

| DESIGN DATA | | | |
|--------------------------|------|---------------|------------|
| Traffic | | Average Daily | |
| Current | 2012 | Pass: 205 | Trucks: 60 |
| | | Total: 265 | |
| Preventative Maintenance | | | |
| | | | |
| | | | |
| | | | |

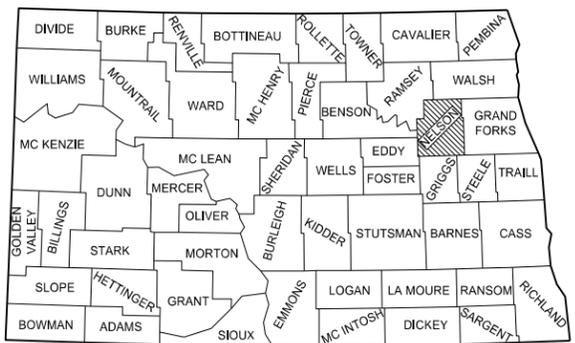
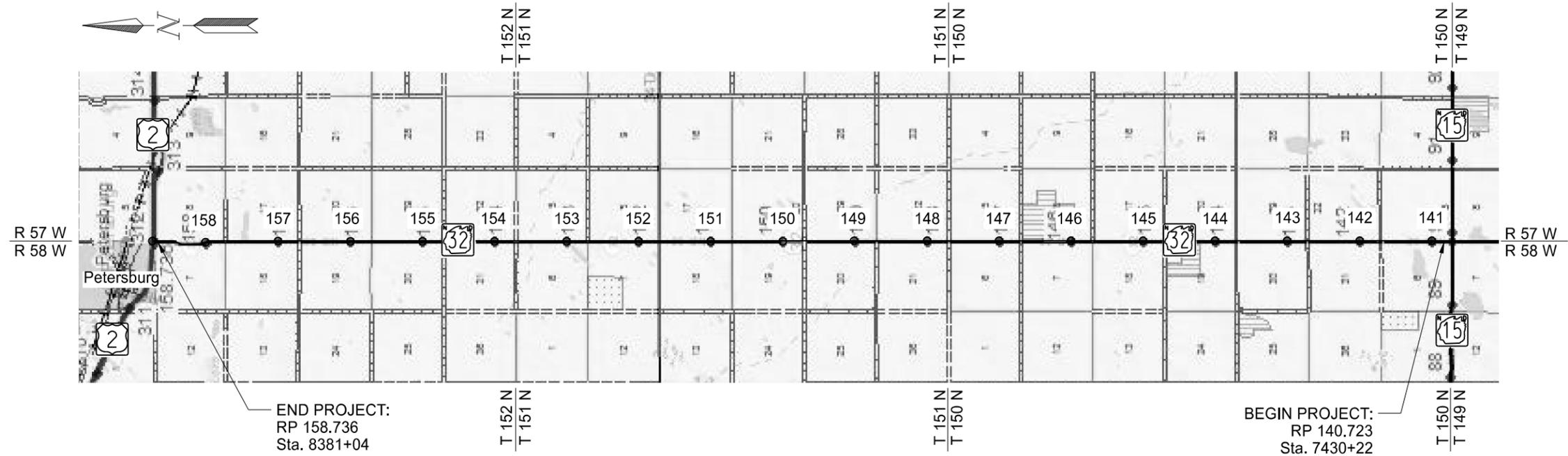
JOB # 20
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

| STATE | PROJECT NO. | PCN | SECTION NO. | SHEET NO. |
|-------|------------------|-------|-------------|-----------|
| ND | SS-6-032(050)140 | 18947 | 1 | 1 |

SS-6-032(050)140
 FHWA Limited Involvement
 Nelson County
 JCT 15 N to JCT 2- Petersburg
 Preventive Maintenance Seal Coat

GOVERNING SPECIFICATIONS:
 Standard Specifications adopted by the North Dakota
 Department of Transportation October 2008; Standard Drawings
 currently in effect; and other Contract Provisions submitted herein.

| PROJECT NUMBER \ DESCRIPTION | NET MILES | GROSS MILES |
|------------------------------|-----------|-------------|
| SS-6-032(050)140 | 18.013 | 18.013 |



DESIGNERS
 James Reed /s/

APPROVED DATE 12/05/2013
 Edward Pavlish /s/
 GRAND FORKS DISTRICT
 ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.
 APPROVED DATE 12/05/2013
 Christopher K. Beggs /s/
 GRAND FORKS DISTRICT

This document was originally issued and sealed by Christopher K. Beggs Registration Number PE- 6240, on 12/5/2013 and the original document is stored at the North Dakota Department of Transportation

| | | | |
|-------|------------------|-------------|-----------|
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| ND | SS-6-032(050)140 | 2 | 1 |

TABLE OF CONTENTS

| <u>Section No.</u> | <u>Sheet No.</u> | <u>Description</u> |
|--------------------|------------------|---------------------------|
| 1 | 1 | Title Sheet |
| 2 | 1 | Table of Contents |
| 4 | 1 | Scope of Work |
| 6 | 1 | Notes |
| 8 | 1 | Quantities |
| 10 | 1 | Basis of Estimate |
| 30 | 1 | Typical Section |
| 100 | 1-5 | Work Zone Traffic Control |

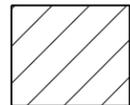
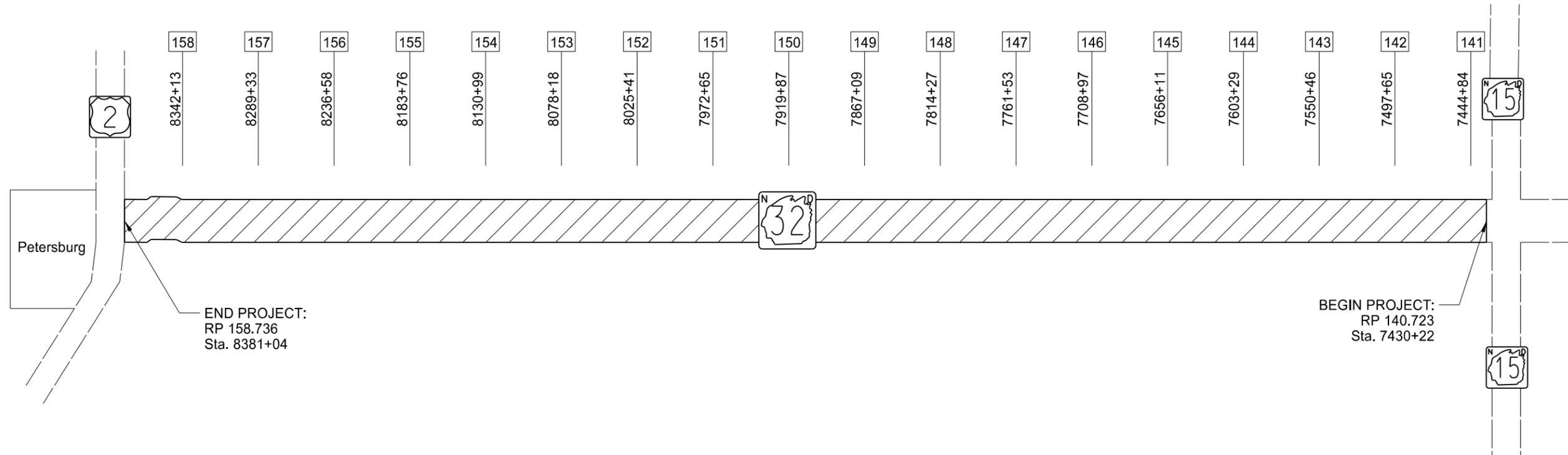
LIST OF STANDARD DRAWINGS

| <u>Standard No.</u> | <u>Description</u> |
|---------------------|---|
| D-20-1, 2, 3 | ND DOT Abbreviations |
| D-20-10 | ND DOT Utility Company Abbreviations |
| D-20-20, 21 | Line Styles |
| D-20-30, 31, 32 | Symbols |
| D-704-3 | Lane Markers (Spotting tabs, seal jobs only) |
| D-704-7, 8 | Break away Systems for Construction Zone Signs |
| D-704-9, 10, 11 | Construction Sign Details |
| D-704-13 | Barricade Details and Channelizing Devices |
| D-704-14 | Construction Sign Punching and Mounting Details |
| D-704-15 | Road Closure Layouts |
| D-704- 20 | Terminal and Seal Coat Sign Layouts |
| D-704- 22 | Construction Truck and Temporary Detour Layouts |
| D-704-27 | Traffic Control Plan for Moving Operations |
| D-704-50 | Portable Sign Support Assembly |
| D-762-3 | Stripping for Flared Intersections |
| D-762-4 | Pavement Marking |
| D-762-6 | Short Term Pavement Marking |

LIST OF SPECIAL PROVISIONS (SP)

| <u>SP #</u> | <u>Description</u> |
|-------------|--|
| SP 559(08) | Permanent Pavement Marking Monitoring System |

| | | | |
|-------|------------------|-------------|-----------|
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| ND | SS-6-032(050)140 | 4 | 1 |



Preventative Maintenance Seal Coat

*Note: Drawing Not To Scale

This document was originally issued and sealed by Christopher K. Beggs Registration Number PE- 6240, on 12/05/13 and the original document is stored at the North Dakota Department of Transportation

Scope of Work

NOTES

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|-------|------------------|-------------|-----------|
| ND | SS-6-032(050)140 | 6 | 1 |

GENERAL NOTES

- 100-P01 SEAL OIL: Near wetlands, including shoulder and sloughs, shall be covered with Class 41 chips. The limits of a wetland will be decided by the engineer.
- 401-P01 BLOTTER SAND: All costs for blotter sand shall be included in the price bid for "CRS2 Emulsified Asphalt."
- 420-P01 SEAL COAT: Initial light brooming shall be during the cool period of the early morning of the next day after seal application. Traffic control will be needed during the brooming operation. Immediately after the light brooming the speed limit shall be increased to 55 mph. The maintenance period will end 5 days after the application of the Fog Coat.
- 420-P02 CLASS 41 COVER COAT MATERIAL: The cover aggregate shall be spread immediately following the application of bituminous material. Under no circumstances shall the seal coat operations proceed if the bituminous material remains uncovered for more than one minute.
- 420-P03 FOG COAT APPLICATION: The roadway shall be broomed immediately prior to the Fog Coat application. A Fog Coat application of CSS-1H will follow at the residual rate as shown in the Basis of Estimate, or as otherwise directed by the Engineer. The dilution rate of the Fog Coat will be 50% (water) and 50% (CSS-1H) or as directed by the Engineer. Dilution at the supplier will be required. This work will begin within 48 hours of the mainline seal completion.
- 420-P04 CSS-1H: Even though the bid item says "SS1H or CSS1H Emulsified Asphalt", the NDDOT will only allow CSS1H to be used on this project.
- 420-P05 CLEANING EXISTING CENTER RUMBLE STRIP: The contractor shall clean the centerline rumble strip by brooming or with pressurized air prior to placing any material over the rumble. The contractor will not be allowed cover the rumble unless they are clean and free of moisture.

- 704-P01 TRAFFIC CONTROL FOR SEAL COATS: Traffic control for the seal coat shall consist of a temporary road closure, flagging, and a pilot car. Traffic Control Devices shall comply with the following Standard Drawings:
 1. Standard D-704-15, layout A: For temporary roadway closures just beyond the daily work areas during seal coat operations. Intermediate flagging stations will require signs W20-7A-48 only.
 2. Standard D-704-20, layout H: For construction signing during seal coat operations. . The ADT is less than 750 on this project, therefore sign no. W8-12-48 "No Center Stripe" will be required. Short term pavement markings will be placed after the fog coat has been applied.
 3. Standard D-704-22, layouts K and L: For trucks hauling material.
 4. Standard D-704-7, 8, 9, 10, 11, 13, 14, 27 and 50 are applicable.
 5. Standard D-704-3, Lane Markers for Seal Jobs (Spotting Tabs)
- 762-P01 PAVEMENT MARKING: Pavement marking will not be measured for payment unless changes are made in the field. Payment for pavement marking will be at plan quantity.
- 762-P02 PAVEMENT MARKING EDGE LINES: Edge lines shall be continued through private drives and broken for intersections.

This document was originally issued and sealed by Christopher K. Beggs, Registration Number PE-6240, on 12/05/13 and the original document is stored at the North Dakota Department of Transportation.

ESTIMATE OF QUANTITIES

| | | | |
|-----------|------------------|-------------|-----------|
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| ND | SS-6-032(050)140 | 8 | 1 |

| SPEC CODE | ITEM DESCRIPTION | UNIT | MAINLINE | TOTAL |
|-----------|---------------------------------------|-------|----------|---------|
| ----- | ----- | ----- | ----- | ----- |
| 103 | 0100 CONTRACT BOND | L SUM | 1 | 1 |
| 420 | 0101 CRS2 EMULSIFIED ASPHALT | GAL | 101,450 | 101,450 |
| 420 | 0109 SS1H OR CSS1H EMULSIFIED ASPHALT | GAL | 22,192 | 22,192 |
| 420 | 0125 COVER COAT MATERIAL CL 41 | TON | 3,171 | 3,171 |
| 702 | 0100 MOBILIZATION | L SUM | 1 | 1 |
| 704 | 1000 TRAFFIC CONTROL SIGNS | UNIT | 2,438 | 2,438 |
| 762 | 0430 SHORT TERM 4IN LINE-TYPE NR | LF | 31,442 | 31,442 |
| 762 | 1104 PVMT MK PAINTED 4IN LINE | LF | 221,195 | 221,195 |

BASIS OF ESTIMATE

| | | | |
|-------|------------------|-------------|-----------|
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| ND | SS-6-032(050)140 | 10 | 1 |

| Design Calculation - Surfacing Quantities | | | |
|---|------|-------|------------|
| Description | Unit | Width | Units/Mile |
| Typical Section 1 | | | |
| RP 140.723 to RP 158.736 | | | |
| Cover Coat Material CI 41 @ 25lb/SY <i>(24 ft x 5280 ft/mile ÷ 9 SF/SY x 25 lb/SY ÷ 2000 lb/ton = 176 tons)</i> | Ton | 24 | 176 |
| CRS2 Asphalt Emulsion for Seal Coat @ 0.40 gal/SY <i>(24 ft x 5280 ft/mile ÷ 9 SF/SY x .40 Gal/SY = 5,632)</i> | Gal | 24 | 5,632 |
| CSS1H Emulsified Asphalt @ 0.10 Gal/SY <i>(Shoulder Seal)(9 FT x 5280 LF/mi ÷ 9 SF/SY x 0.10 Gal/SY = 528 Gal)</i> | Gal | 9 | 528 |
| CSS1H Emulsified Asphalt @ 0.05 Gal/SY <i>(Fog Seal)(24 FT x 5280 LF/mi ÷ 9 SF/SY x 0.05 Gal/SY = 704 Gal)</i> | Gal | 24 | 704 |

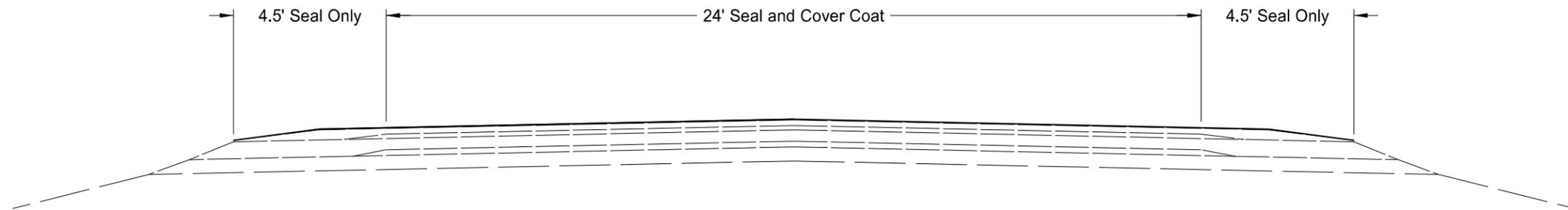
| Temporary Pavement Marking | | |
|--------------------------------------|--------------------------------|------------------|
| Short Term 4 in Line - Type NR | | |
| Location | Basis | Quantity |
| RP 140.723 to RP 158.722 | | |
| Yellow Skip Line- 10' Line, 30' Skip | Centerline Skips 1,320 LF/mile | 23,680 LF |
| Yellow Barrier Stripe | Single Barrier 5280 LF/mile | 7,762 |
| | Double Barrier 10,560 LF/mile | |
| Total - 1 applications = | | 31,442 LF |

| Permanent Pavement Marking | | |
|--|--------------------------------|-------------------|
| PVMT MK Painted 4 in Line | | |
| Location | Basis | Quantity |
| RP 140.723 to RP 157.722 | | |
| Yellow Skip Line- 10' Line, 30' Skip | Centerline Skips 1,320 LF/mile | 23,680 LF |
| Single Yellow Barrier Line | 5,280 LF/mile | 7,128 LF |
| Double Yellow Barrier Line- 4" Between | 10,560 LF/mile | 634 LF |
| White Edge Line | 10,560 LF/mile | 190,070 LF |
| Total= | | 221,512 LF |

| ND Highway 32 Barrier Stripe Location | | | | | | | |
|--|---------|-------|---------|----|----|---------------|-----------|
| | | | | | | Unit/Location | Unit |
| 4" Yellow Single Barrier Line - | 140.723 | RP to | 140.873 | RP | Lt | 792 | LF |
| 4" Yellow Single Barrier Line - | 149.599 | RP to | 149.705 | RP | Rt | 560 | LF |
| 4" Yellow Single Barrier Line - | 149.720 | RP to | 149.855 | RP | Lt | 713 | LF |
| 4" Yellow Single Barrier Line - | 150.500 | RP to | 150.649 | RP | Rt | 787 | LF |
| 4" Yellow Single Barrier Line - | 150.695 | RP to | 150.860 | RP | Lt | 871 | LF |
| 4" Yellow Single Barrier Line - | 151.636 | RP to | 151.711 | RP | Rt | 396 | LF |
| 4" Yellow Single Barrier Line - | 151.725 | RP to | 151.816 | RP | Lt | 480 | LF |
| 4" Yellow Single Barrier Line - | 155.895 | RP to | 156.060 | RP | Rt | 871 | LF |
| 4" Yellow Double Barrier Line - | 156.060 | RP to | 156.120 | RP | | 634 | LF |
| 4" Yellow Single Barrier Line - | 156.120 | RP to | 156.284 | RP | Lt | 866 | LF |
| 4" Yellow Single Barrier Line - | 158.572 | RP to | 158.722 | RP | Rt | 792 | LF |
| Total Barrier Stripe Pavement Marking = | | | | | | 7,762 | LF |

This document was originally issued and sealed by Christopher K. Beggs, Registration Number PE-6240, on 12/05/13 and the original document is stored at the North Dakota Department of Transportation.

| | | | | |
|--|-------|------------------|-------------|-----------|
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| | ND | SS-6-032(050)140 | 30 | 1 |



PROPOSED TYPICAL SECTION
RP 140.723 to RP 158.736

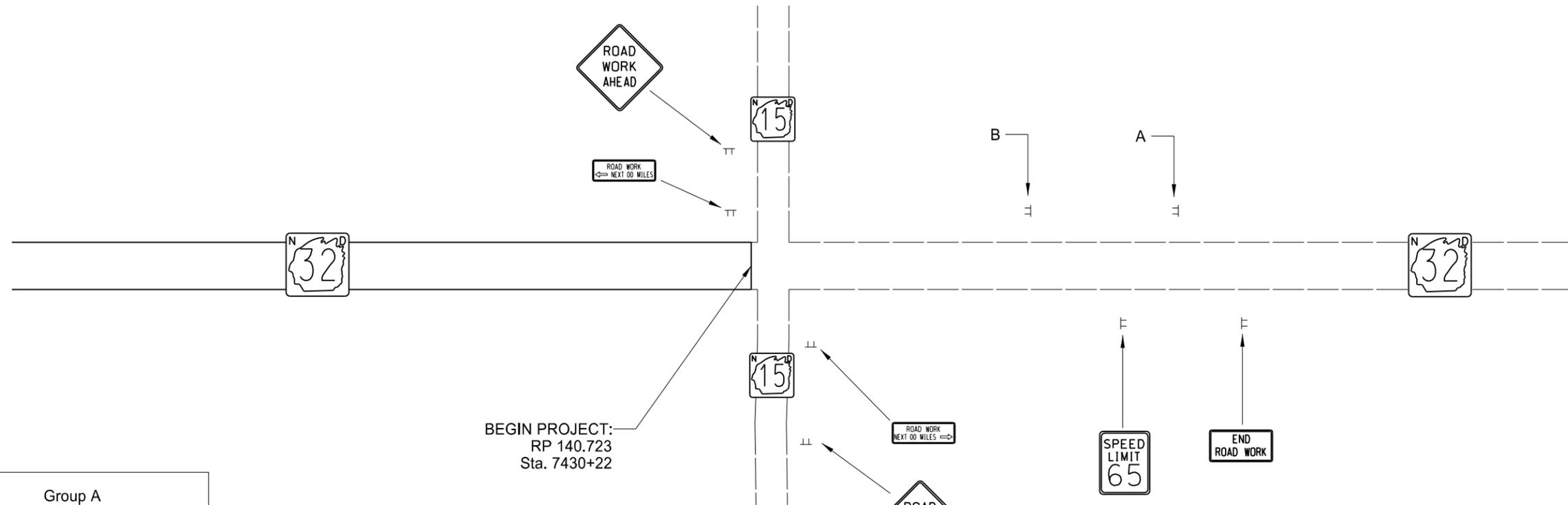
This document was originally issued and sealed by Christopher K. Beggs Registration Number PE- 6240, on 12/05/13 and the original document is stored at the North Dakota Department of Transportation

Proposed Typical Sections

| | | | |
|-------|------------------|-------------|-----------|
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| ND | SS-6-032(050)140 | 100 | 2 |



*Note: Drawing Not To Scale



Group A

W20-1-48 G20-1a-60

GROUP B

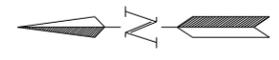
W3-5-48 R4-1-48 W3-5-48 W22-8-48 R2-1-48

W20-52-54 R2-1a-24

This document was originally issued and sealed by Christopher K. Beggs Registration Number PE- 6240, on 12/05/13 and the original document is stored at the North Dakota Department of Transportation

Work Zone Traffic Control

| | | | |
|-------|------------------|-------------|-----------|
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| ND | SS-6-032(050)140 | 100 | 3 |



*Note: Drawing Not To Scale

JCT ND 32 & Co. 7
RP 145.715

JCT ND 32 & Co. 18
RP 143.720



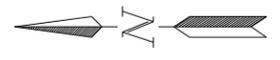
GROUP B

| | | | |
|----------|----------|-----------|----------|
| | | | |
| W8-12-48 | R4-1-48 | R2-1-48 | W22-8-48 |
| | | | |
| | R2-1a-24 | W20-52-54 | |

This document was originally issued and sealed by Christopher K. Beggs Registration Number PE- 6240, on 12/05/13 and the original document is stored at the North Dakota Department of Transportation

Work Zone Traffic Control

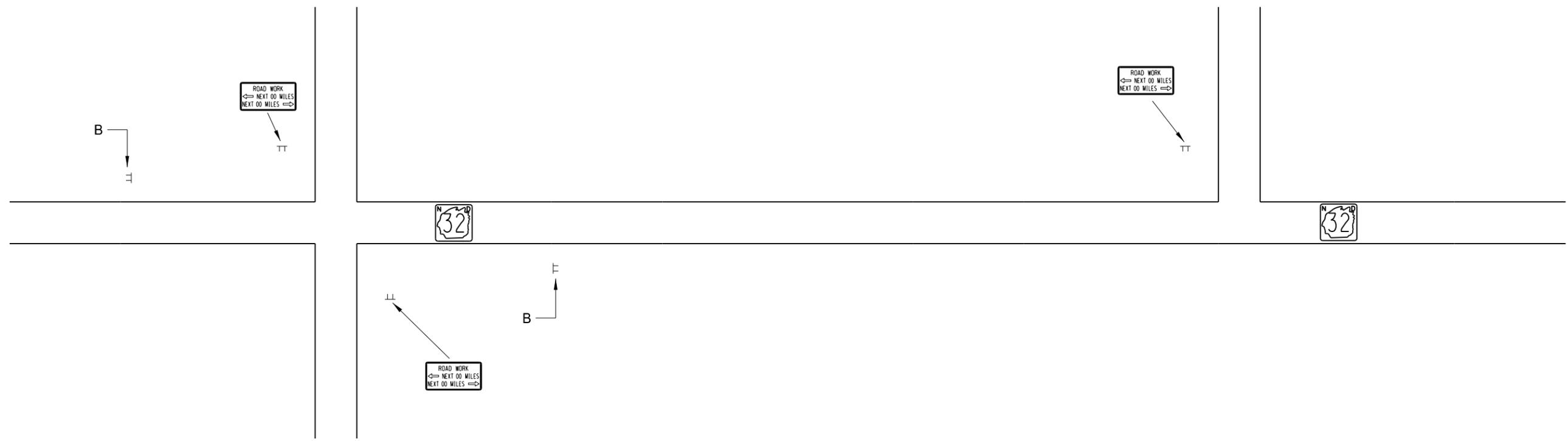
| | | | |
|-------|------------------|-------------|-----------|
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| ND | SS-6-032(050)140 | 100 | 4 |



*Note: Drawing Not To Scale

JCT ND 32 & Co. 4
RP 151.726

JCT ND 32 & Co. 10
RP 149.720



GROUP B

| | | | |
|--------------|--------------|---------------|--------------|
| W8-12-48 | R4-1-48 | R2-1-48 | W22-8-48 |
| | R2-1a-24 | W20-52-54 | |

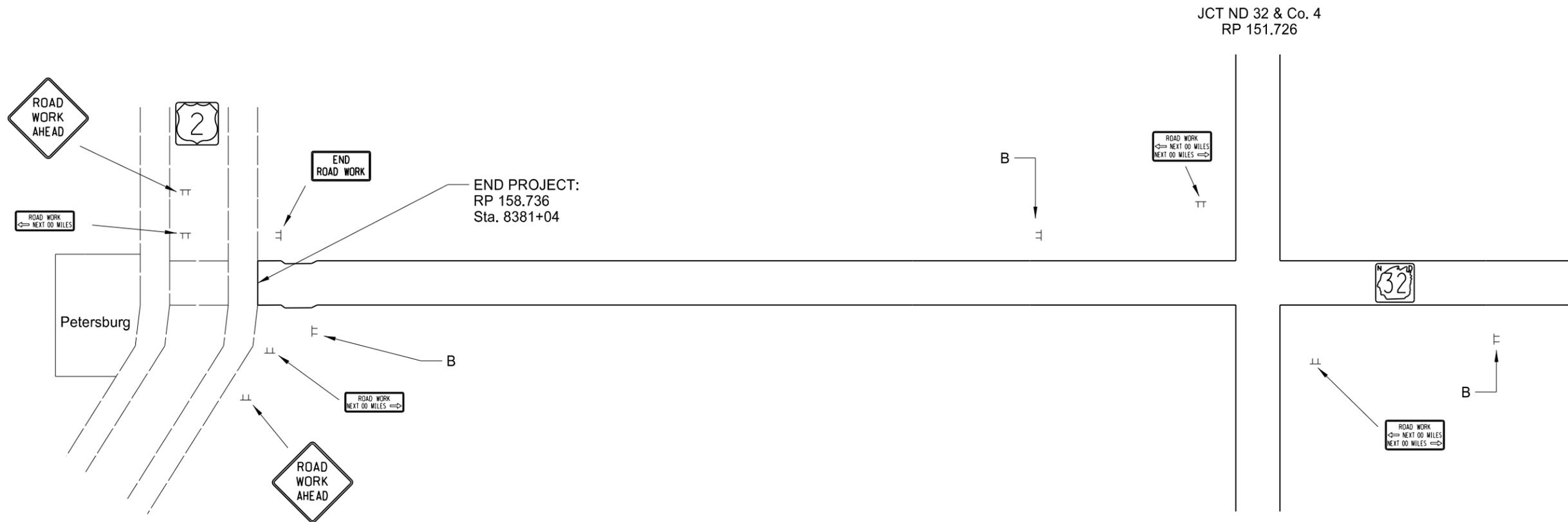
This document was originally issued and sealed by Christopher K. Beggs Registration Number PE- 6240, on 12/05/13 and the original document is stored at the North Dakota Department of Transportation

Work Zone Traffic Control



| | | | | |
|--|-------|------------------|-------------|-----------|
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
| | ND | SS-6-032(050)140 | 100 | 5 |

*Note: Drawing Not To Scale



GROUP B

| | | | |
|----------|----------|-----------|----------|
| | | | |
| W8-12-48 | R4-1-48 | R2-1-48 | W22-8-48 |
| | | | |
| | R2-1a-24 | W20-52-54 | |

This document was originally issued and sealed by Christopher K. Beggs Registration Number PE- 6240, on 12/05/13 and the original document is stored at the North Dakota Department of Transportation

Work Zone Traffic Control

NDDOT ABBREVIATIONS

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

| | |
|--|-------------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 06-15-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 04-20-11 | Added Items |
| 03-15-13 | Added Items |
| 11-01-13 | Added Items |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/01/13 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

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

| | |
|--|-------------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 06-15-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 04-20-11 | Added Items |
| 03-15-13 | Added Items |
| 11-01-13 | Added Items |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/01/13 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

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

| | |
|--|-------------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 06-15-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 04-20-11 | Added Items |
| 03-15-13 | Added Items |
| 11-01-13 | Added Items |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/01/13 and the original document is stored at the North Dakota Department of Transportation

NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-20-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated General Contractors of America
 All PI Alliance Pipeline
 ALL SEAS WU All Seasons Water Users Association
 AMOCO PI Amoco Pipeline Company
 AMRDA HESS Amerada Hess Corporation
 AT&T AT&T Corporation
 B PAW Bear Paw Energy Incorporated
 BAKER ELEC Baker Electric
 BASIN ELEC Basin Electric Cooperative Incorporated
 BEK TEL Bek Communications Cooperative
 BELLE PL Belle Fourche Pipeline Company
 BLM Bureau of Land Management
 BNSF Burlington Northern Santa Fe Railway
 BOEING Boeing
 BRNS RWD Barnes Rural Water District
 BURK-DIV ELEC Burke-Divide Electric Cooperative
 BURL WU Burleigh Water Users
 Cable One Cable One
 CABLE SERV Cable Services
 CAP ELEC Capital Electric Cooperative Incorporat
 CASS CO ELEC Cass County Electric Cooperative
 CASS RWU Cass Rural Water Users Incorporated
 CAV ELEC Cavalier Rural Electric Cooperative
 CBLCOM Cablecom Of Fargo
 CENEX PL Cenex Pipeline
 CENT PL WATER DIST Central Pipe Line Water District
 CENT PWR ELEC Central Power Electric Cooperative
 COE Corps of Engineers
 CONS TEL Consolidated Telephone
 CONT RES Continental Resource Inc
 CPR Canadian Pacific Railway
 D O E Department Of Energy
 DAK CARR Dakota Carrier Network
 DAK CENT TEL Dakota Central Telephone
 DAK RWD Dakota Rural Water District
 DGC Dakota Gasification Company
 DICKEY R NET Dickey Rural Networks
 DICKEY RWU Dickey Rural Water Users Association
 DICKEY TEL Dickey Telephone
 DNRR Dakota Northern Railroad
 DOME PL Dome Pipeline Company
 DVELEC Dakota Valley Electric Cooperative
 DVMW Dakota, Missouri Valley & Western
 ENBRDG Enbridge Pipelines Incorporated
 ENVENTIS Enventis Telephone
 FALK MNG Falkirk Mining Company
 FHWA Federal Highway Administration
 G FKS-TRL WD Grand Forks-trail Water District
 GETTY TRD & TRAN Getty Trading & Transportation
 GLDN W ELEC Golden West Electric Cooperative
 GRGS CO TEL Griggs County Telephone

GT PLNS NAT GAS Great Plains Natural Gas Company
 HALS TEL Halstad Telephone Company
 IDEA1 Idea1
 INT-COMM TEL Inter-Community Telephone Company
 KANEB PL Kaneb Pipeline Company
 KEM ELEC Kem Electric Cooperative Incorporated
 KOCH GATH SYS Koch Gathering Systems Incorporated
 LKHD PL Lakehead Pipeline Company
 LNGDN RWU Langdon Rural Water Users Incorporated
 LWR YELL R ELEC Lower Yellowstone Rural Electric
 MCKNZ CON McKenzie Consolidated Telcom
 MCKENZ ELEC McKenzie Electric Cooperative
 MCKNZ WRD McKenzie County Water Resource District
 MCLEOD McLeod USA
 MCLN ELEC McLean Electric Cooperative
 MCLN-SHRDN R WAT McLean-Sheridan Rural Water
 MDU Montana-dakota Utilities
 MID-CONT CABLE Mid-Continent Cable
 MIDSTATE TEL Midstate Telephone Company
 MINOT CABLE Minot Cable Television
 MINOT TEL Minot Telephone Company
 MISS W W S Missouri West Water System
 MNKOTA PWR Minnkota Power
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative
 MOUNT-WILLI ELEC Mountrail-williams Electric Cooperative
 MRE LBTY TEL Moore & Liberty Telephone
 MUNICIPAL City Water And Sewer
 MUNICIPAL City Of '.....'
 N CENT ELEC North Central Electric Cooperative
 N VALL W DIST North Valley Water District
 ND PKS & REC North Dakota Parks And Recreation
 ND TEL North Dakota Telephone Company
 NDDOT North Dakota Department of Transportation
 NDSU SOIL SCI DEPT NDSU Soil Science Department
 NEMONT TEL Nemont Telephone
 NODAK R ELEC Nodak Rural Electric Cooperative
 NOON FRMS TEL Noonan Farmers Telephone Company
 NPR Northern Plains Railroad
 NSP Northern States Power
 NTH PRAIR RW Northern Prairie Rural Water Association
 NTHN BRDR PL Northern Border Pipeline
 NTHN PLNS ELEC Northern Plains Electric Cooperative Incorporated
 NTHWSTRN REF Northwestern Refinery Company
 NW COMM Northwest Communication Cooperation
 ONEOK Oneok gas
 OSHA Occupational Safety and Health Administration
 OTTR TL PWR Otter Tail Power Company
 P L E M Prairielands Energy Marketing
 POLAR COM Polar Communications
 PVT ELEC Private Electric
 QWEST Qwest Communications
 R & T W SUPPLY R & T Water Supply Association
 RAMSEY R SEW Ramsey Rural Sewer Association
 RAMSEY RW Ramsey Rural Water Association
 RAMSEY UTIL Ramsey County Rural Utilities

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

| | |
|--|---|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 6-15-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 04-20-11 | Added Items |
| 03-15-13 | Added Items |
| 11-01-13 | Added Items, Changed Standard Name to Include Organizations |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/01/13 and the original document is stored at the North Dakota Department of Transportation

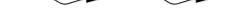
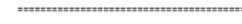
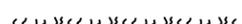
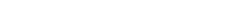
Line Styles

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

| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 4-20-11 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Line Styles

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

| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 4-20-11 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Symbols

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

| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 4-20-11 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-20-31

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

| | |
|------------------------------|--------|
| NORTH DAKOTA | |
| DEPARTMENT OF TRANSPORTATION | |
| 4-20-11 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

This document was originally issued and sealed by
Roger Weigel,
 Registration Number
PE-2930,
 on **4/20/11** and the original document is stored at the
 North Dakota Department
 of Transportation

Symbols

D-20-32

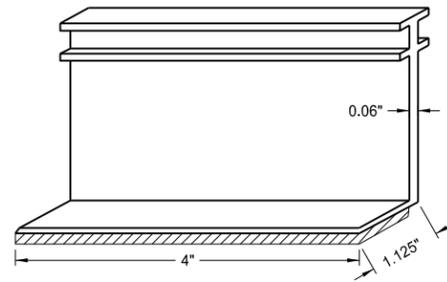
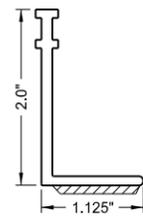
| | | | |
|---|--|---|--|
|  Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2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

| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 4-20-11 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

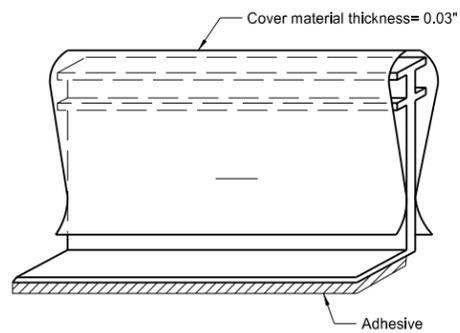
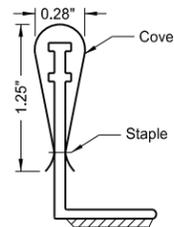
This document was originally issued and sealed by
Roger Weigel,
 Registration Number
PE-2930,
 on **4/20/11** and the original document is stored at the
 North Dakota Department
 of Transportation

LANE MARKERS
(Spotting Tab for Seal Projects only)

D-704-3



Marker Body



Marker Body with Protective Cover

Notes:

1. The lane line markers shall be installed as shown, prior to the beginning of the seal coat.
2. The cover shall be attached to the vertical part of the marker in such a way that traffic will not cause it to detach and so that it may be easily removed manually.
3. The protective covers shall be removed, immediately after the seal coat is applied.
4. The markers shall be removed after permanent pavement marking has been installed.
5. The marker body and cover shall be manufactured from polyurethane material.
6. Marker types:
Type Y - Yellow body and cover with yellow reflective tape on both sides.
Type W - White body and cover with white reflective tape on one side.
7. The reflective tape shall be a retroreflective material. The tape shall have a minimum reflectance of 1200 candle power per foot-candle per square foot, using a .1 degree observation angle and 0 degree entrance angle.
8. The adhesive shall conform to AASHTO M 237.

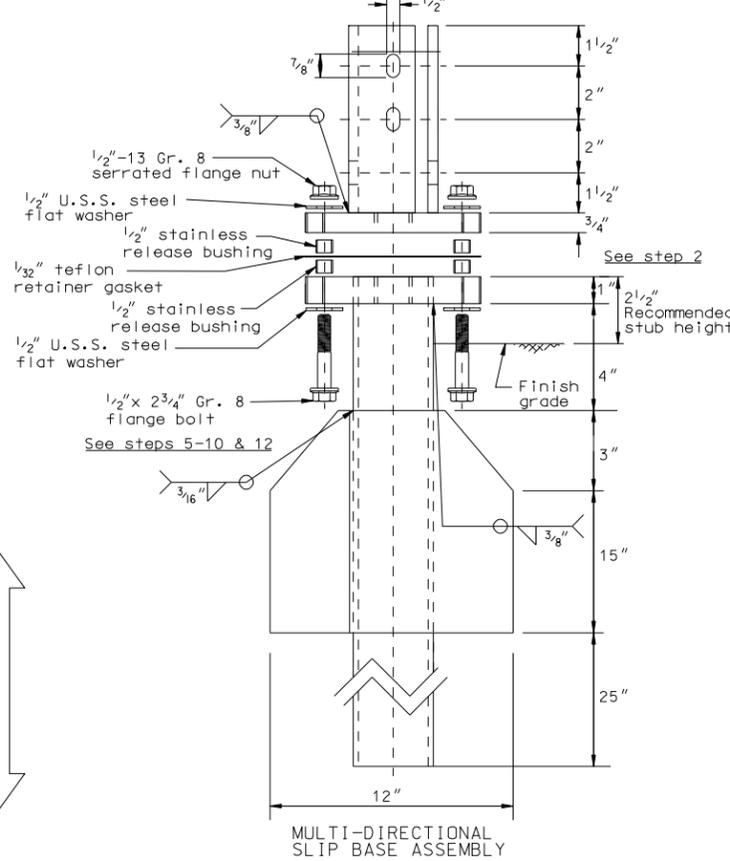
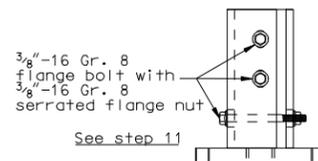
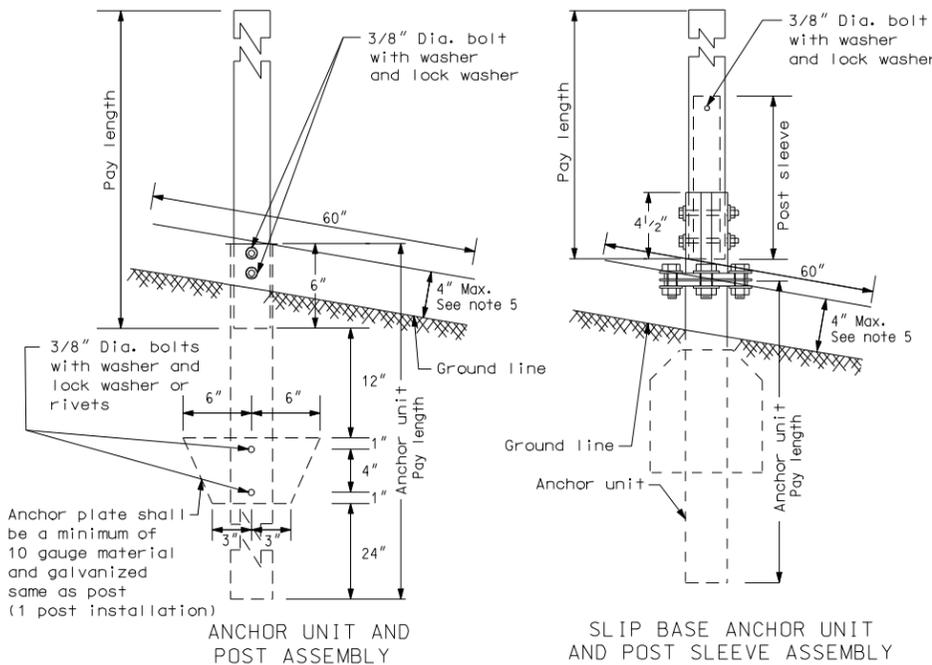
| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/3/13 and the original document is stored at the North Dakota Department of Transportation.

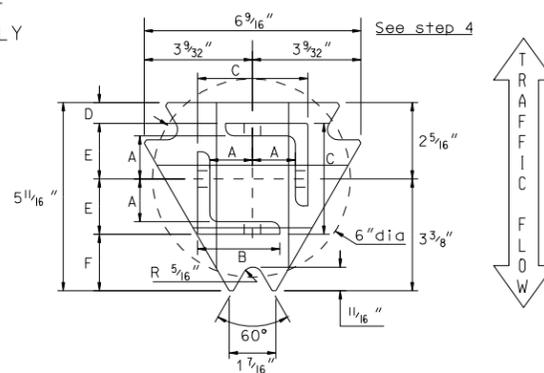
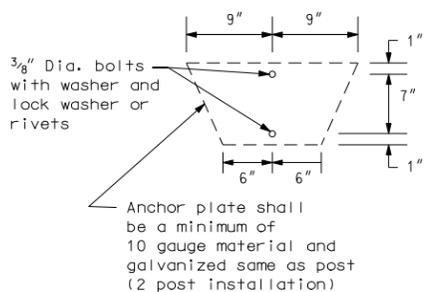
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

PERFORATED TUBE



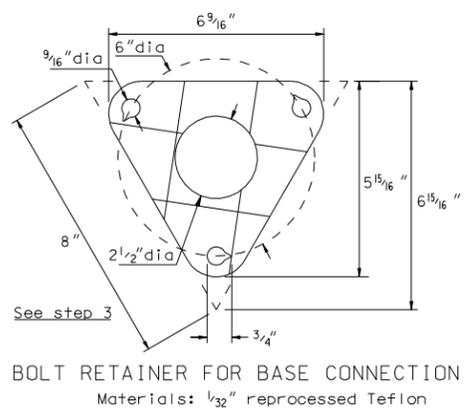
- Notes
- Slip base bolts shall be torqued as specified by the manufacturer.
 - The 2 3/16" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size 10 gauge is shown as 2.51" size on the plans.
 - Anchor for 2", 2 1/4", and 2 1/2" posts.
 - Anchor material shall be 7 gauge H.R.P.O. Commercial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



TOP POST RECEIVER DATA TABLE

| Square Post Sizes | A | B | C | D | E | F |
|------------------------------|---------|--------|---------|---------|----------|--------|
| 2 3/16" x 10 Ga. Square Post | 1 3/64" | 2 1/2" | 3 1/32" | 2 5/32" | 1 33/64" | 1 7/8" |
| 2 1/2" x 10 Ga. Square Post | 1 9/32" | 2 1/2" | 3 5/16" | 5/8" | 1 21/32" | 1 3/4" |

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



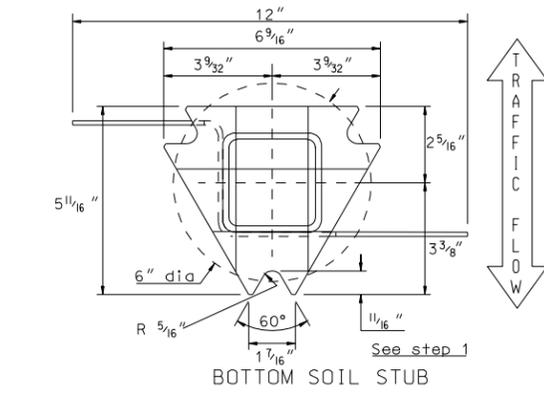
Telescoping Perforated Tube

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

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

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

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



Telescoping Perforated Tubes

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
 11-21-02
REVISIONS

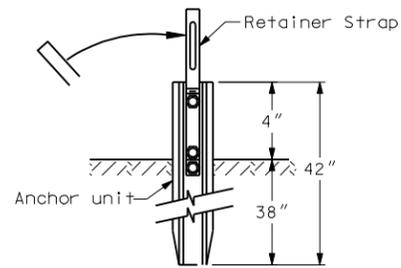
| DATE | CHANGE |
|----------|----------------|
| 12-01-04 | PE stamp added |

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

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

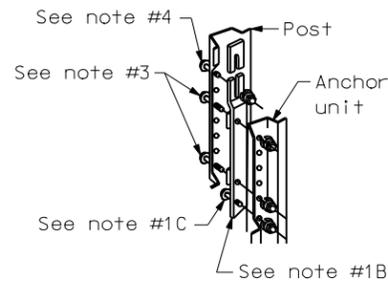
FLANGED CHANNEL



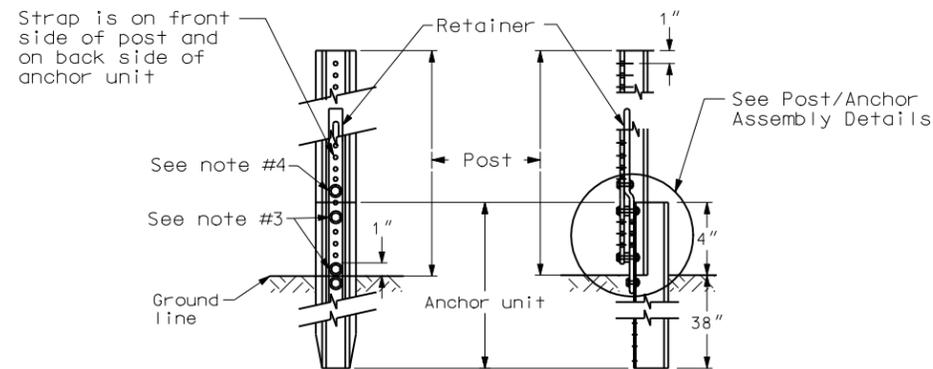
Anchor Unit & Strap Assembly Detail

STEPS OF INSTALLATION

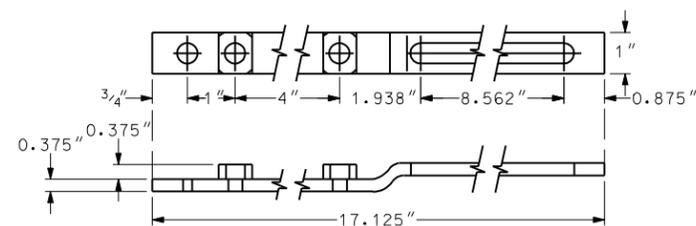
1. A) Drive anchor unit to within 12" of ground level.
B) Proper assembly established by lining up the top 3/4" slot of retainer spacer strap with top hole of anchor unit.
C) Assemble strap to back of anchor unit using 3/8"-16 UNC x 2.0" long bolt, lock washer and nut.
D) Rotate strap 90° to left.
2.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



Post/Anchor Assembly Details



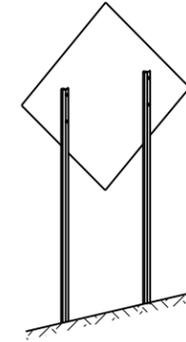
Front View Side View Sign Post Assembly Detail



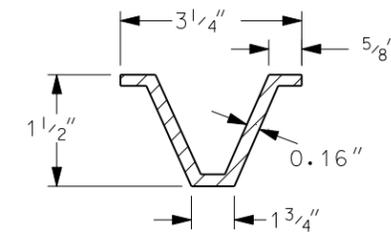
Retainer/Spacer Strap Detail

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

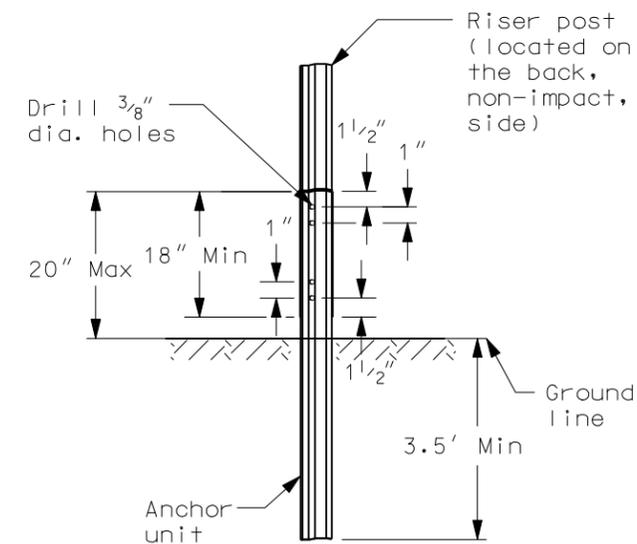
3 LB/FT U POSTS



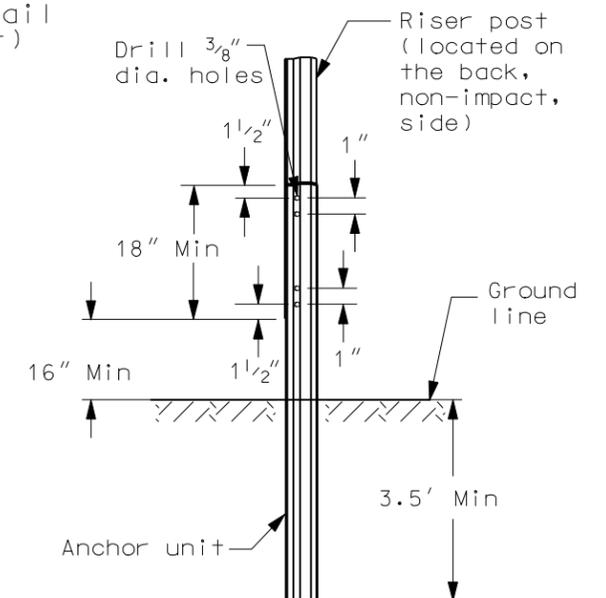
Typical Installation



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



U-Channel Splice Option 2

Notes

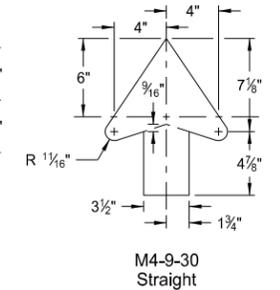
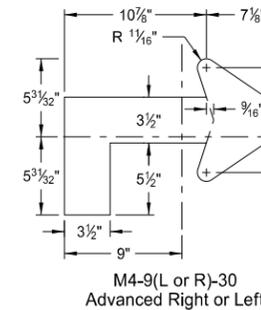
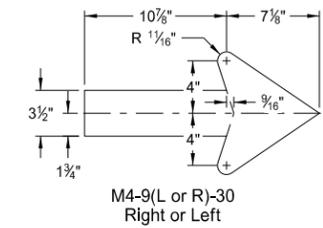
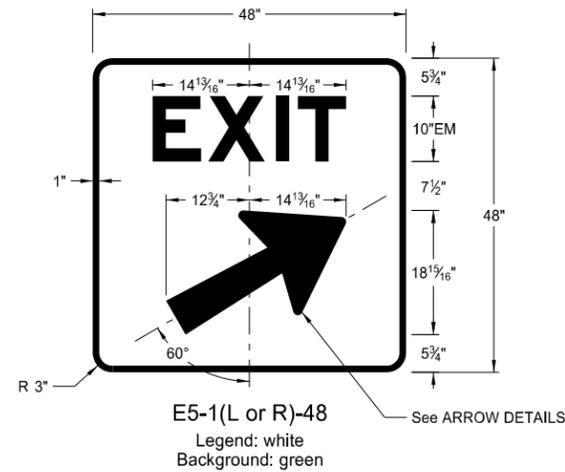
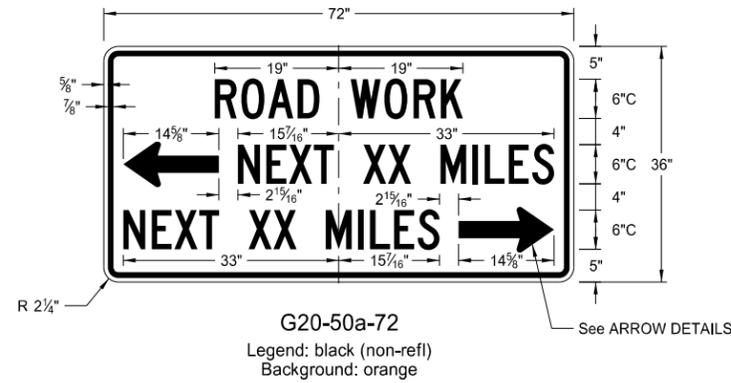
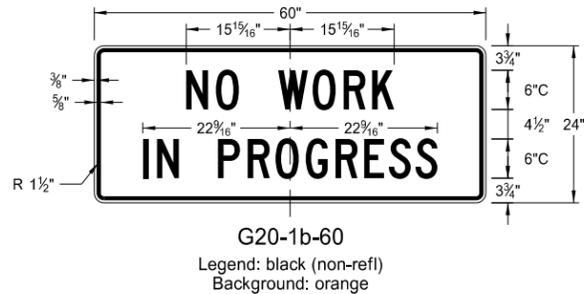
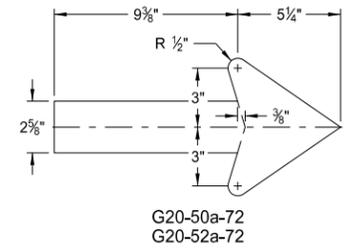
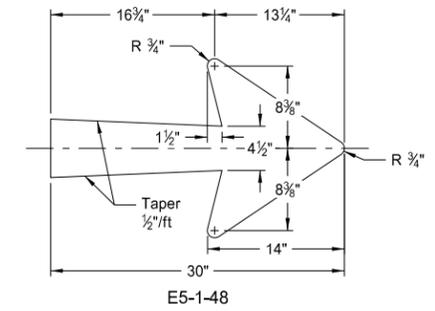
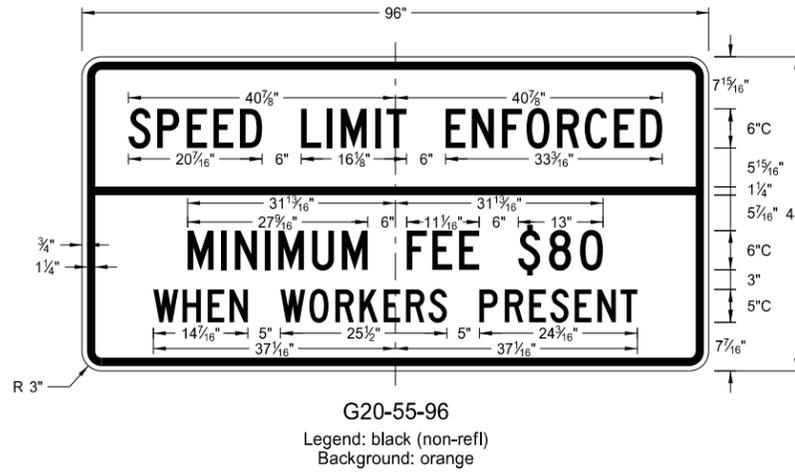
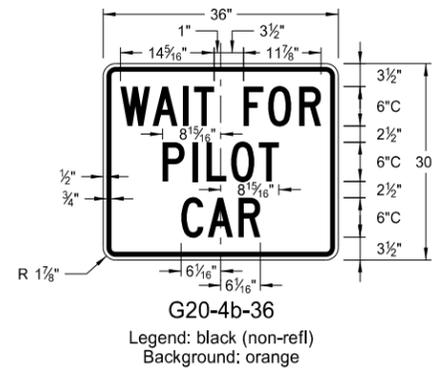
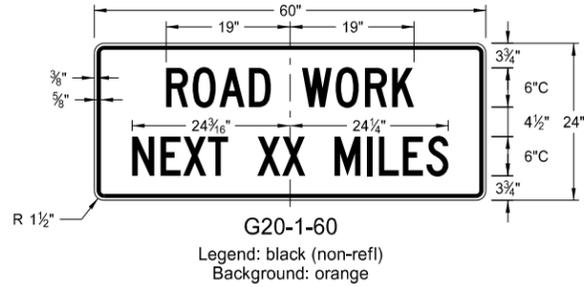
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7' long and embedded at least 3.5'.
3. A splice shall overlap a minimum of 18".
4. Use 4 bolts 5/16" diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more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

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

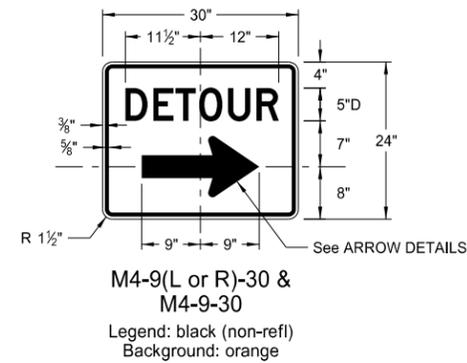
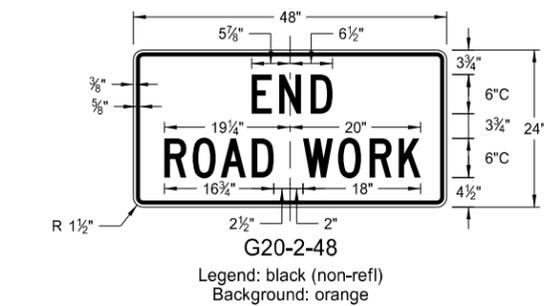
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

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

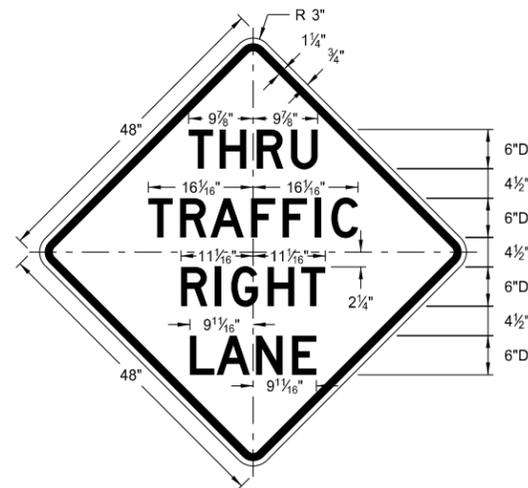
| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 8-13-13 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

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

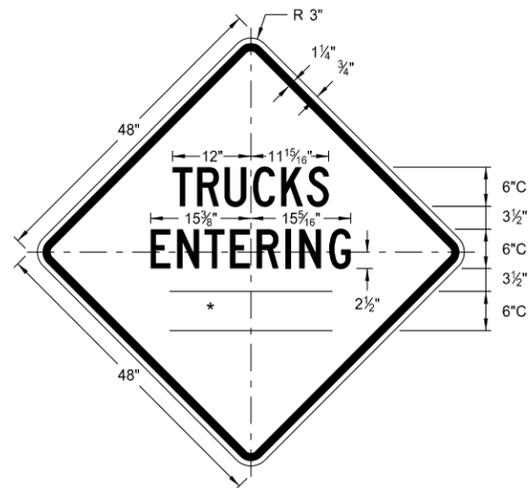
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

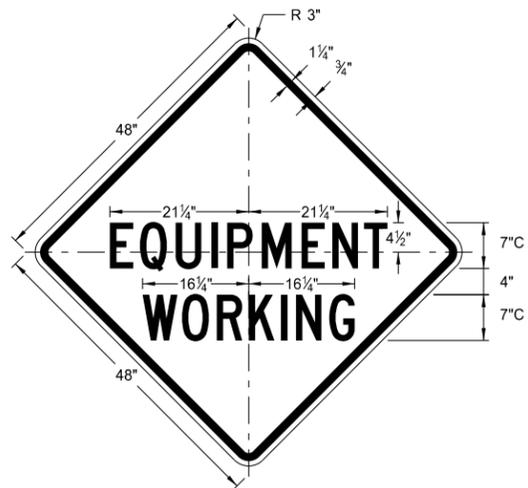
* DISTANCE MESSAGES



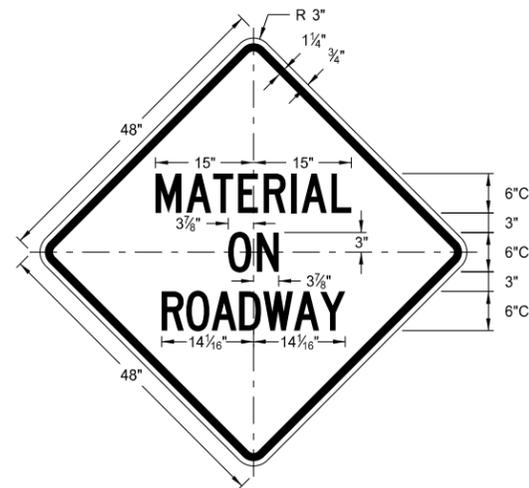
W5-8-48
Legend: black (non-refl)
Background: orange



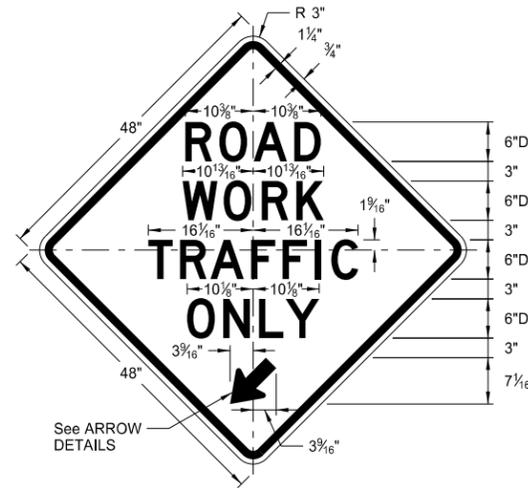
W8-54-48
Legend: black (non-refl)
Background: orange



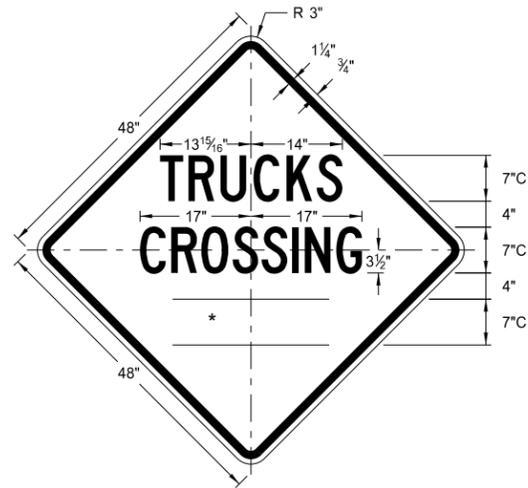
W20-51-48
Legend: black (non-refl)
Background: orange



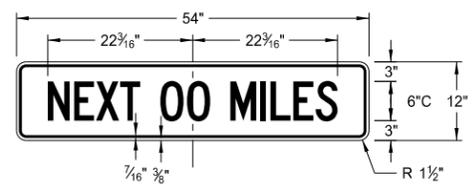
W21-51-48
Legend: black (non-refl)
Background: orange



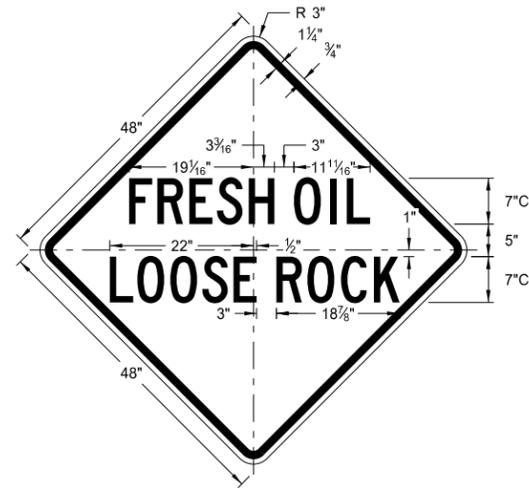
W5-9-48
Legend: black (non-refl)
Background: orange



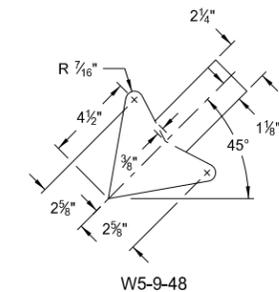
W8-55-48
Legend: black (non-refl)
Background: orange



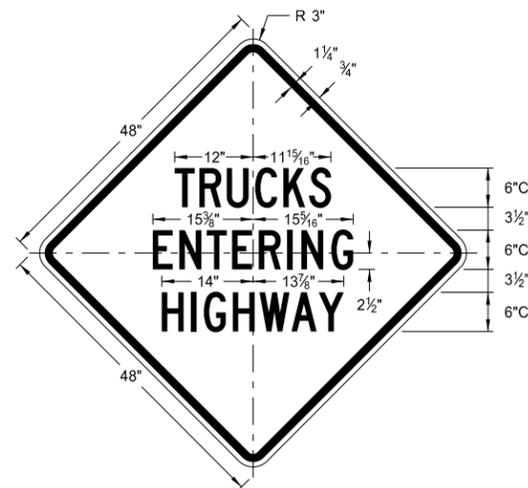
W20-52-54
Legend: black (non-refl)
Background: orange



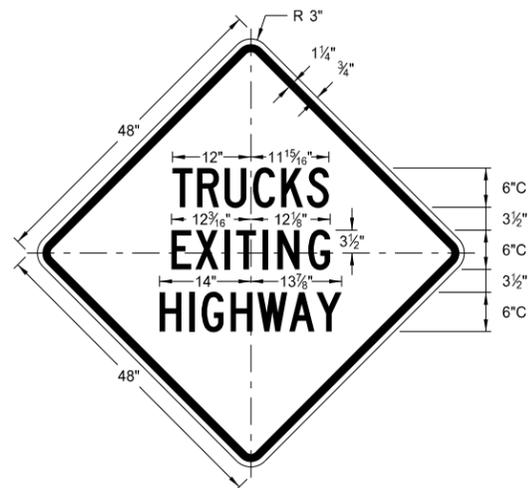
W22-8-48
Legend: black (non-refl)
Background: orange



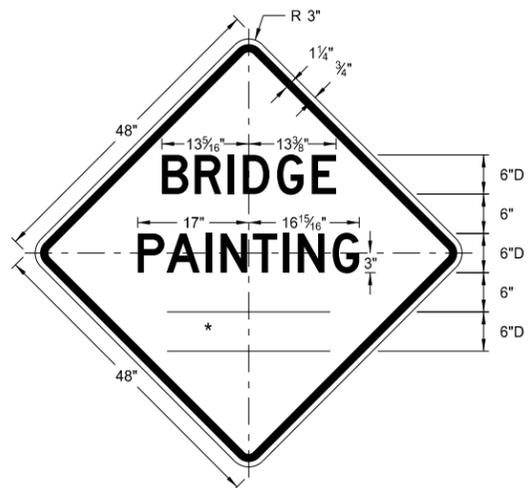
W5-9-48
ARROW DETAILS



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



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

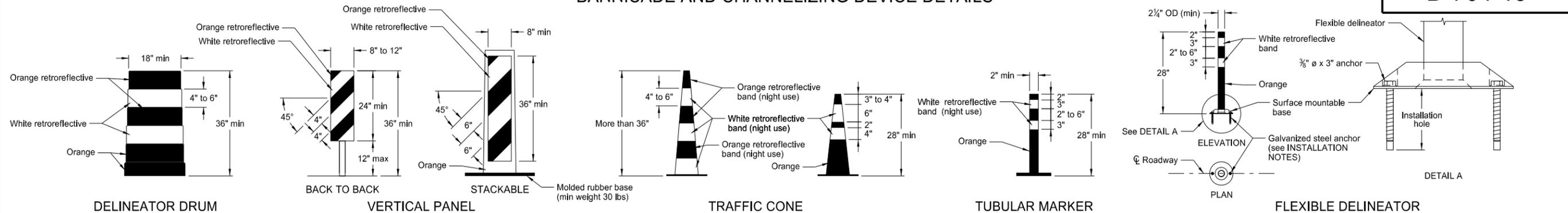


W21-50-48
Legend: black (non-refl)
Background: orange

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

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

BARRICADE AND CHANNELIZING DEVICE DETAILS



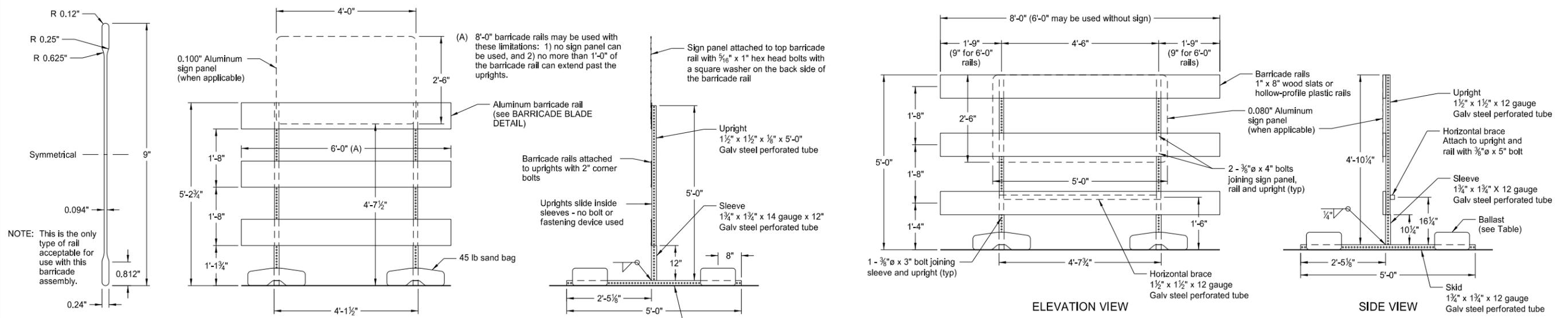
The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflective spaces between the horizontal orange and white stripes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

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.

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

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

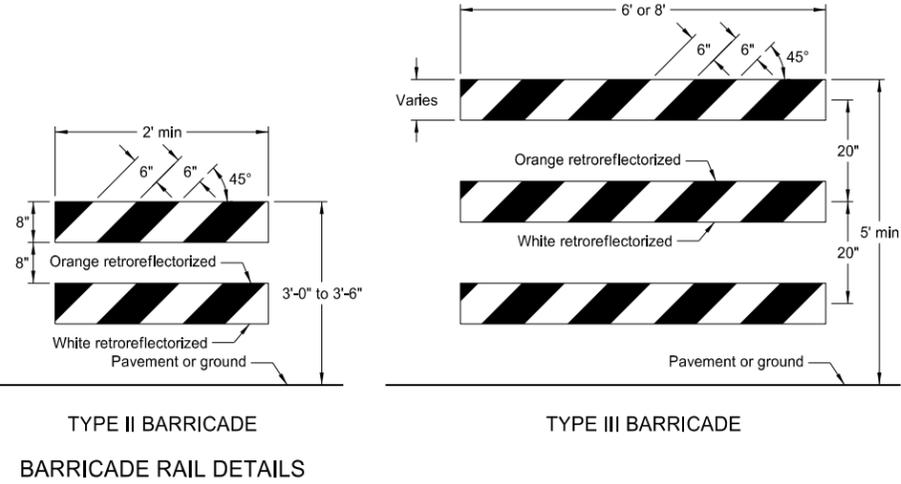
- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.



BARRICADE BLADE DETAIL

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

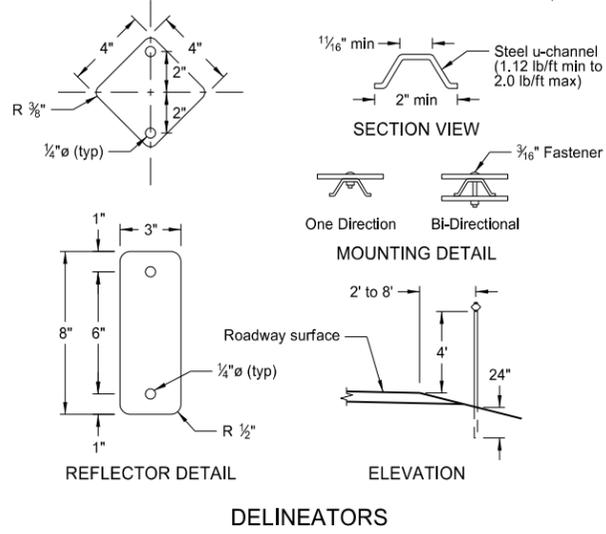
BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)



TYPE I BARRICADE

TYPE II BARRICADE BARRICADE RAIL DETAILS

TYPE III BARRICADE



REFLECTOR DETAIL

DELINEATORS

MINIMUM BALLAST (For each side of barricade support)

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

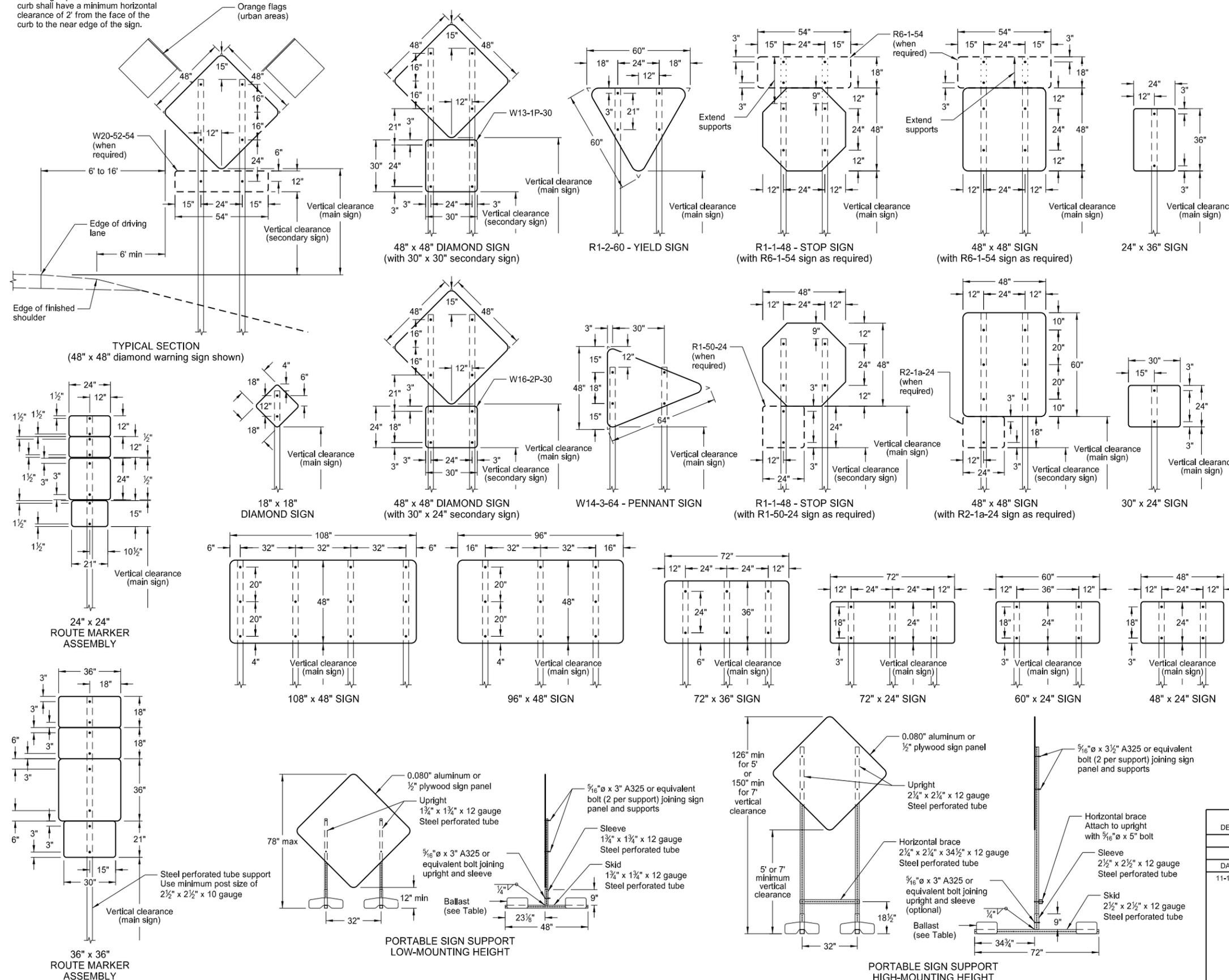
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/3/13 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

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



NOTES:

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

Signs over 50 square feet should be installed on 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
- Sign Panels:** Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.
- Alternate Messages:** The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
- Route Marker Auxiliary Signs:** Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background
- Vertical Clearance:** Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

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

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

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

Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

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

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

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

This document was originally issued and sealed by
Roger Weigel,
Registration Number
PE-2930,
on 11/14/13 and the original document is stored at the North Dakota Department of Transportation

ROAD CLOSURE LAYOUTS

Notes

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

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

KEY

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

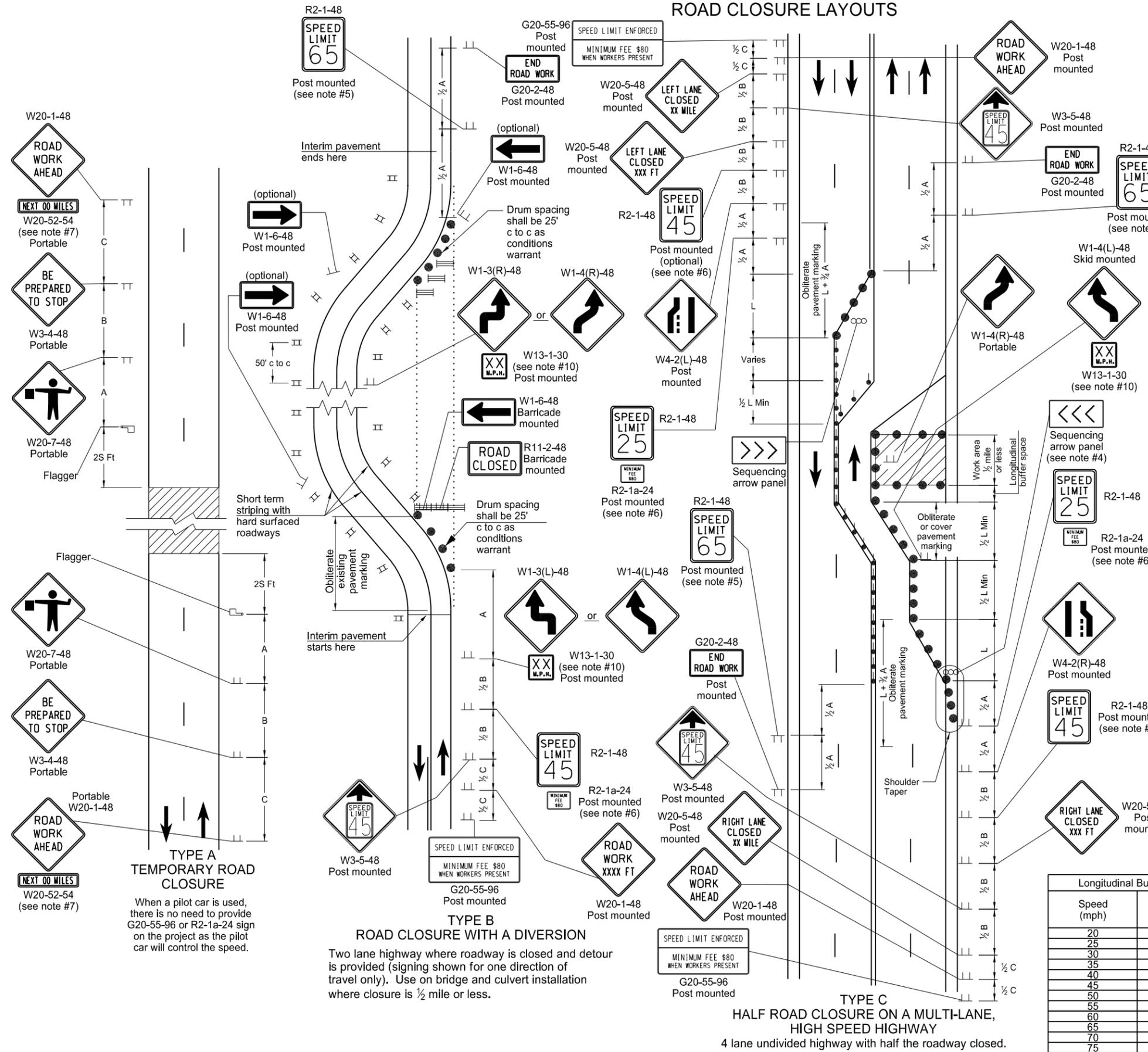
Longitudinal Buffer Space

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13

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

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



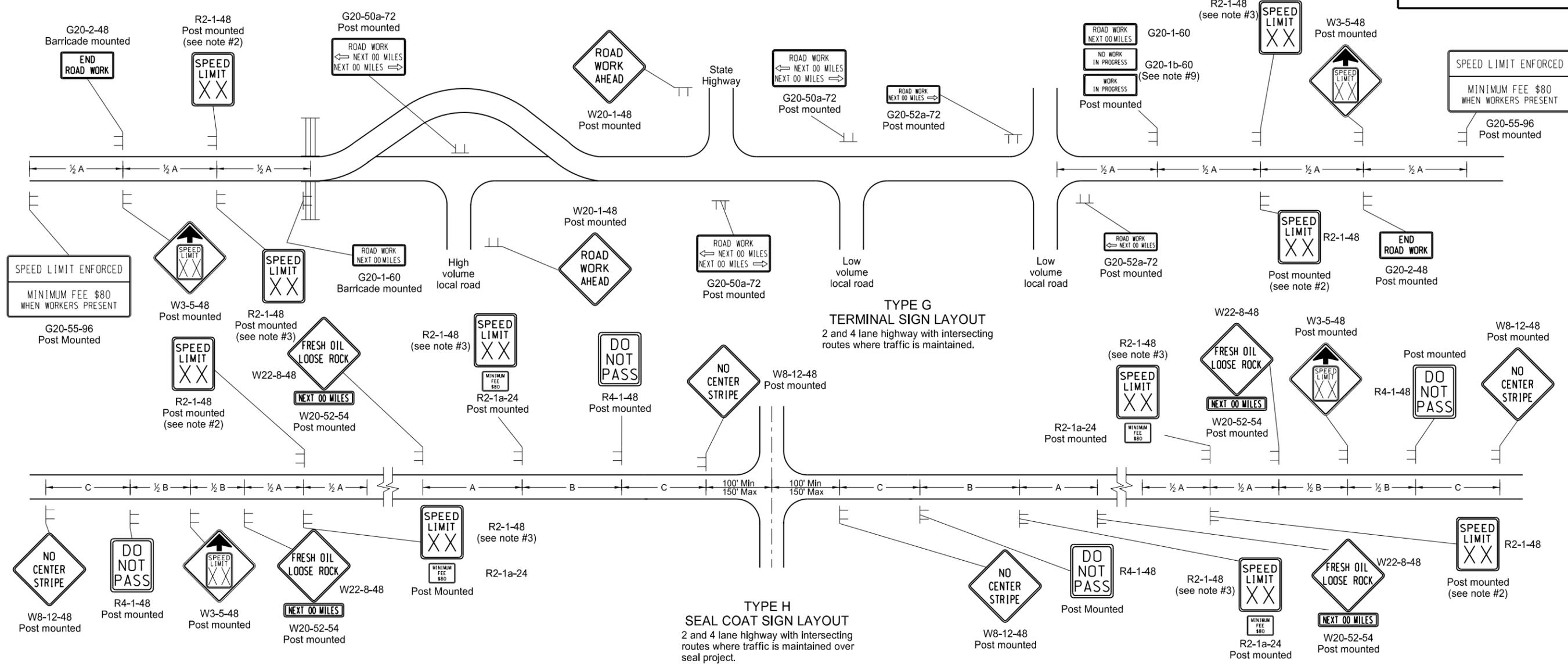
**TYPE A
TEMPORARY ROAD CLOSURE**
 When a pilot car is used, there is no need to provide G20-55-96 or R2-1a-24 sign on the project as the pilot car will control the speed.

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

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

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



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

- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
- G20-55-96 sign is not required if work is less than 15 days.

KEY

≡ Type III barricade

┌ Sign

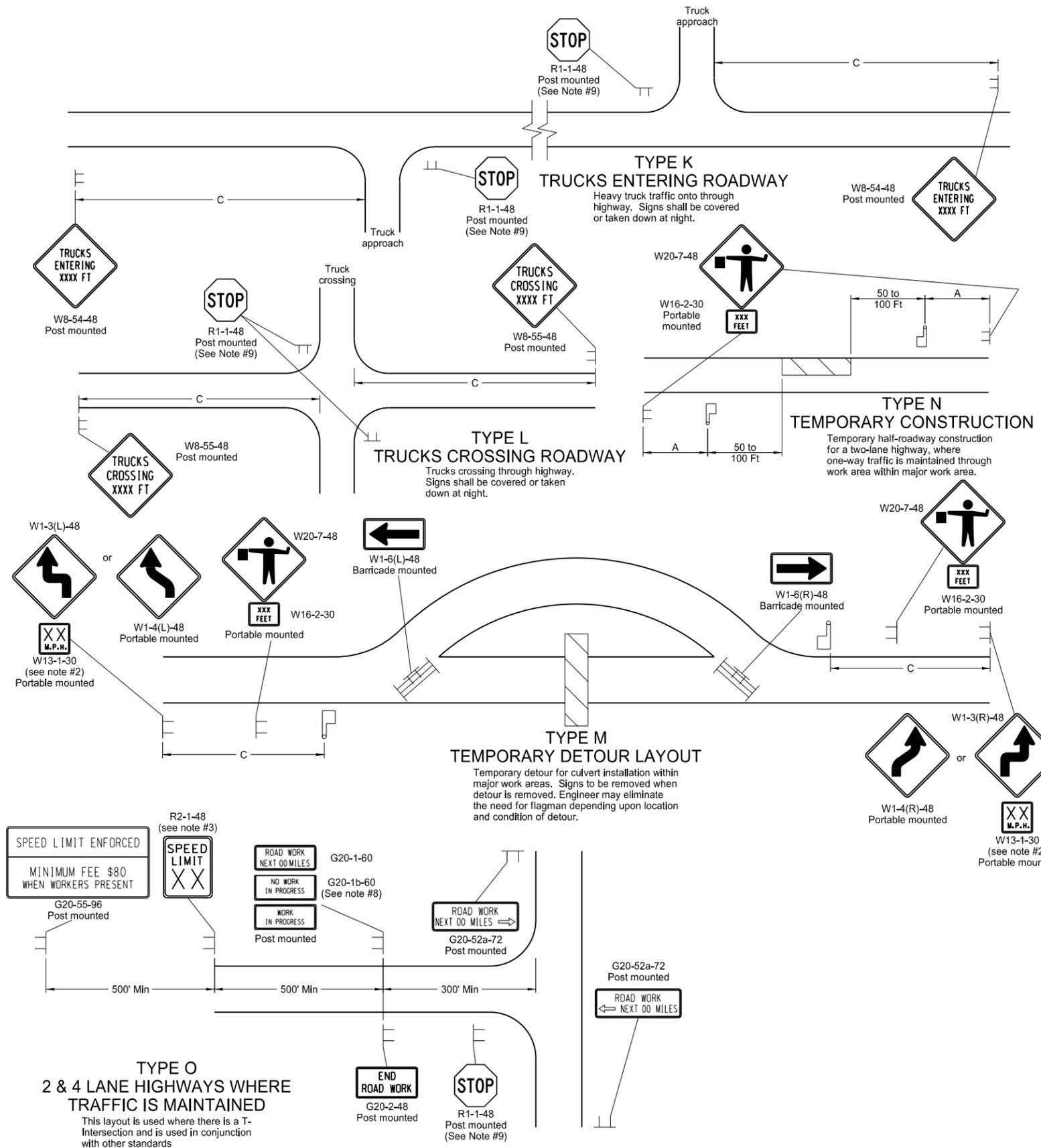
| Road Type | Distance Between Signs Min. (ft) | | |
|---|----------------------------------|------|------|
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 to 40 mph) | 280 | 280 | 280 |
| Urban - High Speed (over 40 mph to 50 mph) | 360 | 360 | 360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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|--------|
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

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

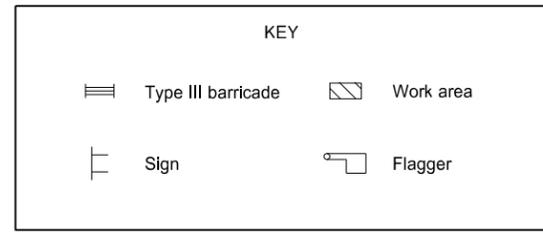
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



Notes

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



ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13

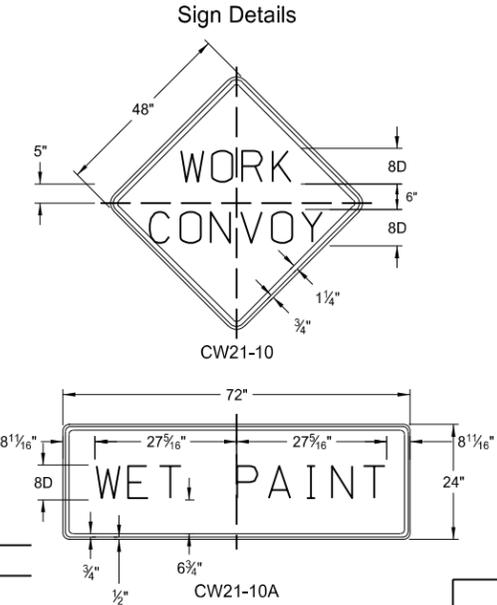
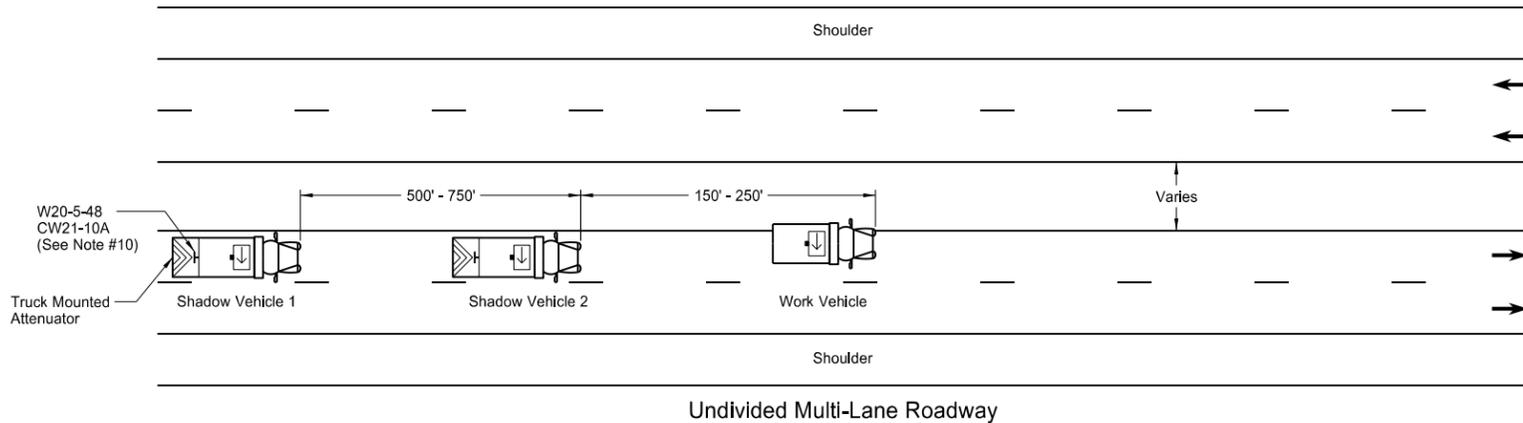
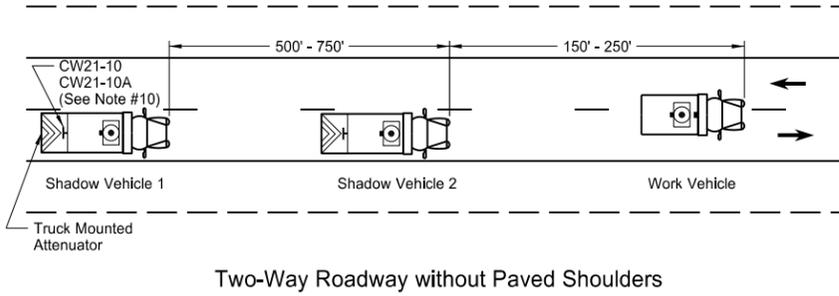
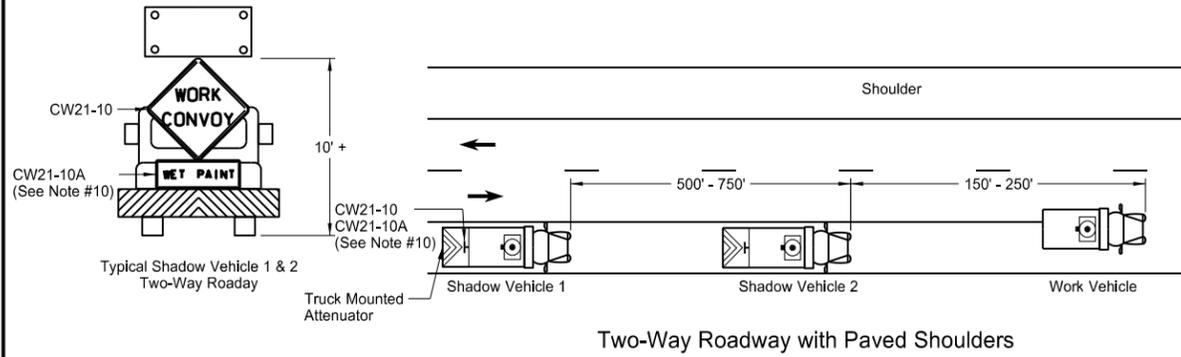
REVISIONS

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

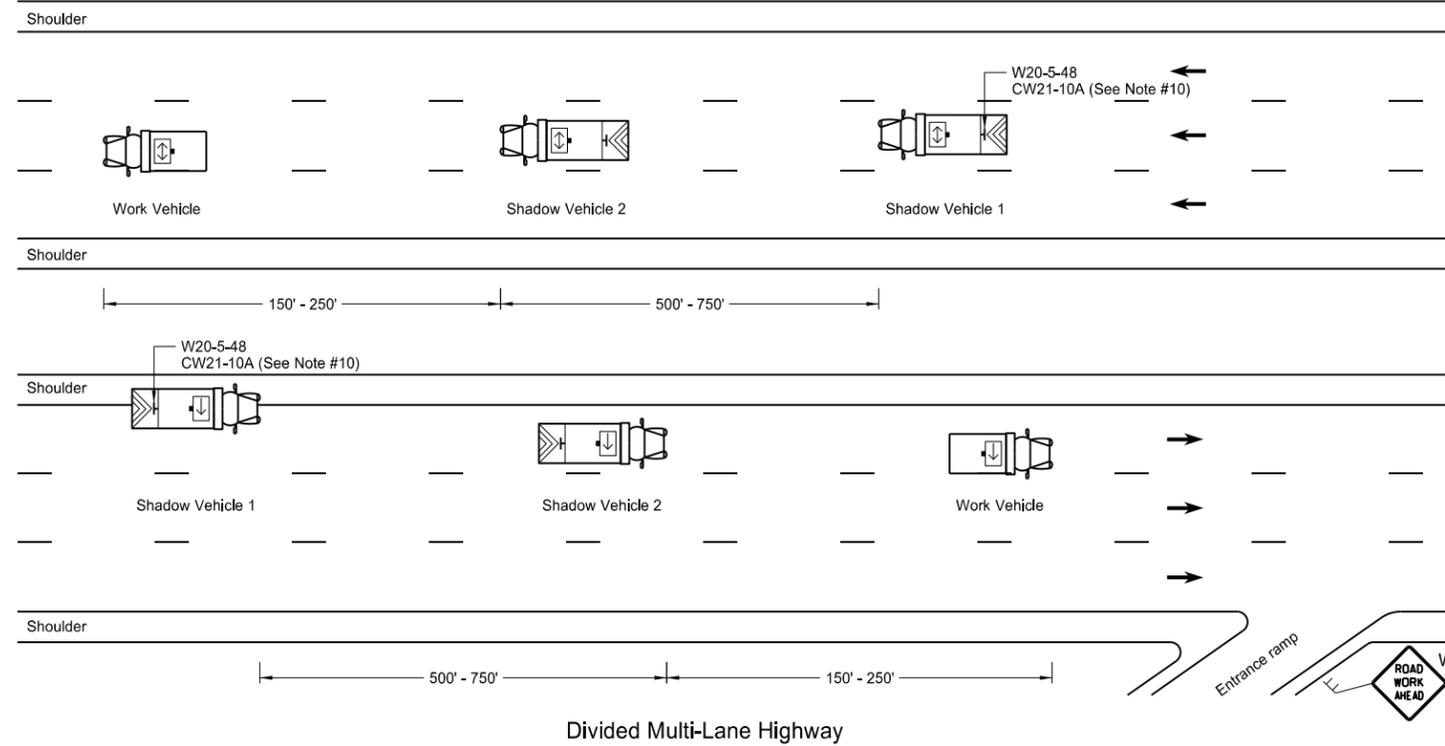
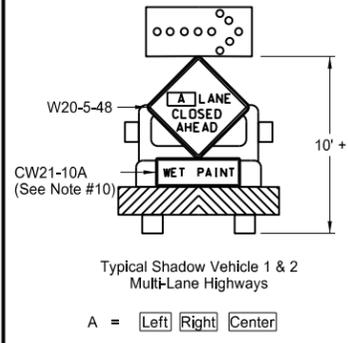
This document was originally issued and sealed by
 Roger Weigel
 Registration Number
 PE- 2930,
 on 09/27/13 and the original document is stored at the
 North Dakota Department
 of Transportation

TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

D-704-27



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



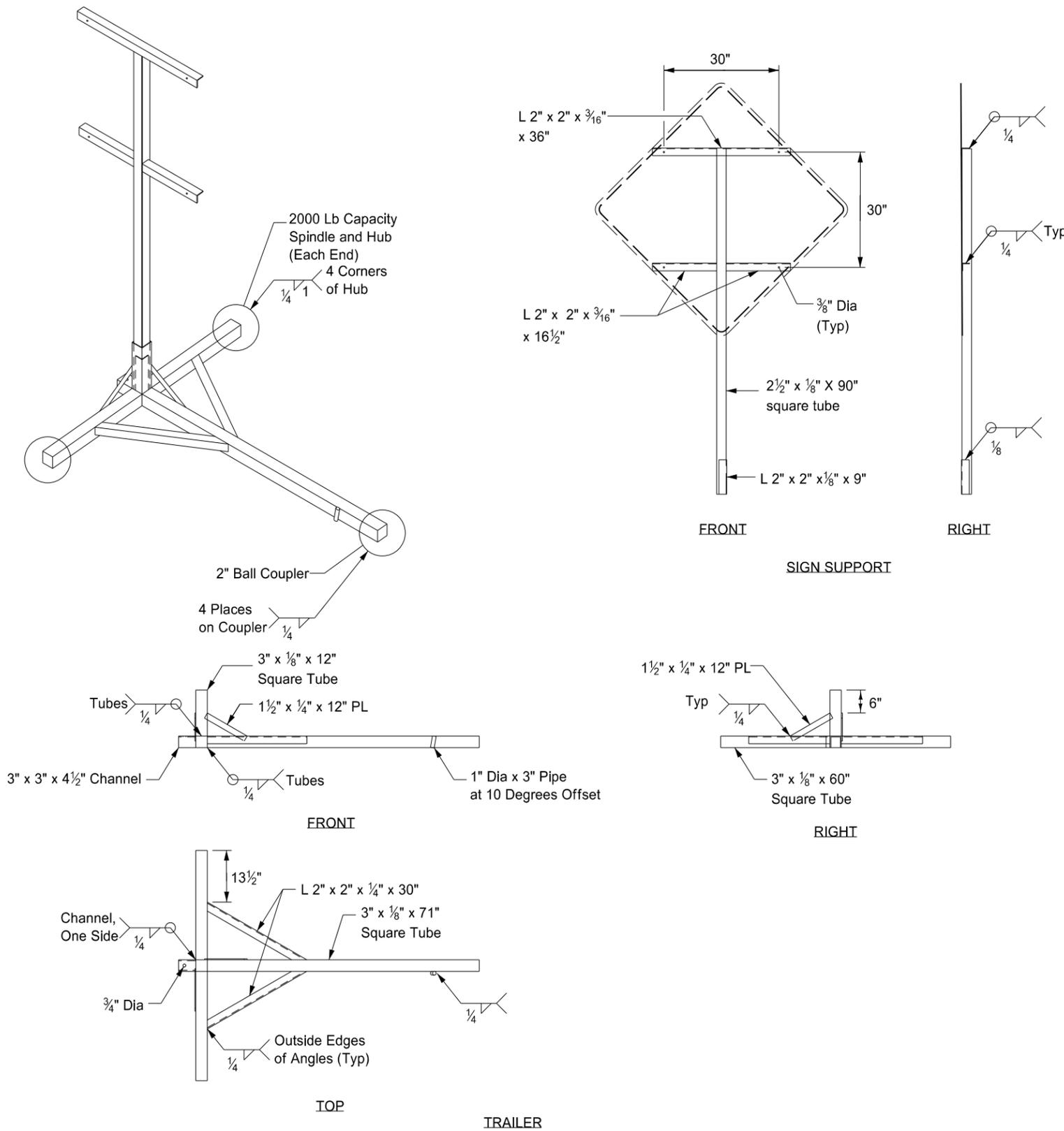
| KEY | |
|-----|--------------------------|
| | Sign |
| | Truck mounted attenuator |
| | Flashing arrow panels: |
| | Right directional |
| | Left directional |
| | Double arrow directional |
| | Caution Mode |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|--------|
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

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

PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

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

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

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

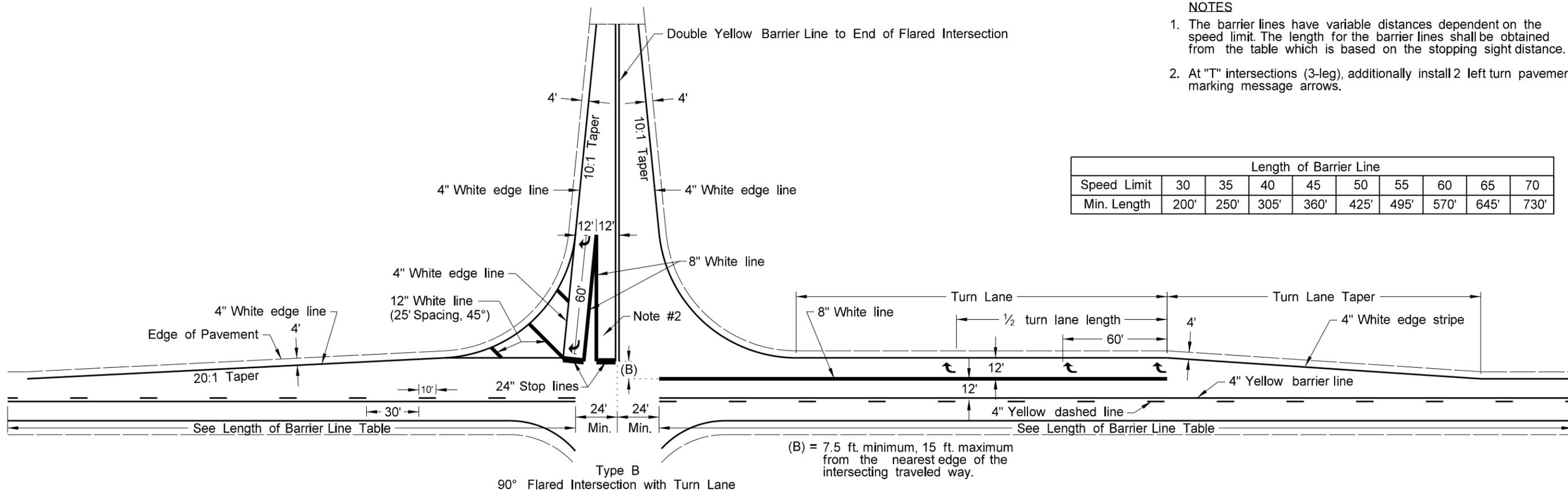
PAVEMENT MARKING FOR STANDARD 90° FLARED INTERSECTION

D-762-3

NOTES

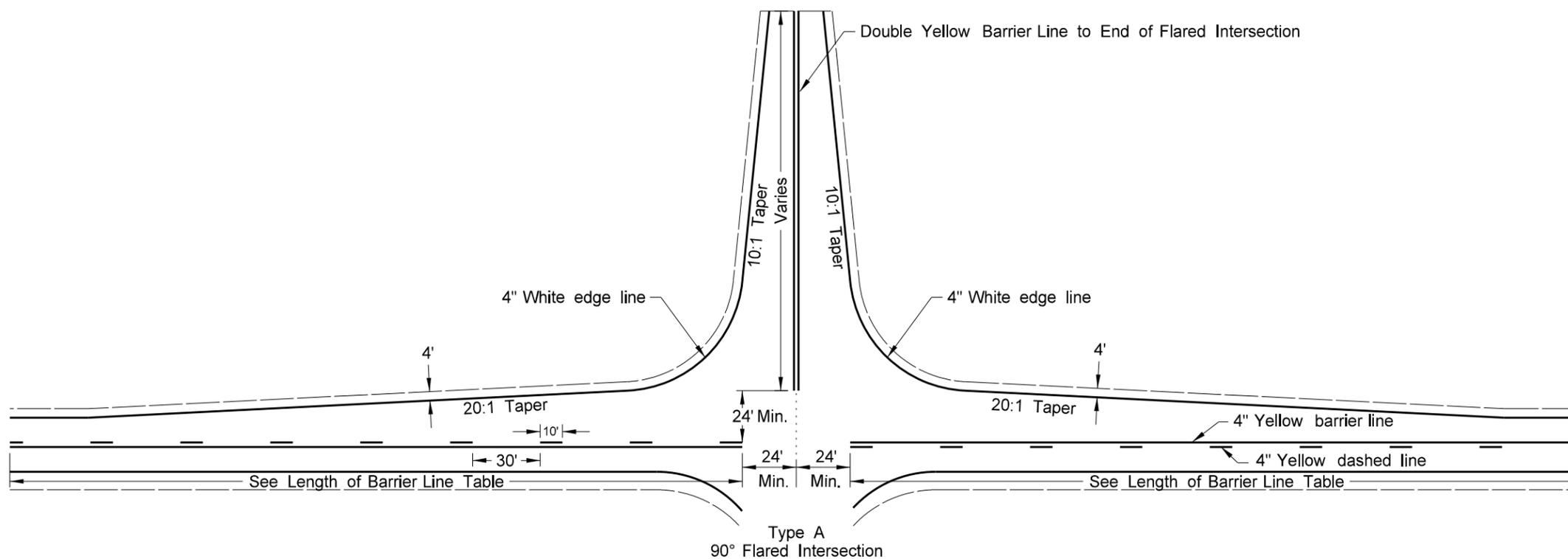
1. The barrier lines have variable distances dependent on the speed limit. The length for the barrier lines shall be obtained from the table which is based on the stopping sight distance.
2. At "T" intersections (3-leg), additionally install 2 left turn pavement marking message arrows.

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



Legend

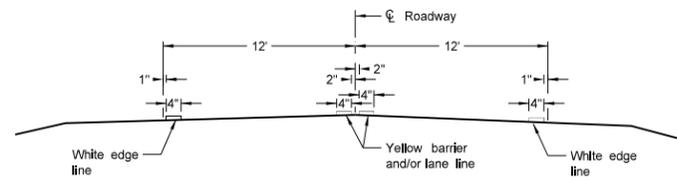
- 4" Line
- 8" Line
- 12" Line
- 24" Line



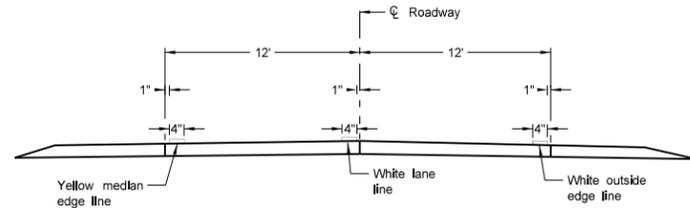
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|--|----------------------------|
| 6-9-09 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-24-09 | Barrier Stripe Correction |
| 9-21-11 | Revised Turn Lane Markings |
| 11-25-13 | Revised Type B Layout |

This document was originally issued and sealed by
 Roger Weigel
 Registration Number
 PE- 2930 ,
 on 11/25/2013 and the original document is stored at the
 North Dakota Department
 of Transportation

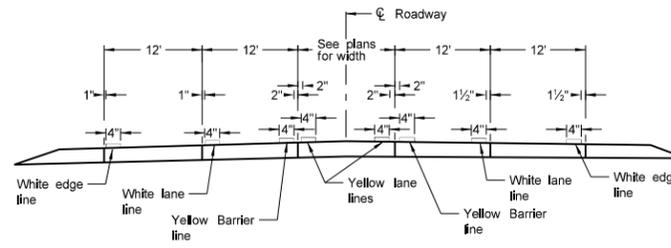
PAVEMENT MARKING



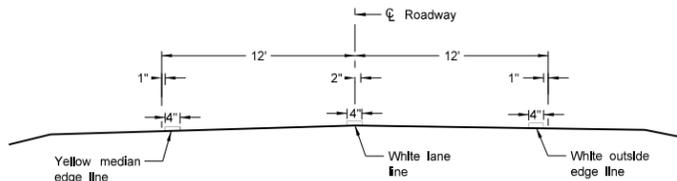
Two Lane Two Way
RURAL ROADWAY



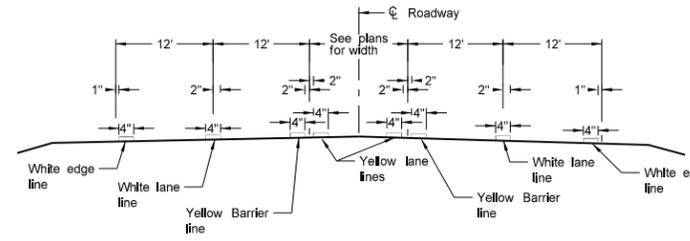
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



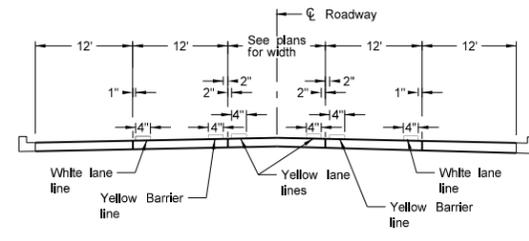
RURAL FIVE LANE ROADWAY
Concrete Section



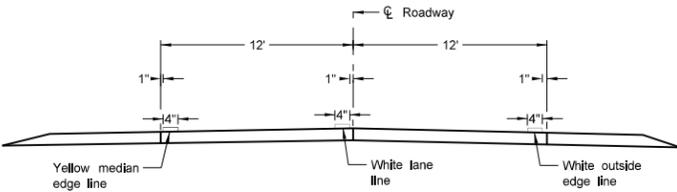
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



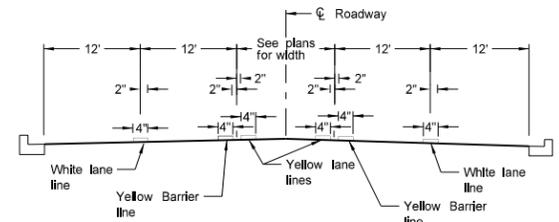
RURAL FIVE LANE ROADWAY
Asphalt Section



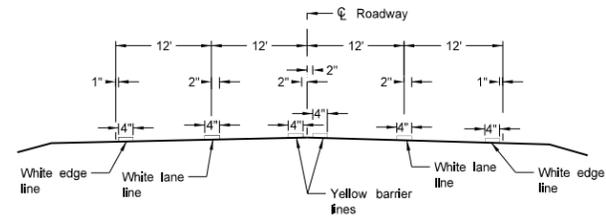
URBAN FIVE LANE SECTION
Concrete Section



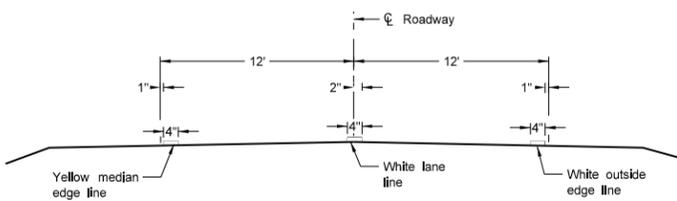
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



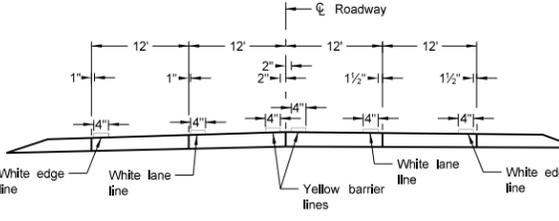
URBAN FIVE LANE SECTION
Asphalt Section



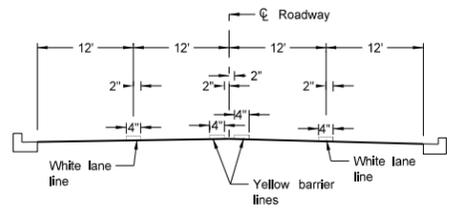
RURAL FOUR LANE ROADWAY
Asphalt Section



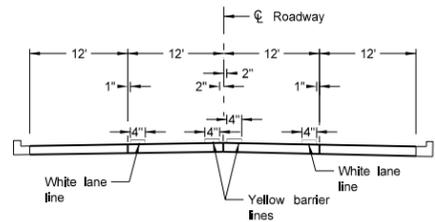
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



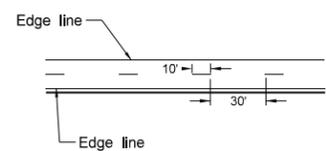
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



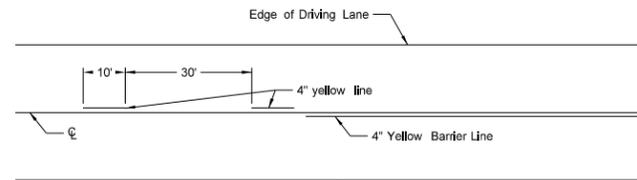
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

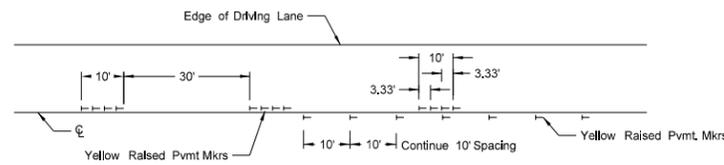
| | |
|--|--------|
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

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

SHORT-TERM PAVEMENT MARKING

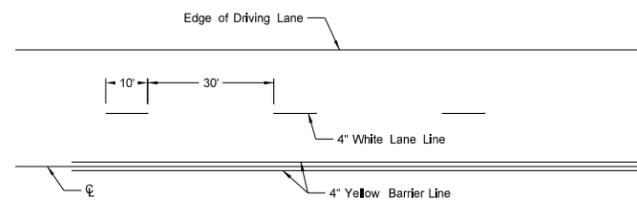


Painted or Tape Lines

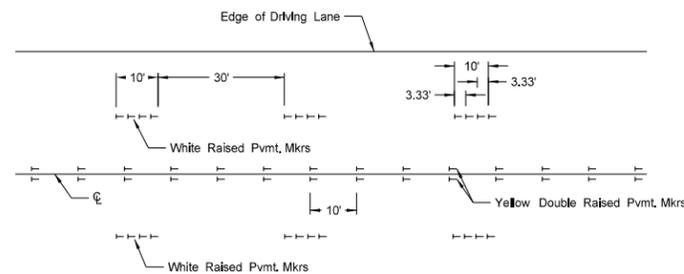


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

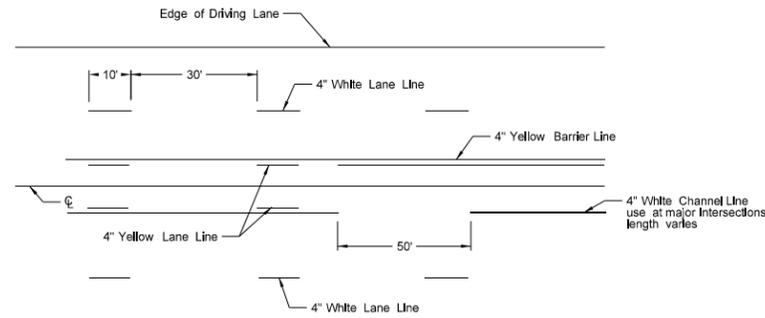


Painted or Tape Lines

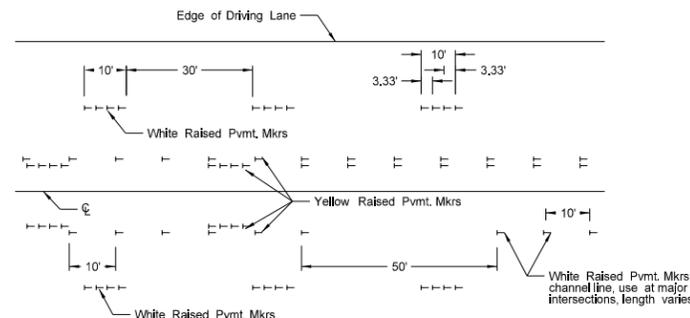


Raised Pavement Markers

FOUR LANE ROADWAY

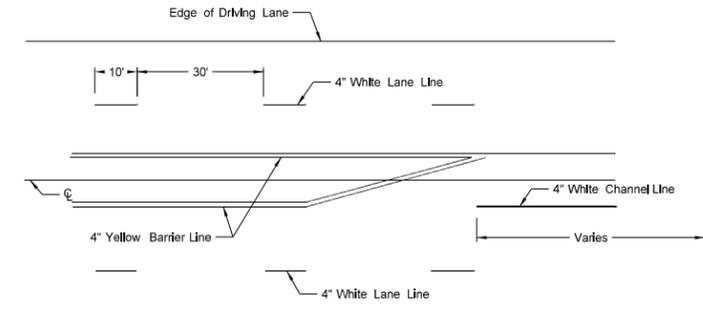


Painted or Tape Lines

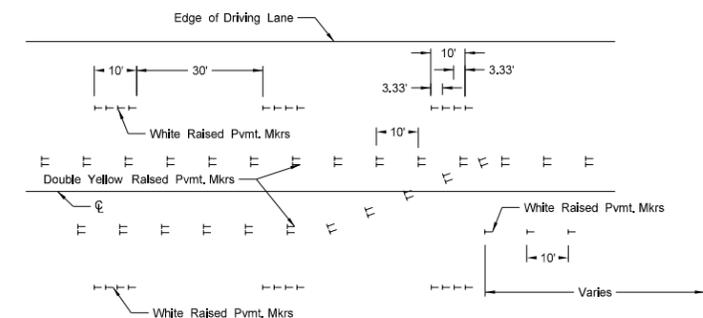


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

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

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

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