

NDDOT ABBREVIATIONS

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

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D-20-2

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

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

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NDDOT UTILITY COMPANY ABBREVIATIONS

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 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
 BASIN ELEC Basin Electric Cooperative Incorporated
 BEK TEL Bek Communications Cooperative
 BELLE PL Belle Fourche Pipeline Company
 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 Incorporated
 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 PWR ELEC Central Power Electric Cooperative
 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
 FALK MNG Falkirk Mining Company
 G FKS-TRL WD Grand Forks-trail 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
 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
 MCKNZ WRD McKenzie County Water Resource District
 MCKNZ ELEC McKenzie Electric Cooperative
 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
 MRE LBTY TEL Moore & Liberty Telephone
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative
 MOUNT-WILLI ELEC Mountrail-williams Electric Cooperative
 MUNICIPAL City Of '.....'
 MUNICIPAL City Water And Sewer
 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
 OTTR TL PWR Otter Tail Power Company
 P L E M Prairielands Energy Marketing
 POLAR COM Polar Communications
 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
 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
 STUT RWU Stutsman Rural Water Users
 T M C Turtle Mountain Communications
 TCI TCI of North Dakota
 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
 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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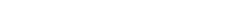
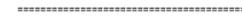
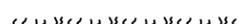
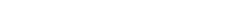
Line Styles

.....	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		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
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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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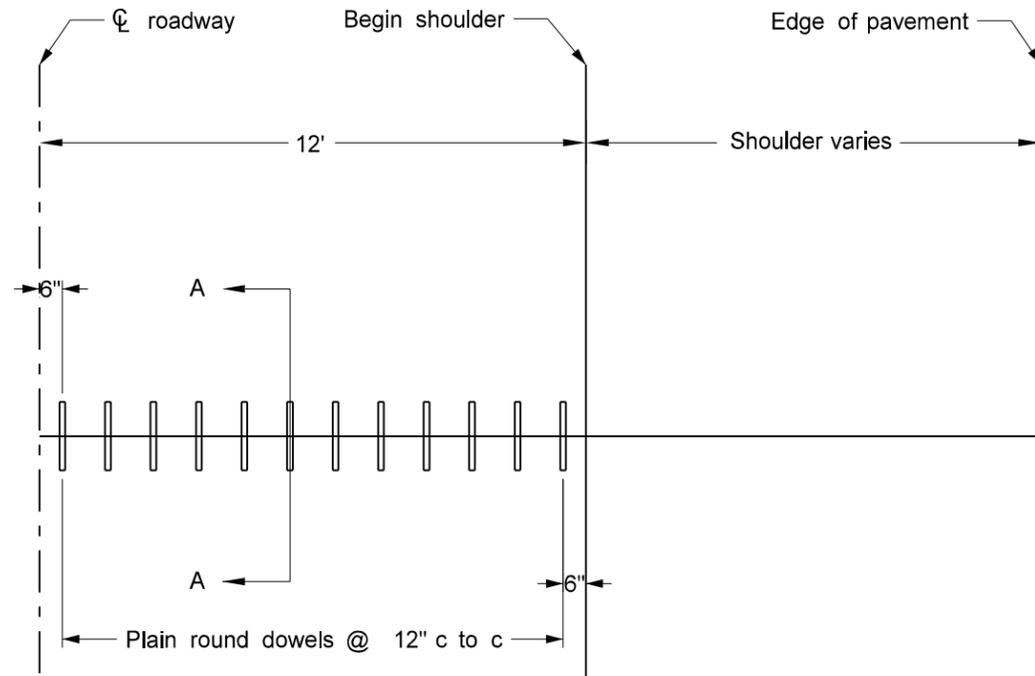
Symbols

 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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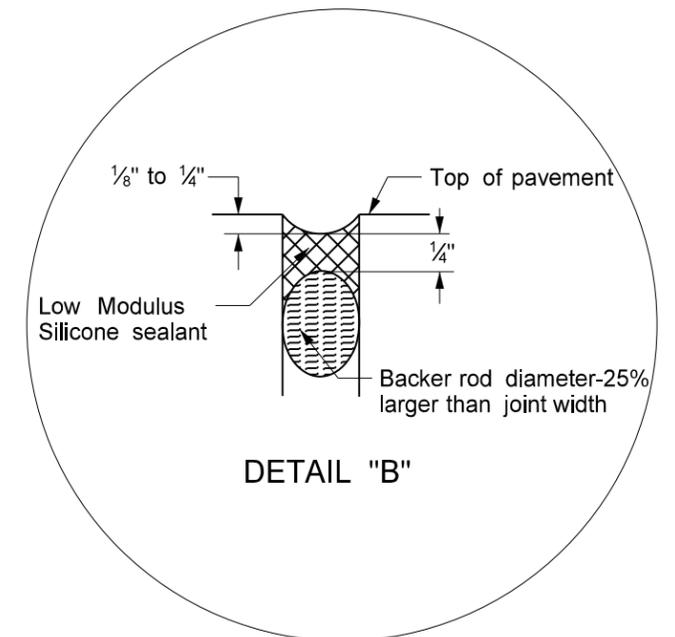
TRANSVERSE CONTRACTION JOINT DETAILS



CONTRACTION JOINT DOWEL ASSEMBLY
(1/2 roadway shown)

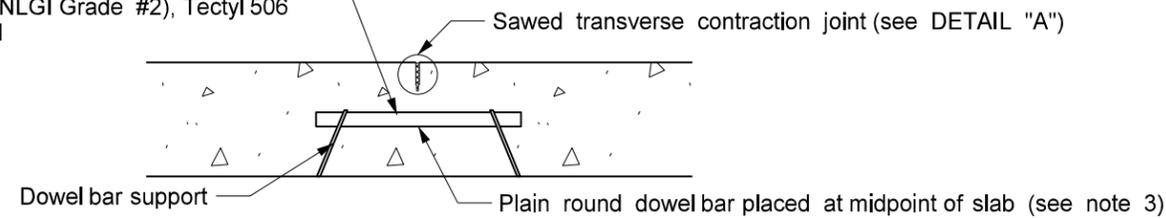
Notes

1. The joint seal details apply to both doweled and non-doweled (plain) transverse joints.
2. T = Thickness of pavement.
3. Dowels
 Pavement 10" or less: 1 1/4" X 18" plain round
 Pavement greater than 10": 1 1/2" X 18" plain round
4. B = T/4 + 1/4" for AE or YE non-doweled concrete pavement
 or T/3 for high early or doweled concrete pavement

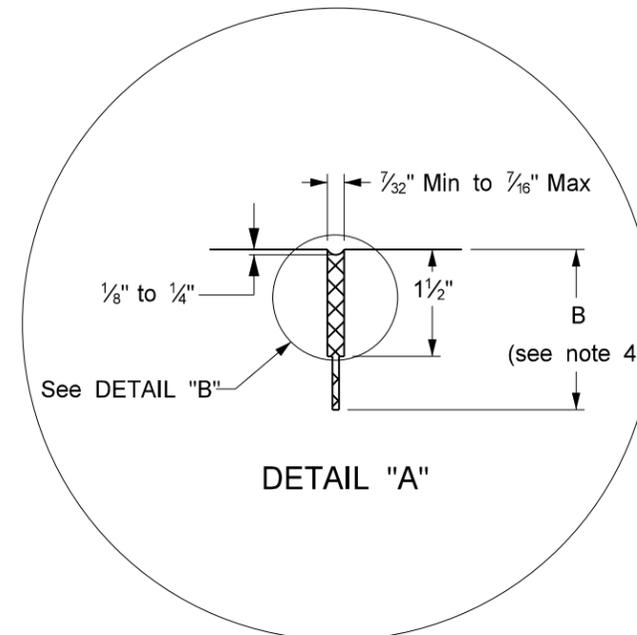


DETAIL "B"

Coat entire dowel bar length with Multipurpose Lithium Grease (NLGI Grade #2), Tectyl 506 or approved equal



SECTION A-A

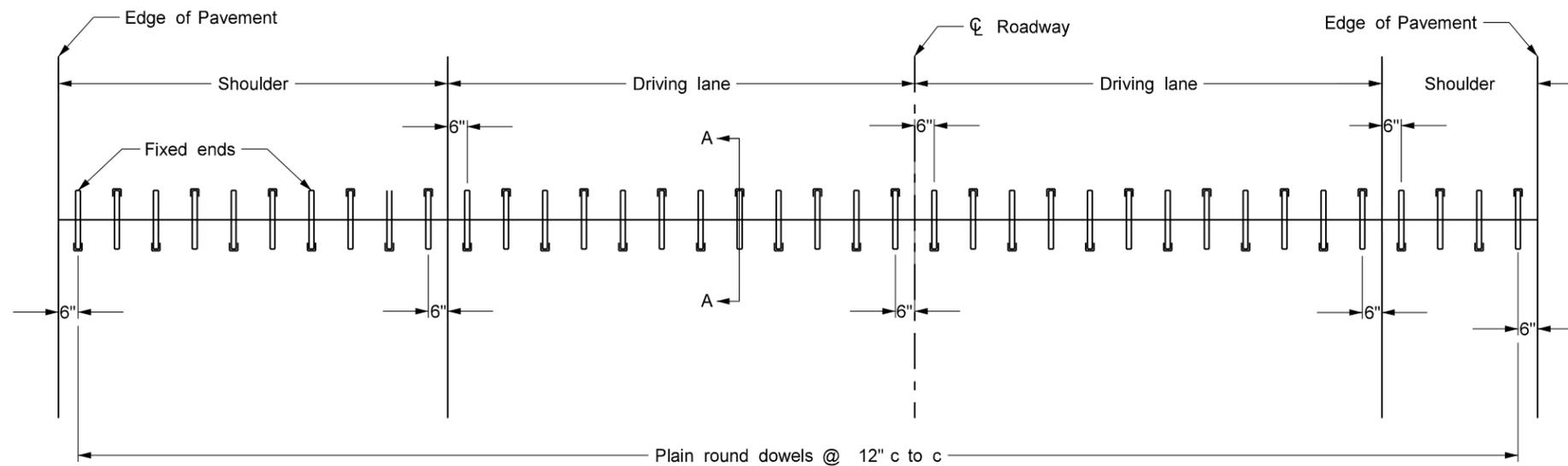


DETAIL "A"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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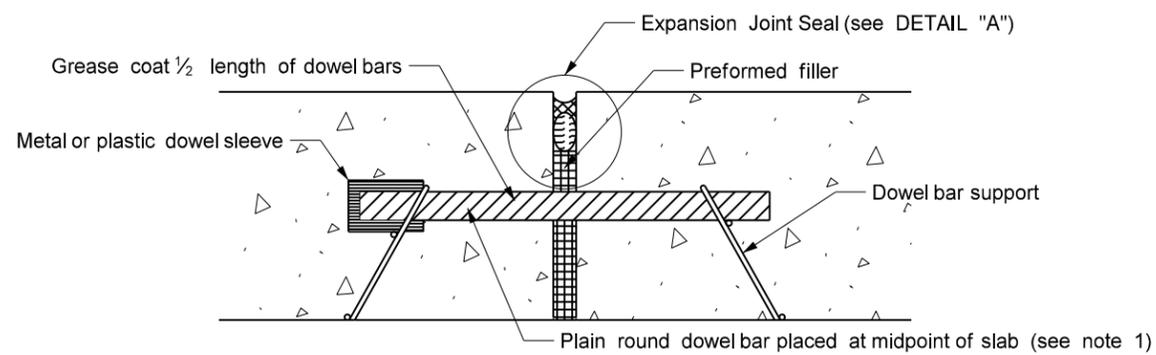
TRANSVERSE EXPANSION JOINT DETAIL



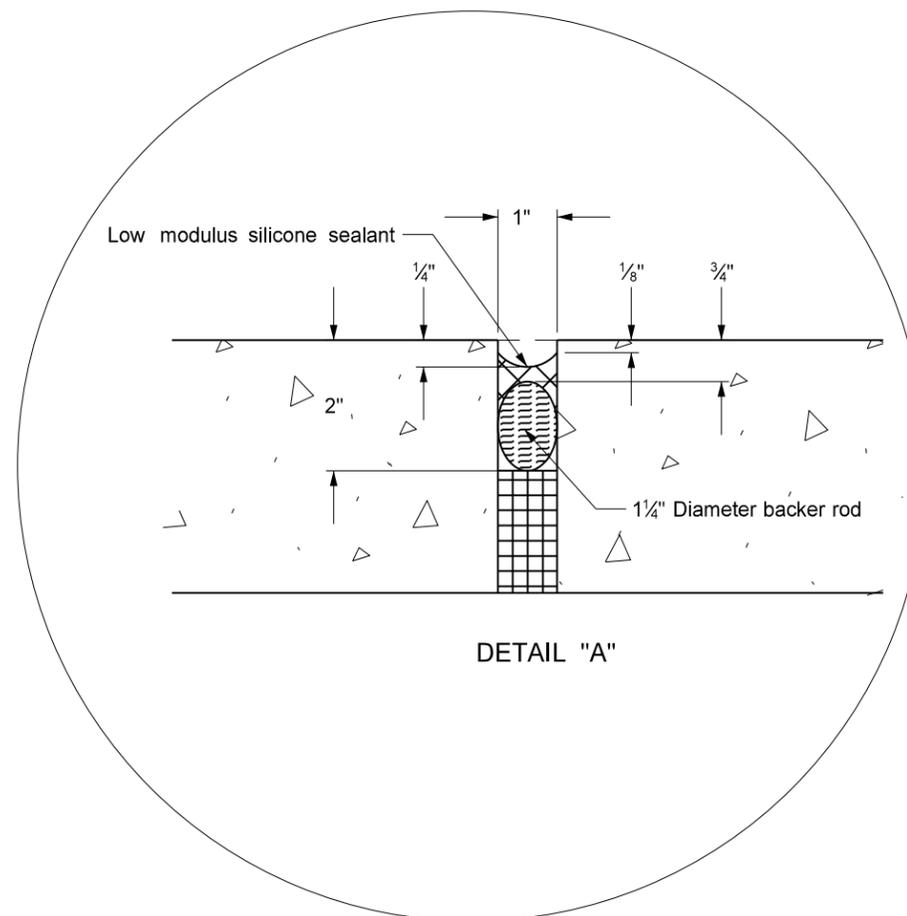
Notes

- 1. Dowels
 - Pavement thickness 10" or less: 1 1/4" X 18" plain round
 - Pavement thickness greater than 10": 1 1/2" X 18" plain round

DOWELED EXPANSION JOINT ASSEMBLY



SECTION A-A



DETAIL "A"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
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WORK ZONE BUSINESS SIGN DETAILS

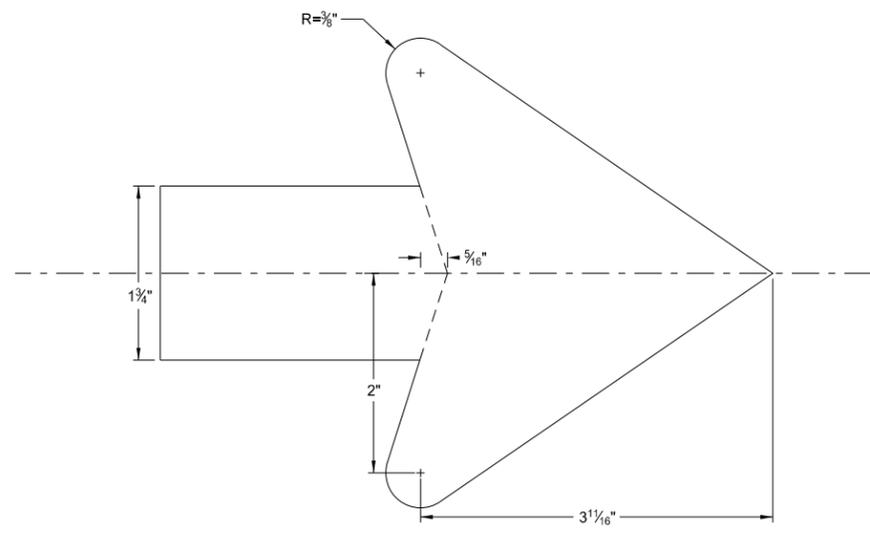
D-704-4

SIGN NUMBER	Con Sign					STATION(S):	AREA: 6.0 Sq.Ft.				
WIDTH x HEIGHT	3'-0" x 2'-0"										
BORDER WIDTH	0.5" (Inset 0")										
CORNER RADIUS	1.5"										
MOUNTING	Ground										
BACKGROUND	TYPE: 3A Reflective COLOR: Blue										
LEGEND/BORDER	TYPE: 3A Reflective COLOR: White										
SYMBOL	X	Y	WID	HT	ANGLE						
ARDD	4.5	1.5	4.8	6	180						
ARDD	25.5	1.5	4.8	6	0						

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

LETTER POSITION (X)											LENGTH	SIZE	SERIES
S	T	E	A	K		H	O	U	S	E	27.1	4	ClearviewHwy-1-W
4.5	6.8	9.2	11.3	14.4	16.3	18.7	21.5	24.7	27.4	30.1			
G	A	S		S	T	A	T	I	O	N	26	4	ClearviewHwy-1-W
5	7.8	10.6	12.4	14.6	16.9	19.1	21.9	24.3	25.7	28.9			
C	A	F	E								9.2	4	ClearviewHwy-1-W
13.4	15.9	18.9	21.2										

Note:
The ground mounted business name sign area has been calculated using a 36"x 24" sign panel. The contractor shall determine the size needed and the exact length required to accommodate the message. The maximum size of the sign shall be 36"x24". The letters shall be 4" Clearview 1-W. The color shall be blue background with white legend and border. The sign shall be post mounted. The arrow shall be positioned either on the right or left side of the sign as required.

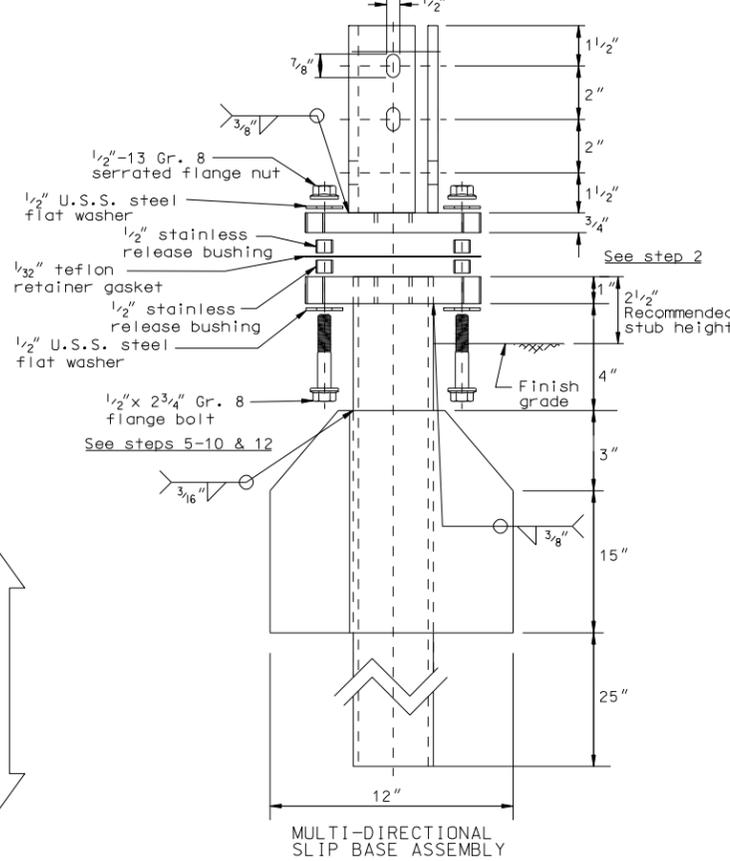
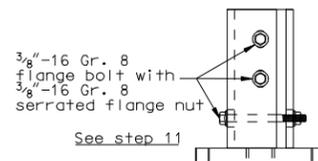
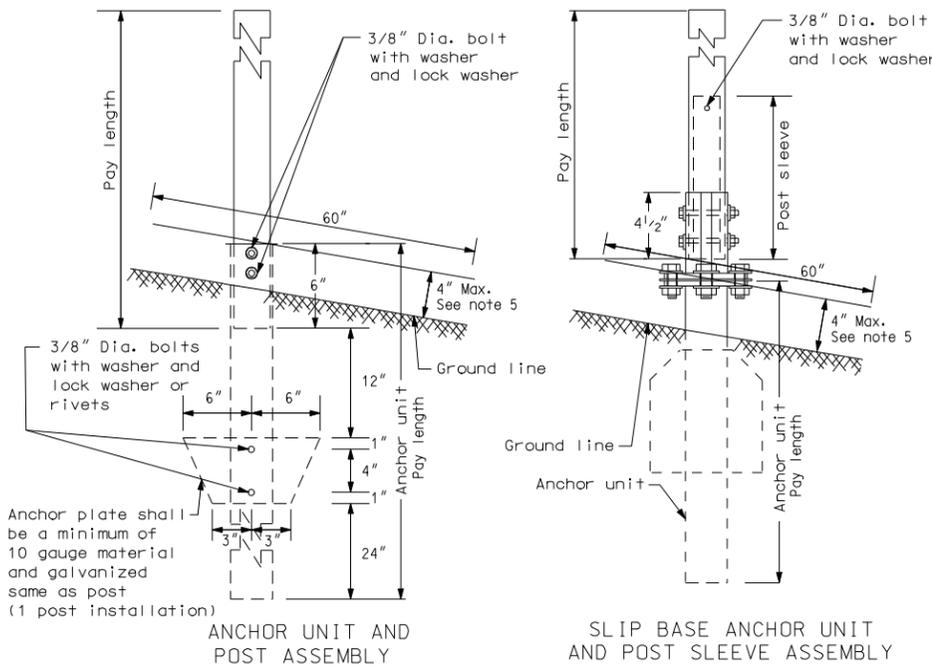


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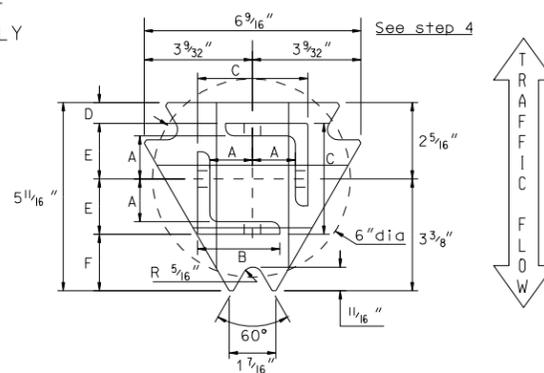
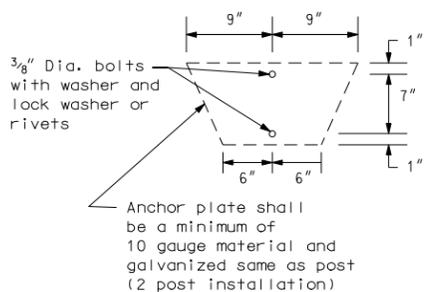
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

PERFORATED TUBE



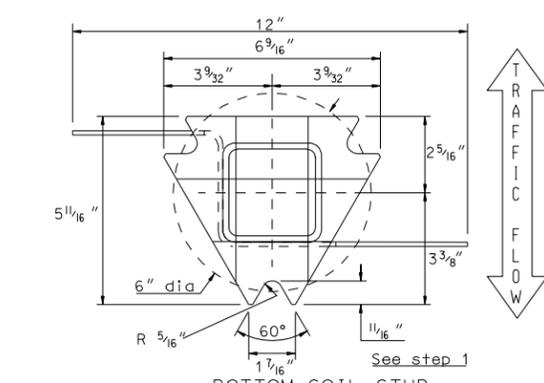
- Notes
1. Slip base bolts shall be torqued as specified by the manufacturer.
 2. The 2 3/16 inch size 10 gauge is shown as 2.19 inch size on the plans. The 2 1/2 inch size 10 gauge is shown as 2.51 inch size on the plans.
 3. Anchor for 2 inch, 2 1/4 inch, and 2 1/2 inch posts.
 4. Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3 inch x 3 inch 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.
 5. 4 inch vertical clearance of anchor or breakaway base. The 4 inch x 60 inch measurement shall be made above and below post location and also back and ahead of post.
 6. When used in concrete sidewalk, anchor shall be the same except without the wings.
 7. Four post signs shall have over 8 feet between the first and fourth posts.



TOP POST RECEIVER
Materials: Plate - ASTM A572 grade 50
Angle receiver - 2 1/2 inch x 2 1/2 inch x 3/8 inch ASTM A36 structural angle

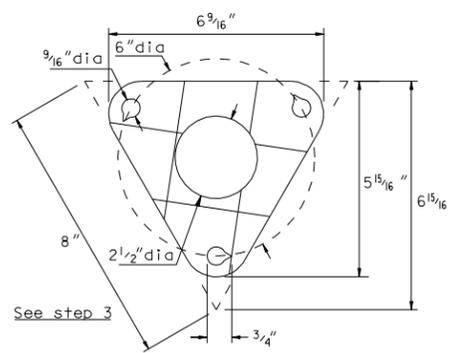
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16 inch x 10 Ga. Square Post	1 3/64 inch	2 1/2 inch	3 1/32 inch	2 5/32 inch	1 3/64 inch	1 7/8 inch
2 1/2 inch x 10 Ga. Square Post	1 3/32 inch	2 1/2 inch	3 5/16 inch	5/8 inch	1 2/32 inch	1 3/4 inch

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



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

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 inch 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 inch flat washer on to 1 each inverted 1/2 inch - 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 inch - 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 inch, not to exceed beyond bottom edge of sign).
11.	Secure posts into receivers using 3 each 3/8 inch - 16 gr. 8 flange bolts and 3 each 3/8 inch - 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 inch - 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.



BOLT RETAINER FOR BASE CONNECTION
Materials: 1/32 inch reprocessed Teflon

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

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			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 inch, 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.

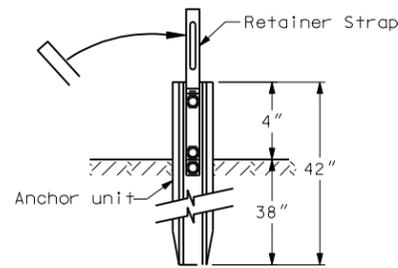
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11-21-02	
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DATE	CHANGE
12-01-04	PE stamp added

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BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

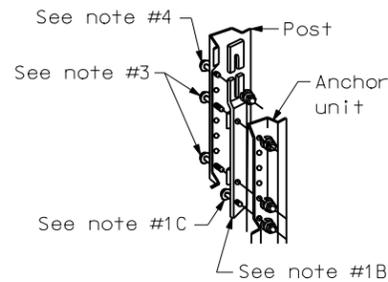
FLANGED CHANNEL



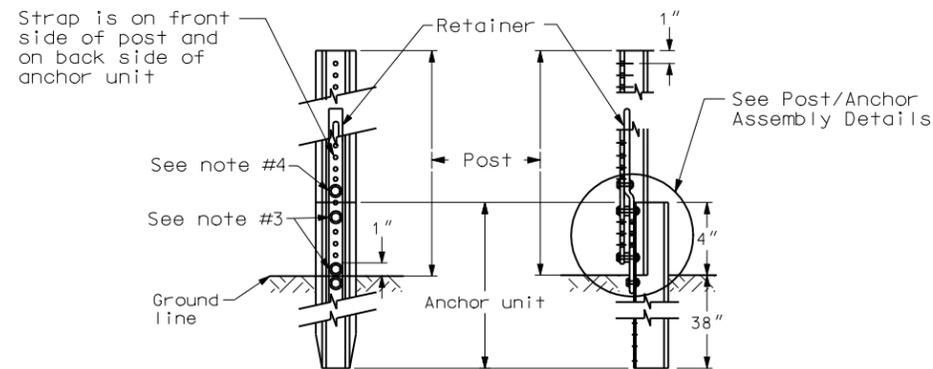
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

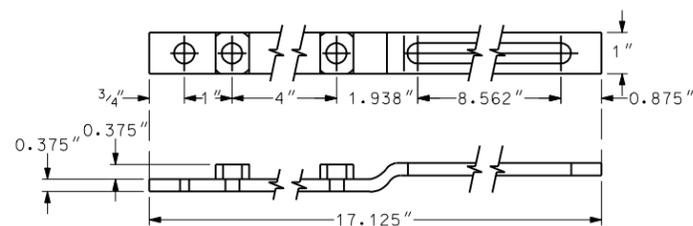
1. A) Drive anchor unit to within 12" of ground level.
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.
D) Rotate strap 90° to left.
2. 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



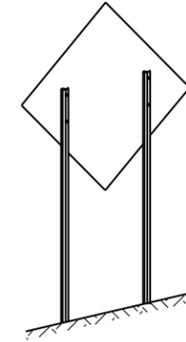
Front View Side View Sign Post Assembly Detail



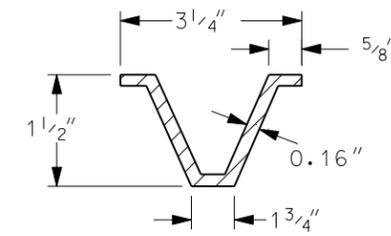
Retainer/Spacer Strap Detail

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

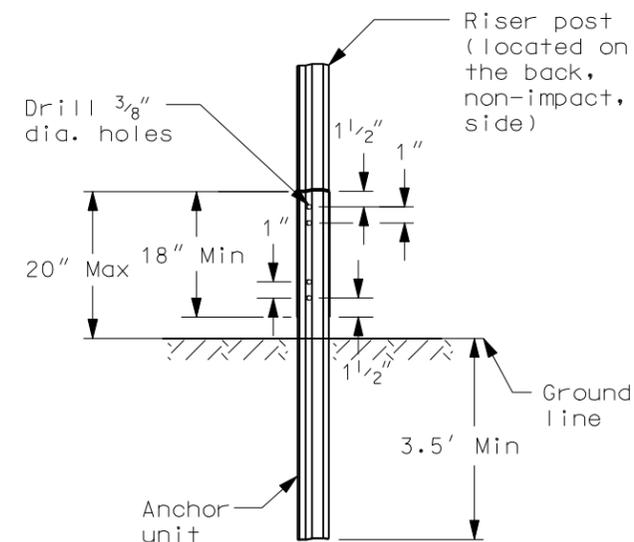
3 LB/FT U POSTS



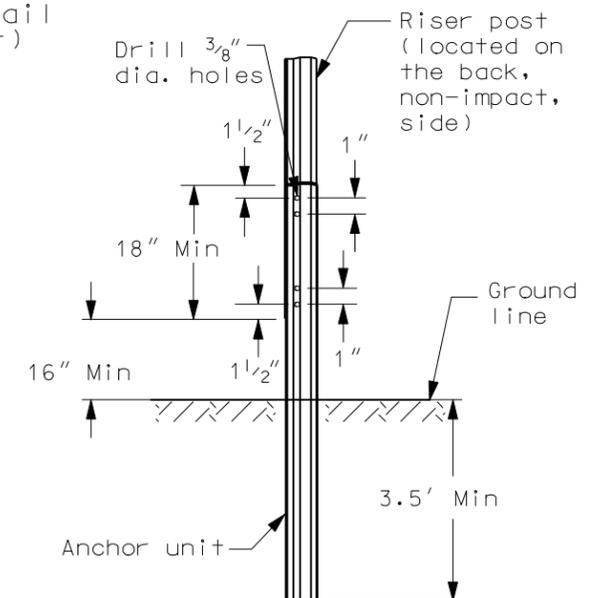
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

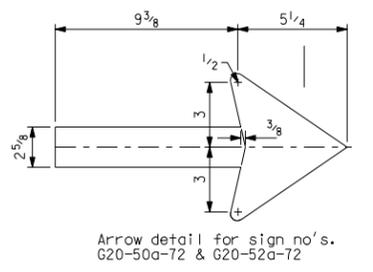
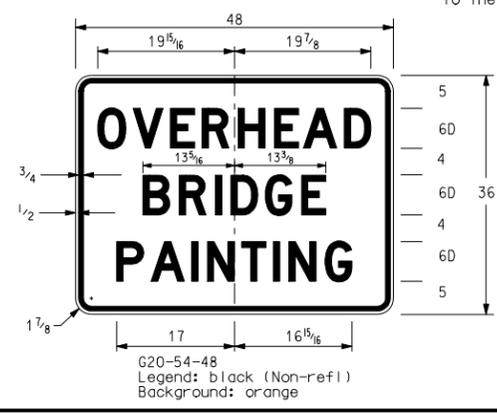
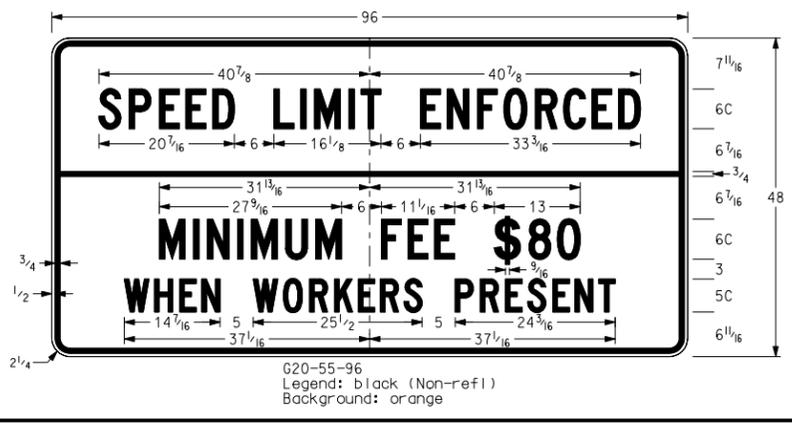
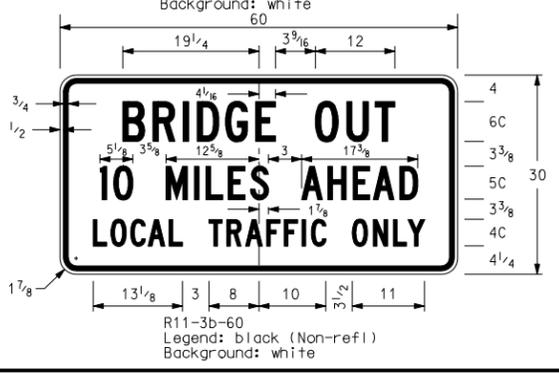
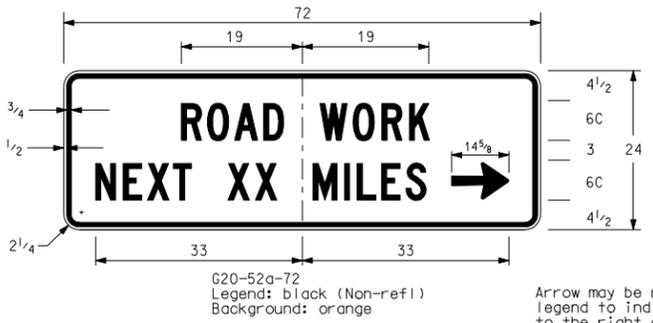
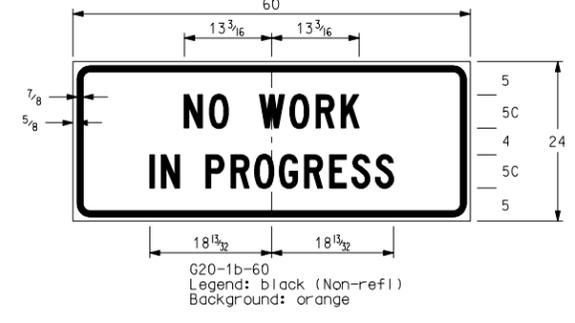
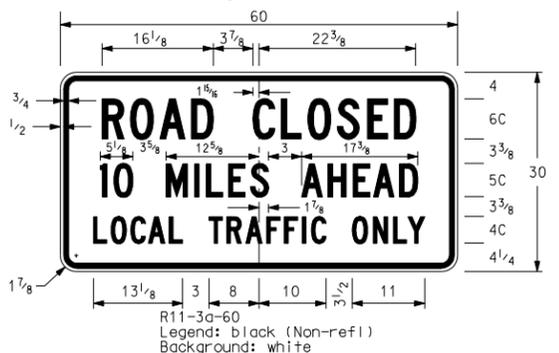
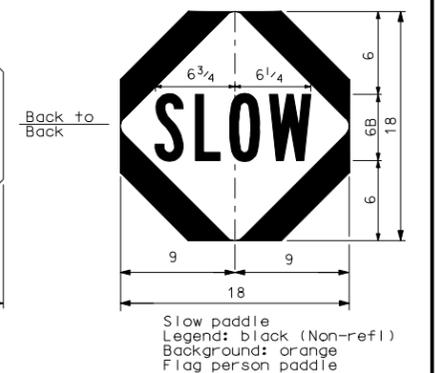
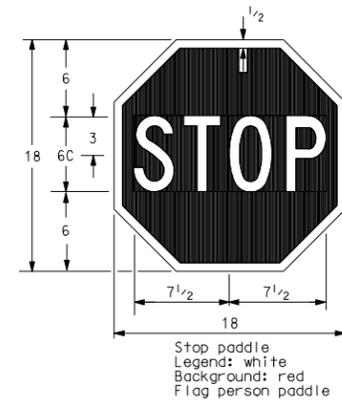
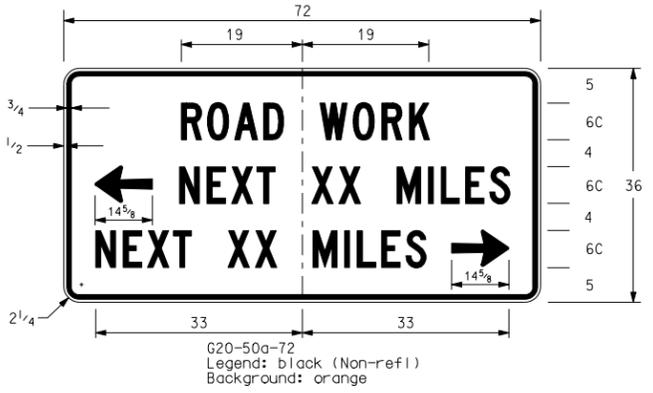
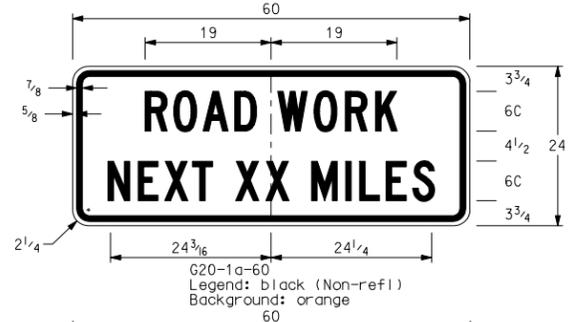
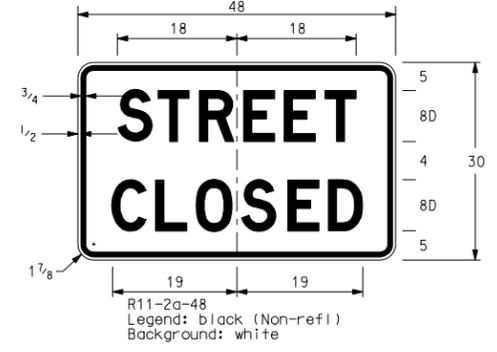
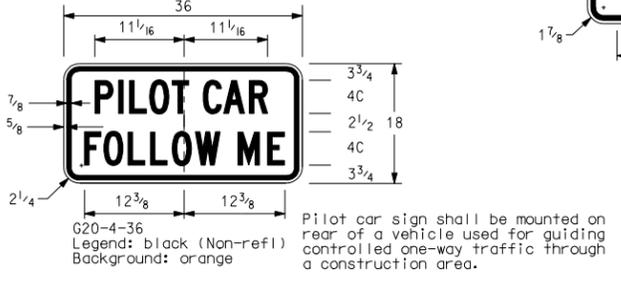
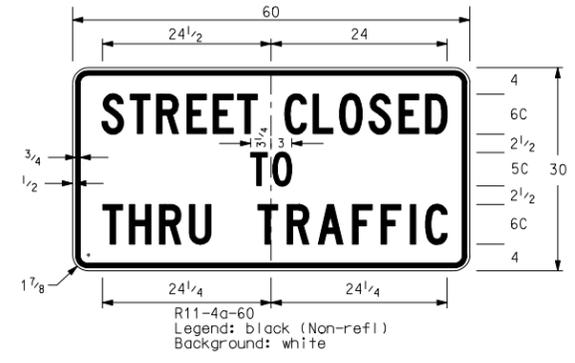
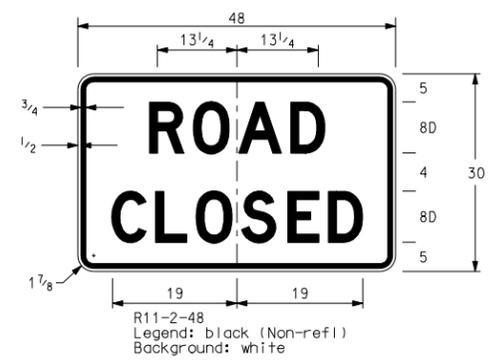
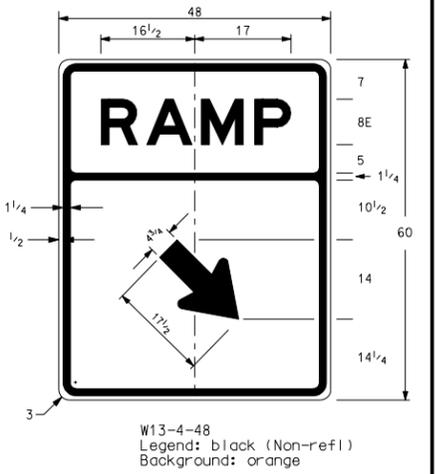
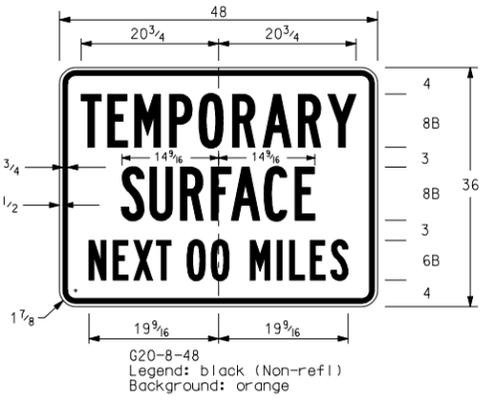
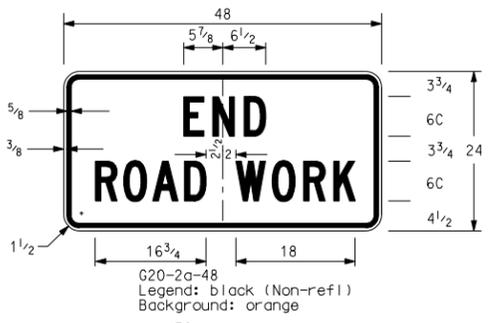
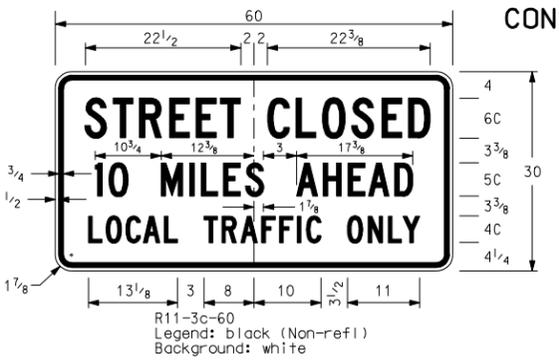
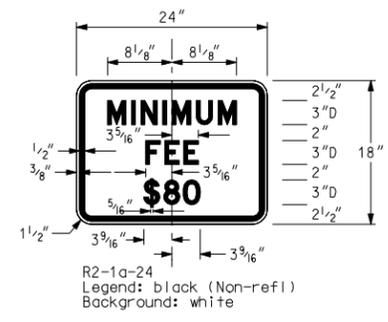
Notes

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'.

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

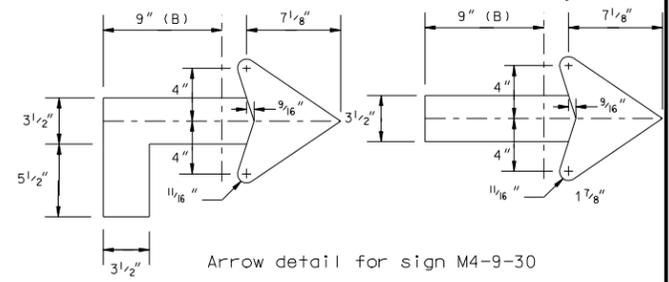
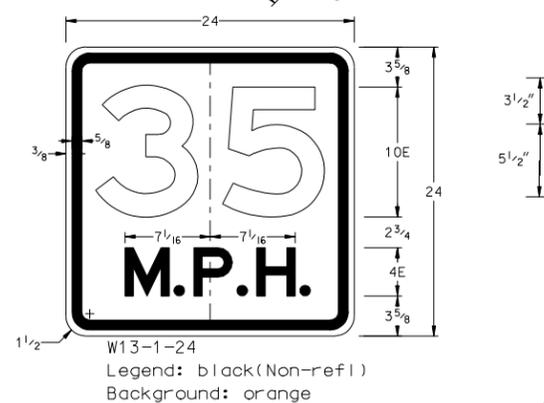
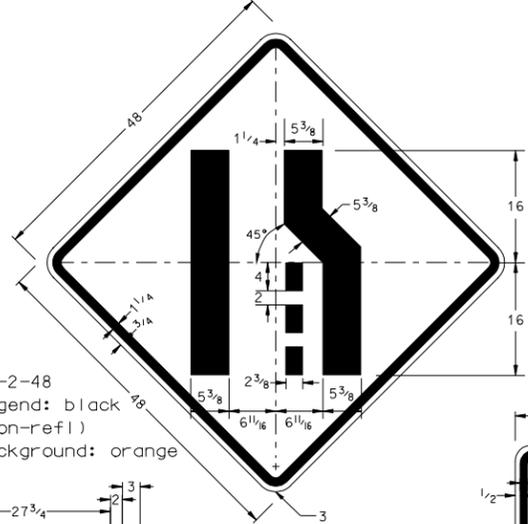
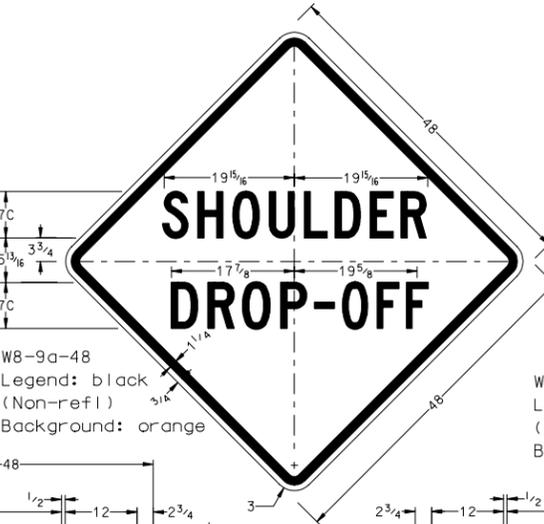
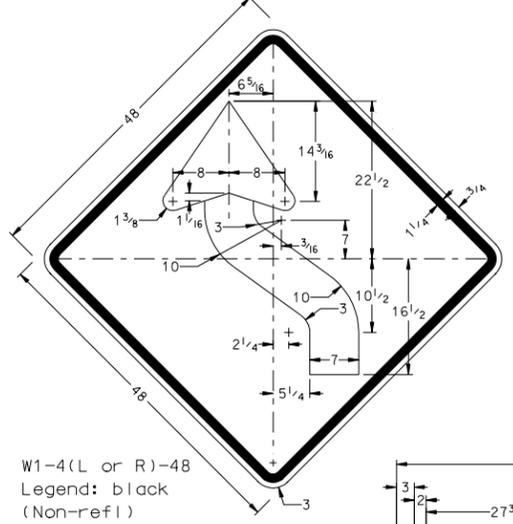
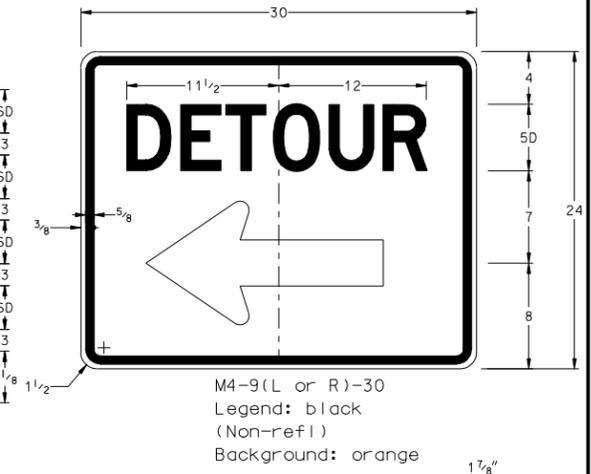
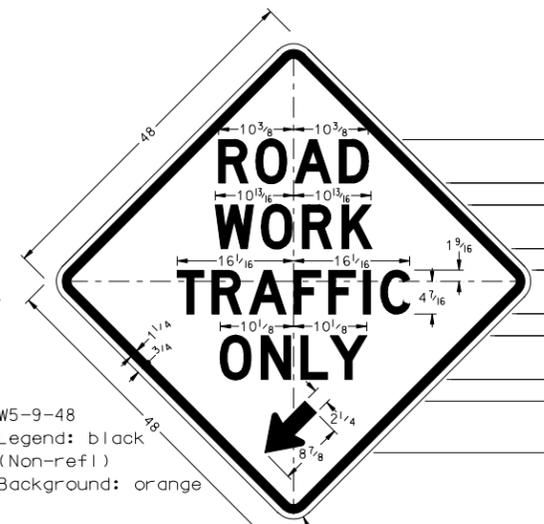
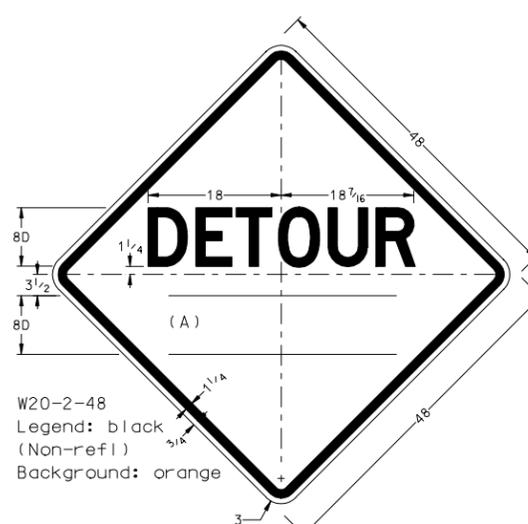
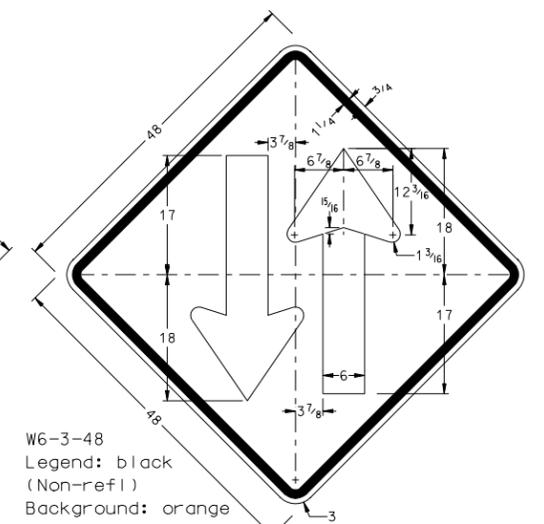
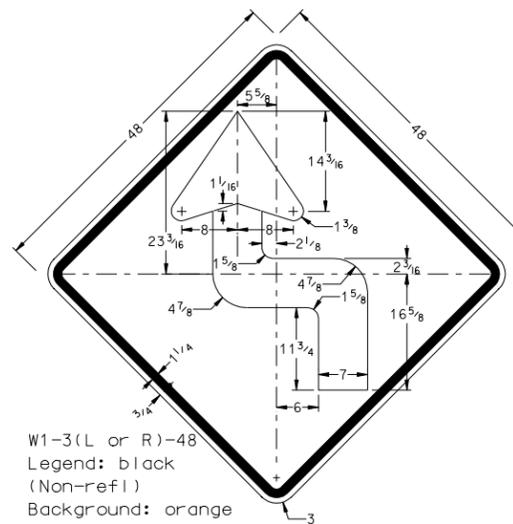
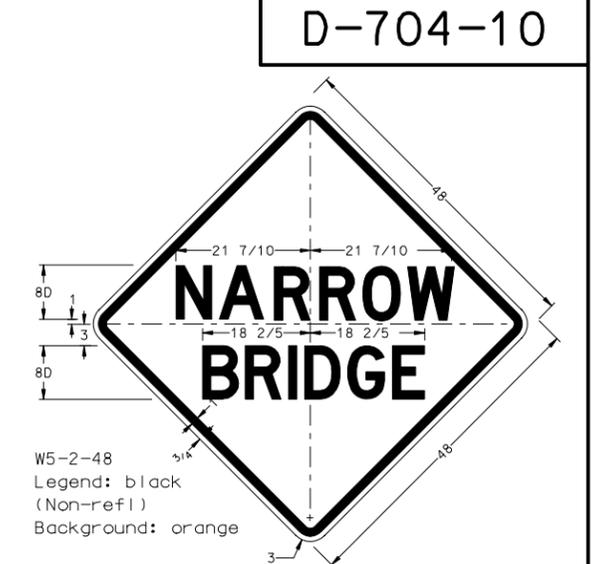
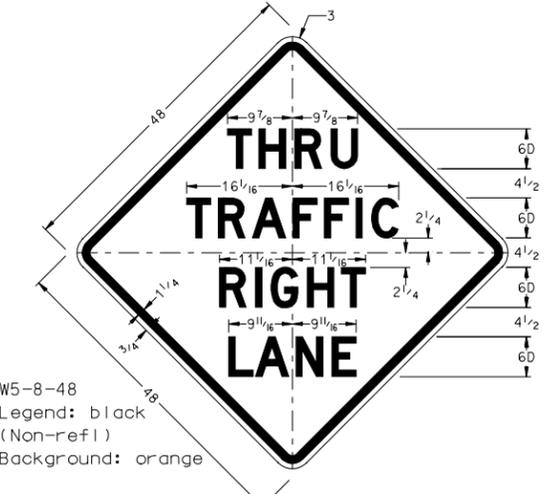
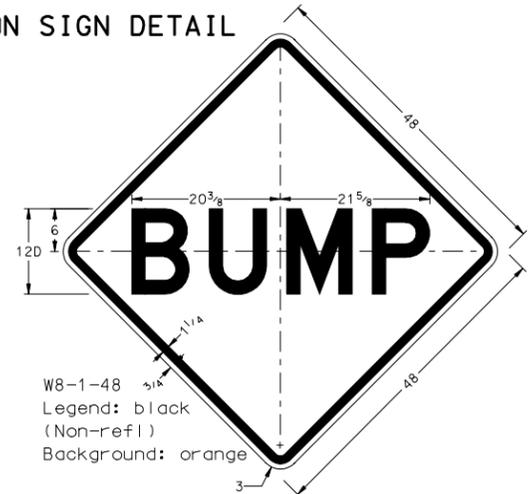
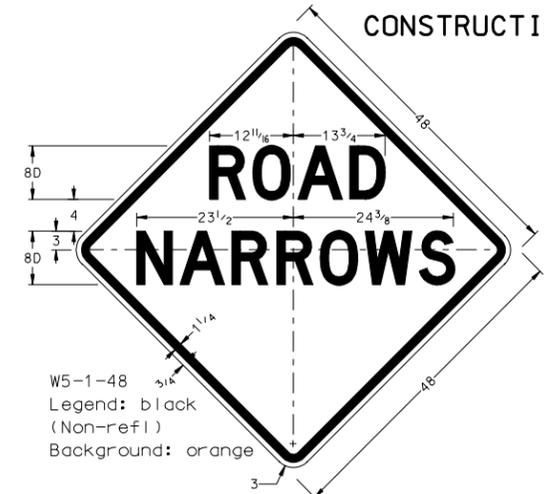
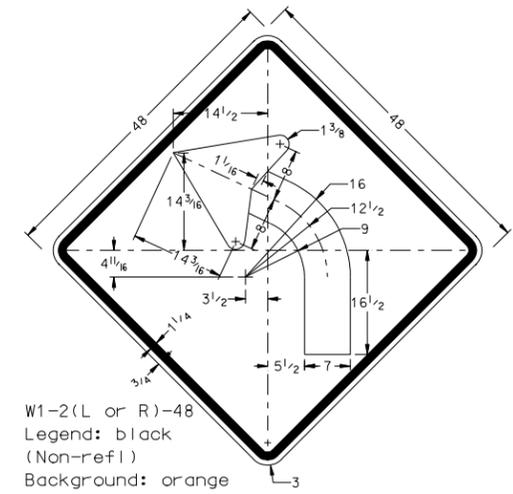


Arrow may be right or left of legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revision
07-26-95	Added signs G20-1a, G20-50a, R2-1a
03-04-96	Remove G20-2-60
10-18-01	G20-1b-60
01-30-03	Pavement end sign
07-25-04	Revised Fee Sign
04-01-04	Revised G20-55-96 sign
08-04-04	Deleted W8-3-48, Added Slow paddle
12-01-04	PE stamp added
07-11-05	Revised G20-4

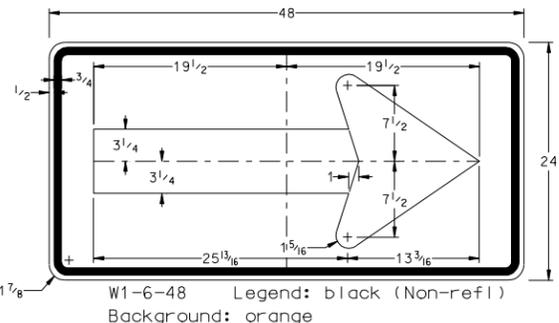
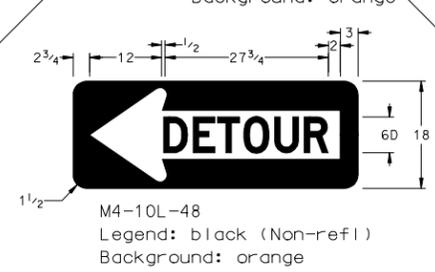
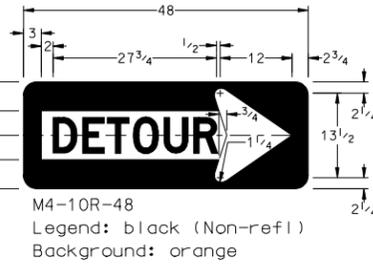
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CONSTRUCTION SIGN DETAIL



(A) See table on standard D-704-12 for messages and dimensions.

(B) Dimension shall be 3" when arrow is placed vertically.

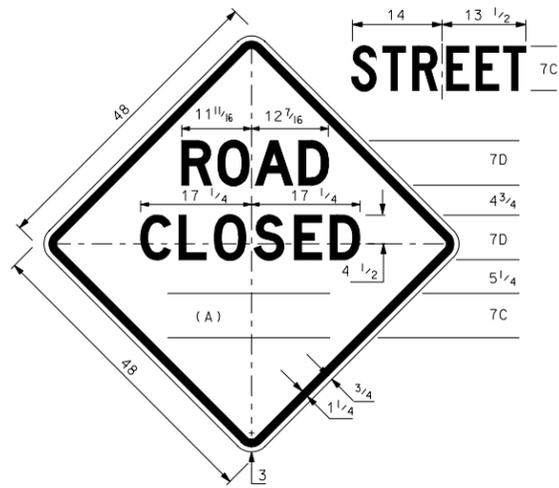


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Detour no.
12-01-88	Shoulder drop off
05-01-88	General revisions
02-03-95	W8-9a-48
03-04-96	Remove W20-1-48
05-01-00	W5-8-48, W5-9-48
11-07-00	Add W5-2-48
01-06-04	W4-9-30 to M4-9-30
08-04-04	add arrow detail
12-01-04	General revisions
07-11-05	PE stamp added
	Revised W8-9a and W4-2

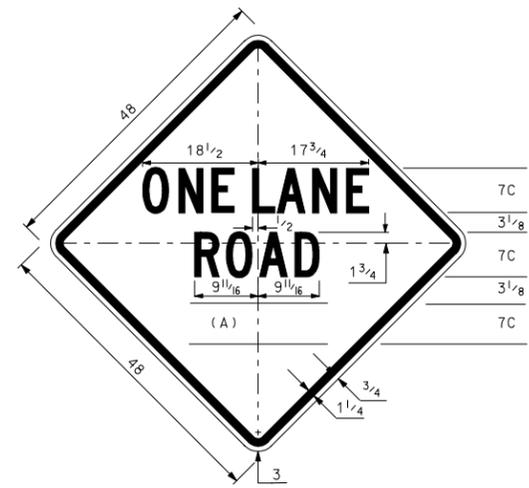
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CONSTRUCTION SIGN DETAIL

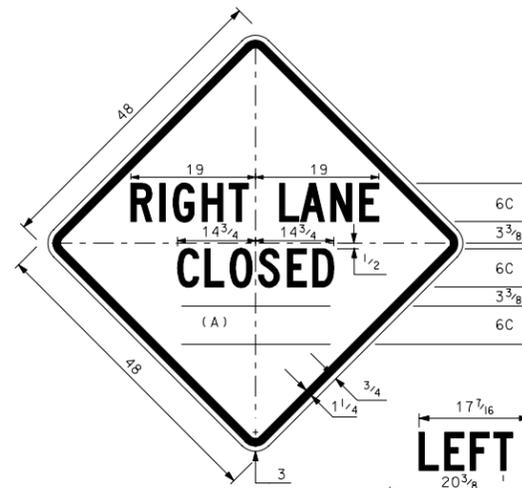
D-704-11



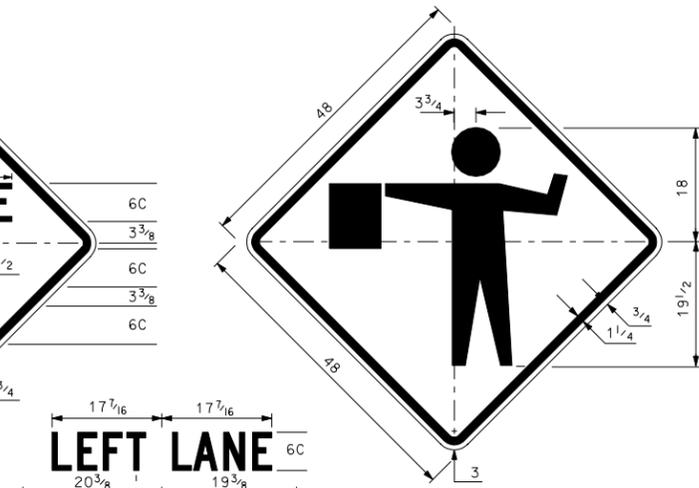
W20-3-48
Legend: black
(Non-refl)
Background: orange



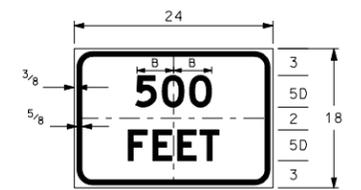
W20-4-48
Legend: black
(Non-refl)
Background: orange



W20-5-48
Legend: black
(Non-refl)
Background: orange



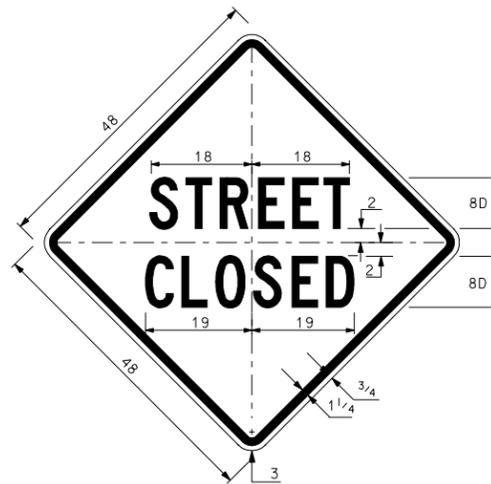
W20-7a-48
Legend: black
(Non-refl)
Background: orange



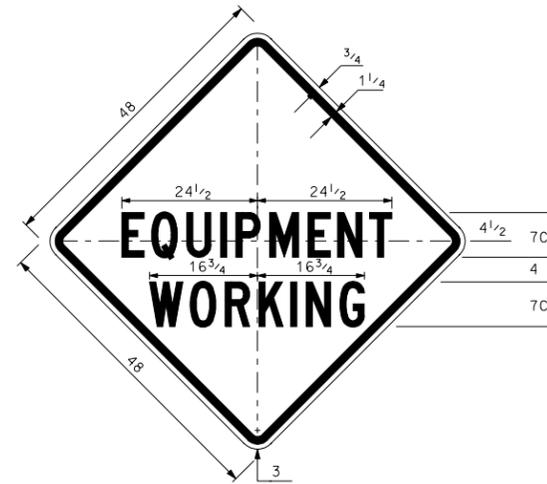
W20-7k-24
Legend: black
(Non-refl)
Background: orange

SIGN	DIMENSION B (INCHES)
500'	6
1000'	7 3/8
1500'	7 3/8

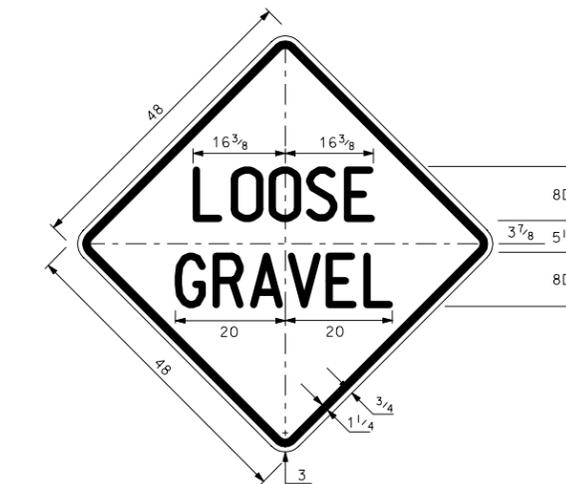
For use with
W20-7a-48 &
W21-1a-48



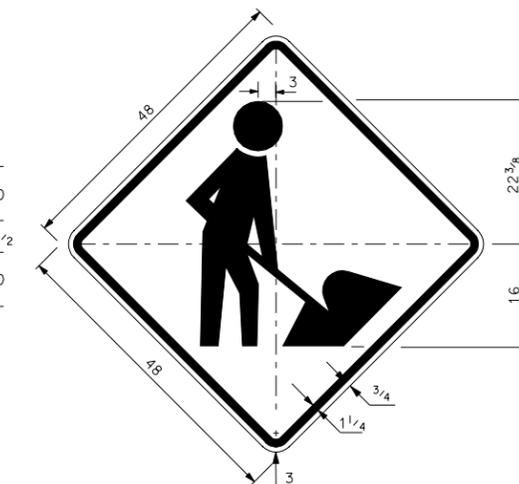
W20-8-48
Legend: black
(Non-refl)
Background: orange



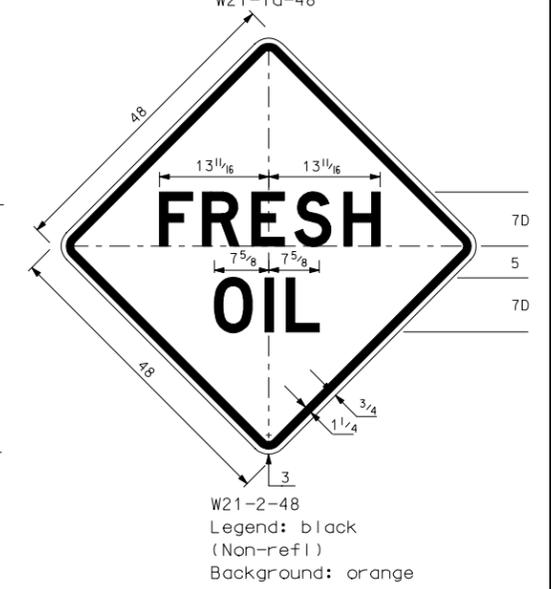
W20-51-48
Legend: black
(Non-refl)
Background: orange



W8-7-48
Legend: black
(Non-refl)
Background: orange



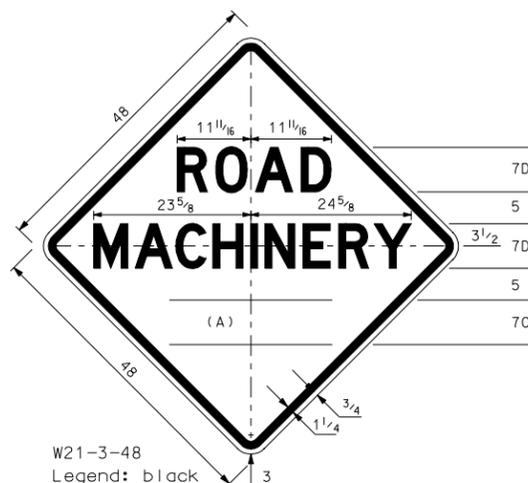
W21-1a-48
Legend: black
(Non-refl)
Background: orange



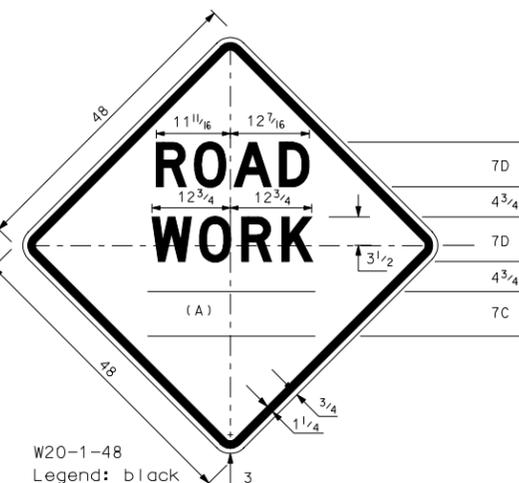
W21-2-48
Legend: black
(Non-refl)
Background: orange



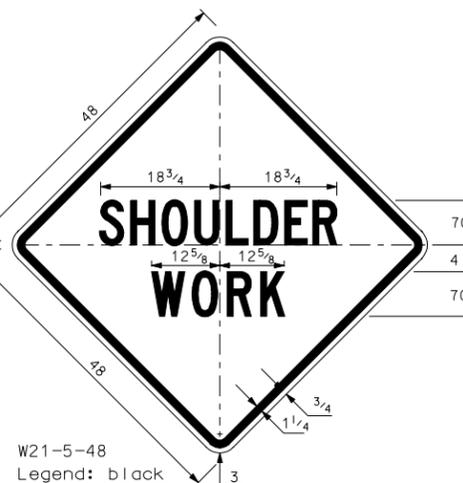
W20-52-54
Legend: black
(Non-refl)
Background: orange



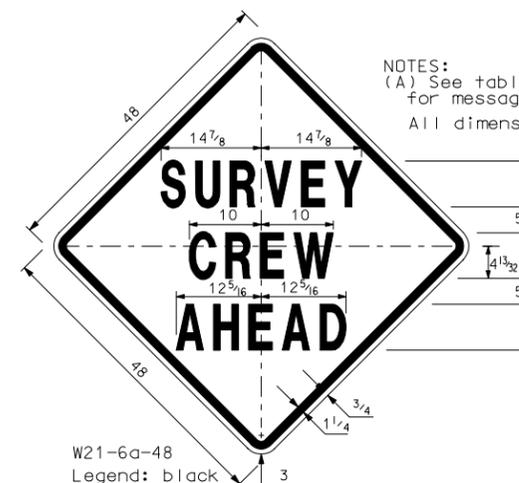
W21-3-48
Legend: black
(Non-refl)
Background: orange



W20-1-48
Legend: black
(Non-refl)
Background: orange



W21-5-48
Legend: black
(Non-refl)
Background: orange



W21-6a-48
Legend: black
(Non-refl)
Background: orange

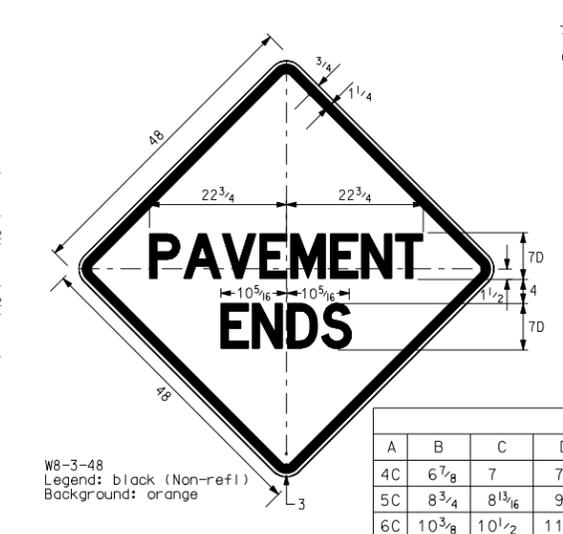
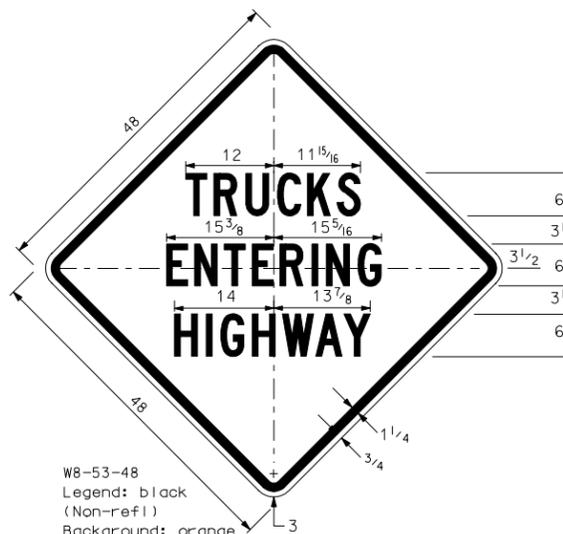
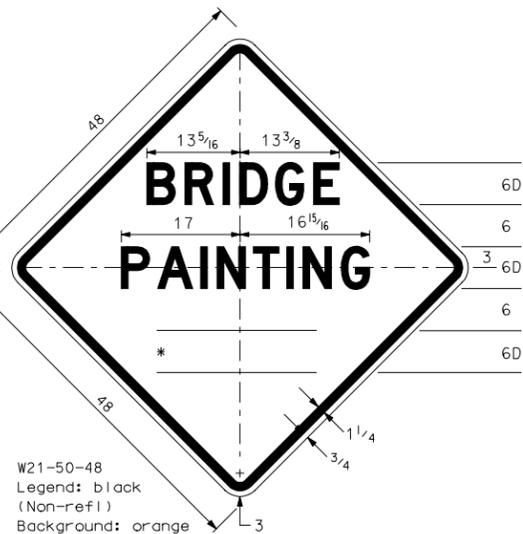
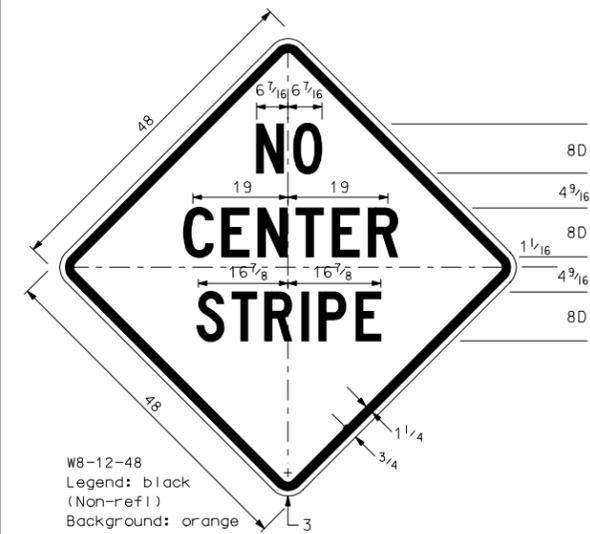
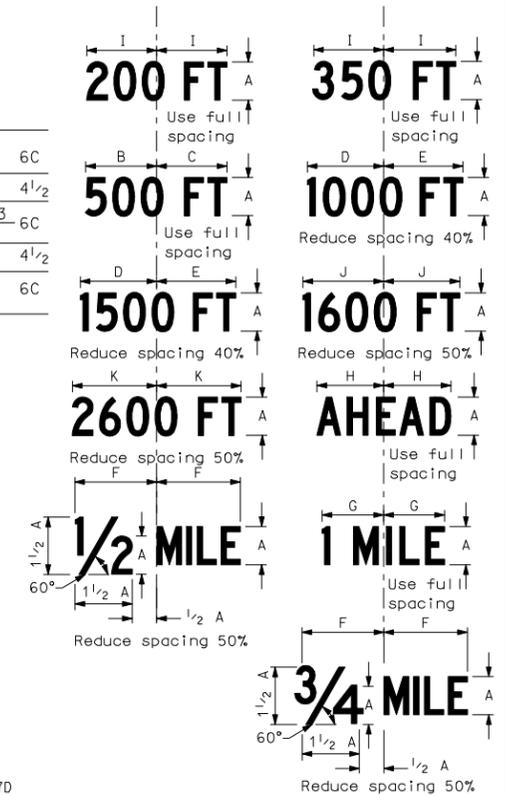
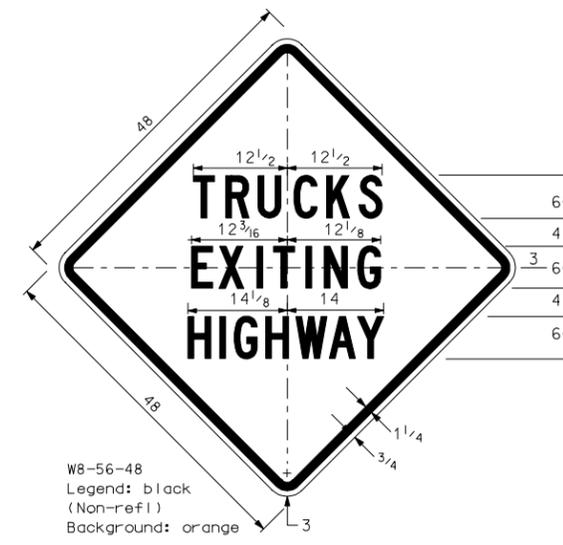
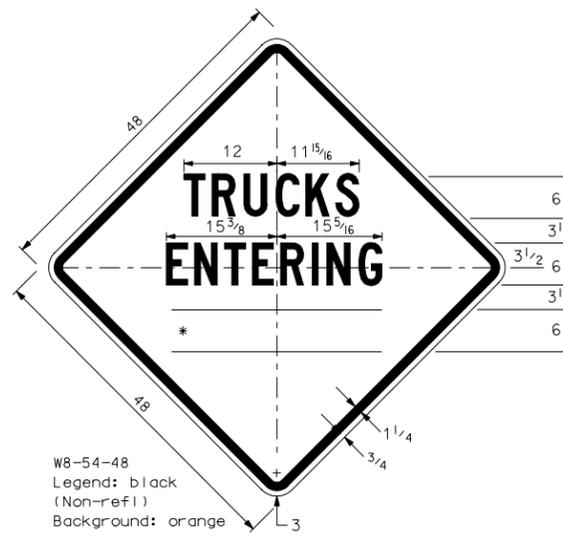
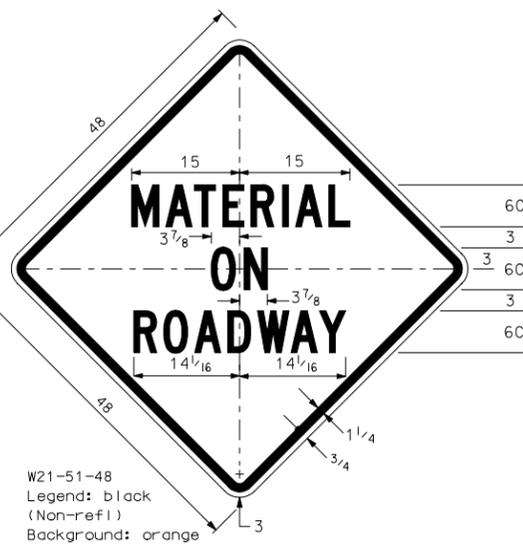
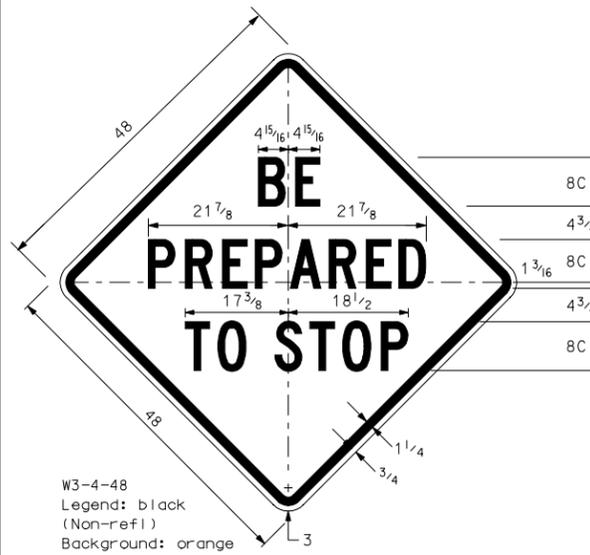
NOTES:
(A) See table on standard D-704-12
for messages and dimensions.
All dimensions are in inches

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revisions
06-09-95	Chg 7D to 7C(Dwg)
	W20-3, W21-3 & W21-4
05-26-98	Add W7-7-48
11-06-00	Rev W20-52-54
01-25-01	W21-6a-48
07-25-03	Rev W21-4 to W20-1
08-05-04	General revisions
12-01-04	PE stamp added
07-11-05	Revised W21-3, W20-1, W20-7a, W21-1a and W20-7k

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CONSTRUCTION SIGN DETAIL

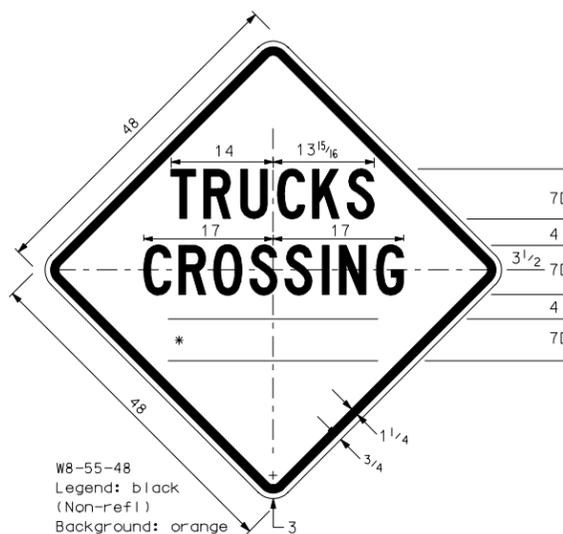
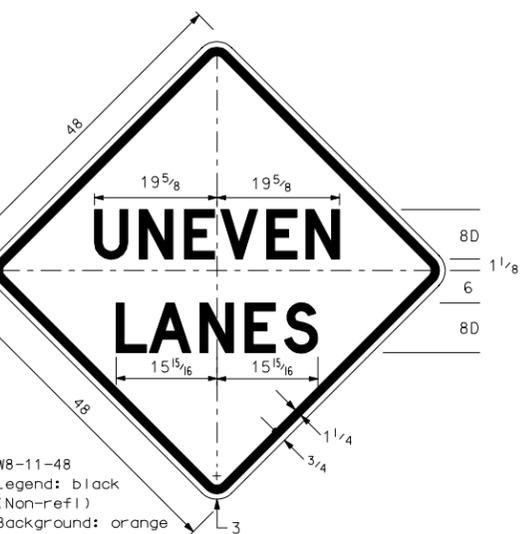
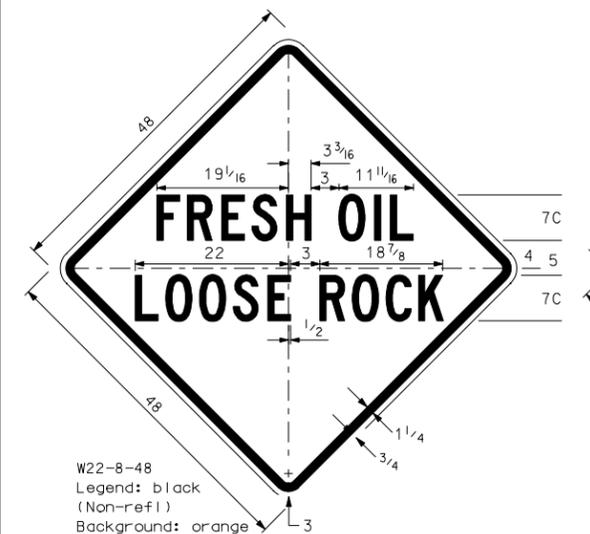
D-704-12



* DIMENSIONS (INCHES)

	A	B	C	D	E	F	G	H	I	J	K
4C	6 7/8	7	7 1/2	8	8 5/16	6 1/16	7	8 5/16	9 1/8	9 3/4	
5C	8 3/4	8 13/16	9 3/8	10	10 7/16	7 5/8	8 3/4	10 1/16	11 1/16	12 3/16	
6C	10 3/8	10 1/2	11 1/4	12	12 1/2	9 1/8	10 1/2	12 1/2	13 3/4	14 5/8	
7C	12	12 3/16	13 1/8	14	14 9/16	10 5/8	12 1/4	14 9/16	15	15 5/8	
8C	13 3/4	14	15	16	16 5/8	12 1/8	14	16 3/4	18 1/4	19 1/2	
4D	8 1/8	8 5/8	8 1/2	9	9	7 3/16	8 1/16	9 3/4	10 3/4	11 3/8	
5D	10 3/16	10 13/16	11 5/8	11 1/4	11 1/4	9 1/2	10 7/8	12 1/8	13 1/4	14 1/4	
6D	12 3/16	12 15/16	13 3/4	13 1/2	13 1/2	11 13/16	13 1/8	14 9/16	14 7/8	15 1/2	
7D	14 1/4	15 1/8	14 7/8	15 3/4	15 3/4	13 1/16	15 1/2	15 1/8	15 1/2	16 1/8	
8D	16 1/4	17 1/4	17	18	18	14 3/8	17 7/16	19 1/4	17 3/4	19 5/16	

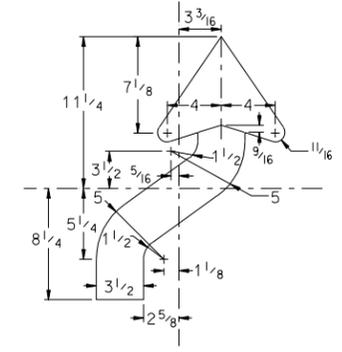
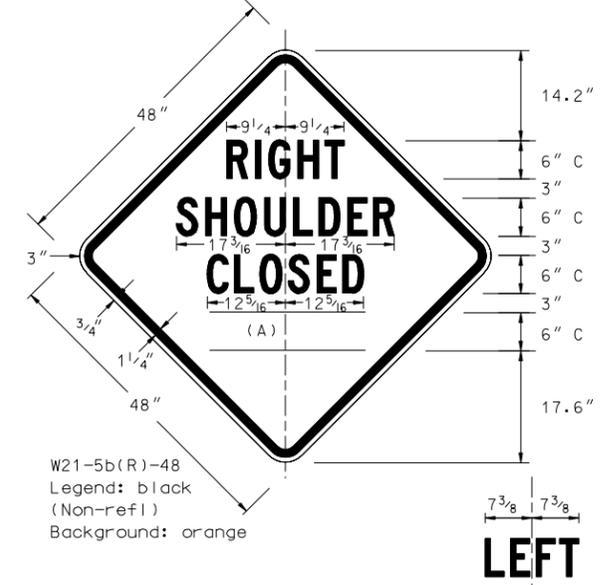
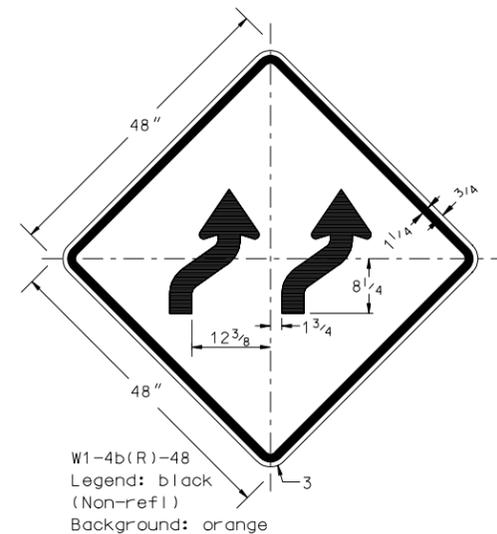
Standard signs that are shown in the construction sign and barricade location details shall be fabricated in the shape, color, and dimensions as shown in the standard signs layout booklet.



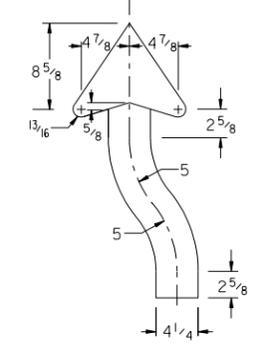
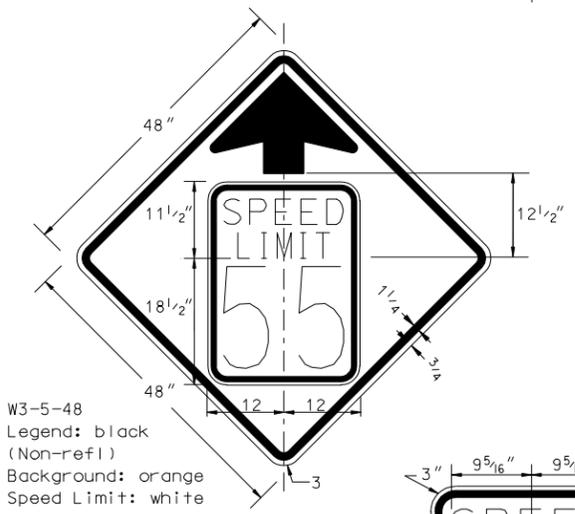
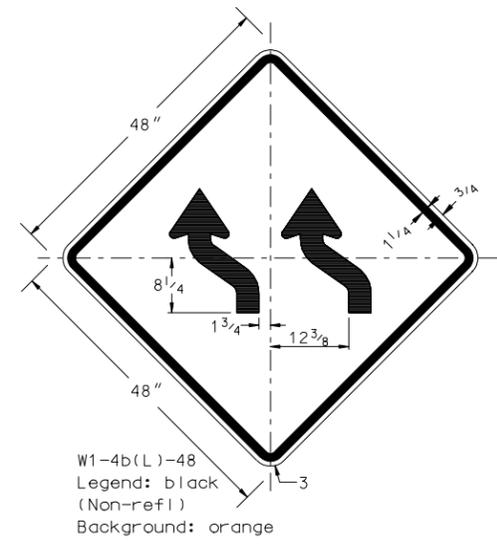
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
12-01-88	Uneven pavement
05-01-92	General revisions
01-24-95	W8-12-48
02-03-95	W8-11-48
06-15-95	General revisions
05-19-98	Added 3/4 mile
05-26-99	Added W8-56-48
08-05-04	Deleted slow paddle added W8-3-48
12-01-04	PE stamp added
07-11-05	Changed W20-7b to W3-4, Revised W8-11 and W8-12

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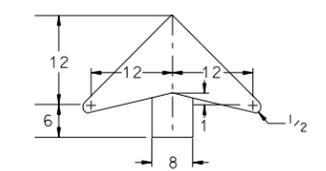
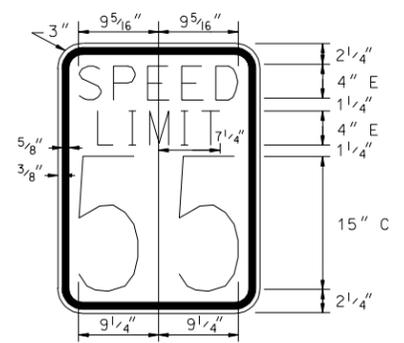
CONSTRUCTION SIGN DETAIL



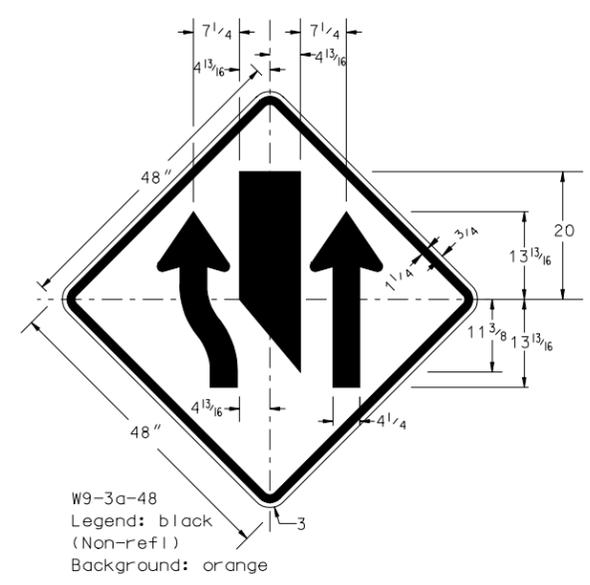
Arrow detail for sign M1-4b(R or L)-48



Arrow detail for sign M9-3a-48



Arrow detail for sign W3-5-48

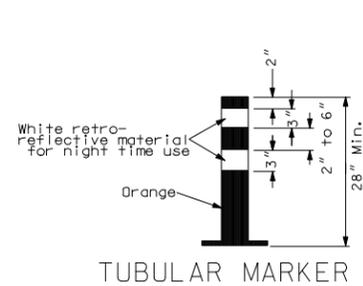


(A) See table on standard D-704-12 for messages and dimensions.

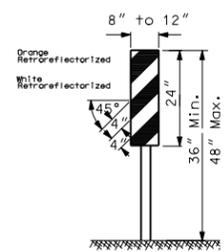
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-12-02	
REVISIONS	
DATE	CHANGE
04-01-04	Added W21-5b-48
08-06-04	General revisions
12-01-04	PE stamp added
06-14-05	Added W3-5-48

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BARRICADE DETAILS AND CHANNELIZING DEVICES



TUBULAR MARKER



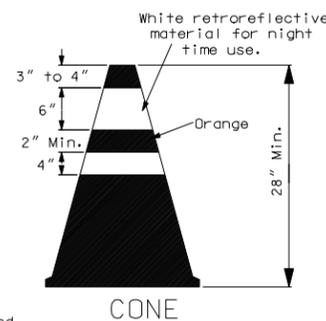
VERTICAL PANEL

(Retro-reflective sheeting shall be placed on both sides)
NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"

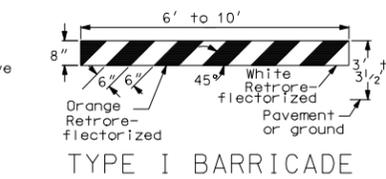


DELINEATOR DRUM
36" Min. height

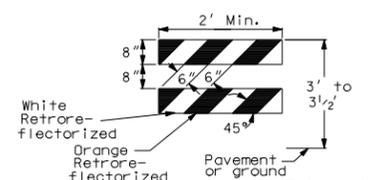
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retro-reflective sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall be prepared as recommended by the sheeting manufacturer before retro-reflective sheeting is applied.



CONE

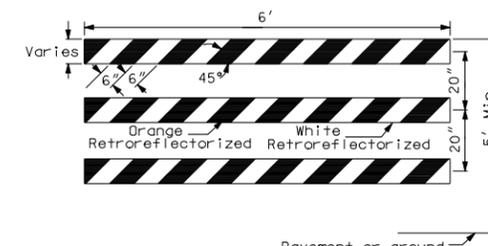


TYPE I BARRICADE



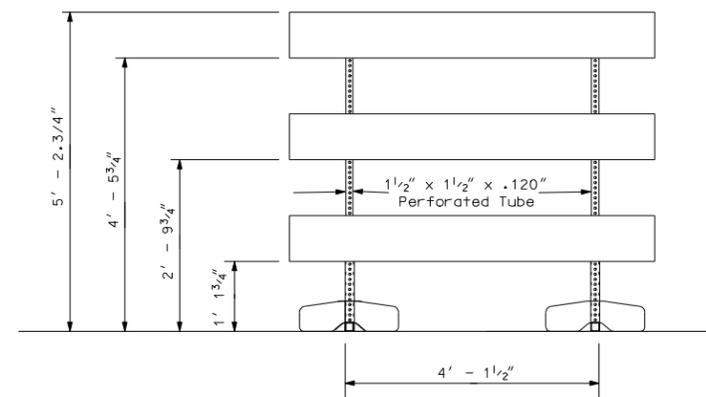
TYPE II BARRICADE

Rail stripe width shall be 4" if barricade length is less than 36".

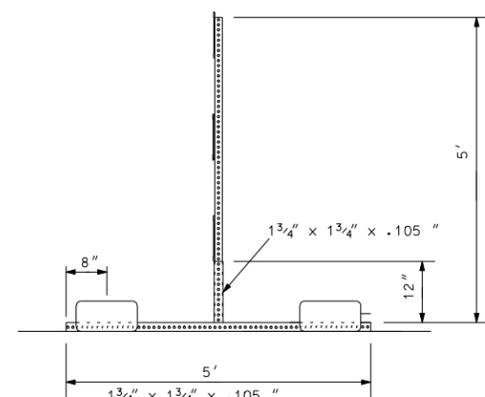


TYPE III BARRICADE

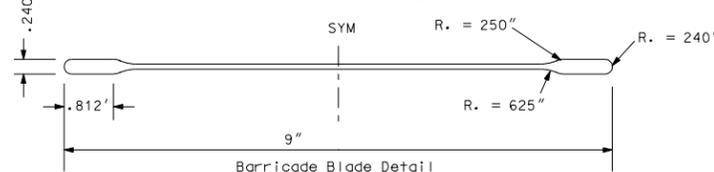
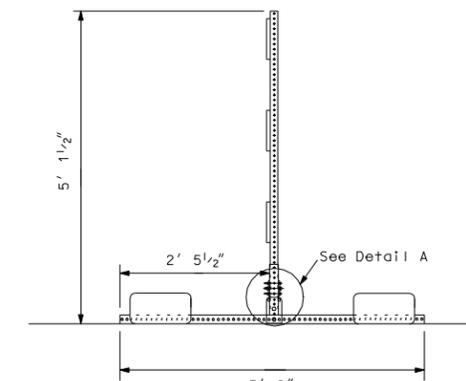
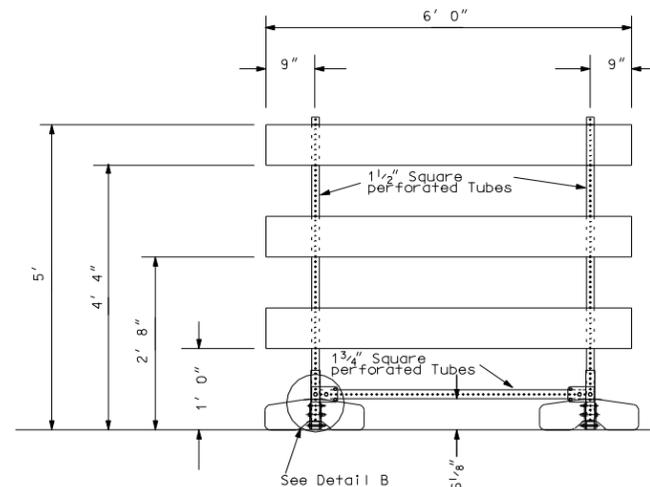
BARRICADES:
Number of retro-reflective rail faces:
Type I - 2 (One each direction)
Type II - 4 (Two each direction)
Type III - 6 (Three in each direction)



FRONT VIEW



END VIEW



Barricade Blade Detail

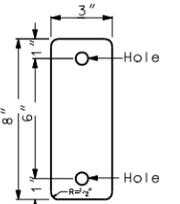
Ballast = 45lb sandbag at the end of each leg.
Barricade blade fastened to vertical supports with 2" corner bolts.
Vertical portion of leg is welded to horizontal portion on all four sides.
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

BARRICADE ASSEMBLY DETAIL
(Use when aluminum blade as detailed above)



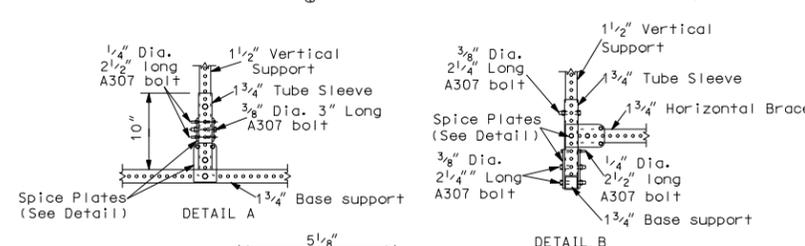
ACRYLIC PLASTIC REFLECTOR

Delineator reflector shall meet the requirements of section 894



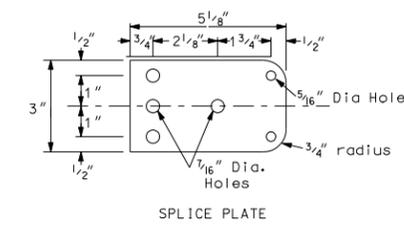
DELINEATOR REFLECTOR

3"x8"-18 Gauge galvanized steel sheet or 0.080" aluminum plate with white retro-reflective sheeting (Type 3A or 3B) as specified in section 894 of the Standard Specifications.



DETAIL A

DETAIL B



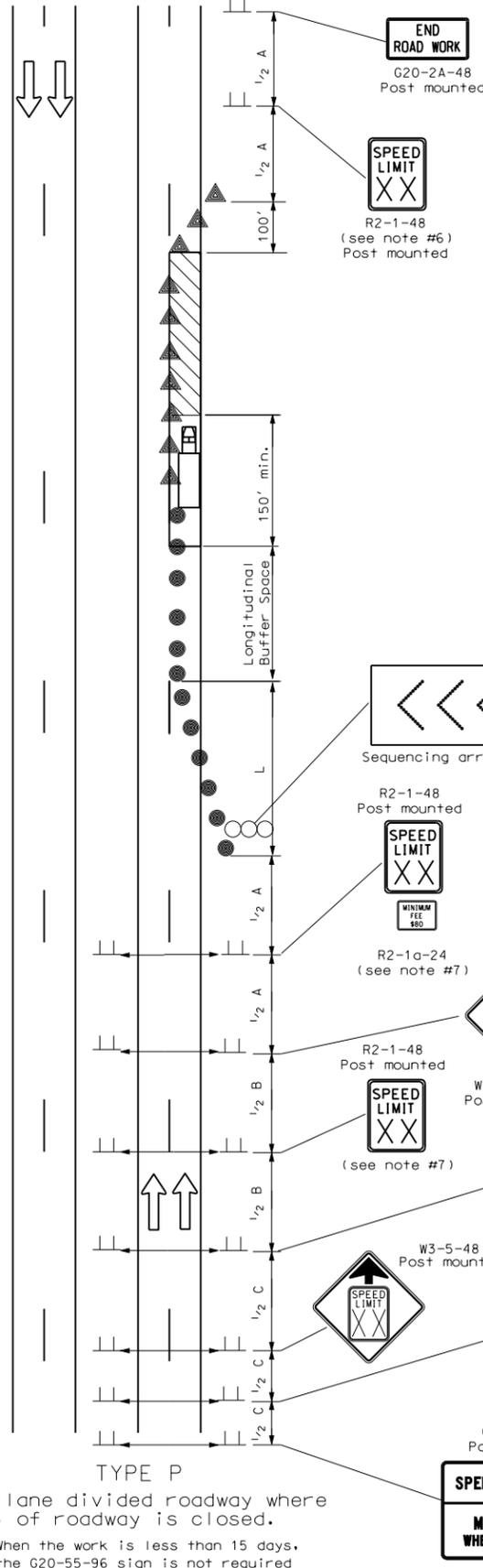
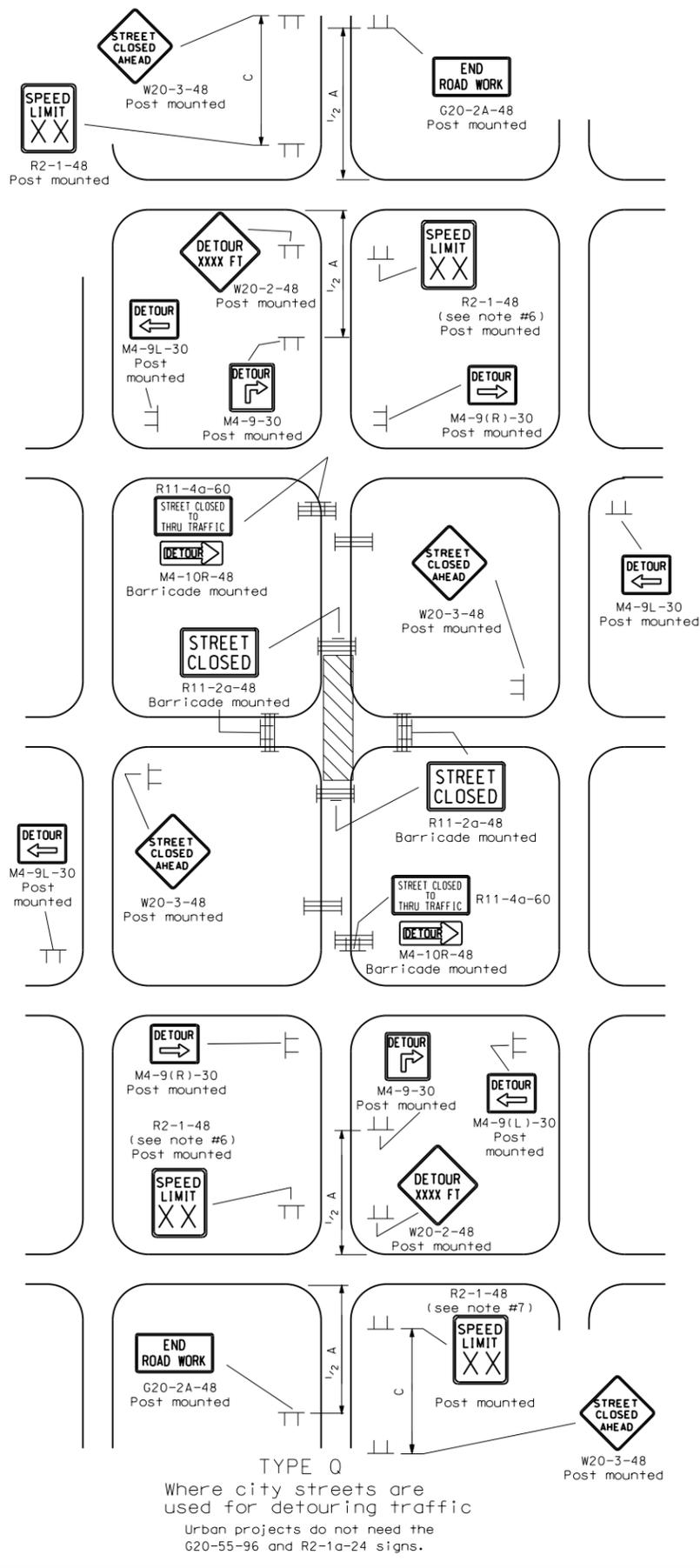
SPLICE PLATE

BARRICADE ASSEMBLY DETAIL
(Use when Plastic I-Beam w/ 1 1/2" Hollow Core Flanges or 1" x 8" x 72" wood boards.)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Type sheeting
10-01-87	Delineator drum note
06-08-88	Barricade type III
06-01-92	General revision
06-10-93	General revision
09-23-93	Vertical panel
06-09-95	Reflective sheeting
03-01-02	Barricade type III assembly details
04-01-02	Type III barricade
12-01-04	PE stamp added
06-29-05	Revised Type II barricade stripe

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CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



- Notes
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper
 - L = Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Signs shown to be placed on the roadway shall be placed on skid mounted assemblies.
 - Delineator drums, or cones used for tapering traffic shall be spaced at dimension "S". Delineator drums, or cones used for tangents shall be spaced at 2 times "S".
 - Existing striping shall be removed as required. Delineator will only be used when in slope is 4:1 or better and roadway alignment is visible to approaching vehicles. Vertical panels shall be used where roadways has steep slopes and not visible to approaching vehicles. Delineators and vertical panels shall be installed back to back.
 - Sequencing Arrow Panels
 - Panel should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room the panel should be moved closer to the work area so that it can be placed on the roadway surface.
 - Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph and 750 ADT or less).
 - Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph 5000 ADT or less).
 - Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 - Use when work area is 1 mile or longer.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 - Intersection control for Type Q may have to be changed on detour. The Engineer in the field shall determine what control is necessary.
 - Where necessary, safe speed to be determined by the Engineer. When parking is present, signs shall be placed so they are entirely visible above parked vehicles or placed at the edge of the parking area so they are visible to oncoming traffic. These signs may be skid mounted when placed on the roadway surface.
 - The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.

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

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

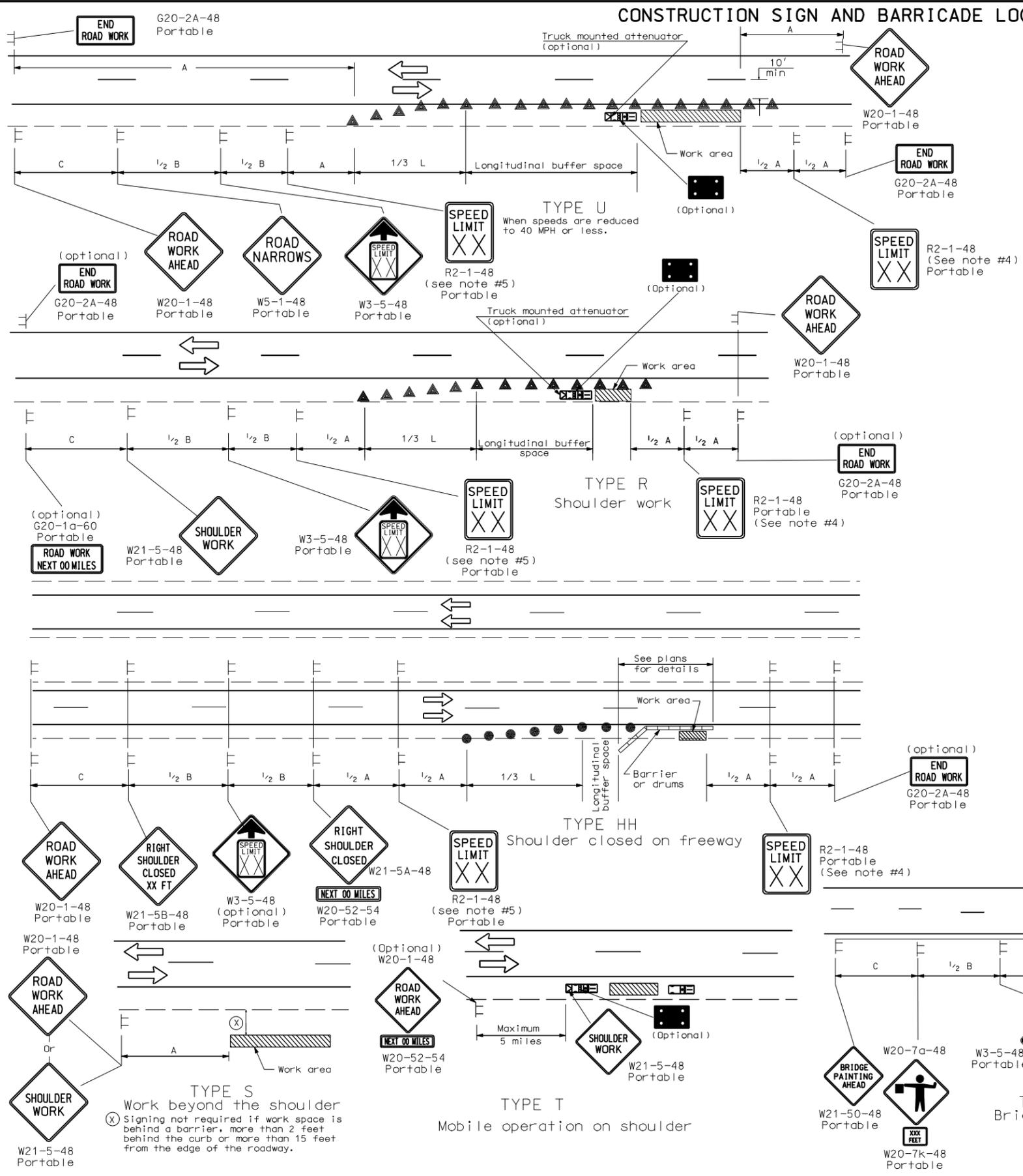
	Type I barricade		Work area
	Type II barricade		Flagger
	Type III barricade		Sequencing arrow panel
	Sign		Type A delineator or vertical panels back to back
	Delineator drum		
	Cones		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
09-03-96	70 MPH Sign spacing
01-31-97	General revisions
10-01-99	Add Taper Width to note
11-15-99	Revised note 3
01-05-01	Revised End Road Work & Speed Limit Signs
07-19-02	Revised R2-1a and W20-1
07-25-03	Rev. fee sign & warning & buffer spacing. Rev note 7
04-01-04	General revisions
09-15-04	PE Stamp added
12-01-04	Revised W4-2, Replaced R2-5a with W3-5.
06-29-05	Rev. Adv. Warning Table. Rev. Note 7

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CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

- 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, or cones used for tapering traffic shall be spaced at dimension "S". Delineator drums, or cones 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 and 750 ADT or less).
 Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph and 5000 ADT or less).
 Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
 The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $1/2 B$.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.



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

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

KEY

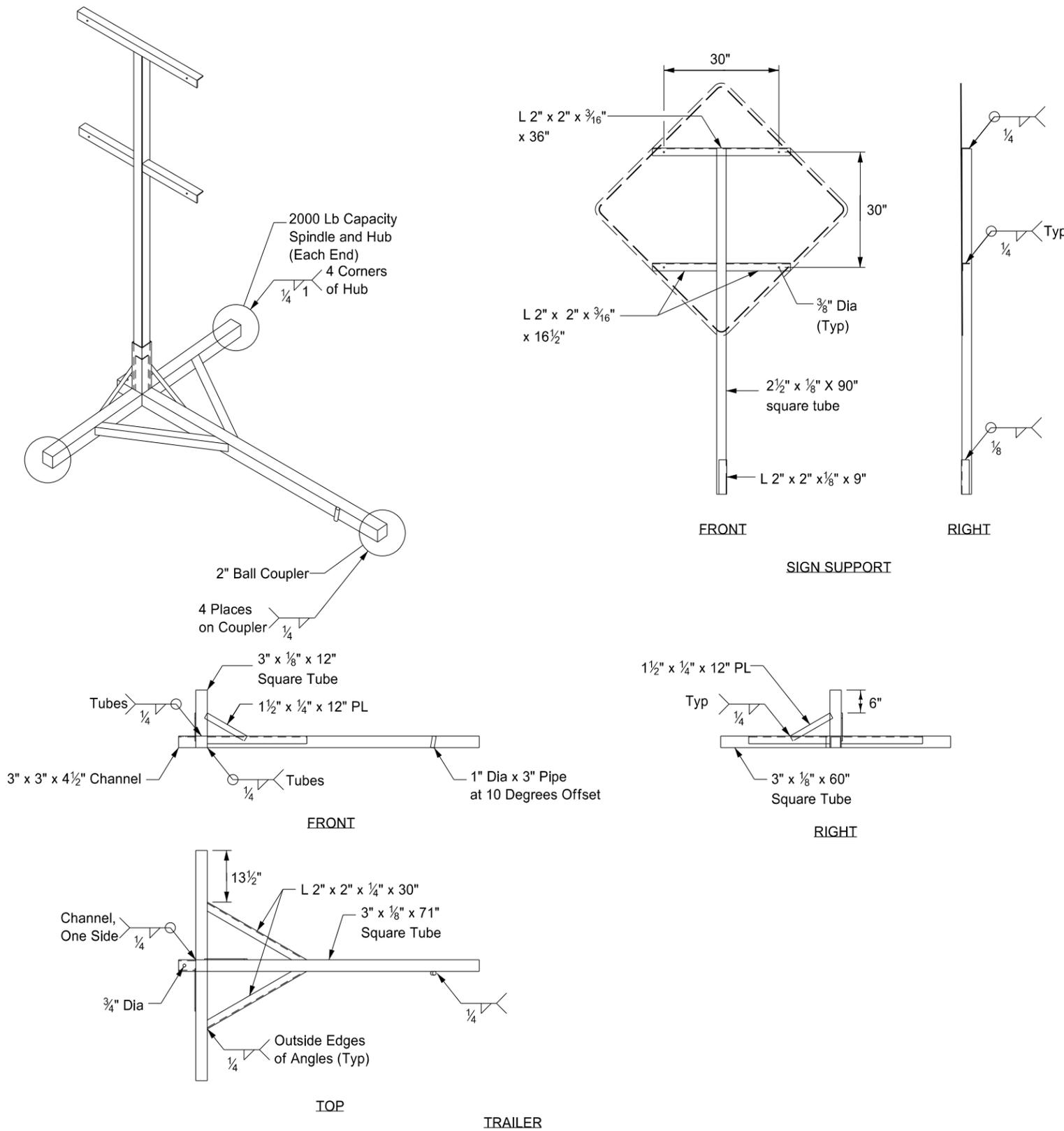
- Type I barricade
- Type II barricade
- Type III barricade
- Sign
- Delineator drum
- Cones
- Work area
- Flagger
- Sequencing arrow panel
- Type A delineator or vertical panels back to back

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-1-86	
DATE	REVISIONS
10-01-99	General revisions
10-04-99	Type HH barrier
11-15-99	Add taper width & note
03-15-01	Revised note 2
07-19-02	Reversed End Road Work & Speed Limit signs
07-25-03	Revised R2-1a and W20-1
04-01-04	Removed fee sign & rev warning & buffer spacing rev note 5
12-01-04	PE Stamp added
06-29-05	Replaced R2-5a with W3-5 Rev. Adv. Warning Table, Rev. Note 5

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

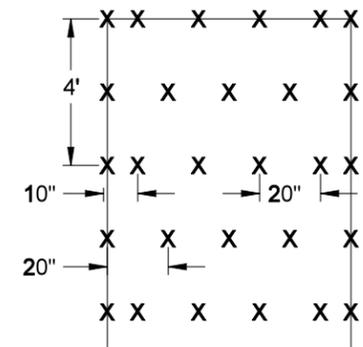
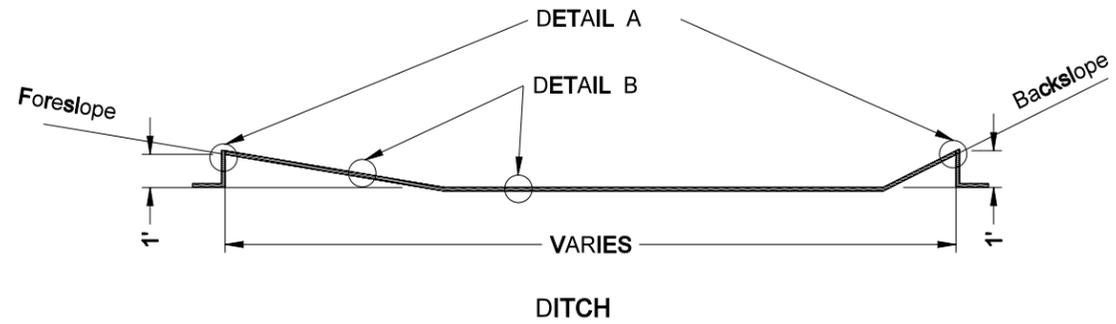
- ① The maximum weight of the assembly is 250 pounds.
- ② Use a 14" wheel and tire.
- ③ Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
- ④ Other NCHRP 350 crash tested assemblies are acceptable.

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

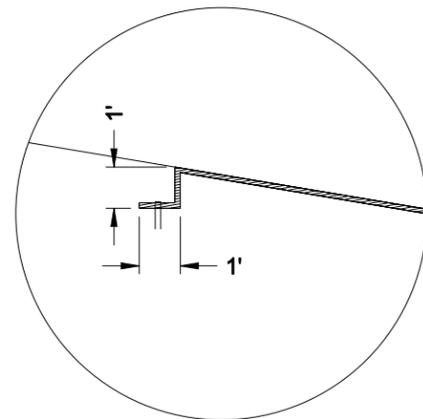
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EROSION AND SILTATION CONTROL BLANKET INSTALLATION

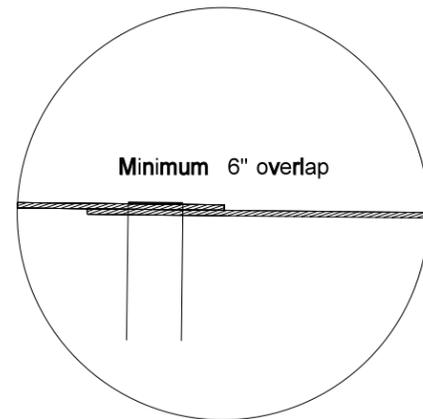
D-708-5



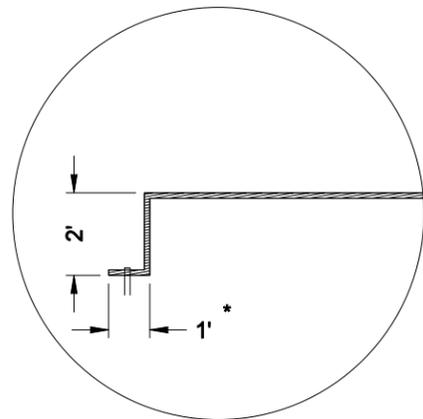
STAPLE PATTERN: 3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



DETAIL A

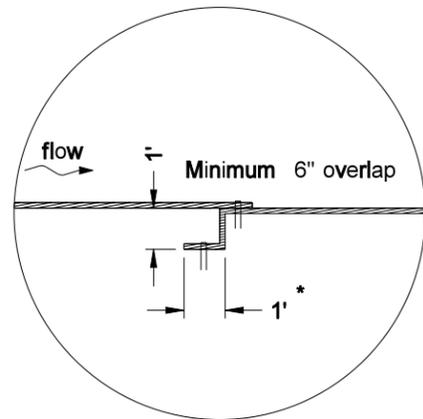


DETAIL B

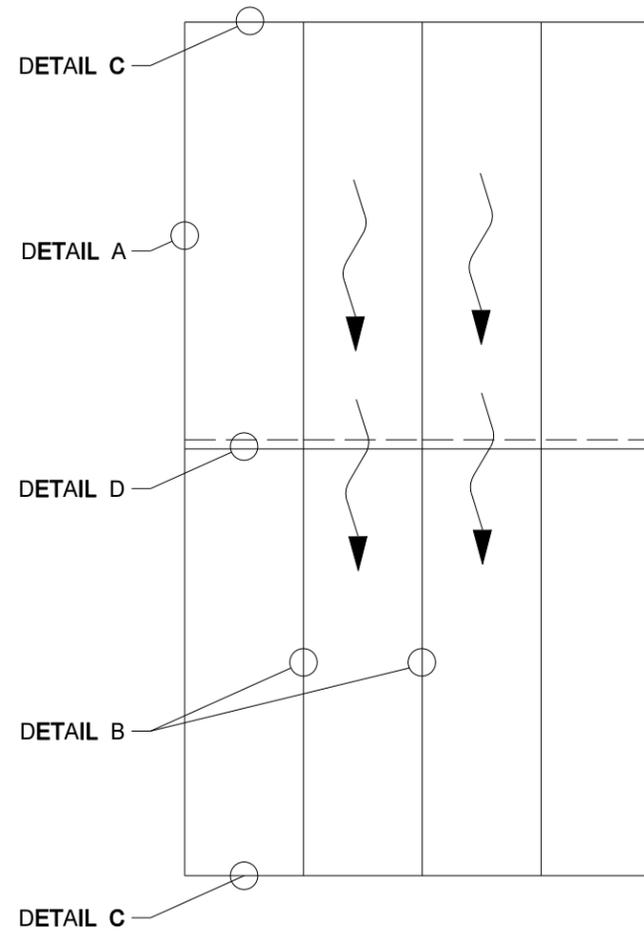


DETAIL C

* This tie may be placed ahead or back.

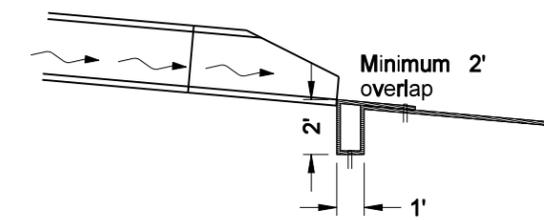


DETAIL D

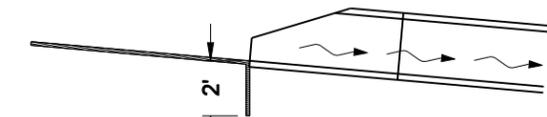


BLANKET LAYOUT

Note: Beginning and ending of erosion control blanket areas shall be installed as DETAIL C.



PIPE OUTLETS



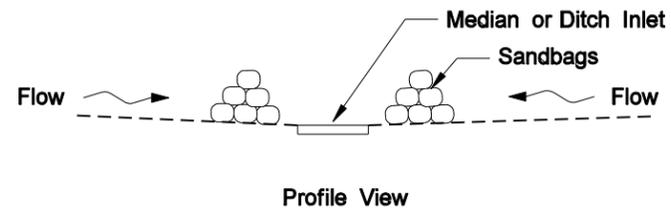
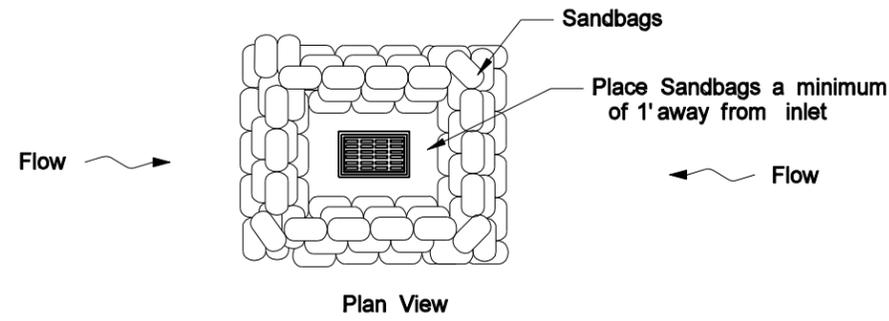
PIPE INLETS
INSTALLATION AT PIPE ENDS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-13-06	
REVISIONS	
DATE	CHANGE

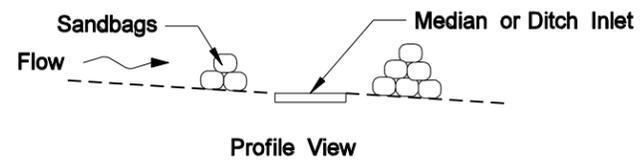
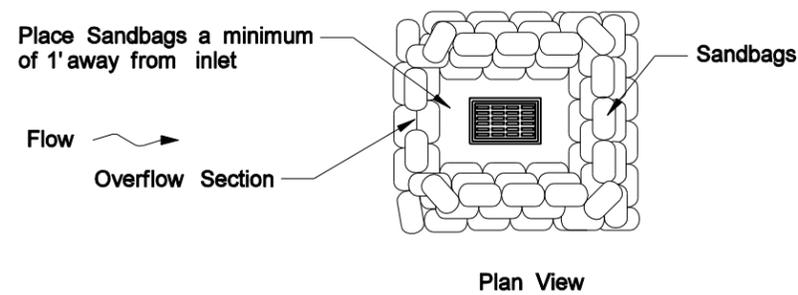
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EROSION CONTROL
MEDIAN OR DITCH INLET PROTECTION

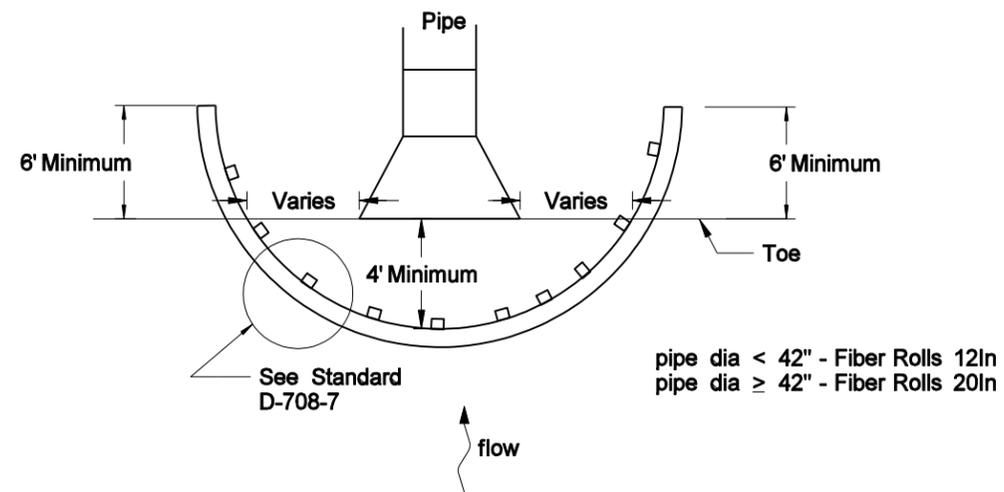
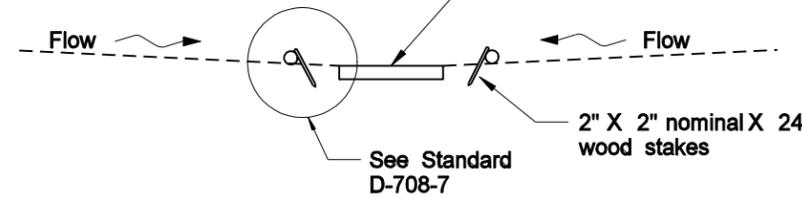
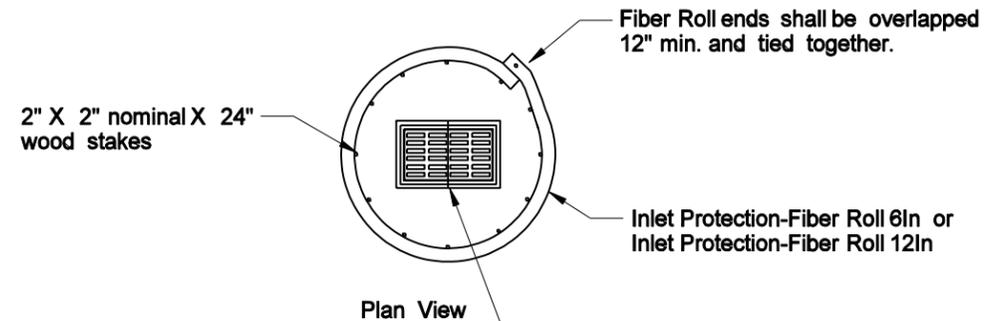
D-708-6



SANDBAG PROTECTION
LOW POINT



SANDBAG PROTECTION
ON SLOPE



pipe dia < 42" - Fiber Rolls 12In
pipe dia ≥ 42" - Fiber Rolls 20In

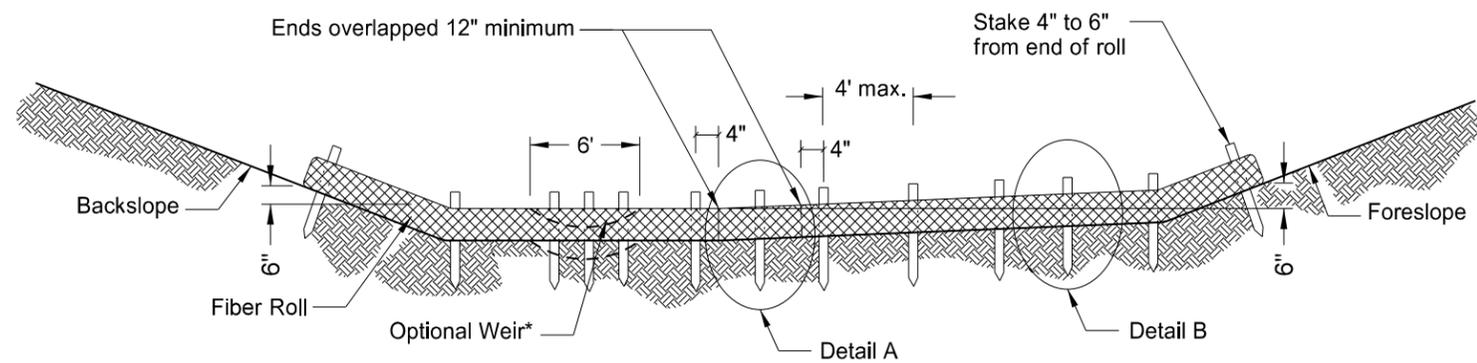
FIBER ROLL PROTECTION
INLET OF PIPE END

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-13-06	
REVISIONS	
DATE	CHANGE

12-14-07	Added 12" Fiber roll overlap, option of butting fiber roll ends removed.
----------	--------------------------------------------------------------------------

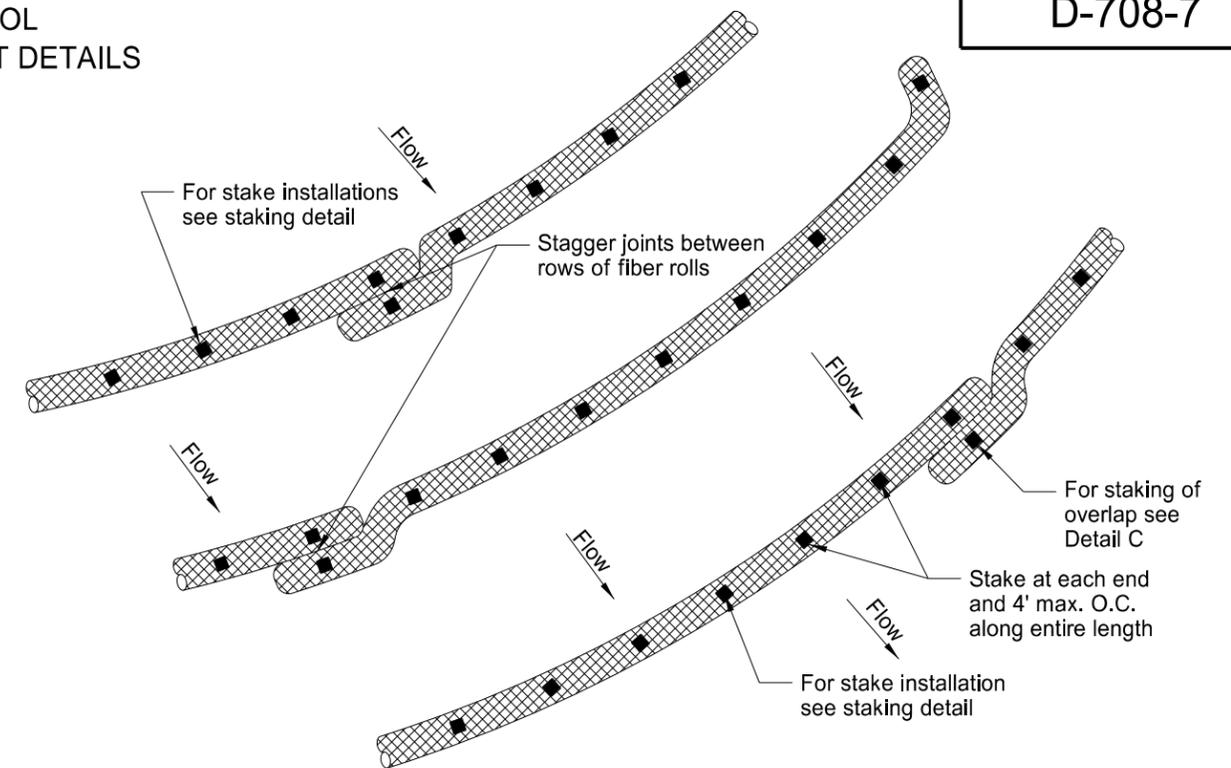
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

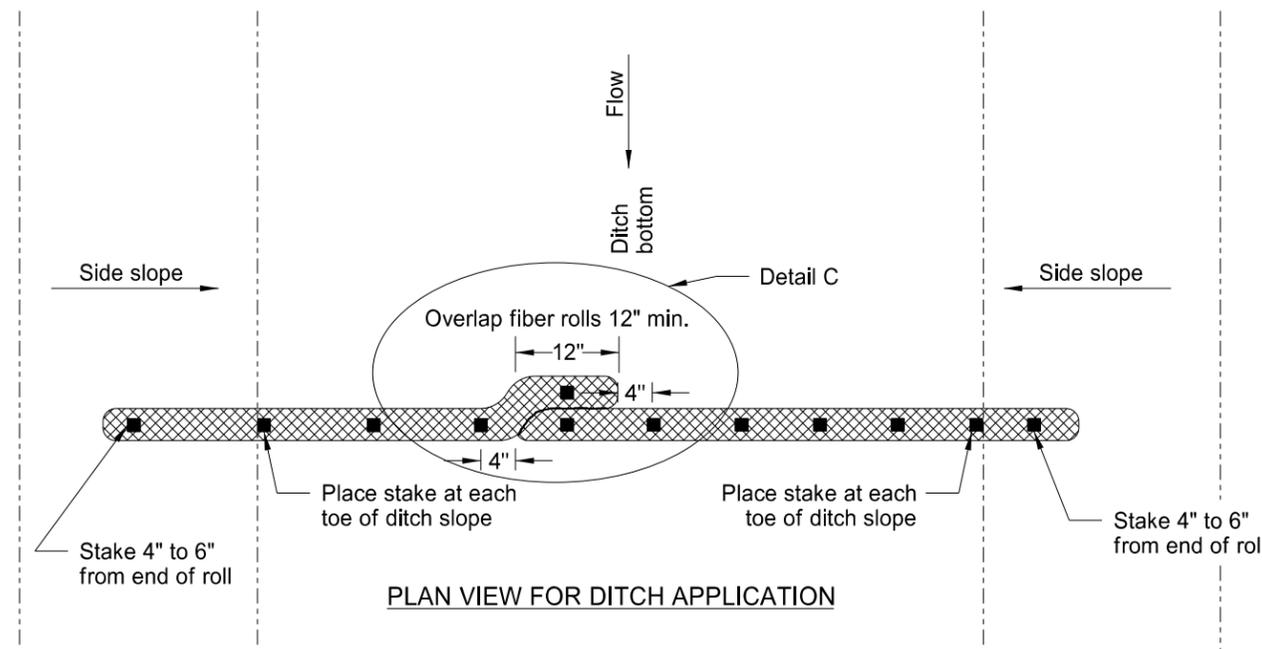


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up on adjacent property.

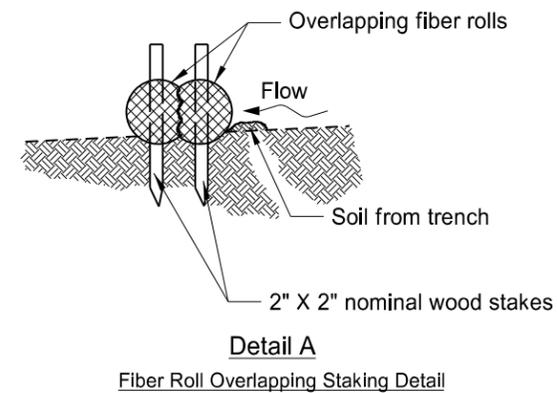
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



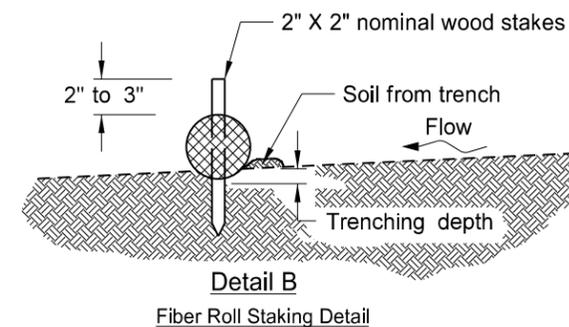
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

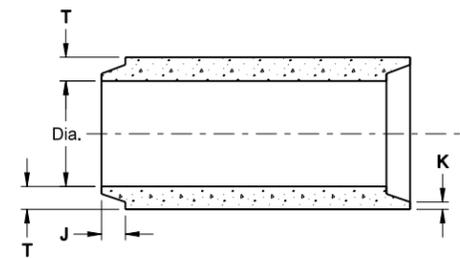
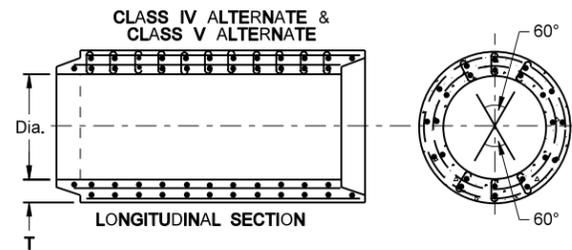
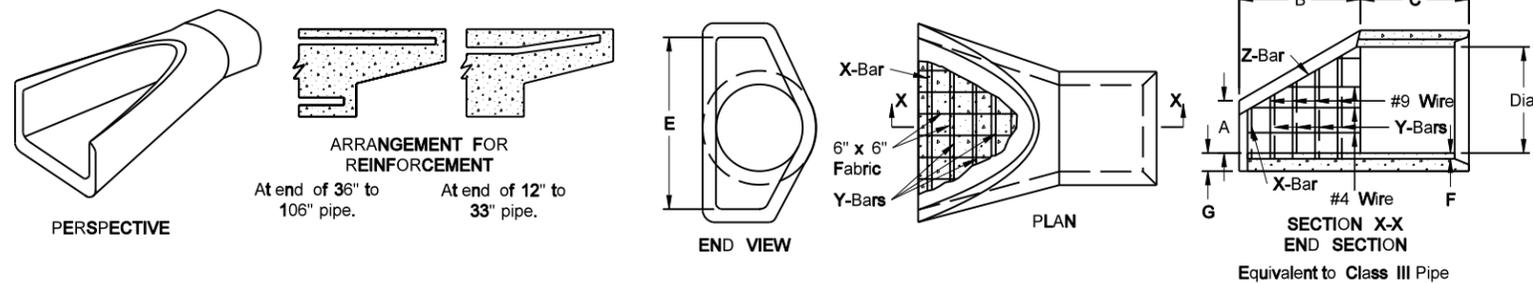
FIBER ROLL DIAMETER	NOMINAL STAKE SIZE	MINIMUM STAKE LENGTH	MINIMUM TRENCH DEPTH	MAXIMUM TRENCH DEPTH
6"	2" x 2"	18"	2"	2"
12"	2" x 2"	24"	2"	3"
20"	2" x 2"	36"	3"	5"

NOTE: Runoff must not be allowed to run under or around roll.

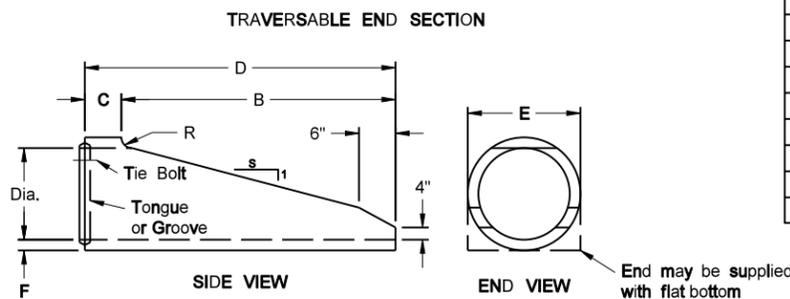
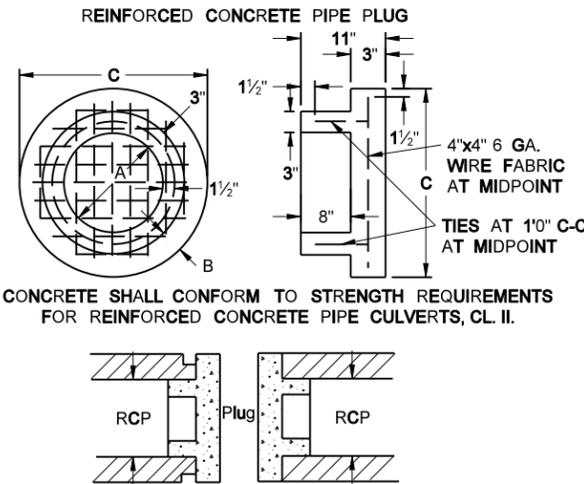
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application, Added table with values for stake and trench dimensions.

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 06/10/13 and the original document is stored at the North Dakota Department of Transportation

REINFORCED CONCRETE PIPE CULVERT AND END SECTIONS



CONCRETE PIPE PLUG DIMENSIONS (in inches)			
PIPE DIAMETER	A	B	C
15	8	2.25	19.5
18	11	3.0	23.0
21	14	3.25	26.5
24	17	3.50	30.0
27	20	3.75	33.5
30	23	4.0	37.0
33	26	4.25	40.5
36	29	4.50	44.0
42	35	5.0	51.0
48	41	5.50	58.0



TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4"	9"	4-9"	1-7 1/2"	2 1/4"	3"	6
18"	5-9"	9"	6-6"	1-11"	2 1/2"	3"	6
24"	6"	1'	7"	2-6"	3"	3"	4
30"	7-6"	1'	8-6"	3-1"	3 1/2"	3 1/2"	4
36"	7-6"	15"	7-3"	3-8"	4"	3"	4

NOTES (Traversable End Section):

- Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
- Reinforcement per class II RCP with double reinforcement in the upper 120° of the full barrel portion.

NOTES:

- All reinforcement shall be electrically welded cold drawn steel wire fabric.
- Circular reinforcement shall lap in accordance to AASHTO M170.
- All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
- Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet; 66" to 108" (incl.) = not less than 6 feet
- Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
- Welded steel wire fabric may be substituted for the reinforcing steel bars but must match the area of steel provided by the bars and the lap of the fabric must be in accordance with AASHTO specifications
- All Reinforcing Steel shall meet AASHTO M170 requirements.

END SECTION										
DIA	TERMINAL DIMENSIONS							REINFORCING STEEL		
	A	B	C	D	E	F	G	X	Y	Z
12	0'-4"	2'-0"	4'-0 1/2"	6'-0 1/2"	2'-0"	2"	2"	2-1/4" x 2'	6-1/4" x 2' @ 6" c.c.	2-1/4" x 4'
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2 1/2"	2 1/2"	2-1/4" x 2 1/2'	6-1/4" x 2 1/2' @ 6" c.c.	2-3/8" x 4'
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2 1/2"	2 1/2"	2-3/8" x 3'	6-1/4" x 3' @ 6" c.c.	2-3/8" x 4'
21	0'-9"	3'-0"	3'-1 1/2"	6'-1 1/2"	3'-6"	2 1/2"	2 1/2"	2-3/8" x 3 1/2'	8-1/4" x 3 1/2' @ 6" c.c.	2-3/8" x 5'
24	0'-9 1/2"	3'-7 1/2"	2'-6"	6'-1 1/2"	4'-0"	3"	3"	2-1/2" x 4'	8-3/8" x 4' @ 8" c.c.	2-3/8" x 6'
27	0'-10 1/2"	4'-1 1/2"	2'-0"	6'-1 1/2"	4'-6"	3 1/2"	3 1/2"	2-1/2" x 5'	8-3/8" x 5' @ 9" c.c.	2-3/8" x 6'
30	1'-0"	4'-6"	1'-7 1/2"	6'-1 1/2"	5'-0"	3 1/2"	3 1/2"	2-1/2" x 5'	12-3/8" x 5' @ 8" c.c.	2-1/2" x 6'
36	1'-3"	5'-3"	2'-10 3/4"	8'-1 3/4"	6'-0"	4"	4"	2-1/2" x 6'	12-3/8" x 6' @ 6" c.c.	2-1/2" x 8'
42	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"	4 1/2"	4 1/2"	2-1/2" x 7'	12-1/2" x 7' @ 9" c.c.	2-1/2" x 8'
48	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"	5"	5"	2-1/2" x 8'	16-1/2" x 8' @ 8" c.c.	2-1/2" x 8'
54	2'-3"	6'-6"	2'-9 1/4"	8'-2 1/4"	7'-6"	5 1/2"	5 1/2"	2-1/2" x 8'	16-1/2" x 8' @ 7" c.c.	2-1/2" x 8'
60	2'-11"	6'-0"	3'-3"	8'-3"	8'-0"	6"	5"	2-1/2" x 9'	16-1/2" x 9' @ 6" c.c.	2-1/2" x 9'
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	6 1/2"	5 1/2"	2-1/2" x 9'	22-1/2" x 9' @ 6" c.c.	2-1/2" x 9'
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"	6"	2-1/2" x 10'	24-1/2" x 10' @ 6" c.c.	2-1/2" x 9'
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	7 1/2"	6 1/2"	2-1/2" x 10'	28-1/2" x 10' @ 6" c.c.	2-1/2" x 10'
84	3'-0"	7'-6 1/2"	1'-9"	9'-3 1/2"	10'-0"	8"	6 1/2"	4-1/2" x 10'	28-1/2" x 10' @ 6" c.c.	4-1/2" x 10'
90	3'-5"	7'-3 1/2"	2'-0"	9'-3 1/2"	11'-0"	8 1/2"	6 1/2"	4-1/2" x 11'	28-1/2" x 11' @ 6" c.c.	4-1/2" x 10'

Internal Dia. of pipe in inches	Cross-Sectional Water Area	Weight per lin. foot of pipe, lbs.	Joint J Groove, Min. Max.	Joint K Tongue, Min.	Minimum Wall Thickness (t)	D-LOAD TO PRODUCE A 0.01 INCH CRACK										Height of Fill Normal Backfill	D-LOAD TO PRODUCE ULTIMATE LOAD									
						CLASS IV ALTERNATE					CLASS V ALTERNATE						5000 P.S.I.					5000 P.S.I.				
						2000					3000						3000					3750				
						Inner Cage	Ellip Cage	Outer Cage	Shear Steel	Inner Cage	Ellip Cage	Outer Cage	Shear Steel	Inner Cage	Ellip Cage		Outer Cage	Shear Steel	Inner Cage	Ellip Cage	Outer Cage	Shear Steel				
Dia	Sq. ft.	Lbs.	In.	In.	In.	Sq.in	Sq.in	Sq.in	No.	In.	Sq.in	Ft.	Sq.in	Sq.in	Sq.in	No.	In.	Sq.in	Ft.							
12	0.79	92	1 1/2-2 3/4	3/4	2																					
15	1.23	127	1 1/2-2 1/4	7/8	2 1/4																					
18	1.77	168	1 1/2-2 1/2	1	2 1/2																					
21	2.40	214	1 1/2-3 1/8	1 1/8	2 1/2																					
24	3.14	265	2 1/2-3 3/4	1 1/8	3																					
27	3.98	322	2 3/4-4	1 1/4	3 1/4																					
30	4.91	384	3 1/4-4 1/4	1 1/4	3 1/2																					
33	5.94	452	3 3/4-4 1/4	1 1/2	3 3/4																					
36	7.07	524	3 3/4-4 1/4	1 1/2	4																					
42	9.62	685	3 3/4-4 1/4	1 1/2	4 1/2																					
48	12.57	885	3 3/4-4 3/8	1 1/2	5									.66	.33	.50	8	4	.22	24-35						
54	15.90	1070	4 1/2-5 1/4	2	5 1/2									.74	.37	.56	9	4	.22	24-35						
60	19.63	1296	4 1/2-5 1/2	2 1/4	6	.54	.27	.41	7	6	.22	16-24	.82	.41	.62	7	6	.22	24-35							
66	23.76	1542	5-6	2 1/2	6 1/2	.60	.30	.45	8	6	.22	16-24	.88	.44	.66	8	6	.22	24-35							
72	28.27	1810	5 1/2-6 3/4	2 1/2	7	.64	.32	.48	8	6	.23	16-24	.96	.48	.72	8	6	.23	24-35							
78	33.18	2098	6 1/4-7 1/4	2 1/2	7 1/2	.70	.35	.53	9	6	.25	16-24	1.04	.52	.78	9	6	.25	24-35							
84	38.48	2410	6 1/2-7 3/4	3 1/8	8	.76	.38	.57	10	6	.28	16-24	1.12	.56	.84	10	6	.28	24-35							
90	44.18	2793	6 3/4-8 1/2	3 1/8	8 1/2	.82	.43	.62	11	6	.31	16-24	1.20	.60	.90	11	6	.31	24-35							
96	50.27	3092	7-8 1/4	3 1/2	9	.88	.46	.66	11	6	.34	16-24	1.32	.66	.99	11	8	.34	24-35							
102	56.75	3466	7-8 1/4	3 1/2	9 1/2	.94	.52	.71	12	6	.37	16-24	1.42	.70	1.07	12	8	.37	24-35							
108	63.62	3864	7 1/2-8 1/2	3 3/4	10	1.02	.57	.76	12	6	.40	16-24														

Ai, Ae, Ao = Minimum circumferential reinforcement required in square inches per lineal foot of pipe.
 Ar = Minimum radial reinforcement required in square inches per square foot of pipe.
 N = Minimum number of rows of radial reinforcement at top and bottom of pipe.
 S = Maximum circumferential spacing of rows of radial reinforcing.

SEE STANDARD D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
11-05-86	Note added
07-17-87	Added pipe plug detail
05-14-88	Reinforcement cage
03-10-88	General revisions
12-23-88	Note # 6, 30" FES
12-01-04	PE stamp added
12-08-08	Major Revisions

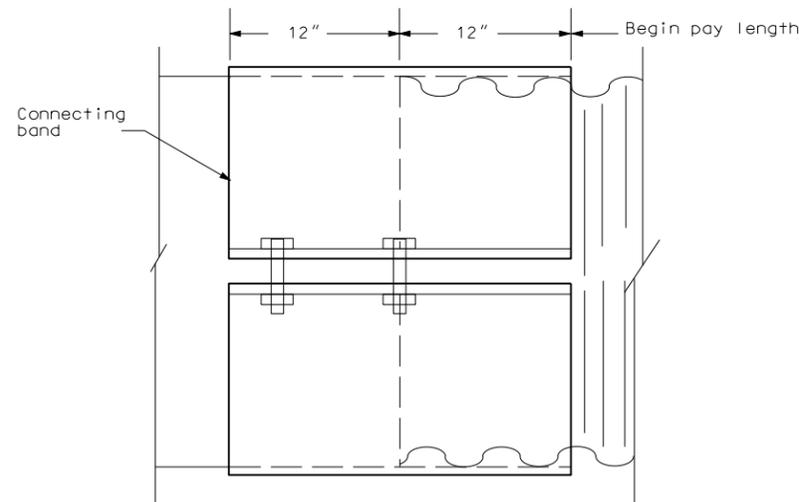
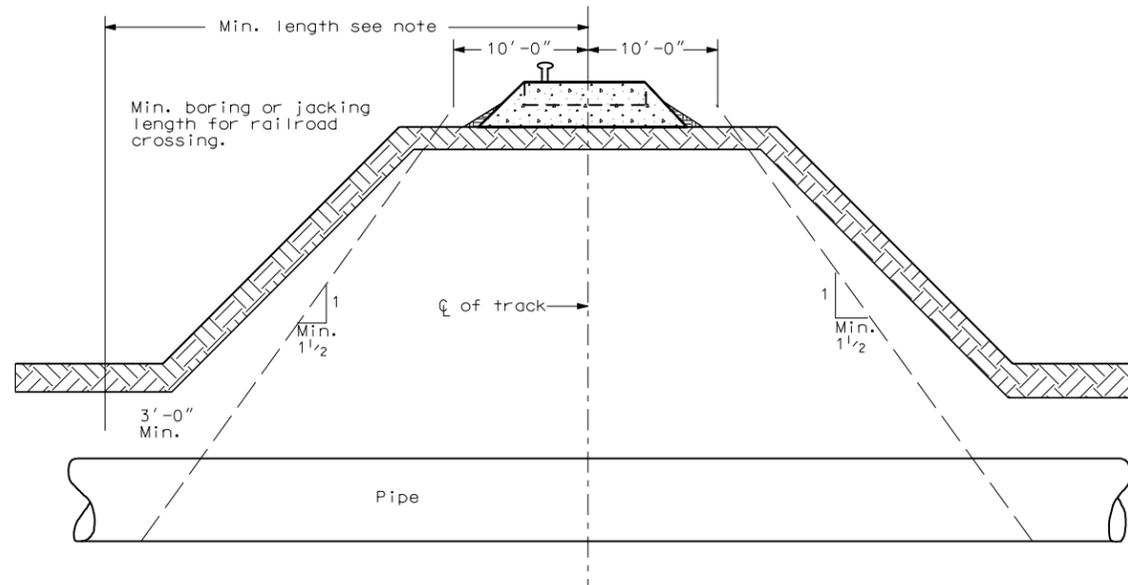
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JACKED AND BORED PIPE

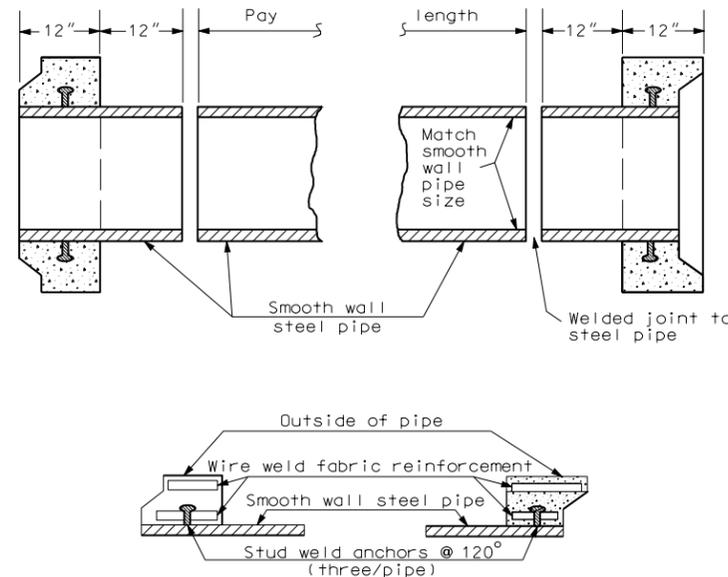
D-714-16

NOTES:

- Pipe under railroad tracks and across railroad right-of-way shall extend to the greater of the following distances, measured at right angles to center line of track.
 - 2 ft. beyond toe of slope
 - 3 ft. beyond ditch
 - A minimum distance of 25 ft. from center line of outside track when end of casing is below ground.
- Depth Of Installation: Pipe under railway tracks and across railway right-of-way shall be not less than 5 1/2 ft. from base of railway to top of casing at its closest point, except that under secondary or industry tracks this distance may be 4 1/2 ft.
- Pipe culverts shall be installed using equipment that encases the hole as the earth is removed. Boring or jacking without the concurrent installation of the pipe will not be permitted. Pipe shall extend through the undisturbed fill and shall be installed so as not to disrupt traffic nor damage roadway grade and surface. Use of water in the process of boring or jacking is prohibited. The boring or jacking shall be made in straight lines and to the grade and alignment shown on the plans. The flow line elevation at the starting point for boring or jacking shall be within 0.1 ft. of staked grade; the flow line shall not be reversed at any point; and the line and grade at any point within the pipe shall not vary by more than 0.5 ft. from the line and grade designated.
- Jacked Pipe: The method used to install the pipe indicated as jacked on the plans shall be left to the discretion of the contractor. The boring or jacked methods are acceptable. If the boring method is used, the contractor may use smooth wall steel pipe in lieu of RCP. Regardless of the method or type of pipe used, the price bid for jacked pipe shall be considered full compensation for the pipe and its installation.
- Pipe culverts that are bored or jacked shall conform to section 714 of the standard specifications.
- Reinforced concrete pipe, class V, shall be used at all railroad crossings unless otherwise indicated on the plans.
- The price of connecting bands will be included in the price bid for "conduit pipe-jacked or bored."



STANDARD DETAIL FOR JOINTING SMOOTH WALL STEEL PIPE TO CORRUGATED PIPE



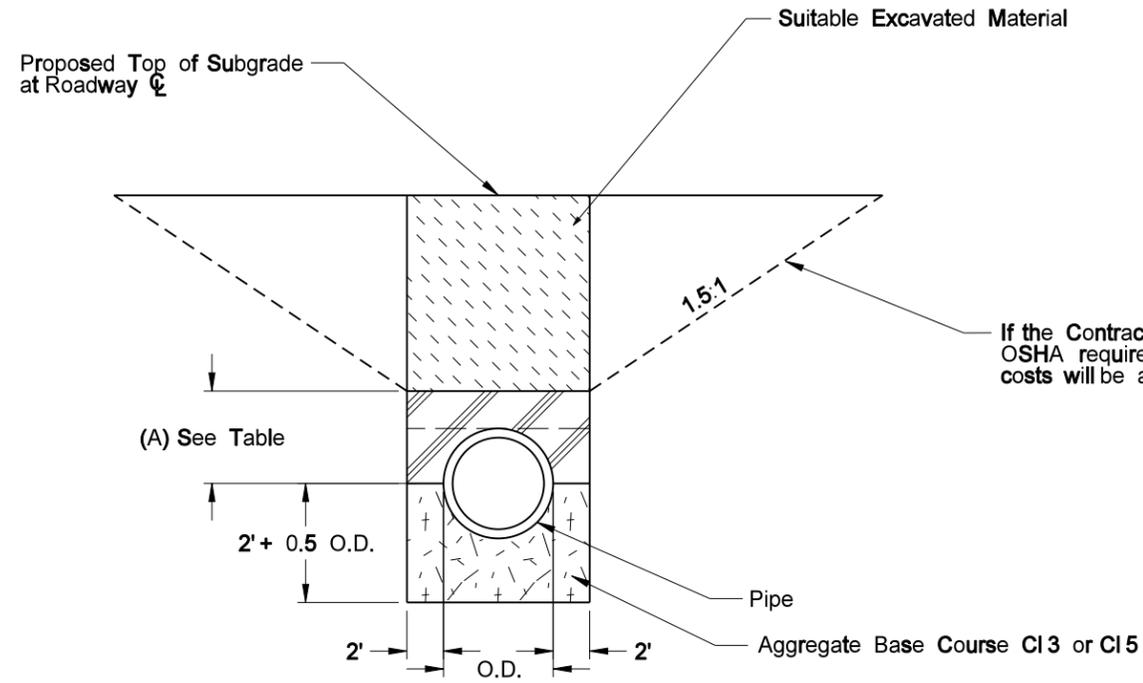
STANDARD DETAIL FOR JOINTING SMOOTH WALL STEEL PIPE TO REINFORCED CONCRETE PIPE

Nominal Thickness (Inches)	Nominal Diameter (Inches)
0.188	Under 14
0.219	14 and 16
0.250	18
0.281	20
0.312	22
0.344	24
0.375	26
0.406	28 and 30
0.438	32
0.469	34 and 36
0.500	38, 40 and 42

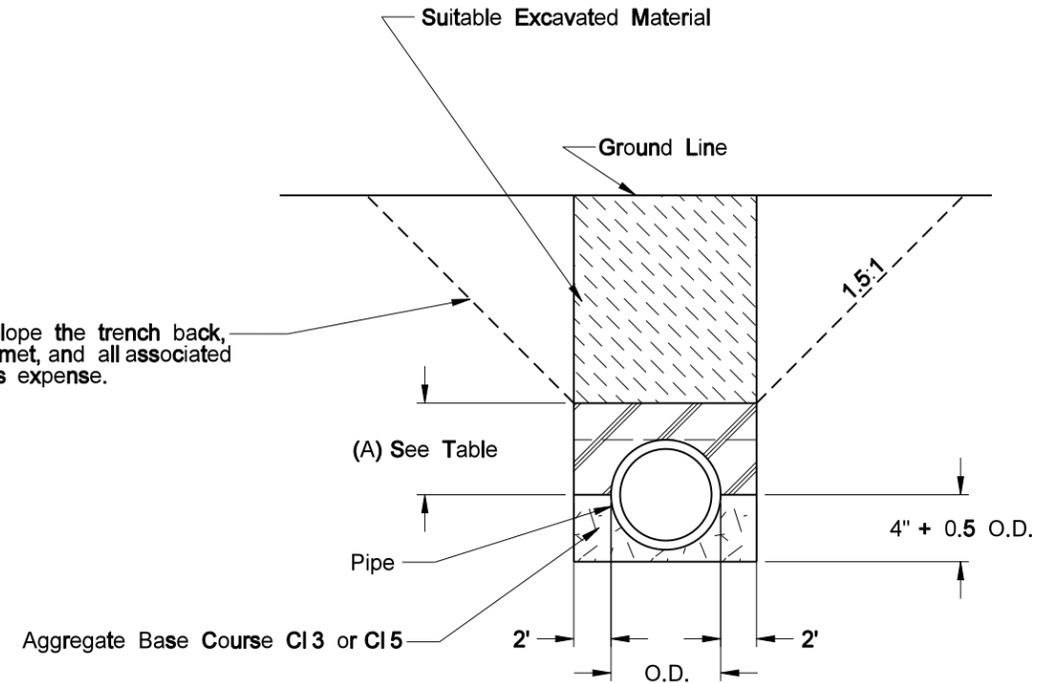
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
04-03-89	
REVISIONS	
DATE	CHANGE
09-03-96	Weld anchor spacing
06-25-03	Layout revisions
12-01-04	PE Stamp added

This document was originally issued and sealed by **MARK S. GAYDOS** Registration Number **PE- 4518**, on **12/01/04** and the original document is stored at the North Dakota Department of Transportation

PIPE BACKFILL FOR STORM DRAIN UNDER ROADWAYS OF 40 MPH OR LESS AND PIPE NOT UNDER ROADWAY



BEDDING AND BACKFILL FOR STORM DRAIN UNDER ROADWAY



BEDDING AND BACKFILL FOR STORM DRAIN NOT UNDER ROADWAY

Included in Pipe Pay Item

- 1) Pipe
- 2) Trench excavation
- 3) Disposal of unsuitable excavated material and placement of suitable excavated material.
- 4) Backfill of suitable excavated material
- 5) Aggregate Base Course CI3 or CI5

Pay Items

- 1) Pipe
- 2) Surfacing removal

Backfill Requirements		
Pipe Material	Dimension (A)	Backfill
Concrete	0.5 O.D.	Approved Backfill (Note 2)
Metal	0.5 O.D. + 1'	CI3 or CI5
PVC/HDPE	0.5 O.D. + 1'	CI3 or CI5

NOTES:

1. This drawing corresponds to Storm Drain Pipe only. It does not include pipes in approaches.
2. Approved backfill shall meet the requirements of AASHTO M 145 for A-1, A-2, and A-3 soils.
3. Compaction requirements for all materials associated with the trench installation shall meet 90% of AASHTO T-180. Maximum thickness of any one lift shall not exceed 6 inches.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-08-08	
REVISIONS	
DATE	CHANGE

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INLET - SLOTTED DRAIN

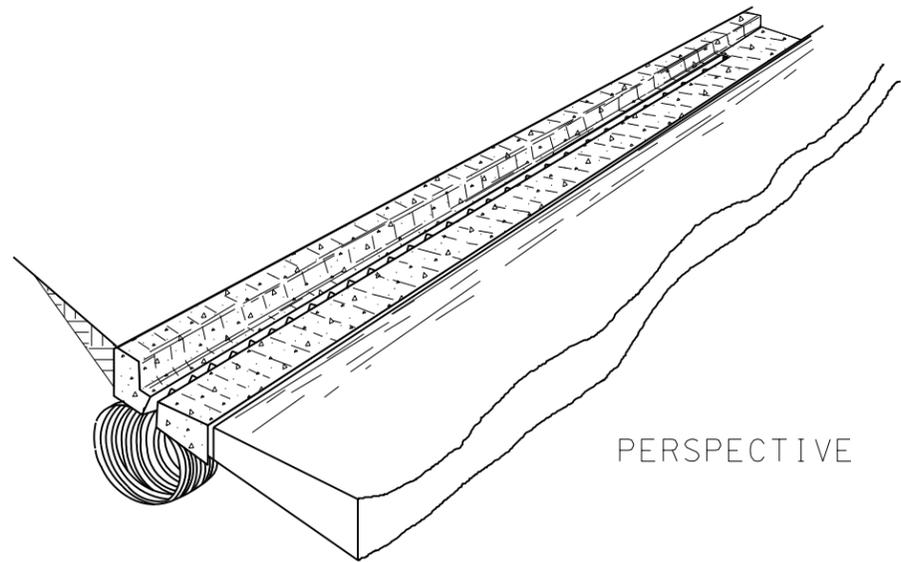
D-722-3A

NOTE:

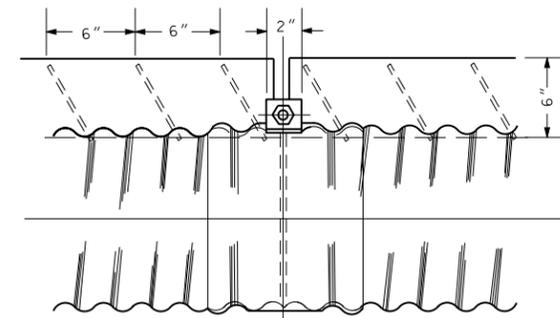
The slotted drain and corrugated steel pipe shall conform to AASHTO M36. The slotted drain assembly fabricated to the corrugated steel pipe shall be coated according to AASHTO M111. All labor, equipment and materials necessary to complete the work, except for the concrete curb and gutter, shall be included in the price bid for "Inlet - Slotted Drain (Size)". Construction shall be in accordance with Section 714 of the Standard Specifications.

PAY ITEMS

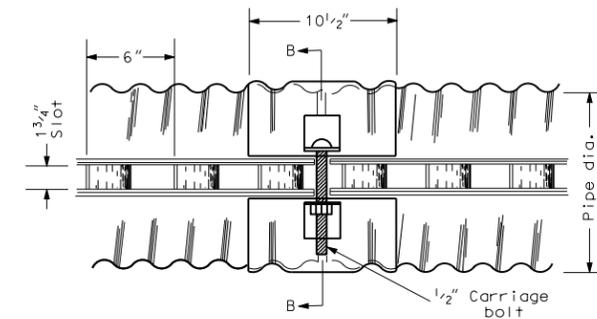
Inlet - Slotted Drain, 12 In.....	L.F.
Inlet - Slotted Drain, 15 In.....	L.F.
Inlet - Slotted Drain, 18 In.....	L.F.
Inlet - Slotted Drain, 21 In.....	L.F.
Inlet - Slotted Drain, 24 In.....	L.F.
Inlet - Slotted Drain, 30 In.....	L.F.
Inlet - Slotted Drain, 36 In.....	L.F.



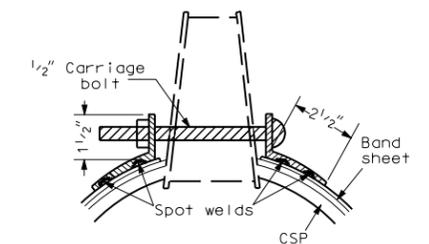
PERSPECTIVE



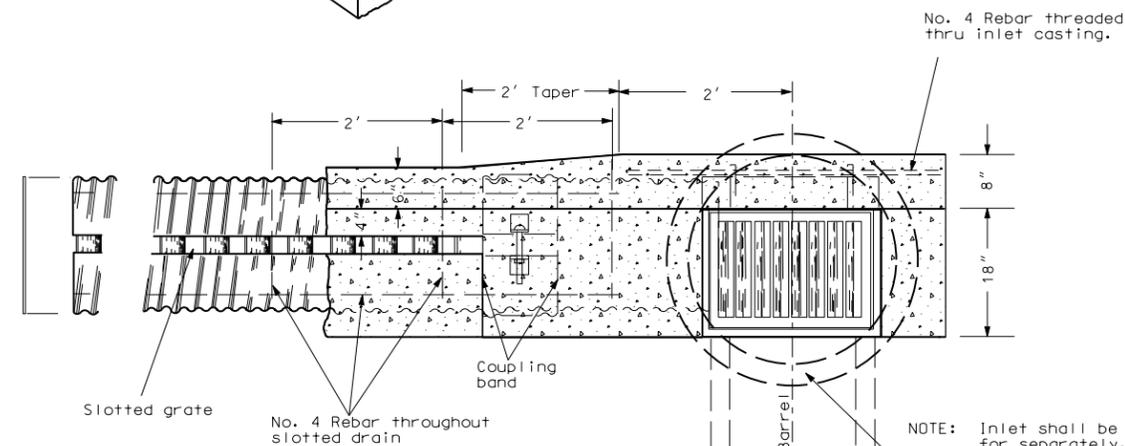
SIDE VIEW



TOP VIEW



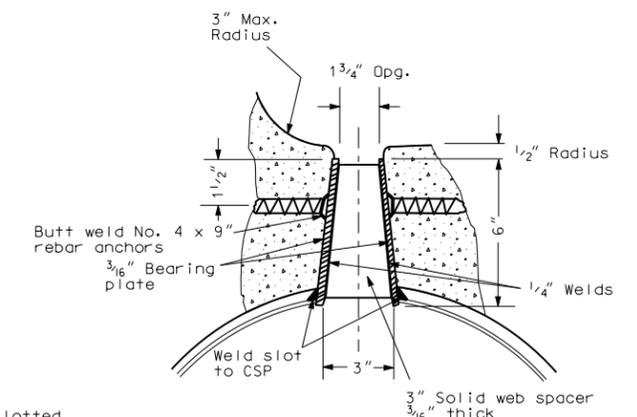
SECTION B-B



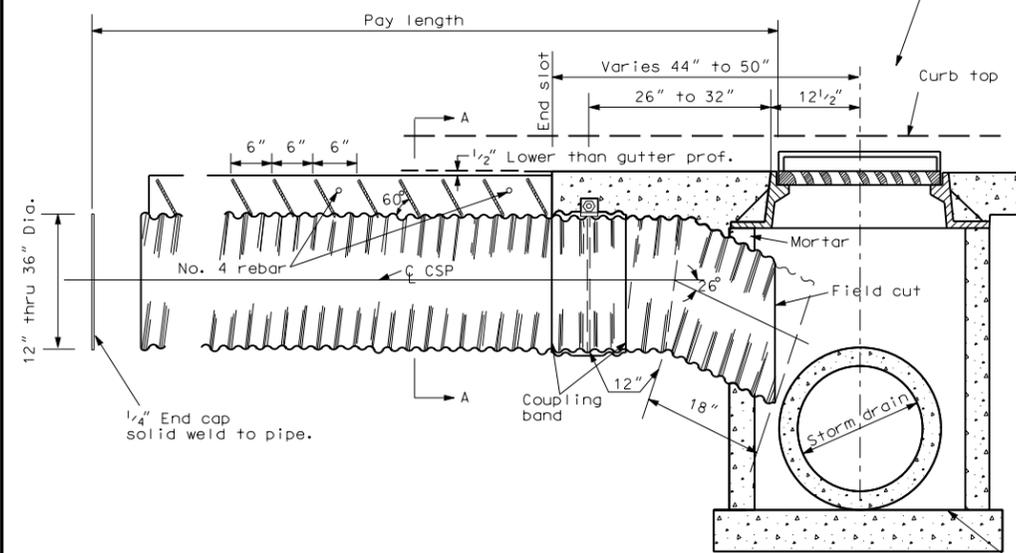
PLAN

NOTE: Inlet shall be paid for separately. See Plan & Profile sheets.

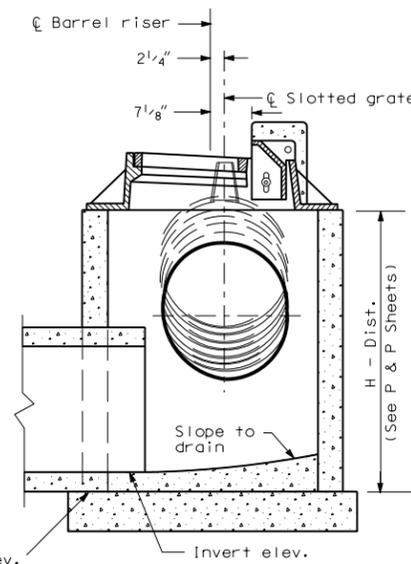
TYPICAL COUPLING BAND



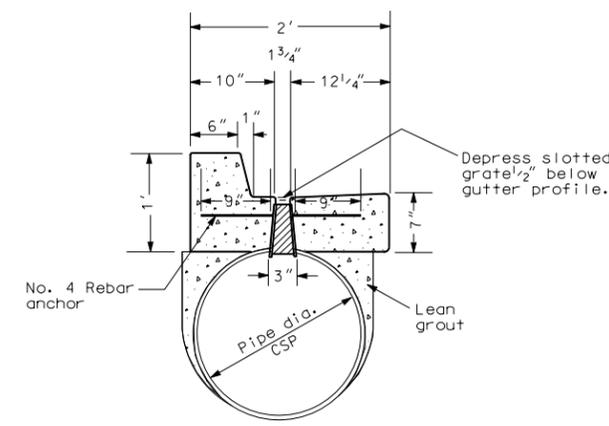
TYPICAL SECTION



SIDE SECTION



END SECTION



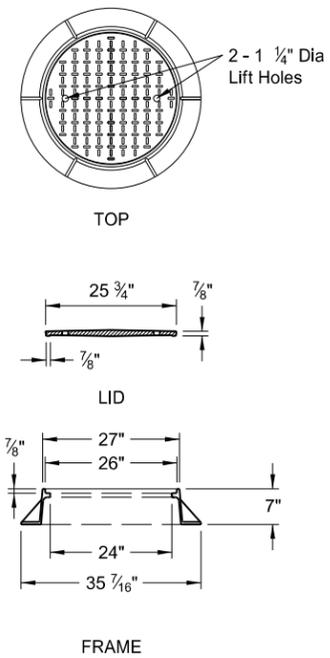
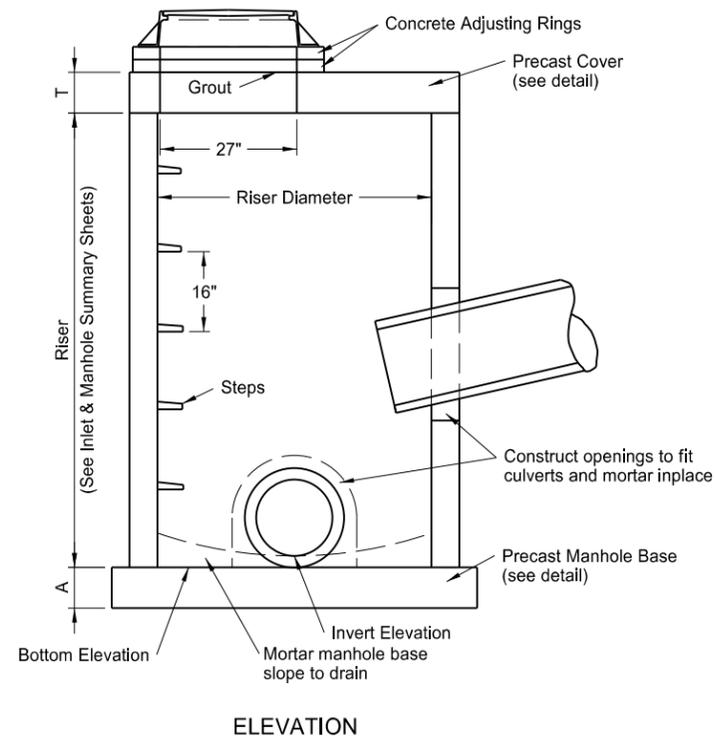
SECTION A-A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-01-89	
REVISIONS	
DATE	CHANGE
10-09-92	Note
01-03-94	Pay length & note
06-26-03	General revisions
12-01-04	PE Stamp added

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MANHOLE DETAILS

D-722-5



PRECAST MANHOLE COVERS

RISER DIAMETER	COVER DIAMETER	WEIGHT OF SECTION	T	K	L	BOTTOM * BARS	TOP * BARS
48"	58"	1,080 Lb	6"	6"	8"	#4 at 6"	—
54"	65"	1,910 Lb	8"	6"	8"	#4 at 6"	—
60"	72"	2,430 Lb	8"	7"	9"	#4 at 6"	#4 at 11"
66"	79"	3,010 Lb	8"	7"	9"	#4 at 6"	#4 at 11"
72"	86"	3,640 Lb	8"	8"	10"	#4 at 6"	#4 at 11"
84"	100"	5,060 Lb	8"	9"	11"	#5 at 6"	#5 at 11"
96"	114"	6,695 Lb	8"	9"	11"	#5 at 6"	#5 at 11"
108"	128"	12,810 Lb	12"	10"	12"	#5 at 6"	#5 at 11"
120"	142"	15,900 Lb	12"	11"	13"	#5 at 6"	#5 at 11"

* - Reinforcement listed shall be placed in each direction.

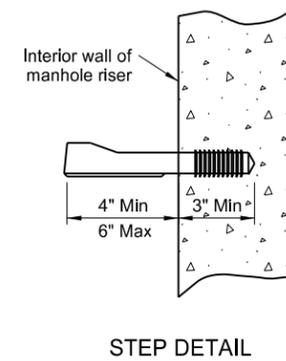
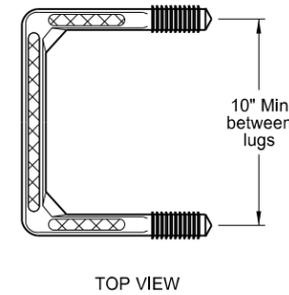
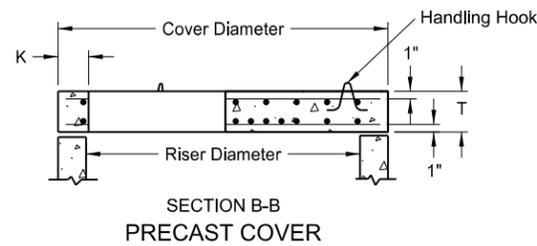
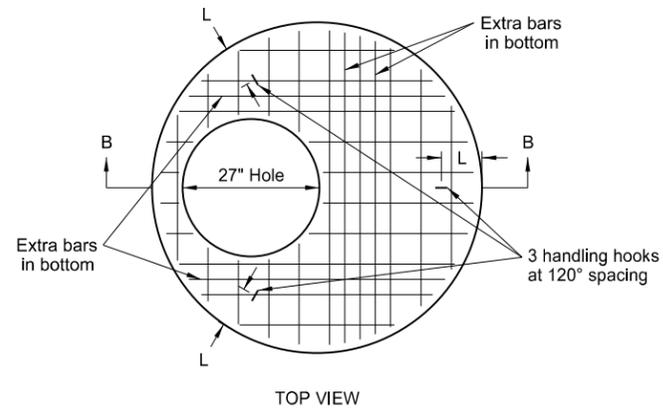
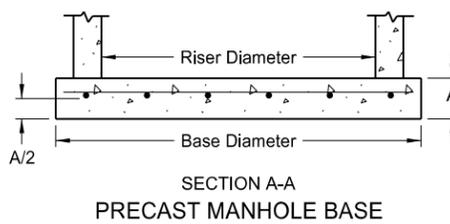
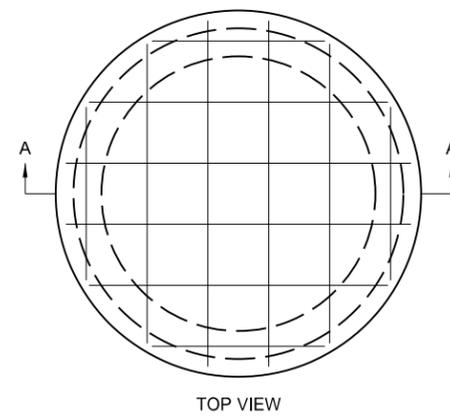
MANHOLE BASES

RISER DIAMETER	BASE DIAMETER	WEIGHT OF SECTION	A	BARS *
48"	66"	1,785 Lb	6"	#4 at 12"
54"	72"	2,830 Lb	8"	#4 at 12"
60"	78"	3,320 Lb	8"	#4 at 12"
66"	86"	4,035 Lb	8"	#4 at 12"
72"	92"	4,620 Lb	8"	#4 at 12"
84"	107"	6,245 Lb	8"	#4 at 12"
96"	120"	7,855 Lb	8"	#4 at 12"
108"	132"	14,255 Lb	12"	#4 at 8"
120"	148"	17,925 Lb	12"	#4 at 8"

* - Reinforcement listed shall be placed in each direction.

NOTES:

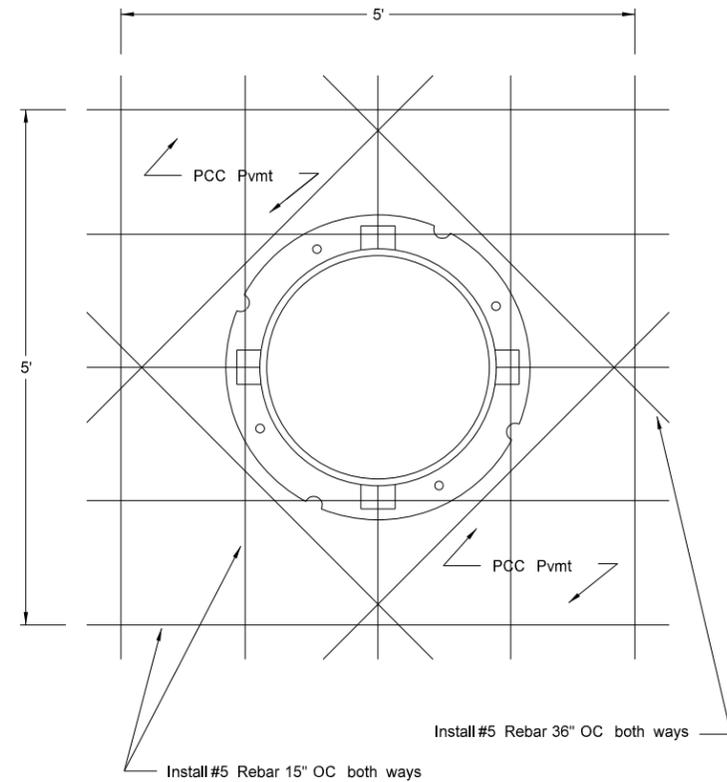
- The contractor shall have the option of using precast or cast-in-place bases. Class of concrete shall be AE. The aggregate size shall be approved by the engineer in the field. Construction shall be in accordance with section 722.03 of the Standard Specifications.
- Precast concrete manholes, risers and steps shall conform to AASHTO M199.
- Precast concrete bases and covers shall be reinforced as shown in the table for the corresponding riser diameter.
- All reinforcing steel shall be Grade 60 steel.
- Bottoms of manhole risers shall be cut or precast square to fit the manhole base. Grout joint between base and riser with cement mortar.
- The contractor may construct the manhole lower than plan grade and bring the casting to grade using precast adjusting rings in a manner satisfactory to the engineer in the field.
- Manhole steps shall be corrosion resistant and shall have a minimum vertical load resistance of 800 pounds and a minimum horizontal pull-out resistance of 400 pounds. Configuration of the steps shall be approved by the Engineer.
- Precast concrete manhole covers shown are designed for an HS-20 wheel load and a maximum fill height of 15'-0". Special design required for heavier wheel loads and/or greater fill heights.
- Other castings, similar in dimension, may be used if the casting conforms to the manhole cover and has a lid style as specified. If modifications to the manhole cover are required to facilitate similar castings the contractor must receive written approval from the engineer.
- Castings shall be manufactured in accordance with AASHTO M306-09. Metal used in the manufacture of castings shall conform to AASHTO M105 Class 35B.



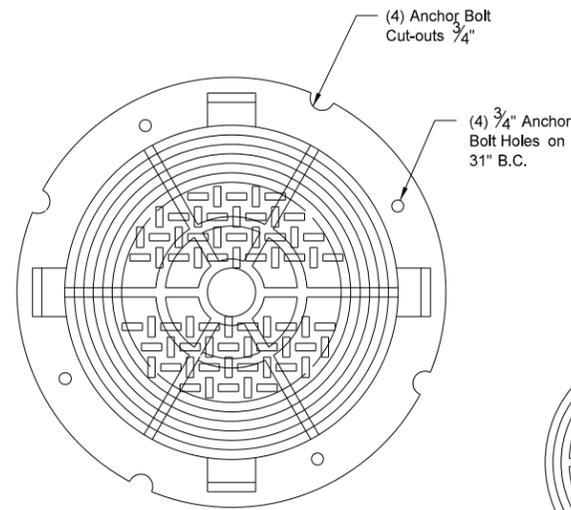
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-14-2013	
REVISIONS	
DATE	CHANGE

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 Roger Weigel,
 Registration Number
 PE-2930,
 on 5-14-13 and the original document is stored at the North Dakota Department of Transportation

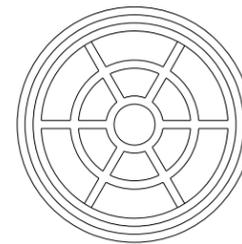
FLOATING MANHOLE CASTING



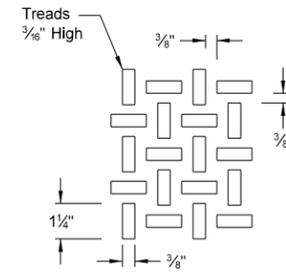
PLAN VIEW



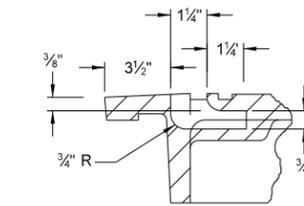
MATERIAL: Cast Gray Iron ASTM A-48, Class 35B
 FINISH: No Paint
 WEIGHT: Approximately 642 Lb/Unit



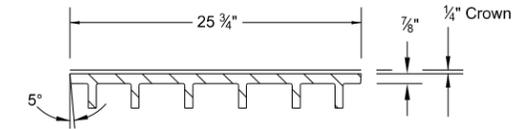
BOTTOM DETAIL
 LID ONLY



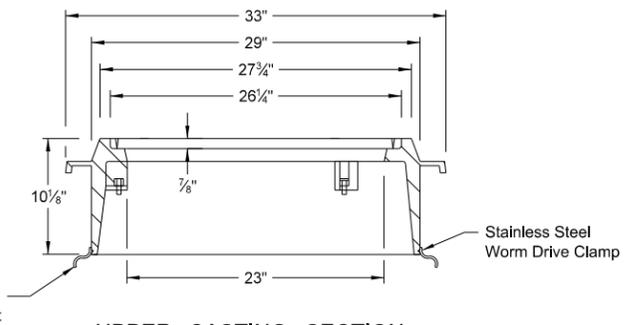
SURFACE DETAIL



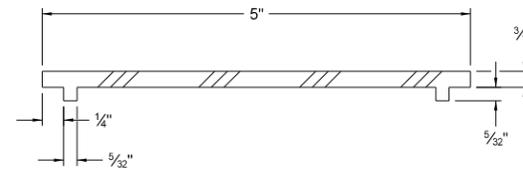
CONCEALED PICK DETAIL



LID SECTION

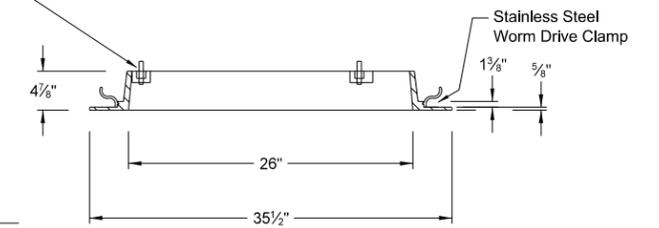


UPPER CASTING SECTION

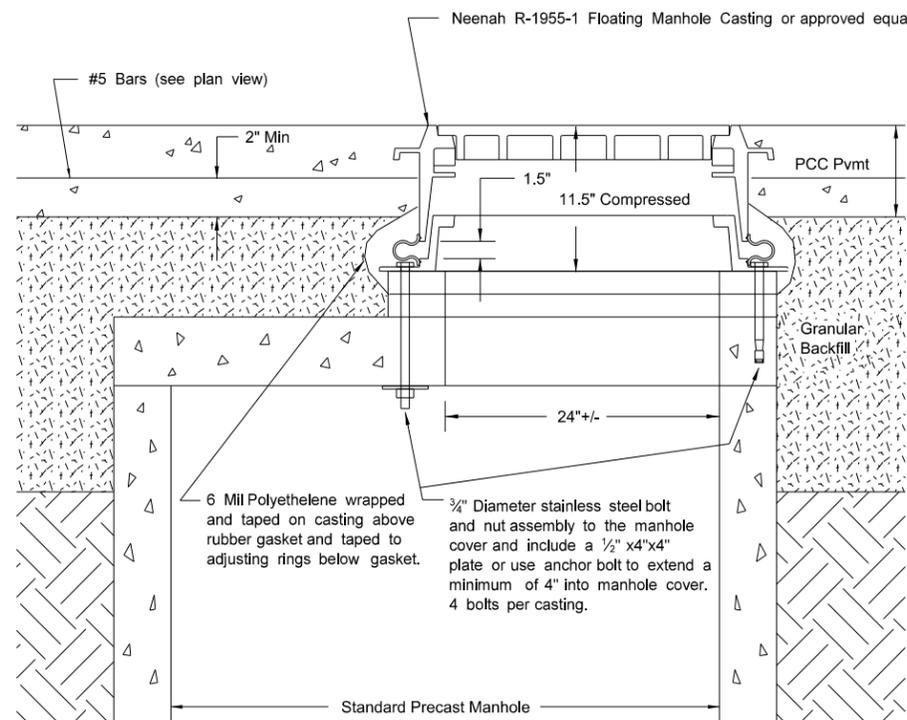


SECTION OF EXTRUDED NEOPRENE GASKET

(3) 5/8"-11 x 5/2" Grade 8 Steel Hex Bolts, Nuts W/ (2) Washers Ea Zinc Plated



LOWER CASTING SECTION



ELEVATION VIEW OF CONNECTION TO STANDARD PRECAST MANHOLE -TYPICAL

NOTES:

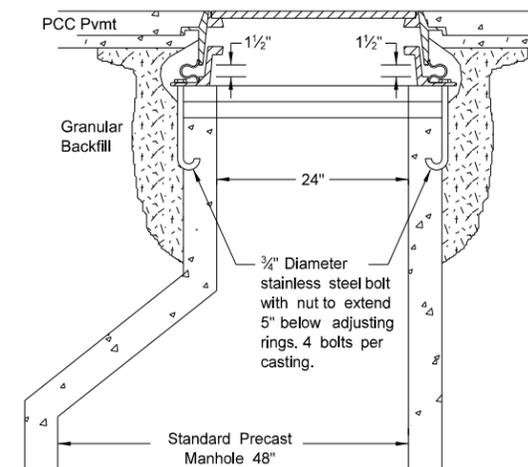
Bed frame in mortar, install precast two-inch rings, and plaster inside and out with mortar.

When installing an existing box out, drill #5 rebar into existing pavement 6" deep - 15" OC - bars to be 20" long.

Length of anchor bolts to vary with number of adjusting rings.

Installation cost at existing locations shall be included in price bid for manhole castings.

Installation cost at new manhole locations shall be included in the price bid for manholes.

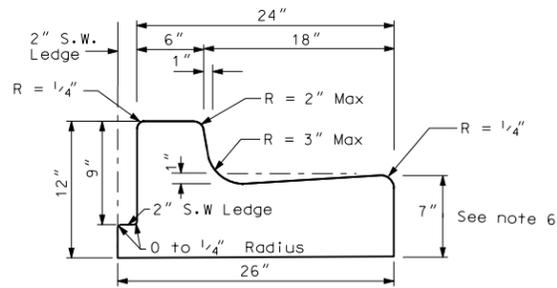


ELEVATION VIEW OF CONNECTION TO CONICAL MANHOLE - TYPICAL

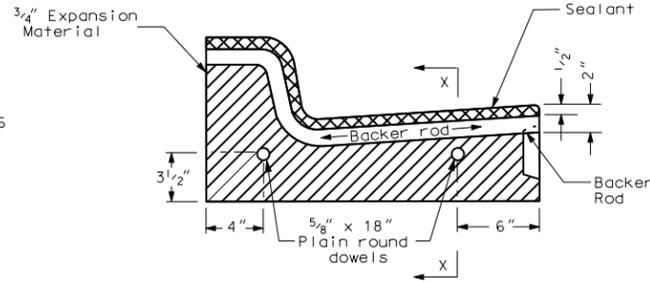
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-19-2010	
REVISIONS	
DATE	CHANGE

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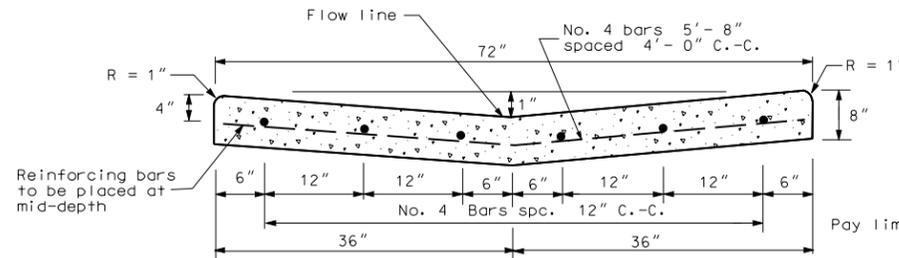
VALLEY GUTTER AND CURB & GUTTER



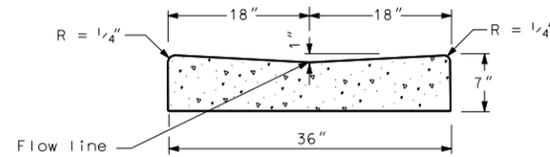
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk,
Median, or Parking Lot
(Sec. A shown. See Sec. B
for additional details.)



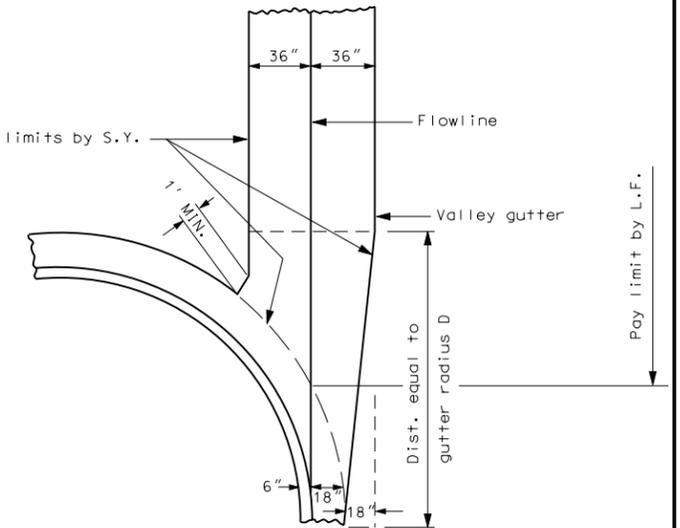
Isolation Joint Detail



72" Concrete Valley Gutter



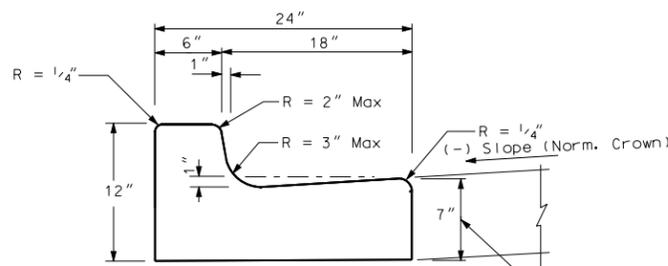
36" Concrete Valley Gutter



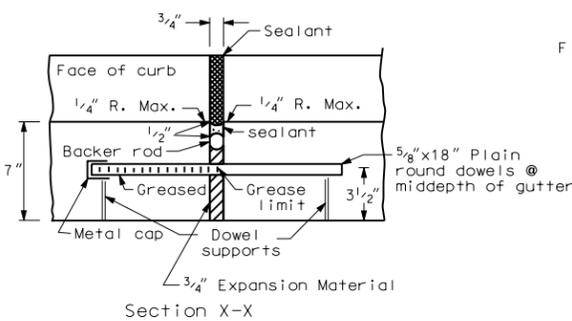
72" Concrete Valley Gutter

NOTES:

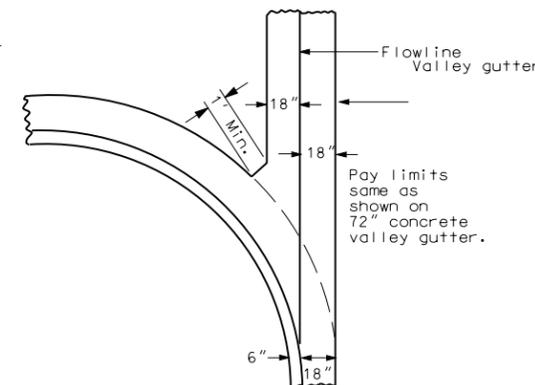
1. Curb and Gutter Type 1 to be used. Section "A" to be used with (-) pavement slopes and section "B" to be used with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Isolation joint material shall be 3/4" pre molded conforming to section 826.02C or D of the standard specifications. The opening for the backer rod and joint sealant shall be formed by a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour of a cold joint. Metal caps and greased dowels shall be installed in the cold joint for the second pour.
4. Joint Spacing: For hot bituminous pavements the joint spacing for the curb and gutter shall be 10' max. with the panels on each side of the inlets. For concrete pavements the joint spacing for the curb and gutter shall match the pavement joint on PCC Pavements.
5. Joint sealing: All contraction and isolation joints shall be sealed as shown in the details. The joint sealant for contraction joints shall conform to section 826.02B. The sealant for expansion joints shall be as specified in note 3 above. The sealant shall be tooled and installed in accordance with the manufacturer's recommendations.
6. Depth of Face of Gutter: For hot bituminous pavement the depth of gutter shall be as shown. For PCC pavements the depth of gutter shall match the adjacent PCC pavement.
7. The cost for all labor, equipment, and material necessary to construct contraction & isolation joints shall be included in the price bid for curb and gutter.
8. On street returns and other locations where the new curb and gutter ends and does not abut existing curb and gutter, the end two (2) feet of the curb shall be tapered from 6" in height to 0". A 1/2" pre-molded isolation joint which is full depth and the same shape as the curb and gutter shall be installed just ahead of the taper. An 18" tie bar shall be installed across the joint.



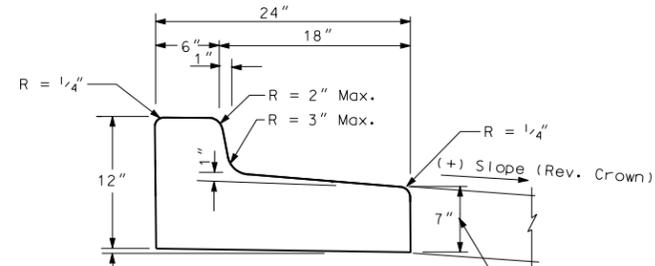
Curb & Gutter Type 1 (Sec. A)



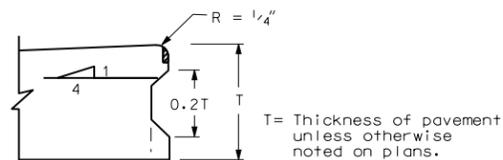
Section X-X



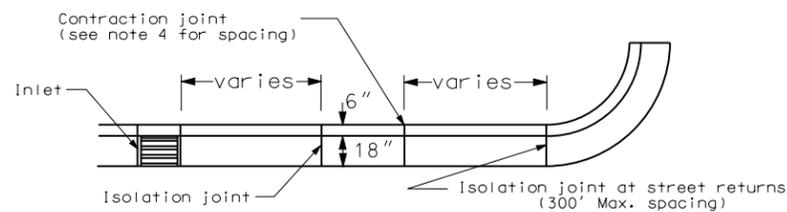
36" Concrete Valley Gutter



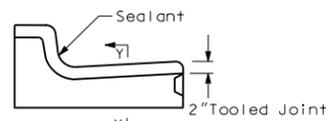
Curb & Gutter Type 1 (Sec. B)



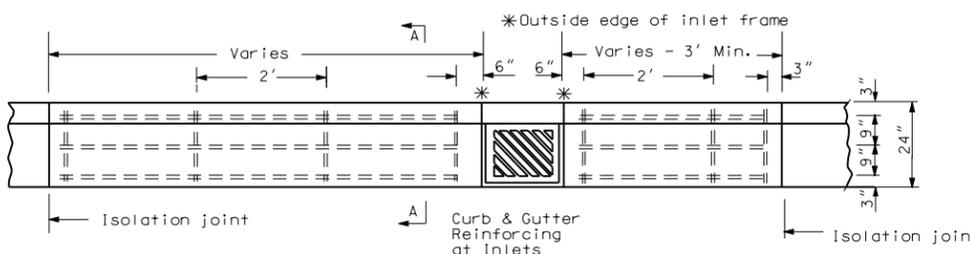
Keyway Detail For
Curb & Gutter
(To be used with P.C.C.
Pavement and Drives.)



Joint Location Detail

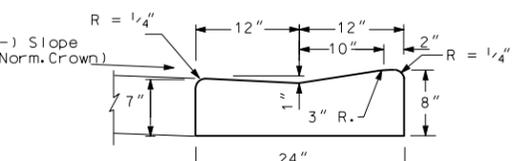


Contraction
Joint Detail
(10' Max. Spacing)

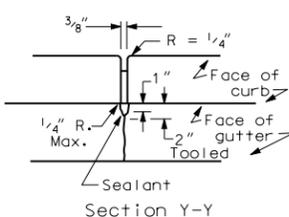


NOTE: All bars shall be #4 deformed reinforcing bars. Splices will not be permitted. Reinforcing bars at inlet locations will not be paid for separately, but shall be included in the price bid for "Curb and Gutter - Type 1."

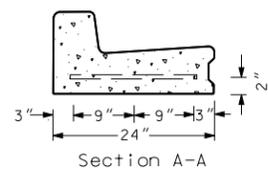
This includes inlets located on radii. The reinforcement shall be extended to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.



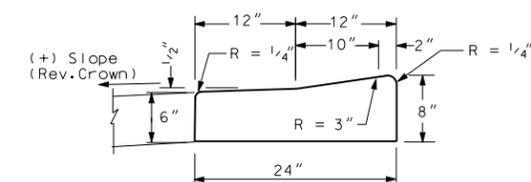
Mountable Curb & Gutter
Type 1 (Sec. A)



Section Y-Y



Section A-A



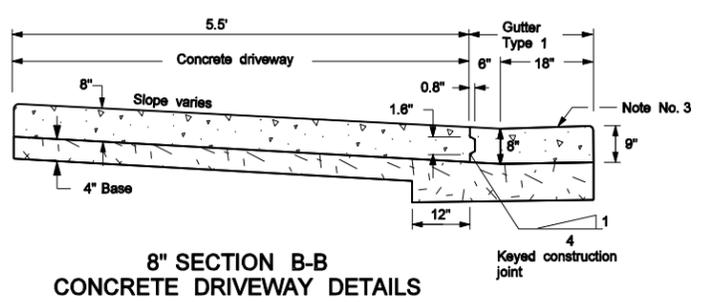
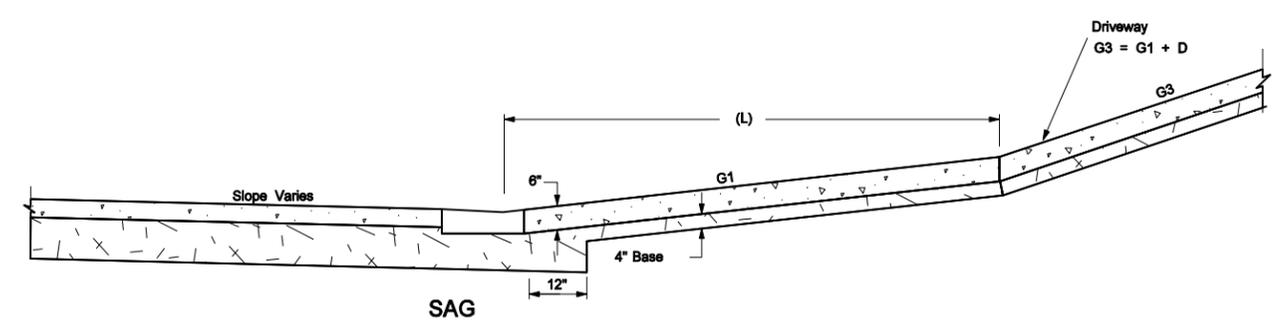
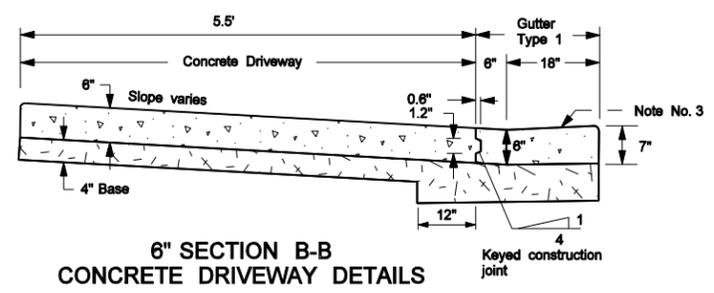
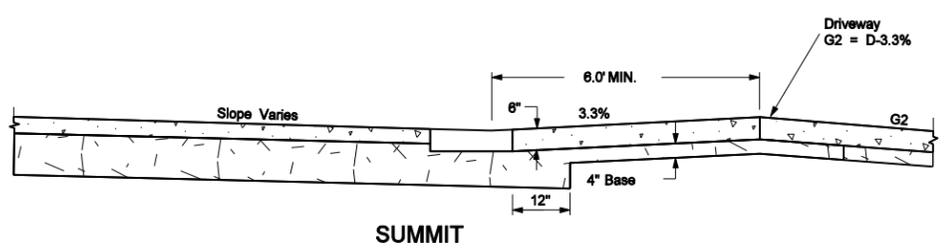
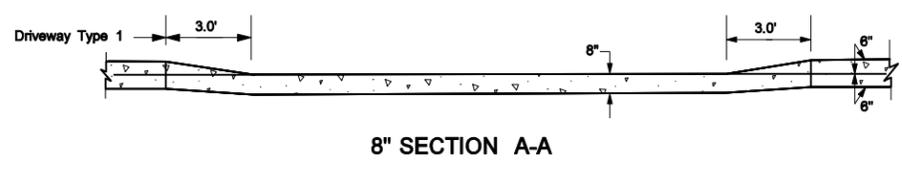
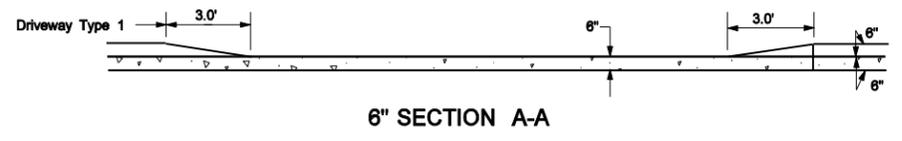
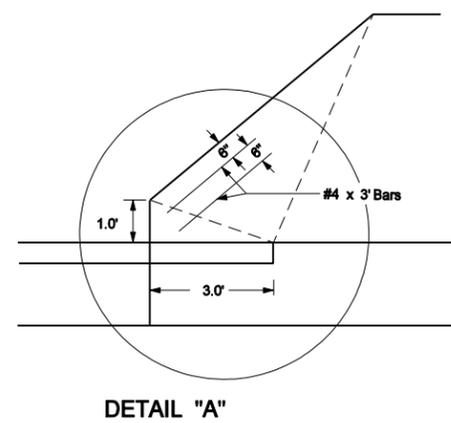
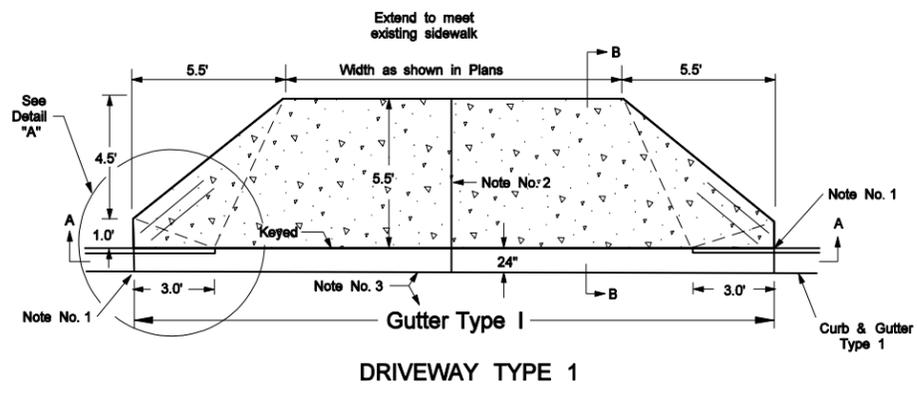
Mountable Curb & Gutter
Type 1 (Sec. B)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
10-17-97	General revisions
12-01-04	PE Stamp added
10-31-06	Added note 8
11-02-07	2" ledge, Section A&B

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CONCRETE DRIVEWAY TYPE 1 (URBAN)

D-750-1



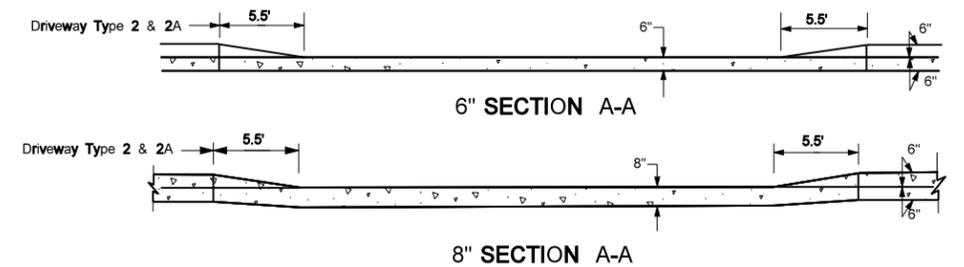
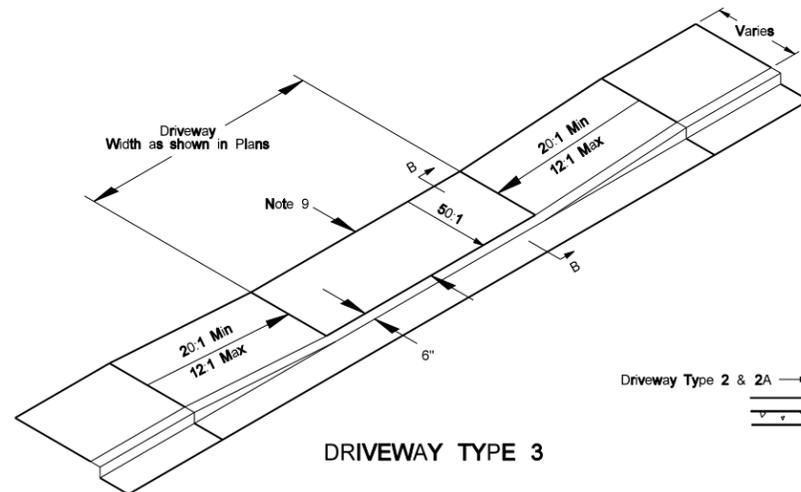
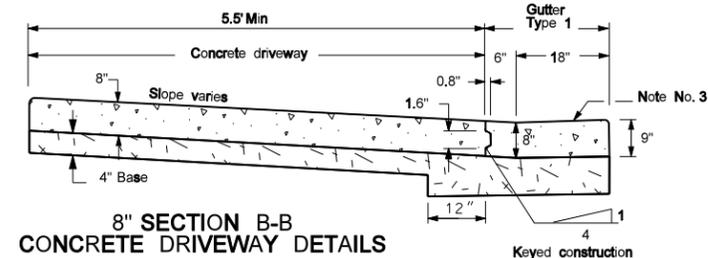
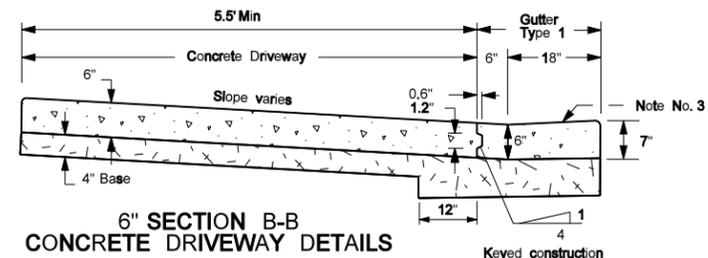
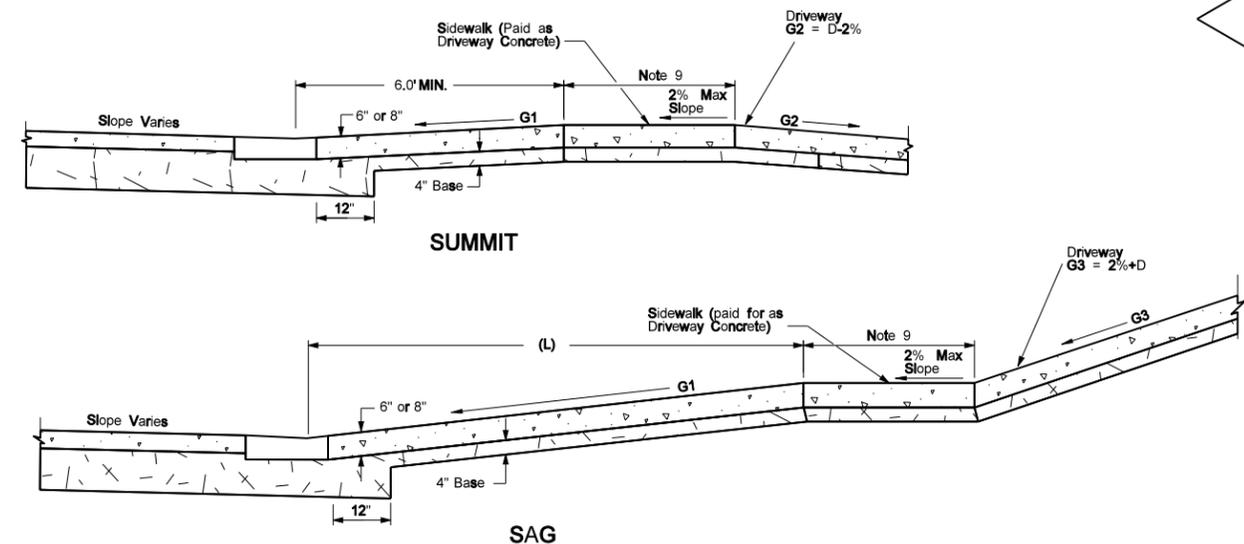
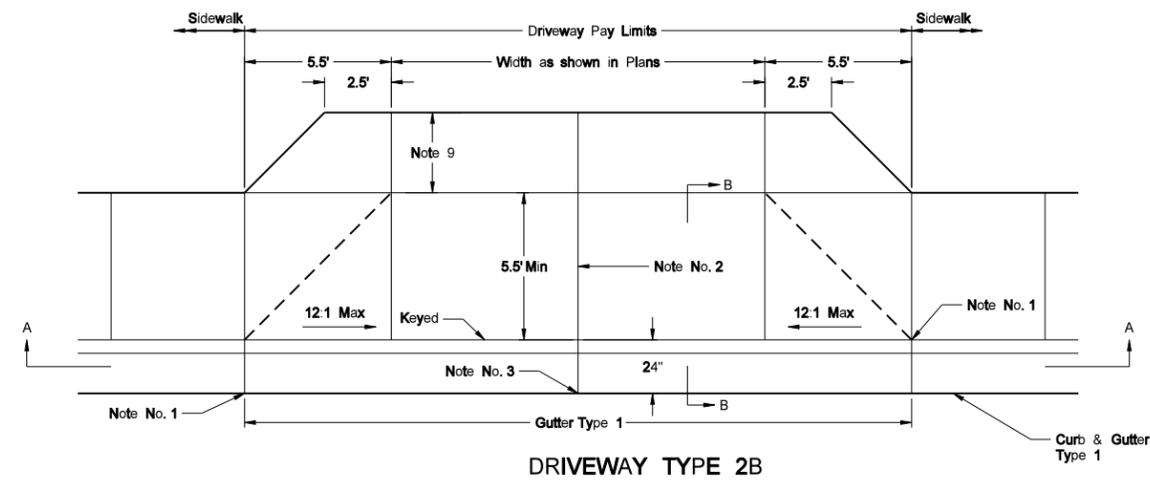
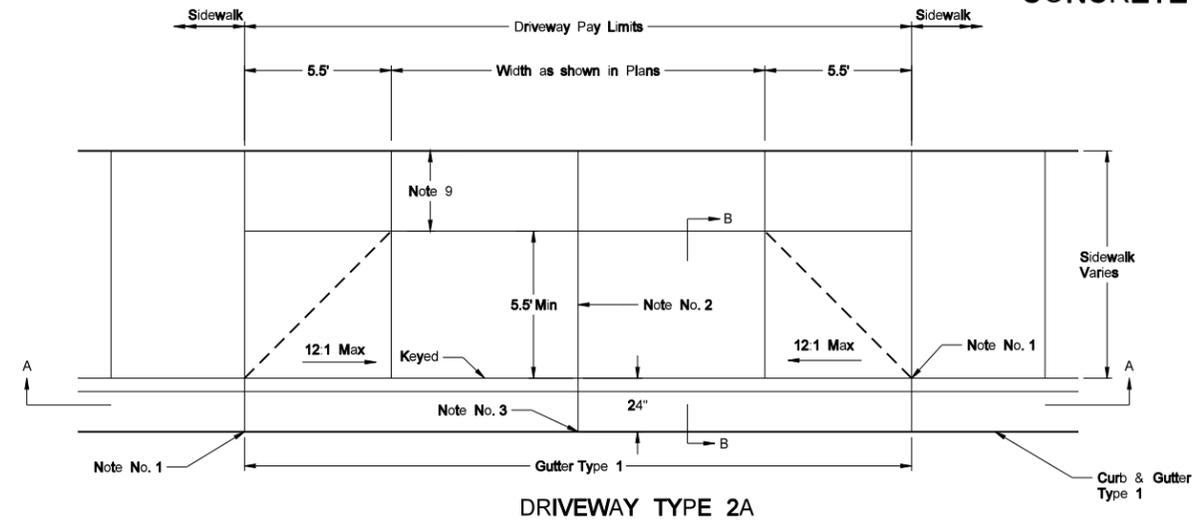
- NOTES:**
1. On bituminous pavements place a 3/4" isolation joint full depth and the same shape as the curb and gutter. On PCC Pavements the curb and gutter joints match those of the pavement.
 2. Joint spacing: The driveway joint spacing shall match the curb and gutter or P.C.C. Pavement joint spacing. (See Standard Drawing D-748-1). The joint may be a keyed construction joint, a sawed, or a grooved joint. The joint depth shall be a minimum of 1/3 the depth of the concrete.
 3. Gutter-Type 1 shall be paid for at the unit price bid for "Curb and Gutter-Type 1".
 4. 6" Driveway to be used unless otherwise specified.
 5. All joints shall be sealed. The joint sealant shall be low modulus silicone. The sealant shall be installed and tooled in accordance with the manufacturer's recommendations
 6. All costs for labor, equipment, and material necessary to construct and seal joints shall be included in the price bid for the driveway.
 7. 4" base material shall be placed under the concrete driveway. All labor and materials necessary to place the base material shall be included in the price bid for Salvage Base Course or Aggregate Base Course CL 5.

Driveway ADT	Grade G1		Dimension (L) ft.		Grade Changes (D)	
	Desirable	Maximum	Desirable	Minimum	Desirable	Maximum
(0-500)	5%	12% or controlled by vehicle clearance	12	6	+6%	15% or controlled by vehicle clearance
(500-1500)	3%	8%	20	20	± 3%	± 6%
(> 1500)	2%	5%	40	40	0%	± 3%

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-88	
REVISIONS	
DATE	CHANGE
03-01-88	Keyed ft dimension
07-01-88	Type 1 taper & quant.
05-01-91	Note 2, 5 & 6
08-08-92	Note 1
09-15-93	Note 5
11-15-93	isolation joint
10-24-94	Rev summit & sag
08-16-97	Rev note 5
01-24-04	Add base & note 7
05-12-04	added 2% to sag det.
12-01-04	PE Stamp added+
08-12-07	Revised to show Type 1 only & Removed Quantities table

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CONCRETE DRIVEWAY TYPE 2 and 3 (URBAN)



NOTES:

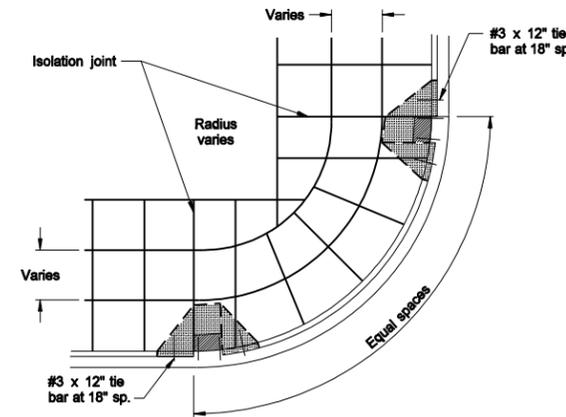
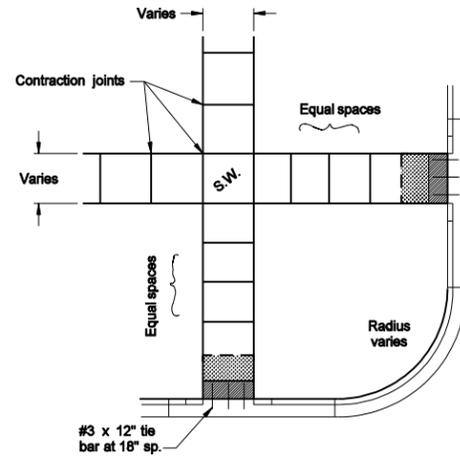
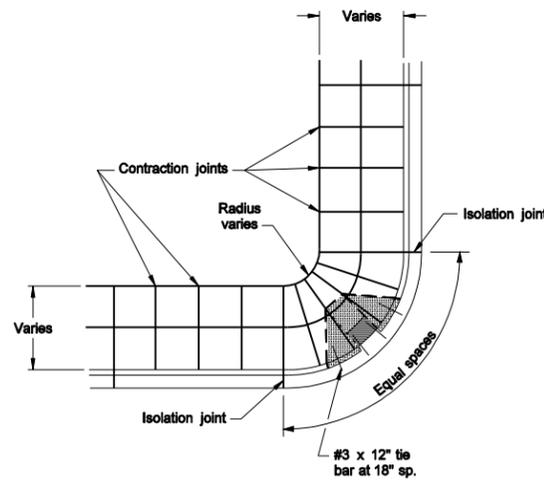
1. On bituminous pavements place a 3/4" isolation joint full depth and the same shape as the curb and gutter. On P.C.C. Pavements the curb and gutter joints match those of the pavement.
2. Joint spacing: The driveway joint spacing shall match the curb and gutter or P.C.C. Pavement joint spacing. (See Standard Drawing D-748-1). The joint may be a keyed construction joint, a sawed, or a grooved joint. The joint depth shall be a minimum of 1/3 the depth of the concrete.
3. Gutter-Type 1 shall be paid for at the unit price bid for "Curb and Gutter-Type 1".
4. 6" Driveway to be used unless otherwise specified.
5. All joints shall be sealed. The joint sealant shall be low modulus silicone. The sealant shall be installed and tooled in accordance with the manufacturer's recommendations
6. All costs for labor, equipment, and material necessary to construct and seal joints shall be included in the price bid for the driveway.
7. 4" base material shall be placed under the concrete driveway. All labor and materials necessary to place the base material shall be included in the price bid for Salvage Base Course or Aggregate Base Course CL 5.
8. Sidewalk that falls behind a driveway shall be constructed to the same thickness as the driveway and shall be paid for as driveway concrete.
9. 5' is desirable but if 5' cannot be used, 4' is the minimum allowable width.

Driveway ADT	Grade G1		Dimension (L) ft		Grade Changes (D)	
	Desirable	Maximum	Desirable	Minimum	Desirable	Maximum
(0-500)	5%	12% or controlled by vehicle clearance	12	6	+6%	15% or controlled by vehicle clearance
(500-1500)	3%	8%	20	20	± 3%	± 6%
(> 1500)	2%	5%	40	40	0%	± 3%

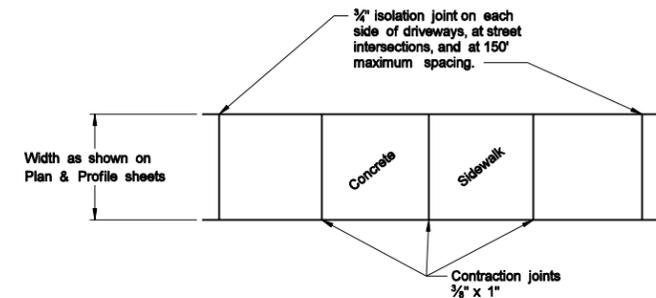
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 09-12-07	
REVISIONS	
DATE	CHANGE

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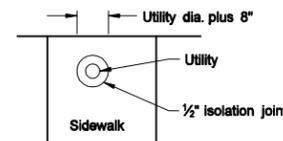
SIDEWALK



TYPICAL JOINT LAYOUTS



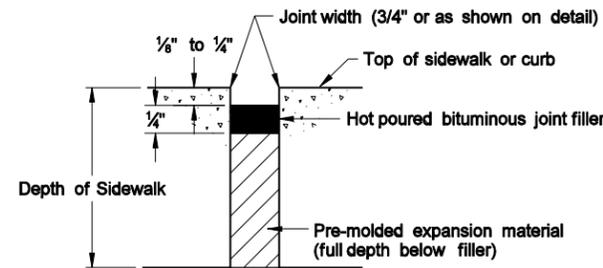
CONCRETE SIDEWALK DETAILS



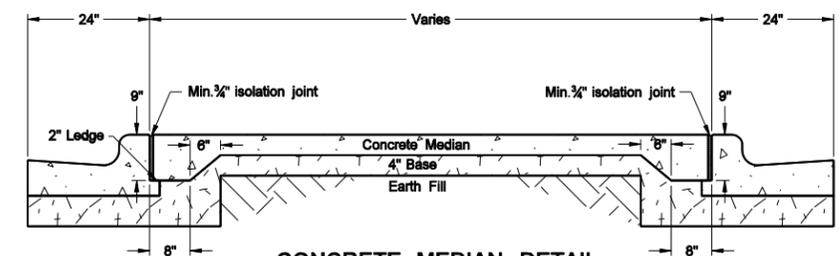
UTILITY BLOCKOUT



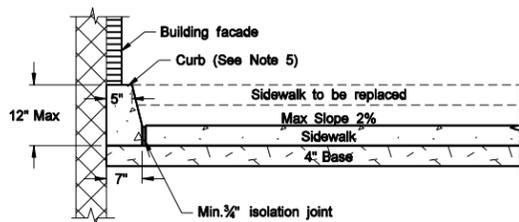
"L"BAR DETAIL #3 BAR



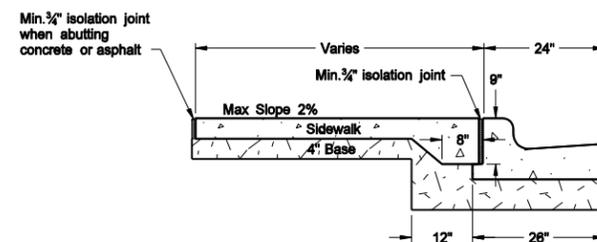
TYPICAL ISOLATION JOINT SEAL (longitudinal and transverse)



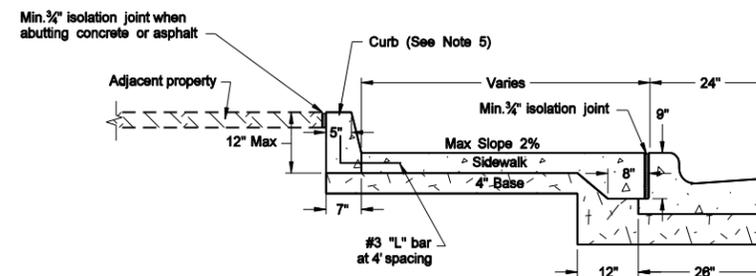
CONCRETE MEDIAN DETAIL



SIDEWALK WITH CURB DETAIL (Building face application)



SIDEWALK DETAIL (Installed adjacent to curb and gutter)



SIDEWALK WITH CURB DETAIL (Adjacent property application)

Notes:

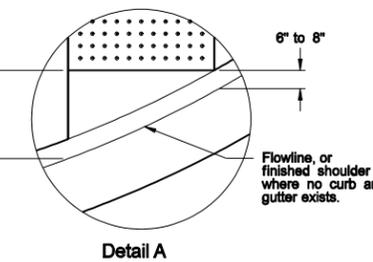
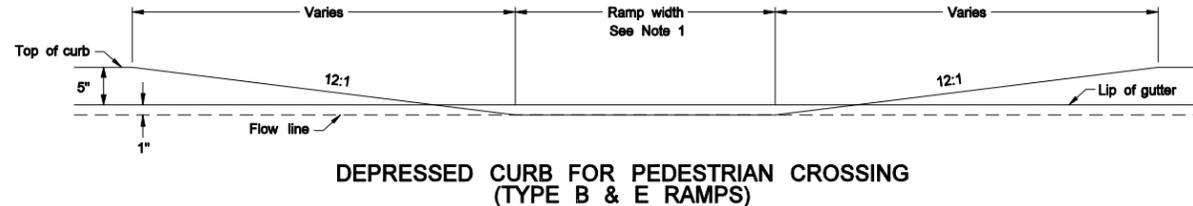
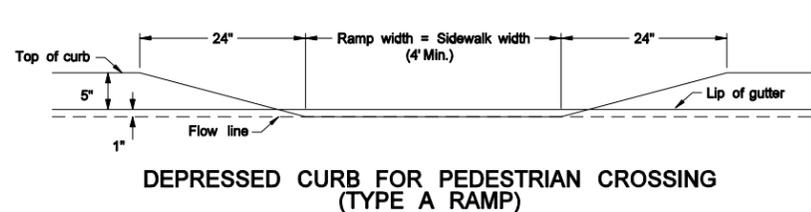
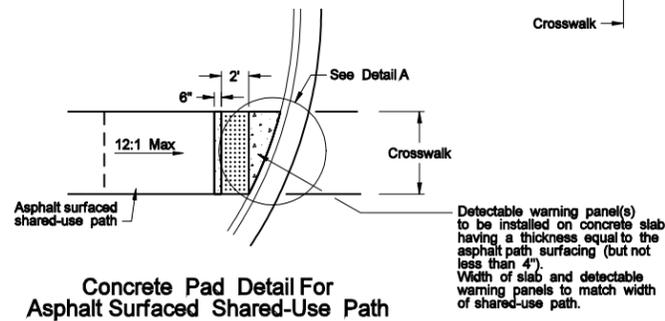
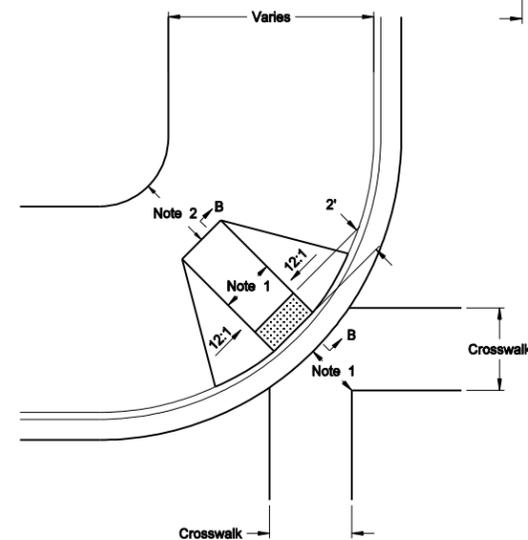
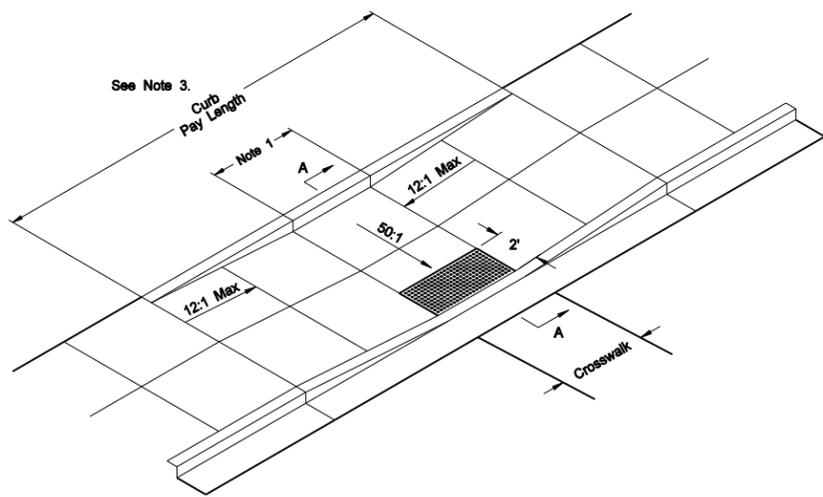
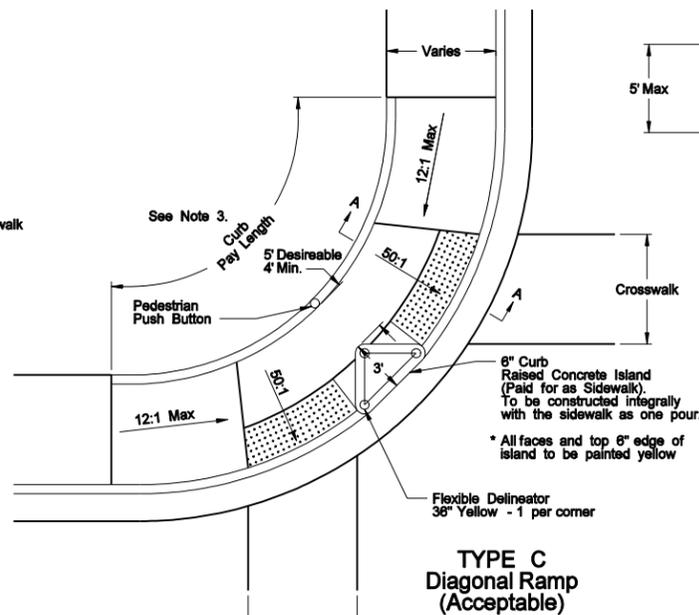
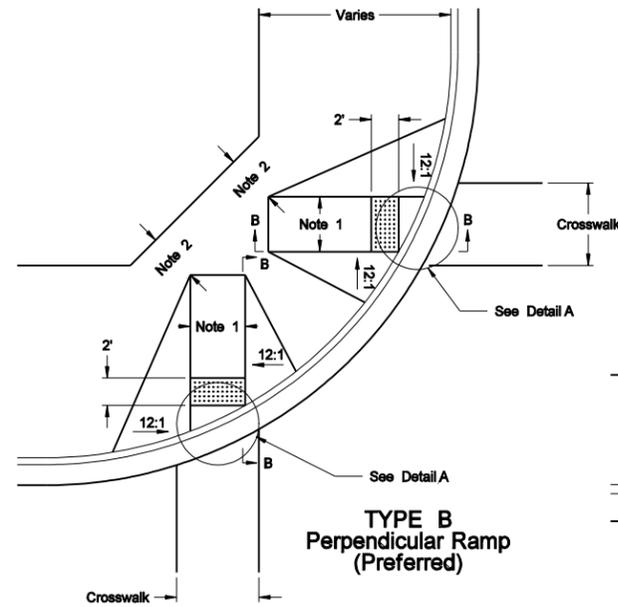
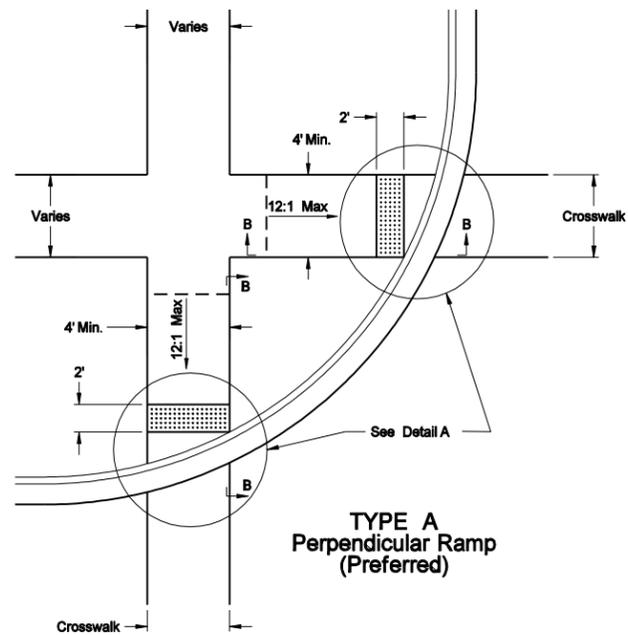
1. Method of payment: The curb ramp will not be paid for separately, but shall be included in the quantities & paid for at the unit price for concrete sidewalk and curb & gutter.
2. The cost for all labor, equipment, and material (pre-molded expansion material & hot bituminous joint filler) necessary to construct contraction and isolation joints shall be included in the price bid for sidewalk.
3. 4" base material shall be placed under the concrete sidewalk. All labor and materials necessary to place the base material shall be included in the price bid for Salvage Base Course or Aggregate Base Course CL 5.
4. Details showing curb ramps and detectable warning panels on this drawing are for joint and reinforcing layout purposes only. See Standard Drawing D-750-3 for curb ramp and detectable warning panel details.
5. As shown in the plans or as directed by the engineer, a curb shall be constructed where the existing sidewalk is to be lowered, or abuts a building or adjacent property. The curb will be paid for at the unit price bid for the item "Curb - Type I" per lineal foot.
6. Transverse sidewalk joint spacing shall vary from 4'-6" to create approximate square panels. When the sidewalk is adjacent to the curb & gutter, the sidewalk joint spacing shall be varied so that the sidewalk joints match up with the curb & gutter joints.
7. Longitudinal joints shall be used where the sidewalk width is 8' or greater, and shall be spaced at half the sidewalk width.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-88	
REVISIONS	
DATE	CHANGE
09-01-82	Remove Detectable Warning
09-23-82	Revised Expansion Joint
12-05-83	Isolation Joint
02-16-84	General Revisions
07-18-01	Revised Joints
03-11-02	Revised Section A-A
10-23-03	Added detectable warning
01-15-04	Added Maximum Slopes
01-24-04	Rev notes - Added base
12-01-04	PE Stamp added
09-12-07	Major Revisions
11-02-07	Thickened sidewalk abutting curb & gutter, added concrete median detail

This document was originally issued and sealed by Mark S Gaydos, Registration Number PE- 4518 , on 11/02/07 and the original document is stored at the North Dakota Department of Transportation

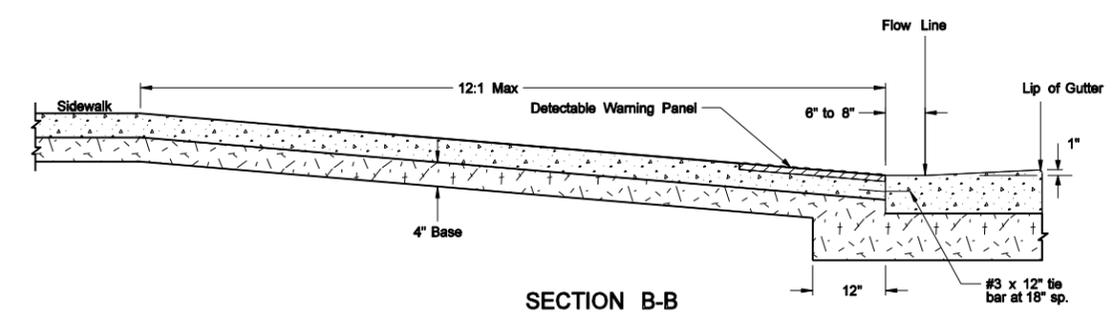
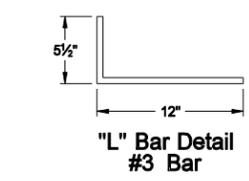
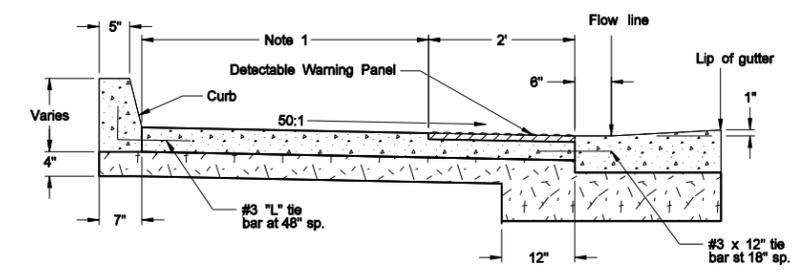
CURB RAMP DETAILS

D-750-3



- Notes:**
- For sidewalk installations, a 5' ramp width should be used. Where site conditions do not allow a 5' ramp width, a 4' ramp width may be used. Detectable warning panels shall be installed to match the ramp width (Ramp width is defined as the useable portion of ramp, excluding flared aprons if used).
 - 5' is desirable but 4' is the minimum allowable distance. If the 4' minimum distance cannot be provided, Ramp Type C shall be used.
 - The curb shown in the details for Type C and D curb ramps shall be measured by the lineal foot, and paid for at the unit price bid for the item "Curb - Type I."

Detectable Warning Panel(s)

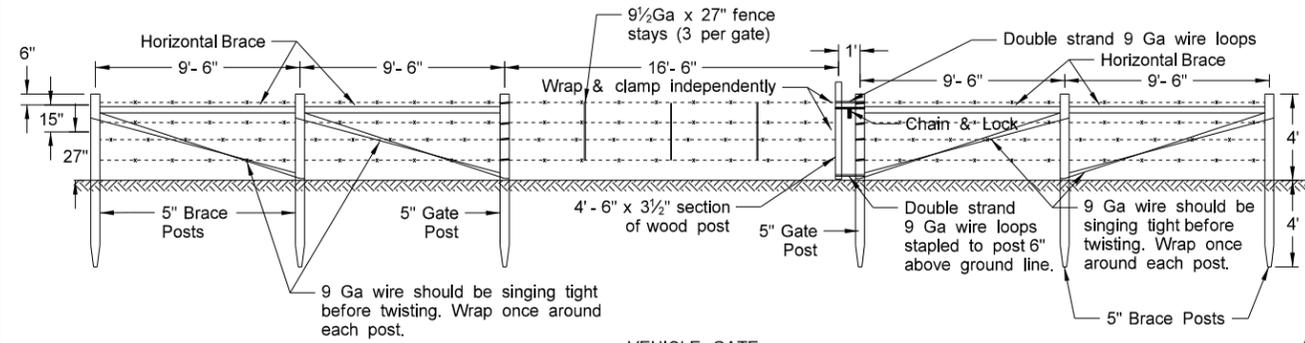


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09-13-07	
REVISIONS	
DATE	CHANGE
09-20-07	Revised detail A
10-26-07	Revised Section B-B, detail C, misc. labeling, Notes, and added concrete pad detail.
12-18-07	Revised Note 1.

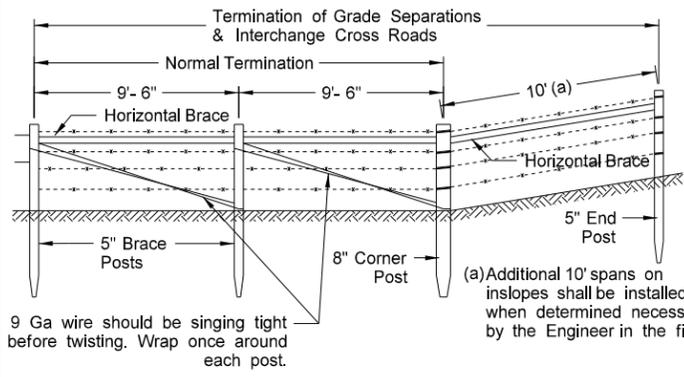
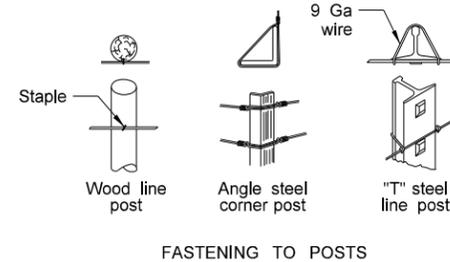
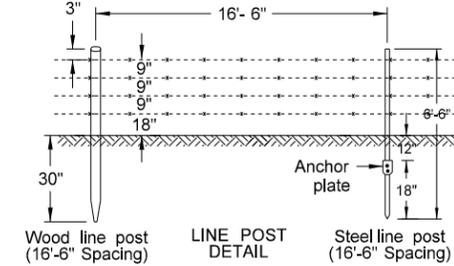
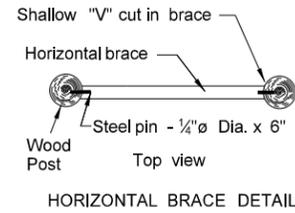
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 Registration Number
PE- 4518 ,
 on 12/18/07 and the original document is stored at the North Dakota Department of Transportation

STANDARD BARBED WIRE FENCE

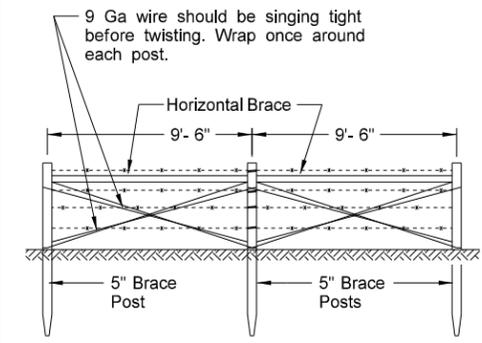
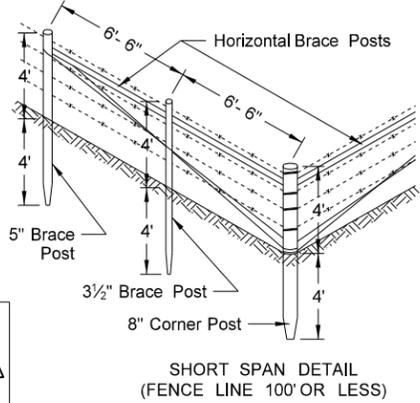
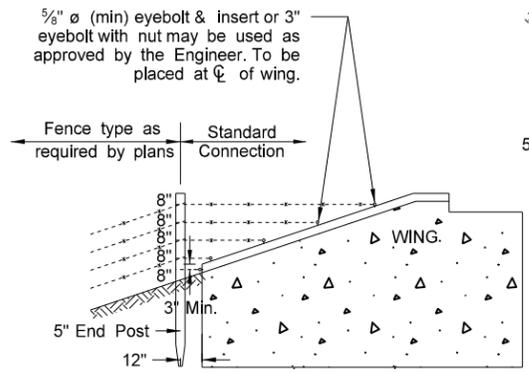
D-752-1



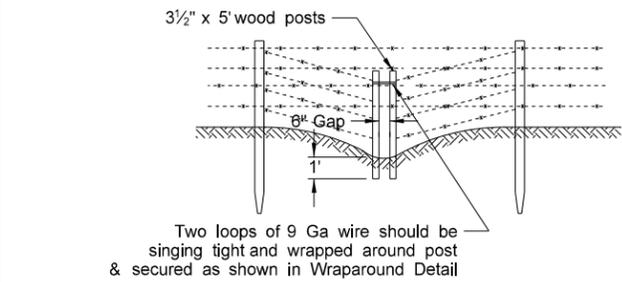
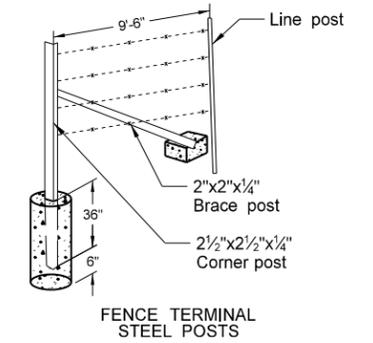
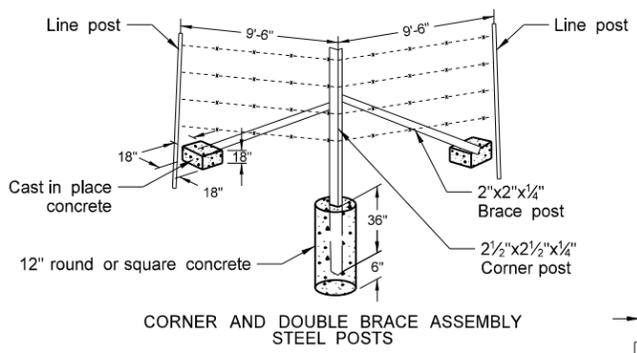
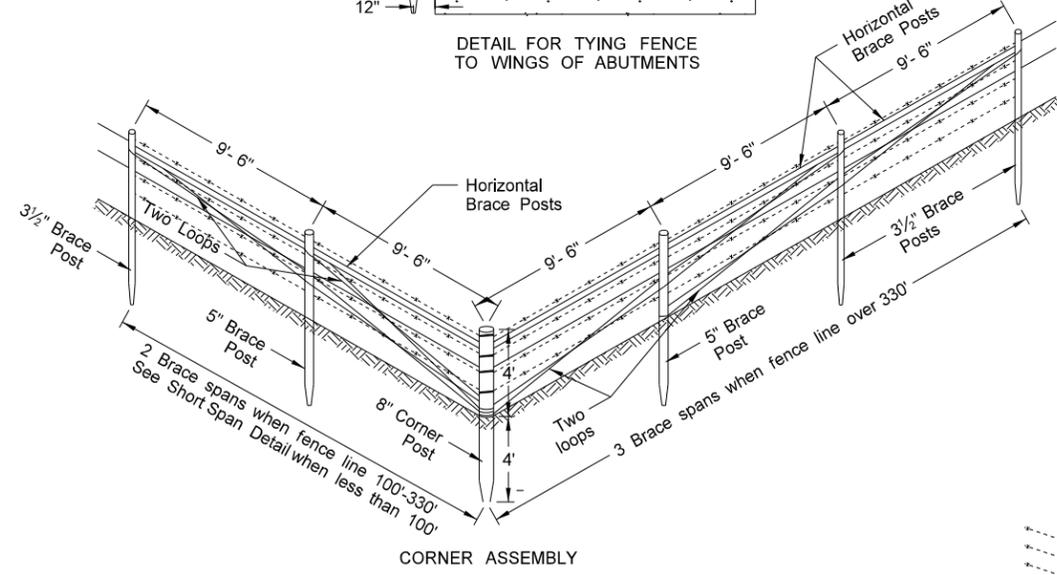
VEHICLE GATE



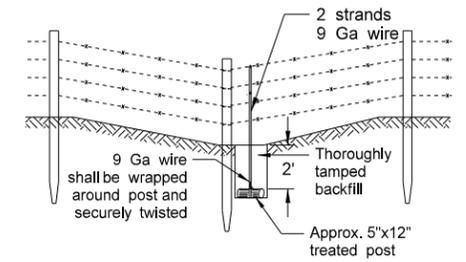
FENCE TERMINAL



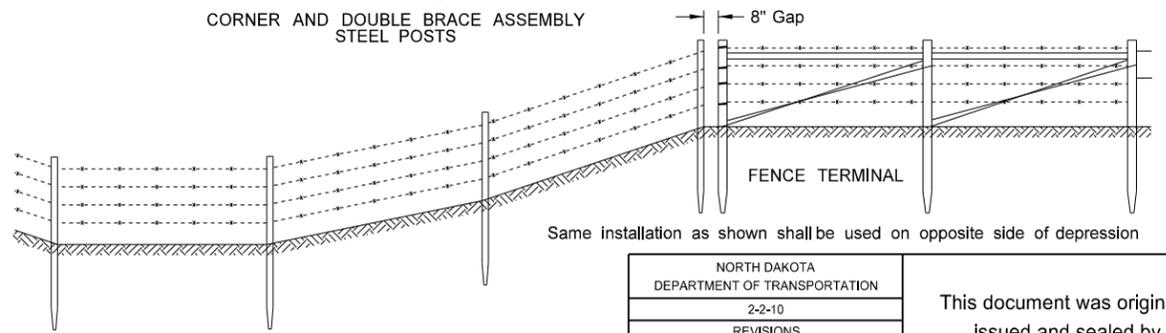
DOUBLE BRACE ASSEMBLY



BREAK-AWAY FENCE FOR NARROW DEPRESSIONS SUBJECT TO FLOODING



*Locations shall be determined in the field and included in price bid for fencing. Other methods of anchoring the fence may be used if approved by the Engineer.



FENCING FOR WIDE DEPRESSIONS

NOTES

1. No deduction in measured pay length of cable fence will be made for gates, corner assemblies, double brace assemblies, fence terminals, or depression fencing. Abutment fencing shall be included in the price bid for fencing bid items.
2. Double brace assemblies shall be installed at locations shown on the plans or established by the Engineer. The distance between adjacent fence terminals, corner assemblies, or double brace assemblies shall not exceed 1,320 feet.
3. Cost of furnishing and installing inserts and eyebolts shall be included in the unit price bid for fencing bid items. Eyebolts shall be galvanized according to AASHTO designation M-30; inserts of corrosion resistant material need not be galvanized. Concrete inserts shall be of such design that, when installed in the concrete, will be capable of developing the full strength of the 5/8" diameter threaded eyebolt.
4. The type of posts to be used, either wood or steel, shall be determined by the contractor unless otherwise specified in the plans.

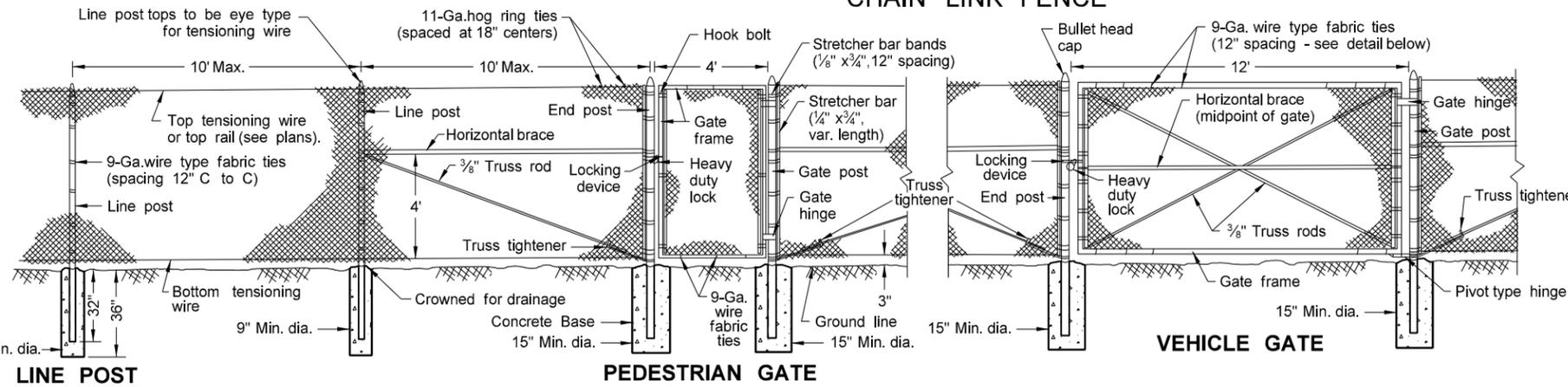
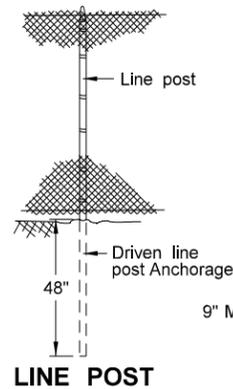
USE OF POST	POST SIZES				
	TREATED WOOD	STEEL	STEEL	STEEL	STEEL
	Post dia.	Post length	Post length	Post wt. Lbs/Ft	Anchor wt. Lbs.
Line post	3 1/2"	6'-6"	6'-6"	1.33	0.67
Corner post	8"	8'	7'	4.10	(Conc.)
End post	5"	8'			
Brace post	5"	3 1/2"	8'	3.19	(Conc.)
Gate post	5"	8'			
Horizontal brace	3 1/2"	Var.	As approved by the Engineer		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-2-10	
REVISIONS	
DATE	CHANGE
10-02-12	Notes, steel assemblies/posts

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CHAIN LINK FENCE

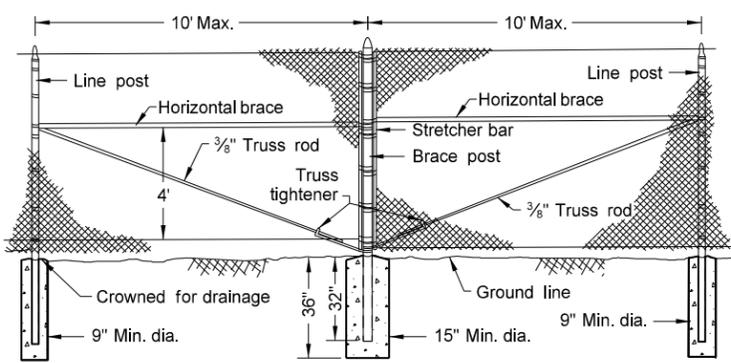
ALTERNATE LINE POST ANCHORAGE



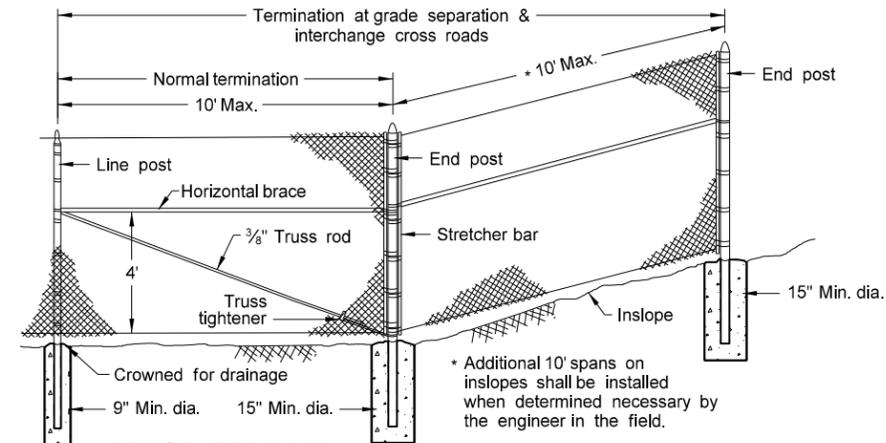
NOTES:

1. Double brace assemblies shall be installed at locations shown on the plans or established by the engineer. The distance between adjacent fence terminals, corner assemblies, or double brace assemblies shall not exceed 1000 feet. No deduction in measured pay length of chain link fence will be made for gates, corner assemblies, double brace assemblies, or fence terminals.
2. All miscellaneous fittings shall be of the type and size recommended by the manufacturer of the fence and approved by the engineer.
3. Height of fabric shall be 6' unless otherwise shown on the plans.
4. Concrete for the post bases shall be Class YE in accordance with Sec. 802 of the Standard Specifications. Course aggregate for concrete mix shall be size No. 4 or 5 at the option of the contractor but shall not be changed during the work except by written permission of the engineer.
5. The contractor shall have the option of using any of the types of posts shown in the table of equivalent post sizes and weights for the specified use.
6. Private fences shall not be connected to the highway right-of-way fence, but may be abutted next to the right-of-way fence.
7. A concrete anchorage shall be used for all end, corner, and brace posts, and for the first line post(s) adjacent to the terminal posts.

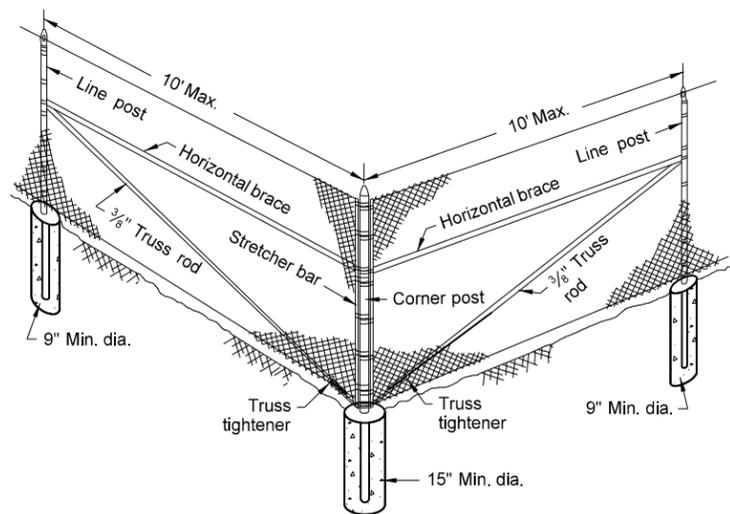
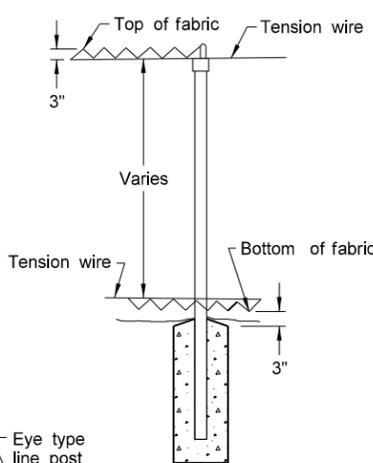
LINE POST



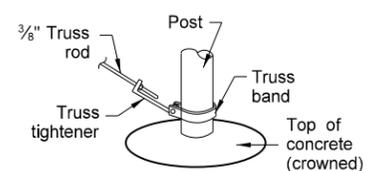
DOUBLE BRACE ASSEMBLY



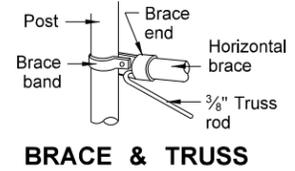
FENCE TERMINAL



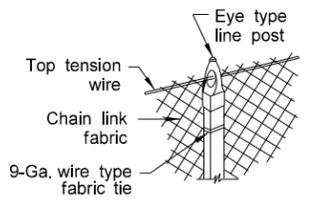
CORNER ASSEMBLY



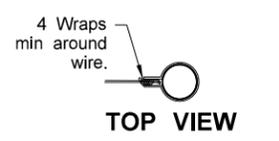
TRUSS ATTACHMENT AT TERMINAL POSTS



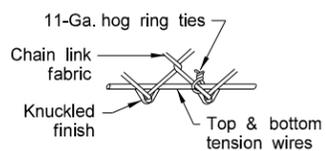
BRACE & TRUSS ATTACHMENT



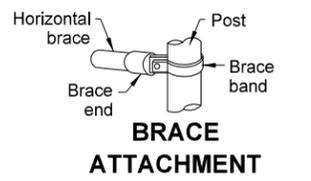
LINE POST TOP DETAIL



TOP VIEW

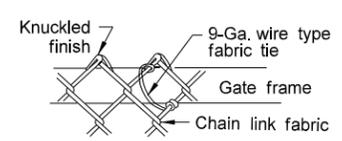


HOG RING FASTENER DETAIL

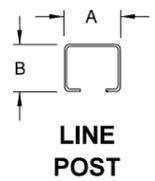


BRACE ATTACHMENT

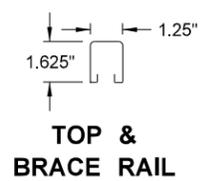
TENSION WIRE ANCHORAGE



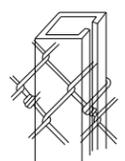
WIRE TYPE FABRIC TIE DETAIL



LINE POST

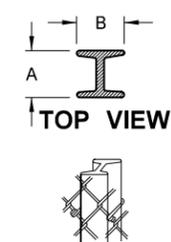


TOP & BRACE RAIL



ROLL FORMED POST

ROLL FORMED POST



"H" COLUMN POST

EQUIVALENT POST SIZES AND WEIGHTS																
USE OF POST	FABRIC HEIGHT	ROUND STEEL			ROLL FORMED			"H" COLUMN STEEL								
		Size	Weight - Lbs./Ft.		Size	Weight	Size		Weight							
		Out. Dia.	Grade 1	Grade 2	A	B	Lbs./Ft.	A	B	Lbs./Ft.						
LINE POST	6' or less	1.900"	2.72	2.28	1.875"	1.625"	2.40	2.25"	1.70"	3.26						
	Over 6'	2.375"	3.65	3.12	2.25"	1.70"	2.78	2.25"	1.70"	3.26						
END or CORNER	6' or less	2.375"	3.65	3.12	ROLL FORMED STEEL POSTS NOT PERMITTED	"H" COLUMN STEEL POSTS NOT PERMITTED	1.35									
	Over 6'	2.875"	5.79	4.64												
BRACE POST	6' or less	2.375"	3.65	3.12												
	Over 6'	2.875"	5.79	4.64												
GATE POST	6' or less	3.500"	7.58	5.71												
	Over 6'	4.000"	9.11	6.56												
EXTERIOR FRAME FOR GATE	Gate width 6' or less	1.660"	2.27	1.84												
	Gate width over 6'	1.900"	2.72	2.28												
HORIZONTAL BRACE	All	1.660"	2.27	1.84							1.625" x 1.25"	1.35				

STRETCHER BAR BAND

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-5-09	
REVISIONS	
DATE	CHANGE
9-28-10	Revised Equivalent Post Sizes and Weights, details, & notes

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930 , on 9/28/10 and the original document is stored at the North Dakota Department of Transportation

NOTES:

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

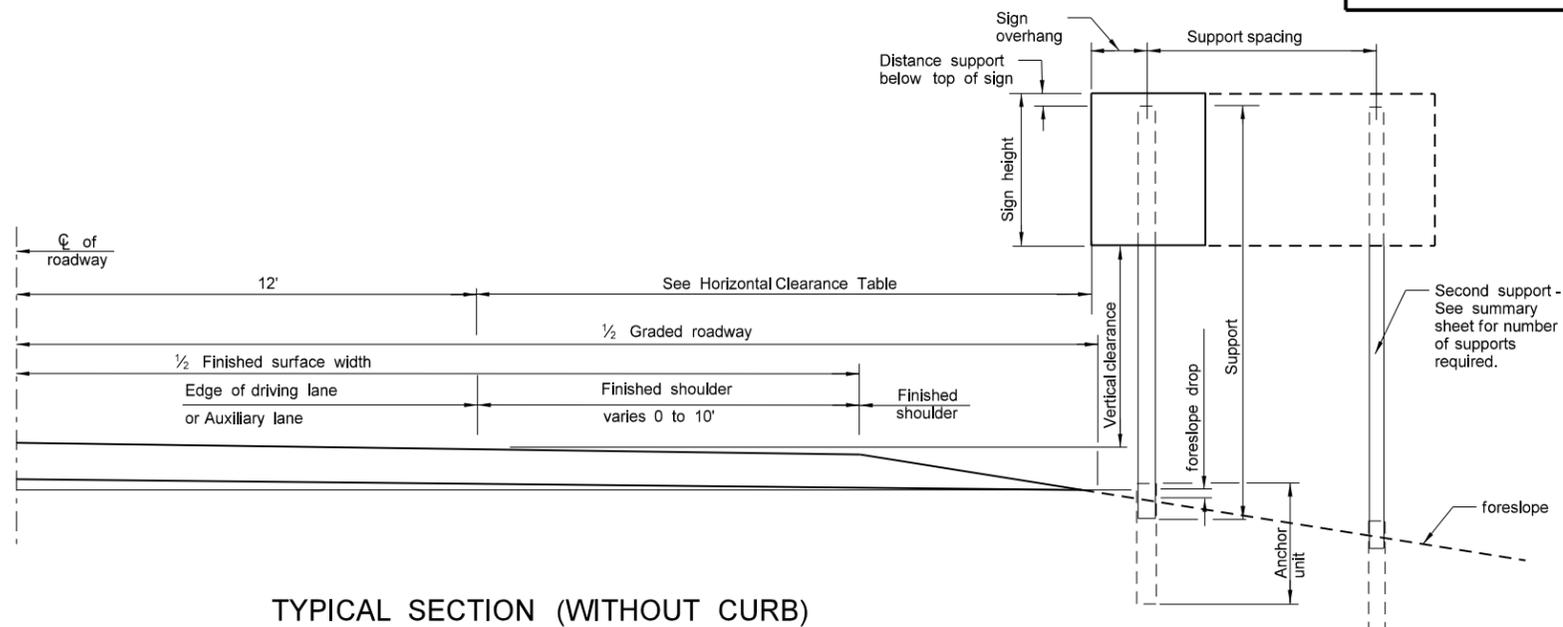
2. Minimum Vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.

Directional signs on expressways and freeways shall be installed with a minimum height of 7'. If the secondary sign is mounted below another sign, the major sign shall be installed at least 8' and the secondary sign shall be installed at least 5' above the edge of the driving lane. All route signs, warning signs, and regulatory signs on expressways and freeways shall be at least 7' above the edge of the driving lane. Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.

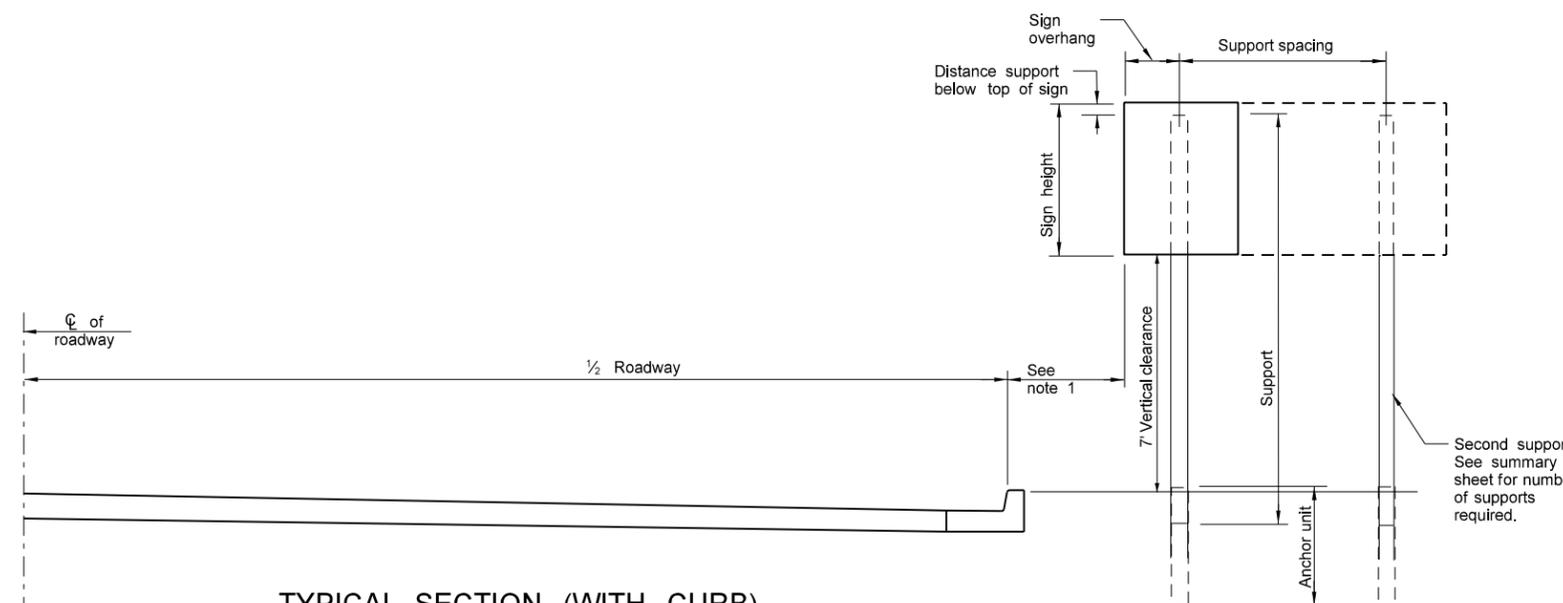
The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.

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

ASSEMBLY DETAILS

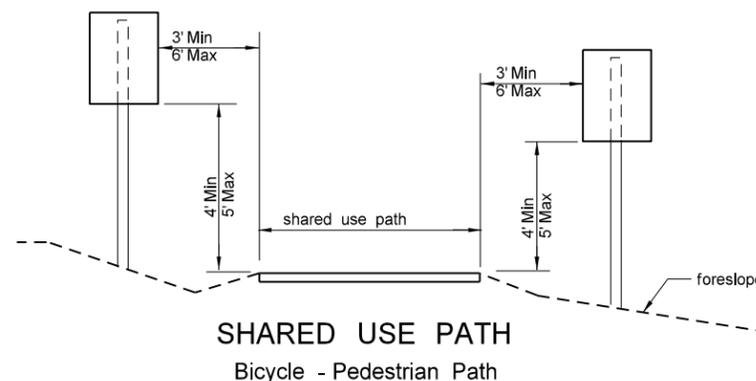


TYPICAL SECTION (WITHOUT CURB)



TYPICAL SECTION (WITH CURB)

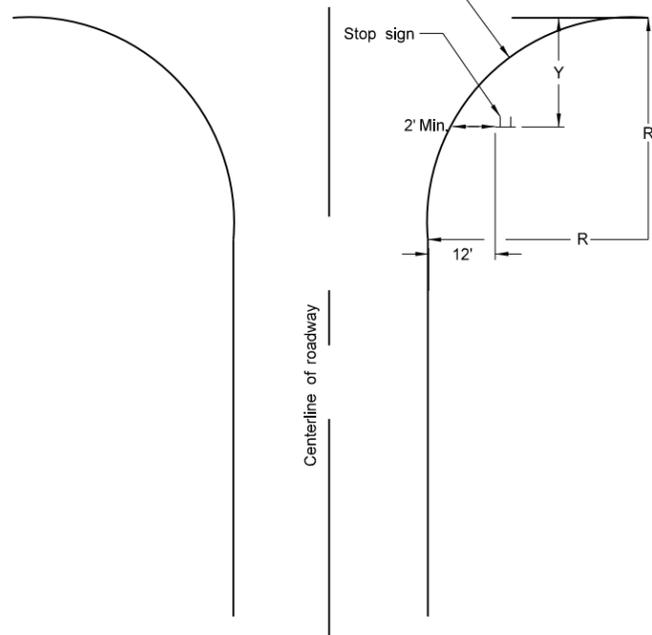
Residential or Business District



SHARED USE PATH

Bicycle - Pedestrian Path

Face of curb or edge of driving lane



STOP SIGN LOCATION WIDE THROAT INTERSECTION

Note: This layout is to be used for the placement of "Stop" signs.

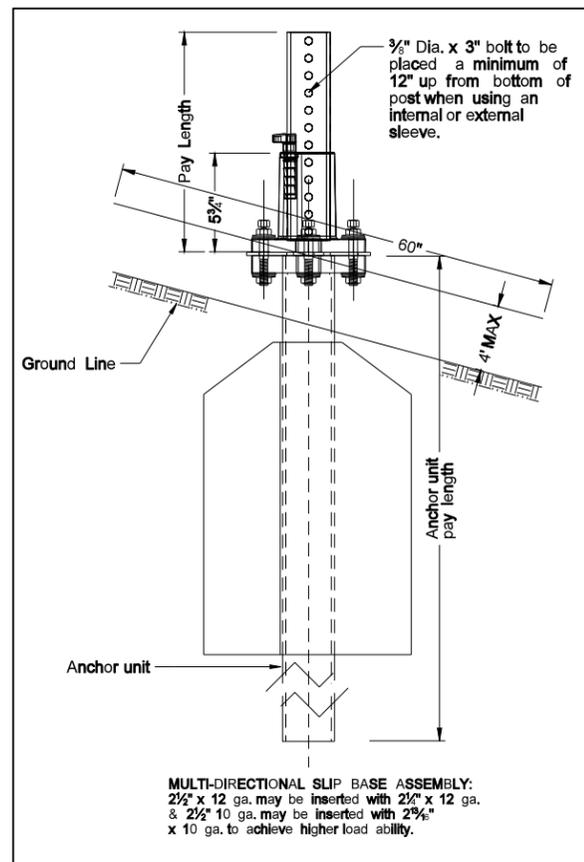
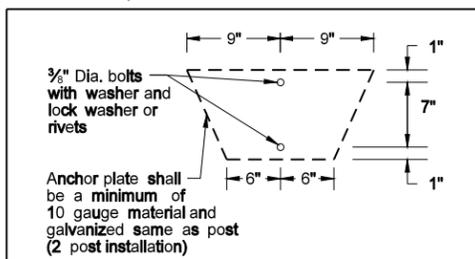
R=Radius	Y-Max	Y-Min
40'	50'	15'
45'	50'	18'
50'	50'	21'
55'	50'	25'
60'	50'	28'
65'	50'	32'
70'	50'	35'
75'	50'	39'
80'	50'	43'

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

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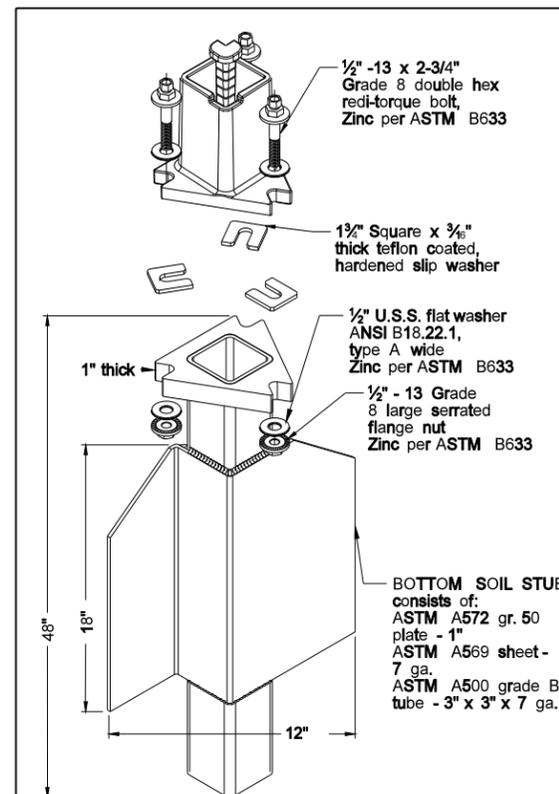
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)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

(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.
 (C) - 3" anchor unit
 (D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

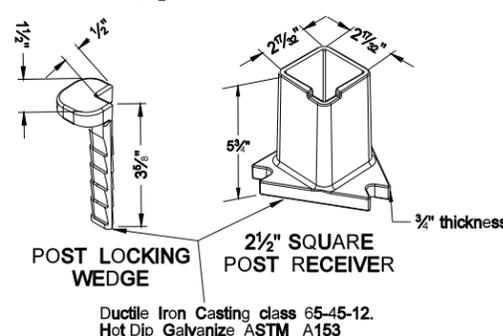


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube



SLIP BASE FOR 2 1/2" POST



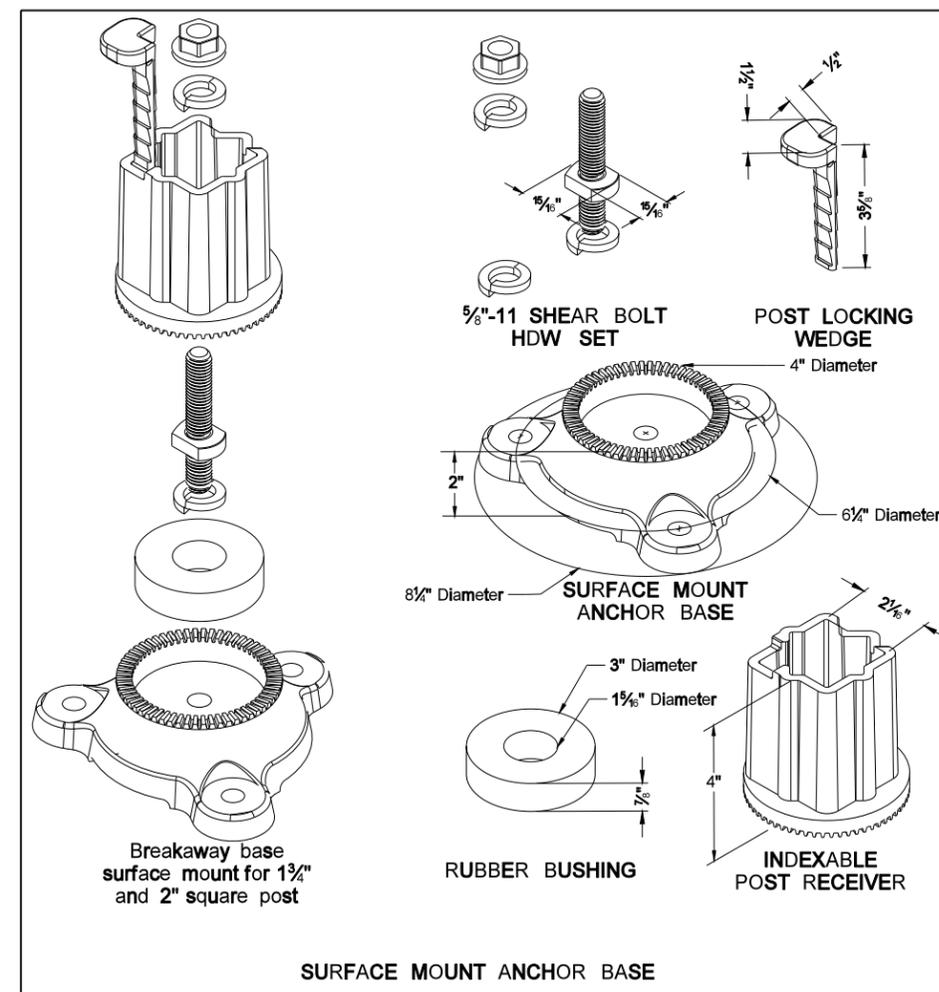
SLIP BASE DETAIL

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 1/2 x 2 1/2	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 shall be made above and below post location and also back and ahead of post.
- 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 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
- When used in concrete sidewalk, anchor shall be the same concept without the wings.
- Four post signs shall have over 8" between the first and fourth posts.
- Installation procedures as per manufacturers recommendation.
- Concrete fasteners for surface mount breakaway base shall be a minimum 1/2" diameter x 4" grade 8.



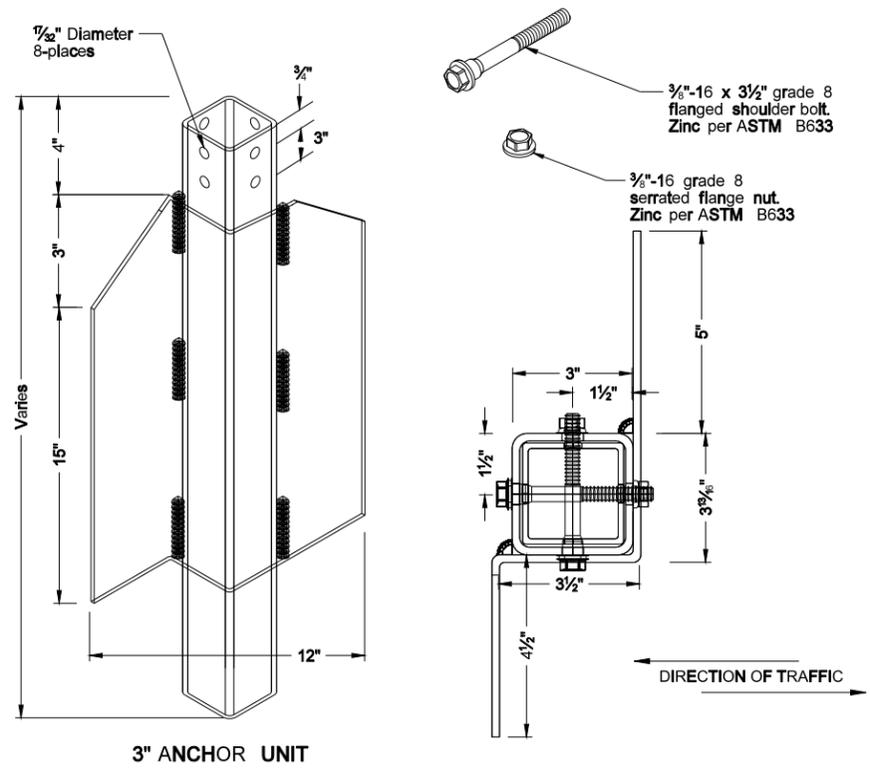
SURFACE MOUNT ANCHOR BASE

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8-6-09	
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SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2 1/2" post. (standard 3/8" diameter grade 8 bolt may be used with proper shim)

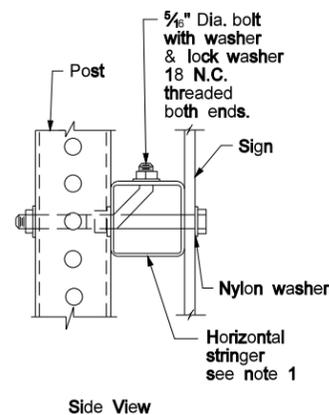


3" ANCHOR UNIT

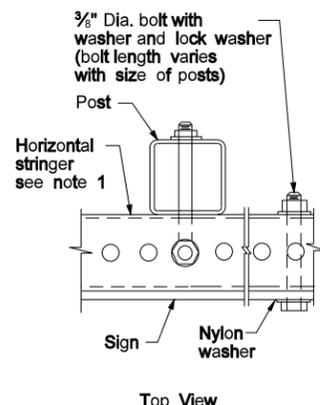
Mounting Details Perforated Tube

Note:

- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 1/2" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
- Metal washers used on sign face shall have a minimum outside diameter of 5/8" ± 1/16" and 10 gauge thickness.
- No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers. Material used for the attachment strap shall be included in the price bid for "Flat sheet for signs."
- In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
- 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.

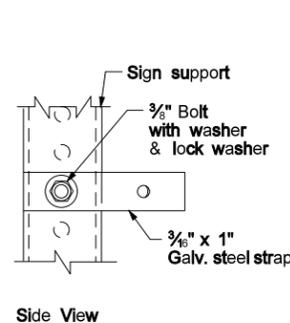


Side View

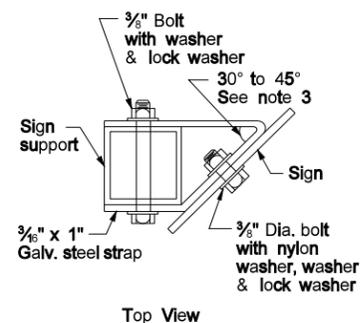


Top View

STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

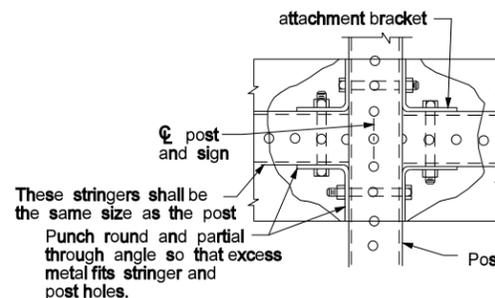


Side View



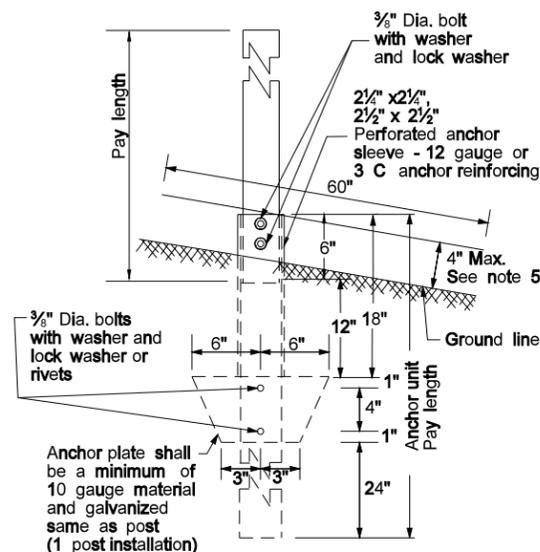
Top View

STRAP DETAIL

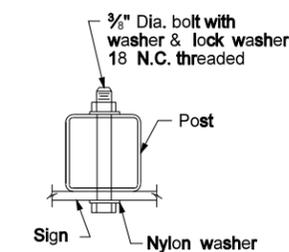
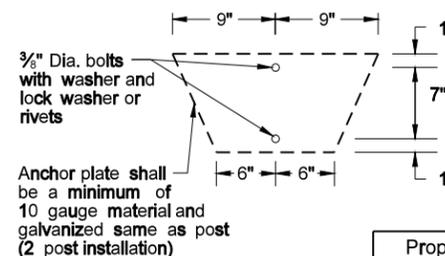


These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.

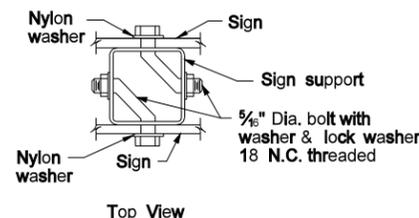
STREET NAME SIGNS
AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR
BACK TO BACK MOUNTING



ANCHOR UNIT AND
POST ASSEMBLY



BOLT MOUNTING



Top View

BACK TO BACK
MOUNTING

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Gross 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

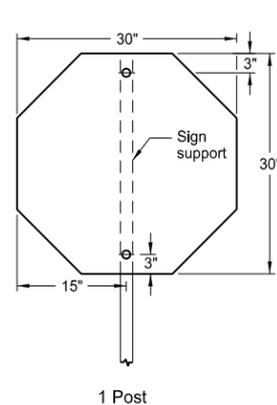
The 2 1/4" size 10 gauge is shown as 2.19" size on the plans.
The 2 1/2" size is shown as 2.51" size on the plans.

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 3/8	10	Yes		7

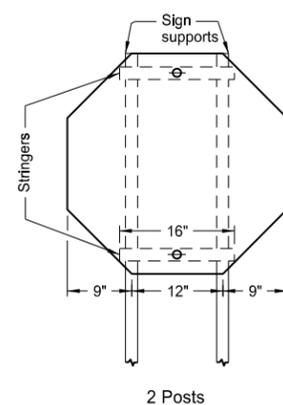
(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

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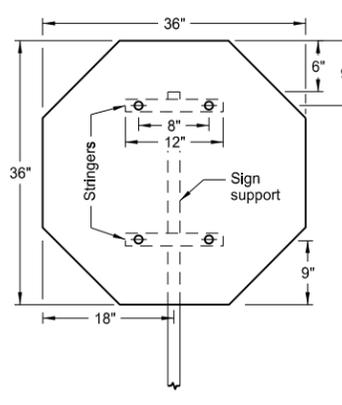
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



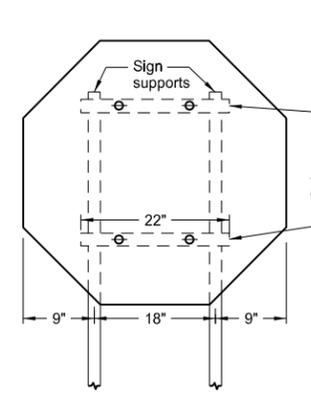
1 Post



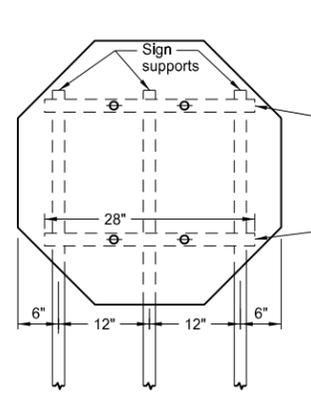
2 Posts



1 Post



2 Posts



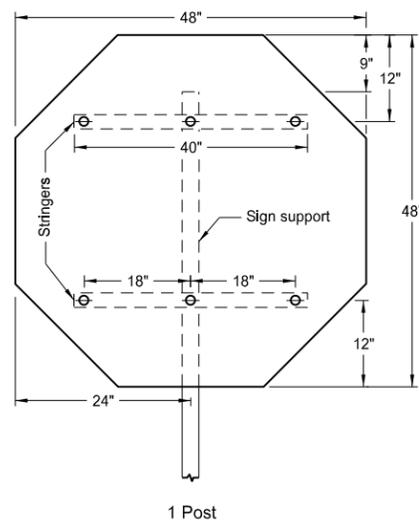
3 Posts

Assembly No. 1

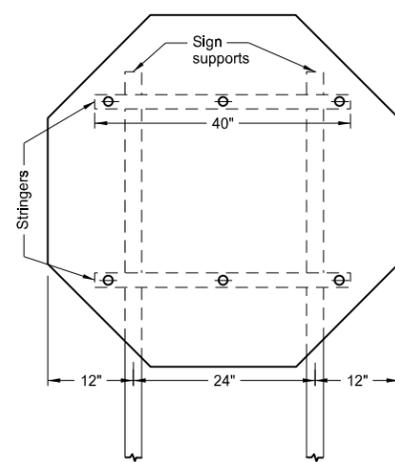
Assembly No. 2

Notes:

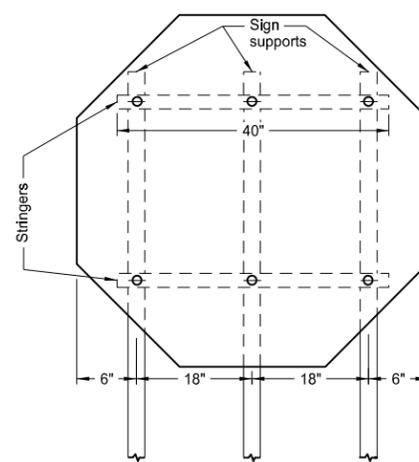
1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



1 Post

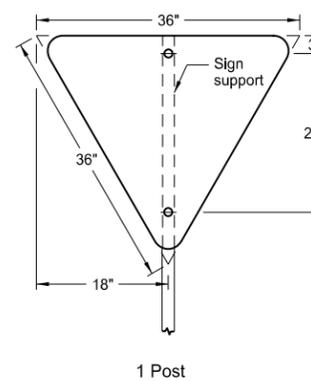


2 Posts

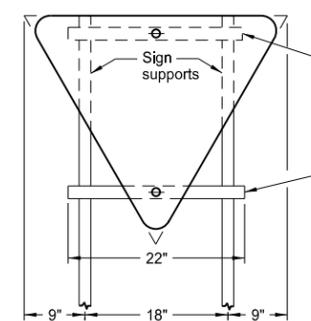


3 Posts

Assembly No. 3

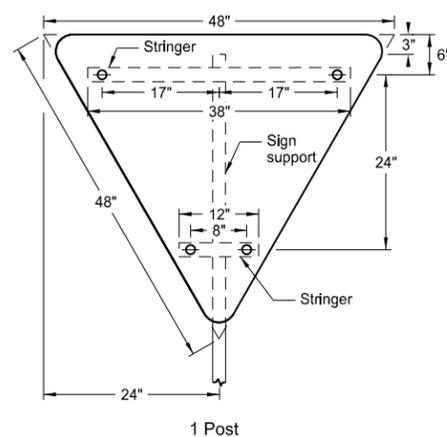


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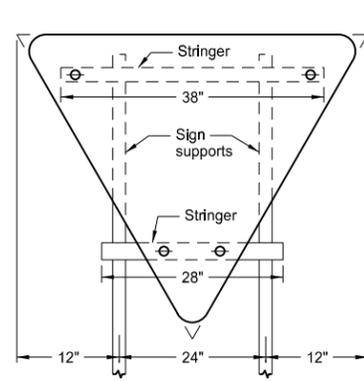


2 Posts

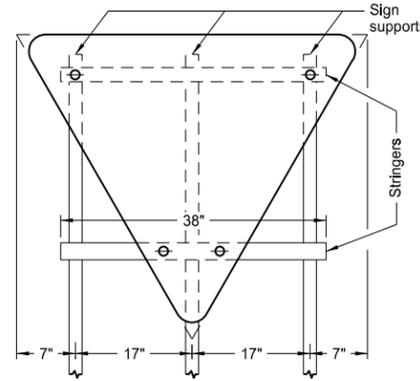
Assembly No. 4



1 Post



2 Posts



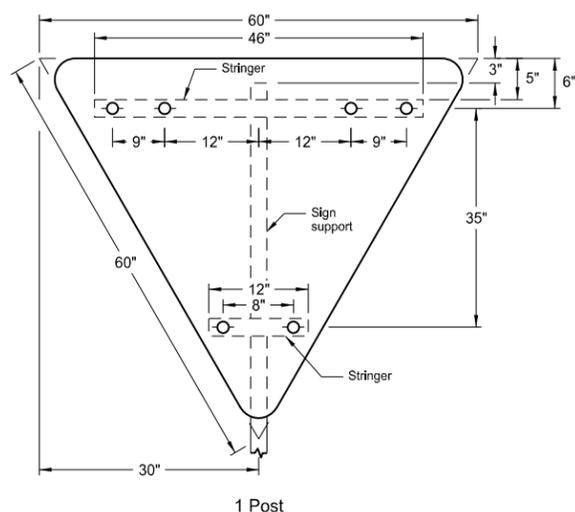
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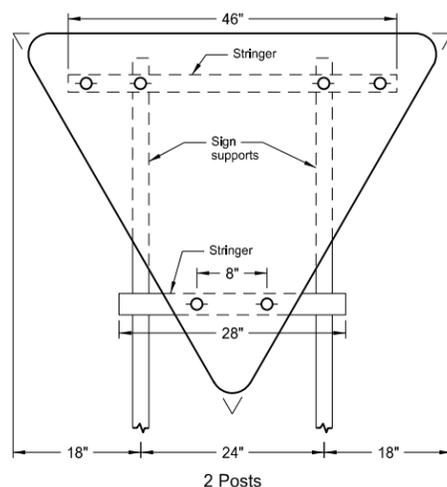
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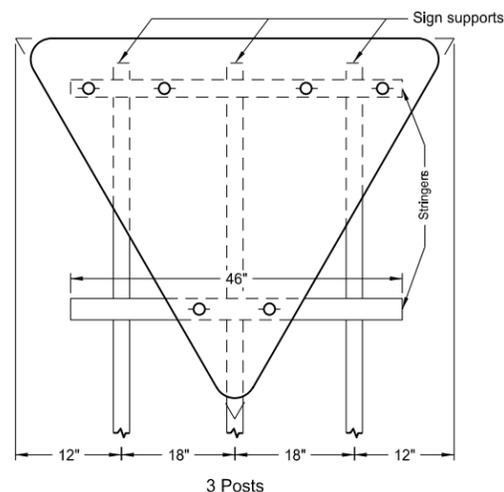
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

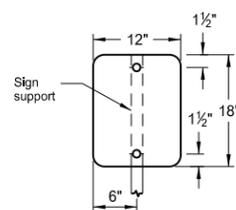


3 Posts

Assembly No. 6

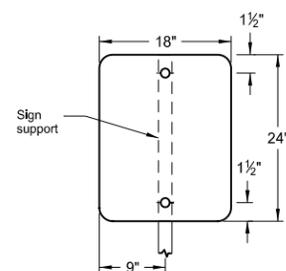
Notes:

1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1 1/2" x 1 1/2".
4. All holes shall be punched round for 3/8" bolt.



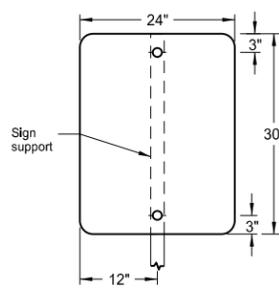
1 Post

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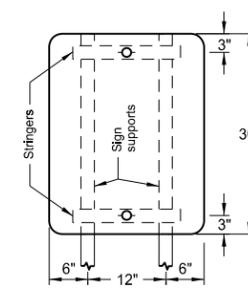
1 Post

Assembly No. 8

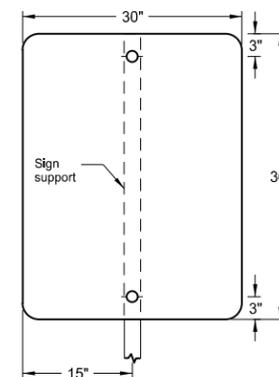


1 Post

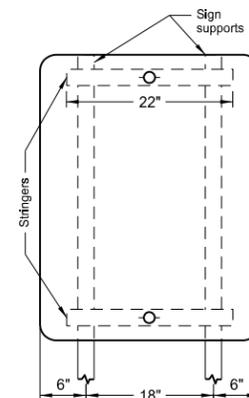
Assembly No. 9



2 Posts

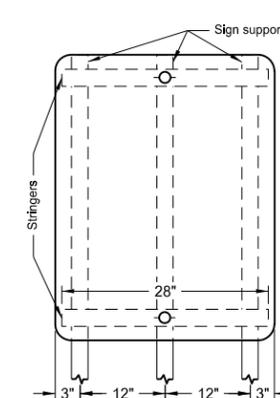


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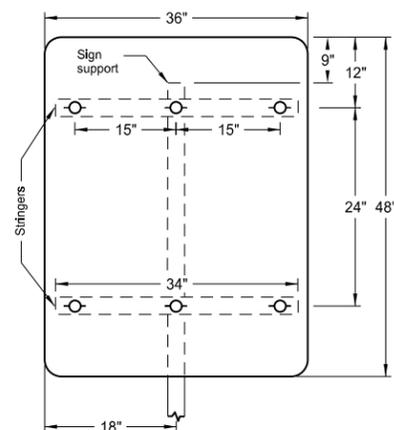


2 Posts

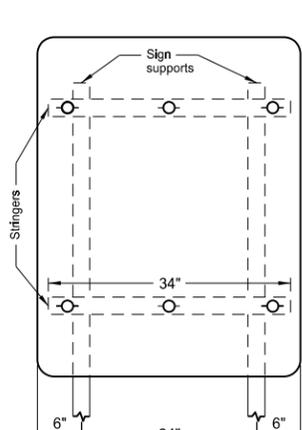
Assembly No. 10



3 Posts

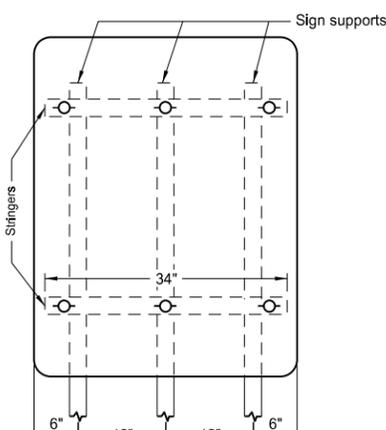


1 Post



2 Posts

Assembly No. 11

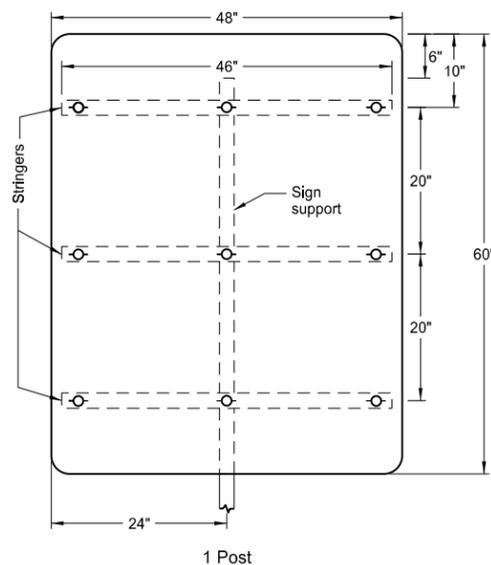


3 Posts

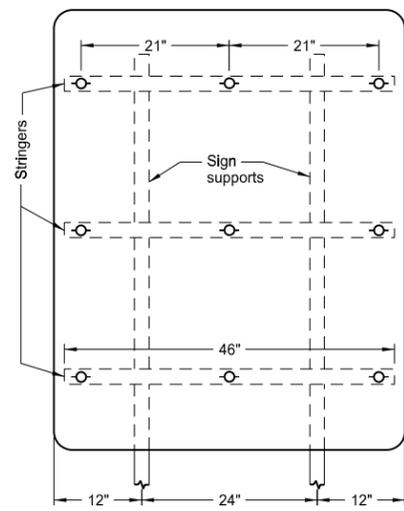
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
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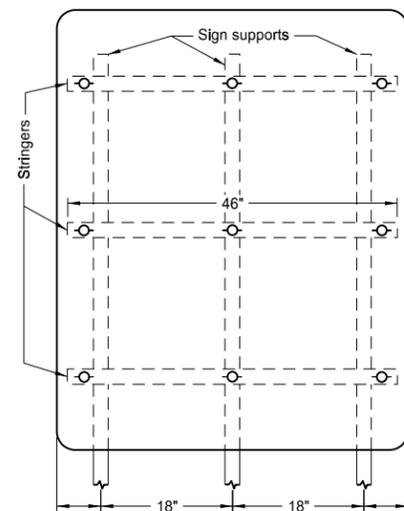


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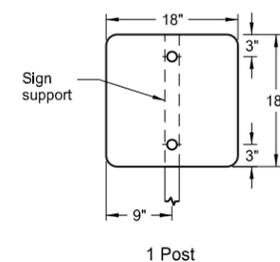


2 Posts

Assembly No. 12

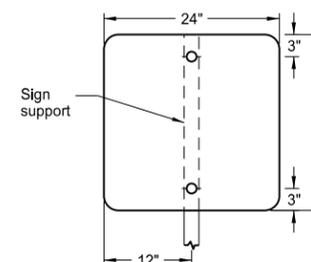


3 Posts



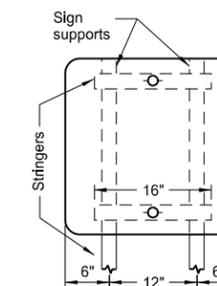
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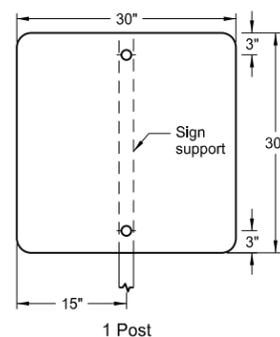


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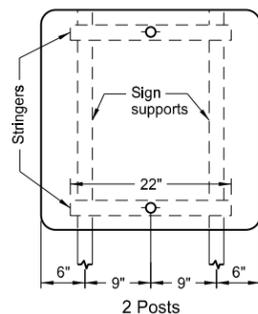


2 Posts

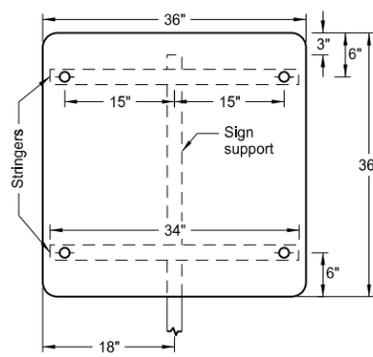


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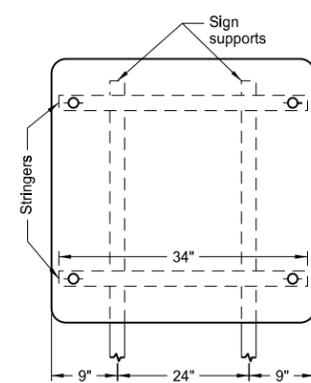
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2 Posts

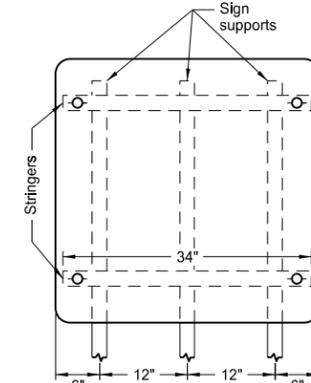


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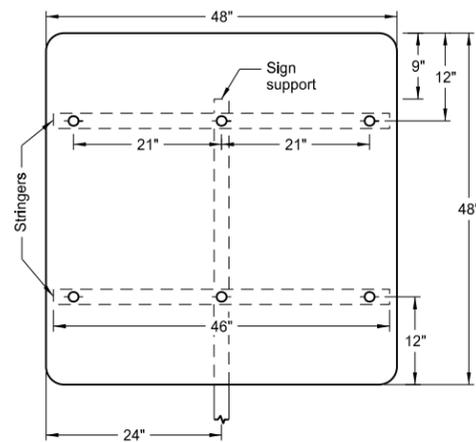


2 Posts

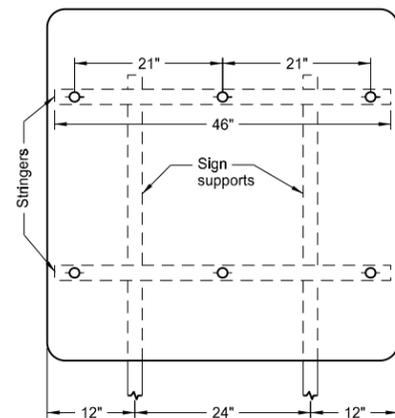
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3 Posts

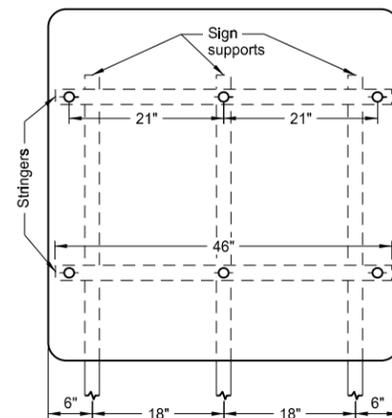


1 Post



2 Posts

Assembly No. 17



3 Posts

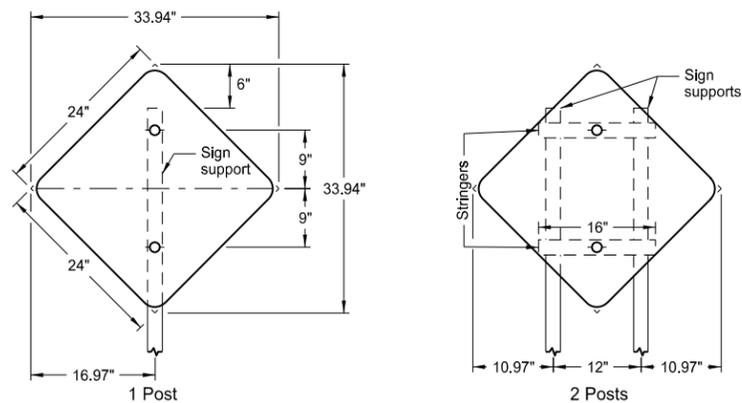
Notes:

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

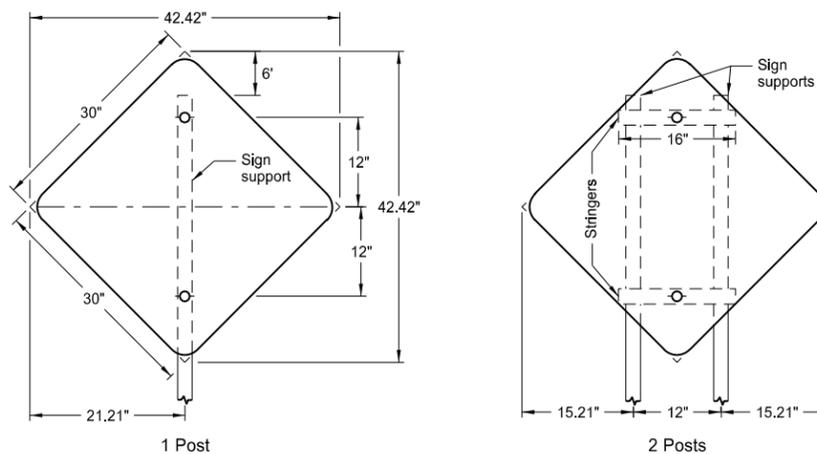
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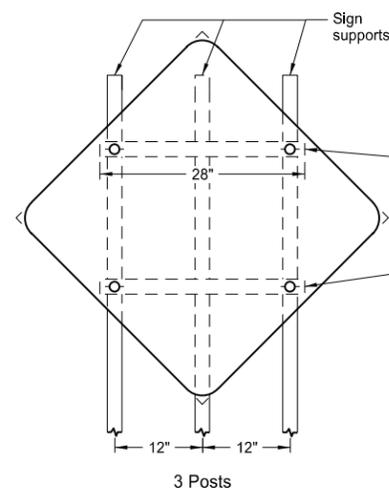
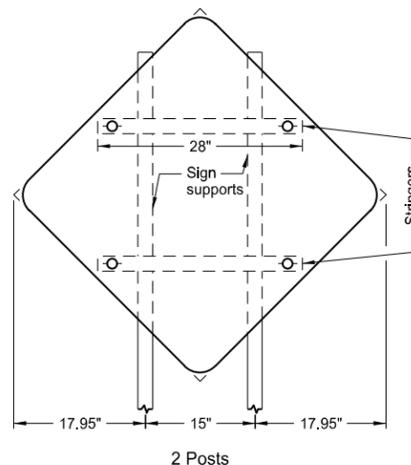
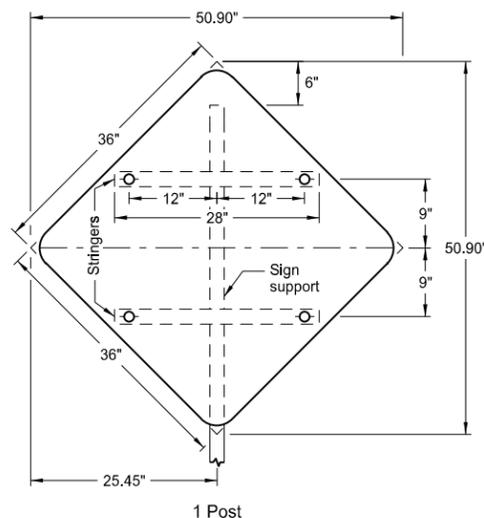
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



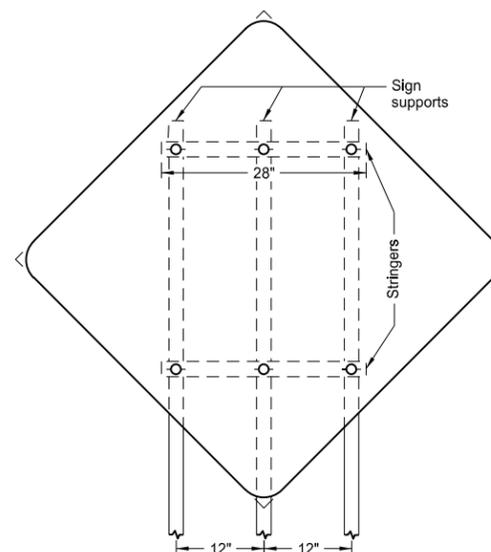
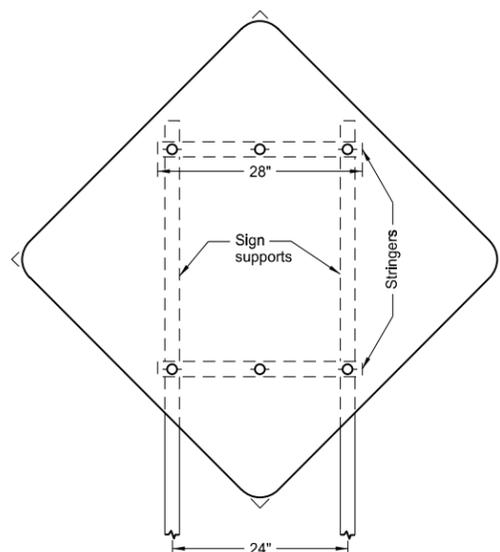
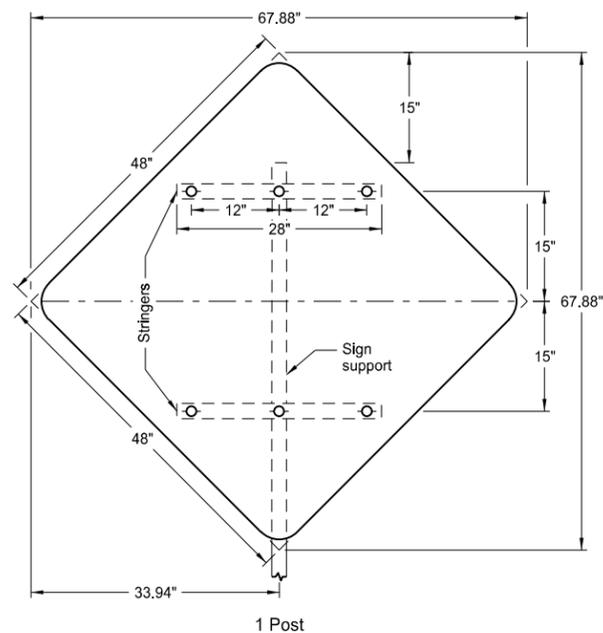
Assembly No. 18



Assembly No. 19



Assembly No. 20



Assembly No. 21

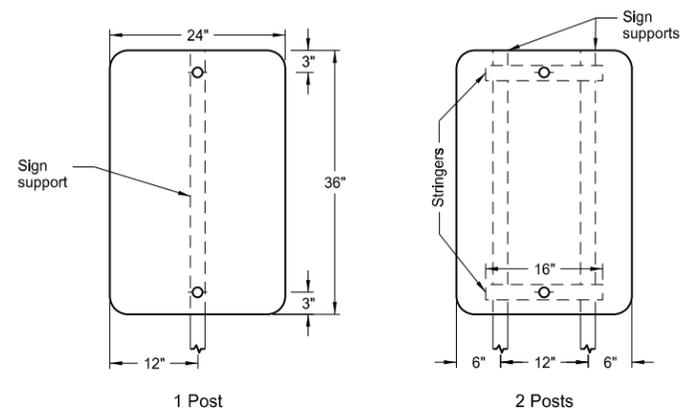
Notes:

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

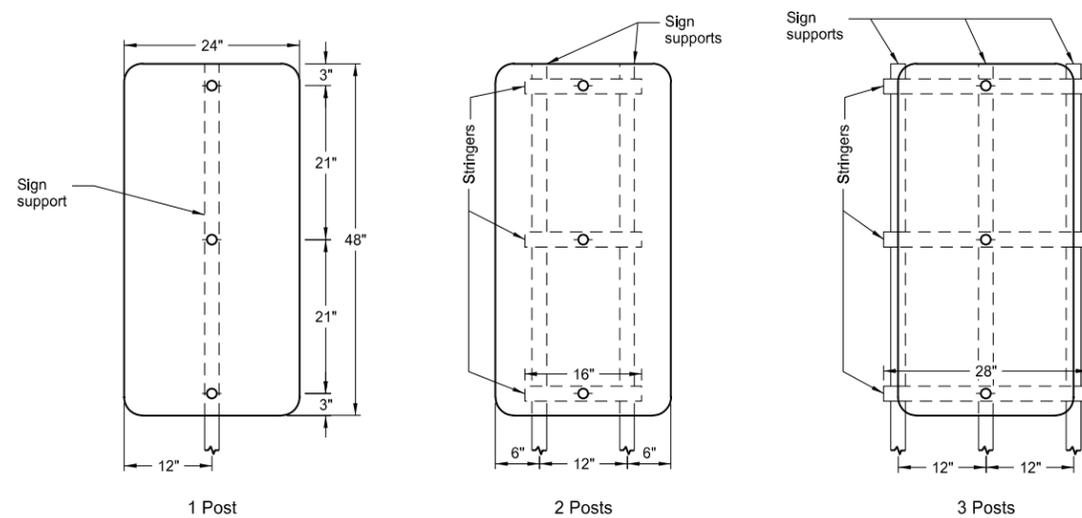
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



Assembly No. 22



Assembly No. 23

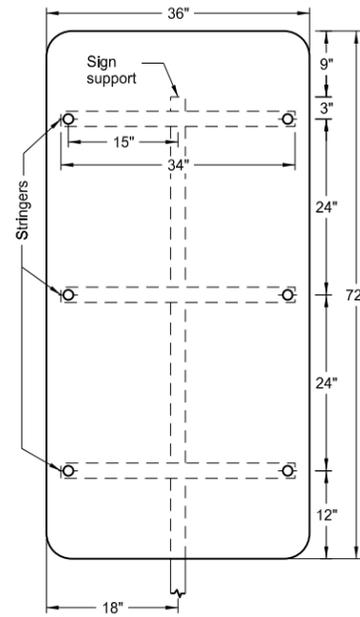
Notes:

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

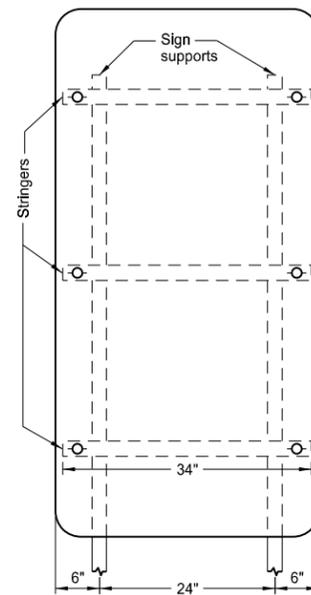
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DATE	CHANGE

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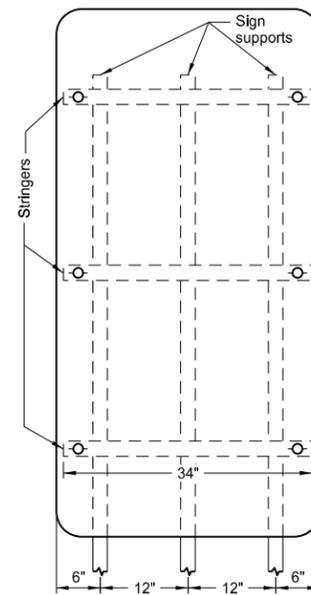
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post

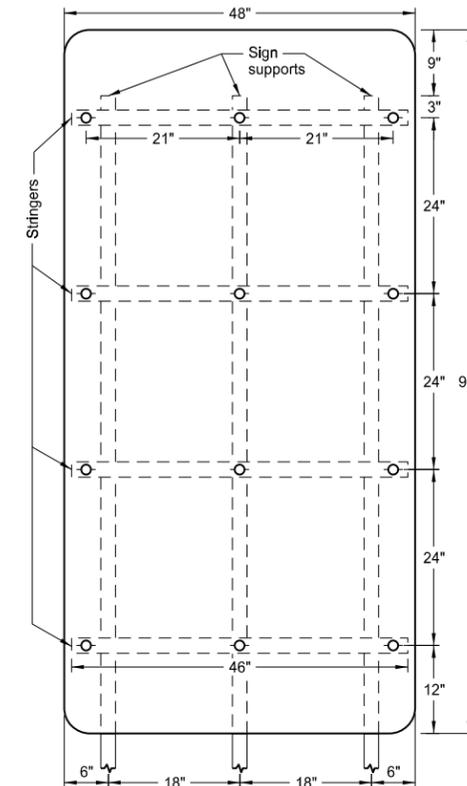


2 Posts



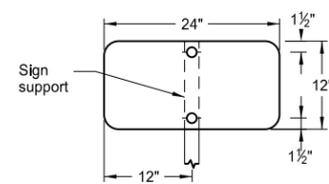
3 Posts

Assembly No. 24



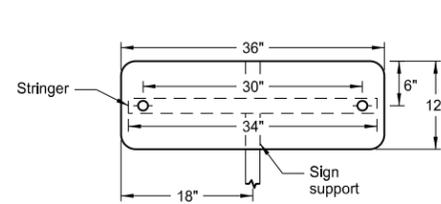
3 Posts

Assembly No. 25



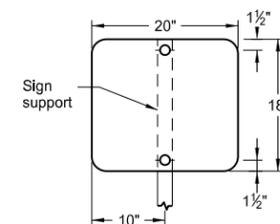
1 Post

Assembly No. 26



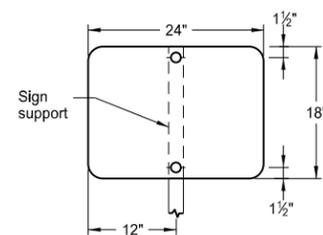
1 Post

Assembly No. 27



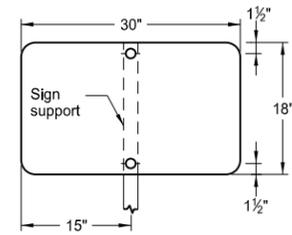
1 Post

Assembly No. 28



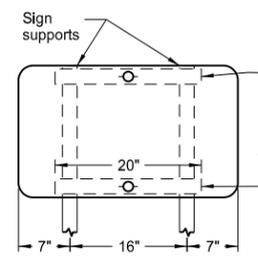
1 Post

Assembly No. 29



1 Post

Assembly No. 30



2 Posts

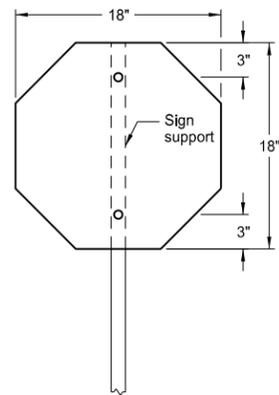
Notes:

1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1 1/2" x 1 1/2".
4. All holes shall be punched round for 3/8" bolt.

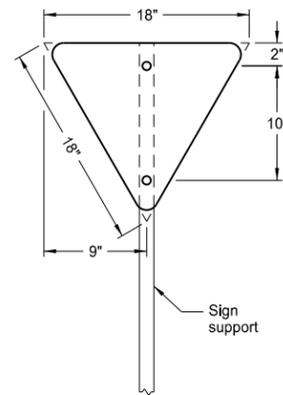
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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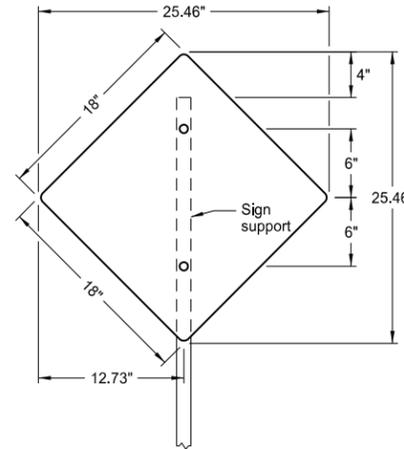
**BIKE ROUTE SIGNS
PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR
REGULATORY, WARNING AND GUIDE SIGNS**



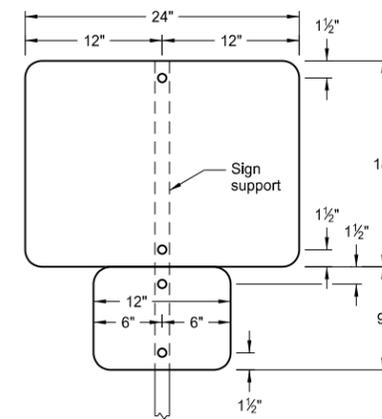
1 Post
Assembly No. 100



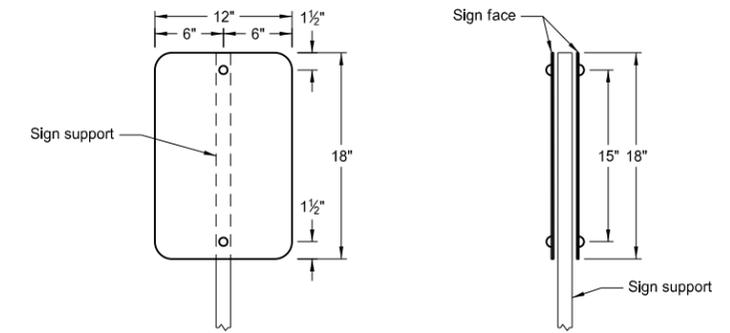
1 Post
Assembly No. 101



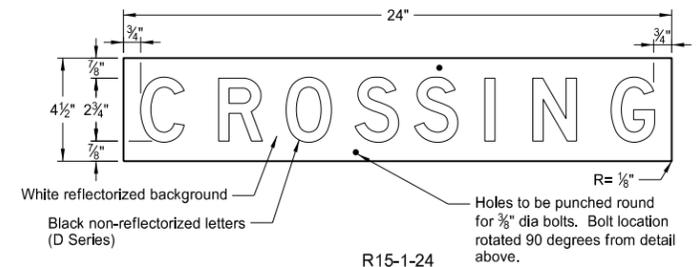
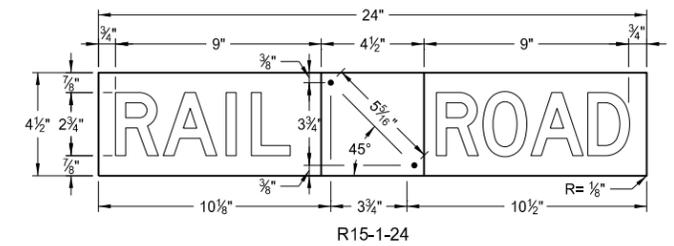
1 Post
Assembly No. 102



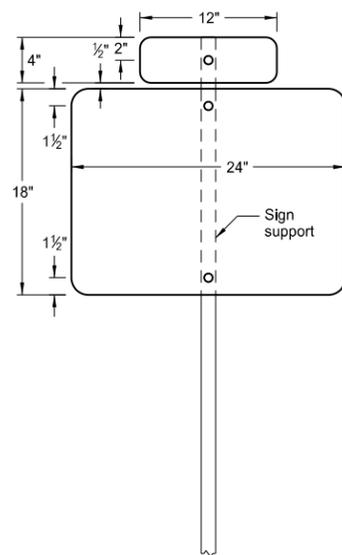
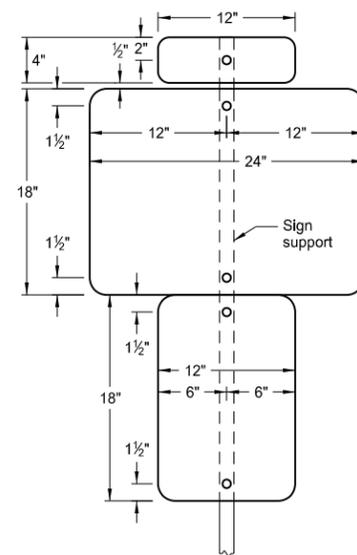
1 Post
Assembly No. 103



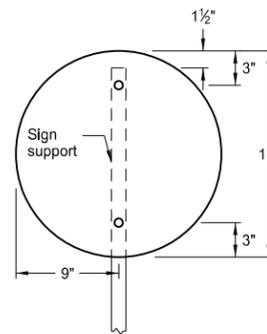
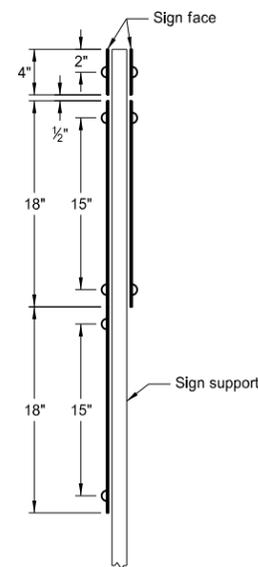
1 Post
back to back
Assembly No. 104



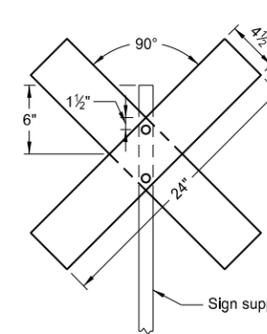
Railroad Crossing Sign Details



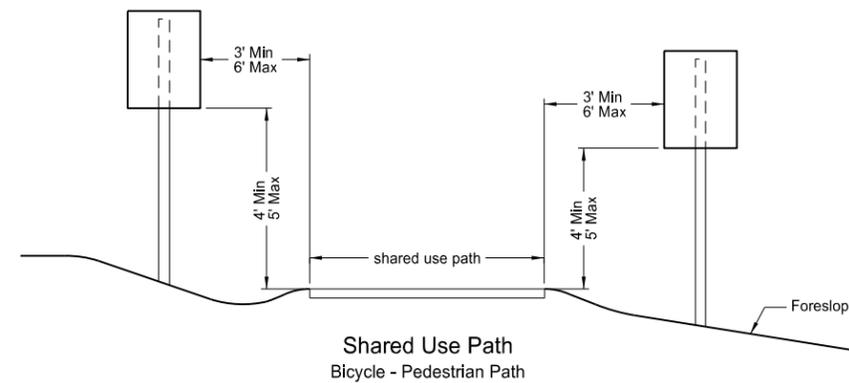
1 Post
back to back
Assembly No. 105



1 Post
Assembly No. 106



1 Post
Assembly No. 107



Shared Use Path
Bicycle - Pedestrian Path

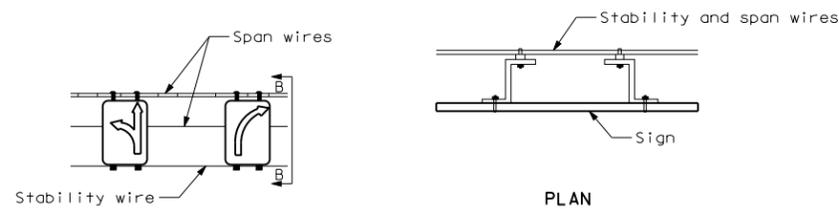
Notes:

1. The minimum sign backing material thickness shall be 0.100 inch.
2. All holes shall be punched round for 3/8" bolt.

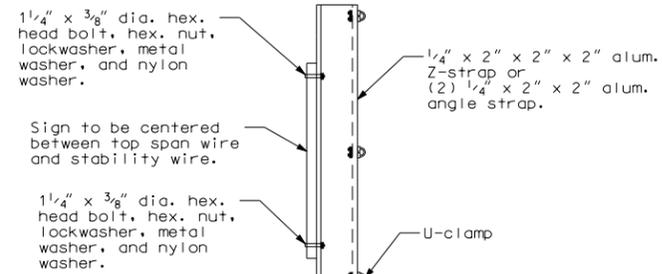
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8/22/12 and the original document is stored at the North Dakota Department of Transportation

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

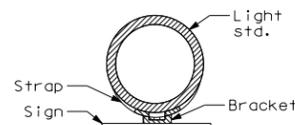


PLAN



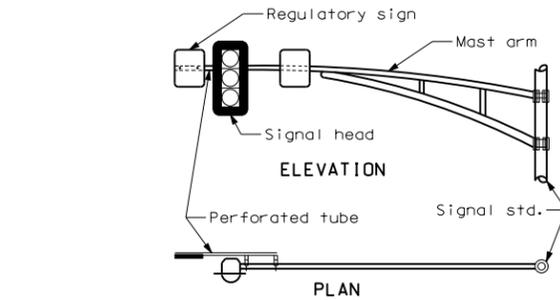
B - B

SPAN WIRE MOUNTED SIGN DETAIL



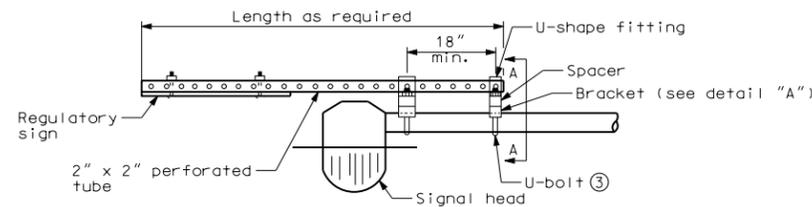
LT. STD. MOUNTED SIGN BRACKET DETAIL
(Max. 24" x 30" signs)

Bracket shall be of galv. steel consisting of strap & sign attachment bracket similar to the one shown in the detail. Cost of the bracket assembly to be included in the price bid for flat sheet signs. Punching shall be as shown on the Standard Drawings. The Engineer in the field shall determine the exact location of the light standard for sign attachment. There shall be a 7' vertical clearance to the bottom of all signs mounted on light standards.

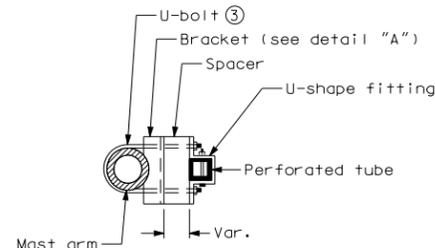


ELEVATION

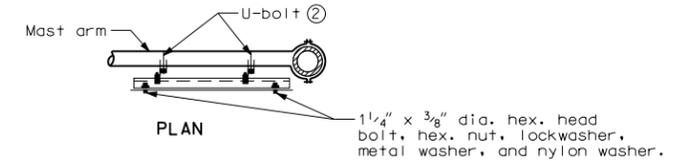
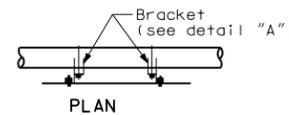
PLAN



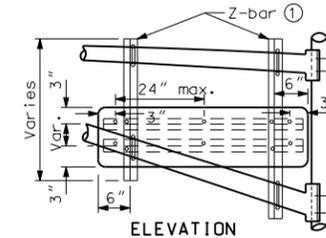
SIGN MOUNTED BEYOND END OF MAST ARM DETAIL



A - A

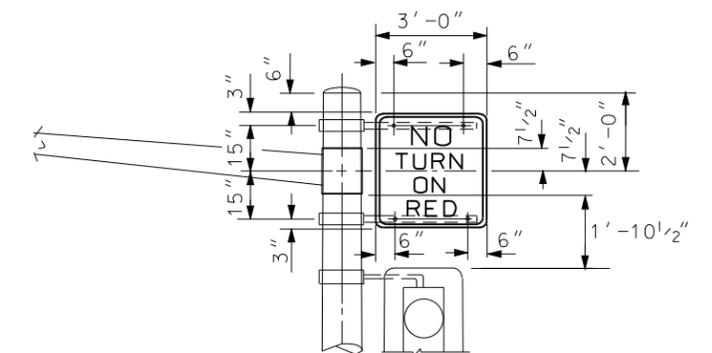


PLAN



ELEVATION

MAST ARM MOUNTED STREET NAME SIGN DETAIL

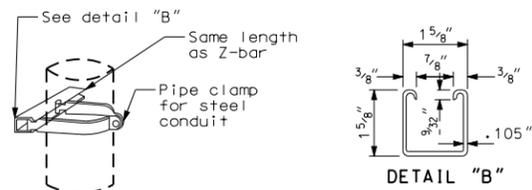


SIGN ATTACHMENT DETAIL
SIGNAL STANDARD MOUNTED

- ① Z-bar - Use 1 3/4" x 3/16" thick 1.08 lbs./ft. aluminum alloy. In lieu of Z-bar, two angles bolted together may be used or a channel. (1 3/4" x 1 3/4" x 3/16" angles) (1 3/4" x 2" x .188" channels)
- ② 3/8" U-bolt, hex. nut, lockwasher, & length depends on dia. of mast arm.
- ③ 3/8" U-bolt, hex. nut, lockwasher, & length depends on dia. of mast arm. Paint perforated tube the same color and specification as mast arm. 2" x 2" maximum support length 9.9 ft. 2 1/4" x 2 1/4" maximum support length 12.6 ft. 2 1/2" x 2 1/2" maximum support length 15.7 ft.

Note:

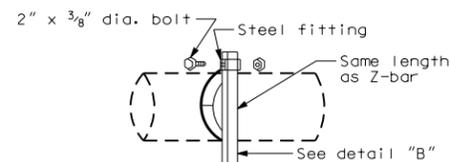
Metal washers and nylon washers used on sign face shall have a minimum outside dia. of 1 5/16" ± 1/16" and 10 gauge thickness.



DETAIL "B"

VERTICAL MOUNTING

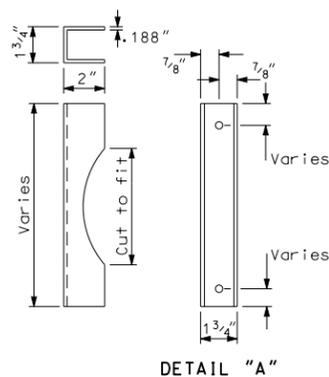
Two (2) clamps required per sign



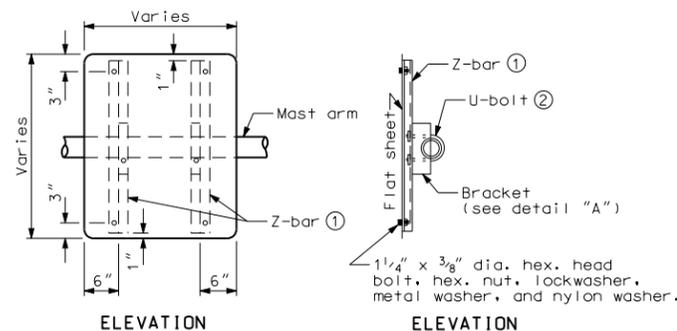
HORIZONTAL MOUNTING

Two (2) clamps required per sign

ALTERNATE CLAMP MOUNTING



DETAIL "A"



ELEVATION

ELEVATION

MAST ARM MOUNTED REGULATORY SIGN DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revisions
11-24-95	Span wire mounting sign detail
10-13-00	Sign attachment detail
12-01-04	PE Stamp added

This document was originally issued and sealed by
MARK S. GAYDOS
Registration Number
PE- 4518 ,
on 12/01/04 and the original document is stored at the
North Dakota Department
of Transportation

911 SUPPORT INFORMATION AND SIGN DETAILS

D-754-86

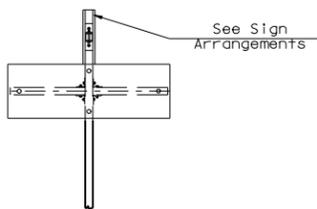
Note: See Standard Drawing D-754-87 for sign punching, stringer and support location details.

THE POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS (60 INCH VERTICAL CLEARANCE)														
ASSEMBLY NUMBER	STREET NAME SIGN SIZE	TOTAL SIGN AREA	MAXIMUM POST LENGTH	NUMBER OF POSTS	SUPPORT SIZE	SLEEVE LENGTH			SLEEVE SIZE	ANCHOR		BREAK-AWAY		
						1ST	2ND	3RD		NUMBER	LENGTH		SIZE	
						LF	LF	LF						
SA 1	24" x 12"	8.00	20.2	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	30" x 12"	10.00	16.4	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	36" x 12"	12.00	13.8	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	42" x 12"	14.00	14.7	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	48" x 12"	16.00	12.9	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	54" x 12"	18.00	15.2	1	2.25X2.25 12ga					1	4.0	2.5X2.5 12ga		
	60" x 12"	20.00	13.7	1	2.25X2.25 12ga					1	4.0	2.5X2.5 12ga		
	24" x 9"	6.00	24.1	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	30" x 9"	7.50	21.3	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	36" x 9"	9.00	17.7	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	42" x 9"	10.50	15.3	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	48" x 9"	12.00	13.5	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	54" x 9"	13.50	14.9	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	60" x 9"	15.00	13.4	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	24" x 6"	4.00	35.2	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	30" x 6"	5.00	28.3	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	36" x 6"	6.00	23.6	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	42" x 6"	7.00	22.3	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	48" x 6"	8.00	19.6	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	54" x 6"	9.00	17.5	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	60" x 6"	10.00	15.4	1	2 x 2 12 ga					1	4.0	2.25X2.25 12ga		
	SA 2	24" x 12"	13.18	14.5	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga	
		30" x 12"	15.18	16.3	1	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	1
		36" x 12"	17.18	15.4	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1
42" x 12"		19.18	14.7	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
48" x 12"		21.18	15.3	1	2.25X2.25 12ga	4.0			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
54" x 12"		23.18	14.4	1	2.5x2.5 12ga	4.7			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
60" x 12"		25.18	16.7	1	2.5x2.5 12ga	3.4			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
24" x 9"		11.18	15.2	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
30" x 9"		12.68	14.5	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
36" x 9"		14.18	13.9	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
42" x 9"		15.68	15.8	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
48" x 9"		17.18	14.4	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
54" x 9"		18.68	13.8	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
60" x 9"		20.18	14.6	1	2.25X2.25 12ga	4.1			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
24" x 6"		9.18	16.0	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
30" x 6"		10.18	15.5	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
36" x 6"		11.18	15.0	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
42" x 6"		12.18	13.7	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
48" x 6"		13.18	15.9	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
54" x 6"		14.18	15.4	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
60" x 6"		15.18	14.9	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
SA 3		24" x 12"	13.93	16.1	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1
		30" x 12"	15.93	15.3	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1
		36" x 12"	17.93	14.6	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1
	42" x 12"	19.93	15.2	1	2.25X2.25 12ga	4.4			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
	48" x 12"	21.93	15.1	1	2.5x2.5 12ga	4.6			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	54" x 12"	23.93	20.6	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	60" x 12"	25.93	16.0	1	2.5x2.5 12ga	4.3			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	24" x 9"	11.93	14.1	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga	1	
	30" x 9"	13.43	16.1	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	36" x 9"	14.93	15.4	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	42" x 9"	16.43	14.8	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	48" x 9"	17.93	14.3	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	54" x 9"	19.43	14.3	1	2.25X2.25 12ga	4.6			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
	60" x 9"	20.93	14.4	1	2.5x2.5 12ga	4.7			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	24" x 6"	9.93	14.7	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
	30" x 6"	10.93	14.3	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
	36" x 6"	11.93	13.9	1	2.5x2.5 12ga					1	4.0	3 X 3 7 ga		
	42" x 6"	12.93	16.0	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	48" x 6"	13.93	14.8	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	54" x 6"	14.93	14.4	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	60" x 6"	15.93	14.0	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	

THE POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS (60 INCH VERTICAL CLEARANCE)														
ASSEMBLY NUMBER	STREET NAME SIGN SIZE	TOTAL SIGN AREA	MAXIMUM POST LENGTH	NUMBER OF POSTS	SUPPORT SIZE	SLEEVE LENGTH			SLEEVE SIZE	ANCHOR		BREAK-AWAY		
						1ST	2ND	3RD		NUMBER	LENGTH		SIZE	
						LF	LF	LF						
SA 4	24" x 12"	15.46	15.1	1	2.25X2.25 12ga	4.3			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
	30" x 12"	17.46	14.5	1	2.25X2.25 12ga				2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
	36" x 12"	19.46	17.5	1	2.5X2.5 12ga	3.1			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	42" x 12"	21.46	16.8	1	2.5x2.5 12ga	3.6			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	48" x 12"	23.46	16.2	1	2.5x2.5 12ga	4.0			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	54" x 12"	25.46	15.6	1	2.5x2.5 12ga	4.4			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	60" x 12"	27.46	17.2	2	2.5x2.5 12ga					2	4.0	3 X 3 7 ga	2	
	24" x 9"	13.46	14.3	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	30" x 9"	14.96	15.1	1	2.25X2.25 12ga	4.0			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
	36" x 9"	16.46	14.6	1	2.25X2.25 12ga	4.3			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
	42" x 9"	17.96	14.1	1	2.25X2.25 12ga	4.6			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
	48" x 9"	19.46	17.2	1	2.5x2.5 12ga	3.0			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	54" x 9"	20.96	15.8	1	2.5x2.5 12ga	3.9			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	60" x 9"	22.46	15.4	1	2.5x2.5 12ga	4.2			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	24" x 6"	11.46	14.7	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	30" x 6"	12.46	14.4	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	36" x 6"	13.46	14.0	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	42" x 6"	14.46	13.7	1	2.5x2.5 10ga					1	4.0	3 X 3 7 ga	1	
	48" x 6"	15.46	13.9	1	2.25X2.25 12ga	4.4			2 x 2 12 ga	1	4.0	3 X 3 7 ga	1	
	54" x 6"	16.46	14.1	1	2.5x2.5 12ga	4.4			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	60" x 6"	17.46	16.8	1	2.5x2.5 12ga	3.0			2.25X2.25 12ga	1	4.0	3 X 3 7 ga	1	
	SA 5	24" x 12"	21.25	17.2	2	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	2
		30" x 12"	23.25	16.7	2	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	2
		36" x 12"	25.25	15.9	2	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	2
42" x 12"		27.25	15.9	2	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	2	
48" x 12"		29.25	16.9	2	2.25X2.25 12ga	4.0	4.5		2 x 2 12 ga	2	4.0	3 X 3 7 ga	2	
54" x 12"		31.25	16.5	2	2.25X2.25 12ga	4.3	4.8		2 x 2 12 ga	2	4.0	3 X 3 7 ga	2	
60" x 12"		33.25	16.1	2	2.25X2.25 12ga	4.5	5.1		2 x 2 12 ga	2	4.0	3 X 3 7 ga	2	
24" x 9"		19.25	15.5	1	2.5x2.5 10ga	4.7			2.19x2.19 10ga	1	4.0	3 X 3 7 ga	1	
30" x 9"		20.75	15.2	1	2.5x2.5 10ga	4.8			2.19x2.19 10ga	1	4.0	3 X 3 7 ga	1	
36" x 9"		22.25	16.7	2	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	2	
42" x 9"		23.75	16.3	2	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	2	
48" x 9"		25.25	16.0	2	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	2	
54" x 9"		26.75	15.7	2	2.5x2.5 10ga					2	4.0	3 X 3 7 ga	2	
60" x 9"		28.25	16.8	2	2.25X2.25 12ga	3.7	4.3		2 x 2 12 ga	2	4.0	3 X 3 7 ga	2	
24" x 6"		17.25	15.7	1	2.5x2.5 10ga	4.2			2.19x2.19 10ga	1	4.0	3 X 3 7 ga	1	
30" x 6"		18.25	15.5	1	2.5x2.5 10ga	4.3			2.19x2.19 10ga	1	4.0	3 X 3 7 ga	1	
36" x 6"		19.25	15.3	1	2.5x2.5 10ga	4.4			2.19x2.19 10ga	1	4.0	3 X 3 7 ga	1	
42" x 6"		20.25	15.1	1	2.5x2.5 10ga	4.5			2.19x2.19 10ga	1	4.0	3 X 3 7 ga	1	
48" x 6"		21.25	14.9	1	2.5x2.5 10ga	4.7			2.19x2.19 10ga	1	4.0	3 X 3 7 ga	1	
54" x 6"		22.25	14.7	1	2.5x									

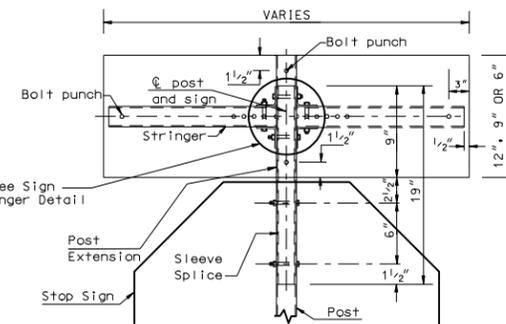
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNING

Note: See Standard Drawing D-754-86 for 911 support information and sign layout details.



1 Post

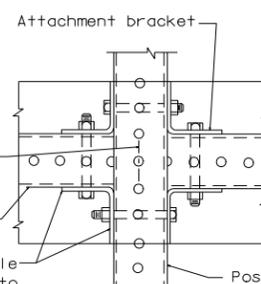
SPECIAL ASSEMBLY 1 (A,B,C,D or E)



FRONT VIEW

SLEEVE SPLICE DETAIL

Note: The splice method may be used upon approval of the engineer.

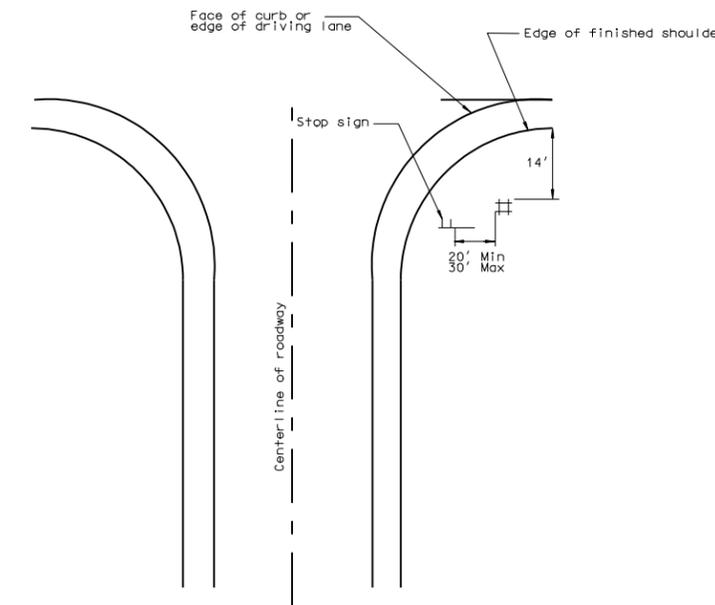


SIGN STRINGER DETAIL

Stringers shall be the same size as the post

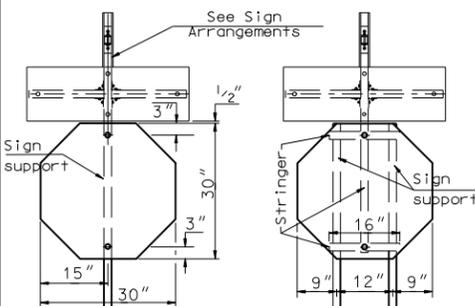
Punch round hole through angle to fit stringer and post holes.

SIGN ARRANGEMENTS



INTERSECTION LAYOUT

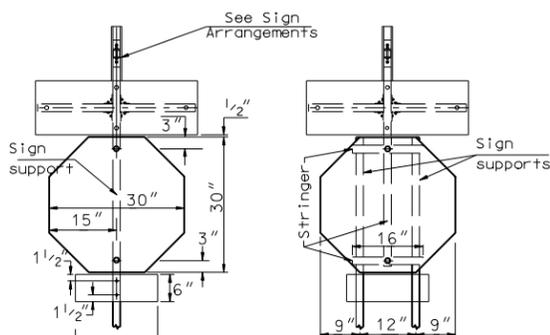
Note: This layout is to be used for street name signs or 911 signs that are used with Special Assembly 1 only.



1 Post

2 Posts

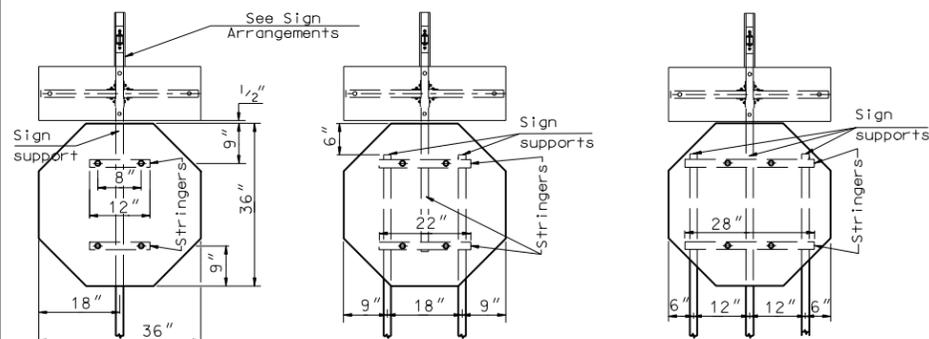
SPECIAL ASSEMBLY 2 (A,B,C,D or E)



1 Post

2 Posts

SPECIAL ASSEMBLY 3 (A,B,C,D or E)

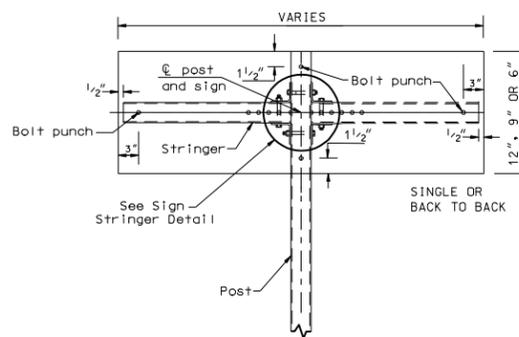


1 Post

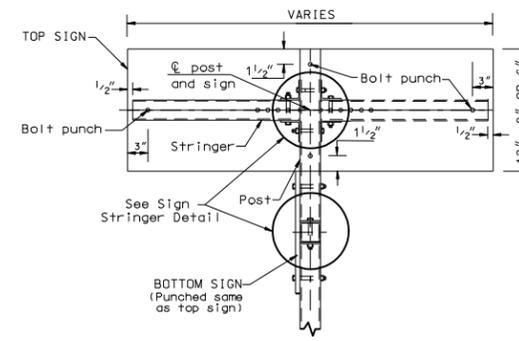
2 Posts

3 Posts

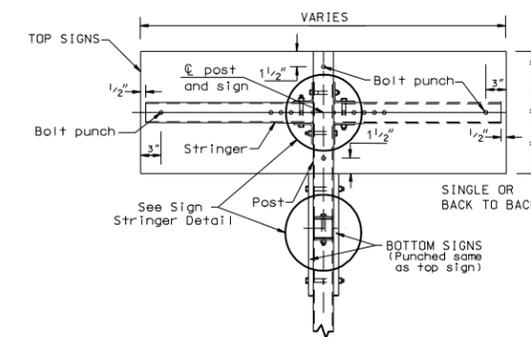
SPECIAL ASSEMBLY 4 (A,B,C,D or E)



DETAIL A or B



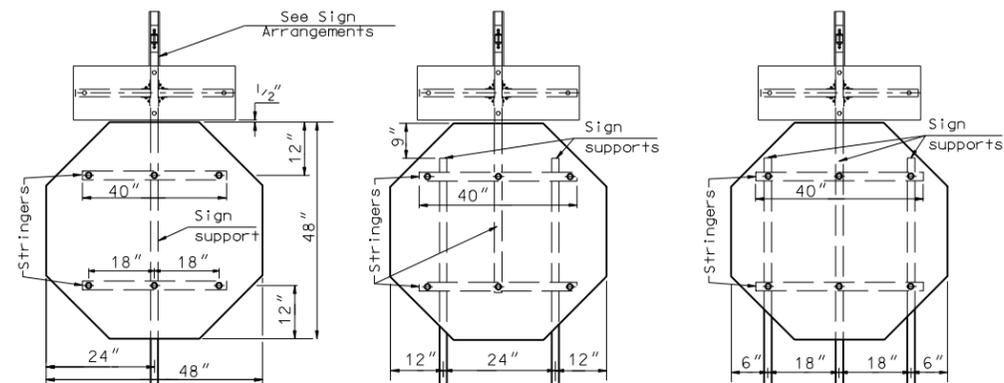
DETAIL C



DETAIL D or E

DETAIL

- A - Single sign
- B - Back to back
- C - Single sign, each direction
- D - Single sign one direction, back to back other direction
- E - Back to Back, both directions



1 Post

2 Posts

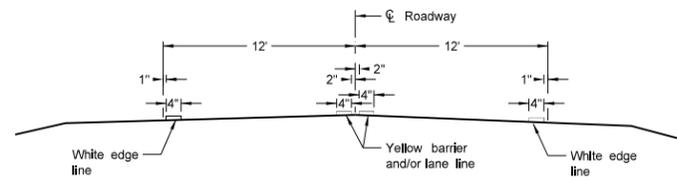
3 Posts

SPECIAL ASSEMBLY 5 (A,B,C,D or E)

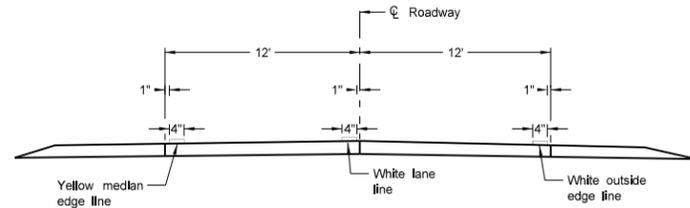
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/10/08 and the original document is stored at the North Dakota Department of Transportation
07-10-08		
REVISIONS		
DATE	CHANGE	

PAVEMENT MARKING

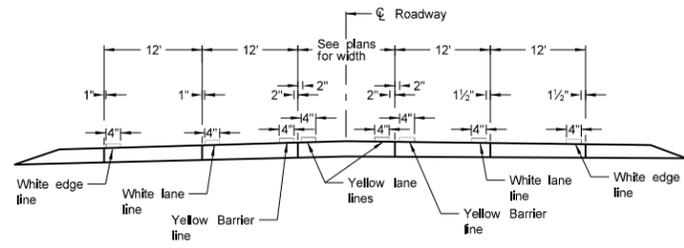
D-762-4



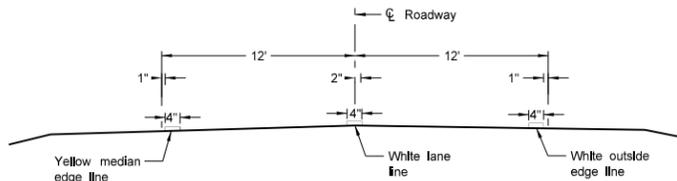
Two Lane Two Way
RURAL ROADWAY



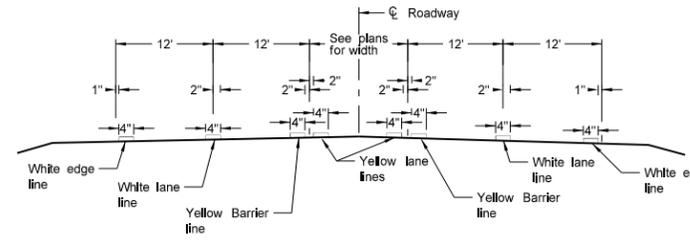
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



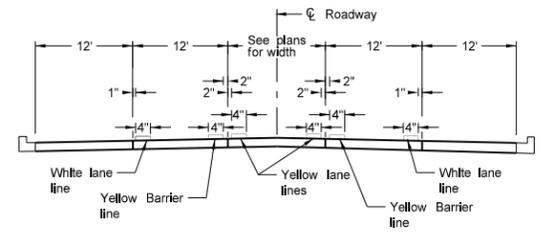
RURAL FIVE LANE ROADWAY
Concrete Section



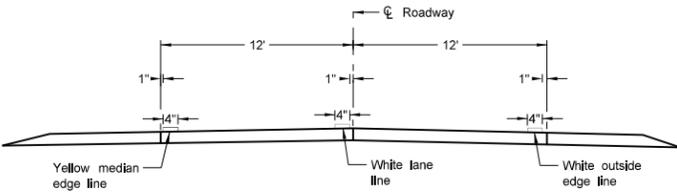
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



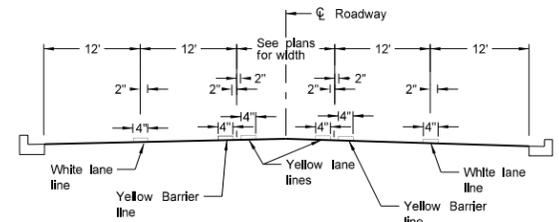
RURAL FIVE LANE ROADWAY
Asphalt Section



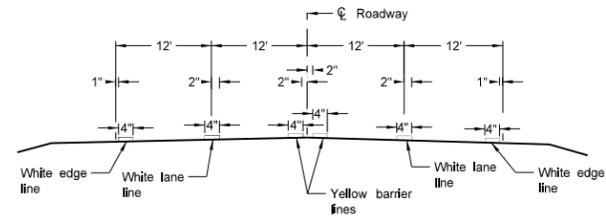
URBAN FIVE LANE SECTION
Concrete Section



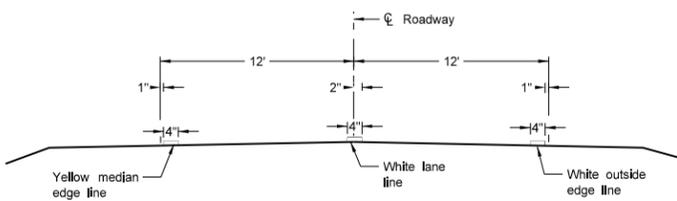
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



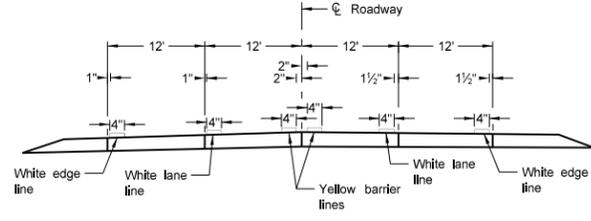
URBAN FIVE LANE SECTION
Asphalt Section



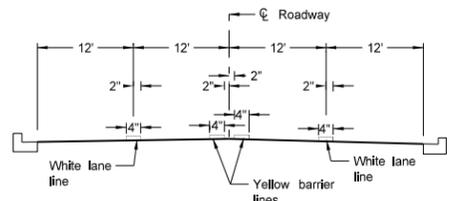
RURAL FOUR LANE ROADWAY
Asphalt Section



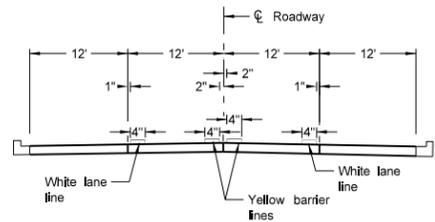
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



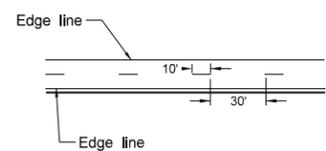
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



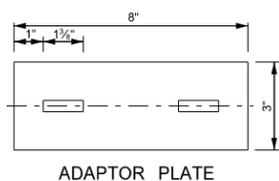
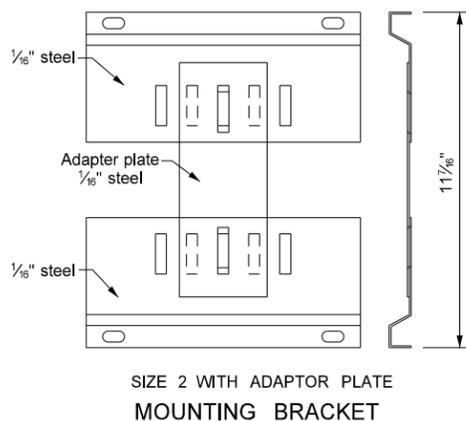
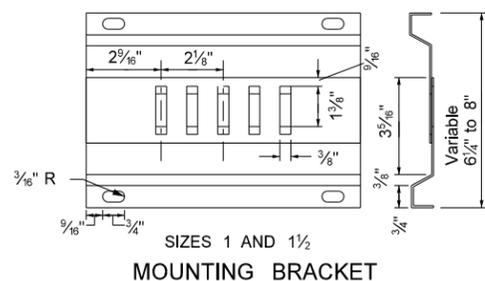
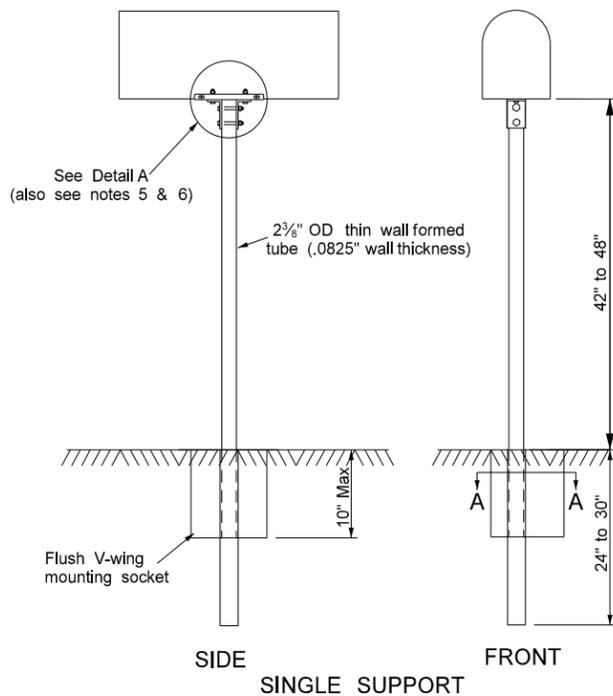
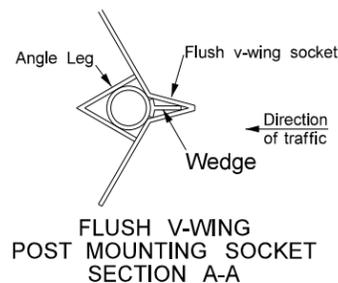
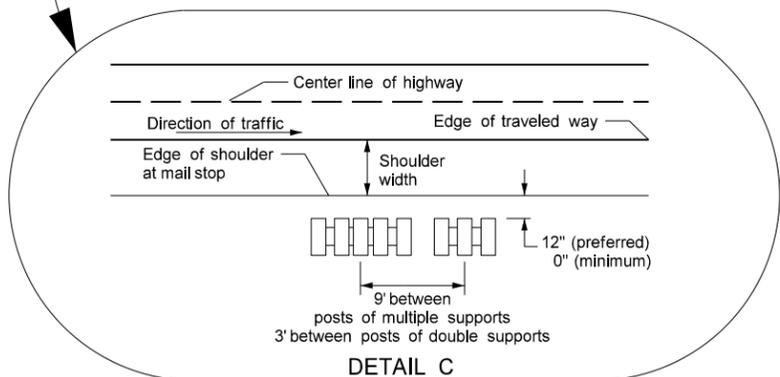
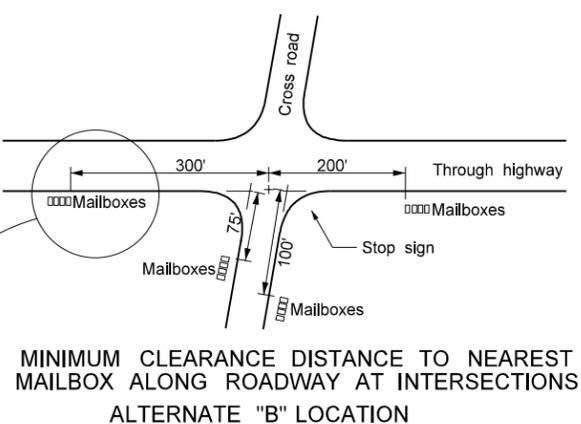
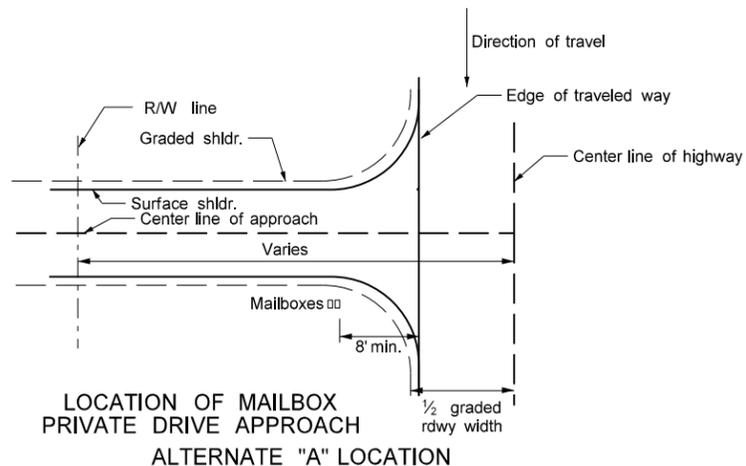
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 12-1-10 and the original document is stored at the North Dakota Department of Transportation

MAILBOX LOCATION DETAILS



Notes:

- The mailbox support and hardware details shall consist of the "V-Loc Mailbox Support System" manufactured by: Tapco Traffic & Parking Control Co. Inc. Any other equal support system meeting the requirements of NCHRP Report 350, which has been crash tested, and approved by the Federal Highway Administration may be used. Approved alternate mailbox assemblies shall be installed in the manner and arrangement crash tested.
- The preferred location for all mailboxes is the Alternate "A" location. However, the Engineer may approve the Alternate "B" location if warranted by existing field conditions.
- Postal regulations require that mailboxes must be located on the right-hand side of the road in the direction traveled by the carrier. Therefore, the Engineer shall contact the local carrier or postmaster before installing new mailboxes to verify the direction of travel.
- Mailboxes installed on private drive approaches must always be located on the downstream side of the approach.
- Install angle connection parallel to traffic flow for size 2 mailbox mounted on single posts.
- Size 2 mailbox mounted on multiple support requires 2 each, 3/8" by 3/4" bolts with lock washers and nuts to attach the adaptor plate to mounting bracket. The unit will then require 4 angle connections to attach to the formed tube support frame. See Detail A.
- Space multiple support frames a minimum of 4 feet apart. Space single support frames a minimum of 3 ft apart. Do not place more than five No. 1 mailboxes, three No. 2 mailboxes, or any combination of four No. 1-A and No. 2 mailboxes on multiple support frames.

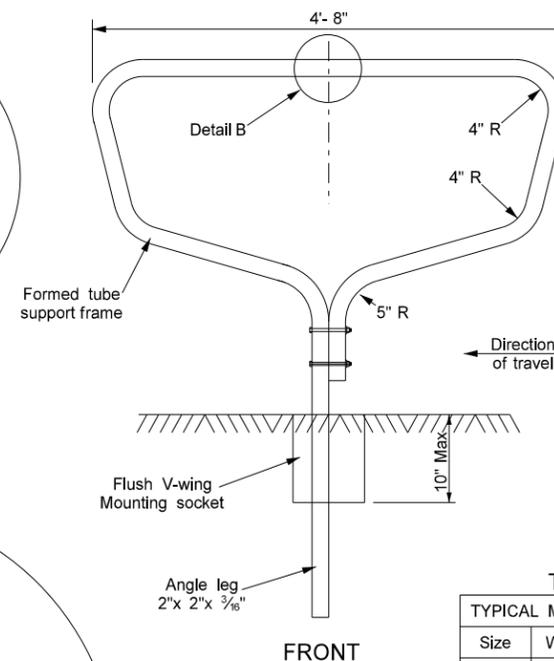
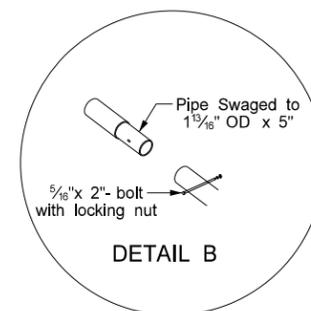
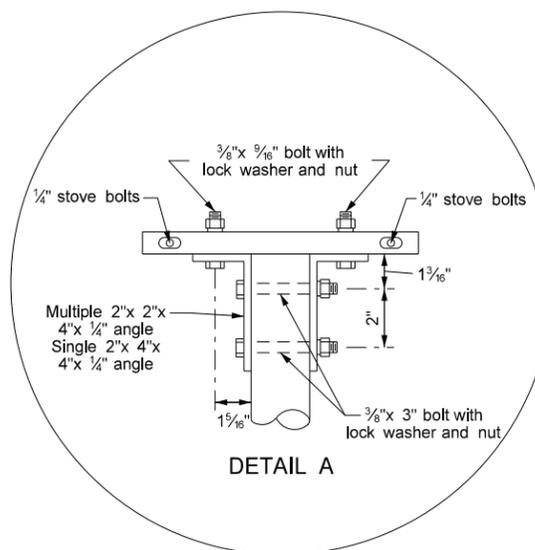


TABLE A
TYPICAL MAILBOX DIMENSIONS

Size	Width	Height	Length
1	6.5"	8.5"	19"
1A	8"	10.5"	21"
2	11.5"	13.5"	23.5"

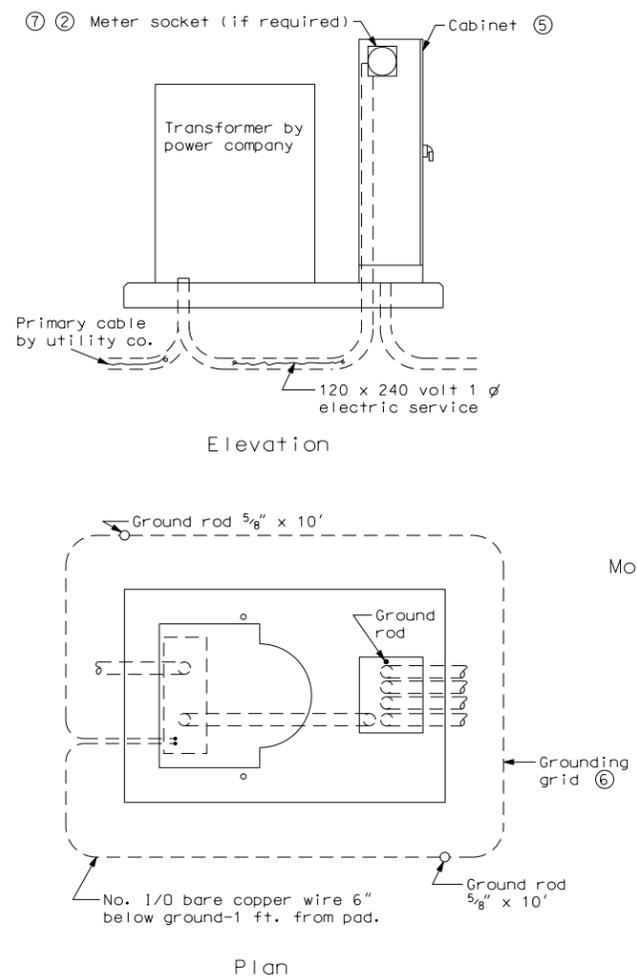


NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-15-2010

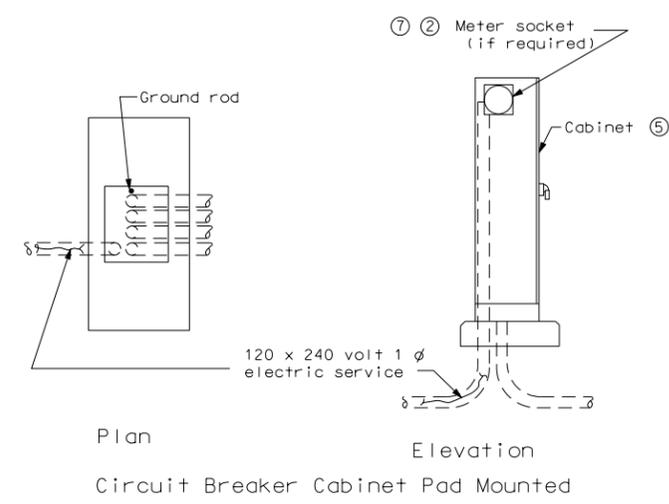
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 9/15/2010 and the original document is stored at the North Dakota Department of Transportation

**FEED POINTS
(ROADWAY LIGHTING)**



Transformer and Circuit Breaker Cabinet Pad Mounted



Plan
Elevation
Circuit Breaker Cabinet Pad Mounted

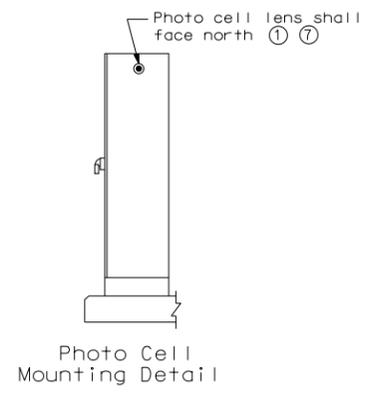
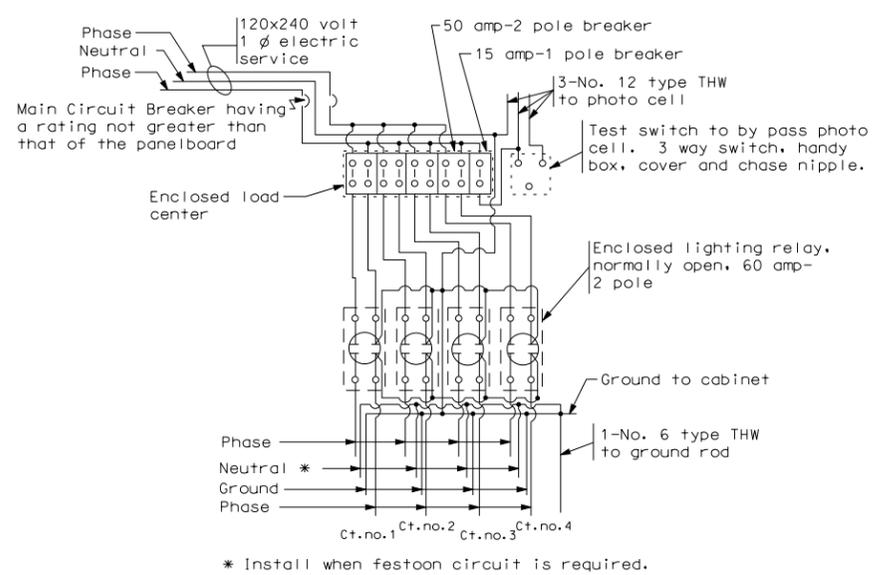


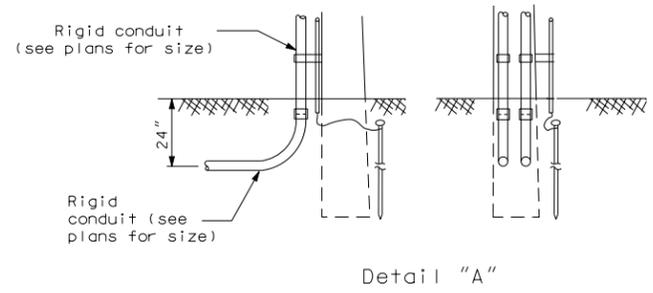
Photo Cell Mounting Detail



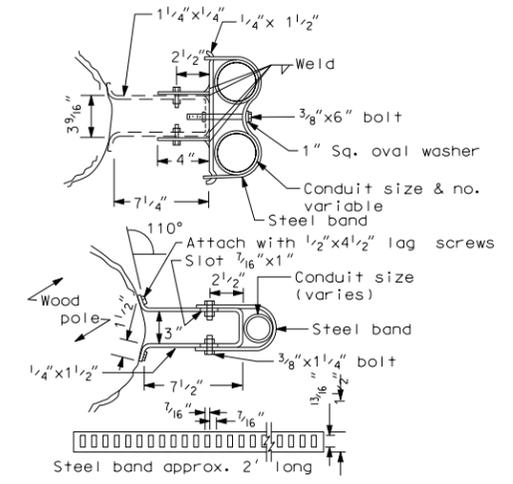
Feed Point TYPE IV

* Install when festoon circuit is required.

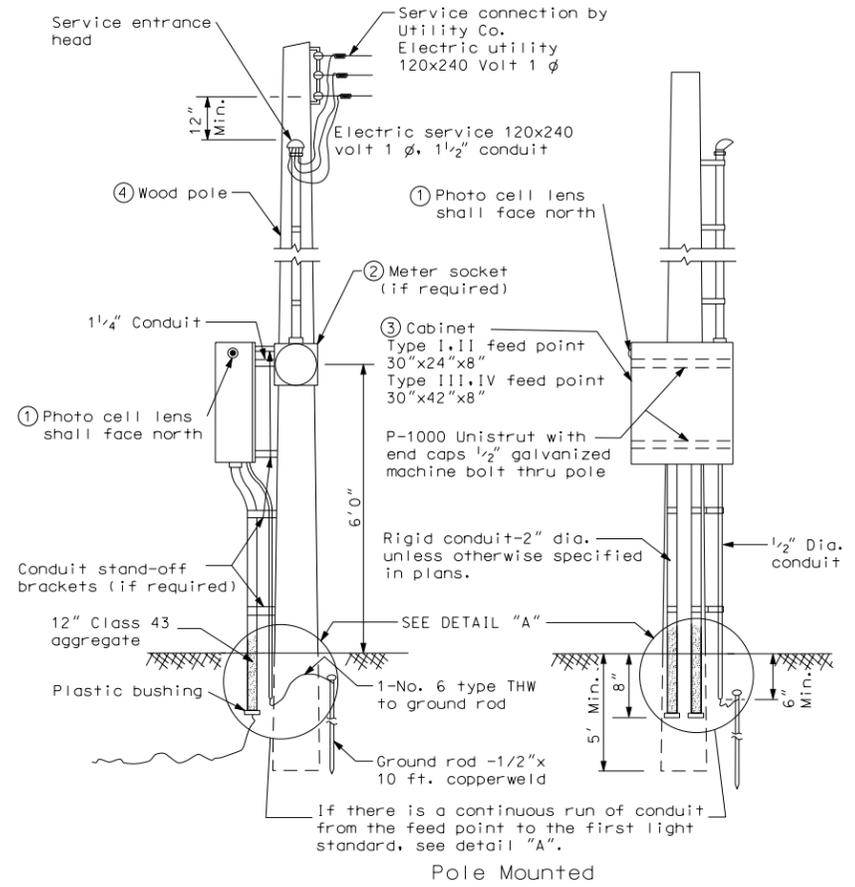
Type I feed point is similar to type IV except only one electrical circuit, one 50 amp-2 pole breaker and one lighting relay, normally open, shall be installed. Type II feed point is similar to type IV except only two electrical circuit, two 50 amp-2 pole breaker and two lighting relays, normally open, shall be installed. Type III feed point is similar to type IV except only three electrical circuits, three 50 amp-2 pole breakers and three lighting relays, normally open, shall be installed.



Detail "A"



Conduit Standoff Bracket
The conduit standoff brackets may be omitted if not required by the local utility company.



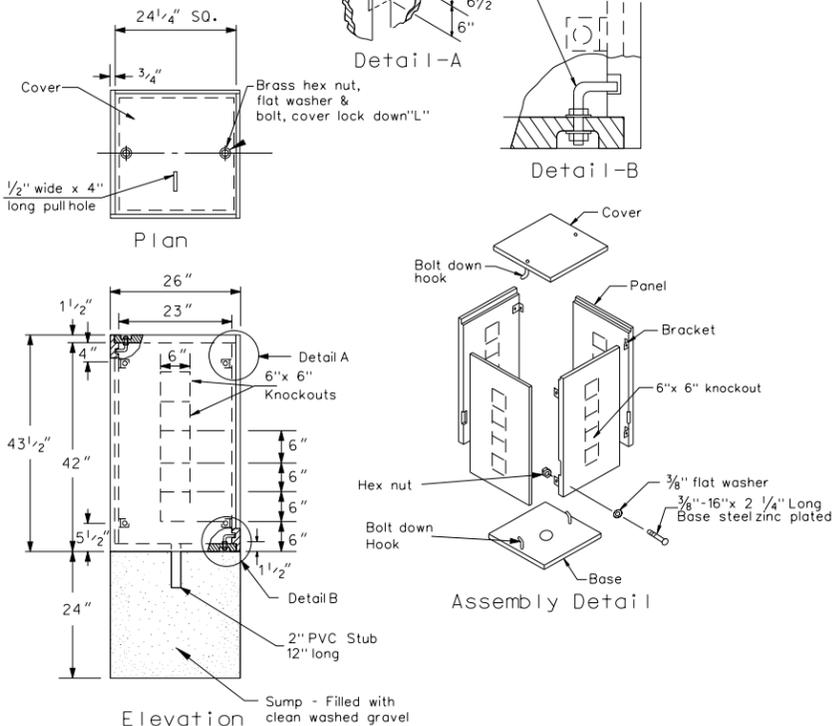
Pole Mounted

- NOTES:
- PHOTO CELL: The electrical contractor shall furnish and install the photoelectric cell.
 - METER SOCKET: The contractor shall install the meter socket and trim if the meter is required by local utility company. Meter to be furnished and installed by utility company.
 - CABINET: Cabinet shall be N.E.M.A. 12 rating with lock drip shield and 1/2" plywood backing, stainless steel hardware. Paint plywood with 2 coats of oil base gray. Cabinet shall be shop coated with one coat of primer & have two coats of exterior gray enamel.
 - WOOD POLE: Minimum 20 ft. Class VII full length penta pressure treated wood pole. (if required, see layout sheets)
 - CABINET: Cabinet shall be 56" high x 26" wide x 14" deep. Minimum 12 ga. steel with provisions for padlock. Cabinet shall be weatherproof. Cabinet shall have one shop coat of primer and two field coats of exterior dark green enamel.
 - GROUNDING GRID: The grounding grid shall have a ground resistance not to exceed 25 ohms. This shall be obtained by one or more 5/8"x10' copperweld ground rods in parallel or series at two corners. Minimum distance between ground unit assemblies shall be 6'0".
 - METER LOCATION: The meter (if required) shall not be mounted on the same side of the cabinet as the photo-cell is mounted.

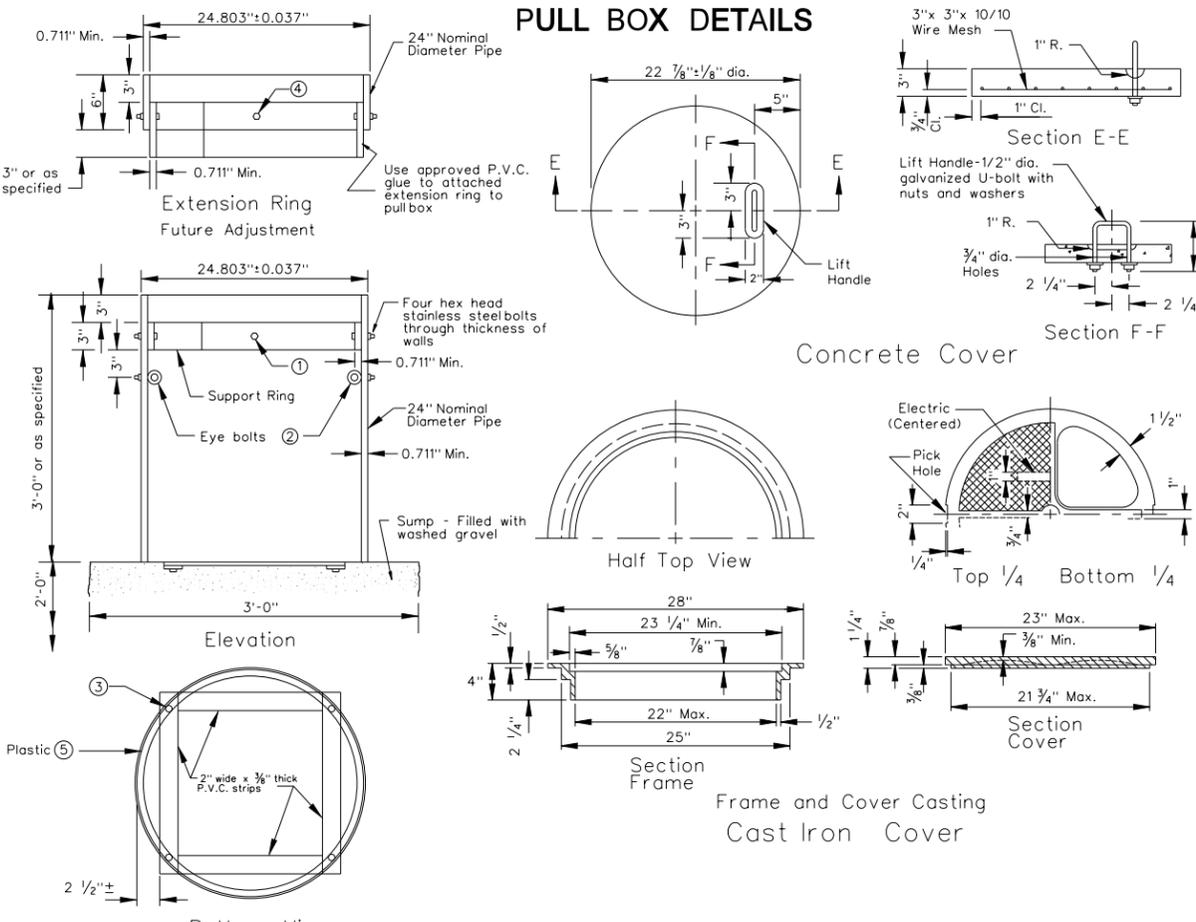
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
01-28-91	Cabinet note
03-20-91	Conduit
09-01-92	Feed point
06-19-03	Minor revisions
12-01-04	PE Stamp added

This document was originally issued and sealed by **MARK S. GAYDOS** Registration Number **PE- 4518**, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

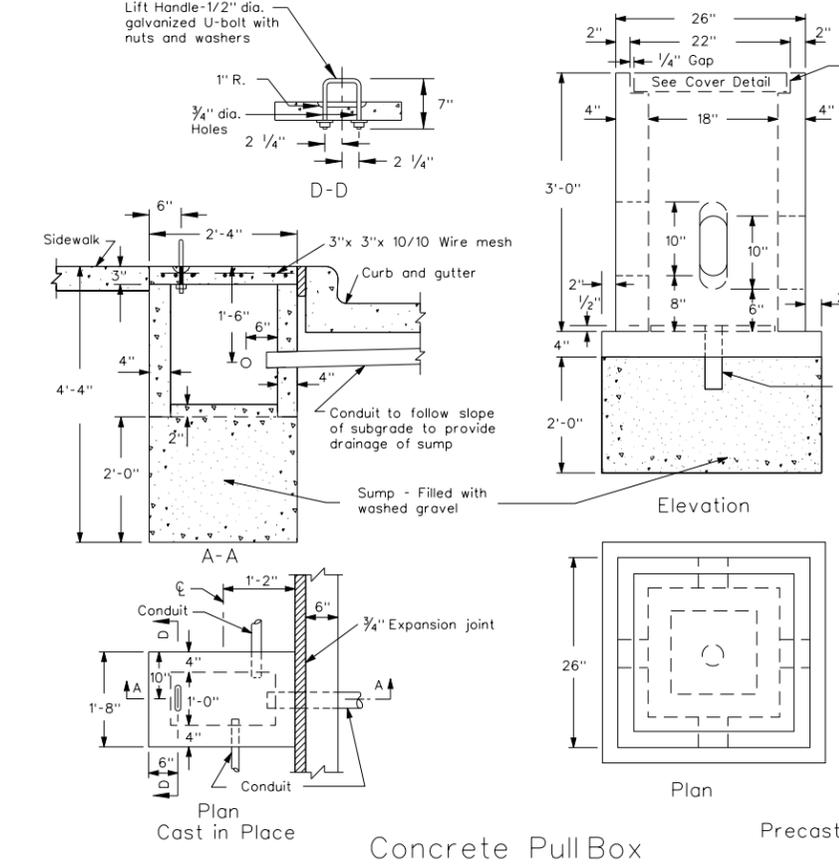
NOTE: Fiberglass pullbox is composed of fiberglass skins and reinforced mortar structural elements in combination with polyurethane foam cells.



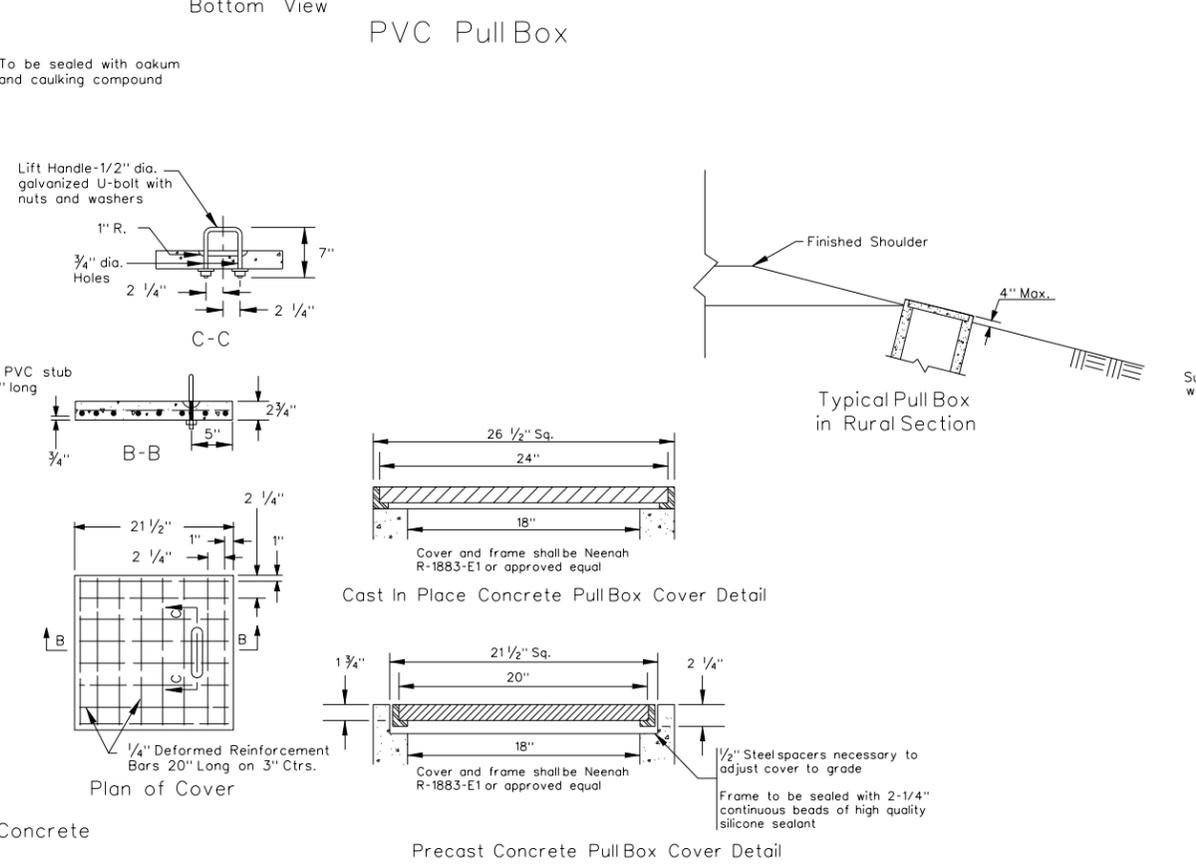
Fiberglass Pull Box



PVC Pull Box

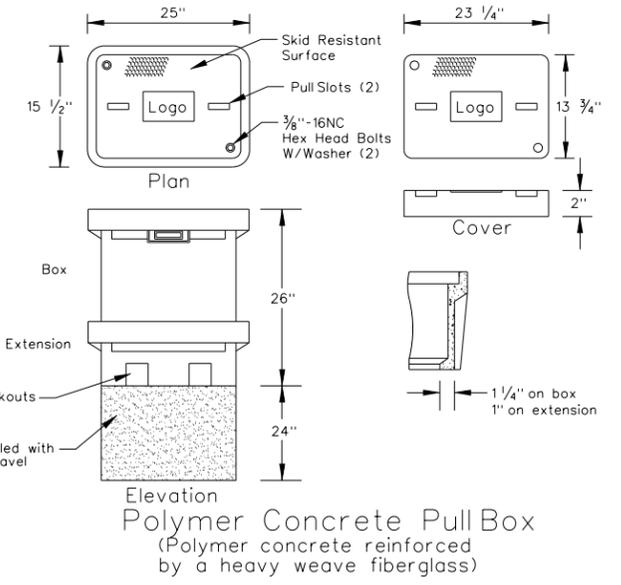


Concrete Pull Box



Prestcast Concrete Pull Box Cover Detail

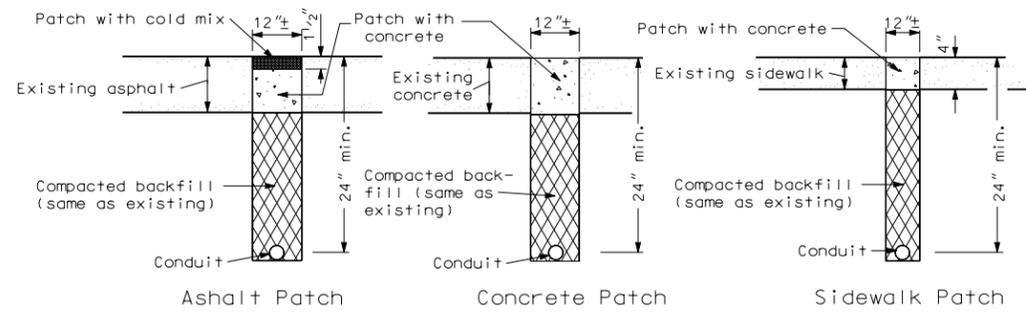
- PVC PULL BOX NOTES:**
- Attach split 24" nominal diameter PVC cover support ring with four 3/8" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
 - Two type 2 shoulder eye bolts, 3/8" dia. x 1 1/4" shank length with hex nuts 180 degrees apart (for lifting pull box and supporting electric cable).
 - Four 1/4" x 1 1/4" long galvanized lag screws, screw assembly together.
 - Attach split 24" nominal diameter PVC cover support extension ring with four 3/8" dia. x 2" long stainless steel hex. head bolts with nuts at 90 degrees apart.
 - Bolt assembly together.
 - Conduit holes located in barrel section shall be sized no more than 1" larger than size of conduit being used.
 - After pull box & conduit installation all inside walls & cover shall be made water tight to the satisfaction of the Engineer.
 - PVC pipe to meet requirements of ASTM F679T-1 or equal.
 - Hex head bolts and nuts shall be austenitic stainless steel. Other fasteners to be galvanized as per AASHTO M-232.
 - Concrete cover shall be coated on top and sides with and approved epoxy coating. The epoxy protective coating shall be light gray, clear, or neutral in color and shall be applied as recommended by the manufacturer. The surfaces of the concrete to which the epoxy protective coating is applied, shall be cleaned by wire brush and shall be dry before application.
 - Cast Iron Cover: Cover castings shall be gray iron as per AASHTO M 105, class 35B.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
04-26-94	Add NEENAH cover
10-11-94	Lift handle & polymer
03-20-95	Concrete pull box
	Add PVC pull box
05-28-99	Pull box cover thickness
06-08-99	Rural pull box detail
09-14-99	Added cast iron cover
12-01-04	PE Stamp added

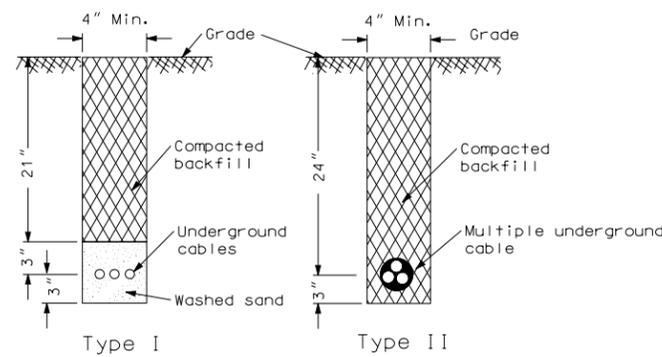
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LIGHTING AND SIGNAL DETAILS



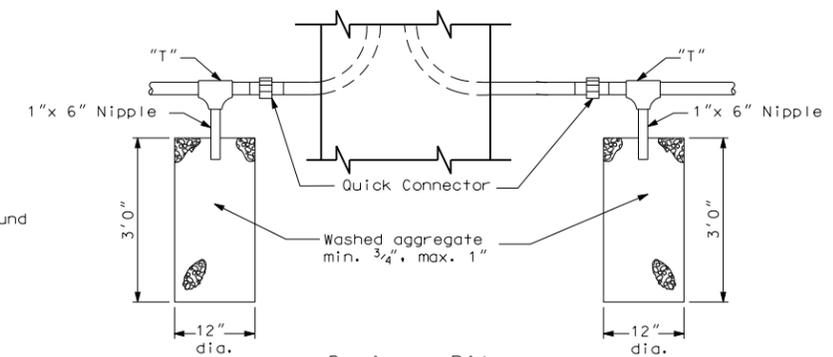
Surface Patch Details

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



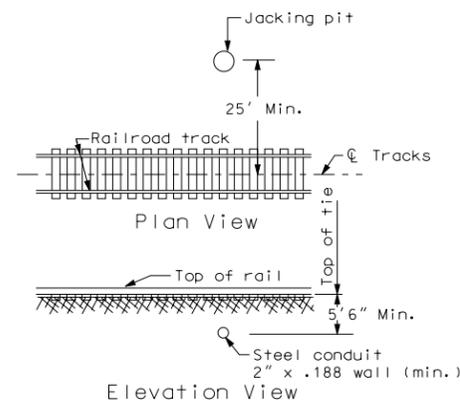
Cable Trench

The entire area which is disturbed by the trenching shall be sodded, or as directed by the Engineer. The cost shall be included in the price bid for "Cable Trench."

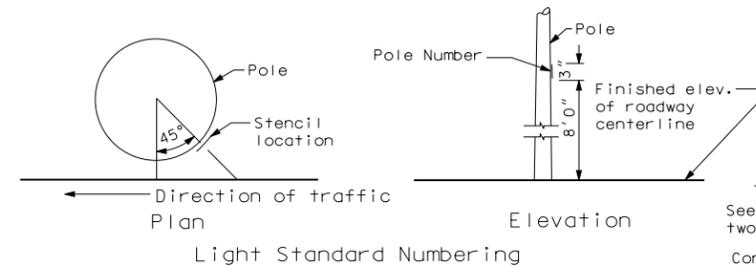


Drainage Pit

Drainage pits shall be installed in both ends of the conduit runs. Except where conduit slopes enough for drainage to one end. (To be used for Traffic Signal Conduit Runs Only)

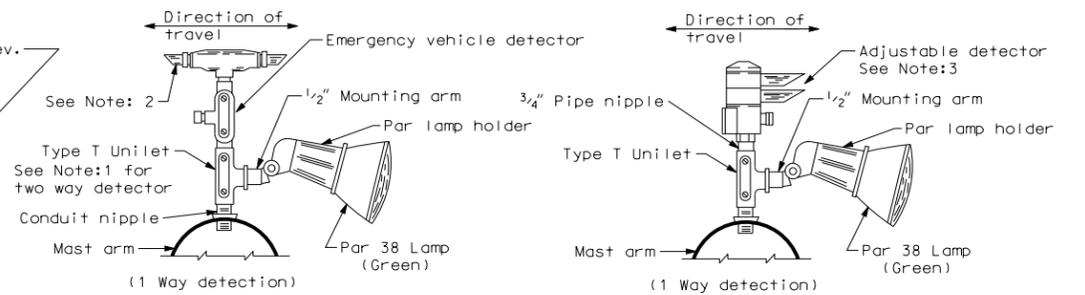


Railroad Track Conduit Placement



Light Standard Numbering

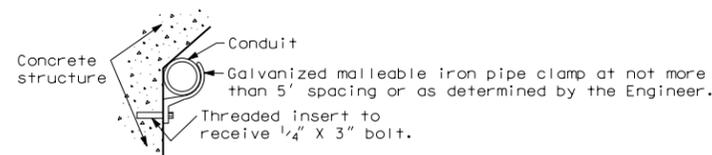
Note:
Pole Numbering: The contractor shall stencil on each light standard the pole number in black paint on the roadway side of the pole, or adhesive coated plastic such as Scotch cal. Manufactured by 3M as approved by the Engineer. See layout sheets for pole numbers.



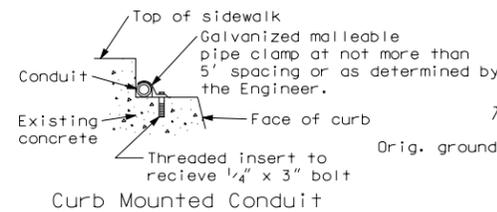
Emergency Vehicle Detector Detail (Location as shown in plans)

Alternate Emergency Vehicle Detector Detail (Adjustable) (Location as shown in plans)

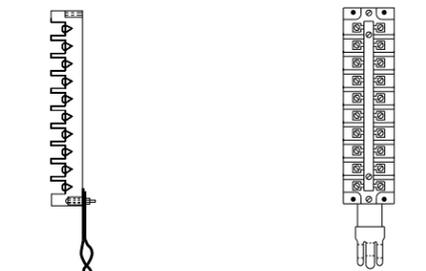
- Notes:
- Two-way Detector shall have Type X Unilet with two Par lamp holders and lamps (one in each direction).
 - One-way Detector shall have the unused end plugged with metal pipe plug.
 - Two-way Detector shall have the detector lens rotated to face the direction of travel, and shall have Type X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



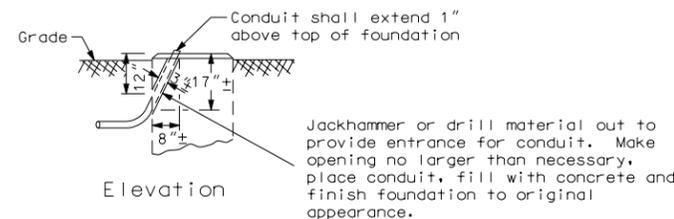
Bridge Mounted Conduit Hanger



Curb Mounted Conduit



Terminal Block (Rigid Mounted)

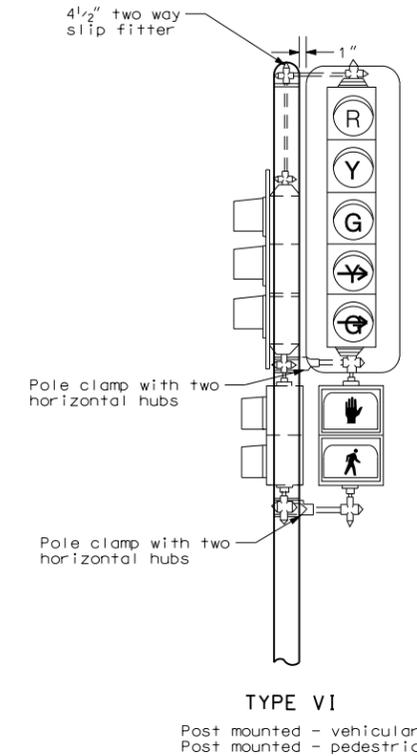
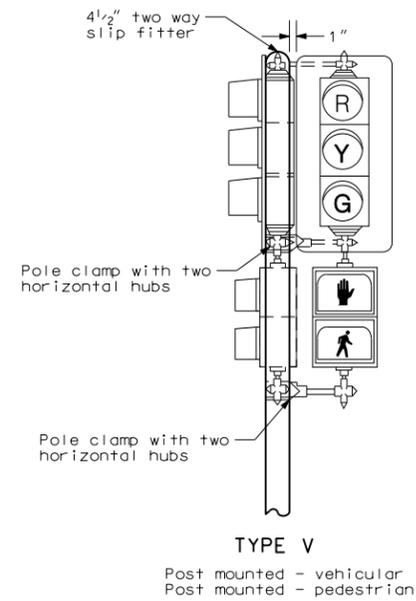
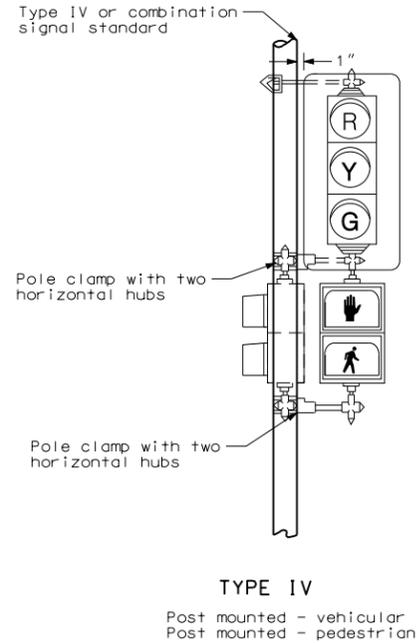
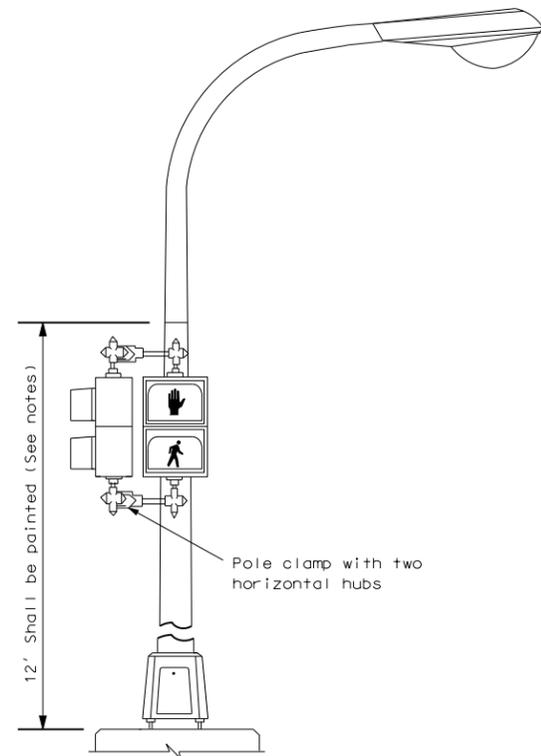


Revise Concrete Foundation

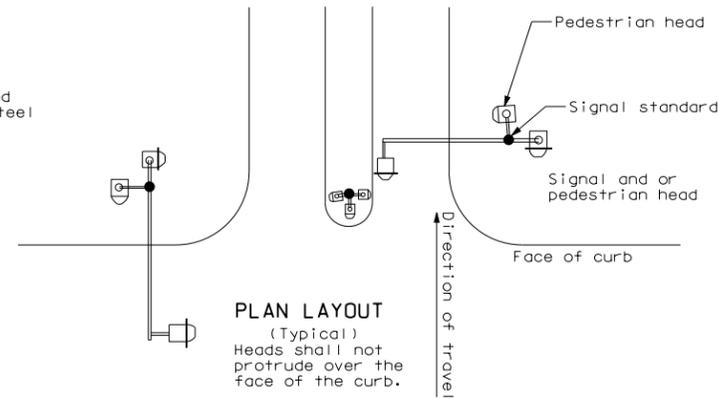
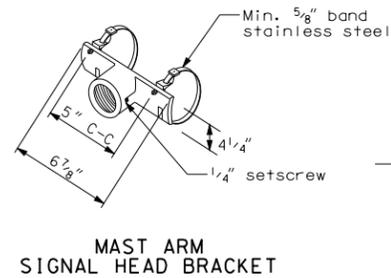
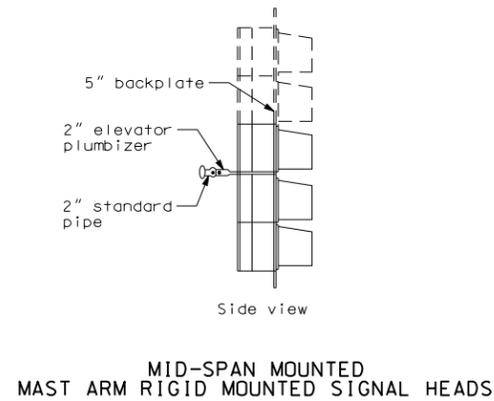
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
11-07-90	Track clearance
06-19-03	Minor revisions
12-01-04	PE Stamp added

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TRAFFIC SIGNAL HEAD MOUNTING



LIGHT STANDARD MOUNTED PEDESTRIAN SIGNAL HEAD



Notes:

Clearance: Clearance from the ground line or sidewalk to the bottom of post or pedestal mounted vehicular signal heads shall be 10 ft. minimum, from pedestrian signal heads shall be 8 ft. minimum.

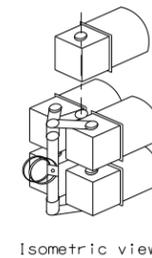
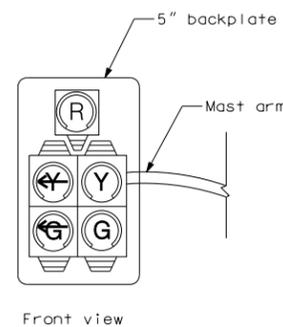
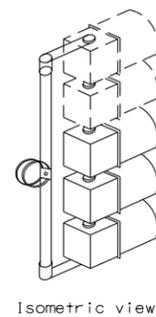
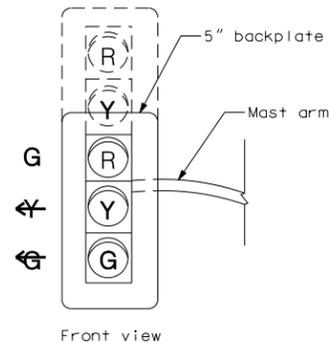
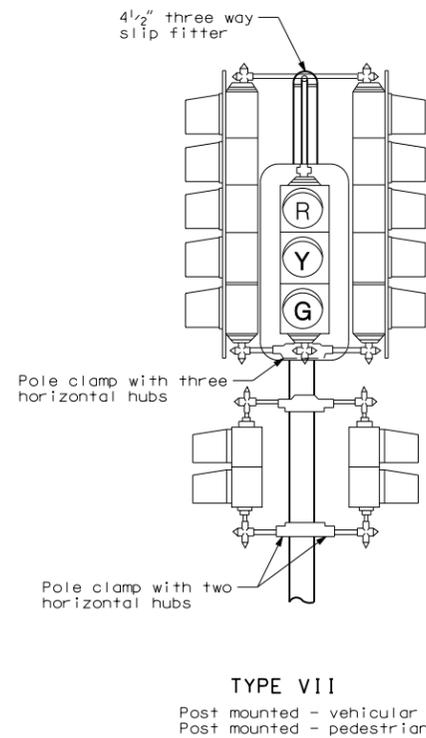
Signal Heads: See traffic signal layout for correct mounting position, numbers, size, and arrangement of lenses.

Pole Clamps: A pole plate with suitable banding material, as approved by the engineer in the field, may be substituted for the pole clamps. Where traffic signal heads and pedestrian signal heads are mounted one above the other, one pole clamp assembly may be used.

Paint: Signal housing shall be painted yellow. Back plates shall be painted dull black. Pole clamps and signal head mounting hardware shall be painted the same color as the signal standard shaft.

When pedestrian heads are light standard mounted, the lower 12 feet shall be painted the same color as the other traffic signal standards.

Mounting Details: All signal heads shown are viewed from direction of travel.



END MOUNTED MAST ARM RIGID MOUNTED SIGNAL HEADS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-23-94	Type II
10-19-94	Rev. visors & add 5-section head
08-01-95	5-section head end mounted detail
08-29-95	Delete Type III
11-29-95	Mast arm mounting bracket
08-14-01	Added pedestrian symbols
05-12-03	Added Lt Std Mt ped head
09-29-04	Revised head mounting
12-01-04	PE Stamp added
10-31-06	Removed pedestrian word messages

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