

?	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
BG	below grade	Const	construction	DB	ditch block	FL	flow line
BM	bench mark	Cont	continuous	DG	ditch grade	Ftg	footing
Bkwy	bikeway	CSB	continuous split barrel sample	Dbl	double	FM	force main
Bit	bituminous	Contr	contraction	Dn	down	Fs	foresight
Blk	block	Contr	contractor	Dwg	drawing		
Bd Ft	board feet	CP	control point	Dr	drive		
BH	bore hole	Coord	coordinate	Drwy	driveway		
BS	both sides	Cor	corner	DI	drop inlet		
Bot	bottom	Corr	corrected	D	dry density		
Blvd	Boulevard	CAES	corrugated aluminum end section	DSDS	dynamic speed display sign		
Bndry	boundary	CAP	corrugated aluminum pipe	Ea	each		
BC	brass cap	CMES	corrugated metal end section	Esmt	easement		
Brkwy	breakaway	CMP	corrugated metal pipe	E	East		
Br	bridge	CPVCP	corrugated poly-vinyl chloride pipe	EB	Eastbound		
		CSES	corrugated steel end section	Elast	elastomeric		
		CSFES	corrugated steel flared end section	EL	electric locker		
				E Mtr	electric meter		
				Elec	electric/al		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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04-23-18 09-20-18	General Revisions 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	Lving	leveling	Mun	municipal	POT	point on tangent
Gdrl	guardrail	Lht	light	N	nano	PE	polyethylene
Gtr	gutter	LP	light pole	NGS	National Geodetic Survey	PVC	polyvinyl chloride
H Plg	H piling	Ltg	lighting	NS	near side	PCC	Portland Cement concrete
Hdwl	headwall	Lig Co	lignite coal	Neop	neoprene	Lb or #	pounds
Ha	hectare	Lig Sl	lignite slack	Ntwk	network	PP	power pole
Ht	height	LF	linear foot	N	newton	Preempt	preemption
HI	height of instrument	Liq	liquid	N	North	Prefab	prefabricated
Hel	helical	LL	liquid limit	NE	North East	Prfmd or Pref	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
ACCENT
AGASSIZ WU
AGC
All PI
ALL SEAS WU
AMOCO PI
AMRDA HESS
AT&T
B PAW
BAKER ELEC
BASIN ELEC
BEK TEL
BELLE PL
BLM
BNSF
BOEING
BRNS RWD
BURK-DIV ELEC
BURL WU
Cable One
CABLE SERV
CAP ELEC
CASS CO ELEC
CASS RWU
CAV ELEC
CBLCOM
CENEX PL
CENT PL WATER DIST
CENT PWR ELEC
COE
CONS TEL
CONT RES
CPR
D O E
DAK CARR
DAK CENT TEL
DAK RWD
DGC
DICKY R NET
DICKY RWU
DICKY TEL
DNRR
DOME PL
DVELEC
DVMW
ENBRDG
ENVENTIS
FALK MNG
FHWA
G FKS-TRL WD
GETTY TRD & TRAN
GLDN W ELEC
GRGS CO TEL
GTR RAMSEY WD

702 Communications
Accent Communications
Agassiz Water Users Incorporated
Associated General Contractors of America
Alliance Pipeline
All Seasons Water Users Association
Amoco Pipeline Company
Amerada Hess Corporation
AT&T Corporation
Bear Paw Energy Incorporated
Baker Electric
Basin Electric Cooperative Incorporated
Bek Communications Cooperative
Belle Fourche Pipeline Company
Bureau of Land Management
Burlington Northern Santa Fe Railway
Boeing
Barnes Rural Water District
Burke-Divide Electric Cooperative
Burleigh Water Users
Cable One
Cable Services
Capital Electric Cooperative Incorporat
Cass County Electric Cooperative
Cass Rural Water Users Incorporated
Cavalier Rural Electric Cooperative
Cablecom Of Fargo
Cenex Pipeline
Central Pipe Line Water District
Central Power Electric Cooperative
Corps of Engineers
Consolidated Telephone
Continental Resource Inc
Canadian Pacific Railway
Department Of Energy
Dakota Carrier Network
Dakota Central Telephone
Dakota Rural Water District
Dakota Gasification Company
Dickey Rural Networks
Dickey Rural Water Users Association
Dickey Telephone
Dakota Northern Railroad
Dome Pipeline Company
Dakota Valley Electric Cooperative
Dakota, Missouri Valley & Western
Enbridge Pipelines Incorporated
Enventis Telephone
Falkirk Mining Company
Federal Highway Administration
Grand Forks-trail Water District
Getty Trading & Transportation
Golden West Electric Cooperative
Griggs County Telephone
Greater Ramsey Water District

GT PLNS NAT GAS
HALS TEL
IDEA1
INT-COMM TEL
KANEB PL
KEM ELEC
KOCH GATH SYS
LKHD PL
LNGDN RWU
LWR YELL R ELEC
MCKNZ CON
MCKNZ ELEC
MCKNZ WRD
MCLEOD
MCLN ELEC
MCLN-SHRDN R WAT
MDU
MID-CONT CABLE
MIDSTATE TEL
MINOT CABLE
MINOT TEL
MISS VALL COMM
MISS W W S
MNKOTA PWR
MOR-GRAN-SOU ELEC
MOUNT-WILLI ELEC
MRE LBTY TEL
MUNICIPAL
MUNICIPAL
N CENT ELEC
N VALL W DIST
ND PKS & REC
ND TEL
NDDOT
NDSU SOIL SCI DEPT
NEMONT TEL
NODAK R ELEC
NOON FRMS TEL
NPR
NSP
NTH PRAIR RW
NTHN BRDR PL
NTHN PLNS ELEC
NTHWSTRN REF
NW COMM
NWRWD
ONEOK
OSHA
OTTR TL PWR
P L E M
POLAR COM
PVT ELEC
QWEST
R&T W SUPPLY

Great Plains Natural Gas Company
Halstad Telephone Company
Idea1
Inter-Community Telephone Company
Kaneb Pipeline Company
Kem Electric Cooperative Incorporated
Koch Gathering Systems Incorporated
Lakehead Pipeline Company
Langdon Rural Water Users Incorporated
Lower Yellowstone Rural Electric
McKenzie Consolidated Telcom
McKenzie Electric Cooperative
McKenzie County Water Resource District
McLeod USA
McLean Electric Cooperative
McLean-Sheridan Rural Water
Montana-dakota Utilities
Mid-Continent Cable
Midstate Telephone Company
Minot Cable Television
Minot Telephone Company
Missouri Valley Communications
Missouri West Water System
Minnkota Power
Mor-gran-sou Electric Cooperative
Mountrail-williams Electric Cooperative
Moore & Liberty Telephone
City Water And Sewer
City Of '.....'
North Central Electric Cooperative
North Valley Water District
North Dakota Parks And Recreation
North Dakota Telephone Company
North Dakota Department of Transportation
NDSU Soil Science Department
Nemont Telephone
Nodak Rural Electric Cooperative
Noonan Farmers Telephone Company
Northern Plains Railroad
Northern States Power
Northern Prairie Rural Water Association
Northern Border Pipeline
Northern Plains Electric Cooperative Incorporated
Northwestern Refinery Company
Northwest Communication Cooperation
Northwest Rural Water District
Oneok gas
Occupational Safety and Health Administration
Otter Tail Power Company
Prairielands Energy Marketing
Polar Communications
Private Electric
Qwest Communications
R & T Water Supply Association

RED RIV TEL
RESVTN TEL
ROBRTS TEL
R-RIDER ELEC
RRVW
S CENT REG WD
S E W U
SCOTT CABLE
SHERDN ELEC
SHEYN VLY ELEC
SKYTECH
SLOPE ELEC
SOURIS RIV TELCOM
ST WAT COMM
STATE LN WATER
STER ENG
STUT RWU
SW PL PRJ
T M C
TCI
TESORO HGH PLNS PL
TRI-CNTY WU
TRL CO RWU
UNTD TEL
UPPR SOUR WUA
US SPRINT
USAF MSL CABLE
USFWS
USW COMM
VRNDRY ELEC
W RIV TEL
WEB
WILLI RWA
WILSTN BAS PL
WLSH RWD
WOLVRTN TEL
XLENER
YSVR

Red River Rural Telephone
Reservation Telephone
Roberts Company Telephone
Roughrider Electric Cooperative
Red River Valley & Western Railroad
South Central Regional Water District
South East Water Users Incorporated
Scott Cable Television Dickinson
Sheridan Electric Cooperative
Sheyenne Valley Electric Cooperative
Skyland Technologies Incorporated
Slope Electric Cooperative Incorporated
Souris River Telecommunications
State Water Commission
State Line Water Cooperative
Sterling Energy
Stutsman Rural Water Users
Southwest Pipeline Project
Turtle Mountain Communications
TCI of North Dakota
Tesoro High Plains Pipeline
Tri-County Water Users Incorporated
Traill County Rural Water Users
United Telephone
Upper Souris Water Users Association
U.S. Sprint
U.S.A.F. Missile Cable
US Fish and Wildlife Service
U.S. West Communications
Verendrye Electric Cooperative
West River Telephone Incorporated
W. E. B. Water Development Association
Williams Rural Water Association
Williston Basin Interstate Pipeline Company
Walsh Water Rural Water District
Wolverton Telephone
Xcel Energy
Yellowstone Valley Railroad

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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

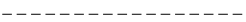
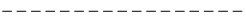




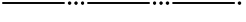






	Existing Overhead Sign Structure
	Existing Overhead Sign Structure Cantilever
	Overhead Sign Structure Cantilever

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09-23-16	Added and Revised Items, Organized by Functional Groups

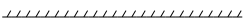








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Line Styles

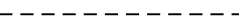
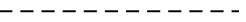
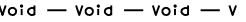
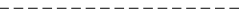




Right Of Way

	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







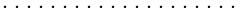

Boundary Control

	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


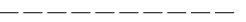
Cross Sections and Typicals

	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

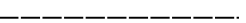
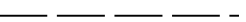
Geotechnical

	D	Geotextile Fabric Type D
	Geo	Geogrid
	R	Geotextile Fabric Type R
	R	Geotextile Fabric Type R1
	RR	Geotextile Fabric Type RR
	S	Geotextile Fabric Type S
		Subgrade Reinforcement
		Failure Line


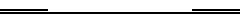

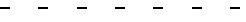


Countours

	Depression Contours
	Supplemental Contour



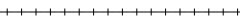
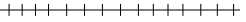
Profile

	Subgrade, Subcut or Ditch Grade
	Topsoil Profile



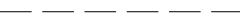


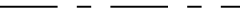
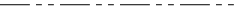
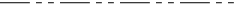

Striping

	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





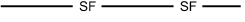


Pavement Joints

	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



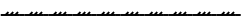
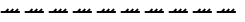
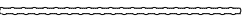
Bridge Details

	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
	S Floating Silt Curtain
	SF 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	
REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups


















































































This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930 , on 09/23/16 and the original document is stored at the North Dakota Department of Transportation

Symbols

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

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

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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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Cross Section Legend

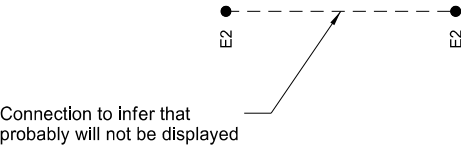
Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Cable Line	● CBL1	● CBL2
Conduit Line	● CDU1	● CDU2
Electric Line	● E1	● E2
Fiber Optic Line	● F1	● F2
Gas Main Line	● GM1	● GM2
Gas Service Line	● GS1	● GS2
Gas Transmission Line	● GT1	● GT2
Fuel Pipeline	● PL1	● PL2
Sanitary Sewer Force Main	● SSF1	● SSF2
Sanitary Sewer	● SS1	● SS2
Steam Line	● STE1	● STE2
Storm Drain (Assumed Depth)	● SD1	● SD2
Telephone Line	● T1	● T2
TV Line	● TV1	● TV2
Water Main Line	● WM1	● WM2
Water Service Line	● WS1	● WS2

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*
Overhead Power Transmission Line	OHT1 ↑	OHT2 ↑
Overhead Line	OH1 ↑	OH2 ↑



When storm drain invert elevations are NOT used to draw pipe, they will appear as shown to the left. When invert elevations are used to draw pipe, they will be a cross section similar to the graphics shown below.

* Usually the transverse utilities are shown on a cross section with 2 or more symbols. The utility runs from one symbol to the other, but the connection may not be shown.

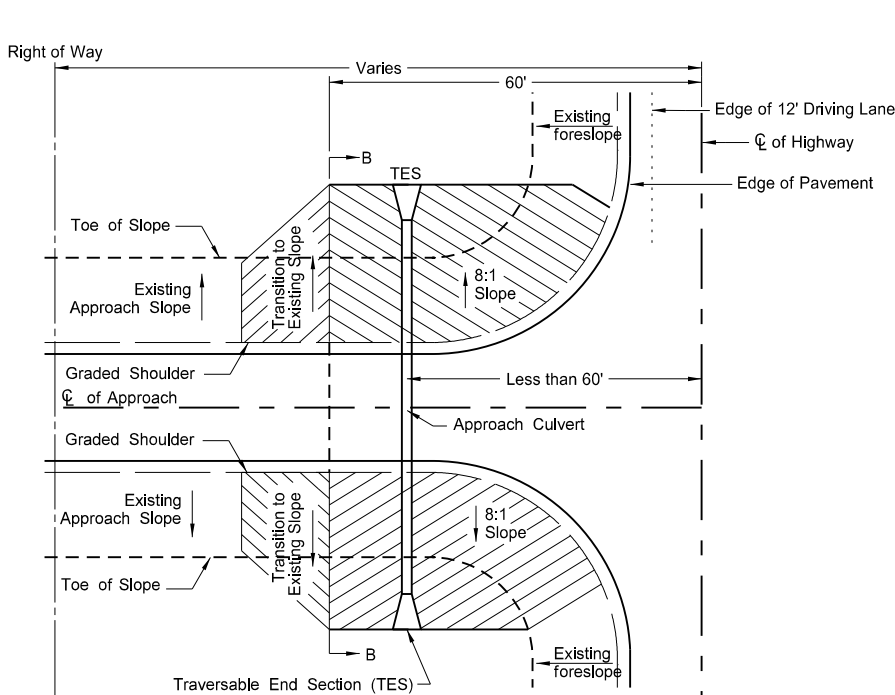
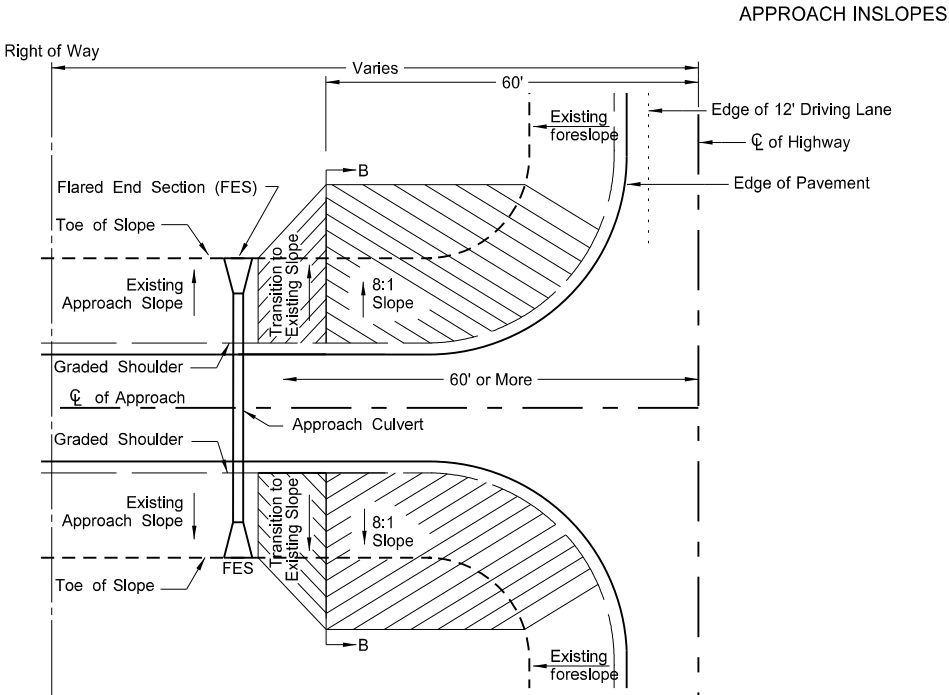
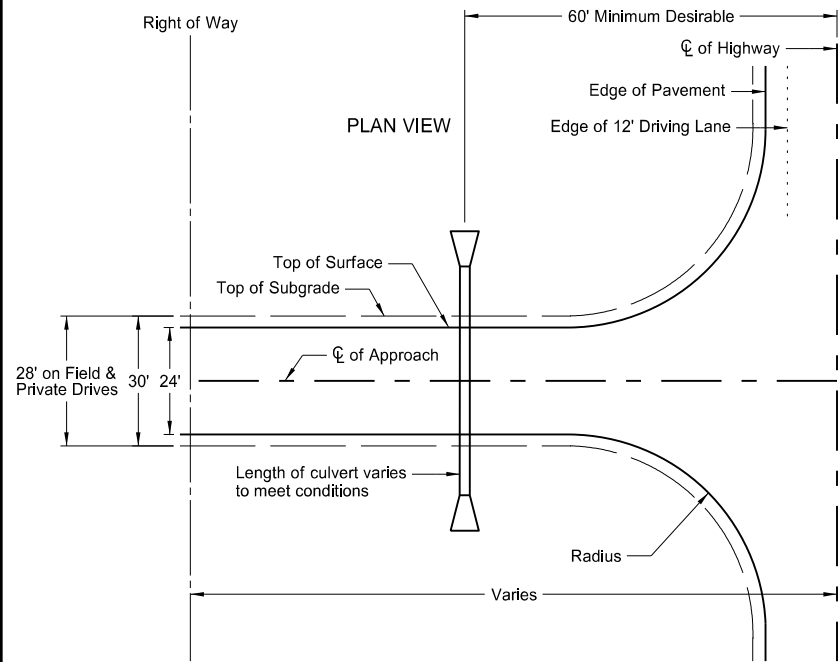


On the right side of most cross sections there is a earthwork table. The following example (values not related to project) details the earthwork table layout.

Cut Area	CA: 34.34 SF
Fill Area	FA: 0.017 SF
Cut Volume	CV: 64.44 CY
Fill Volume	FV: 0.031 CY
Mass Ordinate	MO: 65.13 CY

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE

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Registration Number
PEPE-2930
on 9/20/18 and the original document is stored at the
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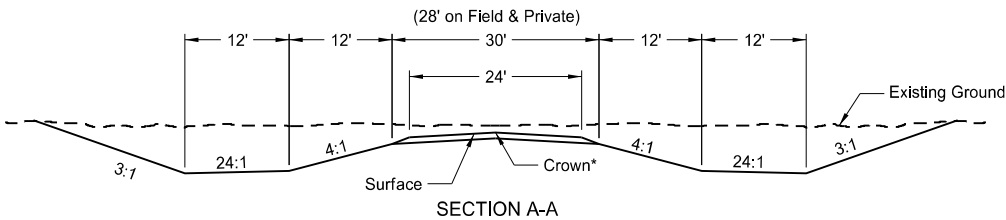


CASE 1
APPROACH PIPE LOCATED
60' OR MORE FROM C

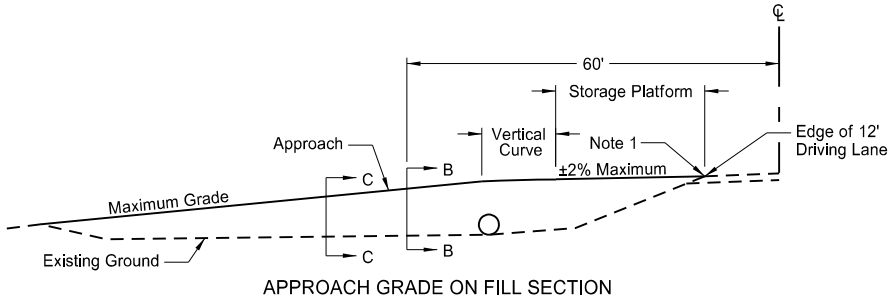
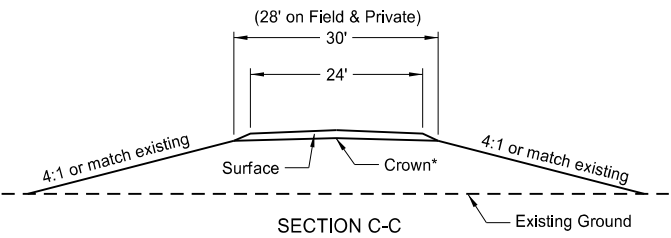
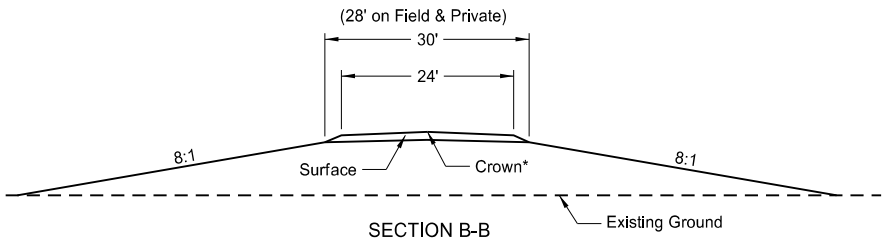
CASE 2
APPROACH PIPE LOCATED
LESS THAN 60' FROM C

CRITERIA FOR RURAL APPROACH TYPES

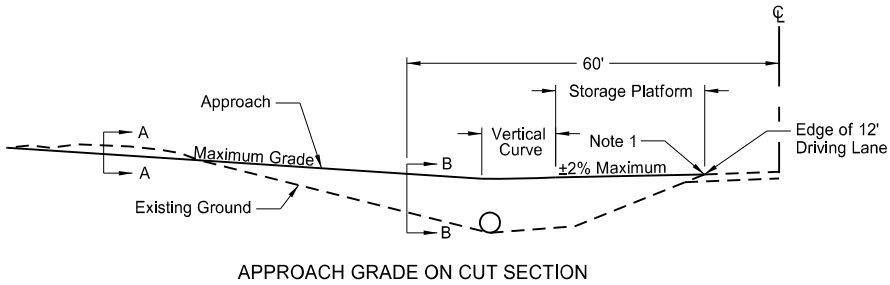
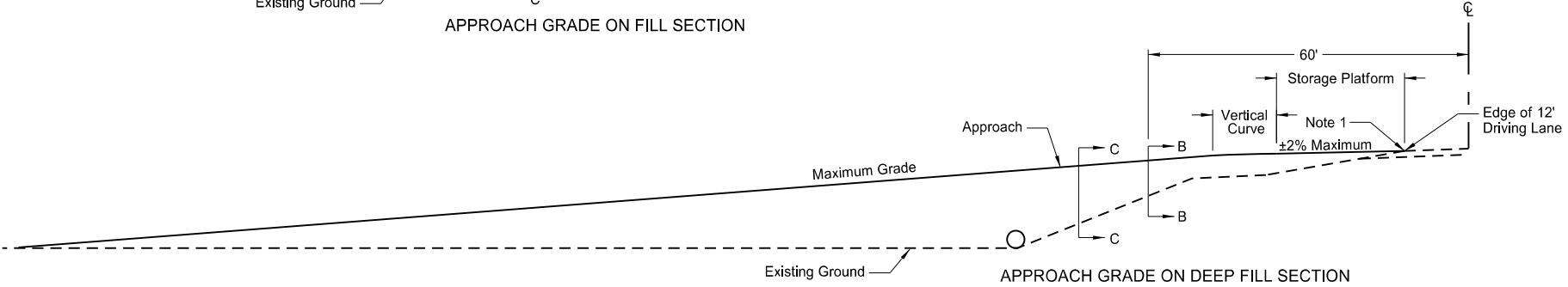
	Field Drives	Private Drives	Low Volume Public Roads
Radius	R=40 ft	R=40 ft	R=50 ft
Maximum Grade	10%	7%	7%
Storage Platform	24 ft	24 ft	50 ft
Vertical Curve Length	10 ft	10 ft	Varies (Min. 20 mph)



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



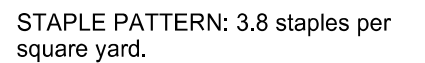
NOTES:
1. 5% Max Rollover between approach storage platform and highway.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-25-14	
REVISIONS	
DATE	CHANGE
6-30-2017	Revised Radius, Storage Platform, Inslope dimensions, and Note 1.
10-25-2019	Changed "Inslope" to "Foreslope".

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 10/25/19 and the original document is stored at the North Dakota Department of Transportation

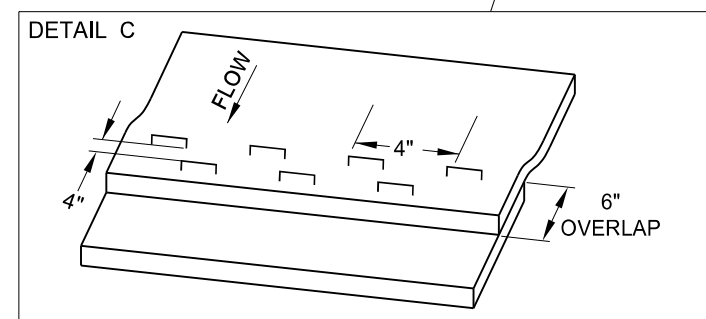
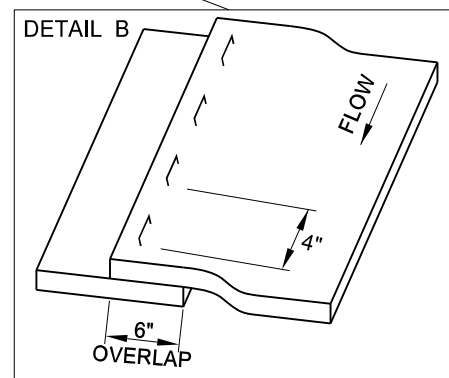
D-255-1



DETAIL A

ANCHOR TRENCH & TRM INSTALLATION

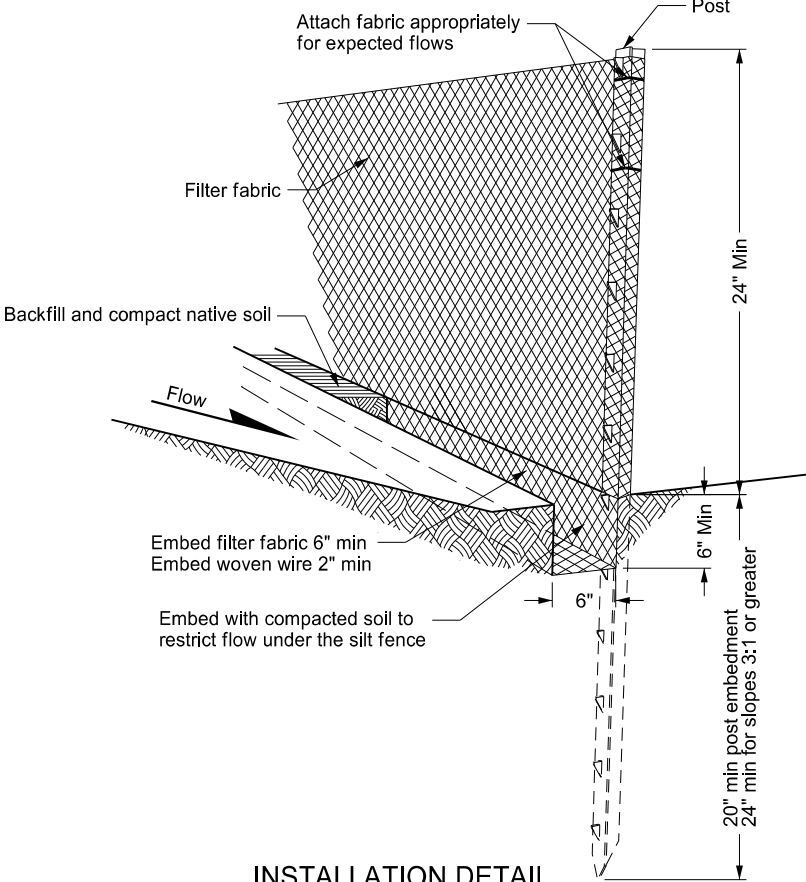
This diagram illustrates the cross-section of an anchor trench and the installation of a Tensar Reinforced Material (TRM). The trench is filled with compacted backfill soil, which is shown with a cross-hatched pattern. Two U-shaped anchor bolts are embedded in the soil, with a dimension of 6" indicated between them. A TRM strip, shown with a diagonal hatched pattern, is installed over the soil and anchored into the trench. The TRM strip is secured by a staple, with a dimension of 1' on center indicated between the staple and the anchor bolts. The TRM strip is also shown extending horizontally to the right, where it is secured by another staple.



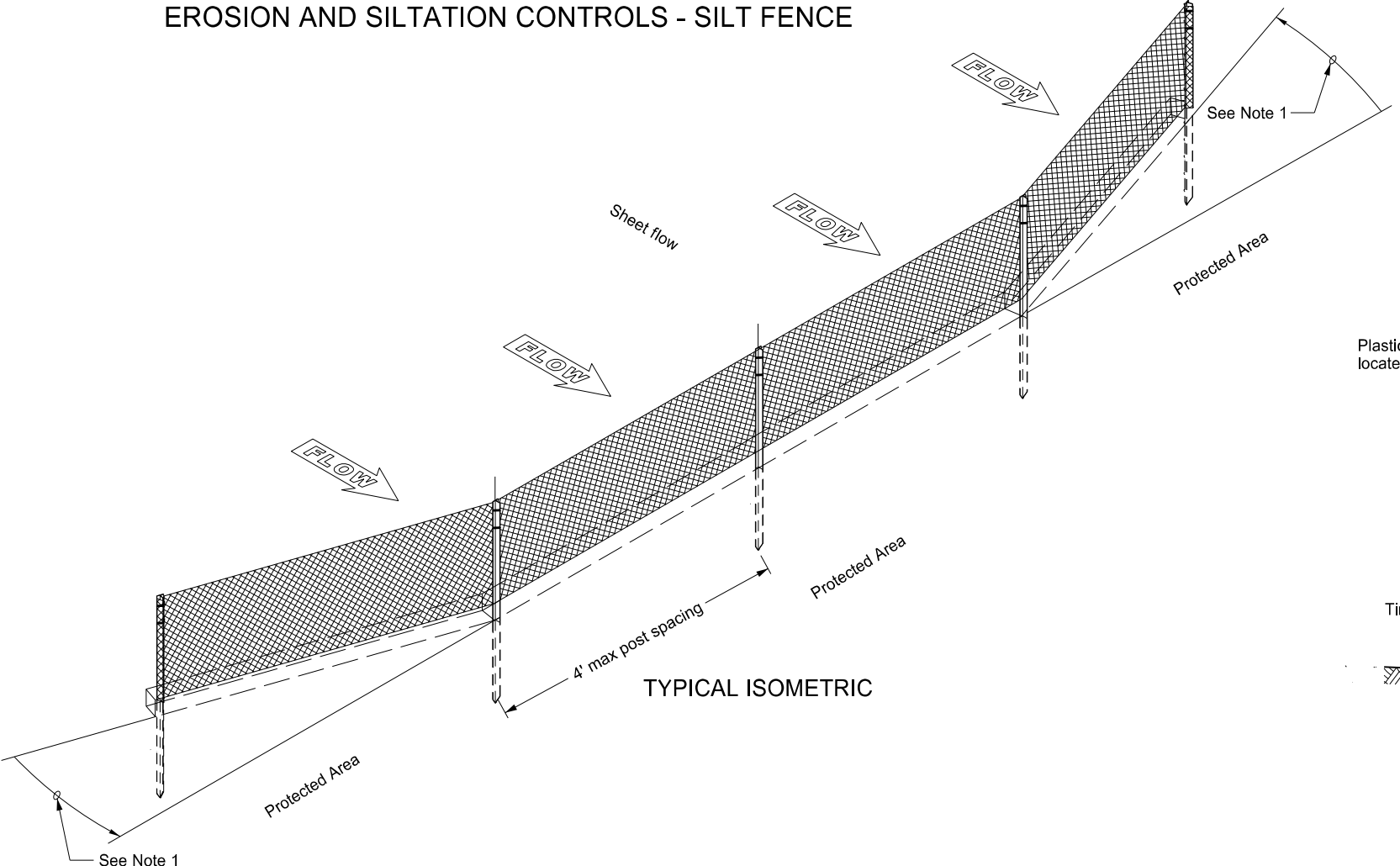
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-4 to D-255-
07-27-15	Changed installation details.
08-27-19	New Design Engineer PE Stamp

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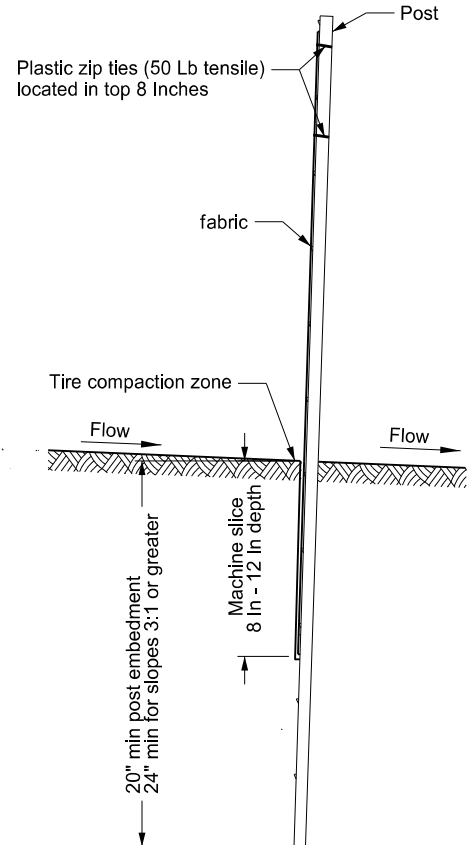
EROSION AND SILTATION CONTROLS - SILT FENCE



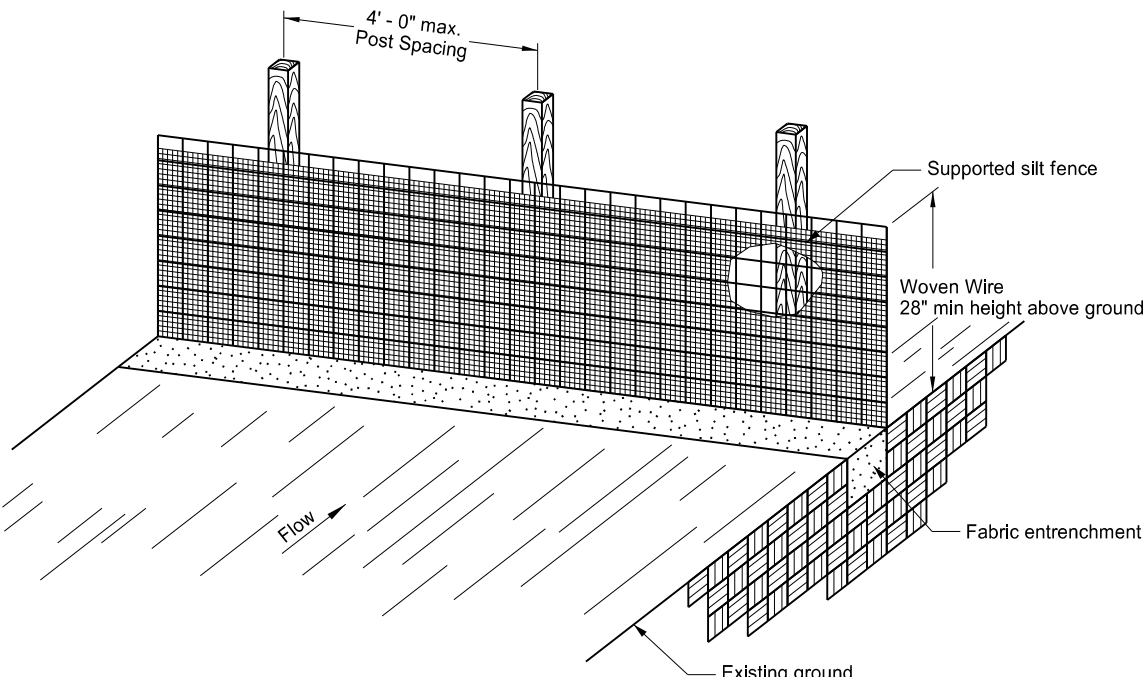
INSTALLATION DETAIL



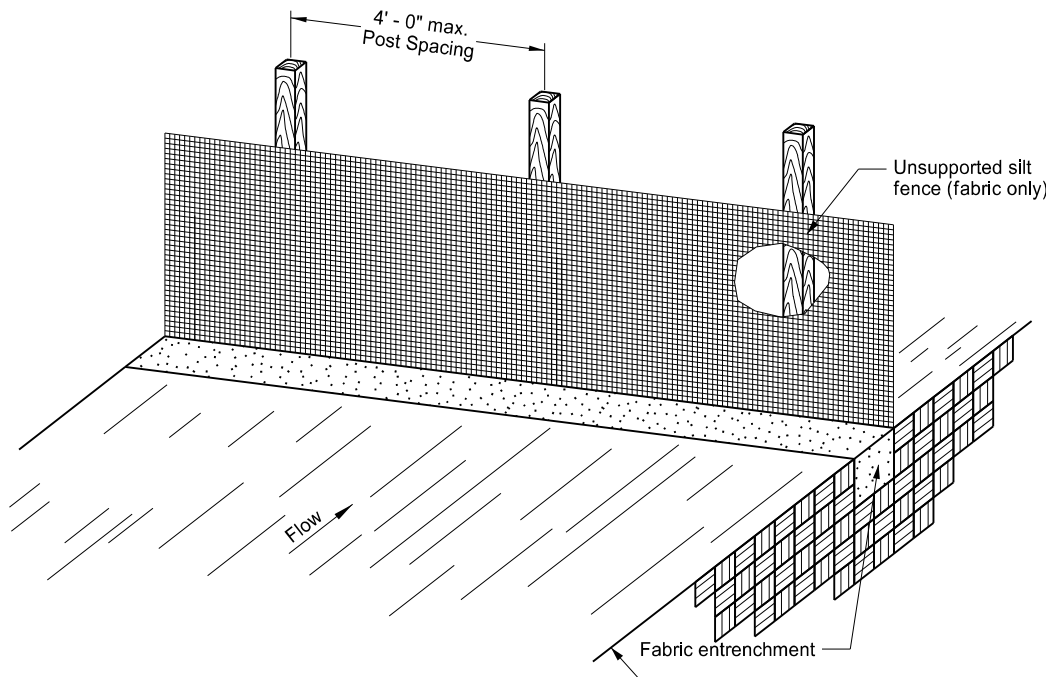
TYPICAL ISOMETRIC



MACHINE SLICED SILT FENCE



SILT FENCE SUPPORTED



SILT FENCE UNSUPPORTED

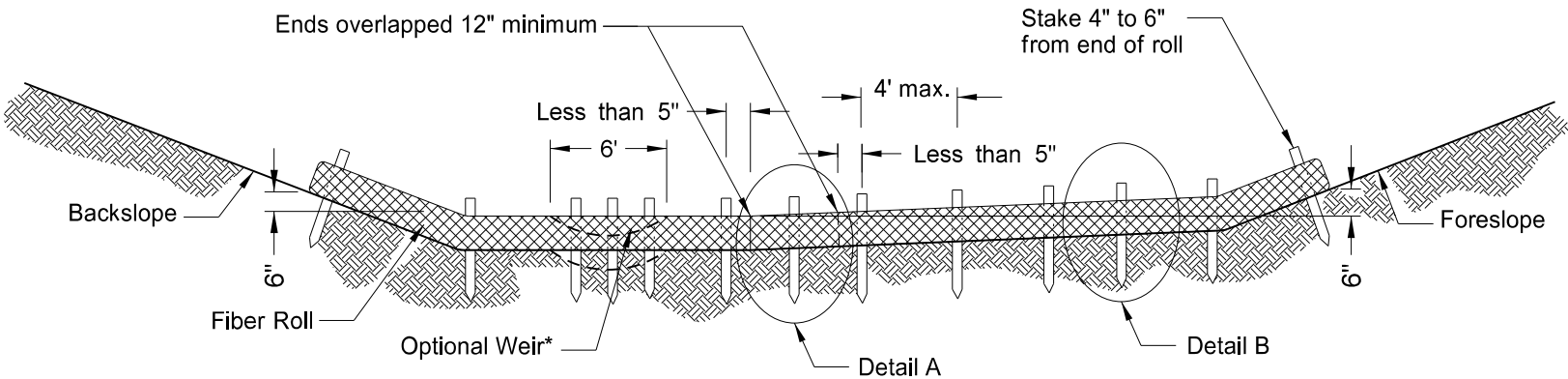
- NOTES:
1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
 2. Place splices outside low spots.
 3. Install silt fencing parallel to contour lines.
 4. Do not embed silt fence when placed in standing water.
 5. Silt fence material does not need to reach the top of woven wire support.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2.
06-27-16 08-27-19	Revised details & added new ones. New Design Engineer PE Stamp.

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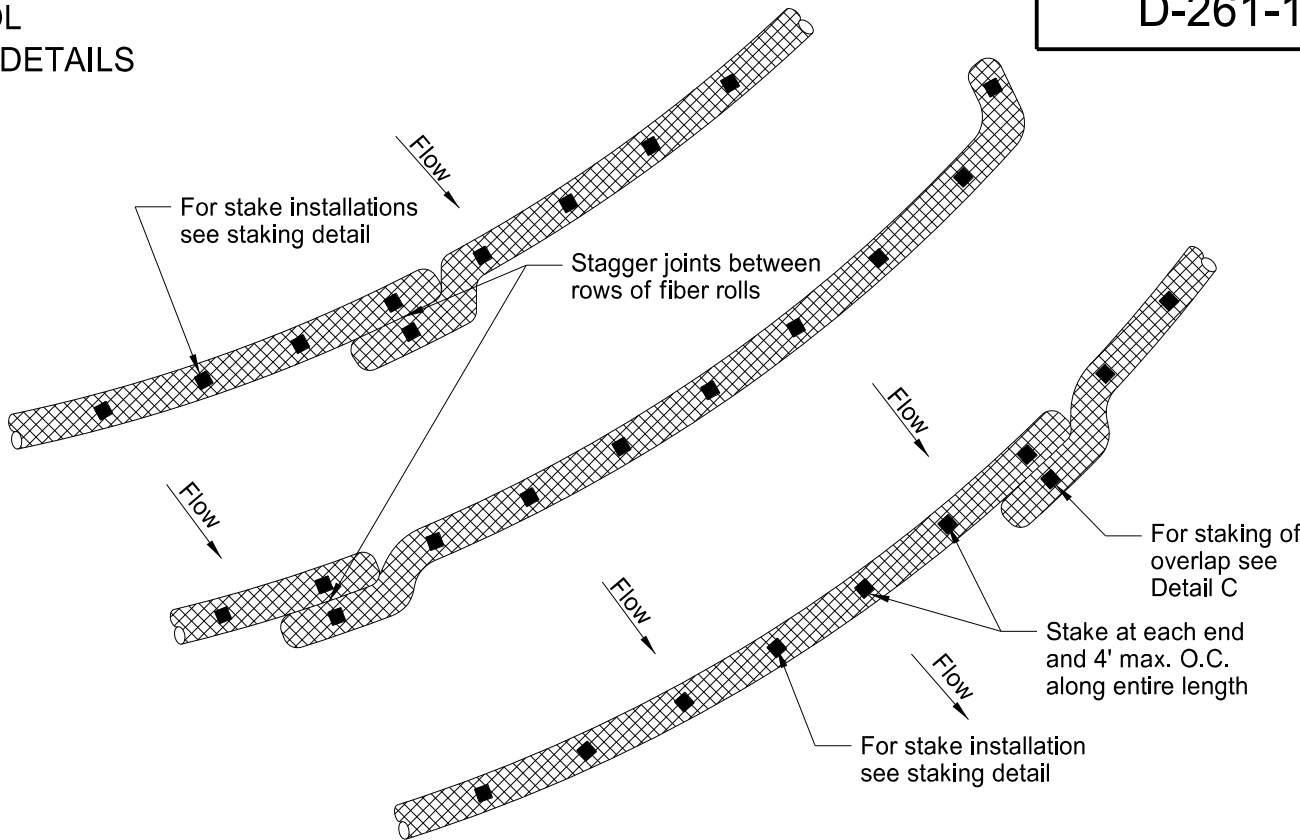
EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

D-261-1

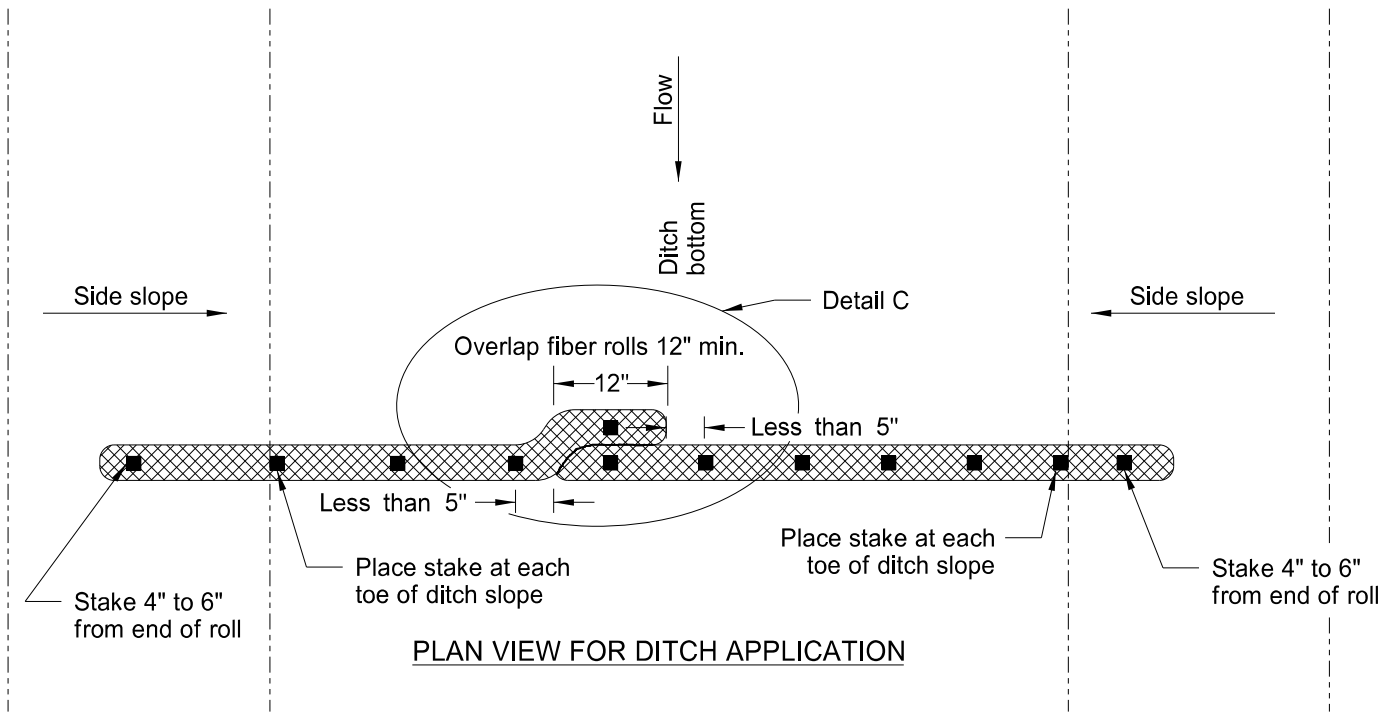


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

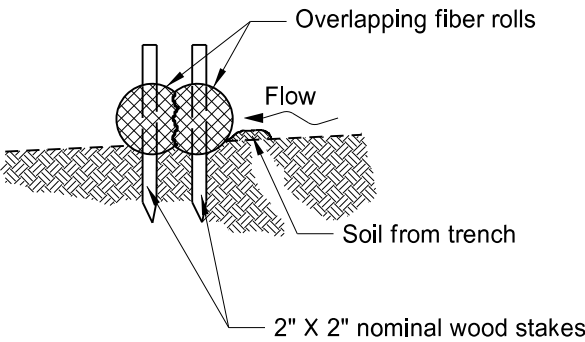
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



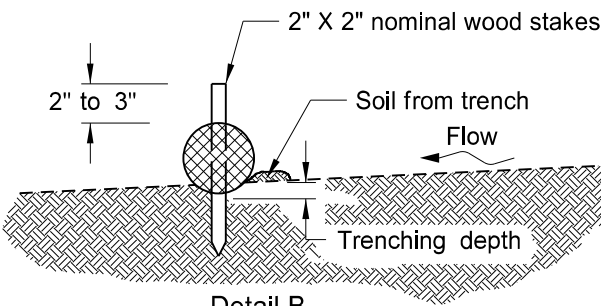
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

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

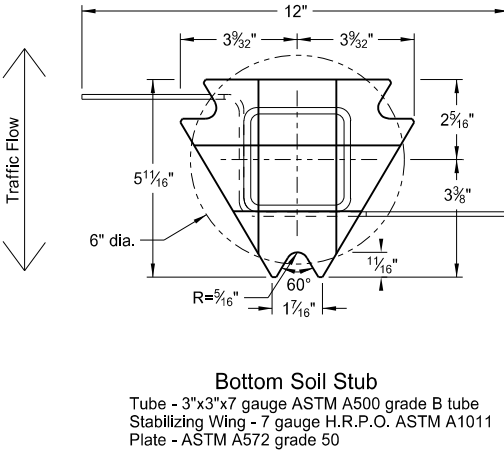
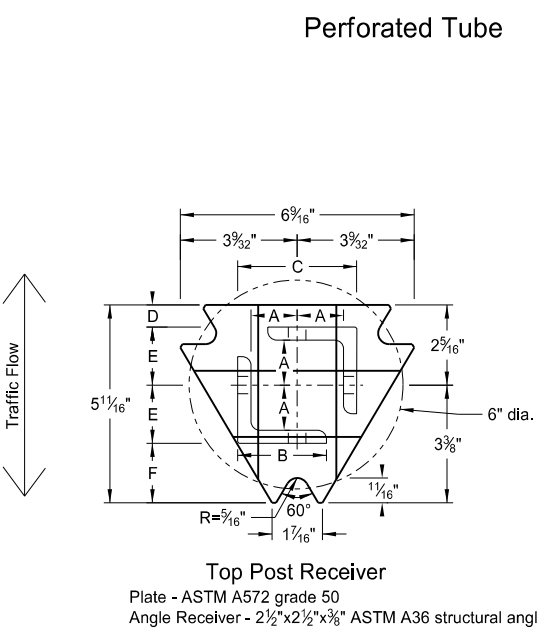
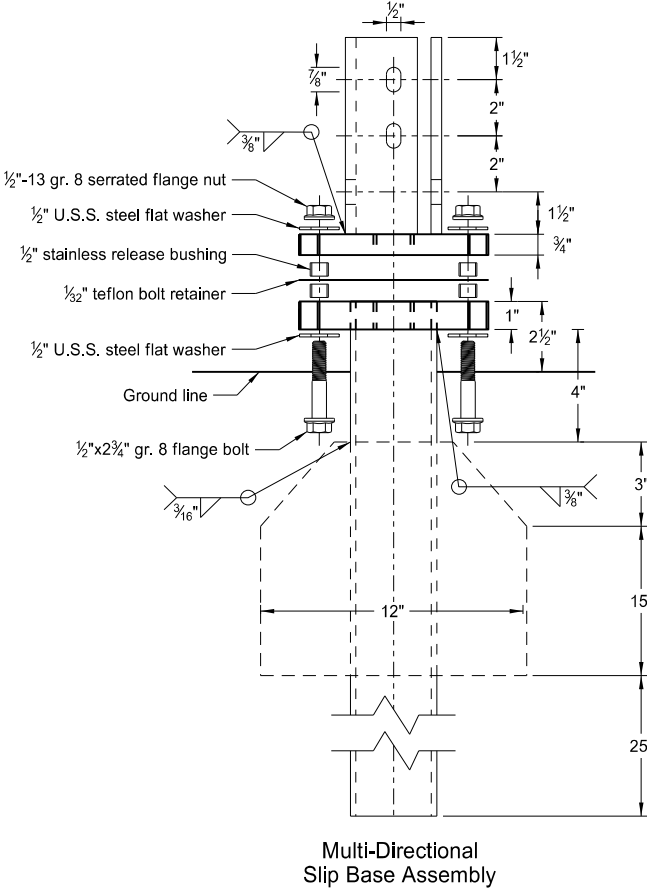
NOTE: Runoff must not be allowed to run under or around roll.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.
08-27-19	New Design Engineer PE Stamp

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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.

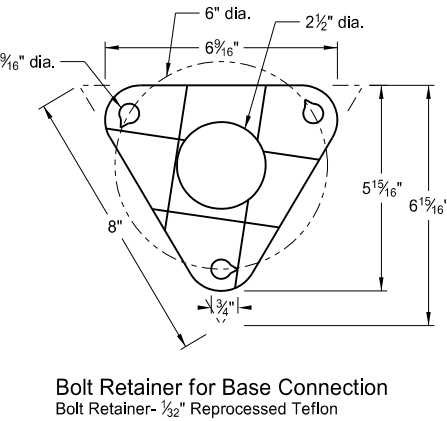
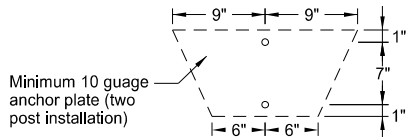
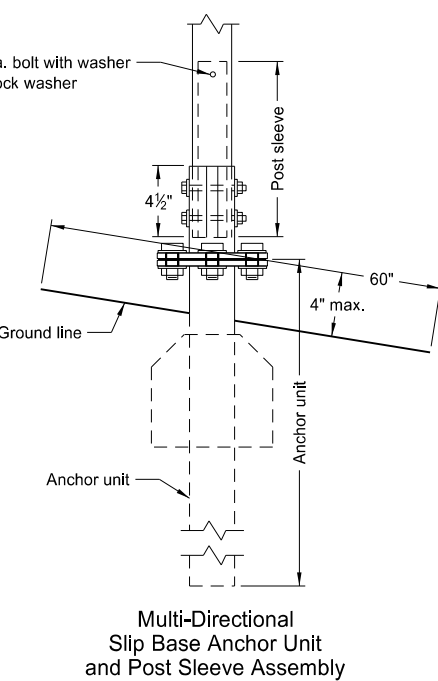
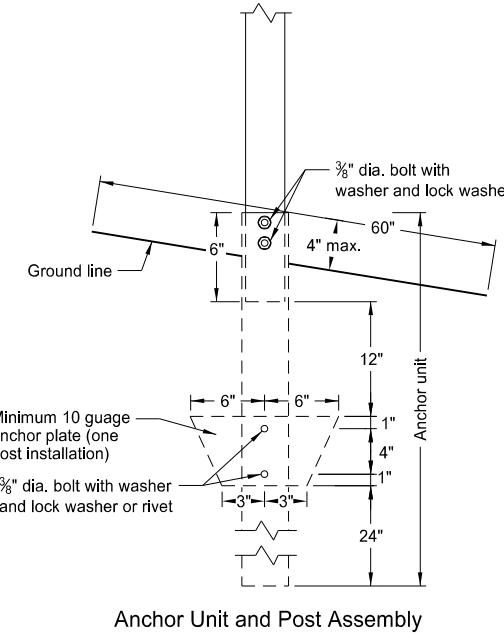


Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

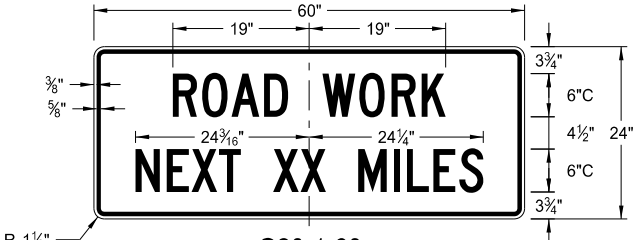


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17 10-03-19	Updated to active voice New Design Engr PE Stamp

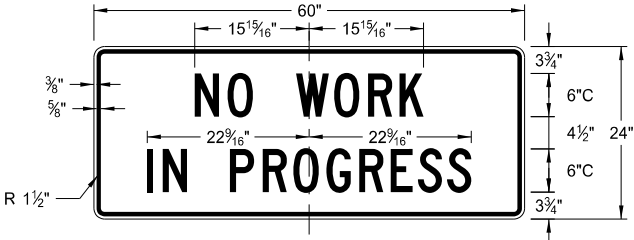
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

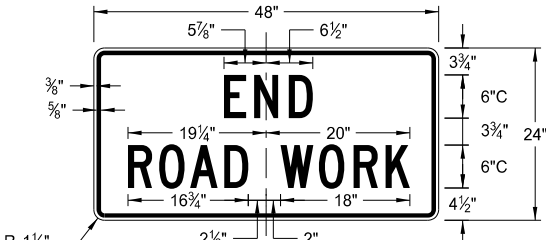
D-704-9



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



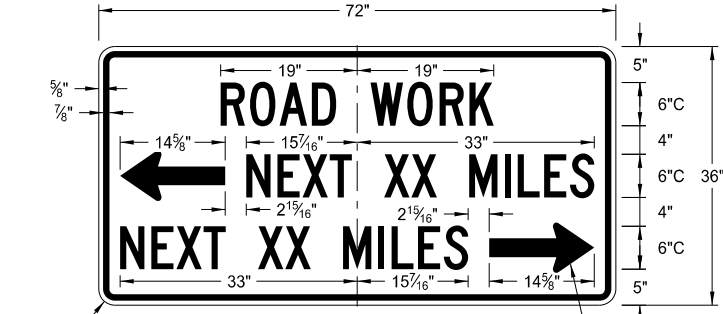
G20-1b-60
Legend: black (non-refl)
Background: orange



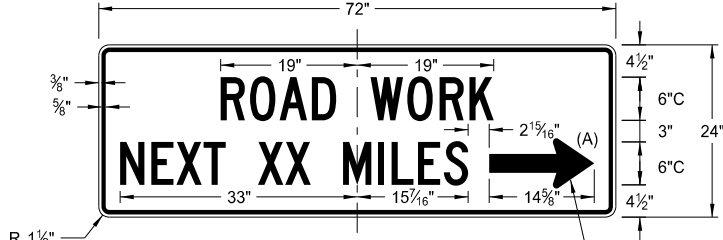
G20-2-48
Legend: black (non-refl)
Background: orange



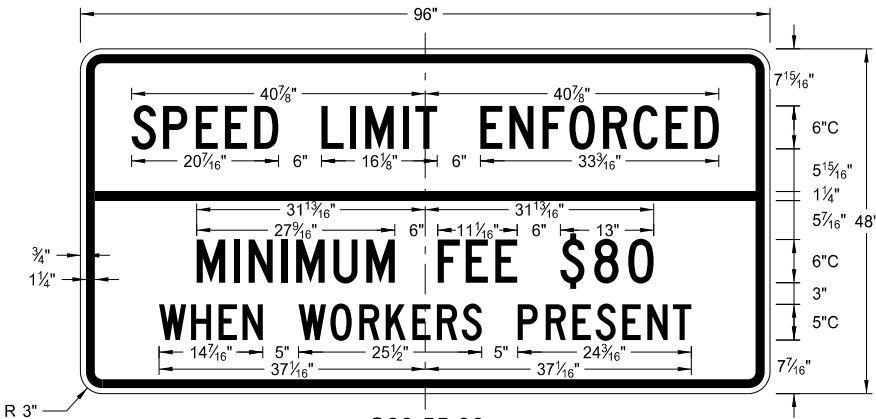
G20-4b-36
Legend: black (non-refl)
Background: orange



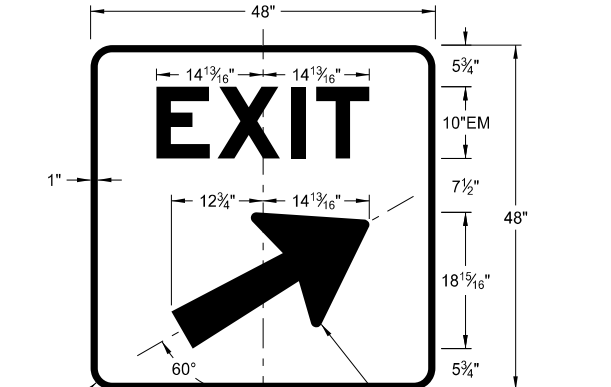
G20-50a-72
Legend: black (non-refl)
Background: orange



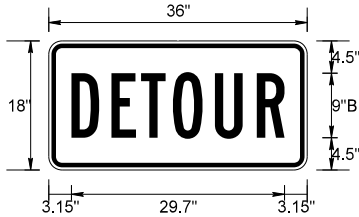
G20-52a-72
Legend: black (non-refl)
Background: orange



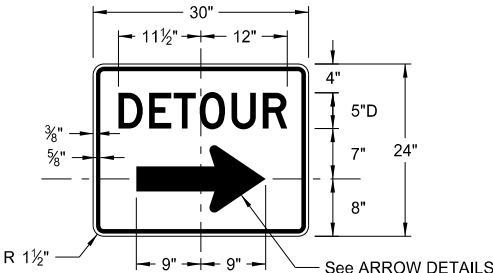
G20-55-96
Legend: black (non-refl)
Background: orange



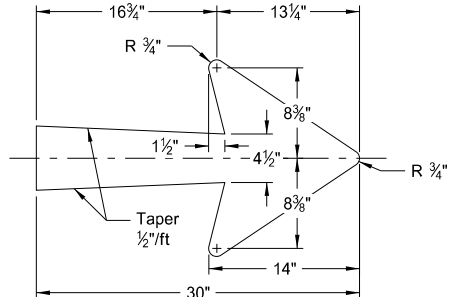
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



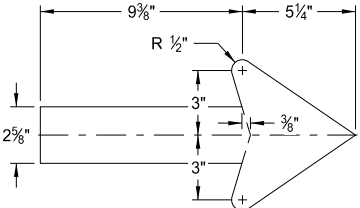
M4-8-36
Legend: black (non-refl)
Background: orange



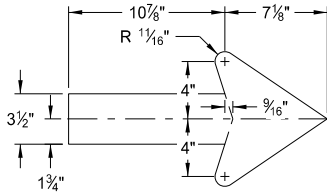
M4-9(L or R)-30 & M4-9-30
Legend: black (non-refl)
Background: orange



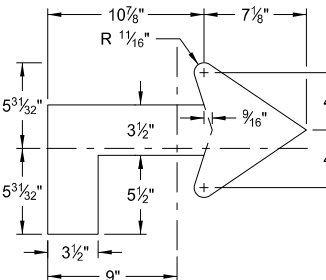
E5-1-48



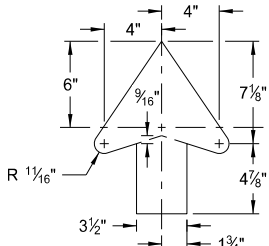
G20-50a-72
G20-52a-72



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



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



M4-9-30
Straight

ARROW DETAILS

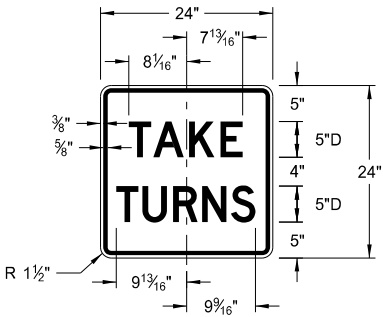
- NOTES:
- (A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17 10-03-19	Added sign & background color New Design Engineer PE Stamp

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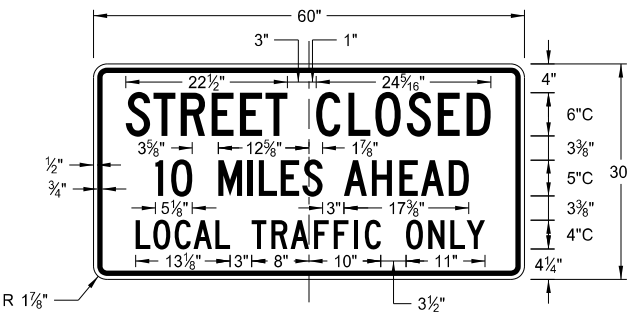
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



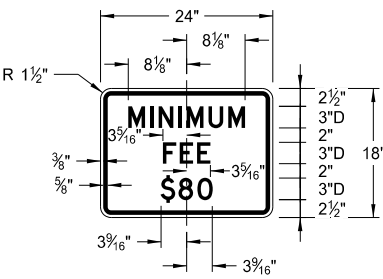
R1-50P-24

Legend: black (non-refl)
Background: white



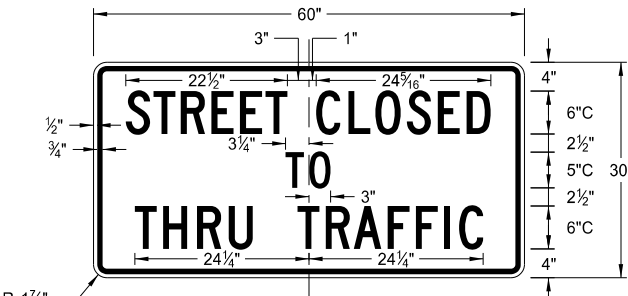
R11-3c-60

Legend: black (non-refl)
Background: white



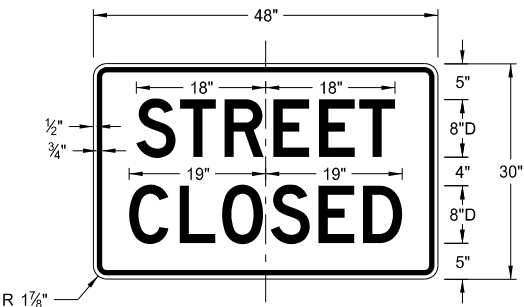
R2-1aP-24

Legend: black (non-refl)
Background: white



R11-4a-60

Legend: black (non-refl)
Background: white

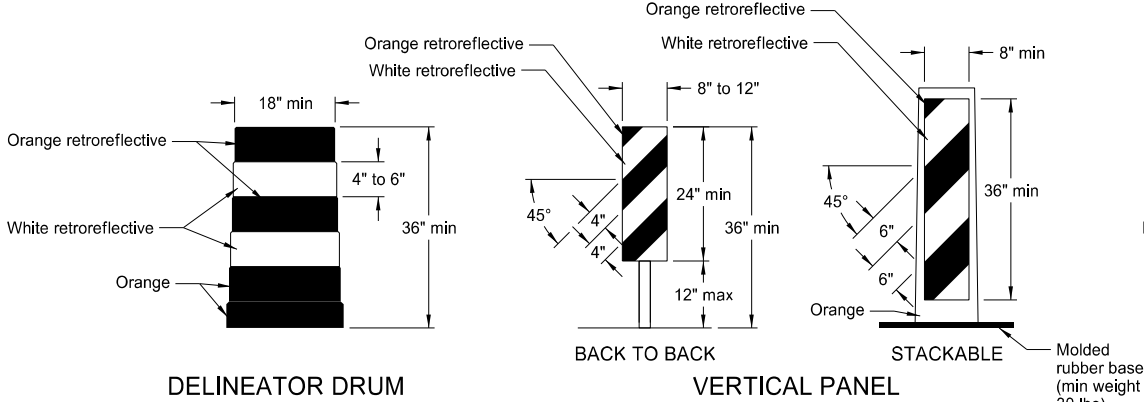


R11-2a-48

Legend: black (non-refl)
Background: white

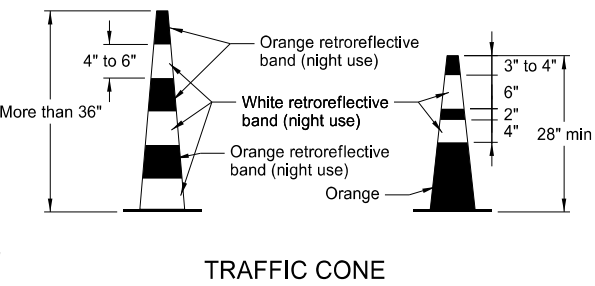
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		<p>This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683, on 10/03/19 and the original document is stored at the North Dakota Department of Transportation</p>
8-13-13		
REVISIONS		
DATE	CHANGE	
8-17-17 10-03-19	Revised sign number New Design Engineer PE Stamp	

BARRICADE AND CHANNELIZING DEVICE DETAILS

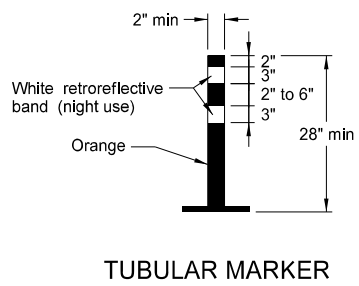


Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and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

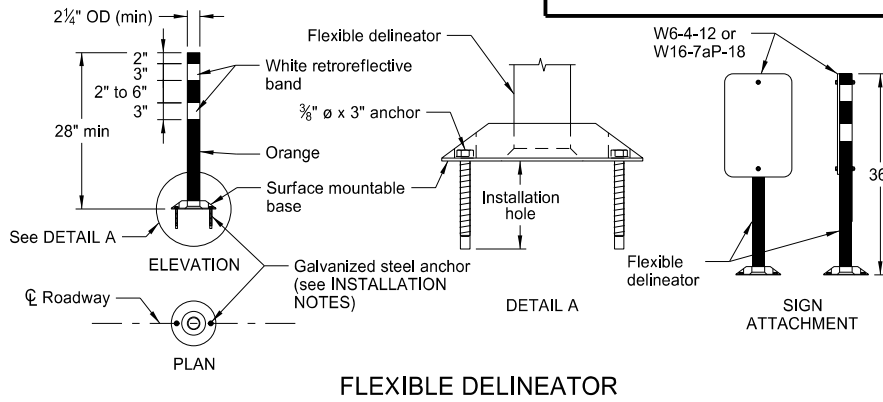
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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



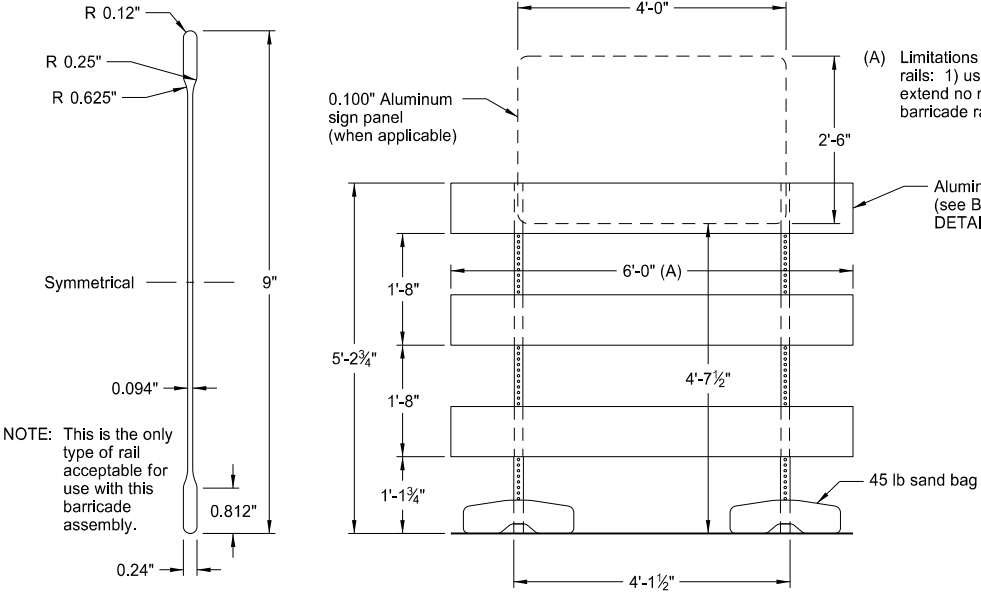
Provide retroreflectORIZATION of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectORIZED space between the orange and white stripes.



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



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

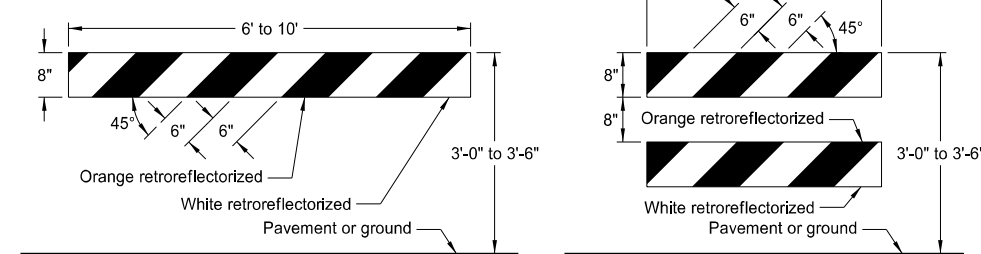


BARRICADE BLADE DETAIL

ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

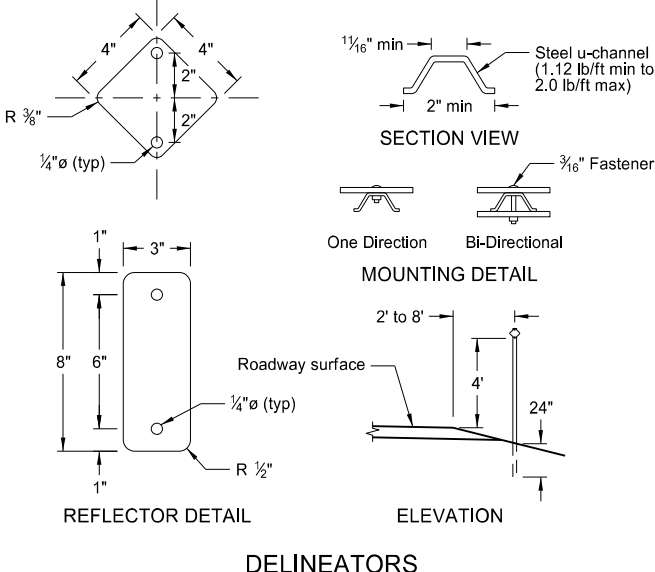
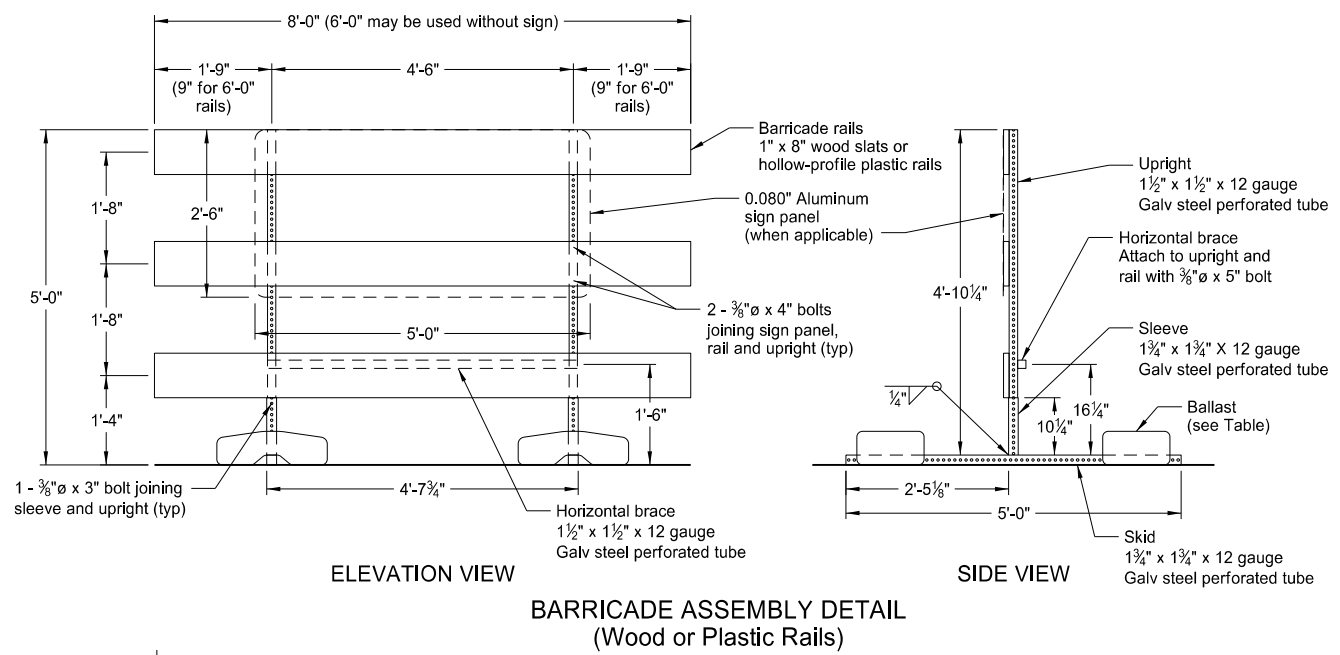
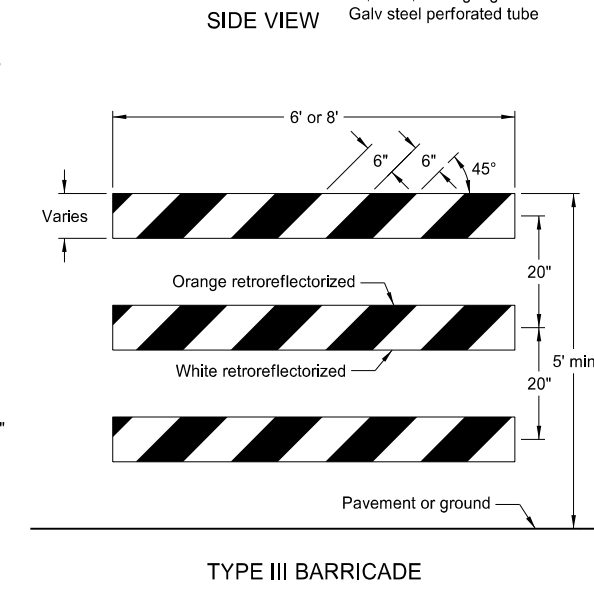
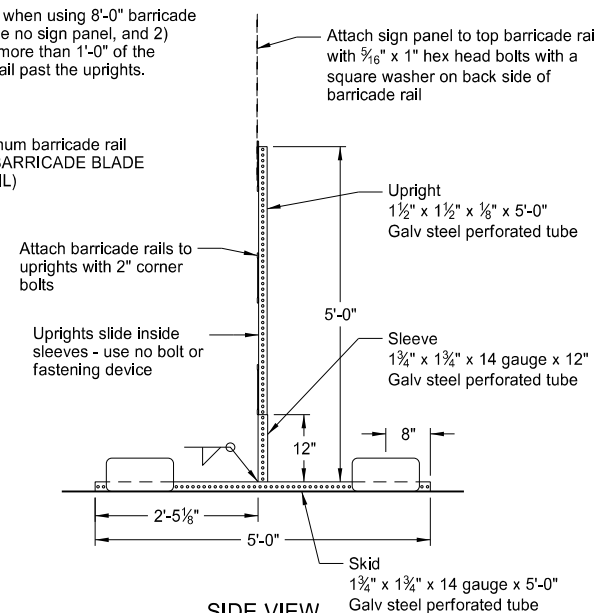
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

TYPE II BARRICADE

BARRICADE RAIL DETAILS



MINIMUM BALLAST (For each side of barricade support)

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

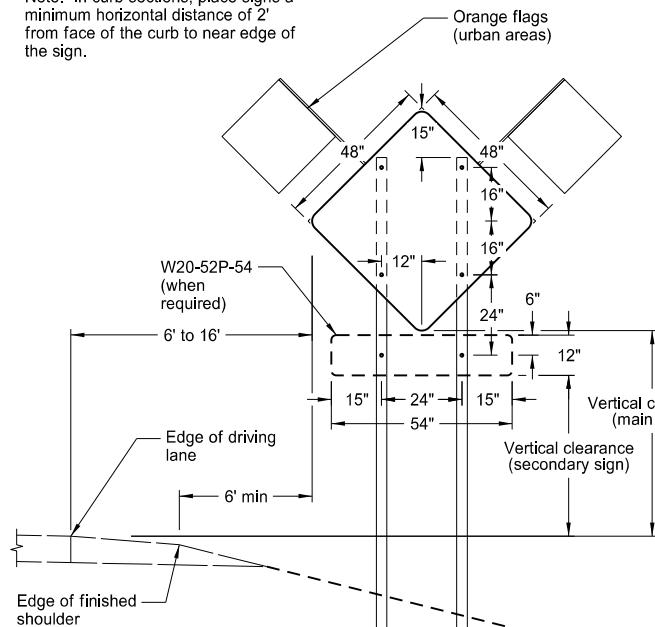
Note: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

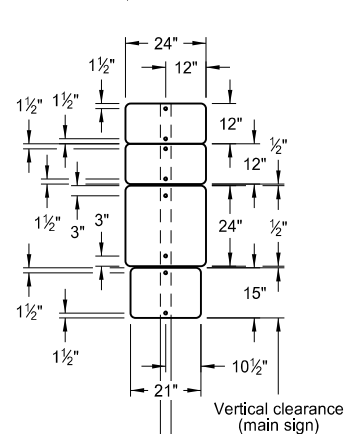
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

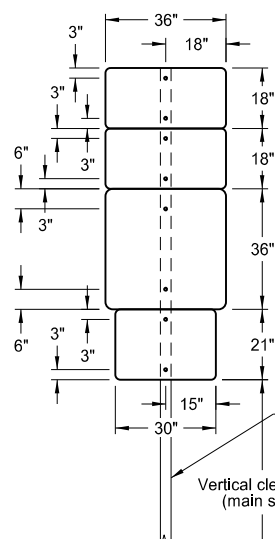
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



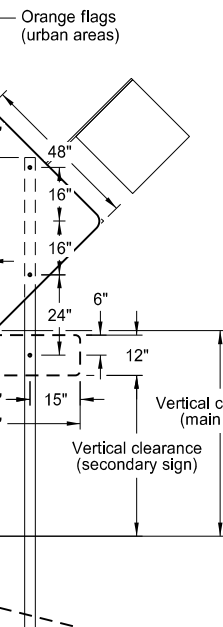
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



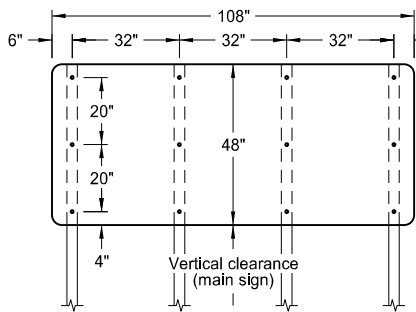
24" x 24"
ROUTE MARKER
ASSEMBLY



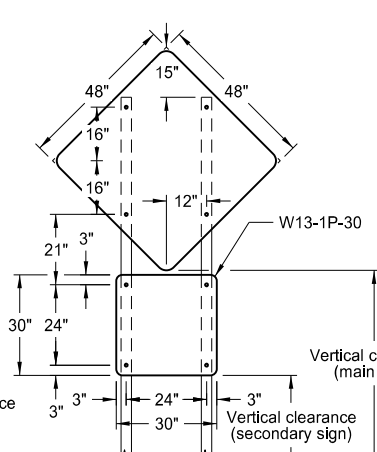
36" x 36"
ROUTE MARKER
ASSEMBLY



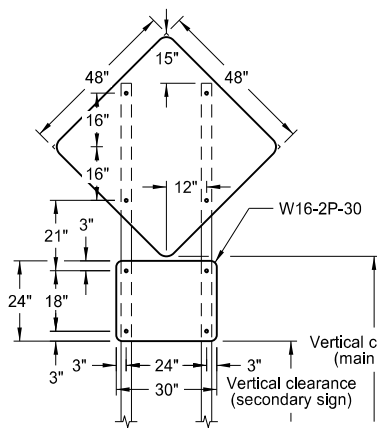
18" x 18"
DIAMOND SIGN



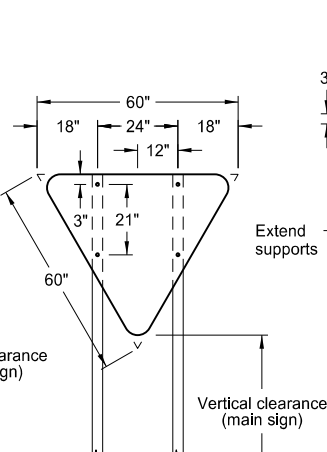
108" x 48" SIGN



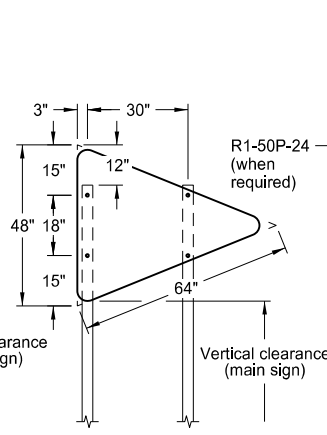
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



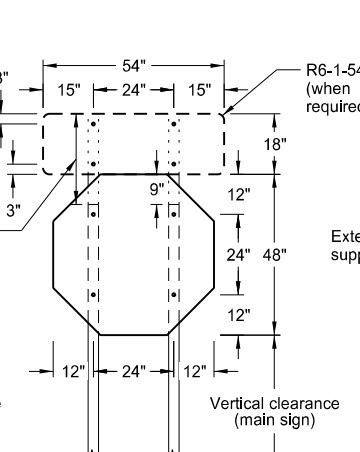
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



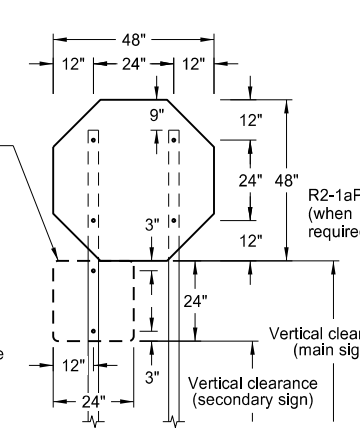
R1-2-60 - YIELD SIGN



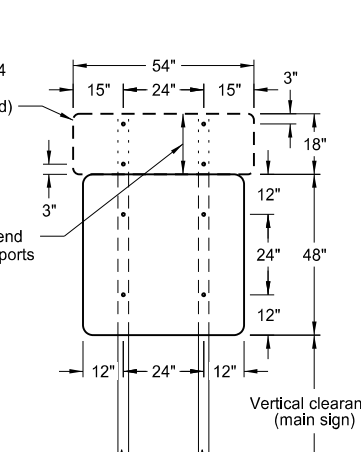
W14-3-64 - PENNANT SIGN



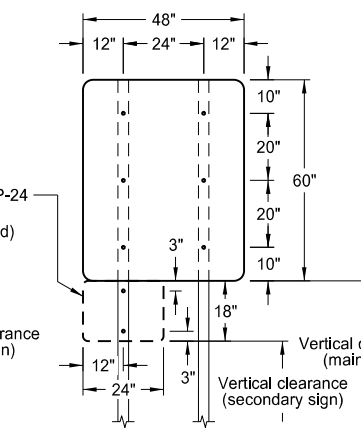
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



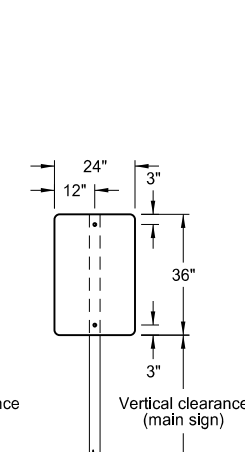
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



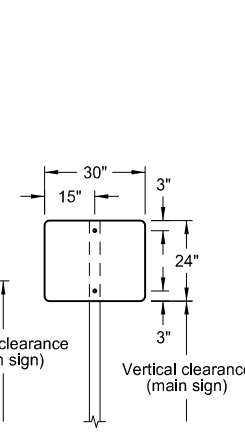
48" x 48" SIGN
(with R6-1-54 sign as required)



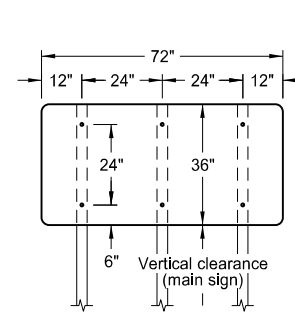
48" x 48" SIGN
(with R2-1aP-24 sign as required)



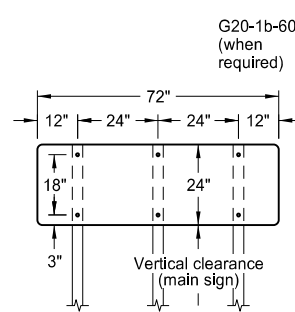
24" x 36" SIGN



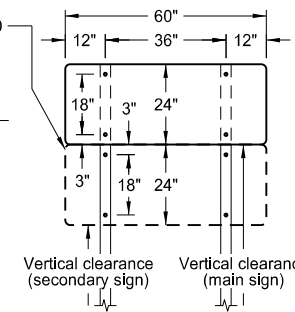
30" x 24" SIGN



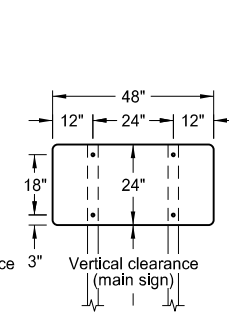
72" x 36" SIGN



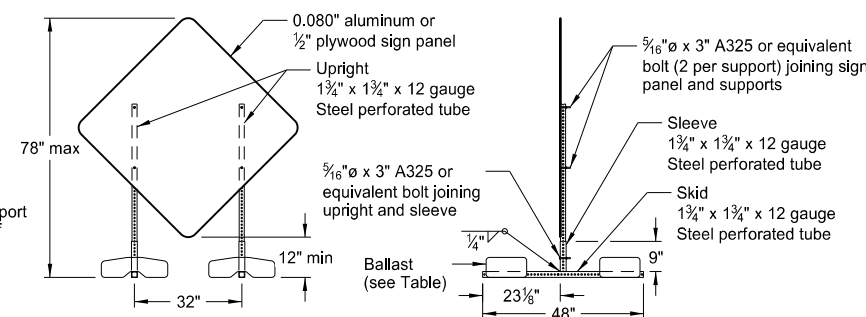
72" x 24" SIGN



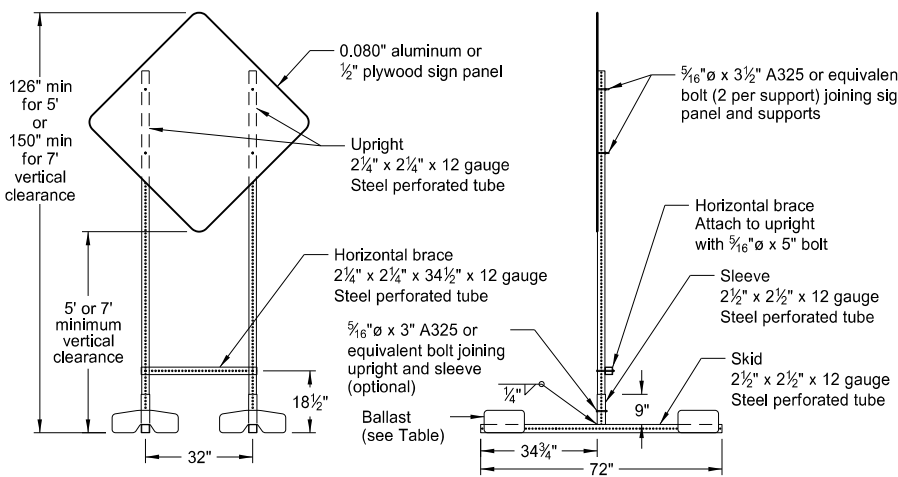
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

Place signs over 50 square feet on 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.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail

This document was originally issued and sealed by

Kirk J Hoff,
Registration Number
PE-4683,
on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

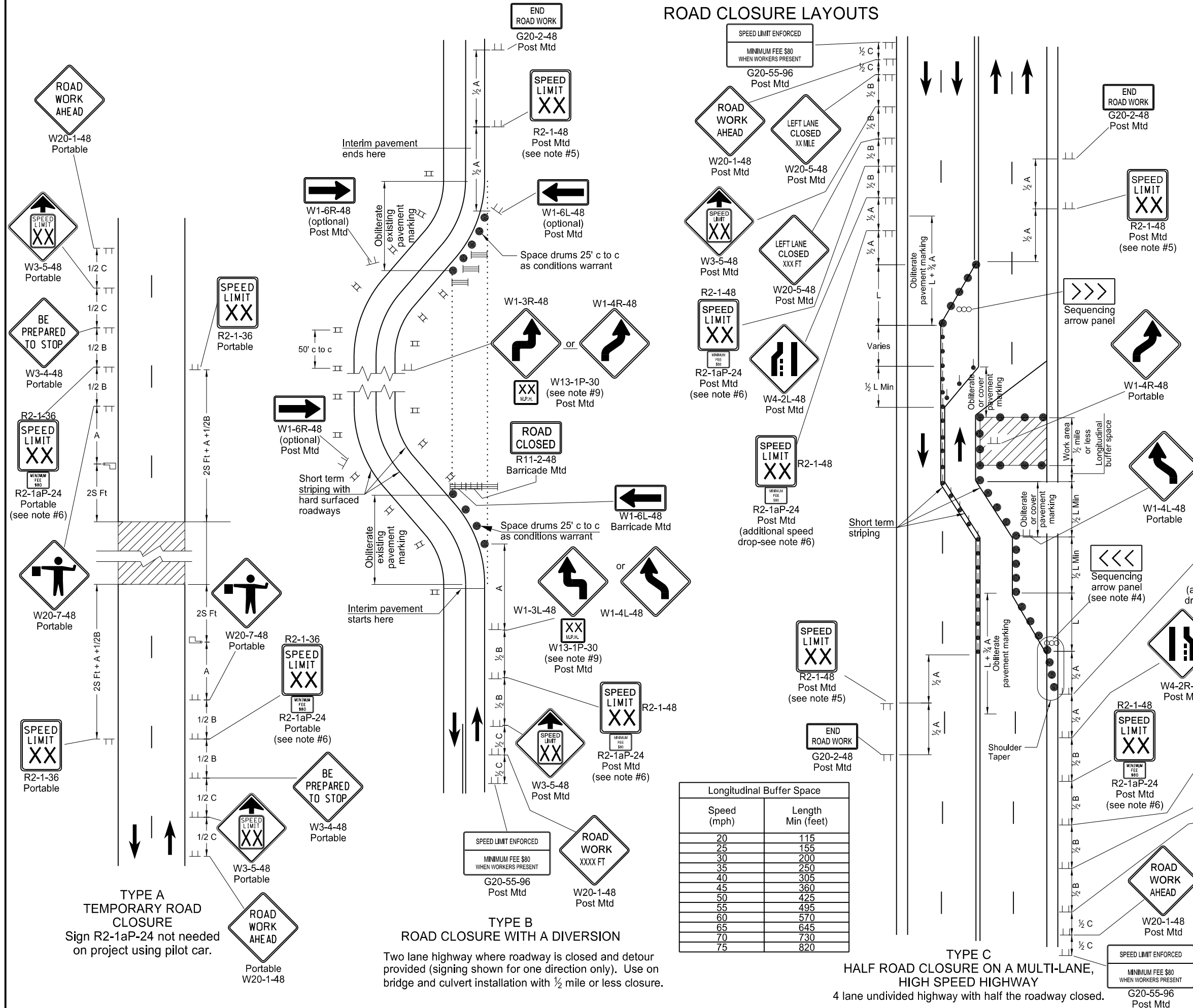
ROAD CLOSURE LAYOUTS

- 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. Install flags on warning signs in urban areas when signs are not portable.
8. Cover existing speed limit signs within reduced speed zones.
9. Where necessary, engineer will determine safe speed.
10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
11. Sign G20-55-96 is not required if this standard is part of other traffic control, or the 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

KEY	
	Type III barricade
	Sign
	Delineator drum
	Tubular markers
	Work area
	Flagger
	Sequencing arrow panel
	Vertical panels back to back

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



TYPE A
TEMPORARY ROAD
CLOSURE
Sign R2-1aP-24 not needed
on project using pilot car.

TYPE B
ROAD CLOSURE WITH A DIVERSION
Two lane highway where roadway is closed and detour
provided (signing shown for one direction only). Use on
bridge and culvert installation with $\frac{1}{2}$ mile or less closure.

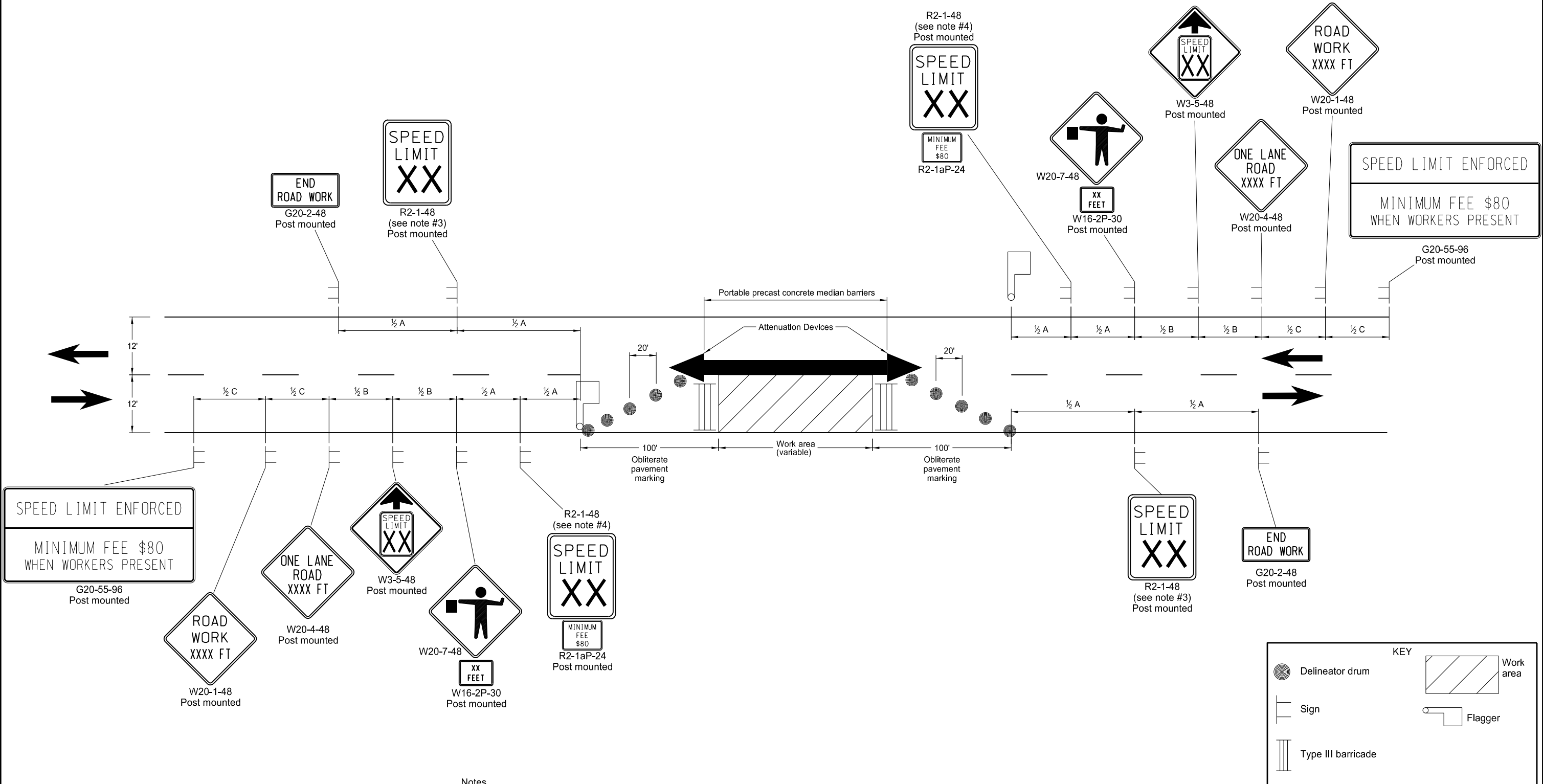
TYPE C
HALF ROAD CLOSURE ON A MULTI-LANE,
HIGH SPEED HIGHWAY
4 lane undivided highway with half the roadway closed.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & Speed Limit signs
11-01-19	Sign, Notes, and Pmnt Mkg updates

This document was originally
issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 11/01/19 and the original
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SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



Notes

1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Remove existing striping as required. Use back to back delineators when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Place back to back vertical panels when roadways have steep slopes and alignment is not visible to approaching traffic.
3. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
4. 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.
5. 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.
6. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
7. Cover existing speed limit signs within a reduced speed zone.
8. Sign G20-55-96 is not required if layout is part of other traffic control or if work is less than 15 days.
9. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

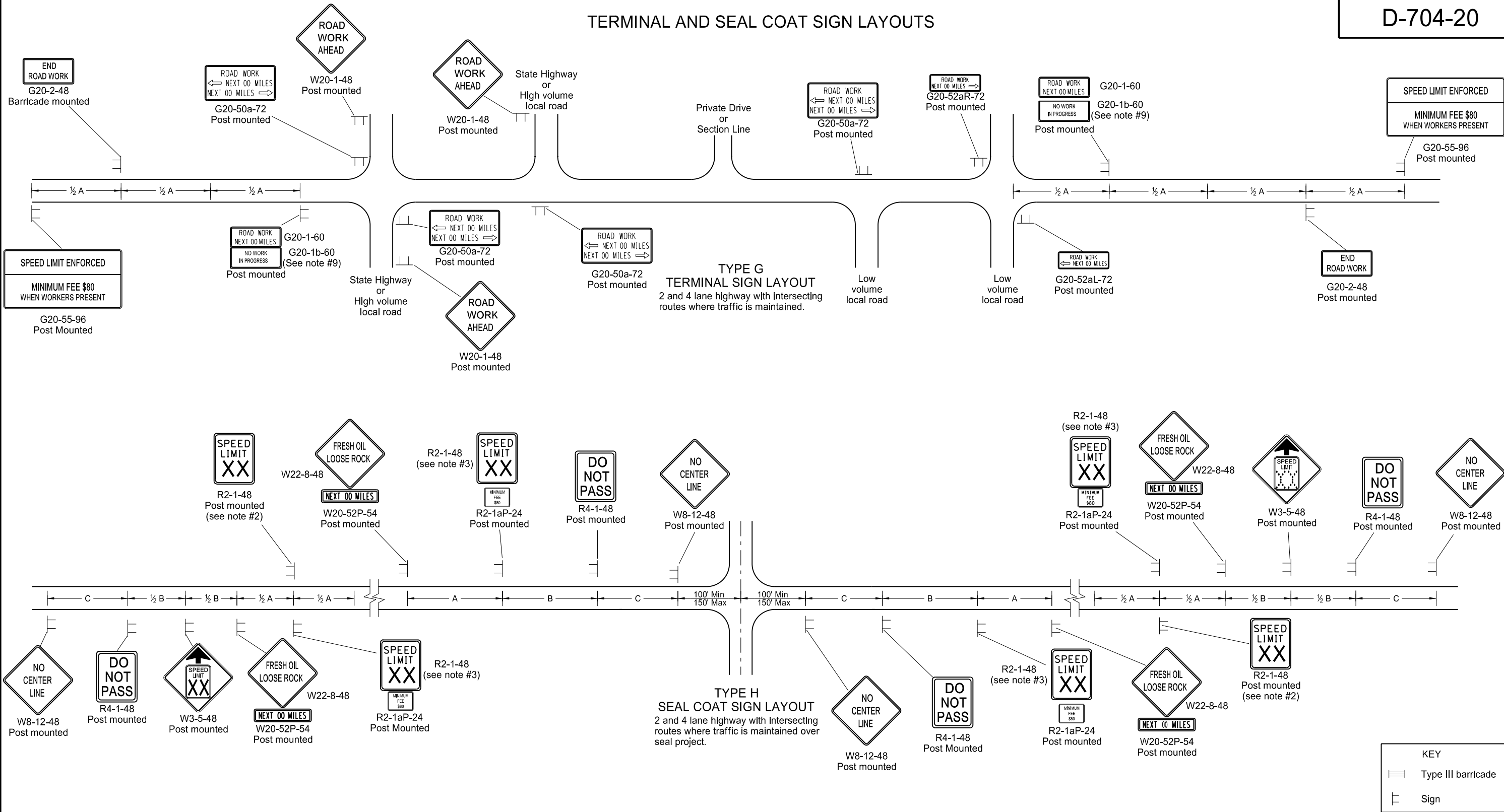
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway 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 11-01-19	Note update & sign numbers Removed signs & revised note

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Kirk J Hoff,
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PE- 4683,
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TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



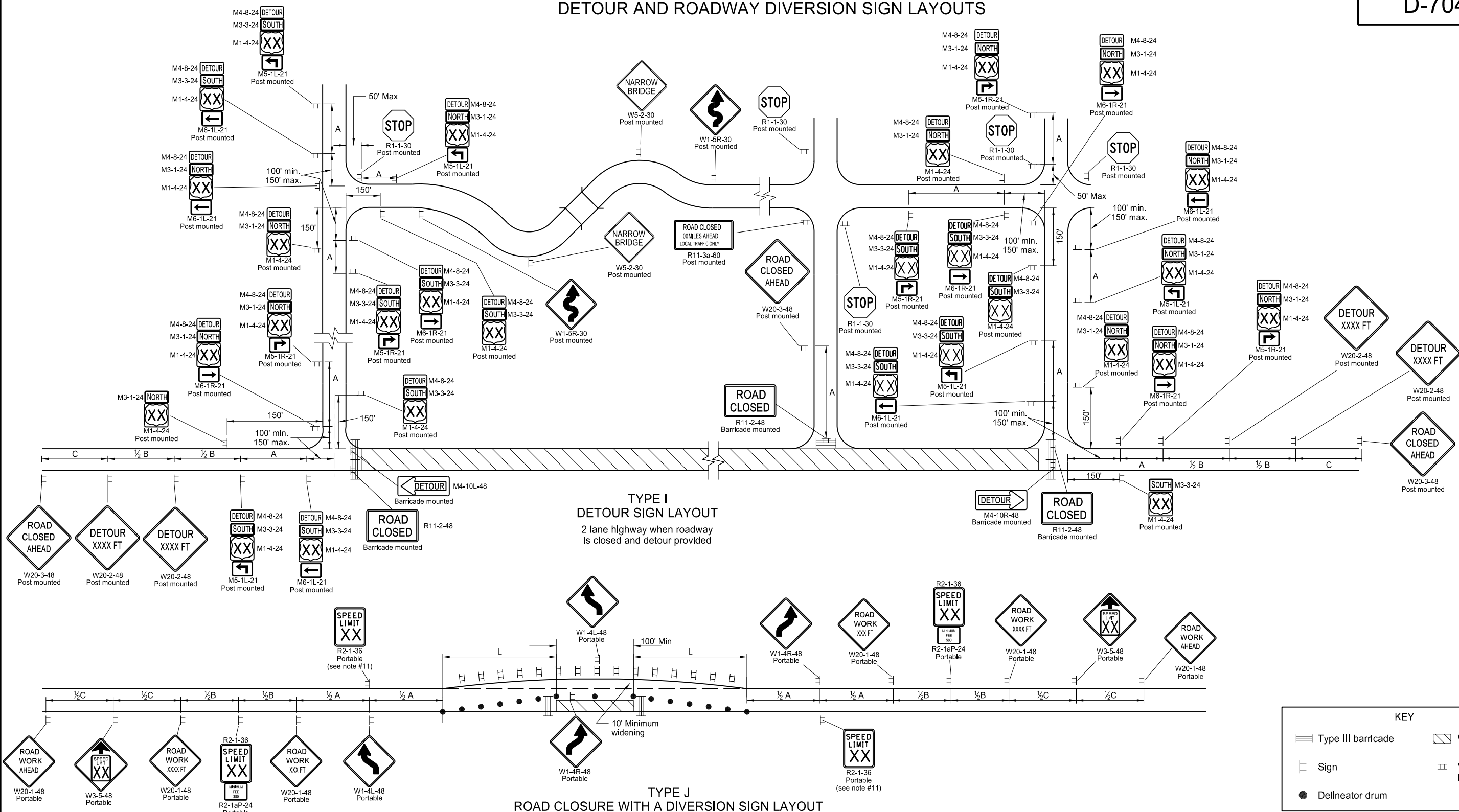
- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
- Determine the exact speed limit in the field, based on location and conditions.
- Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions 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 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.
- 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.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
- Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
- Install sign G20-1b-60 when work is suspended for winter.
- Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
- Sign G20-55-96 is not required if work is less than 15 days.
- 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 11-01-19	Updated notes & sign numbers. Note & sign updates.

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 PE- 4683,
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DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS



- Notes
- Variables
S=Numerical value of speed limit or 85th percentile. W=The width of taper.
L=Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Place barricades on moveable assemblies and signs on portable assemblies when on roadway.
 - Space delineator drums and vertical panels at dimension "S" for tapering traffic. Space delineator drums, tubular markers and vertical panels at 2 times "S" for tangents.
 - Determine the reduced speed limit based on the in place speed limit before construction. Where speed limits 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.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inches square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed limit zone.
 - Covered (when approved by engineer) or obliterated payment marking measured as Obliteration of Pavement Marking.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - If the tangent between tapers is less than 600', as an option, use sign W24-1-48 in place of double reverse curve signs.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 - Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.

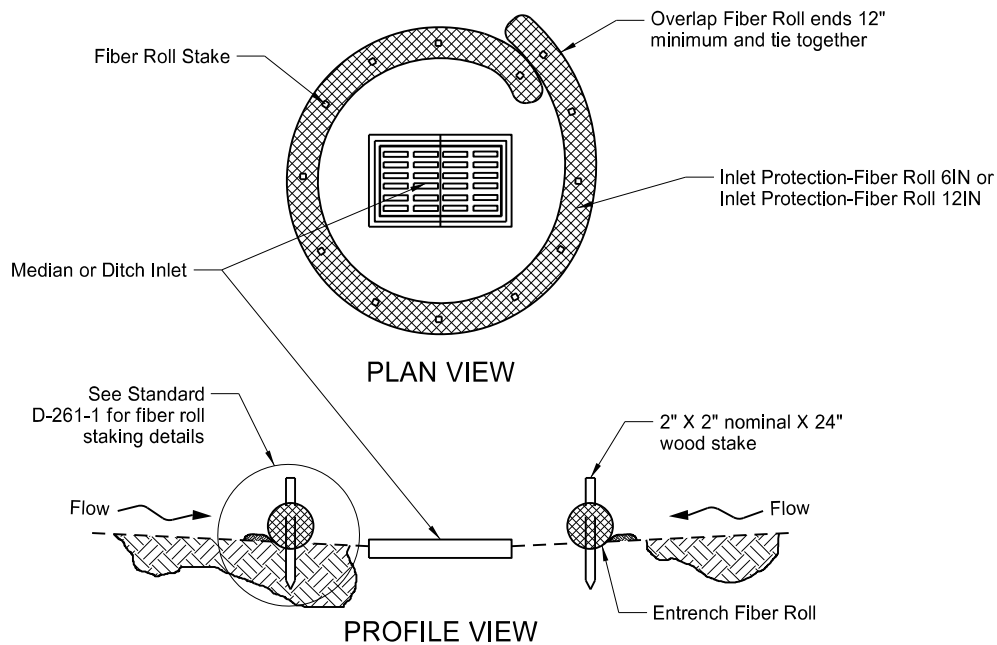
Use layout when work is less than 5 days or is within a project.

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs		
	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

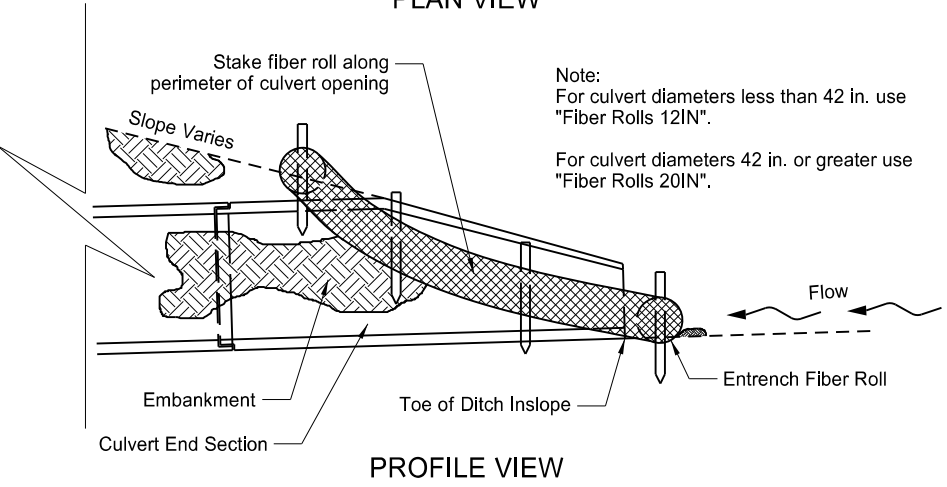
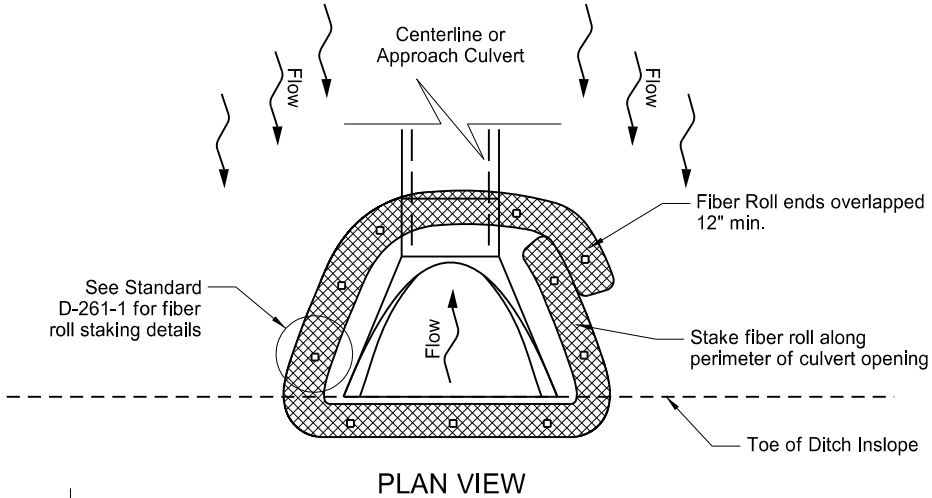
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17 11-01-19	Updated notes. Added speed limit. Revised sign numbers and note 6.

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Kirk J Hoff,
Registration Number
PE- 4683,
on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

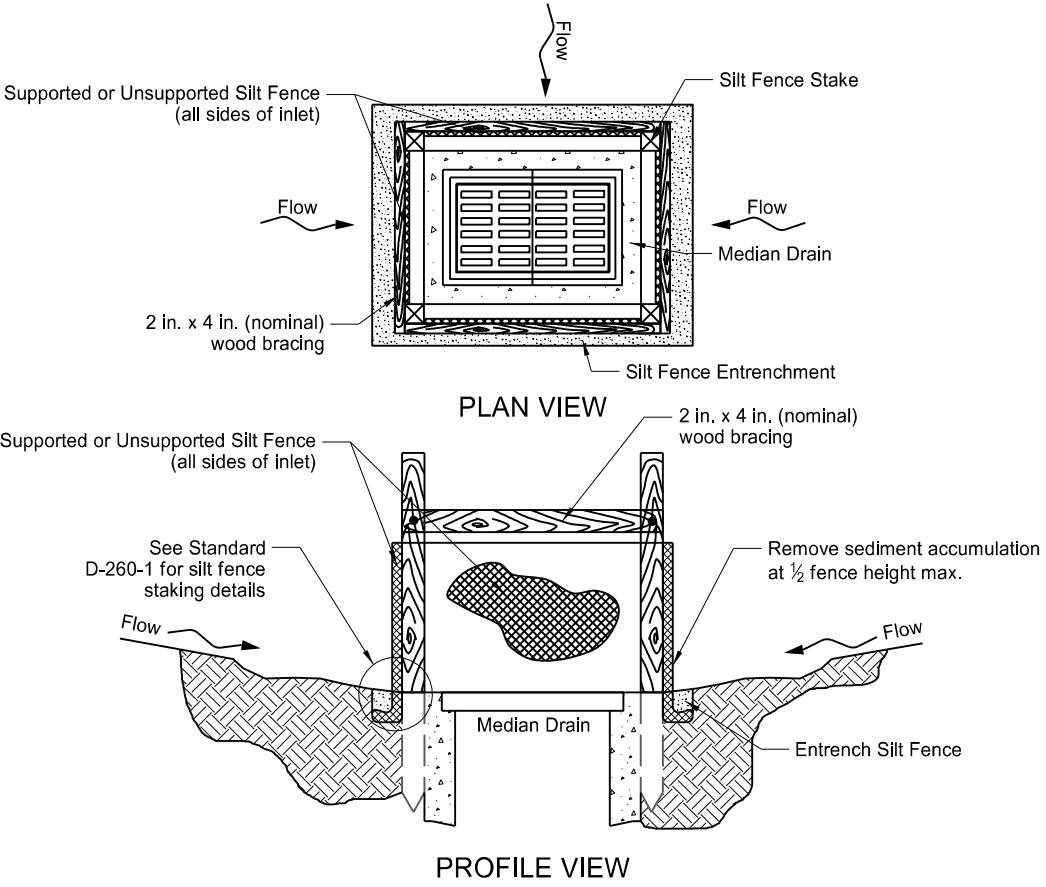
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



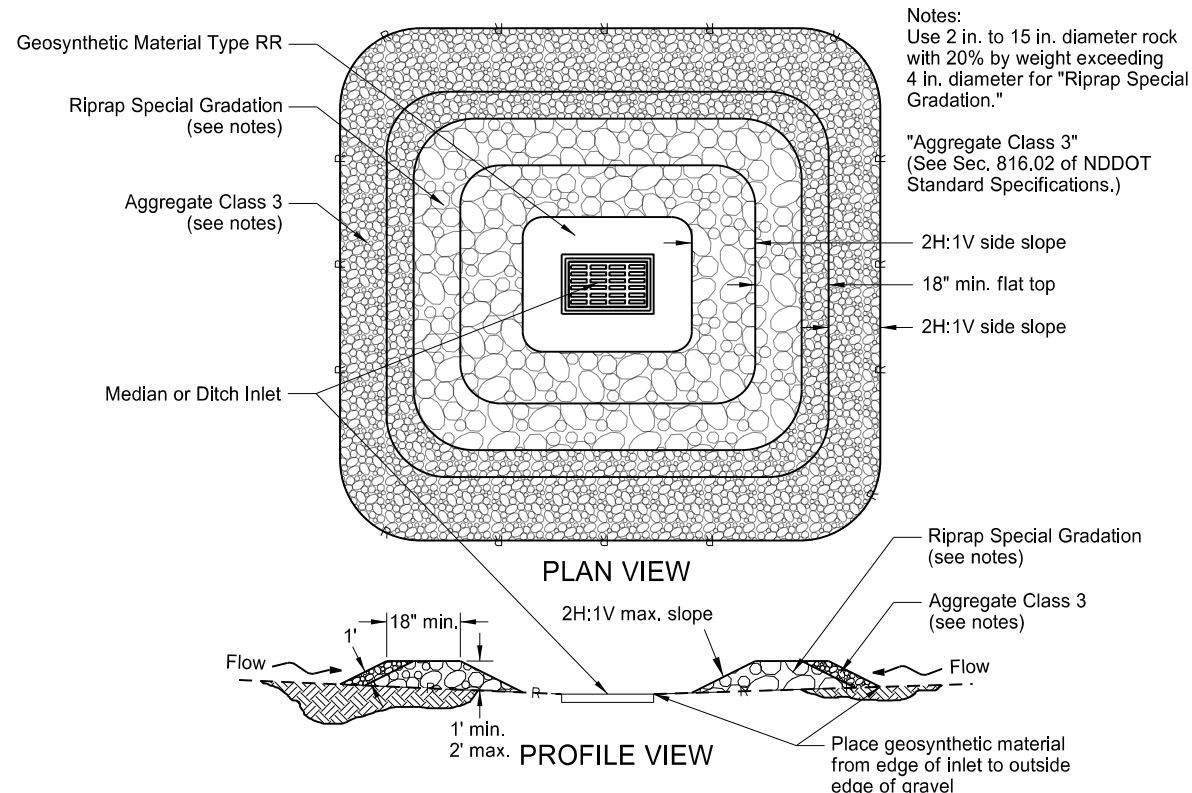
FIBER ROLL PROTECTION
(MEDIAN OR DITCH INLET)



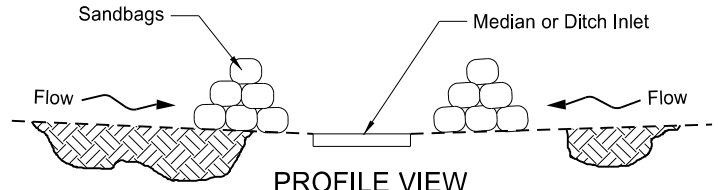
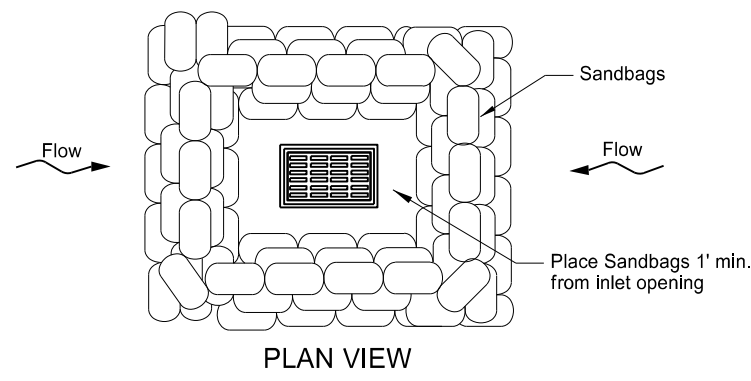
FIBER ROLL PROTECTION
(INLET OF CULVERT)



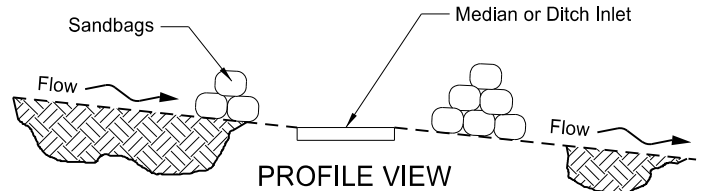
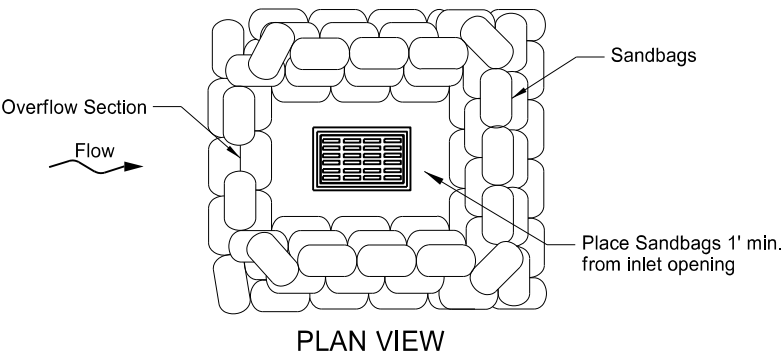
SILT FENCE PROTECTION
(MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION
(MEDIAN OR DITCH INLET)



SANDBAG PROTECTION
(LOW POINT)



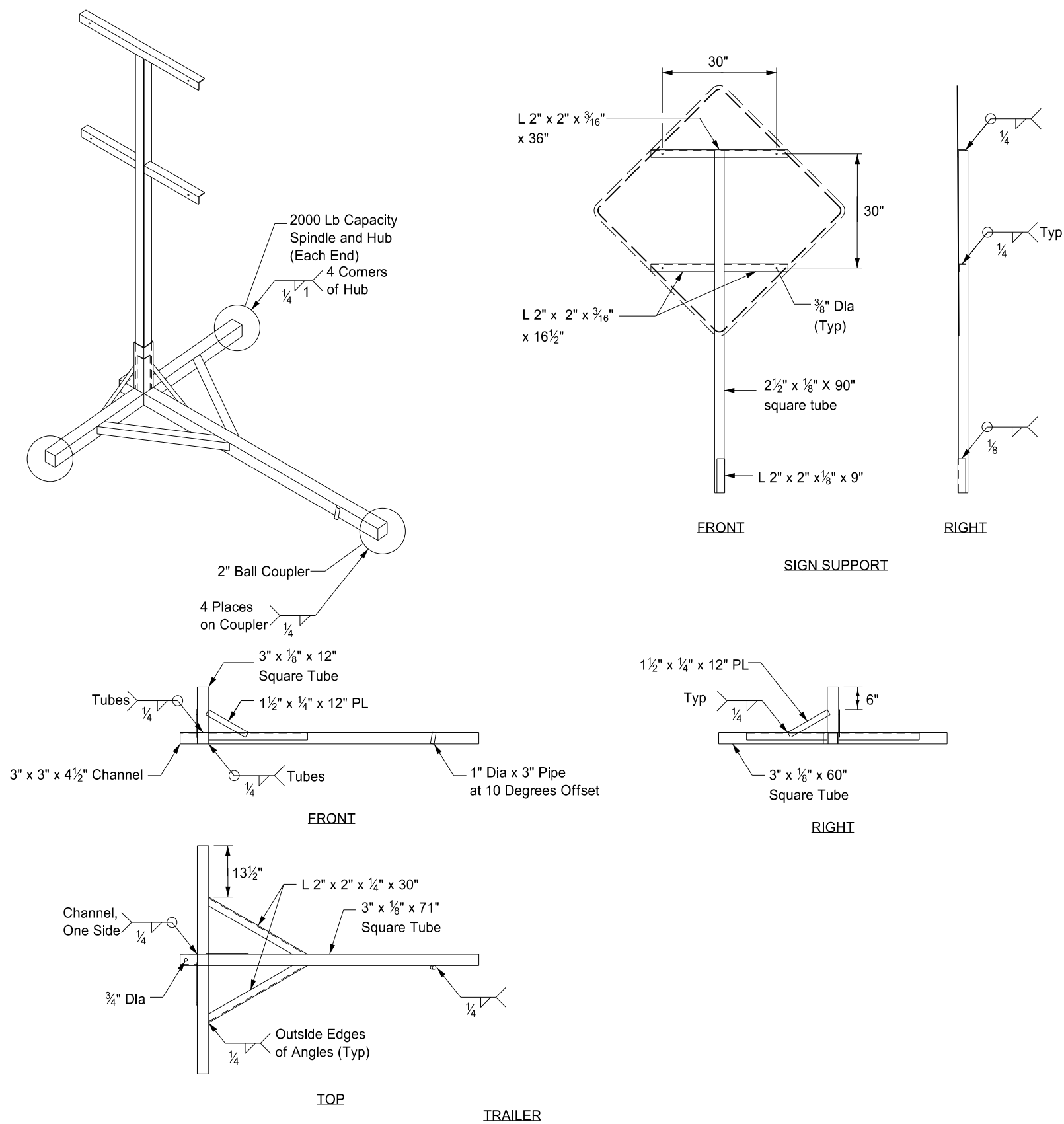
SANDBAG PROTECTION
(ON SLOPE)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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.
08-27-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 8-27-19 and the original document is stored at the
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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

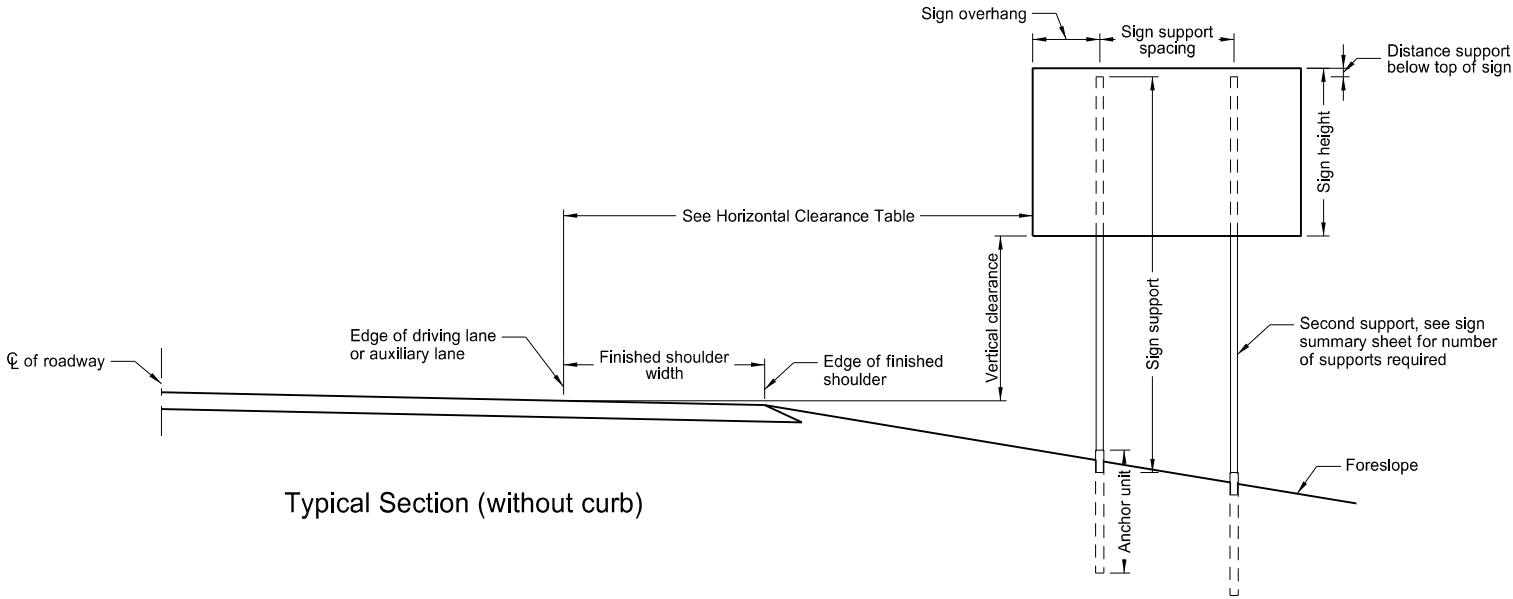
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

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

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

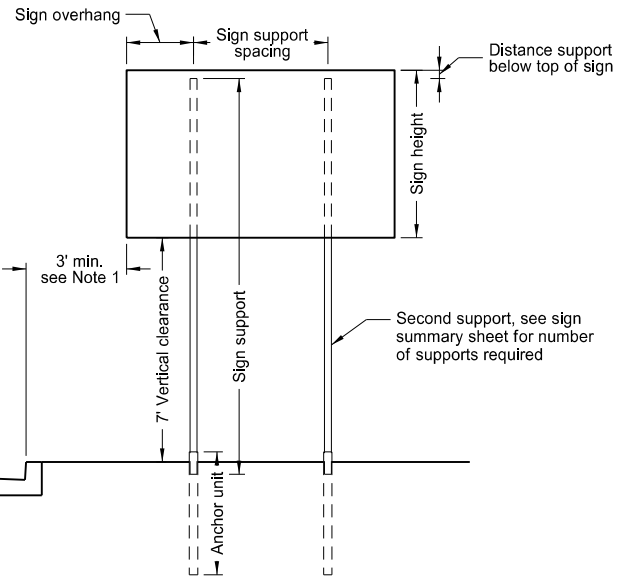
Notes:

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

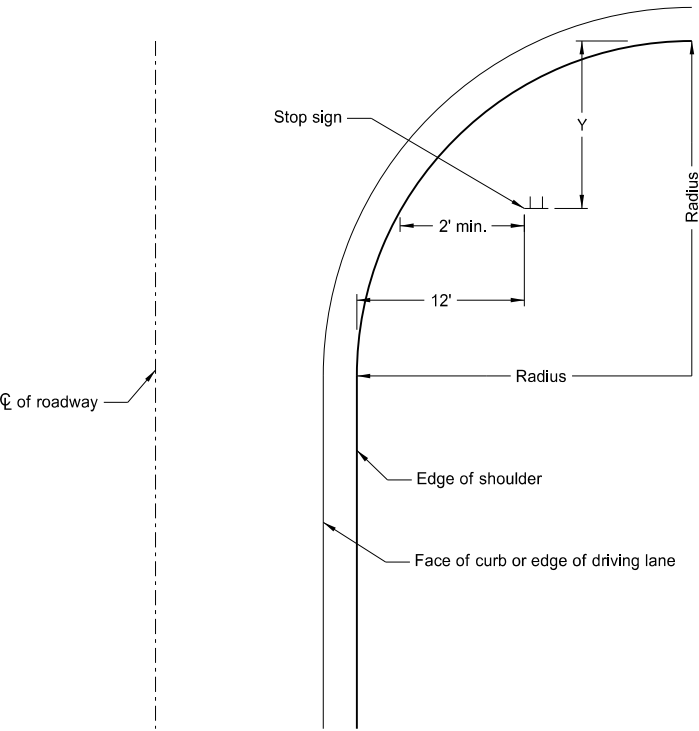


Typical Section (without curb)

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

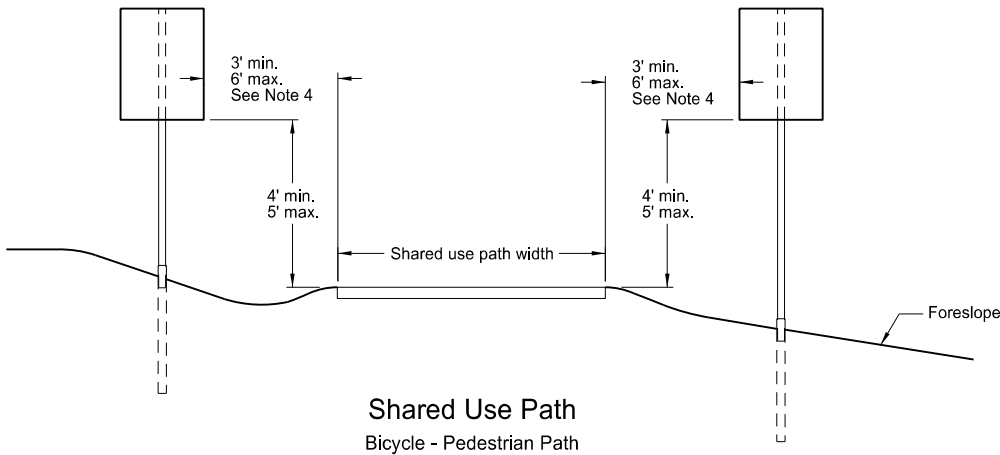


Typical Section (with curb)
Residential or Business District



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

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



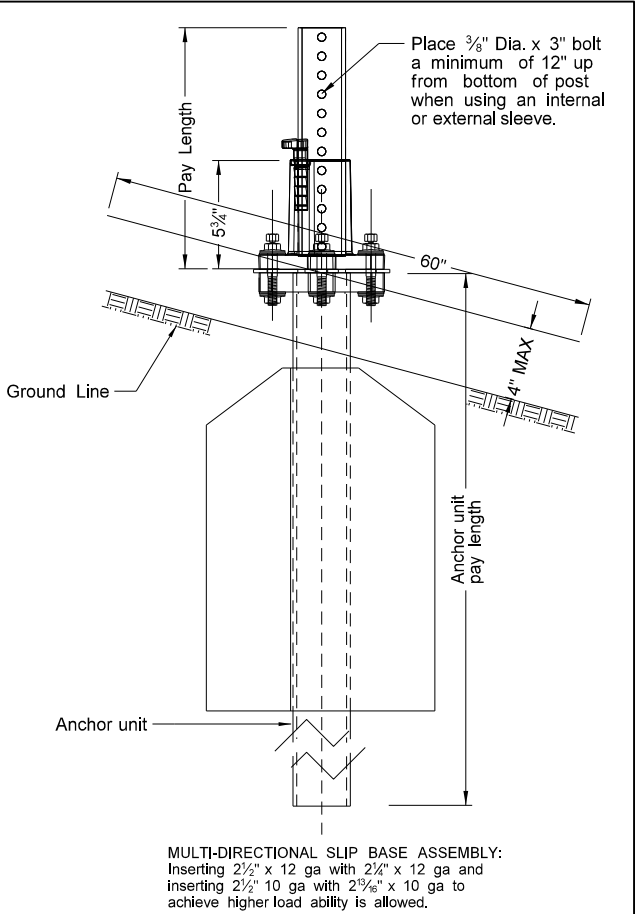
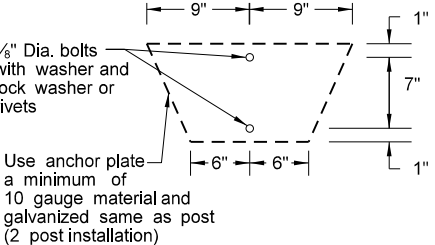
Shared Use Path
Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on **8/29/19** and the original document is stored at the
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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.	Anchor Wall Thick-ness Gauge
1	2	12			No	2 1/2	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

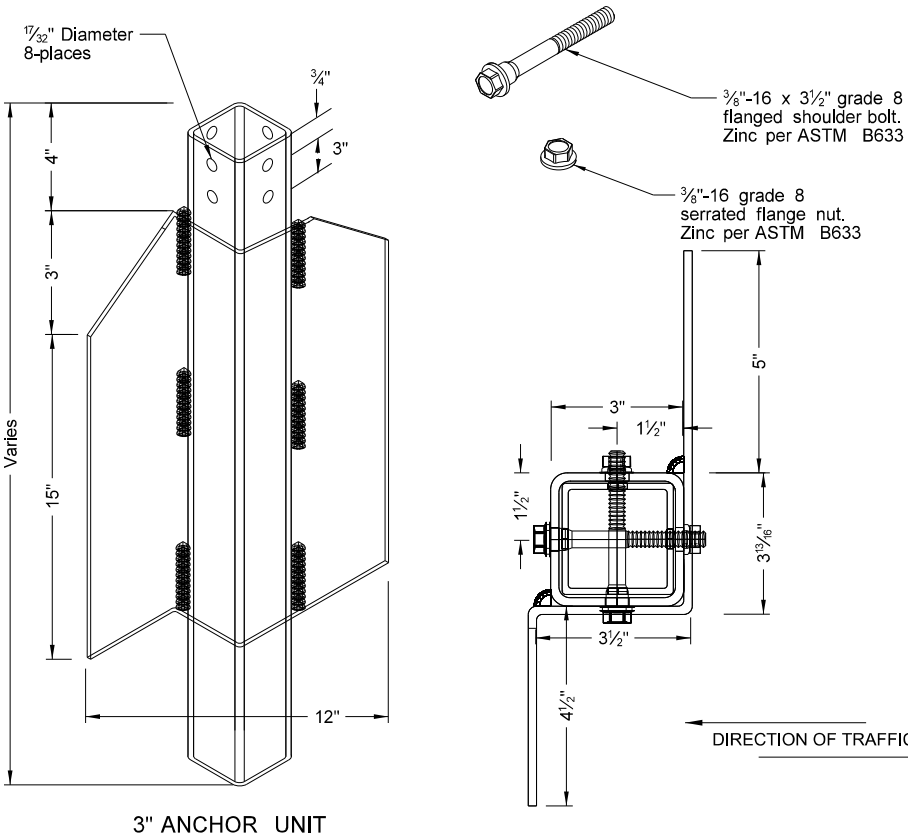
(B) - Provide a shim as specified by the manufacturer when placing 2 1/2", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil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



MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
Inserting 2 1/2" x 12 ga with 2 1/4" x 12 ga and inserting 2 1/2" 10 ga with 2 3/16" x 10 ga to achieve higher load ability is allowed.

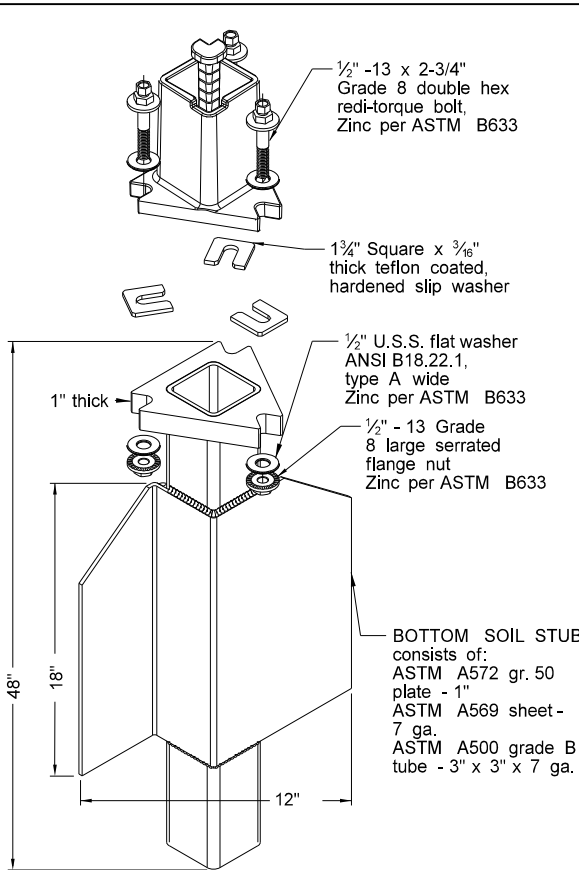
SHOULDER BOLT

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

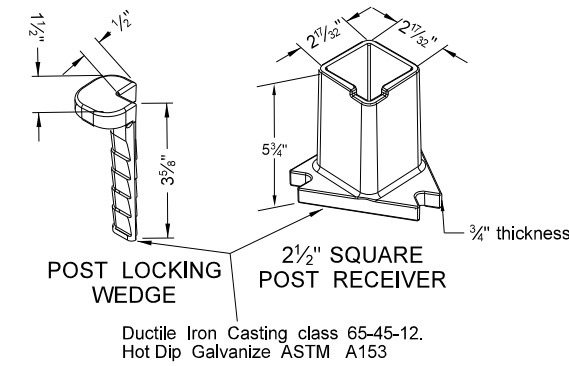


3" ANCHOR UNIT

Mounting Details Perforated Tube

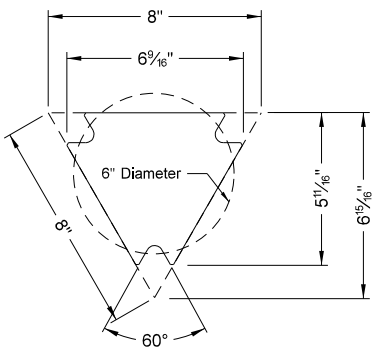


SLIP BASE FOR 2 1/2" POST



POST LOCKING WEDGE

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



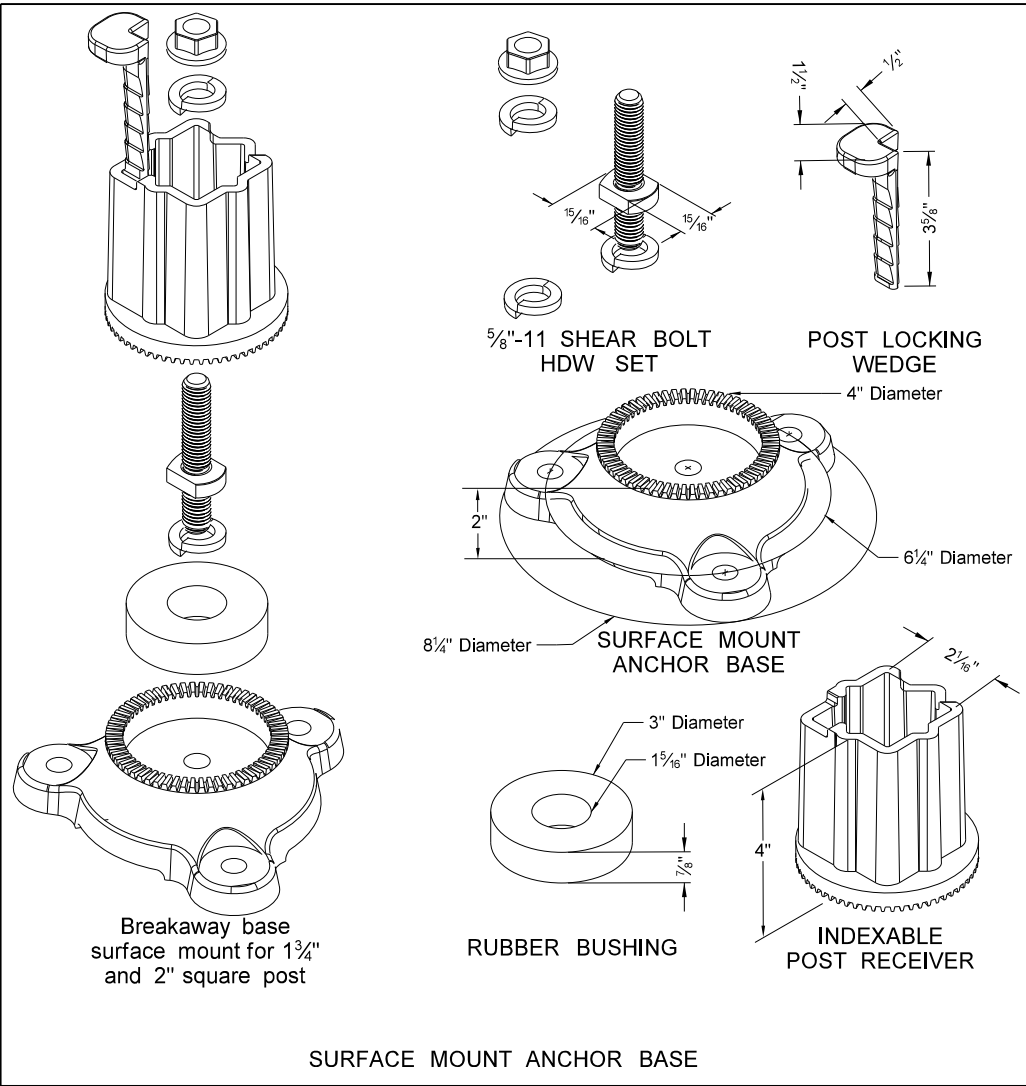
SLIP BASE DETAIL

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

NOTE:

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



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683
on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

Breakaway Coupler System
for Perforated Tubes

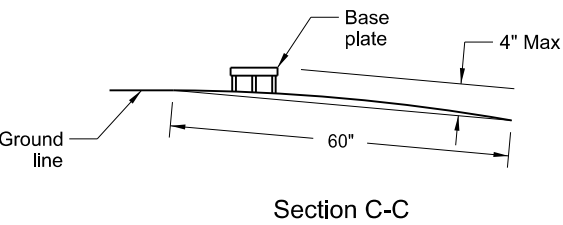
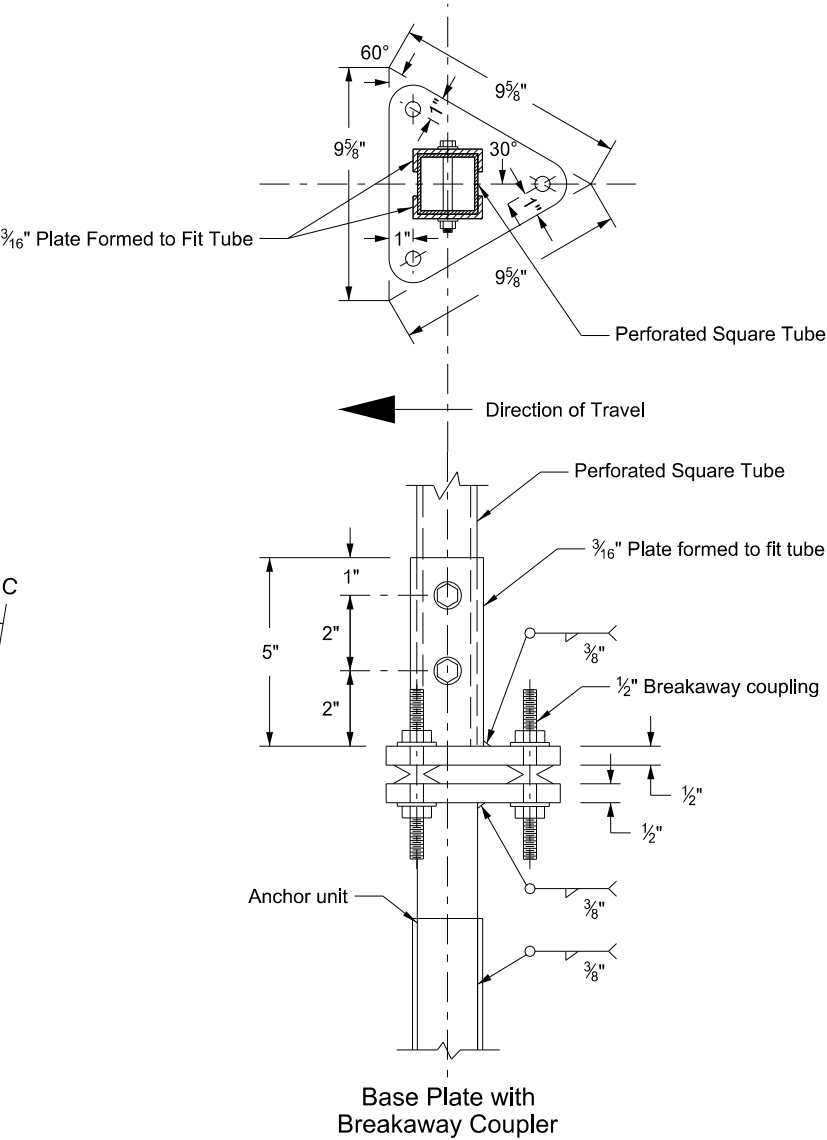
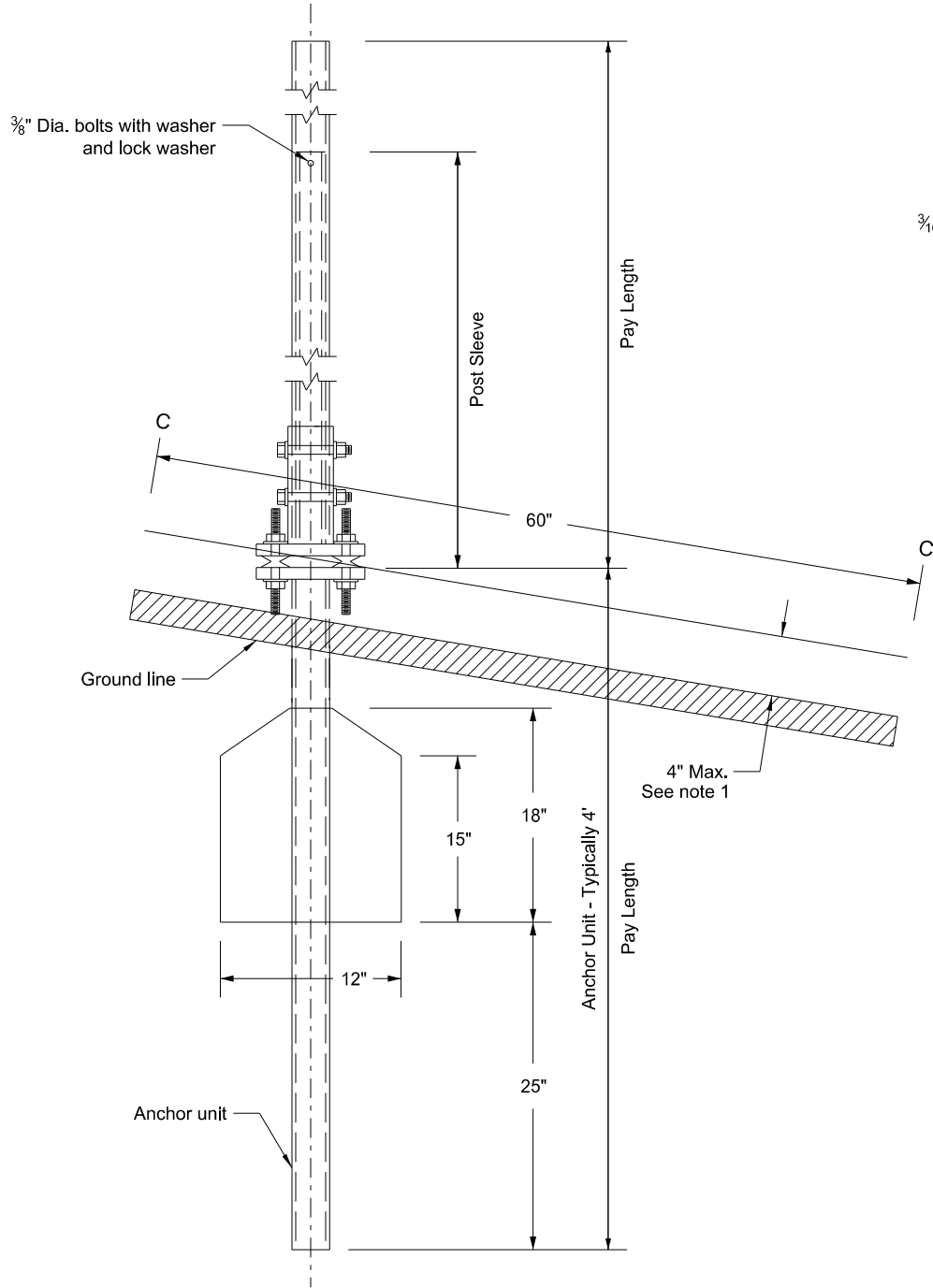
Notes:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Use anchor unit of the same size and specification as the post.
3. Provide a minimum 8' distance between the first and fourth post on four post signs.
4. Use the breakaway base system on standard D-754-24 or the breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

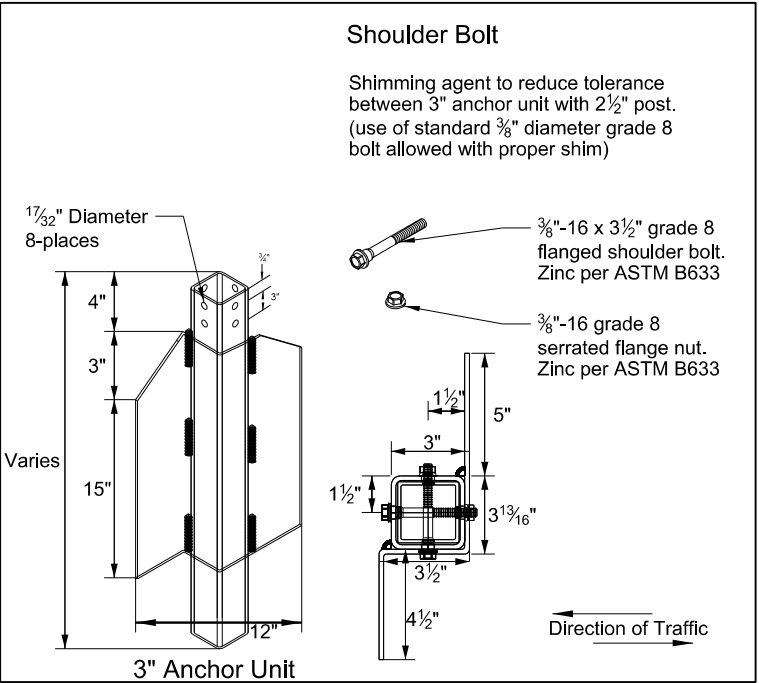
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	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) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

(C) - 3" anchor unit

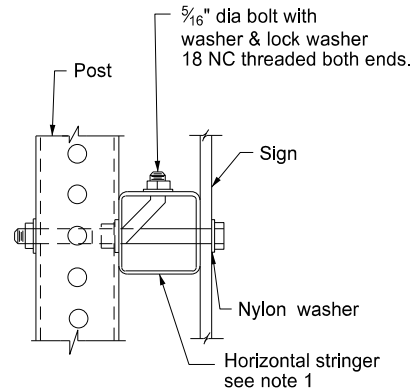


Max protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.

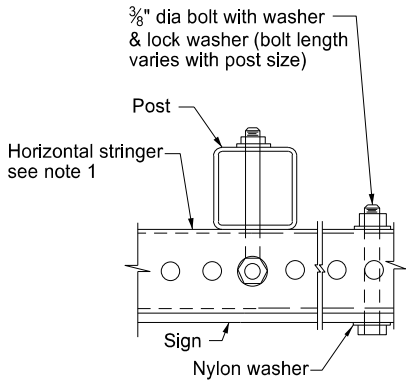


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation
10-3-2013		
REVISIONS		
DATE	CHANGE	
8-30-18 8-30-19	Updated notes to active voice. New Design Engr PE Stamp.	

Mounting Details Perforated Tube

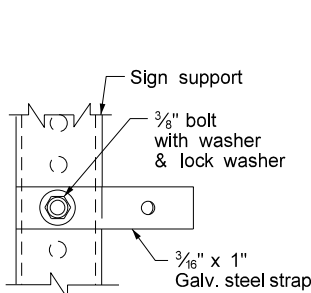


Side View

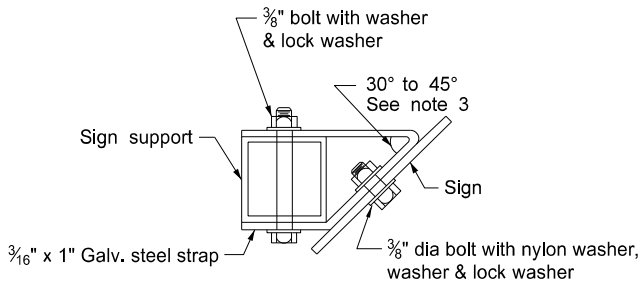


Top View

STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

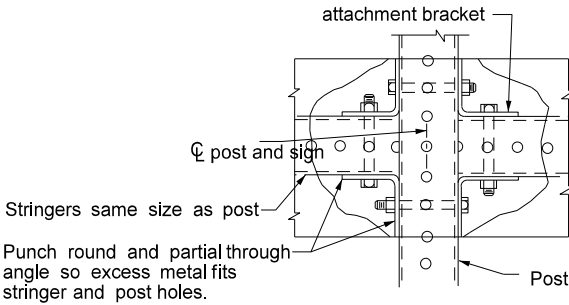


Side View

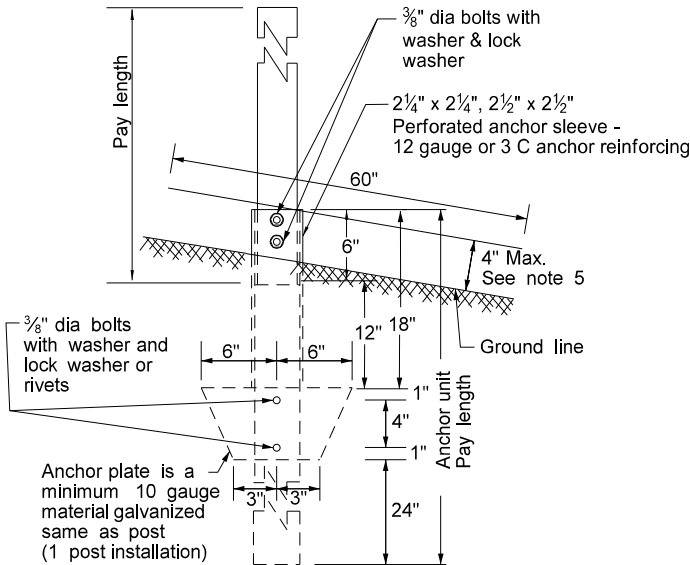


Top View

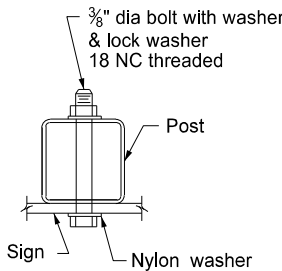
STRAP DETAIL



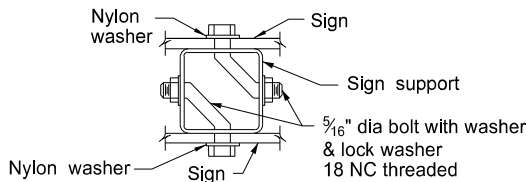
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING



ANCHOR UNIT AND POST ASSEMBLY



BOLT MOUNTING



Top View

BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - Use perforated tubes or 1 3/4" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 1 5/16" ± 1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.

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

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

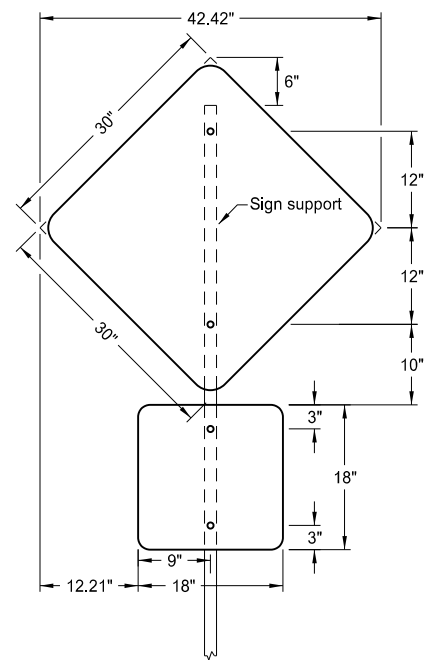
Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. area In. ²	Section Modulus In. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12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

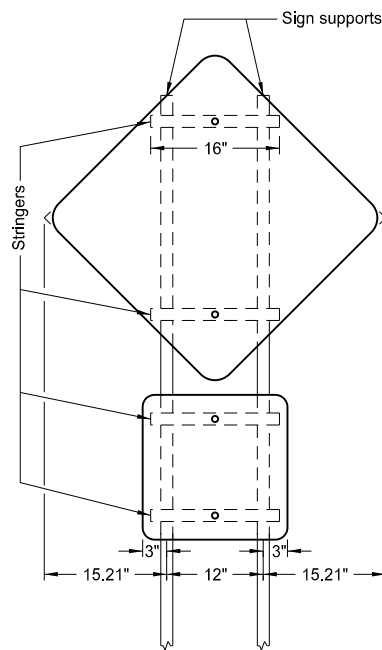
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 , on 8/30/19 and the original document is stored at the North Dakota Department of Transportation
8-6-09		
REVISIONS		
DATE	CHANGE	
7-8-14 8-30-18 8-30-19	Revised Note 3. Updated notes to active voice. New Design Engr PE Stamp.	

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

D-754-37

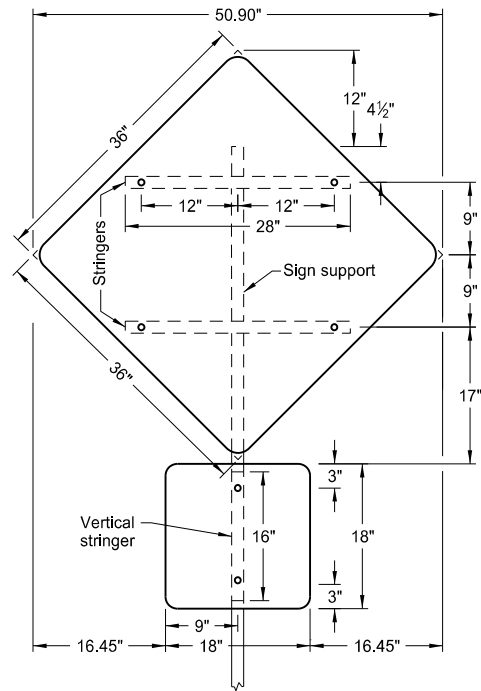


1 Post

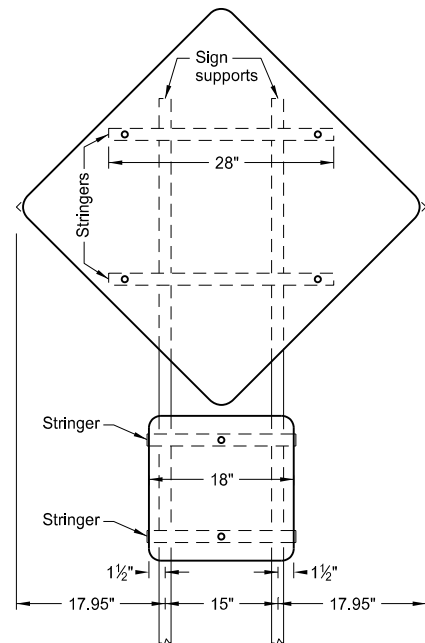


2 Posts

ASSEMBLY NO. 53

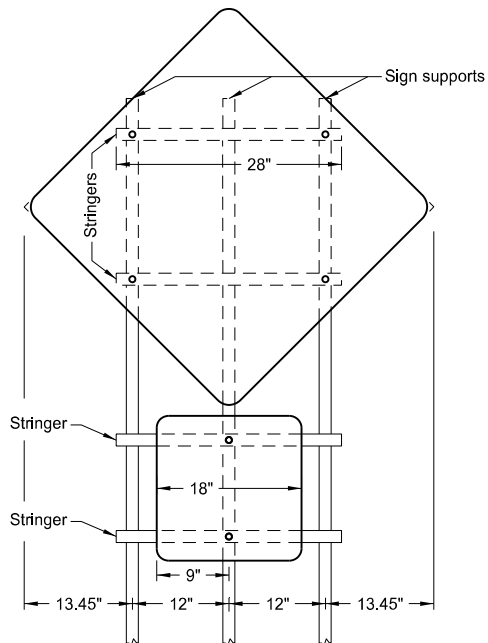


1 Post

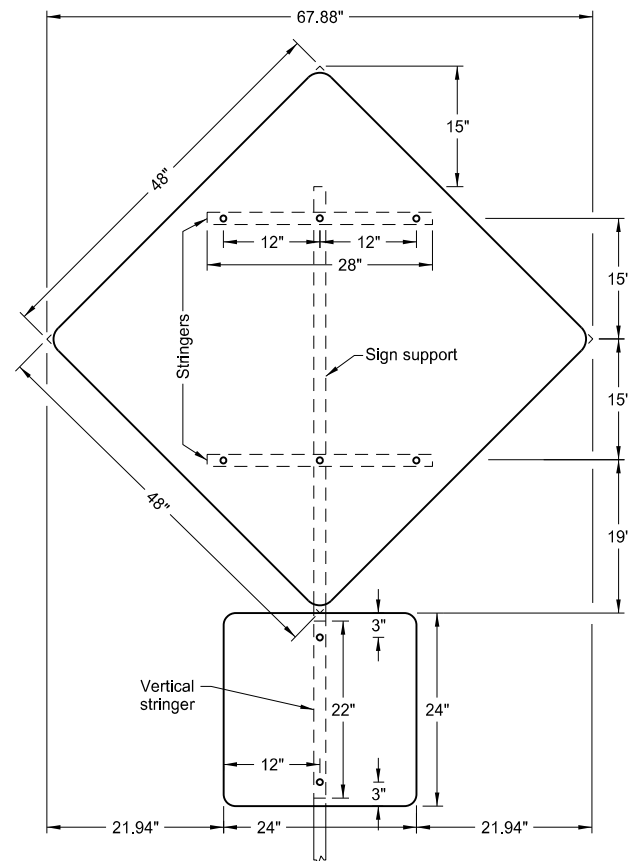


2 Posts

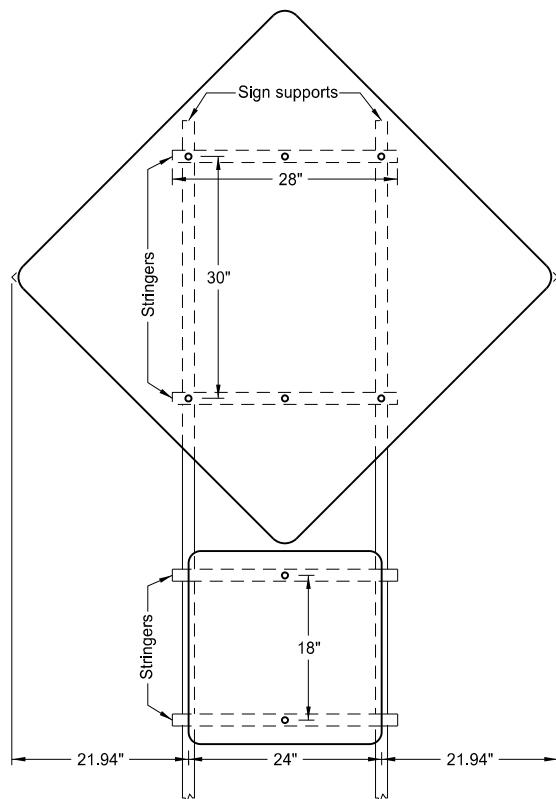
ASSEMBLY NO. 54



3 Posts

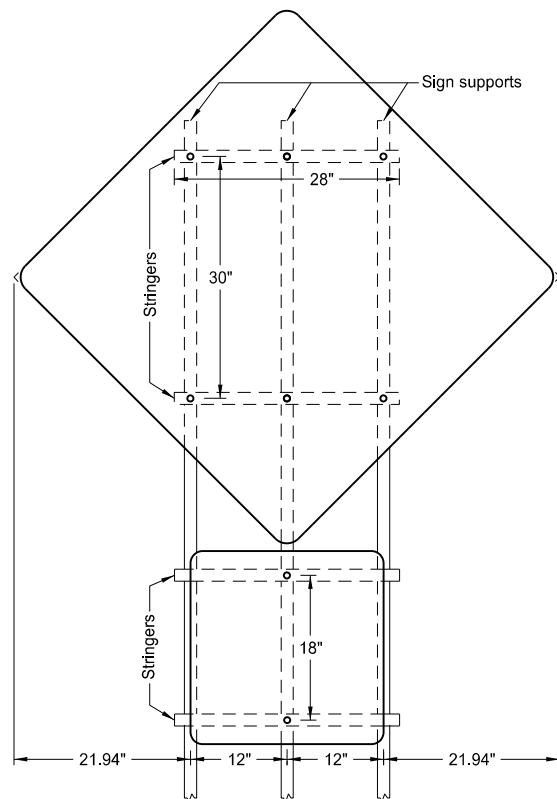


1 Post



2 Posts

ASSEMBLY NO. 55



3 Posts

- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1½"x1½" perforated square tube stringers.
 3. Punch holes round for ⅜" bolt.

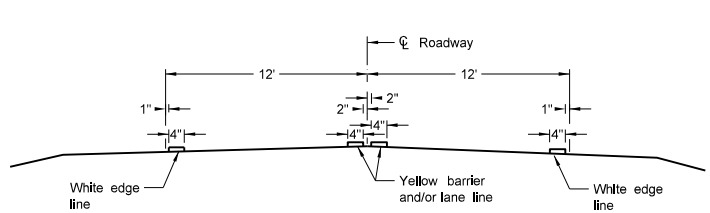
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated to active voice & added Assembly 53, 54, & 55 dimension.
8-30-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on 8/30/19 and the original document is stored at the
North Dakota Department
of Transportation

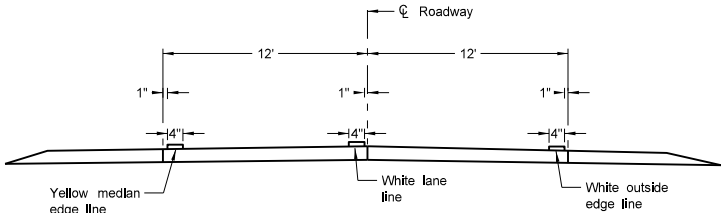
PAVEMENT MARKING

D-762-4

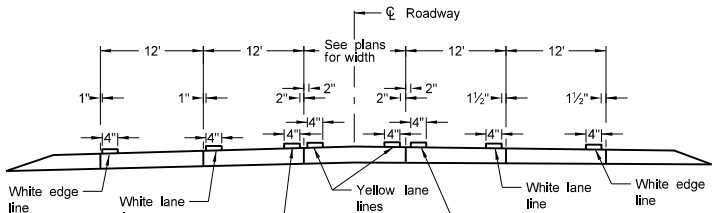
- NOTES:
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.



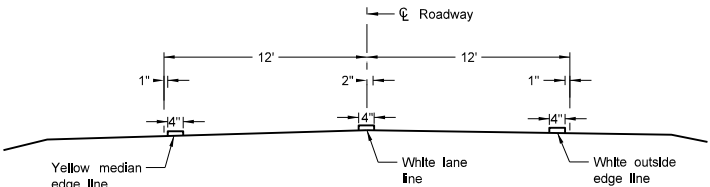
Two Lane Two Way
RURAL ROADWAY



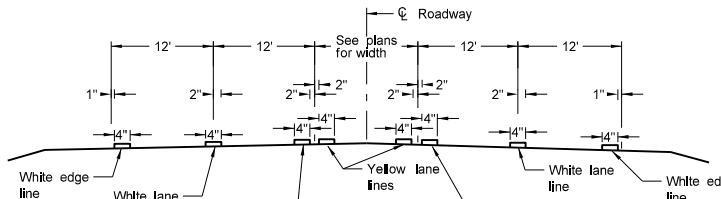
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



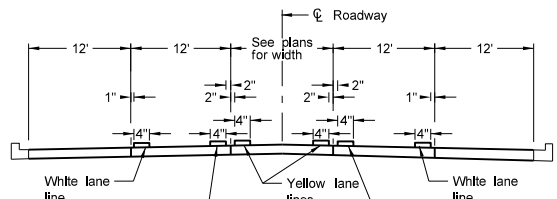
RURAL FIVE LANE ROADWAY
Concrete Section



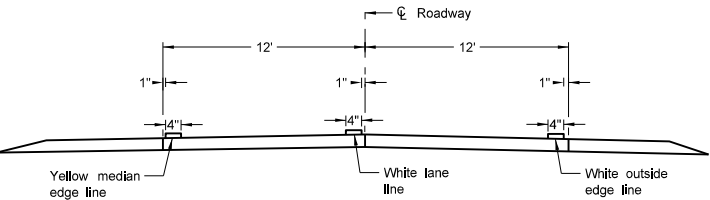
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



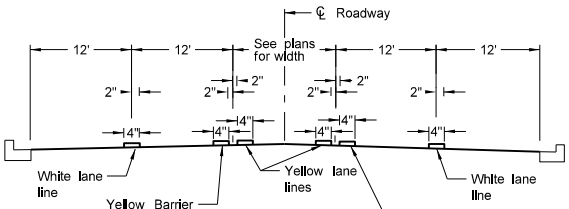
RURAL FIVE LANE ROADWAY
Asphalt Section



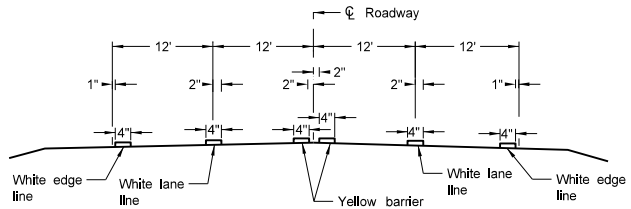
URBAN FIVE LANE SECTION
Concrete Section



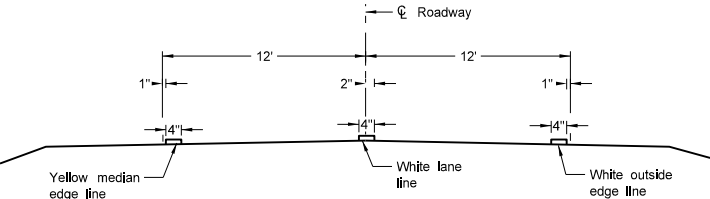
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



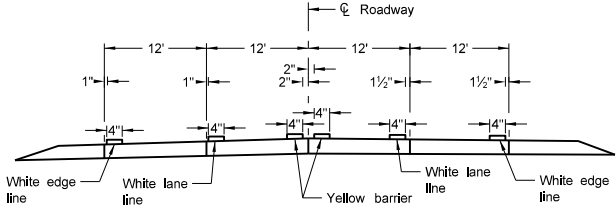
URBAN FIVE LANE SECTION
Asphalt Section



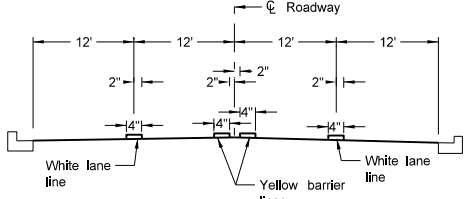
RURAL FOUR LANE ROADWAY
Asphalt Section



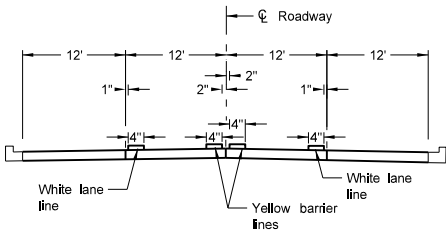
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



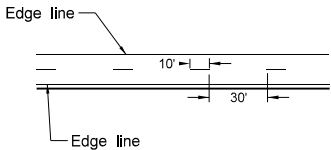
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



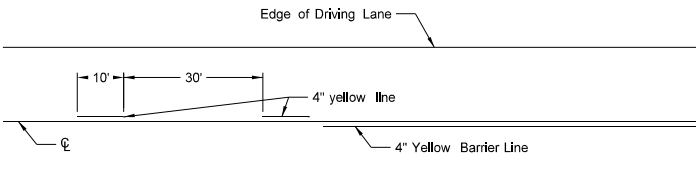
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17 08-27-19	Updated to active voice. New Design Engineer PE Stamp.

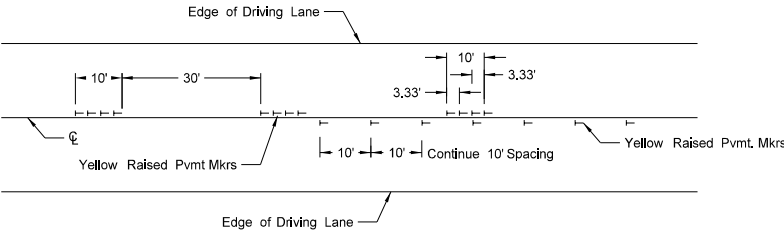
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Kirk J Hoff,
Registration Number
PE-4683,
on 8/27/19 and the original document is stored at the
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of Transportation

SHORT-TERM PAVEMENT MARKING

D-762-11

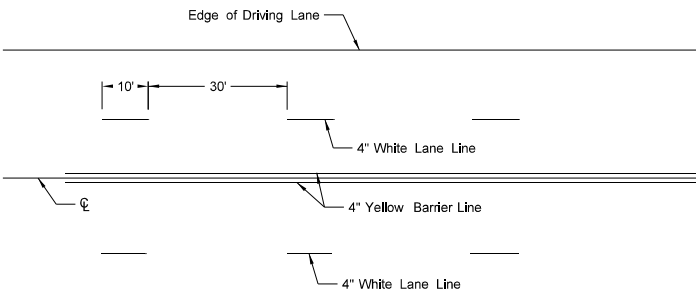


Painted or Tape Lines

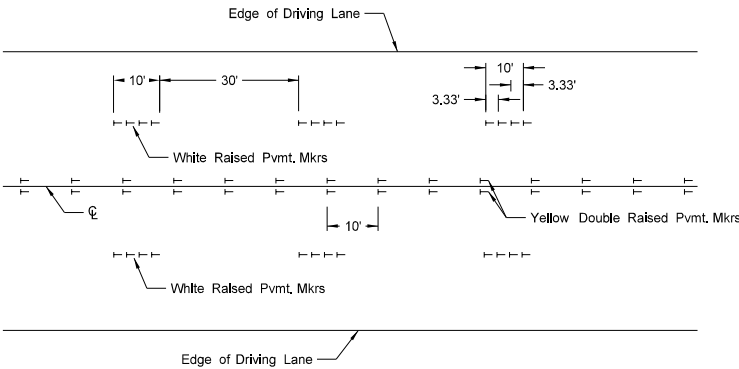


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

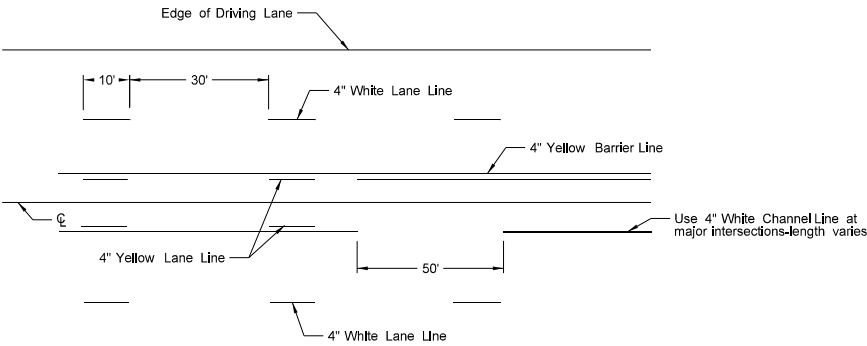


Painted or Tape Lines

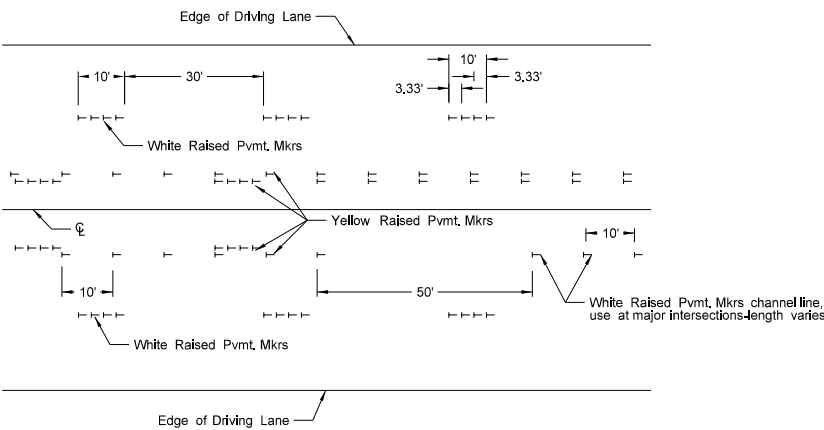


Raised Pavement Markers

FOUR LANE ROADWAY

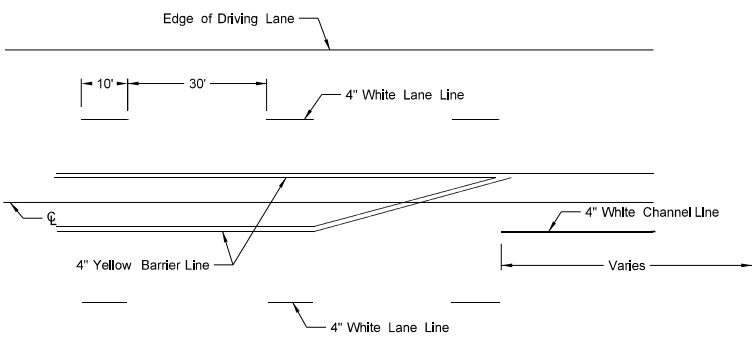


Painted or Tape Lines

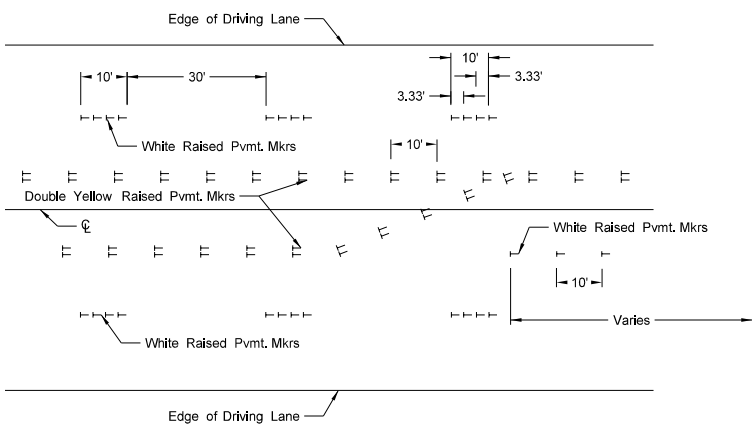


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



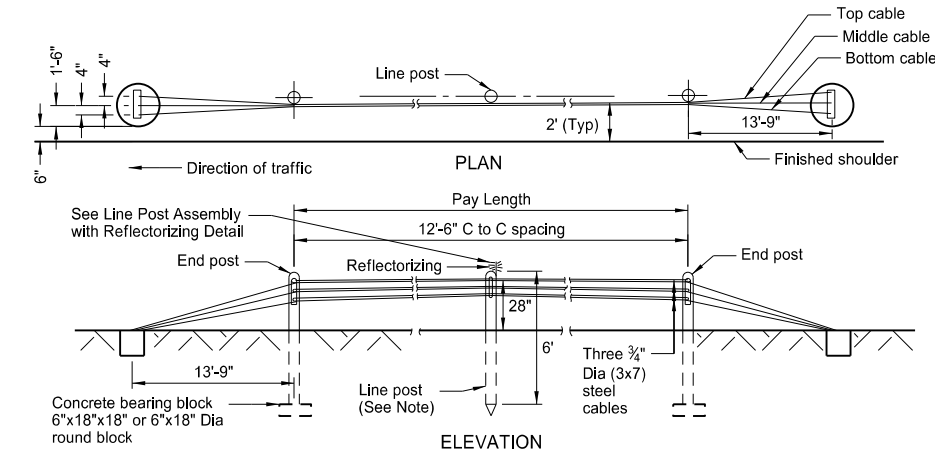
Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

- NOTES:
1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
 2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
 3. Remove raised markers and tape markings after permanent pavement marking is installed.

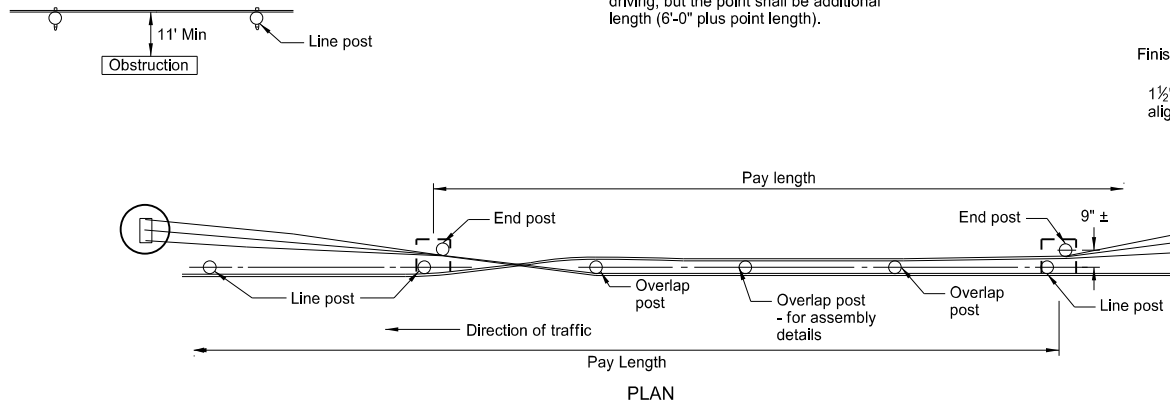
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.
8-27-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE- 4683,
on **8/27/19** and the original document is stored at the North Dakota Department of Transportation

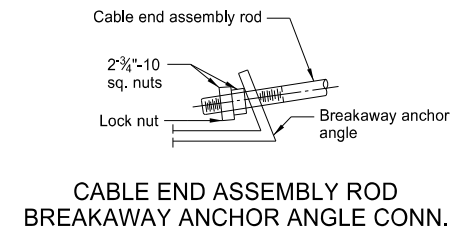


ASSEMBLY WITH END ANCHORAGES

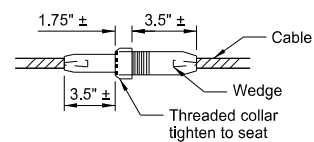
Note: Line post may be pointed to facilitate driving, but the point shall be additional length (6'-0" plus point length).



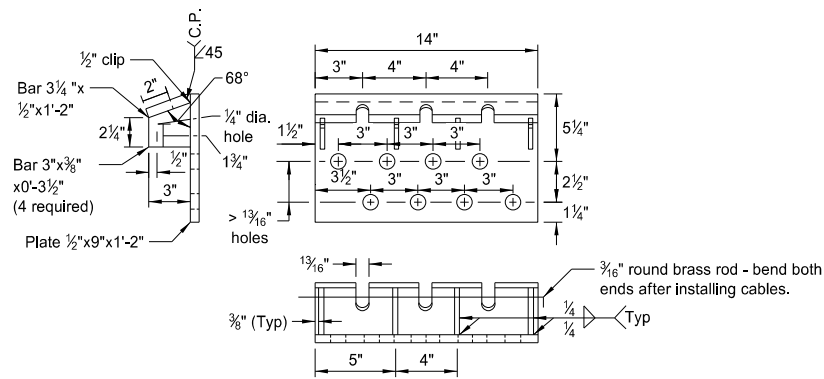
ASSEMBLY WITH INTERMEDIATE ANCHORAGES



CABLE END ASSEMBLY ROD BREAKAWAY ANCHOR ANGLE CONN.

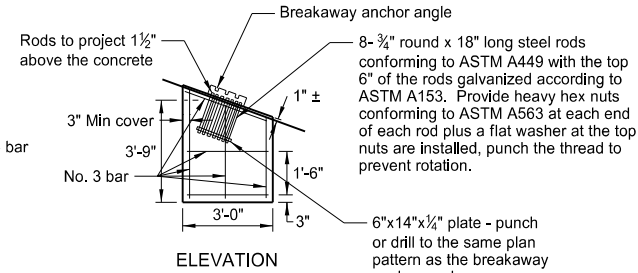


CABLE SPLICE ASSEMBLY



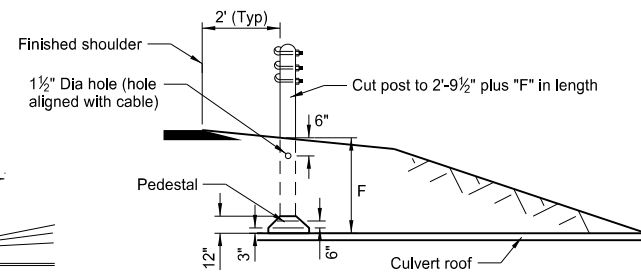
BREAKAWAY ANCHOR ANGLE

THREE CABLE GUARDRAIL



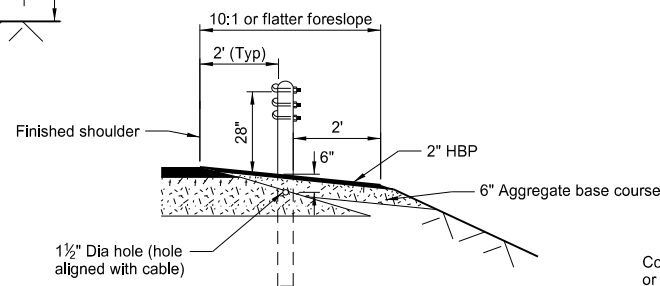
Foundation shall be class AE concrete and cast in place. The foundation shall be formed 6 inches into the ground and the top surface rubbed finished with the edges chamfered.

CONCRETE ANCHOR

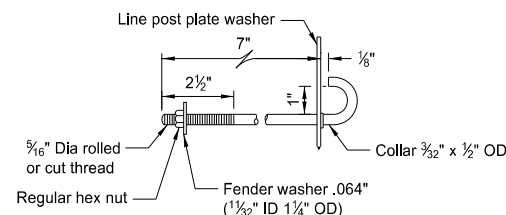


CONCRETE PEDESTAL AT CULVERTS (WHERE REQUIRED)

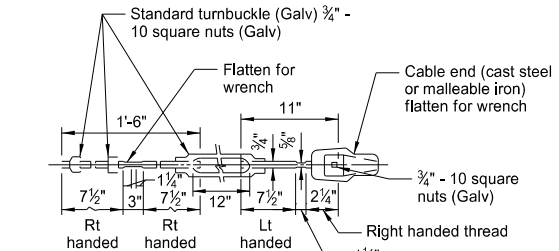
Detail of concrete pedestal for posts to be used over culverts or footings when dimension "F" is less than 3'-8".



TYPICAL SECTION

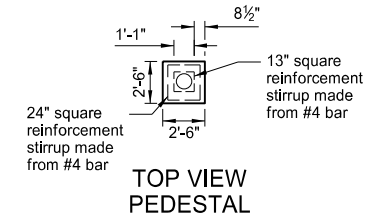


HOOK BOLT

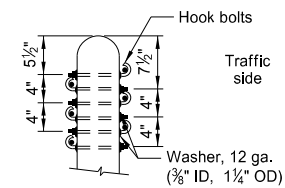


STEEL TURNBUCKLE CABLE END ASSEMBLY

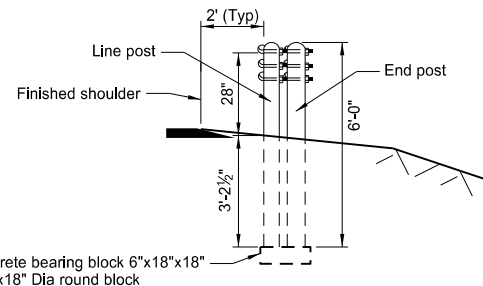
Minimum tensile strength - 25,000 lbs.



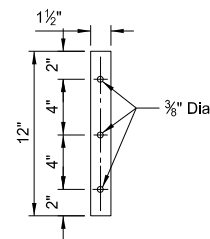
TOP VIEW PEDESTAL



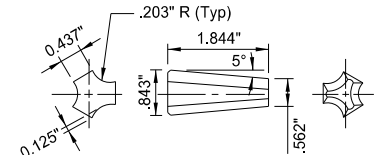
OVERLAP POST ASSEMBLY



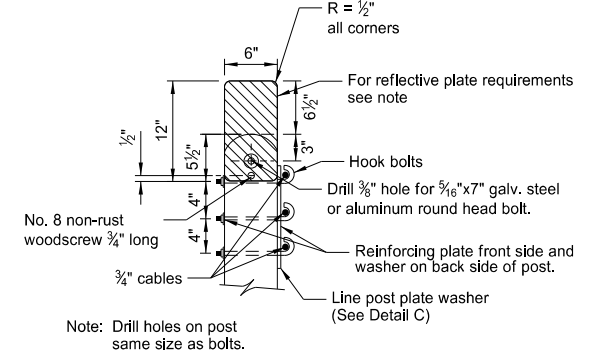
END VIEW



LINE POST PLATE WASHER
1/8" x 1 1/2" x 12"
DETAIL C



WEDGE DETAIL



LINE POST ASSEMBLY WITH REFLECTORIZING DETAIL

Notes: ReflectORIZED Plates: Reflector plates shall be on first and last posts. Spacing in - between at 25' centers on guardrail less than 250' in length and at 50' centers for guardrail over 250' in length. The reflector shall be the same color as the pavement marking adjacent to that reflector unless noted otherwise on the plans.

Intermediate anchors shall be equally spaced at intervals not to exceed 1000 ft. on tangents and the outside of horizontal curves. Do not use cable guardrail on the inside of curves sharper than 4°. On the inside of curves 4° or flatter, intermediate anchors shall be spaced at intervals not to exceed:

DEGREE OF CURVE (C MEASUREMENT)	DISTANCE BETWEEN INTERMEDIATE ANCHORS
4°	150 ft.
3°	175 ft.
2°	215 ft.
1°	300 ft.
30 minutes	430 ft.
15 minutes	600 ft.

For intermediate curves, interpolate between values listed above.

The pay length shall be from end post to end post. The end posts, hardware, and blocks for the intermediate anchorage assembly shall be included in the price bid for "3-cable guardrail".

Wood posts shall be furnished and installed.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by
Roger Weigel,
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of Transportation