppsd, Diamond Grade)	 	Road Closure Gate 40 Ft (Exst, Ppsd)
  	Barricade (Type I, Type II, Type III)		Existing Railroad Battery Box
     	Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)		Existing RR Profile Spot
	Attenuation Device	 	Existing Railroad Crossbuck
	Truck Mounted Attenuator		Existing Railroad Frog
	Delineator Drums		Existing Mailbox (Private, Federal)
	Flagger		
	Tubular Marker		
	Traffic Cone		
	Back to Back Vertical Panel Sign		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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12-18-20	General Revisions



12 18 2020

SYMBOLS

D-101-32

	Existing Luminaire			High Mast Light Standard 3 Luminaire (Exst, Ppsd)		Existing Traffic Signal Standard
	Luminaire LED			High Mast Light Standard 4 Luminaire (Exst, Ppsd)		Pull Box (Exst-Ppsd-Undefined)
	Existing Light Standard Luminaire			High Mast Light Standard 5 Luminaire (Exst, Ppsd)		Intelligent Transportation Pull Box (Exst, Ppsd)
	Relocate Light Standard			High Mast Light Standard 6 Luminaire (Exst, Ppsd)		Transformer (Exst, Ppsd)
	Light Standard Light LED Luminaire			High Mast Light Standard 7 Luminaire (Exst, Ppsd)		Power Pole (Exst-Ppsd-with Transformer)
	Light Standard 35 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 8 Luminaire (Exst, Ppsd)		Wood Pole (Exst, Ppsd)
	Light Standard 50 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 9 Luminaire (Exst, Ppsd)		Pedestrian Push Button Post (Exst, Ppsd)
	Light Standard 70 Watt High Pressure Sodium Vapor Luminaire			High Mast Light Standard 10 Luminaire (Exst, Ppsd)		Existing Pole
	Light Standard 100 Watt High Pressure Sodium Vapor Luminaire			Overhead Sign Structure Load Center (Exst, Ppsd)		Existing Telephone Pole
	Light Standard 150 Watt High Pressure Sodium Vapor Luminaire			Traffic Signal Controller (Exst, Ppsd)		Existing Post
	Light Standard 200 Watt High Pressure Sodium Vapor Luminaire			Pad Mounted Traffic Signal Controller (Exst, Ppsd)		Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
	Light Standard 250 Watt High Pressure Sodium Vapor Luminaire			Flashing Beacon (Exst, Ppsd)		
	Light Standard 310 Watt High Pressure Sodium Vapor Luminaire			Concrete Foundation (Exst, Ppsd)		
	Light Standard 400 Watt High Pressure Sodium Vapor Luminaire			Pipe Mounted Flasher (Exst, Ppsd)		
	Light Standard 700 Watt High Pressure Sodium Vapor Luminaire			Pad Mounted Feed Point (Exst, Ppsd)		
	Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire			Pipe Mounted Feed Point with Pad (Exst, Ppsd)		
	Emergency Vehicle Detector			Pole Mounted Feed Point (Exst, Ppsd)		
	Video Detection Camera			Junction Box (Exst, Ppsd)		
				Existing Pedestrian Head with Number		
				Existing Signal Head		
				Pole Mounted Head		
				Existing Lighting Standard Pole		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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12-18-20	General Revisions



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions



12 18 2020

SYMBOLS

D-101-33

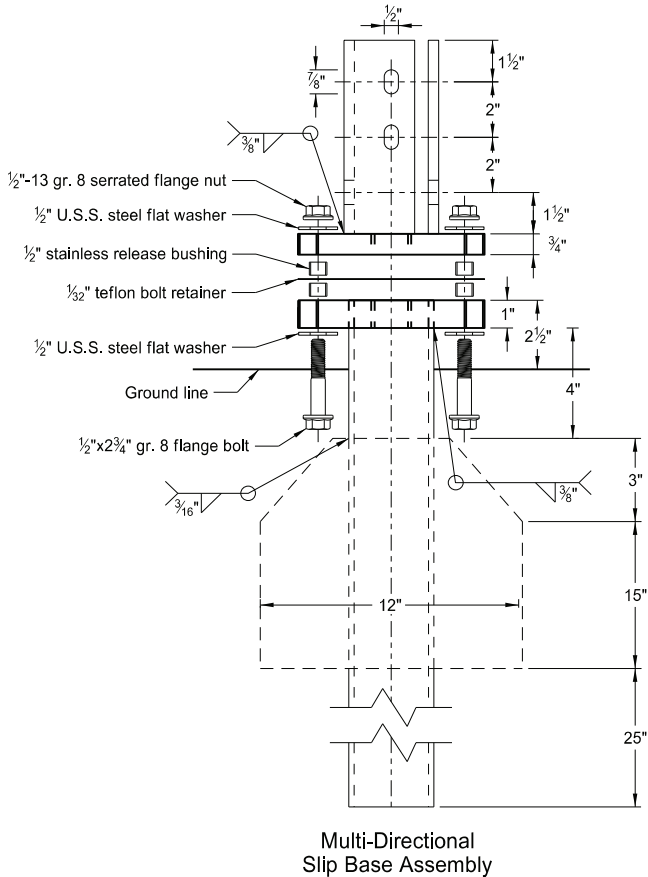
			Existing Manhole (Electrical, Gas, Telephone)		Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water
			Water Manhole (Exst, Exst with Valve)		Existing Pedestal Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined
			Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)		Existing Pipe Vent Gas, Fuel, Sanitary, Storm Drain, Water, Undefined
			Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)		Valve Exst Gas, Exst Water, Ppsd Water, Exst Undefined
			Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)		Pump Sanitary, Storm Drain, Exst Water
			Force Main Storm Drain Manhole (Exst, Exst with Valve)		Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)		Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Existing Water Appurtenance		Existing Utility Marker
			Sprinkler Head (Exst, Ppsd)		Existing Meter
			Fire Hydrant (Exst, Ppsd)		Existing Fuel Dispensers
			Cleanout (Exst Sanitary, Underdrain)		Existing Fuel Filler Pipes
			Existing Catch Basin Inlet (Round, Square)		Existing Fuel Leak Sensors
			Existing Curb Inlet (Round, Square)		
			Existing Slotted Reinforced Concrete Pipe		
			Catch Basin (Riser 30 Inch, Beehive, Type A)		
			Inlet Mountable Curb (Type A, Type B)		
			Inlet Saddle Base (Type 1, Type 2)		
			Inlet Special (Catch Basin, Type 1, Type A)		
			Inlet (Tee, Type 1, Type 2, Type 2 Double)		
			Median Drain		
			Headwall (Exst, Ppsd, Ppsd Single with Vegetation Barrier, Ppsd Double with Vegetation Barrier)		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32

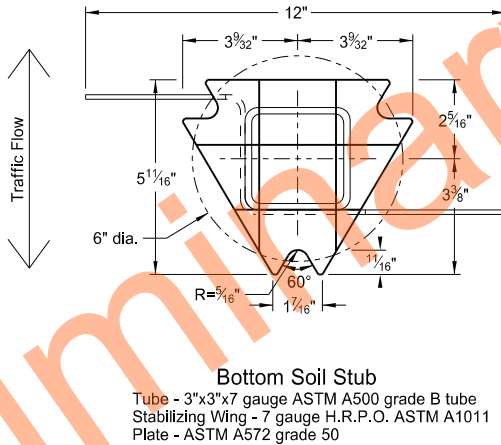
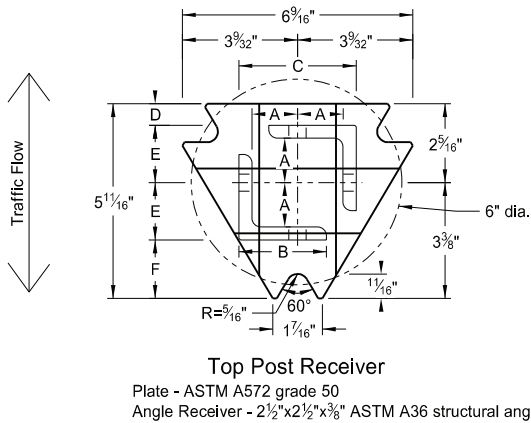
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NORTH DAKOTA
12 18 2020

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7



Perforated Tube



Notes:

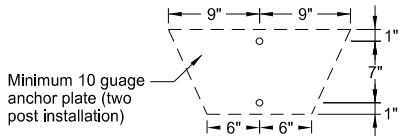
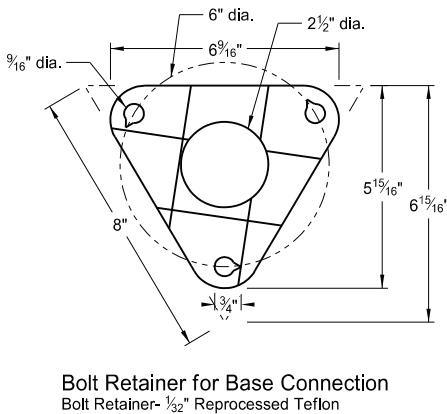
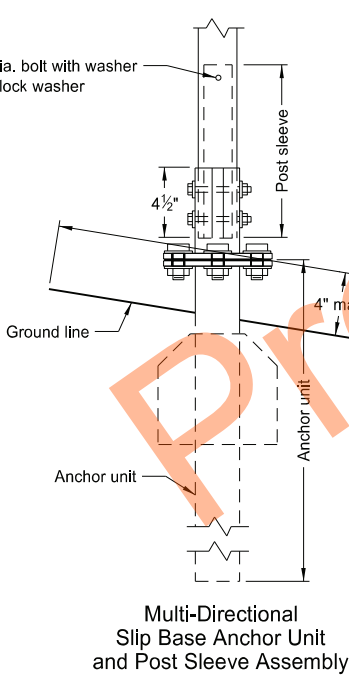
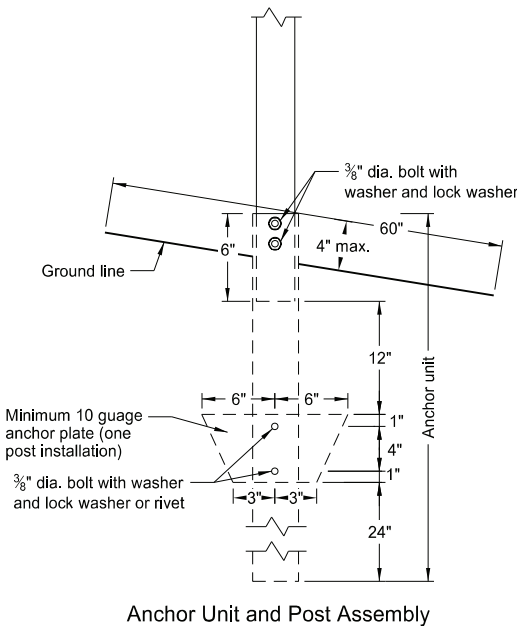
1. Torque slip base bolts as specified by manufacturer.
2. Use anchor with 43.9 KSI yield strength and 59.3 KSI tensile strength.
3. Provide 4" vertical clearance for anchor or breakaway base. Measure the 4"x60" measurement above and below post location and back and ahead of post.
4. In concrete sidewalk,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

Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	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. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

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

- (A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.
- (B) For additional wind load, insert the 2 3/16"x10 ga. into 2 1/2"x10 ga.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp
8-01-24	Electronic Stamp/Signature

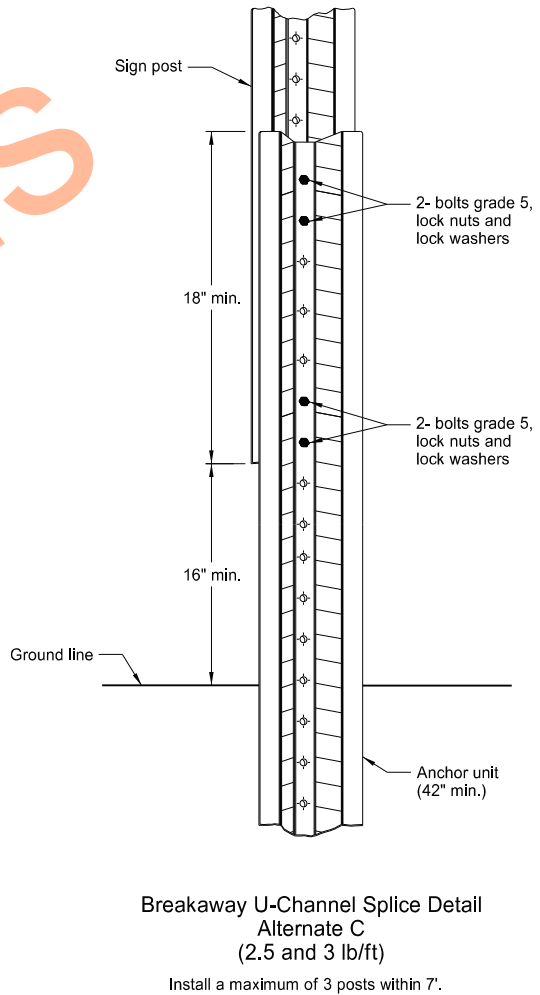
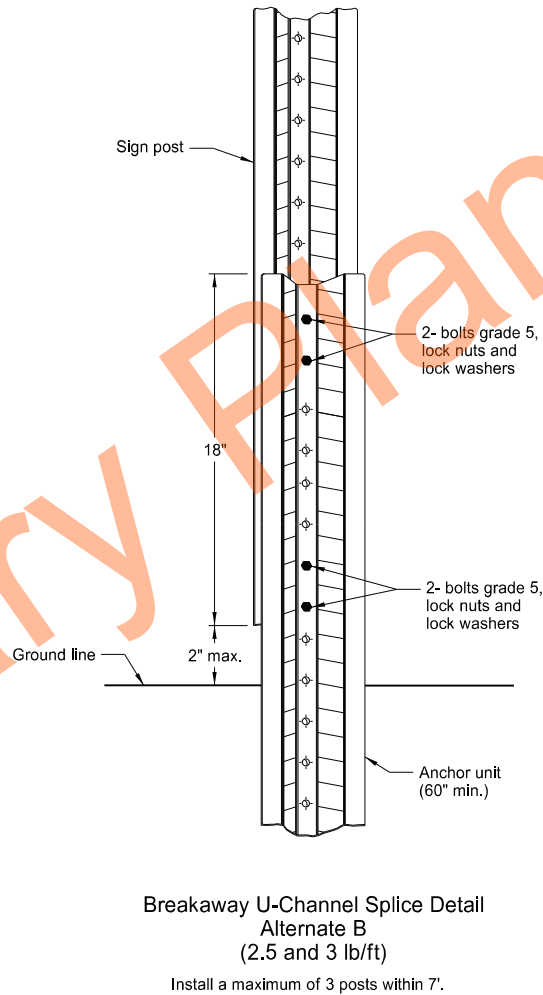
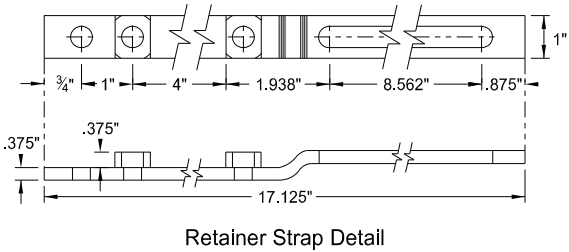
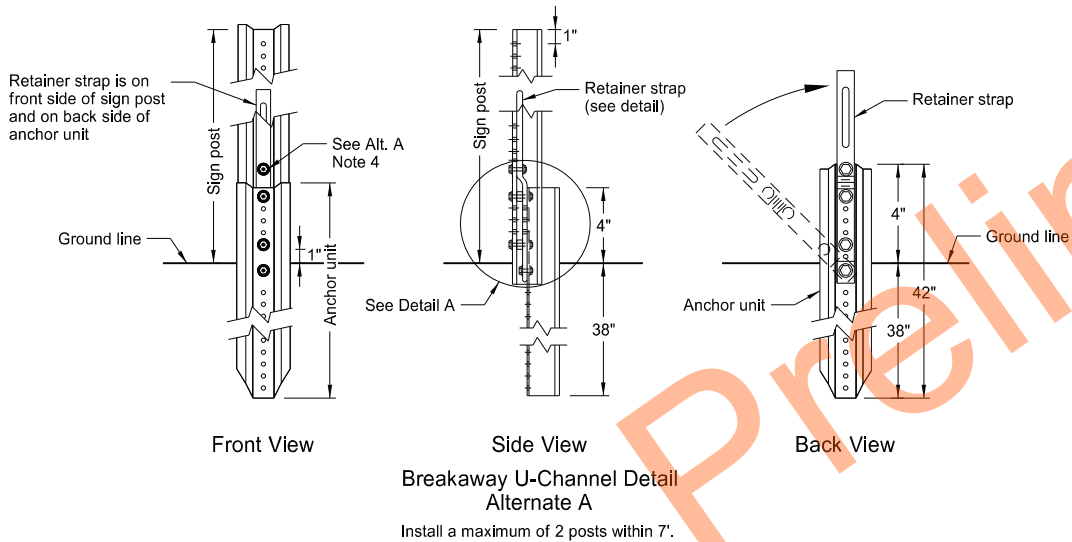
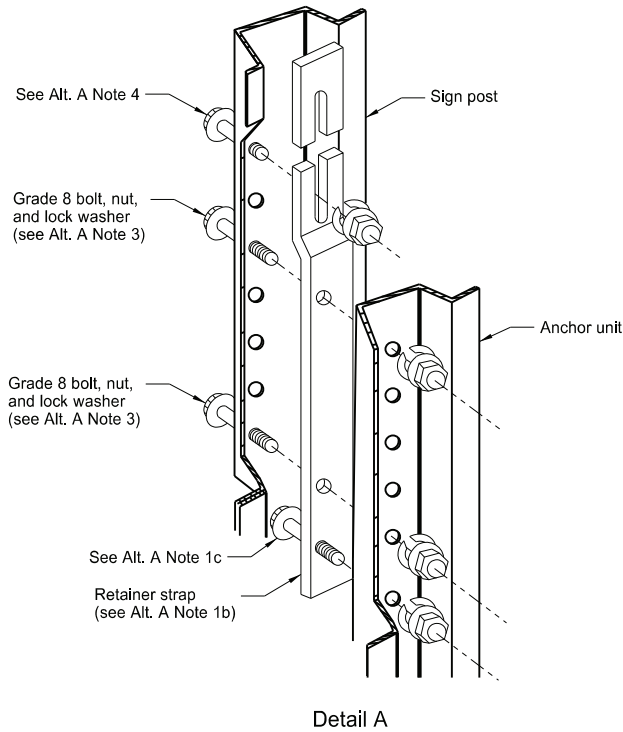


08/01/24

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



Alternate A Steps of Installation:

- Drive anchor unit to within 12" of ground level.
 - Establish proper assembly by lining up bottom hole of retainer strap with 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).
- Properly nest base post, strap, and sign post. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp
8-01-24	Electronic Stamp/Signature

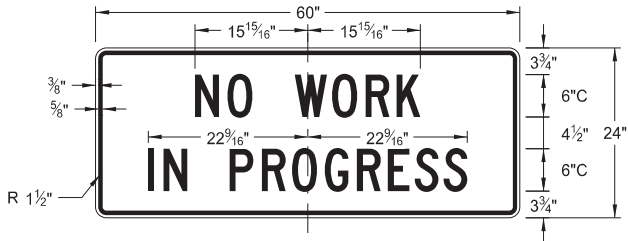


08/01/24

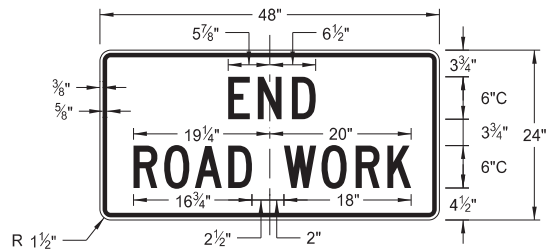
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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



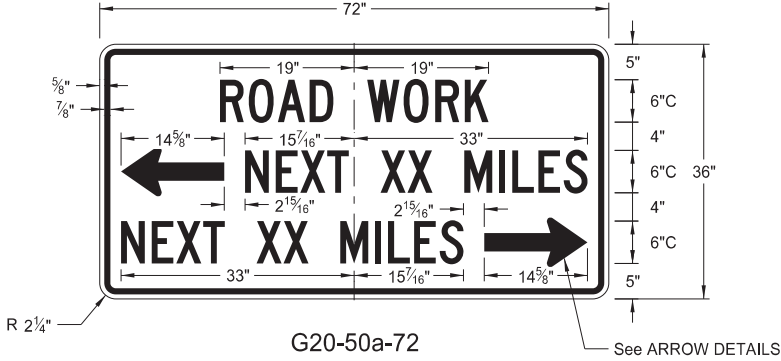
G20-1b-60
Legend: black (non-refl)
Background: orange



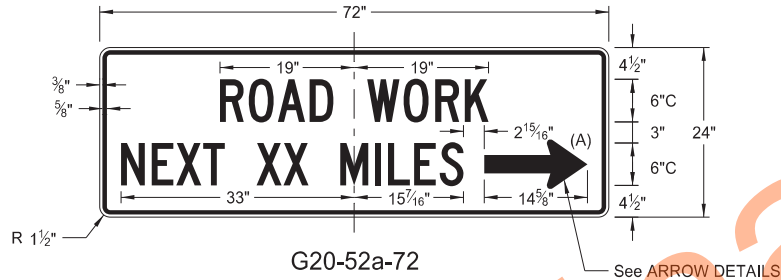
G20-2-48
Legend: black (non-refl)
Background: orange



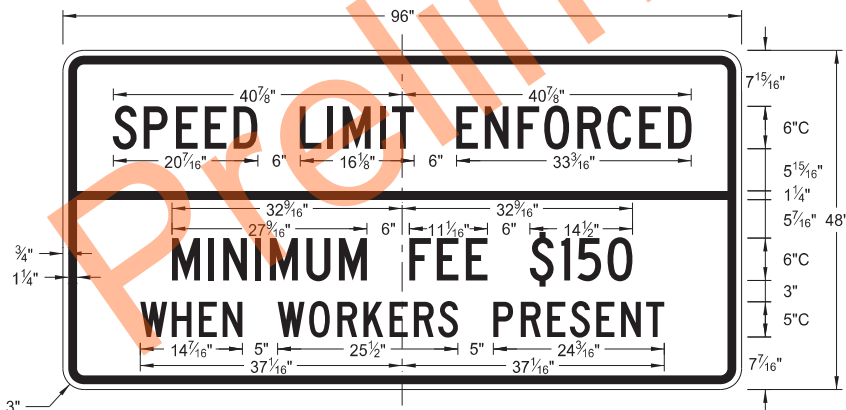
G20-4b-36
Legend: black (non-refl)
Background: orange



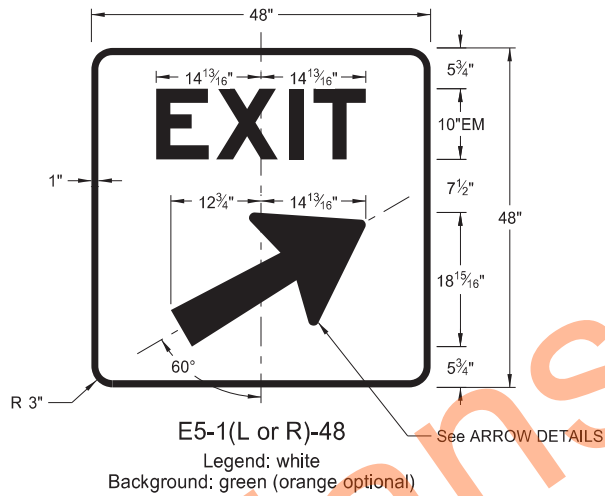
G20-50a-72
Legend: black (non-refl)
Background: orange



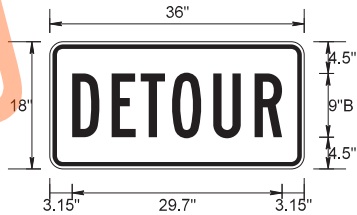
G20-52a-72
Legend: black (non-refl)
Background: orange



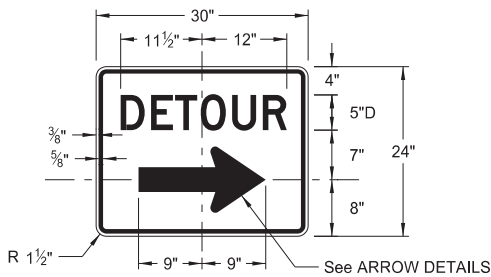
G20-55-96
Legend: black (non-refl)
Background: orange



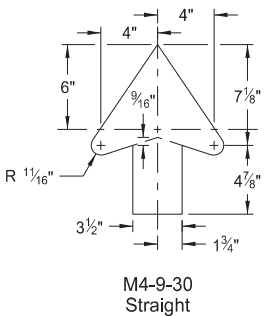
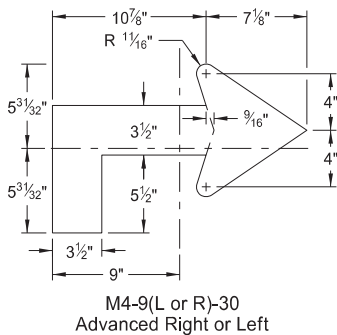
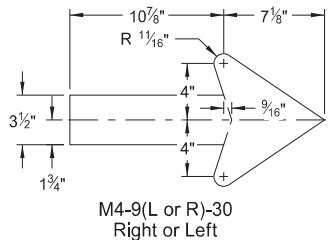
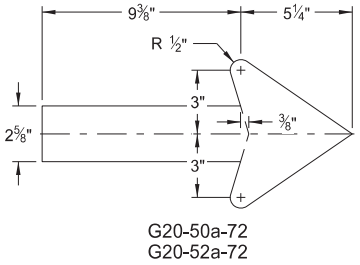
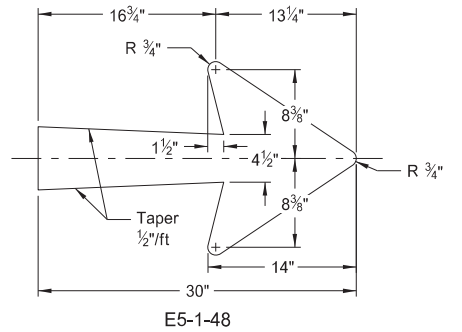
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



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



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



ARROW DETAILS

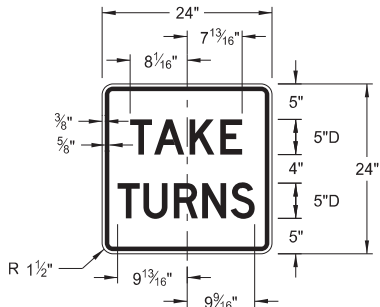
NOTES:

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

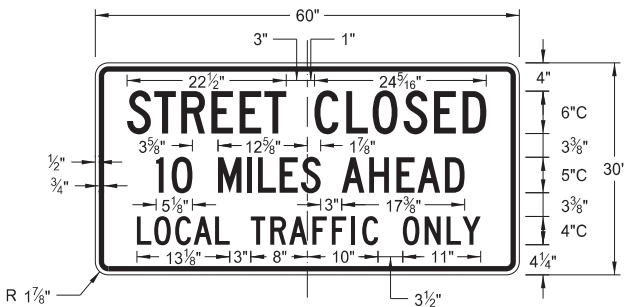
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17	Added sign & background color
10-03-19	New Design Engineer PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes



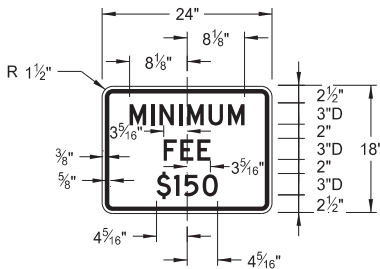
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



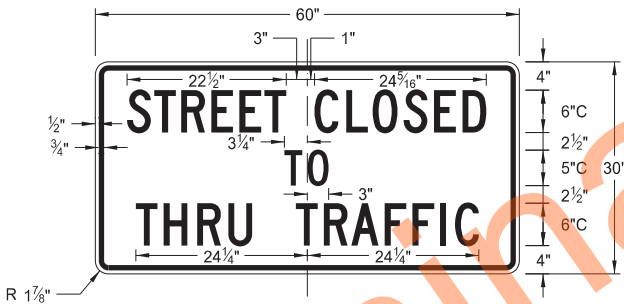
R1-50P-24
Legend: black (non-refl)
Background: white



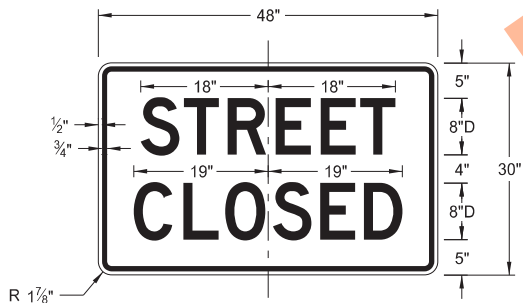
R11-3c-60
Legend: black (non-refl)
Background: white



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



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



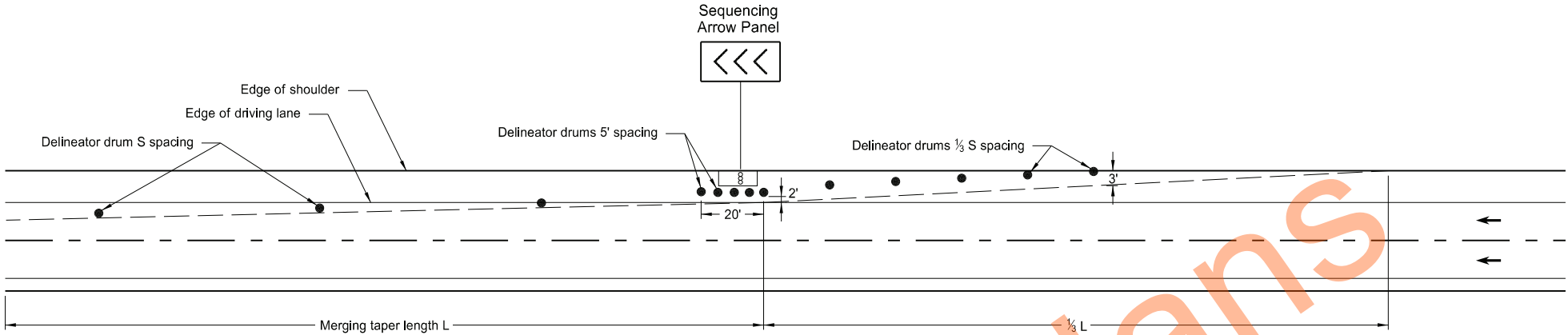
R11-2a-48
Legend: black (non-refl)
Background: white

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes

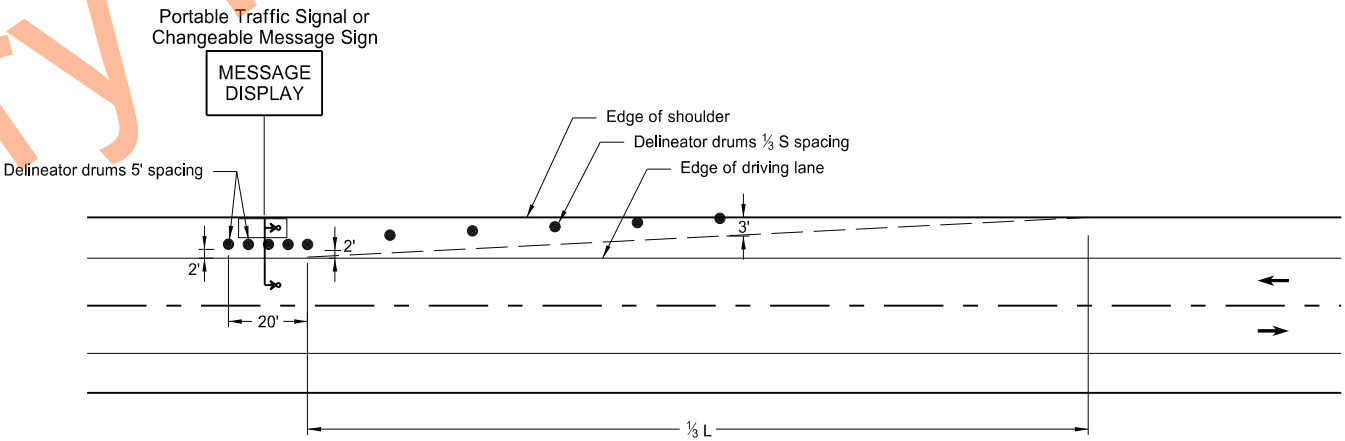
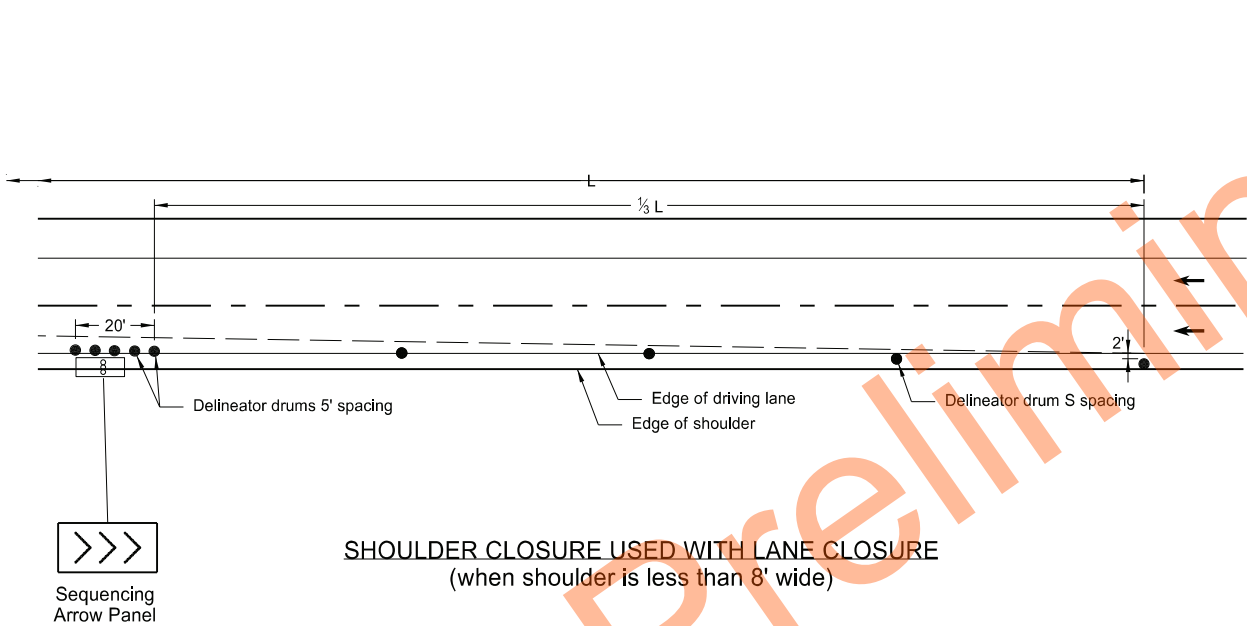


SHOULDER CLOSURE TAPERS

D-704-12



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

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

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

Notes:

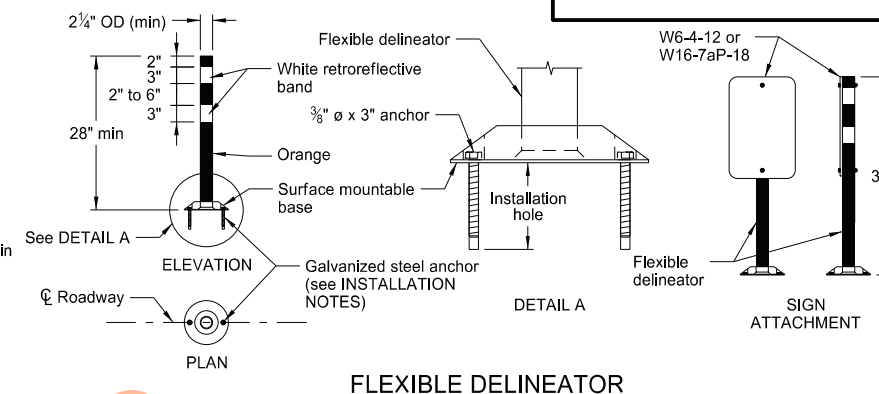
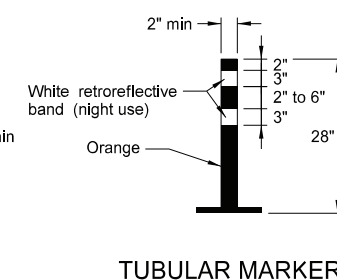
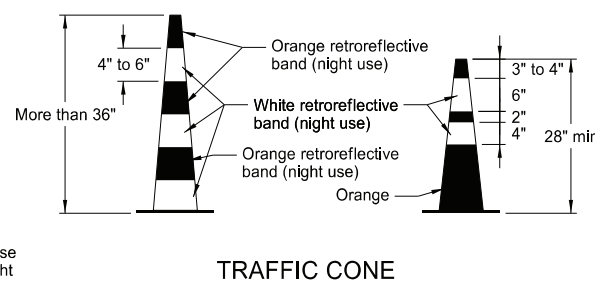
- S = Posted Speed Limit in mph
 W = Width of offset in feet
 L = Taper length in feet
 $L = WS^2/60$ (40mph or less)
 $L = WS$ (45mph or more)
- If a shoulder taper is used, use a length of approximately $\frac{1}{3}L$. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
- When paved shoulders of 8 foot width or more are closed, use channelizing devices to close shoulder in advance, to delineate beginning of work space, and to direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-25-19	Added L dimension to detail
8-01-24	Electronic Stamp/Signature



08/01/24

D-704-13

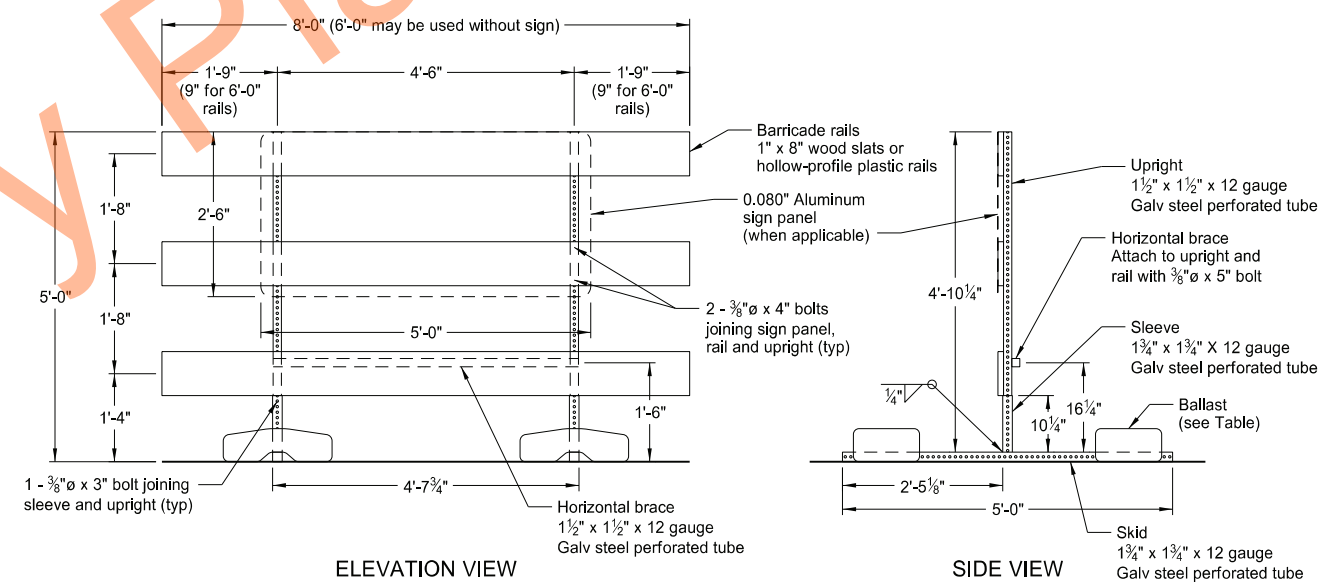
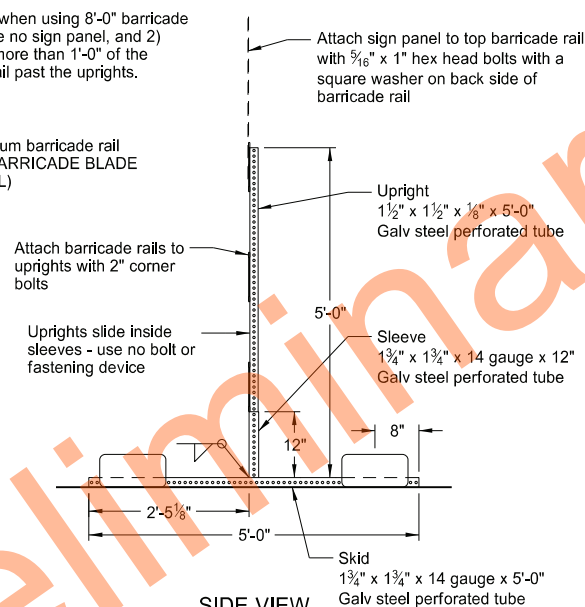


Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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

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

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

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

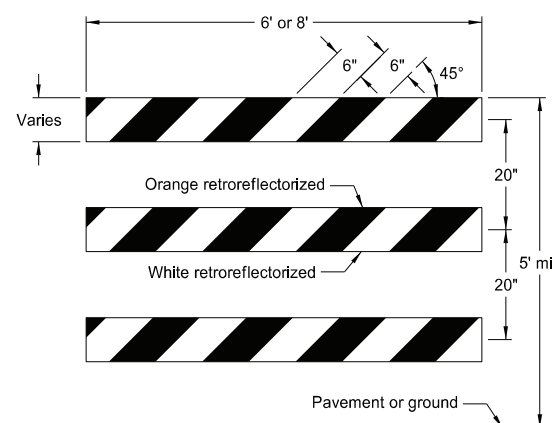


BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

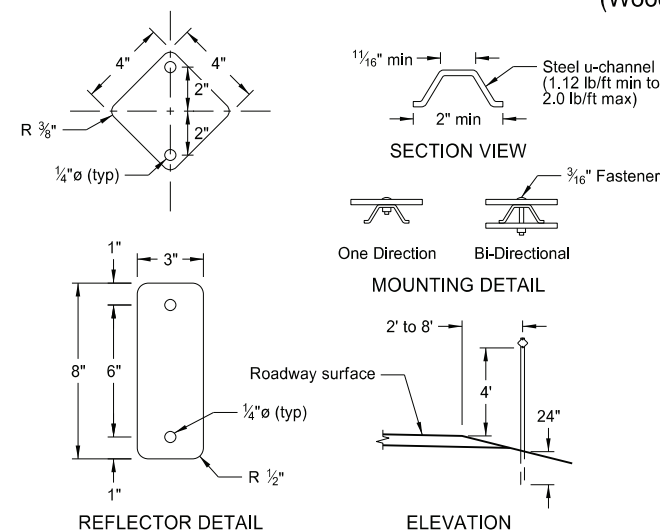
Diagram illustrating the standard crosswalk dimensions and materials:

- Length: 6' to 10'
- Width: 8"
- Stripe Angle: 45°
- Stripe Width: 6"
- Stripe Spacing: 6"
- Materials: Orange retroreflectORIZED, White retroreflectORIZED
- Height: 3'-0" to 3'-6"
- Surface: Pavement or ground

BARRICADE RAIL DETAILS



TYPE III BARRICADE



DELINEATORS

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

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

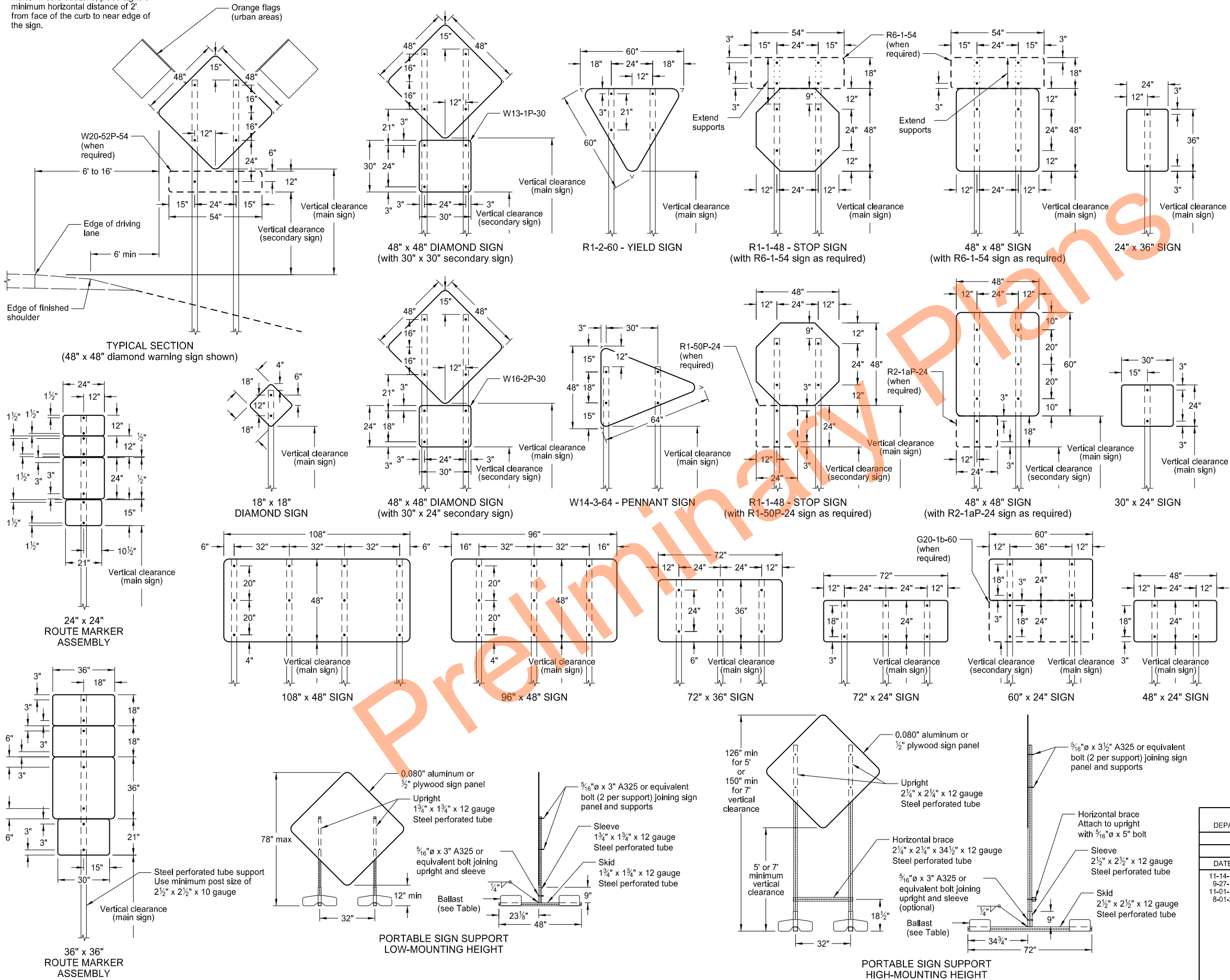
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	Revised details for Flexible Delineator
8-01-24	Electronic Stamp/Signature



08/01/24

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

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



NOTES:

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

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

Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅜" bolts.
3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

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

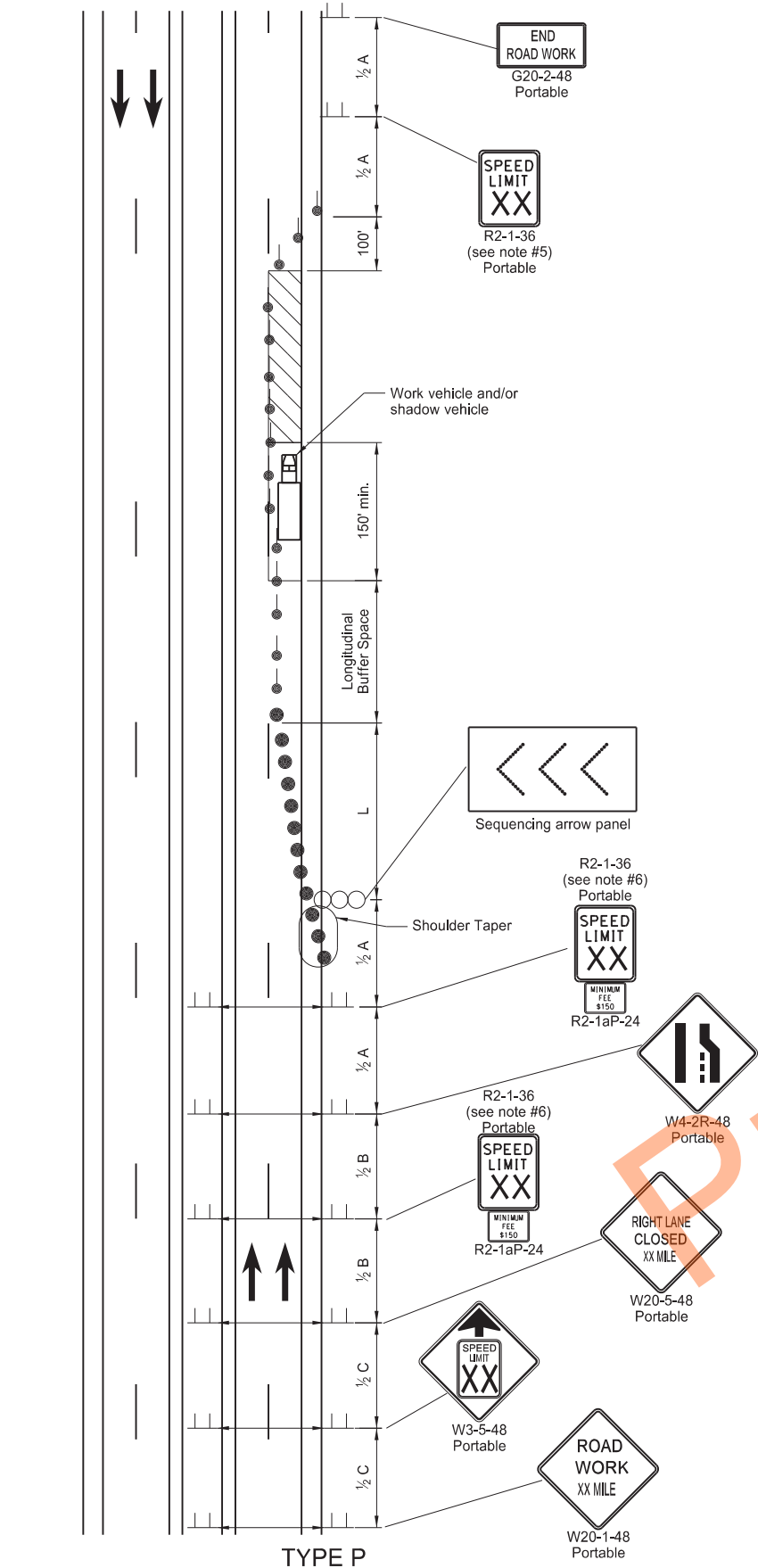
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail
8-01-24	Electronic Stamp/Signature



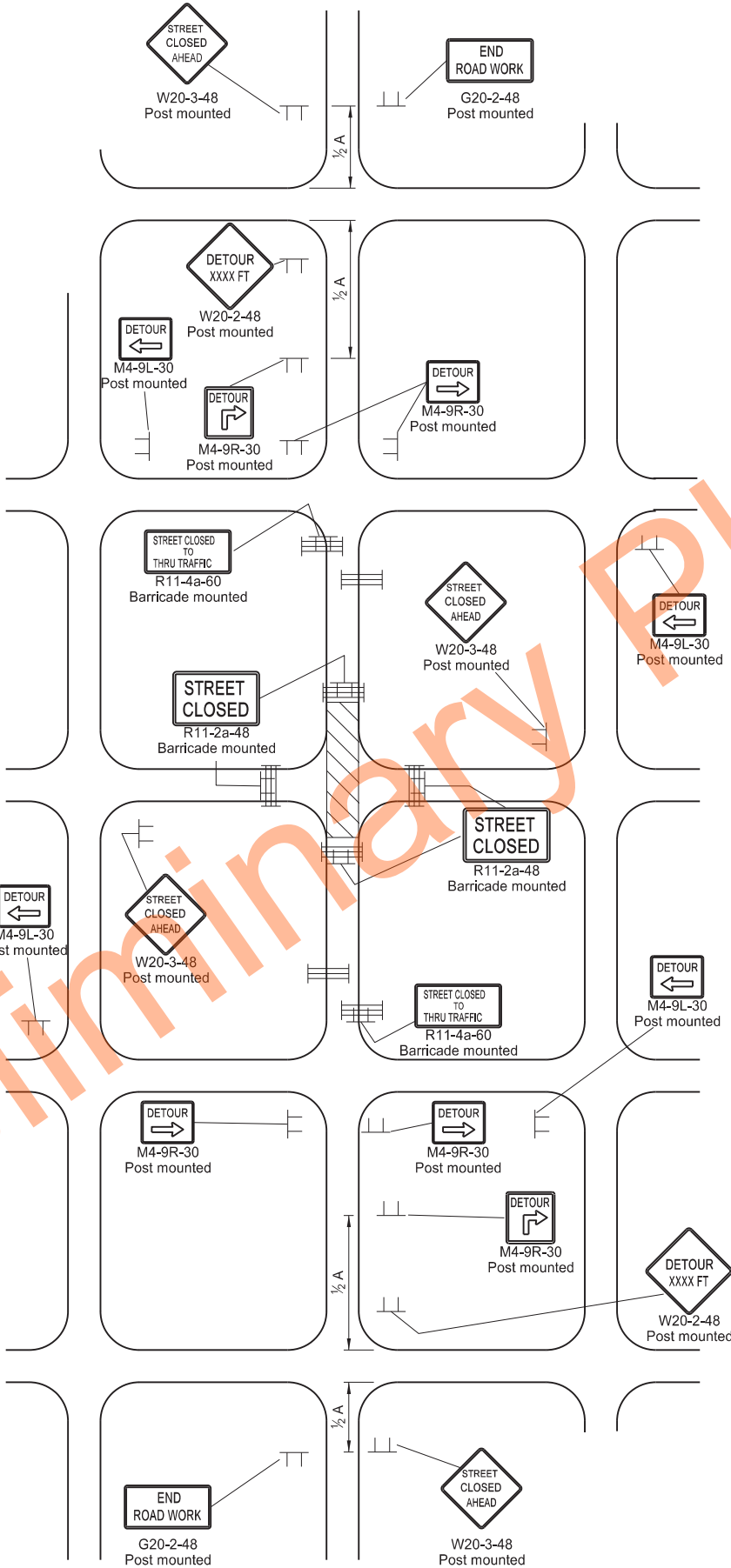
08/01/24

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

D-704-23



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



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

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

KEY

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

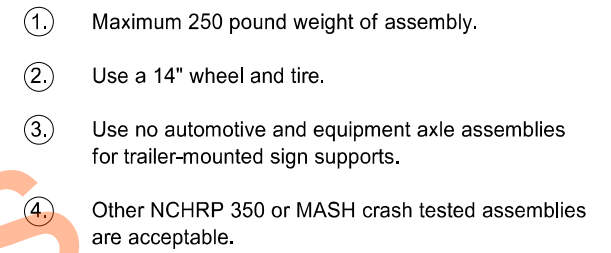
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 80 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
80	910

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Removed speed limit signs, & updated notes & sign numbers
11-01-19	Revised sign numbers & note
12-08-21	Added Dollars At Work sign
11-29-22	Removed Dollars At Work
06-30-25	Legislative Changes



D-704-50



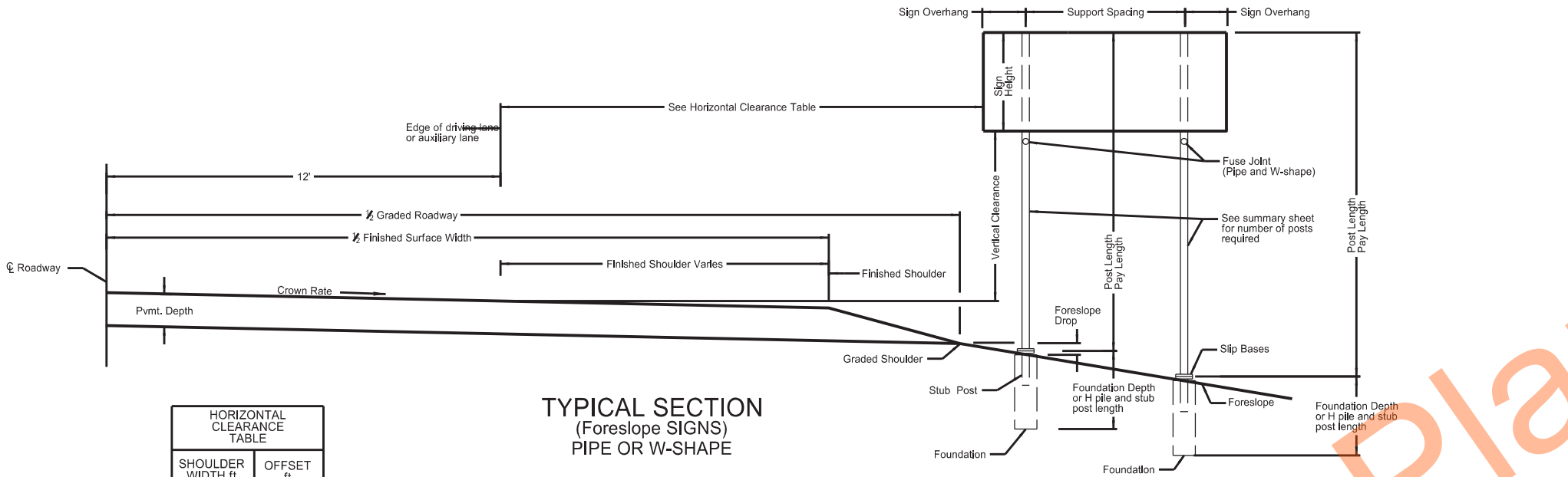
PIPE OR W-SHAPE ASSEMBLY DETAILS

D-754-1

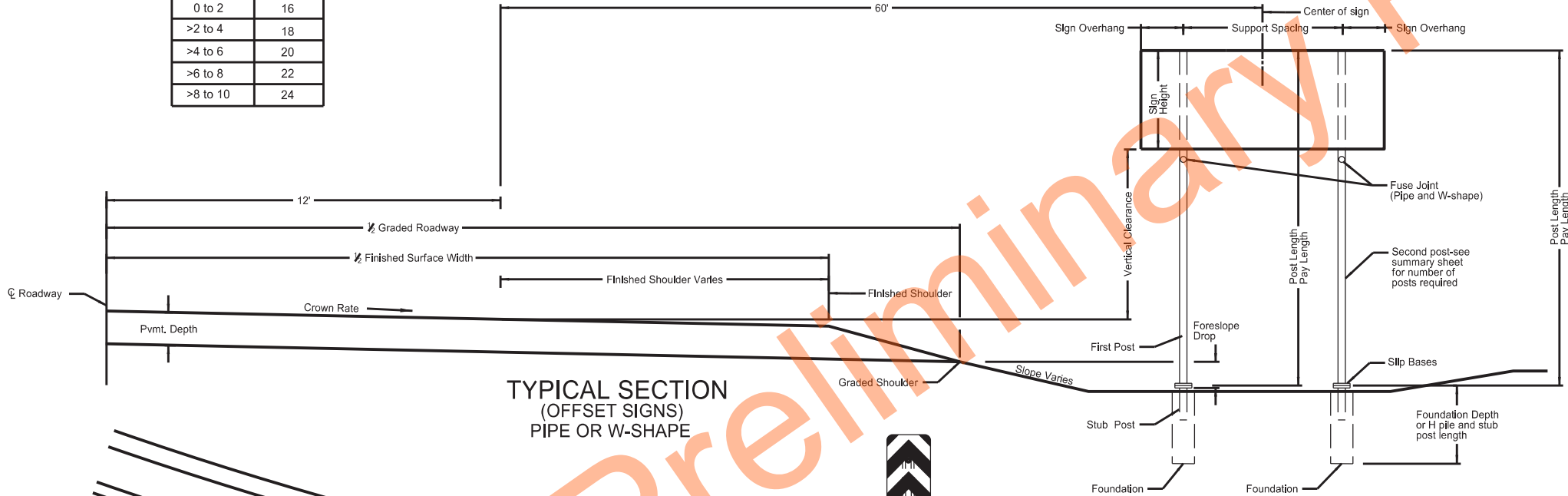
NOTES:
MINIMUM VERTICAL CLEARANCE:
Install signs with a minimum 5 foot vertical clearance from bottom of sign to top edge of the driving lane or auxiliary lane in rural locations. Provide a minimum 7 foot vertical clearance where parking or pedestrian movements occur. Install signs with a minimum 7 foot vertical clearance on freeways, expressways, and multi-lane conventional roadways.

A vertical clearance of 5 feet is acceptable where signs are placed a minimum of 30 feet from the edge of the traveled way.

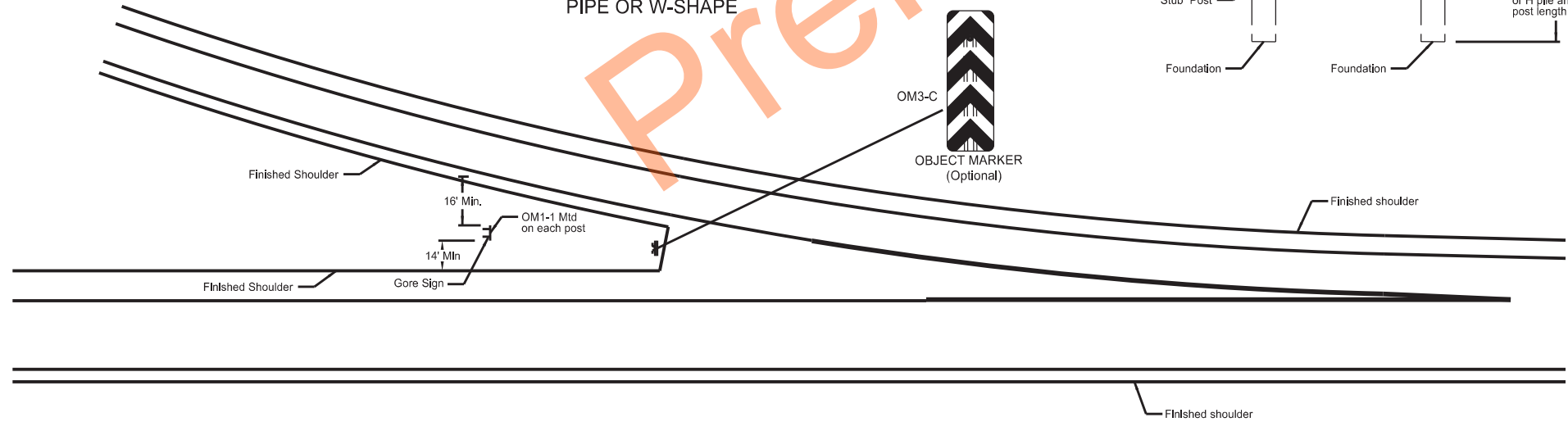
Place signs a maximum of 6" above the vertical clearance specified above.



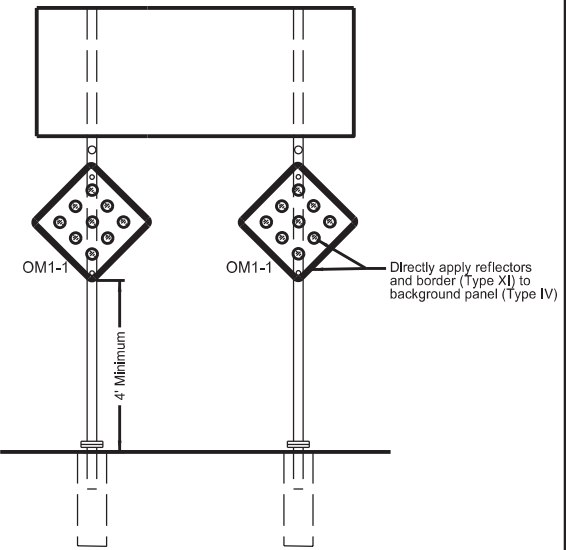
TYPICAL SECTION
(FORESLOPE SIGNS)
PIPE OR W-SHAPE



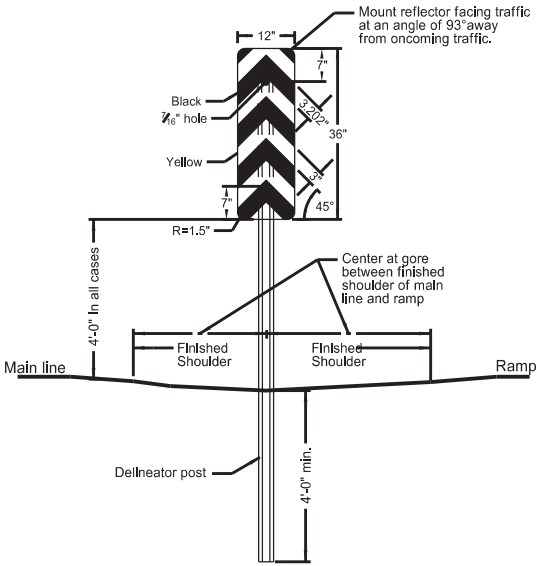
TYPICAL SECTION
(OFFSET SIGNS)
PIPE OR W-SHAPE



EXIT RAMP
GORE SIGN PLACEMENT



GORE SIGN OBJECT MARKER INSTALLATION



OBJECT MARKER INSTALLATION

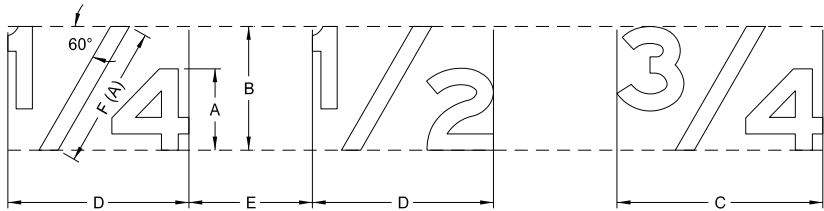
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
7-18-14	Modify notes and update reflective sheeting for object marker. Add correct section number for object marker post.
8-30-18	Updated notes to active voice.
11-26-21	Revised Object Marker signs.



11/26/21

LETTER AND ARROW DETAILS

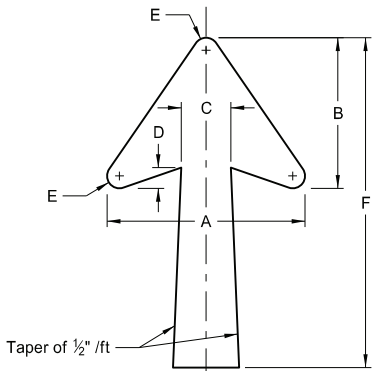
D-754-9



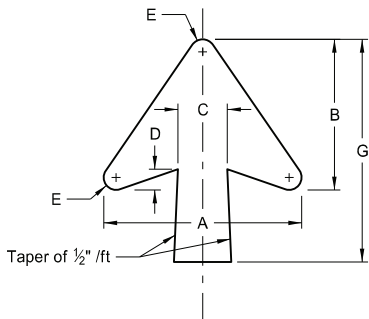
DETERMINE SIZE OF THE FRACTION AS FOLLOWS:

SYMBOL	TITLE	RATIO TO HEIGHT OF CAPITAL OR UPPER CASE
A	Letter height	1.0 of capital or upper case
B	Fraction height	1.5 X A
C	Fraction width	2.5 X A
D	Fraction width	2 X A
E	Space to next character	1 to 1.5 X A
F(A)	Length of diagonal	1.75 X A

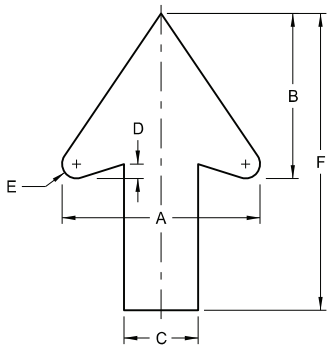
(A) Center diagonal stroke of fraction optically.



TYPE A



TYPE B



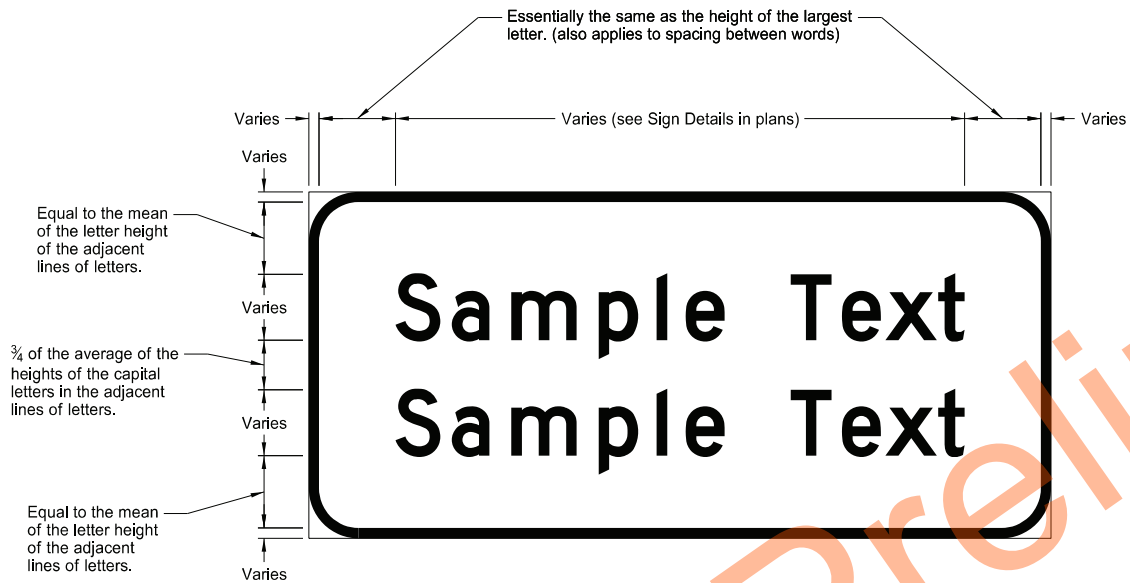
TYPE D

NOTE: Measure rotation angle of arrows counterclockwise from positions shown in details.

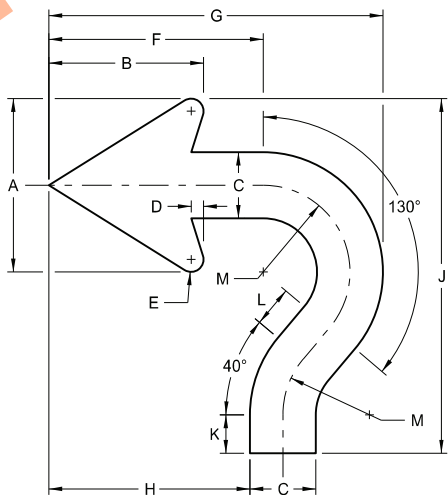
DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G
ND_6IN	6"	12"	9.125"	3"	1"	0.625"	20"	13.5"
ND_8IN	8"	15.125"	11.563"	3.75"	1.313"	0.813"	25"	17"
ND_10IN	10"	18.25"	14"	4.5"	1.5"	0.75"	30"	20"
ND_12IN	12"							
ND_13IN	13.3"							
ND_16IN	16"	22.25"	17"	5.375"	1.75"	1"	35"	25"
ND_20IN	20"							

NOTE: Arrow size on gore signs is based on the letter size of "EXIT".

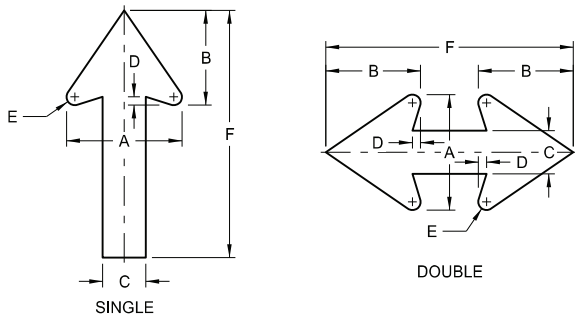
DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F
ND_2IN	2"	2"	1.625"	0.75"	0.125"	0.125"	3"
ND_4IN	4"	4"	3.313"	1.5"	0.25"	0.25"	6"
ND_6IN	6"	6"	4.875"	2.25"	0.375"	0.375"	9"
ND_8IN	8"	8"	6.625"	3"	0.5"	0.5"	12"
ND_10IN	10"	10"	8.375"	3.75"	0.75"	0.75"	15"
ND_12IN	12"	12"	10"	4.5"	0.875"	0.875"	18"



TYPICAL SPACING

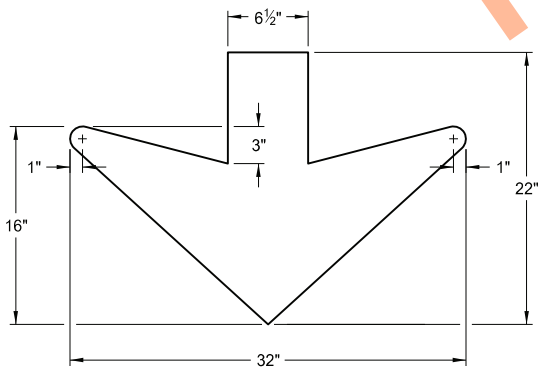


ROUNDBOUT



SPECIAL

DESIGNATION	A	B	C	D	E	F	USES
ND_0.75IN	2"	1.625"	0.75"	0.125"	0.125"	7.75"	Parking Signs (Regulatory)
ND_2.625IN	7"	5.75"	2.625"	0.5"	0.5"	15"	Frontage Road Signs



DOWN ARROW

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G	H	J	K	L	M
ND_6IN	6"	5.25"	4.688"	2"	0.375"	0.375"	6.5"	10.125"	6.094"	10.75"	1.168"	1.25"	2.625"
ND_8IN	8"	7"	5.75"	2.625"	0.5"	0.5"	8.688"	13.5"	8.166"	14.333"	1.557"	1.667"	3.5"

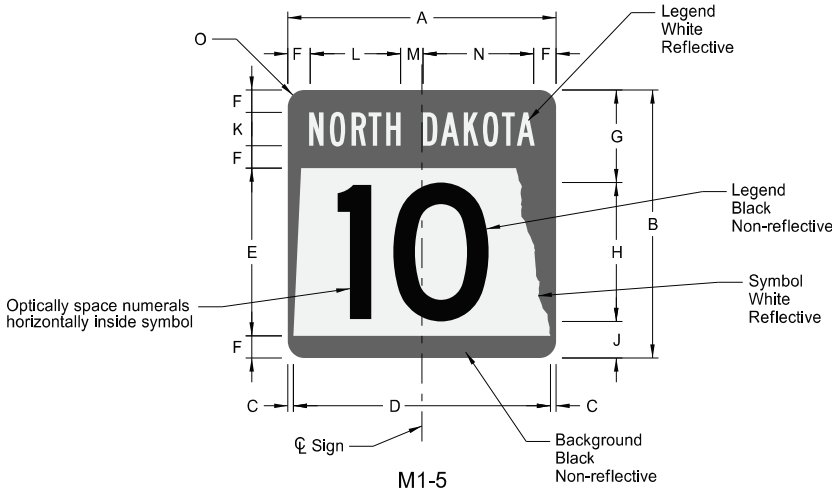
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE
7-8-14	Revised gore sign and added 4" D & D arrow
5-4-16	Revised Distance & Destination and Typical Spacing details
4-23-18	Revised arrow details
8-30-18	Updated notes to active voice.
8-29-19	New Design Engr PE Stamp.
8-05-24	Electronic Stamp/Signature.



08/05/24

STATE HIGHWAY ROUTE SHIELD DETAIL

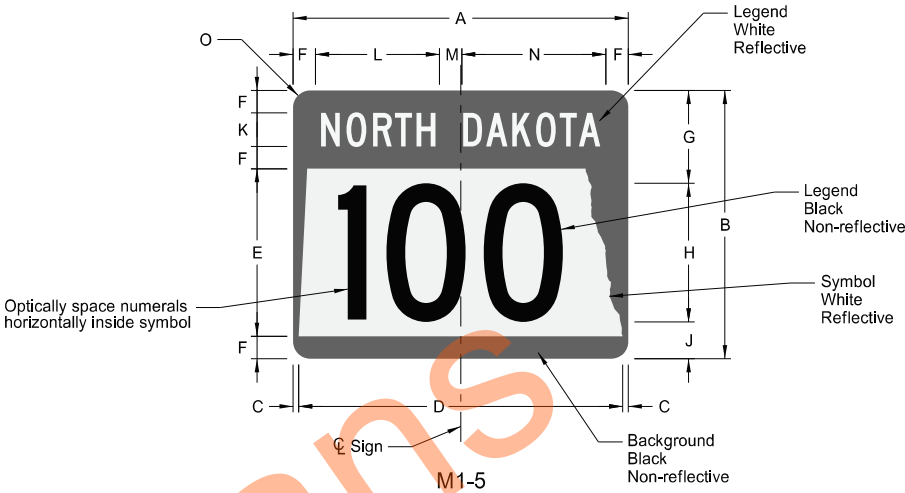
D-754-11



STATE ROUTE MARKER

SIGN	DIMENSION (INCHES)													
	A	B	C	D	E	F	G	H	J	K	L	M	N	O
1, 2 digits	18*	18*	0.38	17.25	11.25	1.5	6.38	9 D**	2.63	2.25 B	6.1	1.5	7.4	1.5
1, 2 digits	24	24	0.5	23	15	2	8.5	12 D**	3.5	3 B	8.1	2	9.9	1.5
1, 2 digits	36	36	0.75	34.5	22.5	3	12.75	18 D**	5.25	4.5 B	12.1	3	14.9	2.25
1, 2 digits	48*	48*	1	46	30	4	17	24 D**	7	6 B	16.2	4	19.8	3

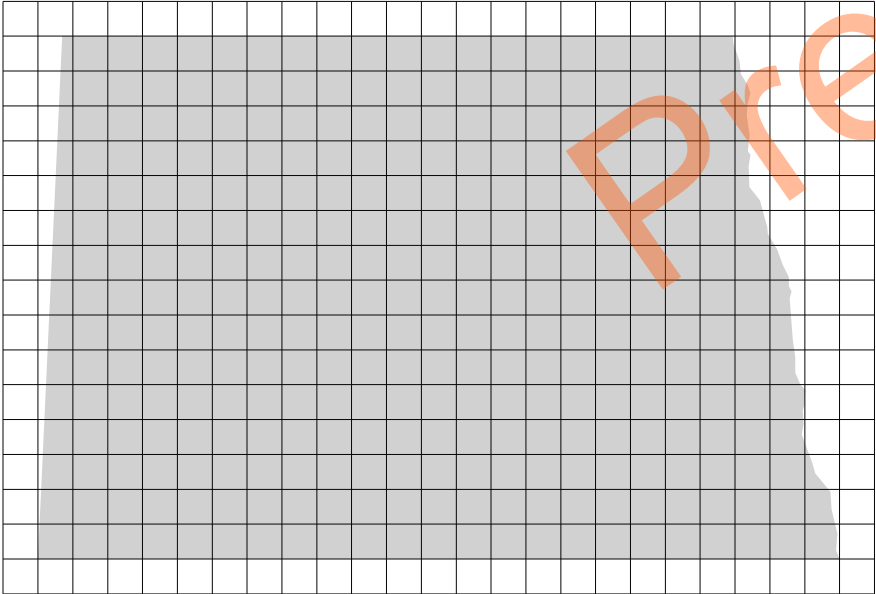
* Size not for independent use (only for use within a guide sign)
** Reduce numeral spacing by 25%



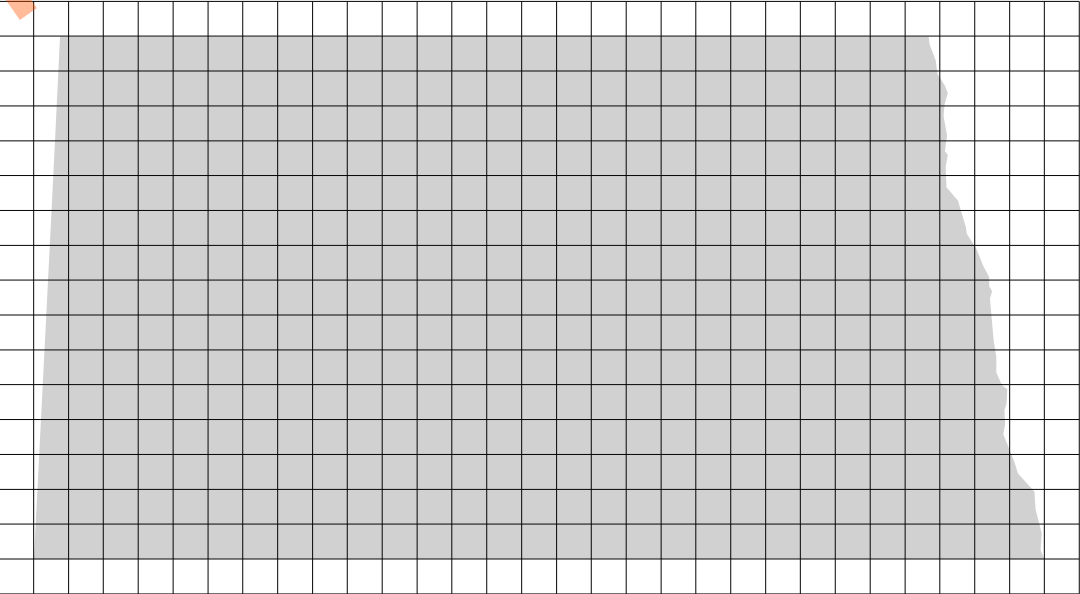
STATE ROUTE MARKER

SIGN	DIMENSION (INCHES)													
	A	B	C	D	E	F	G	H	J	K	L	M	N	O
3 digits	24*	18*	1.13	21.75	11.25	1.5	6.38	9 C**	2.63	2.25 C	8.8	2	10.2	1.5
3 digits	30	24	0.5	29	15	2	8.5	12 C**	3.5	3 C	10.7	2.5	12.8	1.5
3 digits	45	36	0.75	43.5	22.5	3	12.75	18 C**	5.25	4.5 C	16.1	3.8	19.1	2.25
3 digits	60*	48*	1	58	30	4	17	24 C**	7	6 C	21.5	5	25.5	3
4 digits	24*	18*	1.13	21.75	11.25	1.5	6.38	9 B***	2.63	2.25 C	8.8	2	10.2	1.5
4 digits	30	24	0.5	29	15	2	8.5	12 B***	3.5	3 C	10.7	2.5	12.8	1.5
4 digits	45	36	0.75	43.5	22.5	3	12.75	18 B***	5.25	4.5 C	16.1	3.8	19.1	2.25
4 digits	60*	48*	1	58	30	4	17	24 B***	7	6 C	21.5	5	25.5	3

* Size not for independent use (only for use within a guide sign)
** Reduce numeral spacing by 25%
*** Reduce numeral spacing by 50%



Note: North Dakota symbol graphics file may be obtained from the Design Division of North Dakota Department of Transportation.



NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

4-23-18

REVISIONS

DATE	CHANGE
8-29-19 8-09-24	New Design Engineer PE Stamp. Electronic Stamp/Signature.

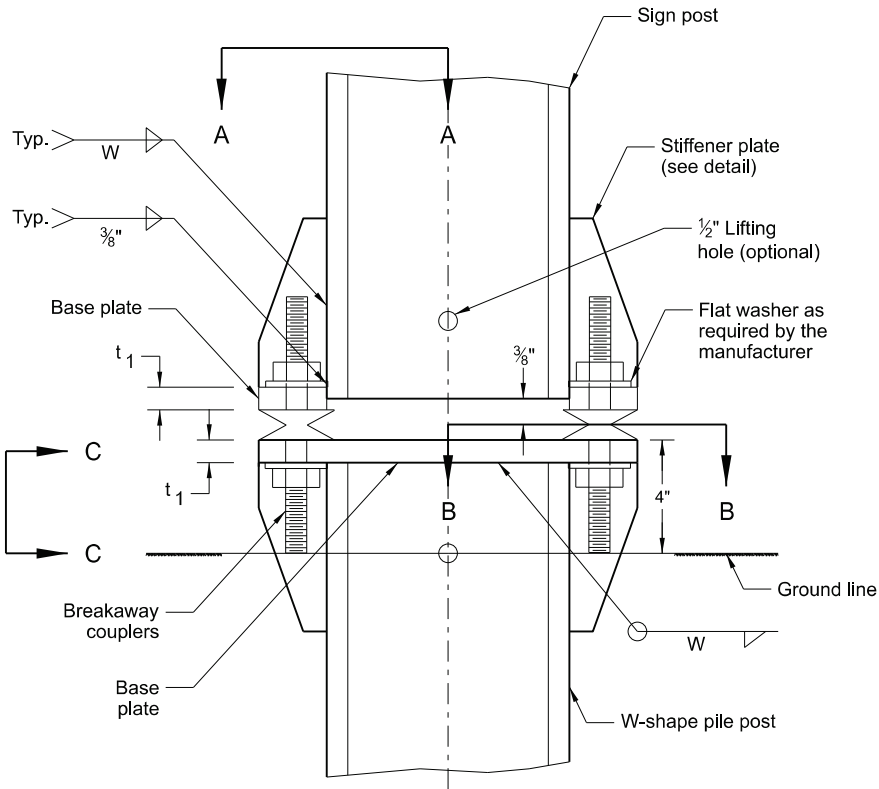
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/05/24

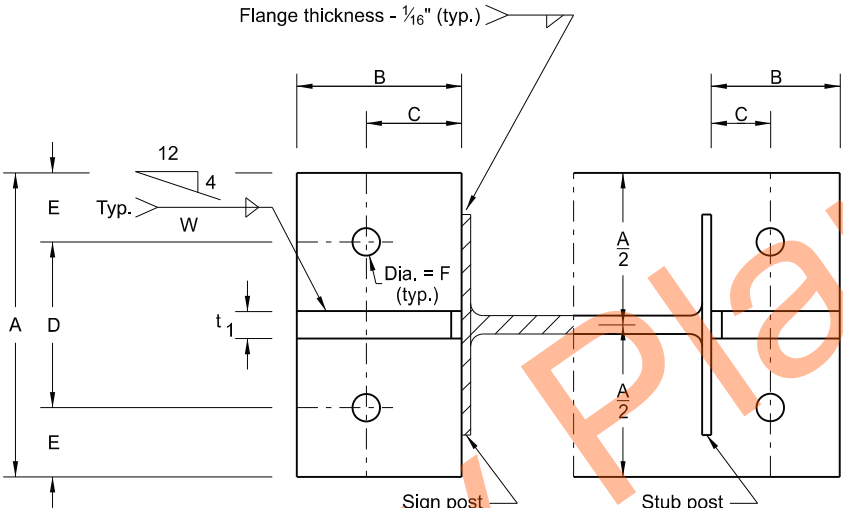
Breakaway Coupler System
Structural Details
for W-Shape Supports

Notes:

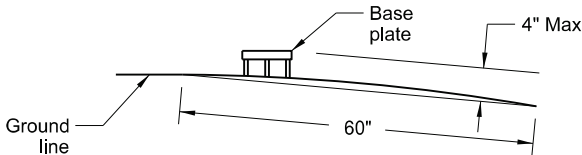
1. Use either the breakaway base system shown on standard D-754-13 or a breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the requirements of NCHRP Report 350.
2. Use structural steel conforming to Sec. 894.03 B.6 and high strength bolts conforming to ASTM - A325. Refer to "Sign Summary" sheet for specific data on each individual sign installation.
3. Use manufacturer's recommendations for assembly procedures.



Sign Post and Stub Post
Elevation

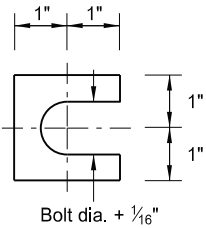


Section A - A
Section B - B
(See Table for Dimensions)

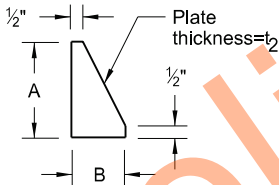


Section C - C

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



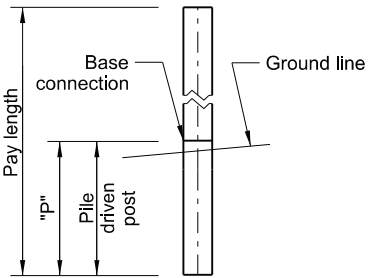
Shim Detail



Stiffener Plate Detail
(See Table for Dimensions)

Furnish 2 - .012"± thick and 2 - .032"± thick shims per post. Fabricate shims from brass shim stock or strip conforming to ASTM B36.

Sections shown are for installations on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations on left shoulder.



W-Shape - Pile Footing

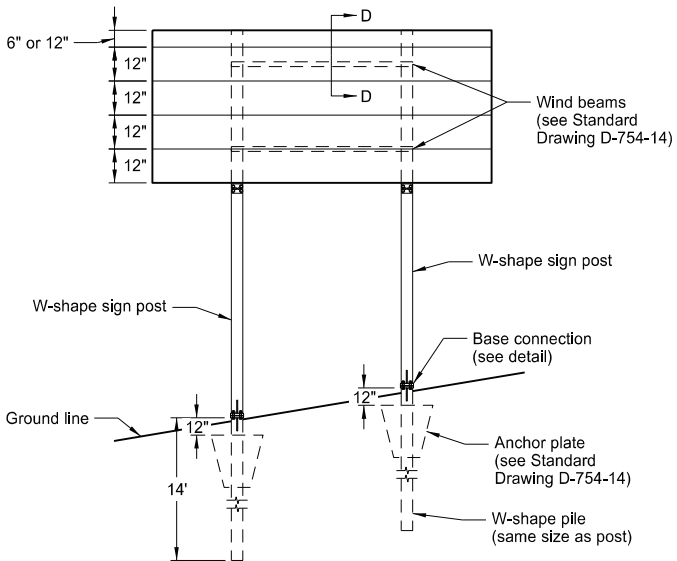
W-Shape Post & Pile Size	Base Connection Data										Footing Data
	Bolt Size	A	B	C	D	E	t ₁	t ₂	W	F	W-Shape Pile Post "P"
W4X13	3/4" x 5 1/4"	6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	13/16"	14'
W5X16											14'
W6X20	7/8" x 5 1/4"	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/16"	14'
W8X24											14'
W8X28	1" x 5 1/4"	8"	3"	2"	4"	2"	1 1/2"	3/4"	5/16"	1 1/16"	14'

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-2013	
REVISIONS	
DATE	CHANGE
7-8-14	Revised notes 2 and 3.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.

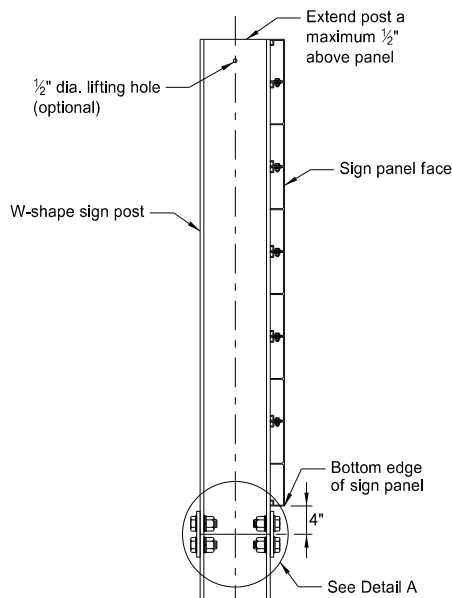


08/05/24

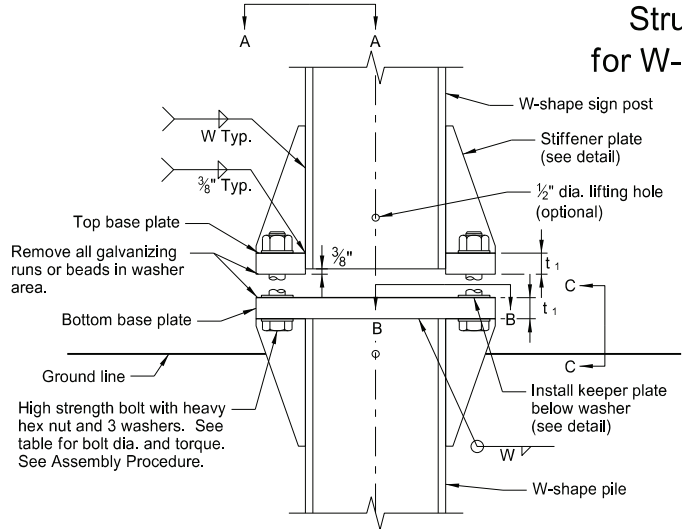
Breakaway System
Structural Details
for W-Shape Supports



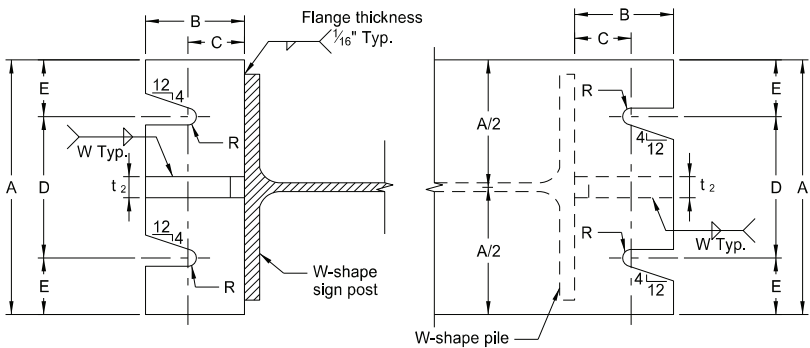
Typical Panel Mounting
on W-shape Sign Posts



Fuse Joint
(Side View)



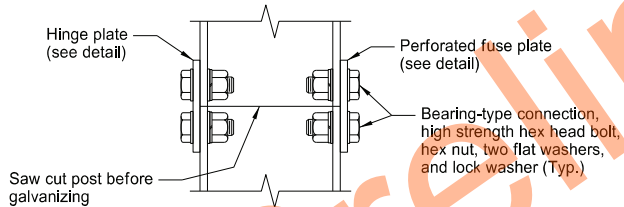
Base Connection Detail



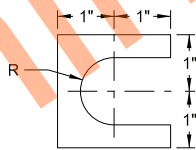
Section A-A

Section B-B

Sections shown for installations on right shoulder. Reverse plate slot
bevels for installations on left shoulder.

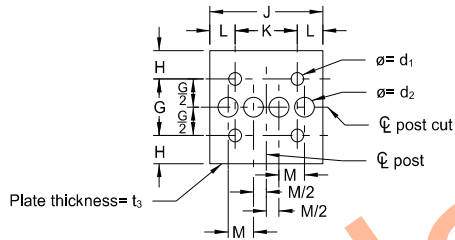


Detail A

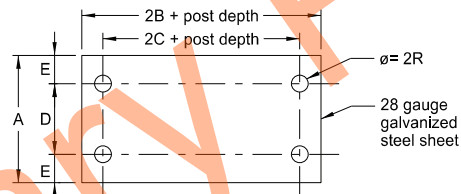


Shim Detail

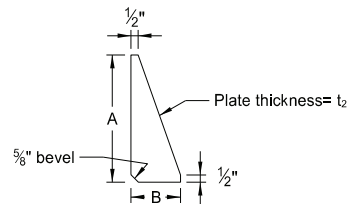
Furnish 2 each .012"± thick and 2 each
.032"± thick shims per post. Shims shall
be fabricated from brass shim stock or
strip conforming to ASTM B36.



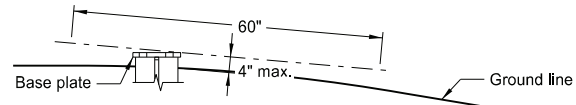
Perforated Fuse Plate



Keeper Plate

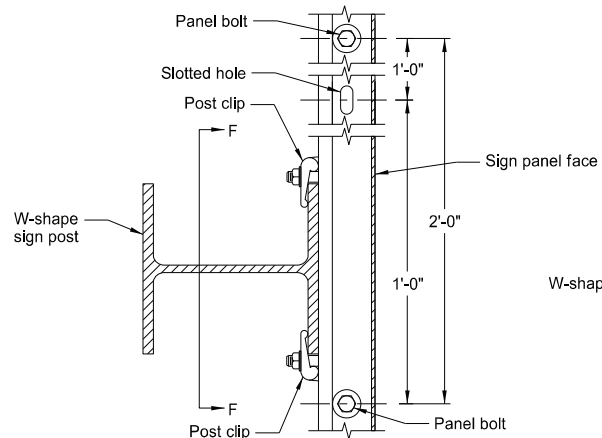


Stiffener Plate

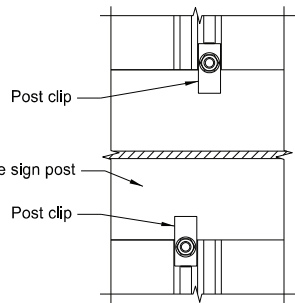


Maximum projection of base plate limits are defined as a line 4"
parallel to any chord, which is perpendicular to, or aligned
radially to, the center line of the highway and has the chord's end
points on the ground surface on opposite sides of the stub post.

Hinge Plate

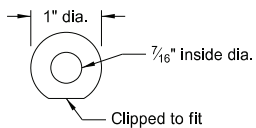


Section E-E



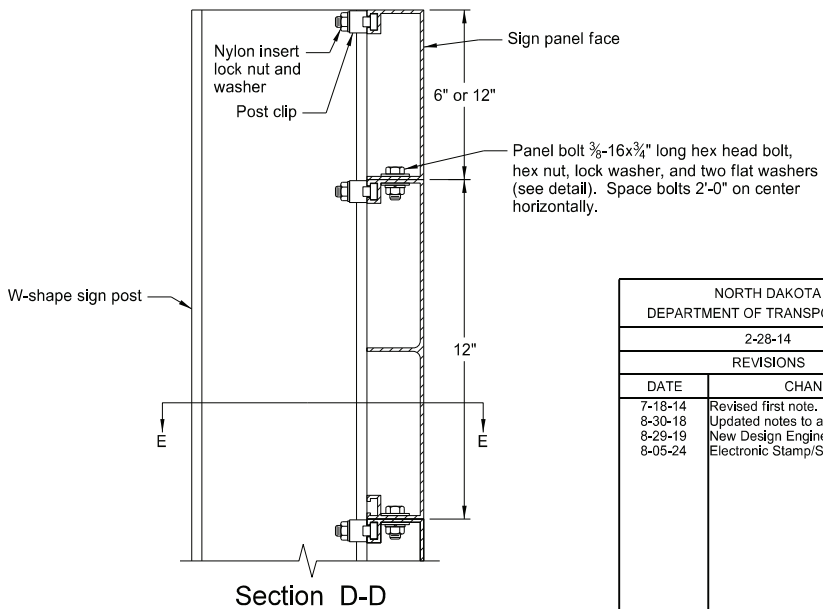
Section F-F

Install post clips on both sides of each post at
each panel joint indicated.



Flat Washer Detail

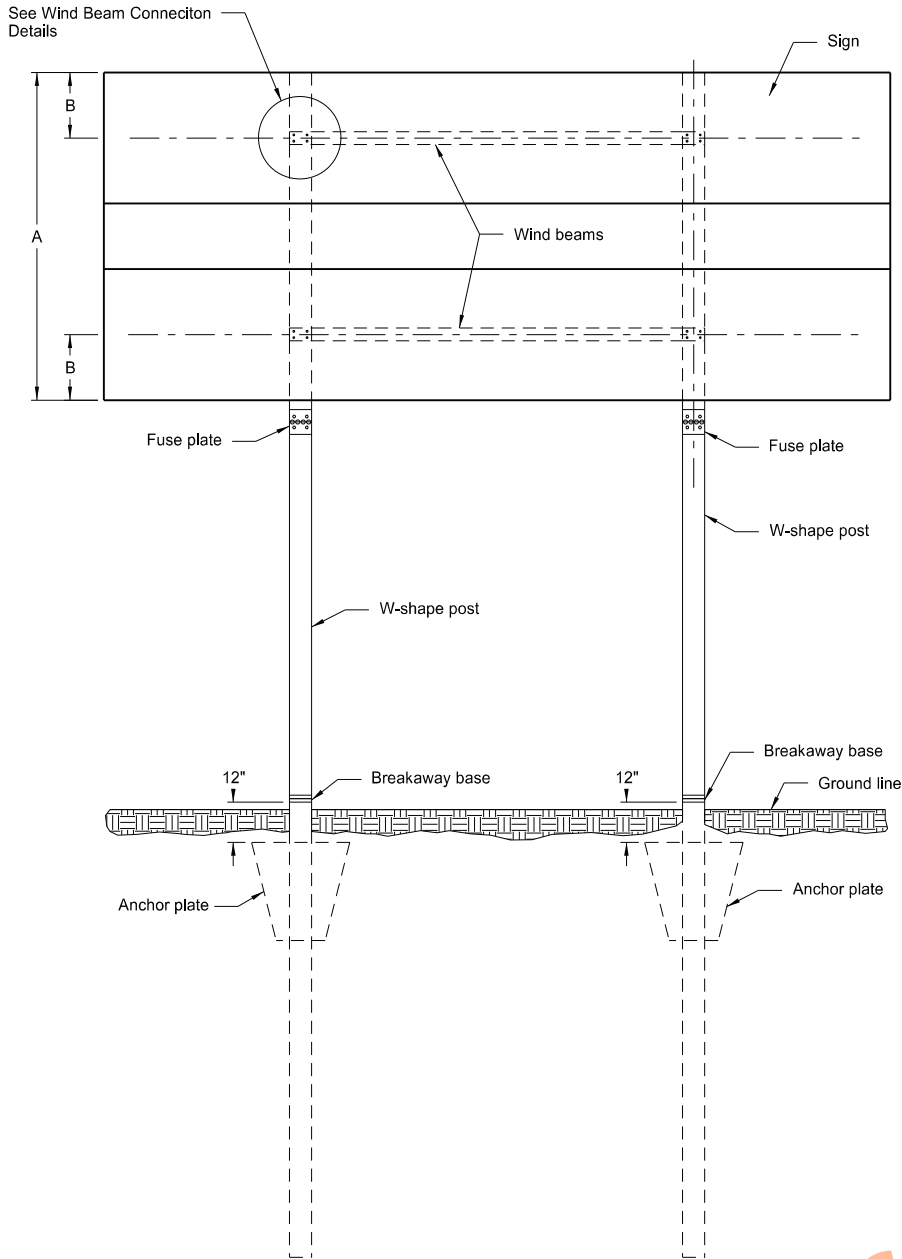
W-Shape Post and Pile Size	Base Connection Dimensions										Fuse and Hinge Plate Dimensions									
	Bolt Size and Torque	A	B	C	D	E	t ₁	t ₂	W	R	G	H	J	K	L	M	d ₁	d ₂	t ₃	Bolt dia.
W4x13	$\frac{3}{4}$ " $\varnothing$ x $3\frac{1}{2}$ " Torque = 600 in-lb	6"	2½"	1½"	3½"	1¼"	1"	½"	¼"	$\frac{13}{32}$ "	2"	1¼"	4"	2¼"	⅞"	1"	$\frac{11}{16}$ "	¾"	⅜"	⅝"
W5x16	$\frac{3}{4}$ " $\varnothing$ x $3\frac{1}{2}$ " Torque = 600 in-lb	6"	2½"	1½"	3½"	1¼"	1"	½"	¼"	$\frac{13}{32}$ "	2½"	1¼"	5"	2¾"	1⅝"	1⅝"	$\frac{13}{16}$ "	⅞"	⅜"	¾"
W6x20	$\frac{7}{8}$ " $\varnothing$ x $4\frac{1}{4}$ " Torque = 800 in-lb	8"	3"	1¾"	4"	2"	1¼"	½"	¼"	$\frac{15}{32}$ "	2½"	1¼"	6"	3½"	1¼"	1⅝"	$\frac{13}{16}$ "	1⅝"	⅜"	¾"
W8x24	$\frac{7}{8}$ " $\varnothing$ x $4\frac{1}{4}$ " Torque = 800 in-lb	8"	3"	1¾"	4"	2"	1¼"	½"	¼"	$\frac{15}{32}$ "	2½"	1½"	6½"	3½"	1½"	1½"	$\frac{15}{16}$ "	1¼"	½"	⅞"
W8x28	1" $\varnothing$ x 5" Torque = 1000 in-lb	8"	3"	2"	4"	2"	1½"	¾"	$\frac{5}{16}$ "	$\frac{17}{32}$ "	2½"	1½"	6½"	3½"	1½"	1⅝"	1⅝"	1⅝"	½"	1"
W8x31	1⅝" $\varnothing$ x 5" Torque = 1200 in-lb	9"	3½"	2"	5"	2"	1½"	¾"	$\frac{5}{16}$ "	$\frac{19}{32}$ "	3"	1¾"	8"	5½"	1¼"	2"	1⅝"	1½"	½"	1"
W10x39	1⅝" $\varnothing$ x 5" Torque = 1200 in-lb	9"	3½"	2"	5"	2"	1½"	¾"	$\frac{5}{16}$ "	$\frac{19}{32}$ "	3"	1¾"	8"	5½"	1¼"	1⅞"	1⅜"	1⅜"	½"	1⅝"



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
7-18-14	Revised first note.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.



WIND BEAMS AND ANCHOR PLATES
FOR W-SHAPE SUPPORTS



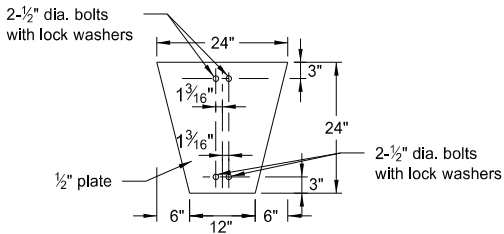
ASSEMBLY DETAIL
FOR WIND BEAMS
AND ANCHOR PLATES

Notes:

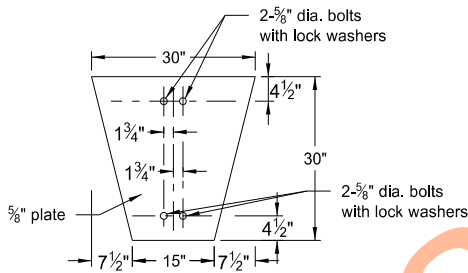
Calculate the B distance using the formula, $B=A/4$.

Use wind beam conforming to Section 894.03 B.6 of the Standard Specifications.

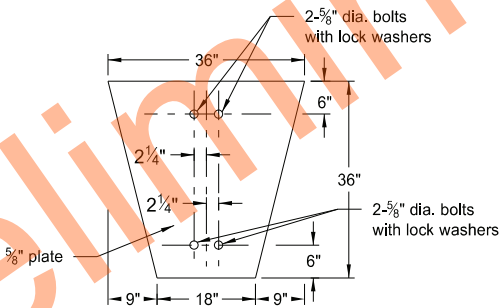
Use bolts conforming to ASTM A307 and galvanized according to ASTM A153.



W4-13 & W5-16

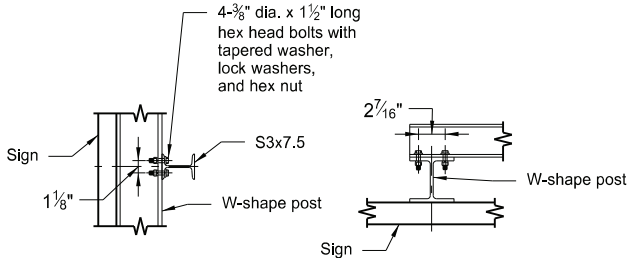


W6-20, W8-24 & W8-28



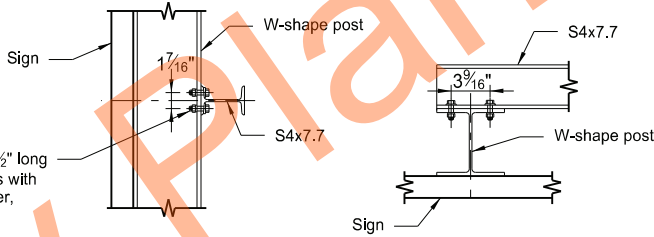
W8-31 & W10-39

ANCHOR PLATE DETAILS



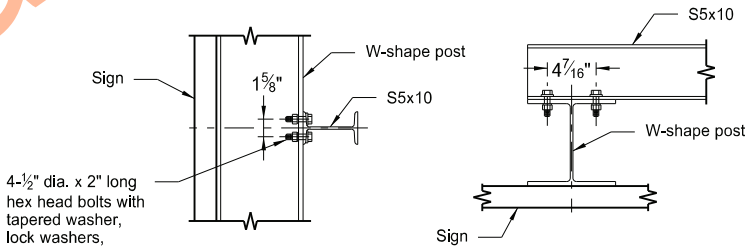
End View
W4-13 & W5-16

Top View



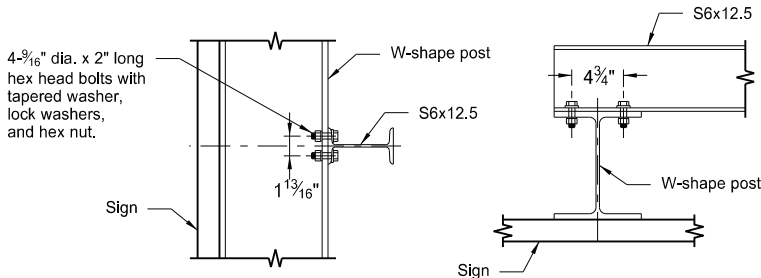
End View
W6-20, W8-24 and W8-28

Top View



End View
W8-31

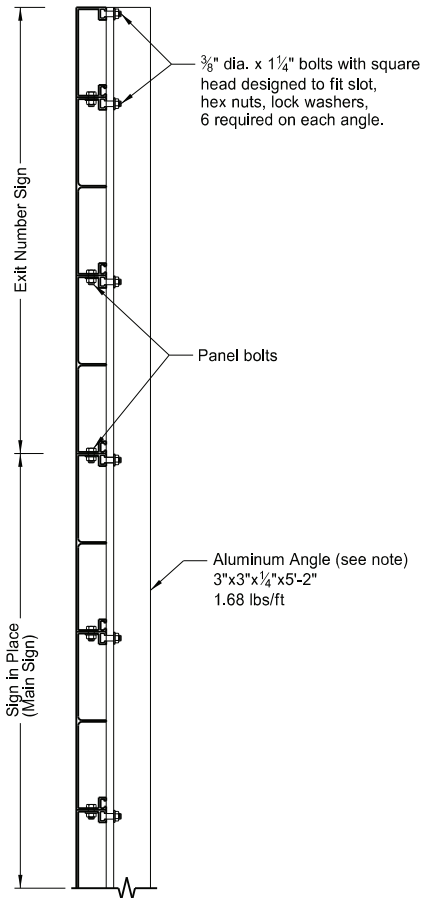
Top View



End View
W10-39

Top View

WIND BEAM CONNECTION DETAILS



ASSEMBLY DETAIL FOR
EXIT NUMBER SIGNS

Note: Use two aluminum angles on each sign. Vary distance between angles dependent on post spacing of sign in place. Place angles as near as possible to posts. The Engineer will determine exact location.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised second note.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.



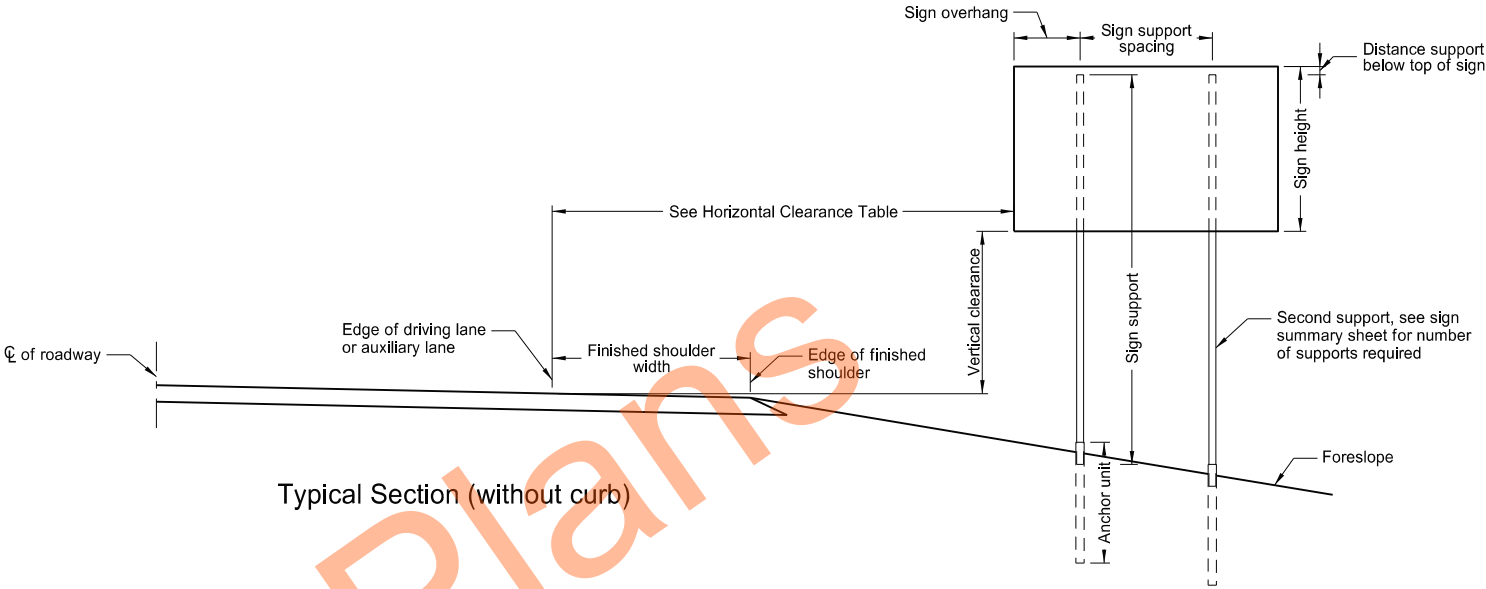
08/05/24

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

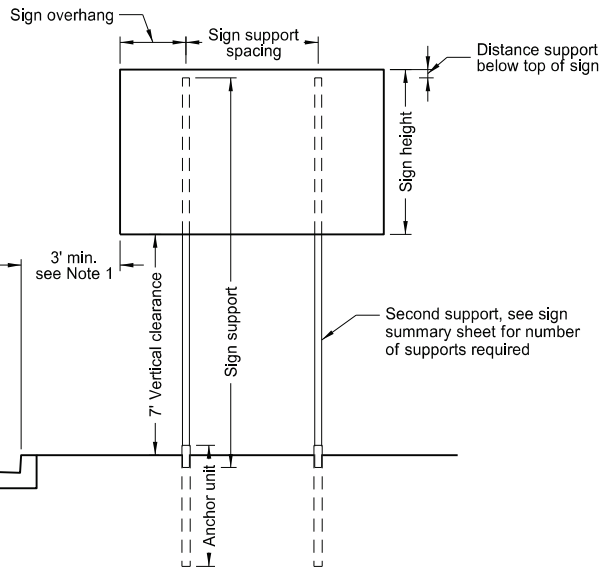
Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
2. Minimum vertical clearance: Provide at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane at the side of the road in rural districts. Provide at least 7' clearance to the bottom of the sign, where parking or pedestrian movements occur.
- Install signs on expressways a minimum height of 7'.
- Install adopt-a-highway signs on Freeways at least 7' above the edge of the driving lane.
- Maximum vertical clearance is 6" greater than the minimum vertical clearance.
3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.

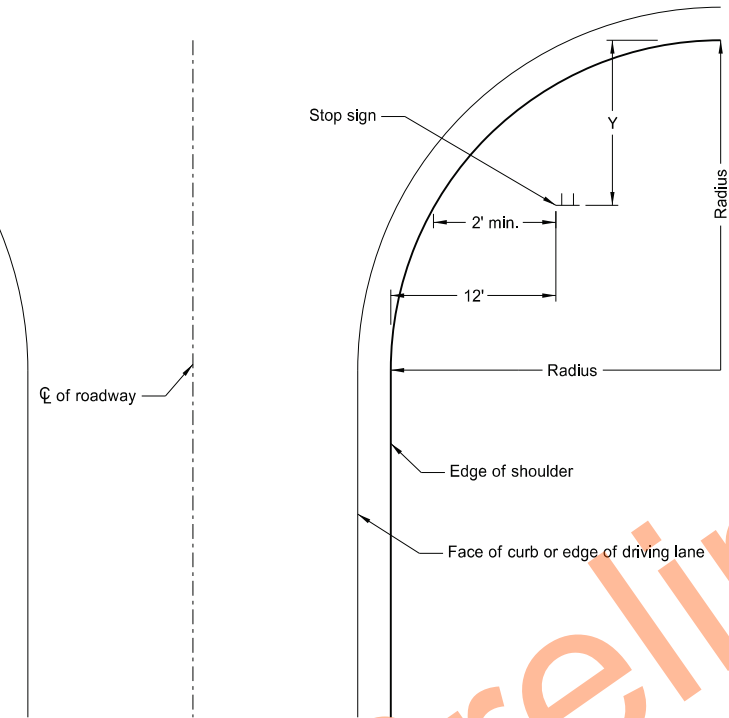


Typical Section (without curb)

Horizontal Clearance Table	
Shoulder Width ft	Offset ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24

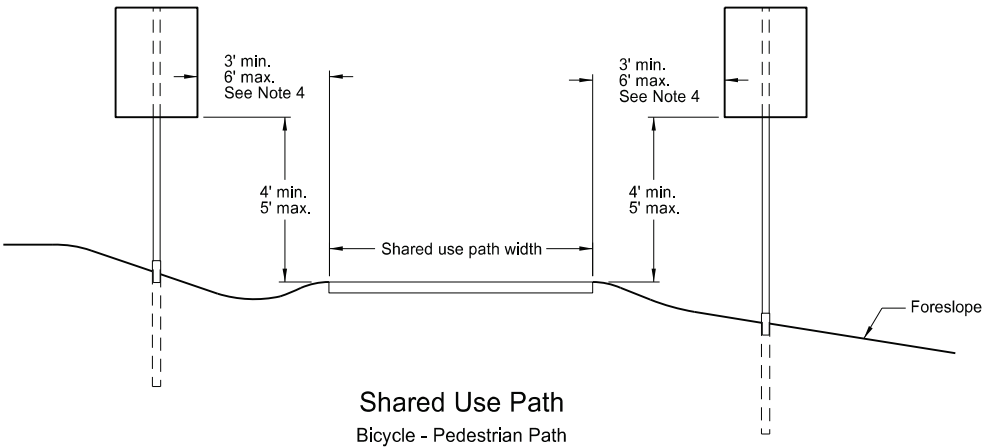


Typical Section (with curb)
Residential or Business District



Stop Sign Location
Wide Throat Intersection
Use layout for the placement of "Stop" signs.

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



Shared Use Path
Bicycle - Pedestrian Path

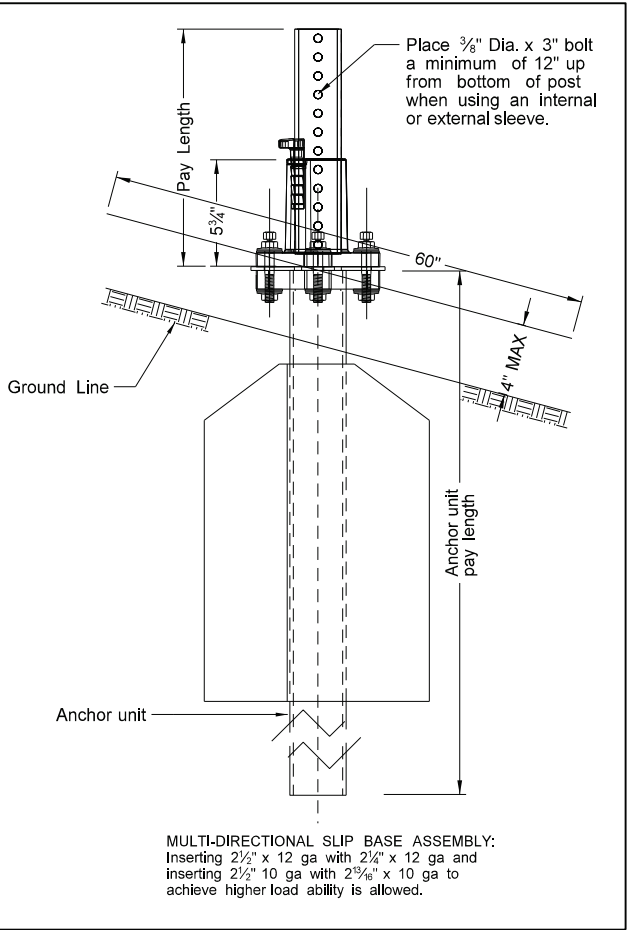
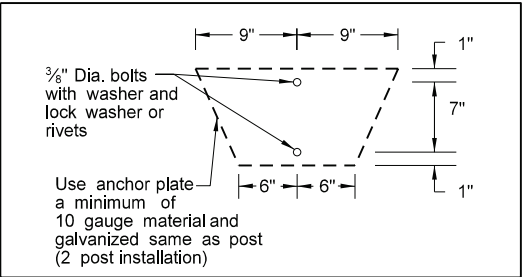
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.



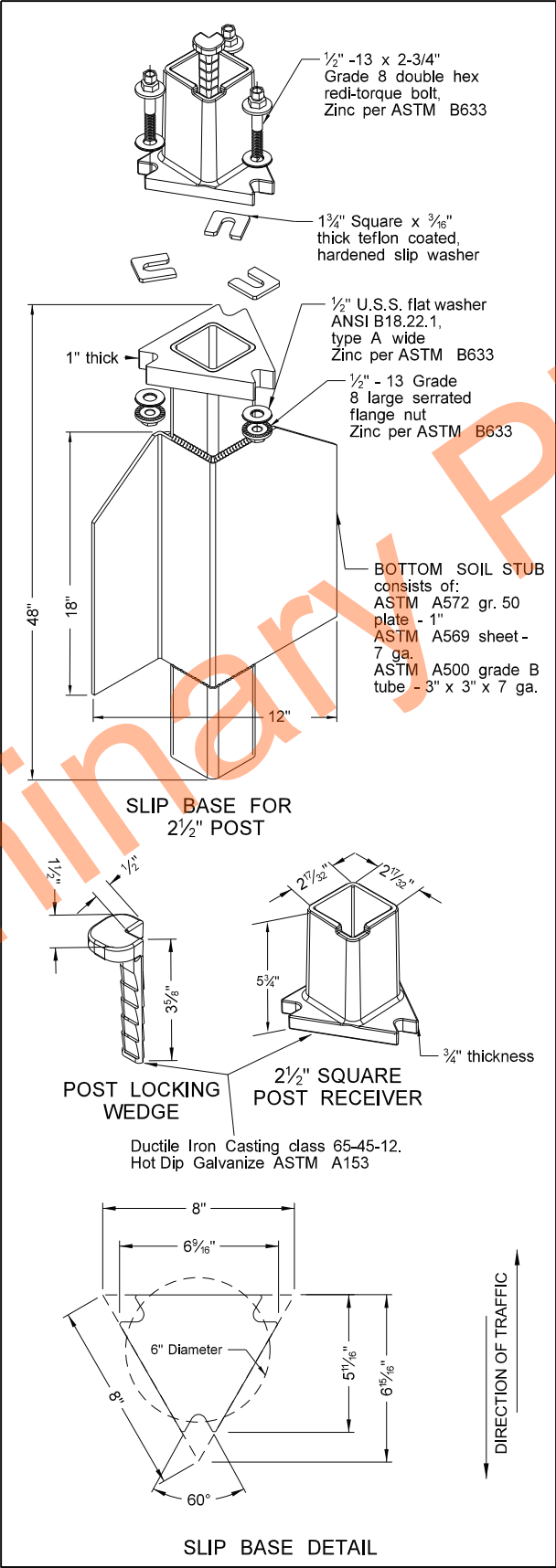
08/05/24

Telescoping Perforated Tube							
Number of Posts	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/16	10	Yes		7

(B) - Provide a shim as specified by the manufacturer when placing 2 1/2" 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

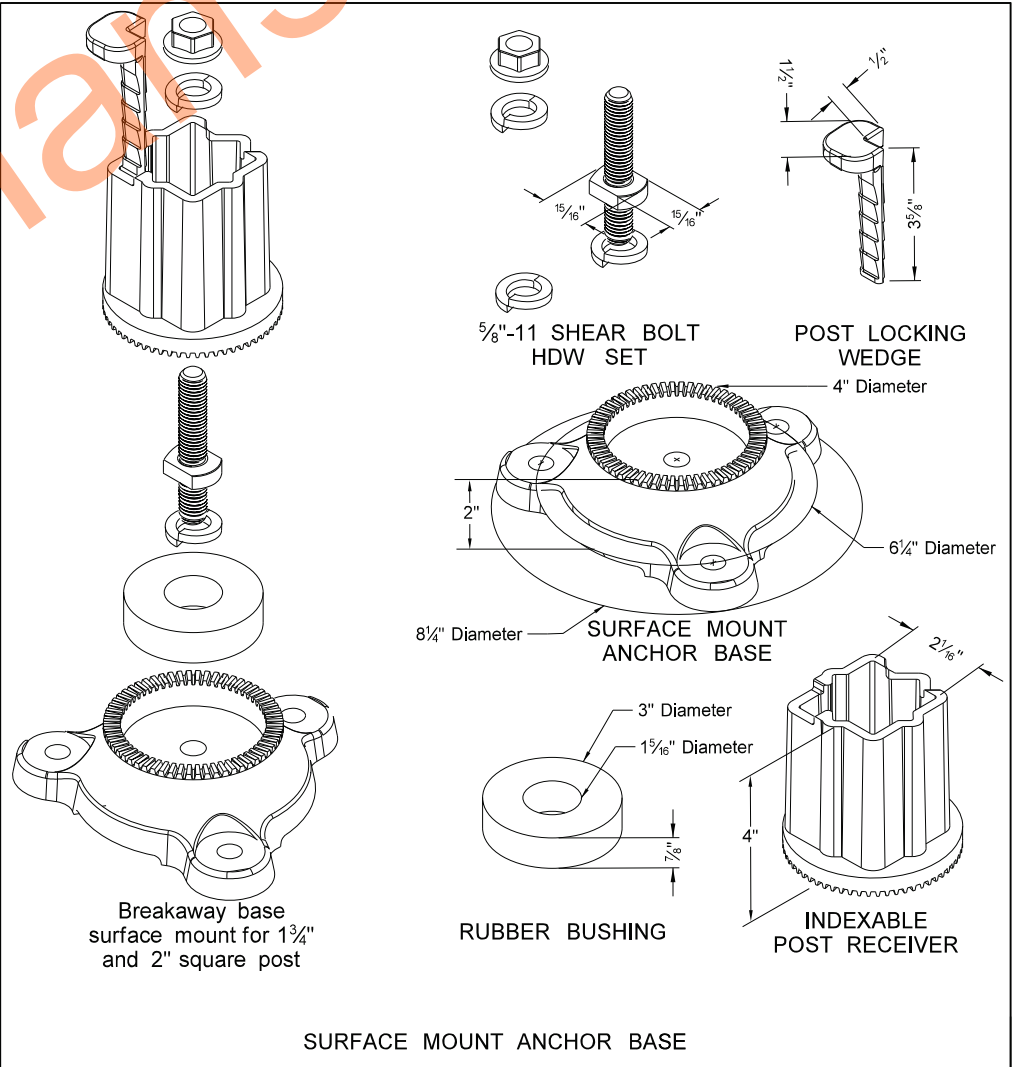


Mounting Details Perforated Tube



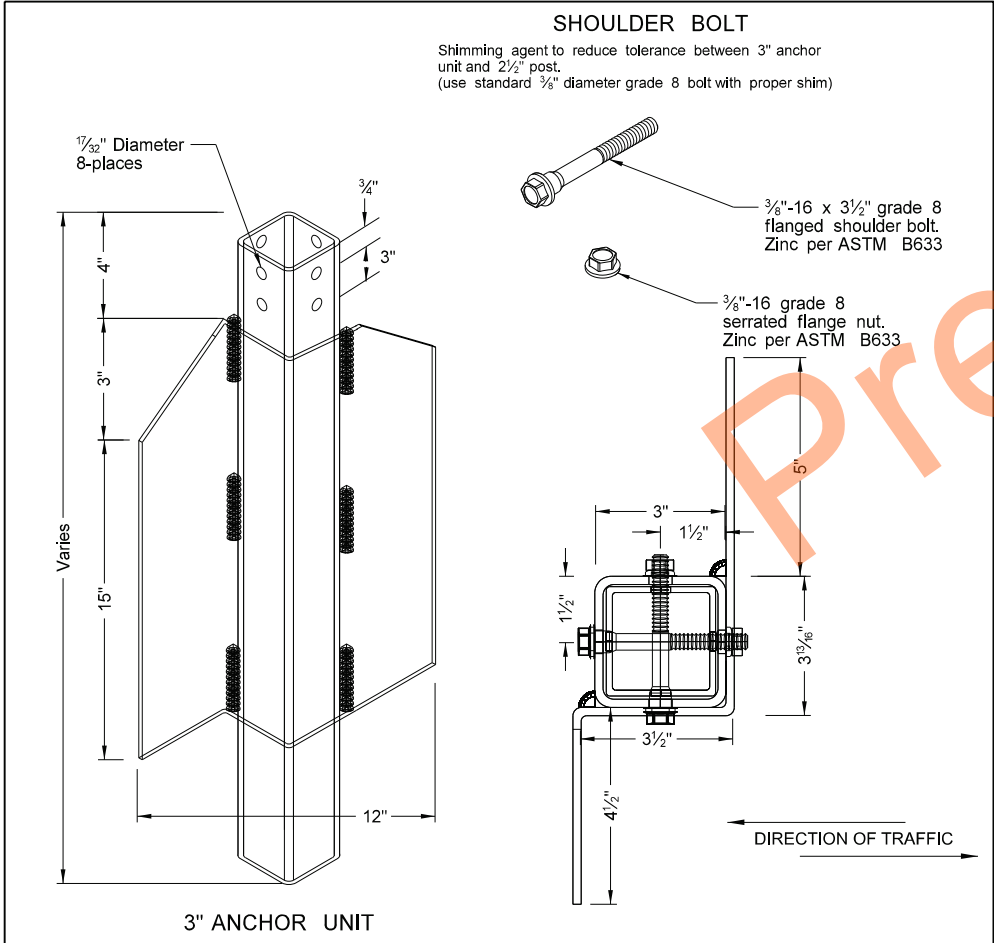
Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. Area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans;
The 2 1/2" size is shown as 2.51" size on the plans.



NOTE:

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



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.



08/05/24

Breakaway Coupler System
for Perforated Tubes

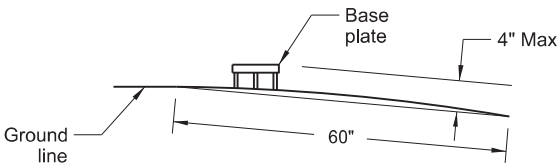
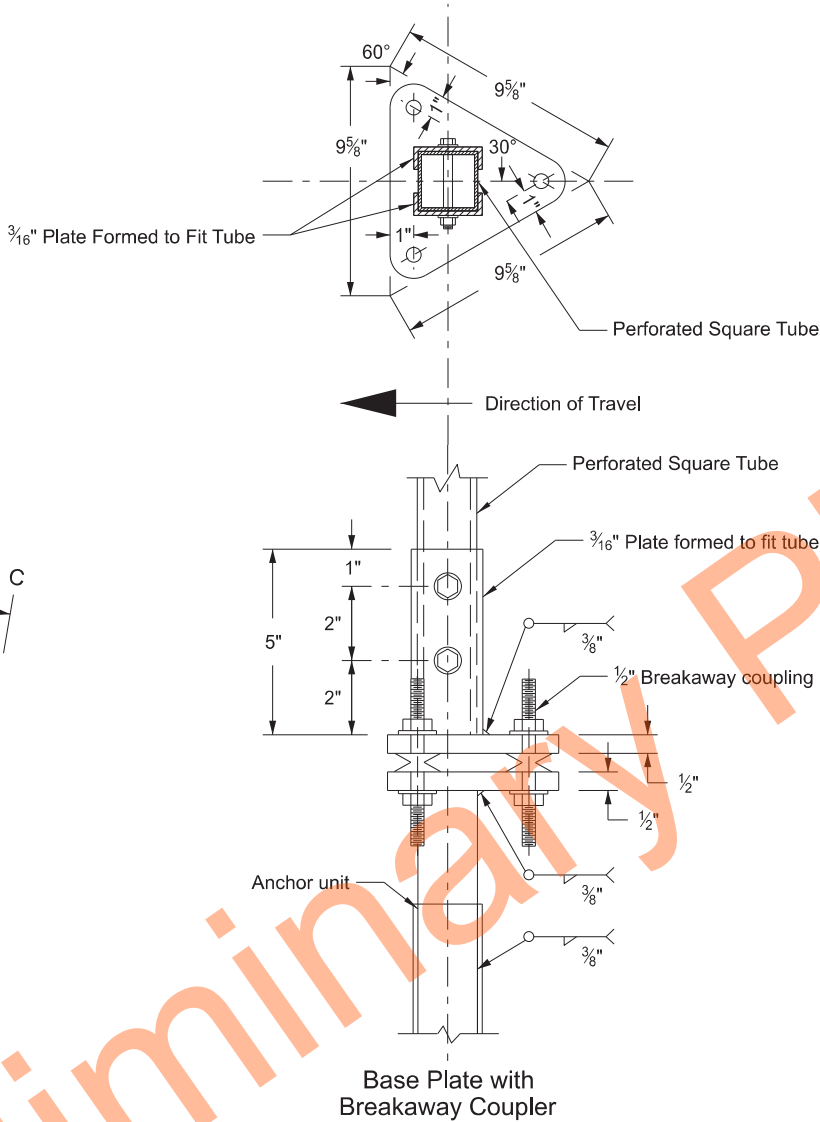
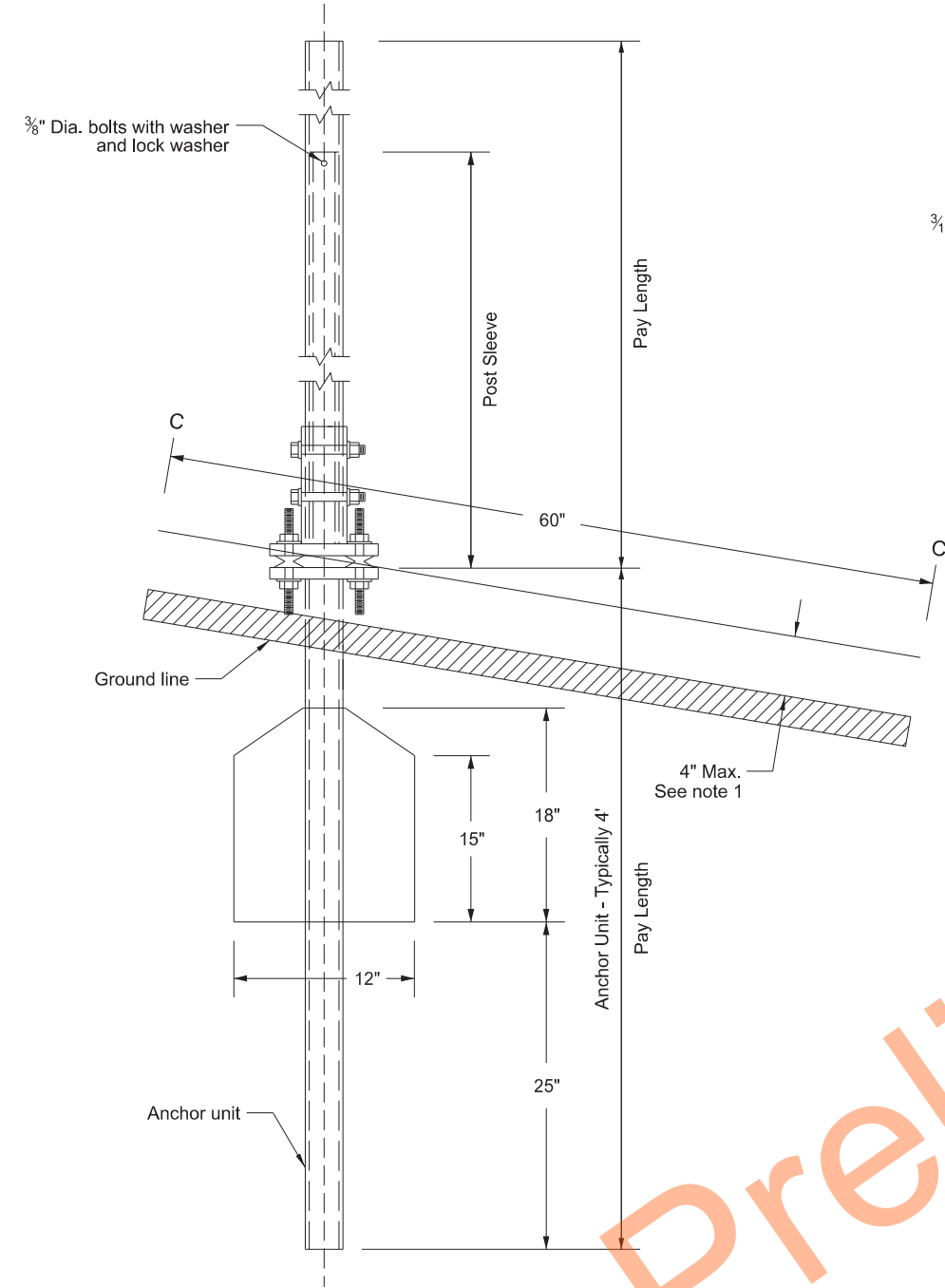
Notes:

- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
- Use anchor unit of the same size and specification as the post.
- Provide a minimum 8' distance between the first and fourth post on four post signs.
- Use the breakaway base system on standard D-754-24 or the breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2¾	10	Yes		7

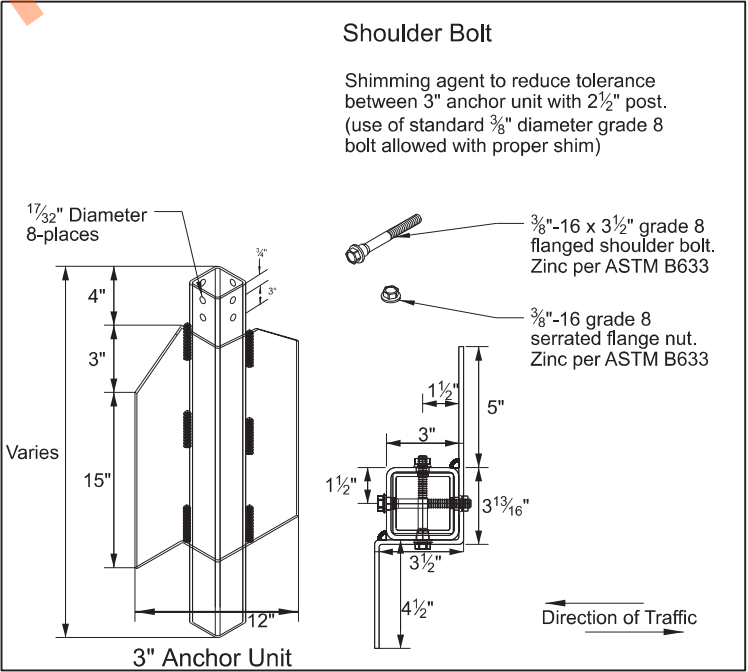
(B) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

(C) - 3" anchor unit



Section C-C

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

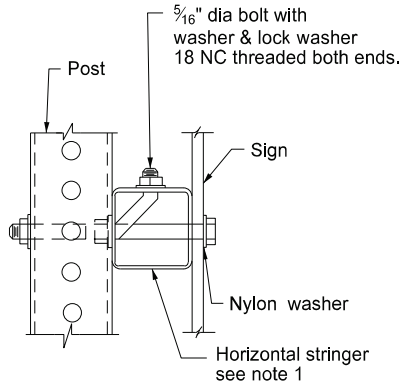


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
08-30-18	Updated notes to active voice.
08-30-19	New Design Engr PE Stamp.
08-05-24	Electronic Stamp/Signature.
07-22-25	Corrected "typo" in C-C note.

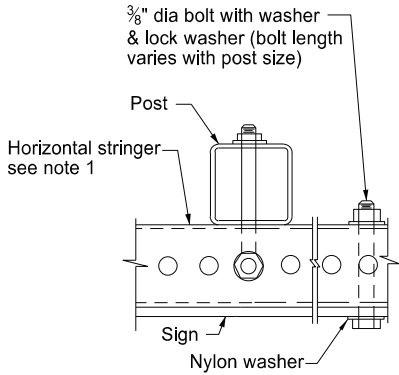


07/22/25

Mounting Details Perforated Tube

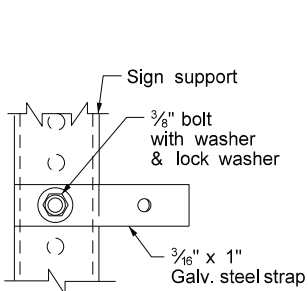


Side View

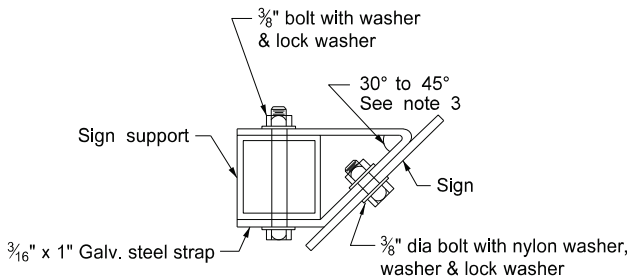


Top View

STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

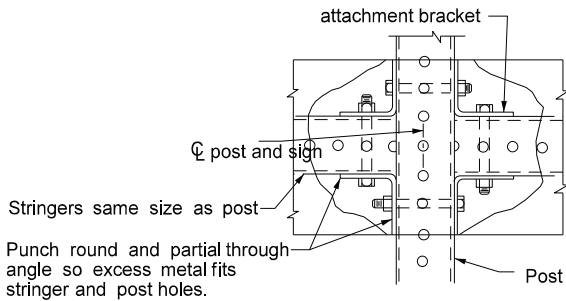


Side View

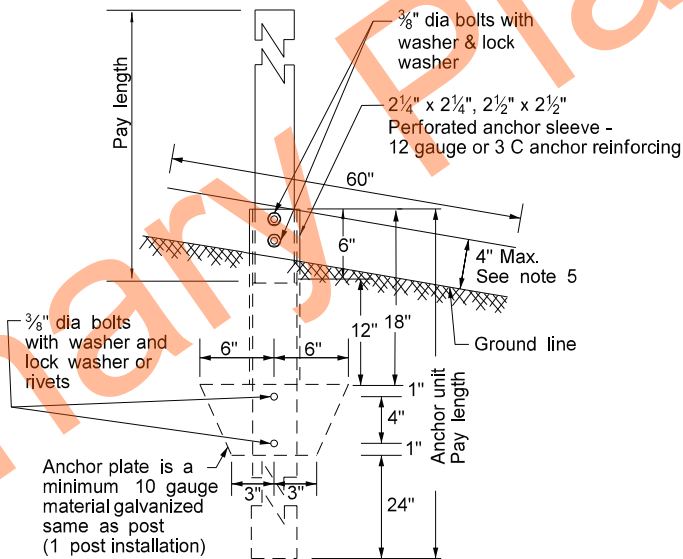


Top View

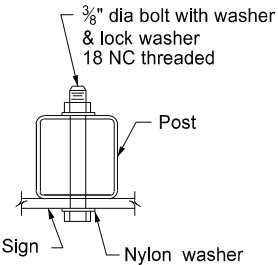
STRAP DETAIL



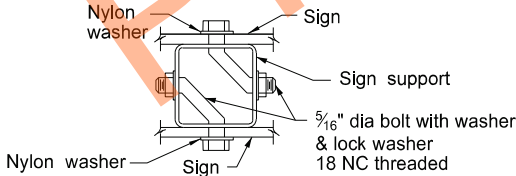
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING



ANCHOR UNIT AND POST ASSEMBLY

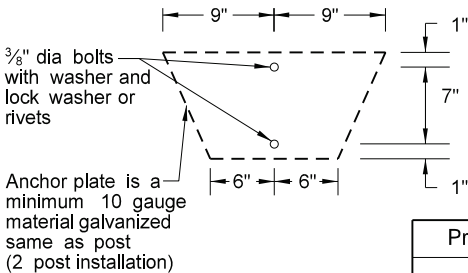


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2 1/2" size is shown as 2.51" size on the plans.

Note:

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

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/16	10	Yes		7

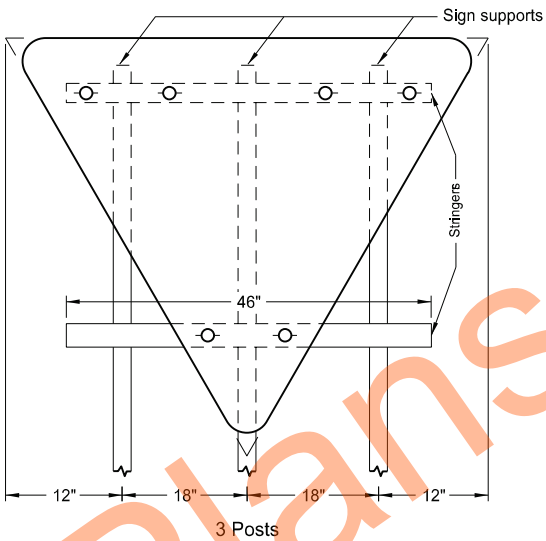
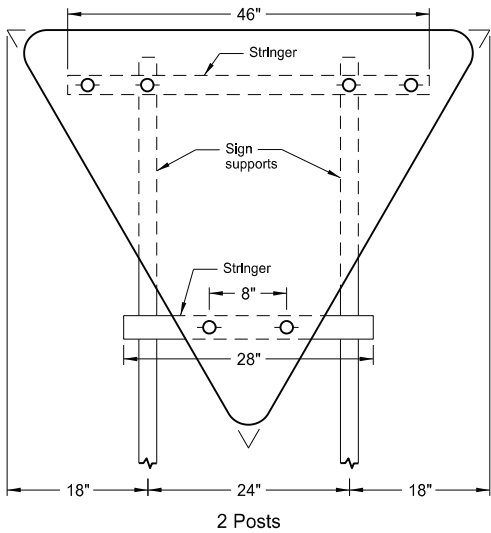
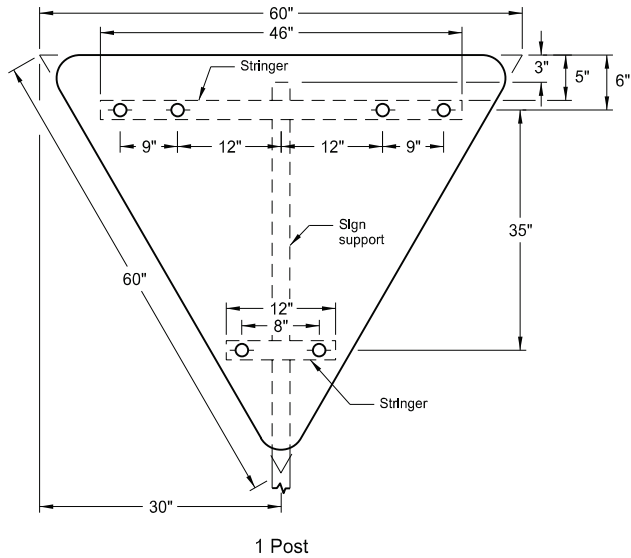
(B) - When placing 2 1/2", 12 gauge posts in standard soils without breakaway bases, provide a shim as specified by the manufacturer. Provide breakaway base when placing the support in weak soils. Engineer will determine if soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3.
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.
8-05-24	Electronic Stamp/Signature.



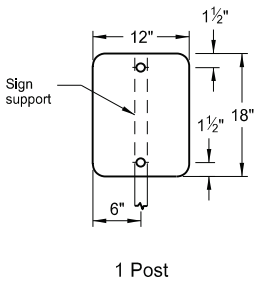
08/05/24

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

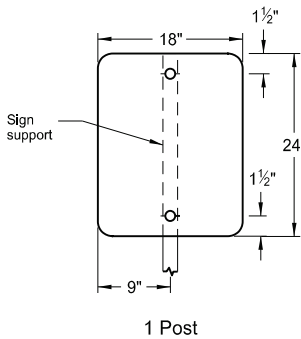


Assembly No. 6

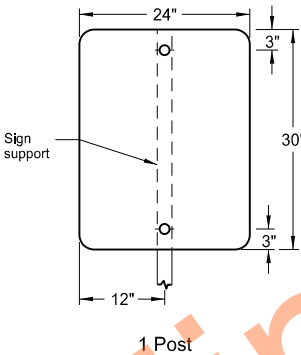
- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1½" x 1½" perforated square tube stringers.
 3. Punch holes round for ⅝" bolt.



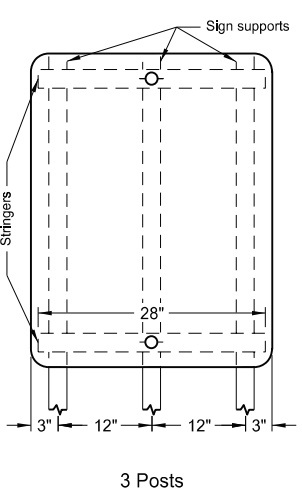
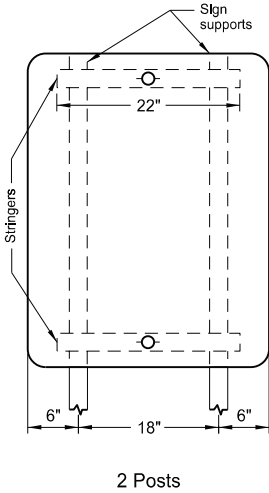
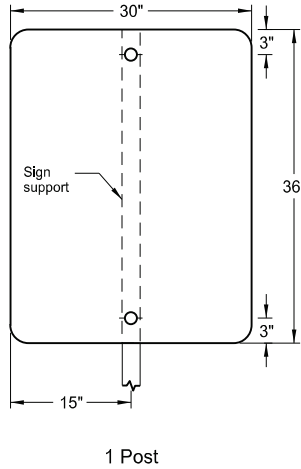
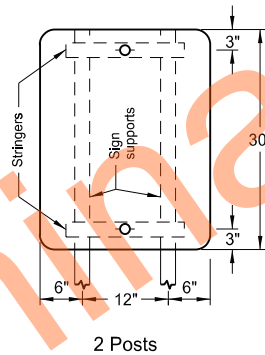
Assembly No. 7



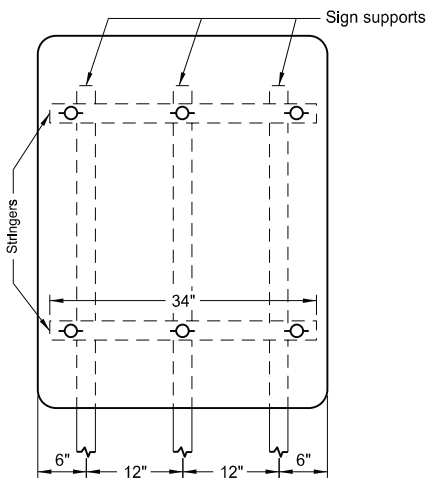
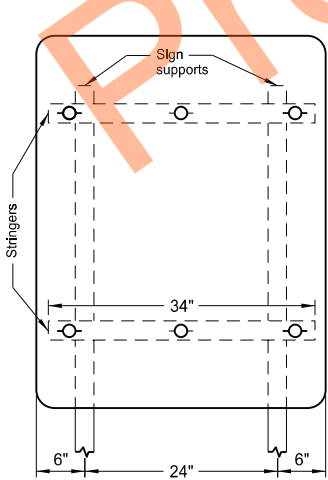
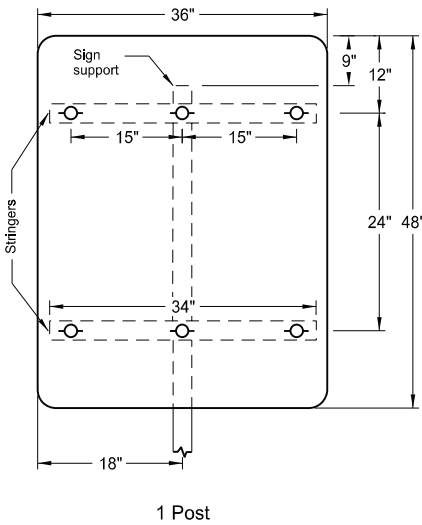
Assembly No. 8



Assembly No. 9



Assembly No. 10



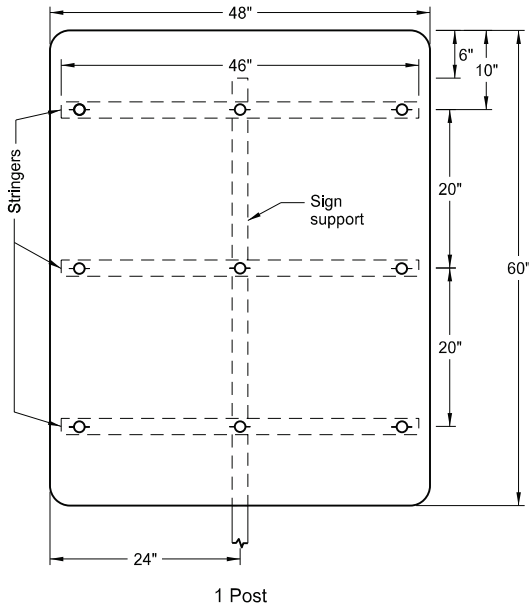
Assembly No. 11

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.
8-06-24	Electronic Stamp/Signature.

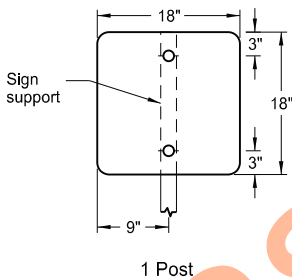
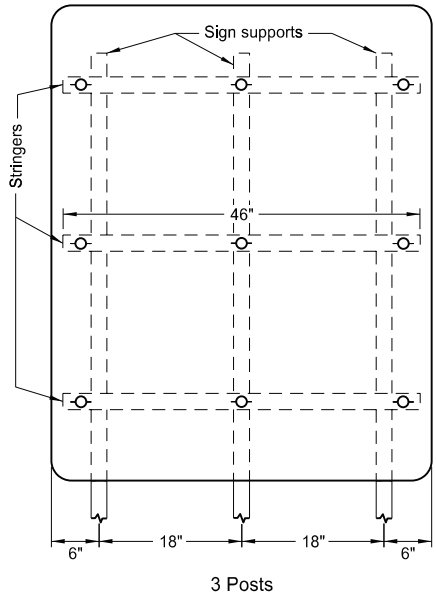
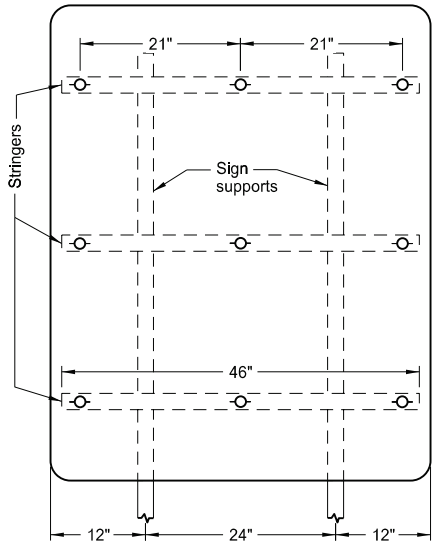


08/06/24

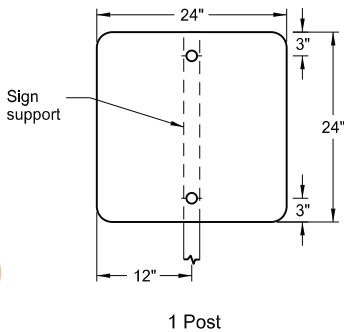
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



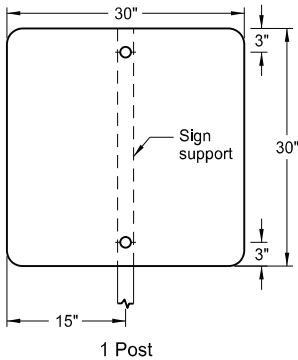
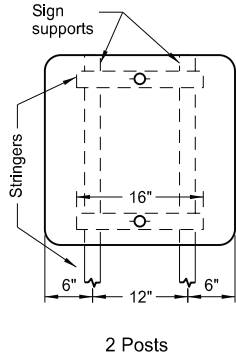
2 Posts
Assembly No. 12



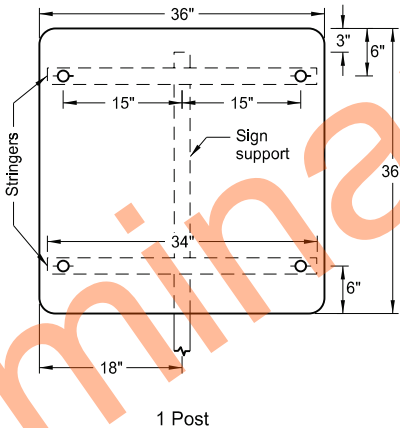
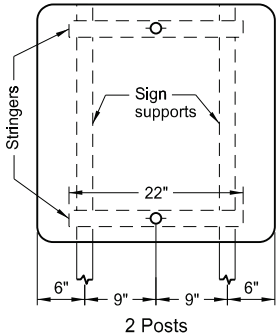
Assembly No. 13



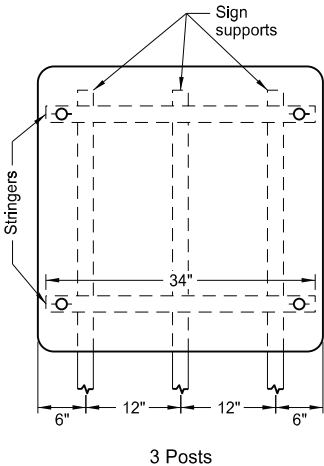
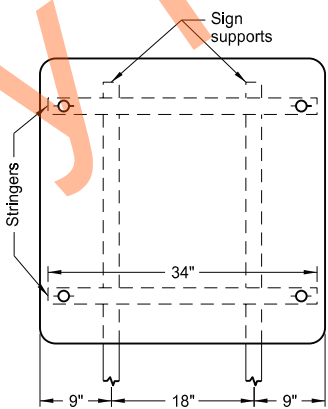
Assembly No. 14



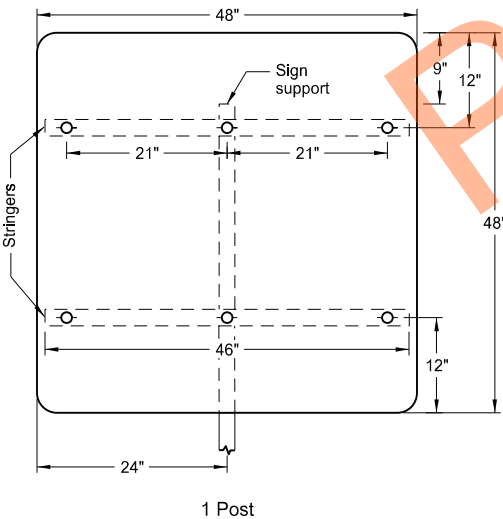
Assembly No. 15



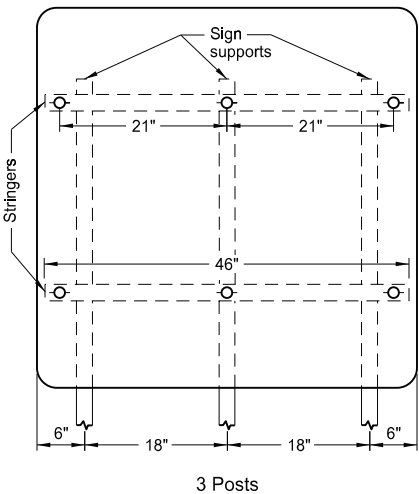
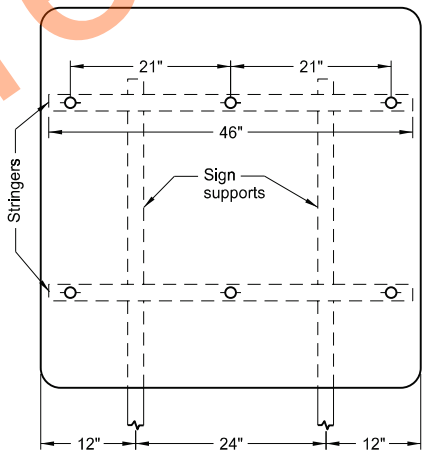
Assembly No. 16



- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1 1/2" x 1 1/2" perforated square tube stringers.
 3. Punch holes round for 3/8" bolt.



Assembly No. 17



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated to active voice & changed
8-30-19	Assembly 16 post spacing.
8-06-24	New Design Engineer PE Stamp, Electronic Stamp/Signature.

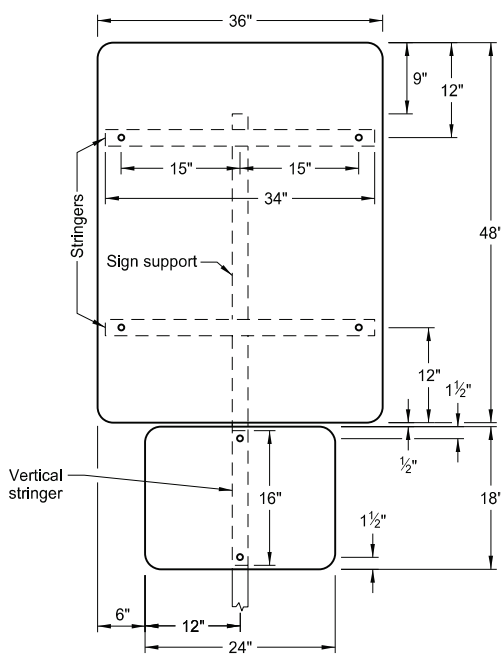


08/06/24

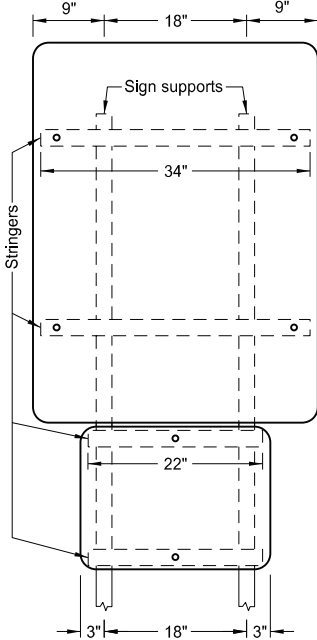
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING AND GUIDE SIGNS

D-754-36

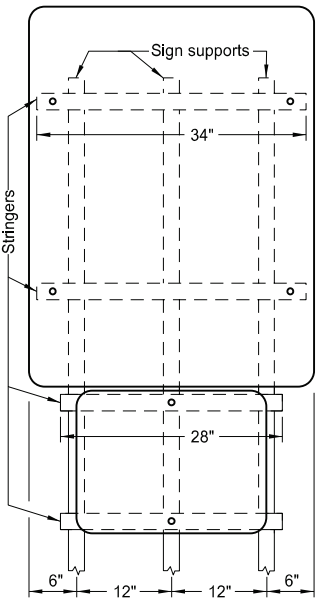
- Notes:
- 1. Use 0.100 inch minimum thickness sign backing material.
 - 2. Use 1½"x1½" perforated square tube stringers.
 - 3. Punch holes round for ⅜" bolt.



1 Post

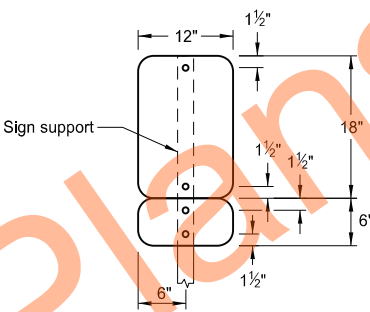


2 Posts



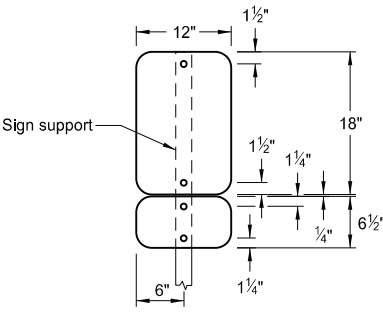
3 Posts

Assembly No. 47



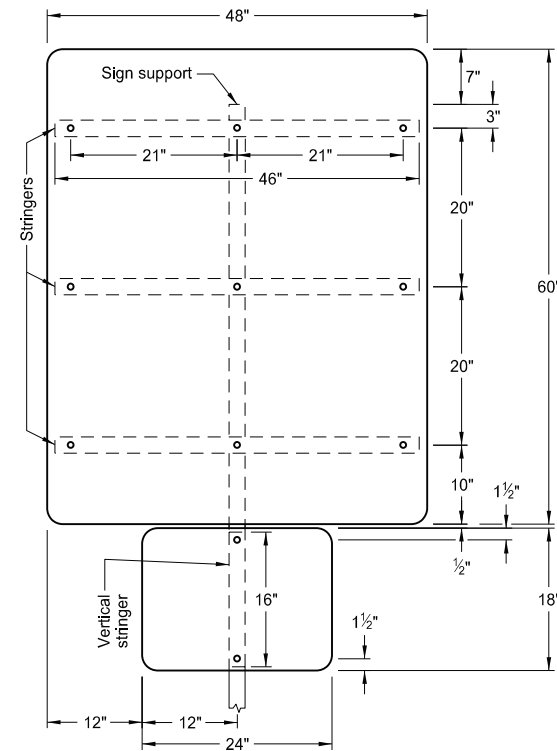
1 Post

Assembly No. 49

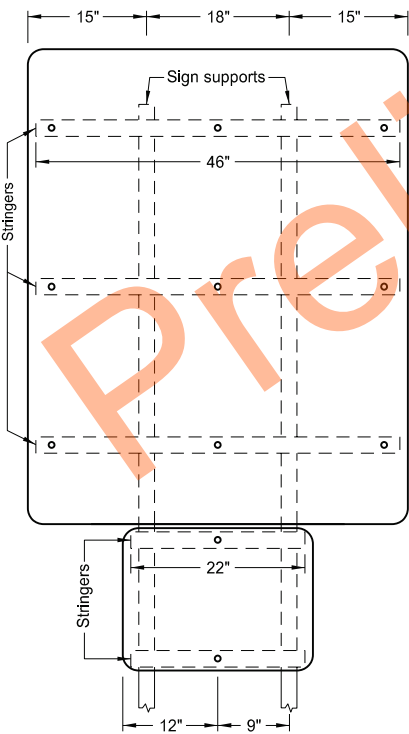


1 Post

Assembly No. 50

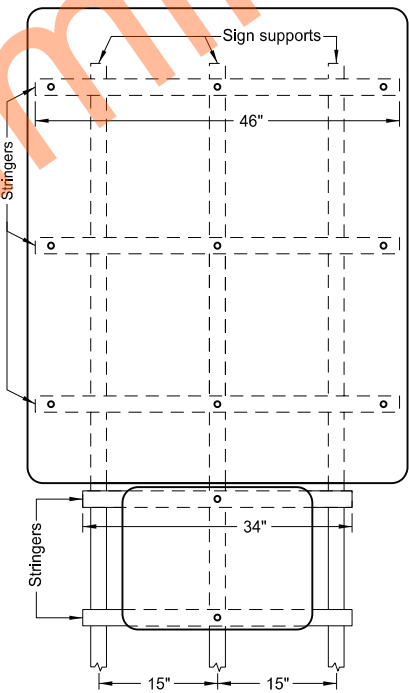


1 Post

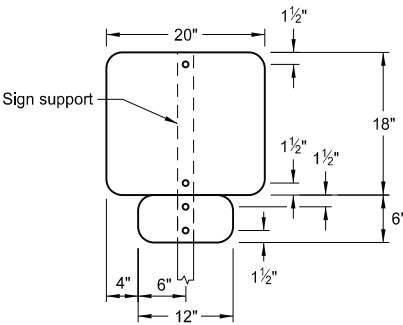


2 Posts

Assembly No. 48

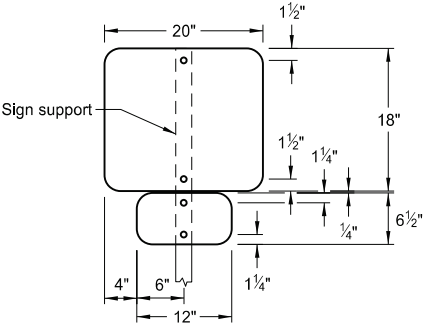


3 Posts



1 Post

Assembly No. 51



1 Post

Assembly No. 52

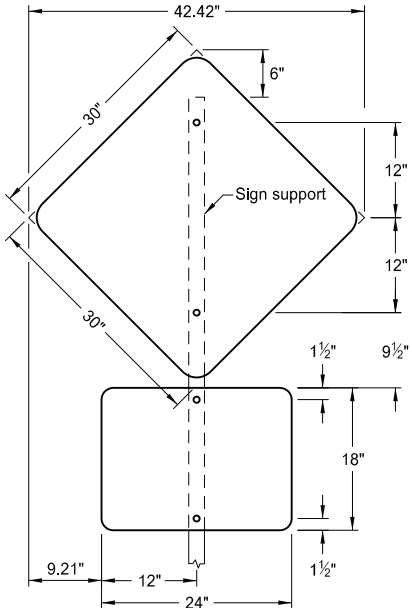
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated to active voice & changed
8-30-19	Assemblies 49 & 51 sign spacing.
8-06-24	New Design Engineer PE Stamp. Electronic Stamp/Signature.



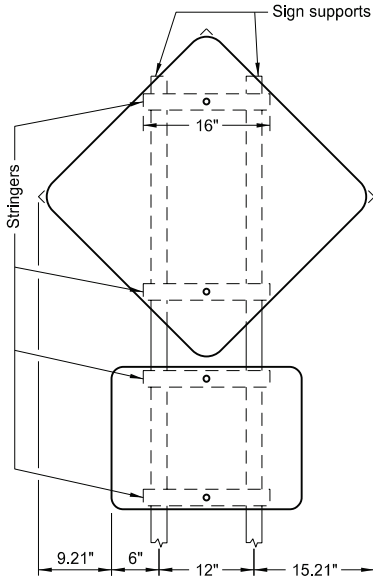
08/06/24

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

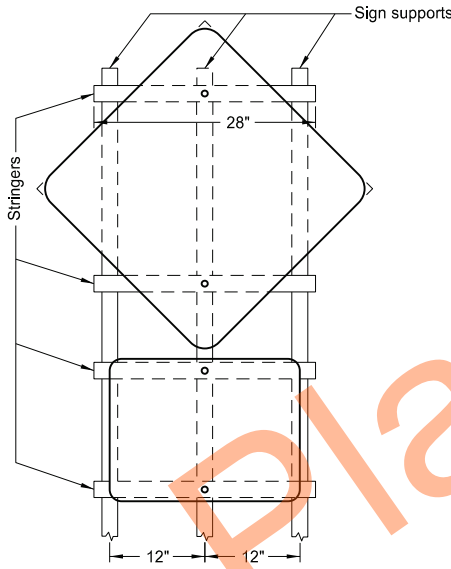
D-754-38



1 Post

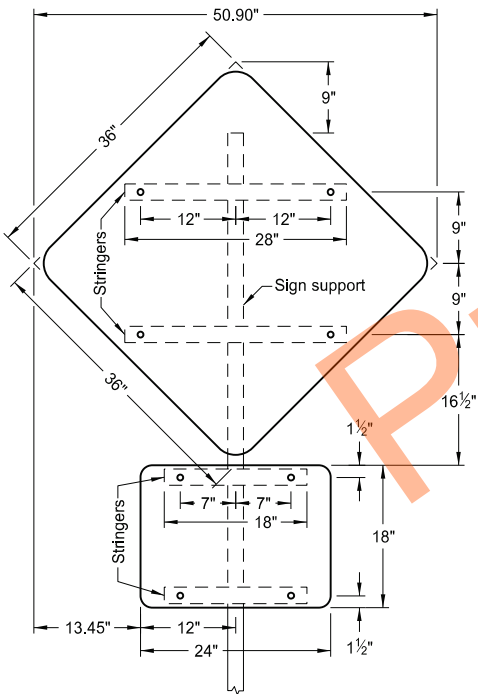


2 Posts

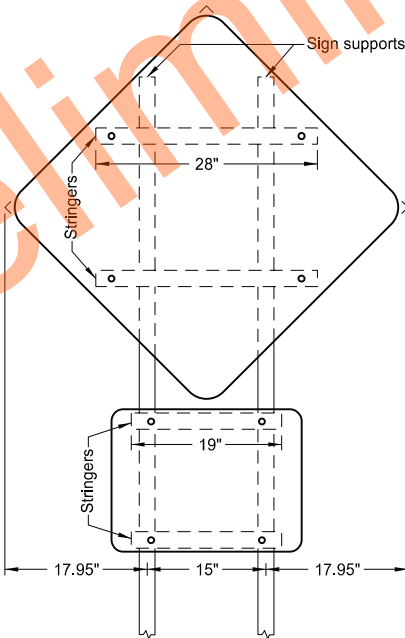


3 Posts

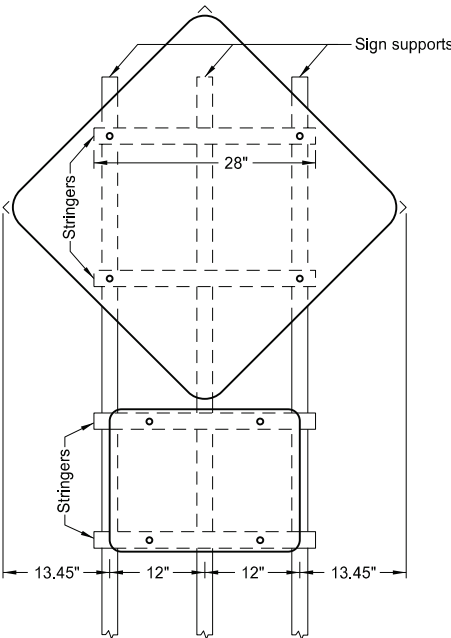
ASSEMBLY NO. 56



1 Post



2 Posts



3 Posts

ASSEMBLY NO. 57

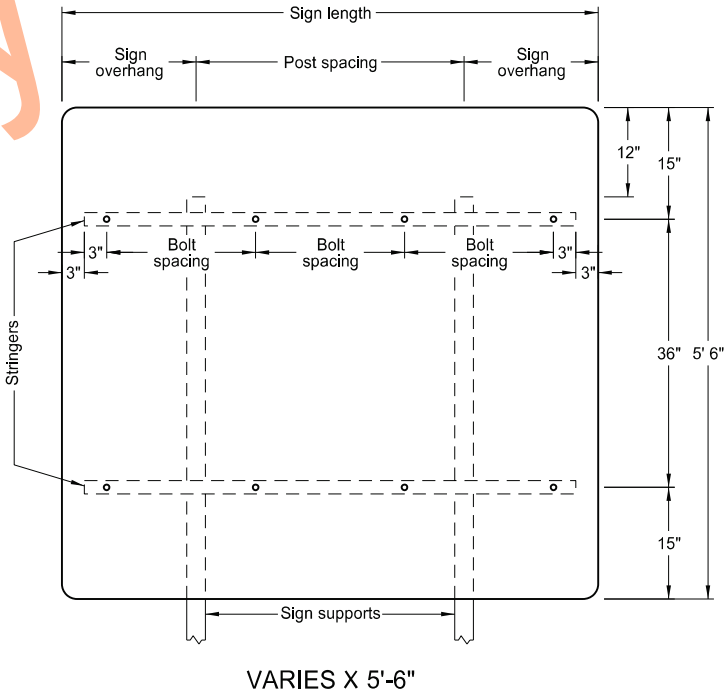
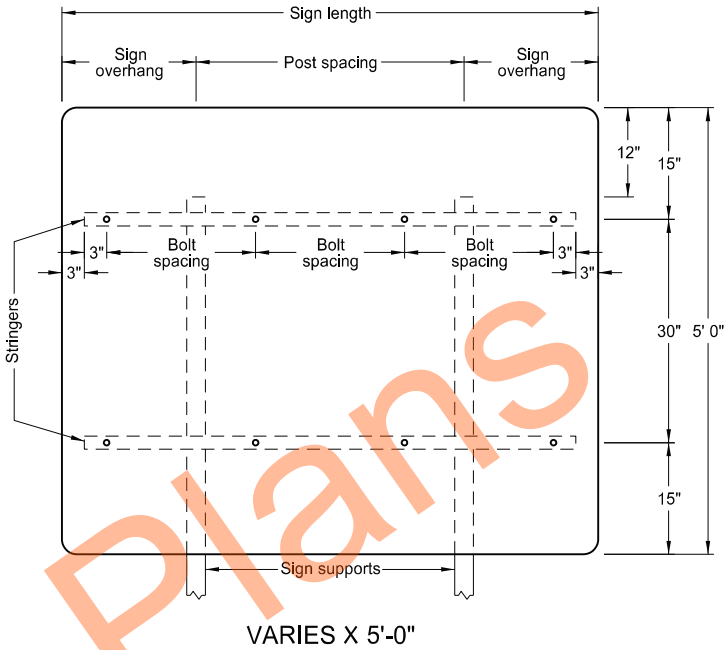
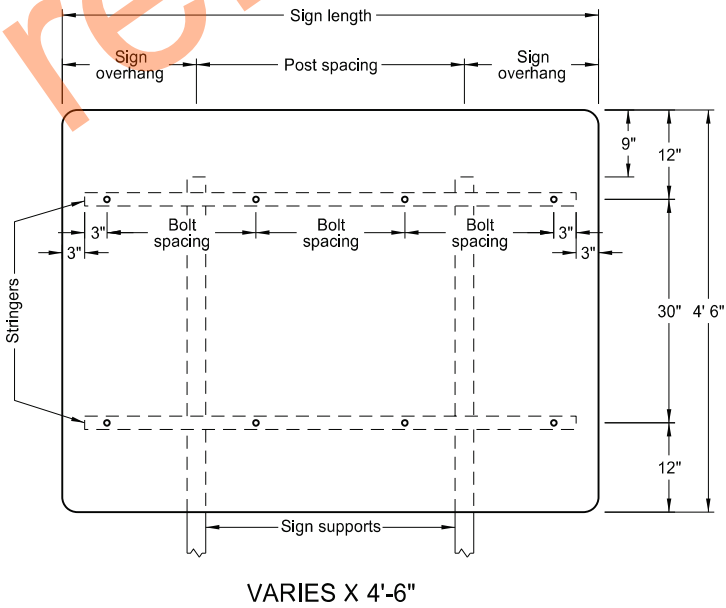
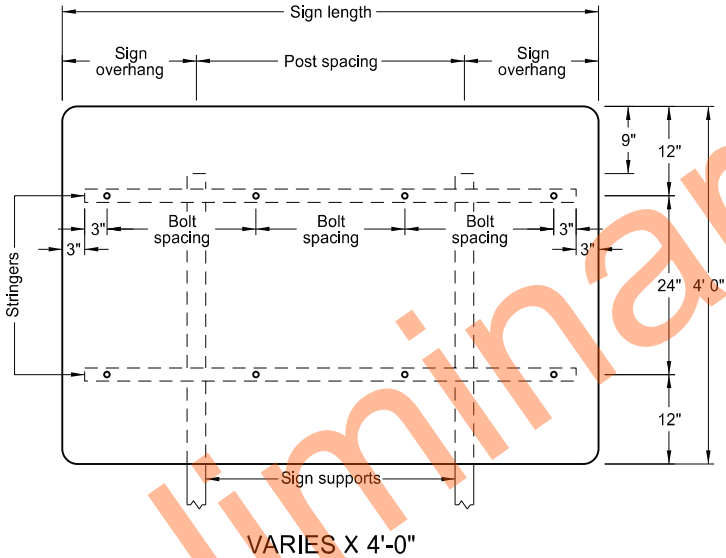
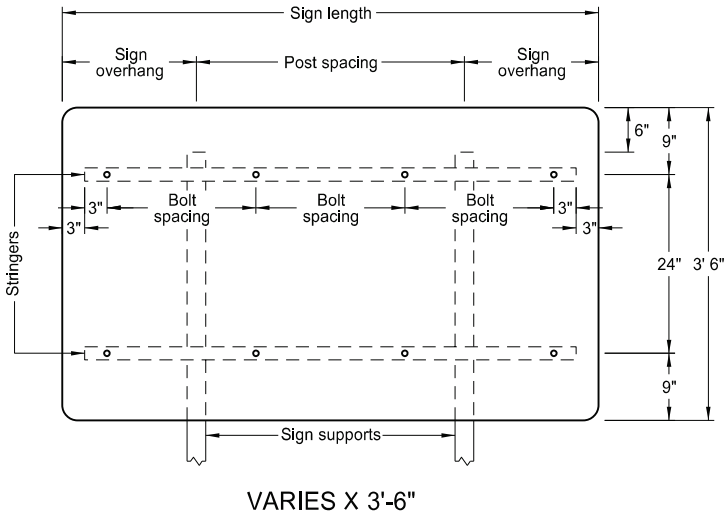
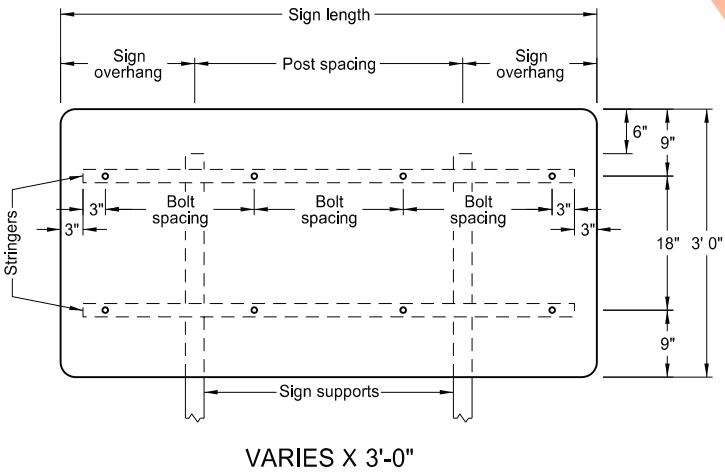
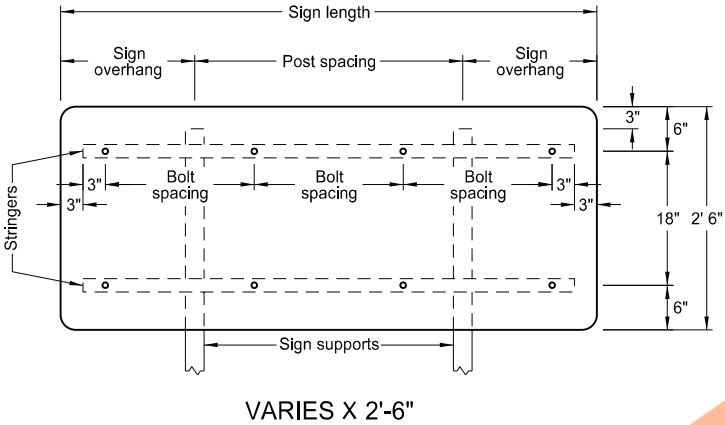
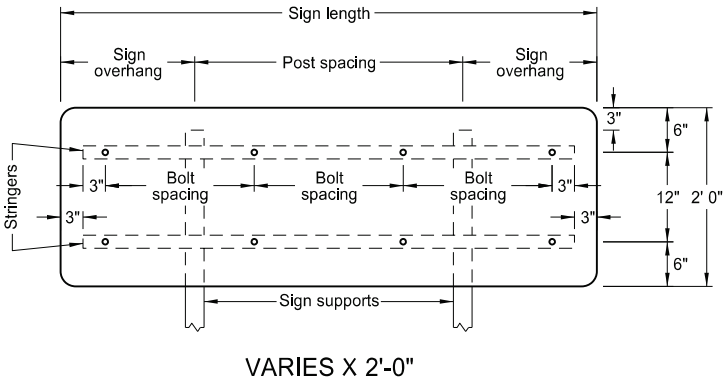
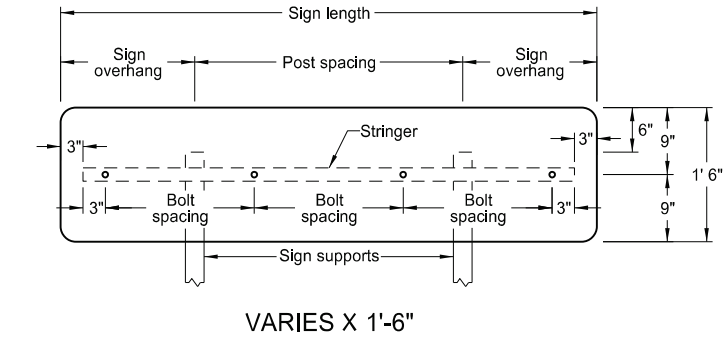
- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1 1/2"x1 1/2" perforated square tube stringers.
 3. Punch holes round for 3/8" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated to active voice & added Assembly dimensions.
8-30-19	New Design Engineer PE Stamp.
8-06-24	Electronic Stamp/Signature.



08/06/24

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



2 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	1'-0"	2'-0"	18"
4'-6"	1'-3"	2'-0"	21"
5'-0"	1'-0"	3'-0"	24"
5'-6"	1'-3"	3'-0"	18"
6'-0"	1'-6"	3'-0"	20"
6'-6"	1'-3"	4'-0"	22"
7'-0"	1'-6"	4'-0"	24"
7'-6"	1'-9"	4'-0"	2-20" & 2-19"
8'-0"	2'-0"	4'-0"	21"
8'-6"	1'-9"	5'-0"	2-22" & 2-23"
9'-0"	2'-0"	5'-0"	24"
9'-6"	1'-9"	6'-0"	4-20" & 1-22"
10'-0"	2'-0"	6'-0"	2-21" & 3-22"
10'-6"	2'-3"	6'-0"	4-23" & 1-22"
11'-0"	2'-6"	6'-0"	24"
11'-6"	2'-9"	6'-0"	21"
12'-0"	2'-0"	8'-0"	22"
12'-6"	2'-3"	8'-0"	23"
13'-0"	2'-6"	8'-0"	24"
13'-6"	2'-9"	8'-0"	3-22" & 4-21"
14'-0"	3'-0"	8'-0"	2-23" & 5-22"
14'-6"	3'-3"	8'-0"	6-23" & 1-24"
15'-0"	3'-6"	8'-0"	24"
15'-6"	2'-9"	10'-0"	6-22" & 2-21"
16'-0"	3'-0"	10'-0"	4-23" & 4-22"
16'-6"	3'-3"	10'-0"	6-23" & 2-24"
17'-0"	3'-6"	10'-0"	24"
17'-6"	3'-9"	10'-0"	22"
18'-0"	3'-0"	12'-0"	6-23" & 3-22"
18'-6"	3'-3"	12'-0"	6-23" & 3-24"
19'-0"	3'-6"	12'-0"	24"
19'-6"	3'-9"	12'-0"	8-22" & 2-23"
20'-0"	4'-0"	12'-0"	8-23" & 2-22"

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

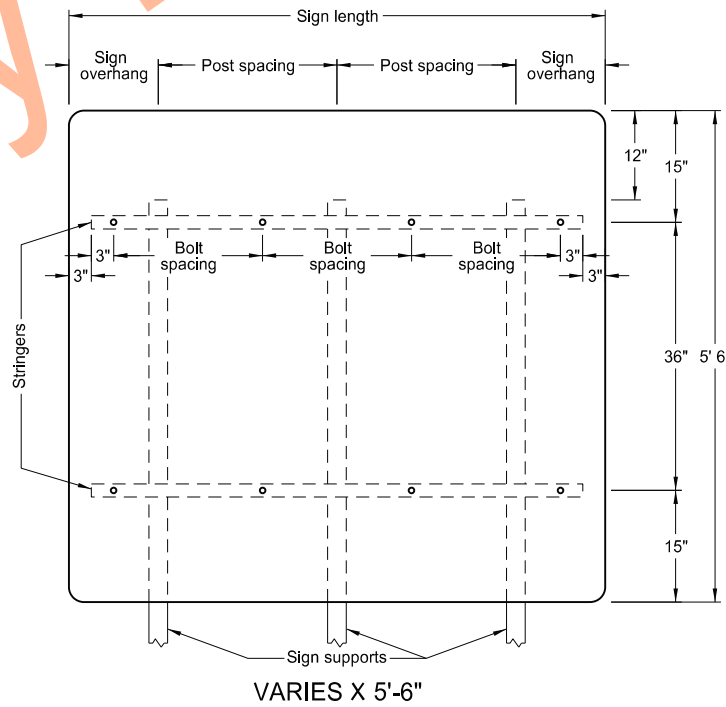
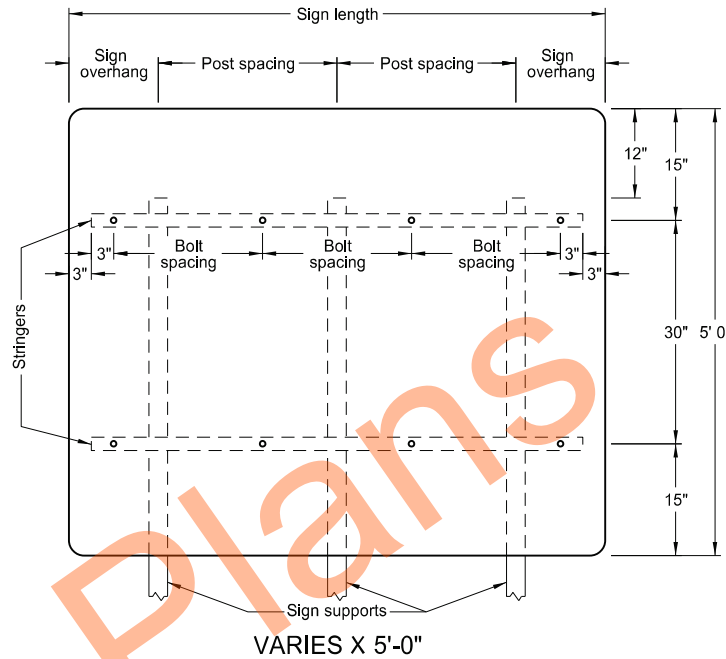
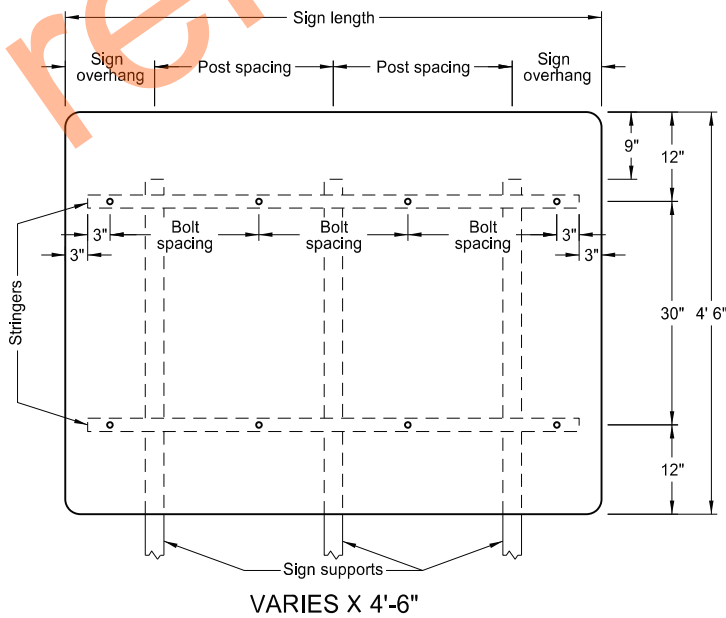
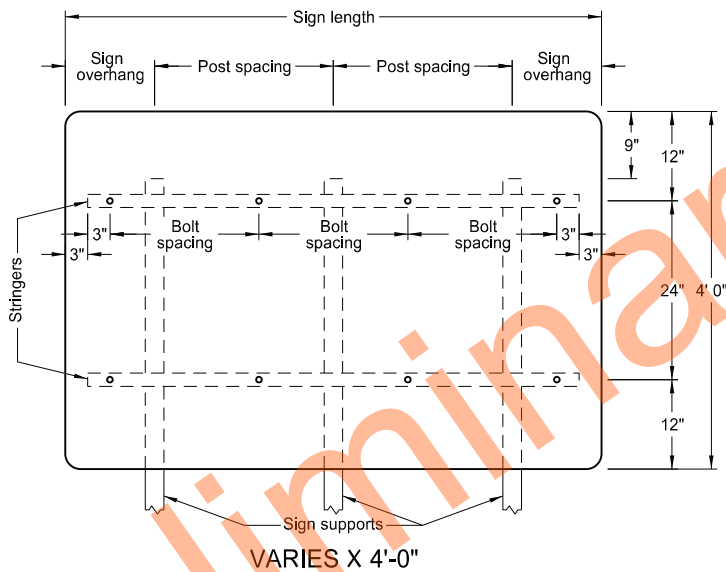
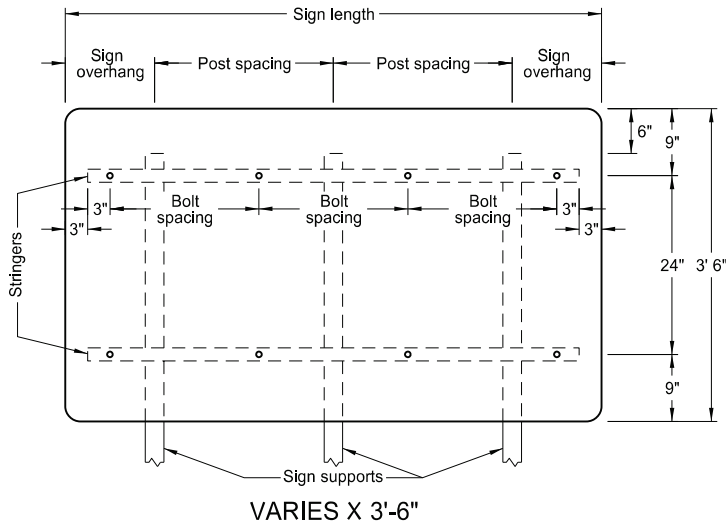
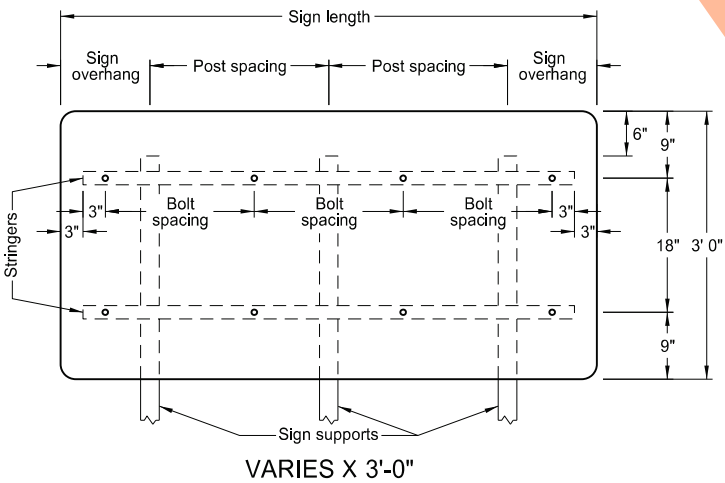
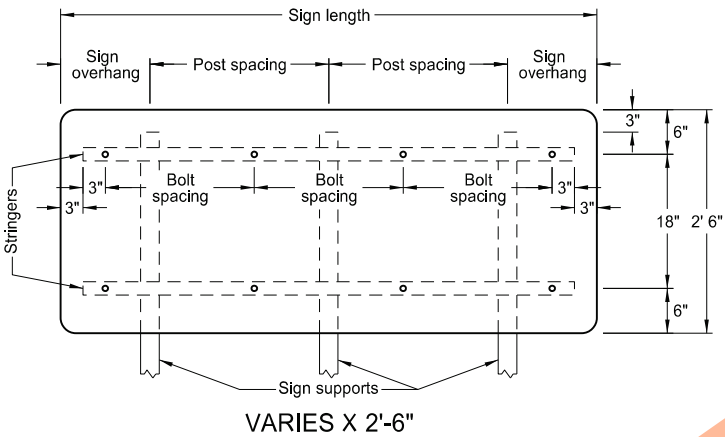
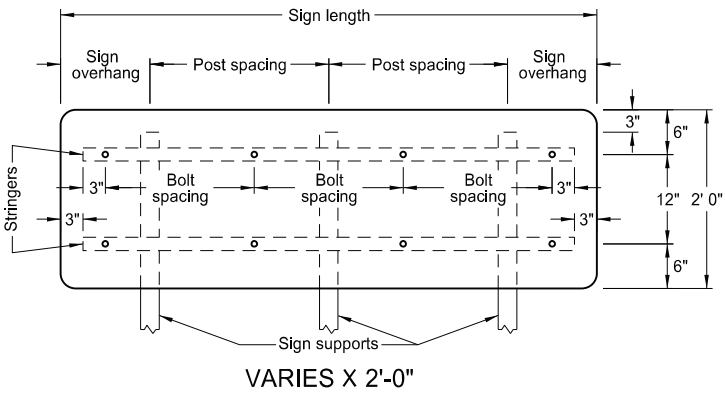
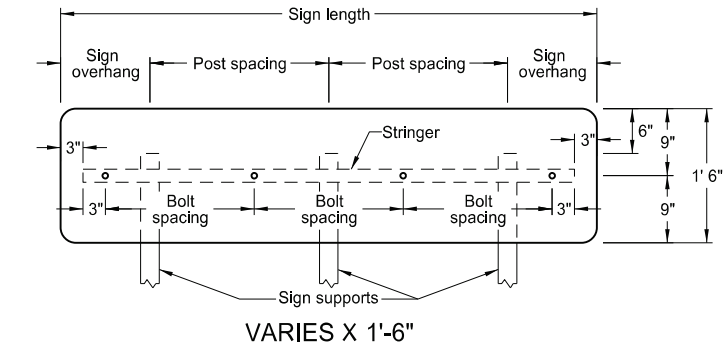
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voices.
9-04-19	New Design Engineer PE Stamp.
8-07-24	Electronic Stamp/Signature.



08/07/24

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

D-754-49



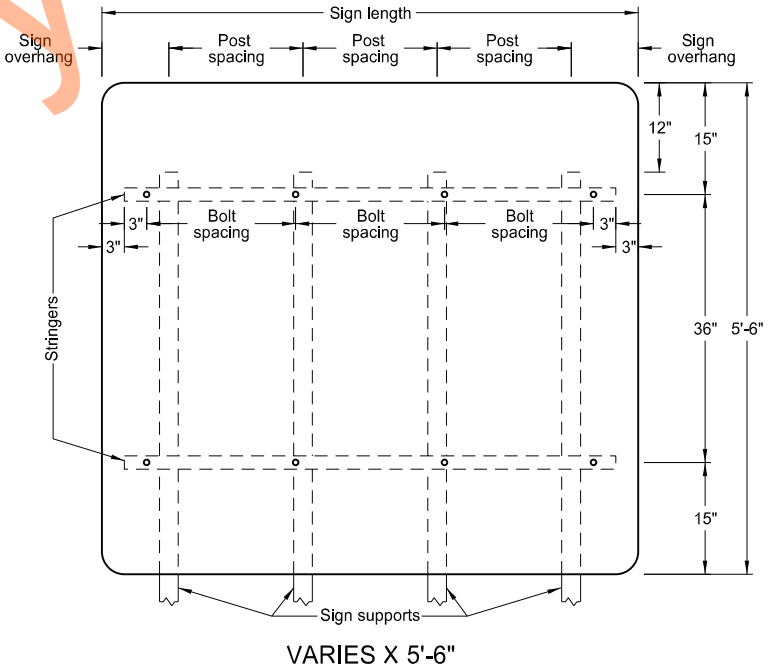
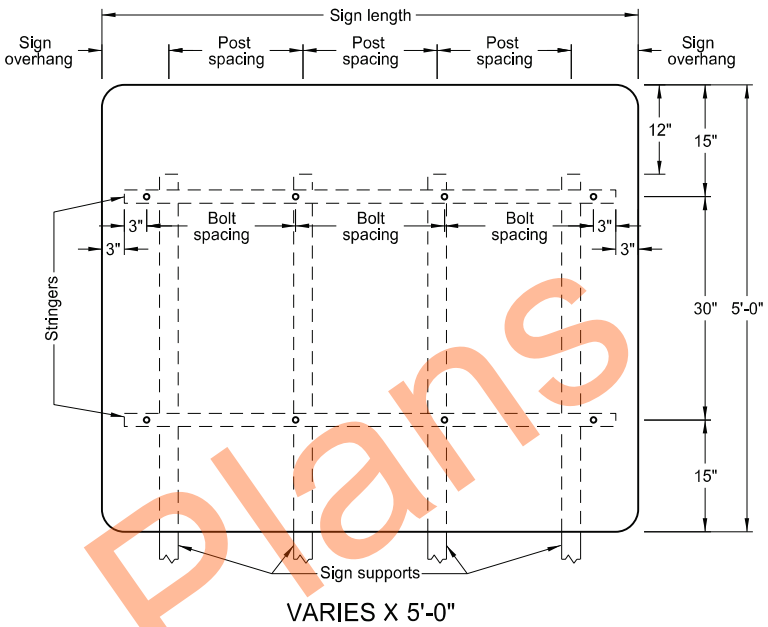
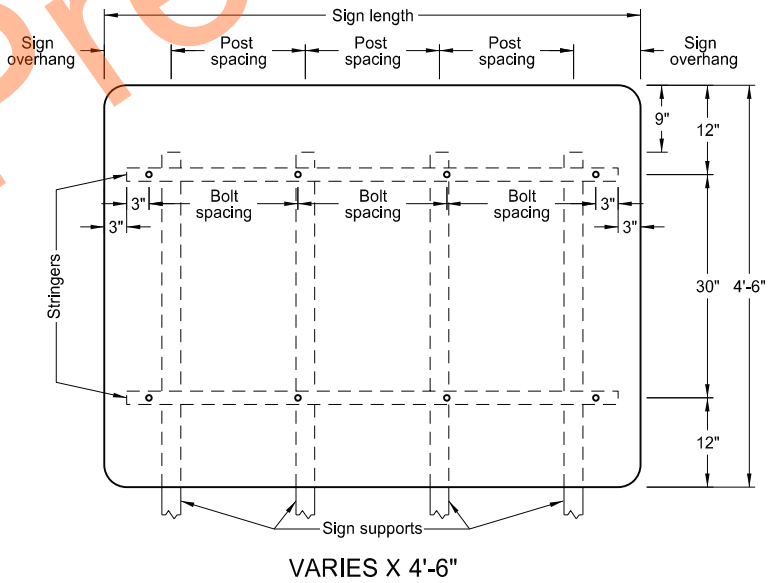
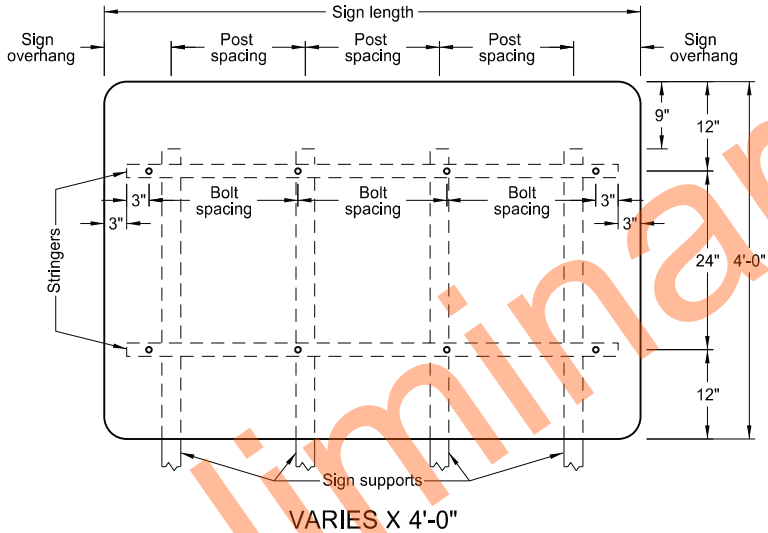
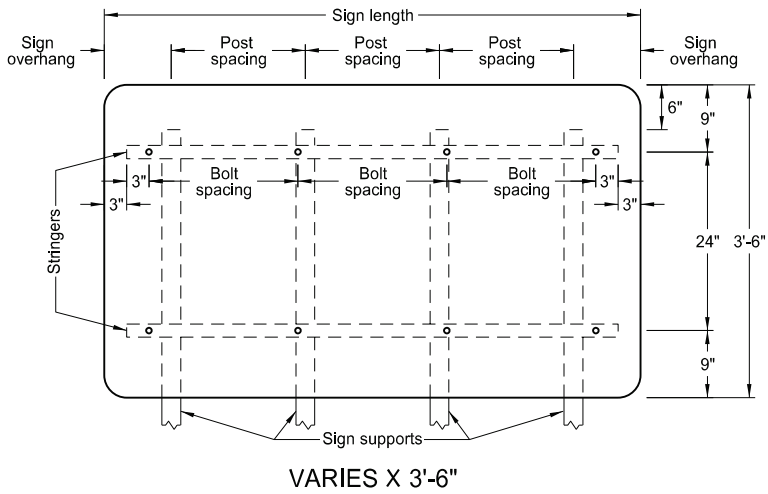
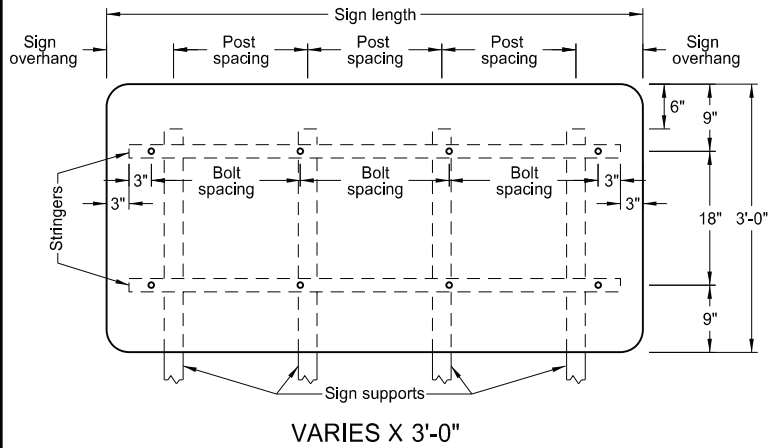
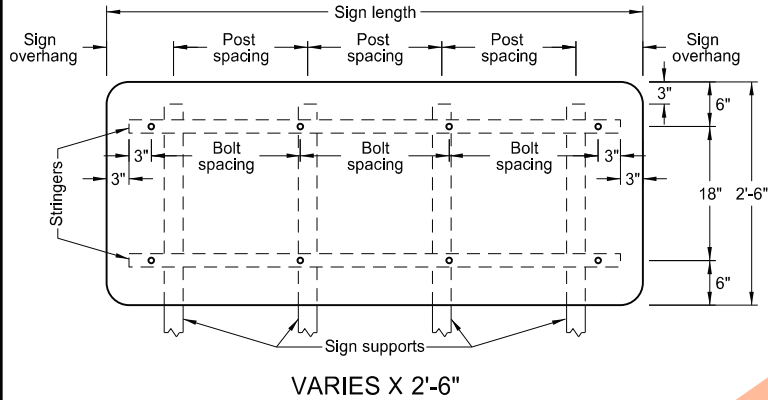
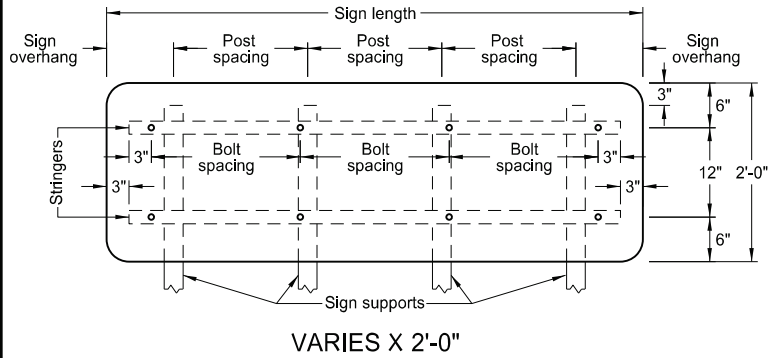
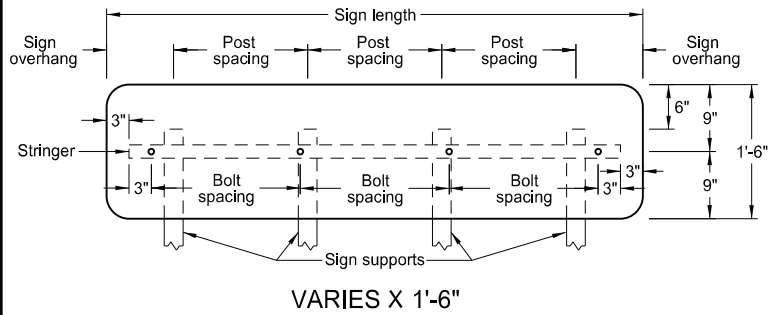
- Notes:
1. Use 0.100 minimum thickness sign backing material.
 2. Use 1½" x 1½" perforated square tube stringers.
 3. Punch holes round for ⅜" bolt.

3 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	0'-6"	1'-6"	18"
4'-6"	0'-6"	1'-9"	21"
5'-0"	0'-6"	2'-0"	24"
5'-6"	1'-3"	1'-6"	18"
6'-0"	1'-0"	2'-0"	20"
6'-6"	1'-3"	2'-0"	22"
7'-0"	1'-6"	2'-0"	24"
7'-6"	1'-6"	2'-3"	2-20" & 2-19"
8'-0"	1'-9"	2'-3"	21"
8'-6"	2'-0"	2'-3"	2-22" & 2-23"
9'-0"	1'-6"	3'-0"	24"
9'-6"	1'-9"	3'-0"	4-20" & 1-22"
10'-0"	1'-9"	3'-3"	2-21" & 3-22"
10'-6"	1'-9"	3'-6"	4-23" & 1-22"
11'-0"	2'-0"	3'-6"	24"
11'-6"	2'-3"	3'-6"	21"
12'-0"	2'-4"	3'-8"	22"
12'-6"	2'-5"	3'-10"	23"
13'-0"	2'-6"	4'-0"	24"
13'-6"	2'-9"	4'-0"	3-22" & 4-21"
14'-0"	3'-0"	4'-0"	2-23" & 5-22"
14'-6"	3'-3"	4'-0"	6-23" & 1-24"
15'-0"	3'-6"	4'-0"	24"
15'-6"	2'-4"	5'-5"	6-22" & 2-21"
16'-0"	2'-5"	5'-7"	4-23" & 4-22"
16'-6"	2'-5"	5'-10"	6-23" & 2-24"
17'-0"	2'-6"	6'-0"	24"
17'-6"	3'-3"	5'-6"	22"
18'-0"	3'-6"	5'-6"	6-23" & 3-22"
18'-6"	3'-9"	5'-6"	6-23" & 3-24"
19'-0"	3'-6"	6'-0"	24"
19'-6"	4'-3"	5'-6"	8-22" & 2-23"
20'-0"	4'-4"	5'-8"	8-23" & 2-22"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.
8-07-24	Electronic Stamp/Signature.



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



4 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
8'-6"	0'-3"	2'-8"	2-22" & 2-23"
9'-0"	0'-6"	2'-8"	24"
9'-6"	0'-9"	2'-8"	4-20" & 1-22"
10'-0"	1'-0"	2'-8"	2-21" & 3-22"
10'-6"	1'-3"	2'-8"	4-23" & 1-22"
11'-0"	1'-0"	3'-0"	24"
11'-6"	0'-6"	3'-6"	21"
12'-0"	0'-6"	3'-8"	22"
12'-6"	0'-6"	3'-10"	23"
13'-0"	0'-6"	4'-0"	24"
13'-6"	1'-3"	3'-8"	3-22" & 4-21"
14'-0"	1'-6"	3'-8"	2-23" & 5-22"
14'-6"	1'-3"	4'-0"	6-23" & 1-24"
15'-0"	1'-6"	4'-0"	24"
15'-6"	1'-0"	4'-6"	6-22" & 2-21"
16'-0"	1'-0"	4'-8"	4-23" & 4-22"
16'-6"	1'-0"	4'-10"	6-23" & 2-24"
17'-0"	1'-0"	5'-0"	24"
17'-6"	0'-6"	5'-6"	22"
18'-0"	2'-0"	4'-8"	6-23" & 3-22"
18'-6"	1'-9"	5'-0"	6-23" & 3-24"
19'-0"	0'-6"	6'-0"	24"
19'-6"	3'-0"	4'-6"	8-22" & 2-23"
20'-0"	3'-0"	4'-8"	8-23" & 2-22"

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

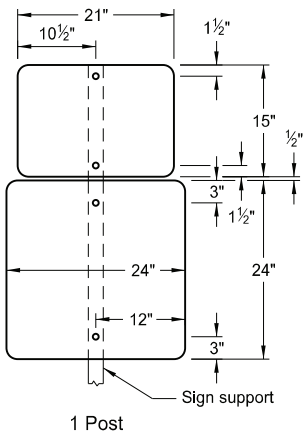
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.
8-07-24	Electronic Stamp/Signature.



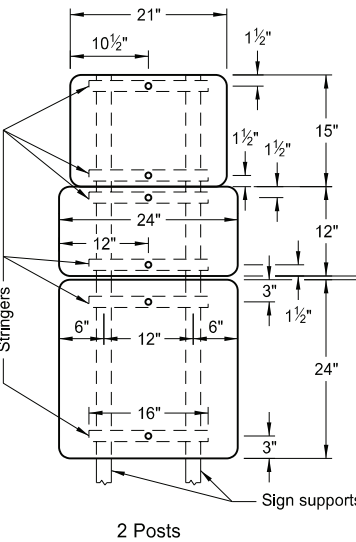
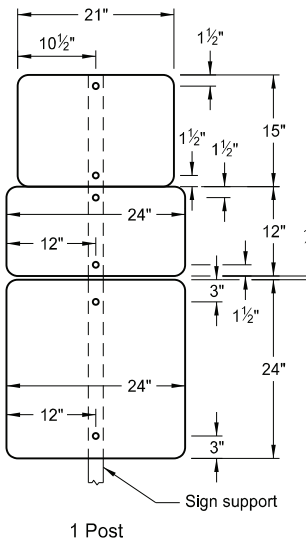
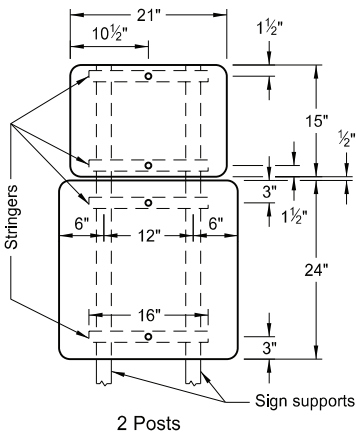
08/07/24

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

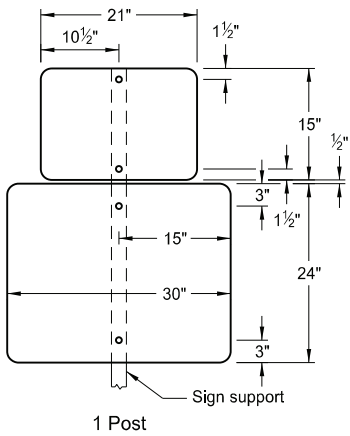
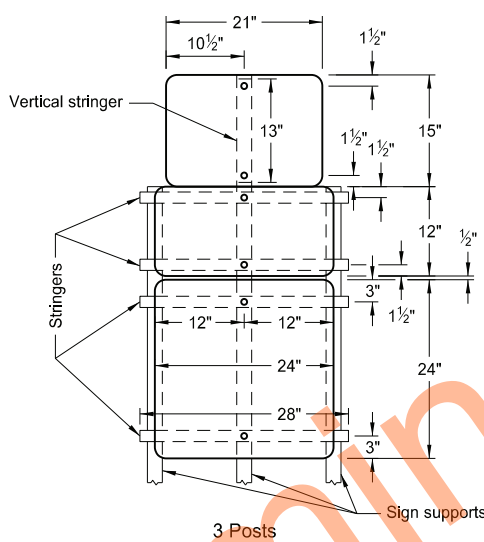
D-754-57



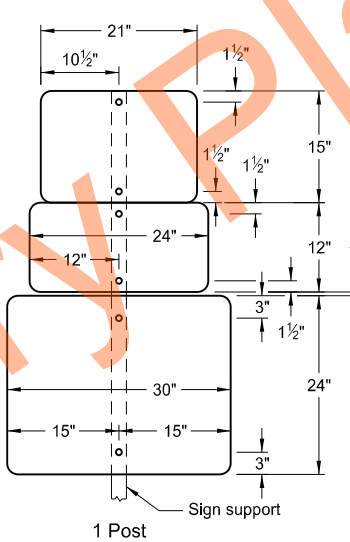
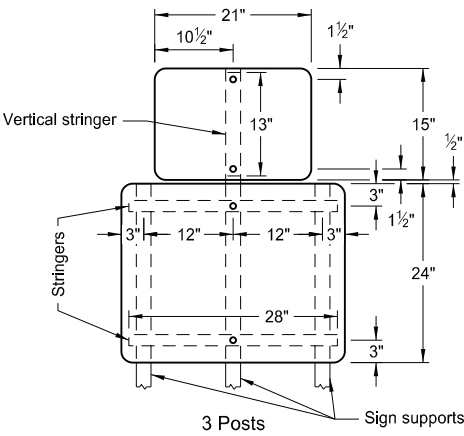
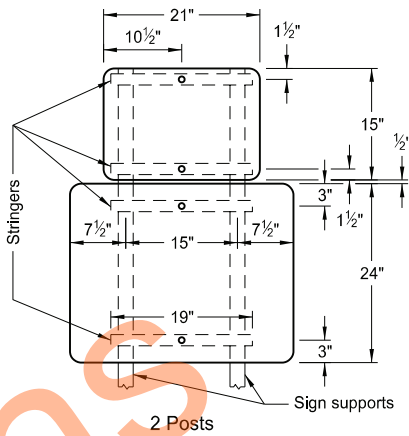
ASSEMBLY 391



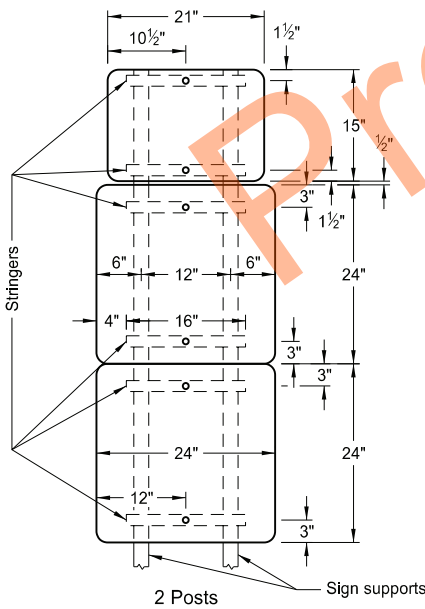
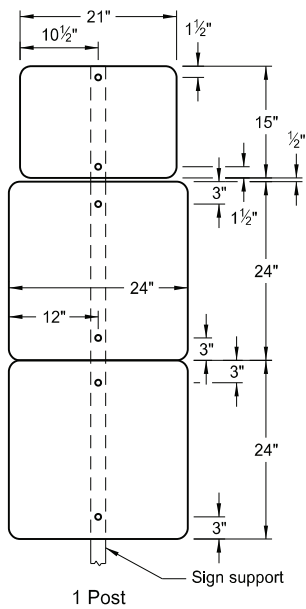
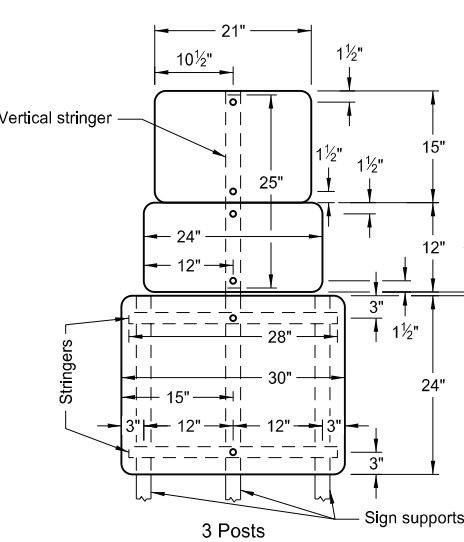
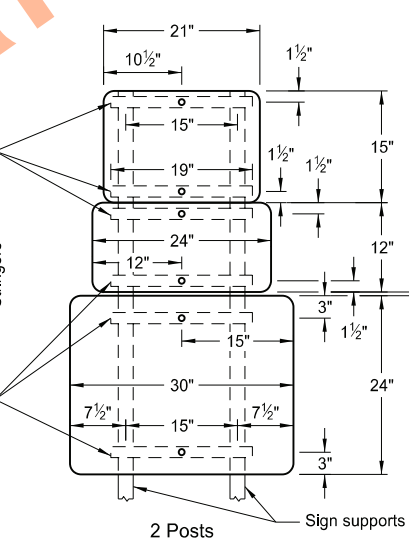
ASSEMBLY 393



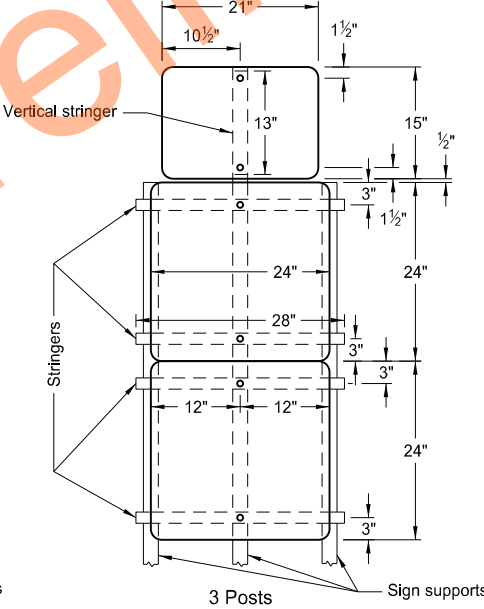
ASSEMBLY 392



ASSEMBLY 394



ASSEMBLY 395



- Notes:
- 1. Use 0.100 inch minimum thickness sign backing material.
 - 2. Use 1 1/2"x1 1/2" perforated square tube stringers.
 - 3. Punch holes round for 3/8" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated to active voice & added dimension to Assembly 393 & 394.
9-04-19	New Design Engineer PE Stamp.
8-07-24	Electronic Stamp/Signature.



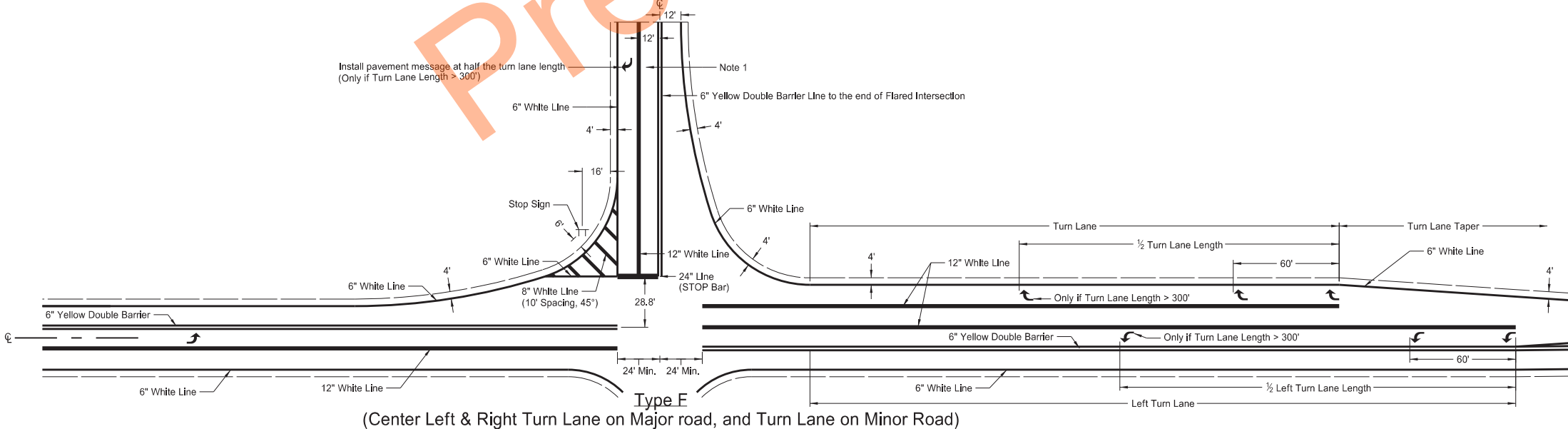
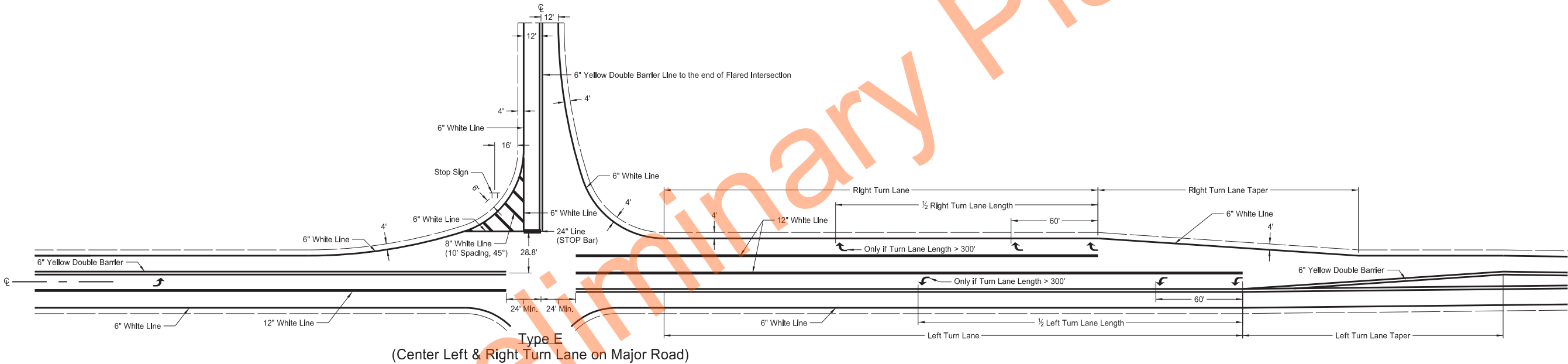
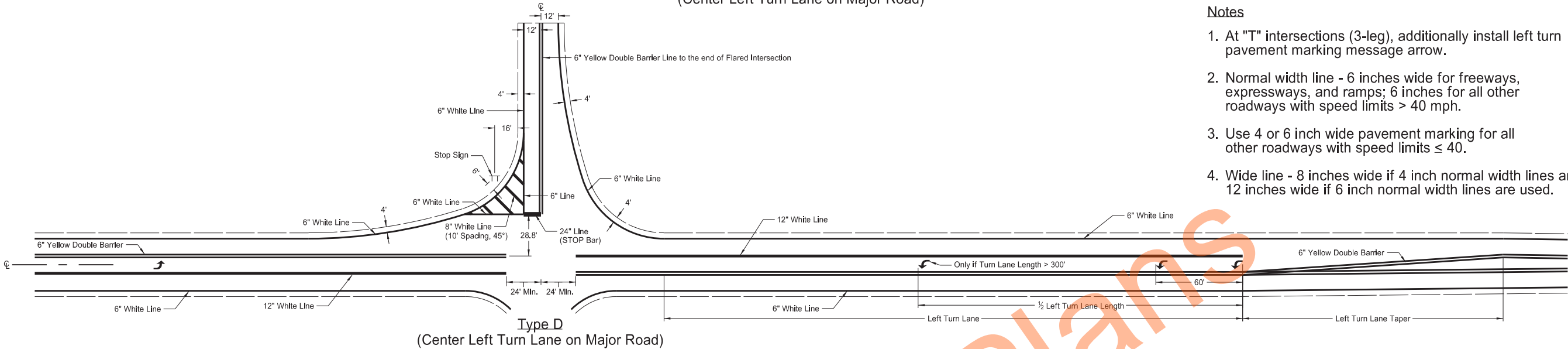
PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION

(Center Left Turn Lane on Major Road)

D-762-6

Notes

- 1. At "T" intersections (3-leg), additionally install left turn pavement marking message arrow.
- 2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
- 3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40.
- 4. Wide line - 8 inches wide if 4 inch normal width lines are used and 12 inches wide if 6 inch normal width lines are used.



- 6" Marking
- 8" Marking
- 12" Marking
- 24" Marking

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17	Updated dimensioning.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
1-17-24	Revised wide pvmt mkg width.



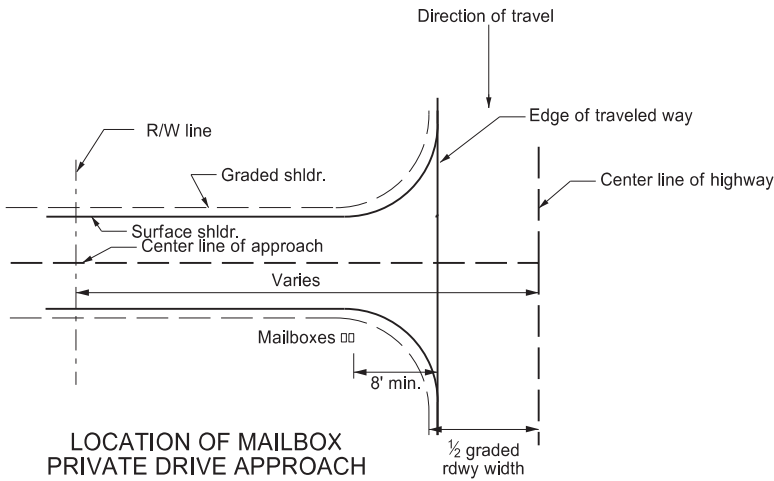
MAILBOX LOCATION DETAILS

D-766-1

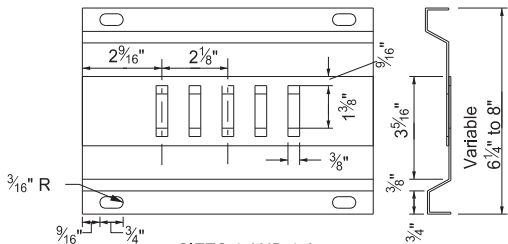
Notes:

- 1. The mailbox support and hardware details consist of the "V-Loc Mailbox Support System" manufactured by:

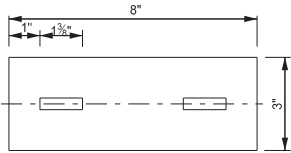
Tapco Traffic & Parking Control Co. Inc.
- Use any equal crash tested and Federal Highway Administration approved support system meeting the requirements of NCHRP Report 350 or MASH. Install approved alternate mailbox assemblies in the manner and arrangement crash tested.
- 2. Install mailboxes in Alternate "A" locations when possible. Install mailboxes in Alternate "B" locations when warranted by existing field conditions.
- 3. Locate mailboxes on the right-hand side of the road in the direction traveled by the carrier. The Engineer will verify the correct direction with the postmaster before installion.
- 4. Install mailboxes on private drive approaches on the downstream side of the approach.
- 5. Install angle connection parallel to traffic flow for size 2 mailbox mounted on single posts.
- 6. For Size 2 mailbox mounted on multiple supports, attach the adapter plate to mounting bracket with 2 each, 3/8" by 9/16" bolts with lock washers and nuts. Then attach the unit to the formed tube support frame using 4 angle connections as shown in Detail A.
- 7. Space multiple support frames a minimum of 4 feet apart. Space single support frames a minimum of 3 ft apart. Do not place more than five No. 1 mailboxes, three No. 2 mailboxes, or any combination of four No. 1-A and No. 2 mailboxes on multiple support frames.



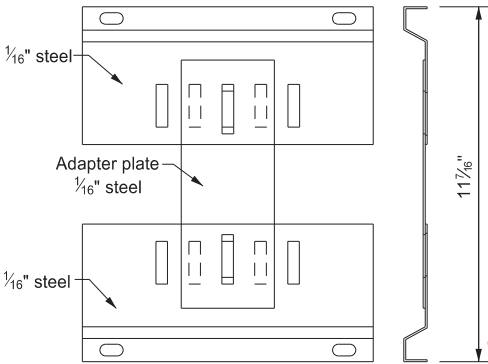
LOCATION OF MAILBOX
PRIVATE DRIVE APPROACH
ALTERNATE "A" LOCATION



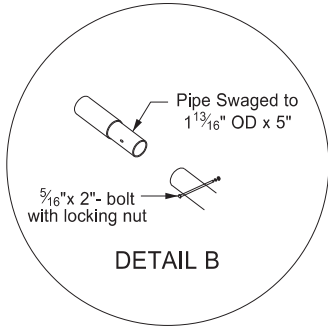
SIZES 1 AND 1-A
MOUNTING BRACKET



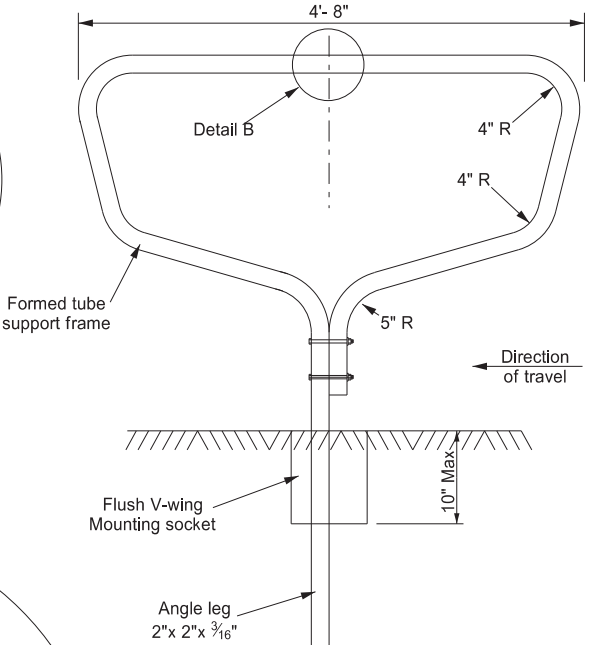
ADAPTOR PLATE



SIZE 2 WITH ADAPTOR PLATE
MOUNTING BRACKET



DETAIL B



FRONT

TABLE A
TYPICAL MAILBOX DIMENSIONS

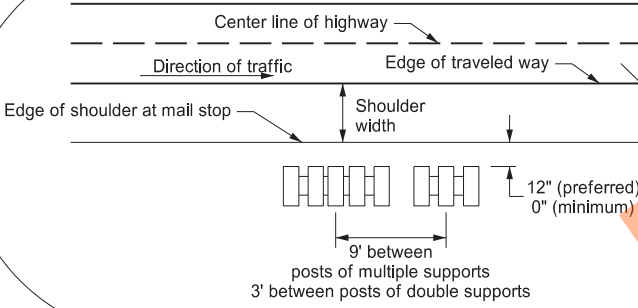
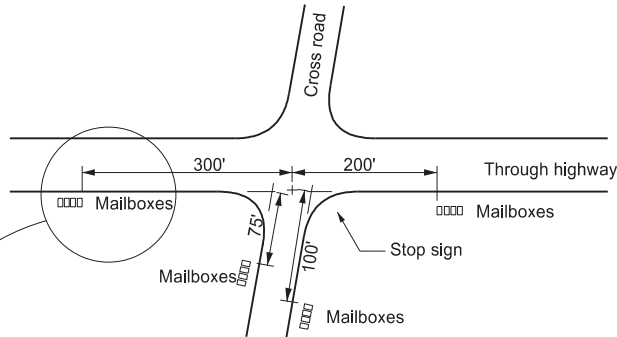
Size	Width	Height	Length
1	6 1/2"	8 1/2"	19"
1-A	8"	10 1/2"	21"
2	11 1/2"	13 1/2"	23 1/2"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
08-25-2023	Dsn Engr stamp/signature update

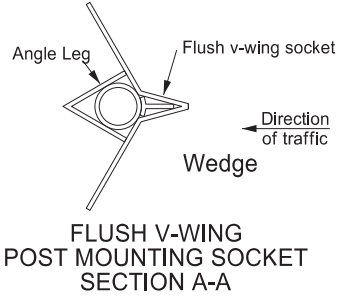


08/25/23

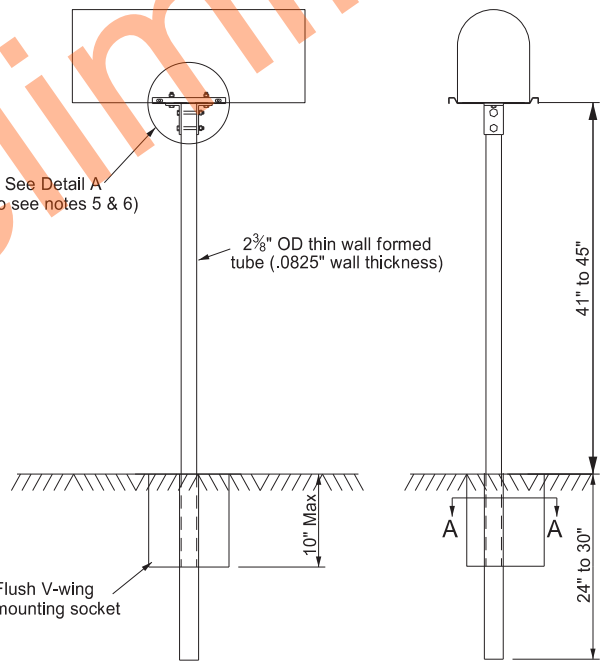
MINIMUM CLEARANCE DISTANCE TO NEAREST
MAILBOX ALONG ROADWAY AT INTERSECTIONS
ALTERNATE "B" LOCATION



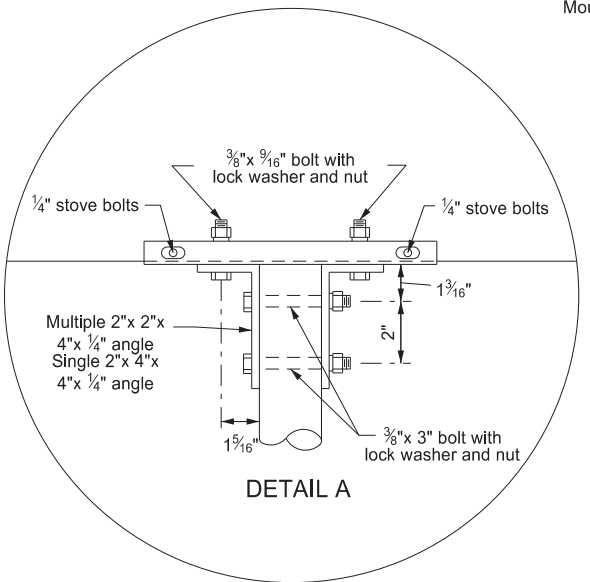
DETAIL C



FLUSH V-WING
POST MOUNTING SOCKET
SECTION A-A



SIDE
FRONT
SINGLE SUPPORT



DETAIL A

CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)

NOTES:

LIGHT & SIGNAL STANDARD FOUNDATIONS:
See plans for conduit size, number of bends and correct position for each foundation. When conduit does not continue beyond the foundation, conduit with a 105° bend and bushings on both ends may be substituted for the 90° bends shown. See plans for correct size & location of foundations. The grade and exact location shall be established by the Engineer in the field. All reinforcing shall be Grade 60. Tie bars shall have a minimum of a 12" lap. Reinforcing may be omitted for Type I, II, V, VI & VII signal standard foundations if the anchor bolts extend to within 3" to 6" above the bottom of the foundation. A minimum of 6 anchor bolts shall be used for cantilevered structures.

CONTROLLER CABINET FOUNDATION PAD MOUNT
FOUNDATION: See plans for the number of 90° bends per foundation and correct positioning. The foundation for Pad Mounted Controller Cabinet shall be of sufficient size so that there is a minimum of 3" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The contractor shall ensure a water-tight seal between the controller cabinet and the foundation by caulking, except for V-groove.

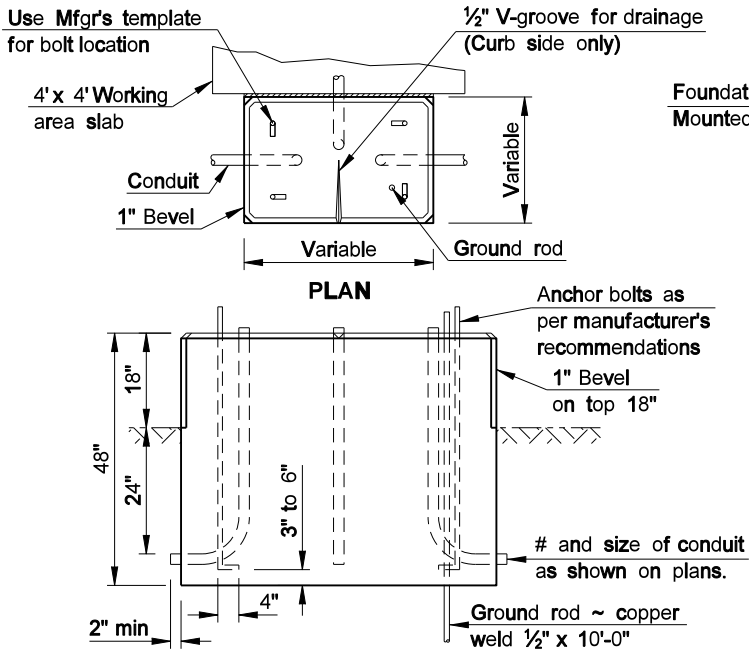
WORKING AREA SLAB: The materials and preparation of this slab shall be as approved by the Engineer in the field.

TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

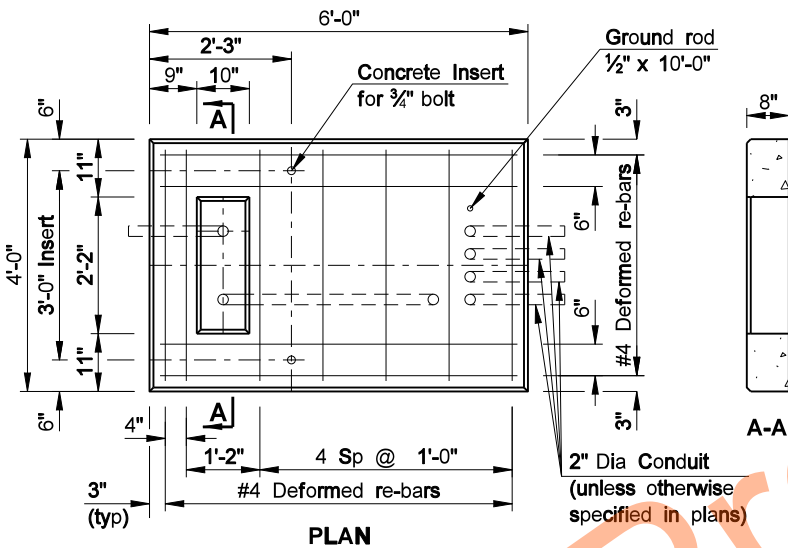
LIGHT & SIGNAL FOUNDATION TABLE	
FOOTING DEPTH (ft)	LONGITUDINAL REINFORCING
≤ 12	8 - #5
13 - 14	8 - #6
15 - 16	8 - #7
17 - 19	8 - #8

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Terrence R. Udland Registration Number PE- 2674 , on 6/15/10 and the original document is stored at the North Dakota Department of Transportation
6-15-10		
REVISIONS		
DATE	CHANGE	



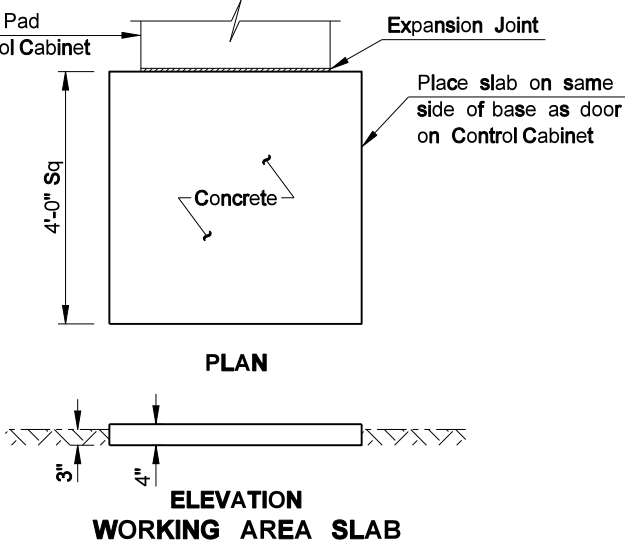
CONTROLLER CABINET FOUNDATION PAD MOUNT

The Controller Cabinet Foundation shall be bid as Concrete Foundation - Traffic Signals.

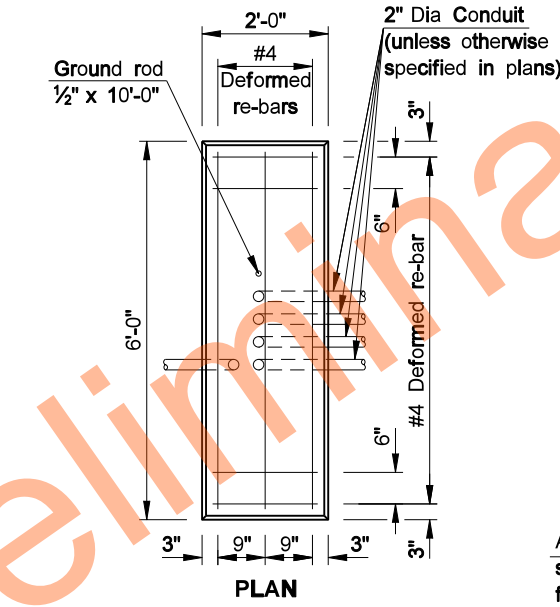


TRANSFORMER & FEED POINT
CABINET FOUNDATION PAD MOUNT

The Transformer & Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type A.

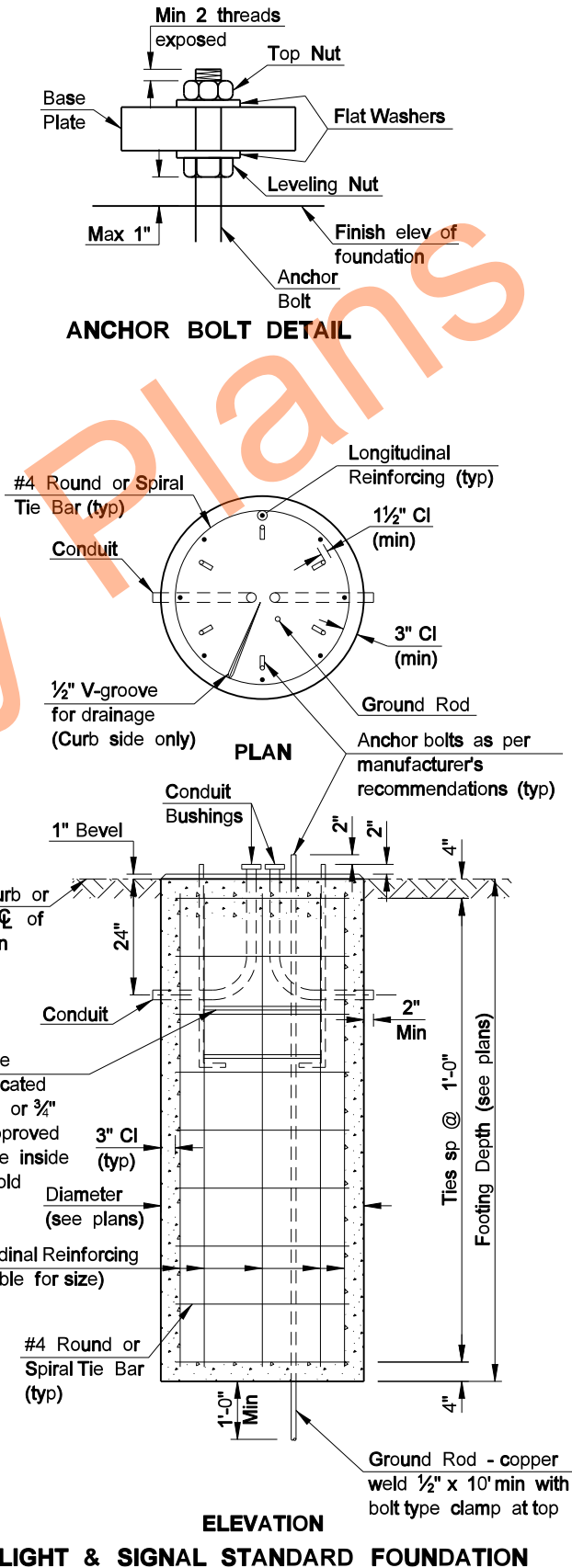


The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.



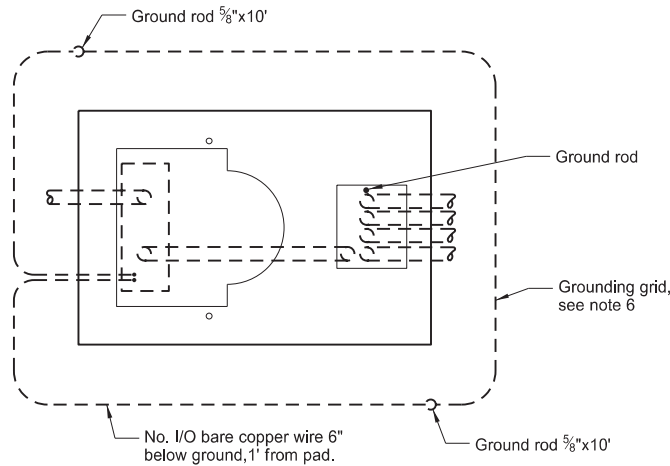
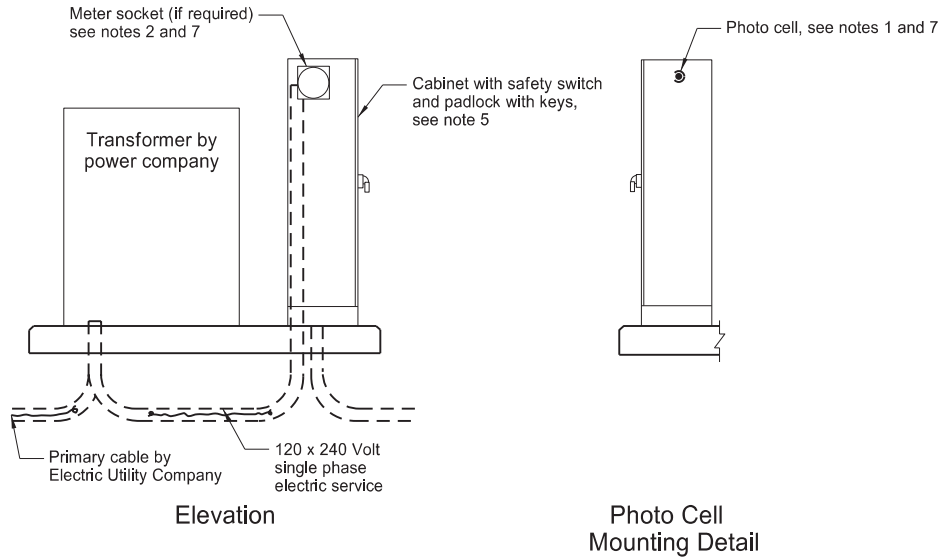
FEED POINT CABINET
FOUNDATION PAD MOUNT

The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type B.

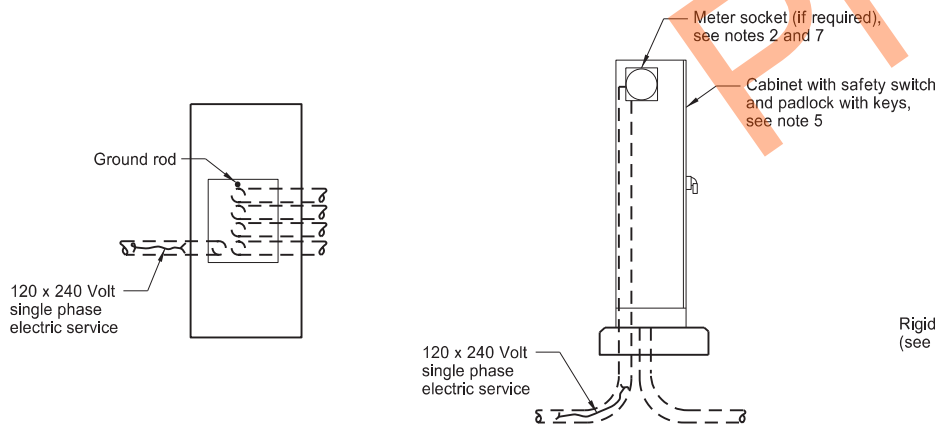


LIGHT & SIGNAL STANDARD FOUNDATION

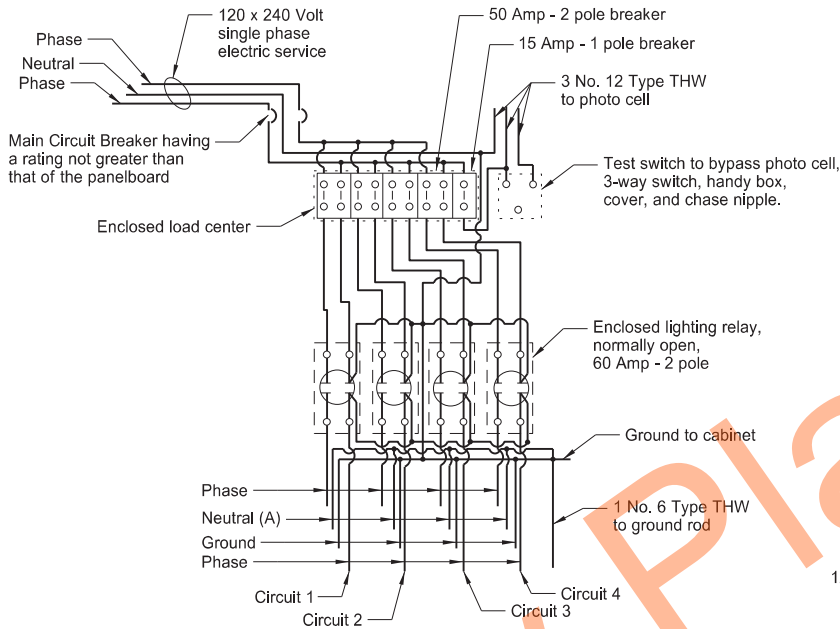
FEED POINTS
(ROADWAY LIGHTING)



Plan
Transformer and Feed Point Cabinet Pad Mounted



Plan
Elevation
Feed Point Cabinet Pad Mounted



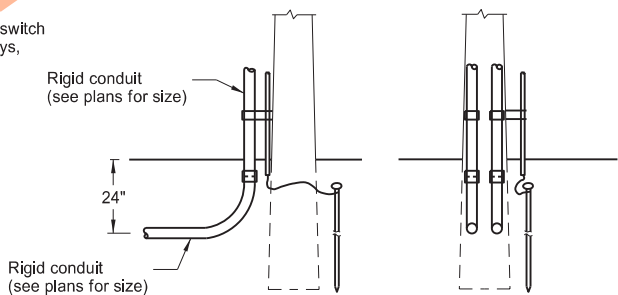
Feed Point Type IV

Provide Type I feed point similar to Type IV, except with one electrical circuit, one 50 Amp - 2 pole breakers, and one lighting relay, normally open.

Provide Type II feed point similar to Type IV, except with two electrical circuit, two 50 Amp - 2 pole breakers, and two lighting relays, normally open.

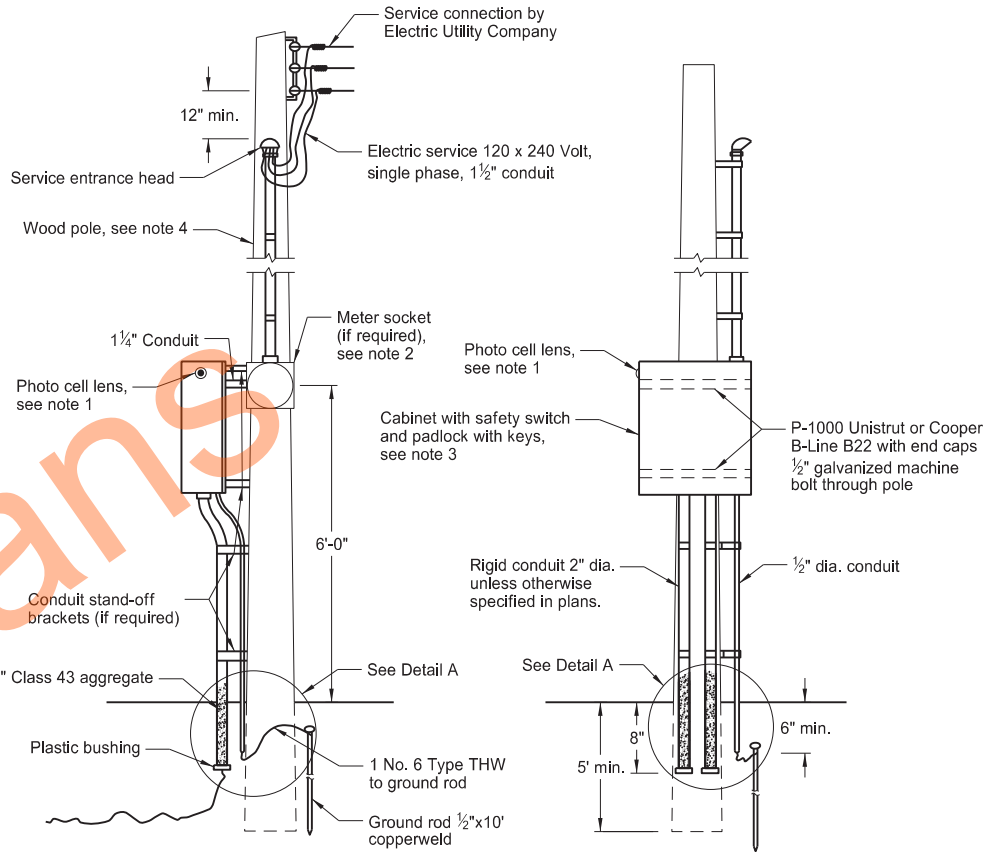
Provide Type III feed point similar to Type IV, except with three electrical circuits, three 50 Amp - 2 pole breakers, and three lighting relays, normally open.

(A) Install when festoon circuit is required.



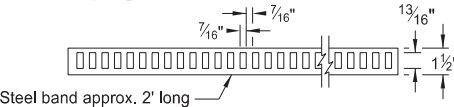
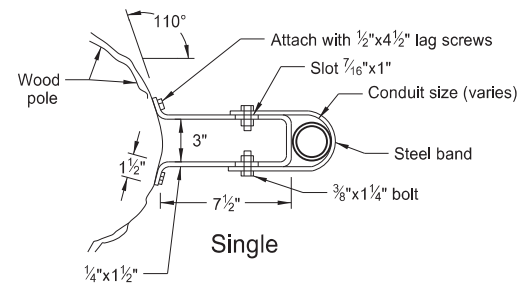
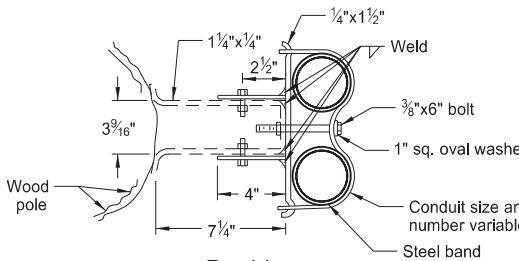
Detail A

Use this detail for a continuous run of conduit from the feed point to the first light standard.



Feed Point Pole Mounted

- Notes:
- Photo Cell: Furnish and install the photoelectric cell. Face photo lens north.
 - Meter Socket: Install meter socket and trim if the meter is required by local Utility Company. Meter furnished and installed by Utility Company.
 - Pole Mounted Cabinet: Provide cabinet with lock drip shield, factory installed steel backing, stainless steel hardware, and side hinge door. Shop coat cabinet with one coat of primer and two coats of exterior gray enamel.
- Provide 30" high x 24" wide x 8" deep Type I and II feed points. Provide 30" high x 42" wide x 10" deep or 36" high x 36" wide x 10" deep Type III and IV feed points.
- Wood Pole: Provide minimum 20' Class VII full length penta pressure treated wood pole. (if required, see layout sheets)
 - Pad Mounted Cabinet: Provide 56" high x 26" wide x 14" deep weatherproof cabinet. Minimum 12 gauge steel or aluminum with provisions for padlock.
 - Grounding Grid: Provide grounding grid with a maximum ground resistance of 25 ohms, using one or more 5/8"x10' copperweld ground rods in parallel or series at two corners. Provide a minimum distance between ground unit assemblies of 6'0".
 - Meter Location: Do not mount the meter (if required) on the same side of the cabinet as the photo cell.



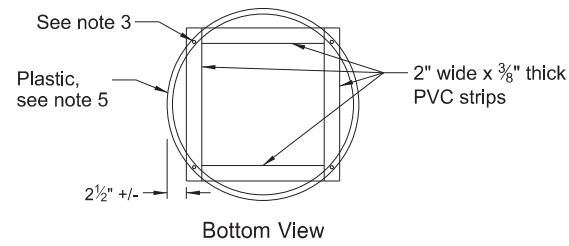
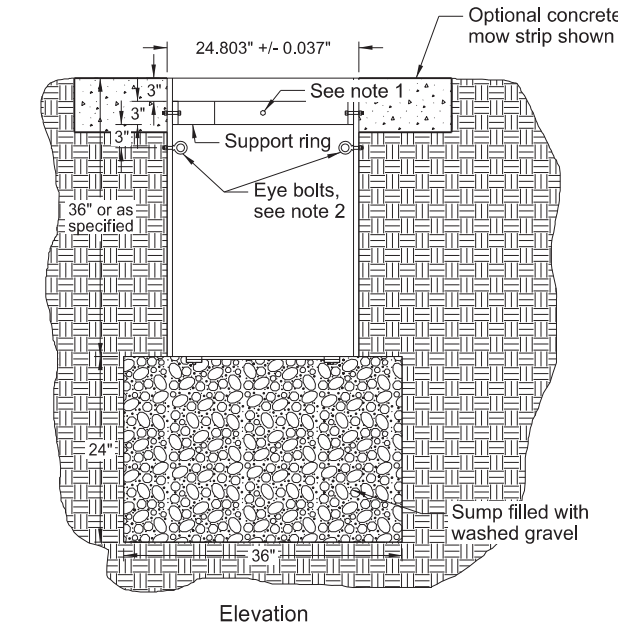
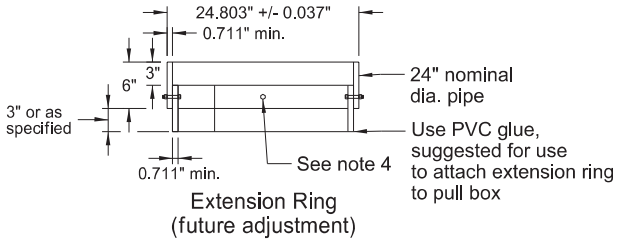
Conduit Standoff Bracket

Omission of conduit standoff brackets allowed when not required by local utility company.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
07-08-14	Revised note 3
10-17-17	Updated to active voice
08-28-19	New Design Engineer PE Stamp
11-01-24	Revised note 5
09-12-25	Revised date to match



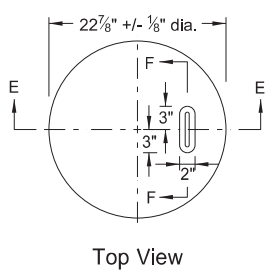
PULL BOX & TRENCHING DETAILS



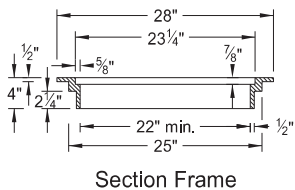
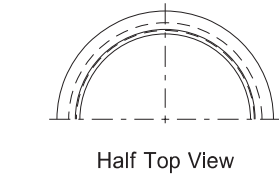
PVC Pull Box

PVC Pull Box Notes:

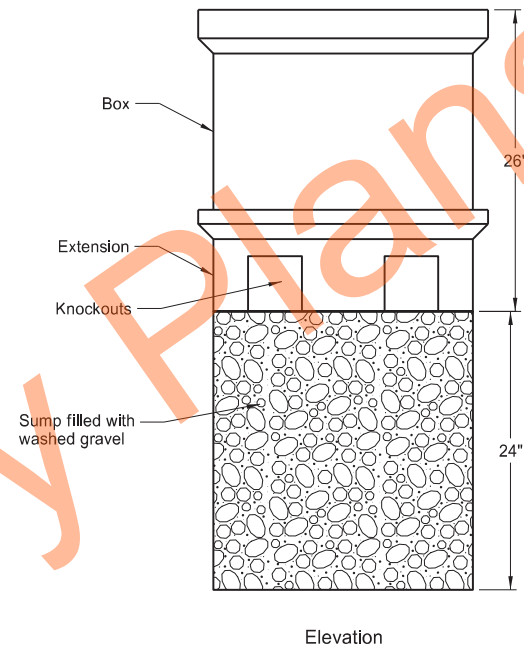
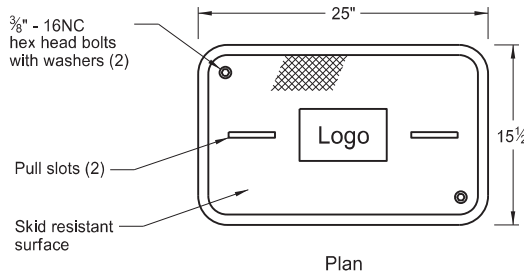
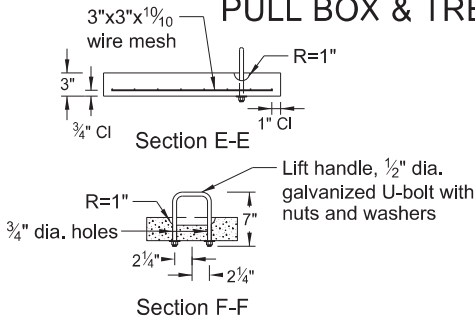
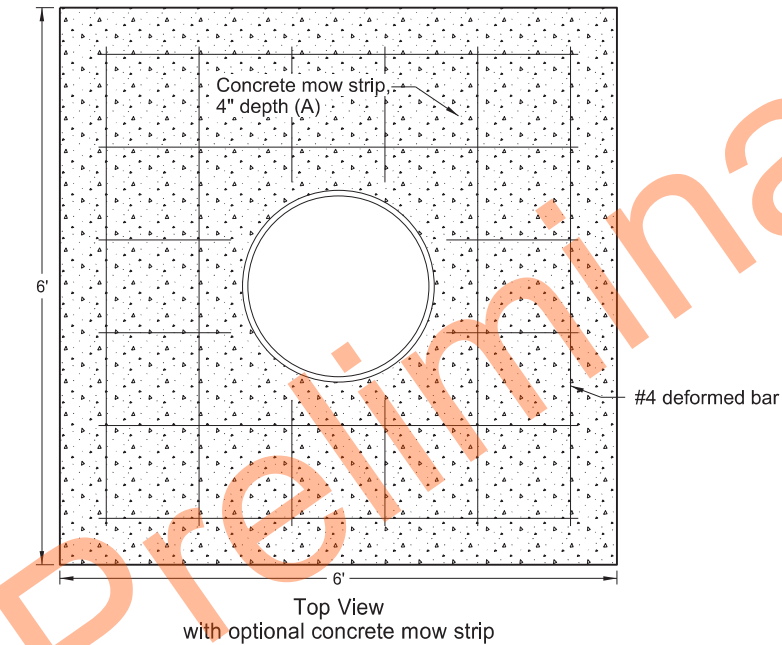
1. Attach split 24" nominal diameter PVC cover support ring with four 3/8" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
2. Two type 2 shoulder eye bolts, 3/8" dia. x 1 1/4" shank length with hex nuts 180 degrees apart (for lifting pull box and supporting electric cable).
3. Four 1/4" x 1 1/4" long galvanized lag screws. Screw assembly together.
4. Attach split 24" nominal diameter PVC cover support extension ring with four 3/8" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
5. Bolt assembly together.
6. Size conduit holes located in barrel section no more than 1" larger than size of conduit being used.
7. After pull box and conduit installation, install water tight seal for inside walls and cover.
8. PVC pipe to meet requirements of ASTM F679 or equal.
9. Provide Austenitic Stainless Steel Hex Head bolts and nuts. Other fasteners to be galvanized as per ASTM A153.
10. Install an epoxy coating on the top and sides of the concrete cover. Provide an epoxy protective coating that is light gray, clear, or neutral in color and apply as recommended by the pull box manufacturer. Before application, clean with a wire brush and dry the surfaces of the concrete to which the epoxy protective coating is applied.
11. If a Cast Iron cover is provided, use grey iron as per AASHTO M 306.



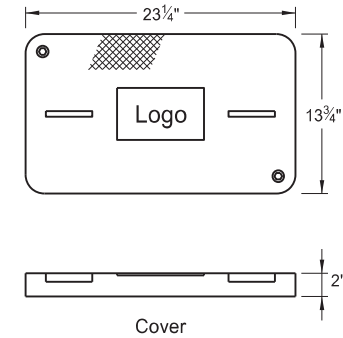
Concrete Cover



Cast Iron Frame and Cover

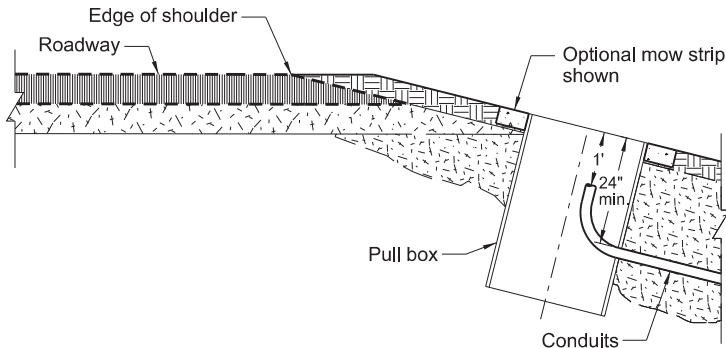


Polymer Concrete Pull Box



Polymer Concrete Pull Box Notes:

1. Place top of pull box flush with surfaced area and approximately one inch above earth or sodded areas on level surfaces.
2. Provide at least one knockout per side in pull box.
3. Provide Polymer Concrete pull box meeting Tier 22 as per ANSI / SCTE 77.
4. Ensure the pull box constructed of polymer concrete reinforced by a heavy weave fiberglass.



Pull Box Installation Details

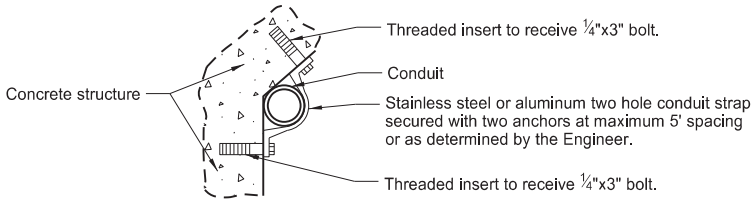
Note: The location of pull box will vary, refer to layout sheets for actual location.

When required, install a mow strip around the pull box. Place expansion material between the foundation and the mow strip. Ensure the mow strip is 4" depth and 2' width from the foundation. Use #4 deformed bars in the mow strip. Space the bars 6" from the outside edge. Place the bars in a grid pattern at 1' apart.

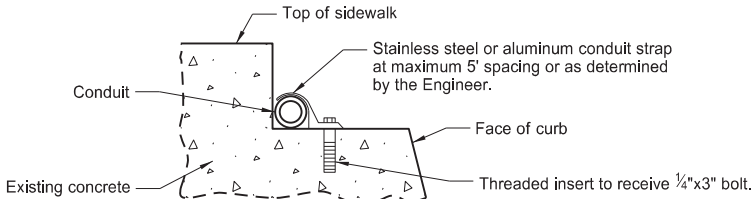
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
11-01-24 09-12-25	Updated PVC pull box, trenching Revised date to match



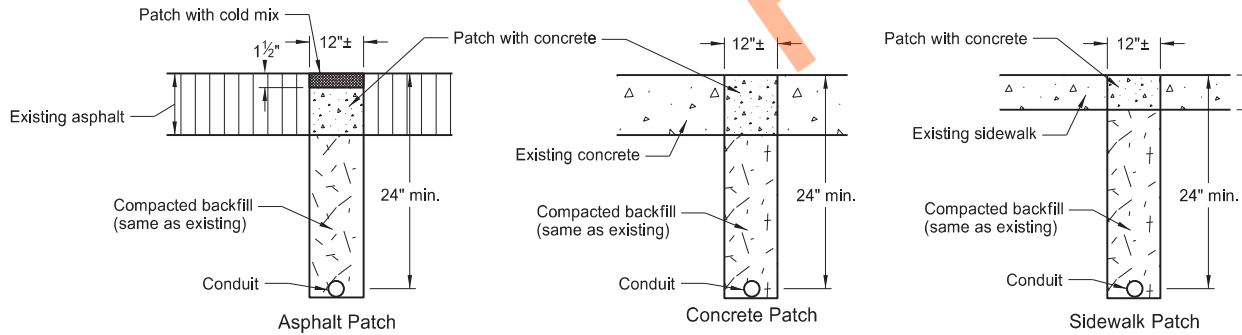
LIGHTING AND SIGNAL DETAILS



Bridge Mounted Conduit Hanger

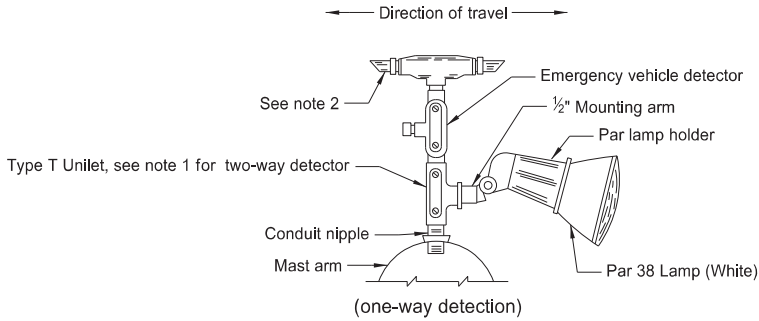


Bridge Curb Mounted Conduit

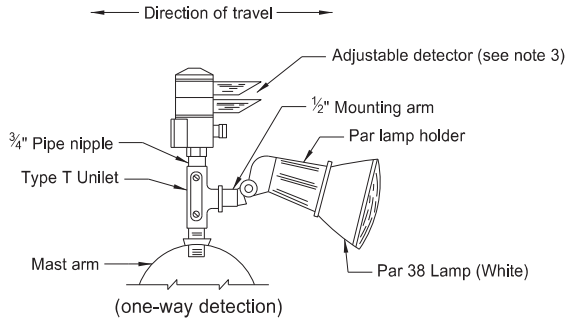


Surface Patch Details

Note: Saw cut trenches. Use PCC pavement for replacement concrete with the coarse aggregate gradation, maximum size and method of curing as approved by the Engineer. Immediately prior to pouring replacement concrete, paint all surfaces with an approved epoxy compound.

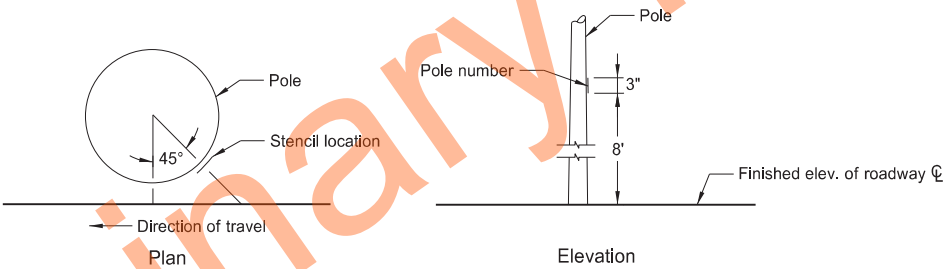


Emergency Vehicle Detector Detail



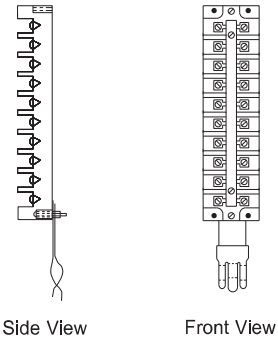
Alternate Emergency Vehicle Detector Detail (adjustable)

- Notes:
1. Use Type X Unilet with two Par lamp holders and lamps for Two-way Detectors. (one in each direction).
 2. Plug unused end of One-way Detector with metal pipe plug.
 3. Rotate detector lens to face direction of travel on Two-way Detectors.

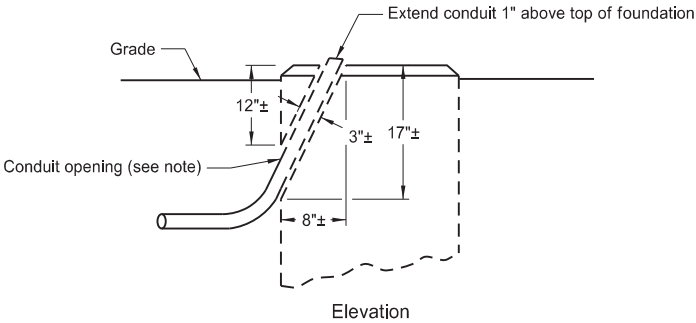
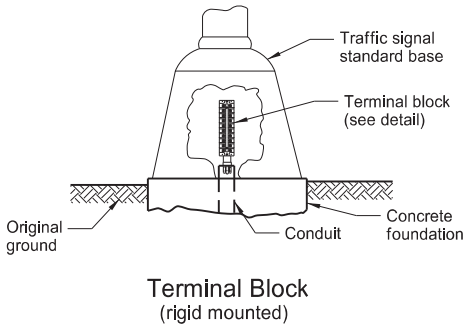


Light Standard Numbering

Note: On the roadway side of each light standard, stencil the pole number using contrasting color paint or an adhesive coated plastic such as Scotchcal by 3M or as approved by the Engineer. See layout sheets for pole numbers.

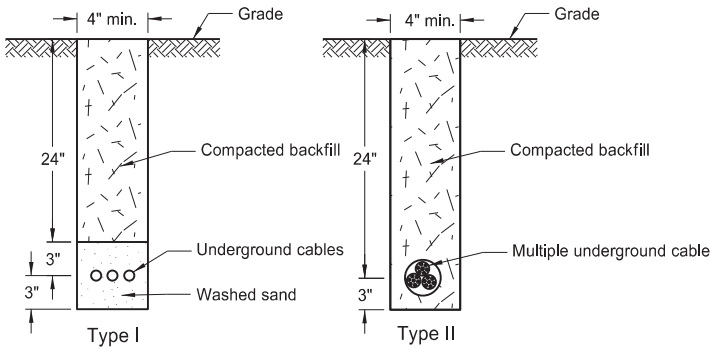


Terminal Block Detail



Revise Concrete Foundation

Note: Jackhammer or drill to remove material and provide a location for conduit. Make opening no larger than necessary. Place conduit, fill with concrete and finish foundation to original appearance.



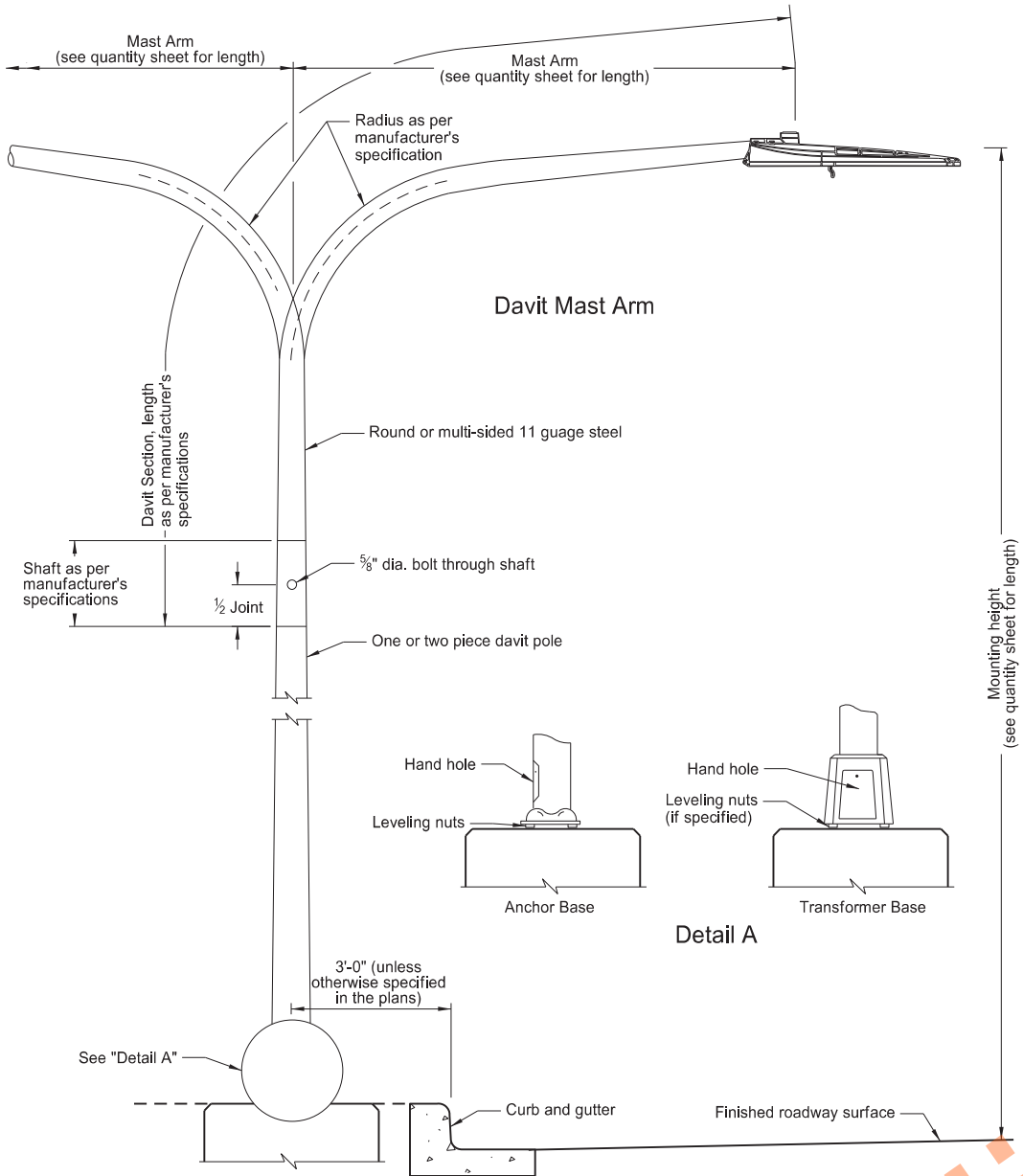
Cable Trench

Note: Seed entire area disturbed by trenching.

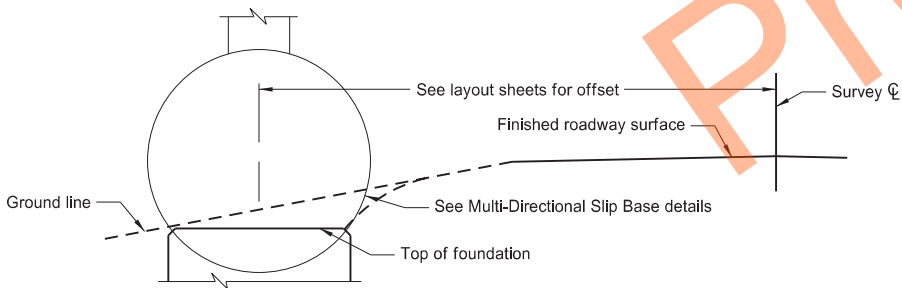
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice
10-25-19	Removed conduit under RR detail
11-01-24	Updated bridge hanger detail
09-12-25	Revised date to match



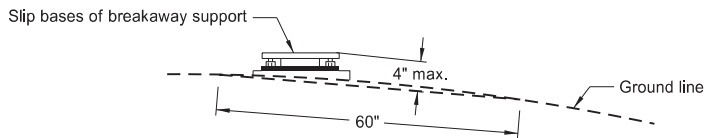
LIGHT STANDARD DETAILS



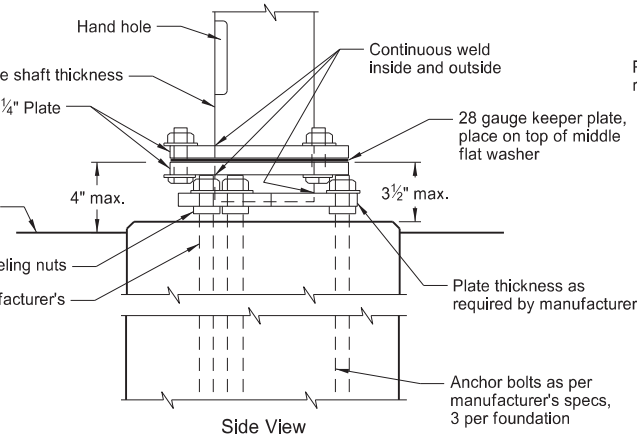
Light Standard Details



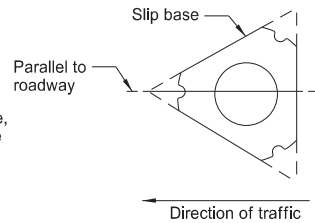
Concrete Foundation Location



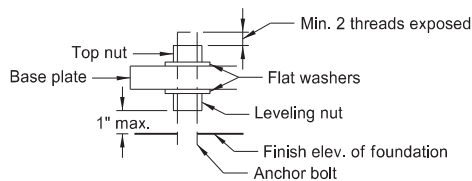
Breakaway Support Stub Clearance Diagram



Steel Base Detail

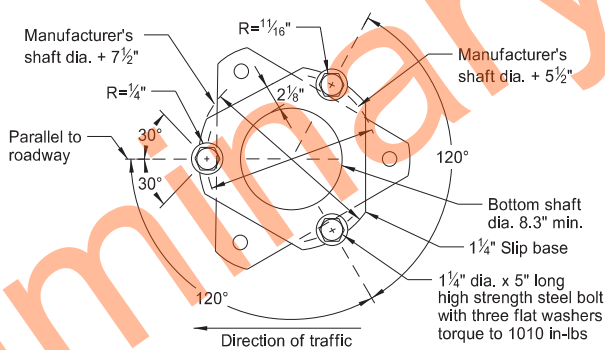


Slip Base Placement Detail

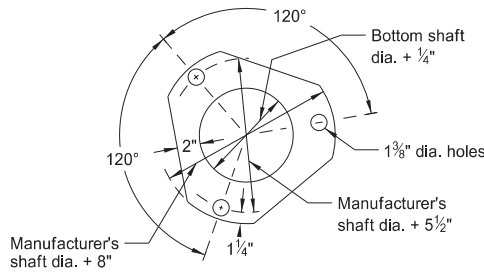


Anchor Bolt Detail

Multi-Directional Slip Base



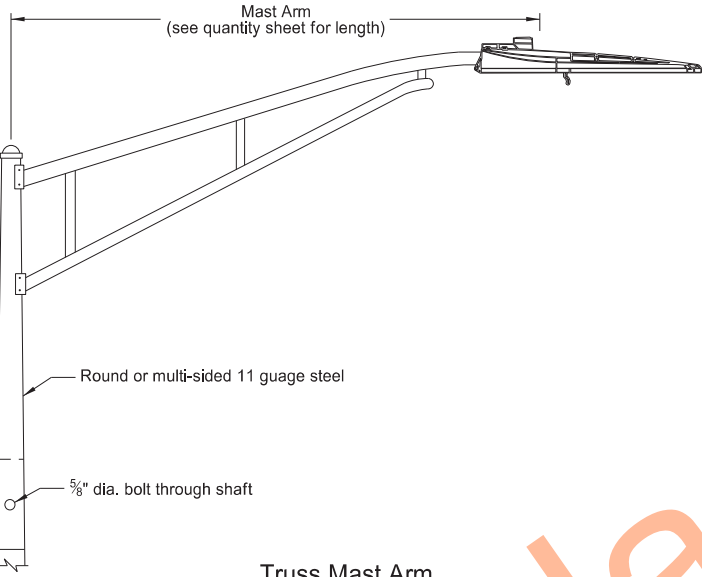
Top View



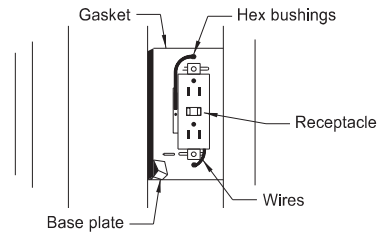
Plan View

Keeper Plate Detail (A)

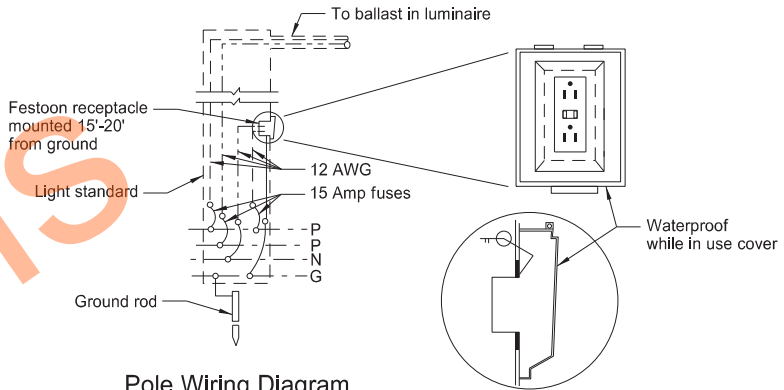
(A) ASTM A446 Grade "A" 28 gauge keeper plate on top of middle flat washer. Galvanize Keeper plate after fabrication.



Truss Mast Arm



Optional: Festoon receptacle mounted on multi-sided pole.



Pole Wiring Diagram

Receptacle Mounting Detail (B)

(B) Mount receptacle on side of pole that faces the street. Install Festoon Receptacle only when specified in the plans.

Notes:

Light Standard Locations: The minimum offset distance from the curb face is 3 feet. Offset light standards at least 3 feet in urban areas and where speeds are less than 30 mph. Where speeds are 30 mph or more, place light standards at least 16 feet from the driving lane.

Steel Standards: Touch up marred or scratched areas after erection.

Luminaire: Use internal ballast-constant wattage 120x240 voltage. See layout sheets for type of luminaire, wattage, I.E.S. distribution, and operating system.

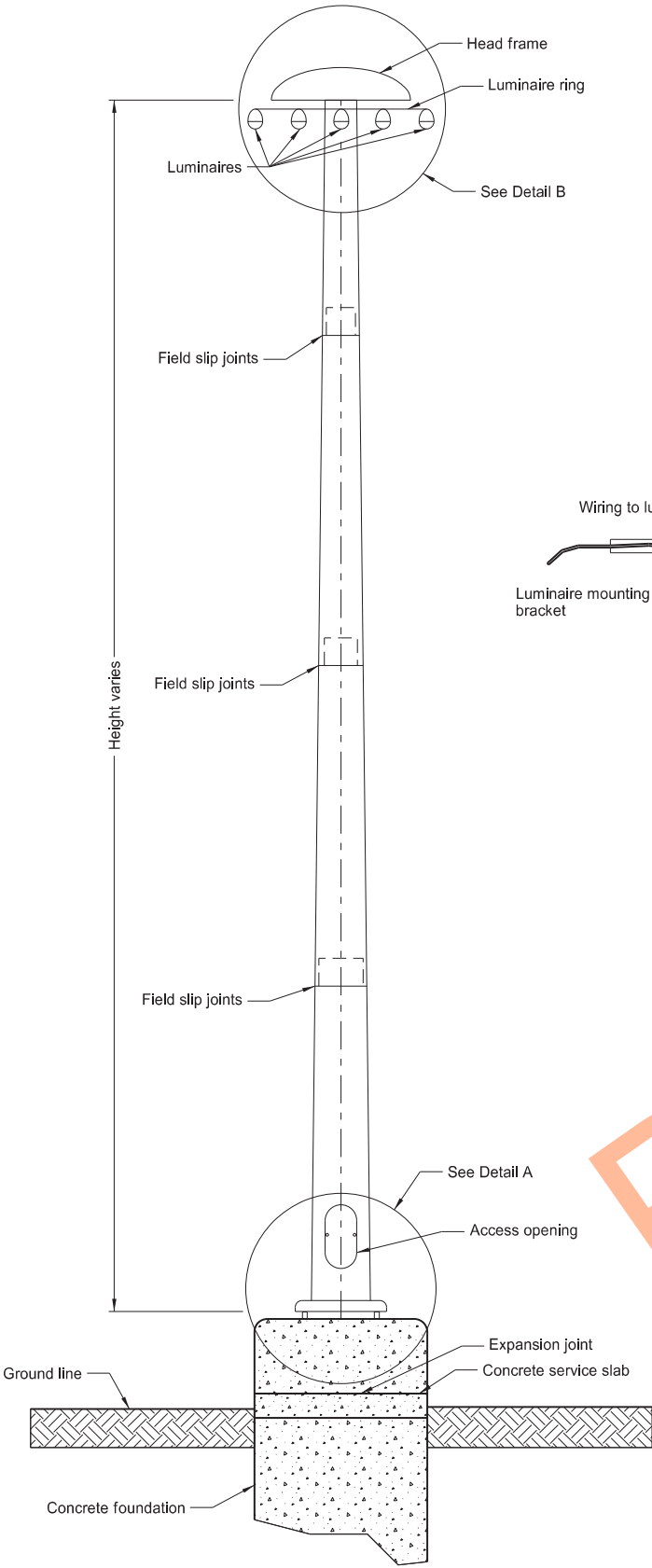
Fusing: Fusing in base, see specifications.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice
08-28-19	New Design Engineer PE Stamp
11-01-24	Revised luminaire details/notes
09-12-25	Revised date to match

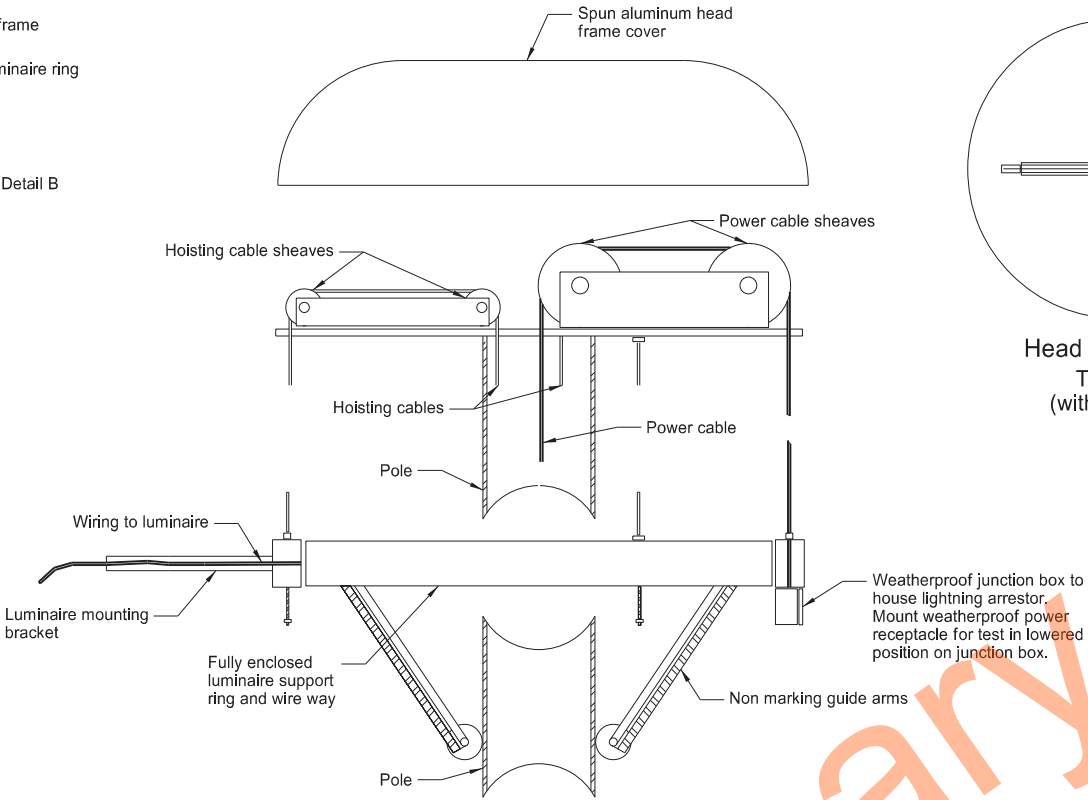


HIGH MAST LIGHTING

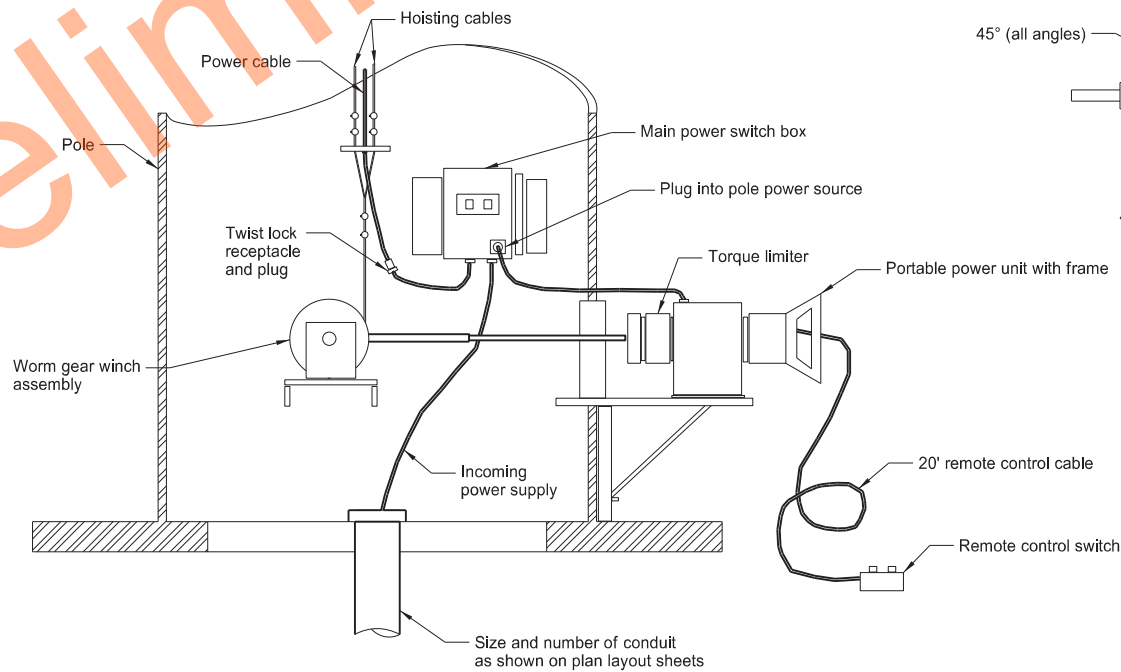
D-770-8



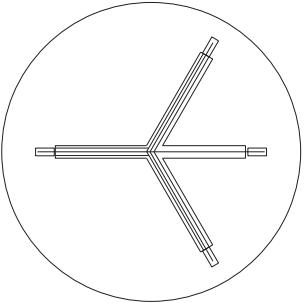
High Mast Lighting Pole Detail



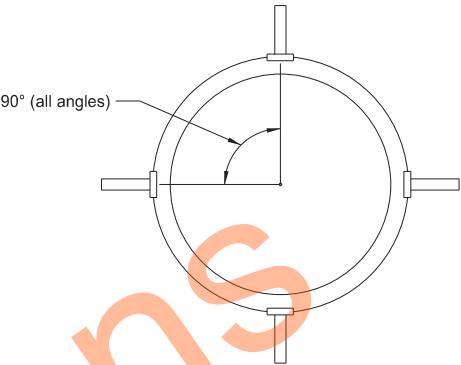
Detail B
Head Frame and Luminaire Ring
(section through pole)



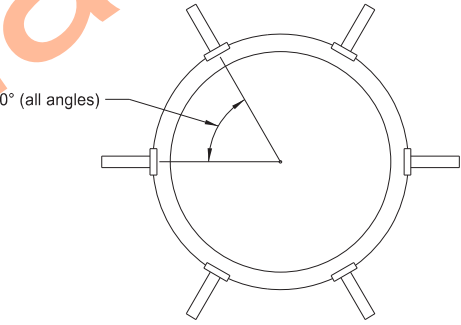
Detail A
Lowering Device
(section through base)



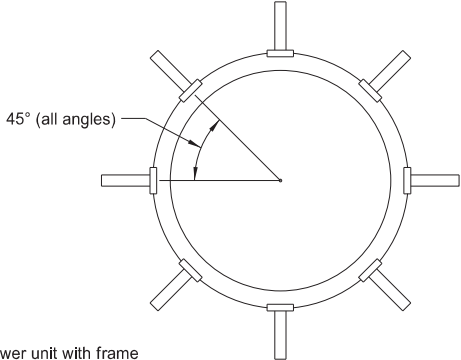
Head Frame Detail
Top View
(without cover)



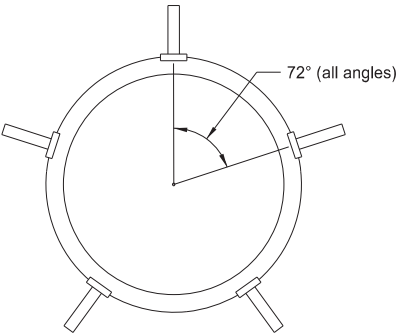
For 4 Luminaires



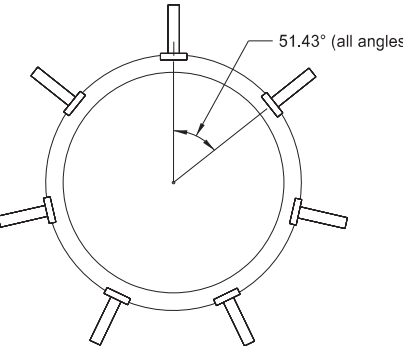
For 6 Luminaires



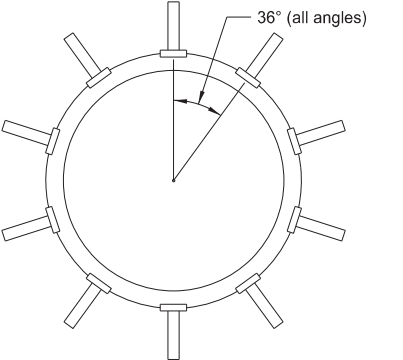
For 8 Luminaires



For 5 Luminaires



For 7 Luminaires



For 10 Luminaires

Luminaire Support Ring Details

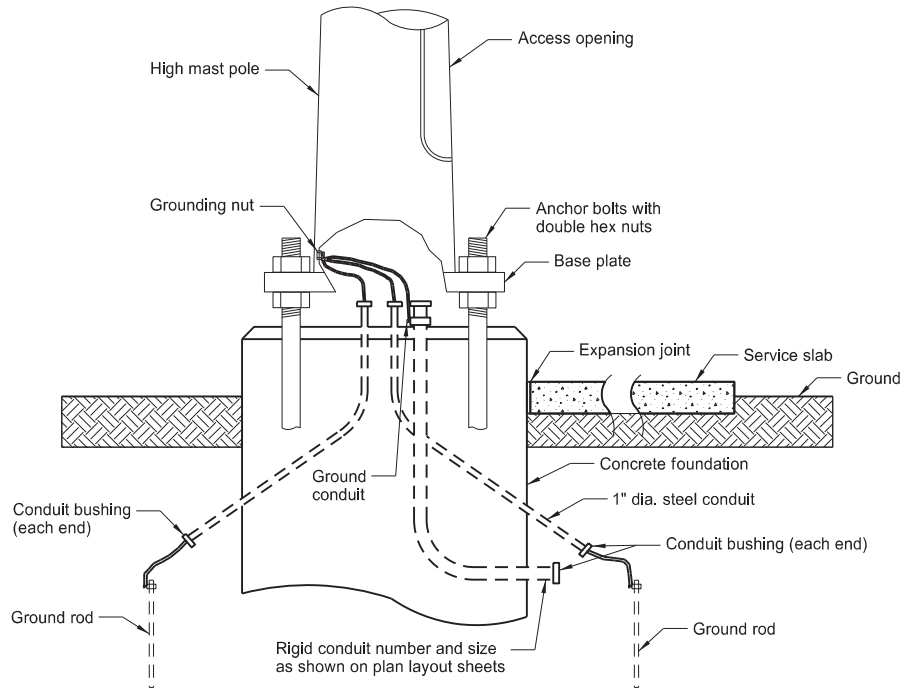
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
8-28-19	New Design Engineer PE Stamp.
8-09-24	Electronic Stamp/Signature.



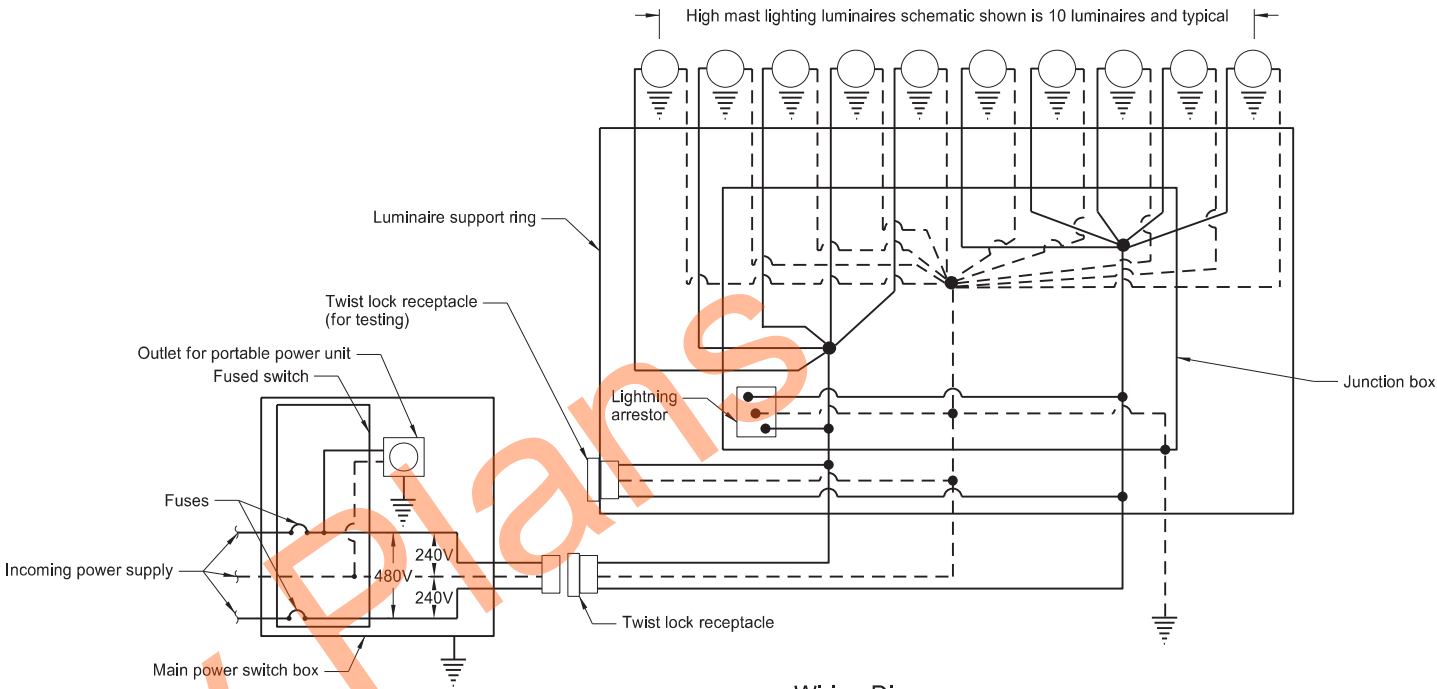
08/09/24

HIGH MAST LIGHTING

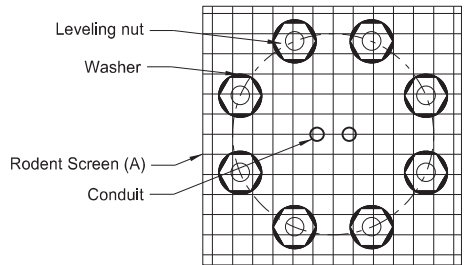
D-770-9



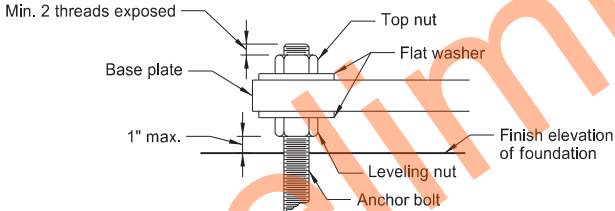
Conduit and Grounding Detail at Base



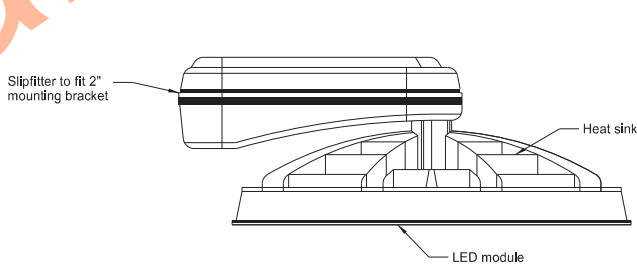
Wiring Diagram



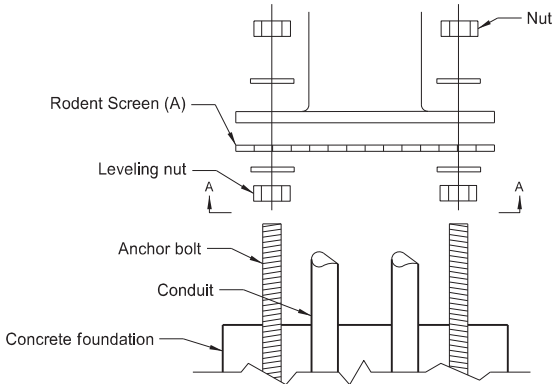
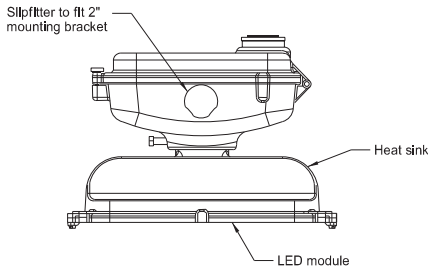
Section A-A



Anchor Bolt Detail



Typical LED Luminaire Details



Elevation View
Rodent Screen

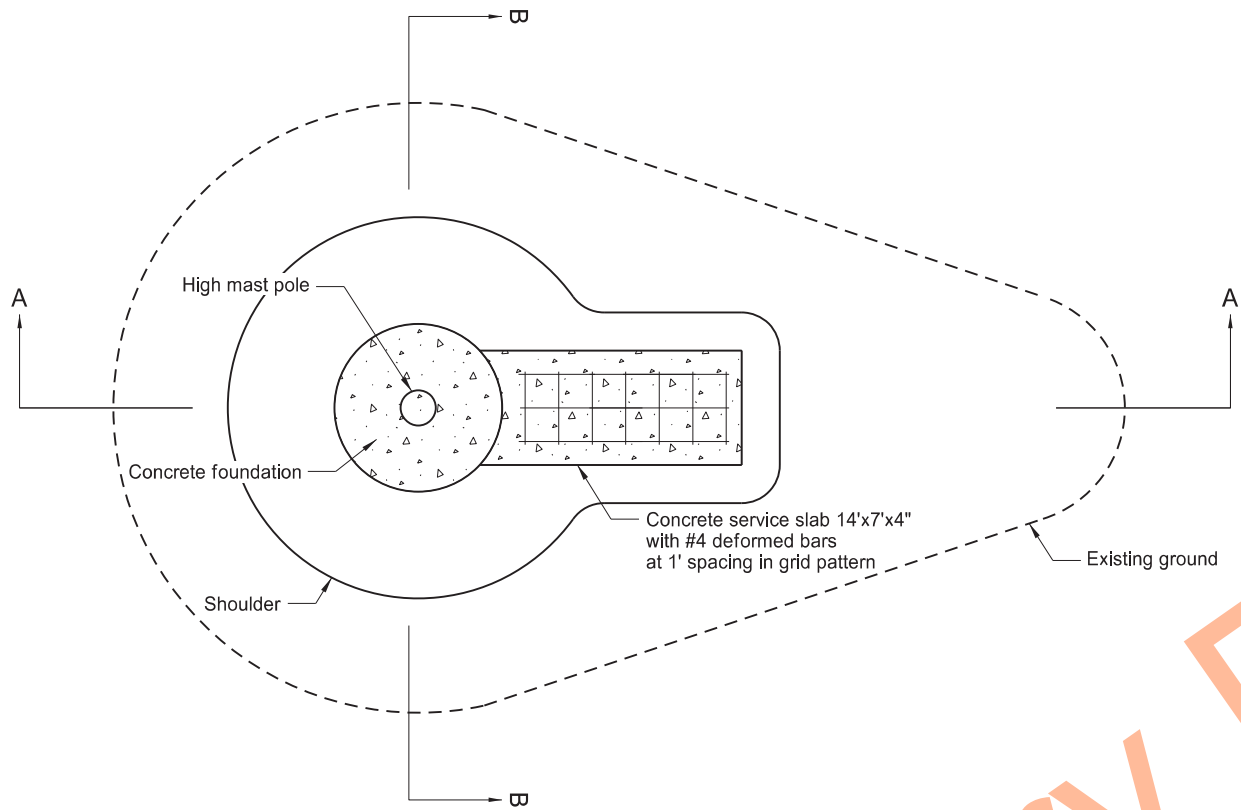
(A) 1/4"x1/4" galvanized steel welded wire fabric (wire dia. 0.025") cut same size as base plate and form tightly around the conduit.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
11-01-24 09-12-25	Updated to 8 anchor bolts Revised date to match

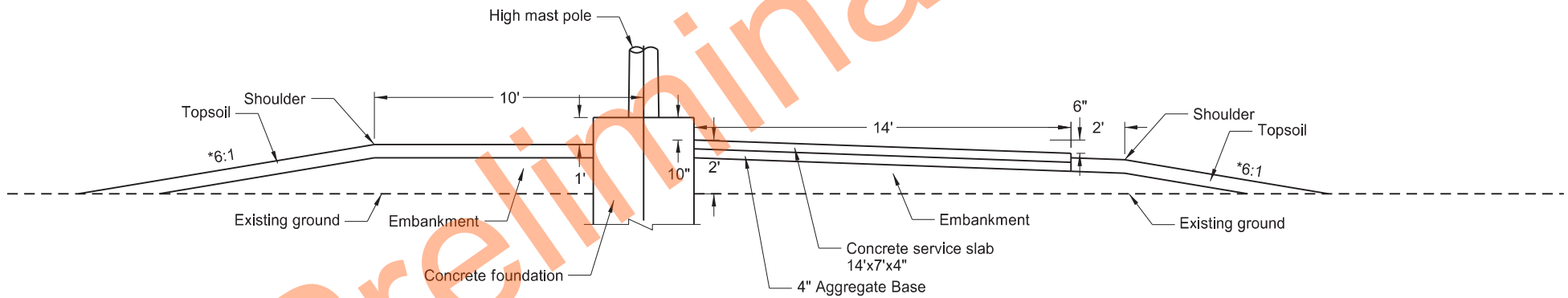


HIGH MAST LIGHTING BERM DETAILS

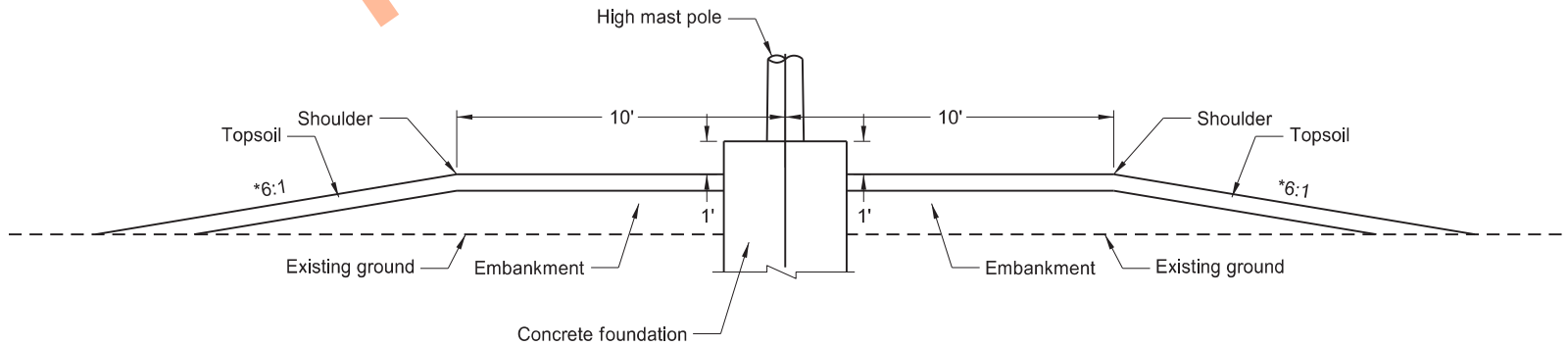
D-770-10



Plan View



Section AA



Section BB

*Use 6:1 if site conditions permit, otherwise 4:1 max slope is permitted.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-01-24	
REVISIONS	
DATE	CHANGE
09-12-25	Revised date to match

