

NDDOT ABBREVIATIONS

D-101-1

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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|---|
| 07-01-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 04-23-18 09-20-18 12-18-20 08-16-22 04-14-25 | General Revisions General Revisions General Revisions General Revisions General Revisions |



NDDOT ABBREVIATIONS

D-101-2

| | | | | | | | |
|--------|------------------------------|----------|--------------------------|---------------|-------------------------------|-----------|---|
| Galv | galvanized | Ln | lane | Obsc | obscure(d) | Qty | quantity |
| Gar | garage | Lg | large | Ocpd | occupied | Qtr | quarter |
| Gs L | gas line | Lat | latitude | Ocpy | occupy | | |
| G Reg | gas line regulator | Lt | left | O/s | offset | | |
| GMV | gas main valve | Lens | lenses | OC | on center | Rad or R | radius |
| G Mtr | gas meter | Lvl | level | C | one dimensional consolidation | RR | railroad |
| GSV | gas service valve | Lvng | leveling | OC | organic content | Rlw | railway |
| GVP | gas vent pipe | Lht | light | Orig | original | Rsd | raised |
| GV | gate valve | LP | light pole | O To O | out to out | RC | rapid curing |
| Ga | gauge | Ltg | lighting | OD | outside diameter | Rec | record |
| Gov | government | Liq | liquid | OH | overhead | Rcy | recycle |
| Grd | graded/grade | LL | liquid limit | | | RAP | recycled asphalt pavement |
| Grnd | ground | Loc | location | PMT | pad mounted transformer | RPCC | recycled portland cement concrete |
| GWM | ground water monitor | Long. | longitude | Pg | pages | Ref | reference |
| Gdrl | guardrail | Lp | loop | Pntd | painted | R Mkr | reference marker |
| Gtr | gutter | LD | loop detector | Pr | pair | RM | reference monument |
| | | Lum | luminaire | Pnl | panel | RP | reference point |
| | | | | Pk | park | Refl | reflectorized |
| H Plg | H piling | | | PSD | passing sight distance | RCB | reinforced concrete box |
| Hdwl | headwall | Mb | mailbox | Pvmt | pavement | RCES | reinforced concrete end section |
| Ht | height | ML | main line | Ped | pedestal | RCFES | reinforced concrete flared end section |
| Hel | helical | MH | manhole | Ped | pedestrian | RCP | reinforced concrete pipe |
| HDPE | high density polyethylene | Mkd | marked | PPP | pedestrian pushbutton post | RCPS | reinforced concrete pipe sewer |
| HM | high mast | Mkr | marker | Pen. | penetration | RCTES | reinforced concrete traversable end section |
| HP | high pressure | Mkg | marking | Perf | perforated | Reinf | reinforcement |
| HPS | high pressure sodium | MA | mast arm | Per. | perimeter | Res | reservation |
| HTCG | high tension cable guardrail | Matl | material | Perm | permanent | Res | residence |
| Hwy | highway | Max | maximum | PL | pipeline | Ret | retaining |
| Hor | horizontal | | | PI | place | Rev | reverse |
| HBP | hot bituminous pavement | Meas | measure | P&P | plan & profile | Rt | right |
| HMA | hot mix asphalt | Mdn | median | PL | plastic limit | R/W | right of way |
| Hyd | hydrant | MD | median drain | PI or P | plate | Riv | river |
| Ph | hydrogen ion content | MC | medium curing | Pt | point | Rd | road |
| | | MGS | Midwest Guardrail System | PE | polyethylene | Rdbo | road bed |
| | | MM | mile marker | PVC | polyvinyl chloride | Rdw | roadway |
| Id | identification | MP | mile post | PCC | Portland Cement concrete | RWIS | roadway weather information system |
| Incl | inclinometer tube | Min | minimum | PP | power pole | Rk | rock |
| IMH | inlet manhole | Misc | miscellaneous | Preempt | preemption | Rt | route |
| ID | inside diameter | Mon | monument | Prefab | prefabricated | | |
| Inst | instrument | Mnd | mound | Prfmd or Pref | preformed | | |
| Intchg | interchange | Mtbl | mountable | Prep | preperation | | |
| Intmdt | intermediate | Mtd | mounted | Press. | pressure | | |
| Intscn | intersection | Mtg | mounting | PRV | pressure relief valve | | |
| Inv | invert | Mk | muck | Prestr | prestressed | | |
| IP | iron pipe | | | Pvt | private | | |
| | | | | PD | private drive | | |
| Jt | joint | | | Prod. | production/produce | | |
| Jct | junction | Neop | neoprene | Prog | programmed | 07-01-14 | |
| | | Ntwk | network | Prop. | property | REVISIONS | |
| | | N | North | Ppsd | proposed | DATE | CHANGE |
| | | NE | Northeast | PB | pull box | 08-03-15 | General Revisions |
| | | NW | Northwest | | | 04-23-18 | General Revisions |
| | | NB | Northbound | | | 12-18-20 | General Revisions |
| | | No. or # | number | | | 08-16-22 | General Revisions |
| | | | | | | 04-14-25 | General Revisions |

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NDDOT ABBREVIATIONS

D-101-3

| | | | |
|------------|----------------------------------|--------|------------------------------------|
| Salv | salvage(d) | Tel | telephone |
| San | sanitary sewer line | Tel B | Telephone Booth |
| Sec | section | Tel P | telephone pole |
| SL | section line | Tv | television |
| Sep | separation | Temp | temperature |
| Seq | sequence | Temp | temporary |
| Serv | service | TBM | temporary bench mark |
| Sht | sheet | T | thinwall tube sample |
| Shtng | sheeting | Ts | topsoil |
| Shldr | shoulder | Traf | traffic |
| Sw or Sdwk | sidewalk | TSCB | traffic signal control box |
| SD | sight distance | Tr | trail |
| SN | sign number | Transf | transformer |
| Sig | signal | Trans | transition |
| Sgl | single | TT | transmission tower |
| SRCP | slotted reinforced concrete pipe | TES | traversable end section |
| SC | slow curing | Trans | transverse |
| SS | slow setting | Trtd | treated |
| Sm | small | Trmt | treatment |
| S | South | Qc | triaxial compression |
| SE | Southeast | TERO | tribal employment rights ordinance |
| SW | Southwest | Tpl | triple |
| SB | Southbound | Typ | typical |
| Sp | spaces | | |
| Spcl | special | | |
| SA | special assembly | Qu | unconfined compressive strength |
| SP | special provisions | Ugrnd | underground |
| G | specific gravity | Util | utility |
| Spk | spike | | |
| SB | split barrel sample | VG | valley gutter |
| SH | sprinkler head | Vap | vapor |
| SV | sprinkler valve | Vert | vertical |
| Sq | square | VCP | vitrified clay pipe |
| Stk | stake | Vol | volume |
| Std | standard | VSFS | vehicle speed feedback sign |
| N | standard penetration test | | |
| Std Specs | standard specifications | Wkwy | walkway |
| Stm L | steam line | W | water content |
| SEC | steel encased concrete | WGV | water gate valve |
| SMA | stone matrix asphalt | WL | water line |
| SSD | stopping sight distance | WM | water main |
| SD | storm drain | WMV | water main valve |
| St | street | W Mtr | water meter |
| SPP | structural plate pipe | WSV | water service valve |
| SPPA | structural plate pipe arch | WW | water well |
| Str | structure | Wrng | wearing |
| Subd | subdivision | WIM | weigh in motion |
| Sub | subgrade | W | west |
| Sub Prep | subgrade preperation | WB | westbound |
| Ss | subsoil | Wrng | wiring |
| SS | supplement specification | W/ | with |
| Supp | supplemental | W/o | without |
| Surf | surfacing | | |
| Surv | survey | | |
| Sym | symmetrical | | |

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NDDOT ABBREVIATIONS

D-101-4

MEASUREMENTS

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

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

SURVEY DESCRIPTIONS

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

SOIL TYPES

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

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| 07-01-14 | |
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| 12-18-20 4-14-25 | Sheet Added - Continued from D-101-3 General Revisions |



NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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LINE STYLES

D-101-21

Right Of Way

| | |
|-------|---------------------------------------|
| ----- | Easement |
| ----- | Existing Easement |
| ----- | Right of Way |
| ----- | Existing Right of Way |
| ----- | Existing Right of Way Railroad |
| ----- | Existing Right of Way Not State Owned |
| ----- | Existing Government Lot Line |
| ----- | Existing Adjacent Block Lines |

Cross Sections and Typicals

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

Striping

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

Erosion Control

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

Geotechnical

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

Pavement Joints

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

Environmental

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

Boundary Control

| | |
|-------|--|
| ----- | Existing City Corporate Limits or Reservation Boundary |
| ----- | Existing State or International Line |
| ----- | Existing Township |
| ----- | Existing County |

Contours

| | |
|-------|----------------------|
| ----- | Depression Contours |
| ----- | Supplemental Contour |

Bridge Details

| | |
|-------|----------------------------|
| ----- | Small Hidden Object |
| ----- | Large Hidden Object |
| ----- | Phantom Object |
| ----- | Existing Conditions Object |

| | |
|-------|----------------------|
| ----- | Centerline Main |
| ----- | Centerline Secondary |
| ----- | Excavation Limits |
| ----- | Proposed Ground |
| ----- | Sheet Piling |

| | |
|------------------------------|---|
| NORTH DAKOTA | |
| DEPARTMENT OF TRANSPORTATION | |
| 07-01-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 09-23-16 12-18-20 | Added and Revised Items, Organized by Functional Groups General Revisions |



SYMBOLS

D-101-30

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

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

SYMBOLS

D-101-31

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

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



 Kirk J. Hoff
 REGISTERED
 PROFESSIONAL
 PE-4683
 ENGINEER
 NORTH DAKOTA
 12 18 2020

SYMBOLS

D-101-32

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

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



SYMBOLS

D-101-33

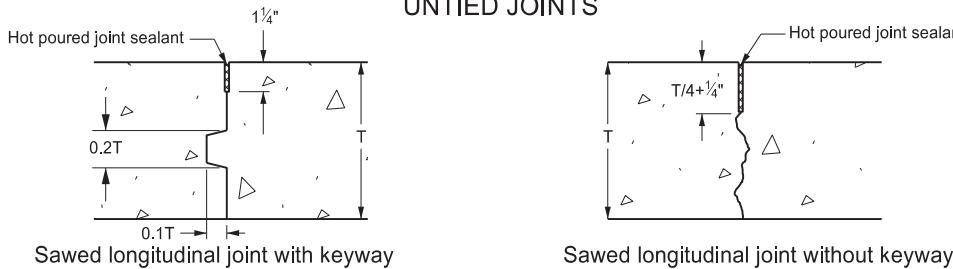
| | | |
|-------|---|--|
| ○ ○ ○ | Existing Manhole (Electrical, Gas, Telephone) | Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water |
| ○ ○ ○ | Water Manhole (Exst, Exst with Valve) | □ □ □ □ □ |
| ○ ○ ○ | Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve) | Existing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

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

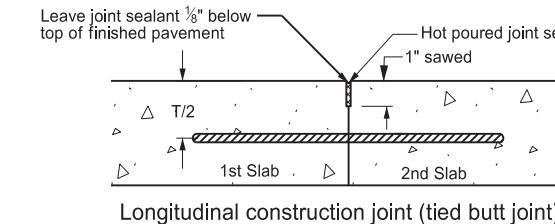


LONGITUDINAL JOINT DETAILS

UNTIED JOINTS



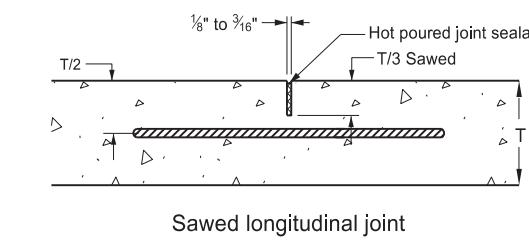
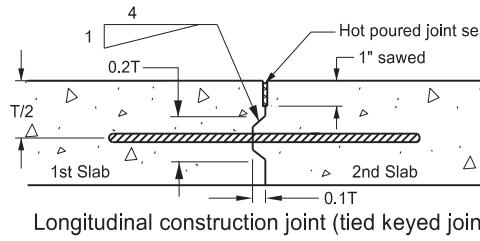
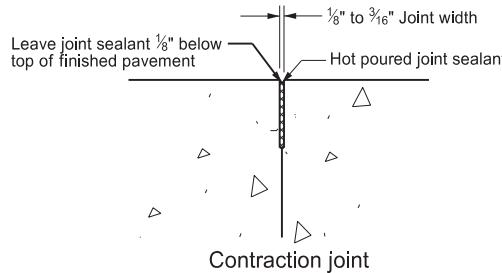
TIED JOINTS



Longitudinal construction joint (tied butt joint)

Notes:

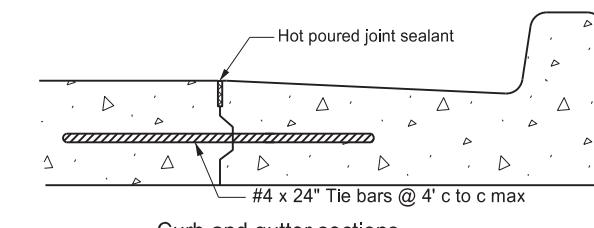
- Provide hot poured joint sealant meeting the requirements of Section 826.02A.2 of the Standard Specifications.
- Include all costs of the longitudinal joint and seal in the price bid for the PCC pavement.
- Do not place tie bars within 18 inches of a transverse joint.
- Use Grade 40 steel for tie bars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



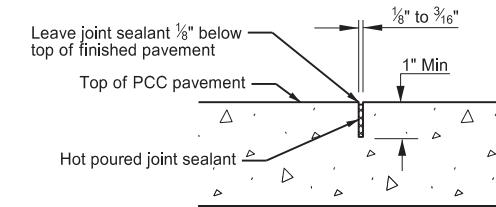
Sawed longitudinal joint

| TIE BARS | STEEL GRADE | 40 | | 60 | | 40 | | 60 | | 40 | | 60 | | 40 | | 60 | | | | | | | | |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----|----|----|----|----|----|----|
| | | #3x24" BARS | #3x30" BARS | #4x24" BARS | #4x36" BARS | #5x30" BARS | #5x42" BARS | #6x36" BARS | #6x48" BARS | #3x24" BARS | #3x30" BARS | #4x24" BARS | #4x36" BARS | #5x30" BARS | #5x42" BARS | #6x36" BARS | #6x48" BARS | | | | | | | |
| DIST TO NEAREST FREE EDGE | | 4 | 6 | 8 | 10 | 4 | 6 | 8 | 10 | 12 | 14 | 8 | 10 | 12 | 14 | 16 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| PCC PVMT DEPTH | JOINT TYPE | | | | | | | | | | | | | | | | | | | | | | | |
| 6" | WARP | 48 | 39 | 37 | 27 | 48 | 48 | 48 | 42 | 48 | 48 | 48 | 48 | 48 | 47 | 41 | 30 | 27 | 48 | 48 | 48 | 48 | 48 | 48 |
| 8" | WARP | 48 | 39 | 29 | 24 | 48 | 48 | 44 | 35 | 29 | 25 | 48 | 42 | 35 | 30 | 26 | 48 | 48 | 45 | 39 | 48 | 48 | 48 | 48 |
| 8 1/2" | WARP | 48 | 37 | 28 | 24 | 48 | 48 | 42 | 33 | 28 | 24 | 48 | 48 | 48 | 42 | 37 | 24 | 48 | 48 | 44 | 38 | 48 | 48 | 48 |
| 9" | WARP | 48 | 35 | 26 | 24 | 48 | 48 | 39 | 31 | 26 | 24 | 47 | 37 | 31 | 26 | 24 | 48 | 48 | 48 | 40 | 35 | 48 | 48 | 48 |
| 9 1/2" | WARP | 48 | 33 | 25 | 24 | 48 | 48 | 37 | 30 | 25 | 24 | 44 | 35 | 29 | 25 | 24 | 48 | 48 | 48 | 39 | 48 | 48 | 48 | 48 |
| 10" | WARP | 47 | 31 | 24 | 24 | 48 | 47 | 35 | 28 | 24 | 24 | 42 | 34 | 28 | 24 | 24 | 48 | 48 | 48 | 36 | 43 | 48 | 48 | 48 |
| 10 1/2" | WARP | 45 | 30 | 24 | 24 | 48 | 45 | 34 | 27 | 24 | 24 | 40 | 32 | 26 | 24 | 24 | 48 | 48 | 48 | 38 | 43 | 48 | 48 | 48 |
| 11" | WARP | 43 | 28 | 24 | 24 | 48 | 43 | 32 | 26 | 24 | 24 | 38 | 31 | 25 | 24 | 24 | 48 | 48 | 48 | 36 | 41 | 48 | 48 | 48 |
| 11 1/2" | WARP | 41 | 27 | 24 | 24 | 48 | 41 | 31 | 24 | 24 | 24 | 36 | 29 | 24 | 24 | 24 | 48 | 48 | 48 | 34 | 39 | 48 | 48 | 48 |
| 12" | WARP | 39 | 26 | 24 | 24 | 48 | 39 | 29 | 24 | 24 | 24 | 35 | 28 | 24 | 24 | 24 | 48 | 48 | 48 | 33 | 38 | 48 | 48 | 48 |
| 12 1/2" | WARP | 38 | 25 | 24 | 24 | 48 | 38 | 28 | 24 | 24 | 24 | 33 | 27 | 24 | 24 | 24 | 48 | 48 | 48 | 32 | 37 | 48 | 48 | 48 |
| 13" | WARP | 36 | 24 | 24 | 24 | 48 | 36 | 27 | 24 | 24 | 24 | 32 | 26 | 24 | 24 | 24 | 48 | 48 | 48 | 30 | 35 | 48 | 48 | 48 |
| 13 1/2" | WARP | 35 | 24 | 24 | 24 | 48 | 35 | 26 | 24 | 24 | 24 | 31 | 25 | 24 | 24 | 24 | 48 | 48 | 48 | 29 | 34 | 48 | 48 | 48 |
| 14" | WARP | 34 | 24 | 24 | 24 | 48 | 34 | 25 | 24 | 24 | 24 | 30 | 25 | 24 | 24 | 24 | 48 | 47 | 40 | 35 | 40 | 48 | 48 | 48 |
| 14 1/2" | WARP | 32 | 24 | 24 | 24 | 48 | 32 | 24 | 24 | 24 | 24 | 29 | 25 | 24 | 24 | 24 | 48 | 45 | 39 | 34 | 39 | 48 | 48 | 48 |
| 15" | WARP | 31 | 24 | 24 | 24 | 47 | 31 | 28 | 24 | 24 | 24 | 29 | 25 | 24 | 24 | 24 | 48 | 44 | 37 | 33 | 38 | 48 | 48 | 48 |
| BUTT | | | | | | | | | | | | | | | | | | | | | | | | |

*Spacing where the calculated pullout strength of the tiebar equals the calculated yield strength of the tiebar - 48 inch spacing indicates a calculated spacing of 4 feet or greater.



JOINT SEALER DETAILS



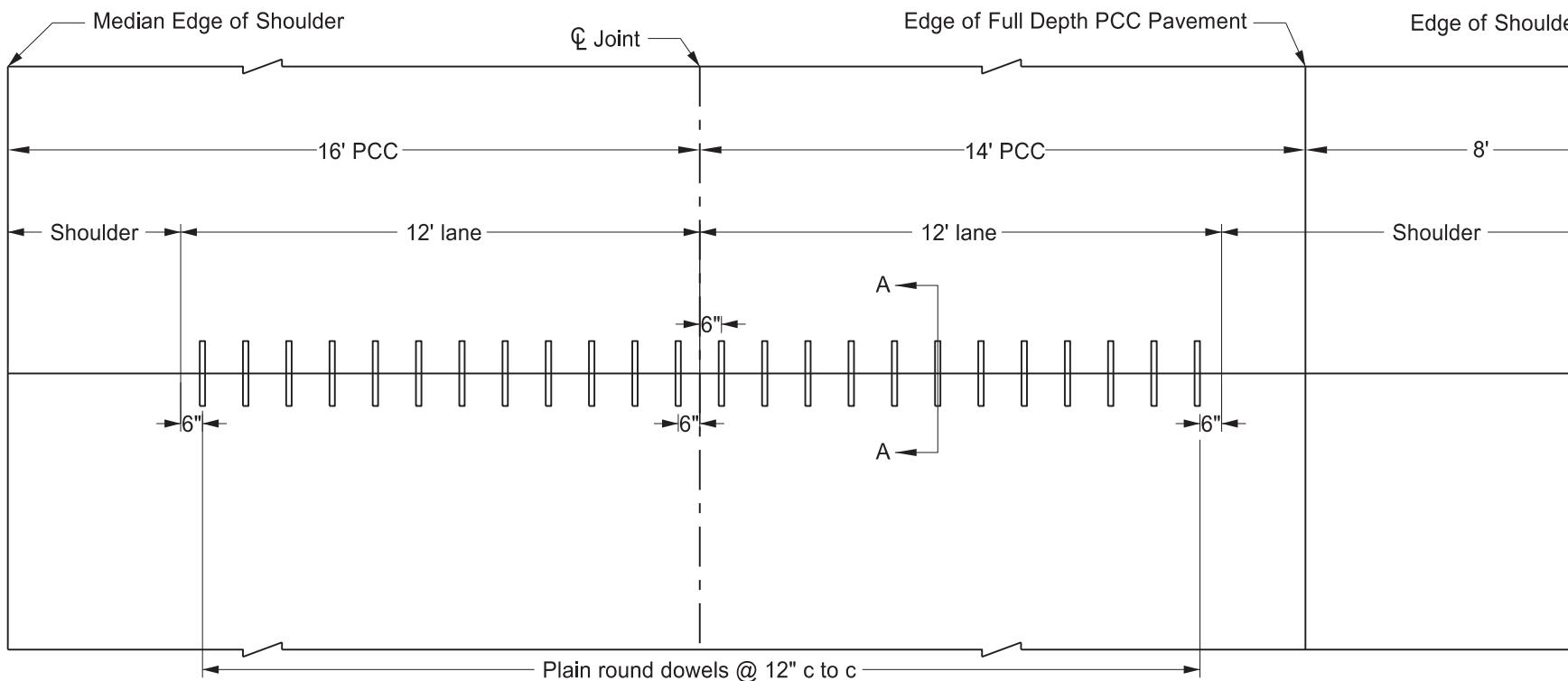
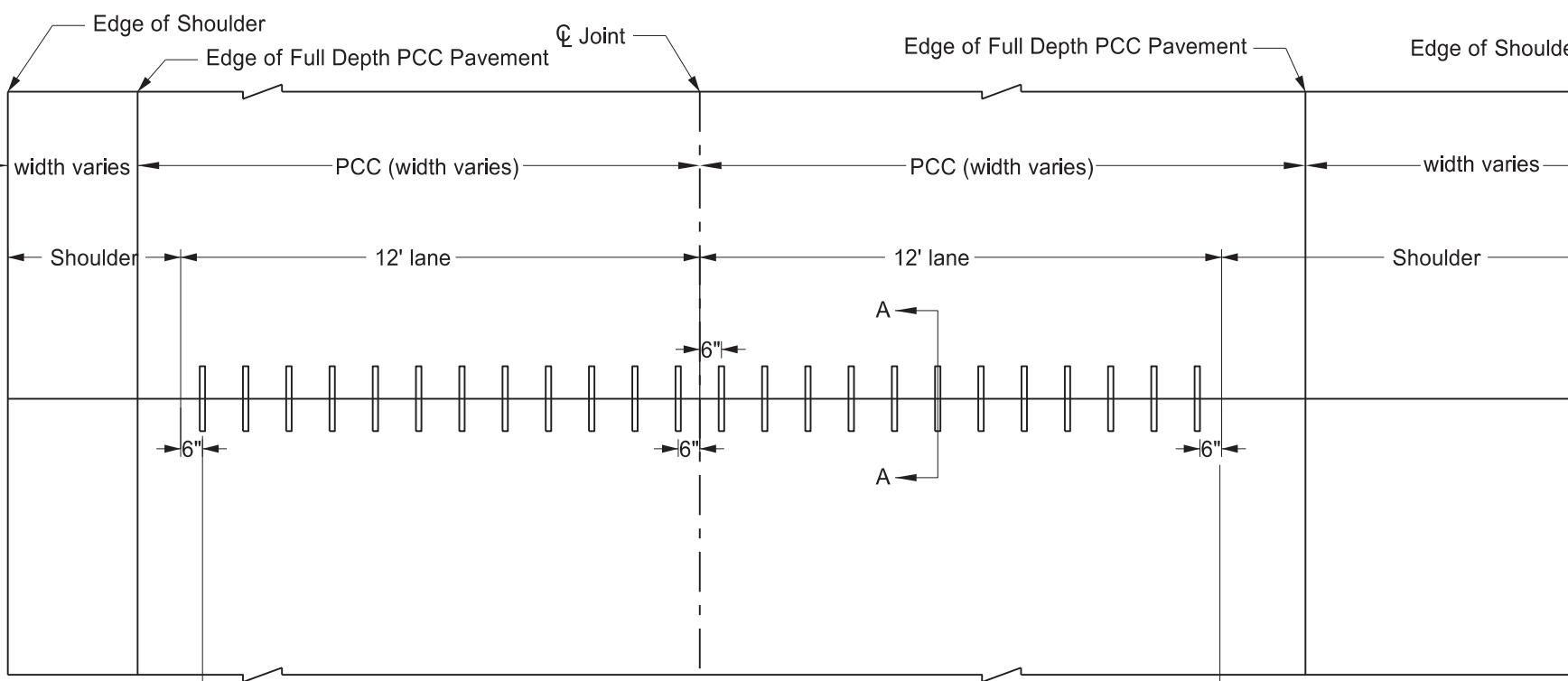
Typical section

| | |
|--|----------------------------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 9-15-2010 | |
| DATE | CHANGE |
| 10/23/2012 | Expanded Tie Bar Table |
| 03/16/2016 | Updated Jt Details & notes |
| 10/25/2019 | Corrected "Typo" in Note 3 |
| 03/13/2025 | Revised C&G Tie Bar Size |



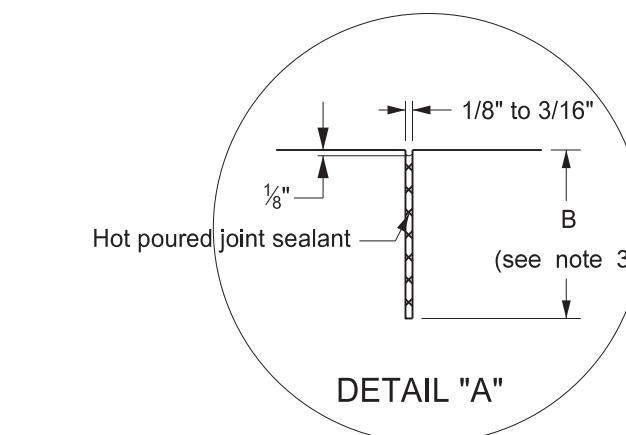
TRANSVERSE CONTRACTION JOINT DETAILS

D-550-3

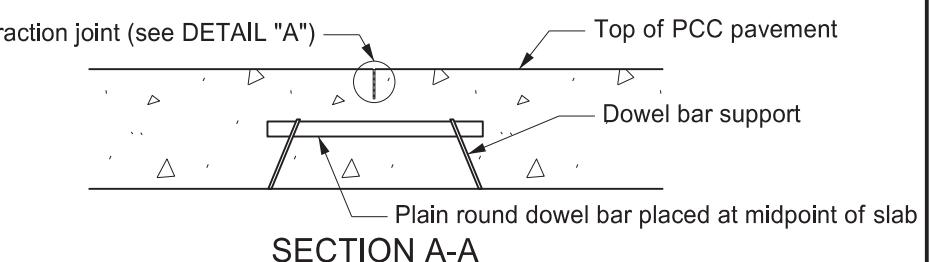
CONTRACTION JOINT DOWEL ASSEMBLY
INTERSTATECONTRACTION JOINT DOWEL ASSEMBLY
NON-INTERSTATE

Notes

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



DETAIL "A"



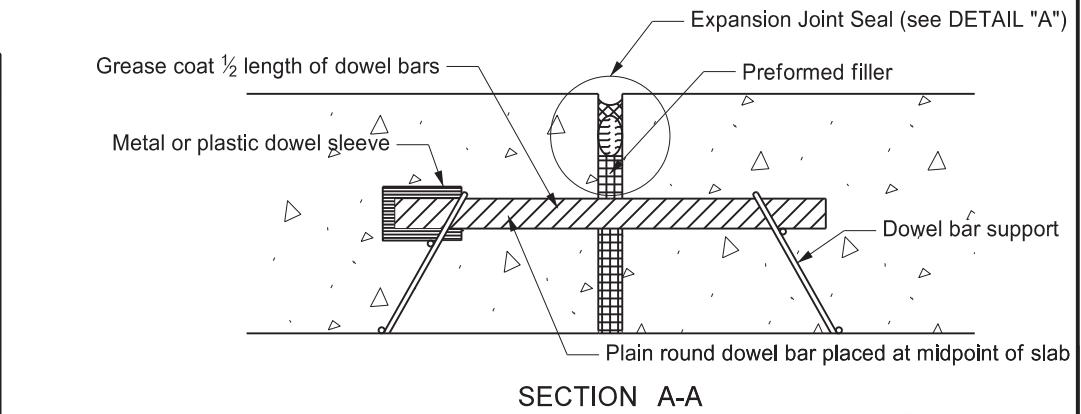
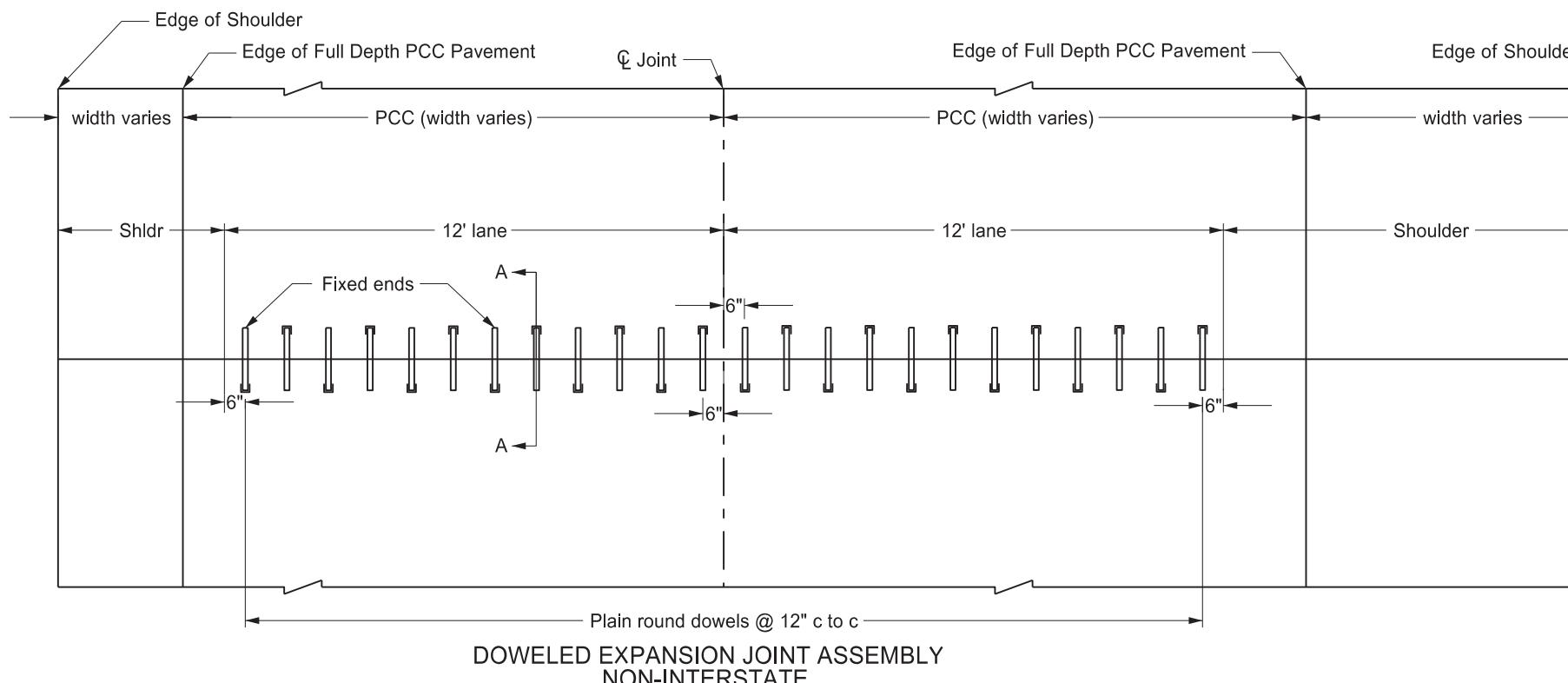
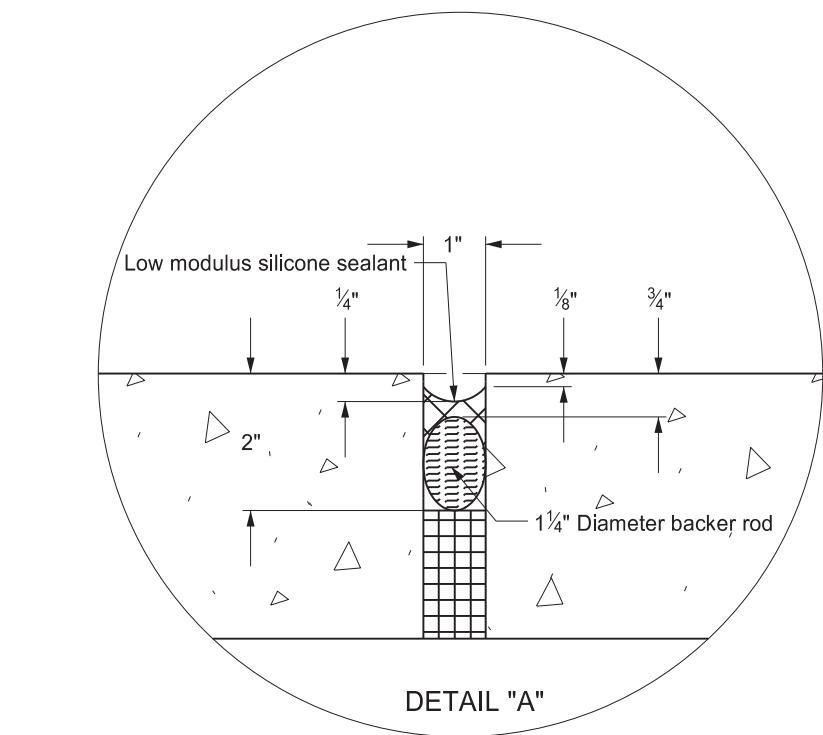
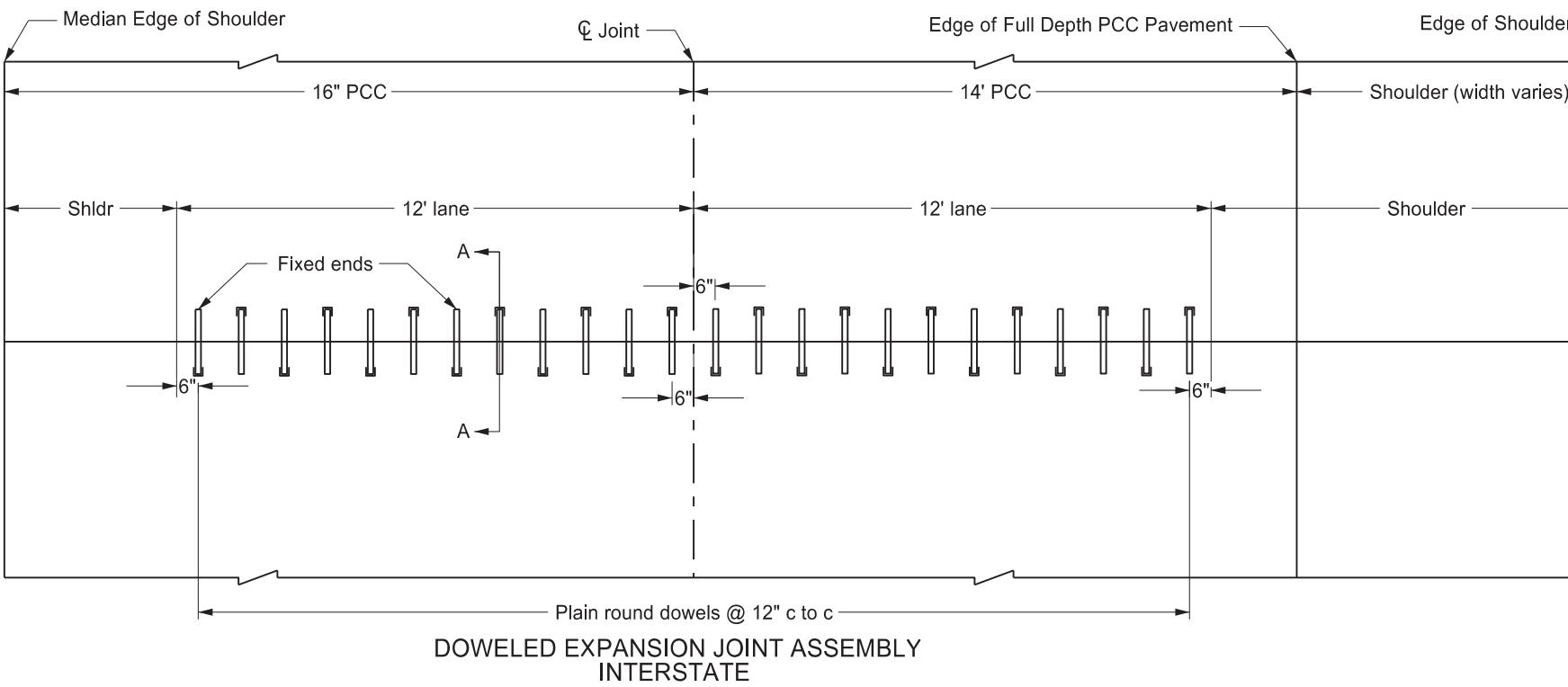
SECTION A-A

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|---------------------------------|
| 9-15-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 6/23/2014 | Removed dowel size reference |
| 3/16/2016 | Revised Joint Details and notes |
| 10/25/2019 | Expanded Details for clarity |
| 03/13/2025 | Revised # of Dowels & Note 3. |



TRANSVERSE EXPANSION JOINT DETAIL

D-550-4



| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|---|
| 9-15-2010 | |
| REVISIONS | |
| DATE | CHANGE |
| 6/23/2014 10/25/2019 3/13/2025 | Removed dowel bar sizes Expanded details for clarity Revised # of dowels. |



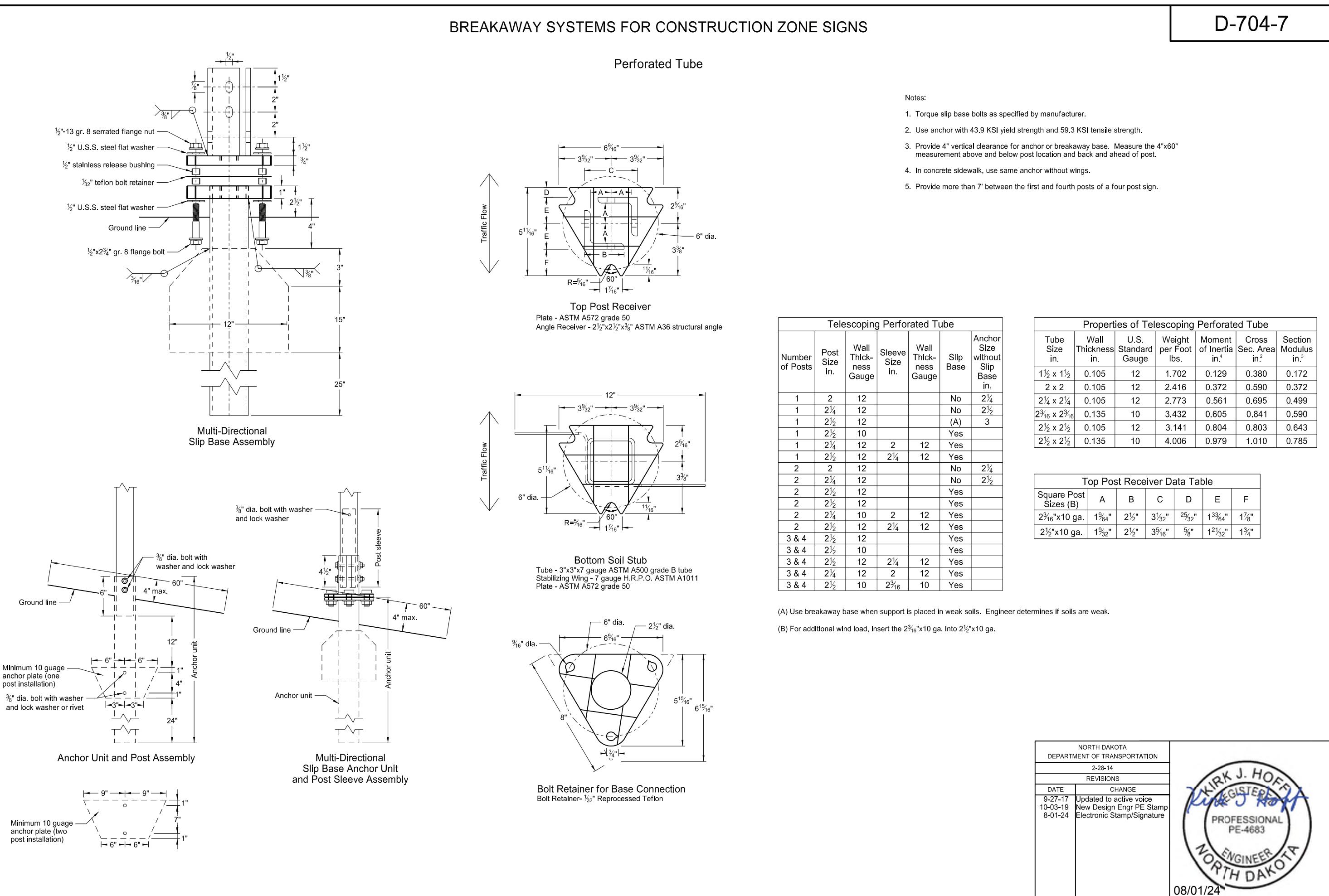
swing operation.

TION
& notes.
Stamp.
ature.



BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIG

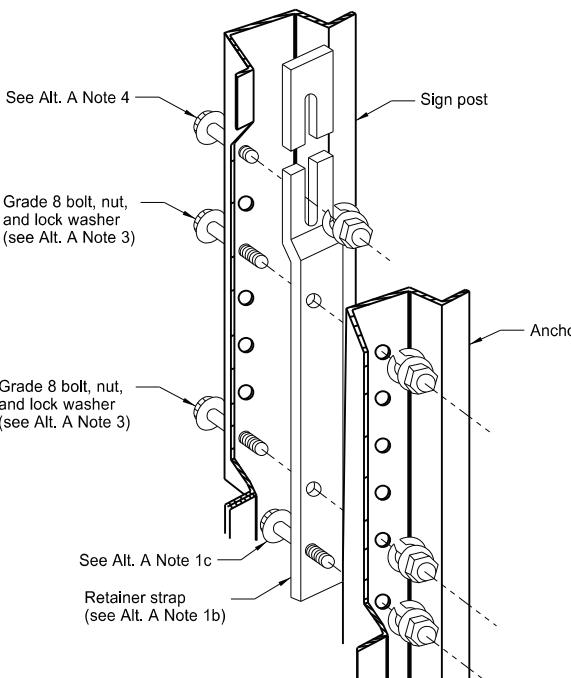
D-704-7



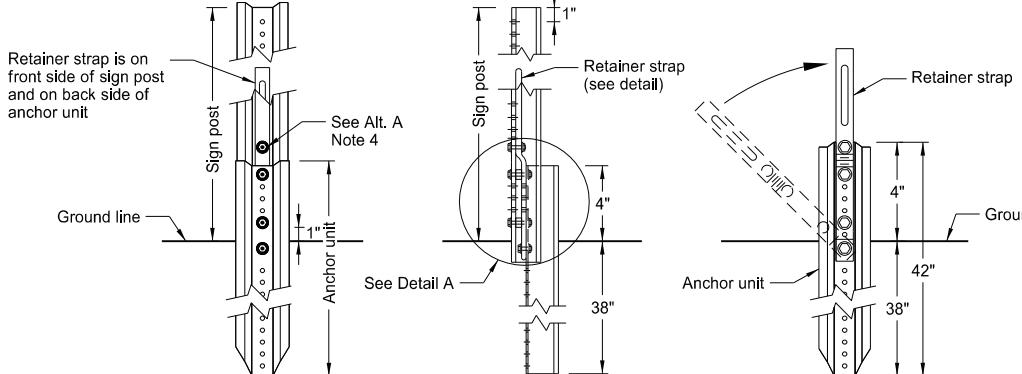
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



Detail A



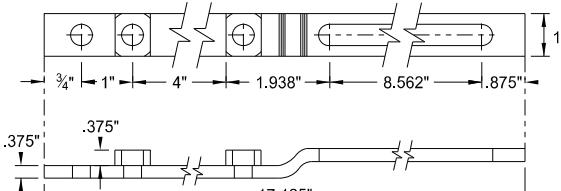
Front View

Side View

Back View

Breakaway U-Channel Detail
Alternate A

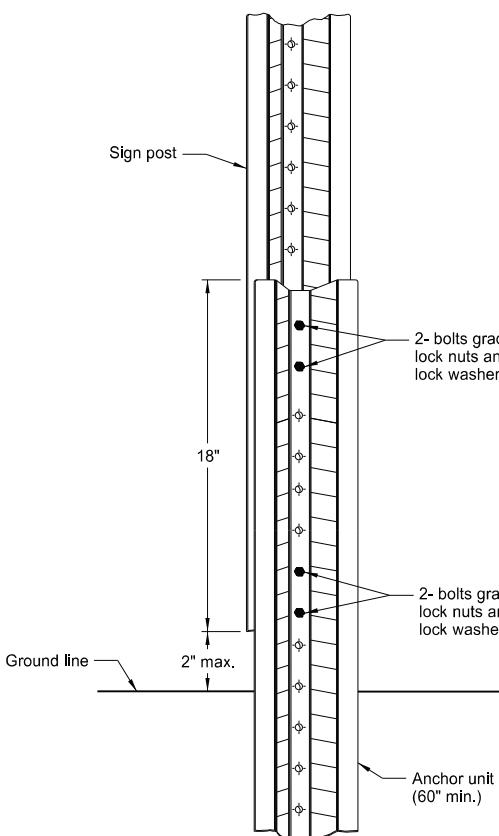
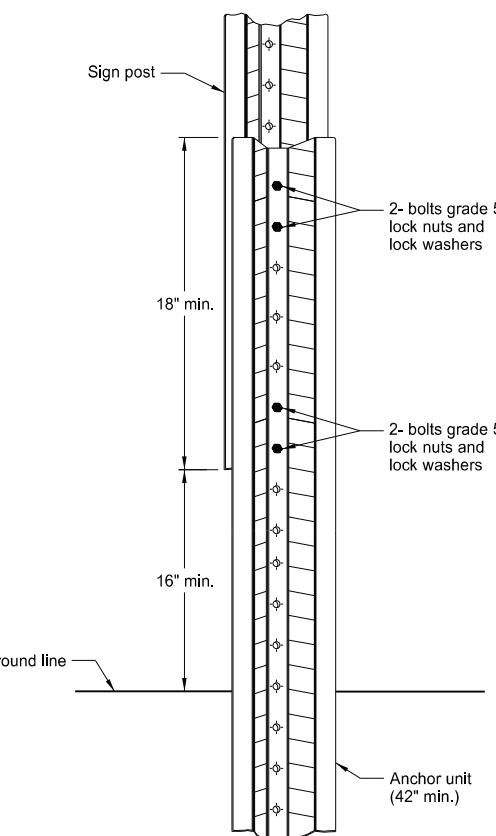
Install a maximum of 2 posts within 7'.



Retainer Strap Detail

Alternate A Steps of Installation:

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

Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)
Install a maximum of 3 posts within 7'.Breakaway U-Channel Splice Detail
Alternate C
(2.5 and 3 lb/ft)
Install a maximum of 3 posts within 7'.

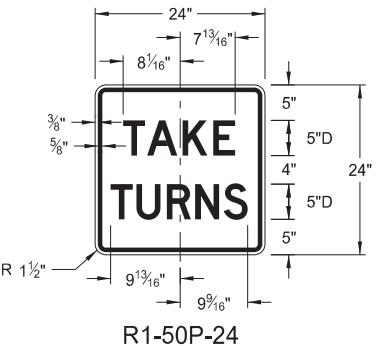
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|---|
| 2-28-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-27-17 10-03-19 8-01-24 | Updated to active voice New Design Engr PE Stamp Electronic Stamp/Signature |



08/01/24

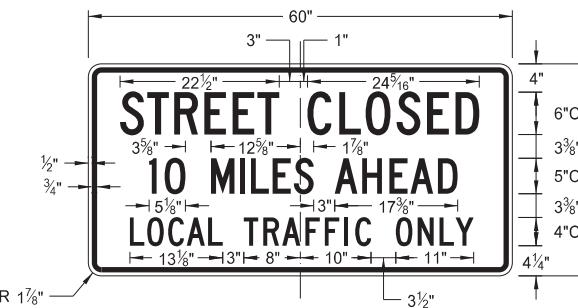
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



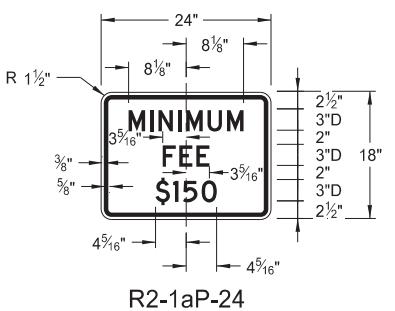
R1-50P-24

Legend: black (non-refl)
Background: white



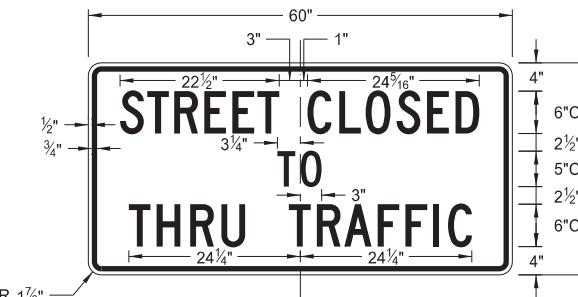
R11-3c-60

Legend: black (non-refl)
Background: white



R2-1aP-24

Legend: black (non-refl)
Background: white



R11-4a-60

Legend: black (non-refl)
Background: white



R11-2a-48

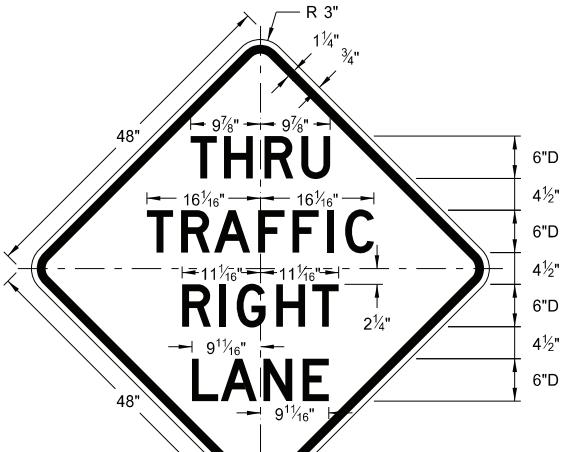
Legend: black (non-refl)
Background: white

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



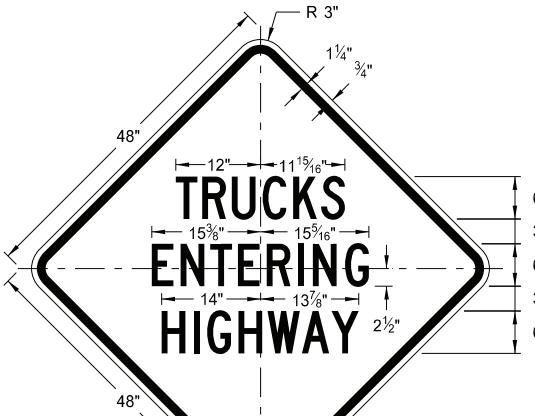
D-704-11

CONSTRUCTION SIGN DETAILS
WARNING SIGNS



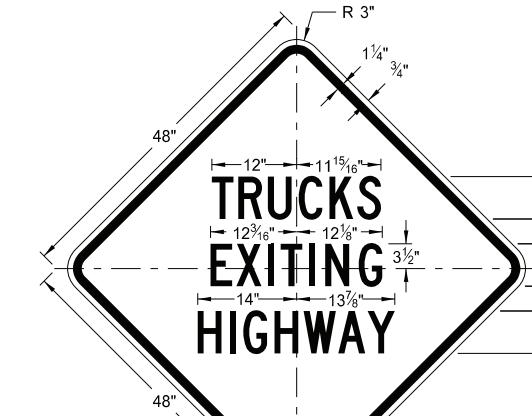
W5-8-48

Legend: black (non-refl)
Background: orange



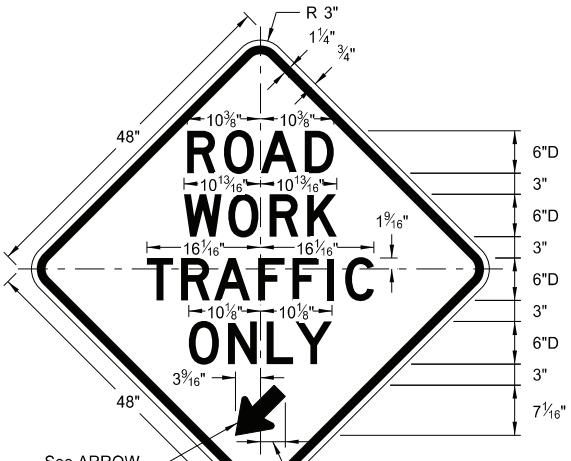
W8-53-48

Legend: black (non-refl)
Background: orange



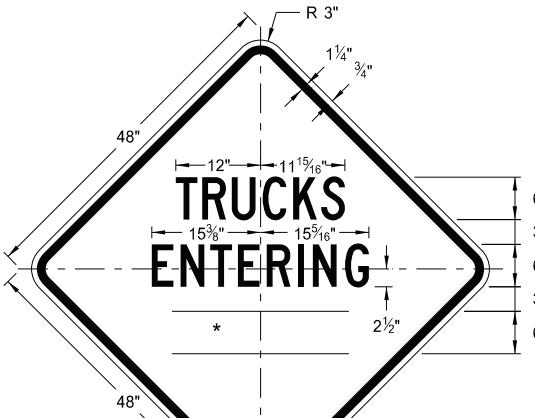
W8-56-48

Legend: black (non-refl)
Background: orange



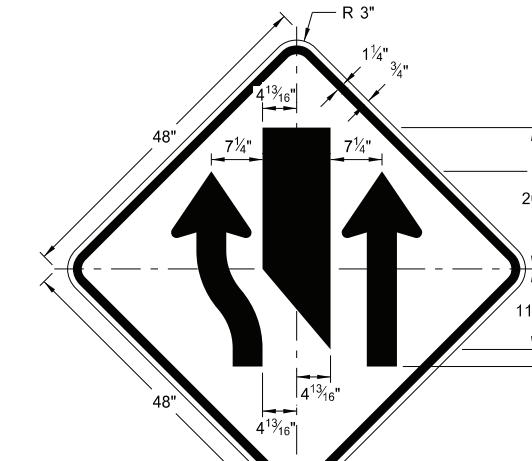
W5-9-48

Legend: black (non-refl)
Background: orange



W8-54-48

Legend: black (non-refl)
Background: orange

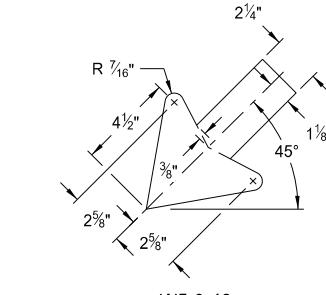


W8-55-48

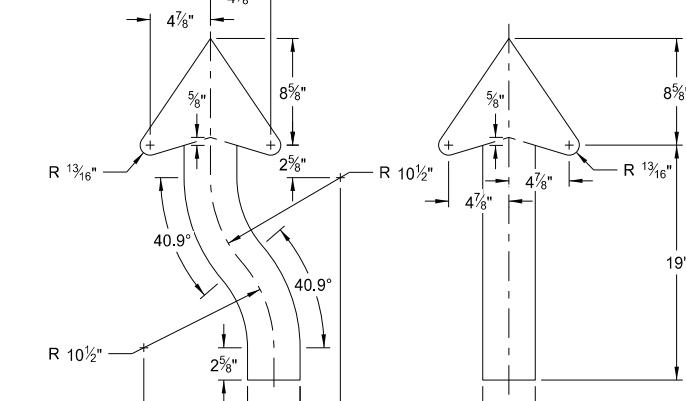
Legend: black (non-refl)
Background: orange

| WORD | LETTER SPACING |
|----------|----------------|
| AHEAD | Standard |
| 200 FT | Standard |
| 350 FT | Standard |
| 500 FT | Standard |
| 1000 FT | Reduce 40% |
| 1500 FT | Reduce 40% |
| 1/2 MILE | Reduce 50% |
| 1 MILE | Standard |

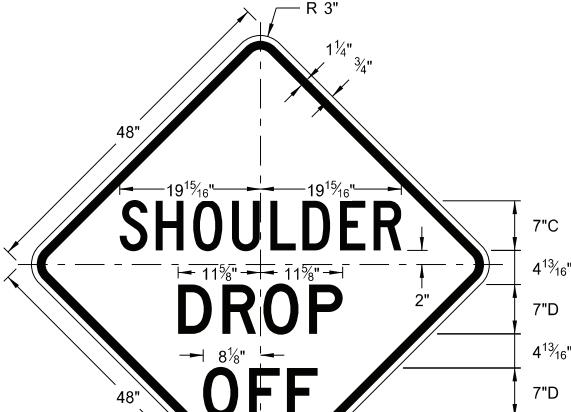
* DISTANCE MESSAGES



W5-9-48



W9-3a-48



W8-9a-48

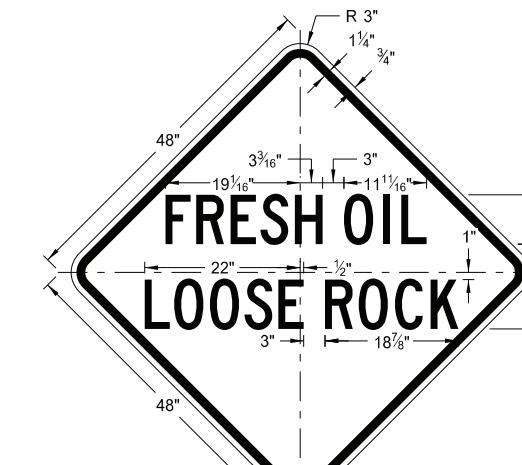
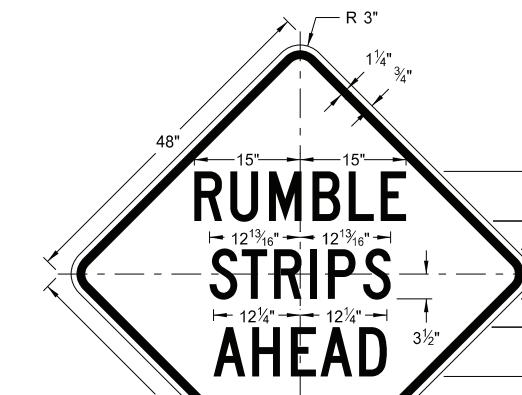
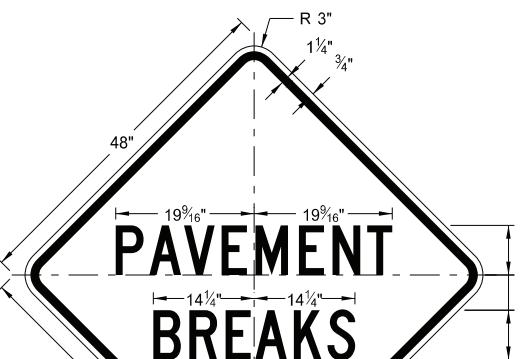
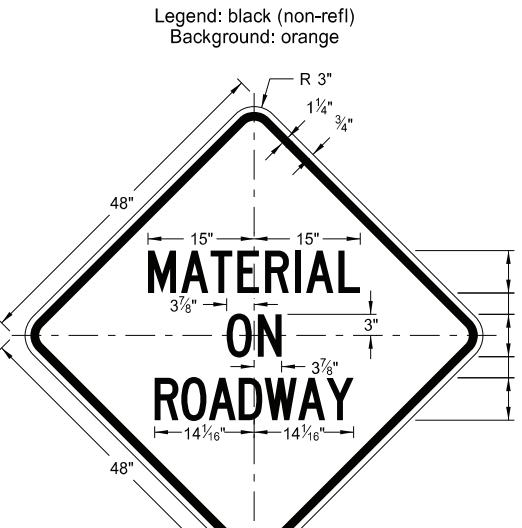
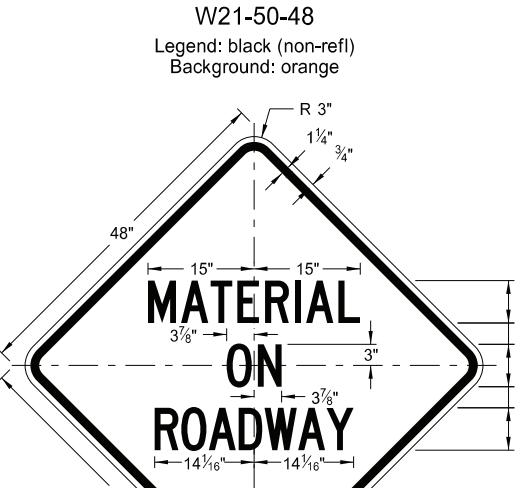
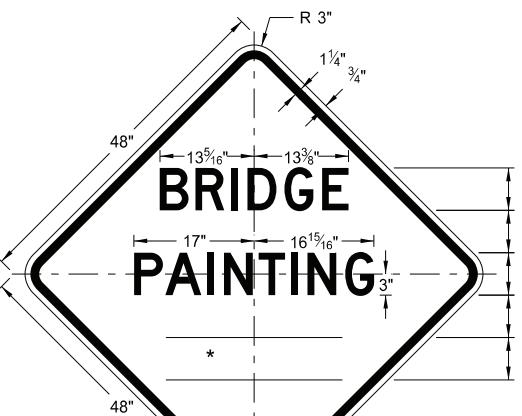
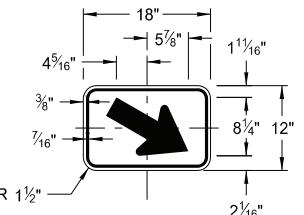
Legend: black (non-refl)
Background: orange

| | |
|--|---|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 8-13-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-17-17 5-31-18 10-03-19 8-01-24 | Updated sign number Revised sign and arrow details New Design Engineer PE Stamp Electronic Stamp/Signature |

08/01/24

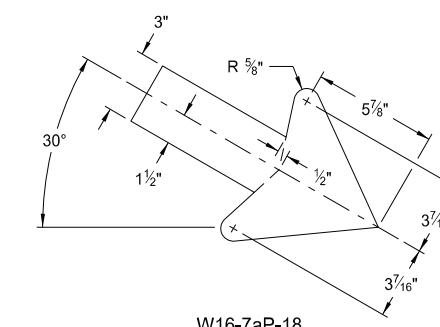


D-704-11A

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



| | |
|--|--|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 5-31-18 | |
| REVISIONS | |
| DATE | CHANGE |
| 11-01-19 8-01-24 | Added details for sign W16-7aP-18. Electronic Stamp/Signature. |

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

08/01/24

BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13

DELINERATOR DRUM

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

VERTICAL PANEL

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

TRAFFIC CONE

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

TUBULAR MARKER

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

FLEXIBLE DELINEATOR

INSTALLATION NOTES:

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

BARRICADE BLADE DETAIL

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

ELEVATION VIEW

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

SIDE VIEW

BARRICADE RAIL DETAILS

TYPE I BARRICADE

TYPE II BARRICADE

TYPE III BARRICADE

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

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

REFLECTOR DETAIL

One Direction Bi-Directional

ELEVATION

DELINERATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

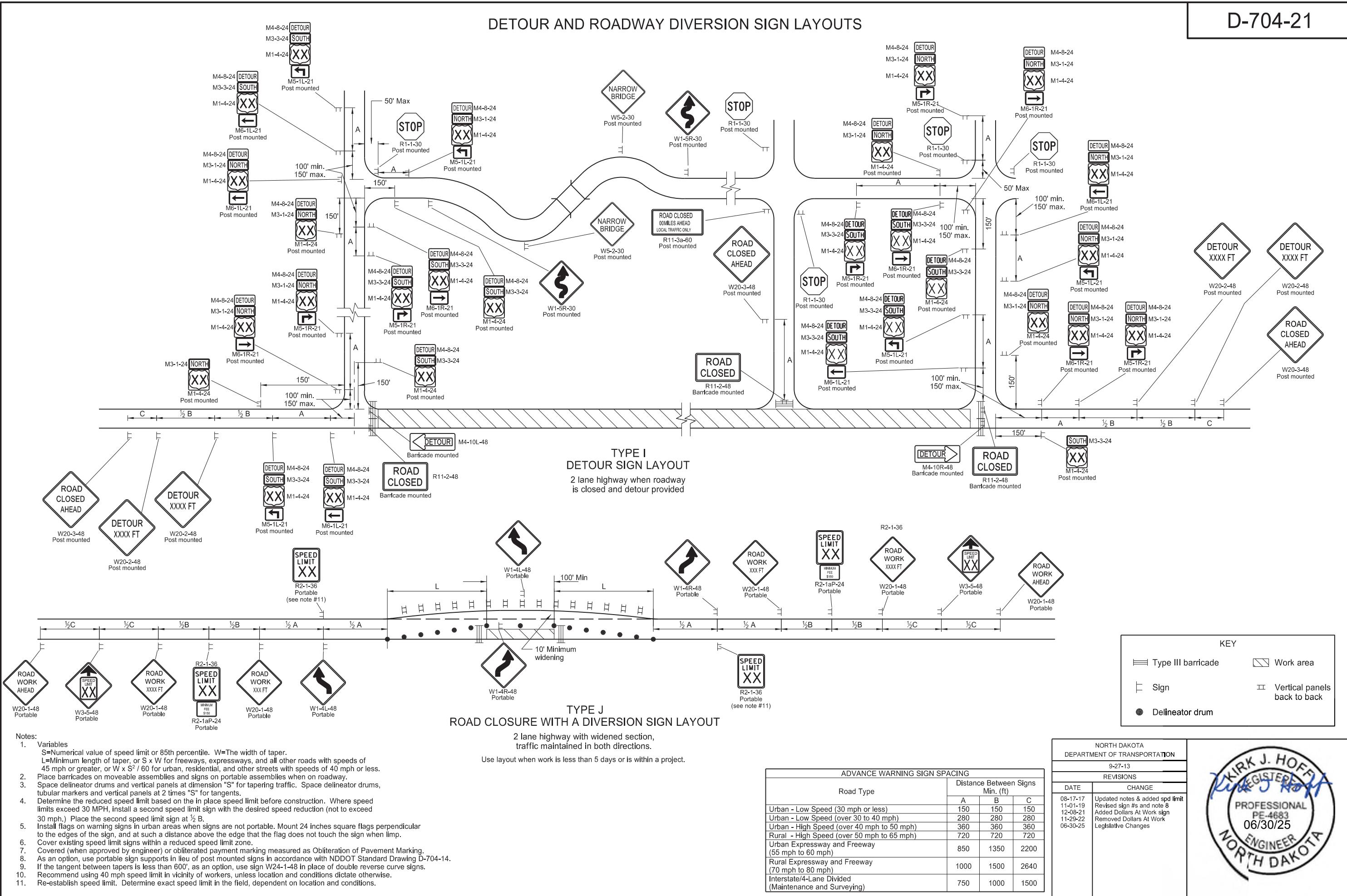
REFLECTOR DETAIL

ELEVATION

DELINERATORS

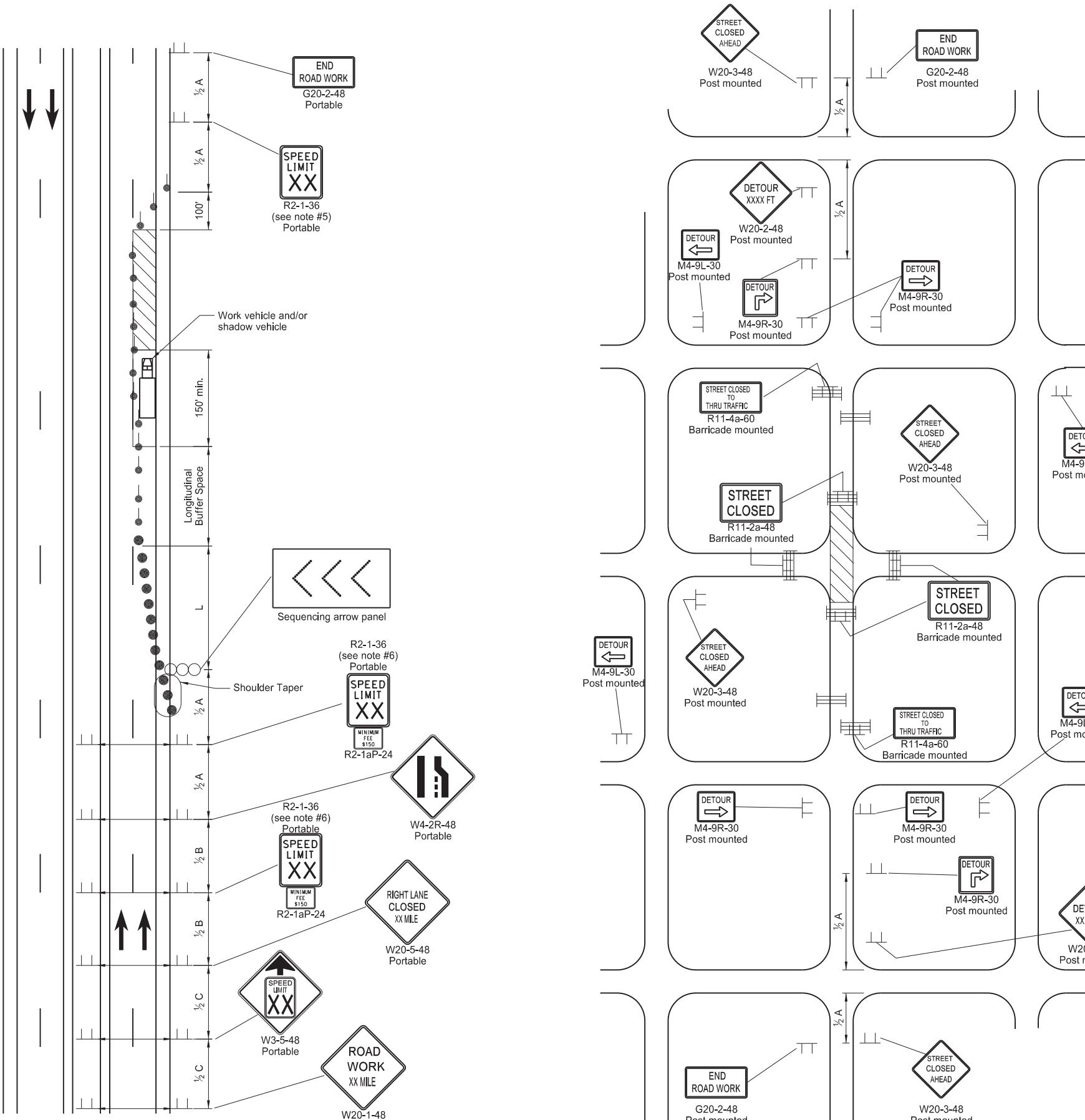
REFLECTOR DETAIL</

DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS



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

D-704-23



Notes:

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

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

| ADVANCE WARNING SIGN SPACING | |
|--|-------------------------------------|
| Road Type | Distance Between Signs Min. (ft) |
| 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 80 mph) | 1000 1500 2640 |
| Interstate/4-Lane Divided (Maintenance and Surveying) | 750 1000 1500 |

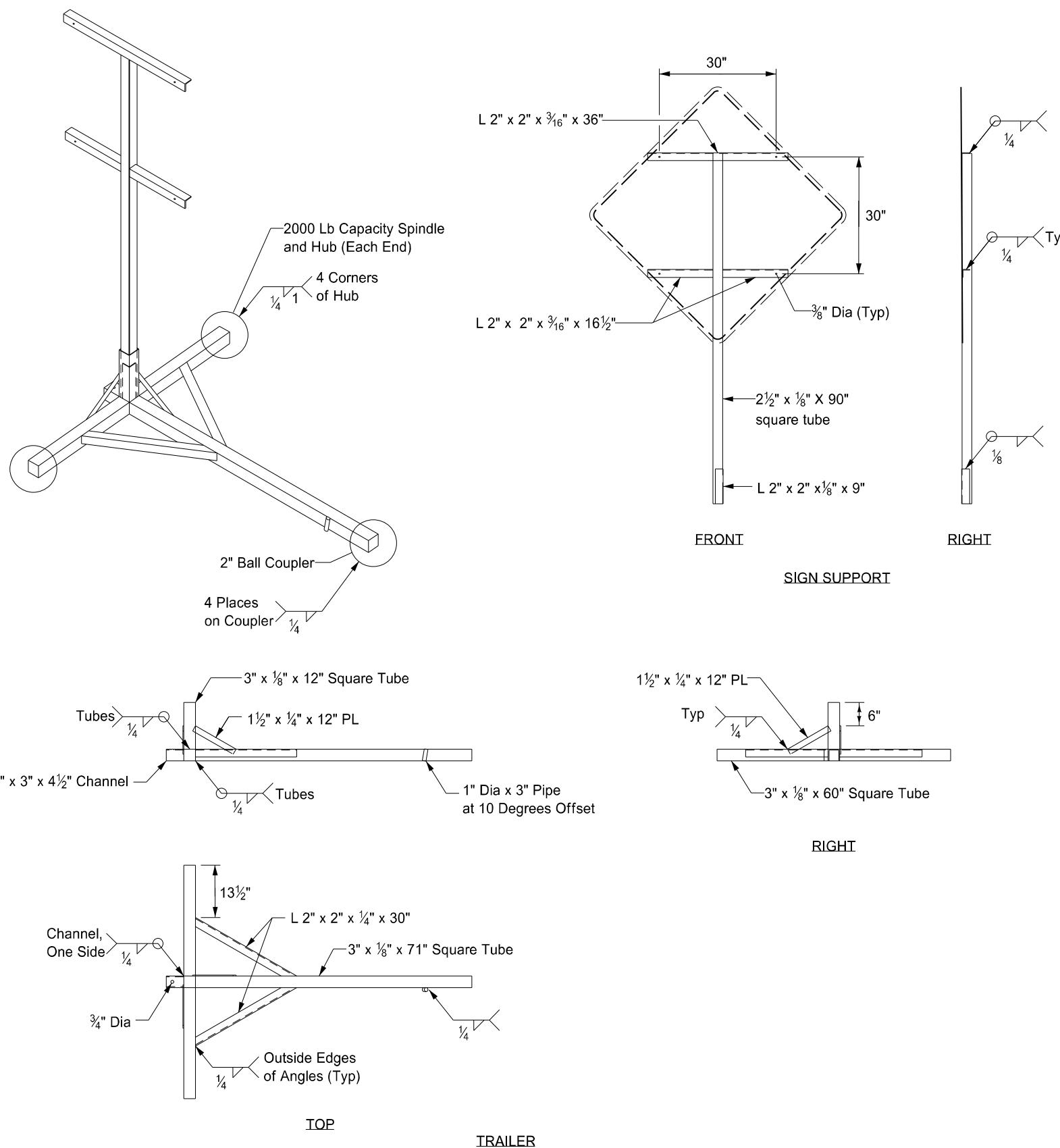
| Longitudinal Buffer Space | |
|---------------------------|-------------------|
| Speed (mph) | Length Min (feet) |
| 20 | 115 |
| 25 | 155 |
| 30 | 200 |
| 35 | 250 |
| 40 | 305 |
| 45 | 360 |
| 50 | 425 |
| 55 | 495 |
| 60 | 570 |
| 65 | 645 |
| 70 | 730 |
| 75 | 820 |
| 80 | 910 |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|---|
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 08-17-17 | Removed speed limit signs, & updated notes & sign numbers |
| 11-01-19 | Revised sign numbers & note |
| 12-08-21 | Added Dollars At Work sign |
| 11-29-22 | Removed Dollars At Work |
| 06-30-25 | Legislative Changes |



PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

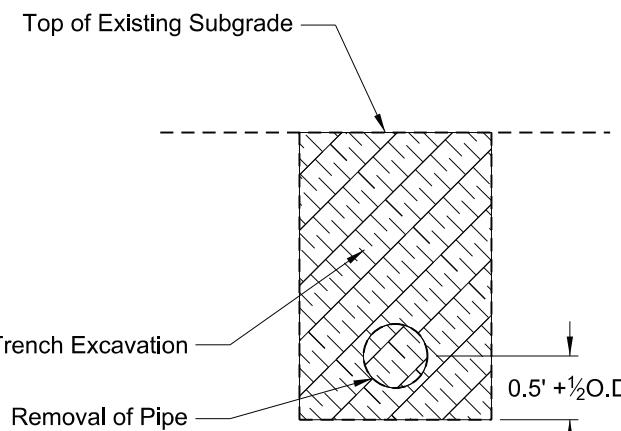
- ① Maximum 250 pound weight of assembly.
- ② Use a 14" wheel and tire.
- ③ Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
- ④ Other NCHRP 350 or MASH crash tested assemblies are acceptable.

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

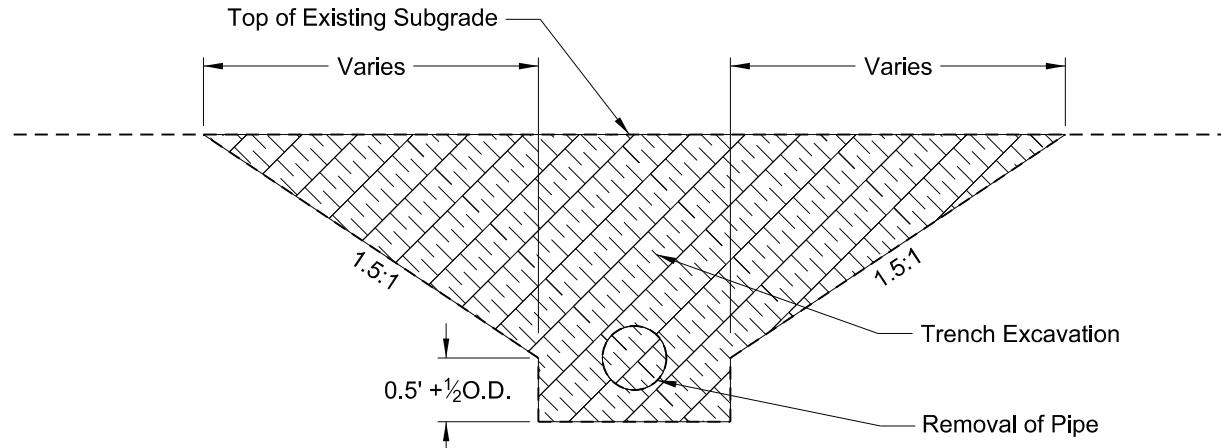
Kirk J. Hoff
 REGISTERED
 PROFESSIONAL
 PE-4683
 ENGINEER
 NORTH DAKOTA
 12 02 2020

PIPE INSTALLATION DETAIL FOR LONGITUDINAL MAINLINE PIPE
OR PIPE NOT UNDER THE ROADWAY

D-714-27



EXCAVATION DETAIL A



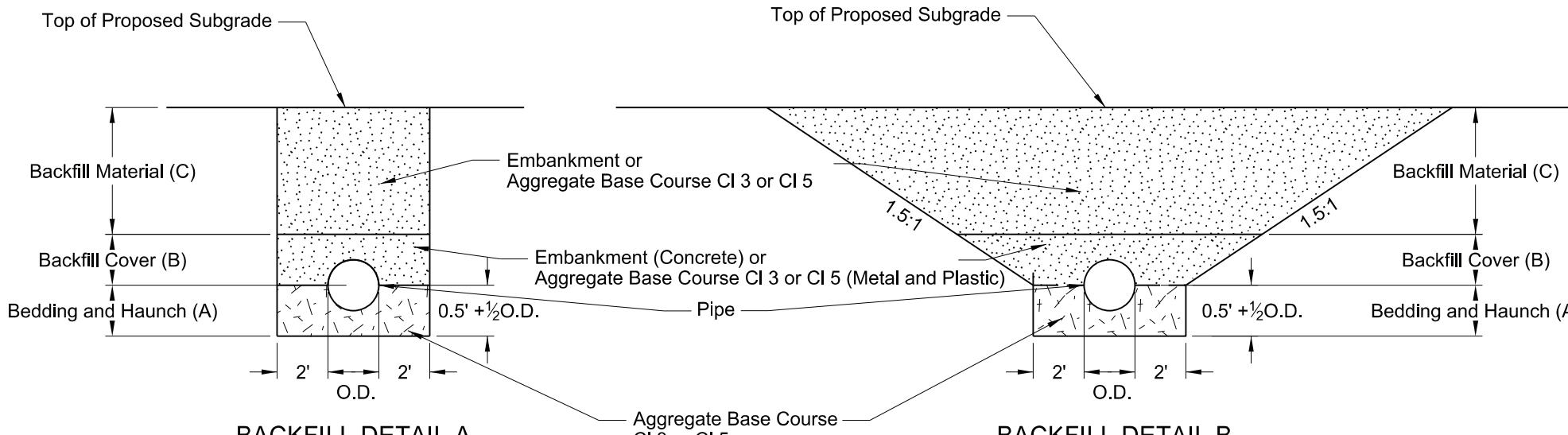
EXCAVATION DETAIL B

Pay Items
1) Pipe*
2) Removal of Pipe (if required)

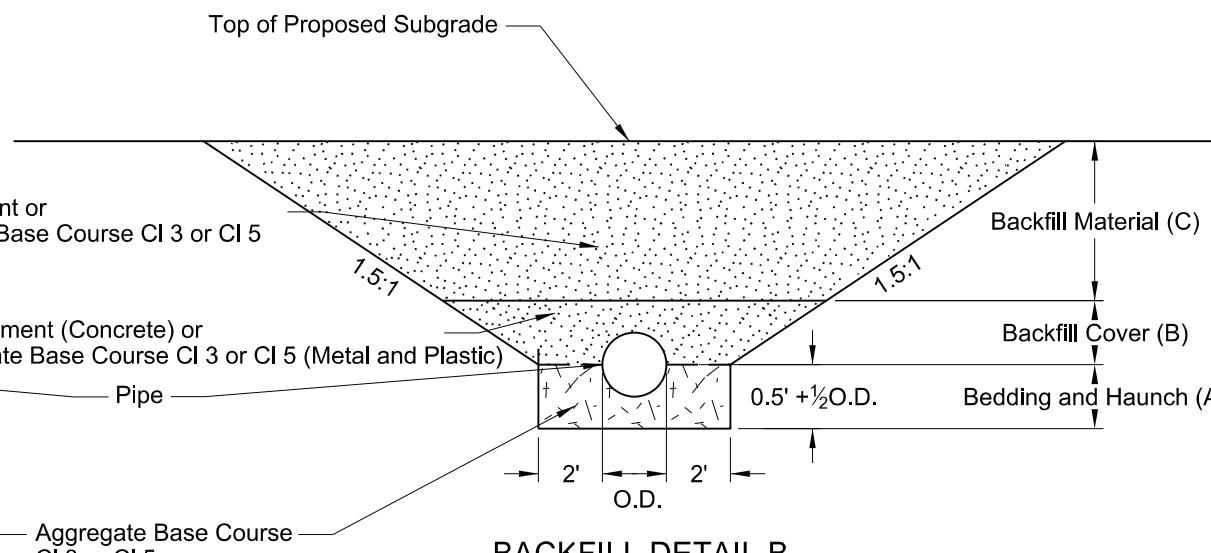
***Included in Pipe Pay Item**
1) Pipe
2) Trench excavation
3) Aggregate base course CI 3 or CI 5
4) Embankment

NOTES:
1) This drawing does not apply to pipes in approaches.
2) It is the contractor's option to select Detail A or B.
3) Embankment may be either Borrow Excavation or Common Excavation - Type A

| |
|---|
| Bedding and Haunch (A) |
| Pipes Not Under Roadway = 0.5 O.D. + 0.5 Feet |
| Pipes Under the Roadway = 0.5 O.D. + 0.5 Feet |
| Backfill Cover (B) |
| Concrete Pipe = 0.5 O.D. |
| Metal and Plastic = 0.5 O.D. + 1 Foot |
| Backfill Material (C) |
| Top of Pipe 4 Feet or Less Below the Top of Proposed Subgrade = Aggregate Base Course CI3 or CI 5 |
| Top of Pipe Greater than 4 Feet Below the Top of Proposed Subgrade = Common Excavation - Type A |
| Pipe Not Under Roadway = Common Excavation - Type B |



BACKFILL DETAIL A



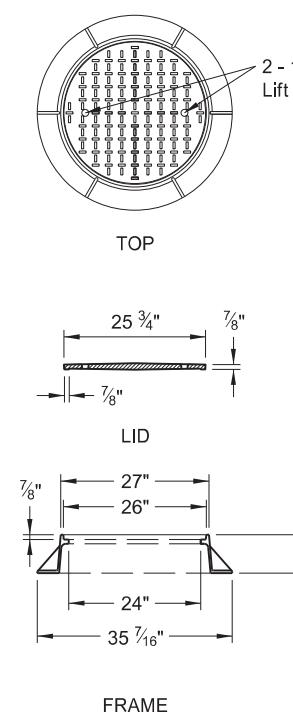
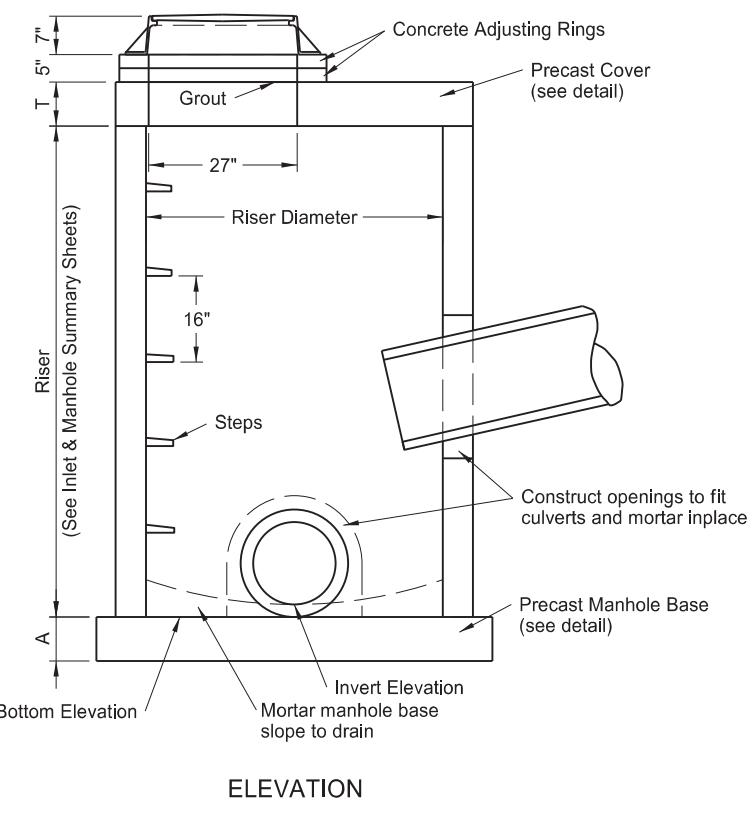
BACKFILL DETAIL B

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|---|
| 7-26-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-16-13 1-21-15 12-10-15 5-27-20 | Label Formatting Nomenclature Added Plastic Pipe Changed bedding depth and updated table |



MANHOLE DETAILS

D-722-5



PRECAST MANHOLE COVERS

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

* - Place reinforcement listed in each direction.

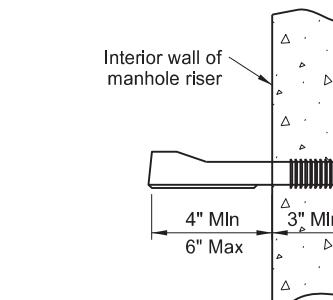
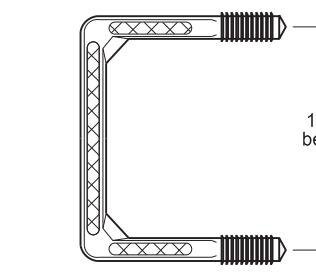
MANHOLE BASES

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

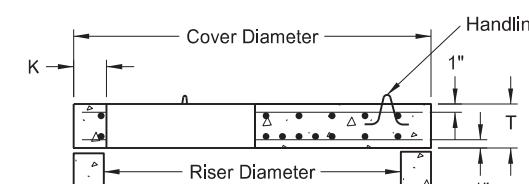
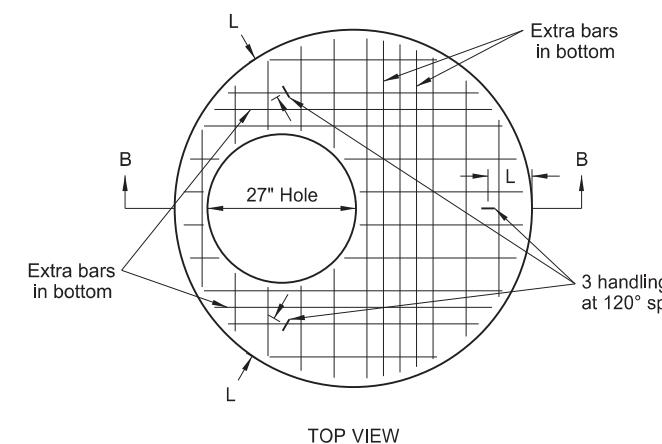
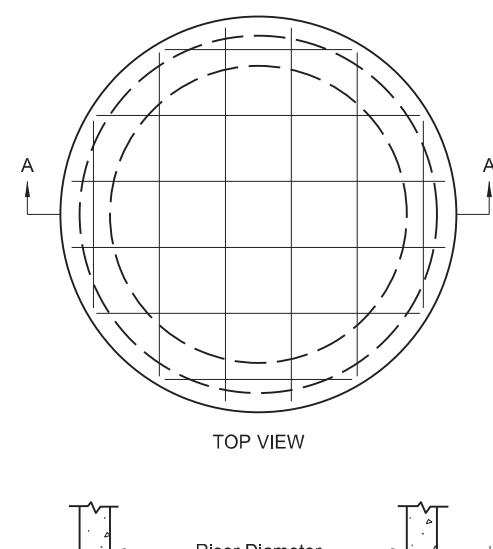
* - Place reinforcement listed in each direction.

NOTES:

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

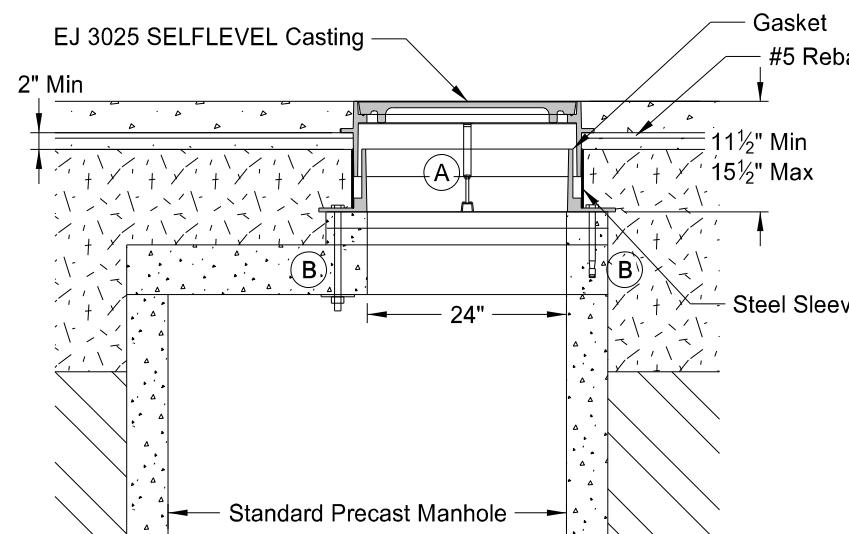


| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|---|
| 05-14-2013 | REVISIONS |
| DATE | CHANGE |
| 6-24-14 | Revised notes 1 & 6, added dimensions to Elev. drawing. |
| 10-17-17 | Updated to active voice. |
| 12-02-20 | Updated PE stamp and signature. |
| 07-24-25 | Note Revisions |

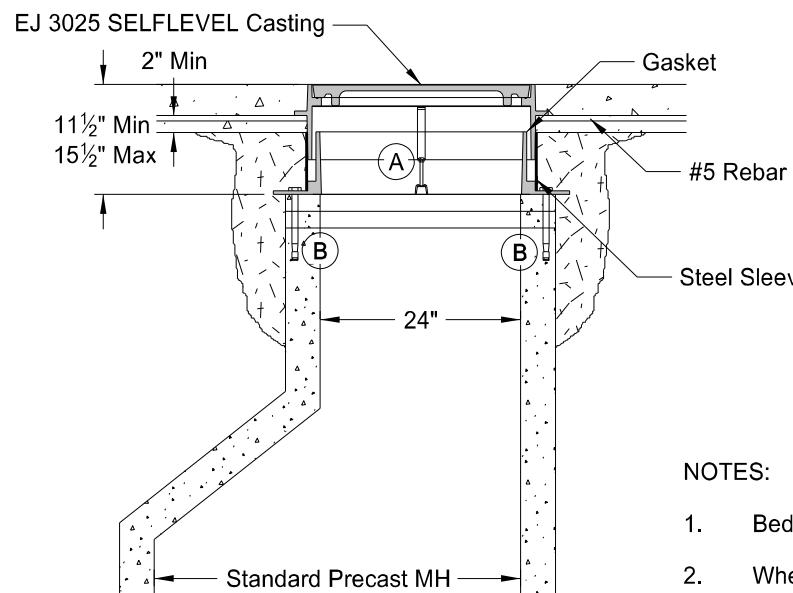


FLOATING MANHOLE CASTING

D-722-5A

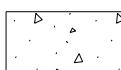


ELEVATION VIEW OF CONNECTION TO STANDARD PRECAST MANHOLE - TYPICAL



ELEVATION VIEW OF CONNECTION TO CONICAL MANHOLE - TYPICAL

KEY:



Portland Cement Concrete Pavement



Granular Backfill

NOTES:

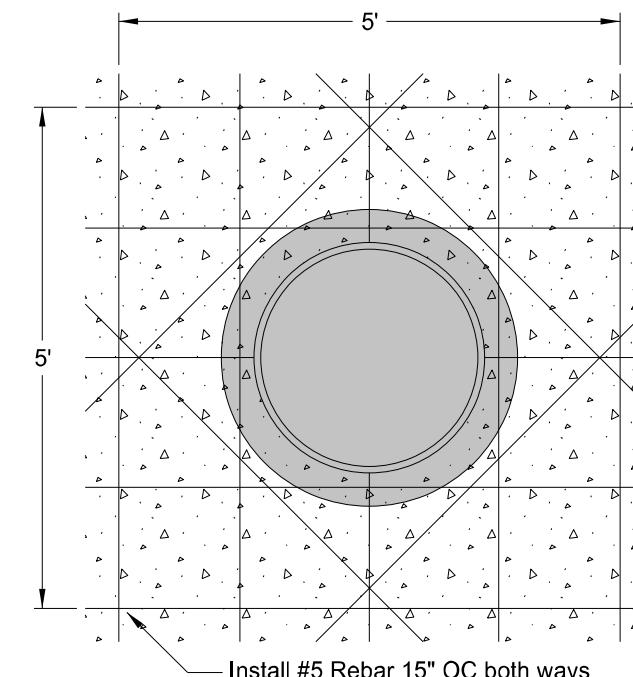
1. Bed frame in mortar, install precast two-inch rings, and plaster inside and out with mortar.
2. When installing an existing box out, drill 20" - #5 rebar into existing pavement 6" deep - 15" OC.
3. The length of anchor bolts varies with the number of adjusting rings.
4. Include installation costs at existing locations in the unit price bid for "MANHOLE CASTING TYPE ____".
5. Include installation costs at new manhole locations in the unit price bid for "MANHOLE ____ IN."

(A) (3) 6" full thread adjusting bolt and bracket (Remove after concrete cures.)

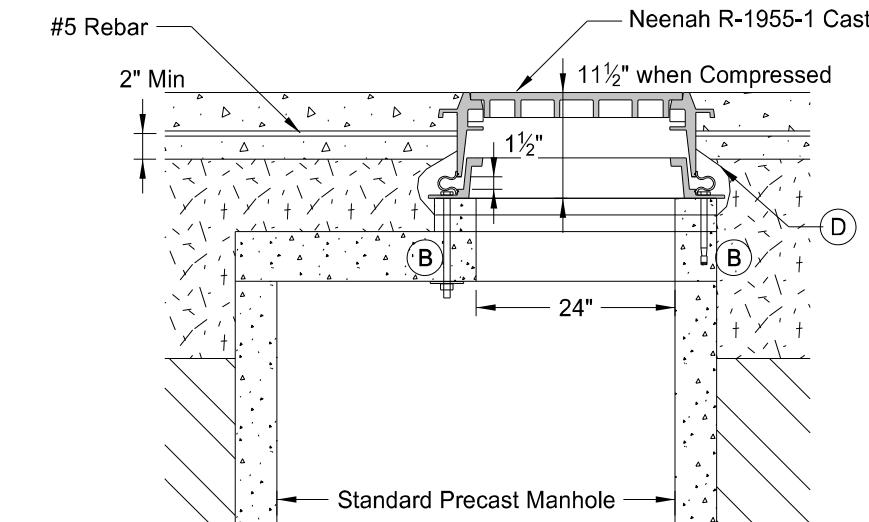
(B) Provide $\frac{3}{4}$ " diameter stainless steel bolts, nut assemblies, and $\frac{1}{2}" \times 4" \times 4"$ plates to extend through the manhole cover, or provide anchor bolts to extend a minimum of 4" into the MH cover. Provide 4 bolts per casting.

(C) Provide $\frac{3}{4}$ " diameter stainless steel bolts with nuts to extend 5" below the adjusting rings. Provide 4 bolts per casting.

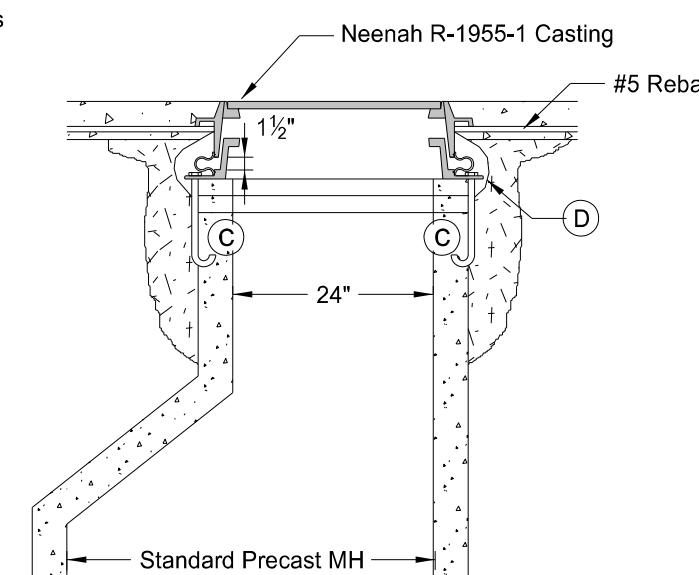
(D) Wrap and tape 6 mil polyethylene on casting above the rubber gasket and tape to adjusting rings below the gasket.



REBAR LAYOUT



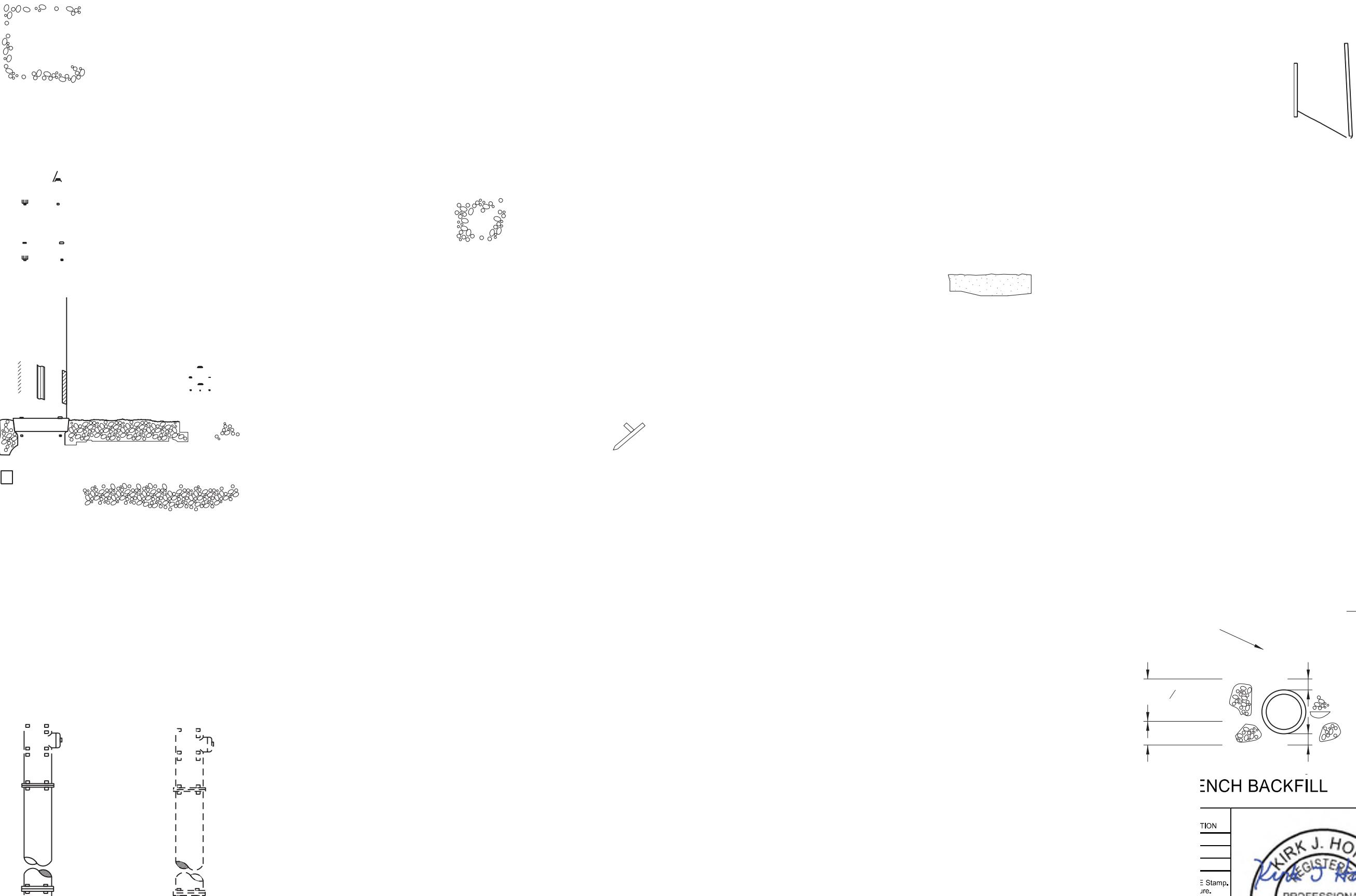
ELEVATION VIEW OF CONNECTION TO STANDARD PRECAST MANHOLE - TYPICAL



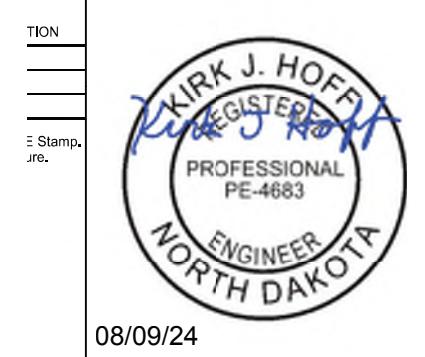
ELEVATION VIEW OF CONNECTION TO CONICAL MANHOLE - TYPICAL

| | |
|------------------------------|--------|
| NORTH DAKOTA | |
| DEPARTMENT OF TRANSPORTATION | |
| 12-2-20 | |
| REVISIONS | |
| DATE | CHANGE |
| | |





ENCH BACKFILL



CONCRETE DRIVEWAY - URBAN

D-750-1

Driveway Type 1

Detail A

Sag - Driveway Type 1

Summit - Driveway Type 1

Sag - Driveway Types 2A & 2B

Summit - Driveway Types 2A & 2B

Sag - Driveway Type 3

Summit - Driveway Type 3

Driveway Type 2A

Driveway Type 2B

Driveway Type 3

Typical Isolation Joint Seal (longitudinal and transverse)

| Driveway ADT | Grade G1 | | Dimension (L) ft. | | Grade Changes (D) | |
|--------------|-----------|--|-------------------|---------|-------------------|--|
| | Desirable | Maximum | Desirable | Maximum | Desirable | Maximum |
| (< 500) | 5% | 12% or controlled by vehicle clearance | 12 | 6 | 6% | 15% or controlled by vehicle clearance |
| (500-1500) | 3% | 8% | 20 | 20 | 3% | 6% |
| (> 1500) | 2% | 5% | 40 | 40 | 0% | 3% |

NOTES:

- See Standard D-748-1 for curb and gutter isolation joint detail. On PCC roadways, match curb and gutter joints with pavement joints, as much as practical.
- Joint Spacing: Use 1 center contraction joint on driveways 20' width or less, 2 center contraction joints for driveways 20' to 30' width, and 3 center contraction joints for driveways greater than 30' width. Saw or groove contraction joints a minimum depth of 1/3 the depth of the concrete. Use isolation joints between separately poured concretes, or between old and new concrete. Seal joints with hot pour bituminous filler or low modulus silicone. Install and tool sealant according to manufacturer's recommendations.
- Include all costs for labor, equipment, and material to construct and seal joints in the price bid for the driveway.
- Include all costs for gutter-Type 1 in the unit price bid for "Curb and Gutter-Type 1".
- Use 6" driveway unless otherwise specified.
- Place 4" base material under concrete driveway. Include all costs for labor and materials necessary to place the base material in the price bid for Salvage Base Course or Aggregate Base Course CL 5.
- Construct sidewalk behind a driveway to the same thickness as the driveway. The Engineer will measure it as driveway concrete.

Section A-A

6" Section B-B

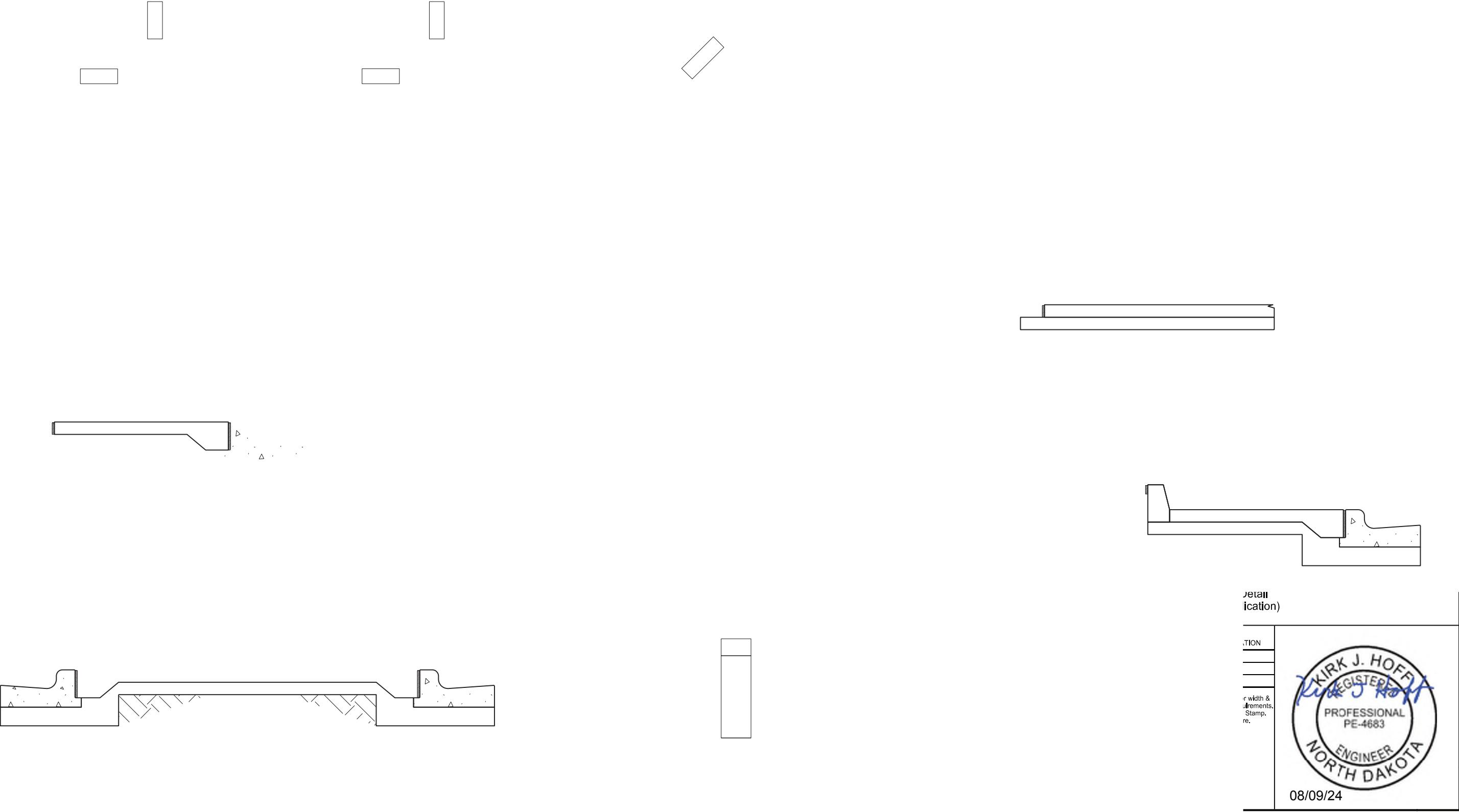
8" Section B-B

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
2-13-2014
REVISIONS

| DATE | CHANGE |
|----------------------------------|---|
| 10-17-17 08-27-19 03-13-25 | Updated to active voice. New Design Engineer PE Stamp. Tied joint bar dimensions. |

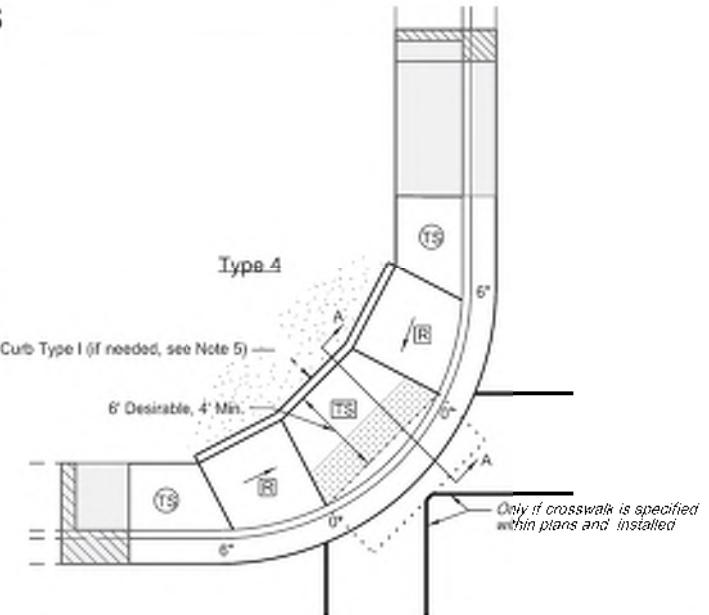
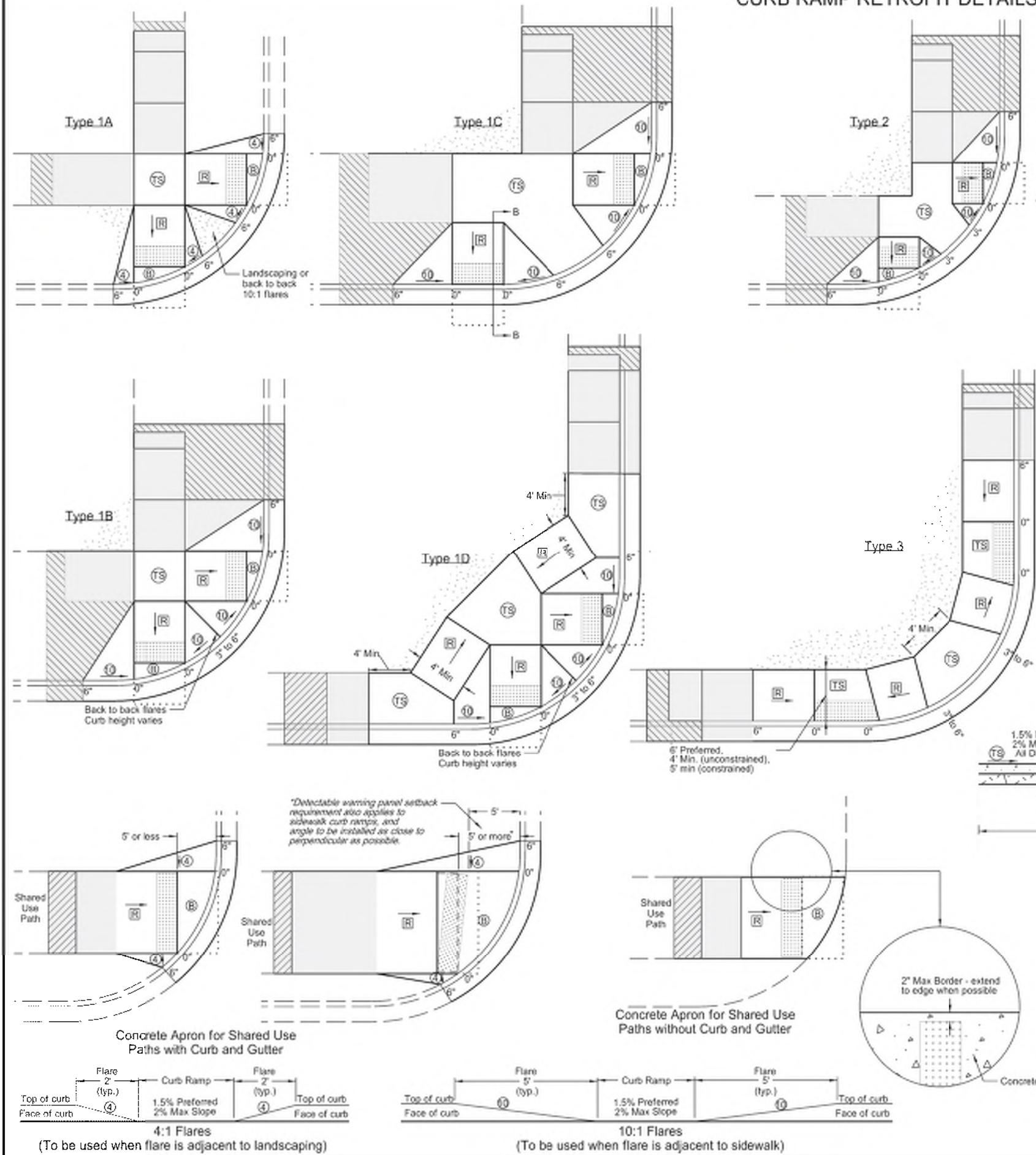
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

03/13/25



CURB RAMP RETROFIT DETAILS

D-750-3

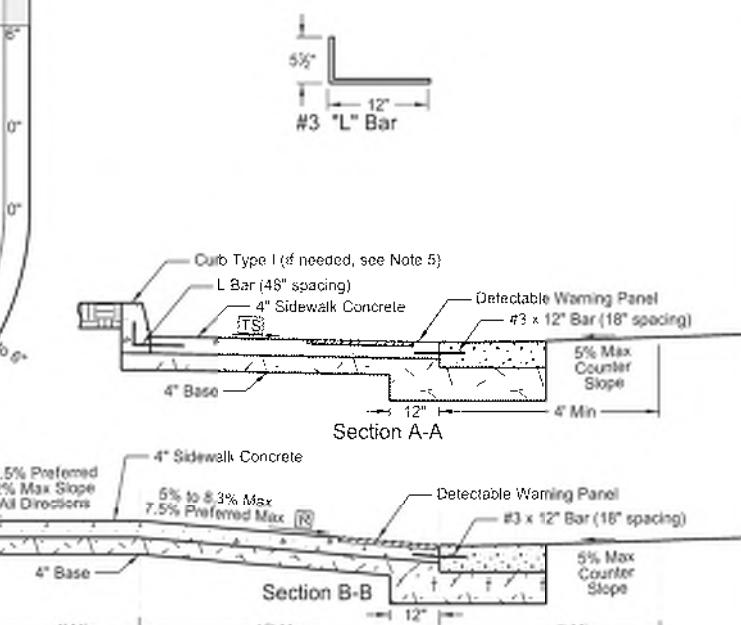


NOTES:

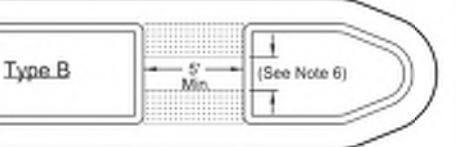
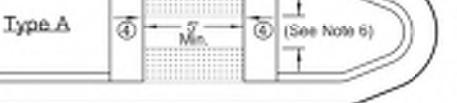
- Ramp width is the useable portion of the ramp, excluding flares. Match curb ramp width to Existing Pedestrian Facility (EPF) width (4' minimum or 5' for island ramps.) Match ramp width to existing shared use path width. Maximum ramp length is 15'.
- Provide turning space with desirable 5' x 5' size or larger and minimum 4' x 4' unconstrained size, for any change of direction. Provide landing 5' long x width of path at the bottom and top of parallel ramps and at the top of perpendicular ramps. Turning spaces and landings may overlap.
- Match detectable warning panel width to ramp width. Radial panels are allowed. Place detectable warning panel within the lower turning space.
- Provide a continuous 4' minimum width EPF with 1.5% preferred cross slope and max 2% constructed cross slope.
- Modify existing ground slope with landscaping, as needed. If not possible, use a vertical curb as detailed on Standard D-750-2. The Engineer will measure curb at the unit price bid for "Curb - Type 2" per linear foot.
- Islands: If the profile of the island curb ramp is 2% or less, provide a minimum distance of 2' between warning panels. If the profile of the island curb ramp is steeper than 2%, provide a turning space between the ramps.
- Provide generally planar vertical alignments. Provide grade breaks, perpendicular to the direction of the pedestrian travel, at the top and bottom of curb ramps (1.5% preferred, 2% max constructed cross slope).
- See Curb Ramp Retrofit Transition Details Standard D-750-4 for additional information. Also See PROWAG for full compliance in the curb ramp area.
- Grade transitions shall be flush.

LEGEND:

- : Detectable Warning Panel.
- : Landscaping.
- : Transitional tie-in to nearest joint, if needed.
- : Curb Ramp Retrofit Transitional Area (See Standard Drawing D750-4)
- : 4' long x width of EPF or 4' minimum Clear space outside traffic lanes of travel. 1.5% preferred cross slope. 2% maximum cross slope. 4.7% preferred running and counter slope. 5% maximum running and counter slope
- : Turning Space. Use at top of ramp or when changing directions. 1.5% preferred slope (2% maximum) all directions.
- : Preferred Ramp Grade = 5% to 7.5%. Maximum Constructed Grade = 8.3%. Preferred Cross Slope = 1.5%. Maximum Constructed Cross Slope = 2%.
- : 1.5% preferred cross slope. 2% maximum constructed cross slope. Running slope consistent with the EPF. 4.7% preferred max counter slope. 5.0% max constructed counter slope.
- : 10:1 maximum constructed slope.
- : 4:1 maximum constructed slope.
- : Curb Height.



Median Refuge Islands (Cut-Through)



| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|--|
| 11-28-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-17-17 | Updated to active voice. |
| 09-05-18 | Revised Notes, Revision for Turning Space, Added Passing Space Requirements, Turned Detectable Warning Panel Slope & other clarifications. |
| 03-15-21 | Separate Curb Ramp Transition Area from Curb Ramp area |
| 05-19-21 | |

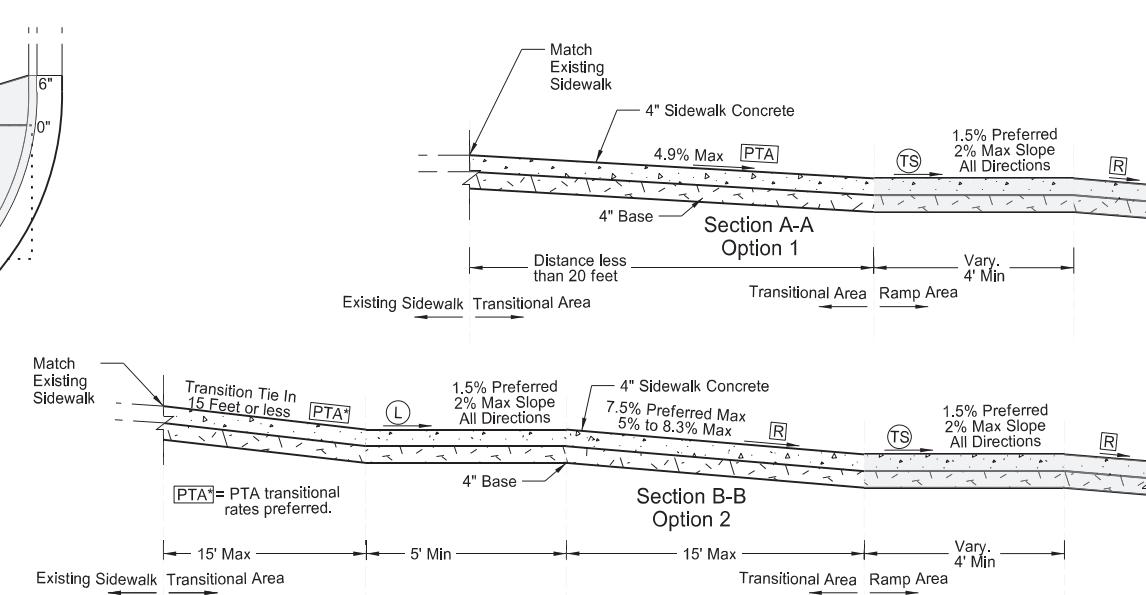
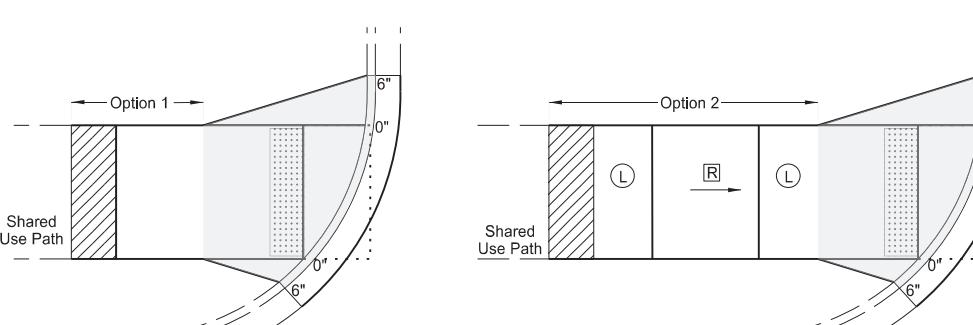
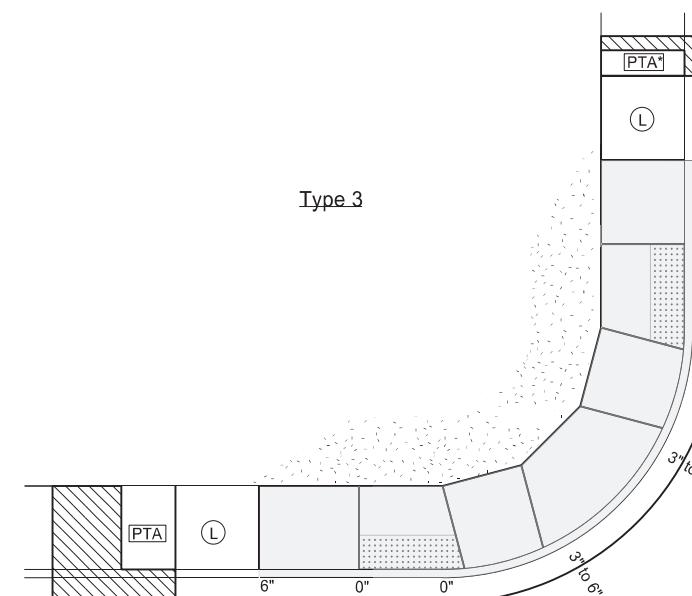
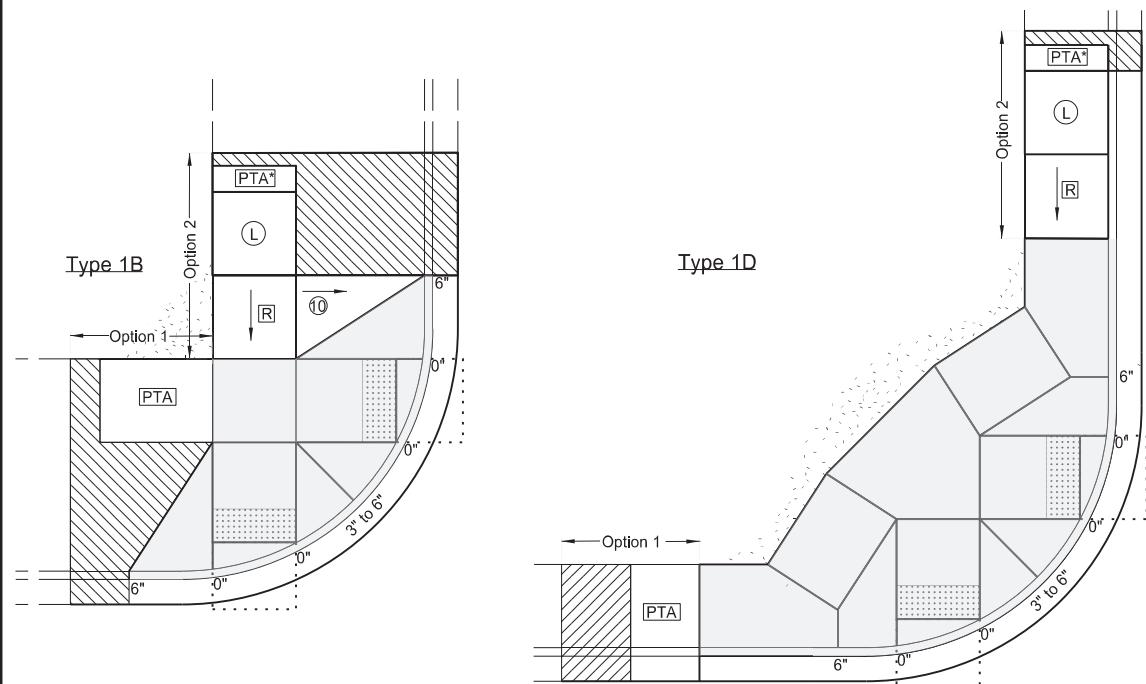
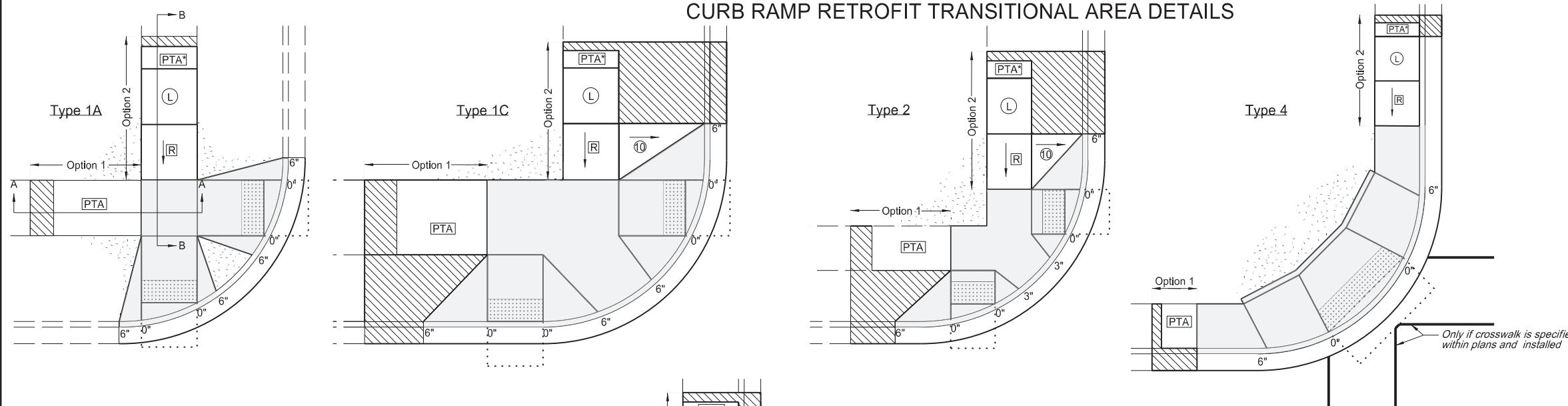


CURB RAMP RETROFIT TRANSITIONAL AREA DETAILS

D-750-4

NOTES:

1. Curb Ramp Transitional Areas are to transition from the Curb Ramp area into the Existing Pedestrian Facility (EPF). Each layout shows example transitions. Use any combination for transitions from the Ramp Area into the EPF that allows for similar or gentler slopes to that of the existing condition, yet transitions in the shortest distance possible. In some cases, if grades allow, the Ramp area can immediately transition into the EPF and no transitional area is needed.
2. Option 1: Use this transition when existing running slope grades are less than 5%. Transition from the ramp area to the EPF using the Pedestrian Access Transition Area (PTA) transition rates and in less than 20 feet.
3. Option 2: Use this transition when existing running slopes are greater than 5% and option 1 is not able to be met. Add a ramp and a landing immediately after the ramp area. Then transition from the compliant landing into the EPF using the PTA rates (preferred), or in less than 15 feet (which ever is shorter).
4. Transitional Areas for Shared Use Paths can be concrete or asphalt.
5. See Curb Ramp Retrofit Details Standard D-750-3 for additional information.



LEGEND:

- Detectable Warning Panel.
- Landscaping.
- Transitional tie-in to nearest joint, if needed.
- Curb Ramp Retrofit Area (See Standard Drawing D750-3)
- 4' long x width of EPF or 4' minimum Clear space outside traffic lanes of travel. 1.5% preferred cross slope 2% maximum cross slope 4.7% preferred running slope 5% maximum running slope
- PTA : Pedestrian Access Transition Area Running Slope less than 4.9%. Transition Cross Section at 1/2 percent per foot from the from Ramp Area to EPF.
- (L) TS : Turning Space/Landing Use at top of ramp or when changing directions. 1.5% preferred slope (2% maximum) all directions.
- (R) : Preferred Ramp Grade = 5% to 7.5%. Maximum Constructed Grade = 8.3%. Preferred Cross Slope = 1.5%. Maximum Constructed Cross Slope = 2% Maximum Length = 15 feet
- ⑩ : 10:1 maximum constructed slope.
- ④ : 4:1 maximum constructed slope.
- 0", 3", or 6" : Curb Height.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

05-19-21

REVISIONS

DATE CHANGE

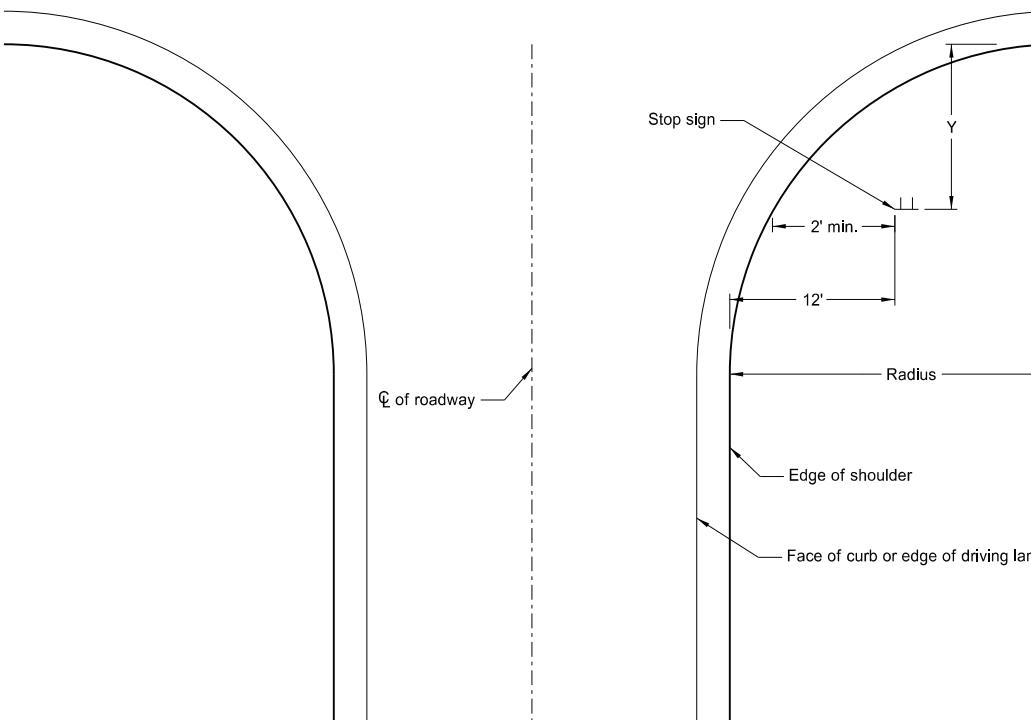


PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

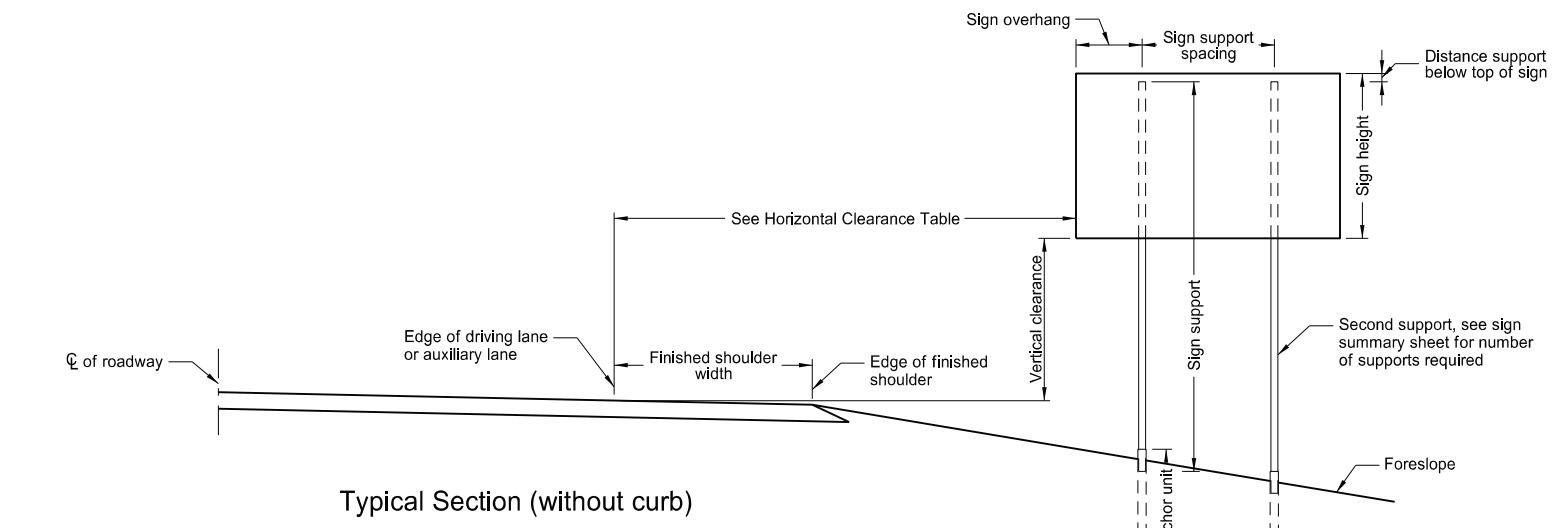
Notes:

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

Stop Sign Location
Wide Throat Intersection

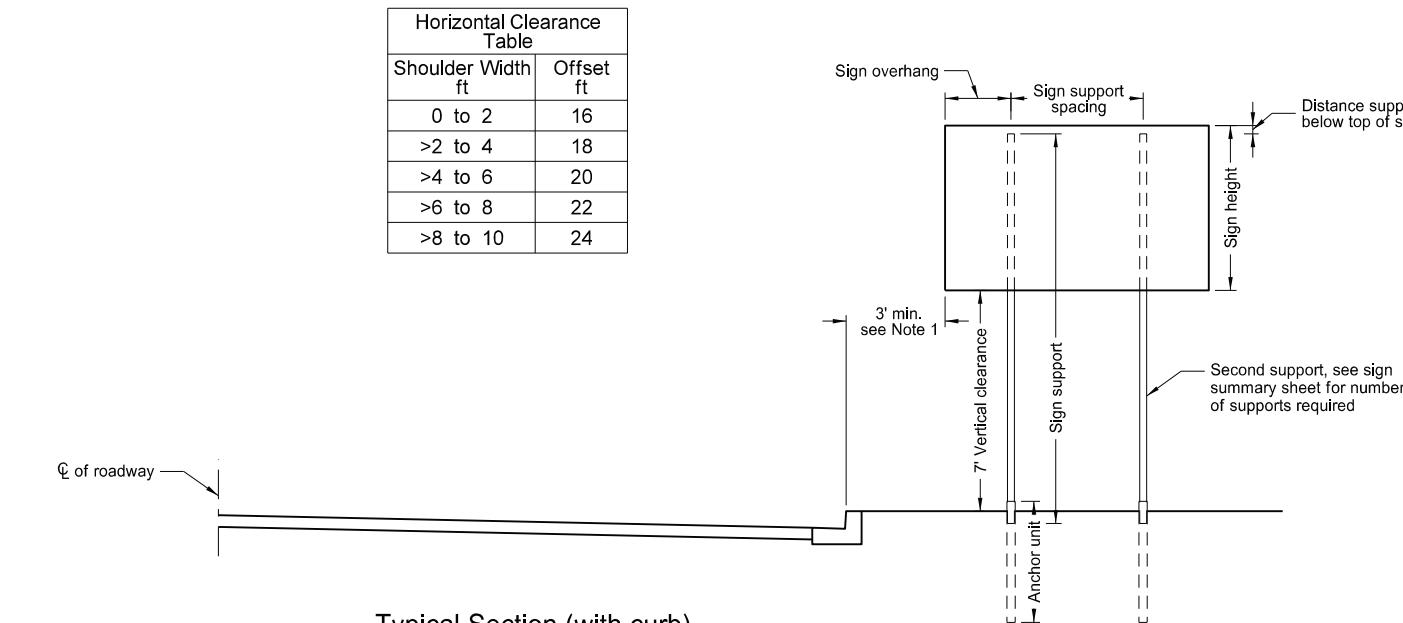
Use layout for the placement of "Stop" signs.

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



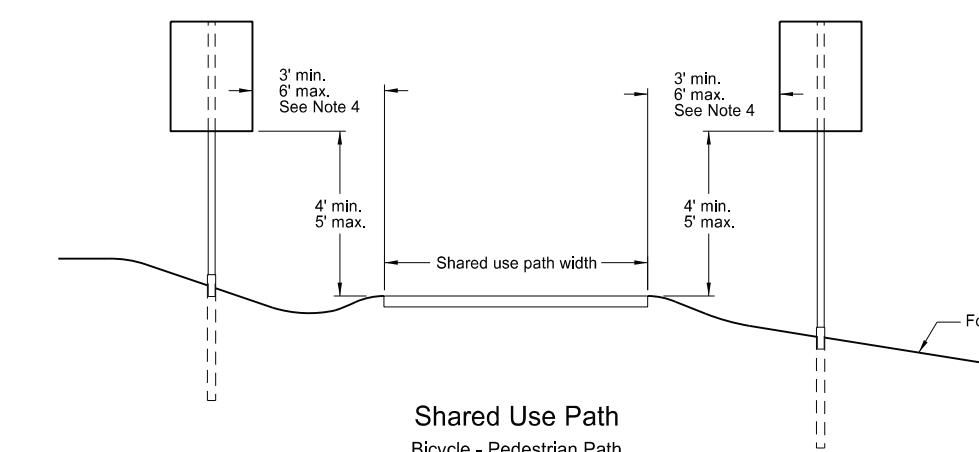
Typical Section (without curb)

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



Typical Section (with curb)

Residential or Business District

Shared Use Path
Bicycle - Pedestrian Path

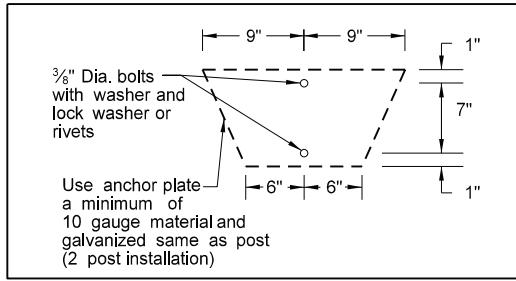
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|---|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-8-14 8-30-18 8-29-19 8-05-24 | Revised note 2, added note 4. Updated notes to active voice. New Design Engineer PE Stamp. Electronic Stamp/Signature. |



| 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 $\frac{1}{4}$ | 12 |
| 1 | 2 $\frac{1}{4}$ | 12 | | | No | 2 $\frac{1}{2}$ | 12 |
| 1 | 2 $\frac{1}{2}$ | 12 | | | (B) | 3(C) | 7 |
| 1 | 2 $\frac{1}{2}$ | 10 | | | Yes | | 7 |
| 1 | 2 $\frac{1}{4}$ | 12 | 2 $\frac{1}{2}$ (D) | 12 | Yes | | 7 |
| 1 | 2 $\frac{1}{2}$ | 12 | 2 $\frac{1}{4}$ | 12 | Yes | | 7 |
| 2 | 2 $\frac{1}{2}$ | 10 | | | Yes | | 7 |
| 2 | 2 $\frac{1}{4}$ | 12 | 2 $\frac{1}{2}$ (D) | 12 | Yes | | 7 |
| 2 | 2 $\frac{1}{2}$ | 12 | 2 $\frac{1}{4}$ | 12 | Yes | | 7 |
| 3 & 4 | 2 $\frac{1}{2}$ | 12 | | | Yes | | 7 |
| 3 & 4 | 2 $\frac{1}{2}$ | 10 | | | Yes | | 7 |
| 3 & 4 | 2 $\frac{1}{2}$ | 12 | 2 $\frac{1}{4}$ | 12 | Yes | | 7 |
| 3 & 4 | 2 $\frac{1}{4}$ | 12 | 2 $\frac{1}{2}$ (D) | 12 | Yes | | 7 |
| 3 & 4 | 2 $\frac{1}{2}$ | 10 | 2 $\frac{3}{16}$ | 10 | Yes | | 7 |

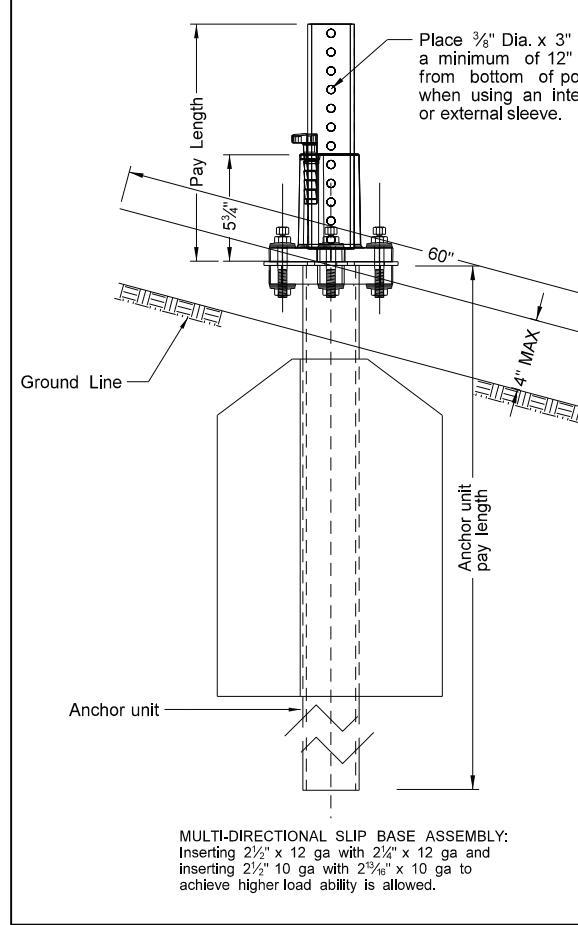
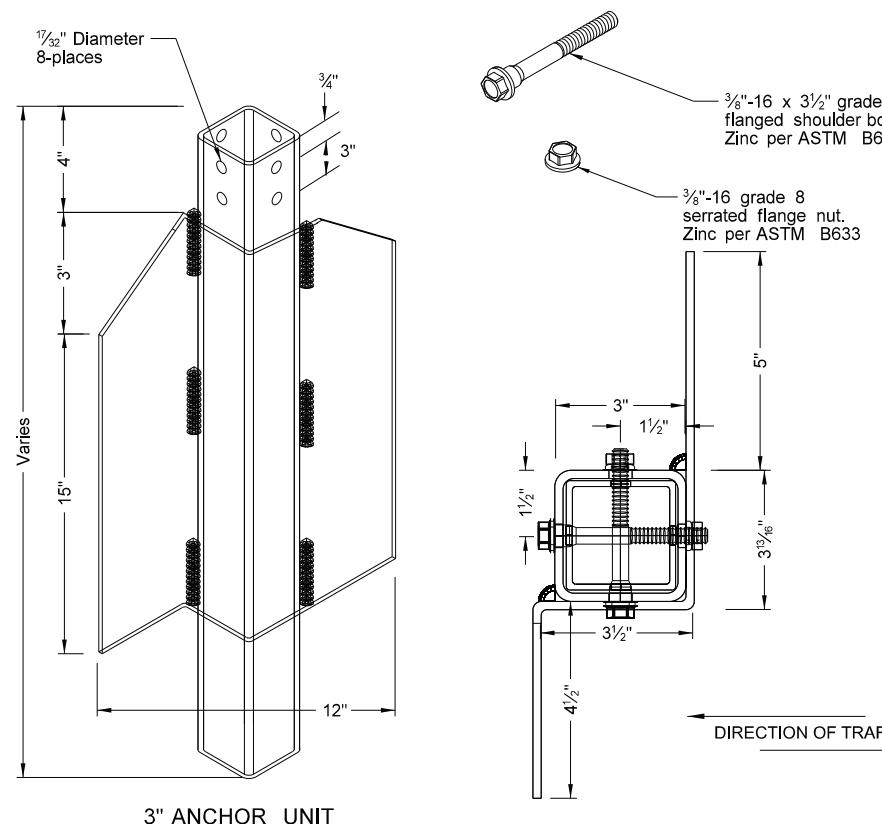
(B) - Provide a shim as specified by the manufacturer when placing 2½", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

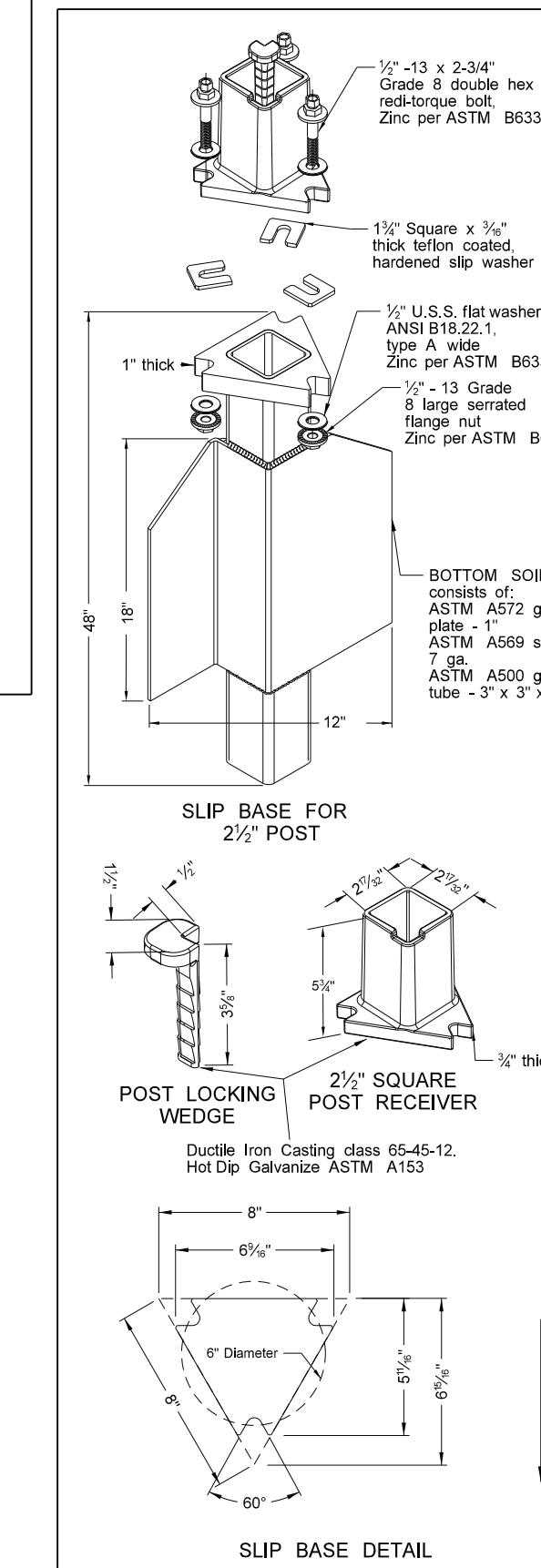


SHOULDER BOL

Shimming agent to reduce tolerance between 3" and unit and 2½" post.
(use standard $\frac{3}{8}$ " diameter grade 8 bolt with proper



Mounting Details Perforated



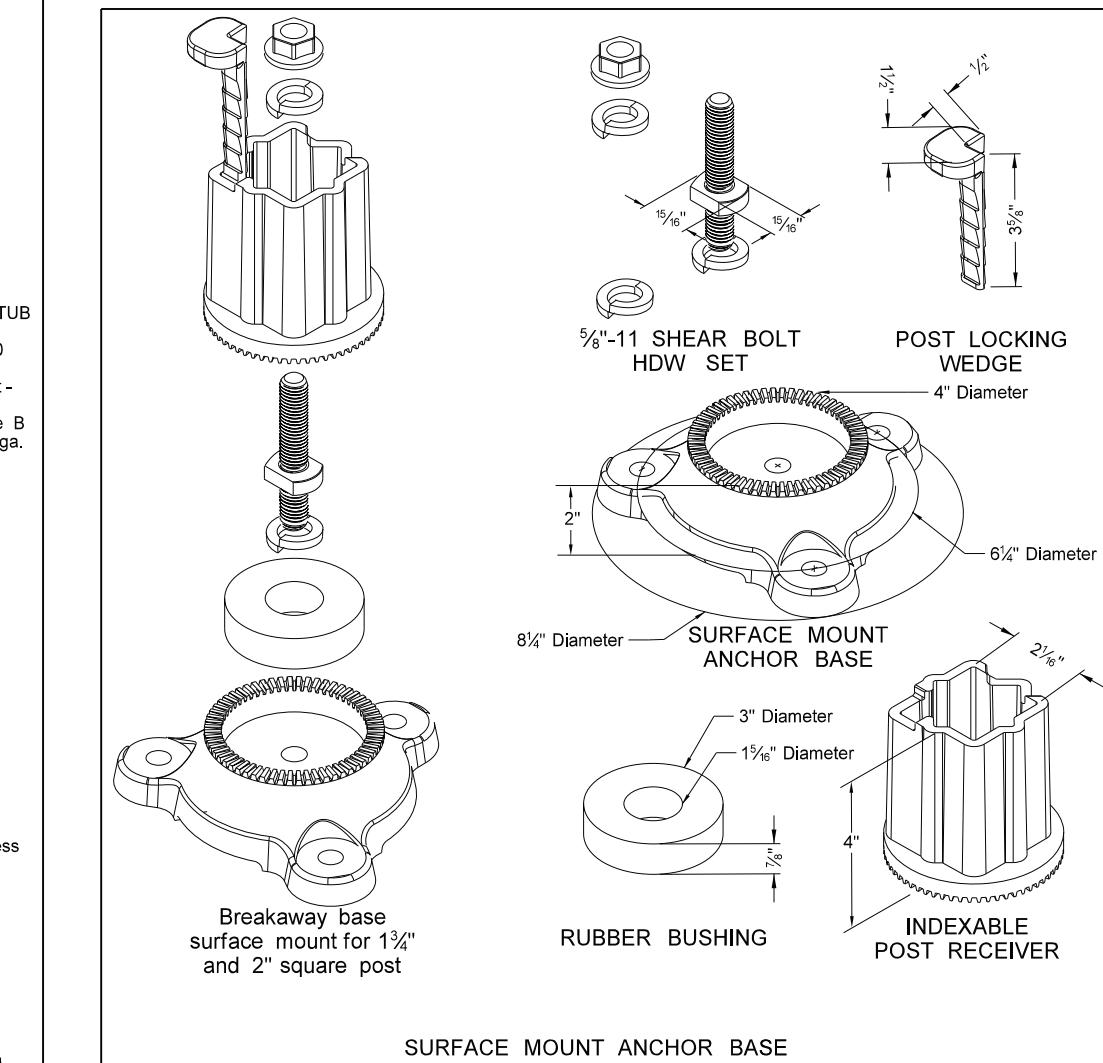
| Properties of Telescoping Perforated Tubes | | | | | |
|--|--------------------|---------------------|----------------------|------------------------------------|-----------------------------------|
| Tube Size In. | Wall Thickness In. | U.S. Standard Gauge | Weight Per Foot Lbs. | Moment of Inertia In. ⁴ | Cross Sect. Area In. ² |
| 1½ x 1½ | 0.105 | 12 | 1.702 | 0.129 | 0.380 |
| 2 x 2 | 0.105 | 12 | 2.416 | 0.372 | 0.590 |
| 2½ x 2¼ | 0.105 | 12 | 2.773 | 0.561 | 0.695 |
| 2¾ ₁₆ x 2¾ ₁₆ | 0.135 | 10 | 3.432 | 0.605 | 0.841 |
| 2½ x 2½ | 0.105 | 12 | 3.141 | 0.804 | 0.803 |
| 2½ x 2½ | 0.135 | 10 | 4.006 | 0.979 | 1.010 |
| | | | | | 0.783 |

The $2\frac{3}{16}$ " size 10 gauge is shown as 2.19" size on the plans.
The $2\frac{1}{2}$ " size is shown as 2.51" size on the plans.

D-754-24

NOTE:

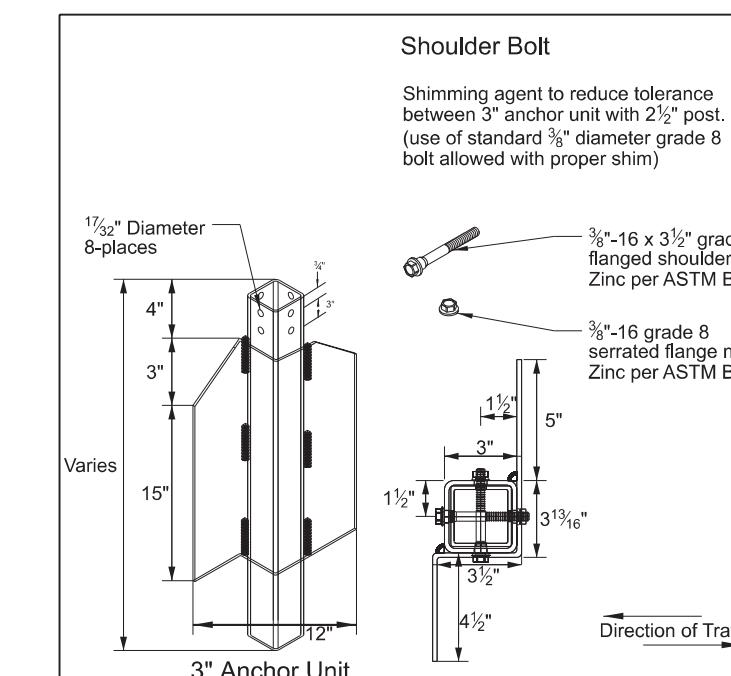
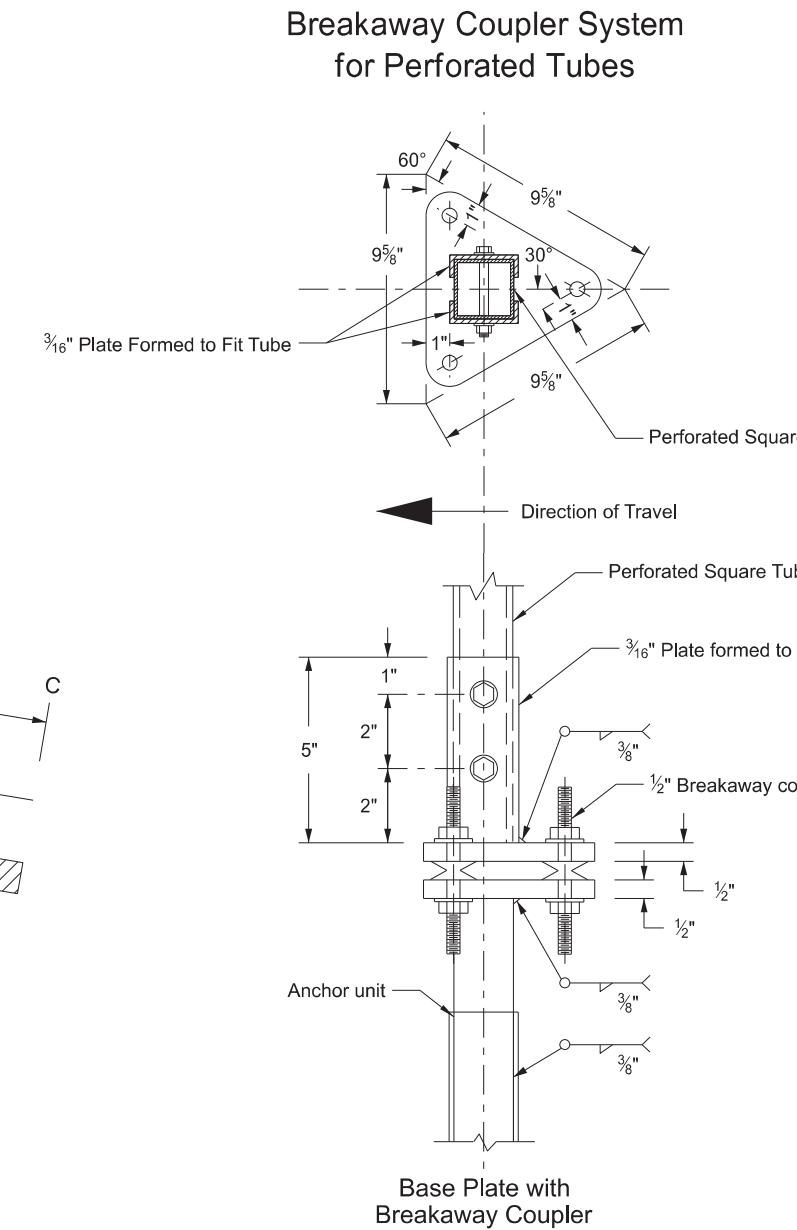
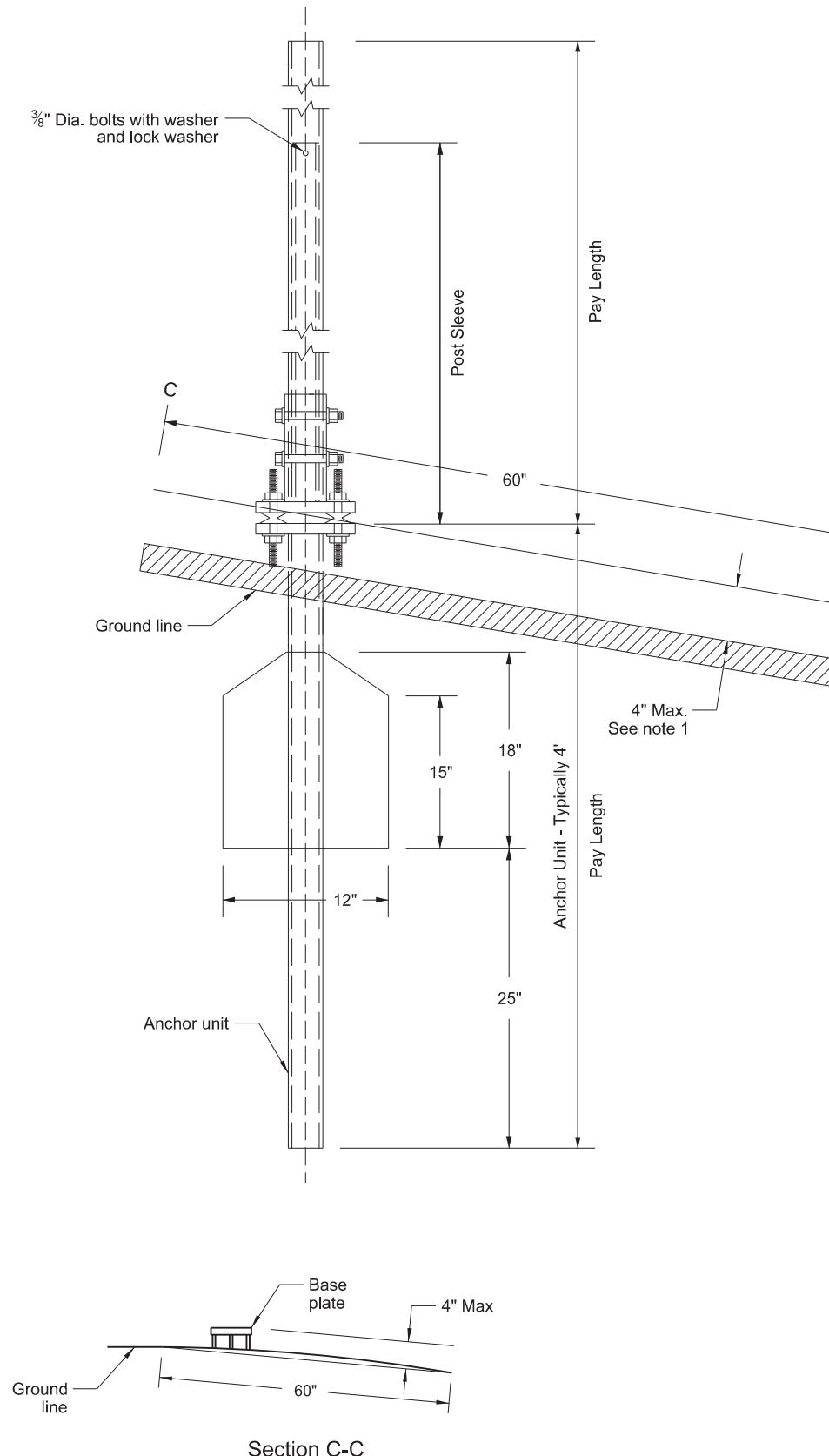
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile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



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

Breakaway Coupler System for Perforated Tubes

D-754-24A



Notes:

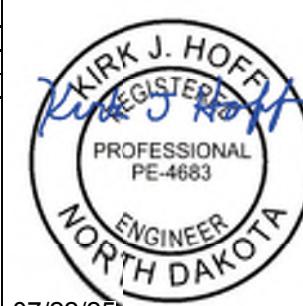
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Use anchor unit of the same size and specification as the post.
3. Provide a minimum 8' distance between the first and fourth post on four post signs.
4.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

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

(B) - 2 1/2" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

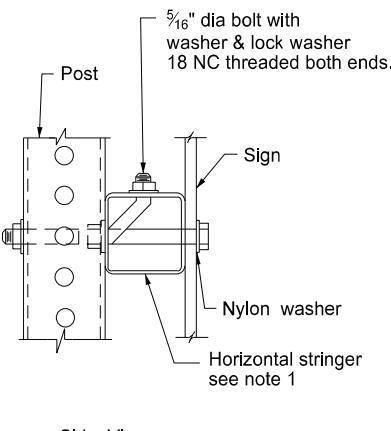
(C) - 3" anchor unit

| | |
|---|---|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 10-3-2013 | |
| REVISIONS | |
| DATE | CHANGE |
| 08-30-18 08-30-19 08-05-24 07-22-25 | Updated notes to active voice. New Design Engr PE Stamp. Electronic Stamp/Signature. Corrected "typo" in C-C note. |
| KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 | |
| Kirk J. Hoff REGISTERED PROFESSIONAL PE-4683 | |
| ENGINEER NORTH DAKOTA | |
| 07/22/25 | |

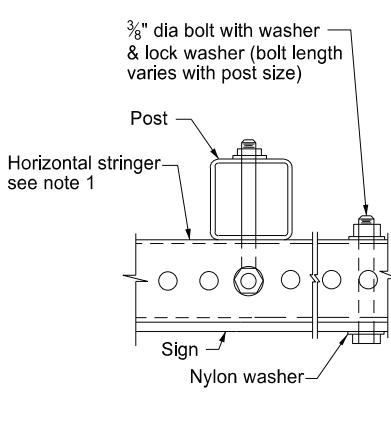


Mounting Details Perforated Tube

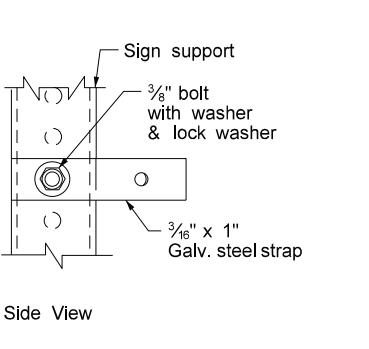
D-754-25



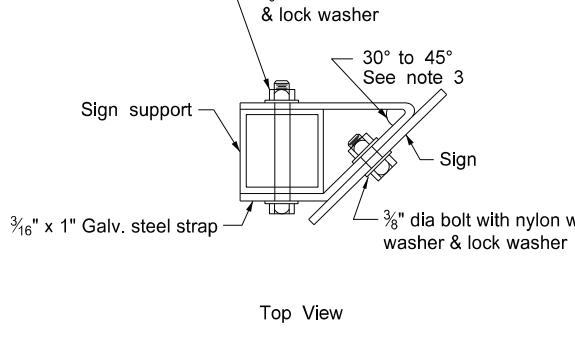
Side View



Top View

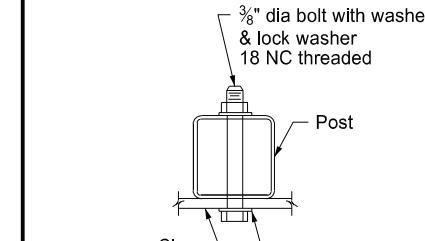
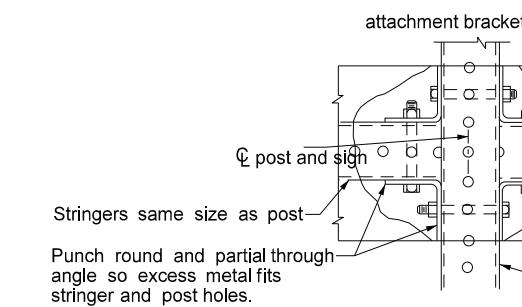
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

Side View

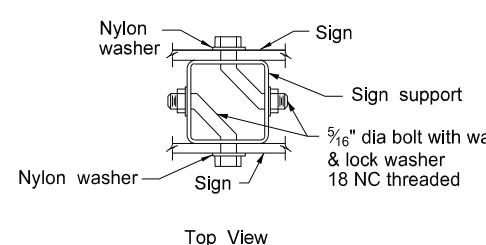


Top View

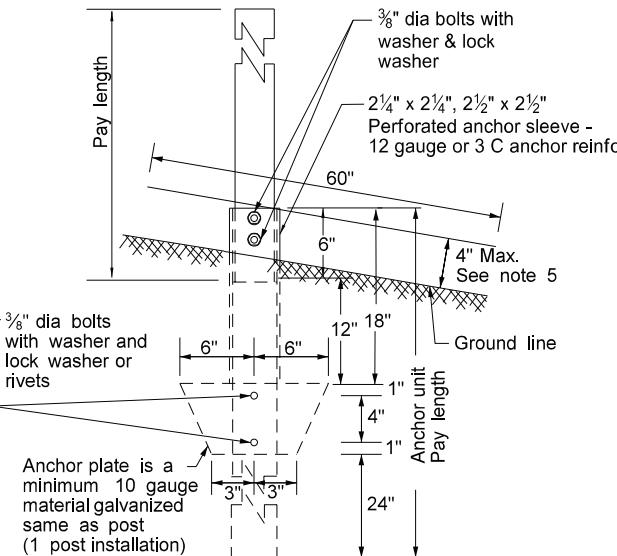
STRAP DETAIL



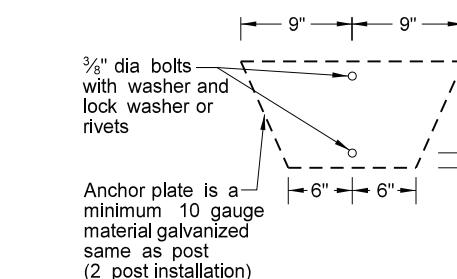
BOLT MOUNTING



BACK TO BACK MOUNTING



ANCHOR UNIT AND POST ASSEMBLY



| Properties of Telescoping Perforated Tubes | | | | | | | |
|--|--------------------|---------------------|----------------------|--|----------------------------------|-------|--|
| Tube Size In. | Wall Thickness In. | U.S. Standard Gauge | Weight Per Foot Lbs. | Moment of Inertia In. ⁴ Cross Sect. area In. ² | Section Modulus In. ³ | | |
| 1 1/2 x 1 1/2 | 0.105 | 12 | 1.702 | 0.129 | 0.380 | 0.172 | |
| 2 x 2 | 0.105 | 12 | 2.416 | 0.372 | 0.590 | 0.372 | |
| 2 1/4 x 2 1/2 | 0.105 | 12 | 2.773 | 0.561 | 0.695 | 0.499 | |
| 2 3/16 x 2 3/16 | 0.135 | 10 | 3.432 | 0.605 | 0.841 | 0.590 | |
| 2 1/2 x 2 1/2 | 0.105 | 12 | 3.141 | 0.804 | 0.803 | 0.643 | |
| 2 1/2 x 2 1/2 | 0.135 | 10 | 4.006 | 0.979 | 1.010 | 0.783 | |

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2 1/2" size is shown as 2.51" size on the plans.

Note:

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

| 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 | | | | 2 1/4 | 12 |
| 1 | 2 1/4 | 12 | | | | 2 1/2 | 12 |
| 1 | 2 1/2 | 12 | | | | (B) | 3(C) |
| 1 | 2 1/2 | 10 | | | | Yes | 7 |
| 1 | 2 1/4 | 12 | 2 1/2(D) | 12 | Yes | | 7 |
| 1 | 2 1/2 | 12 | 2 1/4 | 12 | Yes | | 7 |
| 2 | 2 1/2 | 10 | | | | Yes | 7 |
| 2 | 2 1/4 | 12 | 2 1/2(D) | 12 | Yes | | 7 |
| 2 | 2 1/2 | 12 | 2 1/4 | 12 | Yes | | 7 |
| 3 & 4 | 2 1/2 | 12 | | | | Yes | 7 |
| 3 & 4 | 2 1/2 | 10 | | | | Yes | 7 |
| 3 & 4 | 2 1/2 | 12 | | | | Yes | 7 |
| 3 & 4 | 2 1/2 | 12 | 2 1/4 | 12 | Yes | | 7 |
| 3 & 4 | 2 1/2 | 10 | 2 3/16 | 10 | Yes | | 7 |

(B) - When placing 2 1/2", 12 gauge posts in standard soils without breakaway bases, provide a shim as specified by the manufacturer. Provide breakaway base when placing the support in weak soils. Engineer will determine if soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

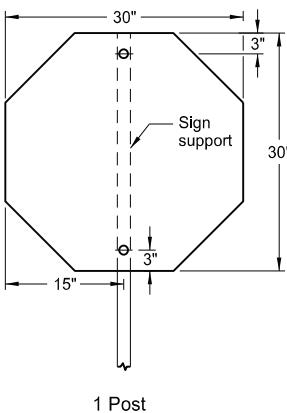
(C) - 3" anchor unit

(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

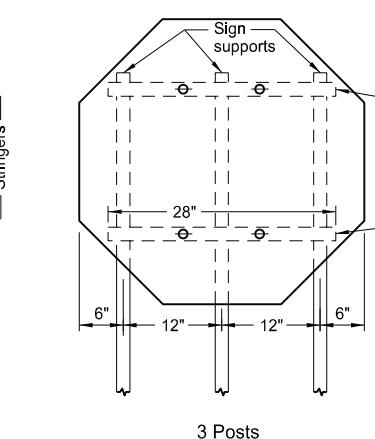
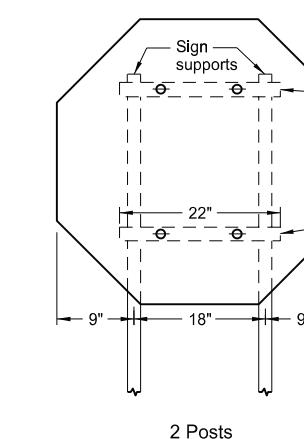
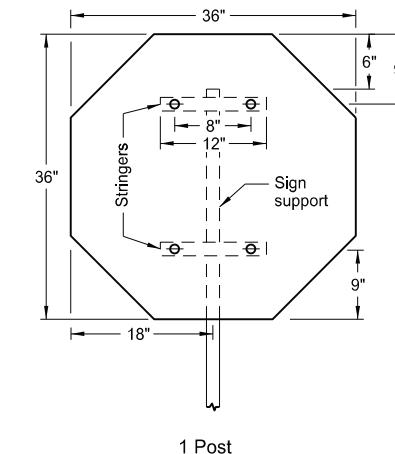
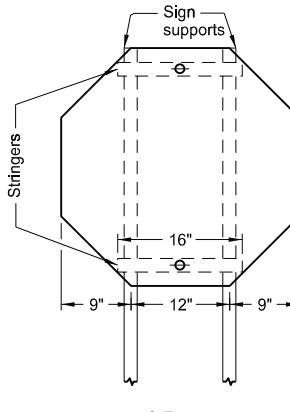
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|--------------------------------|
| 8-6-09 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-8-14 | Revised Note 3. |
| 8-30-18 | Updated notes to active voice. |
| 8-30-19 | New Design Engr PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |



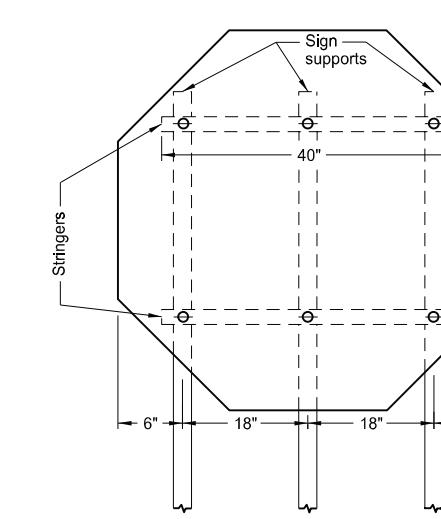
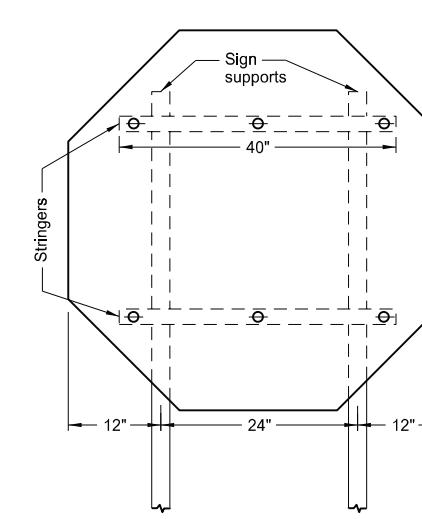
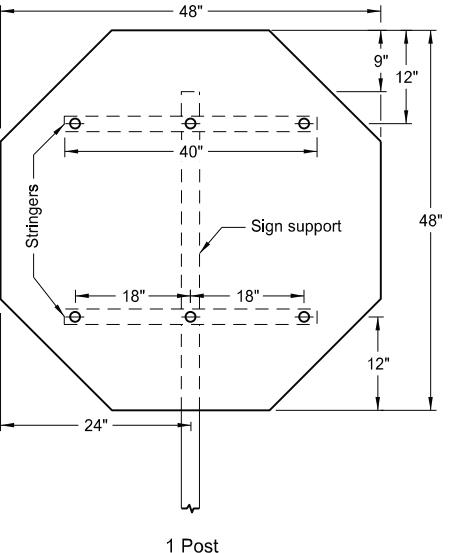
D-754-26

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

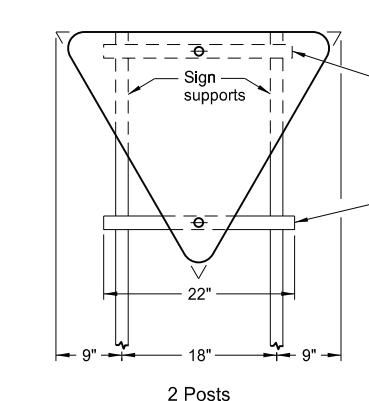
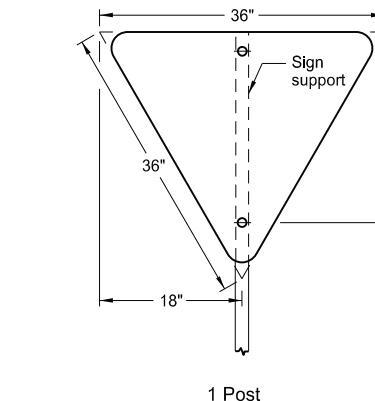
Assembly No. 1



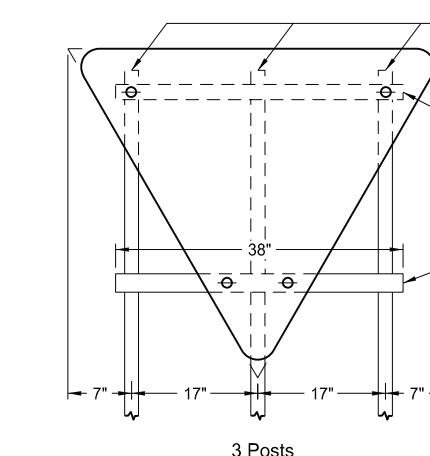
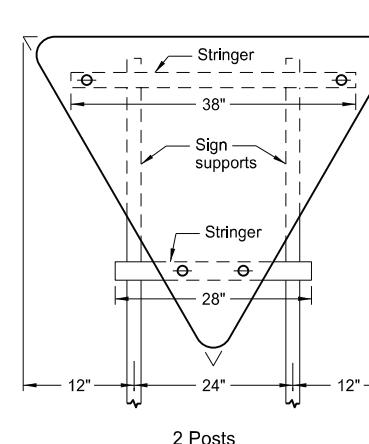
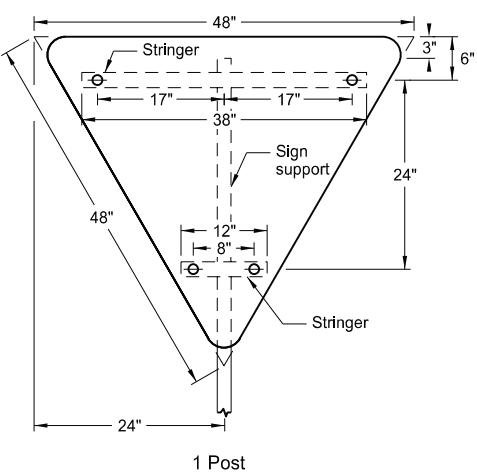
Assembly No. 2



Assembly No. 3



Assembly No. 4



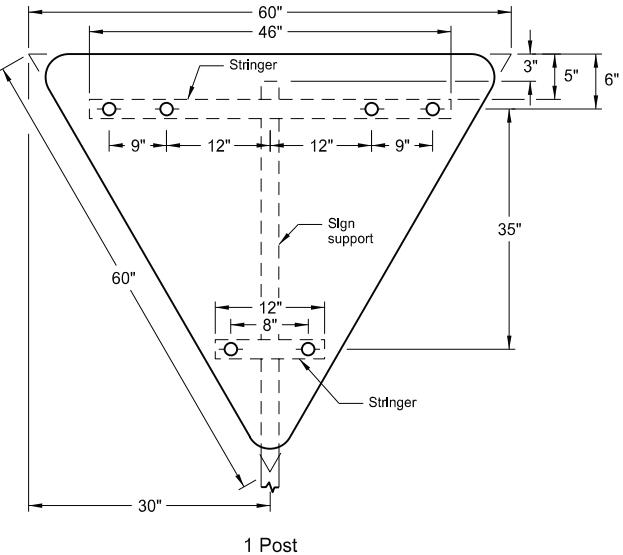
Assembly No. 5

Notes:

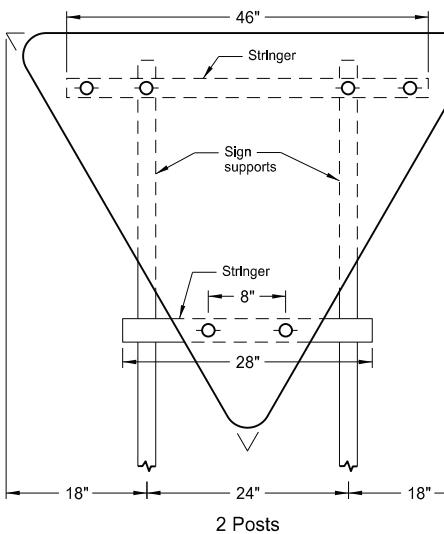
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ¾" bolt.

| | |
|---|--|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 8-30-19 8-05-24 | Updated notes to active voice, New Design Engineer PE Stamp, Electronic Stamp/Signature. |
| KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 | |
| Kirk J Hoff | |
| NORTH DAKOTA 08/05/24 | |

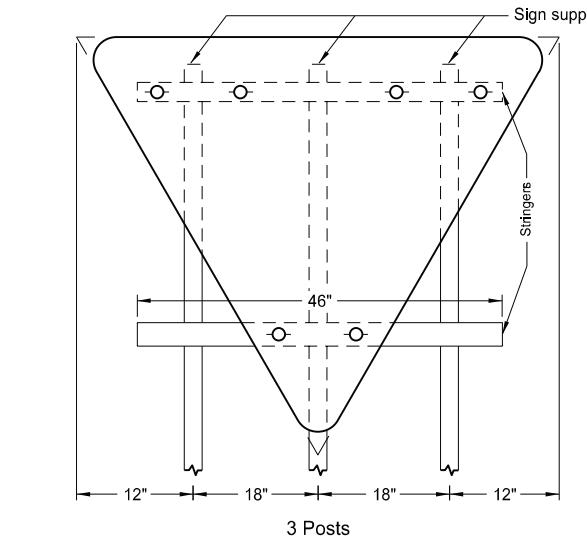
**SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS**



1 Post

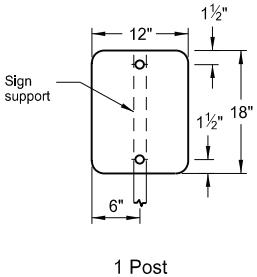


2 Posts

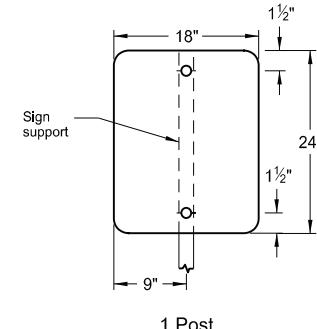


3 Posts

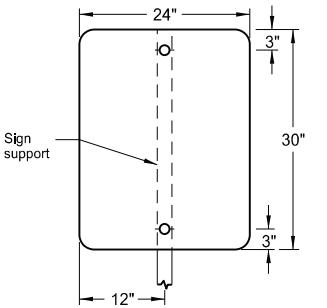
Assembly No. 6



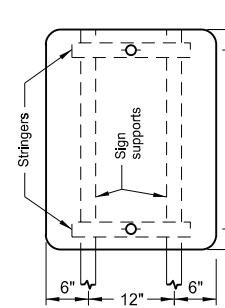
1 Post



1 Post

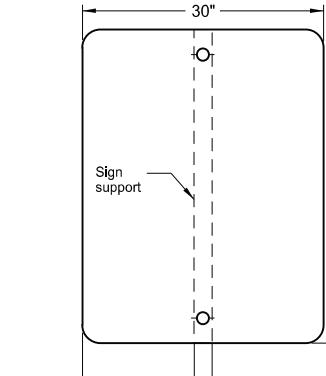


1 Post

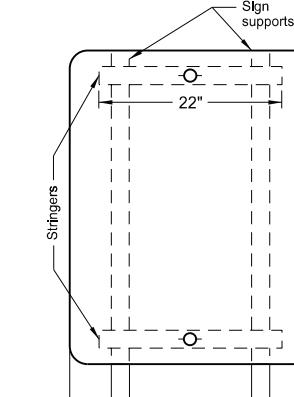


2 Posts

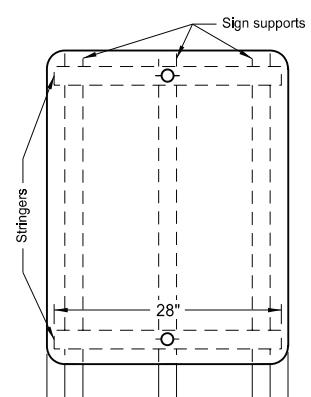
Assembly No. 9



1 Post

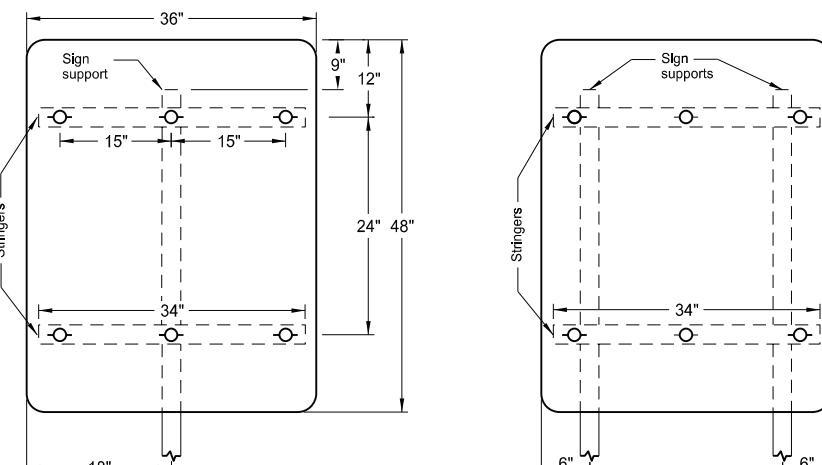


2 Posts

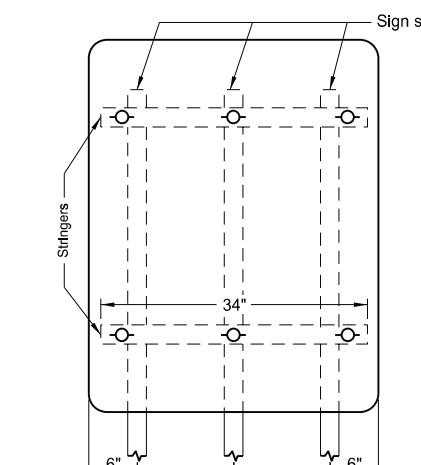


3 Posts

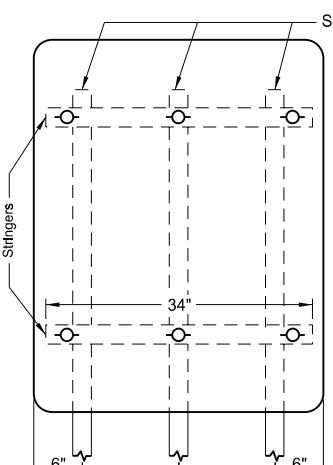
Assembly No. 10



1 Post



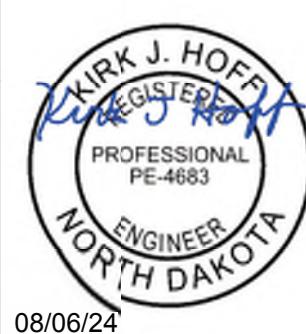
2 Posts



3 Posts

Assembly No. 11

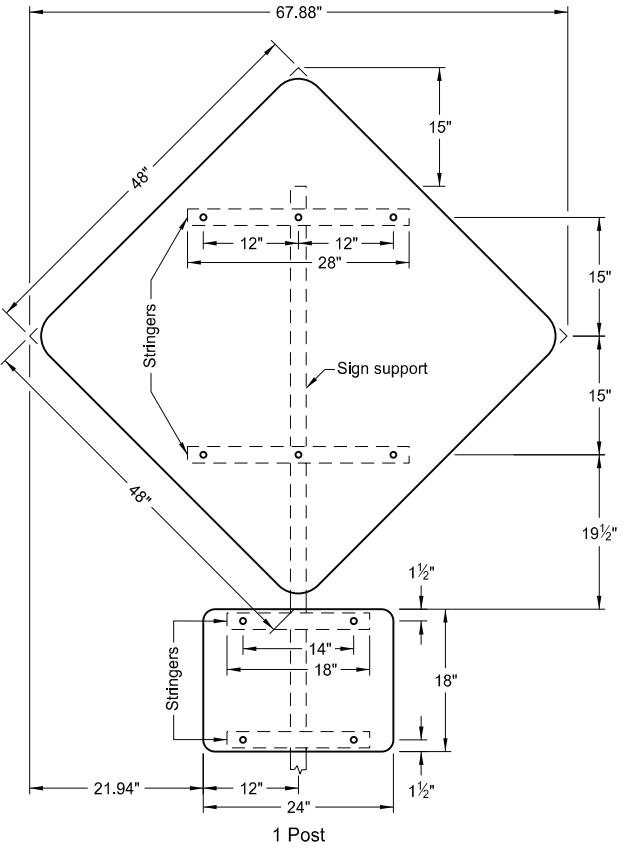
| | |
|--|--|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 8-30-19 8-06-24 | Updated notes to active voice. New Design Engineer PE Stamp, Electronic Stamp/Signature. |



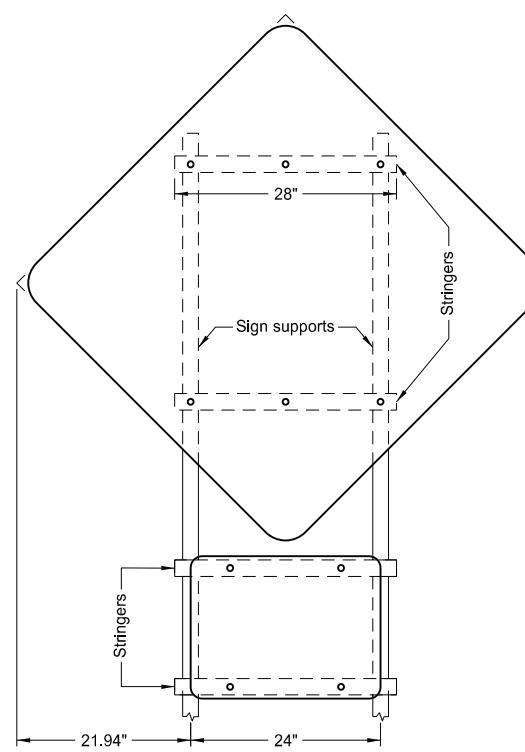
08/06/24

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

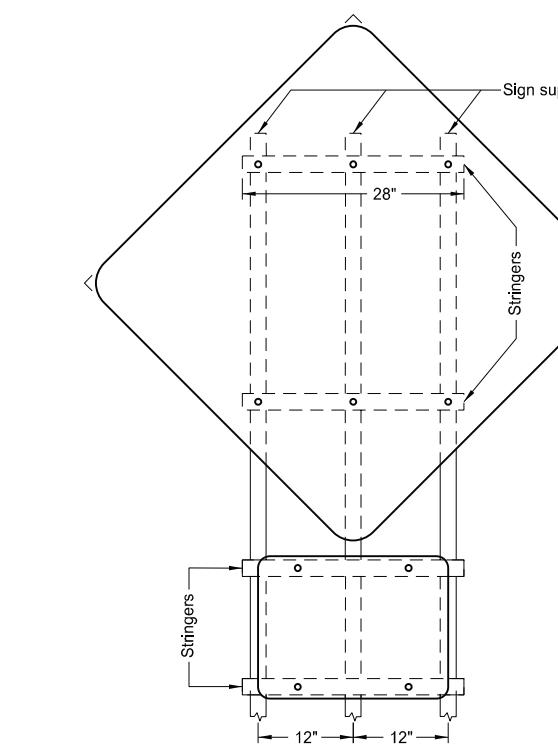
D-754-39



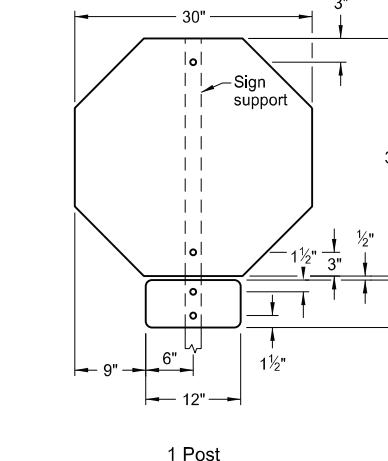
1 Post



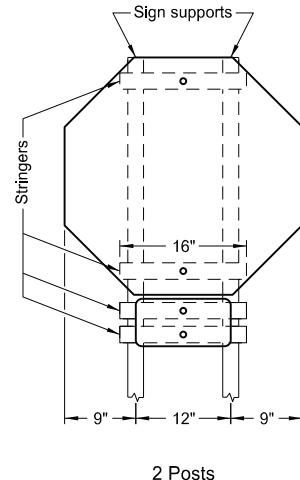
2 Posts



3 Posts

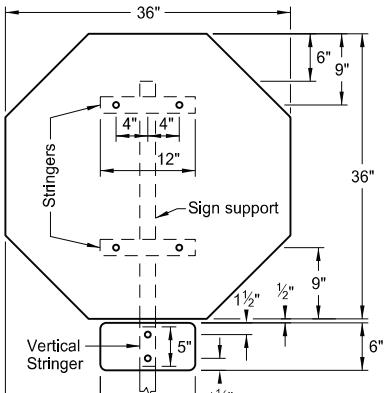


1 Post

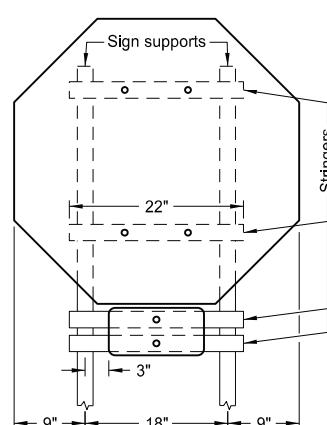


2 Posts

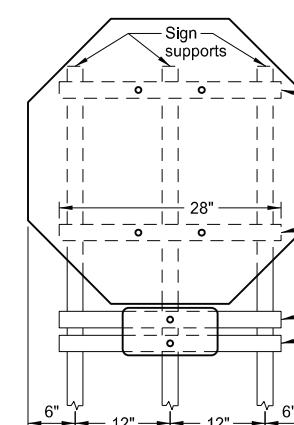
ASSEMBLY NO. 59



1 Post

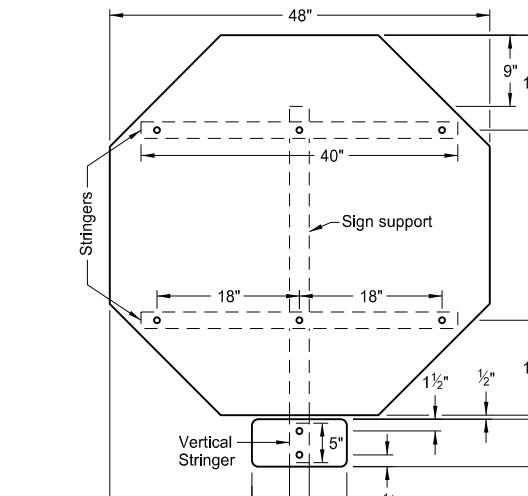


2 Posts

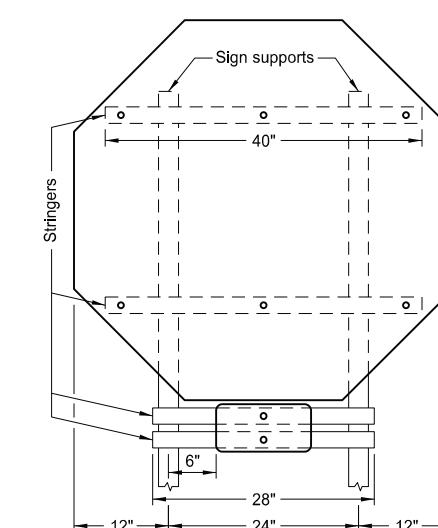


3 Posts

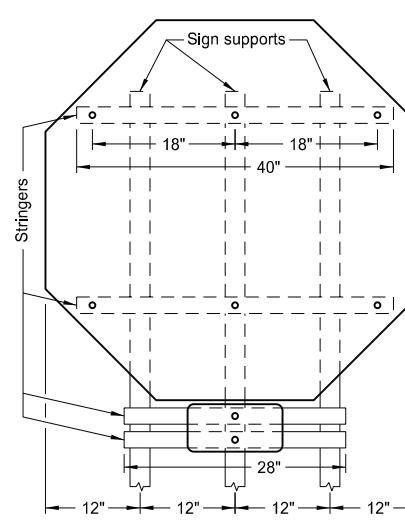
ASSEMBLY NO. 60



1 Post



2 Posts



3 Posts

ASSEMBLY NO. 61

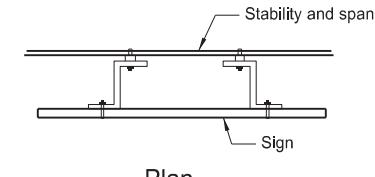
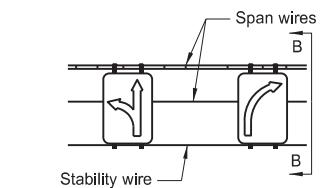
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1 1/2" x 1 1/2" perforated square tube stringers.
3. Punch holes round for $3/8$ " bolt.

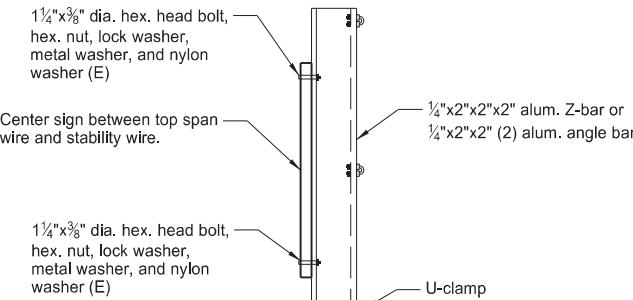
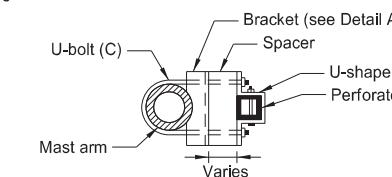
| | |
|--|--|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 8-22-12 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 | Updated to active voice & added Assembly 58 dimension. |
| 8-30-19 | New Design Engineer PE Stamp. |
| 8-06-24 | Electronic Stamp/Signature. |



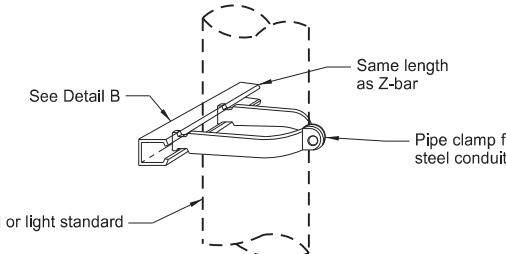
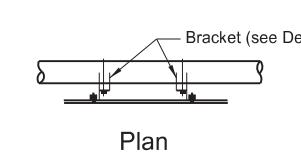
LIGHT STANDARD, SIGNAL STANDARD, AND SPAN WIRE MOUNTED SIGN ASSEMBLY DETAIL



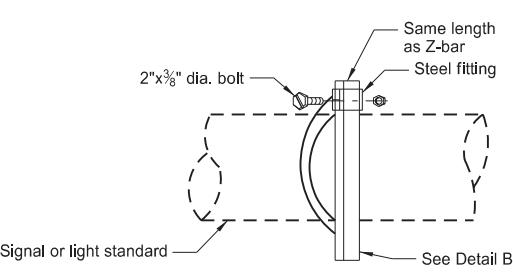
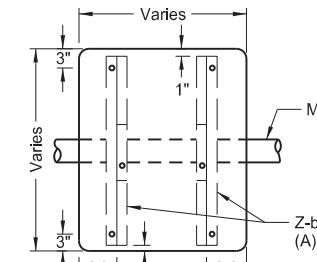
Plan

Section B-B
Span Wire Mounted Sign Detail

Section A-A

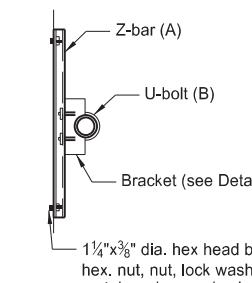
Vertical Mounting
(Use 2 clamps per sign)

Plan

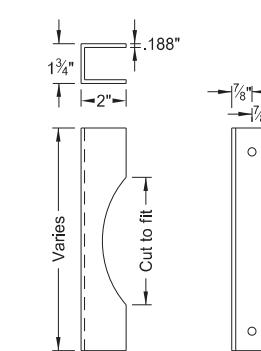
Horizontal Mounting
alternate clamp mounting
(Use 2 clamps per sign)

Elevation

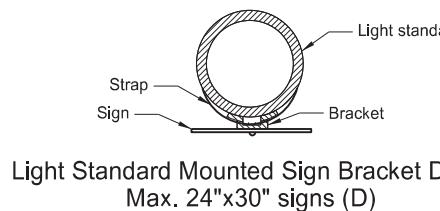
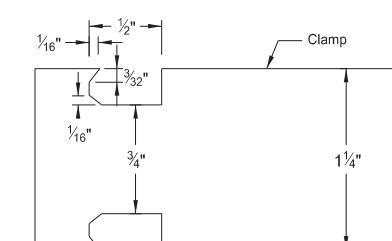
Mast Arm Mounted Regulatory Sign Detail



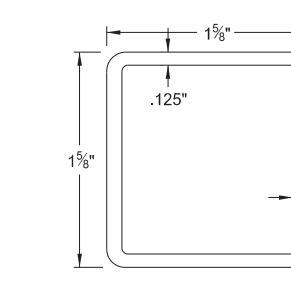
Side View



Detail A

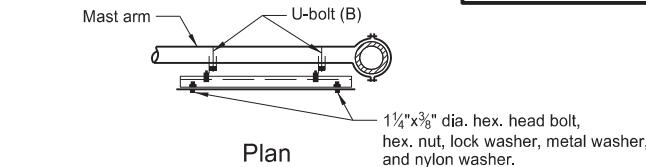
Light Standard Mounted Sign Bracket Detail
Max. 24"x30" signs (D)

Clamp Detail

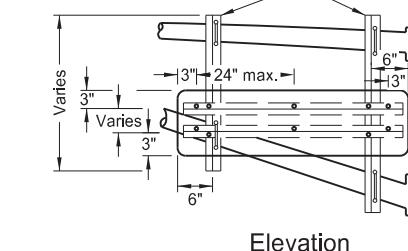
Detail B
Steel Channel

| Post Size dia. | Clamp Gauge min. |
|----------------|------------------|
| 3 1/2" to 5" | 11 |
| 6" to 12" | 10 |

| Clamp | |
|--------------------|---------|
| Post Size dia. in. | D in. |
| 3 1/2 | 3 |
| 4 | 3 3/16 |
| 5 | 5 1/8 |
| 6 | 7 7/16 |
| 8 | 13 1/16 |
| 10 | 20 3/4 |
| 12 | 29 5/8 |

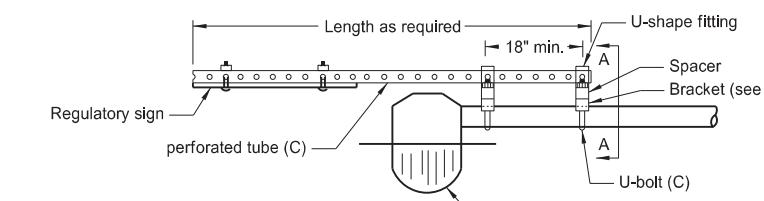


Plan

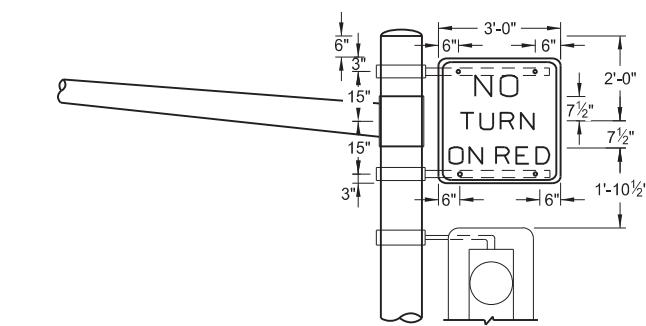


Elevation

Mast Arm Mounted Street Name Sign Detail



Sign Mounted Beyond End of Mast Arm Detail

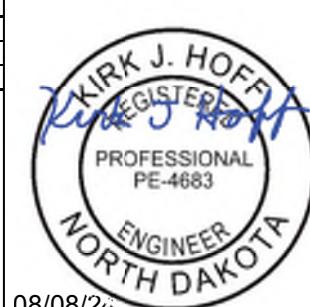


Signal Standard Mounted Sign Attachment Detail

Notes:

- (A) Use $1\frac{3}{16}$ " thick 1.08 lb/ft aluminum alloy Z-bar. In place of Z-bar, use two $1\frac{3}{4}$ " x $1\frac{3}{4}$ " x $\frac{3}{16}$ " angles bolted together or a $1\frac{3}{4}$ " x 2" x 188" channel.
- (B) $\frac{3}{8}$ " U-bolt, hex. nut, lock washer, and bracket (U-bolt length depends on dia. of mast arm.)
- (C) $\frac{3}{8}$ " U-bolt, hex. nut, lock washer, and bracket (U-bolt length depends on dia. of mast arm.)
- Maximum perforated tube lengths for mounting signs beyond end of mast arm:
 $2" \times 2"$ maximum support length 9.9'
 $2\frac{1}{4}" \times 2\frac{1}{4}"$ maximum support length 12.6'
 $2\frac{1}{2}" \times 2\frac{1}{2}"$ maximum support length 15.7'
- (D) Use galv. steel strap and sign attachment bracket similar to the one shown in the detail. Include all costs of bracket assembly in the price bid for flat sheet signs. Punch as shown on Standard Drawings. Provide a 7" minimum vertical clearance to the bottom of signs mounted on light standards.
- (E) Use metal washers and nylon washers with a minimum outside dia. of $1\frac{5}{16}$ " $\pm \frac{1}{16}$ " and 10 gauge thickness on sign face.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|--|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 9-05-19 8-08-24 | Updated notes to active voice. New Design Engineer PE Stamp. Electronic Stamp/Signature. |



911 SIGN SUPPORT INFORMATION AND SIGN DETAILS

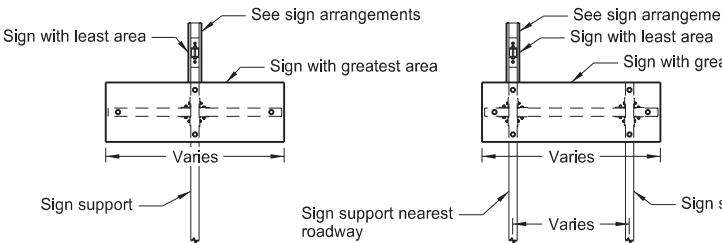
D-754-86

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

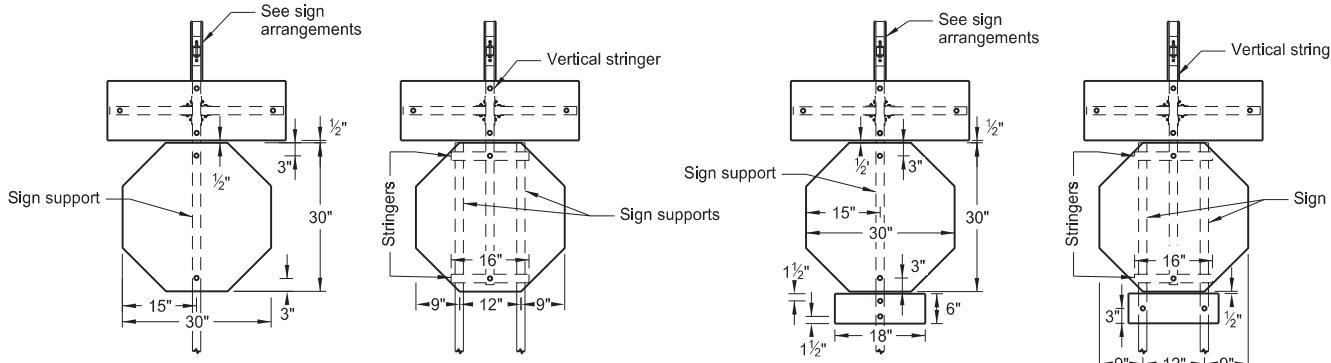
| POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS | | | | | | | | | | | | |
|--|-----------------------|--------------------|---------------------|-----------------|-------------------|-------------------|-------------|-------------------|--------|------|------------|--|
| ASSEMBLY NUMBER | STREET NAME SIGN SIZE | VERTICAL CLEARANCE | MAXIMUM POST LENGTH | NUMBER OF POSTS | SUPPORT SIZE | SLEEVE LENGTH (A) | SLEEVE SIZE | ANCHOR | | | BREAKAWAY | |
| | | | | | | | | 1st 2nd 3rd | | | | |
| | | | | | | | | NUMBER | LENGTH | SIZE | | |
| Inches | LF | LF | | | | | | LF | LF | LF | | |
| Special Assembly 3 | 24"x12" | 5 | 16.2 | 1 | 2.5 x 2.5 10 ga | | | | | | 1 | |
| | 30"x12" | 5 | 15.3 | 1 | 2.5 x 2.5 10 ga | | | | | | 1 | |
| | 36"x12" | 5 | 15.9 | 1 | 2.25 x 2.25 12 ga | 4.3 | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | |
| | 42"x12" | 5 | 15.2 | 1 | 2.25 x 2.25 12 ga | 4.8 | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | |
| | 48"x12" | 5 | 15.2 | 1 | 2.5 x 2.5 12 ga | 5 | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | |
| | 54"x12" | 5 | 20.6 | 1 | 2.5 x 2.5 10 ga | 1.9 | | 2.19 x 2.19 10 ga | 1 | 4.0 | 3 x 3 7 ga | |
| | 60"x12" | 5 | 16 | 1 | 2.5 x 2.5 12 ga | 4.7 | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | |
| | 24"x9" | 5 | 16.8 | 1 | 2.5 x 2.5 10 ga | | | | | | 1 | |
| | 30"x9" | 5 | 16.1 | 1 | 2.5 x 2.5 10 ga | | | | | | 1 | |
| | 36"x9" | 5 | 15.4 | 1 | 2.5 x 2.5 10 ga | | | | | | 1 | |
| | 42"x9" | 5</td | | | | | | | | | | |

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAIL 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

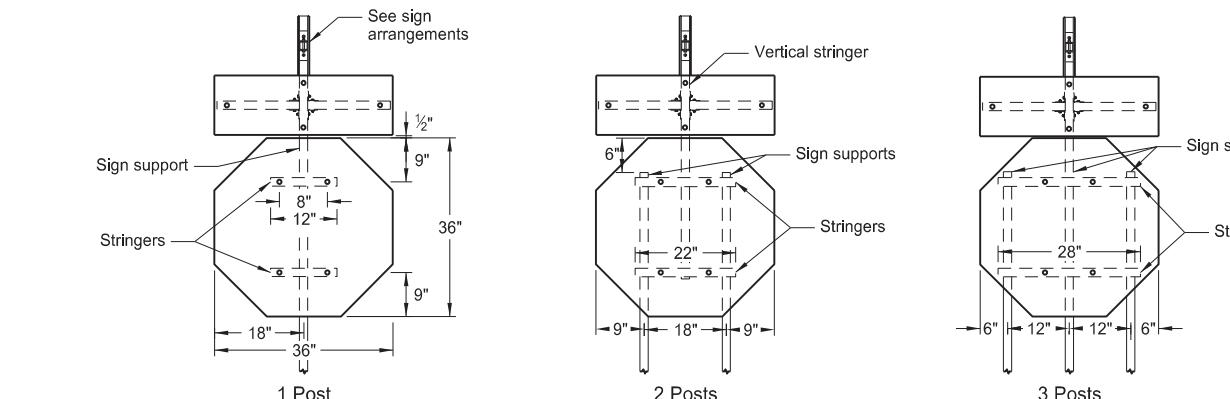


Special Assembly 1 (A, B, C, D or E)

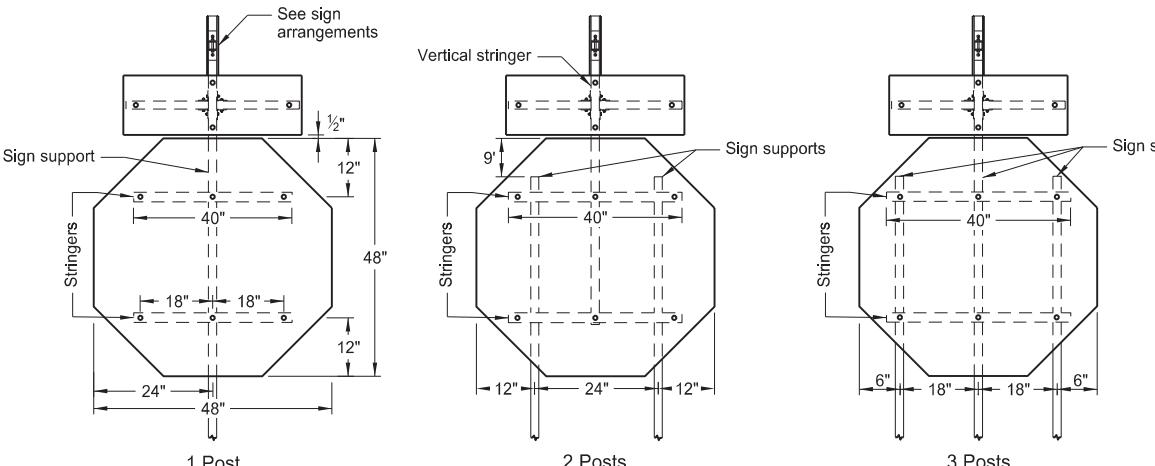


Special Assembly 2 (A, B, C, D or E)

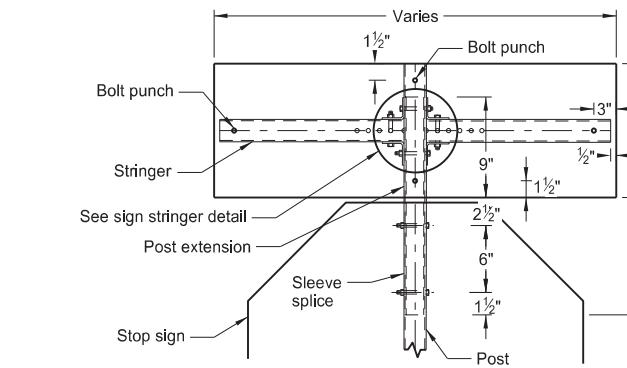
Special Assembly 3 (A, B, C, D or E)



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

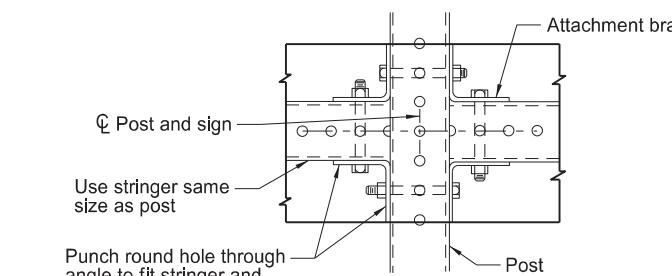


Special Assembly 5 (A, B, C, D or E)

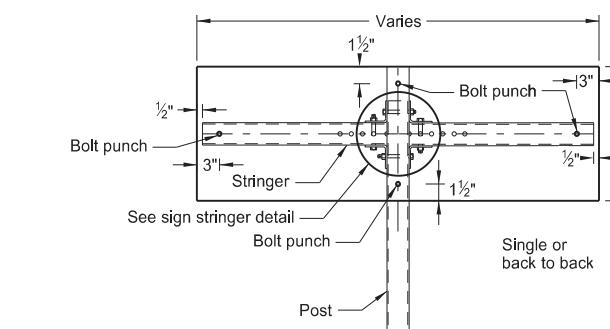


Front View
Sleeve Splice D

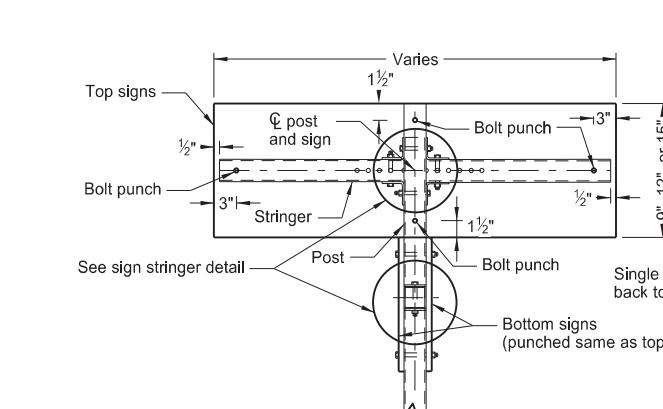
Note: Only use splice method with approval of engineer.



Sign Stringer De

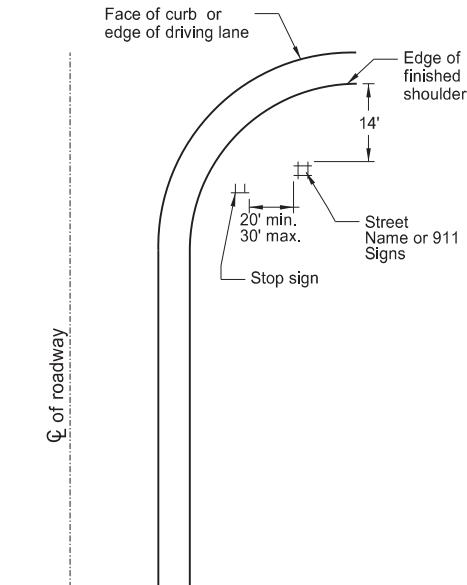


Detail A



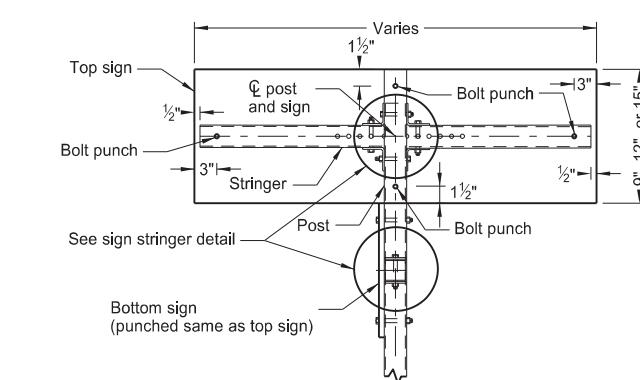
Detail D

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

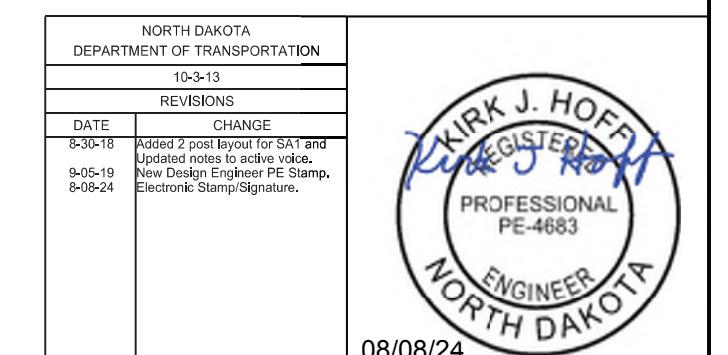


Intersection Layout

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

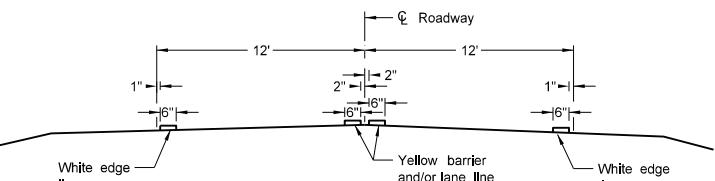


Detail C

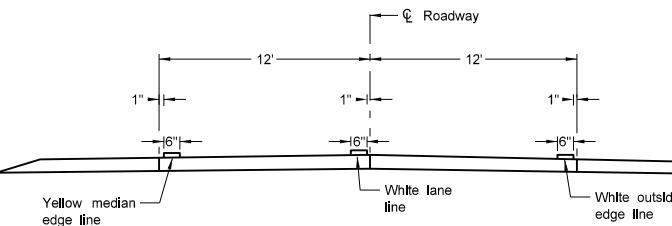


PAVEMENT MARKING

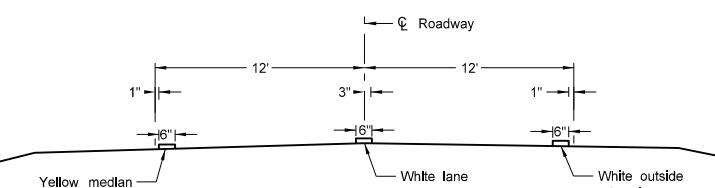
D-762-4



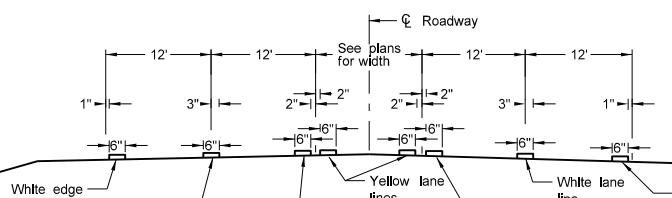
Two Lane Two Way
RURAL ROADWAY



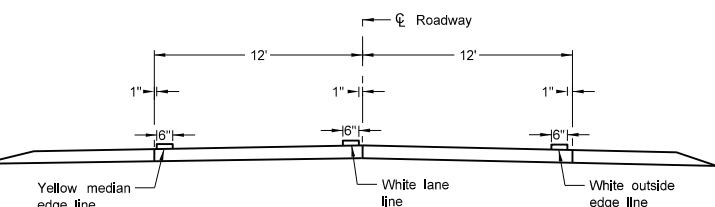
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



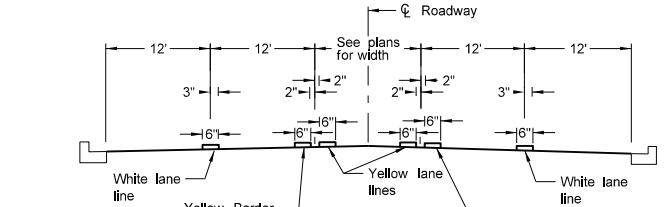
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



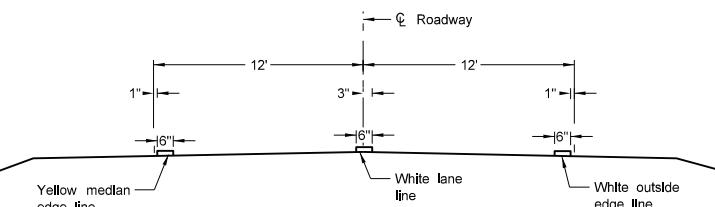
RURAL FIVE LANE ROADWAY
Asphalt Section



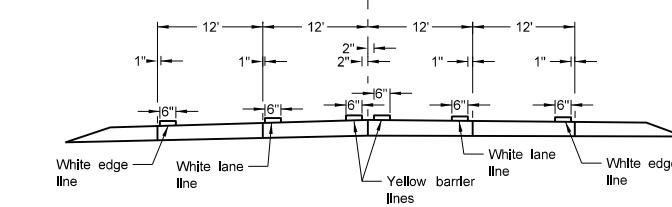
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



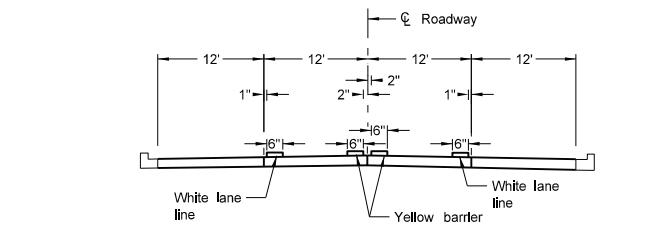
URBAN FIVE LANE SECTION
Asphalt Section



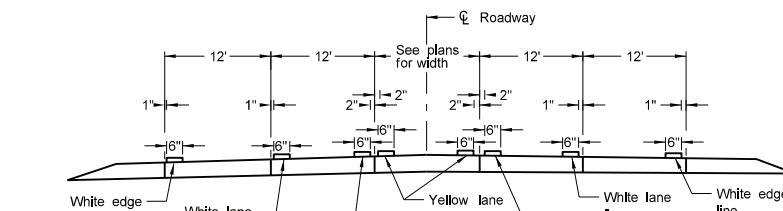
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



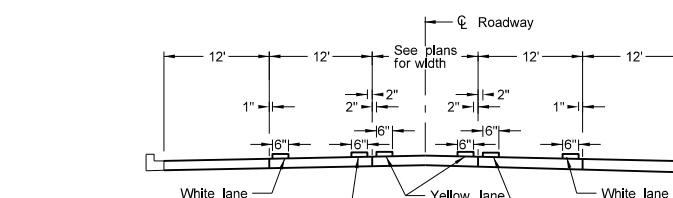
RURAL FOUR LANE ROADWAY
Concrete Section



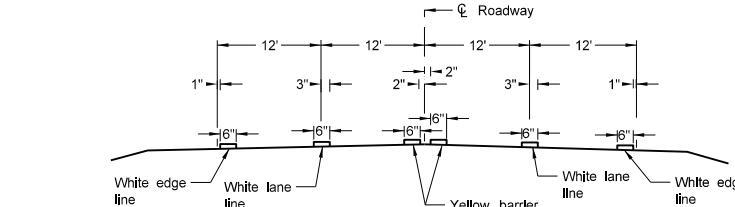
URBAN FOUR LANE SECTION
Concrete Section



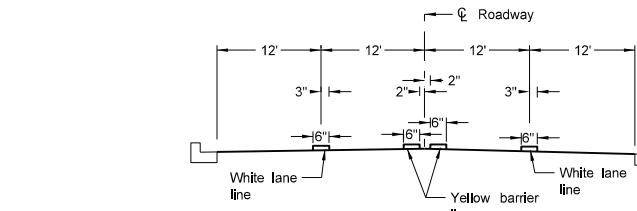
RURAL FIVE LANE ROADWAY
Concrete Section



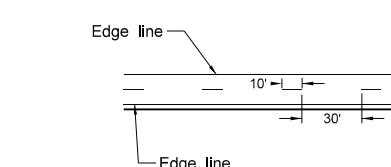
URBAN FIVE LANE SECTION
Concrete Section



RURAL FOUR LANE ROADWAY
Asphalt Section



URBAN FOUR LANE SECTION
Asphalt Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:

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

For section lines, county roads, and street approaches, stripe the radii and edge lines of the paved surface within the right of way except where curb and gutter is present.

2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.

3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits < 40 mph.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

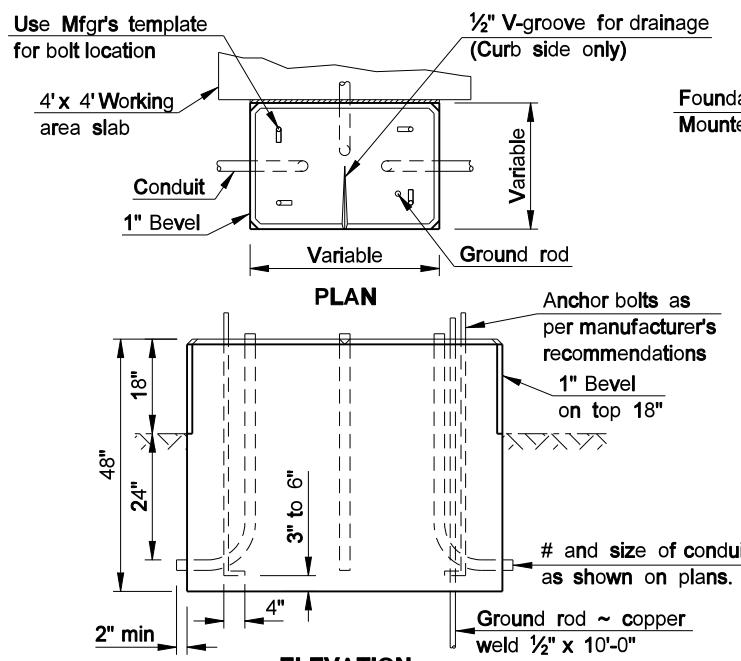
12-1-10

REVISIONS

| DATE | CHANGE |
|--|---|
| 10-17-17 08-27-19 11-22-23 07-09-24 | Updated to active voice. New Design Engineer PE Stamp. Revised pavement marking widths. Modified Note 1. |

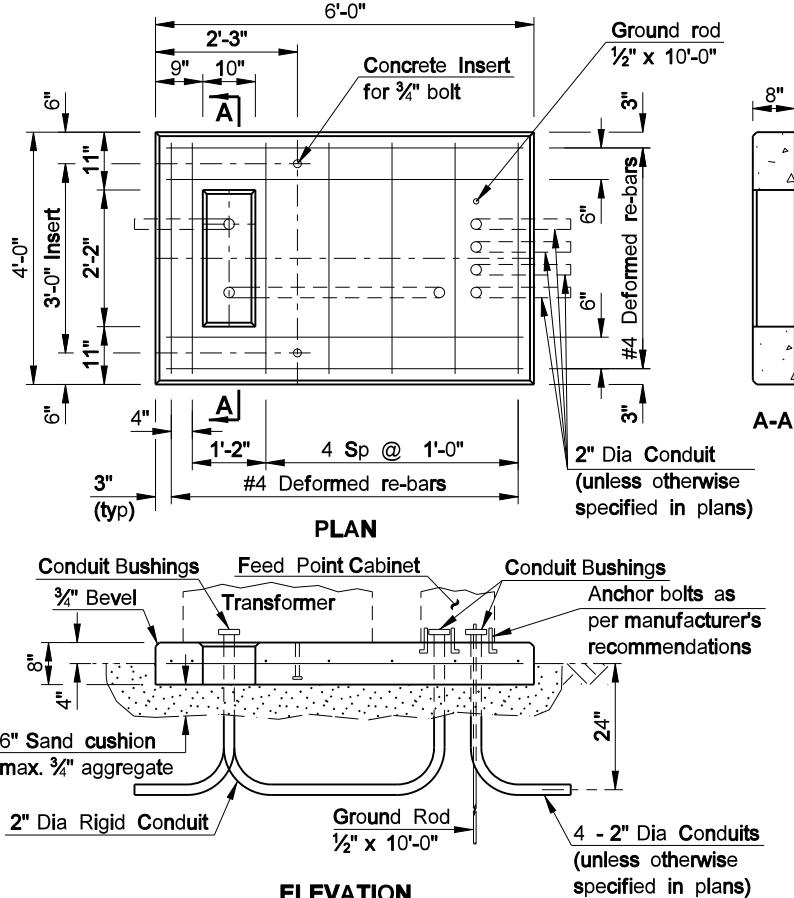


CONCRETE FOUNDATIONS (TRAFFIC SIGNALS & HIGHWAY LIGHTING)



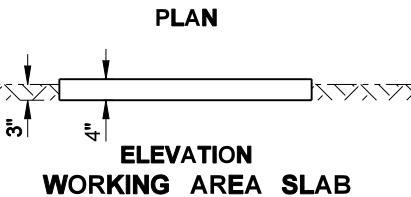
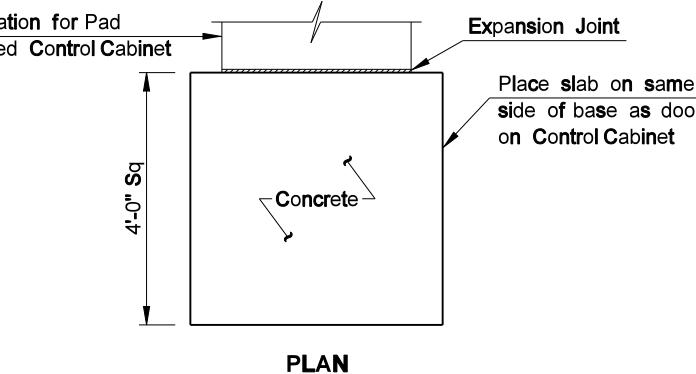
CONTROLLER CABINET FOUNDATION PAD MOUNT

The Controller Cabinet Foundation shall be bid as Concrete Foundation - Traffic Signals.



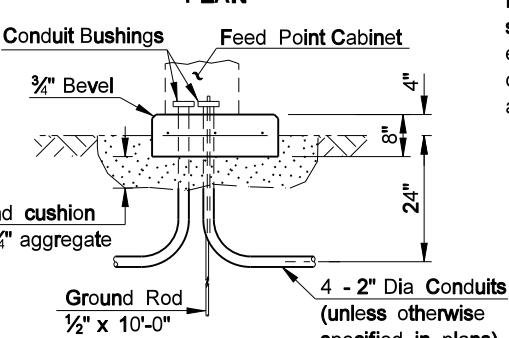
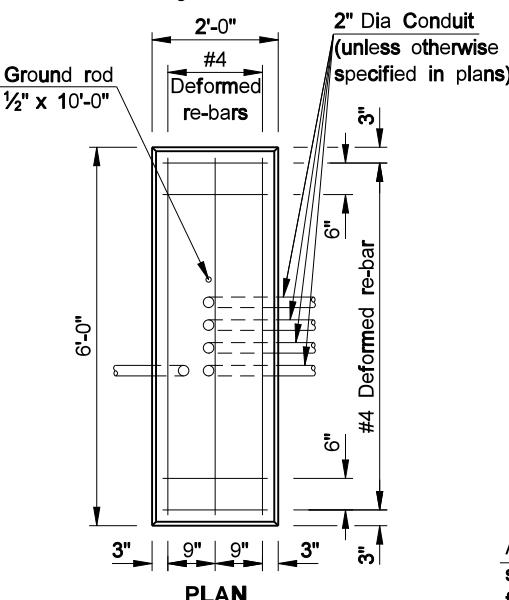
TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

The Transformer & Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type A.



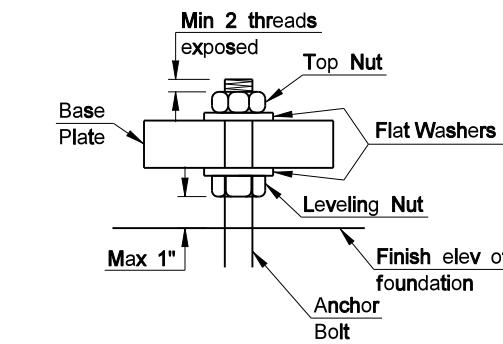
WORKING AREA SLAB

The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.

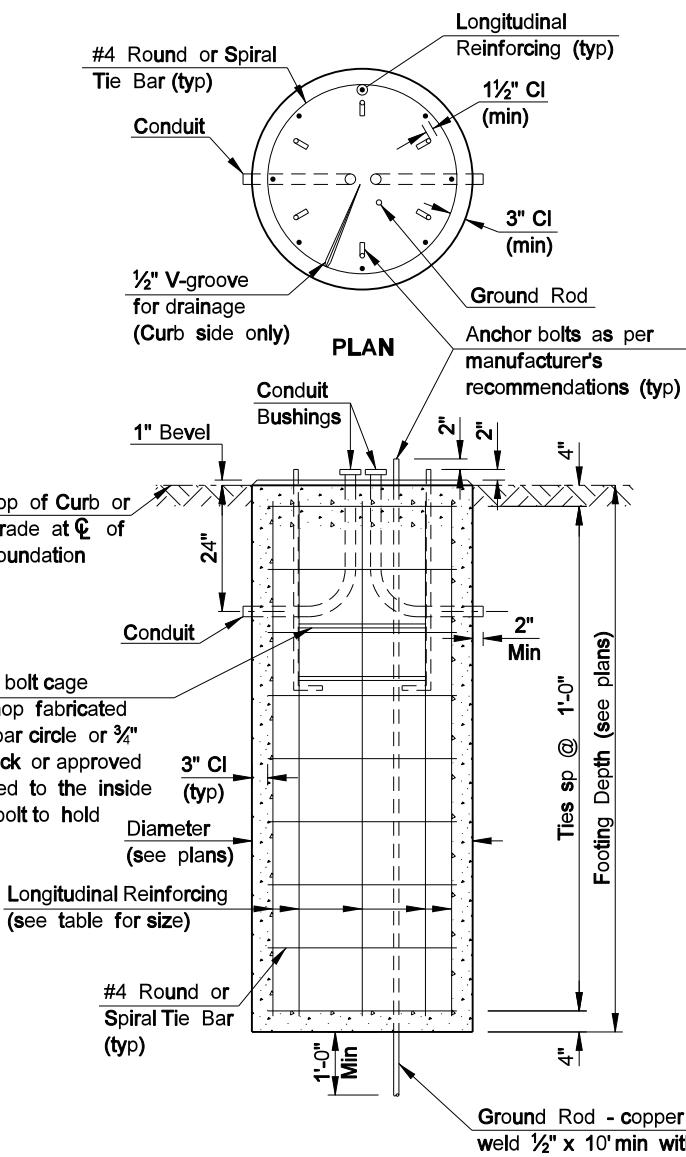


FEED POINT CABINET FOUNDATION PAD MOUNT

The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type B.



ANCHOR BOLT DETAIL



LIGHT & SIGNAL STANDARD FOUNDATION

NOTES:

LIGHT & SIGNAL STANDARD FOUNDATIONS:

See plans for conduit size, number of bends and correct position for each foundation. When conduit does not continue beyond the foundation, conduit with a 105° bend and bushings on both ends may be substituted for the 90° bends shown. See plans for correct size & location of foundations. The grade and exact location shall be established by the Engineer in the field. All reinforcing shall be Grade 60. Tie bars shall have a minimum of a 12" lap. Reinforcing may be omitted for Type I, II, V, VI & VII signal standard foundations if the anchor bolts extend to within 3" to 6" above the bottom of the foundation. A minimum of 6 anchor bolts shall be used for cantilevered structures.

CONTROLLER CABINET FOUNDATION PAD MOUNT

FOUNDATION: See plans for the number of 90° bends per foundation and correct positioning. The foundation for Pad Mounted Controller Cabinet shall be of sufficient size so that there is a minimum of 3" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The contractor shall ensure a water-tight seal between the controller cabinet and the foundation by caulking, except for V-groove.

WORKING AREA SLAB: The materials and preparation of this slab shall be as approved by the Engineer in the field.

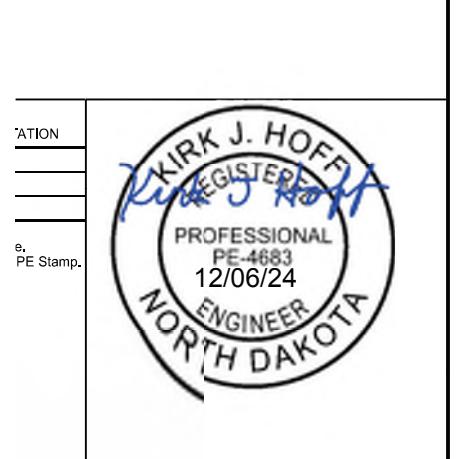
TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

| LIGHT & SIGNAL FOUNDATION TABLE | |
|---------------------------------|--------------------------|
| FOOTING DEPTH (ft) | LONGITUDINAL REINFORCING |
| ≤ 12 | 8 - #5 |
| 13 - 14 | 8 - #6 |
| 15 - 16 | 8 - #7 |
| 17 - 19 | 8 - #8 |

| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 6-15-10 REVISIONS DATE | CHANGE |
| | |
| | |

This document was originally issued and sealed by Terrence R. Ueland Registration Number PE- 2674 , on 6/15/10 and the original document is stored at the North Dakota Department of Transportation



| | |
|-------|--------------|
| ATION | KIRK J. HOFF |
| | REGISTERED |
| | PROFESSIONAL |
| | PE-4683 |
| | 12/06/24 |
| | ENGINEER |
| | NORTH DAKOTA |

Kirk J Hoff

