

DESIGN DATA (ND 48)			
Traffic	Average Daily		
Current 2019	Pass: 1055	Trucks: 45	Total: 1100
Forecast 2039	Pass: 1365	Trucks: 75	Total: 1440
Clear Zone Distance: 14		Design Speed: 25	
Minimum Sight Dist. for Stopping:		Bridges:	
Sight Dist. for No Passing Zone:			
Pavement Design Life (years)			
Design Accumulated One-way ESALs:			
DESIGN DATA (ND 25)			
Traffic	Average Daily		
Current 2019	Pass: 1300	Trucks: 200	Total: 1500
Forecast 2039	Pass: 1590	Trucks: 270	Total: 1860
Clear Zone Distance: 14		Design Speed: 25	
Minimum Sight Dist. for Stopping:		Bridges:	
Sight Dist. for No Passing Zone:			
Pavement Design Life (years)			
Design Accumulated One-way ESALs:			

JOB # 4 NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

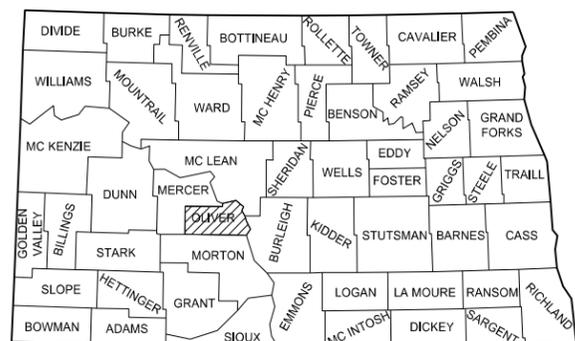
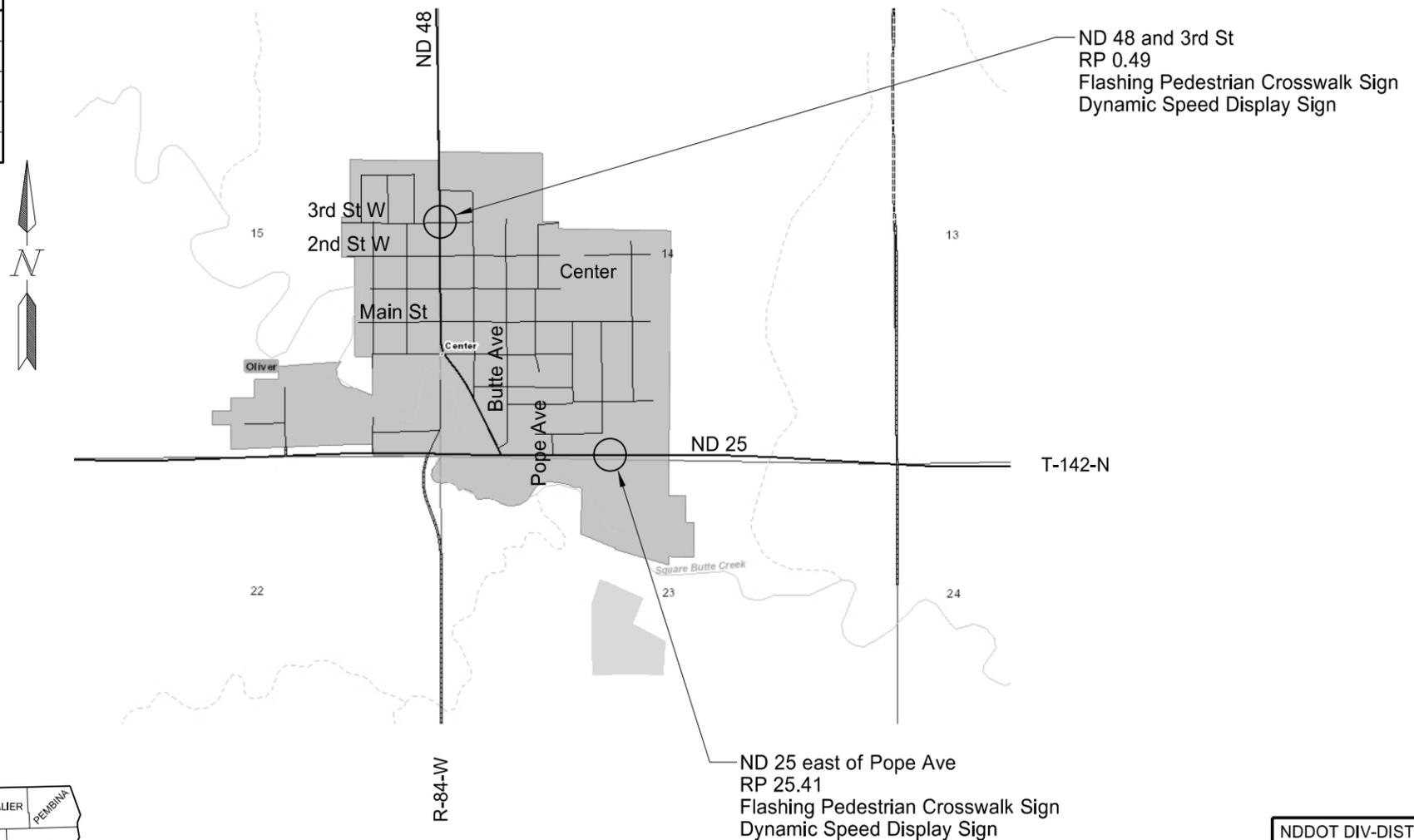
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	HES-1-999(036)	22439	1	1

HES-1-999(036)
Oliver County
ND 48 and 3rd Ave
ND 25 and Park Road
Flashing Beacon, Signing

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
HES-1-999(036)		



STATE COUNTY MAP

DESIGNER Neal Bauer
DESIGNER
DESIGNER

ND DEPARTMENT OF TRANSPORTATION OFFICE OF PROJECT DEVELOPMENT
Derek Pfeifer
5-16-19

NDDOT DIV-DIST OR CONSULTANT FIRM

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6	1	Notes
8	1	Quantities
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150	1 - 10	Signals

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D-101-30, 31,32	Symbols
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NOTES

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SECTION 100

704-P01 TRAFFIC CONTROL: Provide traffic control consisting of temporary lane closure and flagging. For estimating purposes, the traffic control device list is based on a 1000' work zone and the following list:

D-704-24, Layout Type R.
D-704-25, Layout Type V.

Remove lane or shoulder closures at the end of each day's work.

SECTION 140

772-P01 LED ENHANCED SIGN: LED enhance the school crossing signs (S1-1-36), at the intersection of ND 48 and 3rd St W and the pedestrian crossing signs (W11-2-30) at the pedestrian crossing on ND 25. Meet the requirement of Section 2A.07 of the MUTCD. Fit the signs with Light Emitting Diodes (LEDs) that match the color of the sign background. Signs shall contain a minimum of six LEDs in the border. LED's shall be high power-1 watt-Luxeon LEDs. Provide signs with automatic dimming capabilities for night time brightness. Sign sheeting shall be Type XI and sign gauge shall be 0.100 inch.

LED signs shall be free from defects in material and workmanship for a period of 2 years after date of installation.

Include all cost for labor, materials and equipment required to perform this work in the unit price for "Flashing Beacon-Post Mounted."

772-P02 EXISTING FLASHING BEACON: Ensure the existing flashing beacon system remains operational until the new flashing beacon system is operational.

772-P03 ADVISOR ADVANCED ACCESSIBLE PEDESTRIAN SYSTEM (AAPS) PUSHBUTTON AND SIGN: Include the following for the AAPS:

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 AAPS shall be the 2-wire system.

B. Installation Procedures

1. Align tactile arrow parallel to the direction of travel on the crosswalk (MUTCD Section 4E.12, P1).
2. Locate pushbutton within reach 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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ESTIMATE OF QUANTITIES

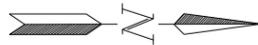
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	1	1
702	0100 MOBILIZATION	L SUM	1	1
704	0100 FLAGGING	MHR	10	10
704	1000 TRAFFIC CONTROL SIGNS	UNIT	529	529
704	1067 TUBULAR MARKERS	EA	13	13
754	0110 FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	58	58
754	0206 STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	169	169
754	0592 RESET SIGN PANEL	EA	1	1
762	1325 PREFORMED PATTERNED PVMT MK 24IN LINE-GROOVED	LF	160	160
772	2110 FLASHING BEACON-POST MOUNTED	EA	2	2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	HES-1-999(036)	110	1

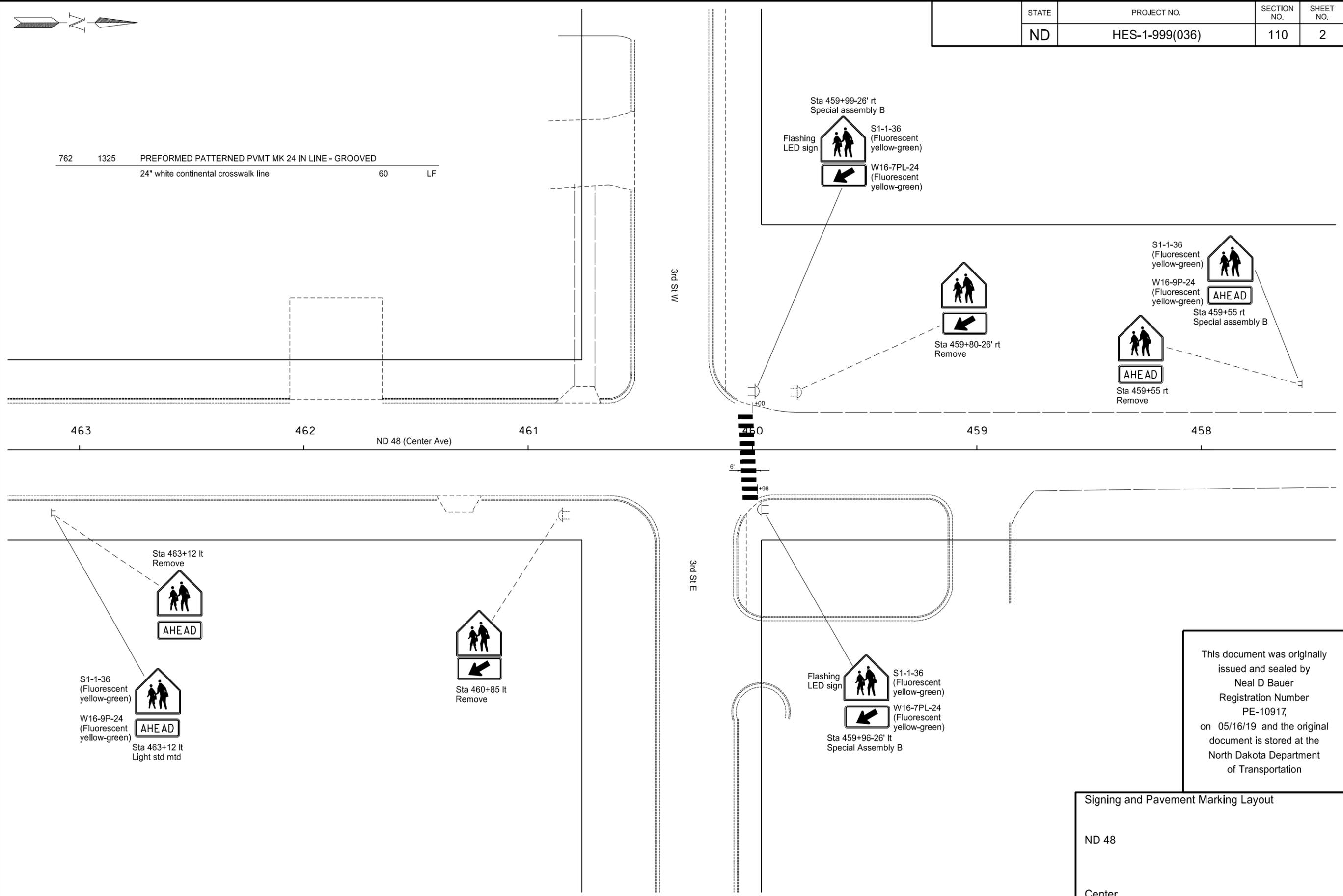
Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Vert Clearance FT	Support Size	Max Post Len LF	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF				1st LF	2nd LF	3rd LF	4th LF								
ND 48																							
452+31 Rt	SA A		10.0		14.0	14.1			5.0	2.25 x 2.25 12 ga	15.1	4.0	4.1		2 x 2 12 ga	2	4	3 x 3 7 ga	1		2		
459+55 Rt			8.8		13.9			7.0	2.5 x 2.5 10 ga	14.2						1	4	3 x 3 7 ga			1		
459+96 Lt	SA B		2.0		13.9			7.0	2.5 x 2.5 10 ga	14.2						1	4	3 x 3 7 ga			1		
459+99 Rt	SA B		2.0		13.9			7.0	2.5 x 2.5 10 ga	14.2						1	4	3 x 3 7 ga			1		
463+12 Lt	SA B		8.8																			Mount on Light Standard	
Sub Total			0.0	31.6	Total 69.8											Total 20.0				1	0	5	
ND 25																							
352+04 Rt	SA C		11.0		15.8			7.0	2.25 x 2.25 12 ga	16.7	5.3			2 x 2 12 ga	1	4	3 x 3 7 ga					1	
355+54 Lt	SA C		2.0		15.8			7.0	2.25 x 2.25 12 ga	16.7	5.3			2 x 2 12 ga	1	4	3 x 3 7 ga					1	
355+57 Rt	SA C		2.0		15.8			7.0	2.25 x 2.25 12 ga	16.7	5.3			2 x 2 12 ga	1	4	3 x 3 7 ga					1	
358+19 Lt	SA C		11.0		15.8			7.0	2.25 x 2.25 12 ga	16.7	5.3			2 x 2 12 ga	1	4	3 x 3 7 ga					1	
Sub Total			0.0	26.0	Total 63.3										Total 16.0				0	0	4		
Grand Total			0.0	57.6	Total 133.1										Total 36	0			1	0	9		

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-1-999(036)	110	2

762 1325 PREFORMED PATTERNED PVMT MK 24 IN LINE - GROOVED
24" white continental crosswalk line 60 LF

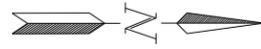


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Signing and Pavement Marking Layout

ND 48

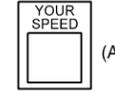
Center



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-1-999(036)	110	3

A. The Dynamic Speed sign front cover will be removed and replaced with a white cover and black message.

Sta 452+31 rt
Remove



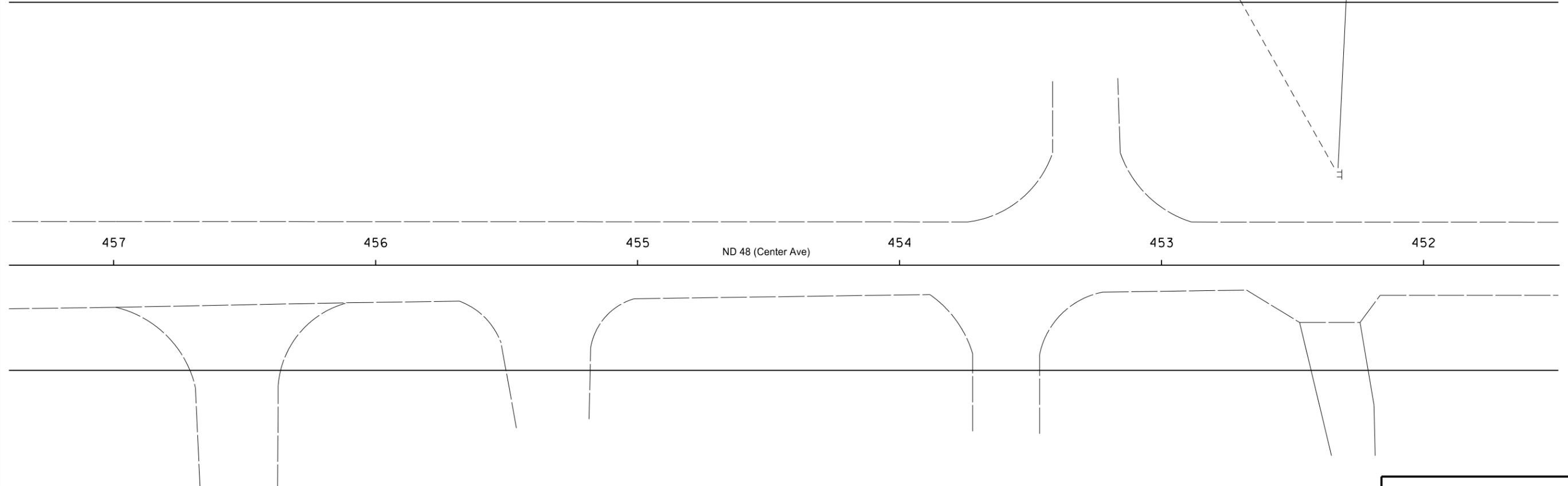
(A)

Sta 452+31 rt
Special assembly A



R2-1-24

Reset Dynamic Speed Display sign



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Signing Layout

ND 48

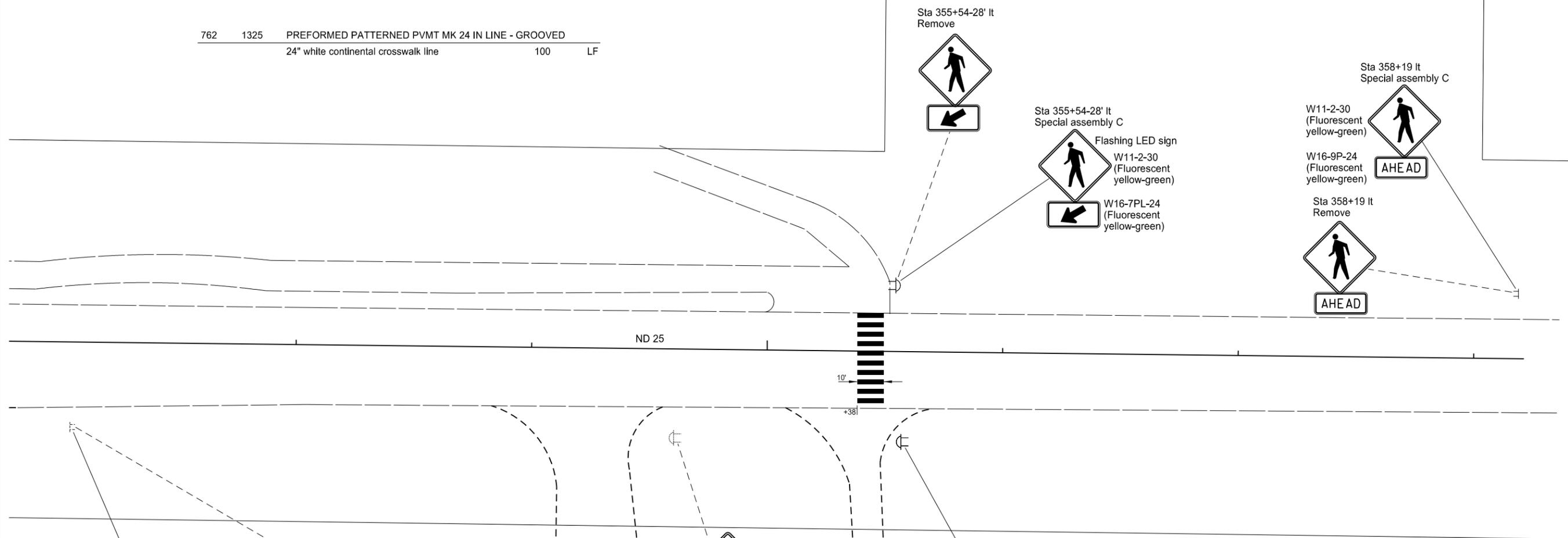
Center



335+00

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-1-999(036)	110	4

762 1325 PREFORMED PATTERNED PVMT MK 24 IN LINE - GROOVED
24" white continental crosswalk line 100 LF



Sta 355+54-28' lt Remove



Sta 355+54-28' lt Special assembly C



Flashing LED sign
W11-2-30 (Fluorescent yellow-green)
W16-7PL-24 (Fluorescent yellow-green)

Sta 358+19 lt Special assembly C

W11-2-30 (Fluorescent yellow-green)
W16-9P-24 (Fluorescent yellow-green)



Sta 358+19 lt Remove



ND 25

10'

+38'

W11-2-30 (Fluorescent yellow-green)
W16-9P-24 (Fluorescent yellow-green)



Sta 352+04 rt Special assembly C



Sta 352+04 rt Remove



Sta 354+61-38' rt Remove

Flashing LED sign



Sta 355+57-38' rt Special assembly C

W11-2-30 (Fluorescent yellow-green)
W16-7PL-24 (Fluorescent yellow-green)

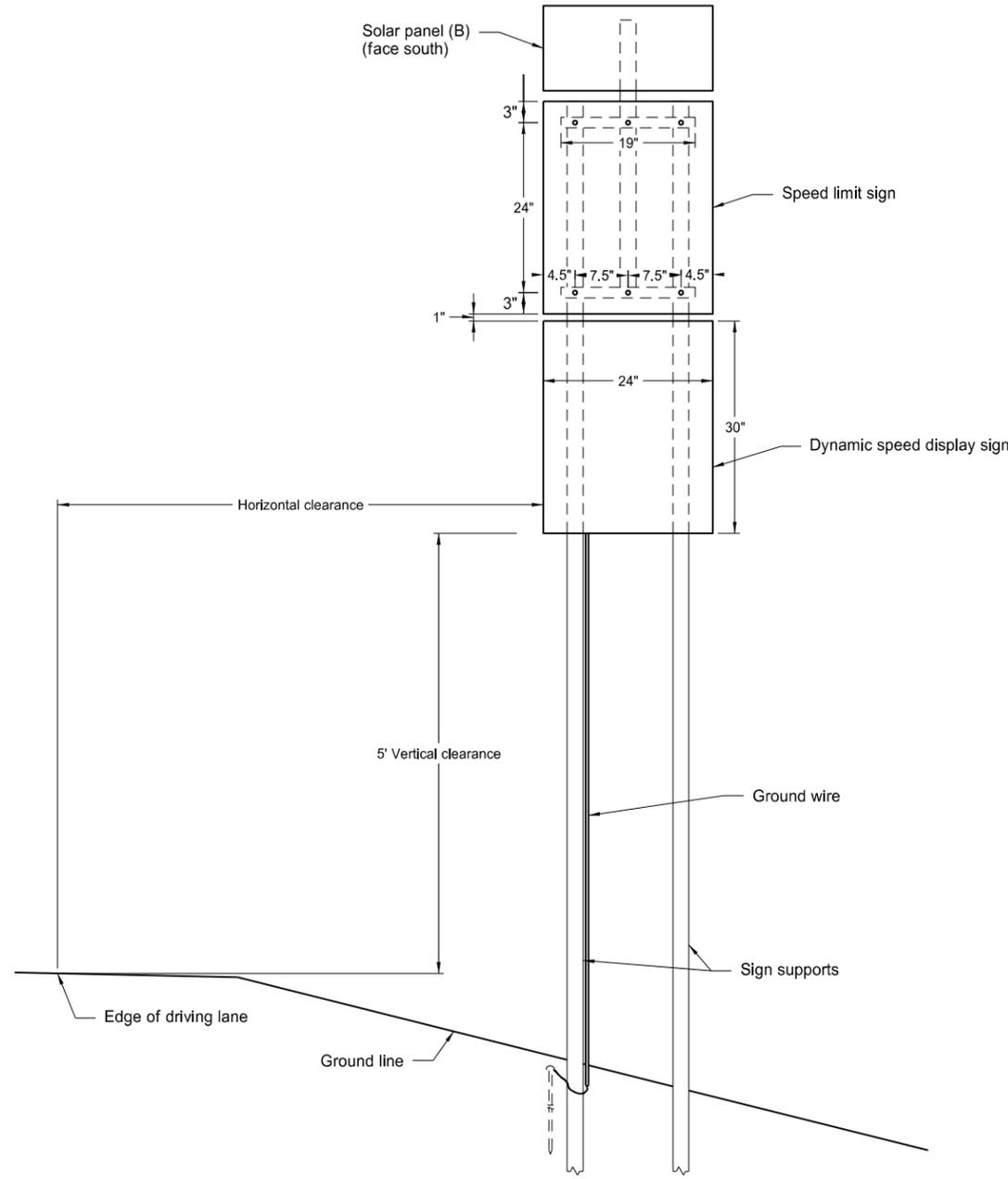
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Signing Layout

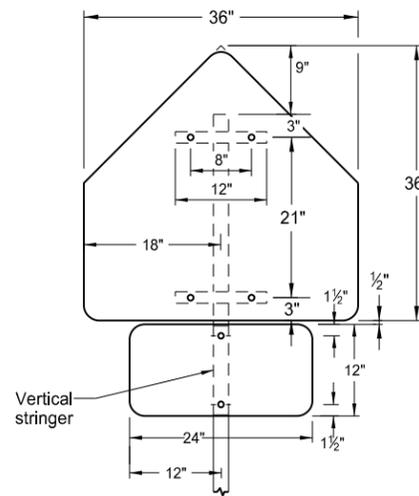
ND 25

Center

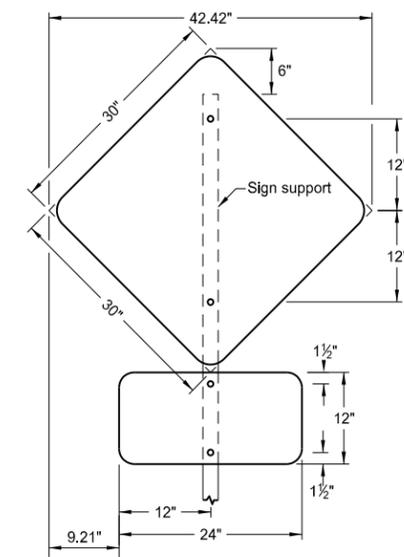
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-1-999(036)	110	5



Special Assembly A
Solar Powered Dynamic Speed Display Sign
ND 48
Sta 452+31 rt



Special Assembly B
Sta 459+96 lt
Sta 459+99 rt
Sta 459+55 rt
Area: 8.75 SF



Special Assembly C
Sta 352+04 rt
Sta 355+57 rt
Sta 355+54 lt
Sta 358+19 lt
Area: 8.25 SF

Notes:

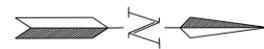
1. See Standards D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
4. Perforated square tube stringers shall be 1½" x 1½".
5. All holes shall be punched round for ⅜" bolt.

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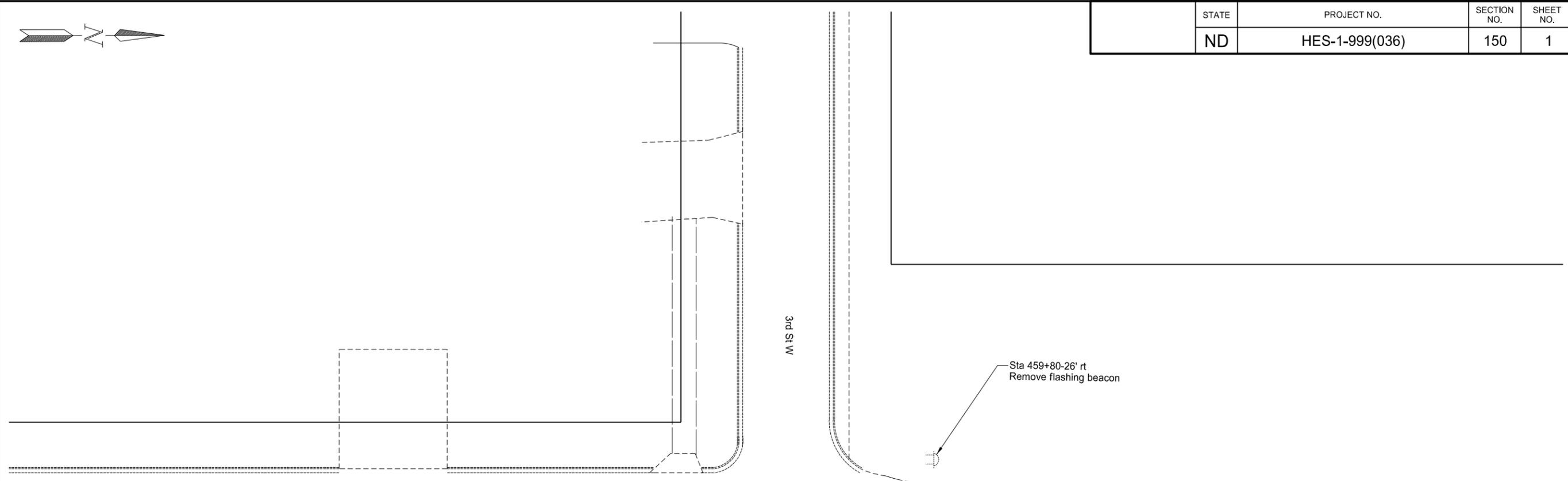
Special assembly details

ND 25
ND 48

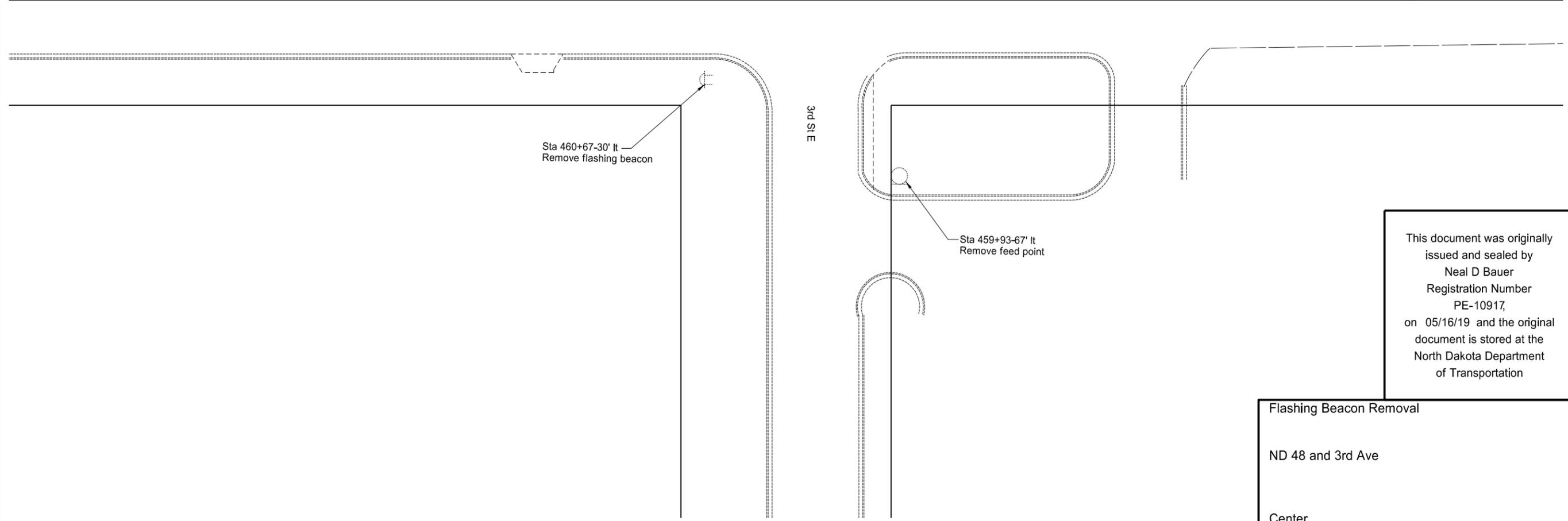
Center



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-1-999(036)	150	1



463 462 ND 48 (Center Ave) 461 460 459 458

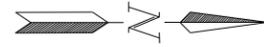


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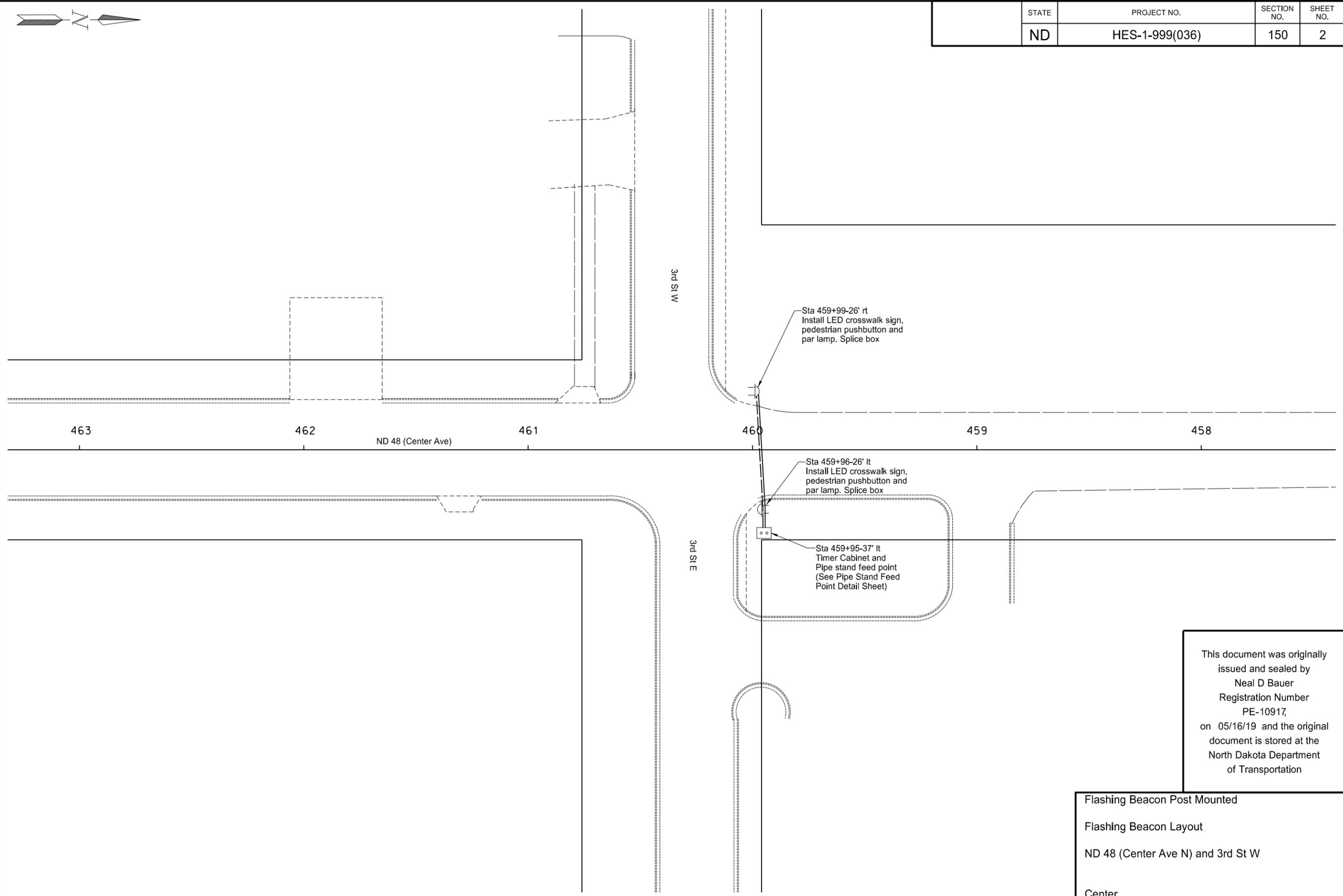
Flashing Beacon Removal

ND 48 and 3rd Ave

Center



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-1-999(036)	150	2



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Flashing Beacon Post Mounted
Flashing Beacon Layout
ND 48 (Center Ave N) and 3rd St W
Center

STATION	CONDUIT RUNS		CABLE RUNS	
	LF	DIA	LF	Type
459+99-26' rt to 459+96-26' lt	52	2"	72 66	No. 12 AWG 3 (B) No. 16 AWG 2 (C)
459+96-26' lt to 459+95-37' lt	11	2"	21 35	No. 12 AWG 3 (B) No. 16 AWG 2 (C)

(B) To beacon head
(C) To pedestrian pushbutton post

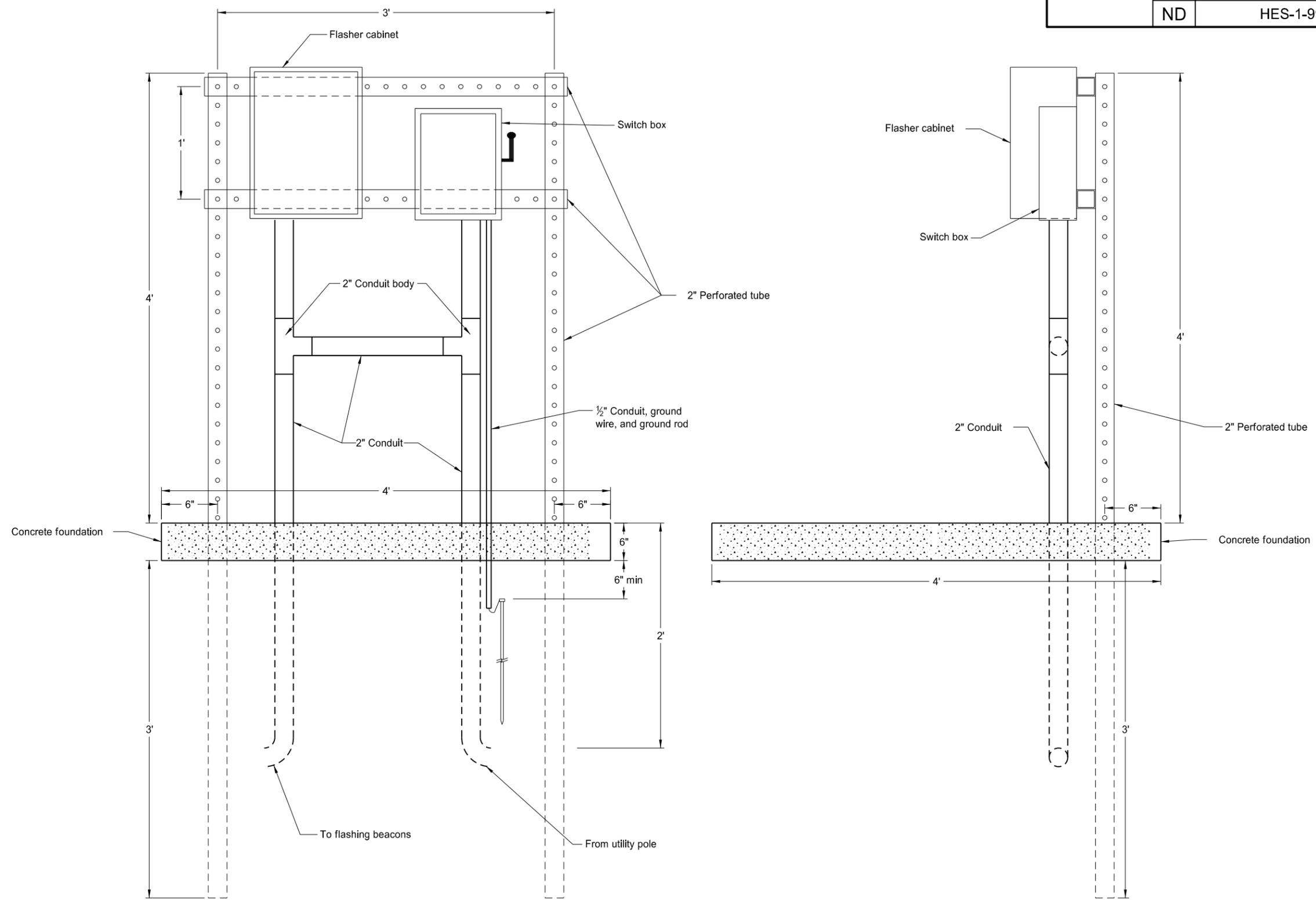
(A) QUANTITIES													
	LED Blinking Crosswalk Sign (S1-1-36)	Structural Splice Box	1" Dia. Conduit	2" Dia. Conduit	No. 12 AWG 3 Conductor Cable	No. 16 AWG 2 Conductor Cable	Pipe Stand Feed Point	Remove Flashing Beacon System	Remove Feed Point	Par Lamp Holder and Par Lamp	Timer Cabinet	Pedestrian Pushbutton and Sign	Flashing Beacon Post Mounted
	EA	EA	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA
TOTAL	2	2	16	63	93	101	1	1	1	2	1	1	1

(A) Do not bid these items bid separately but included in the item "Flashing Beacon Post Mounted."

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Flashing Beacon Post Mounted
Cable Runs and Quantities
ND 25 and Park Road
Center

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Front View

Pipe Stand Feed Point Detail
Sta 459+95-37' It

Side View

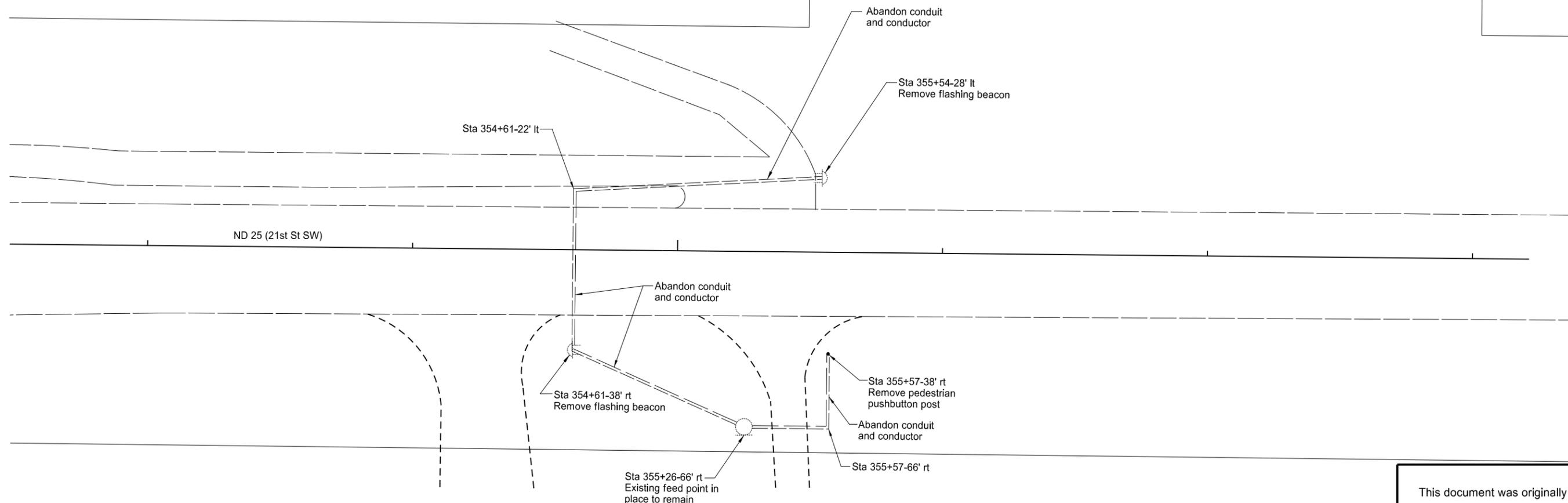
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Flashing Beacon Post Mounted
Flasher Cabinet Pipe Stand Mounted Detail
ND 48
Center



335+00

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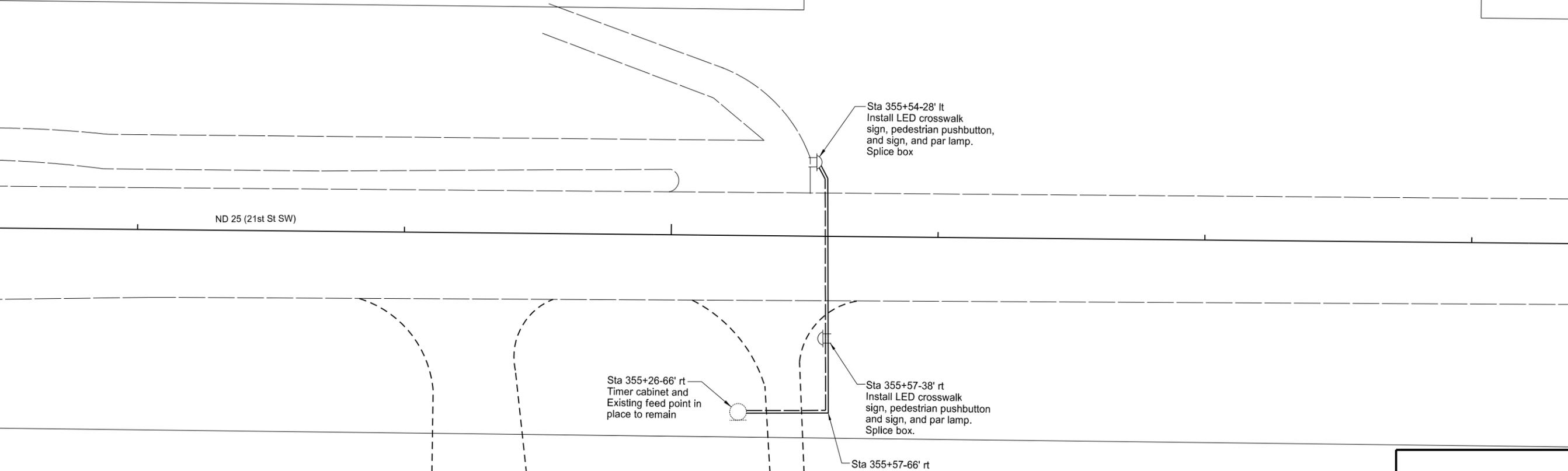
Flashing Beacon Removal

ND 25 (21st St SW)

Center



335+00



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Flashing Beacon Post Mounted

ND 25 (21st St SW)

Center

STATION	CONDUIT RUNS		CABLE RUNS	
	LF	DIA	LF	Type
355+54-28' lt to 355+57-38' rt	62	2"	84 78	No. 12 AWG 3 (B) No. 16 AWG 2 (C)
355+57-38' rt to 355+57-66' rt to 355+26-66' rt	28 31	2" 2"	94 83	No. 14 AWG 3 (B) No. 16 AWG 2 (C)

(B) To beacon head
(C) To pedestrian pushbutton post

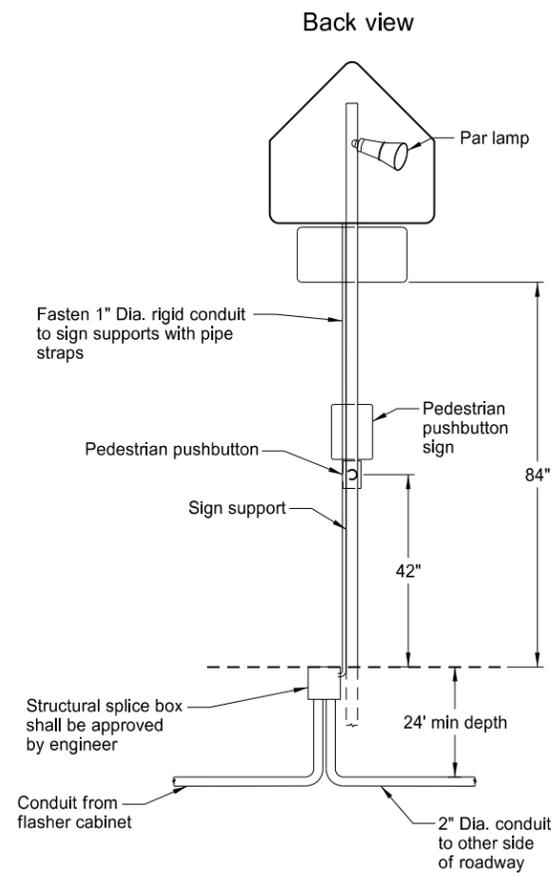
(A) QUANTITIES											
	EA	EA	LF	LF	LF	LF	EA	EA	EA	EA	EA
LED Blinking Crosswalk Sign (W11-2-30)	2	2	16	121	178	161	1	2	1	2	1
Structural Splice Box											
1" Dia. Conduit											
2" Dia. Conduit											
No. 12 AWG 3 Conductor Cable											
No. 16 AWG 2 Conductor Cable											
Remove Flashing Beacon System											
Par Lamp Holder and Par Lamp											
Timer Cabinet											
Pedestrian Pushbutton and Sign											
Flashing Beacon Post Mounted											
TOTAL	2	2	16	121	178	161	1	2	1	2	1

(A) Do not bid these items bid separately but included in the item "Flashing Beacon Post Mounted."

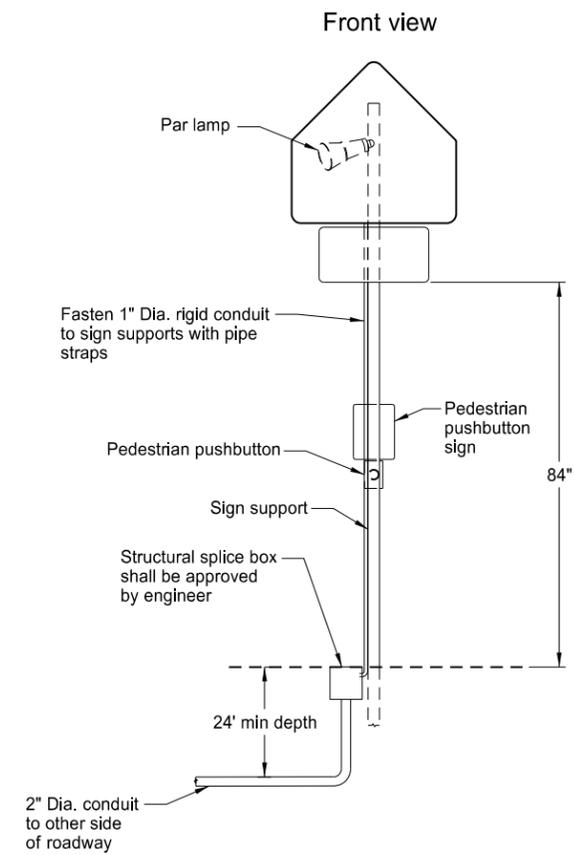
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Flashing Beacon Post Mounted
Cable Runs and Quantities
ND 48 and 3rd St
Center

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-1-999(036)	150	8



Sta 459+96-26' lt

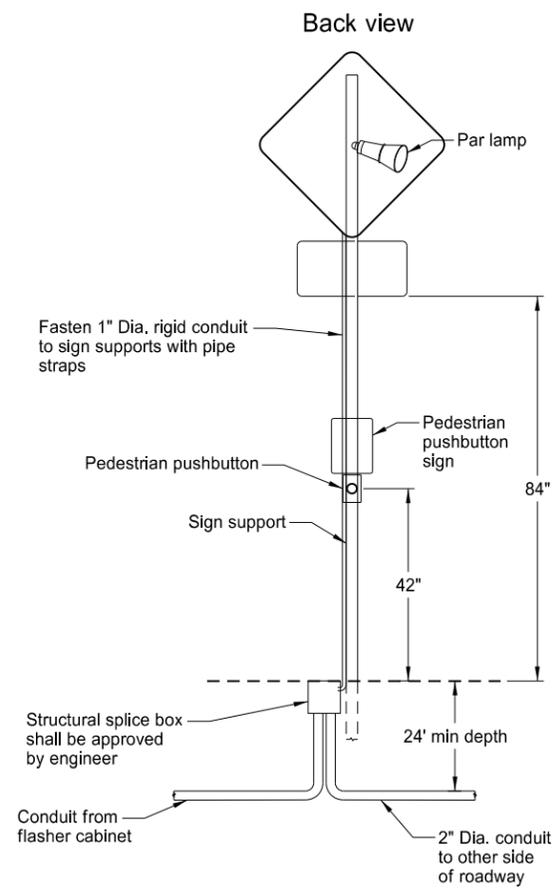


Sta 459+99-26' rt

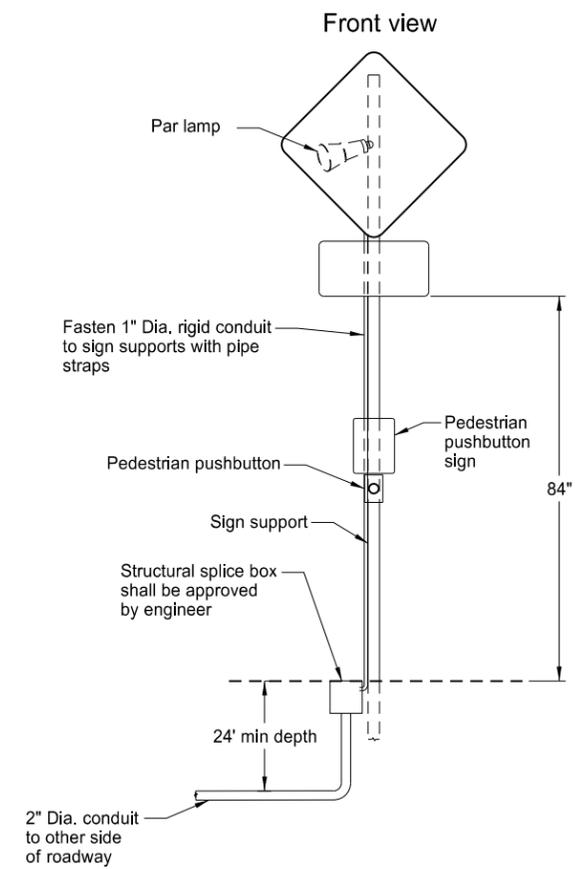
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Flashing Beacon Post Mounted
 Flashing Sign Detail
 ND 48 and 3rd St
 Center

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-1-999(036)	150	9



Sta 355+54-28' lt



Sta 355+57-38' rt

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Flashing Beacon Post Mounted

Flashing Sign Detail

ND 25

Center

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
 BG below grade
 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
 C Gr coarse gravel
 CS coarse sand
 Comb. combination
 Coml commercial
 Compr compression
 CADD computer aided drafting & design
 Conc concrete
 CECB concrete erosion control blanket
 Cond conductor
 Const construction
 Cont continuous
 CSB continuous split barrel sample
 Contr contraction
 Contr contractor
 CP control point
 Coord coordinate
 Cor corner
 Corr corrected
 CAES corrugated aluminum end section
 CAP corrugated aluminum pipe
 CMES corrugated metal end section
 CMP corrugated metal pipe
 CPVCP corrugated poly-vinyl chloride pipe
 CSES corrugated steel end section
 CSFES corrugated steel flared end section

CSP corrugated steel pipe
 CSTES corrugated steel traversable end section
 C coulomb
 Co County
 Crse course
 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 or \emptyset diameter
 Dir direction
 Dist distance
 DM disturbed material
 DB ditch block
 DG ditch grade
 Dbl double
 Dn down
 Dwg drawing
 Dr drive
 Drwy driveway
 DI drop inlet
 D dry density
 DSDS dynamic speed display sign
 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

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NDDOT ABBREVIATIONS

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

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NDDOT ABBREVIATIONS

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated General Contractors of America
 All PI Alliance Pipeline
 ALL SEAS WU All Seasons Water Users Association
 AMOCO PI Amoco Pipeline Company
 AMRDA HESS Amerada Hess Corporation
 AT&T AT&T Corporation
 B PAW Bear Paw Energy Incorporated
 BAKER ELEC Baker Electric
 BASIN ELEC Basin Electric Cooperative Incorporated
 BEK TEL Bek Communications Cooperative
 BELLE PL Belle Fourche Pipeline Company
 BLM Bureau of Land Management
 BNSF Burlington Northern Santa Fe Railway
 BOEING Boeing
 BRNS RWD Barnes Rural Water District
 BURK-DIV ELEC Burke-Divide Electric Cooperative
 BURL WU Burleigh Water Users
 Cable One Cable One
 CABLE SERV Cable Services
 CAP ELEC Capital Electric Cooperative Incorporat
 CASS CO ELEC Cass County Electric Cooperative
 CASS RWU Cass Rural Water Users Incorporated
 CAV ELEC Cavalier Rural Electric Cooperative
 CBLCOM Cablecom Of Fargo
 CENEX PL Cenex Pipeline
 CENT PL WATER DIST Central Pipe Line Water District
 CENT PWR ELEC Central Power Electric Cooperative
 COE Corps of Engineers
 CONS TEL Consolidated Telephone
 CONT RES Continental Resource Inc
 CPR Canadian Pacific Railway
 D O E Department Of Energy
 DAK CARR Dakota Carrier Network
 DAK CENT TEL Dakota Central Telephone
 DAK RWD Dakota Rural Water District
 DGC Dakota Gasification Company
 DICKEY R NET Dickey Rural Networks
 DICKEY RWU Dickey Rural Water Users Association
 DICKEY TEL Dickey Telephone
 DNRR Dakota Northern Railroad
 DOME PL Dome Pipeline Company
 DVELEC Dakota Valley Electric Cooperative
 DVMW Dakota, Missouri Valley & Western
 ENBRDG Enbridge Pipelines Incorporated
 ENVENTIS Enventis Telephone
 FALK MNG Falkirk Mining Company
 FHWA Federal Highway Administration
 G FKS-TRL WD Grand Forks-traill Water District
 GETTY TRD & TRAN Getty Trading & Transportation
 GLDN W ELEC Golden West Electric Cooperative
 GRGS CO TEL Griggs County Telephone
 GTR RAMSEY WD Greater Ramsey Water District

GT PLNS NAT GAS Great Plains Natural Gas Company
 HALS TEL Halstad Telephone Company
 IDEA1 Idea1
 INT-COMM TEL Inter-Community Telephone Company
 KANEB PL Kaneb Pipeline Company
 KEM ELEC Kem Electric Cooperative Incorporated
 KOCH GATH SYS Koch Gathering Systems Incorporated
 LKHD PL Lakehead Pipeline Company
 LNGDN RWU Langdon Rural Water Users Incorporated
 LWR YELL R ELEC Lower Yellowstone Rural Electric
 MCKNZ CON McKenzie Consolidated Telcom
 MCKENZIE ELEC McKenzie Electric Cooperative
 MCKNZ WRD McKenzie County Water Resource District
 MCLEOD McLeod USA
 MCLN ELEC McLean Electric Cooperative
 MCLN-SHRDN R WAT McLean-Sheridan Rural Water
 MDU Montana-dakota Utilities
 MID-CONT CABLE Mid-Continent Cable
 MIDSTATE TEL Midstate Telephone Company
 MINOT CABLE Minot Cable Television
 MINOT TEL Minot Telephone Company
 MISS VALL COMM Missouri Valley Communications
 MISS W W S Missouri West Water System
 MNKOTA PWR Minnkota Power
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative
 MOUNT-WILLI ELEC Mountrail-williams Electric Cooperative
 MRE LBTY TEL Moore & Liberty Telephone
 MUNICIPAL City Water And Sewer
 MUNICIPAL City Of '.....'
 N CENT ELEC North Central Electric Cooperative
 N VALL W DIST North Valley Water District
 ND PKS & REC North Dakota Parks And Recreation
 ND TEL North Dakota Telephone Company
 NDDOT North Dakota Department of Transportation
 NDSU SOIL SCI DEPT NDSU Soil Science Department
 NEMONT TEL Nemont Telephone
 NODAK R ELEC Nodak Rural Electric Cooperative
 NOON FRMS TEL Noonan Farmers Telephone Company
 NPR Northern Plains Railroad
 NSP Northern States Power
 NTH PRAIR RW Northern Prairie Rural Water Association
 NTHN BRDR PL Northern Border Pipeline
 NTHN PLNS ELEC Northern Plains Electric Cooperative Incorporated
 NTHWSTRN REF Northwestern Refinery Company
 NW COMM Northwest Communication Cooperation
 NWRWD Northwest Rural Water District
 ONEOK Oneok gas
 OSHA Occupational Safety and Health Administration
 OTTR TL PWR Otter Tail Power Company
 P L E M Prairielands Energy Marketing
 POLAR COM Polar Communications
 PVT ELEC Private Electric
 QWEST Qwest Communications
 R&T W SUPPLY R & T Water Supply Association

RED RIV TEL Red River Rural Telephone
 RESVTN TEL Reservation Telephone
 ROBRTS TEL Roberts Company Telephone
 R-RIDER ELEC Roughrider Electric Cooperative
 RRVW Red River Valley & Western Railroad
 S CENT REG WD South Central Regional Water District
 S E W U South East Water Users Incorporated
 SCOTT CABLE Scott Cable Television Dickinson
 SHERDN ELEC Sheridan Electric Cooperative
 SHEYN VLY ELEC Sheyenne Valley Electric Cooperative
 SKYTECH Skyland Technologies Incorporated
 SLOPE ELEC Slope Electric Cooperative Incorporated
 SOURIS RIV TELCOM Souris River Telecommunications
 ST WAT COMM State Water Commission
 STATE LN WATER State Line Water Cooperative
 STER ENG Sterling Energy
 STUT RWU Stutsman Rural Water Users
 SW PL PRJ Southwest Pipeline Project
 T M C Turtle Mountain Communications
 TCI TCI of North Dakota
 TESORO GHG PLNS PL Tesoro High Plains Pipeline
 TRI-CNTY WU Tri-County Water Users Incorporated
 TRL CO RWU Traill County Rural Water Users
 UNTD TEL United Telephone
 UPPR SOUR WUA Upper Souris Water Users Association
 US SPRINT U.S. Sprint
 USAF MSL CABLE U.S.A.F. Missile Cable
 USFWS US Fish and Wildlife Service
 USW COMM U.S. West Communications
 VRNDRY ELEC Verendrye Electric Cooperative
 W RIV TEL West River Telephone Incorporated
 WEB W. E. B. Water Development Association
 WILLI RWA Williams Rural Water Association
 WILSTN BAS PL Williston Basin Interstate Pipeline Company
 WLSH RWD Walsh Water Rural Water District
 WOLVRTN TEL Wolverton Telephone
 XLENER Xcel Energy
 YSVR Yellowstone Valley Railroad

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Line Styles

Existing Topography

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

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

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

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

Traffic Utilities

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

Sign Structures

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

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Line Styles

Right Of Way

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

Boundary Control

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

Cross Sections and Typical

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

Geotechnical

- Geotextile Fabric Type D
- Geogrid
- Geotextile Fabric Type R
- Geotextile Fabric Type R1
- Geotextile Fabric Type RR
- Geotextile Fabric Type S
- Subgrade Reinforcement

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

- Hidden Object
- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Centerline Main
- Centerline
- Existing Ground (Details)
- Existing Conditions
- Sheet Piling

Erosion Control

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

Environmental

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

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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		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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DATE	CHANGE

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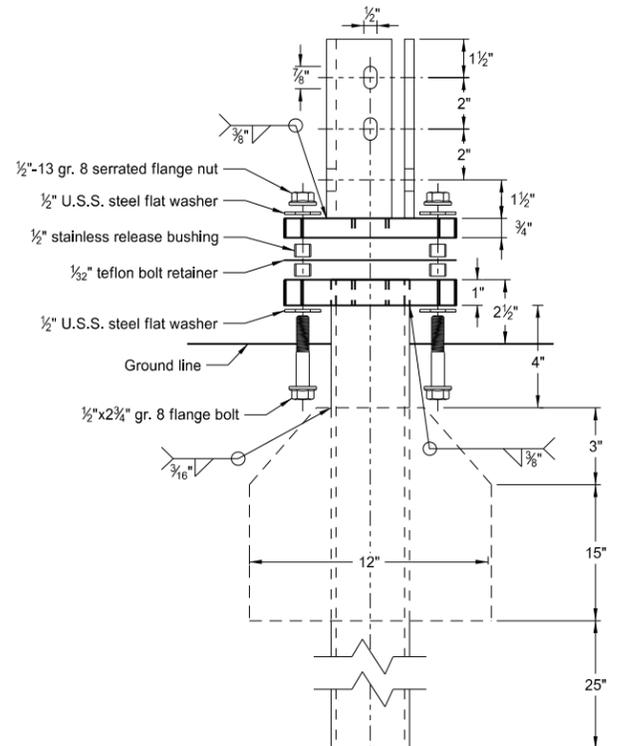
Symbols

D-101-32

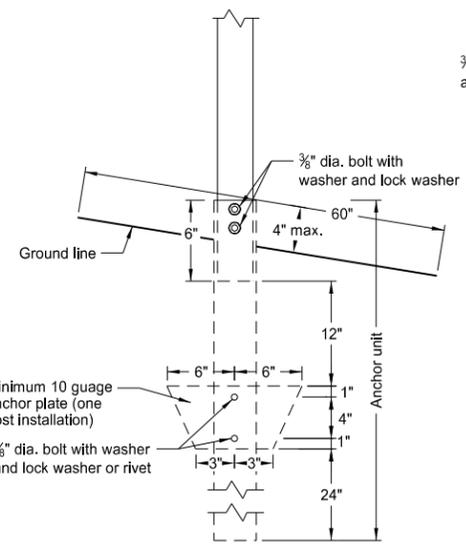
 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Gate Type 2  Junction 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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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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DATE	CHANGE

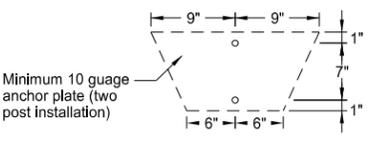
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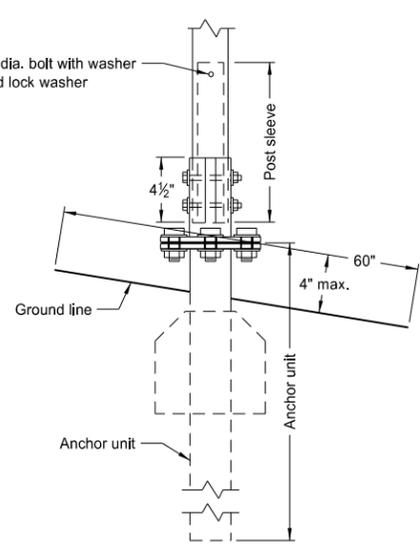
Multi-Directional Slip Base Assembly



Anchor Unit and Post Assembly

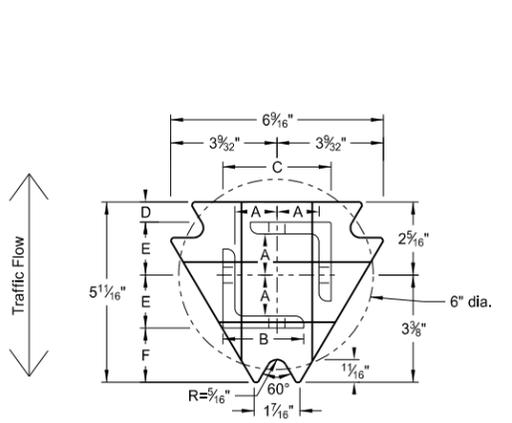


Minimum 10 gauge anchor plate (two post installation)

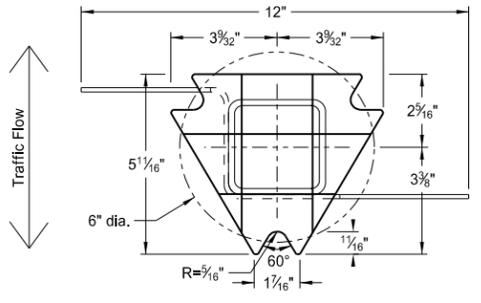


Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly

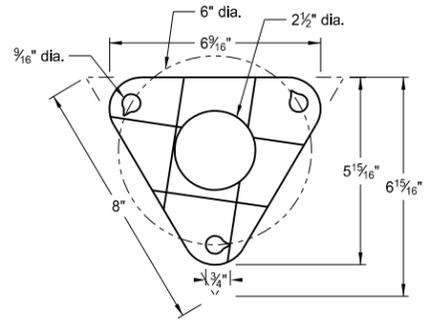
Perforated Tube



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



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



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

Notes:

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

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

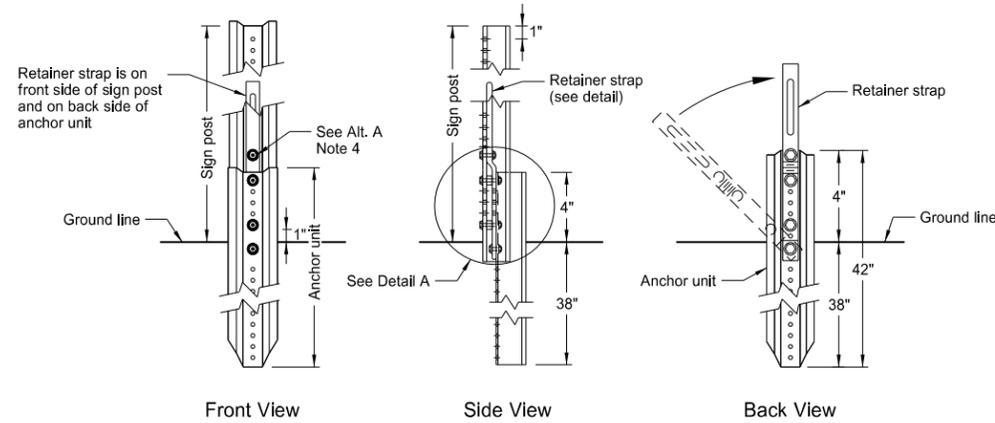
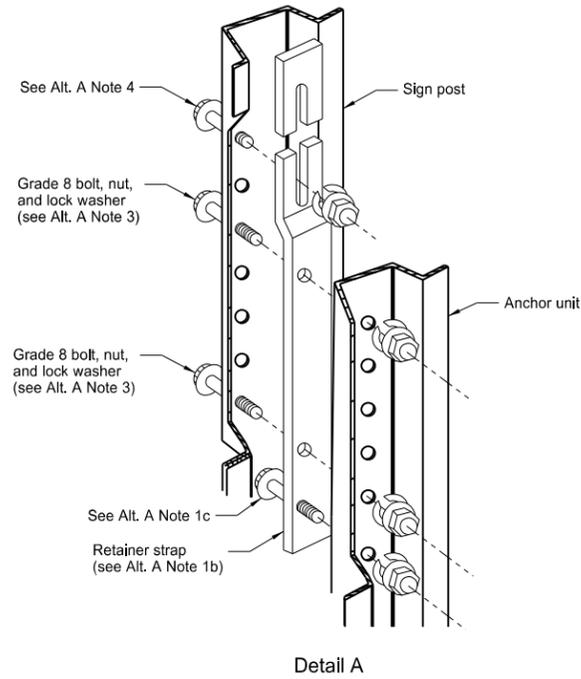
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16" x 10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2" x 10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

- (A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.
 (B) For additional wind load, insert the 2 3/16" x 10 ga. into 2 1/2" x 10 ga.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice

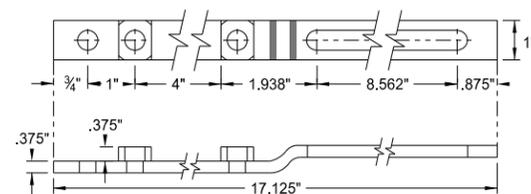
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U-Channel Post

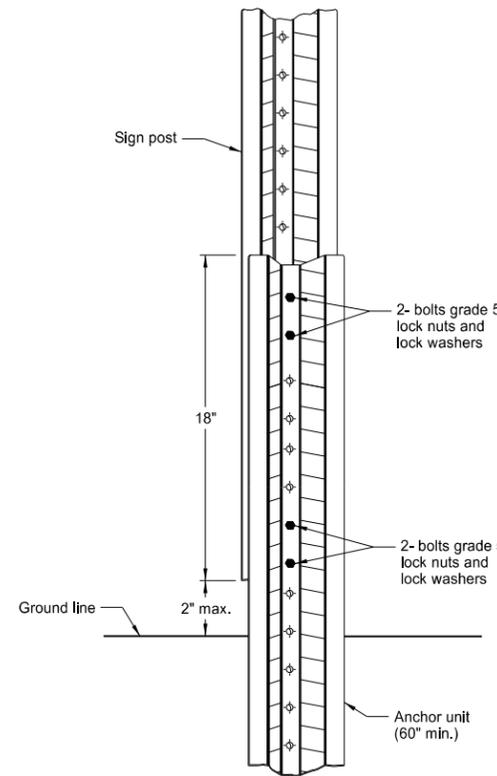


Breakaway U-Channel Detail Alternate A

Install a maximum of 2 posts within 7'.

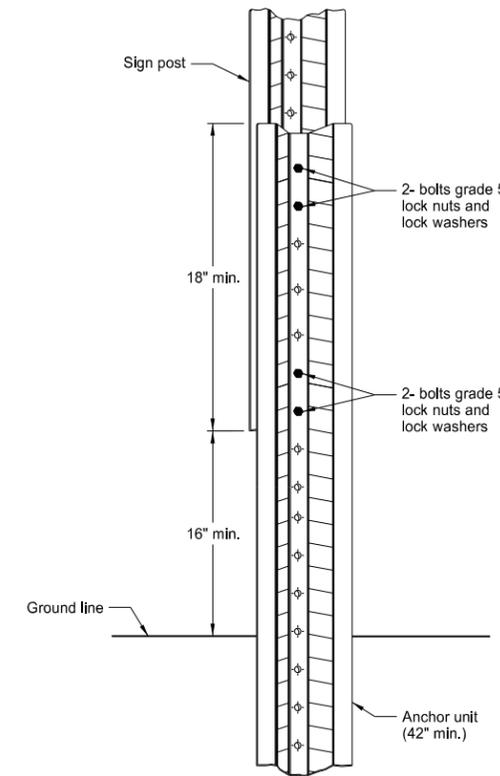


Retainer Strap Detail



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

Install a maximum of 3 posts within 7'.



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

Install a maximum of 3 posts within 7'.

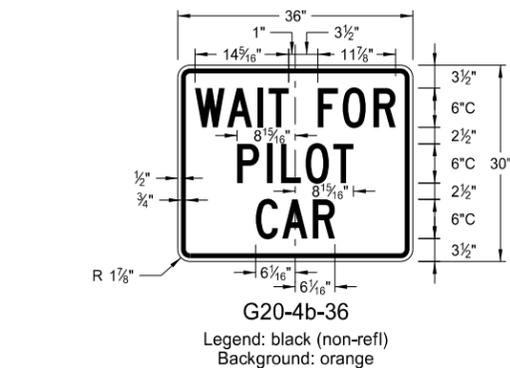
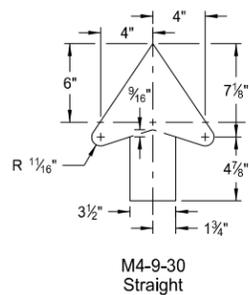
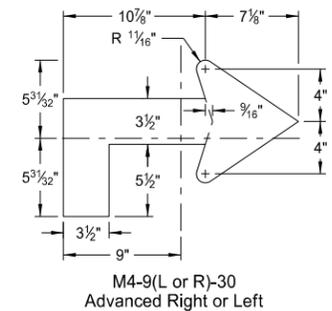
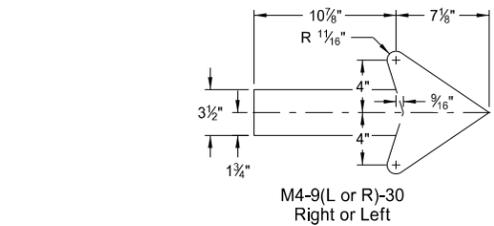
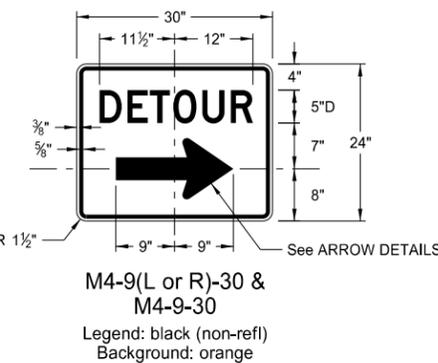
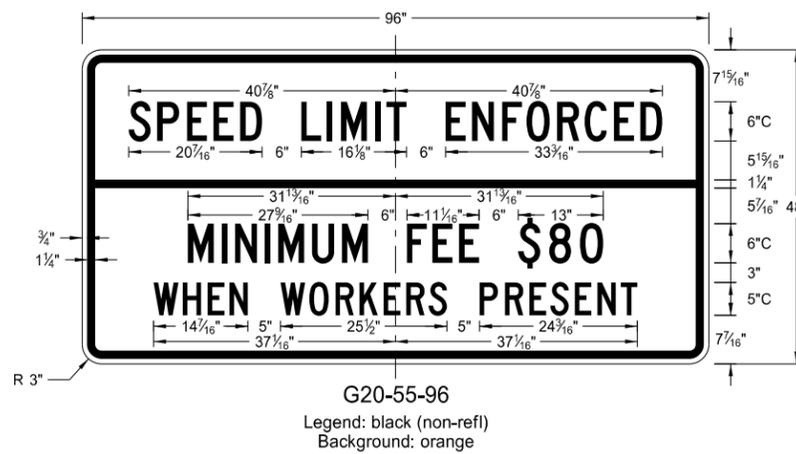
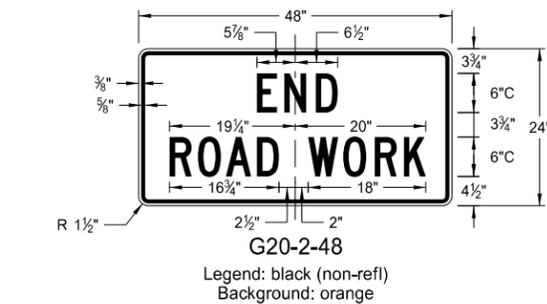
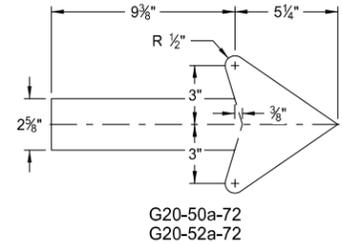
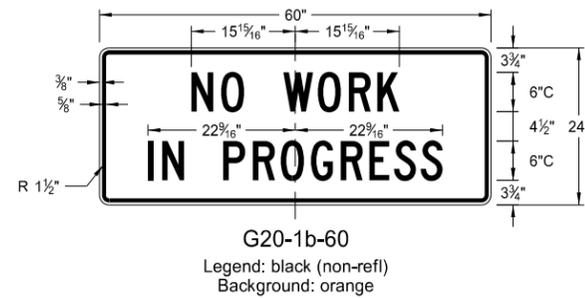
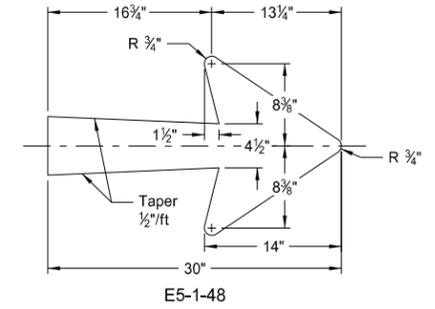
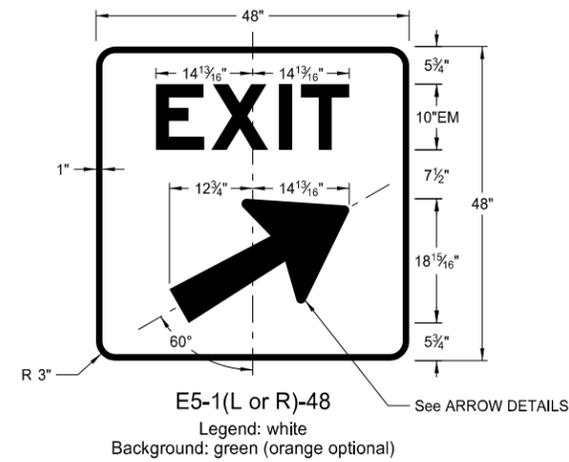
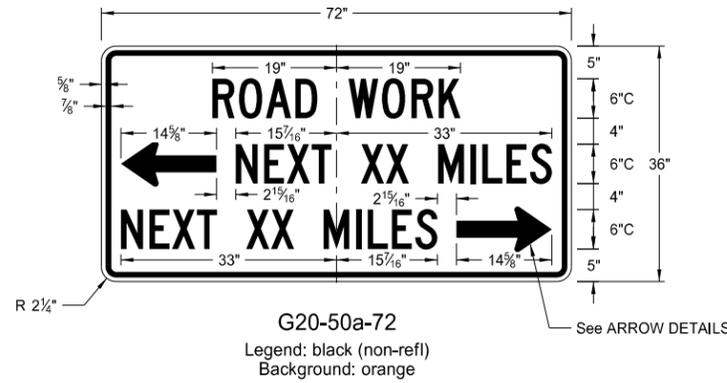
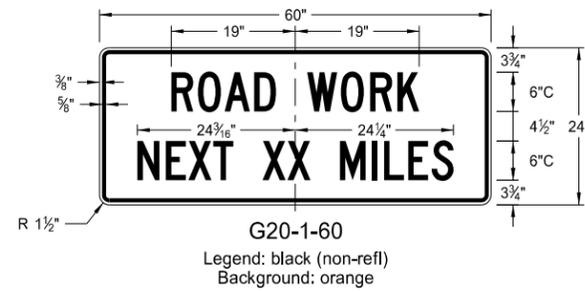
Alternate A Steps of Installation:

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

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2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice

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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



ARROW DETAILS

NOTES:

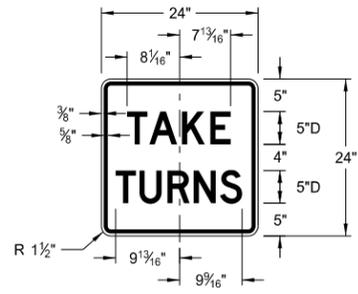
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

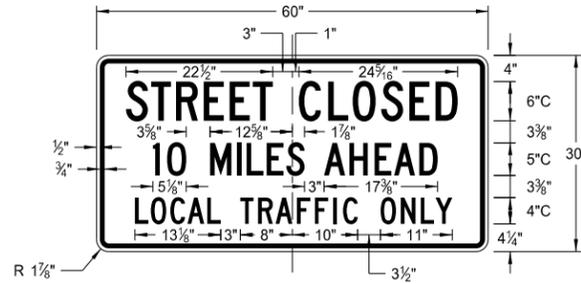
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

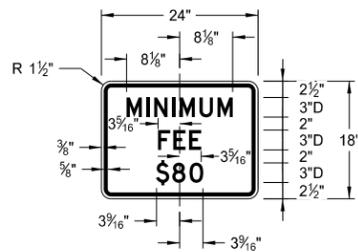
D-704-10



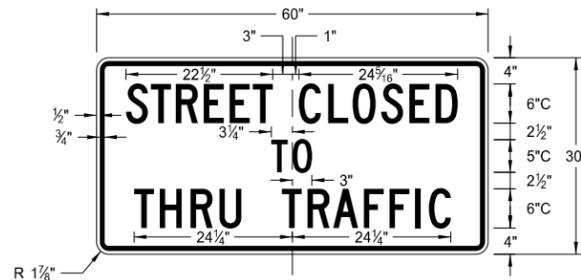
R1-50P-24
Legend: black (non-refl)
Background: white



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



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



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

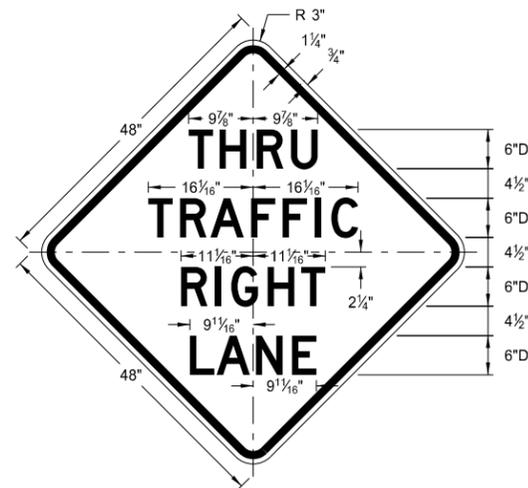


R11-2a-48
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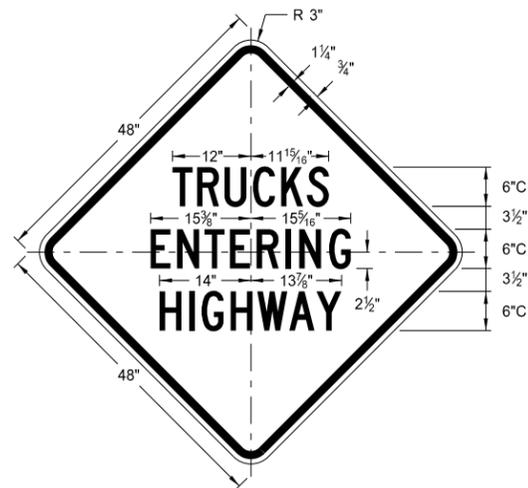
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number

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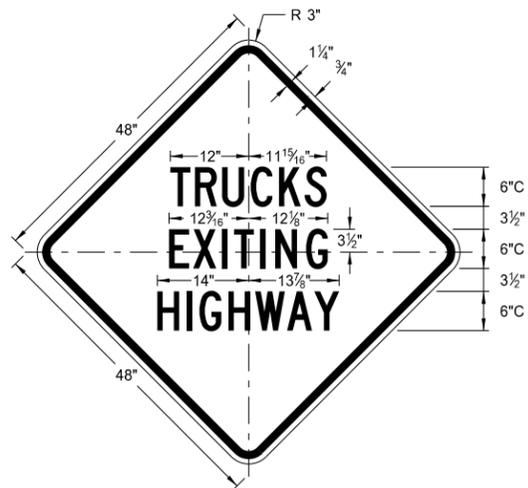
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



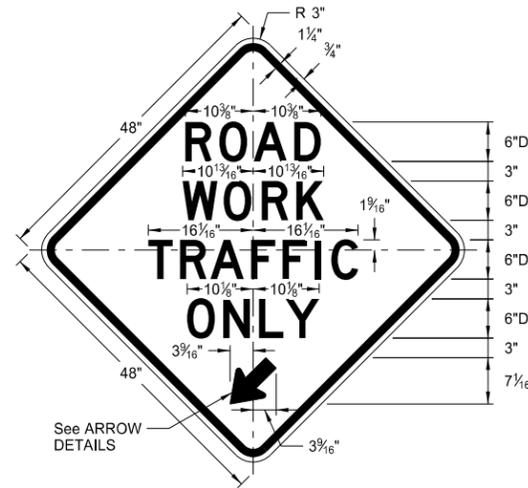
W5-8-48
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Background: orange



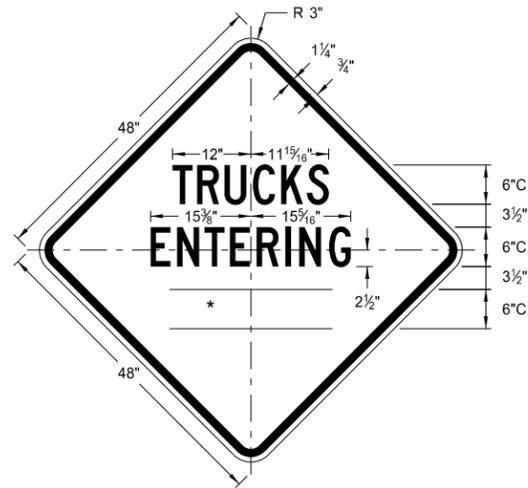
W8-53-48
Legend: black (non-refl)
Background: orange



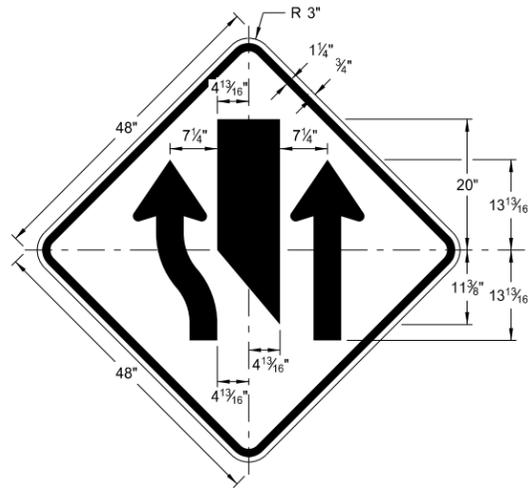
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Background: orange



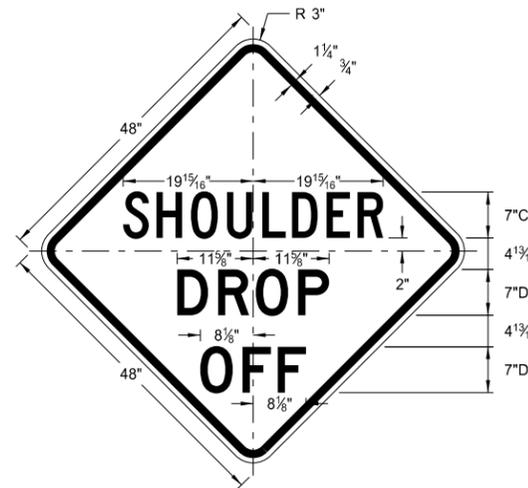
W5-9-48
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Background: orange



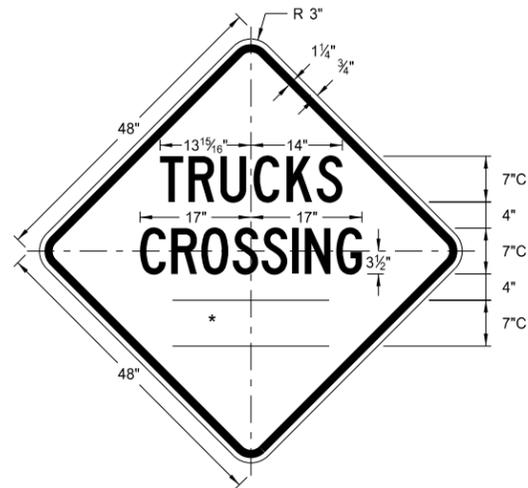
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Background: orange



W9-3a-48
Legend: black (non-refl)
Background: orange



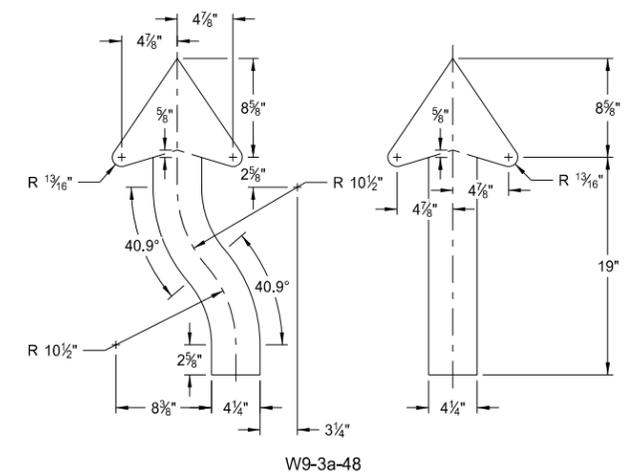
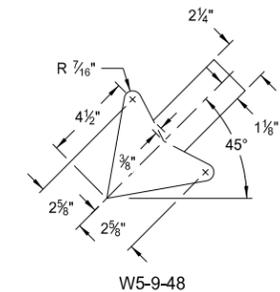
W8-9a-48
Legend: black (non-refl)
Background: orange



W8-55-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



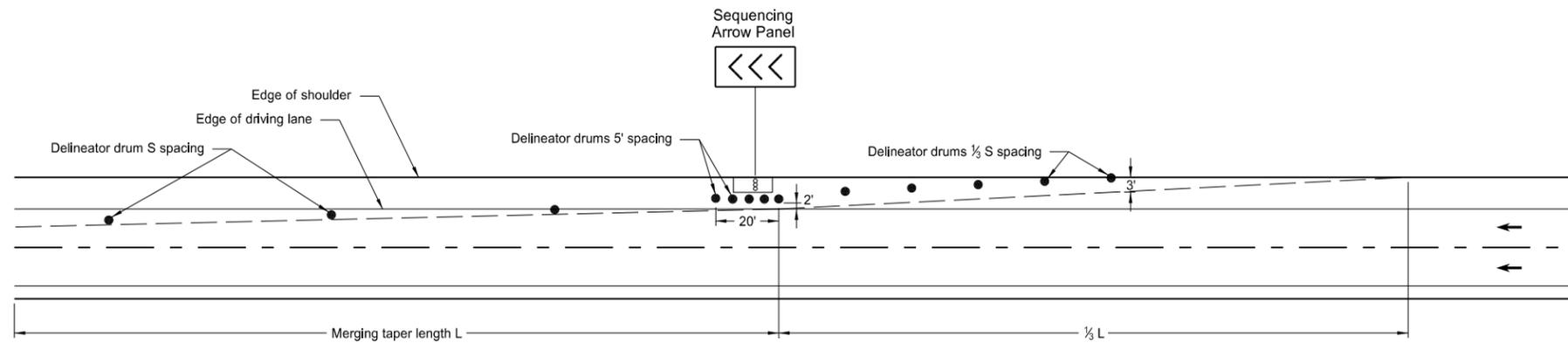
ARROW DETAILS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details

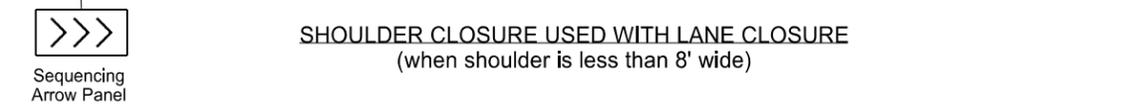
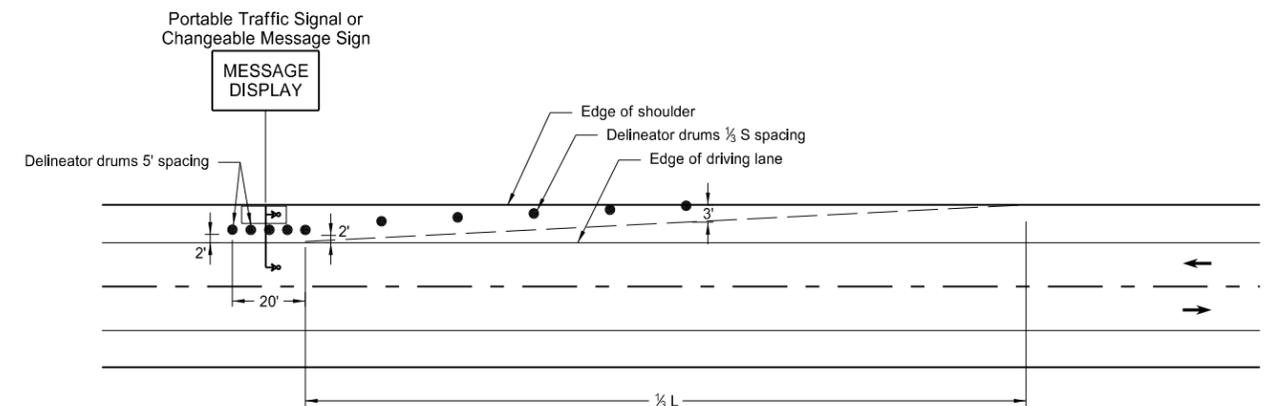
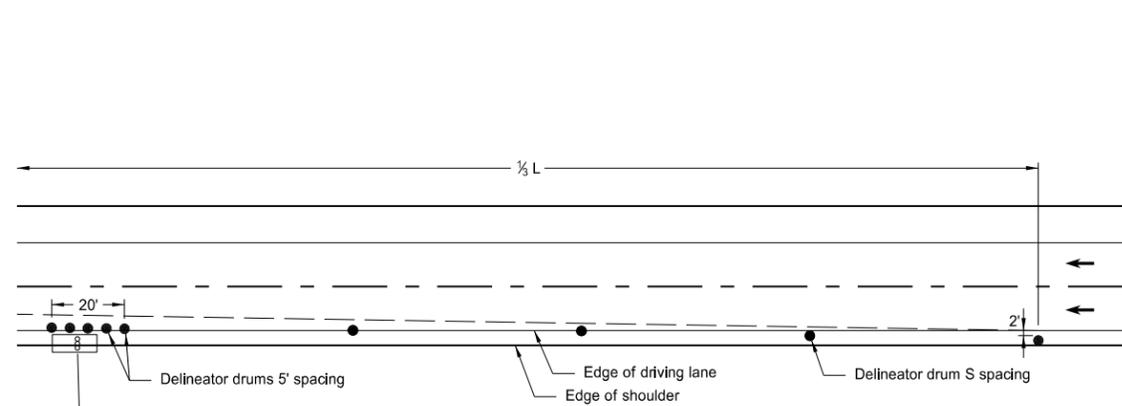
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SHOULDER CLOSURE TAPERS

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

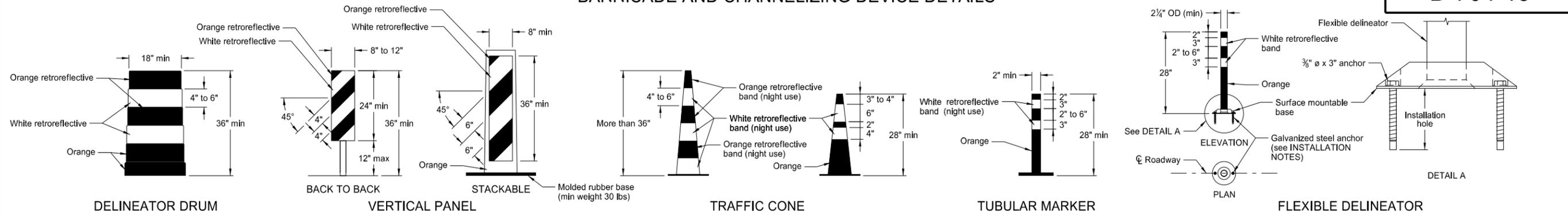
Notes:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
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DATE	CHANGE
9-27-17	Updated to active voice

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BARRICADE AND CHANNELIZING DEVICE DETAILS



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

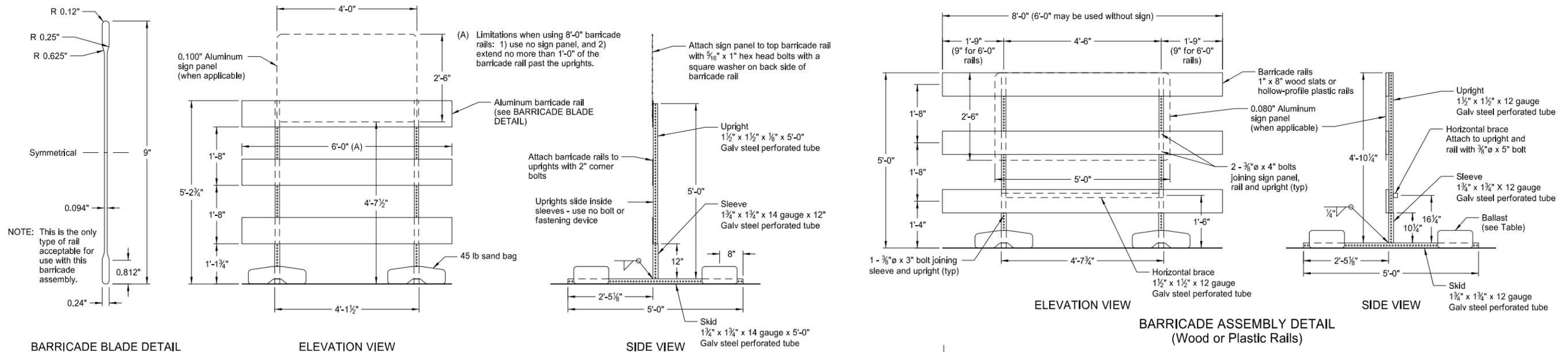
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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

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

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

INSTALLATION NOTES:

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

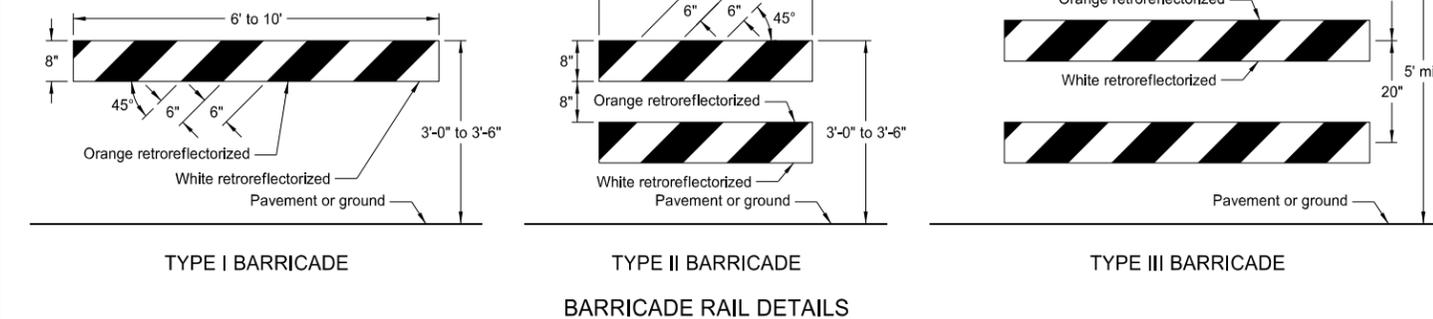


BARRICADE BLADE DETAIL

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

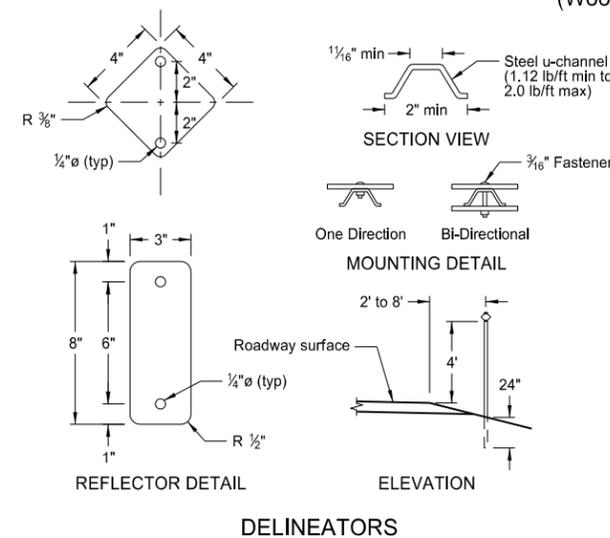
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

TYPE II BARRICADE BARRICADE RAIL DETAILS

TYPE III BARRICADE



REFLECTOR DETAIL

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

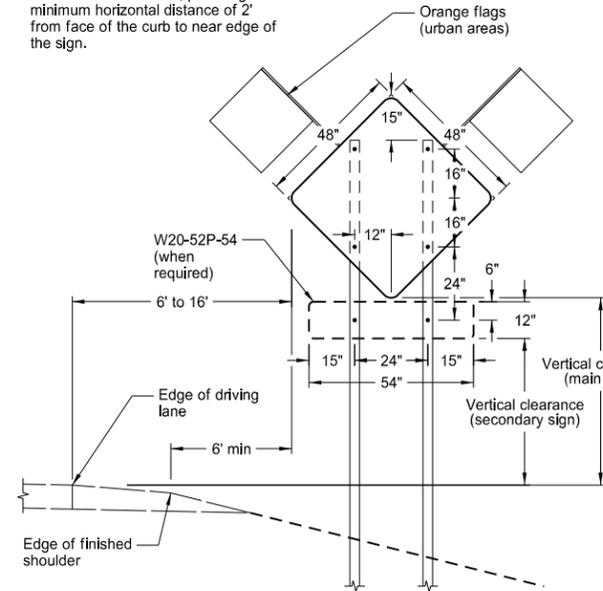
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice

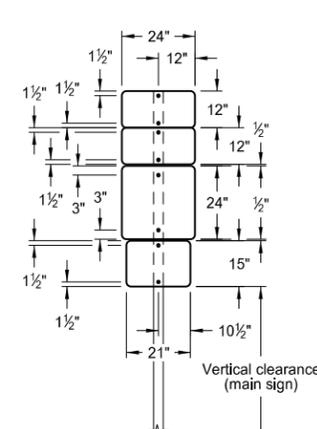
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

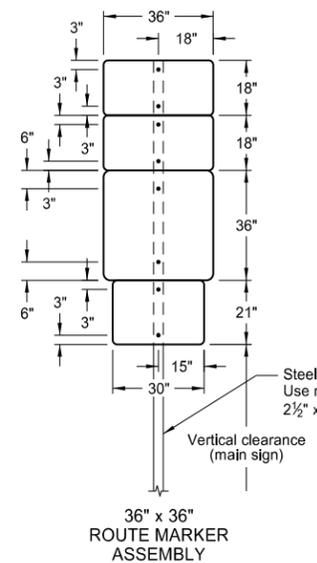
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



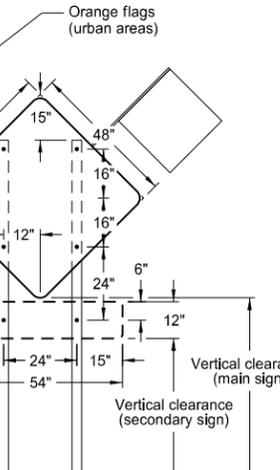
TYPICAL SECTION (48" x 48" diamond warning sign shown)



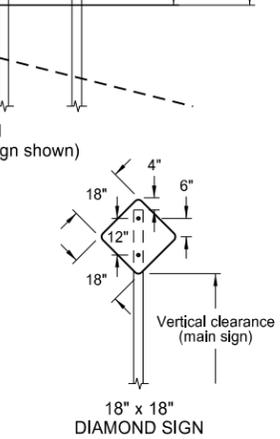
24" x 24" ROUTE MARKER ASSEMBLY



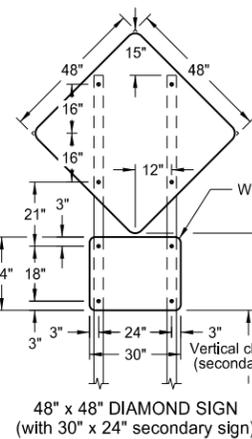
36" x 36" ROUTE MARKER ASSEMBLY



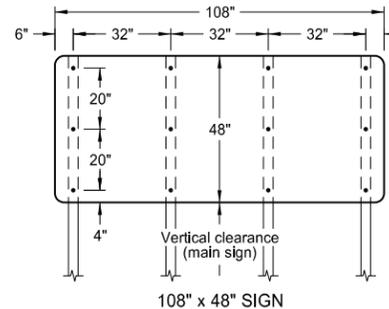
48" x 48" DIAMOND SIGN (with 30" x 30" secondary sign)



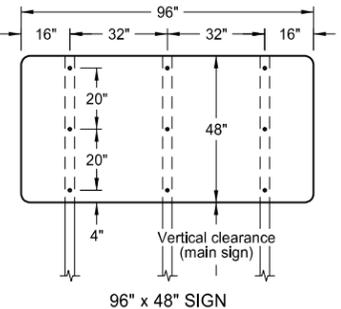
18" x 18" DIAMOND SIGN



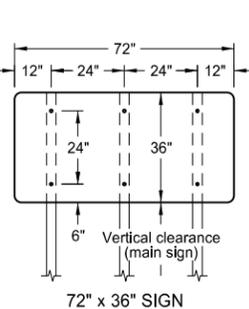
48" x 48" DIAMOND SIGN (with 30" x 24" secondary sign)



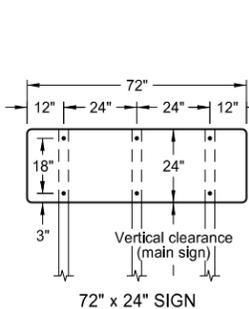
108" x 48" SIGN



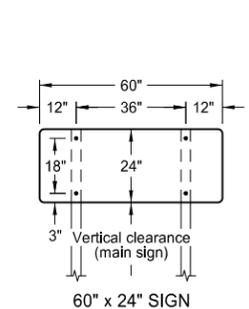
96" x 48" SIGN



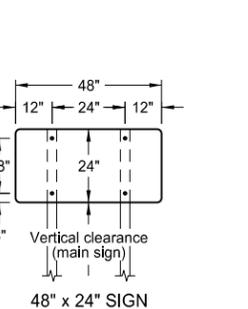
72" x 36" SIGN



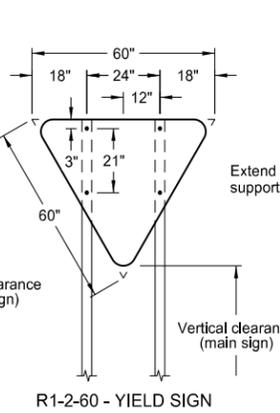
72" x 24" SIGN



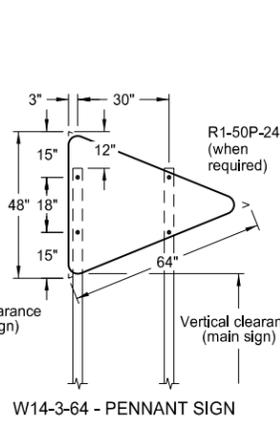
60" x 24" SIGN



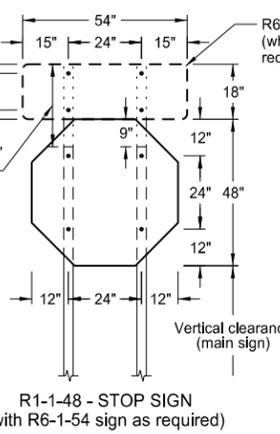
48" x 24" SIGN



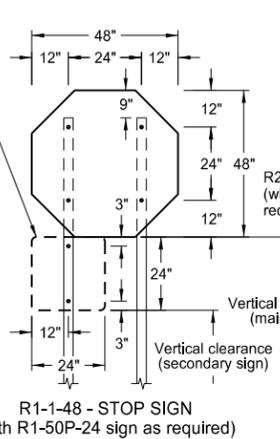
R1-2-60 - YIELD SIGN



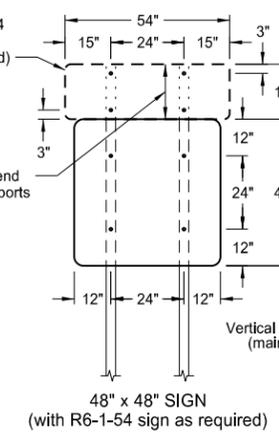
W14-3-64 - PENNANT SIGN



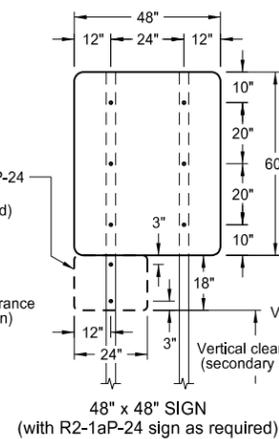
R1-1-48 - STOP SIGN (with R6-1-54 sign as required)



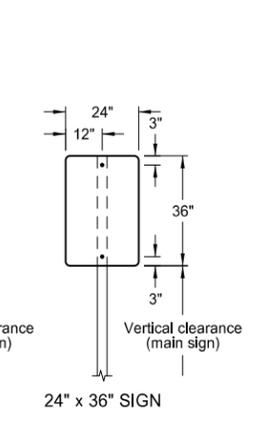
R1-1-48 - STOP SIGN (with R1-50P-24 sign as required)



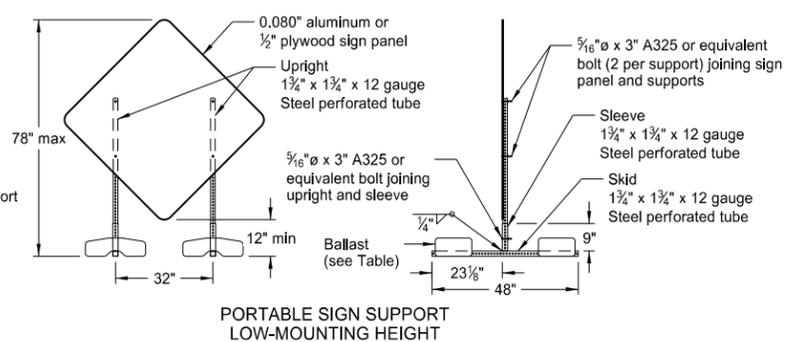
48" x 48" SIGN (with R6-1-54 sign as required)



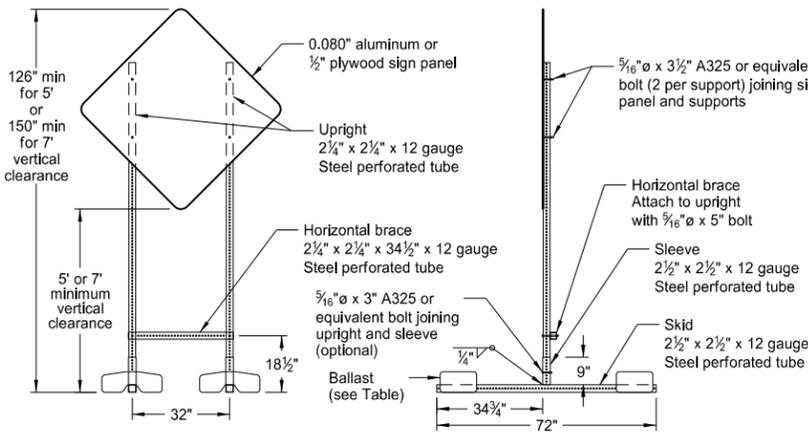
48" x 48" SIGN (with R2-1aP-24 sign as required)



24" x 36" SIGN



PORTABLE SIGN SUPPORT LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Galvanize or paint supports. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.
Place signs over 50 square feet on 2 1/2" x 2 1/2" perforated tube supports as a minimum.
Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
2. Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 3/8" bolts.
3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

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

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

MINIMUM BALLAST (For each side of sign support base)

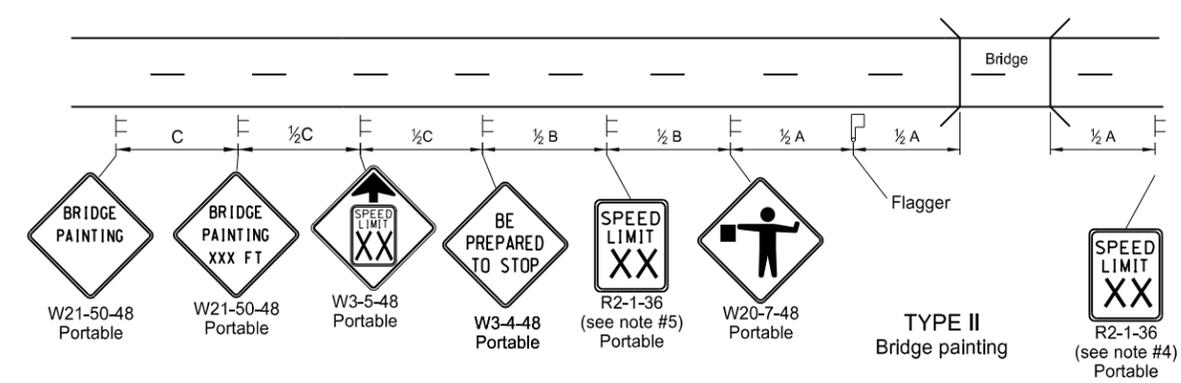
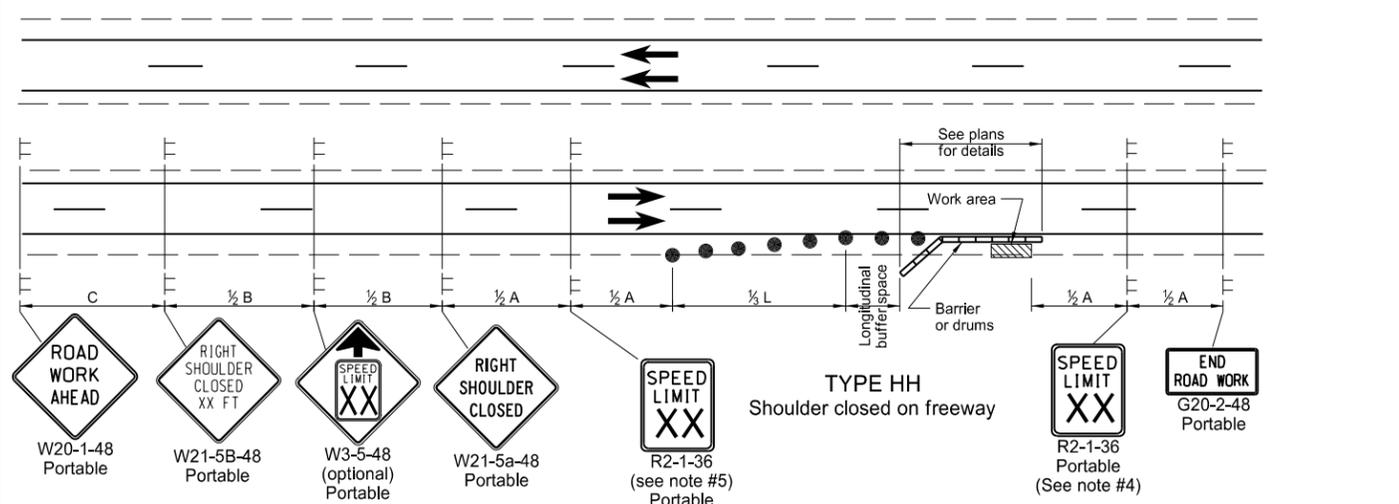
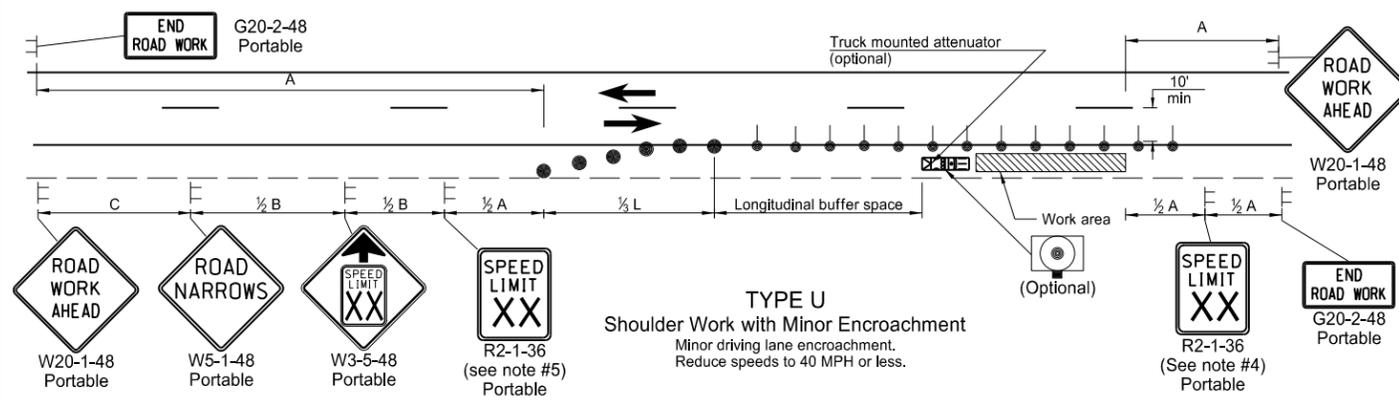
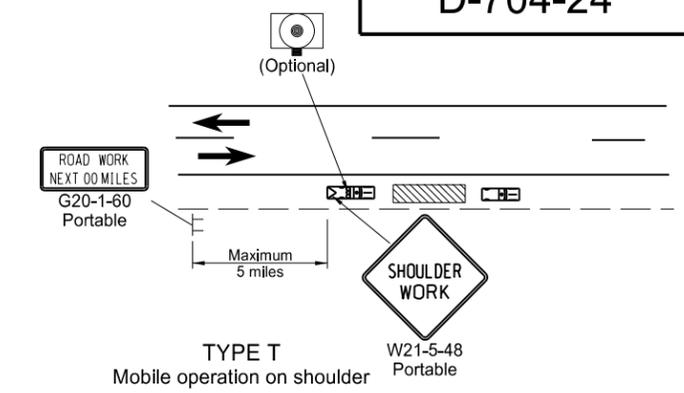
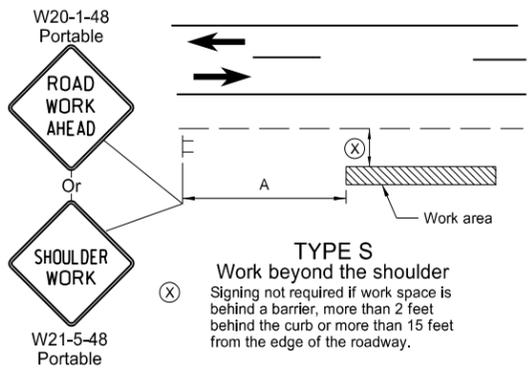
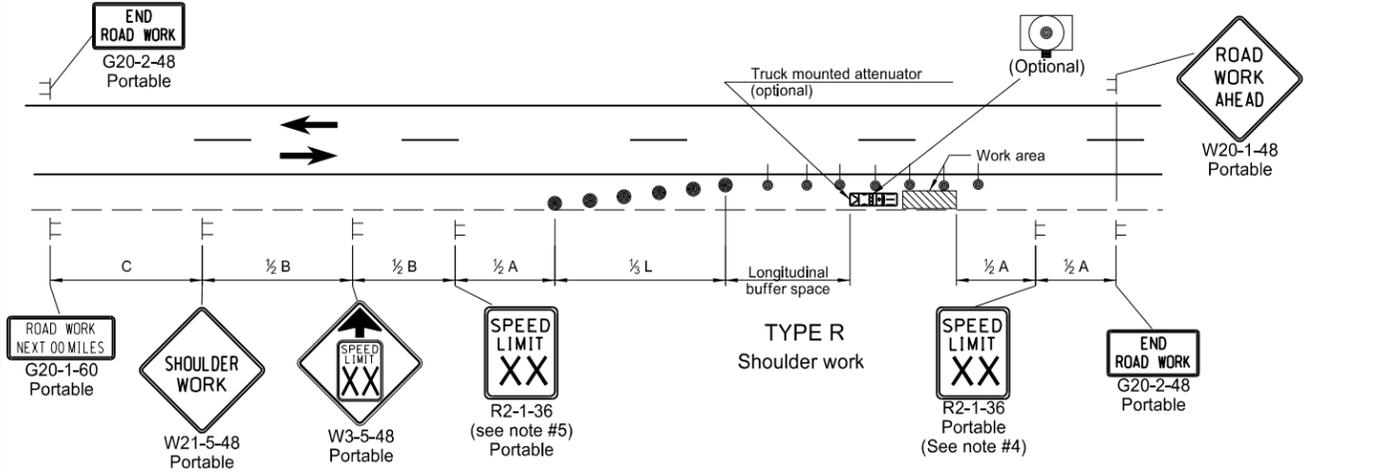
Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

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

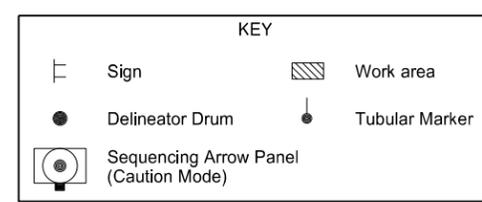
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13 9-27-17	Revised Note 6. Updated to active voice

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS



- Notes
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of the taper in feet.
 - L = Minimum length of taper, S x 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.
 - Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
 - Sequencing Arrow Panels
 - Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
 - Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
 - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
 - Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.



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

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

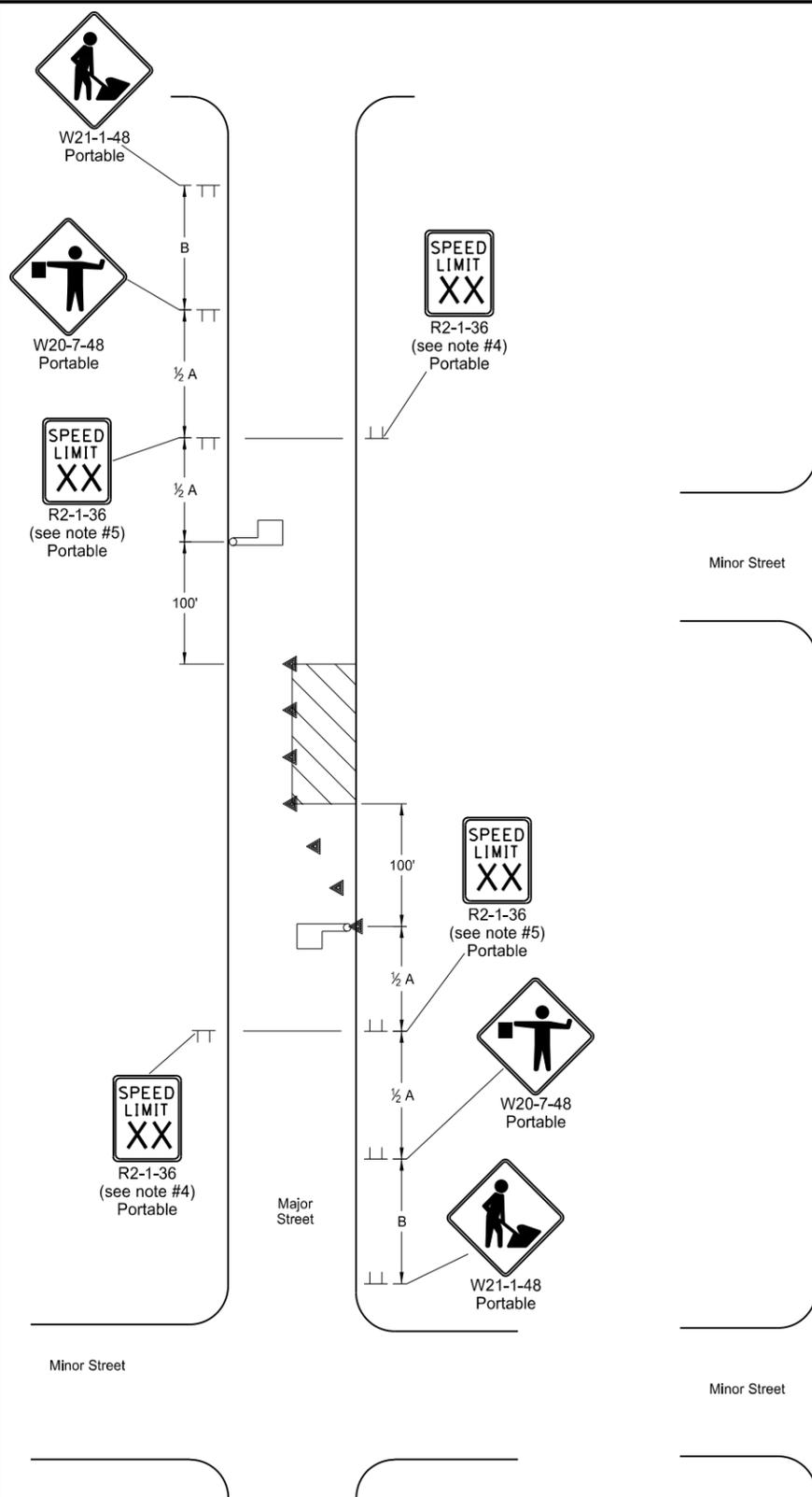
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & revised signs

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

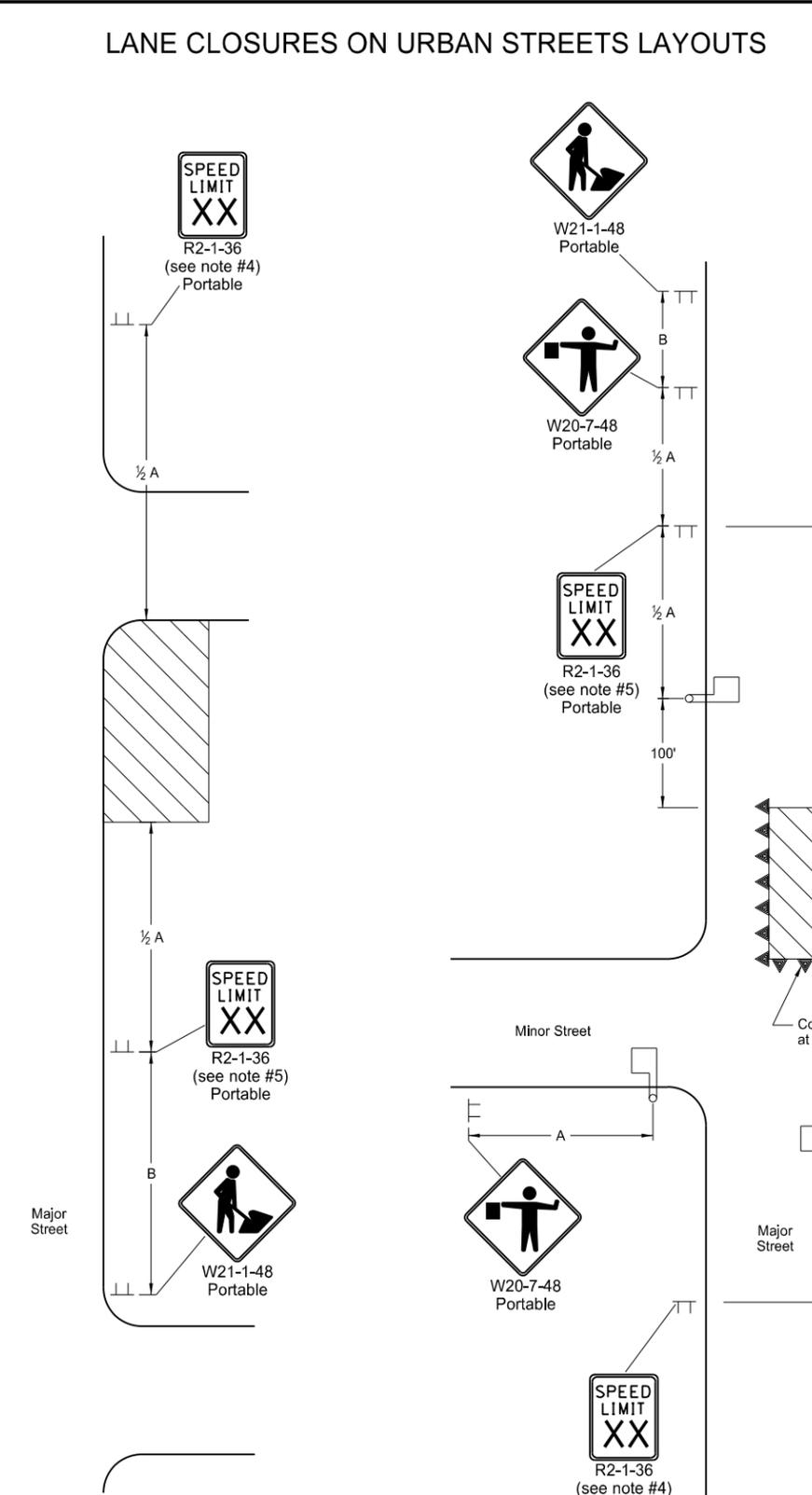
LANE CLOSURES ON URBAN STREETS LAYOUTS

D-704-25

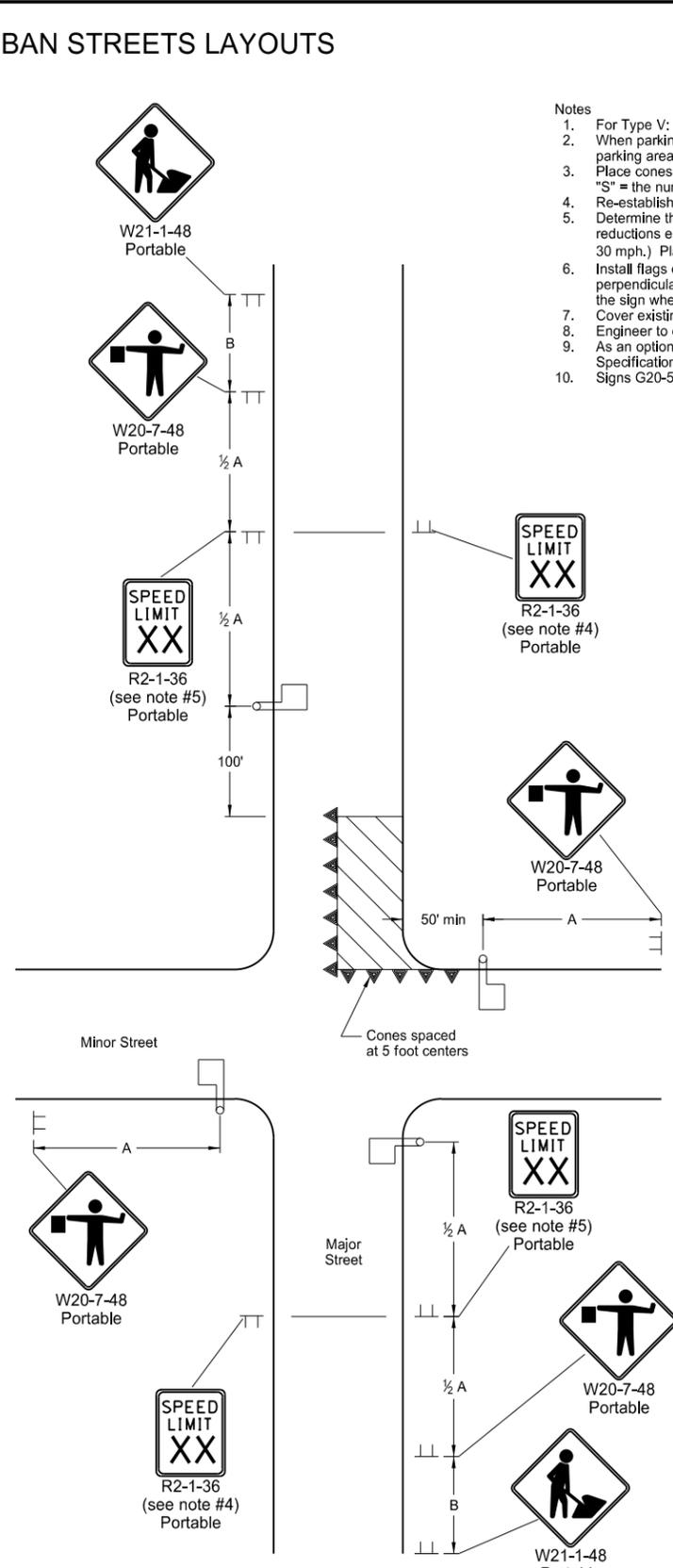
- Notes
- For Type V: Work on one side of roadway at a time so as not to block off more than one lane of traffic.
 - When parking is present, place signs so they are entirely visible above parked vehicles or at the edge of the parking area so they are visible to oncoming traffic. Place signs on portable mounts when located on roadway.
 - Place cones for tapering traffic at 3 equal spaces and cones for tangents at dimension "S".
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inches square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within reduced speed zones.
 - Engineer to determine safe speed, when necessary.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
 - Signs G20-55-96 and R2-1aP-24 are not required for urban projects.



TYPE V
LANE CLOSURE ON URBAN STREET
Portion of roadway closed to traffic only during daylight hours (mid block location).



TYPE W
WORK BEYOND CURB ON URBAN STREET
Work area outside driving lane and no closure necessary.



TYPE X
LANE CLOSURE NEAR INTERSECTION ON URBAN STREET
Portion of roadway closed to traffic only during daylight hours (end block location).

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

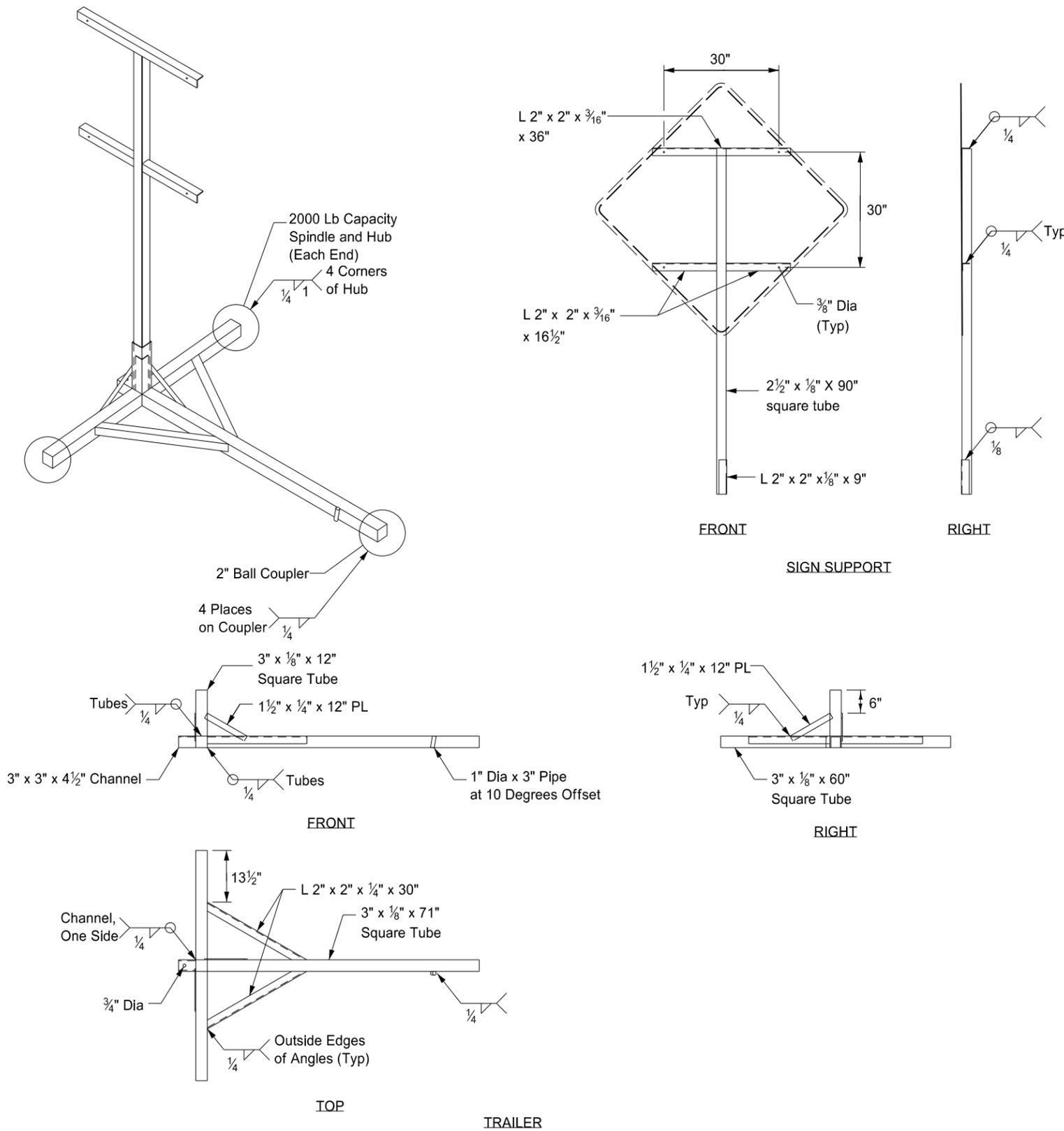
- Sign
- Work area
- Cones
- Flagger

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

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 Registration Number
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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

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

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

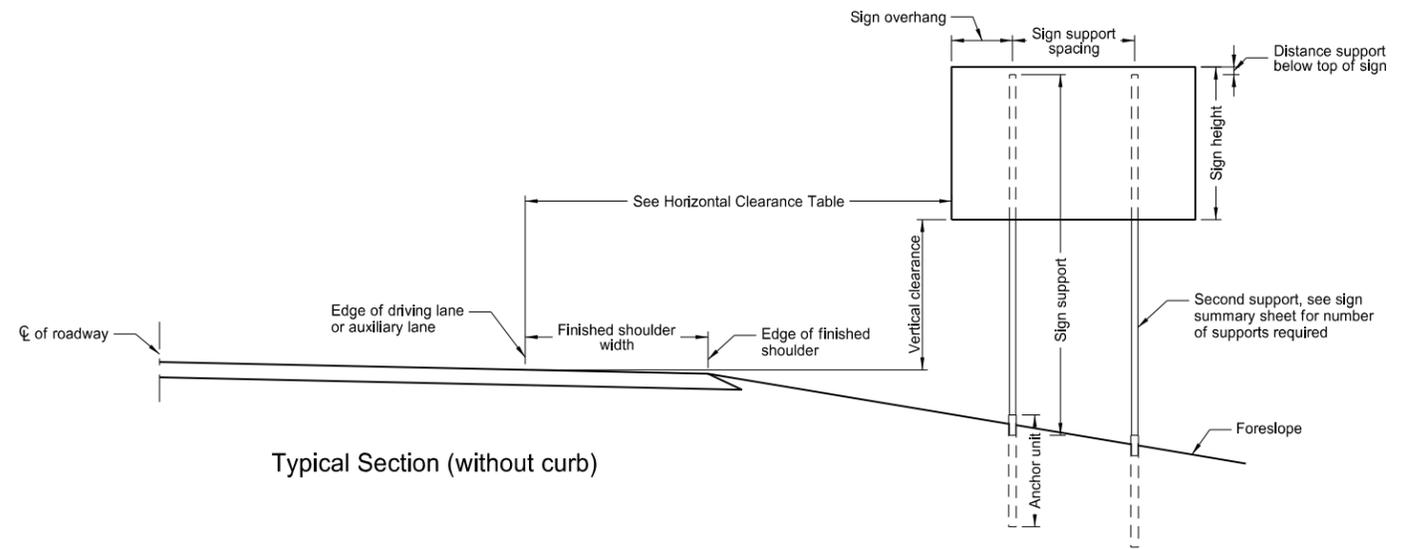
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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

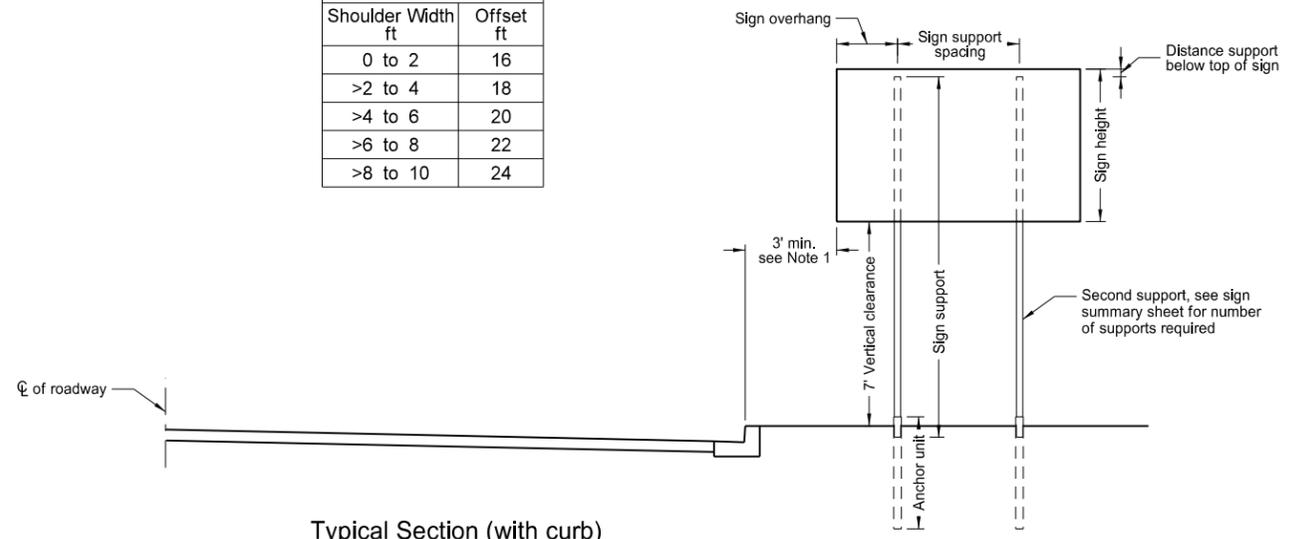
Notes:

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

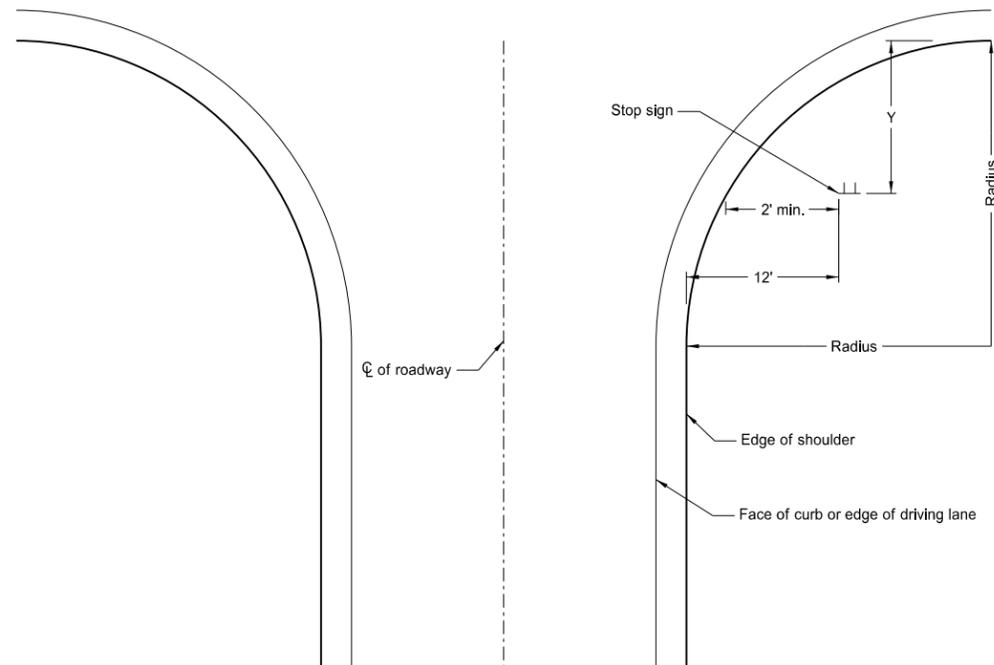


Typical Section (without curb)

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

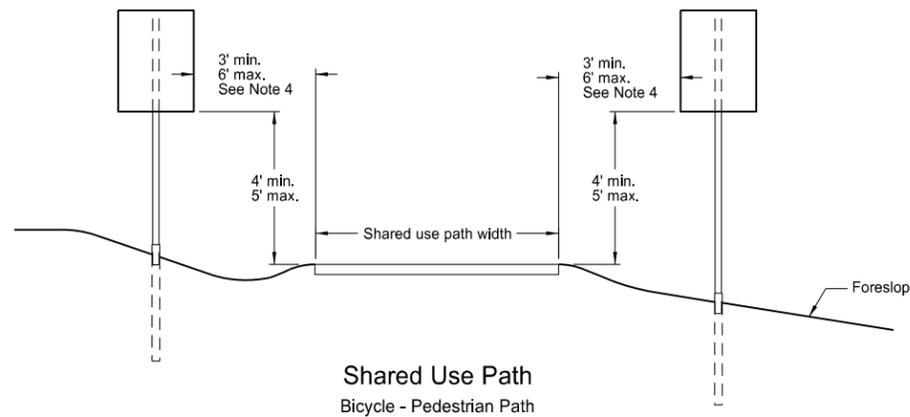


Typical Section (with curb)
Residential or Business District



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

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



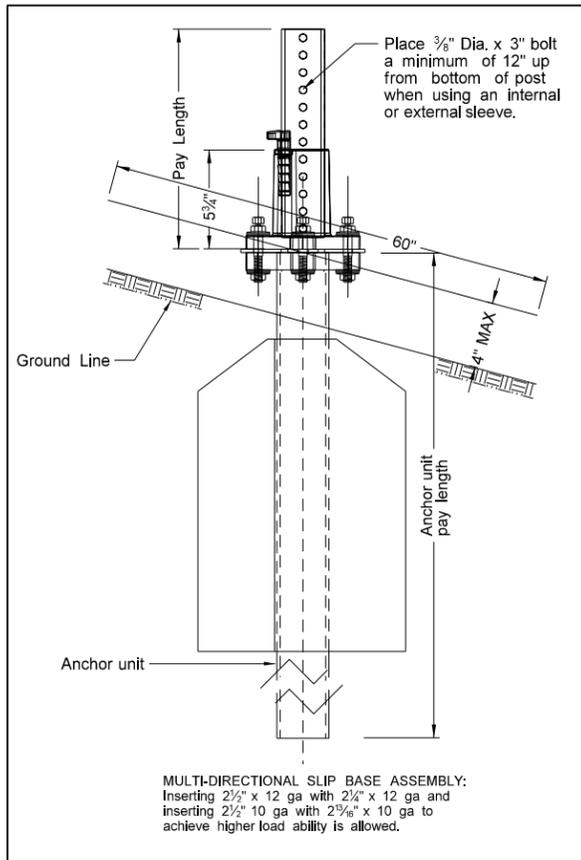
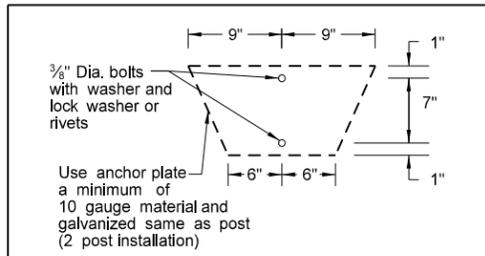
Shared Use Path
Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.
8-30-18	Updated notes to active voice.

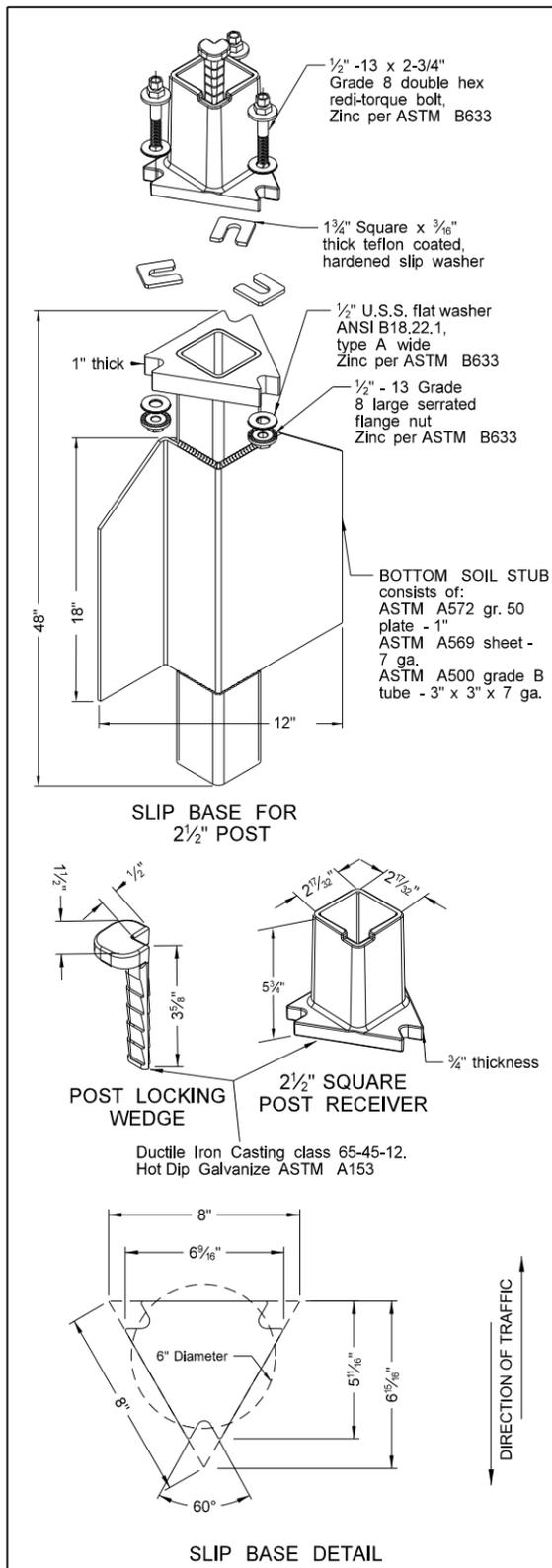
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 Registration Number
 PE-2930,
 on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

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.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 1/8	10	Yes		7

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



Mounting Details Perforated Tube

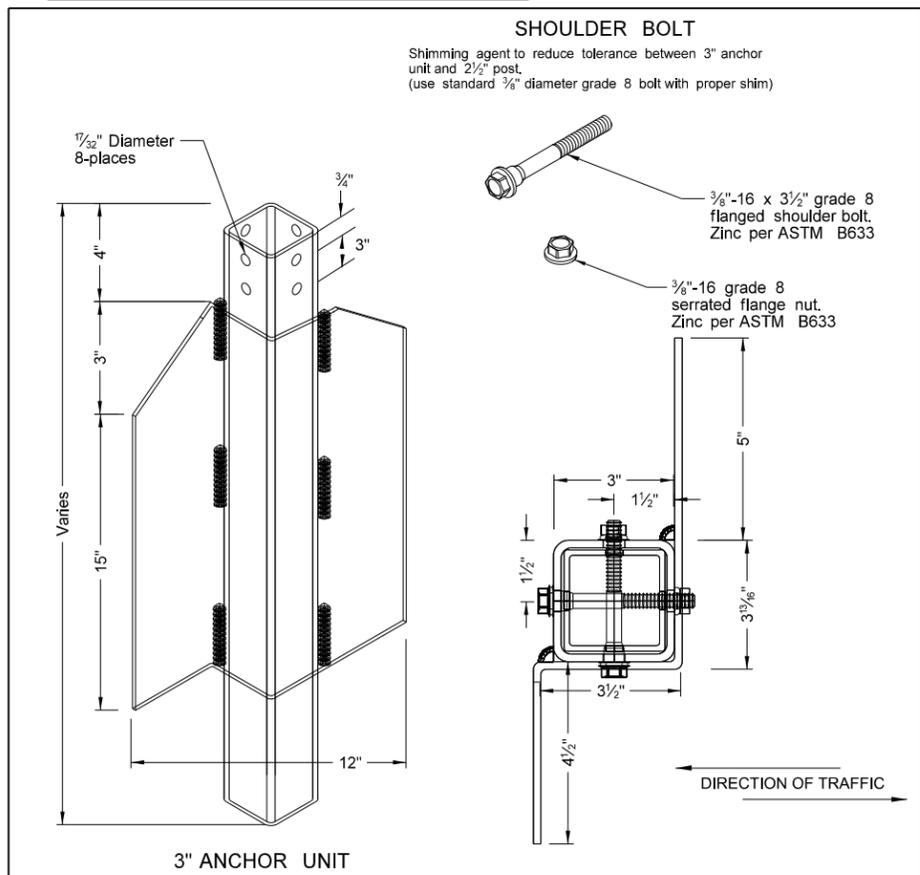
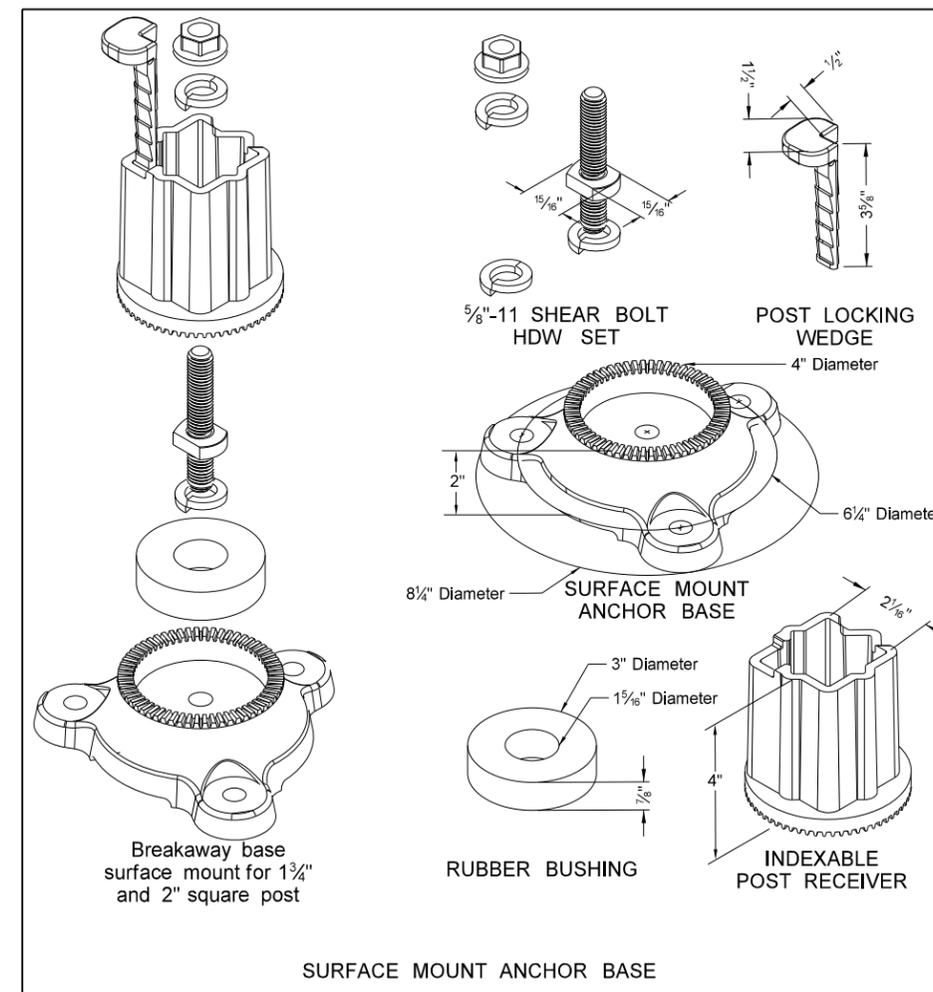


Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. Area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

The 2 3/8 size 10 gauge is shown as 2.19" size on the plans;
 The 2 1/2 size is shown as 2.51" size on the plans.

NOTE:

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



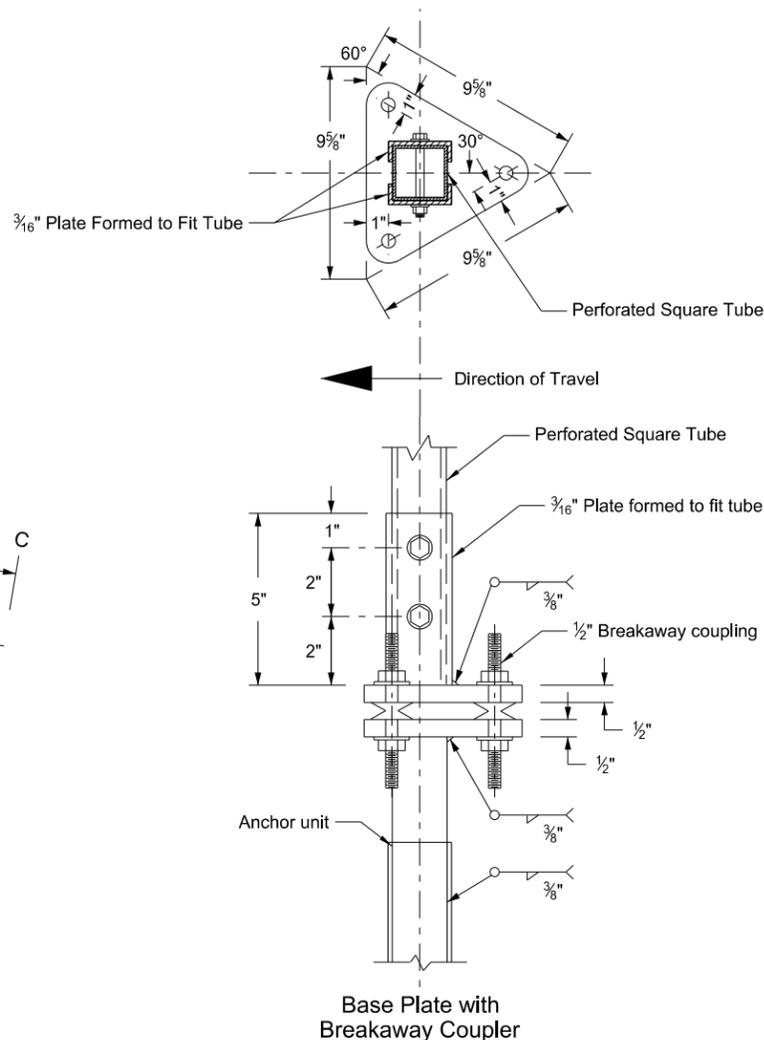
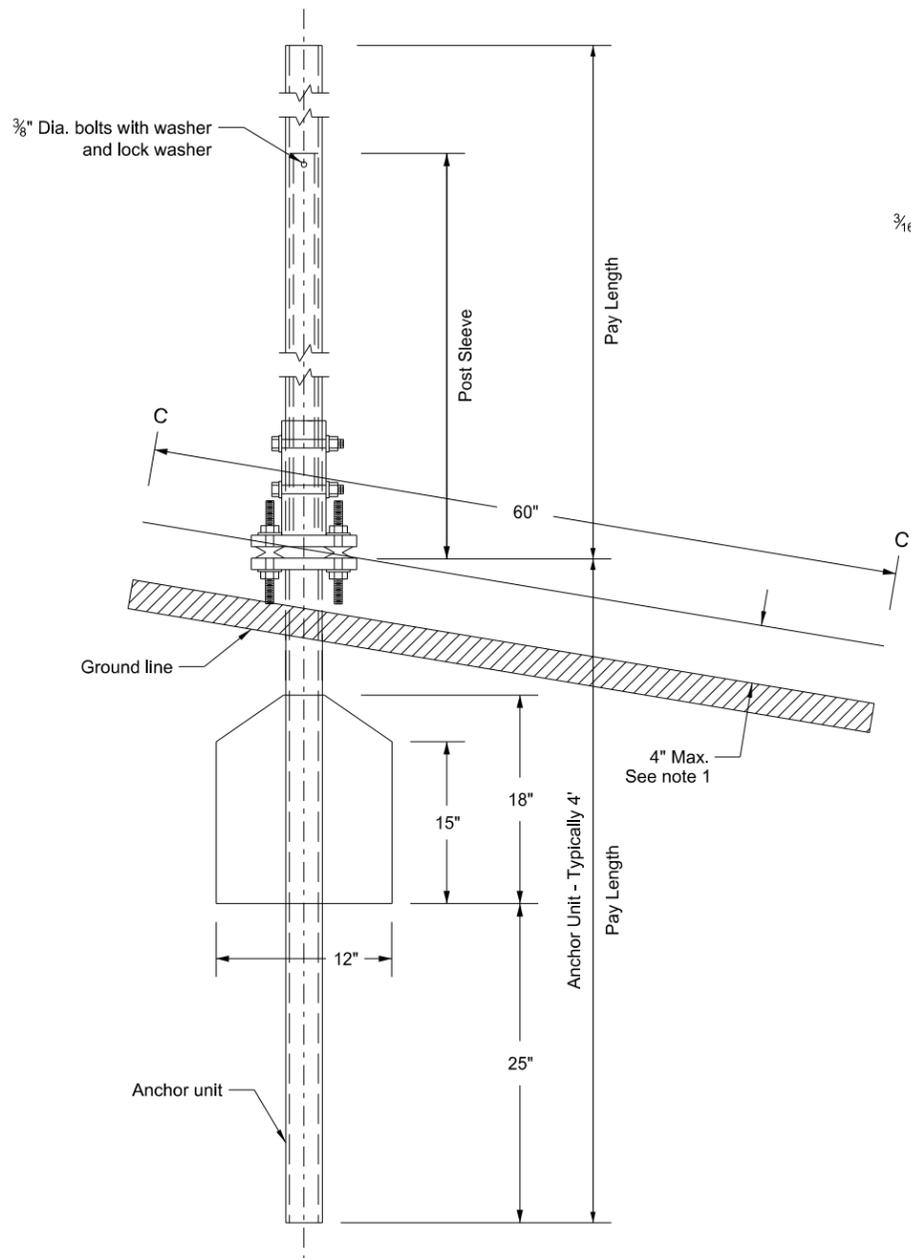
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.

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Breakaway Coupler System for Perforated Tubes

Notes:

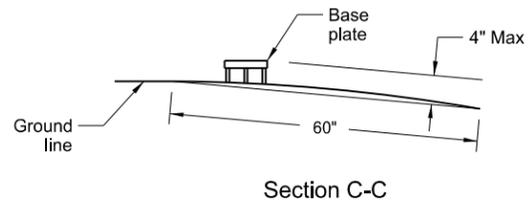
- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
- Use anchor unit of the same size and specification as the post.
- Provide a minimum 8' distance between the first and fourth post on four post signs.
- Use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



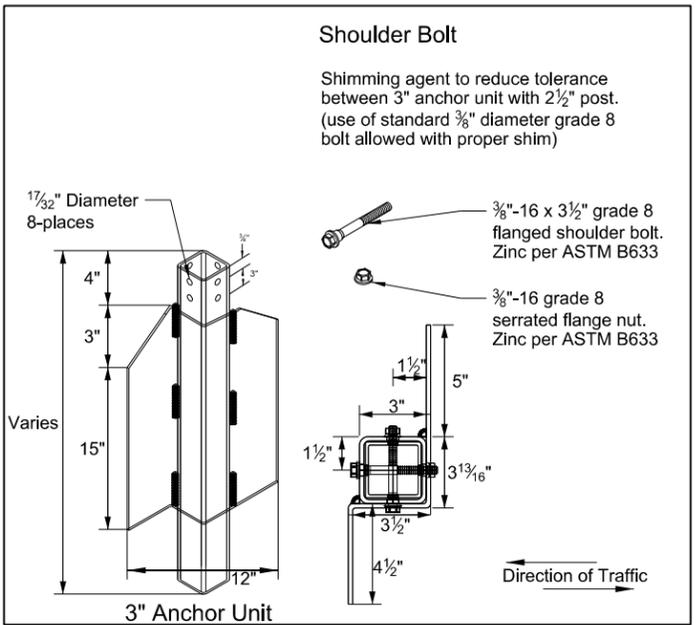
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2	12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

(B) - 2 1/2" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

(C) - 3" anchor unit



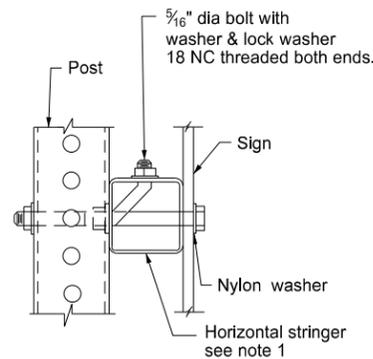
Max protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.



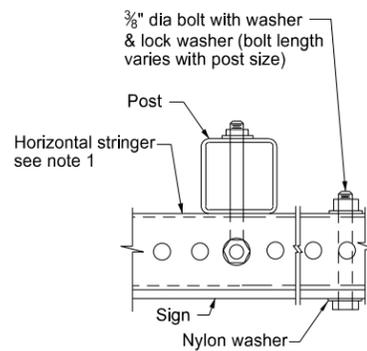
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.

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Mounting Details Perforated Tube

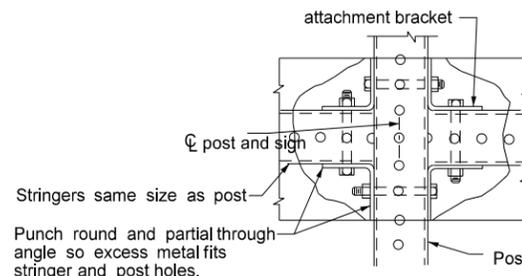


Side View



Top View

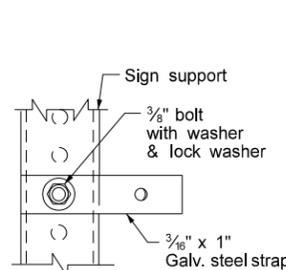
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



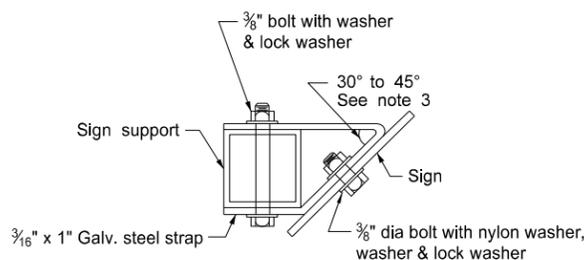
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

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

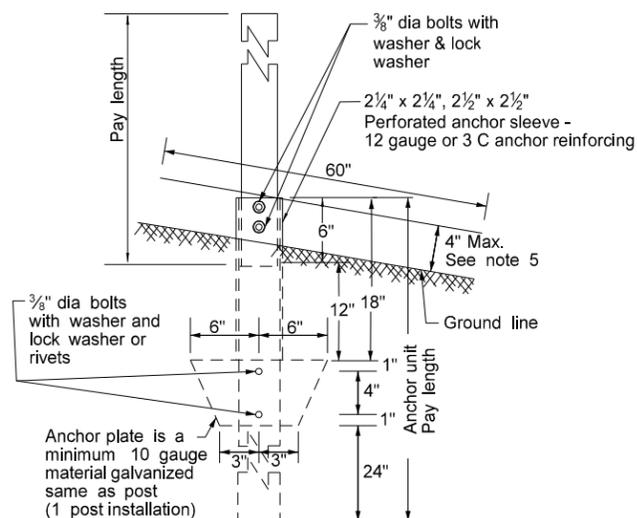


Side View



Top View

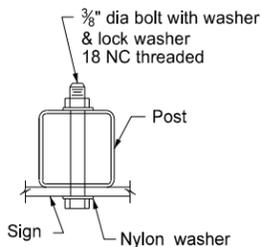
STRAP DETAIL



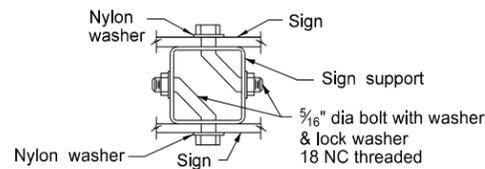
ANCHOR UNIT AND POST ASSEMBLY

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

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

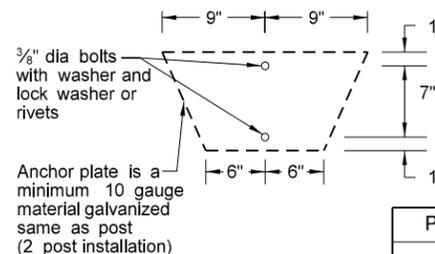


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



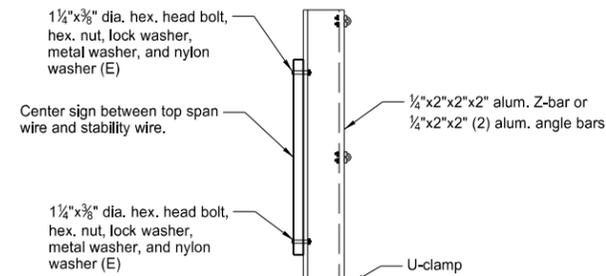
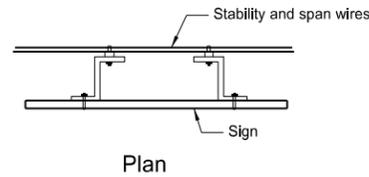
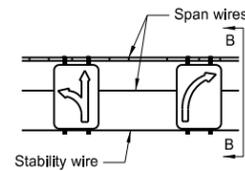
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. area In. ²	Section Modulus In. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10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

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

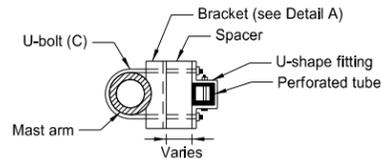
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14 8-30-18	Revised Note 3, Updated notes to active voice.

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Registration Number
PE- 2930 ,
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of Transportation

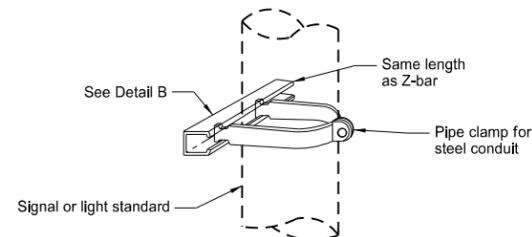
LIGHT STANDARD, SIGNAL STANDARD,
AND SPAN WIRE MOUNTED SIGN
ASSEMBLY DETAIL



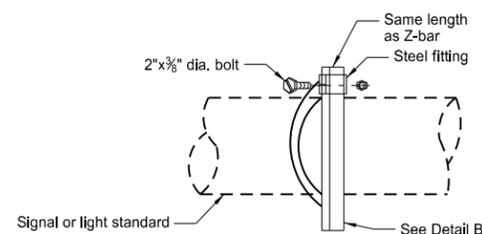
Section B-B
Span Wire Mounted Sign Detail



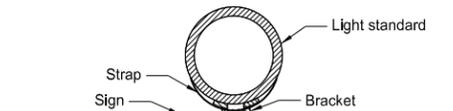
Section A-A



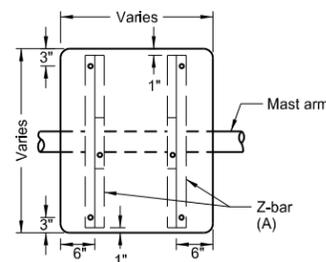
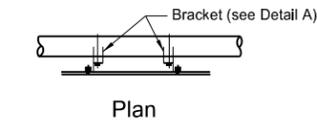
Vertical Mounting
(Use 2 clamps per sign)



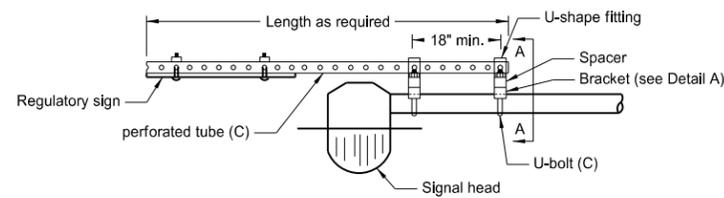
Horizontal Mounting
alternate clamp mounting
(Use 2 clamps per sign)



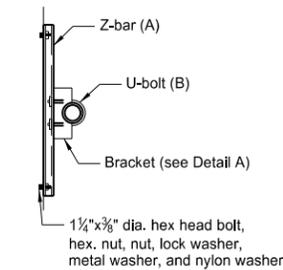
Light Standard Mounted Sign Bracket Detail
Max. 24" x 30" signs (D)



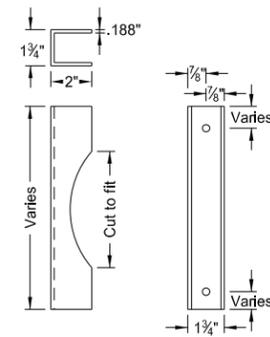
Elevation
Mast Arm Mounted Regulatory Sign Detail



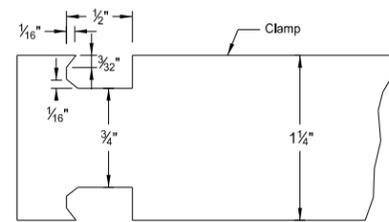
Sign Mounted Beyond End of Mast Arm Detail



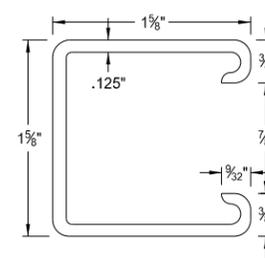
Side View



Detail A



Clamp Detail



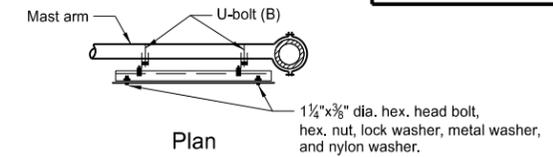
Detail B
Steel Channel

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

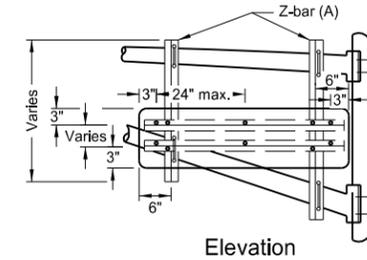
Clamp	
Post Size dia. in.	D in.
3 1/2	3
4	3 3/16
5	5 1/8
6	7 7/16
8	13 1/16
10	20 3/4
12	29 5/8

Notes:

- (A) Use 1 1/4" x 3/16" thick 1.08 lb/ft aluminum alloy Z-bar. In place of Z-bar, use two 1 3/4" x 1 3/4" x 3/16" angles bolted together or a 1 1/4" x 2" x .188" channel.
 - (B) 3/8" U-bolt, hex. nut, lock washer, and bracket (U-bolt length depends on dia. of mast arm.)
 - (C) 3/8" U-bolt, hex. nut, lock washer, and bracket (U-bolt length depends on dia. of mast arm.)
- Maximum perforated tube lengths for mounting signs beyond end of mast arm:
 2" x 2" maximum support length 9.9'
 2 1/2" x 2 1/2" maximum support length 12.6'
 2 1/2" x 2 1/2" maximum support length 15.7'
- (D) Use galv. steel strap and sign attachment bracket similar to the one shown in the detail. Include all costs of bracket assembly in the price bid for flat sheet signs. Punch as shown on Standard Drawings. Provide a 7" minimum vertical clearance to the bottom of signs mounted on light standards.
 - (E) Use metal washers and nylon washers with a minimum outside dia. of 1 5/16" ± 1/16" and 10 gauge thickness on sign face.

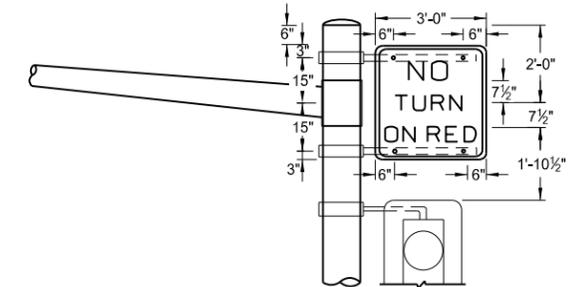


Plan



Elevation

Mast Arm Mounted Street Name Sign Detail

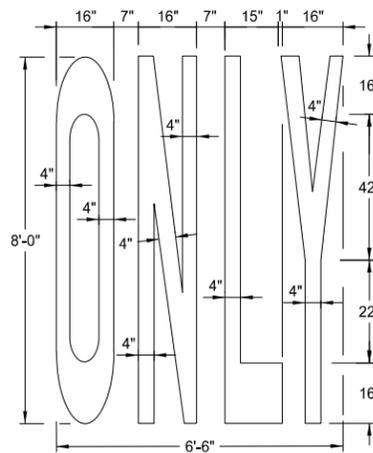


Signal Standard Mounted Sign Attachment Detail

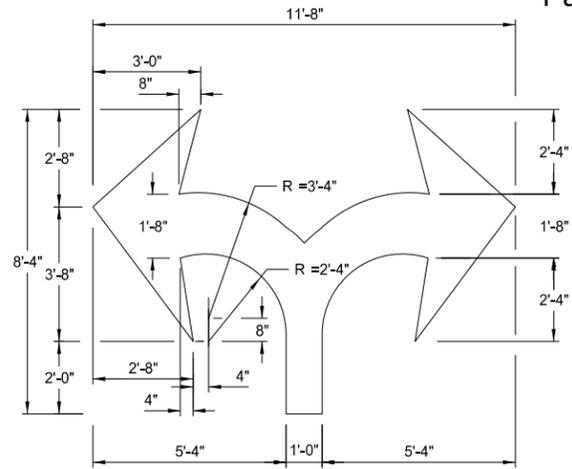
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.

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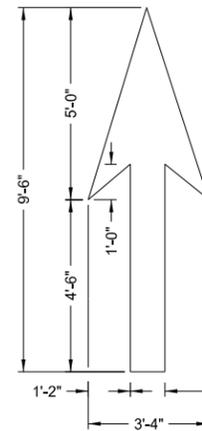
Pavement Marking Message Details



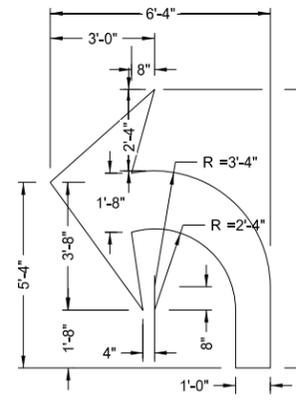
22 S. F.



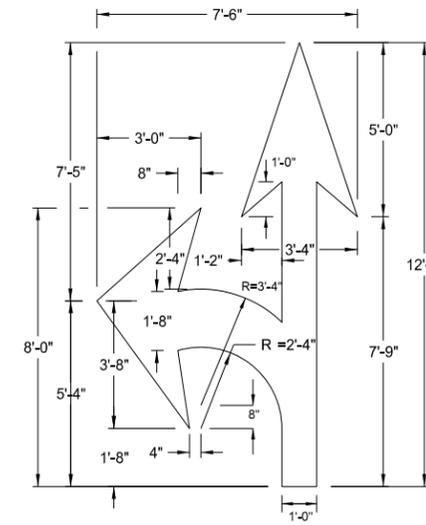
29 S. F.



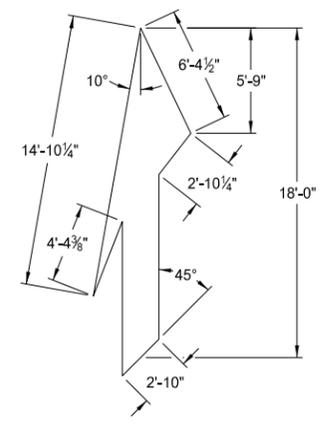
12 S. F.



16 S. F.

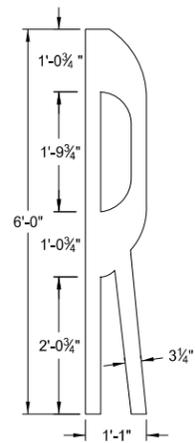


27 S. F.

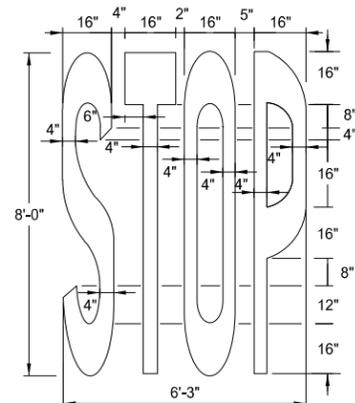


41 S. F.

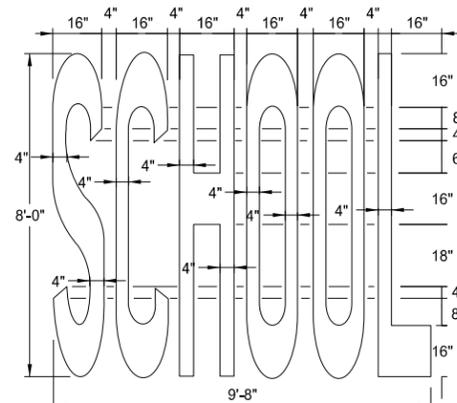
Note: Rotate merge arrow 20° from edge of roadway.



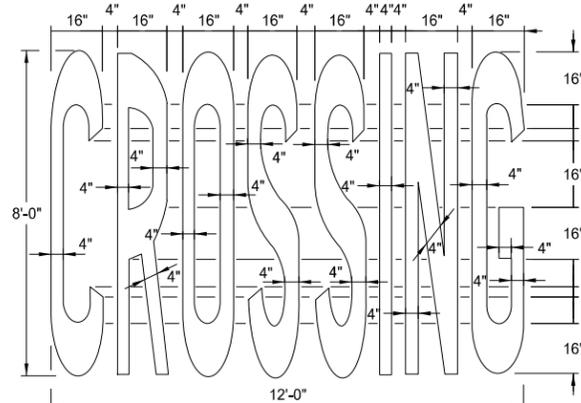
4 S. F.



22 S. F.



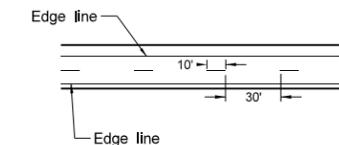
34.5 S. F.



46 S. F.

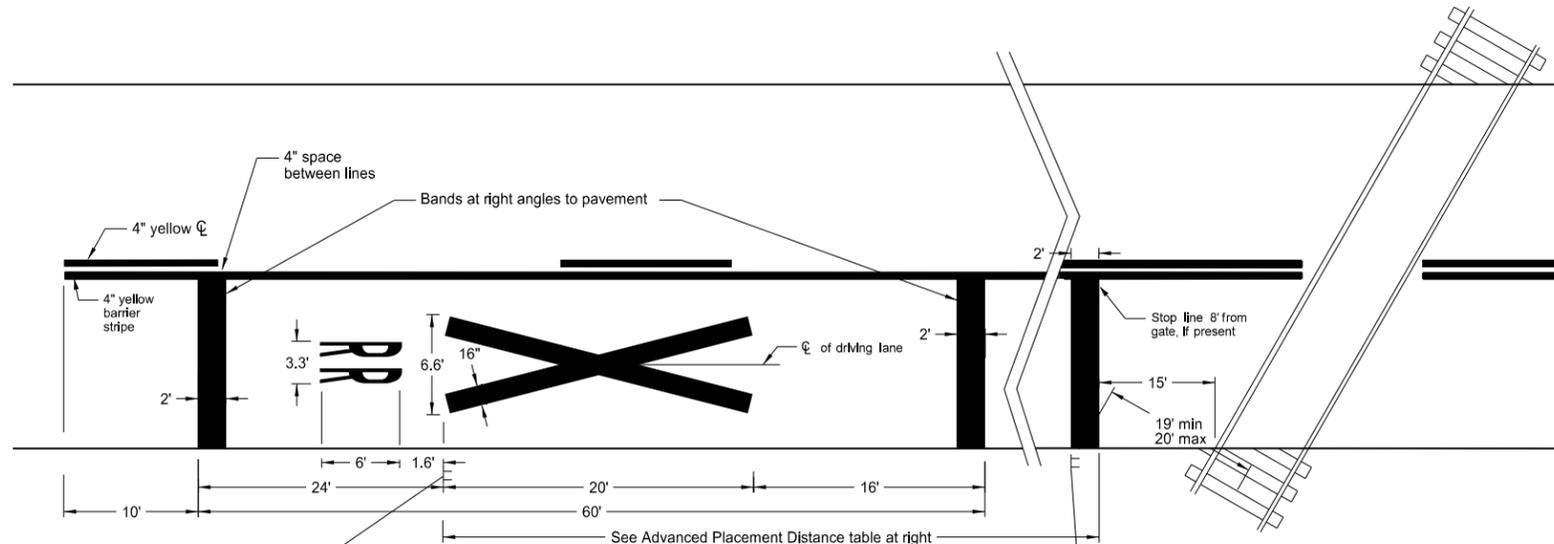
Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table

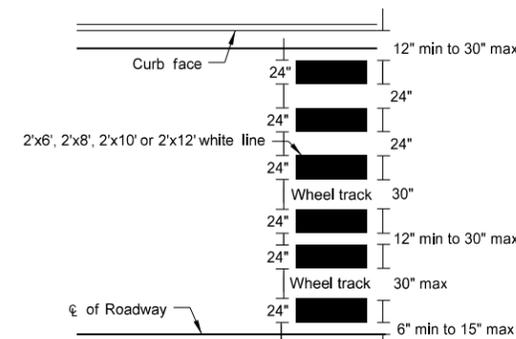


Centerline Pavement Marking Skip Spacing Detail

Advance Placement Distance for Railroad Warning Signs	
Posted or 85th Percentile Speed	Advance Distance
20 mph	min. 100 ft
25 mph	min. 100 ft
30 mph	min. 100 ft
35 mph	min. 100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft



Railroad cross & 2 R's 60.5 S.F.
3 Bands (12' lane) 72 S.F.



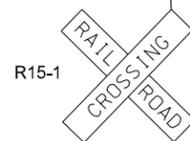
Continental Crosswalk Detail



See Standard Drawing D-754-81

Notes:
Mark a three lane roadway with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, extend the transverse bands across all approach lanes, and use individual R X R symbols in each approach lane.

See plans for correct message. Use white pavement markings unless noted otherwise.

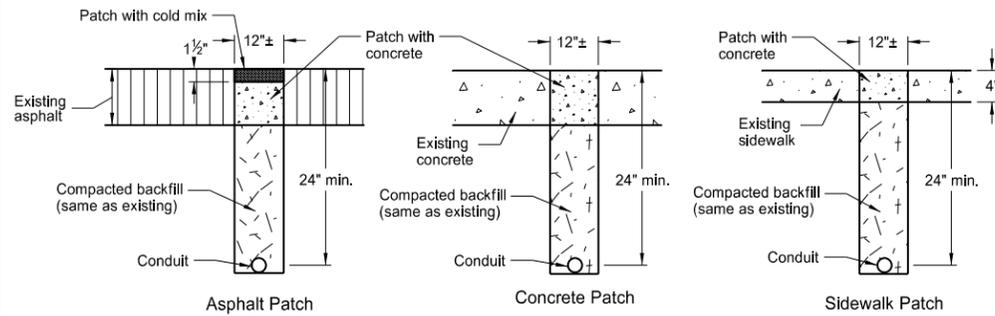


R15-1

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-6-11	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.

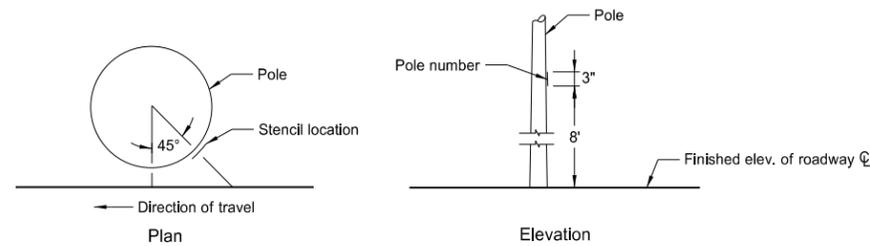
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Registration Number
PE-2930,
on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

LIGHTING AND SIGNAL DETAILS



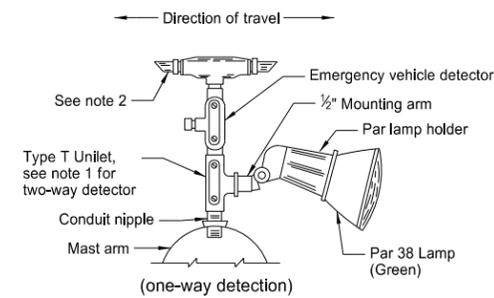
Surface Patch Details

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

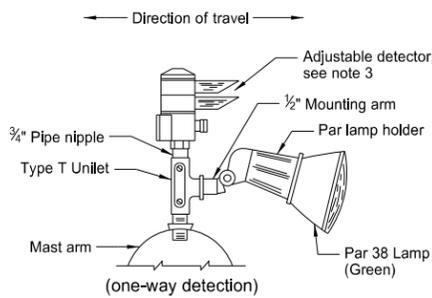


Light Standard Numbering

Note: On the roadway side of each light standard, stencil 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.

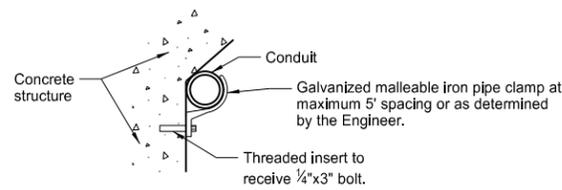


Emergency Vehicle Detector Detail

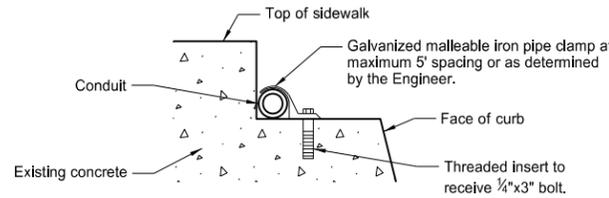


Alternate Emergency Vehicle Detector Detail (adjustable)

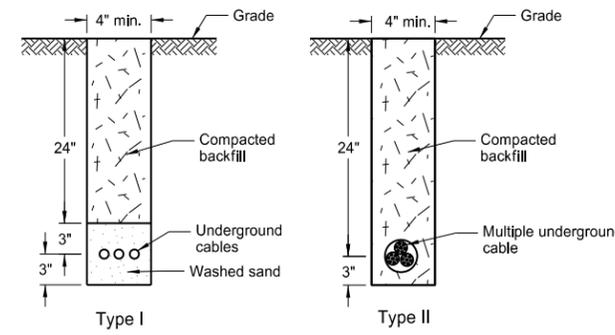
Notes:
 1. Use Type X Unilet with two Par lamp holders and lamps for Two-way Detectors. (one in each direction).
 2. Plug unused end of One-way Detector with metal pipe plug.
 3. Rotate detector lens to face direction of travel on Two-way Detectors.



Bridge Mounted Conduit Hanger

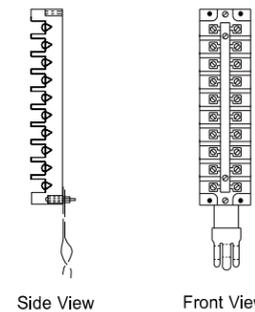


Curb Mounted Conduit

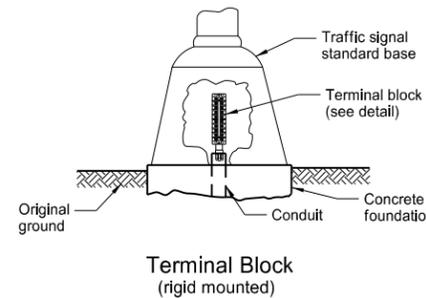


Cable Trench

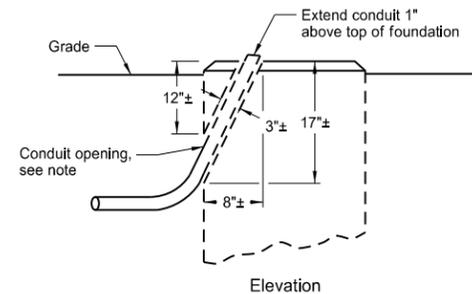
Note: Sod entire area disturbed by trenching, unless directed otherwise by the Engineer.



Terminal Block Detail

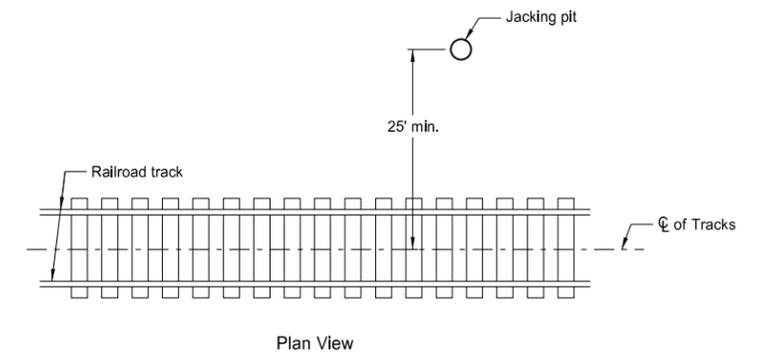


Terminal Block (rigid mounted)

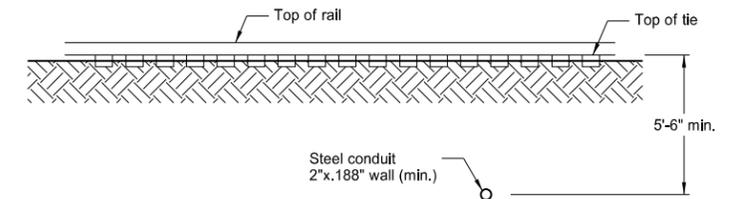


Revise Concrete Foundation

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.



Plan View

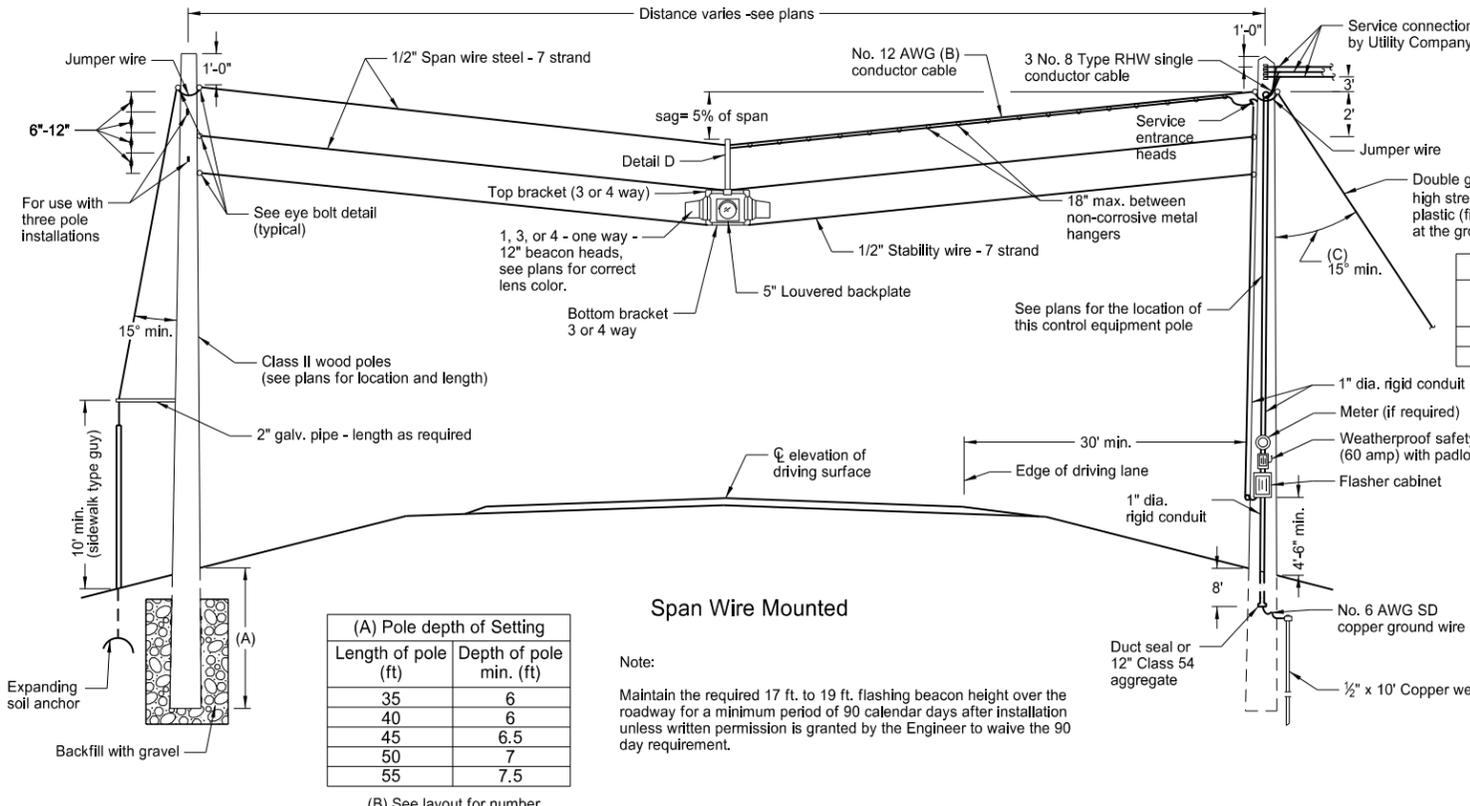
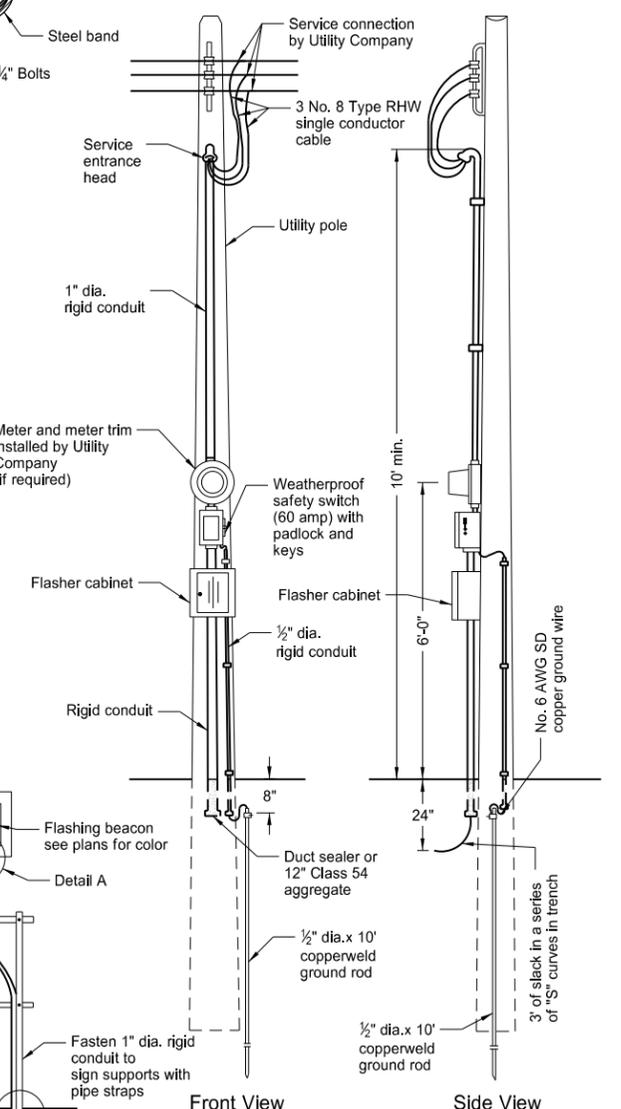
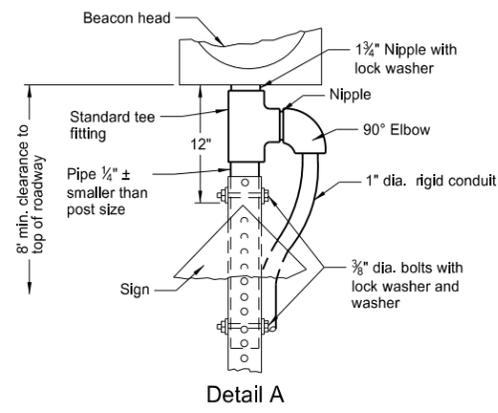
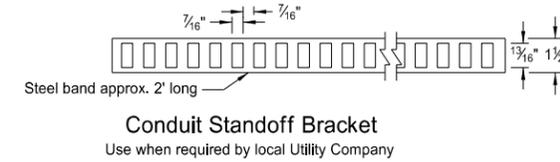
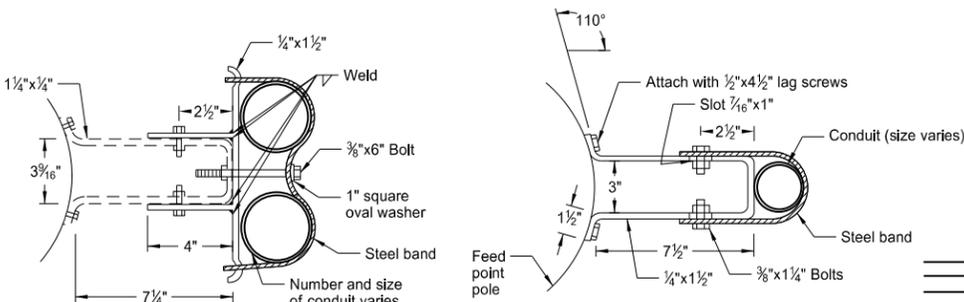
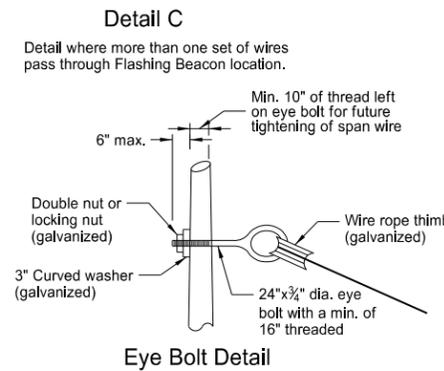
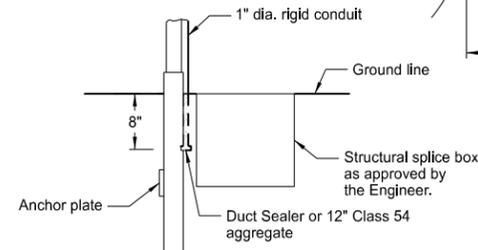
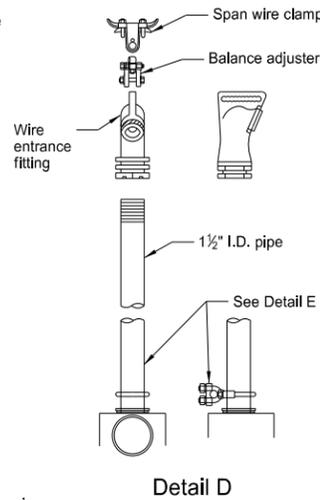
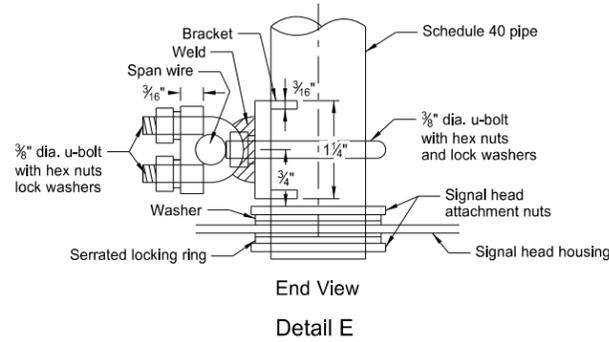
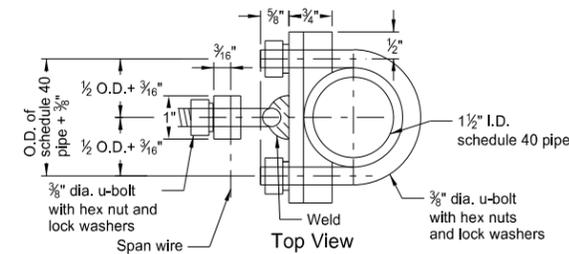


Elevation View
 Conduit Placement under Railroad Tracks

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.

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 of Transportation

FLASHING BEACON



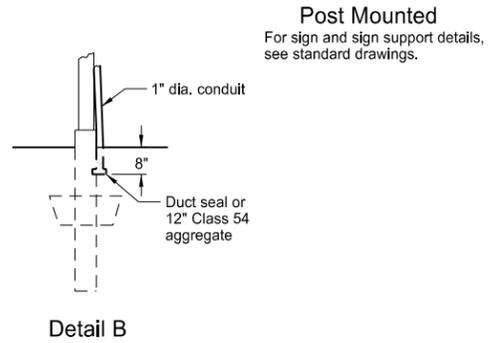
(C) Guy wire

Angle	Anchor Resistance min.
30°	12,000 lbs.
15°	24,500 lbs.

(A) Pole depth of Setting

Length of pole (ft)	Depth of pole min. (ft)
35	6
40	6
45	6.5
50	7
55	7.5

Note:
Maintain the required 17 ft. to 19 ft. flashing beacon height over the roadway for a minimum period of 90 calendar days after installation unless written permission is granted by the Engineer to waive the 90 day requirement.



Post Mounted
For sign and sign support details, see standard drawings.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

2-28-14

REVISIONS	
DATE	CHANGE
7-8-14	Span wire size and sag.
10-17-17	Updated to active voice.

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