

NDDOT ABBREVIATIONS

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

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D-20-2

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

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

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NDDOT UTILITY COMPANY ABBREVIATIONS

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 All PI Alliance Pipeline
 ALL SEAS WU All Seasons Water Users Association
 AMOCO PI Amoco Pipeline Company
 AMRDA HESS Amerada Hess Corporation
 AT&T AT&T Corporation
 B PAW Bear Paw Energy Incorporated
 BASIN ELEC Basin Electric Cooperative Incorporated
 BEK TEL Bek Communications Cooperative
 BELLE PL Belle Fourche Pipeline Company
 BNSF Burlington Northern Santa Fe Railway
 BOEING Boeing
 BRNS RWD Barnes Rural Water District
 BURK-DIV ELEC Burke-Divide Electric Cooperative
 BURL WU Burleigh Water Users
 Cable One Cable One
 CABLE SERV Cable Services
 CAP ELEC Capital Electric Cooperative Incorporated
 CASS CO ELEC Cass County Electric Cooperative
 CASS RWU Cass Rural Water Users Incorporated
 CAV ELEC Cavalier Rural Electric Cooperative
 CBLCOM Cablecom Of Fargo
 CENEX PL Cenex Pipeline
 CENT PWR ELEC Central Power Electric Cooperative
 CONS TEL Consolidated Telephone
 CONT RES Continental Resource Inc
 CPR Canadian Pacific Railway
 D O E Department Of Energy
 DAK CARR Dakota Carrier Network
 DAK CENT TEL Dakota Central Telephone
 DAK RWD Dakota Rural Water District
 DGC Dakota Gasification Company
 DICKEY R NET Dickey Rural Networks
 DICKEY RWU Dickey Rural Water Users Association
 DICKEY TEL Dickey Telephone
 DNRR Dakota Northern Railroad
 DOME PL Dome Pipeline Company
 DVELEC Dakota Valley Electric Cooperative
 DVMW Dakota, Missouri Valley & Western
 ENBRDG Enbridge Pipelines Incorporated
 FALK MNG Falkirk Mining Company
 G FKS-TRL WD Grand Forks-trail Water District
 GETTY TRD & TRAN Getty Trading & Transportation
 GLDN W ELEC Golden West Electric Cooperative
 GRGS CO TEL Griggs County Telephone
 GT PLNS NAT GAS Great Plains Natural Gas Company
 HALS TEL Halstad Telephone Company
 INT-COMM TEL Inter-Community Telephone Company
 KANEB PL Kaneb Pipeline Company

KEM ELEC Kem Electric Cooperative Incorporated
 KOCH GATH SYS Koch Gathering Systems Incorporated
 LKHD PL Lakehead Pipeline Company
 LNGDN RWU Langdon Rural Water Users Incorporated
 LWR YELL R ELEC Lower Yellowstone Rural Electric
 MCKNZ CON McKenzie Consolidated Telcom
 MCKNZ WRD McKenzie County Water Resource District
 MCKNZ ELEC McKenzie Electric Cooperative
 MCLEOD Mcleod USA
 MCLN ELEC Mclean Electric Cooperative
 MCLN-SHRDN R WAT Mclean-Sheridan Rural Water
 MDU Montana-dakota Utilities
 MID-CONT CABLE Mid-Continent Cable
 MIDSTATE TEL Midstate Telephone Company
 MINOT CABLE Minot Cable Television
 MINOT TEL Minot Telephone Company
 MISS W W S Missouri West Water System
 MNKOTA PWR Minnkota Power
 MRE LBTY TEL Moore & Liberty Telephone
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative
 MOUNT-WILLI ELEC Mountrail-williams Electric Cooperative
 MUNICIPAL City Of '.....'
 MUNICIPAL City Water And Sewer
 N CENT ELEC North Central Electric Cooperative
 N VALL W DIST North Valley Water District
 ND PKS & REC North Dakota Parks And Recreation
 ND TEL North Dakota Telephone Company
 NDDOT North Dakota Department of Transportation
 NDSU SOIL SCI DEPT Ndsu Soil Science Department
 NEMONT TEL Nemont Telephone
 NODAK R ELEC Nodak Rural Electric Cooperative
 NOON FRMS TEL Noonan Farmers Telephone Company
 NPR Northern Plains Railroad
 NSP Northern States Power
 NTH PRAIR RW Northern Prairie Rural Water Association
 NTHN BRDR PL Northern Border Pipeline
 NTHN PLNS ELEC Northern Plains Electric Cooperative Incorporated
 NTHWSTRN REF Northwestern Refinery Company
 NW COMM Northwest Communication Cooperation
 OTTR TL PWR Otter Tail Power Company
 P L E M Prairielands Energy Marketing
 POLAR COM Polar Communications
 QWEST Qwest Communications
 R&T W SUPPLY R & T Water Supply Association
 RAMSEY R SEW Ramsey Rural Sewer Association
 RAMSEY RW Ramsey Rural Water Association
 RAMSEY UTIL Ramsey County Rural Utilities
 RED RIV TEL Red River Rural Telephone
 RESVTN TEL Reservation Telephone
 ROBRTS TEL Roberts Company Telephone
 R-RIDER ELEC Roughrider Electric Coop

RRVW Red River Valley & Western Railroad
 RSR ELEC R.S.R. Electric Cooperative
 S E W U South East Water Users Incorporated
 SCOTT CABLE Scott Cable Television Dickinson
 SHERDN ELEC Sheridan Electric Cooperative
 SHEYN VLY ELEC Sheyenne Valley Electric Cooperative
 SKYTECH Skyland Technologies Incorporated
 SLOPE ELEC Slope Electric Cooperative
 SLOPE ELEC Slope Electric Cooperative Incorporated
 SOURIS RIV TELCOM Souris River Telecommunications
 ST WAT COMM State Water Commission
 STATE LN WATER State Line Water Cooperative
 STUT RWU Stutsman Rural Water Users
 T M C Turtle Mountain Communications
 TCI TCI of North Dakota
 TRI-CNTY WU Tri-County Water Users Incorporated
 TRL CO RWU Traill County Rural Water Users
 UNTD TEL United Telephone
 UPPR SOUR WUA Upper Souris Water Users Association
 US SPRINT U.S. Sprint
 USAF MSL CABLE U.S.A.F. Missile Cable
 USW COMM U.S. West Communications
 VRNDRY ELEC Verendrye Electric Cooperative
 W RIV TEL West River Telephone Incorporated
 WEB W. E. B. Water Development Association
 WILLI RWA Williams Rural Water Association
 WILSTN BAS PL Williston Basin Interstate Pipeline Company
 WLSH RWD Walsh Water Rural Water District
 WOLVRTN TEL Wolverton Telephone
 XLENER Xcel Energy
 YSVR Yellowstone Valley Railroad

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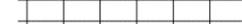
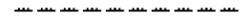
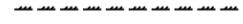
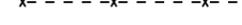
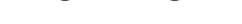
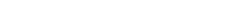
Line Styles

.....	Limits of Const Transition Line	—— s —— s ——	Floating Silt Curtain	—— ——— ———	Existing Aggregate (Cross Section View)	- - - - -	Existing Centerline
.....	Bale Check	—— ——— T ——	Existing Telephone Line	—— ——— ———	Existing Curb and Gutter (Cross Section View)	- - - - -	Supplemental Contour
.....	Rock Check	—— ——— TV ——	Existing TV Line	—— ——— ———	Existing Riprap	—— - - - - -	Right of Way
.....	Sight Distance Triangle Line	Void — void — void — v	Existing Assumed Ground (Not Surveyed)	—— ——— ———	Existing Underground Vault or Lift Station	—— - - - - -	Existing Right of Way
- - - - -	Small Hidden Object	Void — void — void — v	Tentative Ground Line	—— ——— ———	Tangent Line	—— - - - - -	Existing Right of Way Railroad
- - - - -	Dimension Leader	—— ——— w ——	Existing Water or Steam Line	- - - - -	Hidden Object	- - - - -	Failure Line
- - - - -	Existing Ground	=====	Existing Under Drain	—— ——— ———	Existing Dirt Surface	- - - - -	Existing Conditions
- - - - -	Existing Topsoil (Cross Section View)	=====	Under Drain	—— ——— ———	Existing Conduit	- - - - -	Existing Ground (Details)
—— ——— ———	Large Hidden Object	=====	Wall	—— ——— ———	Topsoil Profile	—— - - - - -	Existing Sixteenth Section Line
—— ——— ———	Edge Drain	=====	Existing Slotted Drain	- - - - -	Existing Conductor	- - - - -	Existing Right of Way Not State Owned
—— D —— D ——	Geotextile Fabric Type D	—— + —— + ——	Existing Cemetary Boundary	- - - - -	Conductor	- - - - -	Phantom Object
—— ——— E ——	Existing Electrical	—— ——— ———	Centerline Pavement Marking	- - - - -	Fiber Optic	- - - - -	Centerline Main
—— ——— FO ——	Existing Fiber Optic Line	=====	Barrier with Centerline Pavement Marking	- - - - -	Existing Loop Detector	-	Existing Guardrail Cable
—— ——— FO ——	Existing TV Fiber Optic	=====	Barrier Pavement Marking	- - - - -	Subgrade, Subcut or Ditch Grade	— . — . — . — .	Existing Guardrail Metal
—— ——— G ——	Existing Gas Pipe	- - - - -	Stripe 4 IN Dotted Extension White	—— ——— ———	Existing Asphalt Surface	—— . ——— . ——— .	Existing Edge of Water
—— Geo —— Geo ——	Geogrid	- - - - -	Stripe 8 IN Dotted Extension White	—— ——— ———	Existing Asphalt (Cross Section View)	- - - - -	Excavation Limits
—— ——— OH ——	Existing Overhead Utility Line	- - - - -	Stripe 8 IN Lane Drop	—— ——— ———	Existing Reinforcement Rebar	——	Existing Government Lot Line
—— ——— P ——	Existing Power	—— v v v v ——	Wetland Mitigation	—— ——— ———	Existing Tie Point Line	.....	Existing Adjacent Block Lines
—— ——— PL ——	Existing Fuel Pipeline	- - - - -	Existing Box Culvert Bridge	—— ——— ———	Existing State or International Line	.....	Existing Adjacent Lot Lines
—— ——— PL ——	Existing Undefined Above Ground Pipe Line	- - - - -	Existing Concrete Surface	—— ——— ———	Existing Quarter Section Line	.....	Existing Adjacent Property Line
—— ——— R —— R ——	Geotextile Fabric Type R	- - - - -	Existing Drainage Structure	—— ——— ———	Existing County	.....	Existing Adjacent Subdivision Lines
—— ——— R —— R ——	Geotextile Fabric Type R1	- - - - -	Easement	—— ——— ———	Existing Section Line	.....
—— REMOVE —— REMOVE ——	Remove Line	- - - - -	Existing Concrete	—— - - - - -	Existing Township	.....
—— RR —— RR ——	Geotextile Fabric Type RR	- - - - -	Existing Easement	—— ——— ———	Existing Railroad Centerline	
—— ——— S —— S ——	Geotextile Fabric Type S	—— ——— ———	Existing Gravel Surface	—— - - - - -	Centerline	

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Line Styles

	Subgrade Reinforcement		Existing Railroad Switch		Sheet Piling
	Existing Down Guy Wire Down Guy		Overhead Sign Structure Cantilever		W-Beam w Posts
	Existing Fence		24 Inch Pipe		Existing W-Beam Guardrail with Posts
	Existing Railroad		Reinforced Concrete Pipe		Exst Wet Area-Vegetation Break
	Existing Sanitary Sewer		Signal Head with Mast Arm		Existing Wetland Delineated
	Existing Sanitary Force Main		Existing Signal Head with Mast Arm		
	Existing Storm Drain		Tie Bar at Random Spacing		
	Existing Storm Drain Force Main		3-Cable w Posts		
	Fence		Existing 3-Cable w Posts		
	Silt Fence		Site Boundary		
	Existing Field Line		Fiber Rolls		
	Exst Flow		Doweled Joint		
	Flow		Tie Bar 30 Inch 4 Foot Center to Center		
	Existing Culvert		Tie Bar 18 Inch 3 Foot Center to Center		
	Existing Curb		Existing Berm, Dike, Pit, or Earth Dam		
	Existing Valley Gutter		Existing Ditch Block		
	Existing Driveway Gutter		Depression Contours		
	Existing Curb and Gutter		Existing City Corporate Limits or Reservation Boundary		
	Existing Mountable Curb and Gutter		Gravel Pit - Borrow Area		
	Existing Double Micro Loop Detector		Existing Tree Boundary		
	Micro Loop Detector Double		Tree Row		
	Existing Overhead Sign Structure		Existing Brush or Shrub Boundary		
	Existing Micro Loop Detector		Existing Retaining Wall		
	Micro Loop Detector		Existing Planter or Wall		
	Existing Overhead Sign Structure Cantilever		Retaining Wall (Plan View)		

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Symbols

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
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Symbols

D-20-31

 Existing Light Standard	 Existing Manhole with Valve Water	 Existing Telephone Pole	 Existing Undefined Manhole
 Existing High Mast Light Standard 10 Luminaire	 Existing Water Manhole	 Existing Wood Pole	 Existing Undefined Pull Box
 Existing High Mast Light Standard 3 Luminaire	 Existing Mile Post Type A	 Existing Post	 Existing Undefined Pedestal
 Existing High Mast Light Standard 4 Luminaire	 Existing Mile Post Type B	 Existing Pedestrian Push Button Post	 Existing Undefined Valve
 Existing High Mast Light Standard 5 Luminaire	 Existing Mile Post Type C	 Existing Control Point CP	 Existing Undefined Pipe Vent
 Existing High Mast Light Standard 6 Luminaire	 Existing Reference Marker	 Existing Control Point GPS-RTK	 Existing Gas Valve
 Existing High Mast Light Standard 7 Luminaire	 Existing RW Marker	 Existing Control Point TRI	 Existing Water Valve
 Existing High Mast Light Standard 8 Luminaire	 Existing Utility Marker	 Existing Reference Marker Point NGS	 Existing Fuel Pipe Vent
 Existing High Mast Light Standard 9 Luminaire	 Existing Monument Found	 Existing Pull Box	 Existing Gas Pipe Vent
 Existing Overhead Sign Structure Load Center	 Existing Monument set	 Existing Intelligent Transportation Pull Box	 Existing Sanitary Pipe Vent
 Existing Luminaire	 Existing RW Property Monument Found	 Existing Water Pump	 Existing Storm Drain Pipe Vent
 Existing Light Standard Luminaire	 Existing RW Property Monument set	 Existing Slotted Reinforced Concrete Pipe	 Existing Water Pipe Vent
 Existing Federal Mailbox	 Existing Object Marker Type I	 Existing RR Profile Spot	 Existing Weather Station
 Existing Private Mailbox	 Existing Object Marker Type II	 Existing Fuel Leak Sensors	 Existing Ground Water Well Bore Hole
 Existing Meander Section Corner	 Existing Object Marker Type III	 Existing Highway Sign	 Existing Windmill or Tower
 Existing Meter	 Existing Electrical Pedestal	 Existing Miscellaneous Spot	 Existing Witness Corner
 Existing Electrical Manhole	 Existing Telephone Pedestal	 Existing Lighting Standard Pole	 Flashing Beacon
 Existing Gas Manhole	 Existing Fiber Optic Telephone Pedestal	 Existing Traffic Signal Standard	 Flagger
 Existing Sanitary Manhole	 Existing TV Pedestal	 Existing Transformer	 Pipe Mounted Flasher
 Existing Sanitary Force Main Manhole	 Existing Fiber Optic TV Pedestal	 Existing Large Evergreen Tree	 Sanitary Force Main with Valve
 Existing Sanitary Manhole with Valve	 Existing Fuel Filler Pipes	 Existing Small Evergreen Tree	
 Existing Storm Drain Manhole	 Existing Traverse PI Aerial Panel	 Existing Large Tree	
 Existing Force Main Storm Drain Manhole	 Existing Pole	 Existing Small Tree	
 Existing Force Main Storm Drain Manhole with Valve	 Existing Power Pole	 Existing Tree Trunk	
 Existing Telephone Manhole	 Existing Power Pole with Transformer	 Existing Pad Mounted Traffic Signal Control Box	

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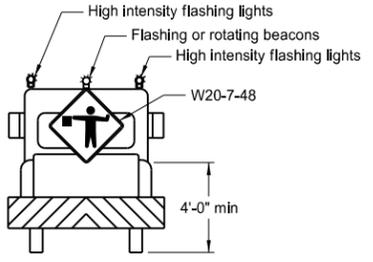
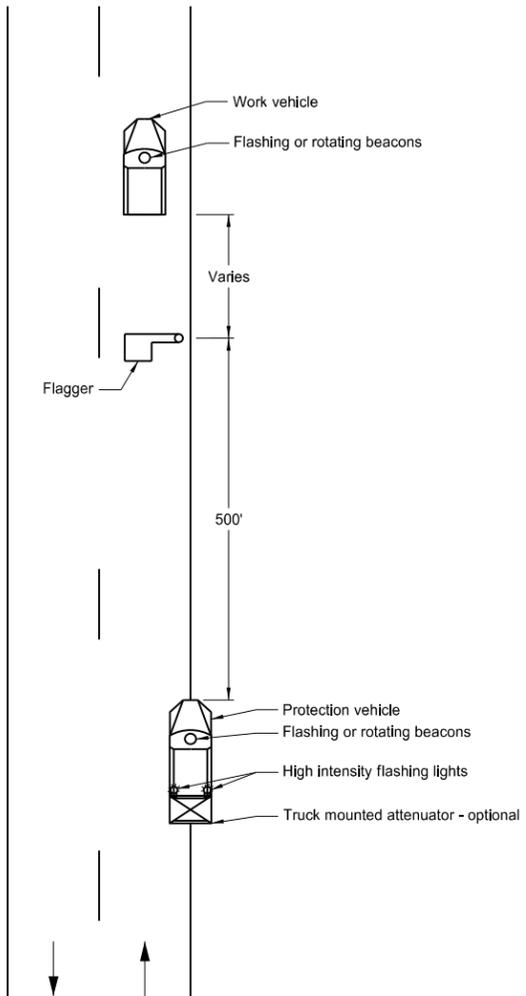
Symbols

 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Grate Type 2  Junction Box  High Mast Light Standard 10 Luminaire  High Mast Light Standard 3 Luminaire  High Mast Light Standard 4 Luminaire  High Mast Light Standard 5 Luminaire  High Mast Light Standard 6 Luminaire  High Mast Light Standard 7 Luminaire  High Mast Light Standard 8 Luminaire  High Mast Light Standard 9 Luminaire  Relocate Light Standard  Overhead Sign Structure Load Center  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire	 Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 175 Watt High Pressure Sodium Vapor Luminaire  Light Standard 200 Watt High Pressure Sodium Vapor Luminaire  Light Standard 250 Watt High Pressure Sodium Vapor Luminaire  Light Standard 310 Watt High Pressure Sodium Vapor Luminaire  Light Standard 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 50 Watt High Pressure Sodium Vapor Luminaire  Light Standard 70 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Manhole  Manhole 48 Inch  Sanitary Force Main Manhole  Sanitary Sewer Manhole  Storm Drain Manhole  Storm Drain Manhole with Inlet  Reset Mile Post  Mile Post Type A  Mile Post Type B  Mile Post Type C  Right of Way Marker  Tubular Marker  Concrete Monument to Be Set  RW Property Monument to Be Set	 Object Marker Type I  Object Marker Type II  Object Marker Type III  Caution Mode Arrow Panel  Back to Back Vertical Panel Sign  Double Direction Arrow Panel  Left Directional Arrow Panel  Right Directional Arrow Panel  Sequencing Arrow Panel  Truck Mounted Arrow Panel  Power Pole  Wood Pole  Pedestrian Push Button Post  Property Corner  Pull Box  Intelligent Transportation Pull Box  Sanitary Pump  Storm Drain Pump  Reinforced Pavement  Reinforced Concrete End Section 15 Inch  Reinforced Concrete End Section 18 Inch  Reinforced Concrete End Section 24 Inch  Reinforced Concrete End Section 30 Inch  Reinforced Concrete End Section 36 Inch  Reinforced Concrete End Section 42 Inch	 Reinforced Concrete End Section 48 Inch  Reinforced Concrete End Section 54 Inch  Reset Right of Way Marker  Reset USGS Marker  Right of Way Markers  Riser 30 Inch  Continuous Split Barrel Sample  Flight Auger Sample  Split Barrel Sample  Thinwall Tube Sample  Highway Sign  SNOW GATE 18 FT  SNOW GATE 28 FT  SNOW GATE 40 FT  Standard Penetration Test  Transformer  Inclinometer Tube  Underdrain Cleanout  Excavation Unit  Water Valve
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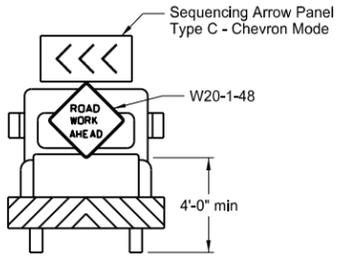
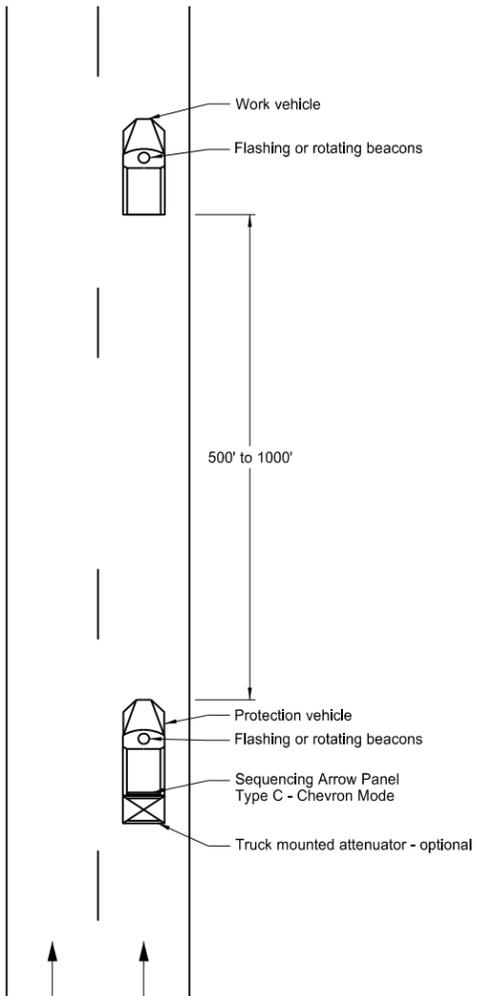
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Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways



Typical Protection Vehicle

- Notes:
1. The working vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light.
 2. The shadow vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light. The shadow vehicle for Multilane Roadway shall also have a sequencing arrow panel Type C operated in the chevron mode.
 3. This application is for use during daylight hours and in areas of good visibility only.
 4. Two lane, two way roadway, a flagger shall be used to protect the work area and warn oncoming traffic.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
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CONSTRUCTION SIGN DETAIL

D-704-5

SIGN NUMBER	G20-10-108	STATION(S):		AREA: 36.0 Sq.Ft.	
WIDTH x HEIGHT	9'-0" x 4'-0"				
BORDER WIDTH	1.25" (Inset 0.75")				
CORNER RADIUS	3"				
MOUNTING	Ground				
BACKGROUND	TYPE: 3A Reflective COLOR: Fluorescent Orange				
LEGEND/BORDER	TYPE: Non-Refl COLOR: Black				
SYMBOL					
	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

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

LETTER POSITION (X)															LENGTH	SIZE	SERIES		
C	O	N	S	T	R	U	C	T	E	D	B	Y			69.7	6	D 2000		
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7						
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E	91.5	6	D 2000
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96			
Y	O	U	R		T	O	W	N				N	D				64.6	6	D 2000
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2							

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

Advance Warning Sign Spacing (A)			
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

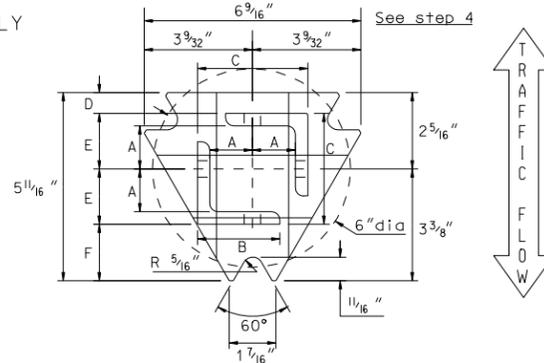
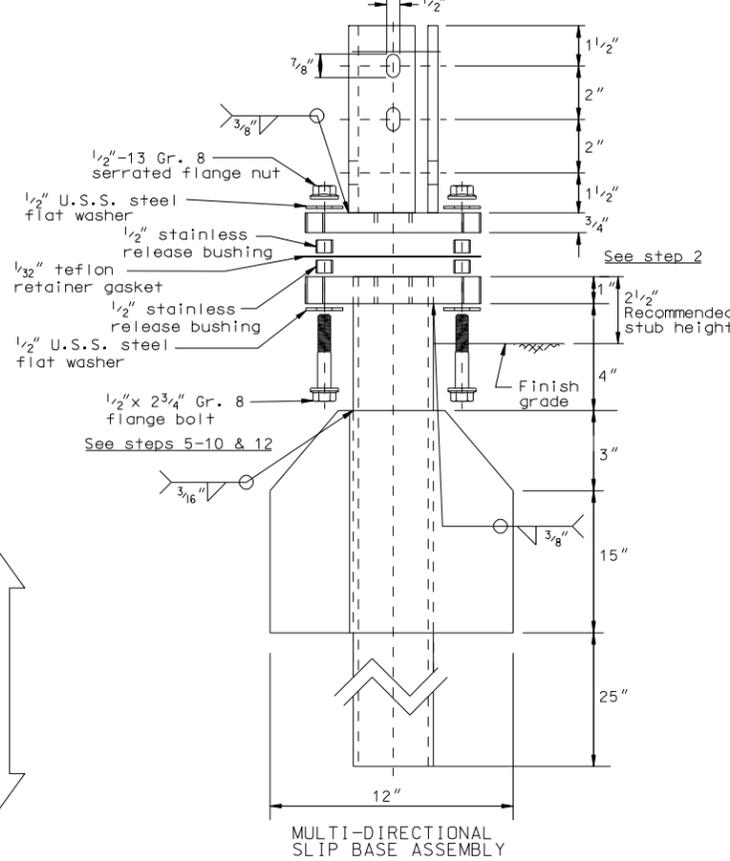
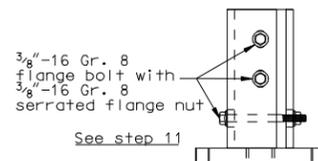
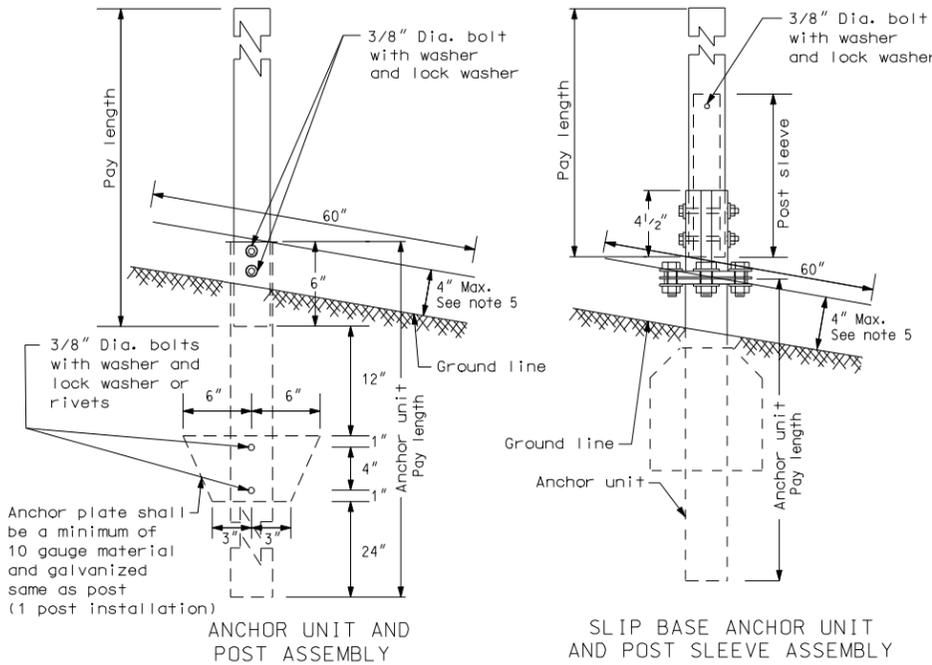
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BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

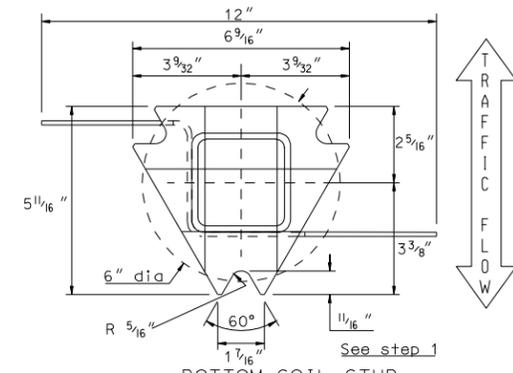
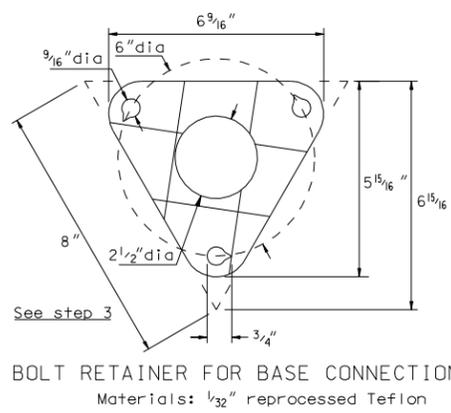
PERFORATED TUBE



TOP POST RECEIVER DATA TABLE

Square Post Sizes	A	B	C	D	E	F
2 3/16" x 10 Ga. Square Post	1 3/64"	2 1/2"	3 1/32"	2 5/32"	1 3/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 3/32"	2 1/2"	3 5/16"	5/8"	1 2/32"	1 3/4"

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



- Notes
- Slip base bolts shall be torqued as specified by the manufacturer.
 - The 2 3/16" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size 10 gauge is shown as 2.51" size on the plans.
 - Anchor for 2", 2 1/4", and 2 1/2" posts.
 - Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3" x 3" x 7 gauge ASTM A500 Grade B. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/A153. All tolerances on anchor unit and slip base bottom assembly are ± 0.005 unless otherwise noted.
 - 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
 - When used in concrete sidewalk, anchor shall be the same except without the wings.
 - Four post signs shall have over 8' between the first and fourth posts.

Telescoping Perforated Tube

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

B - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

STEP	INSTALLATION PROCEDURE
1.	Install bottom soil anchor stub plumb and squared up with road, with point of plate facing oncoming traffic.
2.	Depth of imbedment to leave 2 1/2" from grade to top of anchor plate.
3.	Place teflon bolt retainer gasket on top of bottom plate (make sure that notches in holes are pointing counter clockwise).
4.	Place top post receiver on to retainer gasket, properly indexed so that angle receivers are squared up with road.
5.	Slide 1 each 1/2" flat washer on to 1 each inverted 1/2"-13 gr. 8 flange bolt, followed by 1 each stainless steel release bushing.
6.	Insert above bolt with washer and bushing up through notched points of top and bottom plates, passing through hole in gasket.
7.	Slide second bushing down on to above bolt until it rests on top of gasket followed by second washer.
8.	Complete by threading 1/2"-13 gr. 8 serrated flange nut snugly down against top of washer.
9.	Repeat steps 5,6,7 & 8 at the two remaining notched triangle points.
10.	Insert sign post into angle receivers on top half until post(s) bottom out. *NOTE: Where higher wind load is desired, insert the next size smaller square post inside bottom of main upright post (Minimum of 48", not to exceed beyond bottom edge of sign).
11.	Secure posts into receivers using 3 each 3/8"-16 gr. 8 flange bolts and 3 each 3/8"-16 serrated flange nuts in receiver slots (top 2 bolts should be parallel to highway) do not tighten nuts until all bolts are in place.
12.	After all sub-assembly hardware is tightened, then torque the three 1/2"-13 nuts to 42 ft-lbs, in a circular pattern until all bolt assemblies reach the required torque. *NOTE: On multi-leg installations, be sure that all anchors are squared and lined up with each other.

Telescoping Perforated Tubes

Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. 4	Cross Sect. Area In. 2	Section Modulus In. 3
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785
4 x 4	0.250	1/4	6.600	3.040	1.940	1.050

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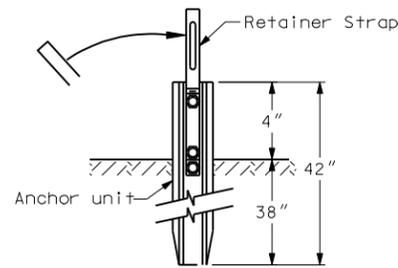
DATE	CHANGE
12-01-04	PE stamp added

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BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

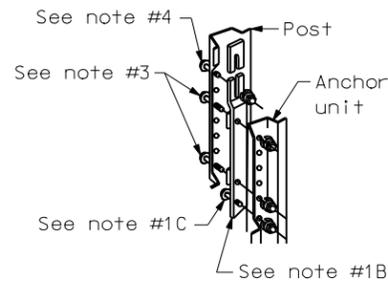
FLANGED CHANNEL



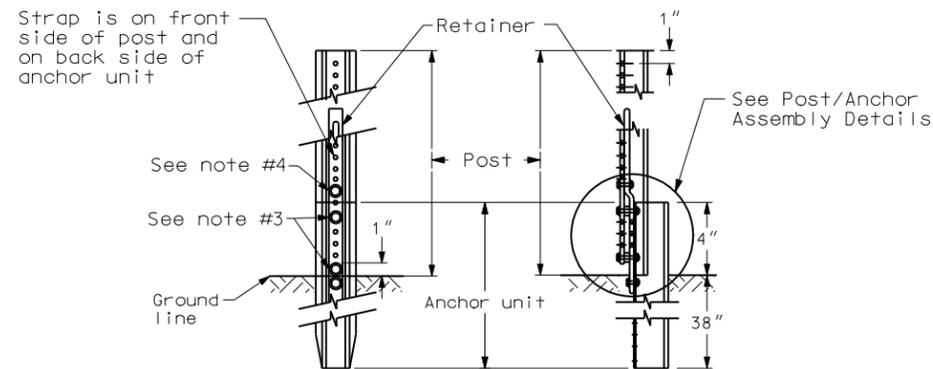
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

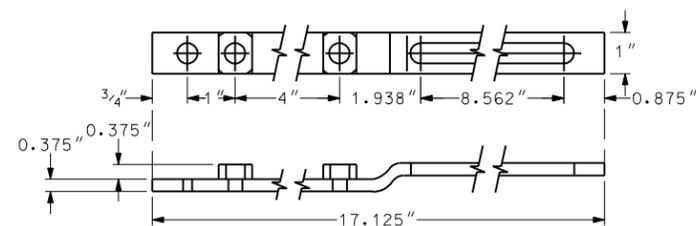
1. A) Drive anchor unit to within 12" of ground level.
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.
D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4" dimension.
B) Rotate strap to vertical position.
3. A) Place 3/8"-16 UNC x 2" bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom 3/4" slot in the strap).
B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening 3/8"-16 UNC x 2" long retainer bolt (this fastens sign post to retainer spacer strap).
5. The base post, strap & sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap and sign post at the bolts have full contact across the entire width.



Post/Anchor Assembly Details



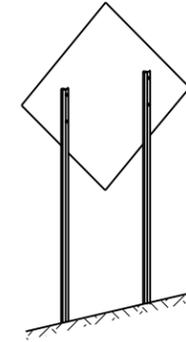
Front View Side View Sign Post Assembly Detail



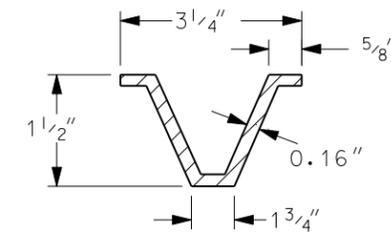
Retainer/Spacer Strap Detail

CHANNEL SIZE IN.	WALL THICKNESS IN.	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN. 4	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN. 3
1.516 x 3.125"	.116	2.00	.179	.590	.225
1.532 x 3.125"	.124	2.25	.201	.648	.254
1.562 x 3.125"	.132	2.50	.233	.748	.289
1.578 x 3.125"	.140	2.75	.271	.819	.329
1.750 x 3.500"	.150	3.00	.372	.918	.403
1.750 x 3.500"	.175	4.00	.500	1.190	.560

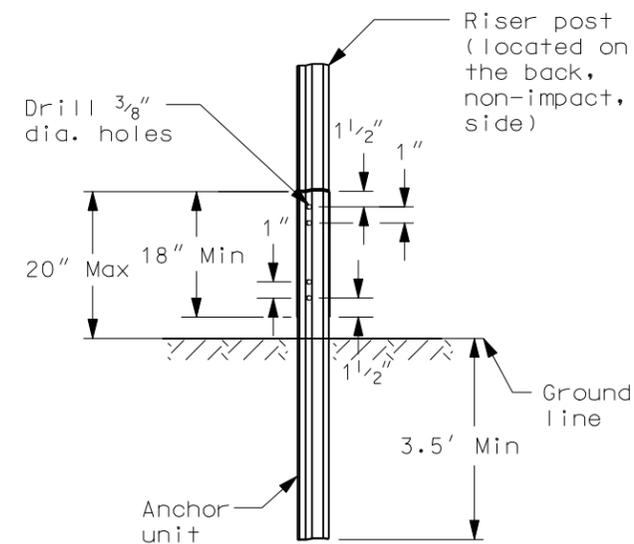
3 LB/FT U POSTS



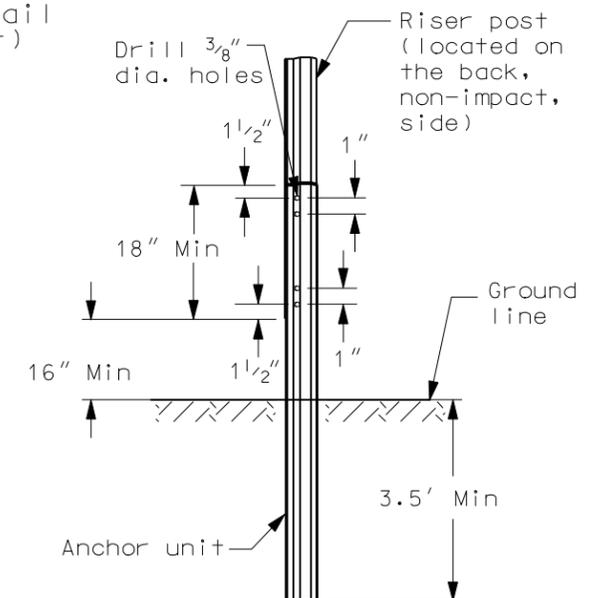
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

Notes

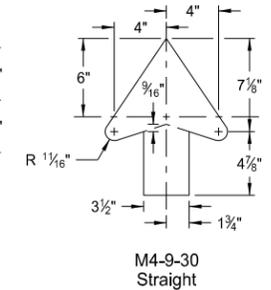
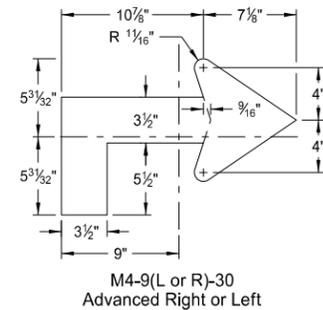
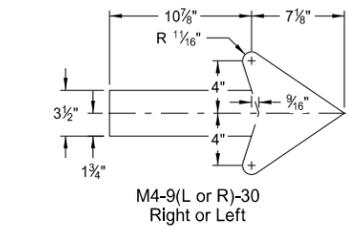
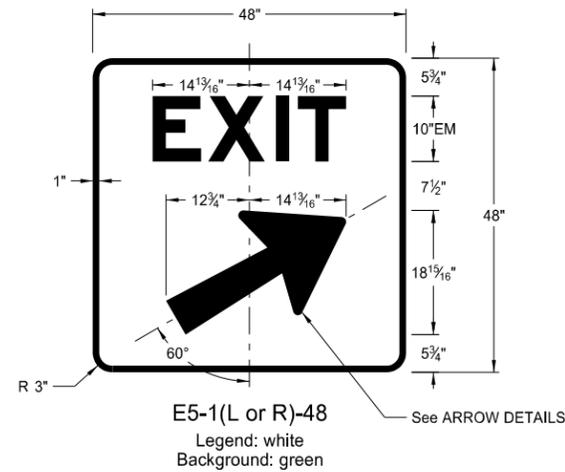
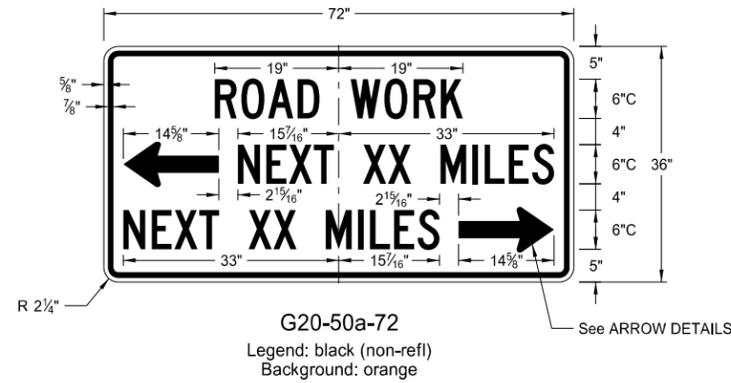
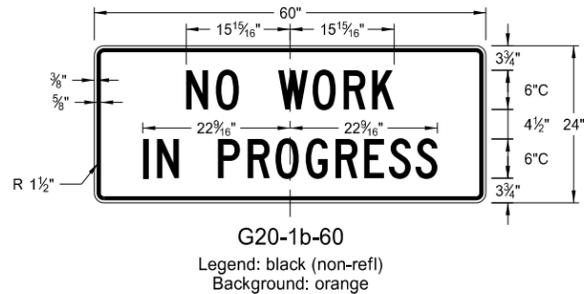
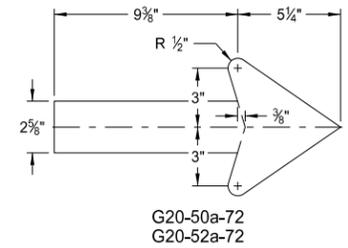
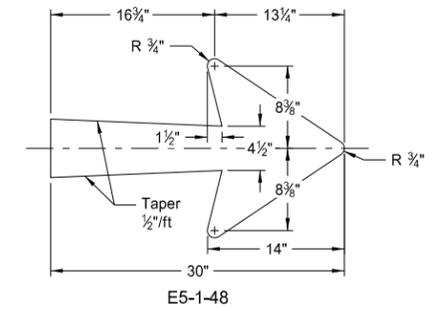
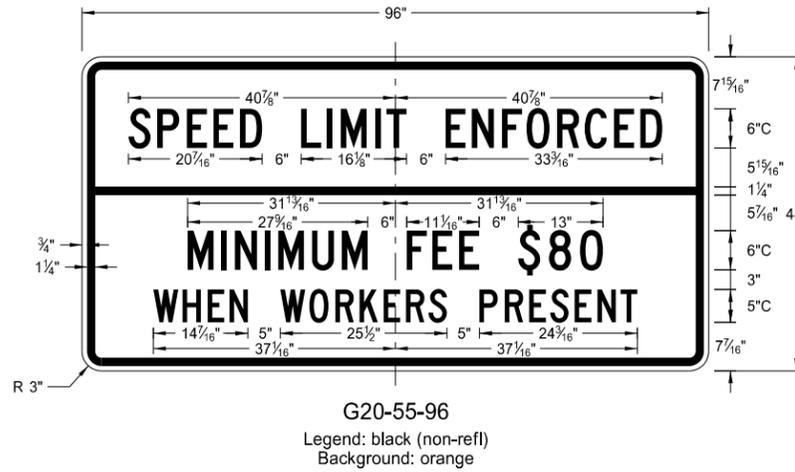
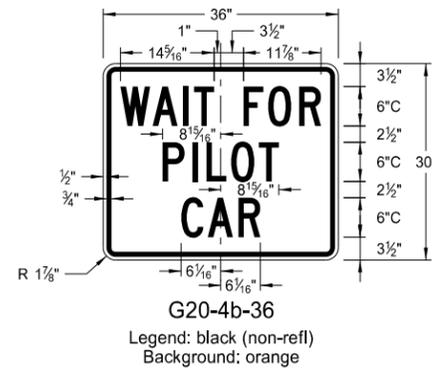
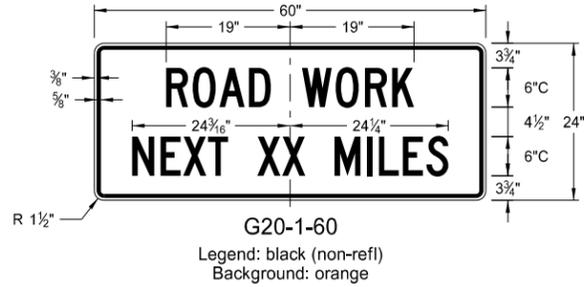
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-28-93	
REVISIONS	
DATE	CHANGE
03-07-01	Revised U-post details
11-21-02	Deleted perforated tube
05-08-03	Revised U-Channel splice
12-01-04	PE stamp added
06-29-05	Revised flanged channel note

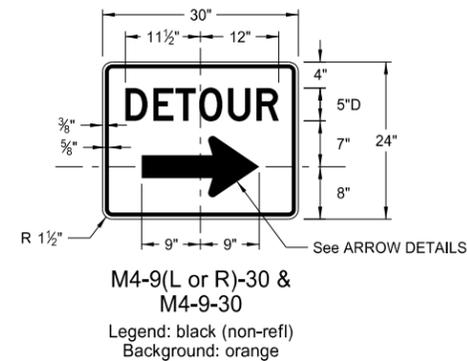
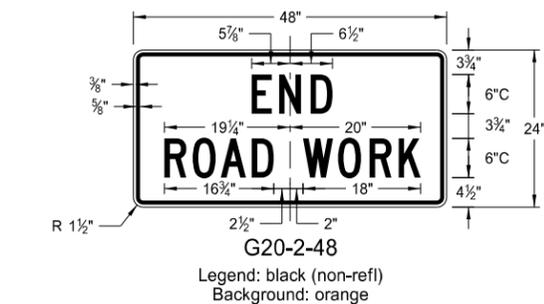
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

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

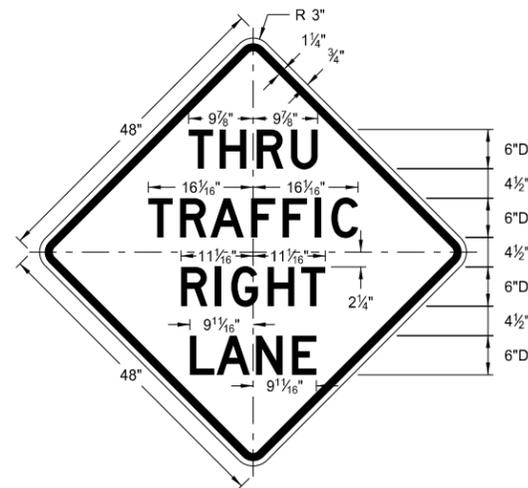
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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

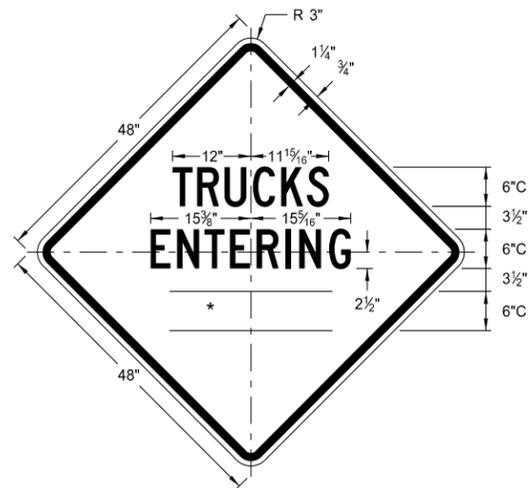
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

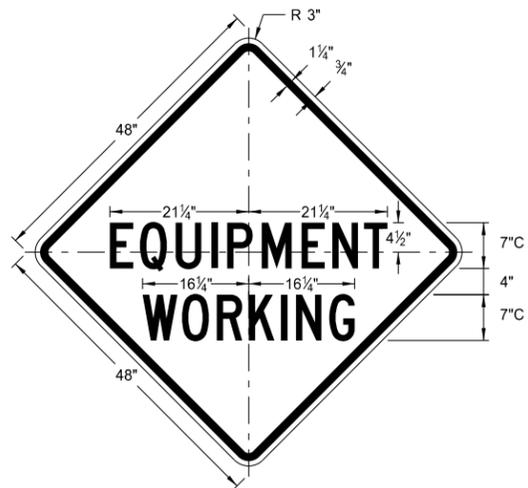
* DISTANCE MESSAGES



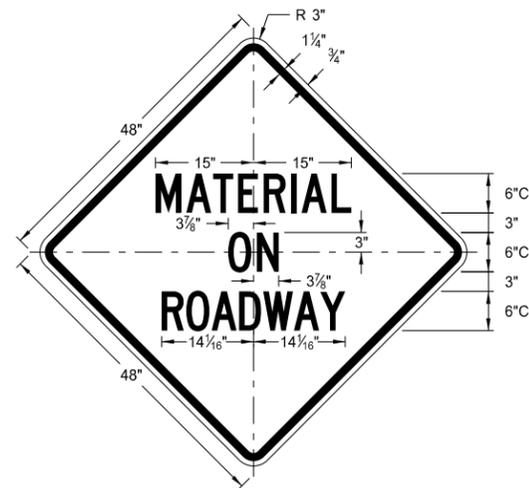
W5-8-48
Legend: black (non-refl)
Background: orange



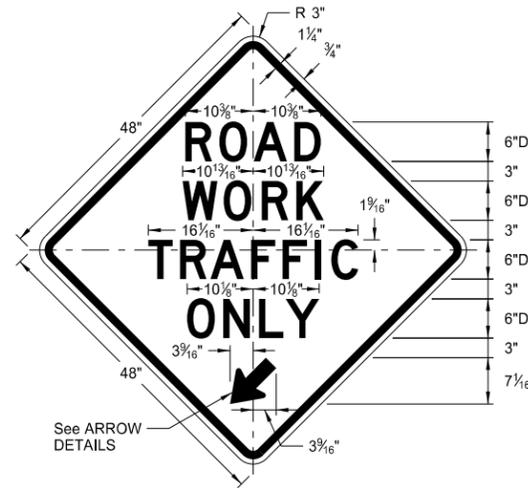
W8-54-48
Legend: black (non-refl)
Background: orange



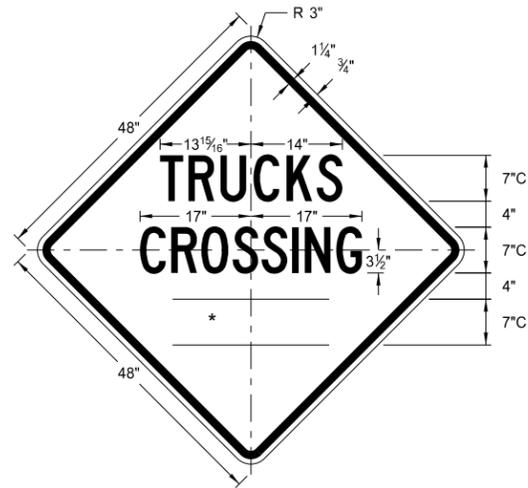
W20-51-48
Legend: black (non-refl)
Background: orange



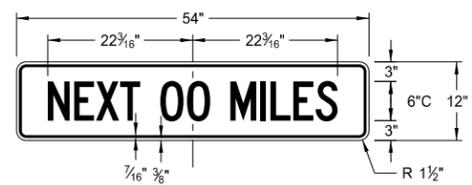
W21-51-48
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Background: orange



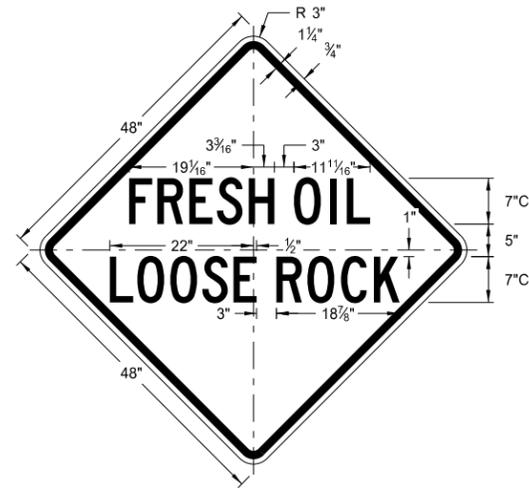
W5-9-48
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Background: orange



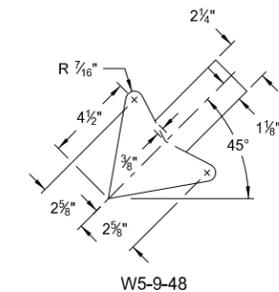
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Background: orange



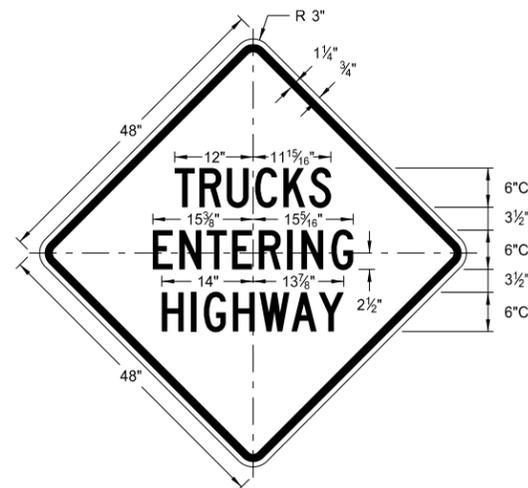
W20-52-54
Legend: black (non-refl)
Background: orange



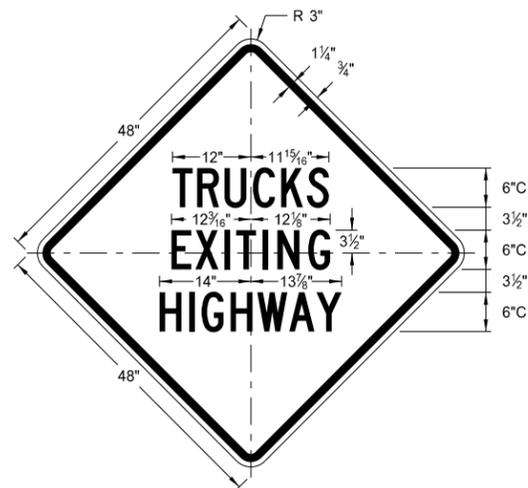
W22-8-48
Legend: black (non-refl)
Background: orange



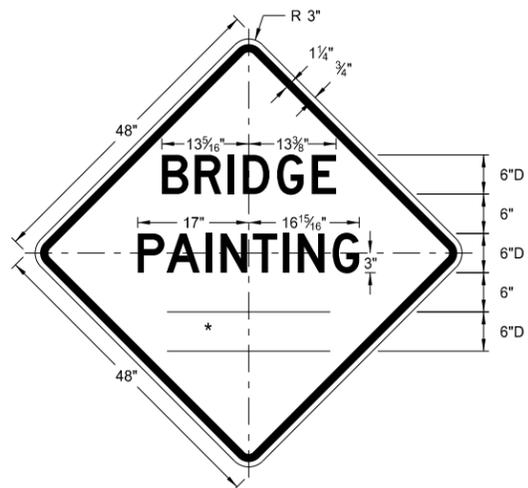
ARROW DETAILS



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



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

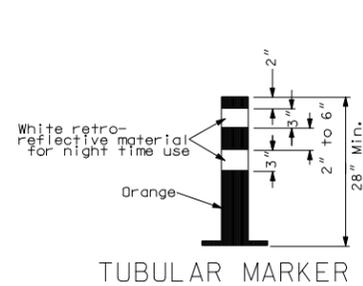


W21-50-48
Legend: black (non-refl)
Background: orange

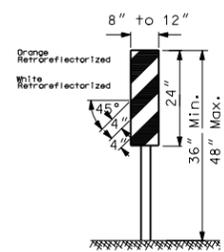
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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BARRICADE DETAILS AND CHANNELIZING DEVICES



TUBULAR MARKER



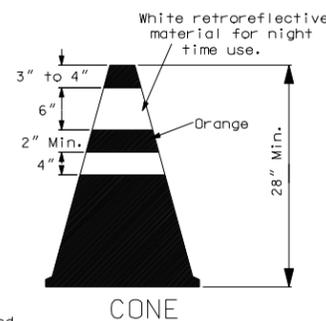
VERTICAL PANEL

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

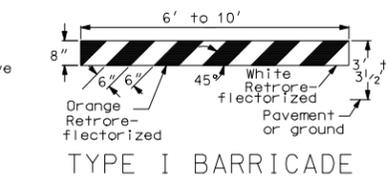


DELINEATOR DRUM
 36" Min. height

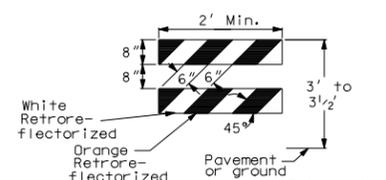
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retro-reflective sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall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



CONE

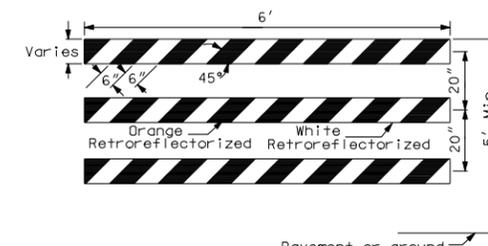


TYPE I BARRICADE



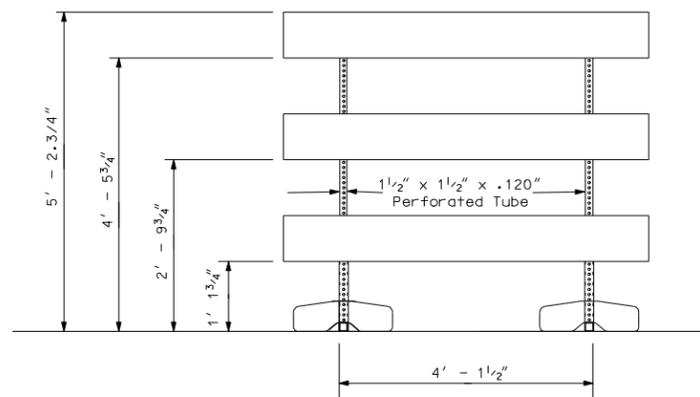
TYPE II BARRICADE

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

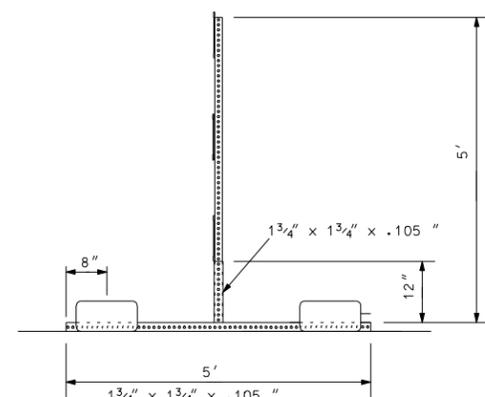


TYPE III BARRICADE

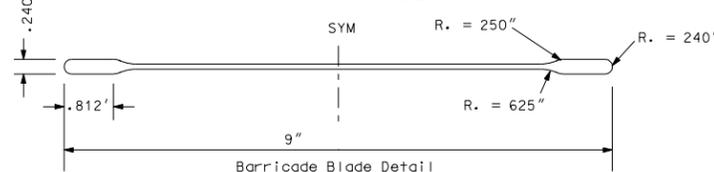
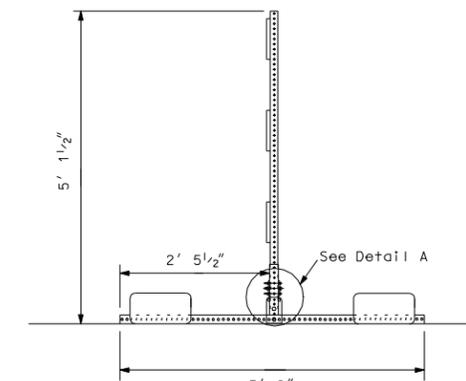
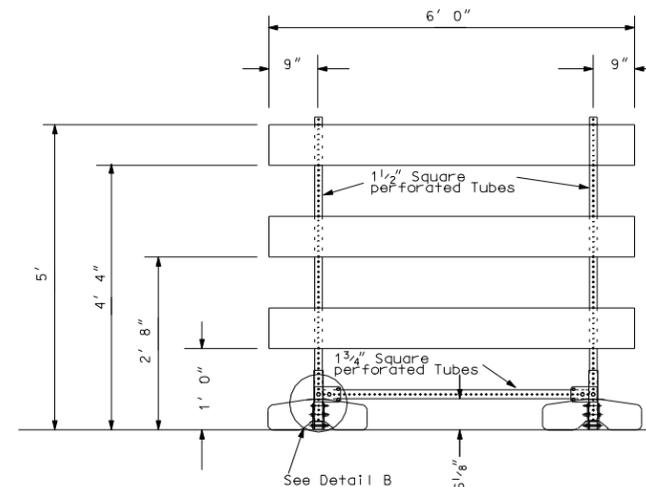
BARRICADES:
 Number of retro-reflective rail faces:
 Type I - 2 (One each direction)
 Type II - 4 (Two each direction)
 Type III - 6 (Three in each direction)



FRONT VIEW

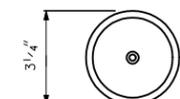


END VIEW



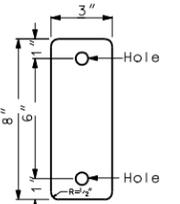
Ballast = 45lb sandbag at the end of each leg.
 Barricade blade fastened to vertical supports with 2" corner bolts.
 Vertical portion of leg is welded to horizontal portion on all four sides.
 Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

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



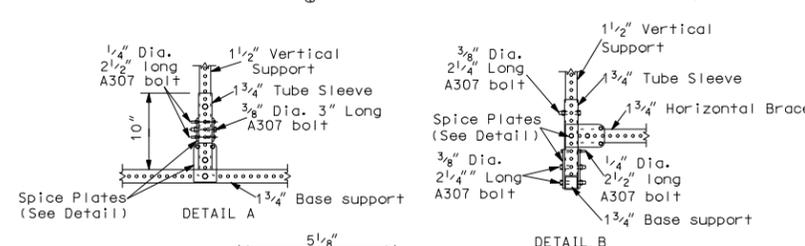
ACRYLIC PLASTIC REFLECTOR

Delineator reflector shall meet the requirements of section 894



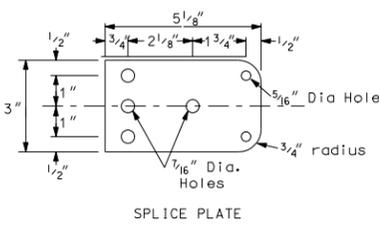
DELINEATOR REFLECTOR

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



DETAIL A

DETAIL B



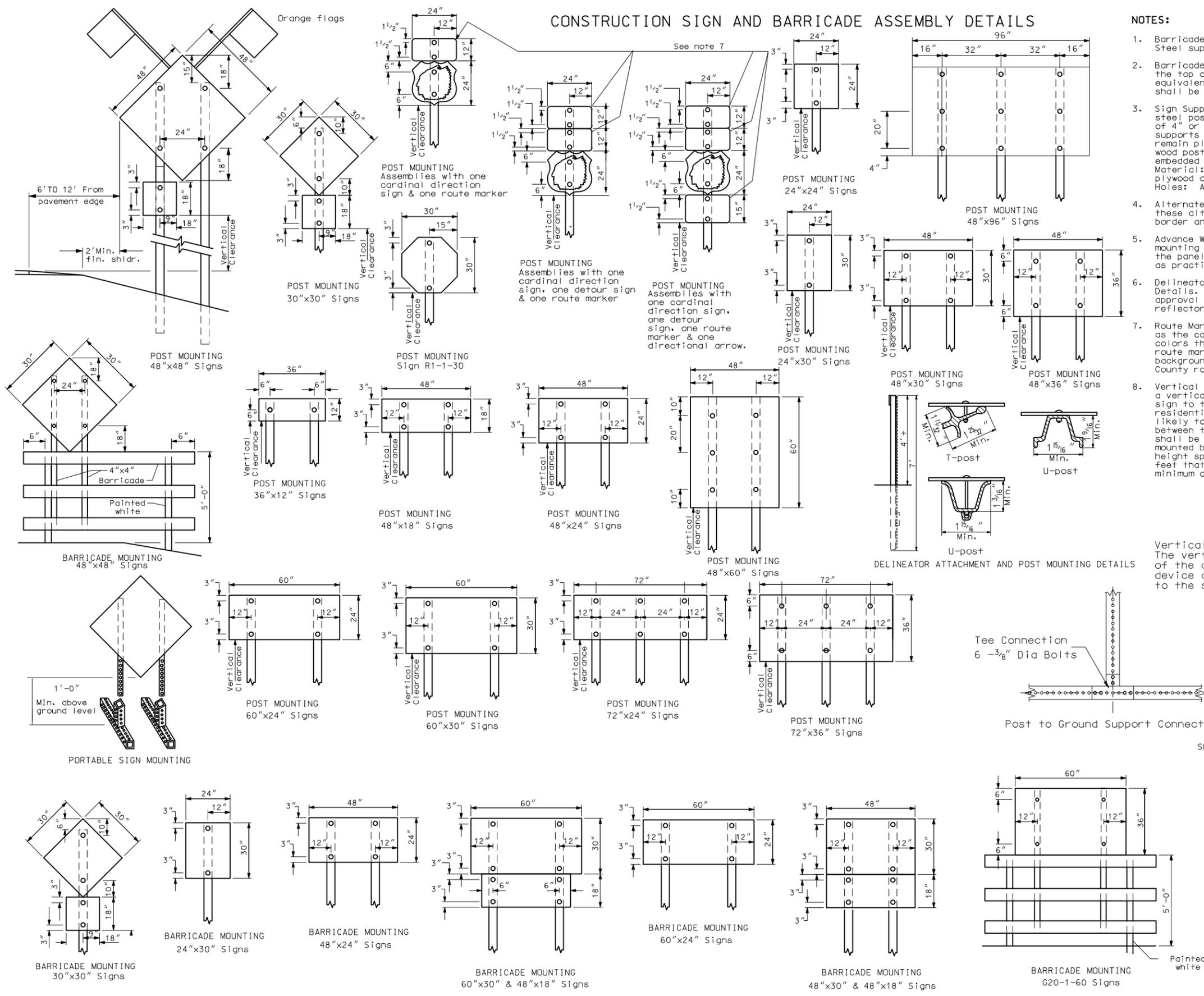
SPLICE PLATE

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

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

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

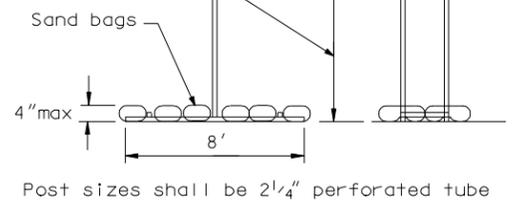
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS



NOTES:

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

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

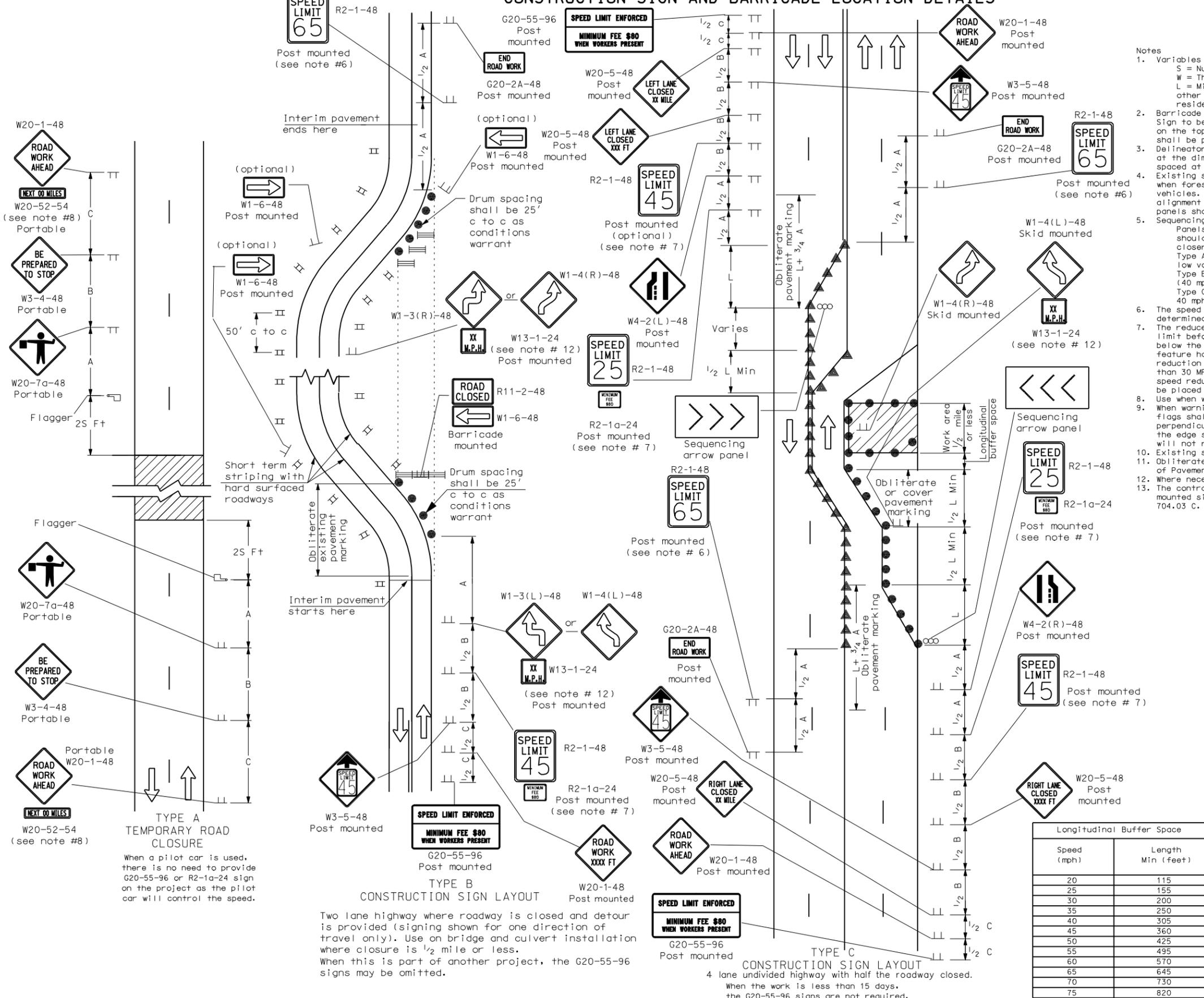


SKID MOUNTED SIGNS

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

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

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



- Notes
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper.
 - L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S²/60 for urban, residential, and other streets with speeds of 40 mph or less.
 - Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on roadway shall be placed on skid mounted assemblies.
 - Delineator drums, barricades or cones used for tapering traffic shall be spaced at the dimension "S". Delineator drums or cones used for tangents shall be spaced at 2 times dimension "S".
 - Existing striping shall be removed as required. Delineators will only be used when foreslope is 1V:4H or better and roadway alignment is visible to approaching vehicles. Vertical panels shall be used where roadways has steep slopes and alignment is not visible to approaching vehicles. Delineators and vertical panels shall be installed back to back.
 - Sequencing Arrow Panels
 - Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
 - Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph and 750 ADT or less).
 - Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph and 5000 ADT or less).
 - Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 - Use when work area is 1 mile or longer.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 - Where necessary, safe speed to be determined by the Engineer.
 - The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 c.

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

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

Longitudinal Buffer Space

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

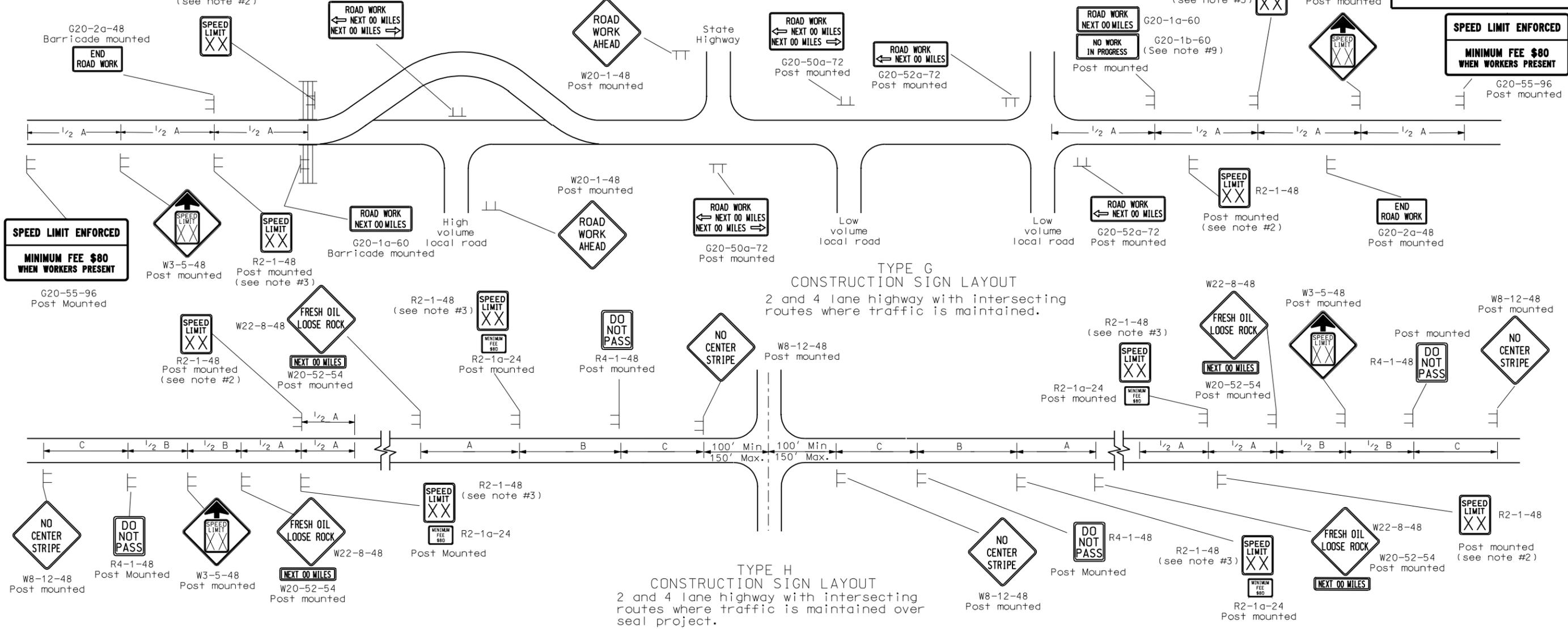
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-1-86

REVISIONS

DATE	CHANGE
01-05-01	Revised note 3
07-19-02	Reversed End Road Work & Speed Signs
07-25-03	Revised R2-1, R2-1a and W20-1
04-01-04	Change Fee Sign, Warning & Buffer Spacing
12-18-03	Relocated reverse curve PE stamp added
12-01-04	Revised W4-2, Replaced R2-5a with W3-5, Rev. Adv.
06-29-05	Warning Table, Rev. Note 7, Changed W20-7b to W3-4
07-05-05	

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CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



- Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Sign no. R2-1-48, R2-1a-24, R4-1-48, W22-8-48, W20-52-54, and W8-12-48 shall be placed just after all important intersections and every five miles in either direction. Sign no W8-12-48 shall be placed when traffic volumes are 750 ADT or less. No short term markings are placed when this condition exists.

- The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
- Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- The layouts show the signs needed before work begins. The requirements at the actual work areas will require the use of other standards. If the speed limit is reduced in the work areas, the speed limit signs shall have the R2-1a-24 sign placed below.

KEY

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

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-1-86

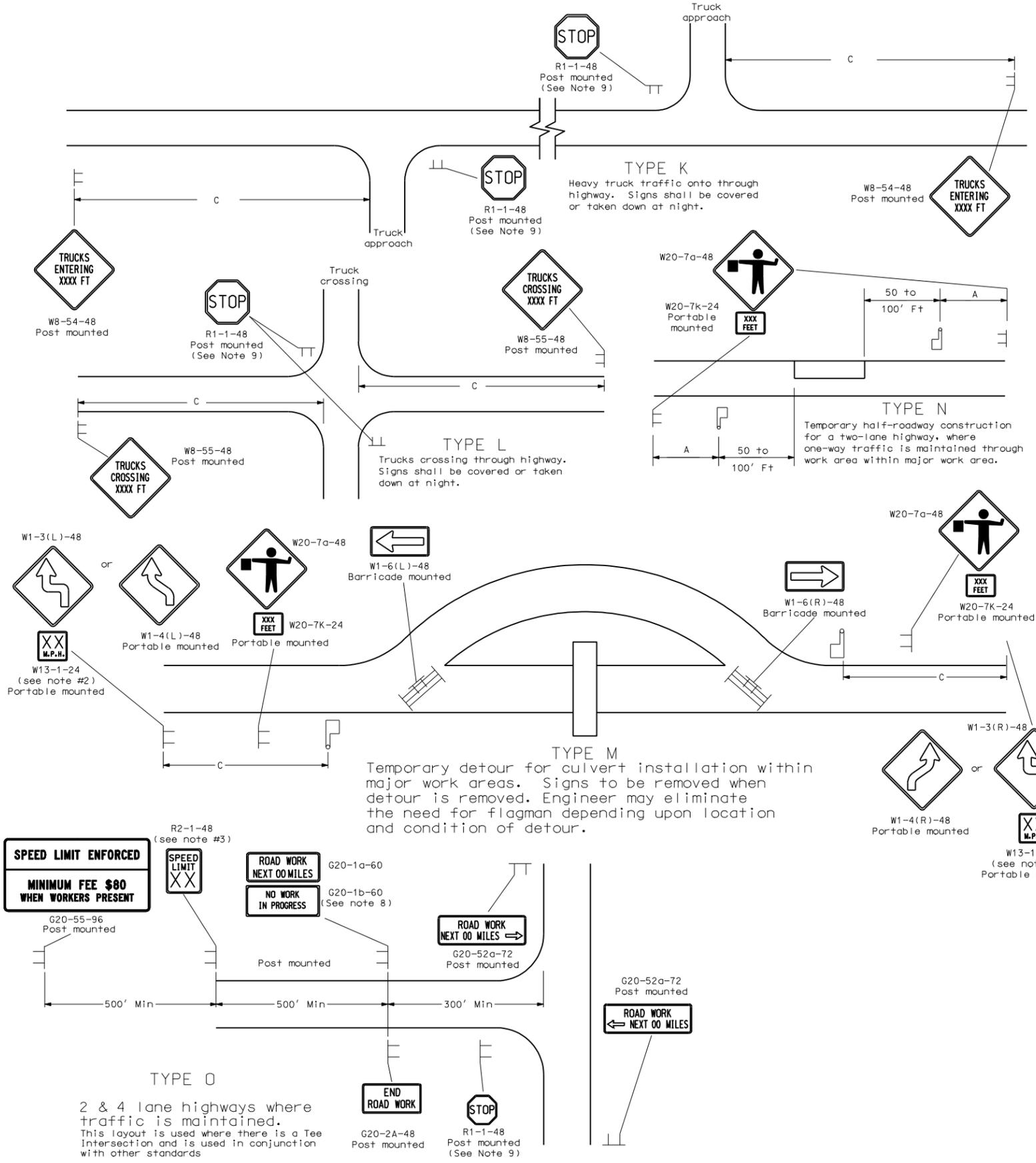
REVISIONS	
DATE	CHANGE
08-15-96	Revise flag note
10-01-99	General revisions
10-18-01	Added note 8 & 9
07-19-02	Rev. end road work & speed limit sign
07-25-03	Rev. R2-1a & W20-1
04-01-04	Rev. Fee sign & warning sign spacing Rev note 3, add note 10
12-01-04	PE Stamp added
06-29-05	Added W3-5 to Type H and Type G, Rev. Adv. Warning Table, Rev. Note 3
04-05-06	Corrected sign W3-5

This document was originally issued and sealed by MARK S. GAYDOS, Registration Number PE-4518, on 04/05/06 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

Notes

- Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be placed on barricades shall be mounted with the sign bottom shall be placed on skid mounted assemblies.
- Where necessary, safe speed to be determined by the Engineer.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- If existing stop sign is in place, a 48" stop sign is not required.



KEY

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

ADVANCE WARNING SIGN SPACING

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

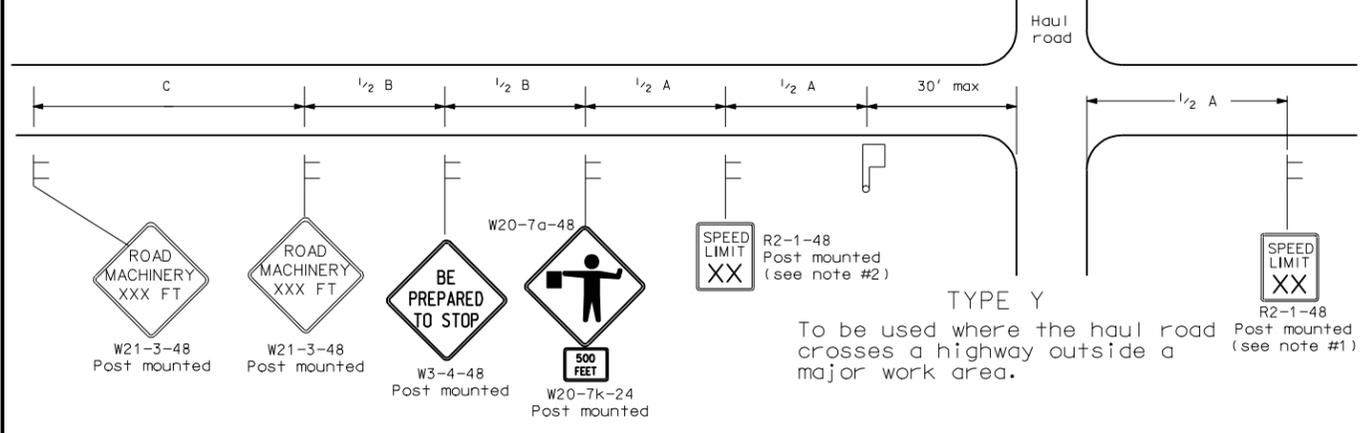
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
10-1-86

REVISIONS

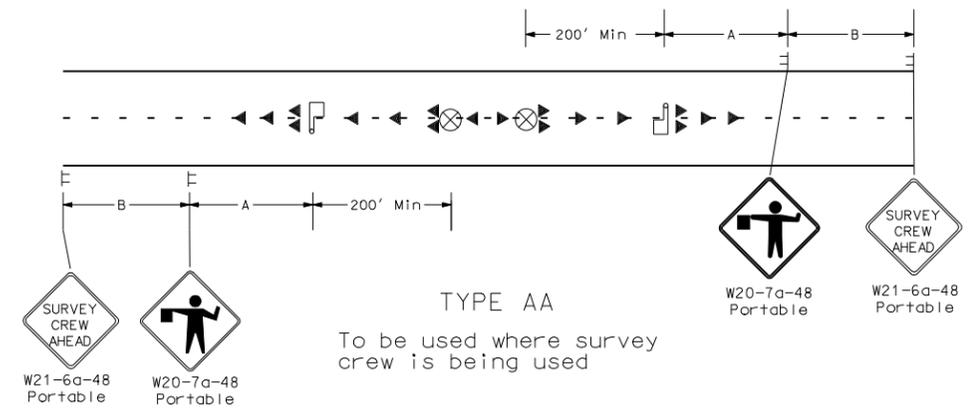
DATE	CHANGE
09-30-93	General revisions
06-21-95	General revisions
08-15-96	Revise flag note
10-01-99	General revisions
02-02-00	W8-55-48 Deleted Work In Progress Sign
10-17-02	Revised R2-1a
07-25-03	Revised fee sign & Warning sign spacing.
04-01-04	Revised note 3
12-01-04	PE stamp added.
02-14-05	Added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

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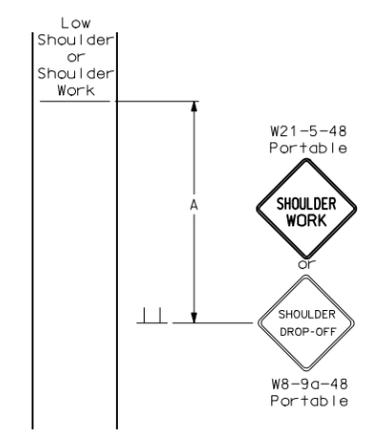
CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



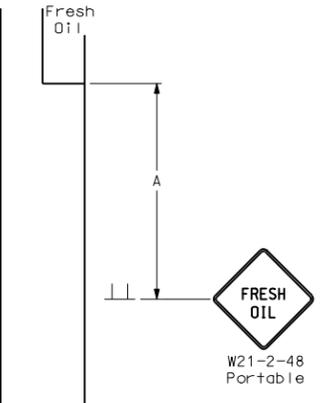
TYPE Y
To be used where the haul road crosses a highway outside a major work area.



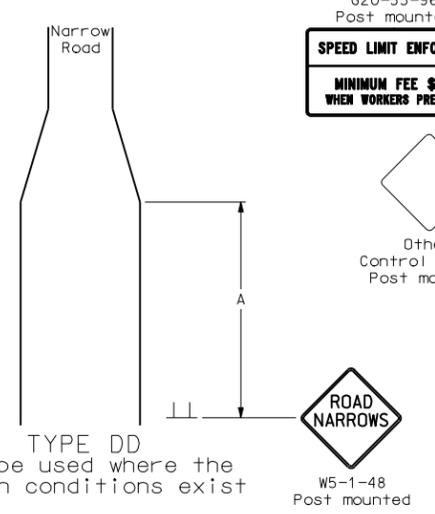
TYPE AA
To be used where survey crew is being used



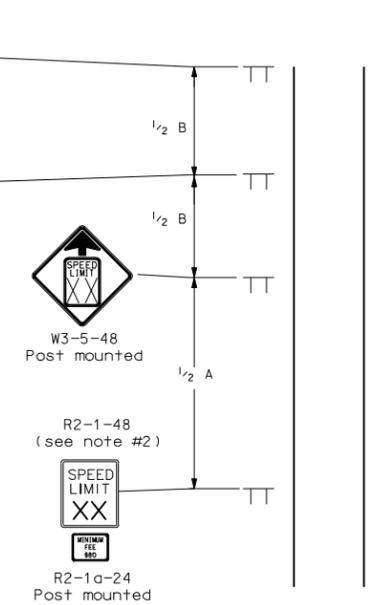
TYPE BB
To be used within a major work area where the sign conditions exist



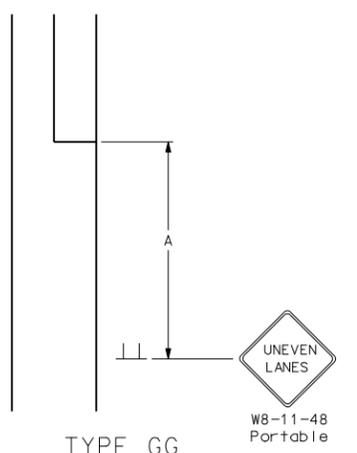
TYPE CC
To be used where the sign conditions exist



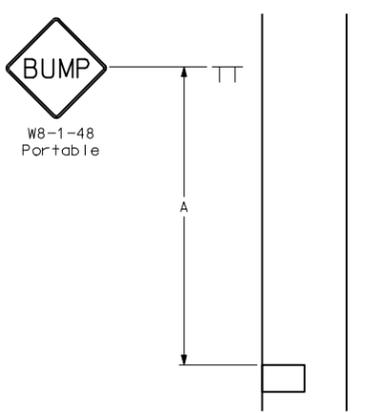
TYPE DD
To be used where the sign conditions exist



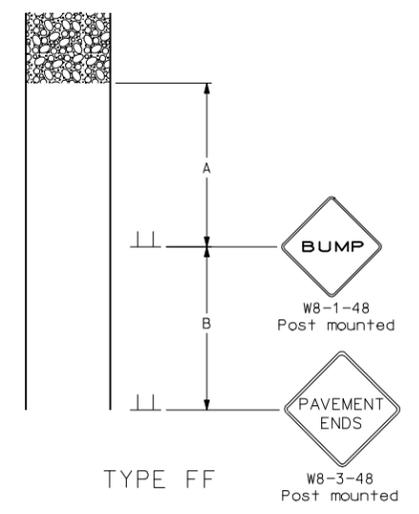
TYPE Z
To be used where speed zone is needed



TYPE GG
To be used where a difference of elevation between lanes exist



TYPE EE
To be used where the sign conditions exist



TYPE FF
To be used where the sign conditions exist

- Notes
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
 - G20-55-96 or R2-1a-24 signs are not required if this standard is part of other traffic control layouts, or the work is less than 5 days.

KEY

—|—	Type I barricade	▨	Work area
—|—|—	Type II barricade	□	Flagger
—|—|—|—	Type III barricade	○	Sequencing arrow panel
□	Sign	⦿	Type A delineator or vertical panels back to back
●	Delineator drum		
▲	Cones		

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 10-1-86

REVISIONS

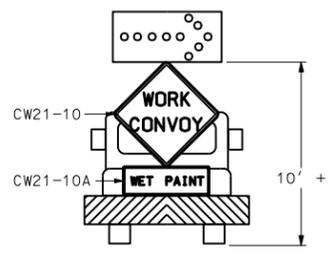
DATE	CHANGE
09-03-96	70 mph
01-31-97	Sign spacing
10-01-99	General Revision
07-19-02	Revised spacing of Speed Limit Signs
01-30-03	Pavement end sign
07-25-03	Revised R2-1a
04-01-04	Rev. fee sign & warning sign spacing. Add note 6
12-01-04	PE Stamp added
06-29-05	Replaced R2-5a with W3-5, Rev. Adv. Warning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

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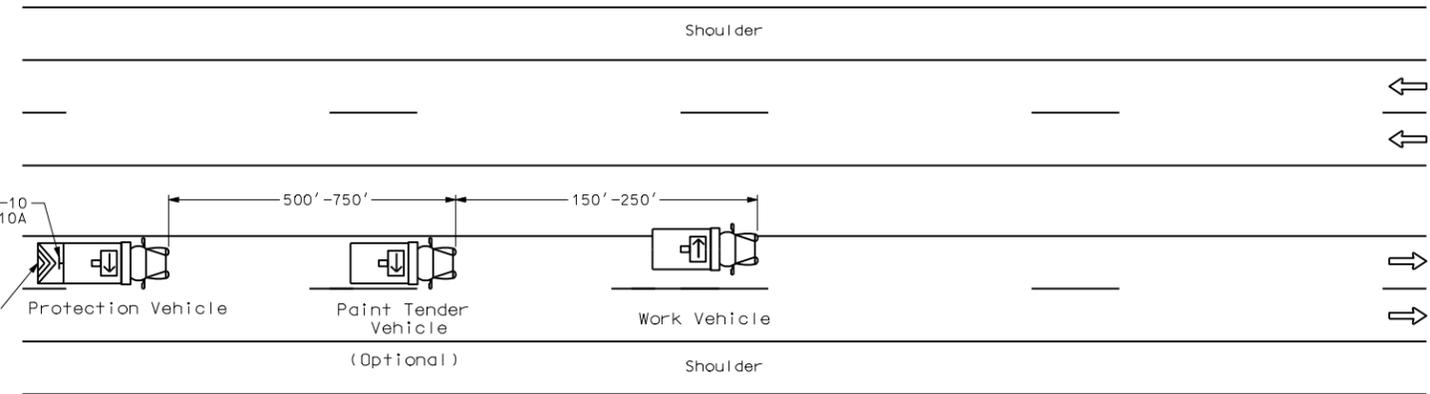
TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS ON CONVENTIONAL HIGHWAYS (Pavement Marking)

D-704-27

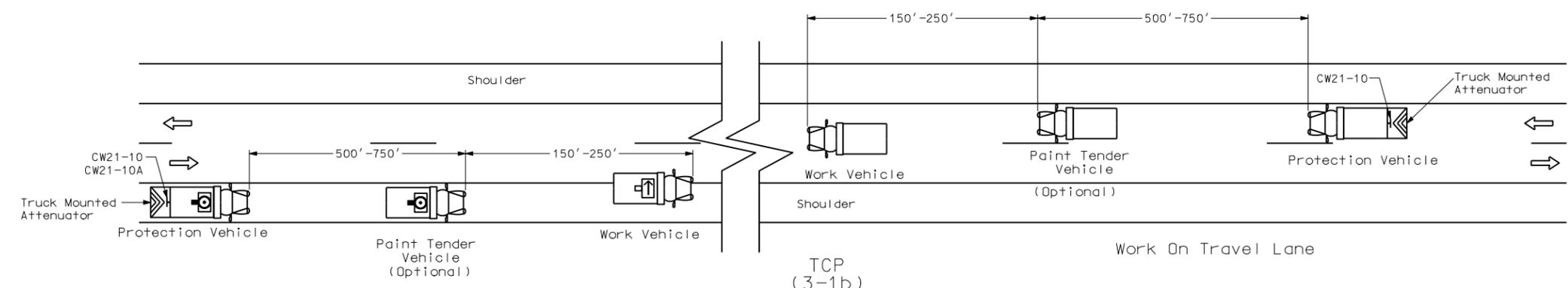
- Notes
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
 2. All traffic control devices shall be in accordance with the "Manual on Uniform Traffic Control Devices" (MUTCD),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



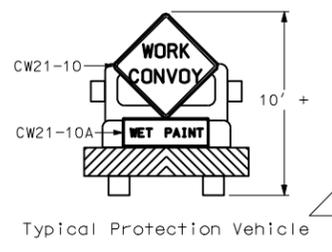
Typical Protection Vehicle with Right Directional Flashing Arrow Panel



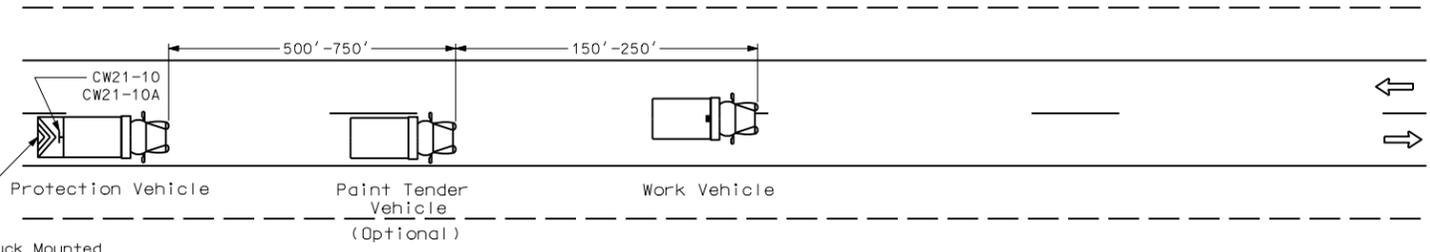
TCP
(3-1a)
Undivided Multi-lane Roadway



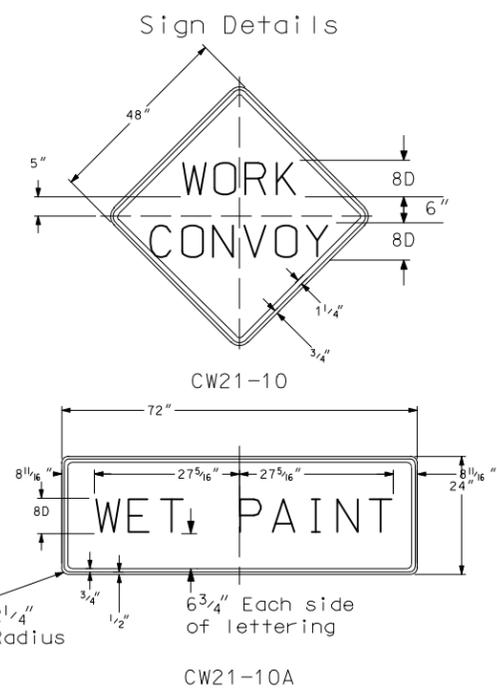
TCP
(3-1b)
Two-Way Roadway with Paved Shoulders



Typical Protection Vehicle



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



KEY

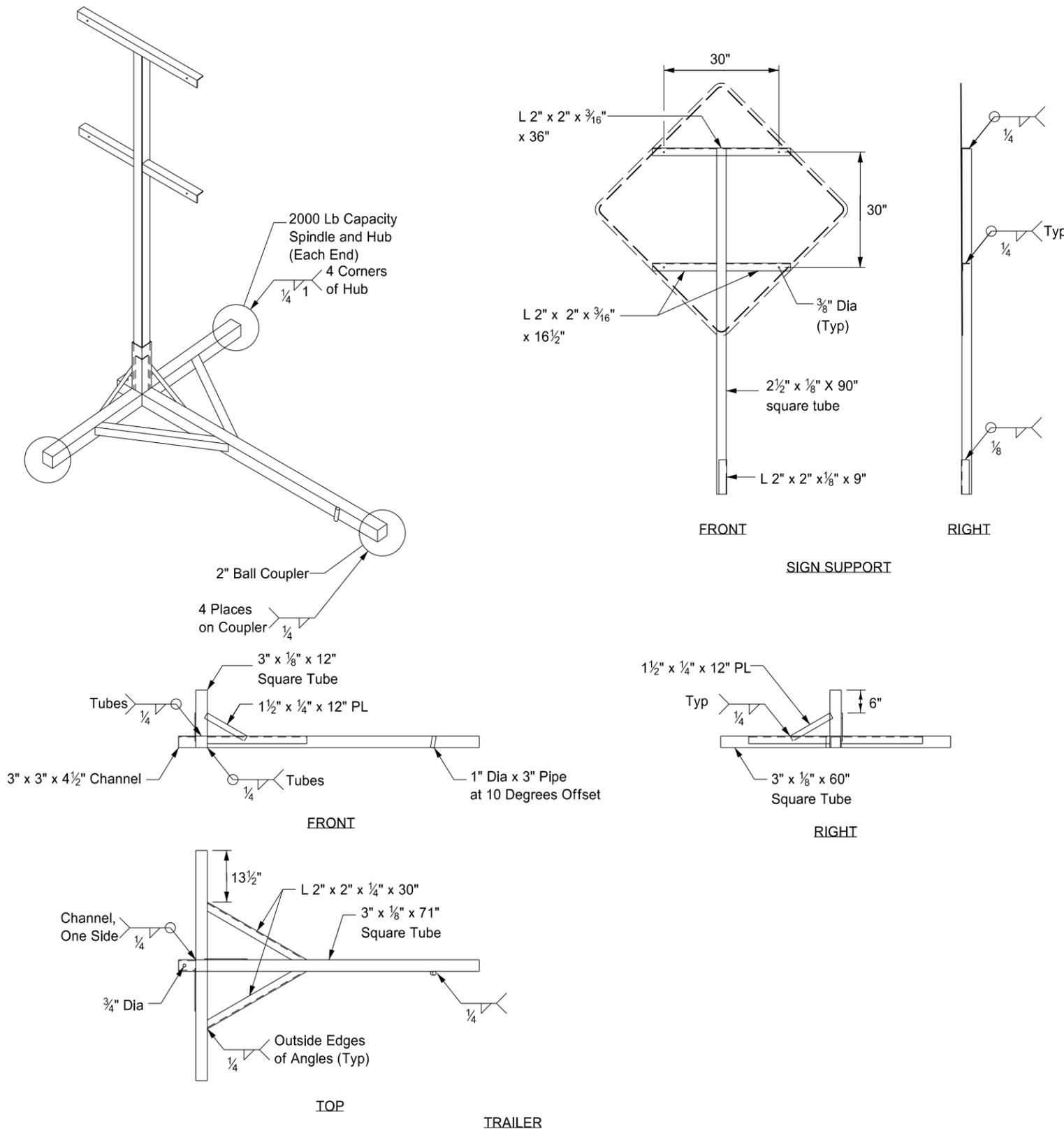
- Truck mounted attenuator
- Flashing arrow panels:
 - Right directional
 - Left directional
 - Double arrow directional
 - Caution Mode

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
01-22-92	
REVISIONS	
DATE	CHANGE
02-24-93	General
03-15-95	General
06-21-95	Remove caution mode
10-01-99	General Revisions
07-25-00	General Revisions
12-01-04	PE Stamp added

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



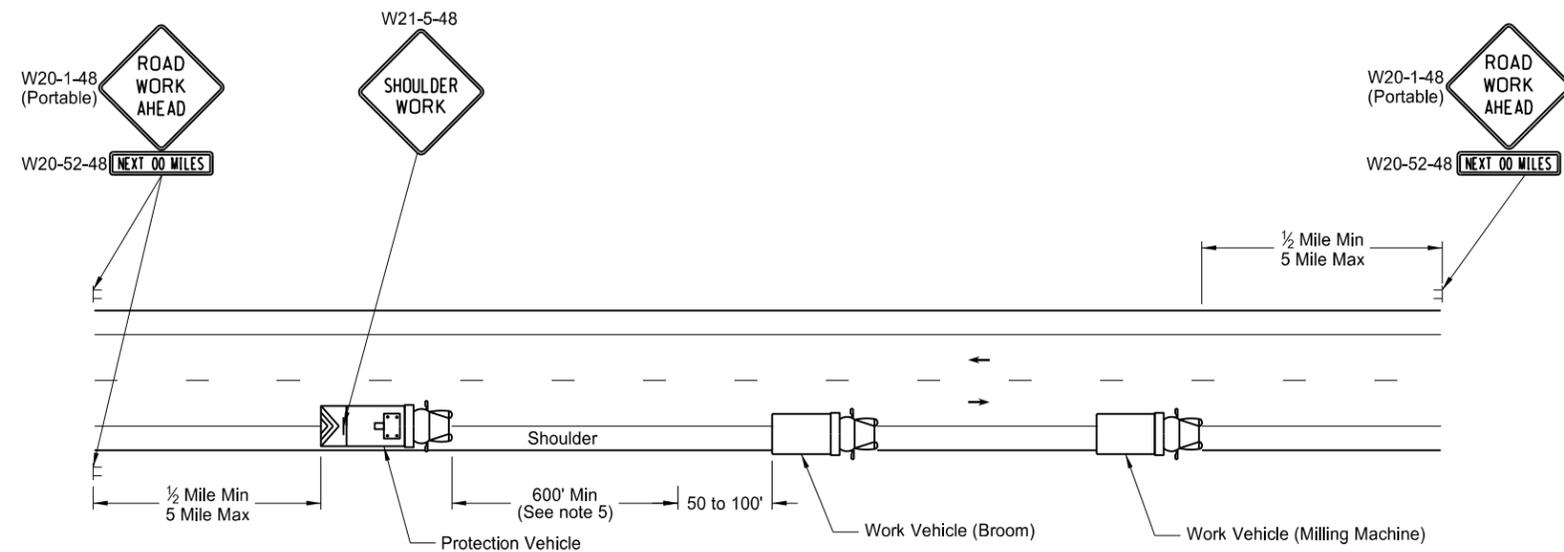
Notes:

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

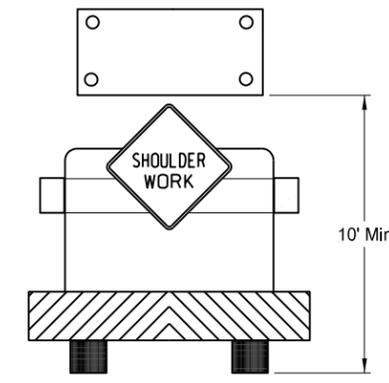
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

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MOBILE OPERATION
Grinding Shoulder Rumble Strips

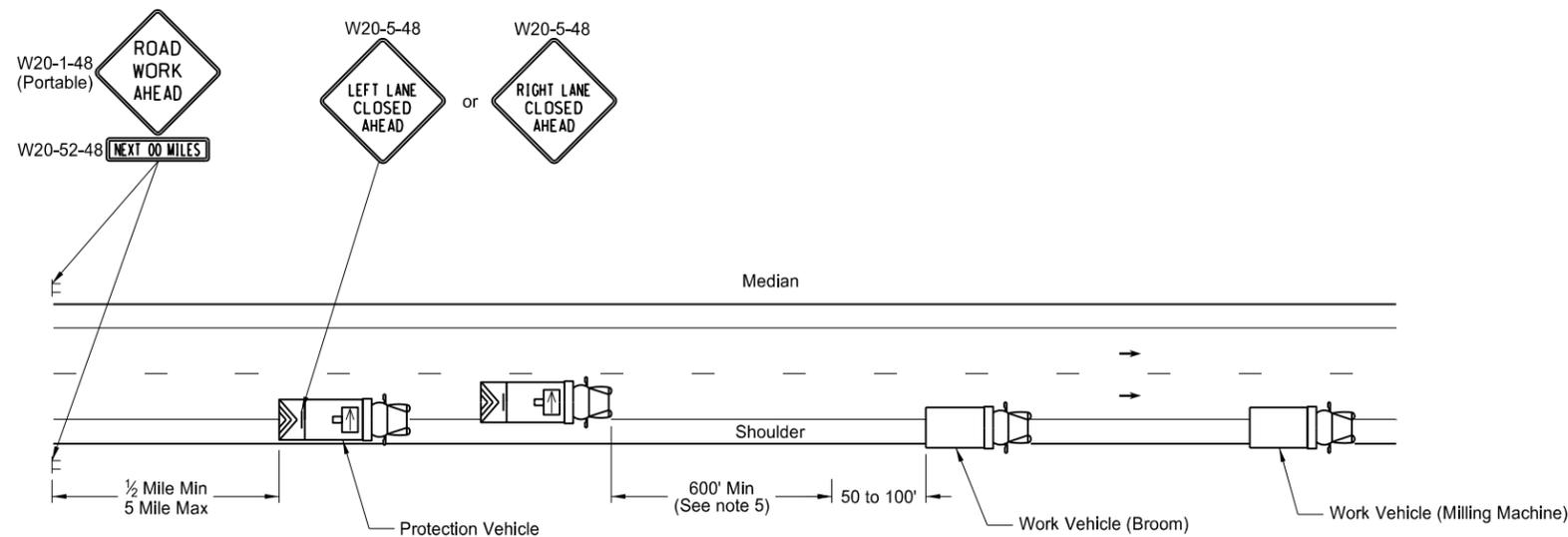


TWO LANE - TWO WAY ROADWAY

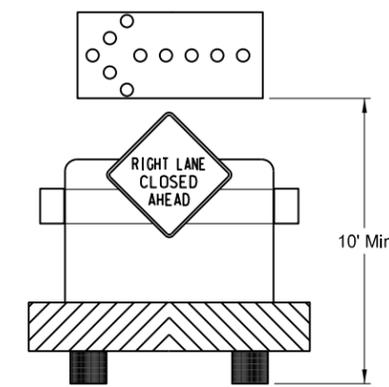


TWO LANE - TWO WAY ROADWAY
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

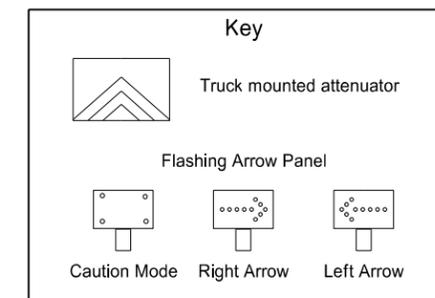
- Notes:
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractors expense.
 2. Vehicles shall have a rotating, flashing, oscillating or strobe lights.
 3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
 4. Each vehicle shall have two - way electronic communication capability.
 5. Vehicle spacing between the protection vehicle and work vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the protection vehicle in time to slow down and safely pass the work vehicles.
 6. ROAD WORK AHEAD SIGN: Advance Road Work Ahead signs shall be moved as the work area moves through the construction zone.
 7. Next XX Miles sign required when the distance from Road Work Ahead sign to the work location is two miles or greater.



INTERSTATE & 4 LANE DIVIDED HIGHWAY



INTERSTATE & 4 LANE DIVIDED HIGHWAY
Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode

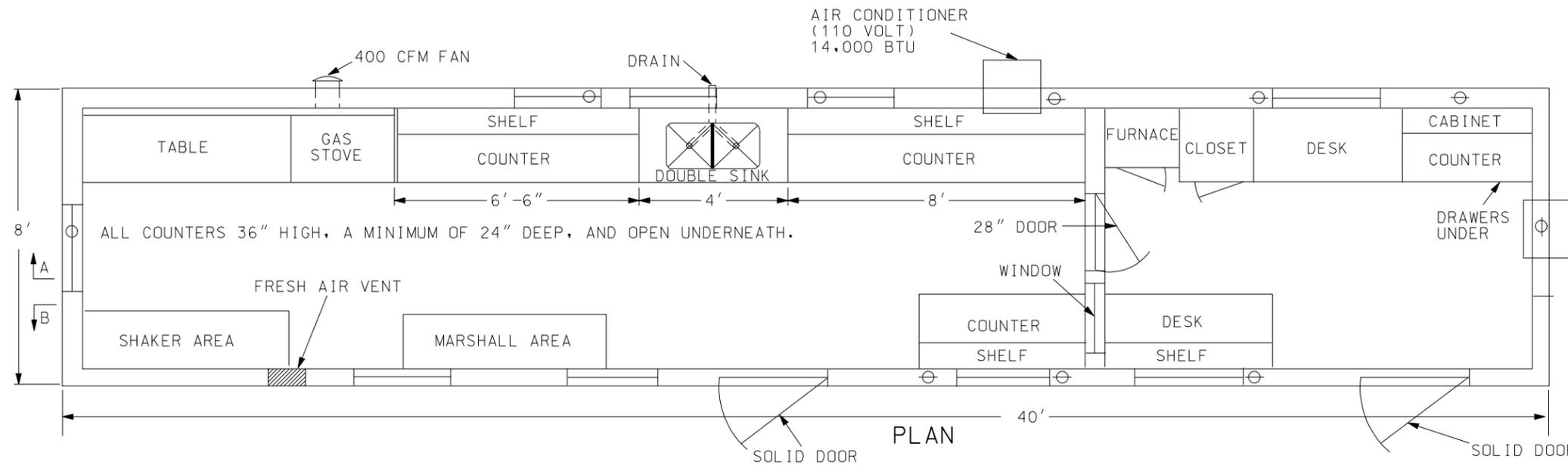


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

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TYPE C FIELD LABORATORY

D-706-1



AIR CONDITIONER (110 VOLT) 8,000 BTU

NOTES:

There shall be a minimum of 6 exterior ventilated casement or double hung windows. The minimum total area of opening shall be 34 square feet. The number, size, and location of windows may be adjusted to fit conditions. Suggested locations are shown on drawing.

The sink shall be double compartment stainless steel. Each compartment shall be a minimum of 16"x14"x10" deep. The sink shall be drained to an outside wasteline. A trap is not required. Water service lines shall be copper or plastic having a diameter of 1/2 inch.

The lab shall be equipped with an exhaust fan capable of removing inside air at a rate of 400 CFM.

The fresh air vent shall be hinged to open or close manually.

24" x 48" table shall be provided capable of holding a 200 lb. masonry saw. The table shall have a minimum clearance of 36" overhead.

The water supply tank shall have a capacity of 500 gallons.

Steps shall be provided for each of two entrance doors. Steps for each area shall be made of, or covered with, a material providing for a non-slip surface. They shall be heavy duty steps that are capable of withstanding heavy loadings and extensive use.

The pressure tank on the pump shall be 20 gallon capacity.

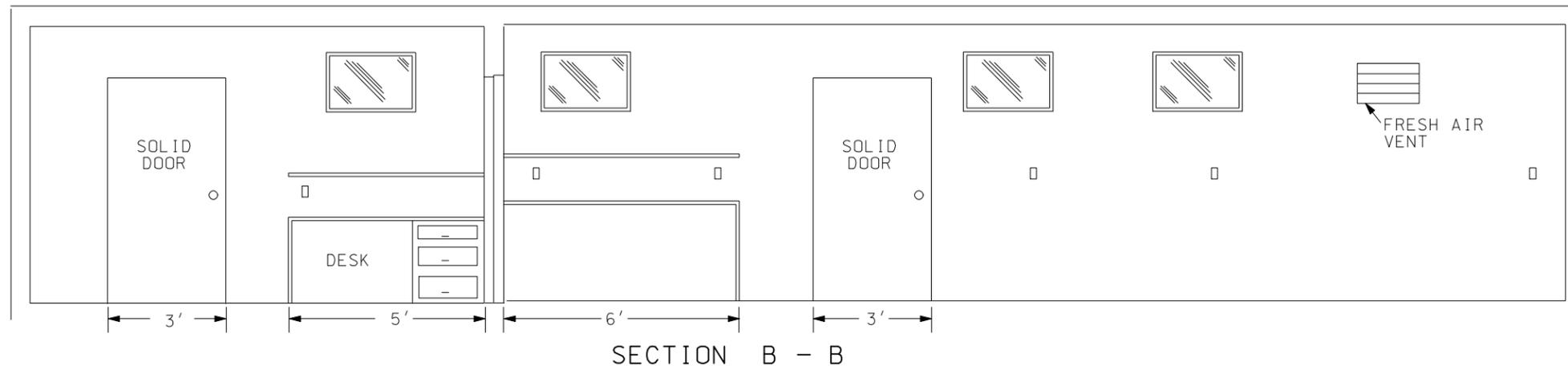
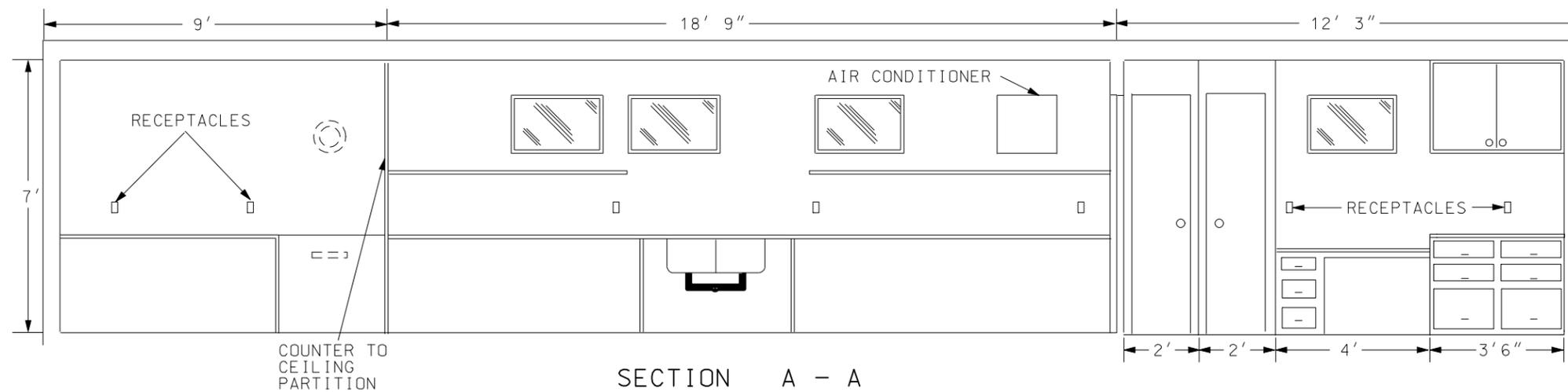
Locks, latches, and hinges for main doors shall be heavy duty type to withstand the intense use in service.

The wall between the office and the work area shall be properly insulated to prevent the transmission of heat & noise.

The floor beneath the marshall area shall be heavily reinforced.

The lab shall be equipped with steel cable tie downs and ground anchors at each corner of the lab.

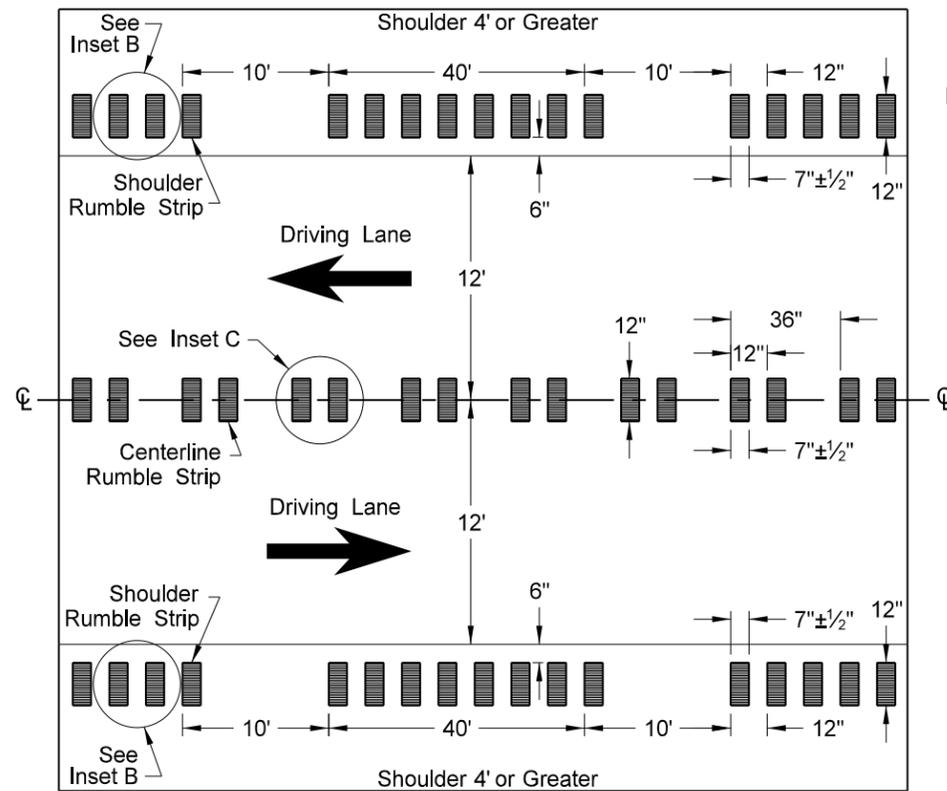
Electrical service entrance shall be wired for 100 amps, and have separate circuits for air conditioners. Convenience outlets shall have a minimum spacing of 4 feet in counter areas.



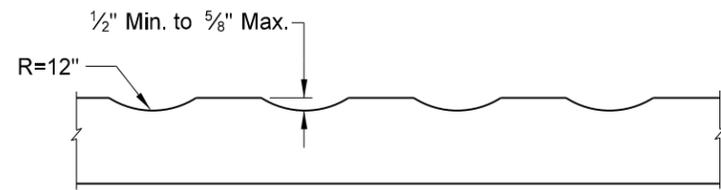
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-05-88	Drawing and notes
06-20-03	General revisions
12-01-04	PE Stamp added

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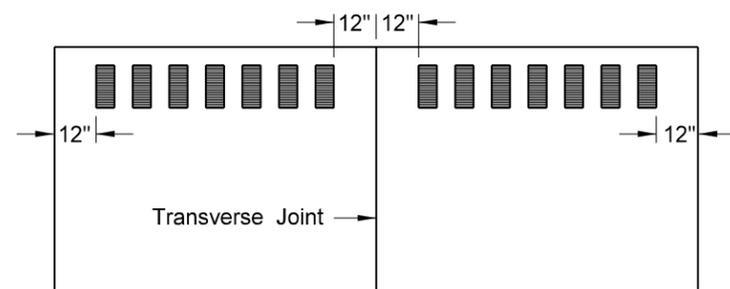
RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS 4' OR GREATER)



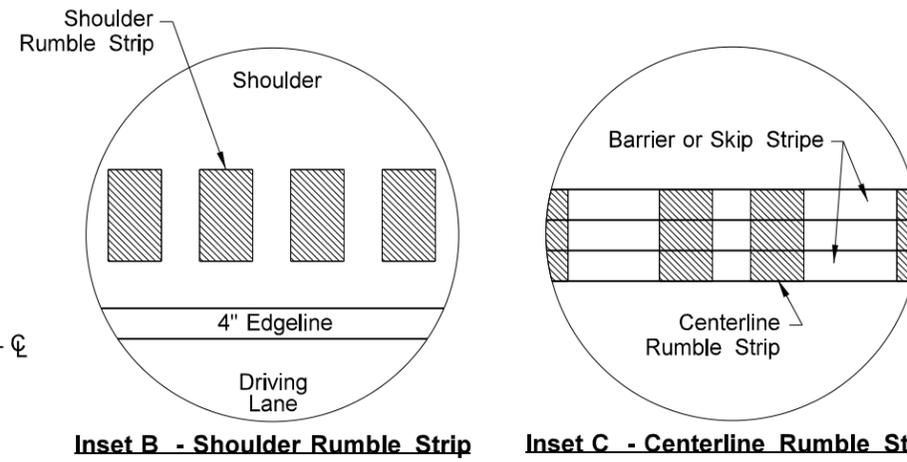
Undivided Highways (Shoulders 4' or Greater)



Profile of Rumble Strips - Bituminous and PCC Pavements



Discontinue rumble strip approx. 12" on both sides of PCC transverse joint

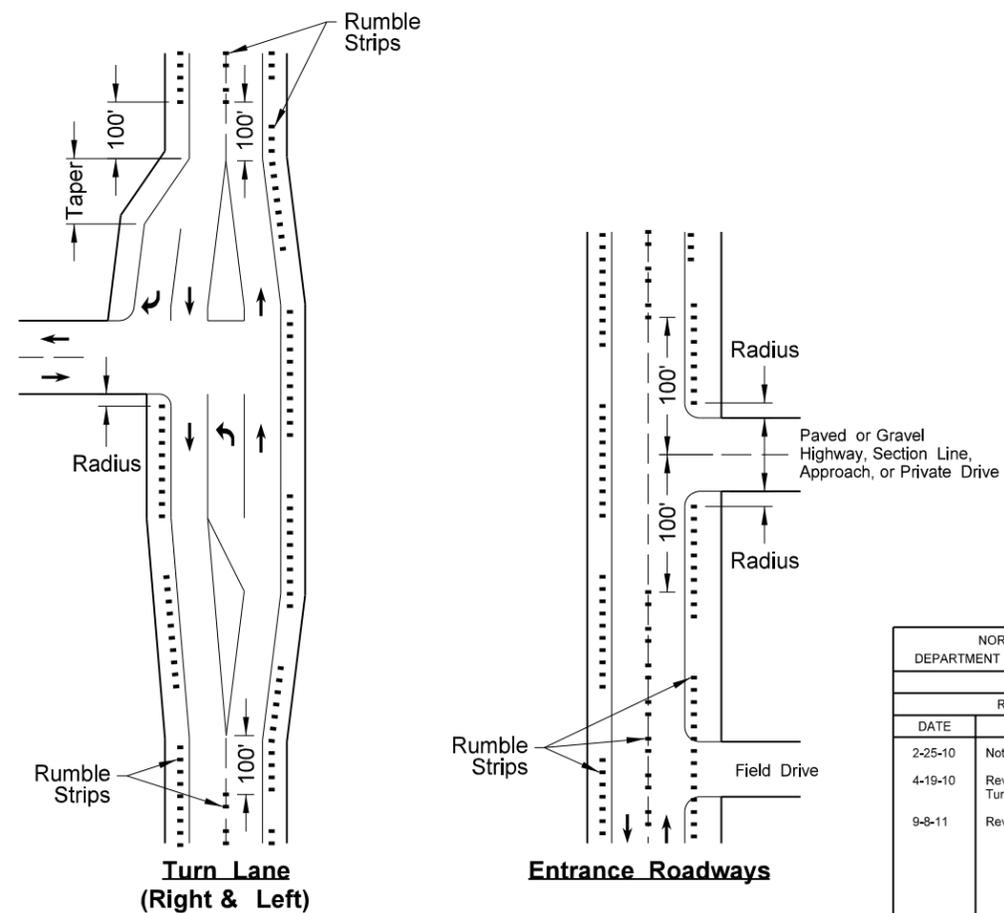


Inset B - Shoulder Rumble Strip

Inset C - Centerline Rumble Strip

NOTES:

- 1) Discontinue shoulder rumble strips through the entire length of right turn lanes, 100' before right turn lane tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive.
- 2) Discontinue centerline rumble strips through the entire length of left turn lanes, 100' before left turn lane tapers and median islands, and 100' before and after a paved or gravel highway, section line, approach, or private drive.



Turn Lane (Right & Left)

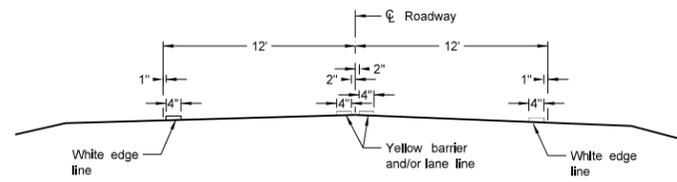
Entrance Roadways

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-8-11	Revised Notes and D-760-3.

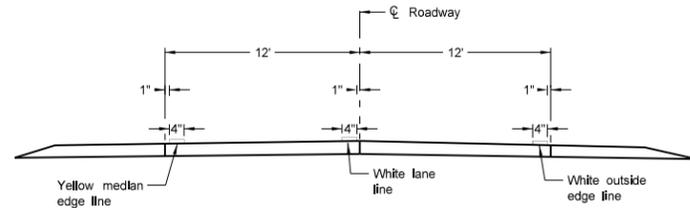
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PAVEMENT MARKING

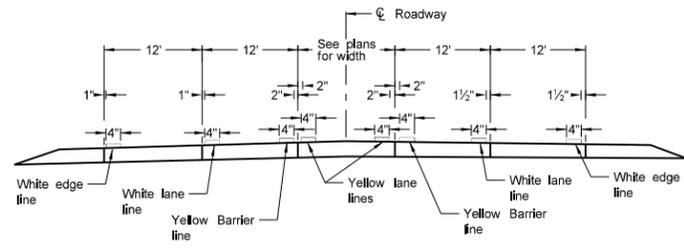
D-762-4



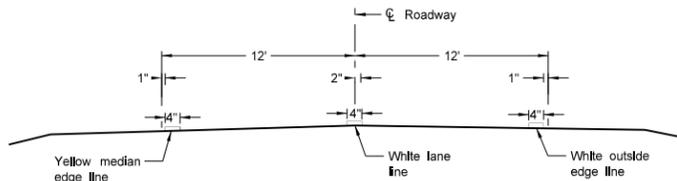
Two Lane Two Way
RURAL ROADWAY



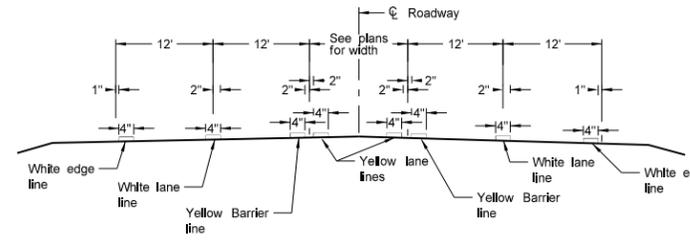
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



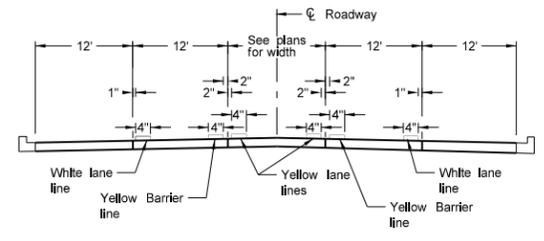
RURAL FIVE LANE ROADWAY
Concrete Section



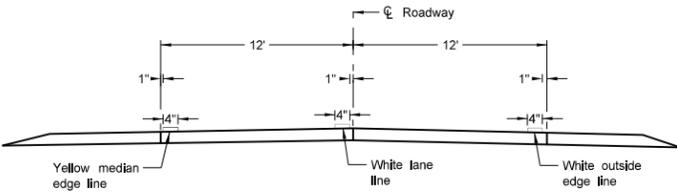
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



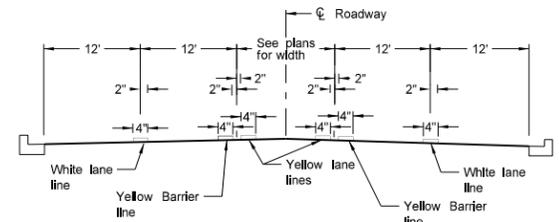
RURAL FIVE LANE ROADWAY
Asphalt Section



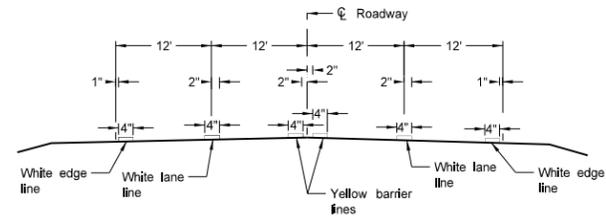
URBAN FIVE LANE SECTION
Concrete Section



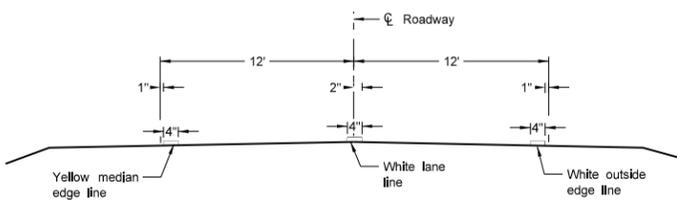
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



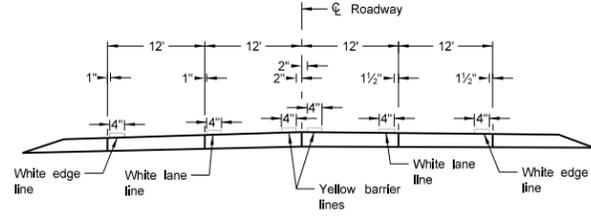
URBAN FIVE LANE SECTION
Asphalt Section



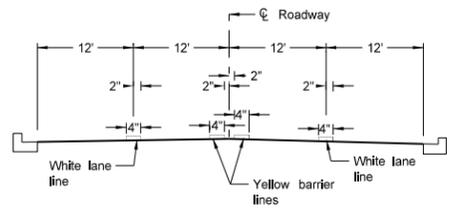
RURAL FOUR LANE ROADWAY
Asphalt Section



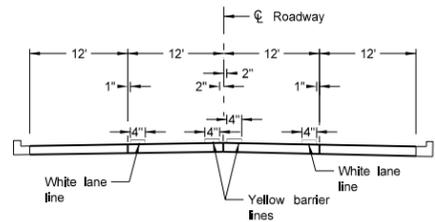
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



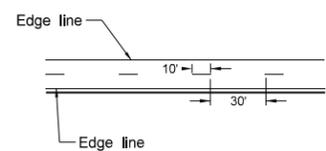
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



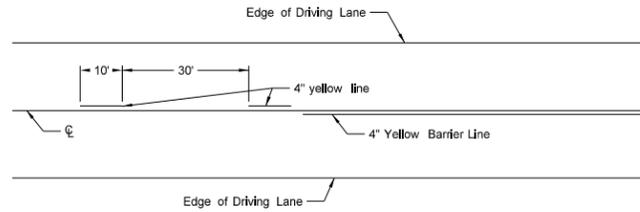
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

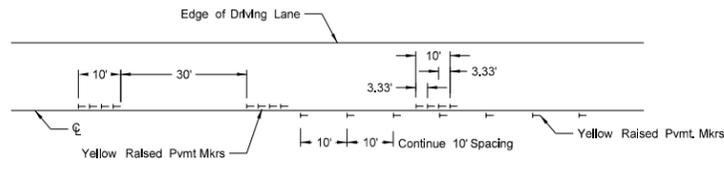
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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SHORT-TERM PAVEMENT MARKING

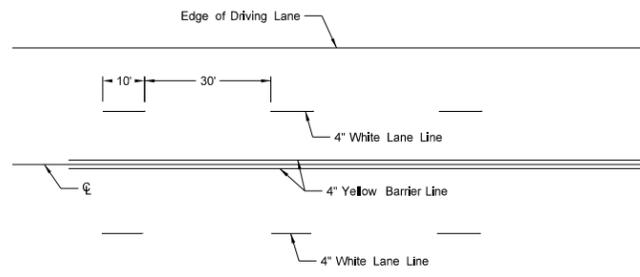


Painted or Tape Lines

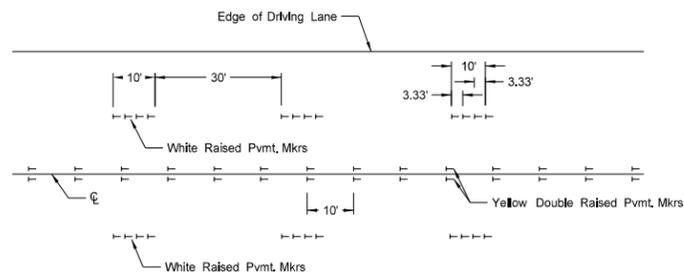


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

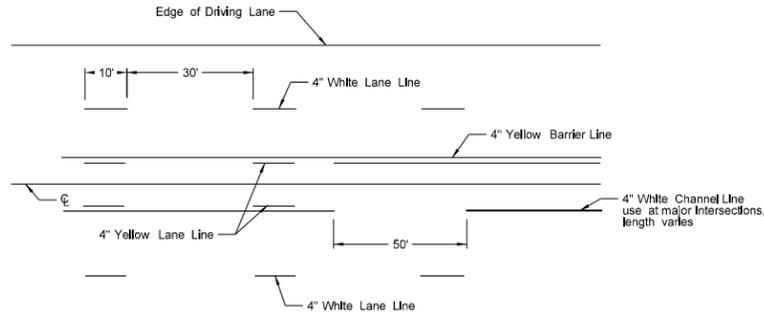


Painted or Tape Lines

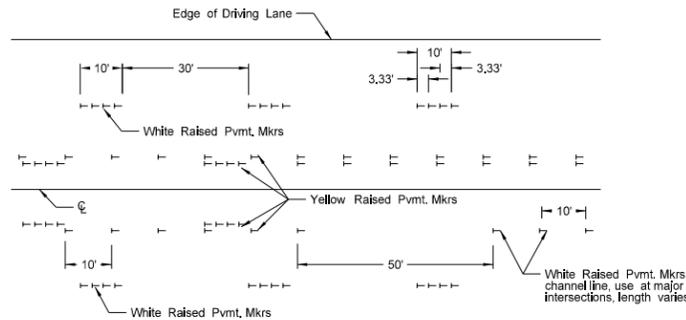


Raised Pavement Markers

FOUR LANE ROADWAY

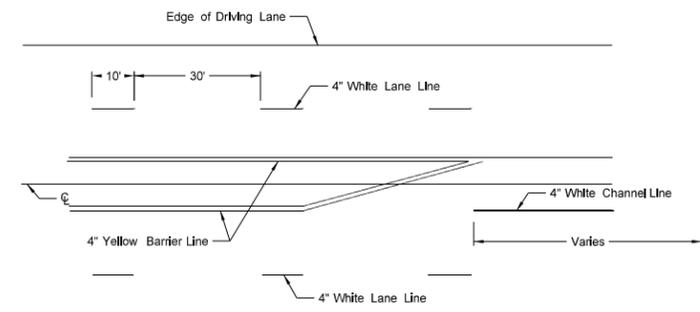


Painted or Tape Lines

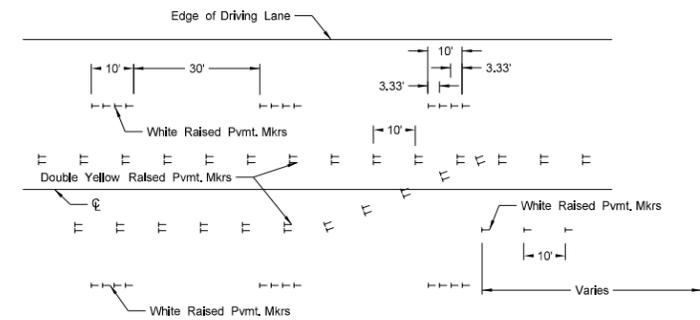


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

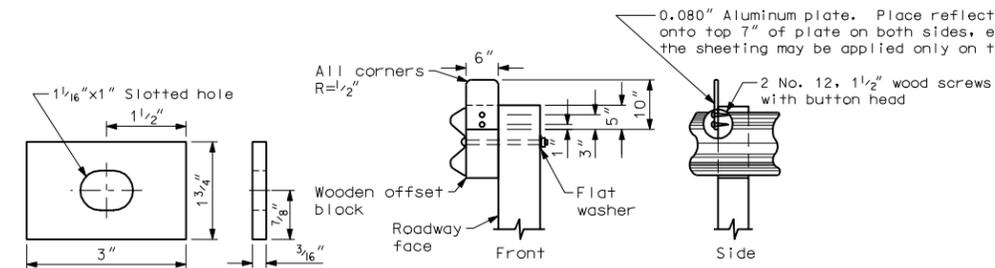
NOTES:

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

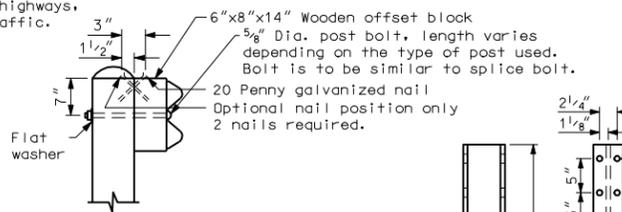
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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

BEAM GUARDRAIL GENERAL DETAILS

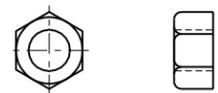
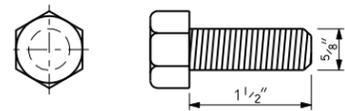


REFLECTORIZED PLATE DETAIL
2 additional reflectors are added to the w-beam guardrail quantities for placement on end treatment.

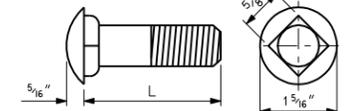


TYPICAL POST ATTACHMENT DETAIL

RECTANGULAR PLATE WASHER



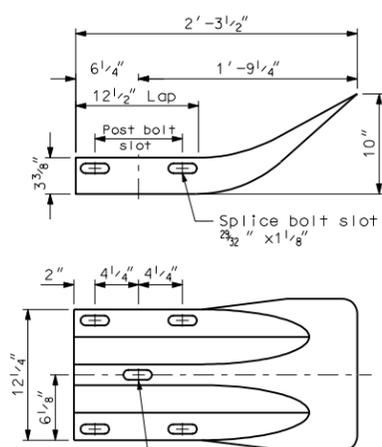
5/8" HEX BOLT & NUT



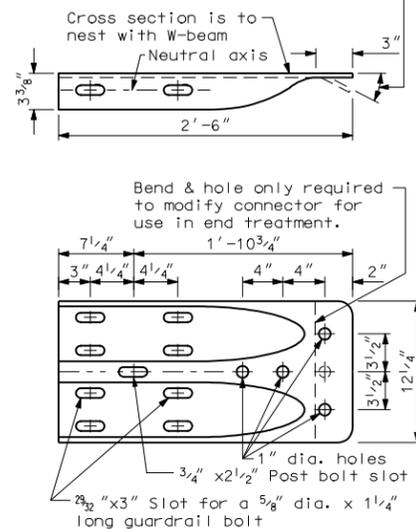
L	THREAD LENGTH
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length



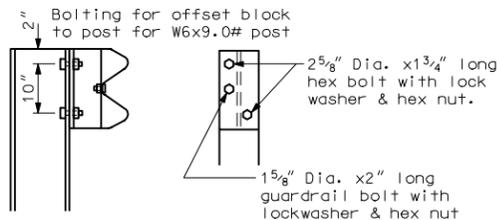
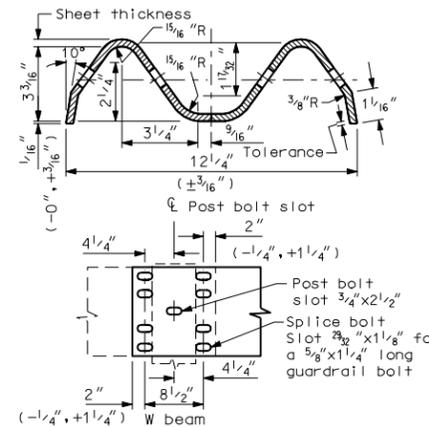
5/8" CARRIAGE BOLT & NUT



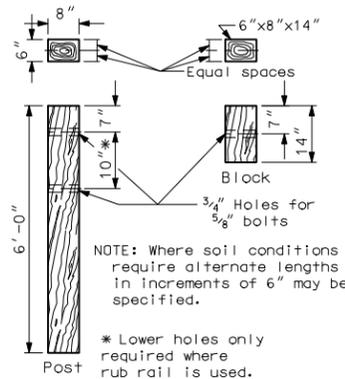
W BEAM END SECTION (FLARED)



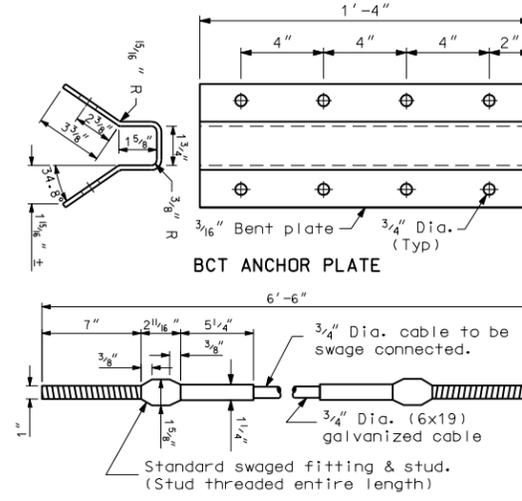
W BEAM TERMINAL CONNECTOR



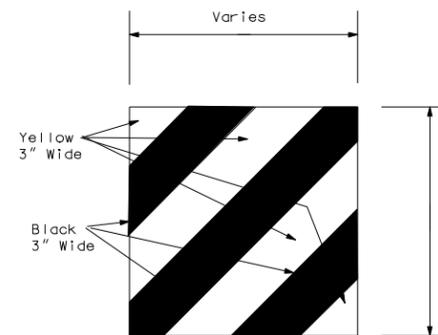
TYPICAL W POST ATTACHMENT DETAIL



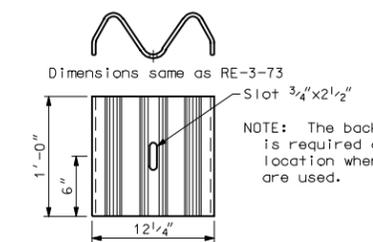
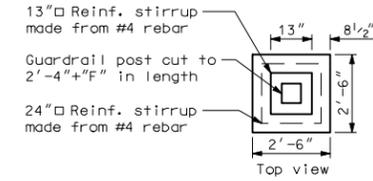
6x8 TIMBER POST & BLOCK



BCT CABLE ASSEMBLY

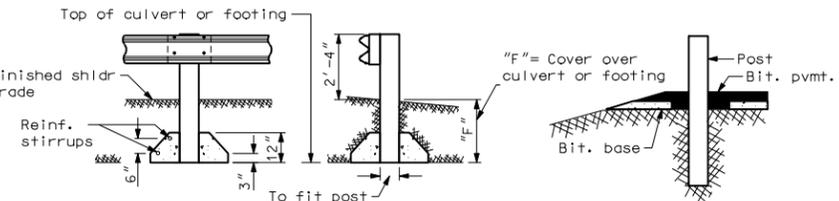
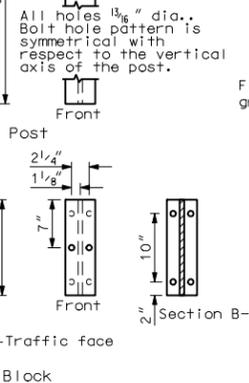


IMPACT HEAD OBJECT MARKER



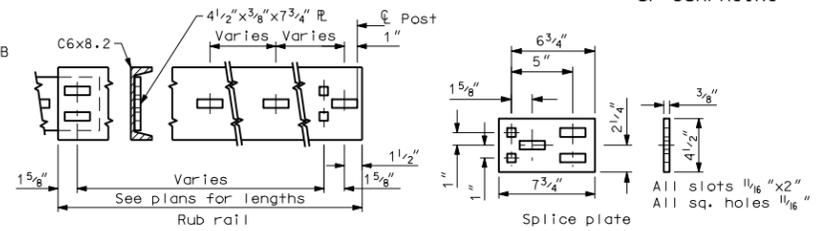
NOTE: The back up plate is required at non splice location when steel posts are used.

Optional for handling during galvanizing.



DETAIL OF CONCRETE PEDESTAL FOR POSTS

REPLACEMENT OF SURFACING



C6x8 RUB RAIL AND SPLICE PLATE

NOTES:

ReflectORIZED plates: Reflecter plates shall begin at first post and be spaced 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.

Detail of concrete pedestal for posts: To be used over culverts or footings when dimension "F" is less than 3'-8". When round posts are used and the pedestal required, the post hole in the pedestal shall be varied as required by the post shape.

Manner of replacing bit. material at guardrail post: All excess earth from excavations for guard posts shall be disposed of as directed by the engineer. Replace bit. material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bit. material to be included in the price bid for other items.

The Object Marker shall fit within the vertical edges of the Impact Plate. The retrorreflective sheeting shall be type IIIA sheeting meeting the requirements of Section 894.02.b of the standard specifications. The sheeting shall be applied to .100 Aluminum sheeting meeting the requirements Section 894.01.a. The Object Marker shall attached to the Impact Head plate with rivets or some other attachment device. The rivets or attachment device shall be non-rust. The Stripes shall slope downward toward the roadway side.

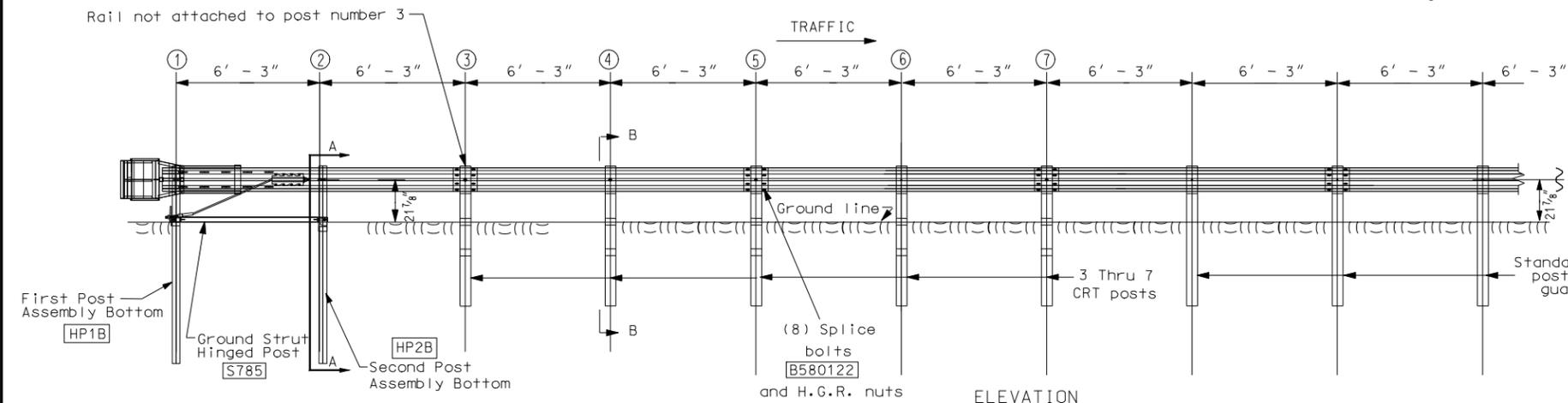
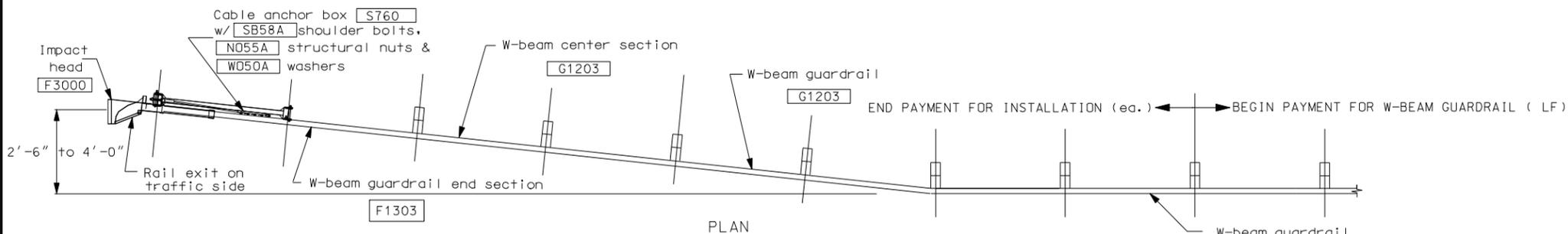
Guardrail installation height tolerance = ± 1".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09-01-08	
REVISIONS	
DATE	CHANGE
11-22-02	Delete Z post. rev. note
12-01-04	PE Stamp added
01-30-07	Revised impact head object marker
09-12-07	Revised guardrail height from 27" to 28" and added gdr1 height tolerance to notes

This document was originally issued and sealed by Mark S Gaydos, Registration Number PE-4518, on 09/12/07 and the original document is stored at the North Dakota Department of Transportation

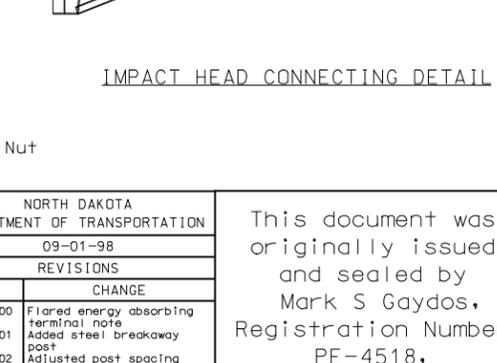
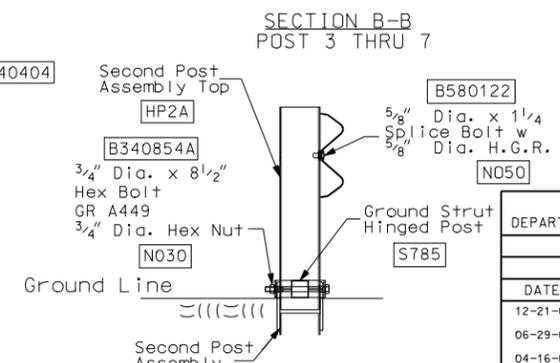
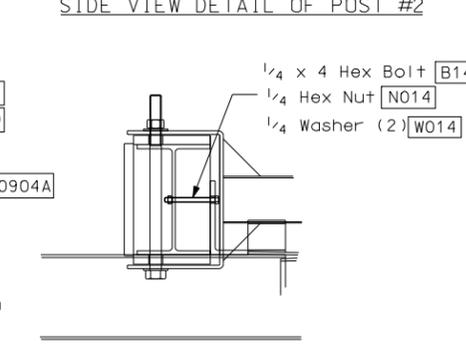
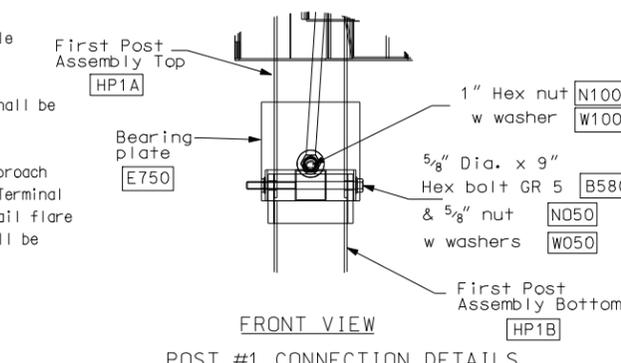
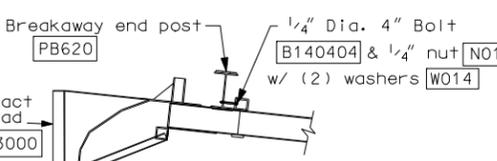
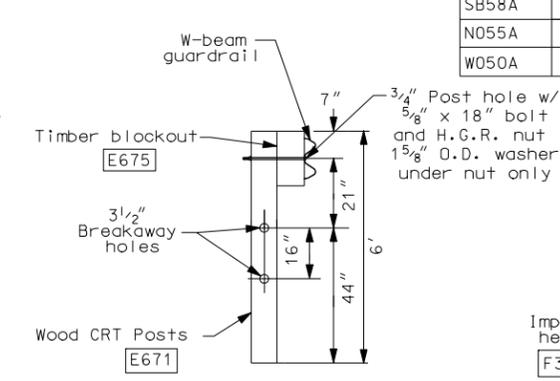
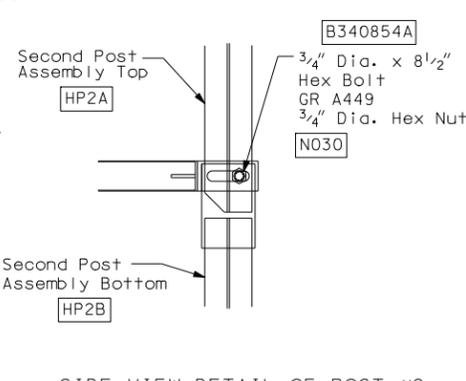
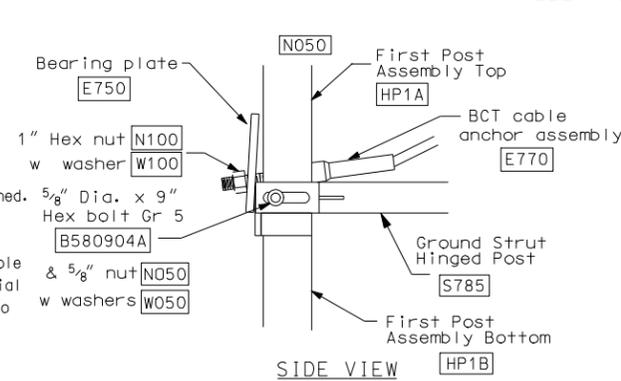
FLARED ENERGY ABSORBING TERMINAL FOR STEEL BREAKAWAY SYSTEM

D-764-2C



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 EQUIV.
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT HINGED POST
HARDWARE (ALL DIMENSIONS IN INCHES)		
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
N030	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 9/16 ID A325 STR. WASHER

- GENERAL NOTES**
- Wood posts are required with the Flared Energy Absorbing Terminal except post 1 and 2.
 - All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
 - The lower sections of the posts shall not protrude more than 4 inches above the ground (measured along a 60 inch cord). Site grading may be necessary to meet this requirement.
 - Lower post sections shall not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactory compacted to prevent settlement.
 - When rock is encountered during excavation, a 12" diameter post hole 20" deep may be used if approved by the Engineer. Granular material will be placed in the bottom of the hole approximately 2 1/2" deep to provide drainage. The soil tubes shall be field cut to length, placed in the hole and back filled with adequately compacted material excavated from the hole.
 - The breakaway cable assembly shall be taut. A locking device (vice grips or channel lock pliers) should be used to prevent cable from twisting when tightening nuts.
 - The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when wood shrinks. The nail shall be 20 penny and galvanized.
 - The Flared Energy Absorbing Terminal shall be flared only when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, the Flared Energy Absorbing Terminal shall have only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, the Flared Energy Absorbing Terminal shall be turned parallel to the roadway.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09-01-98	
DATE	CHANGE
12-21-00	Flared energy absorbing terminal note
06-29-01	Added steel breakaway post
04-16-02	Adjusted post spacing and eliminated one post
12-01-04	PE Stamp added
05-03-05	Revised posts 1 & 2, Revised notes
04-05-06	Changed CRT post & blockout Qty. to 5 and added 7 to section B-B
01-04-07	General revisions
09-12-07	Rev. dimension to center of guardrail to 21 1/8"

This document was originally issued and sealed by Mark S Gaydos, Registration Number PE-4518, on 09/12/07 and the original document is stored at the North Dakota Department of Transportation

**GUARDRAIL AT OBSTRUCTIONS
65 MPH DESIGN LENGTH OF NEED TABLES**

D-764-16A

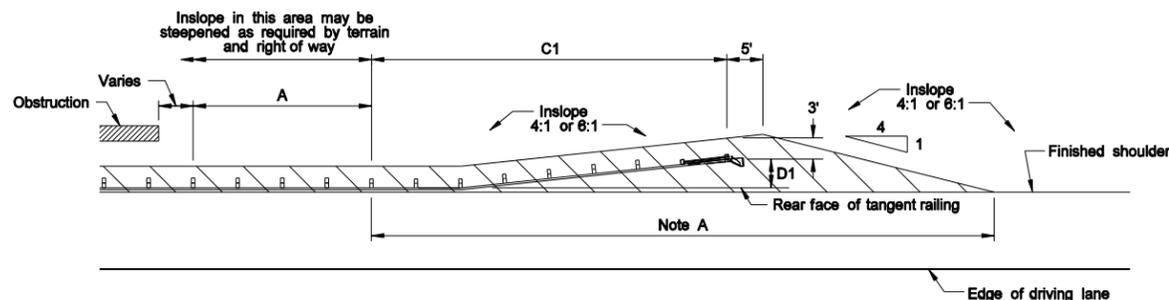
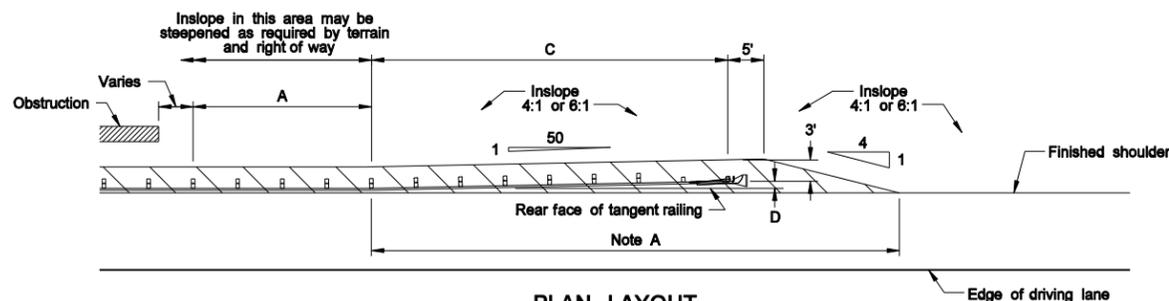
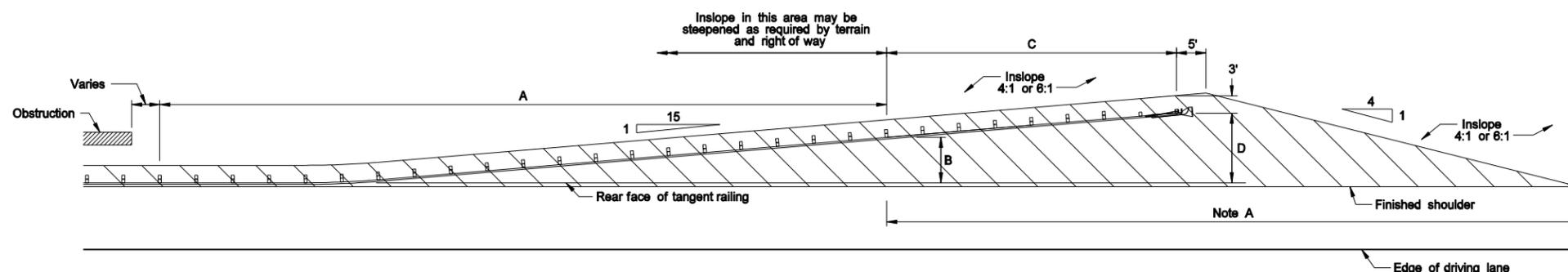
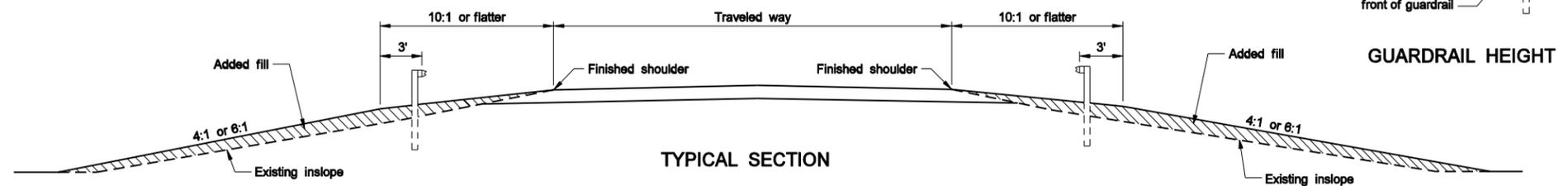
LENGTH OF NEED TABLE 65 MPH DESIGN SPEED

DESIGN TRAFFIC VOLUME	GUARDRAIL OFFSET DISTANCE	APPROACH SIDE							OPPOSITE SIDE							TOTAL W-BEAM LENGTH ①								
		A	B	C	D	C1	D1	E	A	B	C	D	C1	D1	E	0' - 12.5' Obstruction width	12.5' - 25' Obstruction width	25' - 37.5' Obstruction width	37.5' - 50' Obstruction width	50' - 62.5' Obstruction width	62.5' - 75' Obstruction width	75' - 87.5' Obstruction width	87.5' - 100' Obstruction width	
		FT	FT	FT	FT	FT	FT		FT	FT	FT	FT	FT	FT		FT	FT	FT	FT	FT	FT	FT	FT	FT
Under 750 ADT	12	24.96	1.25	49.89	4.57			15	0.00	0.00	49.99	1.00	49.79	4.00	50	87.5	100.0	112.5	125.0	137.5	150.0	162.5	175.0	187.5
	11	37.43	2.08	49.89	5.40			15	0.00	0.00	49.99	1.00	49.79	4.00	50	100.0	112.5	125.0	137.5	150.0	162.5	175.0	187.5	200.0
	10	37.43	2.08	49.89	5.40			15	0.00	0.00	49.99	1.00	49.79	4.00	50	100.0	112.5	125.0	137.5	150.0	162.5	175.0	187.5	200.0
	9	49.91	2.91	49.89	6.24			15	0.00	0.00	49.99	1.00	49.79	4.00	50	112.5	125.0	137.5	150.0	162.5	175.0	187.5	200.0	212.5
	8	62.38	3.74	49.89	7.07			15	0.00	0.00	49.99	1.00	49.79	4.00	50	125.0	137.5	150.0	162.5	175.0	187.5	200.0	212.5	225.0
	7	62.38	3.74	49.89	7.07			15	0.00	0.00	49.99	1.00	49.79	4.00	50	125.0	137.5	150.0	162.5	175.0	187.5	200.0	212.5	225.0
	6	74.85	4.57	49.89	7.90			15	0.00	0.00	49.99	1.00	49.79	4.00	50	137.5	150.0	162.5	175.0	187.5	200.0	212.5	225.0	237.5
	5	74.85	4.57	49.89	7.90			15	0.00	0.00	49.99	1.00	49.79	4.00	50	137.5	150.0	162.5	175.0	187.5	200.0	212.5	225.0	237.5
	4	87.32	5.40	49.89	8.73			15	0.00	0.00	49.99	1.00	49.79	4.00	50	150.0	162.5	175.0	187.5	200.0	212.5	225.0	237.5	250.0
	3	99.80	6.24	49.89	9.56			15	12.49	0.42	49.89	3.74			15	175.0	187.5	200.0	212.5	225.0	237.5	250.0	262.5	275.0
	2	99.80	6.24	49.89	9.56			15	12.49	0.42	49.89	3.74			15	175.0	187.5	200.0	212.5	225.0	237.5	250.0	262.5	275.0
	1	112.27	7.07	49.89	10.39			15	12.49	0.42	49.89	3.74			15	187.5	200.0	212.5	225.0	237.5	250.0	262.5	275.0	287.5
0	124.74	7.90	49.89	11.23			15	24.96	1.25	49.89	4.57			15	212.5	225.0	237.5	250.0	262.5	275.0	287.5	300.0	312.5	
750 - 1500 ADT	12	62.38	3.74	49.89	7.07			15	0.00	0.00	49.99	1.00	49.79	4.00	50	125.0	137.5	150.0	162.5	175.0	187.5	200.0	212.5	225.0
	11	62.38	3.74	49.89	7.07			15	0.00	0.00	49.99	1.00	49.79	4.00	50	125.0	137.5	150.0	162.5	175.0	187.5	200.0	212.5	225.0
	10	74.85	4.57	49.89	7.90			15	0.00	0.00	49.99	1.00	49.79	4.00	50	137.5	150.0	162.5	175.0	187.5	200.0	212.5	225.0	237.5
	9	87.32	5.40	49.89	8.73			15	0.00	0.00	49.99	1.00	49.79	4.00	50	150.0	162.5	175.0	187.5	200.0	212.5	225.0	237.5	250.0
	8	87.32	5.40	49.89	8.73			15	12.49	0.42	49.89	3.74			15	162.5	175.0	187.5	200.0	212.5	225.0	237.5	250.0	262.5
	7	99.80	6.24	49.89	9.56			15	12.49	0.42	49.89	3.74			15	175.0	187.5	200.0	212.5	225.0	237.5	250.0	262.5	275.0
	6	99.80	6.24	49.89	9.56			15	12.49	0.42	49.89	3.74			15	175.0	187.5	200.0	212.5	225.0	237.5	250.0	262.5	275.0
	5	112.27	7.07	49.89	10.39			15	24.96	1.25	49.89	4.57			15	200.0	212.5	225.0	237.5	250.0	262.5	275.0	287.5	300.0
	4	124.74	7.90	49.89	11.23			15	37.43	2.08	49.89	5.40			15	225.0	237.5	250.0	262.5	275.0	287.5	300.0	312.5	325.0
	3	124.74	7.90	49.89	11.23			15	37.43	2.08	49.89	5.40			15	225.0	237.5	250.0	262.5	275.0	287.5	300.0	312.5	325.0
	2	137.21	8.73	49.89	12.06			15	49.91	2.91	49.89	6.24			15	250.0	262.5	275.0	287.5	300.0	312.5	325.0	337.5	350.0
	1	137.21	8.73	49.89	12.06			15	49.91	2.91	49.89	6.24			15	250.0	262.5	275.0	287.5	300.0	312.5	325.0	337.5	350.0
0	149.69	9.56	49.89	12.89			15	62.38	3.74	49.89	7.07			15	275.0	287.5	300.0	312.5	325.0	337.5	350.0	362.5	375.0	
1500 - 2000 ADT	12	87.32	5.40	49.89	8.73			15	12.49	0.42	49.89	3.74			15	162.5	175.0	187.5	200.0	212.5	225.0	237.5	250.0	262.5
	11	99.80	6.24	49.89	9.56			15	12.49	0.42	49.89	3.74			15	175.0	187.5	200.0	212.5	225.0	237.5	250.0	262.5	275.0
	10	99.80	6.24	49.89	9.56			15	24.96	1.25	49.89	4.57			15	187.5	200.0	212.5	225.0	237.5	250.0	262.5	275.0	287.5
	9	112.27	7.07	49.89	10.39			15	24.96	1.25	49.89	4.57			15	200.0	212.5	225.0	237.5	250.0	262.5	275.0	287.5	300.0
	8	112.27	7.07	49.89	10.39			15	37.43	2.08	49.89	5.40			15	212.5	225.0	237.5	250.0	262.5	275.0	287.5	300.0	312.5
	7	124.74	7.90	49.89	11.23			15	37.43	2.08	49.89	5.40			15	225.0	237.5	250.0	262.5	275.0	287.5	300.0	312.5	325.0
	6	124.74	7.90	49.89	11.23			15	49.91	2.91	49.89	6.24			15	237.5	250.0	262.5	275.0	287.5	300.0	312.5	325.0	337.5
	5	137.21	8.73	49.89	12.06			15	49.91	2.91	49.89	6.24			15	250.0	262.5	275.0	287.5	300.0	312.5	325.0	337.5	350.0
	4	137.21	8.73	49.89	12.06			15	62.38	3.74	49.89	7.07			15	262.5	275.0	287.5	300.0	312.5	325.0	337.5	350.0	362.5
	3	149.69	9.56	49.89	12.89			15	62.38	3.74	49.89	7.07			15	275.0	287.5	300.0	312.5	325.0	337.5	350.0	362.5	375.0
	2	149.69	9.56	49.89	12.89			15	74.85	4.57	49.89	7.90			15	287.5	300.0	312.5	325.0	337.5	350.0	362.5	375.0	387.5
	1	162.16	10.39	49.89	13.72			15	87.32	5.40	49.89	8.73			15	312.5	325.0	337.5	350.0	362.5	375.0	387.5	400.0	412.5
0	162.16	10.39	49.89	13.72			15	87.32	5.40	49.89	8.73			15	312.5	325.0	337.5	350.0	362.5	375.0	387.5	400.0	412.5	
2000 - 6000 ADT	12	99.80	6.24	49.89	9.56			15	12.49	0.42	49.89	3.74			15	175.0	187.5	200.0	212.5	225.0	237.5	250.0	262.5	275.0
	11	112.27	7.07	49.89	10.39			15	24.96	1.25	49.89	4.57			15	200.0	212.5	225.0	237.5	250.0	262.5	275.0	287.5	300.0
	10	112.27	7.07	49.89	10.39			15	24.96	1.25	49.89	4.57			15	200.0	212.5	225.0	237.5	250.0	262.5	275.0	287.5	300.0
	9	124.74	7.90	49.89	11.23			15	37.43	2.08	49.89	5.40			15	225.0	237.5	250.0	262.5	275.0	287.5	300.0	312.5	325.0
	8	124.74	7.90	49.89	11.23			15	37.43	2.08	49.89	5.40			15	225.0	237.5	250.0	262.5	275.0	287.5	300.0	312.5	325.0
	7	137.21	8.73	49.89	12.06			15	49.91	2.91	49.89	6.24			15	250.0	262.5	275.0	287.5	300.0	312.5	325.0	337.5	350.0
	6	137.21	8.73	49.89	12.06			15	62.38	3.74	49.89	7.07			15	262.5	275.0	287.5	300.0	312.5	325.0	337.5	350.0	362.5
	5	149.69	9.56	49.89	12.89			15	62.38	3.74	49.89	7.07			15	275.0	287.5	300.0	312.5	325.0	337.5	350.0	362.5	375.0
	4	149.69	9.56	49.89	12.89			15	74.85	4.57	49.89	7.90			15	287.5	300.0	312.5	325.0	337.5	350.0	362.5	375.0	387.5
	3	162.16	10.39	49.89	13.72			15	74.85	4.57	49.89	7.90			15	300.0	312.5	325.0	337.5	350.0	362.5	375.0	387.5	400.0
	2	174.63	11.23	49.89	14.55			15	87.32	5.40	49.89	8.73			15	325.0	337.5	350.0	362.5	375.0	387.5	400.0	412.5	425.0
	1	174.63	11.23	49.89	14.55			15	87.32	5.40	49.89	8.73			15	325.0	337.5	350.0	362.5	375.0	387.5	400.0	412.5	425.0
0	187.10	12.06	49.89	15.38			15	99.80	6.24	49.89	9.56			15	350.0	362.5	375.0	387.5	400.0	412.5	425.0	437.5	450.0	
OVER 6000 ADT	12	112.27	7.07	49.89	10.39			15	24.96	1.25	49.89	4.57			15	200.0	212.5	225.0	237.5	250.0	262.5	275.0	287.5	300.0
	11	124.74	7.90	49.89	11.23			15	37.43	2.08	49.89	5.40			15	225.0	237.5	250.0	262.5	275.0	287.5	300.0	312.5	325.0
	10	124.74	7.90	49.89	11.23																			

TYPICAL GRADING AT OBSTRUCTIONS
WITH FLARED W-BEAM GUARDRAIL
65 MPH DESIGN SPEED

GUARDRAIL EMBANKMENT DIMENSION TABLE

DESIGN TRAFFIC VOLUME	GUARDRAIL OFFSET DISTANCE	APPROACH SIDE						OPPOSITE SIDE							
		TAPERED GUARDRAIL DIMENSIONS		END TERMINAL DIMENSIONS NON-FLARED		END TERMINAL DIMENSIONS FLARED		TAPERED GUARDRAIL DIMENSIONS		END TERMINAL DIMENSIONS NON-FLARED		END TERMINAL DIMENSIONS FLARED			
		A	B	C	D	C1	D1	A	B	C	D	C1	D1		
		FT	FT	FT	FT	FT	FT	FT	FT	FT	FT	FT	FT	FT	FT
Under 750 ADT	12	49.96	1.25	49.89	4.57			25.00	0.00	49.99	1.00	49.79	4.00		
	11	62.43	2.08	49.89	5.40			25.00	0.00	49.99	1.00	49.79	4.00		
	10	62.43	2.08	49.89	5.40			25.00	0.00	49.99	1.00	49.79	4.00		
	9	74.91	2.91	49.89	6.24			25.00	0.00	49.99	1.00	49.79	4.00		
	8	87.38	3.74	49.89	7.07			25.00	0.00	49.99	1.00	49.79	4.00		
	7	87.38	3.74	49.89	7.07			25.00	0.00	49.99	1.00	49.79	4.00		
	6	99.85	4.57	49.89	7.90			25.00	0.00	49.99	1.00	49.79	4.00		
	5	99.85	4.57	49.89	7.90			25.00	0.00	49.99	1.00	49.79	4.00		
	4	112.32	5.40	49.89	8.73			25.00	0.00	49.99	1.00	49.79	4.00		
	3	124.80	6.24	49.89	9.56			37.49	0.42	49.89	3.74				
	2	124.80	6.24	49.89	9.56			37.49	0.42	49.89	3.74				
	1	137.27	7.07	49.89	10.39			37.49	0.42	49.89	3.74				
0	149.74	7.90	49.89	11.23			49.96	1.25	49.89	4.57					
750 - 1500 ADT	12	87.38	3.74	49.89	7.07			25.00	0.00	49.99	1.00	49.79	4.00		
	11	87.38	3.74	49.89	7.07			25.00	0.00	49.99	1.00	49.79	4.00		
	10	99.85	4.57	49.89	7.90			25.00	0.00	49.99	1.00	49.79	4.00		
	9	112.32	5.40	49.89	8.73			25.00	0.00	49.99	1.00	49.79	4.00		
	8	112.32	5.40	49.89	8.73			37.49	0.42	49.89	3.74				
	7	124.80	6.24	49.89	9.56			37.49	0.42	49.89	3.74				
	6	124.80	6.24	49.89	9.56			37.49	0.42	49.89	3.74				
	5	137.27	7.07	49.89	10.39			49.96	1.25	49.89	4.57				
	4	149.74	7.90	49.89	11.23			62.43	2.08	49.89	5.40				
	3	149.74	7.90	49.89	11.23			62.43	2.08	49.89	5.40				
	2	162.21	8.73	49.89	12.06			74.91	2.91	49.89	6.24				
	1	162.21	8.73	49.89	12.06			74.91	2.91	49.89	6.24				
0	174.69	9.56	49.89	12.89			87.38	3.74	49.89	7.07					
1500 - 2000 ADT	12	112.32	5.40	49.89	8.73			37.49	0.42	49.89	3.74				
	11	124.80	6.24	49.89	9.56			37.49	0.42	49.89	3.74				
	10	124.80	6.24	49.89	9.56			49.96	1.25	49.89	4.57				
	9	137.27	7.07	49.89	10.39			49.96	1.25	49.89	4.57				
	8	137.27	7.07	49.89	10.39			62.43	2.08	49.89	5.40				
	7	149.74	7.90	49.89	11.23			62.43	2.08	49.89	5.40				
	6	149.74	7.90	49.89	11.23			74.91	2.91	49.89	6.24				
	5	162.21	8.73	49.89	12.06			74.91	2.91	49.89	6.24				
	4	162.21	8.73	49.89	12.06			87.38	3.74	49.89	7.07				
	3	174.69	9.56	49.89	12.89			87.38	3.74	49.89	7.07				
	2	174.69	9.56	49.89	12.89			99.85	4.57	49.89	7.90				
	1	187.16	10.39	49.89	13.72			112.32	5.40	49.89	8.73				
0	187.16	10.39	49.89	13.72			112.32	5.40	49.89	8.73					
2000 - 6000 ADT	12	124.80	6.24	49.89	9.56			37.49	0.42	49.89	3.74				
	11	137.27	7.07	49.89	10.39			49.96	1.25	49.89	4.57				
	10	137.27	7.07	49.89	10.39			49.96	1.25	49.89	4.57				
	9	149.74	7.90	49.89	11.23			62.43	2.08	49.89	5.40				
	8	149.74	7.90	49.89	11.23			62.43	2.08	49.89	5.40				
	7	162.21	8.73	49.89	12.06			74.91	2.91	49.89	6.24				
	6	162.21	8.73	49.89	12.06			87.38	3.74	49.89	7.07				
	5	174.69	9.56	49.89	12.89			87.38	3.74	49.89	7.07				
	4	174.69	9.56	49.89	12.89			99.85	4.57	49.89	7.90				
	3	187.16	10.39	49.89	13.72			99.85	4.57	49.89	7.90				
	2	199.63	11.23	49.89	14.55			112.32	5.40	49.89	8.73				
	1	199.63	11.23	49.89	14.55			112.32	5.40	49.89	8.73				
0	212.10	12.06	49.89	15.38			124.80	6.24	49.89	9.56					
OVER 6000 ADT	12	137.27	7.07	49.89	10.39			49.96	1.25	49.89	4.57				
	11	149.74	7.90	49.89	11.23			62.43	2.08	49.89	5.40				
	10	149.74	7.90	49.89	11.23			62.43	2.08	49.89	5.40				
	9	162.21	8.73	49.89	12.06			74.91	2.91	49.89	6.24				
	8	162.21	8.73	49.89	12.06			87.38	3.74	49.89	7.07				
	7	174.69	9.56	49.89	12.89			87.38	3.74	49.89	7.07				
	6	174.69	9.56	49.89	12.89			99.85	4.57	49.89	7.90				
	5	187.16	10.39	49.89	13.72			99.85	4.57	49.89	7.90				
	4	199.63	11.23	49.89	14.55			112.32	5.40	49.89	8.73				
	3	199.63	11.23	49.89	14.55			112.32	5.40	49.89	8.73				
	2	212.10	12.06	49.89	15.38			124.80	6.24	49.89	9.56				
	1	212.10	12.06	49.89	15.38			137.27	7.07	49.89	10.39				
0	224.57	12.89	49.89	16.21			137.27	7.07	49.89	10.39					



NOTES:
The design traffic volumes (ADT) shall be as shown on title sheet under traffic forecast.

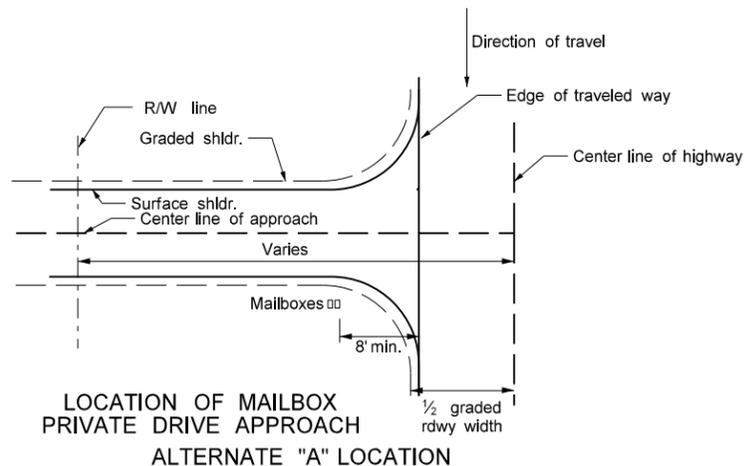
Where normal inslope is 4:1, the added fill shall be 4:1.
Where normal inslope is 6:1, the added fill shall be 6:1.

Note A: This area may have to be placed at flatter than 10:1 to provide the proper guardrail height.

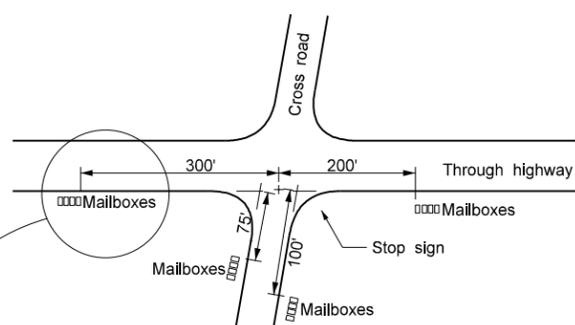
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09-01-98	
REVISIONS	
DATE	CHANGE
10-29-98	Offset dimensions
12-21-00	Revised flared end treatment
12-17-03	Revised flare rate detail
12-01-04	PE Stamp added
01-04-07	Revised table and layouts
02-16-07	Revised table, typical section
09-12-07	Revised guardrail height from 27" to 28"

This document was originally issued and sealed by Mark S Gaydos, Registration Number PE- 4518 , on 09/12/07 and the original document is stored at the North Dakota Department of Transportation

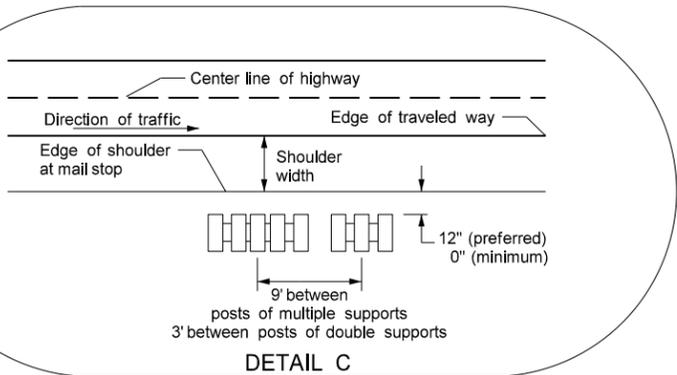
MAILBOX LOCATION DETAILS



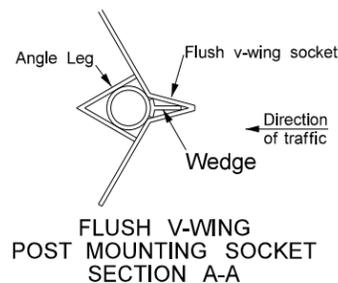
LOCATION OF MAILBOX PRIVATE DRIVE APPROACH ALTERNATE "A" LOCATION



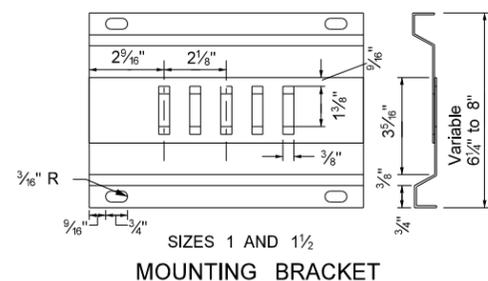
MINIMUM CLEARANCE DISTANCE TO NEAREST MAILBOX ALONG ROADWAY AT INTERSECTIONS ALTERNATE "B" LOCATION



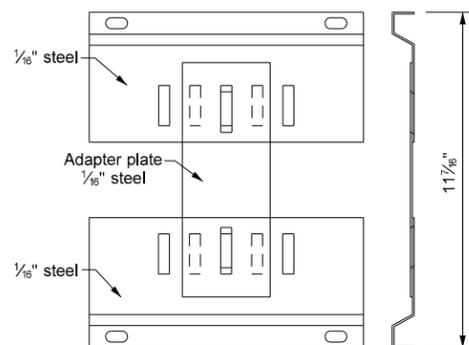
DETAIL C



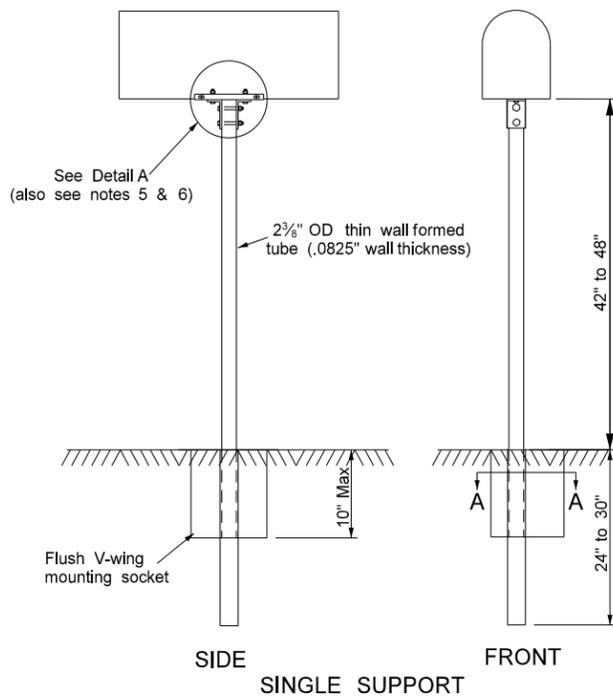
FLUSH V-WING POST MOUNTING SOCKET SECTION A-A



SIZES 1 AND 1/2 MOUNTING BRACKET



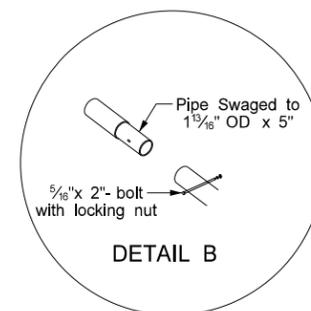
SIZE 2 WITH ADAPTOR PLATE MOUNTING BRACKET



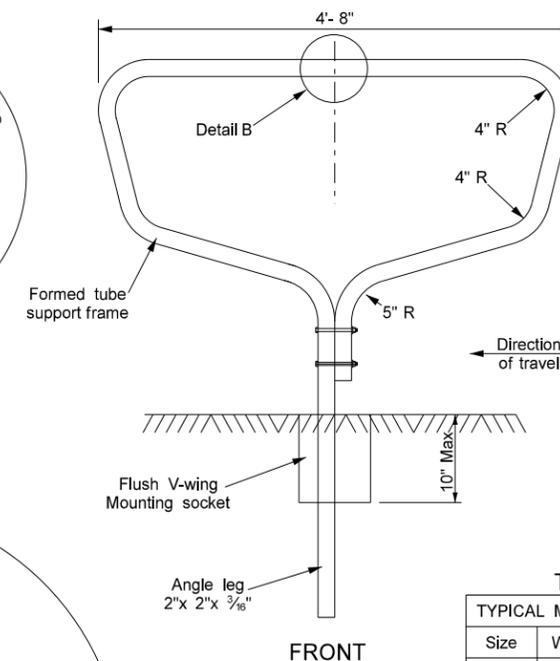
SINGLE SUPPORT

Notes:

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



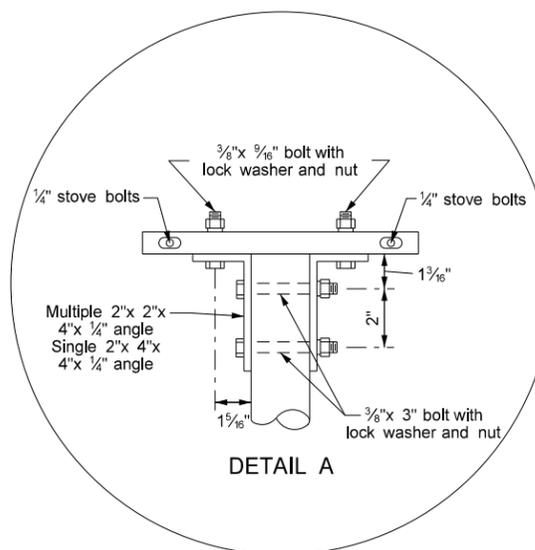
DETAIL B



FRONT

TABLE A

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



DETAIL A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE

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