

DESIGN DATA			
Traffic	Average Daily		
Current 2014	Pass: 9,935	Trucks: 1,785	Total: 11,720
Forecast 2034	Pass: 16,295	Trucks: 2,930	Total: 19,225
Clear Zone Distance: 14 feet		Design Speed: 30 mph	
Minimum Sight Dist. for Stopping: NA		Bridges: NA	
Sight Dist. for No Passing Zone: NA			
Pavement Design Life (years)			
Design Accumulated One-way		ESALs: NA	

JOB # 48
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

NHU-7-804(052)317
Williams County
East Broadway and East Dakota Parkway Intersection
Traffic Signals

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	20596	1	1

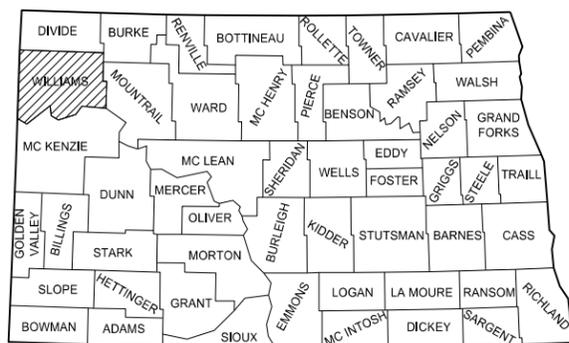
GOVERNING SPECIFICATIONS:

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NHU-7-804(052)317		



NHU-7-804(052)317
E Broadway (ND 1804) and E Dakota Parkway Intersection
RP 317.107



STATE COUNTY MAP

DESIGNERS
Blaine Johanneson /s/

APPROVED DATE 7/30/14

Roger Weigel /s/ for
OFFICE OF PROJECT DEVELOPMENT
ND DEPARTMENT OF TRANSPORTATION

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

APPROVED DATE 7/30/14

James Douglas Rath /s/
NDDOT DIV-DIST OR CONSULTANT FIRM

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	2	1

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LIST OF STANDARD DRAWINGS

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D-101-1,2,3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
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D-704-14	Construction Sign Punching and Mounting Details
D-704-23	Short Term Urban Detour and Lane Closure on a Divided Highway Layouts
D-704-25	Lane Closures on Urban Streets Layouts
D-704-50	Portable Sign Support Assembly
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D-770-1	Concrete Foundations (Traffic Signals & Highway Lighting)
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NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	6	1

SECTION 100

704-P01 TRAFFIC SIGNAL TRAFFIC CONTROL: The traffic control has been developed using the following layouts on the Standard Drawings for traffic control:

D-704-23, type P: For traffic signal installation when lane closure is needed.

D-704-25, type X: For traffic signal installation.

D-704-25, type W: For work beyond curb.

D-704-7, 8, 9, 10, 11, 12, 13, and 14 are applicable.

SECTION 150

772-P01 VIDEO DETECTION SYSTEM: The video detection system shall be Video Trak IQ manufactured by Peek Traffic.

A video monitor shall be included in the controller cabinet for viewing the video detection.

The contractor shall provide a spare video detection camera, video detection processor, and camera interface panel. The spare equipment shall be delivered to the City of Williston.

The cost for the video monitor and spare equipment shall not be bid separately but shall be included in the item "Traffic Signals System".

772-P02 CONTROLLER TYPE 1: The controller shall be a NEMA TS-2, Type 1 controller and produced by Peek Traffic. The traffic counting capability of the controller shall be fully operational.

The cost of the Controller Type 1 shall be included in the price bid for the item "Traffic Signals System".

772-P03 ADDITIONAL CONDUIT: The contractor shall install one additional 2-inch diameter conduit in the new controller foundation. The conduit shall face north. The conduit shall be capped underground and capped in the controller cabinet with a 2" expandable metal plug and labeled which direction the conduit is facing. The cost for the additional conduit shall not be bid separately but shall be included in the item "Traffic Signals System".

772-P04 TRAFFIC SIGNAL HEAD BACK PLATES: Traffic signal head back plates shall be furnished with a yellow retroreflective border. The yellow border shall be installed around the perimeter of the face of the backplate and shall be 1 inch wide. Sheeting shall be Type XI reflective sheeting.

The cost for furnishing and installing the border shall not be bid separately but shall be included in the item "Traffic Signals System".

772-P05 BATTERY BACK-UP: The signal controller shall be equipped with an "on-line" type Uninterruptible Power Supply (UPS) that provides power conditioning in both normal and backup mode. It shall be sized to provide backup power to the system for a minimum of 2 hours in full signalized operation and a minimum of 8 hours in flash operation. The UPS shall have aux contacts to put the system into flash operation. The UPS shall incorporate full power management and diagnostic function. The UPS shall be installed in a temperature and humidity controlled environment. The UPS shall be installed in a separate enclosure on a separate pad from the signal controller cabinet at a location approved by the engineer. All materials, labor and equipment necessary to furnish and install the battery back-up shall be included in the item "Traffic Signals System".

772-P06 TRAFFIC SIGNAL STANDARDS: The design of the Traffic Signal Standards shall meet the requirements of AASHTO publication, Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (5th Edition 2010 Interim). A wind velocity of 90 mph with the necessary coefficient of height correction factor shall be used in the calculations. Each structure component shall be designed using the requirements of Table 11-1, "Fatigue Importance Factor, IF" Fatigue Category III shall be used for Traffic Signal Standards with mast arm lengths less than 40 feet, Fatigue Category II shall be used for Traffic Signal Standards with mast arm lengths greater than or equal to 40 feet. All the necessary calculations and drawings used in the design of the Traffic Signal Standards shall be furnished with the shop drawing submittal. Calculations and work drawings used in the design of the Traffic Signal Standards shall be signed, sealed, and dated by a Professional Engineer duly registered in the State of North Dakota.

772-P07 EMERGENCY VEHICLE PRE-EMPTION: The Contractor shall notify the City of Williston fire chief (Alan Hanson 701-572-3400) when the proposed signalized intersection EVP system is tested and operable. The EVP equipment shall be fully compatible with the other EVP equipment used within the City of Williston. The confirmation light shall be at the same location on the mast arm as the EVP detectors. The City of Williston is responsible for setting the range of the system.

772-P08 SIGNAL HEAD MOUNTING HEIGHT: The signal heads shall be mounted between 19.5 feet and 21.5 feet above the roadway to the bottom of the backplate.

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NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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772-P09 ACCESSIBLE PEDESTRIAN SIGNALS (APS) PUSHBUTTON AND SIGN: Shall include the features, installation procedures, and be compliant with the following:

A. Features:

1. Rapid tick WALK indication, no more than 2–5dBA above ambient sound
2. Vibrotactile WALK indication
3. Speaker and vibrotactile indication located at pushbutton
4. Pushbutton locator tone
5. Tactile arrow on each device aligned in direction of travel on the crosswalk
6. The APS shall be the 2 wire system.

B. Installation Procedures

1. APS should be reachable from the level landing of the curb ramp for the crossing or from a level surface with an accessible path to the ramp (MUTCD Section 4E.08 and Proposed PROWAG).
2. APS should be within 5 feet of the crosswalk line furthest from the center of the intersection and within 10 feet of the curb (MUTCD Section 4E.08).
3. Tactile arrow shall be aligned with parallel to the direction of travel on the crosswalk (MUTCD Section 4E.12, P1).
4. Pushbutton required to be located within reach range for wheelchair users (Proposed PROWAG, R406).

C. Code Compliance:

1. Functionality: MUTCD 2009 - 4E
2. Temperature and Humidity: NEMA TS 2
3. Transient Voltage Protection: NEMA TS 2
4. Transient Suppression: IEC 61000-4-4, IEC 61000-4-5
5. Electronic Noise: FCC Title 47, Part 15, Class A
6. Mechanical Shock and Vibration: NEMA TS 2
7. EN4 PBS Enclosure: NEMA 250 - Type 4X
8. Electrical Reliability: NEMA TS 4

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ENVIRONMENTAL COMMITMENTS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-7-804(052)317	6	3

Based on the NEPA documentation, no additional permits or environmental commitments have been identified beyond what is covered by the NDDOT's Standard Specification of Road and Bridge Construction.

Wetland Number	Cowardin Classification	Wetland Type	Wetland Size (acres)	Wetland Feature	USACE Jurisdictional Wetlands	Impacts to Wetlands	
						Temp.	Perm.
NO WETLANDS PRESENT							
TOTALS:			0.00		0.00	0.00	

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	8	1

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	1	1
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	40	40
704	1000 TRAFFIC CONTROL SIGNS	UNIT	804	804
704	1060 DELINEATOR DRUMS	EA	13	13
704	1065 TRAFFIC CONES	EA	8	8
704	1067 TUBULAR MARKERS	EA	8	8
704	1087 SEQUENCING ARROW PANEL-TYPE C	EA	1	1
704	1500 OBLITERATION OF PAVEMENT MARKING	SF	200	200
754	0110 FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	32	32
754	0112 FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	154	154
762	0122 PREFORMED PATTERNED PVMT MK-MESSAGE(GROOVED)	SF	60	60
762	1305 PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED	LF	1,652	1,652
762	1307 PREFORMED PATTERNED PVMT MK 6IN LINE-GROOVED	LF	156	156
762	1309 PREFORMED PATTERNED PVMT MK 8IN LINE-GROOVED	LF	300	300
762	1325 PREFORMED PATTERNED PVMT MK 24IN LINE-GROOVED	LF	125	125
772	0001 TRAFFIC SIGNALS SYSTEM	EA	1	1

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - Intersection of Broadway and East Dakota Parkway

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	81	1

HORIZONTAL ALIGNMENT				CURVE DATA	US PUBLIC LAND SURVEY DATA				SURVEY CONTROL POINTS						
PNT	STATION	NORTHING	EASTING	ARC DEFINITION	DESC.	SEC-TWP-RGE	NORTHING	EASTING	PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	
										CONTROL POINT DESCRIPTION					
ND 1804 (SCL1804)					SW Cor SEC 19 T-154-N R-100-W		431094.26	1211023.68							
Beg	13+52.13	433784.69	1209808.81		Center Cor SEC 19 T-154-N R-100-W		433636.11	1213692.37		PRIMARY CONTROL					
Intersection of ND 1804 and East Dakota Parkway										GPS 1	433316.68	1219956.94	1955.40	N\A	N\A
ND 1804	26+77.67	433734.21	1211133.38							7" Nail 275' S of Hwy RM 315.39					
E Dakota Parkway	100+00.00	433734.21	1211133.38							GPS 2	445391.62	1218143.34	2048.18	N\A	N\A
End	38+07.05	433691.18	1212261.94							#6 Rebar w/ Alum Cap 3047 Top of hill across from 53 Lane NW Gr Rd to E					
East Dakota Parkway (SCLDAKOTAPKWY)										SECONDARY CONTROL					
Beg	73+57.77	431094.26	1211023.68							RTK 3522	433484.24	1213777.84	1857.85	N\A	N\A
Intscn ND 1804	100+00.00	433734.21	1211133.38												
End	102+50.00	433984.00	1211143.72												
NOTES: Sheet 1 of 1										<input type="checkbox"/> Assumed Coordinates <input checked="" type="checkbox"/> All coordinates on this sheet are Williams County ground coordinates. They are derived from the "North Dakota Coordinate System of 1983", NAD83(CORS96).North Zone Combination Factor (cf) = 0.9998445					
										All coordinates and measurements on this document derived from the International Foot definition. INITIALIZING BENCH MARK NDGPS Stations (OPUS) <input checked="" type="checkbox"/> NAVD-88 <input type="checkbox"/> NGVD-29 <input checked="" type="checkbox"/> GEOID 09 <input type="checkbox"/> _____ <input type="checkbox"/> GEOID 12A					
										This document was originally issued and sealed by Robert D. Zahn Registration Number PLS- 3659 , on 07/24/14 and the original document is stored at the North Dakota Department of Transportation					

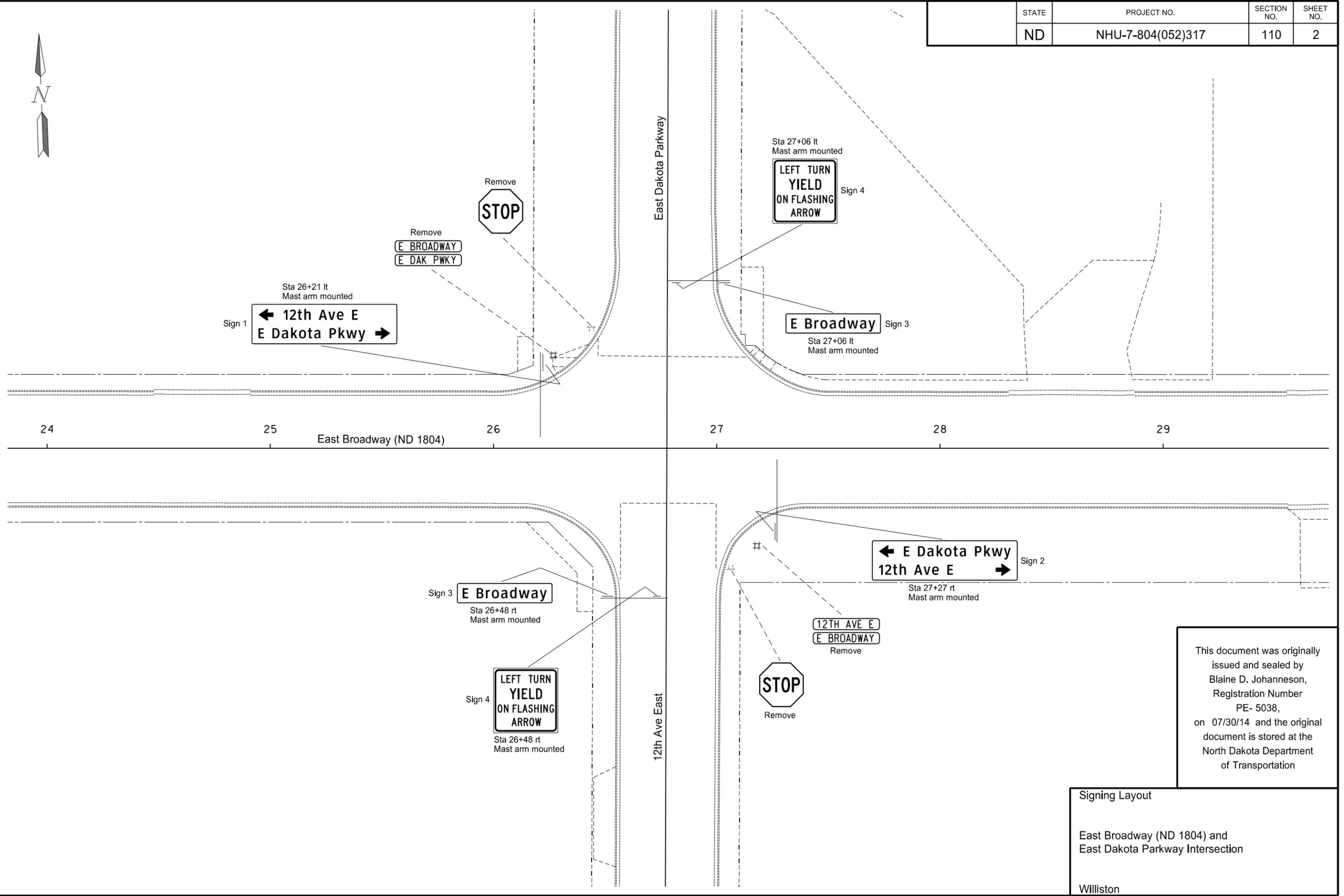
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	NHU-7-804(052)317	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Support Size	Max Post Len LF	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			1st LF	2nd LF	3rd LF	4th LF								
Sta 26+21 Lt	1		58.0																		Mount on Mast Arm	
Sta 26+48 Rt	3		19.0																		Mount on Mast Arm	
Sta 26+48. Rt	4			16.0																	Mount on Mast Arm	
Sta 27+06 Lt	4			16.0																	Mount on Mast Arm	
Sta 27+06. Lt	3		19.0																		Mount on Mast Arm	
Sta 27+27 Rt	2		58.0																		Mount on Mast Arm	
Sub Total			154.0	32.0	Total	0.0																
Grand Total			154.0	32.0	Total	0.0																

Basis of Estimate
Sign Support Lengths
The sign support lengths have been calculated using the following vertical clearances:

<p>This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE-5038, on 7/30/2014 and the original document is stored at the North Dakota Department of Transportation</p>	<p>Sign Summary Perforated Tube East Broadway (ND 1804) and East Dakota Parkway Intersection Williston</p>
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	110	2



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Signing Layout
 East Broadway (ND 1804) and East Dakota Parkway Intersection
 Williston

SIGN NUMBER	Sign 4					STATION(S):	26+48 rt 27+06 lt					AREA: 16.0 Sq.Ft.
WIDTH x HEIGHT	4'-0" x 4'-0"											
BORDER WIDTH	1.25" (inset 0.75")											
CORNER RADIUS	3"											
MOUNTING	Mast Arm Mounted											
BACKGROUND	TYPE: XI Reflective											
	COLOR: White											
LEGEND/BORDER	TYPE: Non-Reflective											
	COLOR: Black											
SYMBOL	X	Y	WID	HT	ANGLE							

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

PANEL STYLE: ND_Misc_Regulatory.ssi

LETTER POSITION (X)											LENGTH	SIZE	SERIES
L	E	F	T		T	U	R	N			36.8	6	C 2000
5.7	9.6	13.7	17.1	20.2	26.2	30.1	34.7	39.1					
Y	I	E	L	D							24.2	8	C 2000
12	18.2	21.1	26.5	31.7									
O	N	F	L	A	S	H	I	N	G		42	6	C 2000
3	7.7	14.2	18.1	21.5	25.9	30.3	35	37.1	41.7				
A	R	R	O	W							22.1	6	C 2000
13.4	18.1	22.5	26.7	31									

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Sign Details
 East Broadway (ND 1804) and East Dakota Parkway Intersection
 Williston



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	120	1

Preformed patterned pvmt mk 4in line - grooved
 Dbl 4" yellow barrier line (4" between) 1652 LF

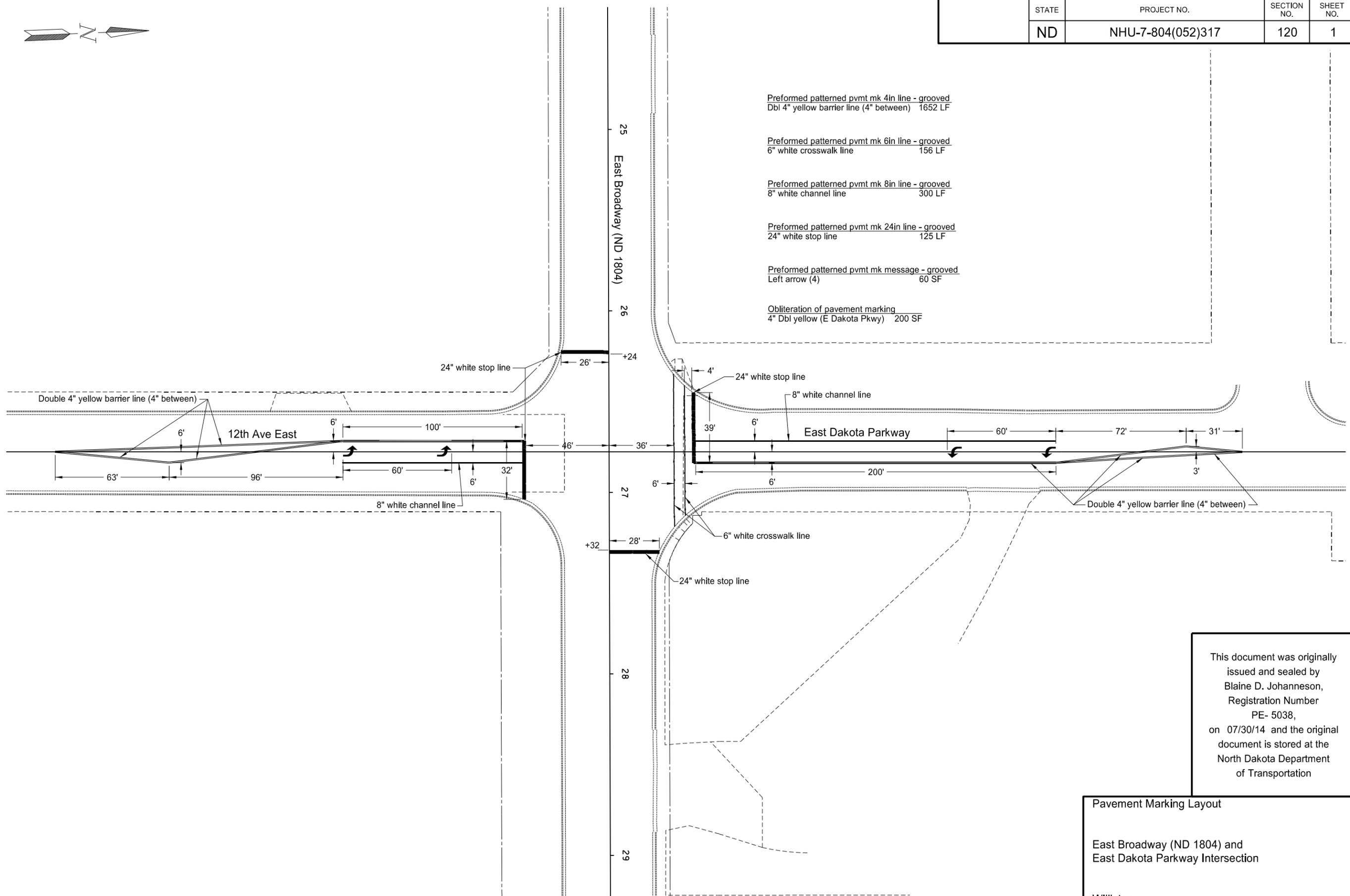
Preformed patterned pvmt mk 6in line - grooved
 6" white crosswalk line 156 LF

Preformed patterned pvmt mk 8in line - grooved
 8" white channel line 300 LF

Preformed patterned pvmt mk 24in line - grooved
 24" white stop line 125 LF

Preformed patterned pvmt mk message - grooved
 Left arrow (4) 60 SF

Obliteration of pavement marking
 4" Dbl yellow (E Dakota Pkwy) 200 SF



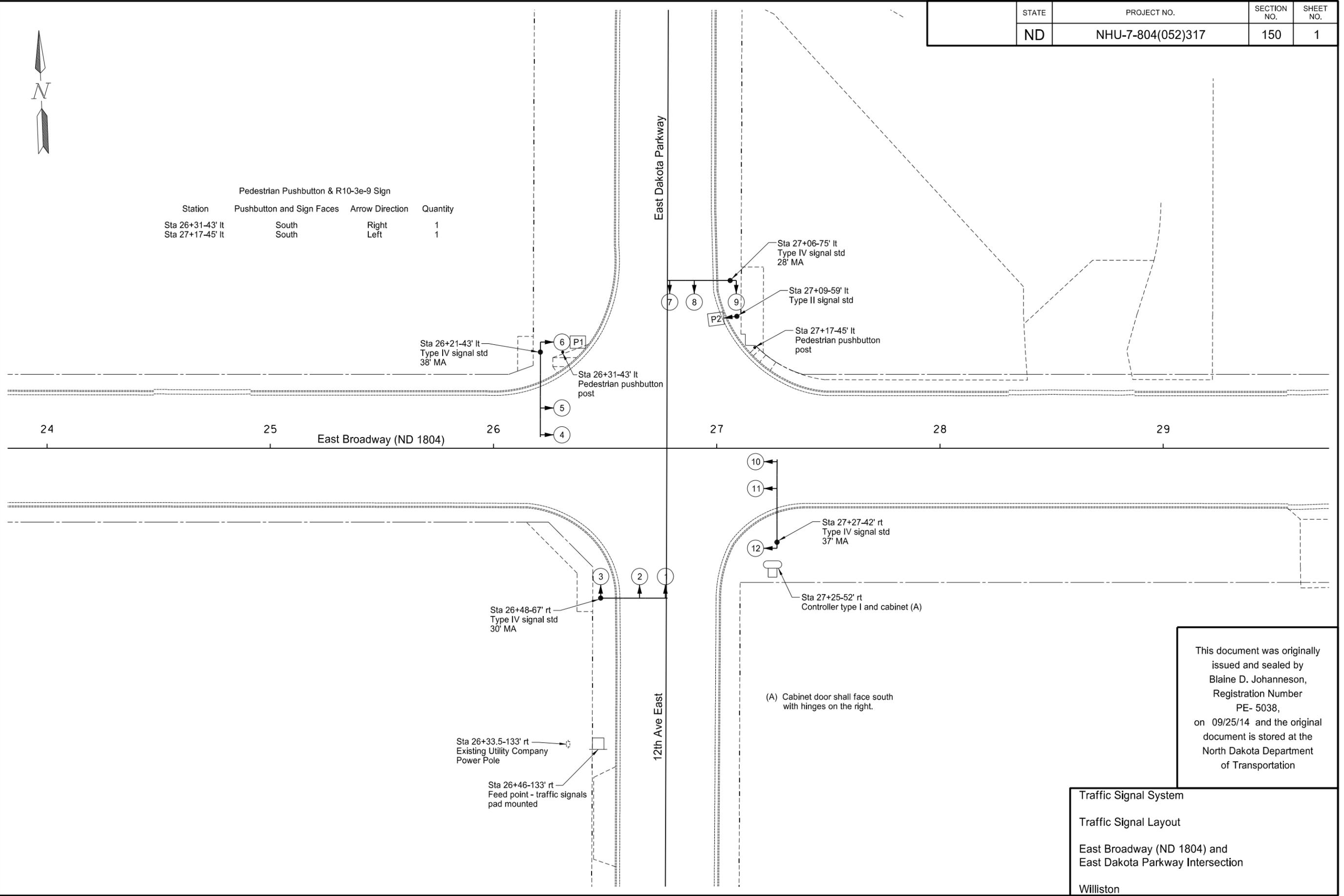
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Pavement Marking Layout
 East Broadway (ND 1804) and East Dakota Parkway Intersection
 Williston

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	150	1



Pedestrian Pushbutton & R10-3e-9 Sign			
Station	Pushbutton and Sign Faces	Arrow Direction	Quantity
Sta 26+31-43' lt	South	Right	1
Sta 27+17-45' lt	South	Left	1

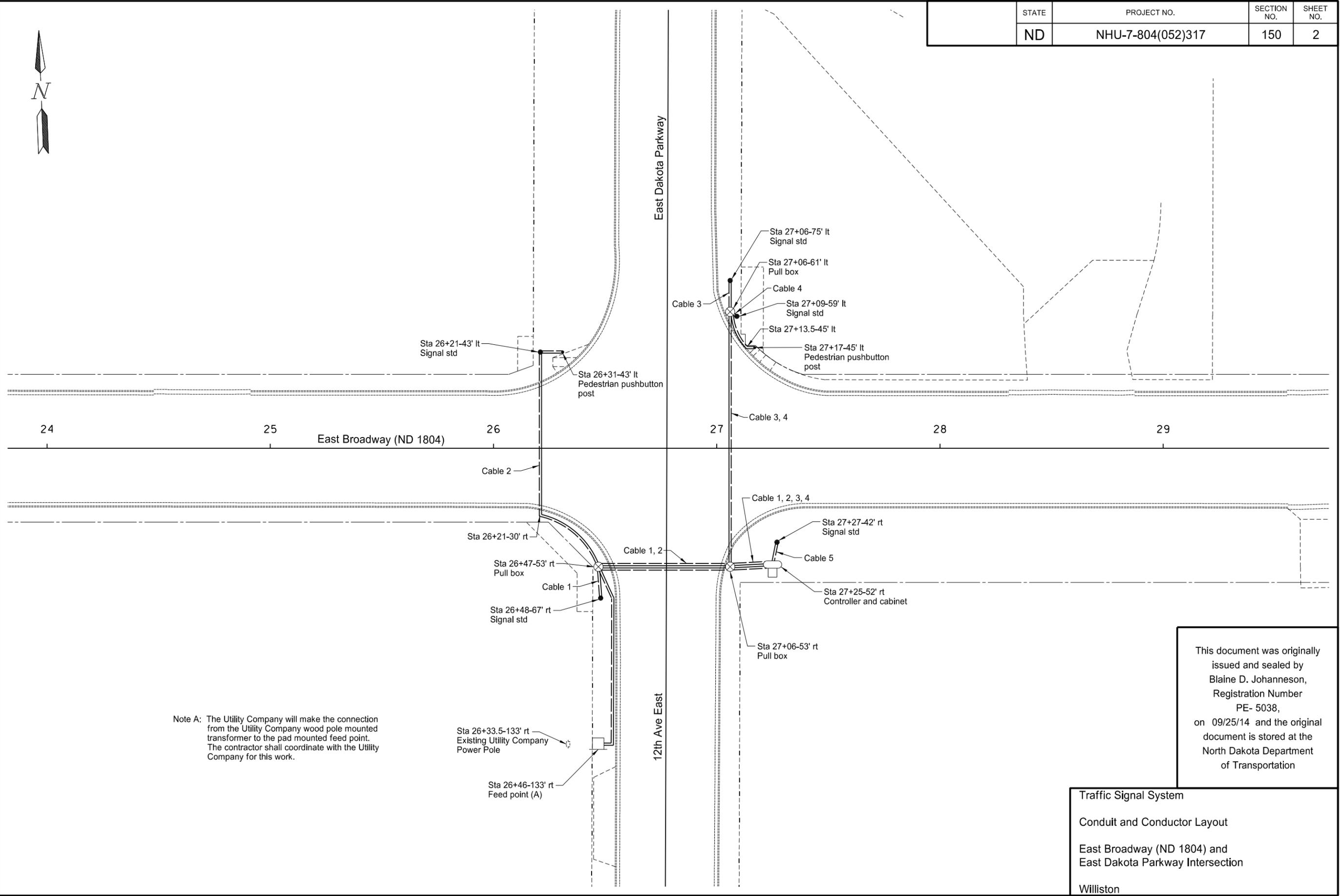


(A) Cabinet door shall face south with hinges on the right.

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Traffic Signal System
 Traffic Signal Layout
 East Broadway (ND 1804) and East Dakota Parkway Intersection
 Williston

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	150	2



Note A: The Utility Company will make the connection from the Utility Company wood pole mounted transformer to the pad mounted feed point. The contractor shall coordinate with the Utility Company for this work.

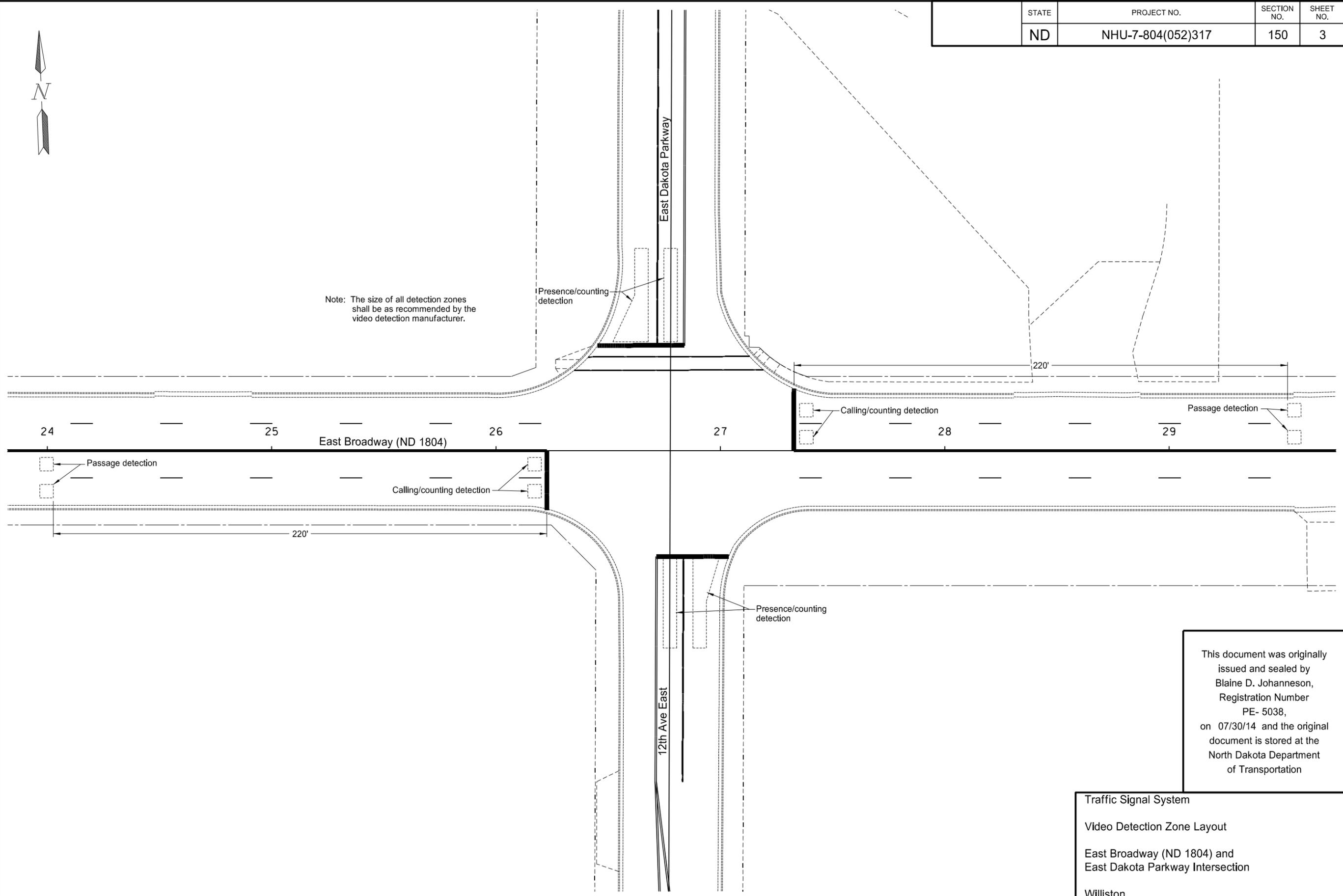
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Traffic Signal System
 Conduit and Conductor Layout
 East Broadway (ND 1804) and
 East Dakota Parkway Intersection
 Williston

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	150	3



Note: The size of all detection zones shall be as recommended by the video detection manufacturer.



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Traffic Signal System
 Video Detection Zone Layout
 East Broadway (ND 1804) and
 East Dakota Parkway Intersection
 Williston

Station	Conduit Runs		Cable Runs	
	LF	DIA	LF	Type
26+31-43' lt to 26+21-43' lt	9	1"	18	No. 16 AWG 2 (C)
26+21-43' lt to 26+21-30' rt to 26+47-53' rt	72 36	2" 2"	115 110 173 173 164 164	Cable 2 No. 16 AWG 2 (C) No. 16 AWG 3 (D) Coaxial Cable (E) EVD Cable (F) No. 12 AWG 2 (G)
26+48-67' rt to 26+47-53' rt	13	2"	19 56 56 47 47	Cable 1 No. 16 AWG 3 (D) Coaxial Cable (E) EVD Cable (F) No. 12 AWG 2 (G)
26+47-53' rt to 27+06-53' rt	58	3"	59 59 118 118 118 118	Cable 1 Cable 2 No. 16 AWG 2 (C) (2) No. 16 AWG 3 (D) (2) Coaxial Cable (E) (2) EVD Cable (F) (2) No. 12 AWG 2 (G)
27+06-75' lt to 27+06-61' lt	13	2"	19 54 54 45 45	Cable 3 No. 16 AWG 3 (D) Coaxial Cable (E) EVD Cable (F) No. 12 AWG 2 (G)
27+09-59' lt to 27+06-61' lt	3	2"	9	Cable 4
27+17-45' lt to 27+13.5-45' lt to 27+06-61' lt	3 18	1" 1"	30	No. 16 AWG 2 (C)
27+06-61' lt to 27+06-53' rt	113	3"	114 114 114 114 114 114	Cable 3 Cable 4 No. 16 AWG 2 (C) No. 16 AWG 3 (D) Coaxial Cable (E) EVD Cable (F) No. 12 AWG 2 (G)
27+06-53' rt to 27+25-52' rt	18	4"	28 28 28 28 56 84 84 84 84	Cable 1 Cable 2 Cable 3 Cable 4 (2) No. 16 AWG 2 (C) (3) No. 16 AWG 3 (D) (3) Coaxial Cable (E) (3) EVD Cable (F) (3) No. 12 AWG 2 (G)
27+27-42' rt to 27+25-52' rt	8	2"	24 81 81 72 72	Cable 5 No. 16 AWG 3 (D) Coaxial Cable (E) EVD Cable (F) No. 12 AWG 2 (G)
26+46-133' rt to 26+47-53' rt to 27+06-53' rt to 27+25-52' rt	88 58 18	2" 2" 2"	372 186	(2) No 6 RHW (1) No 6 THW

- (C) Pedestrian Pushbutton Conductor
- (D) Video Detection Power Cable (As Required by Manufacturer)
- (E) Video Detection (As Required by Manufacturer)
- (F) Emergency Vehicle Detector Cable
- (G) Indicator Light Conductor

STATION	QUANTITIES (A)																															
	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA			
26+21-43' lt	1												12(B)	123(B)																		
26+48-67' rt	1													108(B)																		
27+06-75' lt	1													104(B)																		
27+09-59' lt	1												12(B)																			
27+27-42' rt	1													121(B)																		
27+25-52' rt	1																															
26+46-133' rt		1																														
Various Locations			3	30	309	171	18	372	186	644	644		151	493	387	680	680															
TOTAL	6	1	3	30	309	171	18	372	186	644	644	24	607	493	387	680	680	1	1	1	1	1	1	4	8	1	1	2	1	1	1	1

(A) These items shall not be bid separately but shall be included in the item "Traffic Signals System".
 (B) Conductor used for internal wiring

Description	Footing Depth "D"	Footing Depth "D"
	24" and 30" Dia	36" and 42" Dia
Type II Signal Std	4', 4'	-
Type IV Signal Std		
Single 28' Mast Arm	12', 12'	12', 12'
Single 30' Mast Arm	12', 12'	12', 12'
Single 37' Mast Arm	13', 13'	13', 13'
Single 38' Mast Arm	13', 13'	13', 13'

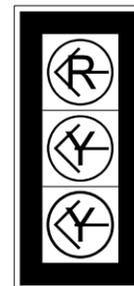
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Traffic Signal System
 Cable Runs and Quantities
 East Broadway (ND 1804) and East Dakota Parkway Intersection
 Williston

CONDUCTORS		CABLE 1 (NO.14 AWG 12)		CONDUCTORS		CABLE 2 (NO.14 AWG 12)		CONDUCTORS		CABLE 3 (NO.14 AWG 12)			
BASE	TRACER	HEAD	INDICATION	BASE	TRACER	HEAD	INDICATION	BASE	TRACER	HEAD	INDICATION		
1	Black		Spare	1	Black	P1	Walk	1	Black		Spare		
2	White		Neutral	2	White		Neutral	2	White		Neutral		
3	Red	2, 3	Red	3	Red	4, 5, 6	Red	3	Red	8, 9	Red		
4	Green		Ground	4	Green		Ground	4	Green		Ground		
5	Orange	2, 3	Yellow	5	Orange	4, 5, 6	Yellow	5	Orange	8, 9	Yellow		
6	Blue	2, 3	Green	6	Blue	4, 5, 6	Green	6	Blue	8, 9	Green		
7	White	Black	Spare	7	White	Black	P1	Don't Walk	7	White	Black	Spare	
8	Red	Black	1	Red Arrow	8	Red	Black	Spare	8	Red	Black	7	Red Arrow
9	Green	Black		Spare	9	Green	Black	Spare	9	Green	Black		Spare
10	Orange	Black	1	Yellow Arrow	10	Orange	Black	Spare	10	Orange	Black	7	Yellow Arrow
11	Blue	Black	1	Flashing Yellow Arrow	11	Blue	Black	Spare	11	Blue	Black	7	Flashing Yellow Arrow
12	Black	White		Spare	12	Black	White	Spare	12	Black	White		Spare

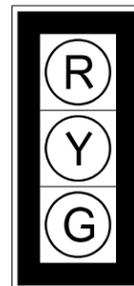
CONDUCTORS		CABLE 4 (NO.14 AWG 5)		CONDUCTORS		CABLE 5 (NO.14 AWG 12)		
BASE	TRACER	HEAD	INDICATION	BASE	TRACER	HEAD	INDICATION	
1	Black		P2	Walk	1	Black		Spare
2	White			Neutral	2	White		Neutral
3	Red		P2	Don't Walk	3	Red	10, 11, 12	Red
4	Green			Ground	4	Green		Ground
5	Orange			Spare	5	Orange	10, 11, 12	Yellow
					6	Blue	10, 11, 12	Green
					7	White	Black	Spare
					8	Red	Black	Spare
					9	Green	Black	Spare
					10	Orange	Black	Spare
					11	Blue	Black	Spare
					12	Black	White	Spare

Heads 1, 7



Flashing

Heads 2, 3, 4, 5, 6, 8, 9, 10, 11, 12



Heads P1, P2

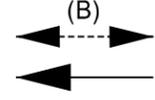


Pedestrian signal heads shall have LED modules

Traffic signal heads shall have 12" LED modules with 5" louvered backplates

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Traffic Signal System
Signal Heads and Conductors
East Broadway (ND 1804) and East Dakota Parkway Intersection
Williston

	Future		→		Future		↑		Future				Future		↓																																																											
	Phase 1		Phase 2		Phase 3		Phase 4		Phase 5		Phase 6		Phase 7		Phase 8																																																											
	Head #	R/W	Clear To ∅						R/W	Clear To ∅						R/W	Clear To ∅						R/W	Clear To ∅						R/W	Clear To ∅						R/W	Clear To ∅																																				
		2	3	4	5	6	7	8		3	4	5	6	7	8	1	2		4	5	6	7	8	1	2	3		5	6	7	8	1	2	3		6	7	8	1	2	3	4		7	8	1	2	3	4	5		8	1	2	3	4	5	6		8	1	2	3	4	5	6		1	2	3	4	5	6	7
1																																																		FY	Y	(A)	Y																					
2																																																		G	Y	(A)	Y																					
3																																																		G	Y	(A)	Y																					
4																																										G	Y	(A)	Y																													
5																																										G	Y	(A)	Y																													
6																																										G	Y	(A)	Y																													
7																																										FY	Y	(A)	Y																													
8																																										G	Y	(A)	Y																													
9																																										G	Y	(A)	Y																													
10																																										G	Y	(A)	Y																													
11																																										G	Y	(A)	Y																													
12																																										G	Y	(A)	Y																													

Blank Squares Denote a Red Indication.

(A) When one phase is on alone, any nonconflicting phase may start timing concurrently without a clearance interval. (See Chart A)

(B) Upon pedestrian actuation only.

CHART A

On Phase	Non-Conflicting Phase Allowed to Time Concurrently
1	Future
2	6
3	Future
4	8
5	Future
6	2
7	Future
8	4

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Traffic Signal System
 Controller Phasing
 East Broadway (ND 1804) and
 East Dakota Parkway Intersection
 Williston

	01	02	03	04	05	06	07	08
--	----	----	----	----	----	----	----	----

BASIC INTERVALS (or FUNCTIONS)								
Minimum Green/Initial		15.0		5.0		15.0		5.0
Vehicle Extension/Passage Time		5.0		2.0		5.0		2.0
Maximum Green		60.0		30.0		60.0		30.0
Yellow Change		3.2		3.0		3.2		3.0
Red Clearance		2.2		3.0		2.2		3.0
Walk						7.0		
Pedestrian Clearance						24.0		

VOLUME DENSITY TIMING FUNCTIONS								
Variable Initial Timing Options		Future		Future		Future		Future
Added Initial per Actuation			1.6			1.6		
Maximum Initial			22.0			22.0		

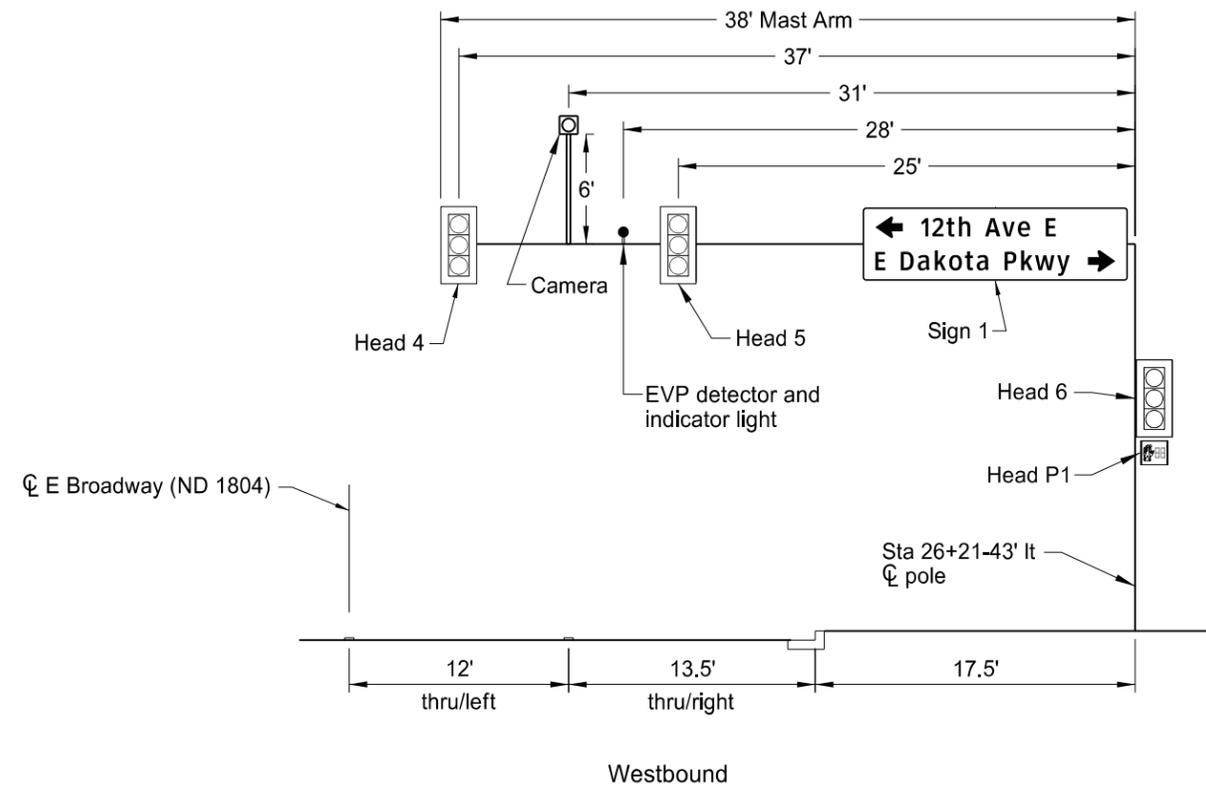
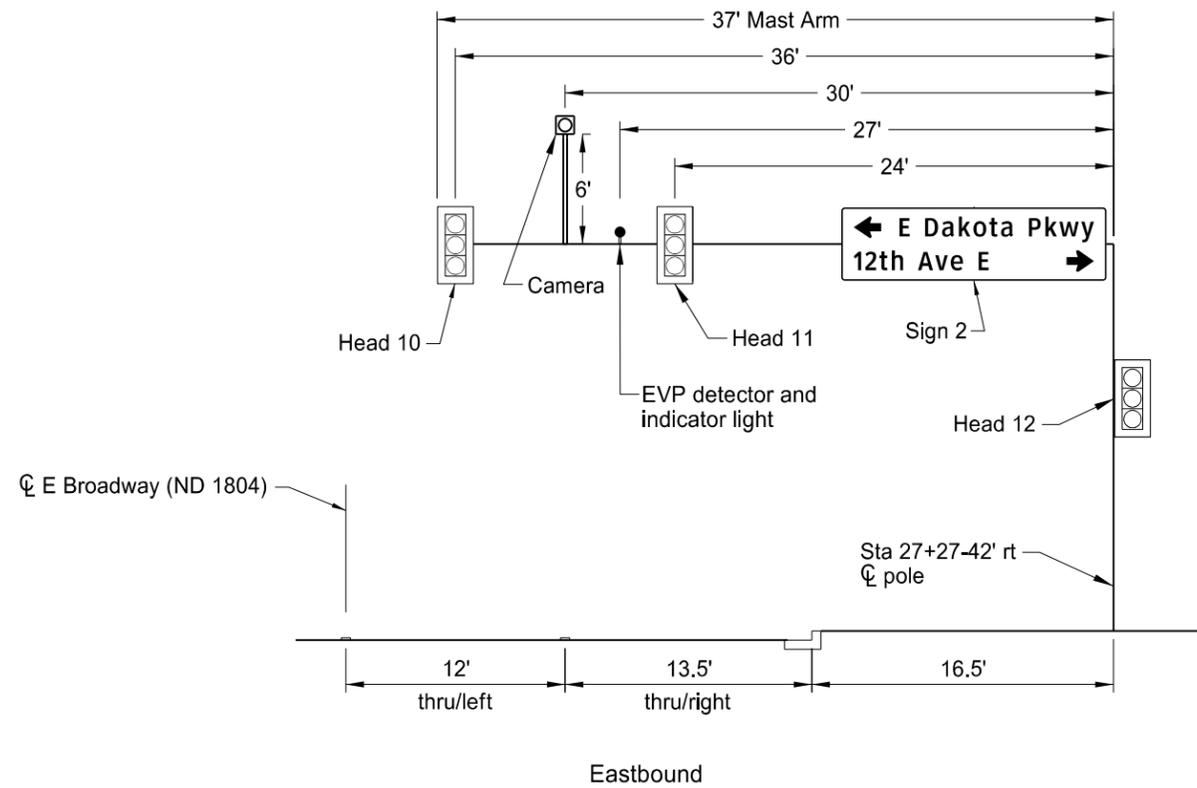
TIME WAITING GAP REDUCTION OPTIONS								
Time Before Reduction								
Time to Reduce to Minimum Gap								
Minimum Gap			5.0			5.0		
Locking Memory			X			X		
Non-Locking Memory				X				X
Flashing-Normal & Conflict Monitor			Y		R	Y		R
Start Up Phasing			G		R	G		R
Type of Detector	Presence				X			X
	Calling (A)		X			X		
	Passage		X			X		
	Counting		X		X	X		X
Emergency Vehicle Pre-emption			X		X	X		X

(A) Calling loops shall place one call into the controller on the yellow or red interval. Calling loops shall be disconnected during the green interval.

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Traffic Signal System
 Controller Settings
 East Broadway (ND 1804) and
 East Dakota Parkway Intersection
 Williston

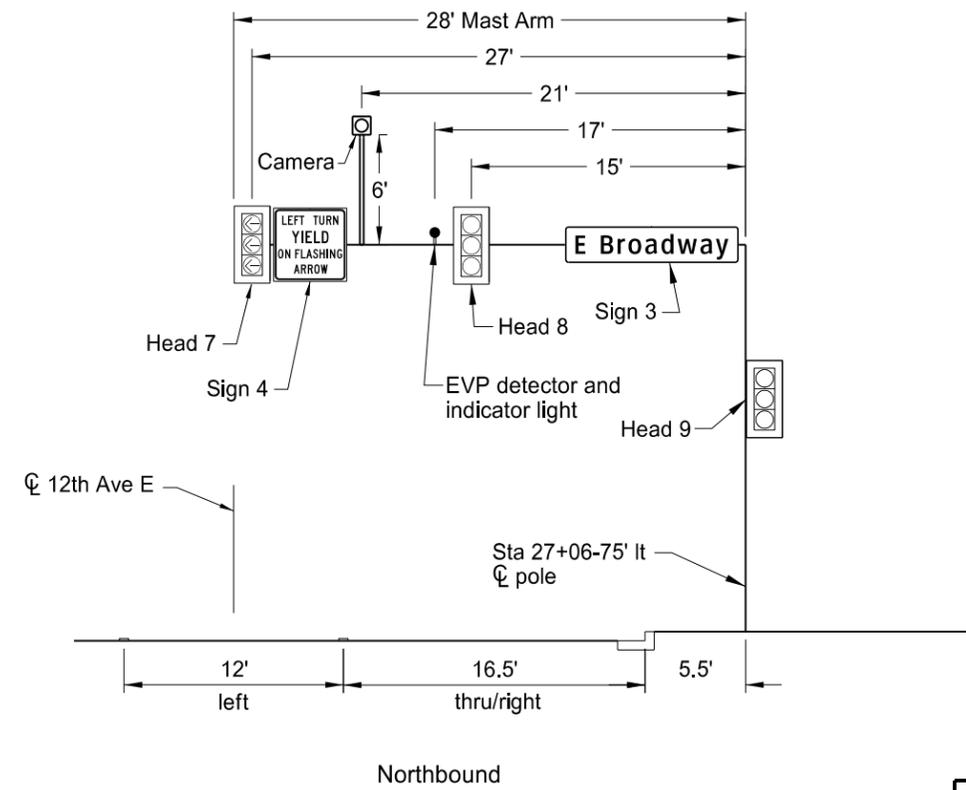
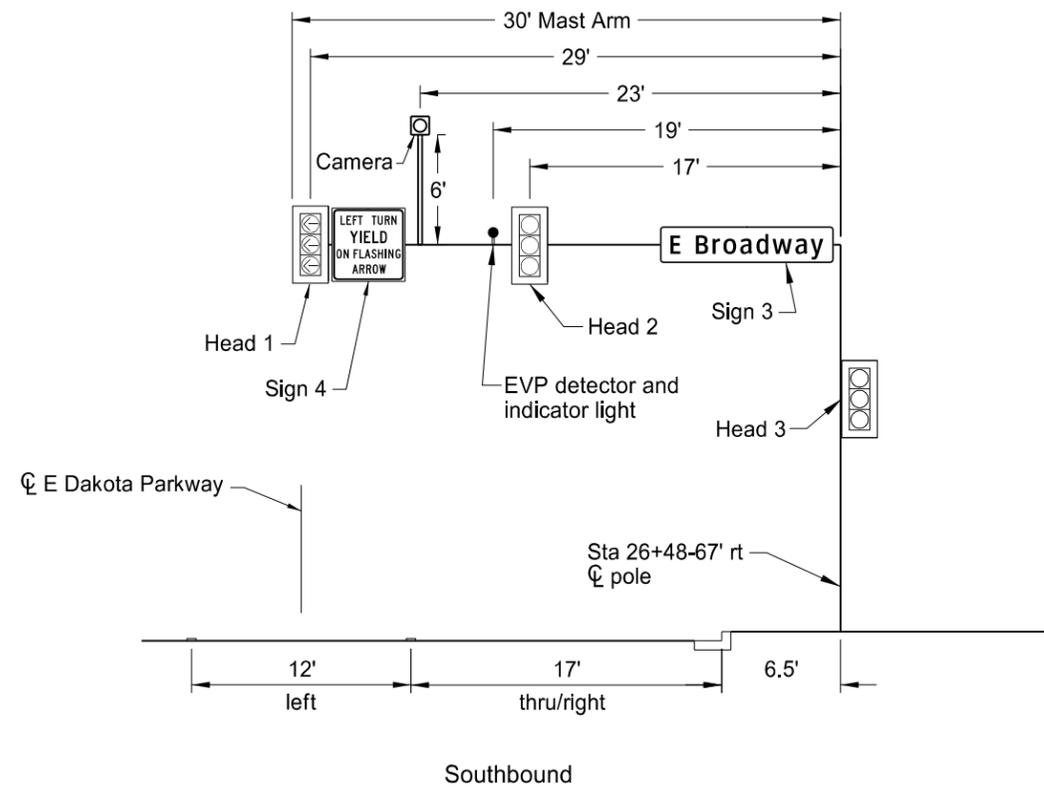
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NHU-7-804(052)317	150	8



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Traffic Signal System
 Signal Standards and Head Locations
 East Broadway (ND 1804) and East Dakota Parkway Intersection
 Williston

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NHU-7-804(052)317	150	9



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 Signal Standards and Head Locations
 East Broadway (ND 1804) and East Dakota Parkway Intersection
 Williston

NDDOT ABBREVIATIONS

D-101-1

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

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

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

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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NDDOT ABBREVIATIONS

D-101-2

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

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NDDOT ABBREVIATIONS

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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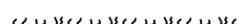
Line Styles

.....	Limits of Const Transition Line	—— s —— s ——	Floating Silt Curtain	—— ——— ———	Existing Aggregate (Cross Section View)	- - - - -	Existing Centerline
.....	Bale Check	—— ——— T ——	Existing Telephone Line	—— ——— ———	Existing Curb and Gutter (Cross Section View)	- - - - -	Supplemental Contour
.....	Rock Check	—— ——— TV ——	Existing TV Line	—— ——— ———	Existing Riprap	—— - - - - -	Right of Way
.....	Sight Distance Triangle Line	Void — void — void — v	Existing Assumed Ground (Not Surveyed)	—— ——— ———	Existing Underground Vault or Lift Station	—— - - - - -	Existing Right of Way
- - - - -	Small Hidden Object	Void — void — void — v	Tentative Ground Line	—— ——— ———	Tangent Line	—— - - - - -	Existing Right of Way Railroad
- - - - -	Dimension Leader	—— ——— w ——	Existing Water or Steam Line	- - - - -	Hidden Object	- - - - -	Failure Line
- - - - -	Existing Ground	=====	Existing Under Drain	—— ——— ———	Existing Dirt Surface	- - - - -	Existing Conditions
- - - - -	Existing Topsoil (Cross Section View)	=====	Under Drain	—— ——— ———	Existing Conduit	- - - - -	Existing Ground (Details)
—— ——— ———	Large Hidden Object	=====	Wall	—— ——— ———	Topsoil Profile	—— - - - - -	Existing Sixteenth Section Line
—— ——— ———	Edge Drain	=====	Existing Slotted Drain	- - - - -	Existing Conductor	- - - - -	Existing Right of Way Not State Owned
—— D —— D ——	Geotextile Fabric Type D	—— + —— + ——	Existing Cemetary Boundary	- - - - -	Conductor	- - - - -	Phantom Object
—— ——— E ——	Existing Electrical	—— ——— ———	Centerline Pavement Marking	- - - - -	Fiber Optic	- - - - -	Centerline Main
—— ——— FO ——	Existing Fiber Optic Line	=====	Barrier with Centerline Pavement Marking	- - - - -	Existing Loop Detector	-	Existing Guardrail Cable
—— ——— FO ——	Existing TV Fiber Optic	=====	Barrier Pavement Marking	- - - - -	Subgrade, Subcut or Ditch Grade	— • — • — • — •	Existing Guardrail Metal
—— ——— G ——	Existing Gas Pipe	- - - - -	Stripe 4 IN Dotted Extension White	—— ——— ———	Existing Asphalt Surface	—— . —— . —— . —— . ——	Existing Edge of Water
—— Geo —— Geo ——	Geogrid	- - - - -	Stripe 8 IN Dotted Extension White	—— ——— ———	Existing Asphalt (Cross Section View)	- - - - -	Excavation Limits
—— ——— OH ——	Existing Overhead Utility Line	- - - - -	Stripe 8 IN Lane Drop	—— ——— ———	Existing Reinforcement Rebar	—— . . . —— . . . —— . . . —— . . . ——	Existing Government Lot Line
—— ——— P ——	Existing Power	—— v v v ——	Wetland Mitigation	—— ——— ———	Existing Tie Point Line	.....	Existing Adjacent Block Lines
—— ——— PL ——	Existing Fuel Pipeline	- - - - -	Existing Box Culvert Bridge	—— ——— ———	Existing State or International Line	.....	Existing Adjacent Lot Lines
—— ——— PL ——	Existing Undefined Above Ground Pipe Line	- - - - -	Existing Concrete Surface	—— ——— ———	Existing Quarter Section Line	.....	Existing Adjacent Property Line
—— ——— R —— R ——	Geotextile Fabric Type R	- - - - -	Existing Drainage Structure	—— ——— ———	Existing County	.....	Existing Adjacent Subdivision Lines
—— ——— R —— R ——	Geotextile Fabric Type R1	- - - - -	Easement	—— ——— ———	Existing Section Line	.....
—— REMOVE —— REMOVE ——	Remove Line	- - - - -	Existing Concrete	—— ——— ———	Existing Township	.....
—— RR —— RR ——	Geotextile Fabric Type RR	- - - - -	Existing Easement	—— ——— ———	Existing Railroad Centerline	
—— S —— S ——	Geotextile Fabric Type S	—— ——— ———	Existing Gravel Surface	—— - - - - -	Centerline	

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Line Styles

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

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Symbols

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

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Symbols

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

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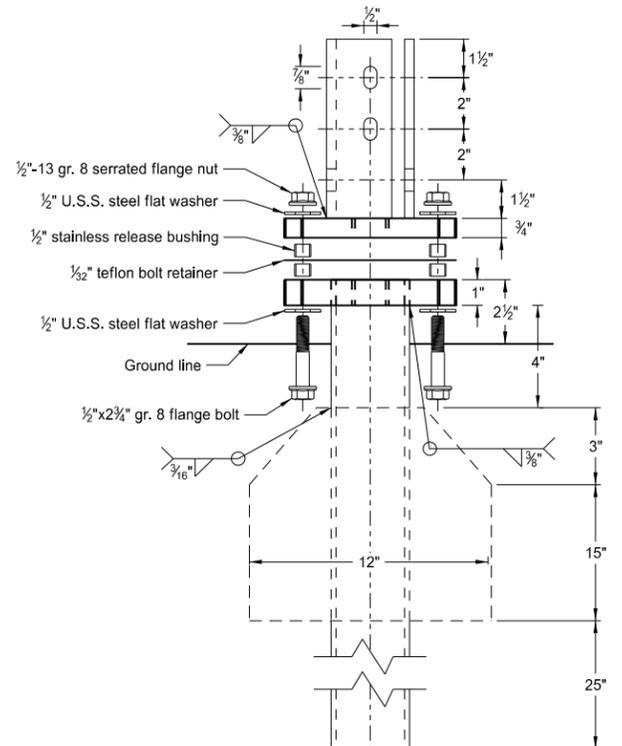
Symbols

D-101-32

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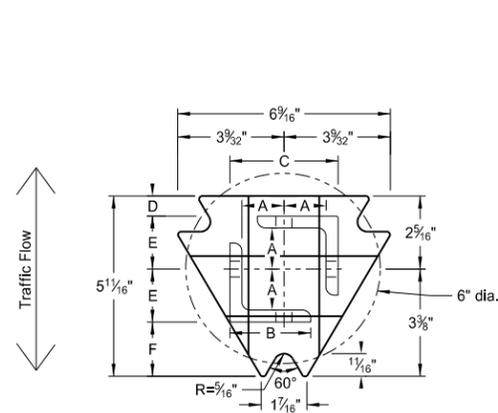
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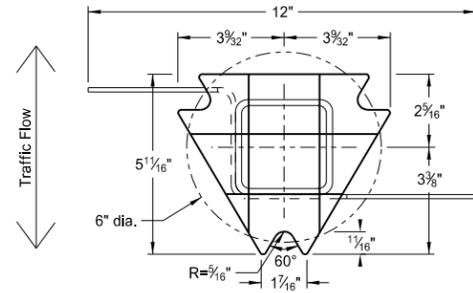


Multi-Directional Slip Base Assembly

Perforated Tube



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



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

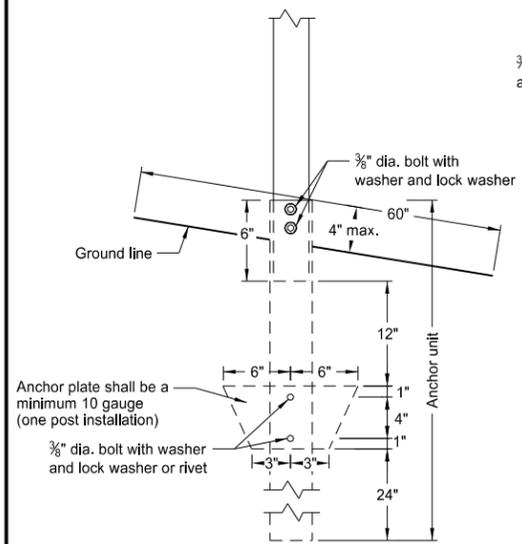
Notes:

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

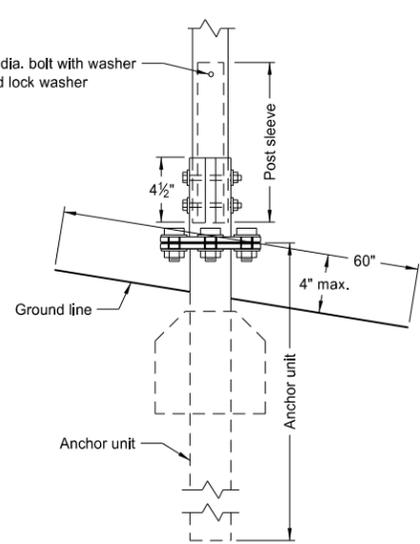
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

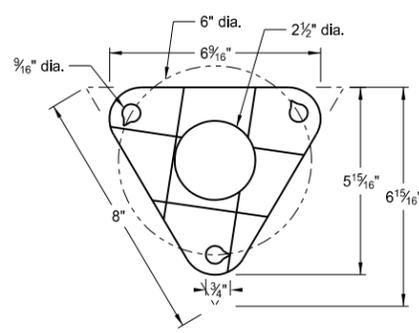
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



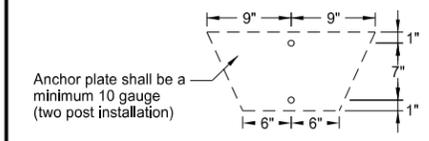
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



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



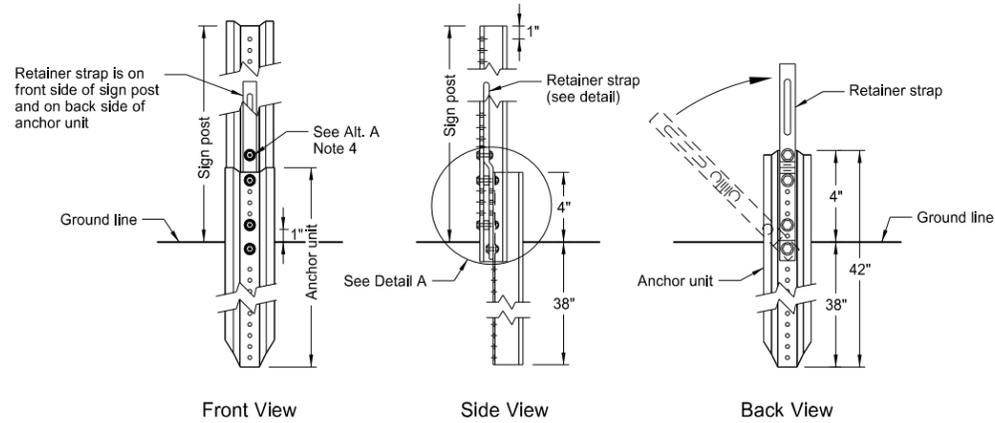
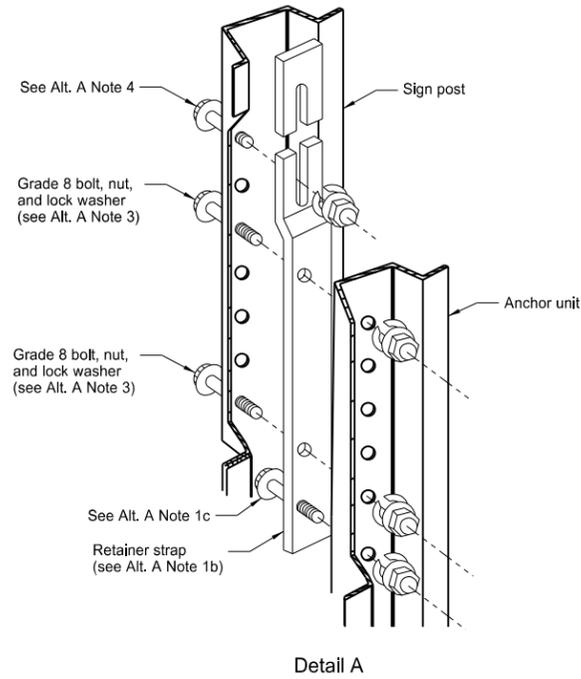
Anchor plate shall be a minimum 10 gauge (two post installation)

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

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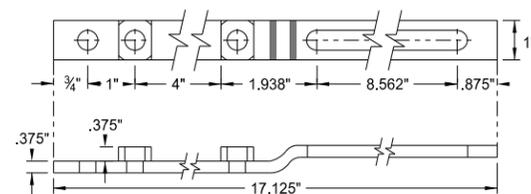
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U-Channel Post

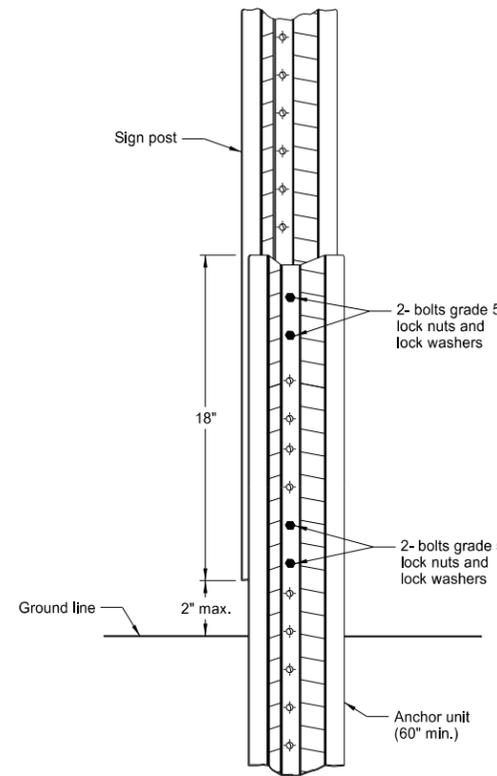


Breakaway U-Channel Detail Alternate A

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

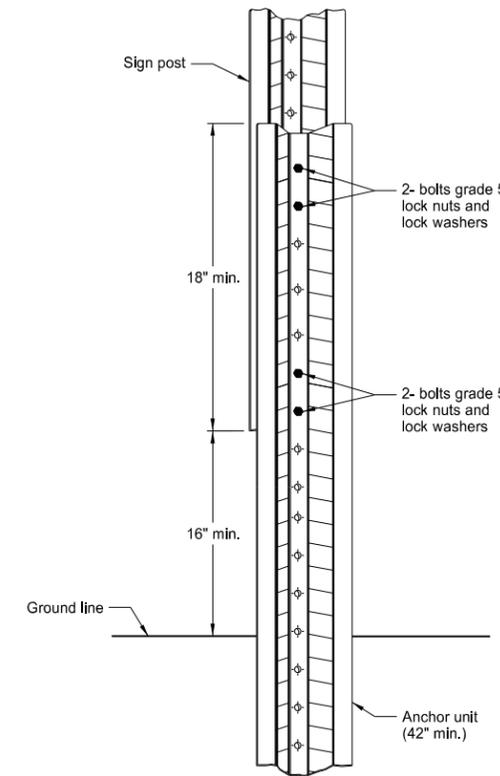


Retainer Strap Detail



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

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



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

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

Alternate A Steps of Installation:

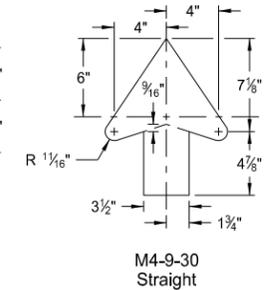
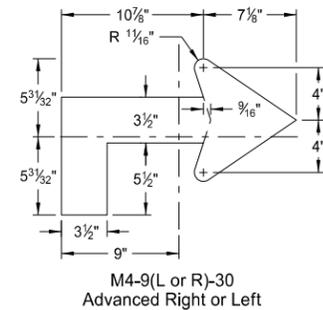
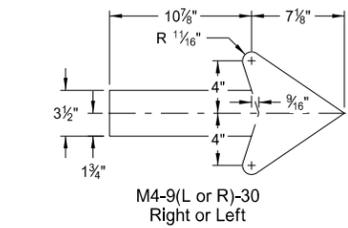
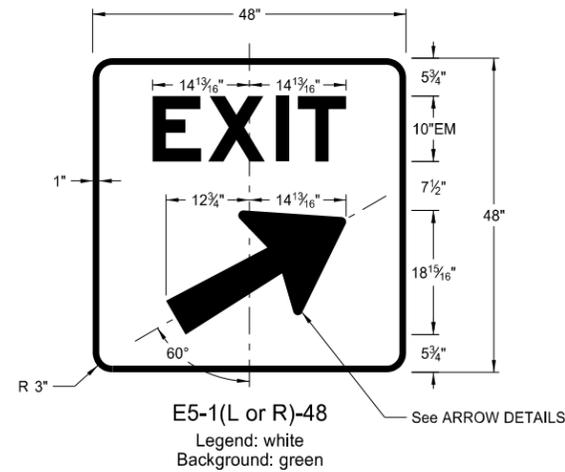
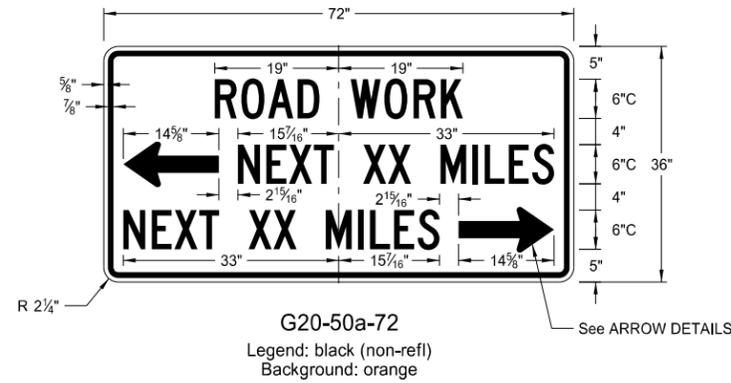
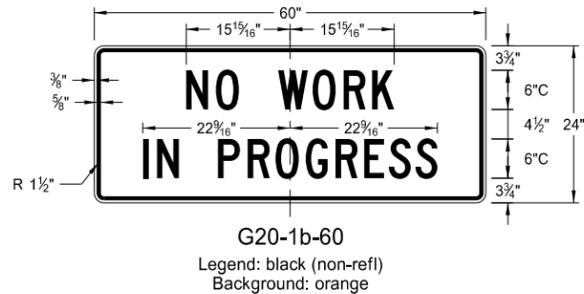
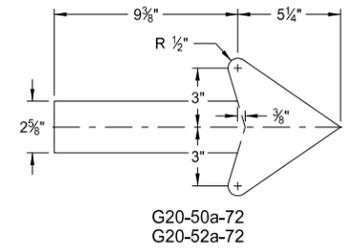
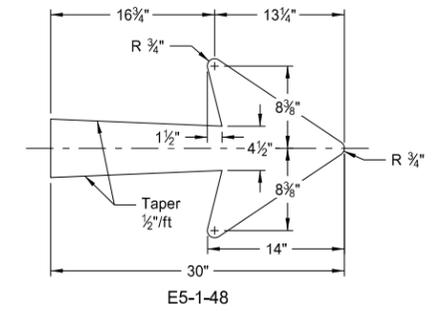
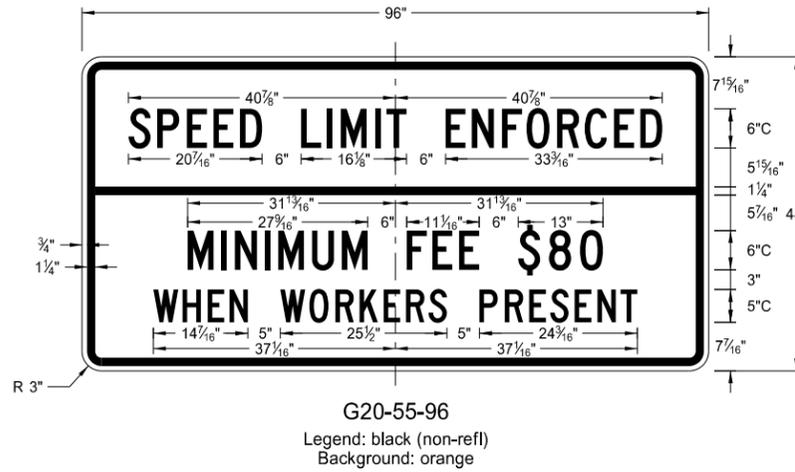
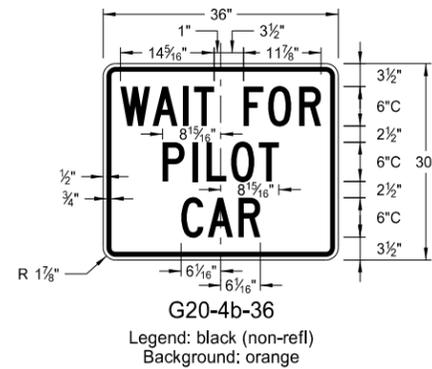
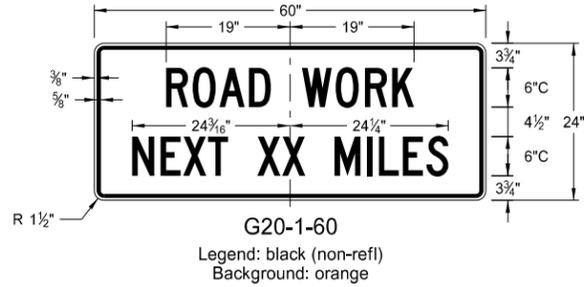
1. a) Drive anchor unit to within 12" of ground level.
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
2. a)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

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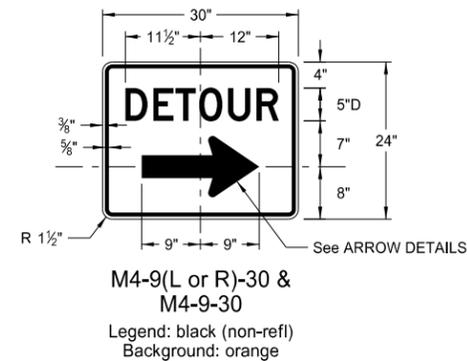
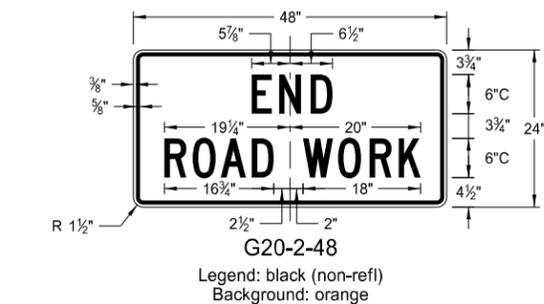
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CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

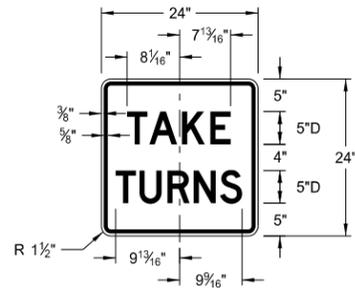
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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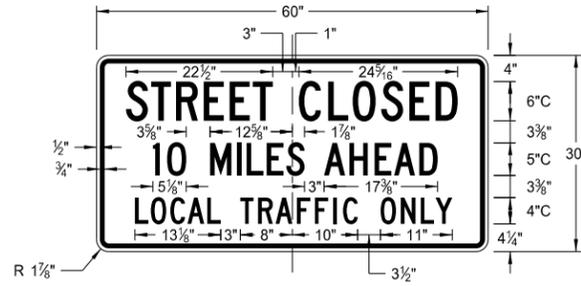
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

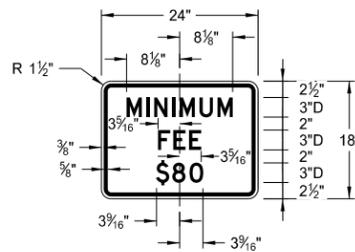
D-704-10



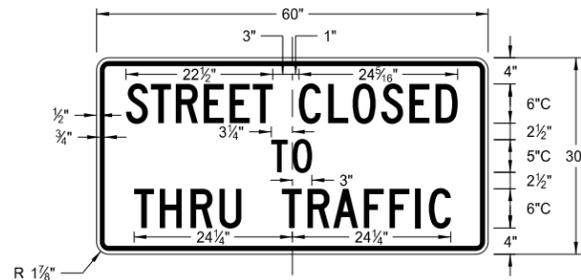
R1-50-24
Legend: black (non-refl)
Background: white



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



R2-1a-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

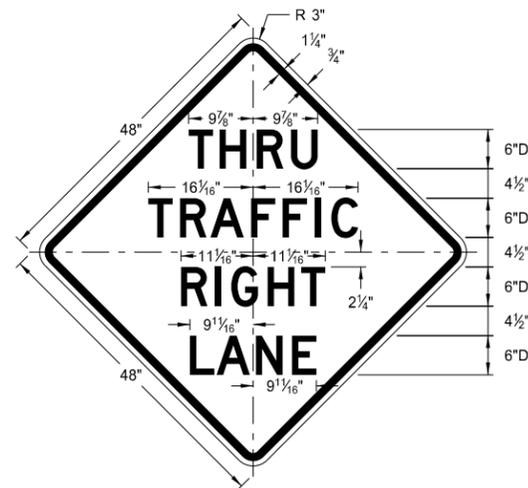
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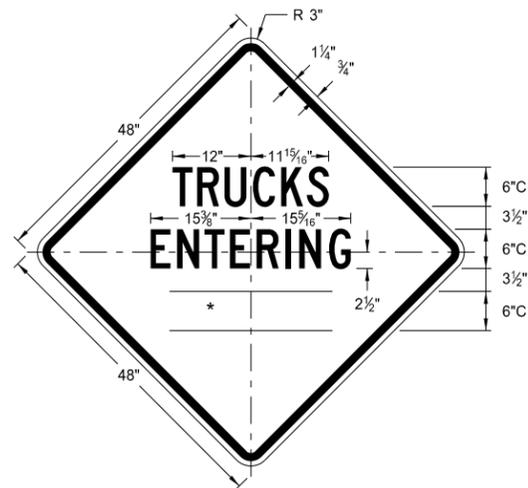
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

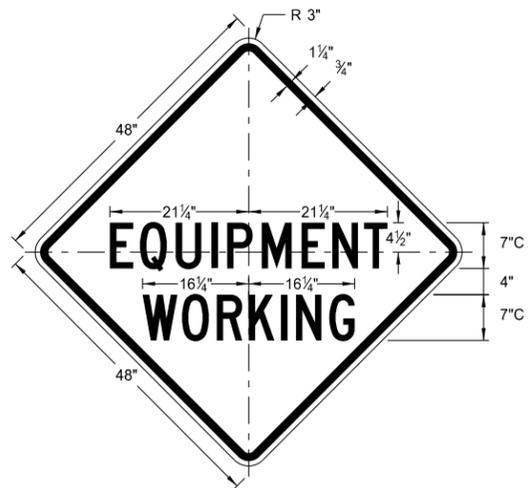
* DISTANCE MESSAGES



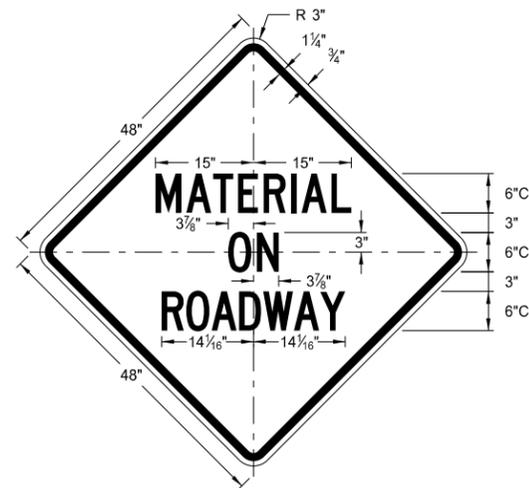
W5-8-48
Legend: black (non-refl)
Background: orange



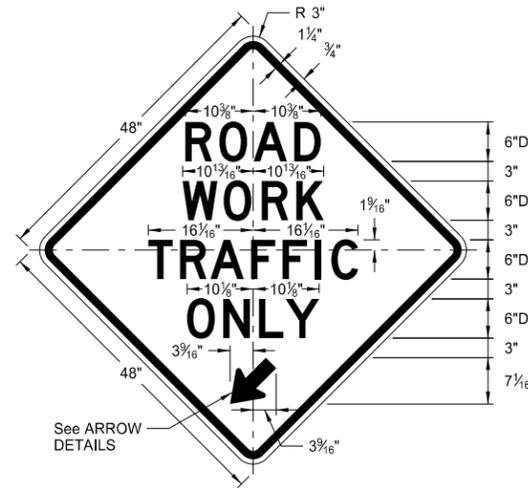
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Background: orange



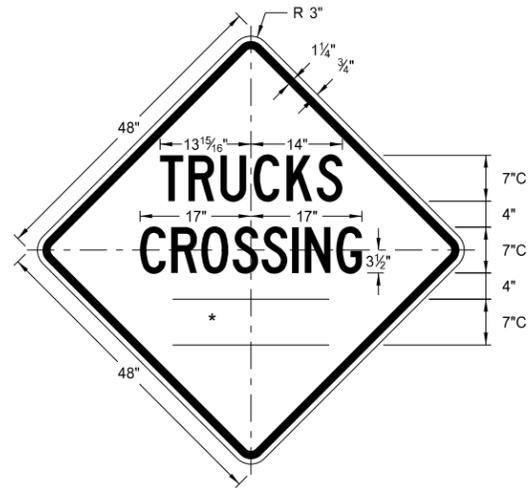
W20-51-48
Legend: black (non-refl)
Background: orange



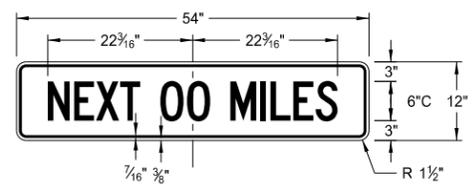
W21-51-48
Legend: black (non-refl)
Background: orange



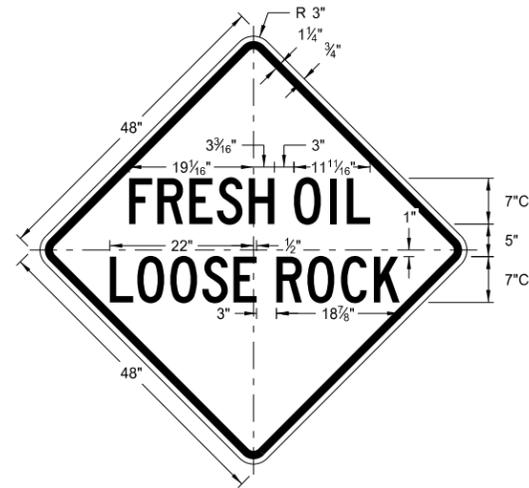
W5-9-48
Legend: black (non-refl)
Background: orange



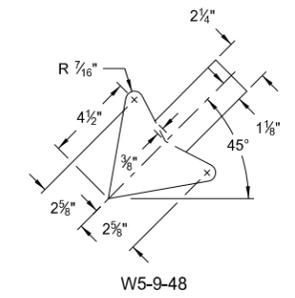
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Background: orange



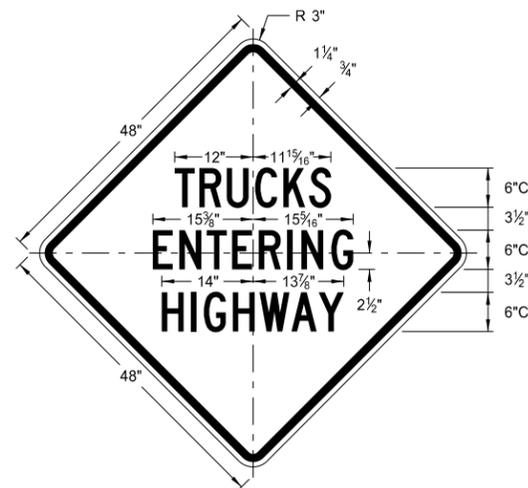
W20-52-54
Legend: black (non-refl)
Background: orange



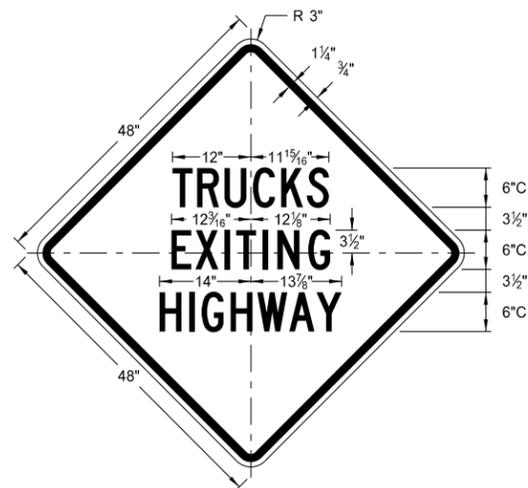
W22-8-48
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Background: orange



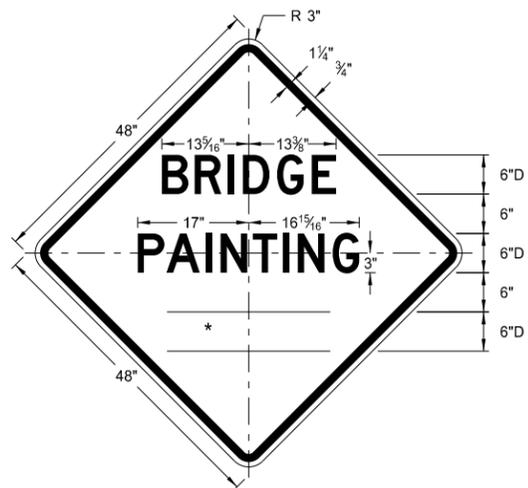
W5-9-48
ARROW DETAILS



W8-53-48
Legend: black (non-refl)
Background: orange



W8-56-48
Legend: black (non-refl)
Background: orange



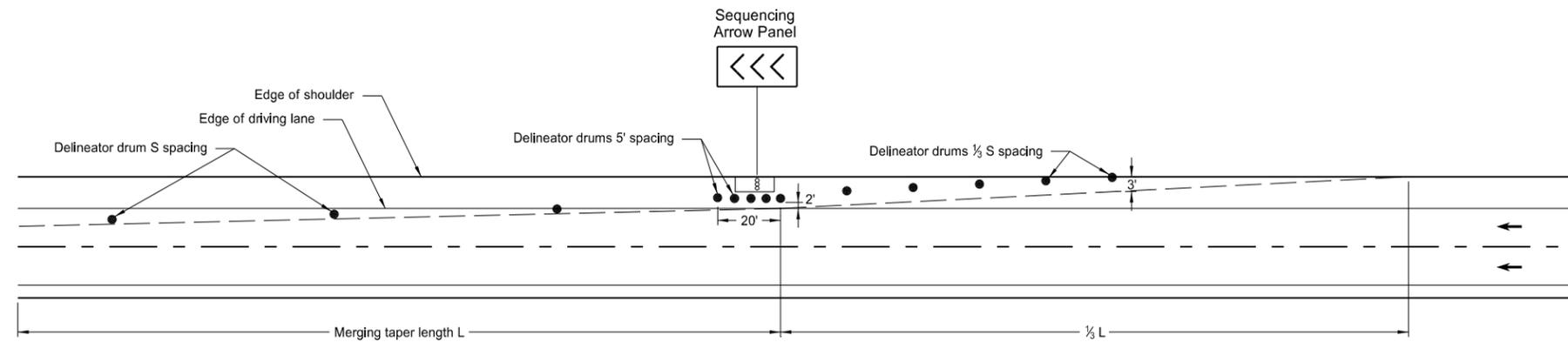
W21-50-48
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Background: orange

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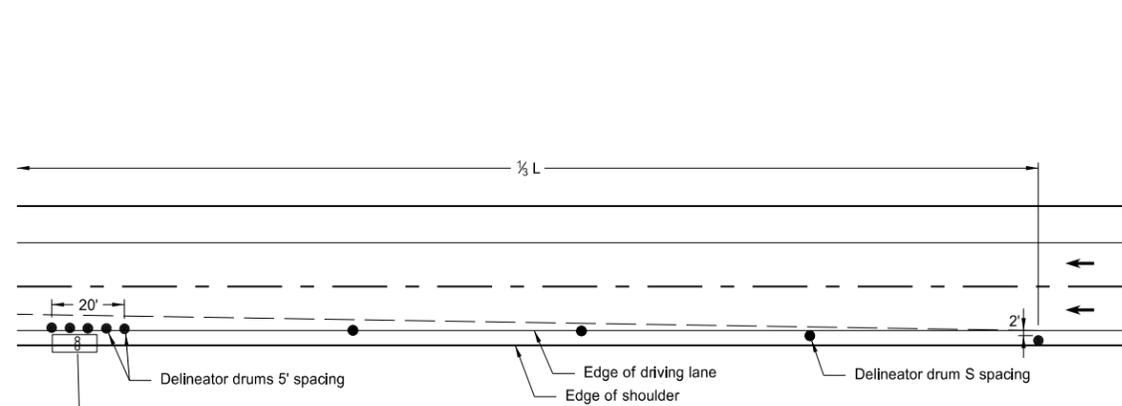
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SHOULDER CLOSURE TAPERS

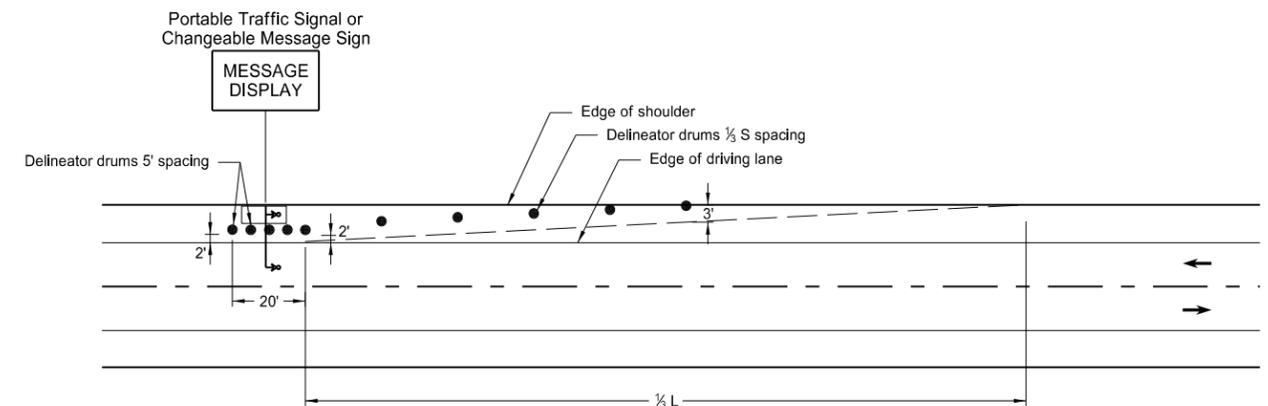
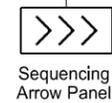
D-704-12



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



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

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

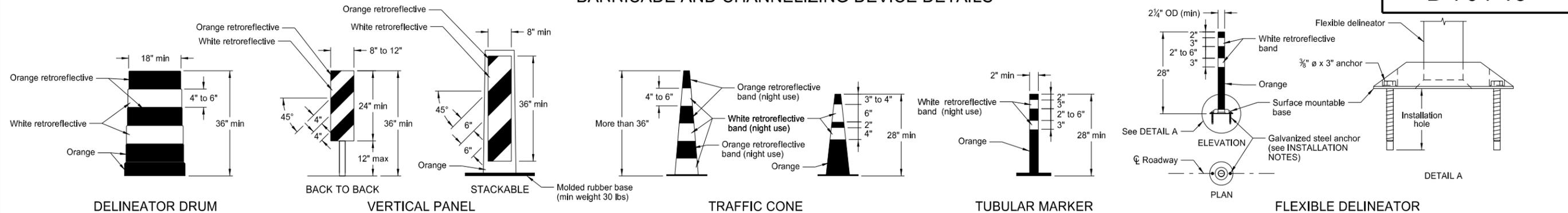
Notes:

- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
L = WS²/60 (40mph or less)
L = WS (45mph or more)
- If a shoulder taper is used, it should have a length of approximately 1/3L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
- When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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BARRICADE AND CHANNELIZING DEVICE DETAILS



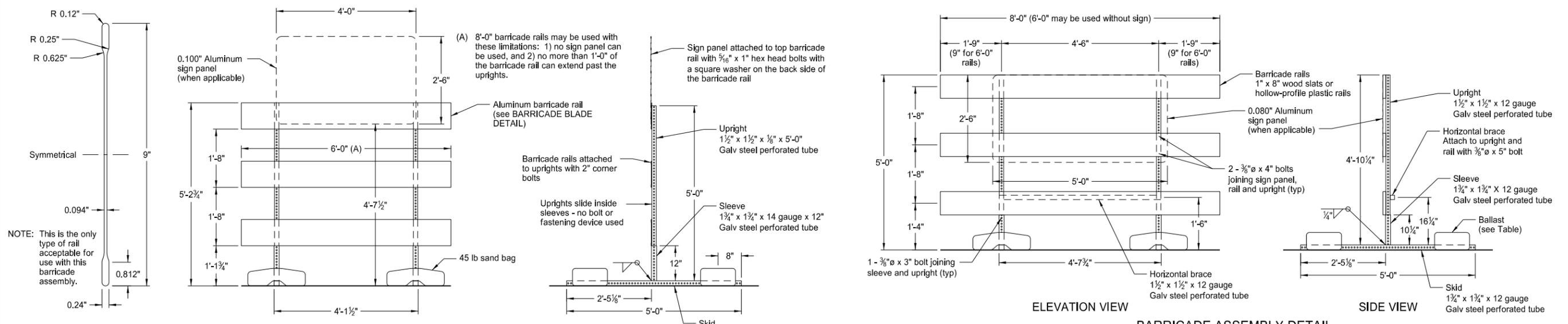
- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl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

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

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

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

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

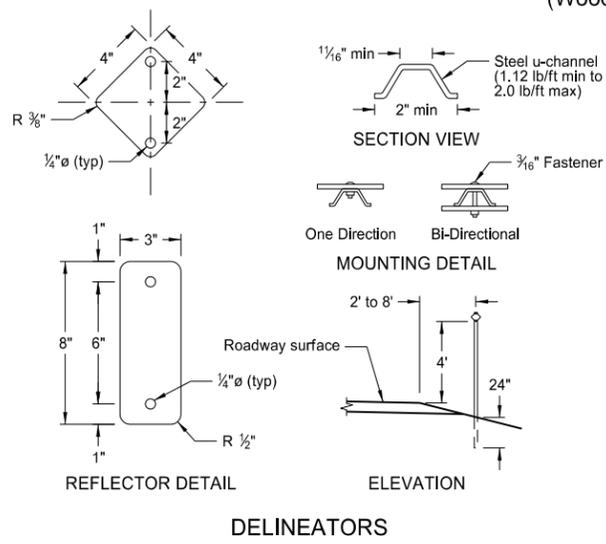


NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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

MINIMUM BALLAST
 (For each side of barricade support)

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

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

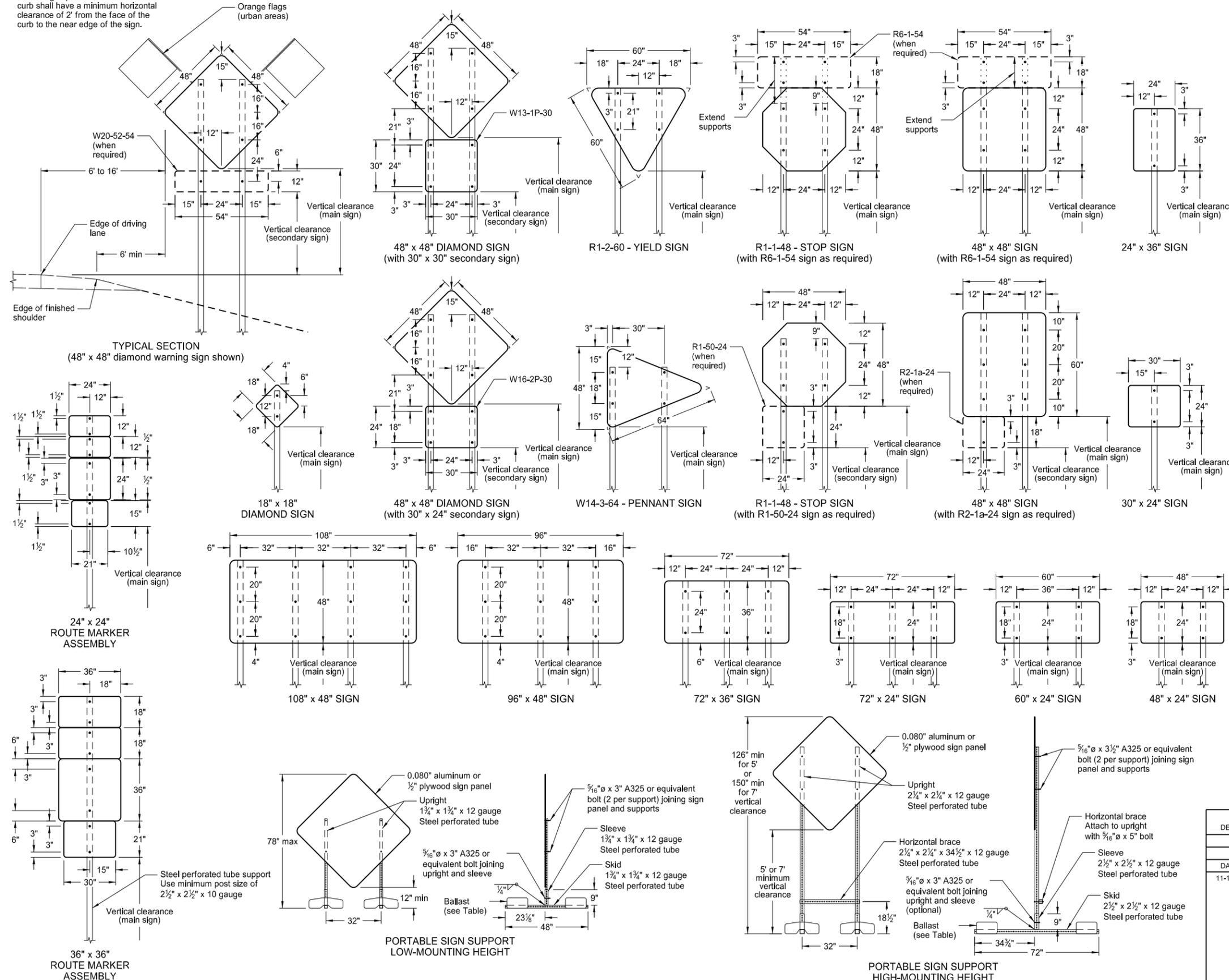


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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

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



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

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

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
 - Sign Panels:** Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.
 - Alternate Messages:** The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
 - Route Marker Auxiliary Signs:** Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background
 - Vertical Clearance:** Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

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

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

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.
- Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

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

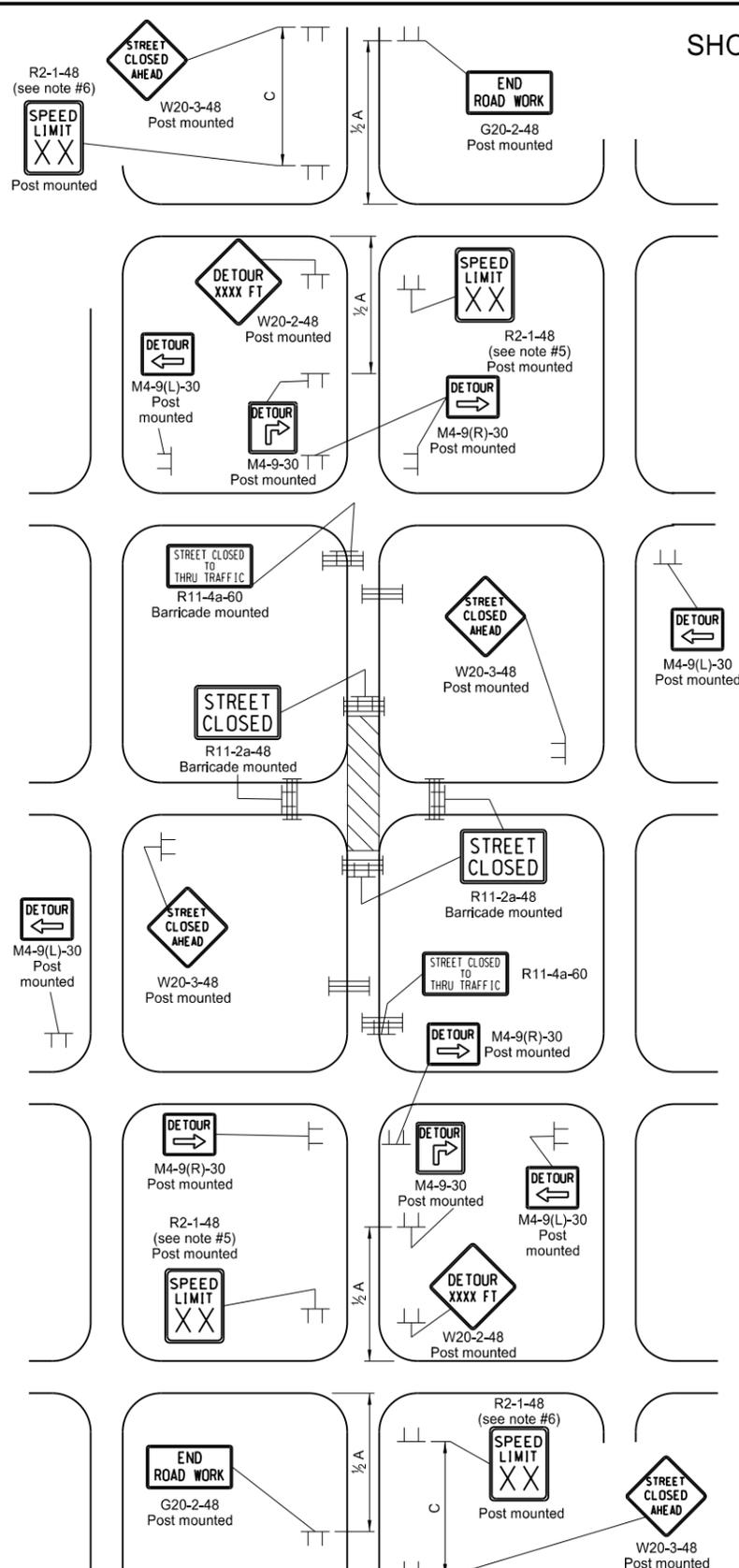
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

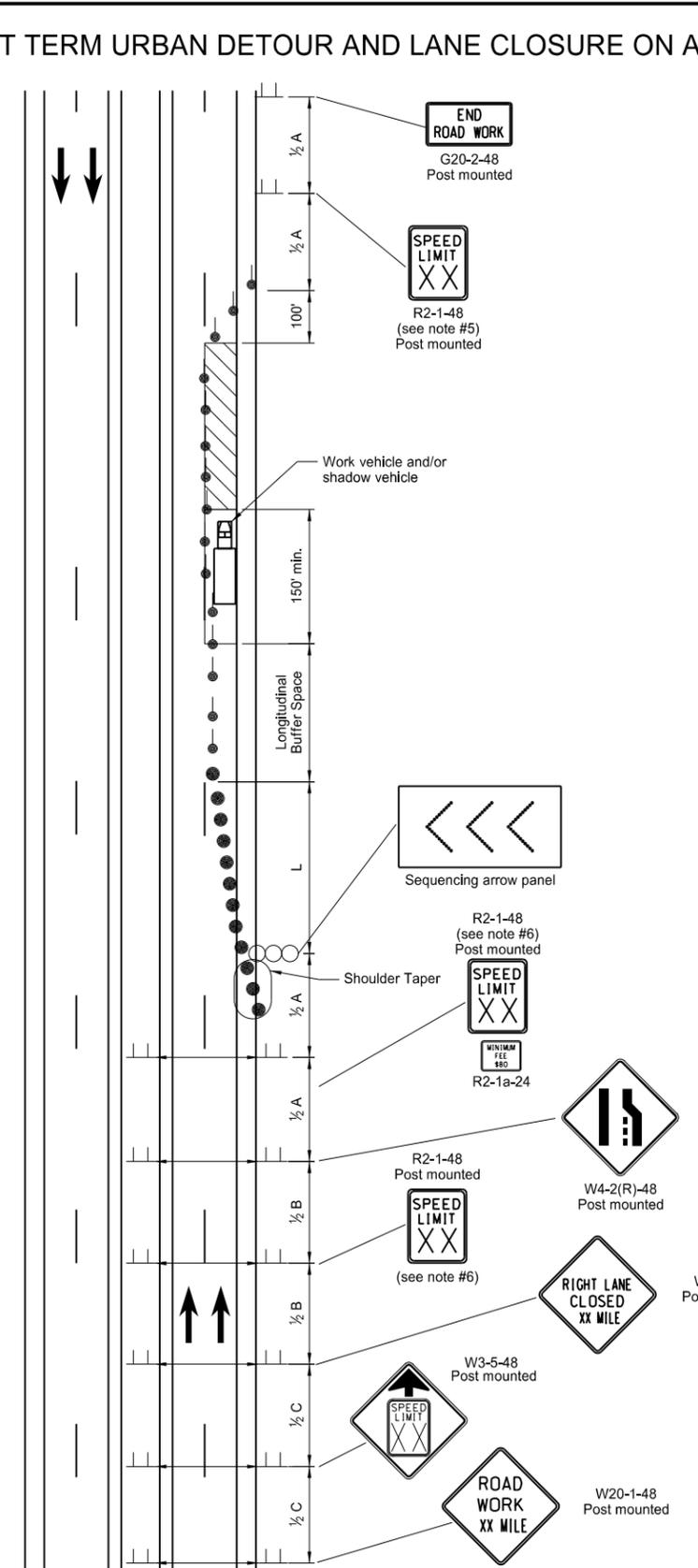
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SHORT TERM URBAN DETOUR AND LANE CLOSURE ON A DIVIDED HIGHWAY LAYOUTS

D-704-23



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



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

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

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

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

KEY

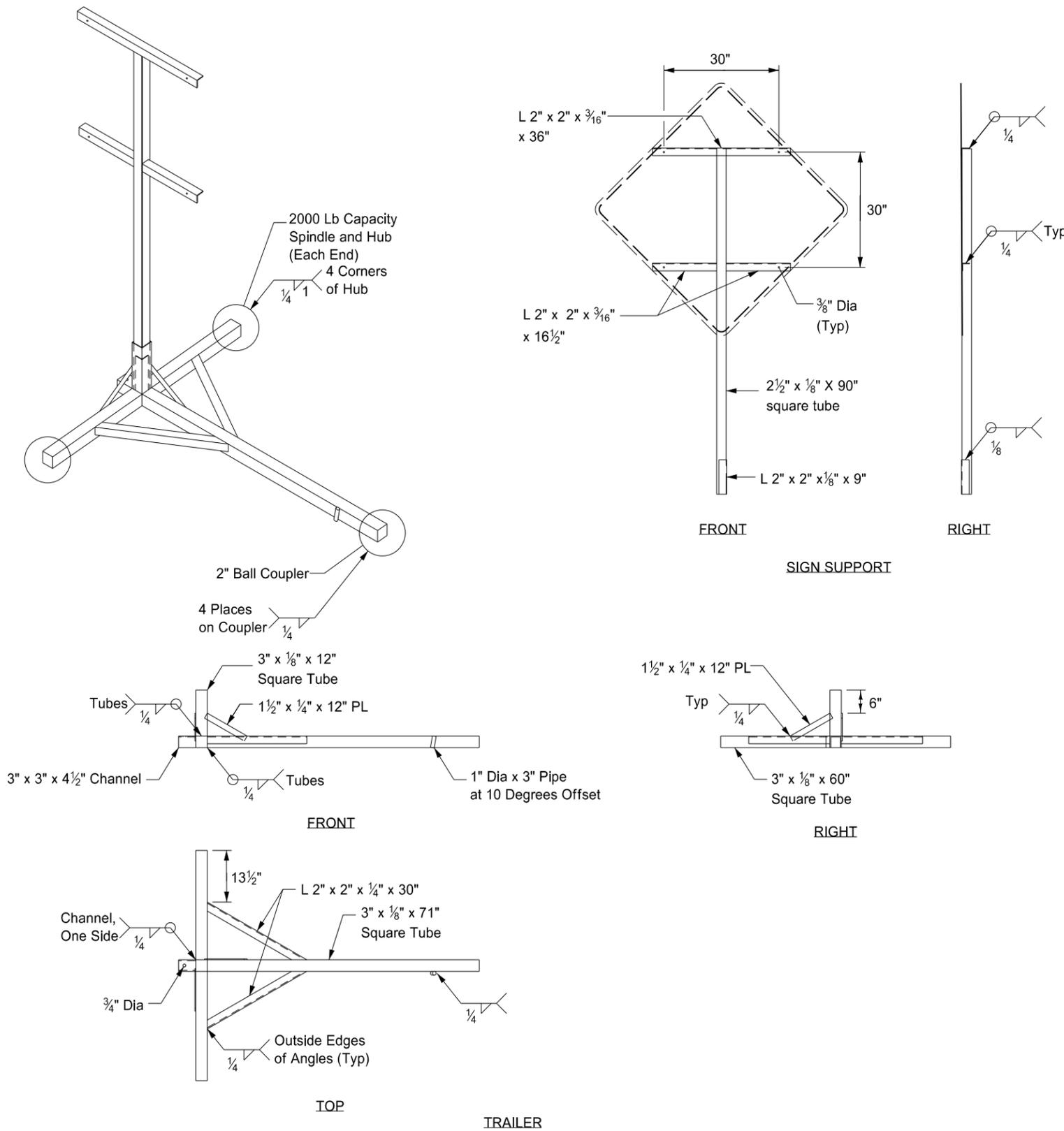
	Type III barricade		Work area
	Sign		Sequencing arrow panel
	Delineator Drum		Tubular Markers

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9-27-13	
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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



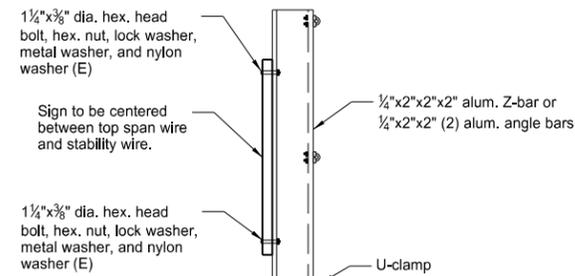
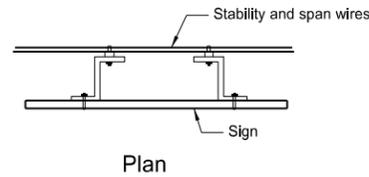
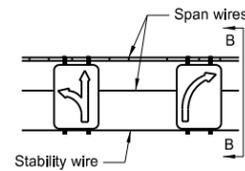
Notes:

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

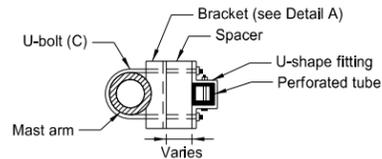
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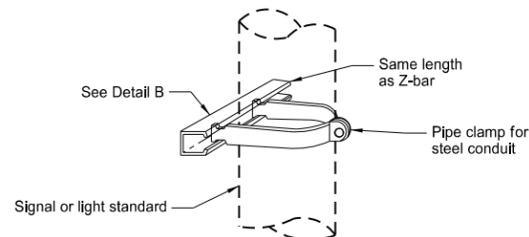
LIGHT STANDARD, SIGNAL STANDARD,
AND SPAN WIRE MOUNTED SIGN
ASSEMBLY DETAIL



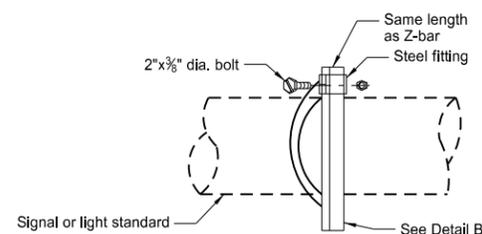
Section B-B
Span Wire Mounted Sign Detail



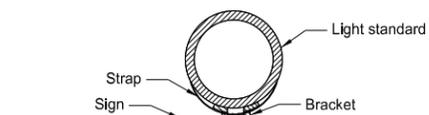
Section A-A



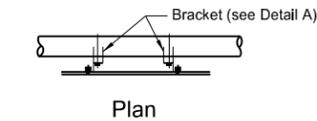
Vertical Mounting
(2 clamps required per sign)



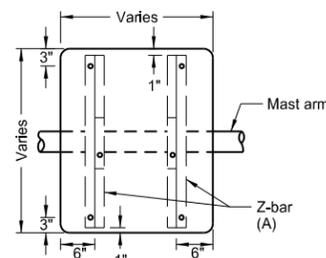
Horizontal Mounting
alternate clamp mounting
(2 clamps required per sign)



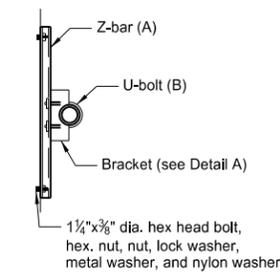
Light Standard Mounted Sign Bracket Detail
Max. 24"x30" signs (D)



Plan

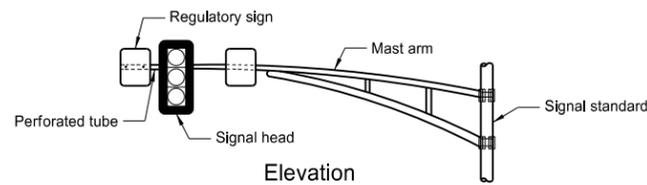


Elevation

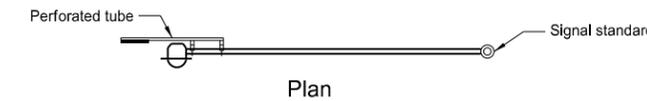


Side View

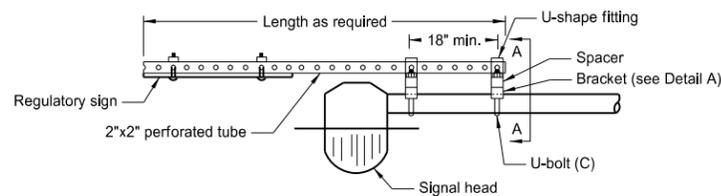
Mast Arm Mounted Regulatory Sign Detail



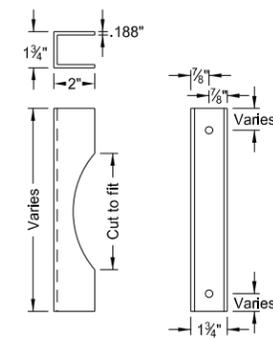
Elevation



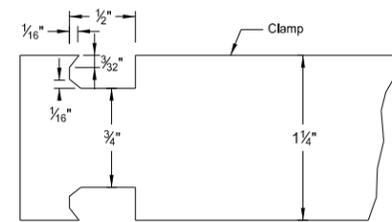
Plan



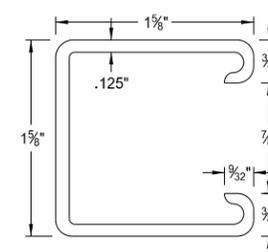
Sign Mounted Beyond End of Mast Arm Detail



Detail A



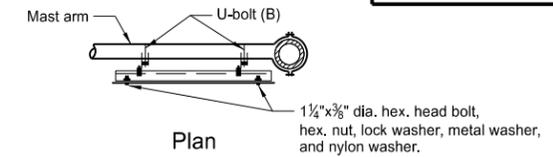
Clamp Detail



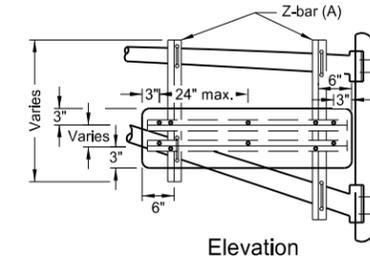
Detail B
Steel Channel

Post Size dia.	Clamp Gauge min.
3 1/2" to 5"	11
6" to 12"	10

Clamp	
Post Size dia. in.	D in.
3 1/2	3
4	3 3/16
5	5 1/8
6	7 7/16
8	13 1/16
10	20 3/4
12	29 5/8

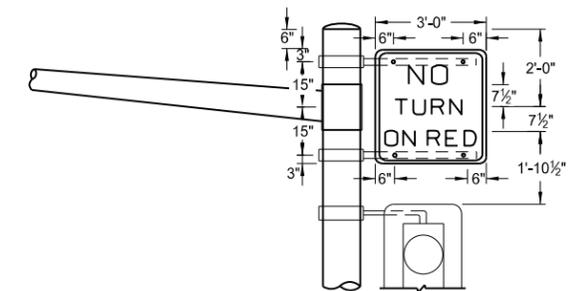


Plan



Elevation

Mast Arm Mounted Street Name Sign Detail



Signal Standard Mounted Sign Attachment Detail

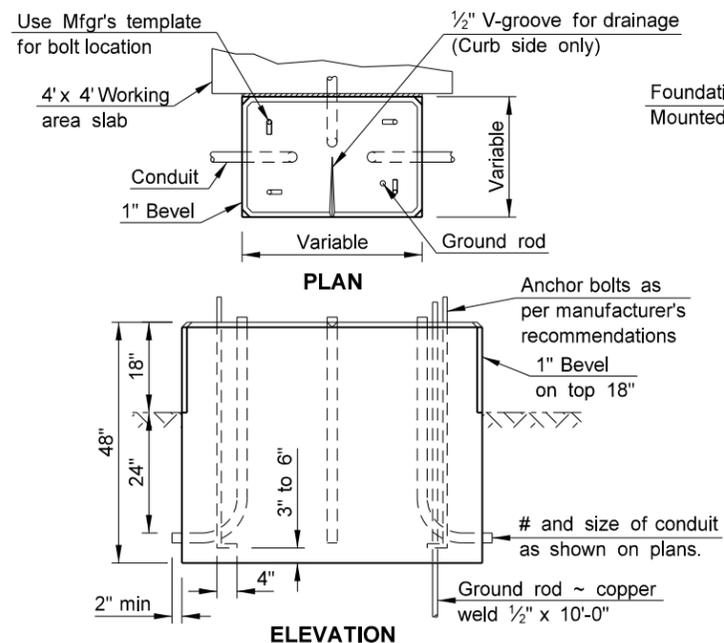
Notes:

- (A) Z-bar - Use 1 1/4"x3/16" thick 1.08 lb/ft aluminum alloy. In place of Z-bar, two angles bolted together may be used or a channel. 1 1/4"x1 1/4"x3/16" angles or 1 1/4"x2"x.188" channels.
- (B) 3/8" U-bolt, hex. nut, lock washer, and length depends on dia. of mast arm.
- (C) 3/8" U-bolt, hex. nut, lock washer, and length depends on dia. of mast arm.
2"x2" maximum support length 9.9'
2 1/4"x2 1/4" maximum support length 12.6'
2 1/2"x2 1/2" maximum support length 15.7'
- (D) Bracket shall be of galv. steel consisting of strap and sign attachment bracket similar to the one shown in the detail. The cost of the bracket assembly is to be included in the price bid for flat sheet signs. Punching shall be as shown on the Standard Drawings. There shall be a 7" vertical clearance to the bottom of all signs mounted on light standards.
- (E) Metal washers and nylon washers used on sign face shall have a minimum outside dia. of 1 5/16" ± 1/16" and 10 gauge thickness.

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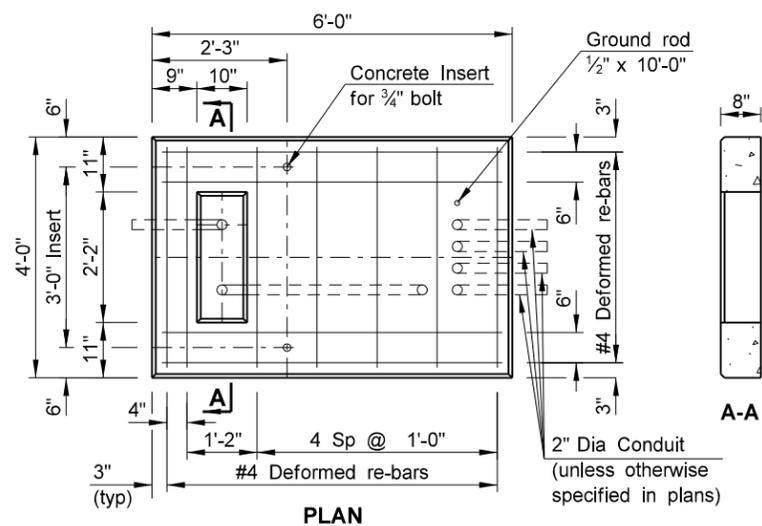
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**CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)**

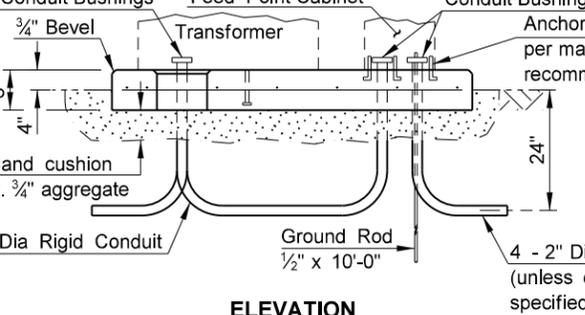


CONTROLLER CABINET FOUNDATION PAD MOUNT

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

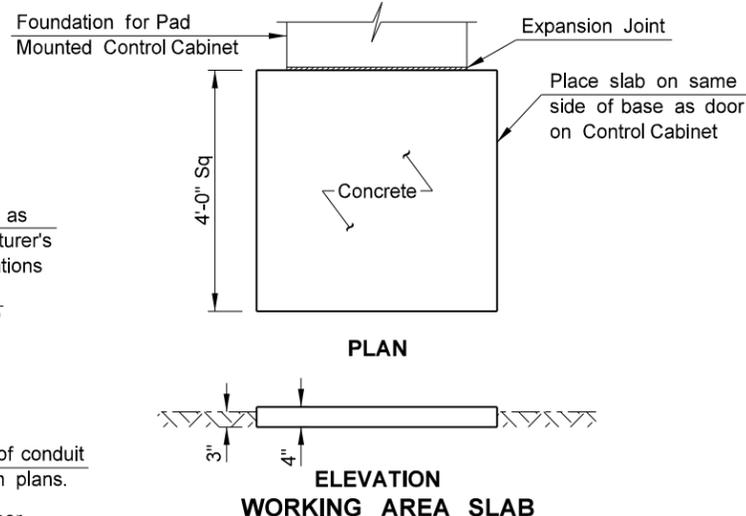


TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

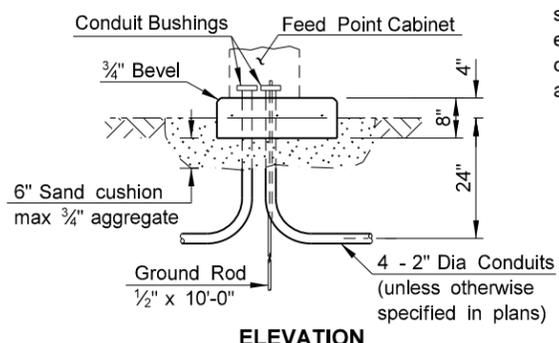
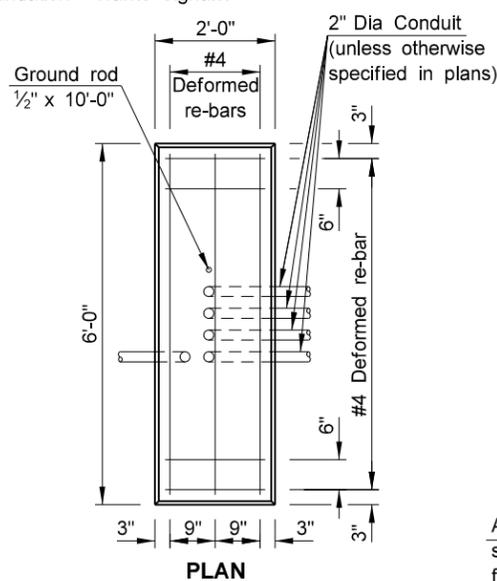


TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

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

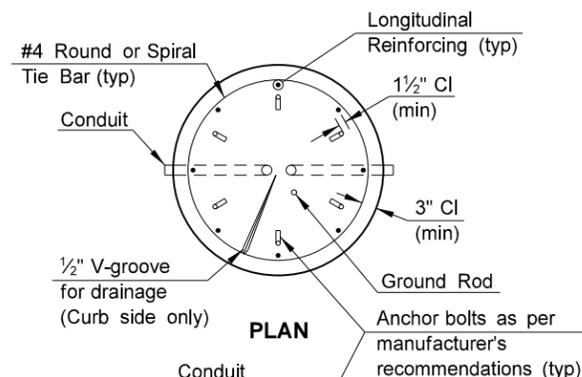
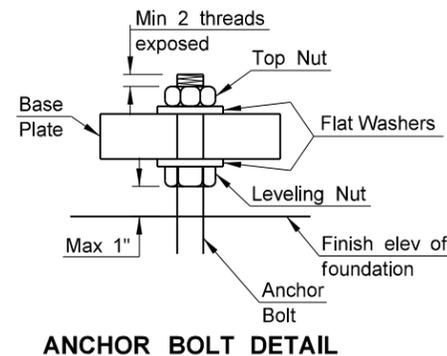


The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.

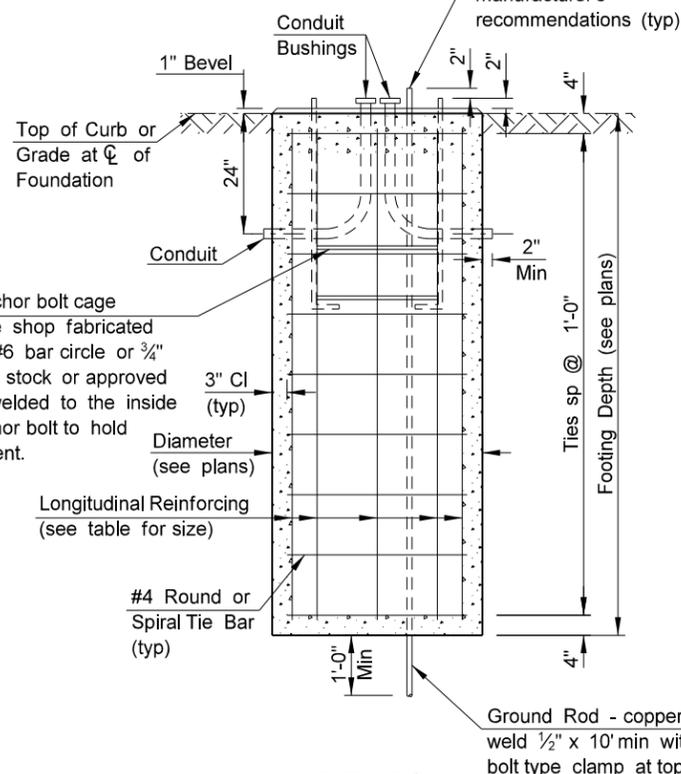


FEED POINT CABINET FOUNDATION PAD MOUNT

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



An anchor bolt cage shall be shop fabricated from #6 bar circle or 3/4" square stock or approved equal welded to the inside of anchor bolt to hold alignment.



LIGHT & SIGNAL STANDARD FOUNDATION

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.

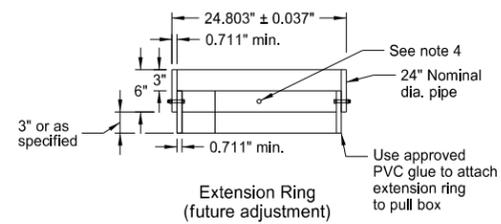
FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

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

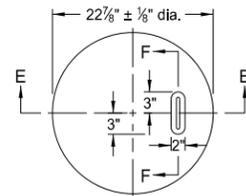
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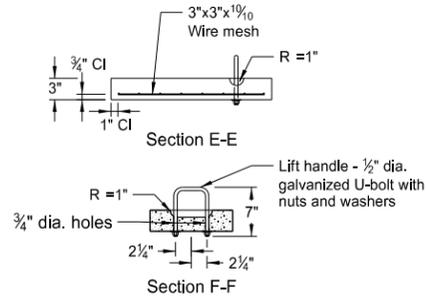
PULL BOX DETAILS



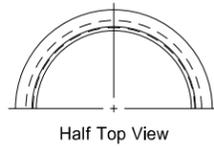
Extension Ring (future adjustment)



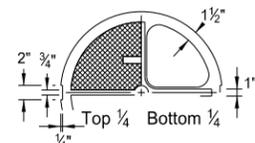
Concrete Cover



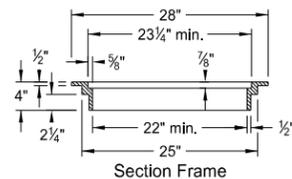
Section F-F



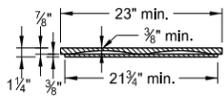
Half Top View



Top 1/4 Bottom 1/4

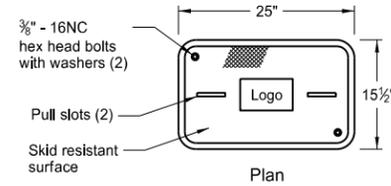


Section Frame

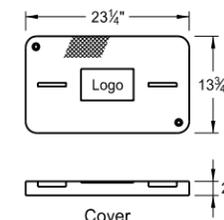


Section Cover

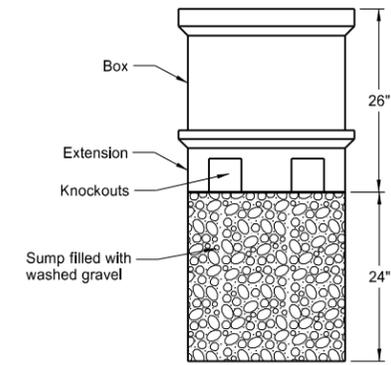
Cast Iron Frame and Cover



Plan



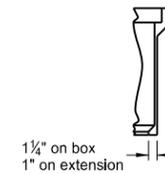
Cover



Elevation

Polymer Concrete Pull Box

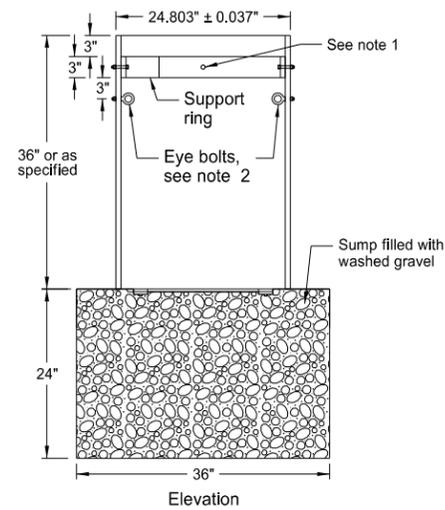
Note: Polymer concrete reinforced by a heavy weave fiberglass



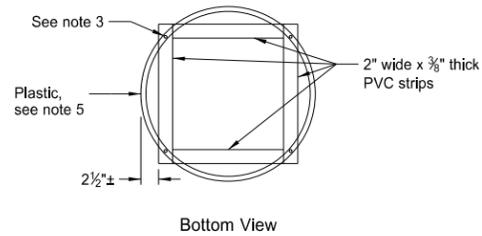
1 1/4" on box
1" on extension

Notes:

1. Place top of pull box flush with surfaced area and approximately one inch above earth or sodded areas on level surfaces.
2. Pull box shall have at least one knockout per side.
3. Polymer Concrete pull box shall be Tier 22 as per ANSI / SCTE 77.

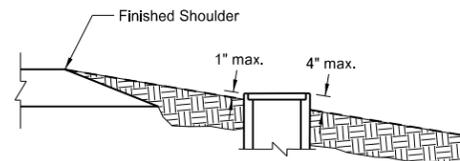


Elevation



Bottom View

PVC Pull Box



Typical Pull Box in Rural Section

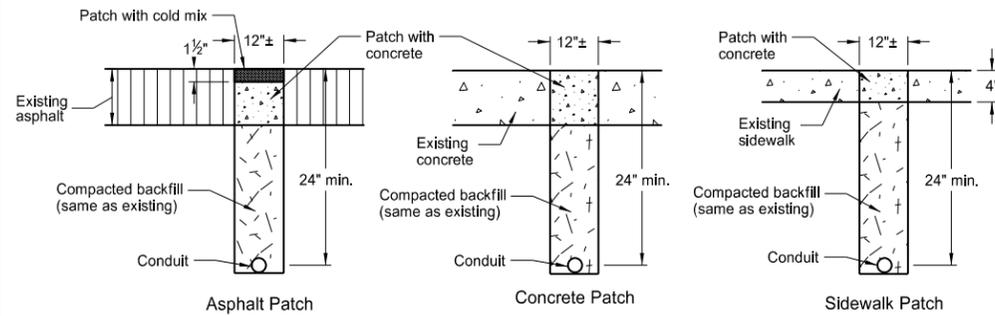
PVC Pull Box Notes:

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. Conduit holes located in barrel section shall be sized no more than 1" larger than size of conduit being used.
7. After pull box and conduit installation all inside walls and cover shall be made water tight to the satisfaction of the Engineer.
8. PVC pipe to meet requirements of ASTM F679T-1 or equal.
9. Hex head bolts and nuts shall be austenitic stainless steel. Other fasteners to be galvanized as per AASHTO M-232.
10. Concrete cover shall be coated on top and sides with an approved epoxy coating. The epoxy protective coating shall be light gray, clear, or neutral in color and shall be applied as recommended by the manufacturer. The surfaces of the concrete to which the epoxy protective coating is applied, shall be cleaned by wire brush and shall be dry before application.
11. Cast Iron Cover castings shall be gray iron as per AASHTO M 105, Class 35B.

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7-8-14	Added Note 3

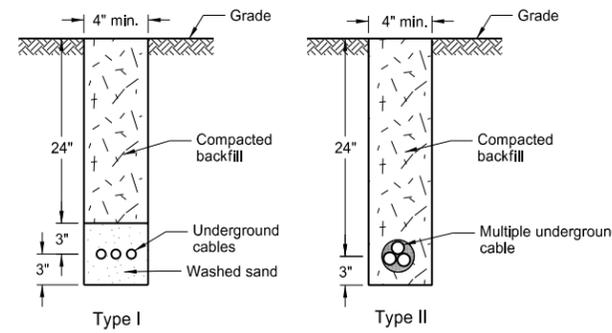
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LIGHTING AND SIGNAL DETAILS



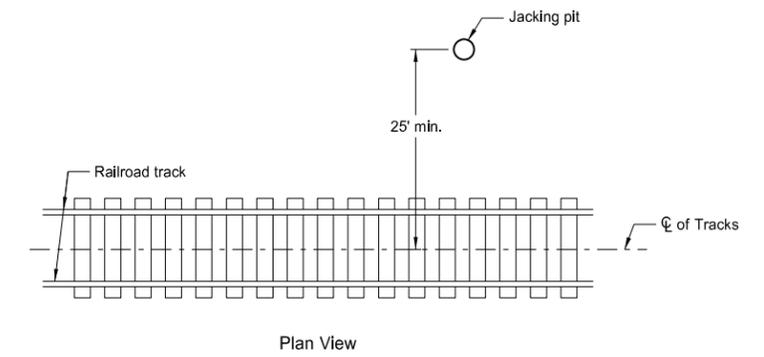
Surface Patch Details

Note: All trenches shall be saw cut. The replacement concrete shall be P.C.C. pavement and the coarse aggregate gradation, maximum size and method of curing shall be as approved by the Engineer. Immediately prior to pouring replacement concrete, all surfaces shall be painted with an approved epoxy compound.

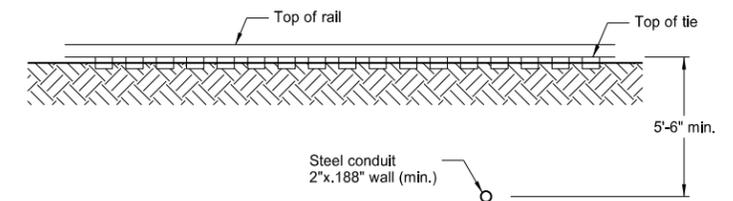


Cable Trench

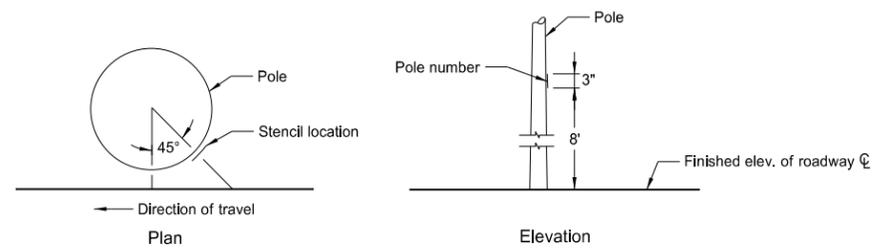
Note: The entire area which is disturbed by the trenching shall be sodded or as directed by the Engineer.



Plan View

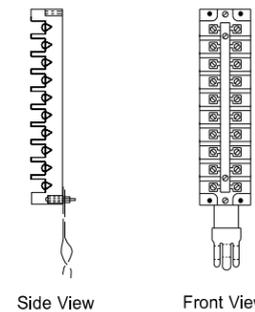


Elevation View
Conduit Placement under Railroad Tracks

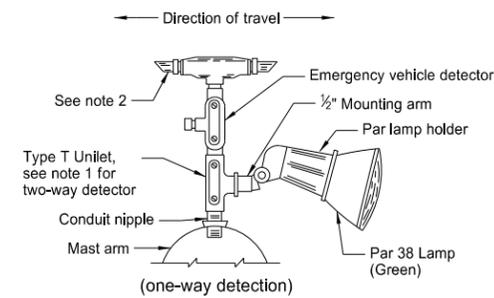


Light Standard Numbering

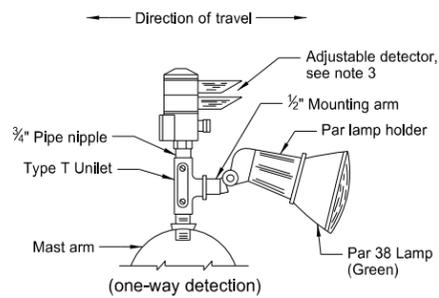
Note: On the roadway side of each light standard, the Contractor shall stencil on the pole number using black paint or an adhesive coated plastic such as Scotchcal by 3M or as approved by the Engineer. See layout sheets for pole numbers.



Side View Front View
Terminal Block Detail

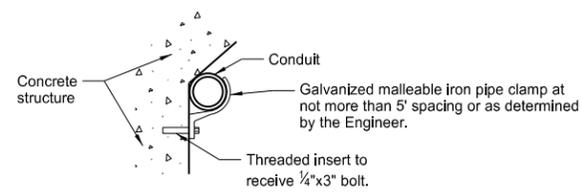


Emergency Vehicle Detector Detail

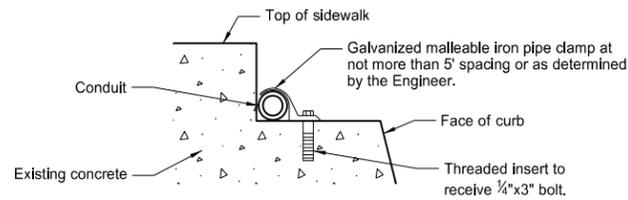


Alternate Emergency Vehicle Detector Detail (adjustable)

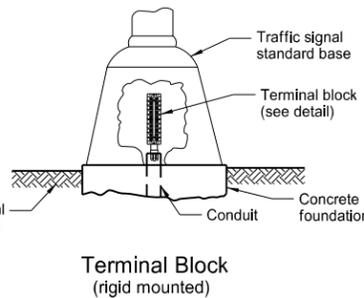
Notes:
1. Two-way Detector shall have Type X Unilet with two Par lamp holders and lamps. (one in each direction).
2. One-way Detector shall have the unused end plugged with metal pipe plug.
3. Two-way Detector shall have the detector lens rotated to face the direction of travel, and shall have Type X Unilet with two Par lamp holders and lamps (one in each direction).



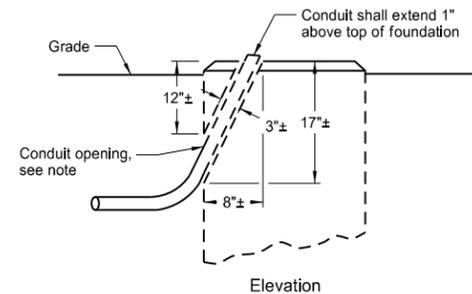
Bridge Mounted Conduit Hanger



Curb Mounted Conduit



Terminal Block (rigid mounted)



Revise Concrete Foundation

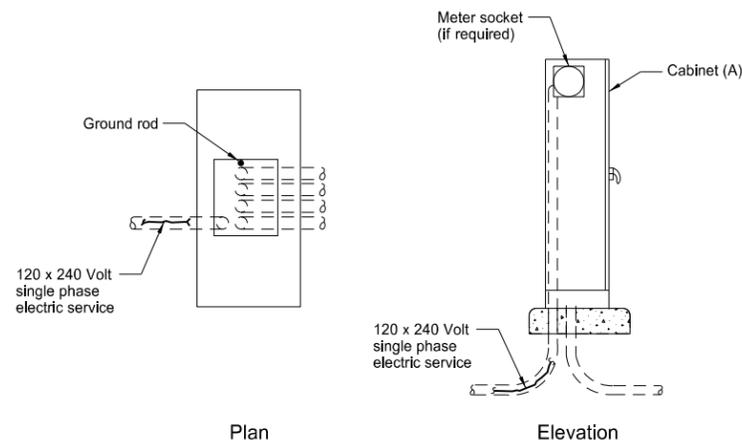
Note: Jackhammer or drill to remove material and provide a location for conduit. Make opening no larger than necessary. Place conduit, fill with concrete and finish foundation to original appearance.

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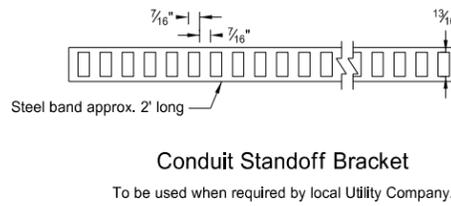
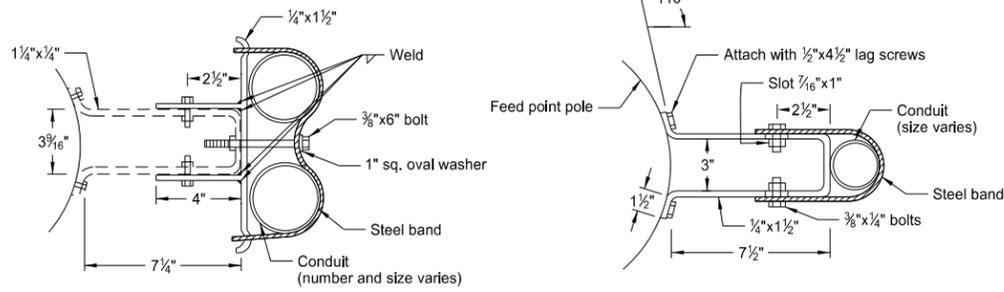
FEED POINT - TRAFFIC SIGNALS

D-772-1

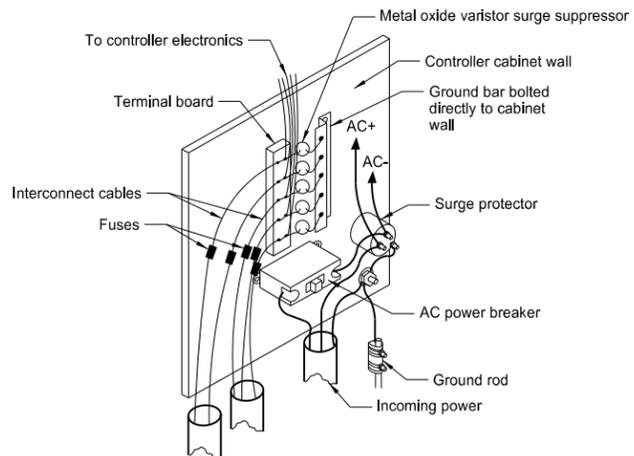


Circuit Breaker Cabinet Pad Mounted

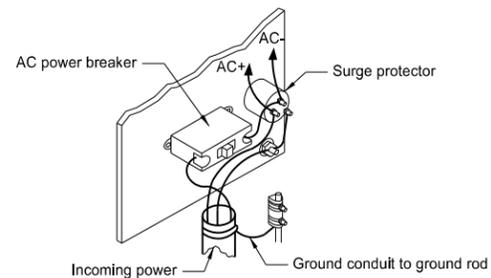
(A) Cabinet shall be 56 in. high x 26 in. wide x 14 in. deep, 12 gauge steel (min.) or aluminum with provisions for padlock. Cabinet shall be weatherproof. A steel cabinet shall have one coat of primer and two coats of exterior dark green enamel.



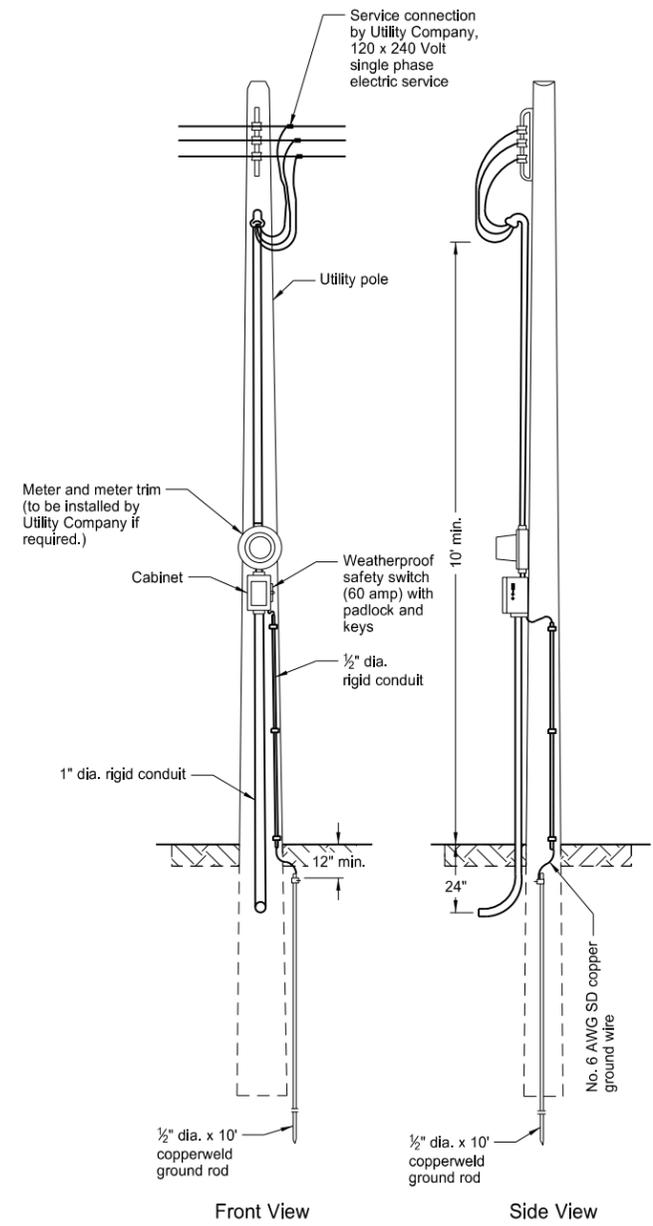
Conduit Standoff Bracket
To be used when required by local Utility Company.



Controller Cabinet Interconnect and Power Cable Lightning Protection



Feed Point Cabinet Lightning Protection



Front View

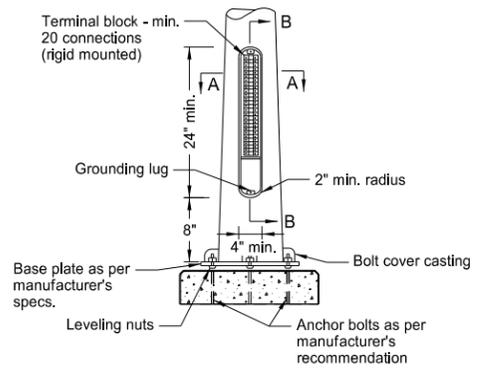
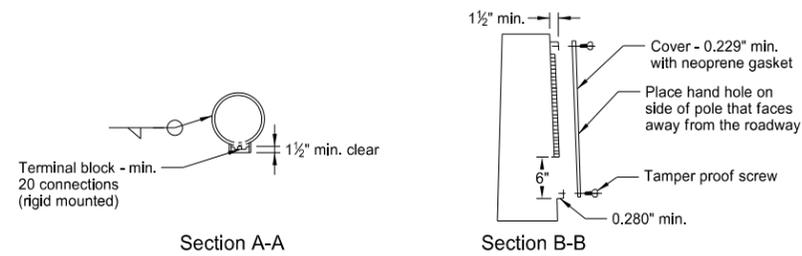
Side View

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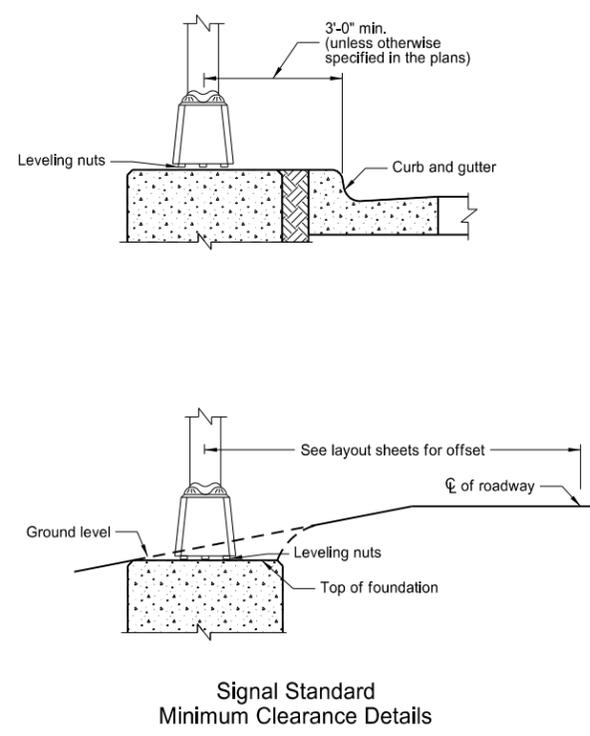
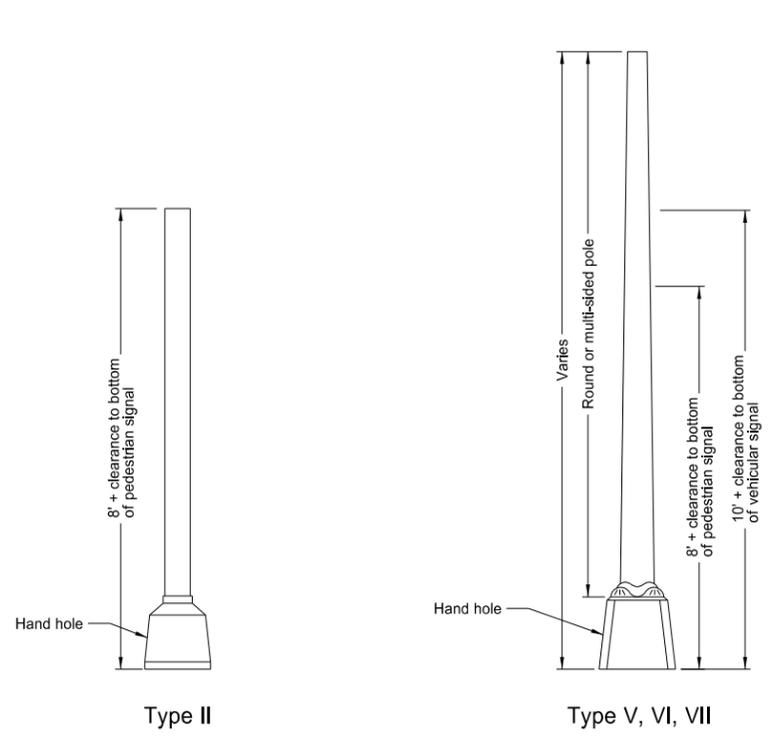
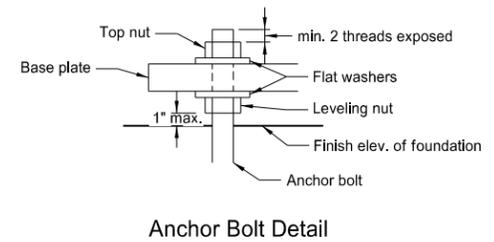
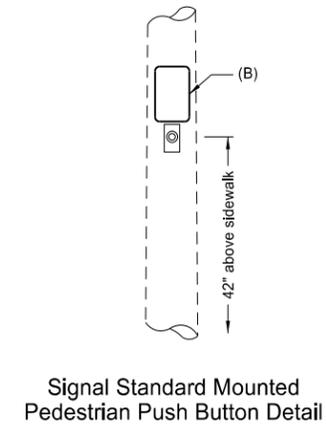
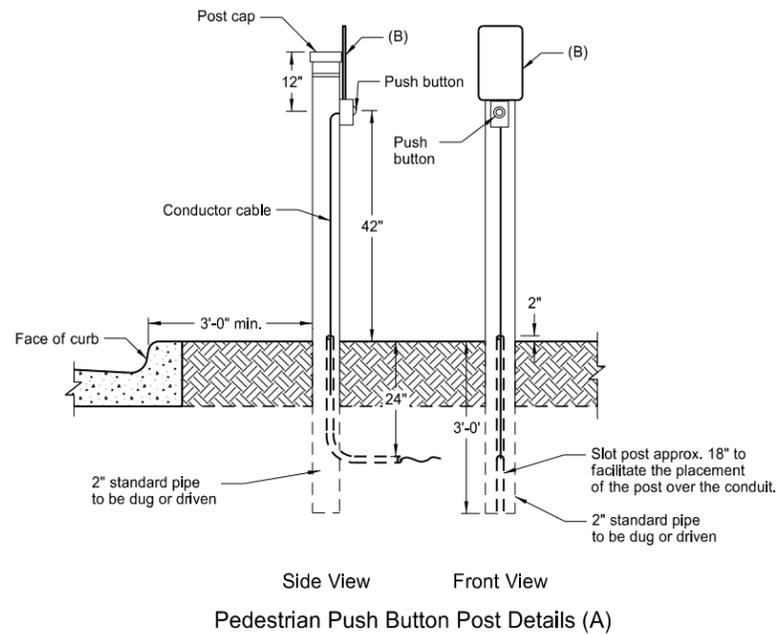
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TRAFFIC SIGNAL STANDARDS

D-772-2



Alternate Signal Standard Base
For use only with Type V, VI, and VII signal standards.

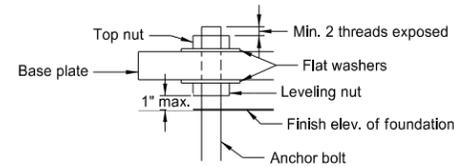


- (A) The positioning of the sign, pushbutton, and direction of arrow shall clearly indicate which crosswalk is actuated by the push button. The type of sign will depend on the jurisdiction they are to be placed in.
- (B) Sign shall be attached to post using rust resistant bracket and banding. The material shall be 0.081 aluminum. See Standard Signs book for dimensions and legend series. See plans for type of sign.
- Notes:
- Signal Heads: See traffic signal layout for correct mounting position, number, size, and arrangement of lenses.
- Steel Standards: The center of the signal standard shall be a minimum of 3 ft. from the face of the curb unless shown otherwise on the layout sheets.
- Paint: See note sheet for required color of paint.
- Transformer Base: In lieu of the transformer base the contractor may use the alternate signal standard base.

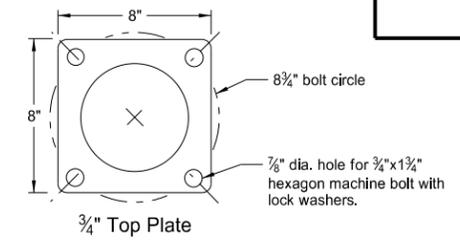
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DATE	CHANGE

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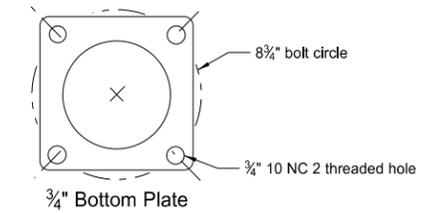
TRAFFIC SIGNAL STANDARDS
(MAST ARM TYPE)



Anchor Bolt Detail



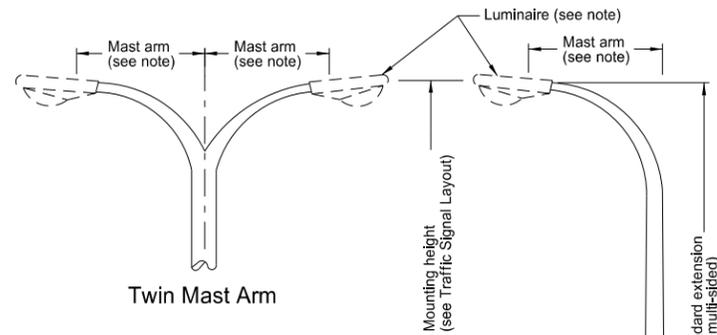
3/4" Top Plate



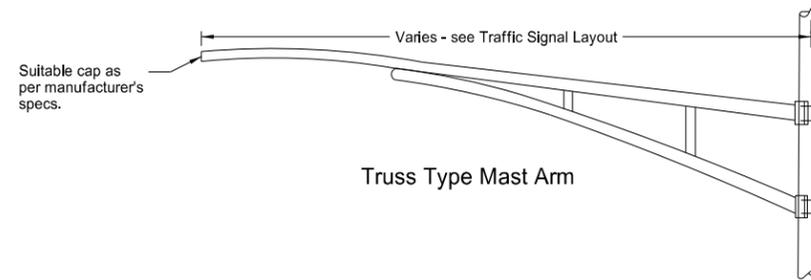
3/4" Bottom Plate

Detail A

Note: In lieu of the plate type connection a telescoping clamp type extension may be used.



Twin Mast Arm



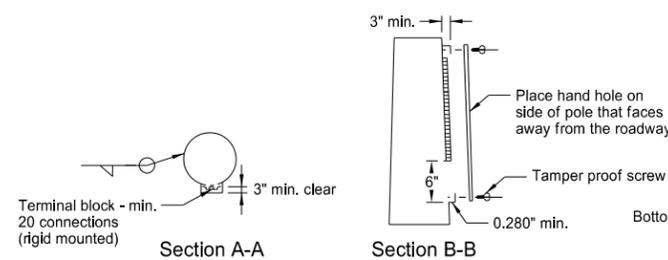
Truss Type Mast Arm

Combination Signal and Light Standard			
Signal Standard Type	Luminaire Mounting height (ft)	Install Light Standard Extension and Luminaire	Luminaire Mast Arm
A	30	yes	single
B	30	(A)	single
C	40	yes	single
D	40	(A)	single
E	30	yes	twin
F	30	(A)	twin
G	40	yes	twin
H	40	(A)	twin
I	50	yes	single
J	50	yes	twin

(A) The light standard extension for these signal standards shall be installed at a later date under a separate contract.

Notes:

- Light standard extension:** The mast arm shall be 6 ft. unless otherwise noted on the plans. The light standard extension shall be galvanized. Galvanizing shall be in accordance with ASTM A 123.
- Luminaire:** Luminaires shall be internal ballast - constant wattage 120 x 240 voltage. See layout sheets for type of luminaire, wattage, and I.E.S. distribution.
- Signal head:** See Traffic Signal Layout for correct mounting position, number, size, and arrangement of lenses. Clearance from the centerline of the roadway to the bottom of mast arm mounted signal heads shall be 17 ft. minimum and 19 ft. maximum.
- Multi-sided poles:** Shall have a means that will not allow the mast arm to be rotated by wind forces other than friction. The pole shall be so fabricated so that the mast arm is rotatable. This feature shall be approved by the Engineer.
- Transformer base:** In lieu of the transformer base the Contractor may use the alternate signal standard base.

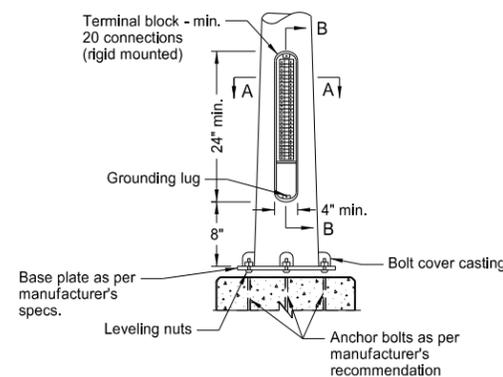


Section A-A

Section B-B

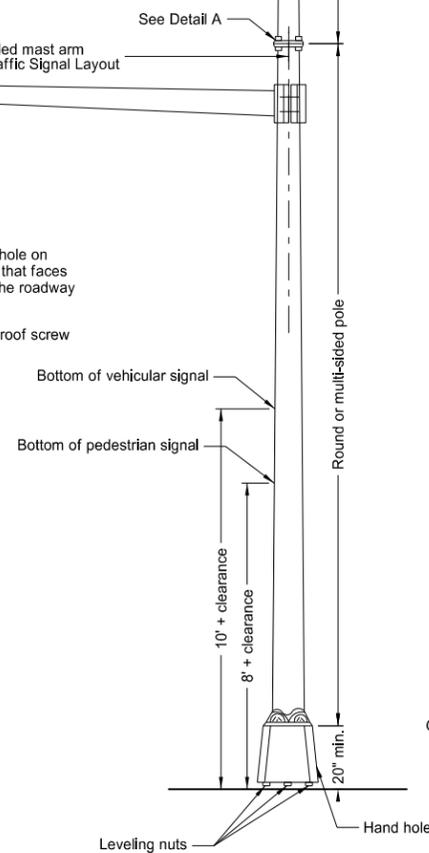
Terminal block - min. 20 connections (rigid mounted) 3" min. clear

3" min. Place hand hole on side of pole that faces away from the roadway Tamper proof screw 0.280" min.

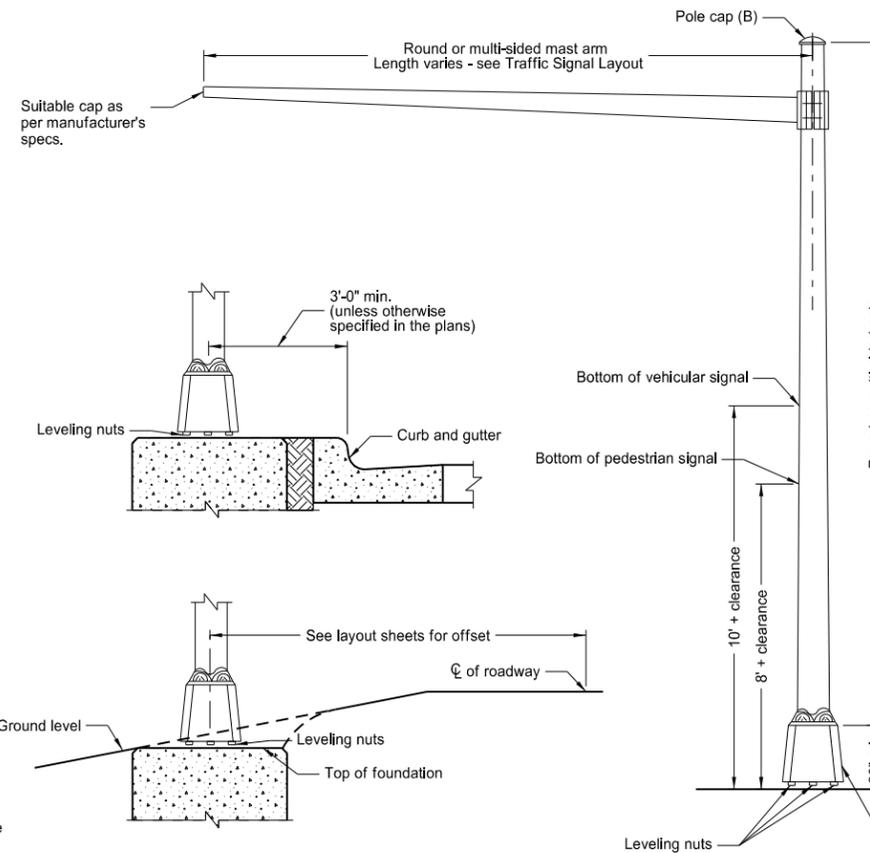


Alternate Signal Standard Base

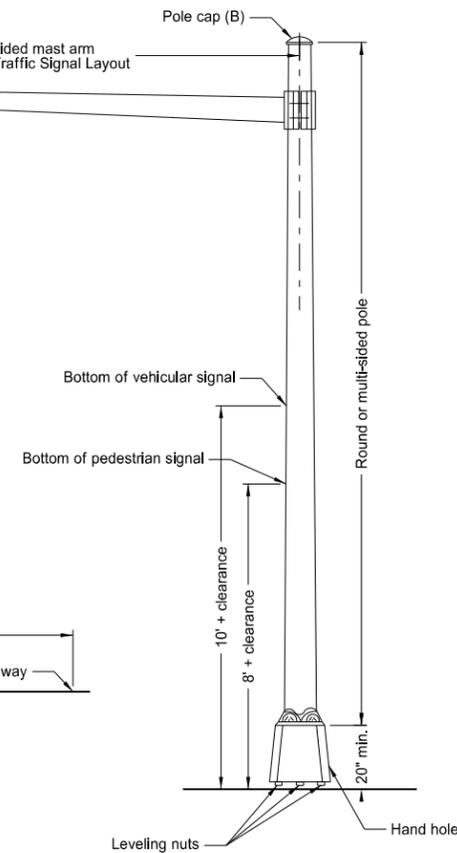
Note: For use only with Type IV and combination signal standards



Combination Signal and Light Standard



Signal Standard Minimum Clearance Detail



Type IV Signal Standard

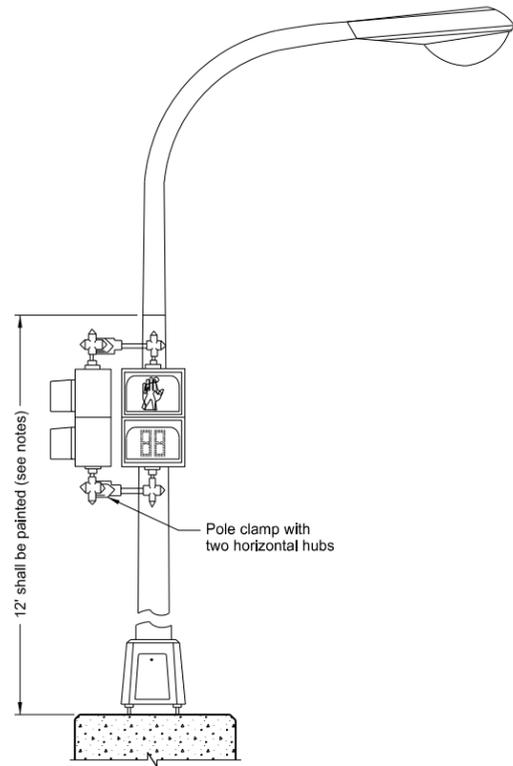
(B) On combination signal and light standards Type B, D, F, and H, and on all Type IV signal standards install a suitable pole cap as per manufacturer's specifications.

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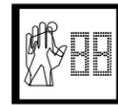
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TRAFFIC SIGNAL HEAD MOUNTING

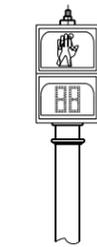
D-772-4



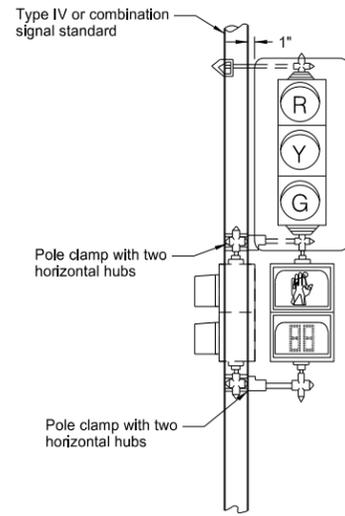
Light Standard Mounted Pedestrian Signal Head (A)



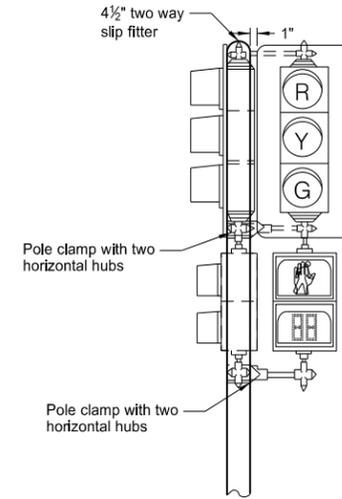
Pedestrian countdown timer
(A) See plans for the appropriate orientation and type of pedestrian signal head to use.



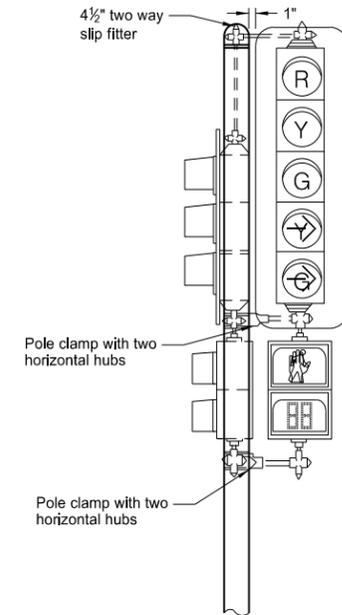
Type II
Pedestal Mounted - Pedestrian (A)



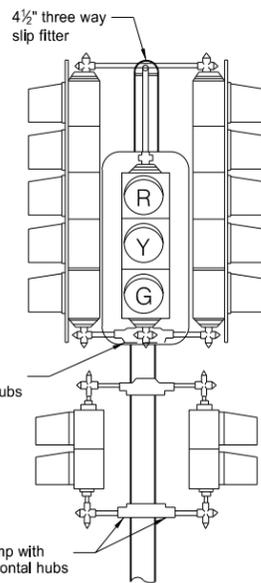
Type IV
Post Mounted - Vehicular
Post Mounted - Pedestrian (A)



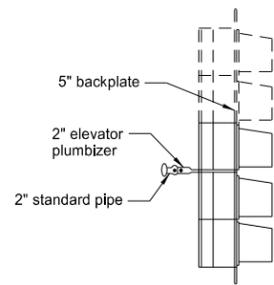
Type V
Post Mounted - Vehicular
Post Mounted - Pedestrian (A)



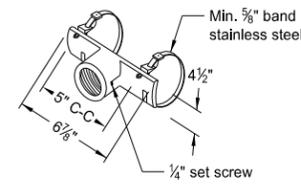
Type VI
Post Mounted - Vehicular
Post Mounted - Pedestrian (A)



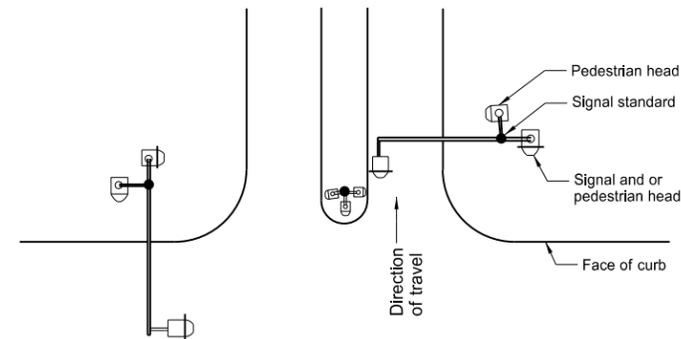
Type VII
Post Mounted - Vehicular
Post Mounted - Pedestrian (A)



Side View
Mid-Span Mounted and Mast Arm Rigid Mounted Signal Heads

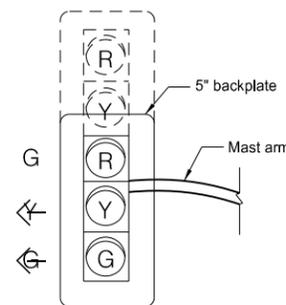


Mast Arm Signal Head Bracket

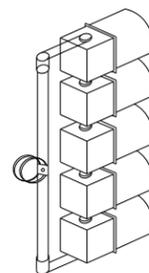


Plan Layout (typical)

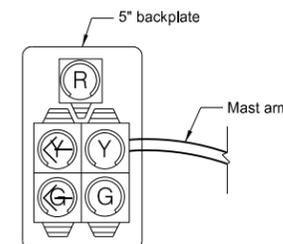
Note: Signal heads shall not protrude over the face of the curb.



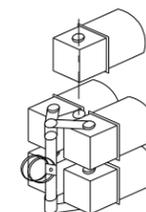
Front View



Isometric View
End Mounted and Mast Arm Rigid Mounted Signal Heads



Front View



Isometric View

Notes:

- Reinforcing Plates:** Polycarbonate signal heads shall have reinforcing plates installed where the mounting hardware attaches to the signal head. Where a plumbizer is used reinforcing plates shall be placed on each side of the plumbizer.
- Clearance:** Clearance from the ground line or sidewalk to the bottom of post or pedestal mounted vehicular signal heads shall be 10 ft. minimum, from pedestrian signal heads shall be 8 ft. minimum.
- Signal Heads:** See traffic signal layout for correct mounting position, numbers, size, and arrangement of lenses.
- Pole Clamps:** A pole plate with suitable banding material, as approved by the Engineer, may be substituted for the pole clamps. Where traffic signal heads and pedestrian signal heads are mounted one above the other, one pole clamp assembly may be used.
- Paint:** Signal housing shall be painted yellow. Backplates shall be painted dull black. Pole clamps and signal head mounting hardware shall be painted the same color as the signal standard shaft.

When pedestrian heads are light standard mounted, the lower 12 ft. shall be painted the same color as the other traffic signal standards.
- Mounting Details:** All signal heads shown are viewed from direction of travel.

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7-8-14	Added reinforcing plate note

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