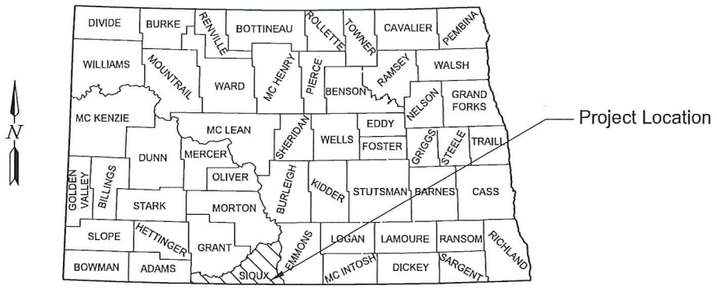
| | STATE | PROJECT NO. | PCN | SECTION NO. | SHEET NO. |
|---|---|---|---|---|---|
| | ND | PCAS A1073000 | | 1 | 1 |




ND STATE COUNTY MAP

# STANDING ROCK SIOUX TRIBE
# SIOUX COUNTY, NORTH DAKOTA
# CORSON COUNTY, SOUTH DAKOTA

**BIA Project No. PCAS A1073000**
**KLJ Project No. 1811-02290**
Pavement Maintenance
Asphalt Pavement Overlay, Seal Coat, Striping & Incidentals

## GOVERNING SPECIFICATIONS

2014 Standard Specifications adopted by North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

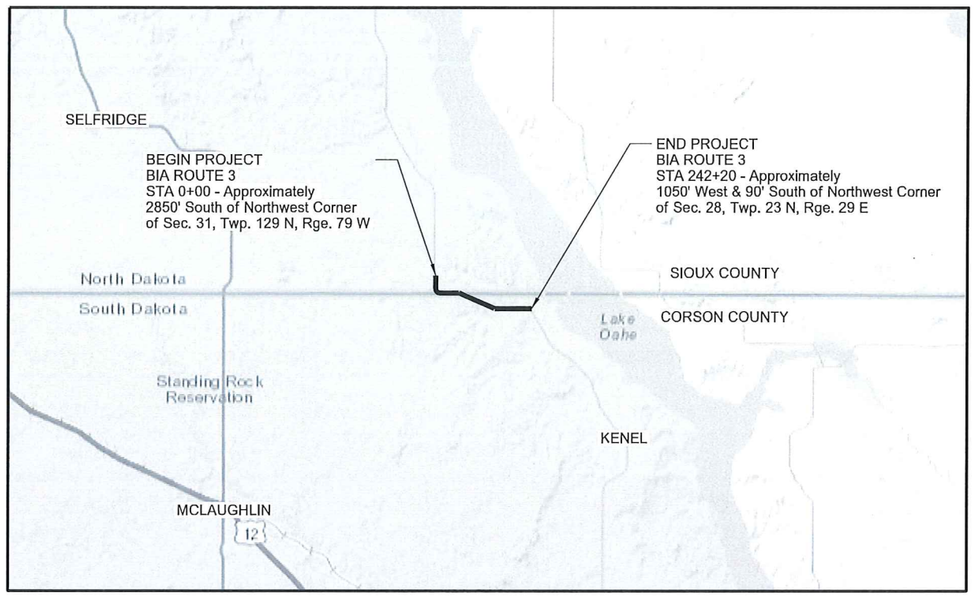
## PROJECT LENGTH

| Project | Gross Miles | Net Miles |
|---|---|---|
| PCAS A1073000 | 4.587 | 4.587 |

| Traffic | | Average Daily | | |
|---|---|---|---|---|
| | | Passenger | Trucks | Total |
| Current Traffic* (est.) | 2019 | 680 | 35 | 715 |
| Forecast Traffic* | 2039 | 750 | 40 | 790 |

*Current traffic count is based on growth rate of 2% from latest available traffic count (1999).
*Forecast traffic count is based on a growth rate of 0.5%.


SD STATE COUNTY MAP




STANDING ROCK SIOUX TRIBAL TRANSPORTATION PROGRAM

SUBMITTED FOR APPROVAL:

Ron Hollow Horn Bear 9-3-2020

DIRECTOR, STANDING ROCK TRIBAL TRANS. PROGRAM — DATE

STANDING ROCK SIOUX TRIBE JULY 1873

REGISTERED PROFESSIONAL ENGINEER
DARIN J FALCON
PE-10498
DATE 9/3/20
NORTH DAKOTA

CERTIFICATION

I HEREBY CERTIFY THAT THESE 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 NORTH DAKOTA.

DATE 9-3-20 REGISTRATION NUMBER PE-10498


KLJ
4585 COLEMAN STREET
P.O. BOX 1157
BISMARCK, ND 58502-1157
(701) 355-8400

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 2 | 1 |

# TABLE OF CONTENTS

## PLAN SECTIONS



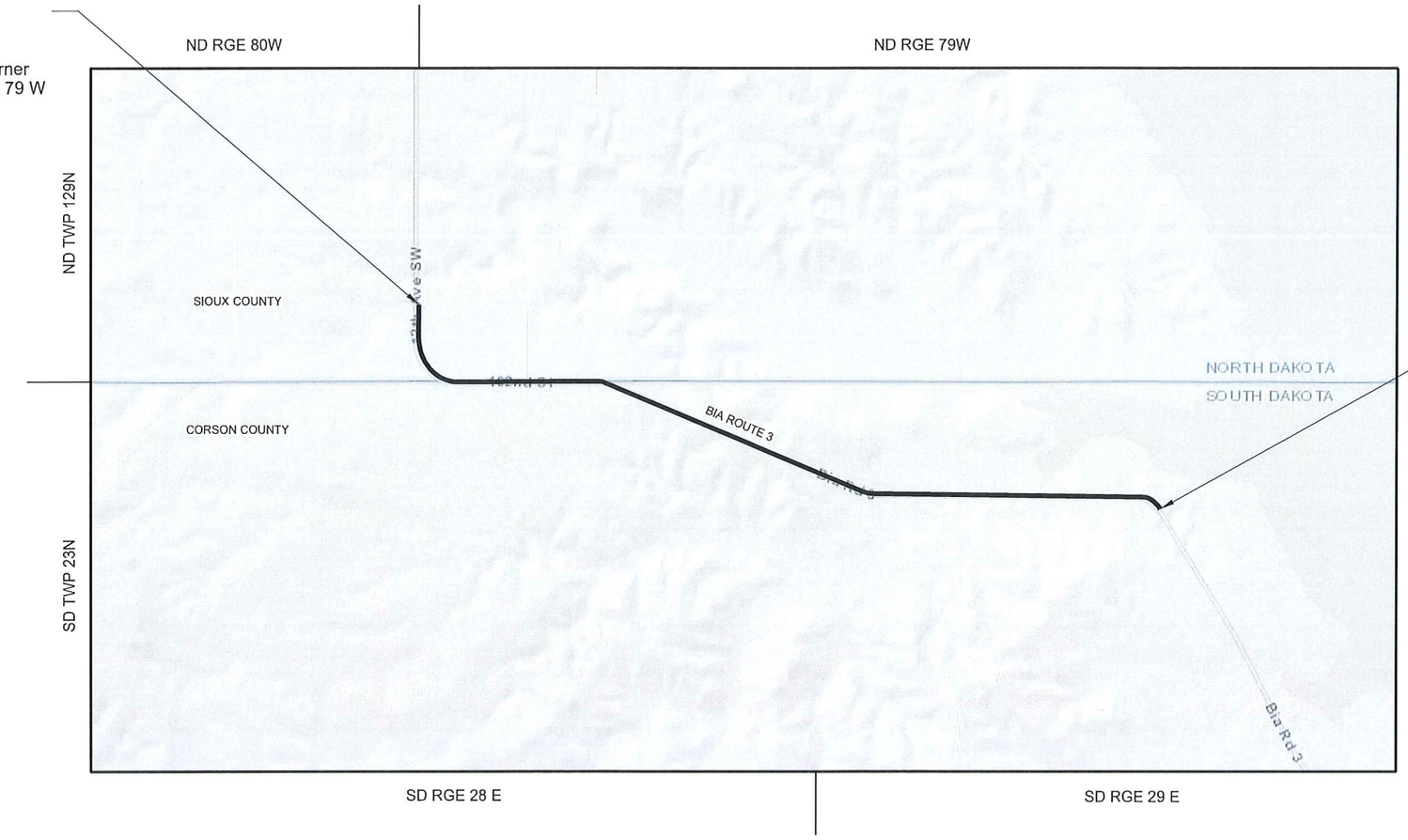
## LIST OF STANDARD DRAWINGS

| Number | Description |
|---|---|
| D-704-2 | Traffic Control For Coring Of Hot Bituminous Pavement |
| D-704-7 | Breakaway Systems For Construction Zone Signs - Perforated Tube |
| D-704-8 | Breakaway Systems For Construction Zone Signs - U-Channel Post |
| D-704-9 | Construction Sign Details - Terminal And Guide Signs |
| D-704-10 | Construction Sign Details - Regulatory Signs |
| D-704-11 | Construction Sign Details - Warning Signs |
| D-704-13 | Barricade And Channelizing Device Details |
| 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-704-26 | Miscellaneous Sign Layouts |
| D-704-27 | Traffic Control Plan For Moving Operations |
| D-704-50 | Portable Sign Support Assembly |
| D-706-1 | Bituminous Laboratory |
| D-754-23 | Perforated Tube Assembly Details |
| D-762-4 | Pavement Marking |
| D-762-11 | Short-Term Pavement Marking |

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 4 | 1 |

Asphalt Pavement Overlay & Incidentals

BEGIN PROJECT
BIA Route 3
Sta. 0+00 - Approximately
2850' South of Northwest Corner
of Sec. 31, Twp. 129 N, Rge. 79 W




END PROJECT
BIA Route 3
Sta. 242+20 - Approximately
1050' West & 90' South of Northwest Corner
of Sec. 28, Twp. 23 N, Rge. 29 E

REGISTERED PROFESSIONAL ENGINEER
DARIN J FALCOON
PE-10498
DATE 9/3/20
NORTH DAKOTA

SCOPE OF WORK

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | PCAS A1073000 | 6 | 1 |

# PLAN NOTES

**100-P01** **CONSTRUCTION ACTIVITIES:** Work activities shall be conducted during daylight hours only and construction activities shall be scheduled to accommodate traffic before dark.

**107-100** **LAWS TO BE OBSERVED:** This project lies within the exterior boundaries of the Standing Rock Indian Reservation. Contractor shall be aware of all Tribal, State, Federal, and Local laws and ordinances pertaining to the work contained within the boundaries of the reservation.

**108-500** **TERO COORDINATION:** Invite the Tribal TERO Office to the Preconstruction Conference.

**203-P01** **COMMON EXCAVATION-SUBCUT:** The Engineer will determine locations and actual quantity of "COMMON EXCAVATION-SUBCUT" (see Subgrade Repair Detail on Sheet 1 Section 20).

All asphalt removed within the subgrade repair locations will be measured and paid as "COMMON EXCAVATION-SUBCUT". Cut the existing asphalt leaving a clean vertical edge. Include the cost to cut a vertical edge and remove, load, haul and dispose of the existing material off the right of way in the price bid for "COMMON EXCAVATION-SUBCUT".

The second paragraph of Standard Specification 203.04 C shall be deleted in its entirety. Compact aggregate according to Section 302.04 B of the Standard Specifications.

**302-P01** **AGGREGATE BASE COURSE CL 5:** The Engineer will determine the actual quantity of "AGGREGATE BASE COURSE CL 5" required for subgrade repair (see Subgrade Repair Detail on Section 20 Sheet 1).

Remove all weeds, grass and deleterious material on the shoulders prior to placing aggregate without removing more than 1-inch depth of shoulder material. Remove or breakdown any sod chunks. Add Aggregate Base Course CL 5 material adjacent to sloughs after paving operations are complete in locations designated by the Engineer in the field. Exact locations will be determined in the field by the Engineer. Include all costs associated with performing this work in the bid items "MILLING PAVEMENT SURFACE" or "AGGREGATE BASE COURSE CL 5".

**411-P01** **MILLING PAVEMENT SURFACE:** Mill the transitions at the ends of the project (see Sheet 1 Section 20). Find a suitable location to stockpile material and remove from project. Include all work required to mill and haul the millings in the price bid for "MILLING PAVEMENT SURFACE".

Payment for milling will be by the square yard based on the typical section top width (See Basis of Estimate on Sheet 1 Section 10). Sloughs, widenings and varying depths will not be measured for payment but will be incidental to the bid item "MILLING PAVEMENT SURFACE".

**411-P02** **TEMPORARY ASPHALT WEDGES:** Place temporary asphalt or milled material wedges at the milled taper locations to allow for the smooth passage of vehicles. Include all costs for labor, materials and equipment to install and remove the wedges in the unit price bid for "MILLING PAVEMENT SURFACE".

**430-P01** **ASPHALT MIX REQUIREMENTS:** Asphalt mix should meet current NDDOT or approved SDDOT specifications.

**430-P04** **COMPACTION:** Calculated Density, as specified in NDDOT Standard Specification 430.04 I.2, will be required for the lift of BIA Route 3.

**704-500** **PORTABLE RUMBLE STRIPS (PRS):** Use PRS made of rubber or engineered polymers.

Install PRS that meet the following criteria:

- Have no adhesives or fasteners required for placement;
- Have a manufacture's speed rating that meets or exceeds the posted speed limit; and
- Each strip in the array must weigh a minimum of 100 pounds.

Use individual PRS constructed in one of the following manners:

- A single piece;
- Interlocking segments; or
- Two pieces hinged at the midpoint.

An installed array of PRS consists of a minimum of 3 individual strips.

Move rumble strips with the flagging operation. Do not place rumble strips on horizontal curves.

The Engineer will count and measure each array as one unit. Include the cost of providing, installing, maintaining, and relocating PRS in the unit price bid for "Portable Rumble Strips".

**704-P01** **CONSTRUCTION SIGNING:** Furnish the necessary signing as required by construction operations.

The required traffic control signs and devices are included in the "Traffic Control Devices List" and will be measured and paid at the contract unit price for each device. Payment will not be made for additional devices required to accommodate construction operations.

**704-P02** **TRAFFIC CONTROL FOR BITUMINOUS PAVEMENT:** Provide traffic control consisting of temporary road closure, flagging and a pilot car.

Traffic control device quantities are based on a 4.576 mile limitation and the list below. Provide additional devices at no additional cost to the Owner.

1. Standard D-704-15, layout A;
2. Standard D-704-20, layout G;
3. Standard D-704-22, layouts K; and
4. Standard D-704-26, layouts EE, GG and FF.

When installing layout G from Standard D-704-20, move sign W-3-5-48 and the sign assembly containing signs R2-1-48 and R2-1a-24 with the work area as it progresses through the construction zone. Place the R2-1-48 assembly a minimum of 500 feet in advance of flagging signs.

**762-050** **PAVEMENT MARKING:** If the Engineer and Contractor agree, plan quantity will be used as the measurement for payment for pavement marking items. Existing no passing zones to be marked prior to any milling or paving.

**762-P01** **SHORT-TERM PAVEMENT MARKING:** The quantity for short term striping is based on 1 application. White edge lines are not required for short-term pavement marking.

**762-P02** **EDGE LINE:** 6-inch white edge lines have been provided to be used throughout the project length. Continue edge lines through private drives and break for intersections.

REGISTERED PROFESSIONAL ENGINEER
DARIN J FALCON
PE-10498
DATE 9-3-20
NORTH DAKOTA

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 8 | 1 |

## ESTIMATE OF QUANTITIES

| SPEC | CODE | ITEM DESCRIPTION | UNIT | QUANTITY |
|---|---|---|---|---|
| 103 | 0100 | CONTRACT BOND | L SUM | 1 |
| 203 | 0138 | COMMON EXCAVATION-SUBCUT | CY | 413 |
| 216 | 0100 | WATER | M GAL | 46 |
| 302 | 0120 | AGGREGATE BASE COURSE CL 5 | TON | 904 |
| 401 | 0050 | SS-1h TACK COAT | GAL | 3,454 |
| 411 | 0105 | MILLING PAVEMENT SURFACE | SY | 322 |
| 430 | 0143 | SUPERPAVE FAA 43 | TON | 7,655 |
| 430 | 1000 | CORED SAMPLE | EA | 53 |
| 430 | 5828 | PG 58S-28 ASPHALT CEMENT | TON | 459 |
| 702 | 0100 | MOBILIZATION | L SUM | 1.0 |
| 704 | 0100 | FLAGGING | MHR | 120 |
| 704 | 1000 | TRAFFIC CONTROL SIGNS | UNIT | 1,384 |
| 704 | 1048 | PORTABLE RUMBLE STRIPS | EA | 2 |
| 704 | 1052 | TYPE III BARRICADE | EA | 3 |
| 704 | 1067 | TUBULAR MARKERS | EA | 145 |
| 704 | 1185 | PILOT CAR | HR | 60 |
| 706 | 0550 | BITUMINOUS LABORATORY | EA | 1 |
| 706 | 0600 | CONTRACTOR'S LABORATORY | EA | 1 |
| 754 | 0110 | FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING | SF | 48 |
| 754 | 0206 | STEEL GALV POSTS-TELESCOPING PERFORATED TUB | LF | 112 |
| 754 | 0592 | RESET SIGN PANEL | EA | 3 |
| 754 | 0593 | RESET SIGN SUPPORT | EA | 3 |
| 762 | 0113 | EPOXY PVMT MK 4IN LINE (YELLOW) | LF | 19,000 |
| 762 | 0114 | EPOXY PVMT MK 6IN LINE (WHITE) | LF | 48,440 |
| 762 | 0430 | SHORT TERM 4IN LINE-TYPE NR (YELLOW) | LF | 19,000 |

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ESTIMATED QUANTITIES

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 10 | 1 |

## BASIS OF ESTIMATE

| BIA ROUTE 3 | | | | |
|---|---|---|---|---|
| TYPICAL SECTION (4.587 MILES) | | PATCHING | | |
| QUANTITY PER MILE | WIDTH | QUANTITY PER MILE | UNIT | DESCRIPTION |
| - | - | 90 | CY | Common Excavation-Subcut |
| 10 | - | - | M GAL | Water (10 M Gal/Mi for Dust Palliative, 20 Gal/Ton for CL 5) |
| - | - | 169 | TON | Aggregate Base Course CL 5 (1.875 Tons/CY) |
| 748 | 25.5' | 5 | GAL | Tack Coat (0.05 Gal/SY) |
| 1,645 | 25.5' | 20 | TON | Superpave FAA 43 (2.0 Tons/CY)* |
| 99 | - | 1.2 | TON | PG 58S-28 (6% of HMA) |
| 24 | - | - | MHR | Flagging |
| 12 | - | - | HR | Pilot Car |

Cored Sample (1 Full Depth/Mile, 2 Per 2000 LF/Lane/Lift)
Pavement markings - 20 mil thickness epoxy paint (6.68 sq ft per gallon)
*An additional 20 tons of Superpave FAA 43 has been added to be used for leveling in distressed areas prior to the pavement overlay.

| DRIVES | | | |
|---|---|---|---|
| STATION | (L)/(R) | DRIVE TYPE | CL-5 (TON) |
| Sta. 8+70 | L | Field | 10 |
| Sta. 15+00 | R | Section | 10 |
| Sta. 28+50 | R | Section | 10 |
| Sta. 52+00 | L | Private | 10 |
| Sta. 59+66 | L | Field | 10 |
| Sta. 63+75 | R | Field | 10 |
| Sta. 105+73 | L | Field | 10 |
| Sta. 105+73 | R | Field | 10 |
| Sta. 150+80 | R | Field | 10 |
| Sta. 154+20 | L | Field | 10 |
| Sta. 158+20 | R | Private | 10 |
| Sta. 212+70 | R | Field | 10 |
| Sta. 230+70 | R | Field | 10 |

REGISTERED PROFESSIONAL ENGINEER
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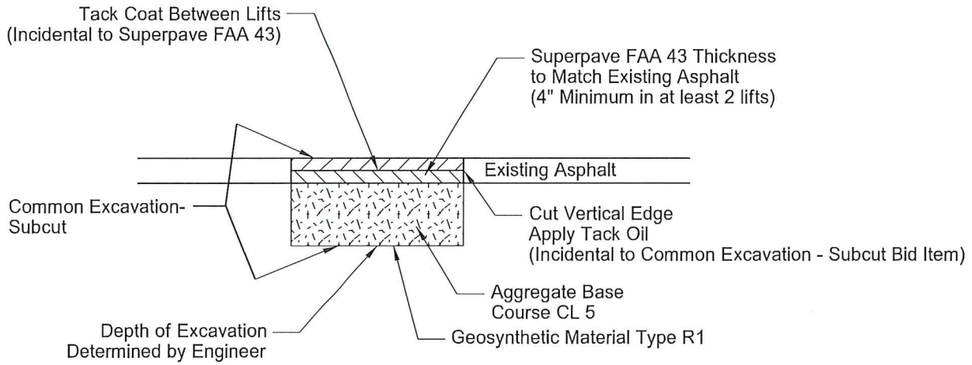
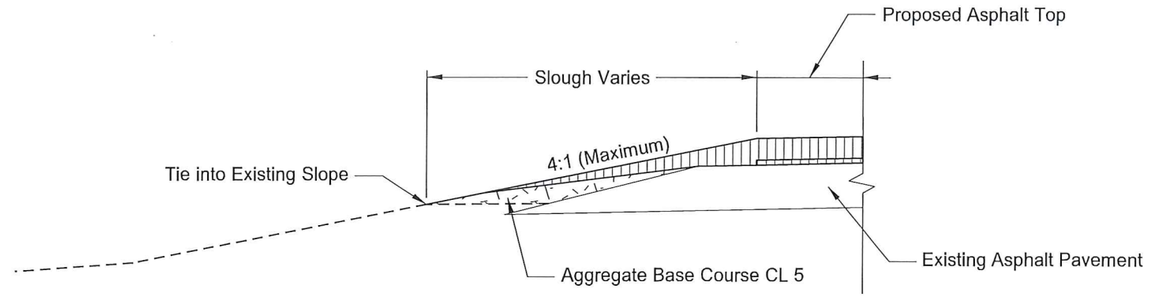
BASIS OF ESTIMATE

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 20 | 1 |



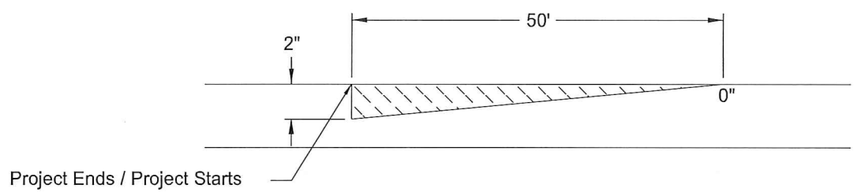

**SUBGRADE REPAIR**

1) Subgrade Repair at depths of 1 foot or greater shall be excavated to the full width of the lane and tapered at a ratio of 20:1 on the ends.
2) Geosynthetic Material Type R1 may be eliminated in field by the Engineer.



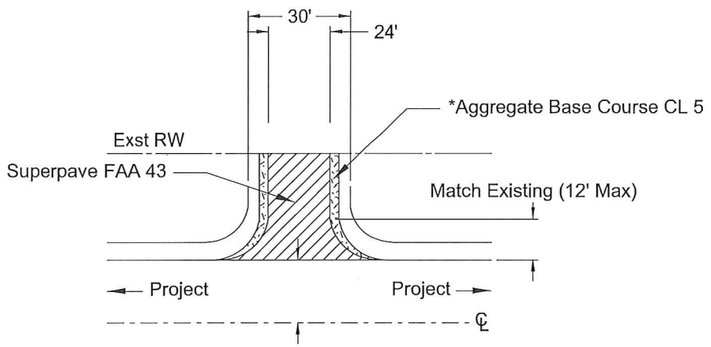

**SHOULDER GRAVEL DETAIL**

1) Locations where steep shoulder drop offs exist & existing top width is less than 25.5' wide Aggregate Base Course CL 5 will be placed.
2) Actual locations will be determined in the field by the Engineer.
3) Additional 250 ton of Aggregate Base Course Class 5 has been included for areas where sloughts are steeper than 4:1

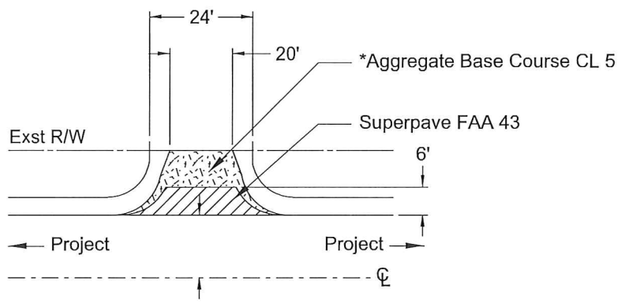



**MILLED TAPER**

Mill the existing pavement and taper as shown above. 25' for every 1.0 inches of HBP. A wearing course shall be placed matching the roadway surface elevation at the ends of the projects

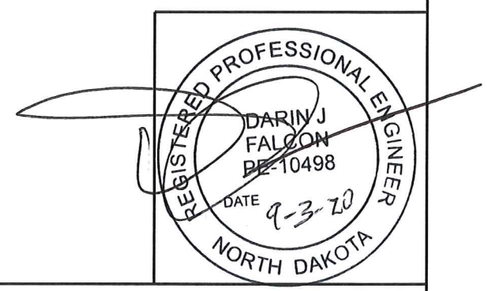



**SECTION/PRIVATE DRIVES**




**FIELD DRIVES**

* Aggregate Base Course CL 5 has been provided to fill in around the drives. This material will be required when sloughs are steeper than a 4:1.




GENERAL DETAILS

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
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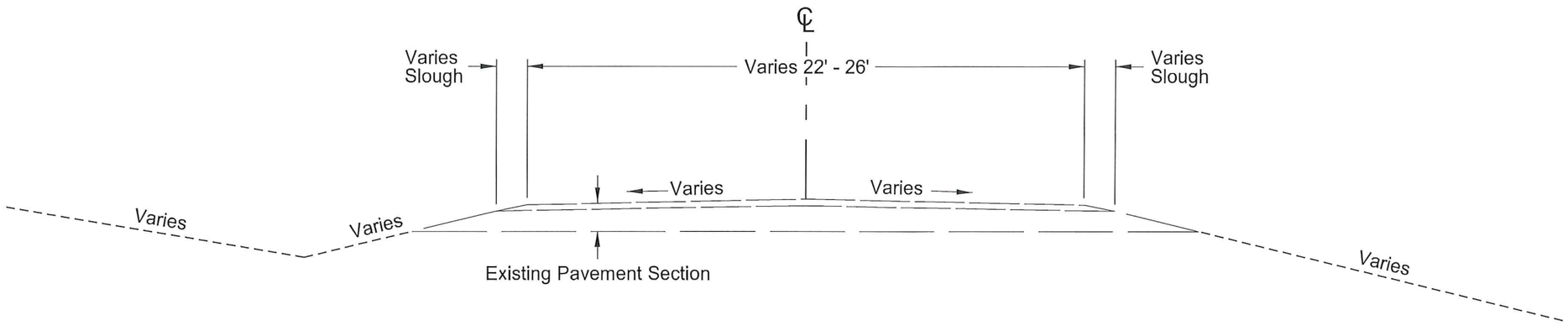
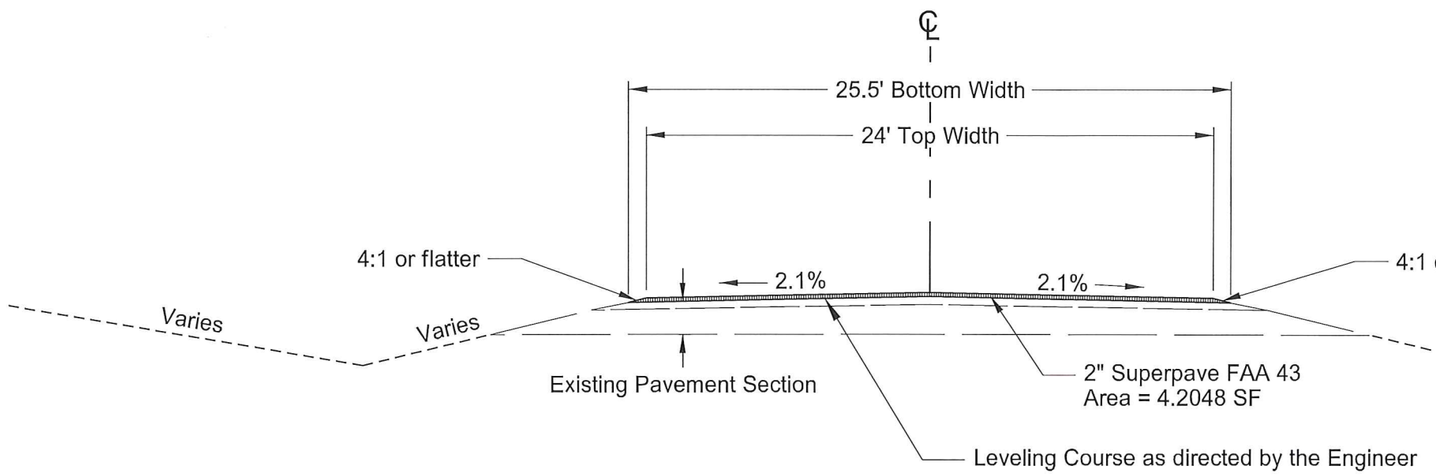
| | ND | PCAS A1073000 | 30 | 1 |




Existing Typical Section




Proposed Typical Section

REGISTERED PROFESSIONAL ENGINEER
DARIN J FALCON
PE-10498
DATE 9-3-20
NORTH DAKOTA

TYPICAL SECTIONS

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | PCAS A1073000 | 100 | 1 |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | AMOUNT REQUIRED | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|
| E5-1-48 | 48"x48" | EXIT GORE | | 35 | |
| **G20-1-60** | **60"x24"** | **ROAD WORK NEXT __ MILES** | **3** | **28** | **84** |
| G20-1b-60 | 60"x24" | NO WORK IN PROGRESS (Sign and installation only) | | 18 | |
| **G20-2-48** | **48"x24"** | **END ROAD WORK** | **2** | **26** | **52** |
| **G20-4-36** | **36"x18"** | **PILOT CAR FOLLOW ME (Mounted to back of pilot car)** | **1** | **18** | **18** |
| G20-10-108 | 108"x48" | CONTRACTOR SIGN | | 70 | |
| G20-50a-72 | 72"x36" | ROAD WORK NEXT __ MILES RT & LT ARROWS | | 43 | |
| **G20-52a-72** | **72"x24"** | **ROAD WORK NEXT __ MILES RT or LT ARROW** | **1** | **36** | **36** |
| **G20-55-96** | **96"x48"** | **SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT** | **2** | **59** | **118** |
| M1-1-36 | 36"x36" | INTERSTATE ROUTE MARKER (Post and installation only) | | 10 | |
| M1-4-24 | 24"x24" | U.S. ROUTE MARKER (Post and installation only) | | 10 | |
| M1-5-24 | 24"x24" | STATE ROUTE MARKER (Post and installation only) | | 10 | |
| M3-1-24 | 24"x12" | NORTH (Mounted on route marker post) | | 7 | |
| M3-2-24 | 24"x12" | EAST (Mounted on route marker post) | | 7 | |
| M3-3-24 | 24"x12" | SOUTH (Mounted on route marker post) | | 7 | |
| M3-4-24 | 24"x12" | WEST (Mounted on route marker post) | | 7 | |
| M4-8-24 | 24"x12" | DETOUR (Mounted on route marker post) | | 7 | |
| M4-9-30 | 30"x24" | DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT | | 15 | |
| M4-10-48 | 48"x18" | DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade) | | 7 | |
| M5-1-21 | 21"x15" | ADVANCE TURN ARROW RT or LT(Mounted on route marker post) | | 7 | |
| M5-1-30 | 30"x21" | ADVANCE TURN ARROW RT or LT(Mounted on route marker post) | | 9 | |
| M6-1-21 | 21"x15" | DIRECTIONAL ARROW RT or LT (Mounted on route marker post) | | 7 | |
| M6-1-30 | 30"x21" | DIRECTIONAL ARROW RT or LT (Mounted on route marker post) | | 9 | |
| M6-3-21 | 21"x15" | DIRECTIONAL ARROW UP (Mounted on route marker post) | | 7 | |
| **R1-1-48** | **48"x48"** | **STOP** | **2** | **32** | **64** |
| R1-2-60 | 60"x60" | YIELD | | 29 | |
| **R2-1-36** | **36"x48"** | **SPEED LIMIT __ (Portable only)** | **4** | **30** | **120** |
| R2-1-48 | 48"x60" | SPEED LIMIT __ | | 39 | |
| **R2-1aP-24** | **24"x18"** | **MINIMUM FEE $80 (Mounted on Speed Limit post)** | **2** | **10** | **20** |
| R3-2-48 | 48"x48" | NO LEFT TURN | | 35 | |
| **R4-1-36** | **36"x48"** | **DO NOT PASS (Portable only)** | **2** | **30** | **60** |
| **R4-1-48** | **48"x60"** | **DO NOT PASS** | **2** | **39** | **78** |
| R4-7-48 | 48"x60" | KEEP RIGHT | | 39 | |
| R5-1-48 | 48"x48" | DO NOT ENTER | | 35 | |
| R6-1-54 | 54"x18" | ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post) | | 14 | |
| R7-1-12 | 12"x18" | NO PARKING ANY TIME | | 11 | |
| R10-6-24 | 24"x36" | STOP HERE ON RED | | 16 | |
| R11-2-48 | 48"x30" | ROAD CLOSED (Mounted on barricade) | | 12 | |
| R11-2a-48 | 48"x30" | STREET CLOSED (Mounted on barricade) | | 12 | |
| R11-3a-60 | 60"x30" | ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade) | | 15 | |
| R11-3c-60 | 60"x30" | STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade) | | 15 | |
| R11-4a-60 | 60"x30" | STREET CLOSED TO THRU TRAFFIC (Mounted on barricade) | | 15 | |
| W1-3-48 | 48"x48" | REVERSE TURN RIGHT or LEFT | | 35 | |
| W1-4-48 | 48"x48" | REVERSE CURVE RIGHT or LEFT | | 35 | |
| W1-4b-48 | 48"x48" | TWO LANE REVERSE CURVE RIGHT or LEFT | | 35 | |
| W1-6-48 | 48"x24" | ONE DIRECTION LARGE ARROW | | 26 | |
| W3-1-48 | 48"x48" | STOP AHEAD | | 35 | |
| W3-3-48 | 48"x48" | SIGNAL AHEAD | | 35 | |
| **W3-4-48** | **48"x48"** | **BE PREPARED TO STOP** | **2** | **35** | **70** |
| **W3-5-48** | **48"x48"** | **SPEED REDUCTION AHEAD** | **2** | **35** | **70** |
| W4-2-48 | 48"x48" | LANE ENDS RIGHT or LEFT | | 35 | |
| W5-1-48 | 48"x48" | ROAD NARROWS | | 35 | |
| W5-8-48 | 48"x48" | THRU TRAFFIC RIGHT LANE | | 35 | |
| W5-9-48 | 48"x48" | ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW | | 35 | |
| W6-3-48 | 48"x48" | TWO WAY TRAFFIC | | 35 | |
| **W8-1-48** | **48"x48"** | **BUMP** | **1** | **35** | **35** |
| **W8-3-48** | **48"x48"** | **PAVEMENT ENDS** | **1** | **35** | **35** |
| W8-7-48 | 48"x48" | LOOSE GRAVEL | | 35 | |
| **W8-11-48** | **48"x48"** | **UNEVEN LANES** | **2** | **35** | **70** |
| **W8-12-48** | **48"x48"** | **NO CENTER LINE** | **2** | **35** | **70** |
| W8-17-48 | 48"x48" | SHOULDER DROP-OFF SYMBOL | | 35 | |
| W8-53-48 | 48"x48" | TRUCKS ENTERING HIGHWAY | | 35 | |
| **W8-54-48** | **48"x48"** | **TRUCKS ENTERING AHEAD or __ FT or _ MILE** | **2** | **35** | **70** |
| W8-55-48 | 48"x48" | TRUCKS CROSSING AHEAD or __ FT or _ MILE | | 35 | |
| W8-56-48 | 48"x48" | TRUCKS EXITING HIGHWAY | | 35 | |
| W9-3a-48 | 48"x48" | CENTER LANE CLOSED SYMBOL | | 35 | |
| W12-2-48 | 48"x48" | LOW CLEARANCE | | 35 | |
| W13-1P-30 | 30"x30" | __ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post) | | 14 | |
| W14-3-64 | 64"x48" | NO PASSING ZONE | | 28 | |
| W16-2P-30 | 30"x24" | __ FEET PLAQUE (Mounted on warning sign post) | | 10 | |
| **W20-1-48** | **48"x48"** | **ROAD WORK AHEAD or _FT or _ MILE** | **3** | **35** | **105** |
| W20-2-48 | 48"x48" | DETOUR AHEAD or __ FT or _ MILE | | 35 | |
| W20-3-48 | 48"x48" | ROAD or STREET CLOSED AHEAD or __ FT or _ MILE | | 35 | |
| W20-4-48 | 48"x48" | ONE LANE ROAD AHEAD or __ FT or _ MILE | | 35 | |
| W20-5-48 | 48"x48" | RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE | | 35 | |
| **W20-7-48** | **48"x48"** | **FLAGGER** | **2** | **35** | **70** |
| **W20-8-18** | **18"x18"** | **STOP - SLOW PADDLE Back to Back** | **2** | **5** | **10** |
| **W20-52P-54** | **54"x12"** | **NEXT __ MILES (Mounted on warning sign post)** | **2** | **12** | **24** |
| W21-1-48 | 48"x48" | WORKERS | | 35 | |
| W21-2-48 | 48"x48" | FRESH OIL | | 35 | |
| W21-3-48 | 48"x48" | ROAD MACHINERY AHEAD or __ FT or _ MILE | | 35 | |
| W21-5-48 | 48"x48" | SHOULDER WORK | | 35 | |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | AMOUNT REQUIRED | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|
| W21-5a-48 | 48"x48" | RIGHT or LEFT SHOULDER CLOSED | | 35 | |
| W21-5b-48 | 48"x48" | RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE | | 35 | |
| W21-6-48 | 48"x48" | SURVEY CREW | | 35 | |
| W21-50-48 | 48"x48" | BRIDGE PAINTING AHEAD or __ FT | | 35 | |
| W21-51-48 | 48"x48" | MATERIAL ON ROADWAY | | 35 | |
| W21-52-48 | 48"x48" | PAVEMENT BREAKS | | 35 | |
| **W21-53-48** | **48"x48"** | **RUMBLE STRIPS AHEAD** | **1** | **35** | **35** |
| **W22-8-48** | **48"x48"** | **FRESH OIL LOOSE ROCK** | **2** | **35** | **70** |

SPECIAL SIGNS

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

SPEC & CODE

| | | | |
|---|---|---|---|
| **704-1000** | **TRAFFIC CONTROL SIGNS** | **TOTAL UNITS** | **1384** |

| SPEC & CODE | DESCRIPTION | UNIT | QUANTITY |
|---|---|---|---|
| **704-0100** | **FLAGGING** | **MHR** | **120** |
| **704-1048** | **PORTABLE RUMBLE STRIPS** | **EACH** | **2** |
| 704-1050 | TYPE I BARRICADES | EACH | |
| **704-1052** | **TYPE III BARRICADES** | **EACH** | **3** |
| 704-1060 | DELINEATOR DRUMS | EACH | |
| 704-1065 | TRAFFIC CONES | EACH | |
| **704-1067** | **TUBULAR MARKERS** | **EACH** | **145** |
| 704-1070 | DELINEATOR | EACH | |
| 704-1072 | FLEXIBLE DELINEATORS | EACH | |
| 704-1080 | STACKABLE VERTICAL PANELS | EACH | |
| 704-1081 | VERTICAL PANELS - BACK TO BACK | EACH | |
| 704-1085 | SEQUENCING ARROW PANEL - TYPE A | EACH | |
| 704-1086 | SEQUENCING ARROW PANEL - TYPE B | EACH | |
| 704-1087 | SEQUENCING ARROW PANEL - TYPE C | EACH | |
| 704-1500 | OBLITERATION OF PVMT MK | SF | |
| 704-3501 | PORTABLE PRECAST CONCRETE MED BARRIER | LF | |
| 704-3510 | PRECAST CONCRETE MED BARRIER - STATE FURNISHED | EACH | |
| 762-0200 | RAISED PAVEMENT MARKERS | EACH | |
| 762-0420 | SHORT TERM 4IN LINE - TYPE R | LF | |
| **762-0430** | **SHORT TERM 4IN LINE - TYPE NR** | **LF** | **19000** |

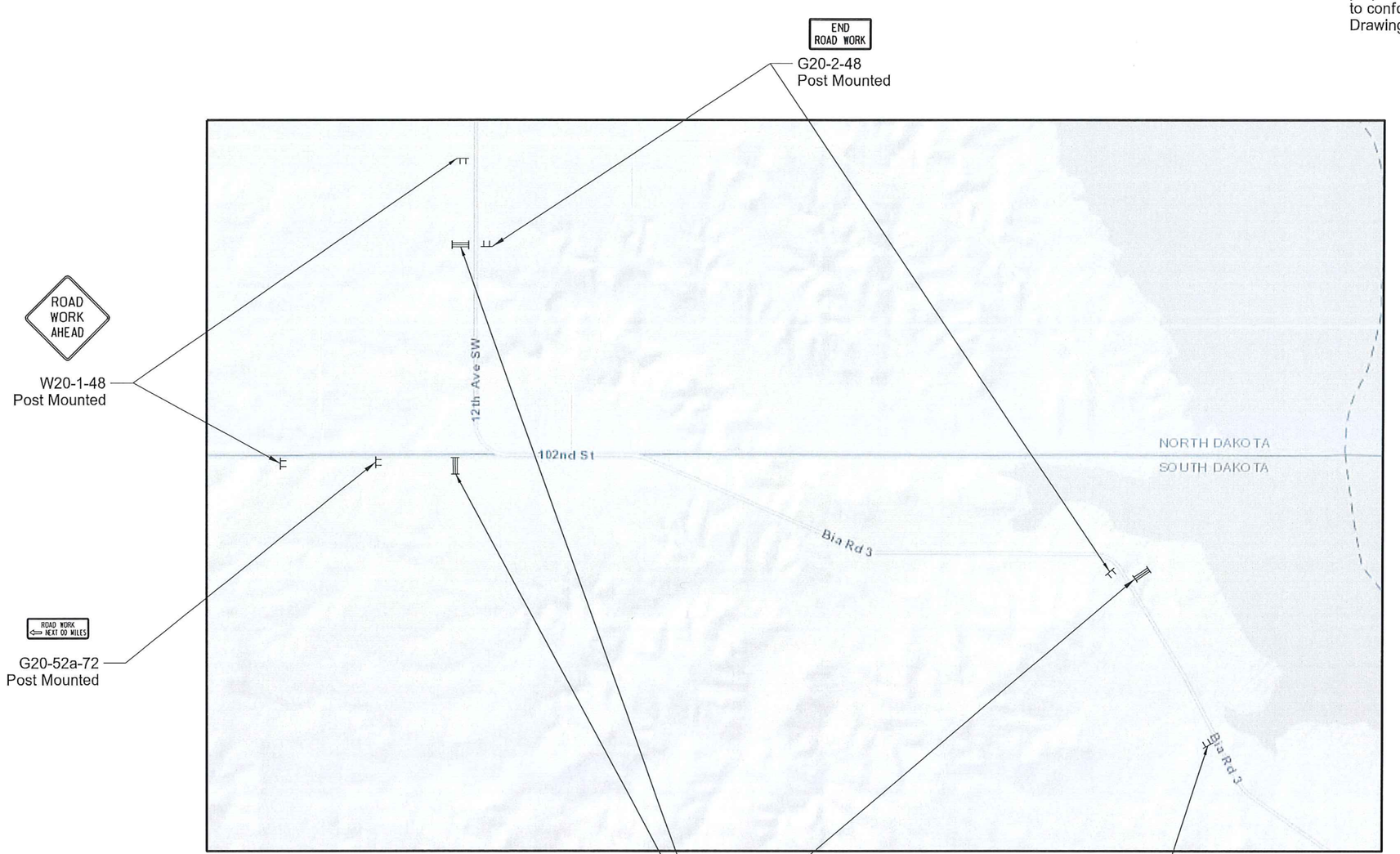
NOTE:
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.
http://www.dot.nd.gov/

REGISTERED PROFESSIONAL ENGINEER
DARIN J FALCON
PE-10498
DATE 9-3-20
NORTH DAKOTA

Traffic Control Devices List

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 100 | 2 |

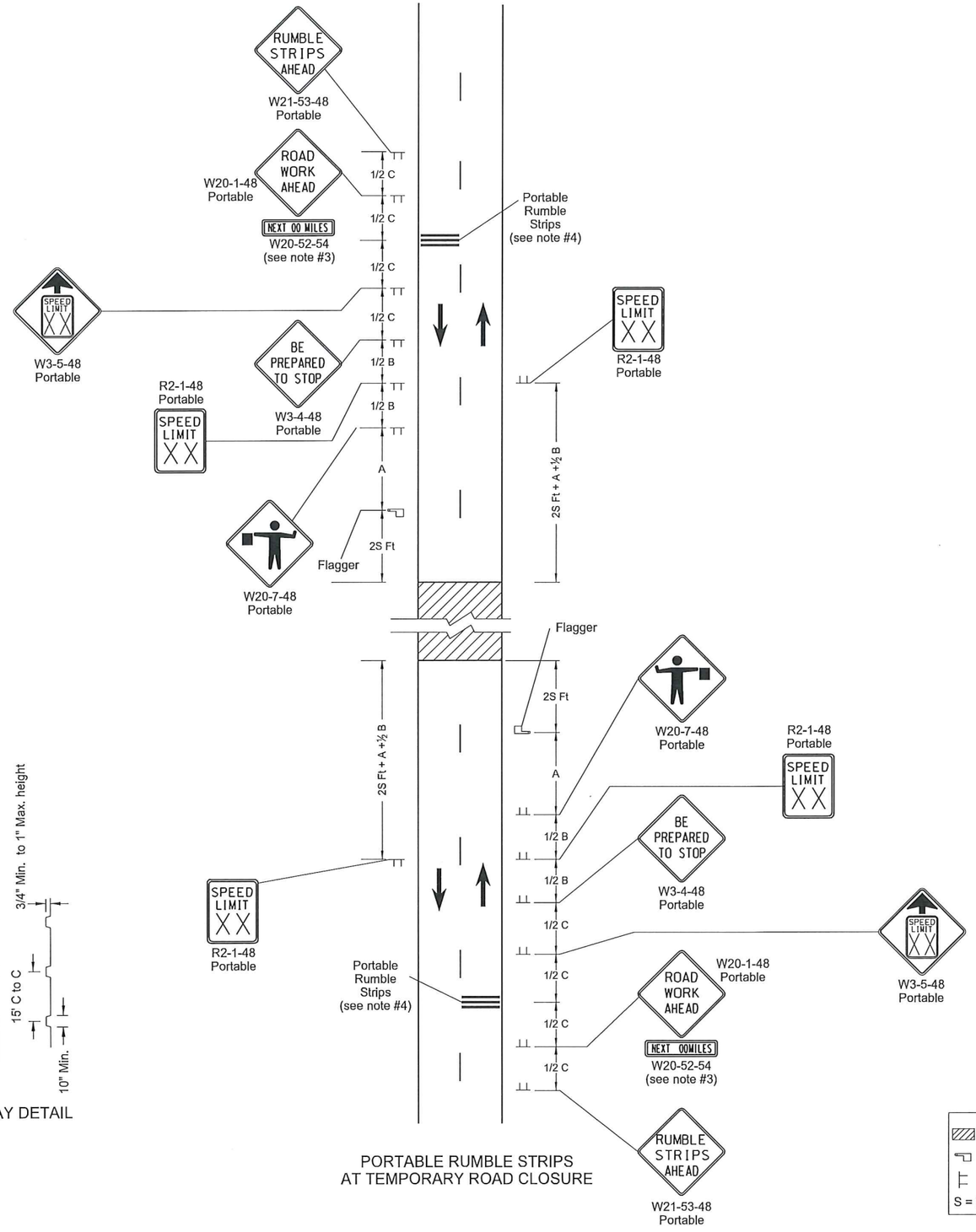
The sign layout shown is for general information purposes only. The Contractor will be required to conform to the MUTCD and the Standard Drawings when installing the Traffic Control Signing.



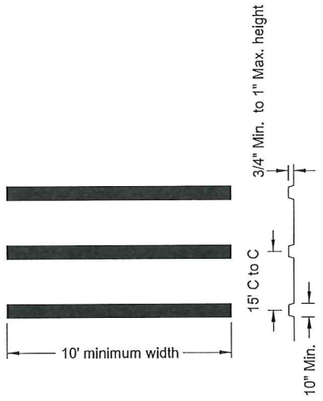

REGISTERED PROFESSIONAL ENGINEER
DARIN J. FALCON
PE-10498
DATE 6-3-20
NORTH DAKOTA

TRAFFIC CONTROL DEVICES LIST

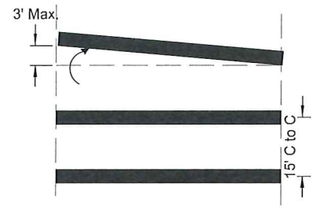
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 100 | 3 |



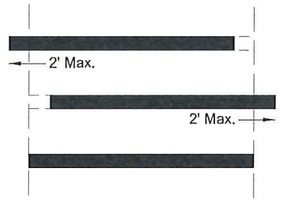

PORTABLE RUMBLE STRIPS AT TEMPORARY ROAD CLOSURE



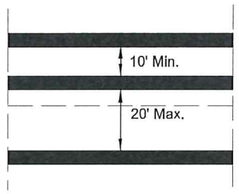

PORTABLE RUMBLE STRIPS ARRAY DETAIL




Reposition if movement is >3' from original position.
Skewing




Reposition if movement is >2' from original position.
Lateral




Reposition if distance between strips is <10' or >20'.
Perpendicular to Travel with or against traffic

PORTABLE RUMBLE STRIPS ARRAY
TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

Notes:
1. Number of devices were calculated using 40 mph. Speed determined in the field based on location and conditions.
2. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
3. Use sign W20-52-54 when work area is 1 mile or longer.
4. Rumble strips are not used on a non paved surface or in a pre-construction speed zone of 25 mph or less.

Drawing not to scale.

| ADVANCE WARNING SIGN SPACING | | | |
|---|---|---|---|
| Road Type | Distance Between Signs Min. (ft) | | |
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 to 40 mph) | 280 | 280 | 280 |
| Urban - High Speed (over 40 mph to 50 mph) | 360 | 360 | 360 |
| Rural - High Speed (over 50 mph to 65 mph) | 720 | 720 | 720 |

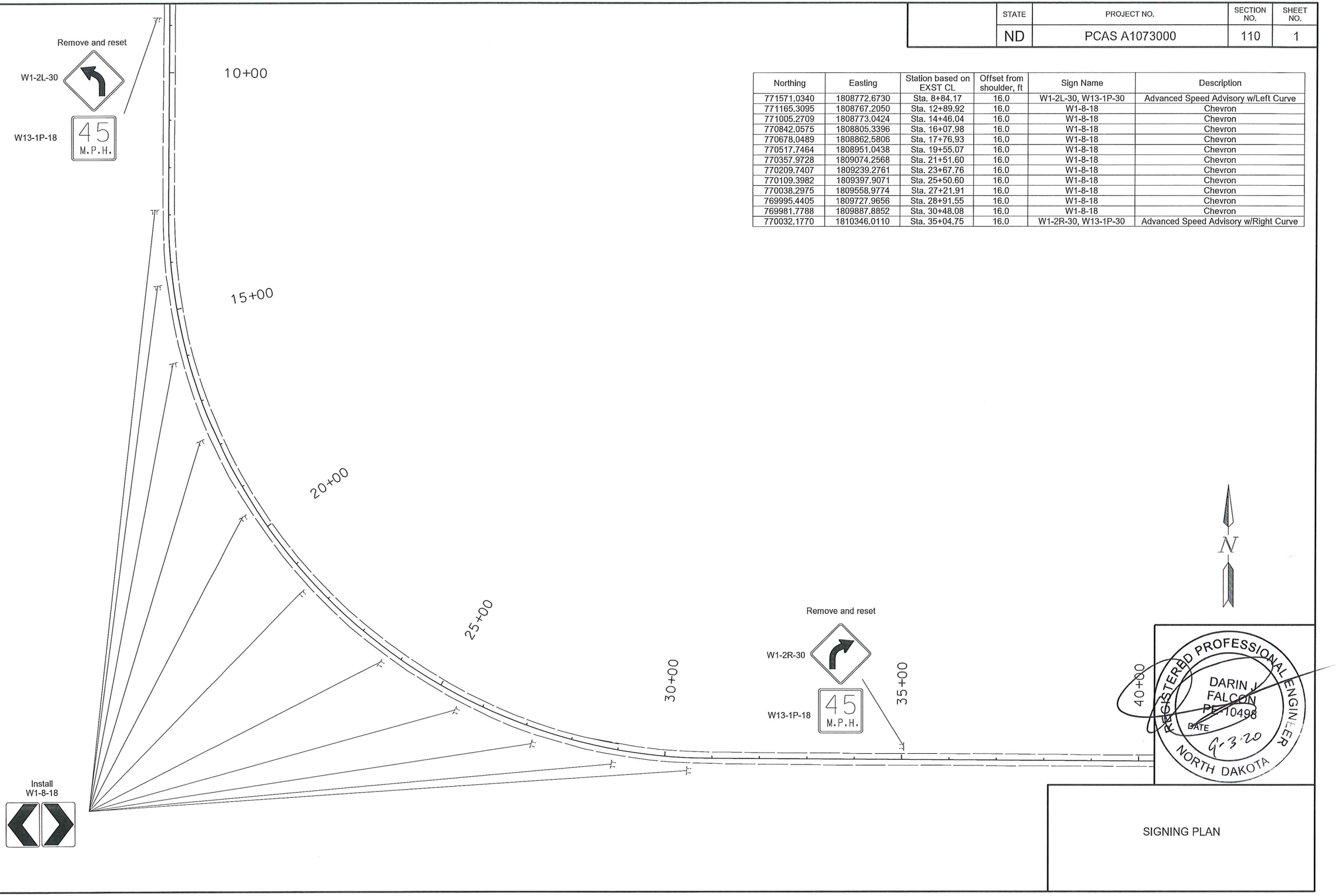
KEY
- Work area
- Flagger
- Sign

S = Numerical value of speed limit or 85th percentile.

REGISTERED PROFESSIONAL ENGINEER
DARIN J FALCON
PE-10498
DATE 9-3-20
NORTH DAKOTA

PORTABLE RUMBLE STRIP LAYOUT

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 110 | 1 |



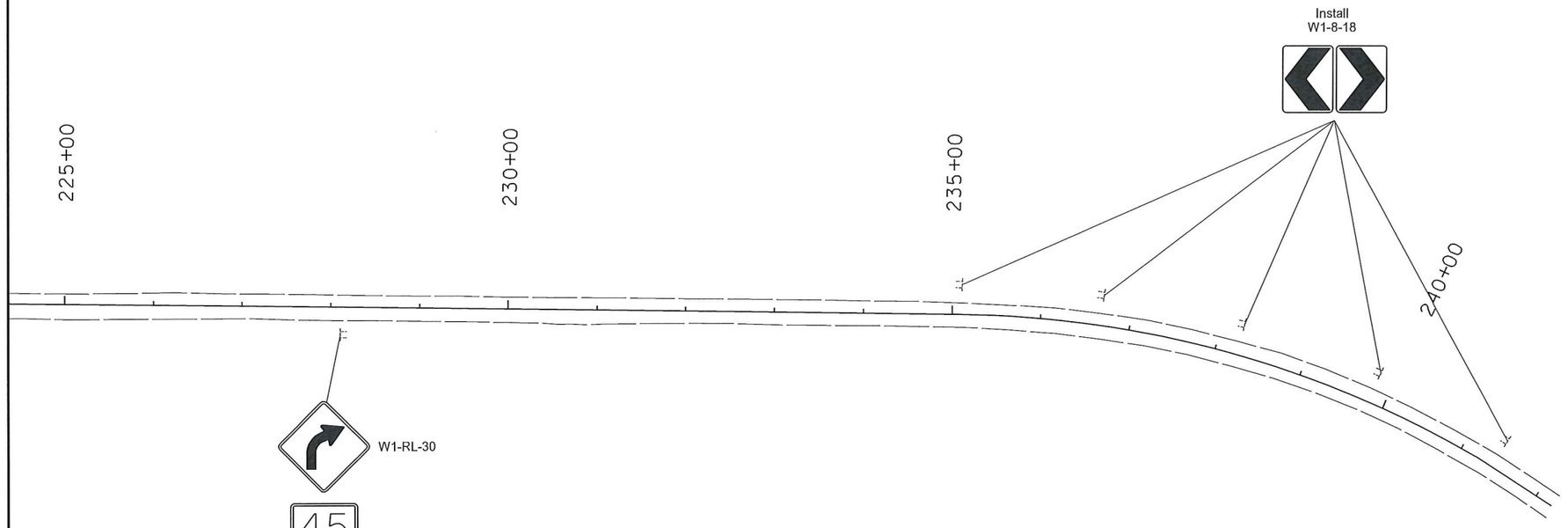

| Northing | Easting | Station based on EXST CL | Offset from shoulder, ft | Sign Name | Description |
|---|---|---|---|---|---|
| 771571.0340 | 1808772.6730 | Sta. 8+84.17 | 16.0 | W1-2L-30, W13-1P-30 | Advanced Speed Advisory w/Left Curve |
| 771165.3095 | 1808767.2050 | Sta. 12+89.92 | 16.0 | W1-8-18 | Chevron |
| 771005.2709 | 1808773.0424 | Sta. 14+46.04 | 16.0 | W1-8-18 | Chevron |
| 770842.0575 | 1808805.3396 | Sta. 16+07.98 | 16.0 | W1-8-18 | Chevron |
| 770678.0489 | 1808862.5806 | Sta. 17+76.93 | 16.0 | W1-8-18 | Chevron |
| 770517.7464 | 1808951.0438 | Sta. 19+55.07 | 16.0 | W1-8-18 | Chevron |
| 770357.9728 | 1809074.2568 | Sta. 21+51.60 | 16.0 | W1-8-18 | Chevron |
| 770209.7407 | 1809239.2761 | Sta. 23+67.76 | 16.0 | W1-8-18 | Chevron |
| 770109.3982 | 1809397.9071 | Sta. 25+50.60 | 16.0 | W1-8-18 | Chevron |
| 770038.2975 | 1809558.9774 | Sta. 27+21.91 | 16.0 | W1-8-18 | Chevron |
| 769995.4405 | 1809727.9656 | Sta. 28+91.55 | 16.0 | W1-8-18 | Chevron |
| 769981.7788 | 1809887.8852 | Sta. 30+48.08 | 16.0 | W1-8-18 | Chevron |
| 770032.1770 | 1810346.0110 | Sta. 35+04.75 | 16.0 | W1-2R-30, W13-1P-30 | Advanced Speed Advisory w/Right Curve |

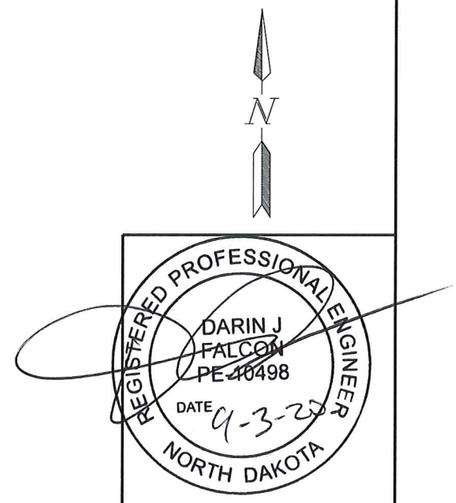
REGISTERED PROFESSIONAL ENGINEER
DARIN J. FALCON
PE-10498
DATE 9-3-20
NORTH DAKOTA

SIGNING PLAN

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | PCAS A1073000 | 110 | 2 |

| Northing | Easting | Station based on EXST CL | Offset from shoulder, ft | Sign Name | Description |
|---|---|---|---|---|---|
| 766499.0940 | 1828971.5790 | Sta. 228+10.71 | 16.0 | W1-2R-30, W13-1P-30 | Advanced Speed Advisory w/Right Curve |
| 766554.8726 | 1829672.6983 | Sta. 235+11.05 | 16.0 | W1-8-18 | Chevron |
| 766542.7259 | 1829832.7427 | Sta. 236+67.17 | 16.0 | W1-8-18 | Chevron |
| 766509.7616 | 1829991.2023 | Sta. 238+24.50 | 16.0 | W1-8-18 | Chevron |
| 766454.5920 | 1830144.0559 | Sta. 239+82.42 | 16.0 | W1-8-18 | Chevron |
| 766378.0565 | 1830287.2014 | Sta. 241+39.33 | 16.0 | W1-8-18 | Chevron |



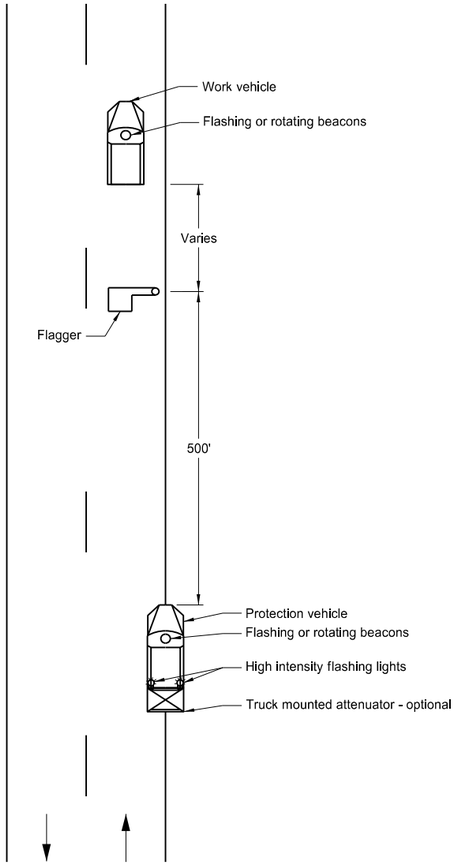



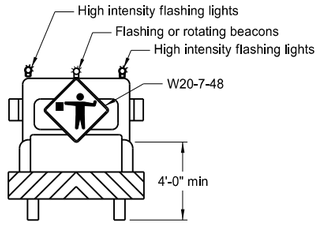

SIGNING PLAN

# TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

D-704-2

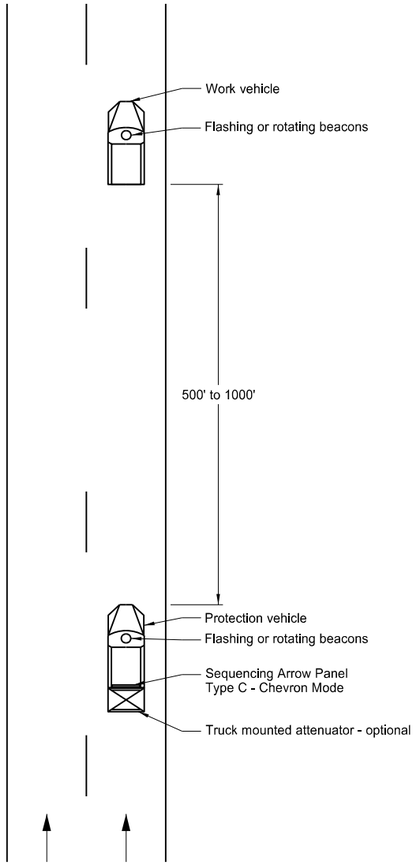
## Two Lane, Two Way Roadways

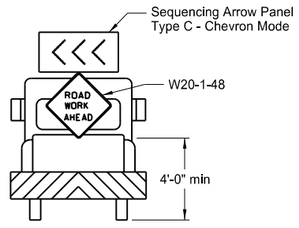



Typical Protection Vehicle

## Multilane Roadways




Typical Protection Vehicle

Notes:

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

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

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

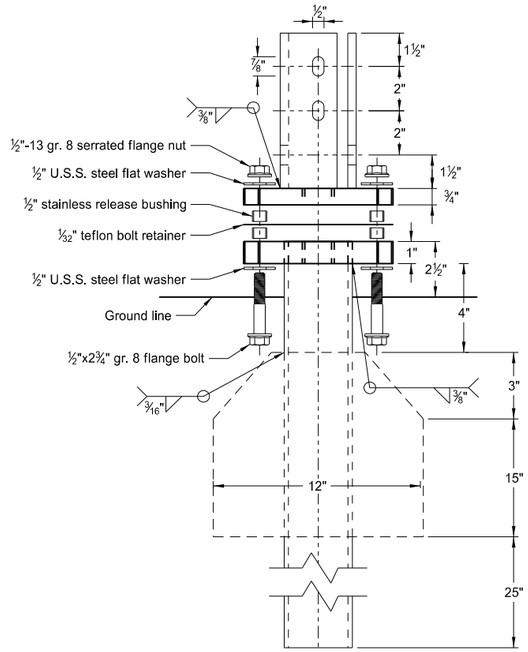
4. Use flagger to protect the work area and warn oncoming traffic for two lane, two way roadway.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-25-12 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-27-17 | Updated to active voice |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 9/27/2017 and the original document is stored at the North Dakota Department of Transportation

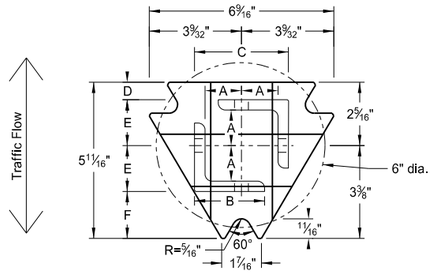
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

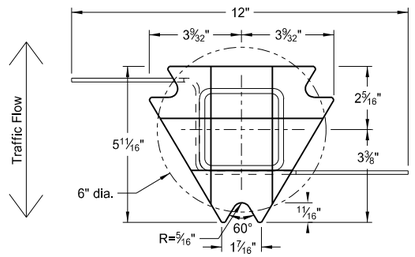



Multi-Directional
Slip Base Assembly

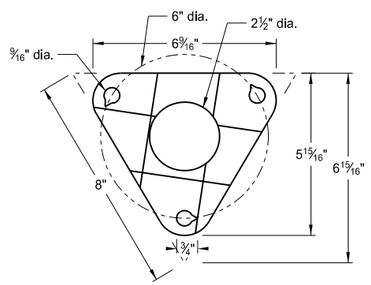
## Perforated Tube




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




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




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

Notes:

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

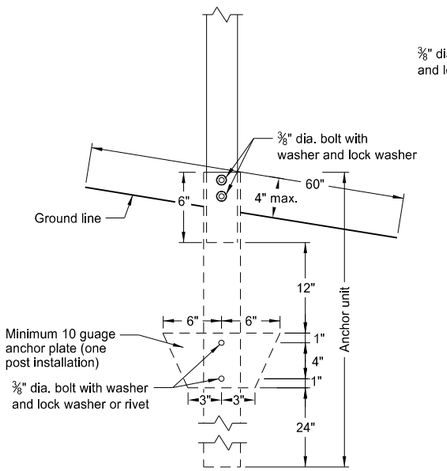
| Telescoping Perforated Tube | | | | | | |
|---|---|---|---|---|---|---|
| Number of Posts | Post Size in. | Wall Thick-ness Gauge | Sleeve Size in. | Wall Thick-ness Gauge | Slip Base | Anchor Size without Slip Base in. |
| 1 | 2 | 12 | | | No | 2¼ |
| 1 | 2¼ | 12 | | | No | 2½ |
| 1 | 2½ | 12 | |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

| Properties of Telescoping Perforated Tube | | | | | | |
|---|---|---|---|---|---|---|
| Tube Size in. | Wall Thickness in. | U.S. Standard Gauge | Weight per Foot lbs. | Moment of Inertia in.⁴ | Cross Sec. Area in.² | Section Modulus in.³ |
| 1½ x 1½ | 0.105 | 12 | 1.702 | 0.129 | 0.380 | 0.172 |
| 2 x 2 | 0.105 | 12 | 2.416 | 0.372 | 0.590 | 0.372 |
| 2¼ x 2¼ | 0.105 | 12 | 2.773 | 0.561 | 0.695 | 0.499 |
| 2³/16 x 2³/16 | 0.135 | 10 | 3.432 | 0.605 | 0.841 | 0.590 |
| 2½ x 2½ | 0.105 | 12 | 3.141 | 0.804 | 0.803 | 0.643 |
| 2½ x 2½ | 0.135 | 10 | 4.006 | 0.979 | 1.010 | 0.785 |

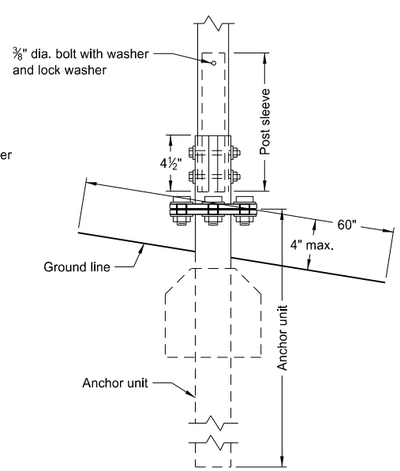
| Top Post Receiver Data Table | | | | | | |
|---|---|---|---|---|---|---|
| Square Post Sizes (B) | A | B | C | D | E | F |
| 2³/16"x10 ga. | 1⁹/64" | 2½" | 3¹/32" | 2⁵/32" | 1³³/64" | 1⅞" |
| 2½"x10 ga. | 1⁹/32" | 2½" | 3⁵/16" | ⅝" | 1²¹/32" | 1¾" |

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

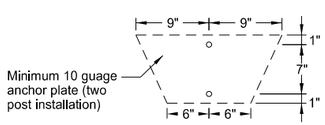
(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.




Anchor Unit and Post Assembly




Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



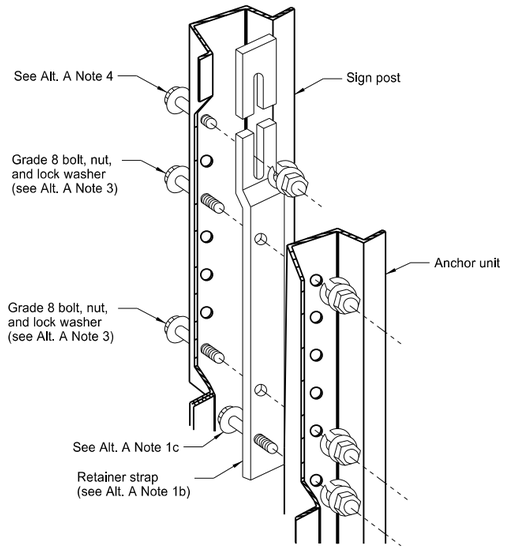

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 2-28-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-27-17 | Updated to active voice |
| 10-03-19 | New Design Engr PE Stamp |

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

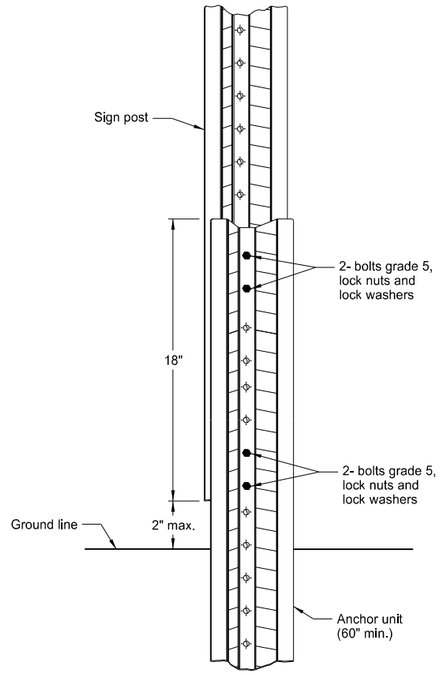
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

## U-Channel Post

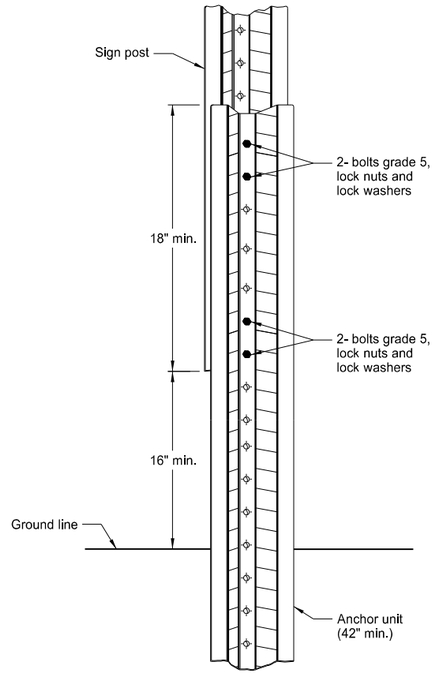



Detail A



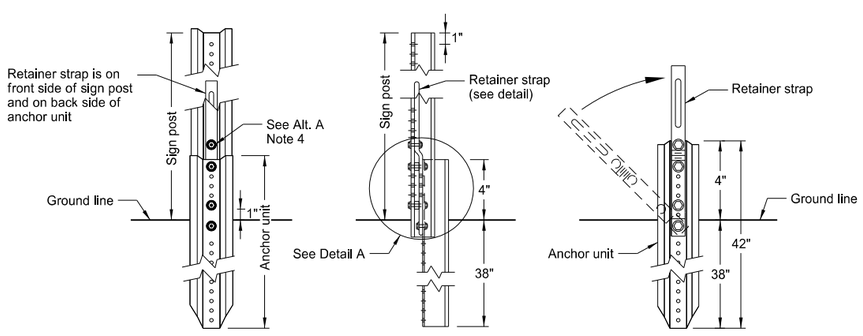

Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.




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

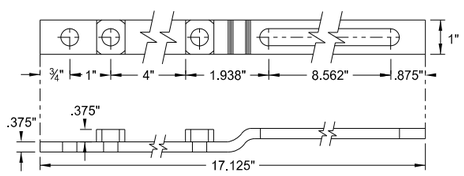
Install a maximum of 3 posts within 7'.




Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.




Retainer Strap Detail

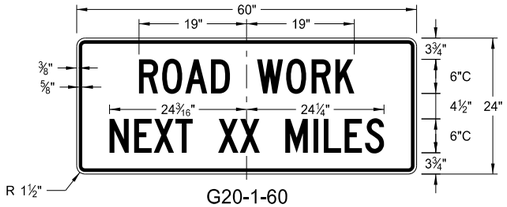
Alternate A Steps of Installation:

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

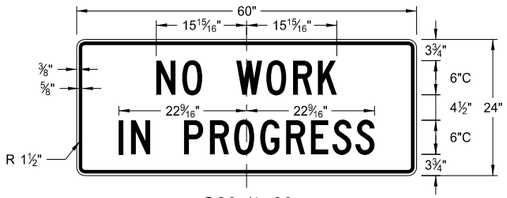
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 2-28-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-27-17 | Updated to active voice |
| 10-03-19 | New Design Engr PE Stamp |

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

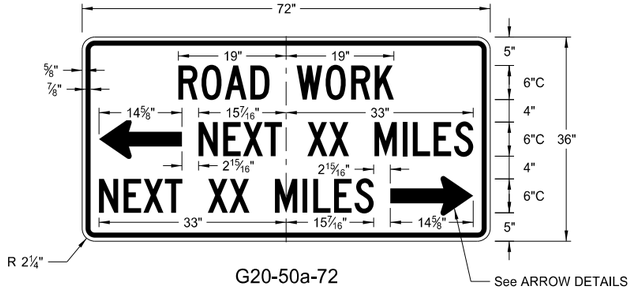
# CONSTRUCTION SIGN DETAILS
# TERMINAL AND GUIDE SIGNS




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




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




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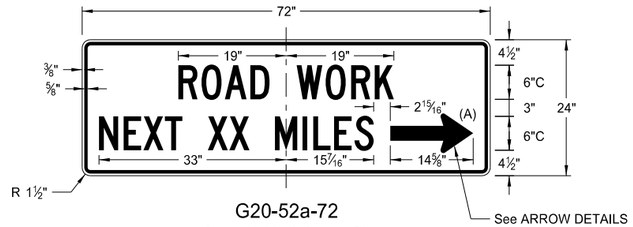
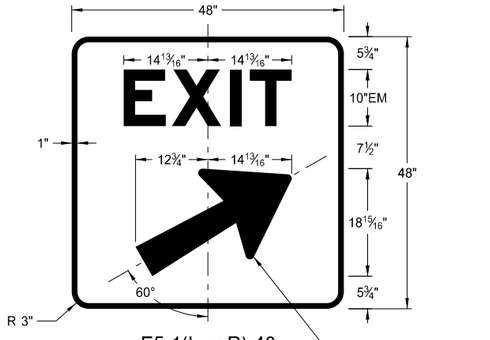
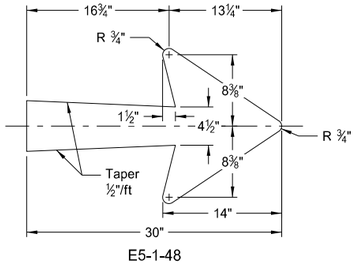


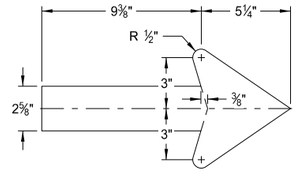

G20-52a-72
Legend: black (non-refl)
Background: orange



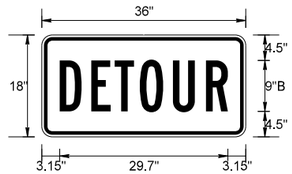

E5-1(L or R)-48
Legend: white
Background: green (orange optional)



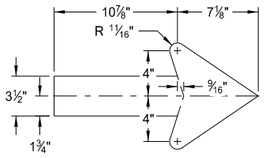

E5-1-48



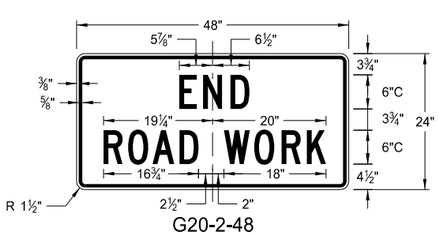
G20-50a-72
G20-52a-72



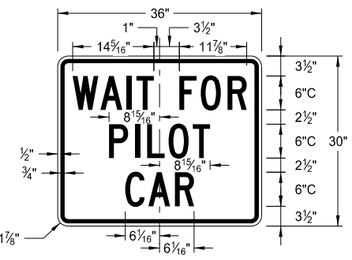

M4-8-36
Legend: black (non-refl)
Background: orange



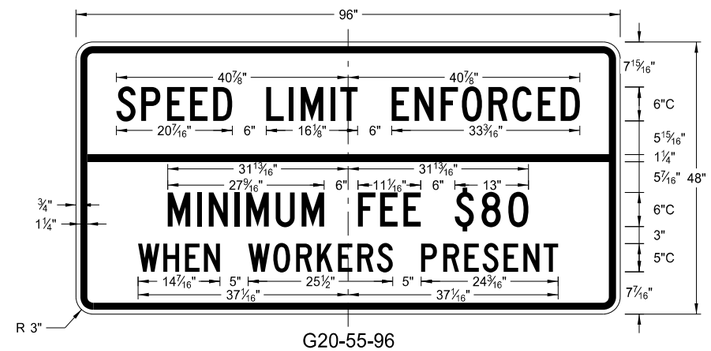
M4-9(L or R)-30
Right or Left



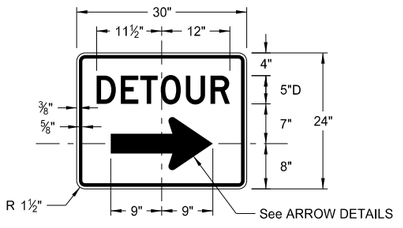

G20-2-48
Legend: black (non-refl)
Background: orange



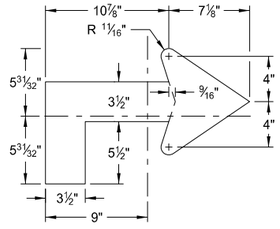

G20-4b-36
Legend: black (non-refl)
Background: orange



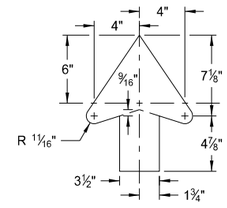

G20-55-96
Legend: black (non-refl)
Background: orange




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



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



M4-9-30
Straight

## ARROW DETAILS

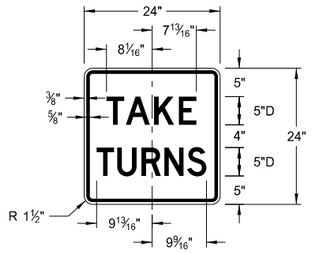
NOTES:

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

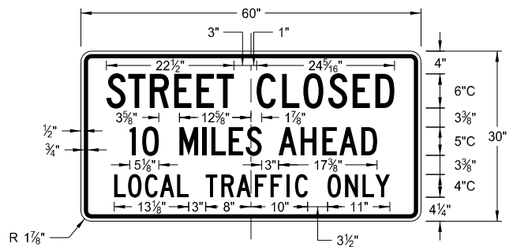
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-13-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-17-17 | Added sign & background color |
| 10-03-19 | New Design Engineer PE Stamp |

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

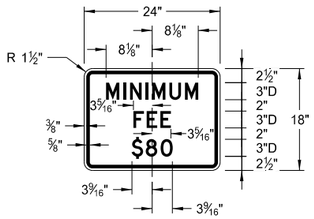
# CONSTRUCTION SIGN DETAILS
## REGULATORY SIGNS




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




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




R2-1aP-24
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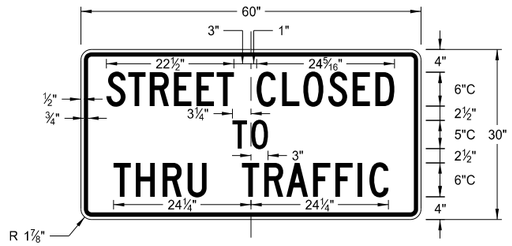
Background: white



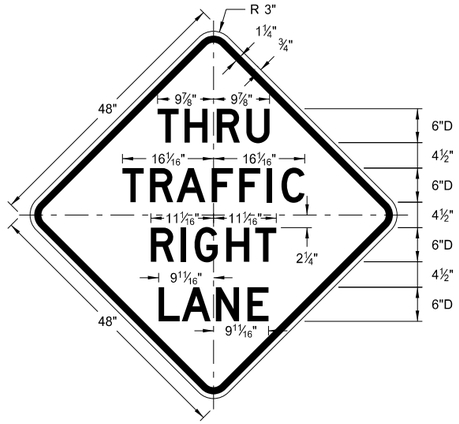

R11-4a-60
Legend: black (non-refl)
Background: white


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

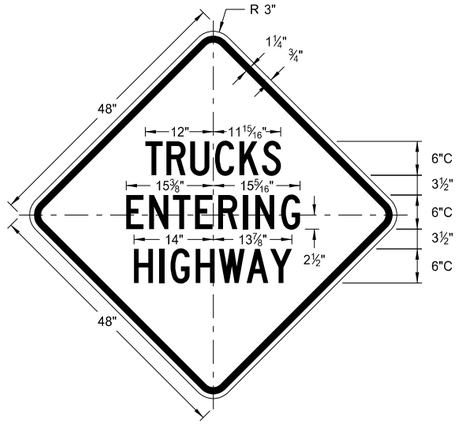
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-13-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-17-17 | Revised sign number |
| 10-03-19 | New Design Engineer PE Stamp |

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

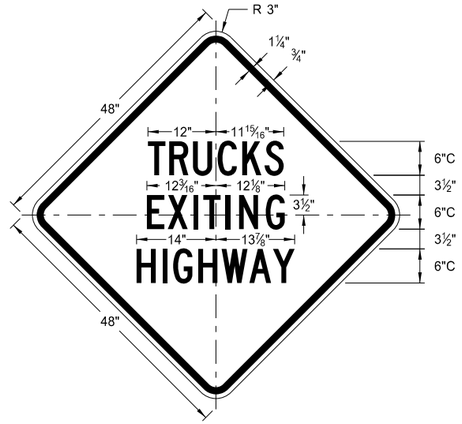
# CONSTRUCTION SIGN DETAILS
## WARNING SIGNS




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




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




W8-56-48
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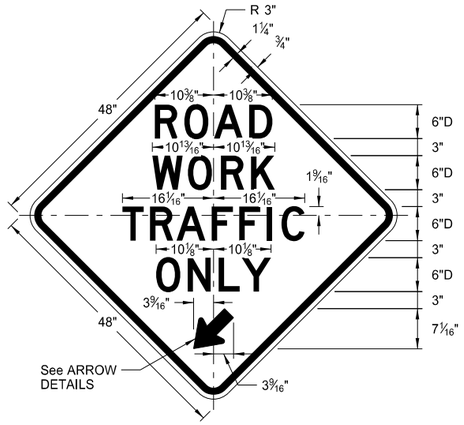
Background: orange




W5-9-48
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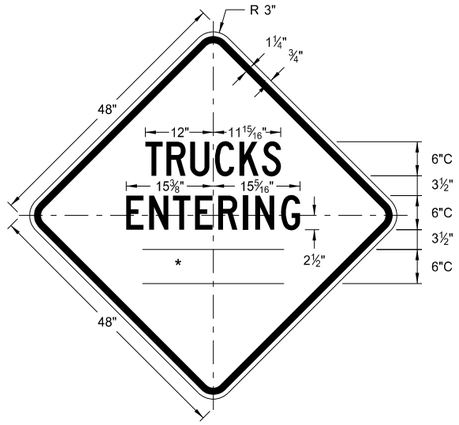
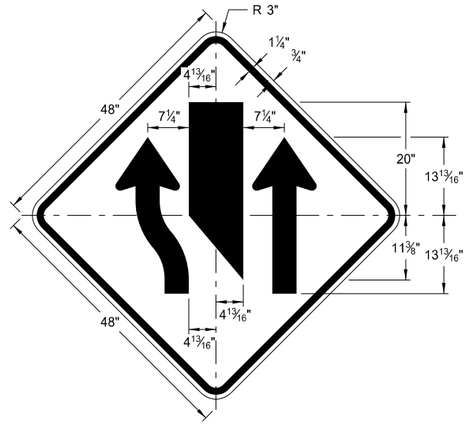
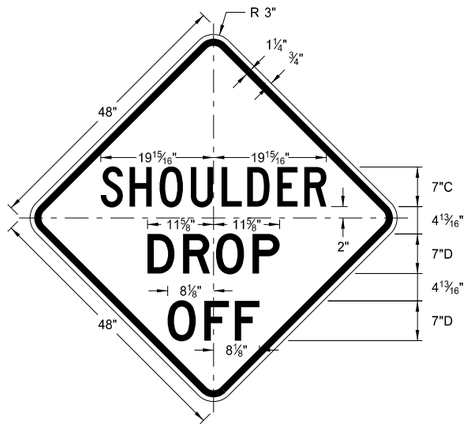
Background: orange



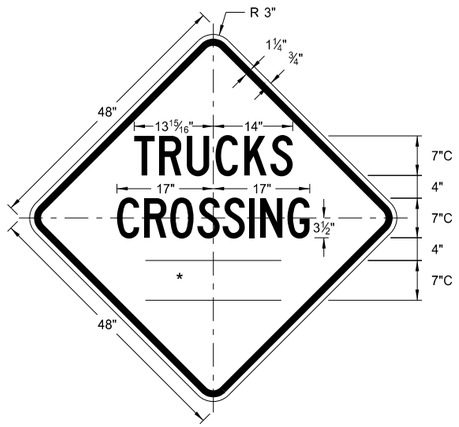

W8-54-48
Legend: black (non-refl)
Background: orange




W9-3a-48
Legend: black (non-refl)
Background: orange



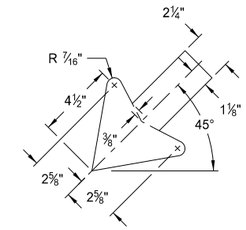

W8-9a-48
Legend: black (non-refl)
Background: orange



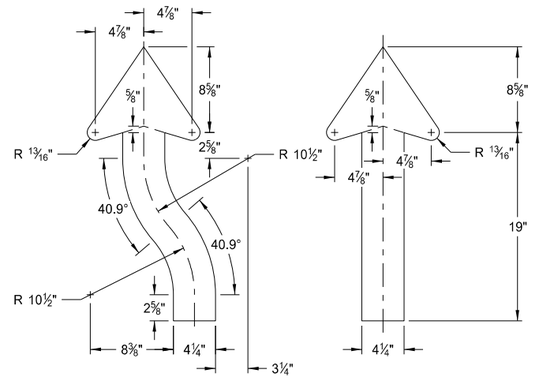

W8-55-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES




W5-9-48



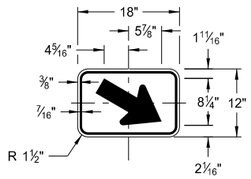

W9-3a-48

ARROW DETAILS

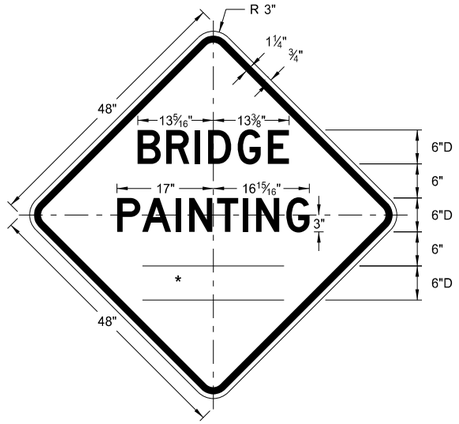
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-13-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-17-17 | Updated sign number |
| 5-31-18 | Revised sign and arrow details |
| 10-03-19 | New Design Engineer PE Stamp |

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

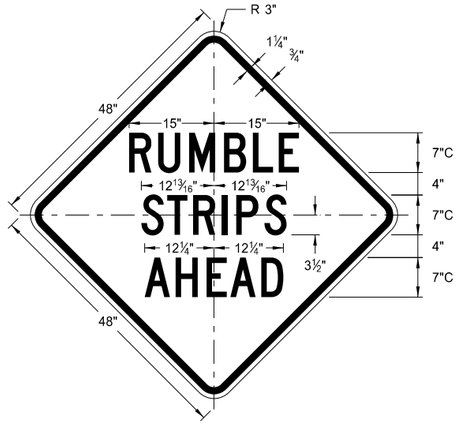
# CONSTRUCTION SIGN DETAILS
## WARNING SIGNS




W16-7aP-18
Legend: black (non-refl)
Background: orange



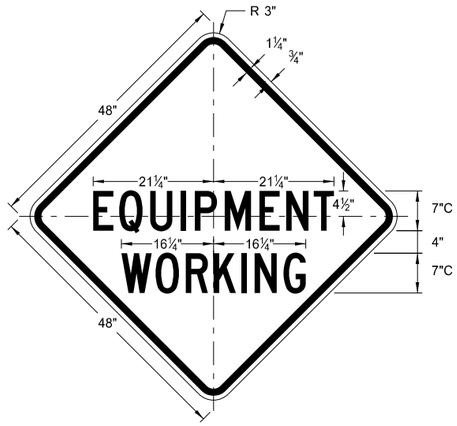

W21-50-48
Legend: black (non-refl)
Background: orange



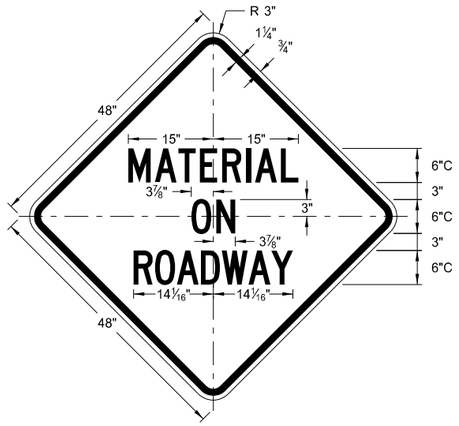

W21-53-48
Legend: black (non-refl)
Background: orange

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

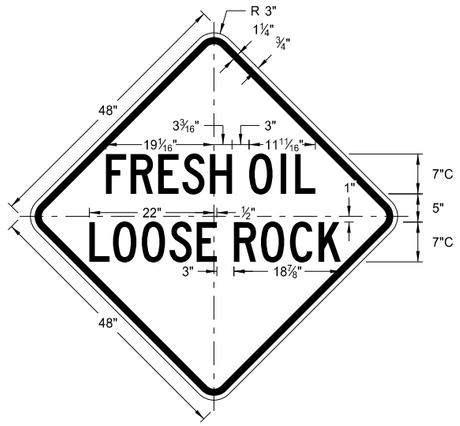
* DISTANCE MESSAGES



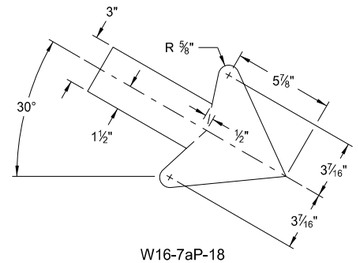

W20-51-48
Legend: black (non-refl)
Background: orange



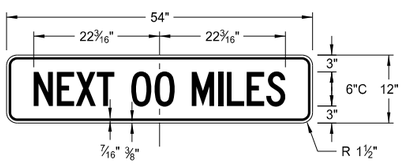

W21-51-48
Legend: black (non-refl)
Background: orange



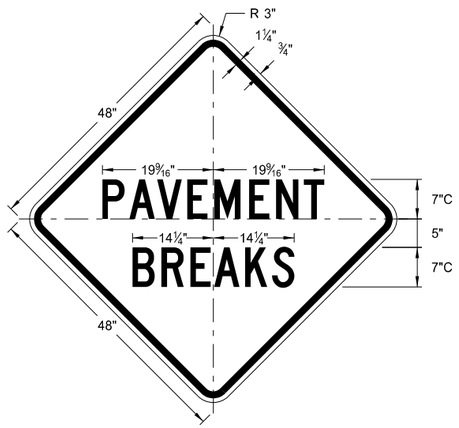

W22-8-48
Legend: black (non-refl)
Background: orange




W16-7aP-18




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



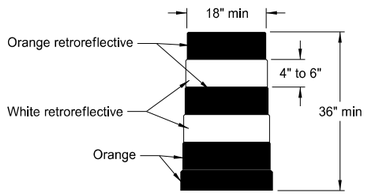

W21-52-48
Legend: black (non-refl)
Background: orange

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

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

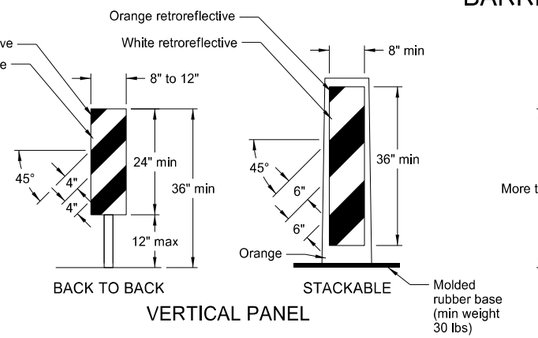
# BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



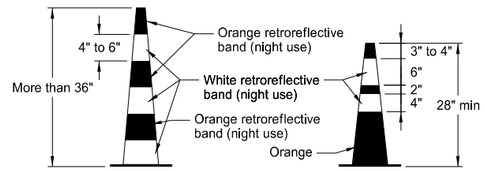

## DELINEATOR DRUM

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



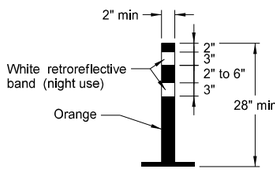

## VERTICAL PANEL

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



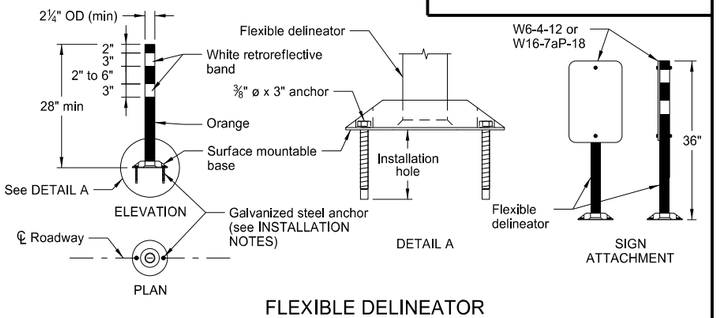

## TRAFFIC CONE

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




## TUBULAR MARKER

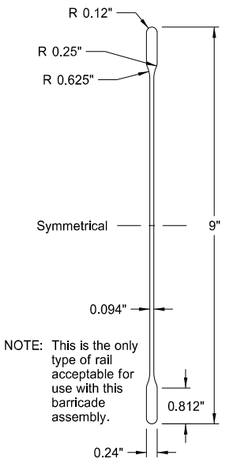
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.




## FLEXIBLE DELINEATOR

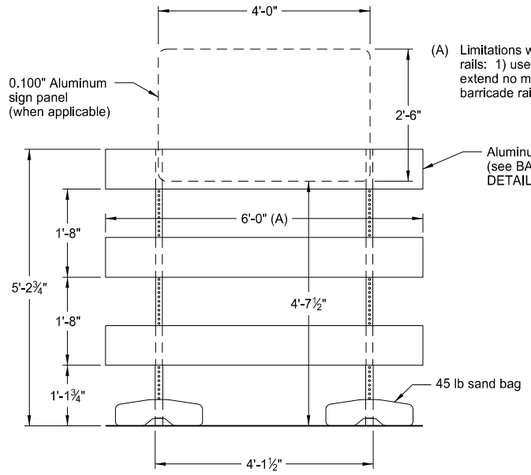
INSTALLATION NOTES:

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



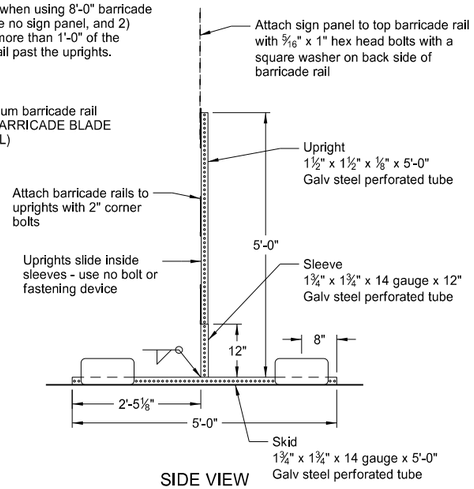

NOTE: This is the only type of rail acceptable for use with this barricade assembly.

## BARRICADE BLADE DETAIL



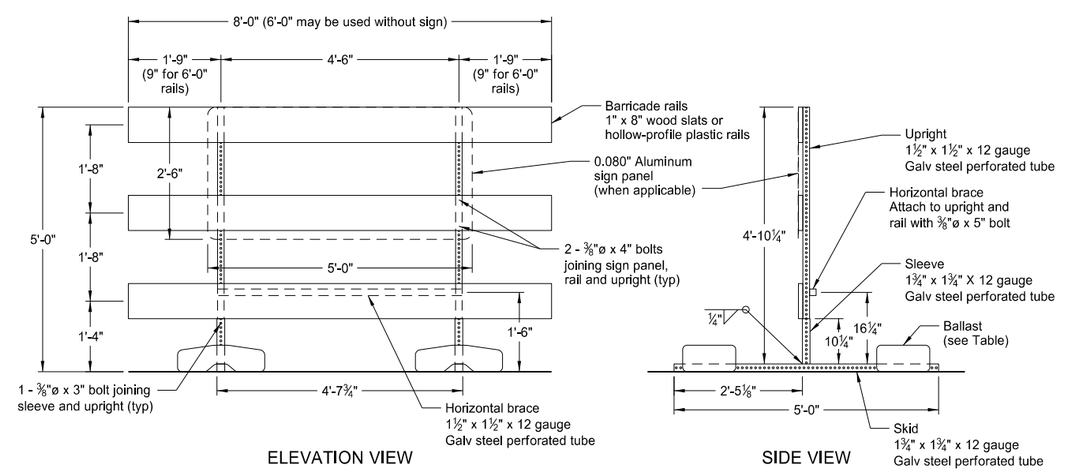

(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

## ELEVATION VIEW



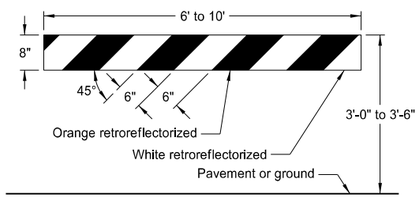

## SIDE VIEW

## BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

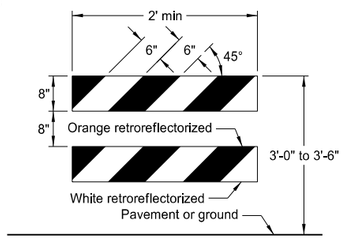



## BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

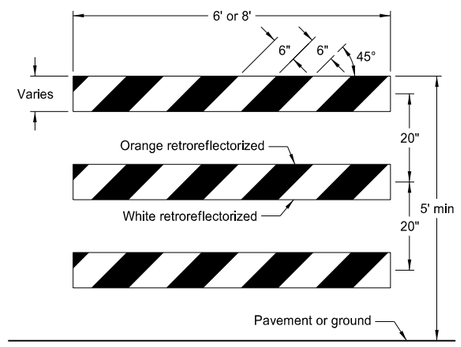
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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




## TYPE I BARRICADE

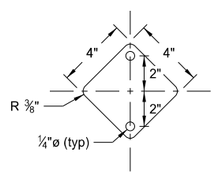


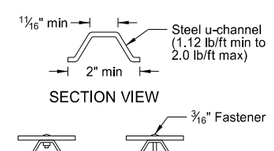

## TYPE II BARRICADE

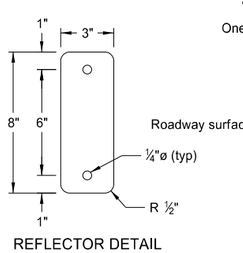



## TYPE III BARRICADE

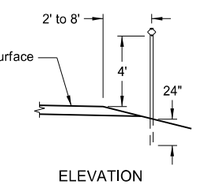
## BARRICADE RAIL DETAILS




## REFLECTOR DETAIL




## ELEVATION

## DELINEATORS

### MINIMUM BALLAST
(For each side of barricade support)

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

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

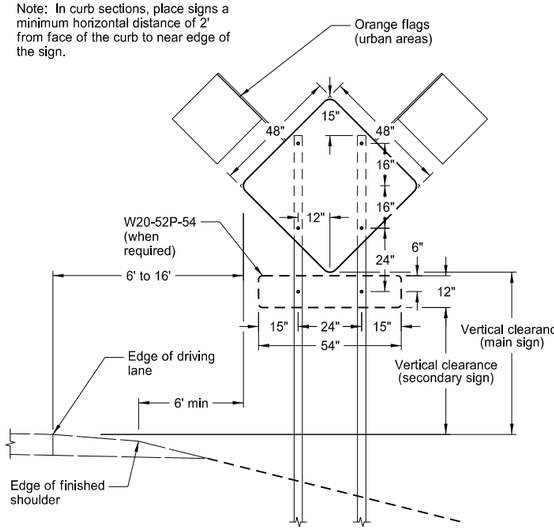
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-27-17<br>11-01-19 | Updated to active voice<br>Revised details for Flexible Delineator |

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

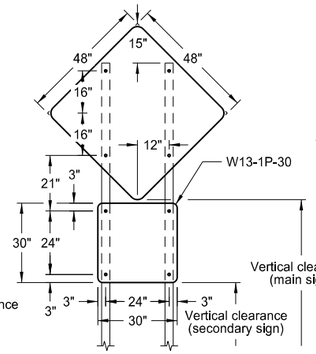
# CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

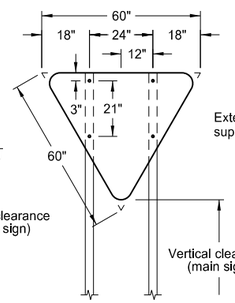
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



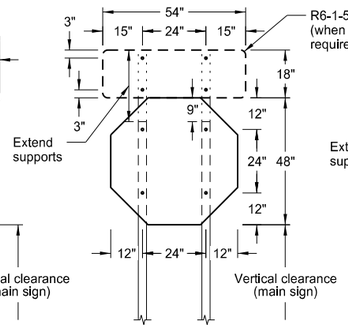

TYPICAL SECTION
(48" x 48" diamond warning sign shown)



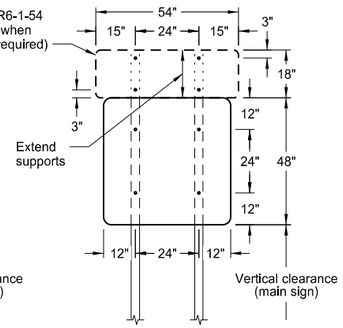

48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



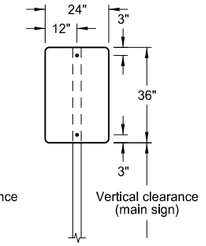

R1-2-60 - YIELD SIGN



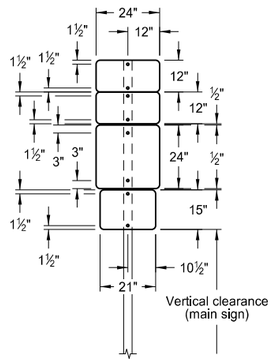

R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



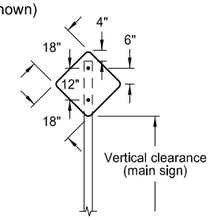

48" x 48" SIGN
(with R6-1-54 sign as required)



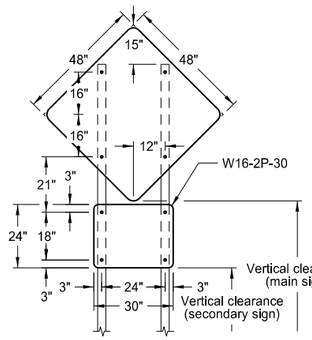

24" x 36" SIGN



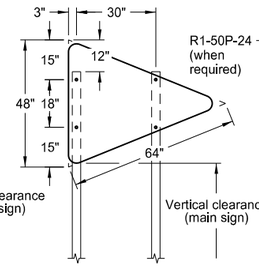

24" x 24"
ROUTE MARKER
ASSEMBLY



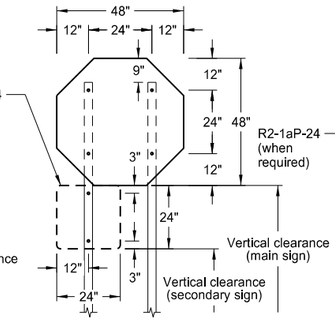

18" x 18"
DIAMOND SIGN



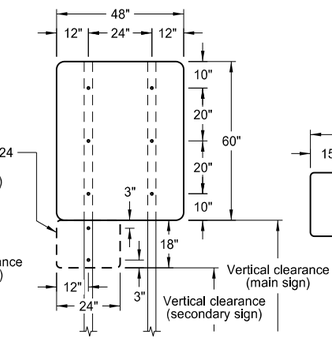

48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



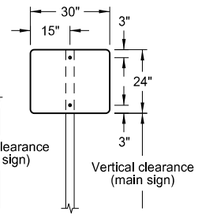

W14-3-64 - PENNANT SIGN



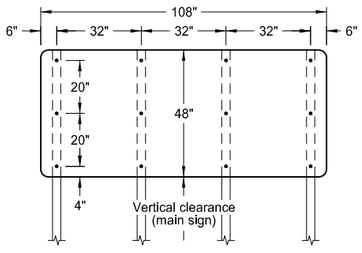

R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



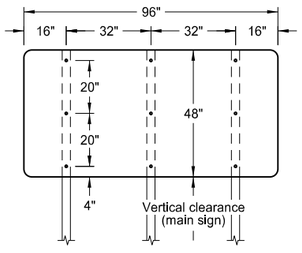

48" x 48" SIGN
(with R2-1aP-24 sign as required)



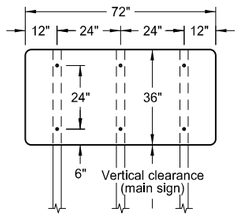

30" x 24" SIGN



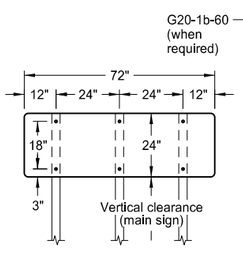

108" x 48" SIGN



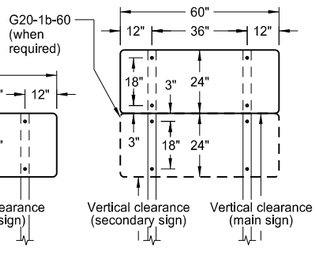

96" x 48" SIGN



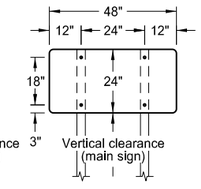

72" x 36" SIGN



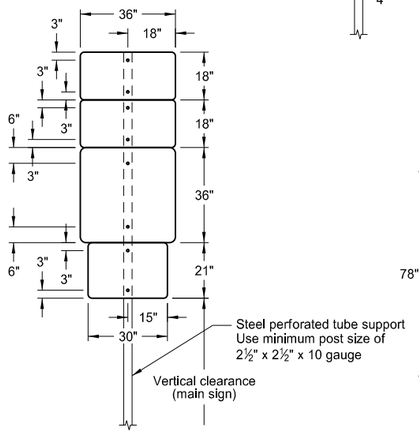

72" x 24" SIGN



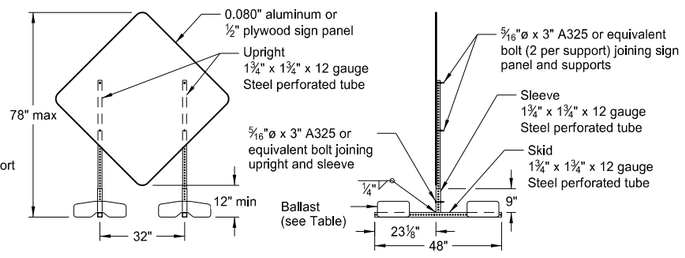

60" x 24" SIGN



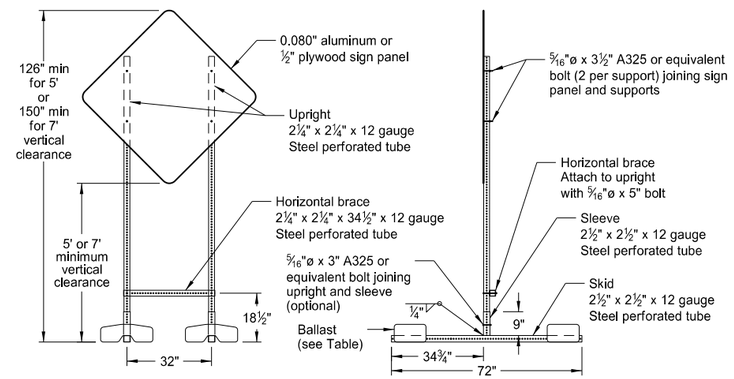

48" x 24" SIGN




36" x 36"
ROUTE MARKER
ASSEMBLY




PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT




PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

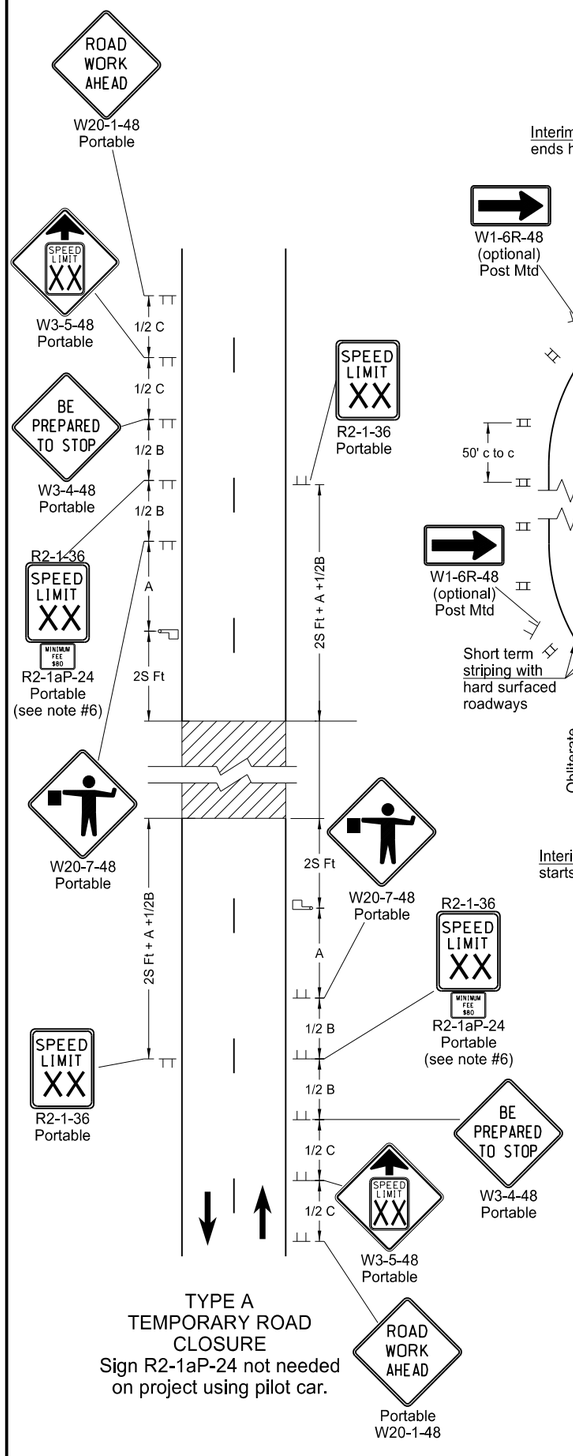
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

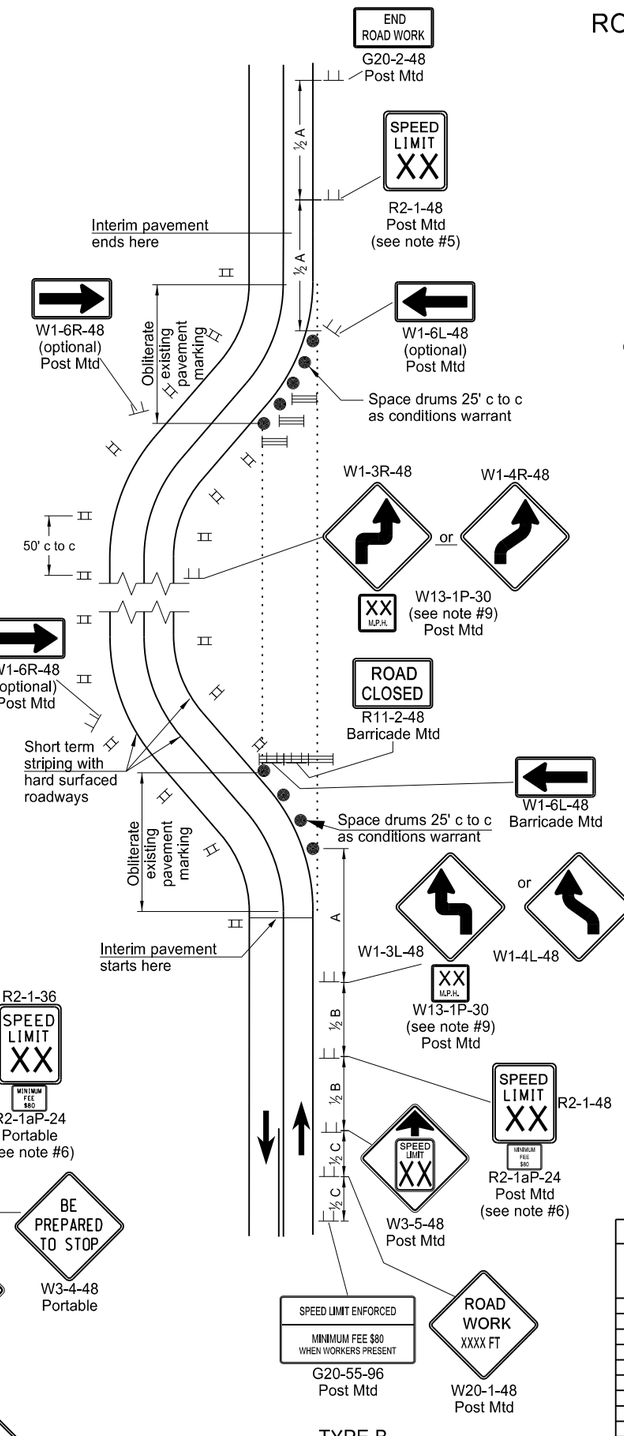
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

# ROAD CLOSURE LAYOUTS

D-704-15

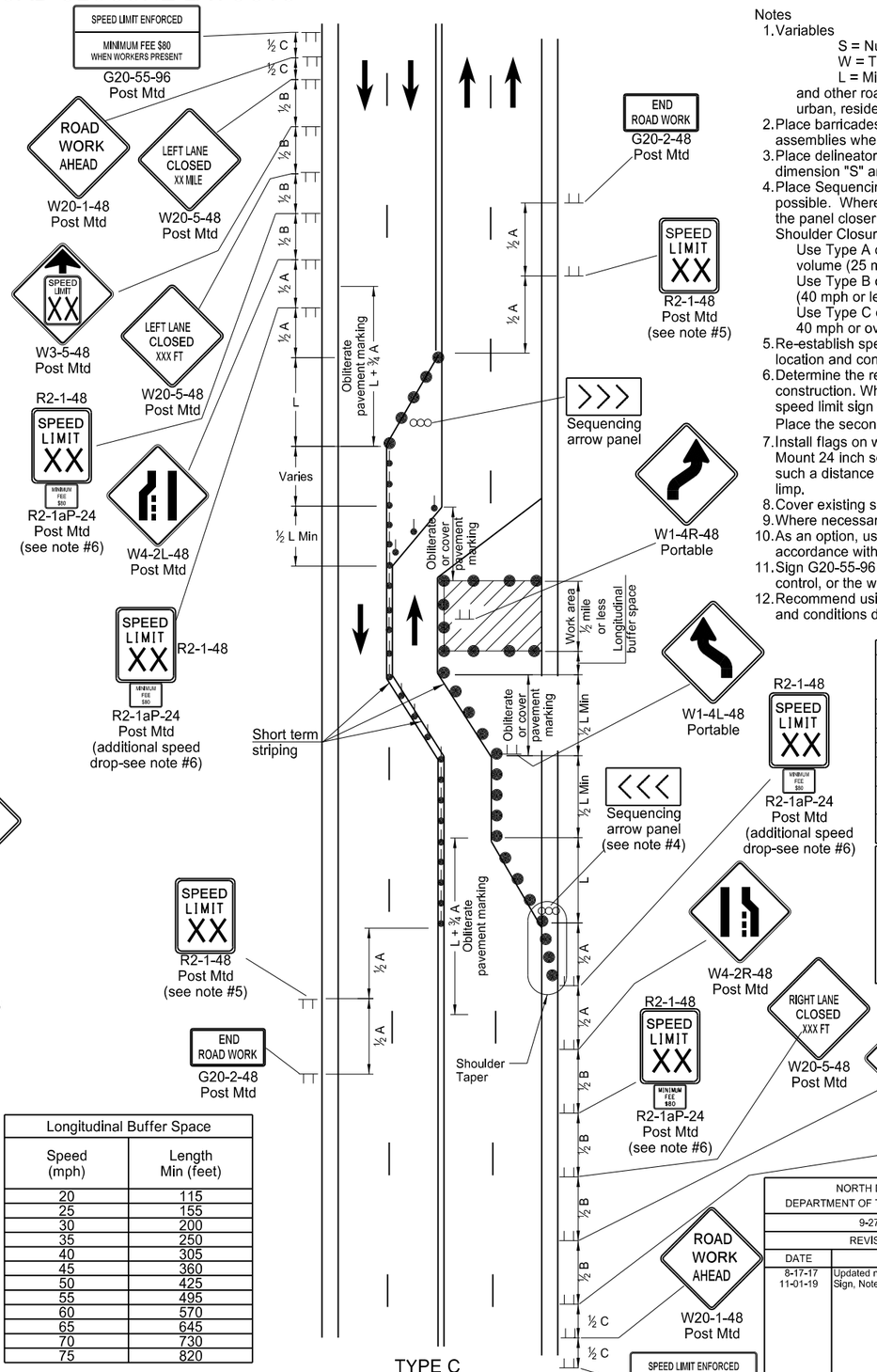



TYPE A
TEMPORARY ROAD CLOSURE
Sign R2-1aP-24 not needed on project using pilot car.




TYPE B
ROAD CLOSURE WITH A DIVERSION
Two lane highway where roadway is closed and detour provided (signing shown for one direction only). Use on bridge and culvert installation with ½ mile or less closure.

| 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 |




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

Notes

1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and other roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
8. Cover existing speed limit signs within reduced speed zones.
9. Where necessary, engineer will determine safe speed.
10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
11. Sign G20-55-96 is not required if this standard is part of other traffic control, or the work is less than 15 days.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

ADVANCE WARNING SIGN SPACING

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

KEY

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

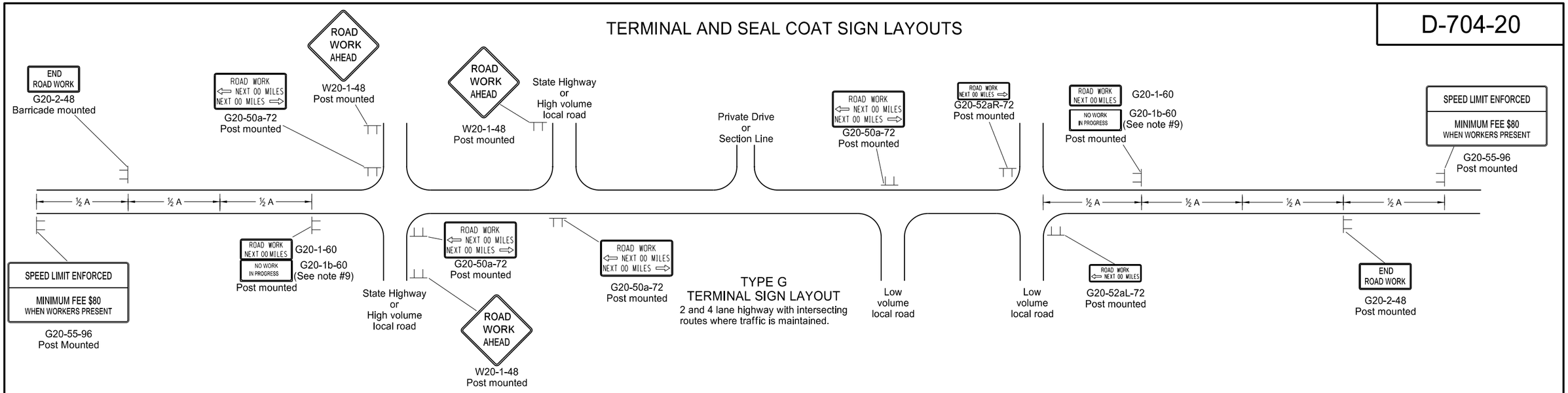
REVISIONS

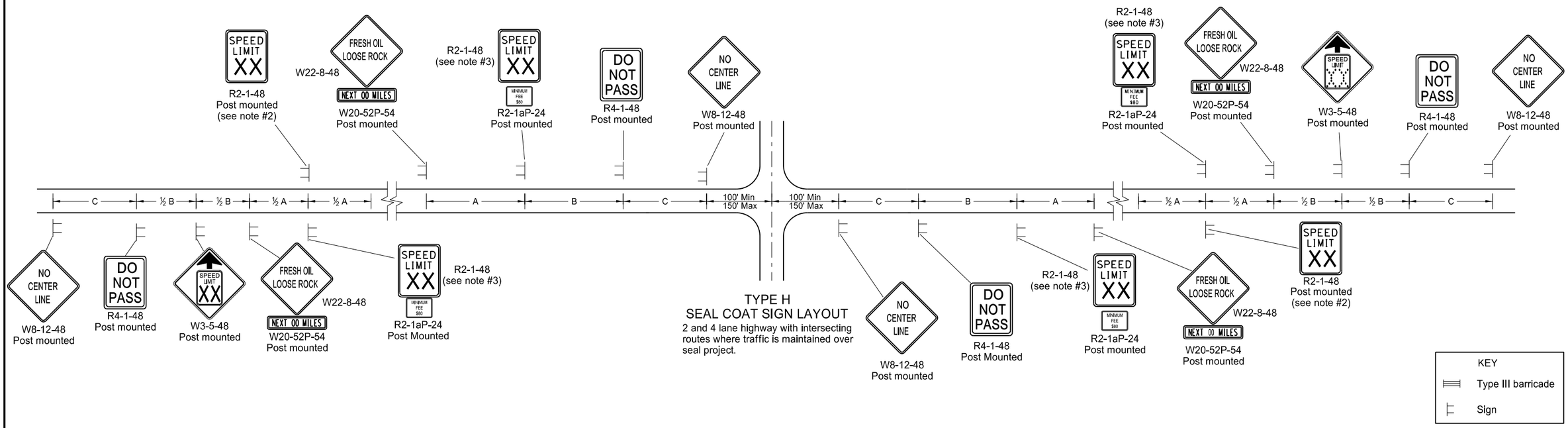
| DATE | CHANGE |
|---|---|
| 8-17-17 | Updated notes & Speed Limit signs |
| 11-01-19 | Sign, Notes, and Pvmt Mkg updates |

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/01/19 and the original document is stored at the North Dakota Department of Transportation

# TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20




1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Determine the exact speed limit in the field, based on location and conditions.
3. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
8. Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
9. Install sign G20-1b-60 when work is suspended for winter.
10. Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
11. Sign G20-55-96 is not required if work is less than 15 days.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

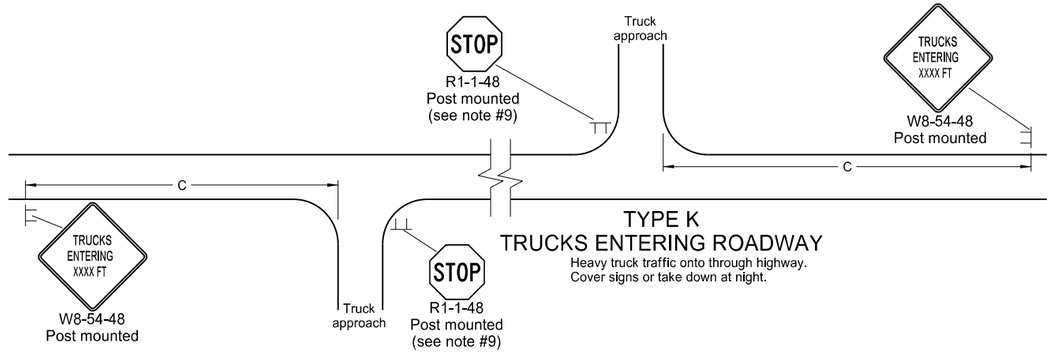
REVISIONS

| DATE | CHANGE |
|---|---|
| 8-17-17 | Updated notes & sign numbers. |
| 11-01-19 | Note & sign updates. |

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

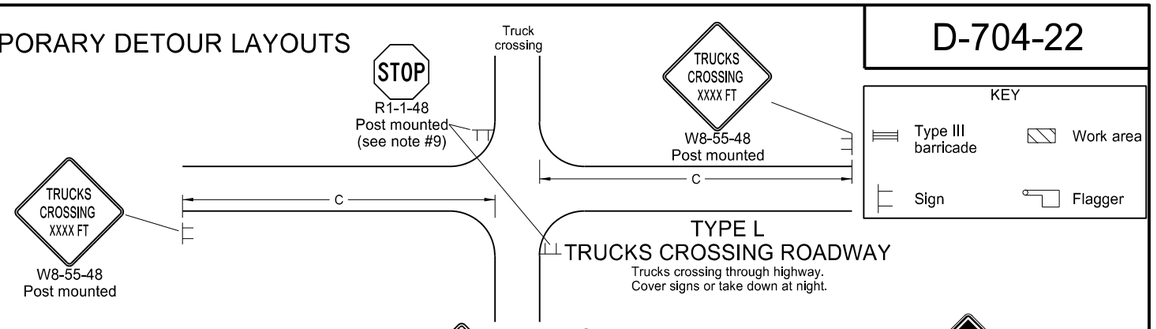
# CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22




## TYPE K
## TRUCKS ENTERING ROADWAY

Heavy truck traffic onto through highway.
Cover signs or take down at night.

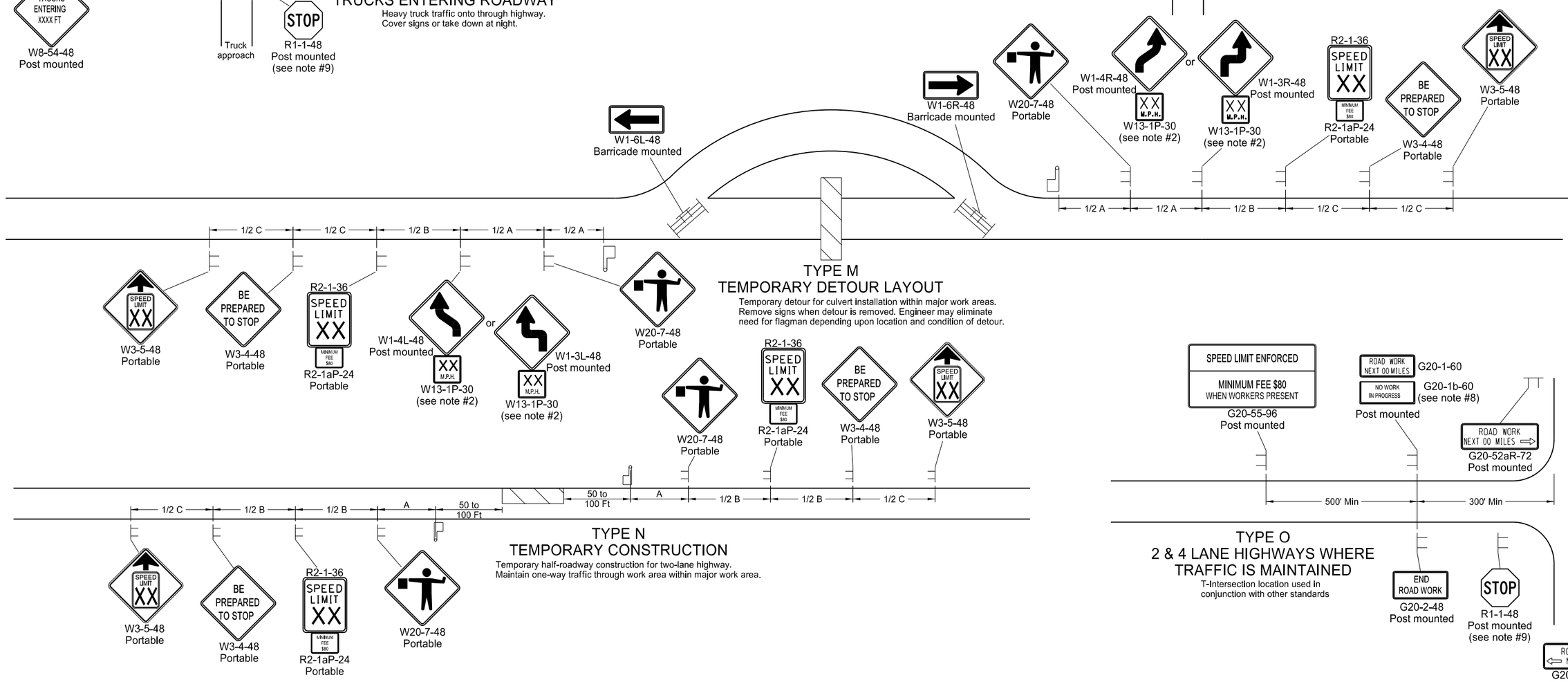



## TYPE L
## TRUCKS CROSSING ROADWAY

Trucks crossing through highway.
Cover signs or take down at night.

KEY

- Type III barricade
- Work area
- Sign
- Flagger




## TYPE M
## TEMPORARY DETOUR LAYOUT

Temporary detour for culvert installation within major work areas.
Remove signs when detour is removed. Engineer may eliminate need for flagman depending upon location and condition of detour.

## TYPE N
## TEMPORARY CONSTRUCTION

Temporary half-roadway construction for two-lane highway.
Maintain one-way traffic through work area within major work area.




## TYPE O
## 2 & 4 LANE HIGHWAYS WHERE TRAFFIC IS MAINTAINED

T-Intersection location used in conjunction with other standards

Notes

1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
8. Install sign G20-1b-60 when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. Sign G20-55-96 is not required if layout is part of other traffic control or if work is less than 15 days.
11. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

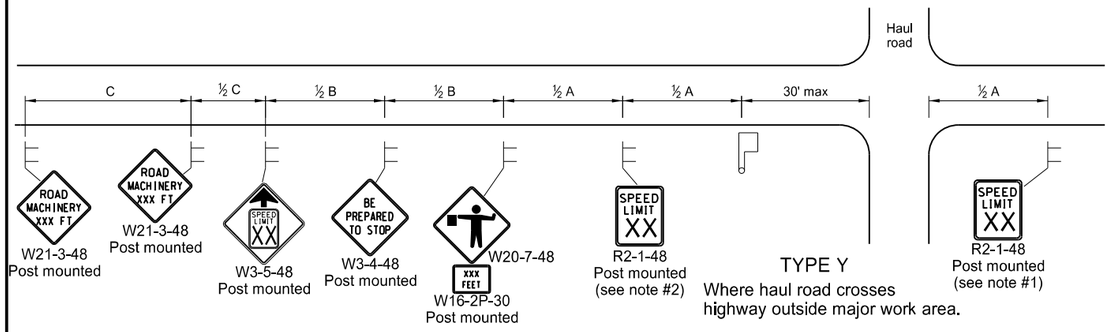
REVISIONS

| DATE | CHANGE |
|---|---|
| 8-17-17 | Update notes & sign numbers |
| 11-01-19 | Revised sign numbers & note 7 |

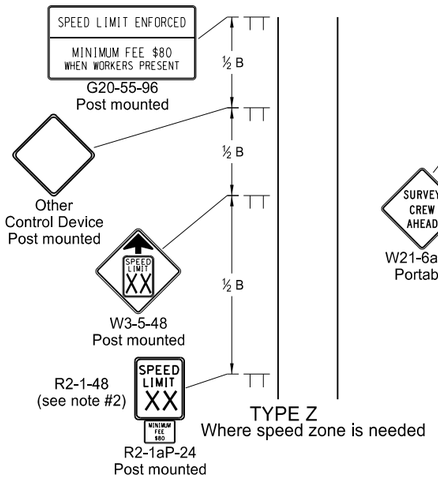
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

# MISCELLANEOUS SIGN LAYOUTS

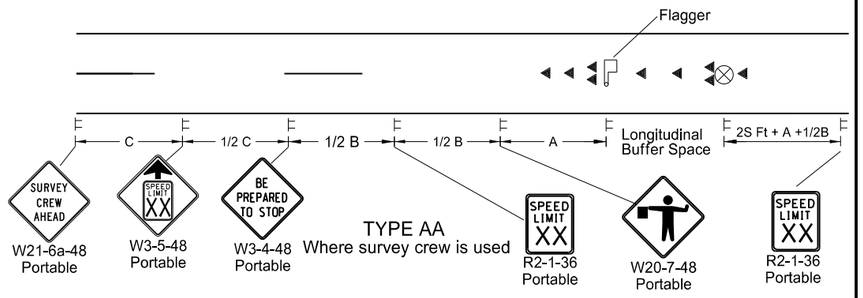
D-704-26



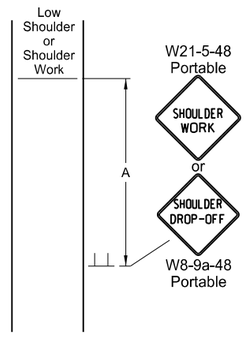

TYPE Y
Where haul road crosses highway outside major work area.



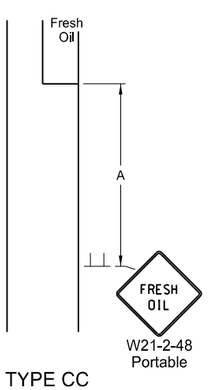

TYPE Z
Where speed zone is needed



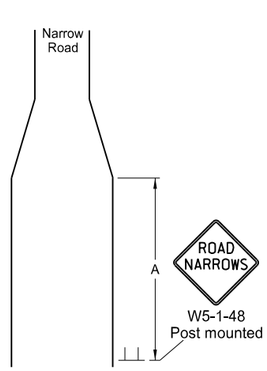

TYPE AA
Where survey crew is used

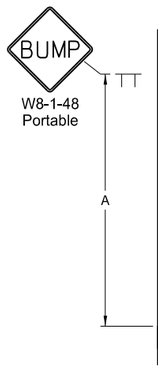



TYPE BB
Within major work area where sign conditions exist



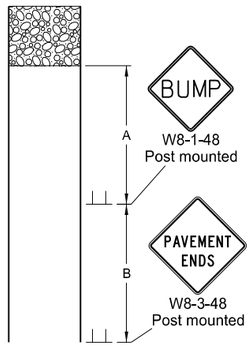

TYPE CC
Where sign conditions exist



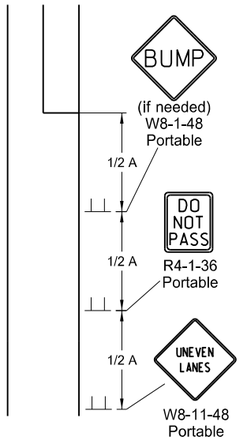




TYPE DD
Where sign conditions exist

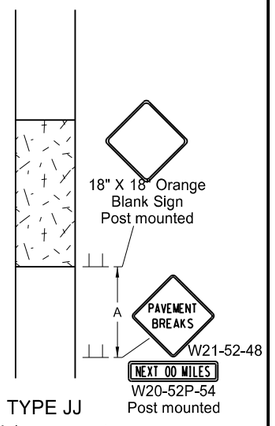
TYPE EE
Where sign conditions exist



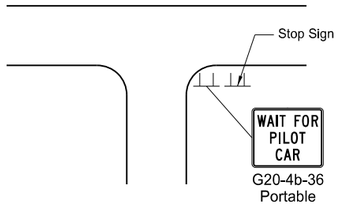

TYPE FF
Where sign conditions exist




TYPE GG
Where elevation difference exists between lanes




TYPE JJ
For break in pavement.
Install signs when conditions exist and remove when not applicable.




TYPE KK
At major intersections within pilot car control area

Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
2. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½B.
3. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
4. Cover existing speed limit signs within reduced speed zones.
5. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
6. Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
7. When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
8. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

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

* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

KEY

Sign  Flagger  Cones

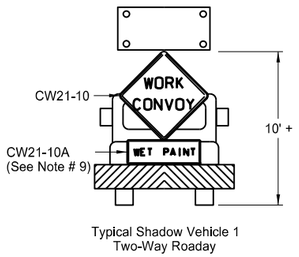
S = Numerical value of speed limit or 85th percentile.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-17-17 | Added speed limit signs. Updated notes & sign numbers |

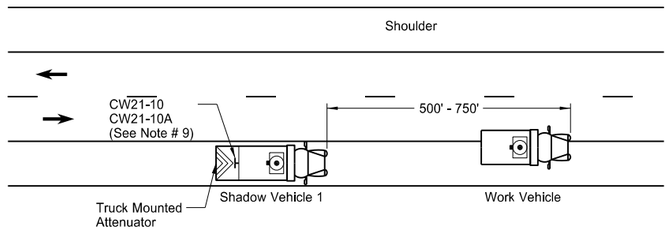
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

# TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

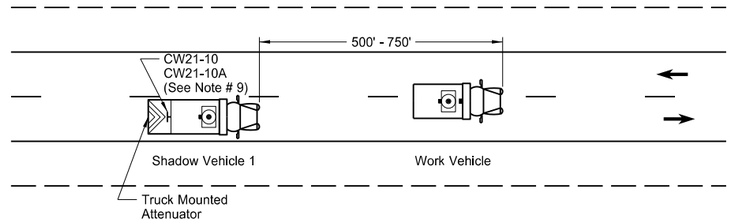
D-704-27




Typical Shadow Vehicle 1
Two-Way Roaday

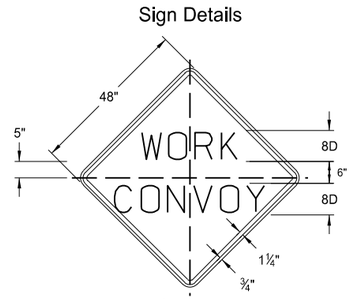



Two-Way Roadway with Paved Shoulders

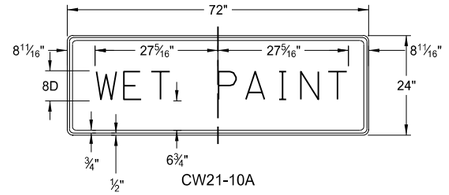



Two-Way Roadway without Paved Shoulders

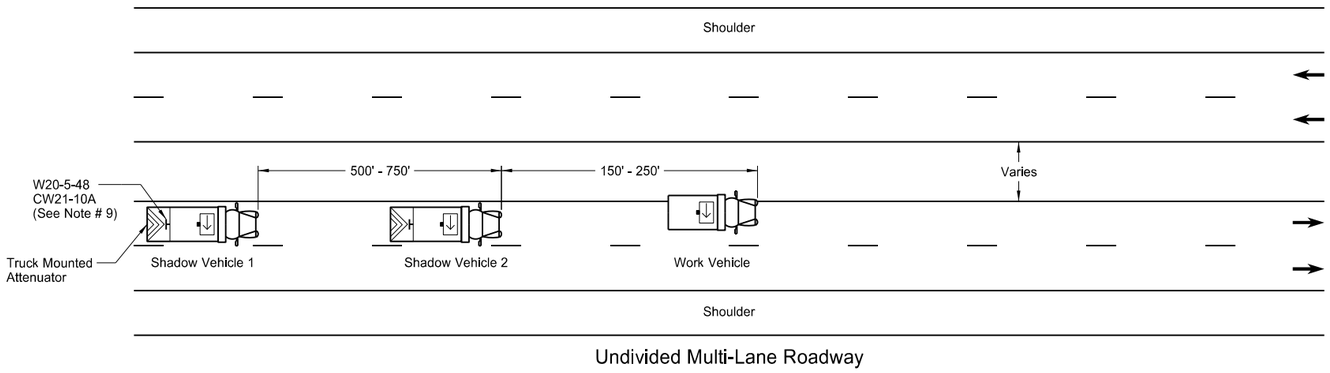
Sign Details




CW21-10

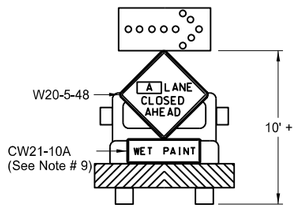



CW21-10A



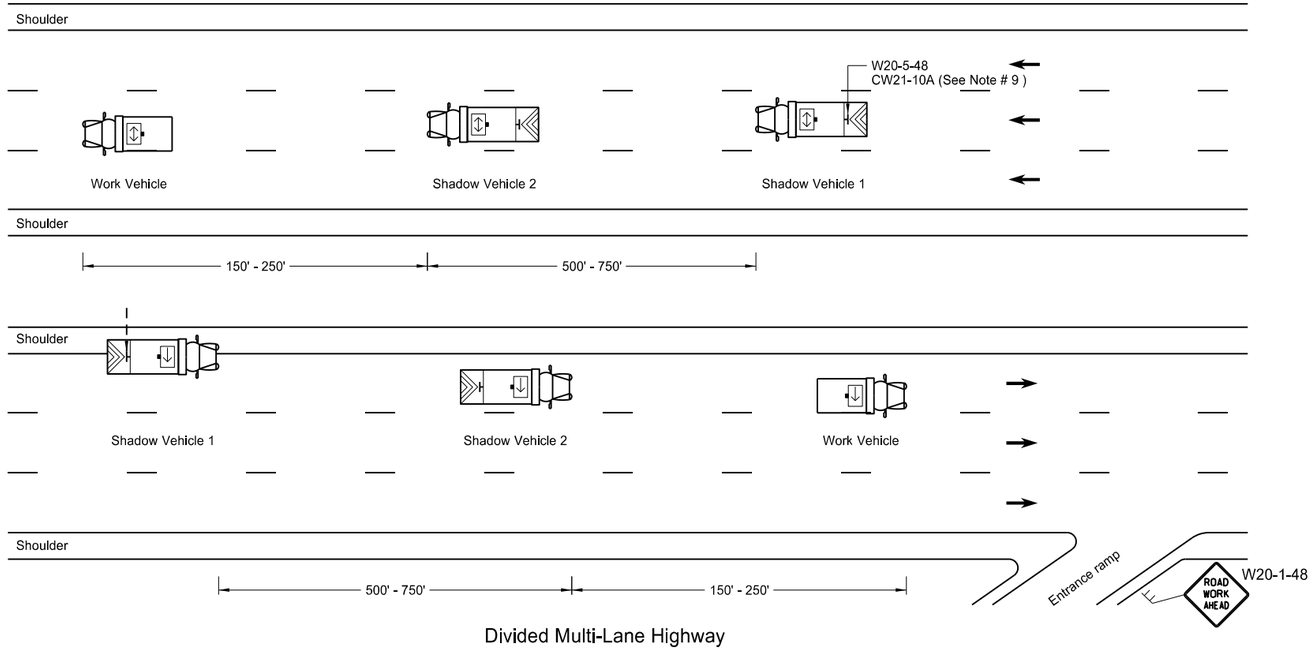

Undivided Multi-Lane Roadway

Notes
1. Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
2. Display yellow rotating beacons or stobe lights on shadow and work vehicles, unless otherwise stated in the plans.
3. Use Type B or Type C flashing arrow panels controlled from inside the vehicle.
4. Provide each vehicle with two-way electronic communication capability.
5. Move shadow vehicle 1 first to shadow other convoy vehicles when convoy changes lane.
6. Vary vehicle spacing between shadow vehicle 1 and shadow vehicle 2 based on sight distance restrictions. Motorists approaching the work convoy need to see trail vehicle in time to slow down and/or change lanes as they approach shadow vehicle.
7. Sign Colors
   Letters = Black
   Border = Black
   Background = Orange
8. As an option, use shadow vehicle 2 the paint tender vehicle.
9. Use sign CW21-10A only during painting operation.
10. Pull over work and shadow vehicles periodically to allow motor vehicle traffic to pass on two lane - two way roadways.




Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center




Divided Multi-Lane Highway

KEY

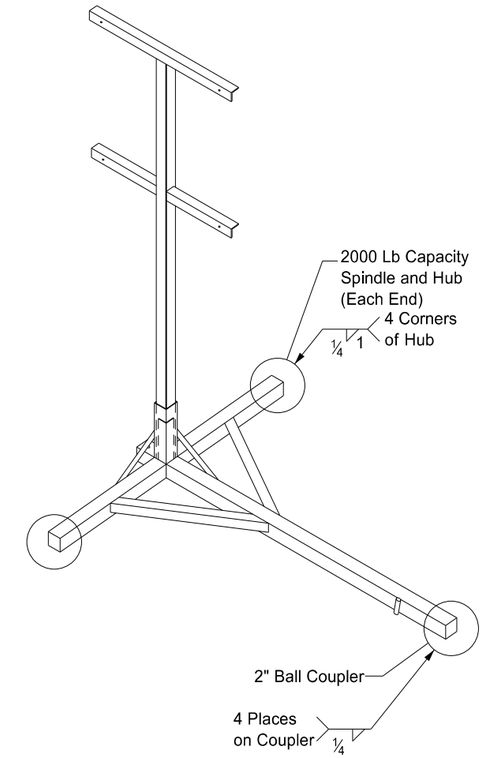
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
  - Right directional
  - Left directional
  - Double arrow directional
  - Caution Mode

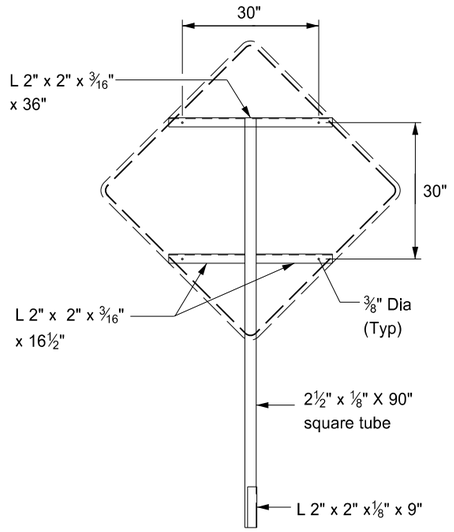
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 6-18-14 | Removed shadow vehicle 2 on two lane roadways |
| 9-27-17 | Updated to active voice |

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 09/27/2017 and the original document is stored at the North Dakota Department of Transportation

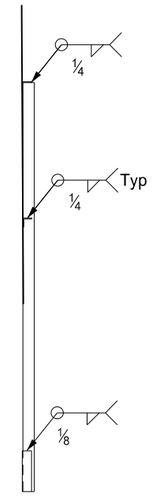
# PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



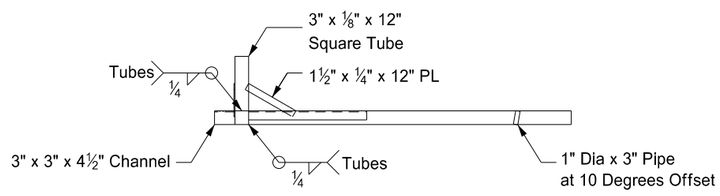




FRONT

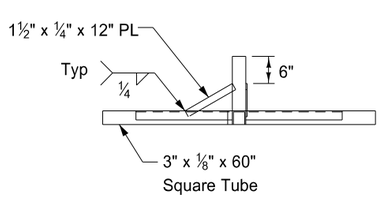



RIGHT

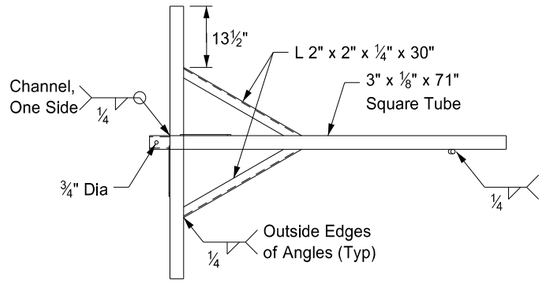
SIGN SUPPORT




FRONT




RIGHT




TOP

TRAILER

Notes:

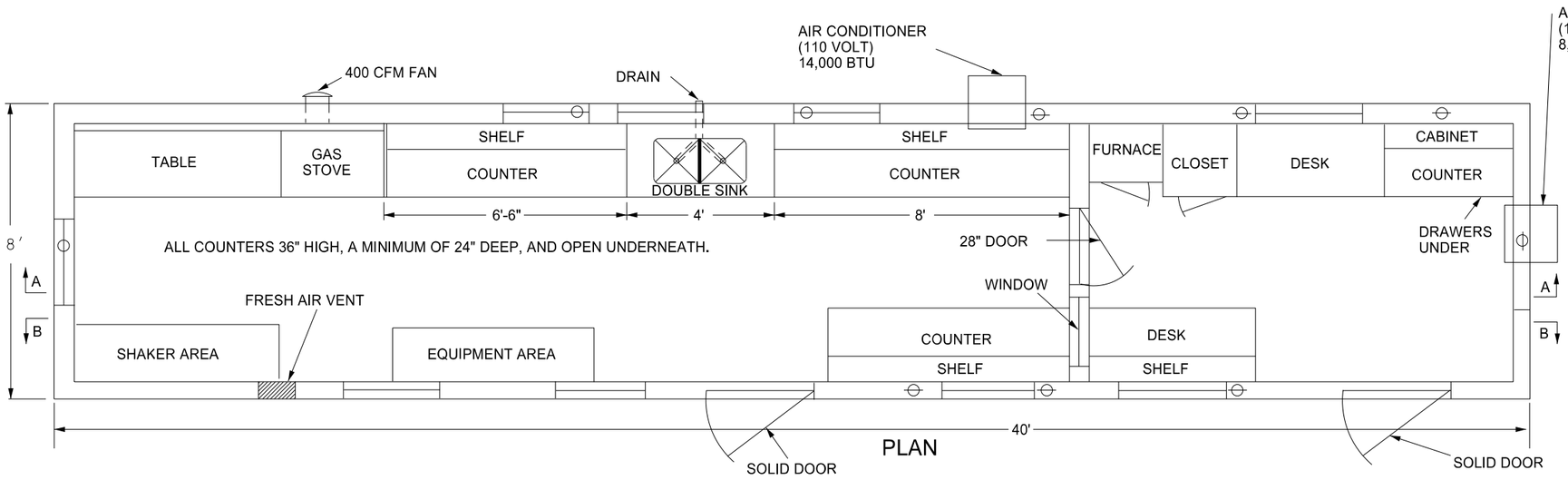
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

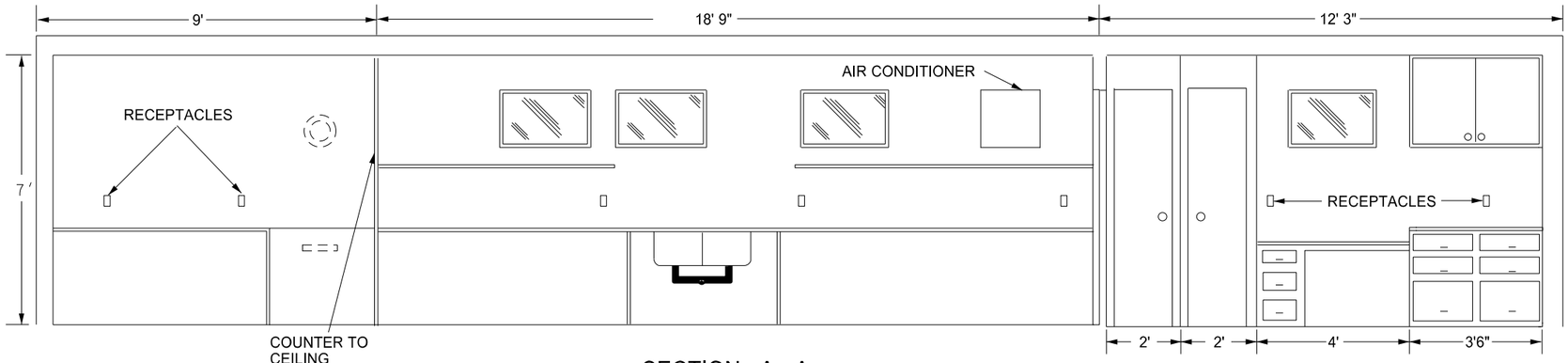
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 11-23-10 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

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

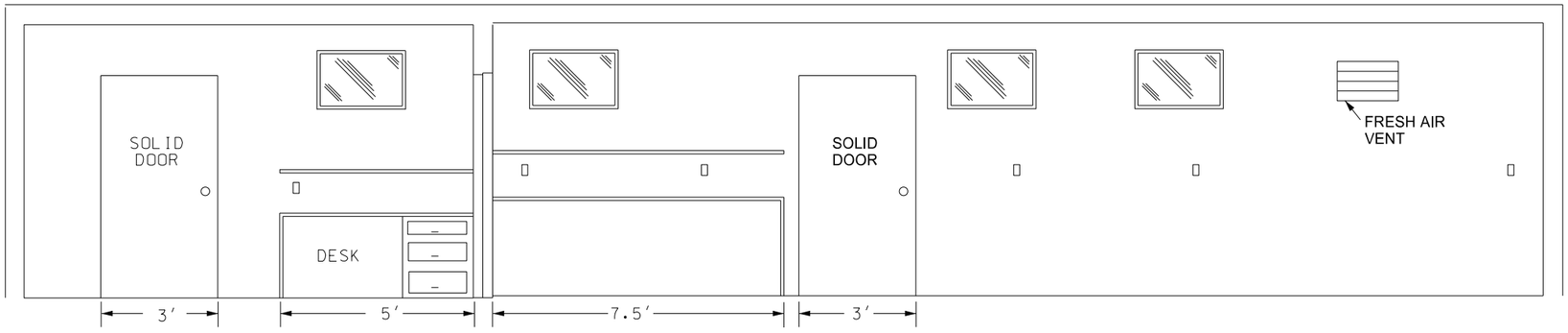
# BITUMINOUS LABORATORY

D-706-1




SECTION A - A




SECTION B - B

Provide a laboratory with the following:

1. A 1'x1' shelf at 36" above the regular countertop.
2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of ½ inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 07-30-14 | Changed standard's title and revised notes. |
| 01-11-16 | Revised notes. |

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 01/11/16 and the original document is stored at the North Dakota Department of Transportation

# PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

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

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

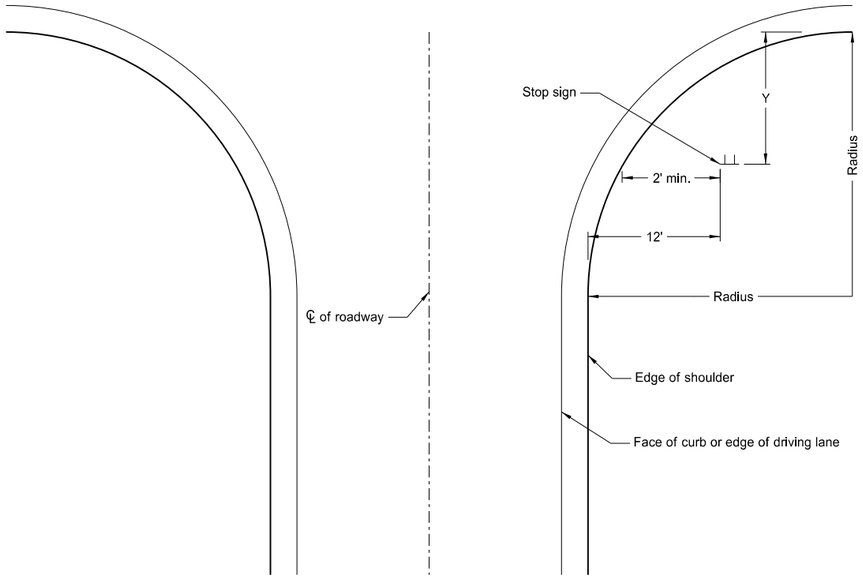
   Install signs on expressways a minimum height of 7'.

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

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

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

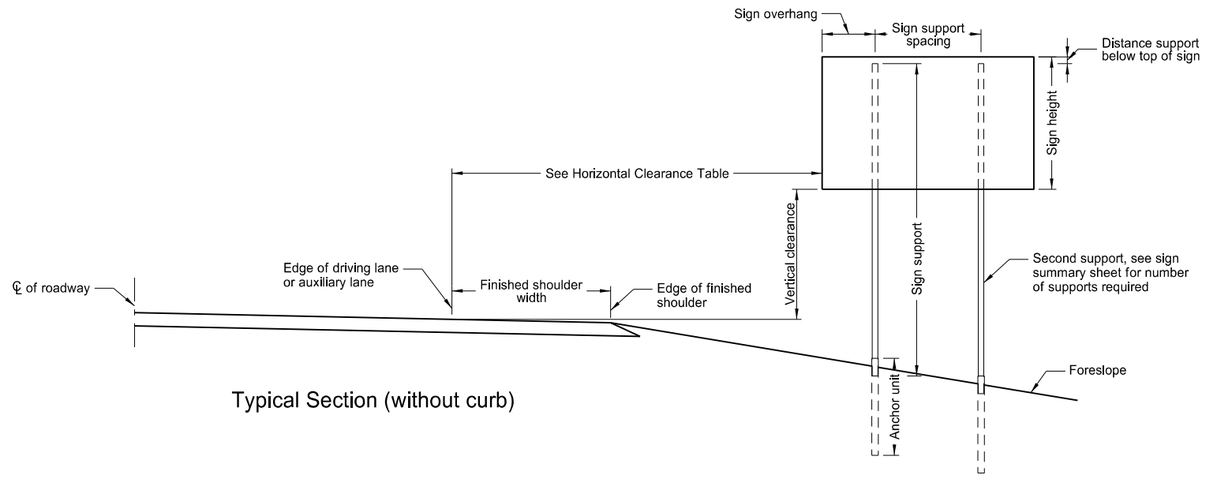
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.




Stop Sign Location
Wide Throat Intersection

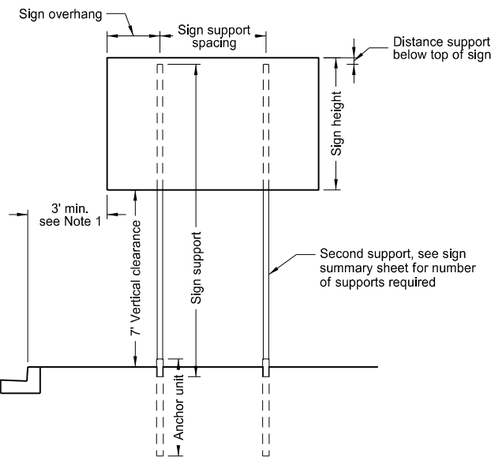
Use layout for the placement of "Stop" signs.

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



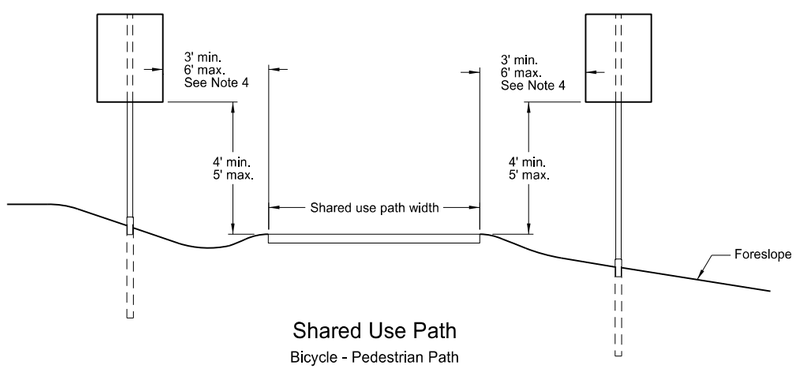

Typical Section (without curb)

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




Typical Section (with curb)

Residential or Business District

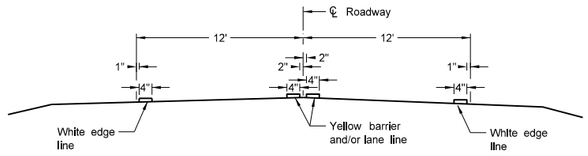



Shared Use Path

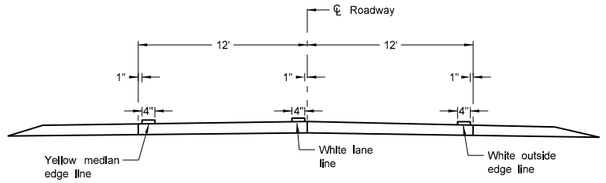
Bicycle - Pedestrian Path

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

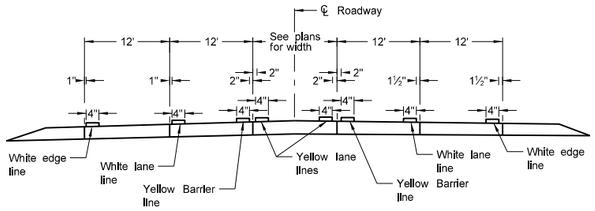
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation



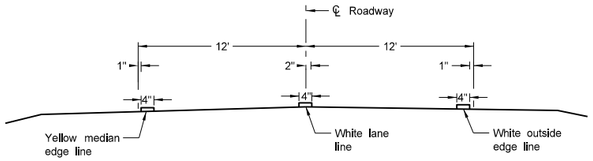

Two Lane Two Way
RURAL ROADWAY



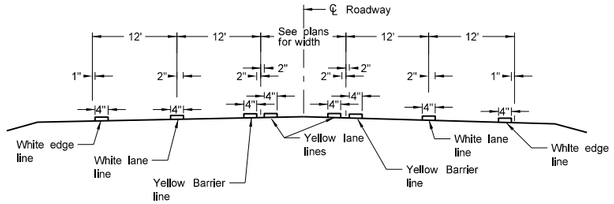

Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



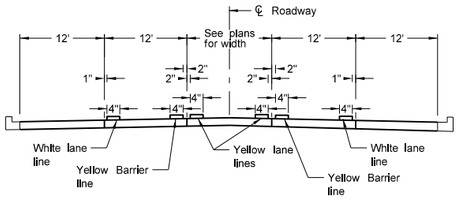

RURAL FIVE LANE ROADWAY
Concrete Section



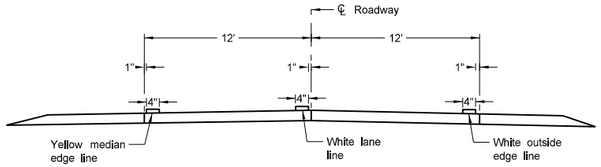

Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



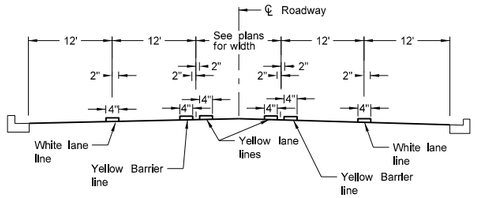

RURAL FIVE LANE ROADWAY
Asphalt Section



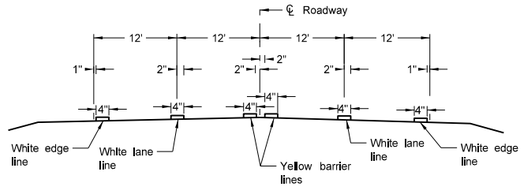

URBAN FIVE LANE SECTION
Concrete Section



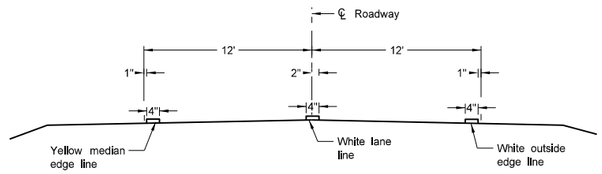

Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



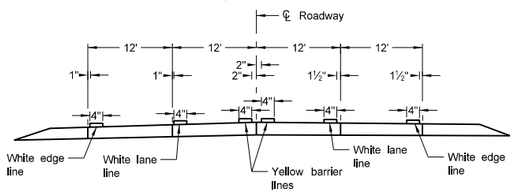

URBAN FIVE LANE SECTION
Asphalt Section



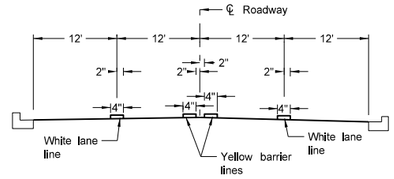

RURAL FOUR LANE ROADWAY
Asphalt Section



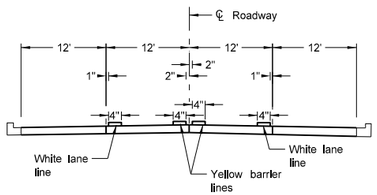

Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



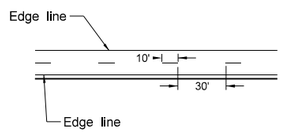

RURAL FOUR LANE ROADWAY
Concrete Section




URBAN FOUR LANE SECTION
Asphalt Section




URBAN FOUR LANE SECTION
Concrete Section




CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:

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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-17-17 | Updated to active voice. |

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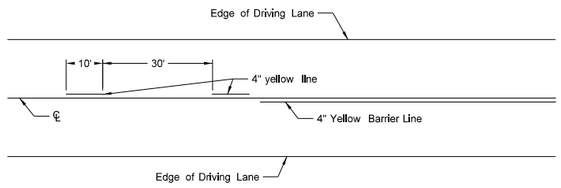
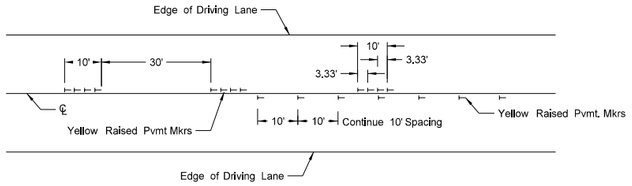
# SHORT-TERM PAVEMENT MARKING

D-762-11

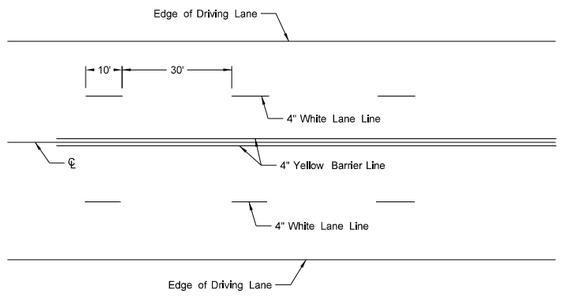



Painted or Tape Lines

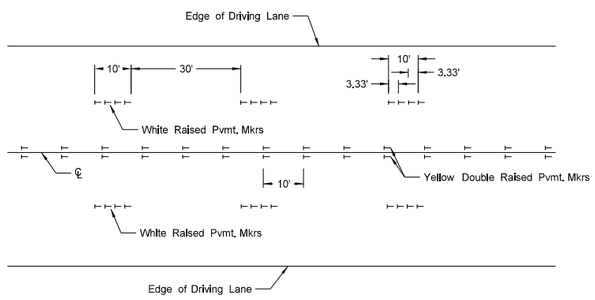



Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

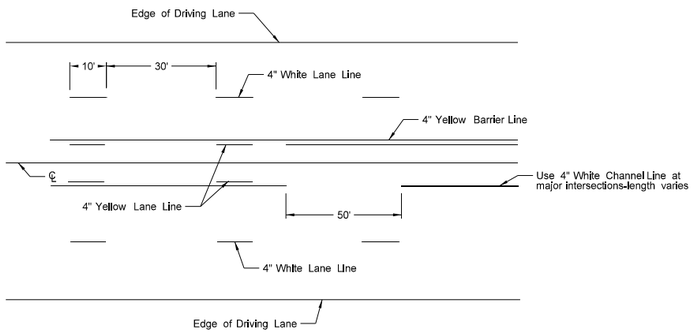



Painted or Tape Lines

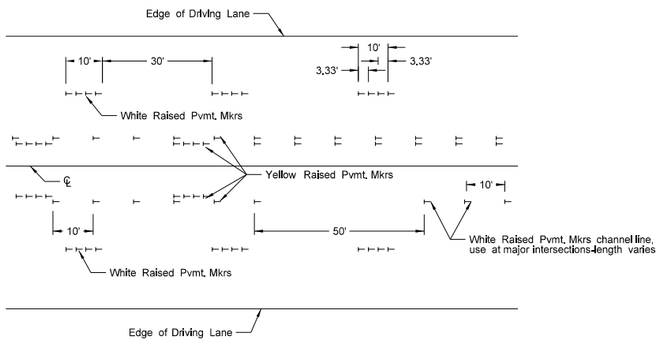



Raised Pavement Markers

FOUR LANE ROADWAY

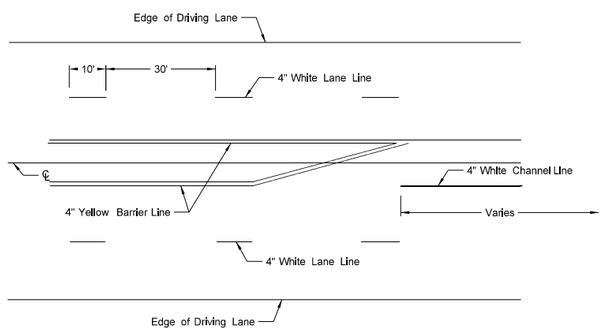



Painted or Tape Lines




Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN

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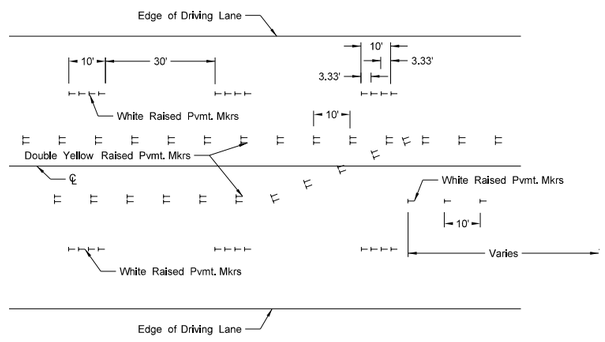


Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 3-29-16 | Re-numbered to be D-762-11 (previously was D-762-6) |
| 10-17-17 | Updated to active voice. |

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