

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 $\text{C}$	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	DWPP	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		

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 3/15/13 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

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	Lvlng	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		
H <sub>z</sub>	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		

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 3/15/13 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

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		

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 3/15/13 and the original document is stored at the North Dakota Department of Transportation

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE
04-20-11 03-15-13	Added Items Added Items

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 3/15/13 and the original document is stored at the North Dakota Department of Transportation

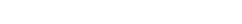
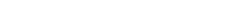
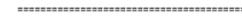
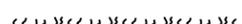
Line Styles

.....	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
—— <b>Geo</b> —— <b>Geo</b> ——	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
—— ——— <b>PL</b> ——	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		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

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)		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

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	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

# 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	

NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by  
 Roger Weigel,  
 Registration Number PE-2930,  
 on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

# 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 Gate Type 2  Junction Box  High Mast Light Standard 10 Luminaire  High Mast Light Standard 3 Luminaire  High Mast Light Standard 4 Luminaire  High Mast Light Standard 5 Luminaire  High Mast Light Standard 6 Luminaire  High Mast Light Standard 7 Luminaire  High Mast Light Standard 8 Luminaire  High Mast Light Standard 9 Luminaire  Relocate Light Standard  Overhead Sign Structure Load Center  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire	 Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 175 Watt High Pressure Sodium Vapor Luminaire  Light Standard 200 Watt High Pressure Sodium Vapor Luminaire  Light Standard 250 Watt High Pressure Sodium Vapor Luminaire  Light Standard 310 Watt High Pressure Sodium Vapor Luminaire  Light Standard 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 50 Watt High Pressure Sodium Vapor Luminaire  Light Standard 70 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Manhole  Manhole 48 Inch  Sanitary Force Main Manhole  Sanitary Sewer Manhole  Storm Drain Manhole  Storm Drain Manhole with Inlet  Reset Mile Post  Mile Post Type A  Mile Post Type B  Mile Post Type C  Right of Way Marker  Tubular Marker  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
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

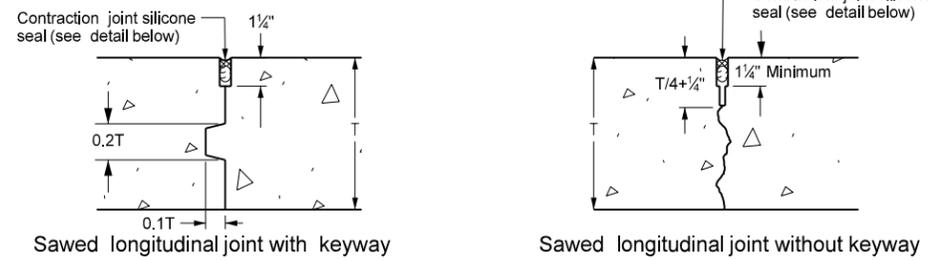
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by  
**Roger Weigel,**  
 Registration Number  
**PE-2930,**  
 on **4/20/11** and the original document is stored at the  
 North Dakota Department  
 of Transportation

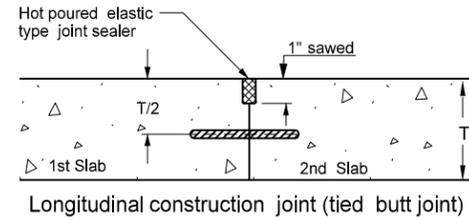
# LONGITUDINAL JOINT DETAILS

D-550-2

## UNTIED JOINTS (silicone seal)

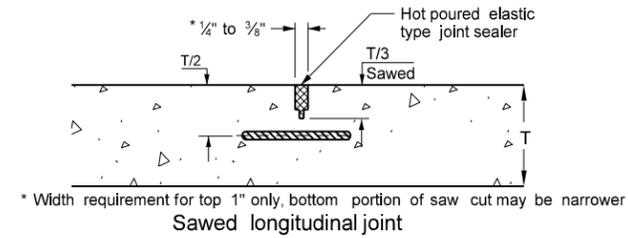
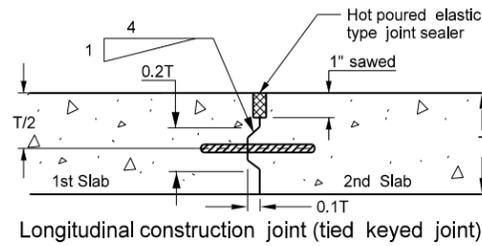
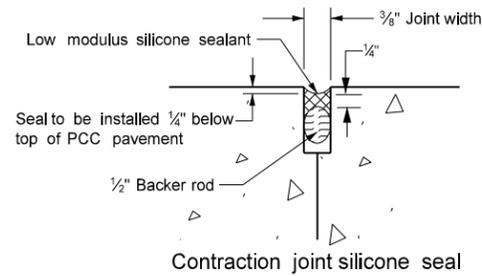


## TIED JOINTS (hot poured elastic seal)



Notes:

1. The hot poured elastic type joint sealer shall be in accordance with Section 826.02A.2 of the Standard Specifications.
2. The longitudinal joint and seal shall be included in the price bid for the P.C.C. pavement.
3. Tie bars shall not be placed within 18 inches of a transverse skewed joint.
4. Where tie bars are installed bent and later straightened, Grade 40 steel shall be used.
5. Tie bar spacing can be increased up to 10% to facilitate construction.
6. Tie Bars shall be at a 48 inch maximum spacing.
7. A "Warp" joint is a sawed joint or a construction joint with a keyway.
8. A "Butt joint" is a construction joint with no keyway.

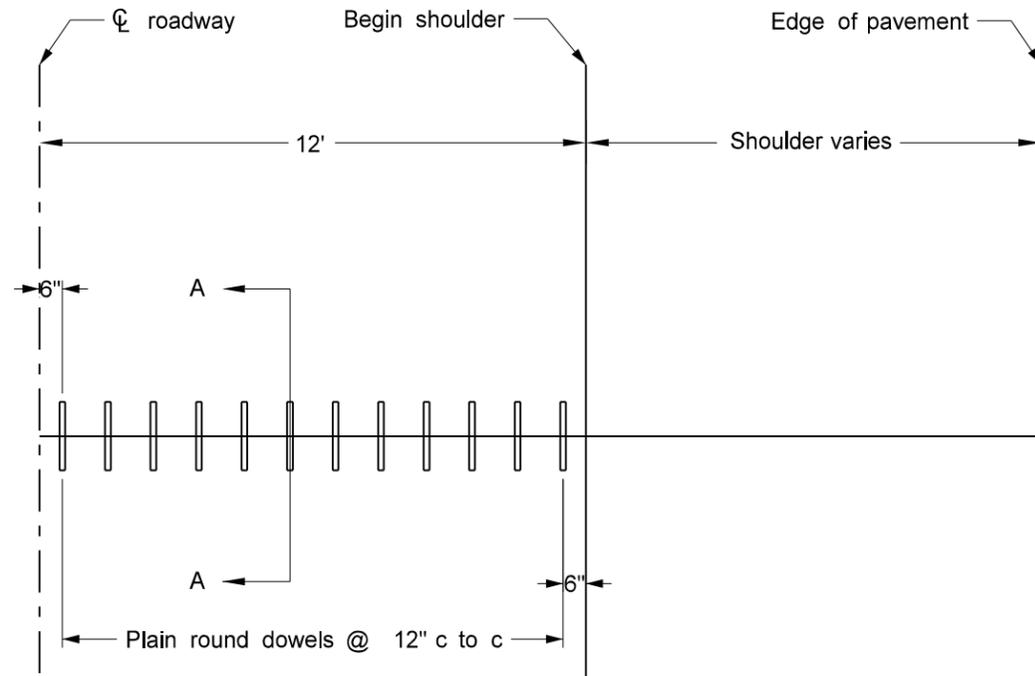


BAR SIZE  
GRADE STEEL  
DIST TO FREE EDGE  
JOINT TYPE  
P.V.M.T THICKNESS

## TIEBAR SPACINGS (In)

P.V.M.T THICKNESS	JOINT TYPE	TIEBAR SPACINGS (In)																																																													
		# 3 BAR						# 4 BAR						# 5 BAR						# 6 BAR																																											
		GRADE 40				GRADE 60				GRADE 40				GRADE 60				GRADE 40				GRADE 60																																									
		24"						30"						24"						36"						30"						42"						36"						48"																			
		4	6	8	10			4	6	8	10	12	14			8	10	12	14	16			8	10	12	14	16	22	24	10	12	14	16	22	24	10	12	14	16	22	24	10	12	14	16	19	22	24	10	12	14	16	19	22	24								
6"	WARP																																																														
	BUTT	48	39	29	24			48	48	44	35	29	25		48	42	35	30	26				48	48	48	45	39	28	26	48	48	47	41	30	27	48	48	48	48	45	41	48	48	48	48	48	43	39	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
8"	WARP	48	39	29	24			48	48	44	35	29	25		48	42	35	30	26				48	48	48	45	39	28	26	48	48	47	41	30	27	48	48	48	48	45	41	48	48	48	48	48	43	39	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
	BUTT	42	27					48	42	31	25				37	29	24						48	44	37	32	27			46	39	33	29			48	48	48	43	32	29	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
8 1/2"	WARP	48	37	28				48	48	42	33	28	24		48	39	33	28	24				48	48	48	42	37	27	24	48	48	44	38	28	25	48	48	48	48	42	38	48	48	48	48	47	40	37	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
	BUTT	39	26					44	39	29					35	27							48	48	47	41	30	27	44	36	31	27	48	48	47	41	30	27	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48				
9"	WARP	48	35	26				48	48	39	31	26			47	37	31	26					48	48	47	40	35	25	48	48	42	36	26	24	48	48	48	48	40	36	48	48	48	48	44	38	35	48	48	48	48	48	48	48	48	48	48	48	48	48	48		
	BUTT	37	24					48	37	27					33	26							48	40	33	28	25	41	34	29	25	48	48	44	39	28	25	48	48	42	37	26	24	48	48	44	39	28	25	48	48	48	48	48	48	48	48	48	48	48	48	48	48
9 1/2"	WARP	48	33	25				48	48	37	30	25			44	35	29	25					48	48	44	38	33	24	48	46	39	34	25	48	48	48	48	38	34	48	48	48	48	42	36	33	48	48	48	48	48	48	48	48	48	48	48	48	48	48			
	BUTT	35						48	35	26					31	25							47	37	31	27	39	32	27	25	48	48	42	37	27	24	48	48	42	37	27	24	48	48	48	48	48	48	48	48	48	48	48	48	48	48							
10"	WARP	47	31					48	47	35	28			42	34	28	24					48	48	42	36	31	48	44	37	33	24	48	48	48	48	36	33	48	48	48	48	40	34	31	48	48	48	48	48	48	48	48	48	48	48	48	48	48					
	BUTT	33						48	33	25				29	24							45	36	29	25	37	31	26	24	48	46	40	35	25	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48								
10 1/2"	WARP	45	30					48	45	34	27			40	32	26						48	48	40	34	30	48	42	36	31	48	48	48	47	34	31	48	48	48	48	45	38	33	30	48	48	48	48	48	48	48	48	48	48	48	48	48	48					
	BUTT	32						48	32	24				28								42	34	28	24	35	29	25	35	29	25	48	44	38	33	24	48	42	36	32	27	48	48	48	48	48	48	48	48	48	48	48	48	48	48								
11"	WARP	43	28					48	43	32	26			38	31	25						48	46	38	33	28	48	40	34	30	48	48	48	45	32	30	48	48	48	48	43	36	31	28	48	48	48	48	48	48	48	48	48	48	48	48	48	48					
	BUTT	30						46	30					27								40	32	27	34	28	24	34	28	24	48	42	36	32	48	40	35	30	25	48	48	48	48	48	48	48	48	48	48	48	48	48	48										
11 1/2"	WARP	41	27					48	41	31	24			48	44	36	31	27				48	48	44	36	31	27	48	46	38	32	28	48	48	47	41	34	31	28	48	48	48	48	48	48	48	48	48	48	48	48	48	48										
	BUTT	29						44	29					25								39	31	25	39	31	25	32	27	48	40	35	30	46	39	33	29	24	48	48	48	48	48	48	48	48	48	48	48	48	48	48											
12"	WARP	39	26					48	39	29			35	28				48	42	35	30	26			44	36	31	28	48	48	47	41	30	27	48	48	45	40	33	28	26	48	48	48	48	48	48	48	48	48	48	48	48	48	48								
	BUTT	27						42	27				25					37	30	25					31	25	31	25	27	21	46	39	33	29	45	37	32	28	48	48	48	48	48	48	48	48	48	48	48	48	48	48											
12 1/2"	WARP	38	25					48	38	28			33	27				48	40	33	29	25			42	35	30	26	48	48	45	39	28	26	48	48	43	38	32	27	25	48	48	48	48	48	48	48	48	48	48	48	48	48	48								
	BUTT	27						40	27				28					35	28					29	25	29	25	24	20	44	37	32	27	42	35	30	27	48	48	48	48	48	48	48	48	48	48	48	48	48	48												
13"	WARP	36	24					48	36	27			32	26				48	39	32	27	24			40	33	29	25	48	48	43	38	27	25	48	48	41	36	30	26	24	48	48	48	48	48	48	48	48	48	48	48	48	48	48								
	BUTT	25						38	25				26					34	27					28		28		22	18	42	35	30	27	41	34	29	25	48	48	44	38	32	28	25	48	48	48	48	48	48	48												
13 1/2"	WARP	35						48	35	26			31	25				47	37	31	26			39	32	28	24	48	48	42	36	26	24	48	47	40	35	29	25	48	48	48	48	48	48	48	48	48	48	48	48	48	48										
	BUTT	25						37	25				25					33	26					27		27		21	17	41	34	29	25	39	33	28	25	48	48	42	37	31	27	24	48	48	48	48	48	48	48												
14"	WARP	34						48	34	25			30	24				45	36	30	25			37	31	27	48	47	40	35	25	48	45	38	34	28	24	48	48	48	48	48	48	48	48	48	48	48	48	48	48												
	BUTT	24						35	24				25					32	25					26		26		20	16	38	32	27	24	38	32	27	24	48	47	40	35	30	26	23	48	48	48	48	48	48	48												
14 1/2"	WARP	32						48	32	24			29					43																																													

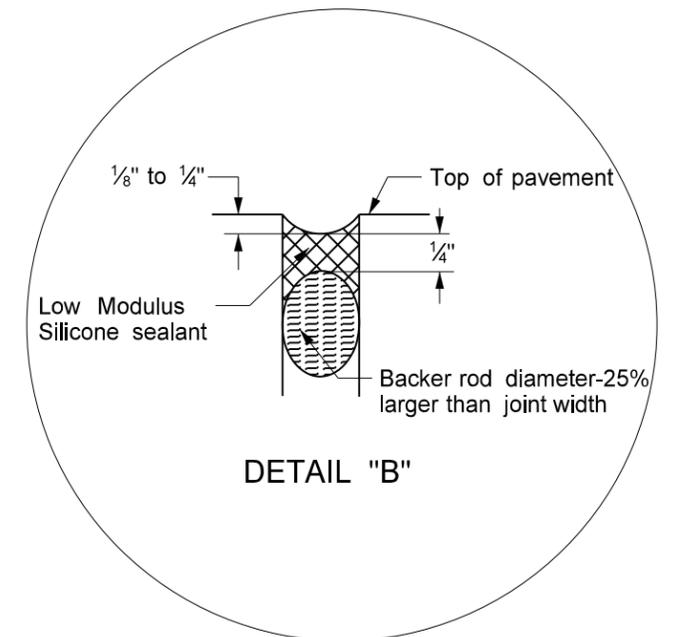
TRANSVERSE CONTRACTION JOINT DETAILS



CONTRACTION JOINT DOWEL ASSEMBLY  
(1/2 roadway shown)

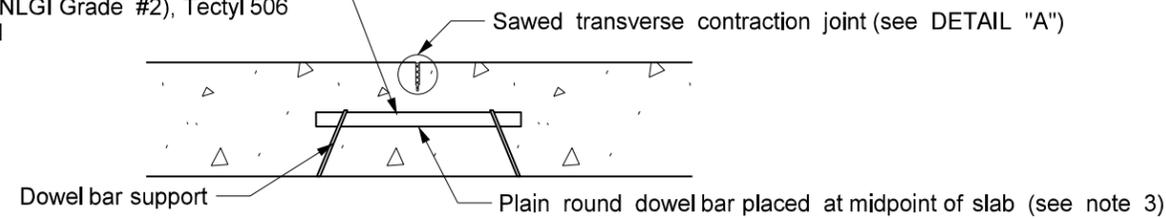
Notes

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

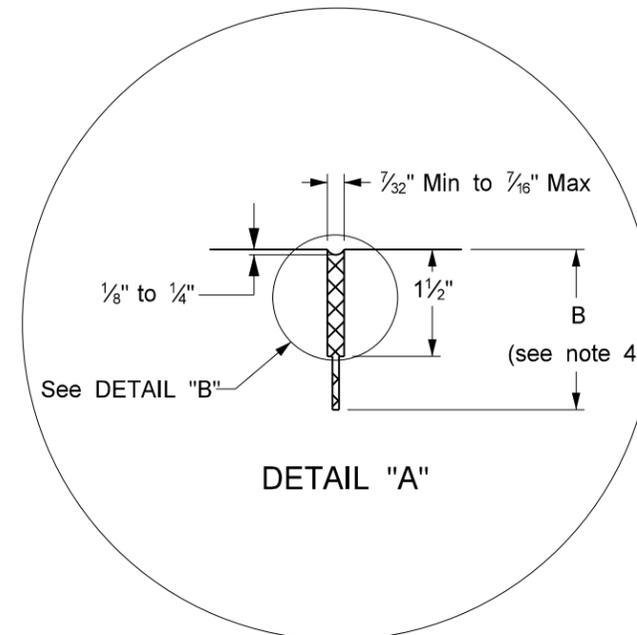


DETAIL "B"

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



SECTION A-A



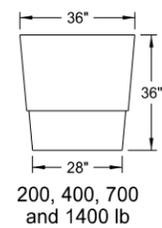
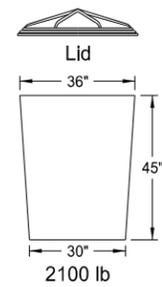
DETAIL "A"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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



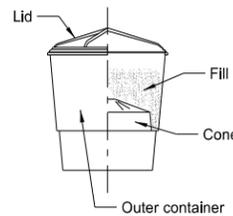
ATTENUATION DEVICE



Outer Containers

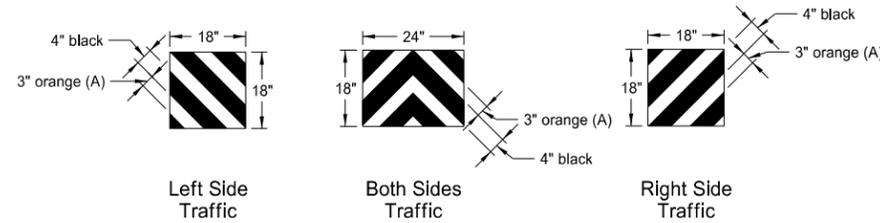


Cones



Typical Assembly

Typical Module Construction Detail

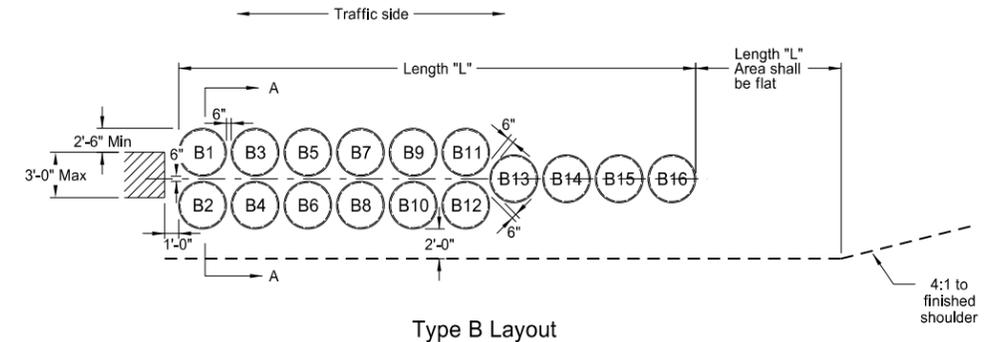


Reflective Sheet Detail

Note:  
The last attenuation device facing traffic shall have a reflective sheet, following the details above, directly applied to the outer container. The sheet may also be applied to a metallic sheet and attached to the container with approved fasteners. The reflective sheeting shall be Type III C as specified in NDDOT Standard Specifications.

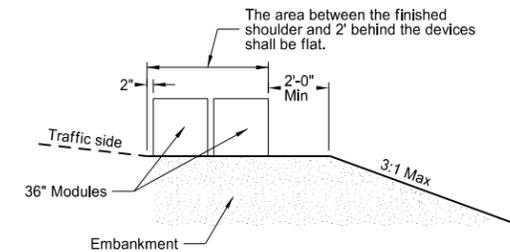
(A) 3" orange sheeting shall be used for temporary installations, and 3" yellow sheeting shall be used for permanent installations.

	Fill Chart				
	Module Weights (LBS)				
Distance from top edge	200	400	700	1400	2100
	8 1/2"	5"	4"	3"	0"



Type B Layout

Note:  
When attenuation devices are placed at piers offset from roadway, they shall be angled 10 degrees towards traffic.



Section A-A (Type B Layout)

Type B Attenuation Device											
Module Number	Dash Number										
	75	70	65	60	55	50	45	40	35	30	25
Module Weights (LBS)											
B1	2100										
B2	2100										
B3	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B4	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B5	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400
B16	200	200	200	200	200	200	200	200	200	200	200
Length (L)	34.2'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	30.7'	27.2'	27.2'
Module Weights (LBS)	Replacement Module										
	2100	1	1	1	1	1	1	1	1	1	
	1400	1	1	1	1	1	1	1	1	1	1
	700	2	2	2	2	2	2	2	2	2	2
	400	1	1	1	1	1	1	1	1	1	1
200	2	2	2	1	1	1	1	1	1	1	1

Notes:

- Materials
  - Modules shall be manufactured from a frangible polyethylene material which will shatter upon impact.
  - Modules shall be filled with class 43 aggregate meeting the requirements for aggregate according to NDDOT Standard Specifications. The fill unit weight shall be at least 100 pounds per cubic foot. Fill left over winter shall have a moisture content of 2% or less.
- Modules
 

The modules shall be provided in two sizes to contain volumes of either 2, 4, 7, 14, or 21 cubic feet as a minimum.

  - The module for the 2, 4 or 7 cubic foot container shall consist of three components:
    - A 14 C.F., yellow outer container.
    - A black lid which locks securely over the top lip of the container.
    - A cone-shaped supporting insert. The insert shall be varied to allow for the three sizes of modules and capable of supporting 200, 400, or 700 pounds of sand mass. The cone inserts shall be placed inside the 14 cubic foot container.
  - The module for the 21 cubic foot container shall consist of two components:
    - A 36" height X 36" width yellow outer container.
    - A black lid which locks securely over the top of the container.
- For temporary use: The modules shall be Energite or Fitch attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or an approved equal. The attenuation devices may be placed on pallets to facilitate maintenance. Pallets shall have a maximum thickness of 3 1/2".
- For permanent use: Barrel Attenuation Device installations, the outer sand container portion of the modules shall consist of a one-piece container with separate detachable lid. The modules which meet these requirements are Energite attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or an approved equal. Modules having outer sand containers assembled from multiple pieces shall not be accepted for permanent installations.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by  
 Roger Weigel,  
 Registration Number  
 PE-2930,  
 on 9/25/2012 and the original document is stored at the  
 North Dakota Department  
 of Transportation

CONSTRUCTION SIGN DETAIL

D-704-5

<b>SIGN NUMBER</b>	G20-10-108	<b>STATION(S):</b>	<b>AREA:</b> 36.0 Sq.Ft.
<b>WIDTH x HEIGHT</b>	9'-0" x 4'-0"		
<b>BORDER WIDTH</b>	1.25" (Inset 0.75")		
<b>CORNER RADIUS</b>	3"		
<b>MOUNTING</b>	Ground		
<b>BACKGROUND</b>	TYPE: 3A Reflective COLOR: Fluorescent Orange		
<b>LEGEND/BORDER</b>	TYPE: Non-Refl COLOR: Black		

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

LETTER POSITION (X)														LENGTH	SIZE	SERIES
C	O	N	S	T	R	U	C	T	E	D	B	Y		69.7	6	D 2000
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7			
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96
Y	O	U	R		T	O	W	N					N	D		
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2				

Notes:

1. Sign shall be placed a distance of 1/2A following the End Road Work (G20-2a-48) sign. There shall be a maximum of 2 signs per project.
2. Sign shall be post mounted.
3. Sign required on rural projects with a 30 day or longer duration and it is not required on seal coat projects or other short duration projects.
4. Sign shall not be placed in urban areas or within city limits.

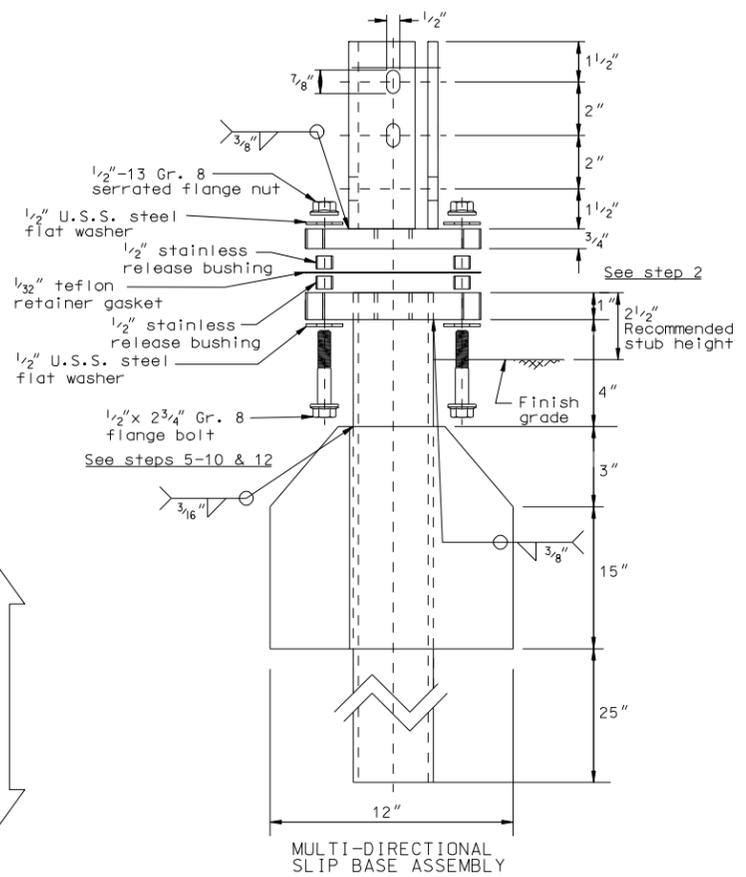
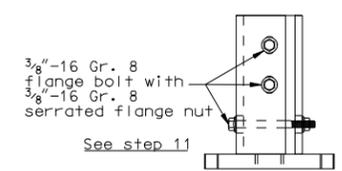
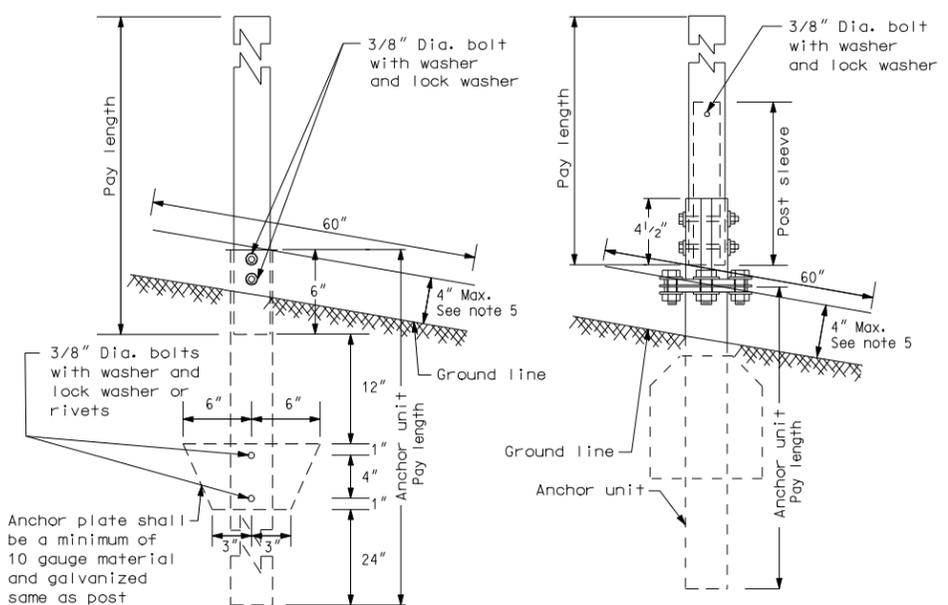
Road Type	Distance between signs min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 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

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

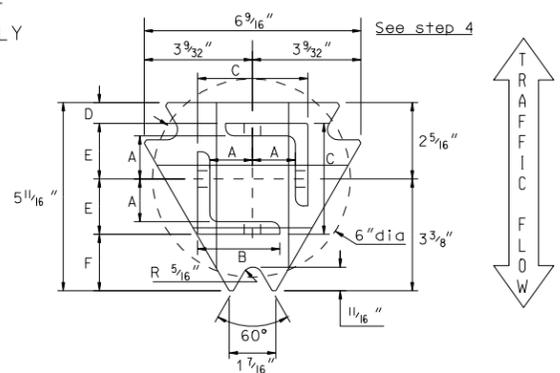
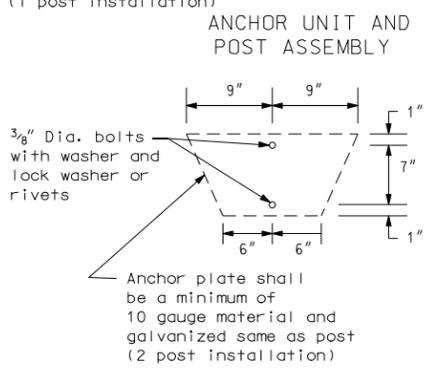
This document was originally issued and sealed by  
 Roger Weigel  
 Registration Number  
 PE- 2930,  
 on 8/22/12 and the original document is stored at the  
 North Dakota Department  
 of Transportation

# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

## PERFORATED TUBE



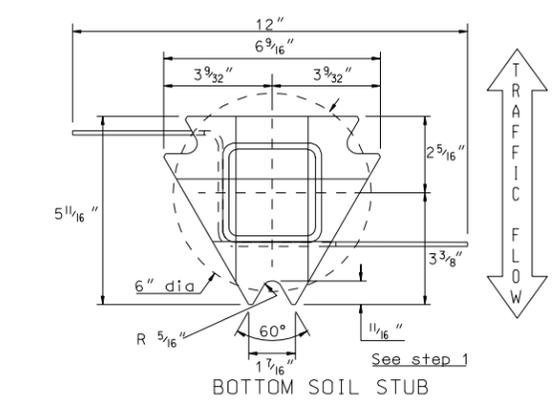
- Notes
1. Slip base bolts shall be torqued as specified by the manufacturer.
  2. The 2 3/16 inch size 10 gauge is shown as 2.19 inch size on the plans. The 2 1/2 inch size 10 gauge is shown as 2.51 inch size on the plans.
  3. Anchor for 2 inch, 2 1/4 inch, and 2 1/2 inch posts.
  4. Anchor material 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

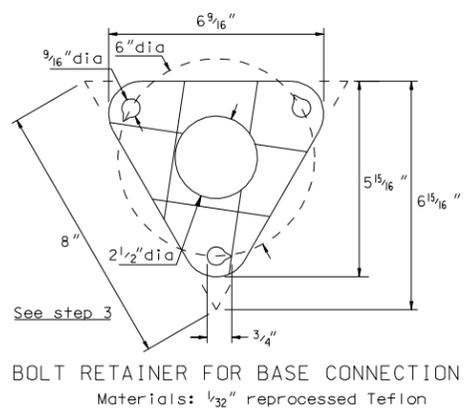
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16 inch x 10 Ga. Square Post	1 3/64 inch	2 1/2 inch	3 1/32 inch	2 5/32 inch	1 3/64 inch	1 7/8 inch
2 1/2 inch x 10 Ga. Square Post	1 3/32 inch	2 1/2 inch	3 5/16 inch	5/8 inch	1 2/32 inch	1 3/4 inch

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 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785
4 x 4	0.250	1/4	6.600	3.040	1.940	1.050

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

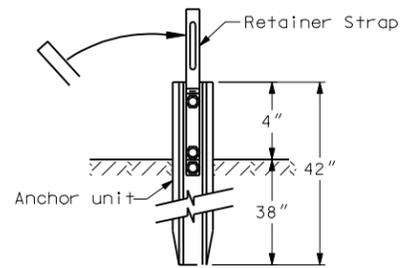
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-21-02	
REVISIONS	
DATE	CHANGE
12-01-04	PE stamp added

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

# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

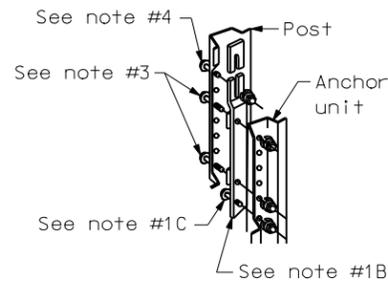
## FLANGED CHANNEL



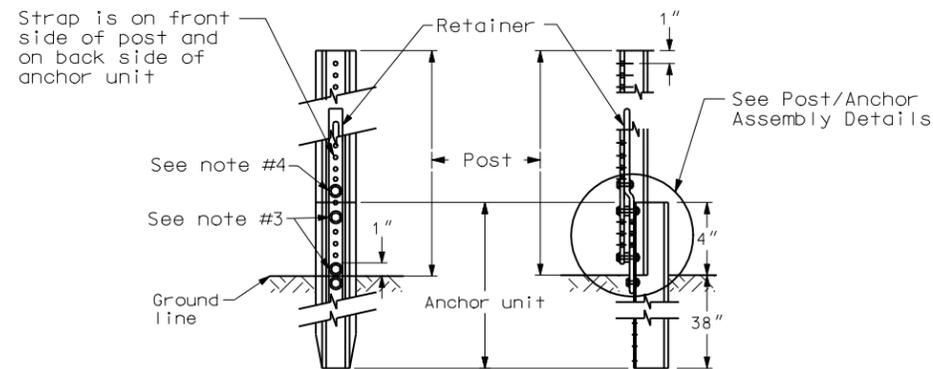
Anchor Unit & Strap Assembly Detail

### STEPS OF INSTALLATION

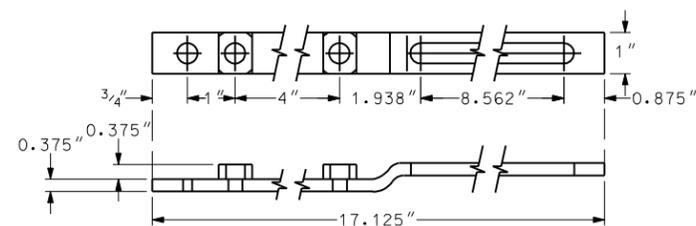
1. A) Drive anchor unit to within 12" of ground level.  
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.  
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.  
D) Rotate strap 90° to left.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



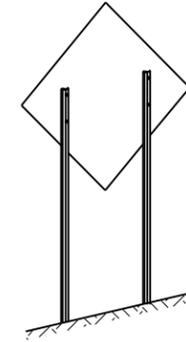
Front View Side View Sign Post Assembly Detail



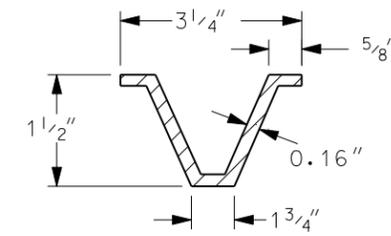
Retainer/Spacer Strap Detail

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

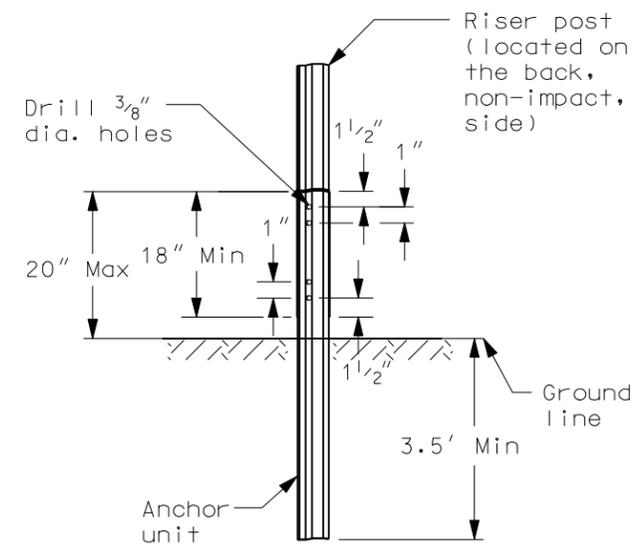
## 3 LB/FT U POSTS



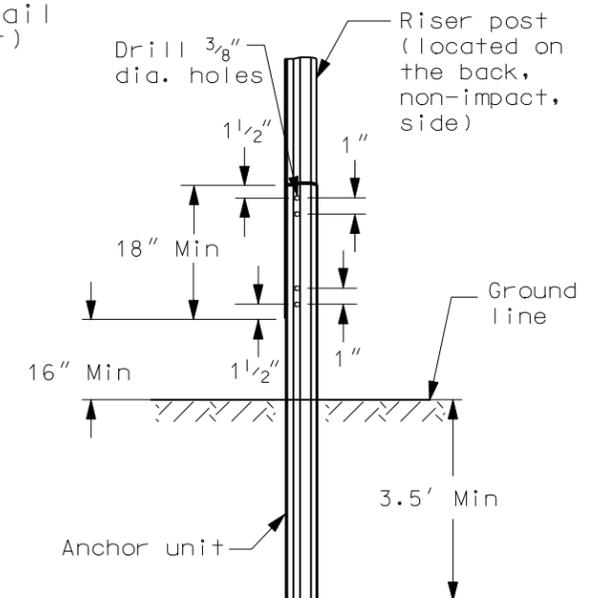
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

### Notes

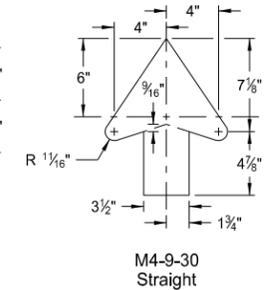
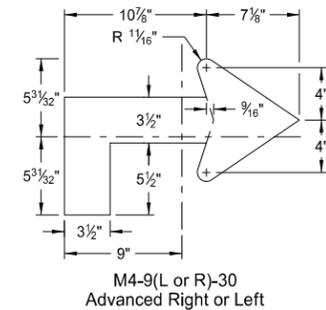
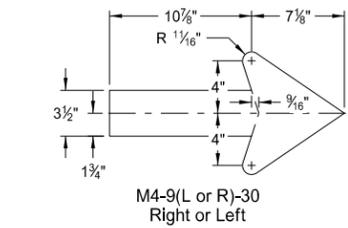
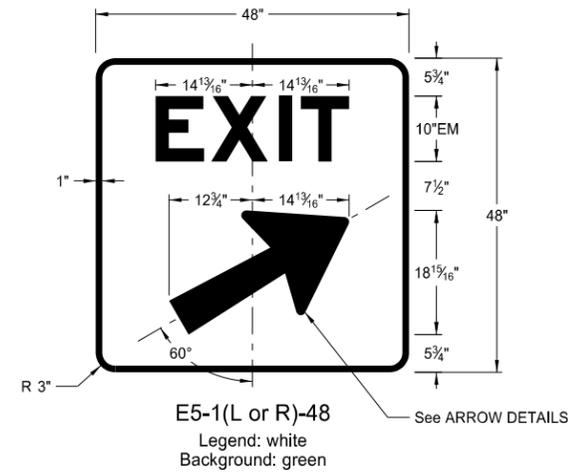
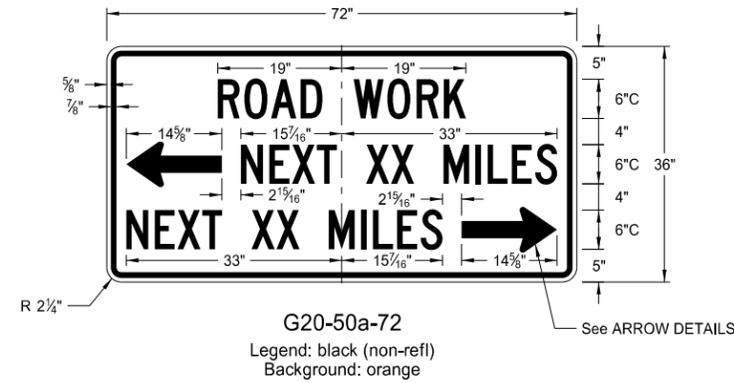
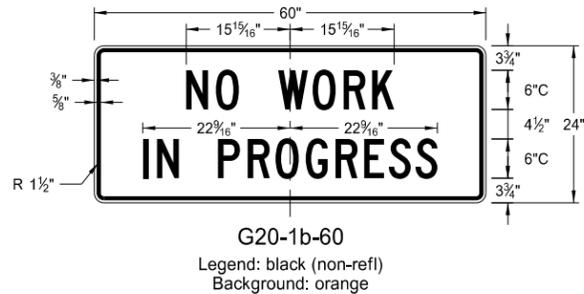
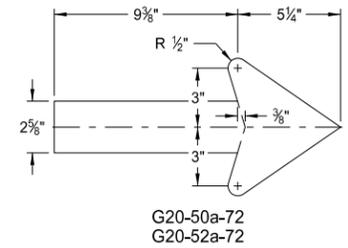
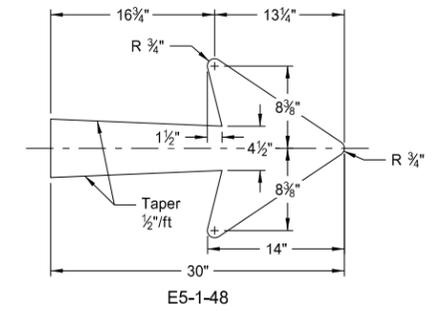
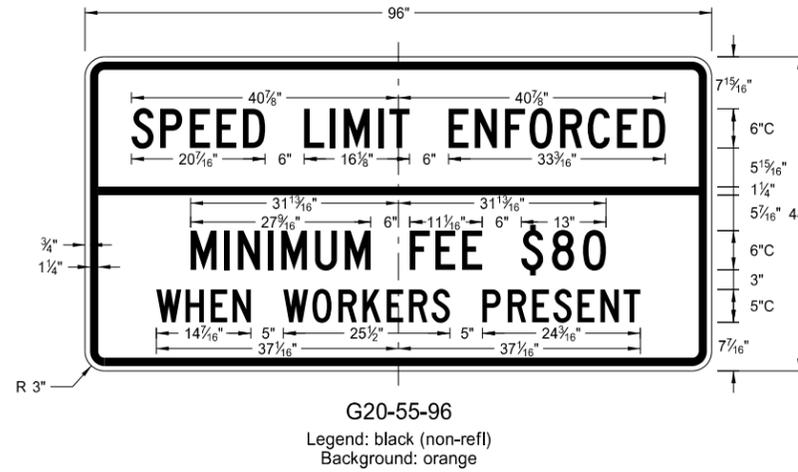
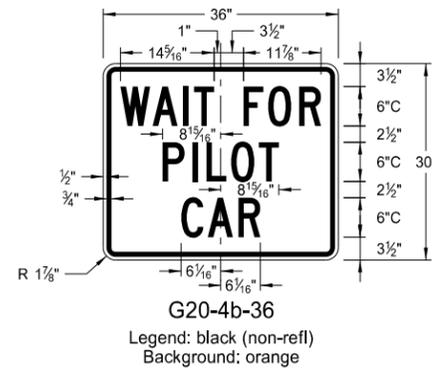
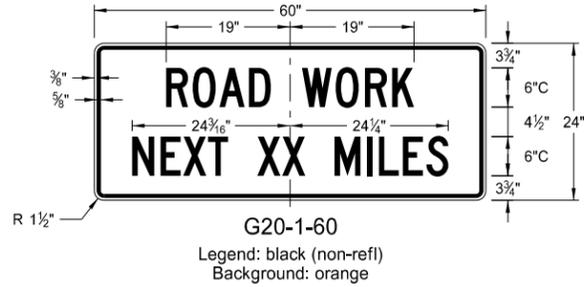
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more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

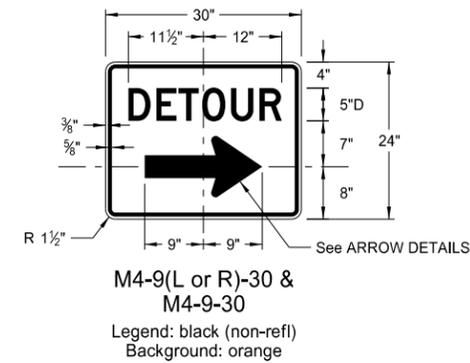
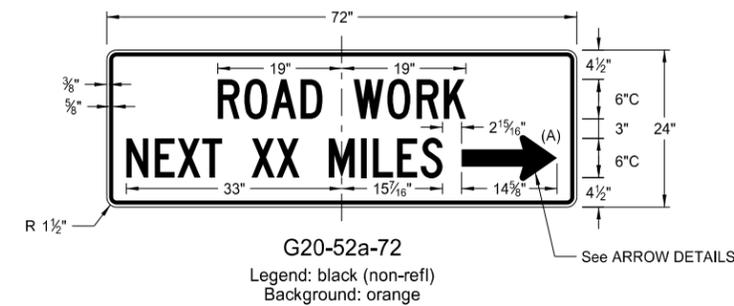
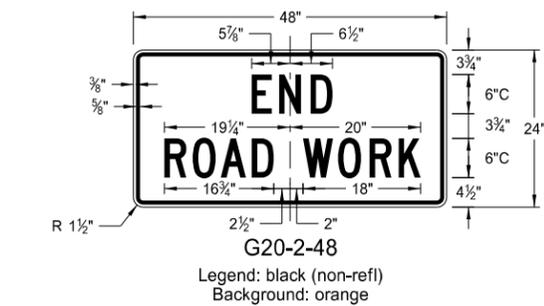
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS  
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

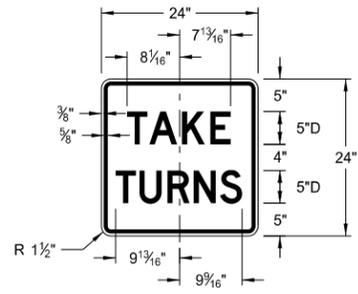
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/13/13 and the original document is stored at the North Dakota Department of Transportation

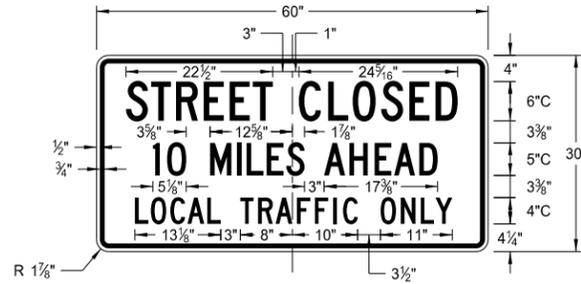
CONSTRUCTION SIGN DETAILS  
REGULATORY SIGNS

D-704-10



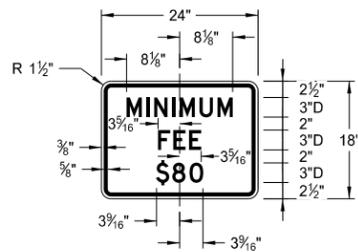
R1-50-24

Legend: black (non-refl)  
Background: white



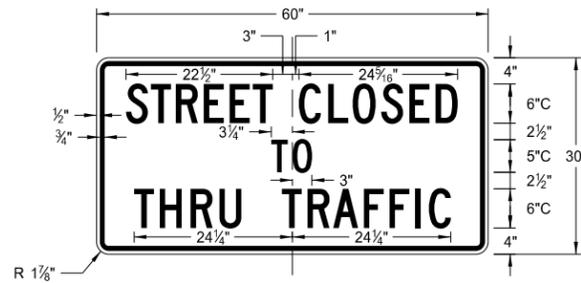
R11-3c-60

Legend: black (non-refl)  
Background: white



R2-1a-24

Legend: black (non-refl)  
Background: white



R11-4a-60

Legend: black (non-refl)  
Background: white



R11-2a-48

Legend: black (non-refl)  
Background: white

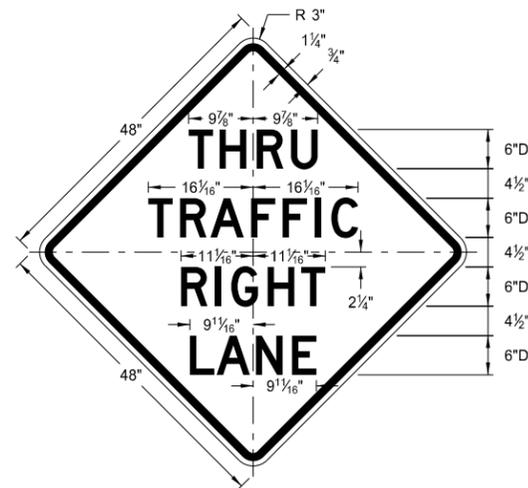
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/13/13 and the original document is stored at the North Dakota Department of Transportation

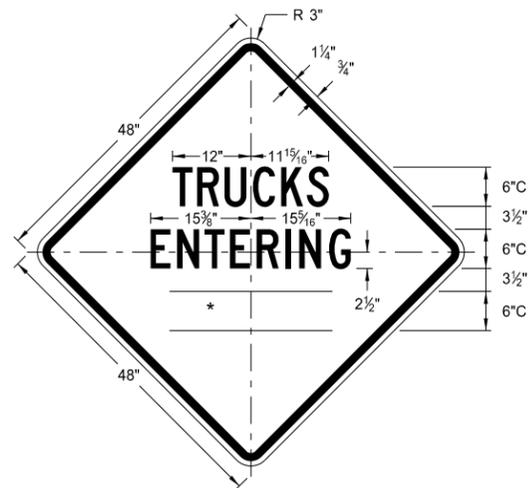
CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

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

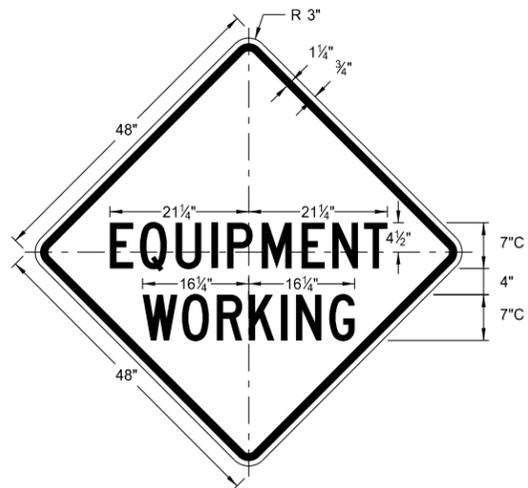
\* DISTANCE MESSAGES



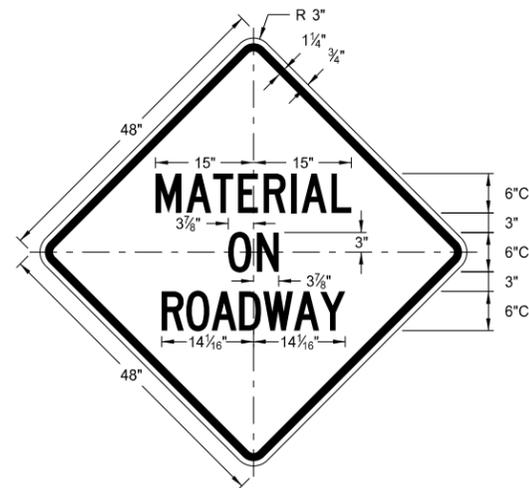
W5-8-48  
Legend: black (non-refl)  
Background: orange



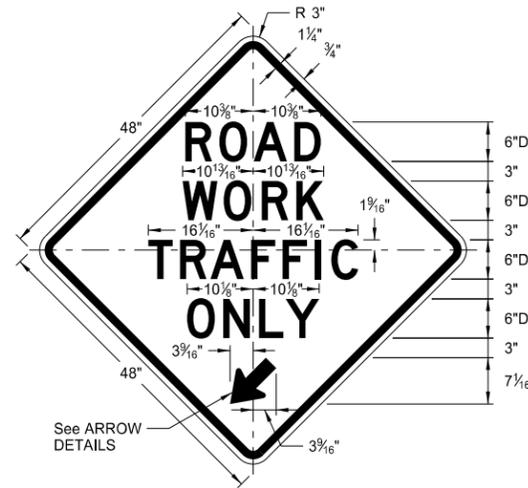
W8-54-48  
Legend: black (non-refl)  
Background: orange



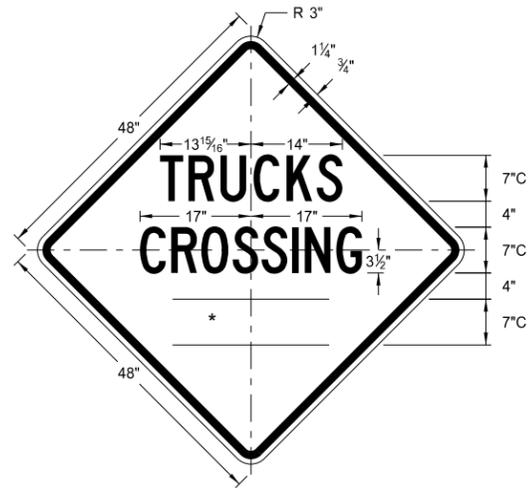
W20-51-48  
Legend: black (non-refl)  
Background: orange



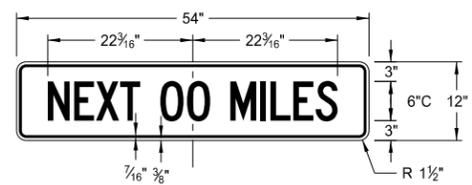
W21-51-48  
Legend: black (non-refl)  
Background: orange



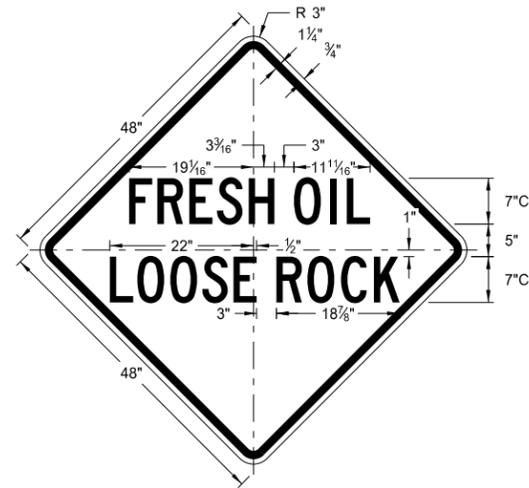
W5-9-48  
Legend: black (non-refl)  
Background: orange



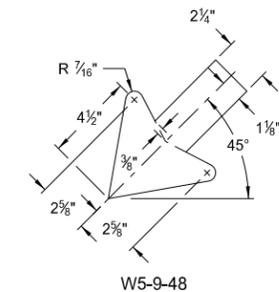
W8-55-48  
Legend: black (non-refl)  
Background: orange



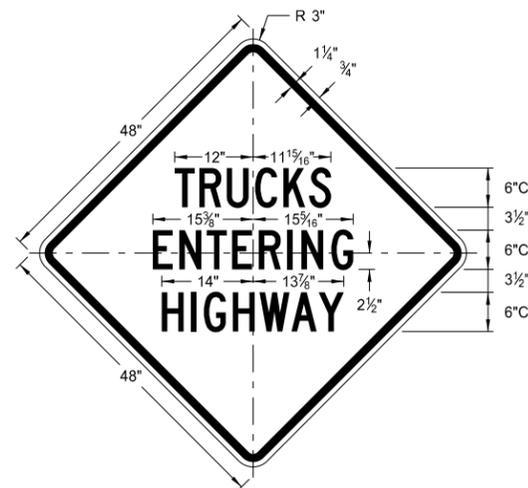
W20-52-54  
Legend: black (non-refl)  
Background: orange



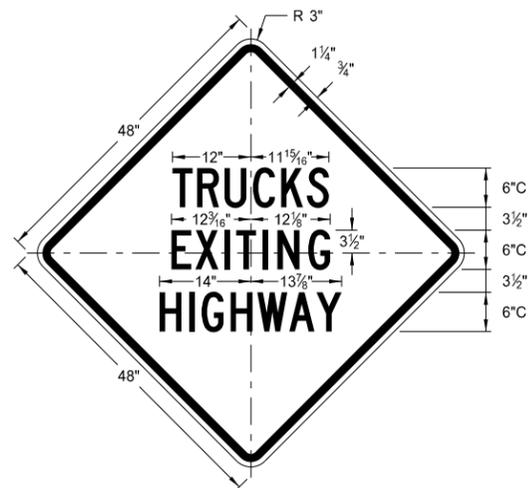
W22-8-48  
Legend: black (non-refl)  
Background: orange



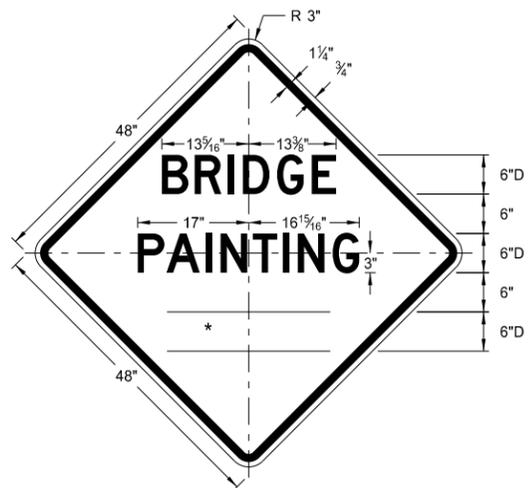
W5-9-48  
ARROW DETAILS



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



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

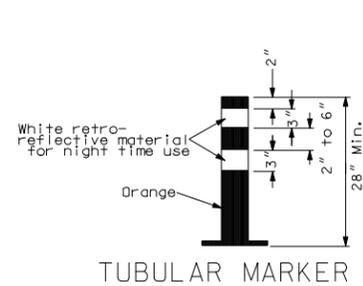


W21-50-48  
Legend: black (non-refl)  
Background: orange

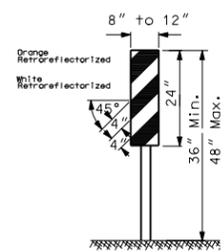
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/13/13 and the original document is stored at the North Dakota Department of Transportation

# BARRICADE DETAILS AND CHANNELIZING DEVICES



TUBULAR MARKER



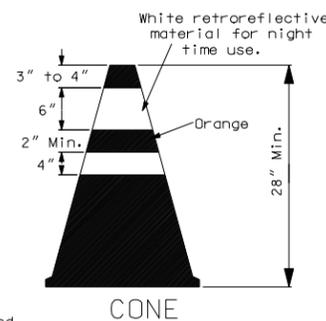
VERTICAL PANEL

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

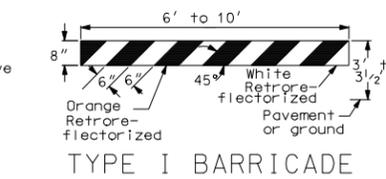


DELINEATOR DRUM  
36" Min. height

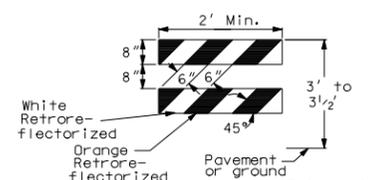
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retroreflective sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall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



CONE

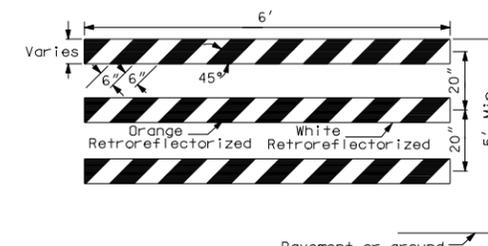


TYPE I BARRICADE



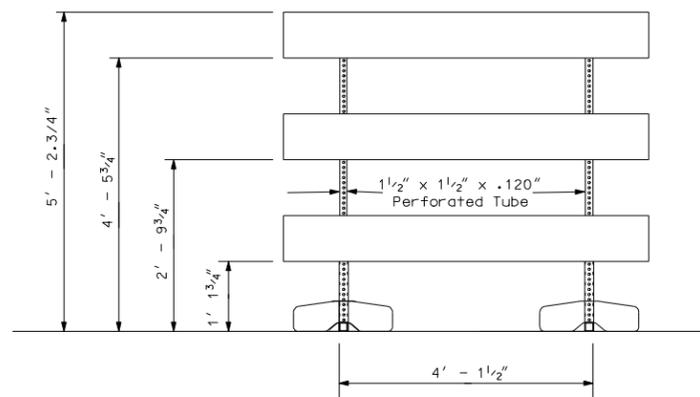
TYPE II BARRICADE

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

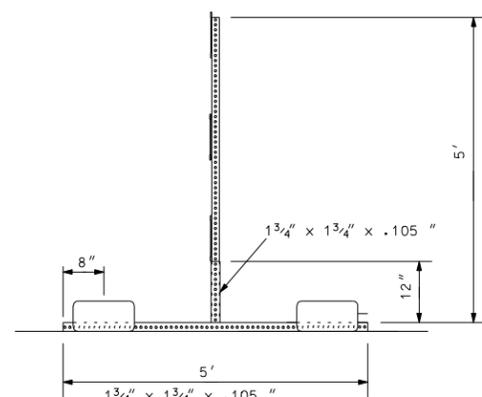


TYPE III BARRICADE

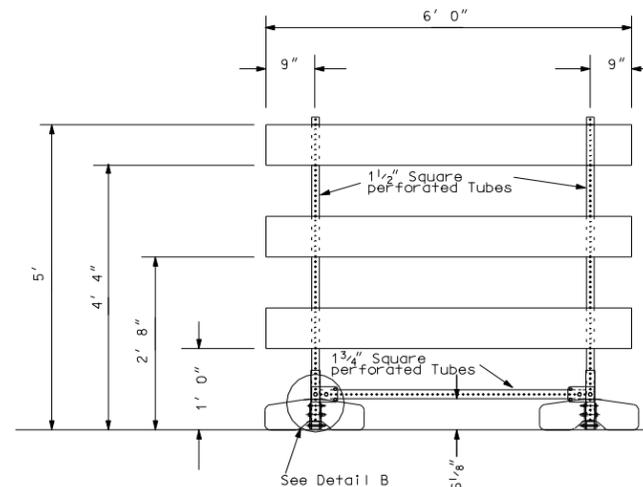
BARRICADES:  
Number of retroreflective rail faces:  
Type I - 2 (One each direction)  
Type II - 4 (Two each direction)  
Type III - 6 (Three in each direction)



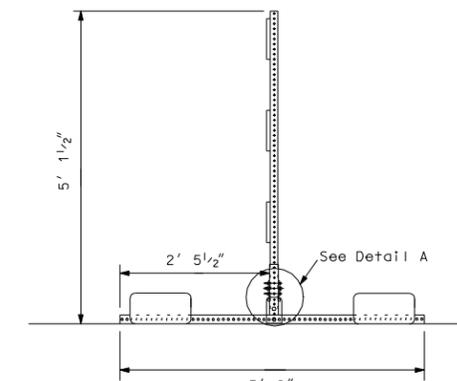
FRONT VIEW



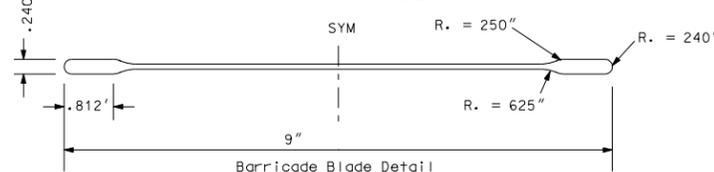
END VIEW



See Detail B



See Detail A



Barricade Blade Detail

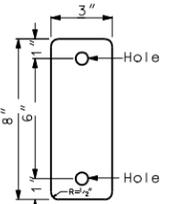
Ballast = 45lb sandbag at the end of each leg.  
Barricade blade fastened to vertical supports with 2" corner bolts.  
Vertical portion of leg is welded to horizontal portion on all four sides.  
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

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



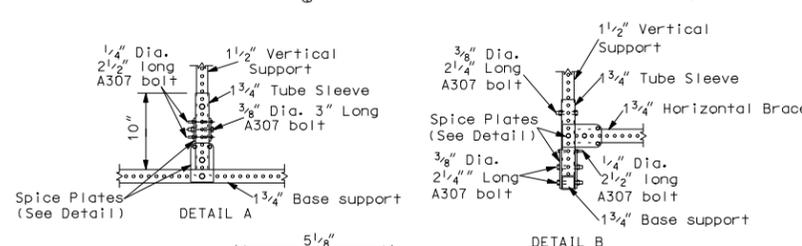
ACRYLIC PLASTIC REFLECTOR

Delineator reflector shall meet the requirements of section 894



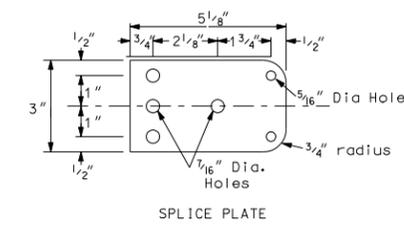
DELINEATOR REFLECTOR

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



DETAIL A

DETAIL B



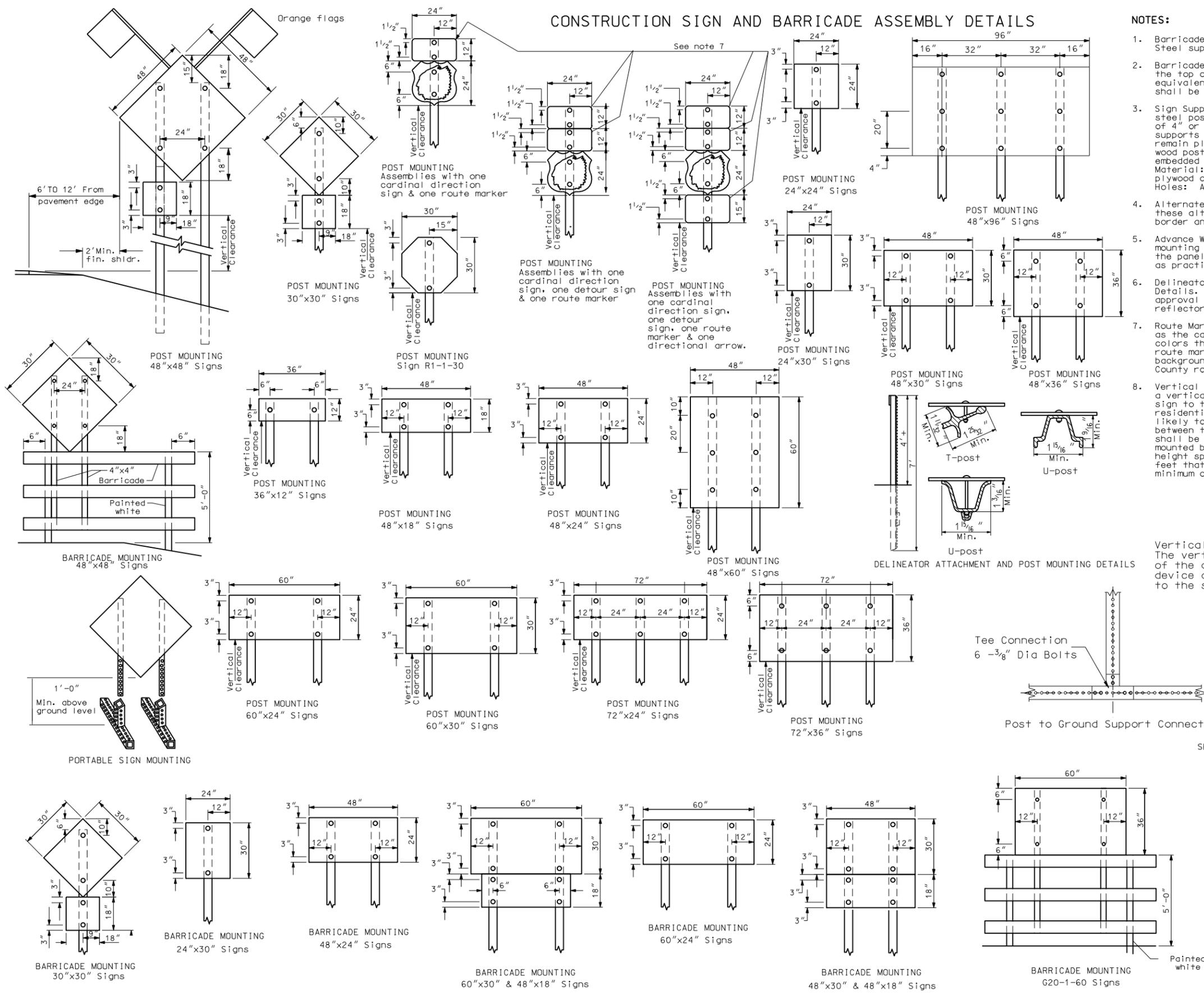
SPLICE PLATE

BARRICADE ASSEMBLY DETAIL  
(Use when Plastic I-Beam w/ 1 1/2" Hollow Core Flanges or 1" x 8" x72" 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

This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

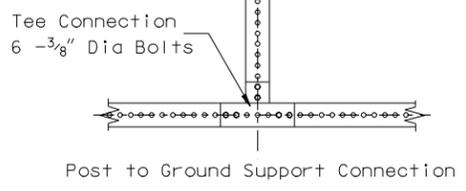
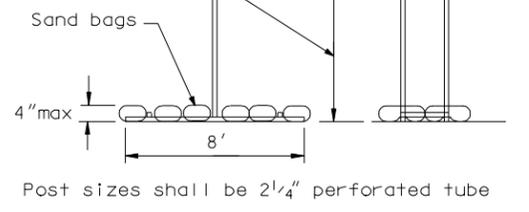
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS



NOTES:

1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricade and barricade mounted signs shall be assembled with 3/8" bolts.
3. Sign Supports: Sign supports shall be 4"x4" min. SFS or equivalent steel post. The anchor for steel supports shall have a stub height of 4" or less. Wood posts more than 4"x4" shall be breakaway. Sign supports shall be imbedded to a sufficient depth so that signs will remain plumb throughout duration of project. It is suggested that wood posts have a min. depth of embedment of 5' and steel posts be imbedded a min. 3'-6". Material: All signs shall be 0.100" aluminum, 12 gauge steel, 1/2" plywood or other approved material. Holes: All holes to be punched round for 3/8" bolts.
4. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate without a border and this plate installed and removed as required.
5. Advance Warning Flashing or Sequencing Arrow Panels: The minimum mounting height shall be 7 feet above the roadway to the bottom of the panel, except on vehicle mounted panels which shall be as high as practicable.
6. Delineator Posts: Typical fence post sections are shown in Attachment Details. Other types of metal fence posts may be substituted upon approval of the engineer. These substituted posts shall have reflectors attached similar to the ones shown.
7. Route Marker Auxiliary Signs: The route marker auxiliary signs such as the cardinal direction and directional arrows shall have background colors the same as the route marker they are used with (Interstate route markers, blue background, US and State route markers, white background, Interstate Business loop and spur, green background, and County route markers, blue background).
8. Vertical Clearance: Post mounted signs placed in rural areas shall have a vertical clearance of at least 5 feet measured from the bottom of the sign to the near edge of the driving lane. In business, commercial and residential districts where parking and/or pedestrian movement is likely to occur or where other obstructions to view, the distance between the bottom of the sign to the near edge of the driving lane shall be at least 7 feet. The height to the bottom of secondary signs mounted below another sign may be 1 foot less than the appropriate height specified. Large signs having an area exceeding 50 square feet that are installed on multiple breakaway posts shall be mounted a minimum of 7 feet above the ground.

Vertical clearance = The vertical height of the delineator device adjacent to the sign



SKID MOUNTED SIGNS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-01-88	Sign assembly
05-01-92	Sign assembly
03-30-93	Sign supports note
07-04-96	Sign height
08-15-96	Note 8
07-10-97	Note revision
01-31-98	Note & portable sign
10-01-99	Skid mounted sign
02-07-03	Vertical clearance note
11-30-04	Third post added to some signs
12-01-04	PE stamp added

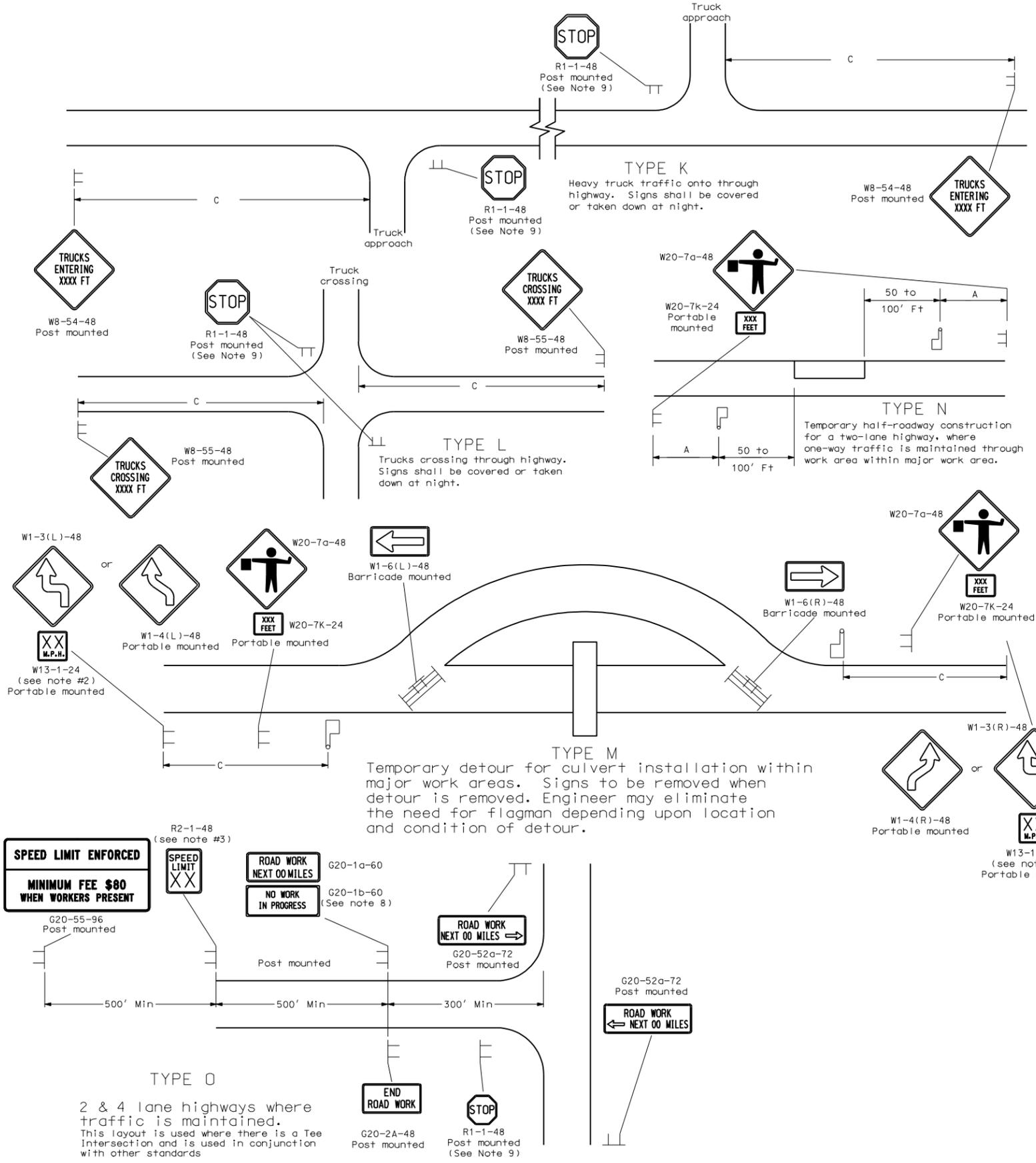
This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation



CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

Notes

1. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be placed on barricades shall be mounted with the sign bottom shall be placed on skid mounted assemblies.
2. Where necessary, safe speed to be determined by the Engineer.
3. 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.
4. 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.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. 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.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.



KEY

	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		

ADVANCE WARNING SIGN SPACING

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

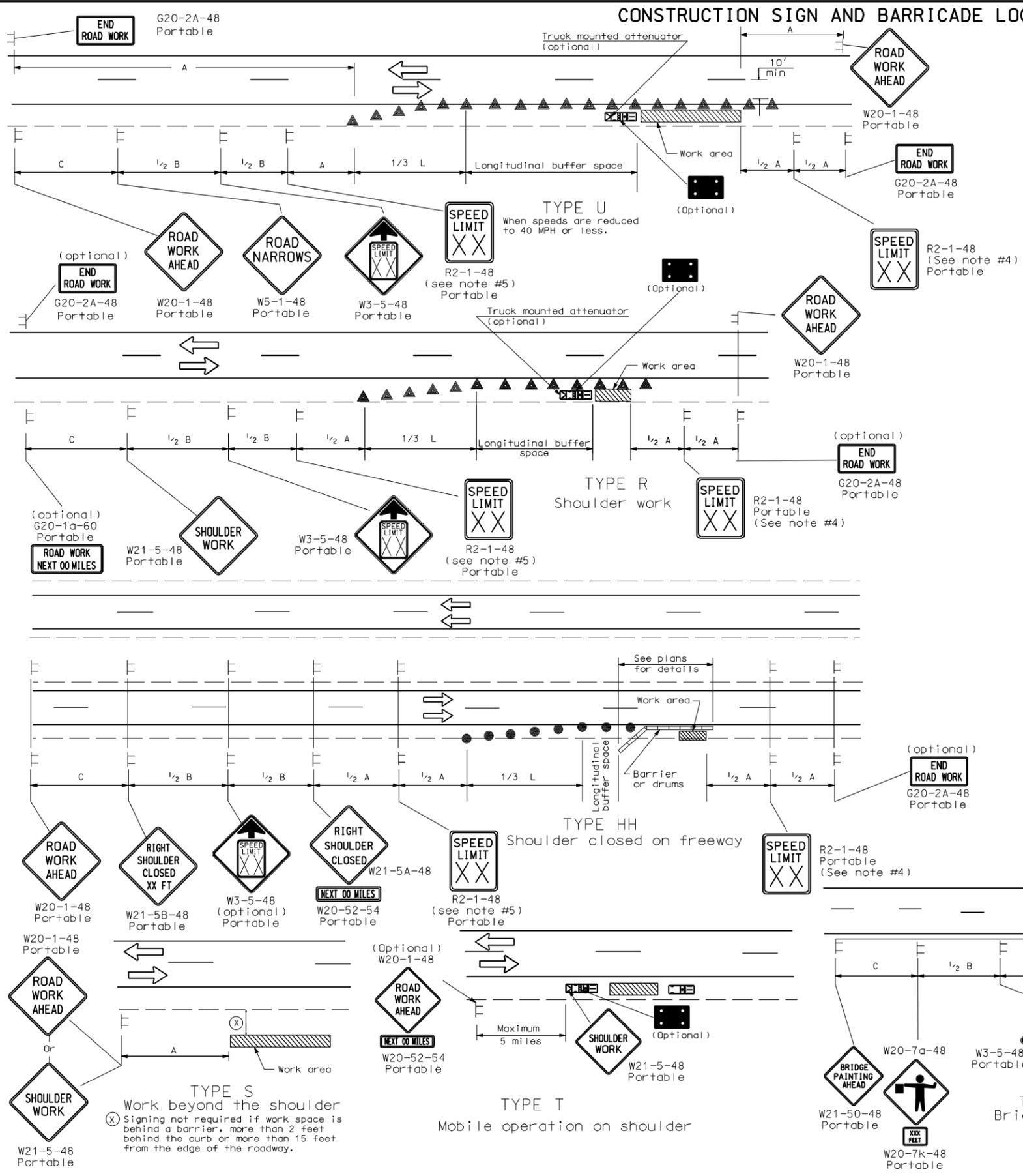
NORTH DAKOTA  
DEPARTMENT OF TRANSPORTATION  
10-1-86

REVISIONS	
DATE	CHANGE
09-30-93	General revisions
06-21-95	General revisions
08-15-96	Revise flag note
10-01-99	General revisions
02-02-00	W8-55-48 Deleted Work In Progress Sign
10-17-02	Revised R2-1a
07-25-03	Revised fee sign & Warning sign spacing.
04-01-04	Revised note 3 PE stamp added.
12-01-04	Added note 9 and revised stop sign size
02-14-05	Rev. Adv. Warning Table, Rev. Note 3
06-29-05	

This document was originally issued and sealed by Mark S Gaydos Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

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

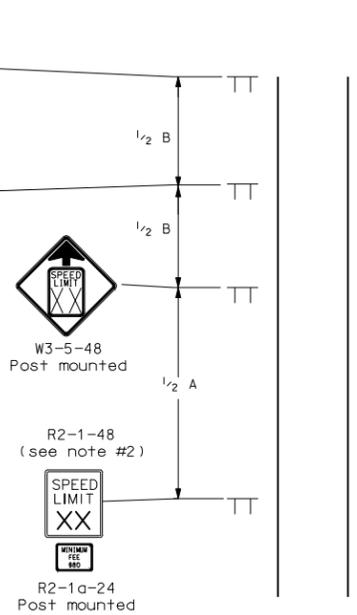
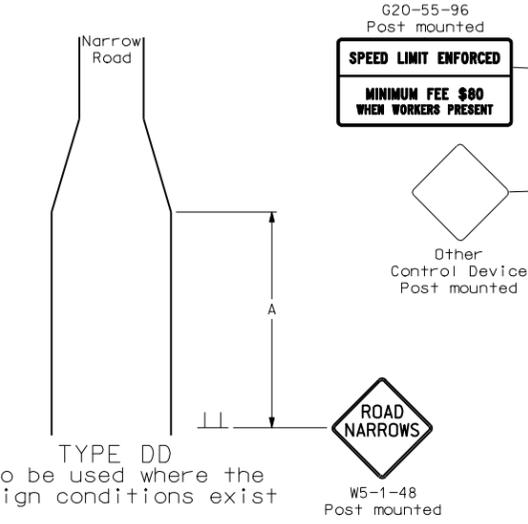
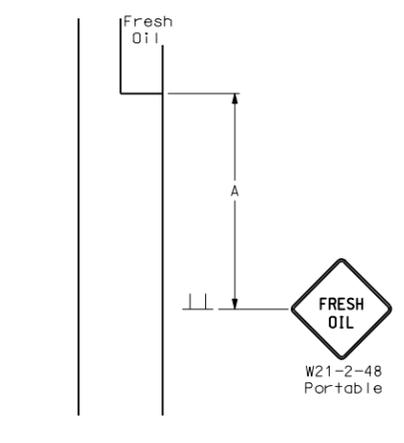
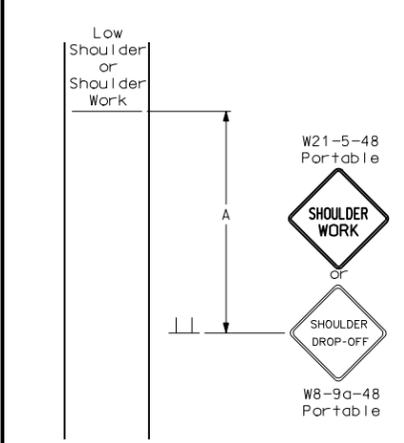
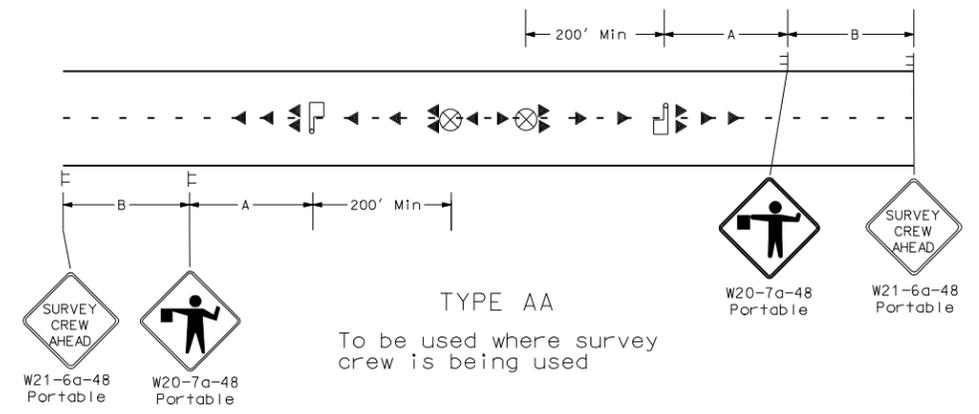
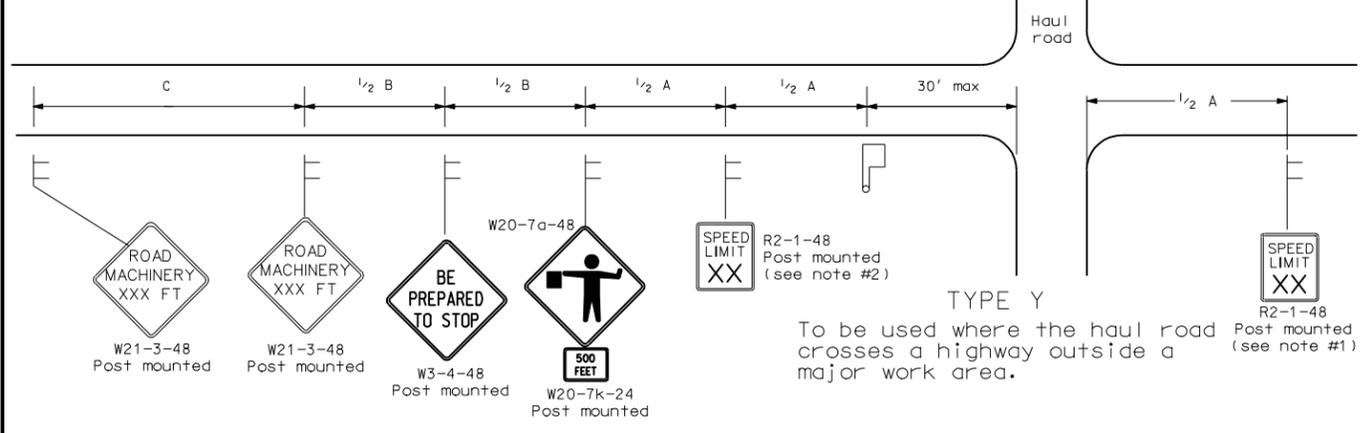
**KEY**

- 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

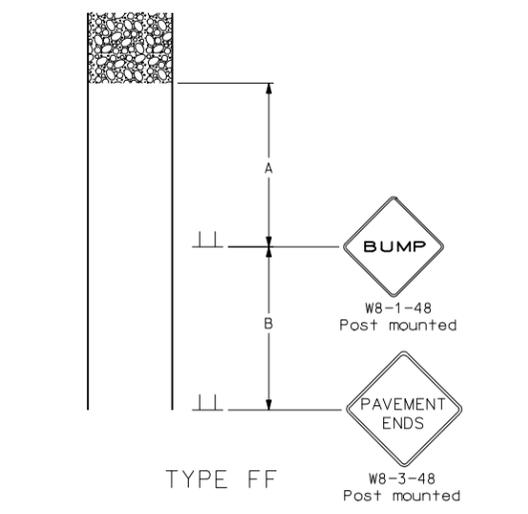
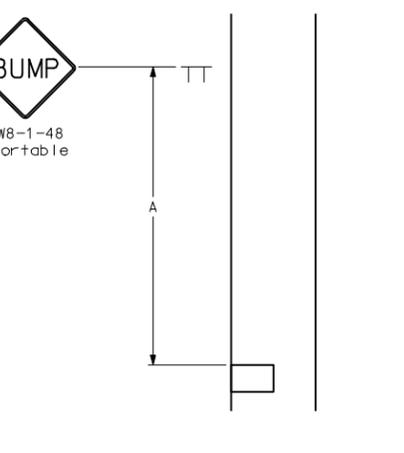
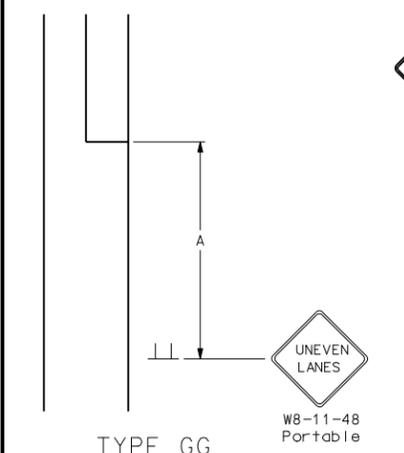
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
10-01-99	General revisions
10-04-99	Type HH barrier
11-15-99	Add taper width & note
03-15-01	Revised note 2
07-19-02	Reversed End Road Work & Speed Limit signs
07-25-03	Revised R2-1a and W20-1
04-01-04	Removed fee sign & rev warning & 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

This document was originally issued and sealed by Mark S Gaydos Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



- Notes
- 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.
  - G20-55-96 or R2-1a-24 signs are not required if this standard is part of other traffic control layouts, or the work is less than 5 days.



KEY

	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		

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-1-86

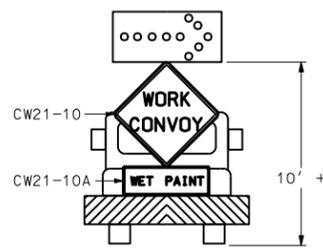
REVISIONS

DATE	CHANGE
09-03-96	70 mph
01-31-97	Sign spacing
10-01-99	General Revision
07-19-02	Revised spacing of Speed Limit Signs
01-30-03	Pavement end sign
07-25-03	Revised R2-1a
04-01-04	Rev. fee sign & warning sign spacing. Add note 6
12-01-04	PE Stamp added
06-29-05	Replaced R2-5a with W3-5, Rev. Adv. Warning Table, Rev. Note 2
07-05-05	Changed W20-7b to W3-4

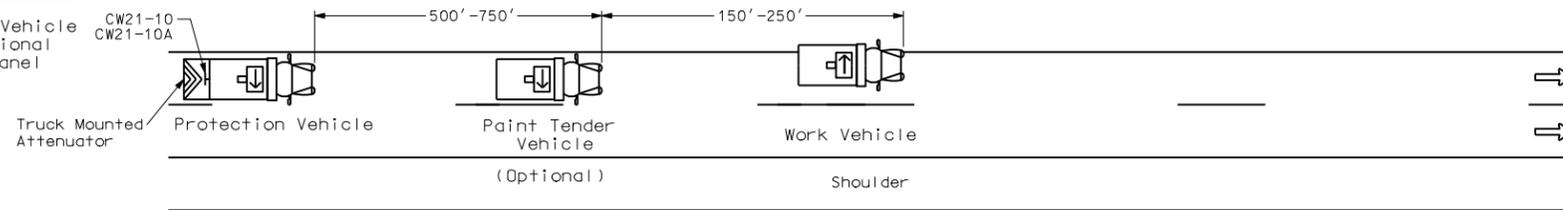
This document was originally issued and sealed by Mark S Gaydos Registration Number PE-4518, on 07/05/05 and the original document is stored at the North Dakota Department of Transportation

# TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS ON CONVENTIONAL HIGHWAYS (Pavement Marking)

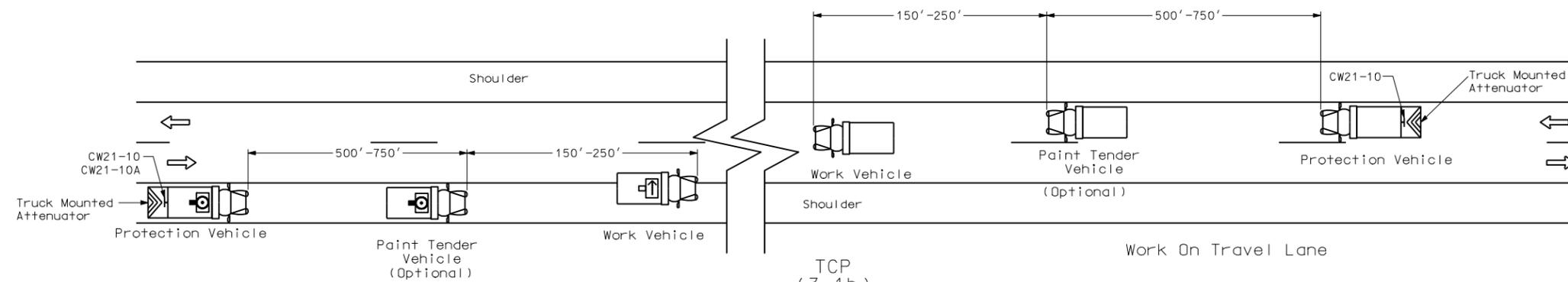
D-704-27



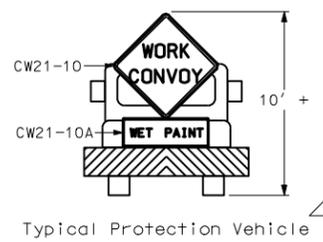
Typical Protection Vehicle with Right Directional Flashing Arrow Panel



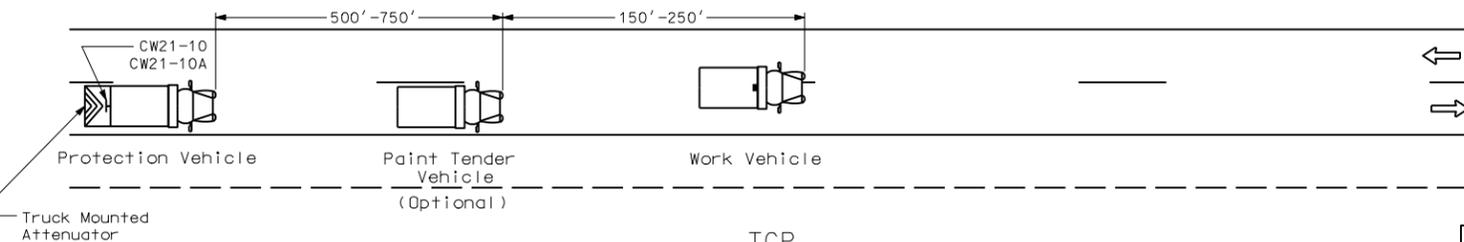
TCP  
(3-1a)  
Undivided Multi Lane Roadway



TCP  
(3-1b)  
Two-Way Roadway with Paved Shoulders



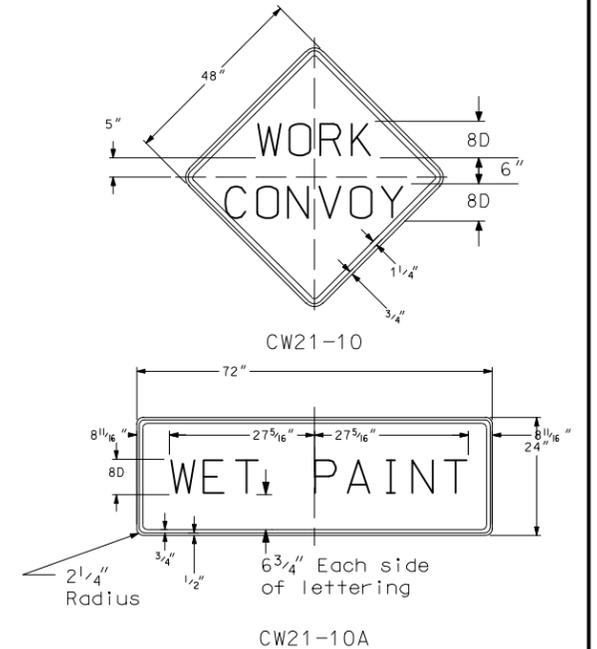
Typical Protection Vehicle



TCP  
(3-1c)  
Two-Way Roadway without Paved Shoulders

- Notes
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
  2. All traffic control devices shall be in accordance with the "Manual on Uniform Traffic Control Devices" (MUTCD), latest edition.
  3. The use of yellow rotating beacons or strobe lights on vehicles is required unless otherwise stated elsewhere in the plans.
  4. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
  5. Each vehicle shall have two-way radio communication capability.
  6. When work convoys must change lanes, the protection vehicle should change lanes first to shadow other convoy vehicles.
  7. Vehicle spacing between the protection vehicle and paint tender vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the protection vehicle in time to slow down and/or change lanes as they approach the trail vehicle.
  8. Sign Colors  
Letters = Black  
Border = Black  
Background = Orange

### Sign Details



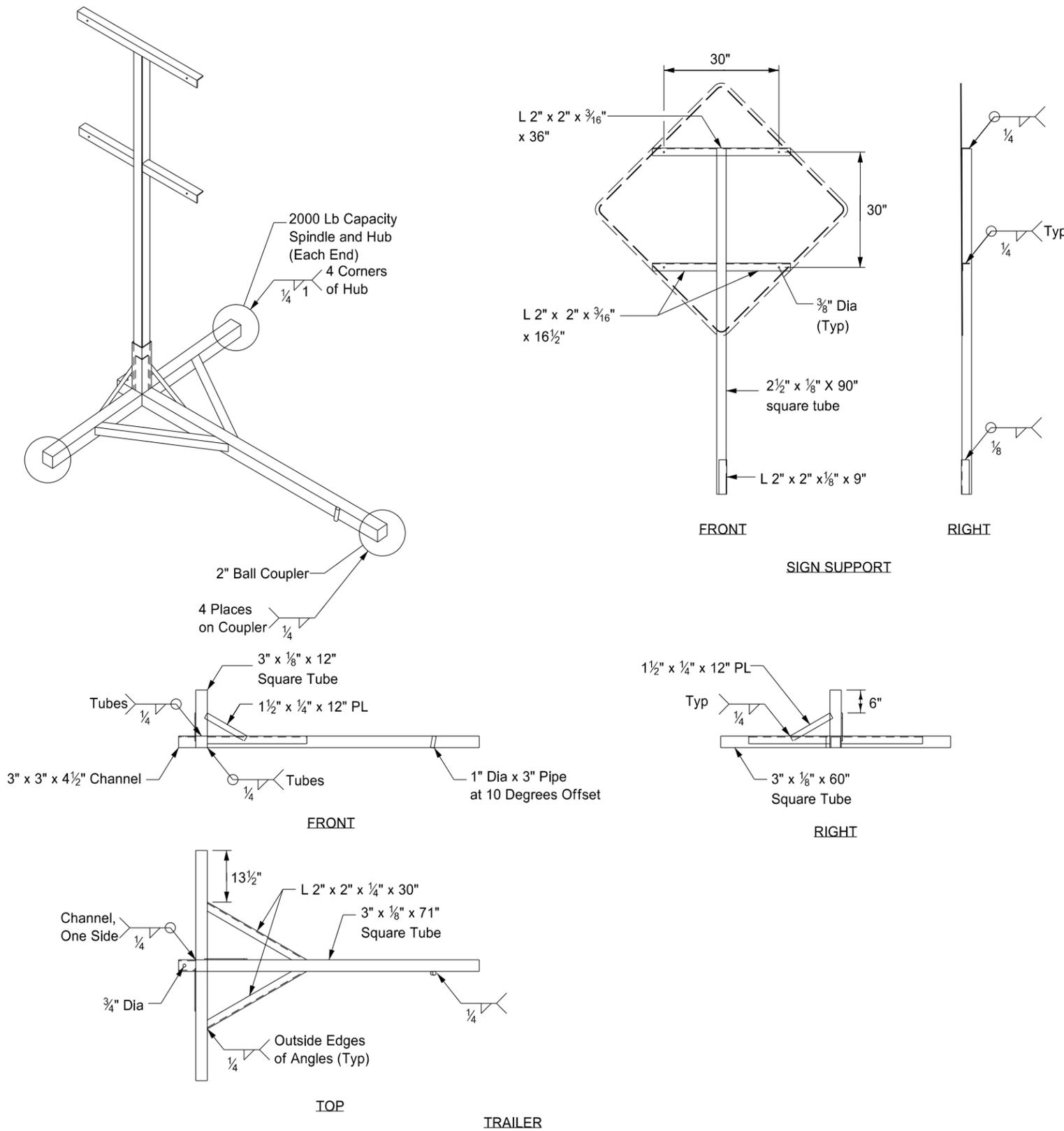
KEY	
	Truck mounted attenuator
	Flashing arrow panels:
	Right directional
	Left directional
	Double arrow directional
	Caution Mode

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
01-22-92	
REVISIONS	
DATE	CHANGE
02-24-93	General
03-15-95	General
06-21-95	Remove caution mode
10-01-99	General Revisions
07-25-00	General 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

PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



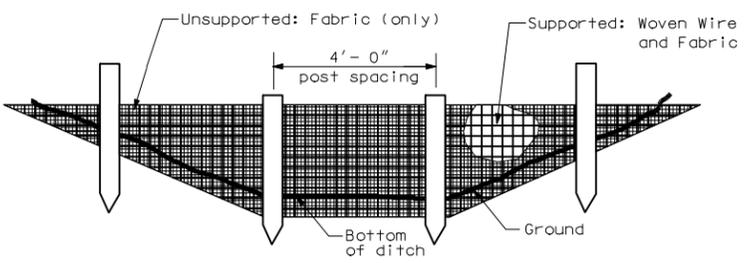
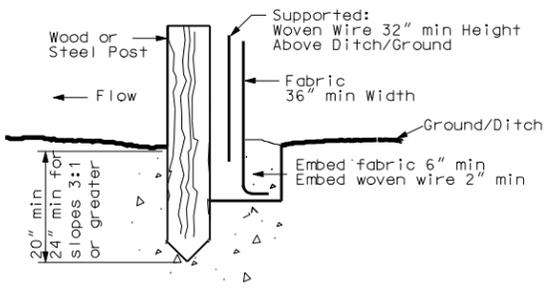
Notes:

- 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.

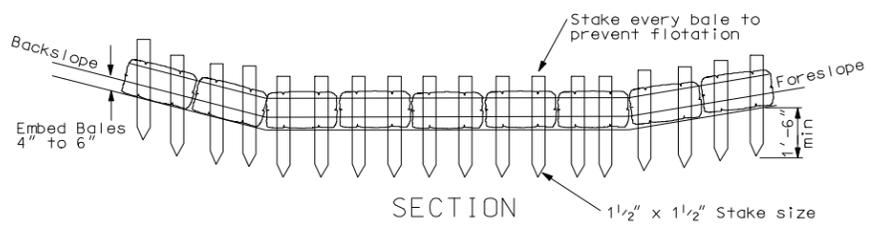
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation.

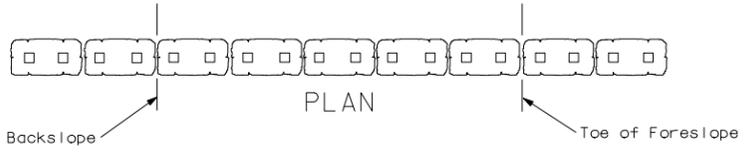
# EROSION AND SILTATION CONTROLS



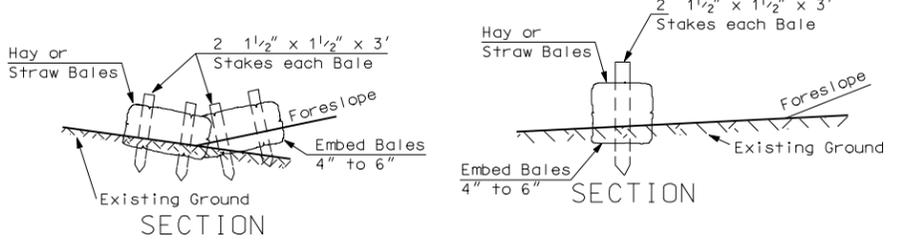
**SILT FENCE**  
Supported and Unsupported



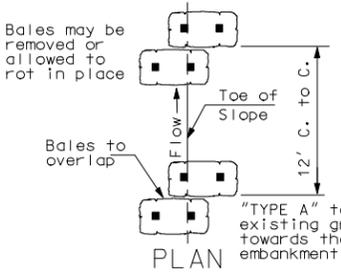
SECTION



"TYPE A"

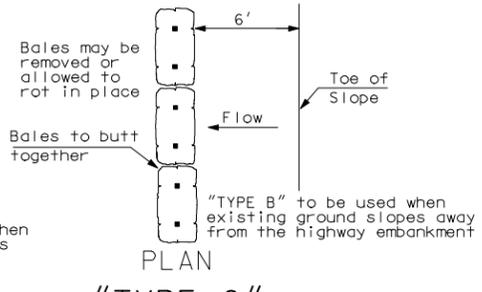


SECTION



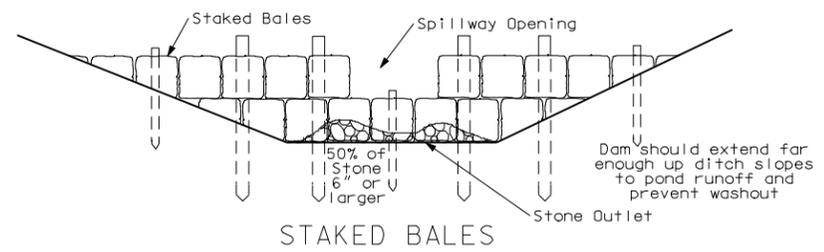
PLAN

"TYPE B"  
BALED HAY OR STRAW EROSION CHECKS

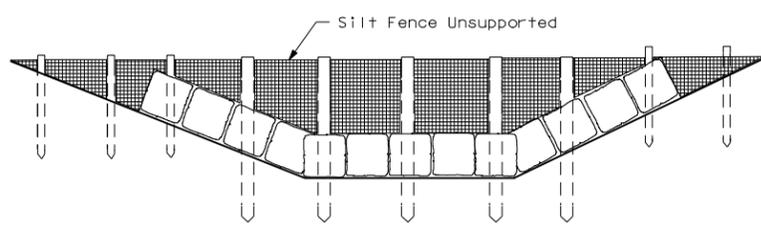


PLAN

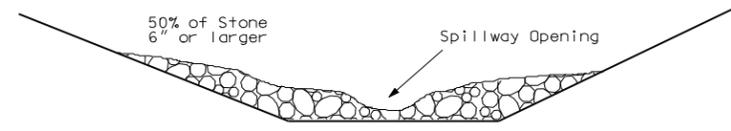
"TYPE C"



STAKED BALES

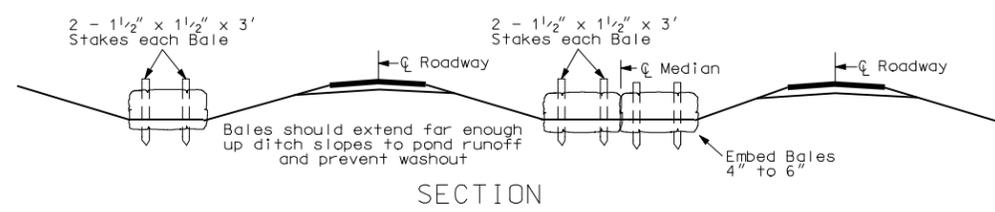


FENCE-BACKED BALES



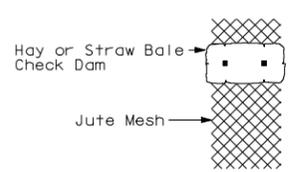
GRADED STONE

DITCH EROSION DAMS

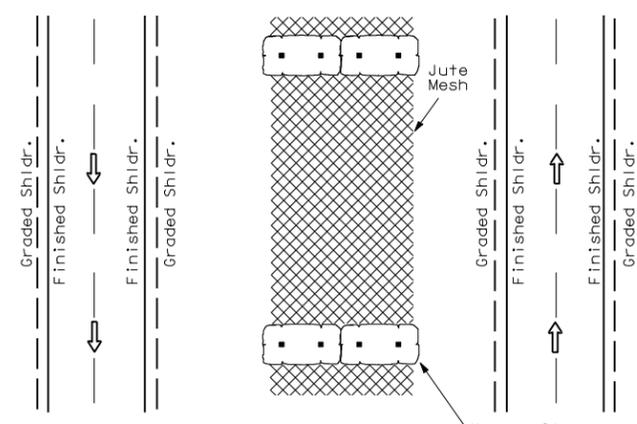


SECTION

MEDIAN OR DITCH PROTECTION AT STREAM CROSSING



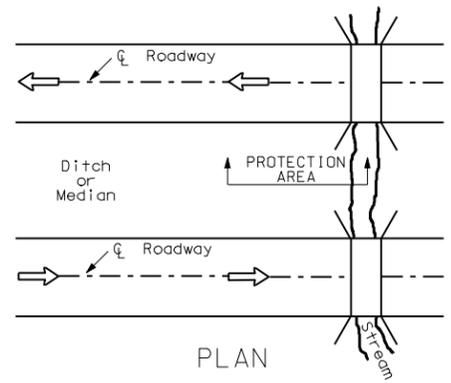
ROADSIDE DITCH



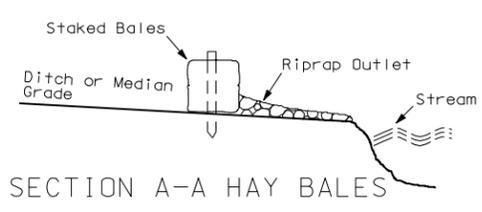
PLAN

MEDIAN DITCH

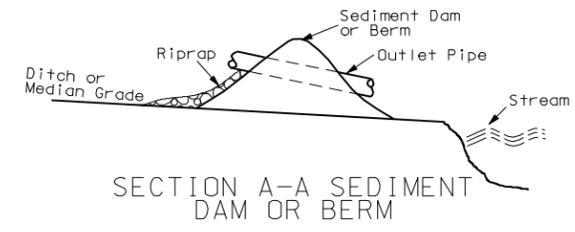
STONE, JUTE, MESH, OR SOD  
DITCH & MEDIAN EROSION CONTROL



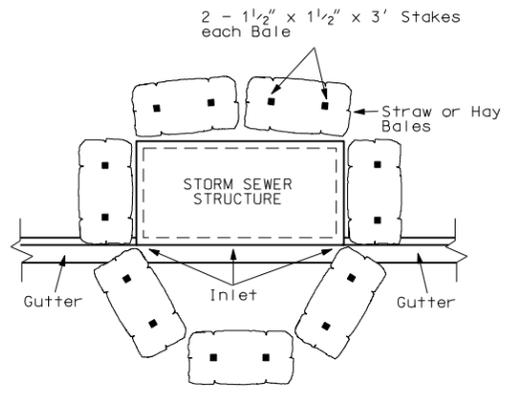
PLAN



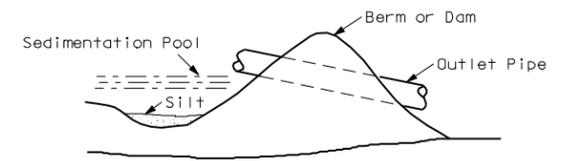
SECTION A-A HAY BALES



SECTION A-A SEDIMENT DAM OR BERM



STORM SEWER INLET  
EROSION & SILTATION  
BARRIER



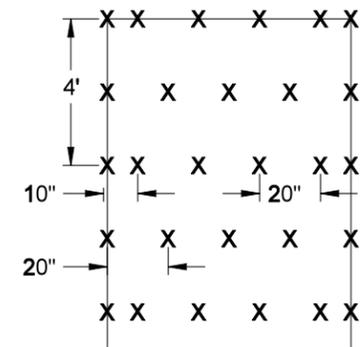
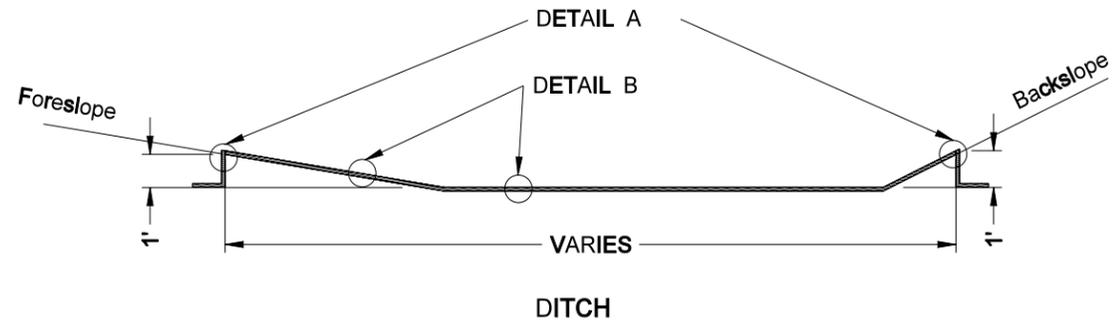
SMALL SEDIMENT DAM OR BERM

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
09-04-92	Ditch check
09-16-92	Sediment cont. fencing
01-31-95	General revisions
10-09-02	Sediment fence
01-24-04	Silt fence
02-06-04	Rev silt fence details
12-01-04	PE Stamp added

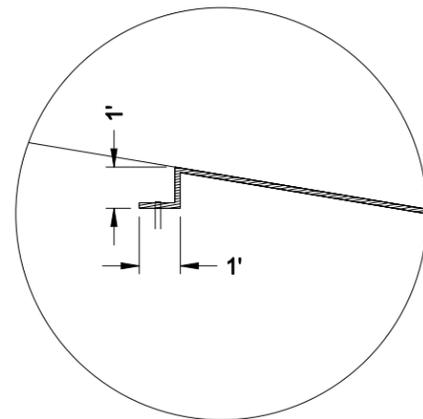
This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

# EROSION AND SILTATION CONTROL BLANKET INSTALLATION

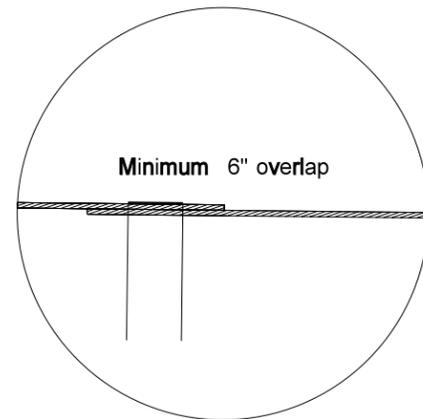
D-708-5



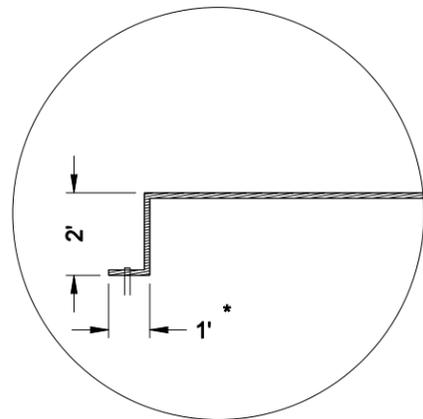
**STAPLE PATTERN:** 3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



DETAIL A

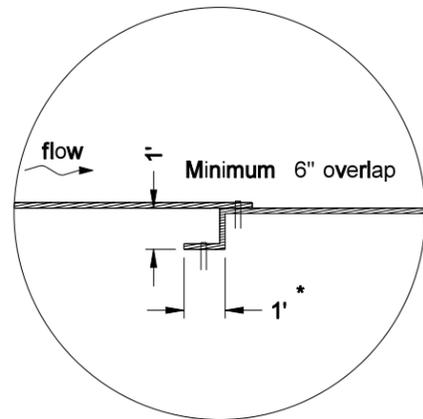


DETAIL B

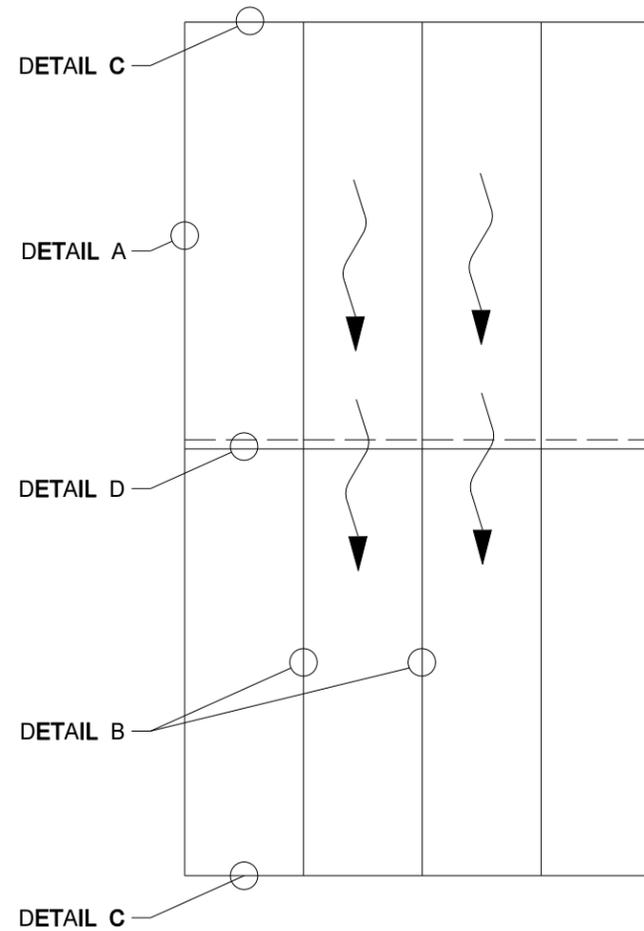


DETAIL C

\* This tie may be placed ahead or back.

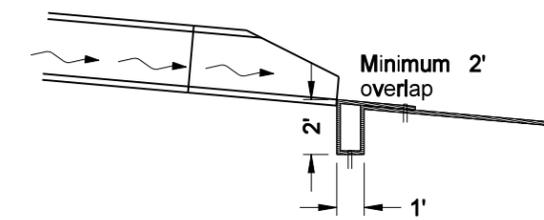


DETAIL D

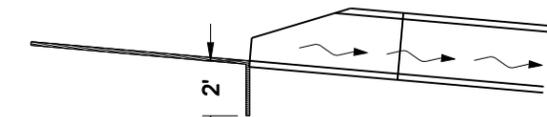


BLANKET LAYOUT

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



PIPE OUTLETS



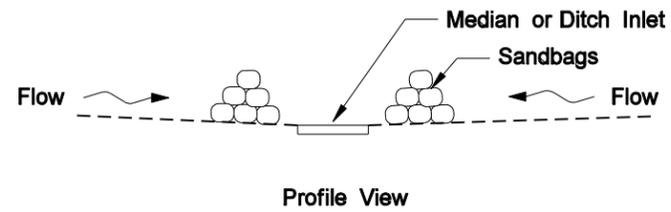
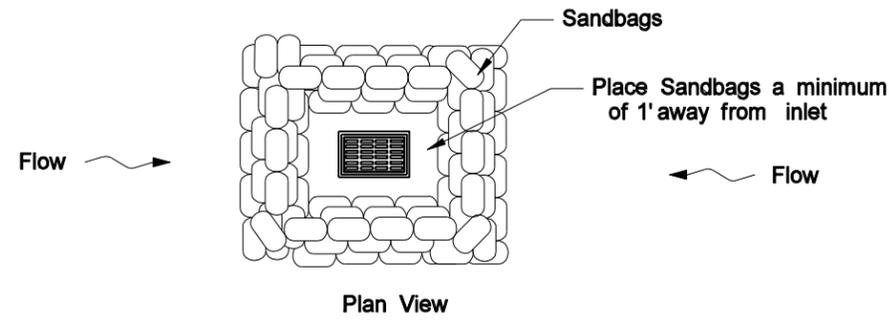
PIPE INLETS  
INSTALLATION AT PIPE ENDS

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

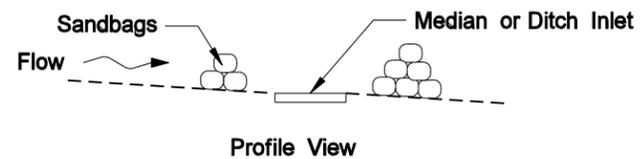
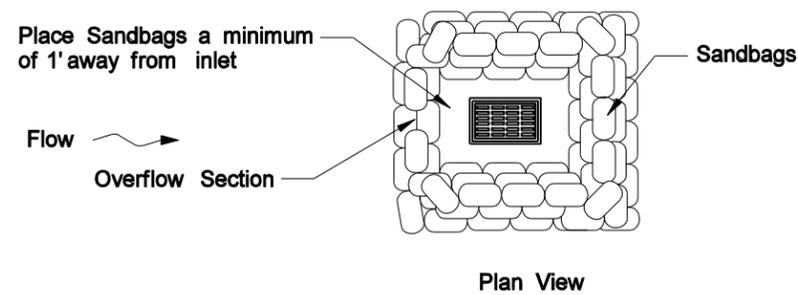
This document was originally issued and sealed by **MARK S. GAYDOS** Registration Number PE- 4518 , on 12/13/06 and the original document is stored at the North Dakota Department of Transportation

EROSION CONTROL  
MEDIAN OR DITCH INLET PROTECTION

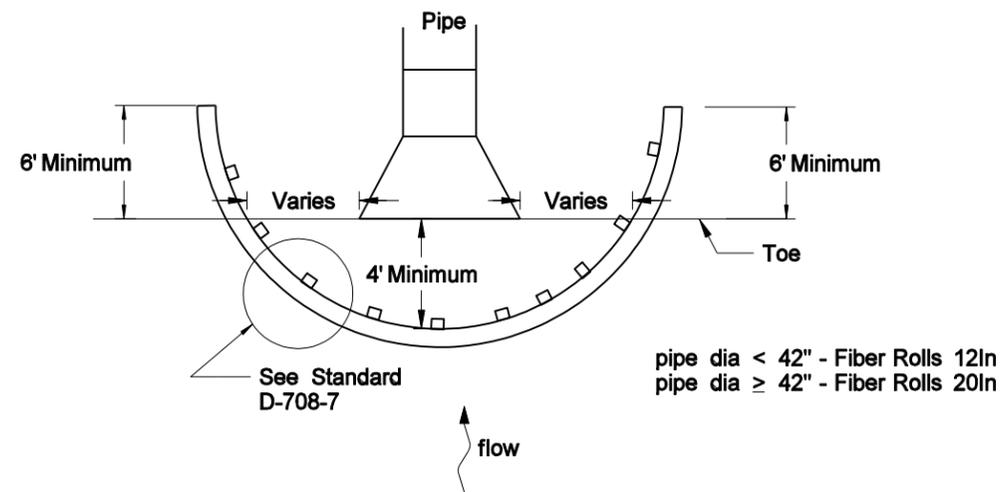
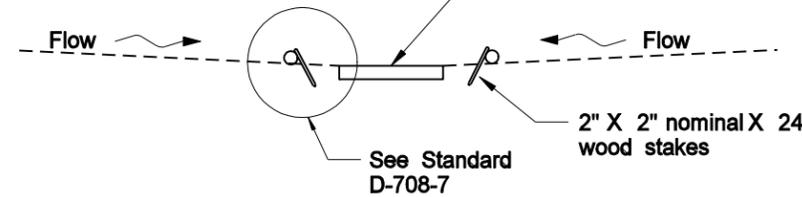
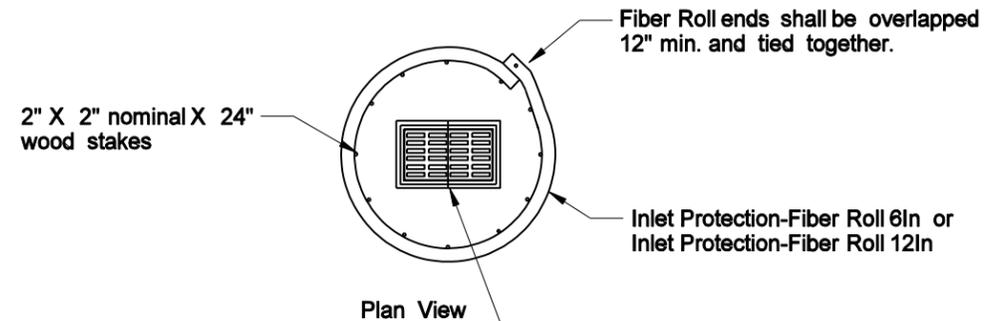
D-708-6



SANDBAG PROTECTION  
LOW POINT



SANDBAG PROTECTION  
ON SLOPE



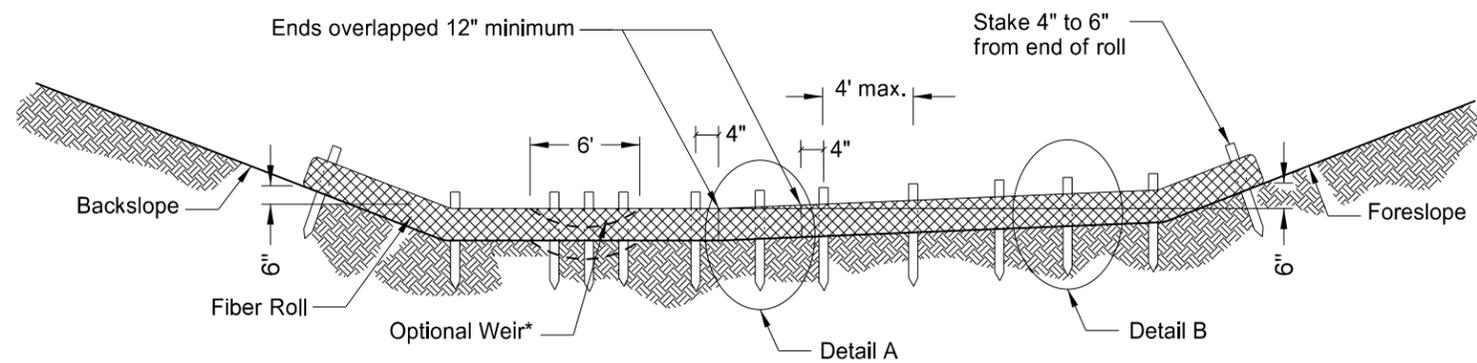
FIBER ROLL PROTECTION  
INLET OF PIPE END

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.
----------	--------------------------------------------------------------------------

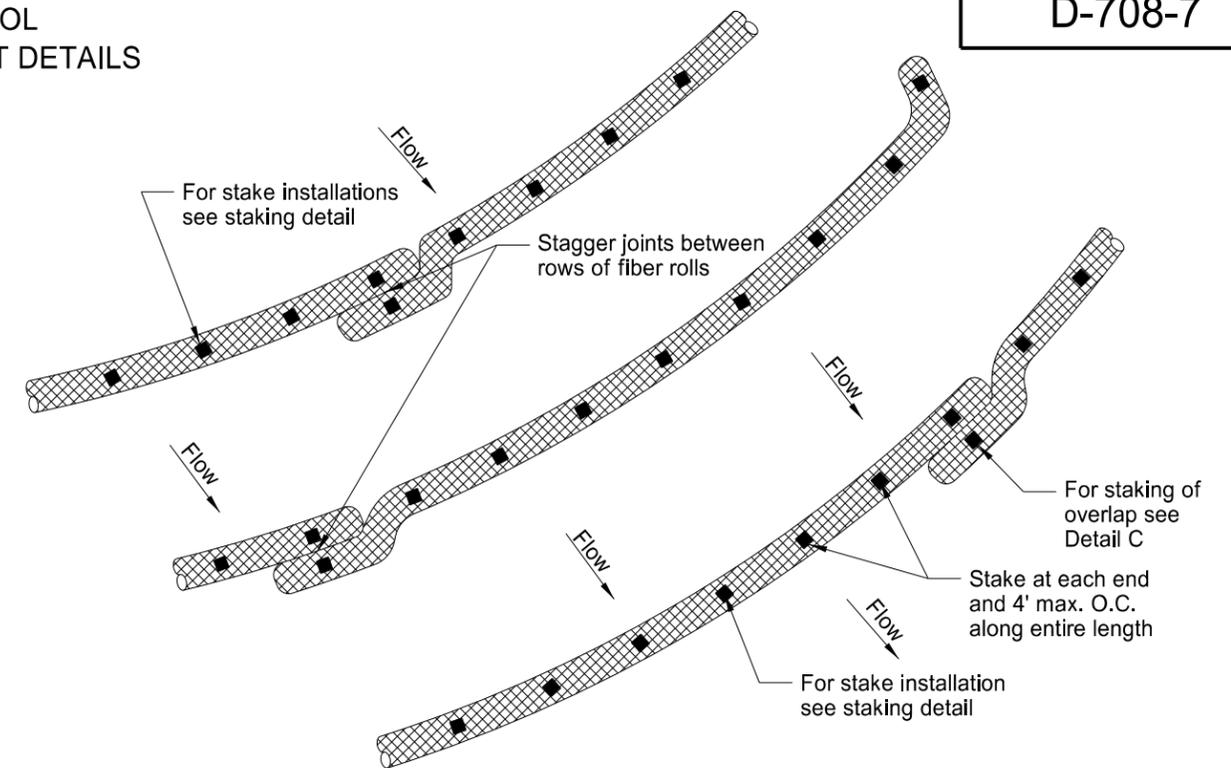
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 12/14/07 and the original document is stored at the North Dakota Department of Transportation

EROSION CONTROL  
FIBER ROLL PLACEMENT DETAILS

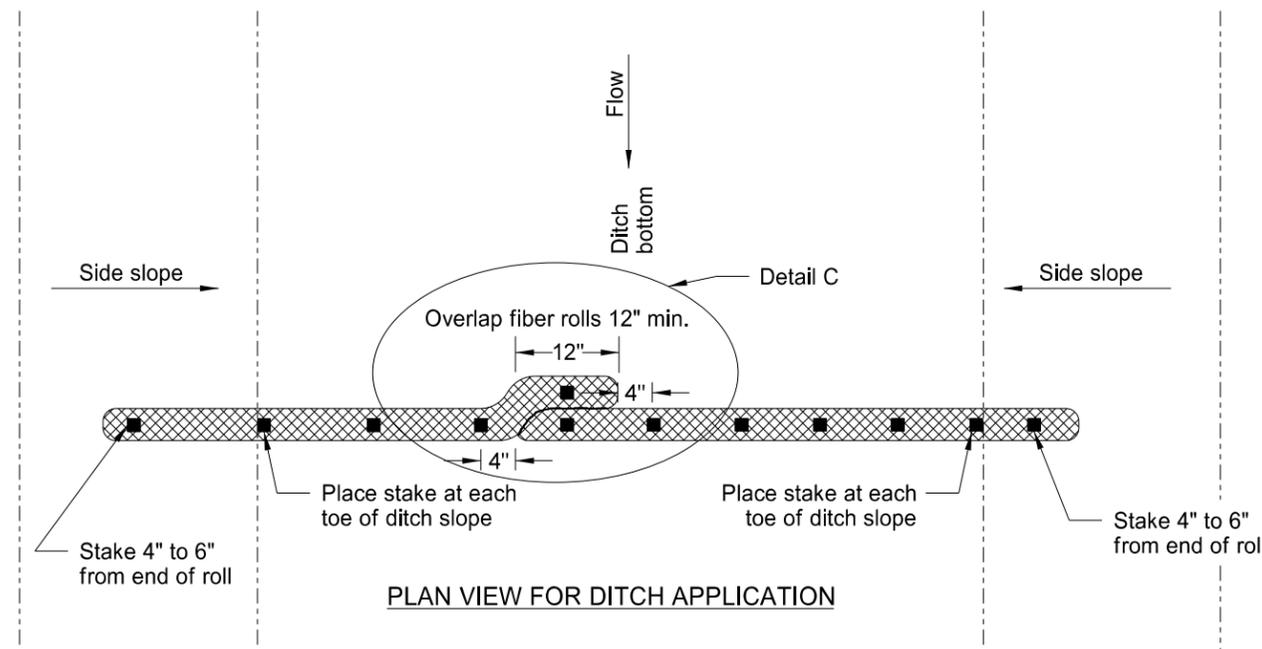


\*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back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

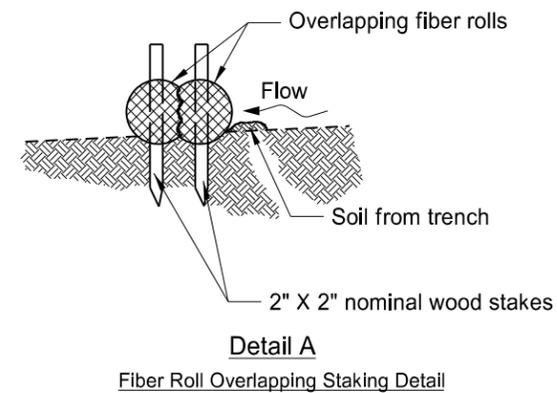
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



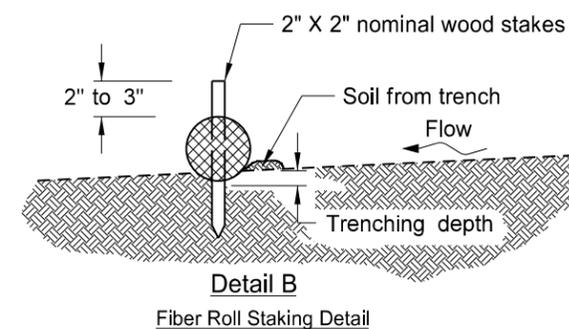
PLAN VIEW FOR SLOPE APPLICATION



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.

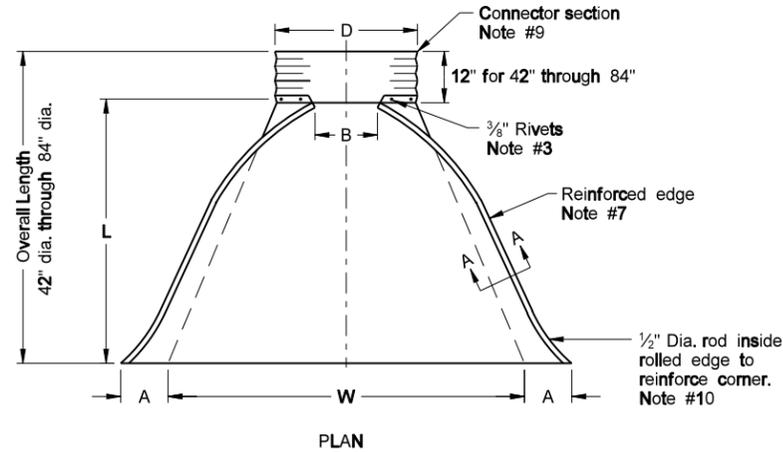
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application, Added table with values for stake and trench dimensions.

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

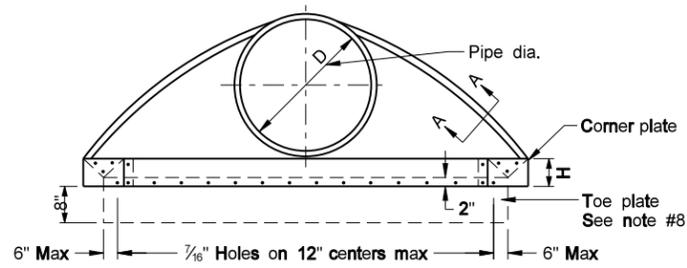




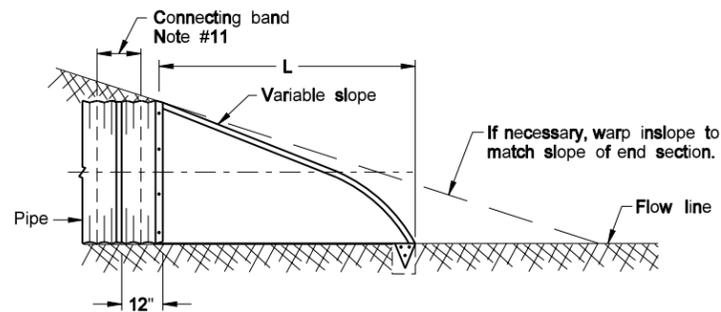
### CORRUGATED ALUMINUM PIPE CULVERT AND END SECTIONS (ROUND PIPE)



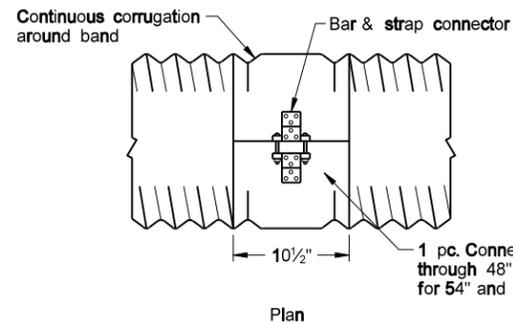
PLAN



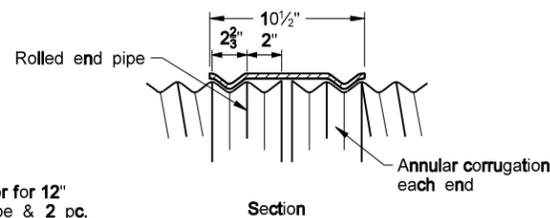
ELEVATION



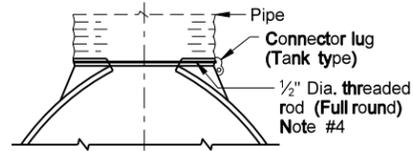
TYPICAL CROSS SECTION  
(Showing connector section)



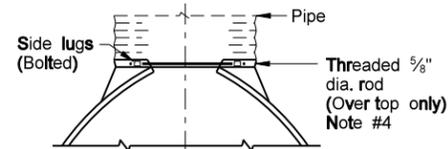
CONNECTING BAND DETAILS FOR HELICAL, WELDED-SEAM CULVERT



SECTION A-A



Sizes 18" & 24" only



Sizes 30" & 36" only

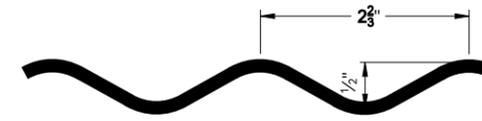
ROD CONNECTION DETAIL

1/2" Dia. threaded rod	
Pipe size	Length
18"	65"
24"	83"

2 1/2" Threaded length both ends. 1/2"-13 UNC thread.

5/8" Dia. threaded rod	
Pipe size	Length
30"	22 1/4"
36"	25 5/8"

1 3/4" Thread length both ends. 5/8"-11 UNC thread



2 2/3" x 1/2" CORRUGATIONS

* * PIPE DIA.	WATERWAY AREA SQ FT	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE RATE	BODY PIECE
			A	B	H	L	W		
			IN	IN	IN	IN	IN		
18	1.8	0.060	8	10	6	31	36	2 1/2:1	1
24	3.1	0.060	10	13	6	41	48	2 1/2:1	1
30	4.9	0.075	12	16	8	51	60	2 1/2:1	1 or 2
36	7.1	0.075	14	19	9	60	72	2 1/2:1	2
42	9.6	0.105	16	22	11	69	84	2 1/2:1	2
48	12.6	0.105	18	27	12	78	90	2 1/2:1	2
54	16.0	0.105	18	30	12	84	102	2 :1	2
* 60	19.6	0.105	18	33	12	87	114	1 3/4:1	3
* 66	23.8	0.105	18	36	12	87	120	1 1/2:1	3
* 72	28.3	0.105	18	39	12	87	126	1 1/3:1	3
* 78	33.2	0.105	18	42	12	87	132	1 1/4:1	3
* 84	38.5	0.105	18	45	12	87	138	1 1/6:1	3

\* These sizes have 0.135" thick center panels.

\* Pipe diameter is equal to dimension "D" of end section.

Manufacturers tolerances of above dimensions will be allowed.

78" and 84" diameter pipe shall be 5% vertically elongated.

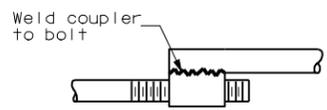
**NOTES:**

- End sections shall be made from aluminum alloy 3004-0, clad 5% each side with alloy 7072.
- Comer plate shall be the same material and thickness as end section.
- Rivets shall be aluminum alloy 6053-T4.
- Threaded rods shall be aluminum alloy 6061-T6.
- Connector & side lugs, bolts, and nuts shall be hot-dipped galvanized steel.
- Multiple panel bodies shall have 2" lap seams which are to be tightly joined with 3/8" diameter rivets spaced 6" c. to c.
- Top edge of all end sections to have rolled edge reinforcement (See section A-A). The rolled edge is to be supplemented with 2"x2"x1/4" aluminum alloy angle for 60" through 72" diameter and 2 1/2"x2 1/2"x1/4" angle for 78" and 84" diameter. Angles to be attached by 3/8" dia. bolts and nuts. Angles are to extend from pipe to the comer wing bend.
- Aluminum alloy toe plate required on end sections for pipe of 30" diameter or larger. Thickness of toe plate to be same as end section. Where toe plate is needed, the toe plate, nuts, and bolts are to be included in price bid for end sections.
- Connector section, when specified, shall be corrugated aluminum alloy pipe culvert.
- Reinforcement for edge of end section shall be alloy 6063-F.
- Pipe and connection bands shall conform to applicable sections of NDDOT Standard specifications and to AASHTO M-196 and M-211.

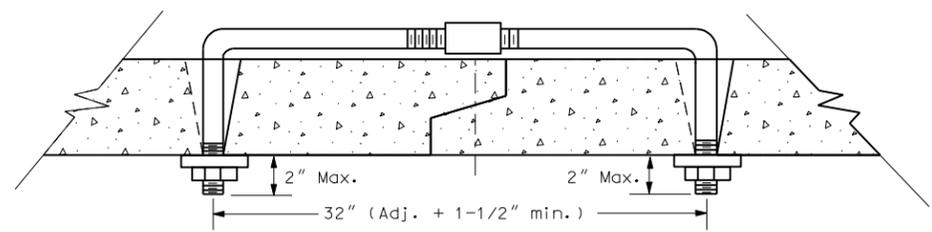
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
04-28-89	Toe plate note
06-25-03	Revised layout
12-01-04	PE Stamp added
12-08-08	Removed min/max fill info

This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674, on 12/08/2008 and the original document is stored at the North Dakota Department of Transportation

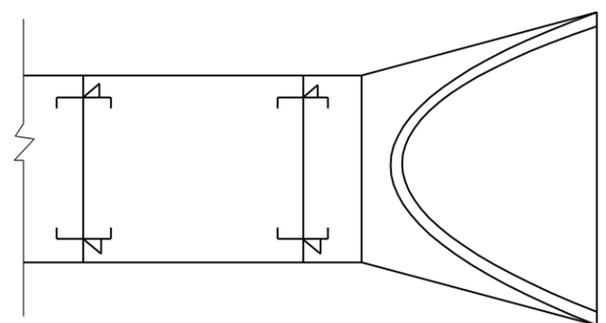
# CONCRETE PIPE TIES



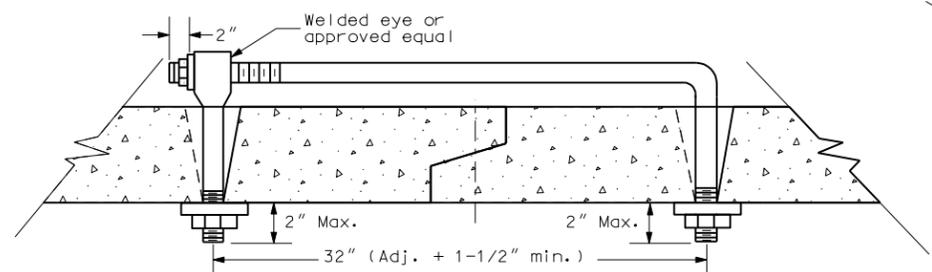
TOP VIEW



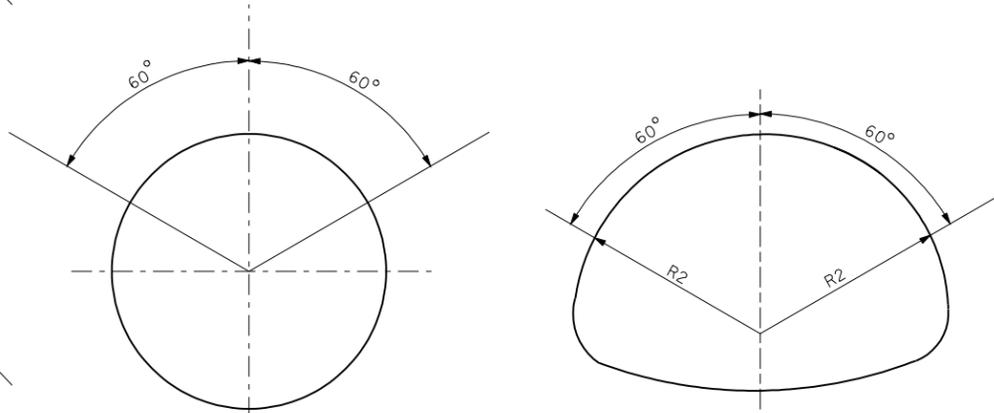
ADJUSTABLE TIE



REQUIRED SIZE OF TIE BOLTS					
Pipe Size (Inches)	Thread Dia.	Pipe Size (Inches)	Thread Dia.	Pipe Size (Inches)	Thread Dia.
12	5/8" (See note 2)	30	3/4"	72	1"
15		33		78	
18		36		84	
21		42		90	
24		48		96	
27		54		102	
		60		108	
		66		120	
			132		



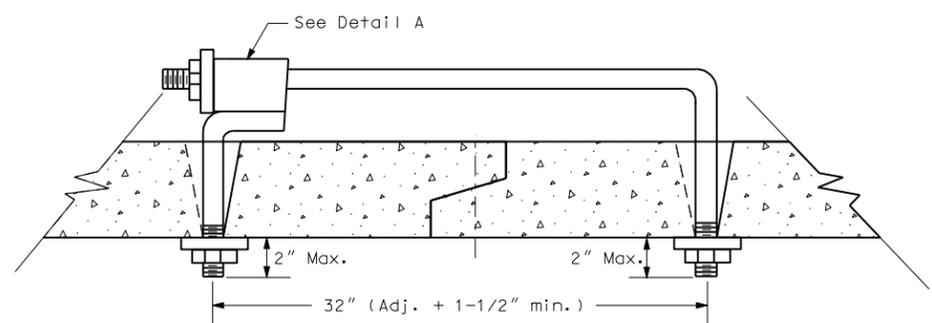
EYE BOLT TIE



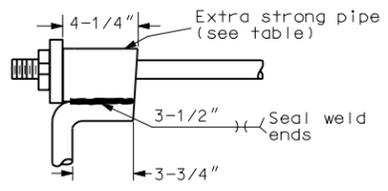
PLACEMENT OF HOLES

NOTES:

1. Pipe size listed is inside diameter of round pipe or equivalent diameter of pipe arch.
2. Nuts and washers are not required on inside of 21" diameter pipe or less.
3. Ties to be used only to hold pipe sections together, not for pulling sections tight.
4. Tie bolts shall be painted after fabrication with one coat of zinc chromate iron oxide paint. Threaded portion of rods do not have to be painted.
5. Holes in pipe to accommodate the tie bolts can be precast or drilled. Tapered holes will be permitted when precast. When existing pipe are extended or salvaged and relayed, the contractor will be required to drill the necessary holes.
6. The contractor has the option of selecting the type of tie bolt to be used. The type selected shall be approved by the engineer.
7. The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for reinforced concrete pipe culverts.
8. All concrete pipe joints will be tied including the end section joints. Tie bolts are not required on storm sewer pipe unless specifically noted in the plans.

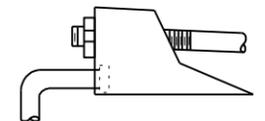


WELDED PIPE TIE

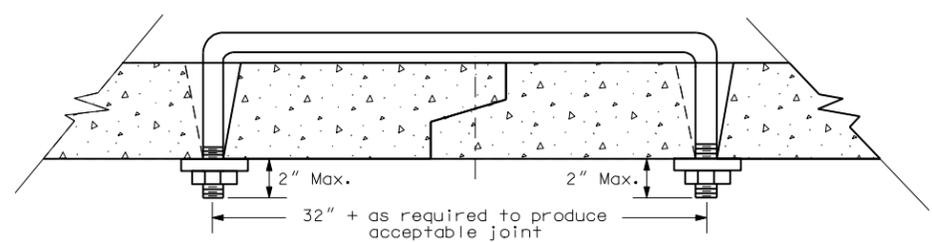


DETAIL A

Thread Dia.	E.S. Pipe I.D.
5/8"	3/4"
3/4"	1"
1"	1-1/4"



OPTIONAL CANOPY TIE

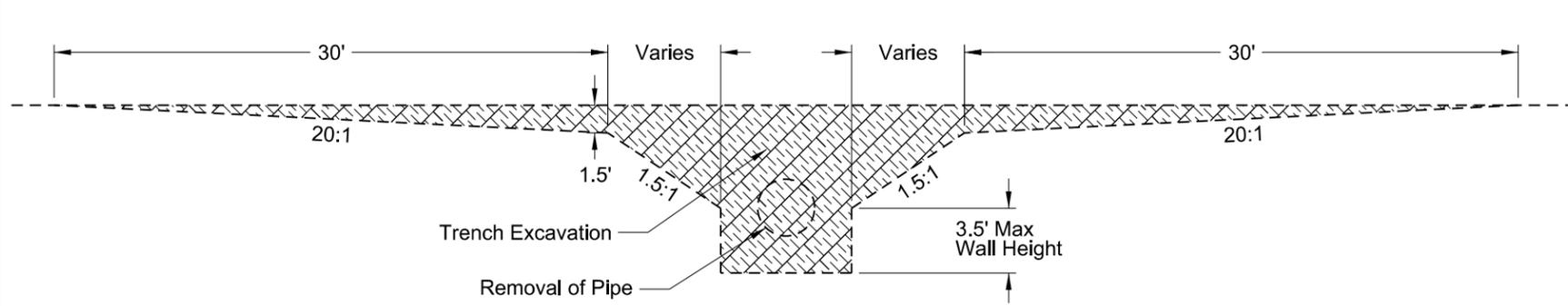


U BOLT TIE

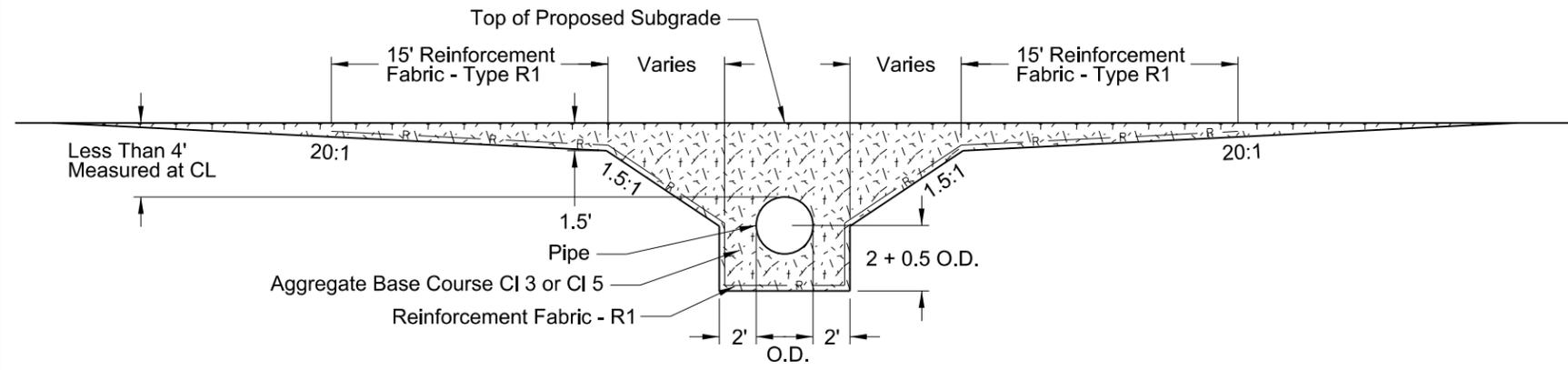
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-1-86	
REVISIONS	
DATE	CHANGE
12-09-94	Notes
06-26-03	Layout revisions
12-01-04	PE Stamp added

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

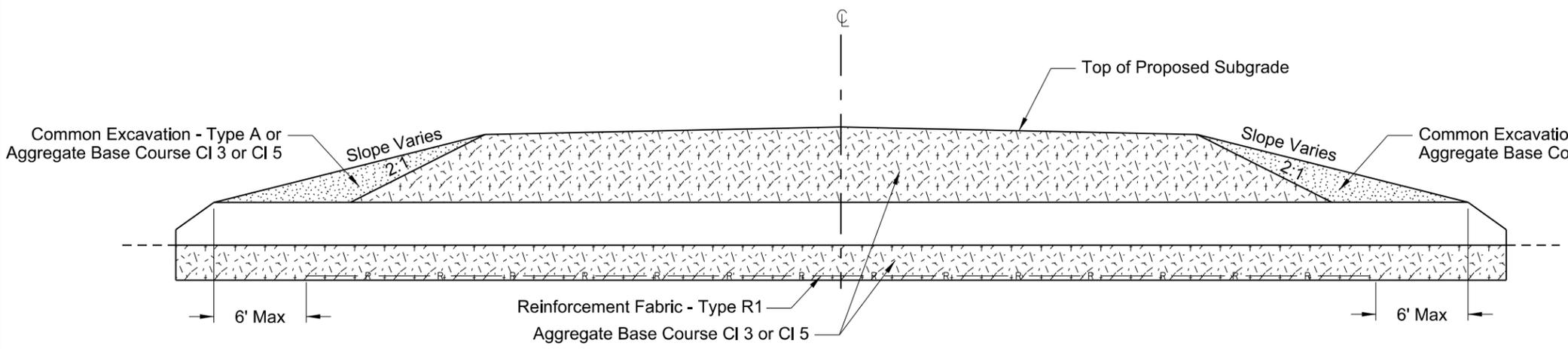
TRANSVERSE MAINLINE PIPE EXCAVATION AND INSTALLATION DETAIL FOR PIPES  
4 FEET OR LESS BELOW THE TOP OF THE PROPOSED SUBGRADE



EXCAVATION DETAIL - PROFILE VIEW



INSTALLATION DETAIL - PROFILE VIEW



CROSS SECTION

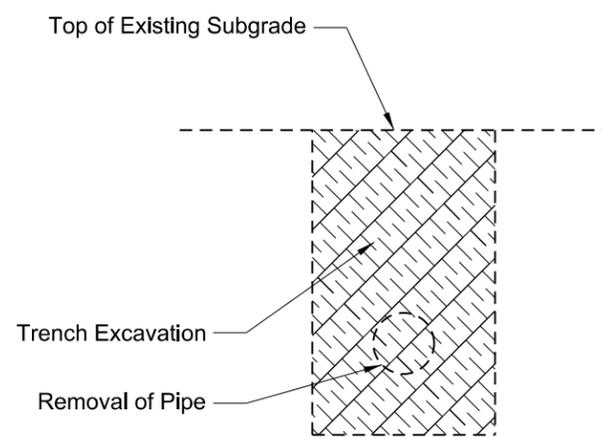
- Pay Items
- 1) Pipe\*
  - 2) Reinforcement Fabric - Type R1
  - 3) Removal of Pipe (if required)
- \*Included in Pipe Pay Item
- 1) Pipe
  - 2) Trench Excavation
  - 3) Aggregate Base Course CI 3 or CI 5
  - 4) Common Excavation - Type A

- NOTES:
- 1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.

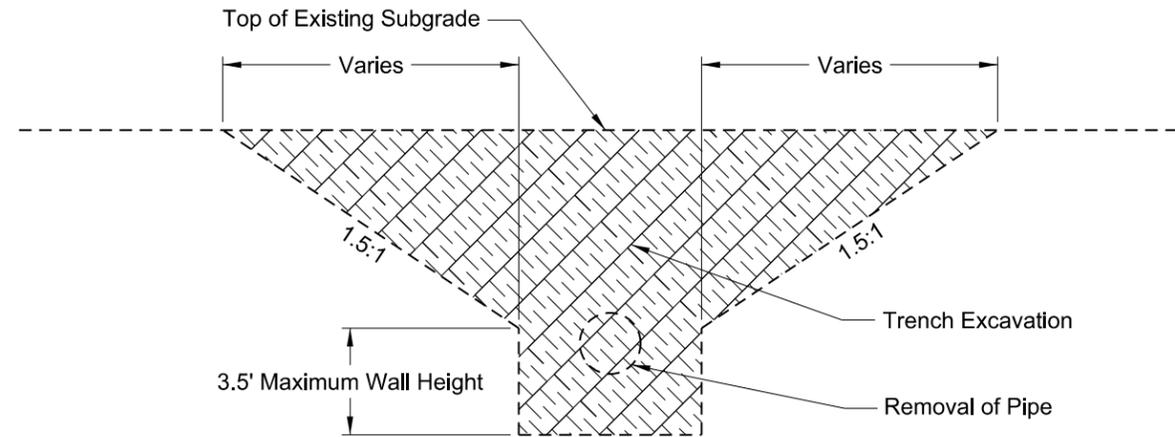
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by  
 Ron Horner,  
 Registration Number  
 PE-2087,  
 on 7/26/13 and the original document is stored at the  
 North Dakota Department  
 of Transportation

PIPE EXCAVATION AND INSTALLATION DETAIL FOR LONGITUDINAL MAINLINE PIPE  
OR PIPE NOT UNDER THE ROADWAY



EXCAVATION DETAIL A



EXCAVATION DETAIL B

Pay Items

- 1) Pipe\*
- 2) Removal of Pipe (if required)

\*Included in Pipe Pay Item

- 1) Pipe
- 2) Trench excavation
- 3) Aggregate base course CL 3 or CL 5
- 4) Common Excavation - Type A
- 5) Common Excavation - Type B

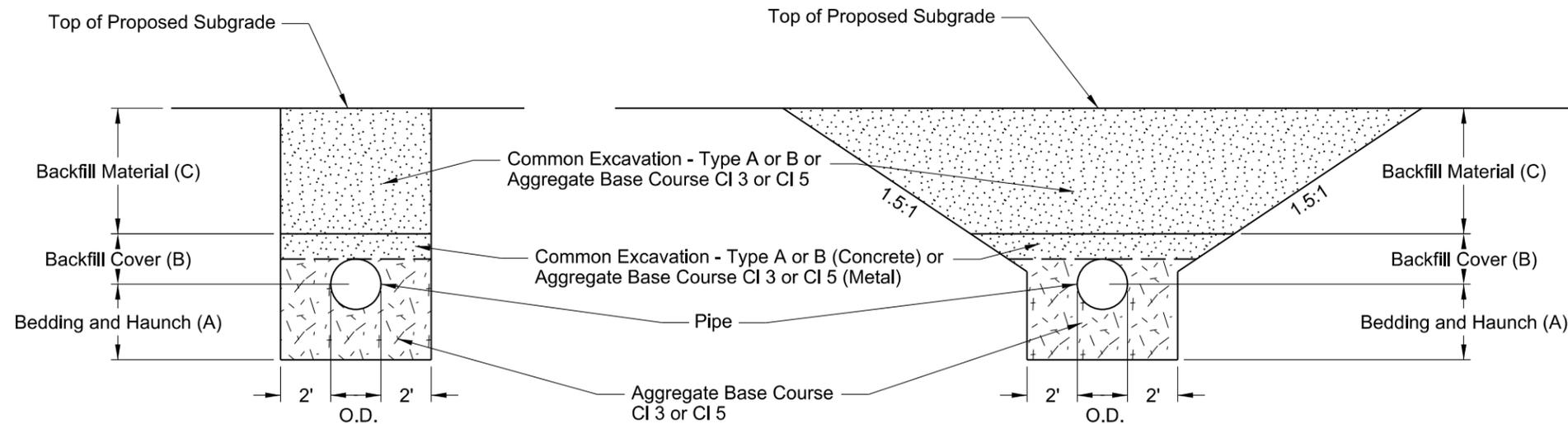
NOTES:

- 1) This drawing does not apply to pipes in approaches.
- 2) It is the contractor's option to select Detail A or B.

Bedding and Haunch (A)
Pipes Not Under Roadway = 0.5 O.D. + 4 Inches
Pipes Under the Roadway = 0.5 O.D. + 2 Feet

Backfill Cover (B)
Concrete Pipe = 0.5 O.D.
Metal Pipe = 0.5 O.D. + 1 Foot
PVC/HDPE = 0.5 O.D. + 1 Foot

Backfill Material (C)
Top of Pipe 4 Feet or Less Below the Top of Proposed Subgrade = Aggregate Base Course CI 3 or CI 5
Top of Pipe Greater than 4 Feet Below the Top of Proposed Subgrade = Common Excavation - Type A
Pipe Not Under Roadway = Common Excavation - Type B



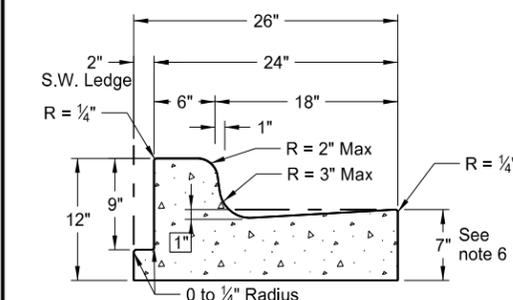
BACKFILL DETAIL A

BACKFILL DETAIL B

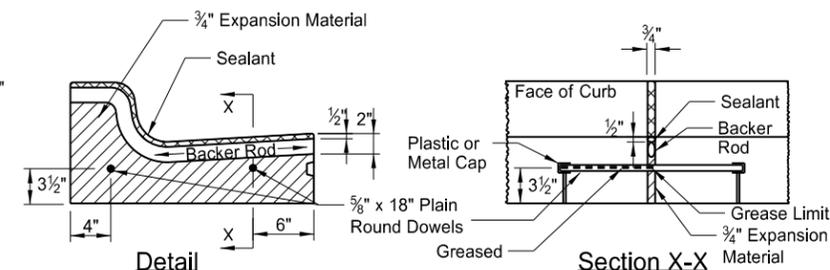
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by  
Ron Horner,  
Registration Number  
PE-2087,  
on 7/26/13 and the original document is stored at the  
North Dakota Department  
of Transportation

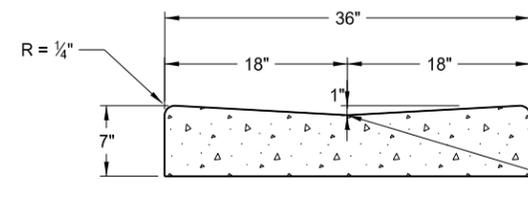
Curb & Gutter and Valley Gutter



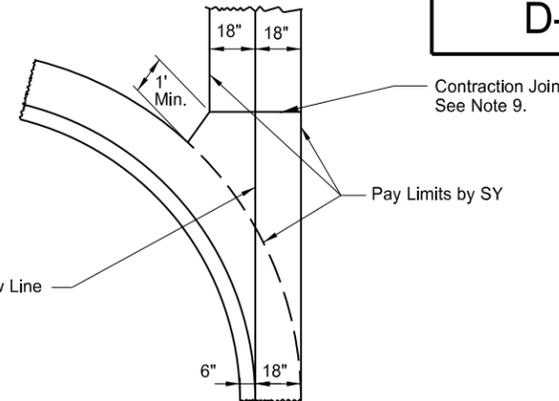
**Curb & Gutter Type 1 (Sec. A & B)**  
Adjacent to Concrete Sidewalk,  
Median, or Parking Lot.  
(Sec. A shown. See Sec B for  
additional details.)



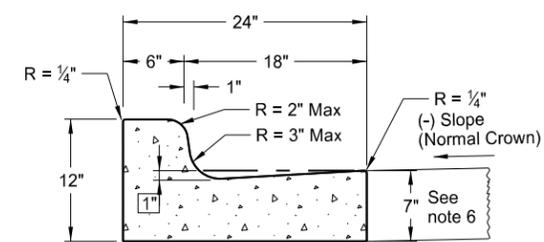
**Isolation Joint**



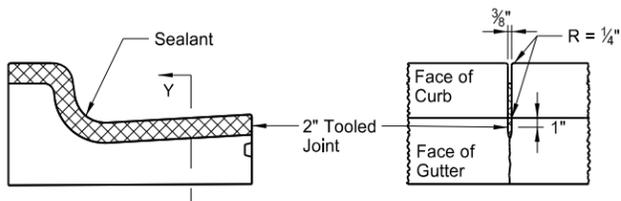
**36" Concrete Valley Gutter Detail**



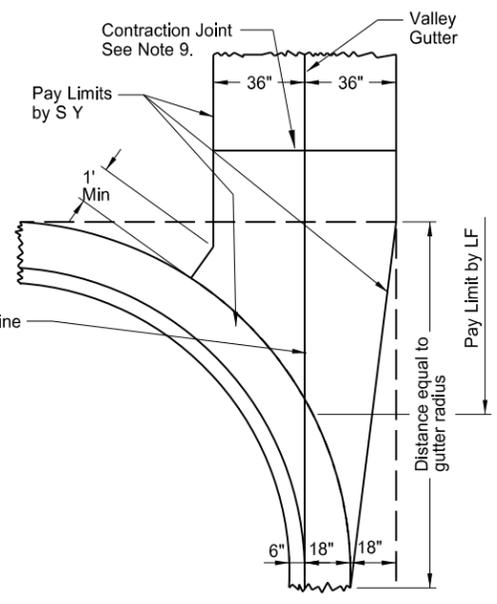
**36" Concrete Valley Gutter Plan**



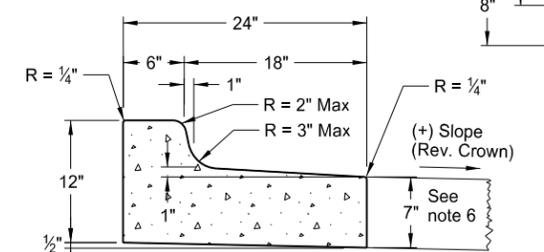
**Curb & Gutter Type 1 (Sec. A)**



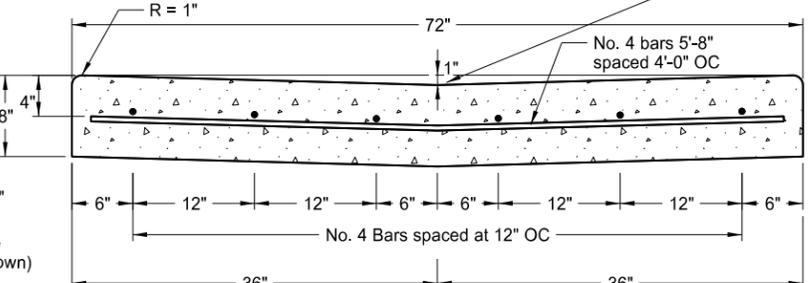
**Contraction Joint**  
(10' Max Spacing)



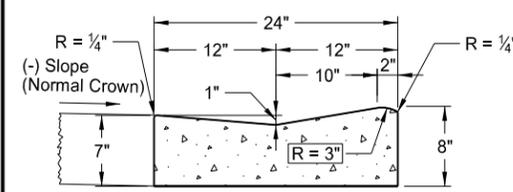
**72" Concrete Valley Gutter Plan**



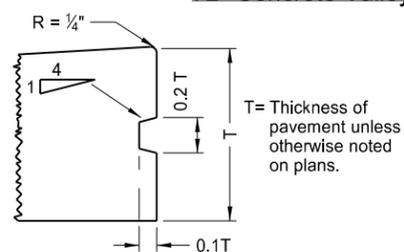
**Curb & Gutter Type 1 (Sec. B)**



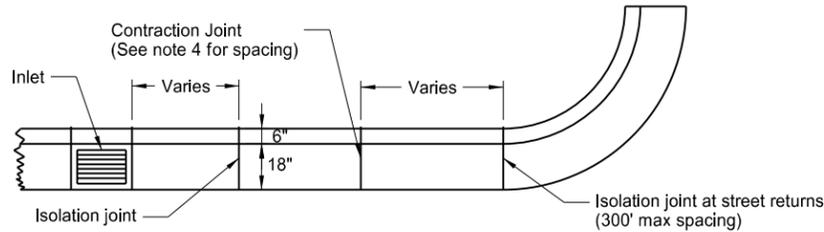
**72" Concrete Valley Gutter Detail**



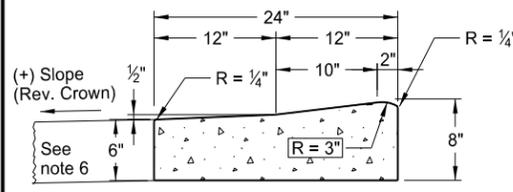
**Mountable Curb & Gutter Type 1 (Sec. A)**



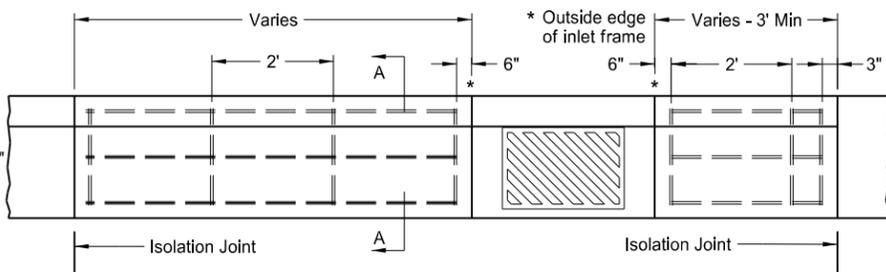
**Keyway Detail for Curb & Gutter**  
(To be used with PCC Pavement and Drives)



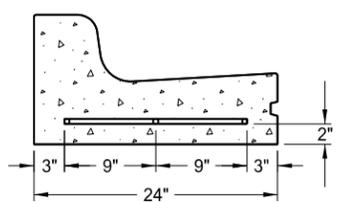
**Joint Location Detail**



**Mountable Curb & Gutter Type 1 (Sec. B)**



**Curb & Gutter Reinforcing at Inlets**



**Section A-A**

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.

NOTES:

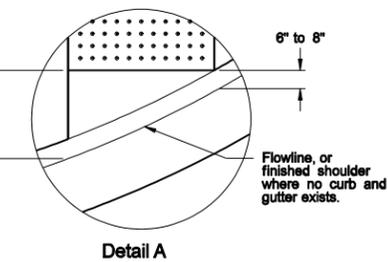
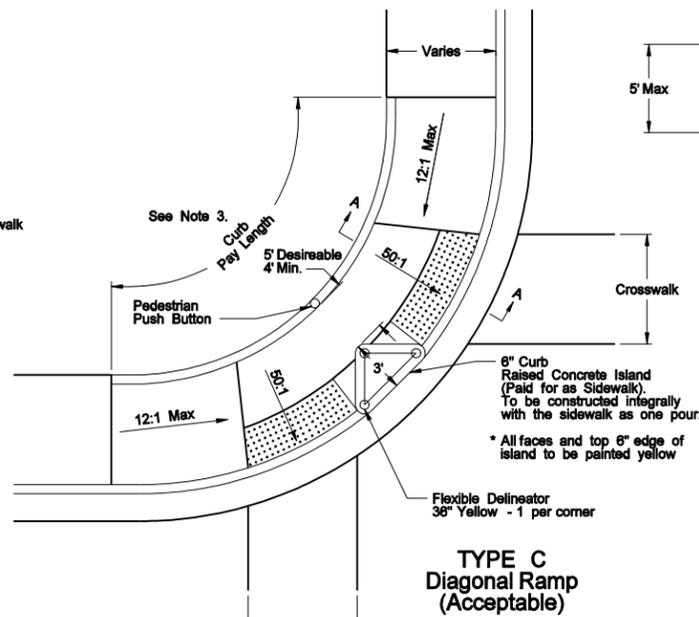
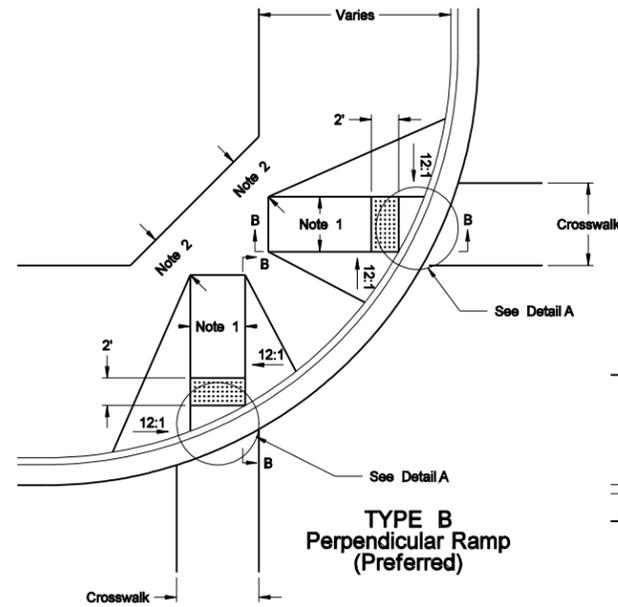
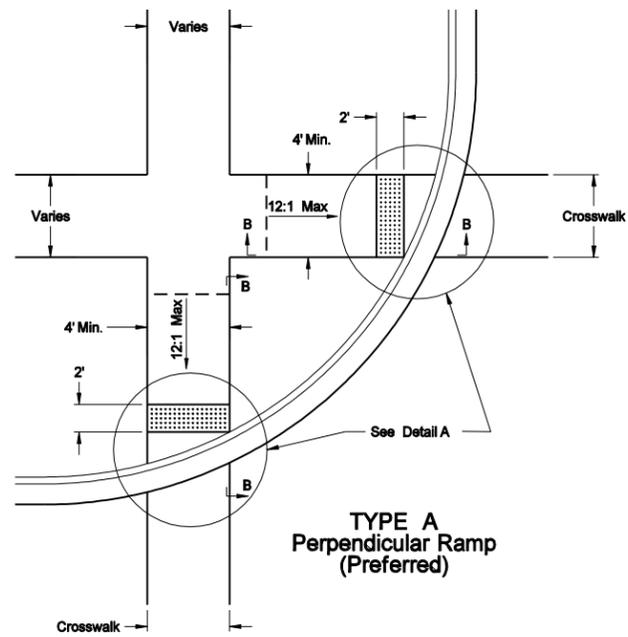
1. Curb and Gutter Type 1 (Sec. A & B) to be used. Section "A" to be used with (-) pavement slopes and section "B" to be used with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Isolation joint material shall be 3/4" preformed expansion joint filler conforming to 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 at a cold joint, plastic or 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 of approximately 15' spacing.
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 7" as shown. For PCC pavements, the Contractor has the option to match the depth of gutter to the depth of the adjacent PCC pavement or to construct a 7" depth as shown.
7. When the curb and gutter abuts PCC pavement, it shall be tied to the PCC pavement. The tie bar shall consist of a No. 3 bar, 1'-6" in length spaced 4' center to center.
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" preformed 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.
9. Valley Gutter Joints: Contraction joints are required at approx. 10' intervals. The contraction joints shall be 1/8" min. to 3/8" max. in width. The joints shall be formed by sawing or scoring to a minimum depth of 2". The joint sealant shall be a hot poured elastic type joint sealer in accordance with Section 826.02A.2 of the Standard Specifications. The joint and sealant shall be included in the price bid for Valley Gutter.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE

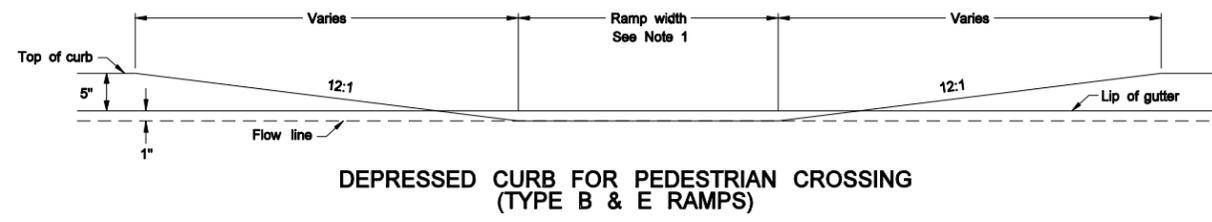
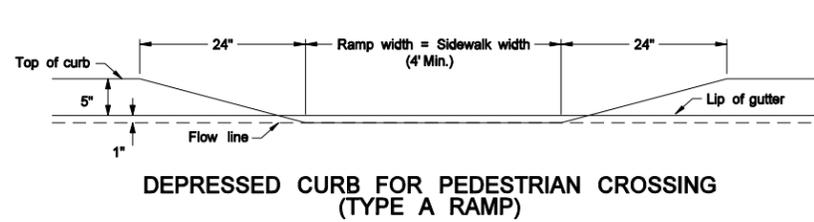
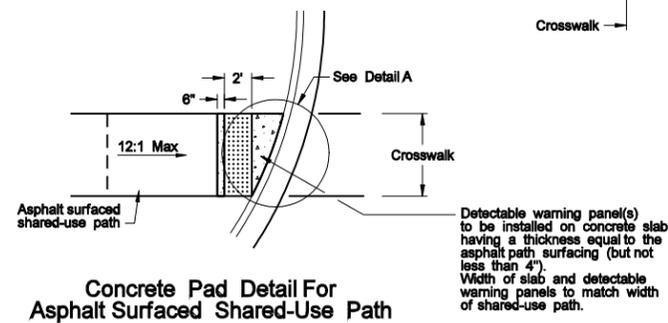
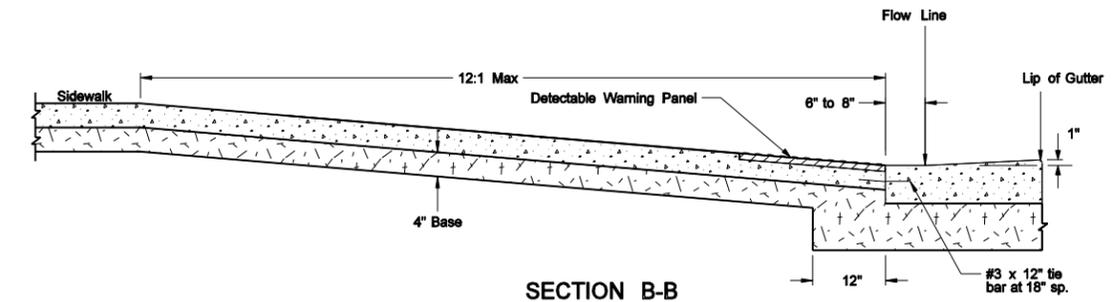
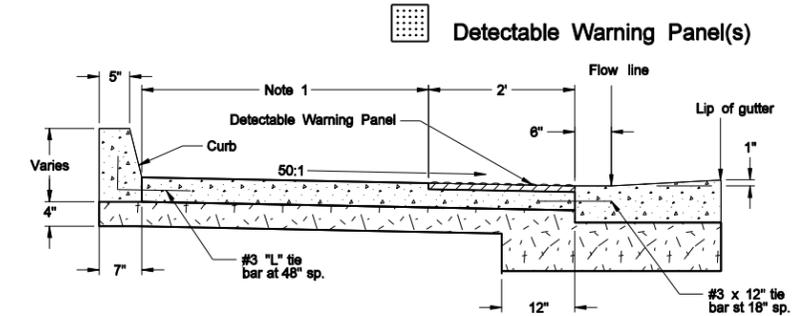
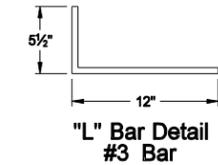
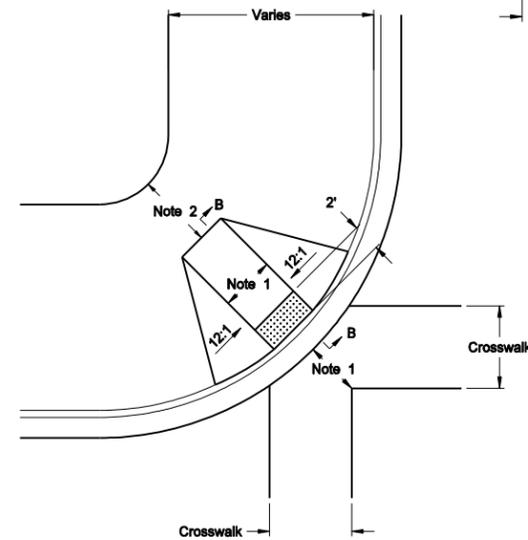
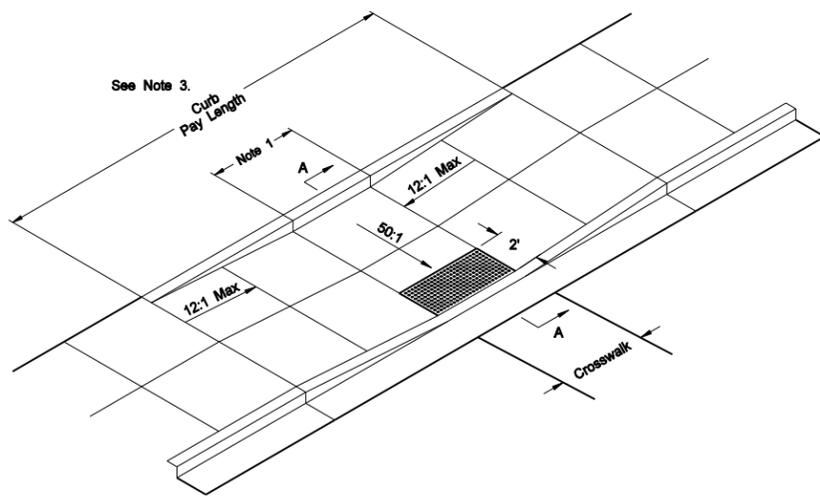
This document was originally issued and sealed by  
Roger Weigel  
Registration Number  
PE-2930,  
on 08/07/2013 and the original document is stored at the  
North Dakota Department  
of Transportation

# 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."



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.

This document was originally issued and sealed by  
**Mark S Gaydos,**  
 Registration Number  
**PE- 4518 ,**  
 on 12/18/07 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.

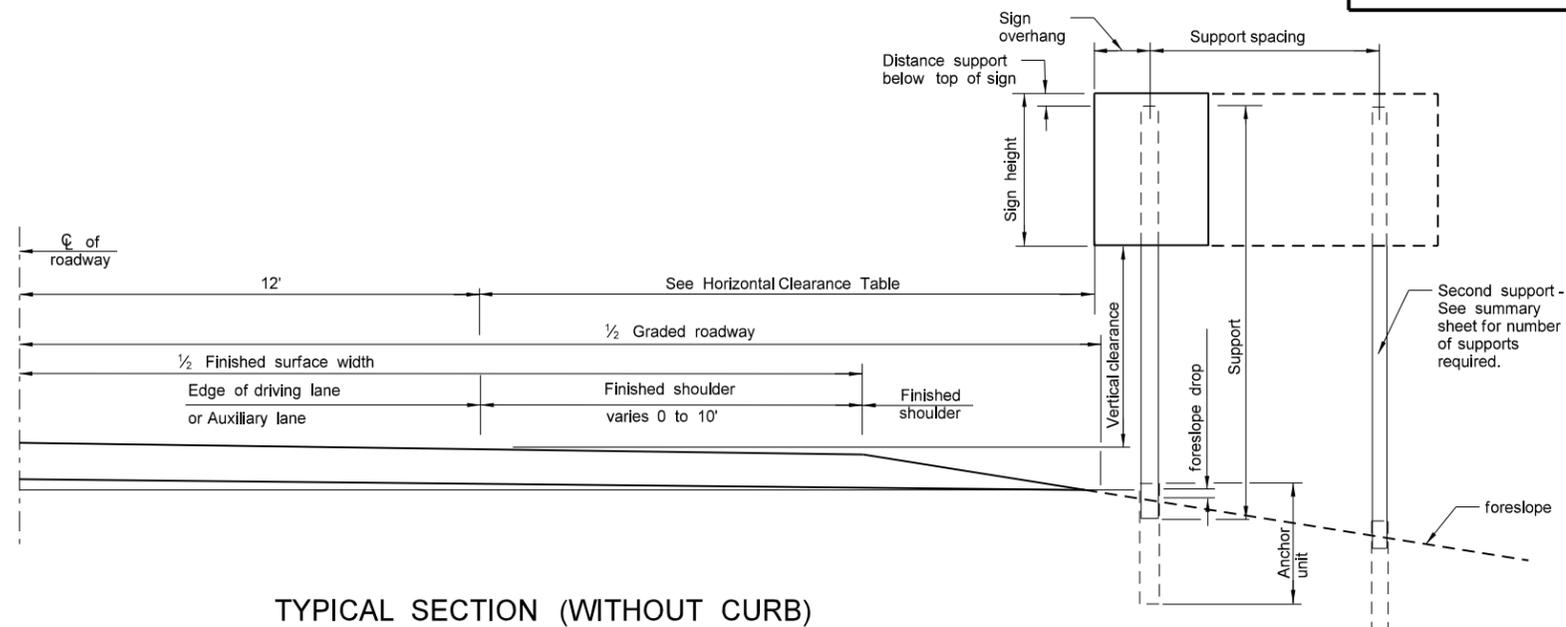
2. Minimum Vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least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

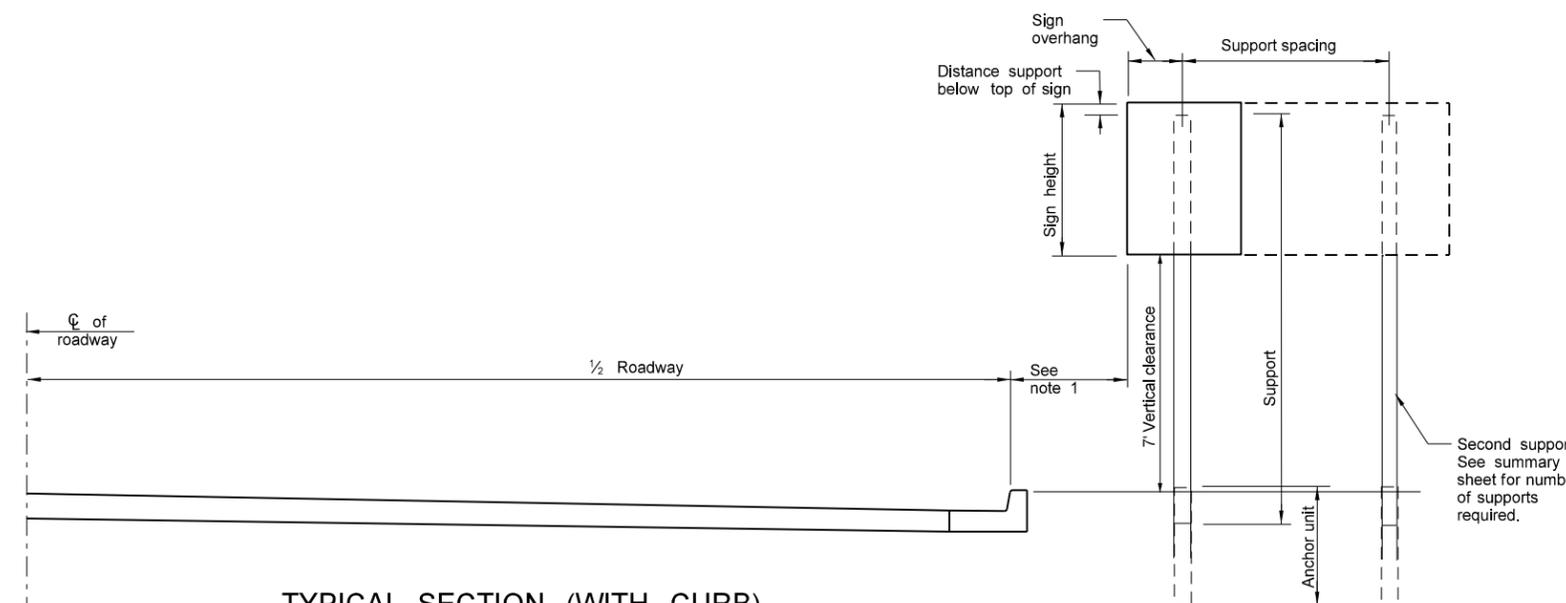
The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.

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

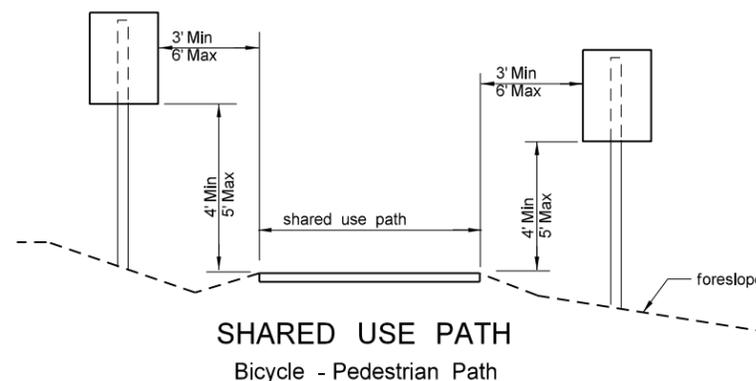


TYPICAL SECTION (WITHOUT CURB)



TYPICAL SECTION (WITH CURB)

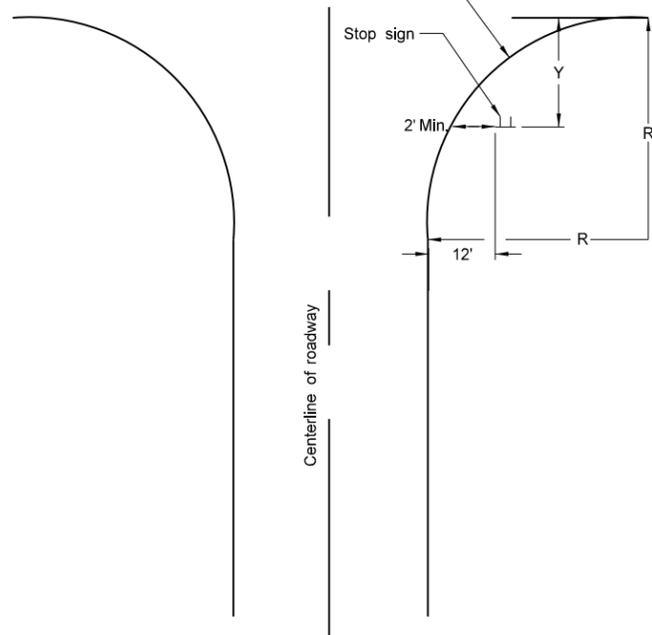
Residential or Business District



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.

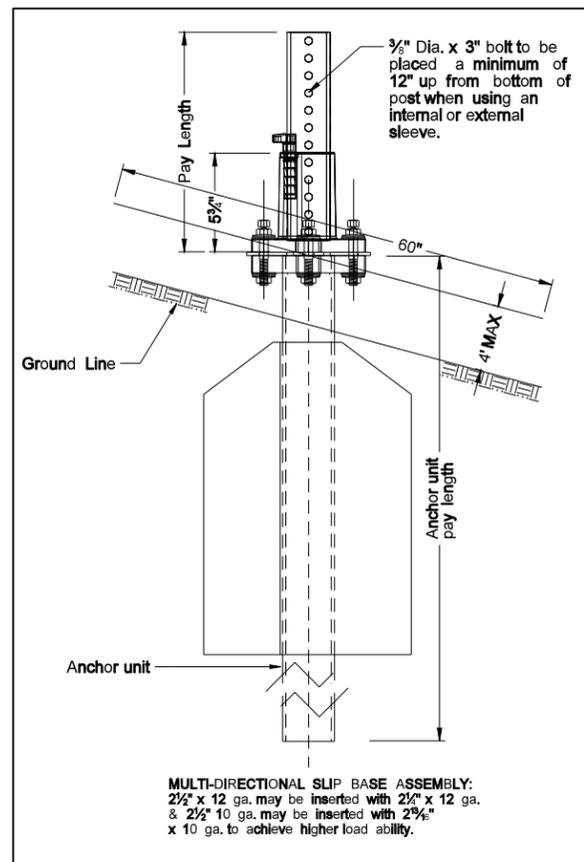
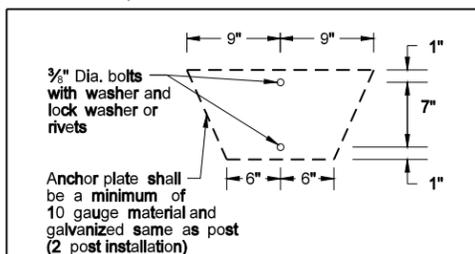
R=Radius	Y-Max	Y-Min
40'	50'	15'
45'	50'	18'
50'	50'	21'
55'	50'	25'
60'	50'	28'
65'	50'	32'
70'	50'	35'
75'	50'	39'
80'	50'	43'

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

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

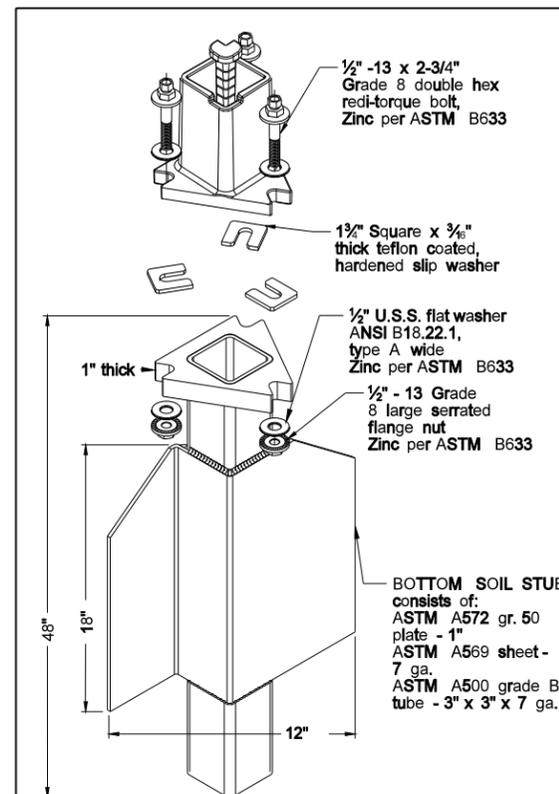
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)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

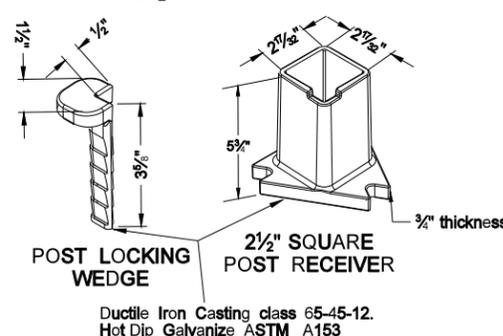


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:  
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube

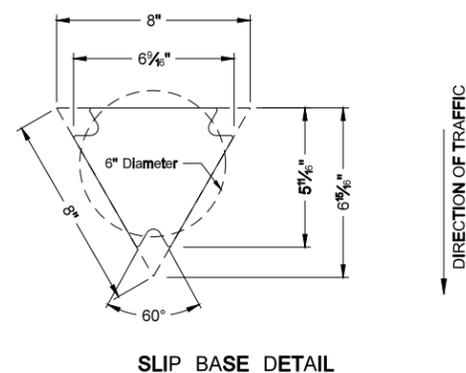


SLIP BASE FOR 2 1/2" POST



2 1/2" SQUARE POST RECEIVER

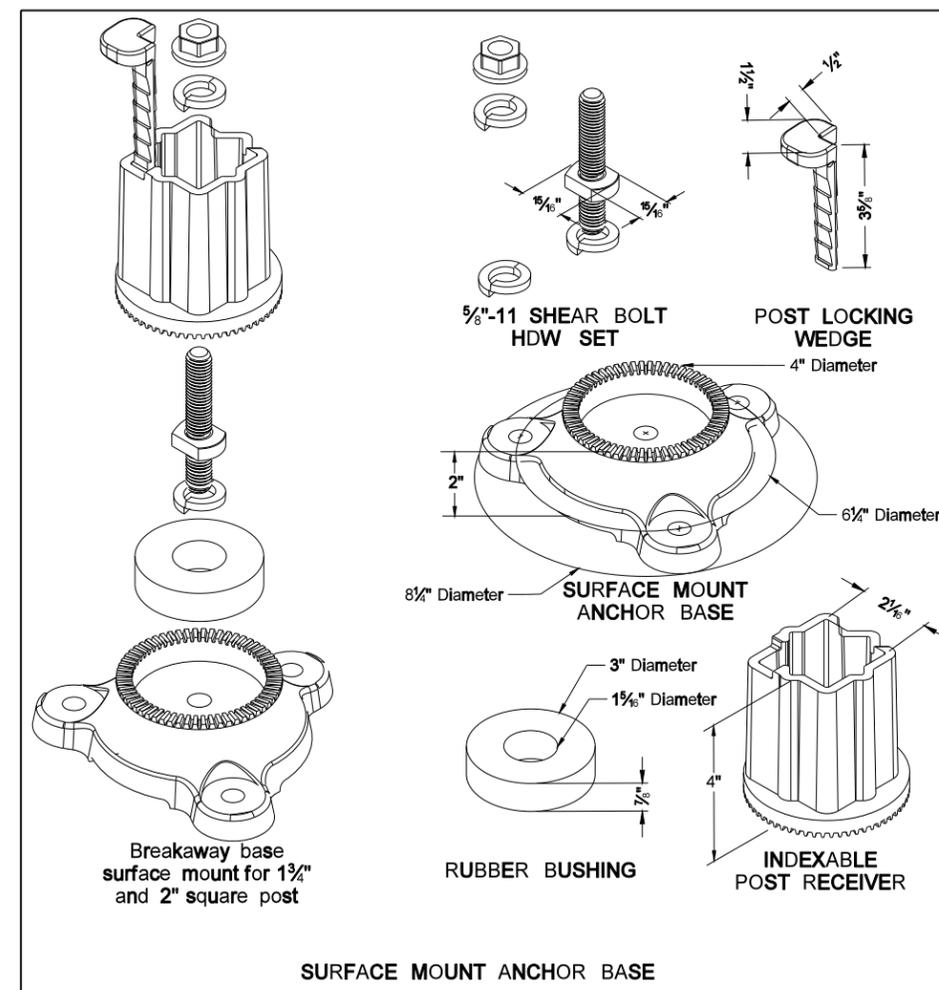
Ductile Iron Casting class 65-45-12. Hot Dip Galvanize ASTM A153



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. <sup>4</sup>	Cross Sect. Area In. <sup>2</sup>	Section Modulus In. <sup>3</sup>
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.



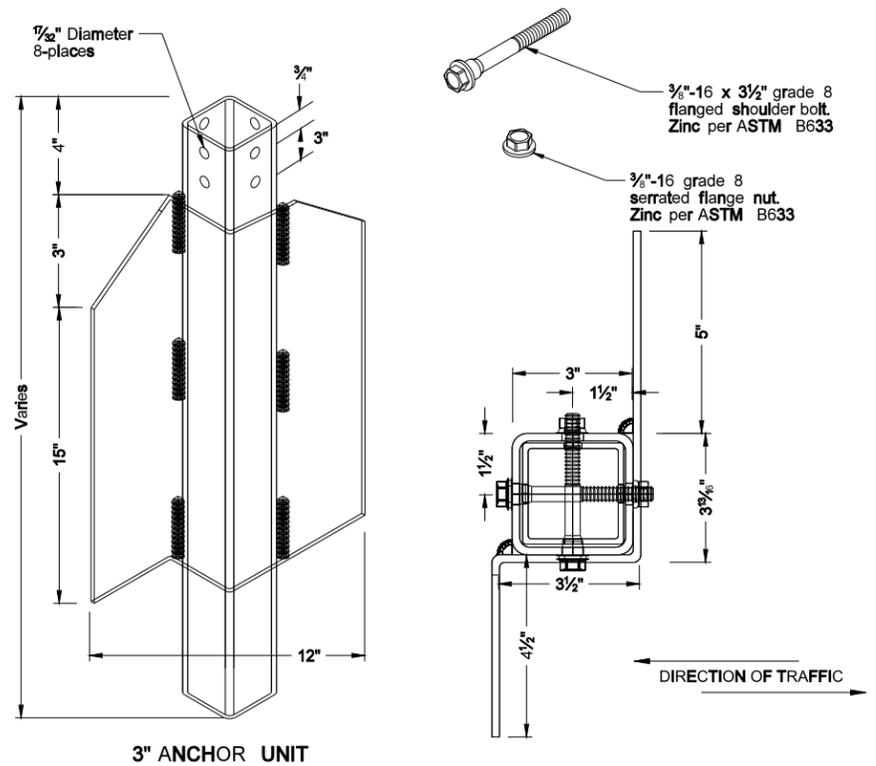
SURFACE MOUNT ANCHOR BASE

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.

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

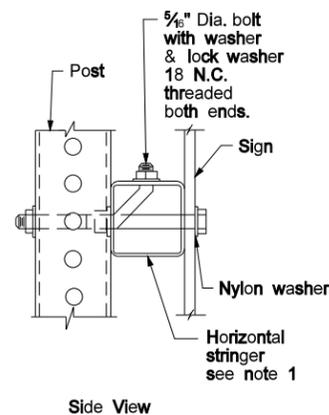
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 08/06/09 and the original document is stored at the North Dakota Department of Transportation

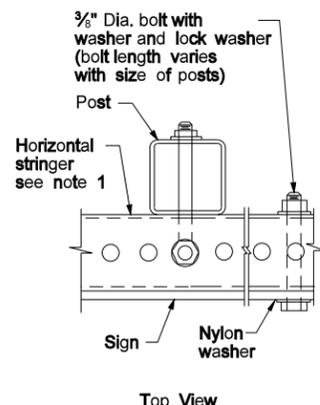
Mounting Details Perforated Tube

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.

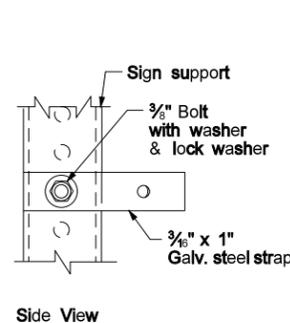


Side View

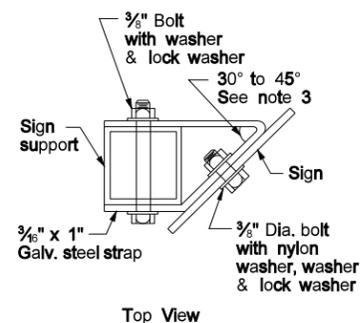


Top View

STRINGER MOUNTING  
(WITH STRINGER IN FRONT OF POST)

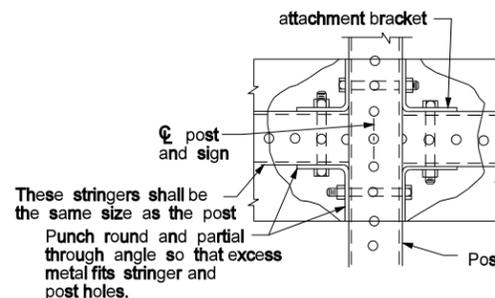


Side View



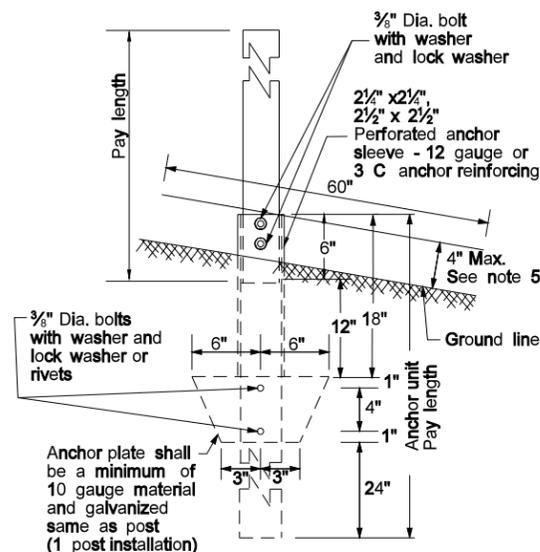
Top View

STRAP DETAIL

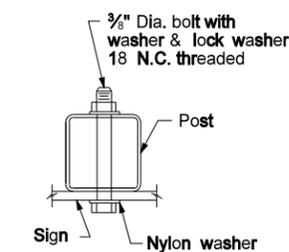
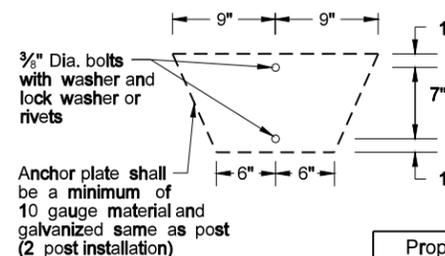


These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.

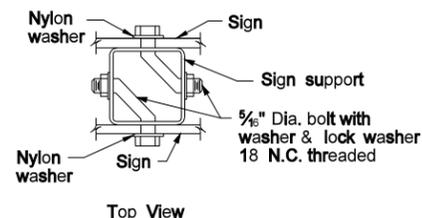
STREET NAME SIGNS  
AND ONE WAY SIGNS  
SINGLE POST ASSEMBLY  
ONE STRINGER OR  
BACK TO BACK MOUNTING



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. <sup>4</sup>	Cross Sect. area In. <sup>2</sup>	Section Modulus In. <sup>3</sup>
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.

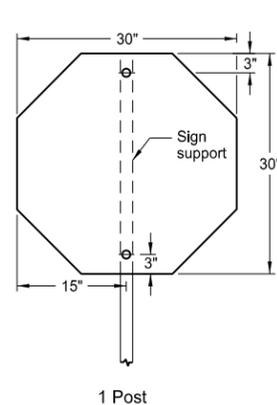
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE

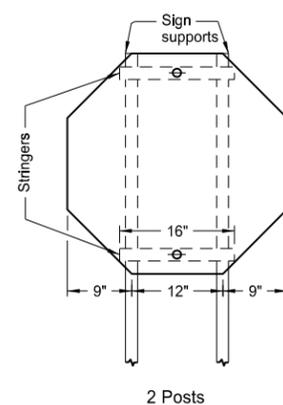
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 08/06/09 and the original document is stored at the North Dakota Department of Transportation

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

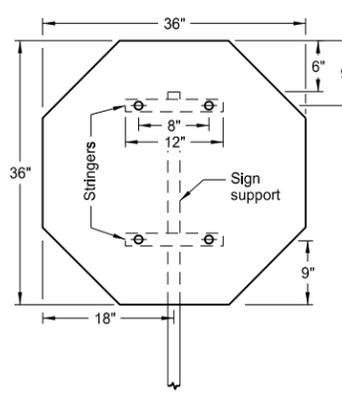


1 Post

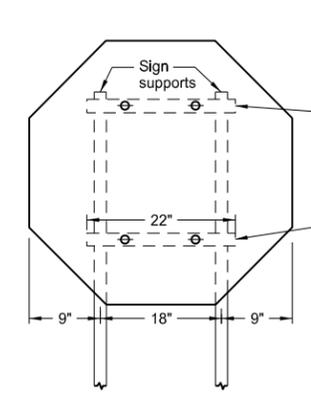
Assembly No. 1



2 Posts

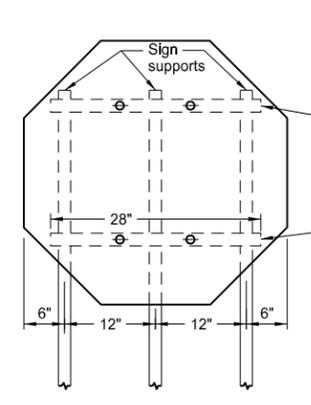


1 Post



2 Posts

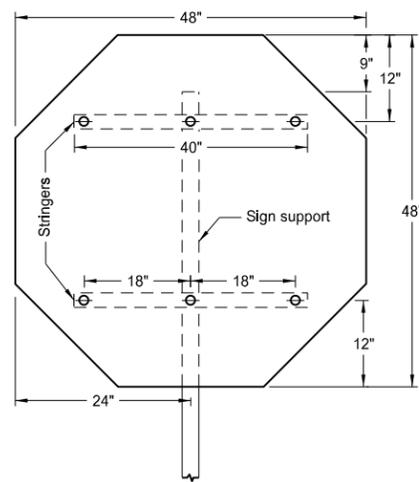
Assembly No. 2



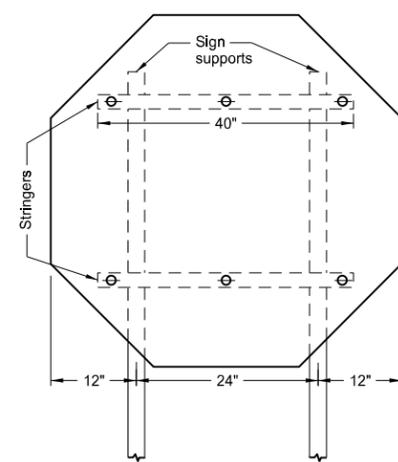
3 Posts

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 1 1/2" x 1 1/2".
4. All holes shall be punched round for 3/8" bolt.

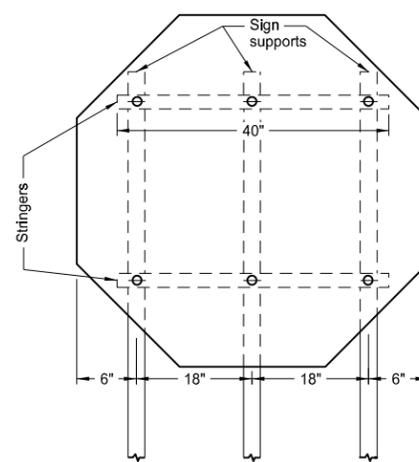


1 Post

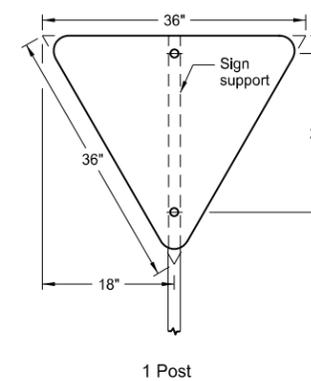


2 Posts

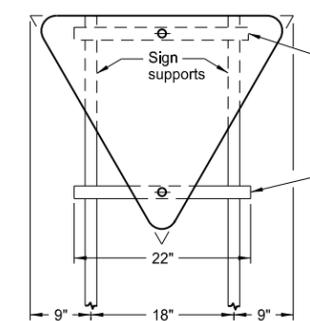
Assembly No. 3



3 Posts

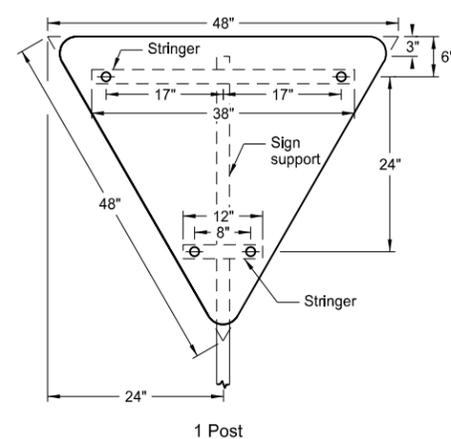


1 Post

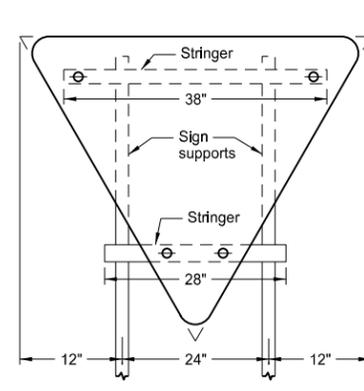


2 Posts

Assembly No. 4

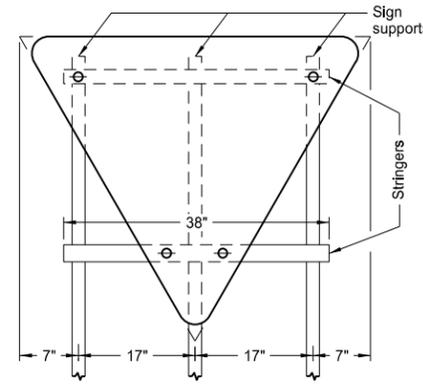


1 Post



2 Posts

Assembly No. 5

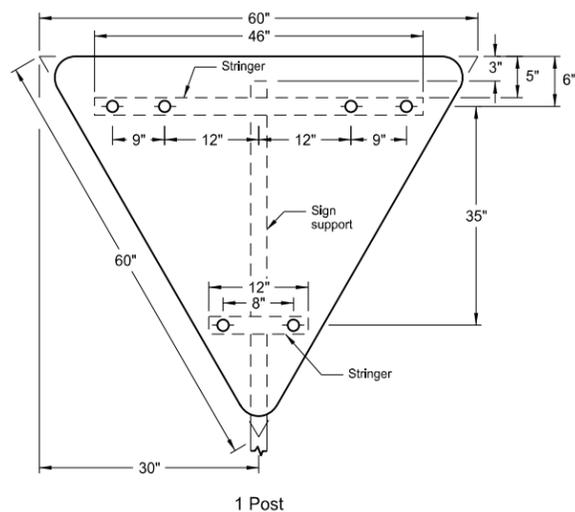


3 Posts

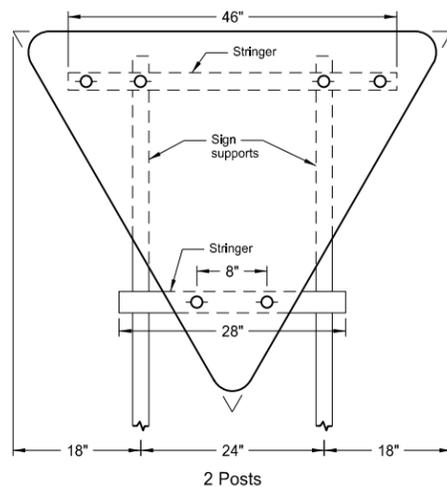
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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

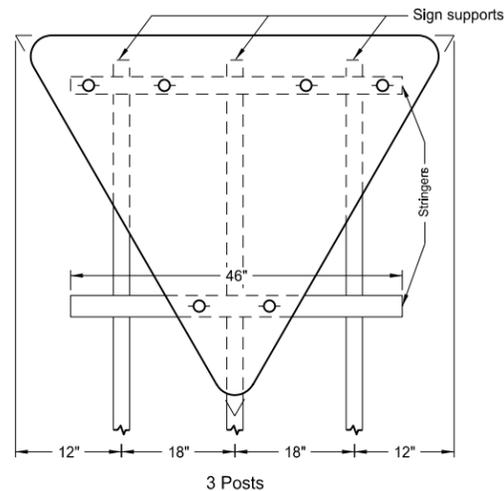
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

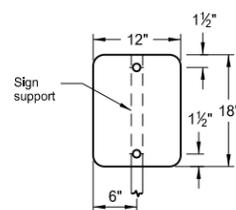


3 Posts

Assembly No. 6

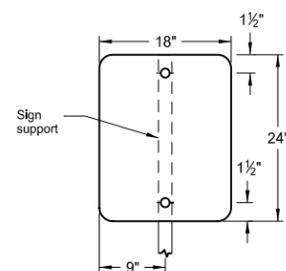
Notes:

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 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



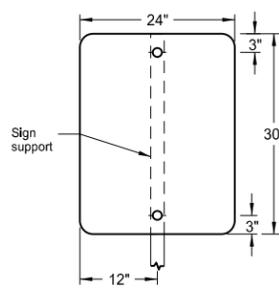
1 Post

Assembly No. 7



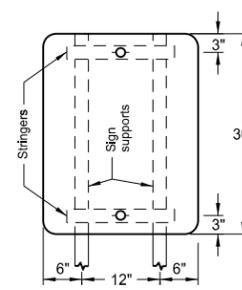
1 Post

Assembly No. 8

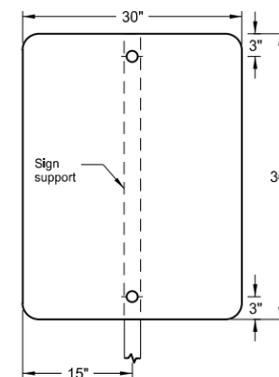


1 Post

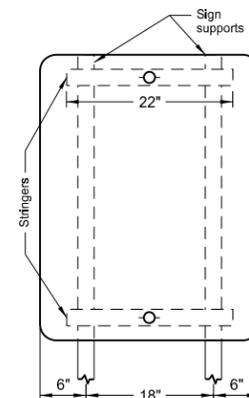
Assembly No. 9



2 Posts

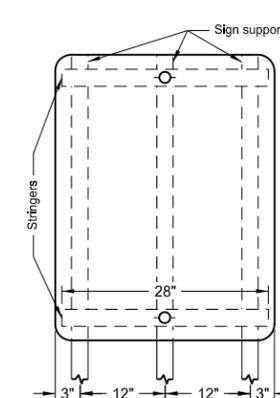


1 Post

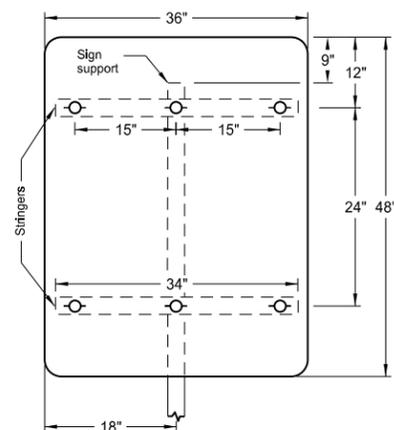


2 Posts

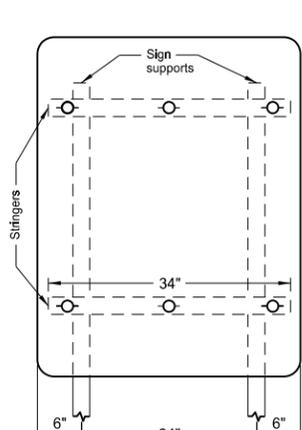
Assembly No. 10



3 Posts

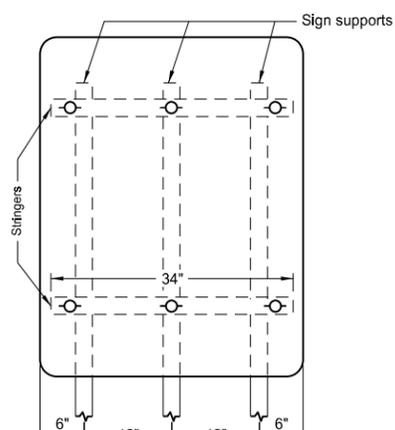


1 Post



2 Posts

Assembly No. 11

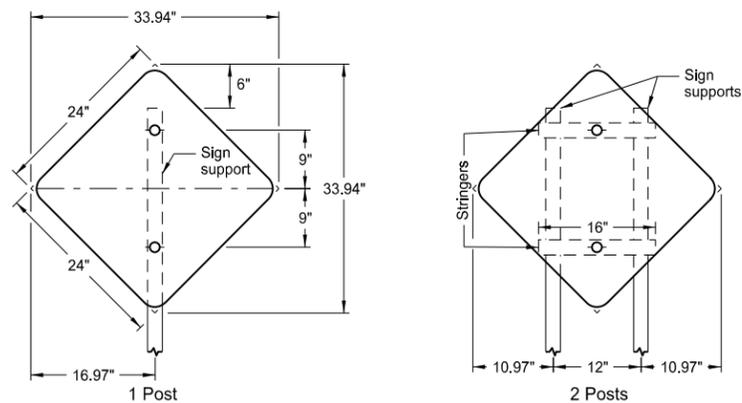


3 Posts

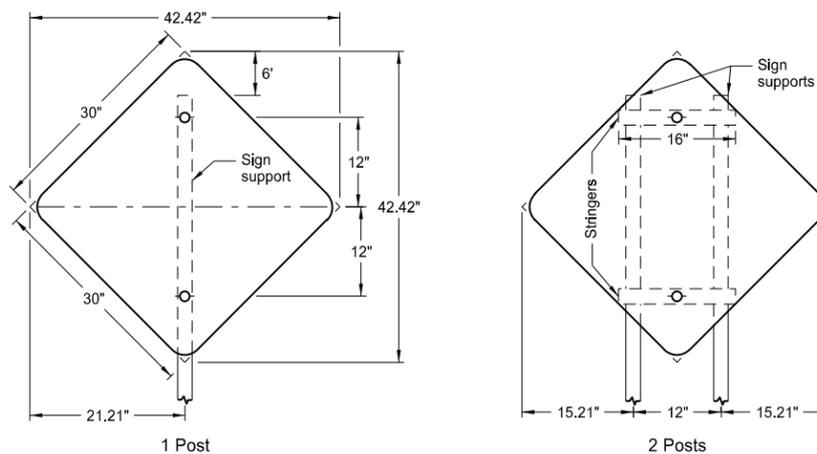
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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

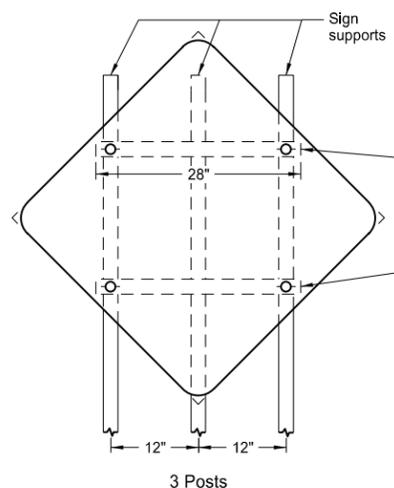
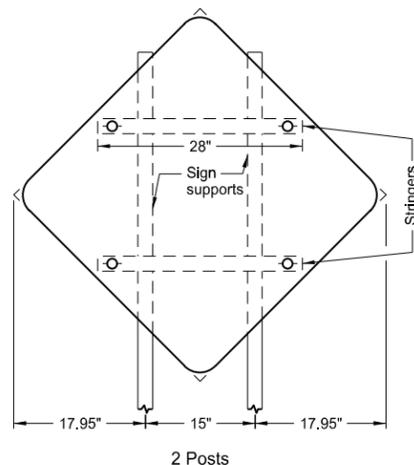
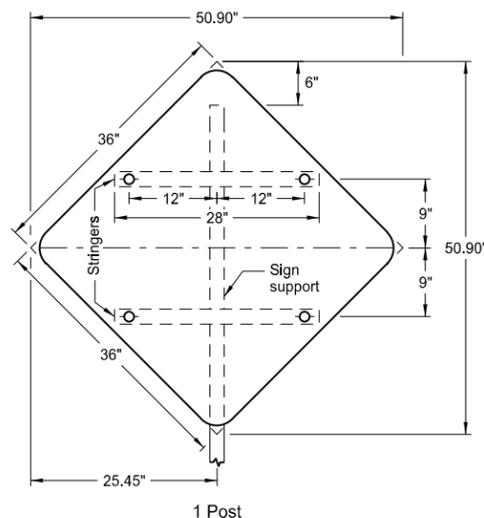
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION  
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



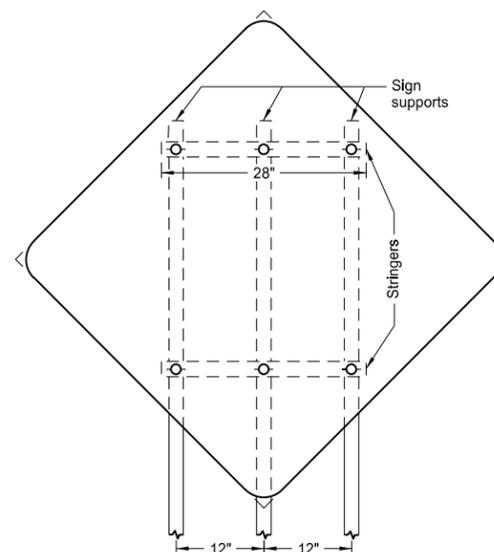
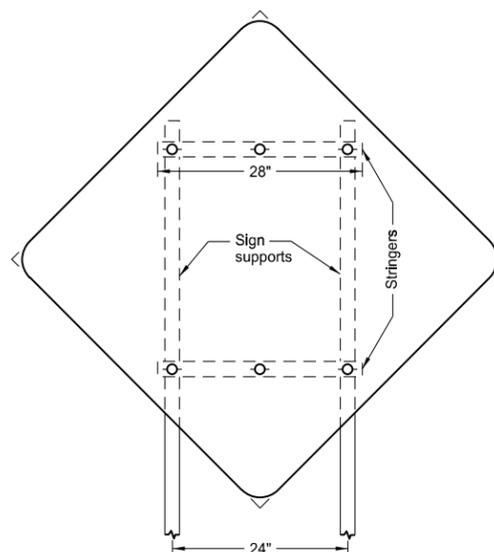
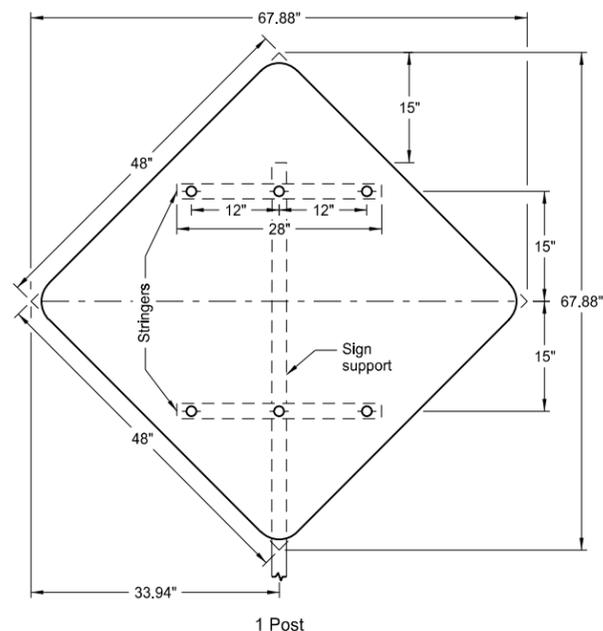
Assembly No. 18



Assembly No. 19



Assembly No. 20



Assembly No. 21

Notes:

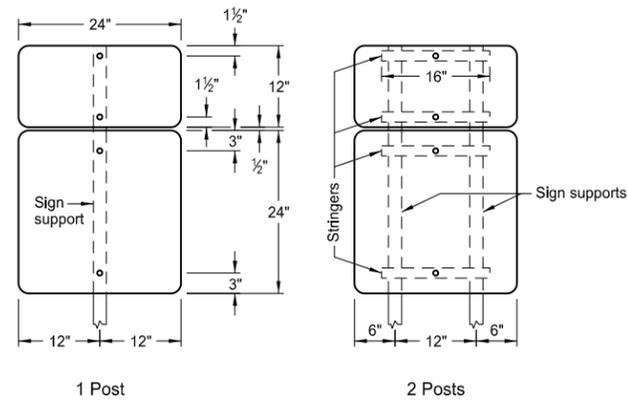
1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.

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

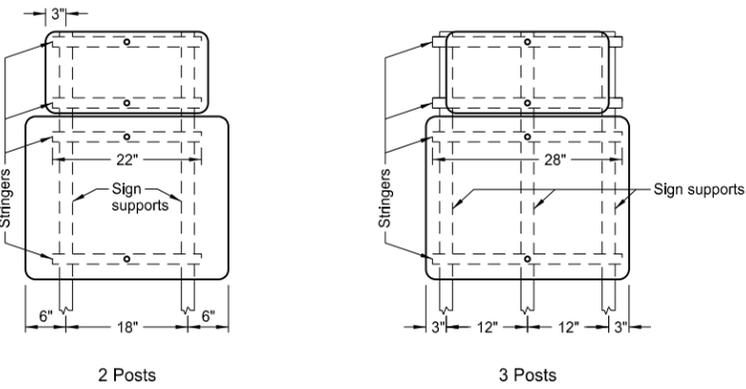
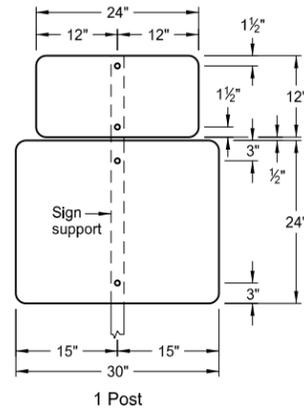
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 12-1-10 and the original document is stored at the North Dakota Department of Transportation

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

D-754-51

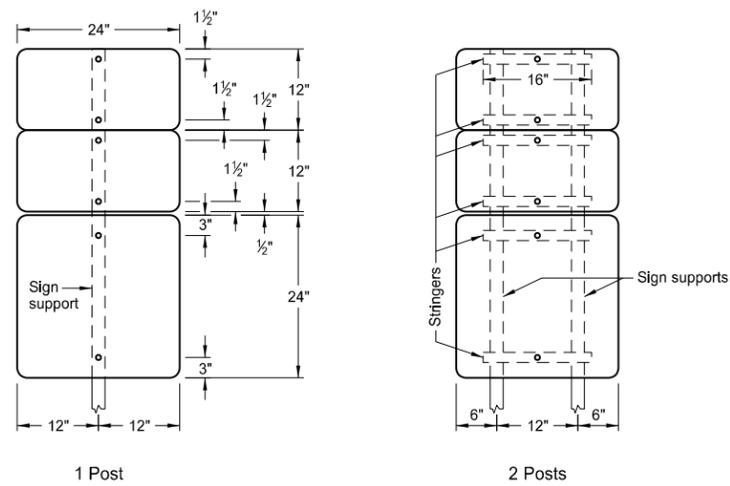


ASSEMBLY NO. 371

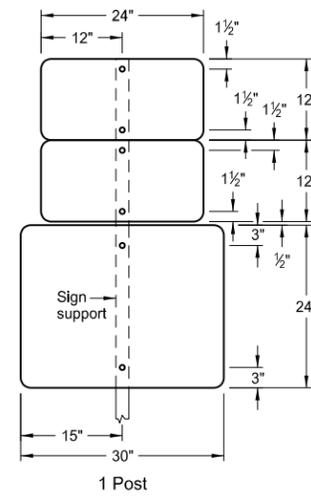
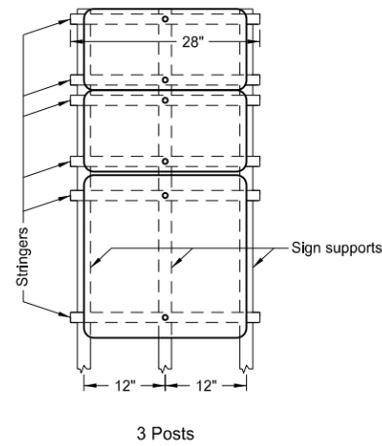


ASSEMBLY NO. 372

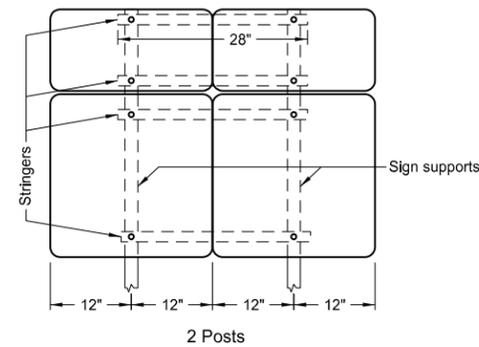
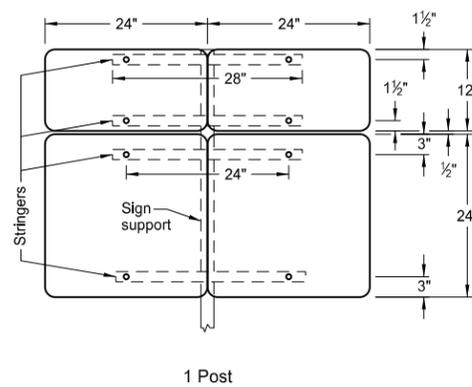
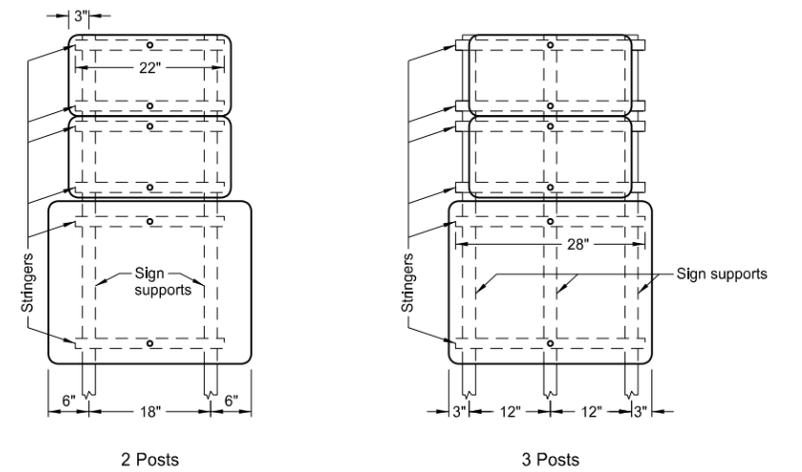
- Notes:
1. The minimum sign backing material thickness shall be 0.100 inch.
  2. Perforated square tube stringer shall be 1 1/2"x1 1/2".
  3. All holes shall be punched round for 3/8" bolt.



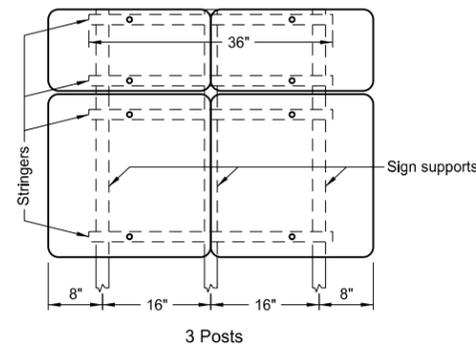
ASSEMBLY NO. 373



ASSEMBLY NO. 374



ASSEMBLY NO. 375

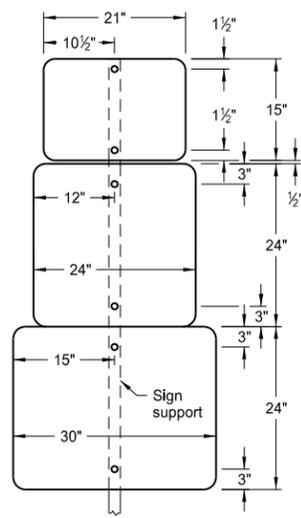


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 8-22-12	
REVISIONS	
DATE	CHANGE

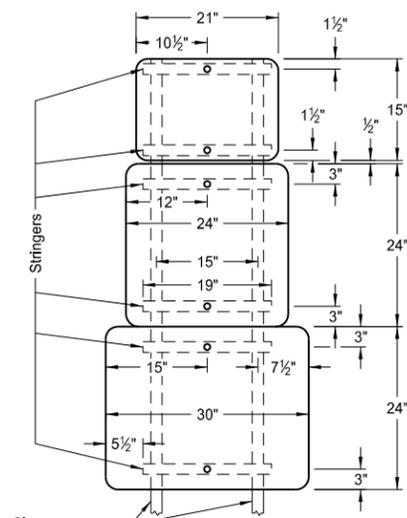
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8/22/12 and the original document is stored at the North Dakota Department of Transportation

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

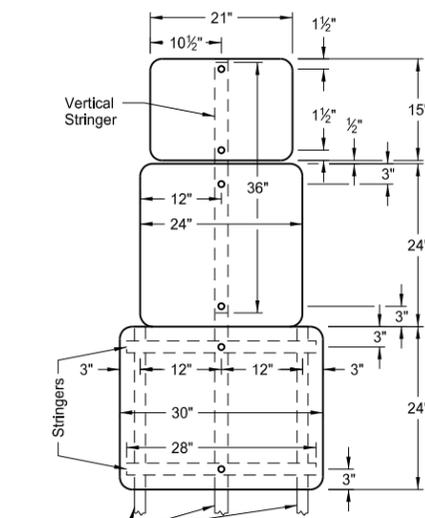
D-754-58



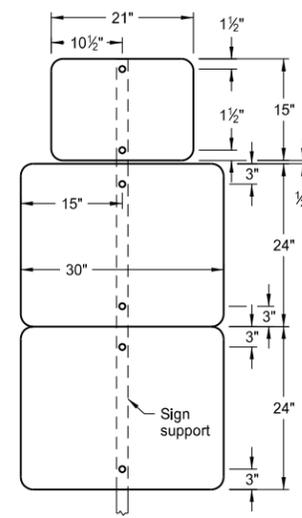
1 Post



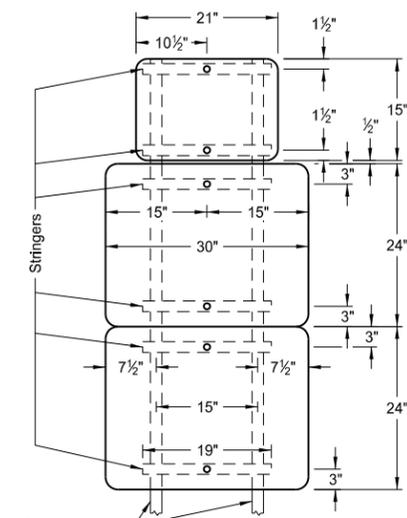
2 Posts  
ASSEMBLY 396



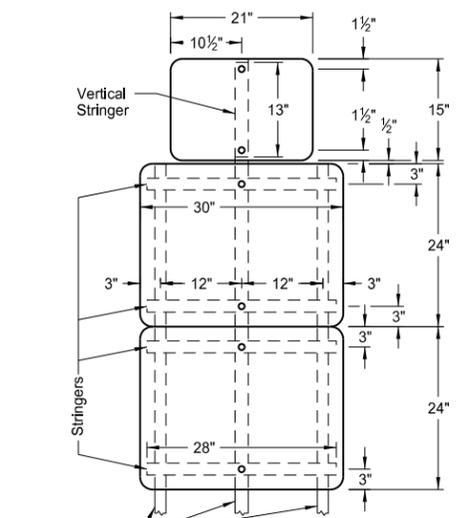
3 Posts



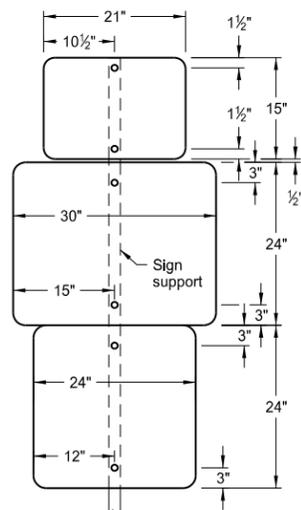
1 Post



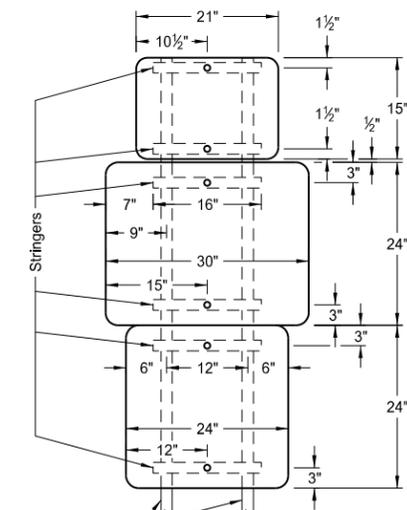
2 Posts  
ASSEMBLY 397



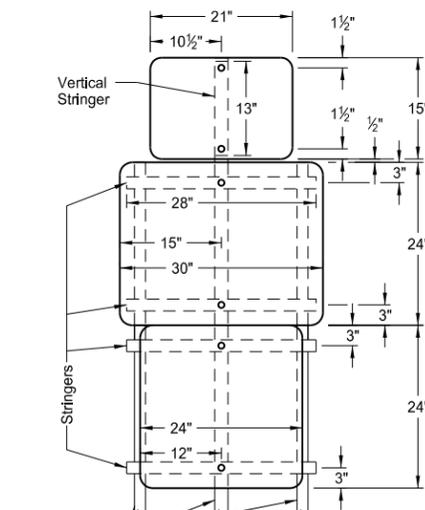
3 Posts



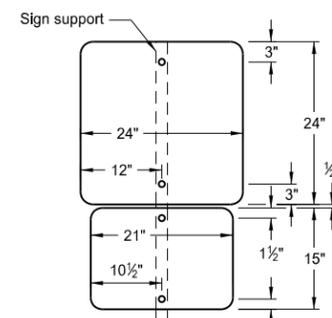
1 Post



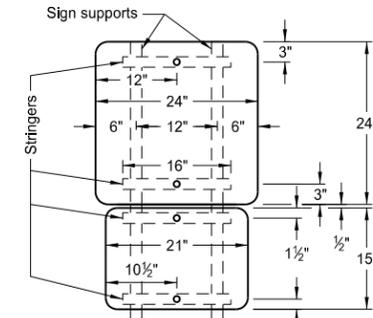
2 Posts  
ASSEMBLY 398



3 Posts



1 Post



2 Posts

ASSEMBLY 399

Notes:

1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1 1/2"x1 1/2".
3. All holes shall be punched round for 3/8" bolt.

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

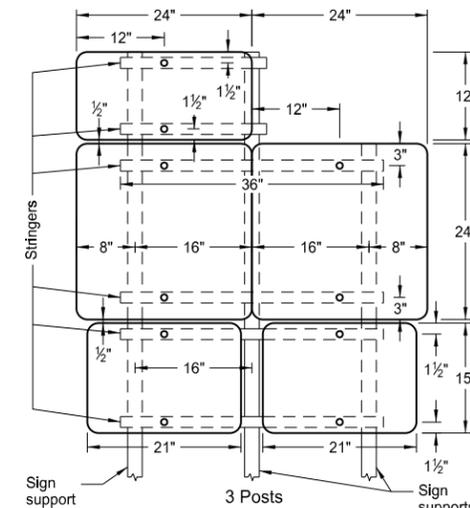
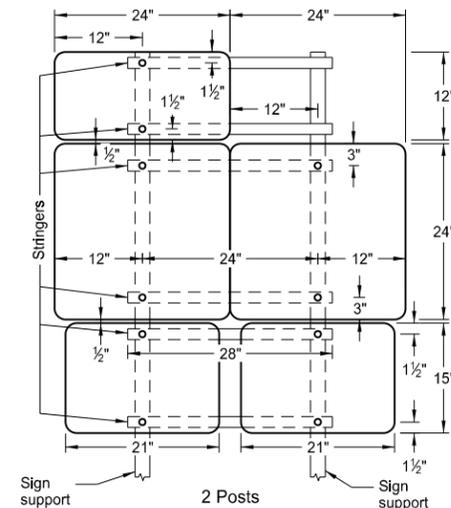
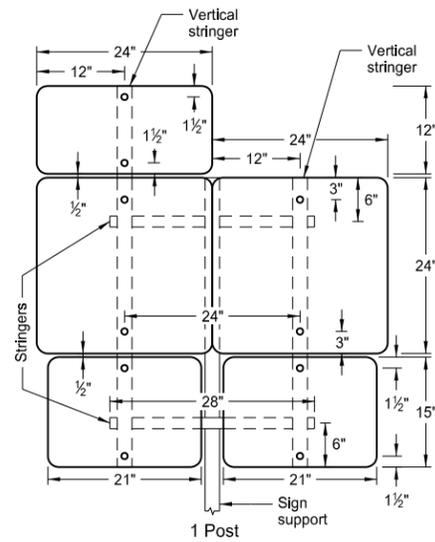
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8/22/12 and the original document is stored at the North Dakota Department of Transportation

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

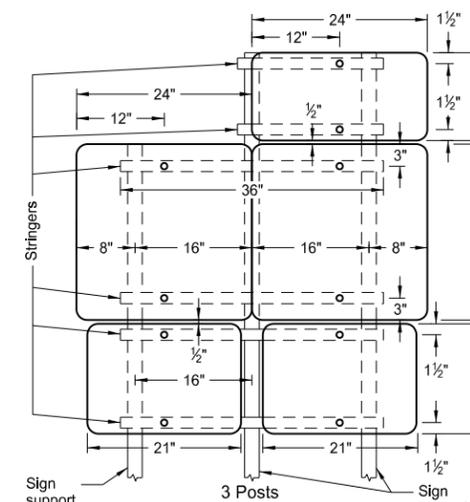
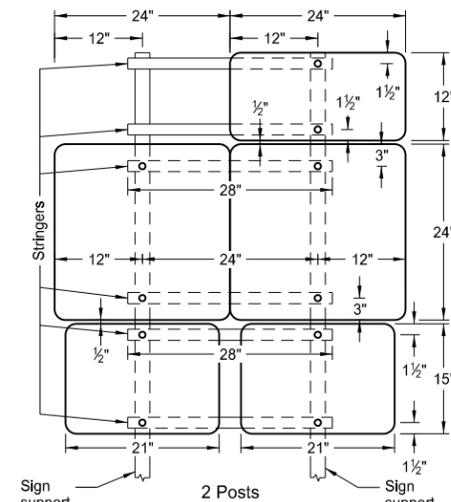
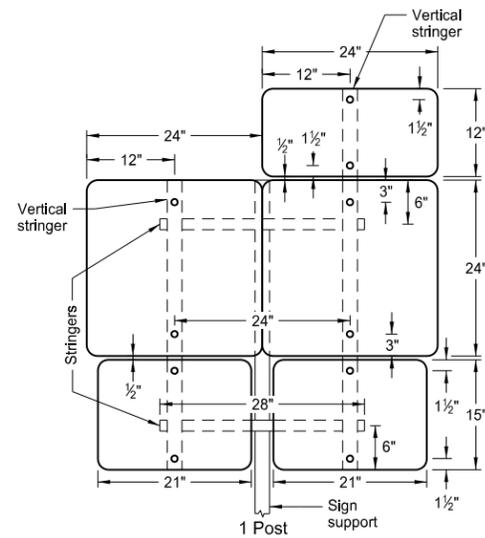
D-754-72

Notes:

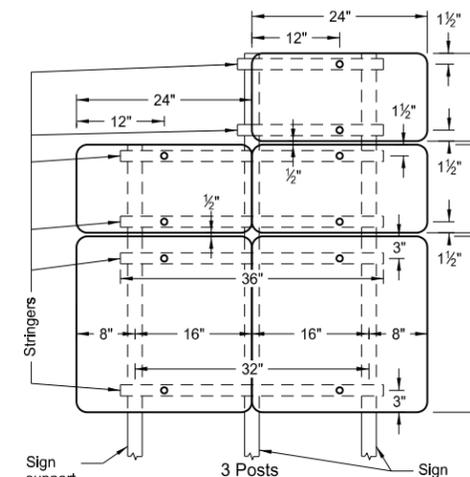
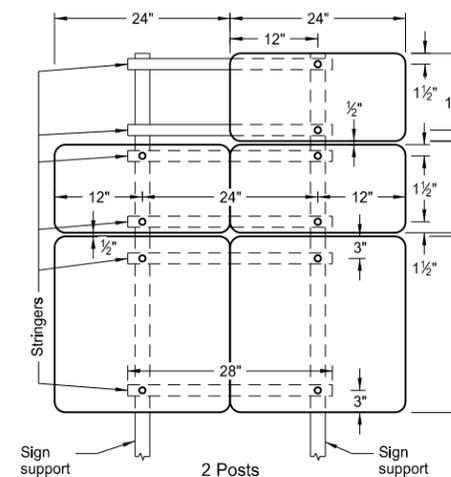
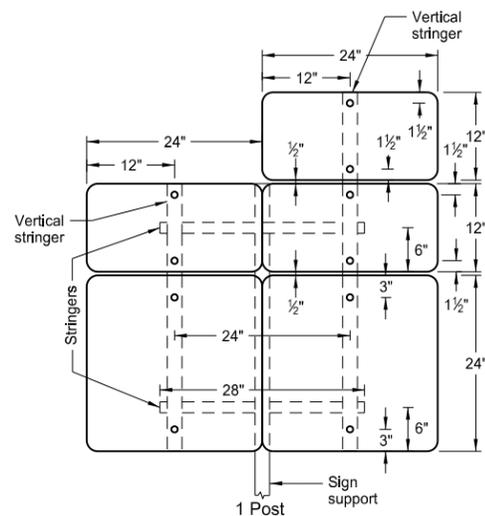
1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½"x1½".
3. All holes shall be punched round for ¾" bolt.



ASSEMBLY NO. 430



ASSEMBLY NO. 431

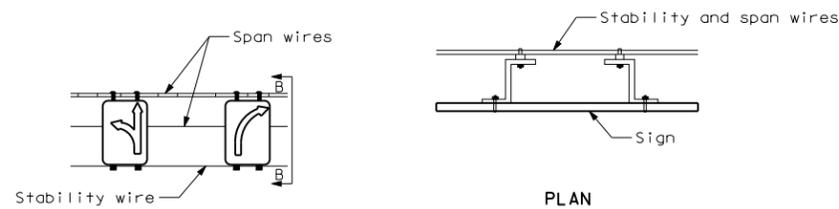


ASSEMBLY NO. 432

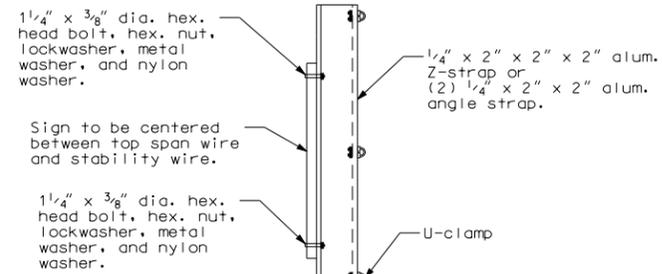
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE

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**

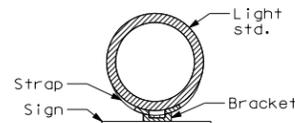


PLAN



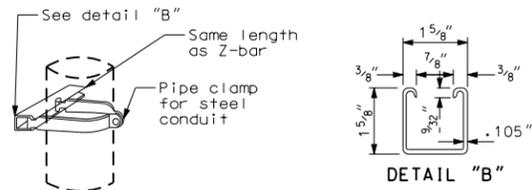
B - B

SPAN WIRE MOUNTED SIGN DETAIL



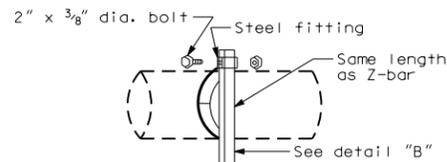
LT. STD. MOUNTED SIGN BRACKET DETAIL  
(Max. 24" x 30" signs)

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.



VERTICAL MOUNTING

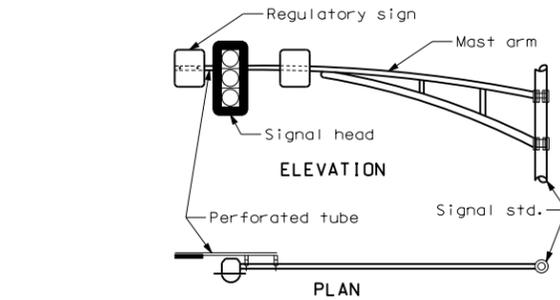
Two (2) clamps required per sign



HORIZONTAL MOUNTING

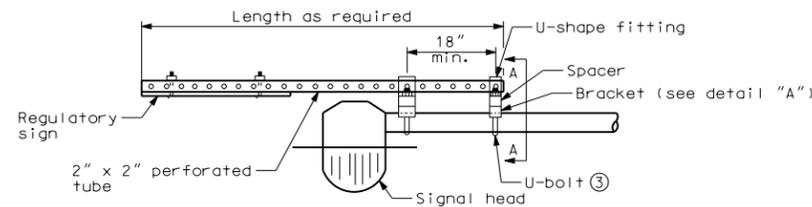
Two (2) clamps required per sign

ALTERNATE CLAMP MOUNTING

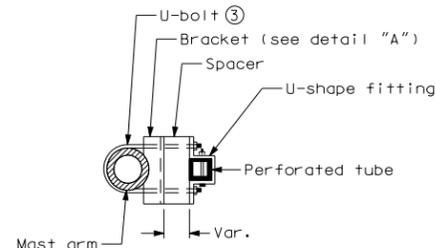


ELEVATION

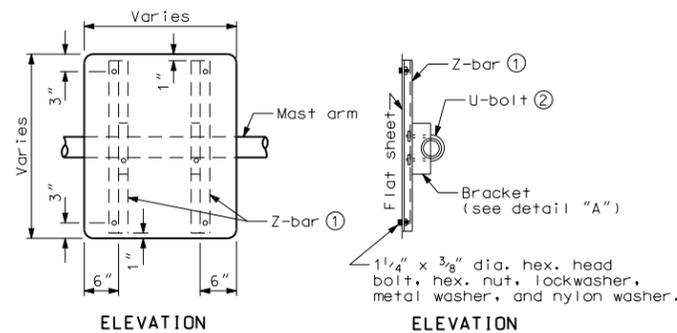
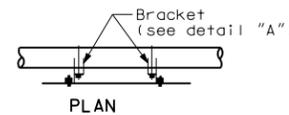
PLAN



SIGN MOUNTED BEYOND END OF MAST ARM DETAIL



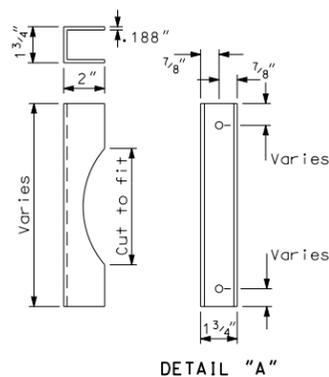
A - A



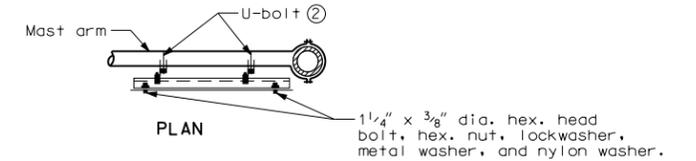
ELEVATION

ELEVATION

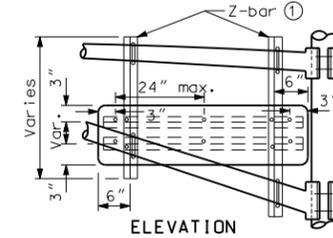
MAST ARM MOUNTED REGULATORY SIGN DETAIL



DETAIL "A"

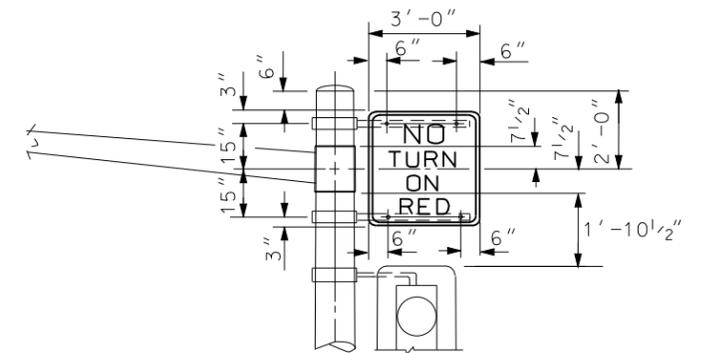


PLAN



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:

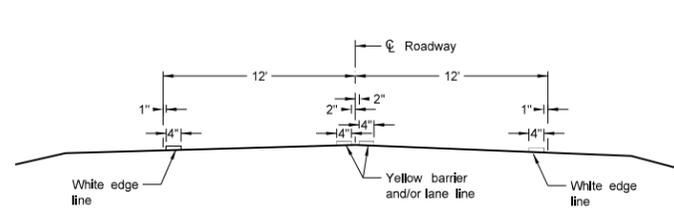
Metal washers and nylon washers used on sign face shall have a minimum outside dia. of 15/16" ± 1/16" and 10 gauge thickness.

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

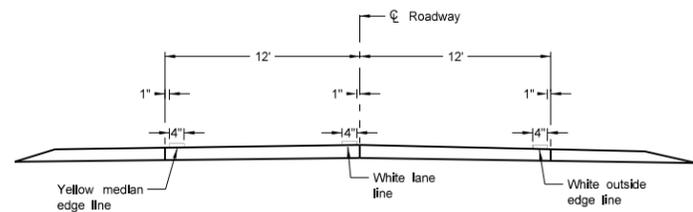
This document was originally issued and sealed by  
**MARK S. GAYDOS**  
Registration Number  
**PE- 4518**,  
on 12/01/04 and the original document is stored at the  
North Dakota Department  
of Transportation

# PAVEMENT MARKING

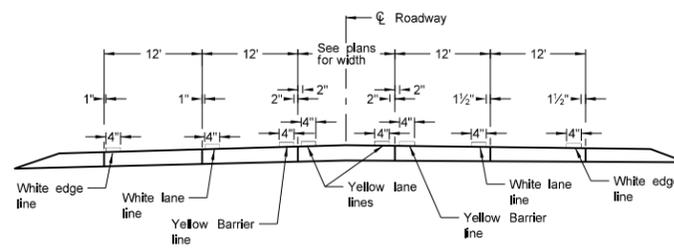
D-762-4



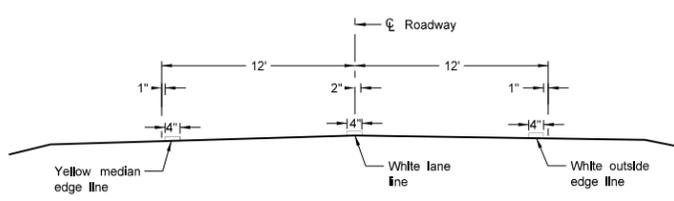
Two Lane Two Way  
RURAL ROADWAY



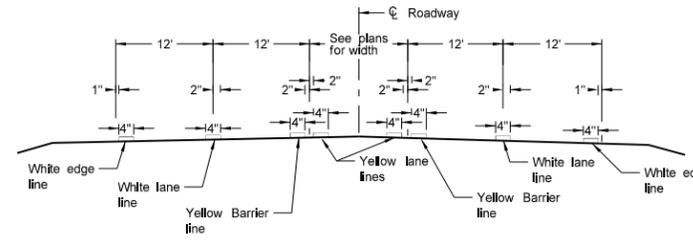
Two Lane Roadway  
INTERSTATE HIGHWAY  
Concrete Section



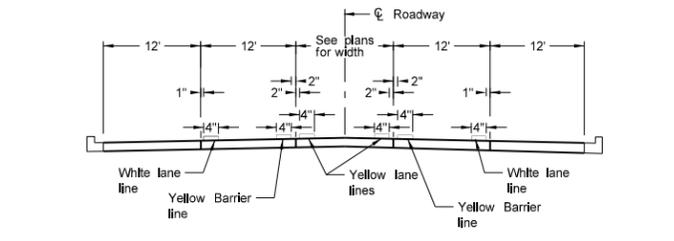
RURAL FIVE LANE ROADWAY  
Concrete Section



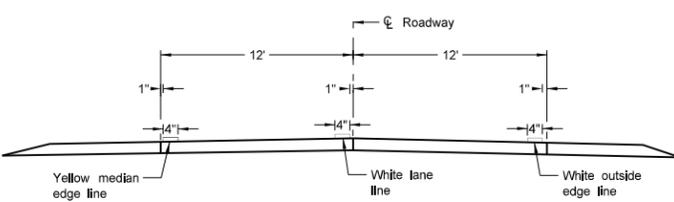
Two Lane Divided  
Rural Roadway  
PRIMARY HIGHWAY  
Asphalt Section



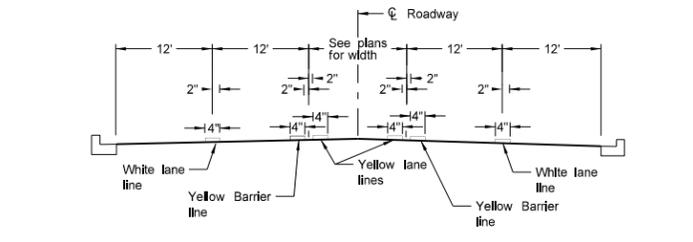
RURAL FIVE LANE ROADWAY  
Asphalt Section



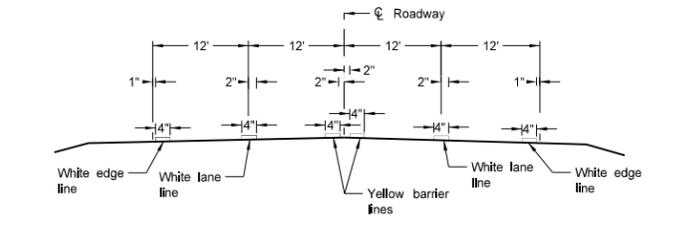
URBAN FIVE LANE SECTION  
Concrete Section



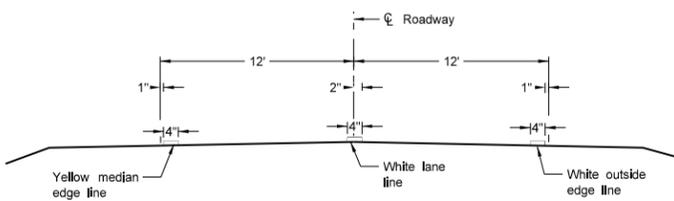
Two Lane Roadway  
PRIMARY HIGHWAY  
Concrete Section



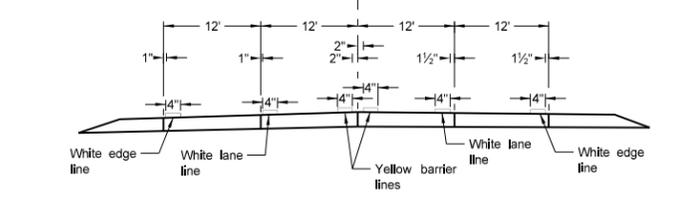
URBAN FIVE LANE SECTION  
Asphalt Section



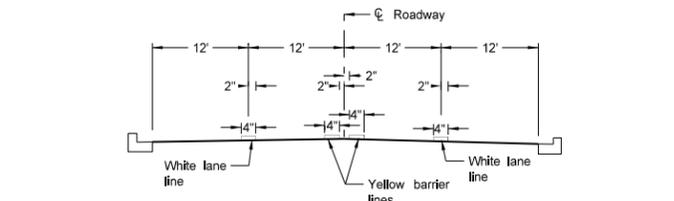
RURAL FOUR LANE ROADWAY  
Asphalt Section



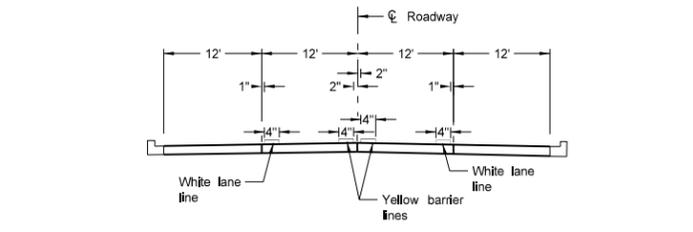
Two Lane Roadway  
INTERSTATE HIGHWAY  
Asphalt Section



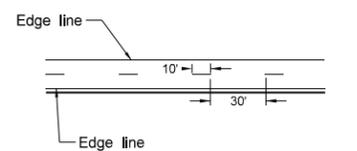
RURAL FOUR LANE ROADWAY  
Concrete Section



URBAN FOUR LANE SECTION  
Asphalt Section



URBAN FOUR LANE SECTION  
Concrete Section



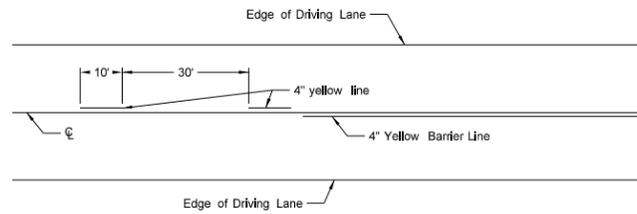
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

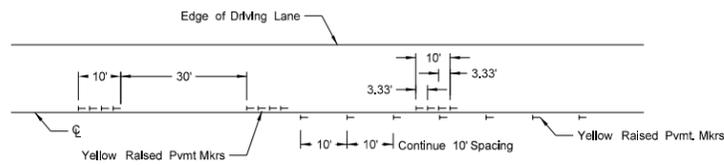
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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

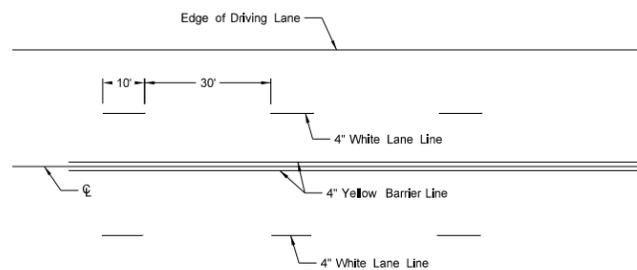
SHORT-TERM PAVEMENT MARKING



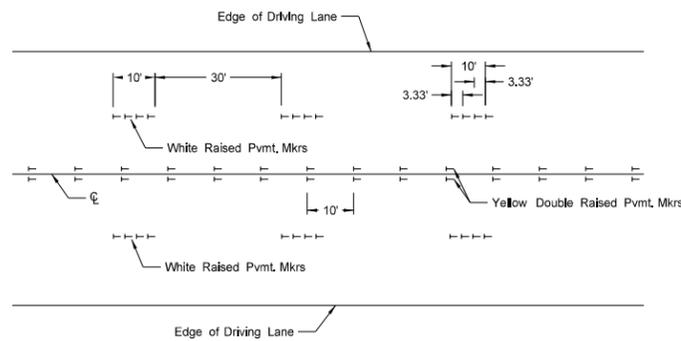
Painted or Tape Lines



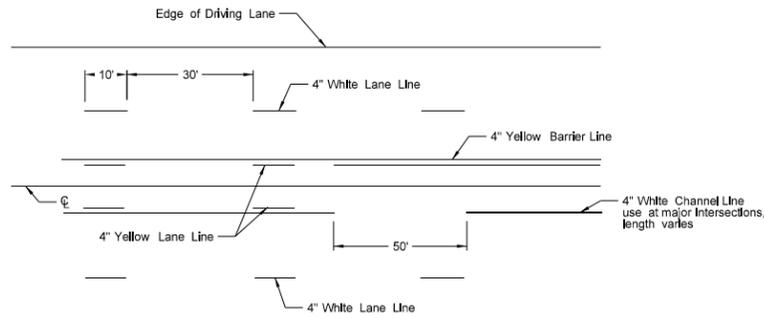
Raised Pavement Markers  
TWO-LANE TWO-WAY ROADWAY



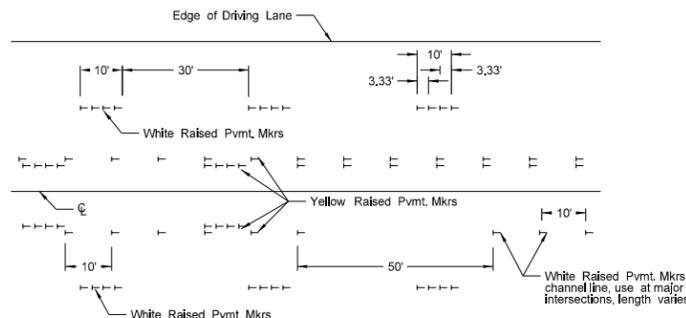
Painted or Tape Lines



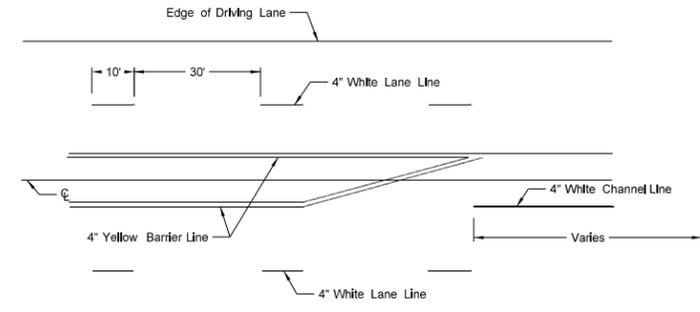
Raised Pavement Markers  
FOUR LANE ROADWAY



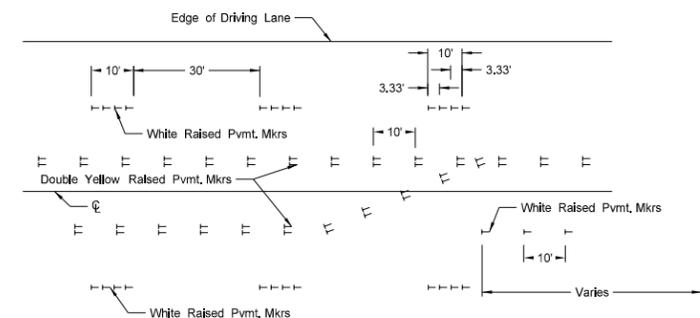
Painted or Tape Lines



Raised Pavement Markers  
FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers  
FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

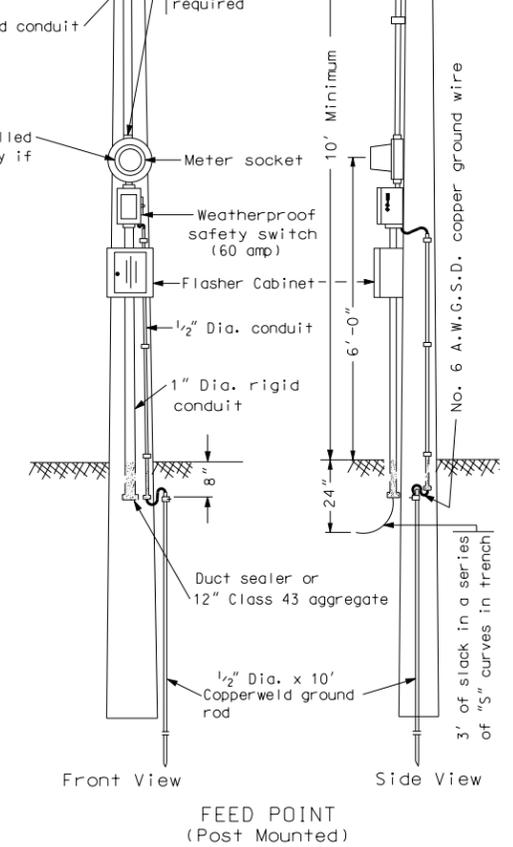
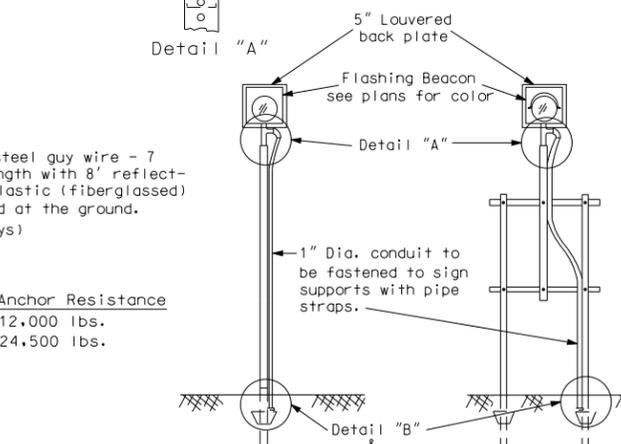
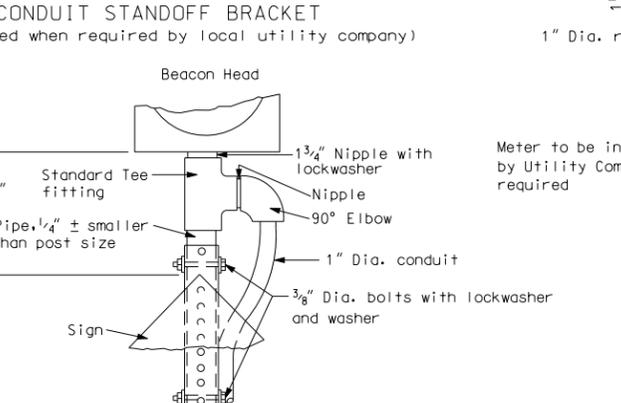
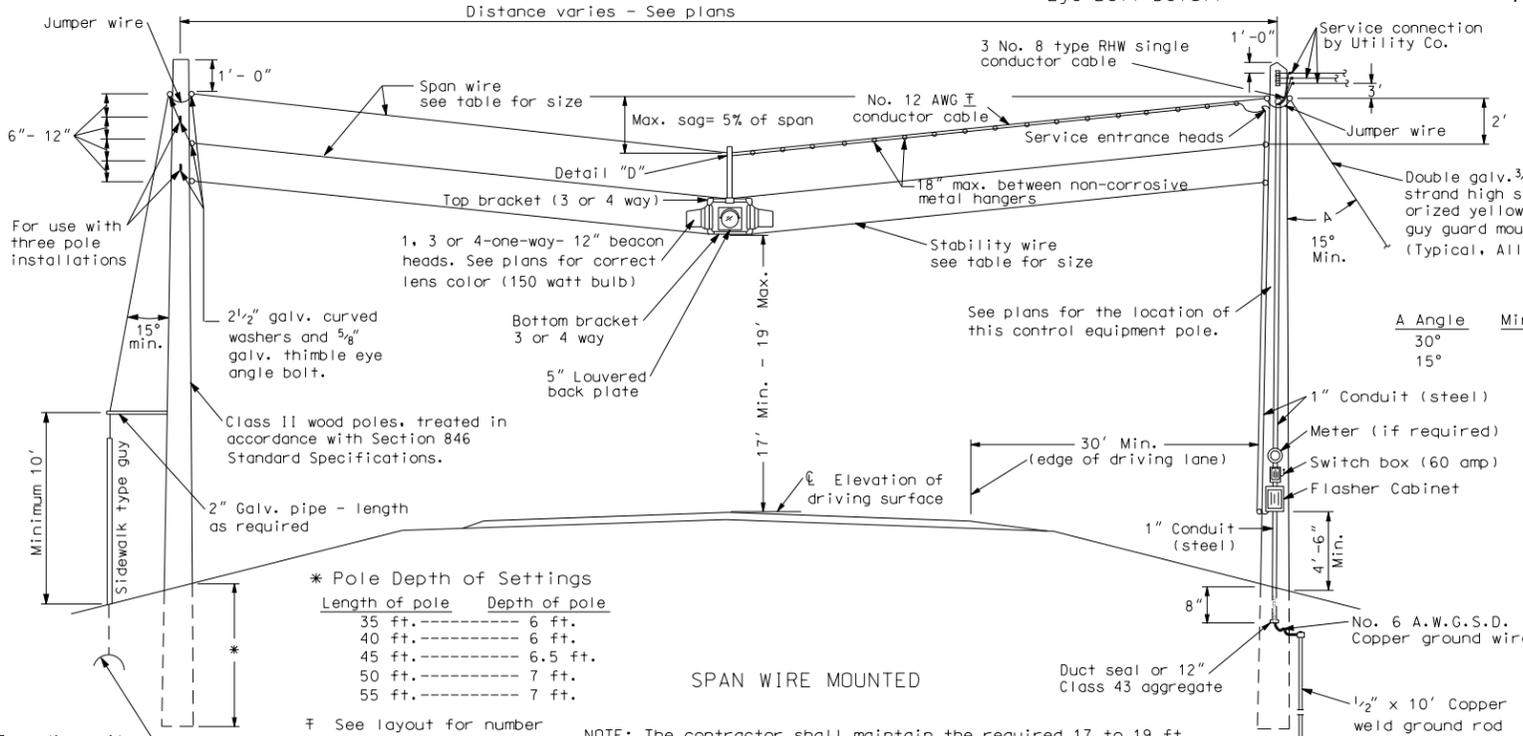
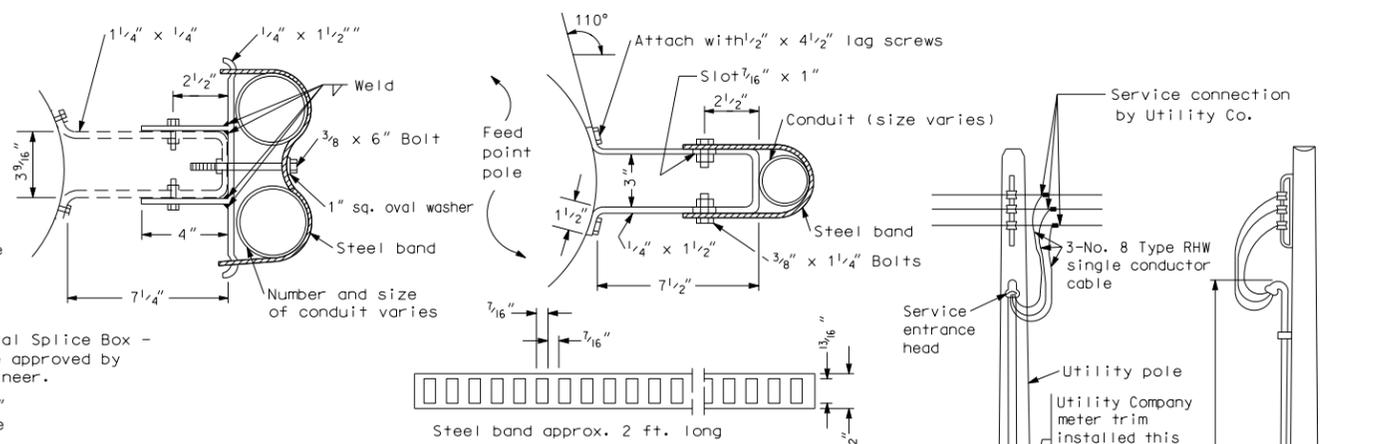
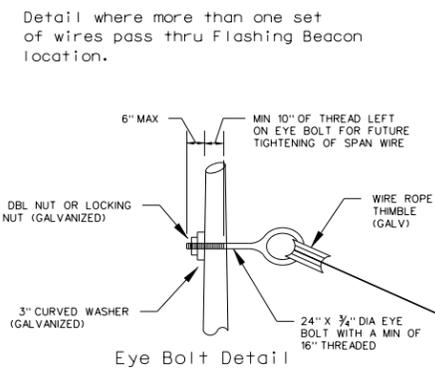
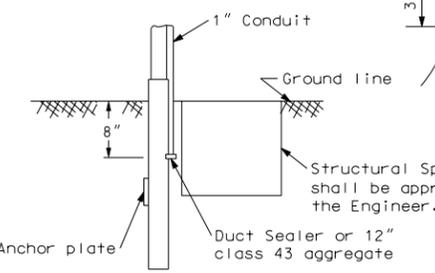
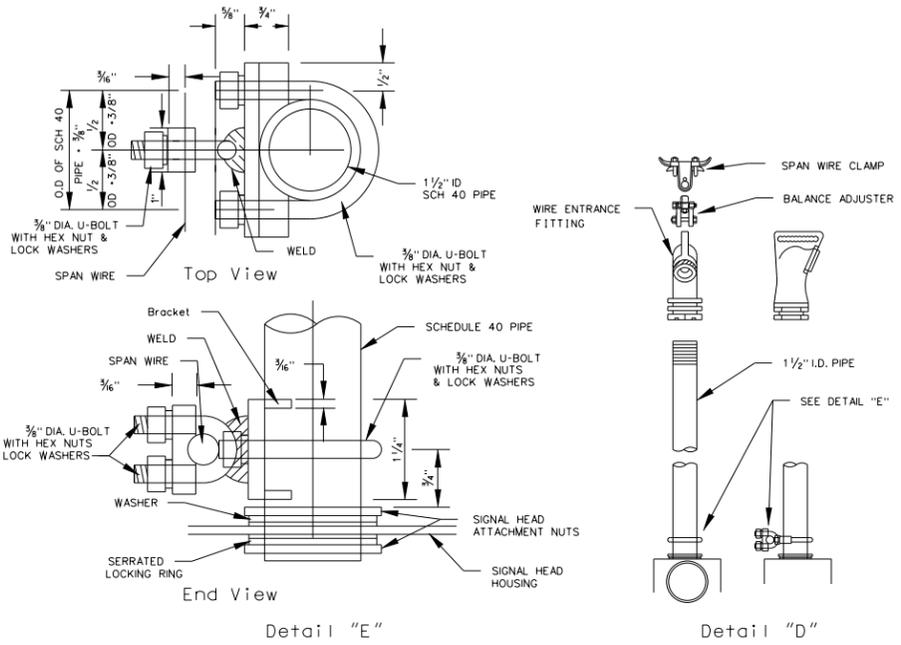
1. Two-lane two-way roadways shall have no passing zones placed as shown. No passing zone signs may be placed in lieu of short term no passing zone pavement markings. These signs will be allowed to remain in place for three days, at which time the short term no passing zone pavement marking shall be placed.
2. Short term center line stripe (paint) on top lift shall be carefully placed with exact spacing so that the permanent stripe will match when applied.
3. Raised markers and tape markings shall be removed after permanent pavement marking has been installed. Removed markings shall become the property of the contractor.

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

SPAN LENGTHS & SIZE OF SPAN WIRE								
Number of Beacon Heads Per Span	3/8" Span wire 1/8" Stability wire		3/8" Span wire 3/8" Stability wire		1/2" Span wire 1/2" Stability wire		5/8" Span wire 5/8" Stability wire	
	Max. Length		Max. Length		Max. Length		Max. Length	
	High Strength	Extra High Strength						
1	140'	170'	150'	180'	160'	195'	170'	210'
2	110'	140'	130'	160'	150'	185'	160'	200'
3	85'	115'	110'	140'	140'	170'	160'	195'
4	68'	90'	90'	120'	125'	160'	150'	185'

FLASHING BEACON



\* Pole Depth of Settings

Length of pole	Depth of pole
35 ft.	6 ft.
40 ft.	6 ft.
45 ft.	6.5 ft.
50 ft.	7 ft.
55 ft.	7 ft.

NOTE: The contractor shall maintain the required 17 to 19 ft. flashing beacon height over the roadway for a minimum period of 90 calendar days after installation unless written permission is granted by the Engineer to waive the 90 day requirement. The cost of maintaining the signal head elevation shall not be bid separately but shall be included in the price bid for flashing beacon.

NOTE: Flasher shall be operated on 120 volts.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-01-90	Depth of pole
05-01-92	General revisions
09-07-95	Back plates & detail D
08-15-96	Add span wire
06-18-03	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