

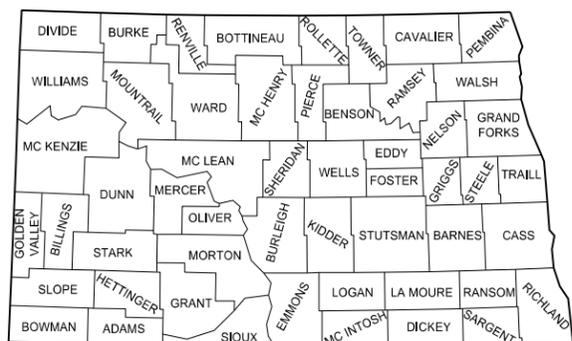
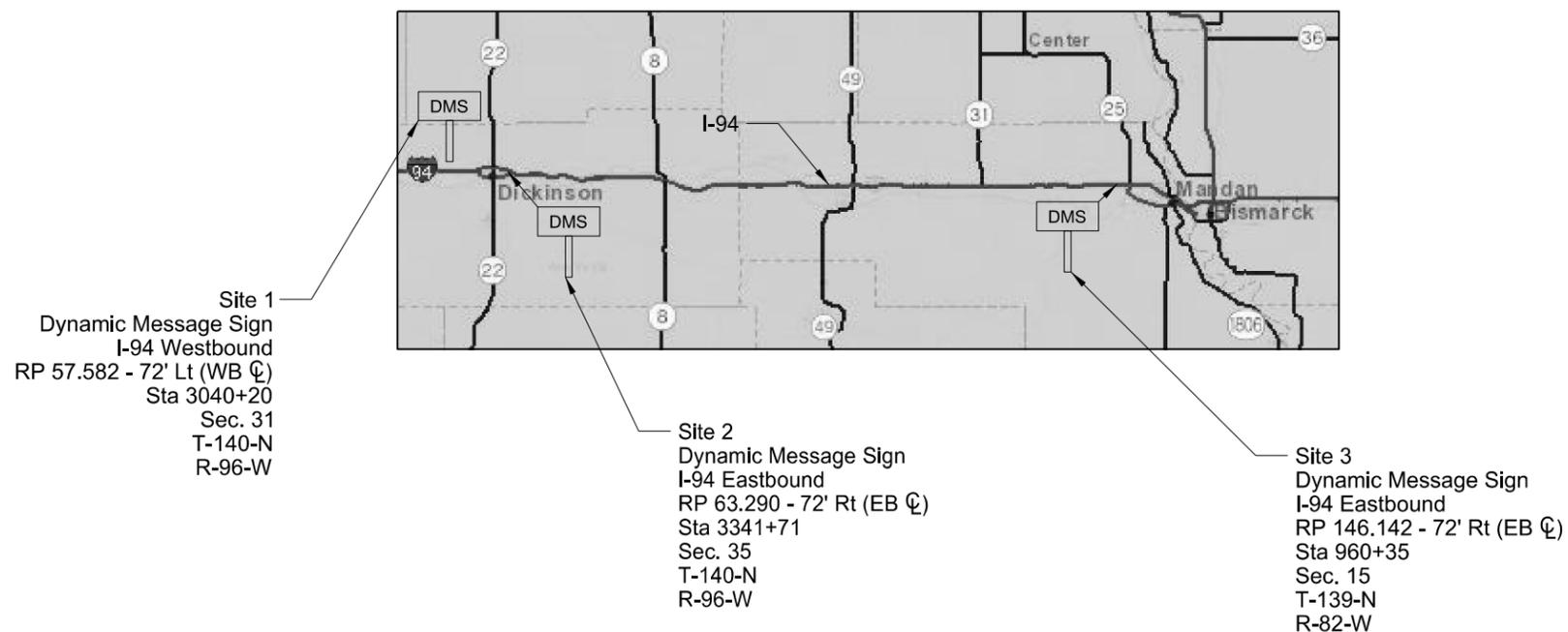
JOB # 32
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	ITS-9-999(311)	20378	1	1

ITS-9-999(311)
 FHWA Limited Involvement
 Stark and Morton County
 Dynamic Message Sign Installation

GOVERNING SPECIFICATIONS:
 Standard Specifications adopted by the North Dakota
 Department of Transportation October 2008; Standard Drawings
 currently in effect; and other Contract Provisions submitted herein.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
ITS-9-999(311)	N/A	N/A



STATE COUNTY MAP

DESIGNERS
 David Bruins /s/

APPROVED DATE 12/05/2013
 Roger Weigel /s/
 OFFICE OF PROJECT DEVELOPMENT
 ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.
 APPROVED DATE 12/5/2013
 David L. Bruins /s/
 NDDOT MAINTENANCE DIVISION

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100	1	Traffic Control Devices List
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160	1-3	ITS Site Layouts
160	4	Feed Point and Trench Details

LIST OF STANDARD DRAWINGS

<u>Standard No.</u>	<u>Description</u>
D-20-1, 2, 3	NDDOT Abbreviations
D-20-10	NDDOT Utility Company Abbreviations
D-20-20, 21	Linestyles
D-20-30, 31, 32	Symbols
D-704-7	Breakaway Systems for Construction Zone Signs Perforated Tube
D-704-8	Breakaway Systems for Construction Zone Signs
D-704-9, 10, 11	Construction Sign Details
D-704-13	Barricade Details and Channelizing Devices
D-704-24	Construction Sign and Barricade Location Details
D-704-50	Portable Sign Support Assembly
D-770-1	Concrete Foundations

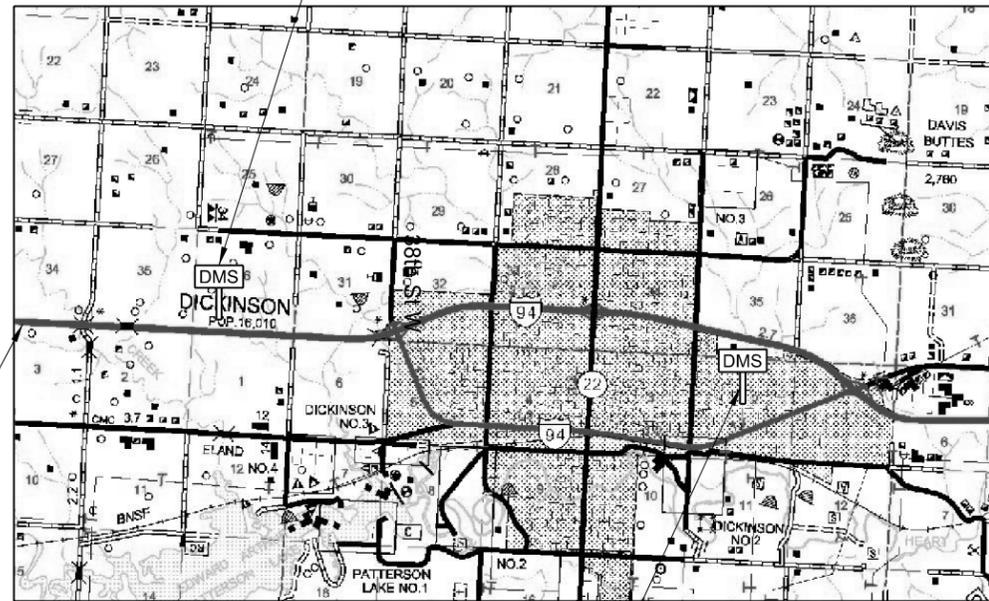
LIST OF SPECIAL PROVISIONS

<u>No.</u>	<u>Description</u>
SP 1304(08)	Full Matrix, Full Color, LED Based, Dynamic Message Sign with Walk-in Access
SP 1305(08)	Surveillance Camera – DMS Mounted

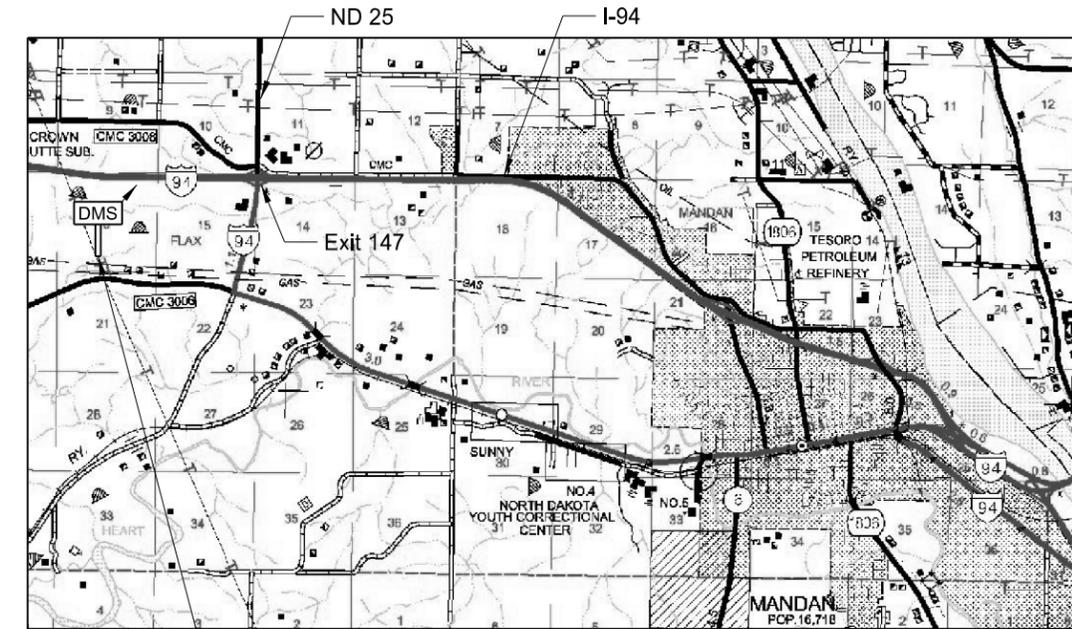
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	ITS-9-999(311)	4	1



Site 1
I-94 Westbound
RP 57.582 - 72' Lt (WB ☉)
Sta 3040+20



Site 2
I-94 Eastbound
RP 63.290 - 72' Rt (EB ☉)
Sta 3341+71



Site 3
I-94 Eastbound
RP 146.142 - 72' Rt (EB ☉)
Sta 960+35

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Scope of Work
Dynamic Message Signs

NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	ITS-9-999(311)	6	1

- 100-P01 COORDINATION OF PROJECTS: It is the contractor's responsibility to coordinate work with other construction projects in the project areas.
- 704-P01 TRAFFIC CONTROL: The traffic control for this project shall consist of a temporary shoulder closure at each site. Traffic control devices shall comply with the following Standard Drawing:

D-704-24 Layout Type HH

Quantities for traffic control have been included for work at three locations. The required traffic control signs and devices are included in the "Traffic Control Devices List" and will be measured and paid for at the Contract Unit Price for each device.
- 754-P01 EMBANKMENT, SEEDING, & MULCHING: The entire area which is disturbed by the trenching shall be mulched and seeded with Type B Class II seeding. The costs associated with topsoil, seeding, and mulching shall not be bid separately but shall be included in the price bid for "Dynamic Message Sign."
- 754-P02 DYNAMIC MESSAGE SIGN STRUCTURE: Sign shall be post mounted on a butterfly support with concrete foundation. The requirements for supporting structure shall conform to the requirements of Section 894.08 A and B.

The supporting structure shall have the vertical and horizontal dimensions to the roadway as shown in the plans.

The actual sign support post length shall be determined by the contractor's field measurements. All necessary calculations and drawings used to manufacture the supporting structure and concrete foundation shall be furnished with the shop drawings.

Soil cohesion of 300 psf shall be used in the design of the concrete foundation.

All costs to design and manufacture the structure, submit calculations and drawings, and install the Dynamic Message Sign shall be included in the price bid for "Dynamic Message Sign."
- 754-P03 DYNAMIC MESSAGE SIGN STRUCTURE: The DMS structures will not require a walkway or handrail.
- 754-P04 DYNAMIC MESSAGE SIGN COMMUNICATIONS: Wireless Code Division Multiple Access (CDMA) communication will be the communications link between the DMS Sign Controller and the state network. The contractor shall provide a CDMA 1X EV-DO LTE Digital Cellular modem that shall conform to NTCIP 2202 Internet Transport Profile and NTCIP 2104 Ethernet Profile over a 10/100 Ethernet connection. The 10/100 Ethernet communications port with RJ45 connector shall support data rates of 10 mb and 100 mb. The CDMA 1X EV-DO LTE Digital Cellular modem shall provide an "Always On" connection with a wireless cell phone carrier and be capable of being remotely managed through the CDMA Network.

- The contractor shall contact the NDDOT Telecomm/Radio Shop at 1-701-328-6973 for assistance with CDMA modem and connection to state network. All costs to furnish and install the CDMA 1X EV-DO LTE Digital Cellular modem shall be included in the bid price for "Dynamic Message Sign".
- 754-P05 DYNAMIC MESSAGE SIGN TYPES: The DMS boards are color walk-in boards and shall be included in the bid item "Dynamic Message Sign."
- 772-P01 DYNAMIC MESSAGE SIGN RODENT PROTECTION: The contractor shall follow all provisions for rodent protection as found in Section 772.03 H.6 of the Standard Specifications.
- 772-P02 STEEL CONDUIT - DYNAMIC MESSAGE SIGN: Steel conduit shall be used for all conduit above ground at the dynamic message sign. Include steel conduit in price bid for "Dynamic Message Sign."
- 772-P03 DYNAMIC MESSAGE SIGN CONTROLLER FOUNDATION & WORKING SLABS: The controller cabinet foundations shall be constructed according to standard drawing D-770-1 "Controller Cabinet Foundation Pad Mount Detail."

Two working slabs shall be constructed at each controller cabinet. A working slab shall be constructed on the front and back side of each controller cabinet. The working slabs shall be constructed to dimensions shown on the D-770-1 "Working Area Slab" detail.

All work necessary to construct cabinets, including concrete foundations and working slabs, shall be included in the bid price for "Dynamic Message Sign."
- 772-P04 DYNAMIC MESSAGE SIGN FEED POINTS: The concrete foundations for the feed points shall be constructed according to the "Pipe Stand Mounted Feed Point" detail found in Section 160 Sheet 4.

The Contractor shall provide and bear all costs for the electrical service necessary to operate and maintain the DMS system until the site is accepted by the Engineer.

All work necessary to construct the feed point cabinets, including concrete foundations, shall be included in the bid price for "Dynamic Message Sign."
- 772-P05 SURVEILLANCE CAMERA SYSTEM: One camera will be installed on each of the dynamic message signs. All costs for camera installation in accordance with the plans and SP 1305(08) shall be included in the price bid for "Surveillance Camera System."
- 772-P06 ETHERNET SWITCH: An Ethernet Switch as specified in the SP 1305(08) shall be installed in each DMS cabinet allowing the DMS and PTZ camera to share the data connection.

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NOTES

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772-P07 MULTIPLE UNDERGROUND CABLE: The plans call for using Multiple Underground Cable in various locations. In lieu of the Multiple Underground Cable, the contractor may furnish and install rigid conduit and single RHW conductors of the same size as shown in the plans for the Multiple Underground Cable.

The conduit size shall be as specified in the National Electric Code. All materials, equipment, and labor required to install conduit and conductors shall be included in the price bid for "Dynamic Message Sign."

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ENVIRONMENTAL COMMITMENTS

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

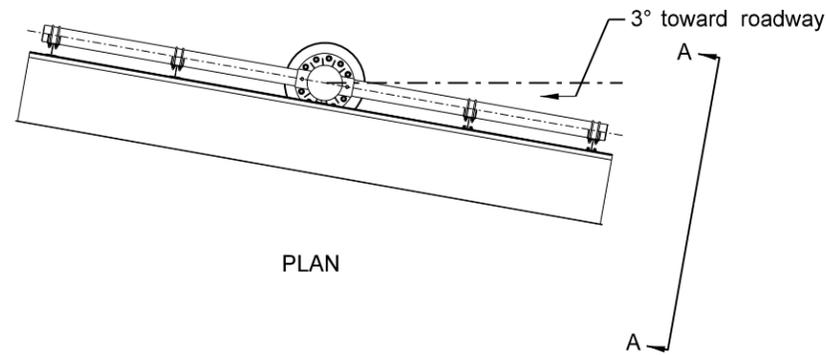
Wetland Number	Cowardin Classification	Wetland Type	Wetland Size (acres)	Wetland Feature	USACE Jurisdictional Wetlands	Impacts to Wetlands	
						Temp.	Perm.
NO WETLANDS PRESENT							
TOTALS:			0.00		0.00	0.00	

ESTIMATE OF QUANTITIES

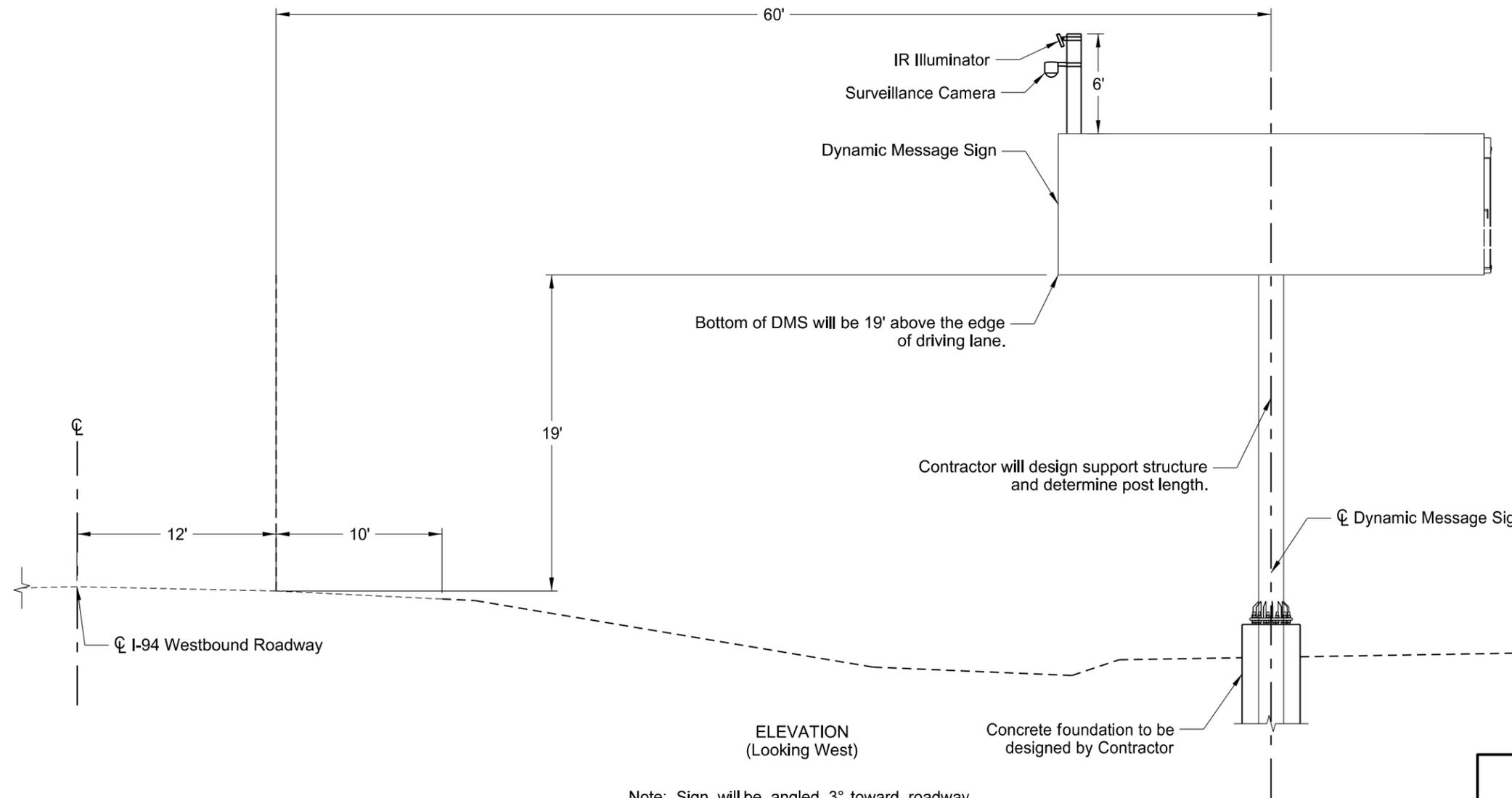
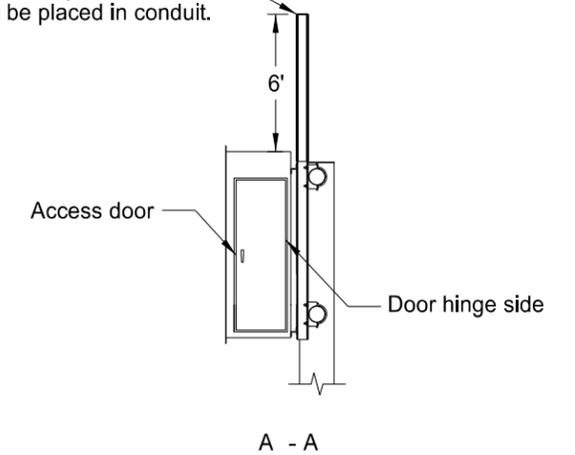
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	ITS-9-999(311)	8	1

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	----	-----	-----
103	0100 CONTRACT BOND	L SUM	1	1
702	0100 MOBILIZATION	L SUM	1	1
704	1000 TRAFFIC CONTROL SIGNS	UNIT	1,418	1,418
704	1060 DELINEATOR DRUMS	EA	45	45
754	8020 DYNAMIC MESSAGE SIGN	EA	3	3
772	9300 SURVEILLANCE CAMERA SYSTEM	EA	3	3

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Extend the bracket 6' above the top of the board.
All necessary cables shall be placed in conduit.



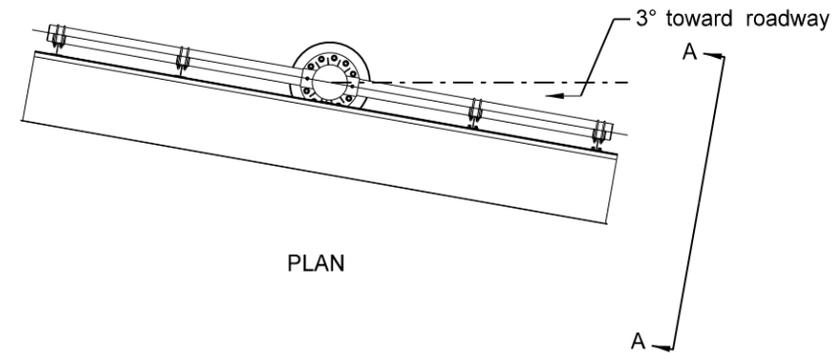
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Proposed Dynamic Message Sign

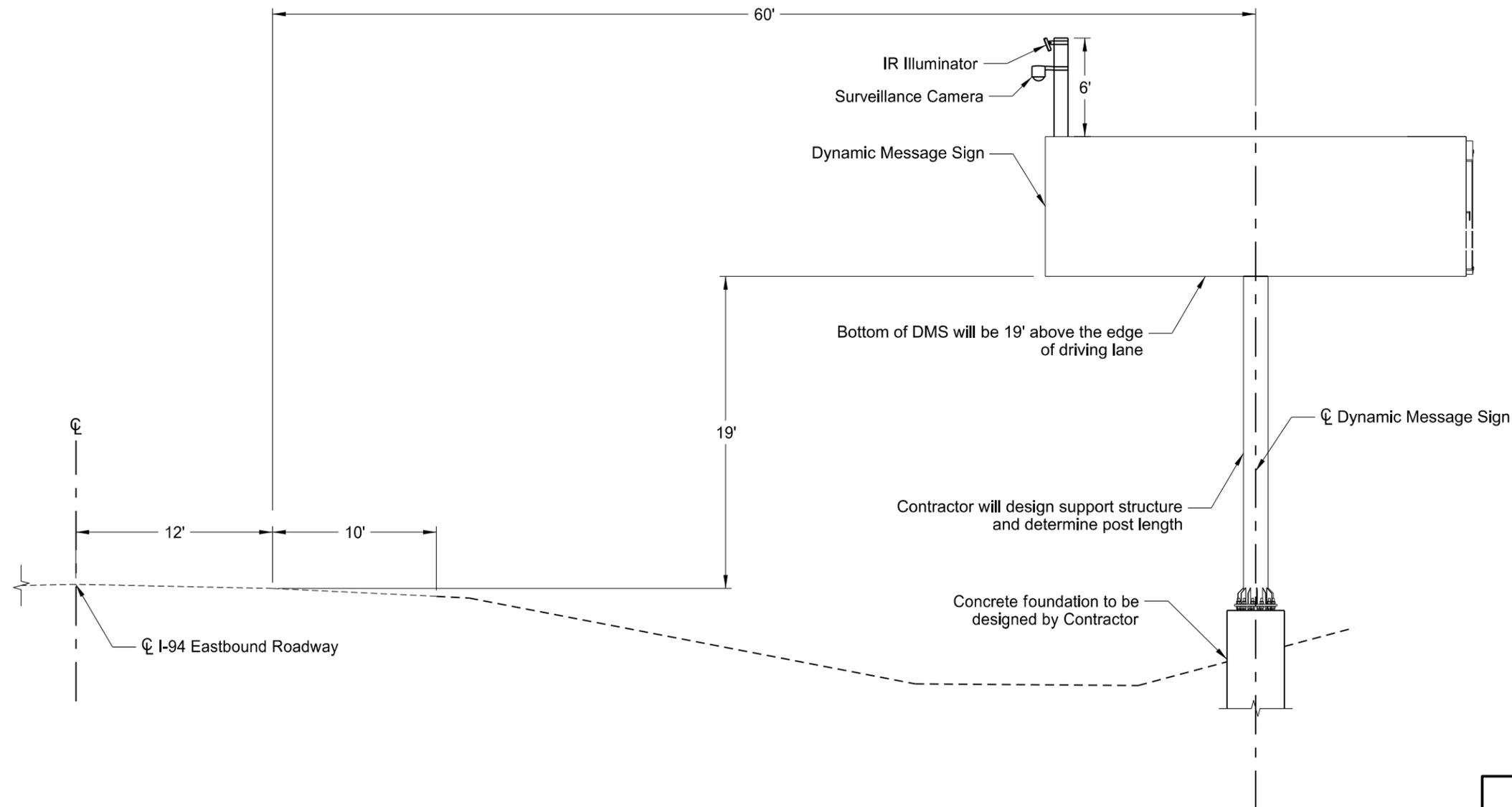
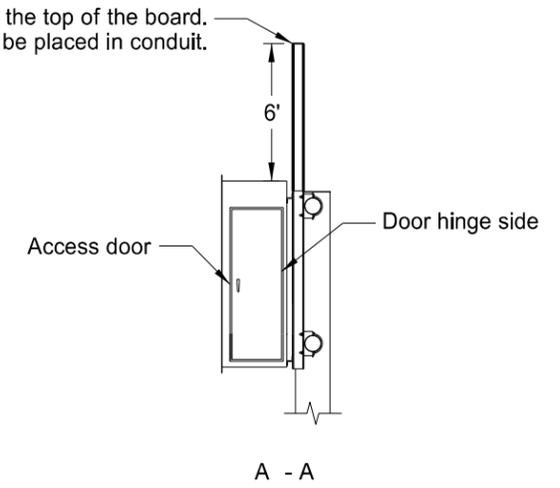
Site 1
RP 57.582

I-94 Westbound Roadway

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	ITS-9-999(311)	110	2



Extend the bracket 6' above the top of the board.
All necessary cables shall be placed in conduit.



ELEVATION
(Looking East)

Note: Sign will be angled 3° towards roadway.

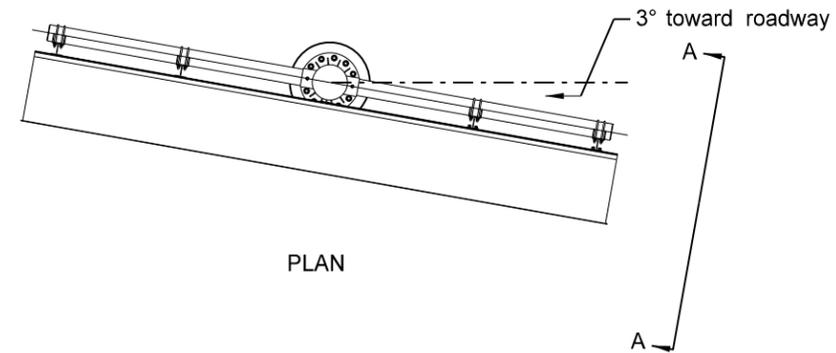
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Proposed Dynamic Message Sign

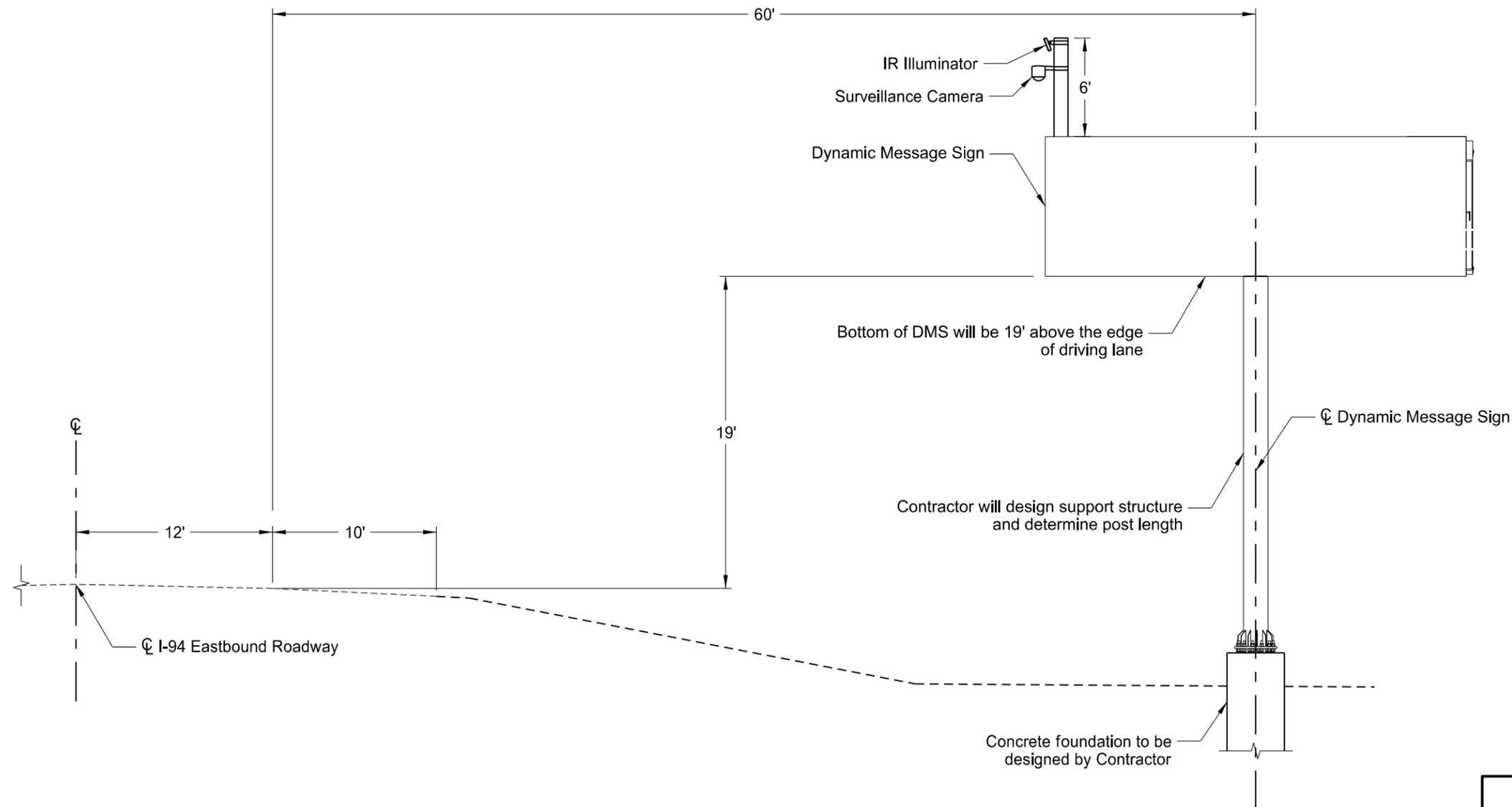
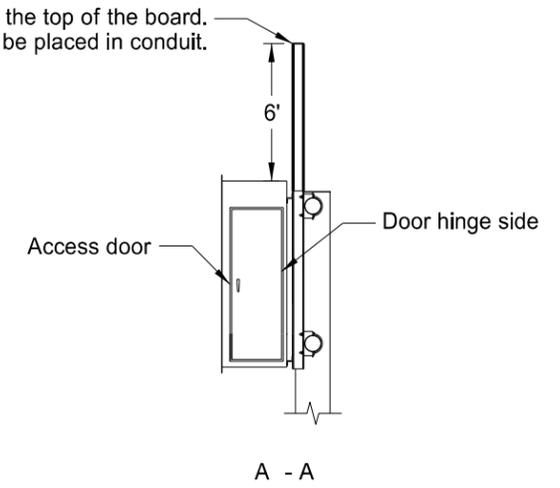
Site 2
RP 63.290

I-94 Eastbound Roadway

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	ITS-9-999(311)	110	3



Extend the bracket 6' above the top of the board.
All necessary cables shall be placed in conduit.



ELEVATION
(Looking East)

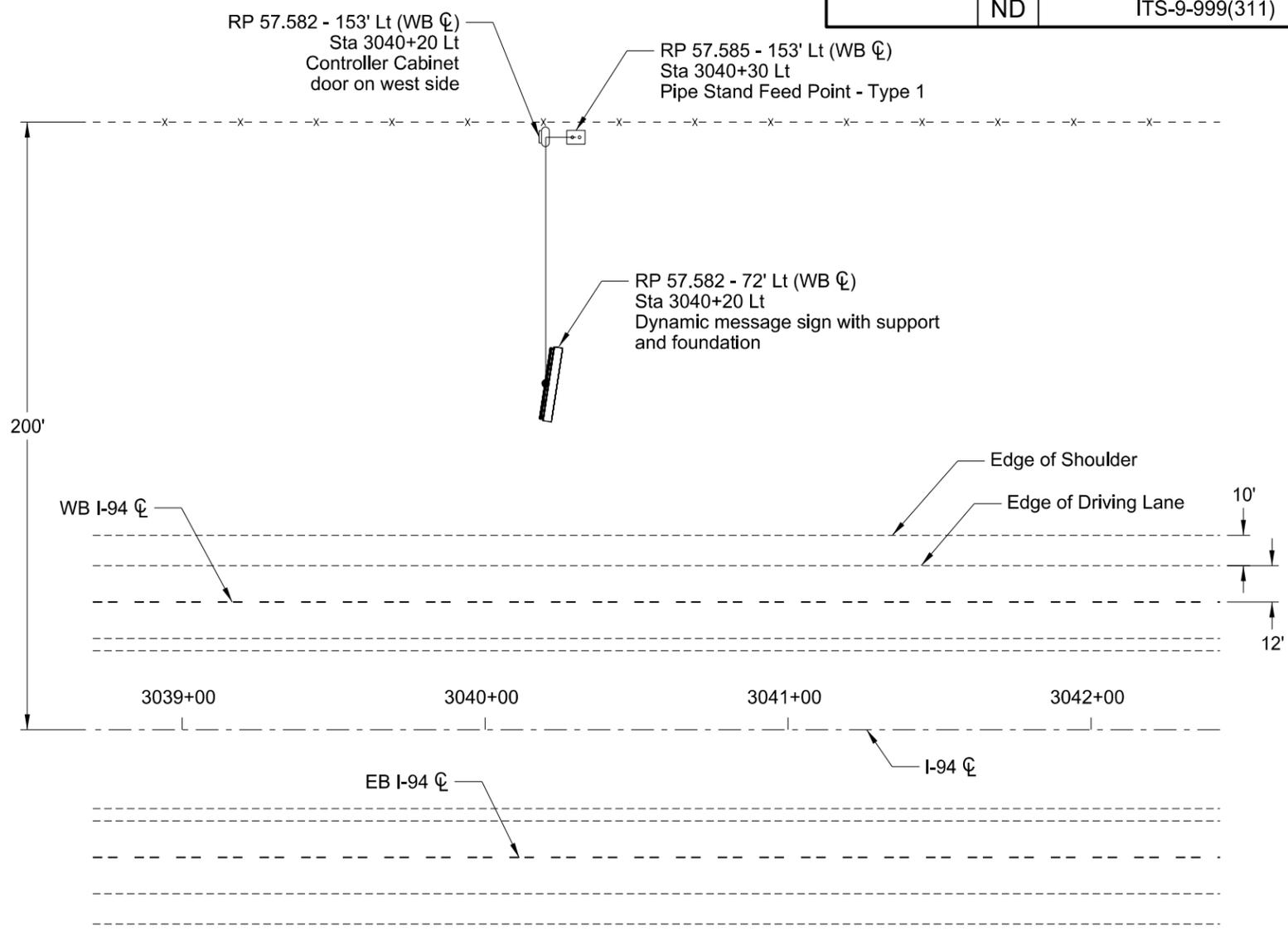
Note: Sign will be angled 3° towards roadway.

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Proposed Dynamic Message Sign

Site 3
RP 146.142

I-94 Eastbound Roadway



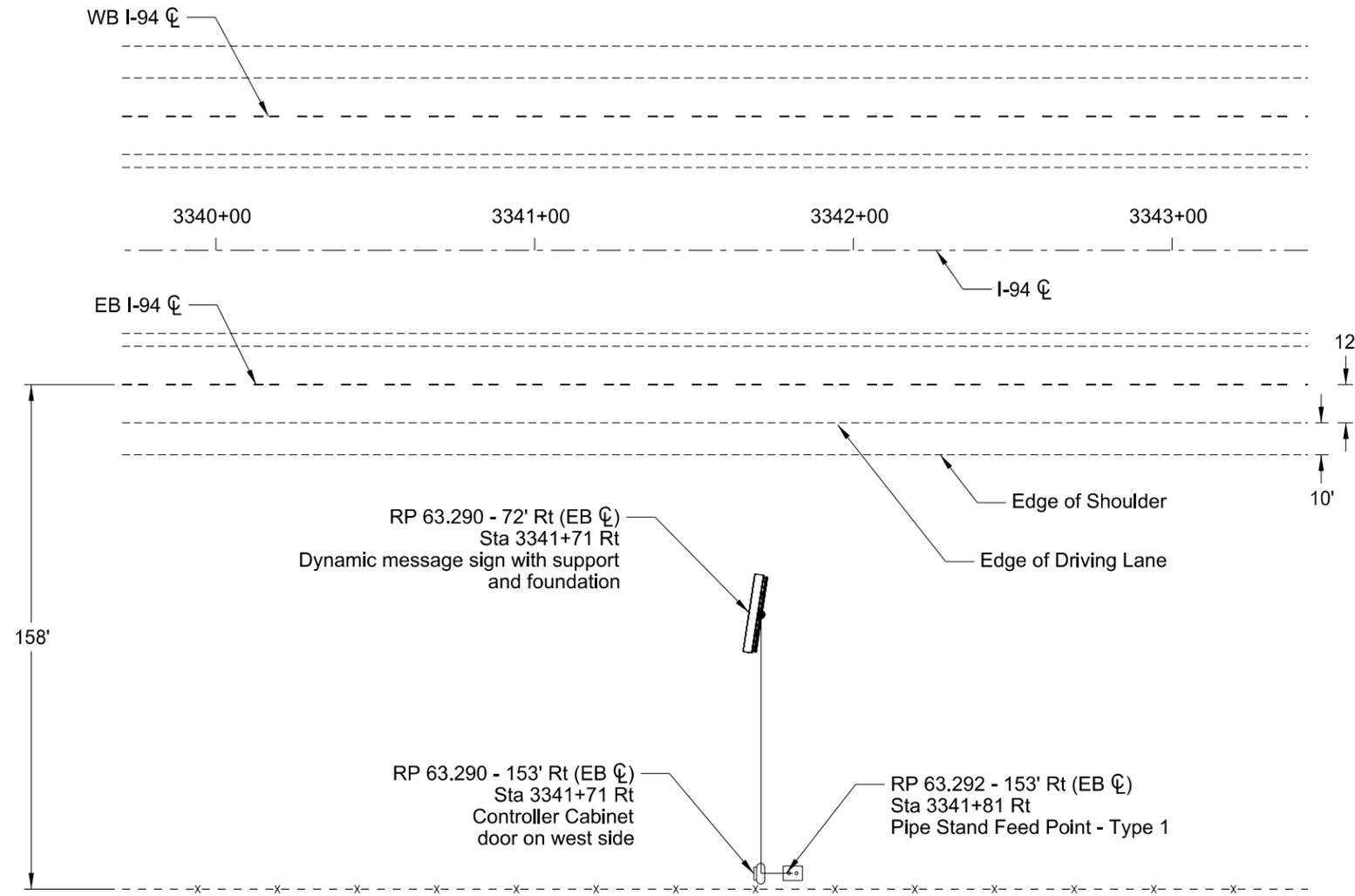
Quantities (A)							Surveillance Camera System
Seeding- Class B- Type II	Mulching	Dynamic Message Sign with support and concrete foundation	Cable Trench-Type II	Multiple Underground Cable 3 No 4 USE, 1 No 6 Style USE	Multiple Underground Cable 3 No 2 USE	Pipe Stand Mounted Feed Point - Type 1 as shown in Section 160 Sheet 4	
ACRE	ACRE	EA	LF	LF	LF	EA	EA
0.01	0.01	1	91	110	20	1	1

(A) These items shall not be bid separately but shall be included in the price bid for the "Dynamic Message Sign"

RP	Circuit 1		
	Cable Trench	Cable Runs	
		LF	LF	TYPE
Sta 3040+20 - 72' Lt to Sta 3040+20 - 153' Lt	81	110	Mult 3 No 4 USE 1 No 6 USE
Sta 3040+20 - 153' Lt Sta 3040+35 - 153' Lt	10	20	Mult 3 No 2 USE

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Proposed ITS Layout
Site 1
RP 57.582
I-94 Westbound Roadway



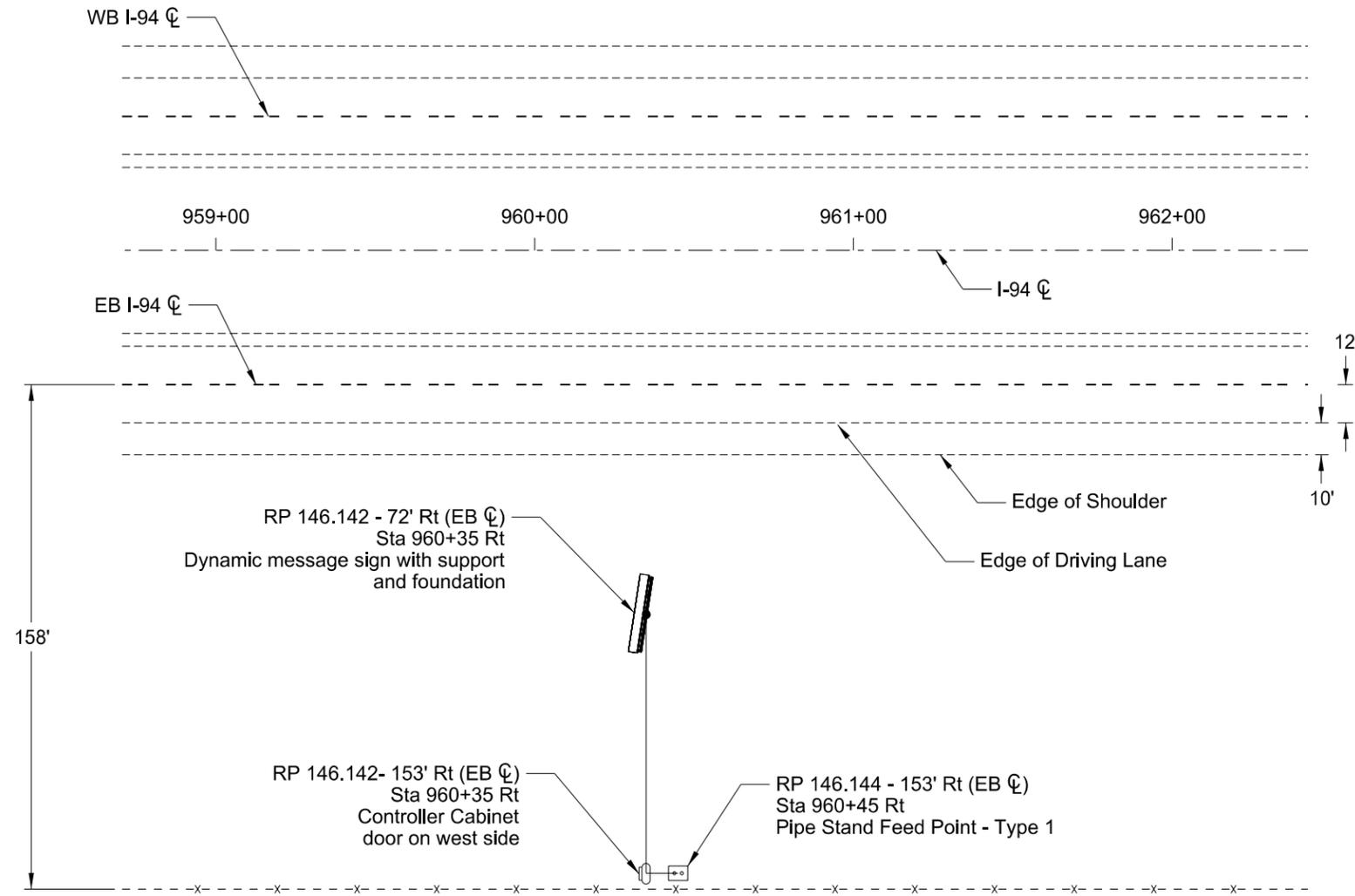
Quantities (A)							Surveillance Camera System
Seeding- Class B- Type II	Mulching	Dynamic Message Sign with support and concrete foundation	Cable Trench-Type II	Multiple Underground Cable 3 No 4 USE, 1 No 6 Style USE	Multiple Underground Cable 3 No 2 USE	Pipe Stand Mounted Feed Point - Type 1 as shown in Section 160 Sheet 4	
ACRE	ACRE	EA	LF	LF	LF	EA	EA
0.01	0.01	1	91	110	20	1	1

(A) These items shall not be bid separately but shall be included in the price bid for the "Dynamic Message Sign"

Circuit 1			
RP	Cable Trench	Cable Runs	
	LF	LF	TYPE
Sta 3341+71 - 72' Rt to Sta 3341+71 - 153' Rt	81	110	Mult 3 No 4 USE 1 No 6 USE
Sta 3341+71 - 153' Rt to Sta 3341+81 - 153' Rt	10	20	Mult 3 No 2 USE

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Proposed ITS Layout
Site 2
RP 63.290
I-94 Eastbound Roadway



Quantities (A)							Surveillance Camera System
Seeding- Class B- Type II	Mulching	Dynamic Message Sign with supports and concrete foundation	Cable Trench-Type II	Multiple Underground Cable 3 No 4 USE, 1 No 6 Style USE	Multiple Underground Cable 3 No 2 USE	Pipe Stand Mounted Feed Point - Type 1 as shown in Section 160 Sheet 4	
ACRE	ACRE	EA	LF	LF	LF	EA	EA
0.01	0.01	1	81	110	20	1	1

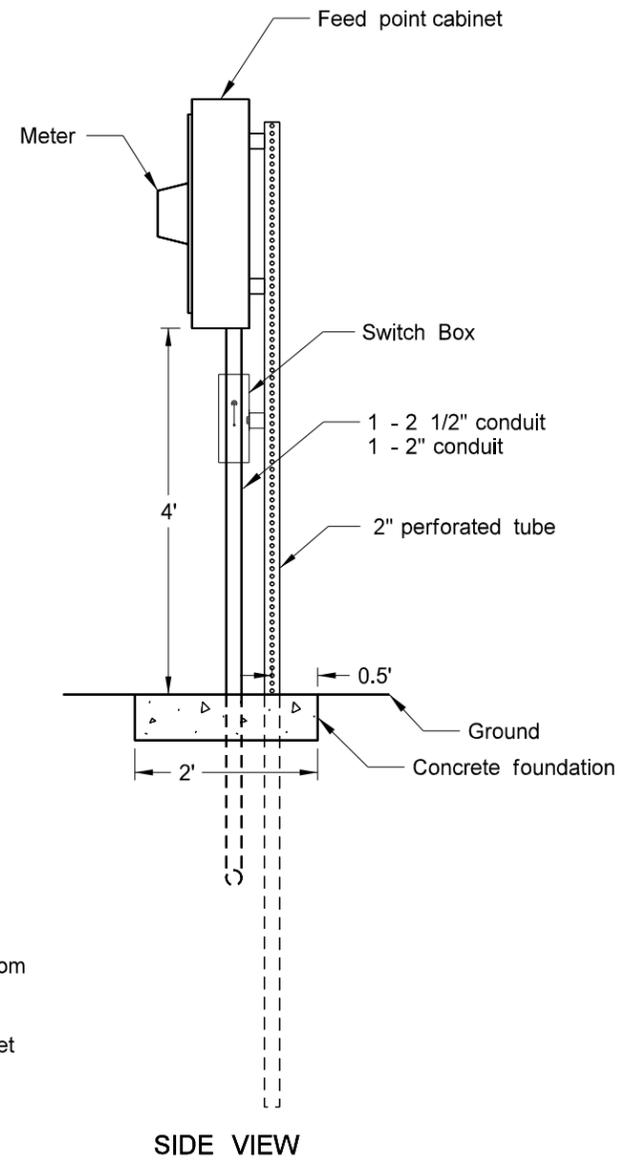
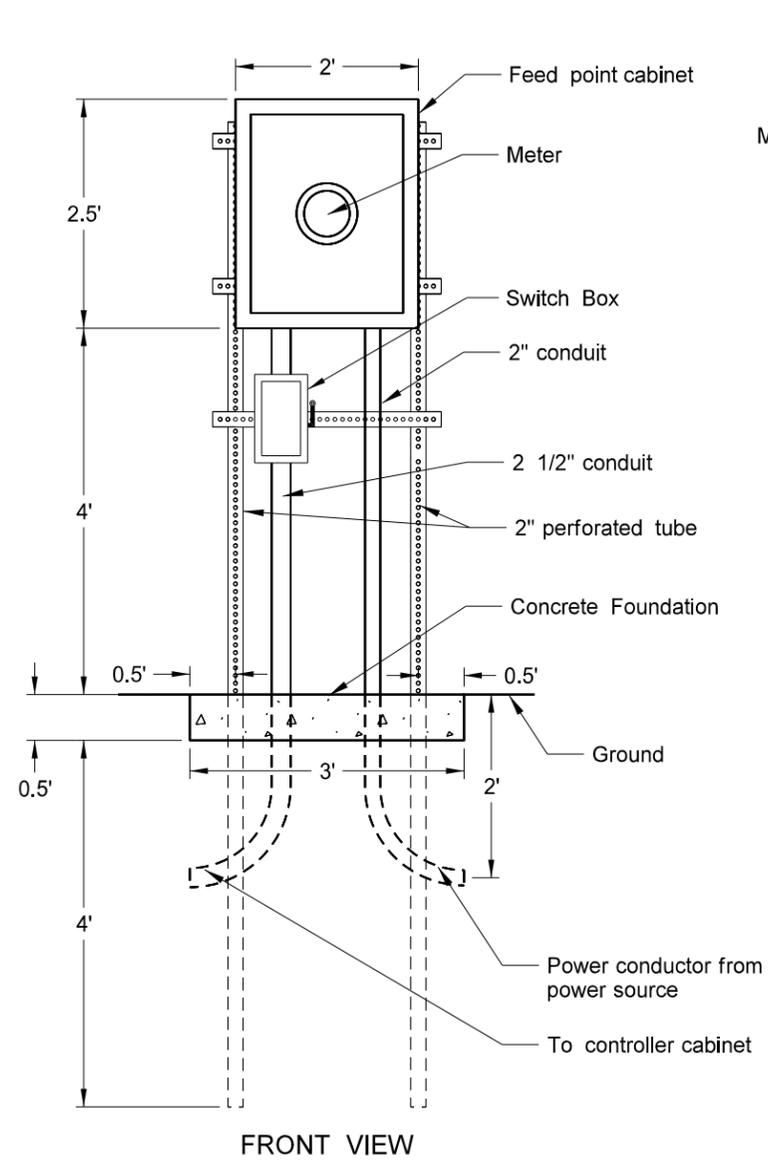
(A) These items shall not be bid separately but shall be included in the price bid for the "Dynamic Message Sign"

Circuit 1			
RP	Cable Trench	Cable Runs	
	LF	LF	TYPE
Sta 960+35 - 72' Rt to Sta 960+35 - 153' Rt	81	110	Mult 3 No 4 USE 1 No 6 USE
Sta 960+35 - 153' Rt to Sta 960+45 - 153' Rt	10	20	Mult 3 No 2 USE

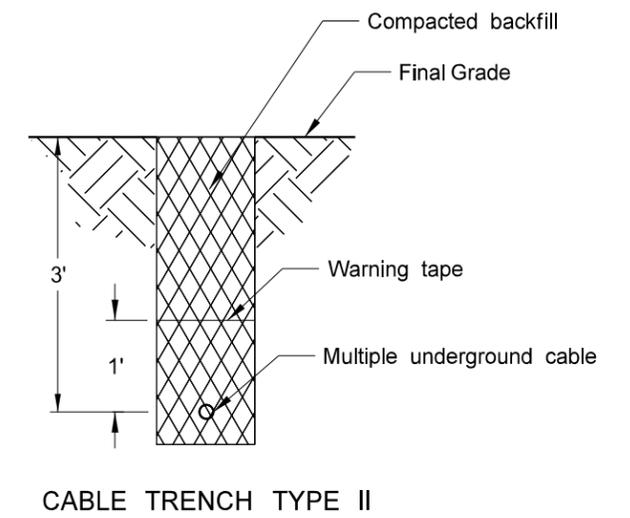
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Proposed ITS Layout
Site 3
RP 146.142
I-94 Eastbound Roadway

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	ITS-9-999(311)	160	4



Pipe Stand Mounted Feed Point- Type I



CABLE TRENCH TYPE II

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Proposed ITS Details
Feed Point & Trench Details

NDDOT ABBREVIATIONS

Abn	abandoned	Calc	calculate	Xsec	cross sections	Eq	equal
Abut	abutment	Cd	candela	Xing	crossing	Eq	equation
Ac	acres	CIP	cast iron pipe	Xrd	Crossroad	Evgr	evergreen
Adj	adjusted	CB	catch basin	Crn	crown	Exc	excavation
Aggr	aggregate	CRS	cationic rapid setting	CF	cubic feet	Exst	existing
Ahd	ahead	C Gd	cattle guard	M3	cubic meter	Exp	expansion
ARV	air release valve	C To C	center to center	M3/s	cubic meters per second	Expy	Expressway
Align	alignment	Cl or C	centerline	CY	cubic yard	E	external of curve
Al	alley	Cm	centimeter	Cy/mi	cubic yards per mile	Extru	extruded
Alt	alternate	Ch	chain	Culv	culvert	FOS	factor of safety
Alum	aluminum	Chnlk	chain-link	C&G	curb & gutter	F	Fahrenheit
ADA	Americans with Disabilities Act	Ch Blk	channel block	CI	curb inlet	FS	far side
A	ampere	Ch Ch	channel change	CR	curb ramp	F	farad
&	and	Chk	check	CS	curve to spiral	Fed	Federal
Appr	approach	Chsld	chiseled	C	cut	FP	feed point
Approx	approximate	Cir	circle	Dd Ld	dead load	Ft	feet/foot
ACP	asbestos cement pipe	Cl	class	Defl	deflection	Fn	fence
Asph	asphalt	Cl	clay	Defm	deformed	Fn P	fence post
AC	asphalt cement	Cl F	clay fill	Deg or D	degree	FO	fiber optic
Assmd	assumed	Cl Hvy	clay heavy	Dint	delineate	FB	field book
@	at	Cl Lm	clay loam	Dintr	delineator	FD	field drive
Atten	attenuation	Clnt	clean-out	Depr	depression	F	fill
ATR	automatic traffic recorder	Clr	clear	Desc	description	FAA	fine aggregate angularity
Ave	Avenue	Cl&gr	clearing & grubbing	Det	detail	FS	fine sand
Avg	average	Co S	coal slack	DWP	detectable warning panel	FH	fire hydrant
ADT	average daily traffic	Comb.	combination	Dtr	detour	FI	flange
Az	azimuth	Coml	commercial	Dia	diameter	FIRD	flared
Bk	back	Compr	compression	Dir	direction	FES	flared end section
BF	back face	CADD	computer aided drafting & design	Dist	distance	F Bcn	flashing beacon
Bs	backsight	Conc	concrete	DM	disturbed material	FA	flight auger sample
Balc	balcony	Cond	conductor	DB	ditch block	FL	flow line
B Wire	barbed wire	Const	construction	DG	ditch grade	Ftg	footing
Barr	barricade	Cont	continuous	Dbl	double	FM	force main
Btry	battery	CSB	continuous split barrel sample	Dn	down	Fs	foresight
Brg	bearing	Contr	contraction	Dwg	drawing	Fnd	found
BI	beehive inlet	Contr	contractor	Dr	drive	Fdn	foundation
Beg	begin	CP	control point	Drwy	driveway	Frac	fractional
BM	bench mark	Coord	coordinate	DI	drop inlet	Frwy	freeway
Bkwy	bikeway	Cor	corner	D	dry density	Frt	front
Bit	bituminous	Corr	corrected	Ea	each	FF	front face
Blk	block	CAES	corrugated aluminum end section	Esmt	easement	F Disp	fuel dispenser
Bd Ft	board feet	CAP	corrugated aluminum pipe	E	East	FFP	fuel filler pipes
BH	bore hole	CMES	corrugated metal end section	EB	Eastbound	FLS	fuel leak sensor
BS	both sides	CMP	corrugated metal pipe	Elast	elastomeric	Furn	furnished
Bot	bottom	CPVCP	corrugated poly-vinyl chloride pipe	EL	electric locker		
Blvd	Boulevard	CSES	corrugated steel end section	E Mtr	electric meter		
Bndry	boundary	CSP	corrugated steel pipe	Elec	electric/al		
BC	brass cap	C	coulomb	EDM	electronic distance meter		
Brkwy	breakaway	Co	County	Elev or El	elevation		
Br	bridge	Crse	course	Ellipt	elliptical		
Bldg	building	C Gr	course gravel	Emb	embankment		
BV	butterfly valve	CS	course sand	Emuls	emulsion/emulsified		
Byb	bypass	Ct	Court	ES	end section		
C Gdrl	cable guardrail	Xarm	cross arm	Engr	engineer		
		Xbuck	cross buck	ESS	environmental sensor station		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items

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NDDOT ABBREVIATIONS

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

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06-15-10	
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DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items

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NDDOT ABBREVIATIONS

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

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

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
 MCKENZ 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 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
 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
 RAMSEY R SEW Ramsey Rural Sewer Association
 RAMSEY RW Ramsey Rural Water Association
 RAMSEY UTIL Ramsey County Rural Utilities

RED RIV TEL Red River Rural Telephone
 RESVTN TEL Reservation Telephone
 ROBRTS TEL Roberts Company Telephone
 R-RIDER ELEC Roughrider Electric Coop
 RRVW Red River Valley & Western Railroad
 RSR ELEC R.S.R. Electric Cooperative
 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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items
03-15-13	Added Items
11-01-13	Added Items, Changed Standard Name to Include Organizations

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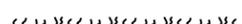
Line Styles

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

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Line Styles

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

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Symbols

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

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Symbols

D-20-31

 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	 Existing Monument Found	 Existing Pull Box	 Existing Gas Pipe Vent
 Existing Overhead Sign Structure Load Center	 Existing Monument set	 Existing Intelligent Transportation Pull Box	 Existing Sanitary Pipe Vent
 Existing Luminaire	 Existing RW Property Monument Found	 Existing Water Pump	 Existing Storm Drain Pipe Vent
 Existing Light Standard Luminaire	 Existing RW Property Monument set	 Existing Slotted Reinforced Concrete Pipe	 Existing Water Pipe Vent
 Existing Federal Mailbox	 Existing Object Marker Type I	 Existing RR Profile Spot	 Existing Weather Station
 Existing Private Mailbox	 Existing Object Marker Type II	 Existing Fuel Leak Sensors	 Existing Ground Water Well Bore Hole
 Existing Meander Section Corner	 Existing Object Marker Type III	 Existing Highway Sign	 Existing Windmill or Tower
 Existing Meter	 Existing Electrical Pedestal	 Existing Miscellaneous Spot	 Existing Witness Corner
 Existing Electrical Manhole	 Existing Telephone Pedestal	 Existing Lighting Standard Pole	 Flashing Beacon
 Existing Gas Manhole	 Existing Fiber Optic Telephone Pedestal	 Existing Traffic Signal Standard	 Flagger
 Existing Sanitary Manhole	 Existing TV Pedestal	 Existing Transformer	 Pipe Mounted Flasher
 Existing Sanitary Force Main Manhole	 Existing Fiber Optic TV Pedestal	 Existing Large Evergreen Tree	 Sanitary Force Main with Valve
 Existing Sanitary Manhole with Valve	 Existing Fuel Filler Pipes	 Existing Small Evergreen Tree	
 Existing Storm Drain Manhole	 Existing Traverse PI Aerial Panel	 Existing Large Tree	
 Existing Force Main Storm Drain Manhole	 Existing Pole	 Existing Small Tree	
 Existing Force Main Storm Drain Manhole with Valve	 Existing Power Pole	 Existing Tree Trunk	
 Existing Telephone Manhole	 Existing Power Pole with Transformer	 Existing Pad Mounted Traffic Signal Control Box	

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Symbols

D-20-32

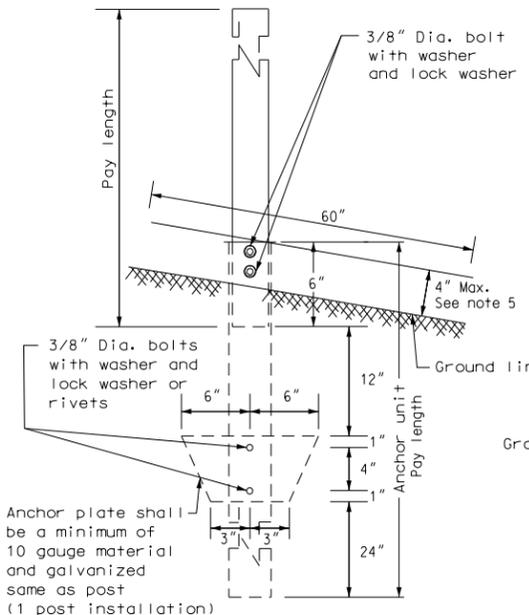
 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Grate Type 2  Junction 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  Concrete Monument to Be Set  RW Property Monument to Be Set	 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	
4-20-11	
REVISIONS	
DATE	CHANGE

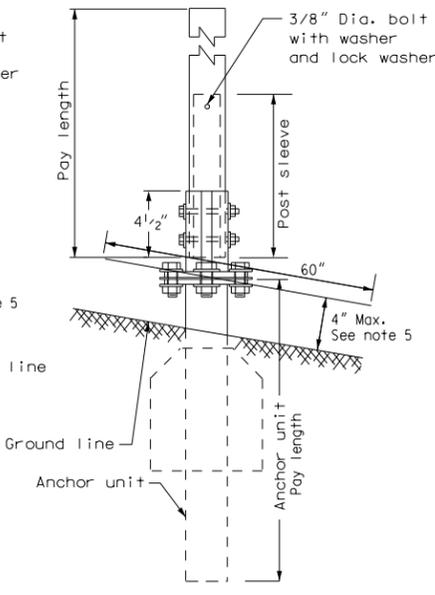
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Roger Weigel,
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 of Transportation

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

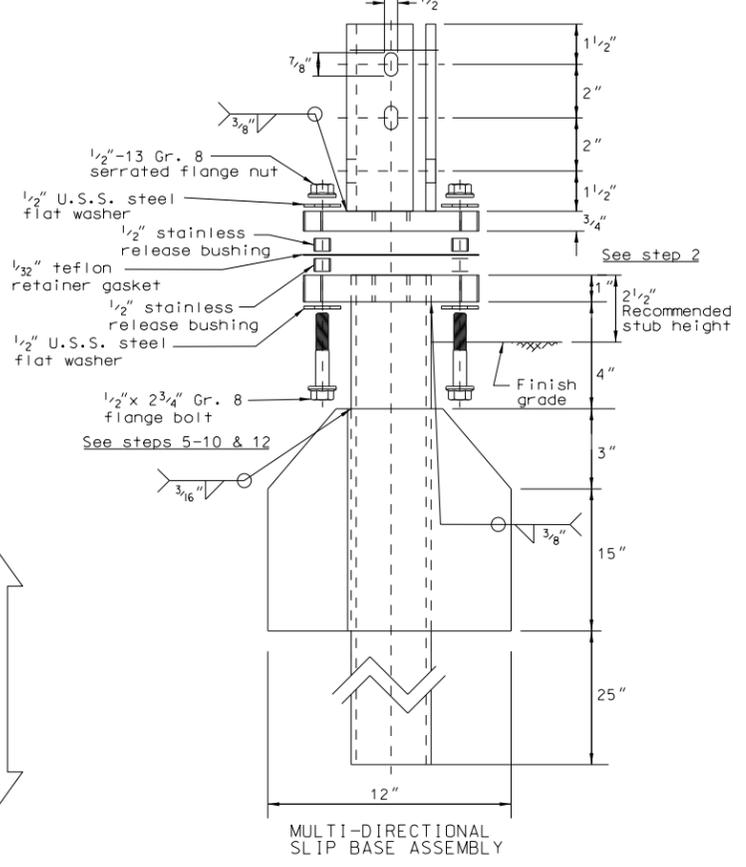
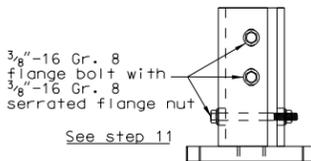
PERFORATED TUBE



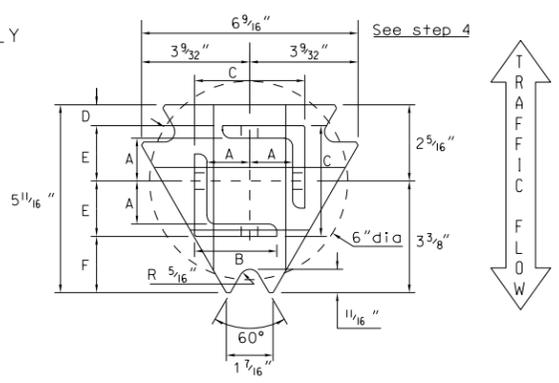
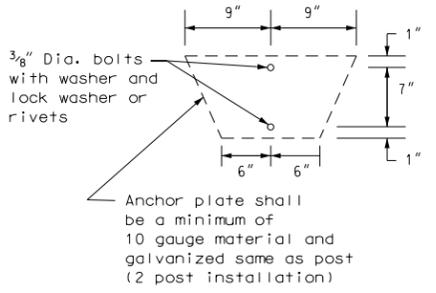
ANCHOR UNIT AND POST ASSEMBLY



SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY



MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

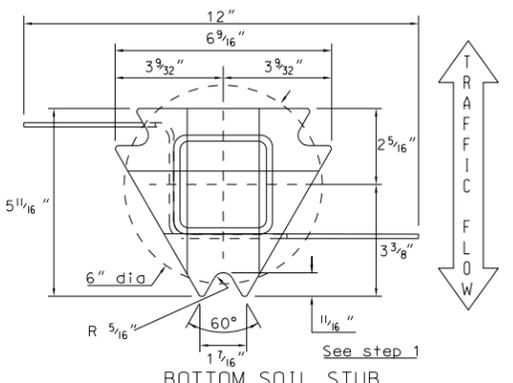


TOP POST RECEIVER

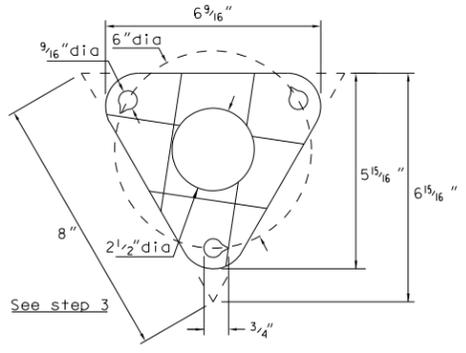
Materials: Plate - ASTM A572 grade 50
Angle receiver - 2 1/2" x 2 1/2" x 3/8" ASTM A36 structural angle

TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16" x 10 Ga. Square Post	1 9/64"	2 1/2"	3 1/32"	2 3/32"	1 33/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

2 3/16" x 10 gauge may be inserted into 2 1/2" x 10 gauge for additional wind load.



BOTTOM SOIL STUB
Materials: Tube - 3" x 3" x 7 gauge ASTM A500 Gr B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A 569
Plate - ASTM A572 grade 50



BOLT RETAINER FOR BASE CONNECTION
Materials: 1/2" reprocessed Teflon

- Notes
- Slip base bolts shall be torqued as specified by the manufacturer.
 - The 2 3/16" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size 10 gauge is shown as 2.51" size on the plans.
 - Anchor for 2", 2 1/4", and 2 1/2" posts.
 - Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3" x 3" x 7 gauge ASTM A500 Grade B. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/A153. All tolerances on anchor unit and slip base bottom assembly are ± 0.005 unless otherwise noted.
 - 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
 - When used in concrete sidewalk, anchor shall be the same except without the wings.
 - Four post signs shall have over 8' between the first and fourth posts.

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.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			B	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	10			Yes	
2	2 1/4	12	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 3/8	10	Yes	

B - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY	
STEP	INSTALLATION PROCEDURE
1.	Install bottom soil anchor stub plumb and squared up with road, with point of plate facing oncoming traffic.
2.	Depth of imbedment to leave 2 1/2" from grade to top of anchor plate.
3.	Place teflon bolt retainer gasket on top of bottom plate (make sure that notches in holes are pointing counter clockwise).
4.	Place top post receiver on to retainer gasket, properly indexed so that angle receivers are squared up with road.
5.	Slide 1 each 1/2" flat washer on to 1 each inverted 1/2"-13 gr. 8 flange bolt, followed by 1 each stainless steel release bushing.
6.	Insert above bolt with washer and bushing up through notched points of top and bottom plates, passing through hole in gasket.
7.	Slide second bushing down on to above bolt until it rests on top of gasket followed by second washer.
8.	Complete by threading 1/2"-13 gr. 8 serrated flange nut snugly down against top of washer.
9.	Repeat steps 5,6,7 & 8 at the two remaining notched triangle points.
10.	Insert sign post into angle receivers on top half until post(s) bottom out. *NOTE: Where higher wind load is desired, insert the next size smaller square post inside bottom of main upright post (Minimum of 48", not to exceed beyond bottom edge of sign).
11.	Secure posts into receivers using 3 each 3/8"-16 gr. 8 flange bolts and 3 each 3/8"-16 serrated flange nuts in receiver slots (top 2 bolts should be parallel to highway) do not tighten nuts until all bolts are in place.
12.	After all sub-assembly hardware is tightened, then torque the three 1/2"-13 nuts to 42 ft-lbs, in a circular pattern until all bolt assemblies reach the required torque. *NOTE: On multi-leg installations, be sure that all anchors are squared and lined up with each other.

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	0.785
4 x 4	0.250	1/4	6.600	3.040	1.940	1.050

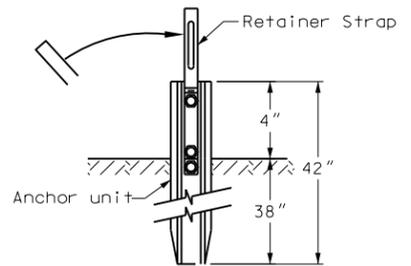
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-21-02	
REVISIONS	
DATE	CHANGE
12-01-04	PE stamp added

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BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

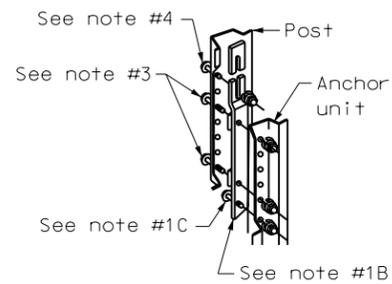
FLANGED CHANNEL



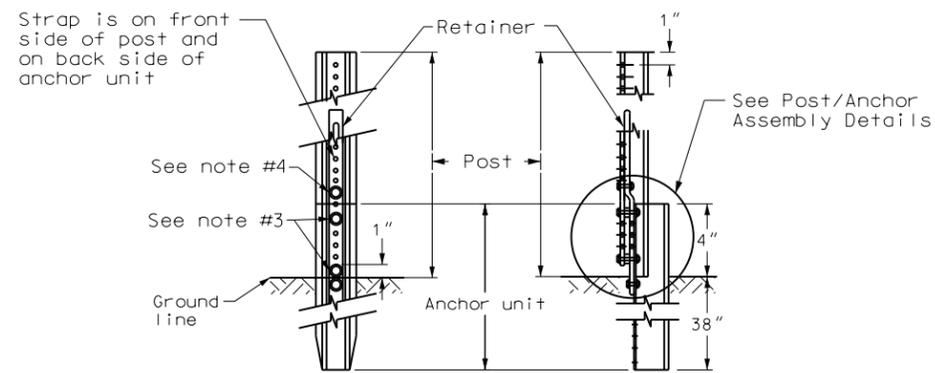
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

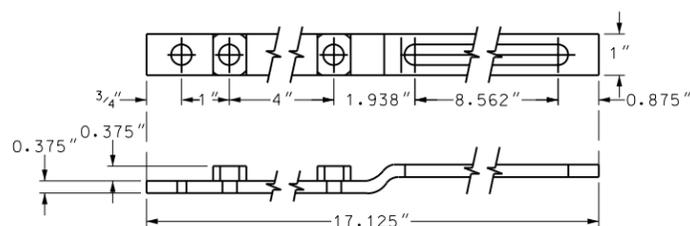
1. A) Drive anchor unit to within 12" of ground level.
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.
D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4" dimension.
B) Rotate strap to vertical position.
3. A) Place 3/8"-16 UNC x 2" bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom 3/4" slot in the strap).
B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening 3/8"-16 UNC x 2" long retainer bolt (this fastens sign post to retainer spacer strap).
5. The base post, strap & sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap and sign post at the bolts have full contact across the entire width.



Post/Anchor Assembly Details



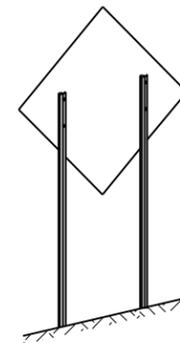
Front View Side View Sign Post Assembly Detail



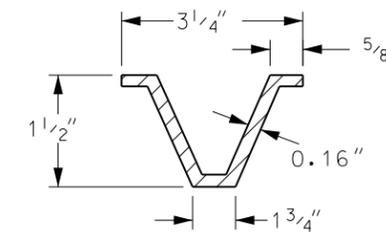
Retainer/Spacer Strap Detail

CHANNEL SIZE IN.	WALL THICKNESS IN.	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN. 4	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN. 3
1.516 x 3.125"	.116	2.00	.179	.590	.225
1.532 x 3.125"	.124	2.25	.201	.648	.254
1.562 x 3.125"	.132	2.50	.233	.748	.289
1.578 x 3.125"	.140	2.75	.271	.819	.329
1.750 x 3.500"	.150	3.00	.372	.918	.403
1.750 x 3.500"	.175	4.00	.500	1.190	.560

3 LB/FT U POSTS



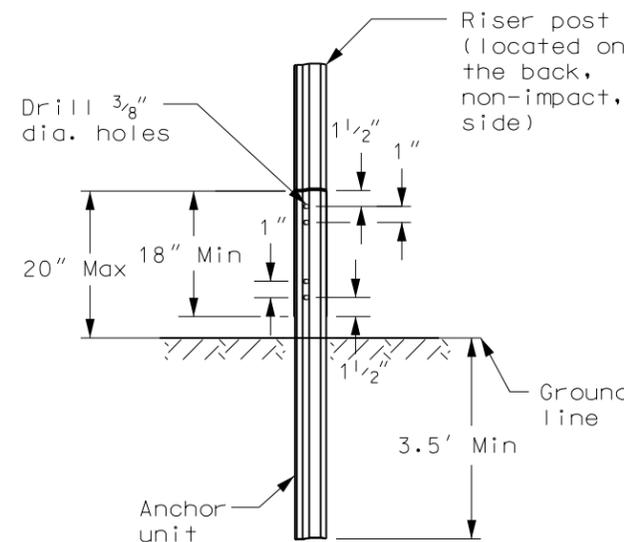
Typical Installation



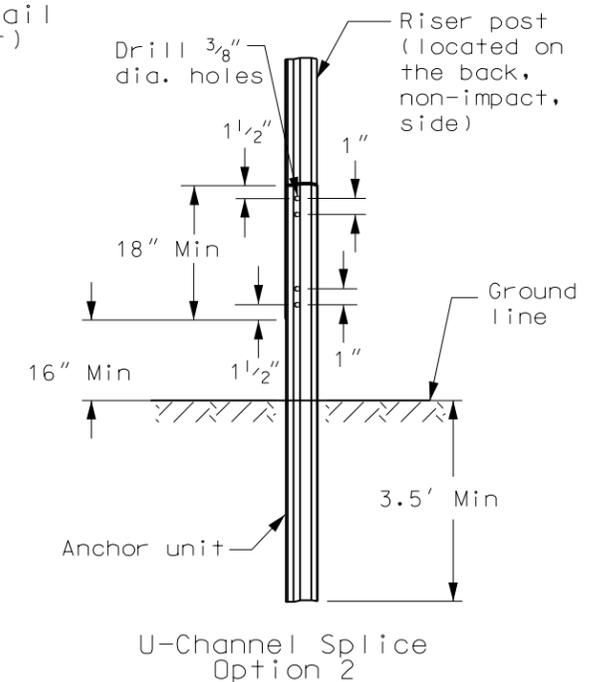
U-Post Detail (3 lb/ft)

Notes

1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more than 4" above ground and embedded at least 3.5'.



U-Channel Splice Option 1



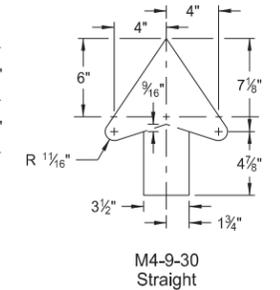
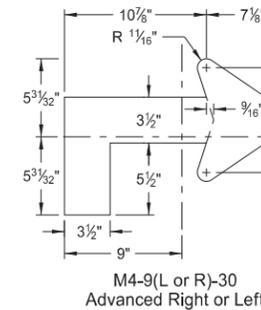
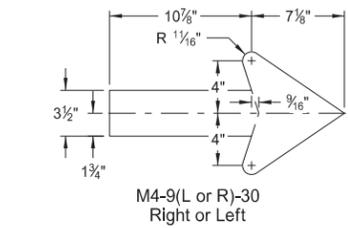
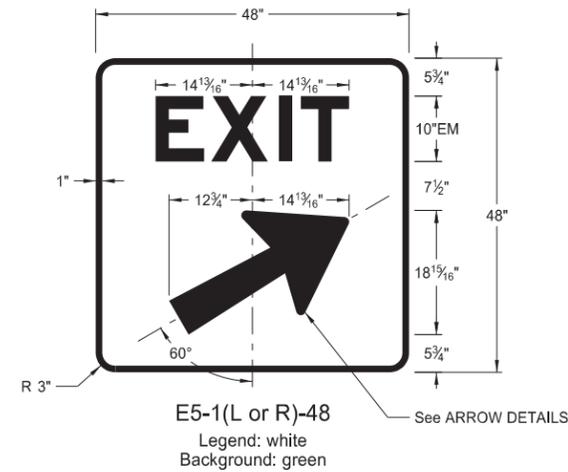
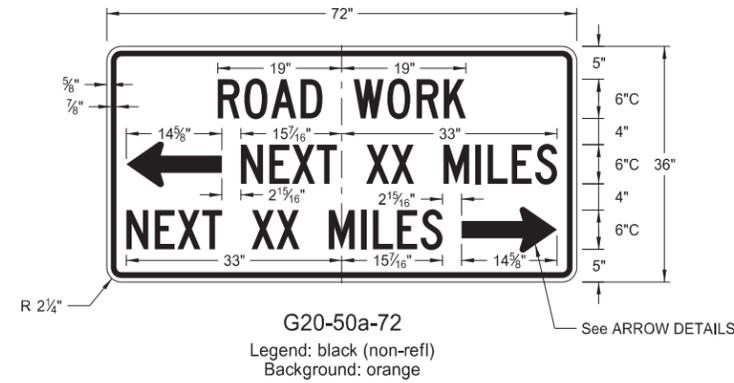
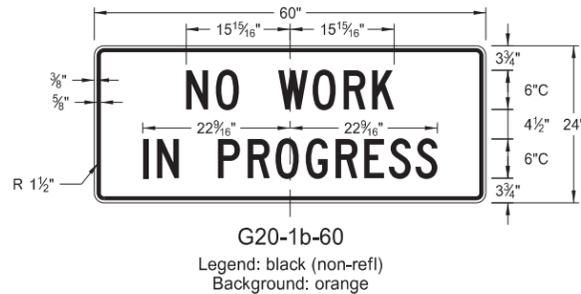
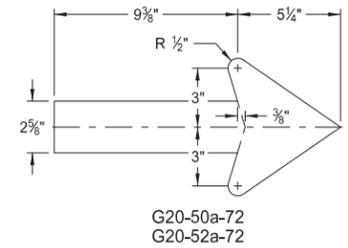
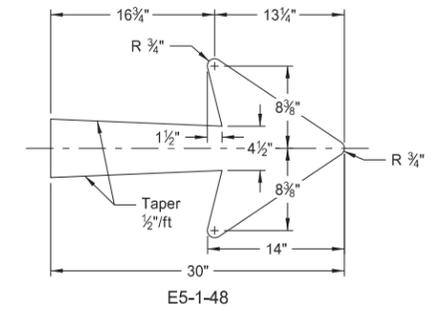
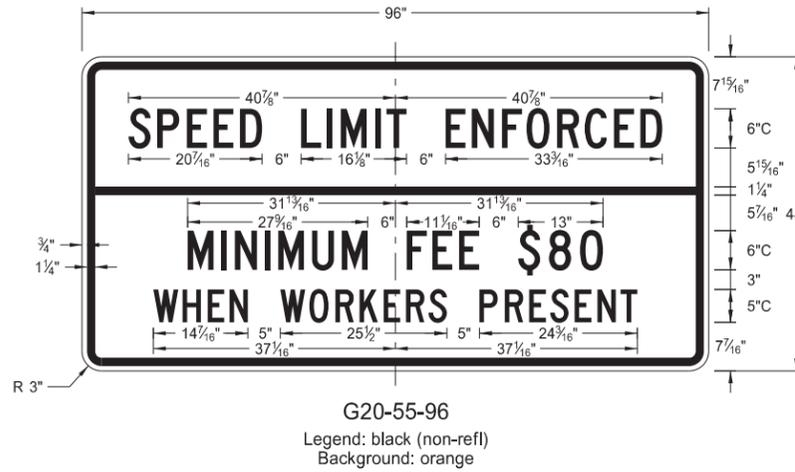
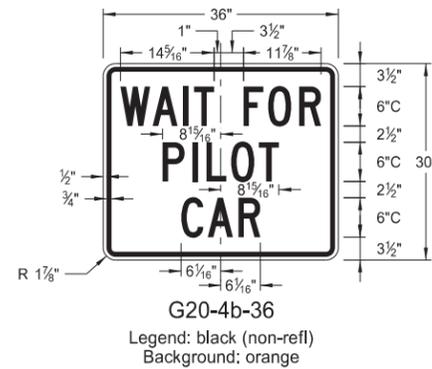
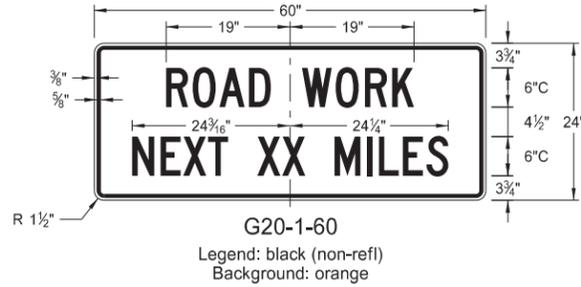
U-Channel Splice Option 2

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-28-93	
REVISIONS	
DATE	CHANGE
03-07-01	Revised U-post details
11-21-02	Deleted perforated tube
05-08-03	Revised U-Channel splice
12-01-04	PE stamp added
06-29-05	Revised flanged channel note

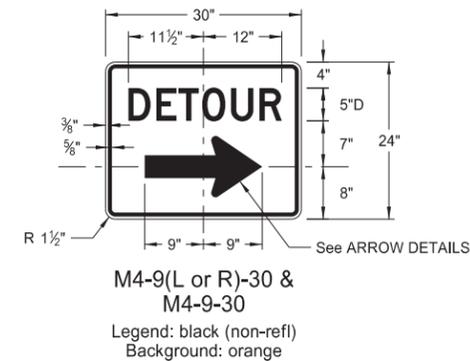
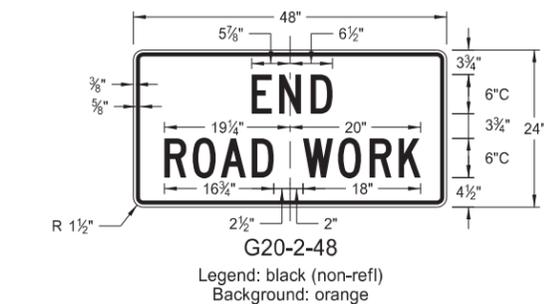
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CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

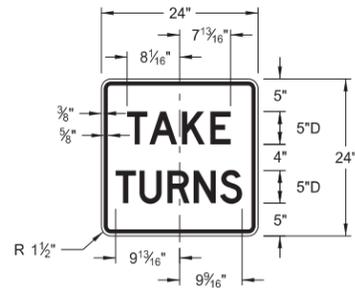
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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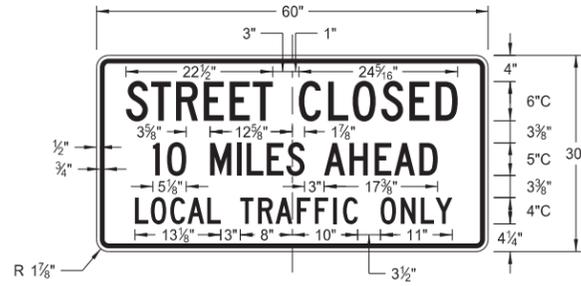
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



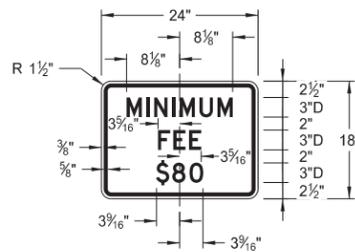
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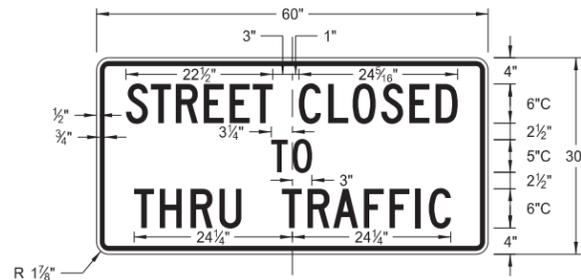
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R2-1a-24

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R11-4a-60

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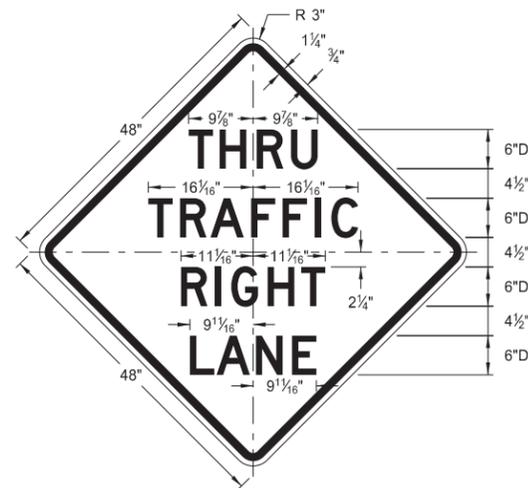
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8-13-13	
REVISIONS	
DATE	CHANGE

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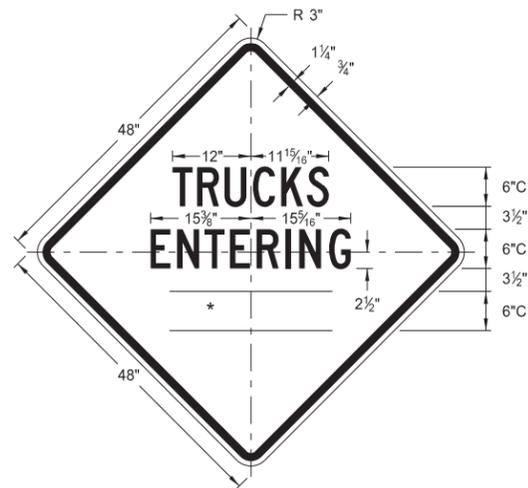
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

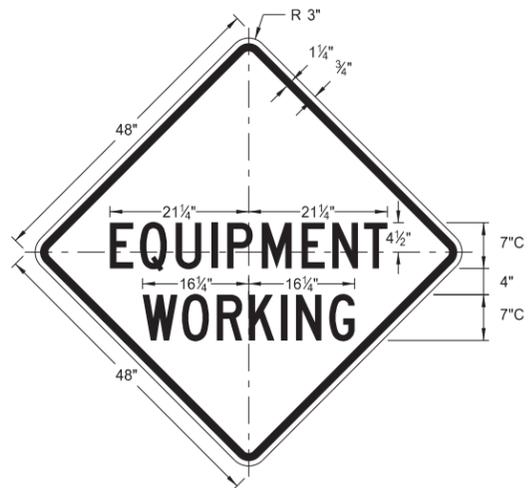
* DISTANCE MESSAGES



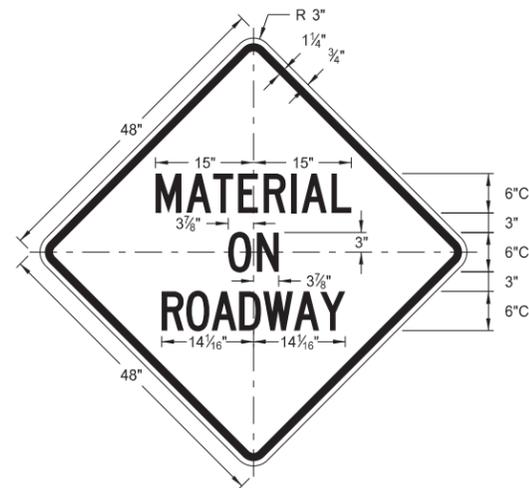
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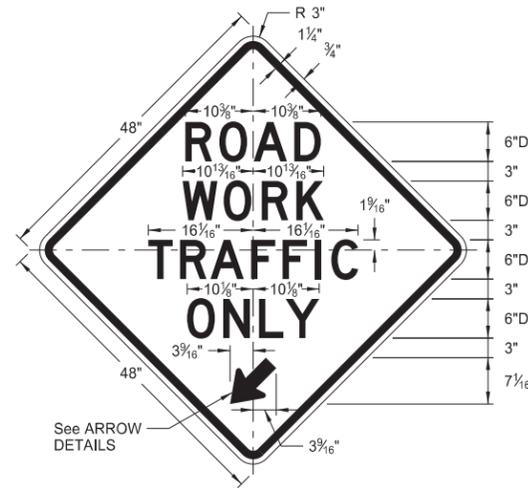
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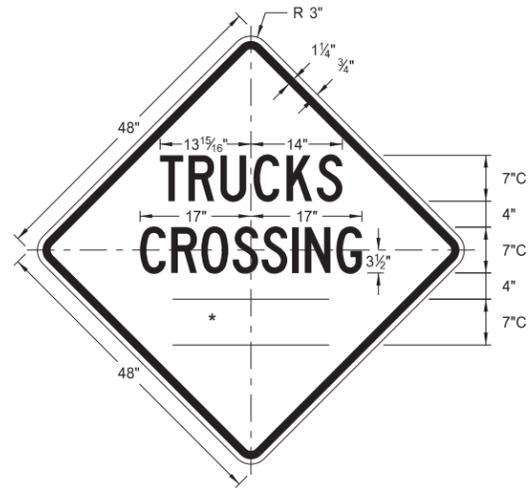
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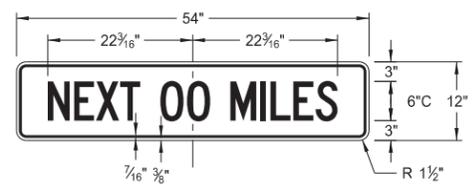
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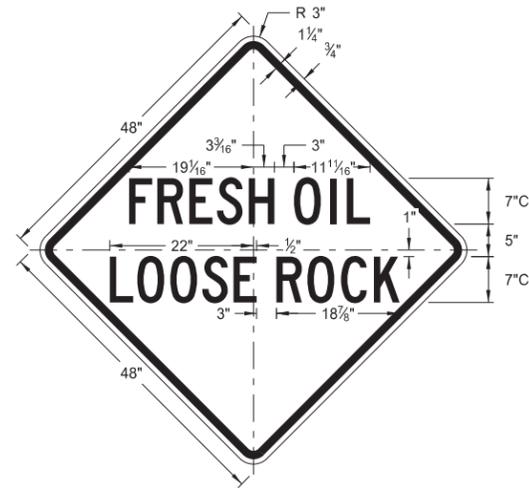
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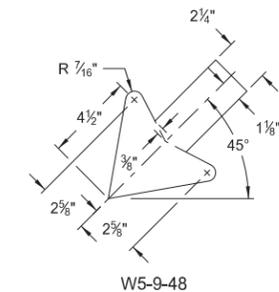
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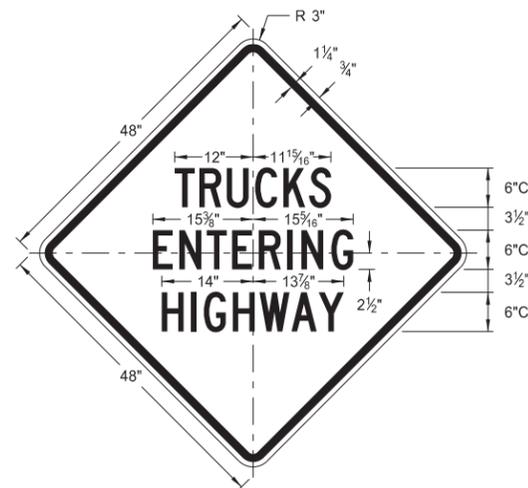
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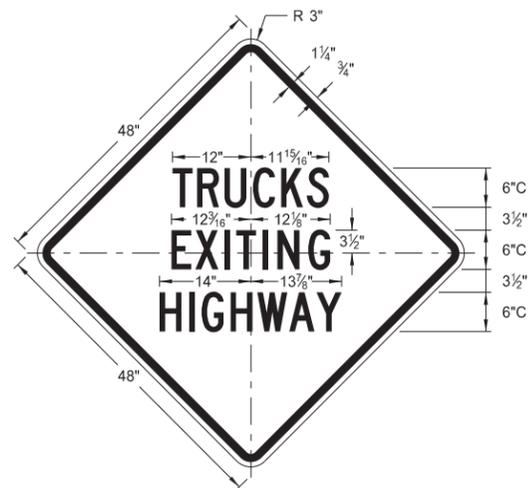
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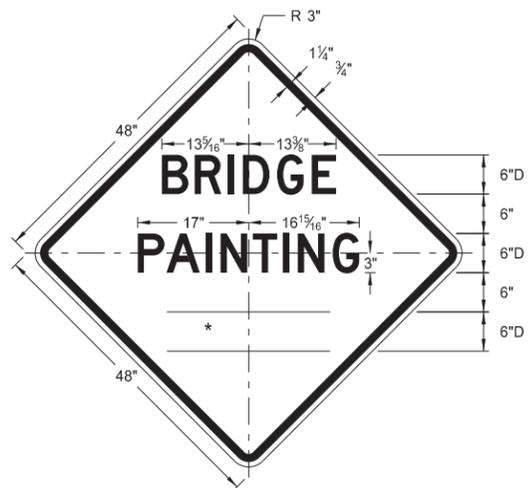
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ARROW DETAILS



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Legend: black (non-refl)
Background: orange

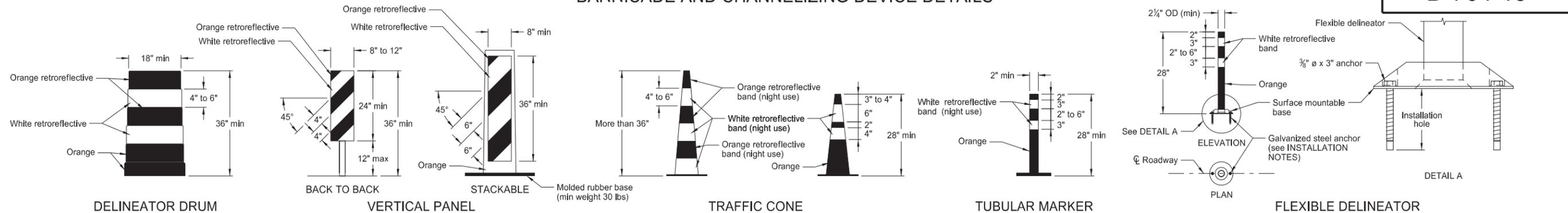


W21-50-48
Legend: black (non-refl)
Background: orange

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BARRICADE AND CHANNELIZING DEVICE DETAILS



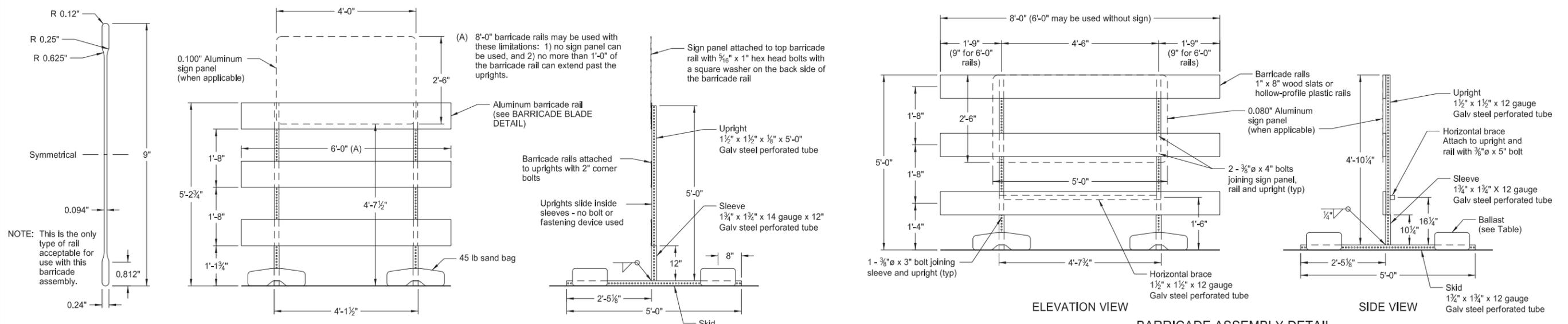
- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl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

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

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

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

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



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

MINIMUM BALLAST
 (For each side of barricade support)

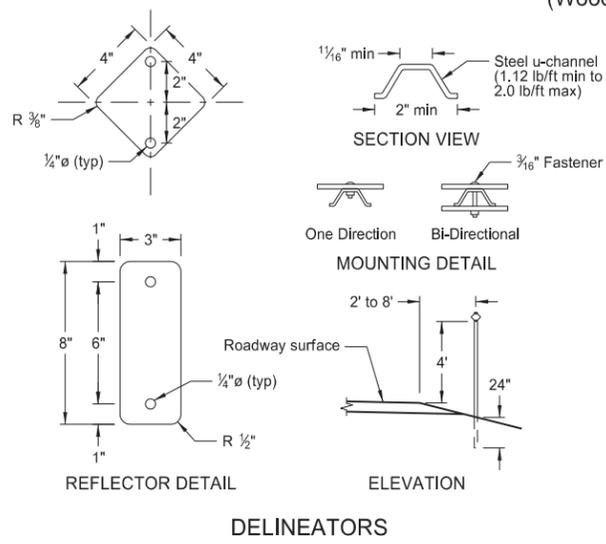
Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

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

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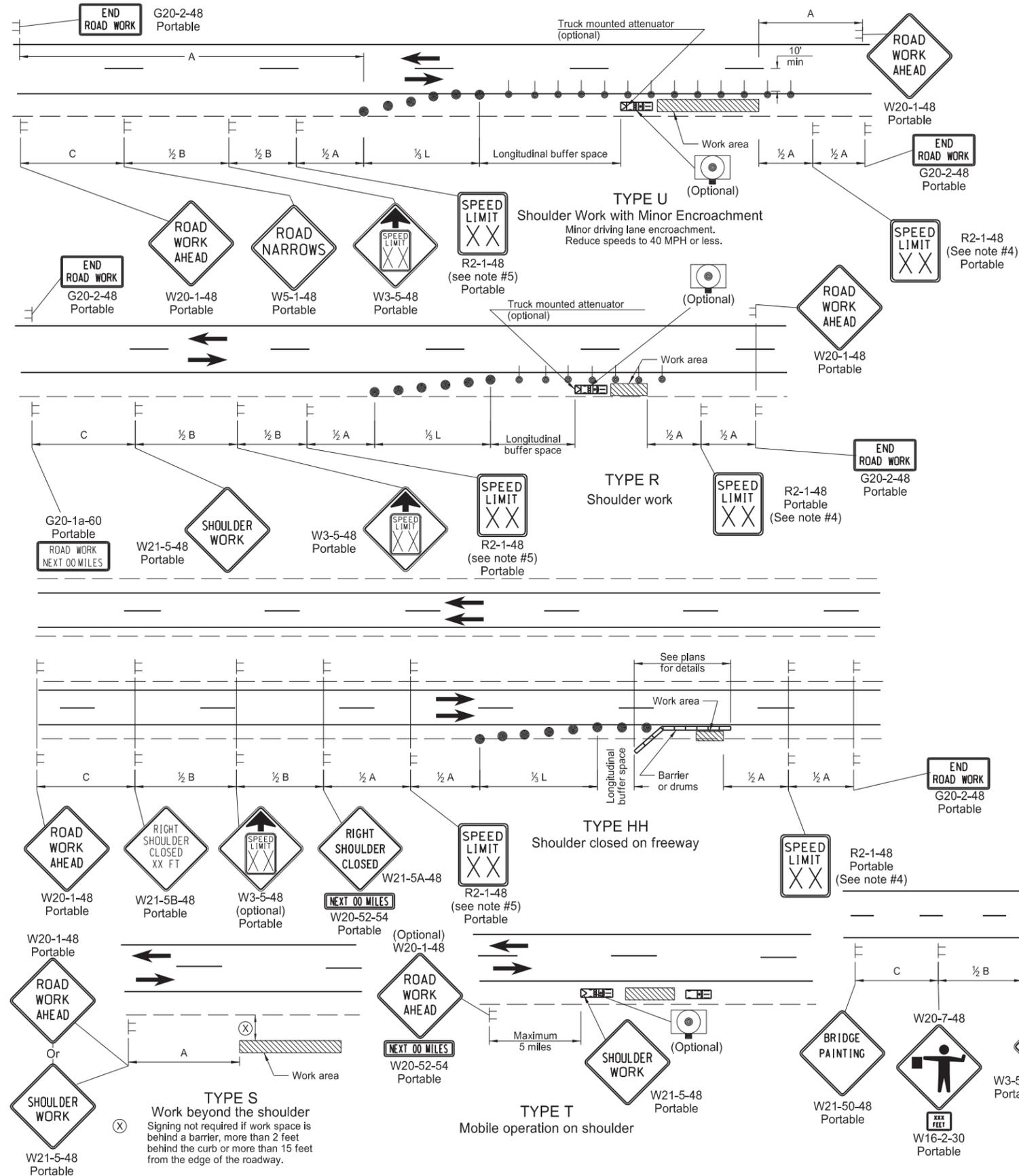
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SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

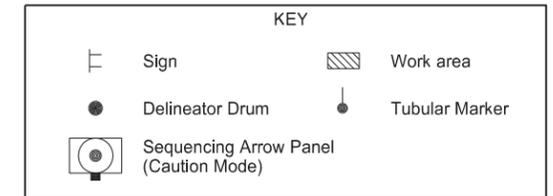
D-704-24



- Notes
- Variables
S = Numerical value of speed limit or 85th percentile.
W = The width of the taper.
L = Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Delineator drums used for tapering traffic shall be spaced at dimension "S".
Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
 - Sequencing Arrow Panels
Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}B$.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

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

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

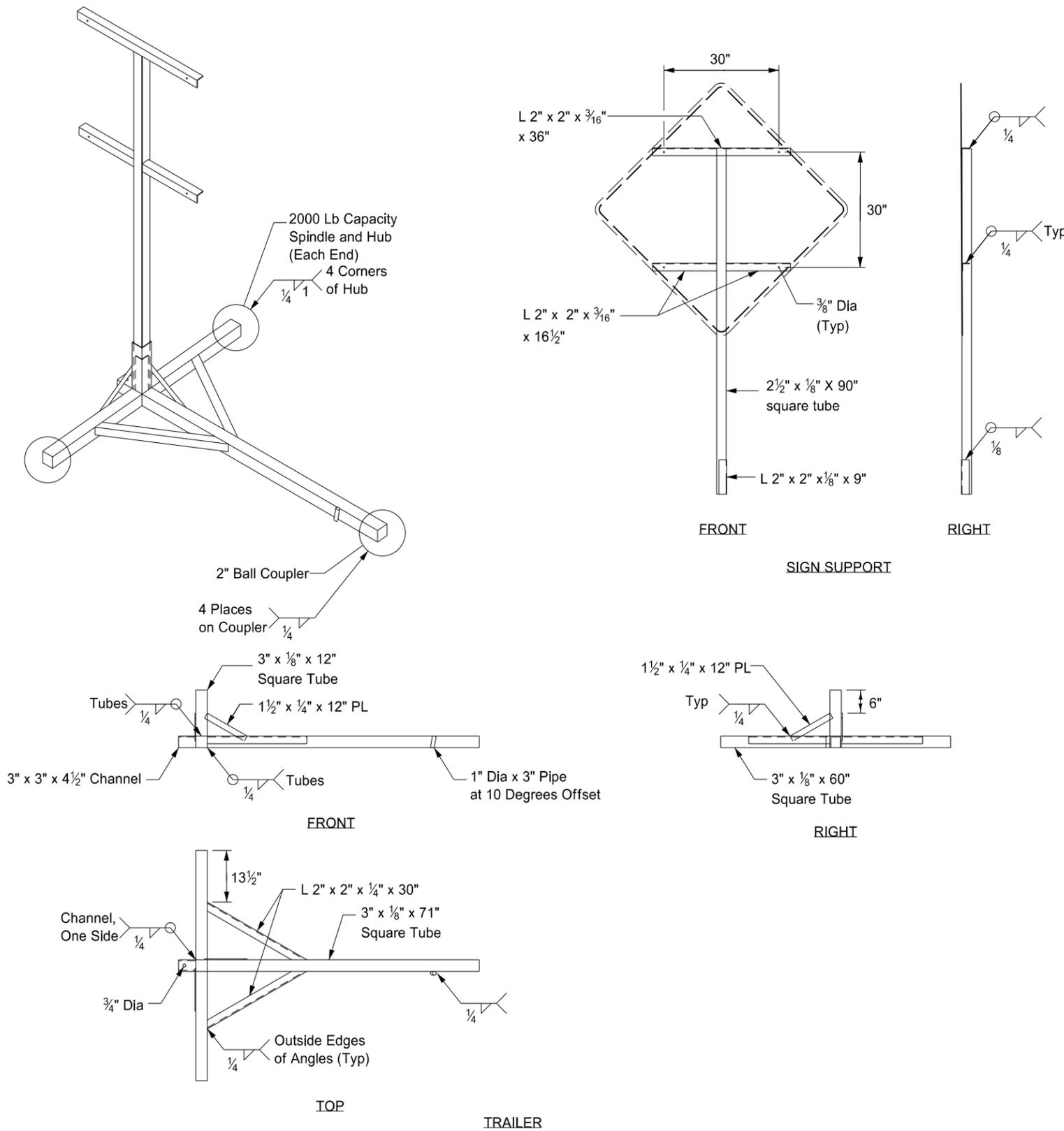


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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



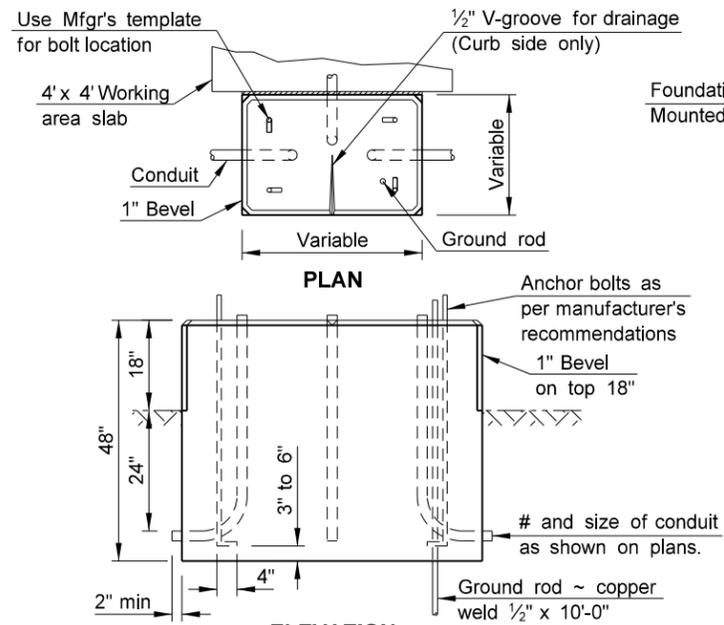
Notes:

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

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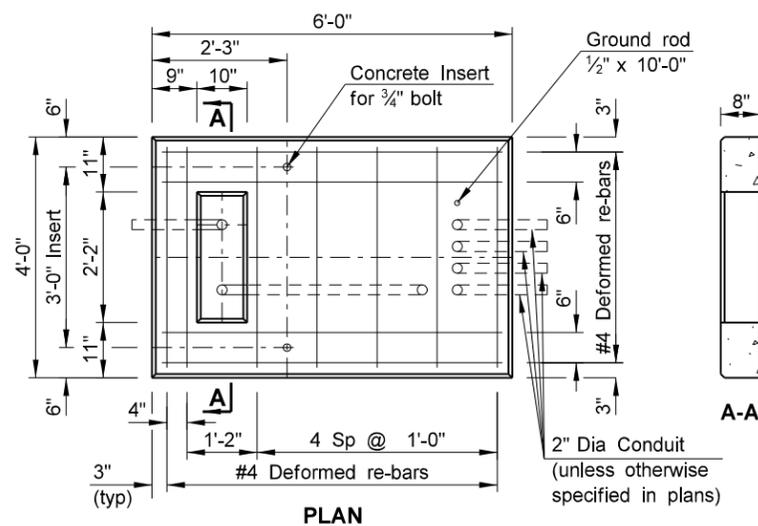
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**CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)**



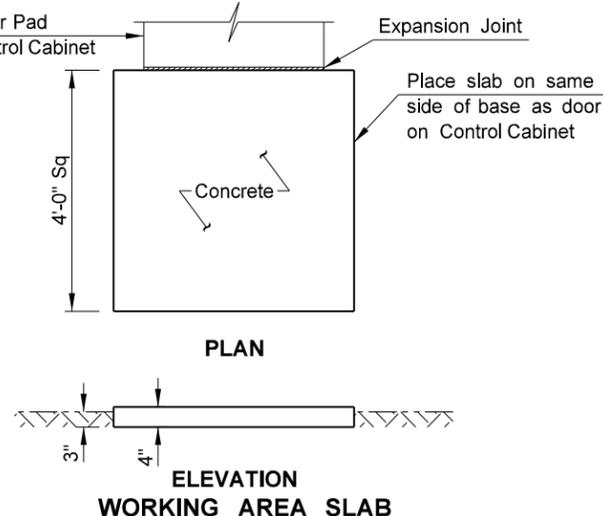
CONTROLLER CABINET FOUNDATION PAD MOUNT

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

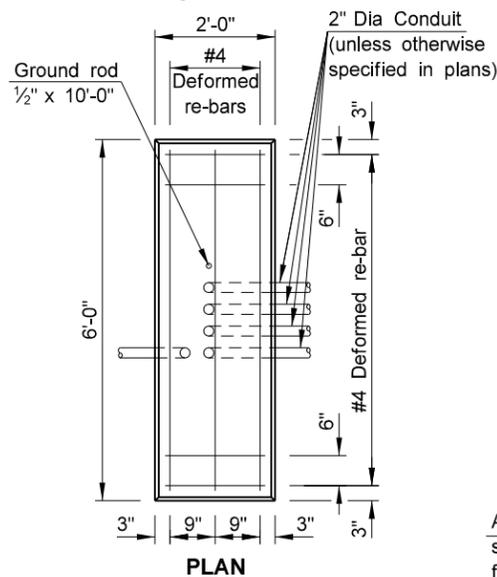


TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

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

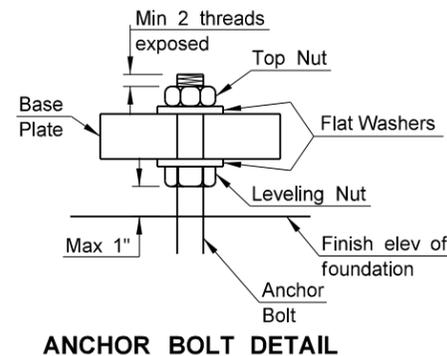


The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.

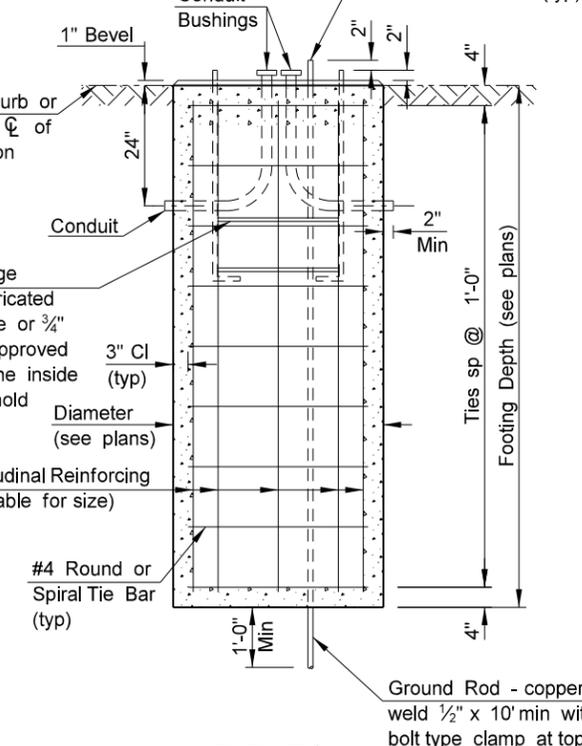
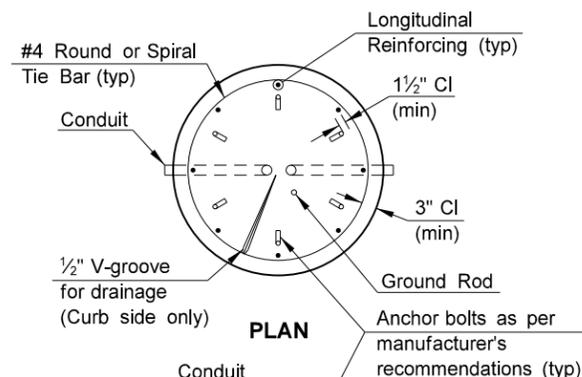


FEED POINT CABINET FOUNDATION PAD MOUNT

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



ANCHOR BOLT DETAIL



LIGHT & SIGNAL STANDARD FOUNDATION

NOTES:

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

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

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

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

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

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

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