

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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04-23-18	General Revisions

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NDDOT ABBREVIATIONS

D-101-2

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

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NDDOT ABBREVIATIONS

D-101-3

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

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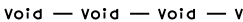


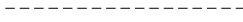
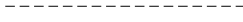

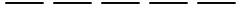
















NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

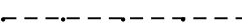
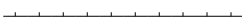


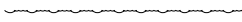
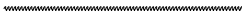
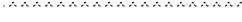

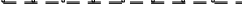



702COM	702 Communications	GT PLNS NAT GAS	Great Plains Natural Gas Company	RED RIV TEL	Red River Rural Telephone
ACCENT	Accent Communications	HALS TEL	Halstad Telephone Company	RESVTN TEL	Reservation Telephone
AGASSIZ WU	Agassiz Water Users Incorporated	IDEA1	Idea1	ROBRTS TEL	Roberts Company Telephone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

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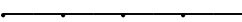

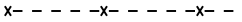

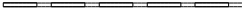


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Existing Topography









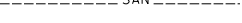
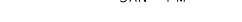












	Existing Ground Void
	Existing Cemetary Boundary
	Existing Box Culvert Bridge
	Existing Concrete Surface
	Existing Drainage Structure
	Existing Gravel Surface
	Existing Riprap
	Existing Dirt Surface
	Existing Asphalt Surface
	Existing Tie Point Line
	Existing Railroad Centerline
	Existing Guardrail Cable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

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

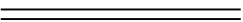


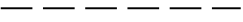
Proposed Topography

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

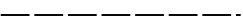
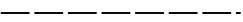







Existing Utilities

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




Proposed Utilities

	24 Inch Pipe
	Reinforced Concrete Pipe
	Under Drain
	Edge Drain

Traffic Utilities

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

Sign Structures

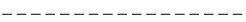
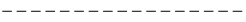




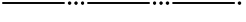






	Existing Overhead Sign Structure
	Existing Overhead Sign Structure Cantilever
	Overhead Sign Structure Cantilever

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups







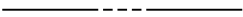
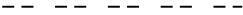

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Line Styles

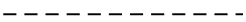
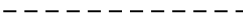
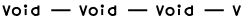
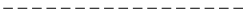




Right Of Way

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







Boundary Control



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

Cross Sections and Typicals



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

Geotechnical


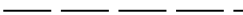
	Geotextile Fabric Type D
	Geogrid
	Geotextile Fabric Type R
	Geotextile Fabric Type R1
	Geotextile Fabric Type RR
	Geotextile Fabric Type S

	Subgrade Reinforcement
	Failure Line


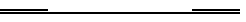

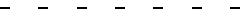


Countours

	Depression Contours
	Supplemental Contour



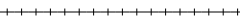

Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile










Striping

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








Pavement Joints

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



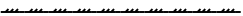
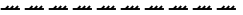
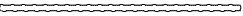
Bridge Details

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

Erosion Control

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

Environmental

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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



























































































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Symbols

	North Arrow (Half Scale)		Attenuation Device		Existing Railroad Battery Box		Existing Delineator Type E										
	Truck Mounted Attenuator		Diamond Grade Delineator Type A		Existing Bush or Shrub		Existing EFB Misc										
	Type I Barricade		Diamond Grade Delineator Type B		Existing Gas Cap or Stub		Existing Flashing Beacon										
	Type II Barricade		Diamond Grade Delineator Type C		Existing Sanitary Cap or Stub		Existing Pipe Mounted Flasher										
	Type III Barricade		Diamond Grade Delineator Type D		Existing Storm Drain Cap or Stub		Existing Pad Mounted Feed Point										
	Catch Basin		Diamond Grade Delineator Type E		Existing Water Cap or Stub		Existing Pipe Mounted Feed Point with Pad										
	Cairn or Stone Circle		Flexible Delineator		Existing Sanitary Cleanout		Existing Pole Mounted Feed Point										
	Video Detection Camera		Flexible Delineator Type A		Existing Concrete Foundation		Existing Railroad Frog										
	Storm Drain Cap or Stub		Flexible Delineator Type B		Existing Traffic Signal Controller		Existing Snow Gate 18										
	Corrugated Metal End Section 18 Inch		Flexible Delineator Type C		Existing Pad Mounted Signal Controller		Existing Snow Gate 28										
	Corrugated Metal End Section 24 Inch		Flexible Delineator Type D		Existing Sixteenth Section Corner		Existing Snow Gate 40										
	Corrugated Metal End Section 30 Inch		Flexible Delineator Type E		Existing Quarter Section Corner		Existing Headwall										
	Corrugated Metal End Section 36 Inch		Delineator Type A		Existing Section Corner		Existing Pedestrian Head with Number										
	Corrugated Metal End Section 42 Inch		Delineator Type A Reset		Existing Railroad Crossbuck		Existing Signal Head										
	Corrugated Metal End Section 48 Inch		Delineator Type B		Existing Satellite Dish		Existing Sprinkler Head										
	Concrete Foundation		Delineator Type B Reset		Existing Fuel Dispensers		Existing Fire Hydrant										
	Ground Connection Conductor		Delineator Type C		Existing Flexible Delineator Type A		Existing Catch Basin Drop Inlet										
	Neutral Connection Conductor		Delineator Type D		Existing Flexible Delineator Type B		Existing Curb Inlet										
	Phase 1 Connection Conductor		Delineator Type E		Existing Flexible Delineator Type C		Existing Manhole Inlet										
	Phase 2 Connection Conductor		Delineator Drums		Existing Flexible Delineator Type D		Existing Junction Box										
	Traffic Cone		Spot Elevation		Existing Flexible Delineator Type E	<table><tr><th colspan="2">NORTH DAKOTA DEPARTMENT OF TRANSPORTATION</th></tr><tr><th colspan="2">07-01-14</th></tr><tr><th colspan="2">REVISIONS</th></tr><tr><th>DATE</th><th>CHANGE</th></tr><tr><td></td><td></td></tr></table>		NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		07-01-14		REVISIONS		DATE	CHANGE		
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION																	
07-01-14																	
REVISIONS																	
DATE	CHANGE																
	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												

Symbols

D-101-31

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

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Symbols



Pad Mounted Feed Point



Pipe Mounted Feed Point with Pad



Pole Mounted Feed Point



Headwall



Double Headwall with Vegetation Barrier



Single Headwall with Vegetation Barrier



Pole Mounted Head



Sprinkler Head



Fire Hydrant



Inlet Type 1



Inlet Type 2



Double Inlet Type 2



Inlet Grate Type 2



Junction Box



High Mast Light Standard 10 Luminaire



High Mast Light Standard 3 Luminaire



High Mast Light Standard 4 Luminaire



High Mast Light Standard 5 Luminaire



High Mast Light Standard 6 Luminaire



High Mast Light Standard 7 Luminaire



High Mast Light Standard 8 Luminaire



High Mast Light Standard 9 Luminaire



Relocate Light Standard



Overhead Sign Structure Load Center



Light Standard 100 Watt High Pressure Sodium Vapor Luminaire



Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire



Light Standard 150 Watt High Pressure Sodium Vapor Luminaire



Light Standard 175 Watt High Pressure Sodium Vapor Luminaire



Light Standard 200 Watt High Pressure Sodium Vapor Luminaire



Light Standard 250 Watt High Pressure Sodium Vapor Luminaire



Light Standard 310 Watt High Pressure Sodium Vapor Luminaire



Light Standard 35 Watt High Pressure Sodium Vapor Luminaire



Light Standard 400 Watt High Pressure Sodium Vapor Luminaire



Light Standard 50 Watt High Pressure Sodium Vapor Luminaire



Light Standard 70 Watt High Pressure Sodium Vapor Luminaire



Light Standard 700 Watt High Pressure Sodium Vapor Luminaire



Manhole



Manhole 48 Inch



Sanitary Force Main Manhole



Sanitary Sewer Manhole



Storm Drain Manhole



Storm Drain Manhole with Inlet



Reset Mile Post



Mile Post Type A



Mile Post Type B



Mile Post Type C



Right of Way Marker



Tubular Marker



Alignment Monument



Iron Pin Reference Monument



Object Marker Type I



Object Marker Type II



Object Marker Type III



Caution Mode Arrow Panel



Back to Back Vertical Panel Sign



Double Direction Arrow Panel



Left Directional Arrow Panel



Right Directional Arrow Panel



Sequencing Arrow Panel



Truck Mounted Arrow Panel



Power Pole



Wood Pole



Pedestrian Push Button Post



Property Corner



Pull Box



Intelligent Transportation Pull Box



Sanitary Pump



Storm Drain Pump



Reinforced Pavement



Reinforced Concrete End Section 15 Inch



Reinforced Concrete End Section 18 Inch



Reinforced Concrete End Section 24 Inch



Reinforced Concrete End Section 30 Inch



Reinforced Concrete End Section 36 Inch



Reinforced Concrete End Section 42 Inch



Reinforced Concrete End Section 48 Inch



Reinforced Concrete End Section 54 Inch



Reset Right of Way Marker



Reset USGS Marker



Right of Way Markers



Riser 30 Inch



Continuous Split Barrel Sample



Flight Auger Sample



Split Barrel Sample



Thinwall Tube Sample



Highway Sign



SNOW GATE 18 FT



SNOW GATE 28 FT



SNOW GATE 40 FT



Standard Penetration Test



Transformer



Inclinometer Tube



Underdrain Cleanout



Excavation Unit



Water Valve

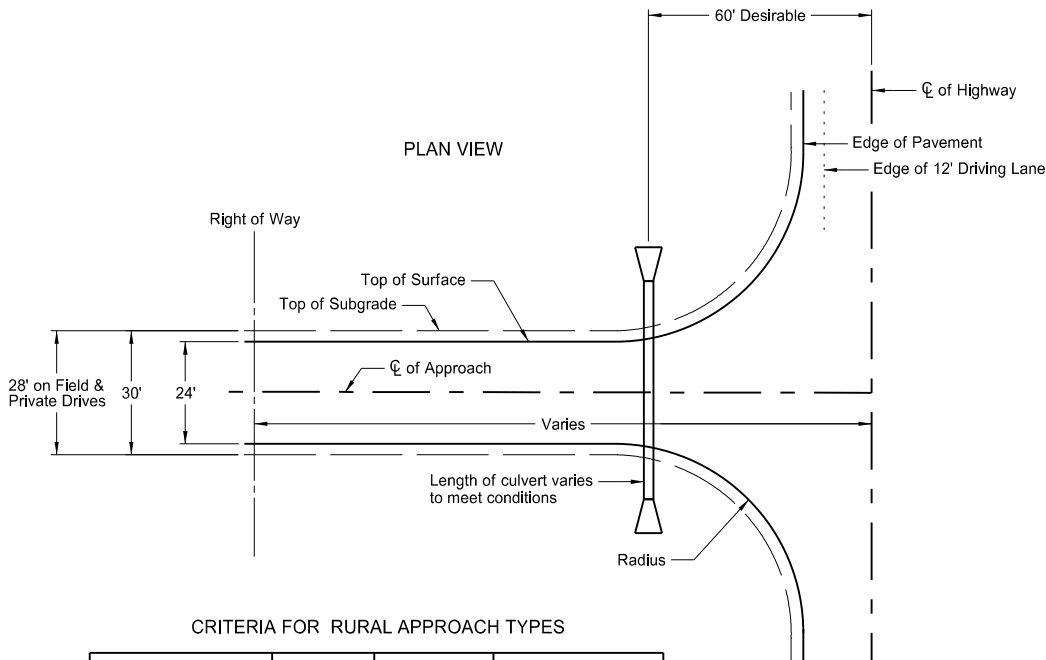
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

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STANDARD RURAL APPROACHES

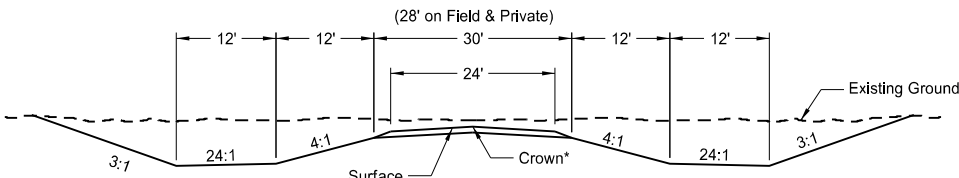
D-203-8

- NOTES:
1. 5% Max Rollover between approach storage platform and highway.

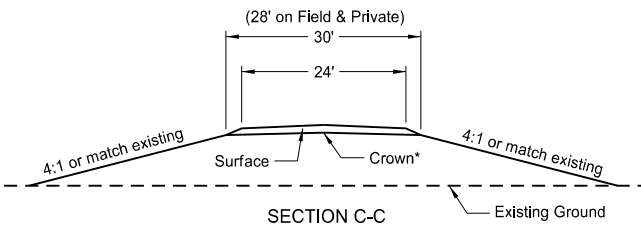
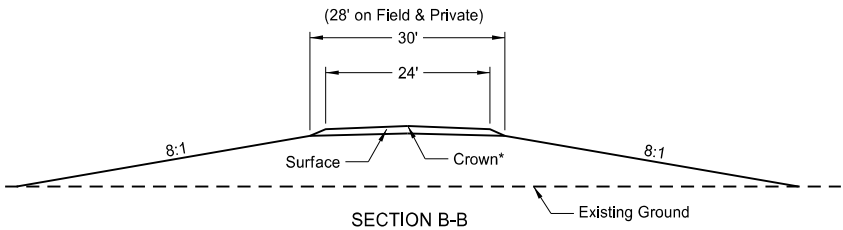


CRITERIA FOR RURAL APPROACH TYPES

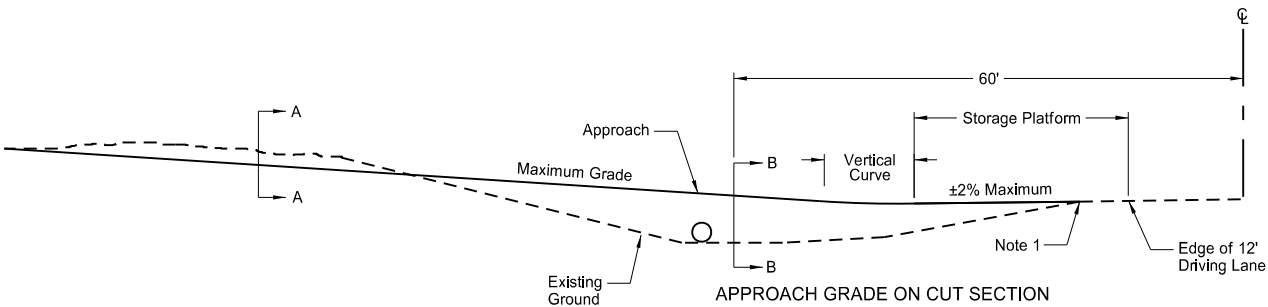
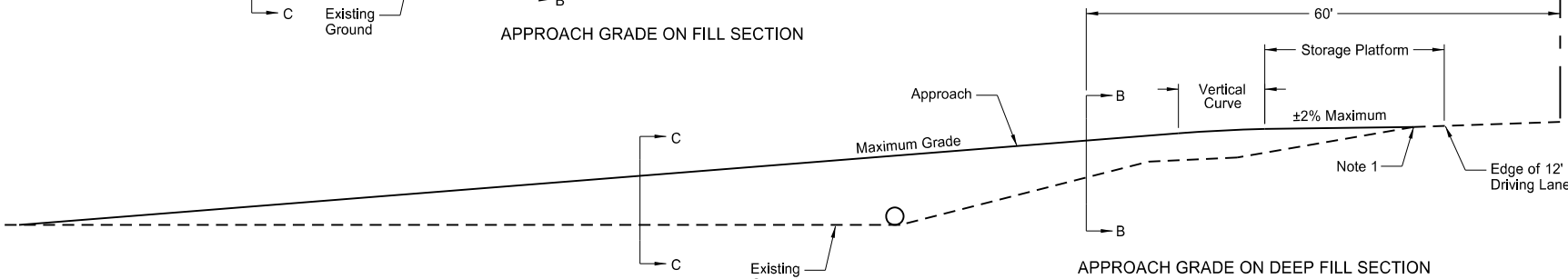
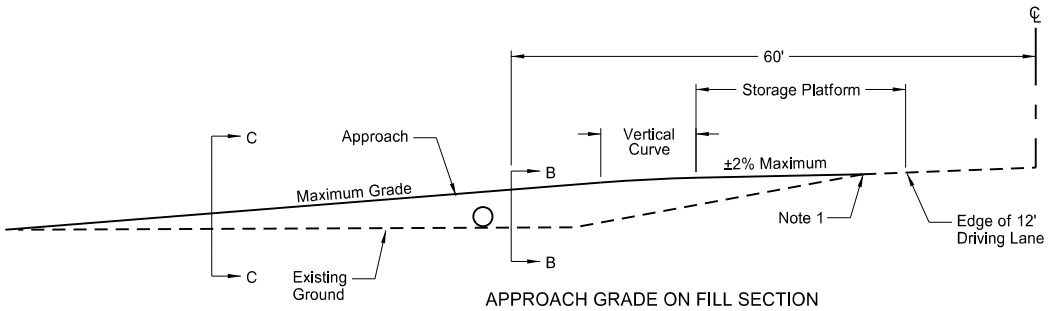
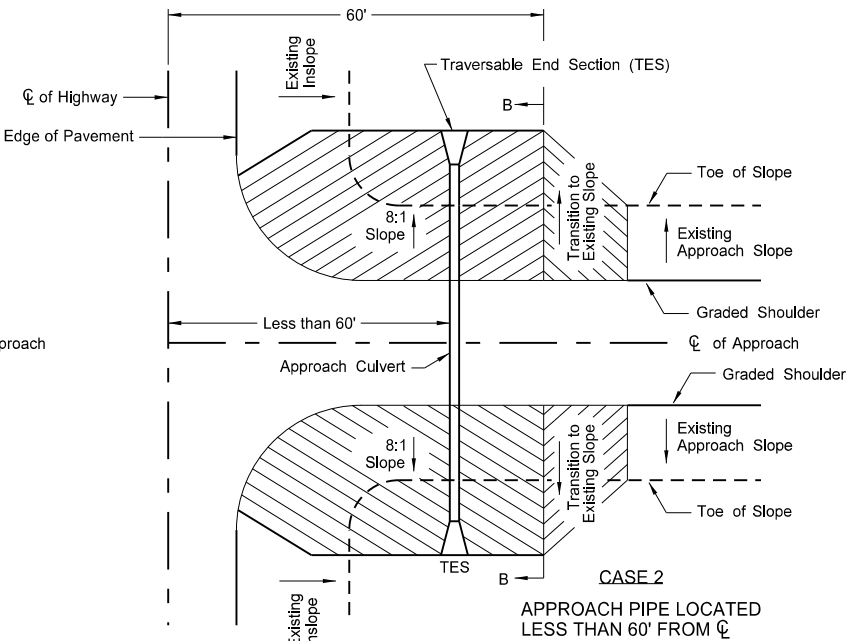
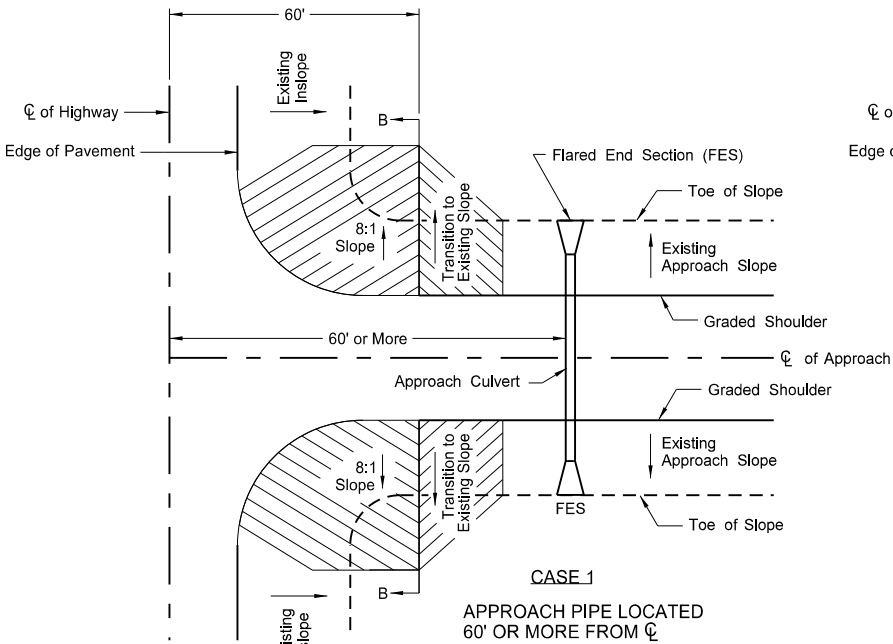
	Field Drives	Private Drives	Low Volume Public Roads
Radius	R=40 ft	R=40 ft	R=50 ft
Maximum Grade	10%	7%	7%
Storage Platform	24 ft	24 ft	50 ft
Vertical Curve Length	10 ft	10 ft	Varies (Min. 20 mph)



*2.1% crown for paved surface
*3.0% crown for gravel surface



APPROACH INSLOPES

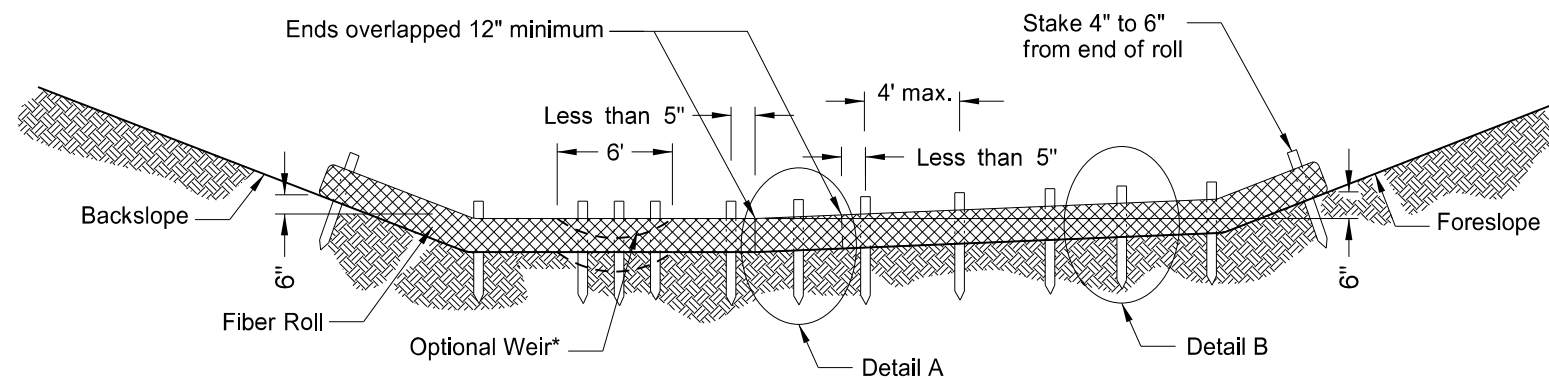


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-25-14	
REVISIONS	
DATE	CHANGE
6-30-2017	Revised Radius, Storage Platform, Inslope dimensions, and Note 1.

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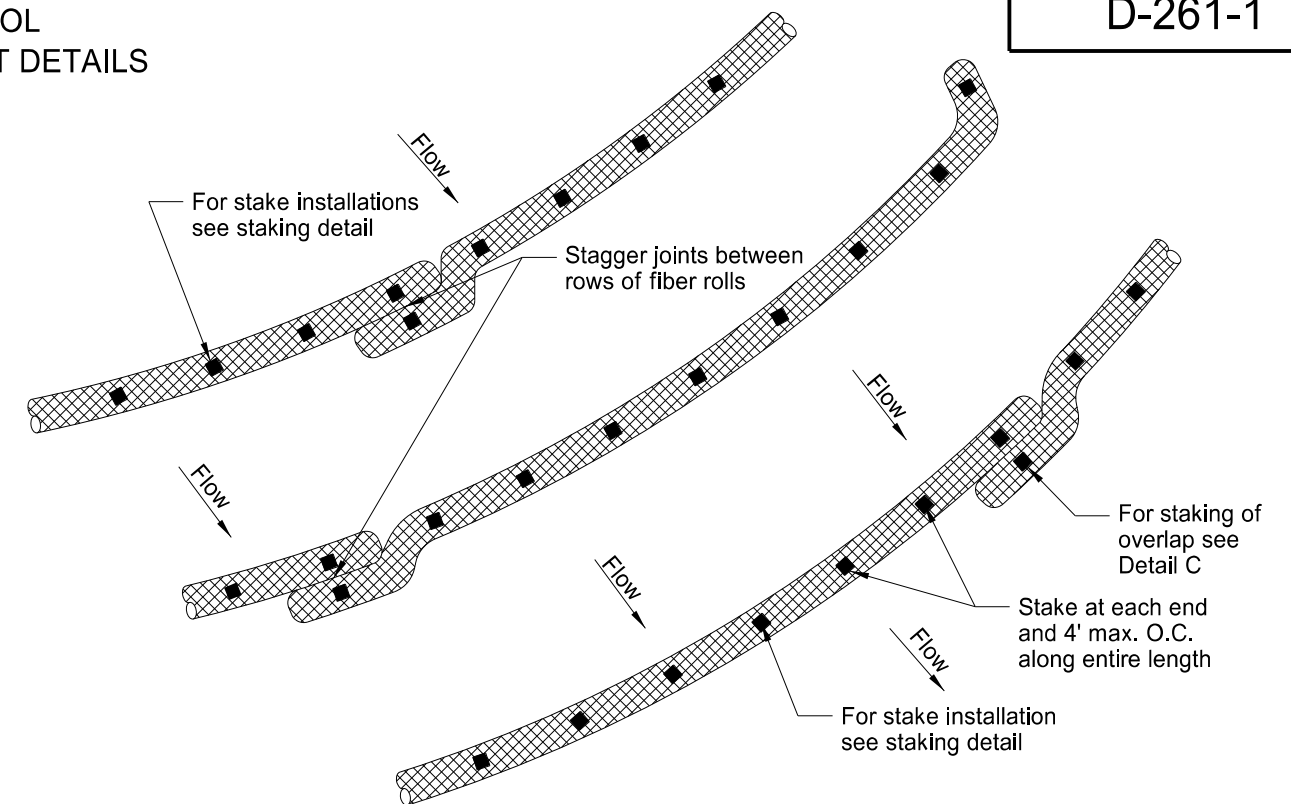
EROSION CONTROL FIBER ROLL PLACEMENT DETAILS

D-261-1

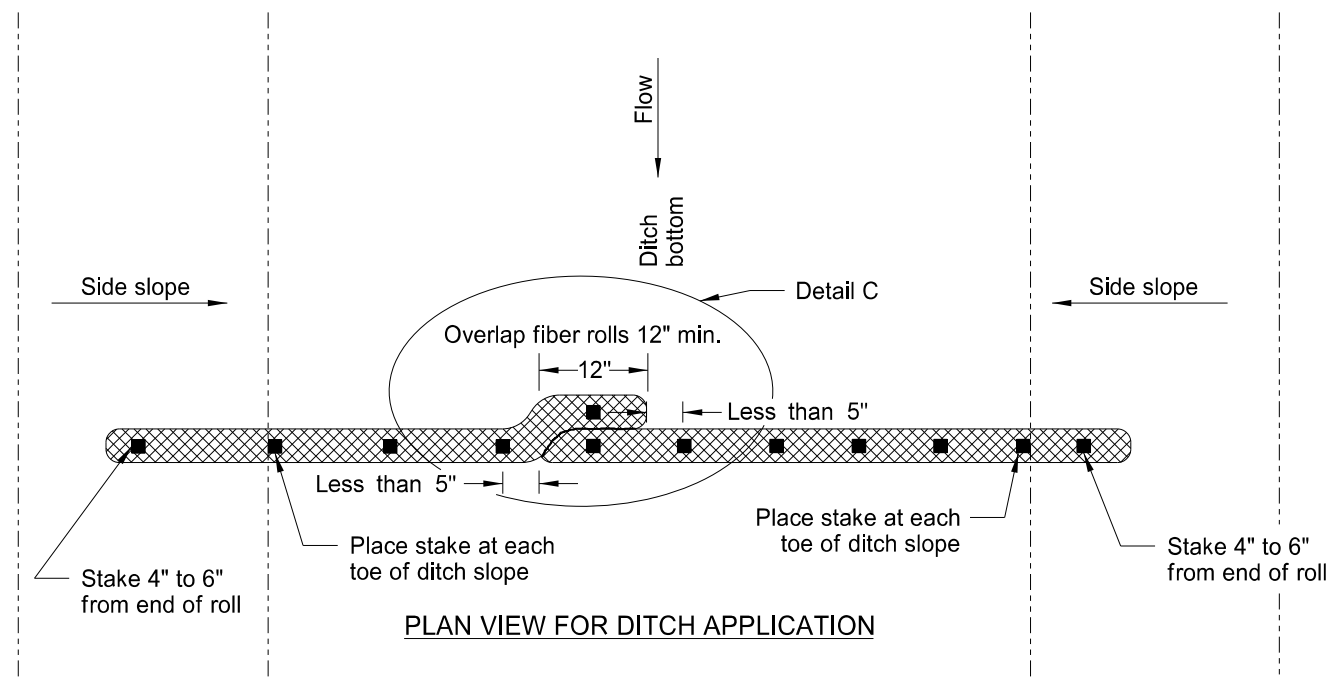


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

12 OR 20 INCH FIBER ROLL - DITCH BOTTOM

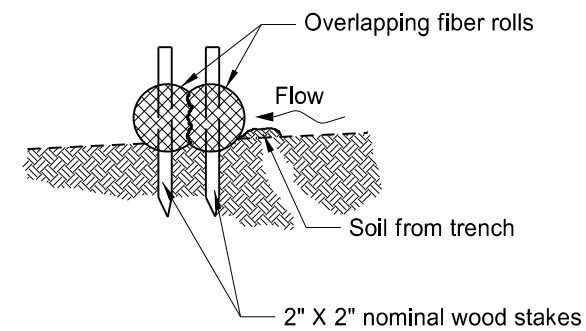


PLAN VIEW FOR SLOPE APPLICATION

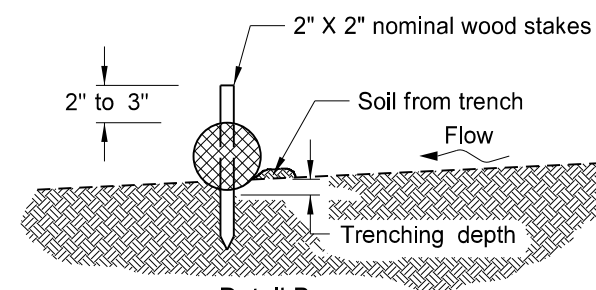


PLAN VIEW FOR DITCH APPLICATION

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"



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

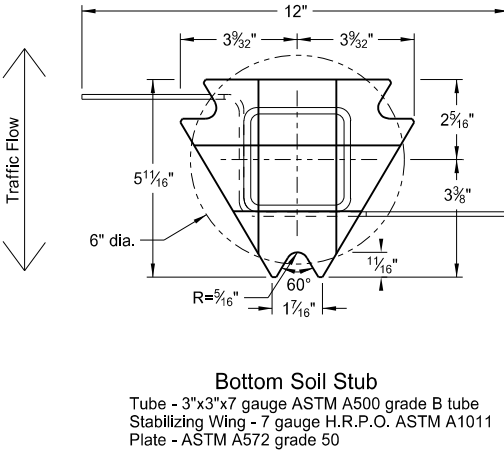
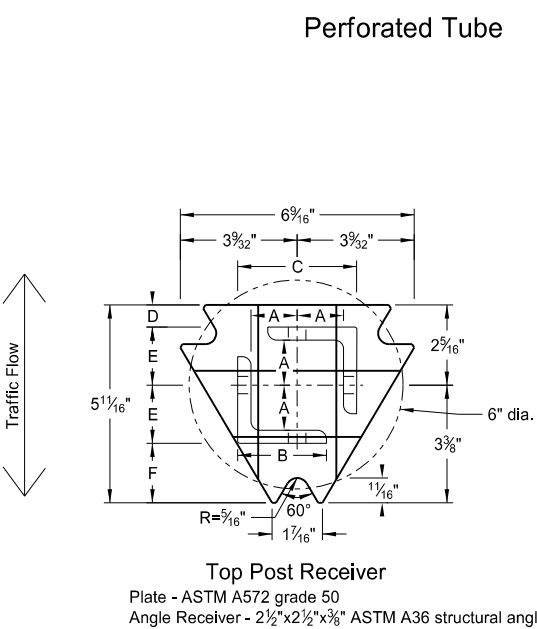
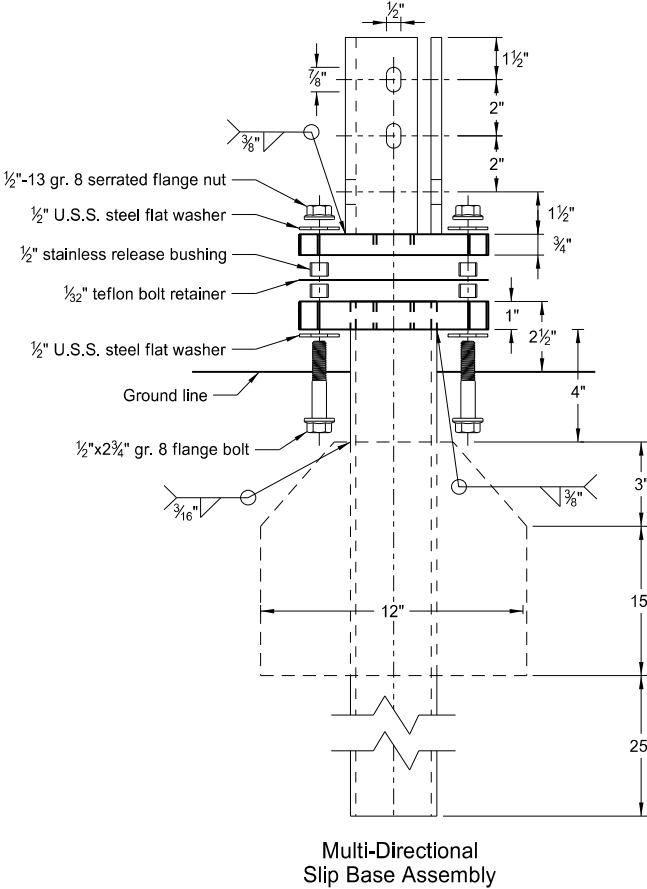
NOTE: Runoff must not be allowed to run under or around roll.

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.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.

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Registration Number
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Perforated Tube

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

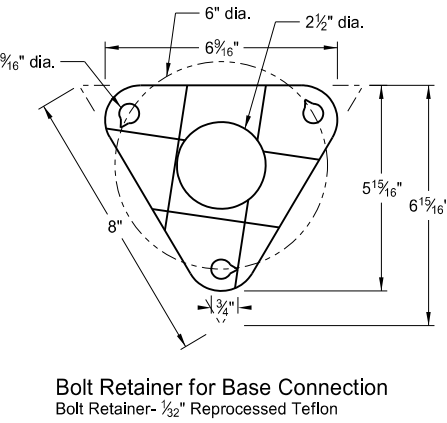
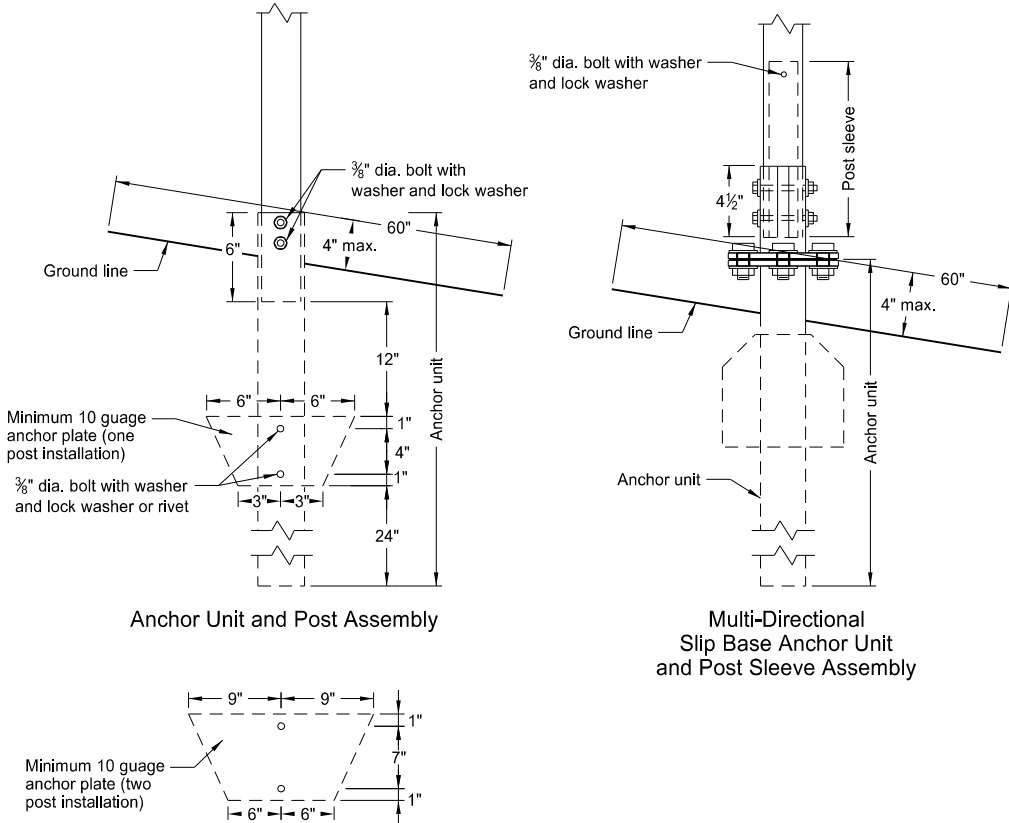


Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

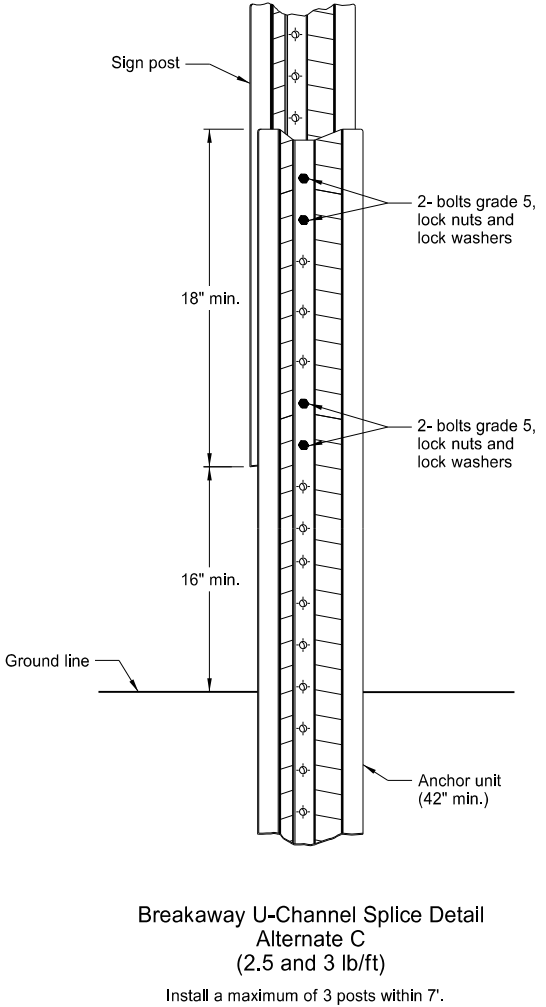
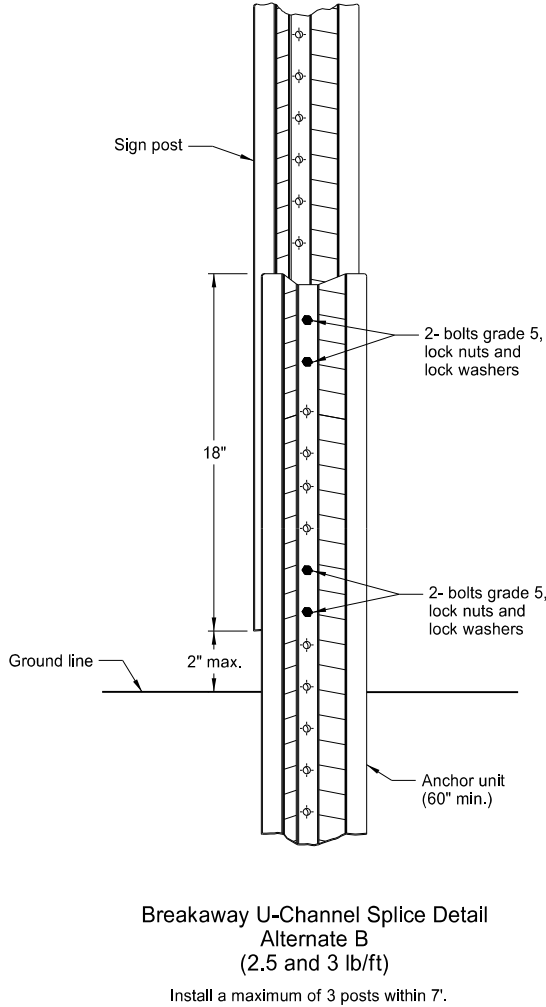
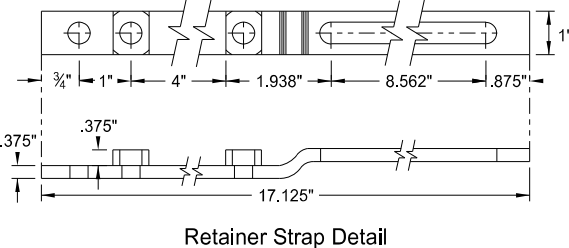
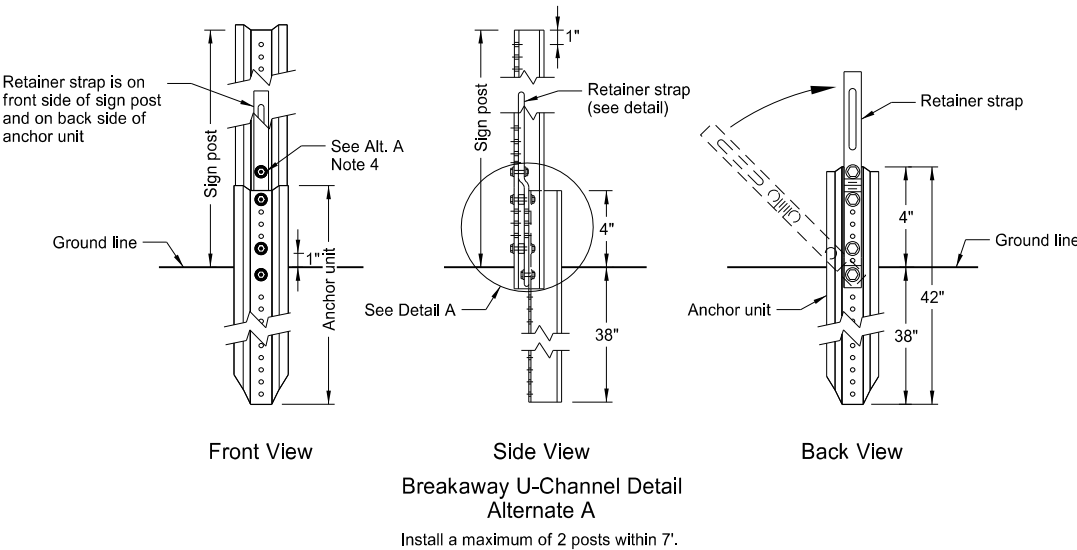
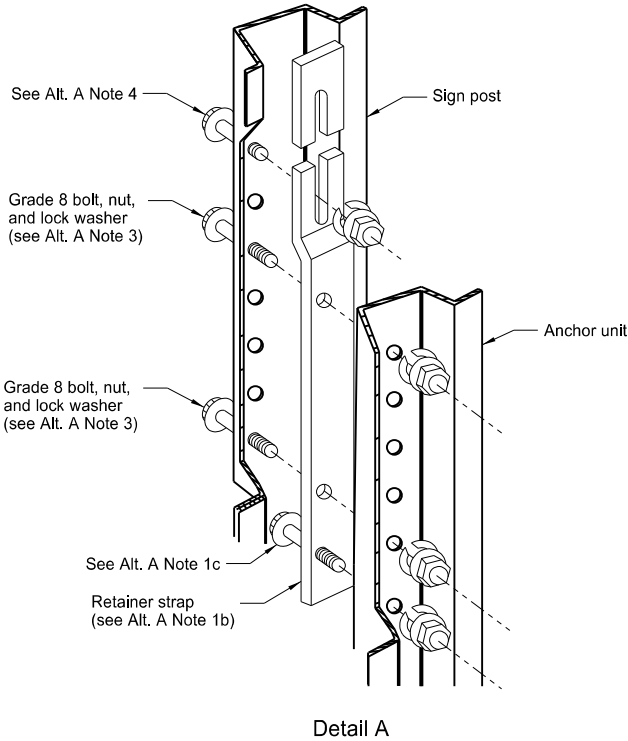
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 5/16"	2 1/2"	3 1/2"	2 5/32"	1 33/64"	1 7/8"
2 1/2"x10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

- (A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.
- (B) For additional wind load, insert the 2 3/8"x10 ga. into 2 1/2"x10 ga.



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

U-Channel Post



Alternate A Steps of Installation:

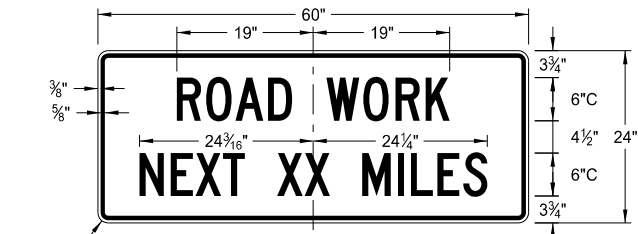
- a) Drive anchor unit to within 12" of ground level.
b) Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
- a) Drive anchor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

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

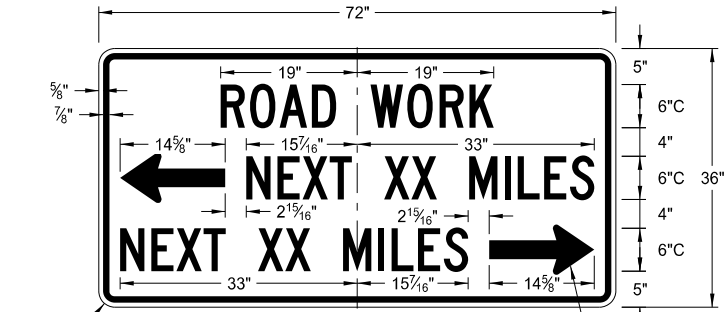
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of Transportation

CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

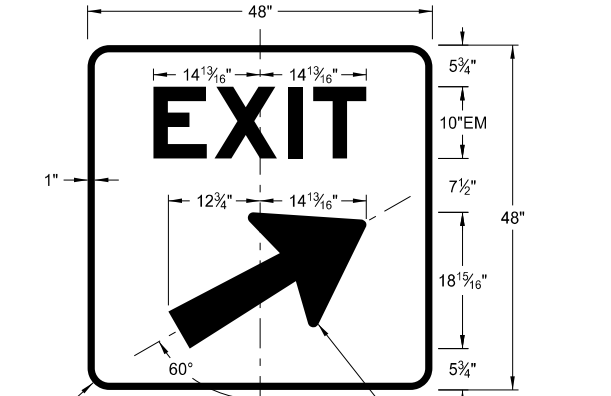
D-704-9



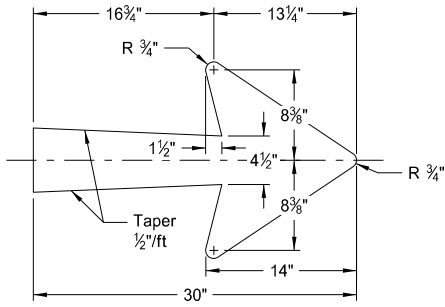
G20-1-60
Legend: black (non-refl)
Background: orange



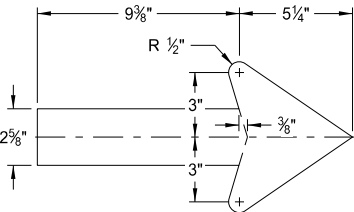
G20-50a-72
Legend: black (non-refl)
Background: orange



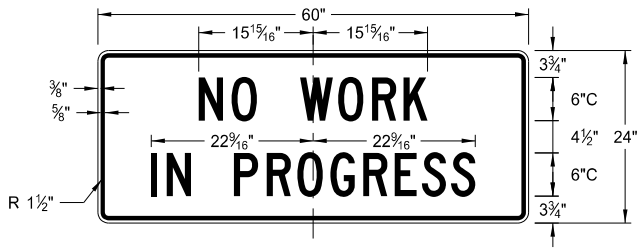
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



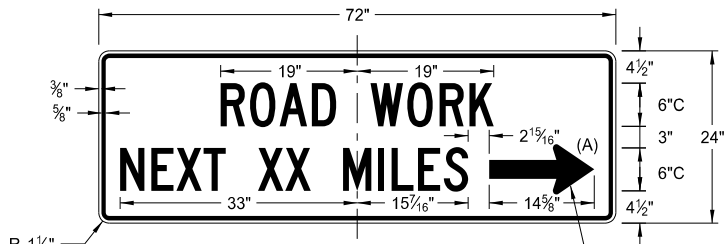
E5-1-48



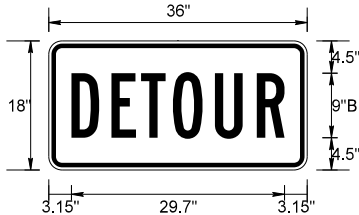
G20-50a-72
G20-52a-72



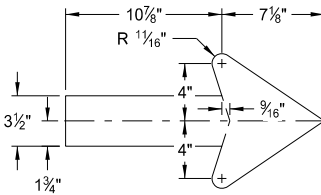
G20-1b-60
Legend: black (non-refl)
Background: orange



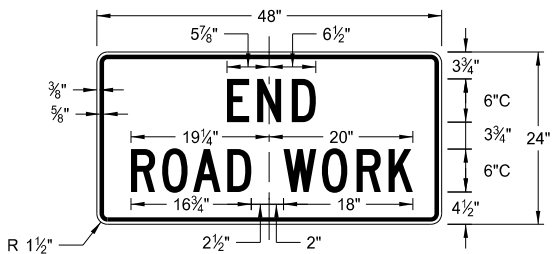
G20-52a-72
Legend: black (non-refl)
Background: orange



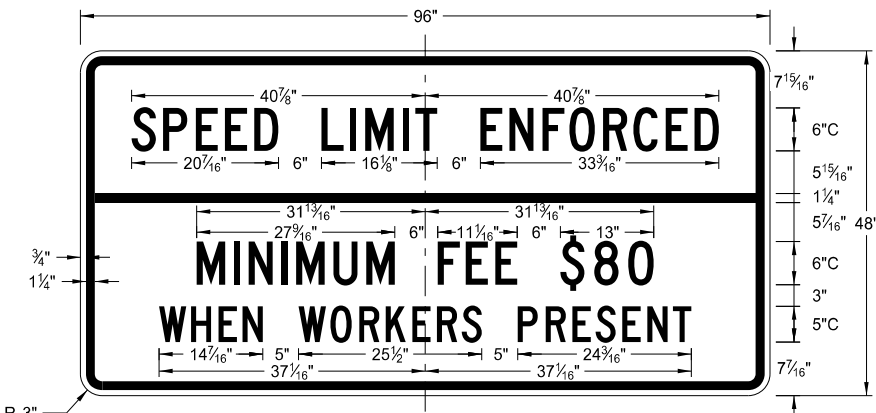
M4-8-36
Legend: black (non-refl)
Background: orange



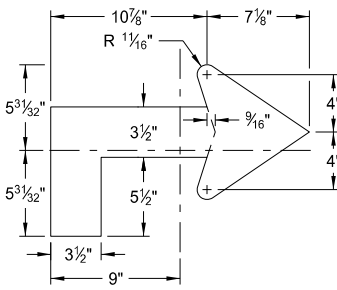
M4-9(L or R)-30
Right or Left



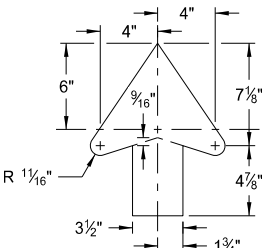
G20-2-48
Legend: black (non-refl)
Background: orange



G20-55-96
Legend: black (non-refl)
Background: orange



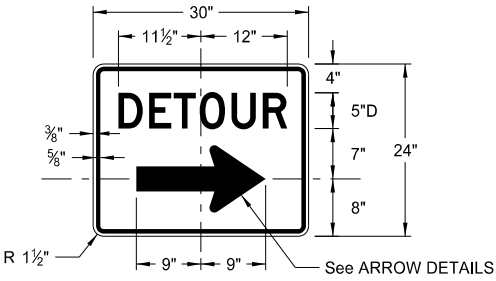
M4-9(L or R)-30
Advanced Right or Left



M4-9-30
Straight



G20-4b-36
Legend: black (non-refl)
Background: orange



M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

ARROW DETAILS

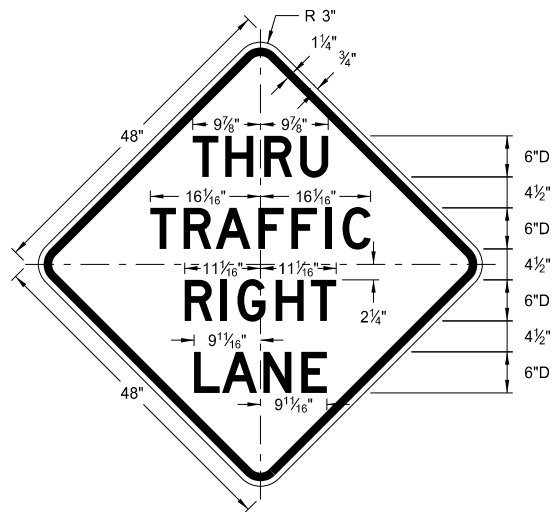
NOTES:
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

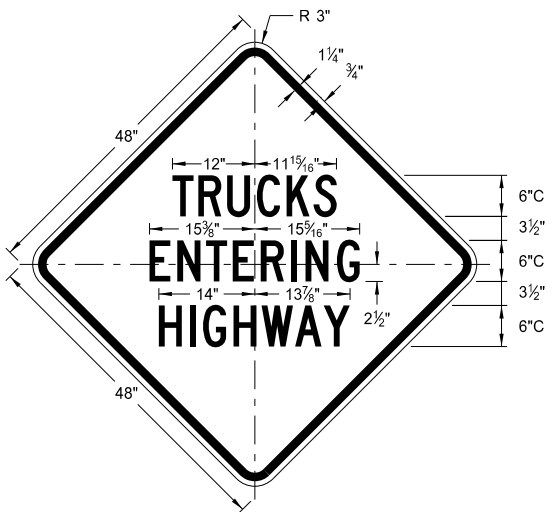
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

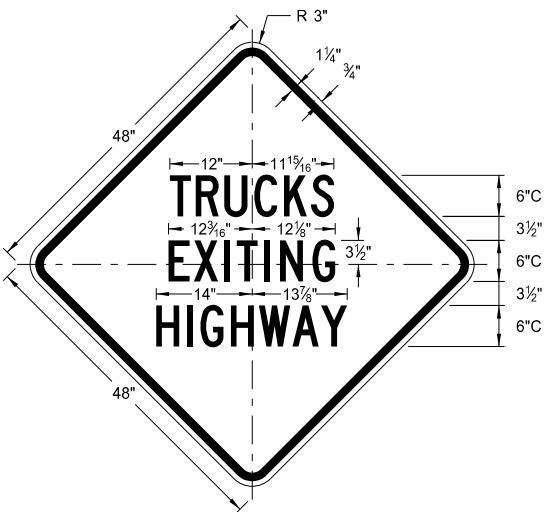
D-704-11



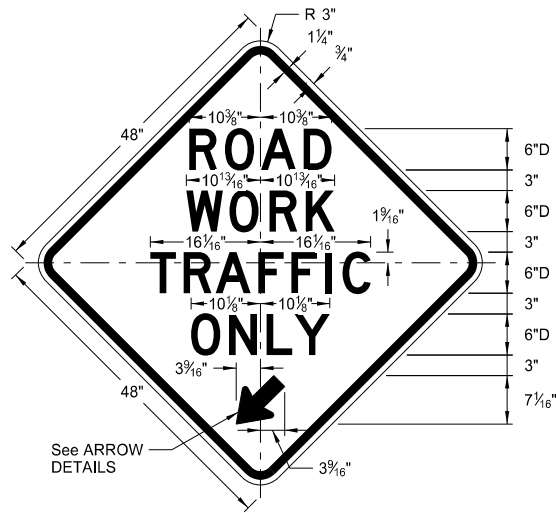
W5-8-48
Legend: black (non-refl)
Background: orange



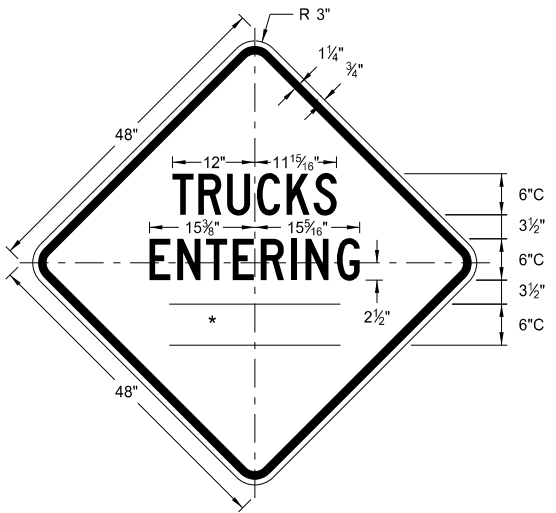
W8-53-48
Legend: black (non-refl)
Background: orange



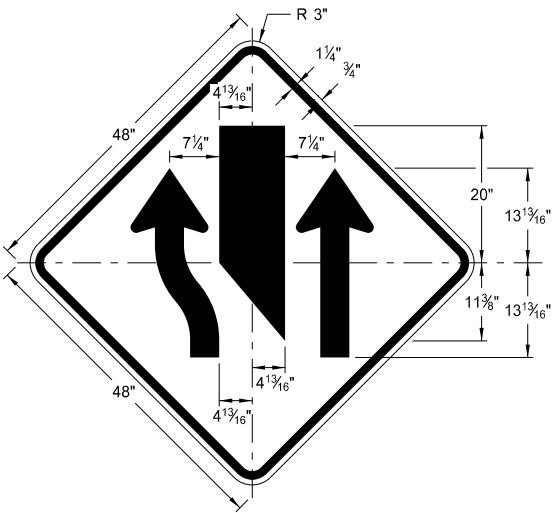
W8-56-48
Legend: black (non-refl)
Background: orange



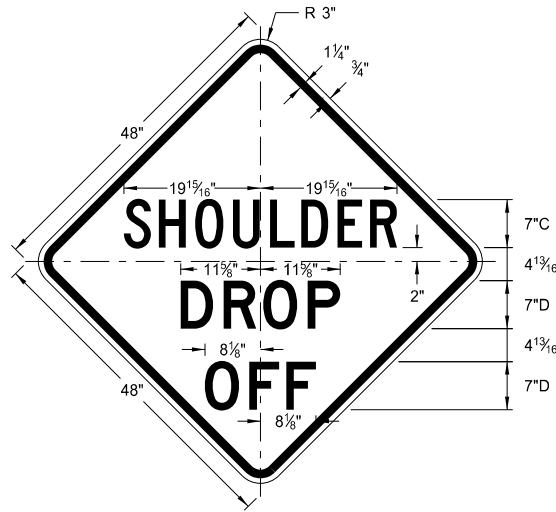
W5-9-48
Legend: black (non-refl)
Background: orange



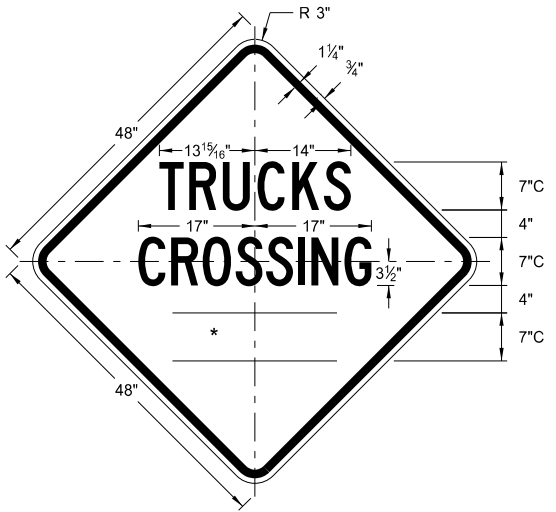
W8-54-48
Legend: black (non-refl)
Background: orange



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



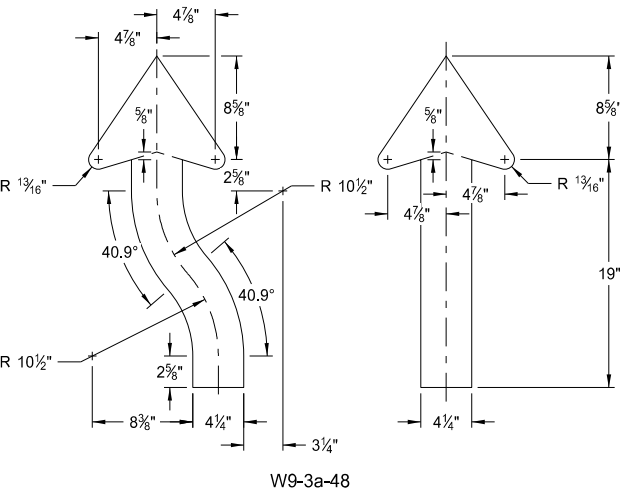
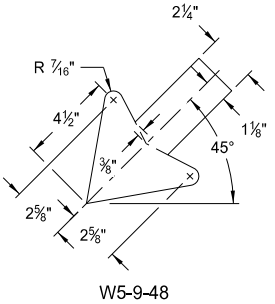
W8-9a-48
Legend: black (non-refl)
Background: orange



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

WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
1/2 MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



ARROW DETAILS

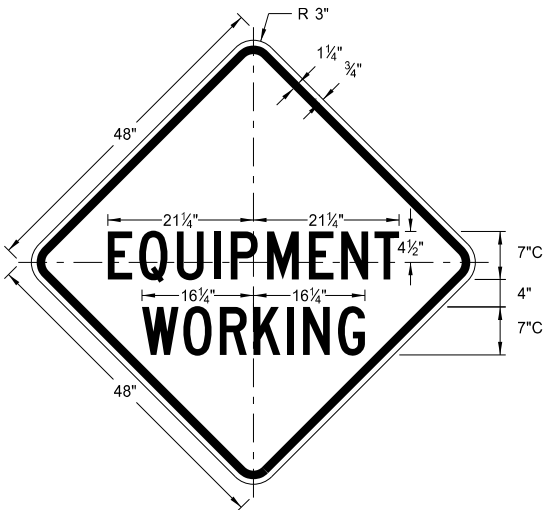
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details

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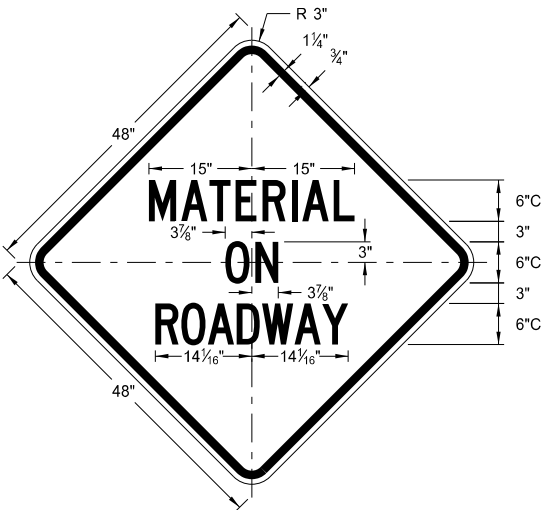
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

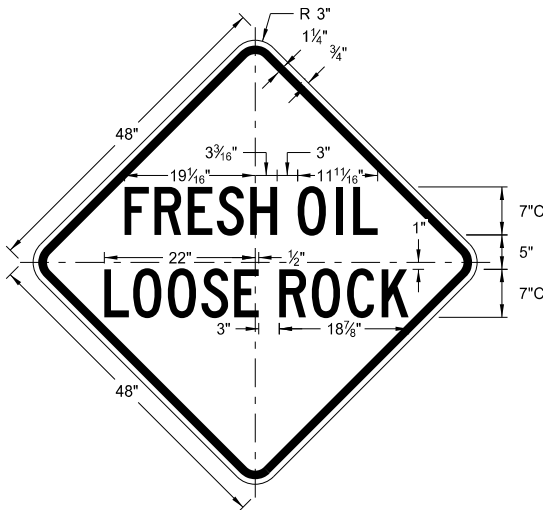
* DISTANCE MESSAGES



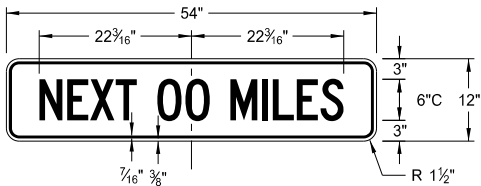
W20-51-48
Legend: black (non-refl)
Background: orange



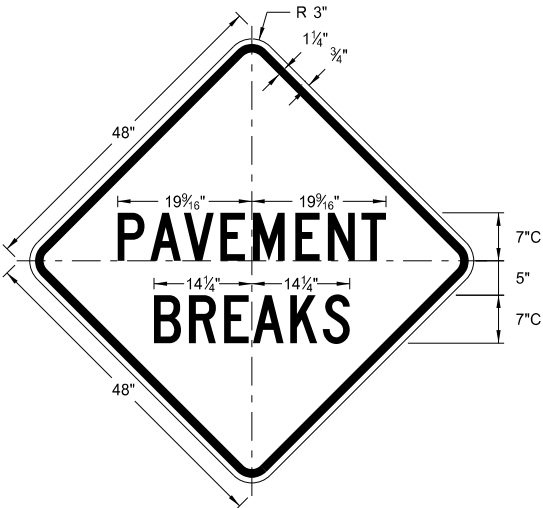
W21-51-48
Legend: black (non-refl)
Background: orange



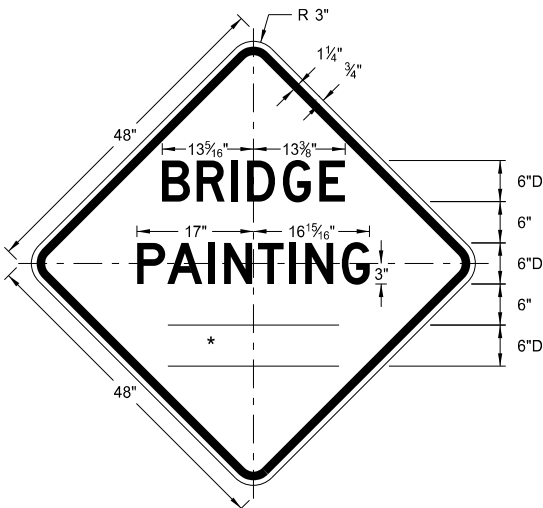
W22-8-48
Legend: black (non-refl)
Background: orange



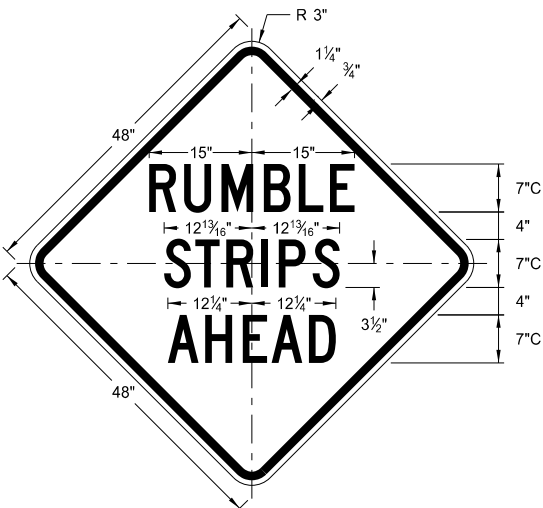
W20-52P-54
Legend: black (non-refl)
Background: orange



W21-52-48
Legend: black (non-refl)
Background: orange



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

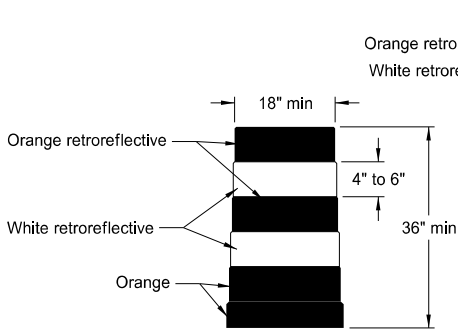


W21-53-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE

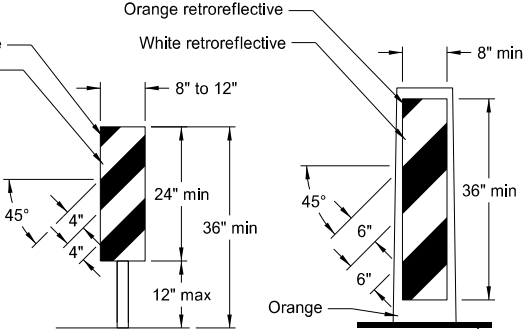
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BARRICADE AND CHANNELIZING DEVICE DETAILS



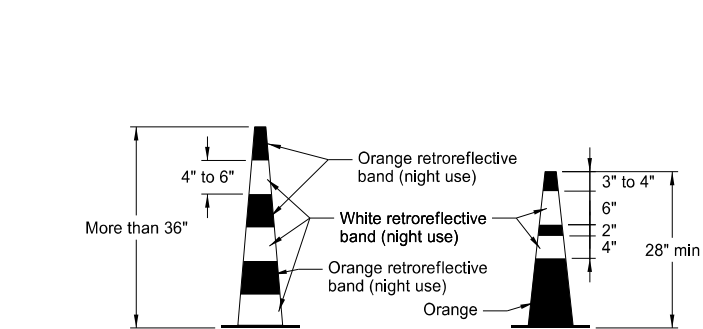
DELINEATOR DRUM

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



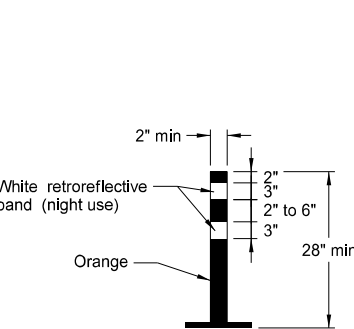
VERTICAL PANEL

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



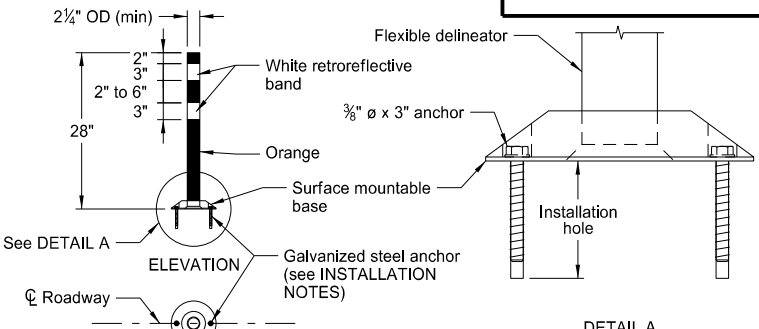
TRAFFIC CONE

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



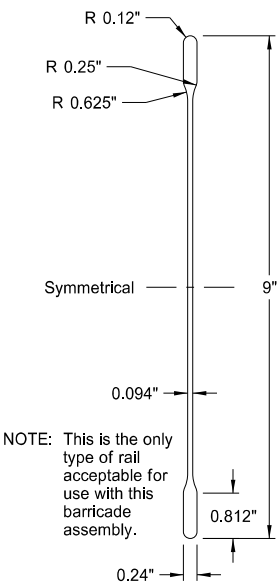
TUBULAR MARKER

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



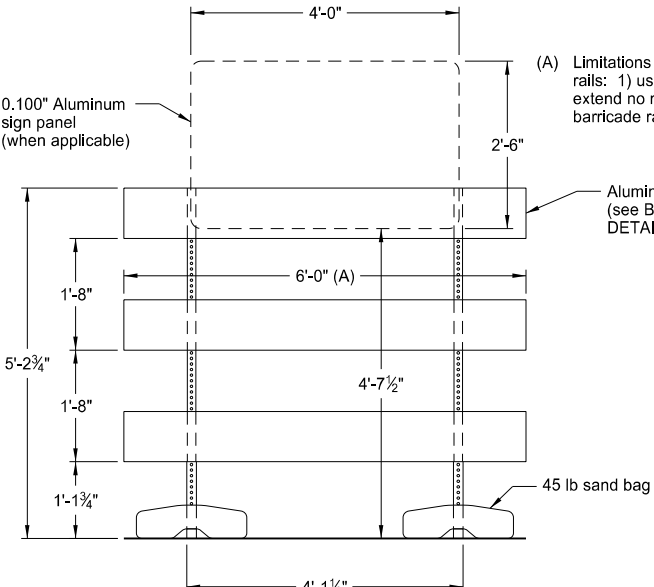
FLEXIBLE DELINEATOR

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

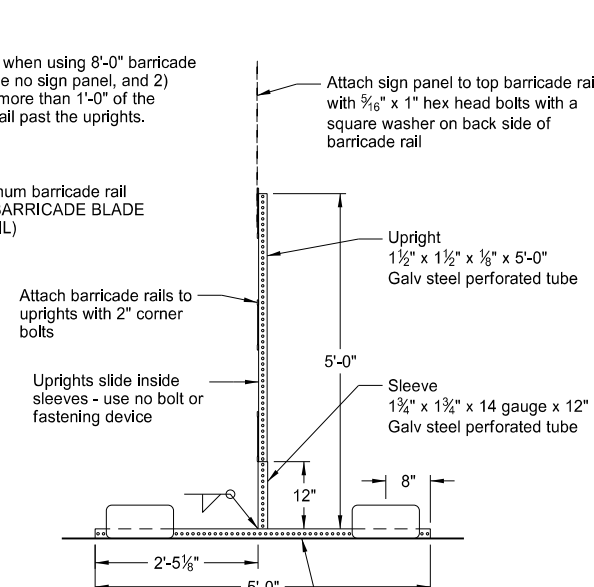


BARRICADE BLADE DETAIL

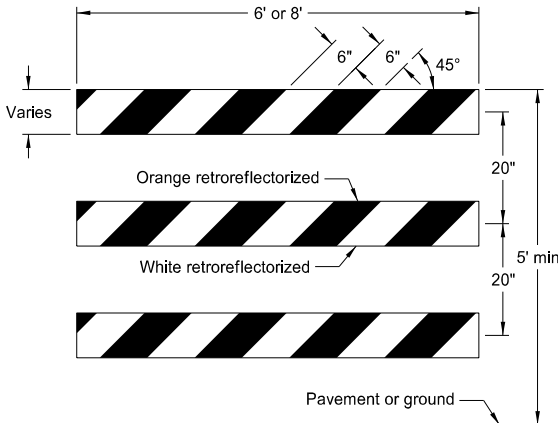
NOTE: This is the only type of rail acceptable for use with this barricade assembly.



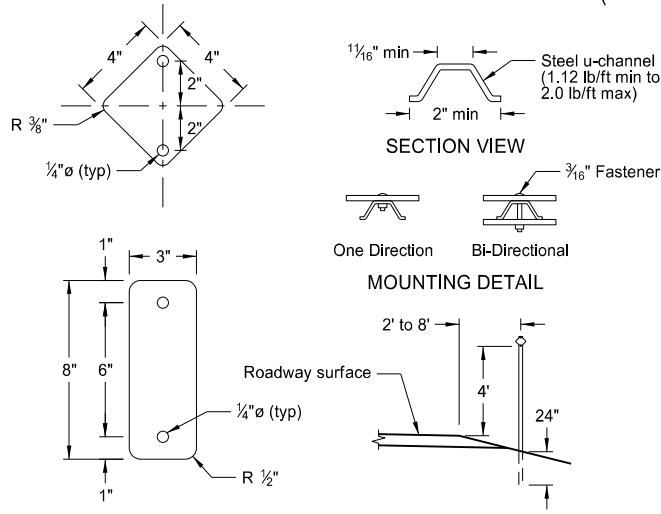
ELEVATION VIEW
BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)



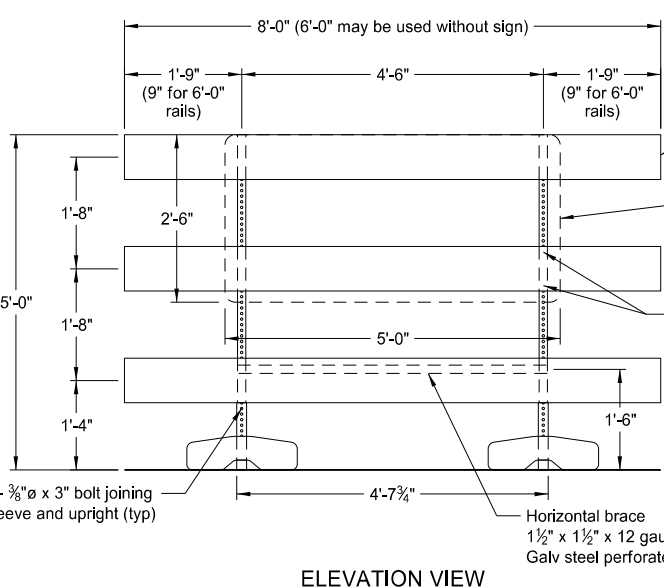
SIDE VIEW



TYPE III BARRICADE

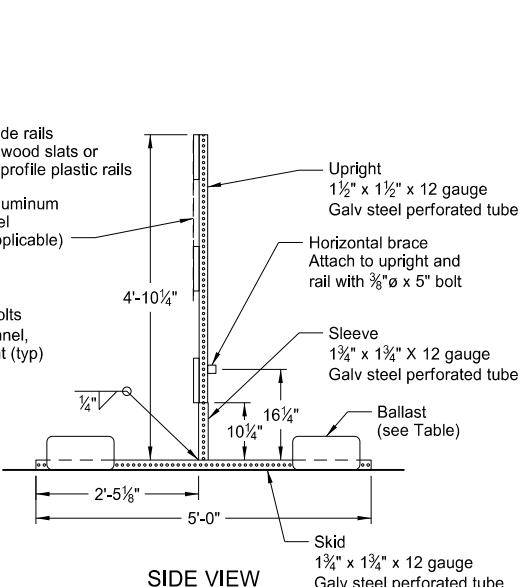


DELINEATORS



ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)



SIDE VIEW

MINIMUM BALLAST
(For each side of barricade support)

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

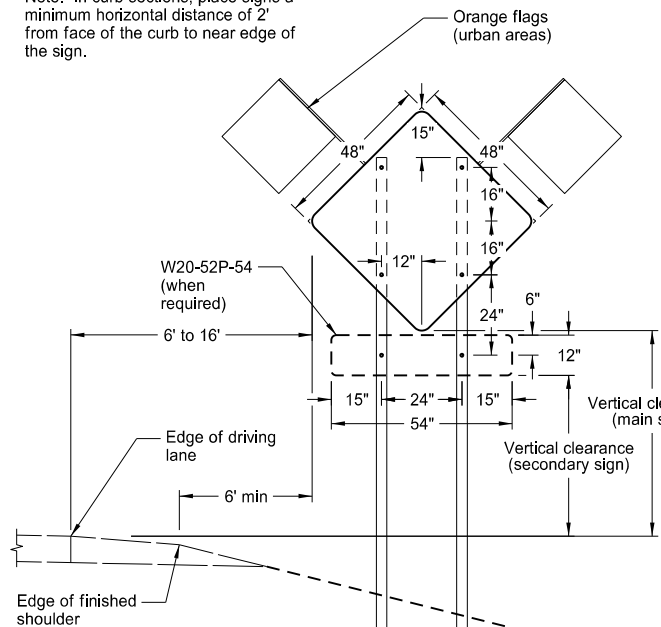
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

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

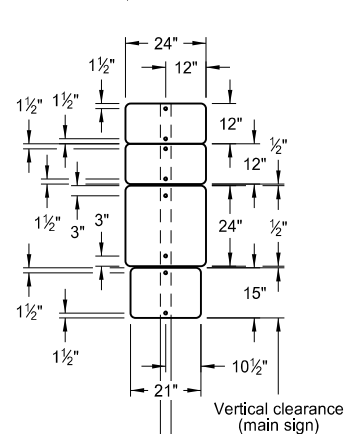
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

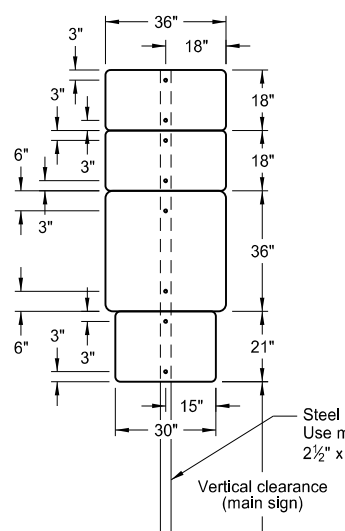
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



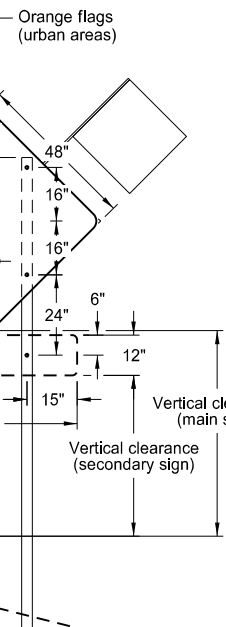
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



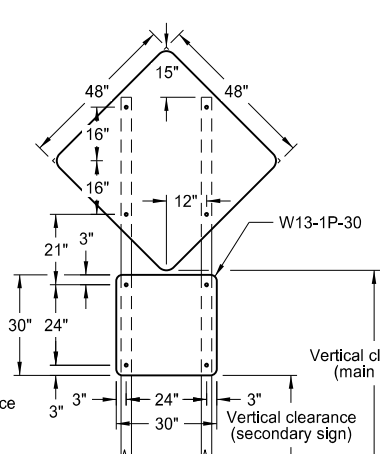
24" x 24"
ROUTE MARKER
ASSEMBLY



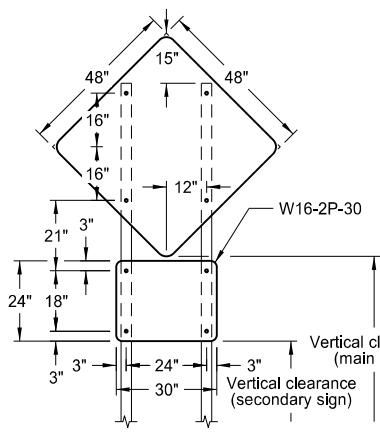
36" x 36"
ROUTE MARKER
ASSEMBLY



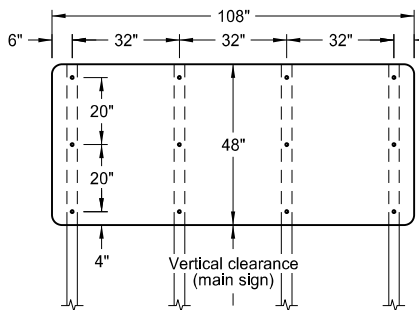
18" x 18"
DIAMOND SIGN



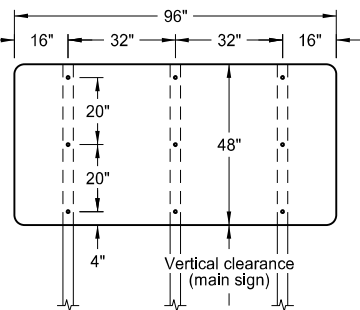
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



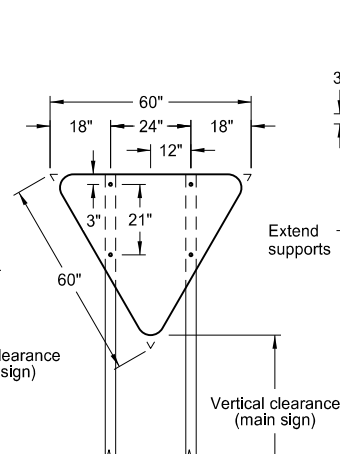
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



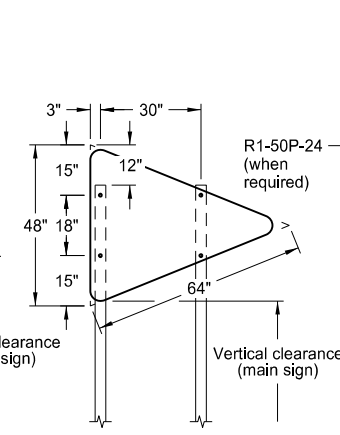
108" x 48" SIGN



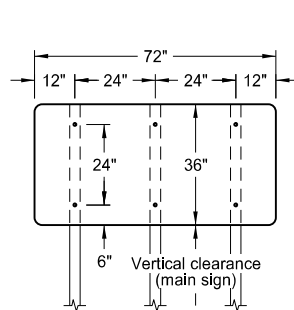
96" x 48" SIGN



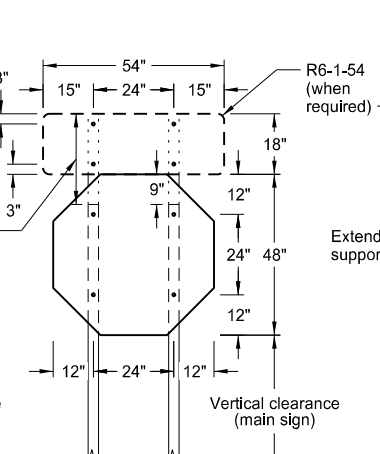
R1-2-60 - YIELD SIGN



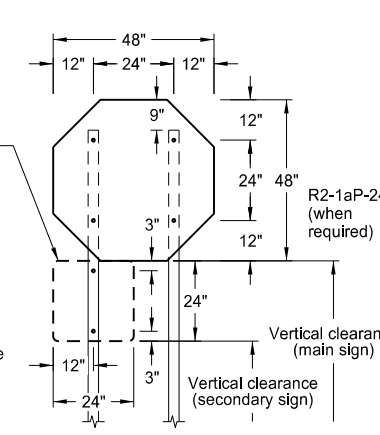
W14-3-64 - PENNANT SIGN



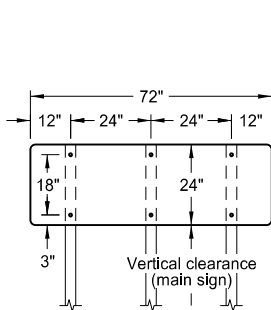
72" x 36" SIGN



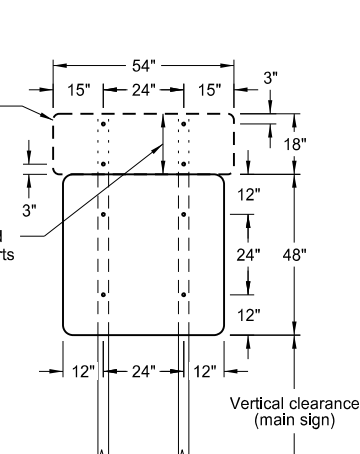
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



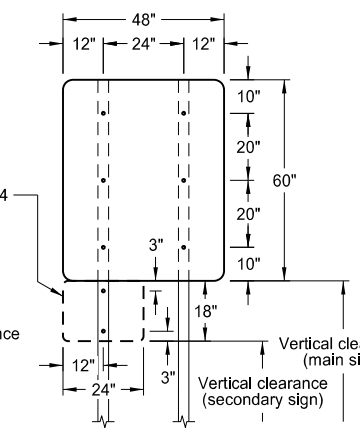
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



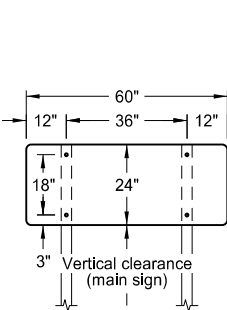
72" x 24" SIGN



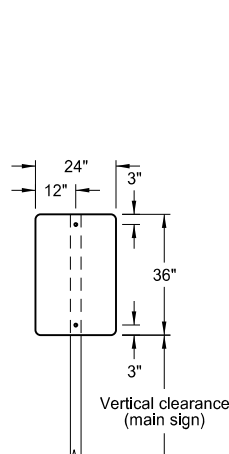
48" x 48" SIGN
(with R6-1-54 sign as required)



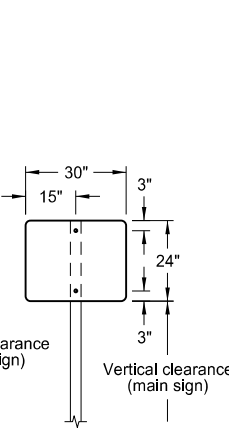
48" x 48" SIGN
(with R2-1aP-24 sign as required)



60" x 24" SIGN



24" x 36" SIGN



30" x 24" SIGN

NOTES:

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

Place signs over 50 square feet on 2½" x 2½" perforated tube supports as a minimum.

Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅝" bolts.
3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

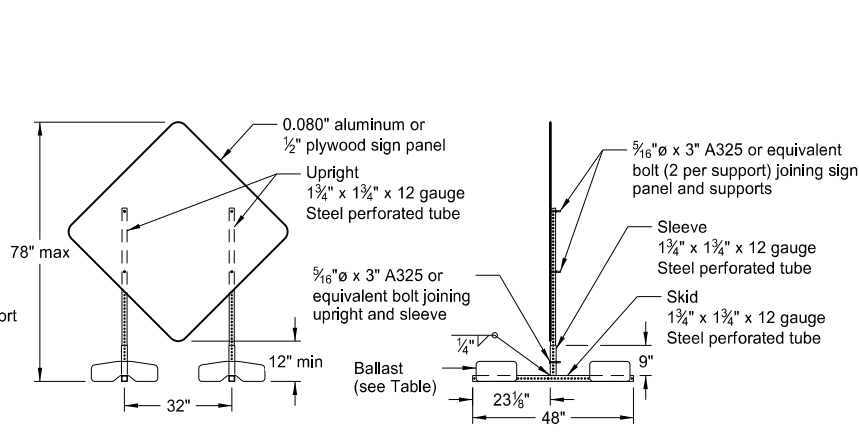
Use of low-mounting height (minimum 12" vertical clearance) portable signs for 5 days or less, is allowed as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period.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

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

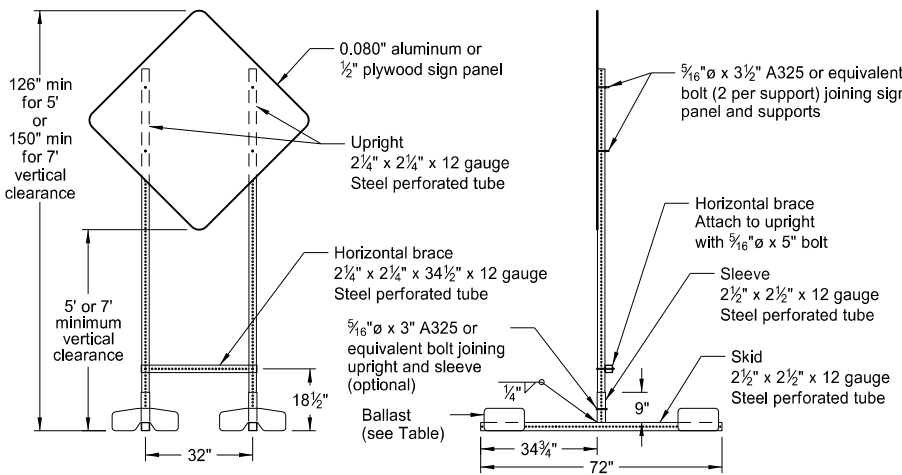
MINIMUM BALLAST
(For each side of sign support base)

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

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



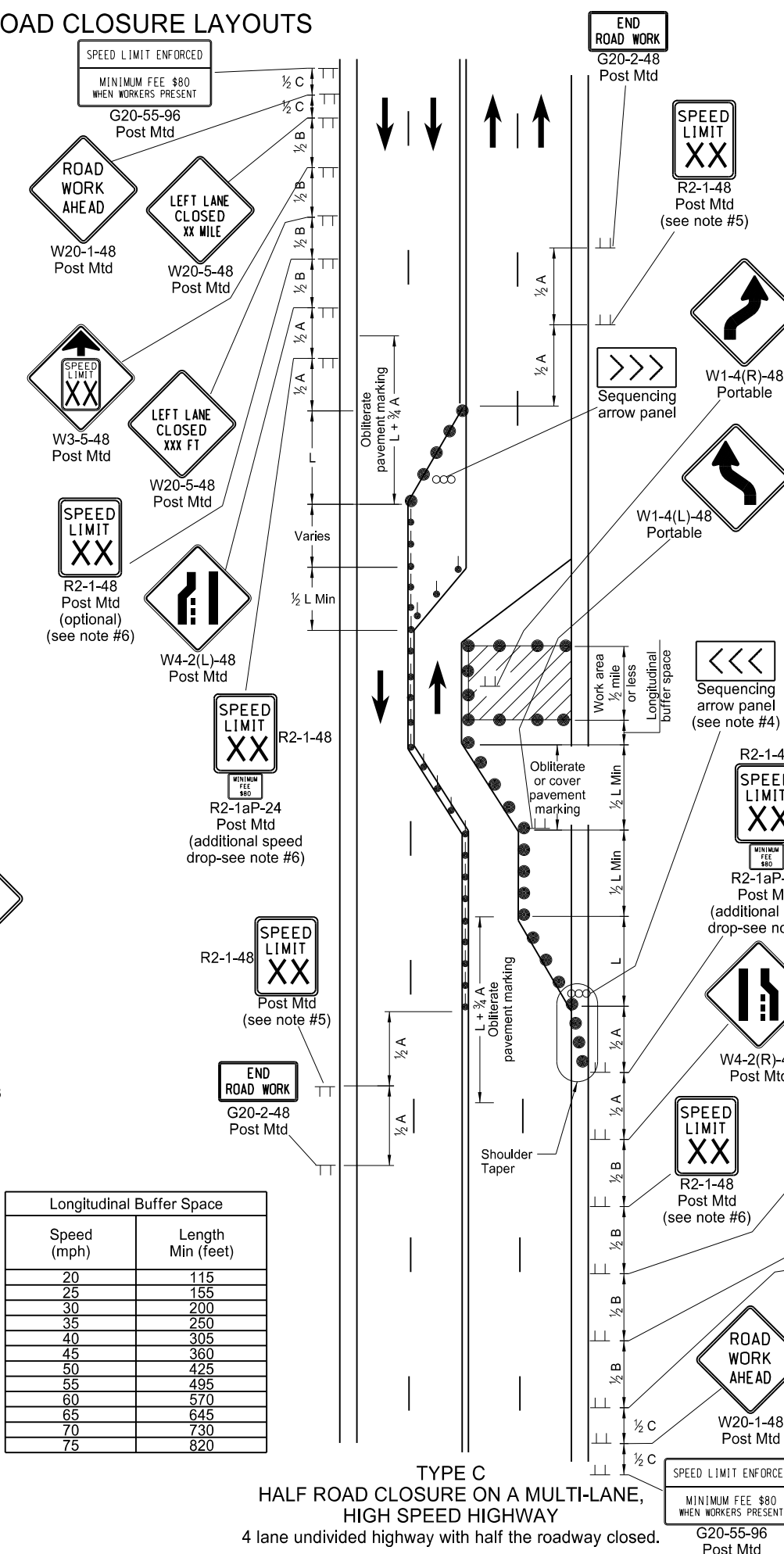
PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

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

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



D-704-15

Notes

1. Variables

S = Numerical value of speed limit or 85th percentile.
W = The width of taper in feet.
L = Minimum length of taper, S x W for freeways, expressways,
and 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.

2. Place barricades on moveable assemblies and signs on portable
assemblies when located on roadway.

3. Place delineator drums, barricades or cones for tapering traffic at
dimension "S" and for tangents space at 2 times dimension "S".

4. Place Sequencing Arrow Panels at the beginning of the taper when
possible. Where shoulder width does not provide sufficient room, move
the panel closer to the work area and place on roadway surface. See
Shoulder Closure Standard Drawing.

Use Type A on roadways with slow moving traffic speeds and low
volume (25 mph or less and 750 ADT or less).
Use Type B on roadways with moderate traffic speeds and volumes
(40 mph or less and 5000 ADT or less).
Use Type C on roadways with high traffic speeds and volumes (over
40 mph or over 5000 ADT).

5. Re-establish speed. Determine exact speed limit in the field, dependent on
location and conditions.

6. Determine the reduced speed limit based on the in-place speed limit before
construction. Where speed reductions exceed 30 mph, install a second
speed limit sign with the desired speed reduction (not to exceed 30 mph.)
Place the second speed limit sign at $\frac{1}{2}$ B.

7. Use when work area is 1 mile or longer.

8. Install flags on warning signs in urban areas when signs are not portable.
Mount 24 inch square flags perpendicular to the edges of the sign, and at
such a distance above the edge that the flag does not touch the sign when
limp.

9. Cover existing speed limit signs within reduced speed zones.

10. Where necessary, engineer will determine safe speed.

11. As an option, use portable sign supports in lieu of post mounted signs in
accordance with NDDOT Standard Specifications.

12. Sign G20-55-96 is not required if this standard is part of other traffic
control, or the work is less than 15 days.

13. Recommend using 40 mph speed limit in vicinity of workers, unless location
and conditions dictate otherwise.

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

Type III barricade

Sign

Delineator drum

Tubular markers

Work area

Flagger

Sequencing arrow panel

Vertical panels back to back

W20-5-48
Post Mtd

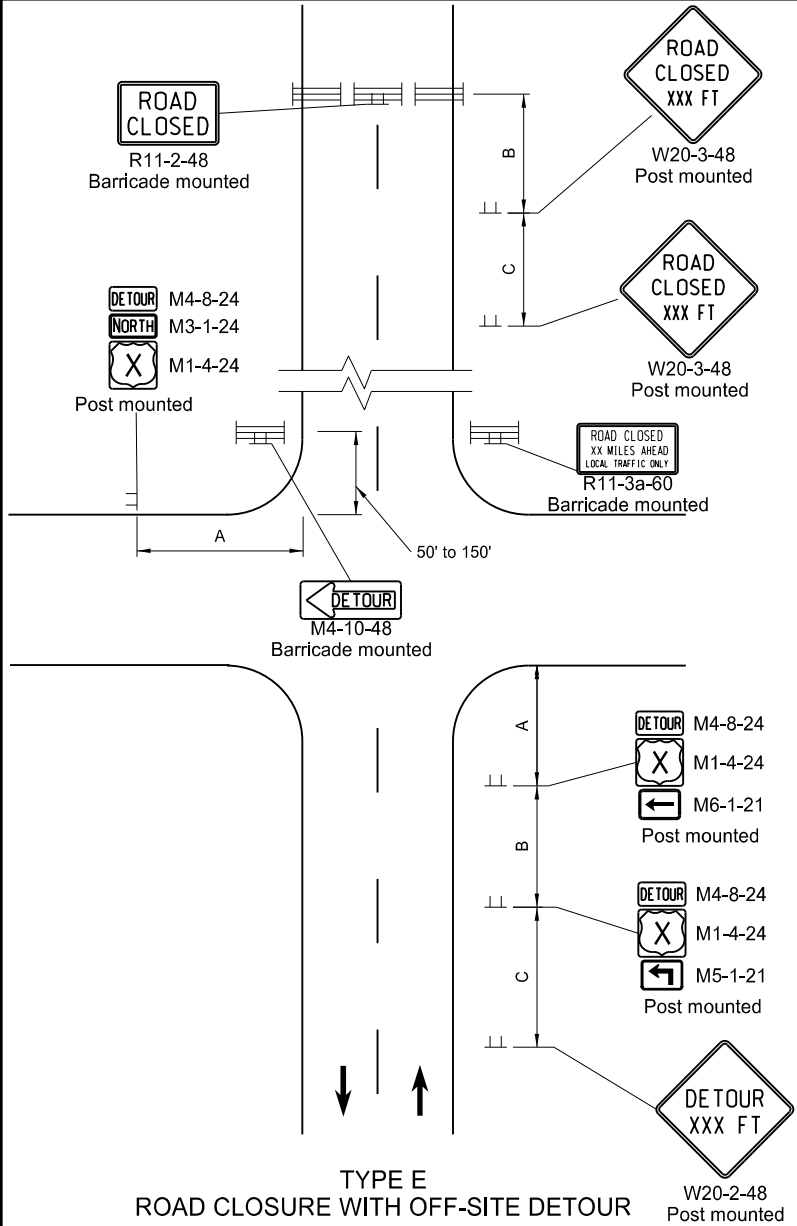
W3-5-48
Post Mtd

W20-5-48
Post Mtd

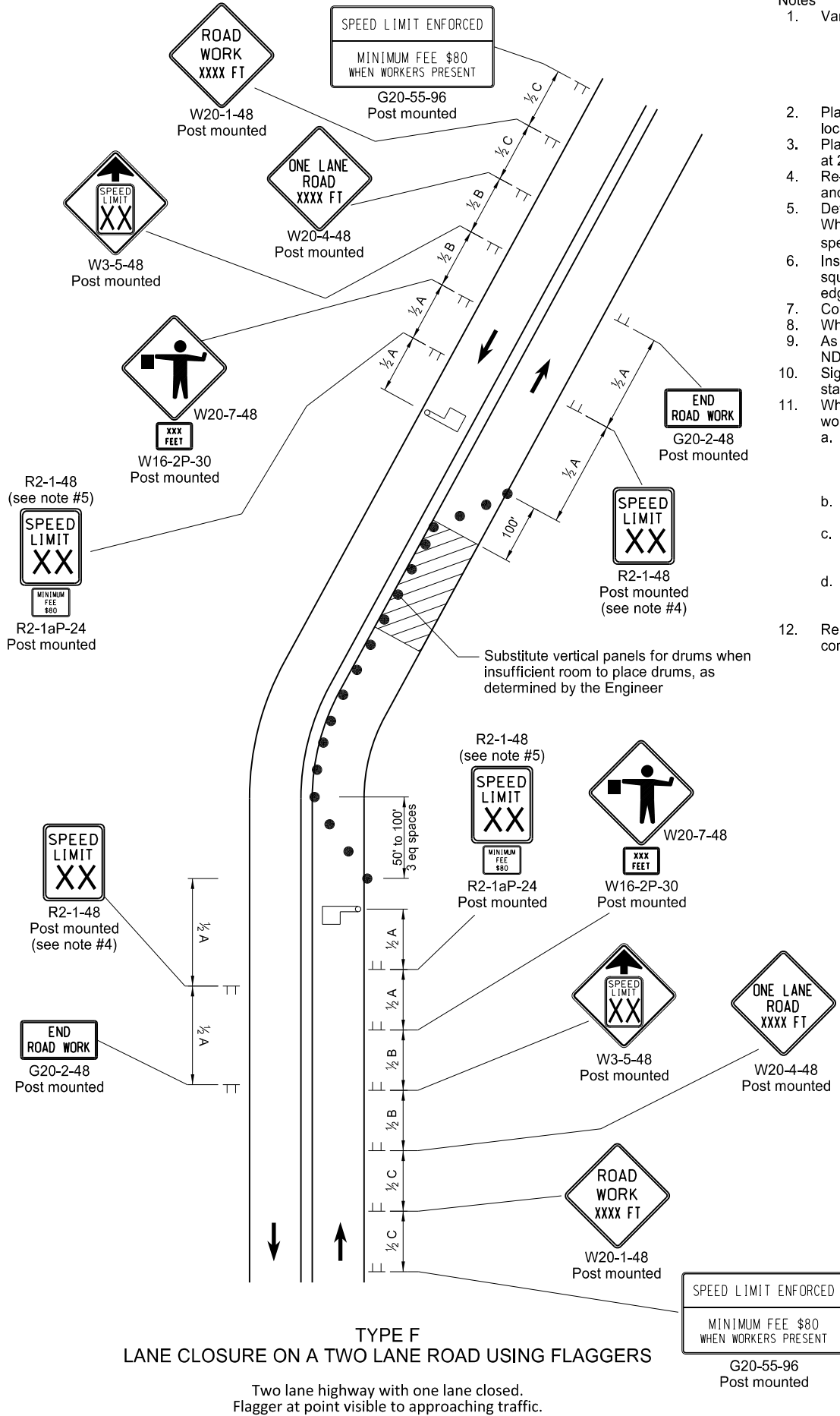
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & Speed Limit signs

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

ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS



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 40mph)	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



- Notes
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper in feet
 - L = Minimum length of taper in feet. S x W for freeways, expressways, and roads with speeds of 45 mph or greater, or W x S²/60 for urban, residential, and streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
 - Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 - Determine the reduced speed limit based on the in place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place second speed limit sign at 1/2B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - Where necessary, safe speed to be determined by the Engineer.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
 - Signs G20-55-96 or R2-1aP-24 are not required when pilot car operation is used, if this standard is part of other traffic control layouts, or if work is less than 15 days.
 - When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
 - Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
 - Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
 - Extend buffer space between work zone and lane closure transition upstream of the highway-rail grade crossing to prevent flagging queue from extending across highway-rail grade crossing.
 - If queuing extends across highway-rail crossing, provide flagger at crossing to prevent vehicles from stopping within the crossing (even when automatic warning devices are in place.)
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

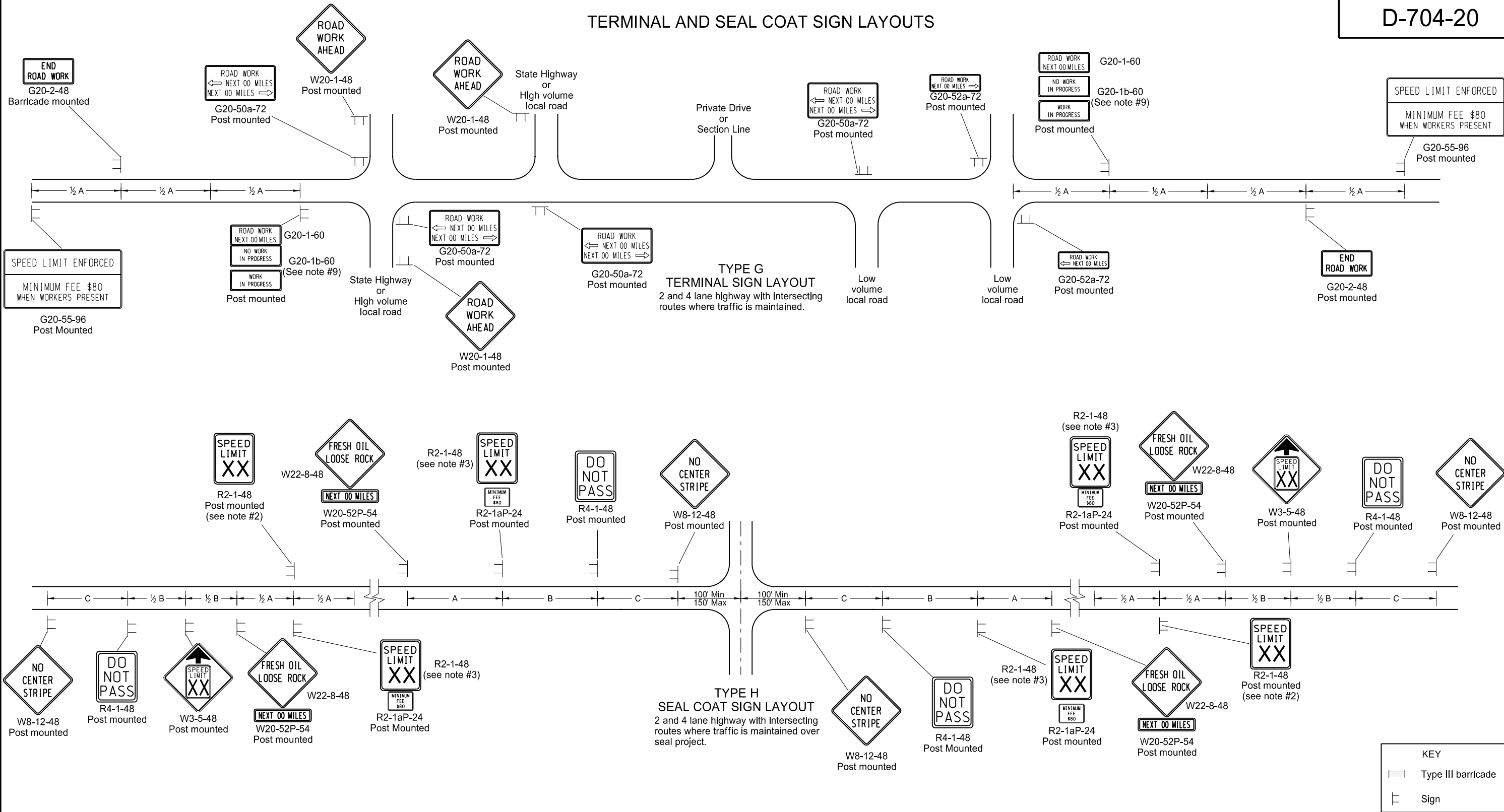
KEY		
	Delineator Drum	
	Type III Barricade	
	Sign	
	Work/Hazard Area	
	Flagger	

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
3-13-14	Revised Sign Call "ROAD WORK XXXX FT"
8-17-17	Update notes & sign numbers

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

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



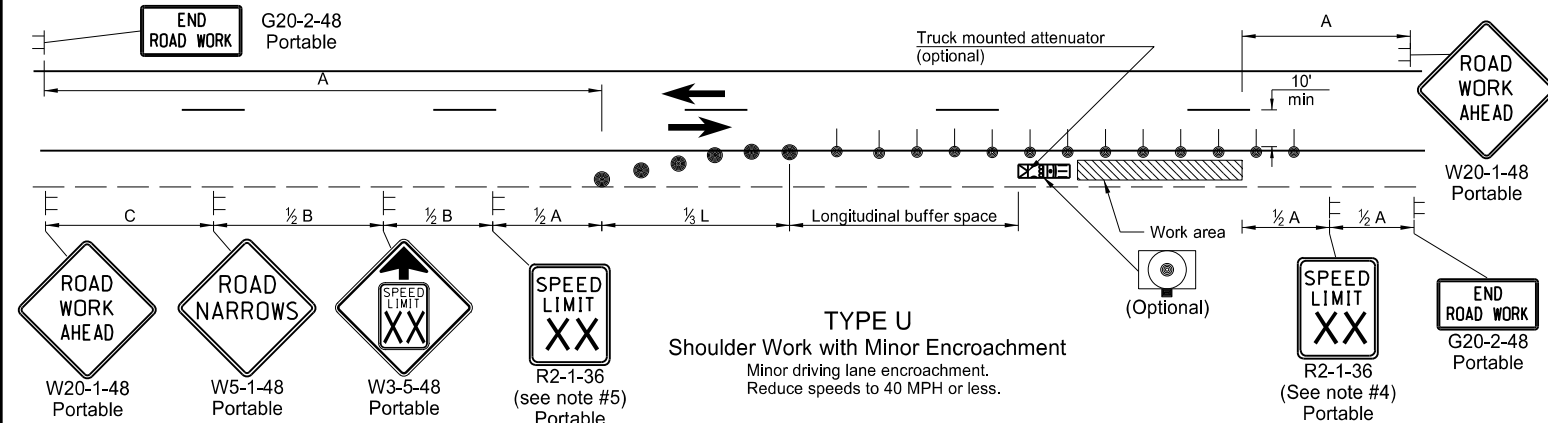
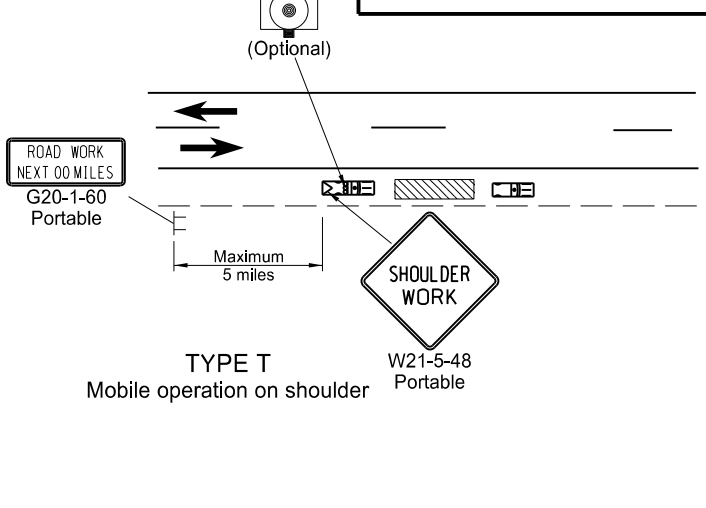
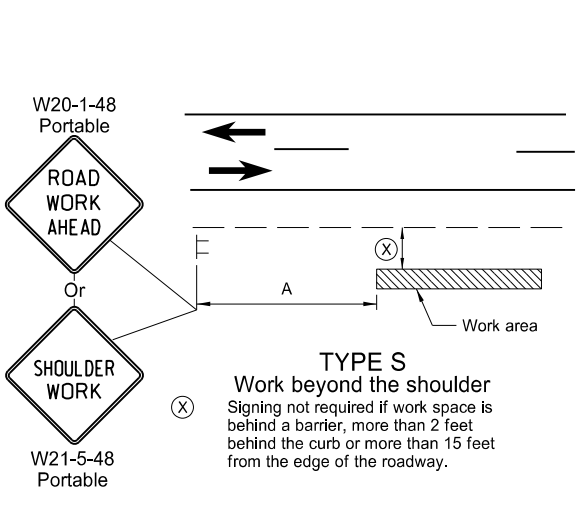
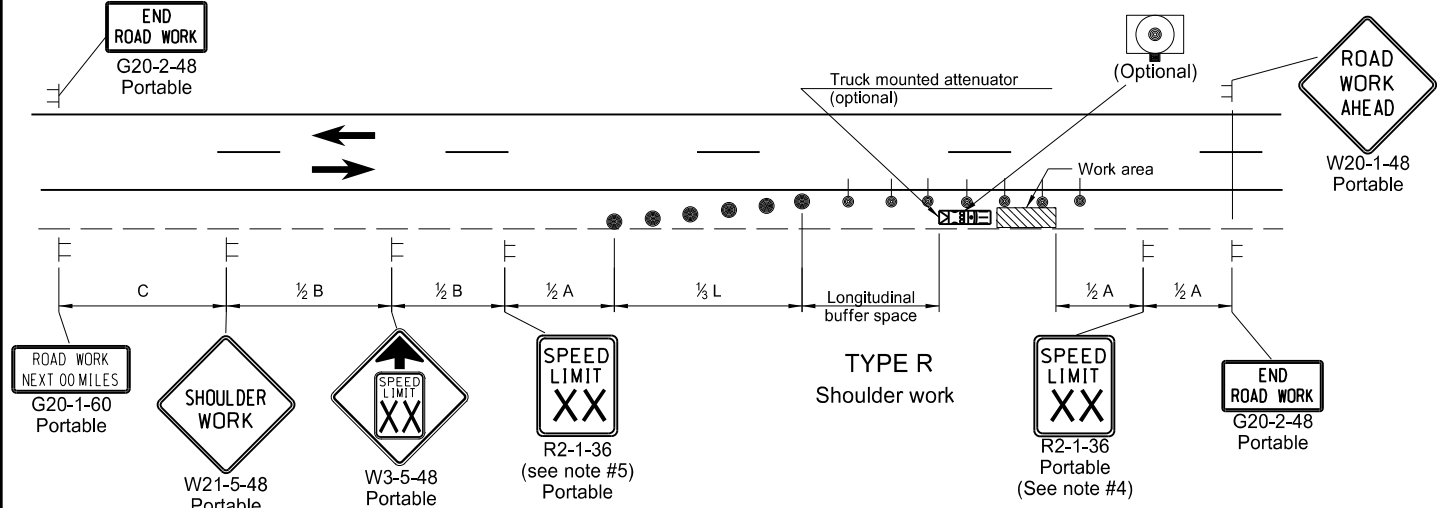
1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
 2. Determine the exact speed limit in the field, based on location and conditions.
 3. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at ½ B.
 4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 5. Cover existing speed limit signs within a reduced speed zone.
 6. On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
 7. As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 8. Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
 9. Install sign G20-1b-60 when work is suspended for winter.
 10. Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
 11. Sign G20-55-96 is not required if work is less than 15 days.
 12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

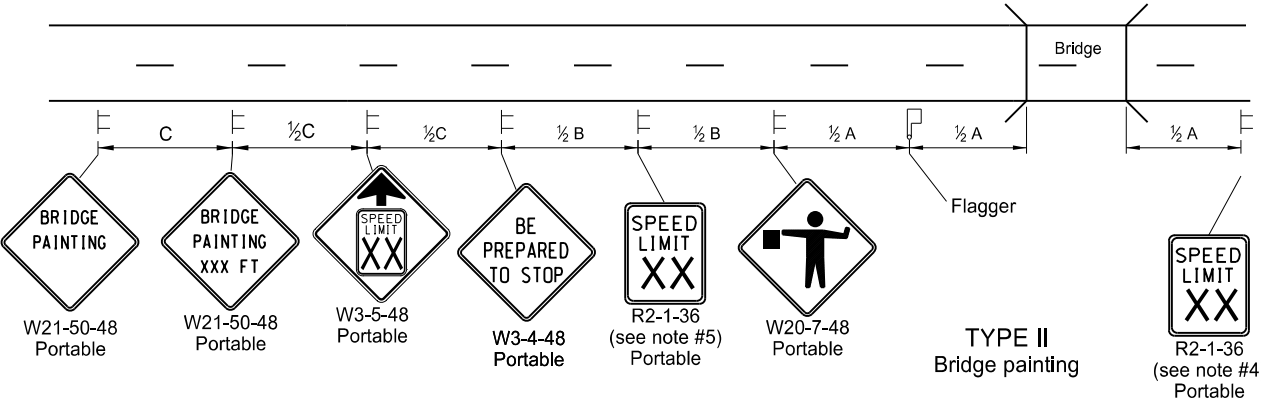
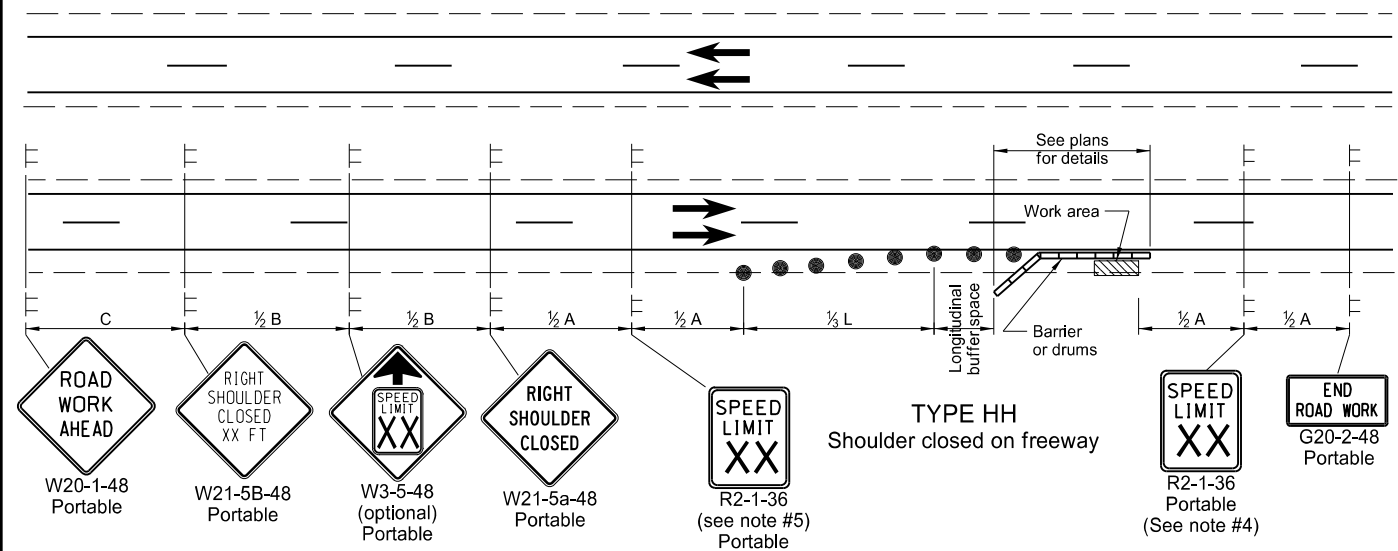
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & sign numbers

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

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS



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



KEY

- Sign
- Delineator Drum
- Sequencing Arrow Panel (Caution Mode)
- Work area
- Tubular Marker

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

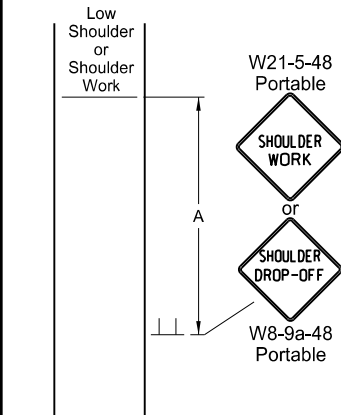
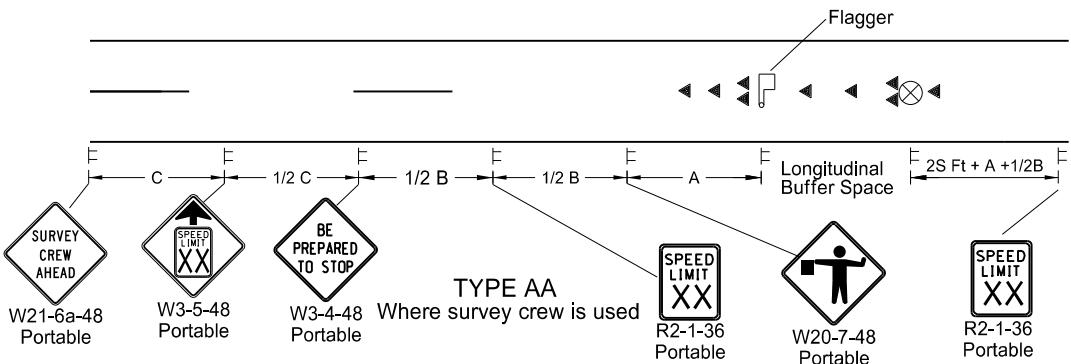
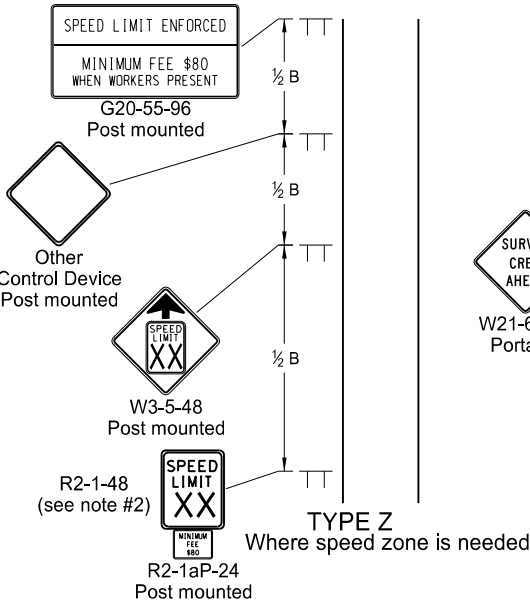
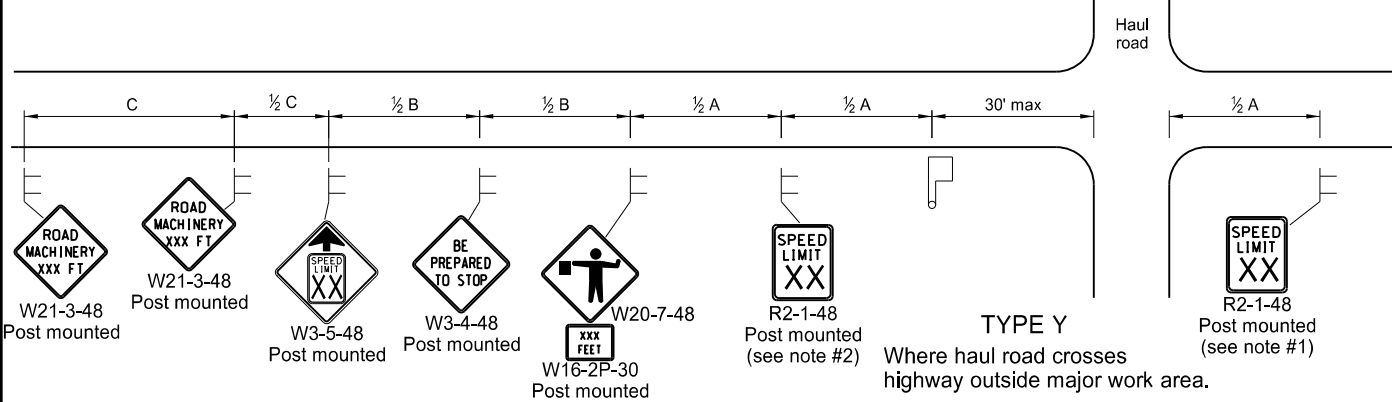
Longitudinal Buffer Space	
Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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

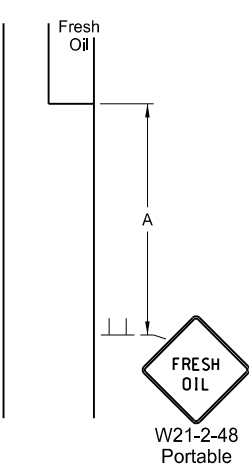
This document was originally issued and sealed by
Roger Weigel
Registration Number
PE- 2930,
on 08/17/17 and the original document is stored at the
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of Transportation

MISCELLANEOUS SIGN LAYOUTS

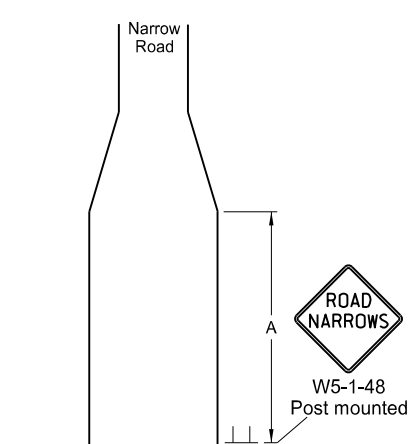
D-704-26



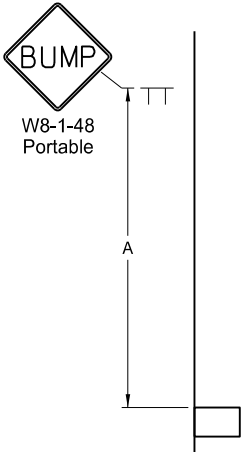
TYPE BB
Within major work area
where sign conditions exist



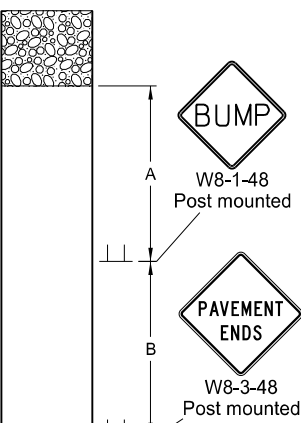
TYPE CC
Where sign conditions exist



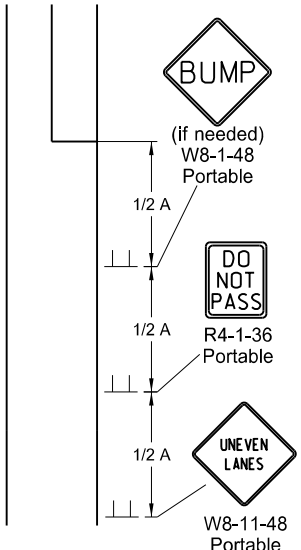
TYPE DD
Where sign conditions exist



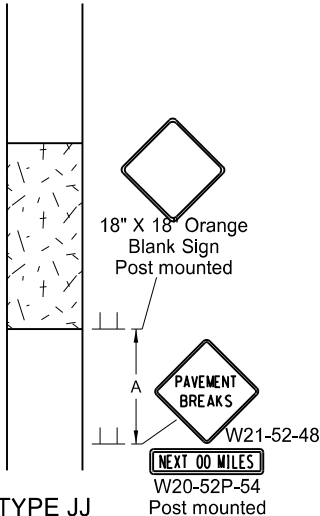
TYPE EE
Where sign conditions exist



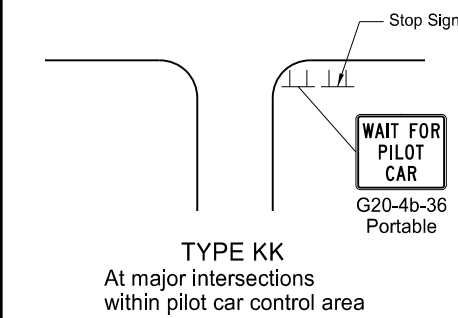
TYPE FF
Where sign conditions exist



TYPE GG
Where elevation difference
exists between lanes



TYPE JJ
For break in pavement.
Install signs when conditions exist
and remove when not applicable.



TYPE KK
At major intersections
within pilot car control area

- Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
 2. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2B.
 3. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 4. Cover existing speed limit signs within reduced speed zones.
 5. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
 6. Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
 7. When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
 8. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

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

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

KEY

Sign Flagger Cones

S = Numerical value of speed limit or 85th percentile.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers

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

D-704-30

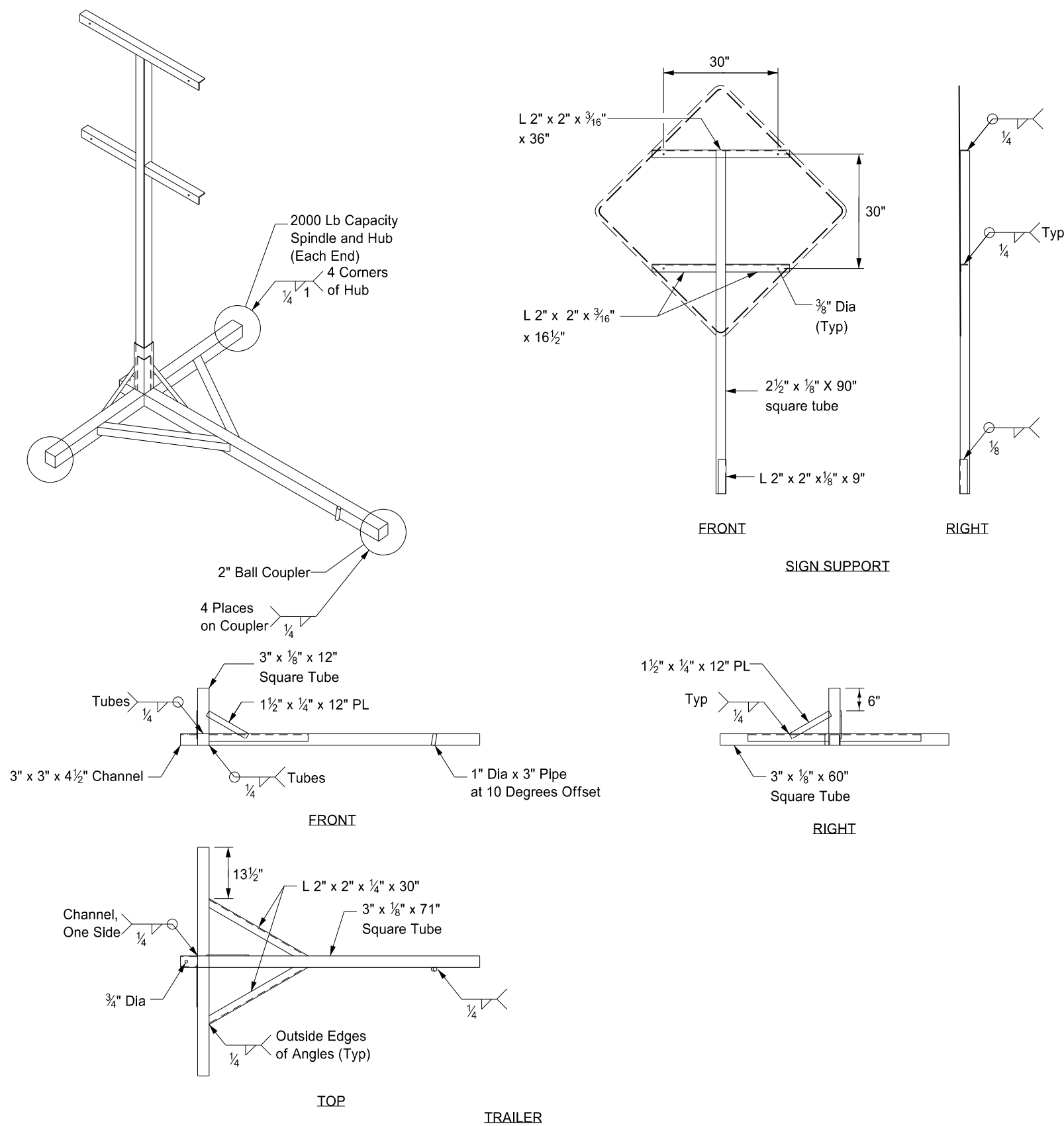


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-24-14 8-17-17	Revised Note Updated notes & sign support

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

PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



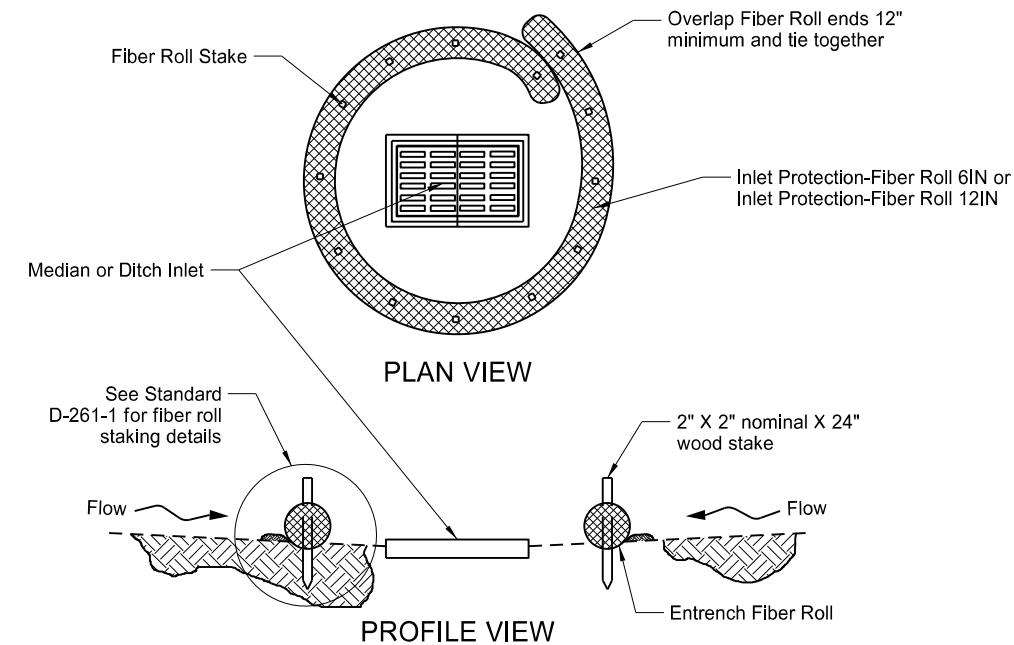
Notes:

- 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.

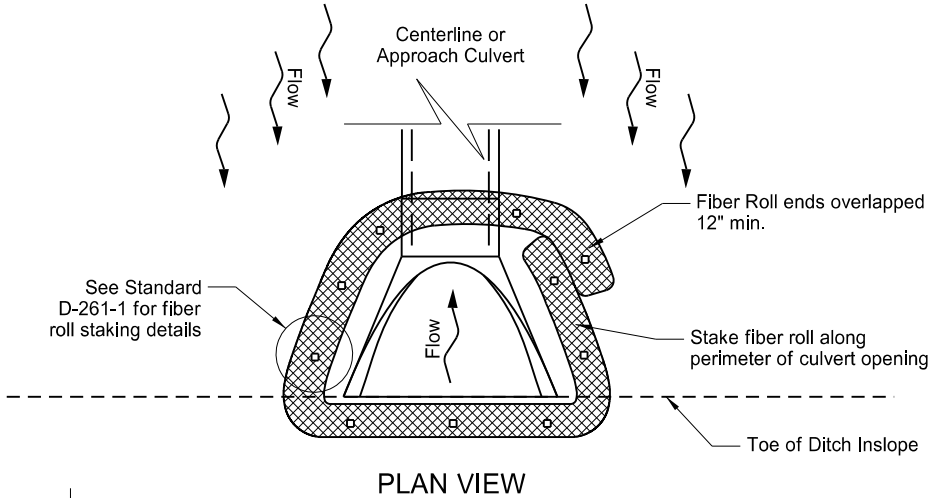
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

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Registration Number
PE- 2930 ,
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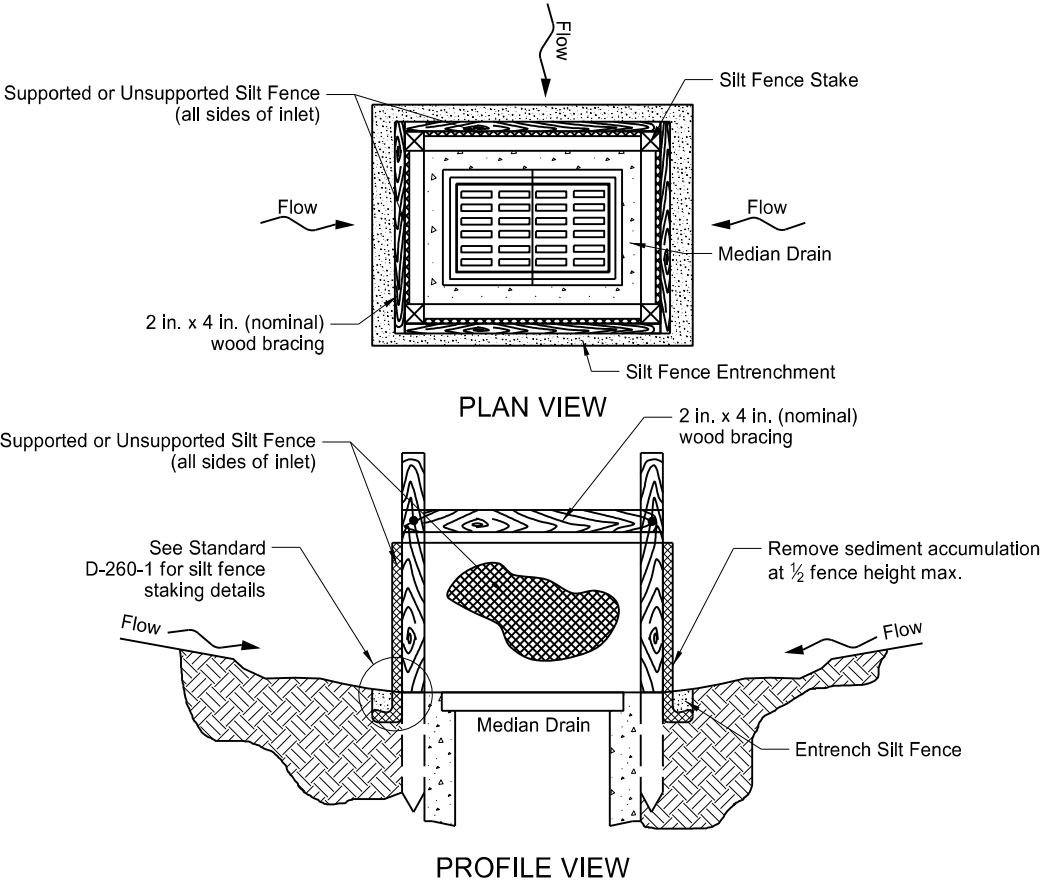
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



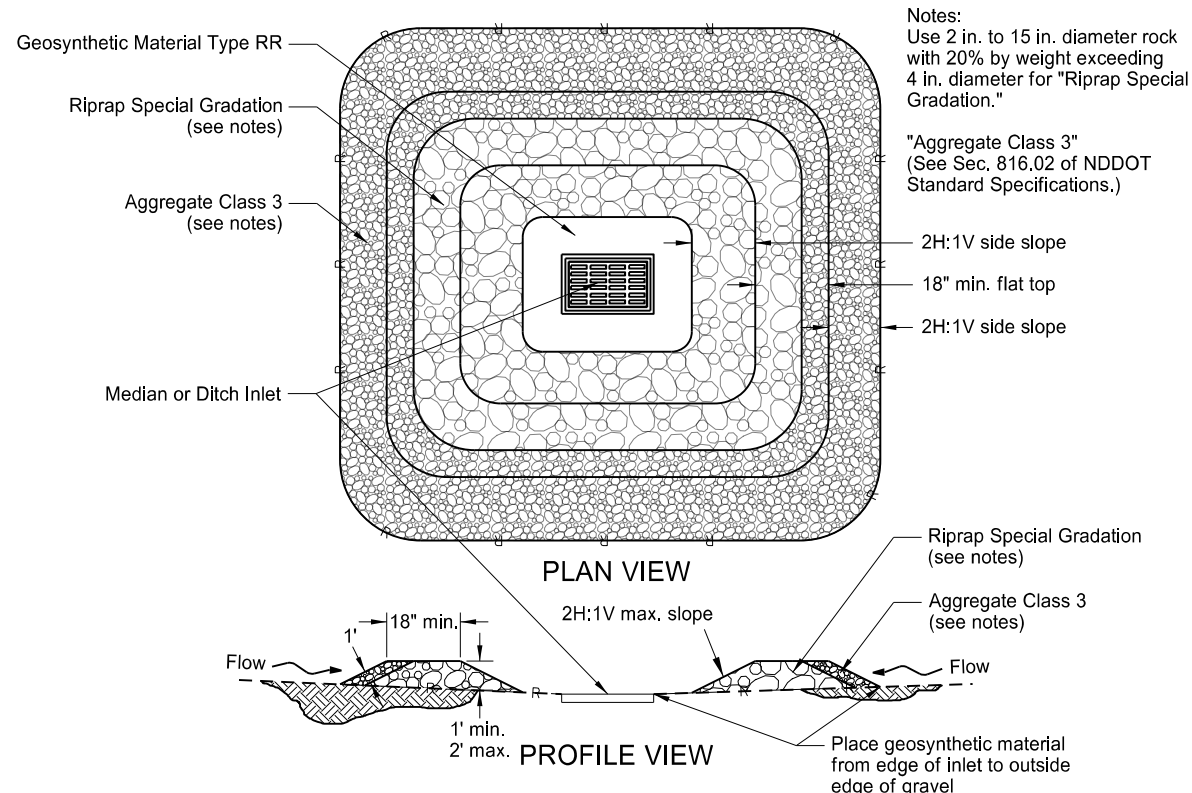
FIBER ROLL PROTECTION
(MEDIAN OR DITCH INLET)



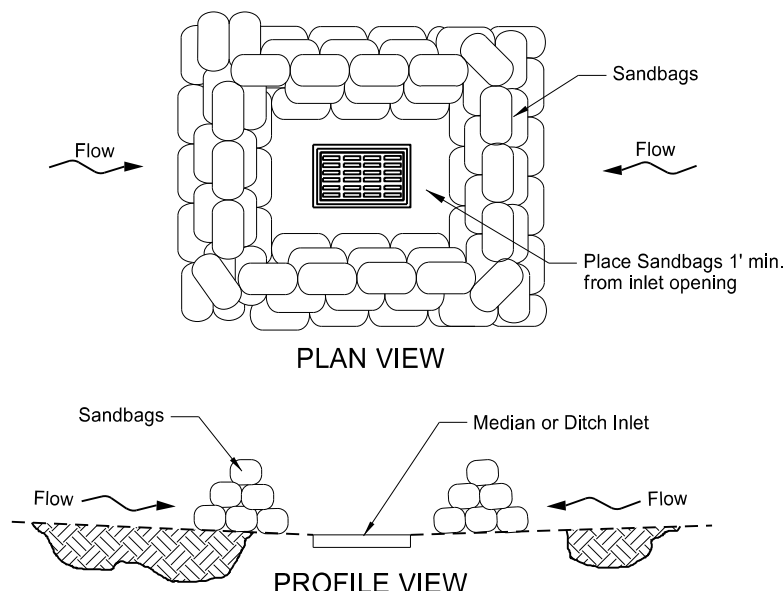
FIBER ROLL PROTECTION
(INLET OF CULVERT)



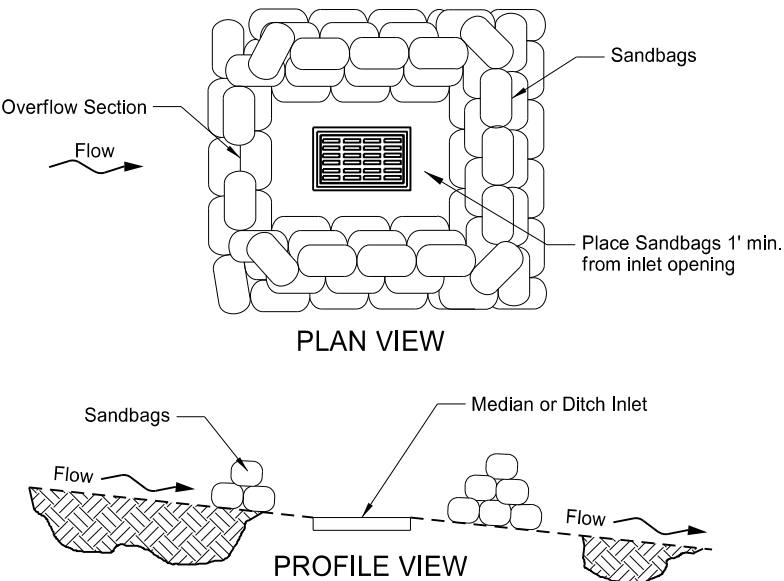
SILT FENCE PROTECTION
(MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION
(MEDIAN OR DITCH INLET)



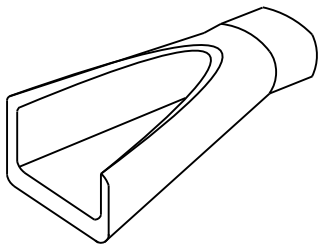
SANDBAG PROTECTION
(LOW POINT)



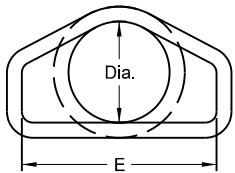
SANDBAG PROTECTION
(ON SLOPE)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930 , on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation
10-03-13		
REVISIONS		
DATE	CHANGE	
06-26-14	Updated reference to standard drawing number for fiber roll staking details,	
10-01-14	Updated reference to standard drawing number for silt fence.	
10-17-17	Updated to active voice.	

REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

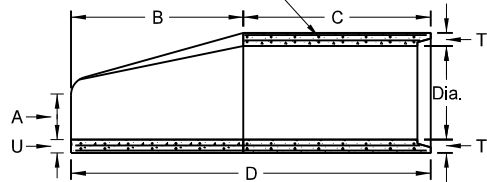


PERSPECTIVE

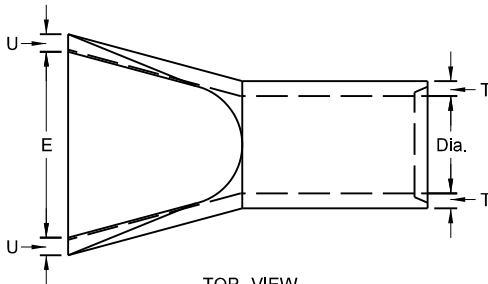


END VIEW

Standard Reinforcement for Class III pipe
reinforced as per AASHTO M170



SIDE VIEW

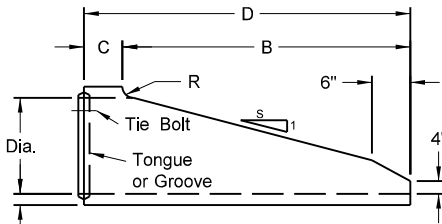


TOP VIEW

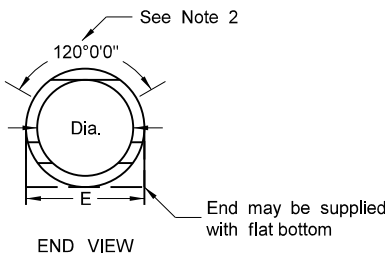
REINFORCED CONCRETE PIPE - FLARED END SECTION
Reinforcement to be equivalent to Class III RCP

FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0 ⁷ / ₈ "	6'-0 ⁷ / ₈ "	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2 ¹ / ₂ "
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2 ¹ / ₂ "
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2 ¹ / ₂ "
24	0'-9 ¹ / ₂ "	3'-7 ¹ / ₂ "	2'-6"	6'-1 ¹ / ₂ "	4'-0"	3"
27	0'-10 ¹ / ₂ "	4'-0"	2'-1 ¹ / ₂ "	6'-1 ¹ / ₂ "	4'-6"	3 ¹ / ₂ "
30	1'-0"	4'-6"	1'-7 ³ / ₄ "	6'-1 ³ / ₄ "	5'-0"	3 ¹ / ₂ "
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4 ¹ / ₂ "
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9 ¹ / ₄ "	8'-2 ¹ / ₄ "	7'-6"	5 ¹ / ₂ "
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5 ¹ / ₂ "
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6 ¹ / ₂ "
84	3'-0"	7'-6 ¹ / ₂ "	1'-9"	9'-3 ¹ / ₂ "	10'-0"	6 ¹ / ₂ "
90	3'-5"	7'-3 ¹ / ₂ "	2'-0"	9'-3 ¹ / ₂ "	11'-0"	6 ¹ / ₂ "

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



SIDE VIEW

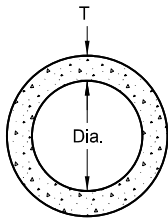


END VIEW

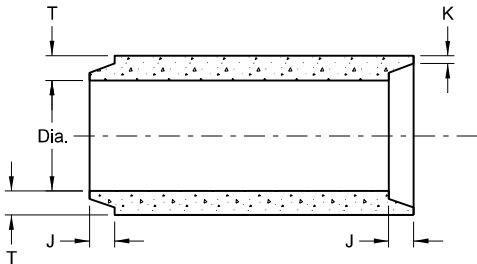
NOTES (Traversable End Section):

1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

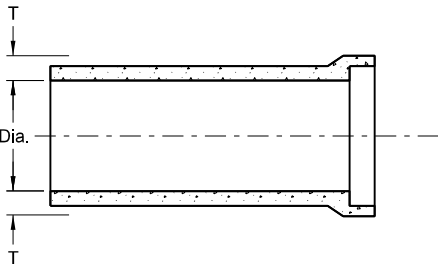
REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION
Reinforcement to be equivalent to Class III RCP



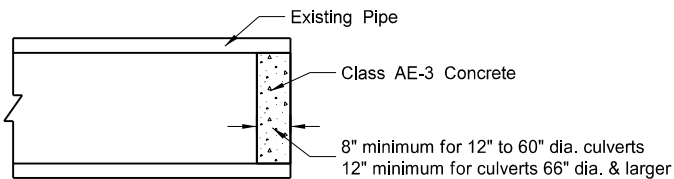
END VIEW



TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT



CONCRETE PIPE PLUG

All Classifications of Round Concrete Pipe						
Internal Dia. of Pipe in Inches	Cross-Sectional Water Area	Weight per Lin. Foot of Pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue Min.	Minimum Wall Thickness (T)	
Dia	Sq. ft.	Lbs.	In.	In.	In.	
12	0.79	92	1 ¹ / ₆ -2 ³ / ₈	3 ¹ / ₄	2	
15	1.23	127	1 ³ / ₄ -2 ³ / ₄	7 ¹ / ₈	2 ¹ / ₄	
18	1.77	168	1 ¹ / ₆ -2 ³ / ₈	1	2 ¹ / ₂	
21	2.40	214	1 ¹ / ₆ -2 ³ / ₈	1 ¹ / ₈	2 ¹ / ₄	
24	3.14	265	2 ³ / ₄ -3 ¹ / ₄	1 ¹ / ₈	3	
27	3.98	322	2 ³ / ₄ -4	1 ¹ / ₄	3 ¹ / ₄	
30	4.91	384	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₄	3 ¹ / ₂	
33	5.94	452	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	3 ³ / ₄	
36	7.07	524	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	4	
42	9.62	685	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₄	4 ¹ / ₂	
48	12.57	685	3 ¹ / ₆ -4 ³ / ₄	1 ¹ / ₈	5	
54	15.90	1070	4 ¹ / ₂ -5 ¹ / ₂	2	5 ¹ / ₂	
60	19.63	1296	4 ¹ / ₂ -5 ¹ / ₂	2 ¹ / ₄	6	
66	23.76	1542	5-6	2 ³ / ₈	6 ¹ / ₂	
72	28.27	1810	5 ¹ / ₆ -6 ¹ / ₂	2 ³ / ₈	7	
78	33.18	2098	6 ¹ / ₄ -7 ¹ / ₄	2 ³ / ₈	7 ¹ / ₂	
84	38.48	2410	5 ¹ / ₆ -7 ³ / ₄	3 ³ / ₈	8	
90	44.18	2793	6 ³ / ₄ -8 ¹ / ₂	3 ³ / ₈	8 ¹ / ₂	
96	50.27	3092	7-8 ¹ / ₄	3 ¹ / ₂	9	
102	56.75	3466	7-8 ¹ / ₄	3 ¹ / ₂	9 ¹ / ₂	
108	63.62	3864	7 ¹ / ₄ -8 ¹ / ₂	3 ³ / ₄	10	

NOTES:

1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
66" to 108" (incl.) = not less than 6 feet
4. Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
5. For Class IV and Class V reinforced concrete pipe and end section sizes which do not have reinforcement specified by AASHTO M170, shop drawings and design calculations shall be prepared and sealed by a Professional Engineer and submitted for the Engineer's review.

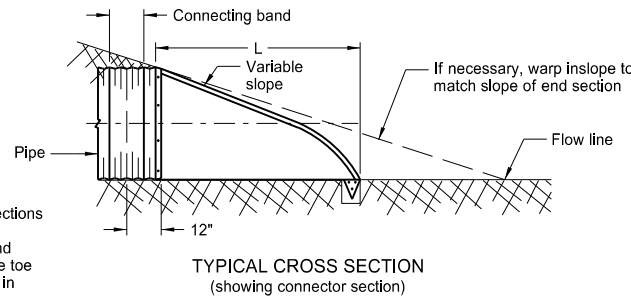
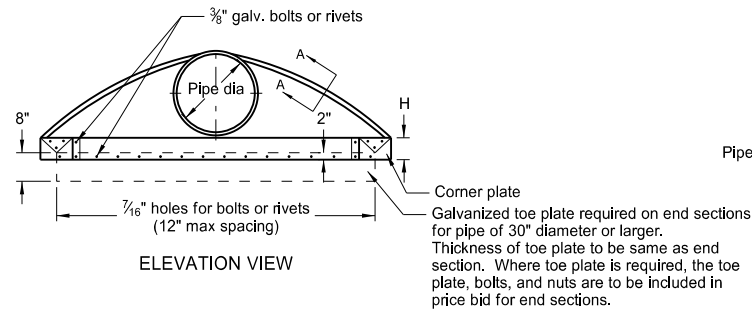
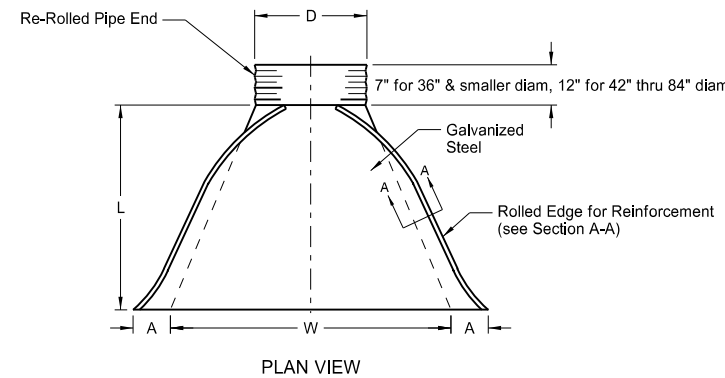
SEE STANDARD DRAWING D-714-22 FOR DETAILS
OF CONCRETE PIPE TIES (TIE BOLTS).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15 11-21-16	Revised Note 5 Revised End Section Dimensions

This document was originally
issued and sealed by
Jon Ketterling
Registration Number
PE- 4684 ,
on 11/21/16 and the original
document is stored at the
North Dakota Department
of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



PIPE DIA.	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE RATE	BODY
		A	B	H	L	W		
IN	IN	IN	IN	IN	IN	IN		
15	0.064	7	8	6	26	30	2 1/2:1	1
18	0.064	8	10	6	31	36	2 1/2:1	1
24	0.064	10	13	6	41	48	2 1/2:1	1
30	0.079	12	16	8	51	60	2 1/2:1	1 or 2
36	0.079	14	19	9	60	72	2 1/2:1	2
42	0.109	16	22	11	69	84	2 1/2:1	2
48	0.109	18	27	12	78	90	2 1/2:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1 1/2:1	3
* 66	0.109	18	36	12	87	120	1 1/2:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1 1/4:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

* These sizes have 0.109" sides and 0.138" center panels.

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

Manufacturers tolerances of above dimensions will be allowed.

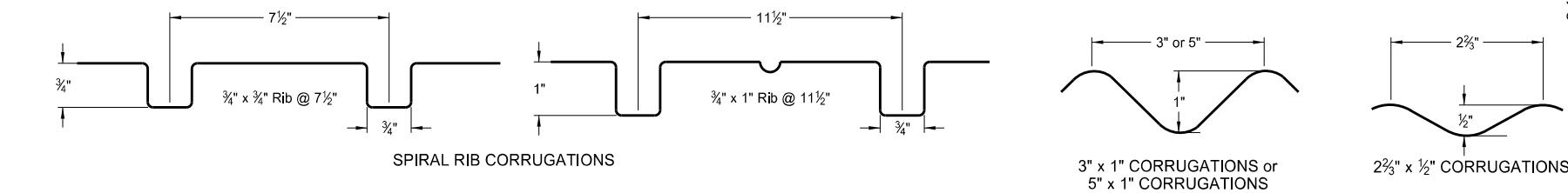
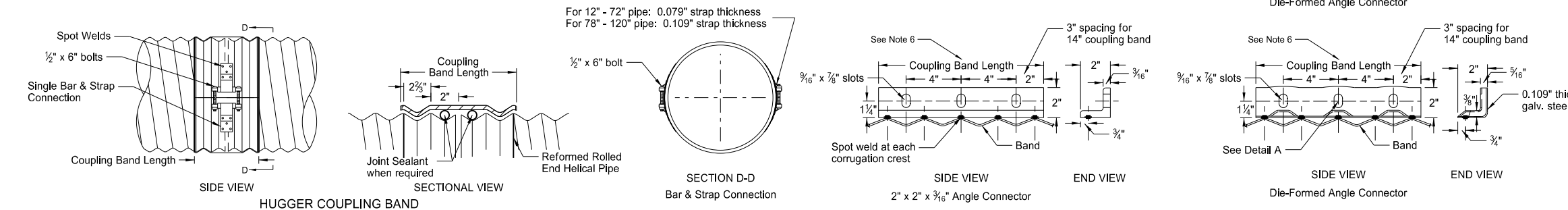
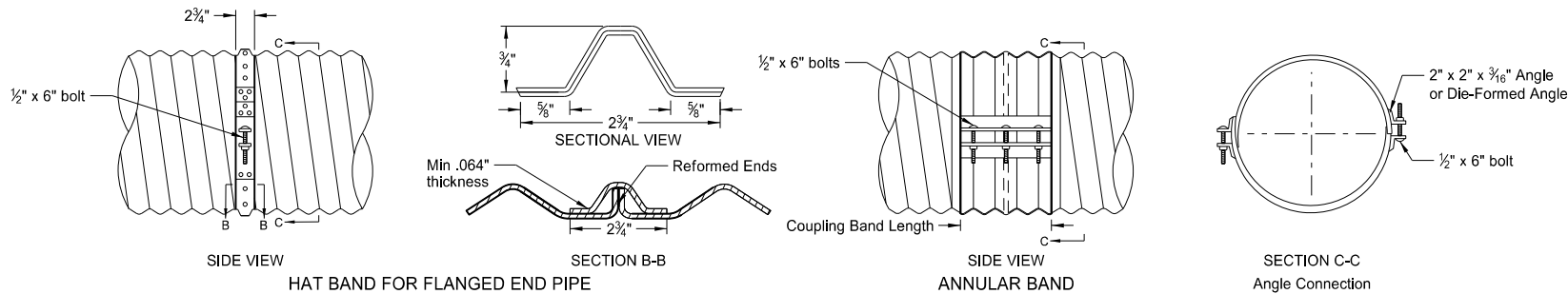
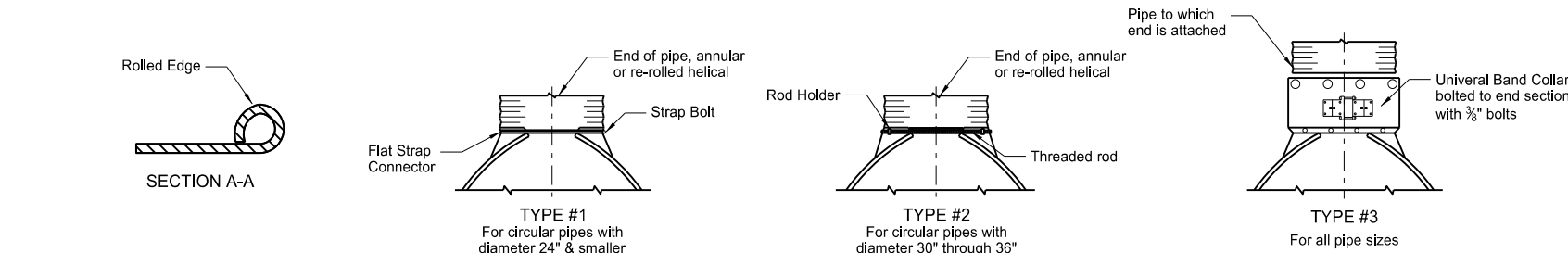
Splices to be the lap riveted type.

Multiple panel bodies shall have lap seams which are to be tightly joined with 3/8" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.

NOTES:

- Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
- Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x 1/16" galv. angle for 60" through 72" dia. and 2 1/2" x 2 1/2" x 1/4" galv. angle for 78" and 84" dia.. Angles to be attached by galv. 3/8" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
- Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
- Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
- 1/2" x 8" bolts may be used as a substitute for the 1/2" x 6" bolts shown in the details.
- Coupling bands wider than 14" may be used if a minimum of four 1/2" bolts with maximum spacing of 5 1/2" are used for the connection.
- Length of spot welds shall be minimum 1/2".

COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2 2/3" x 1/2"	12" - 48"	2 3/4"	.064"
Annular Band	2 2/3" x 1/2"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
Hugger Band	2 2/3" x 1/2" Rerolled End	12" - 72"	10 1/2"	.052"
		78" - 84"	10 1/2"	.079"
	3" x 1" Rerolled End	48" - 120"	10 1/2"	.052"
		5" x 1" Rerolled End	48" - 120"	.064"

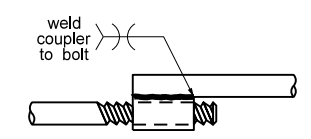
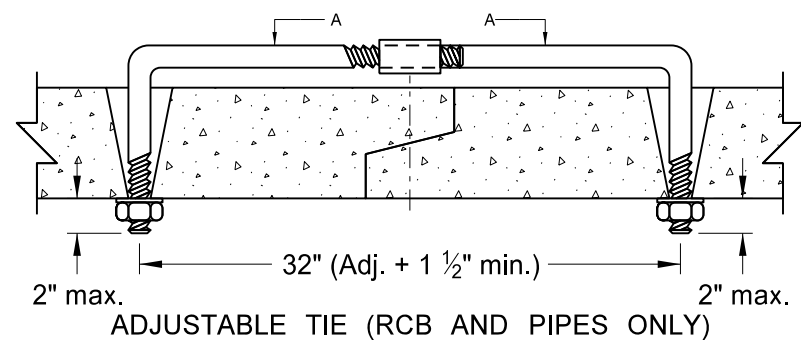
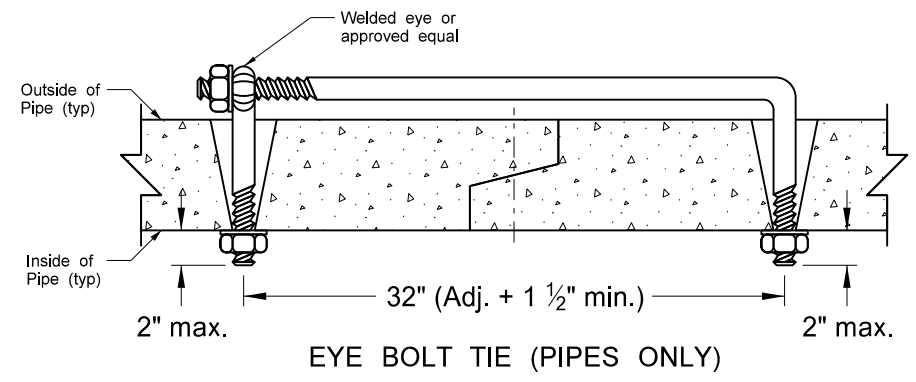


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-06-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail

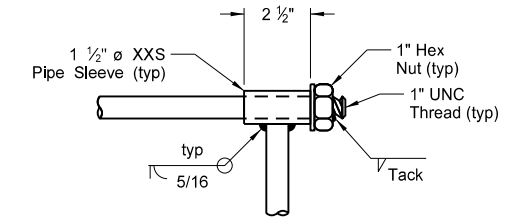
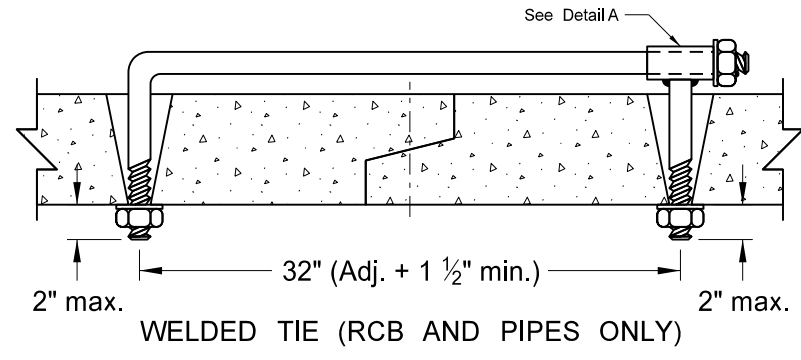
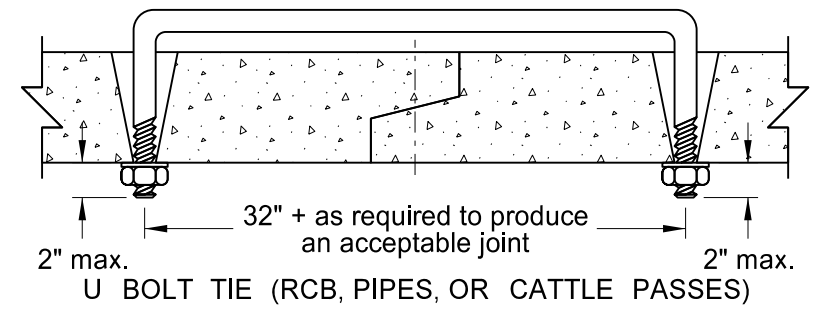
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 02/27/2014 and the original document is stored at the North Dakota Department of Transportation

CONCRETE PIPE, CATTLE PASS, OR
PRECAST CONCRETE BOX CULVERT TIES

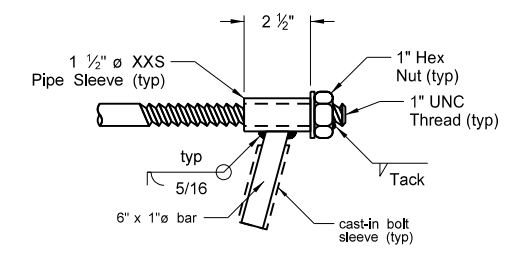
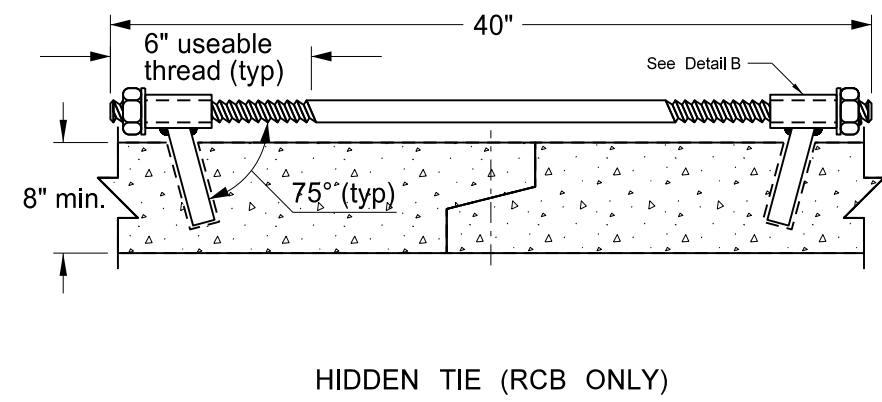
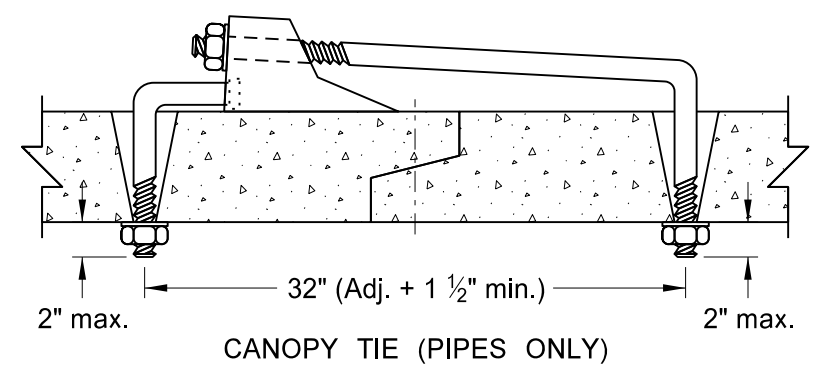
D-714-22



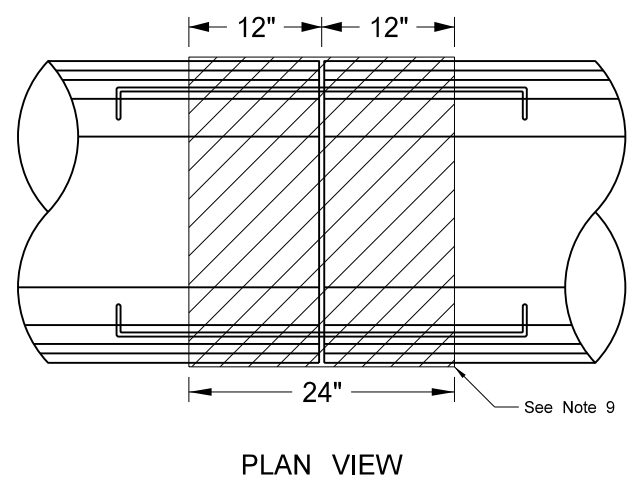
SECTION A-A



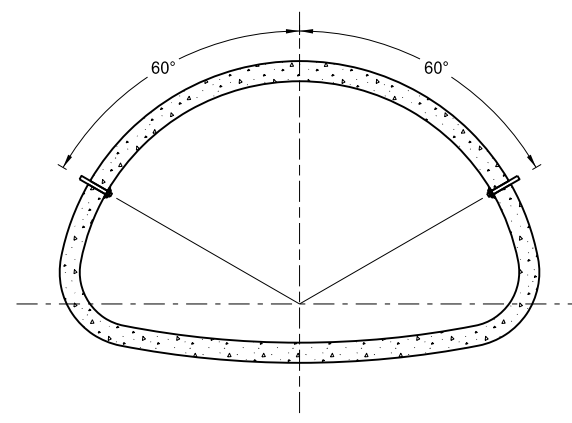
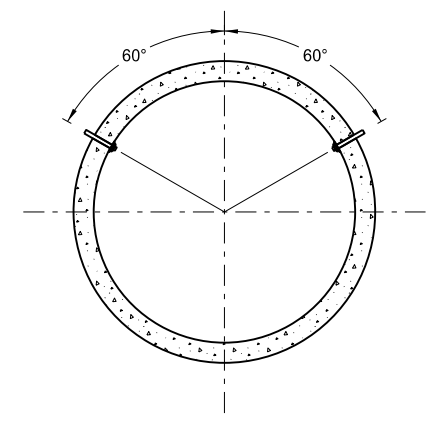
DETAIL A



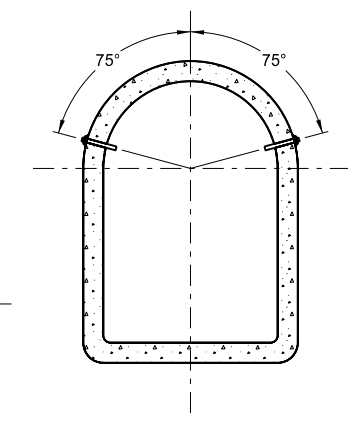
DETAIL B



PLAN VIEW



END VIEW



REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ϕ	XXS Pipe Sleeve Inner ϕ
18" - 24"	$\frac{5}{8}$ " See note 2	$\frac{3}{4}$ "
30" - 66"	$\frac{3}{4}$ "	1"
72" - 78"	1"	1 $\frac{1}{4}$ "
RCB/Cattle Pass		

- NOTES:
- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
 - Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
 - Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
 - Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
 - Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
 - Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter $\frac{1}{4}$ " larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1 $\frac{1}{4}$ ".
 - The contractor has the option of selecting the type of tie bolt used from those shown.
 - The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
 - All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
 - Place joint wrap prior to installing ties. Overlap the joint by 12" in both directions.
 - Tie bolts shall conform to ASTM A 36. Nuts shall be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
 - RCB tie locations shall be as shown on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15 6-6-17	Note 8 Notes 2-11, Table, Title, Labels

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- 1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.
- 2) Embankment may be either Borrow Excavation or Common Excavation - Type A

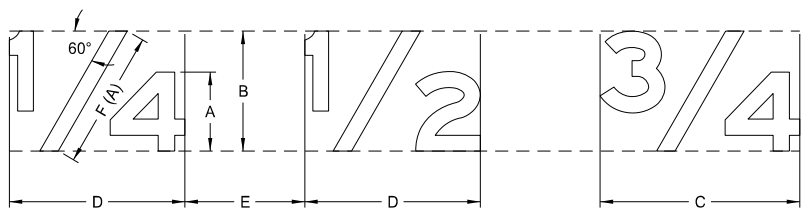


This document was originally
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Ron Horner,
Registration Number
PE-2087,
on 9/18/2015 and the original
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North Dakota Department
of Transportation

LETTER AND ARROW DETAILS

D-754-9

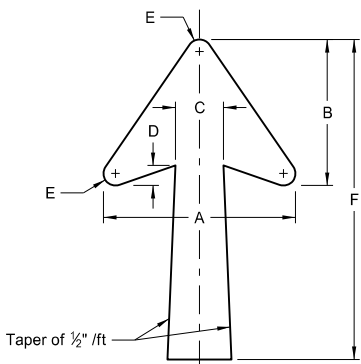
NOTE: The rotation angle of the arrows is measured counterclockwise from the positions shown in the details.



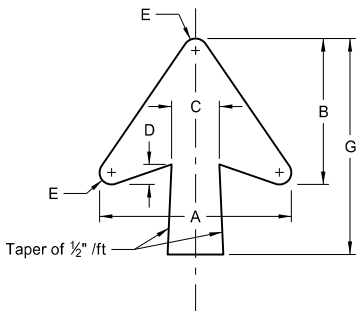
SIZE OF THE FRACTION IS DETERMINED AS FOLLOWS:

SYMBOL	TITLE	RATIO TO HEIGHT OF CAPITAL OR UPPER CASE
A	Letter height	1.0 of capital or upper case
B	Fraction height	1.5 X A
C	Fraction width	2.5 X A
D	Fraction width	2 X A
E	Space to next character	1 to 1.5 X A
F(A)	Length of diagonal	1.75 X A

(A) Diagonal stroke of fraction is to be centered optically.



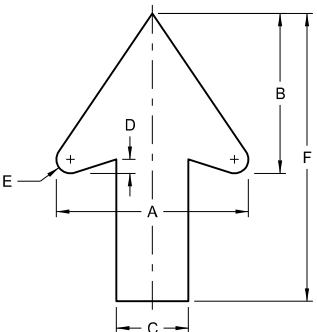
TYPE A



TYPE B

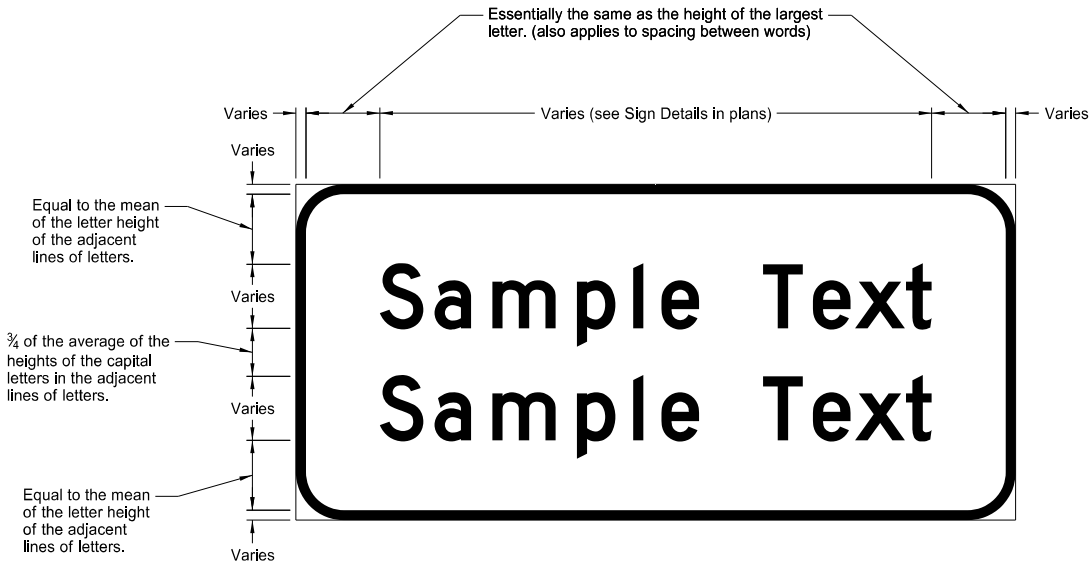
DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G
ND_6IN	6"	12"	9.125"	3"	1"	0.625"	20"	13.5"
ND_8IN	8"	15.125"	11.563"	3.75"	1.313"	0.813"	25"	17"
ND_10IN	10"	18.25"	14"	4.5"	1.5"	0.75"	30"	20"
ND_12IN	12"							
ND_13IN	13.3"							
ND_16IN	16"	22.25"	17"	5.375"	1.75"	1"	35"	25"
ND_20IN	20"							

NOTE: Arrow size on gore signs is based on the letter size of "EXIT".

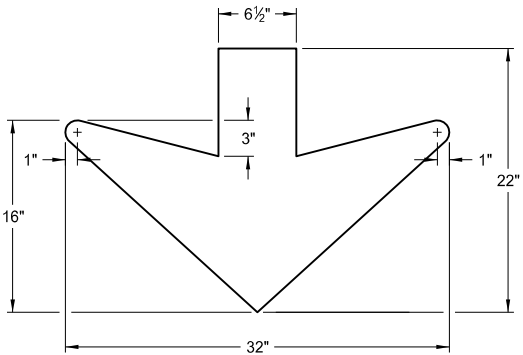


TYPE D

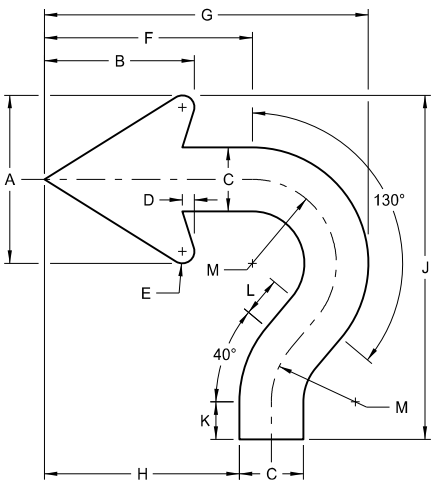
DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F
ND_2IN	2"	2"	1.625"	0.75"	0.125"	0.125"	3"
ND_4IN	4"	4"	3.313"	1.5"	0.25"	0.25"	6"
ND_6IN	6"	6"	4.875"	2.25"	0.375"	0.375"	9"
ND_8IN	8"	8"	6.625"	3"	0.5"	0.5"	12"
ND_10IN	10"	10"	8.375"	3.75"	0.75"	0.75"	15"
ND_12IN	12"	12"	10"	4.5"	0.875"	0.875"	18"



TYPICAL SPACING

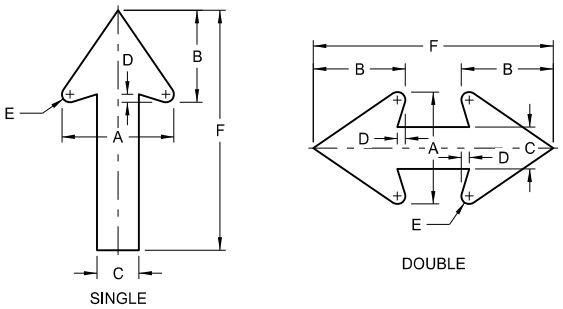


DOWN ARROW



ROUNDOABOUT

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G	H	J	K	L	M
ND_6IN	6"	5.25"	4.688"	2"	0.375"	0.375"	6.5"	10.125"	6.094"	10.75"	1.168"	1.25"	2.625"
ND_8IN	8"	7"	5.75"	2.625"	0.5"	0.5"	8.688"	13.5"	8.166"	14.333"	1.557"	1.667"	3.5"



SPECIAL

DESIGNATION	A	B	C	D	E	F	USES
ND_0.75IN	2"	1.625"	0.75"	0.125"	0.125"	7.75"	Parking Signs (Regulatory)
ND_2.625IN	7"	5.75"	2.625"	0.5"	0.5"	15"	Frontage Road Signs

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE
7-8-14	Revised gore sign and added 4" D & D arrow
5-4-16	Revised Distance & Destination and Typical Spacing details
4-23-18	Revised arrow details

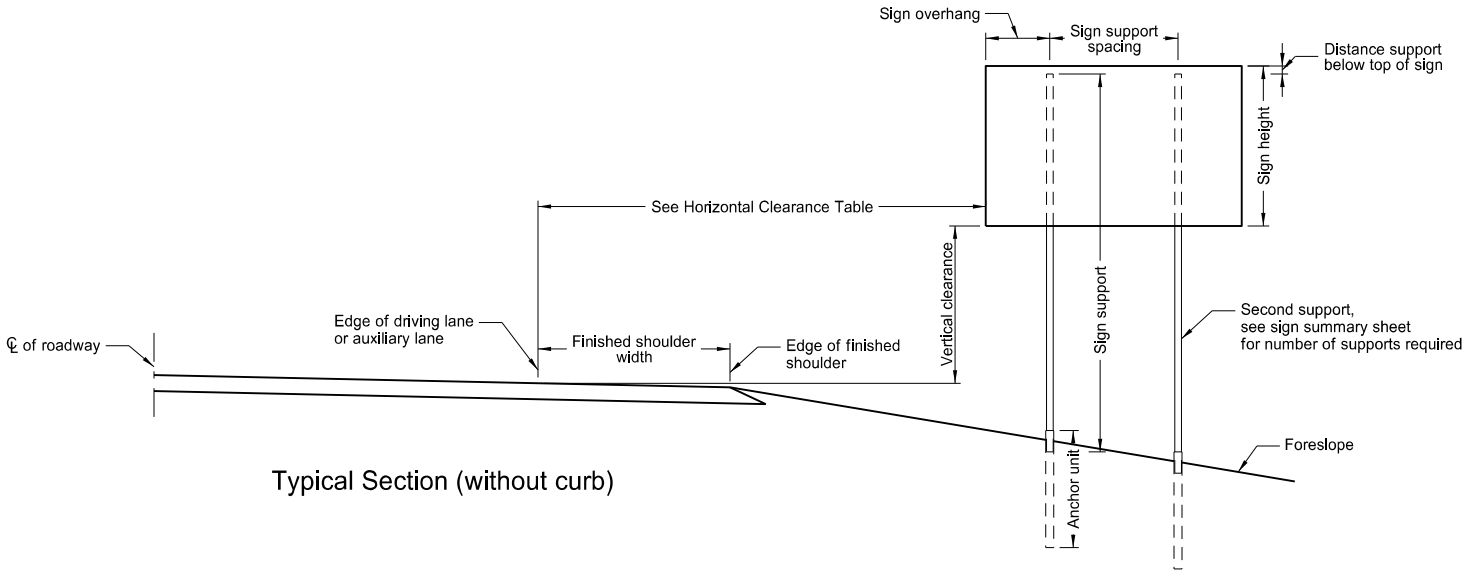
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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

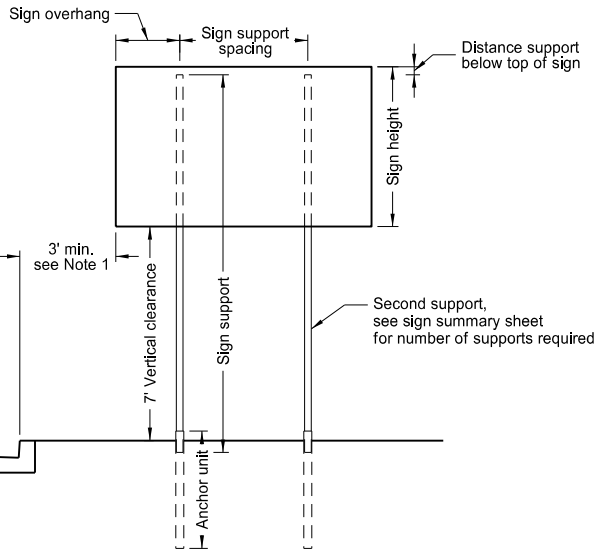
Notes:

- 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'.
- Signs on expressways shall be installed with a minimum height of 7'.
- Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.
- The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.
- 3. Offset signs: 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.
- 4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.

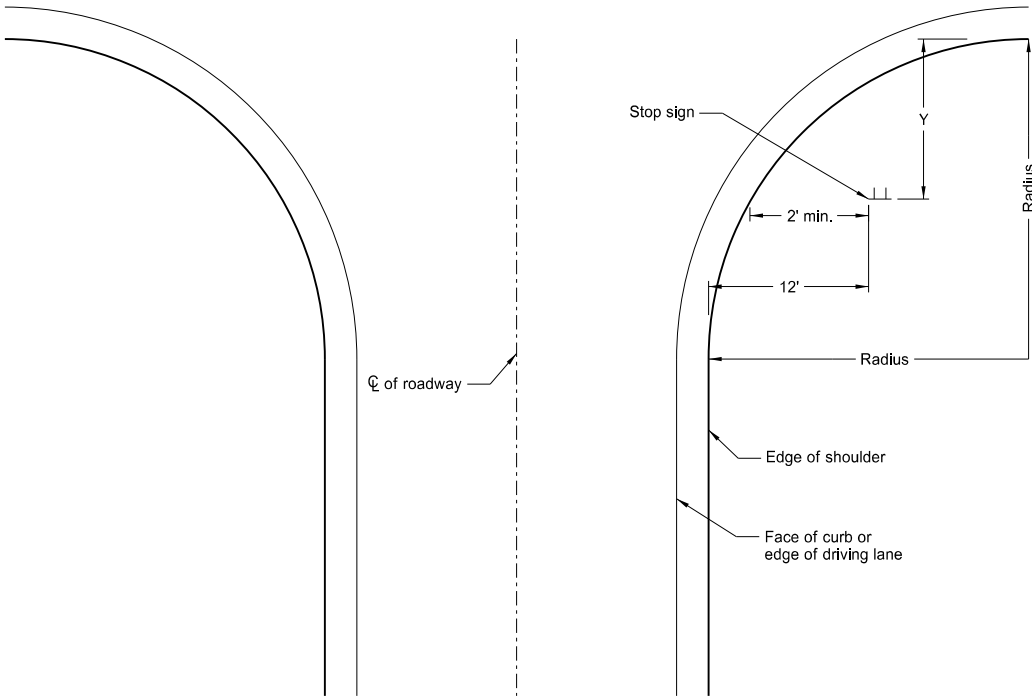


Typical Section (without curb)

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



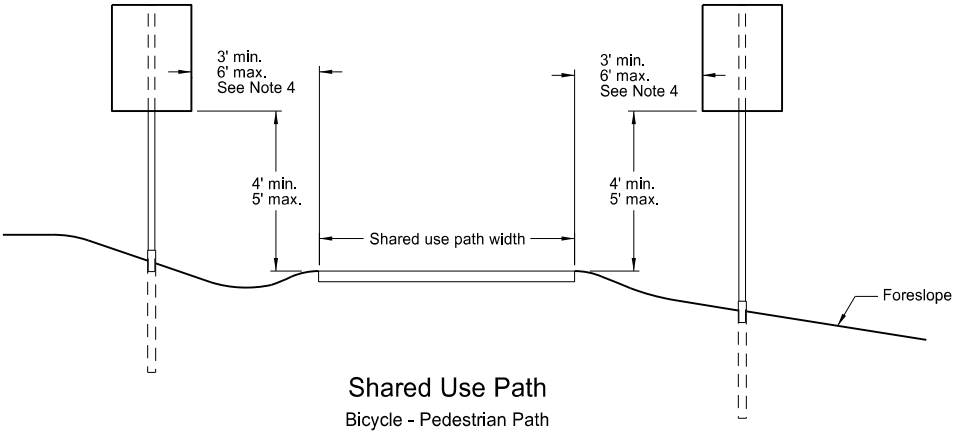
Typical Section (with curb)
Residential or Business District



Stop Sign Location
Wide Throat Intersection

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

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



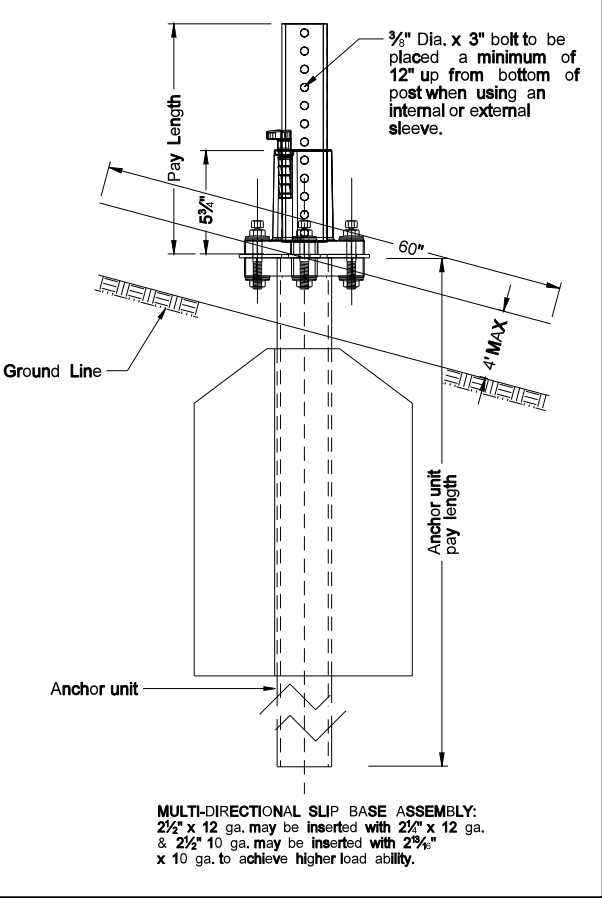
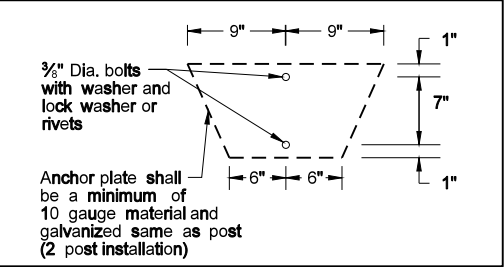
Shared Use Path
Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.

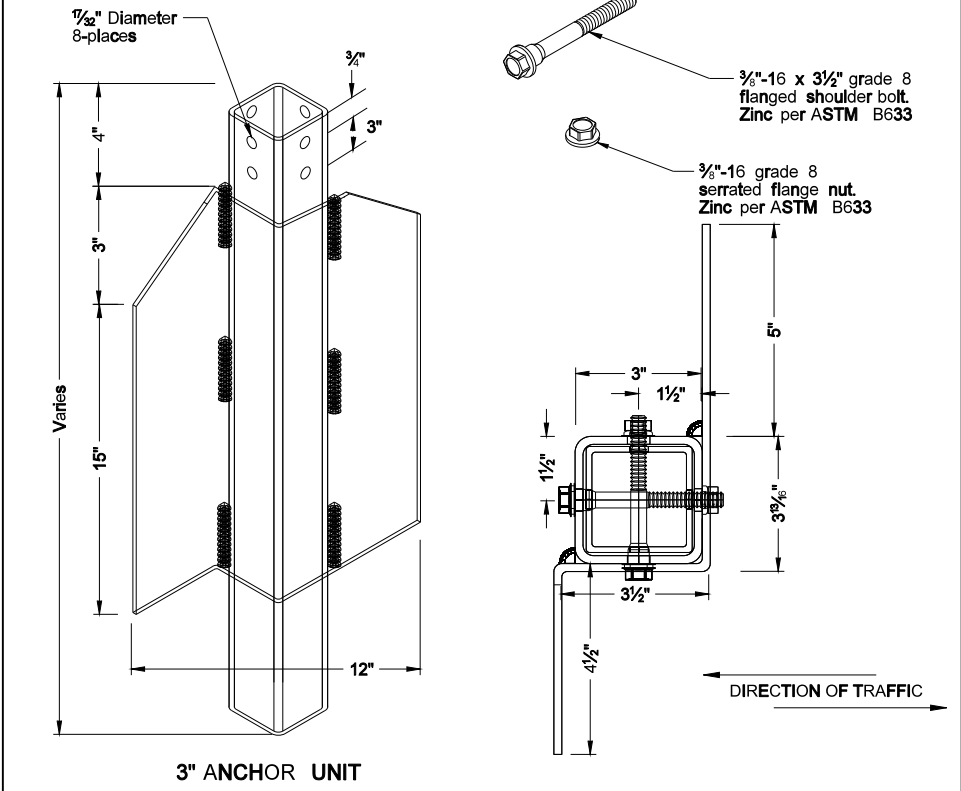
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Number of Posts	Telescoping Perforated Tube					
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.
1	2	12			No	2 1/2
1	2 1/2	12			No	2 1/2
1	2 1/2	12			(B)	3(C)
1	2 1/2	10			Yes	7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

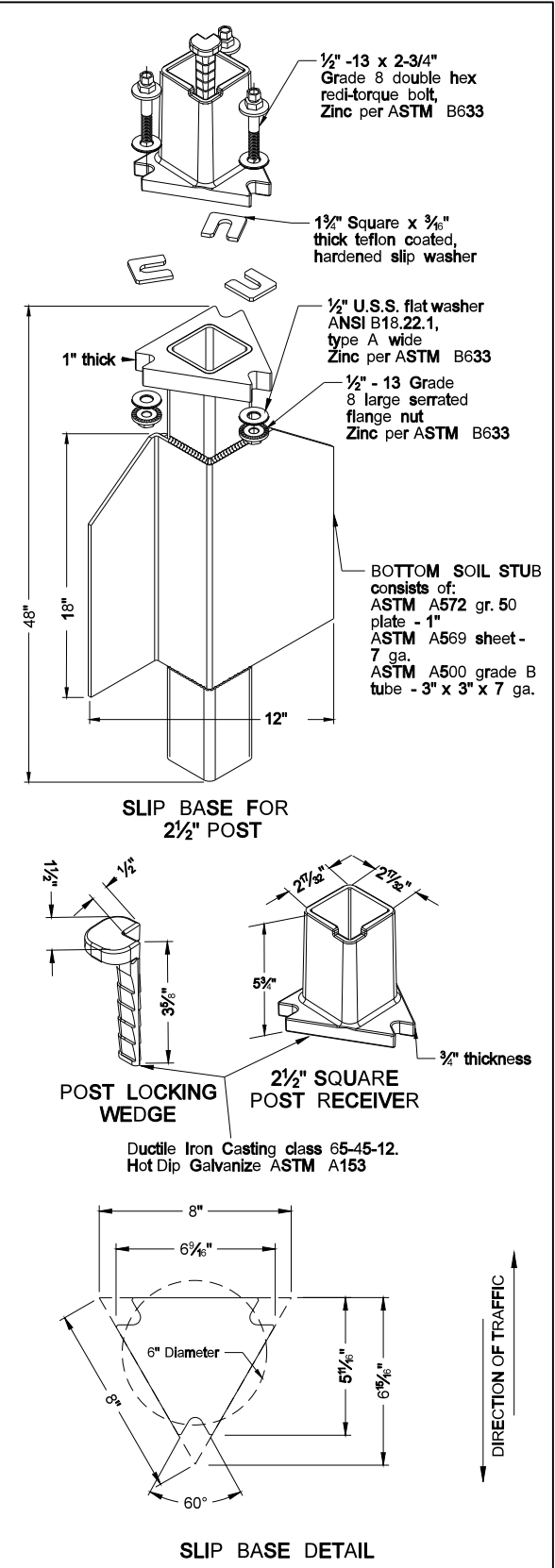
(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy,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



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)

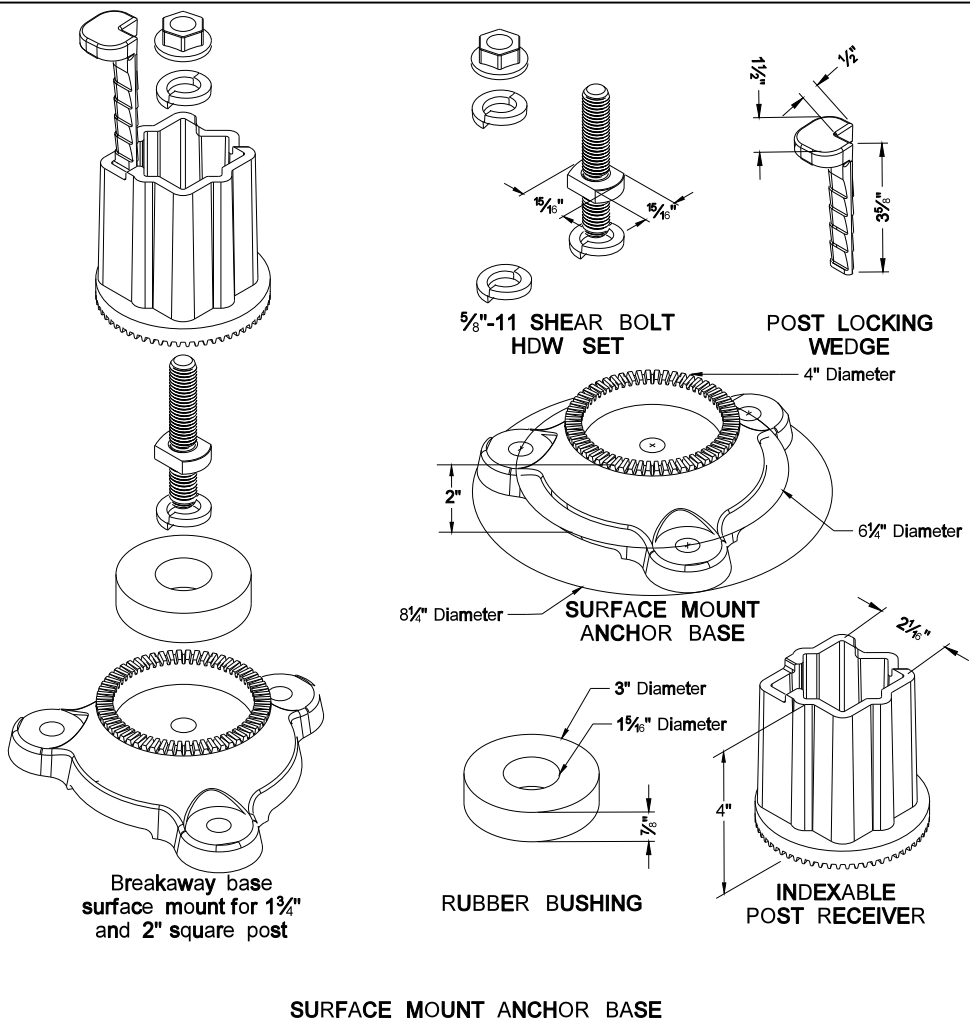


Mounting Details Perforated Tube



Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. Area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/2 x 2 1/2	0.105	12	2.773	0.561	0.695	0.499	
2 3/4 x 2 3/4	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 3/4" 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.



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.

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

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Breakaway Coupler System
for Perforated Tubes

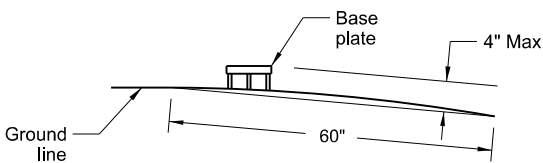
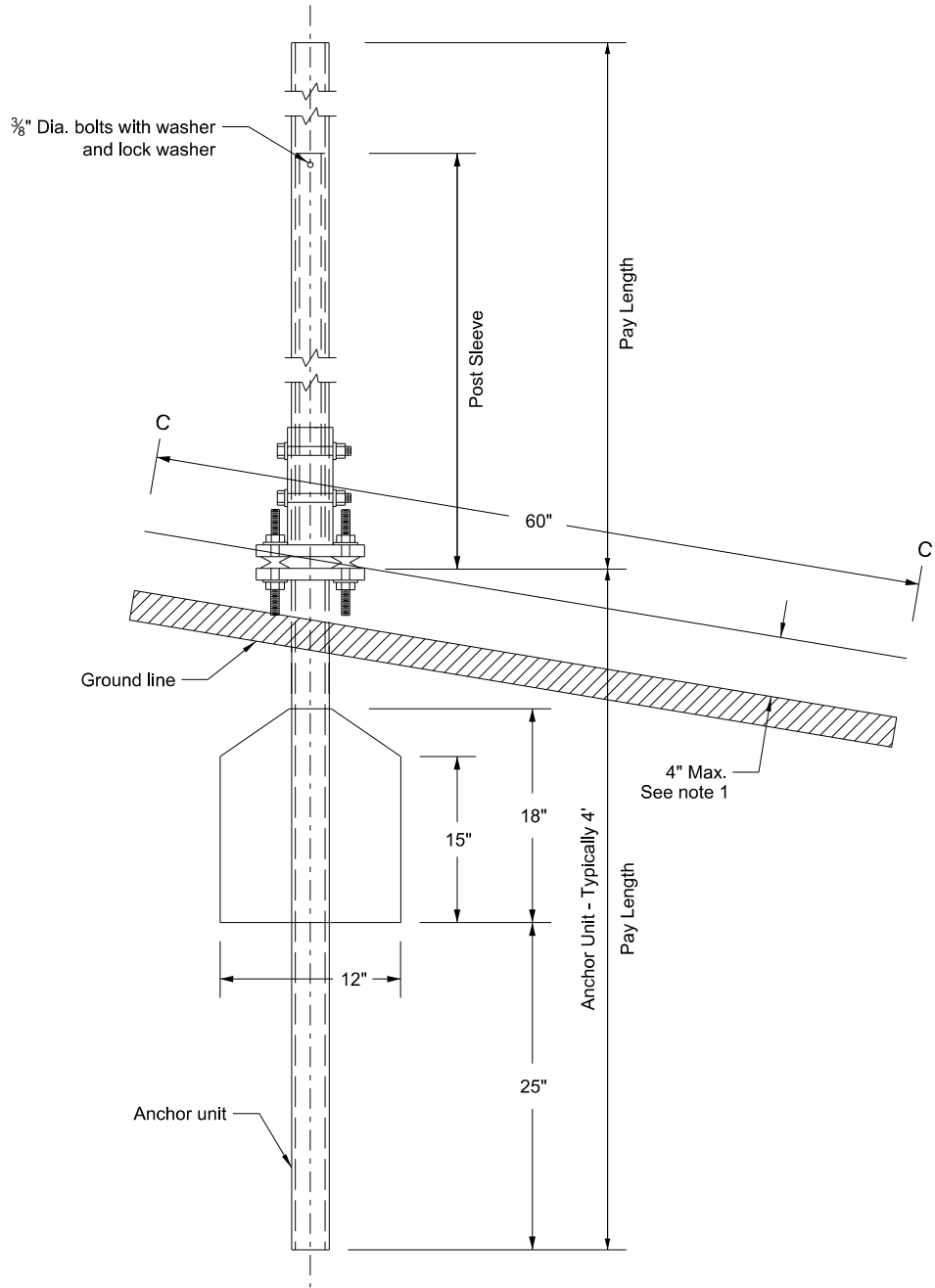
Notes:

- 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 unit shall be the same size as the post and shall have the same specification as the post.
- Four post signs shall have over 8' between the first and fourth post.
- In lieu of the breakaway base system on standard D-754-24 the breakaway coupling system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2¾	10	Yes		7

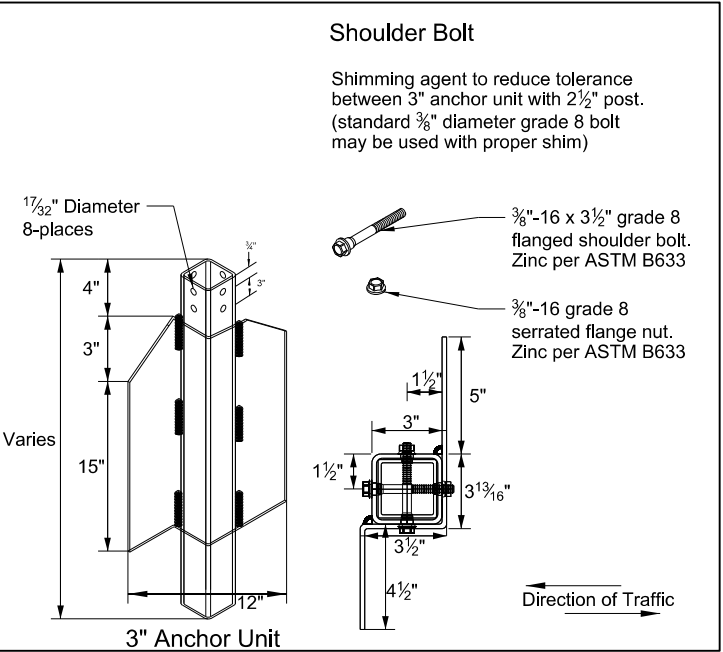
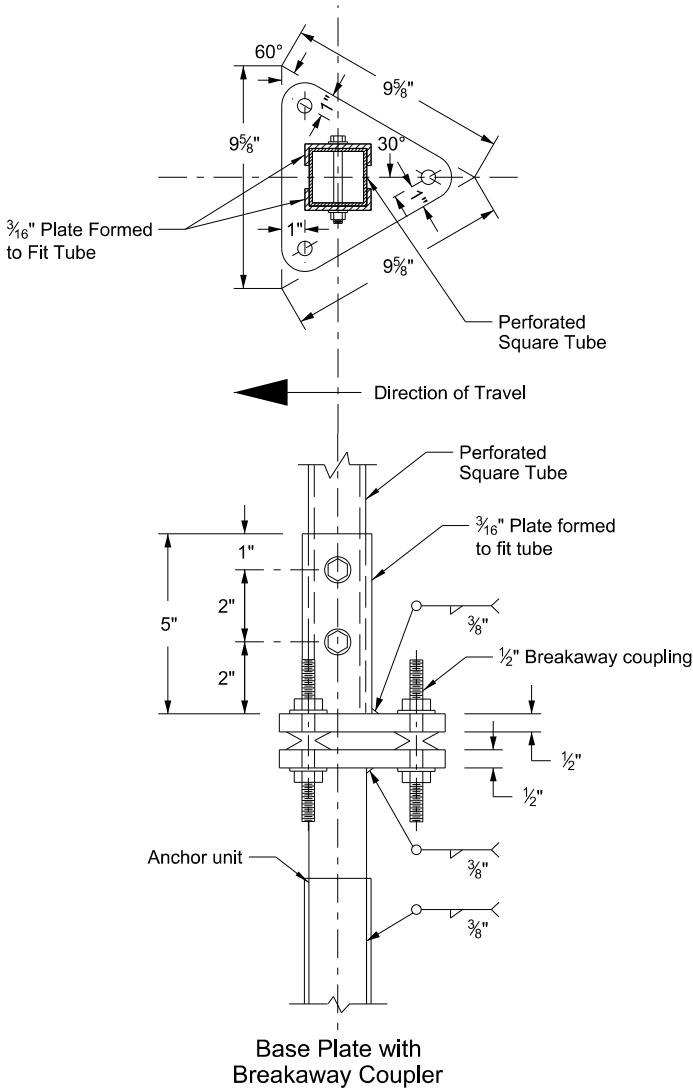
(B) - The 2½" 12 gauge posts do not need breakaway bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

(C) - 3" anchor unit



Section C-C

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

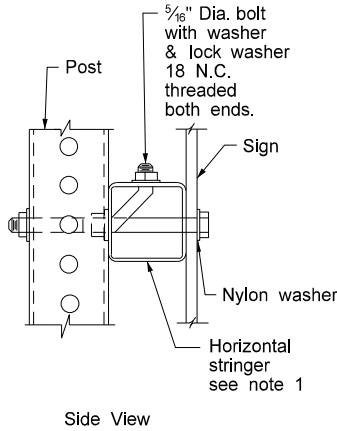


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE

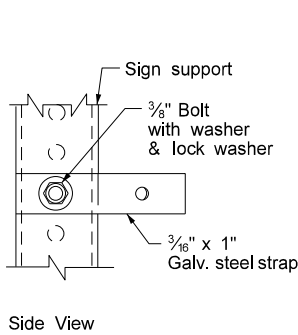
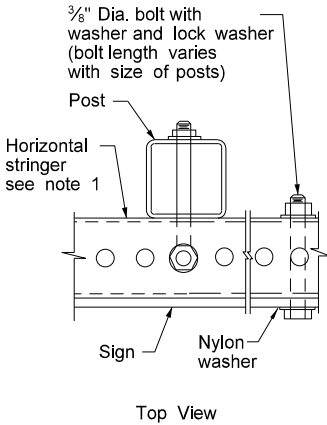
This document was originally issued and sealed by
Roger Weigel
Registration Number
PE-2930,
on 10/3/13 and the original document is stored at the
North Dakota Department
of Transportation

Mounting Details Perforated Tube

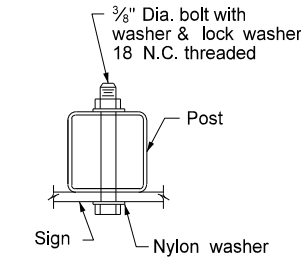
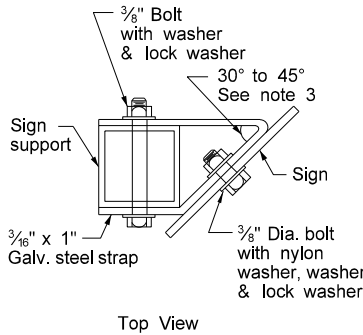
- Note:
- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 3/4" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
 - Metal washers used on sign face shall have a minimum outside diameter of 5/16" ± 1/16" and 10 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.
 - 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.



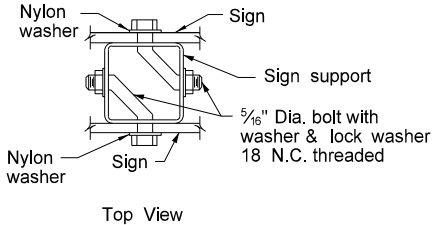
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



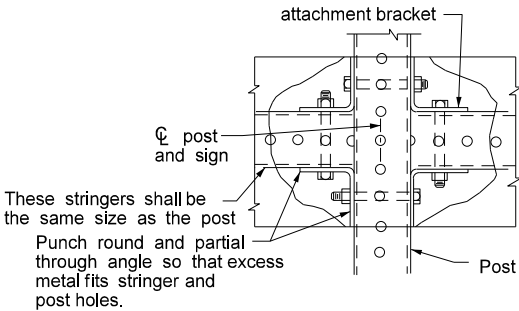
STRAP DETAIL



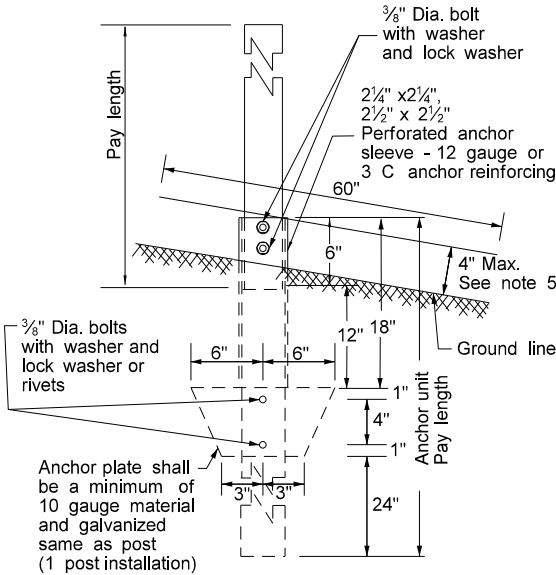
BOLT MOUNTING



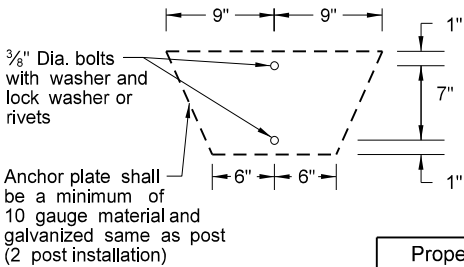
BACK TO BACK
MOUNTING



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



ANCHOR UNIT AND
POST ASSEMBLY



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

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

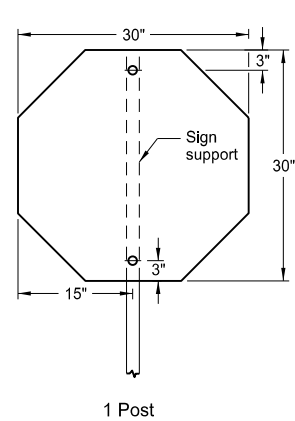
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2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

(B) - 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.

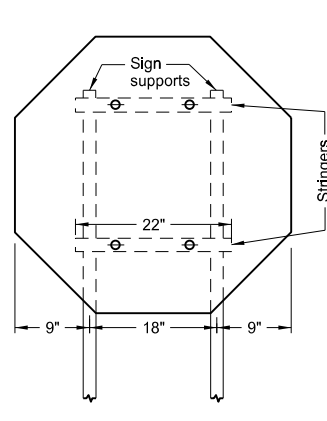
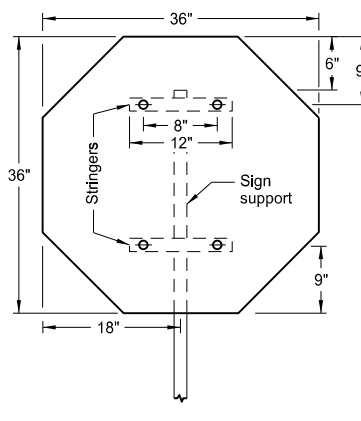
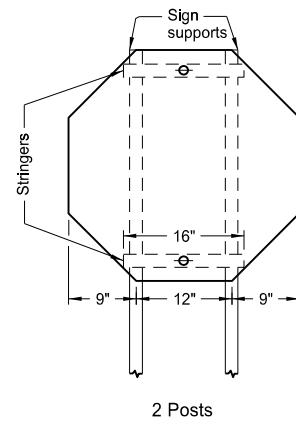
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 7/8/14 and the original document is stored at the North Dakota Department of Transportation
8-8-09		
REVISIONS		
DATE	CHANGE	
7-8-14	Revised Note 3	

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

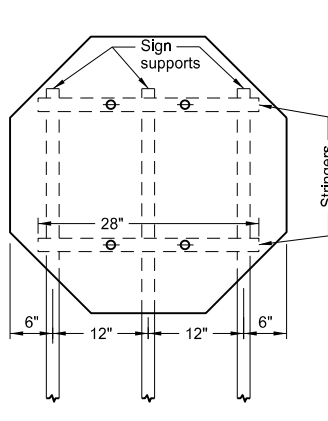
D-754-26



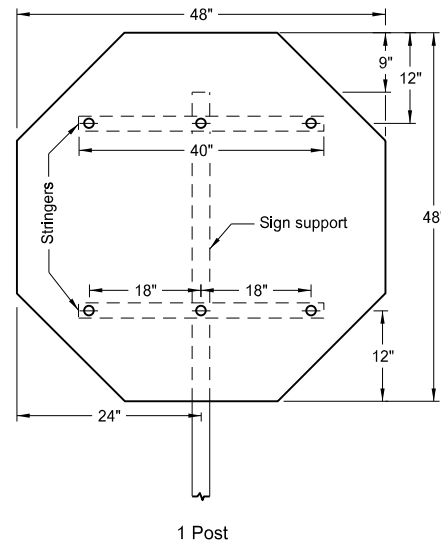
Assembly No. 1



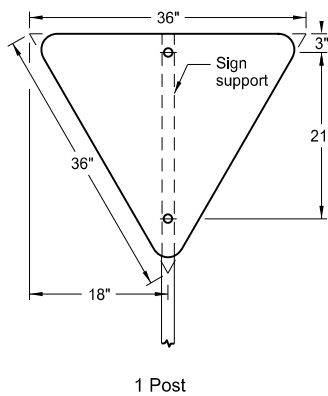
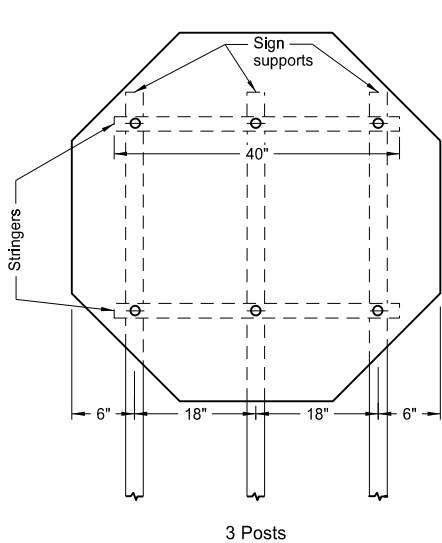
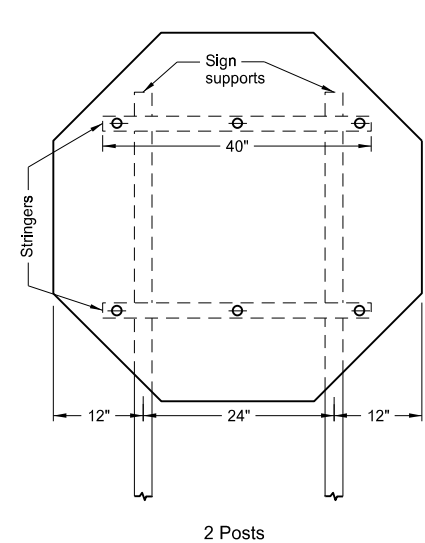
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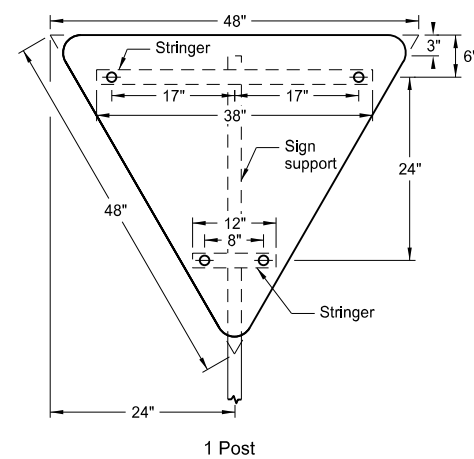
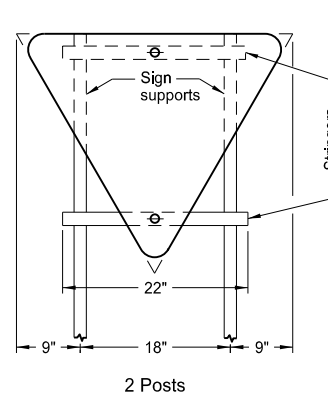
- Notes:
1. See Standard D-754-25 for mounting details.
 2. The minimum sign backing material thickness shall be 0.100 inch.
 3. Perforated square tube stringer shall be 1½" x 1½".
 4. All holes shall be punched round for ⅜" bolt.



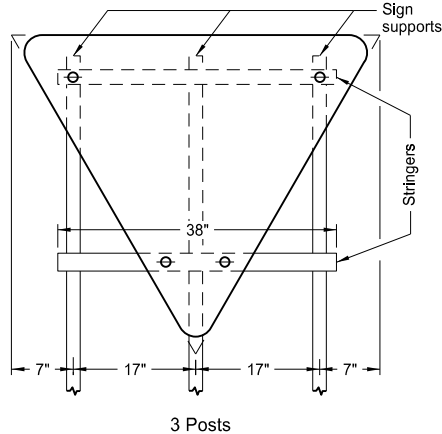
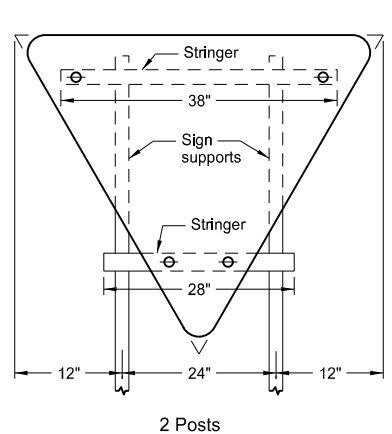
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Assembly No. 4



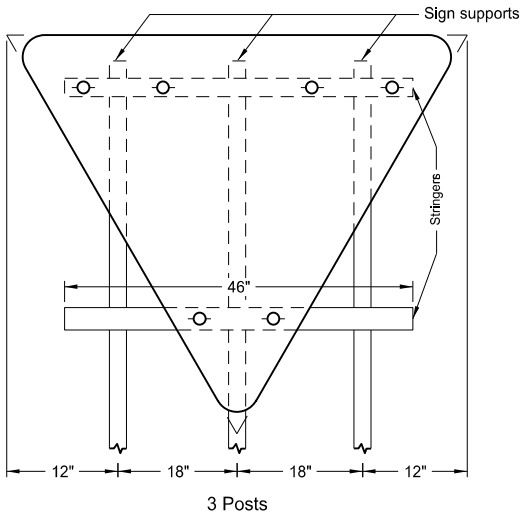
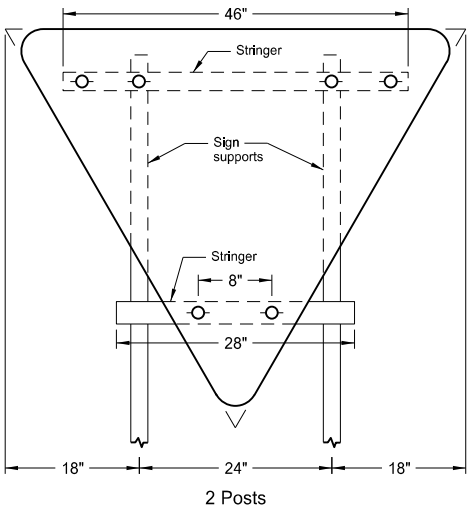
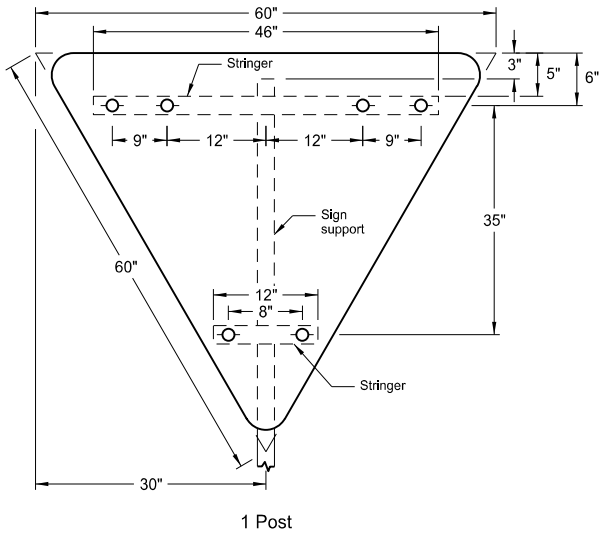
Assembly No. 5



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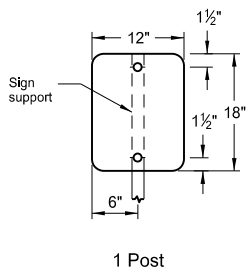
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



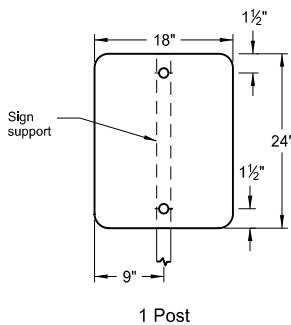
Assembly No. 6

Notes:

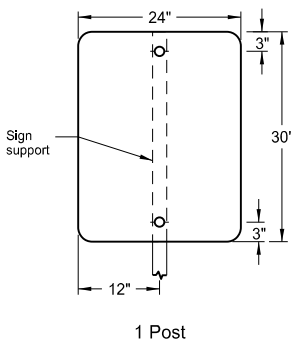
1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



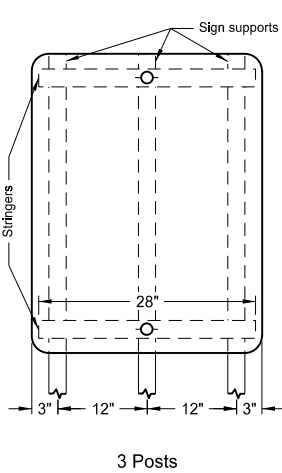
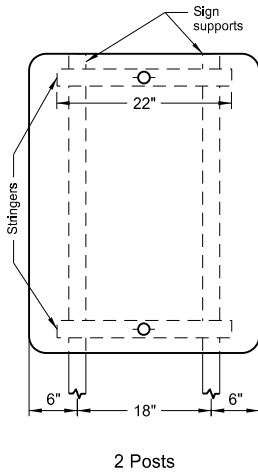
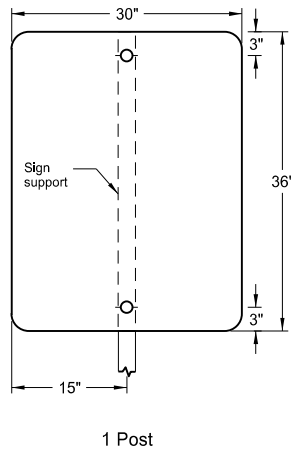
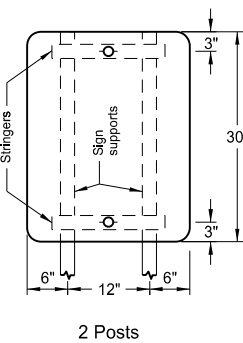
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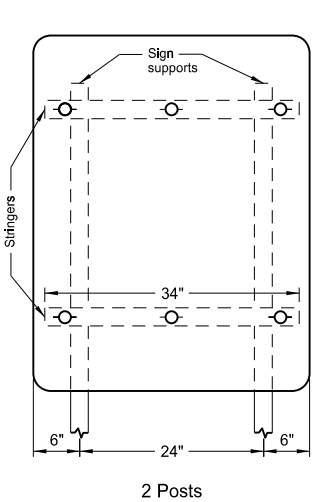
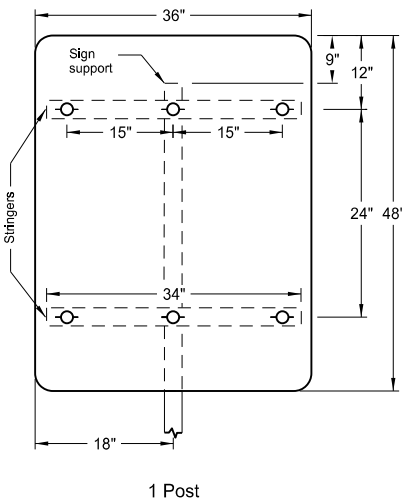
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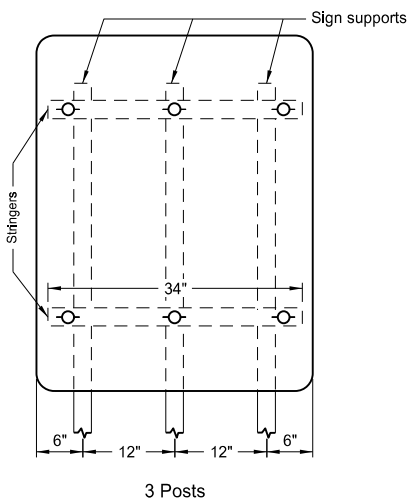
Assembly No. 9



Assembly No. 10



Assembly No. 11

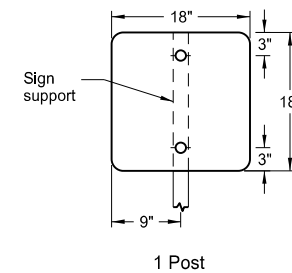
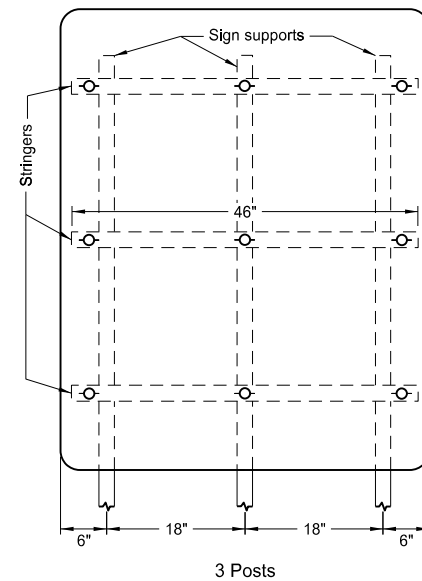
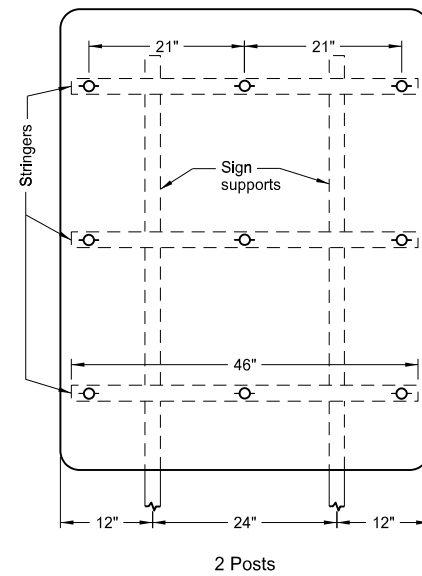
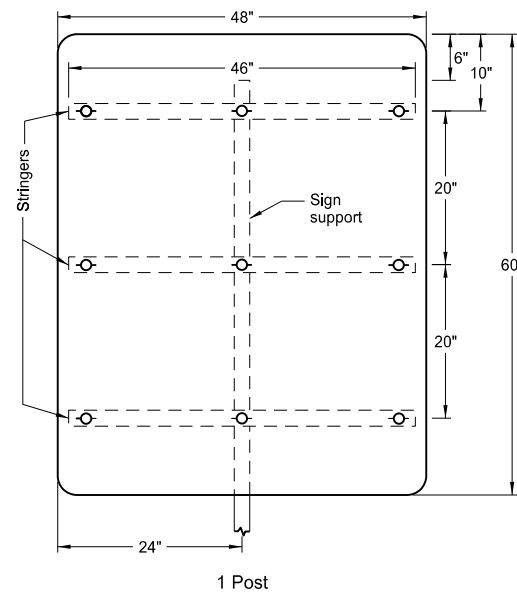


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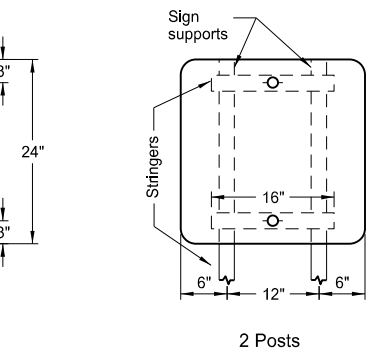
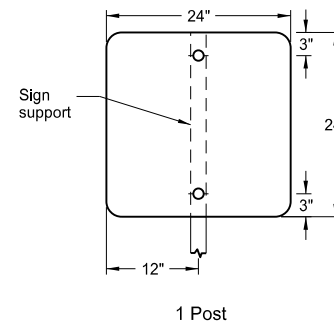
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

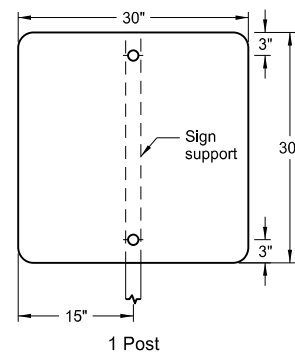
D-754-28



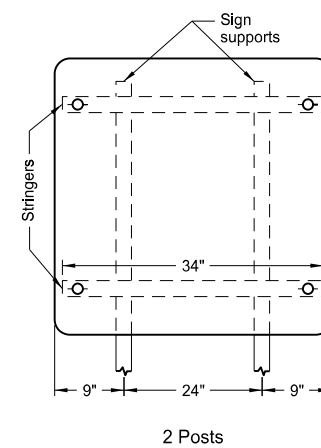
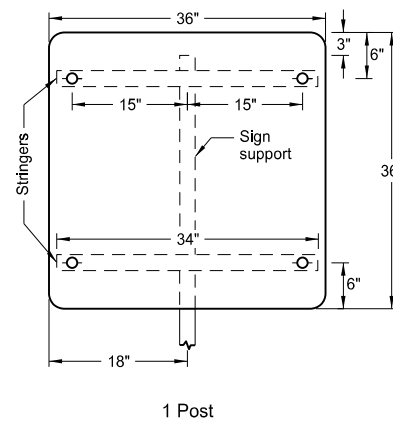
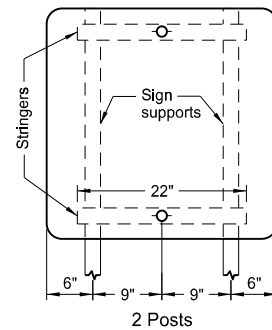
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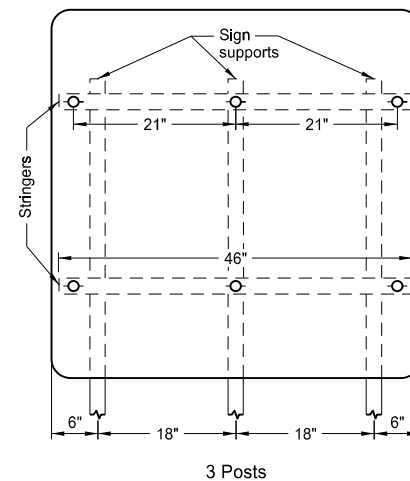
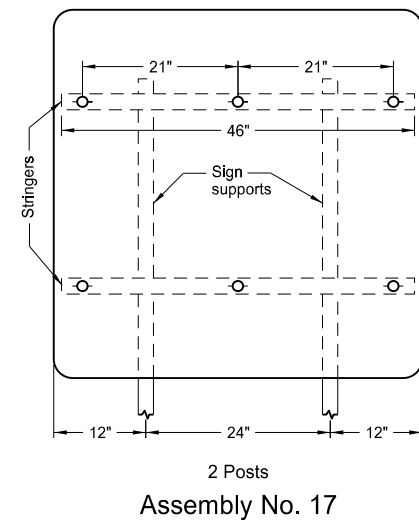
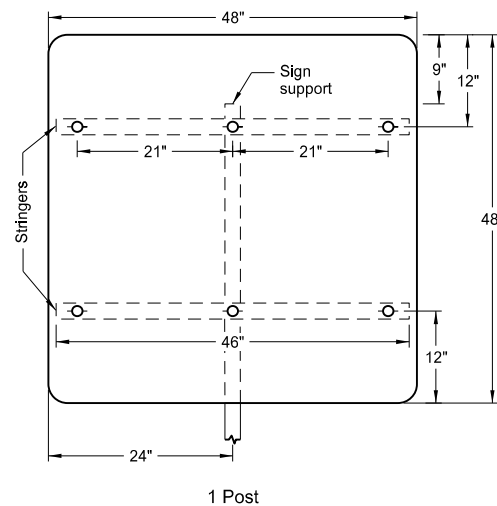
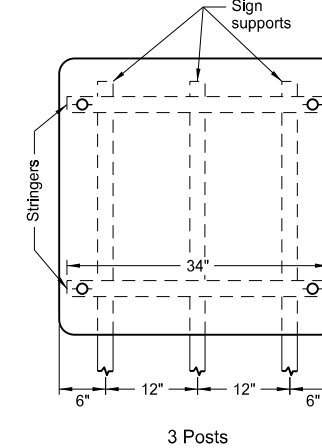
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Assembly No. 15



Assembly No. 16



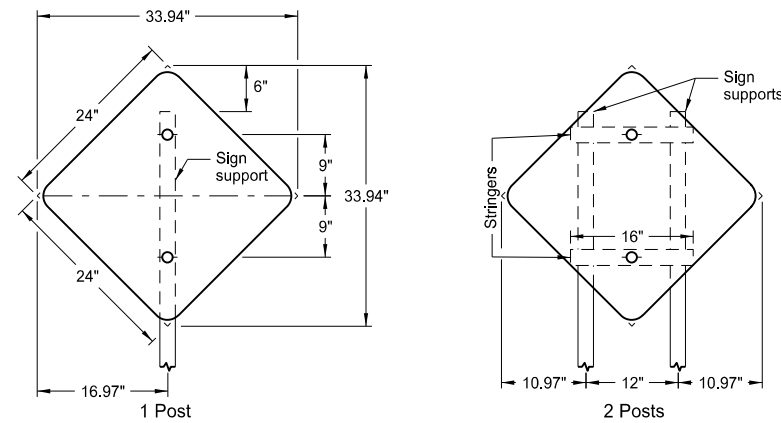
Notes:

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

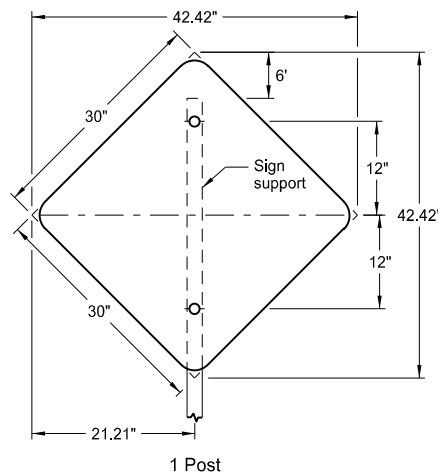
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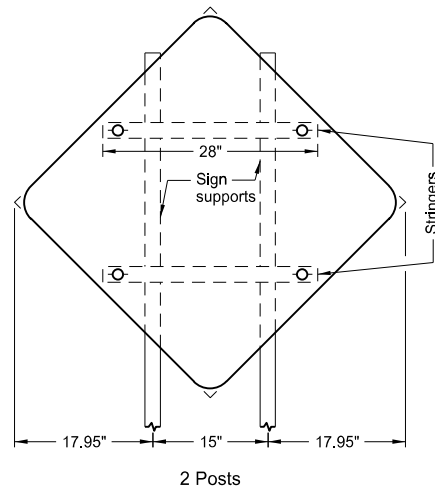
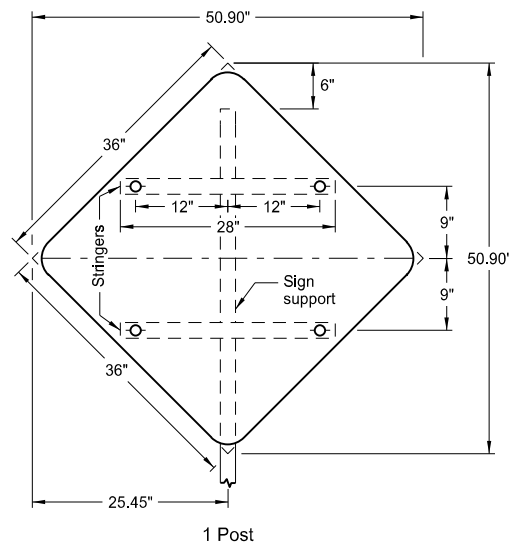
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



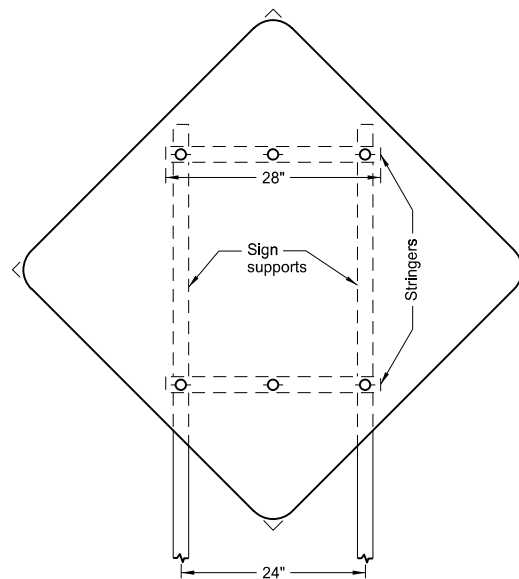
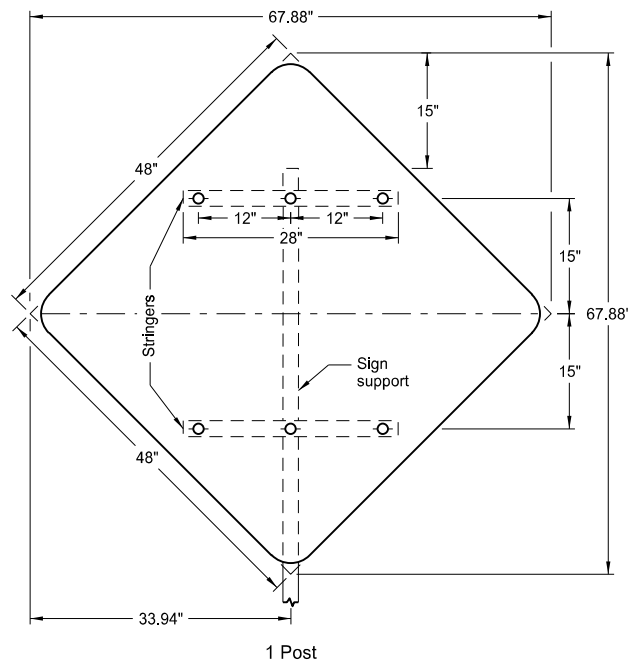
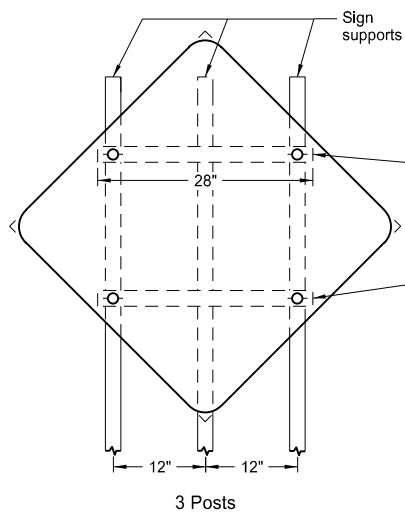
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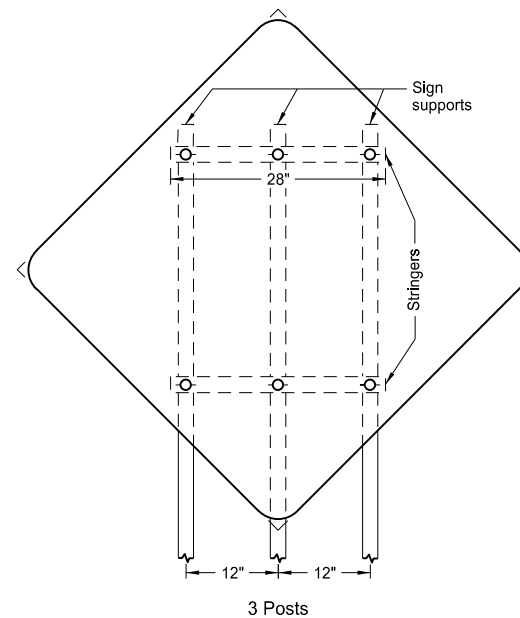
Assembly No. 19



Assembly No. 20



Assembly No. 21



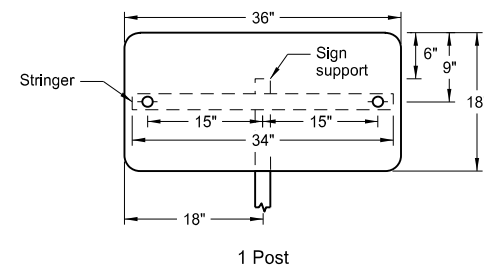
- Notes:
1. See Standard D-754-25 for mounting details.
 2. The minimum sign backing material thickness shall be 0.100 inch.
 3. Perforated square tube stringer shall be 1½" x 1½".
 4. All holes shall be punched round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
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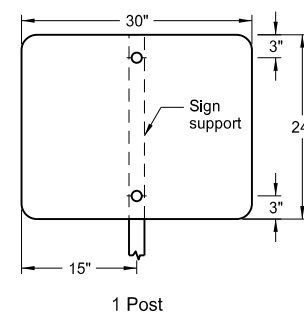
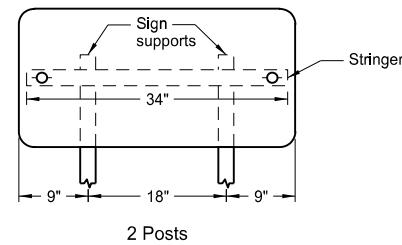
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

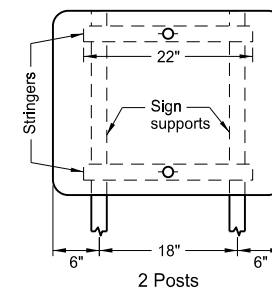
D-754-32



Assembly No. 31

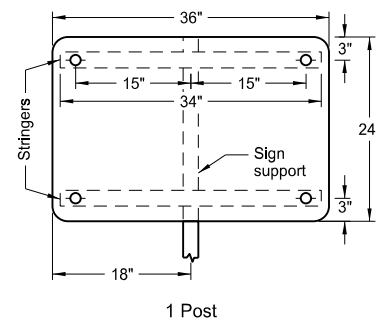


Assembly No. 32

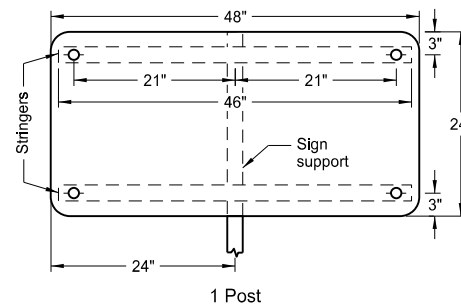
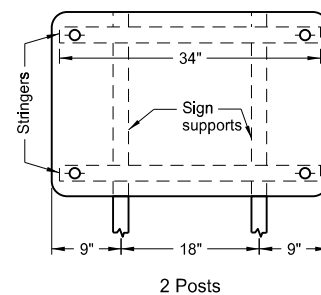


Notes:

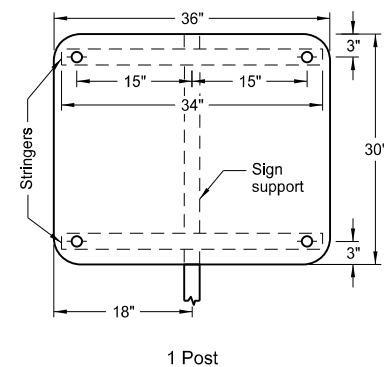
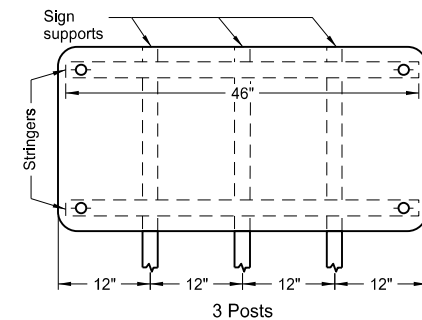
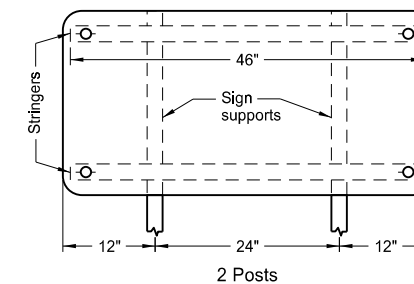
1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be $1\frac{1}{2}$ " x $1\frac{1}{2}$ ".
4. All holes shall be punched round for $\frac{3}{8}$ " bolt.



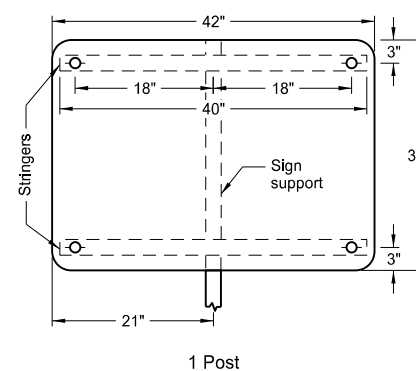
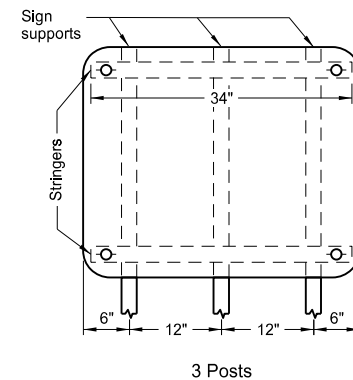
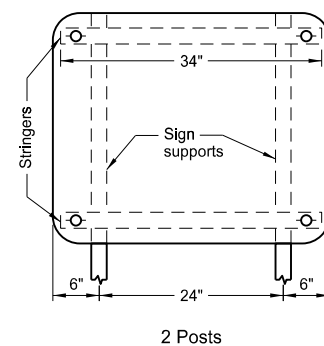
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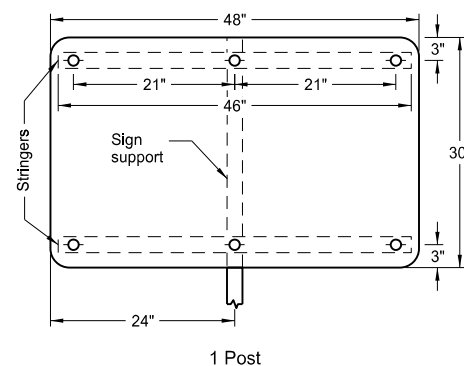
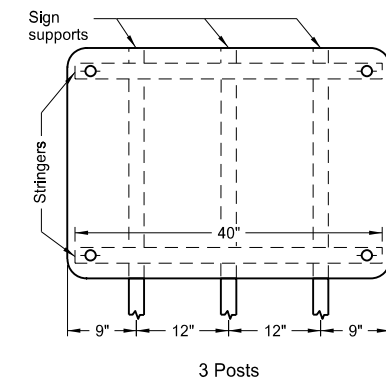
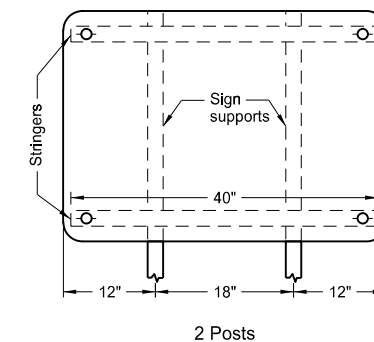
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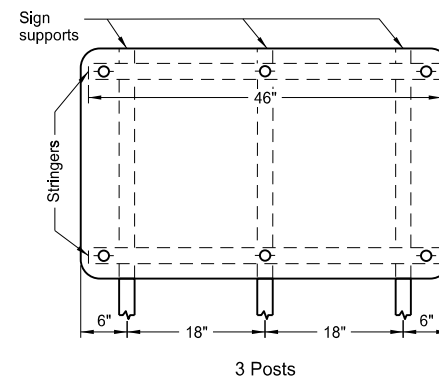
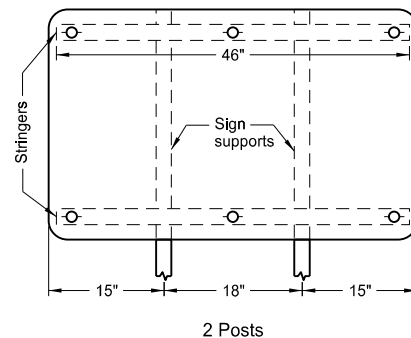
Assembly No. 35



Assembly No. 36



Assembly No. 37

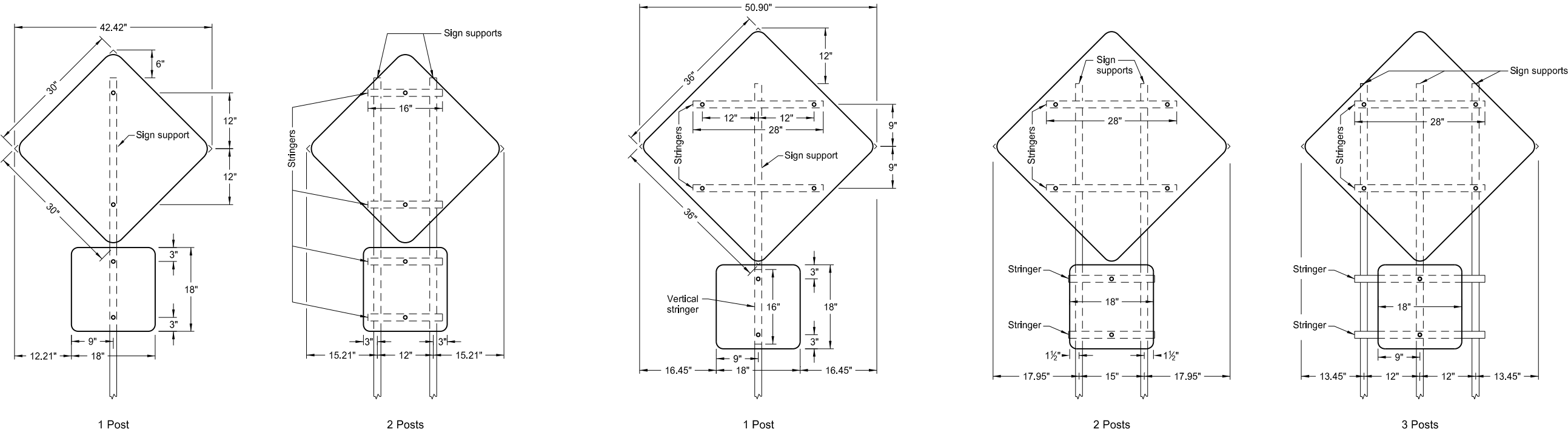


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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING AND GUIDE SIGNS

D-754-37



ASSEMBLY NO. 53

ASSEMBLY NO. 54

ASSEMBLY NO. 55

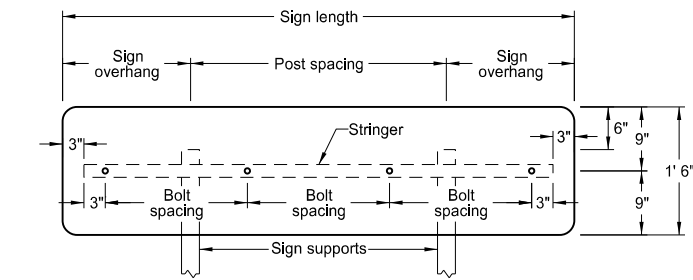
- Notes:
1. The minimum sign backing material thickness shall be 0.100 inch.
 2. Perforated square tube stringer shall be 1½"x1½".
 3. All holes shall be punched round for ⅜" bolt.

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9-25-12	
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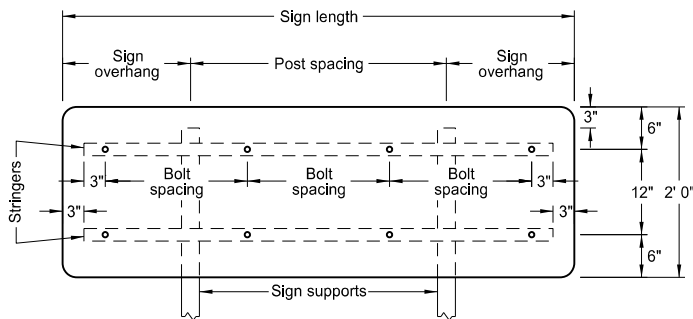
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
FOR VARIABLE LENGTH SIGNS

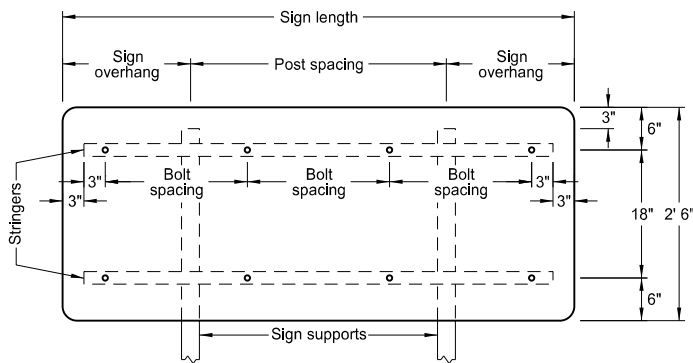
D-754-48



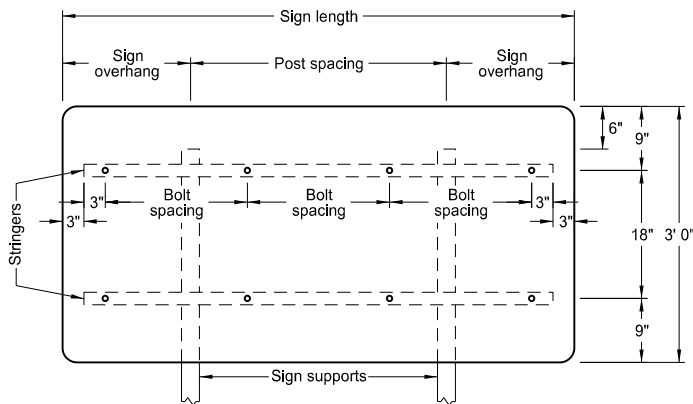
VARIES X 1'-6"



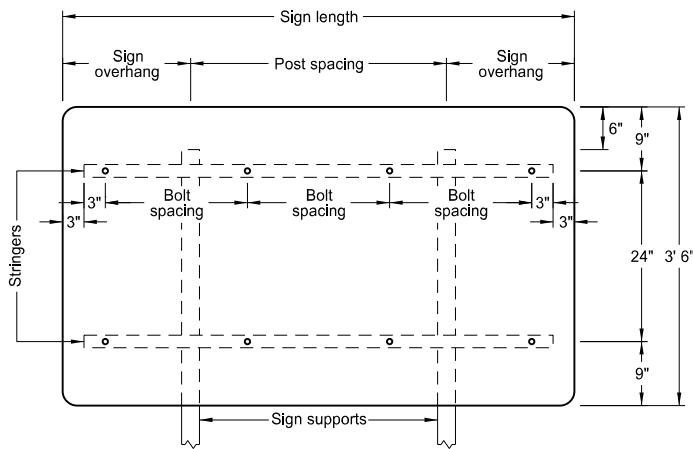
VARIES X 2'-0"



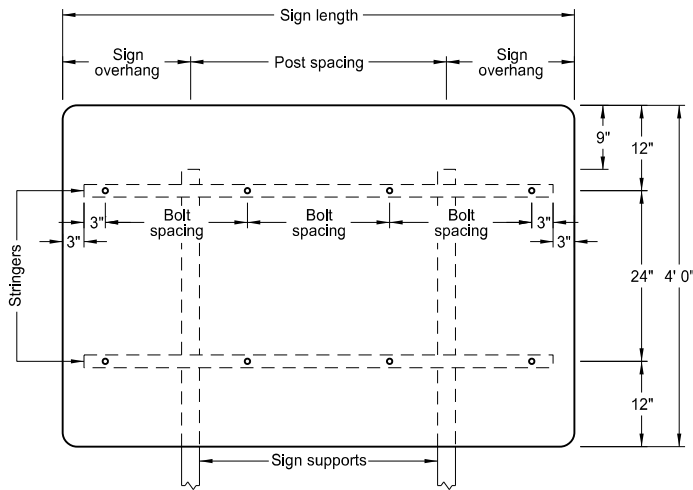
VARIES X 2'-6"



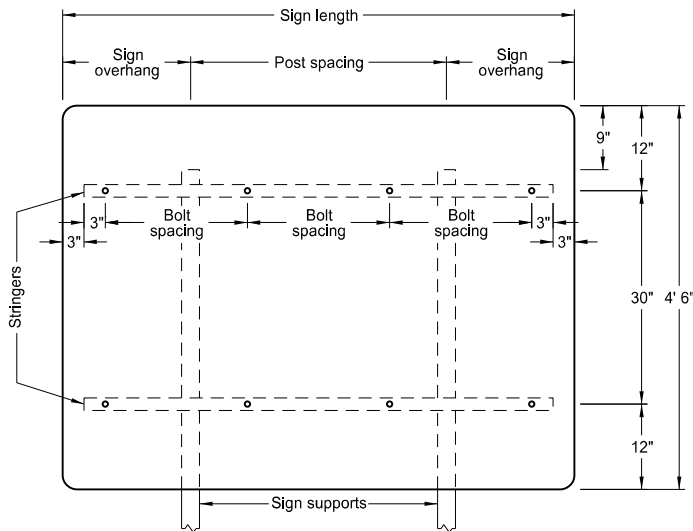
VARIES X 3'-0"



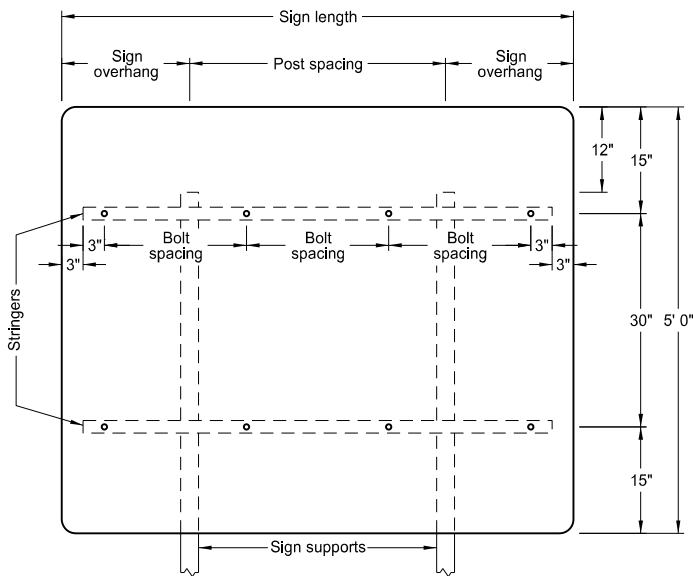
VARIES X 3'-6"



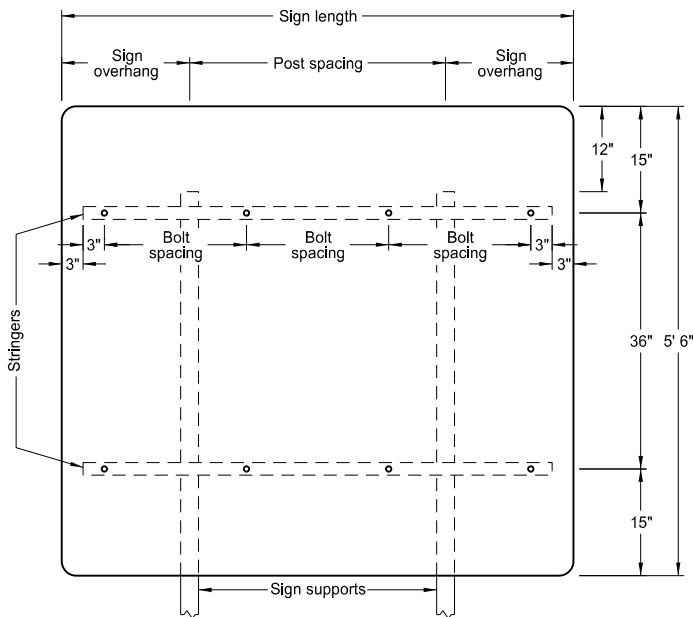
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

- Notes:
1. The minimum sign backing material thickness shall be 0.100 inch.
 2. Perforated square tube stringer shall be 1½" x 1½".
 3. All holes shall be punched round for ⅜" bolt.

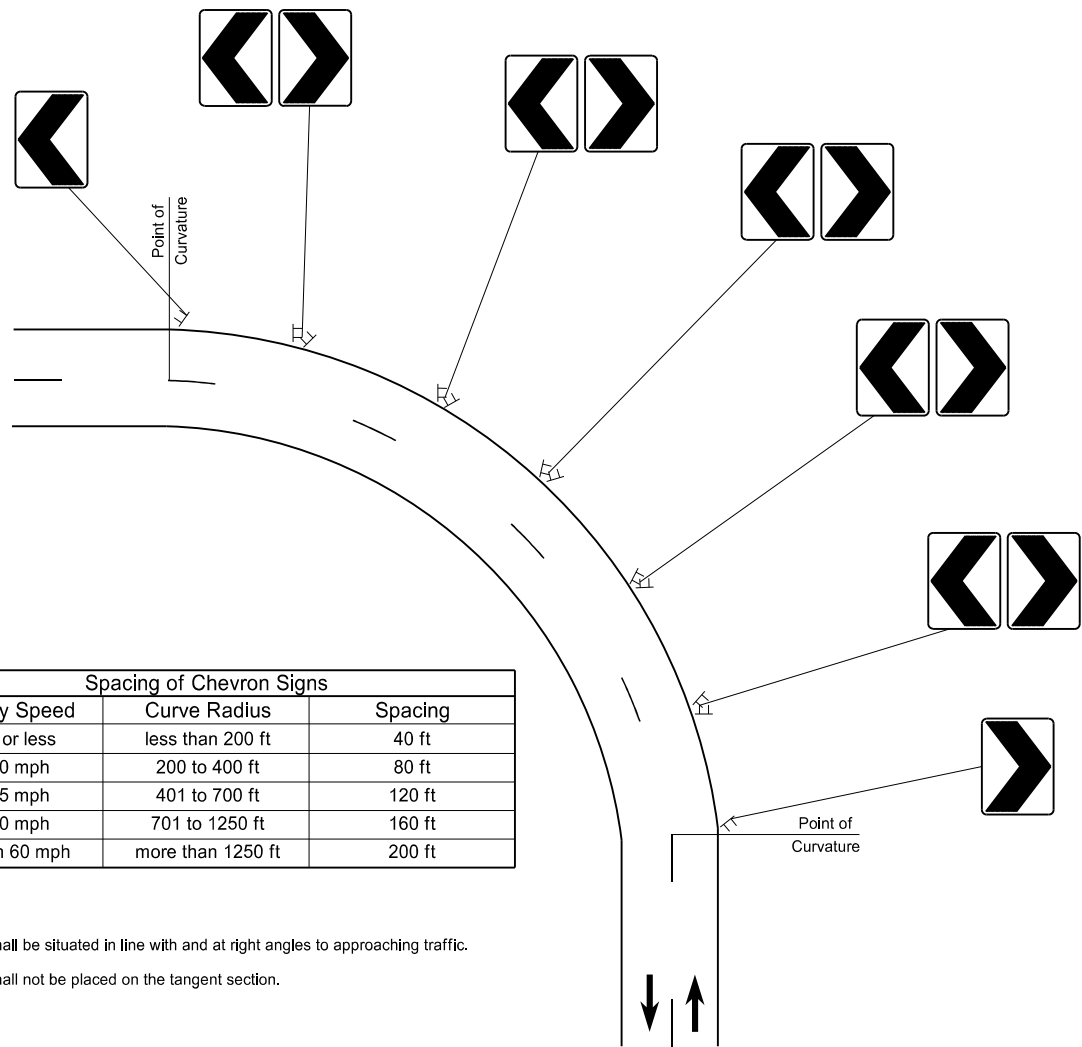
2 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	1'-0"	2'-0"	18"
4'-6"	1'-3"	2'-0"	21"
5'-0"	1'-0"	3'-0"	24"
5'-6"	1'-3"	3'-0"	18"
6'-0"	1'-6"	3'-0"	20"
6'-6"	1'-3"	4'-0"	22"
7'-0"	1'-6"	4'-0"	24"
7'-6"	1'-9"	4'-0"	2-20" & 2-19"
8'-0"	2'-0"	4'-0"	21"
8'-6"	1'-9"	5'-0"	2-22" & 2-23"
9'-0"	2'-0"	5'-0"	24"
9'-6"	1'-9"	6'-0"	4-20" & 1-22"
10'-0"	2'-0"	6'-0"	2-21" & 3-22"
10'-6"	2'-3"	6'-0"	4-23" & 1-22"
11'-0"	2'-6"	6'-0"	24"
11'-6"	2'-9"	6'-0"	21"
12'-0"	2'-0"	8'-0"	22"
12'-6"	2'-3"	8'-0"	23"
13'-0"	2'-6"	8'-0"	24"
13'-6"	2'-9"	8'-0"	3-22" & 4-21"
14'-0"	3'-0"	8'-0"	2-23" & 5-22"
14'-6"	3'-3"	8'-0"	6-23" & 1-24"
15'-0"	3'-6"	8'-0"	24"
15'-6"	2'-9"	10'-0"	6-22" & 2-21"
16'-0"	3'-0"	10'-0"	4-23" & 4-22"
16'-6"	3'-3"	10'-0"	6-23" & 2-24"
17'-0"	3'-6"	10'-0"	24"
17'-6"	3'-9"	10'-0"	22"
18'-0"	3'-0"	12'-0"	6-23" & 3-22"
18'-6"	3'-3"	12'-0"	6-23" & 3-24"
19'-0"	3'-6"	12'-0"	24"
19'-6"	3'-9"	12'-0"	8-22" & 2-23"
20'-0"	4'-0"	12'-0"	8-23" & 2-22"

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

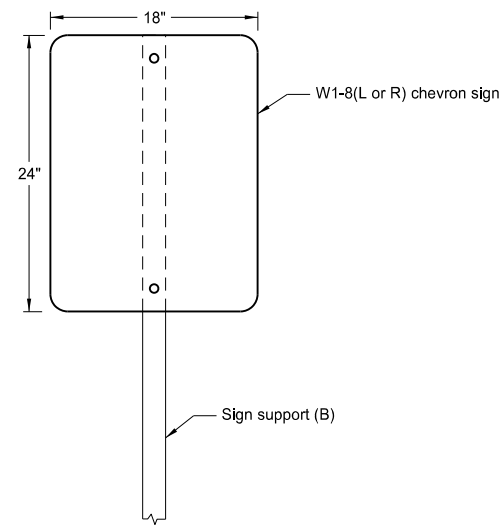
This document was originally issued and sealed by
Roger Weigel,
Registration Number
PE- 2930 ,
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CHEVRON INSTALLATION DETAILS

D-754-79

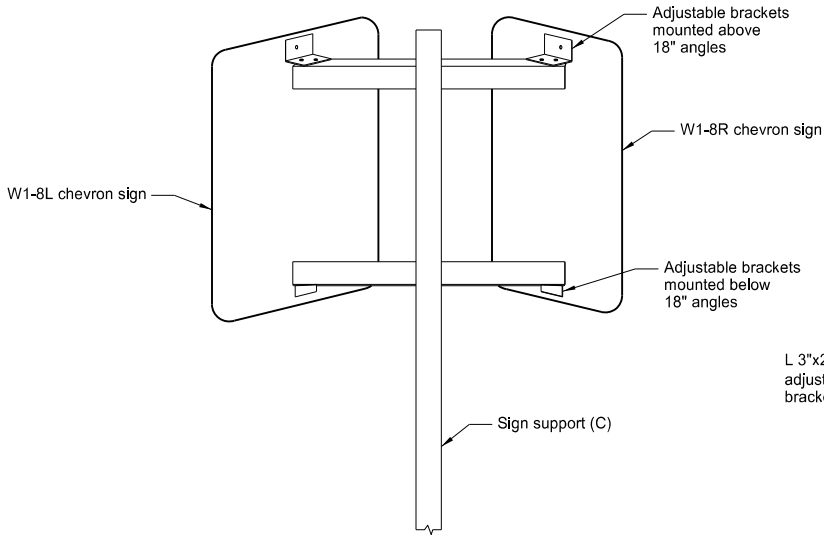


- Notes:
1. Chevrons shall be situated in line with and at right angles to approaching traffic.
 2. Chevrons shall not be placed on the tangent section.



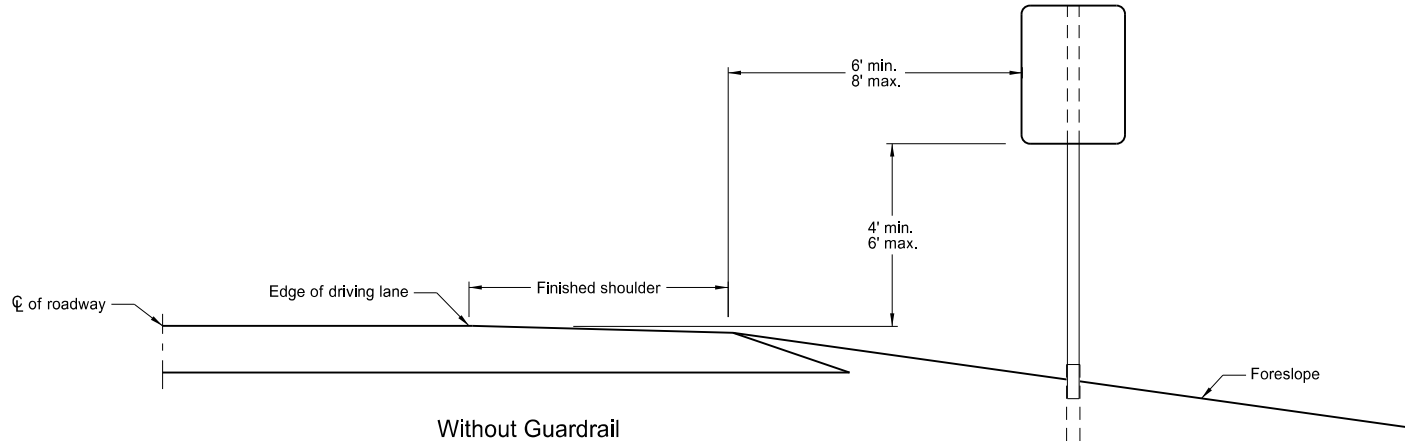
Chevron Single Sign Assembly

(B) Single sign support shall be 2x2x12ga. perforated tube
Anchor unit shall be 2.25x2.25x12ga. perforated tube

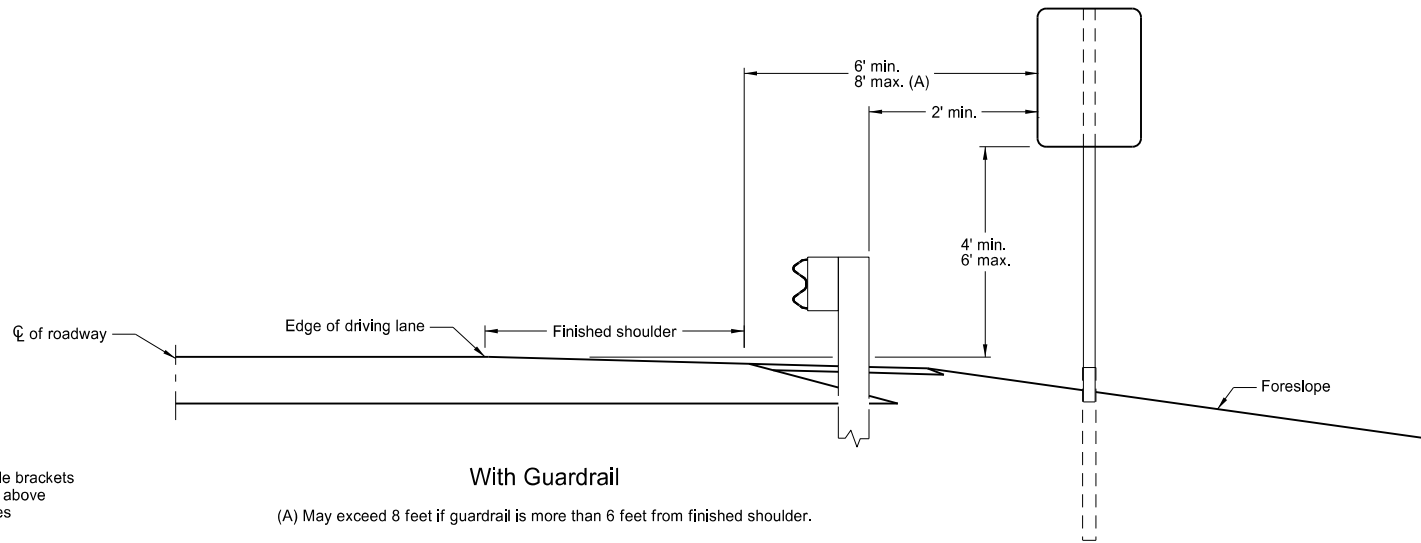


Chevron Double Sign Assembly

(C) Double sign support shall be 2.25x2.25x12ga. perforated tube
Anchor unit shall be 2.5x2.5x12ga. perforated tube

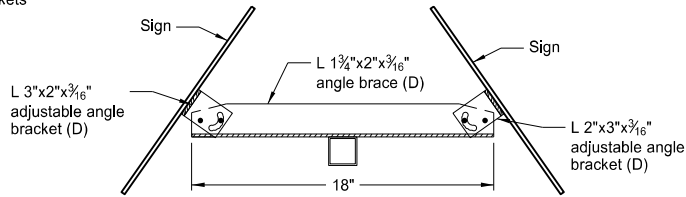


Without Guardrail



With Guardrail

(A) May exceed 8 feet if guardrail is more than 6 feet from finished shoulder.



Top View

(D) All angles shown shall be aluminum or steel. The sizes are the minimum allowed, larger sizes may be used if approved by the Engineer.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-10-13	
REVISIONS	
DATE	CHANGE

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

911 SIGN SUPPORT INFORMATION AND SIGN DETAILS

D-754-86

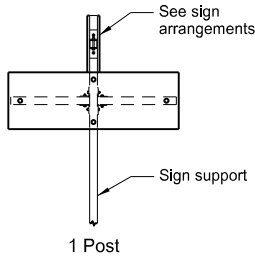
THE POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS (60 INCH VERTICAL CLEARANCE)													
ASSEMBLY NUMBER	STREET NAME SIGN SIZE	TOTAL SIGN AREA	MAXIMUM POST LENGTH	NUMBER OF POSTS	SUPPORT SIZE	SLEEVE LENGTH (A)			SLEEVE SIZE	ANCHOR			BREAK - AWAY
						1st LF	2nd LF	3rd LF		NUMBER	LENGTH LF	SIZE	
SA 1	24"x12"	8.00	20.2	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	30"x12"	10.00	16.4	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	36"x12"	12.00	13.8	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	42"x12"	14.00	14.7	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	48"x12"	16.00	12.9	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	54"x12"	18.00	15.2	1	2.25x2.25 12 ga					1	4.0	2.5x2.5 12ga	
	60"x12"	20.00	13.7	1	2.25x2.25 12 ga					1	4.0	2.5x2.5 12ga	
	24"x9"	6.00	24.1	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	30"x9"	7.50	21.2	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	36"x9"	9.00	17.7	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	42"x9"	10.50	15.3	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	48"x9"	12.00	13.5	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	54"x9"	13.50	14.8	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	60"x9"	15.00	13.4	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	24"x6"	4.00	35.2	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	30"x6"	5.00	28.3	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	36"x6"	6.00	23.6	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	42"x6"	7.00	22.3	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	48"x6"	8.00	19.6	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	54"x6"	9.00	17.5	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
	60"x6"	10.00	15.4	1	2x2 12 ga					1	4.0	2.25x2.25 12ga	
SA 2	24"x12"	13.2	14.6	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	30"x12"	15.2	16.3	1	2.5,2.5 10 ga					1	4.0	3x3 7 ga	1
	36"x12"	17.2	15.4	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	42"x12"	19.2	14.7	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	48"x12"	21.2	15.3	1	2.25x2.25 12 ga	4.5			2x2 12 ga	1	4.0	3x3 7 ga	1
	54"x12"	23.2	20.6	1	2.5x2.5 10 ga	1.5			2.19x2.19 10ga	1	4.0	3x3 7 ga	1
	60"x12"	25.2	16.7	1	2.5x2.5 12 ga	3.9			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	24"x9"	11.2	15.2	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	30"x9"	12.7	14.5	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	36"x9"	14.2	16.5	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	42"x9"	15.7	15.8	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	48"x9"	17.2	14.4	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	54"x9"	18.7	15.1	1	2.25x2.25 12 ga	4.2			2x2 12ga	1	4.0	3x3 7 ga	1
	60"x9"	20.2	14.6	1	2.25x2.25 12 ga	4.6			2x2 12 ga	1	4.0	3x3 7 ga	1
	24"x6"	9.2	16.0	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	30"x6"	10.2	15.5	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	36"x6"	11.2	15.0	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	42"x6"	12.2	13.7	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	48"x6"	13.2	15.9	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	54"x6"	14.2	15.4	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	60"x6"	15.2	14.9	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
SA 3	24"x12"	13.9	16.1	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	30"x12"	15.9	15.3	1	2.5,2.5 10 ga					1	4.0	3x3 7 ga	1
	36"x12"	17.9	15.9	1	2.25x2.25 12 ga	4.4			2x2 12 ga	1	4.0	3x3 7 ga	1
	42"x12"	19.9	15.2	1	2.25x2.25 12 ga	4.8			2x2 12 ga	1	4.0	3x3 7 ga	1
	48"x12"	21.9	15.1	1	2.5x2.5 12 ga	5.1			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	54"x12"	23.9	20.6	1	2.5x2.5 10 ga	1.9			2.19X2.19 10ga	1	4.0	3x3 7 ga	1
	60"x12"	25.9	16.0	1	2.5x2.5 12 ga	4.7			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	24"x9"	11.9	16.8	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	30"x9"	13.4	16.1	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	36"x9"	14.9	15.4	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	42"x9"	16.4	14.8	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	48"x9"	17.9	15.6	1	2.25x2.25 12 ga	4.3			2x2 12 ga	1	4.0	3x3 7 ga	1
	54"x9"	19.4	14.9	1	2.5x2.5 12 ga	4.8			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	60"x9"	20.9	20.6	1	2.5x2.5 10 ga	1.6			2.19x2.19 10ga	1	4.0	3x3 7 ga	1
	24"x6"	9.9	14.7	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	30"x6"	10.9	14.3	1	2.5x2.5 12 ga					1	4.0	3x3 7 ga	
	36"x6"	11.9	16.5	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	42"x6"	12.9	16.0	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	48"x6"	13.9	14.8	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	54"x6"	14.9	14.4	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	60"x6"	15.9	15.3	1	2.25x2.25 12 ga	4.2			2x2 12 ga	1	4.0	3x3 7 ga	1

THE POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS (60 INCH VERTICAL CLEARANCE)													
ASSEMBLY NUMBER	STREET NAME SIGN SIZE	TOTAL SIGN AREA	MAXIMUM POST LENGTH	NUMBER OF POSTS	SUPPORT SIZE	SLEEVE LENGTH (A)			SLEEVE SIZE	ANCHOR			BREAK - AWAY
						1st	2nd	3rd		NUMBER	LENGTH	SIZE	
						LF	LF	LF					
SA 4	24"x12"	15.5	15.1	1	2.25x2.25 12 ga	4.7			2x2 12 ga	1	4.0	3x3 7 ga	1
	30"x12"	17.5	15.1	1	2.5x2.5 12 ga	4.9			2.25x2.25 12 ga	1	4.0	3x3 7 ga	1
	36"x12"	19.5	17.5	1	2.5x2.5 12 ga	3.6			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	42"x12"	21.5	16.8	1	2.5x2.5 12 ga	4.1			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	48"x12"	23.5	16.2	1	2.5x2.5 12 ga	4.5			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	54"x12"	25.5	15.6	1	2.5x2.5 12 ga	4.9			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	60"x12"	27.5	16.7	1	2.5x2.5 10 ga	4.2			2.19x2.19 10ga	1	4.0	3x3 7 ga	1
	24"x9"	13.5	14.3	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	30"x9"	15.0	15.1	1	2.25x2.25 12 ga	4.4			2x2 12 ga	1	4.0	3x3 7 ga	1
	36"x9"	16.5	14.6	1	2.25x2.25 12 ga	4.7			2x2 12 ga	1	4.0	3x3 7 ga	1
	42"x9"	18.0	14.7	1	2.5x2.5 12 ga	4.9			2.25x2.25 12 ga	1	4.0	3x3 7 ga	1
	48"x9"	19.5	17.2	1	2.5x2.5 12 ga	3.5			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	54"x9"	21.0	15.8	1	2.5x2.5 12 ga	4.3			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	60"x9"	22.5	15.4	1	2.5x2.5 12 ga	4.6			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	24"x6"	11.5	14.7	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	30"x6"	12.5	14.4	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	36"x6"	13.5	14.0	1	2.5x2.5 10 ga					1	4.0	3x3 7 ga	1
	42"x6"	14.5	15.0	1	2.25x2.25 12 ga	4.2			2x2 12 ga	1	4.0	3x3 7 ga	1
	48"x6"	15.5	14.5	1	2.5x2.5 12 ga	4.6			2.25x2.25 12 ga	1	4.0	3x3 7 ga	1
	54"x6"	16.5	14.1	1	2.5x2.5 12 ga	4.9			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
	60"x6"	17.5	16.8	1	2.5x2.5 12 ga	3.5			2.25x2.25 12ga	1	4.0	3x3 7 ga	1
SA 5	24"x12"	21.3	17.2	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2
	30"x12"	23.3	16.7	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2
	36"x12"	25.3	16.3	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2
	42"x12"	27.3	17.3	2	2.25x2.25 12 ga	4.2	4.6		2x2 12ga	2	4.0	3x3 7 ga	2
	48"x12"	29.3	16.9	2	2.25x2.25 12 ga	4.5	5.0		2x2 12 ga	2	4.0	3x3 7 ga	2
	54"x12"	31.3	16.5	2	2.25x2.25 12 ga	4.7	5.3		2x2 12 ga	2	4.0	3x3 7 ga	2
	60"x12"	33.3	17.5	3	2.5x2.5 12 ga					3	4.0	3x3 7 ga	3
	24"x9"	19.3	15.6	1	2.5x2.5 10 ga	4.9			2.19x2.19 10ga	1	4.0	3x3 7 ga	1
	30"x9"	20.8	17.0	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2
	36"x9"	22.3	16.7	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2
	42"x9"	23.8	16.3	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2
	48"x9"	25.3	16.0	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2
	54"x9"	26.8	17.2	2	2.25x2.25 12 ga	3.9	4.5		2x2 12 ga	2	4.0	3x3 7 ga	2
	60"x9"	28.3	16.8	2	2.25x2.25 12 ga	4.2	4.8		2x2 12 ga	2	4.0	3x3 7 ga	2
	24"x6"	17.3	15.8	1	2.5x2.5 10 ga	4.4			2.19x2.19 10ga	1	4.0	3x3 7 ga	1
	30"x6"	18.3	15.5	1	2.5x2.5 10 ga	4.5			2.19x2.19 10ga	1	4.0	3x3 7 ga	1
	36"x6"	19.3	15.3	1	2.5x2.5 10 ga	4.7			2.19x2.19 10ga	1	4.0	3x3 7 ga	1
	42"x6"	20.3	15.1	1	2.5x2.5 10 ga	4.9			2.19x2.19 10ga	1	4.0	3x3 7 ga	1
48"x6"	21.3	16.7	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2	
54"x6"	22.3	16.4	2	2.5x2.5 10 ga					2	4.0	3x3 7 ga	2	
60"x6"	23.3	16.8	2	2.25x2.25 12 ga	3.8	4.4		2x2 12 ga	2	4.0	3x3 7 ga	2	

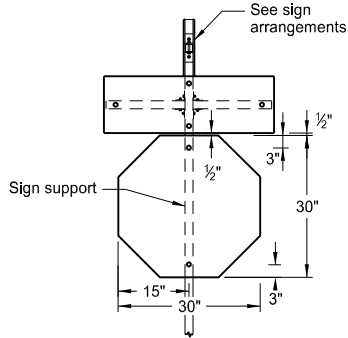
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
FOR STREET NAME SIGNS AND 911 SIGNS

D-754-87

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

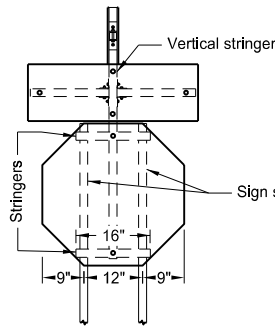


Special Assembly 1 (A, B, C, D or E)



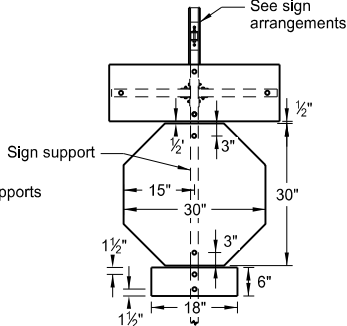
1 Post

Special Assembly 2 (A, B, C, D or E)



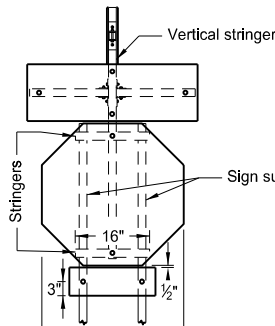
2 Posts

Special Assembly 2 (A, B, C, D or E)



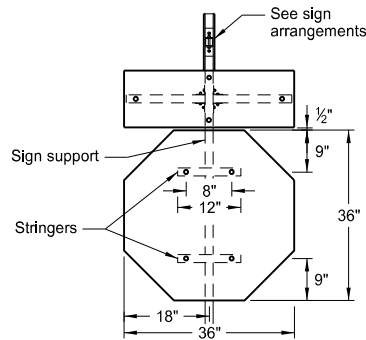
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Special Assembly 3 (A, B, C, D or E)



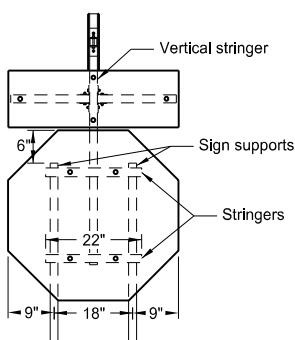
2 Posts

Special Assembly 3 (A, B, C, D or E)



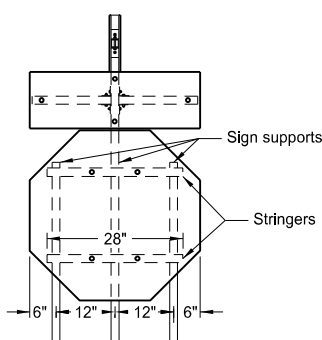
1 Post

Special Assembly 4 (A, B, C, D or E)



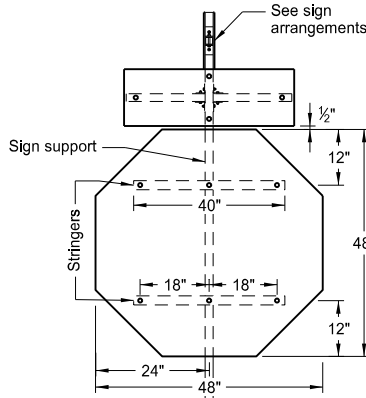
2 Posts

Special Assembly 4 (A, B, C, D or E)



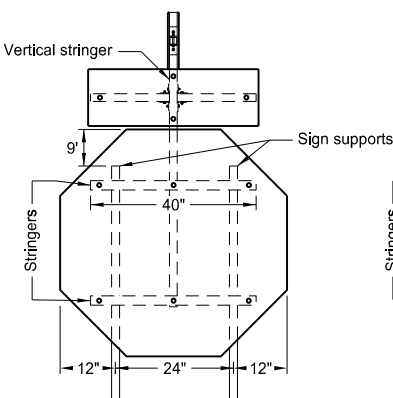
3 Posts

Special Assembly 4 (A, B, C, D or E)



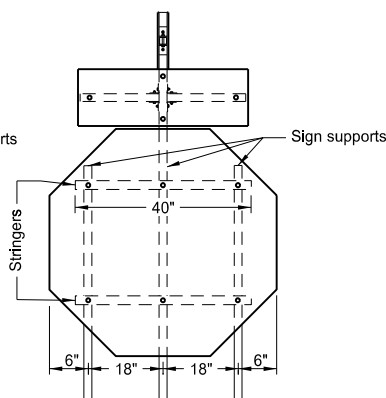
1 Post

Special Assembly 5 (A, B, C, D or E)



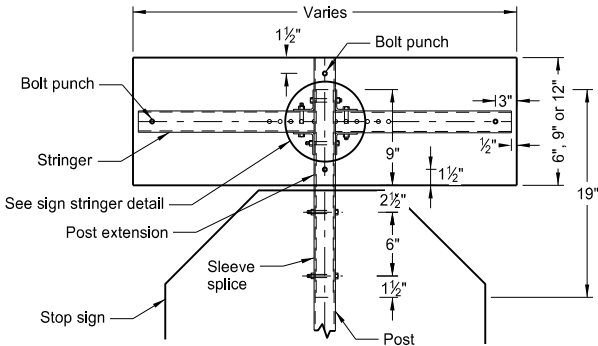
2 Posts

Special Assembly 5 (A, B, C, D or E)



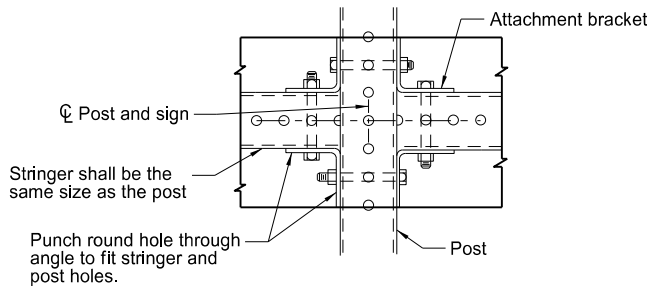
3 Posts

Special Assembly 5 (A, B, C, D or E)

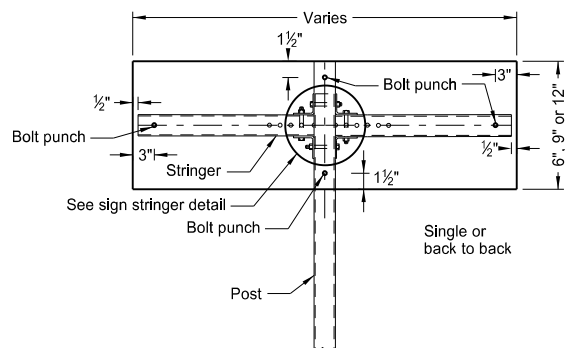


Front View
Sleeve Splice Detail

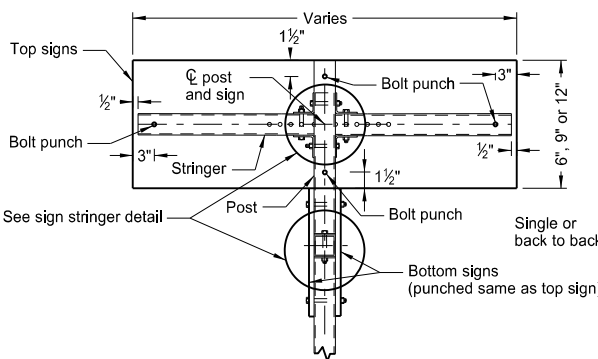
Note: The splice method may be used upon approval of the engineer.



Sign Stringer Detail

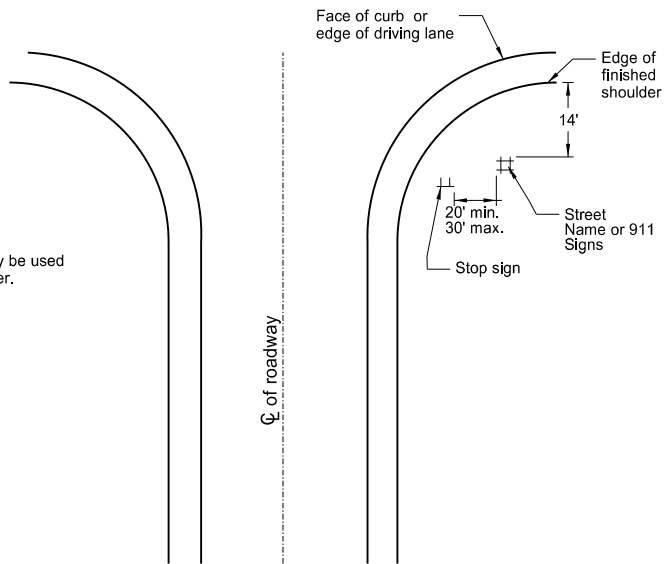


Detail A or B



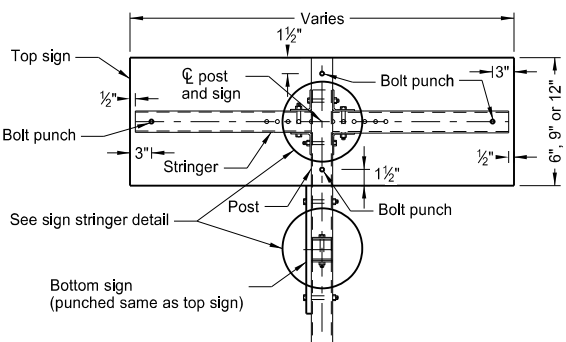
Detail D or E

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



Intersection Layout

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



Detail C

Sign Arrangements

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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Registration Number
PE-2930,
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of Transportation

MAILBOX LOCATION DETAILS

D-766-1

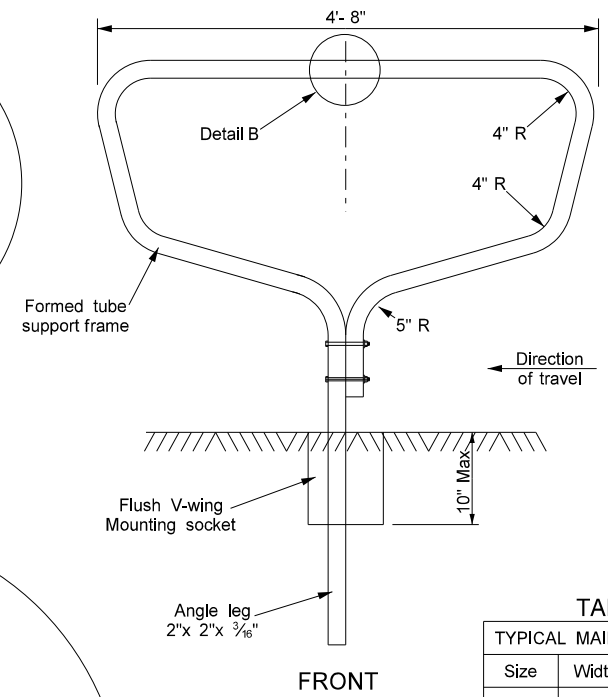
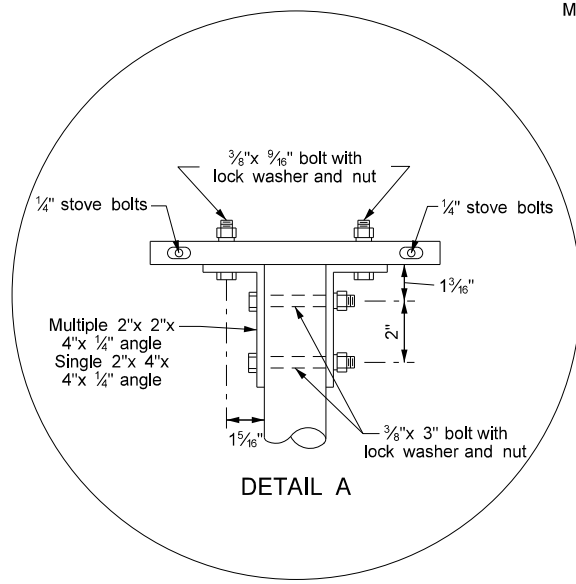
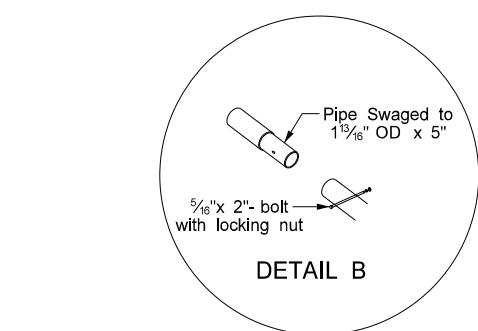
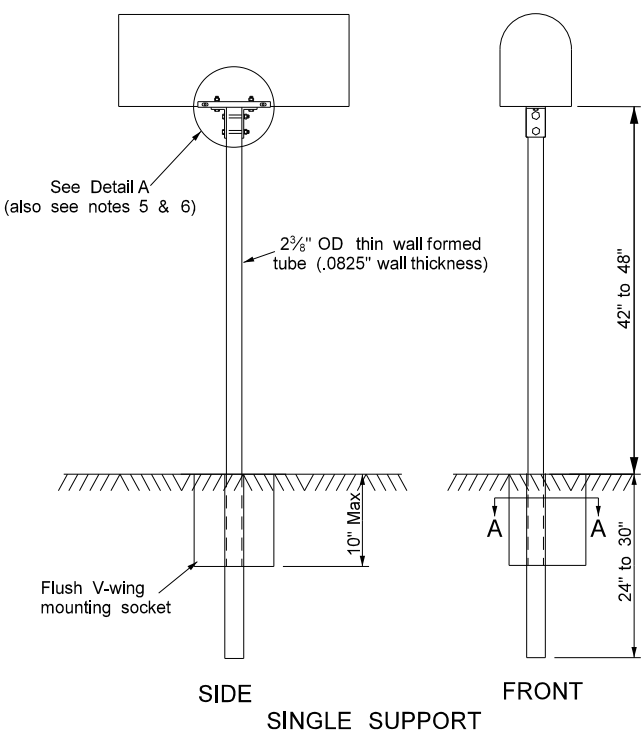
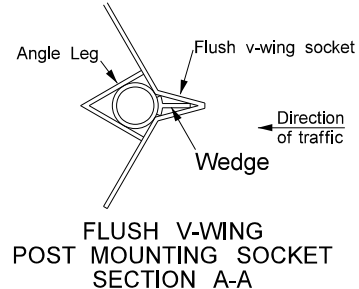
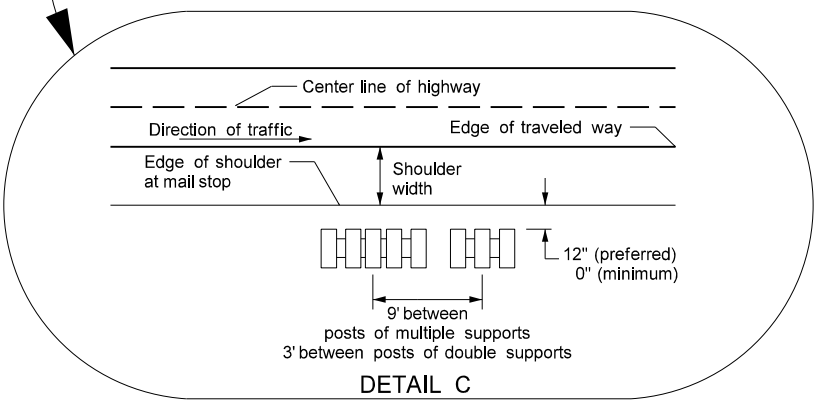
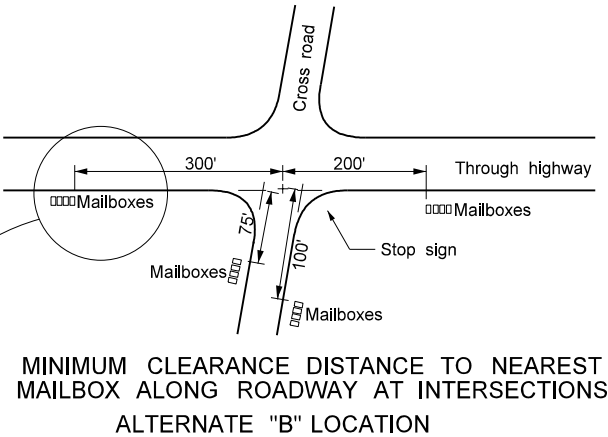
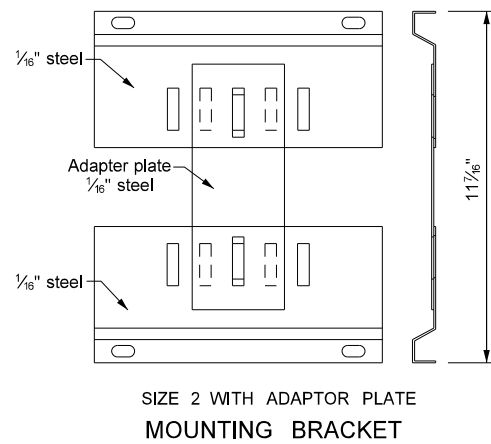
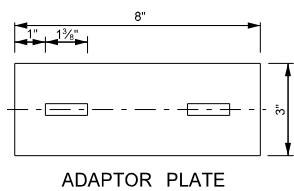
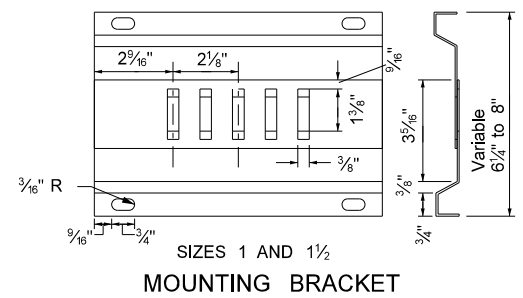
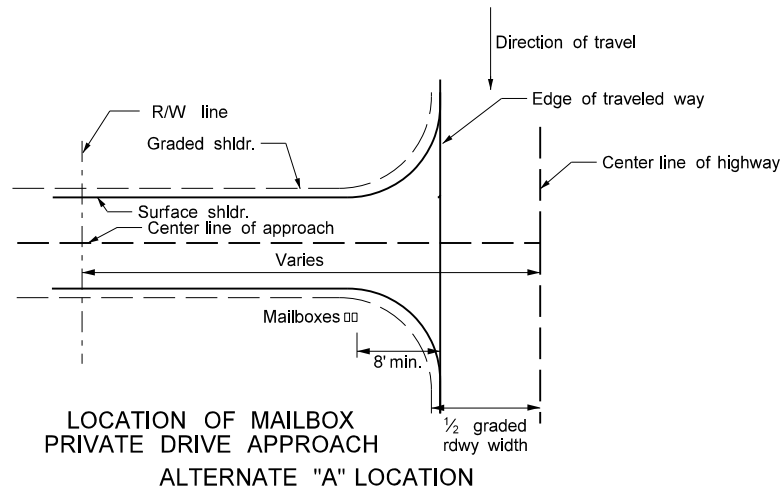


TABLE A TYPICAL MAILBOX DIMENSIONS			
Size	Width	Height	Length
1	6.5"	8.5"	19"
1A	8"	10.5"	21"
2	11.5"	13.5"	23.5"

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- Notes:
- The mailbox support and hardware details shall consist of the "V-Loc Mailbox Support System" manufactured by:
Tapco
Traffic & Parking Control Co. Inc.
Any other equal support system meeting the requirements of NCHRP Report 350, which has been crash tested, and approved by the Federal Highway Administration may be used. Approved alternate mailbox assemblies shall be installed in the manner and arrangement crash tested.
 - The preferred location for all mailboxes is the Alternate "A" location. However, the Engineer may approve the Alternate "B" location if warranted by existing field conditions.
 - Postal regulations require that mailboxes must be located on the right-hand side of the road in the direction traveled by the carrier. Therefore, the Engineer shall contact the local carrier or postmaster before installing new mailboxes to verify the direction of travel.
 - Mailboxes installed on private drive approaches must always be located on the downstream side of the approach.
 - Install angle connection parallel to traffic flow for size 2 mailbox mounted on single posts.
 - Size 2 mailbox mounted on multiple support requires 2 each, 3/8" by 5/16" bolts with lock washers and nuts to attach the adapter plate to mounting bracket. The unit will then require 4 angle connections to attach to the formed tube support frame. See Detail A.
 - Space multiple support frames a minimum of 4 feet apart. Space single support frames a minimum of 3 ft apart. Do not place more than five No. 1 mailboxes, three No. 2 mailboxes, or any combination of four No. 1-A and No. 2 mailboxes on multiple support frames.