NDDOT ABBREVIATIONS

D-101-1

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 09/20/18 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-101-2

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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NDDOT ABBREVIATIONS

D-101-3

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
AGC	Assiociated General Contractors of America
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
BAKER ELEC	Baker Electric
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
BLM	Bureau of Land Management
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 Incorporat
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 PL WATER DIST	Central Pipe Line Water District
CENT PWR ELEC	Central Power Electric Cooperative
COE	Corps of Engineers
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
ENVENTIS	Enventis Telephone
FALK MNG	Falkirk Mining Company
FHWA	Federal Highway Administration
G FKS-TRL WD	Grand Forks-traill Water District
GETTY TRD & TRAN	Getty Trading & Transportation
GLDN W ELEC	Golden West Electric Cooperative
GRGS CO TEL	Griggs County Telephone
GTR RAMSEY WD	Greater Ramsey Water District
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
IDEA1	Idea1
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 ELEC	McKenzie Electric Cooperative
MCKNZ WRD	McKenzie County Water Resource District
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 VALL COMM	Missouri Valley Communications
MISS W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative
MRE LBTY TEL	Moore & Liberty Telephone
MUNICIPAL	City Water And Sewer
MUNICIPAL	City Of '.....'
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
NWRWD	Northwest Rural Water District
ONEOK	Oneok gas
OSHA	Occupational Safety and Health Administration
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
PVT ELEC	Private Electric
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Cooperative
RRVW	Red River Valley & Western Railroad
S CENT REG WD	South Central Regional Water District
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 Incorporated
SOURIS RIV TELCOM	Souris River Telecommunications
ST WAT COMM	State Water Commission
STATE LN WATER	State Line Water Cooperative
STER ENG	Sterling Energy
STUT RWU	Stutsman Rural Water Users
SW PL PRJ	Southwest Pipeline Project
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
TESORO HGH PLNS PL	Tesoro High Plains Pipeline
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
USFWS	US Fish and Wildlife Service
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

D-101-20

Existing Topography

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

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

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

- 24 Inch Pipe
- Reinforced Concrete Pipe
- Under Drain
- Edge Drain

Traffic Utilities

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

Sign Structures

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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09-23-16	Added and Revised Items, Organized by Functional Groups

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Line Styles

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

- Geotextile Fabric Type D (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — S)
- Subgrade Reinforcement
- Failure Line

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

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

Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Floating Silt Curtain (S — S)
- Silt Fence (SF — SF)
- Excavation Limits
- Fiber Rolls

Environmental

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

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

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

Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-31

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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-32

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

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

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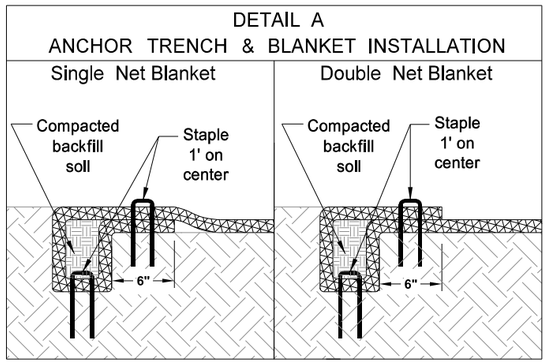
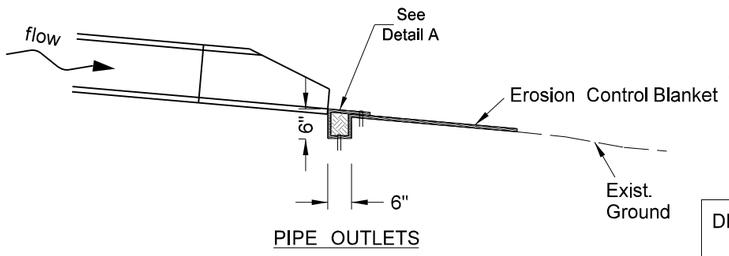
D-255-2

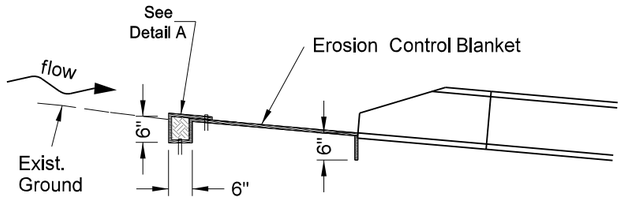
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



NOTE:
If a Single Net Blanket is used the side with the netting should be on the top once the blanket is installed.

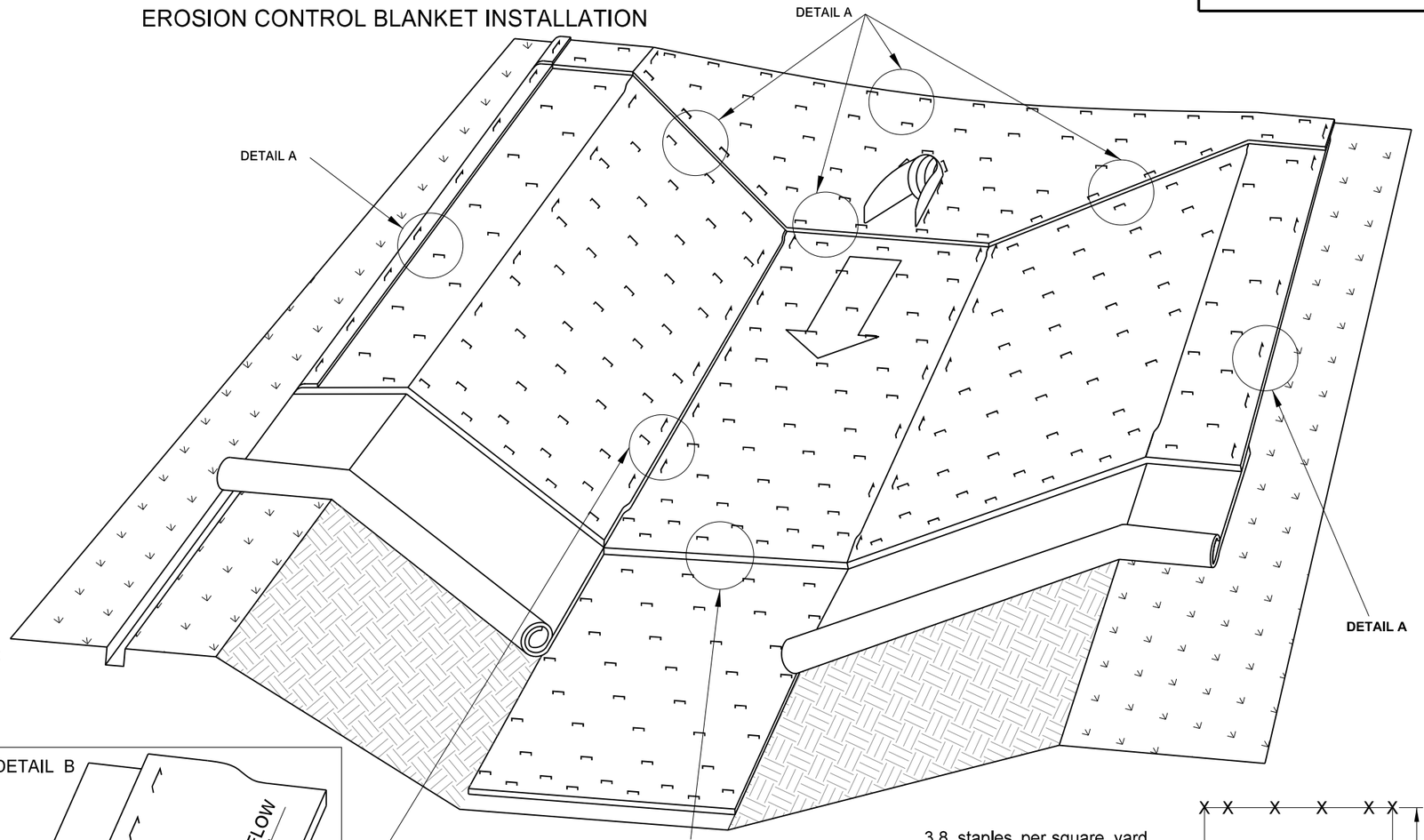


PIPE OUTLETS

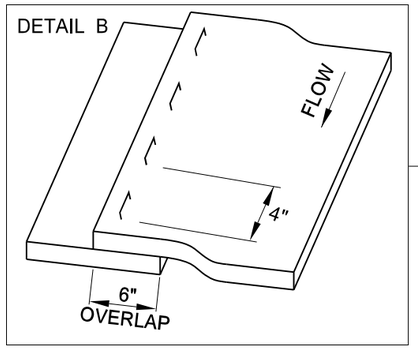


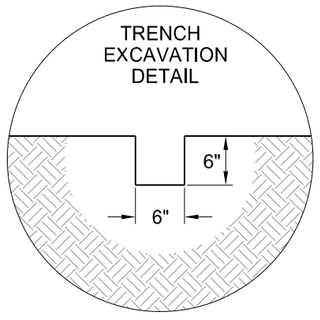
PIPE INLETS

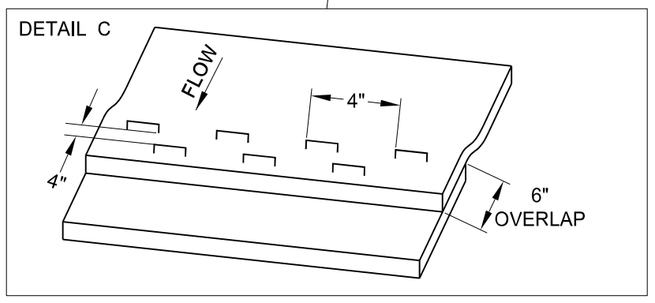
INSTALLATION AT PIPE ENDS



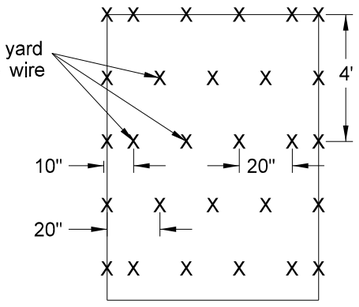
BLANKET LAYOUT
CHANNEL OR SLOPE INSTALLATION







3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



STAPLE PATTERN

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-5 to D-255-2.
07-27-15	Changed Installation details such as trench depth and overlap dimensions.
08-27-19	New Design Engineer PE Stamp.

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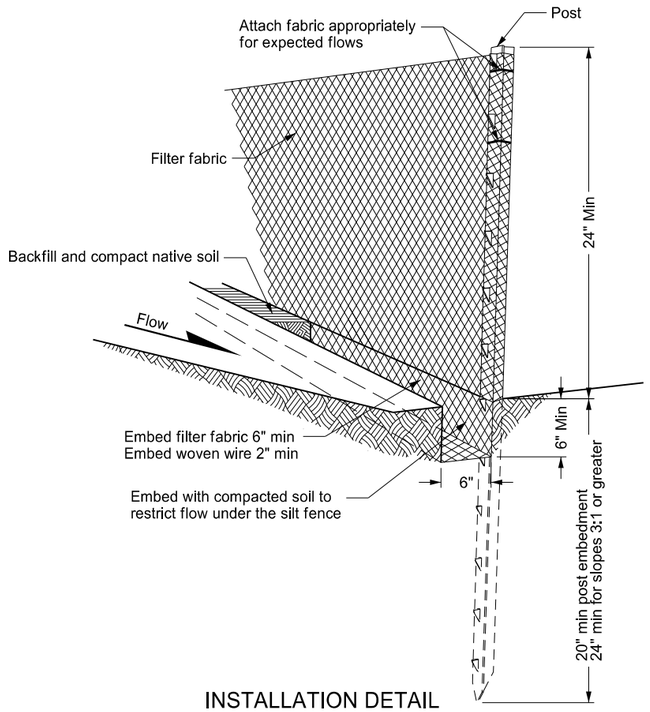
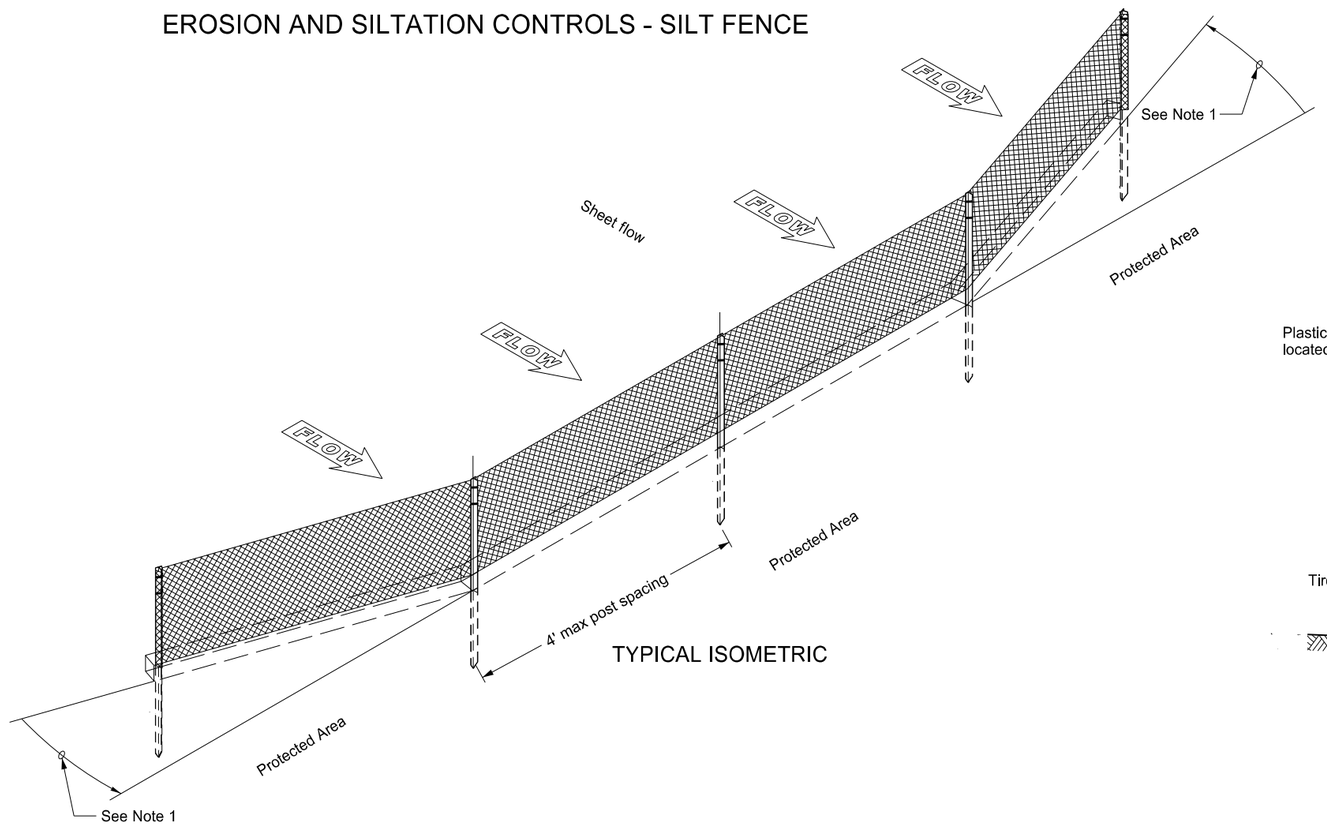
EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1

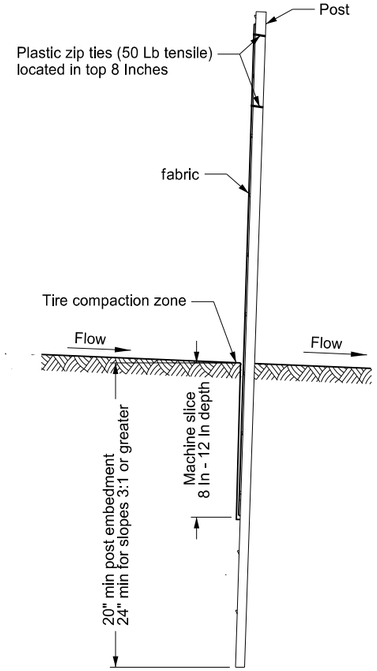


INSTALLATION DETAIL

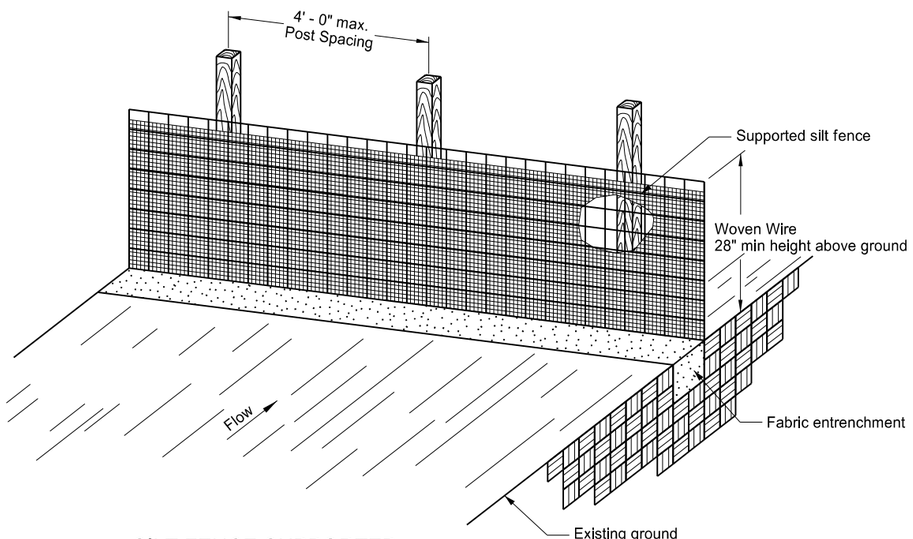
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.



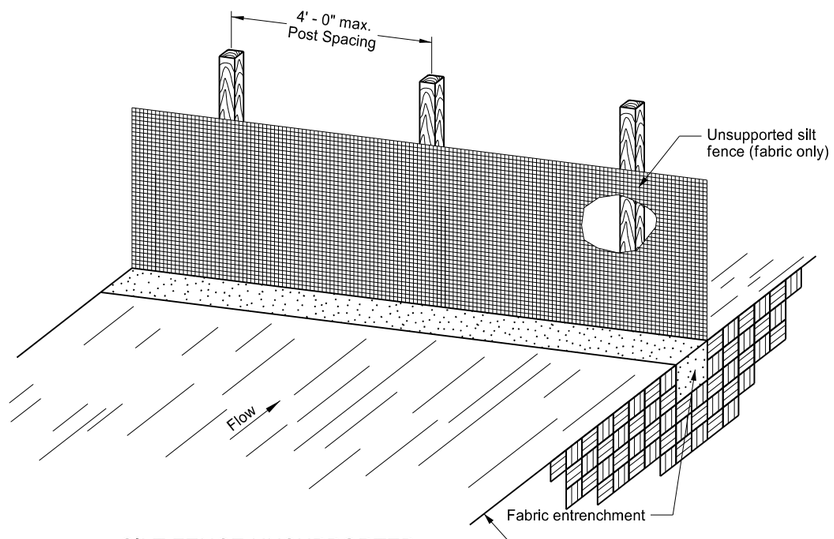
TYPICAL ISOMETRIC



MACHINE SLICED SILT FENCE



SILT FENCE SUPPORTED



SILT FENCE UNSUPPORTED

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

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

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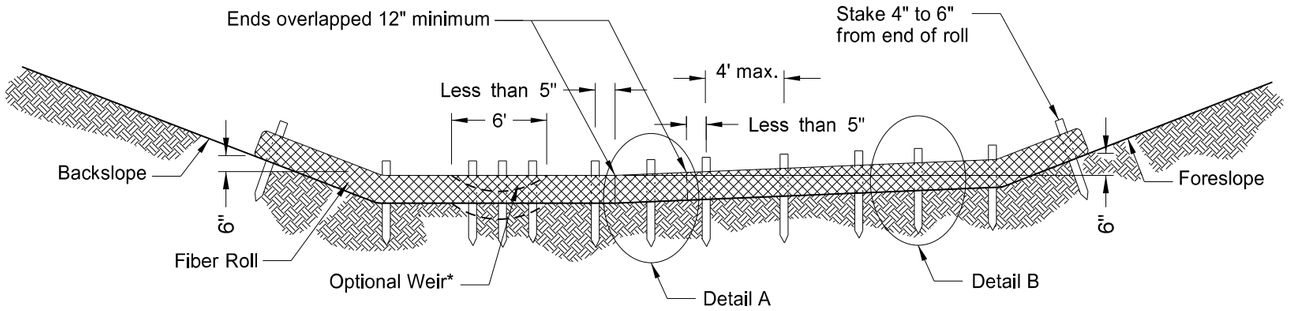
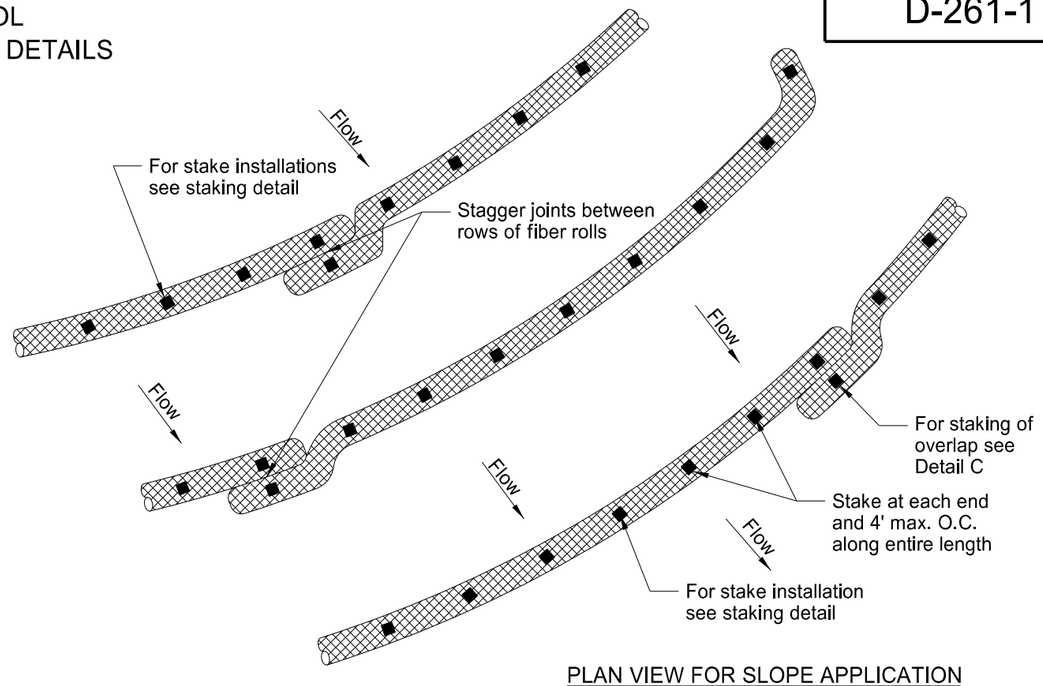
EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

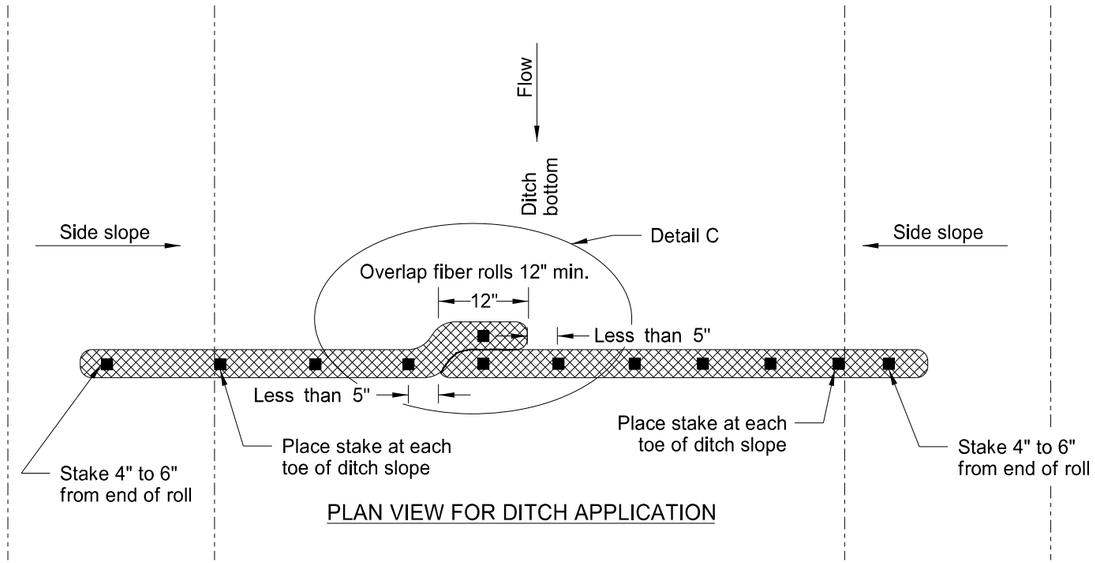


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

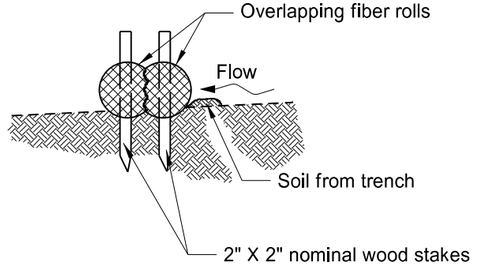
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

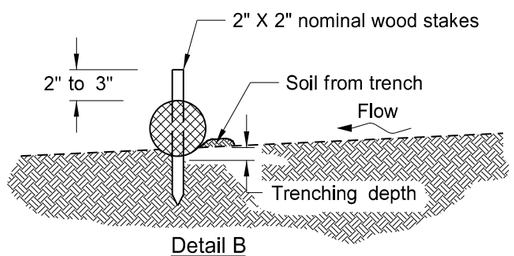


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-18-10

REVISIONS

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

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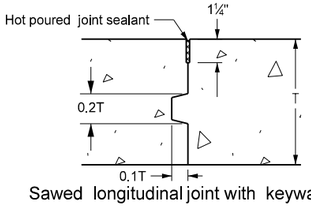
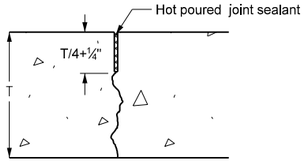
LONGITUDINAL JOINT DETAILS

D-550-2

UNTIED JOINTS

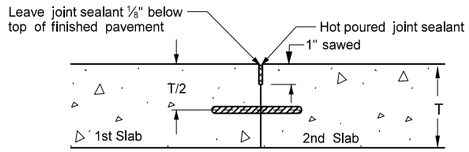


Sawed longitudinal joint with keyway



Sawed longitudinal joint without keyway

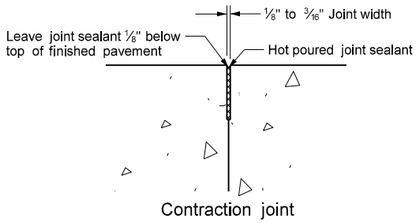
TIED JOINTS



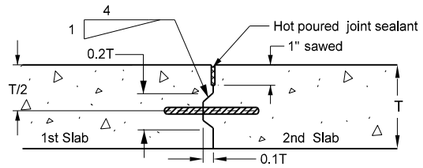
Longitudinal construction joint (tied butt joint)

Notes:

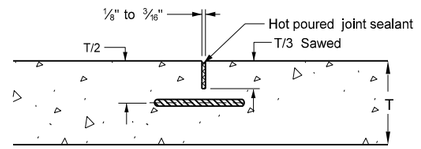
1. Provide hot poured joint sealant meeting the requirements of Section 826.02A.2 of the Standard Specifications.
2. Include all costs of the longitudinal joint and seal in the price bid for the PCC pavement.
3. Do not place tie bars within 18 inches of a transverse skewed joint.
4. Use Grade 40 steel for tie bars installed bent and later straightened.
5. Increase the tie bar spacing up to 10%, when necessary to facilitate construction.
6. Place tie Bars at a 48 inch maximum spacing.
7. A "Warp" joint is a sawed joint or a construction joint with a keyway.
8. A "Butt joint" is a construction joint with no keyway.



Contraction joint



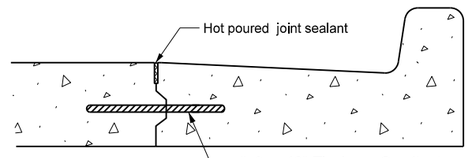
Longitudinal construction joint (tied keyed joint)



Sawed longitudinal joint

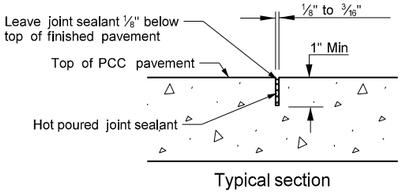
TIEBAR SPACINGS (In)

BAR SIZE / GRADE STEEL / BAR LENGTH / DIST TO FREE EDGE (FT) / JOINT TYPE / PVMT THICKNESS		# 3 BAR										# 4 BAR												# 5 BAR												# 6 BAR											
		GRADE 40				GRADE 60						GRADE 40					GRADE 60							GRADE 40						GRADE 60						GRADE 40						GRADE 60					
		24"				30"						24"					36"							30"						42"						36"						48"					
		4	6	8	10	4	6	8	10	12	14	8	10	12	14	16	8	10	12	14	16	22	24	10	12	14	16	22	24	10	12	14	16	22	24	10	12	14	16	19	22	24	10	12	14	16	19	22	24
6"	WARP		48	39			48	48				48					48																															
	BUTT		37	27			48	42				48					48																															
8"	WARP	48	39	29	24	48	48	44	35	29	25	48	42	35	30	26	48	48	48	45	39	28	26	48	48	47	41	30	27	48	48	48	48	45	41	48	48	48	48	48	43	39	48	48	48	48	48	48	48
	BUTT	42	27			48	42	31	25			37	29	24			48	44	37	32	27			46	39	33	29			48	48	48	43	32	29	48	48	48	48	35	30	27	48	48	48	48	48	45	41
8½"	WARP	48	37	28		48	48	42	33	28	24	48	39	33	28	24	48	48	48	42	37	27	24	48	48	44	38	28	25	48	48	48	48	42	38	48	48	48	48	47	40	37	48	48	48	48	48	48	48
	BUTT	39	26			44	39	29				35	27				48	42	35	29	26			44	36	31	27			48	48	47	41	30	27	48	48	45	39	33	28	26	48	48	48	48	48	42	39
9"	WARP	48	35	26		48	48	39	31	26		47	37	31	26		48	48	47	40	35	25		48	48	42	36	26	24	48	48	48	48	40	36	48	48	48	48	44	38	35	48	48	48	48	48	48	48
	BUTT	37	24			48	37	27				33	26				48	40	33	28	25			41	34	29	25			48	48	44	39	28	25	48	48	42	37	31	26	24	48	48	48	48	47	40	37
9½"	WARP	48	33	25		48	48	37	30	25		44	35	29	25		48	48	44	38	33	24		48	46	39	34	25		48	48	48	48	38	34	48	48	48	48	42	36	33	48	48	48	48	48	48	48
	BUTT	35				48	35	26				31	25				47	37	31	27				39	32	27	25			48	48	42	37	27	24	48	47	40	35	29	25		48	48	48	48	44	38	35
10"	WARP	47	31			48	47	35	28			42	34	28	24		48	48	42	36	31			48	44	37	33	24		48	48	48	48	36	33	48	48	48	48	40	34	31	48	48	48	48	48	48	47
	BUTT	33				48	33	25				29	24				45	36	29	25				37	31	26	24			48	46	40	35	25		48	45	38	33	28	24		48	48	48	48	42	36	33
10½"	WARP	45	30			48	45	34	27			40	32	26			48	48	40	34	30			48	42	36	31			48	48	48	47	34	31	48	48	48	48	45	38	33	30	48	48	48	48	48	48	45
	BUTT	32				48	32	24				28					42	34	28	24				35	29	25				48	44	38	33	24		48	42	36	32	27			48	48	48	48	40	34	31
11"	WARP	43	28			48	43	32	26			38	31	25			48	46	38	33	28			48	40	34	30			48	48	48	45	32	30	48	48	48	43	36	31	28	48	48	48	48	48	47	43
	BUTT	30				46	30					27					40	32	27					34	28	24				48	42	36	32			48	40	35	30	25			48	48	48	46	38	33	30
11½"	WARP	41	27			48	41	31	24			36	29	24			48	44	36	31	27			46	38	32	28			48	48	48	43	31	28	48	48	47	41	34	30	27	48	48	48	48	48	45	41
	BUTT	29				44	29					25					39	31	25					32	27					48	40	35	30			46	39	33	29	24			48	48	48	44	37	31	29
12"	WARP	39	26			48	39	29				35	28				48	42	35	30	26			44	36	31	28			48	48	47	41	30	27	48	48	45	40	33	28	26	48	48	48	48	48	43	39
	BUTT	27				42	27					25					37	30	25					31	25					46	39	33	29			45	37	32	28				48	48	48	42	35	30	27
12½"	WARP	38	25			48	38	28				33	27				48	40	33	29	25			42	35	30	26			48	48	45	39	28	26	48	48	43	38	32	27	25	48	48	48	48	48	41	38
	BUTT	27				40	27					25					35	28						29	25					44	37	32	27			42	35	30	27				48	48	45	40	34	29	26
13"	WARP	36	24			48	36	27				32	26				48	39	32	27	24			40	33	29	25			48	48	43	38	27	25	48	48	41	36	30	26	24	48	48	48	48	46	40	36
	BUTT	25				38	25					24					34	27						28						42	35	30	27			41	34	29	25				48	48	44	38	32	28	25
13½"	WARP	35				48	35	26				31	25				47	37	31	26				39	32	28	24			48	48	42	36	26	24	48	47	40	35	29	25		48	48	48	48	44	38	35
	BUTT	25				37	25					24					33	26						27						41	34	29	25			39	33	28	25				48	48	42	37	31	27	24
14"	WARP	34				48	34	25				30	24				45	36	30	25				37	31	27				48	47	40	35	25		48	45	38	34	28	24		48	48	48	48	43	37	34
	BUTT	24				35	24					23					32	25						26						39	33	28	25			38	32	27	24				48	47	40	35	30	26	
14½"	WARP	32				48	32	24				29					43	35	29	25				36	30	26				48	45	39	34	24		48	43	37	32	27			48	48	48	48	41	35	32
	BUTT					34						22					30	25						25						38	32	27	24			36	30	26					48	46	39	34	29	25	
15"	WARP	31				47	31					28					42	33	28	24				35	29	25				48	44	37	33	24		48	42	36	31	26			48	48	48	47	40	34	31
	BUTT					33						21					29							25						37	31	26				35	29	25					48	44	38	33	28	24	



Curb and gutter sections

JOINT SEALER DETAILS



Typical section

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-15-2010

REVISIONS

DATE	CHANGE
10/23/2012	Expanded Tie Bar Table
03/16/2016	Updated Jt Details & notes
10/25/2019	Corrected "Typo" in Note 3

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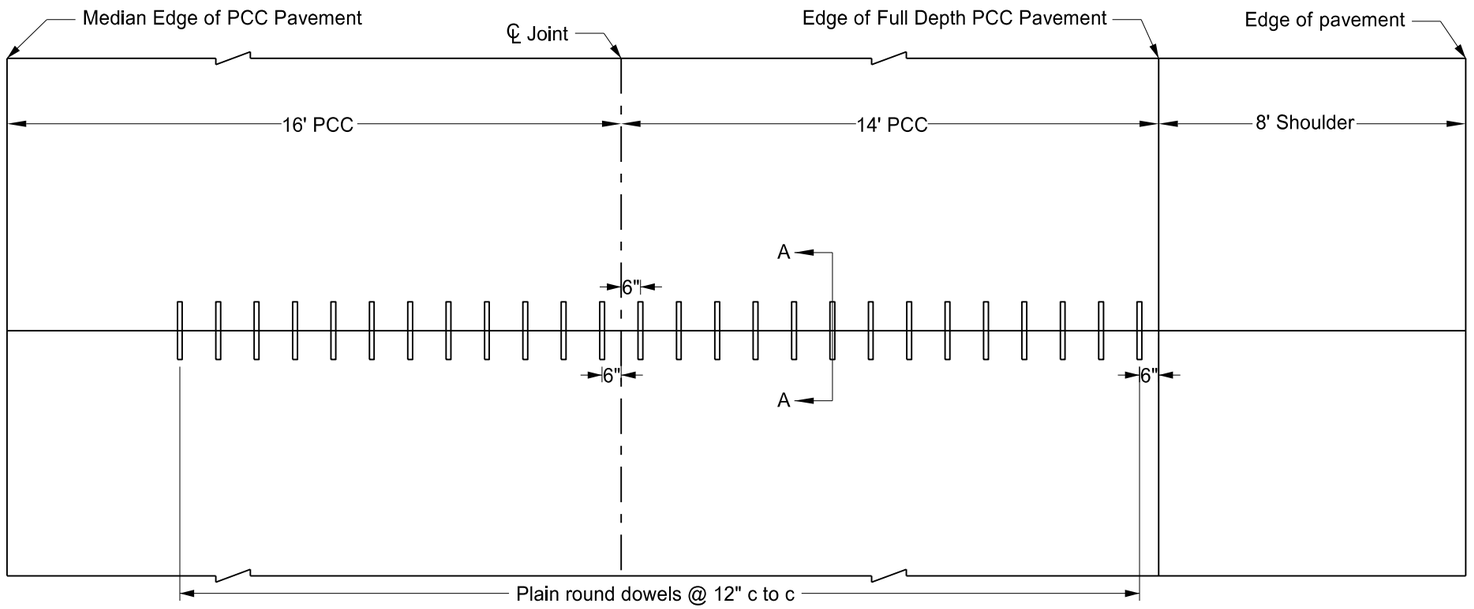
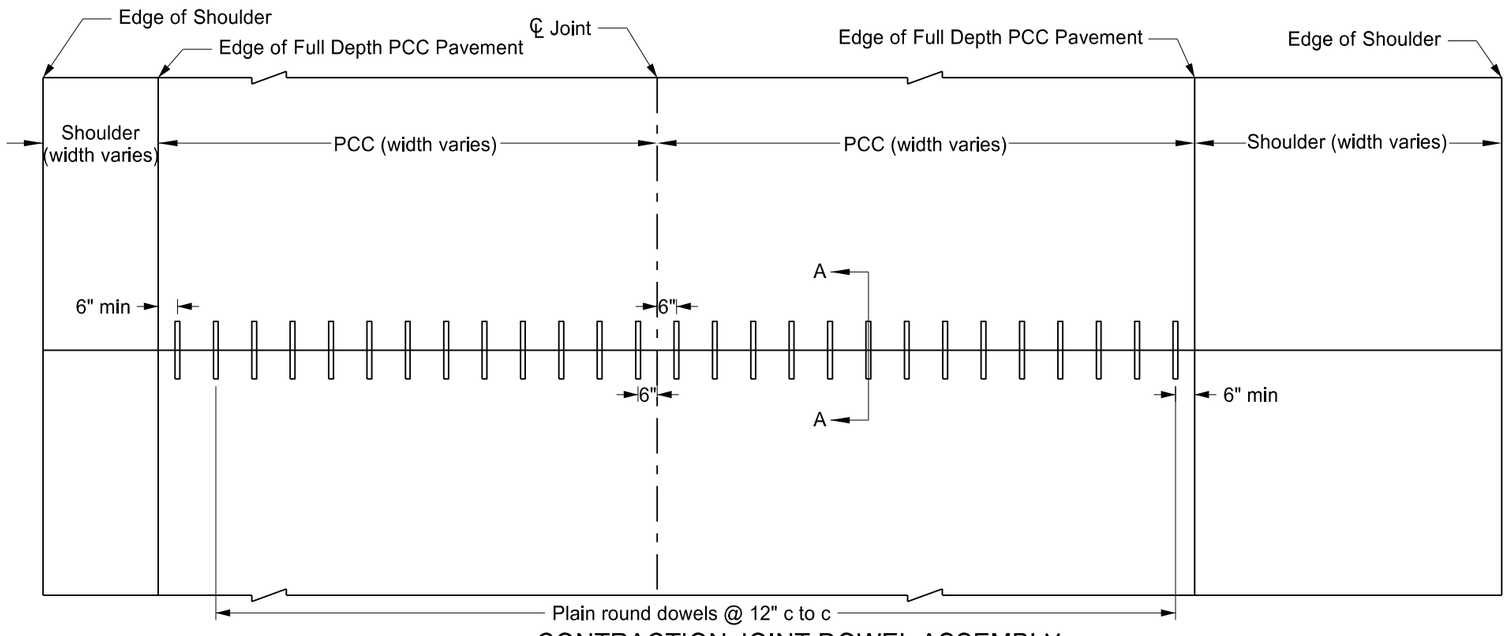
TRANSVERSE CONTRACTION JOINT DETAILS

D-550-3



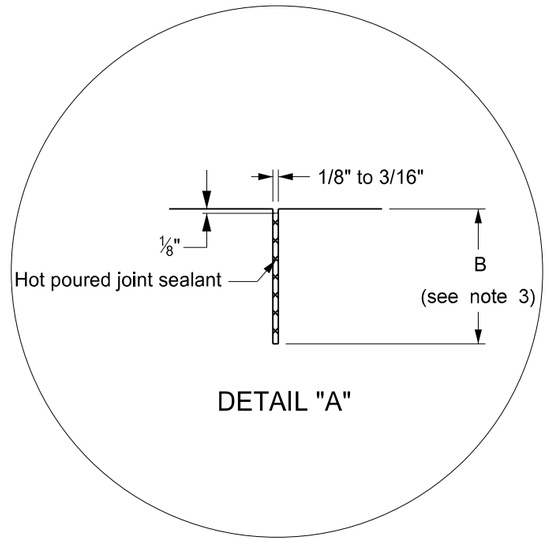
CONTRACTION JOINT DOWEL ASSEMBLY
INTERSTATE



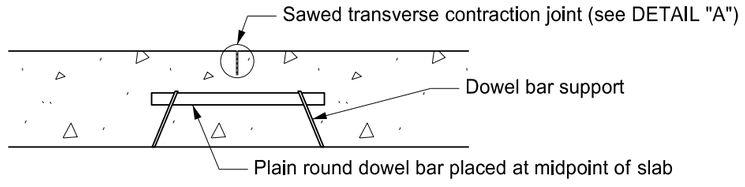
CONTRACTION JOINT DOWEL ASSEMBLY
NON-INTERSTATE

Notes

1. The joint seal details apply to both doweled and non-doweled (plain) transverse joints.
2. T = Thickness of pavement.
3. B = T/4 + ¼" for AE or YE for non-dowelled concrete pavement or
   B = T/3 for AAE or dowelled concrete pavement



DETAIL "A"



SECTION A-A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-10	
REVISIONS	
DATE	CHANGE
6/23/2014	Removed dowel size reference
3/16/2016	Revised Joint Details and notes
10/25/2019	Expanded Details for clarity

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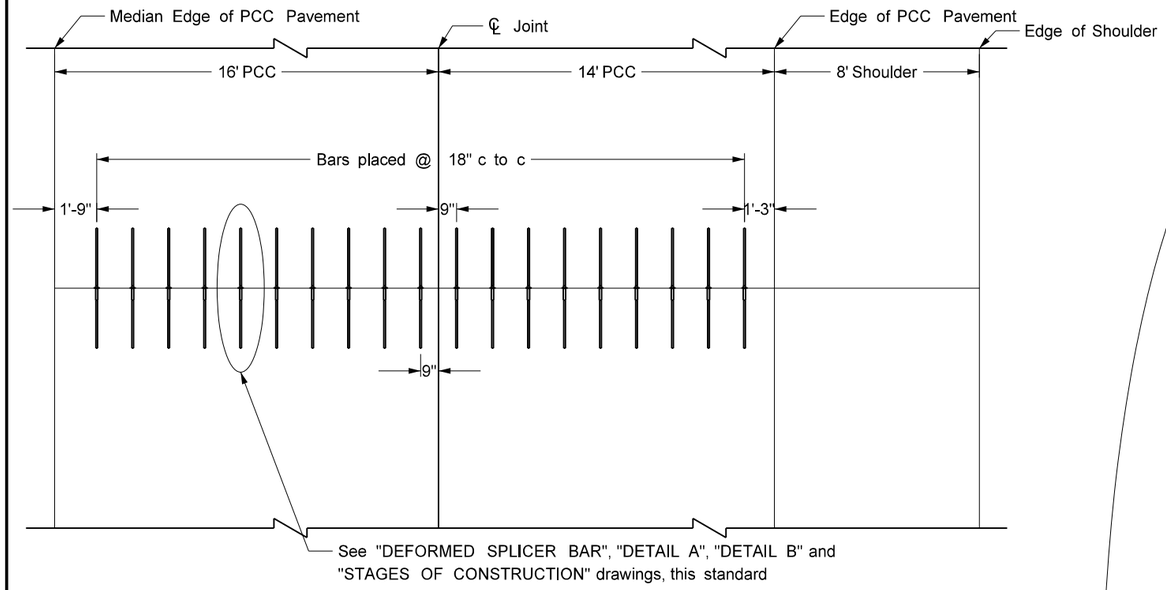
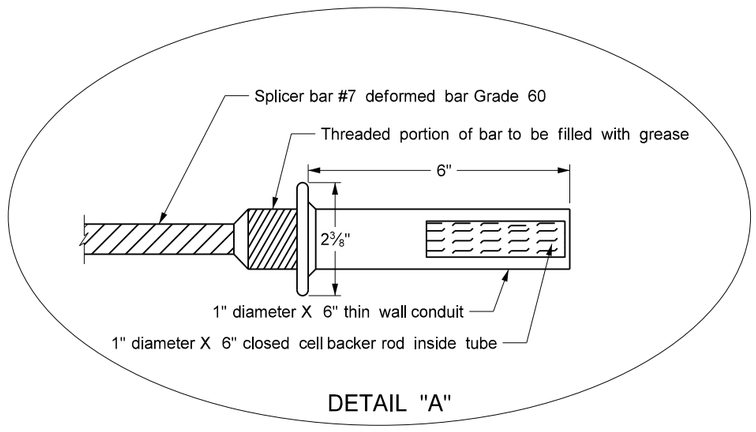
TRANSVERSE CONSTRUCTION JOINT

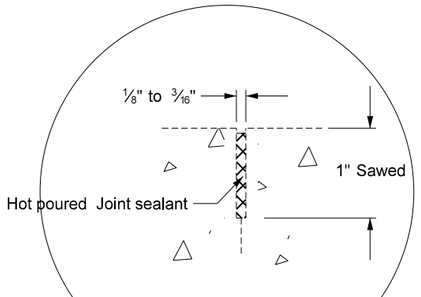
D-550-5



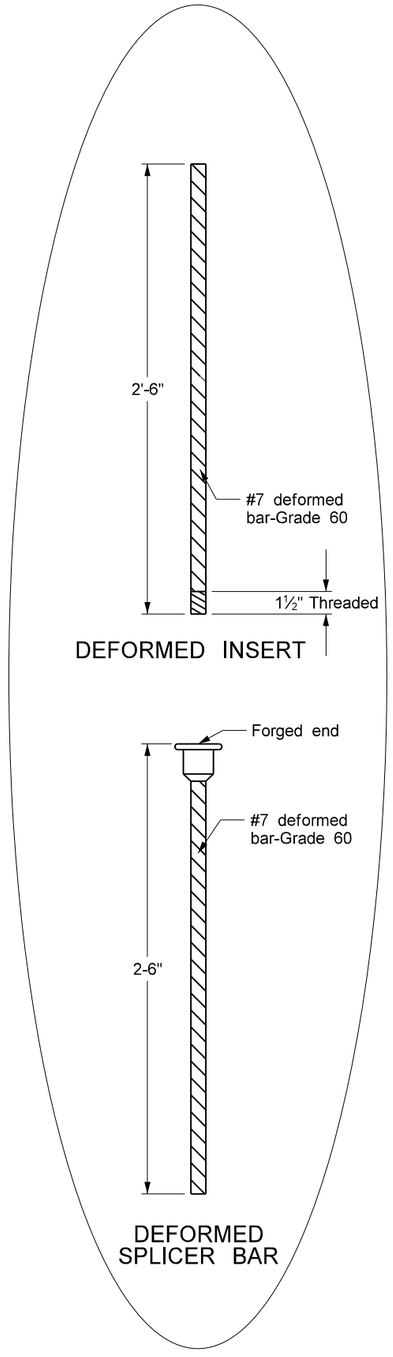
PLAN VIEW



DETAIL "A"



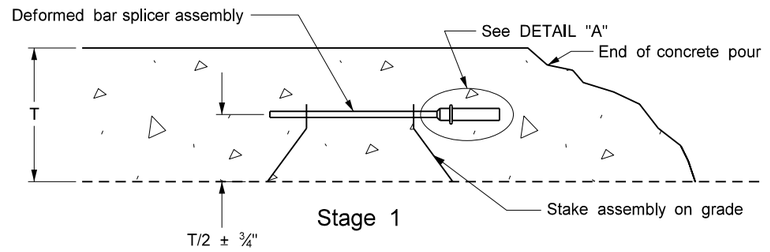
DETAIL "B"



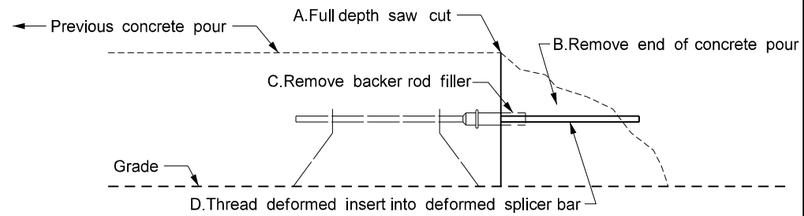
DEFORMED INSERT

DEFORMED SPLICER BAR

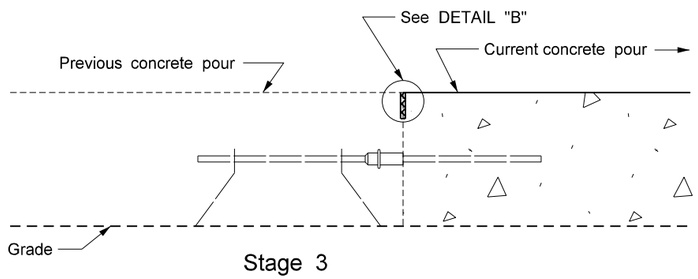
STAGES OF CONSTRUCTION



Stage 1



Stage 2



Stage 3

Notes

1. Saw and seal all construction joints.
2. Include all costs for transverse construction joints in the price bid for PCC pavement.
3. Do not saturate the subgrade during the sawing operation.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
3-16-16 8-27-19	Revised Joint Details & notes. New Design Engr PE Stamp.

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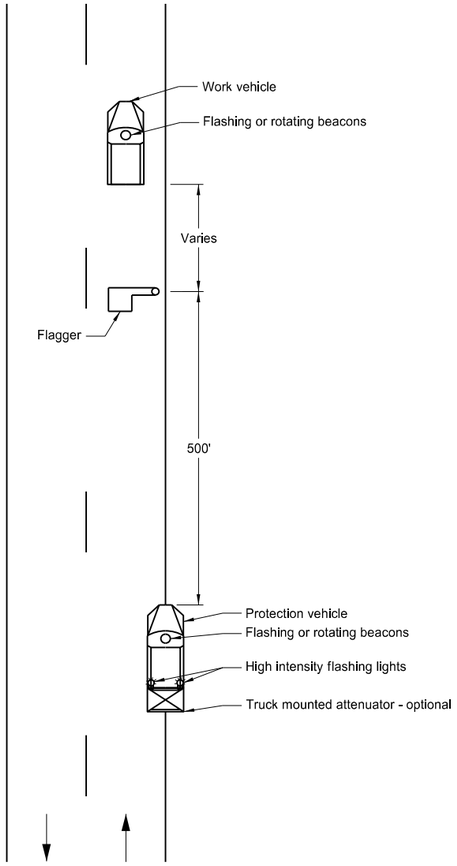
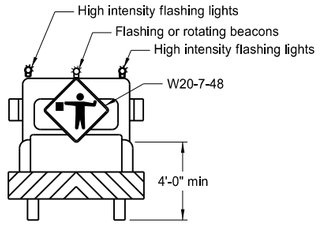
TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

D-704-2

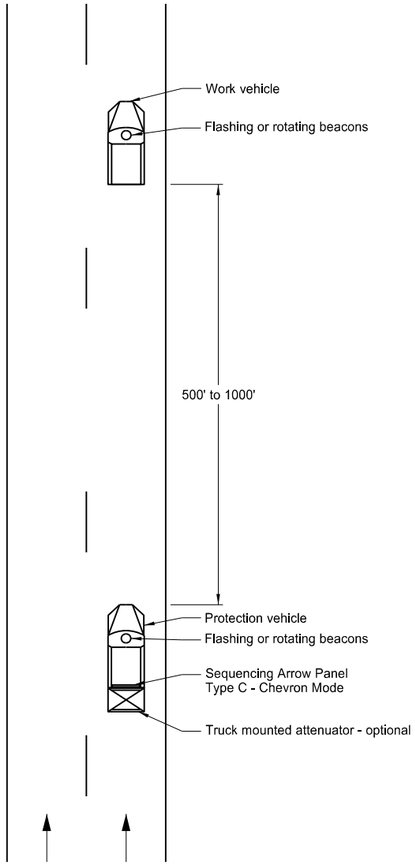
Two Lane, Two Way Roadways

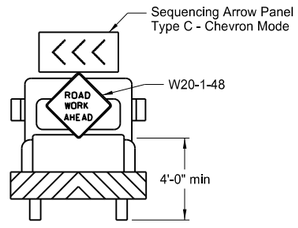




Typical Protection Vehicle

Multilane Roadways





Typical Protection Vehicle

Notes:

1. Display a 360 degree rotating, flashing, oscillating or strobe light on the working vehicle.

2. Display a 360 degree rotating, flashing, oscillating or strobe light on the shadow vehicle. Operate a sequencing arrow panel Type C in chevron mode on the shadow vehicle for Multilane Roadway.

3. Use these layouts during daylight hours and in areas of good visibility only.

4. Use flagger to protect the work area and warn oncoming traffic for two lane, two way roadway.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 10/03/19 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAIL

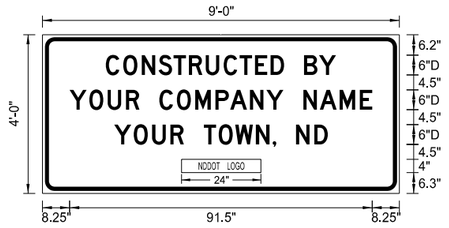
D-704-5

SIGN NUMBER	G20-10-108
WIDTH x HEIGHT	9'-0" x 4'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Refl
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S):

AREA: 36.0 Sq.Ft.



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. Post mount sign a distance of ½A following the End Road Work (G20-2-48) sign (maximum 2 signs per project.)

2. Use sign on rural projects with a 30 day or longer duration (not required on seal coats or other short duration projects.)

3. Do not place sign 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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV.
9-27-17	Updated to active voice.
8-30-18	Updated sign number in note 1.
10-03-19	New Design Engineer PE Stamp.

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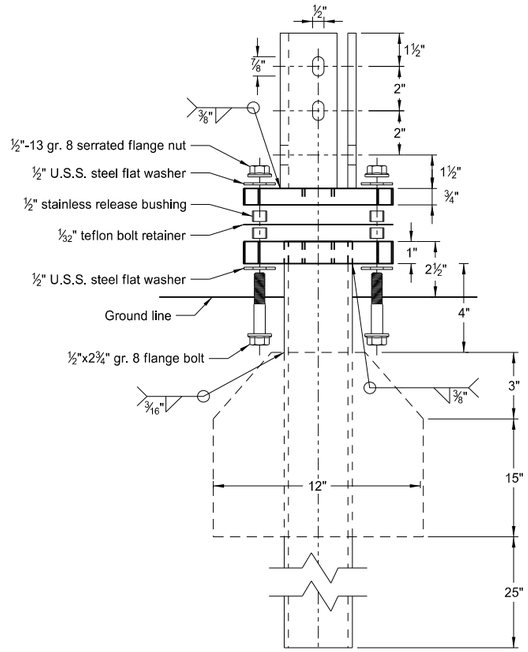
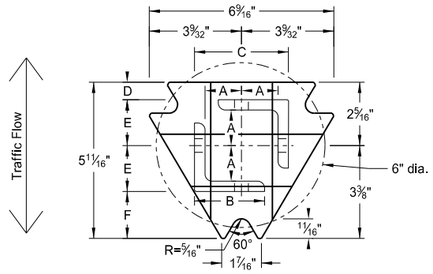
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

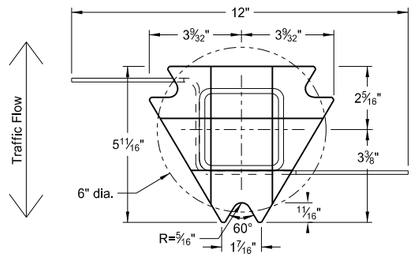


Multi-Directional
Slip Base Assembly

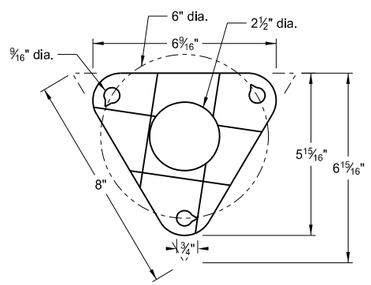
Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50



Bolt Retainer for Base Connection
Bolt Retainer- 1/32" Reprocessed Teflon

Notes:

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

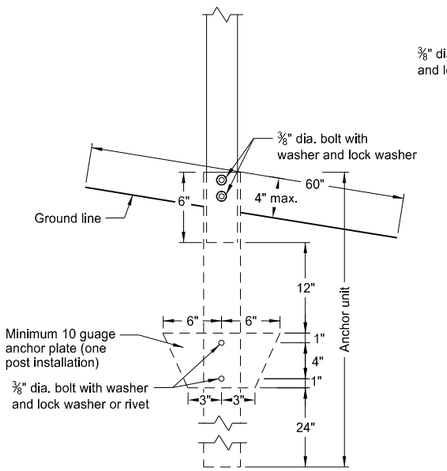
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³/16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in.⁴	Cross Sec. Area in.²	Section Modulus in.³
1½ x 1½	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
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³/16 x 2³/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.785

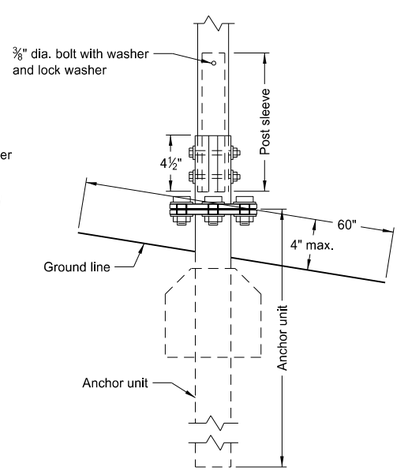
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³/16"x10 ga.	1⁹/64"	2½"	3¹/32"	2⁵/32"	1³³/64"	1⅞"
2½"x10 ga.	1⁹/32"	2½"	3⁵/16"	⅝"	1²¹/32"	1¾"

(A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.

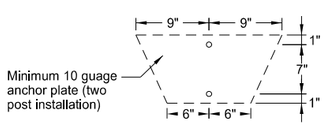
(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



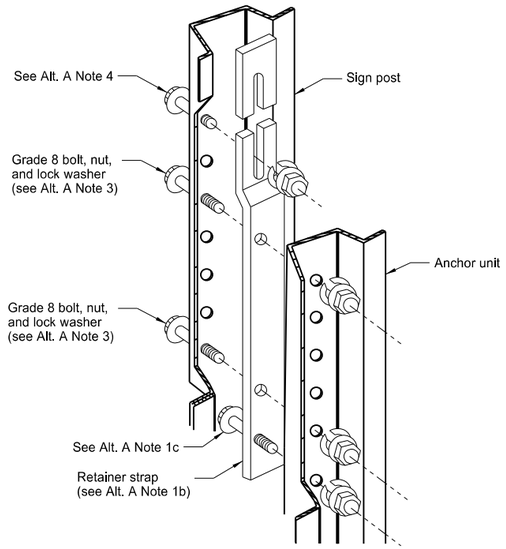
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 10/03/19 and the original document is stored at the North Dakota Department of Transportation

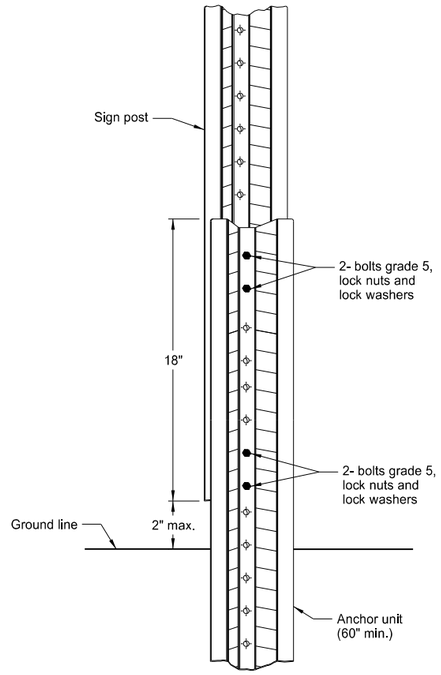
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

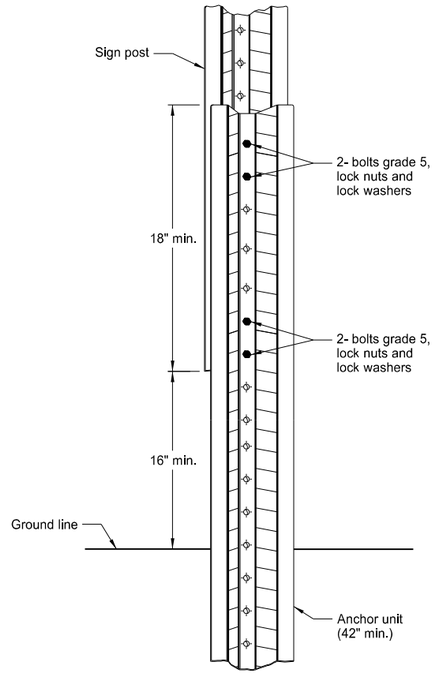


Detail A



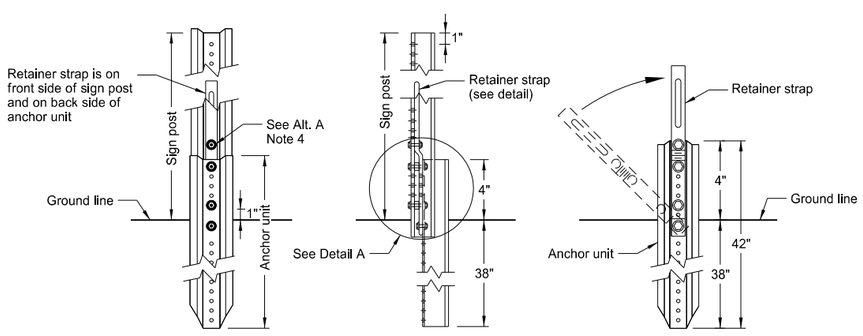
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



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

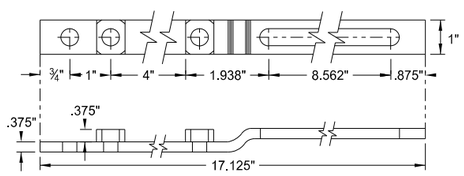
Install a maximum of 3 posts within 7'.



Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



Retainer Strap Detail

Alternate A Steps of Installation:

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

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

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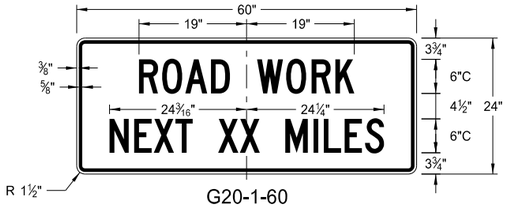
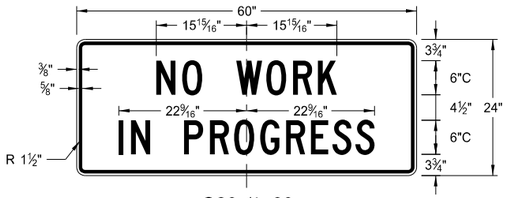
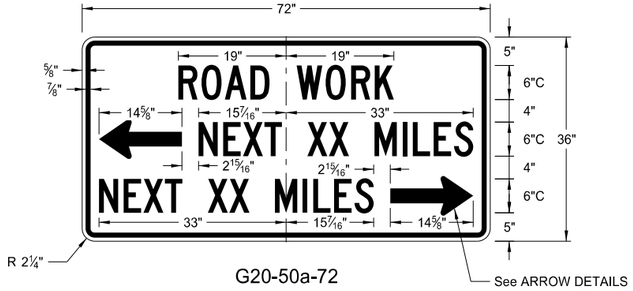
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



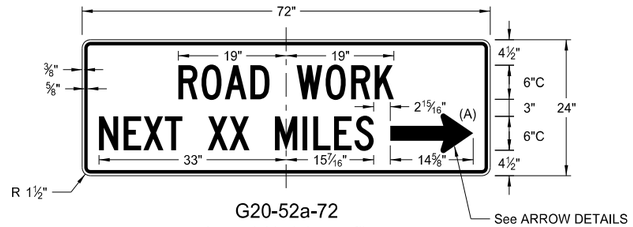
G20-1-60
Legend: black (non-refl)
Background: orange



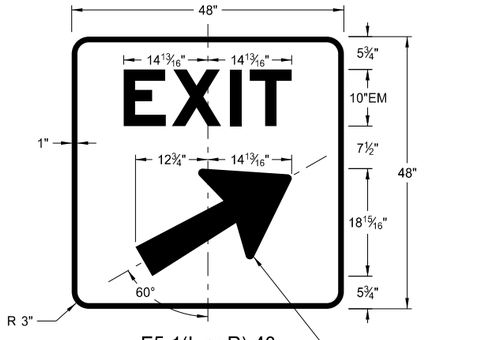
G20-1b-60
Legend: black (non-refl)
Background: orange



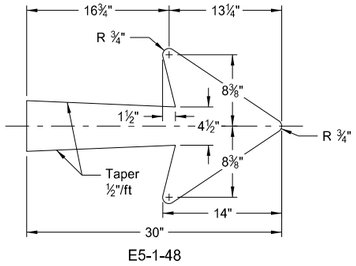
G20-50a-72
Legend: black (non-refl)
Background: orange



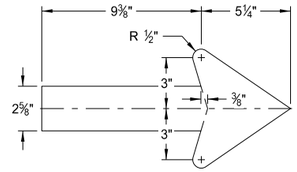
G20-52a-72
Legend: black (non-refl)
Background: orange



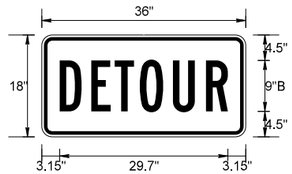
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



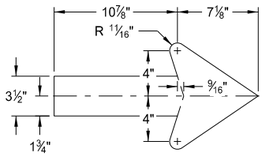
E5-1-48



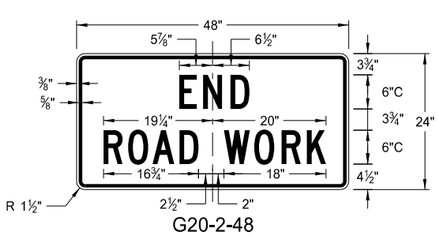
G20-50a-72
G20-52a-72



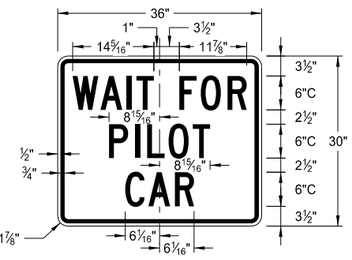
M4-8-36
Legend: black (non-refl)
Background: orange



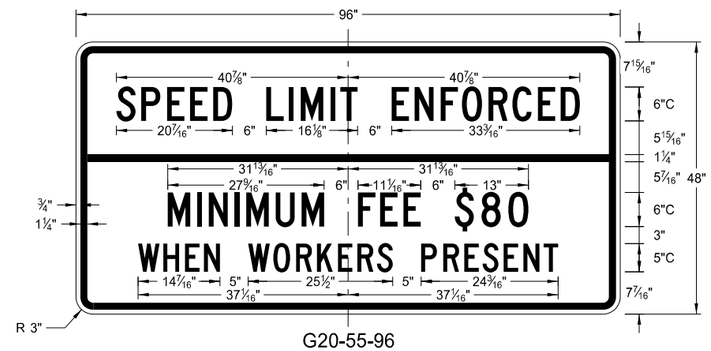
M4-9(L or R)-30
Right or Left



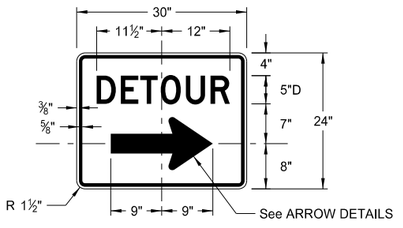
G20-2-48
Legend: black (non-refl)
Background: orange



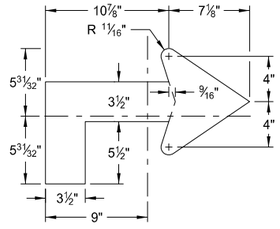
G20-4b-36
Legend: black (non-refl)
Background: orange



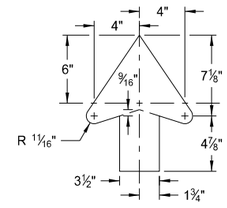
G20-55-96
Legend: black (non-refl)
Background: orange



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



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



M4-9-30
Straight

ARROW DETAILS

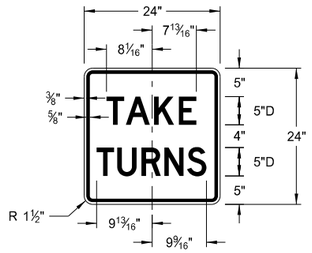
NOTES:

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

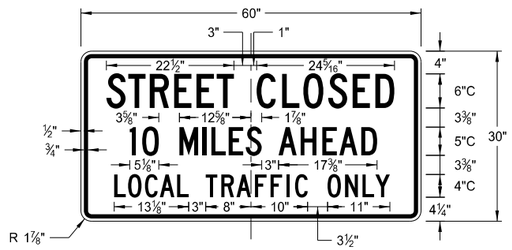
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added sign & background color
10-03-19	New Design Engineer PE Stamp

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 10/03/19 and the original document is stored at the North Dakota Department of Transportation

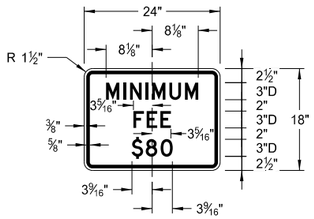
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



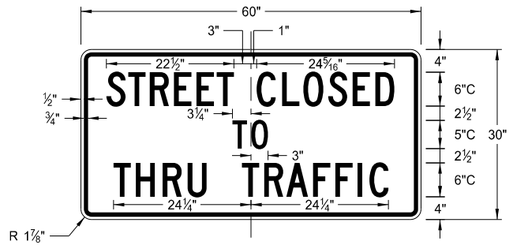
R1-50P-24
Legend: black (non-refl)
Background: white



R11-3c-60
Legend: black (non-refl)
Background: white



R2-1aP-24
Legend: black (non-refl)
Background: white



R11-4a-60
Legend: black (non-refl)
Background: white

R11-2a-48
Legend: black (non-refl)
Background: white

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp

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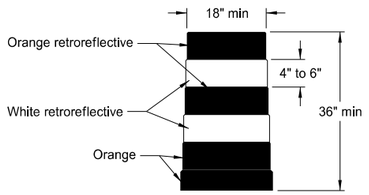
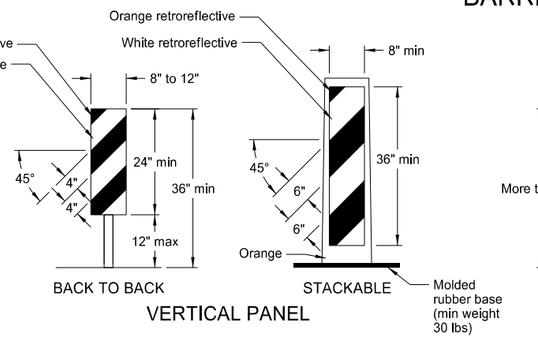
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



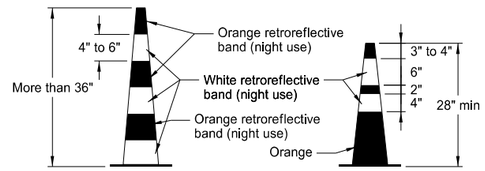
DELINEATOR DRUM

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



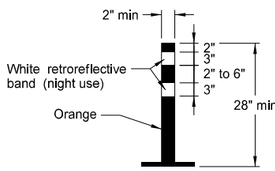
VERTICAL PANEL

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



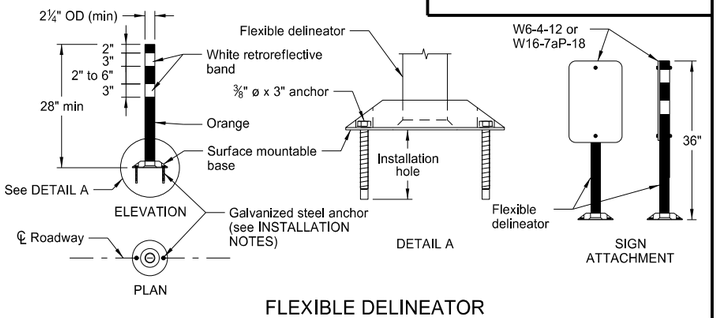
TRAFFIC CONE

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



TUBULAR MARKER

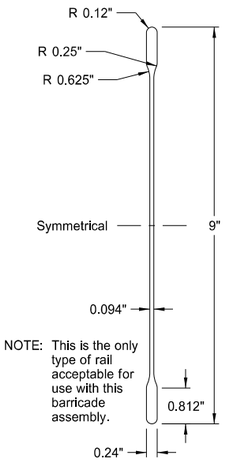
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

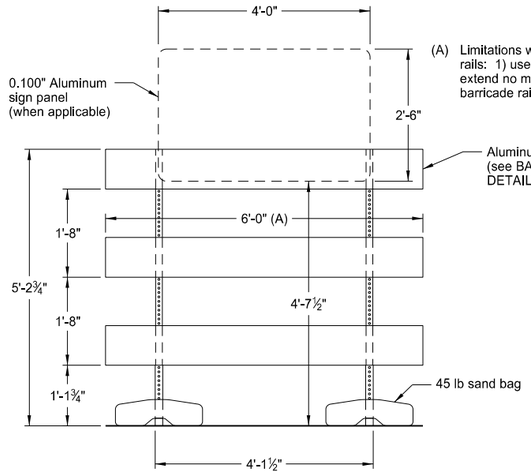
INSTALLATION NOTES:

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



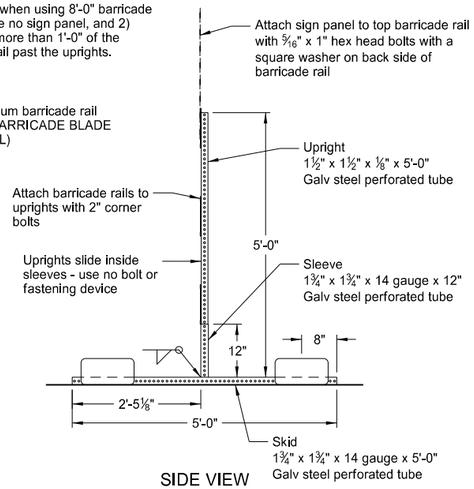
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



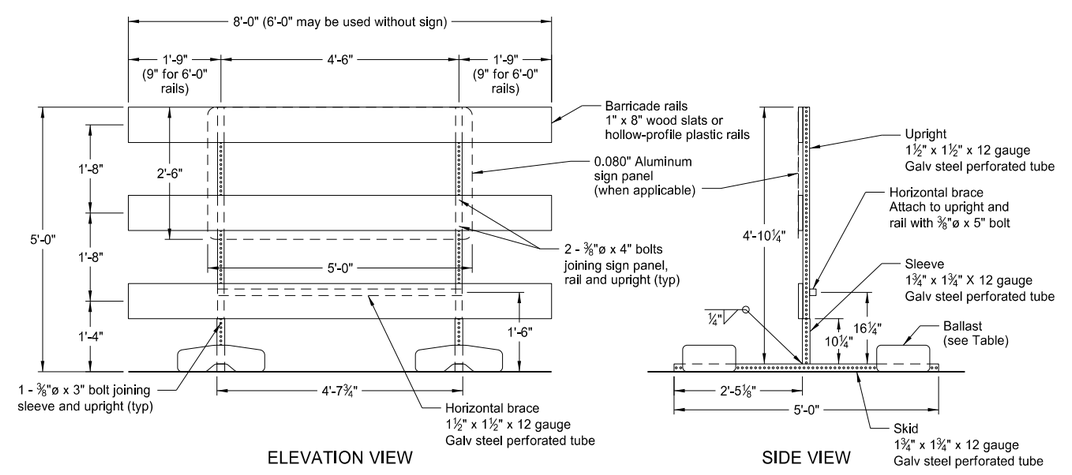
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW



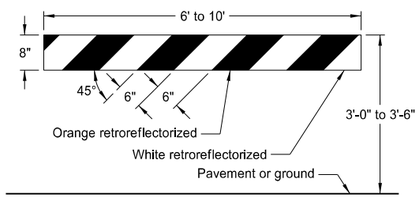
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

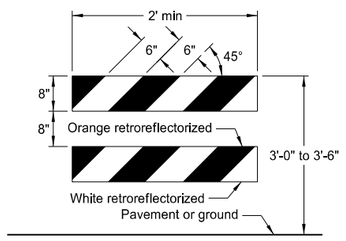


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

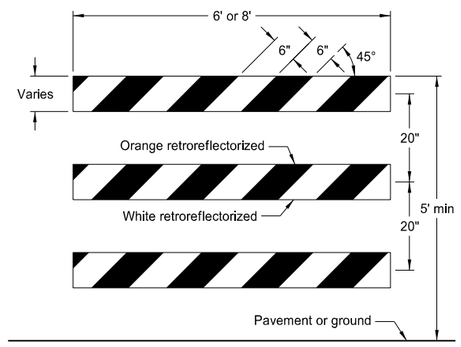
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

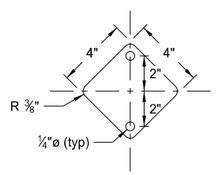


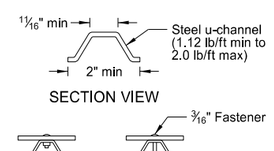
TYPE II BARRICADE

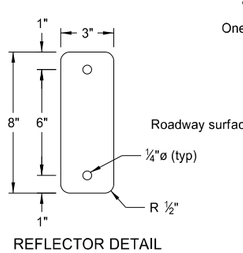


TYPE III BARRICADE

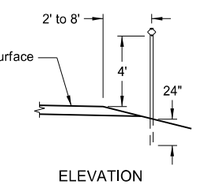
BARRICADE RAIL DETAILS







REFLECTOR DETAIL



ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

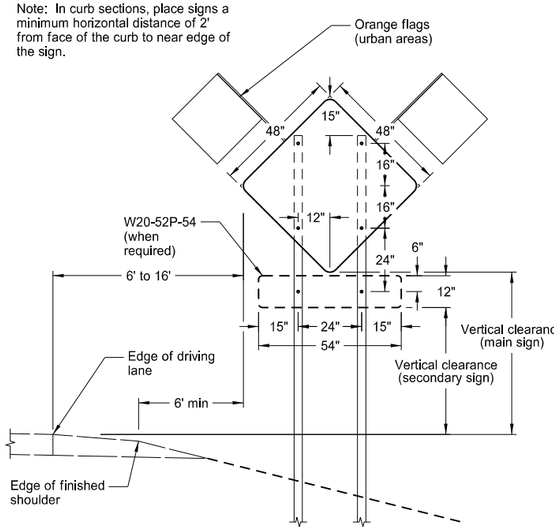
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

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

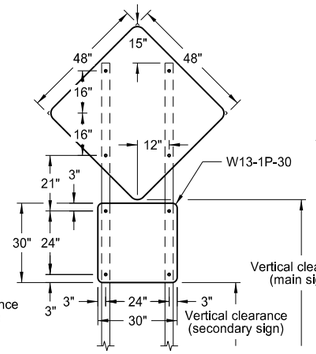
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

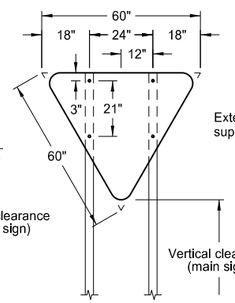
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



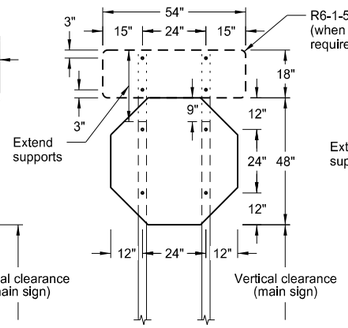
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



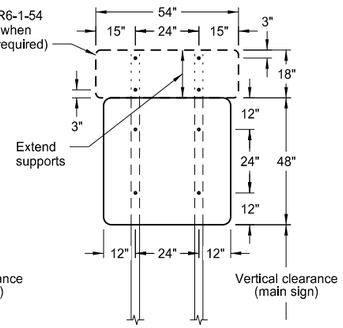
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



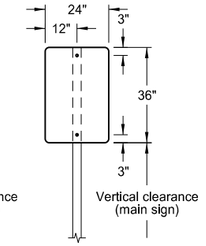
R1-2-60 - YIELD SIGN



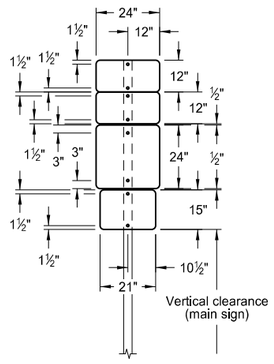
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



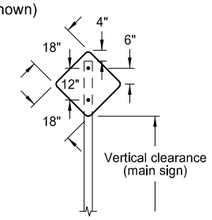
48" x 48" SIGN
(with R6-1-54 sign as required)



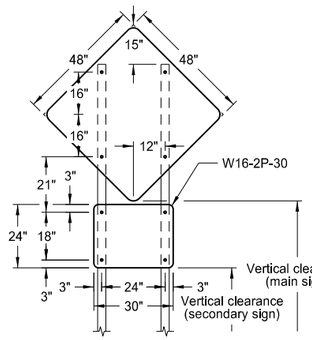
24" x 36" SIGN



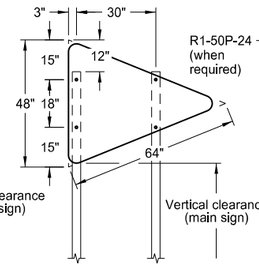
24" x 24"
ROUTE MARKER
ASSEMBLY



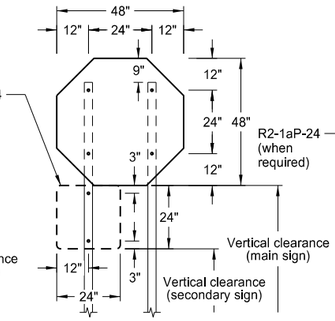
18" x 18"
DIAMOND SIGN



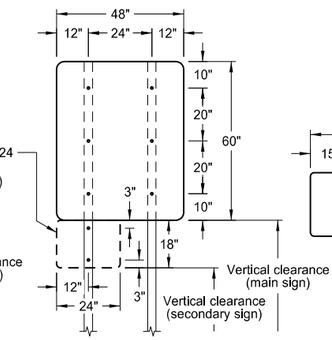
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



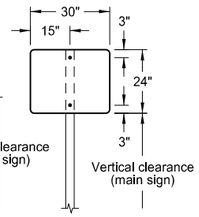
W14-3-64 - PENNANT SIGN



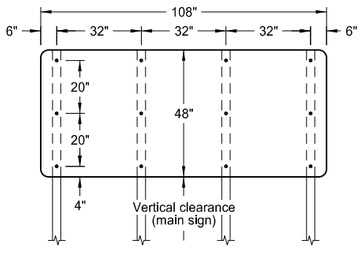
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



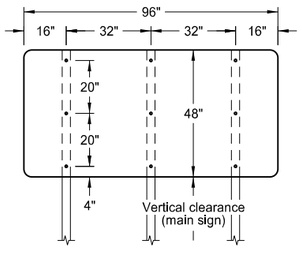
48" x 48" SIGN
(with R2-1aP-24 sign as required)



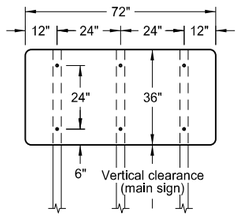
30" x 24" SIGN



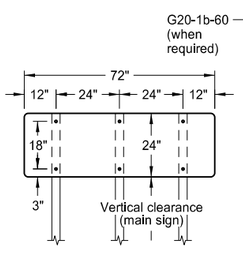
108" x 48" SIGN



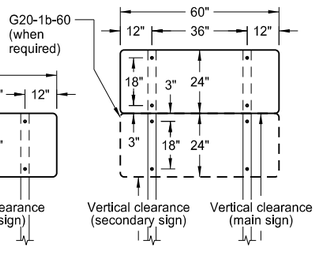
96" x 48" SIGN



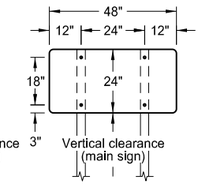
72" x 36" SIGN



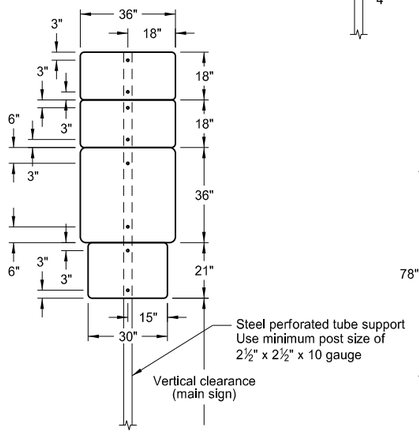
72" x 24" SIGN



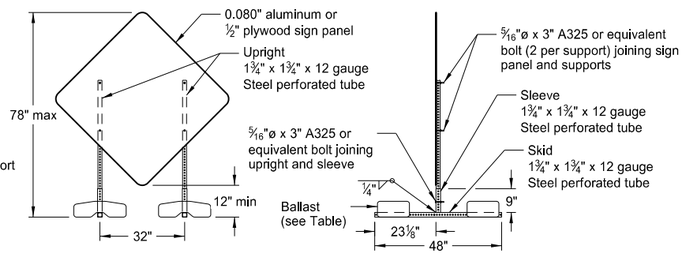
60" x 24" SIGN



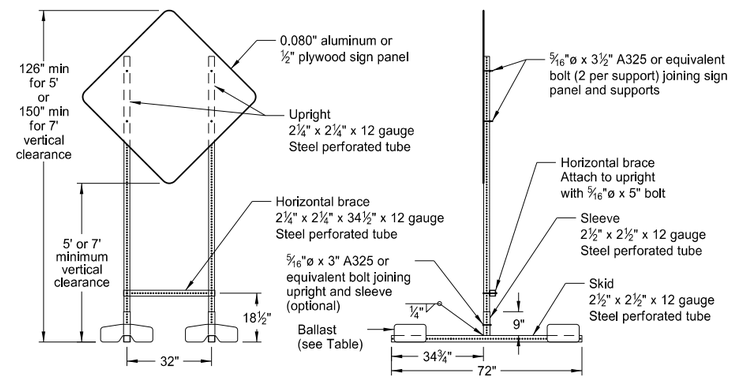
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

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

   Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. Punch all holes round for ⅜" bolts.

3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)

4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

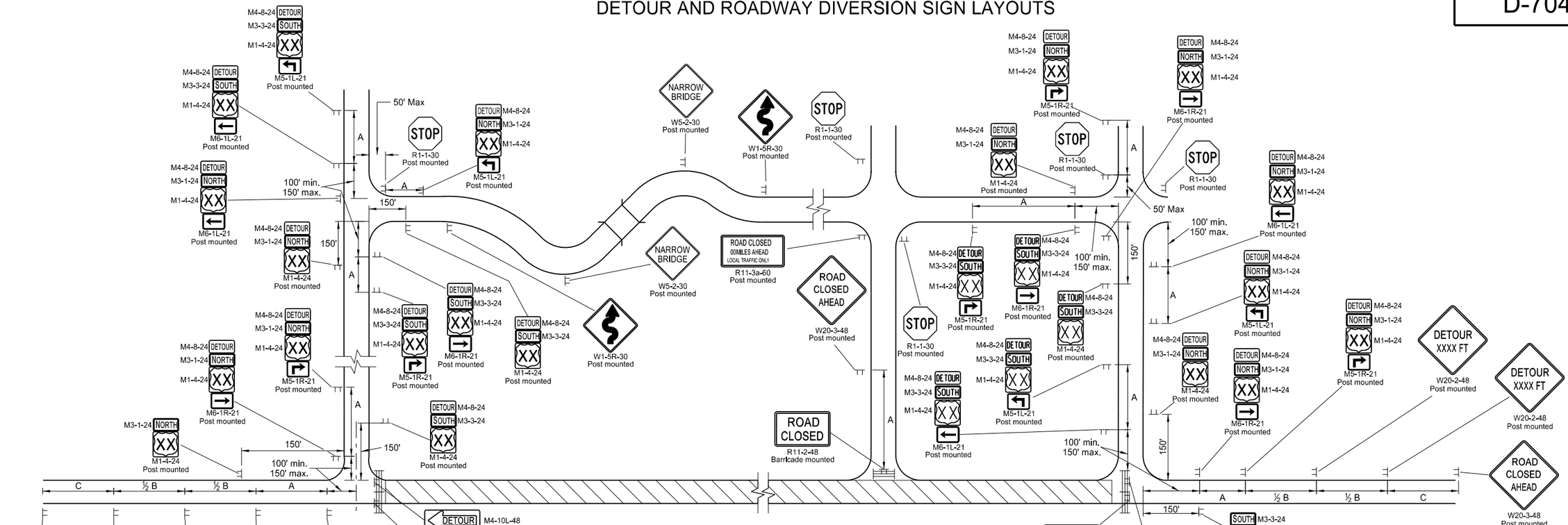
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

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

DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS

D-704-21



Notes

1. 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 S^2 / 60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when on roadway.
3. Space delineator drums and vertical panels at dimension "S" for tapering traffic. Space delineator drums, tubular markers and vertical panels at 2 times "S" for tangents.
4. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limits exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
5. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inches square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
6. Cover existing speed limit signs within a reduced speed limit zone.
7. Covered (when approved by engineer) or obliterated payment marking measured as Obliteration of Pavement Marking.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
9. If the tangent between tapers is less than 600', as an option, use sign W24-1-48 in place of double reverse curve signs.
10. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
11. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

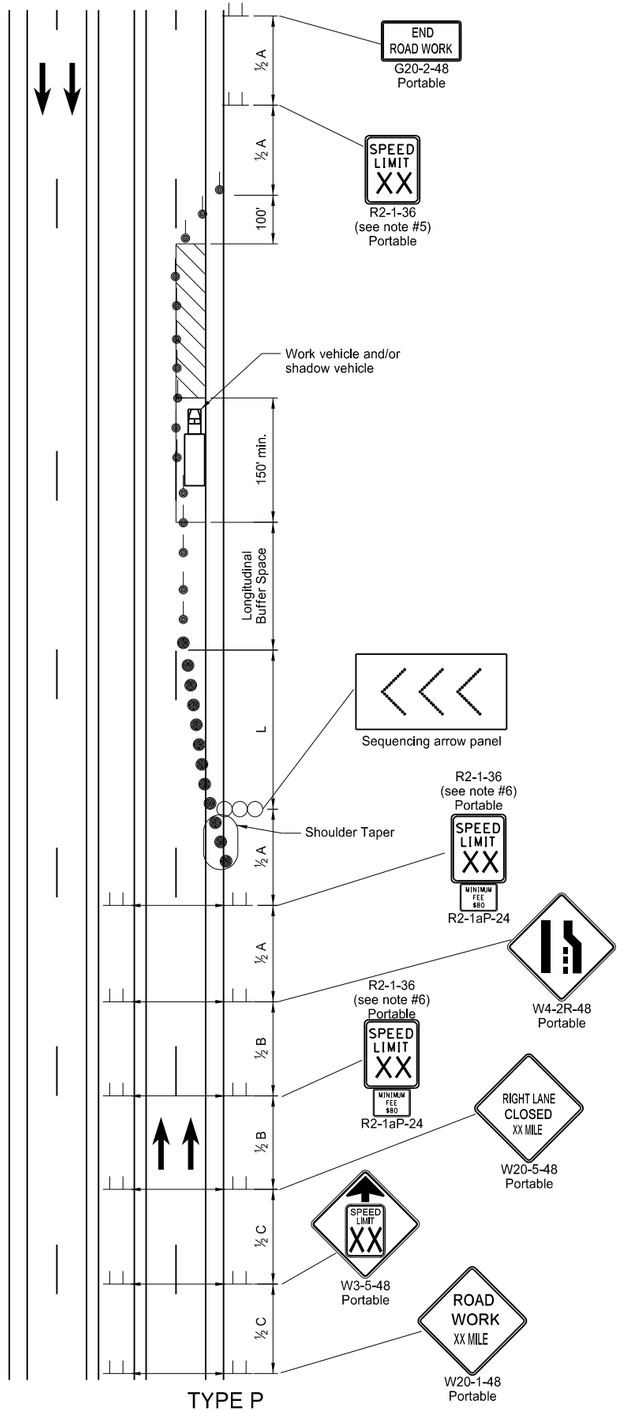
REVISIONS

DATE	CHANGE
8-17-17	Updated notes. Added speed limit.
11-01-19	Revised sign numbers and note 8.

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

SHORT TERM URBAN DETOUR AND LANE CLOSURE ON A DIVIDED HIGHWAY LAYOUTS

D-704-23

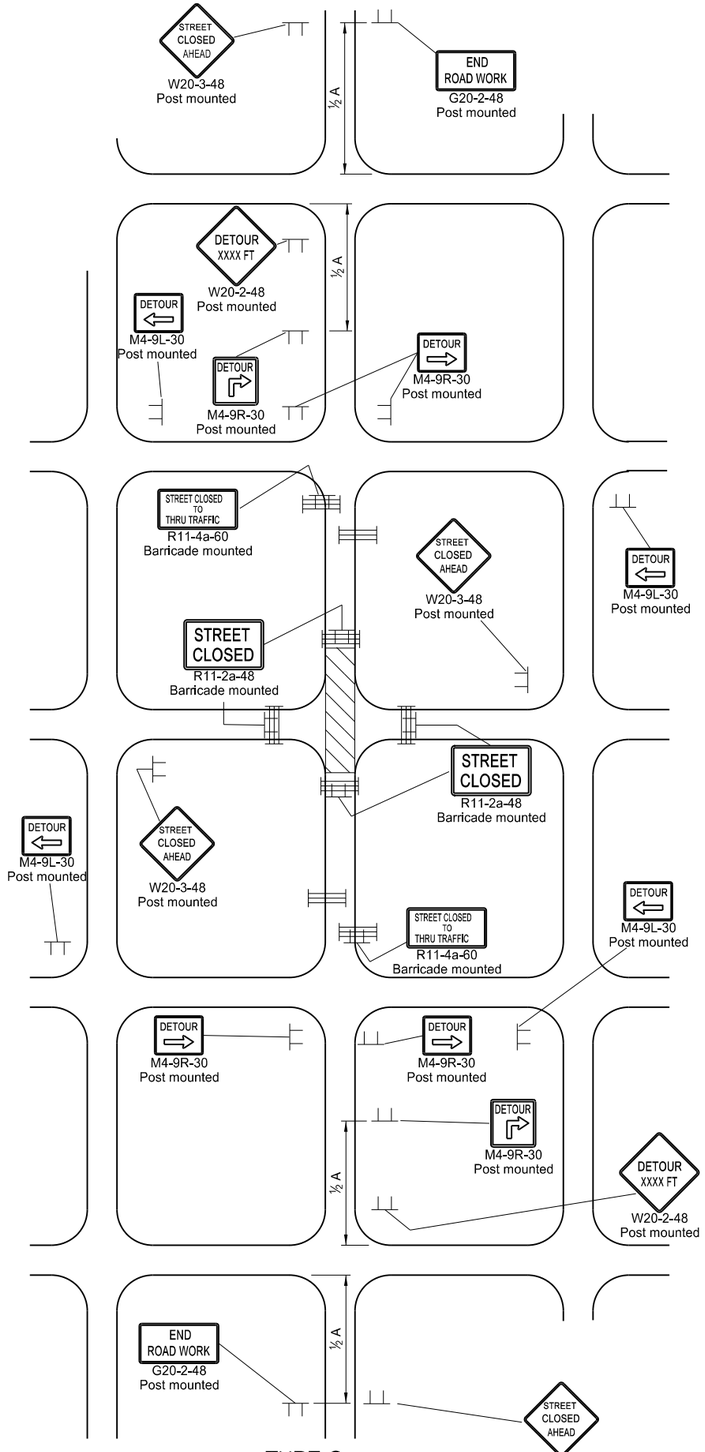


TYPE P

STATIONARY LANE CLOSURE ON A DIVIDED HIGHWAY

4 lane divided roadway where ½ of roadway is closed.

Short-term (more than 1 hour within a single daylight period.)



TYPE Q

DETOUR FOR A CLOSED STREET

Where city streets are used for detouring traffic.

Urban projects do not require the G20-55-96 and R2-1aP-24 signs.

Notes

1. Variables
   - S = Numerical value of speed limit or 85th percentile.
   - W = The width of taper in feet
   - L = Minimum length of taper, S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
4. Place Sequencing Arrow Panels at the beginning of taper. Where shoulder width does not provide sufficient room, move panel closer to the work area and place on roadway surface.
   - Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   - Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. Re-established speed limit. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
8. Cover existing speed limit signs within a reduced speed zone.
9. Covered (when approved by engineer) or obliterated payment marking measured as as Obliteration of Pavement Marking.
10. Change intersection control on detour for Type Q when determined necessary by the engineer.
11. Engineer to determine safe speed where necessary. When parking is present, place signs so they are entirely visible above parked vehicles or at the edge of the parking area so they are visible to oncoming traffic.
12. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
13. Recommend using 40 mph speed limit in vicinity of workers for Layout Type P, unless location and conditions dictate otherwise.

KEY

Type III barricade	Work area
Sign	Sequencing arrow panel
Delineator Drum	Tubular Markers

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

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-27-13

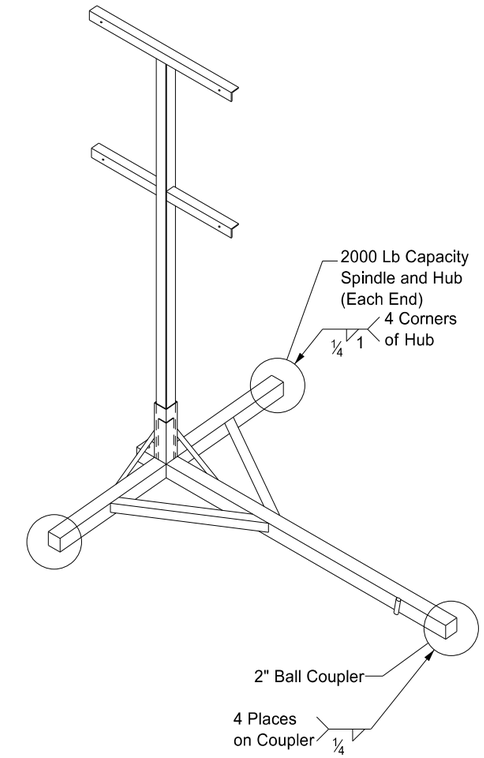
REVISIONS

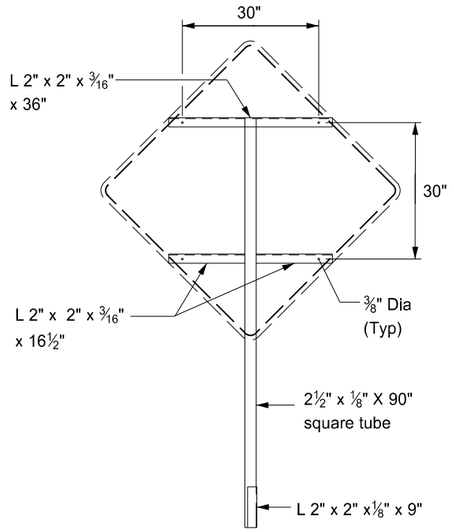
DATE	CHANGE
8-17-17	Removed Speed limit signs, & updated notes & sign numbers.
11-01-19	Revised sign numbers & note.

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

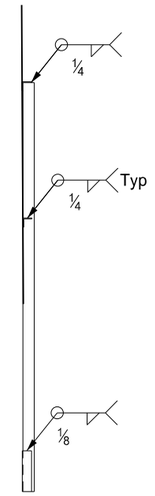
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



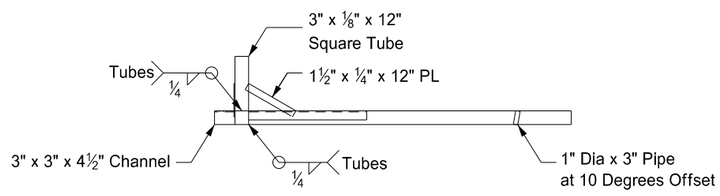


FRONT



RIGHT

SIGN SUPPORT



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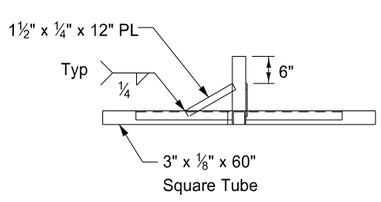

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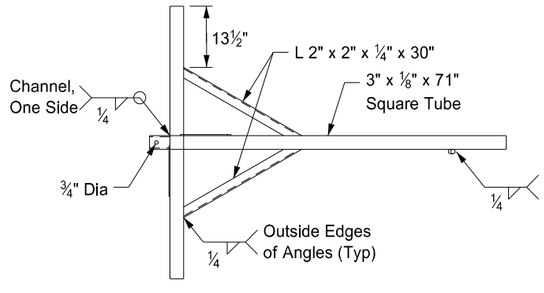


TOP

TRAILER

Notes:

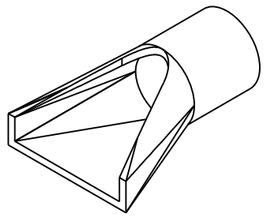
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

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

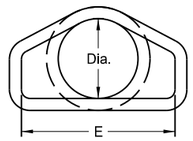
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

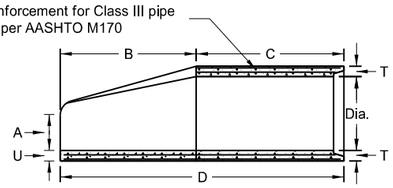
FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4½"
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"	5½"
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5½"
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6½"
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	6½"
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	6½"



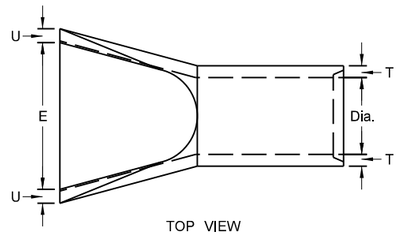
PERSPECTIVE



END VIEW



SIDE VIEW



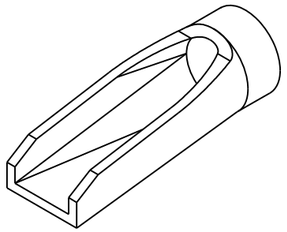
TOP VIEW

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

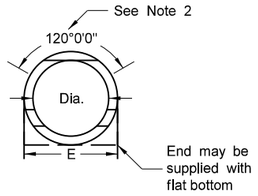
NOTES:

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

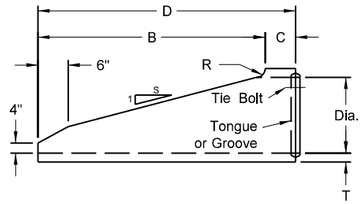
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



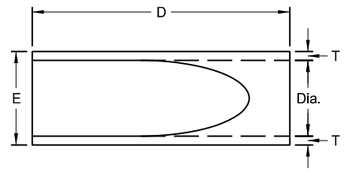
PERSPECTIVE



END VIEW



SIDE VIEW



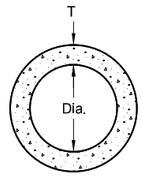
TOP VIEW

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

NOTES (Traversable End Section):

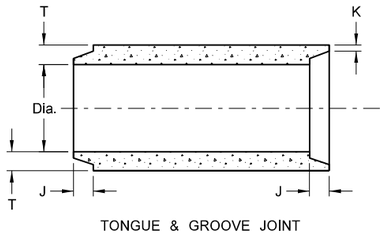
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

All Classifications of Round Concrete Pipe					
Internal Dia. of pipe in Inches	Cross-Sectional Water Area	Weight per lin. foot of Pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue End Min.	Minimum Wall Thickness (T)
Dia	Sq. ft.	Lbs.	In.	In.	In.
12	0.79	92	1⅛-2⅛	¾	2
15	1.23	127	1⅛-2¼	⅞	2¼
18	1.77	168	1⅛-2⅛	1	2½
21	2.40	214	1⅛-3⅛	1⅛	2¾
24	3.14	265	2¾-3¾	1⅛	3
27	3.98	322	2¾-4	1¼	3¼
30	4.91	384	3¼-4¼	1¼	3½
33	5.94	452	3¼-4¼	1½	3¾
36	7.07	524	3¼-4¼	1½	4
42	9.62	685	3¾-4¾	1¾	4½
48	12.57	685	3⅞-4¾	1⅞	5
54	15.90	1070	4⅛-5¼	2	5½
60	19.63	1296	4½-5½	2¼	6
66	23.76	1542	5-6	2⅝	6½
72	28.27	1810	5⅛-6¾	2⅞	7
78	33.18	2098	6¼-7¼	2⅞	7½
84	38.48	2410	5⅛-7¾	3⅜	8
90	44.18	2793	6¾-8½	3⅛	8½
96	50.27	3092	7-8¼	3½	9
102	56.75	3466	7-8¼	3½	9½
108	63.62	3864	7¼-8½	3¾	10

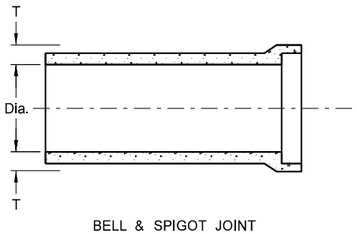


END VIEW

CIRCULAR PIPE

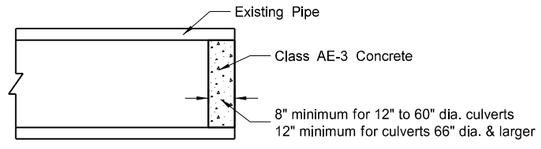


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5
11-21-16	Revised End Section Dimensions
09-18-19	Updated Perspective View Details

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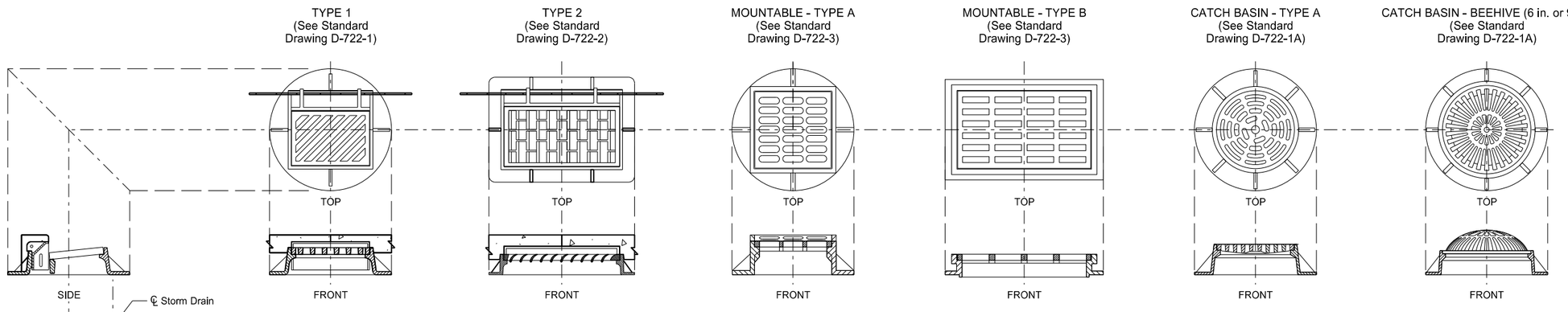
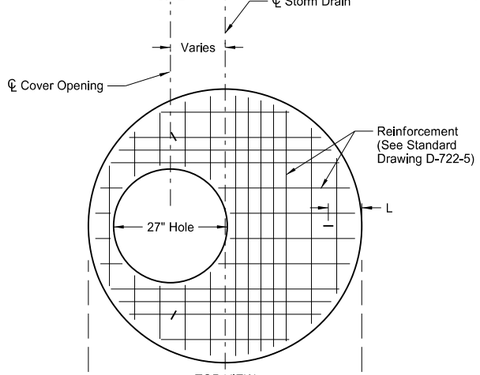
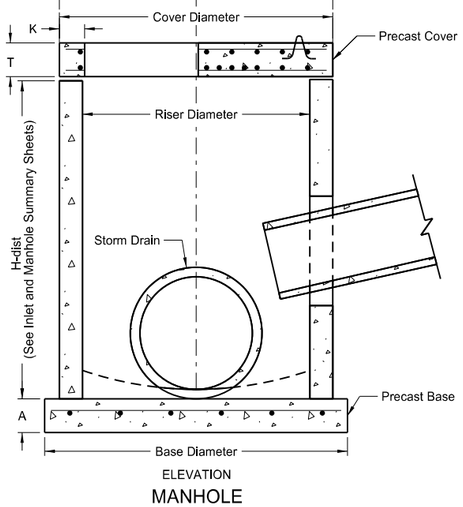
INLET - SPECIAL

D-722-1B



See Note 1.





MANHOLE
(See Standard Drawing D-722-5)

RISER DIAMETER	COVER DIAMETER	BASE DIAMETER
48"	58"	66"
60"	72"	78"
72"	86"	92"

See Note 4.

PAY ITEMS

48 in. Riser
- Inlet Special - Type 1 48 in. . . . . Ea.
- Inlet Special - Type 2 48 in. . . . . Ea.
- Inlet Special Mountable - Type A 48 in. . . . . Ea.
- Inlet Special Mountable - Type B 48 in. . . . . Ea.
- Inlet Special Catch basin 6 in. beehive 48 in. . . . Ea.
- Inlet Special Catch basin 9 in. beehive 48 in. . . . Ea.
- Inlet Special Catch basin - Type A 48 in. . . . . Ea.

60 in. Riser
- Inlet Special - Type 1 60 in. . . . . Ea.
- Inlet Special - Type 2 60 in. . . . . Ea.
- Inlet Special Mountable - Type A 60 in. . . . . Ea.
- Inlet Special Mountable - Type B 60 in. . . . . Ea.
- Inlet Special Catch basin 6 in. beehive 60 in. . . . Ea.
- Inlet Special Catch basin 9 in. beehive 60 in. . . . Ea.
- Inlet Special Catch basin - Type A 60 in. . . . . Ea.

72 in. Riser
- Inlet Special - Type 1 72 in. . . . . Ea.
- Inlet Special - Type 2 72 in. . . . . Ea.
- Inlet Special Mountable - Type A 72 in. . . . . Ea.
- Inlet Special Mountable - Type B 72 in. . . . . Ea.
- Inlet Special Catch basin 6 in. beehive 72 in. . . . Ea.
- Inlet Special Catch basin 9 in. beehive 72 in. . . . Ea.
- Inlet Special Catch basin - Type A 72 in. . . . . Ea.

NOTES:

1. For inlet casting details, see Standard Drawings D-722-1, D-722-21A, D-722-2, and D-722-3. Other castings, similar in dimension, may be used provided the casting meets the requirements set forth in the referenced Standard Drawings. The grate style shall be as specified on the plans and included in the price bid for "Inlet Special - (casting type & riser size)".
2. Metal used in the manufacture of castings shall conform to AASHTO M-105, Class 35B.
3. The Class of concrete, aggregate size, and methods of construction for the manhole riser, cover, and base shall be as detailed in Standard Drawing D-722-5.
4. See Standard Drawing D-722-5 for manhole riser, cover, and base details, dimensions, and reinforcement requirements.
5. The distance between the ℄ of the cover opening and the ℄ of the storm drain shall be noted on the Plan & Profile sheets.
6. Manhole steps, if noted on the Plan and Profile sheets, shall be constructed per Standard Drawing D-722-5.
7. On projects with P.C.C pavement, all risers shall be constructed 4 to 5 inches below final elevation and adjusted to final elevation after paving. Adjustments may be made with adjusting rings or cast-in-place concrete. All costs for this adjustment shall be included in the price bid for "Inlet - Special, (casting type & riser size)".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
03-18-14	
REVISIONS	
DATE	CHANGE

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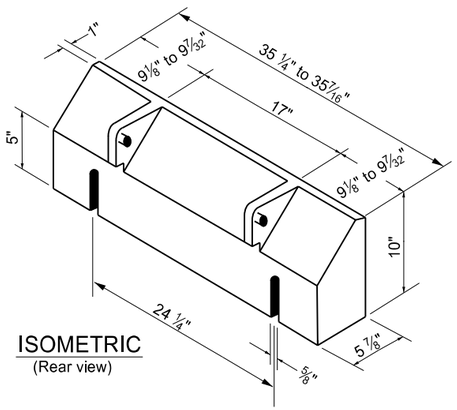
INLET - TYPE 2

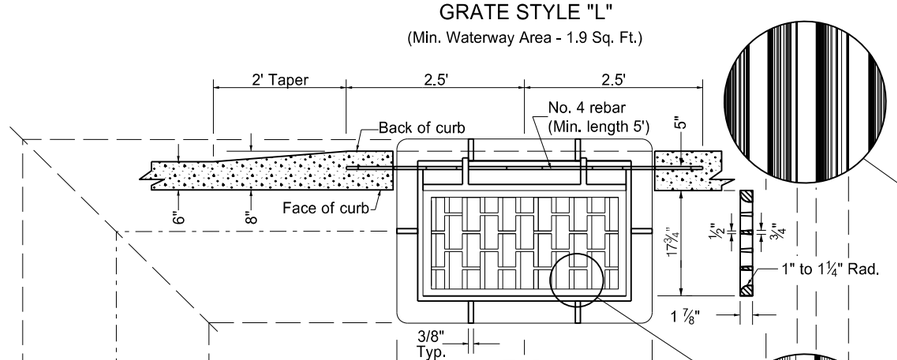
D-722-2

Pay Items
Inlet - Type 2 .....Ea.
Inlet - Type 2, Double.....Ea.



ISOMETRIC
(Rear view)

GRATE STYLE "L"
(Min. Waterway Area - 1.9 Sq. Ft.)



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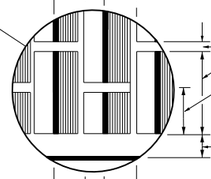
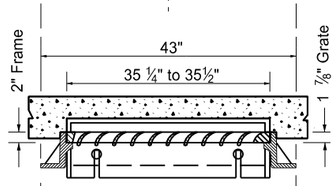
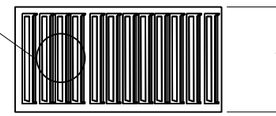




FRONT

GRATE STYLE "V"
(Min. Waterway Area - 2.4 Sq. Ft.)



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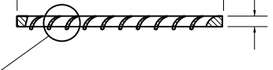
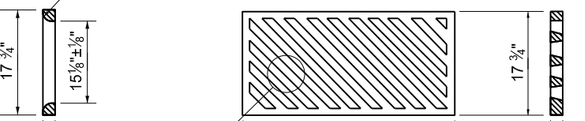


FRONT

GRATE STYLE "D"
(Min. Waterway area - 1.6 Sq. Ft.)



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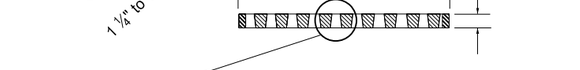
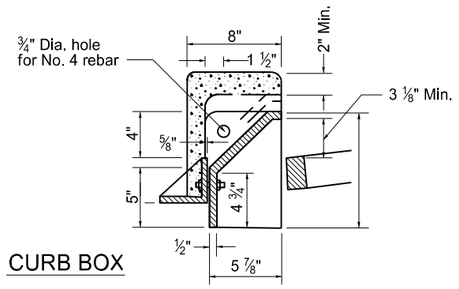
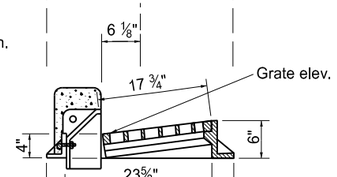


FRONT

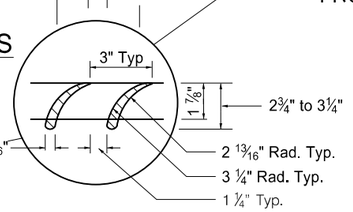


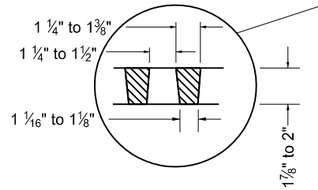
CURB BOX



SIDE

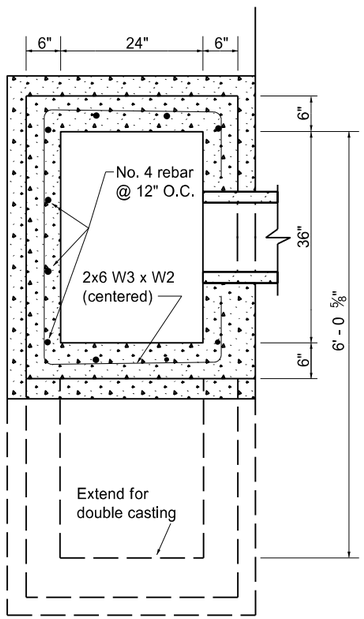
CASTING DETAILS





Notes:

1. Drainage structure castings shall be manufactured in accordance with AASHTO M306. Metal used in the manufacture of castings shall conform to AASHTO M105 Class 35B.
2. Other castings, similar in dimension, may be used if the casting conforms to the riser section and has the grate style as specified in the plans. If modifications to the inlet riser are required to accomodate similar castings, the contractor must receive written approval from the engineer.
3. Precast risers shall be constructed in accordance with ASTM C858.
4. The contractor shall have the option of using precast or poured in place bases. Cast in place concrete shall be Class AE-3. Construction shall be in accordance with section 722 of the Standard Specifications.
5. On projects with P.C.C. pavement, all inlet risers or barrels shall be constructed 4 to 5 inches below final elevation and adjusted to final grade after paving. Adjustment may be done with adjusting rings or cast-in-place concrete. All costs for this adjustment shall be included in the price bid for the inlet.
6. Welded wire reinforcing fabric shall conform to AASHTO M55 Grade 65.
7. The deformed reinforcing steel shall conform to AASHTO M31.



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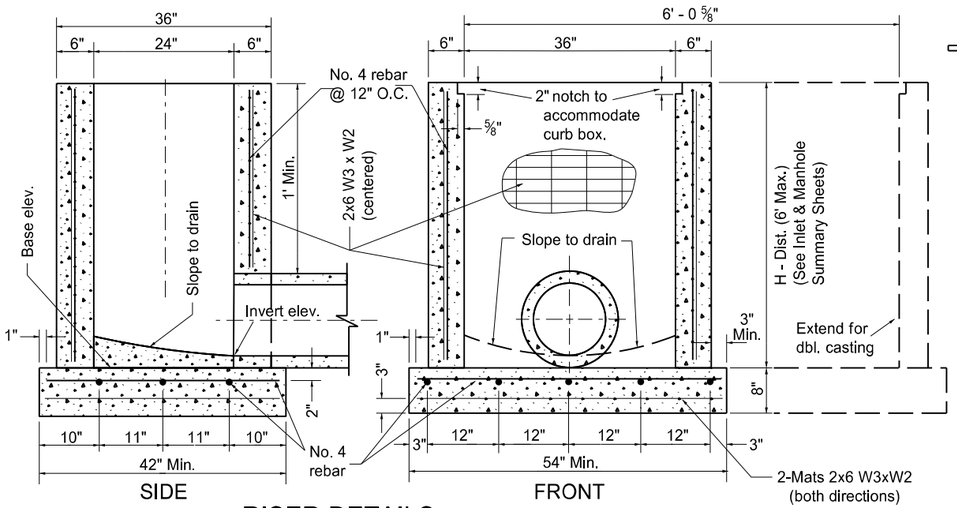
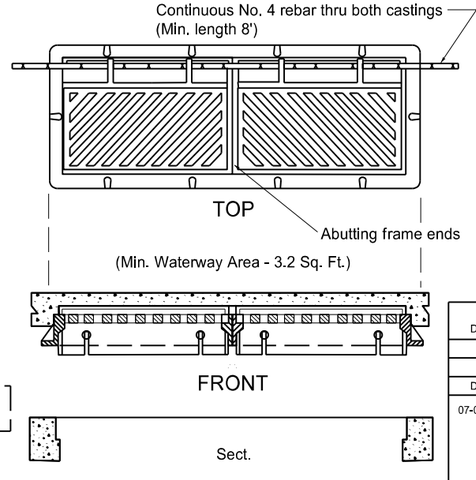


SIDE

FRONT

RISER DETAILS



TOP

FRONT

INLET - TYPE 2 - DOUBLE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
07-07-14	Revised Note 4

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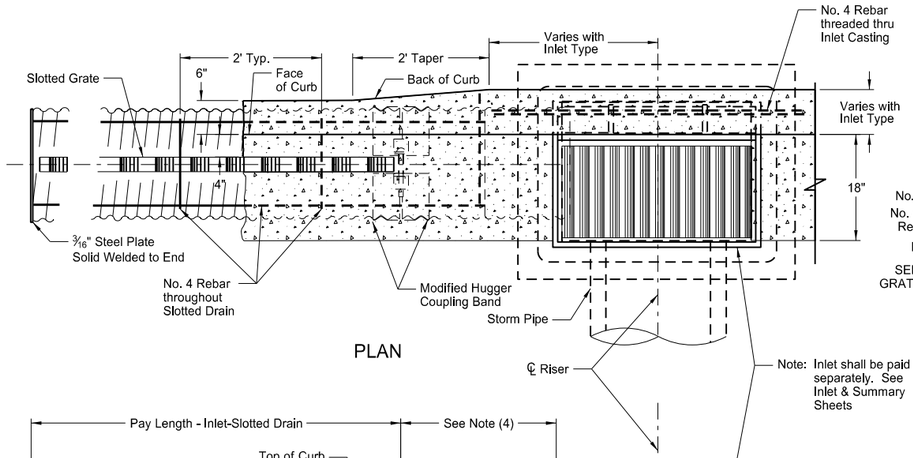
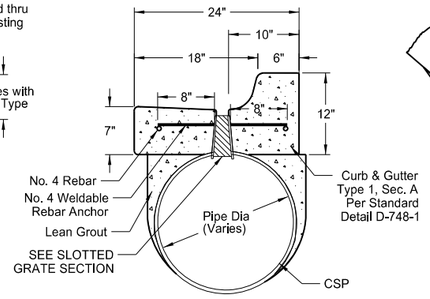
INLET - SLOTTED DRAIN

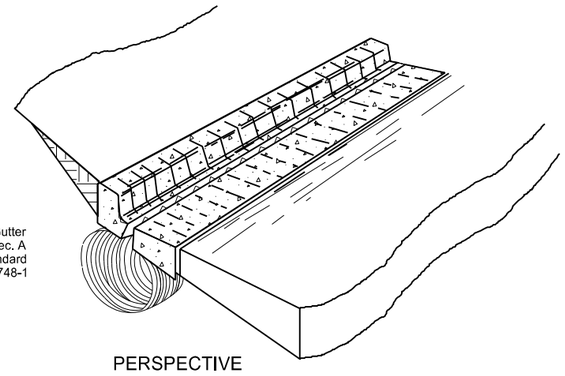
D-722-3A



PLAN



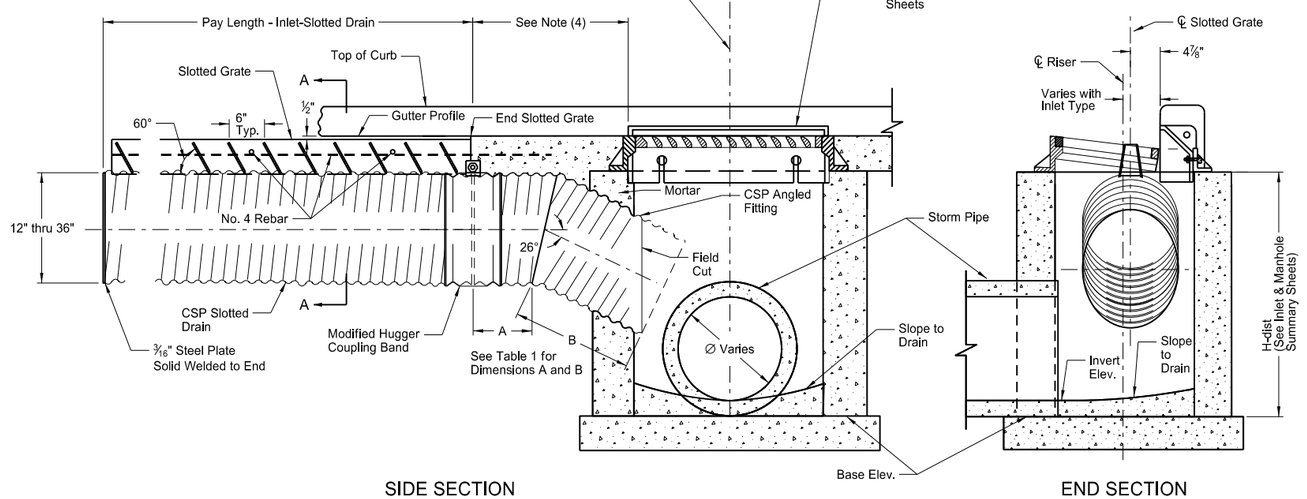
SECTION A-A



PERSPECTIVE

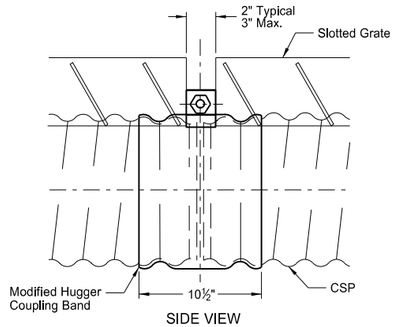
NOTES:

1. Corrugated steel pipe shall conform with applicable sections of NDDOT Standard Specifications and AASHTO M 36.
2. Slotted grate assembly, including rebar and steel plate end, shall be a weldable grade of steel complying with the mechanical requirements of AASHTO M 183 and shall be hot dip galvanized in accordance with AASHTO M 111.
3. All labor, equipment and materials necessary to complete the work, except for the concrete curb and gutter and the inlets, shall be included in the price bid for "Inlet - Slotted Drain (Size)".
4. The non-slotted corrugated pipe angled fitting (see Table 1) shall not be paid for separately but shall be included in the price bid for the Inlet - Slotted Drain.
5. Construction shall be in accordance with Sections 714 and 722 of the Standard Specifications.



SIDE SECTION

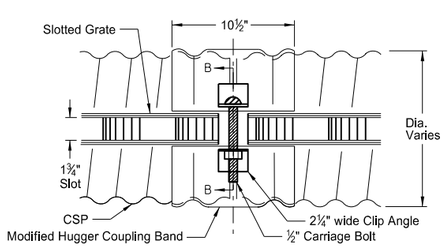
END SECTION



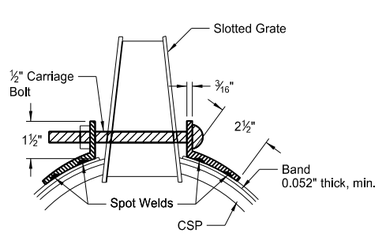
SIDE VIEW

PAY ITEMS

Inlet - Slotted Drain, 12 In . . . . . L.F.
Inlet - Slotted Drain, 15 In . . . . . L.F.
Inlet - Slotted Drain, 18 In . . . . . L.F.
Inlet - Slotted Drain, 24 In . . . . . L.F.
Inlet - Slotted Drain, 30 In . . . . . L.F.
Inlet - Slotted Drain, 36 In . . . . . L.F.



TOP VIEW



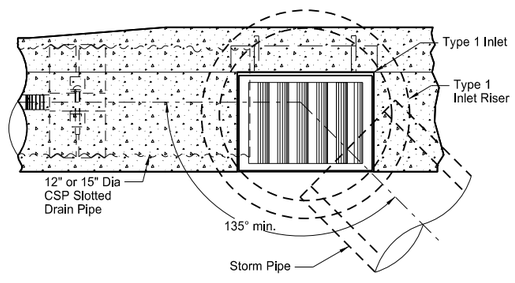
SECTION B-B

MODIFIED HUGGER COUPLING BAND

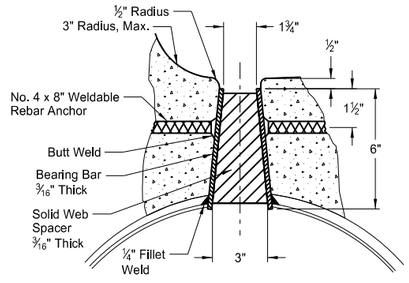
TABLE 1
CSP Angled Fitting Dimensions

Slotted Drain Pipe Dia (in.)	A (in.)	B (in.)							
		Inlet		Inlet - Special					
		Type 1	Type 2	Type 1 48"	Type 1 60"	Type 1 72"	Type 2 48"	Type 2 60"	Type 2 72"
12	12	18(A)	18	35	41	42	31	36	37
15	12	18(A)	18	36	42	43	31	37	38
18	12		18	37	42	43	32	38	39
24	24				44	45		39	41
30	24				45	46		41	42
36	24					48			44

(A) 135° min. angle required between CSP and Storm Pipe for Type 1 Inlet - see Type 1 Inlet Connection Detail)



TYPE 1 INLET CONNECTION DETAIL
For 12" and 15" Slotted Drain Installation



SLOTTED GRATE SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
03-17-2014	
REVISIONS	
DATE	CHANGE

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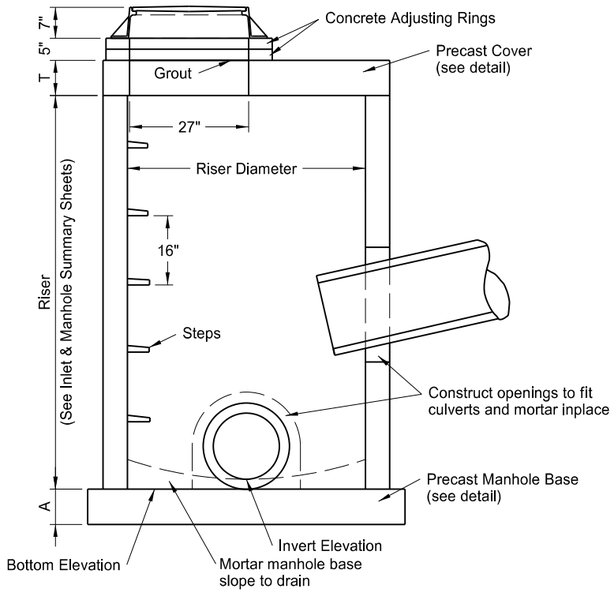
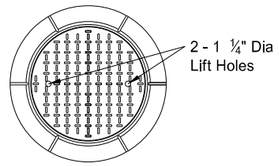
MANHOLE DETAILS

D-722-5



ELEVATION



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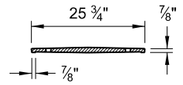
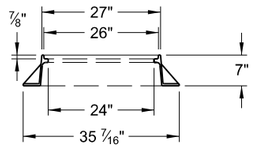


LID



FRAME

MANHOLE CAST IRON RING & COVER

PRECAST MANHOLE COVERS

RISER DIAMETER	COVER DIAMETER	WEIGHT OF SECTION	T	K	L	BOTTOM * BARS	TOP * BARS
48"	58"	1,080 Lb	6"	6"	8"	#4 at 6"	-----
54"	65"	1,910 Lb	8"	6"	8"	#4 at 6"	-----
60"	72"	2,430 Lb	8"	7"	9"	#4 at 6"	#4 at 11"
66"	79"	3,010 Lb	8"	7"	9"	#4 at 6"	#4 at 11"
72"	86"	3,640 Lb	8"	8"	10"	#4 at 6"	#4 at 11"
84"	100"	5,060 Lb	8"	9"	11"	#5 at 6"	#5 at 11"
96"	114"	6,695 Lb	8"	9"	11"	#5 at 6"	#5 at 11"
108"	128"	12,810 Lb	12"	10"	12"	#5 at 6"	#5 at 11"
120"	142"	15,900 Lb	12"	11"	13"	#5 at 6"	#5 at 11"

* - Place reinforcement listed in each direction.

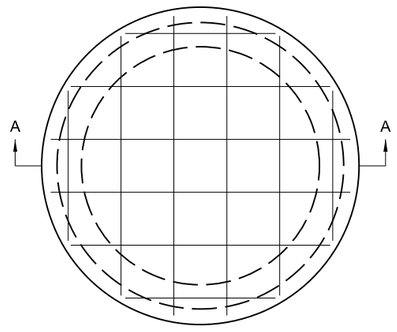
MANHOLE BASES

RISER DIAMETER	BASE DIAMETER	WEIGHT OF SECTION	A	BARS *
48"	66"	1,785 Lb	6"	#4 at 12"
54"	72"	2,830 Lb	8"	#4 at 12"
60"	78"	3,320 Lb	8"	#4 at 12"
66"	86"	4,035 Lb	8"	#4 at 12"
72"	92"	4,620 Lb	8"	#4 at 12"
84"	107"	6,245 Lb	8"	#4 at 12"
96"	120"	7,855 Lb	8"	#4 at 12"
108"	132"	14,255 Lb	12"	#4 at 8"
120"	148"	17,925 Lb	12"	#4 at 8"

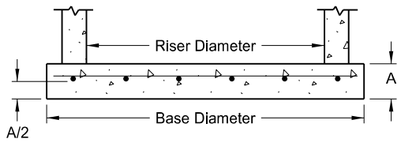
* - Place reinforcement listed in each direction.

NOTES:

1. Use class AE concrete precast or cast-in-place bases constructed in accordance with NDDOT Standard Specifications. Use aggregate size approved by the engineer.
2. Use precast concrete manholes, risers and steps conforming to AASHTO M199.
3. Reinforce precast concrete bases and covers as shown in the table for the corresponding riser diameter.
4. Use Grade 60 reinforcing steel.
5. Cut or Precast manhole riser bottoms square to fit the manhole base. Grout joint between base and riser with cement mortar.
6. The manhole riser length listed in the plans is based on a 7" manhole casting, plus 2 concrete adjusting rings (5"), plus the "T" dimension shown in the Precast Manhole Covers table.
7. Use corrosion resistant manhole steps with a minimum 800 pound vertical load resistance and a minimum 400 pound horizontal pull-out resistance. Use configuration of steps approved by the Engineer.
8. Precast concrete manhole covers shown are designed for an HS-20 wheel load and maximum fill height of 15'-0". Special design is required for heavier wheel loads and/or greater fill heights.
9. Use of other castings, similar in dimension, is allowed if the casting conforms to the manhole cover and has a lid style specified in the plans. Modifications to the manhole cover to facilitate similar castings are only allowed with written approval from the Engineer.
10. Use castings manufactured in accordance with AASHTO M306-09. Use metal conforming to AASHTO M105 Class 35B in the manufacture of castings.

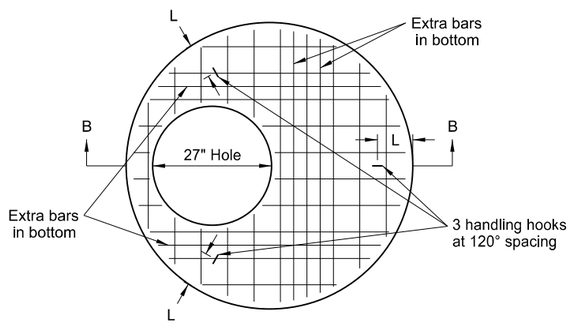


TOP VIEW

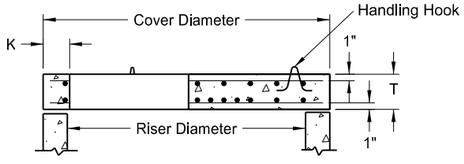


SECTION A-A

PRECAST MANHOLE BASE

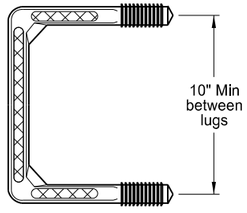


TOP VIEW

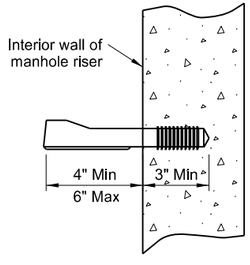


SECTION B-B

PRECAST COVER



TOP VIEW



STEP DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-14-2013	
REVISIONS	
DATE	CHANGE
6-24-14	Revised notes 1 & 6, added dimensions to Elev. drawing.
10-17-17	Updated to active voice.

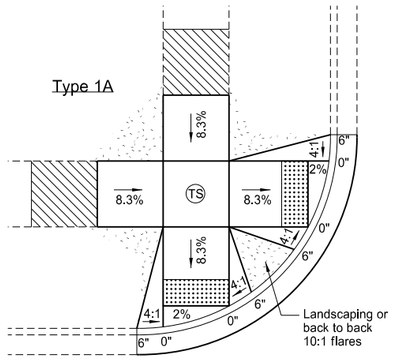
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10-17-2017 and the original document is stored at the North Dakota Department of Transportation

CURB RAMP DETAILS

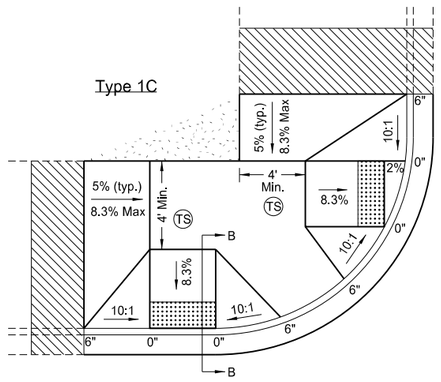
D-750-3

+More Right of Way — Less Right of Way-

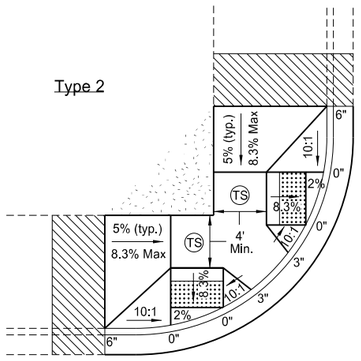
Type 1A



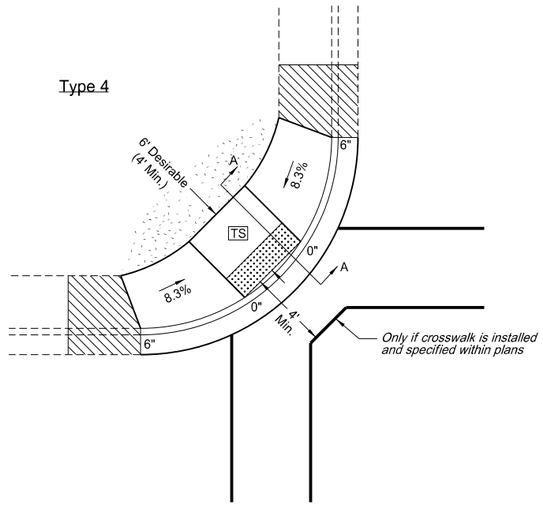
Type 1C



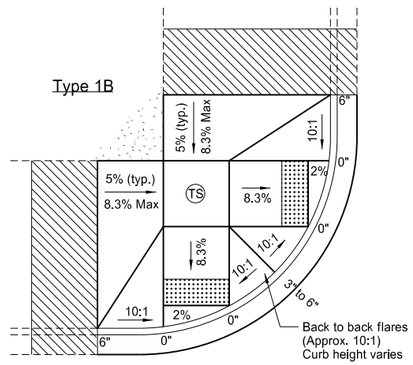
Type 2



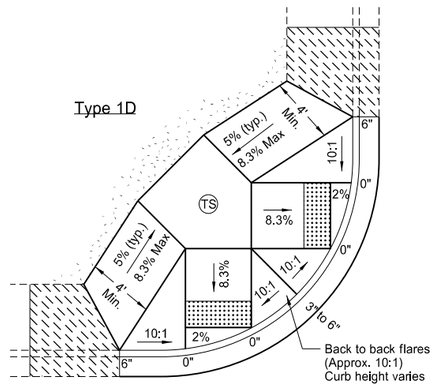
Type 4



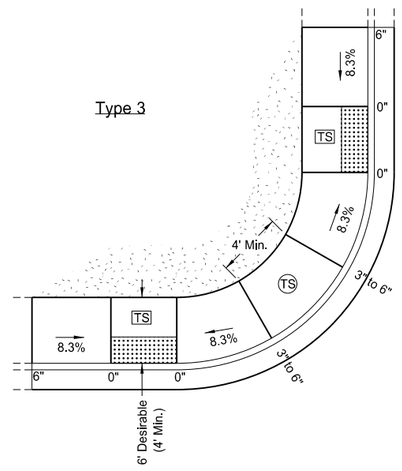
Type 1B



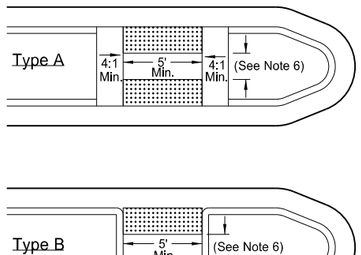
Type 1D

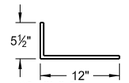


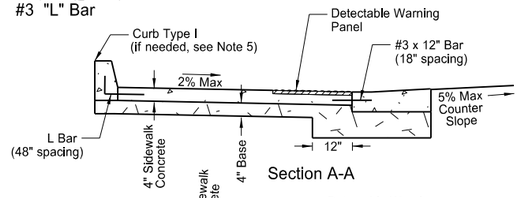
Type 3

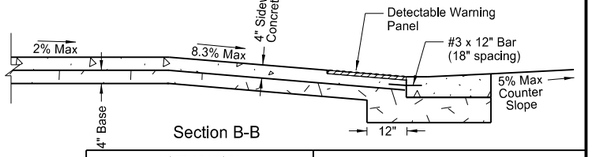


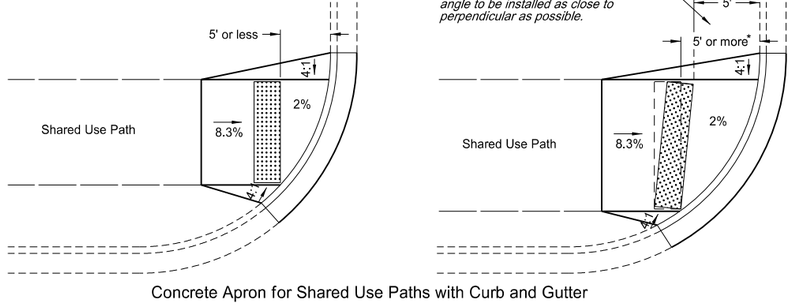
Median Refuge Islands (Cut-Through)



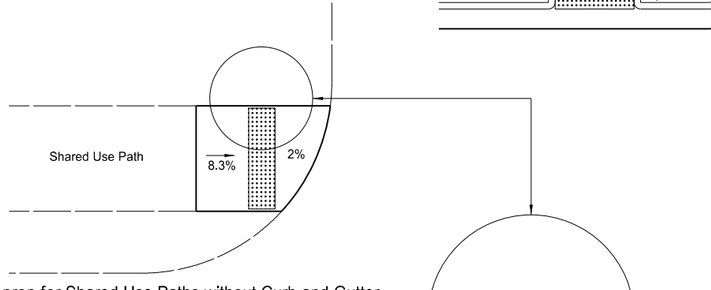




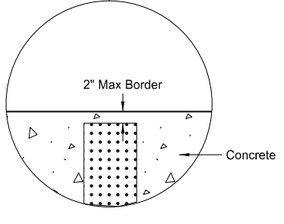


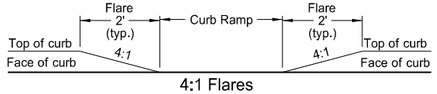


Concrete Apron for Shared Use Paths with Curb and Gutter

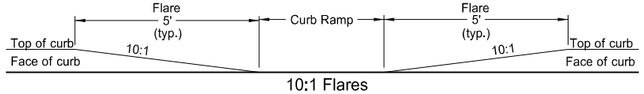


Concrete Apron for Shared Use Paths without Curb and Gutter





4:1 Flares
(To be used when flare is adjacent to landscaping)



10:1 Flares
(To be used when flare is adjacent to sidewalk)

NOTES:

1. Ramp width is the useable portion of the ramp, excluding flares. Match curb ramp width to existing sidewalk width (4' minimum or 5' for island ramps.) Match ramp width to existing shared use path width. Maximum ramp length is 15'.
2. Desirable turning space size is 5' x 5' or larger with a minimum size of 4' x 4'. The maximum slope for turning spaces is 2% in any direction.
3. Match detectable warning panel width to ramp width. Radial panels are allowed. Place detectable warning panel within the lower turning space.
4. Provide a continuous 4' minimum width pedestrian access route with max 2% concrete cross slope, excluding flares.
5. Modify existing ground slope with landscaping, as needed. If not possible, such as adjacent buildings, use a vertical curb as shown in the detail below. The Engineer will measure curb at the unit price bid for "Curb - Type I" per lineal foot.
6. Islands: If the grade of the island curb ramp is less than 2%, provide a minimum distance of 2' between warning panels. If the grade of the island curb ramp is steeper than 2%, provide a turning space between the ramps.

LEGEND:

- : Detectable Warning Panel
- : Landscaping
- : Transitional tie-in segment if needed for retrofits. Max grade slope 8.3%.
- TS : Upper Turning Space
- TS : Lower Turning Space
- 0", 3", or 6" : Curb Height
- 8.3% : All slopes shown are max grades. Flatter slopes may be used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-26-13

REVISIONS

DATE	CHANGE
10-17-17	Updated to active voice.
09-05-18	Revised Notes, Revision for Turning Space, Added Passing Space Requirements, Turned Detectable Warning Panel

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 09-05-2018 and the original document is stored at the North Dakota Department of Transportation

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

2. Minimum vertical clearance: Provide at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane at the side of the road in rural districts. Provide at least 7' clearance to the bottom of the sign, where parking or pedestrian movements occur.

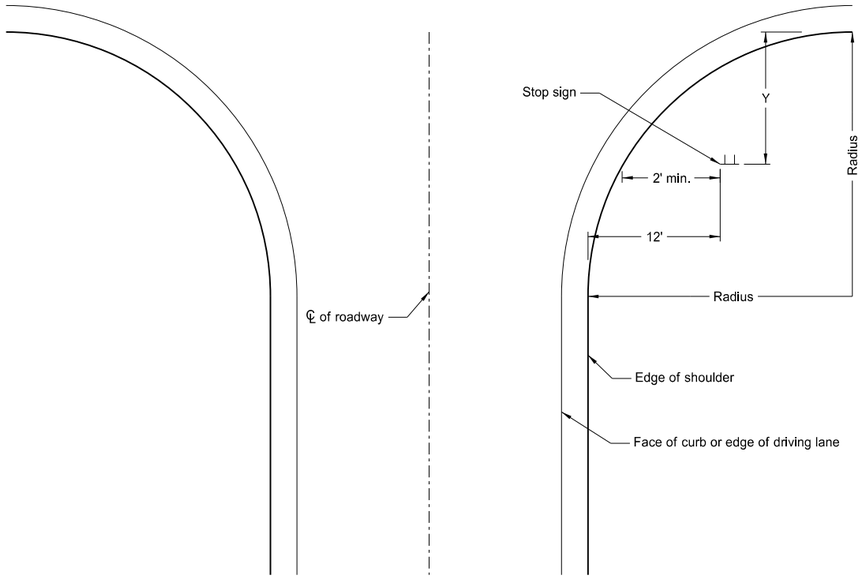
   Install signs on expressways a minimum height of 7'.

   Install adopt-a-highway signs on Freeways at least 7' above the edge of the driving lane.

   Maximum vertical clearance is 6" greater than the minimum vertical clearance.

3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.

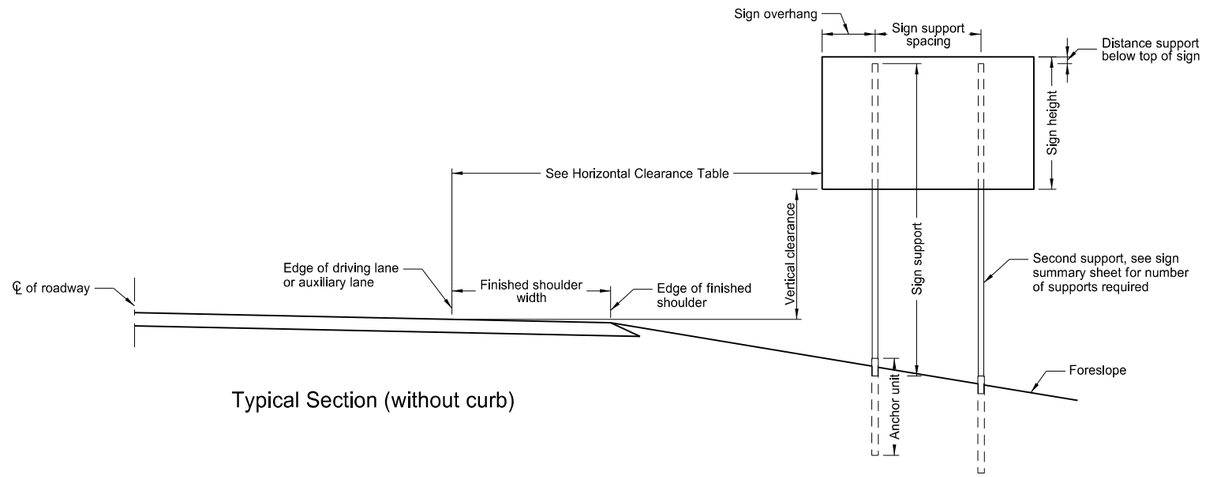
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

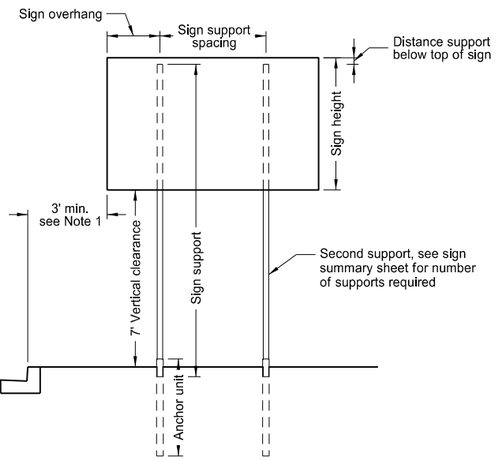
Use layout for the placement of "Stop" signs.

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



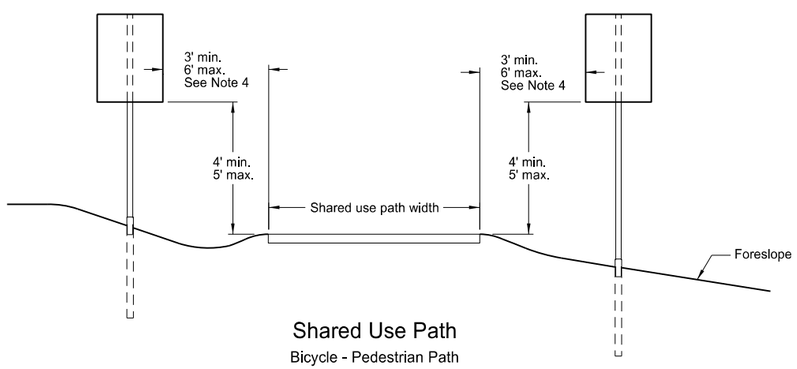
Typical Section (without curb)

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



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

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

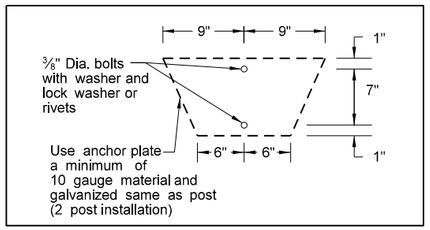
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

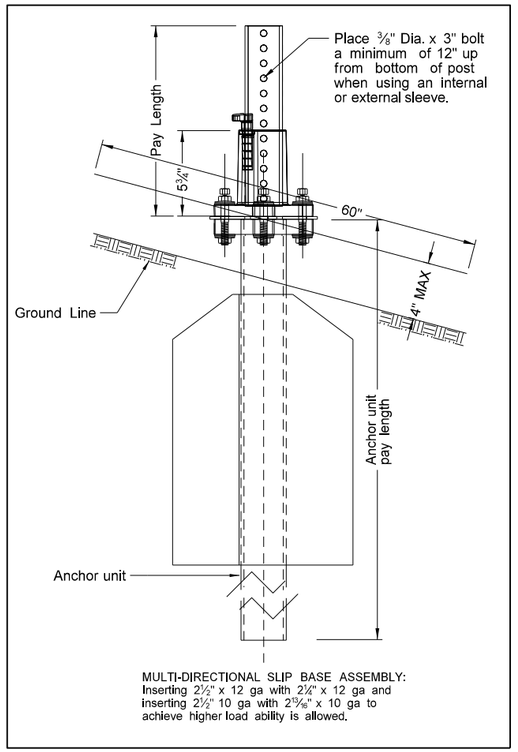
Mounting Details Perforated Tube

D-754-24

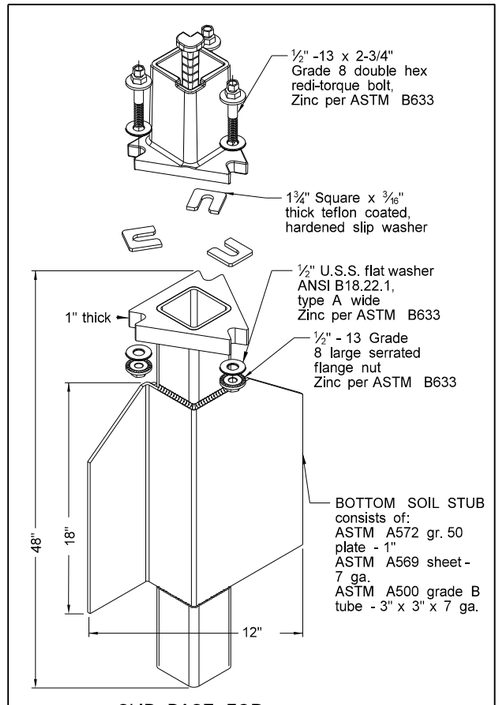
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2⅜16	10	Yes		7

(B) - Provide a shim as specified by the manufacturer when placing 2½", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

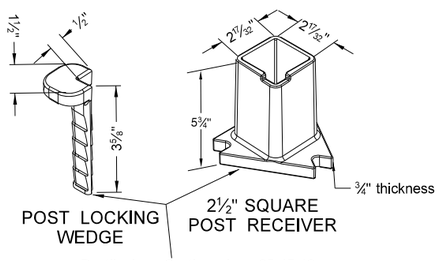




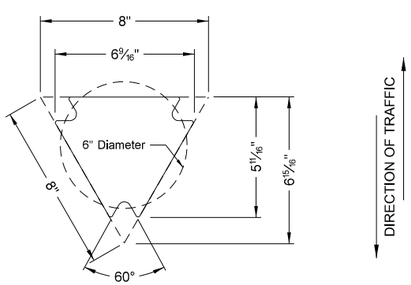
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
Inserting 2½" x 12 ga with 2¼" x 12 ga and inserting 2½" 10 ga with 2⅜16" x 10 ga to achieve higher load ability is allowed.



SLIP BASE FOR 2½" POST



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



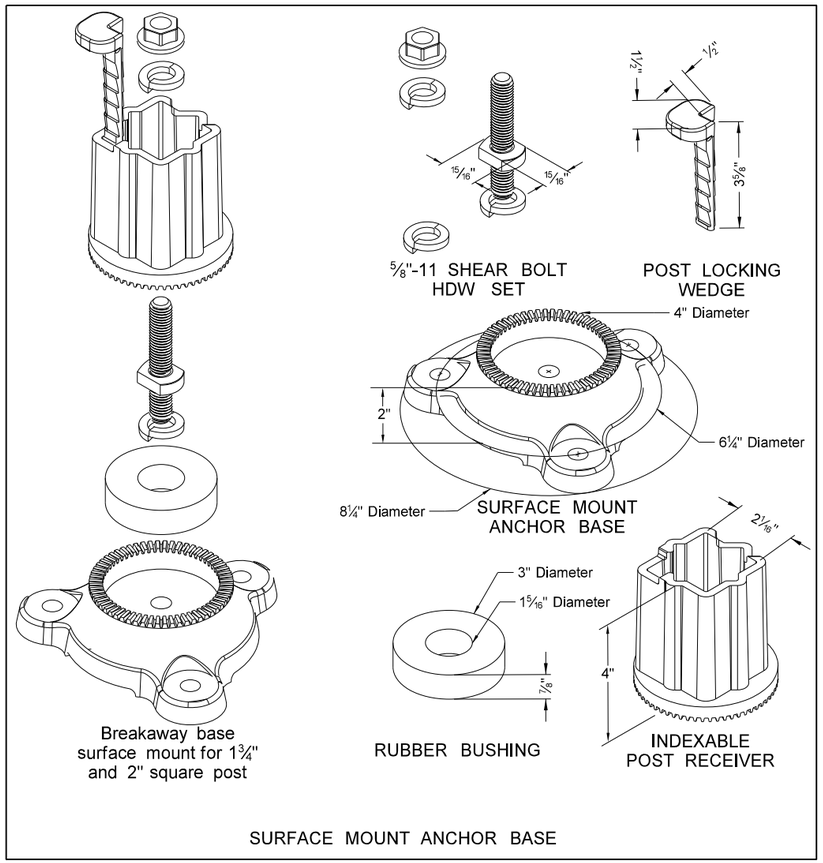
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulud In.³
1½ x 1½	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
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2⅜16 x 2⅜16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 ⅜16" size 10 gauge is shown as 2.19" size on the plans;
The 2½" size is shown as 2.51" size on the plans.

NOTE:

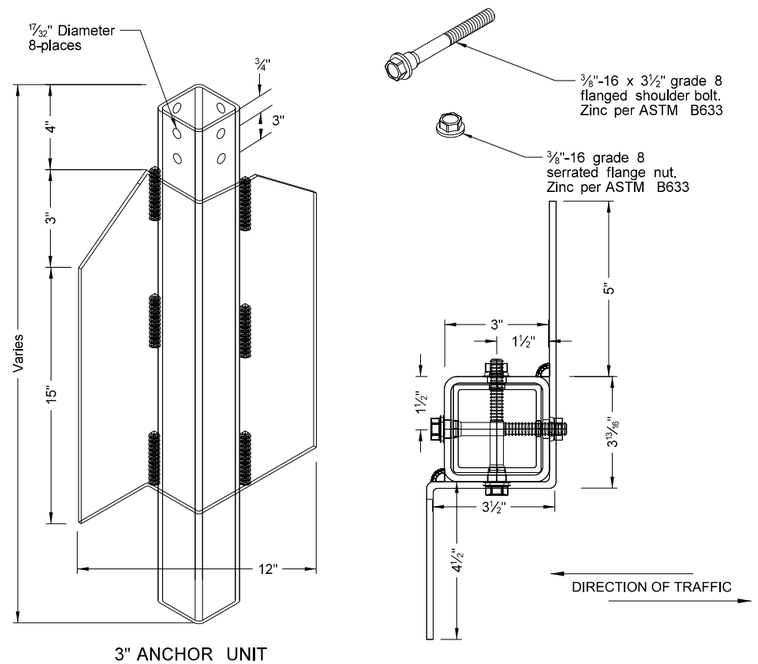
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless ortherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum ½" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.



SURFACE MOUNT ANCHOR BASE

SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2½" post.
(use standard ⅜" diameter grade 8 bolt with proper shim)



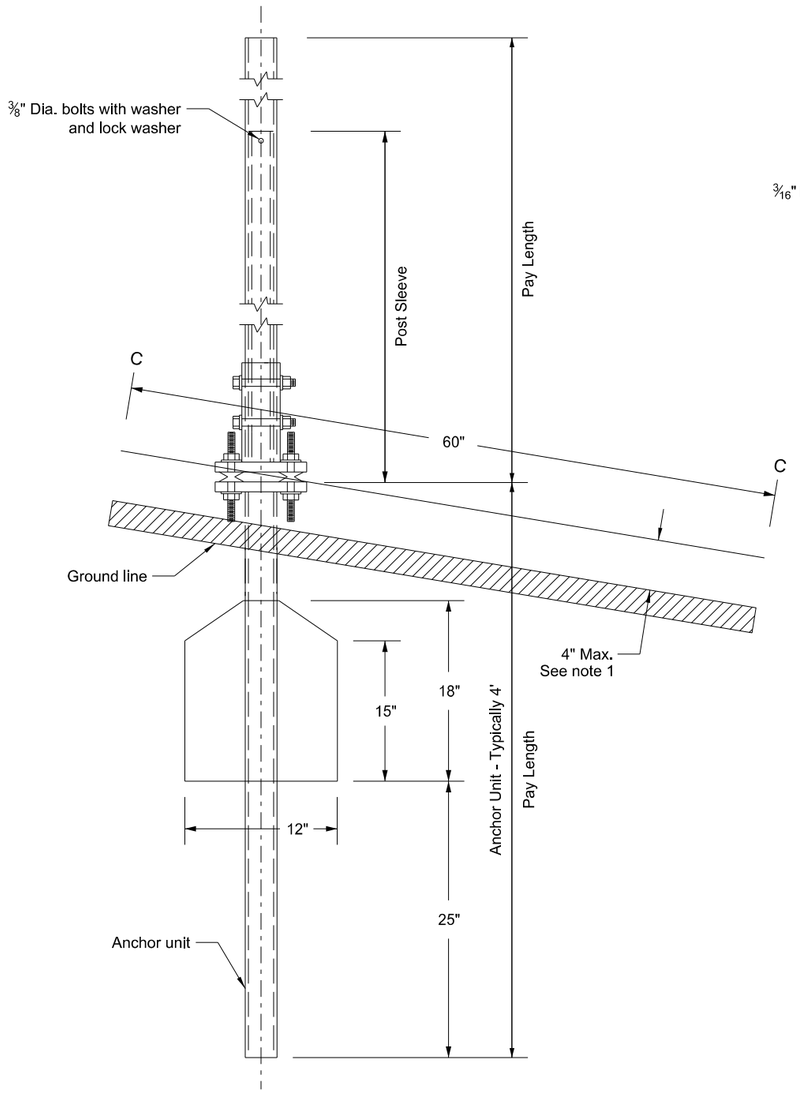
3" ANCHOR UNIT

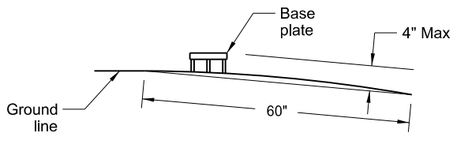
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.

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

Breakaway Coupler System for Perforated Tubes

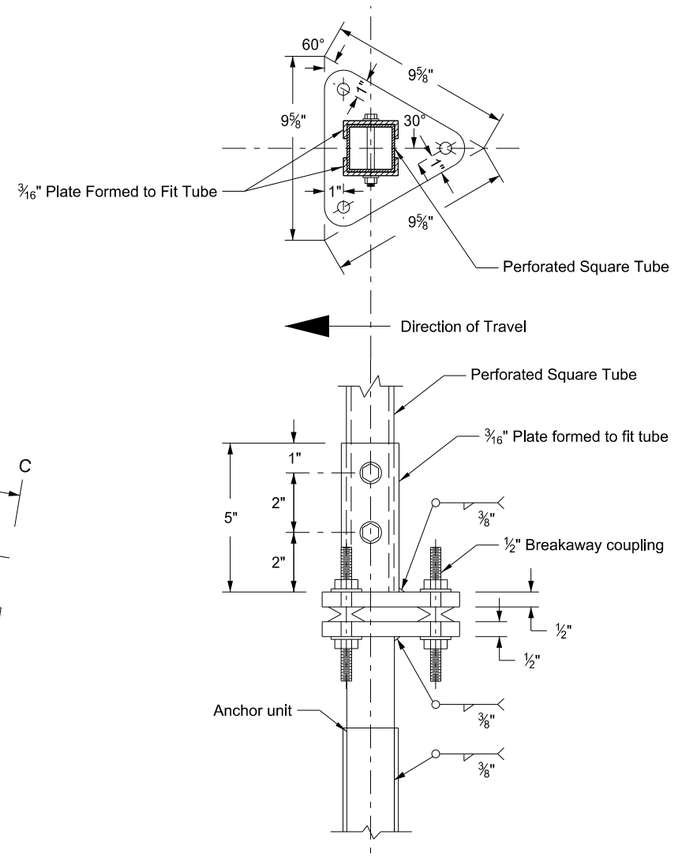
D-754-24A





Section C-C

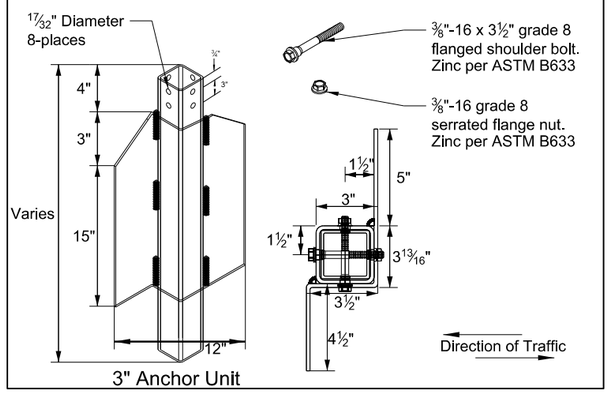
Max protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.



Base Plate with Breakaway Coupler

Shoulder Bolt

Shimming agent to reduce tolerance between 3" anchor unit with 2½" post. (use of standard ⅜" diameter grade 8 bolt allowed with proper shim)



3" Anchor Unit

Notes:

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

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

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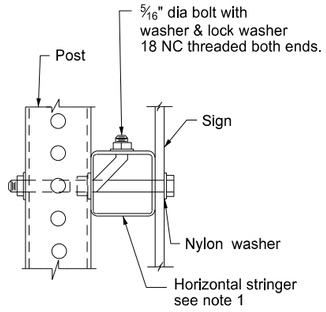
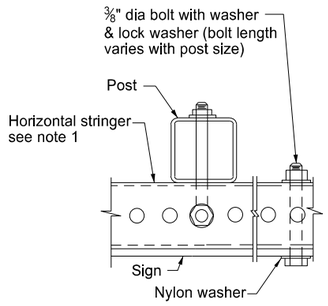
Mounting Details Perforated Tube

D-754-25

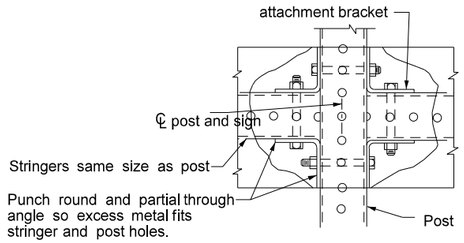


Side View



Top View

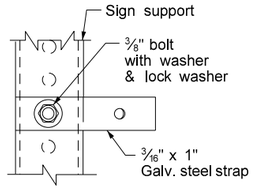
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



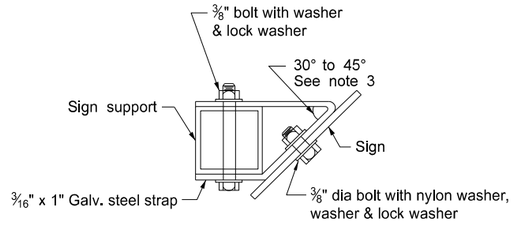
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - Use perforated tubes or 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 15/16" ±1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.

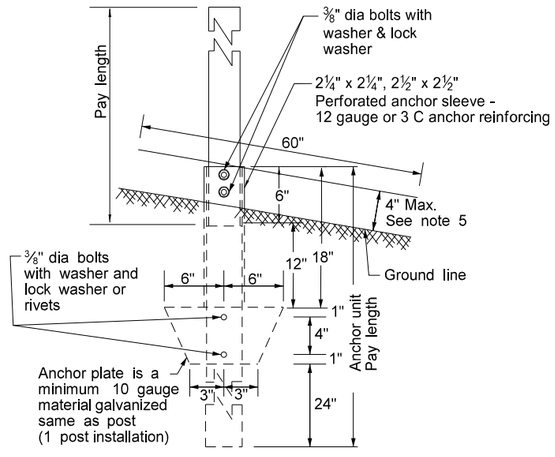


Side View



Top View

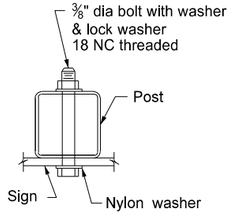
STRAP DETAIL



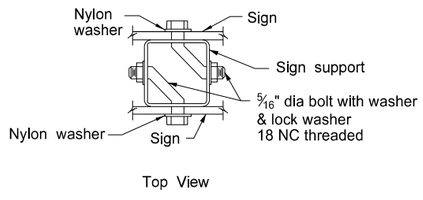
ANCHOR UNIT AND POST ASSEMBLY

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - When placing 2½", 12 gauge posts in standard soils without breakaway bases, provide a shim as specified by the manufacturer. Provide breakaway base when placing the support in weak soils. Engineer will determine if soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

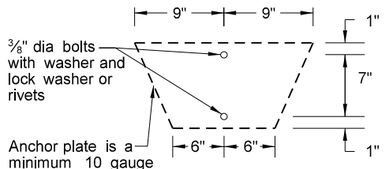


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



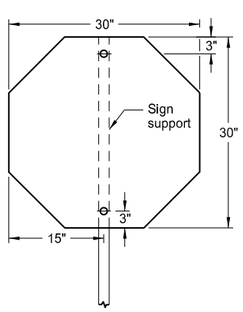
Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. area In.²	Section Modulus In.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3.
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

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

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



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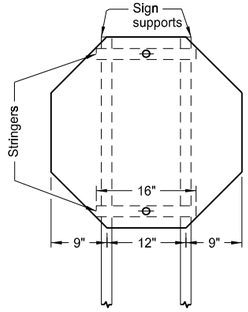
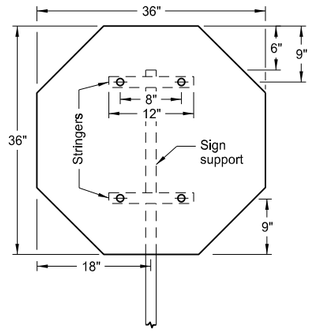


2 Posts

Assembly No. 1



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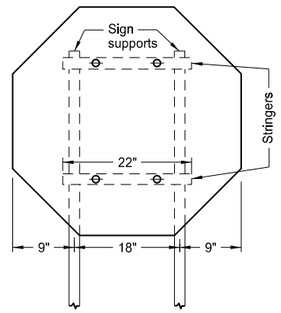
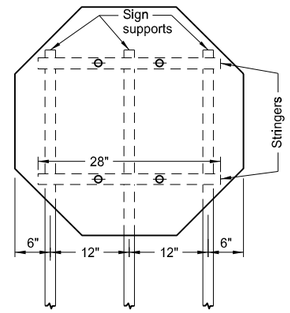


2 Posts

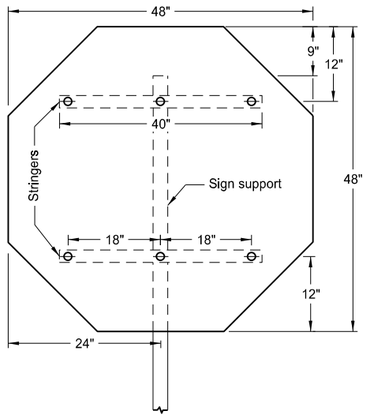


3 Posts

Assembly No. 2

Notes:

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



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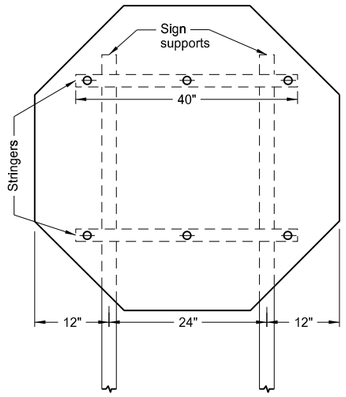
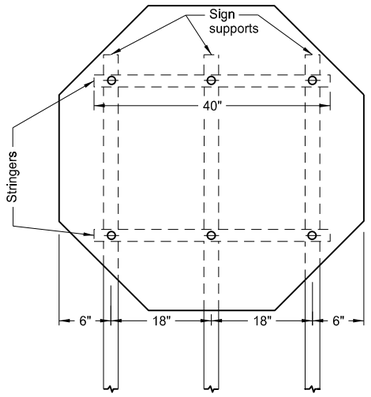
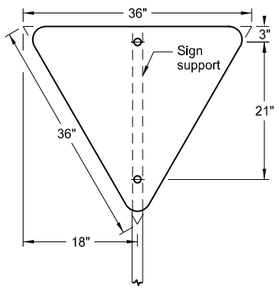


2 Posts



3 Posts

Assembly No. 3



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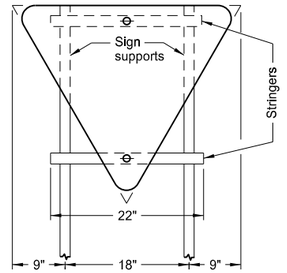

2 Posts

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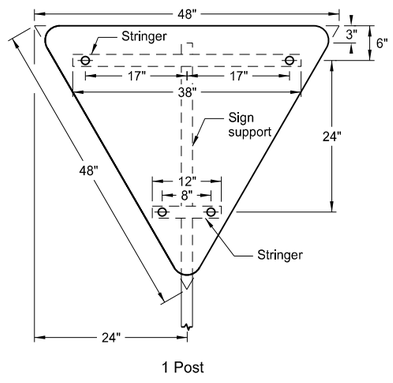

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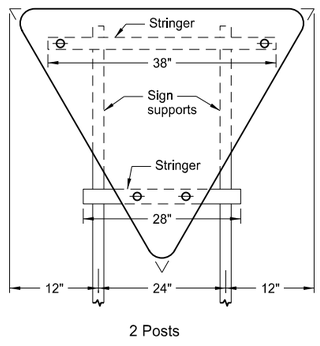
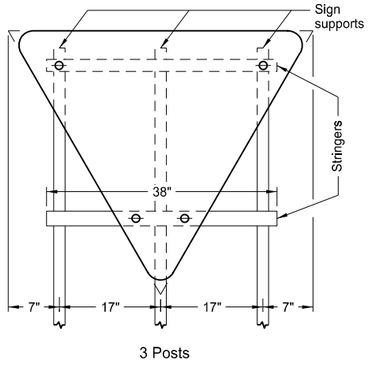


2 Posts



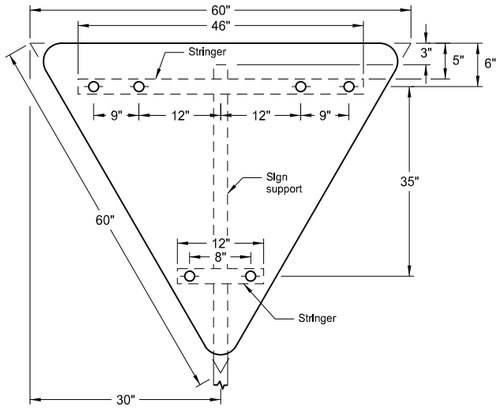
3 Posts

Assembly No. 5

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

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

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



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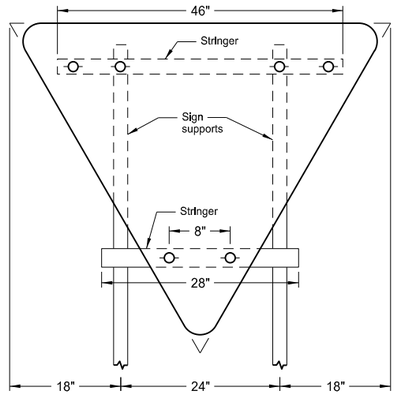
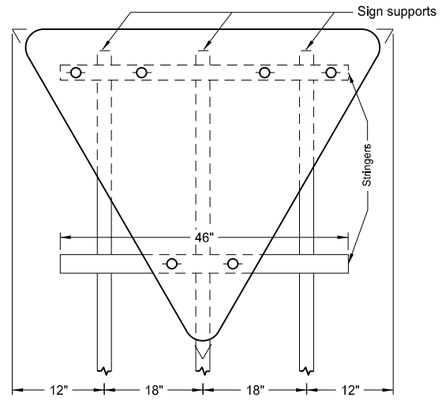


2 Posts

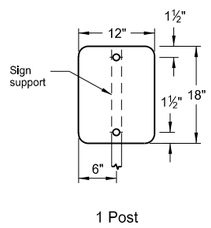


3 Posts

Assembly No. 6

Notes:

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



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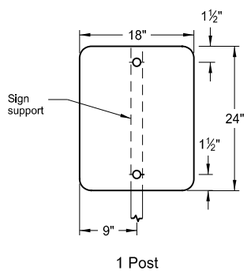

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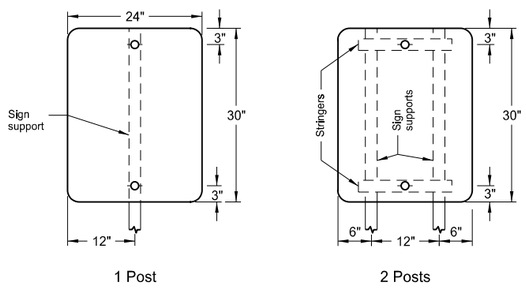

1 Post

2 Posts

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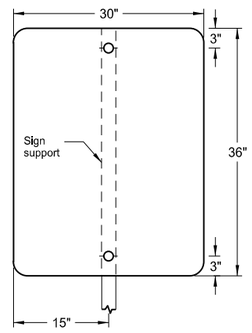

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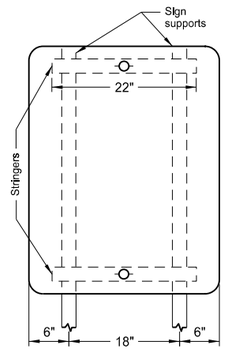
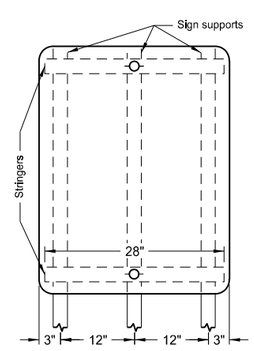
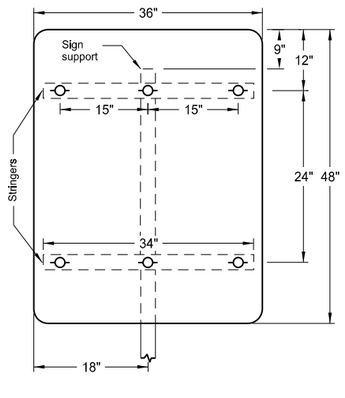


2 Posts



3 Posts

Assembly No. 10



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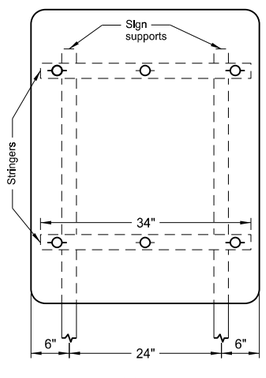
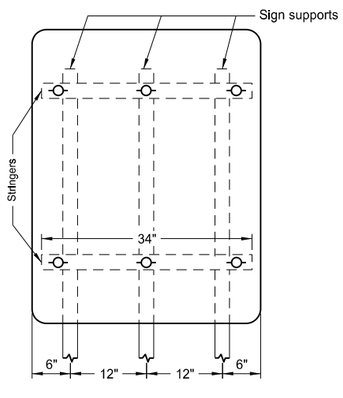


2 Posts



3 Posts

Assembly No. 11

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

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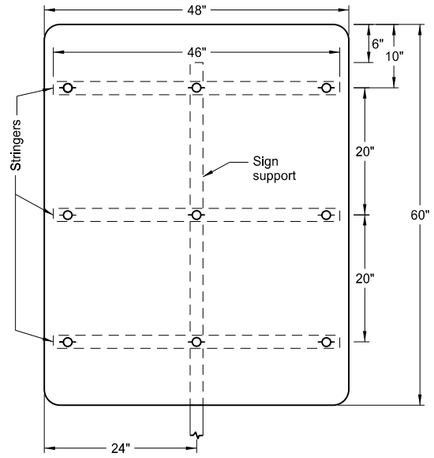
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



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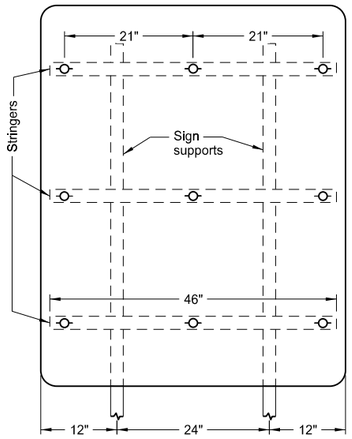
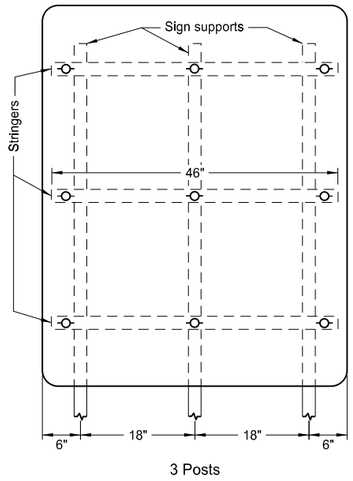
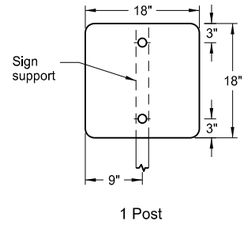


2 Posts



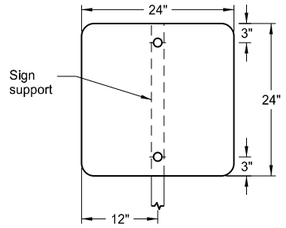
3 Posts

Assembly No. 12

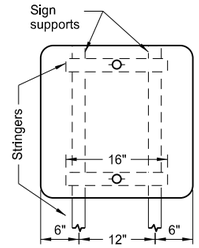


1 Post

Assembly No. 13

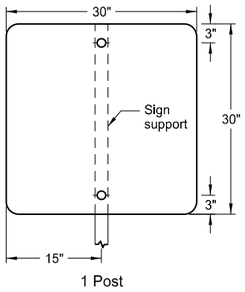


1 Post

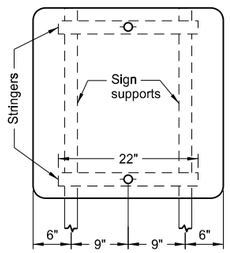


2 Posts

Assembly No. 14

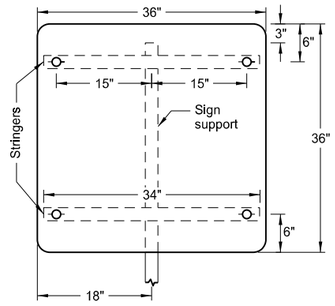


1 Post

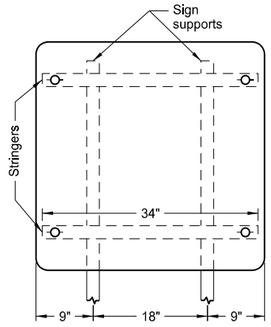


2 Posts

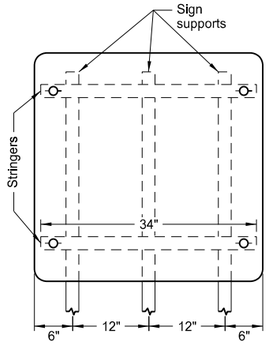
Assembly No. 15



1 Post

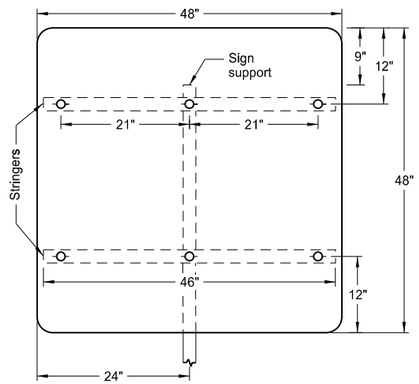


2 Posts



3 Posts

Assembly No. 16



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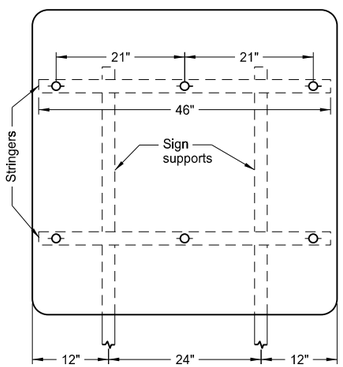
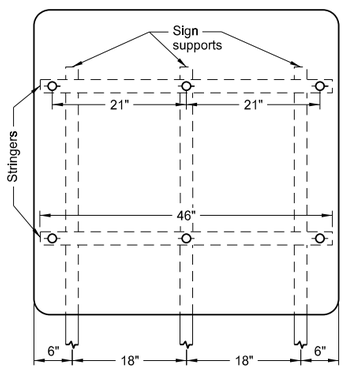


2 Posts



3 Posts

Assembly No. 17

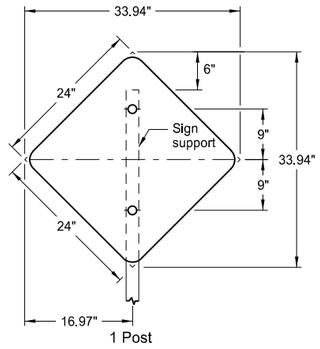
Notes:

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

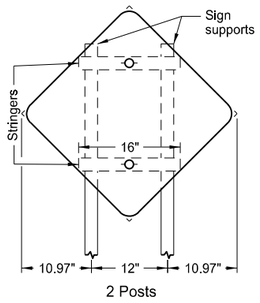
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated to active voice & changed Assembly 16 post spacing.
8-30-19	New Design Engineer PE Stamp.

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

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

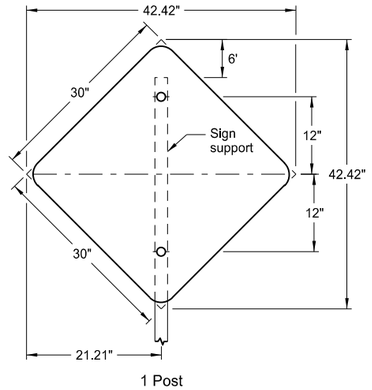


1 Post

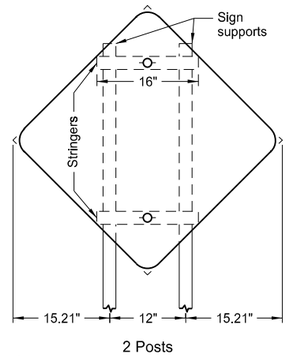


2 Posts

Assembly No. 18

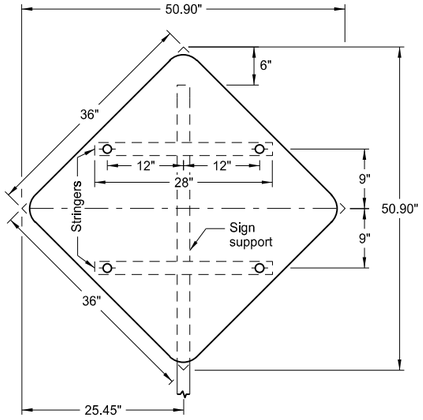


1 Post

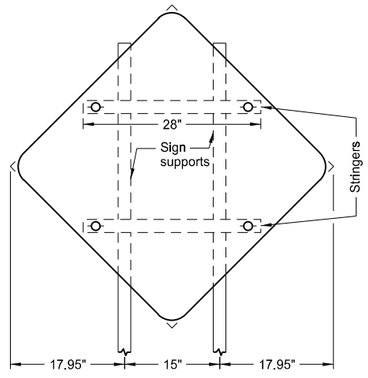


2 Posts

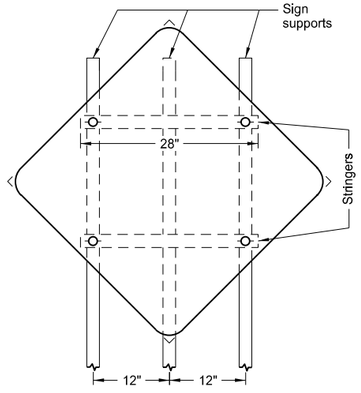
Assembly No. 19



1 Post

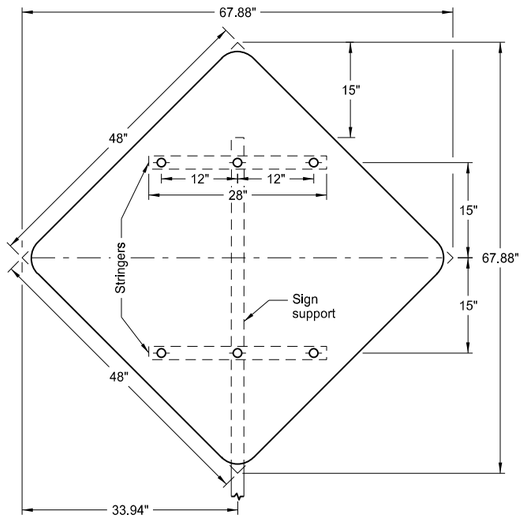


2 Posts



3 Posts

Assembly No. 20



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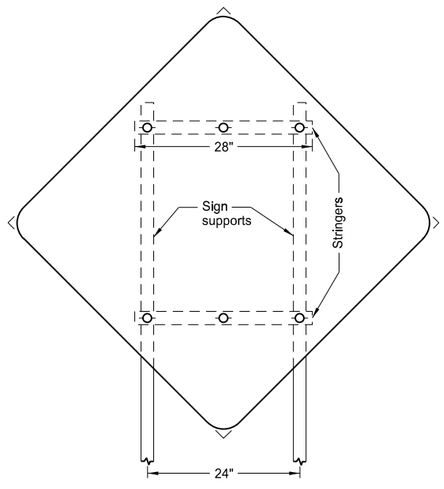
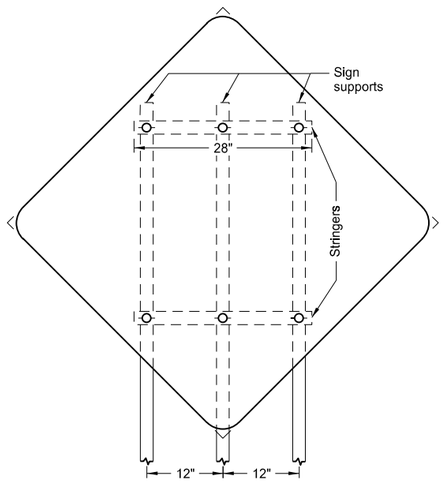


2 Posts



3 Posts

Assembly No. 21

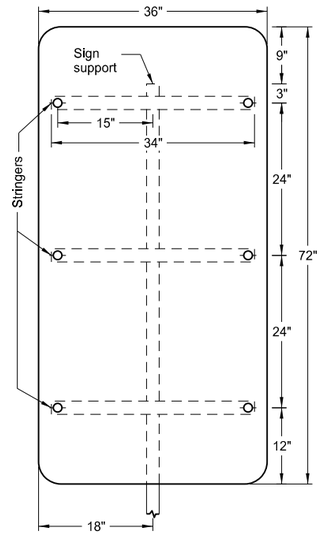
Notes:

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

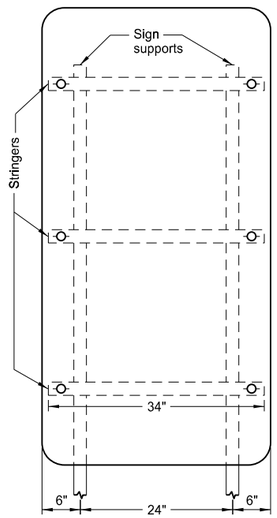
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

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

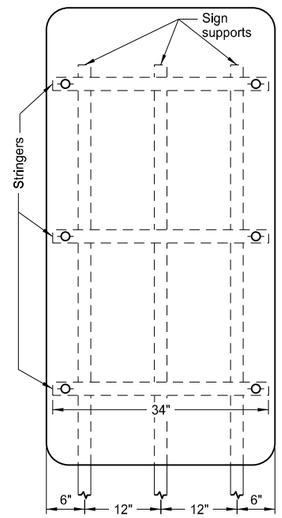
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post

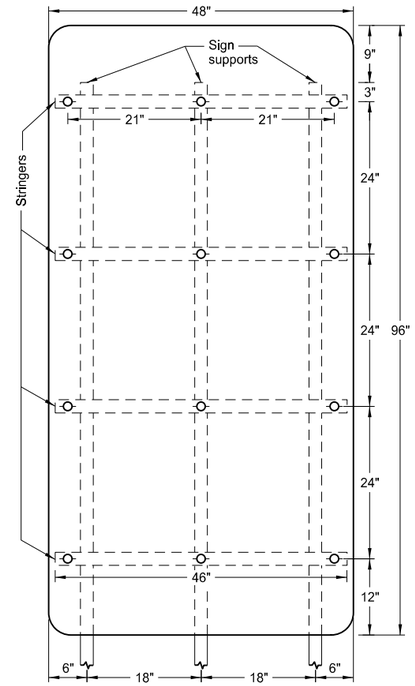


2 Posts



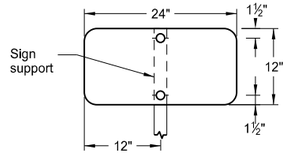
3 Posts

Assembly No. 24



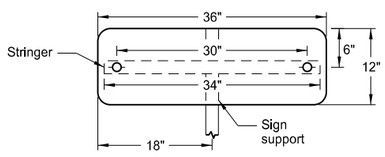
3 Posts

Assembly No. 25



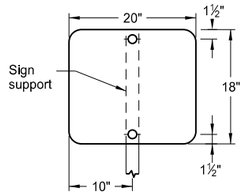
1 Post

Assembly No. 26



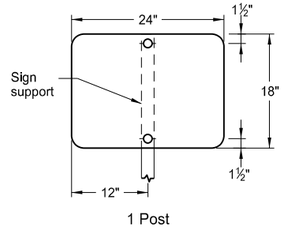
1 Post

Assembly No. 27



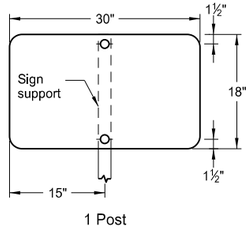
1 Post

Assembly No. 28

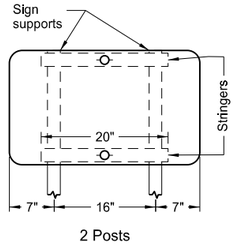


1 Post

Assembly No. 29



1 Post



2 Posts

Assembly No. 30

Notes:

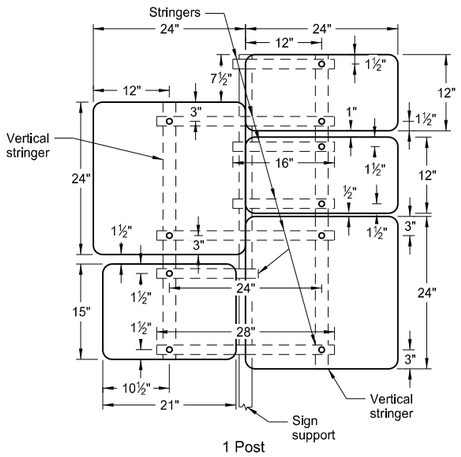
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

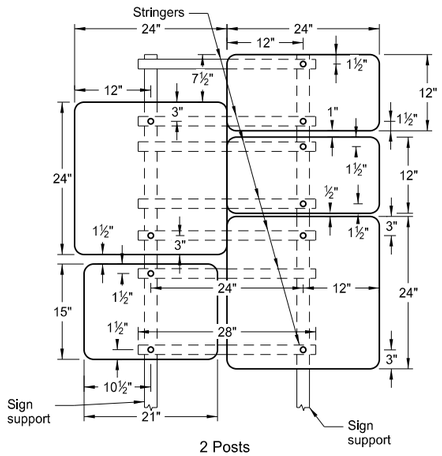
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

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

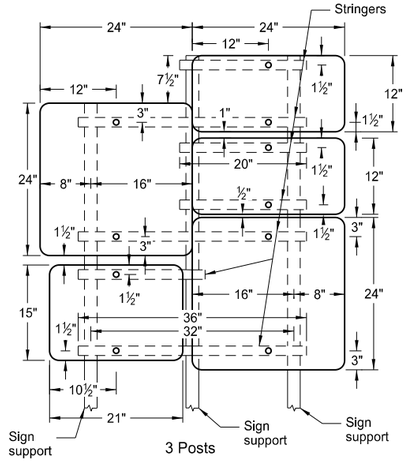
D-754-74



1 Post

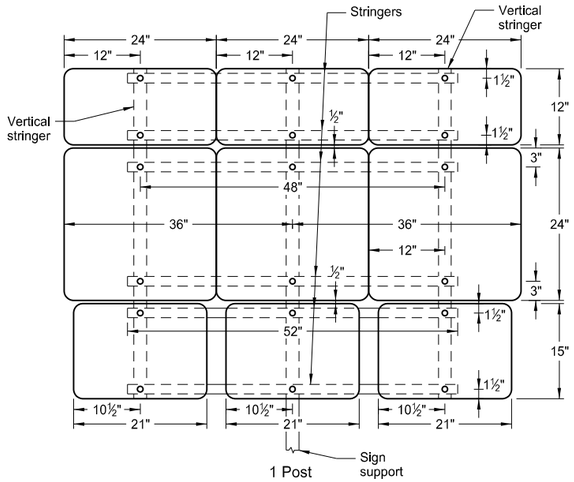


2 Posts

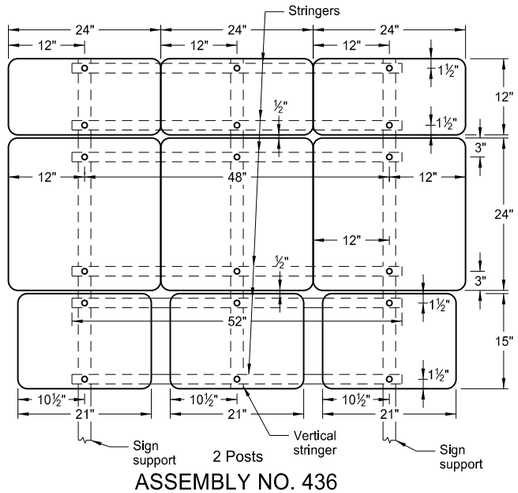


3 Posts

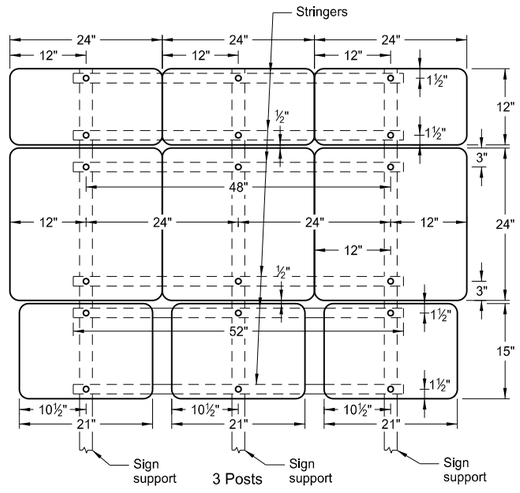
ASSEMBLY NO. 435



1 Post

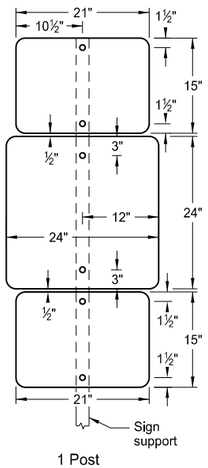


2 Posts

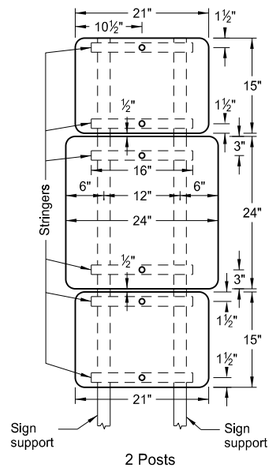


3 Posts

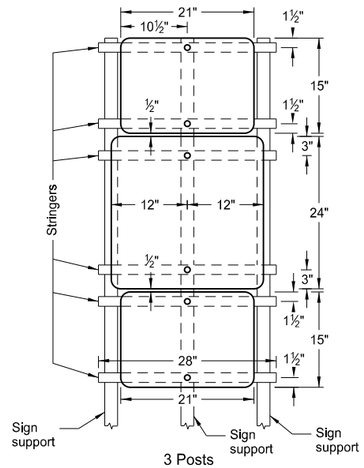
ASSEMBLY NO. 436



1 Post



2 Posts



3 Posts

ASSEMBLY NO. 437

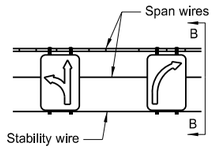
Notes:

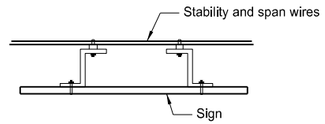
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½"x1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18 9-05-19	Updated notes to active voice. New Design Engineer PE Stamp.

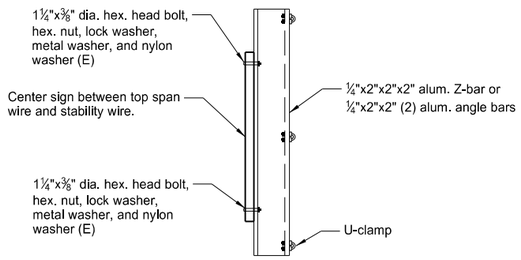
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/05/19 and the original document is stored at the North Dakota Department of Transportation

LIGHT STANDARD, SIGNAL STANDARD, AND SPAN WIRE MOUNTED SIGN ASSEMBLY DETAIL



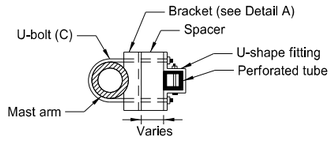


Plan

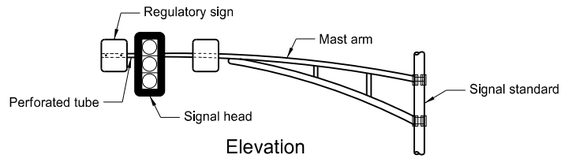


Section B-B

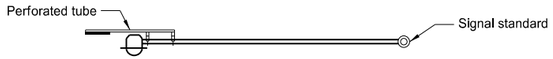
Span Wire Mounted Sign Detail



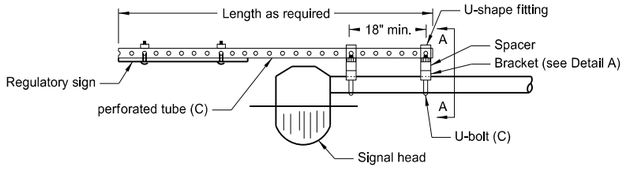
Section A-A



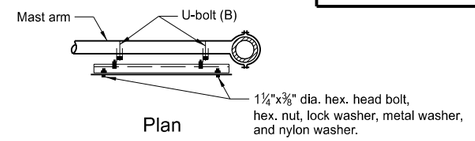
Elevation



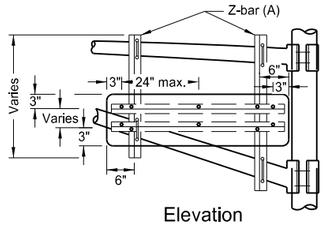
Plan



Sign Mounted Beyond End of Mast Arm Detail

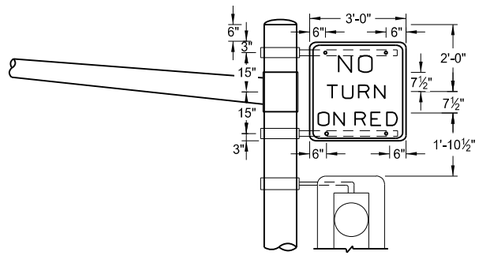


Plan

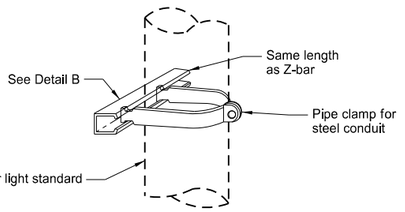


Elevation

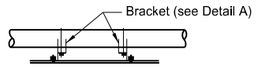
Mast Arm Mounted Street Name Sign Detail



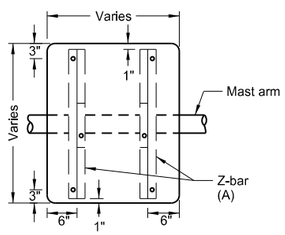
Signal Standard Mounted Sign Attachment Detail



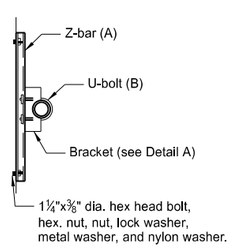
Vertical Mounting
(Use 2 clamps per sign)



Plan

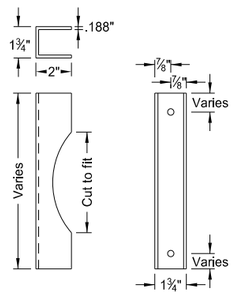


Elevation

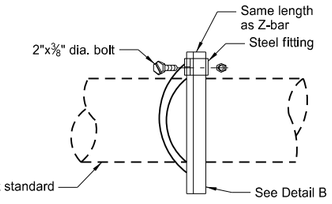


Side View

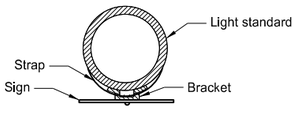
Mast Arm Mounted Regulatory Sign Detail



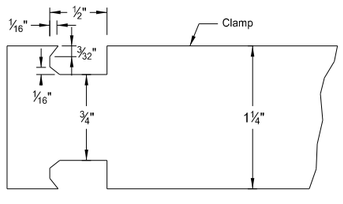
Detail A



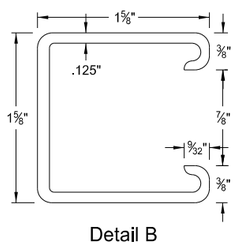
Horizontal Mounting
alternate clamp mounting
(Use 2 clamps per sign)



Light Standard Mounted Sign Bracket Detail
Max. 24"x30" signs (D)



Clamp Detail



Detail B
Steel Channel

Post Size dia.	Clamp Gauge min.
3½" to 5"	11
6" to 12"	10

Clamp	
Post Size dia. in.	D in.
3½	3
4	3 3/16
5	5 1/8
6	7 7/16
8	13 1/16
10	20 3/4
12	29 5/8

Notes:

(A) Use 1¾"x3/16" thick 1.08 lb/ft aluminum alloy Z-bar. In place of Z-bar, use two 1¾"x1¾"x3/16" angles bolted together or a 1¾"x2"x.188" channel.

(B) ⅜" U-bolt, hex. nut, lock washer, and bracket (U-bolt length depends on dia. of mast arm.)

(C) ⅜" U-bolt, hex. nut, lock washer, and bracket (U-bolt length depends on dia. of mast arm.)

Maximum perforated tube lengths for mounting signs beyond end of mast arm:
2"x2" maximum support length 9.9'
2½"x2½" maximum support length 12.6'
2½"x2½" maximum support length 15.7'

(D) Use galv. steel strap and sign attachment bracket similar to the one shown in the detail. Include all costs of bracket assembly in the price bid for flat sheet signs. Punch as shown on Standard Drawings. Provide a 7' minimum vertical clearance to the bottom of signs mounted on light standards.

(E) Use metal washers and nylon washers with a minimum outside dia. of 15/16" ± 1/16" and 10 gauge thickness on sign face.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/05/19 and the original document is stored at the North Dakota Department of Transportation

911 SIGN SUPPORT INFORMATION AND SIGN DETAILS

D-754-86

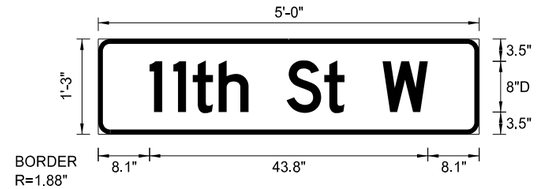
POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS

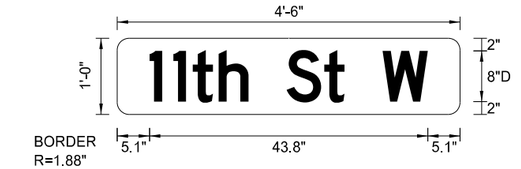
ASSEMBLY NUMBER	STREET NAME SIGN SIZE	VERTICAL CLEARANCE	MAXIMUM POST LENGTH	NUMBER OF POSTS	SUPPORT SIZE	SLEEVE LENGTH (A)			SLEEVE SIZE	ANCHOR			BREAKAWAY
						1st	2nd	3rd		NUMBER	LENGTH	SIZE	
	Inches	LF	LF			LF	LF	LF			LF		
Special Assembly 1	48"x15"	7	14.5	1	2.5 x 2.5 12 ga					1	4.0	3 x 3 7 ga	
	54"x15"	7	16.1	1	2.5 x 2.5 12 ga					1	4.0	3 x 3 7 ga	
	60"x15"	7	18.9	1	2.25 x 2.25 12 ga	2.6			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	66"x15"	7	15.8	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	72"x15"	7	14.6	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	78"x15"	7	17.6	2	2.5 x 2.5 12 ga					2	4.0	3 x 3 7 ga	2
	84"x15"	7	15.8	2	2.25 x 2.25 12 ga					2	4.0	2.5 x 2.5 12 ga	
	90"x15"	7	15.3	2	2.5 x 2.5 12 ga					2	4.0	3 x 3 7 ga	2
	96"x15"	7	17.4	2	2.5 x 2.5 10 ga					2	4.0	3 x 3 7 ga	2
	48"x12"	7	17.5	1	2.5 x 2.5 12 ga					1	4.0	3 x 3 7 ga	
	54"x12"	7	15.2	1	2.25 x 2.25 12 ga					1	4.0	2.5 x 2.5 12 ga	
	60"x12"	7	14.2	1	2.5 x 2.5 12 ga					1	4.0	3 x 3 7 ga	
	66"x12"	7	15.9	1	2.5 x 2.5 12 ga					1	4.0	3 x 3 7 ga	
	72"x12"	7	14.7	1	2.5 x 2.5 12 ga					1	4.0	3 x 3 7 ga	
	78"x12"	7	15.7	2	2 x 2 12 ga					2	4.0	2.25 x 2.25 12 ga	
	84"x12"	7	15.6	2	2.25 x 2.25 12 ga					2	4.0	2.5 x 2.5 12 ga	
	90"x12"	7	18.6	2	2.5 x 2.5 12 ga					2	4.0	3 x 3 7 ga	2
	96"x12"	7	17.5	2	2.5 x 2.5 12 ga					2	4.0	3 x 3 7 ga	2
	24"x12"	5	20.3	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	30"x12"	5	16.4	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	36"x12"	5	13.8	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	42"x12"	5	14.7	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	48"x12"	5	12.9	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	54"x12"	5	15.2	1	2.25 x 2.25 12 ga					1	4.0	2.5 x 2.5 12 ga	
	60"x12"	5	13.8	1	2.25 x 2.25 12 ga					1	4.0	2.5 x 2.5 12 ga	
	24"x9"	5	24.1	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	30"x9"	5	21	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	36"x9"	5	17.3	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	42"x9"	5	15.4	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	48"x9"	5	13.5	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	54"x9"	5	14.8	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
	60"x9"	5	13.3	1	2 x 2 12 ga					1	4.0	2.25 x 2.25 12 ga	
Special Assembly 2	24"x12"	5	17.2	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	30"x12"	5	16.3	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	36"x12"	5	15.4	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	42"x12"	5	14.6	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	48"x12"	5	15.2	1	2.25 x 2.25 12 ga	4.5			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	54"x12"	5	20.6	1	2.5 x 2.5 10 ga	1.5			2.19 x 2.19 10 ga	1	4.0	3 x 3 7 ga	1
	60"x12"	5	16.7	1	2.5 x 2.5 12 ga	3.9			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	24"x9"	5	15.2	1	2.5 x 2.5 12 ga					1	4.0	3 x 3 7 ga	
	30"x9"	5	14.4	1	2.5 x 2.5 12 ga					1	4.0	3 x 3 7 ga	
	36"x9"	5	16.4	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	42"x9"	5	15.8	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	48"x9"	5	14.4	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	54"x9"	5	15.1	1	2.25 x 2.25 12 ga	4.2			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	60"x9"	5	14.5	1	2.25 x 2.25 12 ga	4.7			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1

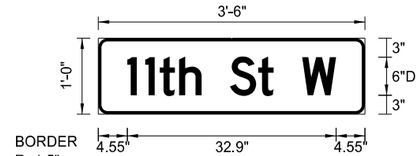
POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS

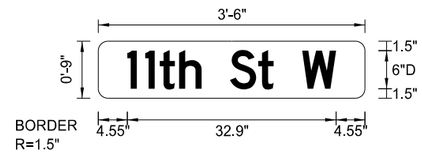
ASSEMBLY NUMBER	STREET NAME SIGN SIZE	VERTICAL CLEARANCE	MAXIMUM POST LENGTH	NUMBER OF POSTS	SUPPORT SIZE	SLEEVE LENGTH (A)			SLEEVE SIZE	ANCHOR			BREAKAWAY
						1st	2nd	3rd		NUMBER	LENGTH	SIZE	
	Inches	LF	LF			LF	LF	LF			LF		
Special Assembly 3	24"x12"	5	16.2	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	30"x12"	5	15.3	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	36"x12"	5	15.9	1	2.25 x 2.25 12 ga	4.3			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	42"x12"	5	15.2	1	2.25 x 2.25 12 ga	4.8			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	48"x12"	5	15.2	1	2.5 x 2.5 12 ga	5			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	54"x12"	5	20.6	1	2.5 x 2.5 10 ga	1.9			2.19 x 2.19 10 ga	1	4.0	3 x 3 7 ga	1
	60"x12"	5	16	1	2.5 x 2.5 12 ga	4.7			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	24"x9"	5	16.8	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	30"x9"	5	16.1	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	36"x9"	5	15.4	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	42"x9"	5	14.9	1	2.5 x 2.5 10 ga					1	4.0	3 x 3 7 ga	1
	48"x9"	5	15.7	1	2.25 x 2.25 12 ga	4.2			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	54"x9"	5	14.9	1	2.5 x 2.5 12 ga	4.8			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	60"x9"	5	20.5	1	2.5 x 2.5 10 ga	1.6			2.19 x 2.19 10 ga	1	4.0	3 x 3 7 ga	1
Special Assembly 4	24"x12"	5	15.1	1	2.25 x 2.25 12 ga	4.8			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	30"x12"	5	15.1	1	2.5 x 2.5 12 ga	5			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	36"x12"	5	17.4	1	2.5 x 2.5 12 ga	3.6			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	42"x12"	5	16.8	1	2.5 x 2.5 12 ga	4.1			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	48"x12"	5	16.1	1	2.5 x 2.5 12 ga	4.5			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	54"x12"	5	15.5	1	2.5 x 2.5 12 ga	4.9			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	60"x12"	5	16.7	1	2.5 x 2.5 10 ga	4.2			2.19 x 2.19 10 ga	1	4.0	3 x 3 7 ga	1
	24"x9"	5	15.5	1	2.25 x 2.25 12 ga	4.2			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	30"x9"	5	15	1	2.25 x 2.25 12 ga	4.5			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	36"x9"	5	14.5	1	2.25 x 2.25 12 ga	4.8			2 x 2 12 ga	1	4.0	3 x 3 7 ga	1
	42"x9"	5	14.7	1	2.5 x 2.5 12 ga	4.9			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	48"x9"	5	17.2	1	2.5 x 2.5 12 ga	3.5			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	54"x9"	5	15.8	1	2.5 x 2.5 12 ga	4.4			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
	60"x9"	5	15.3	1	2.5 x 2.5 12 ga	4.7			2.25 x 2.25 12 ga	1	4.0	3 x 3 7 ga	1
Special Assembly 5	24"x12"	5	17.1	2	2.5 x 2.5 10 ga					2	4.0	3 x 3 7 ga	2
	30"x12"	5	16.7	2	2.5 x 2.5 10 ga					2	4.0	3 x 3 7 ga	2
	36"x12"	5	17.7	2	2.25 x 2.25 12 ga	4	4.5		2 x 2 12 ga	2	4.0	3 x 3 7 ga	2
	42"x12"	5	17.3	2	2.25 x 2.25 12 ga	4.3	4.8		2 x 2 12 ga	2	4.0	3 x 3 7 ga	2
	48"x12"	5	16.8	2	2.25 x 2.25 12 ga	4.5	5		2 x 2 12 ga	2	4.0	3 x 3 7 ga	2
	54"x12"	5	16.5	2	2.25 x 2.25 12 ga	4.8	5.3		2 x 2 12 ga	2	4.0	3 x 3 7 ga	2
	60"x12"	5	17.5	3	2.5 x 2.5 12 ga					3	4.0	3 x 3 7 ga	3
	24"x9"	5	17.3	2	2.5 x 2.5 10 ga					2	4.0	3 x 3 7 ga	2
	30"x9"	5	17	2	2.5 x 2.5 10 ga					2	4.0	3 x 3 7 ga	2
	36"x9"	5	16.6	2	2.5 x 2.5 10 ga					2	4.0	3 x 3 7 ga	2
	42"x9"	5	16.3	2	2.5 x 2.5 10 ga					2	4.0	3 x 3 7 ga	2
	48"x9"	5	16	2	2.5 x 2.5 10 ga					2	4.0	3 x 3 7 ga	2
	54"x9"	5	17.1	2	2.25 x 2.25 12 ga	4	4.6		2 x 2 12 ga	2	4.0	3 x 3 7 ga	2
	60"x9"	5	16.8	2	2.25 x 2.25 12 ga	4.2	4.8		2 x 2 12 ga	2	4.0	3 x 3 7 ga	2

(A) The sleeve length shown is for the maximum post length. The required sleeve length is the "sleeve length" minus the difference between the "maximum post length" and the post length required in the field.









Notes:
Use 6 inch legend except on multi-lane divided roads with speeds of 45 mph or greater.
On divided multi-lane roadways, do not place 911 signs on top of stop sign.

When installing signs on existing supports, check support and sleeve size to determine if they meet table requirements. Measure maximum post length from ground to top of street name sign. If calculated support length is greater than maximum post length shown, recalculate support size.

See Standard Drawing D-754-87 for sign punching, stringer and support location details.

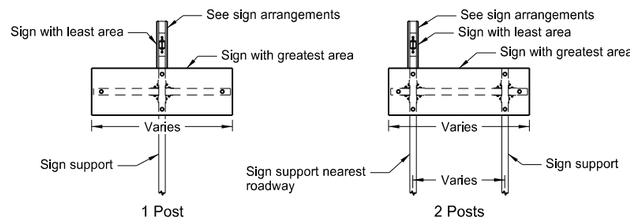
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-18-14	Revised street name sign layouts.
8-30-18	Revised tables, lettering, & signs and updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/05/19 and the original document is stored at the North Dakota Department of Transportation

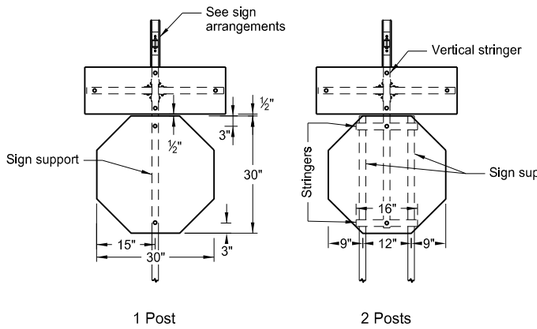
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

D-754-87

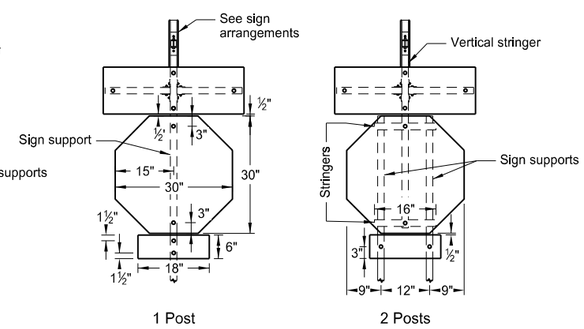
A - Single sign
B - Single sign back to back
C - Single sign each direction
D - Single sign one direction, back to back other direction
E - Back to back both directions



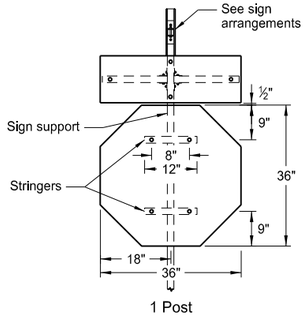
Special Assembly 1 (A, B, C, D or E)



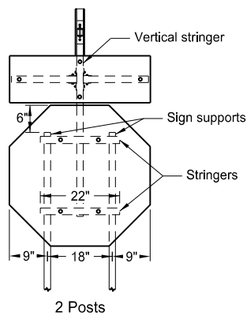
Special Assembly 2 (A, B, C, D or E)



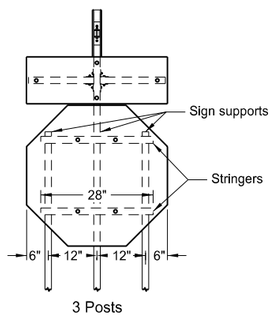
Special Assembly 3 (A, B, C, D or E)



1 Post

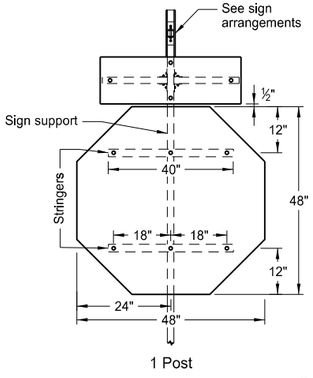


2 Posts

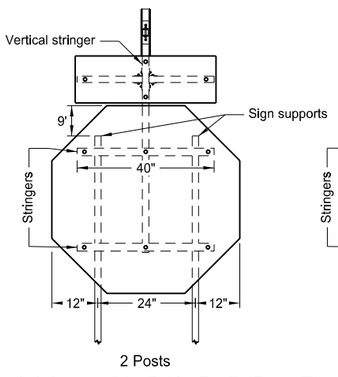


3 Posts

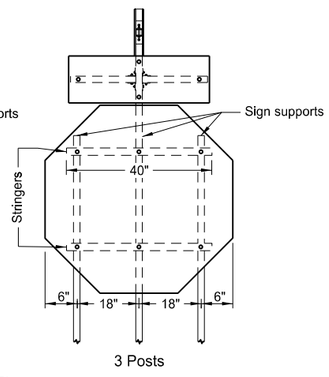
Special Assembly 4 (A, B, C, D or E)



1 Post

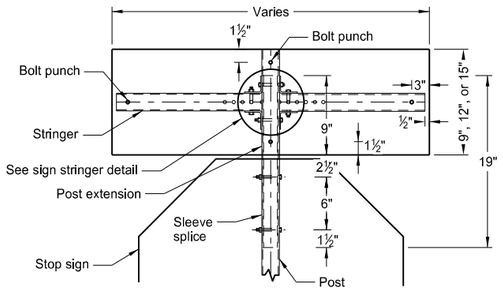


2 Posts



3 Posts

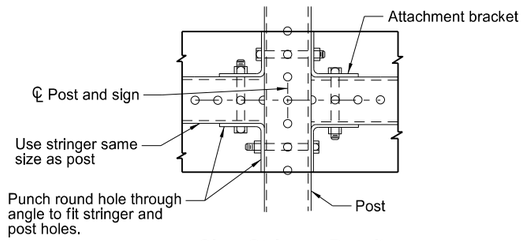
Special Assembly 5 (A, B, C, D or E)



Front View

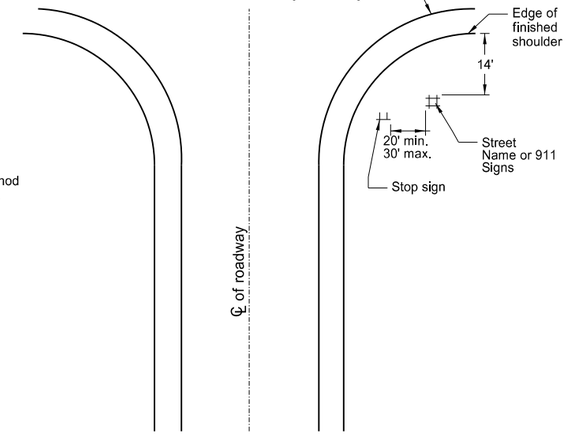
Sleeve Splice Detail

Note: Only use splice method with approval of engineer.



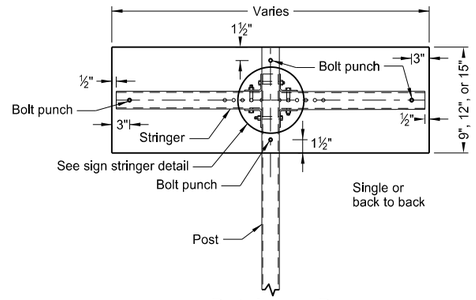
Sign Stringer Detail

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

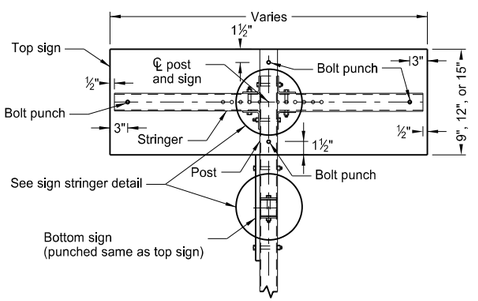


Intersection Layout

Note: Use layout for street name signs or 911 signs with Special Assembly 1 .

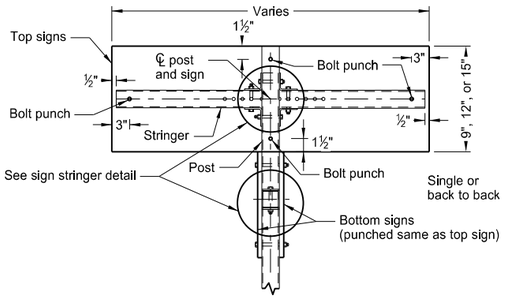


Detail A or B



Detail C

Sign Arrangements



Detail D or E

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
8-30-18	Added 2 post layout for SA1 and Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/05/19 and the original document is stored at the North Dakota Department of Transportation