

NDDOT ABBREVIATIONS

? 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
 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
 Cl or C 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
 Comb. combination
 Coml commercial
 Compr compression
 CADD computer aided drafting & design
 Conc concrete
 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
 CSP corrugated steel pipe
 C coulomb
 Co County
 Crse course
 C Gr course gravel
 CS course sand

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
 DInt delineate
 DIntr delineator
 Depr depression
 Desc description
 Det detail
 DWP detectable warning panel
 Dtr detour
 Dia 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
 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
 Fnd found
 Fdn foundation
 Frac fractional
 Frwy freeway
 Frt front
 FF front face
 F Disp fuel dispenser

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| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 07-01-14 | |
| REVISIONS | |
| DATE | CHANGE |
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D-101-2

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

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D-101-3

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

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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 Associated 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

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
 MCKENZIE 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 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
 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
 RAMSEY R SEW Ramsey Rural Sewer Association
 RAMSEY RW Ramsey Rural Water Association
 RAMSEY UTIL Ramsey County Rural Utilities

RED RIV TEL Red River Rural Telephone
 RESVTN TEL Reservation Telephone
 ROBRTS TEL Roberts Company Telephone
 R-RIDER ELEC Roughrider Electric Coop
 RRVW Red River Valley & Western Railroad
 RSR ELEC R.S.R. Electric Cooperative
 S E W U South East Water Users Incorporated
 SCOTT CABLE Scott Cable Television Dickinson
 SHERDN ELEC Sheridan Electric Cooperative
 SHEYN VLY ELEC Sheyenne Valley Electric Cooperative
 SKYTECH Skyland Technologies Incorporated
 SLOPE ELEC Slope Electric Cooperative 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 GHG 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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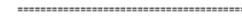
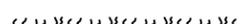
Line Styles

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

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Line Styles

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

| | |
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Symbols

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

| | |
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Symbols

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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
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Symbols

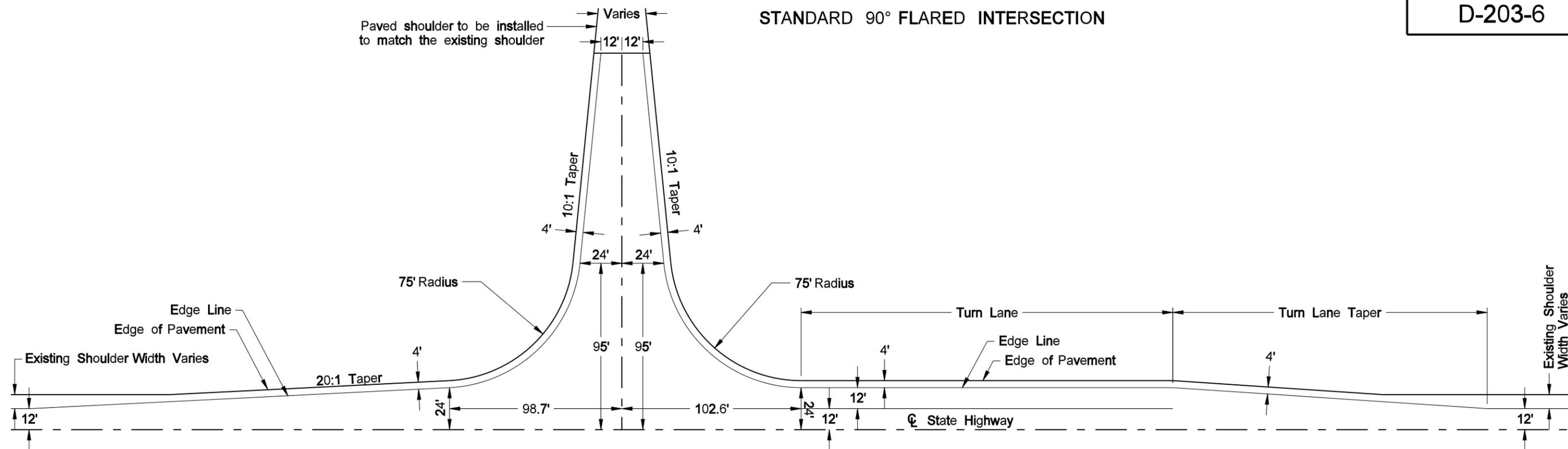
D-101-32

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

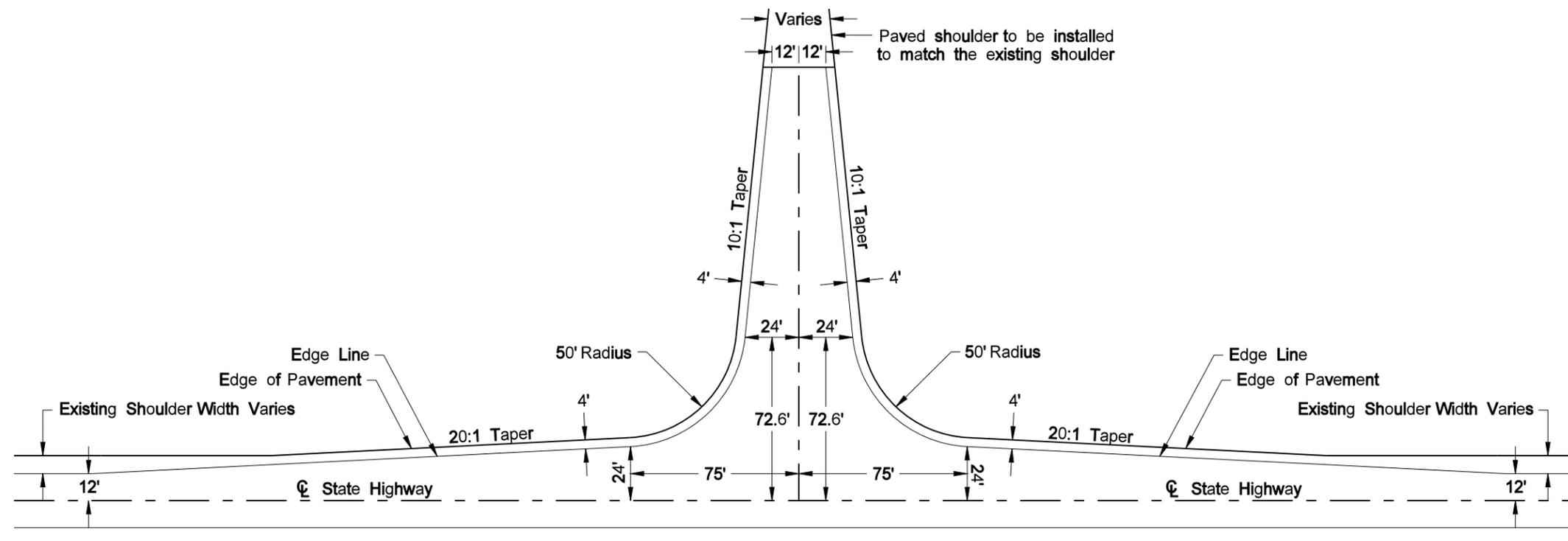
| | |
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STANDARD 90° FLARED INTERSECTION



Type B
90° Flared Intersection with Turn Lane



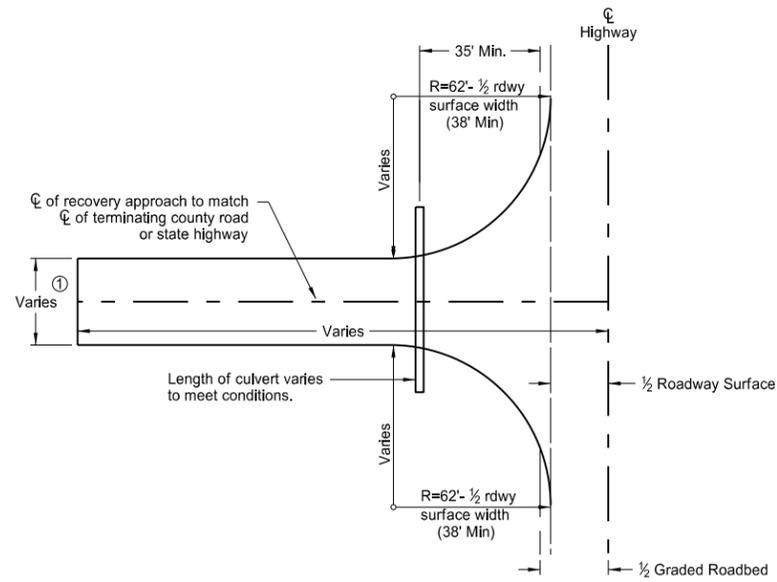
Type A
90° Flared Intersection

| | |
|--|--------|
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| 5-19-09 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

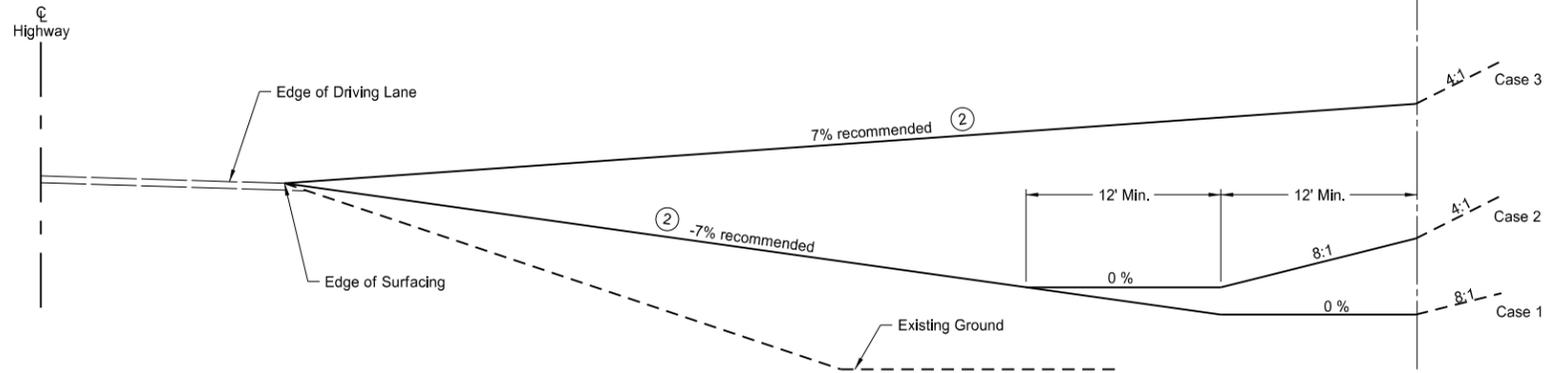
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RECOVERY APPROACHES AT T-INTERSECTIONS

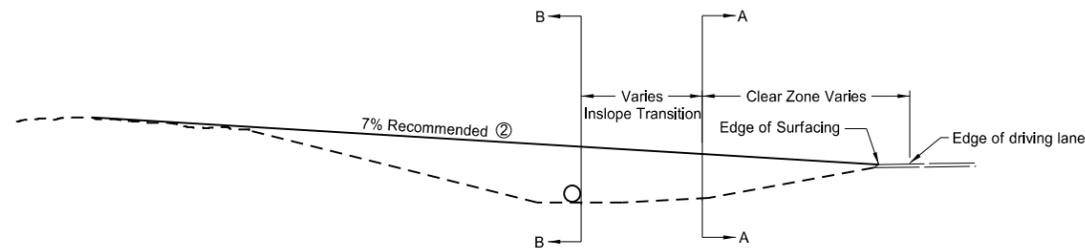
D-203-7



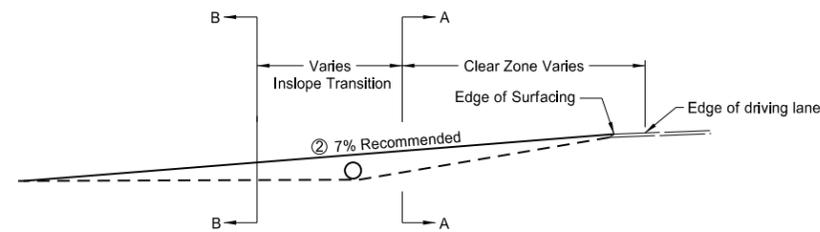
PLAN VIEW RECOVERY APPROACH



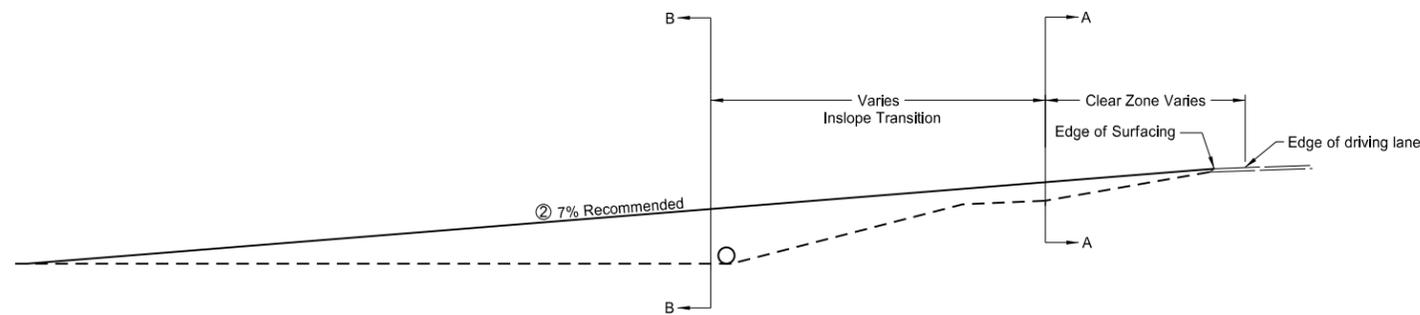
- Case 1: Ties into existing back slope and within existing right of way. Existing Back Slope is 8:1 or flatter.
- Case 2: Ties into existing back slope and within existing right of way. Existing Back Slope is 4:1 or flatter.
- Case 3: Ties into existing back slope and within existing right of way. Existing Back Slope is 4:1 or flatter.



RECOVERY APPROACH GRADE ON CUT SECTION



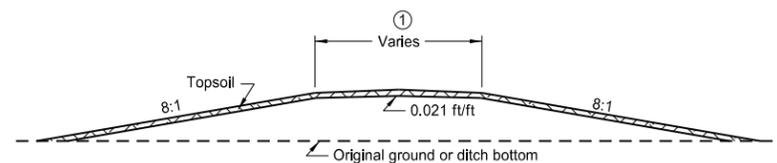
RECOVERY APPROACH GRADE ON FILL SECTION



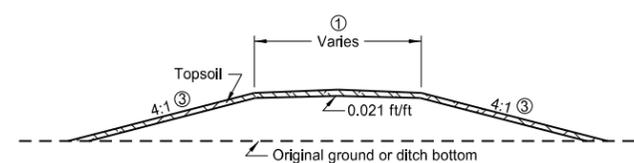
RECOVERY APPROACH GRADE ON DEEP FILL SECTION

FOOT NOTES

- ① width of recovery approach to match width of terminating county road or state highway
- ② 10% Max
- ③ 3:1 Slope - 20' to 30' fill
2:1 Slope on fills over 30'



SECTION A-A



SECTION B-B

| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 10-4-13 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

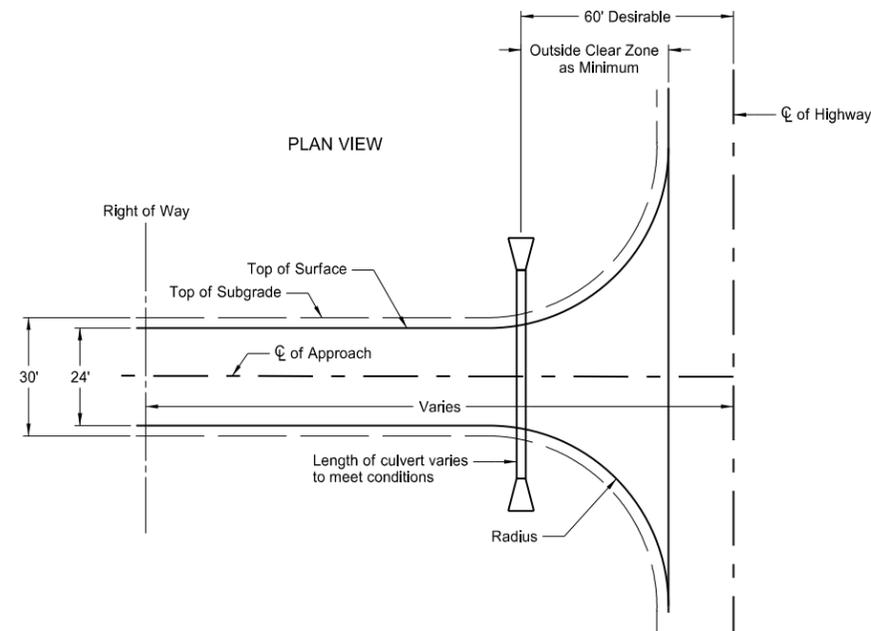
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STANDARD RURAL APPROACHES

D-203-8

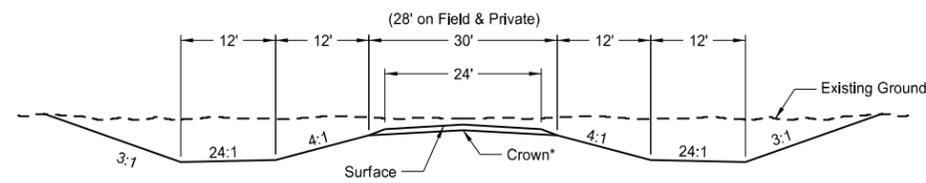
NOTES:

1. Max breakover between approach storage platform and highway shall not exceed 5%.
2. The approach slope shall be measured outside the area of mainline inslope influence.



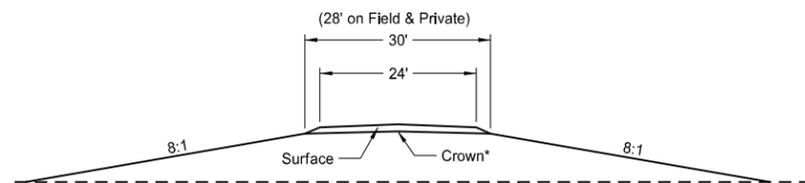
CRITERIA FOR RURAL APPROACH TYPES

| | Field Drives | Private Drives | Low Volume Public Roads |
|-----------------------|--------------|----------------|-------------------------|
| Radius | R=24 ft | R=30 ft | R=40 ft |
| Maximum Grade | 10% | 7% | 7% |
| Storage Platform | 20 ft | 24 ft | 30 ft |
| Vertical Curve Length | 10 ft | 10 ft | Varies (Min. 20 mph) |

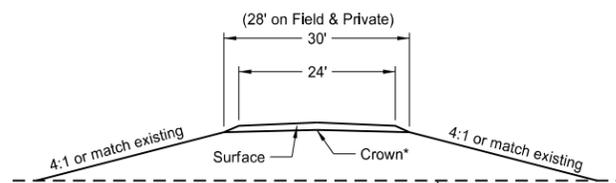


SECTION A-A

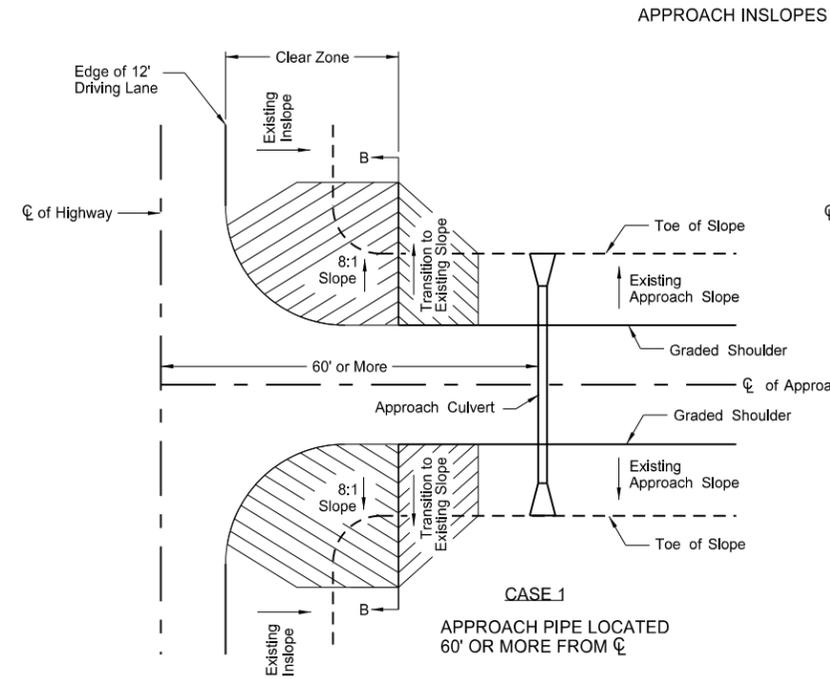
*2.1% crown for paved surface
*3.0% crown for gravel surface



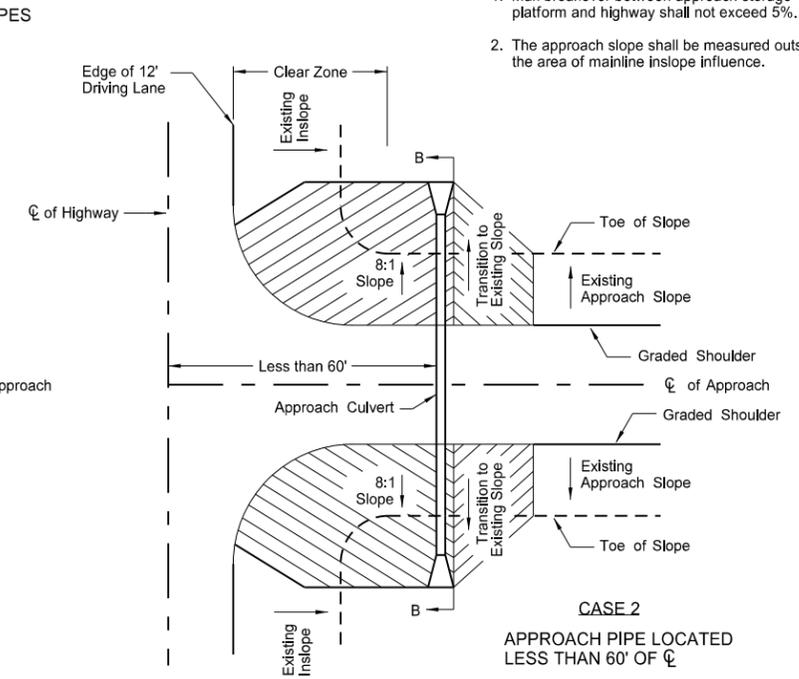
SECTION B-B



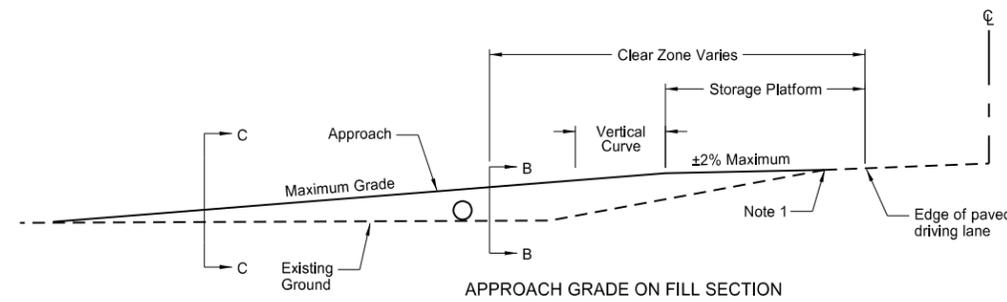
SECTION C-C



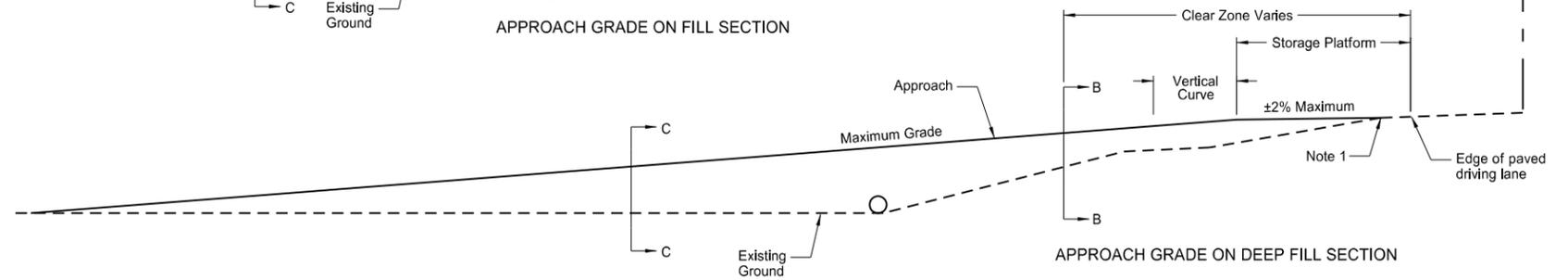
CASE 1
APPROACH PIPE LOCATED
60' OR MORE FROM C



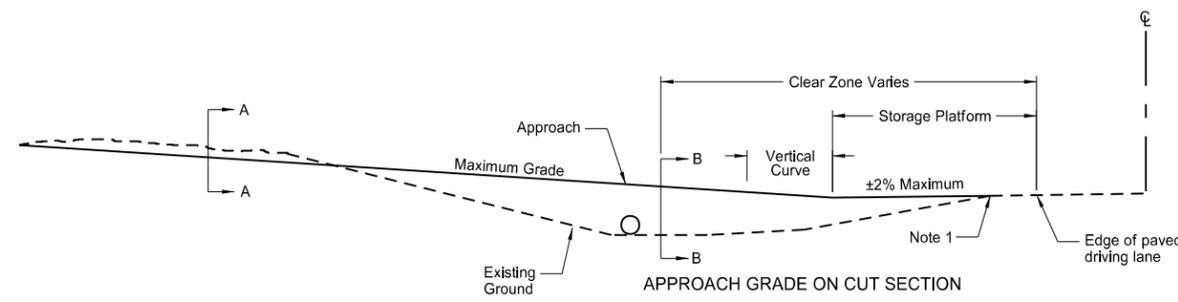
CASE 2
APPROACH PIPE LOCATED
LESS THAN 60' OF C



APPROACH GRADE ON FILL SECTION



APPROACH GRADE ON DEEP FILL SECTION

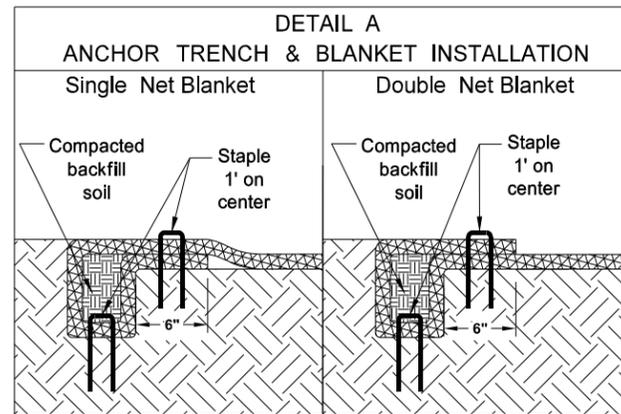


APPROACH GRADE ON CUT SECTION

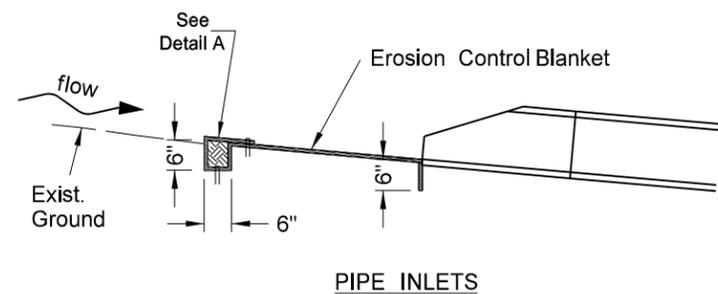
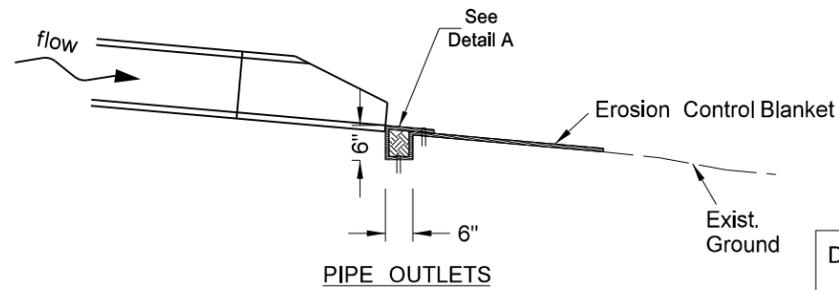
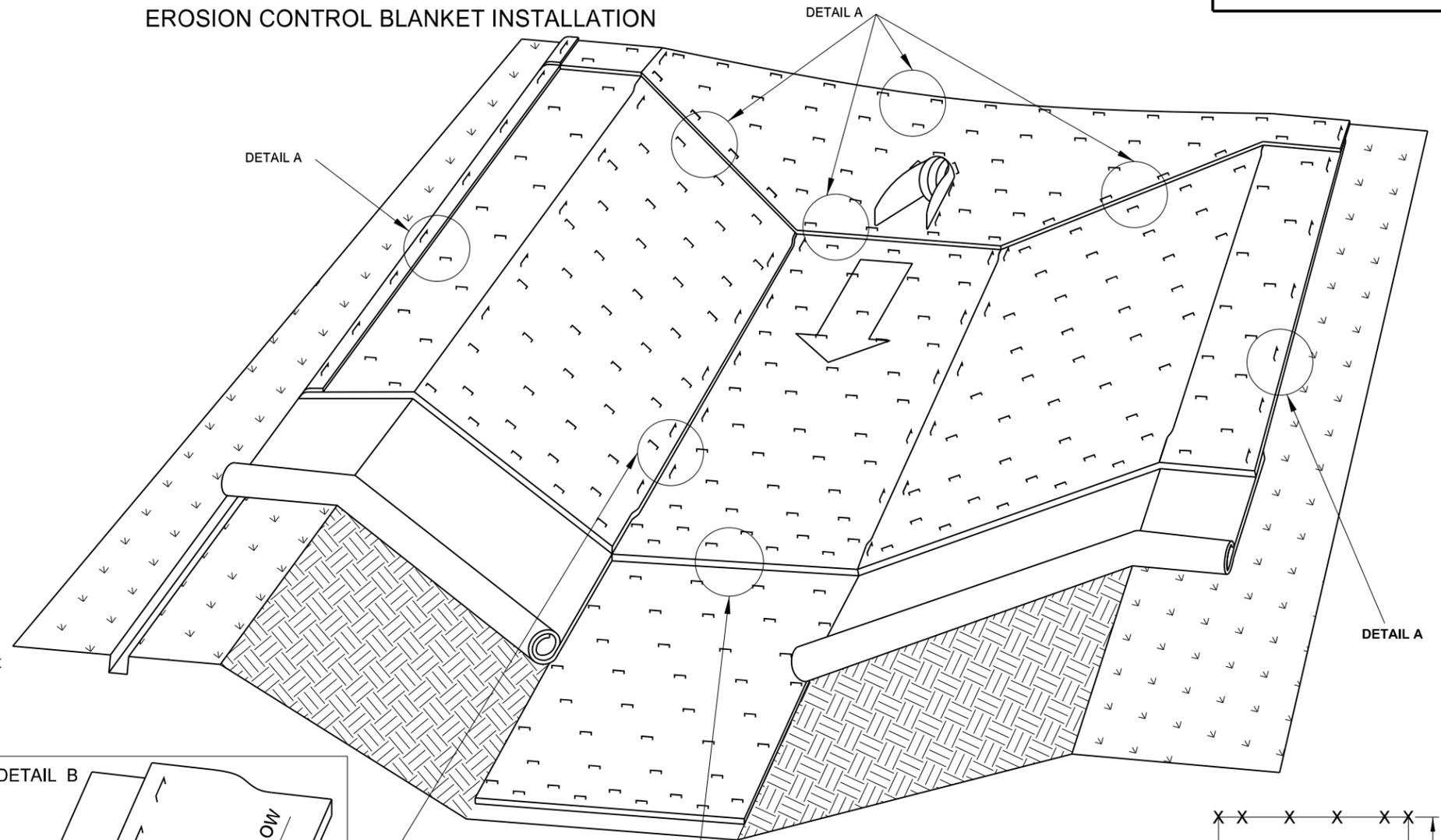
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| 2-25-14 | |
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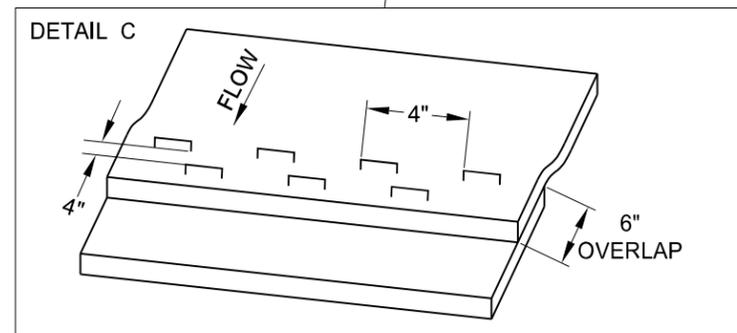
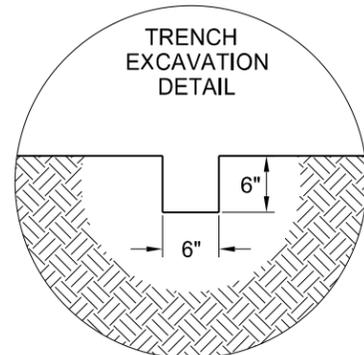
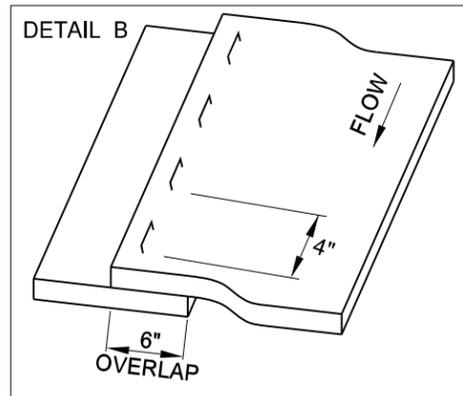
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



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

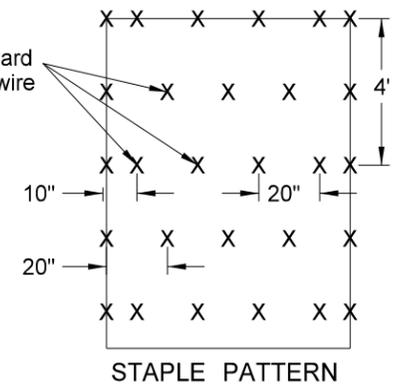


PIPE INLETS
INSTALLATION AT PIPE ENDS



BLANKET LAYOUT
CHANNEL OR SLOPE INSTALLATION

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

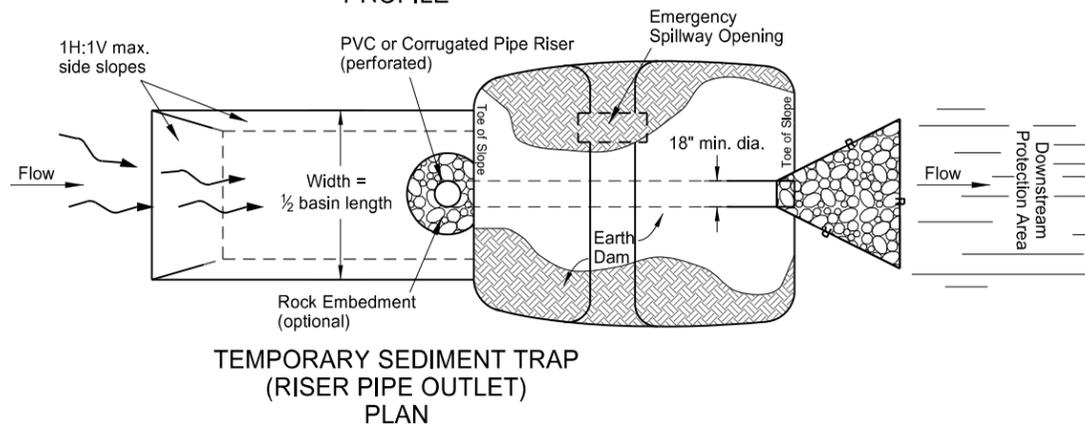
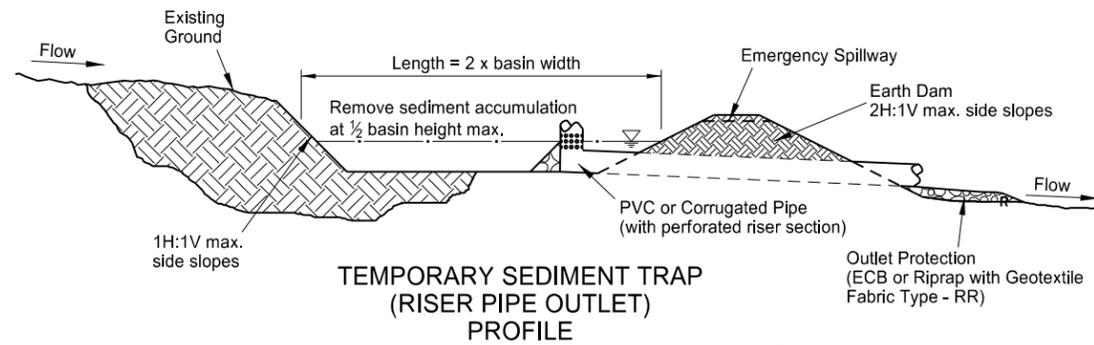
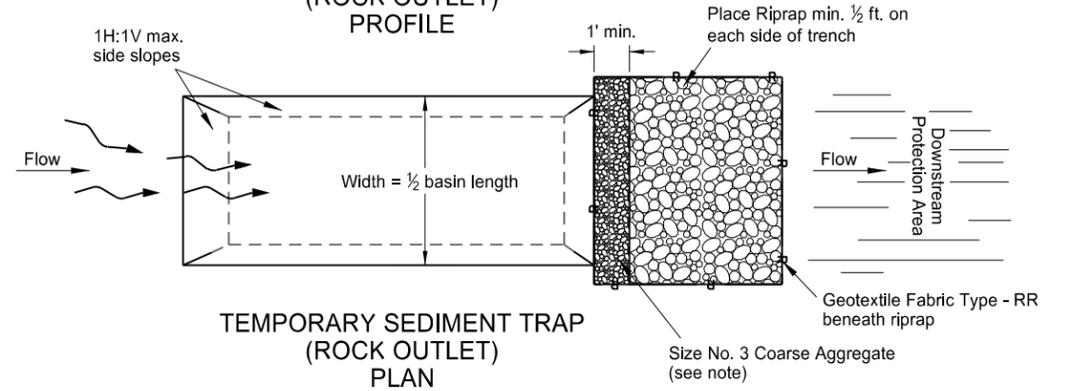
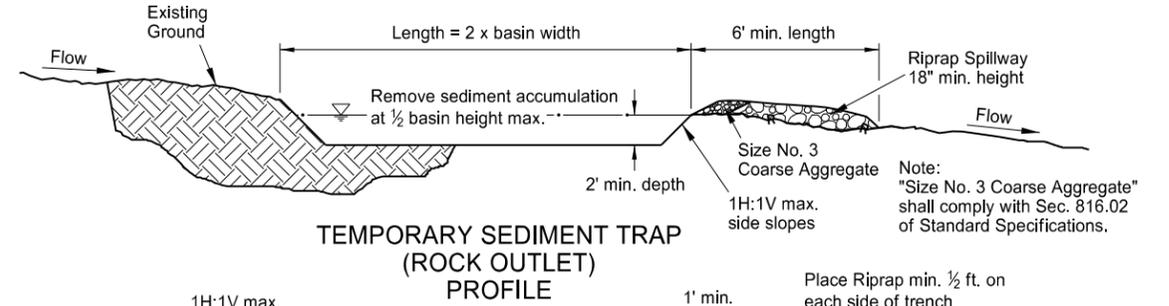
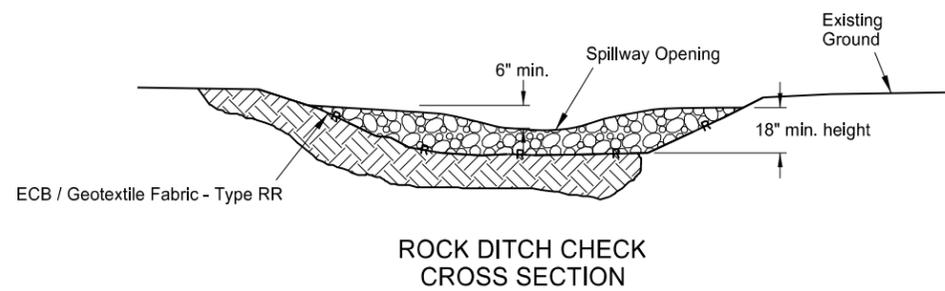
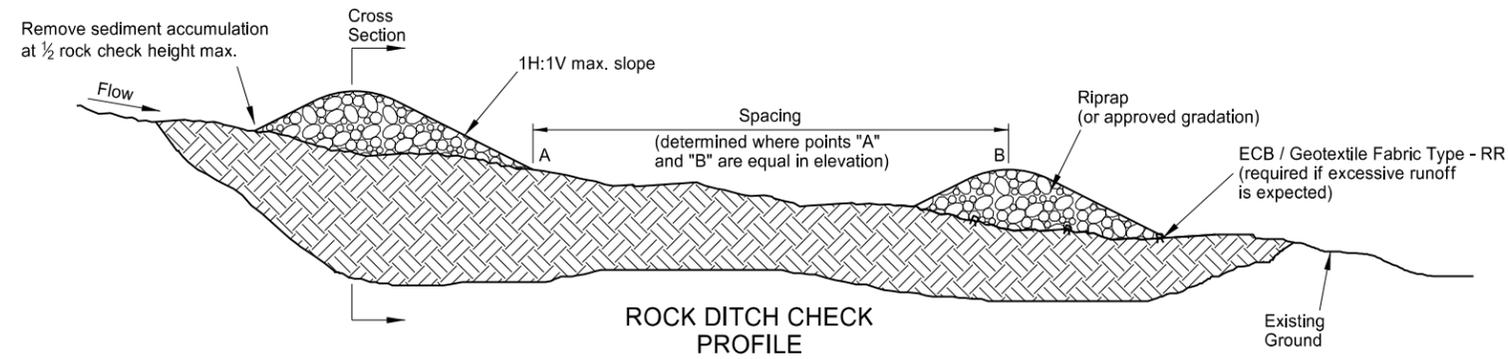


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|--|---|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Changed standard drawing number from D-708-5 to D-255-2. |
| 07-27-15 | Changed installation details such as trench depth and overlap dimensions. |

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Registration Number
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EROSION AND SILTATION CONTROLS

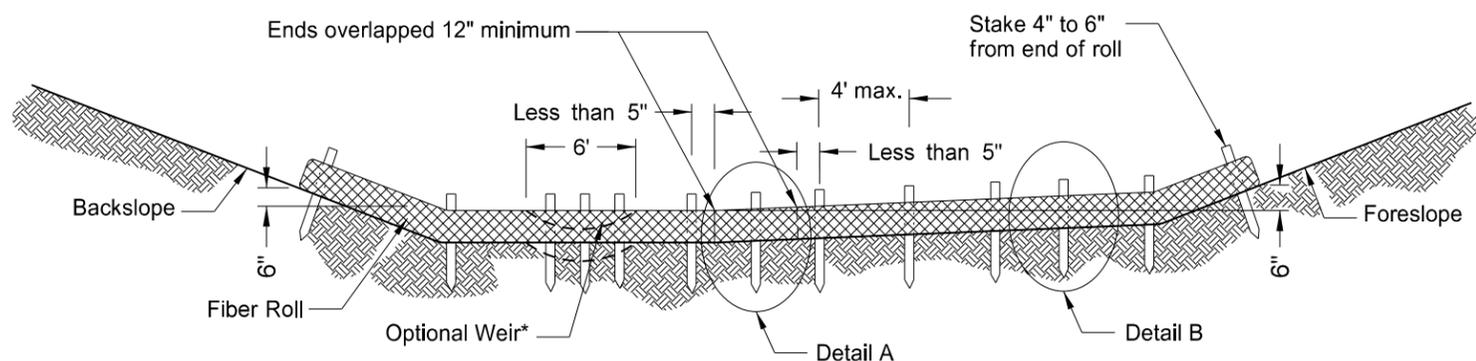
D-256-1



| | |
|--|--|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Changed standard drawing number from D-708-2 to D-256-1. Deleted silt fence details. |

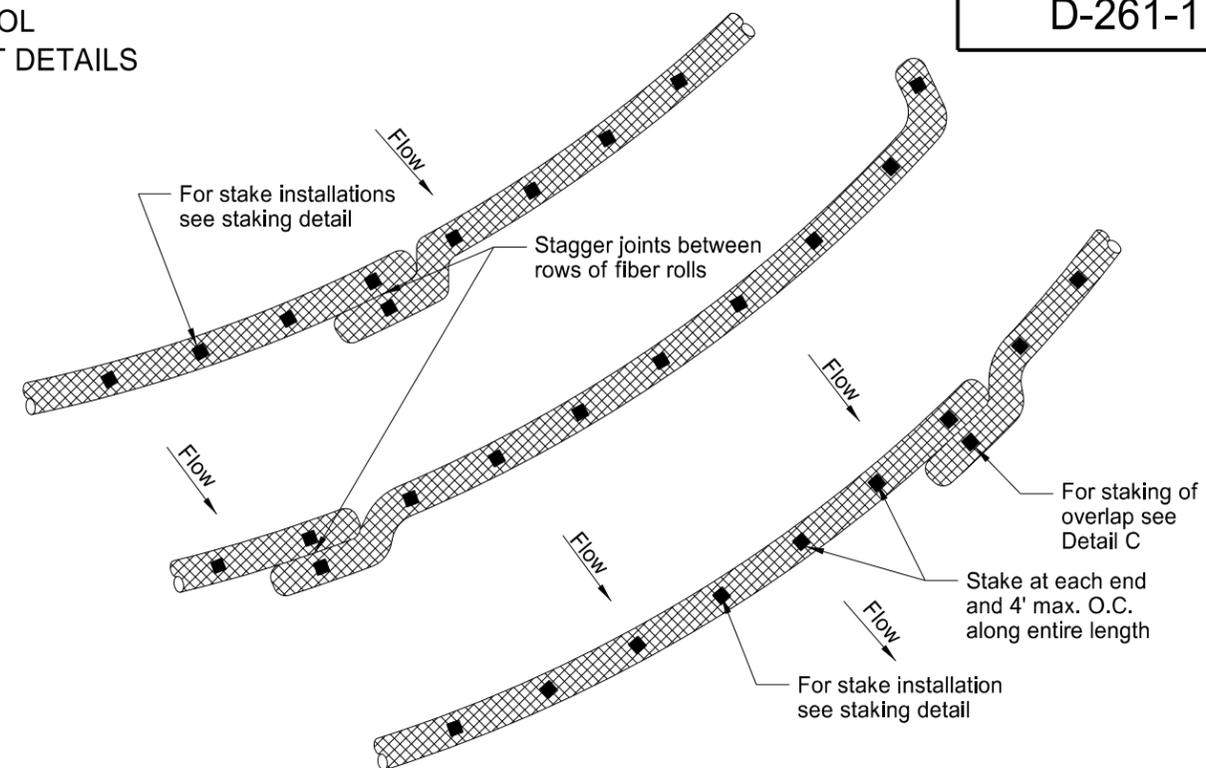
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

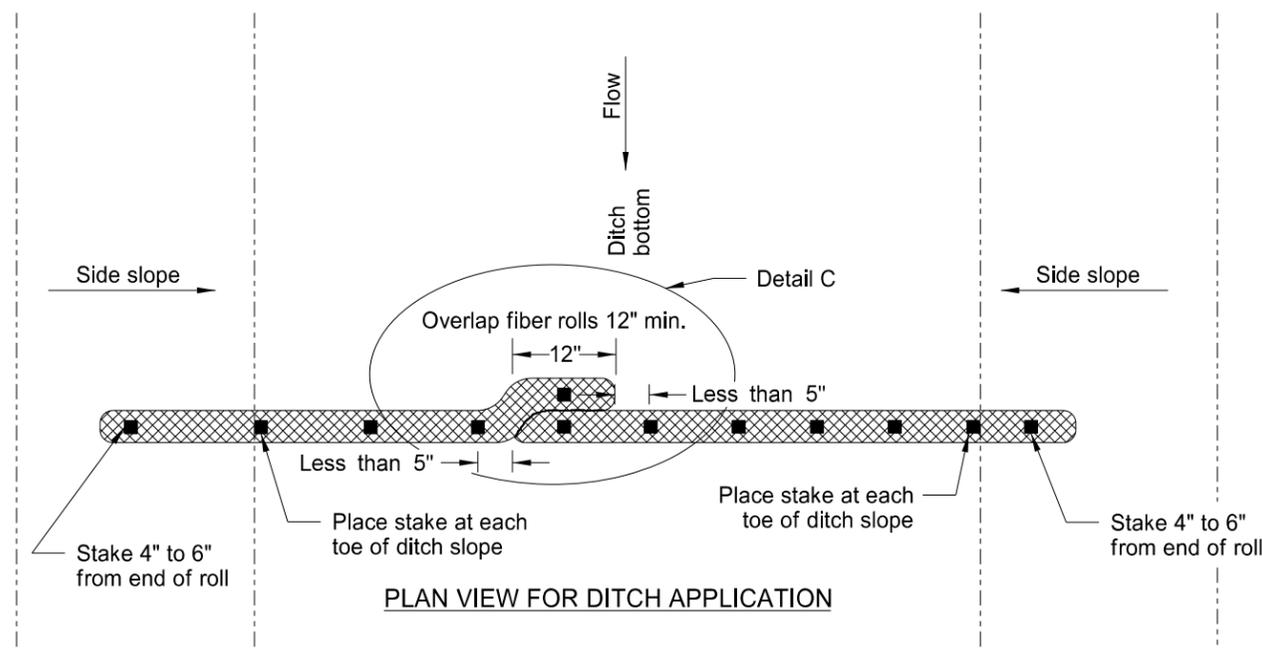


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

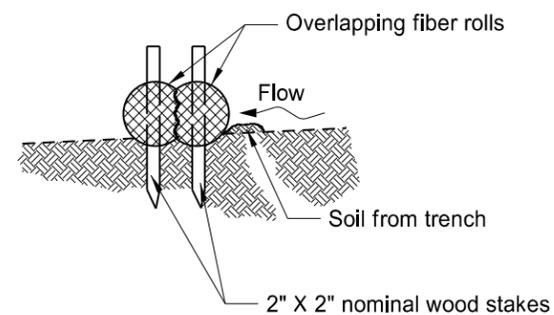
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



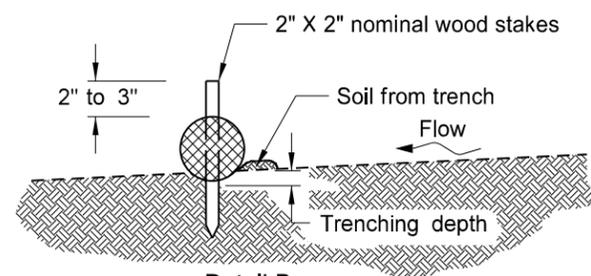
PLAN VIEW FOR SLOPE APPLICATION



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 |

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CONSTRUCTION SIGN DETAIL

D-704-5

| | | | | | |
|-----------------------|--|--|--|--------------|-------------|
| SIGN NUMBER | G20-10-108 | STATION(S): | | AREA: | 36.0 Sq.Ft. |
| WIDTH x HEIGHT | 9'-0" x 4'-0" | | | | |
| BORDER WIDTH | 1.25" (Inset 0.75") | | | | |
| CORNER RADIUS | 3" | | | | |
| MOUNTING | Ground | | | | |
| BACKGROUND | TYPE: IV Reflective COLOR: Fluorescent Orange | | | | |
| LEGEND/BORDER | TYPE: Non-Refl COLOR: Black | | | | |
| SYMBOL | X Y WID HT ANGLE | Dimensions are in inches.tenths Letter locations are panel edge to lower left corner | | | |
| | 42.1 6.2 24 4 0 | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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

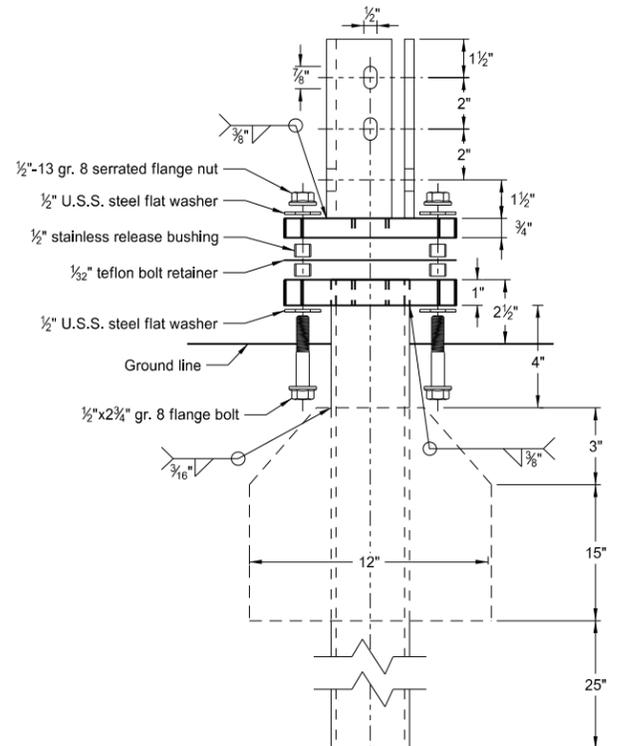
Notes:

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

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

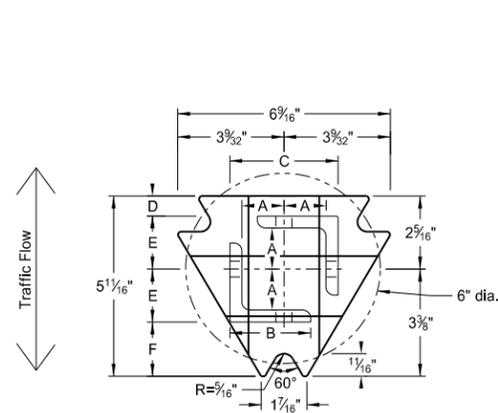
| | |
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| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 8-22-12 | |
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| DATE | CHANGE |
| 7-18-14 | Revise sheeting to type IV |

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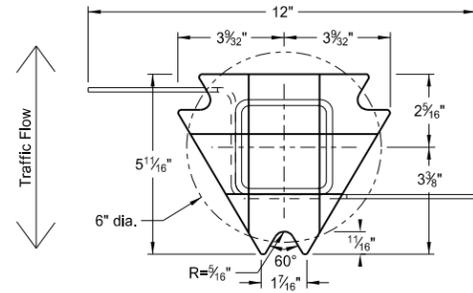


Multi-Directional Slip Base Assembly

Perforated Tube



Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2"x2 1/2"x3/8" 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

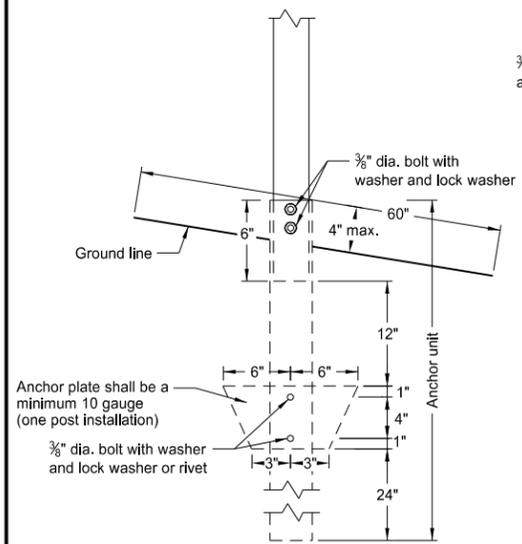
Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

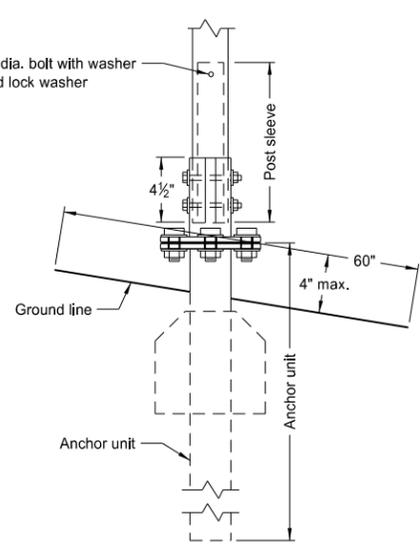
| Telescoping Perforated Tube | | | | | | |
|-----------------------------|---------------|----------------------|-----------------|----------------------|-----------|-----------------------------------|
| Number of Posts | Post Size in. | Wall Thickness Gauge | Sleeve Size in. | Wall Thickness Gauge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

| Properties of Telescoping Perforated Tube | | | | | | |
|---|--------------------|---------------------|----------------------|------------------------------------|----------------------------------|----------------------------------|
| Tube Size in. | Wall Thickness in. | U.S. Standard Gauge | Weight per Foot lbs. | Moment of Inertia in. ⁴ | Cross Sec. Area in. ² | Section Modulus in. ³ |
| 1 1/2 x 1 1/2 | 0.105 | 12 | 1.702 | 0.129 | 0.380 | 0.172 |
| 2 x 2 | 0.105 | 12 | 2.416 | 0.372 | 0.590 | 0.372 |
| 2 1/4 x 2 1/4 | 0.105 | 12 | 2.773 | 0.561 | 0.695 | 0.499 |
| 2 3/16 x 2 3/16 | 0.135 | 10 | 3.432 | 0.605 | 0.841 | 0.590 |
| 2 1/2 x 2 1/2 | 0.105 | 12 | 3.141 | 0.804 | 0.803 | 0.643 |
| 2 1/2 x 2 1/2 | 0.135 | 10 | 4.006 | 0.979 | 1.010 | 0.785 |

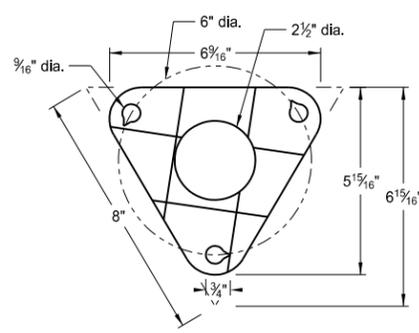
| Top Post Receiver Data Table | | | | | | |
|------------------------------|---------|--------|---------|---------|----------|--------|
| Square Post Sizes (B) | A | B | C | D | E | F |
| 2 3/16"x10 ga. | 1 9/64" | 2 1/2" | 3 1/32" | 2 5/32" | 1 33/64" | 1 1/8" |
| 2 1/2"x10 ga. | 1 9/32" | 2 1/2" | 3 5/16" | 5/8" | 1 21/32" | 1 3/4" |



Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



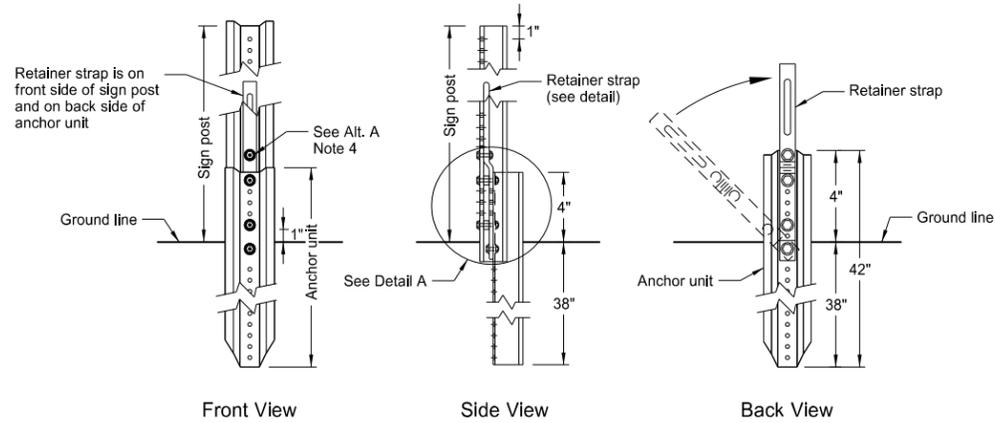
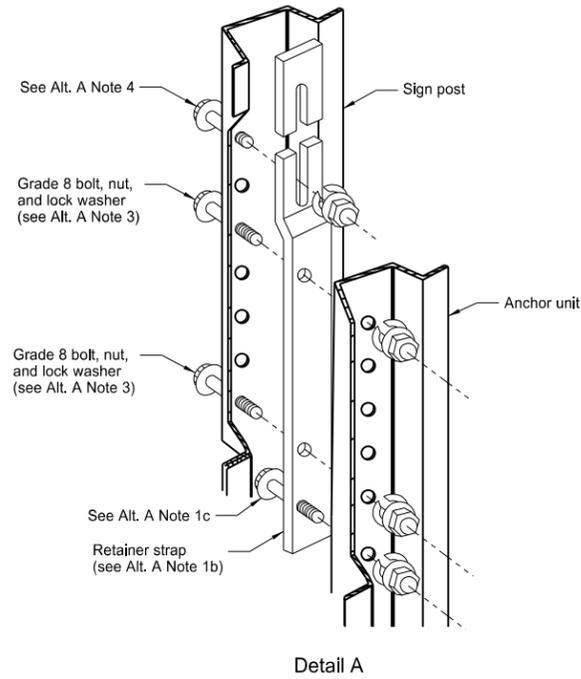
Bolt Retainer for Base Connection
Bolt Retainer - 1/32" Reprocessed Teflon

- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.
- (B) The 2 3/16"x10 ga. may be inserted into 2 1/2"x10 ga. for additional wind load.

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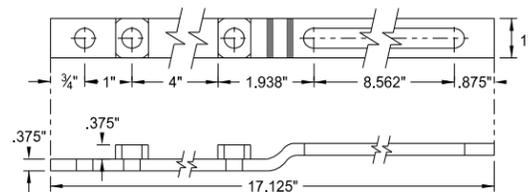
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U-Channel Post

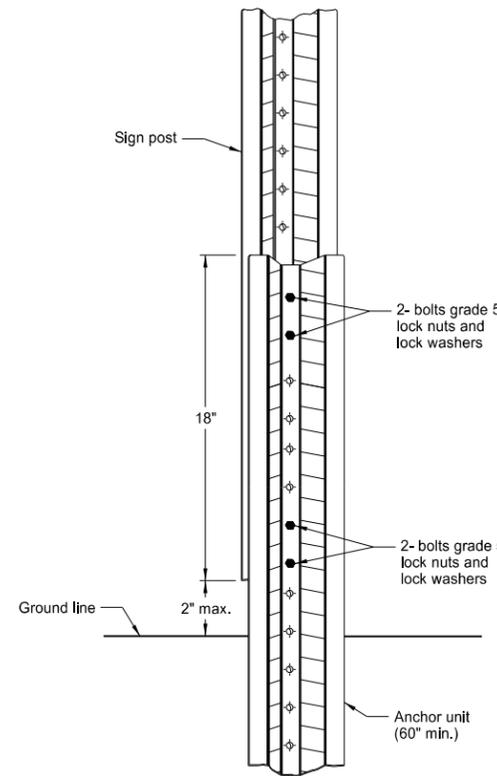


Breakaway U-Channel Detail Alternate A

A maximum of 2 posts shall be installed within 7'.

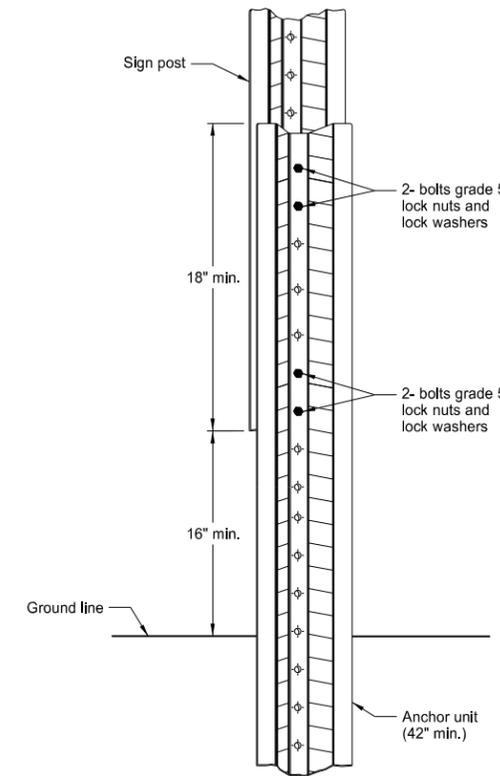


Retainer Strap Detail



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

A maximum of 3 posts shall be installed within 7'.



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

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

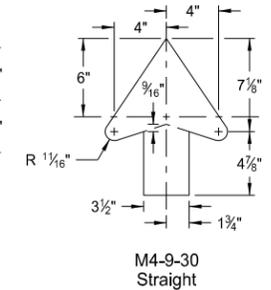
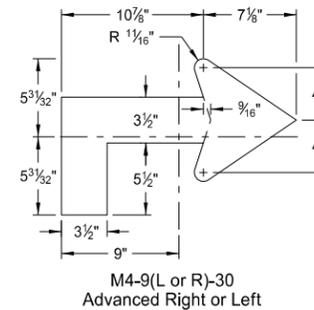
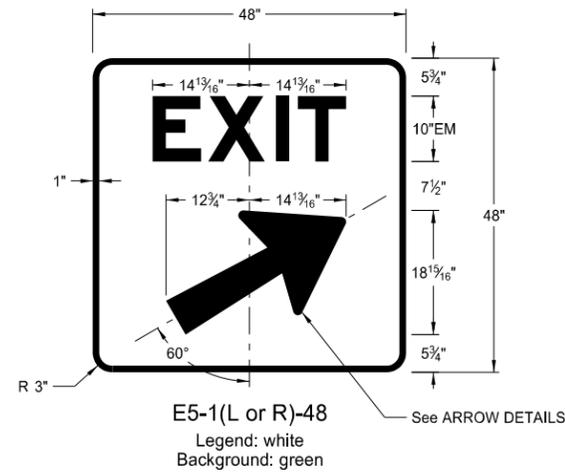
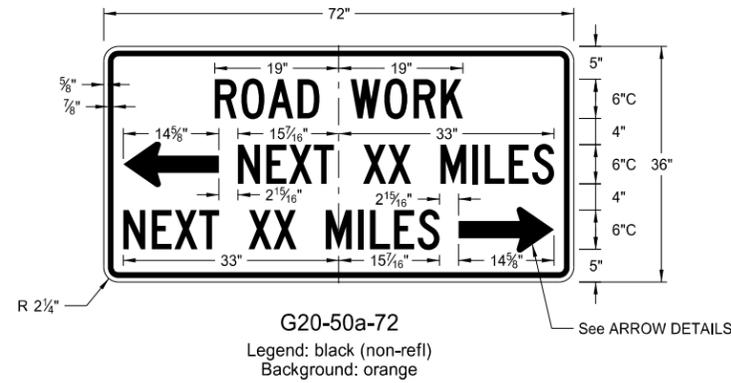
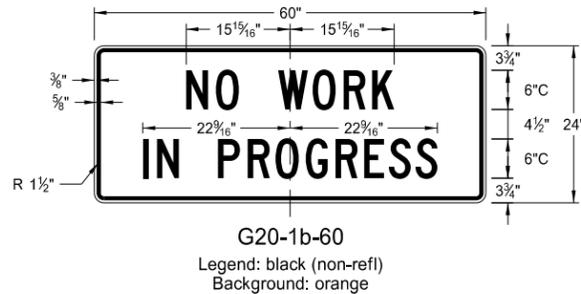
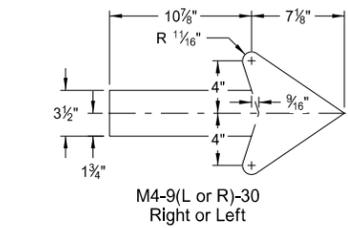
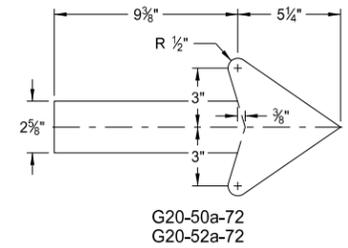
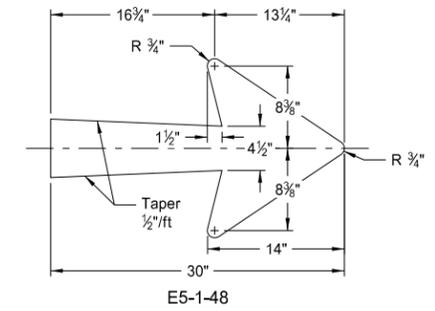
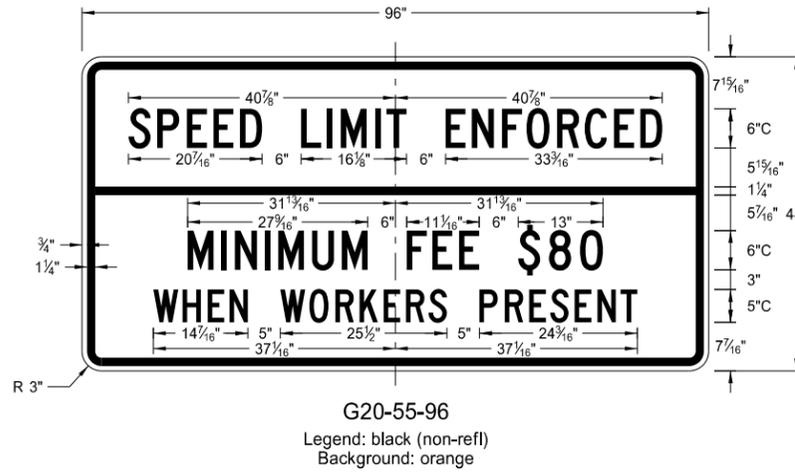
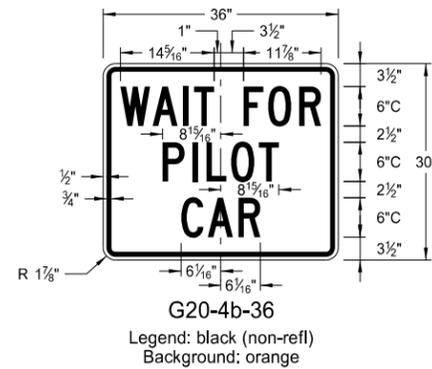
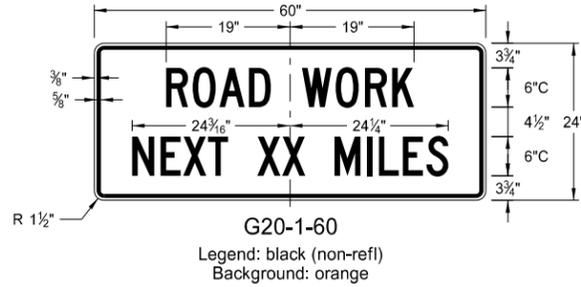
1. a) Drive anchor unit to within 12" of ground level.
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
2. a) 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. The base post, strap and sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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| 2-28-14 | |
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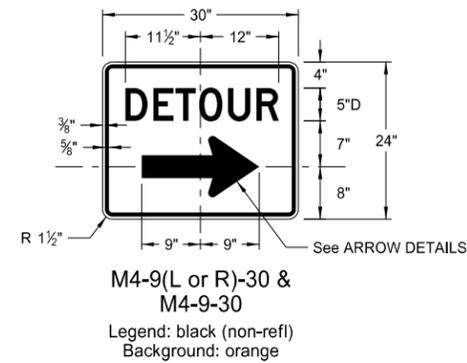
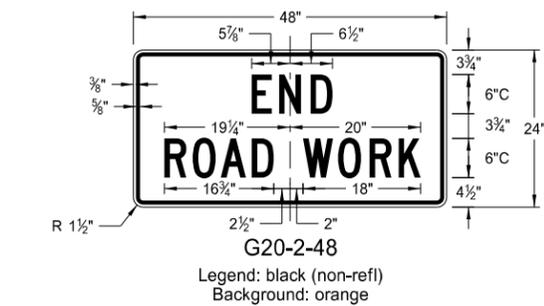
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

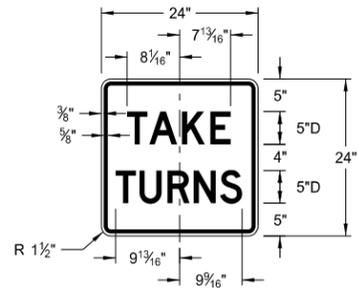
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

| | |
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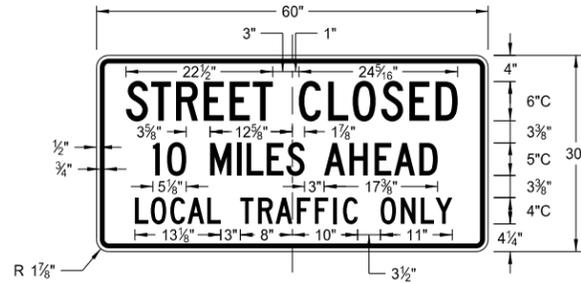
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



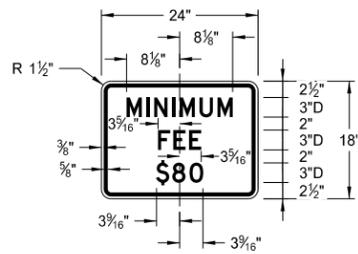
R1-50-24

Legend: black (non-refl)
Background: white



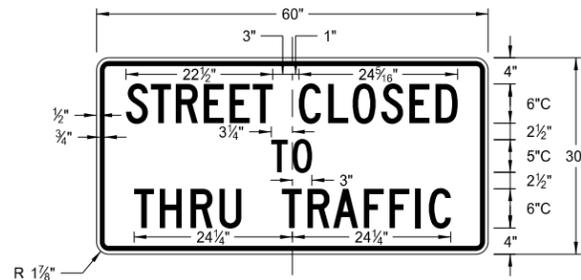
R11-3c-60

Legend: black (non-refl)
Background: white



R2-1a-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

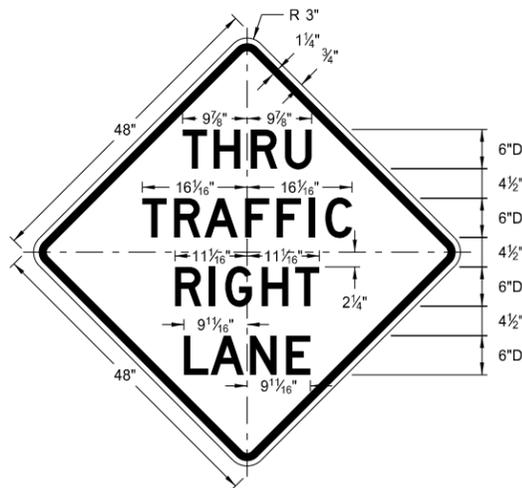
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

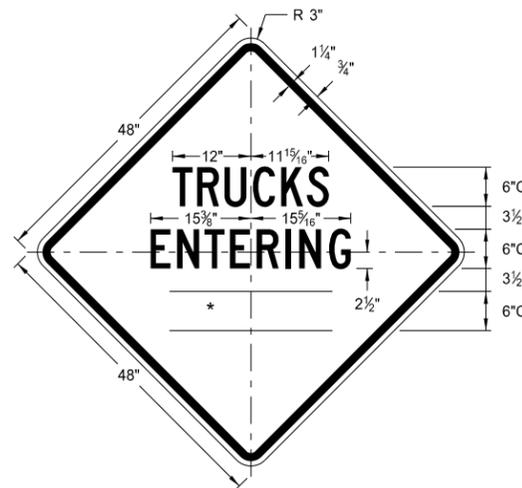
| WORD | LETTER SPACING |
|---------|----------------|
| AHEAD | Standard |
| 200 FT | Standard |
| 350 FT | Standard |
| 500 FT | Standard |
| 1000 FT | Reduce 40% |
| 1500 FT | Reduce 40% |
| ½ MILE | Reduce 50% |
| 1 MILE | Standard |

* DISTANCE MESSAGES



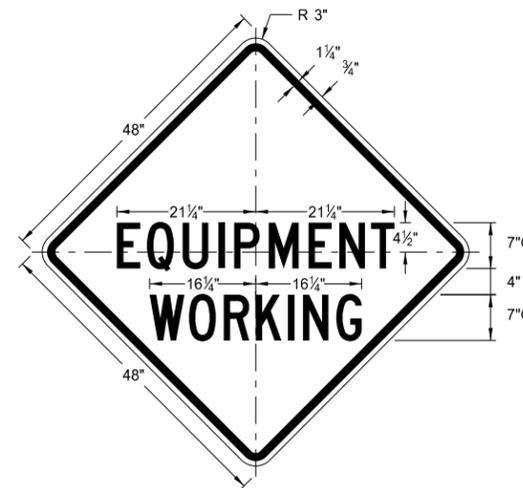
W5-8-48

Legend: black (non-refl)
Background: orange



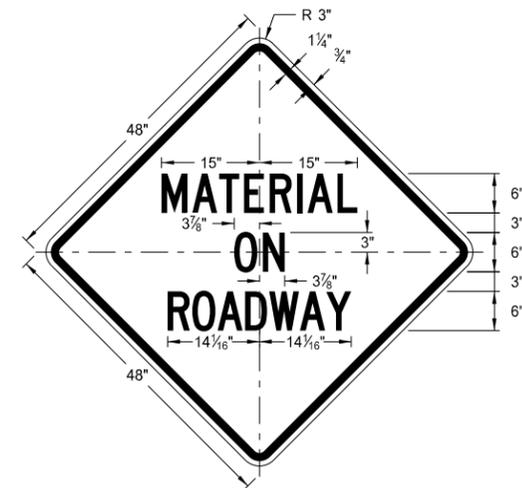
W8-54-48

Legend: black (non-refl)
Background: orange



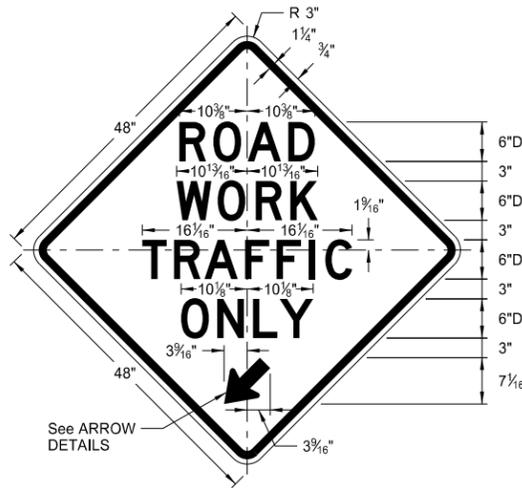
W20-51-48

Legend: black (non-refl)
Background: orange



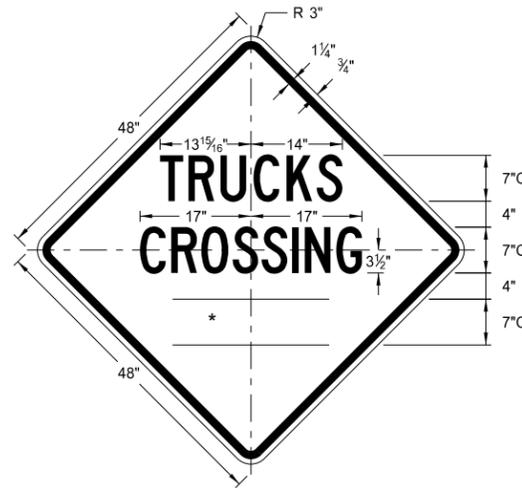
W21-51-48

Legend: black (non-refl)
Background: orange



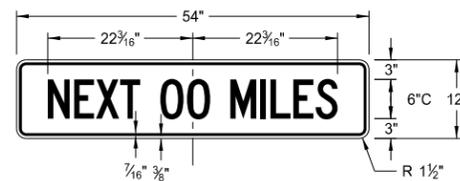
W5-9-48

Legend: black (non-refl)
Background: orange



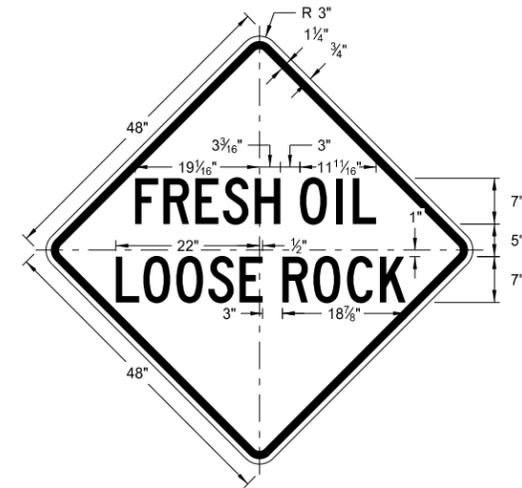
W8-55-48

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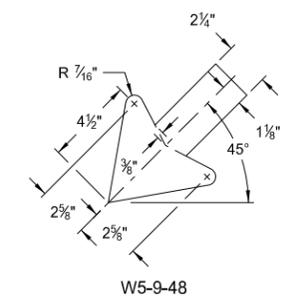
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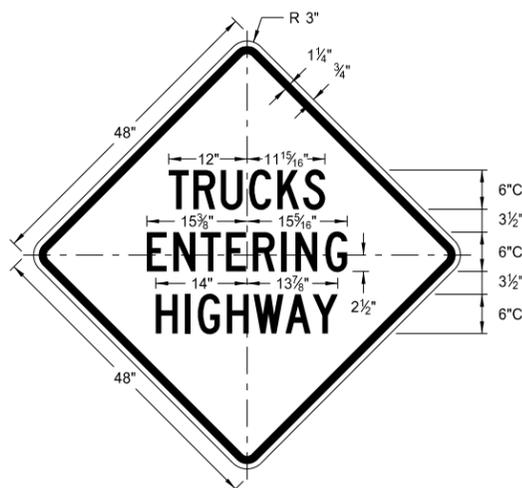


W22-8-48

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Background: orange

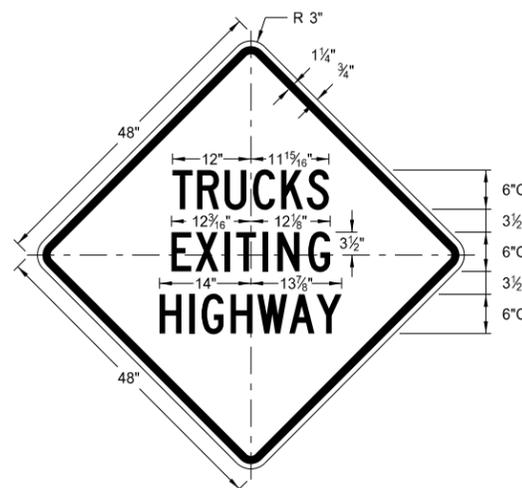


ARROW DETAILS



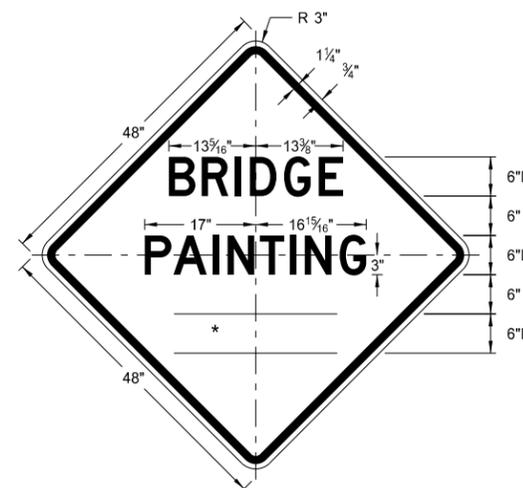
W8-53-48

Legend: black (non-refl)
Background: orange



W8-56-48

Legend: black (non-refl)
Background: orange



W21-50-48

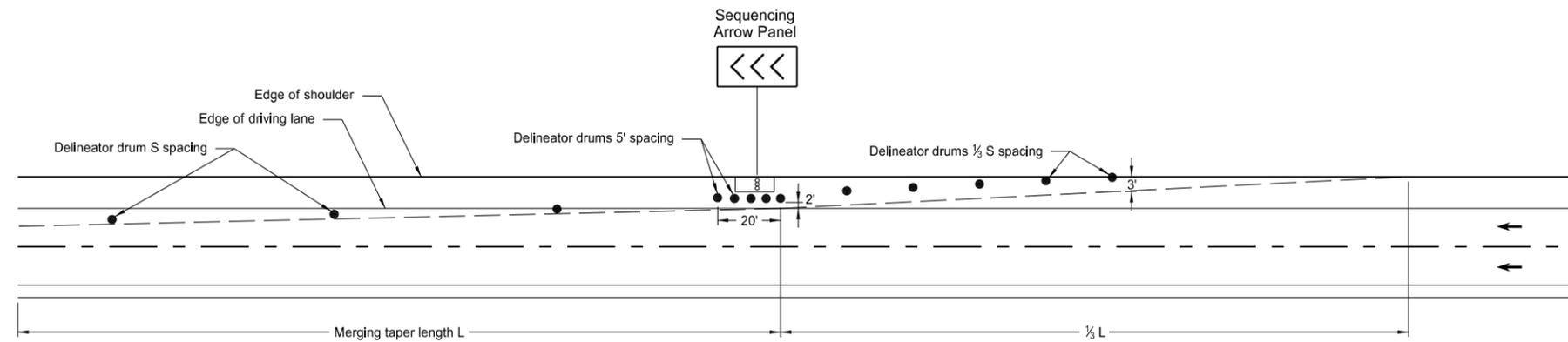
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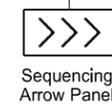
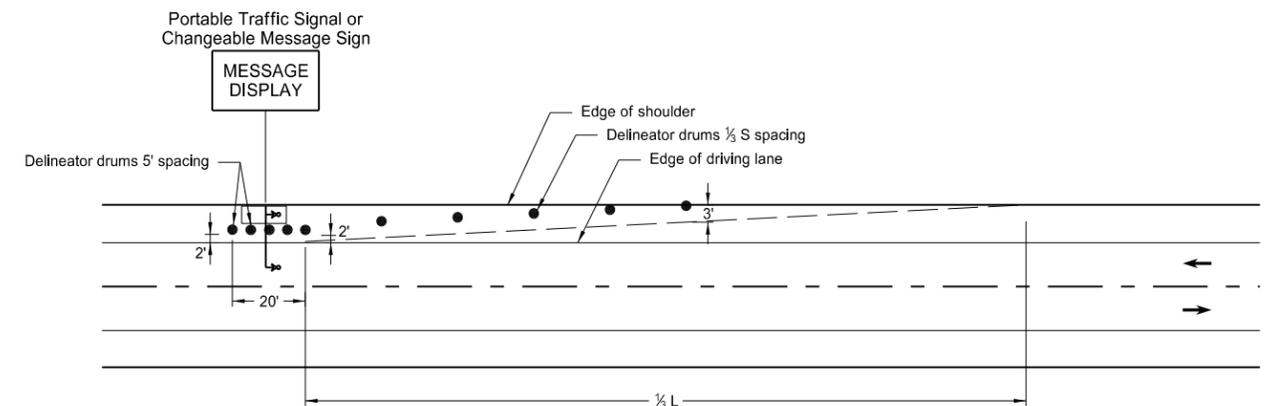
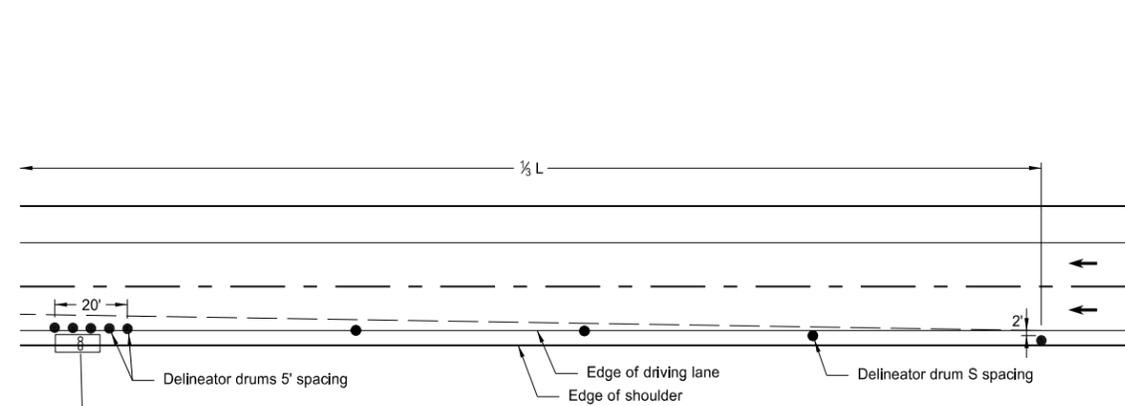
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SHOULDER CLOSURE TAPERS

D-704-12



SHOULDER CLOSURE WITH LANE CLOSURE
(when shoulder is 8' or wider)



Sequencing Arrow Panel

SHOULDER CLOSURE USED WITH LANE CLOSURE
(when shoulder is less than 8' wide)

PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

| KEY | |
|-------------------|---------------------------|
| ● Delineator Drum | ∞ Sequencing Arrow Panel |
| • Message Display | ↳ Portable Traffic Signal |

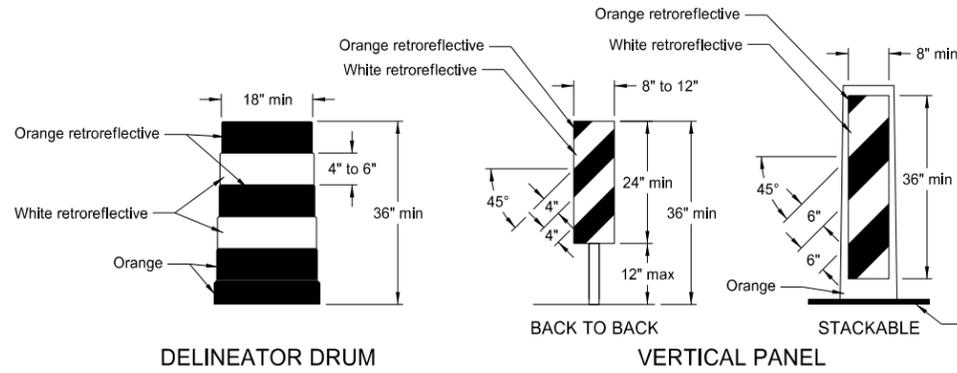
Notes:

- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
L = WS²/60 (40mph or less)
L = WS (45mph or more)
- If a shoulder taper is used, it should have a length of approximately 1/3 L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
- When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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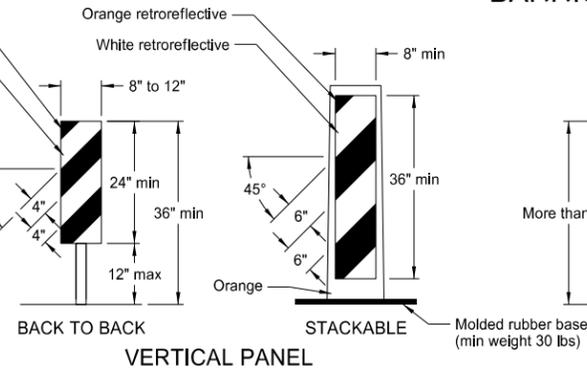
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BARRICADE AND CHANNELIZING DEVICE DETAILS



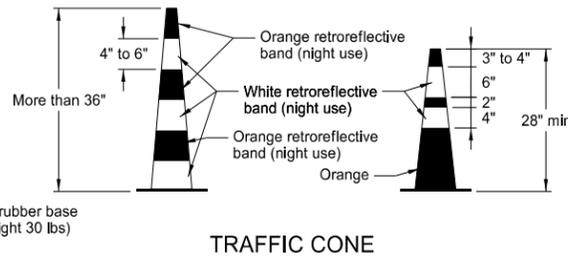
DELINEATOR DRUM

The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.



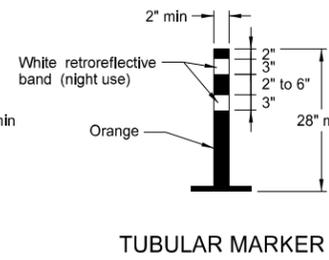
VERTICAL PANEL

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have 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, a stripe width of 6 inches shall be used.



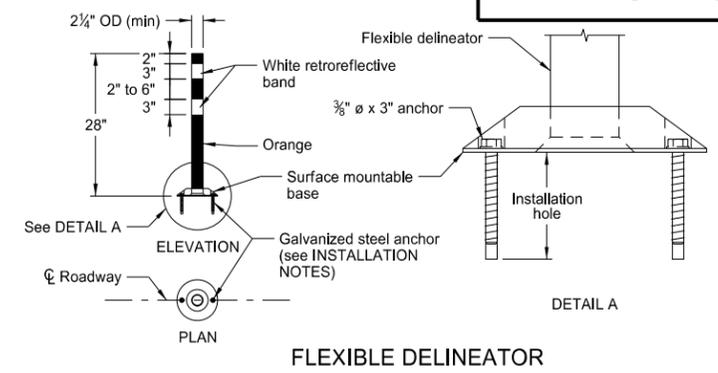
TRAFFIC CONE

RetroreflectORIZATION of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED space between the orange and white stripes shall not exceed 3" wide.



TUBULAR MARKER

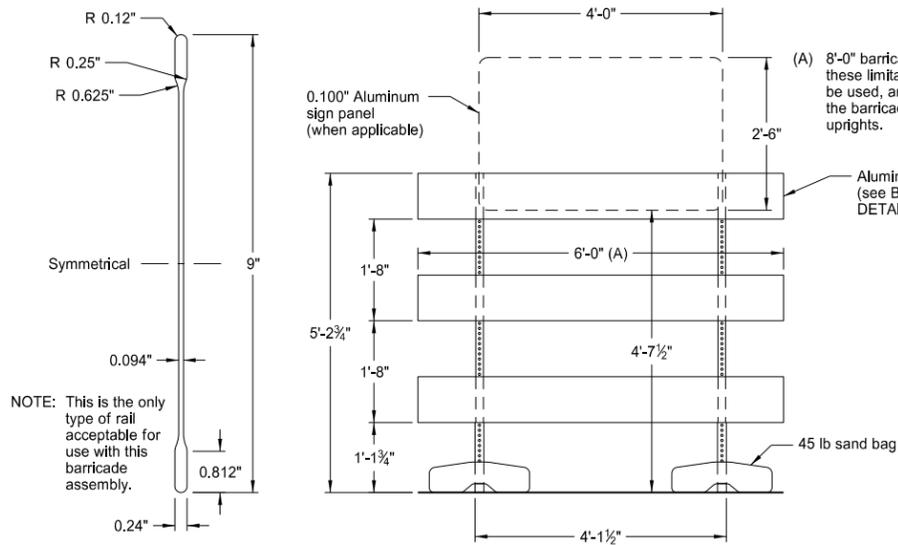
RetroreflectORIZATION of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

INSTALLATION NOTES:

1. Drill installation holes to diameter and depth as 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, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.

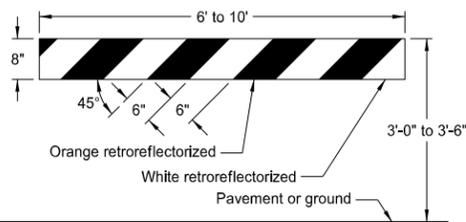


BARRICADE BLADE DETAIL

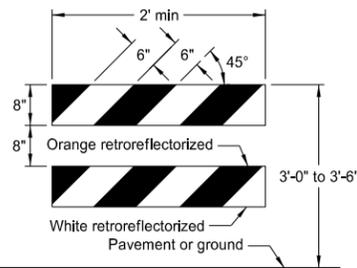
ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

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

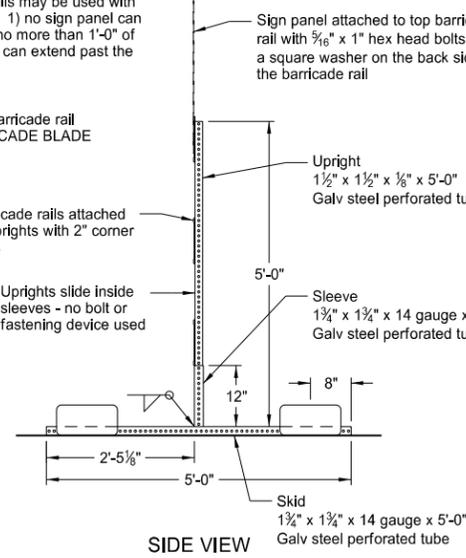


TYPE I BARRICADE



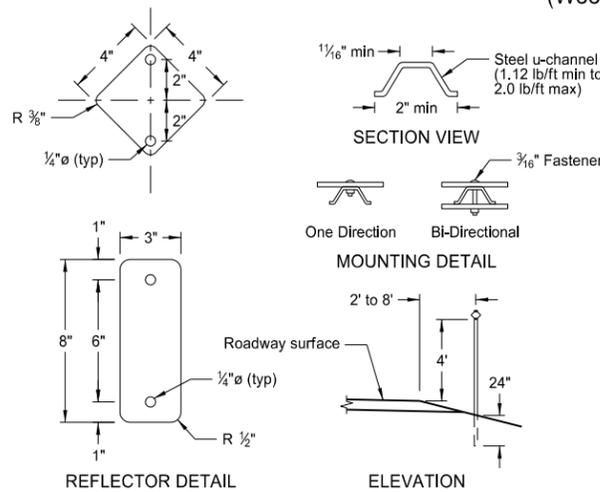
TYPE II BARRICADE

BARRICADE RAIL DETAILS



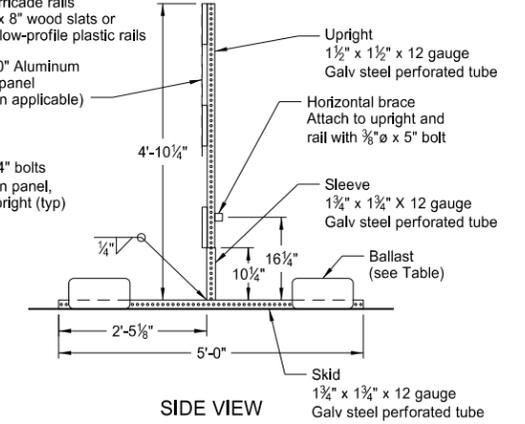
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)



REFLECTOR DETAIL

DELINEATORS



SIDE VIEW

MINIMUM BALLAST (For each side of barricade support)

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

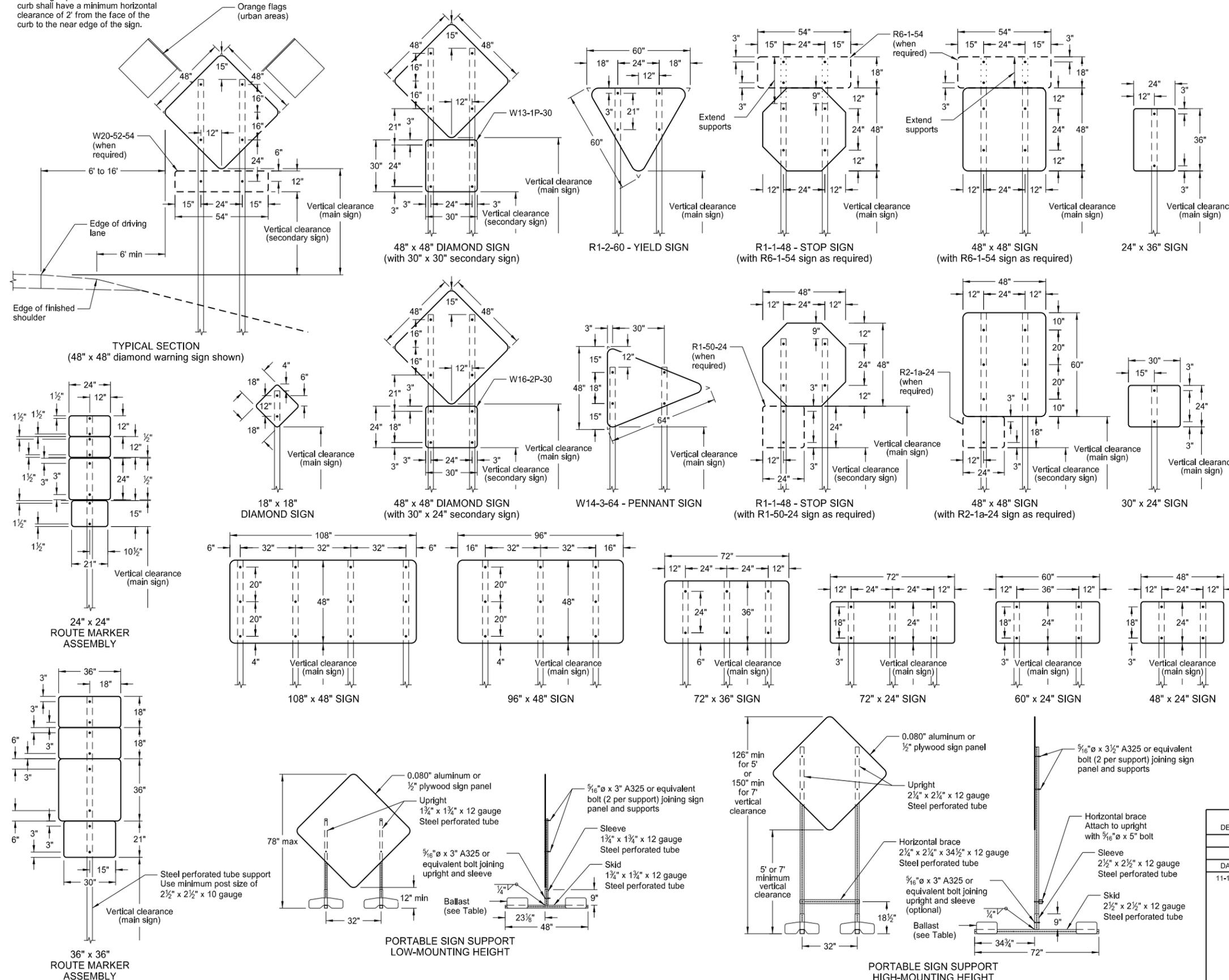
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |

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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



- NOTES:
- Sign Supports:** Supports shall be galvanized or painted. 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, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
 - Sign Panels:** Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.
 - Alternate Messages:** The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
 - 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

- 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 as stated above.

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.
 - Portable Signs:** Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.
- Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have 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. The sandbags are assumed to be placed at or near the ends of the skids.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|-----------------|
| 10-4-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 11-14-13 | Revised Note 6. |

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ROAD CLOSURE LAYOUTS

Notes

- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper.
 - L = Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
- Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
- Delineator drums, barricades or cones used for tapering traffic shall be spaced at the dimension "S". Delineator drums or cones used for tangents shall be spaced at 2 times dimension "S".
- Sequencing Arrow Panels
 - Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface. See Shoulder Closure Standard Drawing.
 - Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
 - Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
 - Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}$ B.
- Use when work area is 1 mile or longer.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Where necessary, safe speed to be determined by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- G20-55-96 sign is not required if this standard is part of other traffic control layouts, or the work is less than 15 days.

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

KEY

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

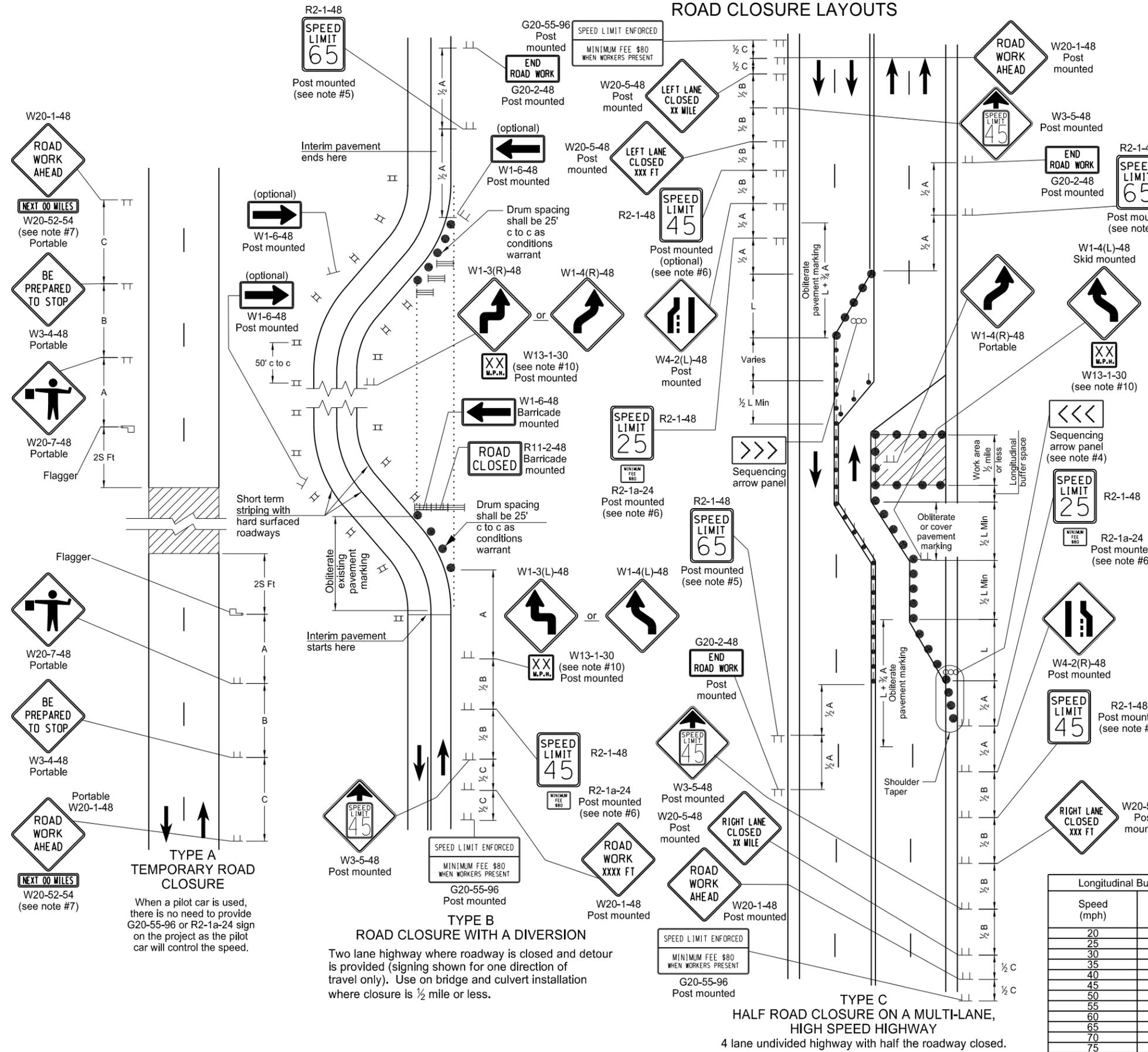
Longitudinal Buffer Space

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13
REVISIONS

| DATE | CHANGE |
|------|--------|
| | |

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**TYPE A
TEMPORARY ROAD CLOSURE**
 When a pilot car is used, there is no need to provide G20-55-96 or R2-1a-24 sign on the project as the pilot car will control the speed.

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

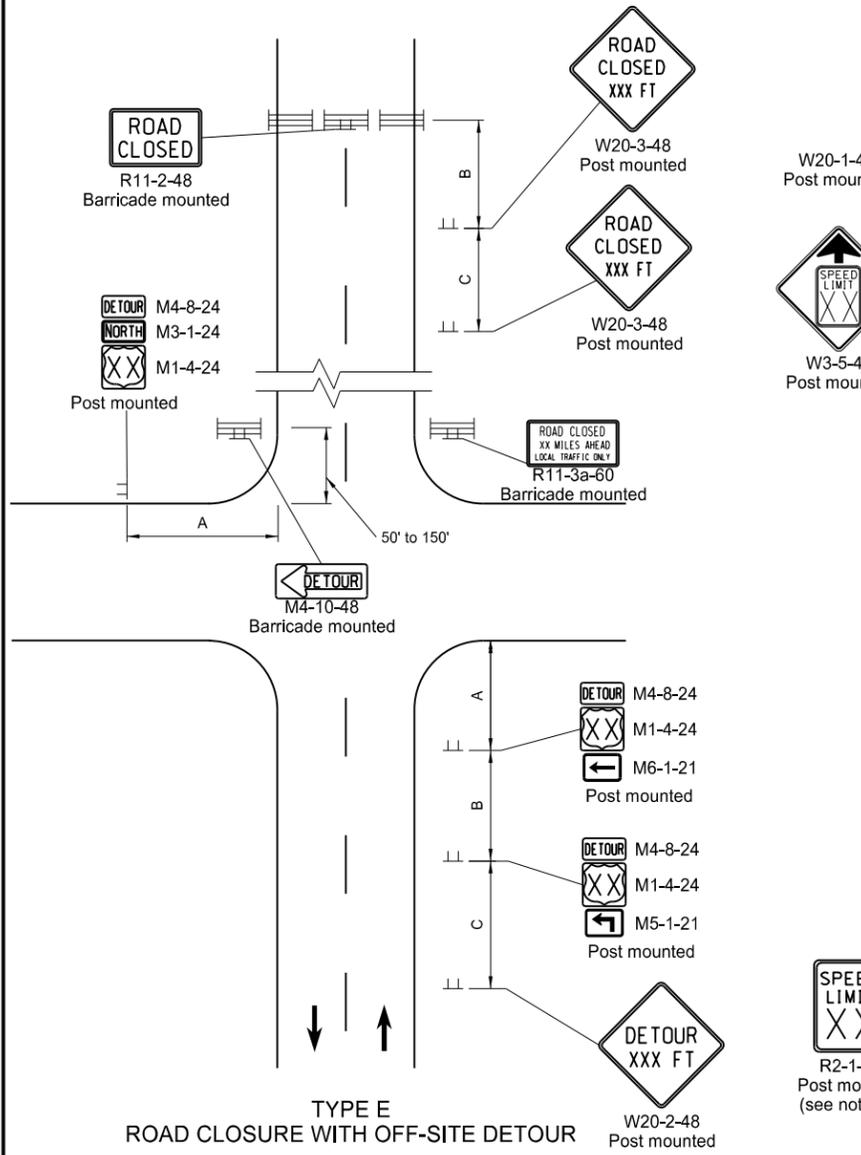
**TYPE C
HALF ROAD CLOSURE ON A MULTI-LANE,
HIGH SPEED HIGHWAY**
 4 lane undivided highway with half the roadway closed.

ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19

Notes

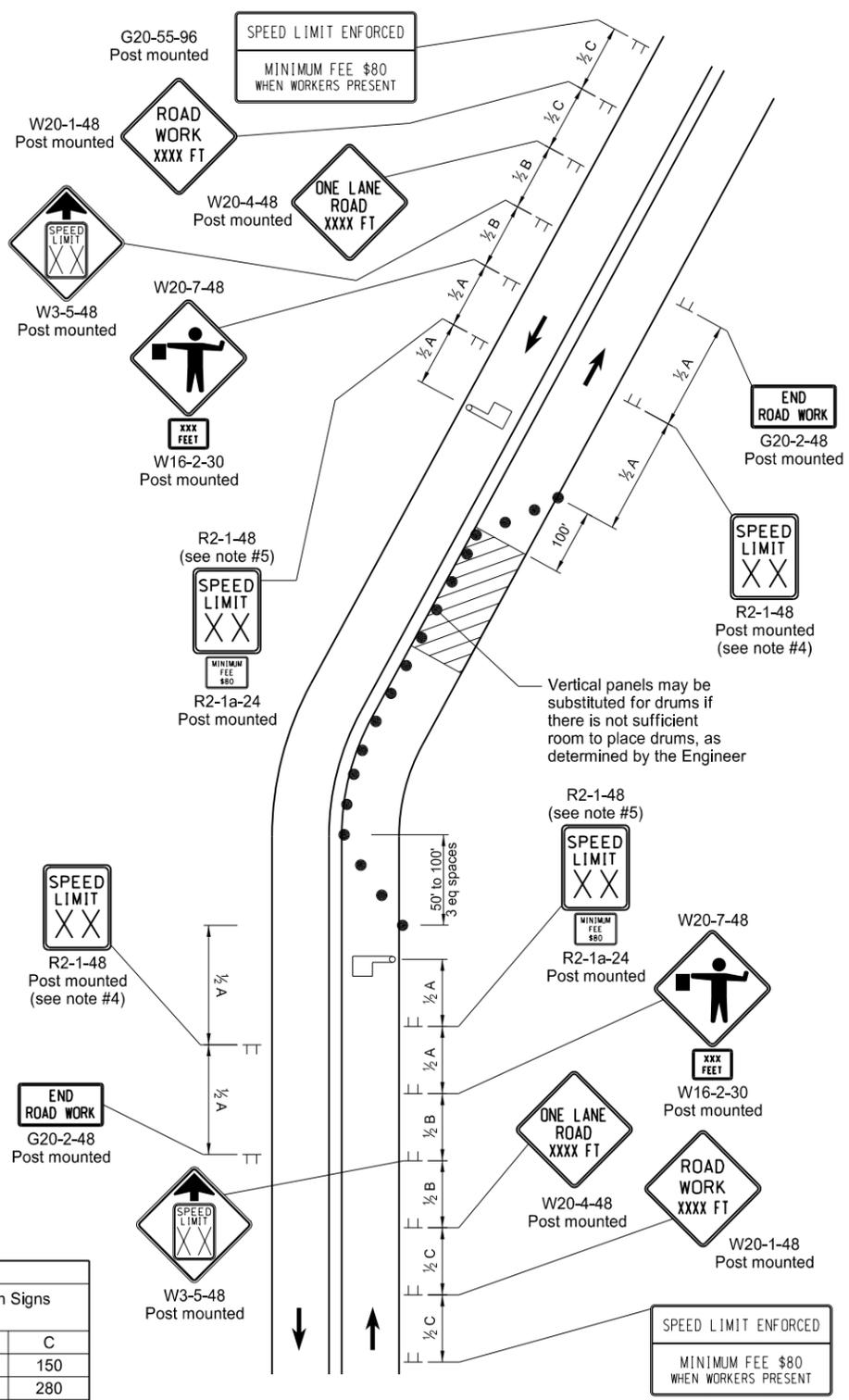
- Variables
 - S = Numerical value of speed limit or 85th percentile.
 - W = The width of taper
 - L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S²/60 for urban, residential, and other streets with speeds of 40 mph or less.
- Barricades placed on roadway shall be on a moveable assembly.
- Signs placed on the roadway shall be placed on skid mounted assemblies.
- Delineator drums used for tapering traffic shall be placed at 3 equal spaces. Delineator drums for tangents shall be spaced at 2 times dimension "S".
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Where necessary, safe speed to be determined by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- G20-55-96 or R2-1a-24 sign are not required when a pilot car operation is used, if this standard is part of other traffic control layouts, or the work is less than 15 days.
- When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
 - Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
 - A "Do Not Stop on Tracks" sign (R8-8-24) should be placed near the cross buck in each direction while the lane closure is in the vicinity of the tracks.
 - A buffer space between the work zone and the lane closure transition should be extended upstream of the highway-rail grade crossing so a queue created by the flagging operation will not extend across the highway-rail grade crossing.
 - If the queuing of vehicles across active rail tracks cannot be avoided, a flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing, even if automatic warning devices are in place.



**TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR**

Used where a road is closed beyond a detour point. Signing shown for one direction only. Sign not shown on detour shall be shown in plans and installed and maintained by the contractor.

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



**TYPE F
LANE CLOSURE ON A TWO WAY ROAD USING FLAGGERS**

Two lane highway with one lane closed. Flagger is at a point where it is visible to approaching traffic.

KEY

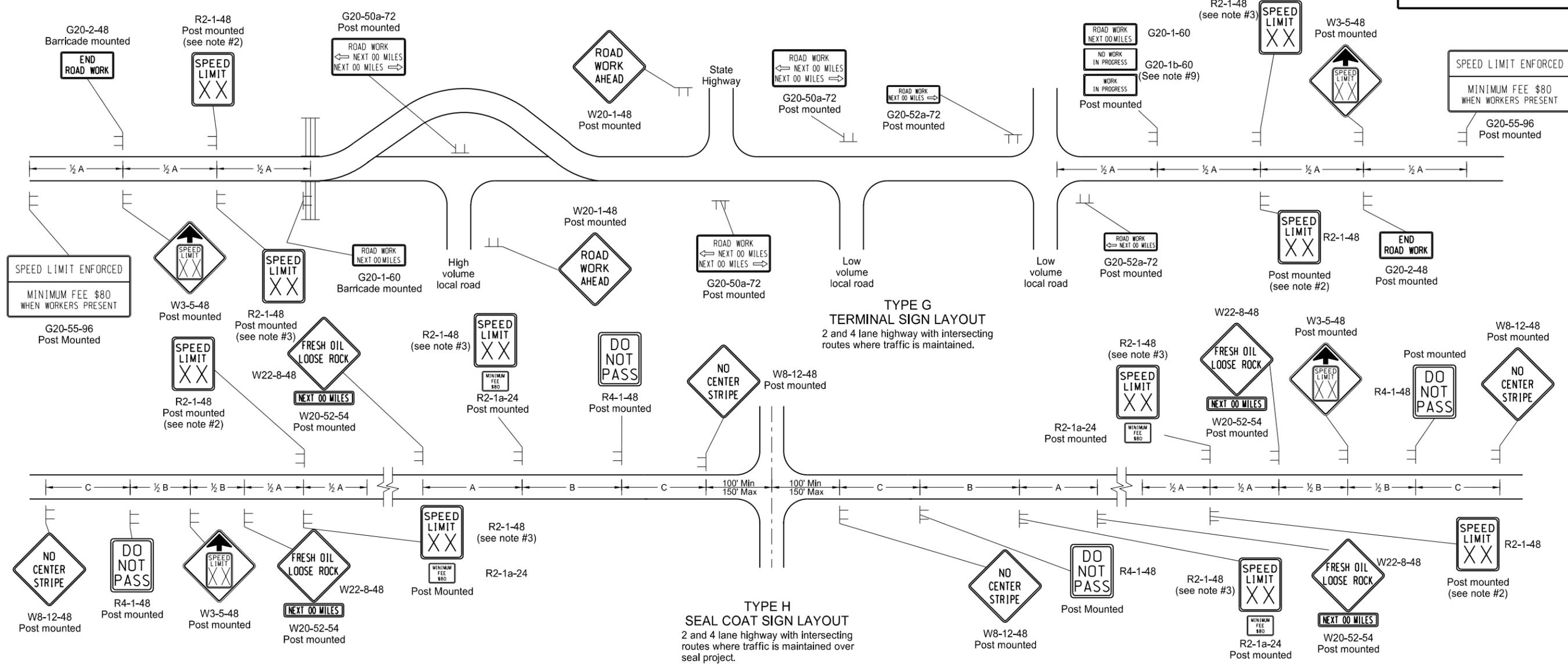
- Delineator Drum
- ▬ Sign
- ▬ Type III Barricade
- ▨ Work/Hazard Area
- ☞ Flagger

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|--------------------------------------|
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 3-13-14 | Revised Sign Cell "ROAD WORK XXX FT" |

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TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



- Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- On seal projects, signs R2-1-48, R2-1a-24, R4-1-48, W22-8-48 and W20-52-54 shall be placed just after all important intersections and at five mile intervals thereafter. Sign W8-12-48 shall be placed just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. No short term pavement markings are placed when traffic volumes are 750 ADT or less.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
- G20-55-96 sign is not required if work is less than 15 days.

KEY

≡ Type III barricade

⊥ Sign

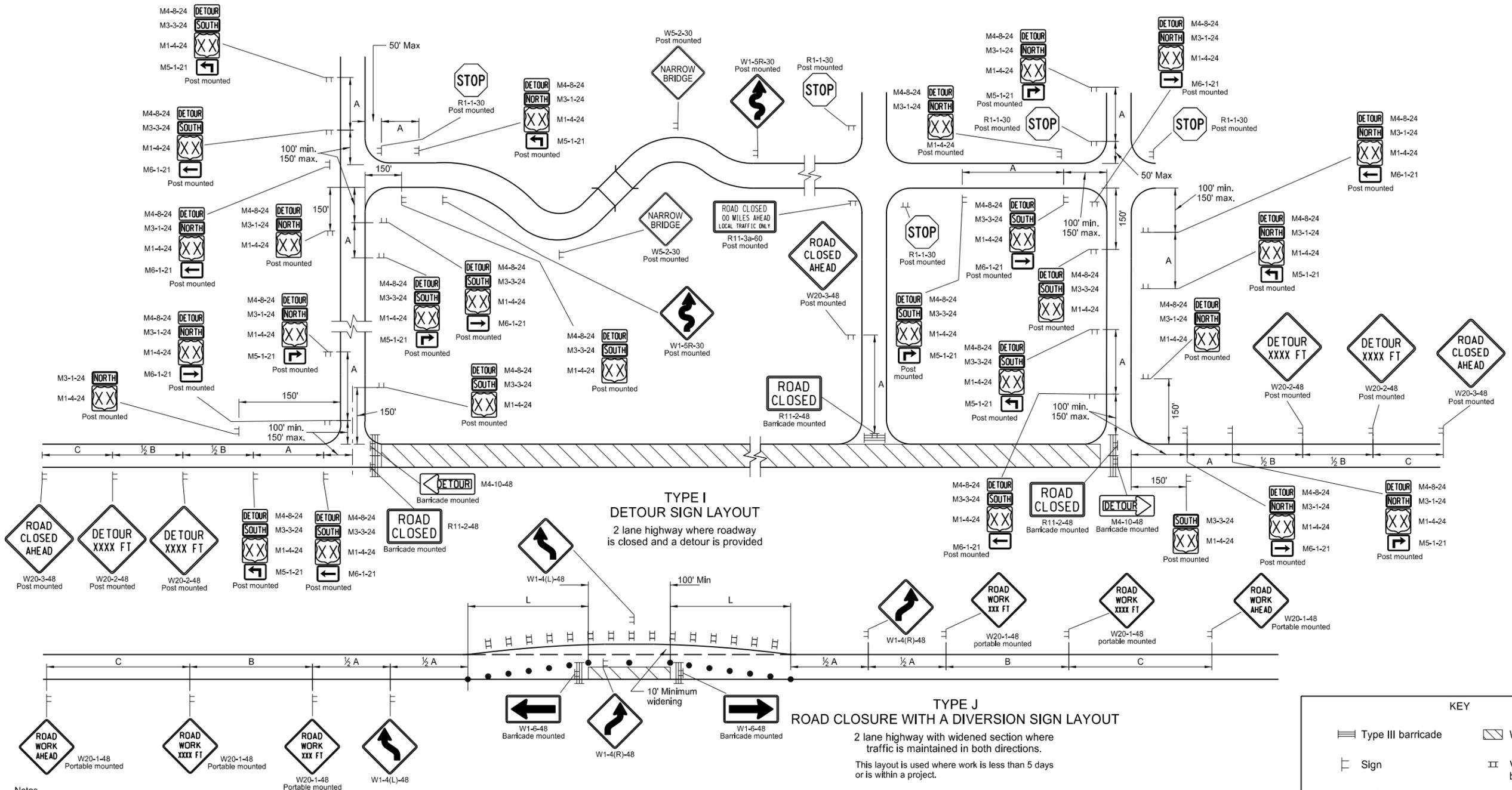
| Road Type | Distance Between Signs Min. (ft) | | |
|---|----------------------------------|------|------|
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 to 40 mph) | 280 | 280 | 280 |
| Urban - High Speed (over 40 mph to 50 mph) | 360 | 360 | 360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

| | |
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DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS

D-704-21



- Notes**
- Variables
S=Numerical value of speed limit or 85th percentile. W=The width of taper.
L=Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
 - Delineator drums and vertical panels used for tapering traffic shall be spaced at dimension "S". Delineator drums, tubular markers and vertical panels used for tangents shall be spaced at 2 times "S". The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}$ B.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

- A W24-1-48 sign may be used in place of the double reverse curve signs if the tangent between tapers is less than 60'.

KEY

| | | | |
|--|--------------------|--|------------------------------|
| | Type III barricade | | Work area |
| | Sign | | Vertical panels back to back |
| | Delineator drum | | |

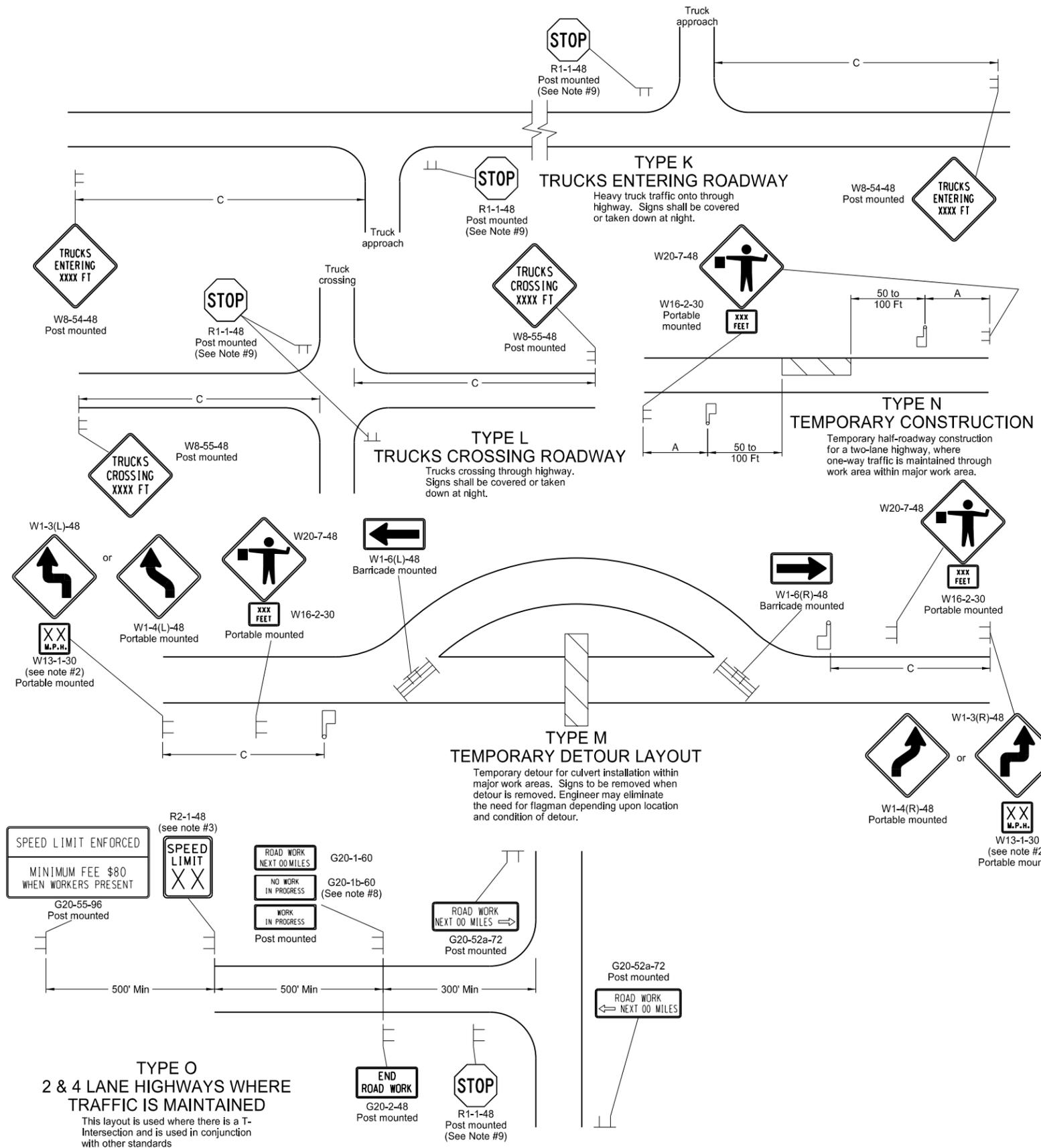
| ADVANCE WARNING SIGN SPACING | | | |
|---|----------------------------------|------|------|
| Road Type | Distance Between Signs Min. (ft) | | |
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 to 40 mph) | 280 | 280 | 280 |
| Urban - High Speed (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 | |
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| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
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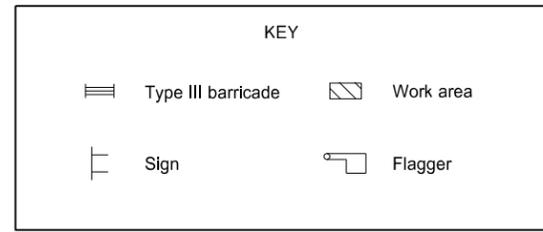
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CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



- Notes
1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies. Where necessary, safe speed to be determined by the Engineer.
 2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 4. Existing speed limit signs within a reduced speed zone shall be covered. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
 5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
 6. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
 7. If existing stop sign is in place, a 48" stop sign is not required.
 8. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.



ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13

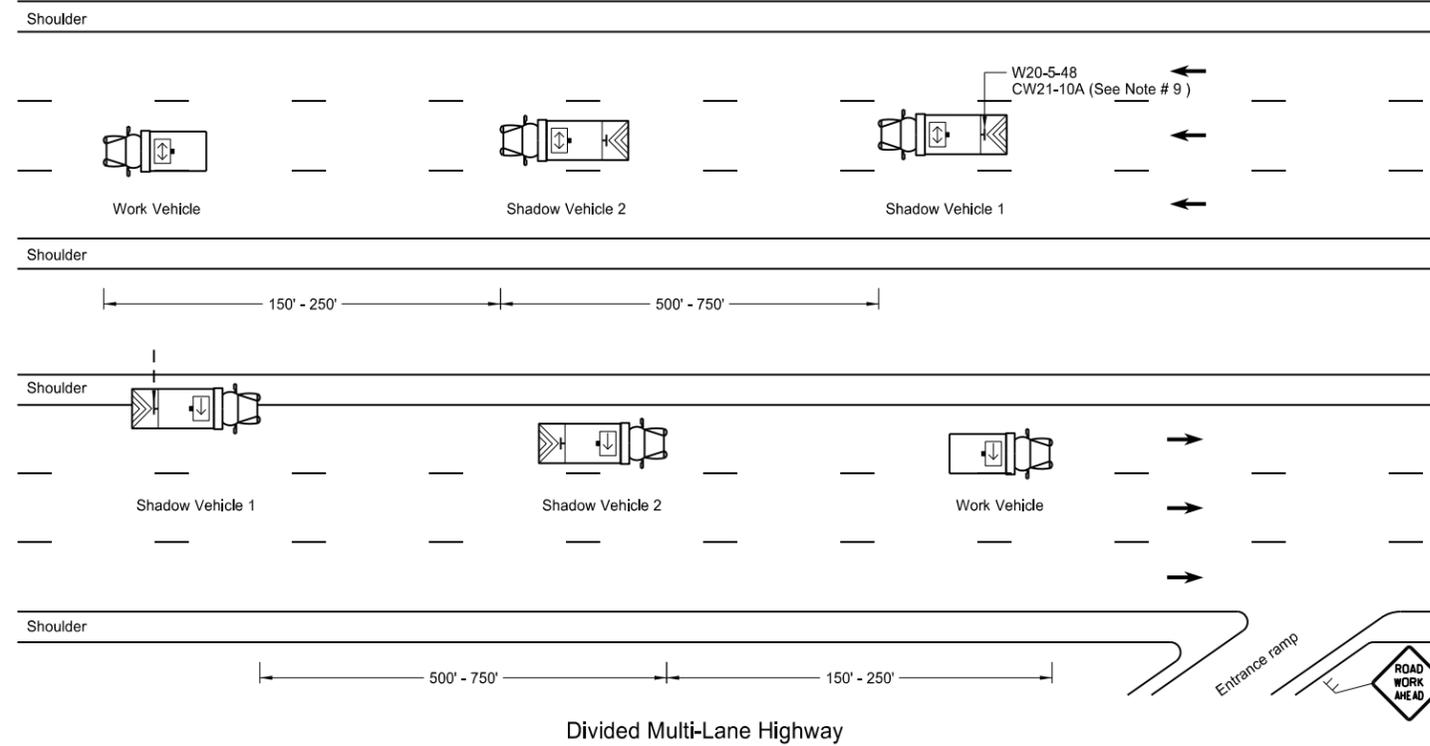
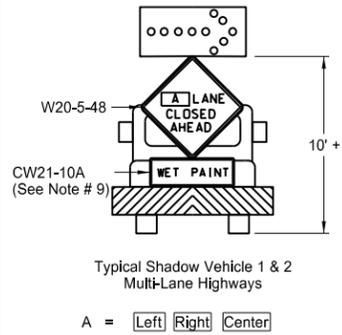
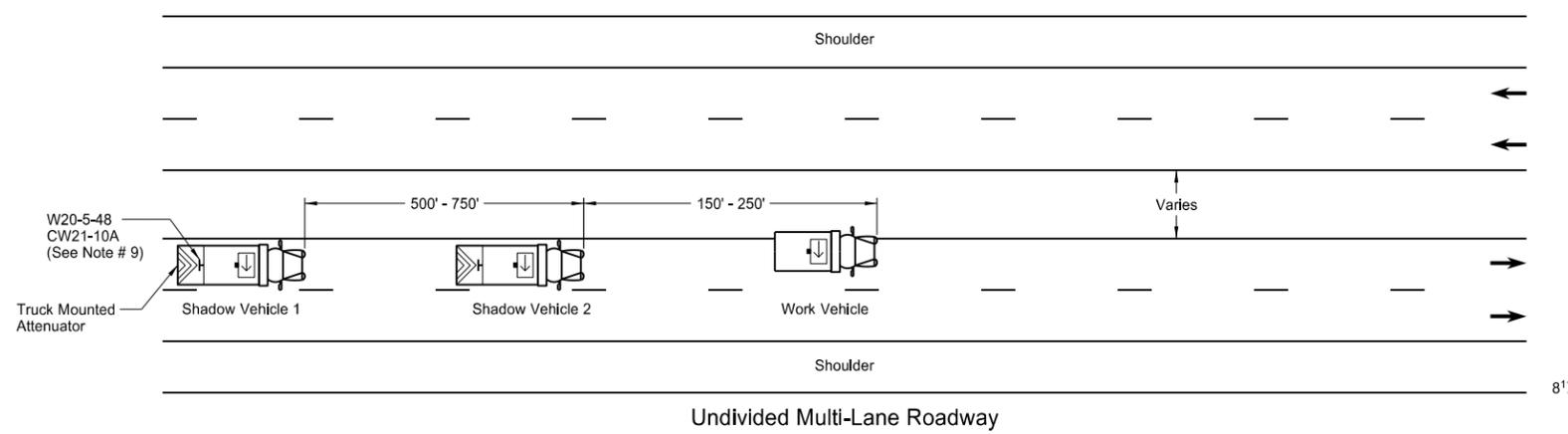
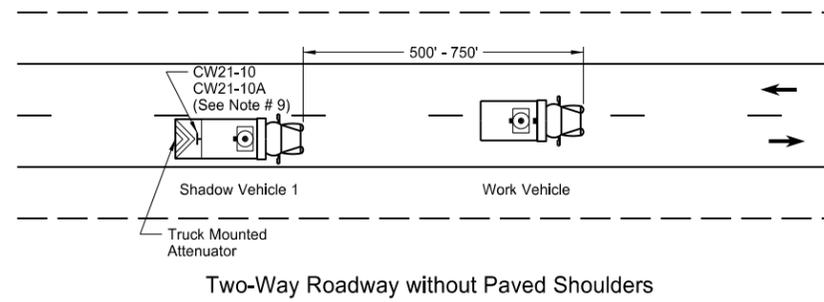
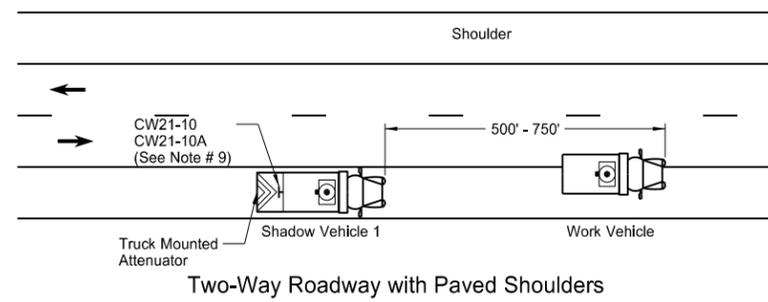
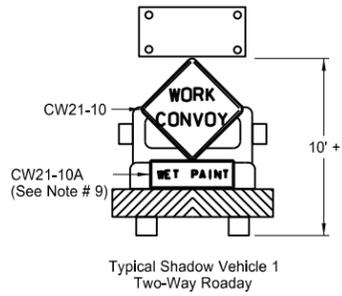
REVISIONS

| DATE | CHANGE |
|------|--------|
| | |

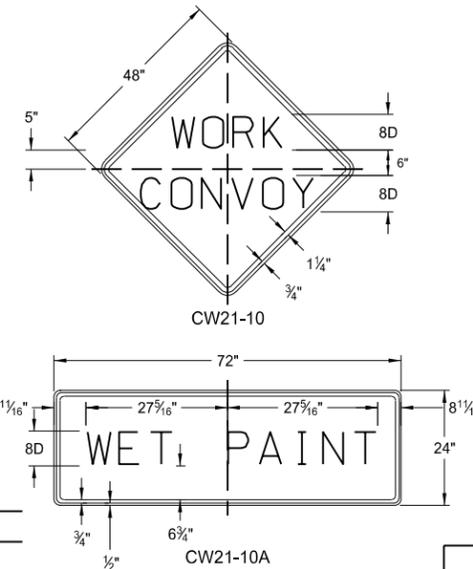
This document was originally issued and sealed by
 Roger Weigel
 Registration Number
 PE- 2930,
 on 09/27/13 and the original document is stored at the
 North Dakota Department
 of Transportation

TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

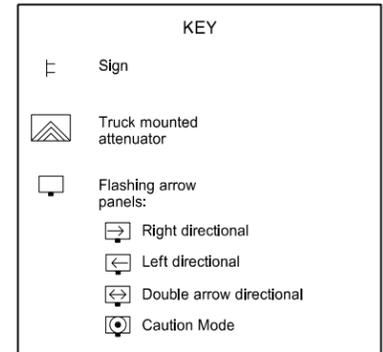
D-704-27



Sign Details



- Notes
- If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
 - Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
 - Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
 - Each vehicle shall have two-way electronic communication capability.
 - When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
 - Vehicle spacing between the shadow vehicle 1 and shadow vehicle 2 will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the trail vehicle in time to slow down and/or change lanes as they approach the shadow vehicle.
 - Sign Colors
Letters = Black
Border = Black
Background = Orange
 - Shadow vehicle 2 may be used as the paint tender vehicle.
 - Sign CW21-10A shall only be used during a painting operation.
 - On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.

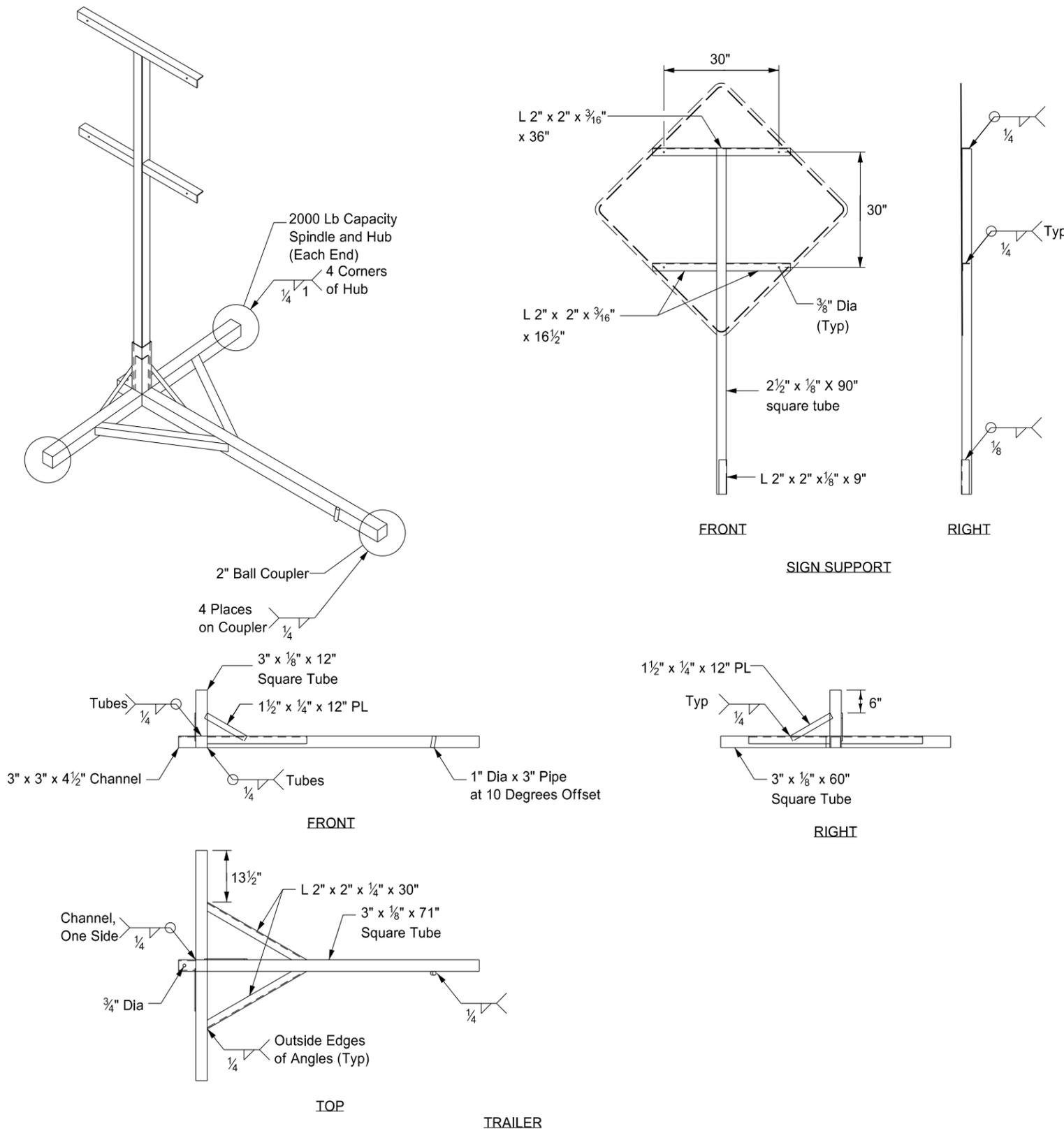


| | |
|--|---|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 6-18-14 | Removed shadow vehicle 2 on two lane roadways |

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



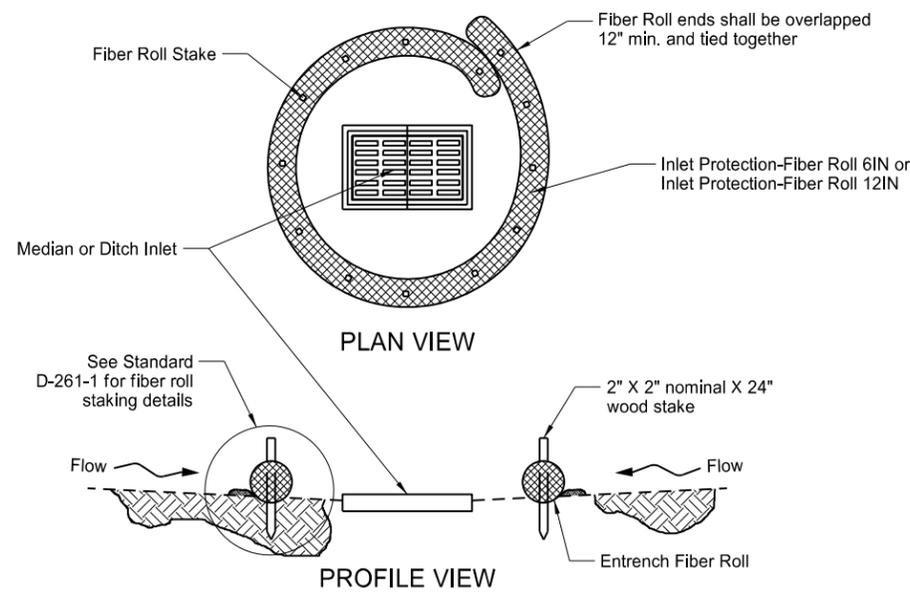
Notes:

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

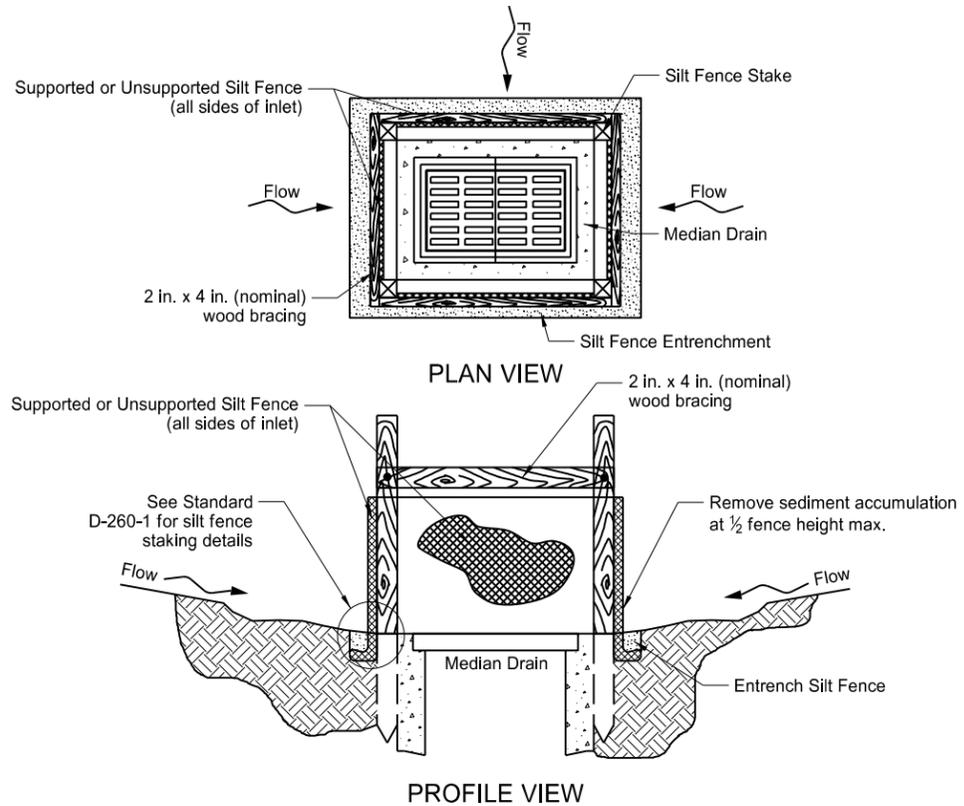
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| 11-23-10 | |
| REVISIONS | |
| DATE | CHANGE |
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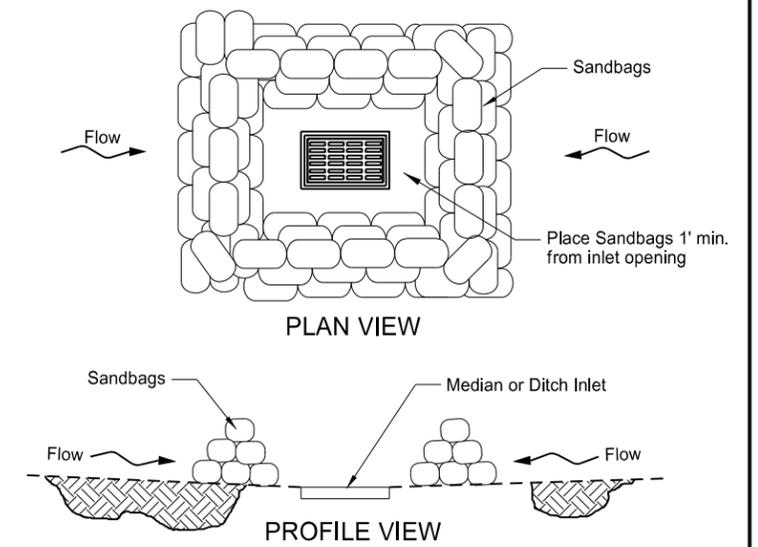
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



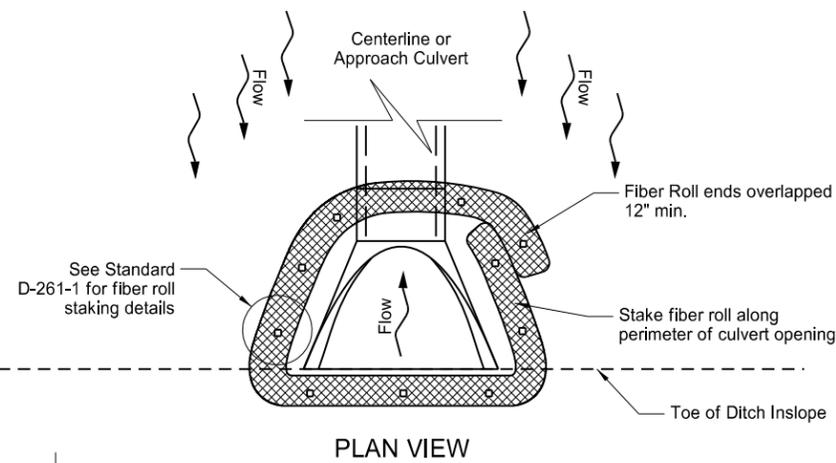
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



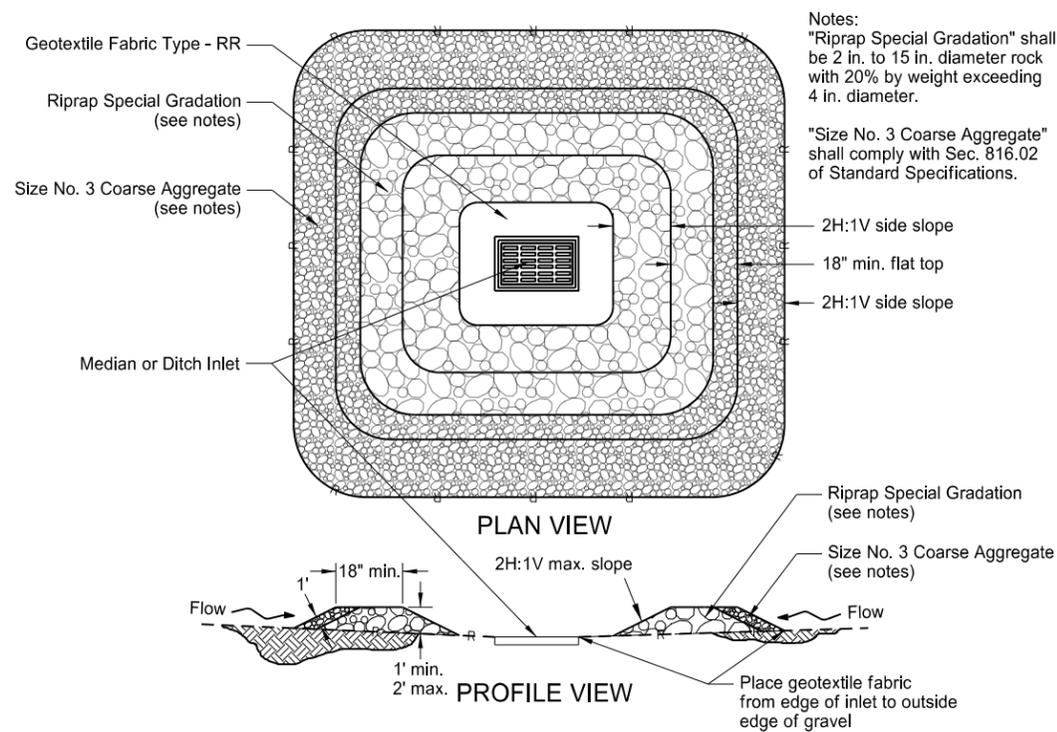
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



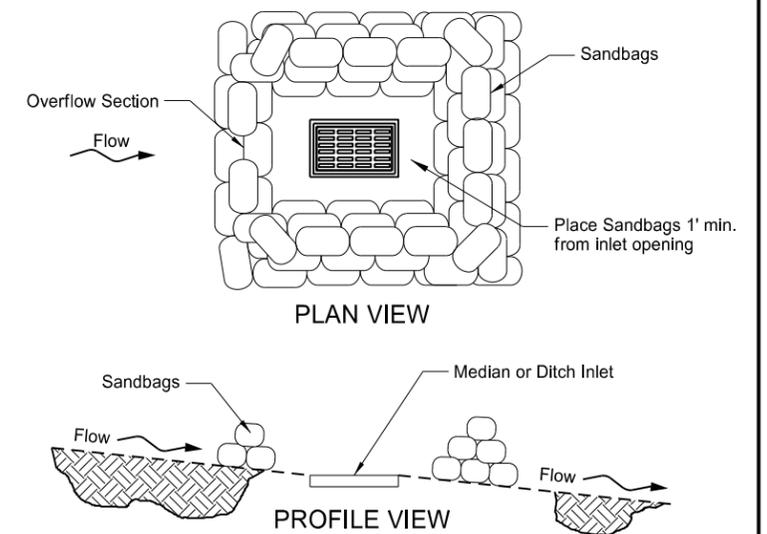
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



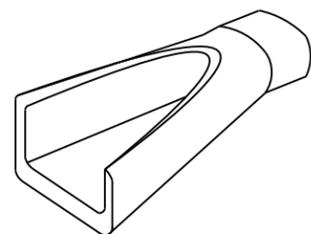
SANDBAG PROTECTION (ON SLOPE)

Notes:
"Riprap Special Gradation" shall be 2 in. to 15 in. diameter rock with 20% by weight exceeding 4 in. diameter.
"Size No. 3 Coarse Aggregate" shall comply with Sec. 816.02 of Standard Specifications.

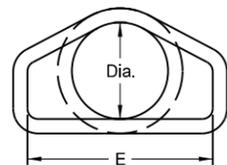
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|--|
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Updated reference to standard drawing number for fiber roll staking details. |
| 10-01-14 | Updated reference to standard drawing number for silt fence. |

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REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

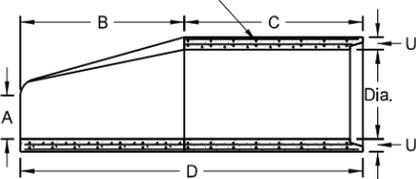


PERSPECTIVE

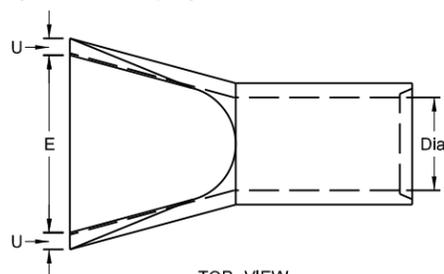


END VIEW

Standard Reinforcement for Class III pipe reinforced as per AASHTO M170



SIDE VIEW

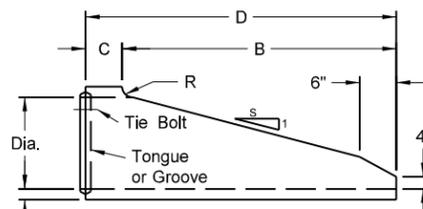


TOP VIEW

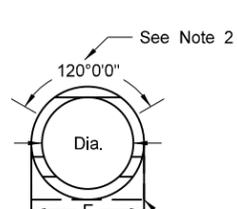
REINFORCED CONCRETE PIPE - FLARED END SECTION

Reinforcement to be equivalent to Class III RCP

| TRAVERSABLE END SECTION | | | | | | | |
|-------------------------|-------|-----|-------|--------|-----|-----|---|
| DIA | B | C | D | E | F | R | S |
| 15" | 4' | 9" | 4'-9" | 1'-7½" | 2½" | 3" | 6 |
| 18" | 5'-9" | 9" | 6'-6" | 1'-11" | 2½" | 3" | 6 |
| 24" | 6' | 1' | 7' | 2'-6" | 3" | 3" | 4 |
| 30" | 7'-6" | 1' | 8'-6" | 3'-1" | 3½" | 3½" | 4 |
| 36" | 7'-3" | 15" | 8'-6" | 3'-8" | 4" | 3" | 4 |



SIDE VIEW



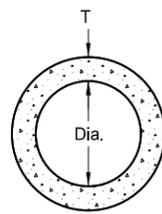
END VIEW

NOTES (Traversable End Section):

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

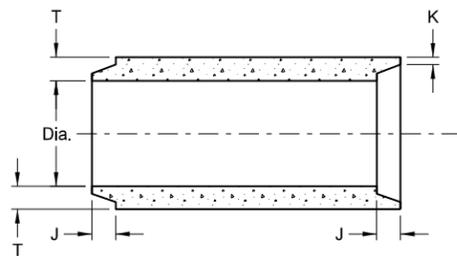
REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

Reinforcement to be equivalent to Class III RCP

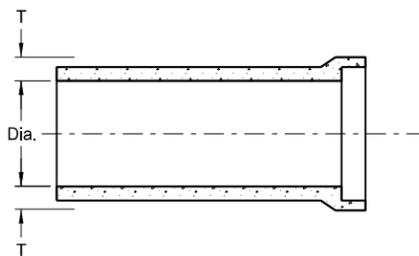


END VIEW

CIRCULAR PIPE

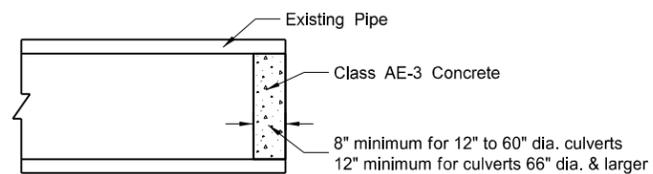


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

| FLARED END SECTION | | | | | | |
|---------------------|---------|--------|--------|--------|--------|-----|
| TERMINAL DIMENSIONS | | | | | | |
| DIA | A | B | C | D | E | U |
| 12 | 0'-4" | 2'-0" | 4'-0½" | 6'-0½" | 2'-0" | 2" |
| 15 | 0'-6" | 2'-3" | 3'-10" | 6'-1" | 2'-6" | 2½" |
| 18 | 0'-9" | 2'-3" | 3'-10" | 6'-1" | 3'-0" | 2½" |
| 21 | 0'-9" | 3'-0" | 3'-1" | 6'-1" | 3'-6" | 2½" |
| 24 | 0'-9½" | 3'-7½" | 2'-6" | 6'-1½" | 4'-0" | 3" |
| 27 | 0'-10½" | 4'-0" | 2'-1½" | 6'-1½" | 4'-6" | 3½" |
| 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'-9½" | 8'-2½" | 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" |

All Classifications of Round Concrete Pipe

| Internal Dia. of Pipe (In.) | Cross-Sectional Water Area (Sq. ft.) | Weight per Lin. Foot of Pipe (Lbs.) | Joint Groove End Min./Max. (In.) | Joint Tongue End Min./Max. (In.) | Minimum Wall Thickness (In.) |
|-----------------------------|--------------------------------------|-------------------------------------|----------------------------------|----------------------------------|------------------------------|
| 12 | 0.79 | 92 | 1½-2¾ | ¾ | 2 |
| 15 | 1.23 | 127 | 1¾-2¾ | ¾ | 2½ |
| 18 | 1.77 | 168 | 1¾-2¾ | 1 | 2½ |
| 21 | 2.40 | 214 | 1¾-3¾ | 1½ | 2¾ |
| 24 | 3.14 | 265 | 2¾-3¾ | 1½ | 3 |
| 27 | 3.98 | 322 | 2¾-4 | 1¾ | 3¼ |
| 30 | 4.91 | 384 | 3¾-4¼ | 1¾ | 3½ |
| 33 | 5.94 | 452 | 3¾-4¼ | 1½ | 3¾ |
| 36 | 7.07 | 524 | 3¾-4¼ | 1½ | 4 |
| 42 | 9.62 | 685 | 3¾-4¼ | 1¾ | 4½ |
| 48 | 12.57 | 885 | 3¾-4¼ | 1¾ | 5 |
| 54 | 15.90 | 1070 | 4½-5½ | 2 | 5½ |
| 60 | 19.63 | 1296 | 4½-5½ | 2¼ | 6 |
| 66 | 23.76 | 1542 | 5-6 | 2½ | 6½ |
| 72 | 28.27 | 1810 | 5½-6¾ | 2½ | 7 |
| 78 | 33.18 | 2098 | 6¼-7¼ | 2½ | 7½ |
| 84 | 38.48 | 2410 | 5½-7¼ | 3¾ | 8 |
| 90 | 44.18 | 2793 | 6¾-8½ | 3¾ | 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 |

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

NOTES:

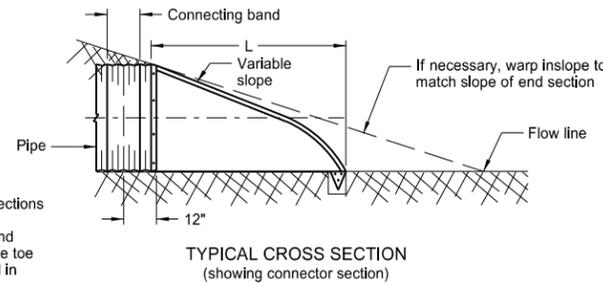
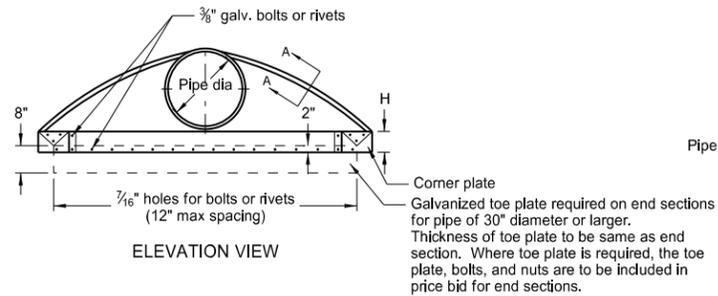
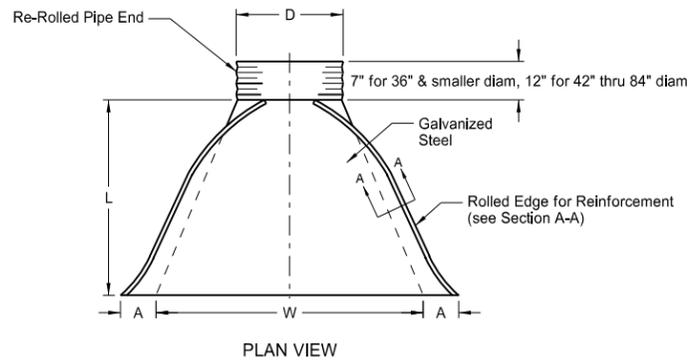
1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66" (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.

| | |
|--|----------------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 05-12-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 01-21-15 | Revised Note 5 |

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ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



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

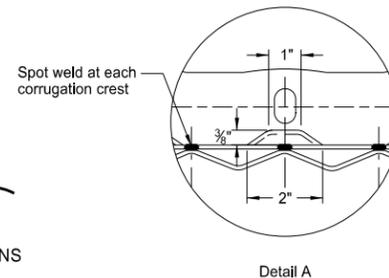
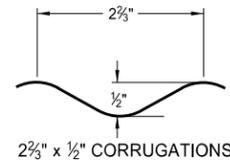
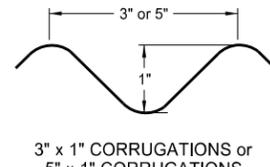
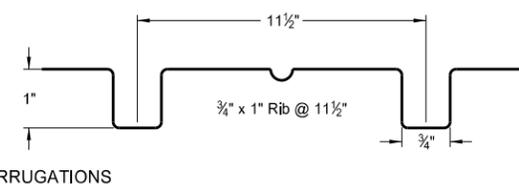
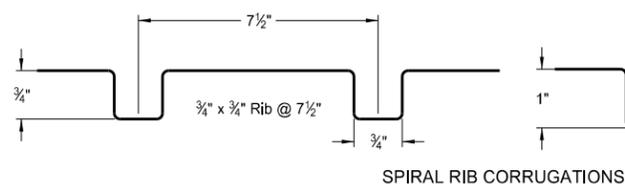
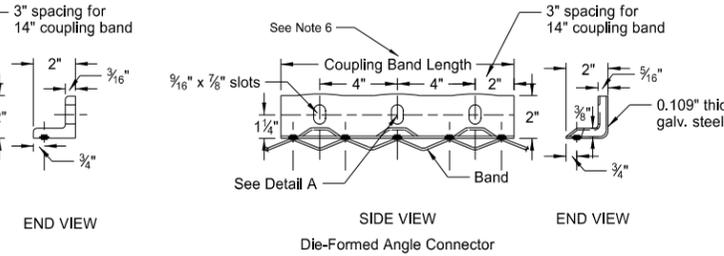
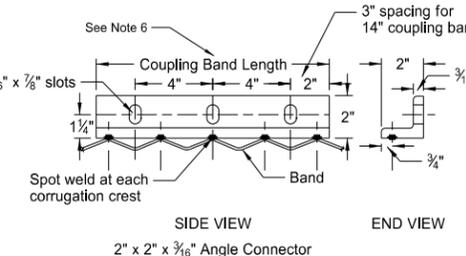
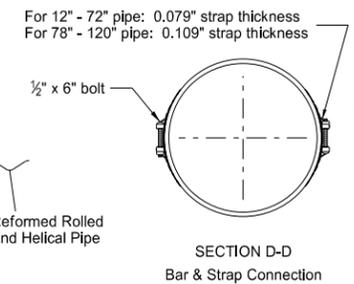
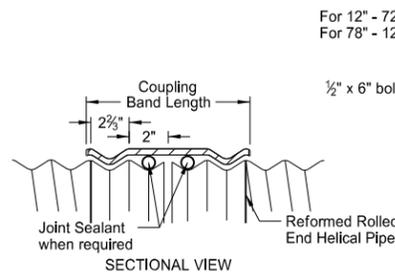
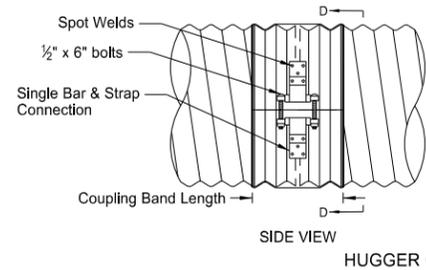
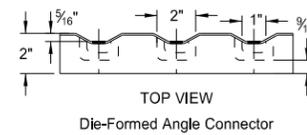
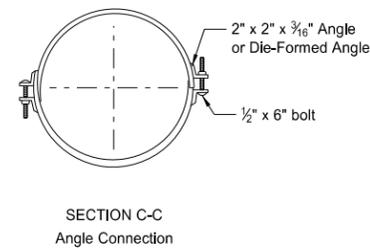
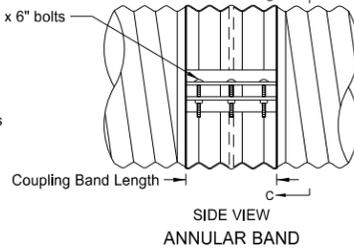
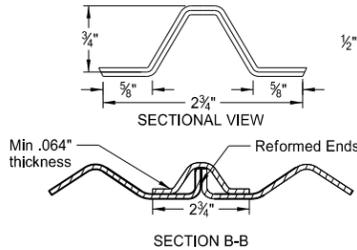
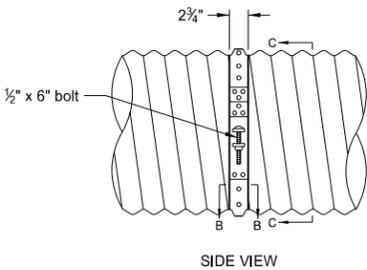
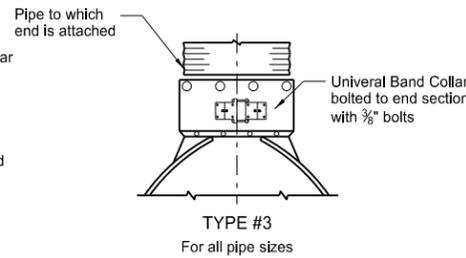
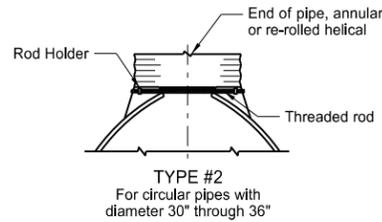
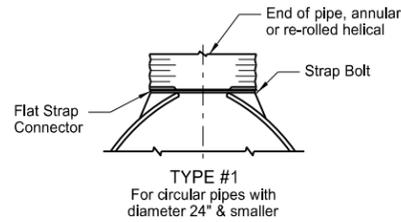
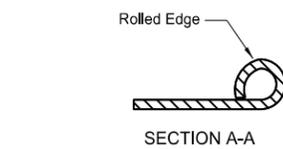
- These sizes have 0.109" sides and 0.138" center panels.
 - Pipe diameter is equal to dimension "D" of end section.
- Manufacturers tolerances of above dimensions will be allowed.
- Splices to be the lap riveted type.

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

NOTES:

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

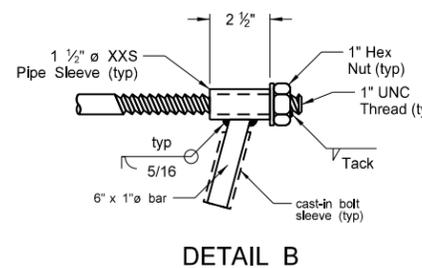
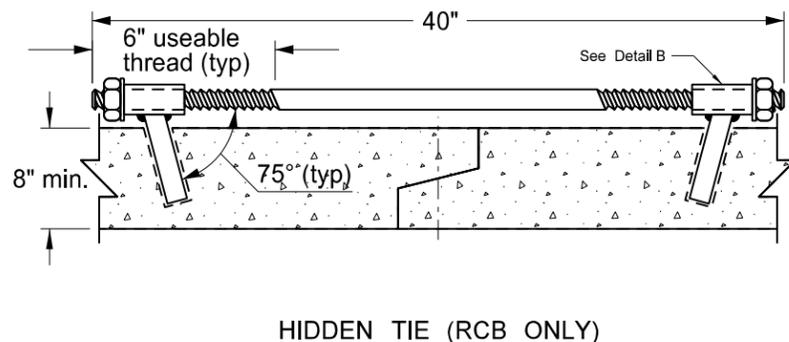
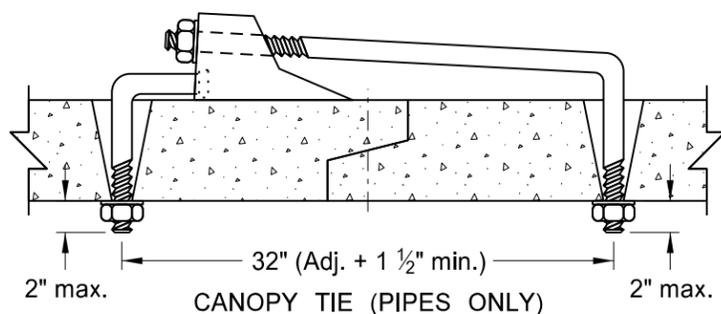
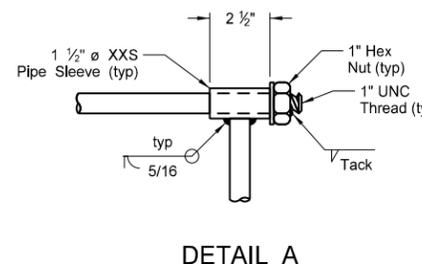
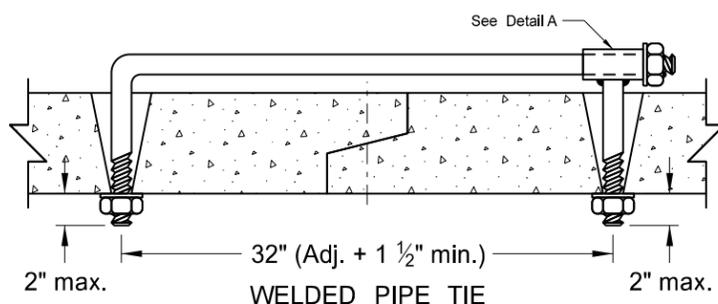
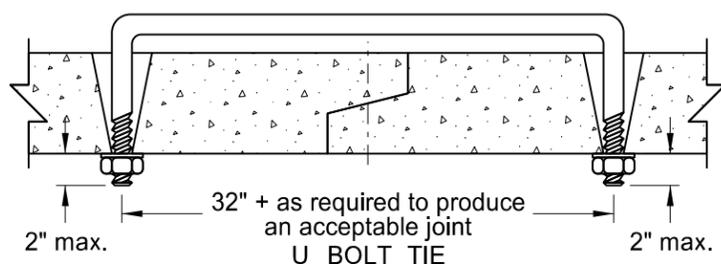
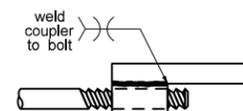
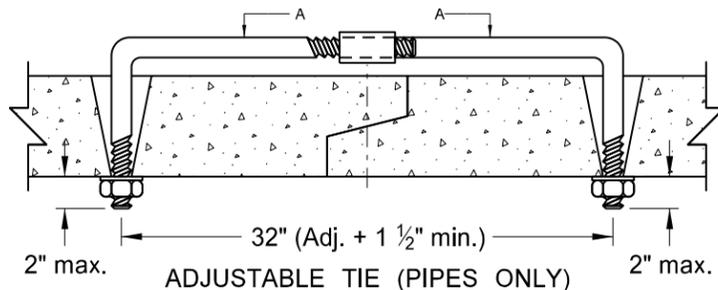
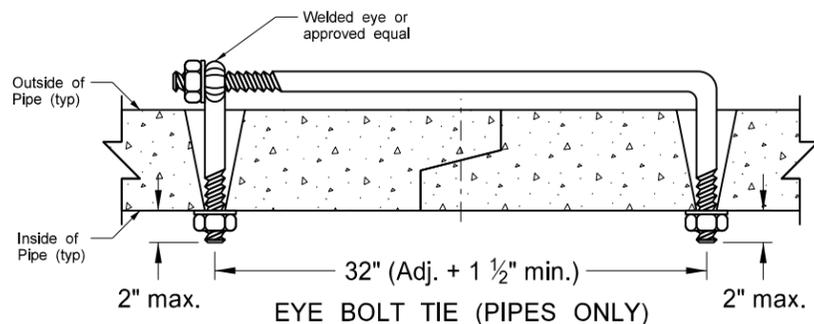
| COUPLING BAND DIMENSIONS | | | | |
|--------------------------|----------------------------|------------|----------------------|---------------------|
| COUPLING TYPE | CORRUGATION PITCH x DEPTH | PIPE SIZE | COUPLING BAND LENGTH | MIN. BAND THICKNESS |
| Hat Band | 2 3/8" x 1/2" | 12" - 48" | 2 3/4" | .064" |
| Annular Band | 2 3/8" x 1/2" | 12" - 72" | 12" | .052" |
| | | 78" - 84" | 12" | .079" |
| Hugger Band | 2 5/8" x 1/2" Rerolled End | 12" - 72" | 10 1/2" | .052" |
| | | 78" - 84" | 10 1/2" | .079" |
| | 3" x 1" Rerolled End | 48" - 120" | 10 1/2" | .052" |
| | 5" x 1" Rerolled End | 48" - 120" | 12" | .064" |



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

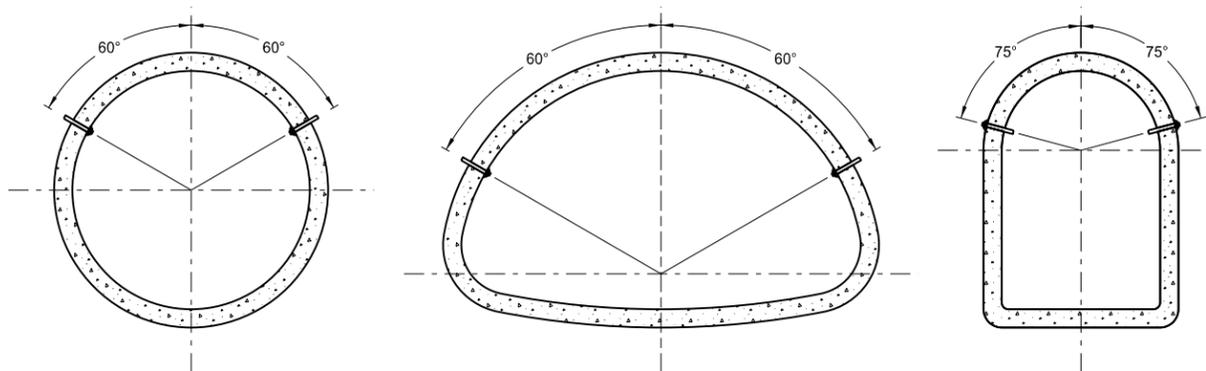
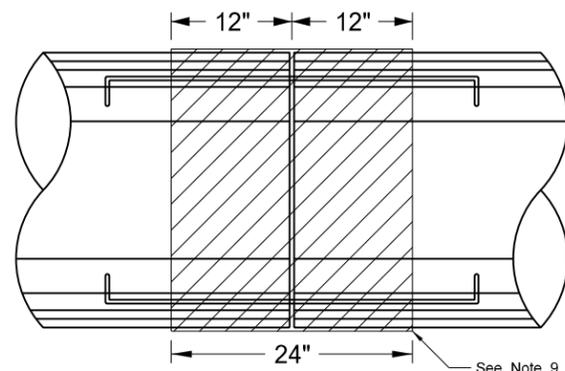
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CONCRETE PIPE OR PRECAST CONCRETE BOX CULVERT TIES



| REQUIRED SIZE OF TIE BOLTS | | |
|----------------------------|--------------------|------------------------------|
| Pipe Size | Thread ϕ | XXS Pipe Sleeve Inner ϕ |
| 18" - 24" | 5/8" See note 2 | 3/4" |
| 30" - 66" | 3/4" | 1" |
| 72" - 78" | 1" | 1 1/4" |
| RCB | | |

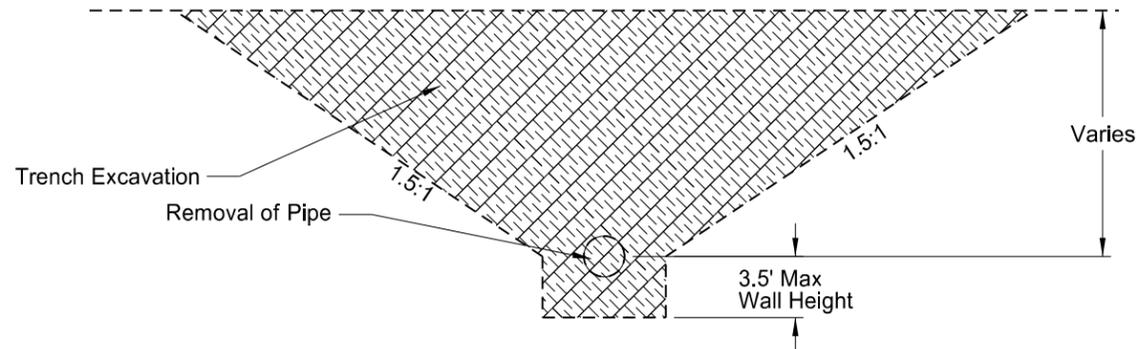
- NOTES:
- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
 - Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.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



| | |
|---|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 3-18-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-21-15 | Note 8 |

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TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL FOR
PIPES MORE THAN 4 FEET BELOW THE TOP OF PROPOSED SUBGRADE



Pay Items

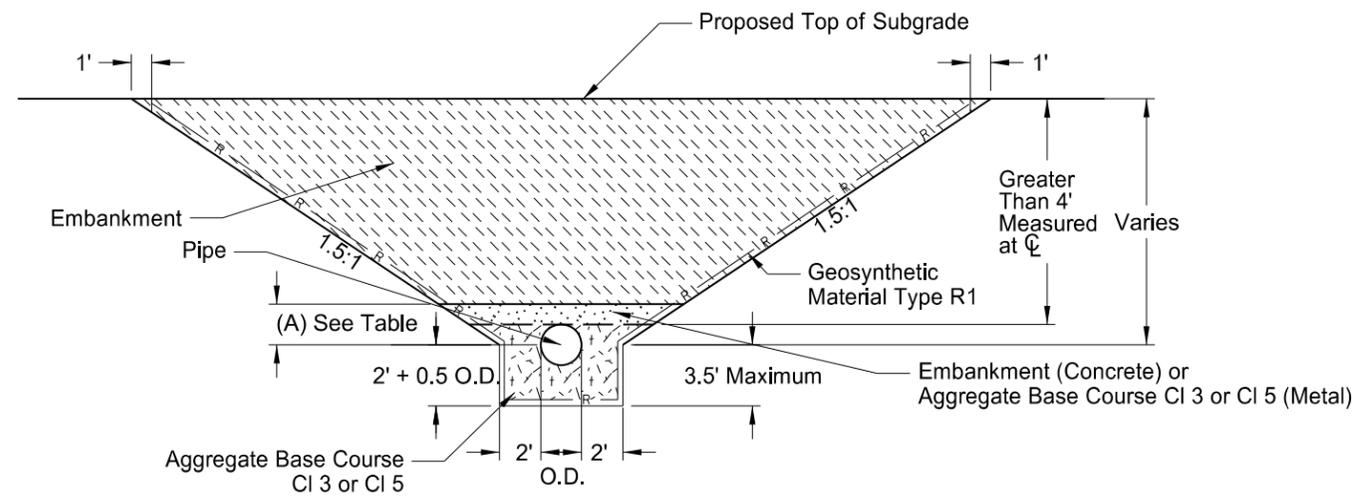
- 1) Pipe*
- 2) Geosynthetic Material Type R1
- 3) Removal of Pipe (if required)

*Included in Pipe Pay Item

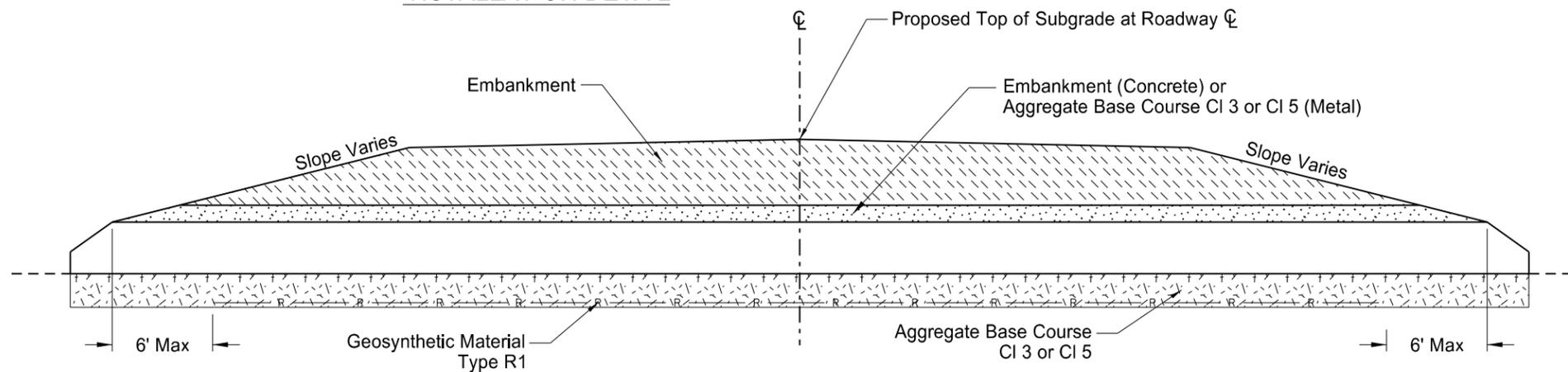
- 1) Pipe
- 2) Trench excavation
- 3) Aggregate Base Course CI 3 or CI 5
- 4) Embankment

NOTES:

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



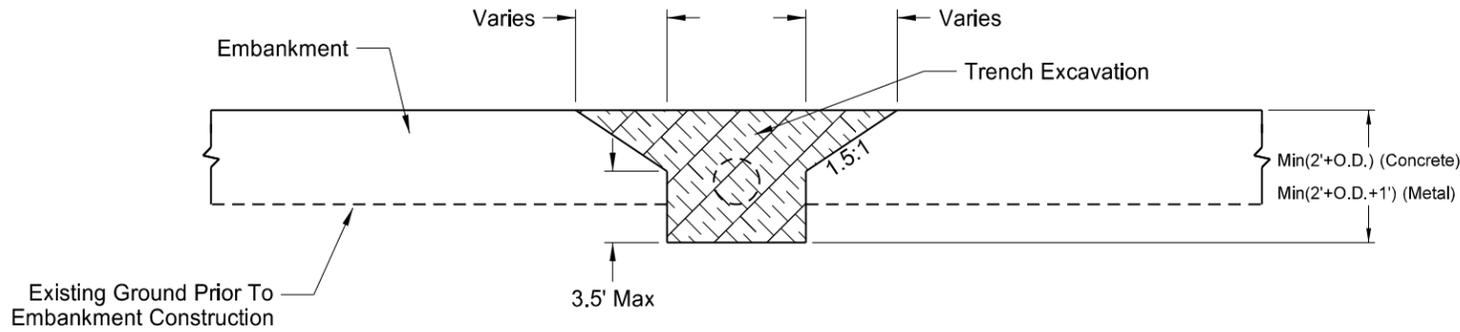
| Backfill Dimensions | |
|---------------------|-------------------|
| Pipe Materials | Dimension (A) |
| Concrete | 0.5 O.D. |
| Metal | 0.5 O.D. + 1 Foot |



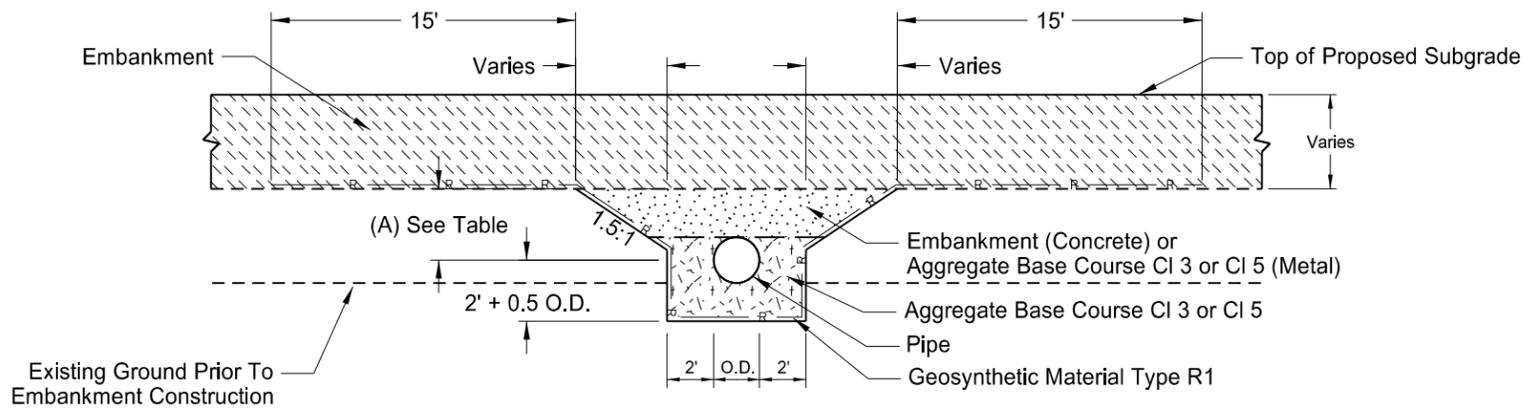
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|------------------|
| 7-26-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-15-13 | Label Formatting |
| 1-21-14 | Nomenclature |

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Registration Number
PE-2087,
on 1/22/2015 and the original document is stored at the
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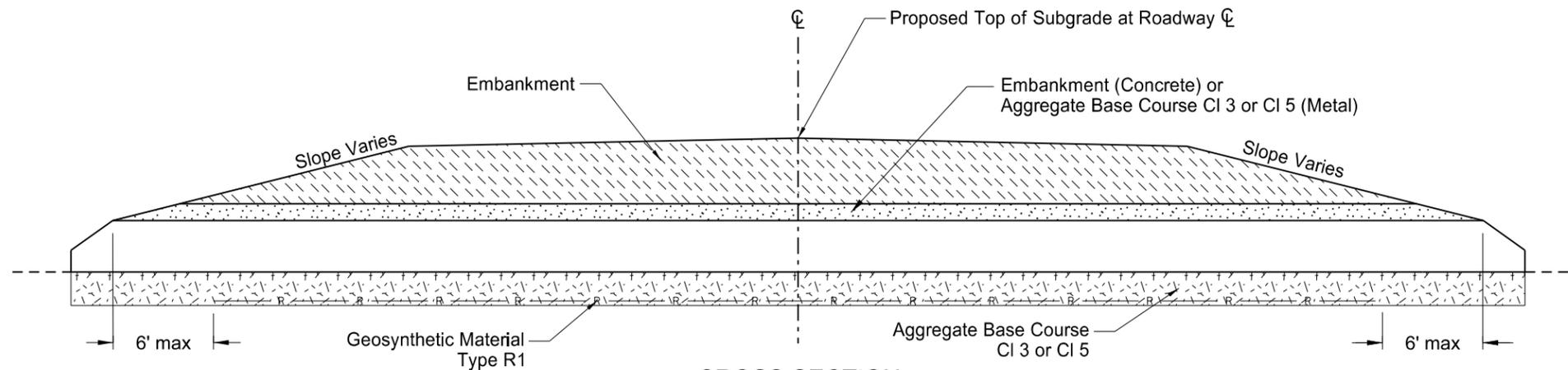
TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL FOR PIPES INSTALLED IN NEW EMBANKMENT AREAS



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items

- 1) Pipe*
- 2) Geosynthetic Material Type R1

*Included in Pipe Pay Item

- 1) Pipe
- 2) Trench excavation
- 3) Aggregate base course CI 3 or CI 5
- 4) Embankment

NOTES:

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

| Backfill Dimensions | |
|---------------------|-------------------|
| Pipe Materials | Dimension (A) |
| Concrete | 0.5 O.D. |
| Metal | 0.5 O.D. + 1 foot |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|----------------------------------|
| 7-26-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-15-13 1-21-15 | Label Formatting Nomenclature |

This document was originally issued and sealed by
 Ron Homer,
 Registration Number
 PE-2087,
 on 1/22/2015 and the original document is stored at the
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STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

NOTES:

The construction and installation of Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) shall conform to Section 720 of the Standard Specifications.

ALIGNMENT MONUMENTS:

Iron Pin or Precast Concrete Alignment Monuments with aluminum caps will be placed on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

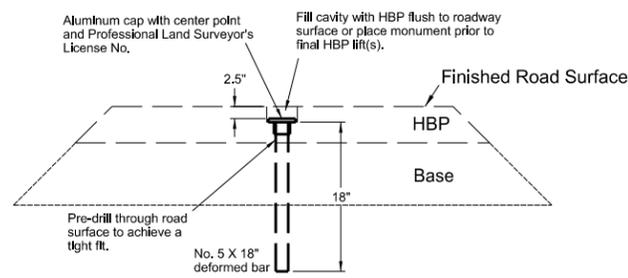
IRON PIN R/W MONUMENT:

Iron pins with aluminum caps (No. 5 X 18") will be placed at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

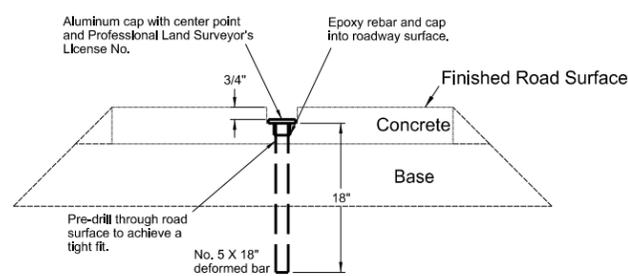
IRON PIN REFERENCE MONUMENT:

Iron Pins without aluminum caps (No. 5 X 18") will be placed as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

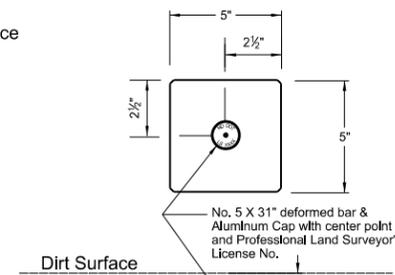
ALIGNMENT MONUMENT DETAILS



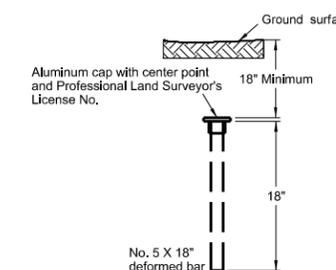
IRON PIN
(Within Finished Roadway Surface)



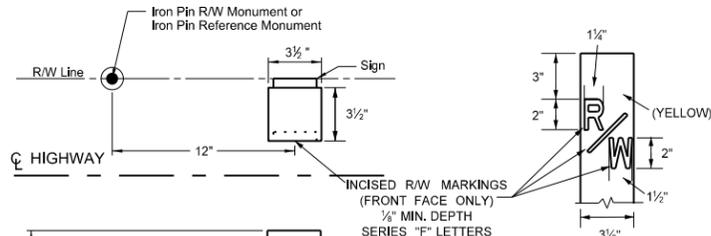
IRON PIN
(Within Finished Roadway Surface)



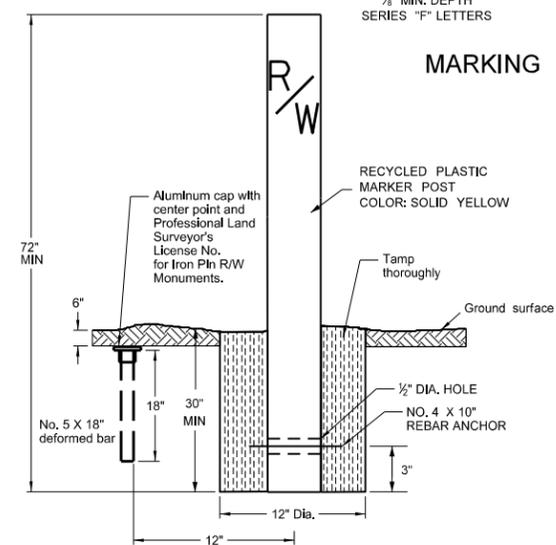
PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)



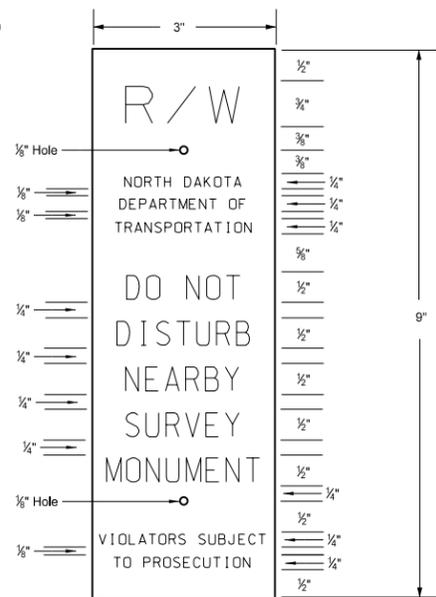
IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)



MARKING DETAIL



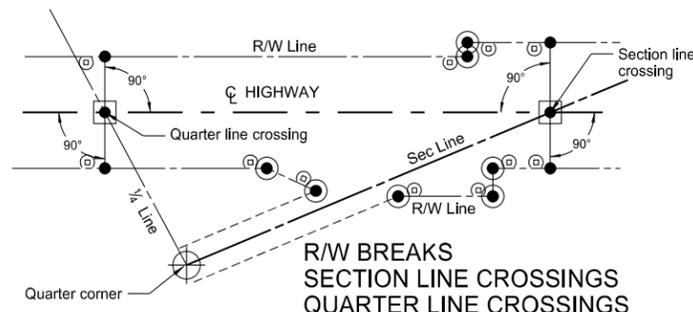
RECYCLED PLASTIC
RIGHT OF WAY MARKER
(WITNESS POST) DETAILS
&
IRON PIN REFERENCE AND R/W
MONUMENT DETAILS



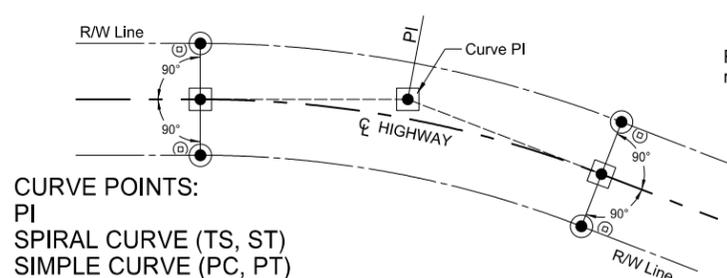
SIGN DETAIL

Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Sign shall be attached by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Sign shall be installed 2" from top of post.

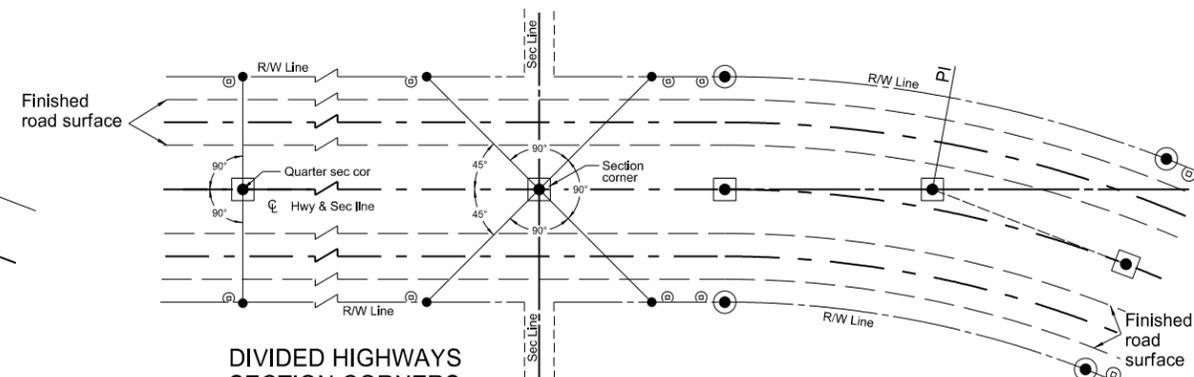
VARIOUS MONUMENT AND MARKER PLACEMENTS



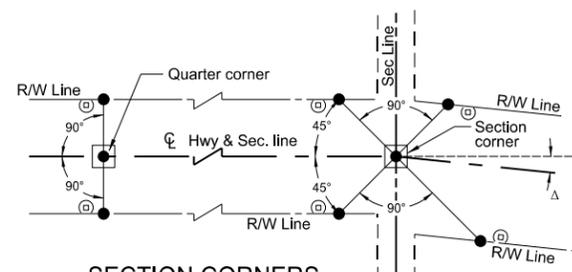
R/W BREAKS
SECTION LINE CROSSINGS
QUARTER LINE CROSSINGS



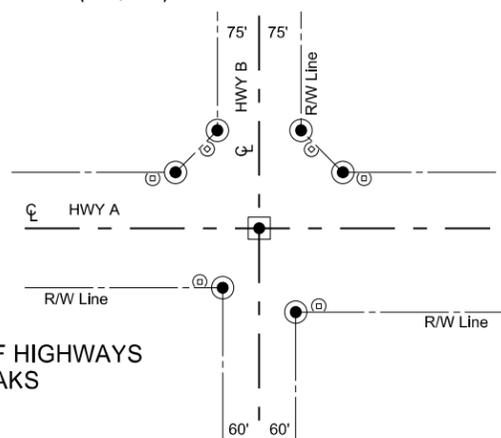
CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)



DIVIDED HIGHWAYS
SECTION CORNERS
QUARTER CORNERS



SECTION CORNERS
QUARTER CORNERS



INTERSECTION OF HIGHWAYS
FLARED R/W BREAKS

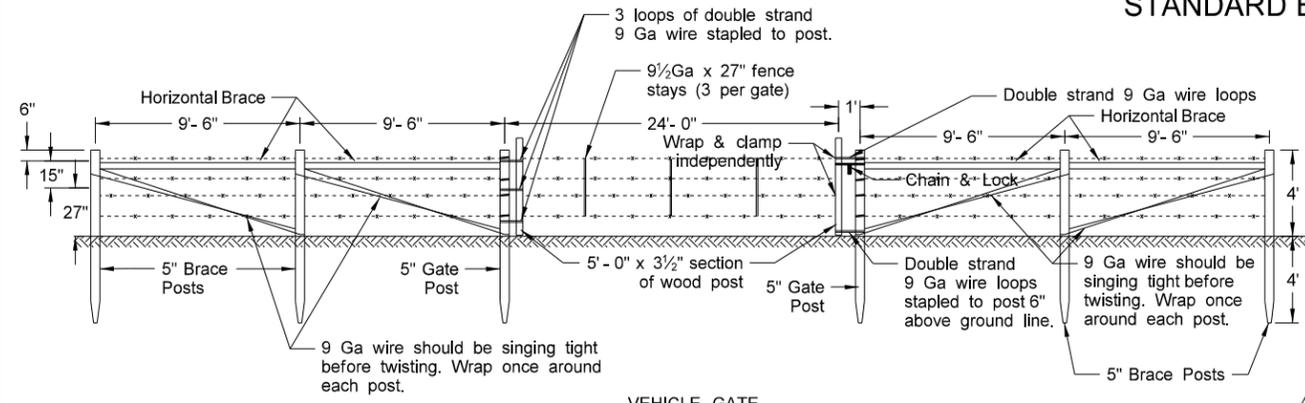
LEGEND

- Iron Pin Reference Monument
- ⊙ R/W Marker (witness post)
- Alignment Monument
- Iron Pin R/W Monument

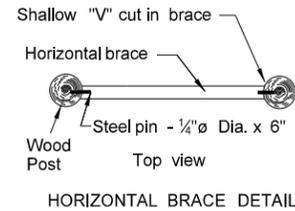
| | |
|--|---|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 10-3-2013 | |
| REVISIONS | |
| DATE | CHANGE |
| 11/12/13 | Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38 |

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Registration Number
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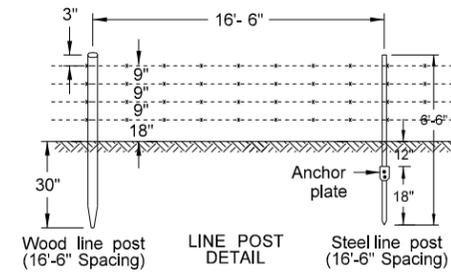
STANDARD BARBED WIRE FENCE



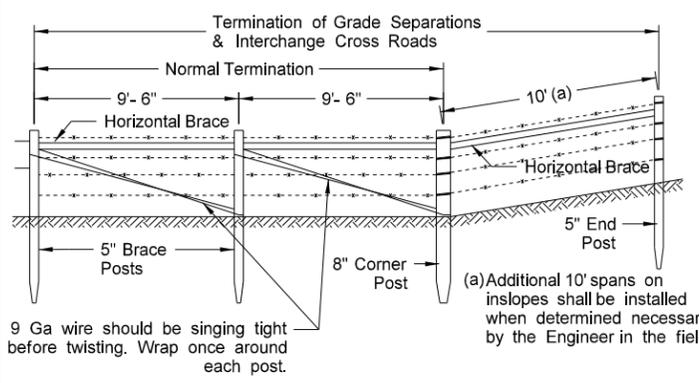
VEHICLE GATE



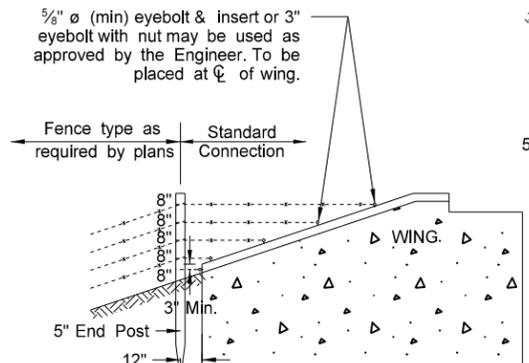
HORIZONTAL BRACE DETAIL



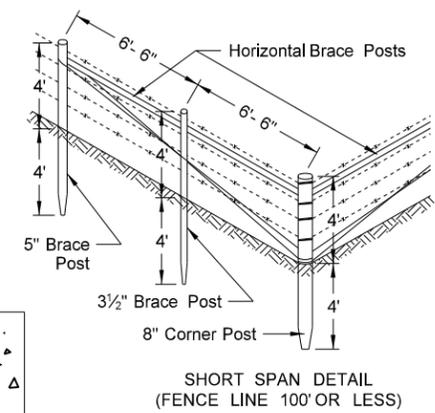
LINE POST DETAIL



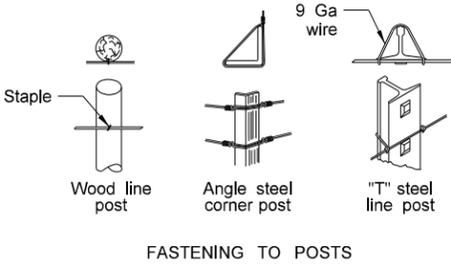
FENCE TERMINAL



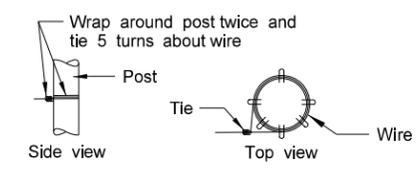
DETAIL FOR TYING FENCE TO WINGS OF ABUTMENTS



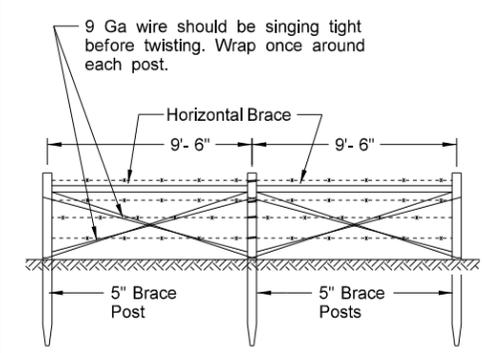
SHORT SPAN DETAIL (FENCE LINE 100' OR LESS)



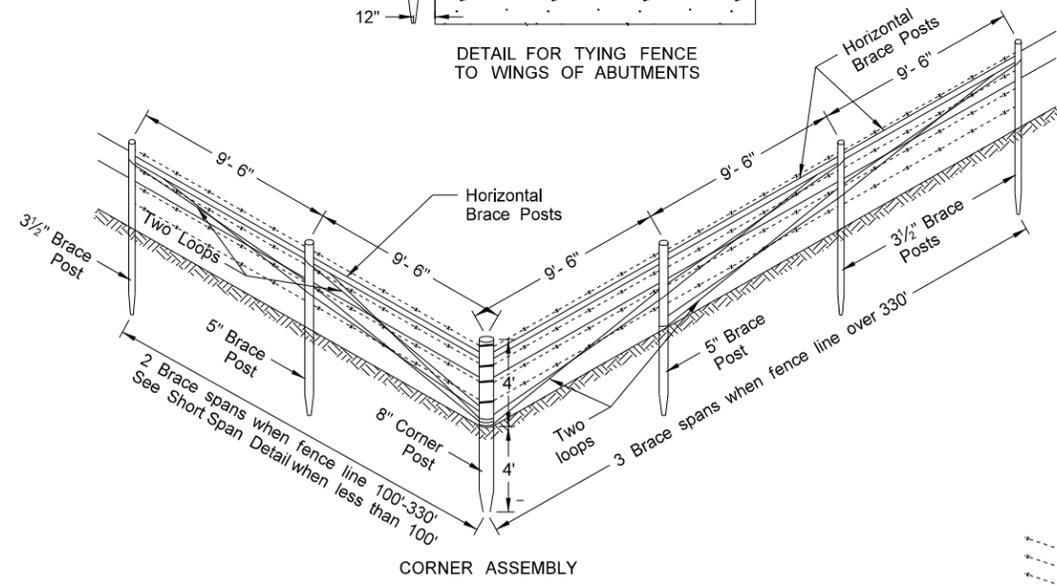
FASTENING TO POSTS



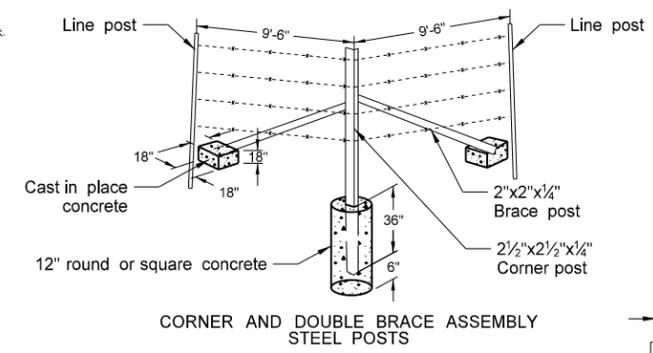
WRAP-AROUND DETAIL



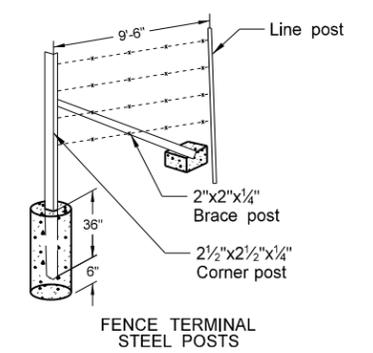
DOUBLE BRACE ASSEMBLY



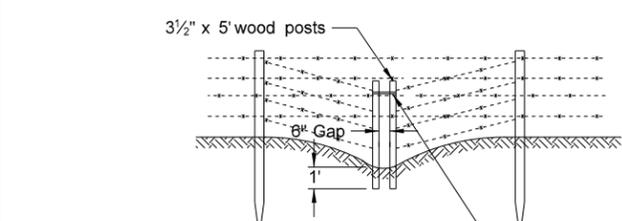
CORNER ASSEMBLY



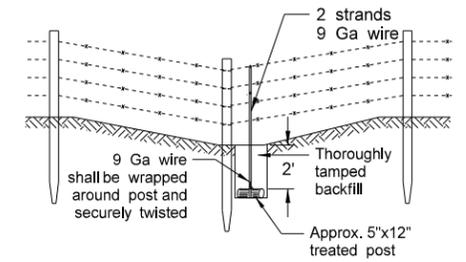
CORNER AND DOUBLE BRACE ASSEMBLY STEEL POSTS



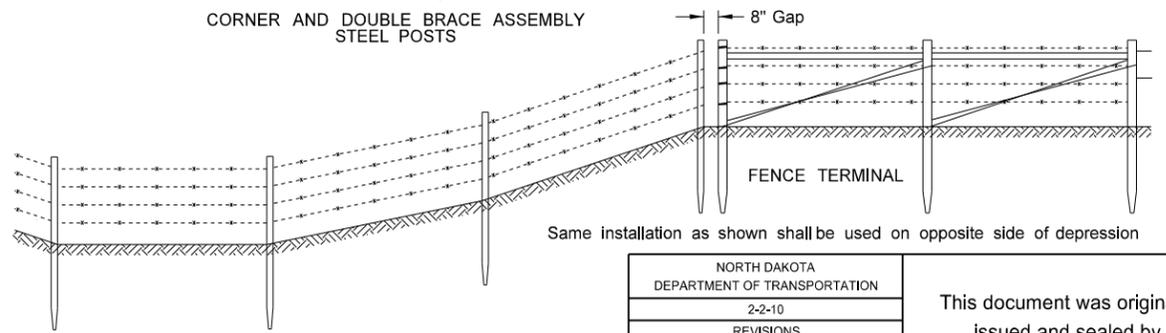
FENCE TERMINAL STEEL POSTS



BREAK-AWAY FENCE FOR NARROW DEPRESSIONS SUBJECT TO FLOODING



DETAIL FOR ANCHORING FENCES IN DEPRESSIONS*
*Locations shall be determined in the field and included in price bid for fencing. Other methods of anchoring the fence may be used if approved by the Engineer.



FENCING FOR WIDE DEPRESSIONS

NOTES

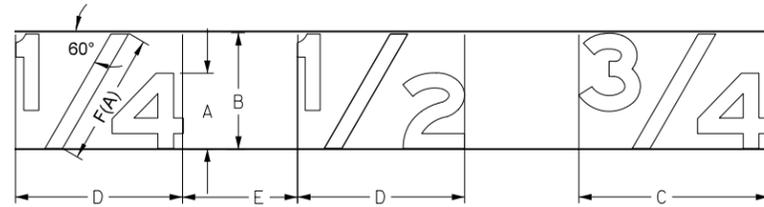
1. No deduction in measured pay length of cable fence will be made for gates, corner assemblies, double brace assemblies, fence terminals, or depression fencing. Abutment fencing shall be included in the price bid for fencing bid items.
2. Double brace assemblies shall be installed at locations shown on the plans or established by the Engineer. The distance between adjacent fence terminals, corner assemblies, or double brace assemblies shall not exceed 1,320 feet.
3. Cost of furnishing and installing inserts and eyebolts shall be included in the unit price bid for fencing bid items. Eyebolts shall be galvanized according to AASHTO designation M-30; inserts of corrosion resistant material need not be galvanized. Concrete inserts shall be of such design that, when installed in the concrete, will be capable of developing the full strength of the 5/8 inch diameter threaded eyebolt.
4. The type of posts to be used, either wood or steel, shall be determined by the contractor unless otherwise specified in the plans.

| USE OF POST | POST SIZES | | | | |
|------------------|--------------|-------------|-----------------------------|-----------------|-----------------|
| | TREATED WOOD | STEEL | STEEL | STEEL | STEEL |
| | Post dia. | Post length | Post length | Post wt. Lbs/Ft | Anchor wt. Lbs. |
| Line post | 3 1/2" | 6'-6" | 6'-6" | 1.33 | 0.67 |
| Corner post | 8" | 8' | 7' | 4.10 | (Conc.) |
| End post | 5" | 8' | | | |
| Brace post | 5" | 3 1/2" | 8' | 3.19 | (Conc.) |
| Gate post | 5" | 8' | | | |
| Horizontal brace | 3 1/2" | Var. | As approved by the Engineer | | |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|-------------------------------|
| 2-2-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-02-12 | Notes, steel assemblies/posts |
| 11-25-13 | Revised Vehicle Gate |

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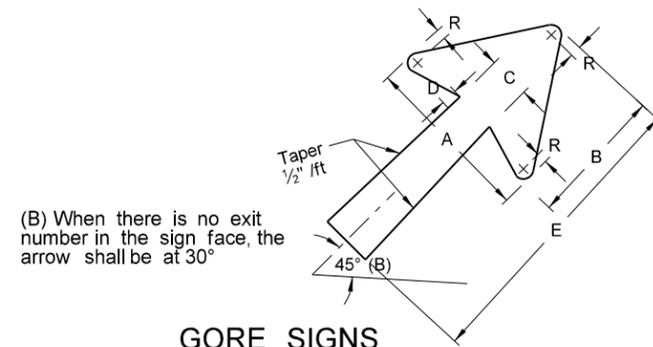
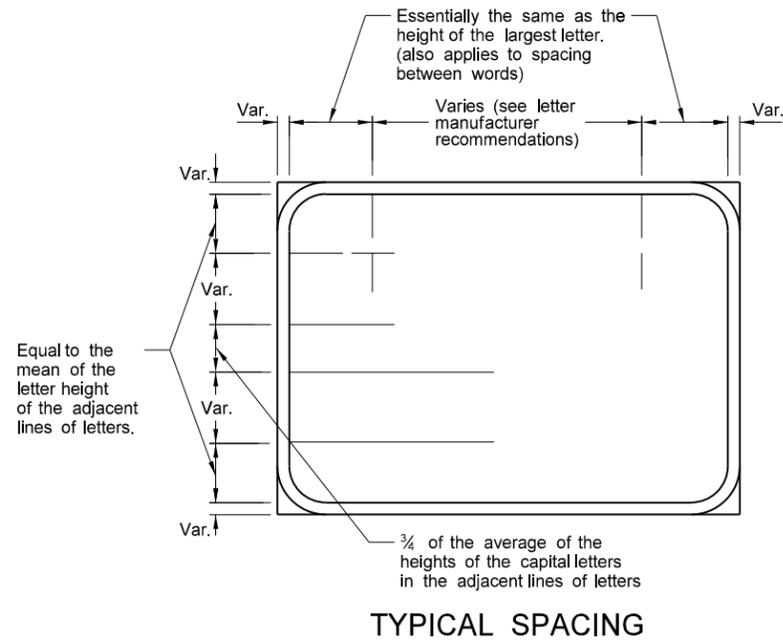
LETTER AND ARROW DETAILS FOR VARIABLE LENGTH SIGNS



SIZE OF THE FRACTION IS DETERMINED AS FOLLOWS:

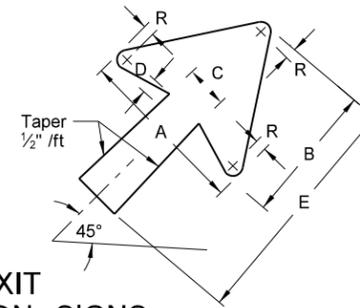
| SYMBOL | TITLE | RATIO TO HEIGHT OF CAPITAL OR UPPER CASE |
|--------|-------------------------|--|
| A | Letter height | 1.0 of capital or upper case |
| B | Fraction height | 1.5 X A |
| C | Fraction width | 2.5 X A |
| D | Fraction width | 2 X A |
| E | Space to next character | 1 to 1.5 X A |
|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

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



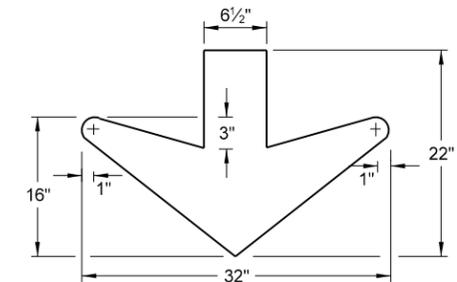
GORE SIGNS

| "EXIT" LETTER SIZE (Upper Case) | A | B | C | D | E | R |
|---------------------------------|---------|----------|--------|---------|-----|----------|
| 8" | 15 1/8" | 11 1/16" | 3 3/4" | 1 5/16" | 25" | 13 1/16" |
| 10" - 13 1/3" | 18 1/4" | 14" | 4 1/2" | 1 1/2" | 30" | 3/4" |

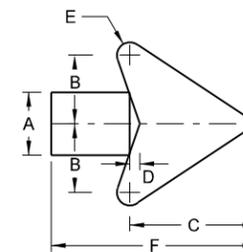


EXIT DIRECTION SIGNS

| LETTER SIZE (Upper Case) | A | B | C | D | E | R |
|--------------------------|---------|----------|--------|---------|-----|----------|
| 8" | 15 1/8" | 11 1/16" | 3 3/4" | 1 5/16" | 17" | 13 1/16" |
| 10" - 13 1/3" | 18 1/4" | 14" | 4 1/2" | 1 1/2" | 20" | 3/4" |
| 16" - 20" | 22 1/4" | 17" | 5 3/8" | 1 3/4" | 25" | 1" |



DOWN ARROW



DISTANCE AND DESTINATION SIGNS

| LETTER SIZE (Upper Case) | A | B | C | D | E | F |
|--------------------------|--------|----|---------|--------|---------|-----|
| 4" | 1 3/4" | 2" | 3 9/16" | 5/16" | 3/8" | 6" |
| 6" | 2 3/4" | 3" | 5 9/16" | 7/16" | 9/16" | 9" |
| 8" | 3 1/2" | 4" | 7 1/8" | 9/16" | 1 1/16" | 12" |
| 12" | 5 1/4" | 6" | 10 5/8" | 13/16" | 1 1/16" | 18" |

| | |
|---|--|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 8-3-11 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-8-14 | Revised gore sign and added 4" D & D arrow |

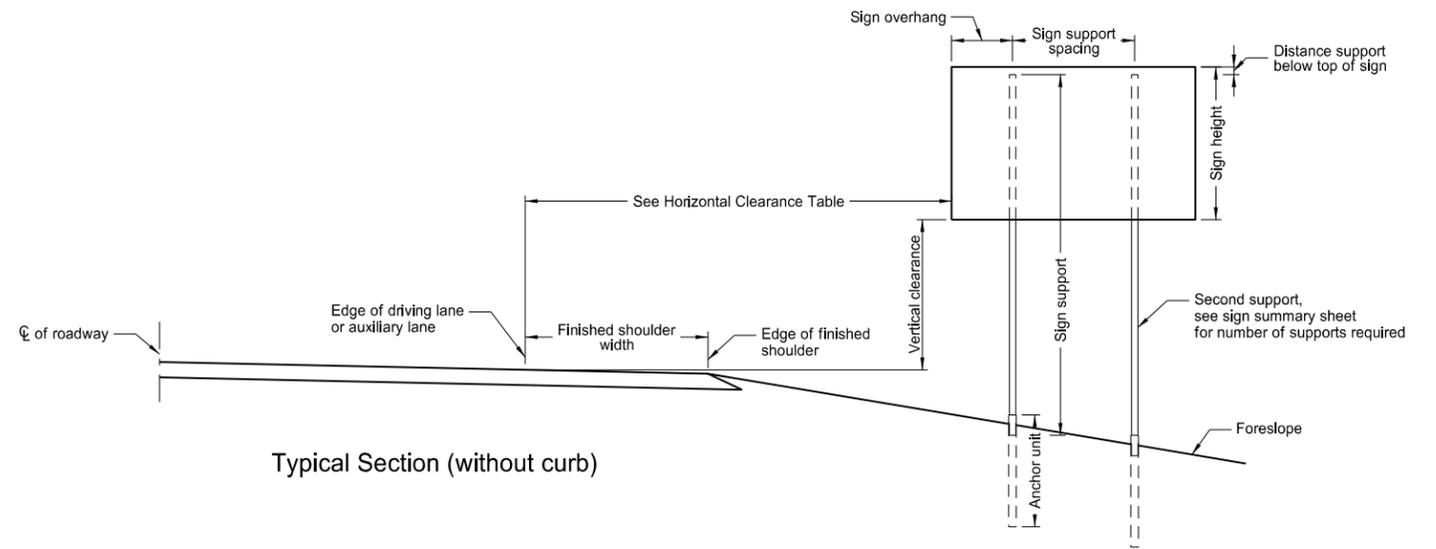
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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

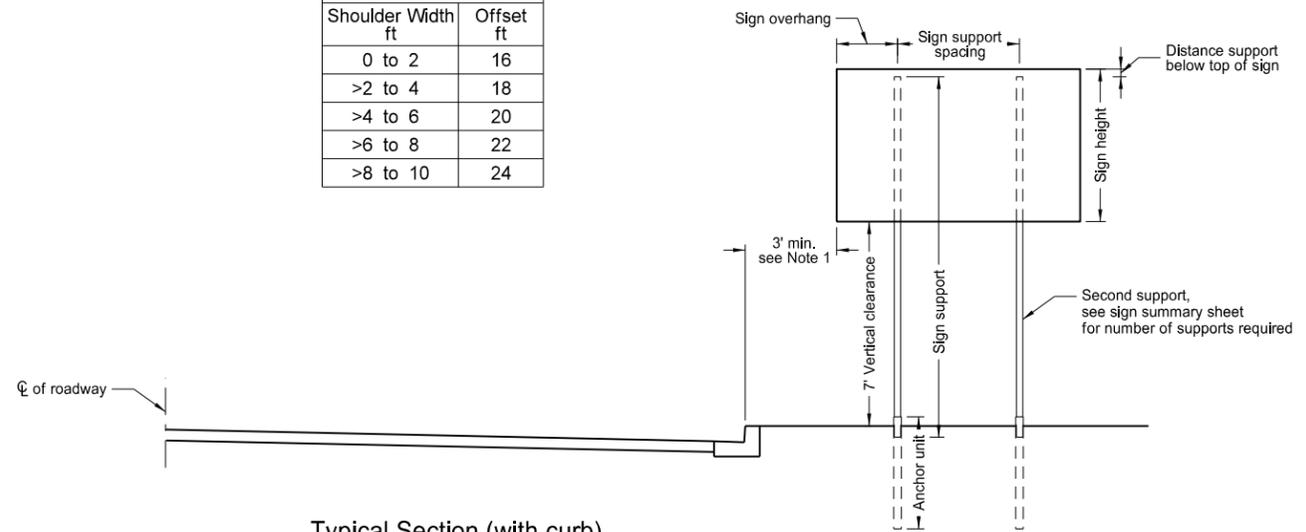
Notes:

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
2. Minimum vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.
- Signs on expressways shall be installed with a minimum height of 7'.
- Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.
- The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.
3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.
4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.

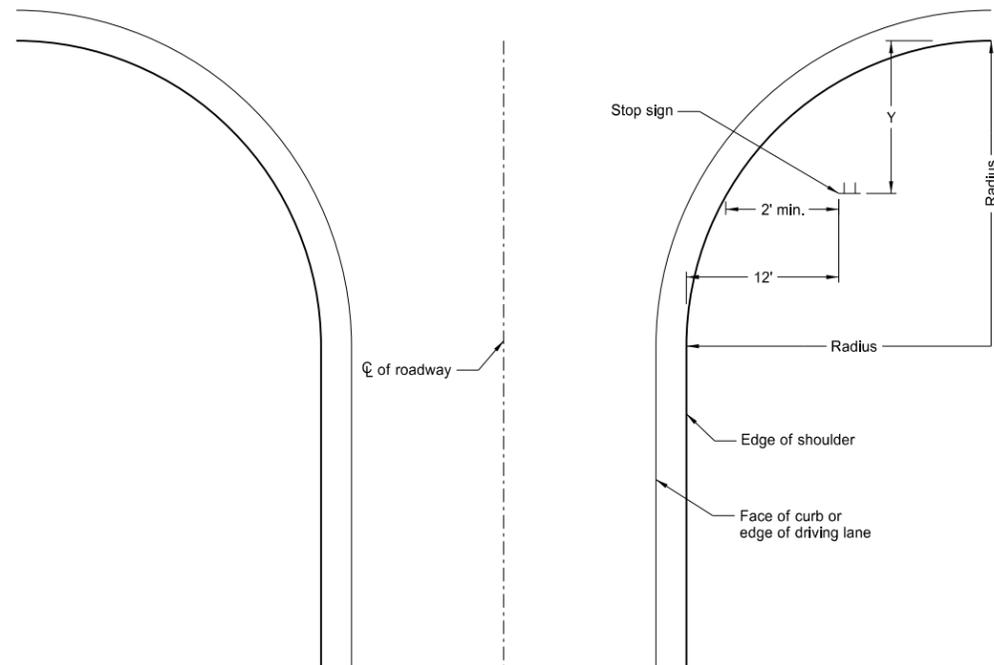


Typical Section (without curb)

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



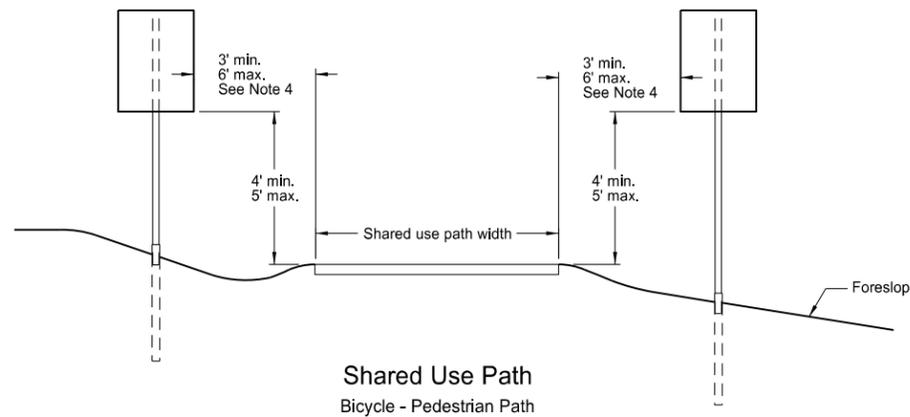
Typical Section (with curb)
Residential or Business District



Stop Sign Location
Wide Throat Intersection

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

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



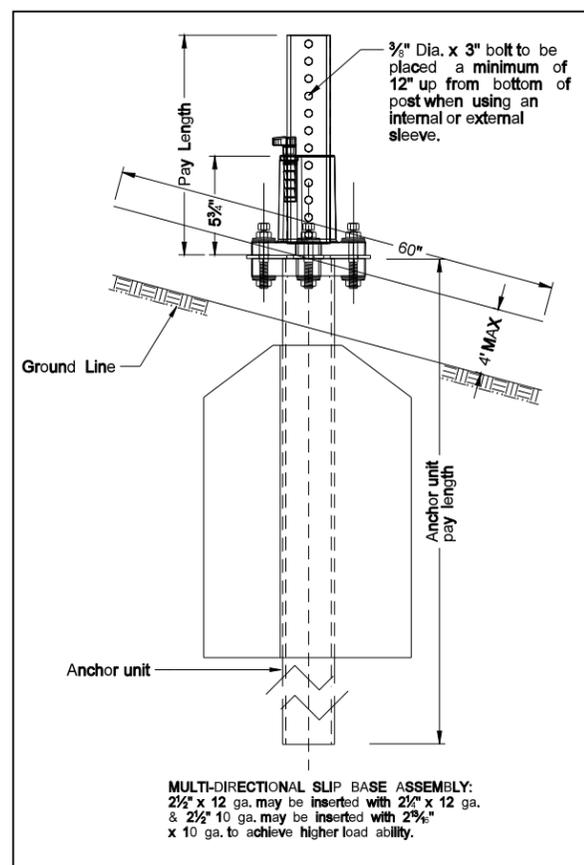
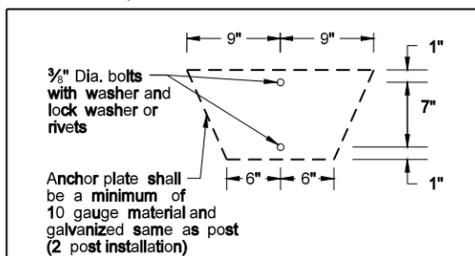
Shared Use Path
Bicycle - Pedestrian Path

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

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 Registration Number
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 of Transportation

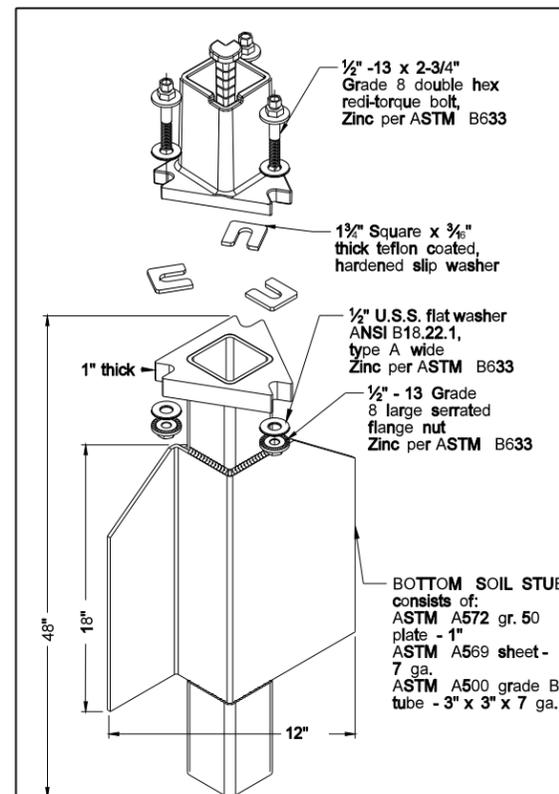
| Number of Posts | Telescoping Perforated Tube | | | | | | |
|-----------------|-----------------------------|----------------------|-----------------|----------------------|-----------|-----------------------------------|-----------------------------|
| | Post Size In. | Wall Thickness Gauge | Sleeve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

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

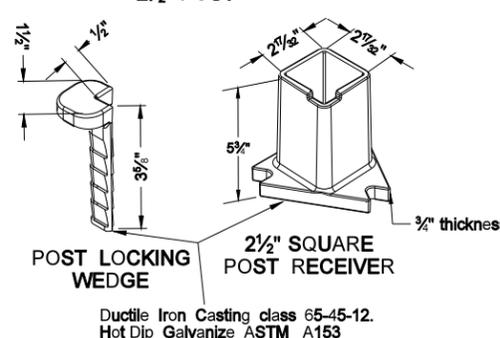


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube

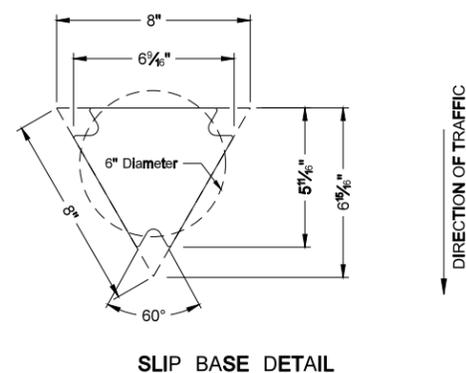


SLIP BASE FOR 2 1/2" POST



2 1/2" SQUARE POST RECEIVER

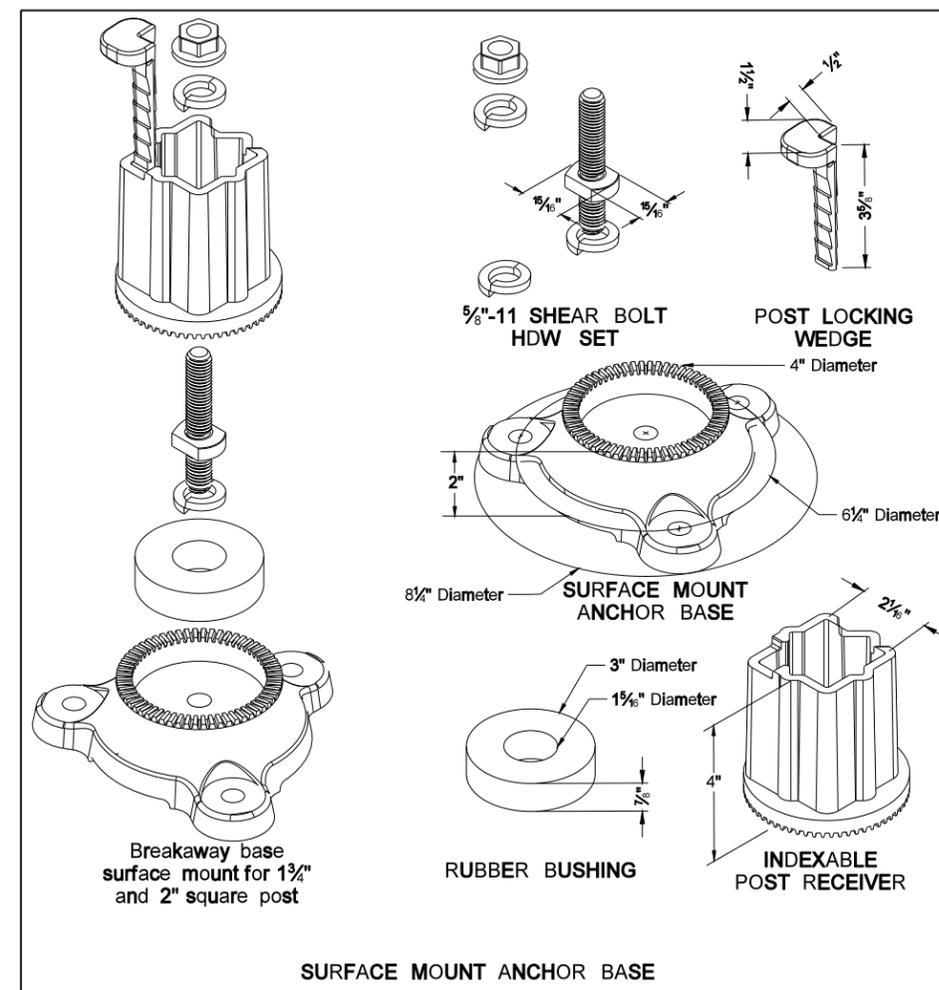
Ductile Iron Casting class 65-45-12. Hot Dip Galvanize ASTM A153



SLIP BASE DETAIL

| Properties of Telescoping Perforated Tubes | | | | | | |
|--|--------------------|---------------------|----------------------|------------------------------------|-----------------------------------|----------------------------------|
| Tube Size In. | Wall Thickness in. | U.S. Standard Gauge | Weight Per Foot Lbs. | Moment of Inertia In. ⁴ | Cross Sect. Area In. ² | Section Modulus In. ³ |
| 1 1/2 x 1 1/2 | 0.105 | 12 | 1.702 | 0.129 | 0.380 | 0.172 |
| 2 x 2 | 0.105 | 12 | 2.416 | 0.372 | 0.590 | 0.372 |
| 2 1/2 x 2 1/2 | 0.105 | 12 | 2.773 | 0.561 | 0.695 | 0.499 |
| 2 3/8 x 2 3/8 | 0.135 | 10 | 3.432 | 0.605 | 0.841 | 0.590 |
| 2 1/2 x 2 1/2 | 0.105 | 12 | 3.141 | 0.804 | 0.803 | 0.643 |
| 2 1/2 x 2 1/2 | 0.135 | 10 | 4.006 | 0.979 | 1.010 | 0.783 |

The 2 3/8" size 10 gauge is shown as 2.19" size on the plans; The 2 1/2" size is shown as 2.51" size on the plans.



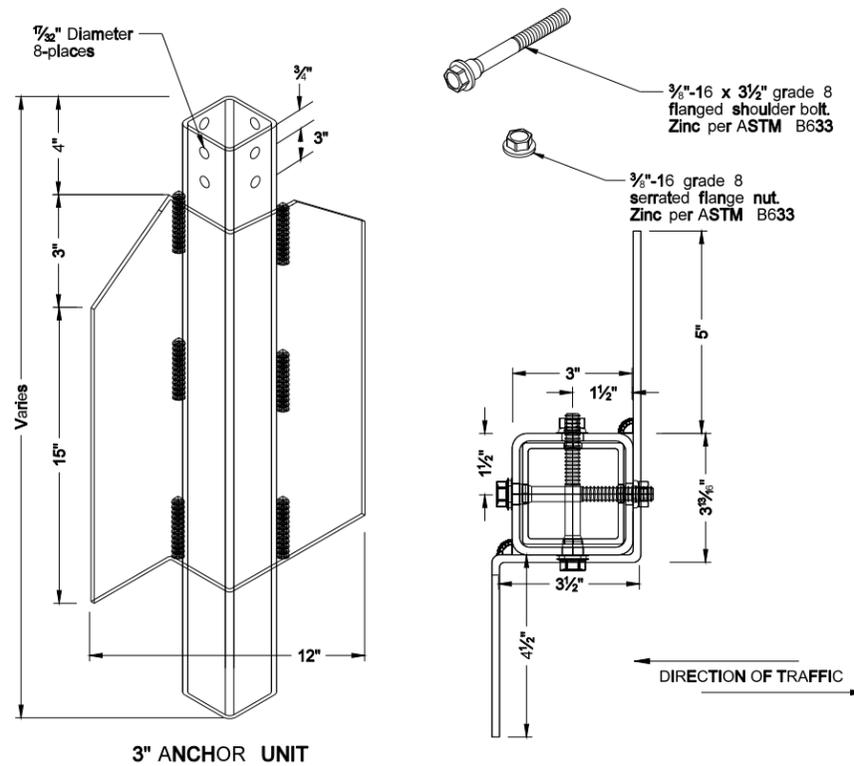
SURFACE MOUNT ANCHOR BASE

NOTE:

- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
- Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3" x 3" x 7" gauge ASTM A500 grade B. Anchor shall have a yield strength 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
- When used in concrete sidewalk, anchor shall be the same concept without the wings.
- Four post signs shall have over 8" between the first and fourth posts.
- Installation procedures as per manufacturers recommendation.
- Concrete fasteners for surface mount breakaway base shall be a minimum 1/2" diameter x 4" grade 8.

SHOULDER BOLT

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

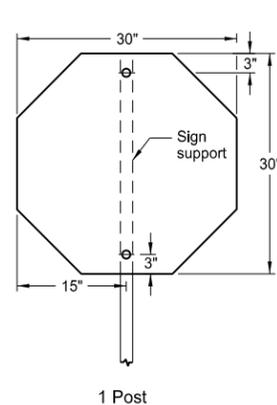


3" ANCHOR UNIT

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

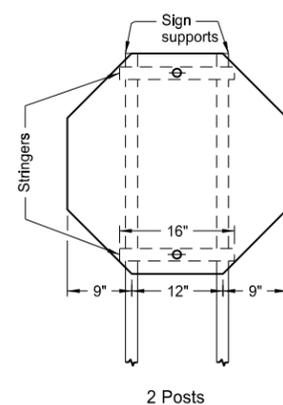
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

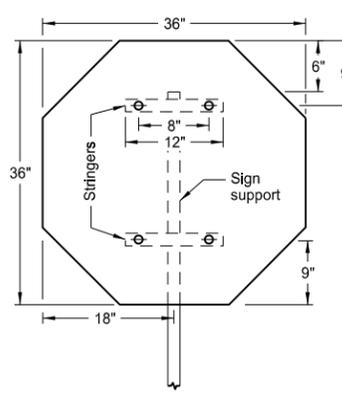


1 Post

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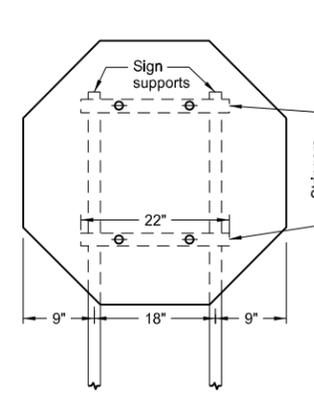


2 Posts

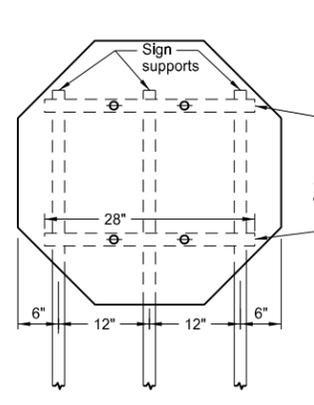


1 Post

Assembly No. 2



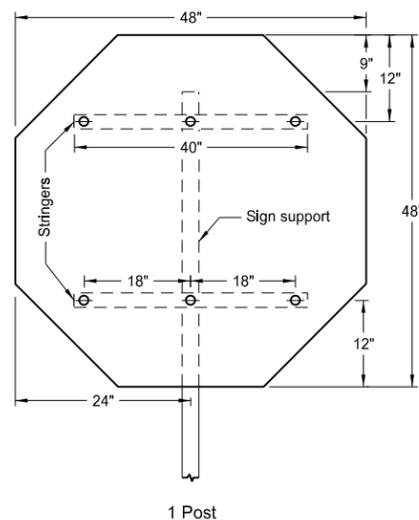
2 Posts



3 Posts

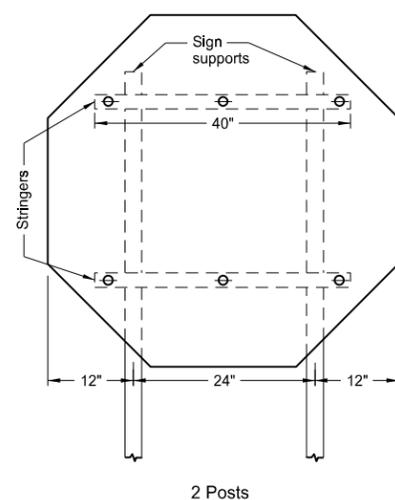
Notes:

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

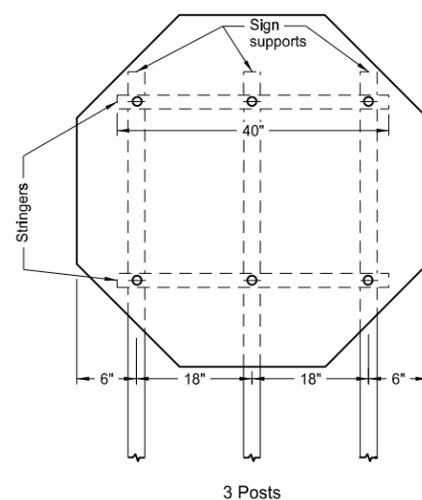


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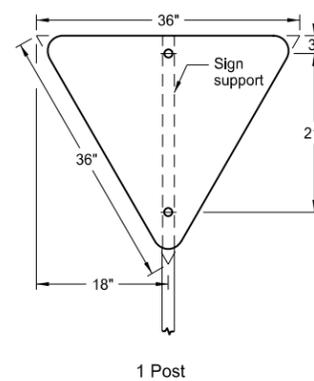
Assembly No. 3



2 Posts

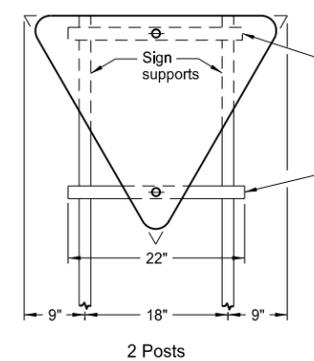


3 Posts

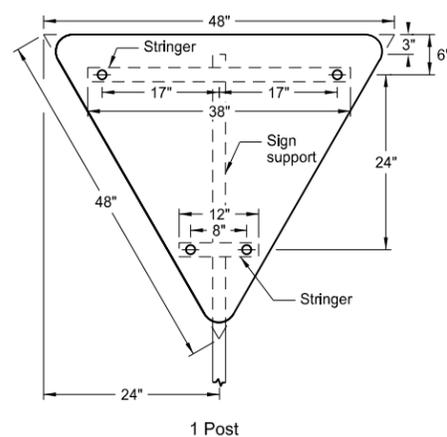


1 Post

Assembly No. 4

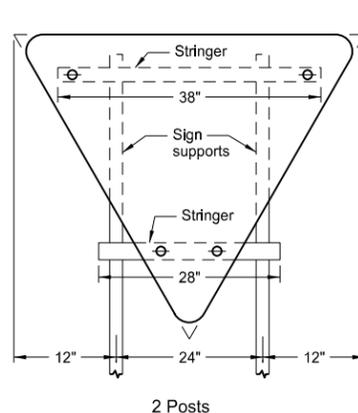


2 Posts

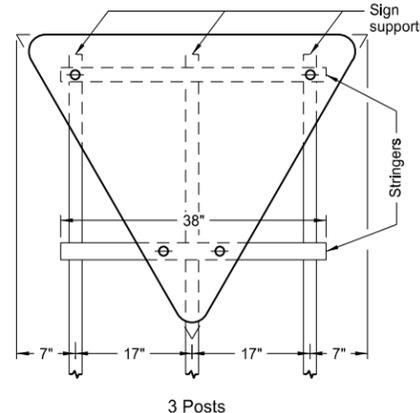


1 Post

Assembly No. 5



2 Posts

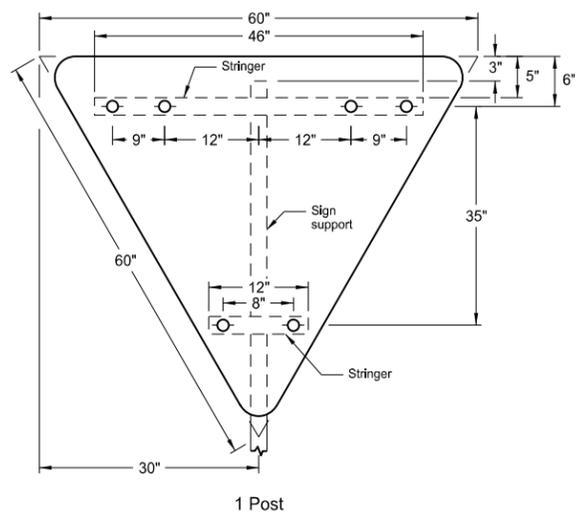


3 Posts

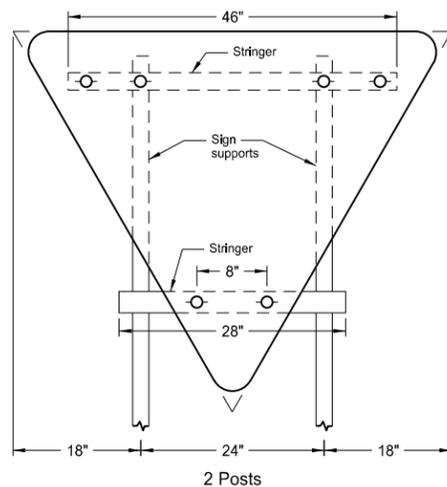
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| 12-1-10 | |
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| DATE | CHANGE |
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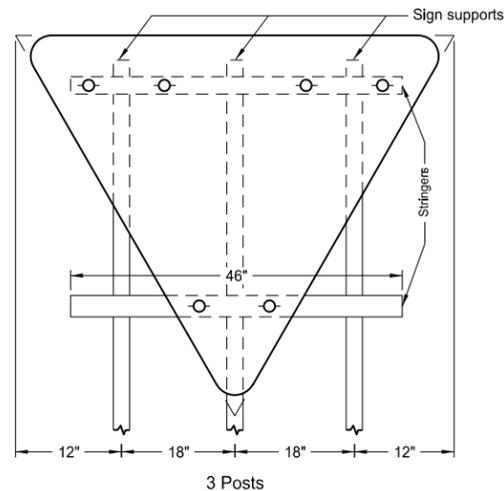
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

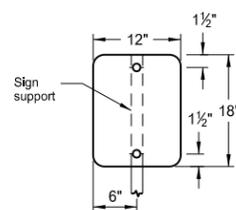


3 Posts

Assembly No. 6

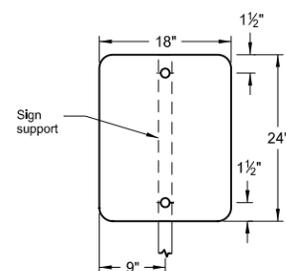
Notes:

1. See Standard D-754-25 for mounting details.
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3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



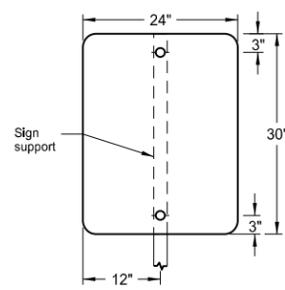
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Assembly No. 7



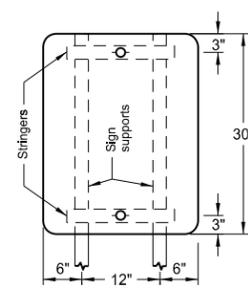
1 Post

Assembly No. 8

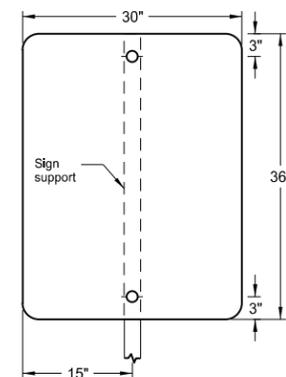


1 Post

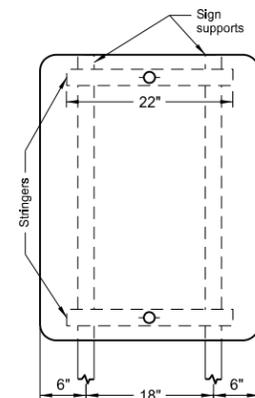
Assembly No. 9



2 Posts

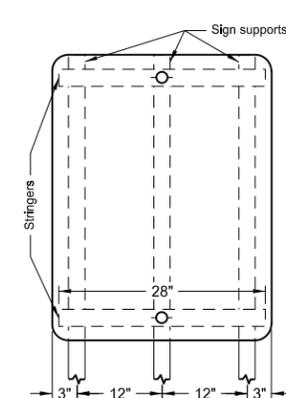


1 Post

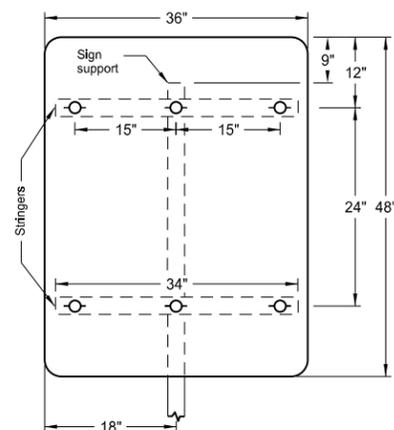


2 Posts

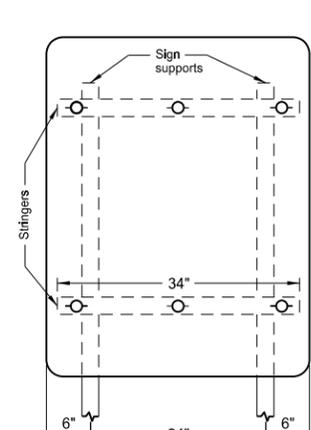
Assembly No. 10



3 Posts

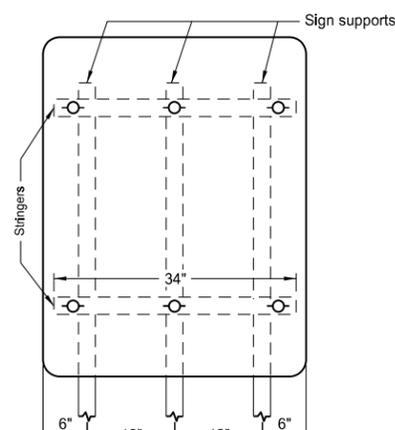


1 Post



2 Posts

Assembly No. 11

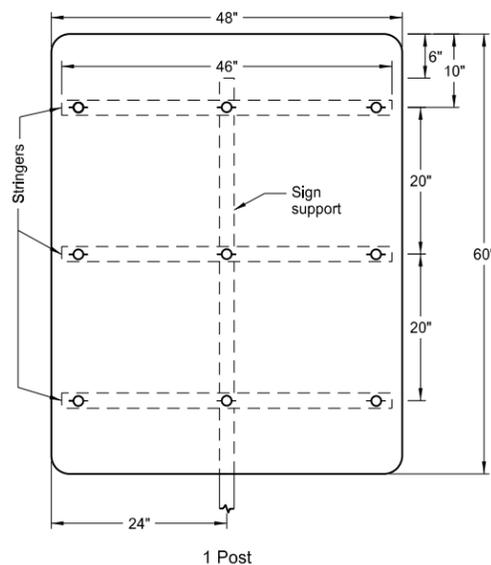


3 Posts

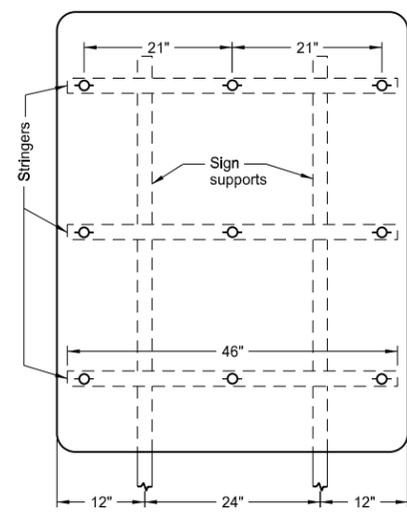
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

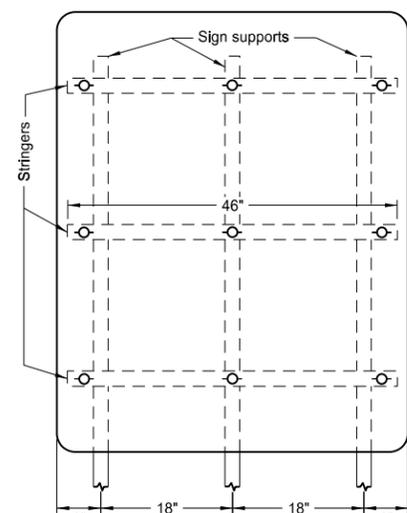


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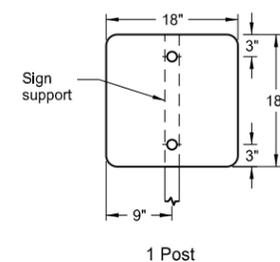


2 Posts

Assembly No. 12

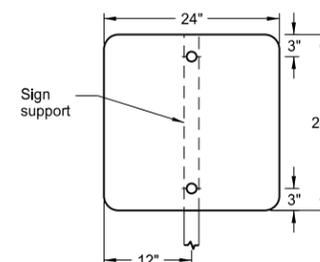


3 Posts



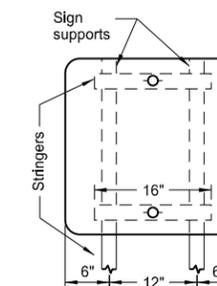
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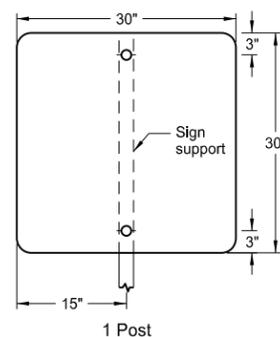


1 Post

Assembly No. 14

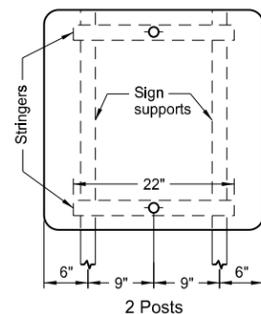


2 Posts

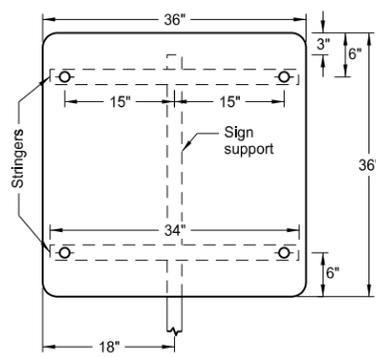


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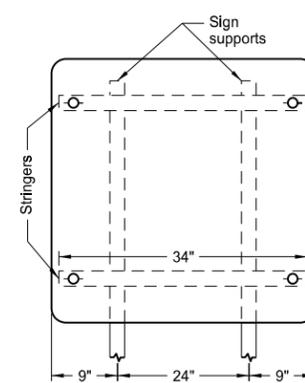
Assembly No. 15



2 Posts

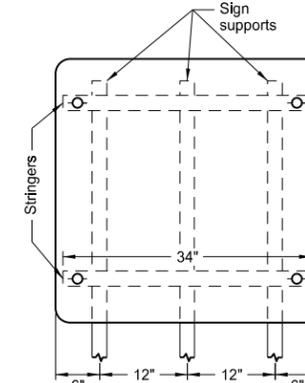


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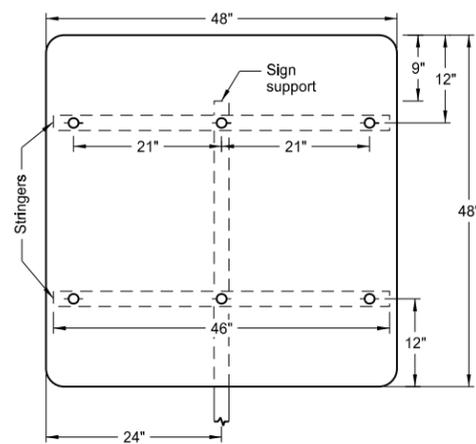


2 Posts

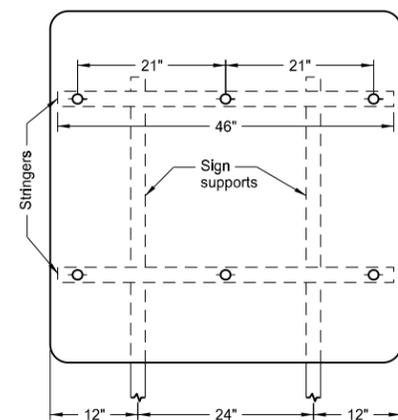
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3 Posts

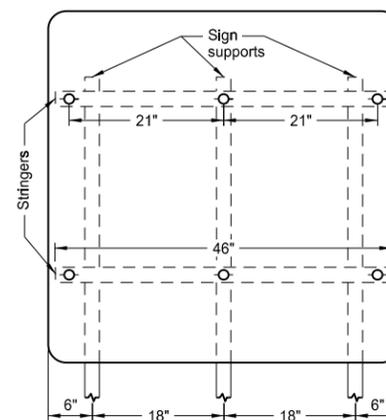


1 Post



2 Posts

Assembly No. 17



3 Posts

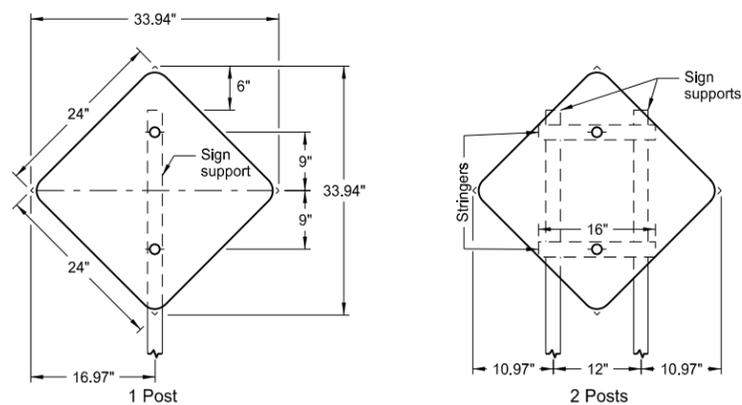
Notes:

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

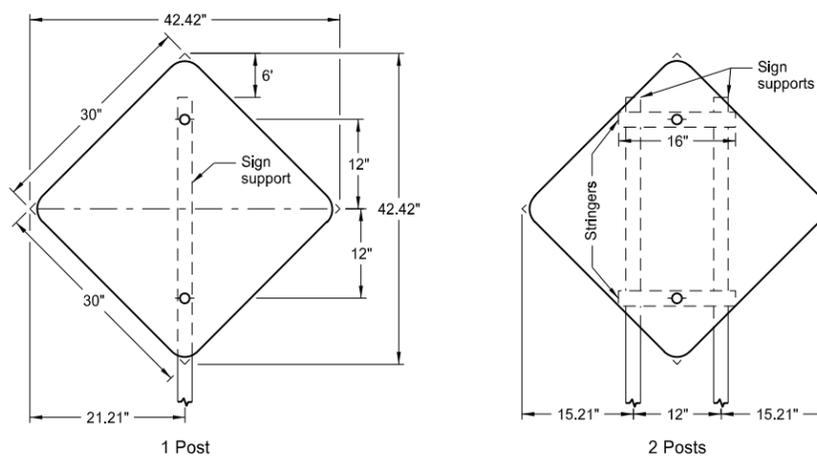
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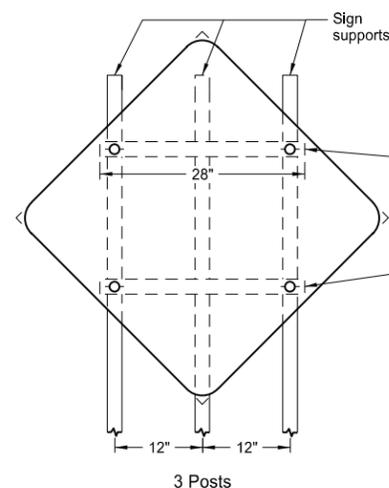
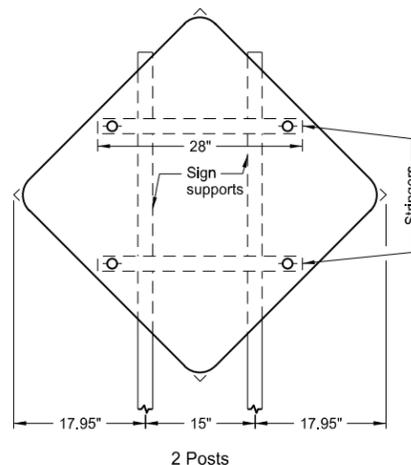
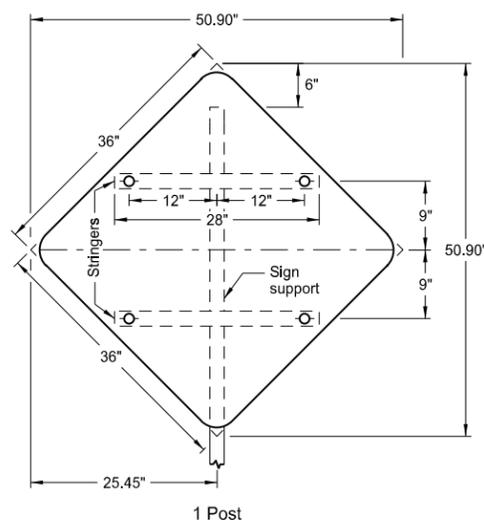
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



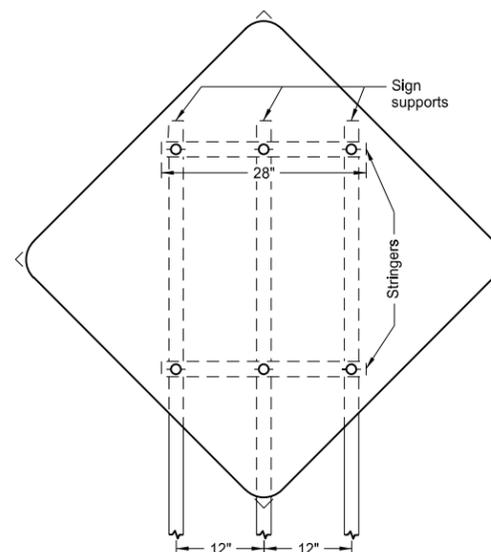
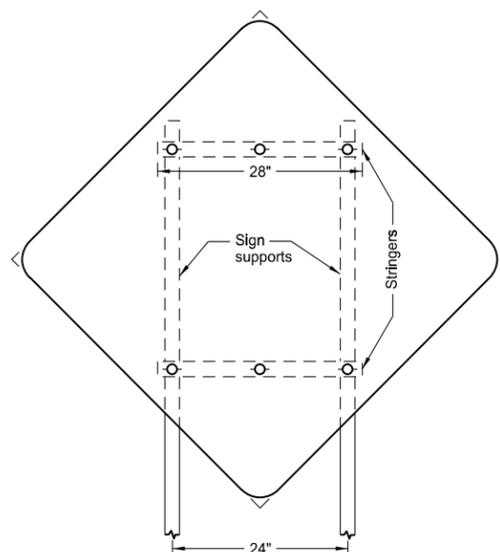
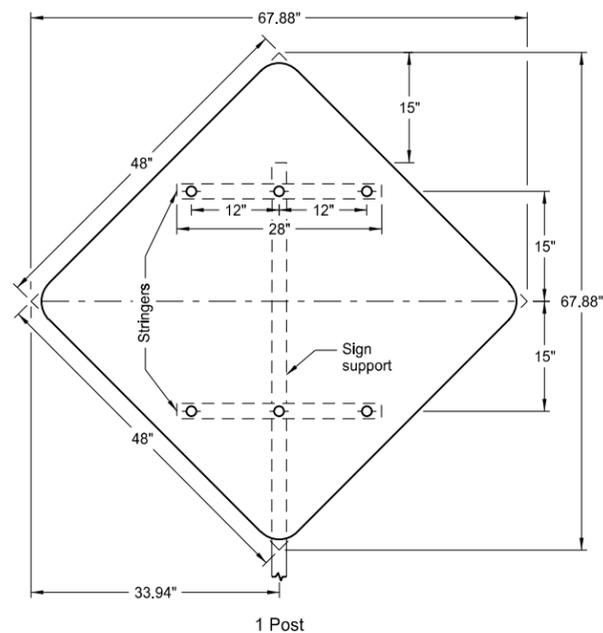
Assembly No. 18



Assembly No. 19



Assembly No. 20



Assembly No. 21

Notes:

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

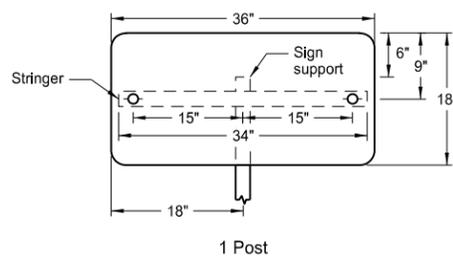
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| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
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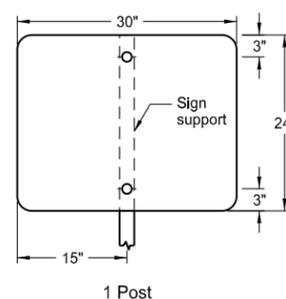
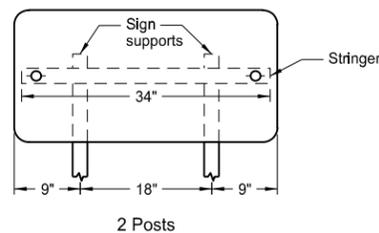
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

Notes:

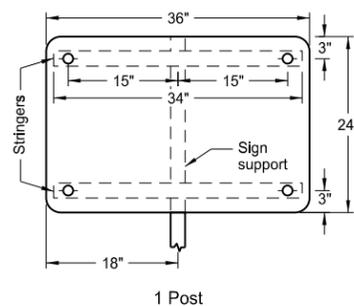
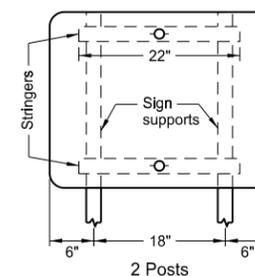
1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.



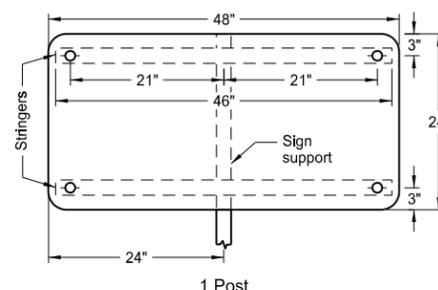
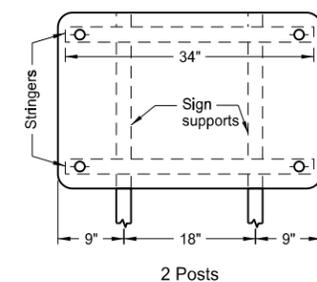
Assembly No. 31



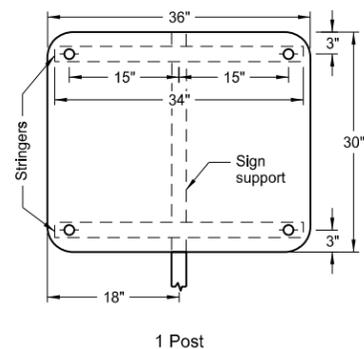
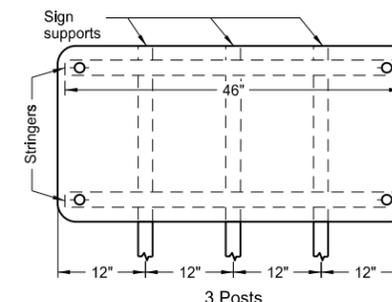
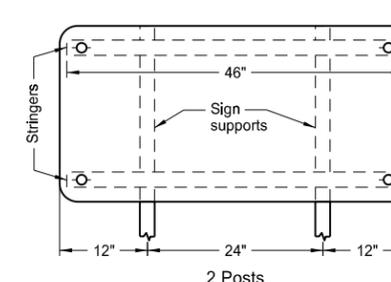
Assembly No. 32



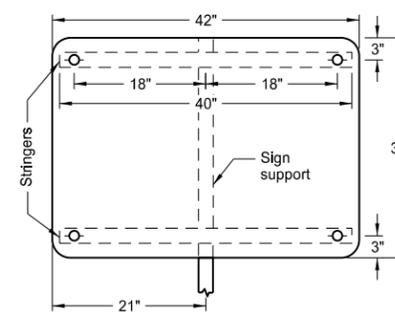
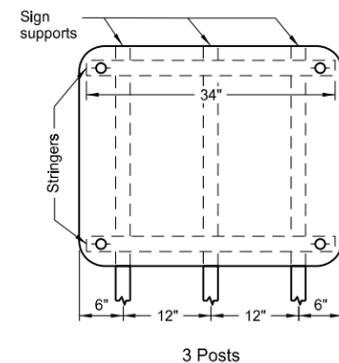
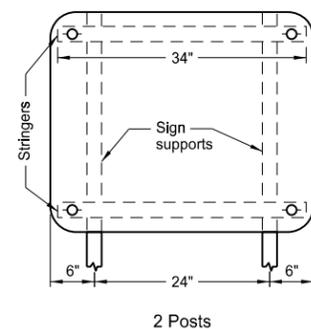
Assembly No. 33



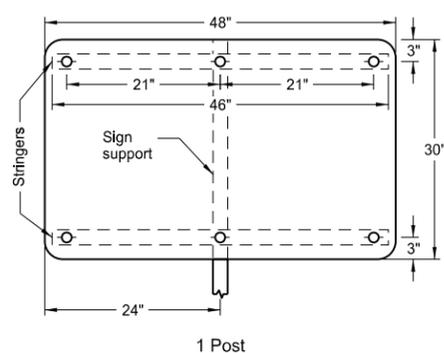
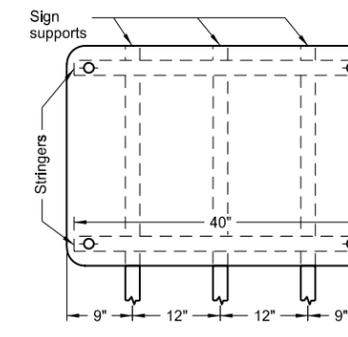
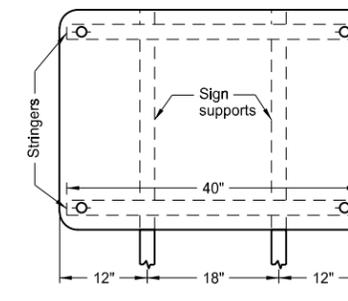
Assembly No. 34



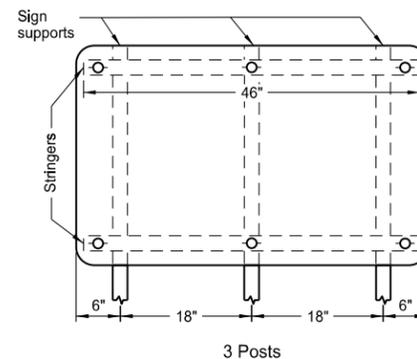
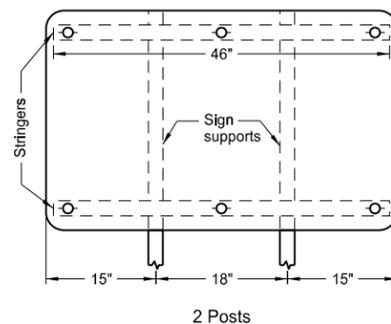
Assembly No. 35



Assembly No. 36



Assembly No. 37

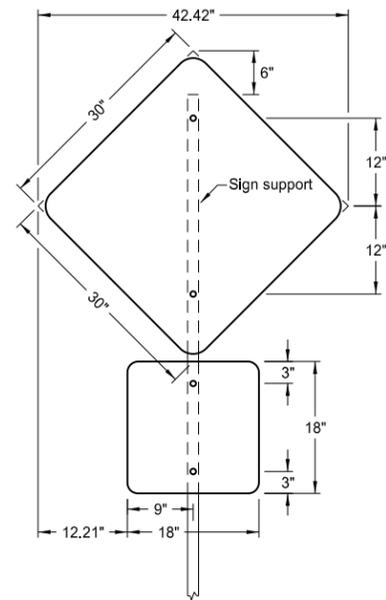


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| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

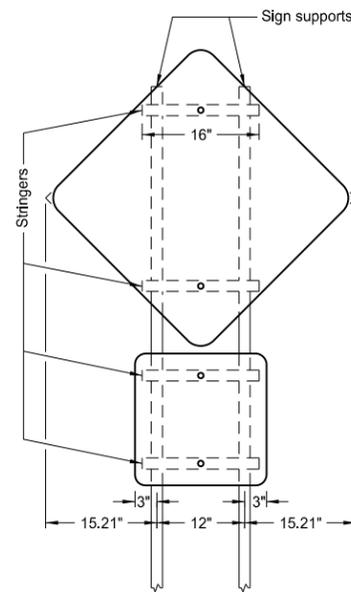
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING AND GUIDE SIGNS

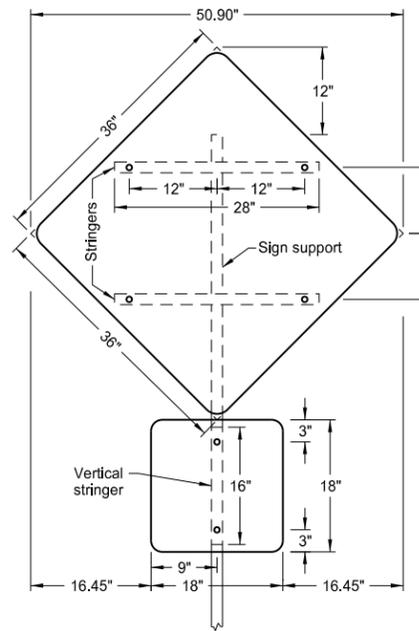
D-754-37



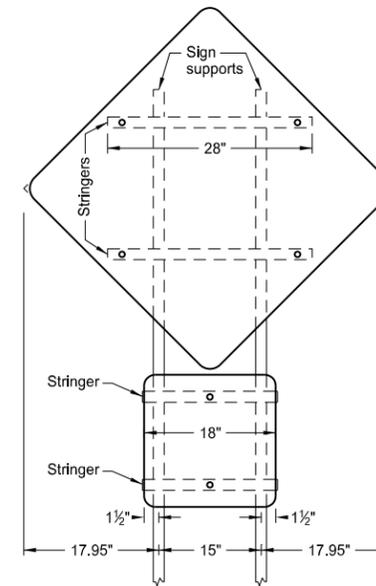
1 Post



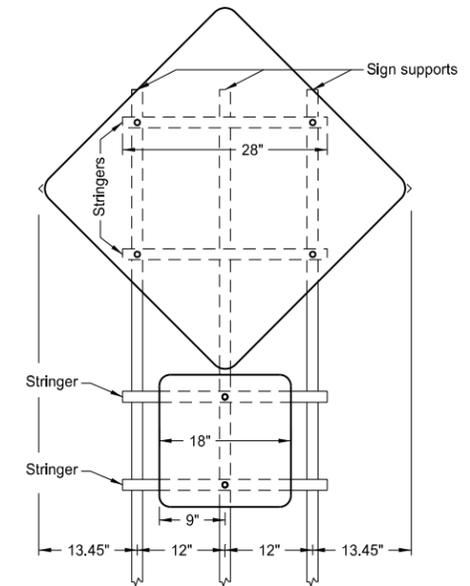
2 Posts



1 Post



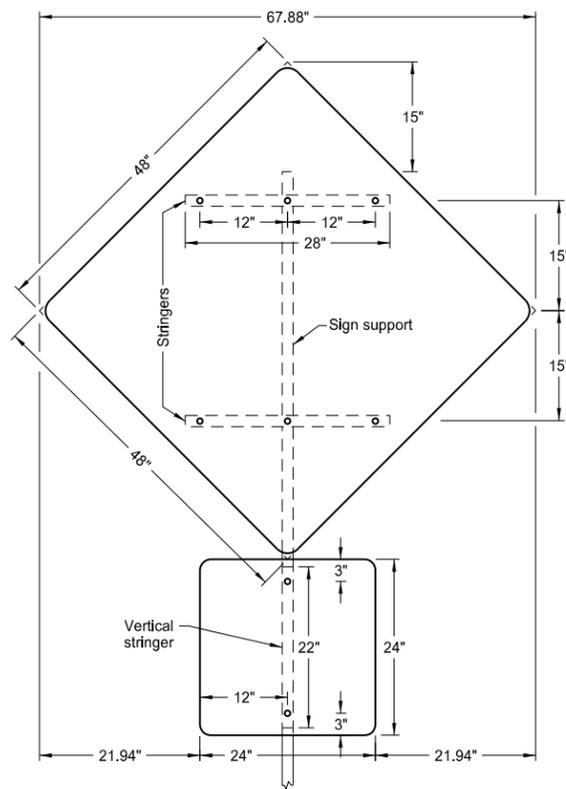
2 Posts



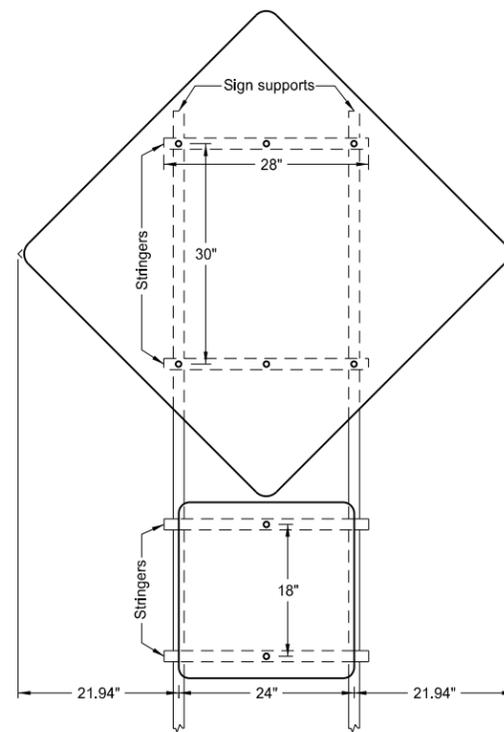
3 Posts

ASSEMBLY NO. 53

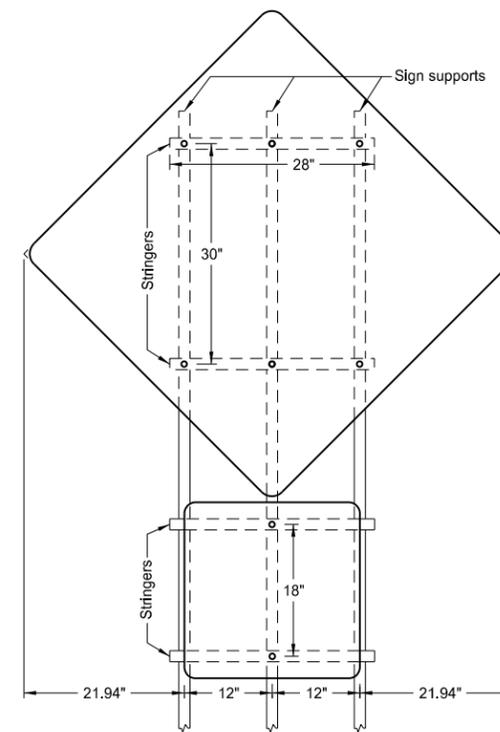
ASSEMBLY NO. 54



1 Post



2 Posts



3 Posts

ASSEMBLY NO. 55

Notes:

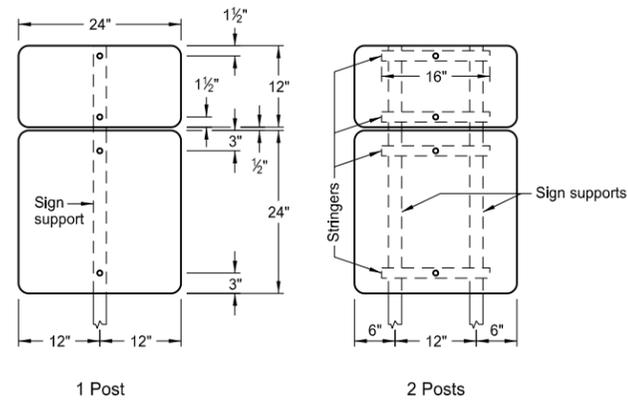
1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½"x1½".
3. All holes shall be punched round for ⅜" bolt.

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

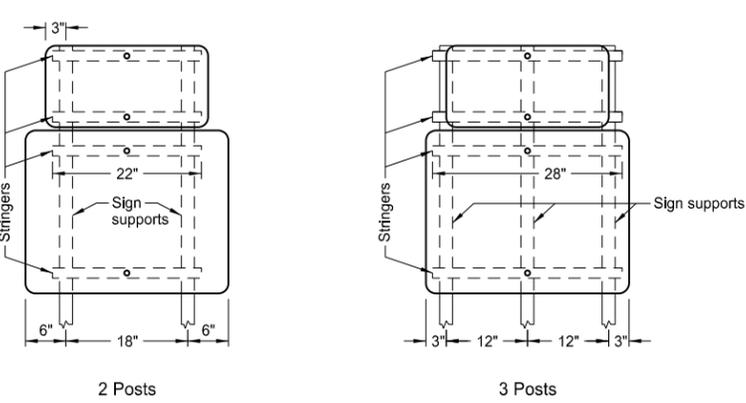
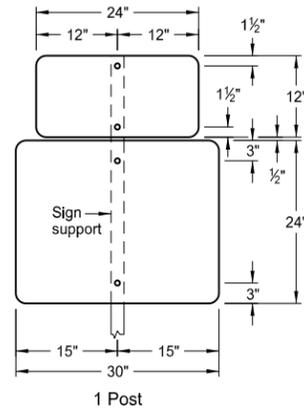
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

D-754-51

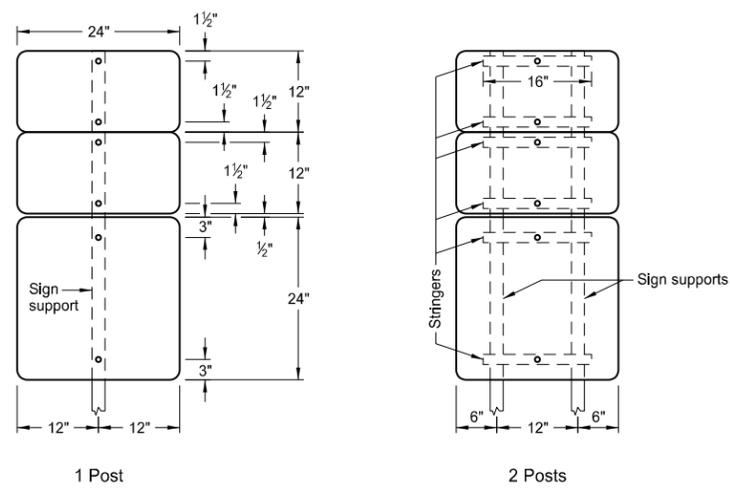


ASSEMBLY NO. 371

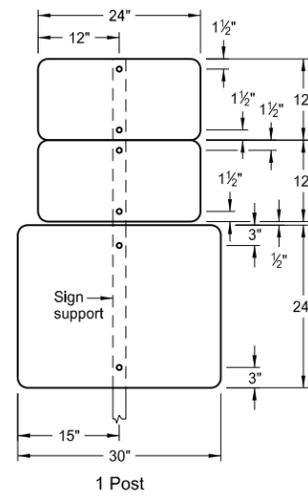
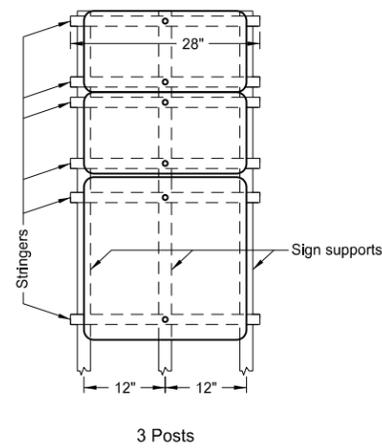


ASSEMBLY NO. 372

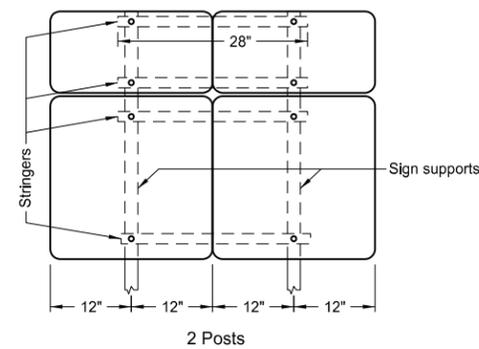
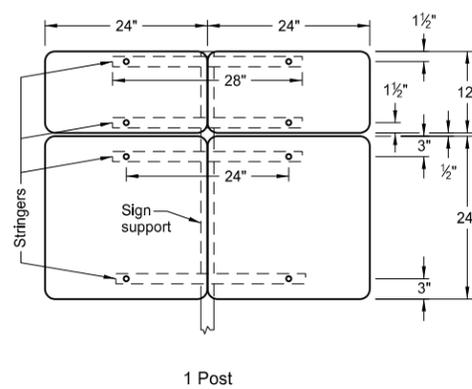
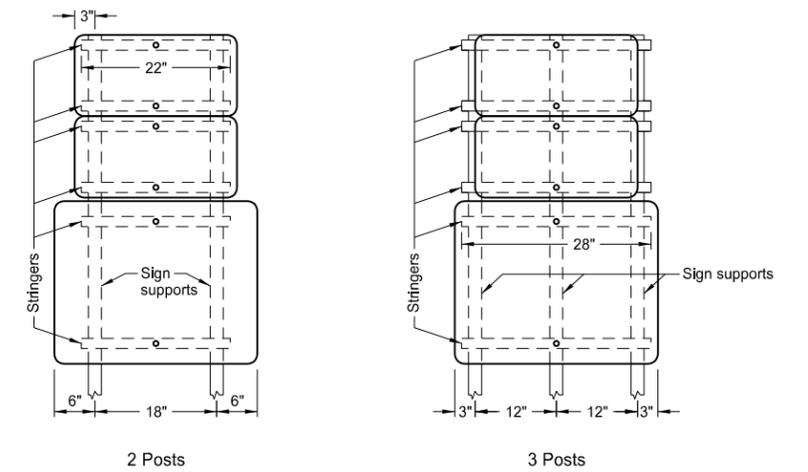
- Notes:
1. The minimum sign backing material thickness shall be 0.100 inch.
 2. Perforated square tube stringer shall be 1 1/2"x1 1/2".
 3. All holes shall be punched round for 3/8" bolt.



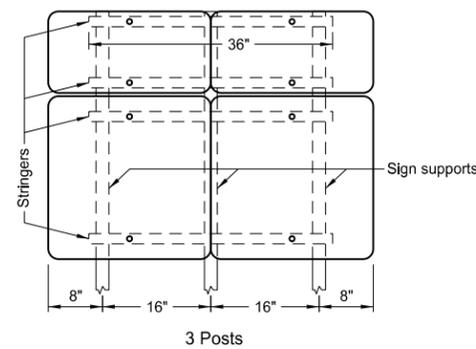
ASSEMBLY NO. 373



ASSEMBLY NO. 374



ASSEMBLY NO. 375

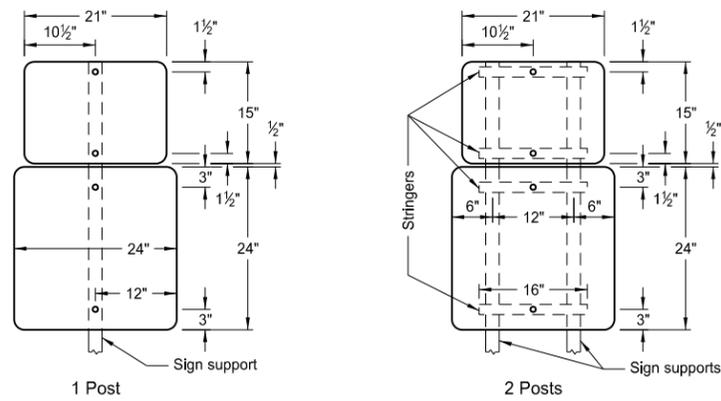


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| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 8-22-12 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

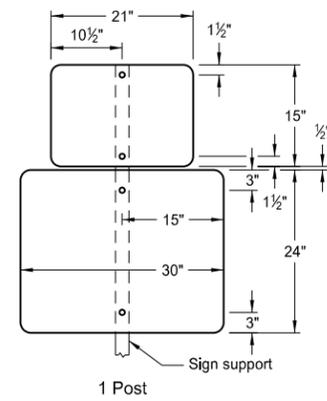
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8/22/12 and the original document is stored at the North Dakota Department of Transportation

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

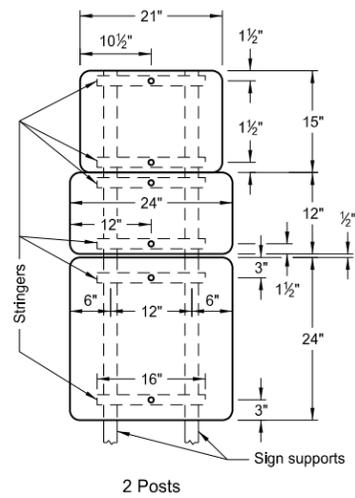
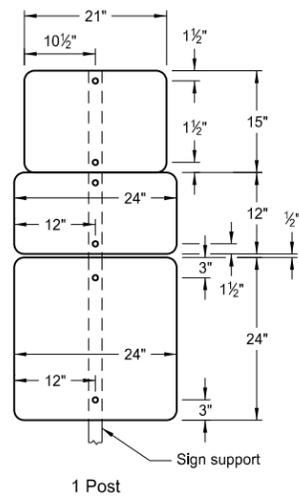
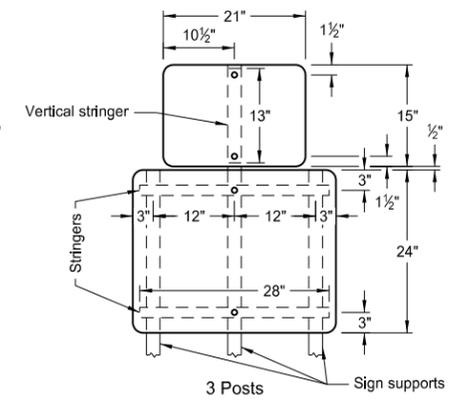
D-754-57



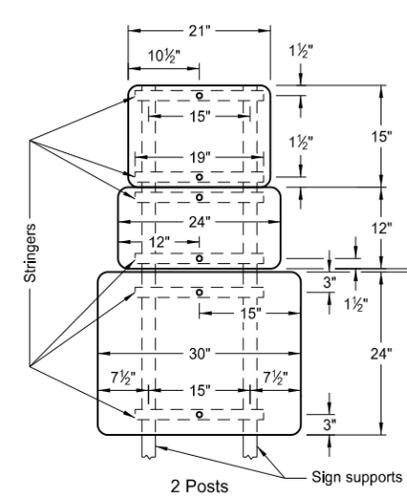
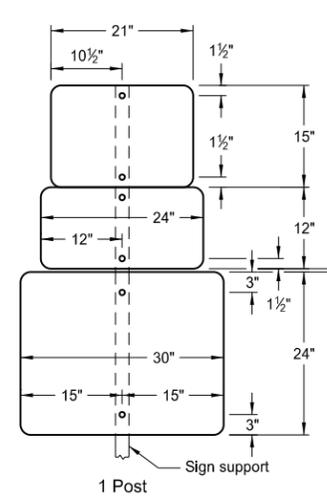
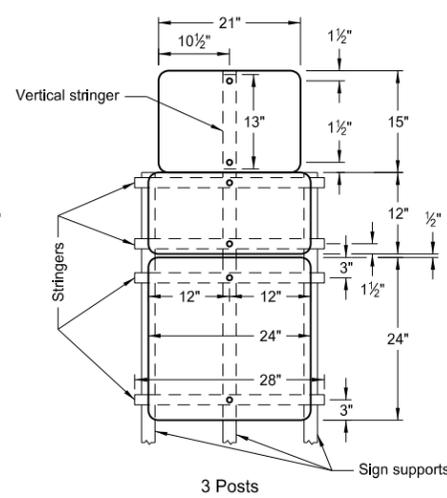
ASSEMBLY 391



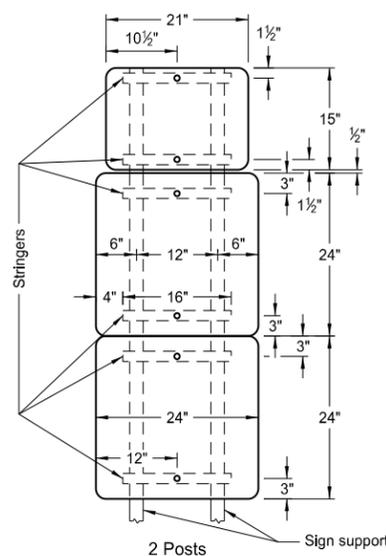
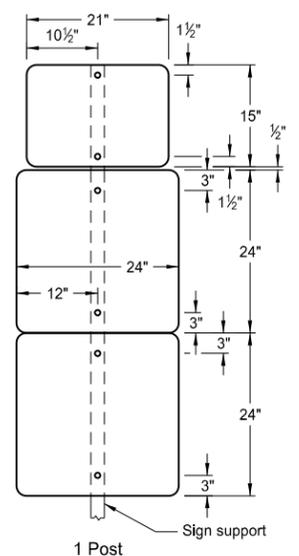
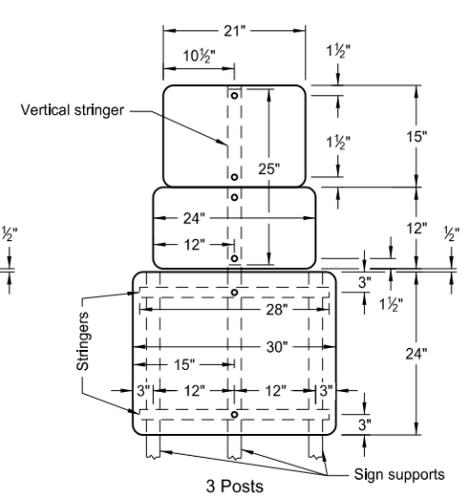
ASSEMBLY 392



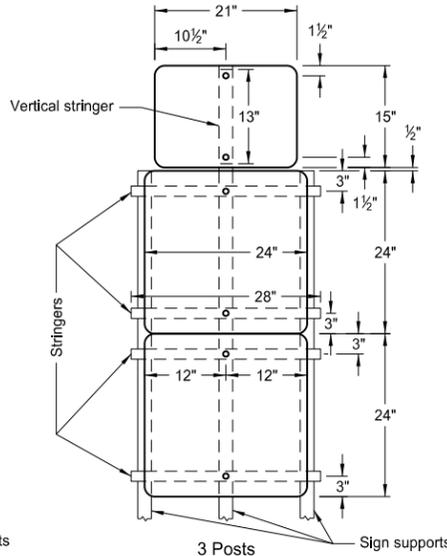
ASSEMBLY 393



ASSEMBLY 394



ASSEMBLY 395



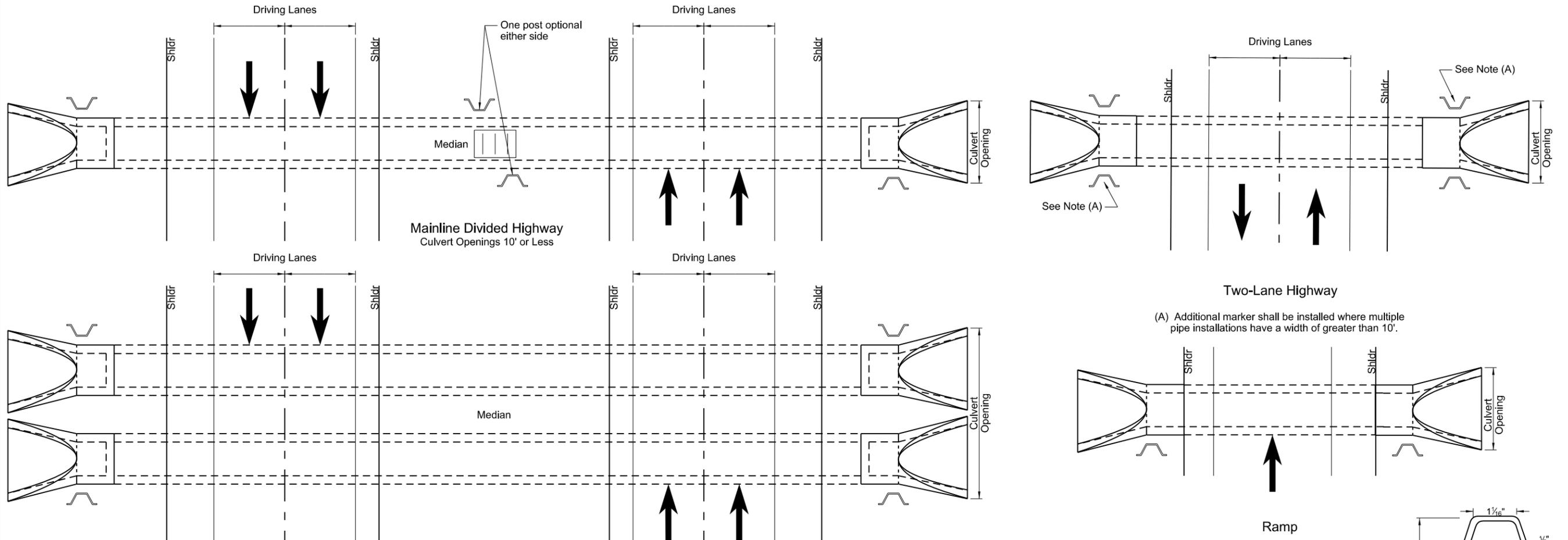
- Notes:
1. The minimum sign backing material thickness shall be 0.100 inch.
 2. Perforated square tube stringer shall be 1 1/2"x1 1/2".
 3. All holes shall be punched round for 3/8" bolt.

| | |
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| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 8-22-12 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

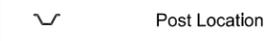
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OBJECT MARKERS - CULVERTS

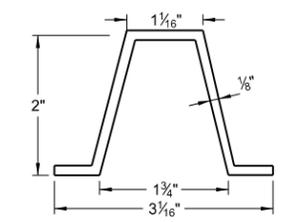
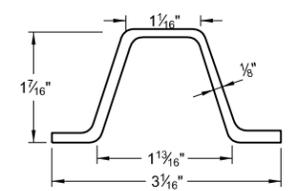
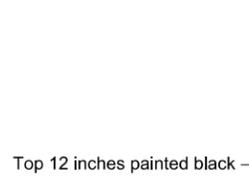
D-754-83



(A) Additional marker shall be installed where multiple pipe installations have a width of greater than 10'.

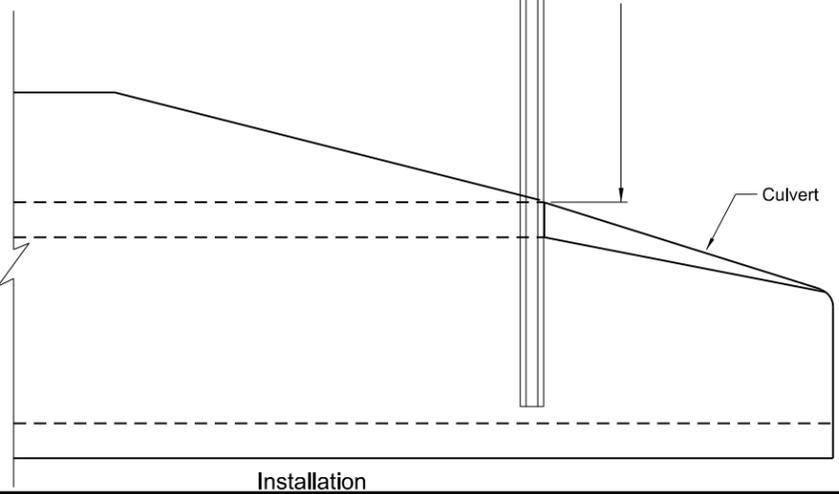


Mainline Divided Highway Culvert Openings Greater than 10' Multiple Installations



Notes:

- Installation:** Construction requirements shall meet 754.04D. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.
- Posts:** Posts shall conform to section 894.04A of the Standard Specifications with the exception that the post may or may not have holes drilled.
- Basis of Payment:** The quantity will be measured by the number of object markers each installed. All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Markers - Culverts".



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|---|---------------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 8-05-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-7-14 | Revised Notes |

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 Registration Number
 PE-2930,
 on 7/7/2014 and the original document is stored at the North Dakota Department of Transportation

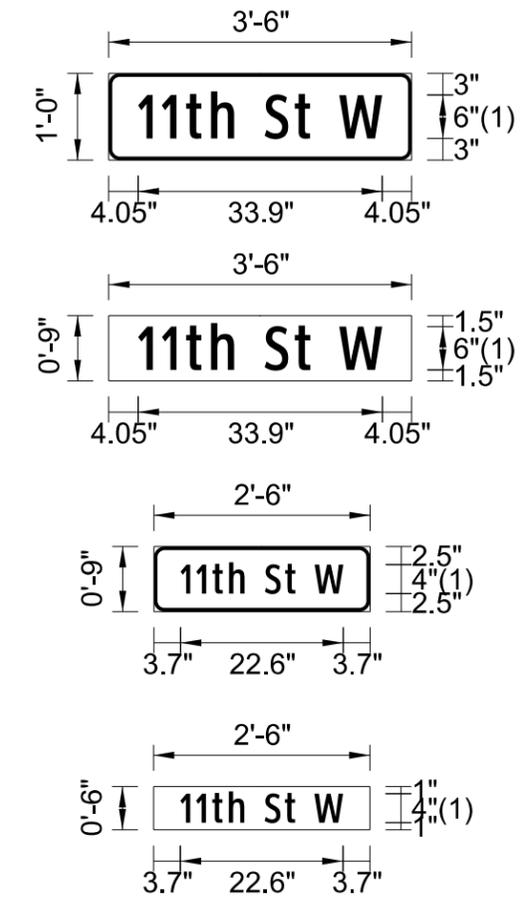
911 SIGN SUPPORT INFORMATION AND SIGN DETAILS

D-754-86

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

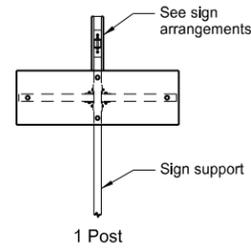
| THE POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS (60 INCH VERTICAL CLEARANCE) | | | | | | | | | | | | | |
|--|-----------------------|-----------------|---------------------|-----------------|-----------------|-------------------|-----|----------------|-----------------|--------|----------|------------|------|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

(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.

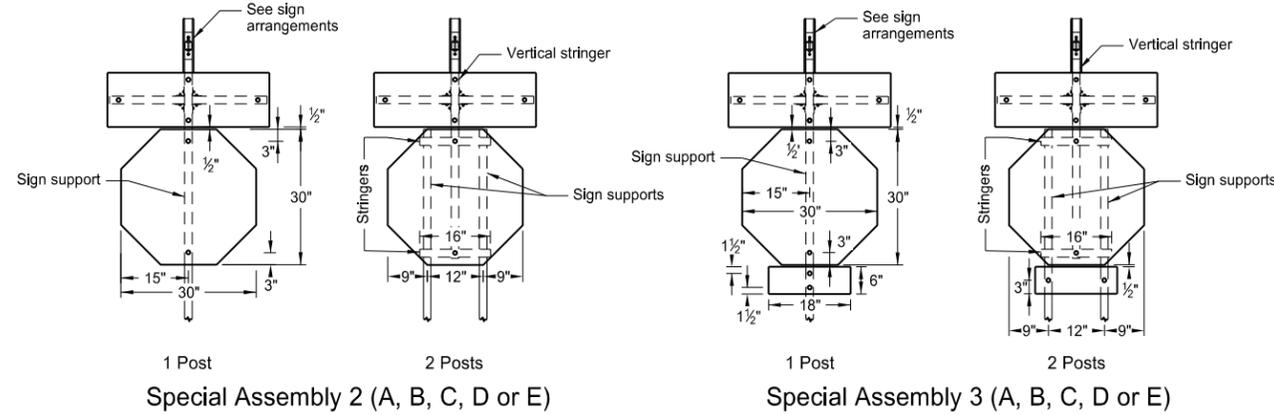


SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

- 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

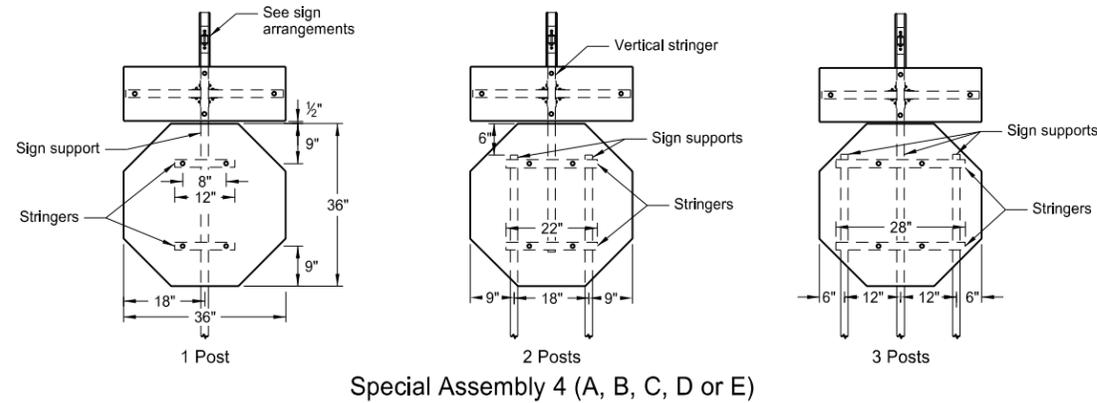


Special Assembly 1 (A, B, C, D or E)

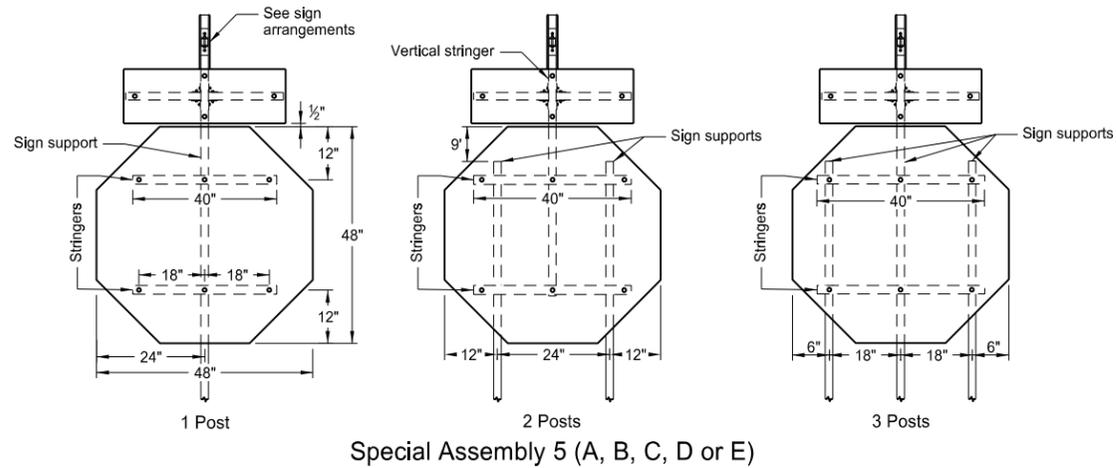


Special Assembly 2 (A, B, C, D or E)

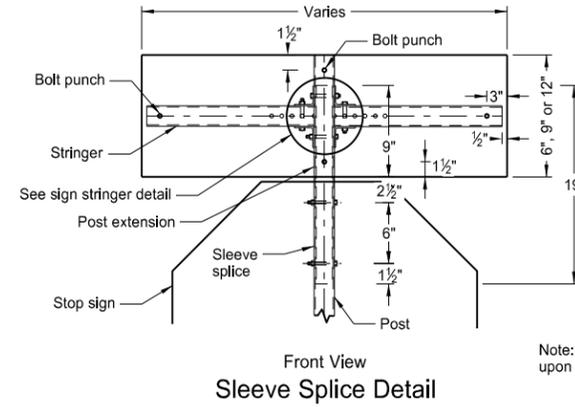
Special Assembly 3 (A, B, C, D or E)



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

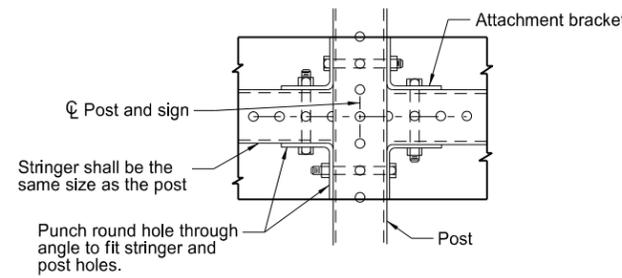


Special Assembly 5 (A, B, C, D or E)

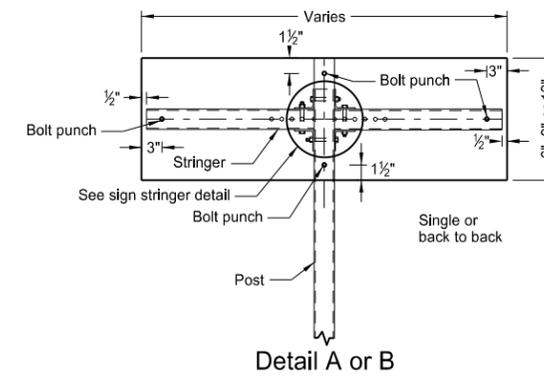


Sleeve Splice Detail

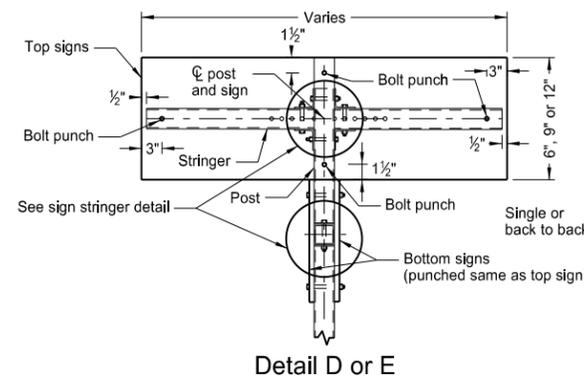
Note: The splice method may be used upon approval of the engineer.



Sign Stringer Detail

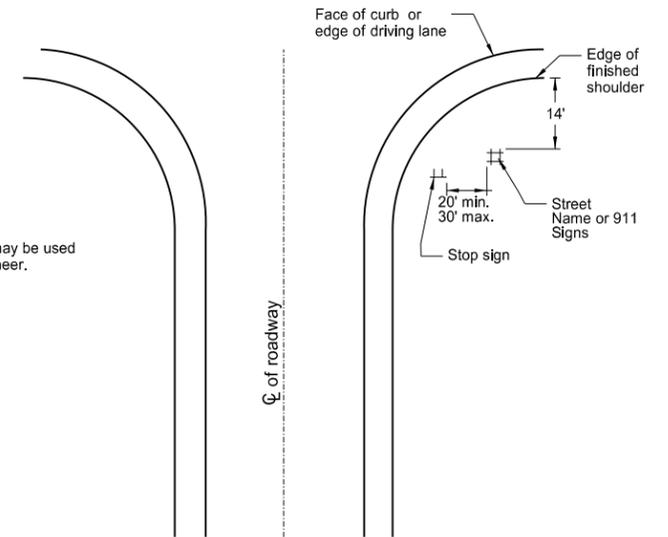


Detail A or B



Detail D or E

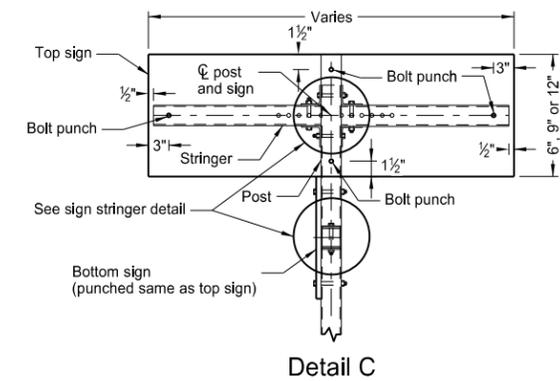
Note: See Standard Drawing D-754-86 for 911 support information and sign layout details.



Intersection Layout

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

Sign Arrangements

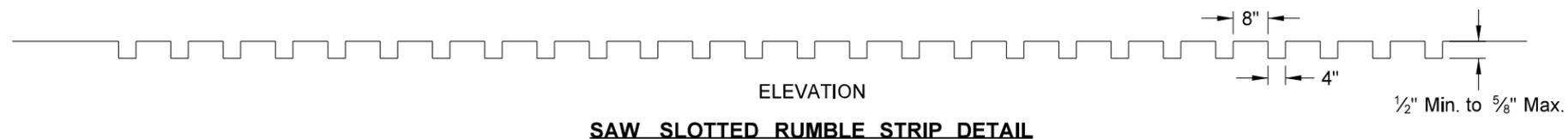
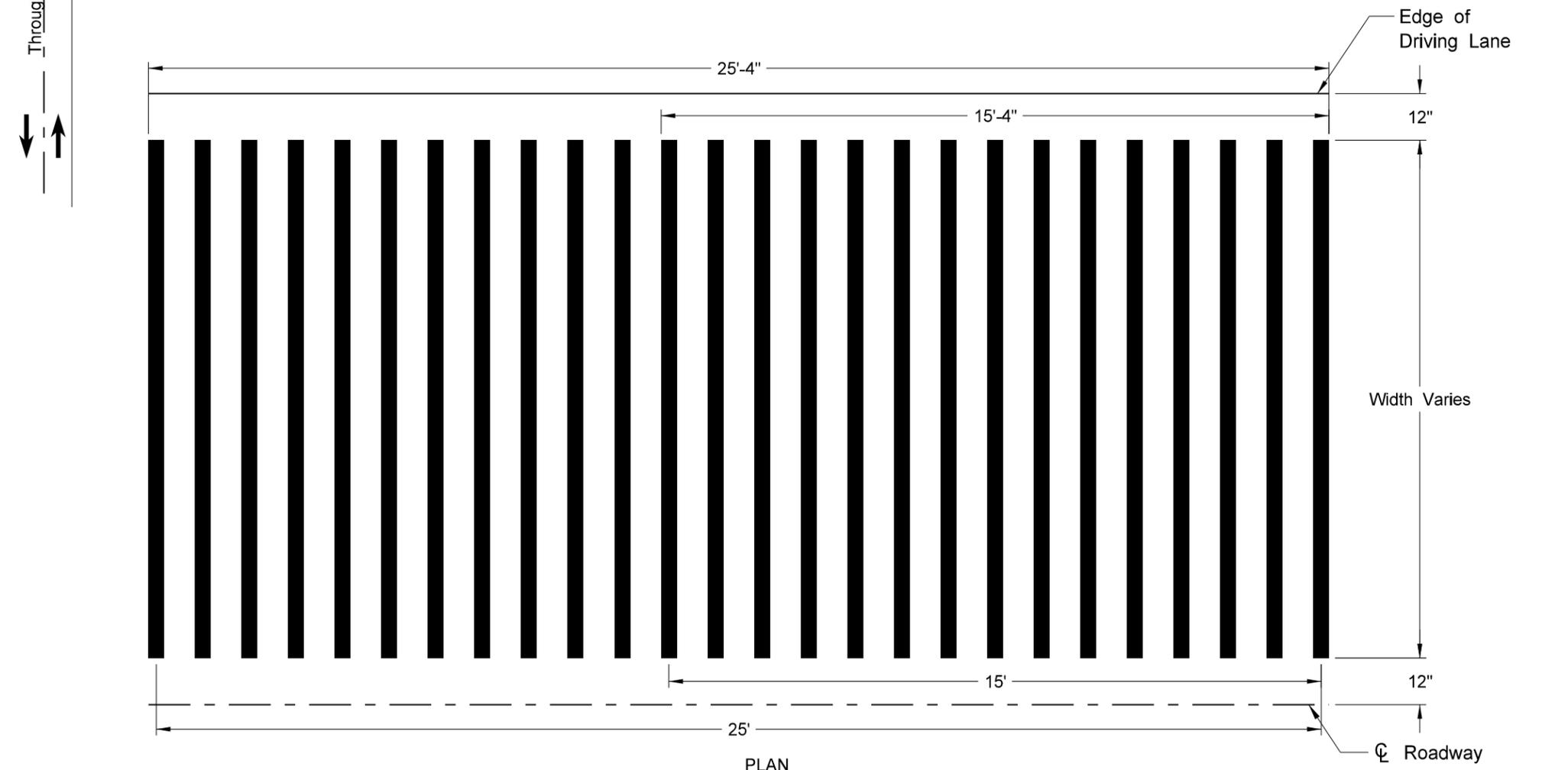
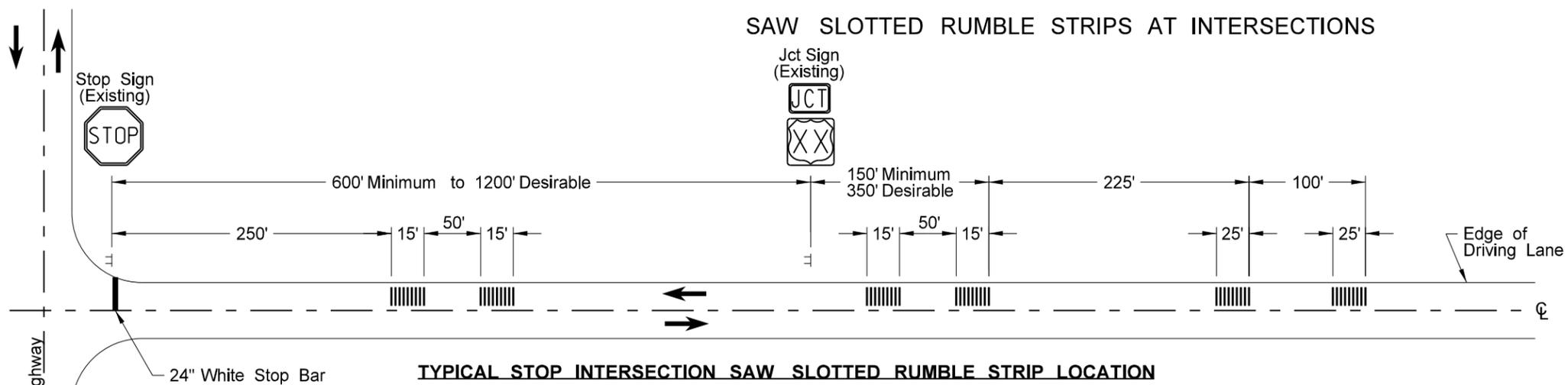


Detail C

| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

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SAW SLOTTED RUMBLE STRIPS AT INTERSECTIONS



| | |
|--|----------------------------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 12-29-09 | |
| REVISIONS | |
| DATE | CHANGE |
| 2-22-10 | Saw Slotted width revised. |
| 2-25-10 | Note 7 was added. |
| 9-8-11 | Revised Notes and D-760-5. |
| 7-7-14 | Deleted Notes. |

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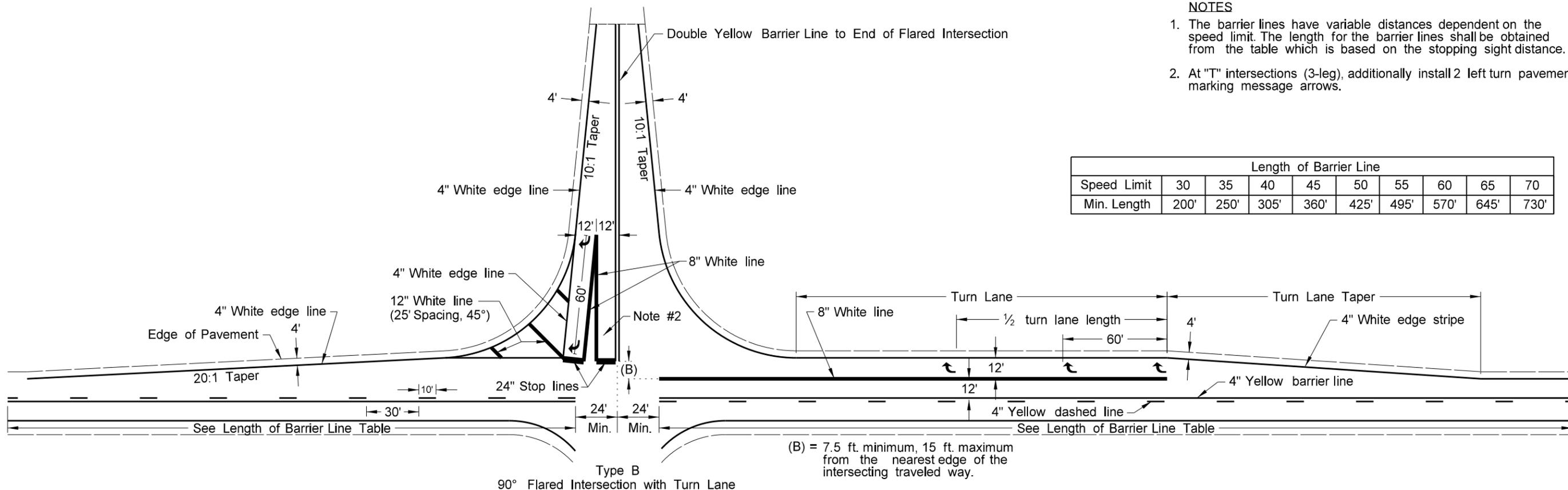
PAVEMENT MARKING FOR STANDARD 90° FLARED INTERSECTION

D-762-3

NOTES

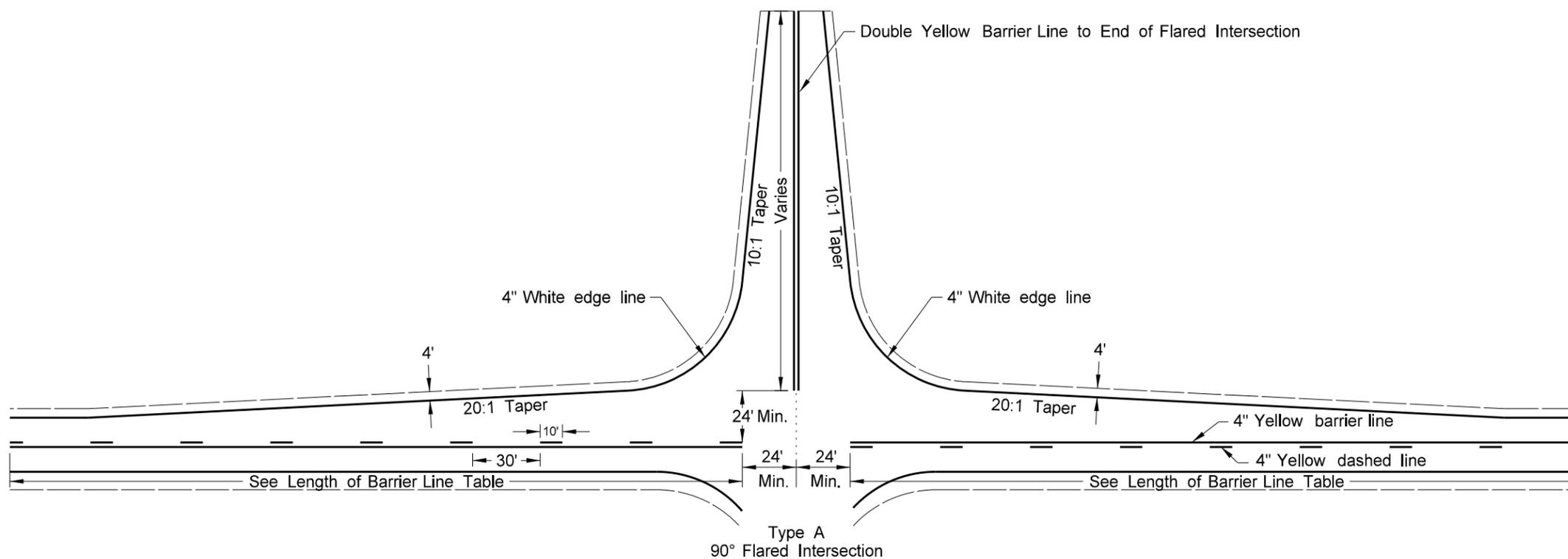
1. The barrier lines have variable distances dependent on the speed limit. The length for the barrier lines shall be obtained from the table which is based on the stopping sight distance.
2. At "T" intersections (3-leg), additionally install 2 left turn pavement marking message arrows.

| Length of Barrier Line | | | | | | | | | |
|------------------------|------|------|------|------|------|------|------|------|------|
| Speed Limit | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 |
| Min. Length | 200' | 250' | 305' | 360' | 425' | 495' | 570' | 645' | 730' |



Legend

- 4" Line
- 8" Line
- 12" Line
- 24" Line

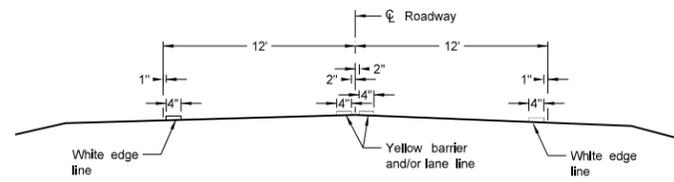


| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|----------------------------|
| 6-9-09 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-24-09 | Barrier Stripe Correction |
| 9-21-11 | Revised Turn Lane Markings |
| 11-25-13 | Revised Type B Layout |

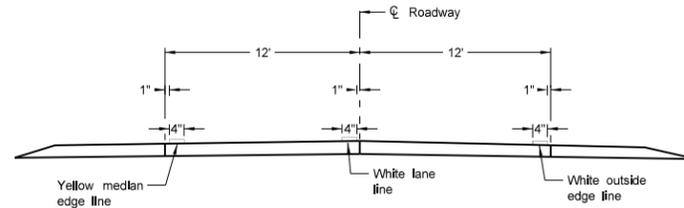
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 PE- 2930 ,
 on 11/25/2013 and the original document is stored at the
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 of Transportation

PAVEMENT MARKING

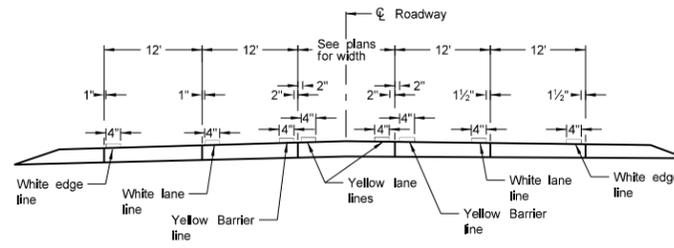
D-762-4



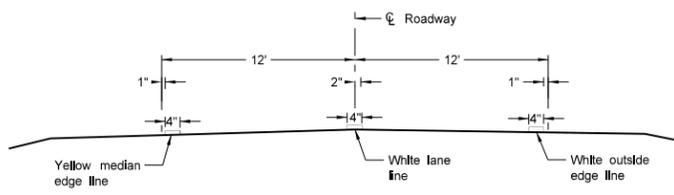
Two Lane Two Way
RURAL ROADWAY



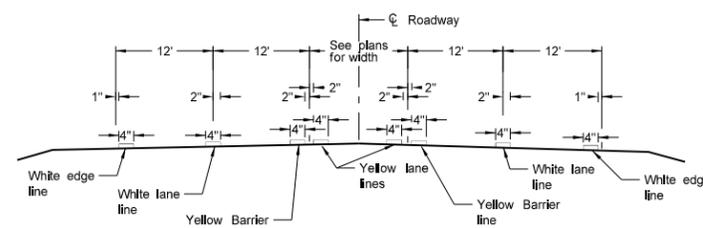
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



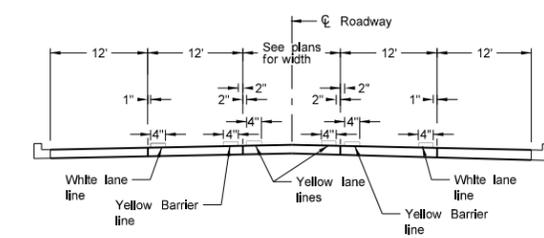
RURAL FIVE LANE ROADWAY
Concrete Section



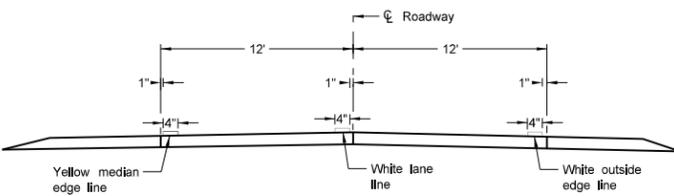
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



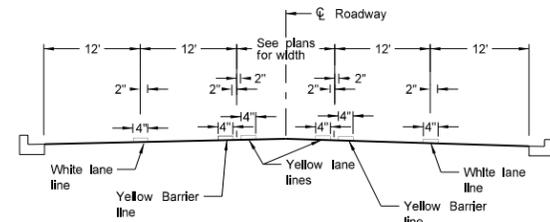
RURAL FIVE LANE ROADWAY
Asphalt Section



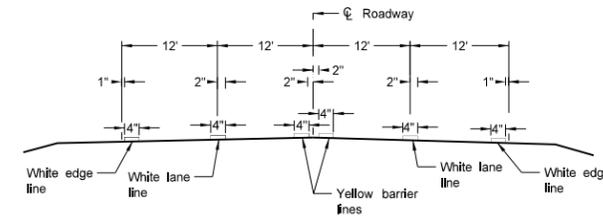
URBAN FIVE LANE SECTION
Concrete Section



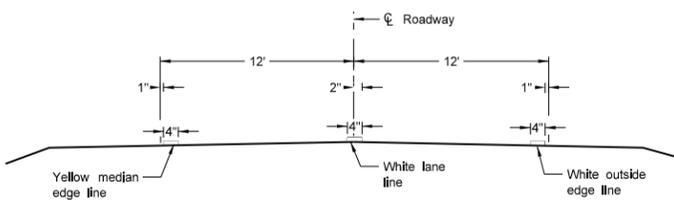
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



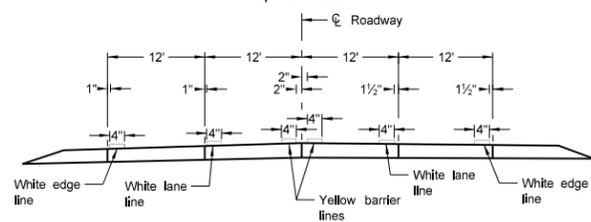
URBAN FIVE LANE SECTION
Asphalt Section



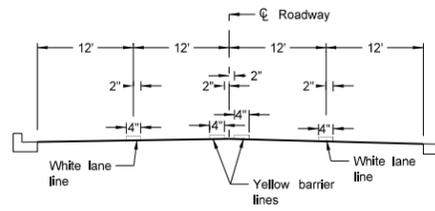
RURAL FOUR LANE ROADWAY
Asphalt Section



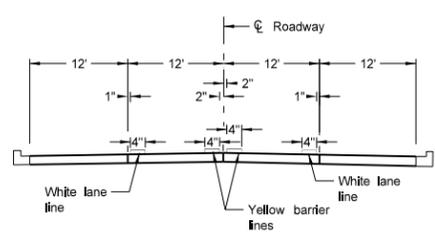
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



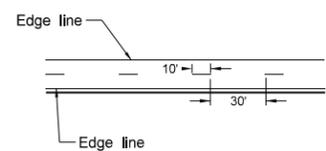
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



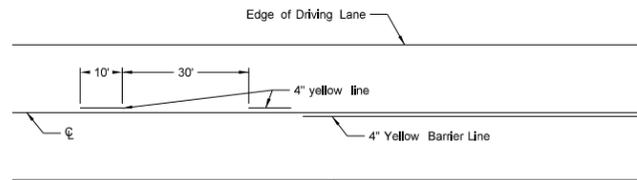
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

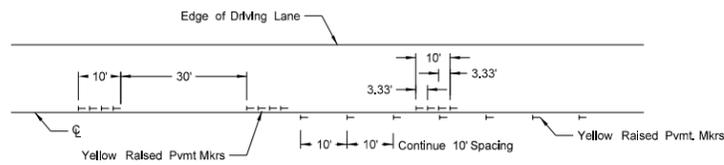
| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

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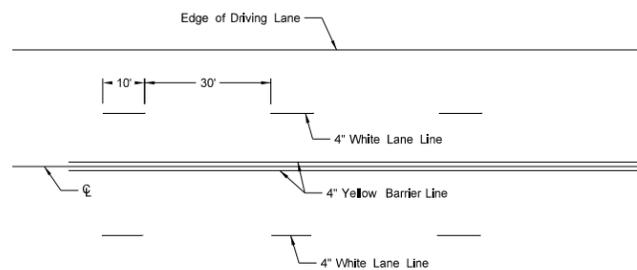
SHORT-TERM PAVEMENT MARKING



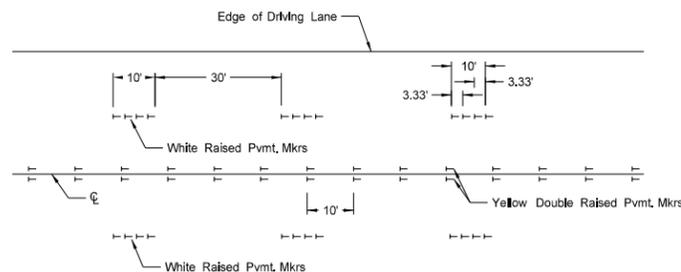
Painted or Tape Lines



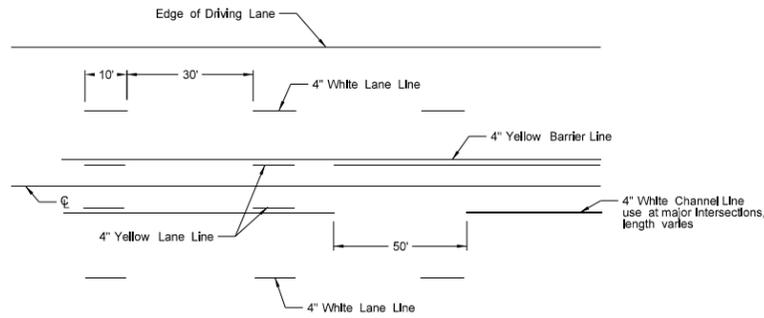
Raised Pavement Markers
TWO-LANE TWO-WAY ROADWAY



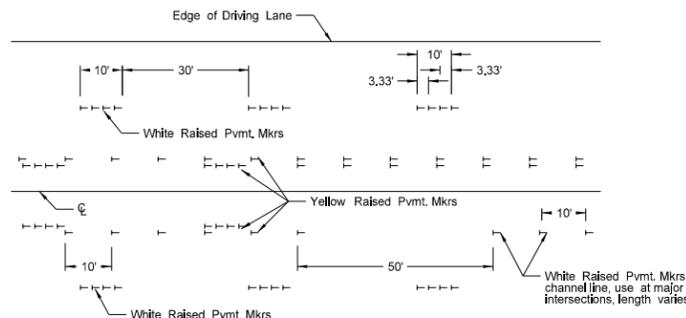
Painted or Tape Lines



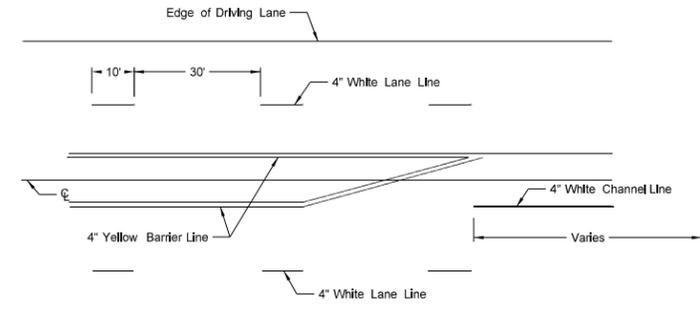
Raised Pavement Markers
FOUR LANE ROADWAY



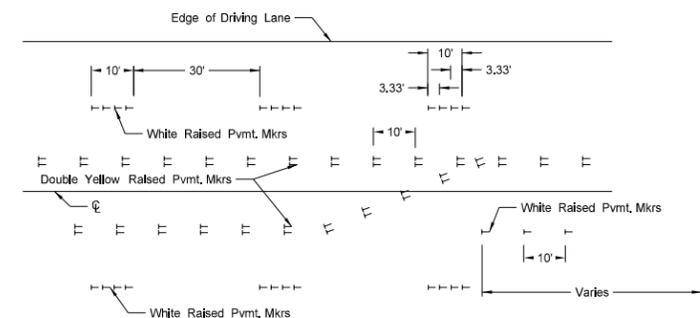
Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

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

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

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