

NDDOT ABBREVIATIONS

D-101-1

?	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.	C Gdrl	cable guardrail	Culv	culvert	FOS	factor of safety
		Calc	calculate	C&G	curb & gutter	Fed	Federal
		CIP	cast iron pipe	CI	curb inlet	FP	feed point
		CB	catch basin	CR	curb ramp	Fn	fence
		CRS	cationic rapid setting	C	cut	Fn P	fence post
Abn	abandoned	C Gd	cattle guard	Dd Ld	dead load	FO	fiber optic
Abut	abutment	C To C	center to center	Defl	deflection	FD	field drive
Adj	adjusted	CL or C	centerline	Defm	deformed	F	fill
Aggr	aggregate	Ch	chain	DInt	delineate	FAA	fine aggregate angularity
Ahd	ahead	Chnlk	chain-link	Dlntr	delineator	FH	fire hydrant
ARV	air release valve	Ch Blk	channel block	Depr	depression	Fl	flange
Align	alignment	Ch Ch	channel change	Desc	description	Flrd	flared
Al	alley	Chk	check	Det	detail	FES	flared end section
Alt	alternate	Chsld	chiseled	DWP	detectable warning panel	F Bcn	flashing beacon
Alum	aluminum	Cir	circle	Dtr	detour	FA	flight auger sample
ADA	Americans with Disabilities Act	Cl	class	Dia or ø	diameter	FL	flow line
&	and	CInt	clean-out	Dir	direction	Ftg	footing
Appr	approach	Clr	clear	Dist	distance	FM	force main
Approx	approximate	Cl&gr	clearing & grubbing	DM	disturbed material	Fnd	found
ACP	asbestos cement pipe	Comb.	combination	DB	ditch block	Fdn	foundation
Asph	asphalt	Coml	commercial	DG	ditch grade	Frac	fractional
AC	asphalt cement	Compr	compression	Dbl	double	Frwy	freeway
Assmd	assumed	CADD	computer aided drafting & design	Dn	down	Fr	front
@	at	Conc	concrete	Dwg	drawing	FF	front face
Atten	attenuation	CECB	concrete erosion control blanket	Dr	drive	F Disp	fuel dispenser
ATR	automatic traffic recorder	Cond	conductor	Drwy	driveway	FFP	fuel filler pipes
Ave	Avenue	Const	construction	DI	drop inlet	FLS	fuel leak sensor
Avg	average	Cont	continuous	D	dry density	Furn	furnish/ed
ADT	average daily traffic	CSB	continuous split barrel sample				
		Contr	contraction				
		Contr	contractor				
Bk	back	CP	control point	Ea	each		
BF	back face	Coord	coordinate	Esmt	easement		
Balc	balcony	Cor	corner	E	East		
B Wire	barbed wire	Corr	corrected	EB	Eastbound		
Barr	barricade	CAES	corrugated aluminum end section	Elast	elastomeric		
Btry	battery	CAP	corrugated aluminum pipe	EL	electric locker		
BI	beehive inlet	CMES	corrugated metal end section	E Mtr	electric meter		
Beg	begin	CMP	corrugated metal pipe	EVSE	electric vehicle supply equipment		
BG	below grade	CPVCP	corrugated poly-vinyl chloride pipe	Elec	electric/al		
BM	bench mark	CSES	corrugated steel end section	EDM	electronic distance meter		
Bkwy	bikeway	CSFES	corrugated steel flared end section	Elev or El	elevation		
Bit	bituminous	CSP	corrugated steel pipe	Ellipt	elliptical		
Blk	block	CSTES	corrugated steel traversable end section	Emb	embankment		
BH	bore hole	Co	County	Emuls	emulsion/emulsified		
Bot	bottom	Crse	course	ES	end section		
Blvd	Boulevard	Ct	Court	Engr	engineer		
Bndry	boundary	Xarm	cross arm	ESS	environmental sensor station		
Brkwy	breakaway	Xbuck	cross buck	Eq	equal		
Br	bridge	Xsec	cross sections	Evgr	evergreen		
Bldg	building	Xing	crossing	Exc	excavation		
Bus.	business	Xrd	crossroad	Exst	existing		
BV	butterfly valve	Crn	crown	Exp	expansion		
Byp	bypass			Expy	Expressway		
				E	external of curve		
				Extru	extruded		

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NDDOT ABBREVIATIONS

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Galv	galvanized	Ln	lane	Obsc	obscure(d)	Qty	quantity
Gar	garage	Lg	large	Ocpd	occupied	Qtr	quarter
Gs L	gas line	Lat	latitude	Ocpy	occupy		
G Reg	gas line regulator	Lt	left	O/s	offset		
GMV	gas main valve	Lens	lenses	OC	on center	Rad or R	radius
G Mtr	gas meter	Lvl	level	C	one dimensional consolidation	RR	railroad
GSV	gas service valve	Lvng	leveling	OC	organic content	Rlw	railway
GVP	gas vent pipe	Lht	light	Orig	original	Rsd	raised
GV	gate valve	LP	light pole	O To O	out to out	RC	rapid curing
Ga	gauge	Ltg	lighting	OD	outside diameter	Rec	record
Gov	government	Liq	liquid	OH	overhead	Rcy	recycle
Grd	graded/grade	LL	liquid limit			RAP	recycled asphalt pavement
Grnd	ground	Loc	location	PMT	pad mounted transformer	RPCC	recycled portland cement concrete
GWM	ground water monitor	Long.	longitude	Pg	pages	Ref	reference
Gdrl	guardrail	Lp	loop	Pntd	painted	R Mkr	reference marker
Gtr	gutter	LD	loop detector	Pr	pair	RM	reference monument
		Lum	luminaire	Pnl	panel	RP	reference point
				Pk	park	Refl	reflectorized
H Plg	H piling			PSD	passing sight distance	RCB	reinforced concrete box
Hdwl	headwall	Mb	mailbox	Pvmt	pavement	RCES	reinforced concrete end section
Ht	height	ML	main line	Ped	pedestal	RCFES	reinforced concrete flared end section
Hel	helical	MH	manhole	Ped	pedestrian	RCP	reinforced concrete pipe
HDPE	high density polyethylene	Mkd	marked	PPP	pedestrian pushbutton post	RCPS	reinforced concrete pipe sewer
HM	high mast	Mkr	marker	Pen.	penetration	RCTES	reinforced concrete traversable end section
HP	high pressure	Mkg	marking	Perf	perforated	Reinf	reinforcement
HPS	high pressure sodium	MA	mast arm	Per.	perimeter	Res	reservation
HTCG	high tension cable guardrail	Matl	material	Perm	permanent	Res	residence
Hwy	highway	Max	maximum	PL	pipeline	Ret	retaining
Hor	horizontal			PI	place	Rev	reverse
HBP	hot bituminous pavement	Meas	measure	P&P	plan & profile	Rt	right
HMA	hot mix asphalt	Mdn	median	PL	plastic limit	R/W	right of way
Hyd	hydrant	MD	median drain	PI or P	plate	Riv	river
Ph	hydrogen ion content	MC	medium curing	Pt	point	Rd	road
		MGS	Midwest Guardrail System	PE	polyethylene	Rdbo	road bed
		MM	mile marker	PVC	polyvinyl chloride	Rdw	roadway
Id	identification	MP	mile post	PCC	Portland Cement concrete	RWIS	roadway weather information system
Incl	inclinometer tube	Min	minimum	PP	power pole	Rk	rock
IMH	inlet manhole	Misc	miscellaneous	Preempt	preemption	Rt	route
ID	inside diameter	Mon	monument	Prefab	prefabricated		
Inst	instrument	Mnd	mound	Prfmd or Pref	preformed		
Intchg	interchange	Mtbl	mountable	Prep	preperation		
Intmdt	intermediate	Mtd	mounted	Press.	pressure		
Intscn	intersection	Mtg	mounting	PRV	pressure relief valve		
Inv	invert	Mk	muck	Prestr	prestressed		
IP	iron pipe			Pvt	private		
				PD	private drive		
Jt	joint			Prod.	production/produce		
Jct	junction	Neop	neoprene	Prog	programmed	07-01-14	
		Ntwk	network	Prop.	property	REVISIONS	
		N	North	Ppsd	proposed	DATE	CHANGE
		NE	Northeast	PB	pull box	08-03-15	General Revisions
		NW	Northwest			04-23-18	General Revisions
		NB	Northbound			12-18-20	General Revisions
		No. or #	number			08-16-22	General Revisions
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Salv	salvage(d)	Tel	telephone
San	sanitary sewer line	Tel B	Telephone Booth
Sec	section	Tel P	telephone pole
SL	section line	Tv	television
Sep	separation	Temp	temperature
Seq	sequence	Temp	temporary
Serv	service	TBM	temporary bench mark
Sht	sheet	T	thinwall tube sample
Shtng	sheeting	Ts	topsoil
Shldr	shoulder	Traf	traffic
Sw or Sdwk	sidewalk	TSCB	traffic signal control box
SD	sight distance	Tr	trail
SN	sign number	Transf	transformer
Sig	signal	Trans	transition
Sgl	single	TT	transmission tower
SRCP	slotted reinforced concrete pipe	TES	traversable end section
SC	slow curing	Trans	transverse
SS	slow setting	Trtd	treated
Sm	small	Trmt	treatment
S	South	Qc	triaxial compression
SE	Southeast	TERO	tribal employment rights ordinance
SW	Southwest	Tpl	triple
SB	Southbound	Typ	typical
Sp	spaces		
Spcl	special		
SA	special assembly	Qu	unconfined compressive strength
SP	special provisions	Ugrnd	underground
G	specific gravity	Util	utility
Spk	spike		
SB	split barrel sample		
SH	sprinkler head	VG	valley gutter
SV	sprinkler valve	Vap	vapor
Sq	square	Vert	vertical
Stk	stake	VCP	vitrified clay pipe
Std	standard	Vol	volume
N	standard penetration test	VSFS	vehicle speed feedback sign
Std Specs	standard specifications		
Stm L	steam line	Wkwy	walkway
SEC	steel encased concrete	W	water content
SMA	stone matrix asphalt	WGV	water gate valve
SSD	stopping sight distance	WL	water line
SD	storm drain	WM	water main
St	street	WMV	water main valve
SPP	structural plate pipe	W Mtr	water meter
SPPA	structural plate pipe arch	WSV	water service valve
Str	structure	WW	water well
Subd	subdivision	Wrng	wearing
Sub	subgrade	WIM	weigh in motion
Sub Prep	subgrade preperation	W	west
Ss	subsoil	WB	westbound
SS	supplement specification	Wrng	wiring
Supp	supplemental	W/	with
Surf	surfacing	W/o	without
Surv	survey		
Sym	symmetrical		

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NDDOT ABBREVIATIONS

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MEASUREMENTS

ac	acres
A	ampere
Bd Ft	board feet
Cd	candela
cm	centimeter
C	coulomb
CF	cubic feet
m3	cubic meter
m3/s	cubic meters per second
CY	cubic yard
CY/mi	cubic yards per mile
D or Deg	degree
F	Fahrenheit
F	farad
ft	feet/foot
Gal	gallon
G	giga
Ha	hectare
H	henry
Hz	hertz
hr	hour(s)
in.	inch
J	joule
K	kelvin
kN	kilo newton
kPa	kilo pascal
kg	kilogram
kg/m3	kilogram per cubic meter
km	kilometer
K	Kip(s)
LF	linear foot
L	litre
Lm	lumen
L sum	lump sum
Lx	lux
M Hr	man hour
M	mega
m	meter
m/s	meters per second
mi	mile
mL	milliliter
mm	millimeter
mm/hr	millimeters per hour
n	nano
N	newton
Pa	pascal
lb	pounds
sec	seconds
S	siemens
SF	square feet
km2	square kilometer
m2	square meter
SY	square yard
Sta Yd	station yards
SI	Systems International

T	tesla
T/mi	tons per mile
V	volt
W	watt
Wb	weber

SURVEY DESCRIPTIONS

Az	azimuth
Bs	backsight
Brg	bearing
BP Cap	blue plastic cap
BS	both sides
BC	brass cap
CC	closing corner
CS	curve to spiral
Eq	equation
E	external of curve
FS	far side
FB	field book
Fs	foresight
Geod	geodetic
GIS	Geographical Information System
GPS	Global Positioning System
HI	height of instrument
IM	iron monument
I Pn	iron pin
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
L	length of curve
LC	long chord
LB	level book
MC	meander corner
Mer	meridian
M	mid ordinate of curve
NGS	National Geodetic Survey
NS	near side
Obsn	observation
Off Loc	office location
OP Cap	orange plastic cap
PK	Parker-Kalon nail
P Cap	plastic cap
PP Cap	pink plastic cap
PCC	point of compound curve
PC	point of curve
PI	point of intersection
PRC	point of reverse curvature
PT	point of tangent
POC	point on curve
POT	point on tangent
RTP	random traverse point
Rge	range
RP Cap	red plastic cap
SC	spiral to curve
SC	standard corner
ST	spiral to tangent
Sta	station
SE	superelevation
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Twp	township
TB	transit book
TP	traverse point
TP	turning point
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
VC	vertical curve
WC	witness corner
WGS	World Geodetic System
YP Cap	yellow plastic cap
Z	zenith

SOIL TYPES

Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Co S	coal slack
C Gr	coarse gravel
CS	coarse sand
FS	fine sand
Gr	gravel
Lig Co	lignite coal
Lig Sl	lignite slack
Lm	loam
Rk	rock
Sd	sand
Sdy Cl	sandy clay
Sdy Cl Lm	sandy clay loam
Sdy Fl	sandy fill
Sdy Lm	sandy loam
Sc	scoria
Sh	shale
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

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

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LINE STYLES

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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

Cross Sections and Typicals

-----	Existing Ground
-----	Existing Topsoil (Cross Section View)
void — void — void — v	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

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

Erosion Control

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

Geotechnical

-----	Geotextile Fabric Type D
Geo — Geo —	Geogrid
-----	Geotextile Fabric Type R
-----	Geotextile Fabric Type R1
-----	Geotextile Fabric Type RR

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

Environmental

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

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

Contours

Depression Contours

Supplemental Contour

Profile

Subgrade, Subcut or Ditch Grade

Topsoil Profile

Small Hidden Object

Large Hidden Object

Phantom Object

Existing Conditions Object

Centerline Main

Centerline Secondary

Excavation Limits

Proposed Ground

Sheet Piling

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SYMBOLS

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	North Arrow (Half Scale)
	Alignment Data Point
	Alignment Monument
	Spot Elevation
	Existing Miscellaneous Spot
	Existing Access Control Arrow
	Existing Benchmark
	Reset USGS Marker
	Iron Monument Found
	Iron Pin R/W Monument
	Property Corner
	Iron Pin Reference Monument
	Right of Way Marker (Exst, Ppsd, Reset)
	Existing Federal Reference Corner
	Existing Section Corner (Full, Quarter, Sixteenth, Meander)
	Existing Witness Corner
	Existing Control Point (CP, GPS-RTK, TRI)
	Existing Traverse PI Aerial Panel
	Existing Reference Marker Point NGS
	Existing EFB Misc
	Existing Bush or Shrub
	Existing Large Evergreen Tree
	Existing Small Evergreen Tree
	Existing Large Tree
	Existing Small Tree
	Existing Tree Trunk
	Cairn or Stone Circle
	Existing Artifact
	Existing Satellite Dish
	Existing Weather Station
	Existing Windmill or Tower
	Reinforced Pavement
	Continuous Split Barrel Sample
	Flight Auger Sample
	Split Barrel Sample
	Thinwall Tube Sample
	Standard Penetration Test
	Inclinometer Tube
	Excavation Unit
	Existing Ground Water Well Bore Hole

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SYMBOLS

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■	Flexible Delineator	■	Highway Sign (Exst, Ppsd)
□ □	Flexible Delineator Type A (Exst, Ppsd)	□ □	Mile Post Type A (Exst-Ppsd-Reset)
□ □	Flexible Delineator Type B (Exst, Ppsd)	□ □	Mile Post Type B (Exst, Ppsd)
□ □	Flexible Delineator Type C (Exst, Ppsd)	□ □	Mile Post Type C (Exst, Ppsd)
○ ○	Flexible Delineator Type D (Exst, Ppsd)	○ ○	Object Marker Type I (Exst, Ppsd)
○ ○	Flexible Delineator Type E (Exst, Ppsd)	○ ○	Object Marker Type II (Exst, Ppsd)
└ └ └ └	Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)	└ └	Object Marker Type III (Exst, Ppsd)
└ └ └ └	Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)	○	Existing Reference Marker
└ └ └ └	Delineator Type C (Exst, Ppsd, Diamond Grade)	○—○	Road Closure Gate 18 Ft (Exst, Ppsd)
○ ○ ○	Delineator Type D (Exst, Ppsd, Diamond Grade)	○—○	Road Closure Gate 28 Ft (Exst, Ppsd)
○ ○ ○	Delineator Type E (Exst, Ppsd, Diamond Grade)	○—○	Road Closure Gate 40 Ft (Exst, Ppsd)
└ └ └	Barricade (Type I, Type II, Type III)	□	Existing Railroad Battery Box
○ ○ ○	Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)	×	Existing RR Profile Spot
△	Attenuation Device	×	Existing Railroad Crossbuck
☒	Truck Mounted Attenuator	×	Existing Railroad Frog
●	Delineator Drums	—	Existing Mailbox (Private, Federal)
□	Flagger		
←	Tubular Marker		
▲	Traffic Cone		
---	Back to Back Vertical Panel Sign		

NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
NORTH DAKOTA
12 18 2020

SYMBOLS

D-101-32

	Existing Luminaire		High Mast Light Standard 3 Luminaire (Exst, Ppsd)		Existing Traffic Signal Standard
	Luminaire LED		High Mast Light Standard 4 Luminaire (Exst, Ppsd)		Pull Box (Exst-Ppsd-Undefined)
	Existing Light Standard Luminaire		High Mast Light Standard 5 Luminaire (Exst, Ppsd)		Intelligent Transportation Pull Box (Exst, Ppsd)
	Relocate Light Standard		High Mast Light Standard 6 Luminaire (Exst, Ppsd)		Transformer (Exst, Ppsd)
	Light Standard Light LED Luminaire		High Mast Light Standard 7 Luminaire (Exst, Ppsd)		Power Pole (Exst-Ppsd-with Transformer)
	Light Standard 35 Watt High Pressure Sodium Vapor Luminaire		High Mast Light Standard 8 Luminaire (Exst, Ppsd)		Wood Pole (Exst, Ppsd)
	Light Standard 50 Watt High Pressure Sodium Vapor Luminaire		High Mast Light Standard 9 Luminaire (Exst, Ppsd)		Pedestrian Push Button Post (Exst, Ppsd)
	Light Standard 70 Watt High Pressure Sodium Vapor Luminaire		High Mast Light Standard 10 Luminaire (Exst, Ppsd)		Existing Pole
	Light Standard 100 Watt High Pressure Sodium Vapor Luminaire		Overhead Sign Structure Load Center (Exst, Ppsd)		Existing Telephone Pole
	Light Standard 150 Watt High Pressure Sodium Vapor Luminaire		Traffic Signal Controller (Exst, Ppsd)		Existing Post
	Light Standard 200 Watt High Pressure Sodium Vapor Luminaire		Pad Mounted Traffic Signal Controller (Exst, Ppsd)		Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
	Light Standard 250 Watt High Pressure Sodium Vapor Luminaire		Flashing Beacon (Exst, Ppsd)		
	Light Standard 310 Watt High Pressure Sodium Vapor Luminaire		Concrete Foundation (Exst, Ppsd)		
	Light Standard 400 Watt High Pressure Sodium Vapor Luminaire		Pipe Mounted Flasher (Exst, Ppsd)		
	Light Standard 700 Watt High Pressure Sodium Vapor Luminaire		Pad Mounted Feed Point (Exst, Ppsd)		
	Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire		Pipe Mounted Feed Point with Pad (Exst, Ppsd)		
	Emergency Vehicle Detector		Pole Mounted Feed Point (Exst, Ppsd)		
	Video Detection Camera		Junction Box (Exst, Ppsd)		
			Existing Pedestrian Head with Number		
			Existing Signal Head		
			Pole Mounted Head		
			Existing Lighting Standard Pole		

NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions



SYMBOLS

D-101-33

○ ○ ○	Existing Manhole (Electrical, Gas, Telephone)	Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water
○ ○ ○	Water Manhole (Exst, Exst with Valve)	□ □ □ □ □
○ ○ ○	Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)	Existing Pedestal Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined
○ ○ ○	Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)	□ □ □ □ □ □
○ ○ ○	Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)	Existing Pipe Vent Gas, Fuel, Sanitary, Storm Drain, Water, Undefined
○ ○ ○	Force Main Storm Drain Manhole (Exst, Exst with Valve)	□ □ □ □ □ □
○ ○ ○	Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)	Valve Exst Gas, Exst Water, Ppsd Water, Exst Undefined
○ ○ ○	Existing Water Appurtenance	○ ○ ○ ○
○ ○ ○	Sprinkler Head (Exst, Ppsd)	Pump Sanitary, Storm Drain, Exst Water
○ ○ ○	Fire Hydrant (Exst, Ppsd)	○ ○ ○
○ ○ ○	Cleanout (Exst Sanitary, Underdrain)	Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
○ ○ ○	Existing Catch Basin Inlet (Round, Square)	□ □ □ □ □ □ □ □
○ ○ ○	Existing Curb Inlet (Round, Square)	Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
○ ○ ○	Existing Slotted Reinforced Concrete Pipe	□ □ □ □ □ □ □
○ ○ ○	Catch Basin (Riser 30 Inch, Beehive, Type A)	
○ ○ ○	Inlet Mountable Curb (Type A, Type B)	— Existing Utility Marker
○ ○ ○	Inlet Saddle Base (Type 1, Type 2)	□ Existing Meter
○ ○ ○	Inlet Special (Catch Basin, Type 1, Type A)	□ Existing Fuel Dispensers
○ ○ ○	Inlet (Tee, Type 1, Type 2, Type 2 Double)	□ Existing Fuel Filler Pipes
○ ○ ○	Median Drain	○ Existing Fuel Leak Sensors
○ ○ ○	Headwall (Exst, Ppsd, Ppsd Single with Vegetation Barrier, Ppsd Double with Vegetation Barrier)	

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32



Cross Section Legend

D-101-40

Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*	Description	Longitudinal Parallel to Roadway	Transverse Perpendicular to Roadway*	Light Standard - Multiple Variations	Pole - Multiple Variations
Cable Line				OHT1	OHT2	Concrete Steel Wood with Traffic Signal	Utility Brace Feed Point Guy Power Power Structure Power with Light Power with Transformer
Conduit Line							
Electric Line							
Fiber Optic Line							
Gas Main Line				OH1	OH2		
Gas Service Line							
Gas Transmission Line							
Fuel Pipeline							
Sanitary Sewer Force Main							
Sanitary Sewer							
Steam Line							
Storm Drain (Assumed Depth)	SD1	SD2					
Telephone Line	T1	T2					
TV Line	TV1	TV2					
Water Main Line	WM1	WM2					
Water Service Line	WS1	WS2					

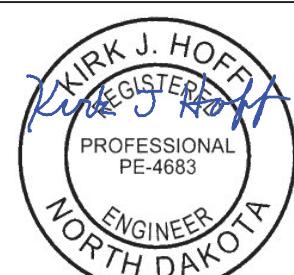
* Usually the transverse utilities are shown on a cross section with 2 or more symbols. The utility runs from one symbol to the other, but the connection may not be shown.

Connection to infer that probably will not be displayed

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.



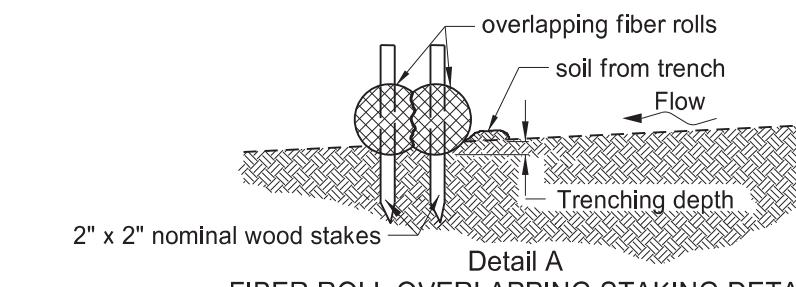
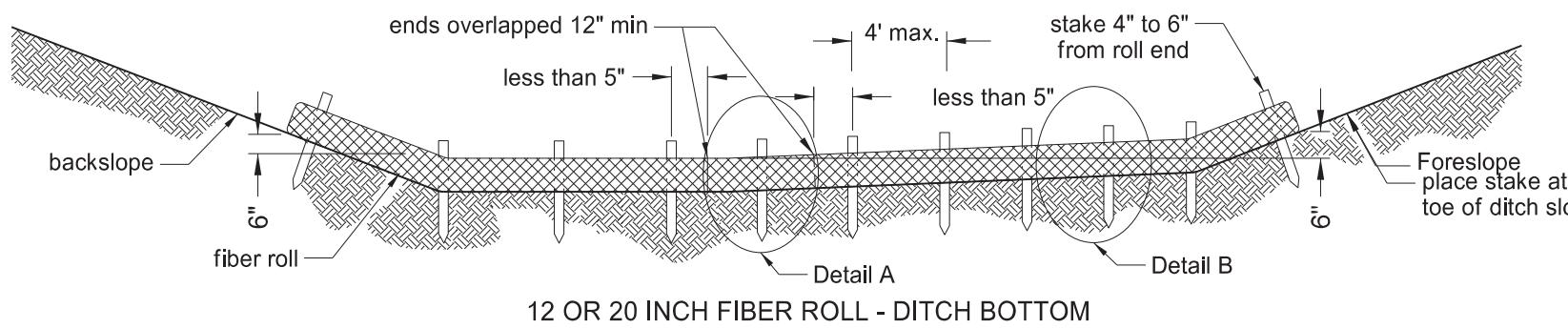
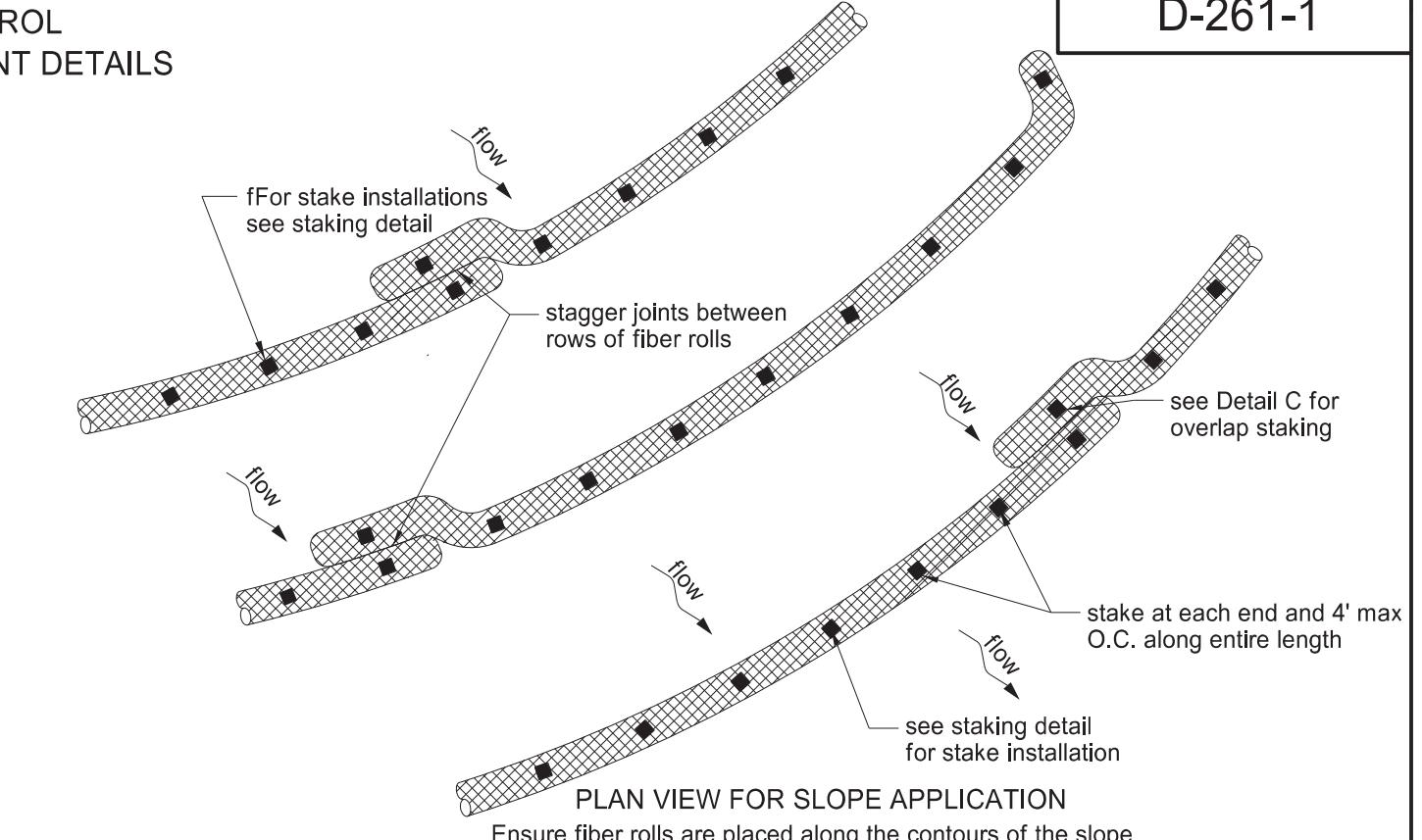
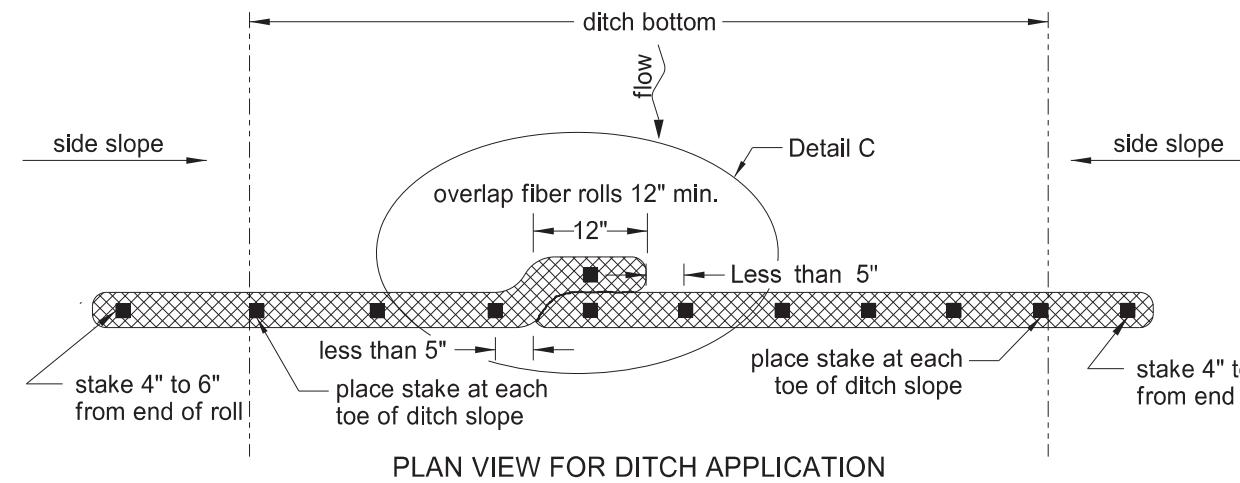
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update



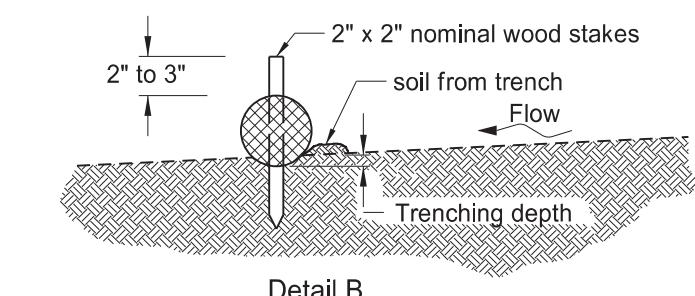
KIRK J. HOFF
REGISTERED
PROFESSIONAL
ENGINEER
NORTH DAKOTA

06/14/23

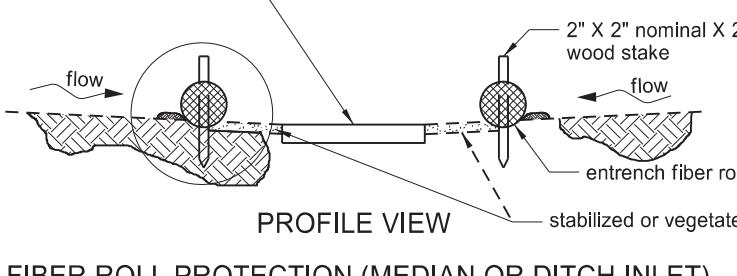
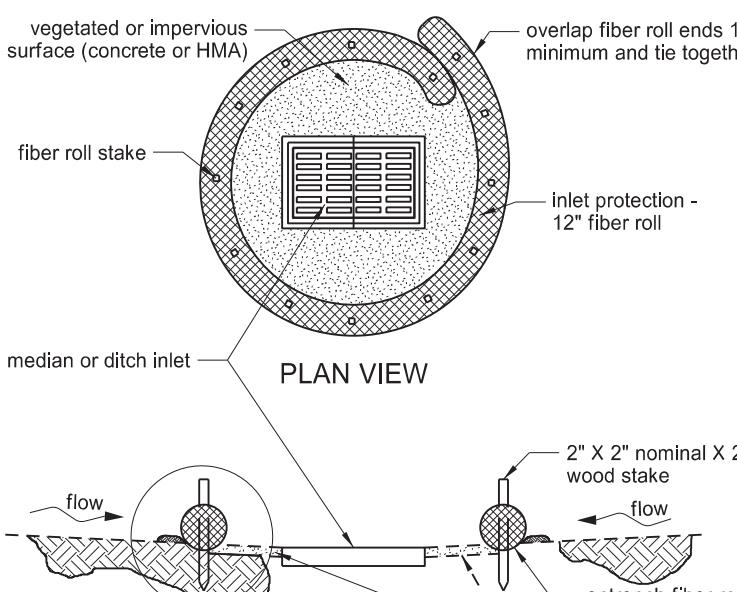
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

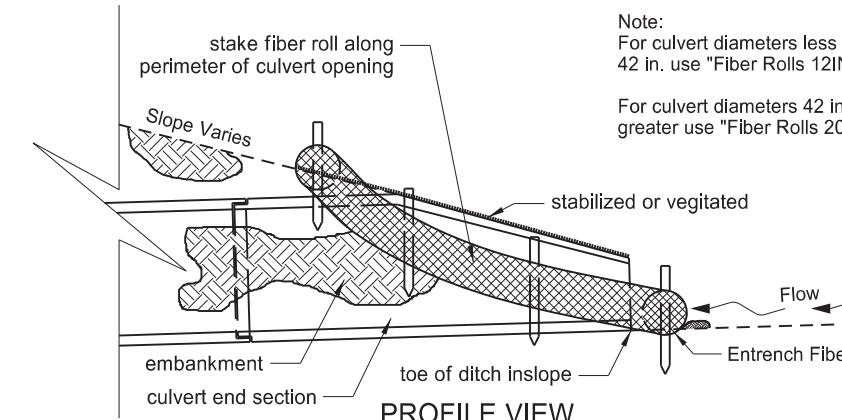
FIBER ROLL OVERLAPPING STAKING DETAIL



FIBER ROLL STAKING DETAIL

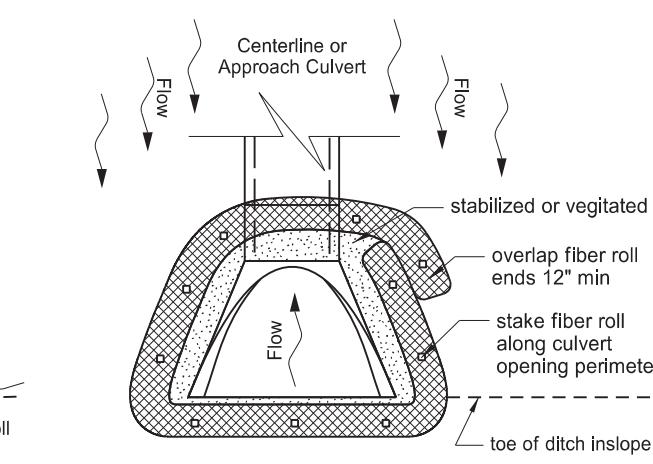


FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



FIBER ROLL PROTECTION (INLET OF CULVERT)

Note:
For culvert diameters less than 42 in. use "Fiber Rolls 12IN".
For culvert diameters 42 in. or greater use "Fiber Rolls 20IN".



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

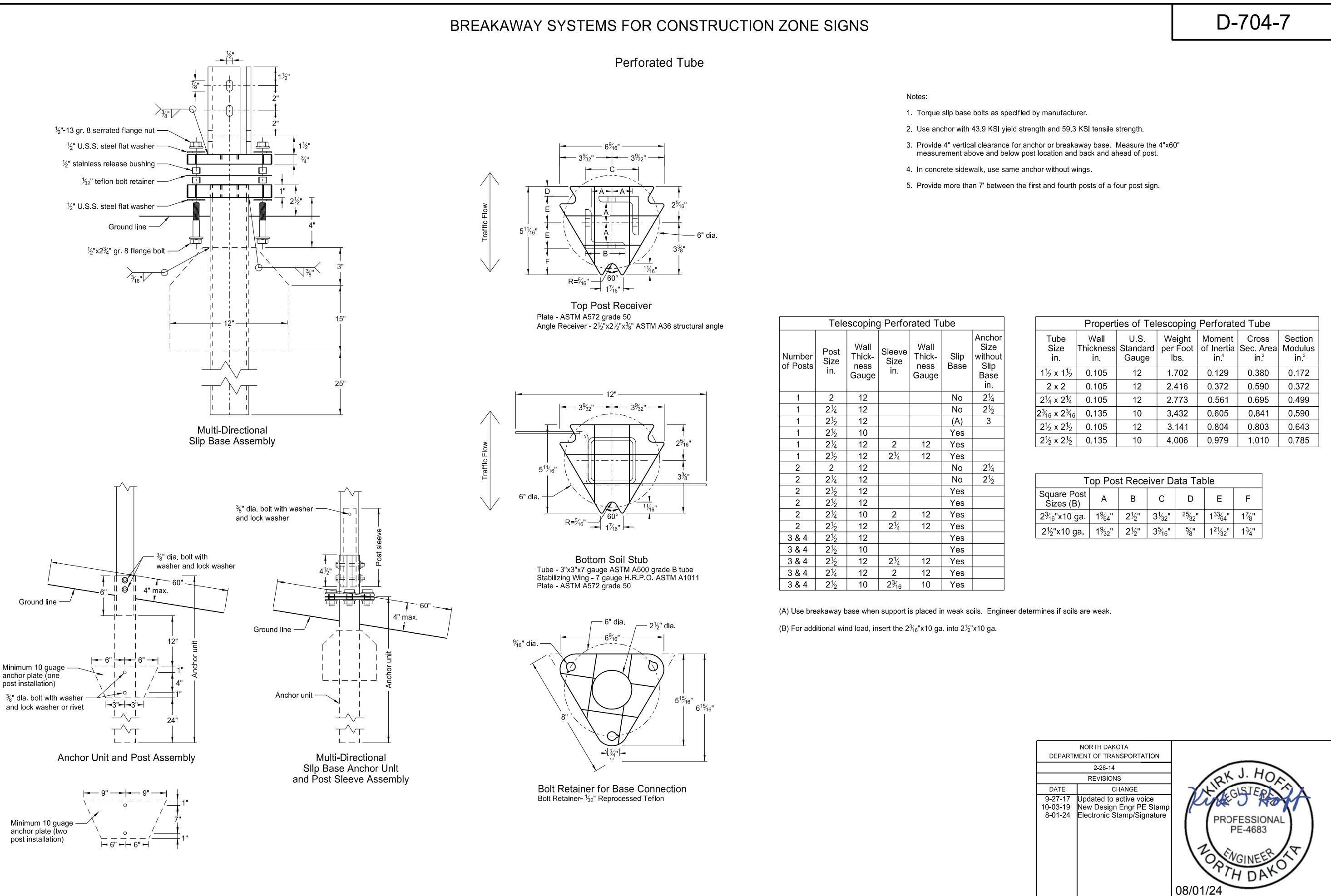
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail
06-26-14	Changed standard drawing number from D-708-7 to D-261-1
08-27-19	New Design Engineer PE Stamp
04-22-24	Slope Plan View-overlap change
03-13-25	Added D-708-6 Culvert Inlet detail
09-02-25	Added D-708-6 Inlet detail



09/02/25

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

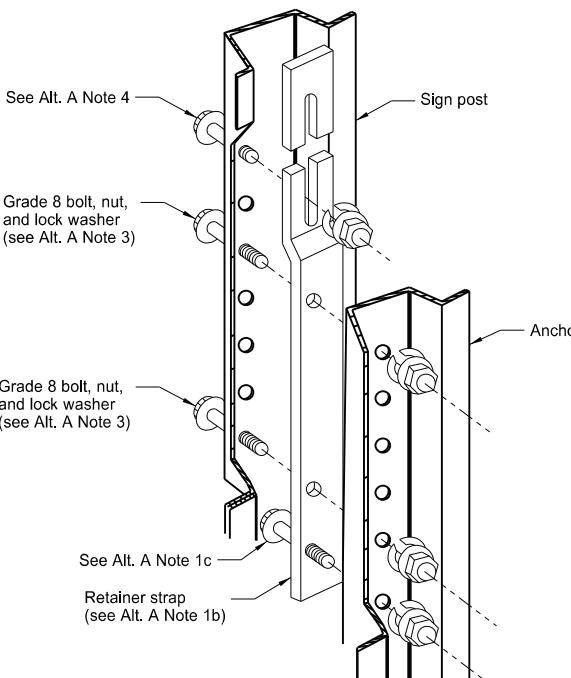
D-704-7



BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

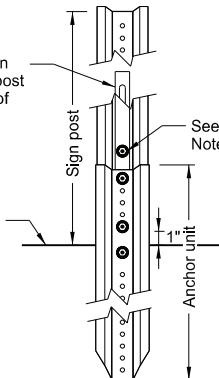
D-704-8

U-Channel Post

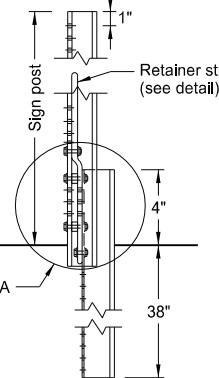


Detail A

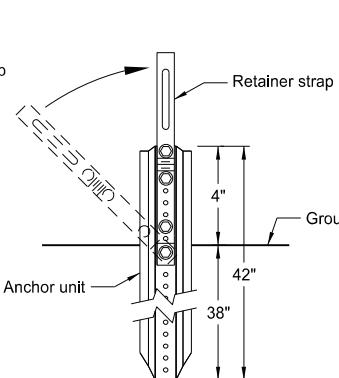
Retainer strap is on front side of sign post and on back side of anchor unit



Front View



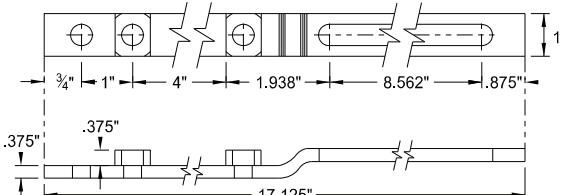
Side View



Back View

Breakaway U-Channel Detail
Alternate A

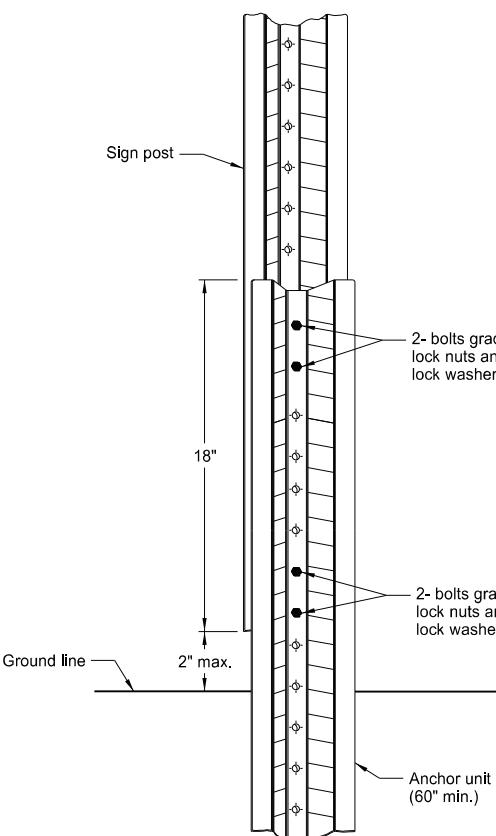
Install a maximum of 2 posts within 7'.



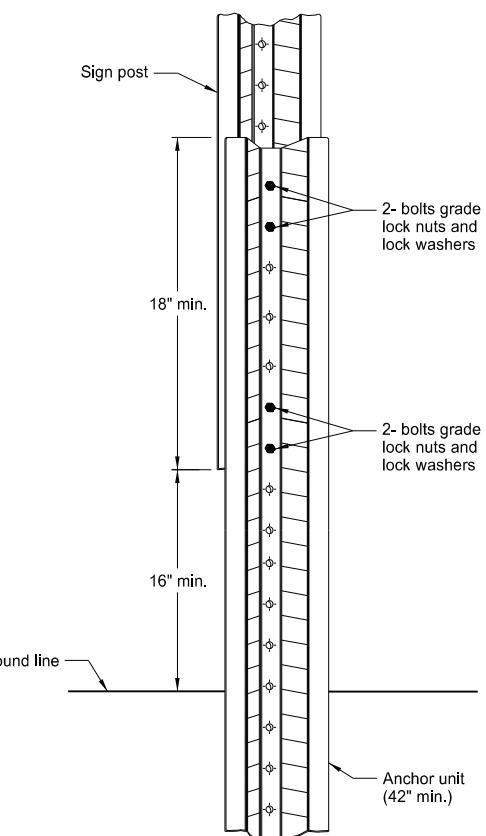
Retainer Strap Detail

Alternate A Steps of Installation:

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

Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.

Breakaway U-Channel Splice Detail
Alternate C
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.

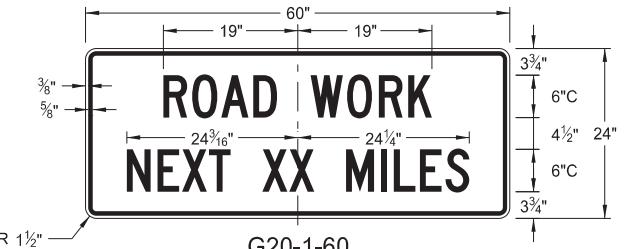
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17 10-03-19 8-01-24	Updated to active voice New Design Engr PE Stamp Electronic Stamp/Signature



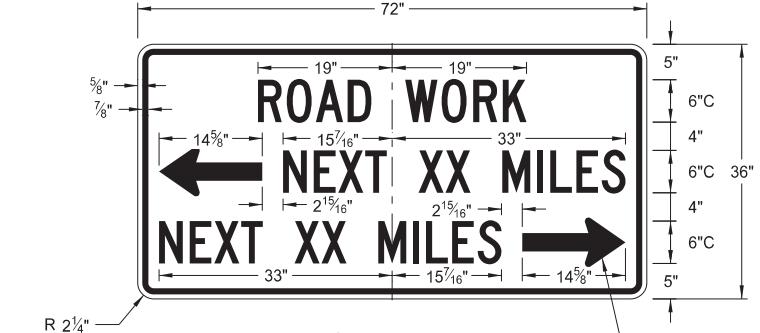
08/01/24

CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

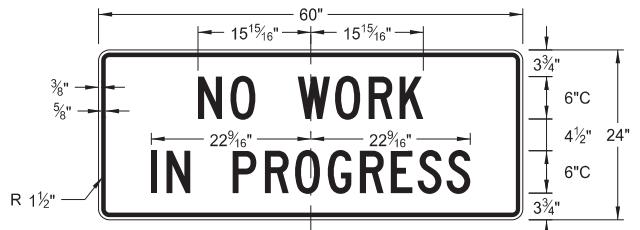
D-704-9



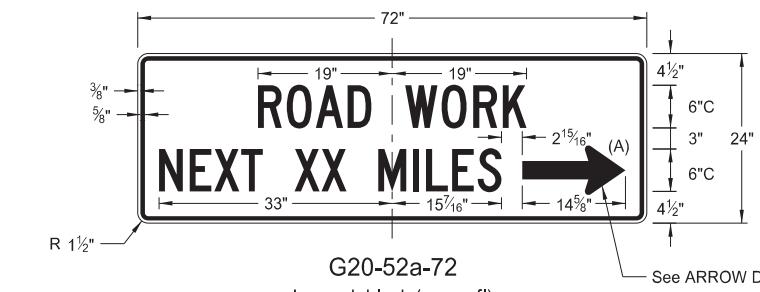
G20-1-60

Legend: black (non-refl)
Background: orange

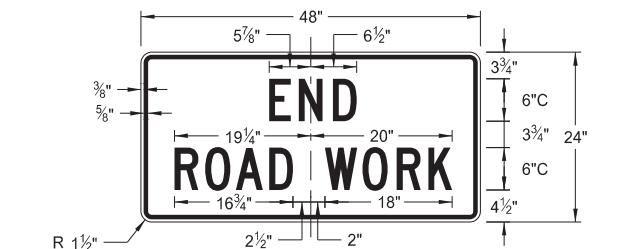
G20-50a-72

Legend: black (non-refl)
Background: orange

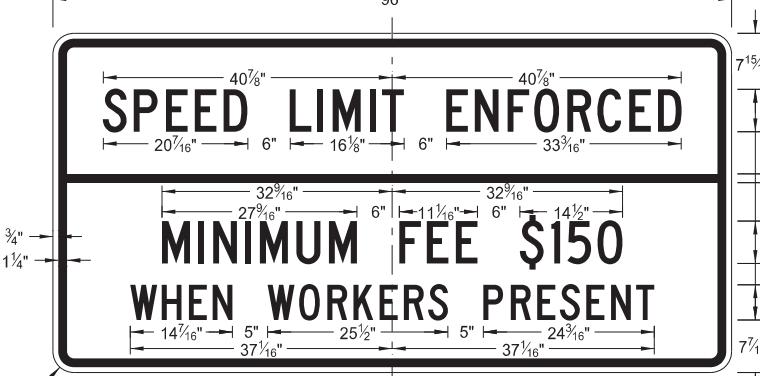
G20-1b-60

Legend: black (non-refl)
Background: orange

G20-52a-72

Legend: black (non-refl)
Background: orange

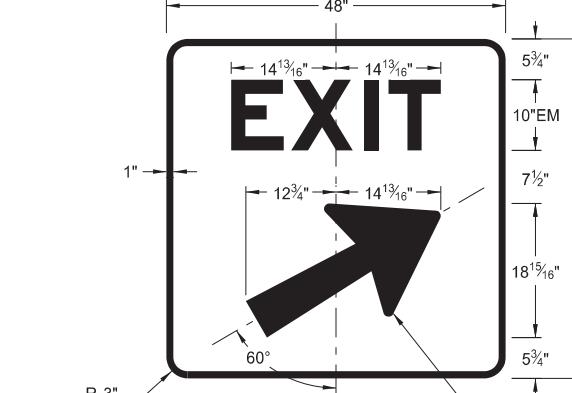
G20-2-48

Legend: black (non-refl)
Background: orange

G20-55-96

Legend: black (non-refl)
Background: orange

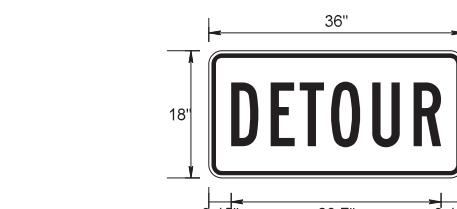
G20-4b-36

Legend: black (non-refl)
Background: orange

E5-1(L or R)-48

Legend: white
Background: green (orange optional)

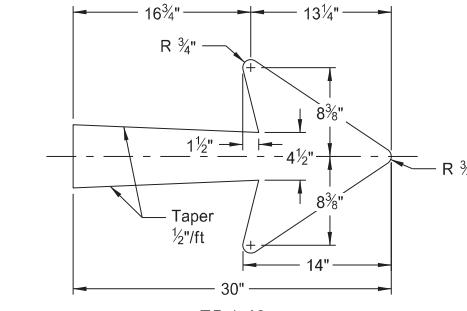
See ARROW DETAILS



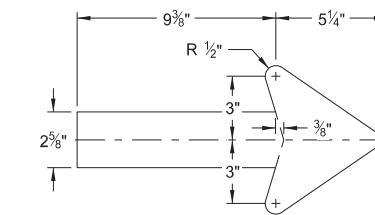
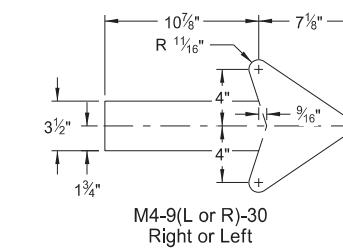
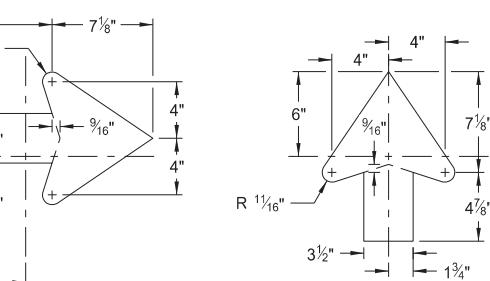
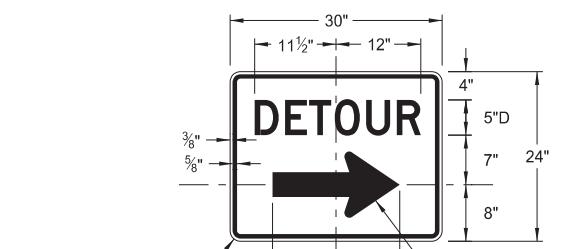
M4-8-36

Legend: black (non-refl)
Background: orange

See ARROW DETAILS



E5-1-48

G20-50a-72
G20-52a-72M4-9(L or R)-30
Right or LeftM4-9(L or R)-30
Advanced Right or LeftM4-9-30
StraightM4-9(L or R)-30 &
M4-9-30Legend: black (non-refl)
Background: orange

See ARROW DETAILS

NOTES:

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

ARROW DETAILS

DATE

8-17-17
10-03-19
08-01-24
06-30-25

CHANGE

Added sign & background color
New Design Engineer PE Stamp
Electronic Stamp/Signature
Legislative Changes

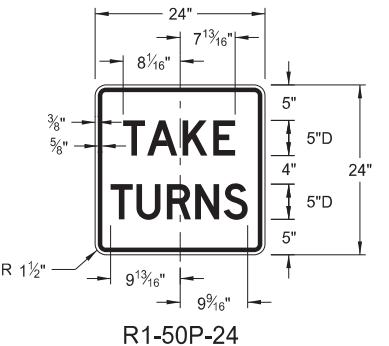
REVISIONS

8-13-13

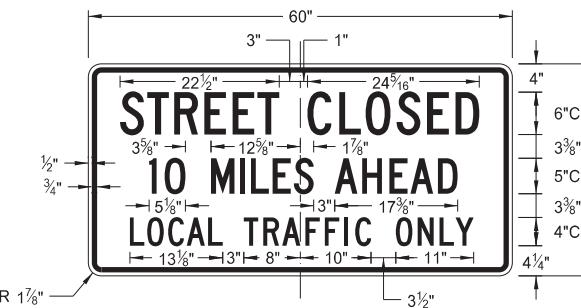
PE-4683
06/30/25PROFESSIONAL
ENGINEER
NORTH DAKOTA

CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

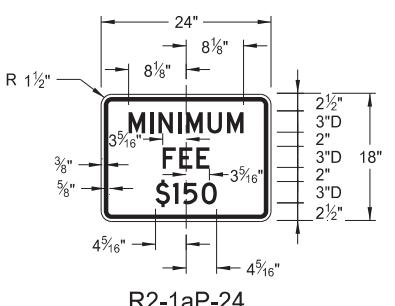
D-704-10



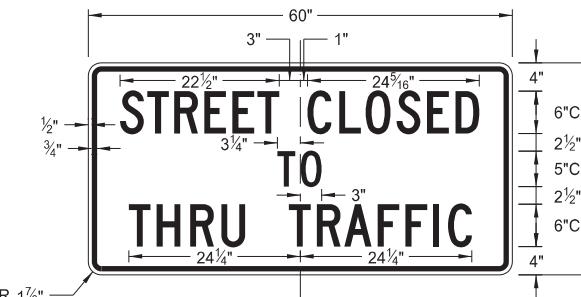
R1-50P-24

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Background: white

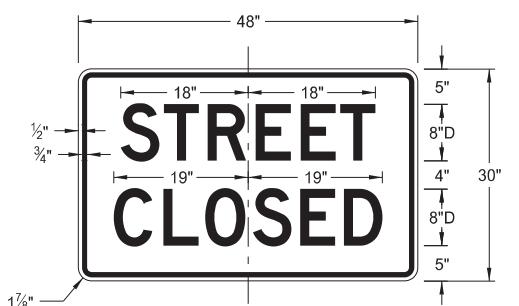
R11-3c-60

Legend: black (non-refl)
Background: white

R2-1aP-24

Legend: black (non-refl)
Background: white

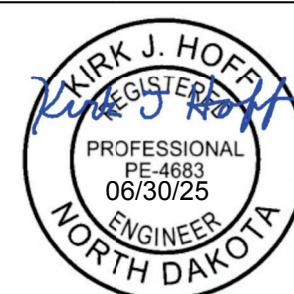
R11-4a-60

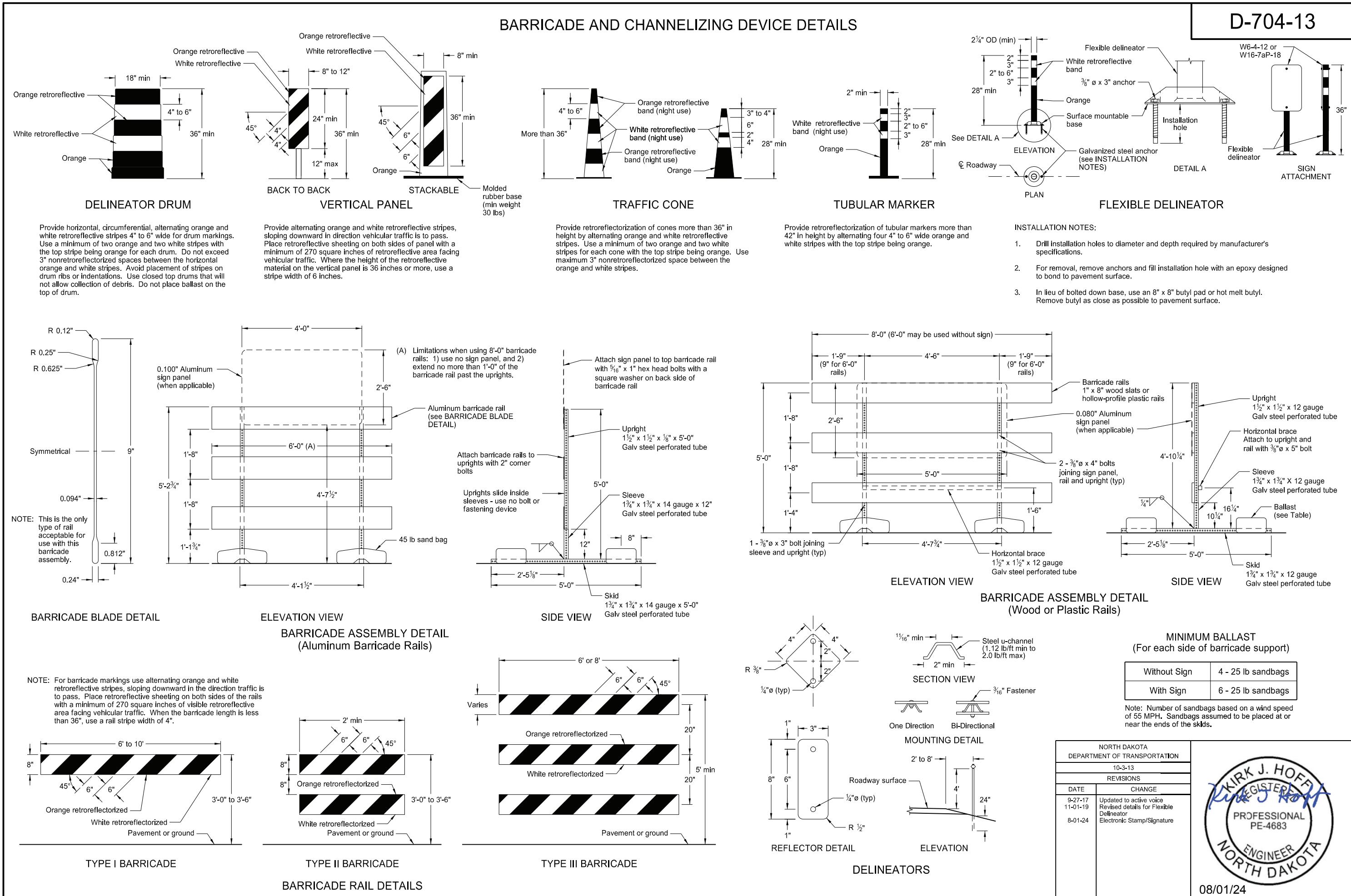
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Background: white

R11-2a-48

Legend: black (non-refl)
Background: white

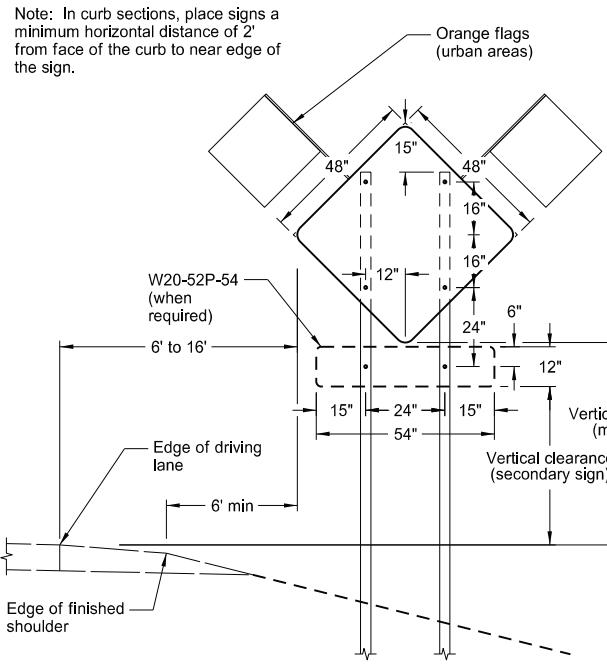
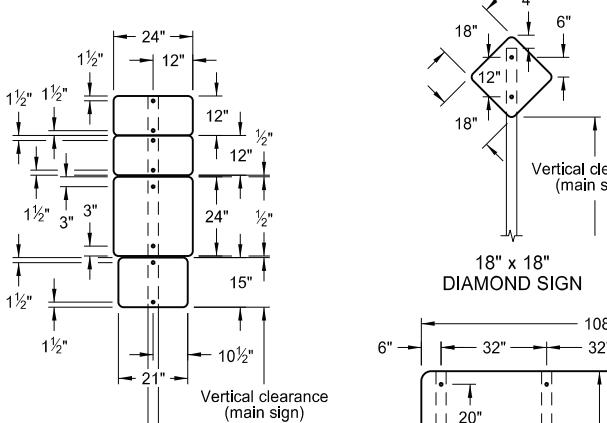
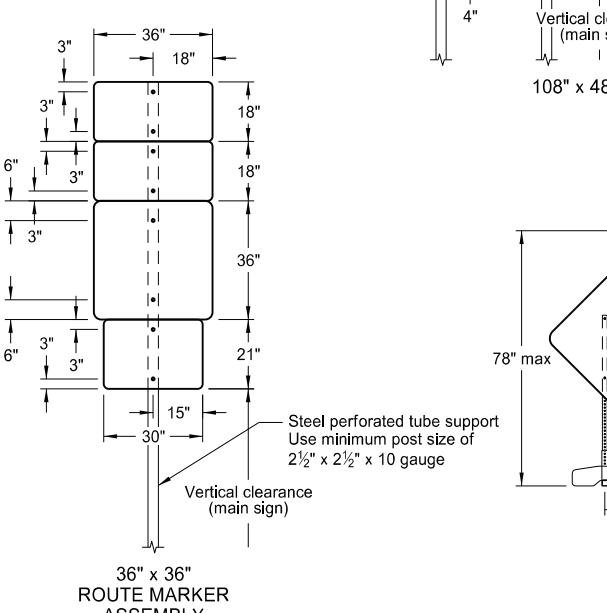
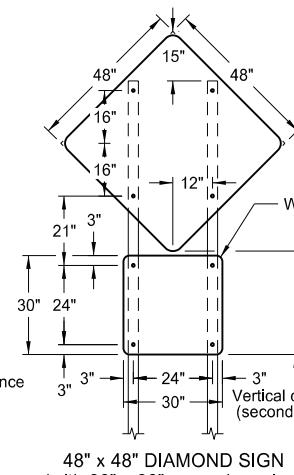
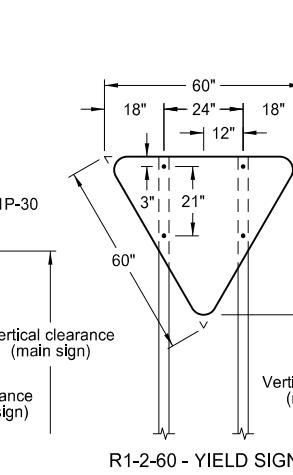
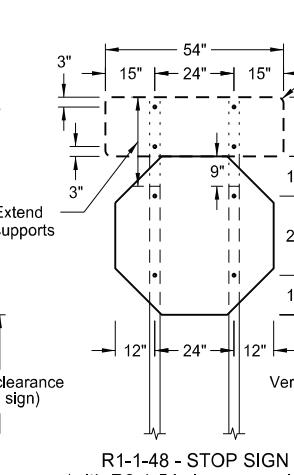
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17 10-03-19 08-01-24 06-30-25	Revised sign number New Design Engineer PE Stamp Electronic Stamp/Signature Legislative Changes



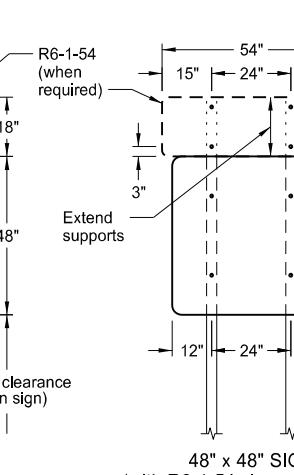
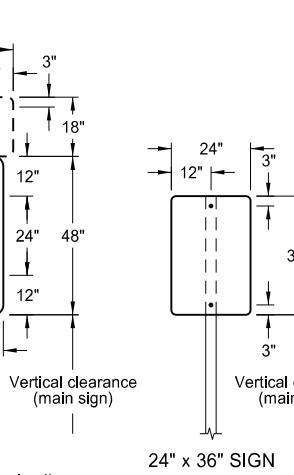


CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

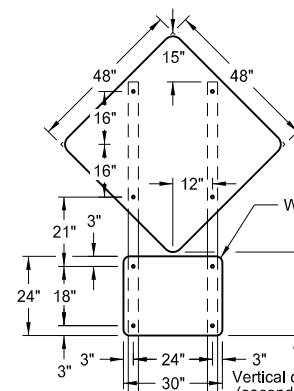
D-704-14

TYPICAL SECTION
(48" x 48" diamond warning sign shown)ROUTE MARKER
ASSEMBLYROUTE MARKER
ASSEMBLY48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)

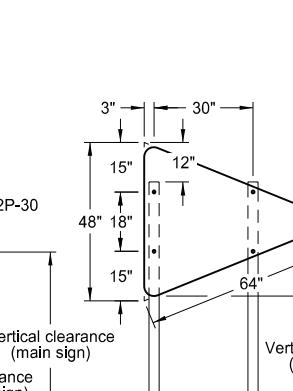
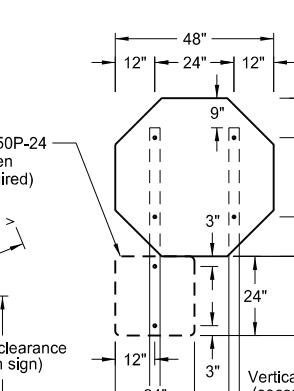
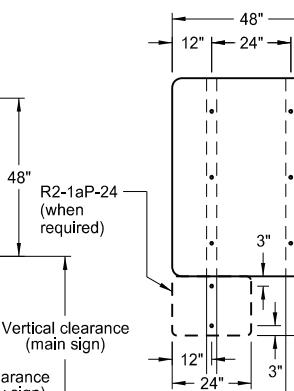
R1-2-60 - YIELD SIGN

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

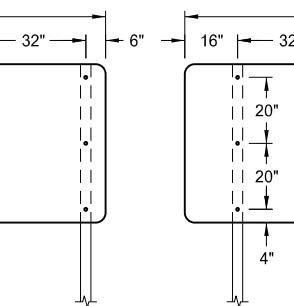
24" x 36" SIGN



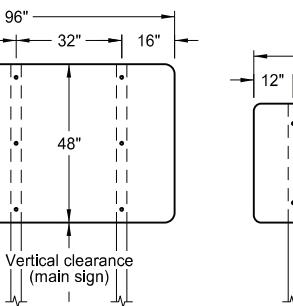
W14-3-64 - PENNANT SIGN

R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)48" x 48" SIGN
(with R2-1aP-24 sign as required)

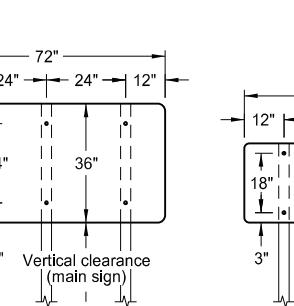
30" x 24" SIGN



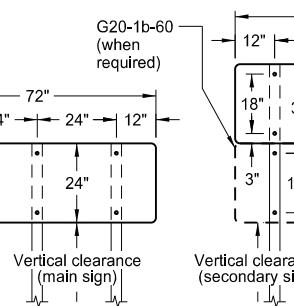
108" x 48" SIGN



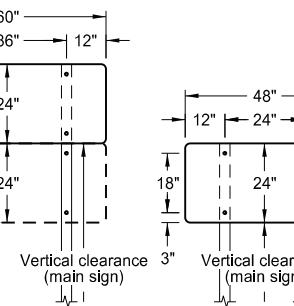
96" x 48" SIGN



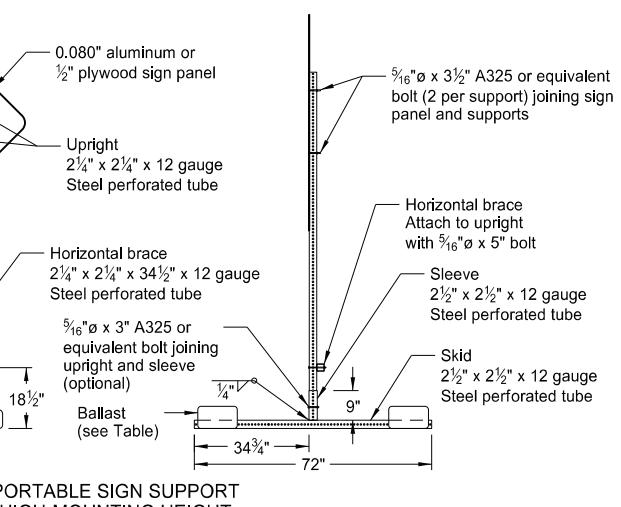
72" x 36" SIGN



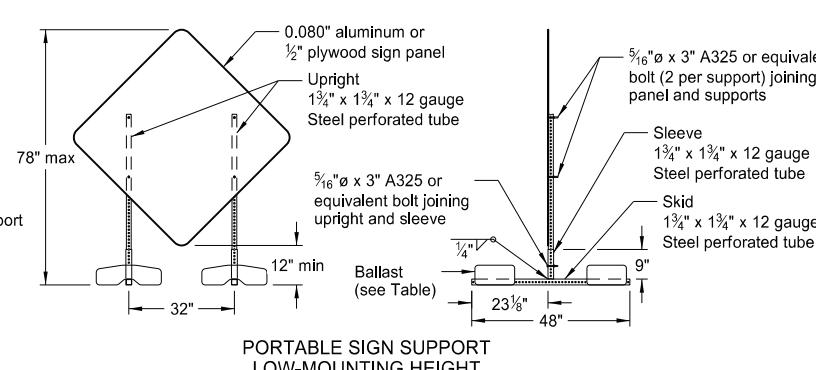
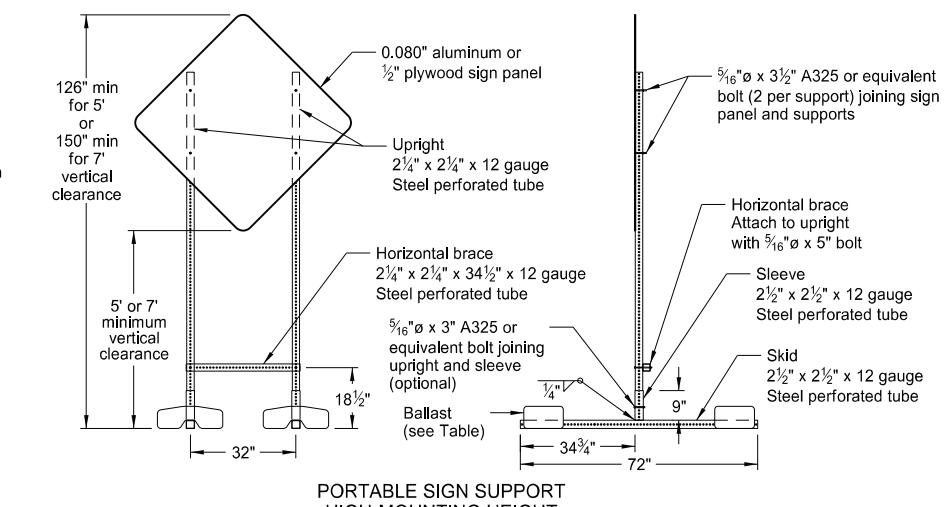
72" x 24" SIGN



60" x 24" SIGN



48" x 24" SIGN

PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHTPORTABLE 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 2 1/2" x 2 1/2" 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, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 3/8" 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.

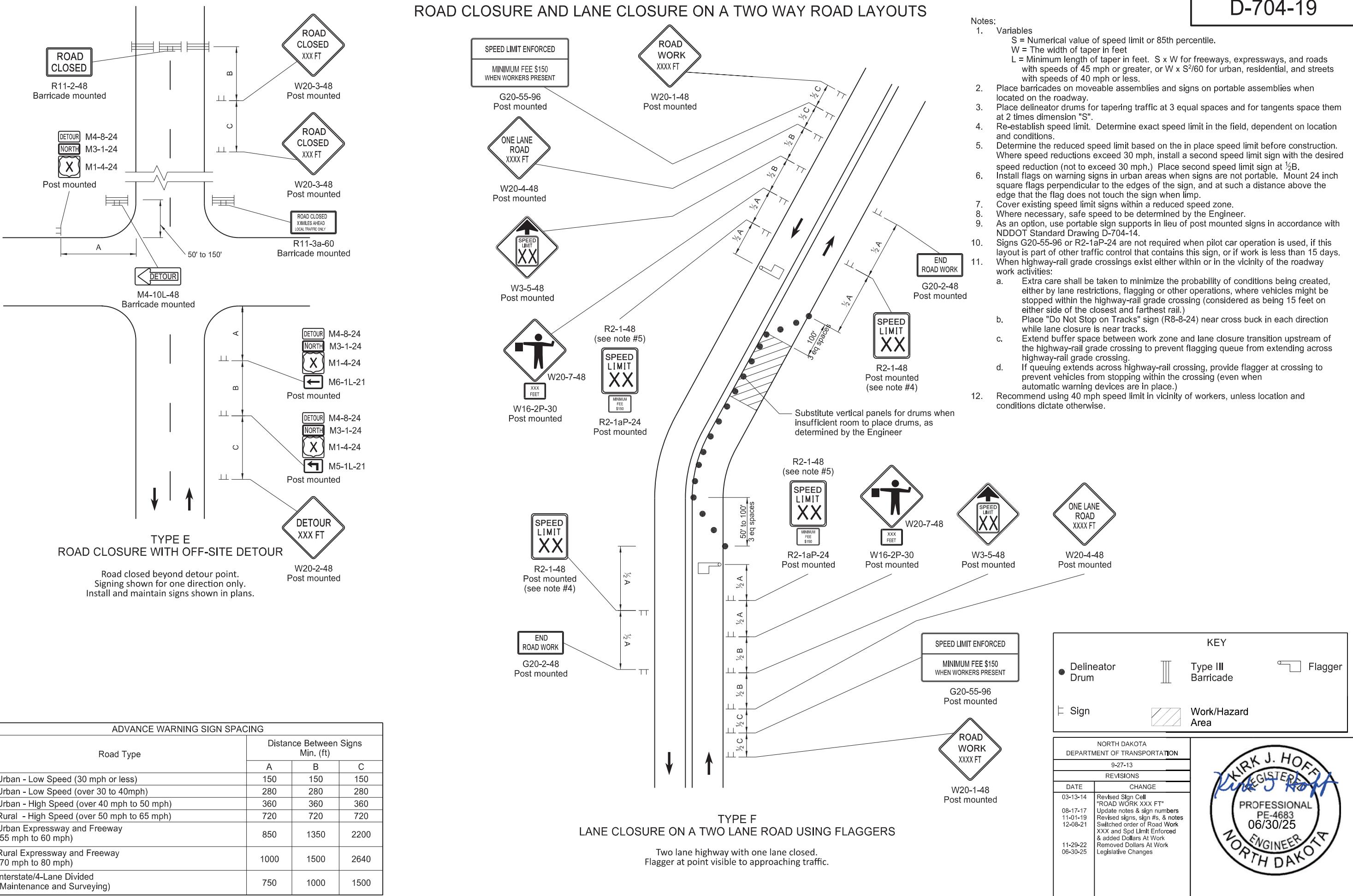
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13 9-27-17 11-01-19 8-01-24	Revised Note 6 Updated to active voice Revised 60"x24" sign detail Electronic Stamp/Signature

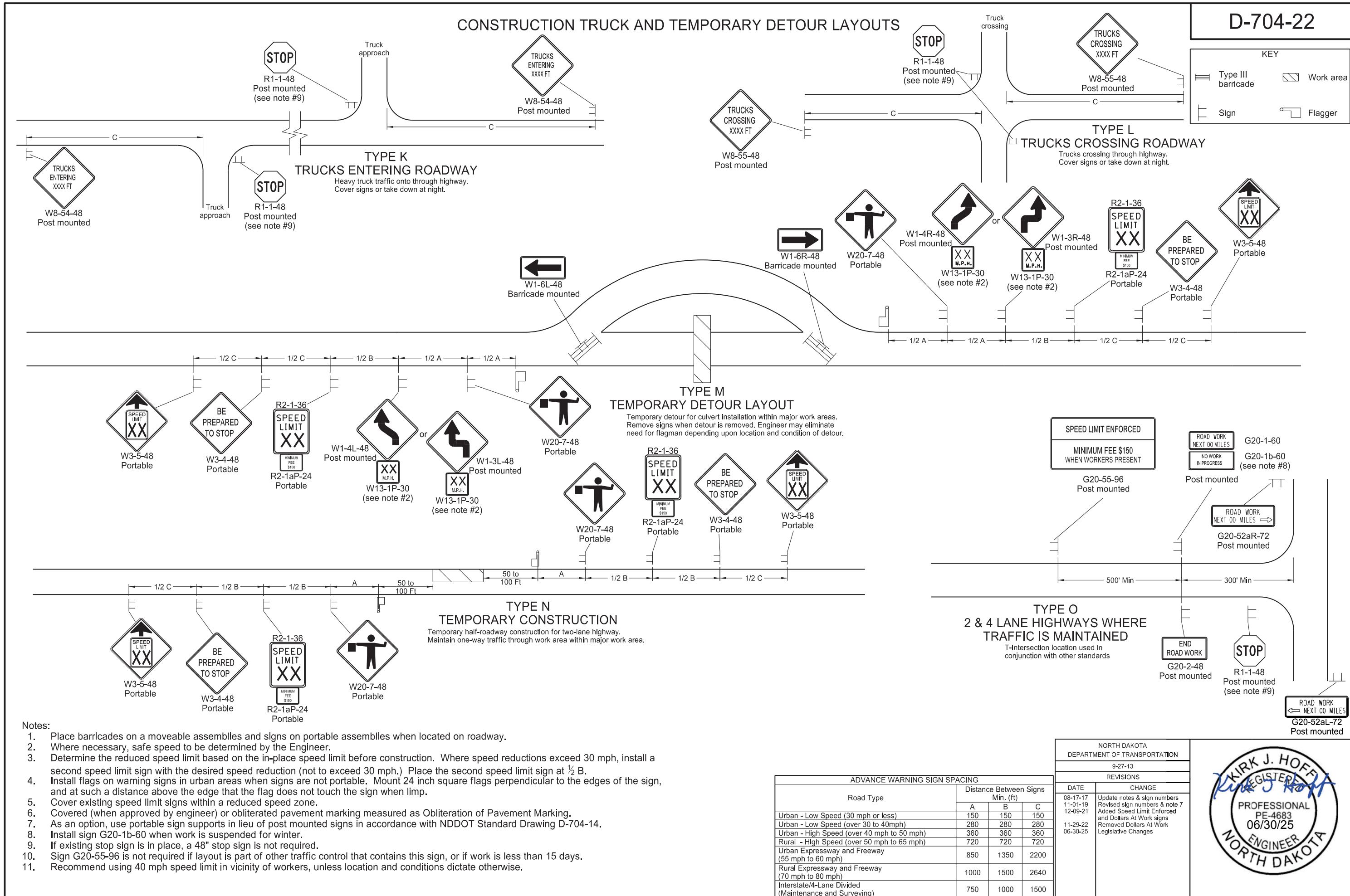


08/01/24

ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

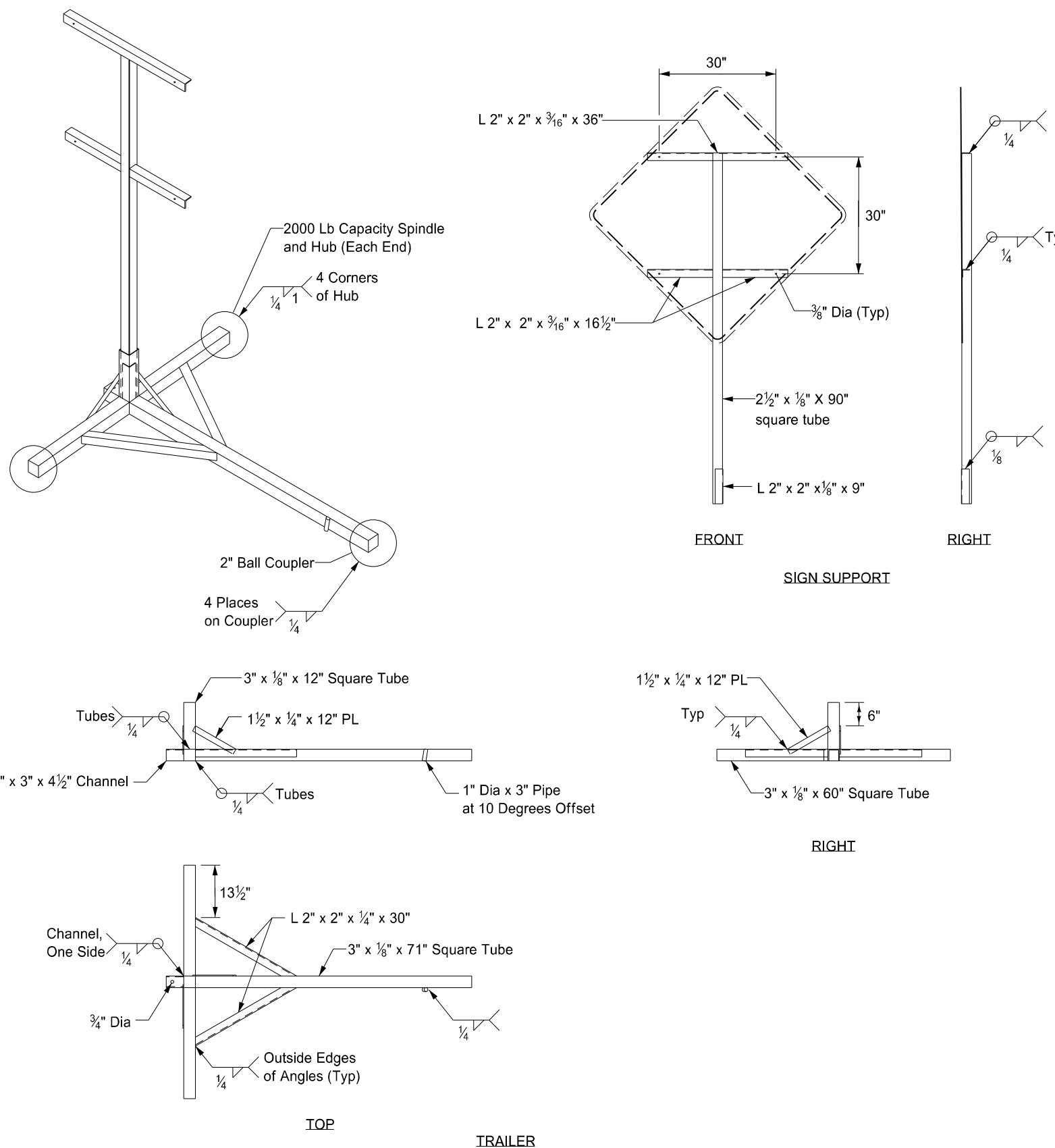
D-704-19





PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50

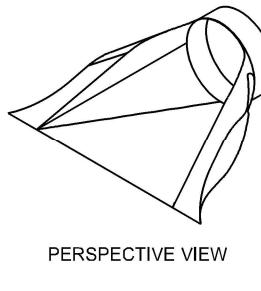
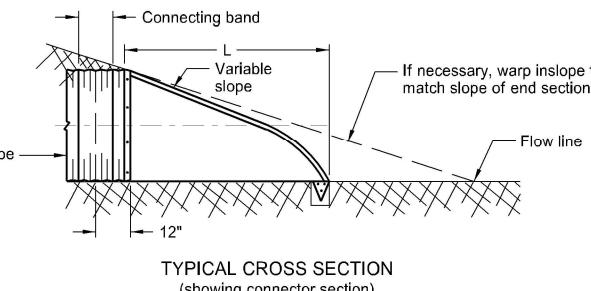
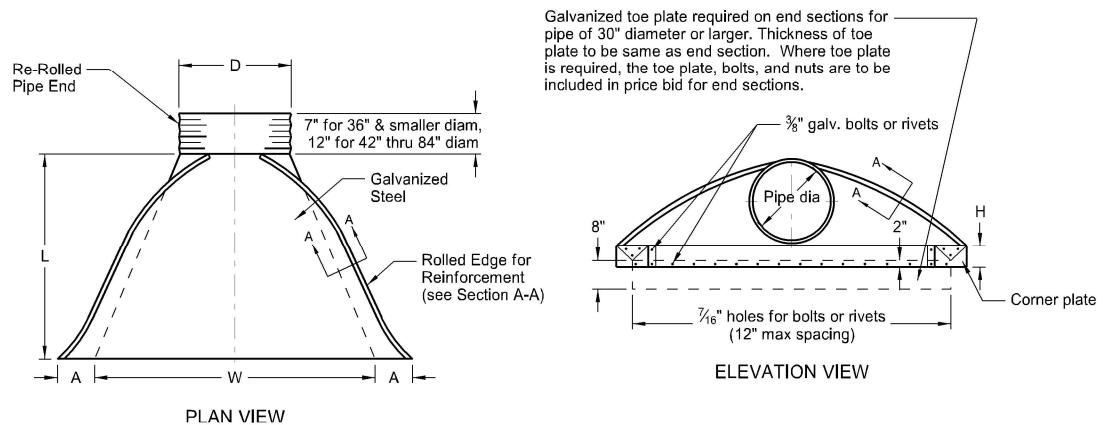


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.



ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



PIPE DIA. IN	GALVANIZED THICKNESS IN	END SECTION DIMENSIONS					APPROX. SLOPE RATE	BODY PIECE
		A IN	B IN	H IN	L IN	W IN		
15	0.064 - 0.079	7	8	6	26	30	2 1/2:1	1
18	0.064 - 0.109	8	10	6	31	36	2 1/2:1	1
24	0.064 - 0.109	10	13	6	41	48	2 1/2:1	1
30	0.064 - 0.109	12	16	8	51	60	2 1/2:1	1 or 2
36	0.064 - 0.109	14	19	9	60	72	2 1/2:1	2
42	0.064 - 0.138	16	22	11	69	84	2 1/2:1	2
48	0.064 - 0.168	18	27	12	78	90	2 1/4:1	2
54	0.064 - 0.168	18	30	12	84	102	2:1	2
* 60	0.064 - 0.168	18	33	12	87	114	1 3/4:1	3
* 66	0.064 - 0.168	18	36	12	87	120	1 1/2:1	3
* 72	0.064 - 0.168	18	39	12	87	126	1 1/2:1	3
* 78	0.064 - 0.168	18	42	12	87	132	1 1/4:1	3
* 84	0.064 - 0.168	18	45	12	87	138	1 1/8:1	3

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

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

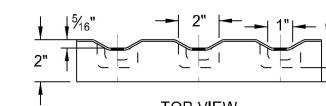
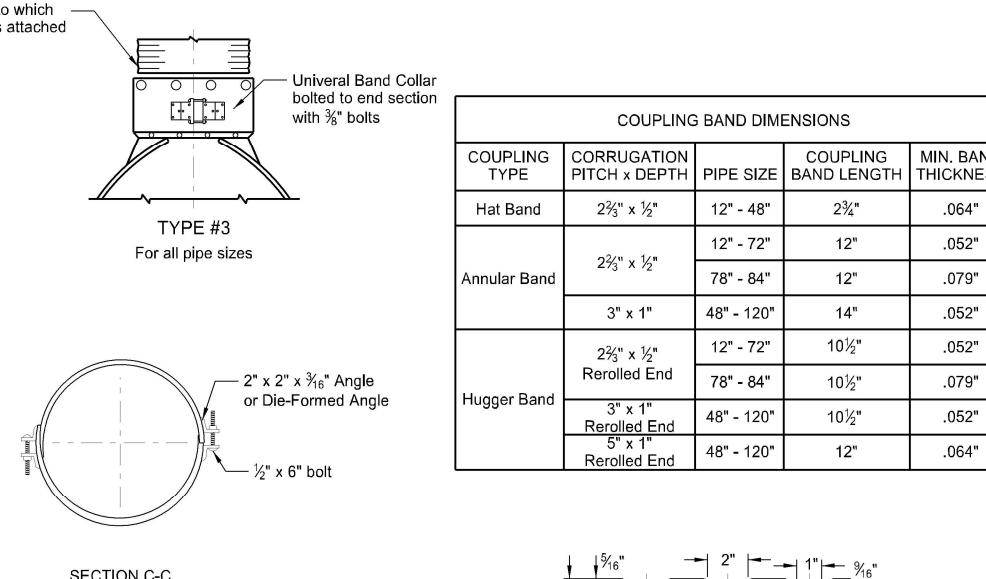
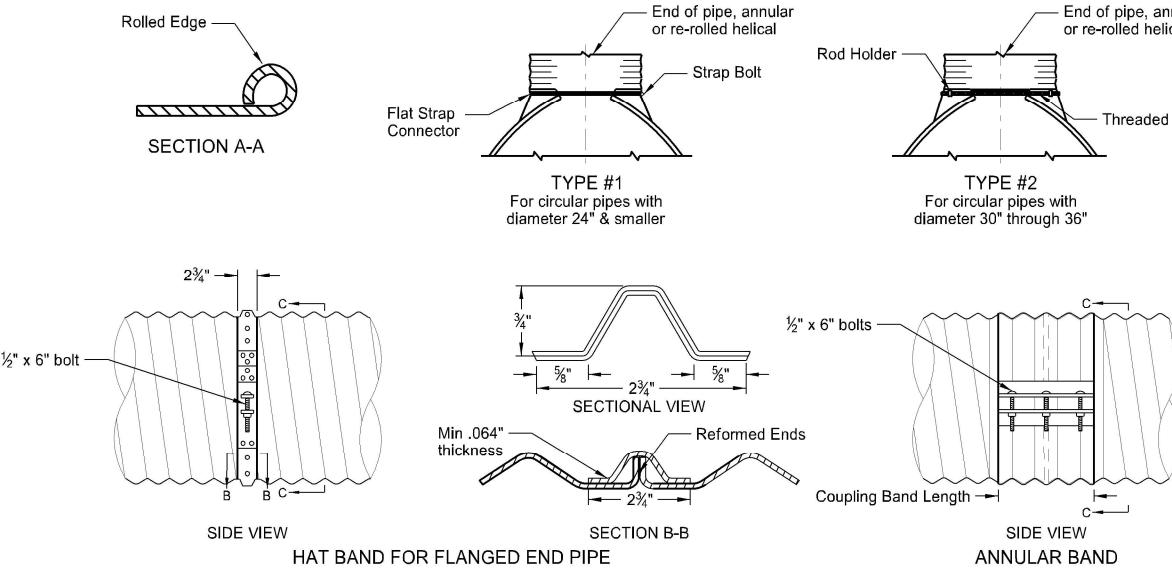
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

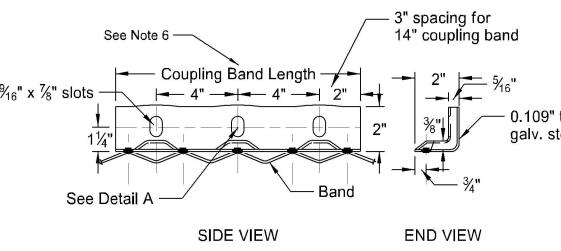
Multiple panel bodies shall have lap seams which are to be tightly joined with 3/8" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs.

NOTES:

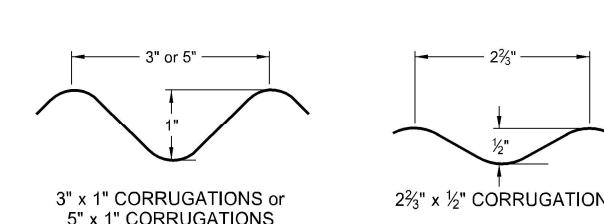
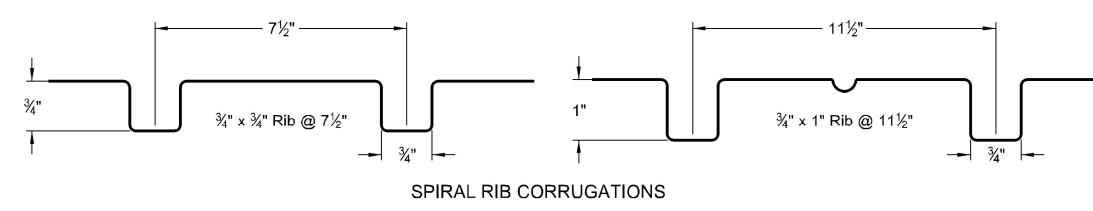
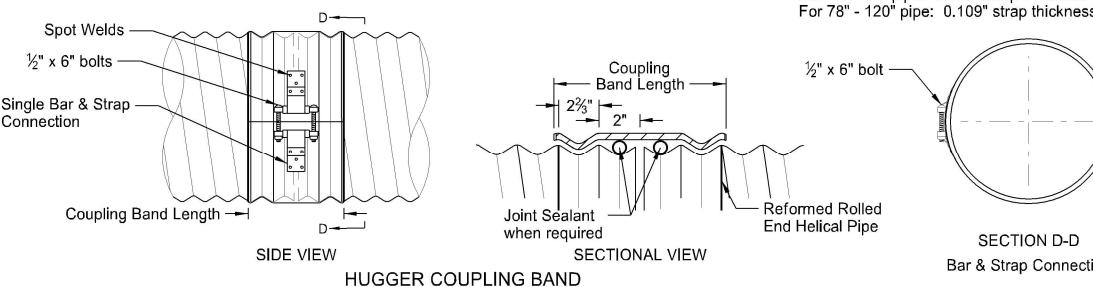
1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x 1/4" galv. angle for 60" through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



Die-Formed Angle Connector



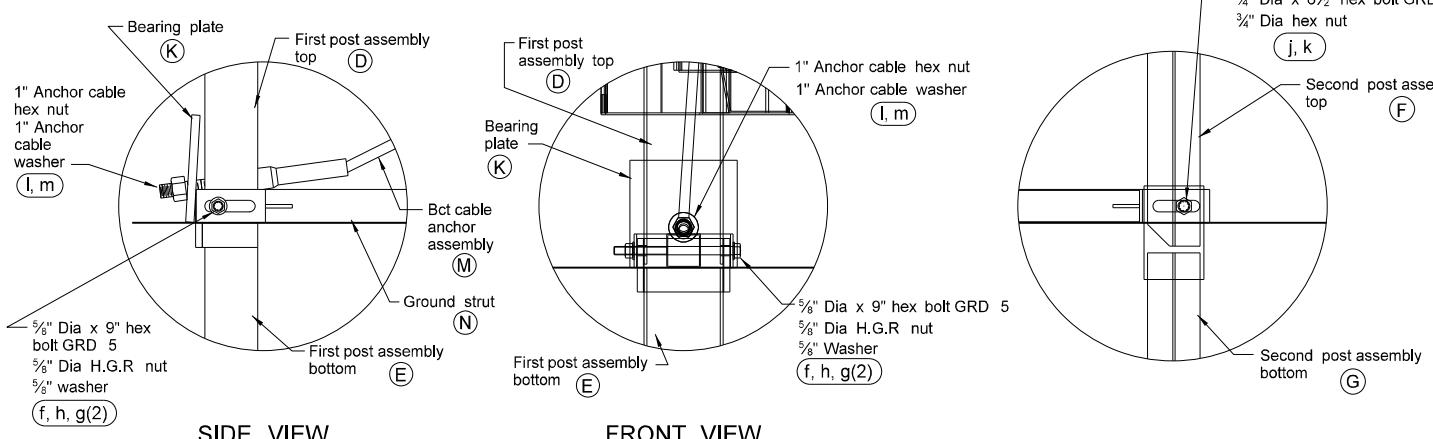
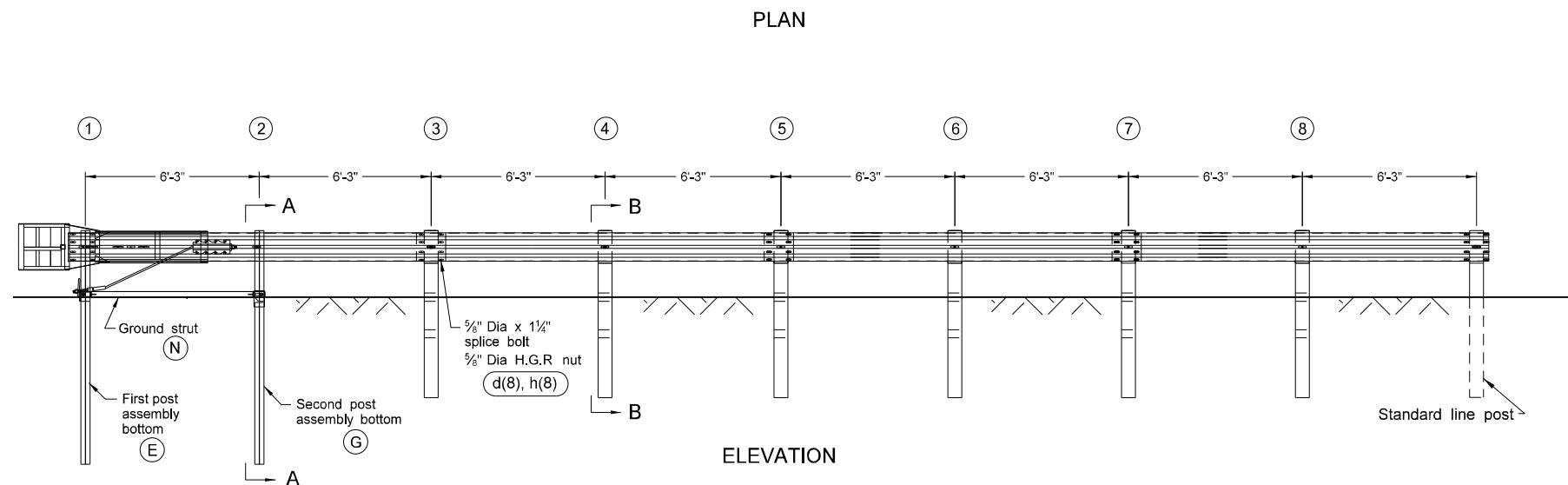
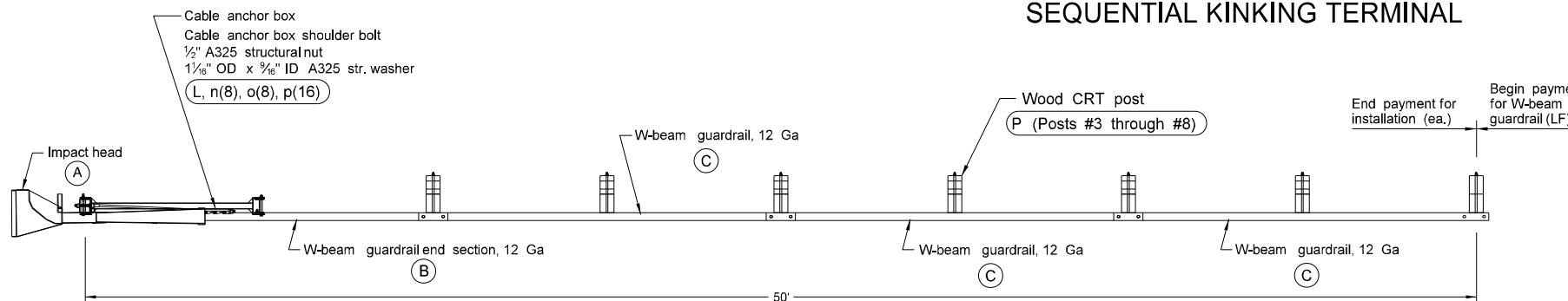
Die-Formed Angle Connector



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-16-13	
REVISIONS	
DATE	CHANGE
01-07-14 02-27-14 09-18-19 09-23-22	End Section Plan View 3" x 1" Corrugation Detail Added Perspective View Detail Galvanized Thickness Table



SEQUENTIAL KINKING TERMINAL



POST #1 CONNECTION DETAILS

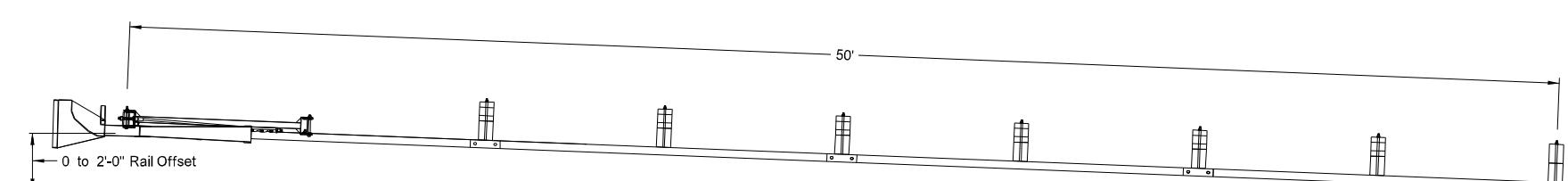
SIDE VIEW DETAIL OF POST #2

IMPACT HEAD CONNECTION DETAIL

SECTION A-A

SECTION B-B

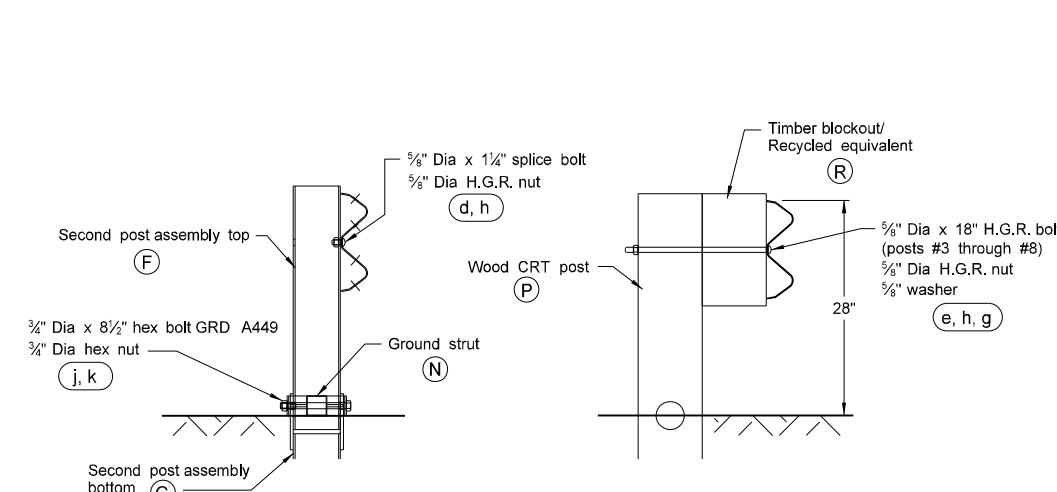
Posts #3 through #8

FLARED INSTALLATION
25:1 maximum flare rate

GENERAL NOTES:

1. Use breakaway posts with the SKT.
2. Use galvanized bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Flare the SKT at a rate of up to 25:1 to prevent shoulder encroachment by the impact head.
4. Grade site as needed to prevent lower sections of the posts from protruding more than 4" above ground (measured along a 5' cord).
5. Drive the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material satisfactorily to prevent settlement.
6. When rock is encountered during excavation, use a 10" diameter post hole, 20" into the rock surface, if approved by the engineer. Place granular material in the bottom of the hole, approximately 2 1/2" deep to provide drainage. Field cut posts 1 & 2 to length, place in the hole, and backfill with adequately compacted material excavated from the hole.
7. Place the breakaway cable assembly taut. Use a locking device (vice grips or channellock pliers) to prevent the cable from twisting when tightening nuts.
8. "Toe nail" the wood blockouts on post #3 through post #8 with two 20 penny galvanized nails in each rectangular post, to prevent them from turning when the wood shrinks.

BILL OF MATERIALS		
ITEM	QTY	
A	1	IMPACT HEAD
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga
C	3	W-BEAM GUARDRAIL, 12 Ga
D	1	FIRST POST ASSEMBLY TOP
E	1	FIRST POST ASSEMBLY BOTTOM
F	1	SECOND POST ASSEMBLY TOP
G	1	SECOND POST ASSEMBLY BOTTOM
K	1	BEARING PLATE
L	1	CABLE ANCHOR BOX
M	1	BCT CABLE ANCHOR ASSEMBLY
N	1	GROUND STRUT HINGED POST
P	6	WOOD CRT POST
R	6	TIMBER BLOCKOUT/RCY EQUIVALENT
		HARDWARE
a	2	1/4 " x 4" HEX BOLT Grade 5
b	4	5/8" WASHER
c	2	1/4" HEX NUT
d	25	5/8" Dia X 1 1/4" SPLICE BOLT, POST #2
e	6	5/8" Dia X 18" H.G.R. BOLT (POSTS 3 THRU 8)
f	1	5/8" Dia X 9" HEX BOLT GRD 5
g	8	5/8" WASHER
h	32	5/8" Dia H.G.R. NUT
j	1	3/4" Dia X 8 1/2" HEX BOLT GRD A449
k	1	3/4" Dia HEX NUT
I	2	1" ANCHOR CABLE HEX NUT
m	2	1" ANCHOR CABLE WASHER
n	8	GROUND STRUT HINGED POST
o	8	1/2" A325 STRUCTURAL NUT
p	16	1 1/8" OD X 5/16" ID A325 STR. WASHER

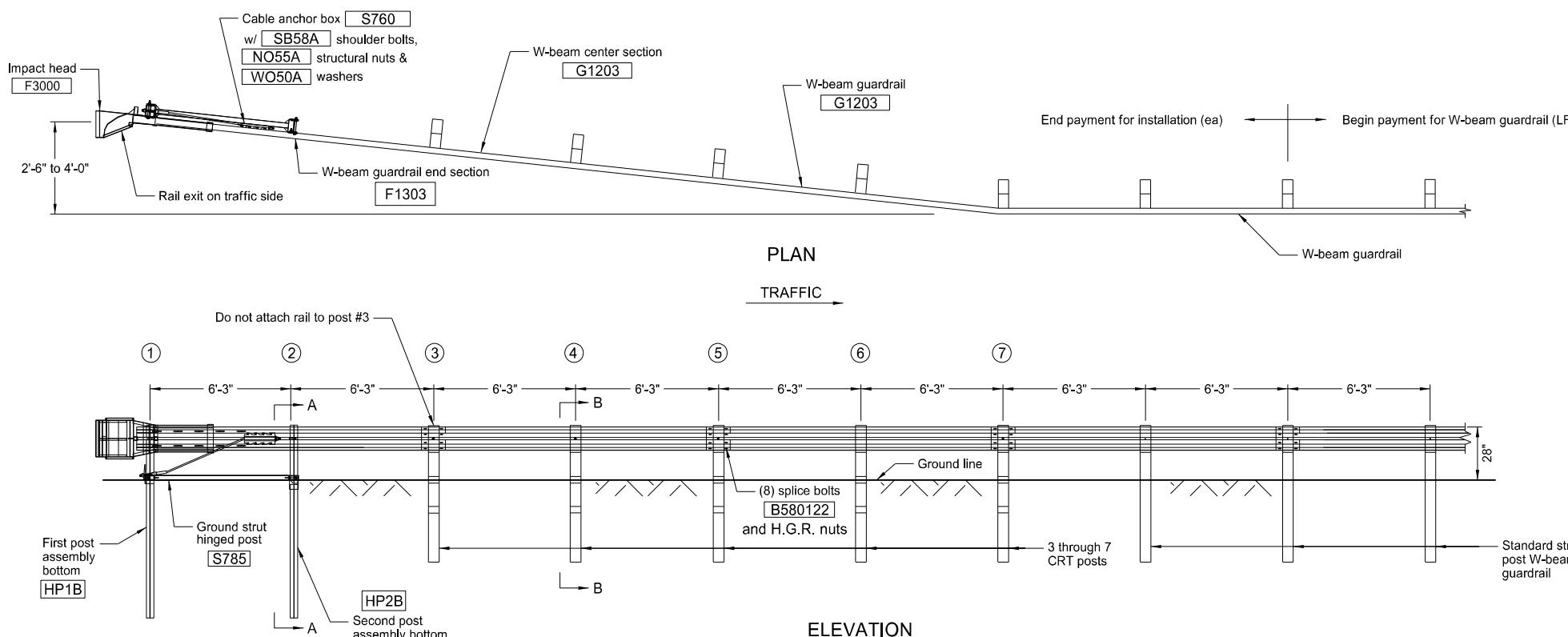


NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

KIRK J. HOFF
 REGISTERED
 PROFESSIONAL
 PE-4683
 ENGINEER
 NORTH DAKOTA
 12 02 2020

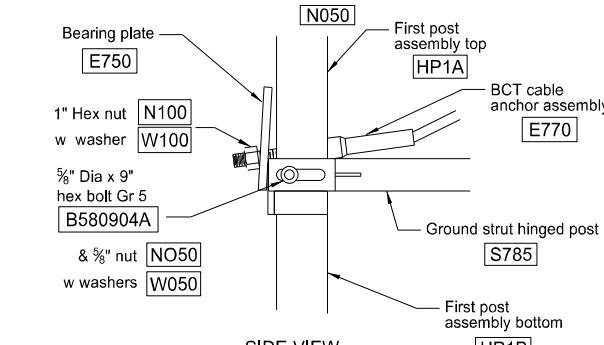
FLARED ENERGY ABSORBING TERMINAL

D-764-6

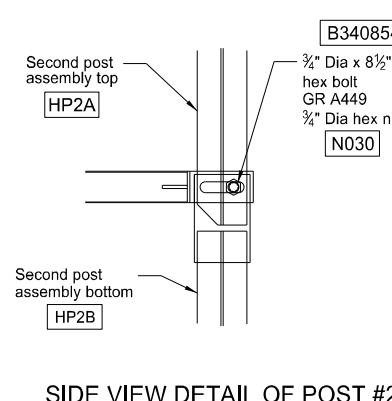


GENERAL NOTES

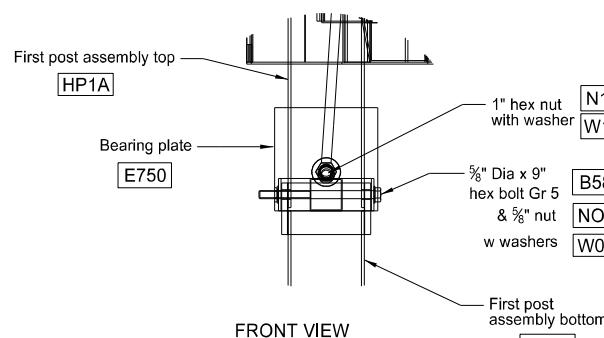
1. Use wood posts with the Flared Energy Absorbing Terminal except posts #1 and #2.
2. Use galvanized bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Grade site as needed to prevent lower sections of the posts from protruding more than 4 inches above the ground (measured along a 60 inch cord).
4. Drive the lower section without the upper post attached. If the post is placed in a drilled hole, compact the backfill material satisfactorily to prevent settlement.
5. When rock is encountered during excavation, use a 12" diameter post hole 20" into the rock surface, if approved by the Engineer. Place granular material in the bottom of hole approximately 2½" deep to provide drainage. Field cut soil tubes to length, place in hole, and back fill with adequately compacted material excavated from hole.
6. Place the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
7. "Toe nail" the wood blockouts to the rectangular wood posts with two 20 penny galvanized nails in each post to prevent them from turning when the wood shrinks.
8. Flare the Flared Energy Absorbing Terminal when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, flare the Flared Energy Absorbing Terminal at the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, turn the Flared Energy Absorbing Terminal parallel to the roadway.



SIDE VIEW

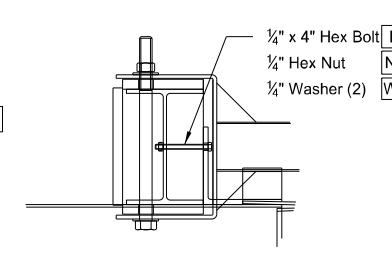


SIDE VIEW DETAIL OF POST #2

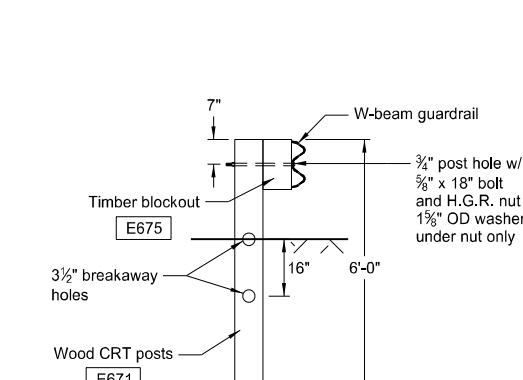
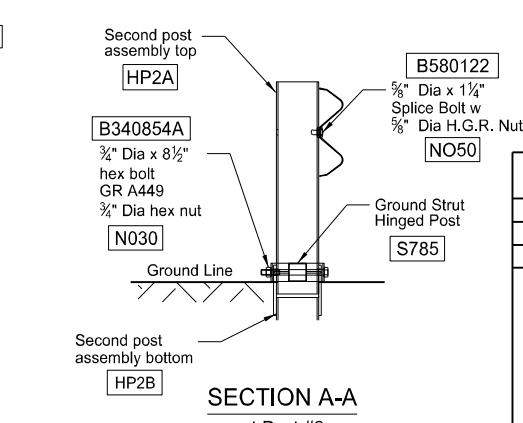


FRONT VIEW

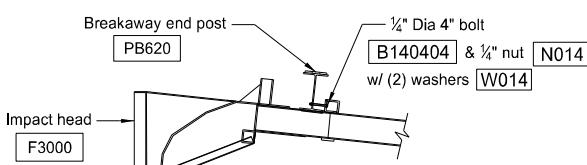
POST #1 CONNECTION DETAILS



IMPACT HEAD CONNECTION DETAIL

SECTION B-B
POST 3 THRU 7SECTION A-A
at Post #2

ITEM #	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA
G1203	2	W-BEAM GUARDRAIL, 12 GA
HP1A	1	FIRST POST ASSEMBLY TOP
HP1B	1	FIRST POST ASSEMBLY BOTTOM
HP2A	1	SECOND POST ASSEMBLY TOP
HP2B	1	SECOND POST ASSEMBLY BOTTOM
P671	5	WOOD CRT POST
P675	5	TIMBER BLOCKOUT OR RECYCLED EQUIVALENT
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT HINGED POST
HARDWARE		
B140404	2	1/4" Dia x 4" HEX BOLT
W014	4	1/4" WASHER
N014	2	1/4" HEX NUT
B580122	17	5/8" Dia x 1 1/4" SPLICE BOLT
B581802	4	5/8" Dia x 10" H.G.R. BOLT (POSTS 3 THRU 6)
B580904A	1	5/8" Dia x 9" HEX BOLT GR 5
W050	5	5/8" WASHER
N050	22	5/8" Dia H.G.R. NUT
B340854A	1	3/4" Dia x 8 1/2" HEX BOLT GR A449
NO30	1	3/4" Dia HEX NUT
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	1/2" A325 STRUCTURAL NUT
W050A	16	1 1/16" OD x 1/16" ID A325 STR. WASHER



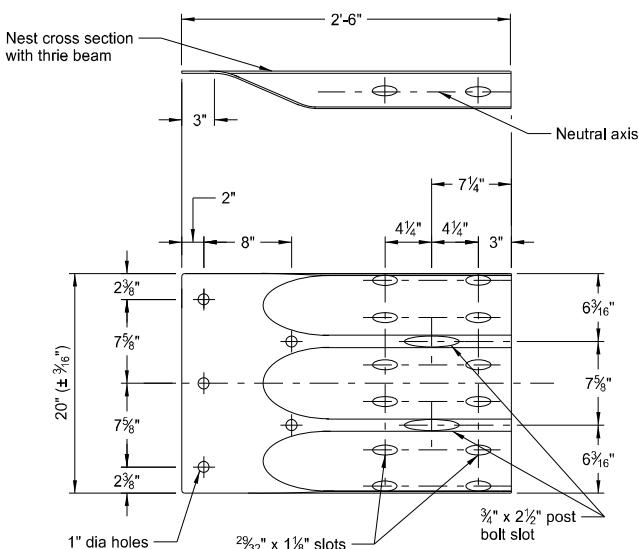
IMPACT HEAD CONNECTING DETAIL

NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Update notes to active voice.

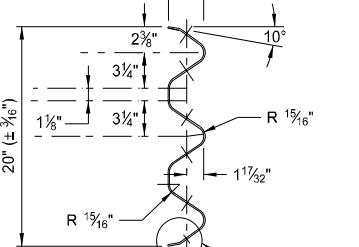


THRIE BEAM TRANSITION TO DOUBLE BOX BEAM RETROFIT

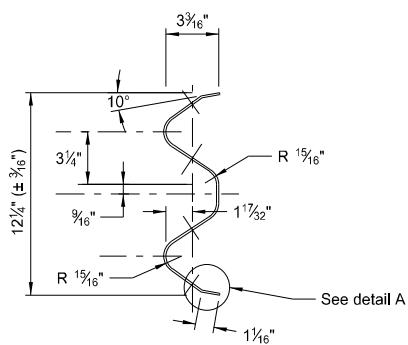
D-764-10



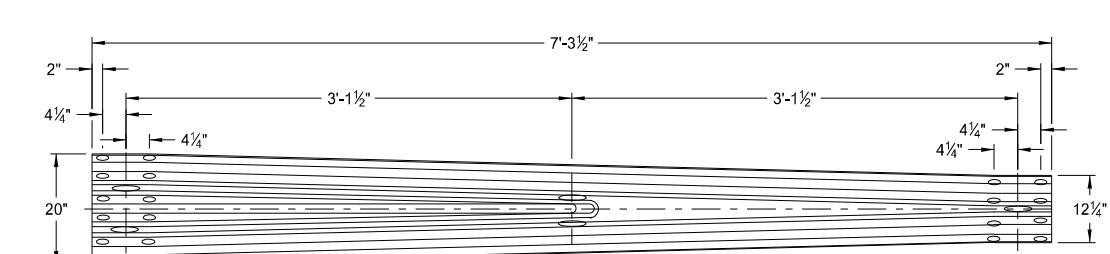
THRIE BEAM TERMINAL CONNECTOR



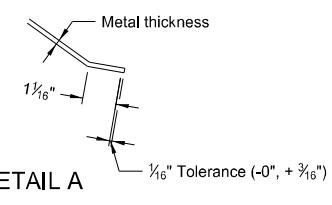
THRIE BEAM END VIEW



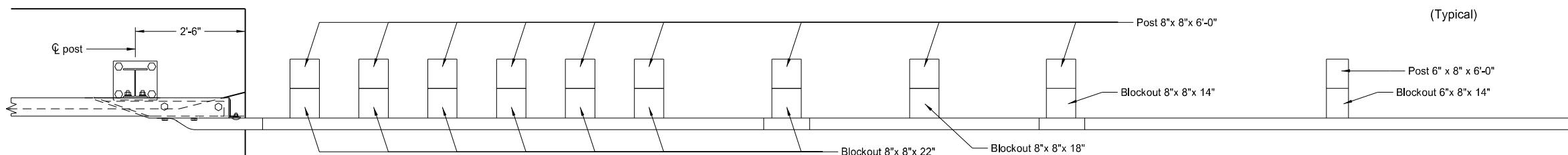
W-BEAM END VIEW



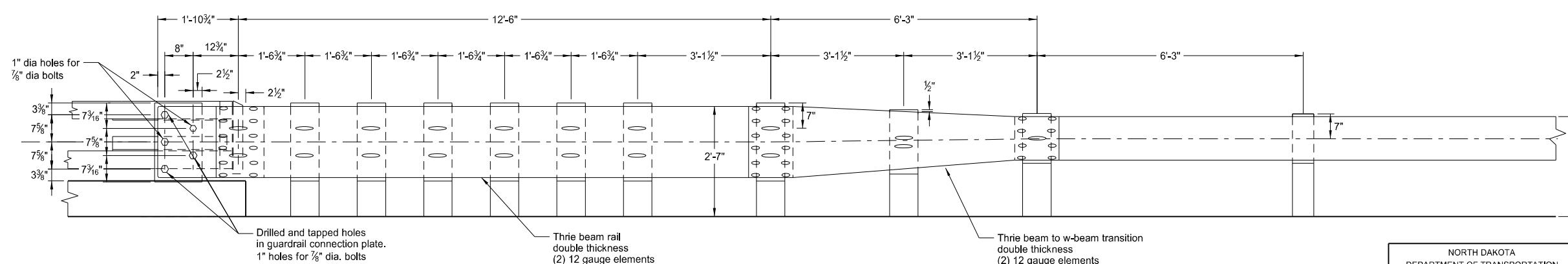
THRIE BEAM TO W-BEAM TRANSITION SECTION



DETAIL A



PLAN



ELEVATION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12/02/20	Updated text to active voice.

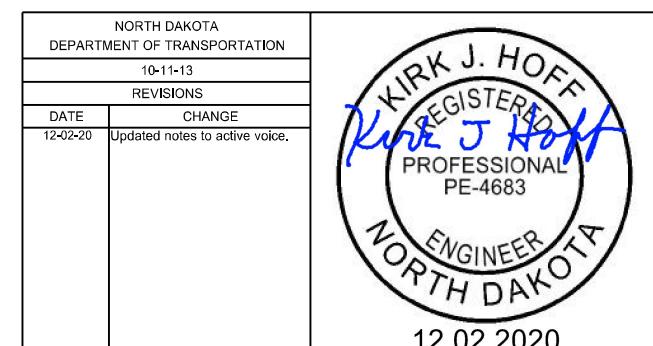
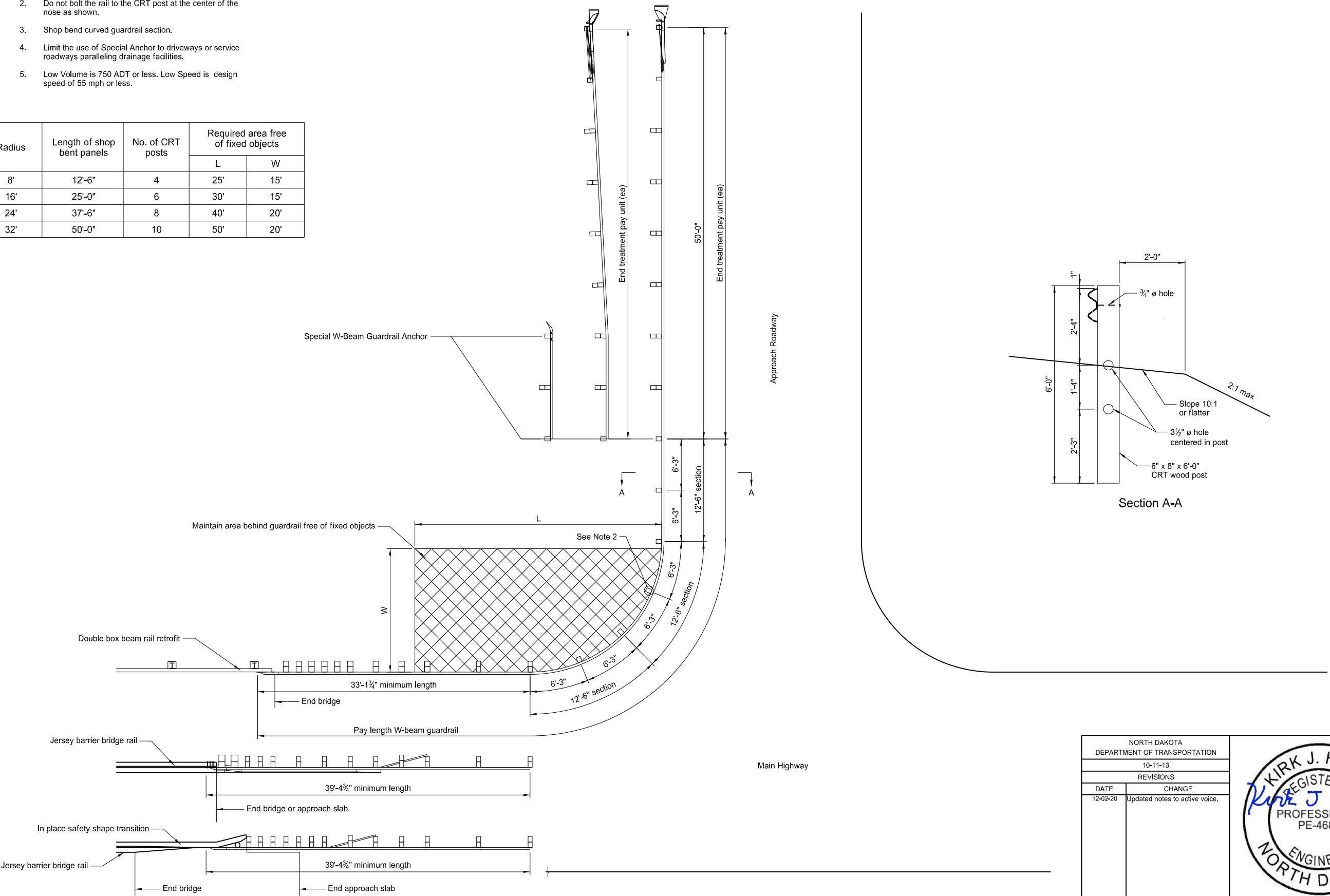
A circular blue ink stamp. The outer ring contains the text 'KIRK J. HOFF' at the top, 'PROFESSIONAL' in the middle, and 'NORTH DAKOTA' at the bottom. The inner circle contains 'REGISTERED' at the top, '1974' in the middle, and 'PE-4683' at the bottom. The date '12 02 2020' is stamped at the bottom of the circle.

W-BEAM GUARDRAIL WITH APPROACHES NEAR BRIDGE FOR LOW VOLUME LOW SPEED ROADWAYS

NOTES:

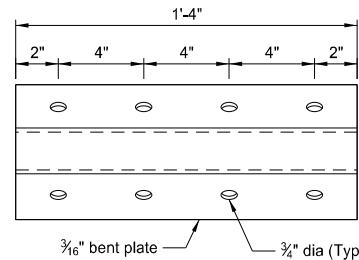
1. Use no washers on the $\frac{3}{8}$ " guardrail bolts connecting the rail to the Controlled Release Terminal (CRT) posts.
2. Do not bolt the rail to the CRT post at the center of the nose as shown.
3. Shop bend curved guardrail section.
4. Limit the use of Special Anchor to driveways or service roadways paralleling drainage facilities.
5. Low Volume is 750 ADT or less. Low Speed is design speed of 55 mph or less.

Radius	Length of shop bent panels	No. of CRT posts	Required area free of fixed objects	
			L	W
8'	12'-6"	4	25'	15'
16'	25'-0"	6	30'	15'
24'	37'-6"	8	40'	20'
32'	50'-0"	10	50'	20'

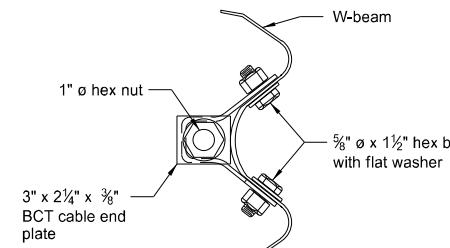
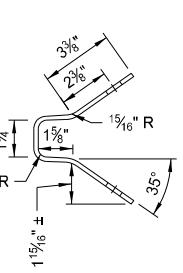


SPECIAL W-BEAM GUARDRAIL ANCHOR

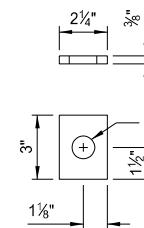
D-764-14



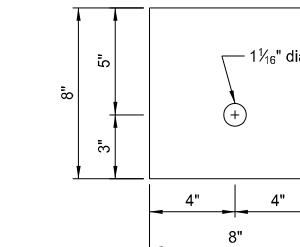
BCT ANCHOR PLATE



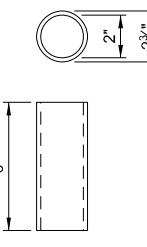
SECTION B-B



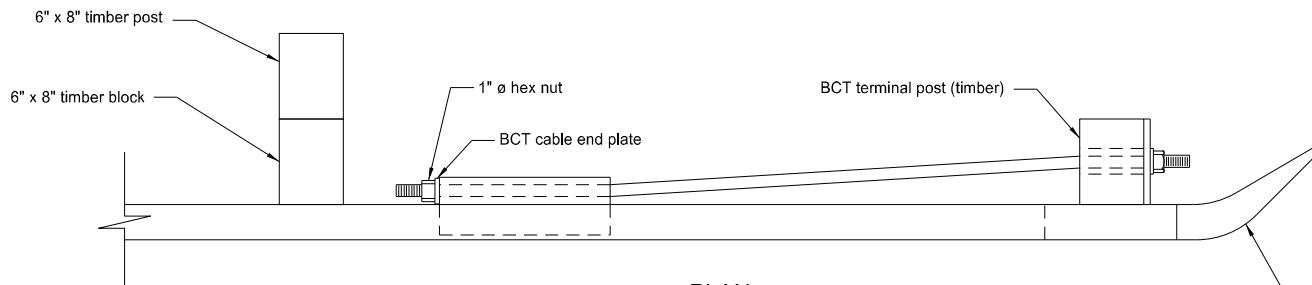
BCT CABLE END PLATE



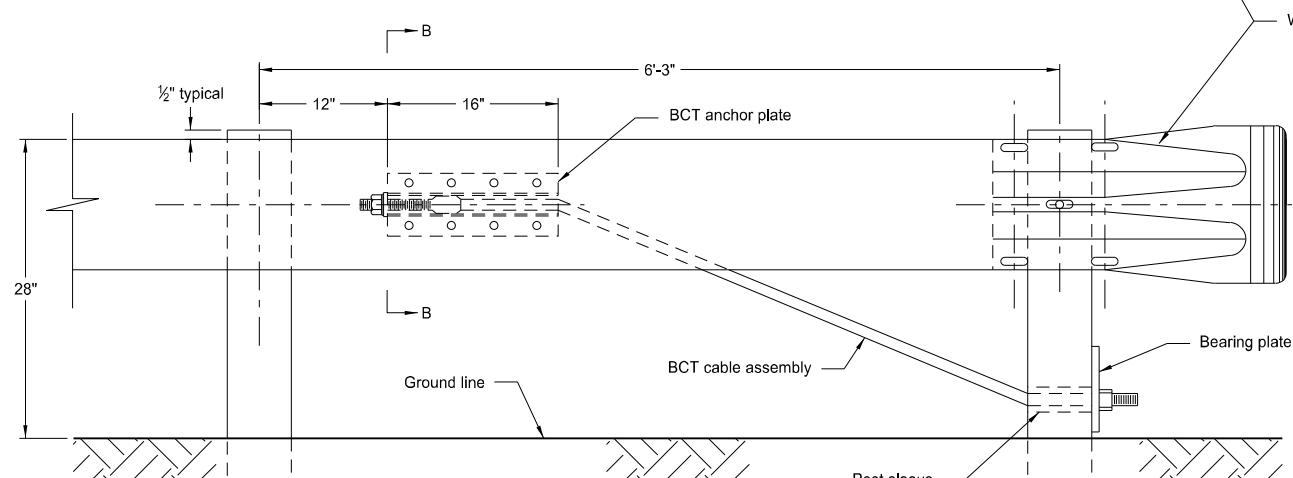
BEARING PLATE



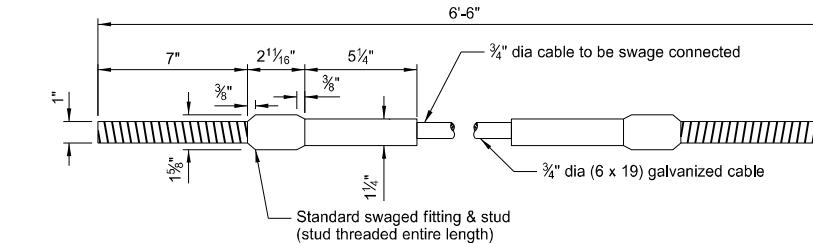
POST SLEEVE



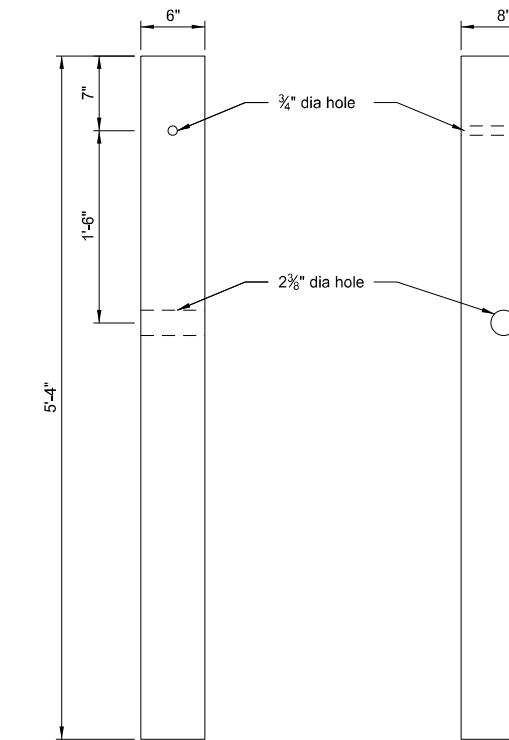
PLAN



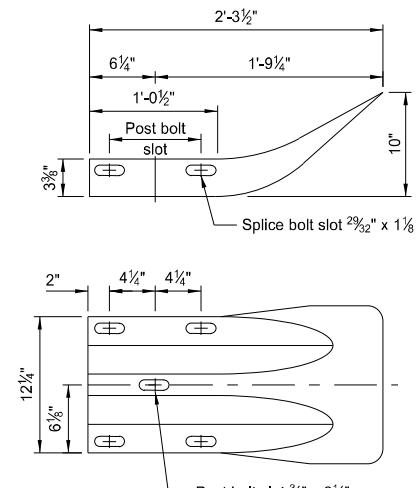
ELEVATION



BCT CABLE ASSEMBLY



BCT TERMINAL POST DETAILS



W BEAM END SECTION (FLARED)

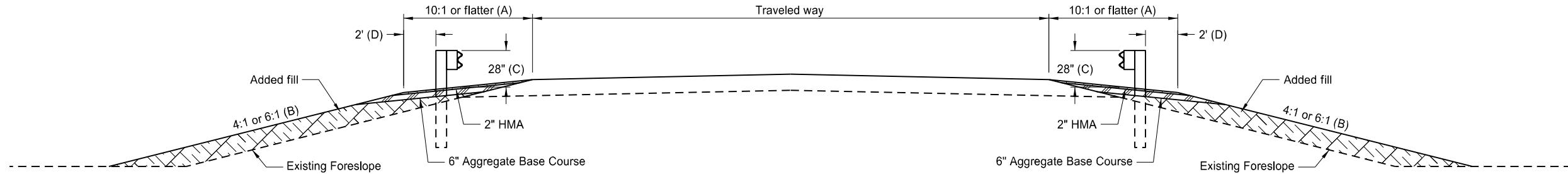
NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12/02/20	Dsn Engr Signature Update



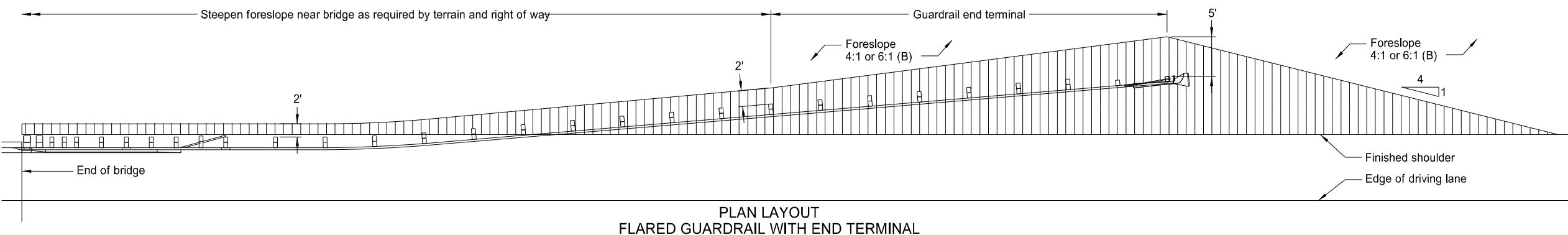
12 02 2020

TYPICAL GRADING AT BRIDGE ENDS
WITH W-BEAM GUARDRAIL

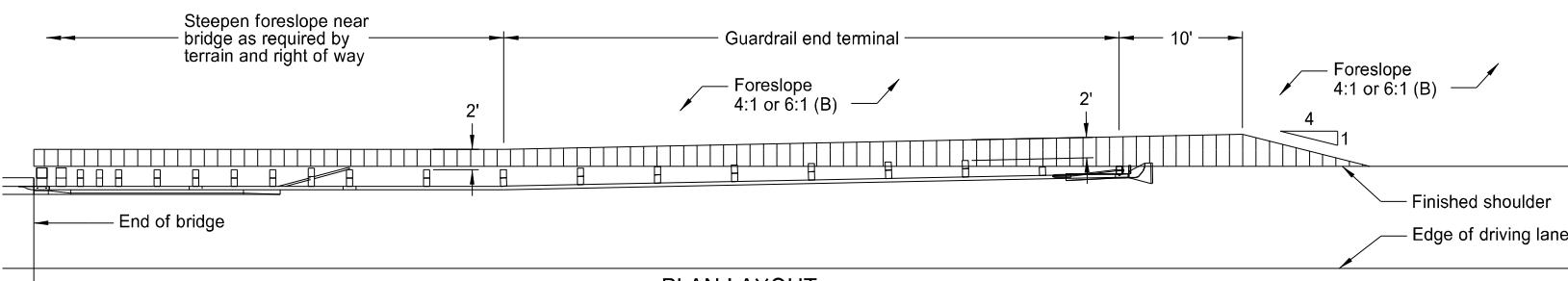
D-764-22



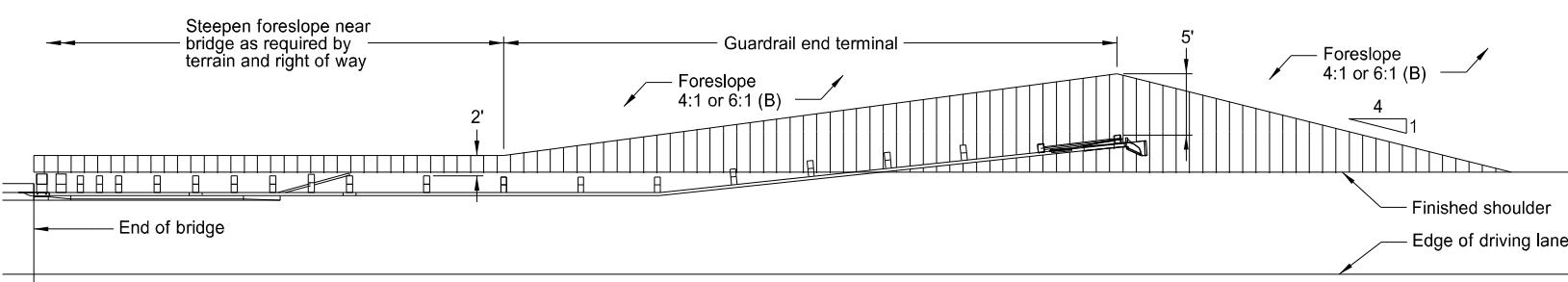
TYPICAL SECTION



PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

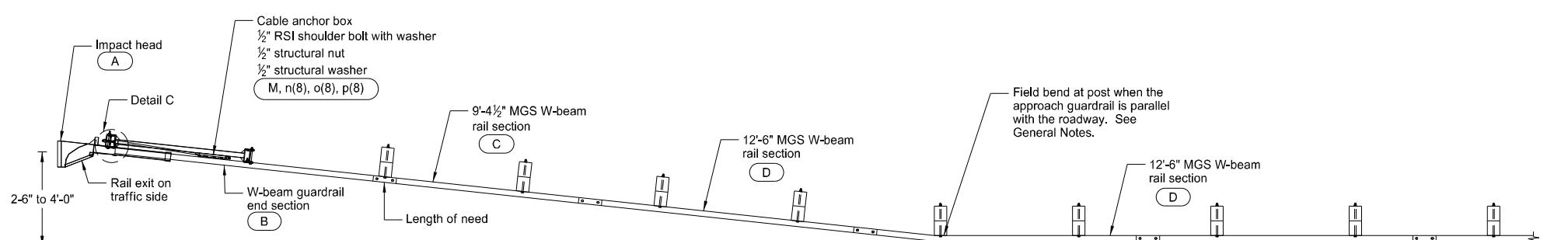
- (A) Use slope flatter than 10:1 when necessary to provide proper guardrail height.
- (B) When normal foreslope is 4:1, use added fill slope of 4:1. When normal foreslope is 6:1, use added fill slope of 6:1.
- (C) Measure from top of guardrail to top of surfacing at front face of guardrail.
- (D) Dimension at end terminals vary per Plan Layouts shown on this sheet.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

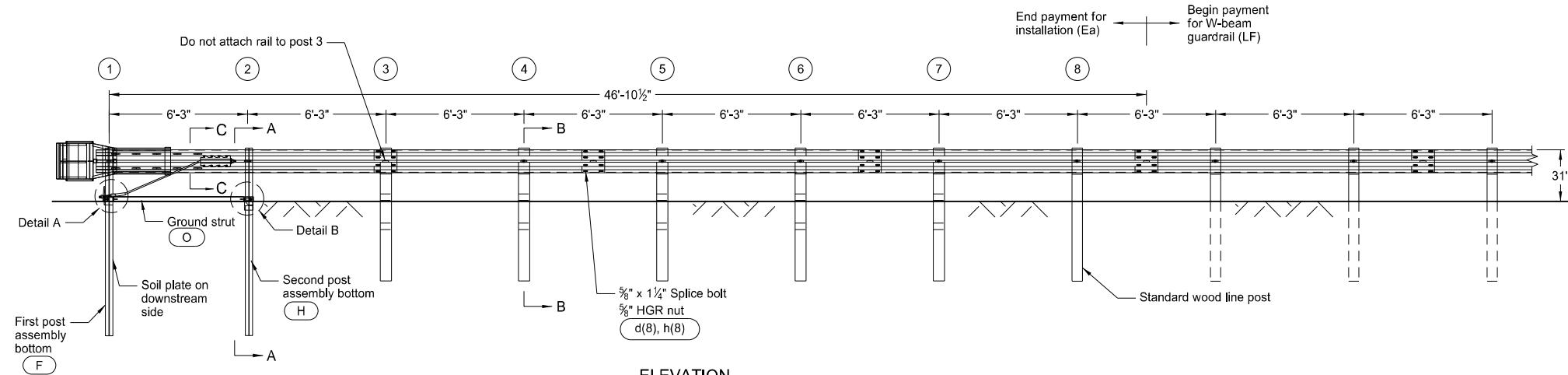


MGS FLARED ENERGY ABSORBING TERMINAL - WOOD POST

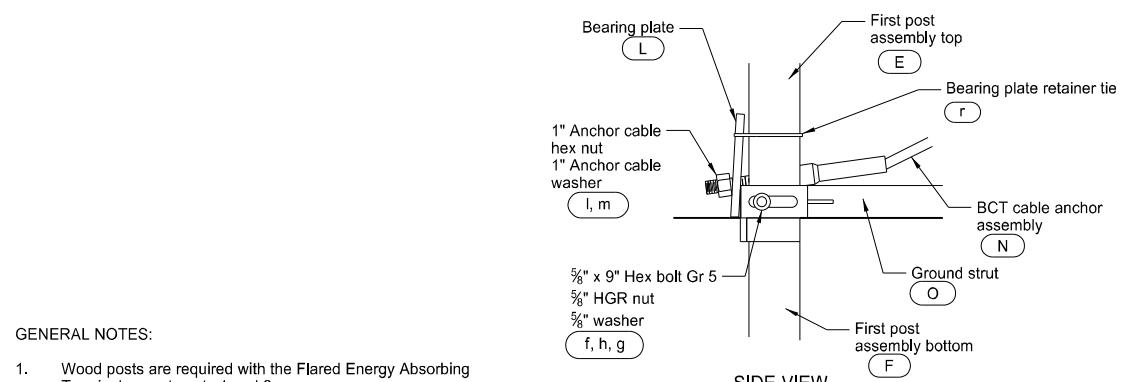
D-764-38



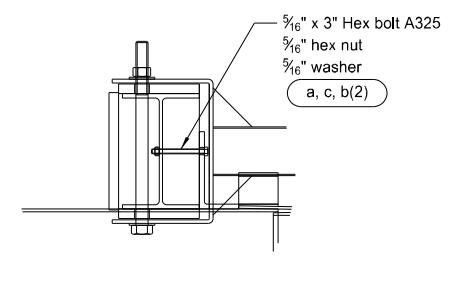
PLAN



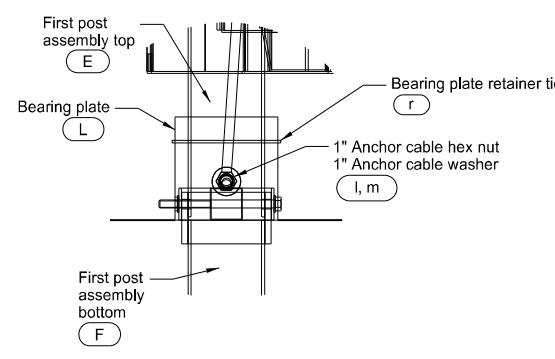
ELEVATION



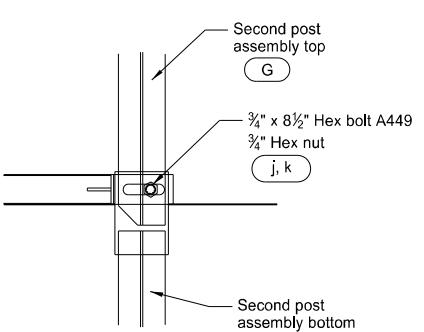
SIDE VIEW



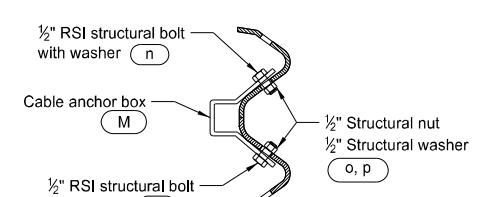
DETAIL C
Post 1 (Impact Head connection)



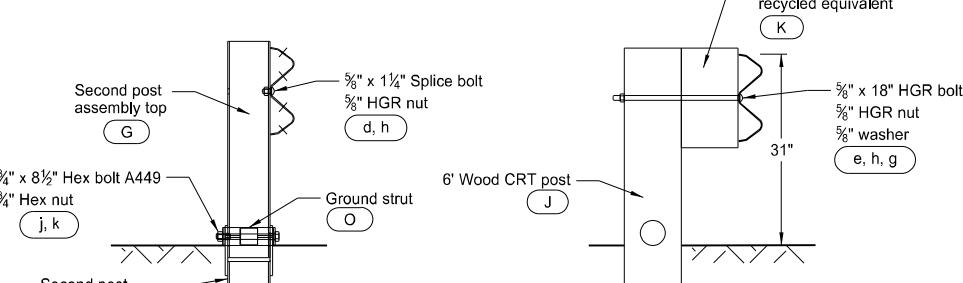
FRONT VIEW
DETAIL A
Post 1



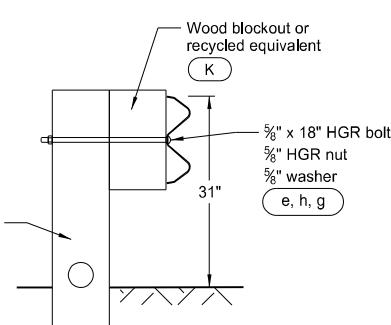
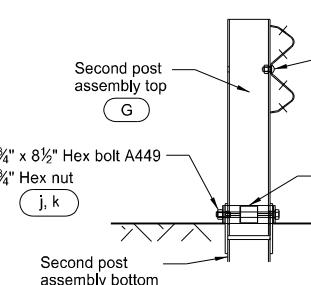
DETAIL B
Post 2



SECTION C-C



SECTION A-A
Post 2



SECTION B-B
Posts 3 through 7

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.



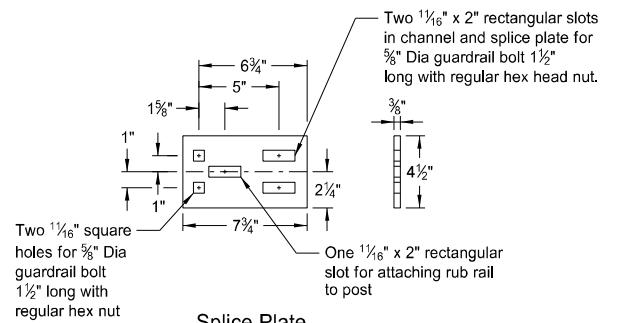
ITEM	ITEM NO.	BILL OF MATERIALS	QTY
A	F3000	IMPACT HEAD	1
B	SF1303	W-BEAM GUARDRAIL END SECTION, 12 Ga	1
C	G12025	9'-4 1/2" MGS W-BEAM RAIL SECTION, 12 Ga	1
D	G1203A	12'-6" MGS W-BEAM RAIL SECTION, 12 Ga	2
E	UHP1A	FIRST POST ASSEMBLY TOP	1
F	HP1B	FIRST POST ASSEMBLY BOTTOM	1
G	UHP2A	SECOND POST ASSEMBLY TOP	1
H	HP2B	SECOND POST ASSEMBLY BOTTOM	1
J	UP671	WOOD CRT POST	5
K	P675	WOOD BLOCKOUT OR RECYCLE EQUIVALENT	5
L	E750	BEARING PLATE	1
M	S760	CABLE ANCHOR BOX	1
N	E770	BCT CABLE ANCHOR ASSEMBLY	1
O	S785	GROUND STRUT HINGED POST	1
HARDWARE			
a	B5160304A	5/16" x 3" HEX BOLT A325	2
b	W0516	5/16" WASHER	4
c	N0516	5/16" HEX NUT	2
d	B580122	5/8" Dia x 1 1/4" SPLICE BOLT	33
e	B581802	5/8" Dia X 18" HGR BOLT	5
f	B580904A	5/8" Dia x 9" HEX BOLT GRD 5	1
g	W050	5/8" WASHER	7
h	N050	5/8" Dia HGR NUT	39
j	B340854A	3/4" Dia x 8 1/2" HEX BOLT GRD A449	1
k	N030	3/4" Dia HEX NUT	1
l	N100	1" ANCHOR CABLE HEX NUT	2
m	W100	1" ANCHOR CABLE WASHER	2
n	SB12A	1/2" RSI SHOULDER BOLT WITH WASHER	8
o	N012A	1/2" STRUCTURAL NUT	8
p	W012A	1/2" STRUCTURAL WASHER	8
r	CT-100ST	BEARING PLATE RETAINER TIE	1

NOTE: Standard wood line post, block, and associated hardware not included in Bill of Materials.

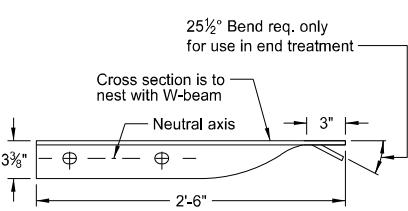
GENERAL NOTES:

- Wood posts are required with the Flared Energy Absorbing Terminal except posts 1 and 2.
- Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
- Flare the Flared Energy Absorbing Terminal when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, ensure the Flared Energy Absorbing Terminal has only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, ensure the Flared Energy Absorbing Terminal is turned parallel to the roadway.
- Site grade as necessary to ensure the lower sections of the posts do not protrude more than 4" above the ground (measured along a 5' cord).
- Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material to prevent settlement.
- Install the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent cable from twisting when tightening nuts.
- "Toe nail" the wood blockouts to the rectangular wood posts with two 20 penny galvanized nails to prevent them from turning when the wood shrinks.

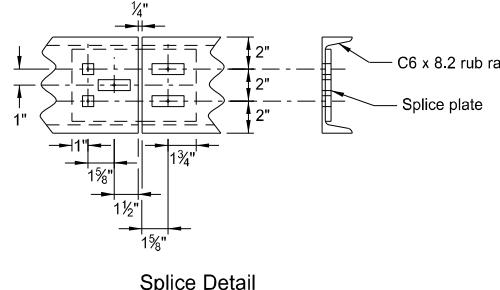
MGS W-BEAM GUARDRAIL GENERAL DETAILS



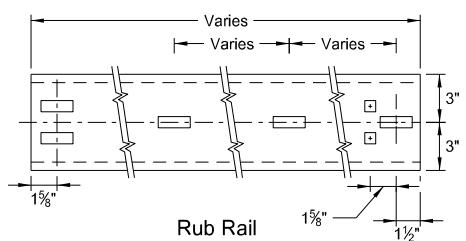
Splice Plate



Bend & hole only required to modify connector for use in end treatment.

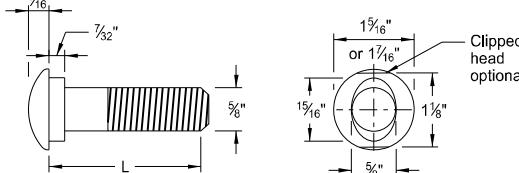


Splice Detail



W BEAM TERMINAL CONNECTOR

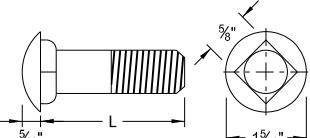
C6x8.2 RUB RAIL AND SPLICING PLATE



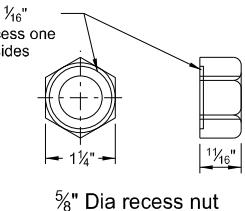
SPLICING DETAIL

NOTE: Do not install center bolt in the $\frac{3}{4}'' \times 2\frac{1}{2}''$ slot at mid span splices.

5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/8" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length

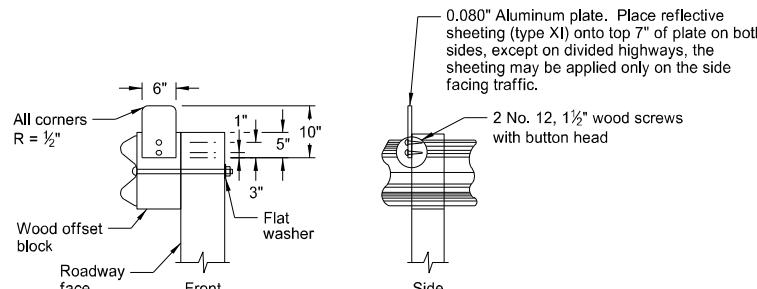


5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length



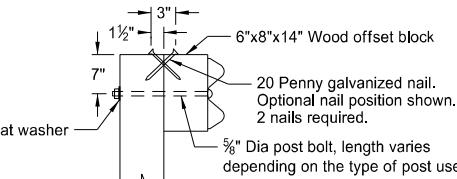
5/8" GUARDRAIL BOLT & RECESS NUT

5/8" CARRIAGE BOLT & NUT

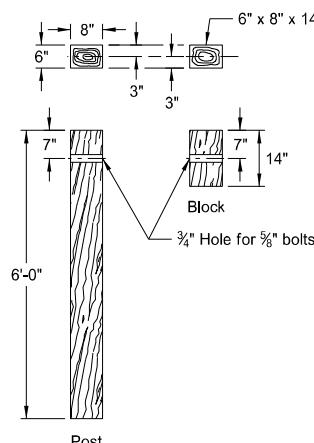


REFLECTORIZED PLATE DETAIL

NOTE: Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.

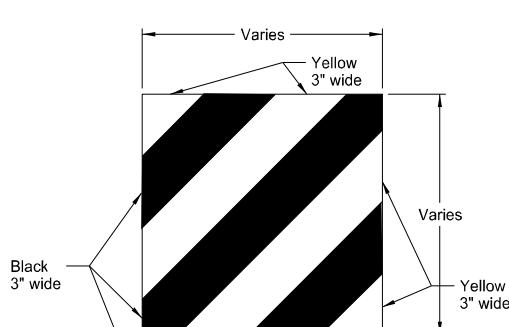


TYPICAL WOOD POST ATTACHMENT DETAIL



6" x 8" WOOD POST & BLOCK

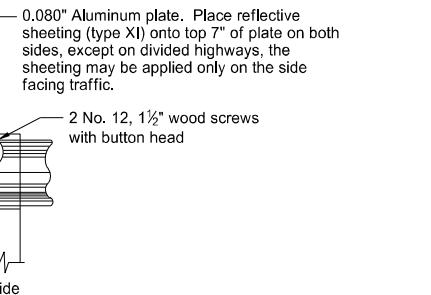
NOTE: Where soil conditions require, alternate lengths may be specified, in 6" increments.



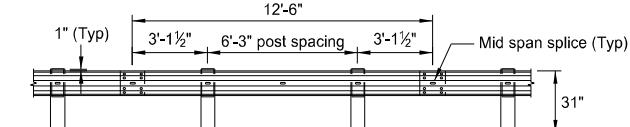
IMPACT HEAD OBJECT MARKER

NOTES:

1. Begin reflector plates at the first post and space at 25' centers on guardrail less than 250' length and at 50' centers for guardrail over 250' length. Provide the reflector the same color as the pavement marking adjacent to it unless noted otherwise on the plans.
2. Replacing bituminous material at guardrail post: Dispose all excess earth from excavations for guard posts as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. Fit the Object Marker within the vertical edges of the Impact Plate. Provide type XI retroreflective sheeting meeting the requirements of Section 894.02.E of the standard specifications. Apply the sheeting to 0.100 Aluminum sheeting meeting the requirements of Section 894.01.A. Attach the Object Marker to the Impact Head Plate with rivets or other attachment device. Ensure the rivets or attachment device are non-rust. Slope the stripes downward toward the roadway side.
4. Guardrail installation height tolerance = $\pm 1''$.

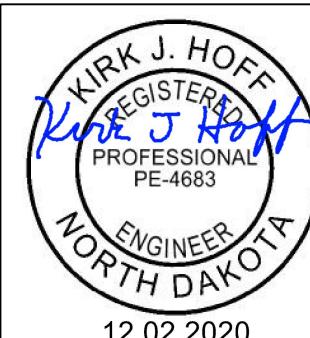


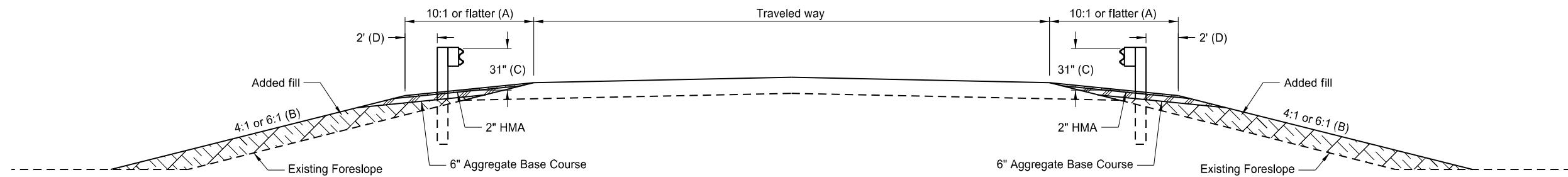
STANDARD MGS GUARDRAIL PANEL



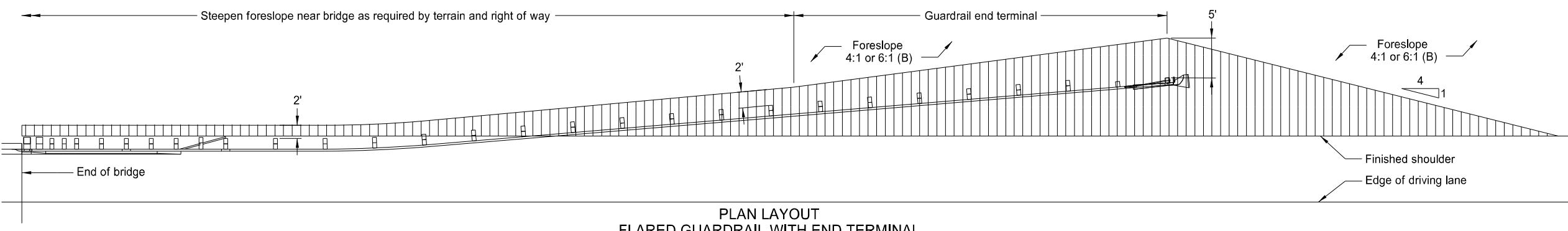
STANDARD MGS GUARDRAIL SYSTEM

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated clipped head to optional

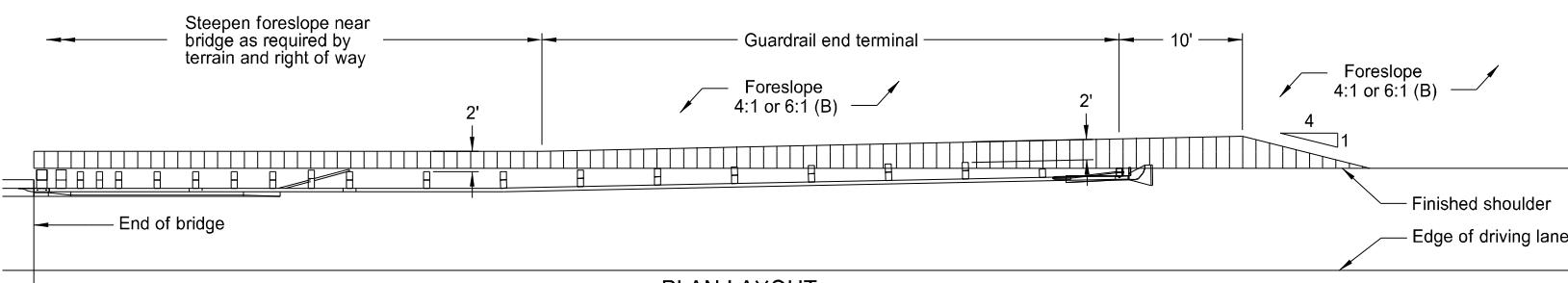




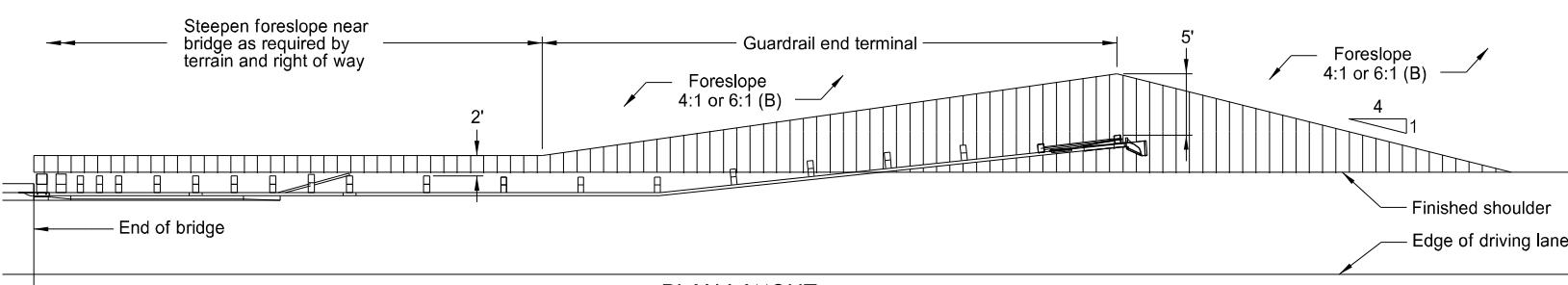
TYPICAL SECTION



PLAN LAYOUT FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



PLAN LAYOUT NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

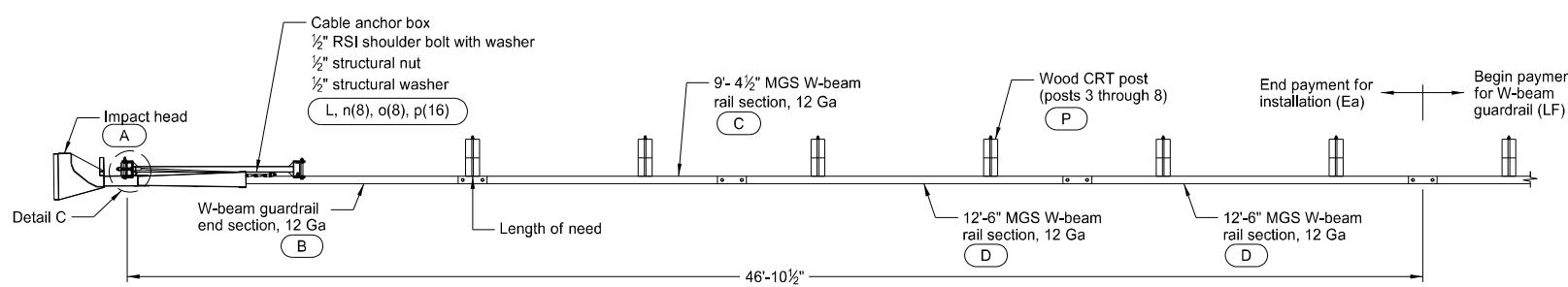
- (A) Use slope flatter than 10:1 when required to provide proper guardrail height.
- (B) When normal foreslope is 4:1, use added fill slope of 4:1. When normal foreslope is 6:1, use added fill slope of 6:1.
- (C) Measure from top of guardrail to top of surfacing at front face of guardrail.
- (D) Vary dimension at end terminals per Plan Layouts shown on this sheet.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12/02/20	Updated notes to active voice.

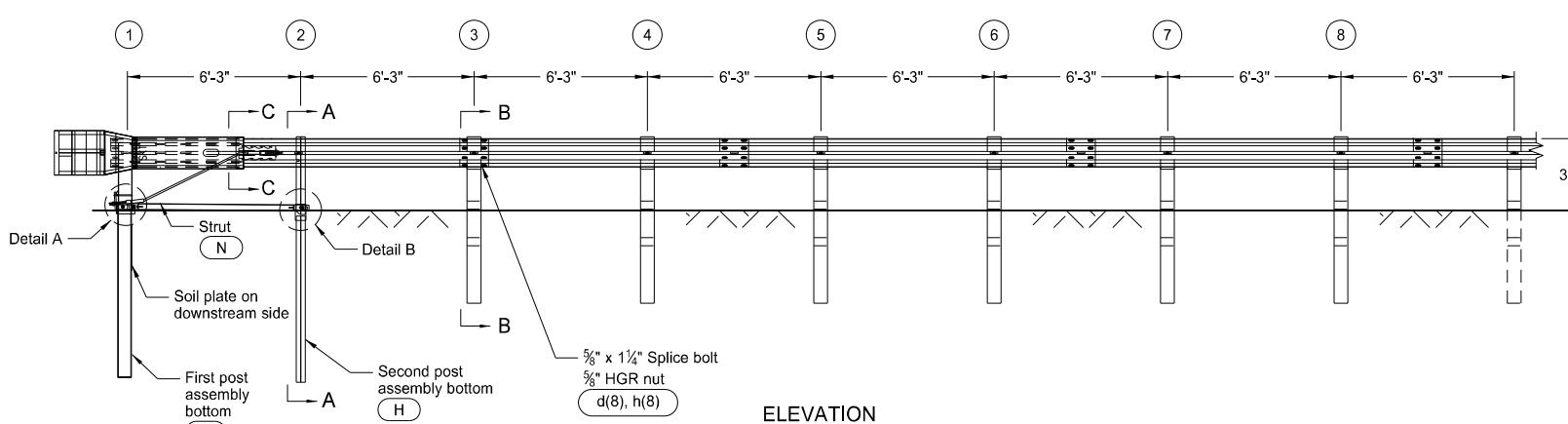


MASH SEQUENTIAL KINKING TERMINAL - WOOD POST

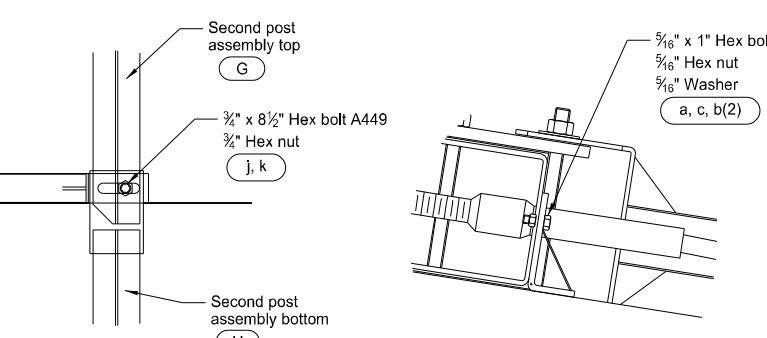
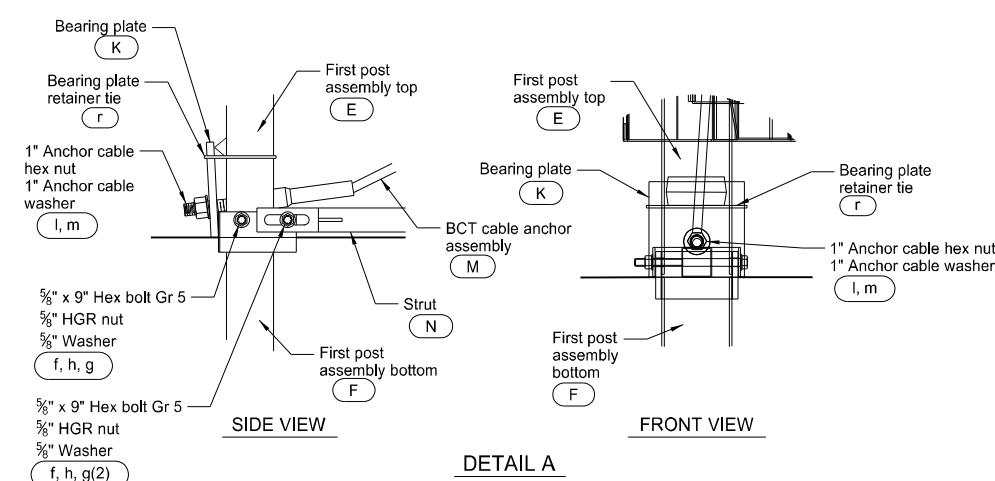
D-764-51



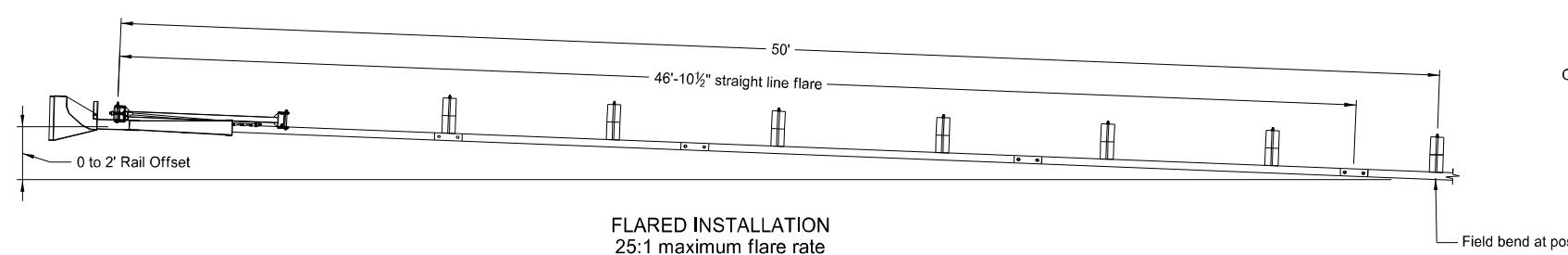
PLAN



ELEVATION



DETAIL A Post 1
DETAIL B Post 2

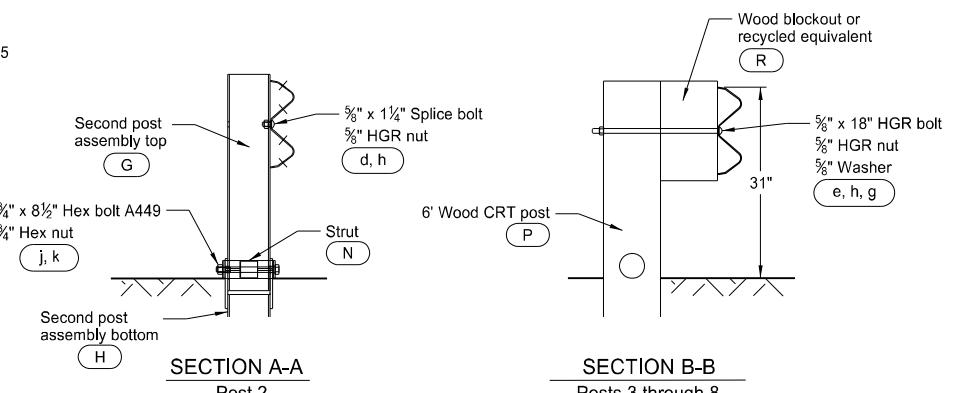


FLARED INSTALLATION
25:1 maximum flare rate

GENERAL NOTES:

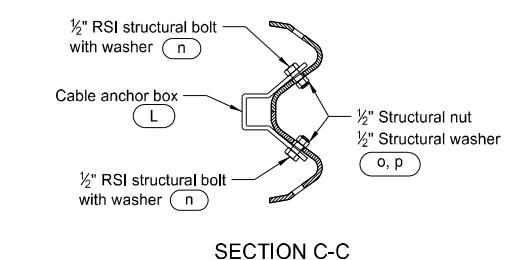
1. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
2. Flare the MSKT at a rate of up to 25:1, as needed to prevent the impact head from encroaching on the shoulder.
3. Site grade as necessary to ensure the lower sections of posts do not protrude more than 4" above the ground (measured along a 5' cord).
4. Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material to prevent settlement.
5. Install breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
6. "Toe nail" the wood blockouts to the rectangular wood posts at post 3 through post 8 with two 20 penny galvanized nails to prevent them from turning when the wood warps.

ITEM	ITEM NO.	BILL OF MATERIALS	QTY
A	MS3000	IMPACT HEAD	1
B	SF1303	W-BEAM GUARDRAIL END SECTION, 12 Ga	1
C	G12025	9'-4 1/2" MGS W-BEAM RAIL SECTION, 12 Ga	1
D	G1203A	12'-6" MGS W-BEAM RAIL SECTION, 12 Ga	2
E	MTPHP1A	FIRST POST ASSEMBLY TOP (6" X 6" X 1/8" Tube)	1
F	MTPHP1B	FIRST POST ASSEMBLY BOTTOM (6" W6X15)	1
G	UHP2A	SECOND POST ASSEMBLY TOP	1
H	HP2B	SECOND POST ASSEMBLY BOTTOM	1
K	E750	BEARING PLATE	1
L	S760	CABLE ANCHOR BOX	1
M	E770	BCT CABLE ANCHOR ASSEMBLY	1
N	MS785	STRUT	1
P	UP671	6' WOOD CRT POST	6
R	P675	WOOD BLOCKOUT OR RECYCLED EQUIVALENT	6
		HARDWARE	
a	B5160104A	5/16" x 1" HEX BOLT GR 5	2
b	W0516	5/16" WASHER	4
c	N0516	5/16" HEX NUT	2
d	B580122	5/8" Dia x 1 1/4" SPLICE BOLT	33
e	B581802	5/8" Dia x 18" HGR BOLT (POSTS 3 THRU 8)	6
f	B580904A	5/8" x 9" HEX BOLT GR 5	2
g	W050	5/8" WASHER	9
h	N050	5/8" Dia HGR NUT	35
j	B340854A	3/4" Dia x 8 1/2" HEX BOLT GRD A449	1
k	N030	3/4" Dia HEX NUT	1
l	N100	1" ANCHOR CABLE HEX NUT	2
m	W100	1" ANCHOR CABLE WASHER	2
n	SB12A	1/2" RSI SHOULDER BOLT WITH WASHER	8
o	N012A	1/2" STRUCTURAL NUT	8
p	W012A	1/2" STRUCTURAL WASHER	8
r	CT-100ST	BEARING PLATE RETAINER TIE	1



SECTION A-A
Post 2

SECTION B-B
Posts 3 through 8



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

