| DESIGN DATA | | | | |
|---|---|---|---|---|
| Traffic (Direction) | Average Daily | | | |
| Current 2015 (WB) | Pass: 1670 | Trucks: 360 | Total: 2030 | |
| Forecast 2035 (WB) | Pass: 2567 | Trucks: 553 | Total: 3120 | |
| Current 2015 (EB) | Pass: 1704 | Trucks: 366 | Total: 2070 | |
| Forecast 2035 (EB) | Pass: 2622 | Trucks: 563 | Total: 3185 | |
| Clear Zone Distance: 42' | | Design Speed: 70 | | |
| Minimum Sight Dist. for Stopping: 730' | | Bridges: | | |
| Pavement Design Life 20 (years) | | | | |
| Design Accumulated One-way Flexible ESALs: | | | | |

| STATE | PROJECT NO. | PCN | SECTION NO. | SHEET NO. |
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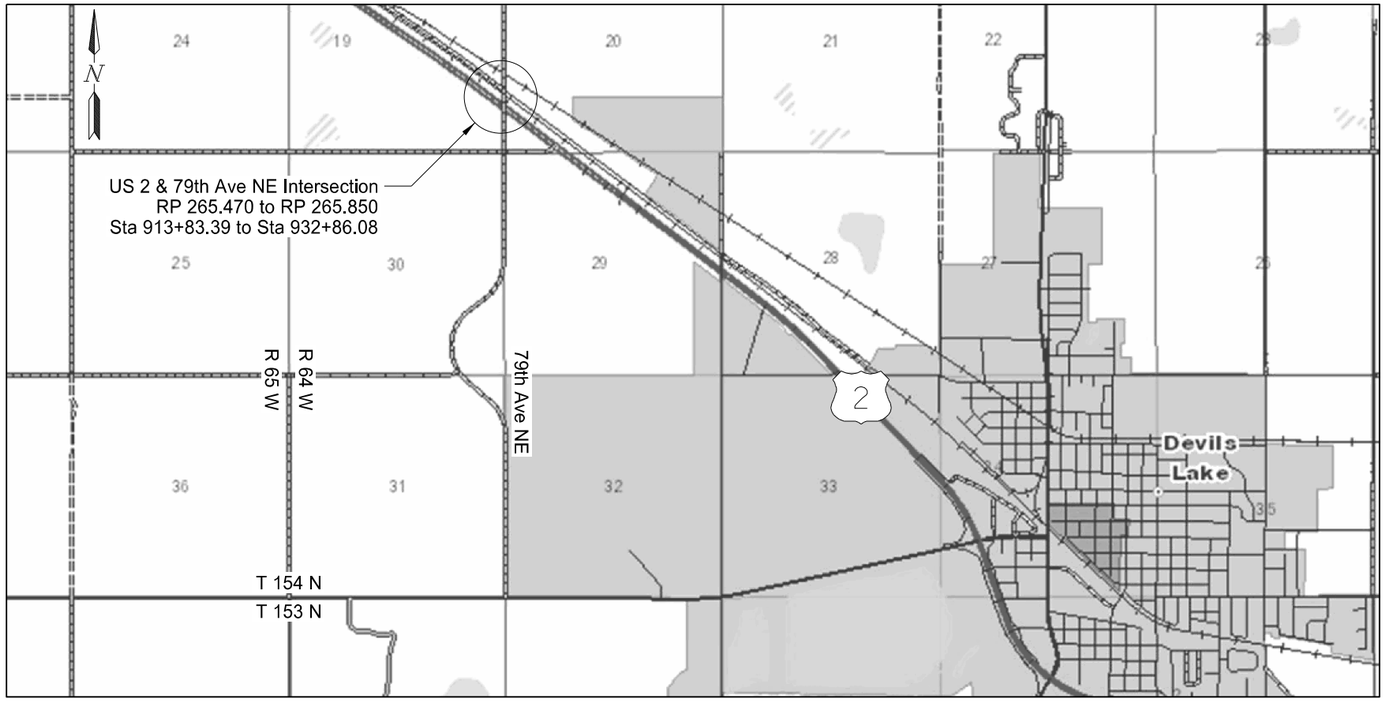
| ND | NH-3-002(146)265 | 20946 | 1 | 1 |

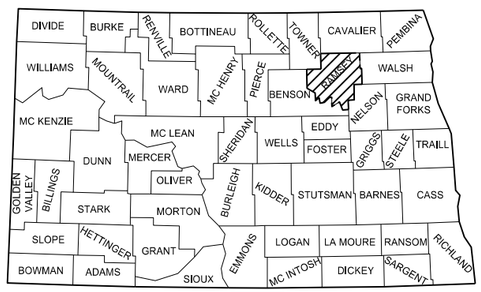
# JOB # 22
# NORTH DAKOTA
# DEPARTMENT OF TRANSPORTATION

NH-3-002(146)265
Ramsey County
US 2 & 79th Ave NE
RP 265.470 to RP 265.850
Intersection Realignment

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

| PROJECT NUMBER \ DESCRIPTION | NET MILES | GROSS MILES |
|---|---|---|
| NH-3-002(146)265 | 0.38 | 0.38 |




STATE COUNTY MAP

DESIGNERS

Aaron Murra /s/

Joe Wagner /s/

APPROVED DATE 03/22/16

Roger Weigel /s/
OFFICE OF PROJECT DEVELOPMENT
ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 03/22/16

James Rath /s/
Design Division

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
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## PLAN SECTIONS



## SPECIAL PROVISIONS

| Number | Description |
|---|---|
| SP 0003(14) | Temporary Erosion and Sediment Best Management Practices |
| SP 5048(14) | Permits and Environmental Considerations |

## LIST OF STANDARD DRAWINGS

| Number | Description |
|---|---|
| D-101-1, 2, 3 | NDDOT Abbreviations |
| D-101-10 | NDDOT Utility Company and Organization Abbreviations |
| D-101-20, 21 | Line Styles |
| D-101-30, 31, 32 | Symbols |
| D-255-2 | Erosion and Siltation Control - Erosion Control Blanket Installation |
| D-260-1 | Erosion and Siltation Controls - Silt Fence |
| D-261-1 | Erosion Control - Fiber Roll Placement Details |
| D-704-2 | Traffic Control For Coring of Hot Bituminous Pavement |
| D-704-5 | Construction Sign Detail |
| 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-704-12 | Shoulder Closure Tapers |
| D-704-13 | Barricade and Channelizing Device Details |
| D-704-14 | Construction Sign Punching and Mounting Details |
| D-704-15 | Road Closure Layouts |
| D-704-19 | Road Closure and Lane Closure on a Two Way Road Layouts |
| D-704-22 | Construction Truck and Temporary Detour Layouts |
| D-704-24 | Shoulder Closures and Bridge Painting Layouts |
| D-704-26 | Miscellaneous Sign Layouts |
| D-704-34 | Sign Layout for One Lane Closure |
| D-704-50 | Portable Sign Support Assembly |
| D-706-1 | Bituminous Laboratory |
| D-708-6 | Erosion and Siltation Controls - Median or Ditch Inlet Protection |
| D-714-1 | Reinforced Concrete Pipe Culverts and End Sections (Round Pipe) |
| D-714-4 | Round Corrugated Steel Pipe Culverts and End Sections |
| D-714-16 | Jacked and Bored Pipe |
| D-714-22 | Concrete Pipe or Precast Concrete Box Culvert Ties |
| D-714-25 | Transverse Mainline Pipe Installation Detail-Pipes More Than 4 Feet Below Top of Subgrade |
| D-714-26 | Transverse Mainline Pipe Installation Detail-Pipes 4 Feet or Less Below Top of Subgrade |
| D-714-28 | Transverse Mainline Pipe Installation Detail for Pipes Installed in New Embankment Areas |
| D-754-21 | Reflectorized Delineators |
| D-754-23 | Perforated Tube Assembly Details |
| D-754-24, 25 | Mounting Details Perforated Tube |
| D-754-24A | Breakaway Coupler System for Perforated Tubes |
| D-754-29 | Sign Punching, Stringer and Support Location Details Regulatory, Warning, and Guide Signs |
| D-754-81 | Railroad Crossing Signs for Passive Grade Crossings |
| D-754-83 | Object Markers - Culverts |
| D-762-1 | Pavement Marking Message Details |
| D-762-4 | Pavement Marking |
| D-762-6 | Short-Term Pavement Marking |
| D-900-2 | Pavement Details at Railroad Crossing |

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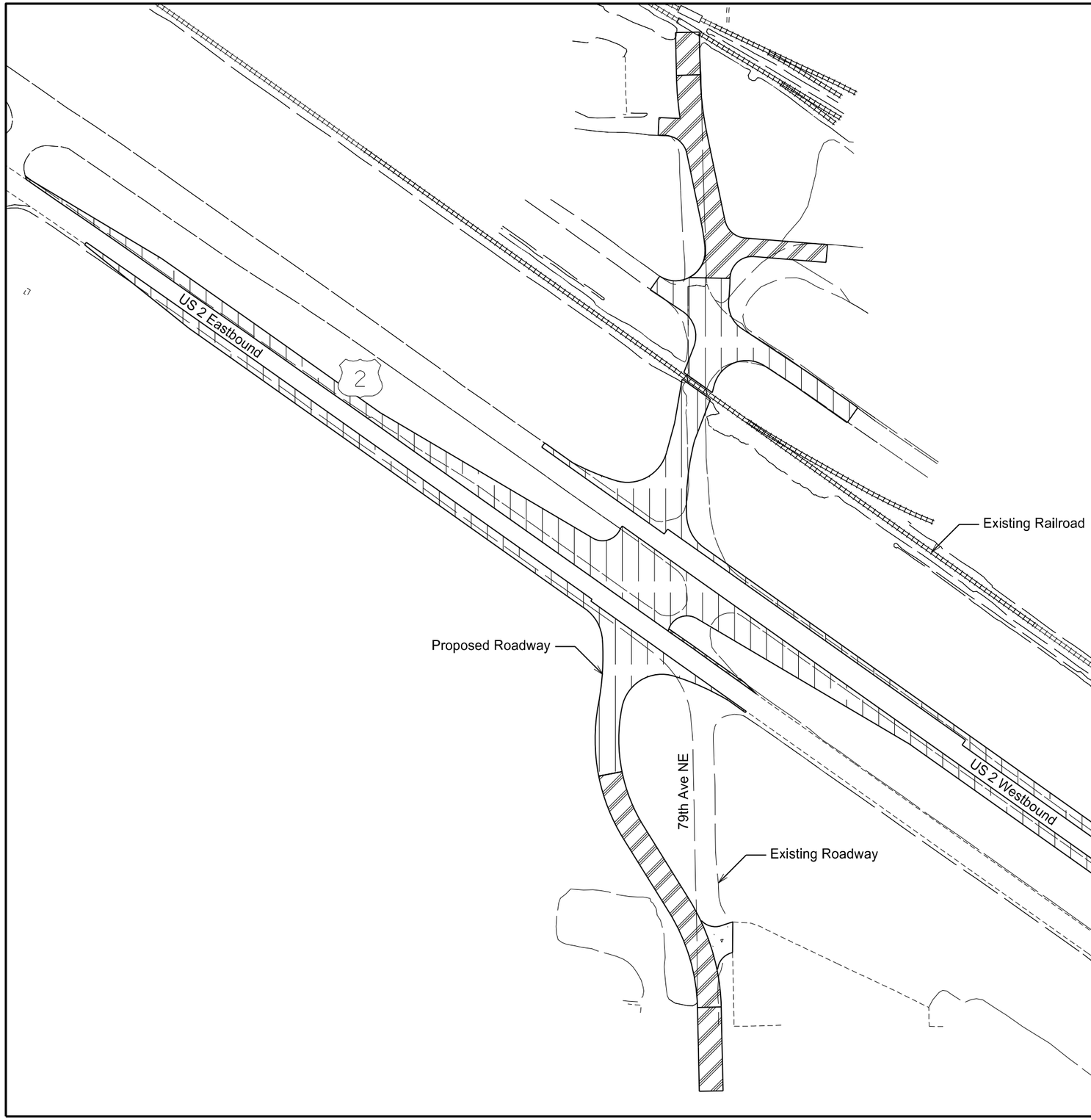



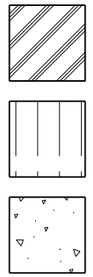

Aggregate

Superpave

Concrete

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Scope of Work

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
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# NOTES

107-113 RAILROAD PROTECTIVE LIABILITY INSURANCE: This project crosses the Northern Plains Railroad on 79th Ave. The type of work that will be performed within the railroad right of way is minor grading and aggregate surfacing. Direct inquiries regarding protective liability insurance to:

Jesse Chalich
Vice President Operations
Northern Plains Railroad
P.O. Box 38
Fordville, ND 58231
701-229-3330
jesse_chalich@nprail.com

Obtain information regarding Site 2 crossing number NPR DOT 698079 milepost 444.86 from the Federal Railroad Administration website: http://safetydata.fra.dot.gov/Officeofsafety/

107-115 RAILROAD PROTECTIVE LIABILITY INSURANCE: This project crosses the BNSF Railway Company on 79th Ave. The type of work that will be performed within the railroad right of way is grading, paving, and pavement marking. Direct inquiries regarding protective liability insurance to:

Rosa Martinez
Marsh USA Inc.
4400 Comerica Bank Tower
1717 Main Street
Dallas, TX 75201-7357, USA
214-303-8519
Rosa.M.Martinez@marsh.com

Obtain information regarding crossing Site 1 number BNSF DOT 102629H milepost 88.73 from the Federal Railroad Administration website: http://safetydata.fra.dot.gov/Officeofsafety/

107-700 HAUL ROADS: The Engineer will not designate paved roads off the state system as haul roads.

107-710 HAUL ROADS: Before submitting a proposal, contact the appropriate State, County, Township, or City officials to determine if there are any roadways that will be designated as "no haul routes."

107-P01 HAUL ROAD: The entire haul cycle, loaded and empty, will be considered for haul routes.

107-P02 HAUL ROAD RESTORATION: Use Class 13 aggregate for haul road restoration.

107-P03 HAUL ROAD: If the contractor obtains written permission from the applicable local entity and chooses to use a paved road off the state system for this project, the contractor will be responsible for all costs of the inspection, maintenance, restoration, and release of the haul road.

202-P01 REMOVAL OF PAVEMENT: Include the cost of the full depth vertical saw cuts adjacent to pavement removal areas, specified in Section 202.04 A "General", in the contract unit price for “Removal of Pavement.”

202-P02 REMOVAL OF PIPE ALL TYPES AND SIZES: Existing pipes under US 2 will be abandoned in place. Remove the existing end sections and enough pipe to complete the grading. Remove one barrel section on these pipes and plug them with a concrete pipe plug according to Standard Drawing D-714-1. Include all costs associated with this work in the contract unit price for “Removal of Pipe all Types and Sizes.”

203-010 SHRINKAGE: 25 percent additional volume is included for shrinkage in earth embankment.

203-385 AVERAGE HAUL: No average haul has been computed for this project.

260-P01 SILT FENCE: Do not embed silt fence installed in standing water.

430-P01 CONTRACTOR CORING: Before placing bituminous material into core holes, apply a tack coat on all sides of the core holes as Specified in Section 401.

704-255 TRAFFIC CONTROL FOR SHOULDER DROP-OFF: If the shoulder and adjacent driving lane are not even at the end of the day, the following criteria will apply:

Place the following sign assembly at the locations listed below.

Sign Assembly: Sign No. W8-9a-48 "Shoulder Drop Off" and supplemental plate Sign No. W20-52-54 to identify the distance.

Locations:

- In advance of the drop off;
- Spaced at each mile from the advance sign; and
- At major intersections (CMC routes, state and US highways, and Interstate Ramps).

If the difference in elevation between the shoulder and the driving lane is 2" or greater, construct a slough on the driving lane that is 4:1 or flatter.

If the difference in elevation between the shoulder & driving lane is less than 2", no slough is required.

Sign assemblies will be measured and paid for according to Section 704 "Temporary Traffic Control.”

704-P01 TRAFFIC CONTROL DEVICES: Temporary traffic control for this project consists of temporary single lane closures with times of flagging. The traffic control devices list was developed using the layouts in the plans as well as the following layouts shown on the Standard Drawings.

Provide Traffic Control Devices that comply with the following Standard Drawings:

D-704-15 Type A: For closure and flagging on 79th Ave.
D-704-19 Type F: For lane closure on 79th Ave.
D-704-22 Layouts Type K and L: For construction trucks entering from a borrow site, aggregate source, or a Contractor jobsite.
D-704-24 Type R: For shoulder closure of 79th Ave.
D-704-26, Layout FF
D-704-34: For lane closures.

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
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# NOTES

The required traffic control signs and devices are included in the “Traffic Control Devices List” and will be measured and paid for at the Contract Unit price for each device. Include the cost for additional devices required to accommodate the Contractor’s operation in the contract unit price for “Traffic Control Signs.”

704-P02 PROJECT PHASING: Temporary traffic control details were developed on the basis that this project will be constructed in phases.

Phase 1: Use two single lane closures and shoulder closures to construct the proposed roadway for 79th Ave NE and the right turn lanes on EB & WB US 2. Close the outer lanes of EB & WB US 2 and close parts of the shoulder for 79th Ave.

Phase 2: Use two single lane closures to construct the left turn lanes for EB & WB US 2 and part of the median cross over for 79th Ave. Close the inner lanes of EB & WB US 2. Shoulder closures and flagging are included to construct the remaining portions of 79th Ave.

Additional stackable panels are included for use along the right turn lanes after Phase 1 and prior to paving.

706-P01 LABORATORY: Provide laboratories wired for DSL Broadband internet with Wi-Fi and have the capability to allow for hard wiring the computer.

Include the cost of the installation and monthly fee in the contract unit price for the laboratory.

754-P01 ADOPT-A-HIGHWAY SIGN PANEL: Furnish and install signs and support as shown in the special assembly detail. The NDDOT will furnish and install the Adopt-A-Highway symbol sign panel only.

762-P01 OBLITERATION OF PVMT MK: Obliterate all pavement markings by blast cleaning as Specified in Section 704.04 N.1.

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|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 6 | 3 |

# ENVIRONMENTAL COMMITMENTS

**ENVIRONMENTAL COMMITMENTS (EC):** The North Dakota Department of Transportation in cooperation the Federal Highway Administration have made environmental commitments to secure approval of this project. The environmental commitments are as follows:

**EC-1:** Unavoidable permanent impacts will be mitigated onsite, adjacent to the project, or at a NDDOT approved mitigation site or bank in accordance with the mitigation guidance[2, 3].

ACTION REQUIRED /TAKEN: 0.32 acres of permanent USACE impacts to jurisdictional waters and impacts to EO11990 wetlands will require mitigation. The NDDOT will mitigate jurisdictional and EO 11990 impacts at Wetlands 3b & 3d in the Herda Mitigation Bank.

**Wetland Impact Table**

| Wetland Number | Location | Cowardin Class. | Wetland Type | Wetland Size (acres) | Wetland Feature | USACE Jurisdictional Wetlands[1] | Wetland Impacts (acres) | | USFWS Easement Impacts (acres) | | Wetland Mitigation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Mitigation Required | | | Bank | | Onsite | | | |
| | | | | | | | Temp. | Perm. | Temp. | Perm. | EO 11990 | USACE | USFWS | Location | acres | Mitigation Location; Ratio | acres | Constructed Site # | Constructed size (acres) |
| 1 | Sec. 19, T154N, R64W | PEMAx | Ditch | 0.12 | Artificial | No | - | - | - | - | N | N | N | - | - | - | - | - | - |
| 2 | Sec. 19, T154N, R64W | PEMAx | Ditch | 0.37 | Artificial | No | - | - | - | - | N | N | N | - | - | - | - | - | - |
| 3a | Sec. 19, T154N, R64W | PEMA | Basin | 0.25 | Natural | Yes | - | - | - | - | N | N | N | - | - | - | - | - | - |
| 3b | Sec. 19, T154N, R64W | PEMAx | Ditch | 0.45 | Artificial | Yes | - | 0.14 | - | - | N | Y | N | Herda Mitigation Bank | 0.14 | - | - | - | - |
| 3c | Sec. 19, T154N, R64W | PEMC | Basin | 0.21 | Natural | Yes | - | - | - | - | N | N | N | - | - | - | - | - | - |
| 3d | Sec. 20, T154N, R64W | PEMAx | Ditch | 0.93 | Artificial | Yes | - | 0.18 | - | - | N | Y | N | Herda Mitigation Bank | 0.18 | - | - | - | - |
| 4 | Sec. 20, T154N, R64W | PEMAx | Ditch | 0.12 | Artificial | No | - | - | - | - | N | N | N | - | - | - | - | - | - |
| 5 | Sec. 19, T154N, R64W | PEMAx | Ditch | 0.09 | Artificial | No | - | 0.02 | - | - | N | N | N | - | - | - | - | - | - |
| 6a | Sec. 19, T154N, R64W | PEMAx | Ditch | 0.13 | Artificial | No | - | 0.01 | - | - | N | N | N | - | - | - | - | - | - |
| 6b | Sec. 20, T154N, R64W | PEMAx | Ditch | 0.04 | Artificial | No | - | 0.04 | - | - | N | N | N | - | - | - | - | - | - |
| 6c | Sec. 20, T154N, R64W | PEMAx | Ditch | 0.09 | Artificial | No | - | .002 | - | - | N | N | N | - | - | - | - | - | - |
| 7 | Sec. 20, T154N, R64W | PEMAx | Ditch | 0.01 | Artificial | No | - | - | - | - | N | N | N | - | - | - | - | - | - |
| | | | **Totals** | **2.81** | | | **0.00** | **0.39** | **0.00** | **0.00** | | | | | **0.32** | | **0.00** | | **0.00** |

[1] A wetland Jurisdictional Determination was issued by the USACE on 8/31/2015; NWO-2015-1470-BIS.

[2] All impacts to natural wetlands (natural/jurisdictional and natural/non-jurisdictional), regardless of size, as well as impacts greater than 0.10 acre to artificial/jurisdictional wetlands require mitigation.

[3] All artificial/non-jurisdictional, deep water (impacts greater than 6.6 feet), Other Waters less than 300 linear feet (determined by the USACE on a case by case), and temporary impacts do not require mitigation.

# ENVIRONMENTAL COMMITMENTS

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 6 | 4 |

| Summary Impact Table | | | |
|---|---|---|---|
| **Total Permanent Impact Summary** | | **Temporary Impacts and additional information** | |
| **Wetland Type** | **Total (Acres)** | **Wetland Type** | **Total (Acres/Lf)** |
| **Natural/JD** | - | **Temporary JD** | - |
| **Natural/Non-JD** | - | **Non-JD Temporary** | - |
| **Artificial/JD** | 0.32 | **Permanent JD > 0.10** | 0.32 |
| **Artificial /Non-JD** | 0.07 | **Permanent OW** | - |
| **Total** | **0.39** | **Temporary OW** | - |

# ESTIMATE OF QUANTITIES

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 8 | 1 |

| SPEC | CODE | ITEM DESCRIPTION | UNIT | MAINLINE | TOTAL |
|---|---|---|---|---|---|
| 103 | 0100 | CONTRACT BOND | L SUM | 0.6 | 0.6 |
| 107 | 0103 | RAILWAY PROTECTION INSURANCE-SITE 1 | EA | 1 | 1 |
| 107 | 0104 | RAILWAY PROTECTION INSURANCE-SITE 2 | EA | 1 | 1 |
| 202 | 0136 | REMOVAL OF PAVEMENT | TON | 5,150 | 5,150 |
| 202 | 0174 | REMOVAL OF PIPE ALL TYPES AND SIZES | LF | 206 | 206 |
| 203 | 0101 | COMMON EXCAVATION-TYPE A | CY | 3,742 | 3,742 |
| 203 | 0109 | TOPSOIL | CY | 4,205 | 4,205 |
| 203 | 0114 | COMMON EXCAVATION-WASTE | TON | 747 | 747 |
| 203 | 0140 | BORROW-EXCAVATION | CY | 7,951 | 7,951 |
| 216 | 0100 | WATER | M GAL | 411 | 411 |
| 251 | 0200 | SEEDING CLASS II | ACRE | 5.33 | 5.33 |
| 251 | 2000 | TEMPORARY COVER CROP | ACRE | 5.33 | 5.33 |
| 253 | 0101 | STRAW MULCH | ACRE | 10.66 | 10.66 |
| 255 | 0101 | ECB TYPE 1 | SY | 276 | 276 |
| 260 | 0200 | SILT FENCE SUPPORTED | LF | 1,917 | 1,917 |
| 260 | 0201 | REMOVE SILT FENCE SUPPORTED | LF | 1,917 | 1,917 |
| 261 | 0112 | FIBER ROLLS 12IN | LF | 692 | 692 |
| 261 | 0113 | REMOVE FIBER ROLLS 12IN | LF | 692 | 692 |
| 302 | 0120 | AGGREGATE BASE COURSE CL 5 | TON | 15,135 | 15,135 |
| 401 | 0050 | TACK COAT | GAL | 1,250 | 1,250 |
| 401 | 0060 | PRIME COAT | GAL | 4,606 | 4,606 |
| 430 | 0045 | SUPERPAVE FAA 45 | TON | 3,141 | 3,141 |
| 430 | 1000 | CORED SAMPLE | EA | 25 | 25 |
| 430 | 5828 | PG 58-28 ASPHALT CEMENT | TON | 188 | 188 |
| 702 | 0100 | MOBILIZATION | L SUM | 0.6 | 0.6 |
| 704 | 0100 | FLAGGING | MHR | 500 | 500 |
| 704 | 1000 | TRAFFIC CONTROL SIGNS | UNIT | 3,661 | 3,661 |
| 704 | 1052 | TYPE III BARRICADE | EA | 2 | 2 |
| 704 | 1060 | DELINEATOR DRUMS | EA | 60 | 60 |
| 704 | 1067 | TUBULAR MARKERS | EA | 55 | 55 |
| 704 | 1080 | STACKABLE VERTICAL PANELS | EA | 21 | 21 |
| 704 | 1087 | SEQUENCING ARROW PANEL-TYPE C | EA | 2 | 2 |
| 704 | 1500 | OBLITERATION OF PAVEMENT MARKING | SF | 572 | 572 |

ESTIMATE NUMBER: 16699  RUN DATE: 03/21/2016 TIME: 16:49:43

# ESTIMATE OF QUANTITIES

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 8 | 2 |

| SPEC | CODE | ITEM DESCRIPTION | UNIT | MAINLINE | TOTAL |
|---|---|---|---|---|---|
| 706 | 0500 | AGGREGATE LABORATORY | EA | 0.6 | 0.6 |
| 706 | 0550 | BITUMINOUS LABORATORY | EA | 0.6 | 0.6 |
| 706 | 0600 | CONTRACTOR'S LABORATORY | EA | 0.6 | 0.6 |
| 714 | 4105 | PIPE CONDUIT 24IN | LF | 451 | 451 |
| 714 | 4110 | PIPE CONDUIT 30IN | LF | 30 | 30 |
| 714 | 4165 | PIPE CONDUIT 24IN-JACKED OR BORED | LF | 62 | 62 |
| 714 | 4166 | PIPE CONDUIT 30IN-JACKED OR BORED | LF | 186 | 186 |
| 720 | 0110 | RIGHT OF WAY MARKERS | EA | 7 | 7 |
| 720 | 0125 | ALIGNMENT MONUMENTS | EA | 13 | 13 |
| 720 | 0130 | IRON PIN R/W MONUMENTS | EA | 7 | 7 |
| 754 | 0110 | FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING | SF | 13 | 13 |
| 754 | 0112 | FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING | SF | 5 | 5 |
| 754 | 0162 | REMOVE & RESET DELINEATORS | EA | 7 | 7 |
| 754 | 0206 | STEEL GALV POSTS-TELESCOPING PERFORATED TUBE | LF | 69 | 69 |
| 754 | 0592 | RESET SIGN PANEL | EA | 9 | 9 |
| 754 | 0593 | RESET SIGN SUPPORT | EA | 9 | 9 |
| 762 | 0103 | PVMT MK PAINTED-MESSAGE | SF | 192 | 192 |
| 762 | 0430 | SHORT TERM 4IN LINE-TYPE NR | LF | 2,237 | 2,237 |
| 762 | 1104 | PVMT MK PAINTED 4IN LINE | LF | 7,136 | 7,136 |
| 762 | 1108 | PVMT MK PAINTED 8IN LINE | LF | 2,067 | 2,067 |
| 762 | 1112 | PVMT MK PAINTED 12IN LINE | LF | 787 | 787 |
| 762 | 1124 | PVMT MK PAINTED 24IN LINE | LF | 80 | 80 |

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| Spec | Code | Description | Qty | Unit |
|---|---|---|---|---|
| Use or Location | | Rate or Station | | |
| 202 | 136 | Removal of Pavement | 5150 | TON |
| Aggregate | | 1.875 TON/CY | 3876 | TON |
| Bituminous Surfacing | | 2 TON/CY | 1109 | TON |
| Concrete | | 2 TON/CY | 165 | TON |
| 203 | 114 | Common Excavation-Waste | 747 | TON |
| Aggregate Surfacing | | 1.875 TON/CY | 747 | TON |
| 216 | 100 | Water | 411 | MGAL |
| For Aggregate | | 20 GAL/TON | 303 | MGAL |
| For Dust Palliative | | 25 MGAL/Mi | 9 | MGAL |
| For Borrow | | 10 GAL/CY | 99 | MGAL |
| 302 | 120 | Aggregate Base Course CL 5 | 15135 | TON |
| For Aggregate | | 1.875 TON/CY | 15135 | TON |
| 401 | 050 | Tack Coat | 1250 | GAL |
| 1st Lift of Bituminous | | 0.05 GAL/SY | 625 | GAL |
| 2nd Lift of Bituminous | | 0.05 GAL/SY | 625 | GAL |
| 401 | 060 | Prime Coat | 4606 | GAL |
| 1st Lift of Bituminous | | 0.35 GAL/SY | 4606 | GAL |
| 430 | 045 | Superpave FAA 45 | 3141 | TON |
| Hot Mix Asphalt | | 2 TON/CY | 3141 | TON |
| 430 | 5828 | PG 58-28 Asphalt Cement | 188 | TON |
| Asphalt Cement | | 6% of Superpave FAA 45 | 188 | TON |

| HMA Cored Samples | | | | | | | |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | | | |
| Specification Section | Distance (Ft) / 2000 | Lanes | Lifts | Sublots (A x B x C) | Quantity (D x 2) | Quantity | Unit |
| 430.04 I.2.b(1), "General" | 1 | 5 | 2 | 10 | 20 | | EA |
| 430.04 I.2.b(2), "Pavement Thickness Determination Cores" | | | | | | 5 | EA |
| | | | | Total | 20 | 5 | EA |

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Basis of Estimate

US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
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| | ND | NH-3-002(146)265 | 11 | 1 |

| Location | Common Excavation Type A (Pay Item) | Embankment* | Borrow Excavation (Pay Item) | Topsoil (Pay Item) |
|---|---|---|---|---|
| | CY | CY | CY | CY |
| | I | J | K=J-I | L |
| 79th N of US 2 (Sta 510+75 to 515+82) | 1165 | 1753 | 588 | 593 |
| 14th Ave N of US 2 (Sta 21+58 to 24+80) | 234 | 264 | 30 | 367 |
| US 2 WB & EB (Sta 914+00 to 934+00) | 1195 | 8311 | 7117 | 2581 |
| 79th S of US 2 (Sta 502+75 to 507+35) | 1148 | 1364 | 217 | 665 |
| | 3742 | 11692 | 7951 | 4205 |

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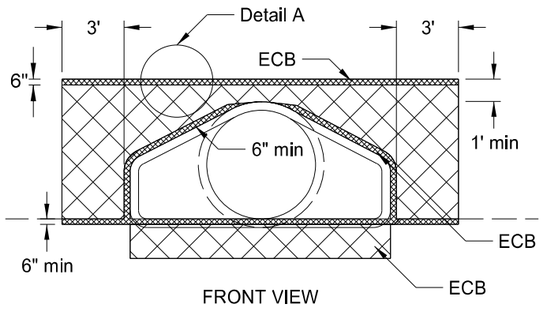
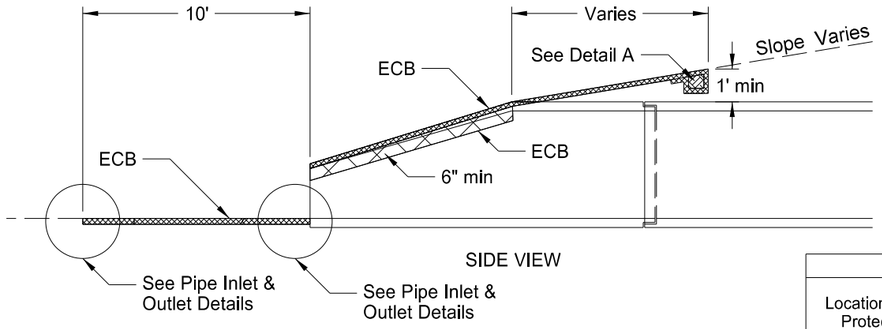
Earthwork Summary

US 2 and 79th Ave NE Realignment

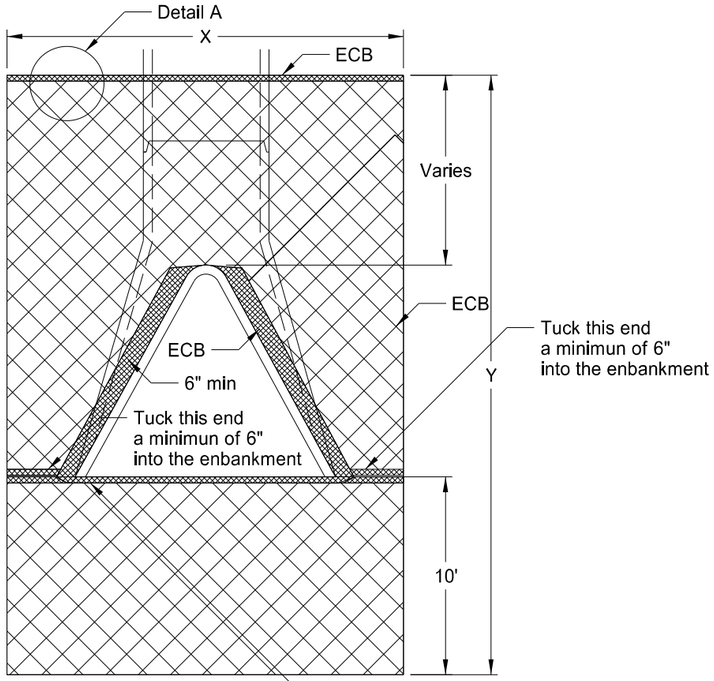
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 20 | 1 |



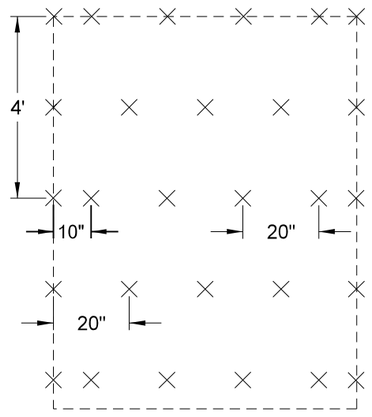

FRONT VIEW




SIDE VIEW




TOP VIEW




STAPLE PATTERN

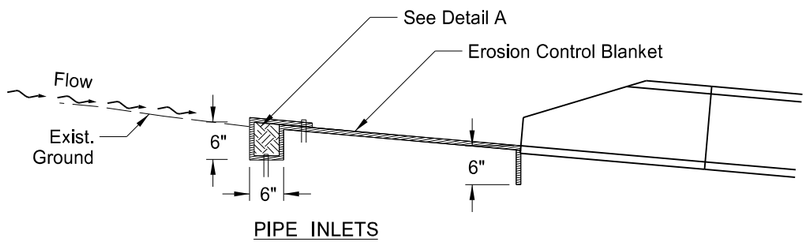
| Erosion Control Blanket (ECB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location to be Protected | Culvert Type Appr / CL | Pipe Dia. (IN) | No. | Unit Quantity (SY) | Total Quantity Type 1 (SY) | Type 2 (SY) | Type 3 (SY) | Type 4 (SY) |
| SCL_US2 Station | | | | | | | | |
| 920+00* | CL | 24 | 2 | 18 | 36 | - | - | - |
| 922+78* | CL | 30 | 2 | 20 | 40 | - | - | - |
| OCL_79 Station | | | | | | | | |
| 507+24 | CL | 24 | 2 | 20 | 40 | - | - | - |
| 510+38 | CL | 24 | 2 | 20 | 40 | - | - | - |
| 511+91 | CL | 24 | 2 | 20 | 40 | | | |
| 512+87 | CL | 24 | 2 | 20 | 40 | - | - | - |
| 513+48 | CL | 24 | 2 | 20 | 40 | - | - | - |
| Total (SY) | | | | | 276 | 0 | 0 | 0 |

NOTES: Stationing along SCL_US2 and OCL_79
(*) Indicates Traversable End Section

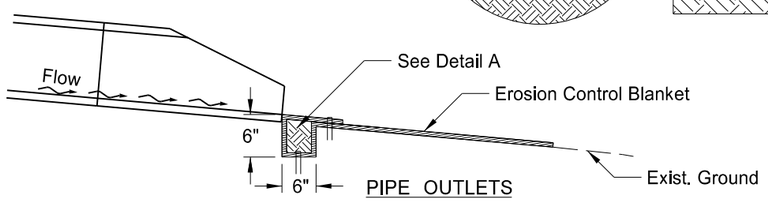
| CENTERLINE CULVERTS | | | | | |
|---|---|---|---|---|---|
| Type | Dia. (IN) | X (FT) | Y (FT) | Surface Area to be Protected (SF) | ECB (SY) |
| TES | 24 | 8.5 | 20.1 | 155.8 | 18 |
| TES | 30 | 9.1 | 21.6 | 173.4 | 20 |
| FES | 24 | 10.5 | 17.7 | 174.1 | 20 |
| Note: Quantities based on 4:1 slope. | | | | | |

FES = Flared End Section
TES = Traversable End Section

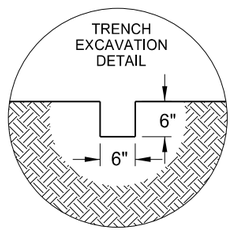
NOTE: Tuck the ECB a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section.

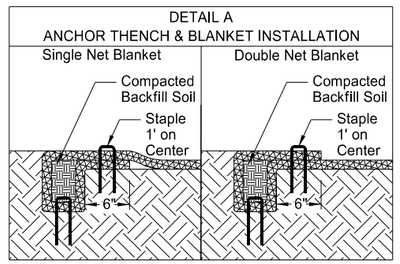



PIPE INLETS




PIPE OUTLETS

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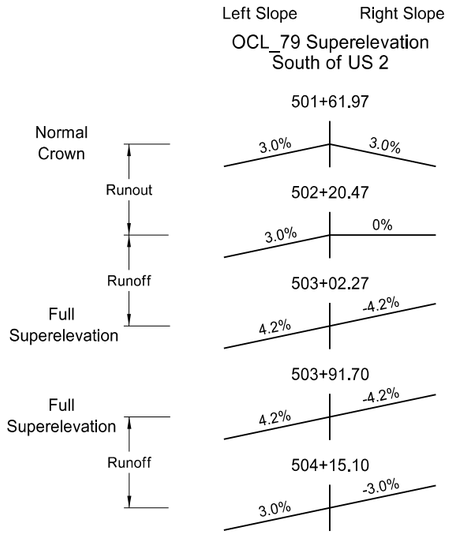
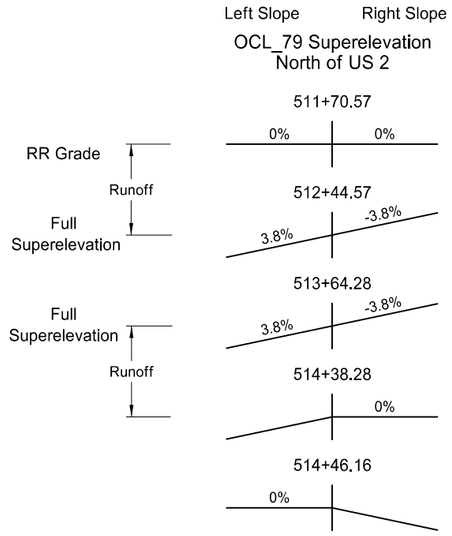
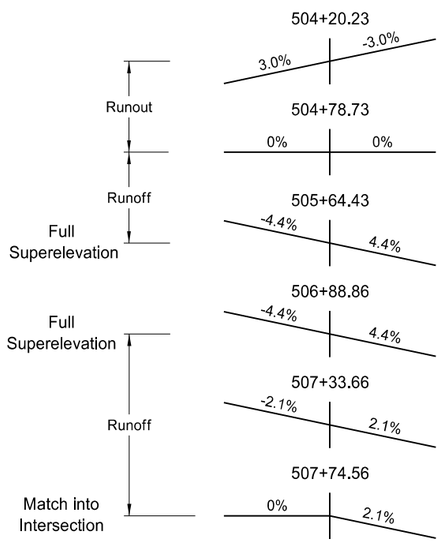
Erosion Control at Culvert Flared End Sections

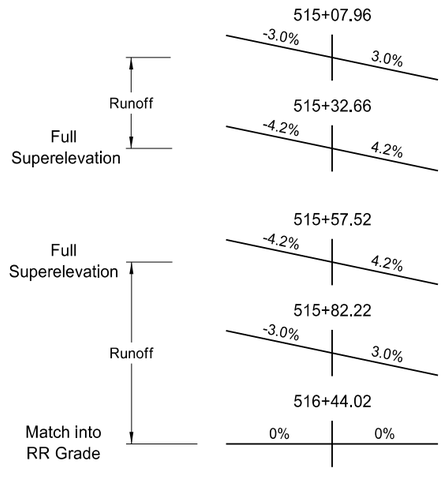
US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 20 | 2 |




| Curve OCL_79-1 | |
|---|---|
| P.I. Station | 503+48.74 |
| Delta | 30° 33' 05.31" (LT) |
| Degree | 21° 13' 14.37" |
| Tangent | 73.7408 |
| Length | 143.9704 |
| Radius | 270 |
| External | 9.8887 |
| Long Chord | 142.2709 |
| Mid. Ord. | 9.5393 |
| P.C. Station | 502+75.00 |
| P.T. Station | 504+18.97 |

| Station | Left Slope | Right Slope |
|---|---|---|
| 501+61.97 | 3.0% | 3.0% |
| 502+20.47 | 3.0% | 0.0% |
| 502+78.87 | 3.0% | -3.0% |
| 503+02.27 | 4.2% | -4.2% |
| 503+91.70 | 4.2% | -4.2% |
| 504+15.10 | 3.0% | -3.0% |

Design Speed 20mph

$e_{Proposed}$ = 4.2%

Runoff Length = 82' Runout Length = 59'

| Curve OCL_79-2 | |
|---|---|
| P.I. Station | 506+39.71 |
| Delta | 47° 08' 49.33" (RT) |
| Degree | 24° 04' 25.88" |
| Tangent | 103.8487 |
| Length | 195.8433 |
| Radius | 238 |
| External | 21.6701 |
| Long Chord | 190.3645 |
| Mid. Ord. | 19.8617 |
| P.C. Station | 505+35.86 |
| P.T. Station | 507+31.71 |

| Station | Left Slope | Right Slope |
|---|---|---|
| 504+20.23 | 3.0% | -3.0% |
| 504+78.73 | 0.0% | 0.0% |
| 505+37.13 | -3.0% | 3.0% |
| 505+64.43 | -4.4% | 4.4% |
| 506+88.86 | -4.4% | 4.4% |
| 507+33.66 | -2.1% | 2.1% |
| 507+74.56 | 0.0% | |

Design Speed 20mph

$e_{Proposed}$ = 4.4%

Runoff Length = 86' Runout Length = 59'

| Curve OCL_79-3 | |
|---|---|
| P.I. Station | 513+06.03 |
| Delta | 27° 03' 21.71" (LT) |
| Degree | 16° 00' 15.87" |
| Tangent | 86.1334 |
| Length | 169.0536 |
| Radius | 358 |
| External | 10.2159 |
| Long Chord | 167.4873 |
| Mid. Ord. | 9.9325 |
| P.C. Station | 512+19.90 |
| P.T. Station | 513+88.95 |

| Station | Left Slope | Right Slope |
|---|---|---|
| 511+70.57 | 0.0% | 0.0% |
| 512+11.47 | 2.1% | -2.1% |
| 512+44.57 | 3.8% | -3.8% |
| 513+64.28 | 3.8% | -3.8% |
| 513+79.88 | 3.0% | -3.0% |
| 514+38.28 | | 0.0% |

Design Speed 20mph

$e_{Proposed}$ = 3.8%

Runoff Length = 74' Runout Length = 59'

| Curve OCL_79-4 | |
|---|---|
| P.I. Station | 515+45.21 |
| Delta | 10° 27' 37.68" (RT) |
| Degree | 12° 40' 33.81" |
| Tangent | 41.3757 |
| Length | 82.5215 |
| Radius | 452 |
| External | 1.8898 |
| Long Chord | 82.4069 |
| Mid. Ord. | 1.8819 |
| P.C. Station | 515+03.83 |
| P.T. Station | 515+86.35 |

| Station | Left Slope | Right Slope |
|---|---|---|
| 513+84.36 | 3.0% | |
| 514+46.16 | 0.0% | |
| 515+07.96 | -3.0% | 3.0% |
| 515+32.66 | -4.2% | 4.2% |
| 515+57.52 | -4.2% | 4.2% |
| 515+82.22 | -3.0% | 3.0% |
| 516+44.02 | 0.0% | 0.0% |

Design Speed 25mph

$e_{Proposed}$ = 4.2%

Runoff Length = 87' Runout Length = 62'

Note:

Calculations based on AASHTO method five,
the NDDOT Design Manual, a design speed of 20-25 mph,
and a maximum superelevation of 6%

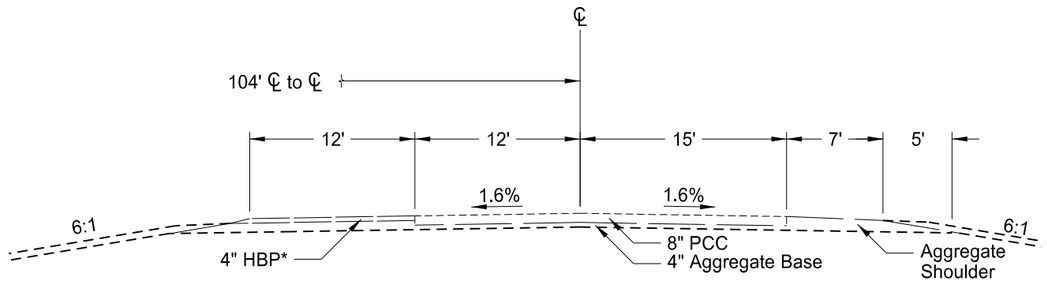
Additional curve data is in Sec. 82.



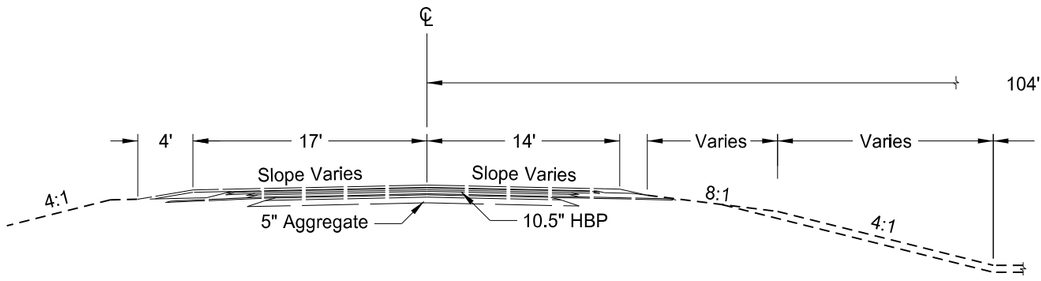
Superelevation Details

US 2 and 79th Ave NE Realignment

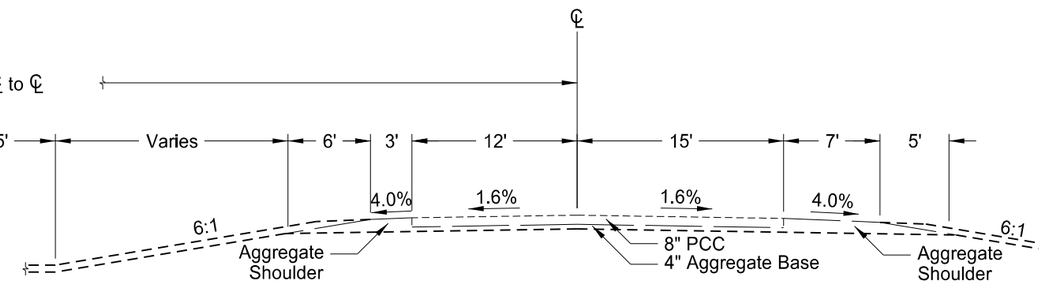
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 30 | 1 |



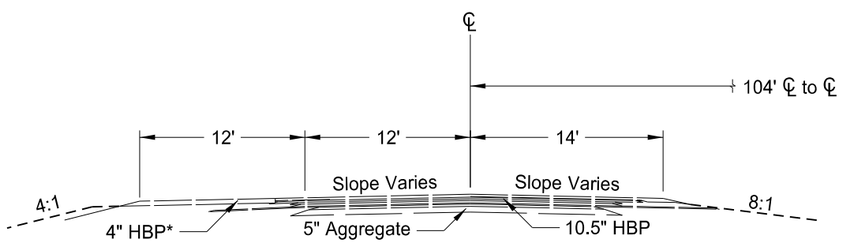

Eastbound US 2
Sta 919+49 - 924+45 with Turn Lane




Westbound US 2
Sta 919+76 - 924+71, 929+75 - 933+39




Eastbound US 2
Sta 913+83 - 919+49, 924+45 - 927+79




Westbound US 2
Sta 924+71 - 929+75 with Turn Lane

Surfacing thickness was drawn from old plans. Actual thickness may vary.

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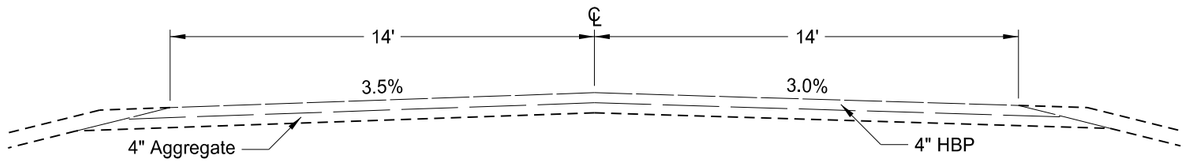
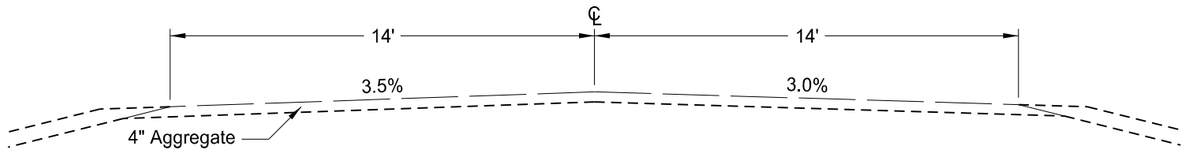
US 2 Existing Typical Sections

US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 30 | 2 |




Existing Typical - 79th Ave
Sta 97+50 - 104+50




Existing Typical - 79th Ave
Sta 89+25 - 97+50
Sta 104+50 - 110+00

Surfacing thickness was drawn from old plans. Actual thickness may vary.

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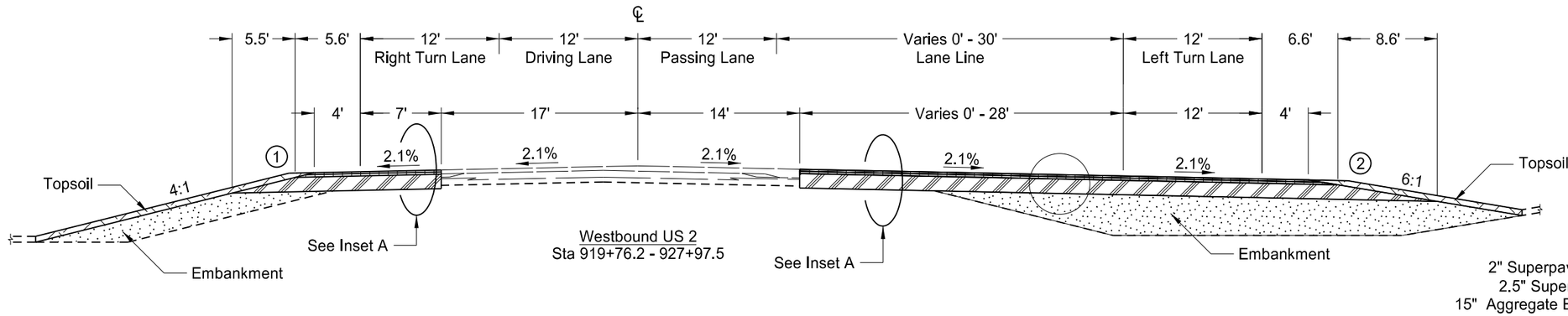
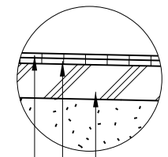
79th Ave NE Existing Typical Sections

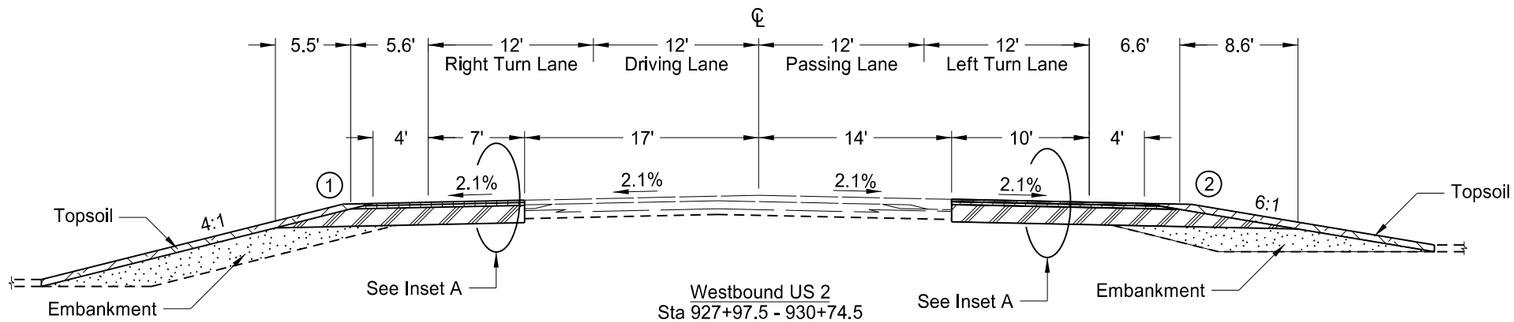
US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 30 | 3 |

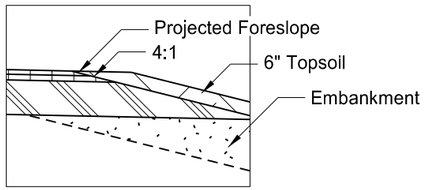



Inset A

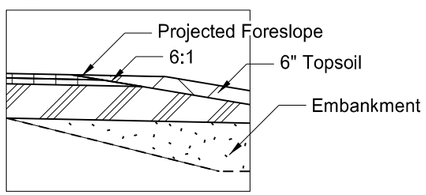


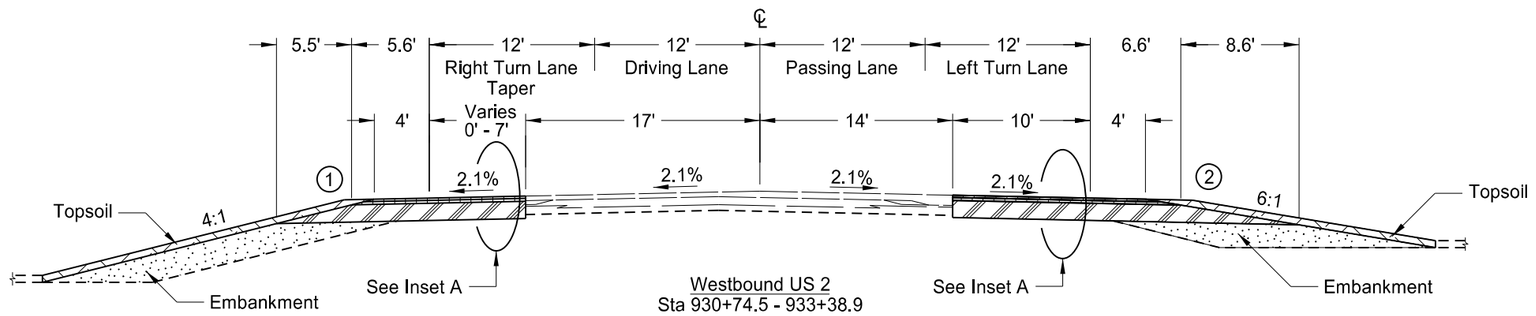




① Slough Detail




② Slough Detail

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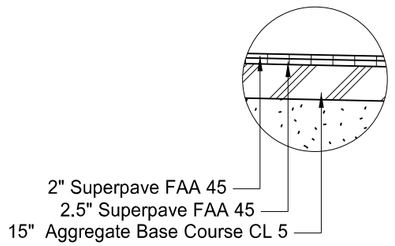
US 2 WB Proposed Typical Sections

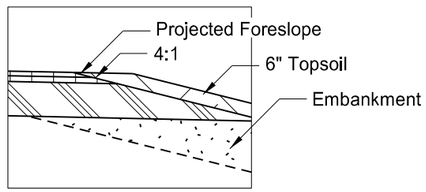
US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 30 | 4 |

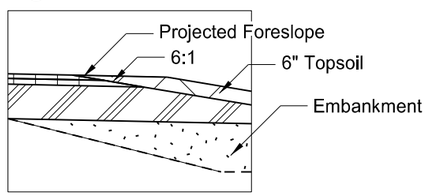
Inset A

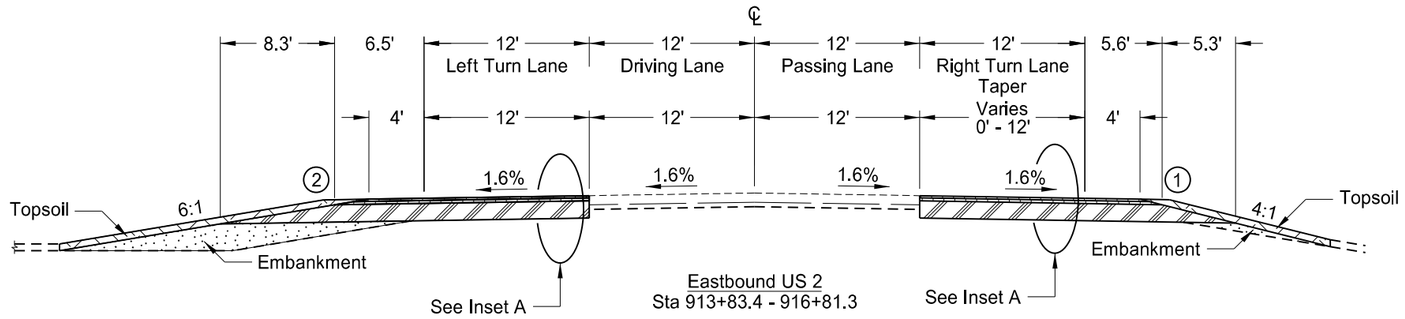


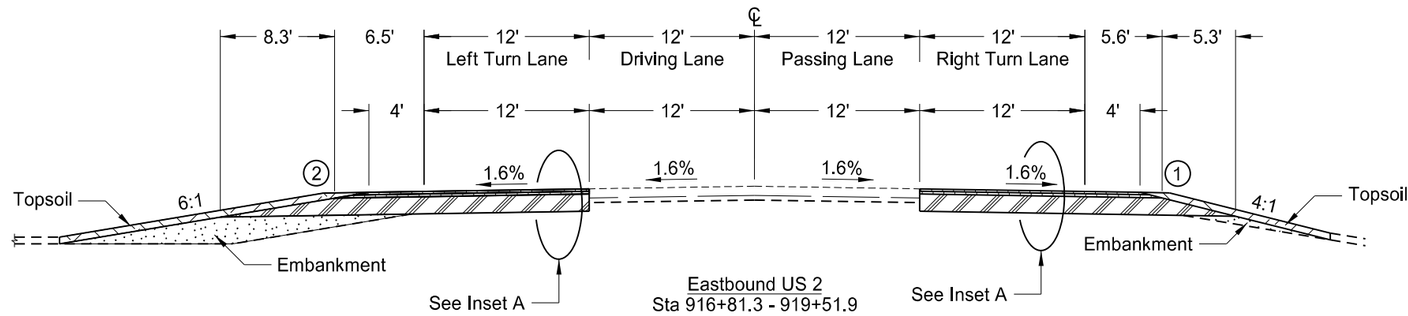

① Slough Detail

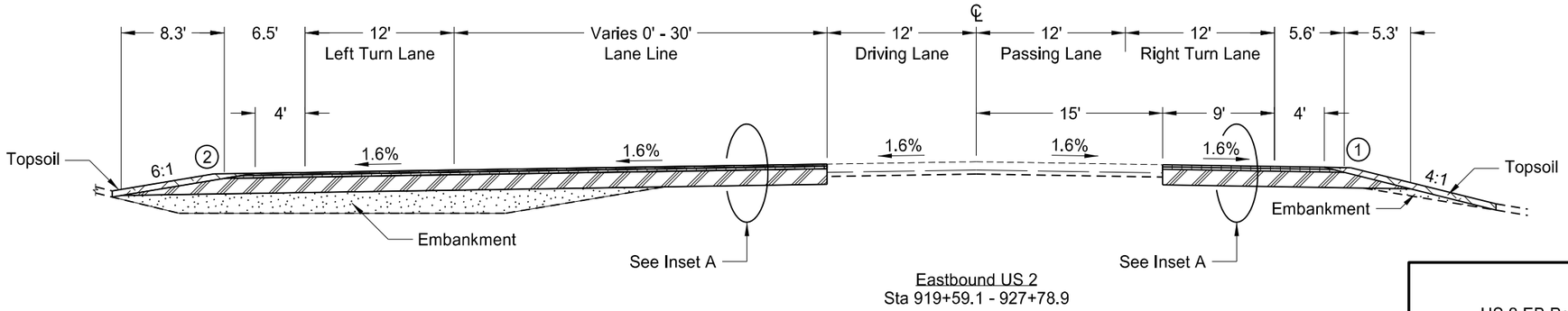



② Slough Detail

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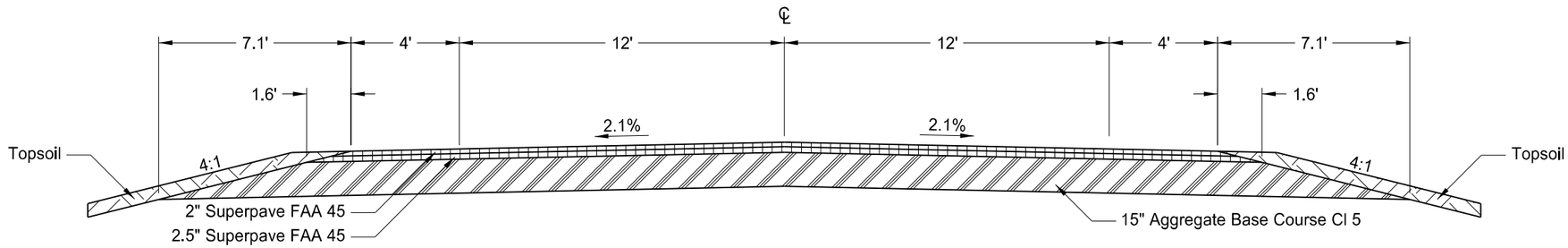
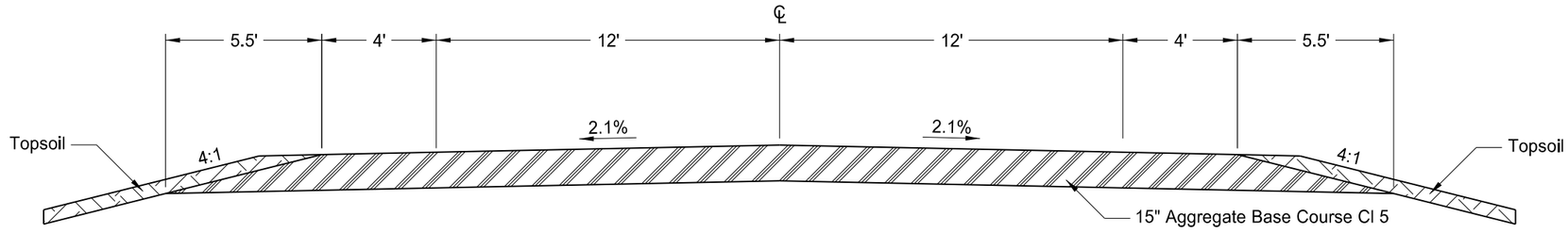
US 2 EB Proposed Typical Sections

US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 30 | 5 |




Proposed Typical - 79th Ave
Sta 506+21.2 - 513+51.0




Proposed Typical - 79th Ave
Sta 501+62.0 - 506+21.2, 513+51.0 - 516+44.0

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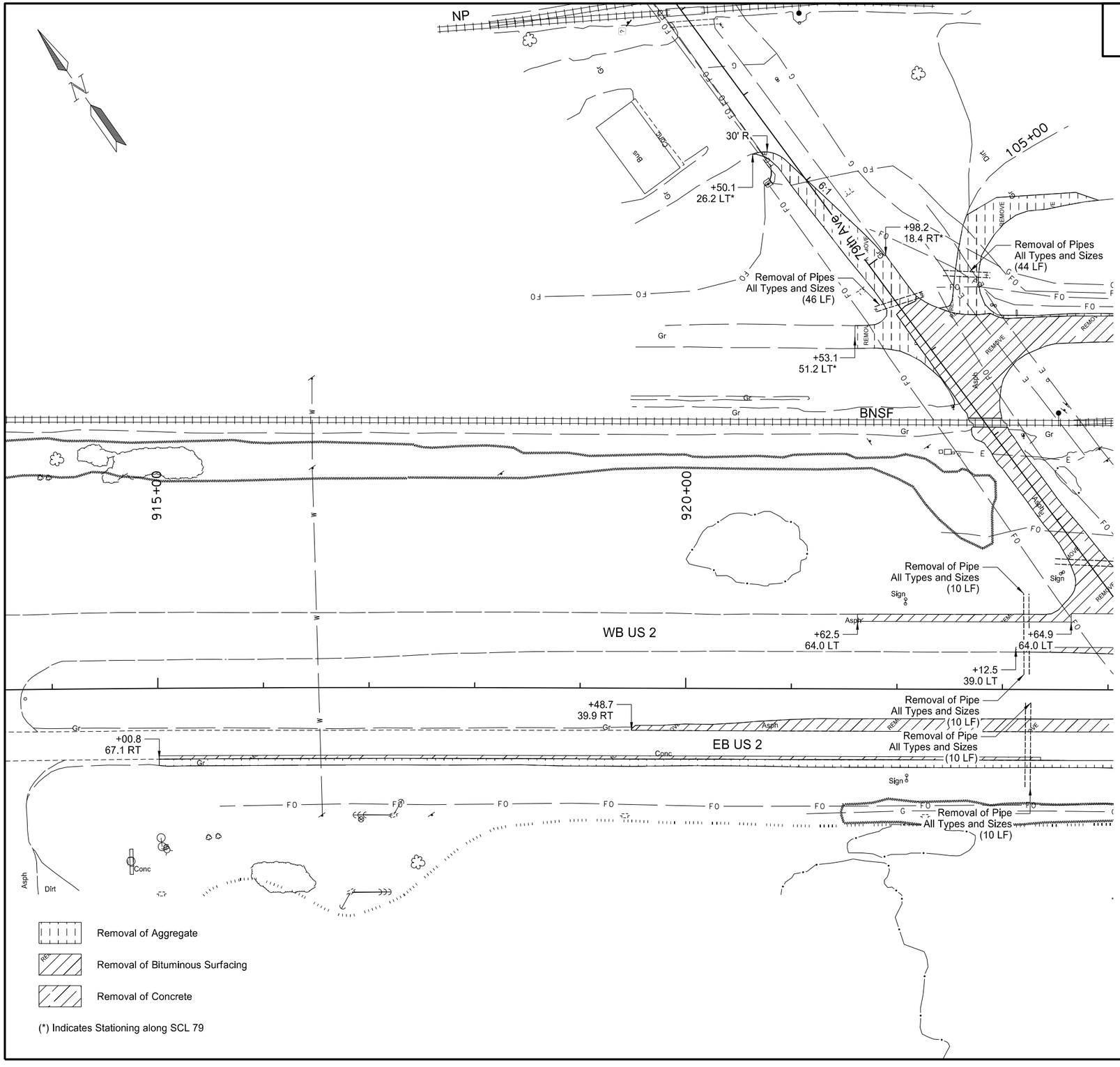
79th Ave NE Proposed Typical Sections

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 40 | 1 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 202 | 136 | Removal of Pavement | 1414 TON |
| | | Aggregate | 978 TON |
| | | Bituminous Surfacing | 309 TON |
| | | Concrete | 127 TON |
| 202 | 174 | Removal of Pipe All Types and Sizes | 130 LF |
| 203 | 114 | Common Excavation-Waste | 395 TON |

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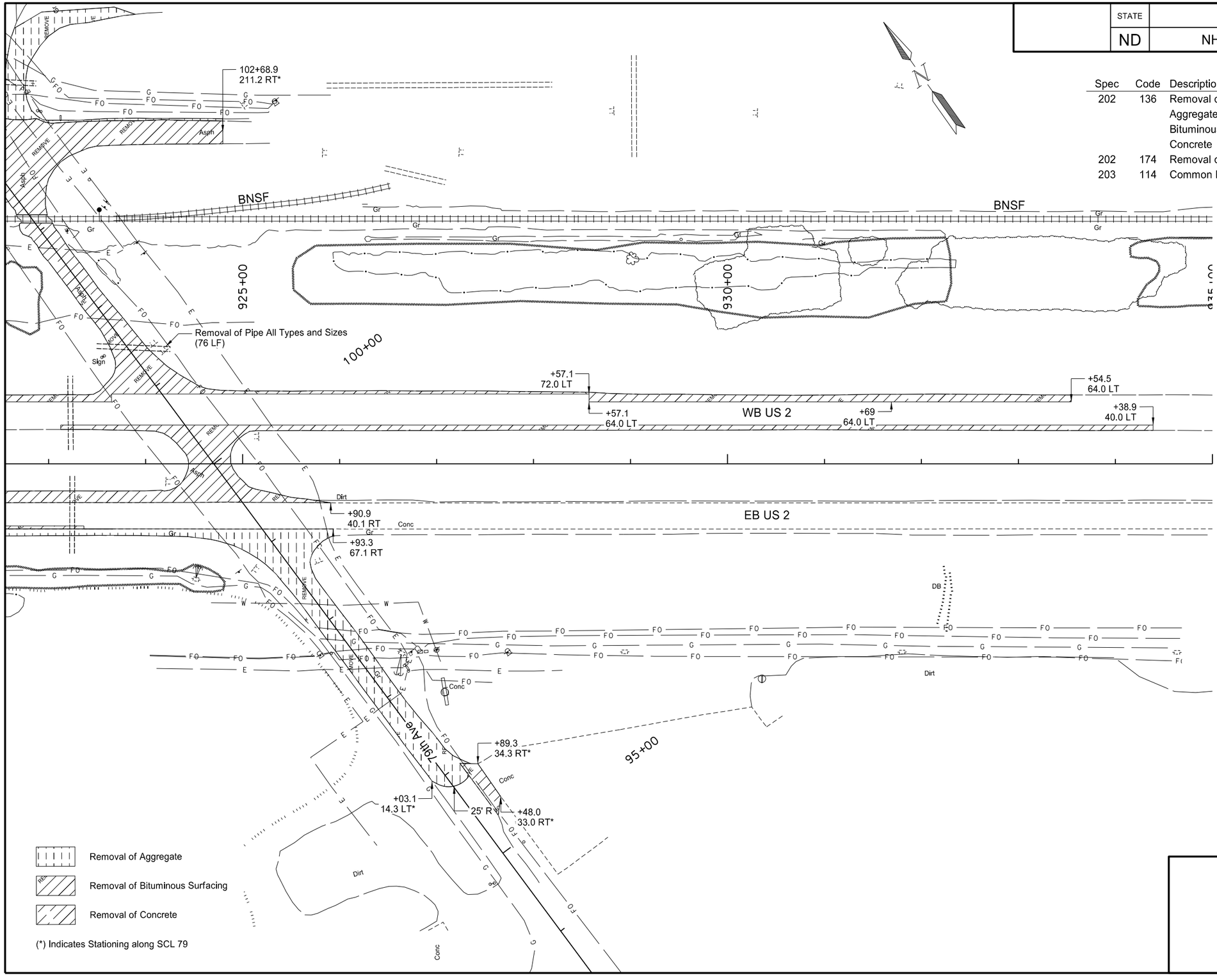
Removal Layouts
Sta 914+00 to 923+00

US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 40 | 2 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 202 | 136 | Removal of Pavement | 3736 TON |
| | | Aggregate | 2898 TON |
| | | Bituminous Surfacing | 801 TON |
| | | Concrete | 37 TON |
| 202 | 174 | Removal of Pipe All Types and Sizes | 76 LF |
| 203 | 114 | Common Excavation-Waste | 352 TON |

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Removal Layouts
Sta 923+00 to 935+00

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 50 | 1 |

HYDRAULIC DATA FOR NH-3-002(146)265 (A)

| STATION | EXISTING PIPE | PROPOSED PIPE SIZE | DRAINAGE AREA (ACRES) | 25-YEAR DATA | | | | 100-YEAR DATA | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | DESIGN DISCHARGE (CFS) | DESIGN HEADWATER (FT) | DESIGN VELOCITY (FPS) | DESIGN STAGE (NAVD 88) | 100-YEAR DISCHARGE (CFS) | 100-YEAR STAGE (NAVD 88) |
| 920+00 | | 24" (B) | 2.6 | 8.8 | 1.56 | 8.04 | 1470.25 | 13.0 | 1470.70 |
| 922+40 to 923+26 | 24" RCP | 30" (B) | 38.1 | 20.7 | 2.50 | 6.51 | 1469.79 | 32.0 | 1470.99 |

(A) Hydraulic data provided is for smooth-walled (Manning's n = 0.012) type conduits.
(B) Jacked or Bored at this location.

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Culvert Hydraulic Data

US 2 and 79th Ave NE
Intersection Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 51 | 1 |

| Roadway (Alignment) | Begin Station / Location | Begin Offset | End Station / Location | End Offset | Pipe Installation (Pay Item) | | | Allowable Material | Required Diameter | Steel Pipe Coatings | Steel Pipe Corrugations or Spiral Ribs | Steel Pipe Minimum Thickness | R1 Fabric (Pay Item) | (*) End Sections | | Applicable Backfill Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Begin | End | |
| | | | | | In | Bid Item | LF | | In | Type | | In | SY | EA | EA | |
| SCL_US2 | 920+00 | 91.8' Lt | 920+00 | 19.8' Lt | 24 | Pipe Conduit - Bored | 62' | Reinforced Concrete Pipe - Class III(Barrel length = 70 LF) | 24 | | | | | TES | TES | D-714-16 |
| | | | | | | Pipe Conduit | 10' | | | | | | | | | |
| SCL US2 | 922+40 | 103.5' Lt | 923+26 | 94.8' Rt | 30 | Pipe Conduit - Bored | 186' | Reinforced Concrete Pipe - Class II(Barrel length = 214 LF) | 30 | | | | | TES | TES | D-714-16 |
| | | | | | | Pipe Conduit | 30' | | | | | | | | | |
| SCL_US2 | 922+65 | 136.2' Lt | 923+80 | 136.2' Lt | 24 | Pipe Conduit | 115' | Reinforced Concrete Pipe - Class III(barrel length = 110 LF) | 24 | | | | | FES | FES | D-714-25 |
| | | | | | | | | Spiral Rib Steel Pipe | | P | 3/4, 1 | 0.064 | | | | |
| | | | | | 30 | | | Corrugated Steel Pipe | 30 | P | 2 | 0.079 | | | | |
| SCL_US2 | 923+95 | 173.8' Rt | 924+81 | 139.2' Rt | 24 | Pipe Conduit | 93' | Reinforced Concrete Pipe - Class III(barrel length = 88 LF) | 24 | | | | | FES | FES | D-714-25 |
| | | | | | | | | Corrugated Steel Pipe | | P | 2 | 0.064 | | | | |
| | | | | | | | | Spiral Rib Steel Pipe | | P | 3/4, 1 | 0.064 | | | | |
| OCL_79 | 512+72 | 36.6' Rt | 513+17 | 54.3' Lt | 24 | Pipe Conduit | 101' | Reinforced Concrete Pipe - Class III(barrel length = 96 LF) | 24 | | | | | FES | FES | D-714-25 |
| | | | | | | | | Corrugated Steel Pipe | | P | 2 | 0.064 | | | | |
| | | | | | | | | Spiral Rib Steel Pipe | | P | 3/4, 1 | 0.064 | | | | |
| OCL_79 | 511+77 | 39.7' Rt | 512+02 | 33.3' Lt | 24 | Pipe Conduit | 77' | Reinforced Concrete Pipe - Class III(barrel length = 72 LF) | 24 | | | | | FES | FES | D-714-25 |
| | | | | | | | | Spiral Rib Steel Pipe | | P | 3/4, 1 | 0.064 | | | | |
| | | | | | 30 | | | Corrugated Steel Pipe | 30 | P | 2 | 0.079 | | | | |
| OCL_79 | 513+22 | 42.2' Rt | 513+71 | 41.4' Rt | 24 | Pipe Conduit | 55' | Reinforced Concrete Pipe - Class III(barrel length = 50 LF) | 24 | | | | | FES | FES | D-714-25 |
| | | | | | | | | Corrugated Steel Pipe | | P | 2 | 0.064 | | | | |
| | | | | | | | | Spiral Rib Steel Pipe | | P | 3/4, 1 | 0.064 | | | | |

Coatings: Z = Zinc
A = Aluminum
P = Polymeric (over Zinc or Aluminum)

Corrugations: 2 = 2-2/3"x1/2"
3 = 3"x1"
5 = 5"x1"

Spiral Ribs: 3/4 = 3/4"x3/4"@7-1/2"
1 = 3/4"x1"@11-1/2"

(*) Include the cost for End Sections in the Price Bid for "Pipe Conduit."
FES = Flared End Section
TES = Traversable End Section

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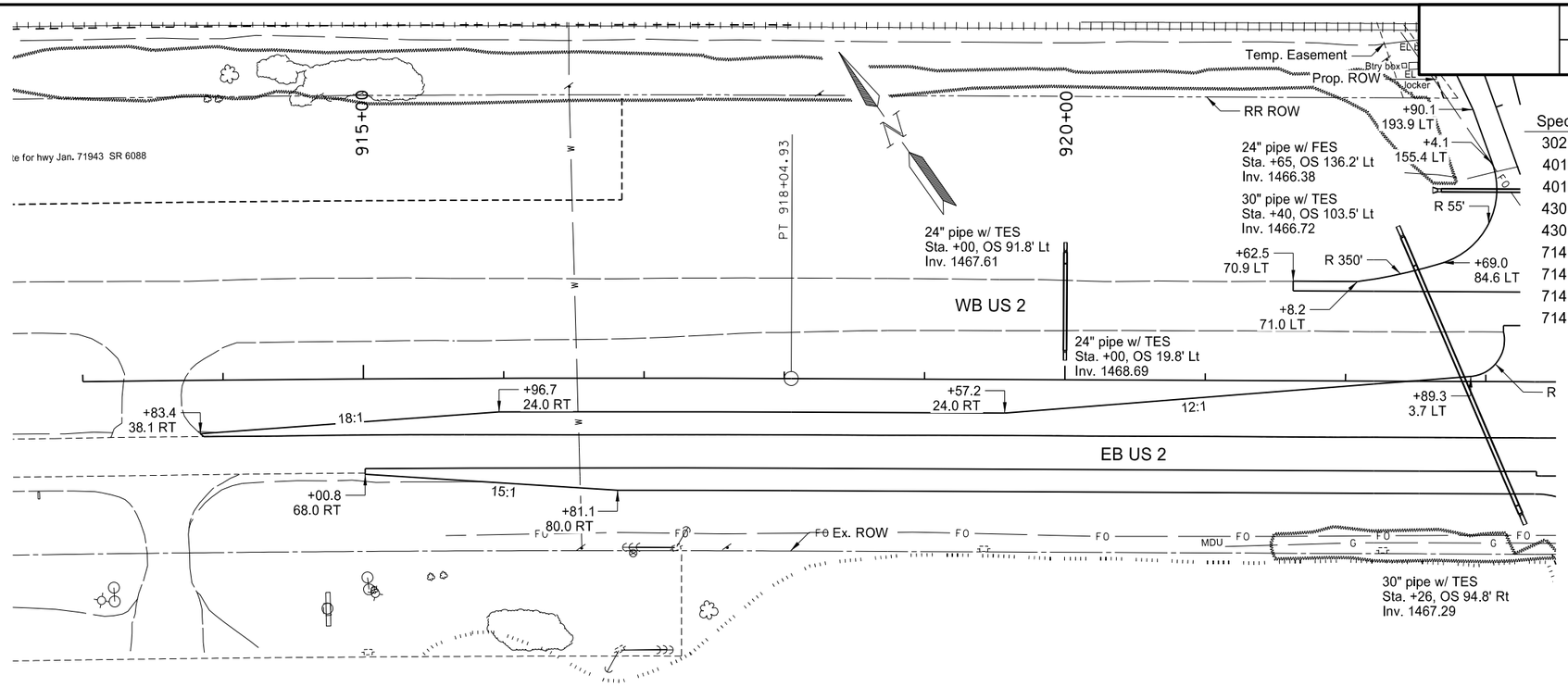
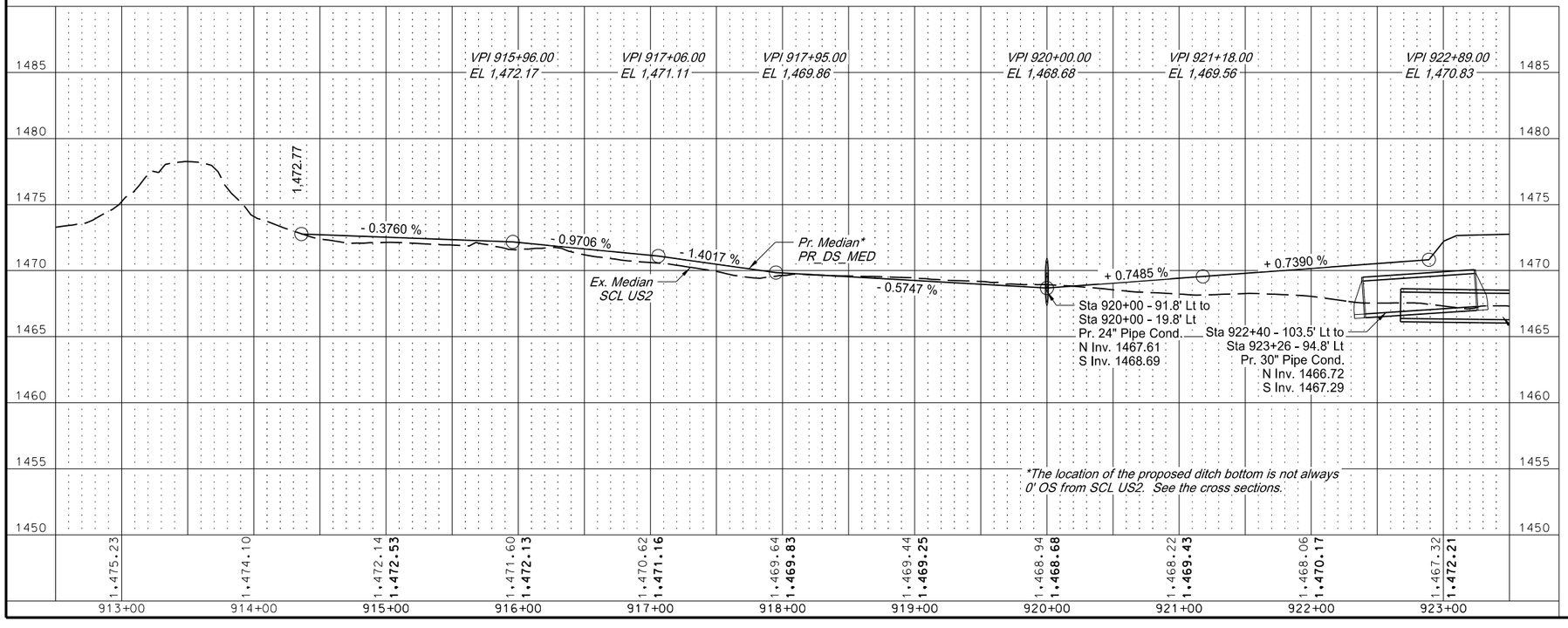
Allowable Pipe List

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 60 | 1 |




| Spec | Code | Description | Quantity |
|---|---|---|---|
| 302 | 120 | Aggregate Base Course CL 5 | 3444 TON |
| 401 | 50 | Tack Coat | 350 GAL |
| 401 | 60 | Prime Coat | 1300 GAL |
| 430 | 45 | Superpave FAA 45 | 879 TON |
| 430 | 5828 | PG 58-28 Asphalt Cement | 53 TON |
| 714 | 4105 | Pipe Conduit 24IN | 10 LF |
| 714 | 4110 | Pipe Conduit 30IN | 30 LF |
| 714 | 4165 | Pipe Conduit 24IN-Jacked or Bored | 62 LF |
| 714 | 4166 | Pipe Conduit 30IN-Jacked or Bored | 186 LF |



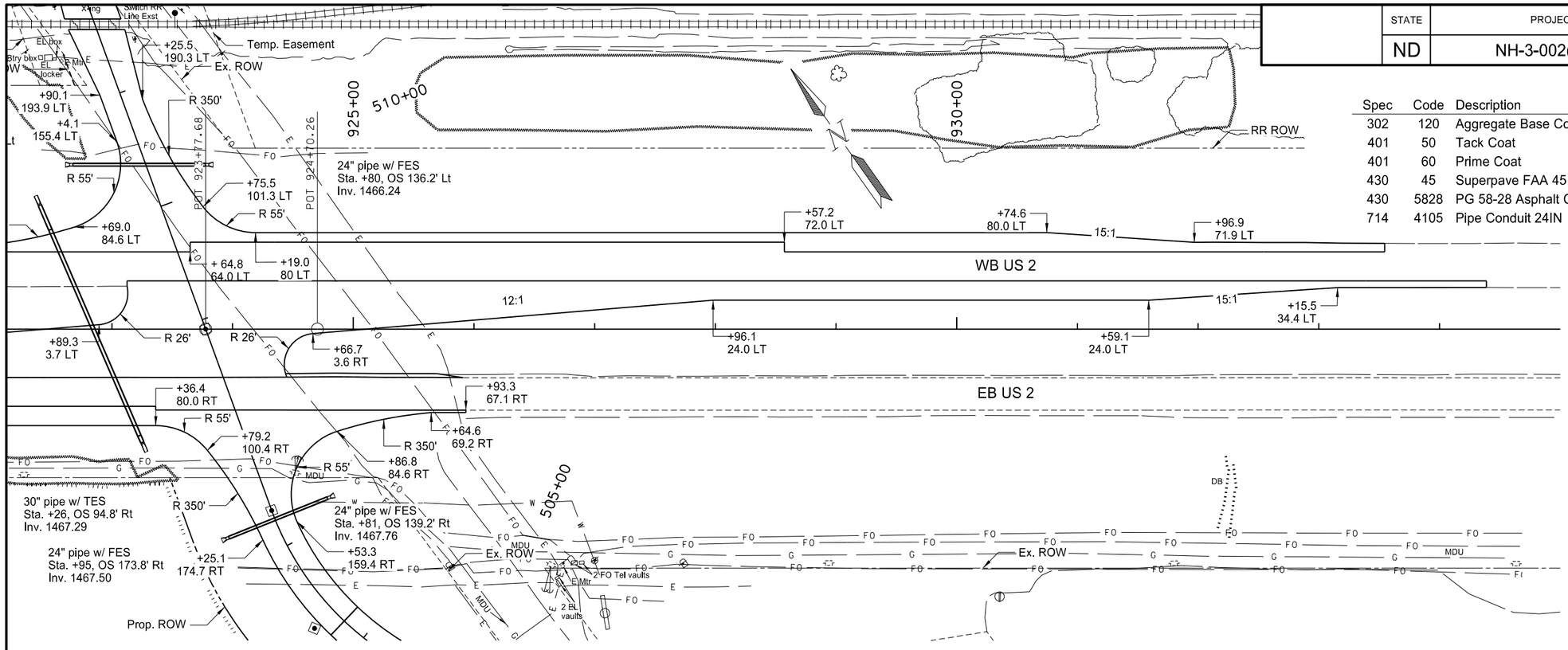


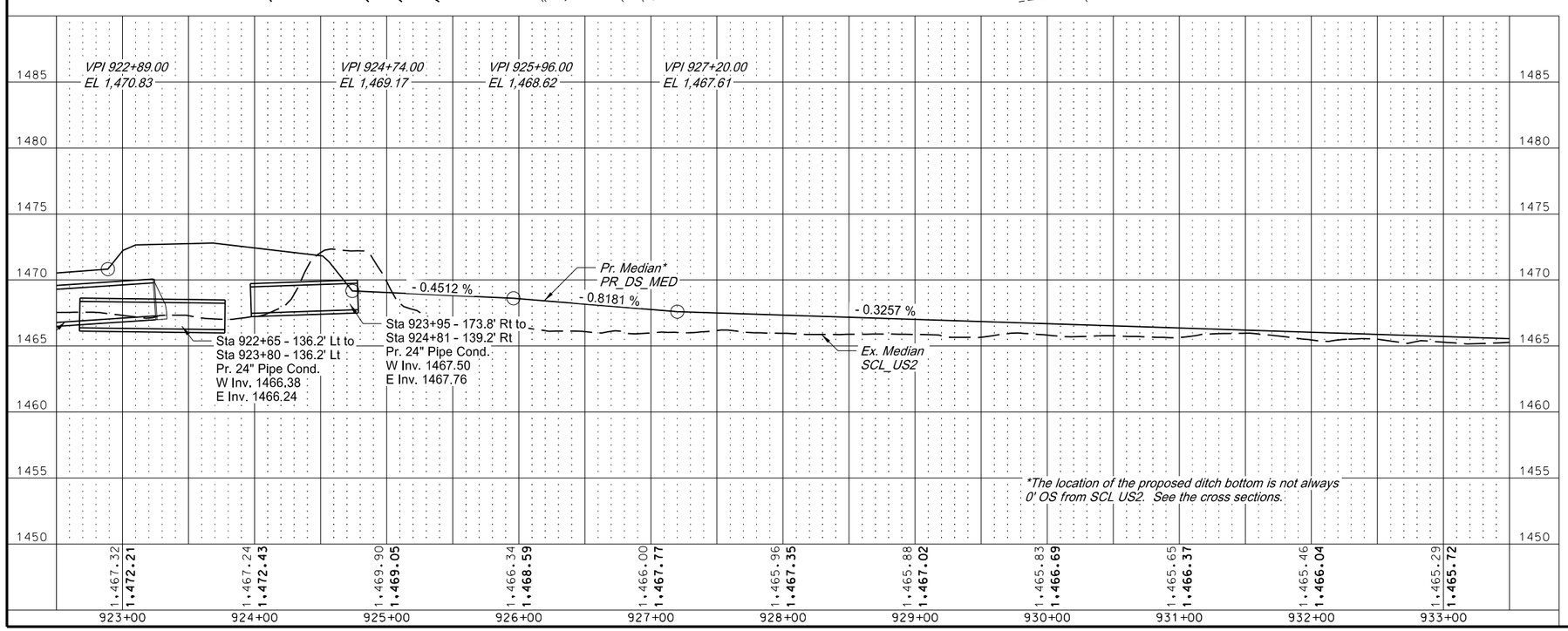

Plan & Profile
US 2 Sta 913+00 to 923+00

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 60 | 2 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 302 | 120 | Aggregate Base Course CL 5 | 4624 TON |
| 401 | 50 | Tack Coat | 464 GAL |
| 401 | 60 | Prime Coat | 1719 GAL |
| 430 | 45 | Superpave FAA 45 | 1169 TON |
| 430 | 5828 | PG 58-28 Asphalt Cement | 70 TON |
| 714 | 4105 | Pipe Conduit 24IN | 208 LF |



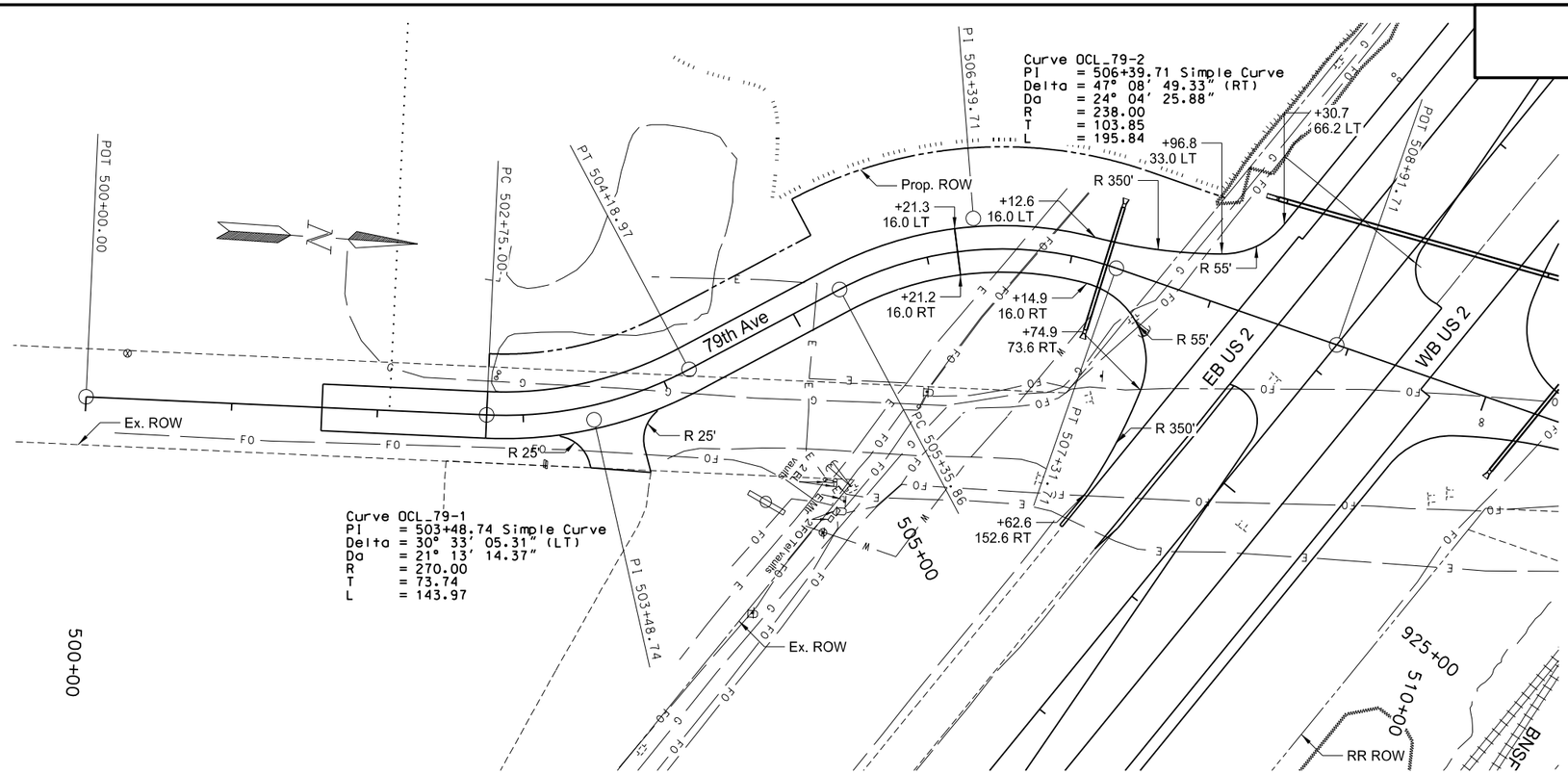


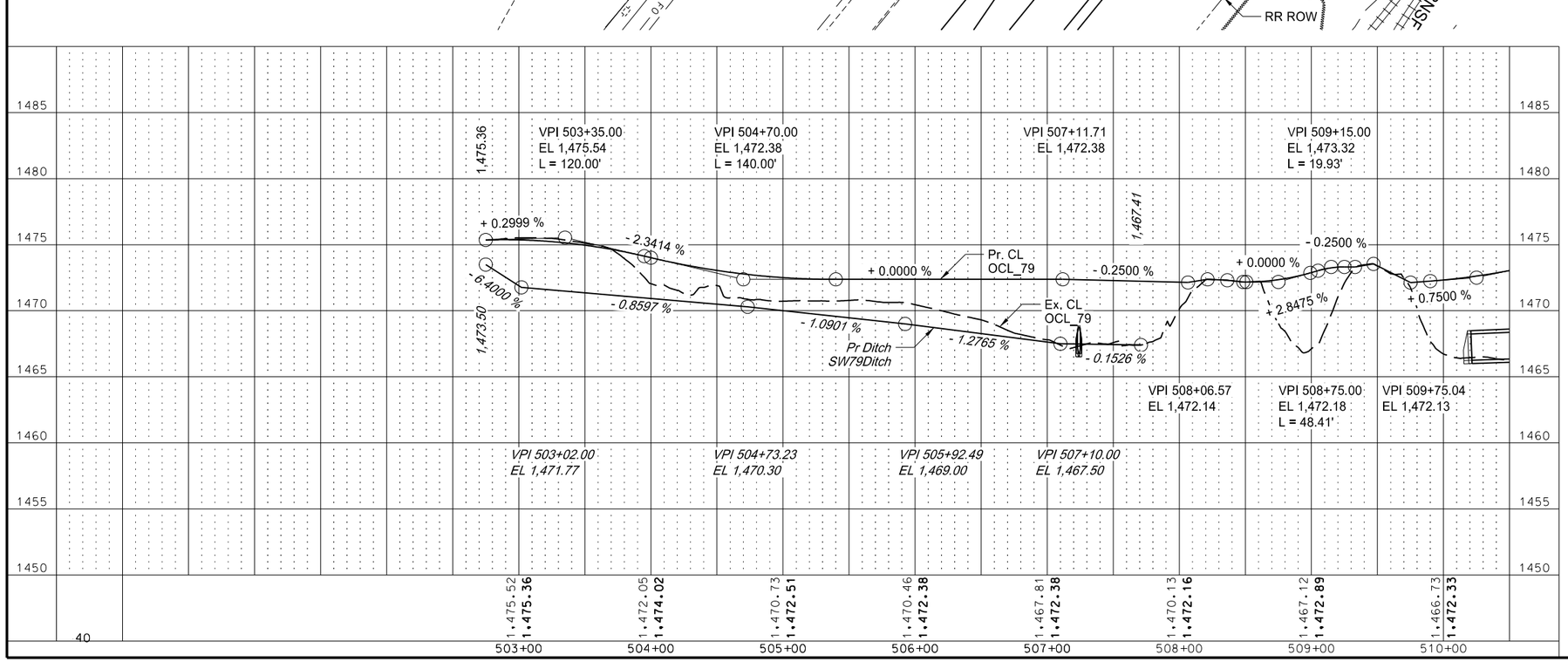

Plan & Profile
US 2 Sta 923+00 to 935+00

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 60 | 3 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 302 | 120 | Aggregate Base Course CL 5 | 3086 TON |
| 401 | 50 | Tack Coat | 136 GAL |
| 401 | 60 | Prime Coat | 493 GAL |
| 430 | 45 | Superpave FAA 45 | 339 TON |
| 430 | 5828 | PG 58-28 Asphalt Cement | 20 TON |

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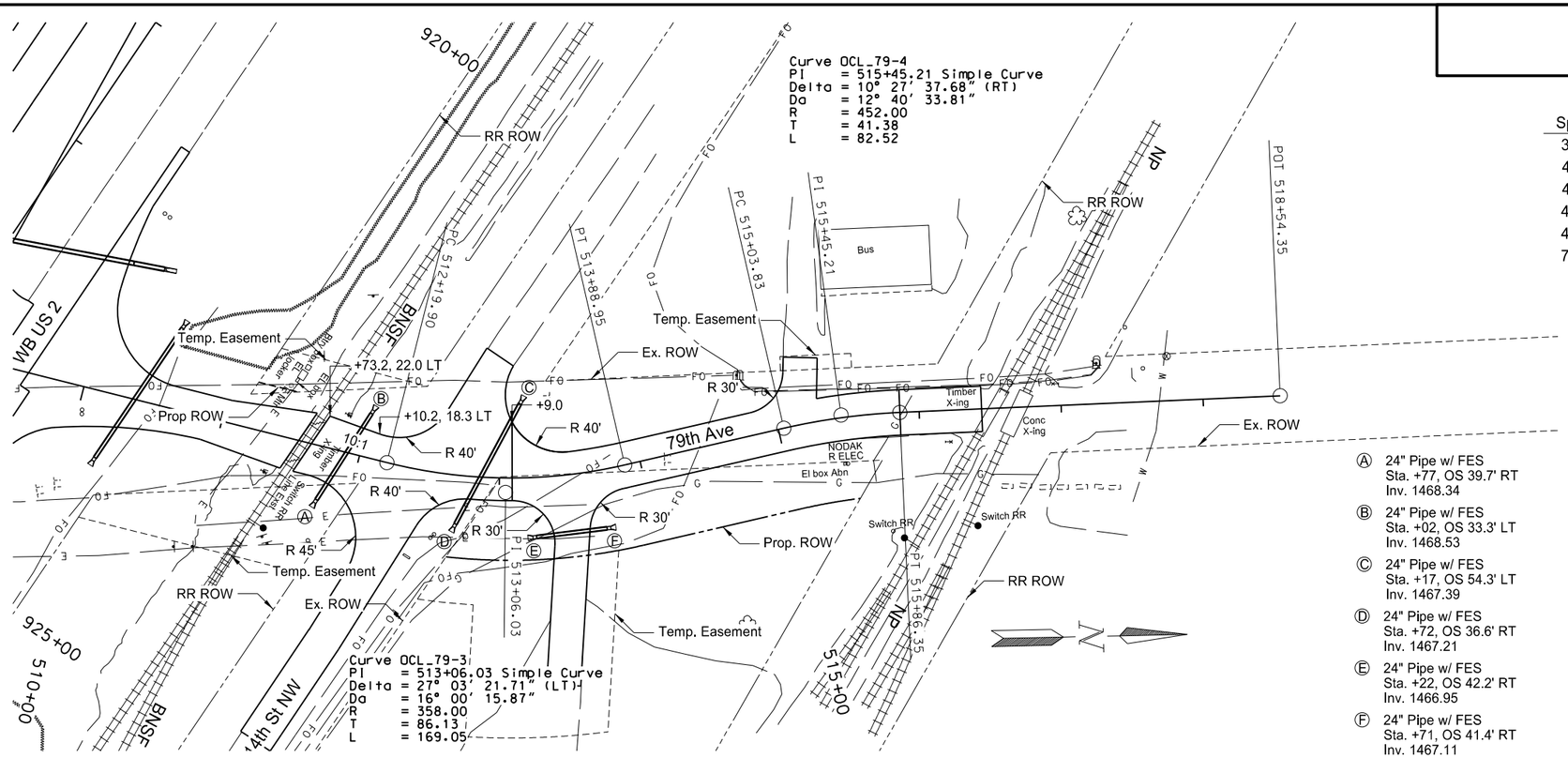
Plan & Profile
79th Ave NE Sta 500+00 to 510+00

US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 60 | 4 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 302 | 120 | Aggregate Base Course CL 5 | 3981 TON |
| 401 | 50 | Tack Coat | 300 GAL |
| 401 | 60 | Prime Coat | 1094 GAL |
| 430 | 45 | Superpave FAA 45 | 754 TON |
| 430 | 5828 | PG 58-28 Asphalt Cement | 45 TON |
| 714 | 4105 | Pipe Conduit 24IN | 233 LF |




Ⓐ 24" Pipe w/ FES
Sta. +77, OS 39.7' RT
Inv. 1468.34

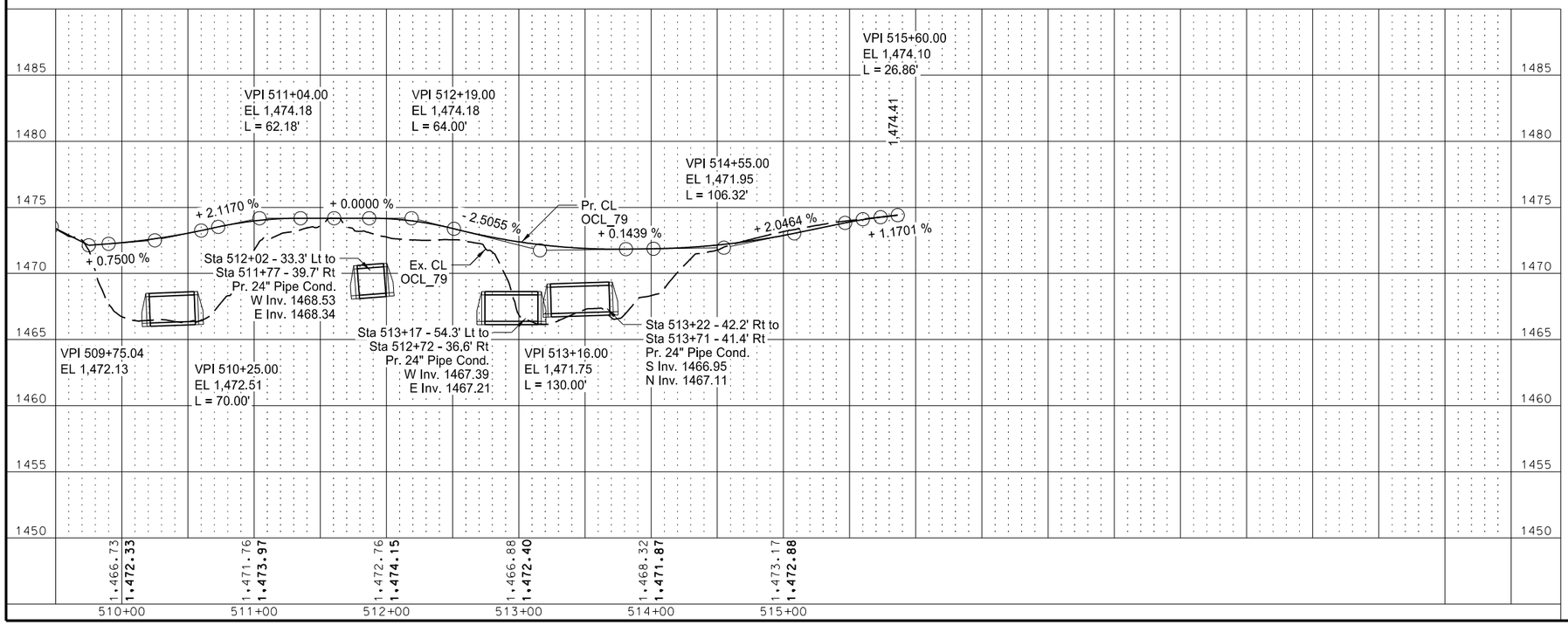
Ⓑ 24" Pipe w/ FES
Sta. +02, OS 33.3' LT
Inv. 1468.53

Ⓒ 24" Pipe w/ FES
Sta. +17, OS 54.3' LT
Inv. 1467.39

Ⓓ 24" Pipe w/ FES
Sta. +72, OS 36.6' RT
Inv. 1467.21

Ⓔ 24" Pipe w/ FES
Sta. +22, OS 42.2' RT
Inv. 1466.95

Ⓕ 24" Pipe w/ FES
Sta. +71, OS 41.4' RT
Inv. 1467.11

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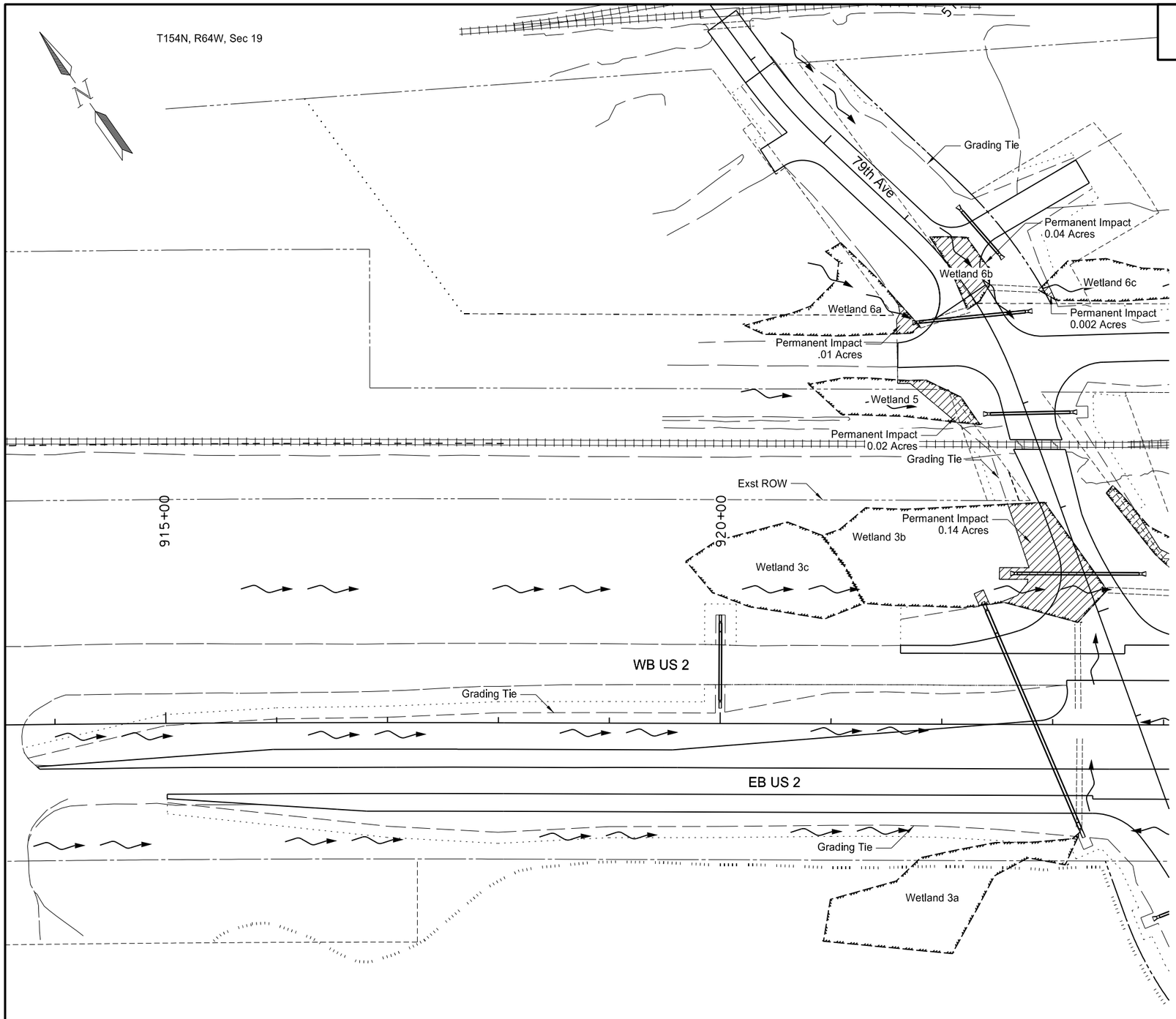
Plan & Profile
79th Ave N Sta 510+00 to 517+00

US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 75 | 1 |

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Wetland Impacts
Sta 914+00 to 923+00

US 2 and 79th Ave NE Realignment

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| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 75 | 2 |

T154N, R64W, Sec 20

N

Wetland 6c

Grading Tie

Exst ROW

Wetland 7

925+00

510+00

930+00

Exst ROW

Permanent Impact
0.18 Acres

Wetland 3d

Grading Tie

WB US 2

Grading Tie

EB US 2

505+00

Wetland 4

Grading Tie

79th Ave

Grading Tie

Permanent Wetland Impact

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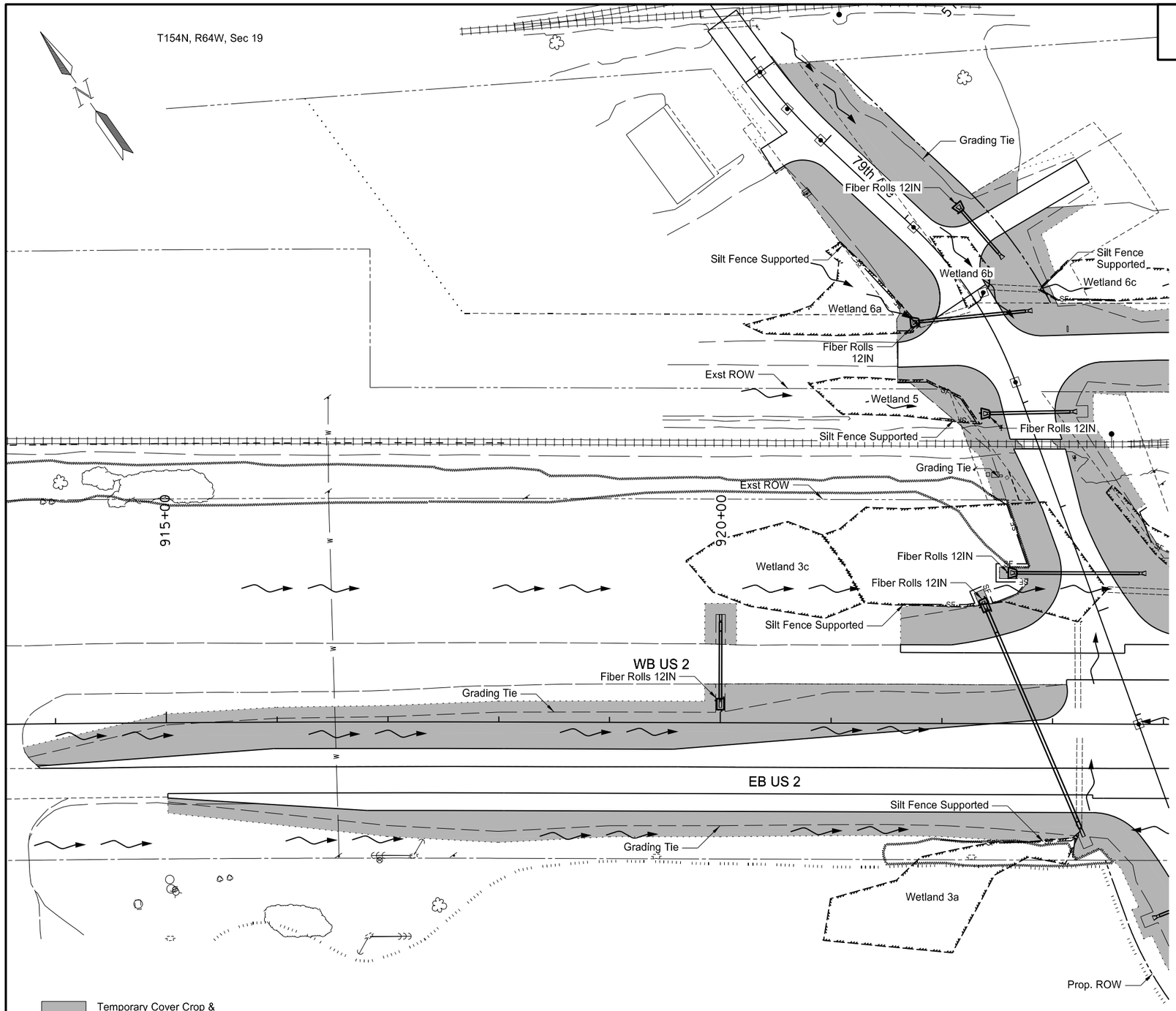
Wetland Impacts
Sta 923+00 to 935+00

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 76 | 1 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 251 | 2000 | Temporary Cover Crop | 2.080 Acre |
| 253 | 101 | Straw Mulch | 2.080 Acre |
| 260 | 200 | Silt Fence Supported | 718 LF |
| 260 | 201 | Remove Silt Fence Supported | 718 LF |
| 261 | 112 | Fiber Rolls 12IN | 195 LF |
| 261 | 113 | Remove Fiber Rolls 12IN | 195 LF |

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Temporary Erosion Control
Sta 914+00 to 923+00

US 2 and 79th Ave NE Realignment

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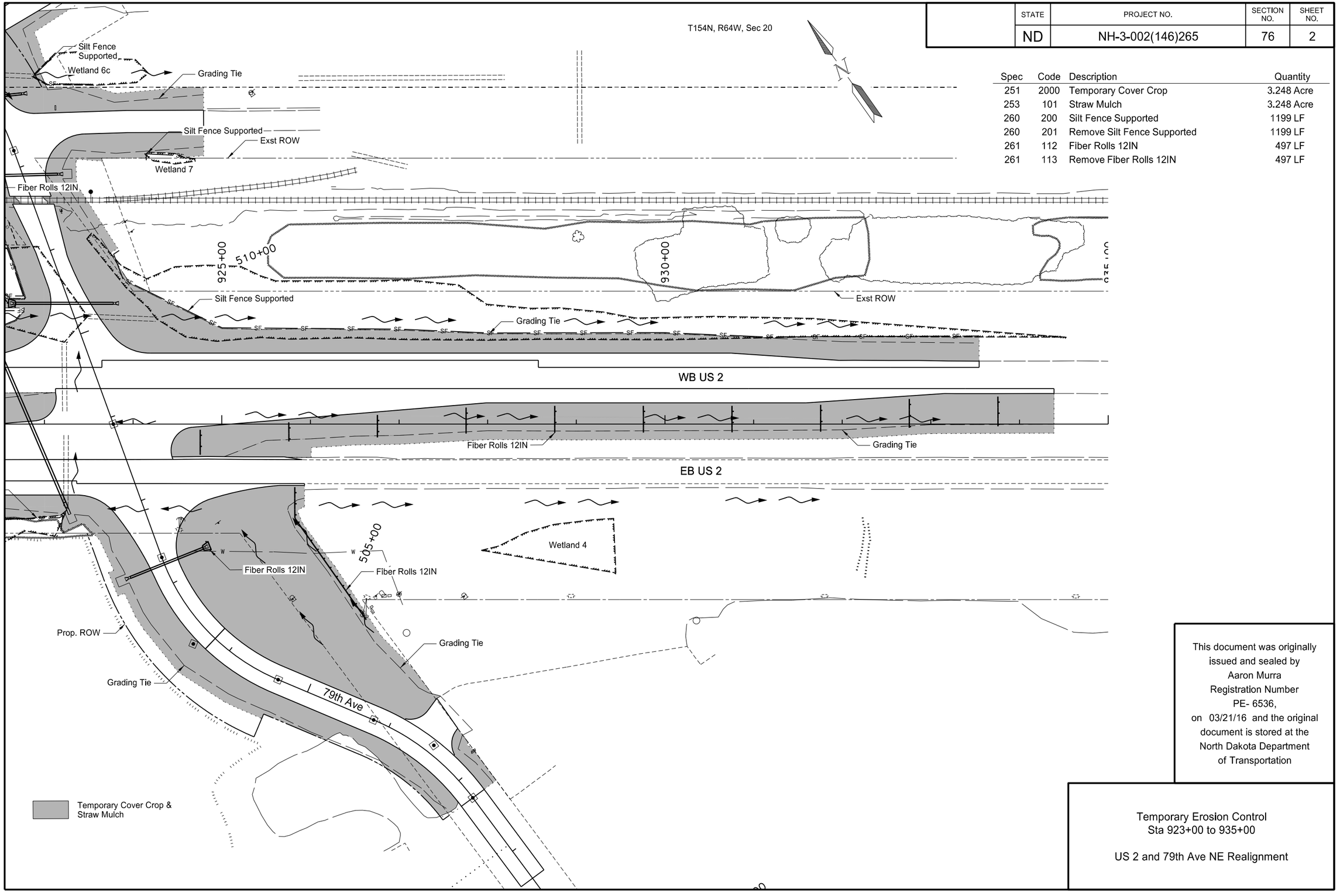
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 76 | 2 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 251 | 2000 | Temporary Cover Crop | 3.248 Acre |
| 253 | 101 | Straw Mulch | 3.248 Acre |
| 260 | 200 | Silt Fence Supported | 1199 LF |
| 260 | 201 | Remove Silt Fence Supported | 1199 LF |
| 261 | 112 | Fiber Rolls 12IN | 497 LF |
| 261 | 113 | Remove Fiber Rolls 12IN | 497 LF |

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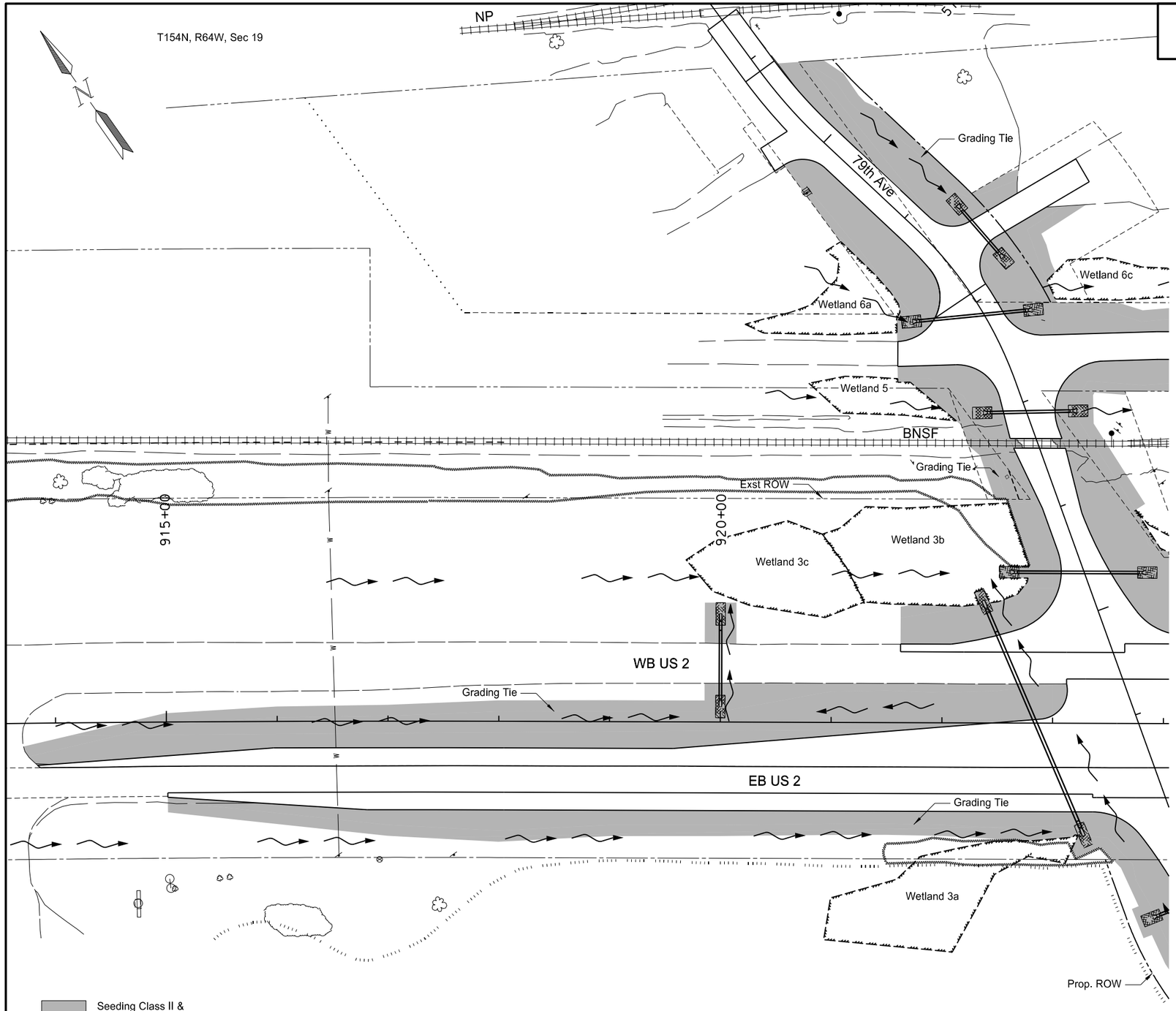
Temporary Erosion Control
Sta 923+00 to 935+00

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 77 | 1 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 251 | 200 | Seeding Class II | 2.080 ACRE |
| 253 | 101 | Straw Mulch | 2.080 ACRE |
| 255 | 101 | ECB Type 1 | 240 SY |

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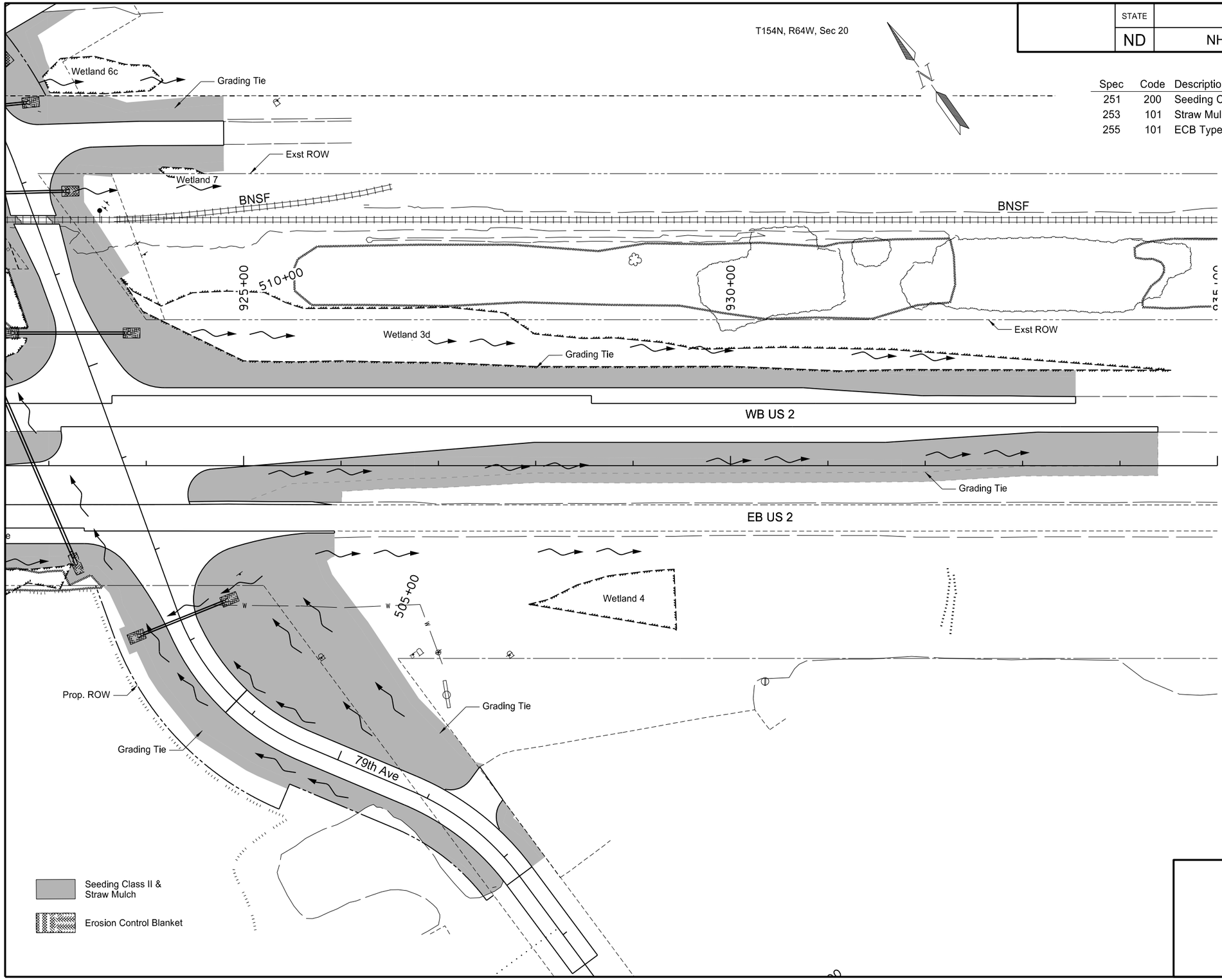
Permanent Erosion Control
Sta 914+00 to 923+00

US 2 and 79th Ave NE Realignment

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 77 | 2 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 251 | 200 | Seeding Class II | 3.248 ACRE |
| 253 | 101 | Straw Mulch | 3.248 ACRE |
| 255 | 101 | ECB Type 1 | 36 SY |

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Permanent Erosion Control
Sta 923+00 to 935+00

US 2 and 79th Ave NE Realignment

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# PRELIMINARY SURVEY COORDINATE AND CURVE DATA - **79TH AVE NE WEST OF DEVILS LAKE**

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 81 | 1 |

## HORIZONTAL ALIGNMENT

| PNT | STATION | NORTHING | EASTING |
|---|---|---|---|
| **US 2** | | | |
| **( Chain: SCL02 )** | | | |
| Begin | 881+07.94 | 422,171.99 | 2,351,066.64 |
| PC | 904+79.33 | 420,892.66 | 2,353,063.34 |
| PI | 911+42.25 | 420,535.03 | 2,353,621.52 |
| PT | 918+04.93 | 420,151.92 | 2,354,162.52 |
| POT | 924+70.26 US 2<br>100+00.00 79th Ave NE | 419,767.41 | 2,354,705.49 |
| End | 943+48.07 | 418,682.19 | 2,356,237.96 |
| **79th AVE NE** | | | |
| **( Chain: 79TH )** | | | |
| Begin | 89+25.23 | 418,692.91 | 2,354,729.71 |
| POT | 100+00.00 79th Ave NE<br>924+70.26 US 2 | 419,767.41 | 2,354,705.49 |
| POT | 115+69.45 | 421,336.46 | 2,354,670.12 |
| End | 142+13.46 | 423,979.80 | 2,354,610.46 |

## CURVE DATA

ARC DEFINITION

C301

PI STA= 911+42.25

Delta = 2° 39′ 22″ RT

$D_a$ = 0° 12′ 01″

R = 28,595.90′

T = 662.92′

L = 1,325.60′

Date Survey Completed 06/01/15

## US PUBLIC LAND SURVEY DATA

| DESC. | SEC-TWP-RGE | NORTHING | EASTING |
|---|---|---|---|
| SW Cor | Sec 20 T-154-N R-64-W | 418692.91 | 2354729.71 |
| W 1/4 Cor | 20 T-154-N R-64-W | 421336.46 | 2354670.12 |
| NW Cor | Sec 20 T-154-N R-64-W | 423979.80 | 2354610.46 |

☐ Assumed Coordinates

☒ All coordinates on this sheet are Ramsey County ground coordinates. They are derived from the NAD83(2011) Reference frame; North Dakota North Zone Combination Factor (cf) = 0.9998685

## SURVEY CONTROL POINTS

| PNT | NORTHING | EASTING | ELEV | STATION | OFFSET | CONTROL POINT DESCRIPTION |
|---|---|---|---|---|---|---|
| | | | | | | PRIMARY CONTROL |
| | | | | | | US 2 |
| GPS 4 | 412836.16 | 2318643.29 | 1461.98 | | N/A | #6 Rebar w/ Alum cap stamped "ND DOT LS 3047 |
| GPS 5 | 408324.10 | 2336495.62 | 1461.62 | | N/A | #6 Rebar w/ Alum cap stamped "ND DOT LS 3047 |
| GPS 6 | 408167.15 | 2351747.15 | 1467.15 | | N/A | #6 Rebar w/ Alum cap stamped "ND DOT LS 3047 |
| | | | | | | SECONDARY CONTROL |
| | | | | | | 79th AVE NE |
| RTK 50000 | 418701.34 | 2354760.95 | 1471.32 | 89+33 | - 31′RT | |
| RTK 50001 | 421166.09 | 2354728.70 | 1472.83 | 113+98 | - 55′RT | |

### REFERENCE MARKERS

| R Mkr# | NORTHING | EASTING | STATION | OFFSET |
|---|---|---|---|---|
| | | US 2 | | |
| 265 | 421823.50 | 2351751.85 | 888+73 | - 76′ LT |
| 266 | 418839.49 | 2356145.24 | 941+81 | - 75′ LT |

All coordinates and measurements on this document derived from the International Foot definition.

INITIALIZING BENCH MARK
NDGPS Stations (OPUS)

☒ NAVD-88
☐ NGVD-29

☐ GEOID 09 ☐ _____
☒ GEOID 12A

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NOTES:

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 82 | 1 |

Beginning chain SCL79 description
==========

Point 8013 N 418,692.9088 E 2,354,729.7080 Sta 89+25.23

Course from 8013 to 8014 N 1°17' 28.22" W Dist 1,074.7749

Point 8014 N 419,767.4108 E 2,354,705.4898 Sta 100+00.00

Course from 8014 to 8015 N 1°17' 28.22" W Dist 1,569.4523

Point 8015 N 421,336.4646 E 2,354,670.1248 Sta 115+69.46

Course from 8015 to 8016 N 1°17' 34.72" W Dist 2,644.0088

Point 8016 N 423,979.8002 E 2,354,610.4633 Sta 142+13.47

==========
Ending chain SCL79 description

Beginning chain SCL US2 description
==========

Point 8010 N 422,171.9864 E 2,351,066.6351 Sta 881+07.94

Course from 8010 to PC SCL US2-1 S 57°21' 05.89" E Dist 2,371.3902

Curve Data
*———*

Curve SCL US2-1
P.I. Station 911+42.25 N 420,535.0313 E 2,353,621.5167
Delta = 2°39' 21.70" (RT)
Degree = 0°12' 01.31"
Tangent = 662.9206
Length = 1,325.6038
Radius = 28,595.9000
External = 7.6830
Long Chord = 1,325.4851
Mid. Ord. = 7.6809
P.C. Station 904+79.33 N 420,892.6648 E 2,353,063.3393
P.T. Station 918+04.93 N 420,151.9161 E 2,354,162.5217
C.C. N 396,814.9935 E 2,337,636.3745
Back = S 57°21' 05.89" E
Ahead = S 54°41' 44.19" E
Chord Bear = S 56°01' 25.04" E

Course from PT SCL US2-1 to 8011 S 54°41' 44.19" E Dist 665.3259

Point 8011 N 419,767.4108 E 2,354,705.4898 Sta 924+70.26

Course from 8011 to 8012 S 54°41' 44.19" E Dist 1,877.8119

Point 8012 N 418,682.1855 E 2,356,237.9595 Sta 943+48.07

==========
Ending chain SCL US2 description

Beginning chain OCL 79 description
==========

Point 8532 N 418,967.6090 E 2,354,723.5165 Sta 500+00.00

Course from 8532 to PC OCL 79-1 N 1°17' 28.22" W Dist 275.0000

Curve Data
*———*

Curve OCL 79-1
P.I. Station 503+48.74 N 419,316.2612 E 2,354,715.6582
Delta = 30°33' 05.31" (LT)
Degree = 21°13' 14.37"
Tangent = 73.7408
Length = 143.9704
Radius = 270.0000
External = 9.8887
Long Chord = 142.2709
Mid. Ord. = 9.5393
P.C. Station 502+75.00 N 419,242.5392 E 2,354,717.3199
P.T. Station 504+18.97 N 419,378.9040 E 2,354,676.7535
C.C. N 419,236.4552 E 2,354,447.3884
Back = N 1°17' 28.22" W
Ahead = N 31°50' 33.53" W
Chord Bear = N 16°34' 00.88" W

Course from PT OCL 79-1 to PC OCL 79-2 N 31°50' 33.53" W Dist 116.8917

Curve Data
*———*

Curve OCL 79-2
P.I. Station 506+39.71 N 419,566.4231 E 2,354,560.2934
Delta = 47°08' 49.33" (RT)
Degree = 24°04' 25.88"
Tangent = 103.8487
Length = 195.8433
Radius = 238.0000
External = 21.6701
Long Chord = 190.3645
Mid. Ord. = 19.8617
P.C. Station 505+35.86 N 419,478.2036 E 2,354,615.0828
P.T. Station 507+31.71 N 419,666.5890 E 2,354,587.7040
C.C. N 419,603.7696 E 2,354,817.2638
Back = N 31°50' 33.53" W
Ahead = N 15°18' 15.81" E
Chord Bear = N 8°16' 08.86" W

Course from PT OCL 79-2 to 8533 N 15°18' 15.81" E Dist 160.0000

Point 8533 N 419,820.9149 E 2,354,629.9355 Sta 508+91.71

Course from 8533 to PC OCL 79-3 N 15°18' 15.81" E Dist 328.1911

Curve Data
*———*

Curve OCL 79-3
P.I. Station 513+06.03 N 420,220.5463 E 2,354,739.2952
Delta = 27°03' 21.71" (LT)
Degree = 16°00' 15.87"
Tangent = 86.1334
Length = 169.0536
Radius = 358.0000
External = 10.2159
Long Chord = 167.4873
Mid. Ord. = 9.9325
P.C. Station 512+19.90 N 420,137.4674 E 2,354,716.5605
P.T. Station 513+88.95 N 420,304.8742 E 2,354,721.7524
C.C. N 420,231.9605 E 2,354,371.2562
Back = N 15°18' 15.81" E
Ahead = N 11°45' 05.91" W
Chord Bear = N 1°46' 34.95" E

Course from PT OCL 79-3 to PC OCL 79-4 N 11°45' 05.91" W Dist 114.8801

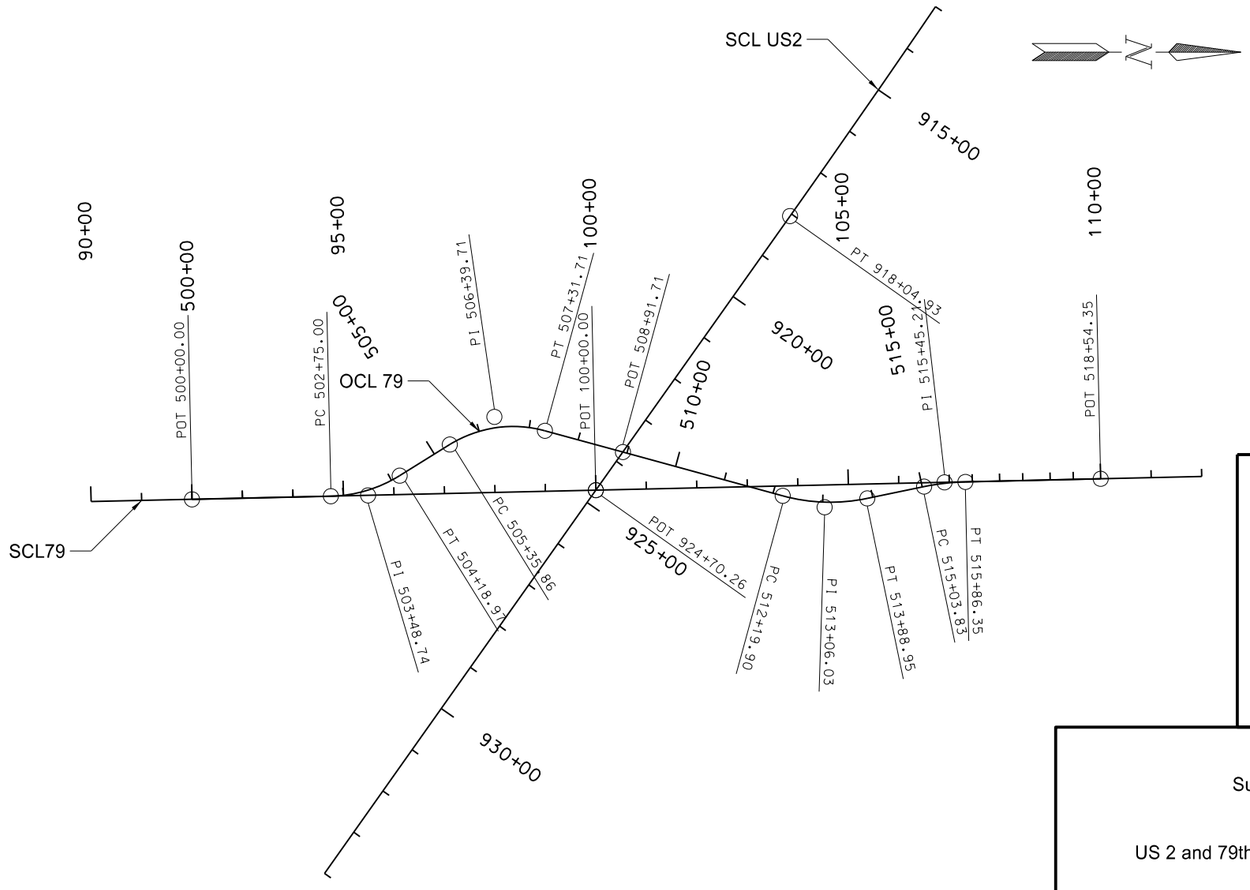
Curve Data
*———*

Curve OCL 79-4
P.I. Station 515+45.21 N 420,457.8548 E 2,354,689.9278
Delta = 10°27' 37.68" (RT)
Degree = 12°40' 33.81"
Tangent = 41.3757
Length = 82.5215
Radius = 452.0000
External = 1.8898
Long Chord = 82.4069
Mid. Ord. = 1.8819
P.C. Station 515+03.83 N 420,417.3464 E 2,354,698.3548
P.T. Station 515+86.35 N 420,499.2200 E 2,354,688.9955
C.C. N 420,509.4051 E 2,355,140.8807
Back = N 11°45' 05.91" W
Ahead = N 1°17' 28.22" W
Chord Bear = N 6°31' 17.06" W

Course from PT OCL 79-4 to 8534 N 1°17' 28.22" W Dist 268.0000

Point 8534 N 420,767.1520 E 2,354,682.9566 Sta 518+54.35

==========
Ending chain OCL 79 description

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Survey Data

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 82 | 2 |

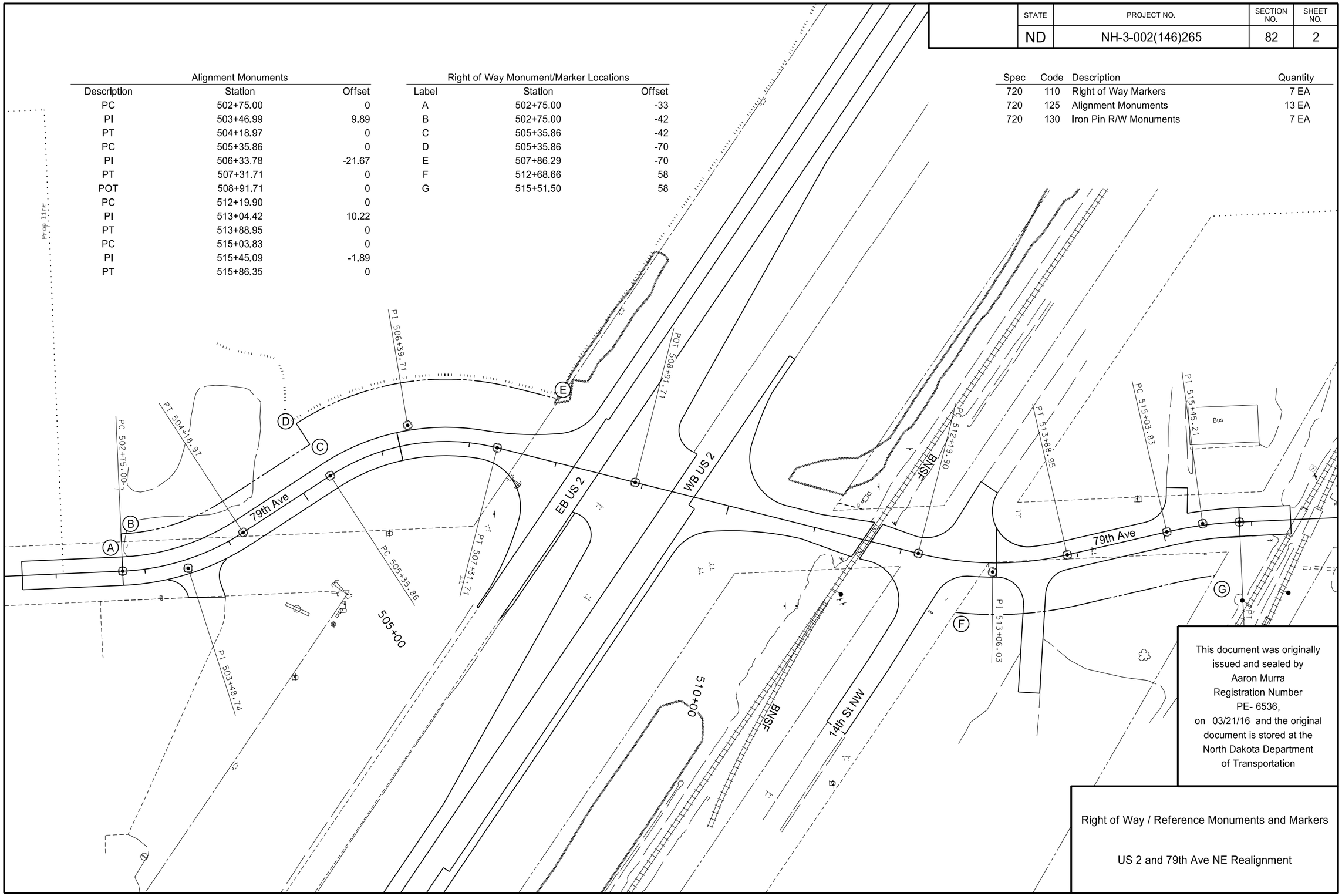
**Alignment Monuments**

| Description | Station | Offset |
|---|---|---|
| PC | 502+75.00 | 0 |
| PI | 503+46.99 | 9.89 |
| PT | 504+18.97 | 0 |
| PC | 505+35.86 | 0 |
| PI | 506+33.78 | -21.67 |
| PT | 507+31.71 | 0 |
| POT | 508+91.71 | 0 |
| PC | 512+19.90 | 0 |
| PI | 513+04.42 | 10.22 |
| PT | 513+88.95 | 0 |
| PC | 515+03.83 | 0 |
| PI | 515+45.09 | -1.89 |
| PT | 515+86.35 | 0 |

**Right of Way Monument/Marker Locations**

| Label | Station | Offset |
|---|---|---|
| A | 502+75.00 | -33 |
| B | 502+75.00 | -42 |
| C | 505+35.86 | -42 |
| D | 505+35.86 | -70 |
| E | 507+86.29 | -70 |
| F | 512+68.66 | 58 |
| G | 515+51.50 | 58 |

| Spec | Code | Description | Quantity |
|---|---|---|---|
| 720 | 110 | Right of Way Markers | 7 EA |
| 720 | 125 | Alignment Monuments | 13 EA |
| 720 | 130 | Iron Pin R/W Monuments | 7 EA |

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Right of Way / Reference Monuments and Markers

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | NH-3-002(146)265 | 100 | 1 |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | AMOUNT REQUIRED BY PHASE NO. 1 | 2 | | TOTAL AMOUNT REQUIRED | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|---|---|---|
| D3-36 | 36"x6" | STREET NAME SIGN (Sign and installation only) | | | | | 6 | |
| G20-1-60 | 60"x24" | ROAD WORK NEXT __ MILES | | | | | 34 | |
| G20-1b-60 | 60"x24" | WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only) | | | | | 26 | |
| **G20-2-48** | **48"x24"** | **END ROAD WORK** | **6** | **6** | | **6** | **19** | **114** |
| G20-4-36 | 36"x18" | PILOT CAR FOLLOW ME (Mounted to back of pilot car) | | | | | 18 | |
| **G20-10-108** | **108"x48"** | **CONTRACTOR SIGN** | **2** | **2** | | **2** | **64** | **128** |
| G20-50a-72 | 72"x36" | ROAD WORK NEXT __ MILES RT & LT ARROWS | | | | | 37 | |
| G20-52a-72 | 72"x24" | ROAD WORK NEXT __ MILES RT or LT ARROW | | | | | 30 | |
| **G20-55-96** | **96"x48"** | **SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT** | **6** | **6** | | **6** | **59** | **354** |
| 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 ARROW RIGHT or LEFT | | | | | 23 | |
| M5-1-21 | 21"x15" | ARROW AHD AND RT or LT(Mounted on route marker post) | | | | | 7 | |
| M5-2-21 | 21"x15" | ARROW AHD UP & RT or LT (Mounted on route marker post) | | | | | 7 | |
| M6-1-21 | 21"x15" | ARROW RT or LT (Mounted on route marker post) | | | | | 7 | |
| M6-2-21 | 21"x15" | ARROW UP & RT or LT (Mounted on route marker post) | | | | | 7 | |
| M6-3-21 | 21"x15" | ARROW AHD (Mounted on route marker post) | | | | | 7 | |
| **R1-1-48** | **48"x48"** | **STOP** | **6** | | | **6** | **32** | **192** |
| **R1-1a-18** | **18"x18"** | **STOP and SLOW PADDLE Back to Back** | **4** | **2** | | **4** | **5** | **20** |
| R1-2-60 | 60"x60" | YIELD | | | | | 29 | |
| **R2-1-48** | **48"x60"** | **SPEED LIMIT __** | **26** | **24** | | **26** | **39** | **1014** |
| **R2-1a-24** | **24"x18"** | **MINIMUM FEE $80 (Mounted on Speed Limit post)** | **10** | **8** | | **10** | **10** | **100** |
| R3-7-48 | 48"x48" | LEFT or RIGHT LANE MUST TURN LEFT or RIGHT | | | | | 35 | |
| R4-1-48 | 48"x60" | DO NOT PASS | | | | | 39 | |
| R4-7-48 | 48"x60" | KEEP RIGHT SYMBOL | | | | | 39 | |
| R5-1-48 | 48"x48" | DO NOT ENTER | | | | | 35 | |
| R6-1-36 | 36"x12" | ONE WAY RIGHT or LEFT | | | | | 13 | |
| R7-1-12 | 12"x18" | NO PARKING | | | | | 11 | |
| R10-6-24 | 24"x36" | STOP HERE ON RED | | | | | 16 | |
| R11-2-48 | 48"x30" | ROAD CLOSED | | | | | 28 | |
| R11-2a-48 | 48"x30" | STREET CLOSED | | | | | 28 | |
| R11-3a-60 | 60"x30" | ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY | | | | | 31 | |
| R11-3c-60 | 60"x30" | STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY | | | | | 31 | |
| R11-4a-60 | 60"x30" | STREET CLOSED TO THRU TRAFFIC | | | | | 31 | |
| W1-3-48 | 48"x48" | RIGHT or LEFT SHARP REVERSE CURVE ARROW | | | | | 35 | |
| W1-4-48 | 48"x48" | RIGHT or LEFT REVERSE CURVE ARROW | | | | | 35 | |
| W1-4b-48 | 48"x48" | DOUBLE RIGHT or LEFT REVERSE CURVE ARROW | | | | | 35 | |
| W1-6-48 | 48"x24" | LARGE ARROW | | | | | 26 | |
| W3-1-48 | 48"x48" | STOP AHEAD SYMBOL | | | | | 35 | |
| W3-3-48 | 48"x48" | SIGNAL AHEAD SYMBOL | | | | | 35 | |
| **W3-4-48** | **48"x48"** | **BE PREPARED TO STOP** | **2** | | | **2** | **35** | **70** |
| **W3-5-48** | **48"x48"** | **SPEED REDUCTION AHEAD** | **9** | **9** | | **9** | **35** | **315** |
| **W4-2-48** | **48"x48"** | **RIGHT or LEFT LANE TRANSITION SYMBOL** | **4** | **4** | | **4** | **35** | **140** |
| 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 SYMBOL | | | | | 35 | |
| **W8-1-48** | **48"x48"** | **BUMP** | **3** | | | **3** | **35** | **105** |
| **W8-3-48** | **48"x48"** | **PAVEMENT ENDS** | **3** | | | **3** | **35** | **105** |
| W8-7-48 | 48"x48" | LOOSE GRAVEL | | | | | 35 | |
| **W8-9a-48** | **48"x48"** | **SHOULDER DROP-OFF** | **2** | | | **2** | **35** | **70** |
| W8-11-48 | 48"x48" | UNEVEN LANES | | | | | 35 | |
| W8-12-48 | 48"x48" | NO CENTER STRIPE | | | | | 35 | |
| W8-53-48 | 48"x48" | TRUCKS ENTERING HIGHWAY | | | | | 35 | |
| **W8-54-48** | **48"x48"** | **TRUCKS ENTERING AHEAD or __ FT.** | **2** | | | **2** | **35** | **70** |
| **W8-55-48** | **48"x48"** | **TRUCKS CROSSING AHEAD or __ FT.** | **2** | | | **2** | **35** | **70** |
| 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 SYMBOL | | | | | 35 | |
| W13-1-24 | 24"x24" | __ MPH ADVISORY SPEED PLATE (Mounted on warning sign post) | | | | | 11 | |
| W13-4-48 | 48"x60" | RAMP ARROW | | | | | 39 | |
| W14-3-48 | 48"x36" | NO PASSING ZONE | | | | | 23 | |
| **W20-1-48** | **48"x48"** | **ROAD WORK AHEAD or _FT or _ MILE** | **11** | **9** | | **11** | **35** | **385** |
| W20-2-48 | 48"x48" | DETOUR AHEAD or __ FT | | | | | 35 | |
| W20-3-48 | 48"x48" | ROAD or STREET CLOSED AHEAD or __ FT. | | | | | 35 | |
| W20-4-48 | 48"x48" | ONE LANE ROAD AHEAD or __ FT. | | | | | 35 | |
| **W20-5-48** | **48"x48"** | **RIGHT or LEFT LANE CLOSED AHEAD or __ FT.** | **4** | **4** | | **4** | **35** | **140** |
| **W20-7a-48** | **48"x48"** | **FLAGGING SYMBOL** | **4** | **2** | | **4** | **35** | **140** |
| W20-7k-24 | 24"x18" | __ FEET (Mounted on warning sign post) | | | | | 10 | |
| W20-8-48 | 48"x48" | STREET CLOSED | | | | | 35 | |
| W20-51-48 | 48"x48" | EQUIPMENT WORKING | | | | | 35 | |
| **W20-52-54** | **54"x12"** | **NEXT __ MILES (Mounted on warning sign post)** | **2** | | | **2** | **12** | **24** |
| W21-1a-48 | 48"x48" | WORKERS SYMBOL | | | | | 35 | |
| W21-2-48 | 48"x48" | FRESH OIL | | | | | 35 | |
| W21-3-48 | 48"x48" | ROAD MACHINERY AHEAD or __FT | | | | | 35 | |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | AMOUNT REQUIRED BY PHASE NO. 1 | 2 | | TOTAL AMOUNT REQUIRED | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|---|---|---|
| **W21-5-48** | **48"x48"** | **SHOULDER WORK** | **3** | **3** | | **3** | **35** | **105** |
| W21-5a-48 | 48"x48" | RIGHT or LEFT SHOULDER CLOSED | | | | | 35 | |
| W21-5b-48 | 48"x48" | RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT. | | | | | 35 | |
| W21-6a-48 | 48"x48" | SURVEY CREW AHEAD | | | | | 35 | |
| W21-50-48 | 48"x48" | BRIDGE PAINTING AHEAD or __ FT. | | | | | 35 | |
| W21-51-48 | 48"x48" | MATERIAL ON ROADWAY | | | | | 35 | |
| W22-8-48 | 48"x48" | FRESH OIL LOOSE ROCK | | | | | 35 | |
| | 24"x24" | TAKE TURNS (6" D letters) (Mounted on stop sign post) | | | | | 11 | |

**SPECIAL SIGNS**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 9"x9" | 9x9 PLAQUE WITH 6" DOWNWARD ARROW | | | | | 7 | |

**SPEC & CODE**

| | | | |
|---|---|---|---|
| **704-1000** | **TRAFFIC CONTROL SIGNS** | **TOTAL UNITS** | **3661** |

| SPEC & CODE | DESCRIPTION | UNIT | QUANTITY BY PHASE NO. 1 | 2 | | TOTAL QUANTITY |
|---|---|---|---|---|---|---|
| **704-0100** | **FLAGGING** | MHR | **500** | | | **500** |
| 704-1041 | ATTENUATION DEVICE-TYPE B-55 | EACH | | | | |
| 704-1043 | ATTENUATION DEVICE-TYPE B-65 | EACH | | | | |
| 704-1044 | ATTENUATION DEVICE-TYPE B-70 | EACH | | | | |
| 704-1050 | TYPE I BARRICADES | EACH | | | | |
| 704-1051 | TYPE II BARRICADES | EACH | | | | |
| **704-1052** | **TYPE III BARRICADES** | EACH | **2** | **2** | | **2** |
| **704-1060** | **DELINEATOR DRUMS** | EACH | **60** | **37** | | **60** |
| 704-1065 | TRAFFIC CONES | EACH | | | | |
| **704-1067** | **TUBULAR MARKERS** | EACH | **55** | **52** | | **55** |
| 704-1070 | DELINEATOR | EACH | | | | |
| 704-1072 | FLEXIBLE DELINEATORS | EACH | | | | |
| **704-1080** | **STACKABLE VERTICAL PANELS** | EACH | | **21** | | **21** |
| 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 | **2** | **2** | | **2** |
| 704-1088 | SEQUENCING ARROW PANEL - TYPE C - CROSSOVER | EACH | | | | |
| 704-1095 | TYPE B FLASHERS | EACH | | | | |
| **704-1500** | **OBLITERATION OF PVMT MK** | SF | **572** | | | **572** |
| 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 | | | | |
| 772-2110 | FLASHING BEACON - POST MOUNTED | EACH | | | | |

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.
http://www.dot.nd.gov/

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Traffic Control Devices List

US 2 and 79th Ave NE Realignment

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| N.D. | NH-3-002(146)265 | 110 | 1 |

| Sta/RP | Sign No. | Assembly No. | Flat Sheet For Signs IV SF | Flat Sheet For Signs XI SF | Sign Support Length 1st LF | 2nd LF | 3rd LF | 4th LF | Support Size | Max Post Len LF | Sleeve Length 1st LF | 2nd LF | 3rd LF | 4th LF | Sleeve Size | Anchor EA | Anchor LF | Anchor Size | Reset Sign Panel EA | Reset Sign Support EA | Break-Away EA | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hwy 2** | | | | | | | | | | | | | | | | | | | | | | |
| 922+08 Lt | SN 2 | | 2.5 | | 14.2 | | | | 2.25 x 2.25 12 ga | 15.4 | 4.6 | | | | 2 x 2 12 ga | 1 | 4 | 3 x 3 7 ga | | | 1 | |
| 922+08 Rt | SN 1 | | 2.5 | | 14.2 | | | | 2.25 x 2.25 12 ga | 15.4 | 4.6 | | | | 2 x 2 12 ga | 1 | 4 | 3 x 3 7 ga | | | 1 | |
| 922+82 Lt | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| 922+83 Rt mdn | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| 923+63 Rt | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| 924+72 Lt mdn | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| 924+74 Rt | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| **Sub Total** | | | 5.0 | 0.0 | | **Total** | 28.4 | | | | | | | | | **Total** | 8 | | 5 | 5 | 2 | |
| **79th Ave NE** | | | | | | | | | | | | | | | | | | | | | | |
| 91+00 Rt | | 19 | | 6.3 | 12.4 | | | | 2.5 x 2.5 12 ga | 14.5 | | | | | | 1 | 4 | 3 x 3 7 ga | | | | |
| 95+00 Rt | | 19 | | 6.3 | 12.4 | | | | 2.5 x 2.5 12 ga | 14.5 | | | | | | 1 | 4 | 3 x 3 7 ga | | | | |
| 101+35 Rt | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| 101+55 Rt | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| 104+75 Lt | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| 105+68 Rt | | | | | | | | | 2 x 2 12 ga | | | | | | | | | | 1 | 1 | | |
| **Sub Total** | | | 0.0 | 12.6 | | **Total** | 24.8 | | | | | | | | | **Total** | 8 | | 4 | 4 | 0 | |
| **Grand Total** | | | 5.0 | 12.6 | | **Total** | 53.2 | | | | | | | | | **Total** | 16 | | 9 | 9 | 2 | |

Basis of Estimate
Sign Support Lengths

The sign support lengths have been calculated using the following vertical clearances:

Urban/rural expressway and freeway - 84" (Offset - 60")

This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE-5047, on 3/14/2016 and the original document is stored at the North Dakota Department of Transportation

Sign Summary
Perforated Tube

US 2 and 79th Ave NE

US Hwy 2

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 110 | 2 |

Sta 922+08 Lt
Special Assembly A

To be installed by state forces

ADOPT-A-HIGHWAY
DEVILS LAKE JAYCEES
Sign 2

Sta 922+08 Lt
Remove

ADOPT A HIGHWAY
LITTER CONTROL
NEXT 3 MILES
DEVILS LAKE
JAYCEES

Sta 104+75 Lt
Reset sign and support
From 104+86 Lt

YIELD

Sta 105+68 Rt
Reset sign and support
From 105+65 Rt

TRUCK ROUTE
TRUCKS
40 MPH

Sta 922+82 Lt
Reset sign and support
From 923+60 Lt

ONE WAY
ONE WAY
STOP
DIVIDED HIGHWAY

Sta 101+55 Rt
Reset sign and support
From 101+35 Rt

R R

Sta 101+35 Rt
Reset sign and support
From 101+23 Rt

79th Ave NE
US HWY 2

Sta 922+08 Rt
Remove

ADOPT A HIGHWAY
LITTER CONTROL
NEXT 3 MILES
KNIGHTS OF COLUMBUS

Sta 922+08 Rt
Special Assembly A

To be installed by state forces

ADOPT-A-HIGHWAY
KNIGHTS OF COLUMBUS
Sign 1

Sta 924+72 Lt Mdn
Reset sign and support
From 925+17 Lt Mdn

ONE WAY
ONE WAY
YIELD

Sta 922+83 Rt Mdn
Reset sign and support
From 924+21 Rt Mdn

ONE WAY
ONE WAY
YIELD

79th Ave NE
US HWY 2
Sta 923+63 Rt
Reset sign and support
From

W3-1A-30
Sta 95+00 Rt

W4-4(L)-30
Sta 91+00 Rt

ONE WAY
ONE WAY
STOP
DIVIDED HIGHWAY
Sta 924+74 Rt
Reset sign and assembly
From 925+79 Rt

Remove & reset delineators

| | |
|---|---|
| US 2 West Bound | 3 EA |
| US 2 East Bound | 3 EA |
| Median | 1 EA |
| Total | 7 EA |

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Sign Layout

US 2 and 79th Ave NE

US Hwy 2

3/14/2016 8:36:03 AM jallery R:\project\30002265.146\traffic\110SN_002_Lsign.dgn

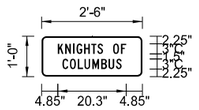
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 110 | 3 |

| | |
|---|---|
| SIGN NUMBER | Sign 1 |
| WIDTH x HEIGHT | 2'-6" x 1'-0" |
| BORDER WIDTH | 0.5" (inset 0") |
| CORNER RADIUS | 1.5" |
| MOUNTING | Ground |
| BACKGROUND | TYPE: IV Reflective |
| | COLOR: Blue |
| LEGEND/BORDER | TYPE: IV Reflective |
| | COLOR: White |

| SYMBOL | X | Y | WID | HT | ANGLE |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

STATION(S):
922+08 Rt

AREA: 2.5 Sq.Ft.




Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Adopt-a-Highway.ssi

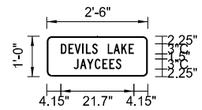
| LETTER POSITION (X) | | | | | | | | | | | | | | | | | | | LENGTH | SIZE | SERIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| K | N | I | G | H | T | S | | O | F | | | | | | | | | | 20.3 | 3 | C 2000 |
| 4.8 | 7 | 9.4 | 10.4 | 12.7 | 14.8 | 16.6 | 18.3 | 21.3 | 23.6 | | | | | | | | | | | | |
| C | O | L | U | M | B | U | S | | | | | | | | | | | | 17.6 | 3 | C 2000 |
| 6.2 | 8.4 | 10.8 | 12.7 | 15.1 | 17.7 | 19.9 | 22.1 | | | | | | | | | | | | | | |

| SIGN NUMBER | Sign 2 |
|---|---|
| WIDTH x HEIGHT | 2'-6" x 1'-0" |
| BORDER WIDTH | 0.5" (inset 0") |
| CORNER RADIUS | 1.5" |
| MOUNTING | Ground |
| BACKGROUND | TYPE: IV Reflective |
| | COLOR: Blue |
| LEGEND/BORDER | TYPE: IV Reflective |
| | COLOR: White |

| SYMBOL | X | Y | WID | HT | ANGLE |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

STATION(S):
922+08 Lt

AREA: 2.5 Sq.Ft.




Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Adopt-a-Highway.ssi

| LETTER POSITION (X) | | | | | | | | | | | | | | | | | | | LENGTH | SIZE | SERIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | E | V | I | L | S | | L | A | K | E | | | | | | | | | 21.7 | 3 | C 2000 |
| 4.2 | 6.4 | 8.2 | 10.5 | 11.6 | 13.4 | 15.1 | 18.1 | 19.8 | 22.1 | 24.3 | | | | | | | | | | | |
| J | A | Y | C | E | E | S | | | | | | | | | | | | | 14.2 | 3 | C 2000 |
| 7.9 | 9.8 | 11.9 | 14.2 | 16.5 | 18.5 | 20.4 | | | | | | | | | | | | | | | |

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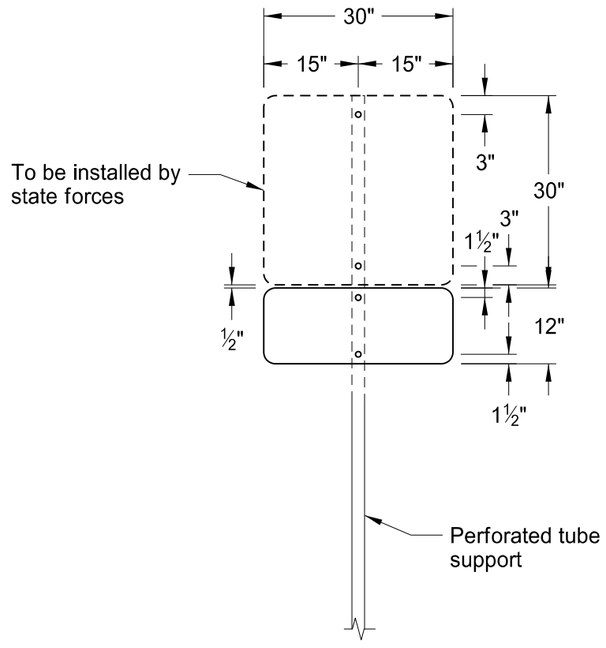
Sign Details

US 2 and 79th Ave NE

US Hwy 2

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 110 | 4 |




## Special Assembly A

Sta 922+08 Rt
Sta 922+08 Lt

Pay Area: 2.5 SF

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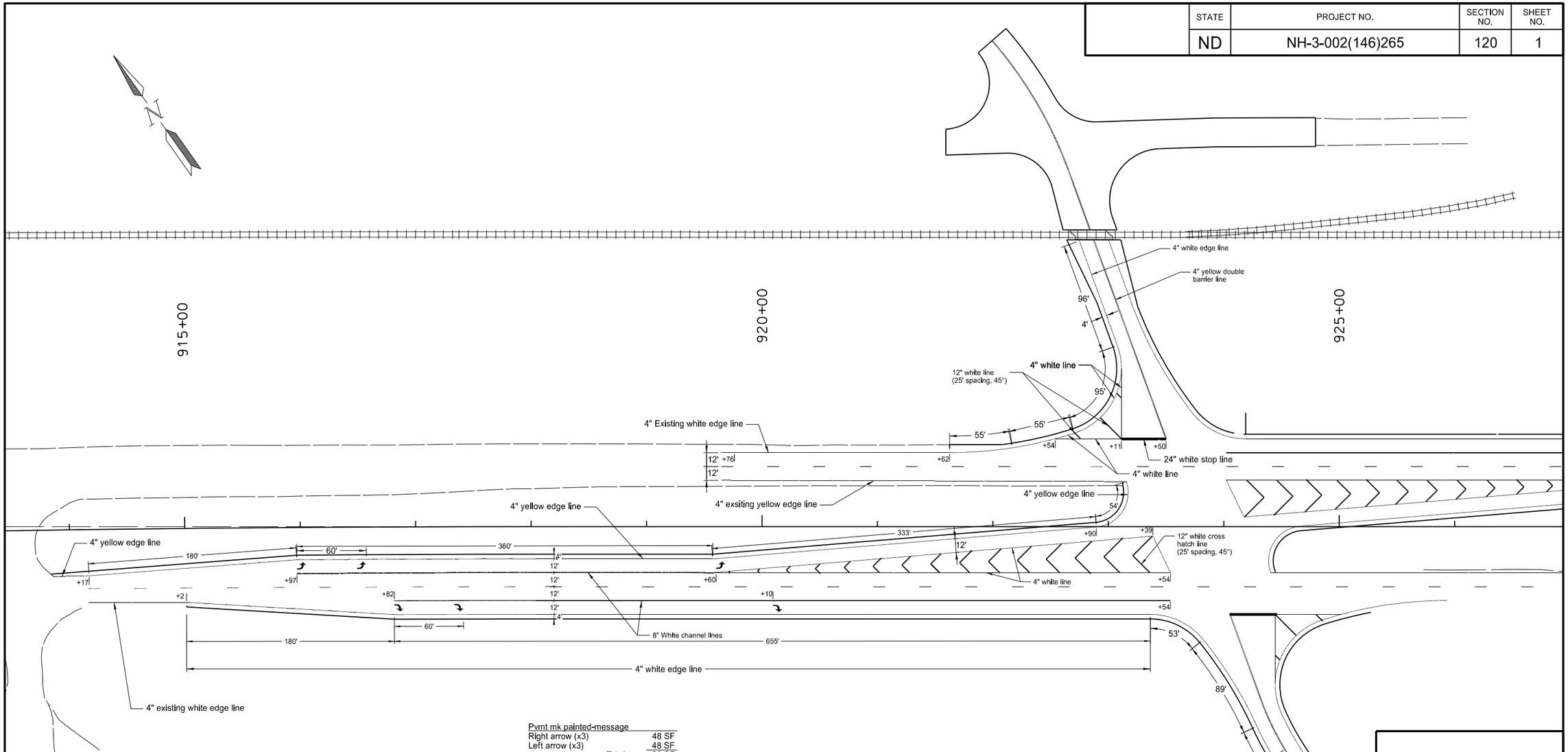
Sign Assembly

US 2 and 79th Ave NE

US Hwy 2

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 120 | 1 |




Pvmt mk painted-message

| | |
|---|---|
| Right arrow (x3) | 48 SF |
| Left arrow (x3) | 48 SF |
| Total | 96 SF |

Pvmt mk painted 4" line

| | |
|---|---|
| 4" white edge line | 2305 LF |
| 4" yellow edge line | 959 LF |
| 4" double barrier line | 369 LF |
| Total | 3633 LF |

Pvmt mk painted 8" line

| | |
|---|---|
| 8" white channel line | 1033 LF |

Pvmt mk painted 12" line

| | |
|---|---|
| 12" white line (25' centers @ 45°) | 401 LF |

Pvmt mk painted 24" line

| | |
|---|---|
| 24" white stop line | 40 LF |

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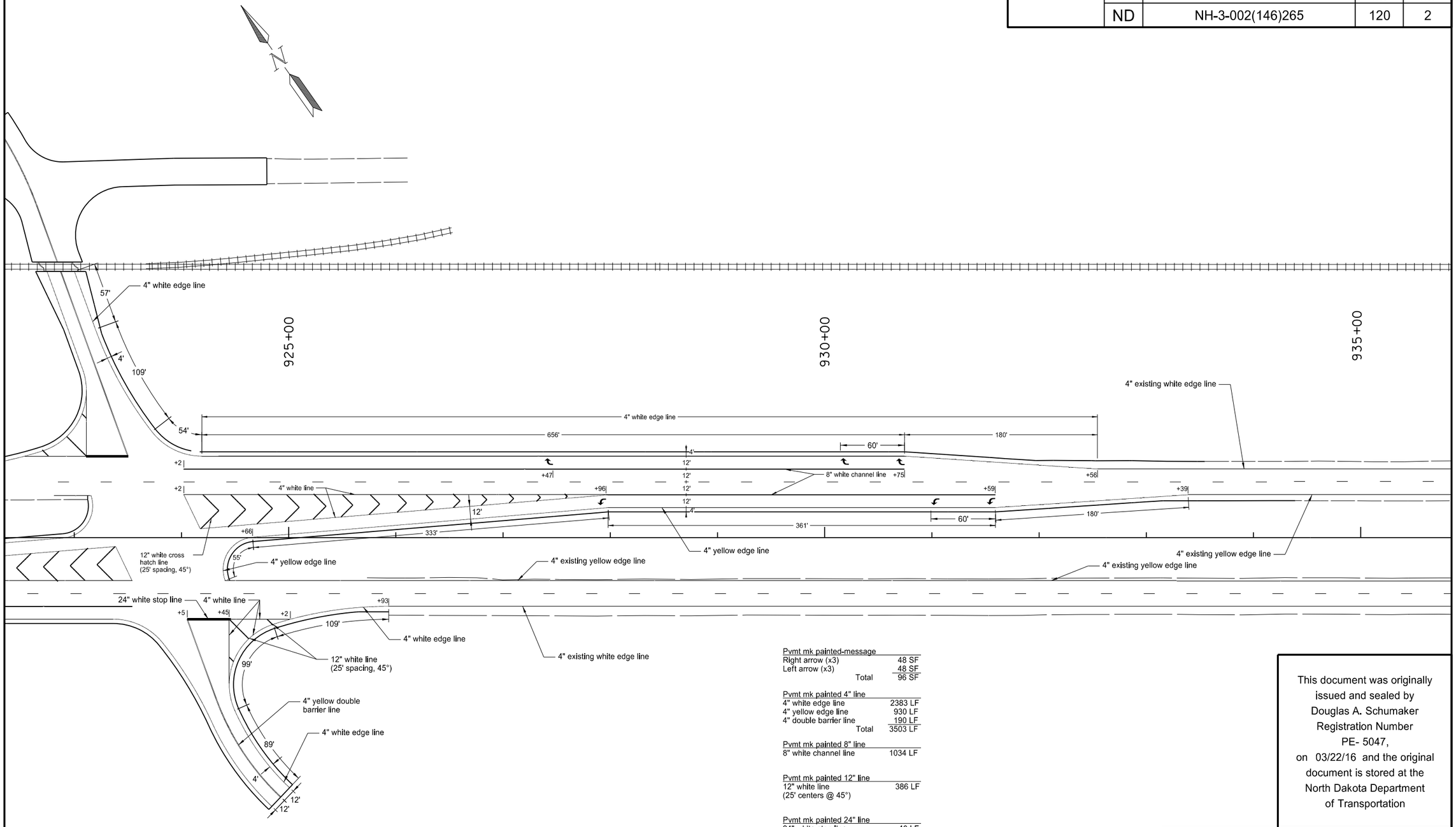
Pavement Marking Layout

Turn lanes
US 2 and 79th Ave NE

US Hwy 2

3/17/2016 11:23:12 AM tcork R:\project\30002265.146\traffic\120MK_001_LPvmt.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 120 | 2 |




Pvmt mk painted-message

| | |
|---|---|
| Right arrow (x3) | 48 SF |
| Left arrow (x3) | 48 SF |
| Total | 96 SF |

Pvmt mk painted 4" line

| | |
|---|---|
| 4" white edge line | 2383 LF |
| 4" yellow edge line | 930 LF |
| 4" double barrier line | 190 LF |
| Total | 3503 LF |

Pvmt mk painted 8" line

| | |
|---|---|
| 8" white channel line | 1034 LF |

Pvmt mk painted 12" line

| | |
|---|---|
| 12" white line (25' centers @ 45°) | 386 LF |

Pvmt mk painted 24" line

| | |
|---|---|
| 24" white stop line | 40 LF |

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Pavement Marking Layout

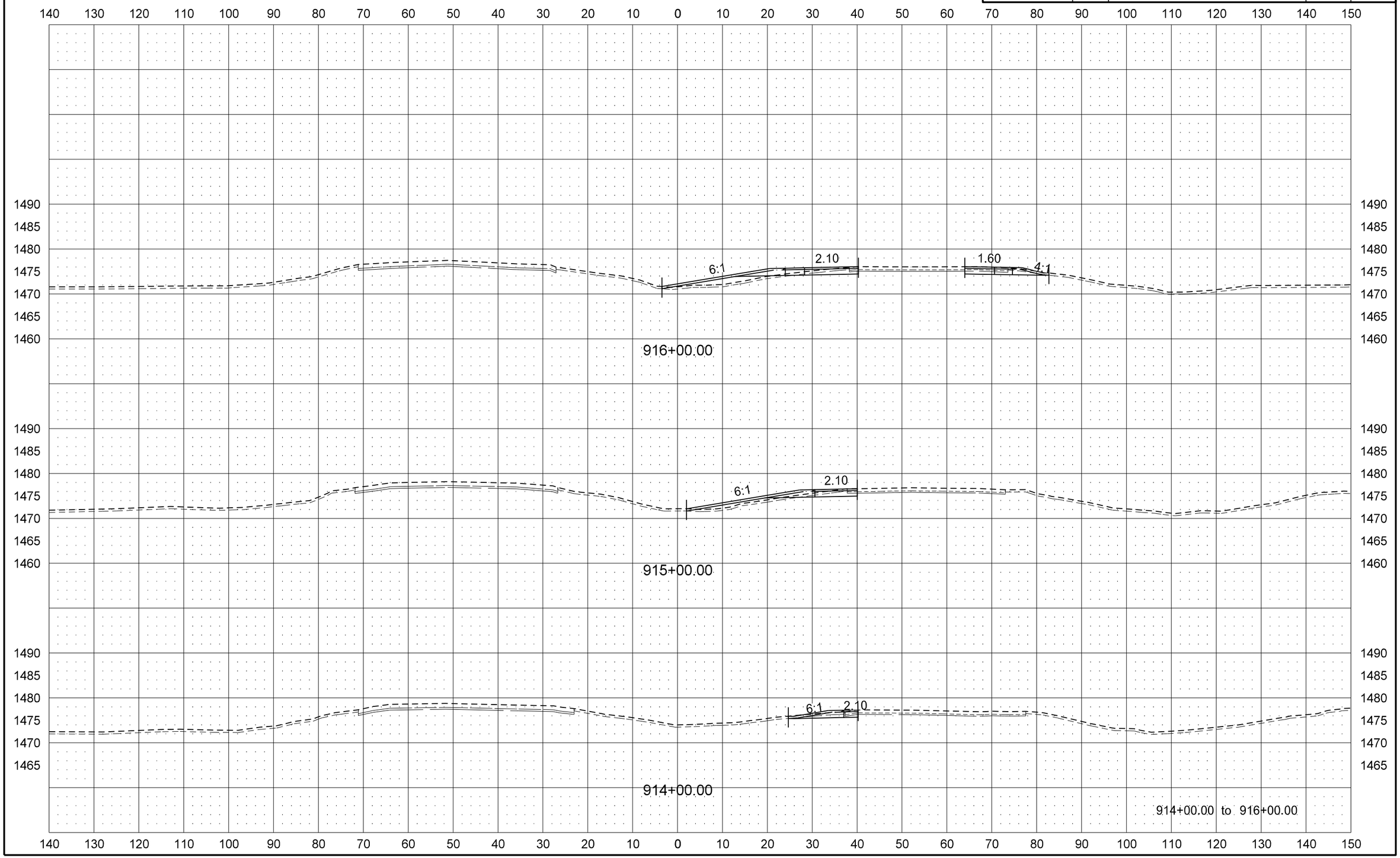
Turn lanes
US 2 and 79th Ave NE

US Hwy 2

3/22/2016 1:12:36 PM jallery R:\project\30002265.146\traffic\120MK_002_LPvmt.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 1 |

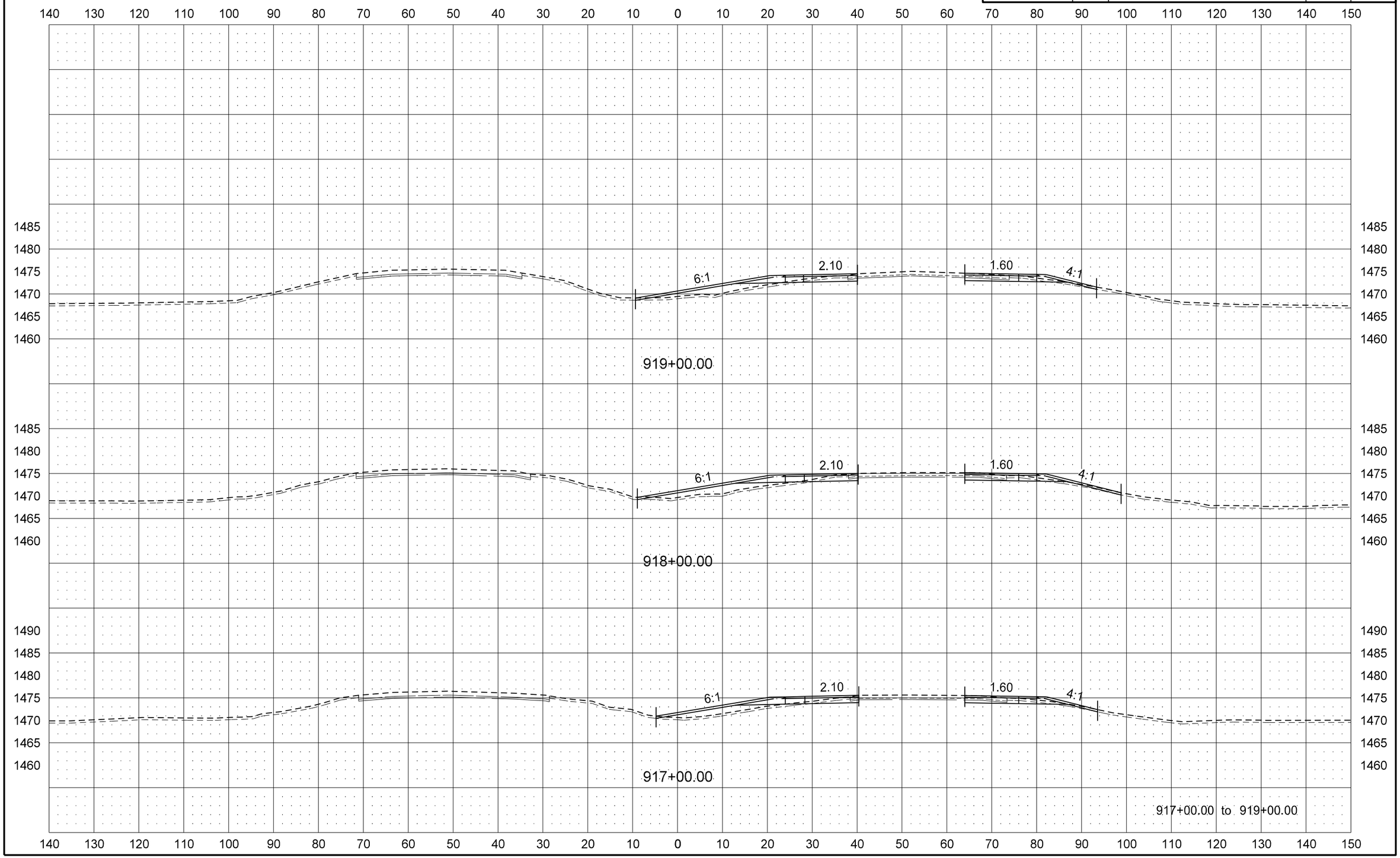
SCL US2




3/21/2016 5:18:58 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_001.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 2 |

SCL US2



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 3 |

SCL US2

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460 1455

Wetland

6:1 2.10 1.60 4:1

921+50.00

921+00.00

920+00.00

920+00.00 to 921+50.00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 4 |

SCL US2

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1490 1485 1480 1475 1470 1465 1460

1.37 1.60 4:1

923+50.00

1485 1480 1475 1470 1465 1460 1455

Wetland 4:1 6:1 2.10 1.60 4:1 Wetland

922+50.00

1485 1480 1475 1470 1465 1460

Wetland 4:1 6:1 2.10 1.60 4:1 Wetland

922+00.00

922+00.00 to 923+50.00

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

3/21/2016 5:19:00 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_001.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 5 |

SCL US2

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460 1455

Wetland 4:1 2.10 2.10 6:1

925+50.00

1485 1480 1475 1470 1465 1460 1455

4:1 Wetland 2.10 2.10 6:1 4:1

925+00.00

1485 1480 1475 1470 1465 1460 1455

2.10

924+00.00

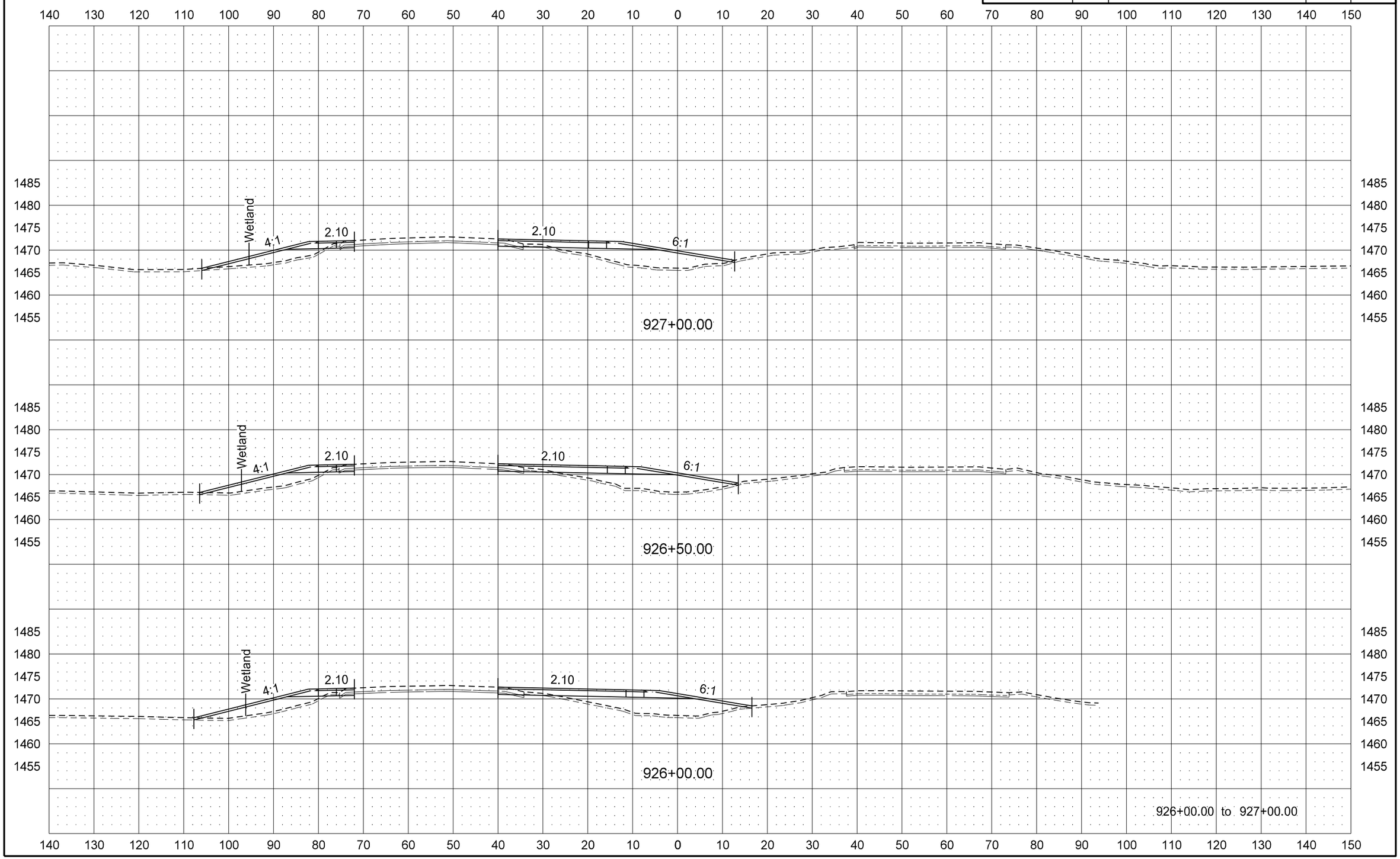
924+00.00 to 925+50.00

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

3/21/2016 5:19:01 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_001.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 6 |

SCL US2



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 7 |

SCL US2

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460 1455

Wetland Wetland 4:1 2.10 2.10 6:1

930+00.00

929+00.00

928+00.00

928+00.00 to 930+00.00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 8 |

SCL US2

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460 1455

Wetland Wetland 4:1 2.10 2.10 6:1

933+00.00

932+00.00

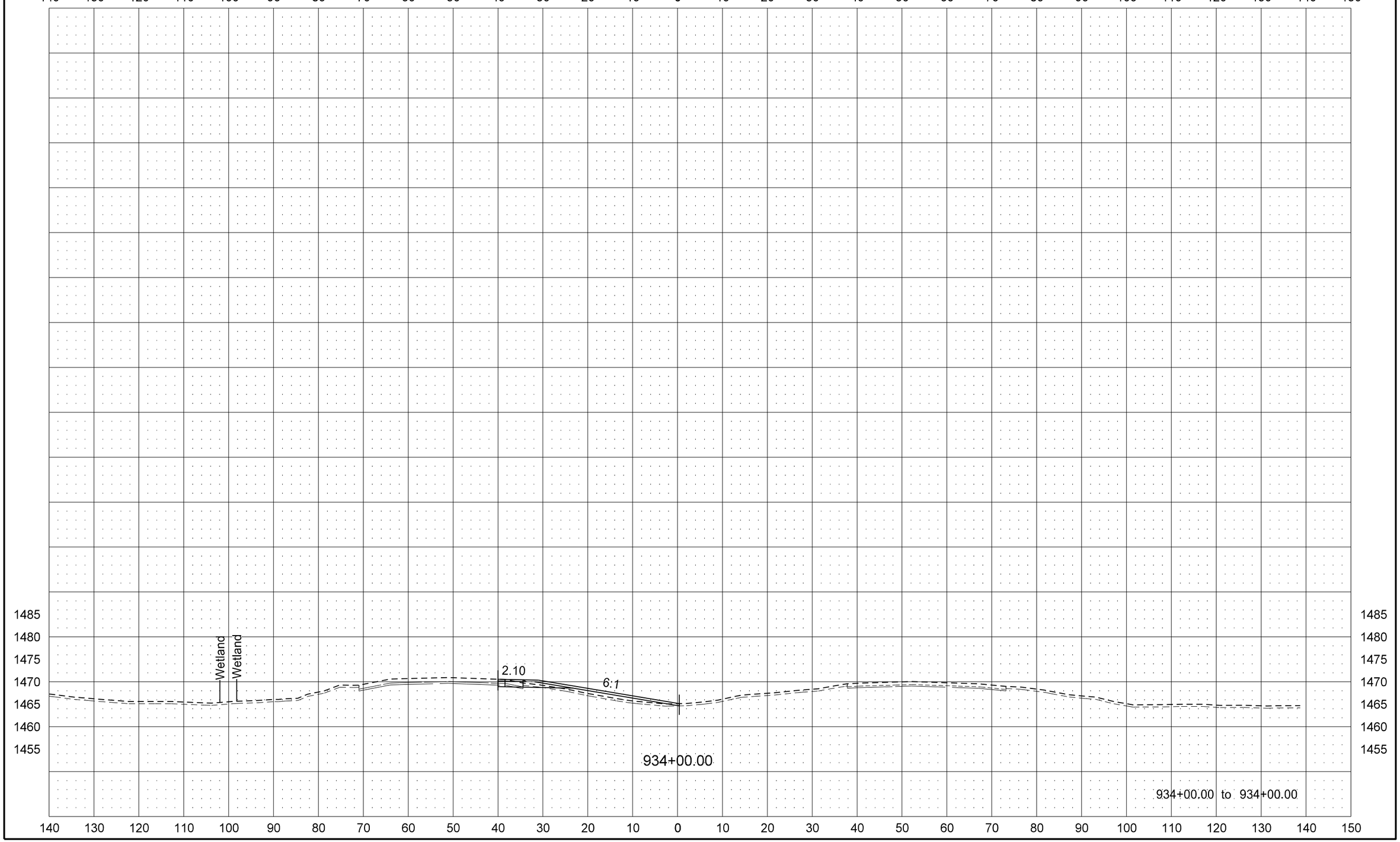
931+00.00

931+00.00 to 933+00.00

3/21/2016 5:19:03 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_001.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 9 |

SCL US2




3/21/2016 5:19:04 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_001.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 10 |

OCL 79S

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220

1490 1485 1480 1475 1470 1465 1460

4:1 4.20 4.20 4:1

503+02.27

1490 1485 1480 1475 1470 1465

4:1 3.00 3.00 4:1

502+78.87

1490 1485 1480 1475 1470 1465

4:1 3.00 2.80 4:1

502+75.00

502+75.00 to 503+02.27

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 11 |

OCL 79S

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220

1490 1485 1480 1475 1470 1465 1460

4:1 3.00 3.00 4:1

504+15.10

4:1 4.20 4.20 4:1

503+91.70

4:1 4.20 4.20

503+25.00

503+25.00 to 504+15.10

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 12 |

OCL 79S

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220

1490 1485 1480 1475 1470 1465 1460

4:1 2.74 3.00 4:1

505+32.00

4:1 0.00 0.27 4:1

504+78.73

4:1 3.00 2.74 4:1

504+20.23

504+20.23 to 505+32.00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 13 |

OCL 79S

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220

1490 1485 1480 1475 1470 1465 1460

4:1 4.40 4.40 4:1

505+75.00

1485 1480 1475 1470 1465 1460

4:1 4.40 4.40 4:1

505+64.43

1490 1485 1480 1475 1470 1465 1460

4:1 3.00 3.00 4:1

505+37.13

505+37.13 to 505+75.00

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220

3/21/2016 5:19:10 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_010.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 14 |

OCL 79S

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220

1485 1480 1475 1470 1465 1460

4:1 4.40 4.40 4:1

506+88.86

1485 1480 1475 1470 1465 1460

4:1 4.40 4.40 4:1

506+75.00

1485 1480 1475 1470 1465 1460

4:1 4.40 4.40 4:1

506+25.00

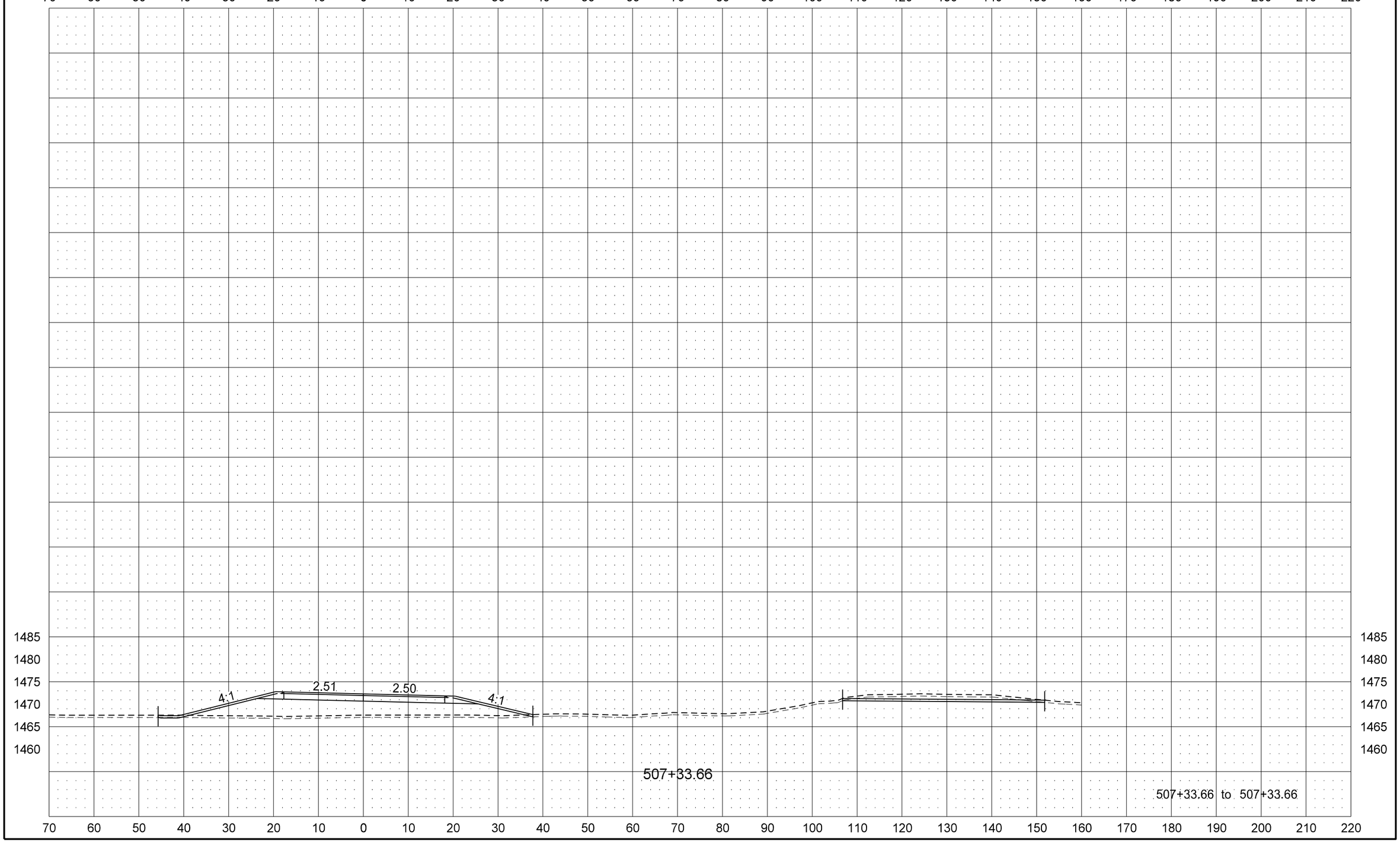
506+25.00 to 506+88.86

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220

3/21/2016 5:19:11 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_010.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 15 |

OCL 79S



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 16 |

OCL_79N

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460 1455

Wetland

3.80 3.80

Wetland

Wetland

512+65.00

4:1 0.00 0.14 4:1

511+70.57

Wetland Wetland

4:1 2.10 1.07 4:1

510+75.00

510+75.00 to 512+65.00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 17 |

OCL_79N

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460

Wetland

4:1 2.24 1.97 4:1

514+00.00

Wetland Wetland

4:1 3.00 2.77 4:1

513+84.36

Wetland

1.42 3.80 3.80 4:1

512+99.28

512+99.28 to 514+00.00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 18 |

OCL_79N

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460

4:1 1.40 1.88 4:1

514+75.00

4:1 0.00 0.40 4:1

514+46.16

4:1 0.38 0.00 4:1

514+38.28

514+38.28 to 514+75.00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 19 |

OCL_79N

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460

4:1 4.20 4.20 4:1

515+32.66

4:1 3.00 3.00 4:1

515+07.96

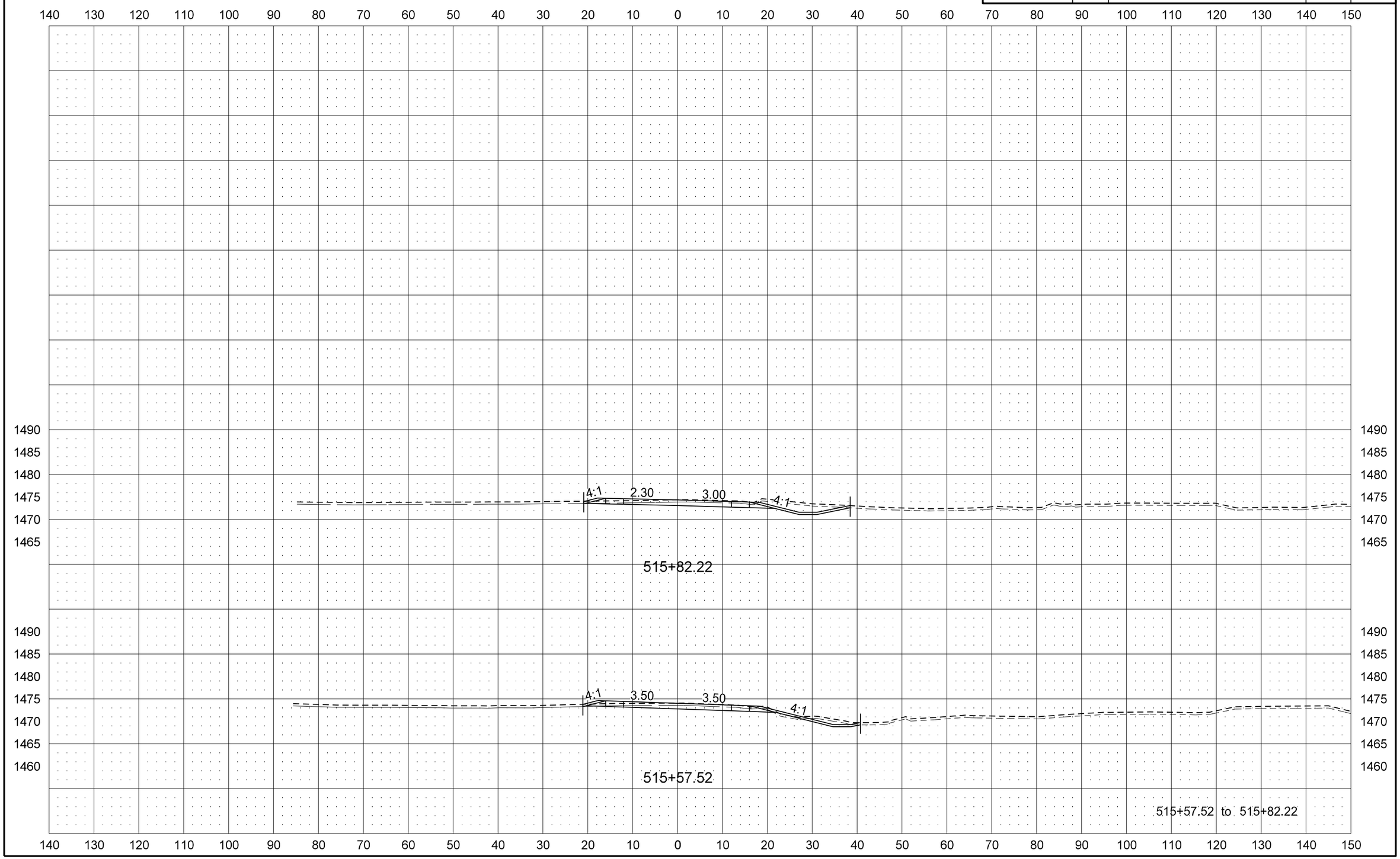
4:1 2.46 3.00 4:1

514+96.78

514+96.78 to 515+32.66

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 20 |

OCL_79N



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 21 |

OCL_14

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

1485 1480 1475 1470 1465 1460 1455

Wetland Wetland 4:1 2.10 2.10 4:1

23+78.99

1485 1480 1475 1470 1465 1460

Wetland 4:1 2.10

23+28.99

1485 1480 1475 1470 1465 1460

Wetland Wetland Wetland 4:1 2.40 2.10 4:1

21+58.50

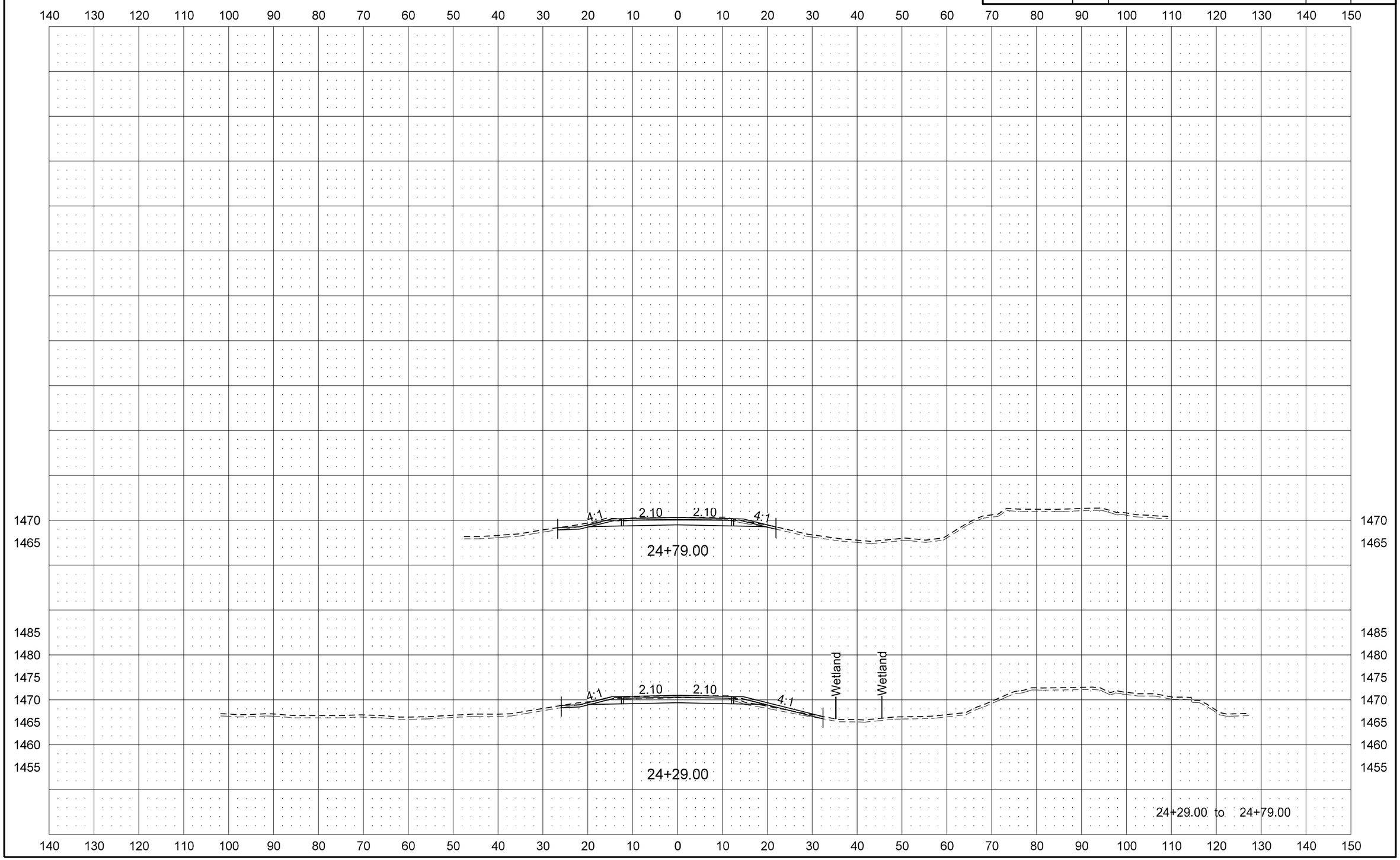
21+58.50 to 23+78.99

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

3/21/2016 5:19:17 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_010.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | NH-3-002(146)265 | 200 | 22 |

OCL_14




3/21/2016 5:19:18 PM jmwagner R:\project\30002265.146\design\DOTSC\Plan\200XS_010.dgn

# NDDOT ABBREVIATIONS

D-101-1

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

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# NDDOT ABBREVIATIONS

D-101-2

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

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# NDDOT ABBREVIATIONS

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

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# NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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D-101-20

# Line Styles

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

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# Line Styles

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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
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| | |

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# Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

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# Symbols

D-101-31

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

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# Symbols

D-101-32

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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 07-01-14 | |
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| DATE | CHANGE |
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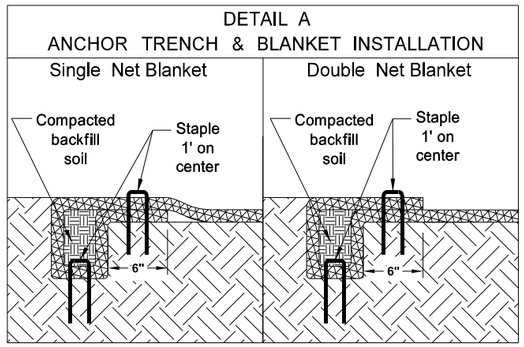
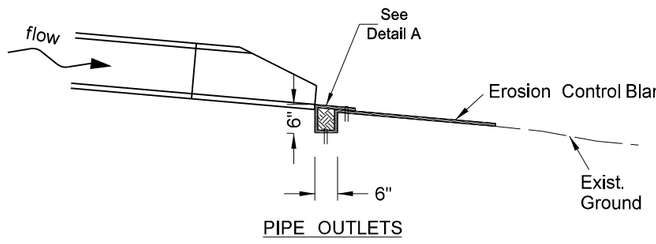
D-255-2

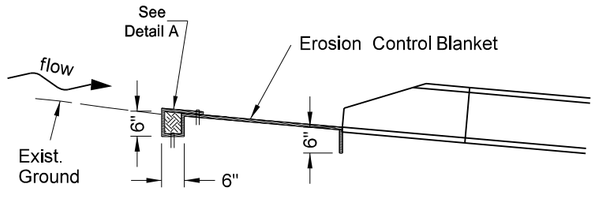
# EROSION AND SILTATION CONTROL
# EROSION CONTROL BLANKET INSTALLATION




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

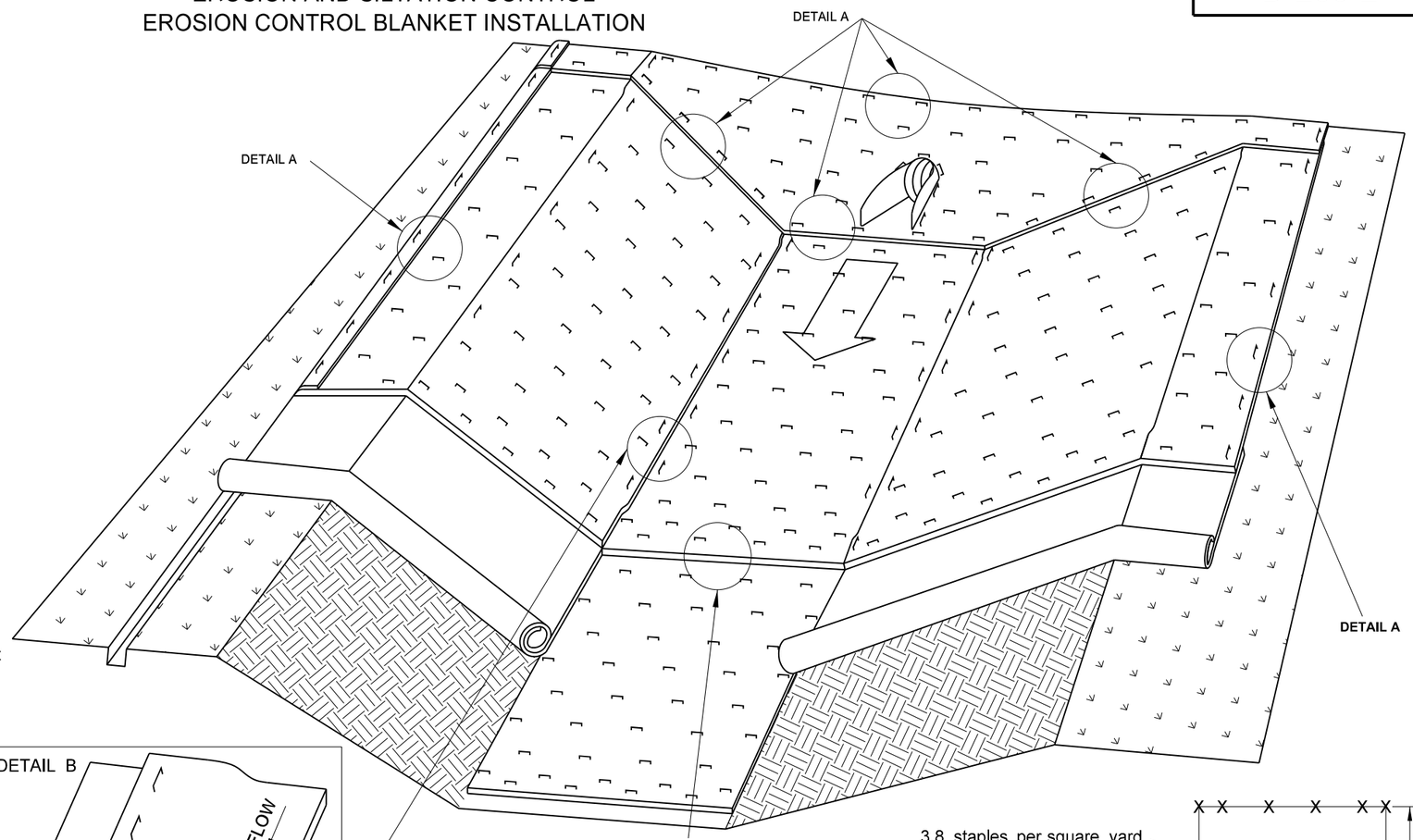



PIPE OUTLETS

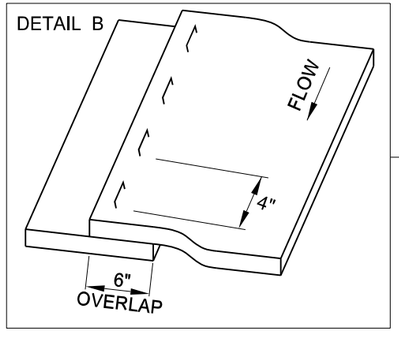


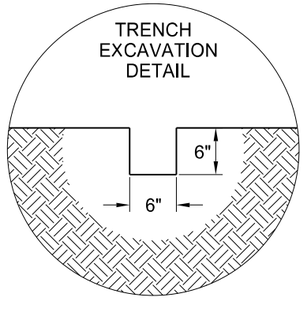

PIPE INLETS

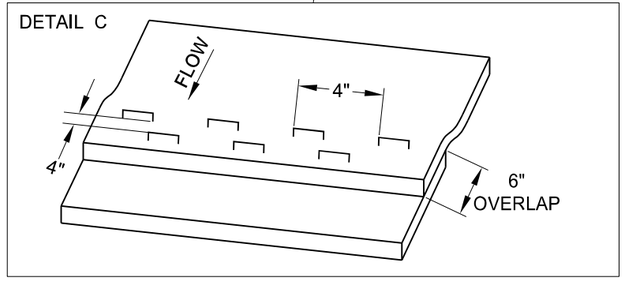
## INSTALLATION AT PIPE ENDS



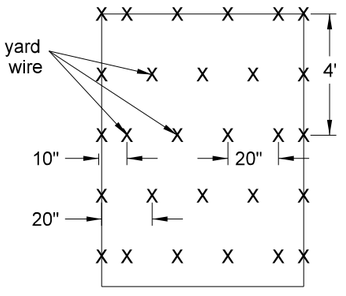

## BLANKET LAYOUT
## CHANNEL OR SLOPE INSTALLATION




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




STAPLE PATTERN

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Changed standard drawing number from D-709-5 to D-255-2. |
| 07-27-15 | Changed installation details such as trench depth and overlap dimensions. |

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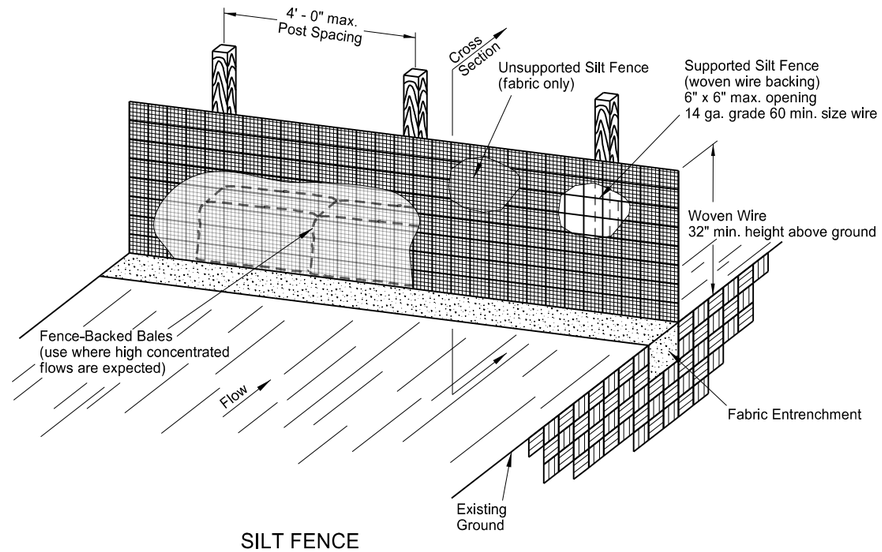
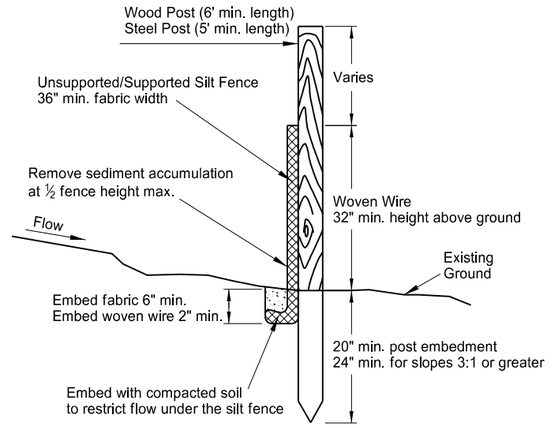
# EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1




SILT FENCE
SUPPORTED AND UNSUPPORTED




SILT FENCE
CROSS SECTION

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Standard drawing resulted from splitting standard D-708-2. |

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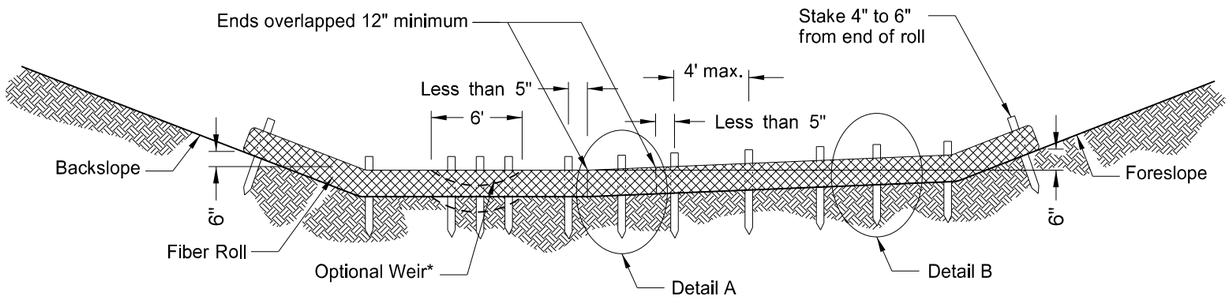
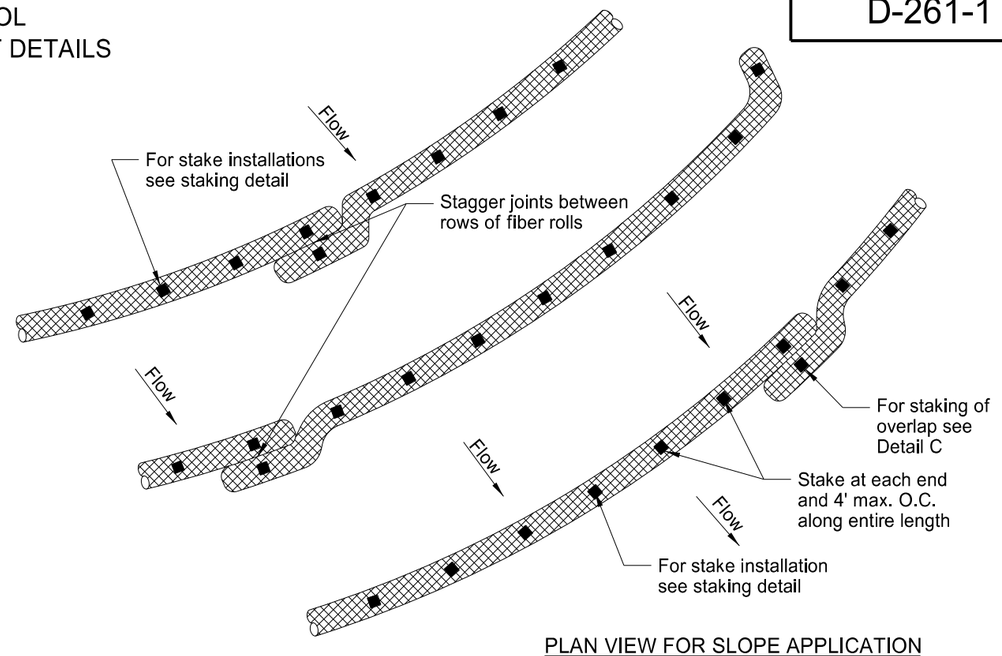
D-261-1

# EROSION CONTROL
# FIBER ROLL PLACEMENT DETAILS

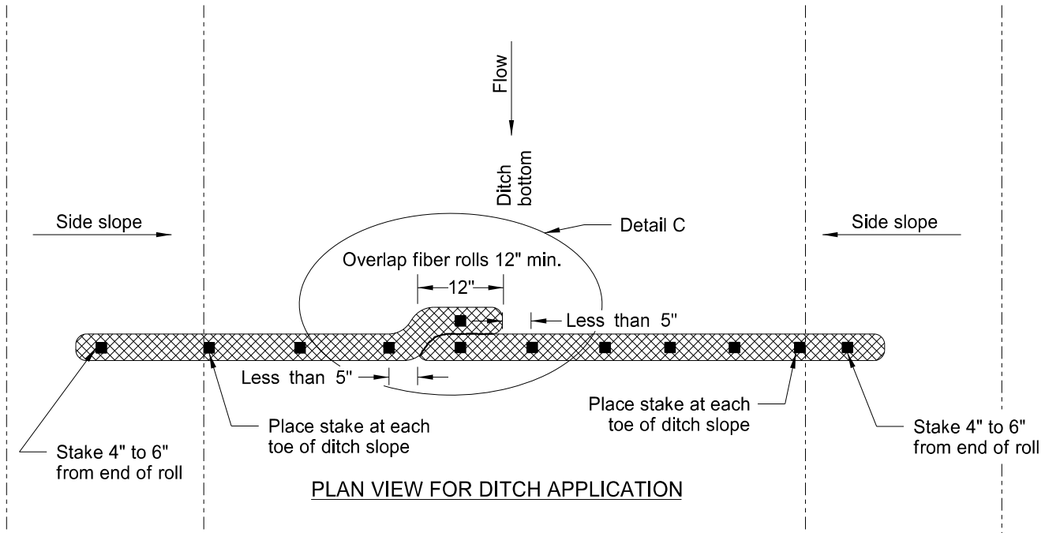



*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

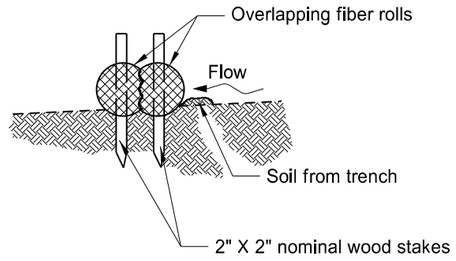
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM




PLAN VIEW FOR SLOPE APPLICATION

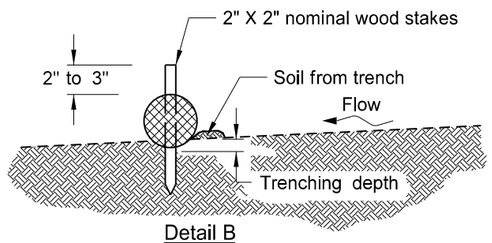



PLAN VIEW FOR DITCH APPLICATION




Detail A

Fiber Roll Overlapping Staking Detail




Detail B

Fiber Roll Staking Detail

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

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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 11-18-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-10-13 | Added plan view for ditch and slope application. Added table with values for stake and trench dimensions. |
| 10-04-13 | Revised fiber roll overlap detail. |
| 06-26-14 | Changed standard drawing number from D-708-7 to D-261-1 |

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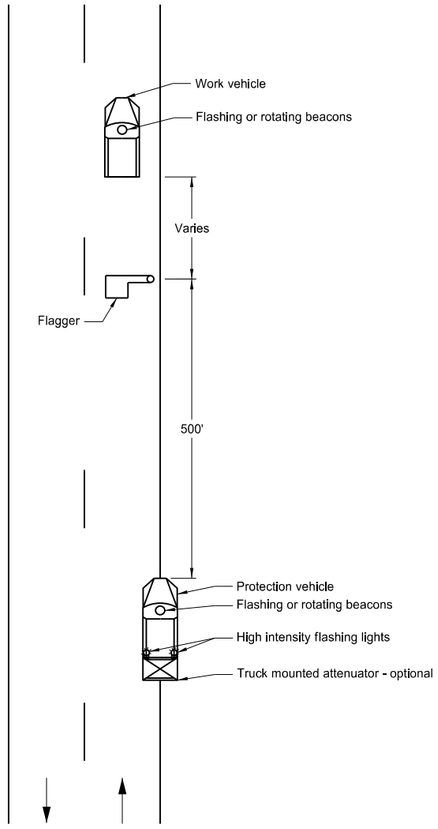
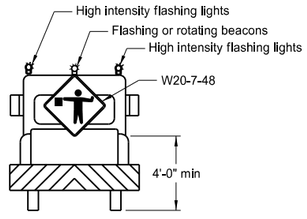
# TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

D-704-2

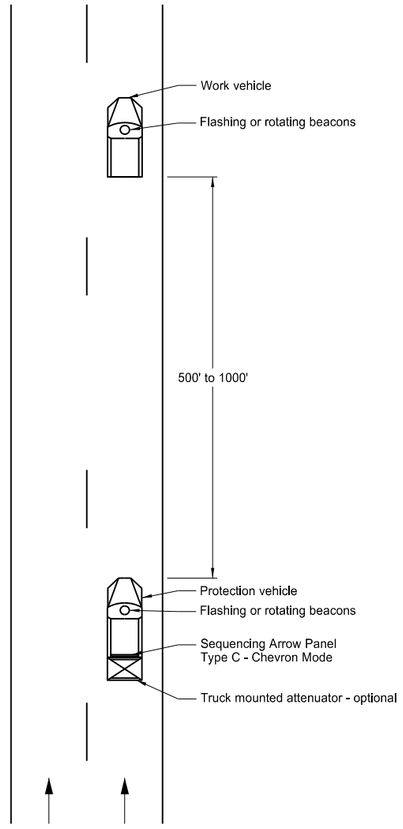
## Two Lane, Two Way Roadways

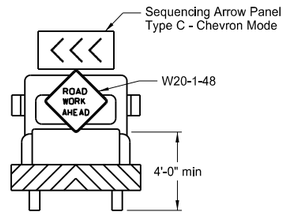



Typical Protection Vehicle

## Multilane Roadways




Typical Protection Vehicle

Notes:

1. The working vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light.
2. The shadow vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light. The shadow vehicle for Multilane Roadway shall also have a sequencing arrow panel Type C operated in the chevron mode.
3. This application is for use during daylight hours and in areas of good visibility only.
4. Two lane, two way roadway, a flagger shall be used to protect the work area and warn oncoming traffic.

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

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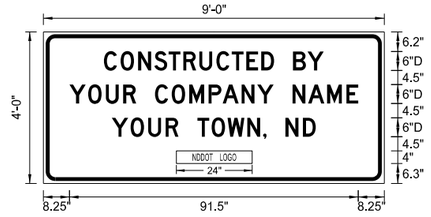
# CONSTRUCTION SIGN DETAIL

D-704-5

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

| SYMBOL | X | Y | WID | HT | ANGLE |
|---|---|---|---|---|---|
| | 42.1 | 6.2 | 24 | 4 | 0 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

STATION(S): AREA: 36.0 Sq.Ft.




Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

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

Notes:

1. Sign shall be placed a distance of ½A following the End Road Work (G20-2a-48) sign. There shall be a maximum of 2 signs per project.
2. Sign shall be post mounted.
3. Sign required on rural projects with a 30 day or longer duration and it is not required on seal coat projects or other short duration projects.
4. Sign shall not be placed in urban areas or within city limits.

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

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

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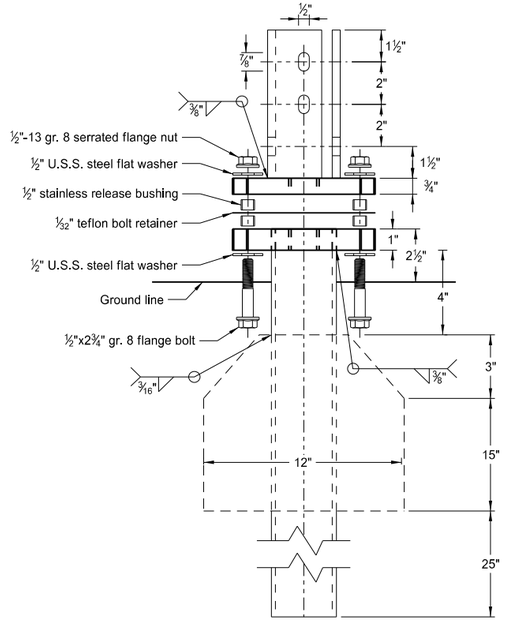
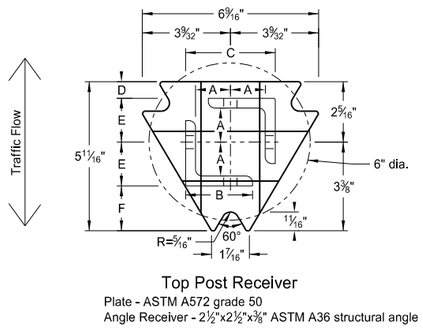
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

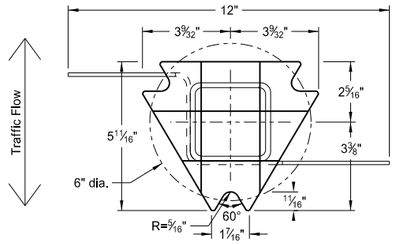



Multi-Directional
Slip Base Assembly

Perforated Tube




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




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

Notes:

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

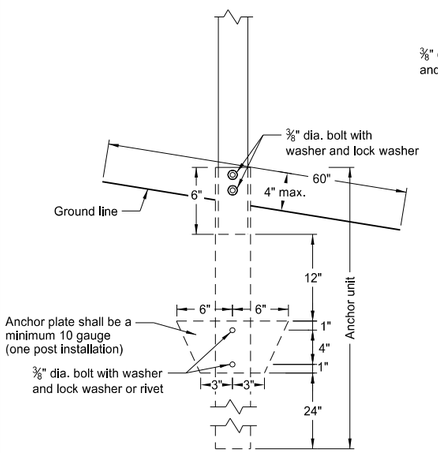
| Telescoping Perforated Tube | | | | | | |
|---|---|---|---|---|---|---|
| Number of Posts | Post Size in. | Wall Thick-ness Gauge | Sleeve Size in. | Wall Thick-ness Gauge | Slip Base | Anchor Size without Slip Base in. |
| 1 | 2 | 12 | | | No | 2¼ |
| 1 | 2¼ | 12 | | | No | 2½ |
| 1 | 2½ | 12 | | | (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 |

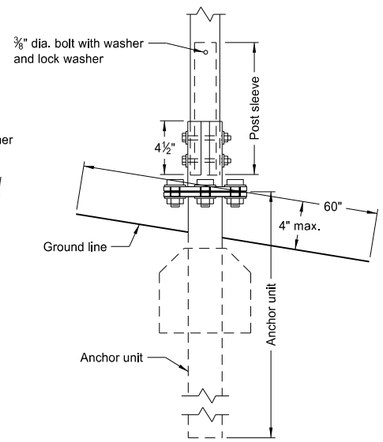
| Top Post Receiver Data Table | | | | | | |
|---|---|---|---|---|---|---|
| Square Post Sizes (B) | A | B | C | D | E | F |
| 2³⁄₁₆"x10 ga. | 1⁹⁄₆₄" | 2½" | 3¹⁄₃₂" | 25⁄₃₂" | 1³³⁄₆₄" | 1⅞" |
| 2½"x10 ga. | 1⁹⁄₃₂" | 2½" | 3⁵⁄₁₆" | ⅝" | 1²¹⁄₃₂" | 1¾" |

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

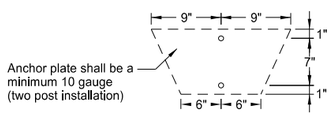
(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

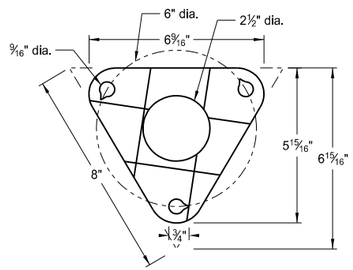



Anchor Unit and Post Assembly




Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly




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

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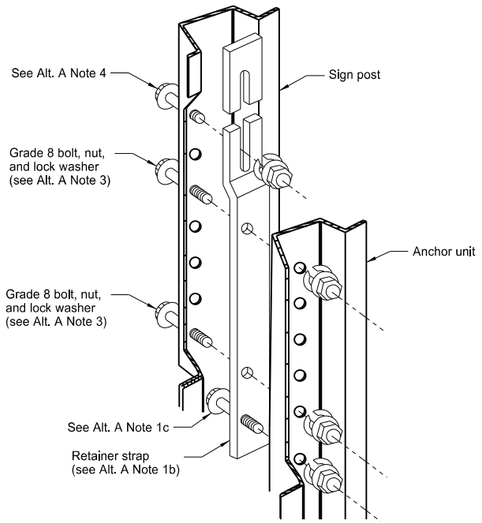
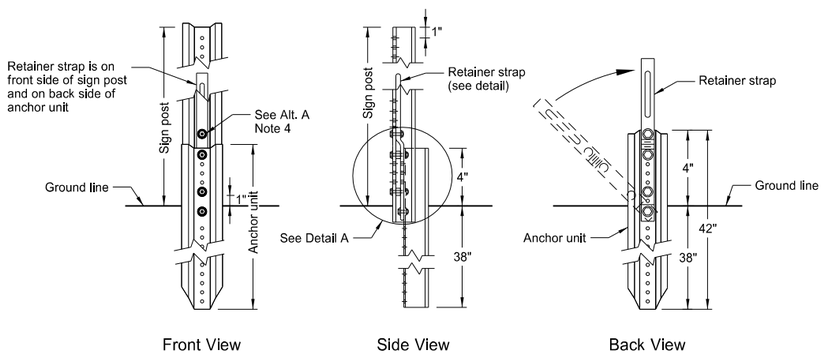
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

## U-Channel Post



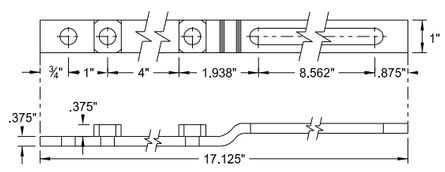

Detail A



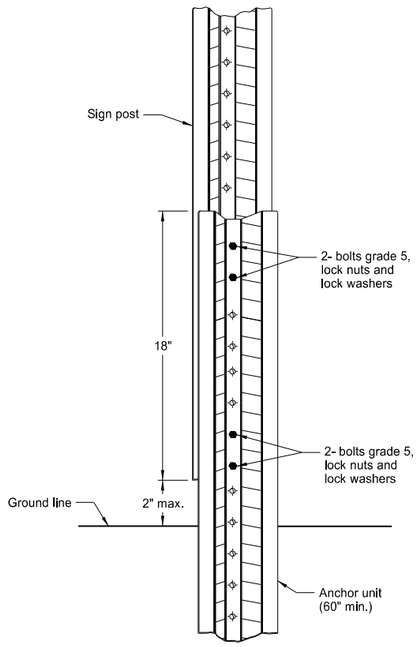

Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

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

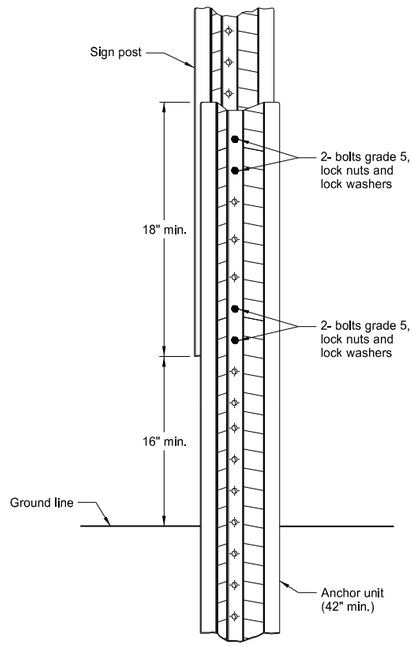



Retainer Strap Detail




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

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




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

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

Alternate A Steps of Installation:

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

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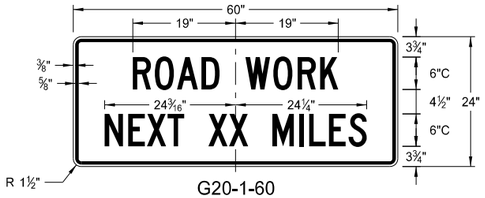
# CONSTRUCTION SIGN DETAILS
# TERMINAL AND GUIDE SIGNS




G20-1-60
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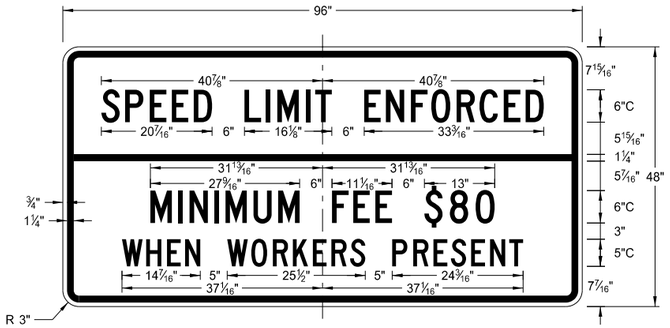
Background: orange


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

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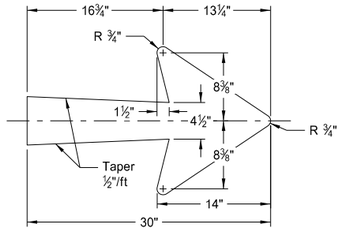
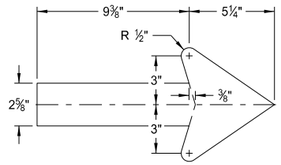
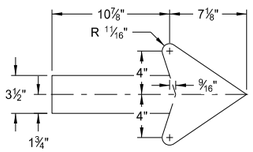
Background: orange



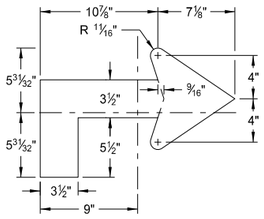

E5-1-48



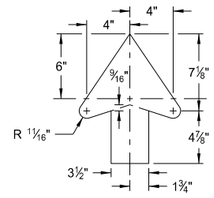
G20-50a-72
G20-52a-72



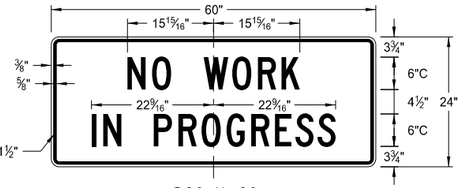
M4-9(L or R)-30
Right or Left



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



M4-9-30
Straight

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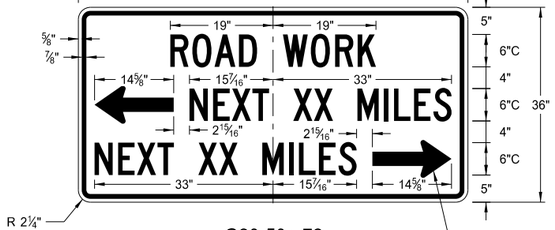


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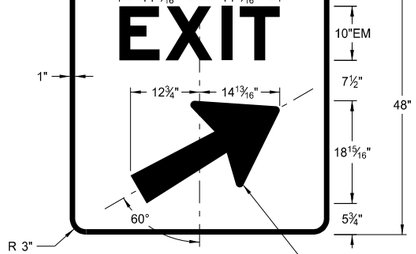


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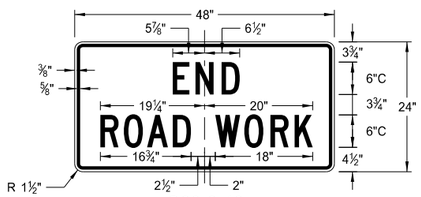
Background: green




G20-2-48
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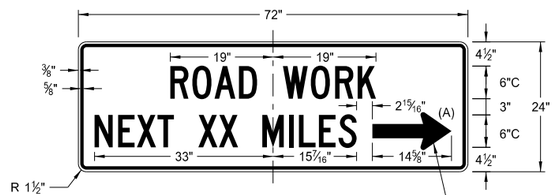
Background: orange

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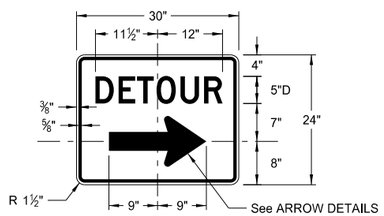


M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

## ARROW DETAILS

NOTES:

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

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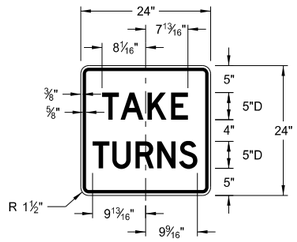
# CONSTRUCTION SIGN DETAILS
## REGULATORY SIGNS

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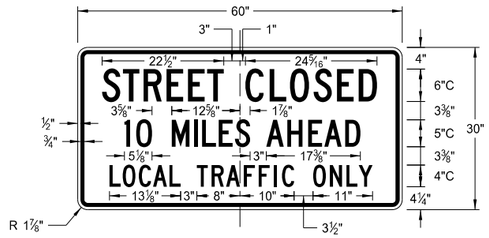


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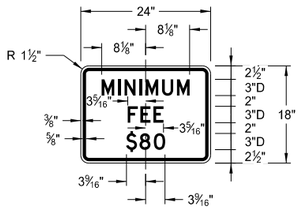


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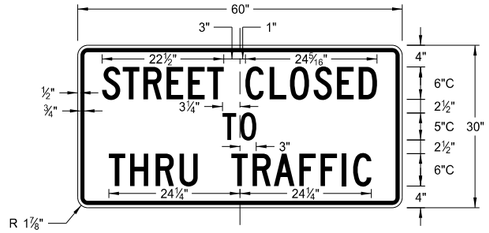


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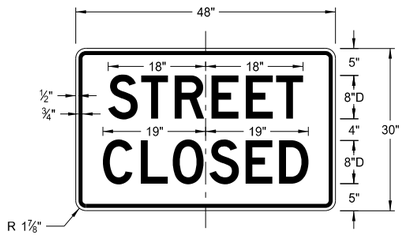


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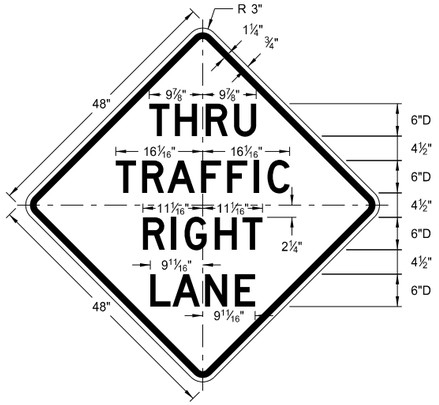
# CONSTRUCTION SIGN DETAILS
## WARNING SIGNS

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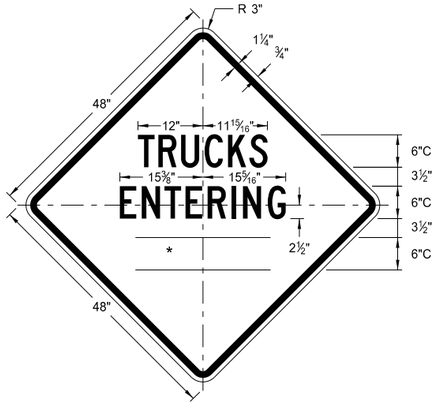
Background: orange

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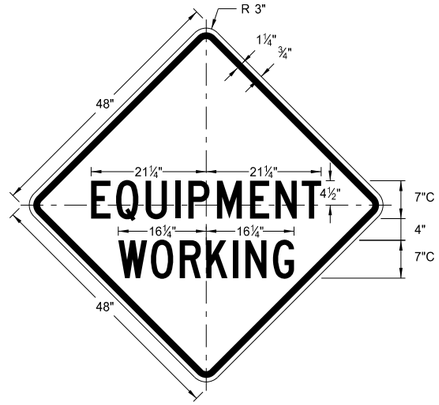


W20-51-48
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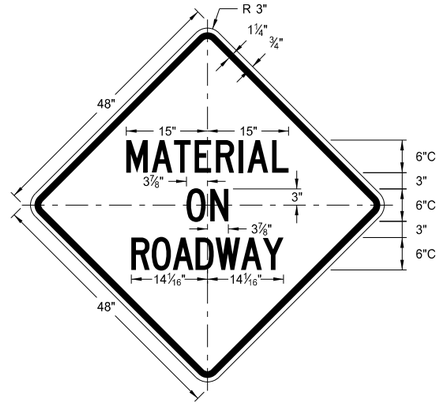
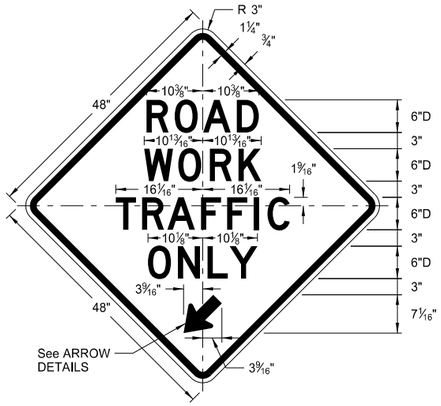



W21-51-48
Legend: black (non-refl)
Background: orange

| 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

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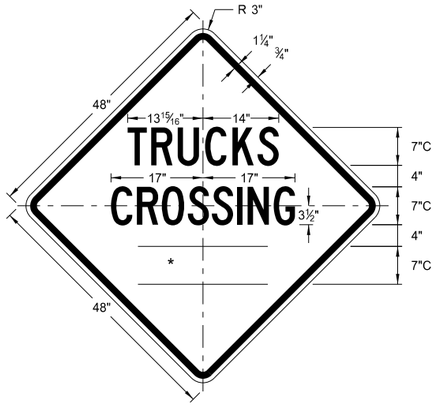


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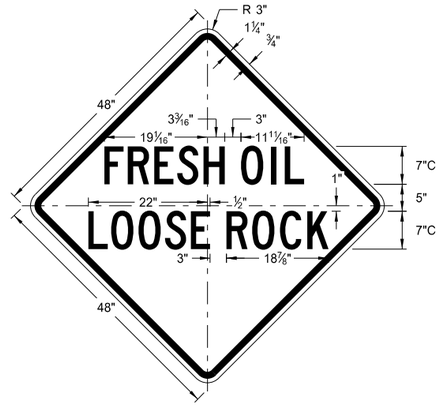
Background: orange




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

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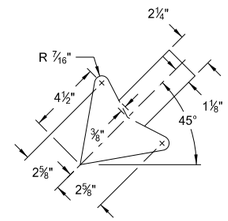
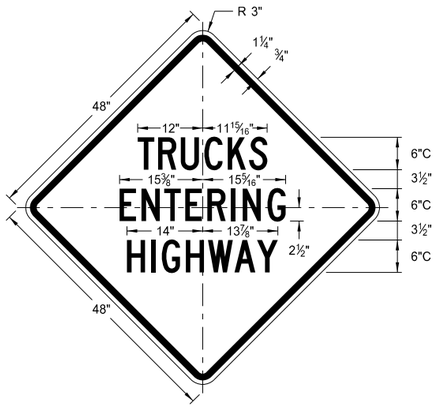



W5-9-48

ARROW DETAILS

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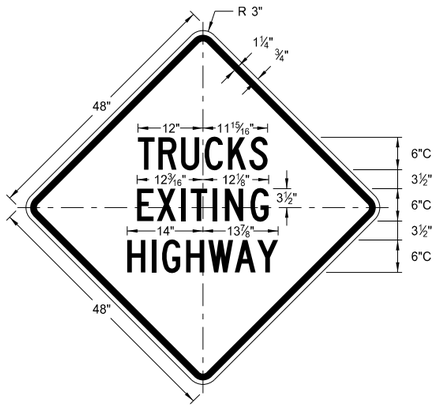
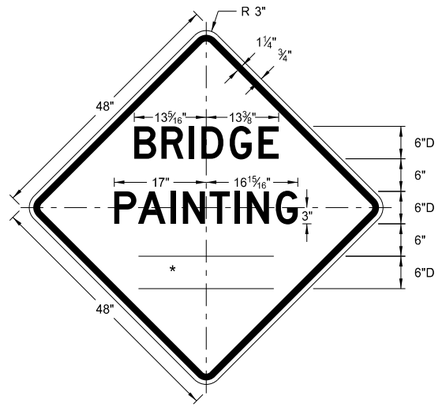
Background: orange




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




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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
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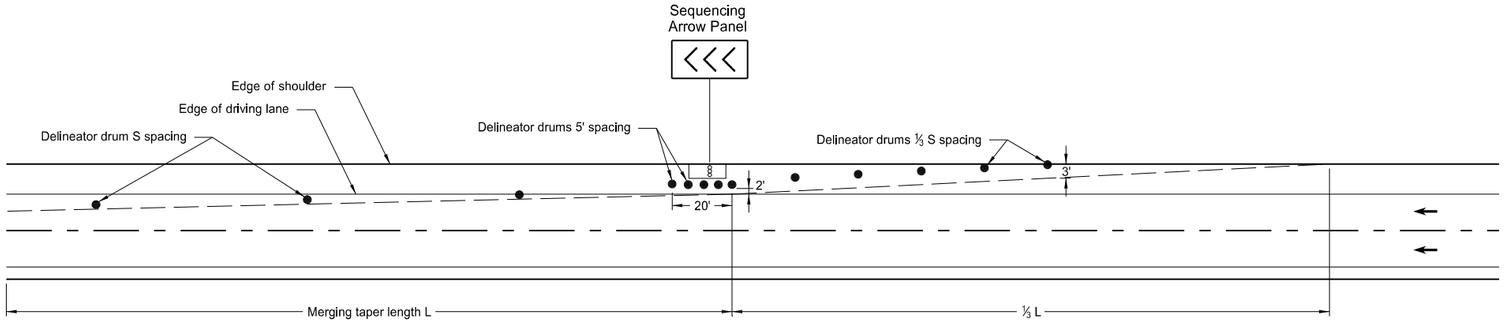
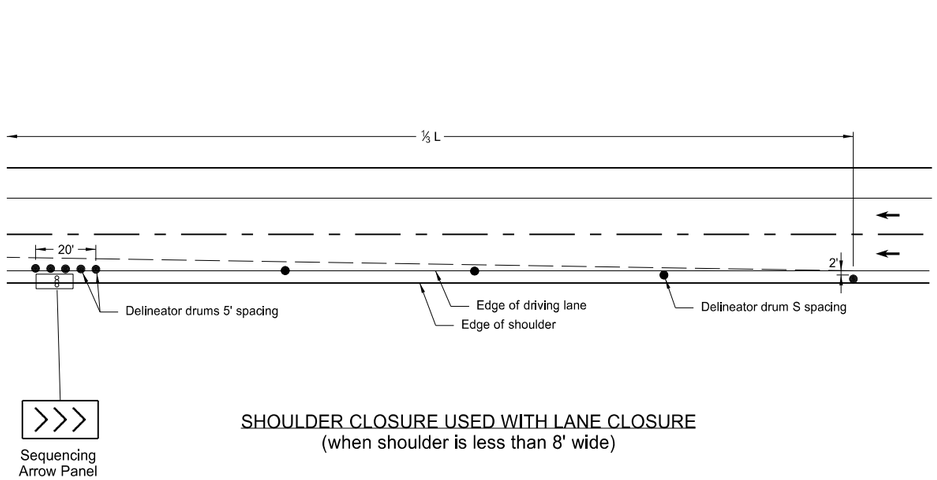
# SHOULDER CLOSURE TAPERS

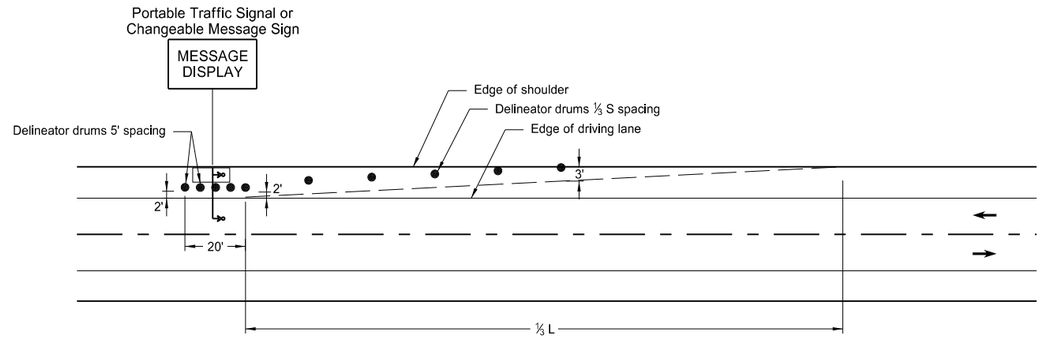
D-704-12




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




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




PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

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

Notes:

1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   L = $WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, it should have a length of approximately ⅓L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
3. When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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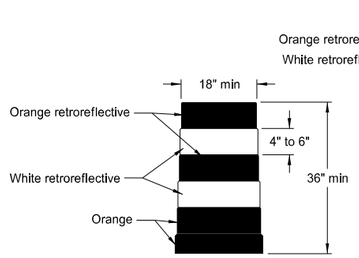
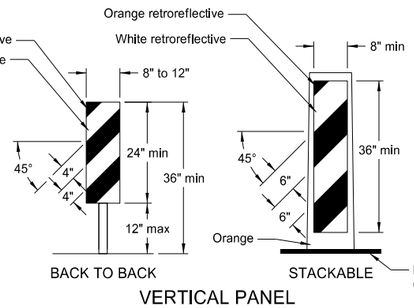
# BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



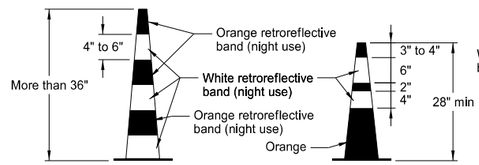

DELINEATOR DRUM

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



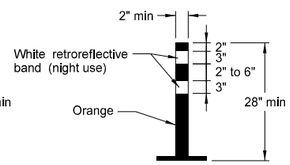

VERTICAL PANEL

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



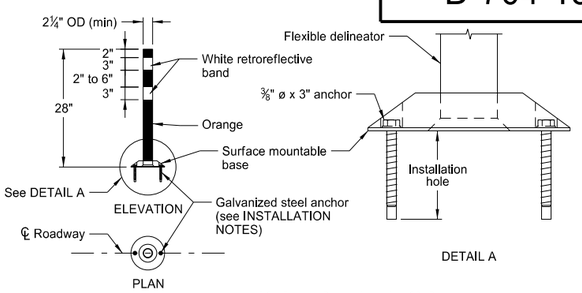

TRAFFIC CONE

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




TUBULAR MARKER

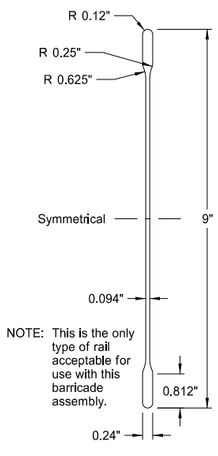
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



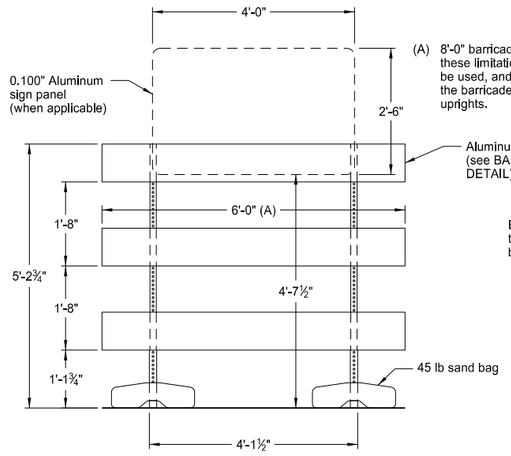

FLEXIBLE DELINEATOR

INSTALLATION NOTES:

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

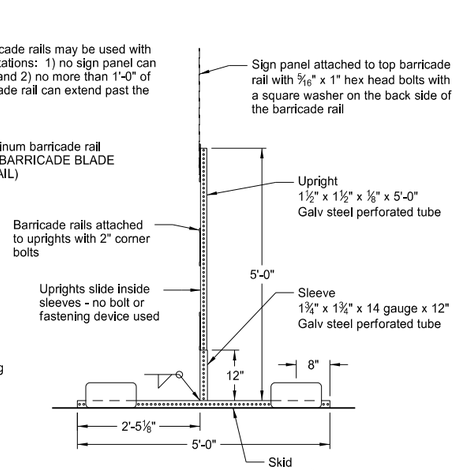



BARRICADE BLADE DETAIL



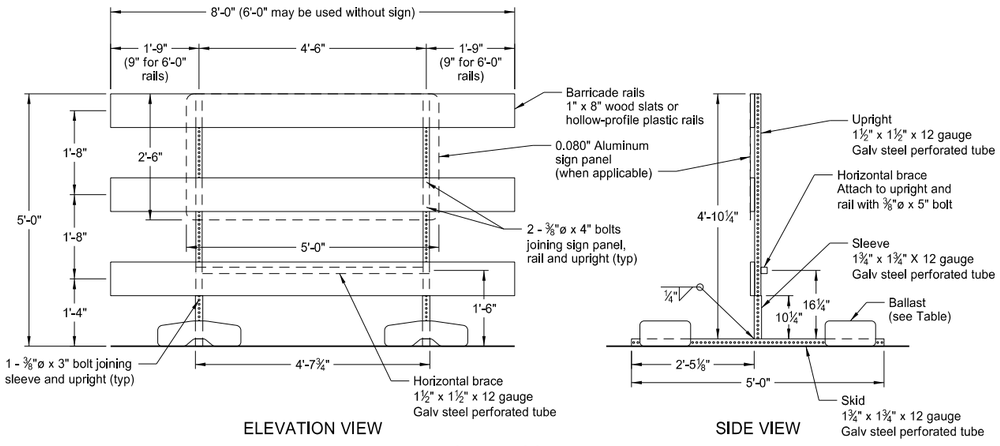

ELEVATION VIEW

(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.




SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

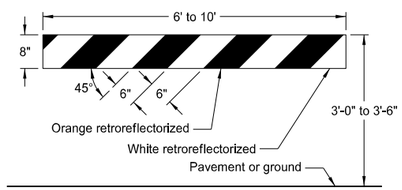



ELEVATION VIEW

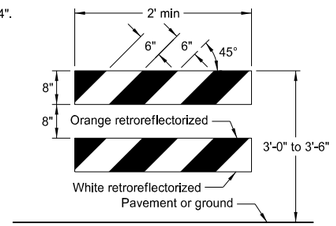
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

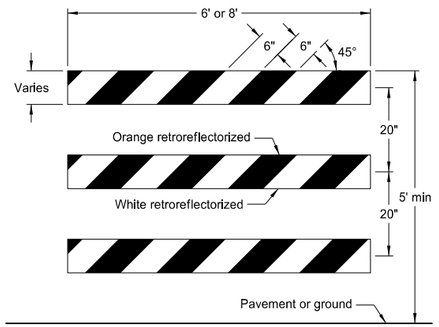
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".




TYPE I BARRICADE

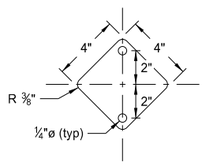


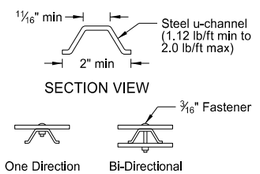

TYPE II BARRICADE

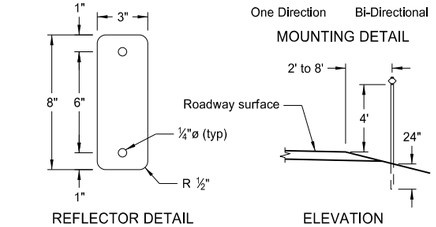



TYPE III BARRICADE

BARRICADE RAIL DETAILS




DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

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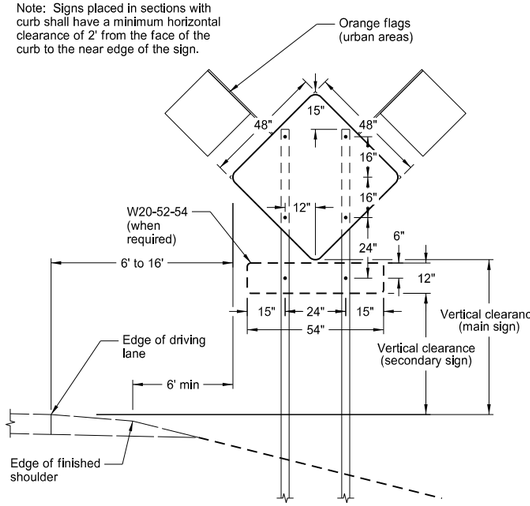
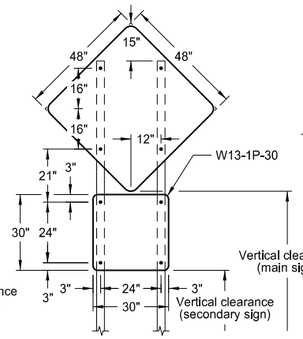
# CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

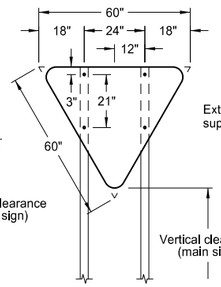
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



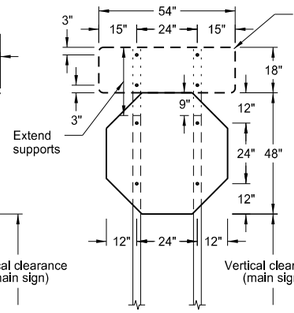

TYPICAL SECTION
(48" x 48" diamond warning sign shown)



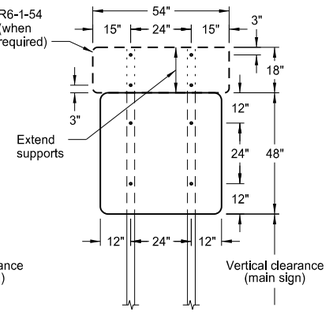

48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



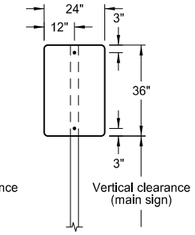

R1-2-60 - YIELD SIGN



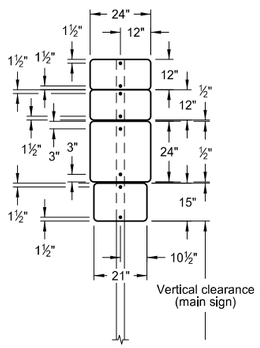

R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



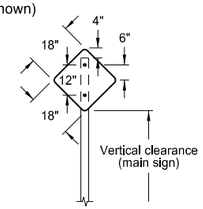

48" x 48" SIGN
(with R6-1-54 sign as required)



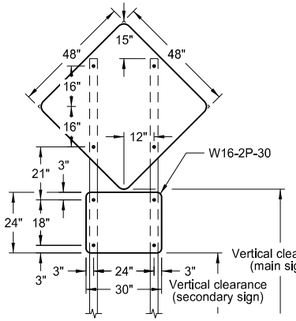

24" x 36" SIGN



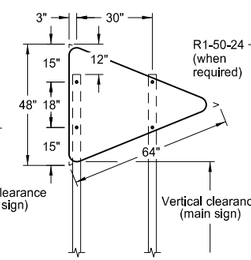

24" x 24"
ROUTE MARKER
ASSEMBLY



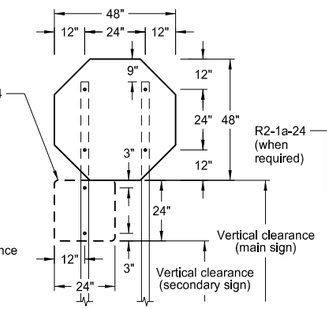

18" x 18"
DIAMOND SIGN



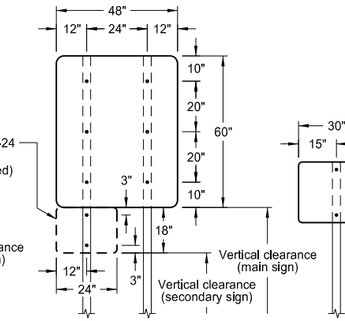

48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



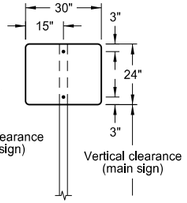

W14-3-64 - PENNANT SIGN



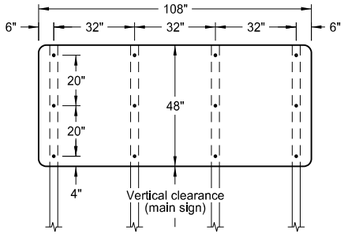

R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



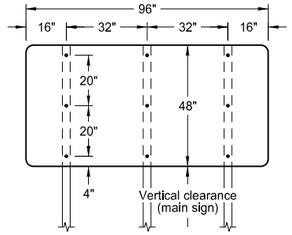

48" x 48" SIGN
(with R2-1a-24 sign as required)



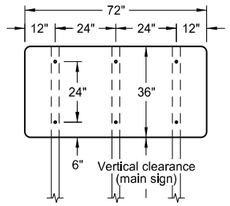

30" x 24" SIGN



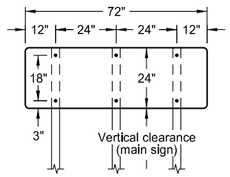

108" x 48" SIGN



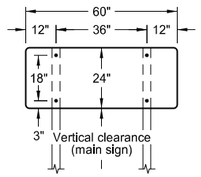

96" x 48" SIGN



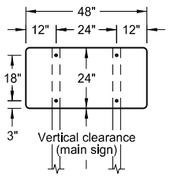

72" x 36" SIGN



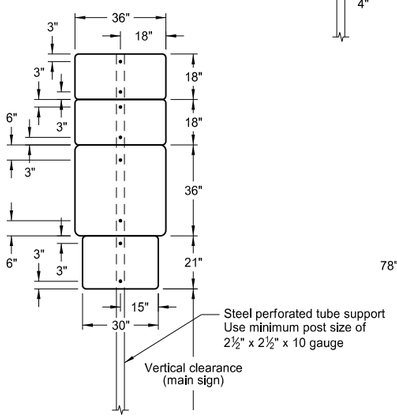

72" x 24" SIGN



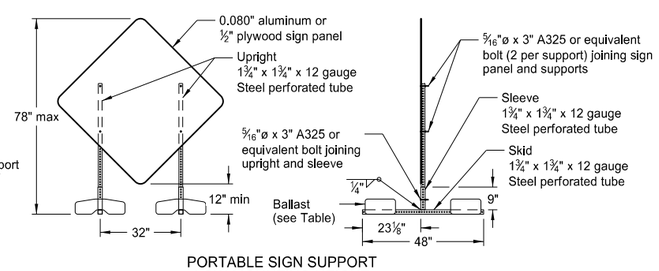

60" x 24" SIGN



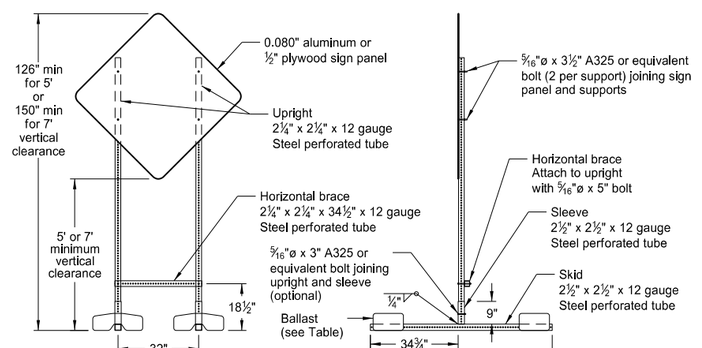

48" x 24" SIGN




36" x 36"
ROUTE MARKER
ASSEMBLY




PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT




PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

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

   Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

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

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)

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 as stated above.

   Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

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

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

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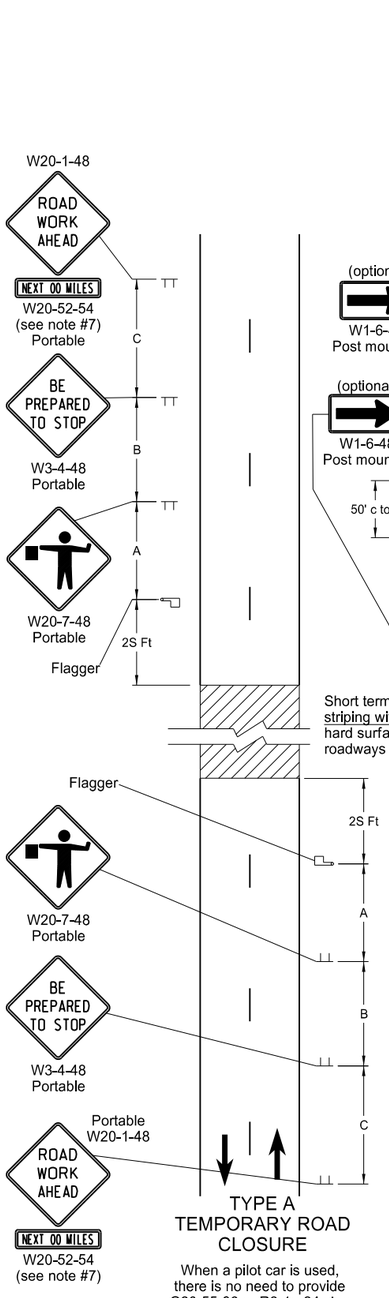
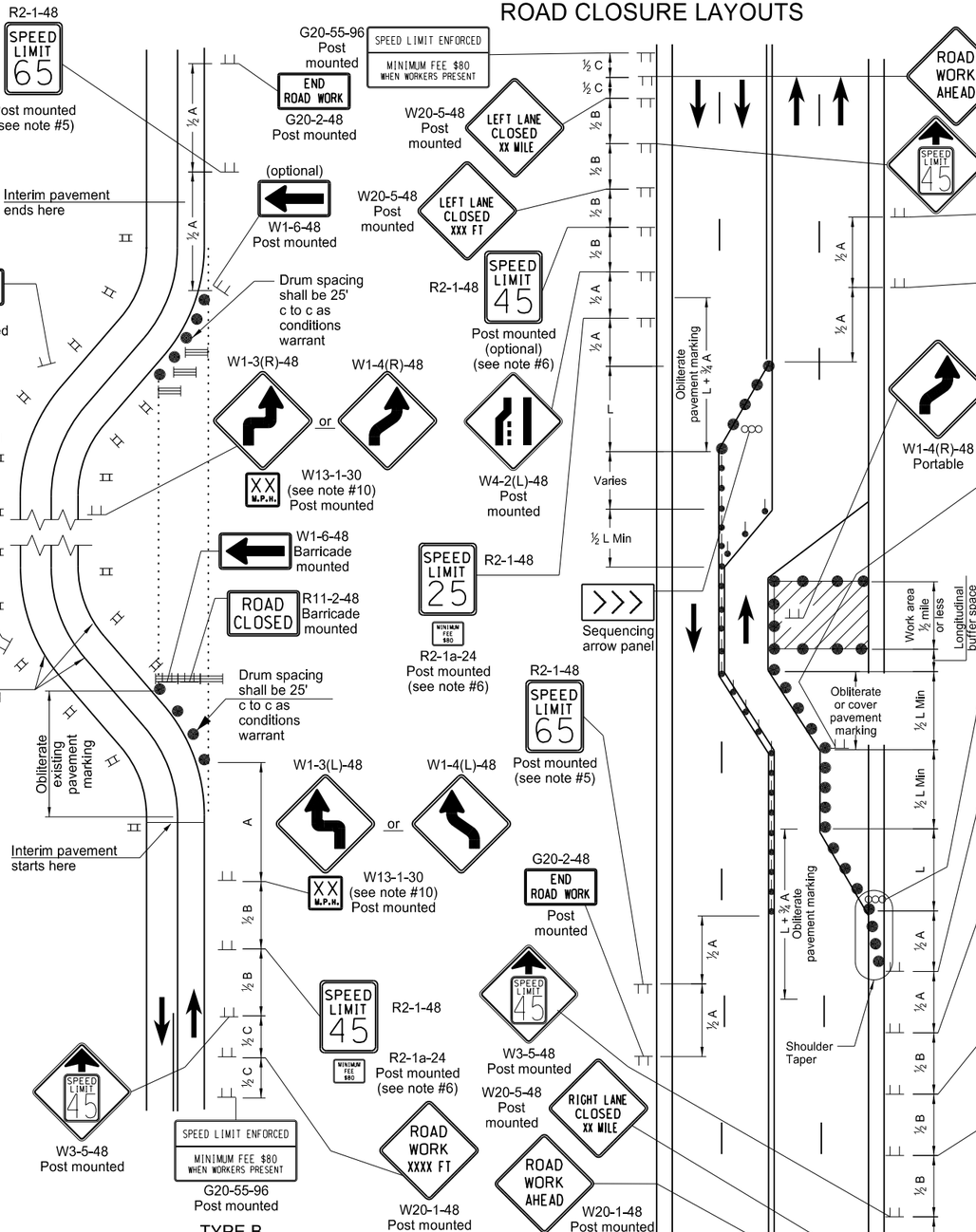
# ROAD CLOSURE LAYOUTS

D-704-15




TYPE A
TEMPORARY ROAD CLOSURE

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




TYPE B
ROAD CLOSURE WITH A DIVERSION

Two lane highway where roadway is closed and detour is provided (signing shown for one direction of travel only). Use on bridge and culvert installation where closure is ½ mile or less.




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.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
3. Delineator drums, barricades or cones used for tapering traffic shall be spaced at the dimension "S". Delineator drums or cones used for tangents shall be spaced at 2 times dimension "S".
4. Sequencing Arrow Panels
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface. See Shoulder Closure Standard Drawing.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
7. Use when work area is 1 mile or longer.
8. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
9. Existing speed limit signs within a reduced speed zone shall be covered.
10. Where necessary, safe speed to be determined by the Engineer.
11. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
12. G20-55-96 sign is not required if this standard is part of other traffic control layouts, or the work is less than 15 days.

| 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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

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

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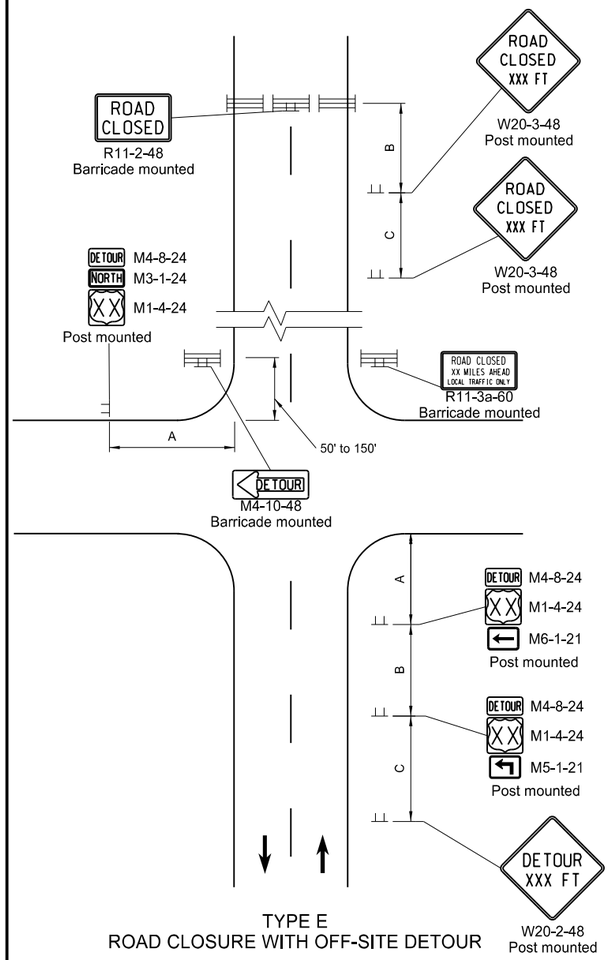
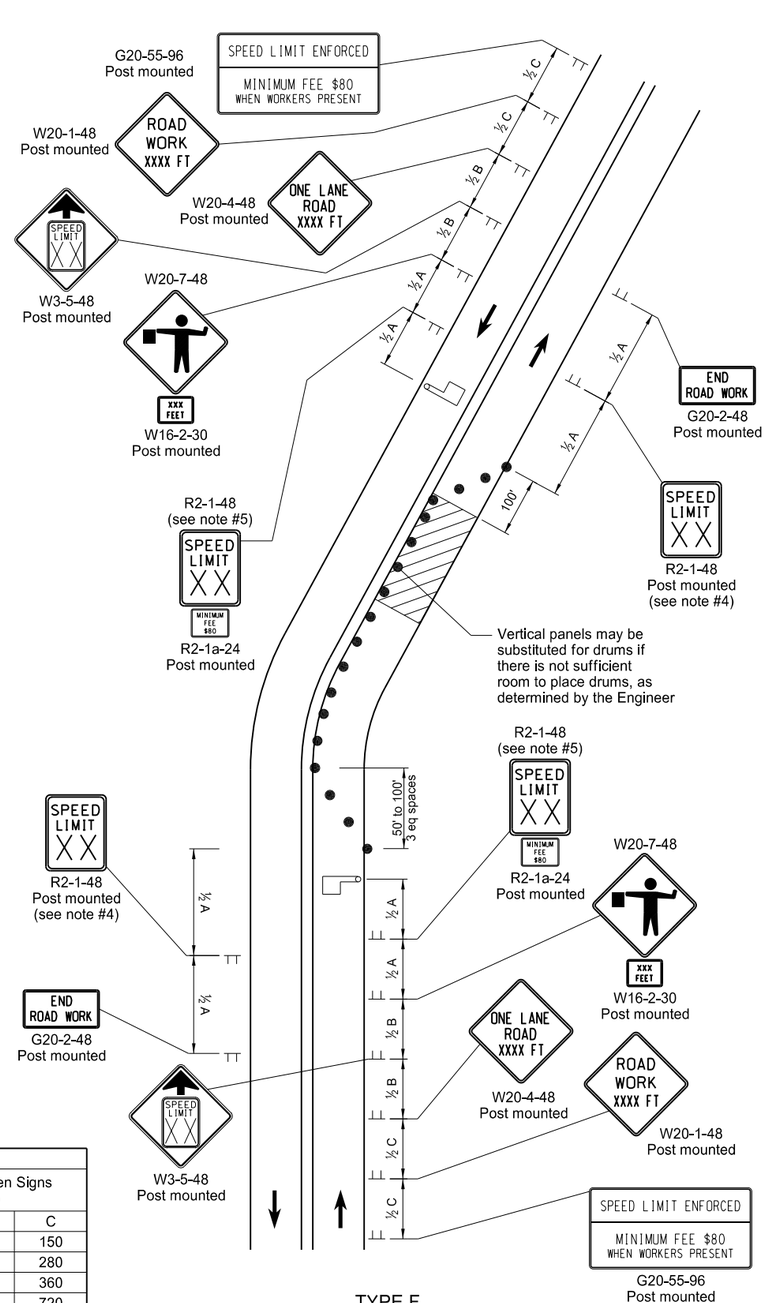
# ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19




TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

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




TYPE F
LANE CLOSURE ON A TWO LANE ROAD USING FLAGGERS

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

| 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 |

Notes

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

KEY

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

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

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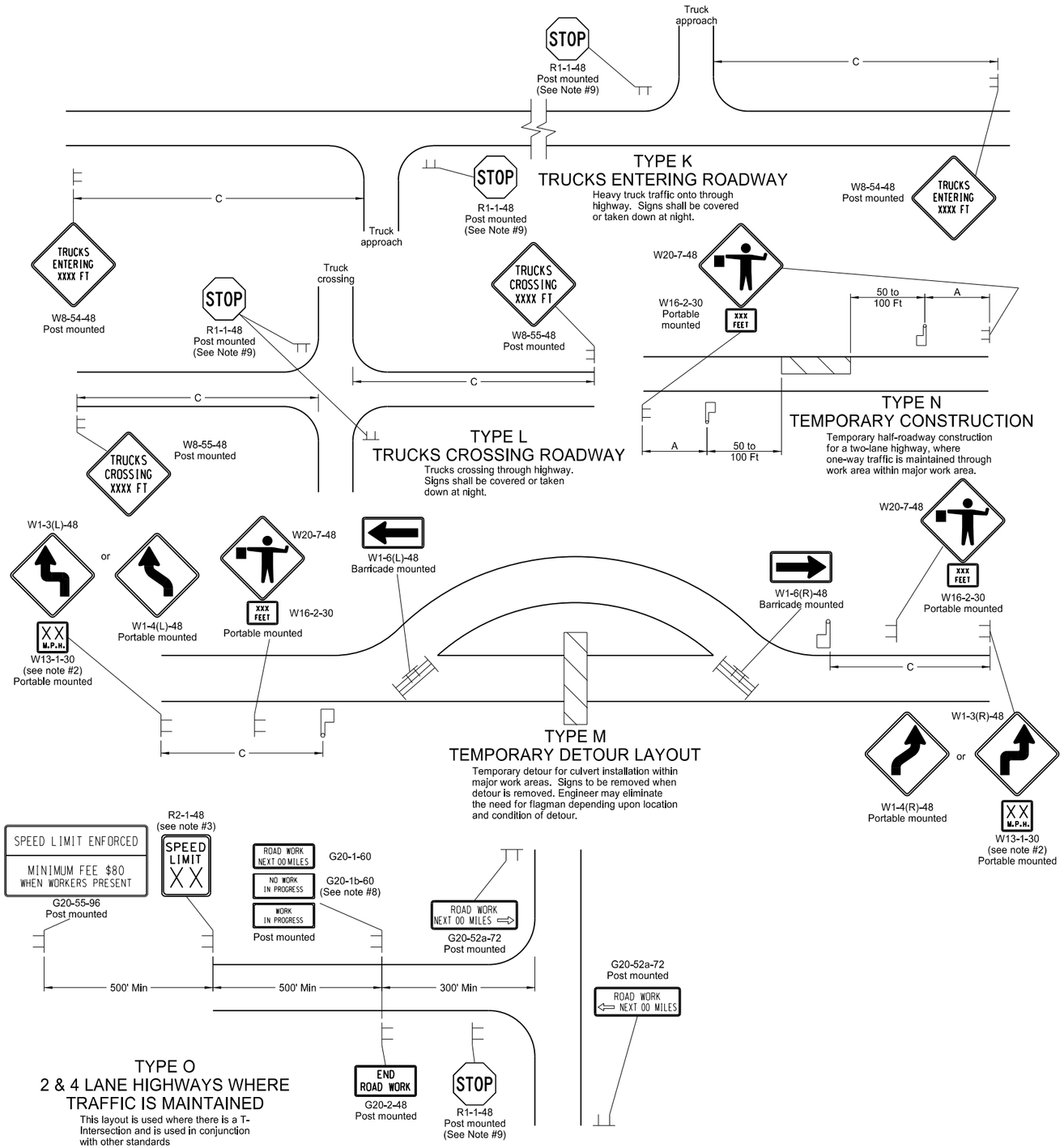
# CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22




Notes

1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
2. Where necessary, safe speed to be determined by the Engineer.
3. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
4. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.

KEY

Type III barricade — Work area

Sign — Flagger

| 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 | |
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| DATE | CHANGE |
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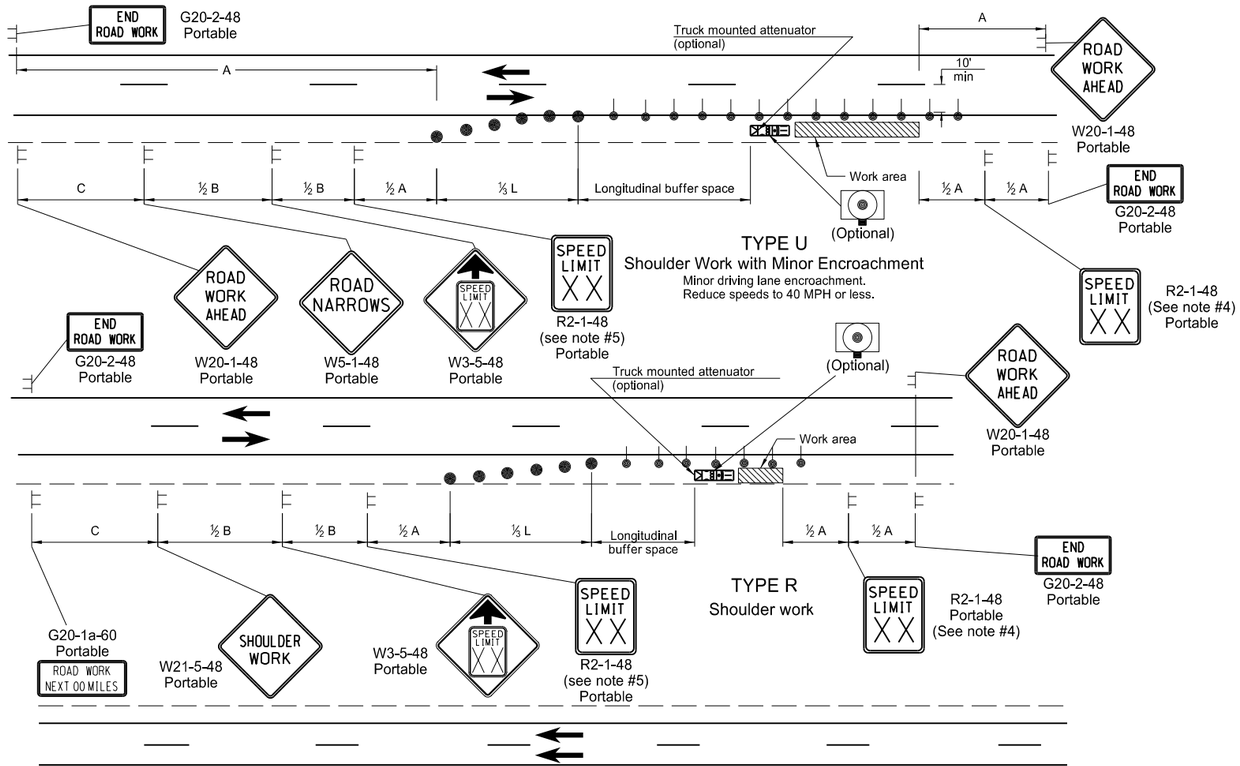
# SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

D-704-24




Notes

1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of the taper.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x $S^2$ /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Delineator drums used for tapering traffic shall be spaced at dimension "S".
   Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
3. Sequencing Arrow Panels
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
5. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½B.
6. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
7. Existing speed limit signs within a reduced speed zone shall be covered.
8. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

| 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 |

| 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

Sign — Work area
Delineator Drum — Tubular Marker
Sequencing Arrow Panel (Caution Mode)

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-27-13 | |
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| DATE | CHANGE |
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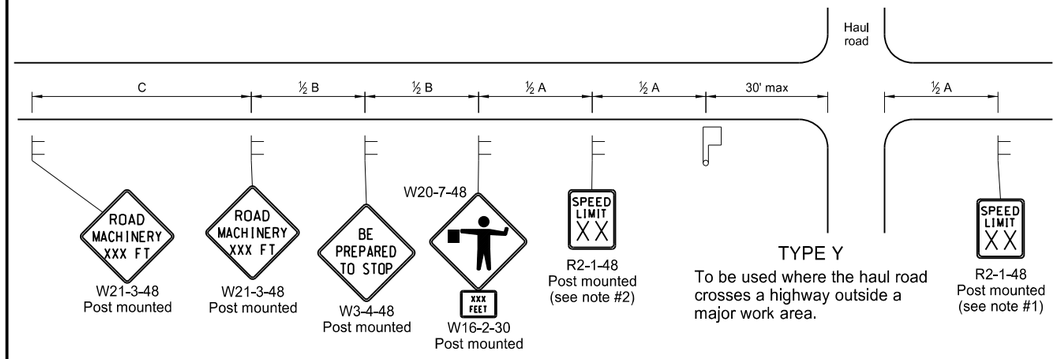
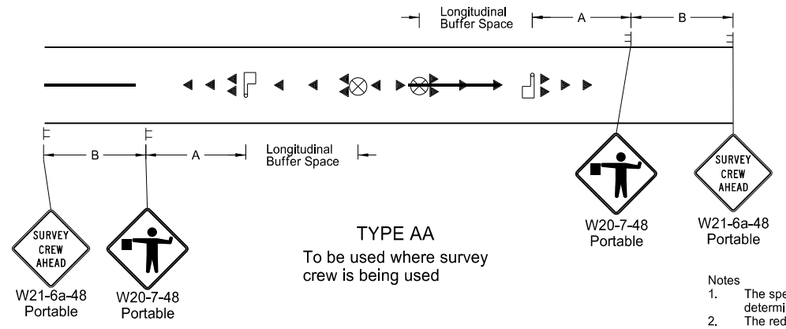
# MISCELLANEOUS SIGN LAYOUTS

D-704-26



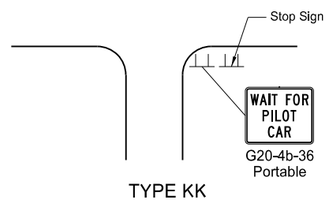

## TYPE Y

To be used where the haul road crosses a highway outside a major work area.




## TYPE AA

To be used where survey crew is being used

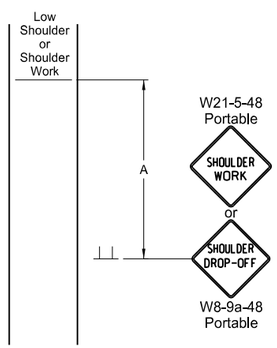



## TYPE KK

To be used at major intersections within pilot car control area

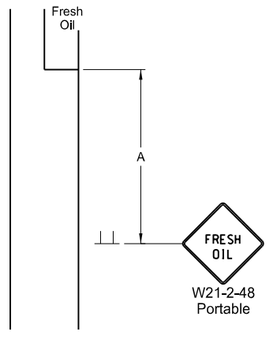
Notes

1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
3. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
4. Existing speed limit signs within a reduced speed zone shall be covered.
5. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
6. G20-55-96 signs are not required if this standard is part of other traffic control layouts, or the work is less than 15 days.
7. When a pilot car operation is used, place a G20-4b-36 "Wait For Pilot Car" sign at major intersections within pilot car control area.



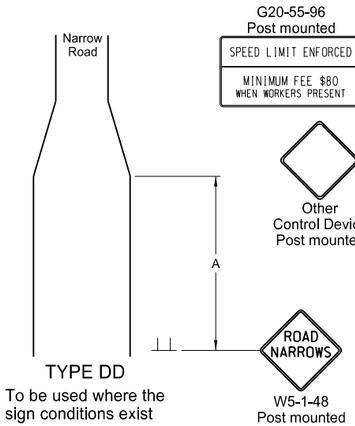

## TYPE BB

To be used within a major work area where the sign conditions exist



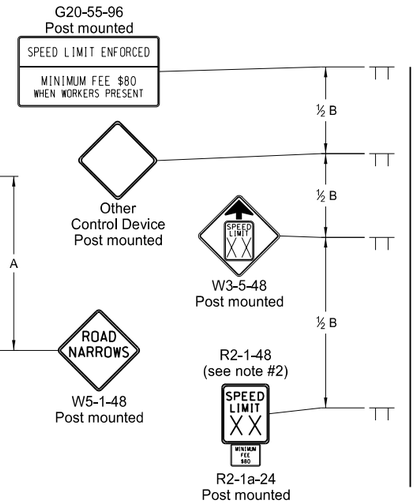

## TYPE CC

To be used where the sign conditions exist



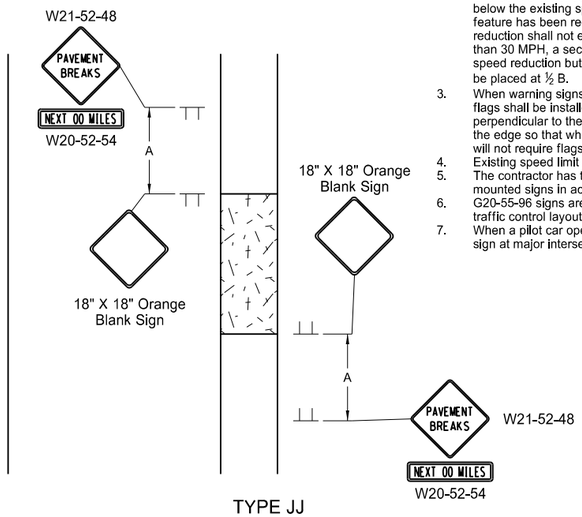

## TYPE DD

To be used where the sign conditions exist




## TYPE Z

To be used where speed zone is needed

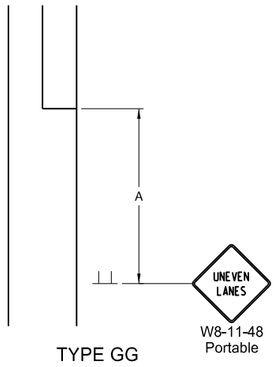



## TYPE JJ

To be used where there is a break in the pavement. These signs may be skid mounted or post mounted and shall be installed when conditions exist and removed when not applicable.

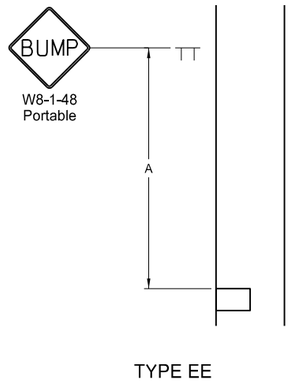
| Longitudinal Buffer Space | |
|---|---|
| *Speed (mph) | Length Min (feet) |
| 20 | 115 |
| 25 | 155 |
| 30 | 200 |
| 35 | 250 |
| 40 | 305 |
| 45 | 360 |
| 50 | 425 |
| 55 | 495 |
| 60 | 570 |
| 65 | 645 |
| 70 | 730 |
| 75 | 820 |

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



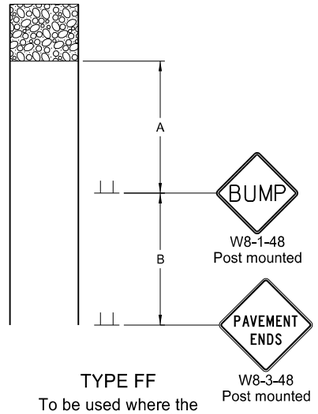

## TYPE GG

To be used where a difference of elevation between lanes exist




## TYPE EE

To be used where the sign conditions exist




## TYPE FF

To be used where the sign conditions exist

| 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

Sign — Flagger

Cones

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

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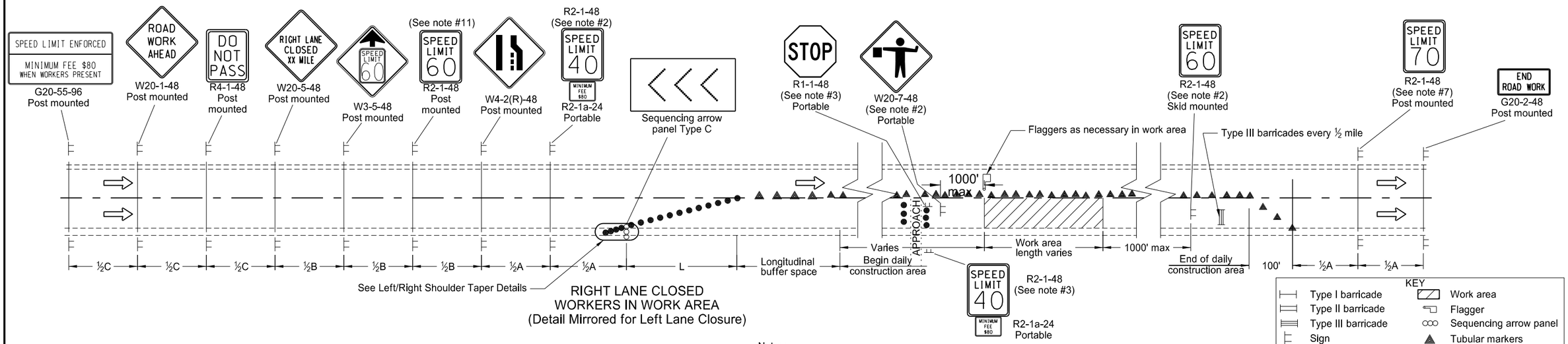
# SIGN LAYOUT FOR ONE LANE CLOSURE

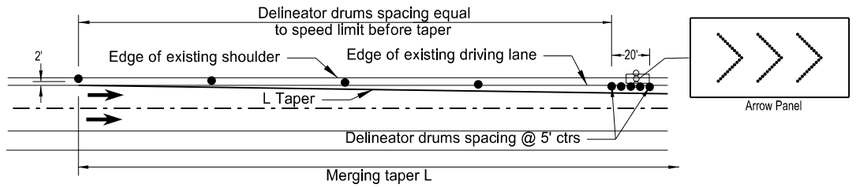
D-704-34



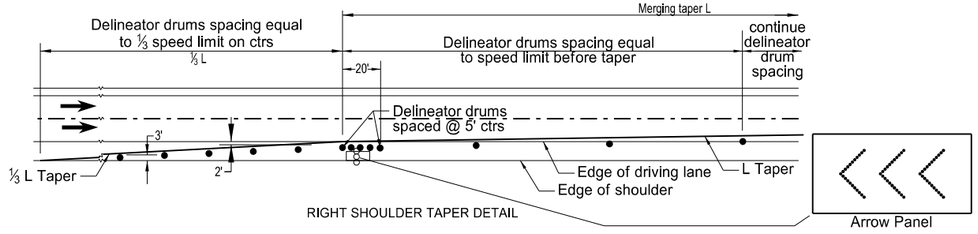

RIGHT LANE CLOSED
WORKERS IN WORK AREA
(Detail Mirrored for Left Lane Closure)

Notes:

1. Advance signs for flagging should be installed when flaggers are present.
2. The advanced flagger sign and the speed limit signs shall be moved as the work area moves through the construction zone. When the work area is not visible from the flagger, the flagger station shall be placed so the work area is visible. The 40 mph speed limit sign shall be spaced at ½A in advance of the flagger sign. The 60 mph speed limit sign shall also be moved. Upon completion of the work day or when workers are not present, the 40 mph speed limit and the Minimum Fee $80 signs shall be covered or removed. The exact speed limit shall be determined in the field, dependent on location and conditions.
3. Approaches: When the work area encompasses an approach, the approach shall be controlled by installing a 40 mph speed limit sign. If this approach is on the side of the lane closure, the existing stop sign shall be covered and a new portable stop sign shall be installed. When the main line 40 mph speed zone is moved past the approach, the approach speed limit sign shall be removed.
4. Variables:
   S=Numerical value of speed limit or 85th percentile
   W=The width of taper.
   L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or (WxSxS)/60 for urban, residential, and other streets with speeds of 40 mph or less.
5. Delineator drums, used for tapering traffic shall be spaced at the dimension "S". Tubular markers used for tangents shall be spaced at 2 times dimension "S".
6. Sequencing arrow panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
7. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
10. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 mph. Where speed limits are to be reduced more than 30 mph, a second speed limit sign shall be installed with the desired speed reduction, but shall not exceed 30 mph. The second speed limit sign shall be placed at ½B.
11. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
12. Sign G20-55-96 is not required if this standard is part of other traffic control layouts or the work is less than 15 days.




LEFT SHOULDER TAPER DETAIL




RIGHT SHOULDER TAPER DETAIL

| 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.

| 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

9-26-2012

REVISIONS

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

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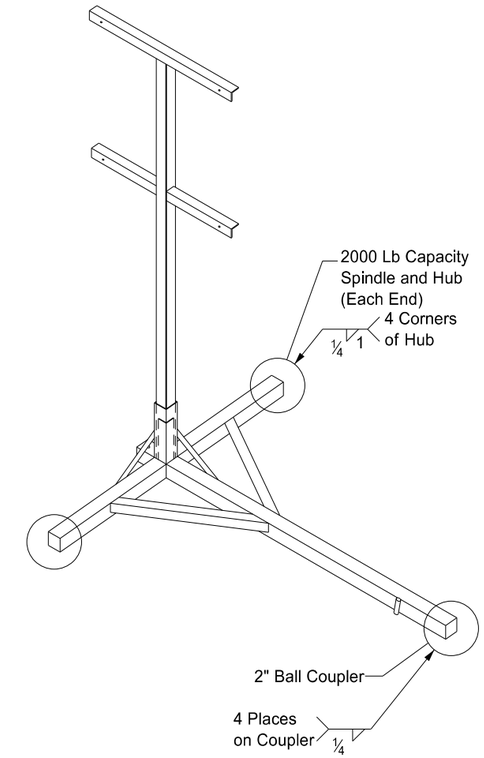
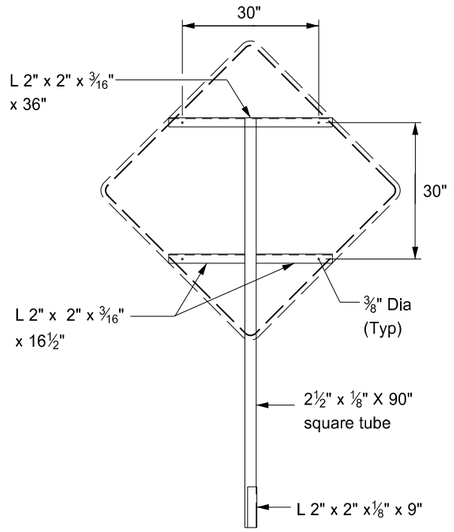
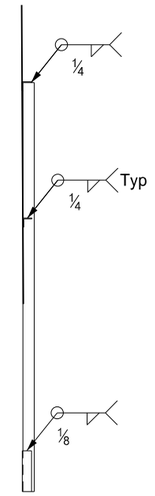
# PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



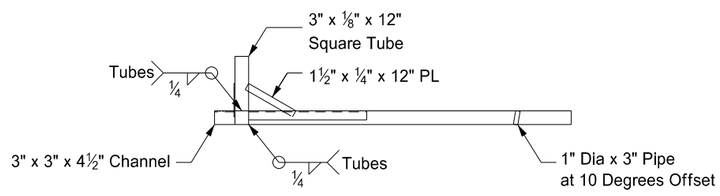




FRONT

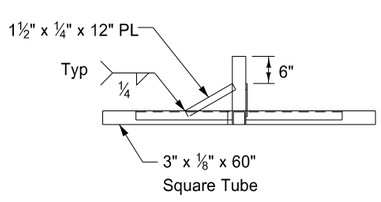



RIGHT

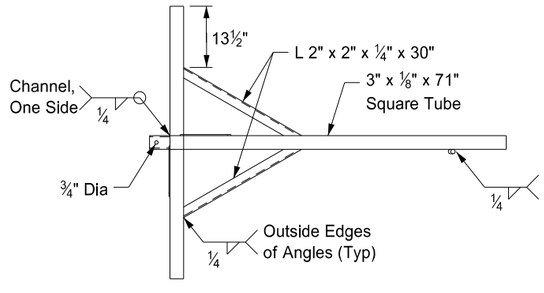
SIGN SUPPORT




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 |
| | |

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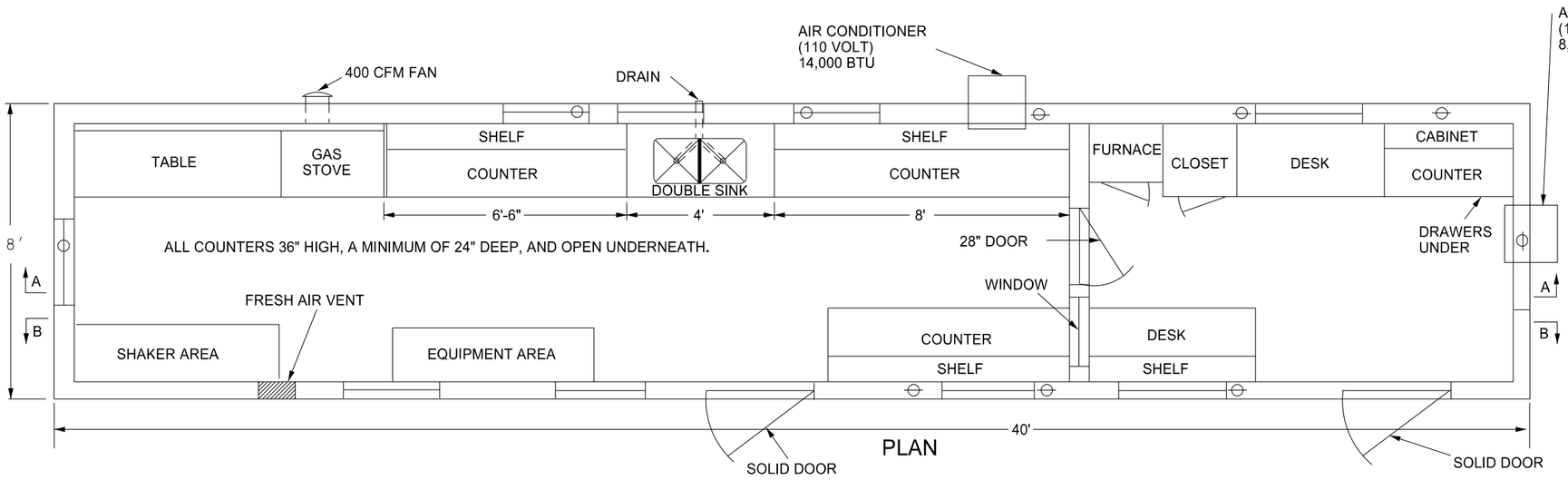
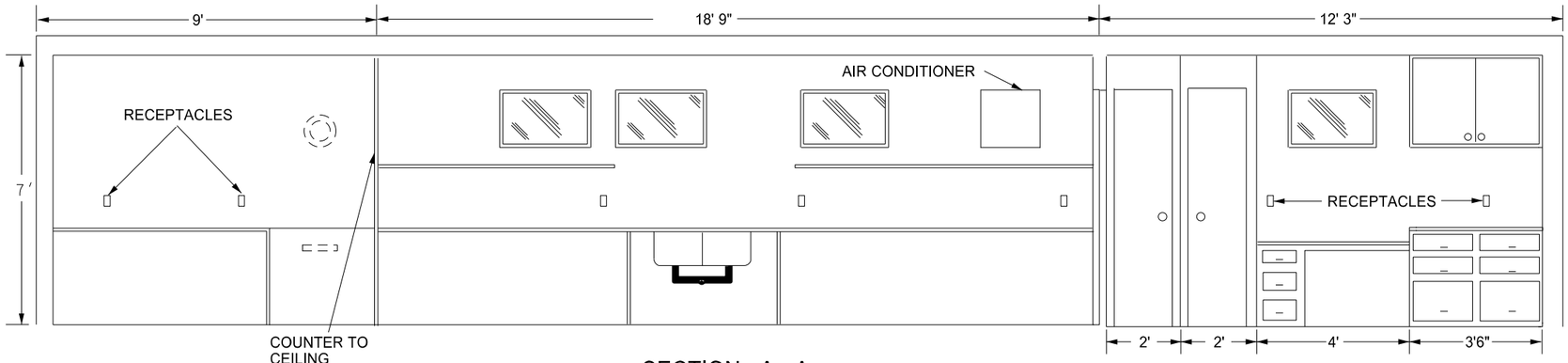
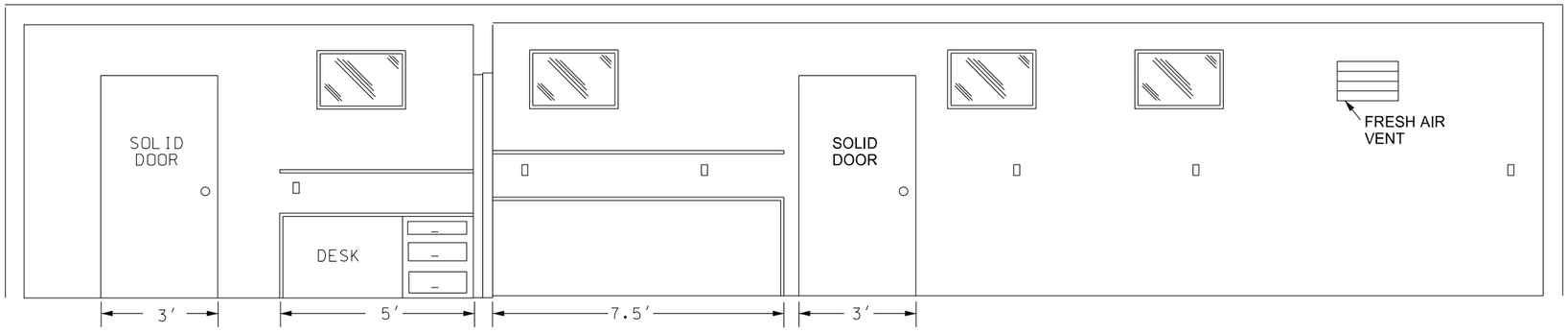
# BITUMINOUS LABORATORY

D-706-1




SECTION A - A




SECTION B - B

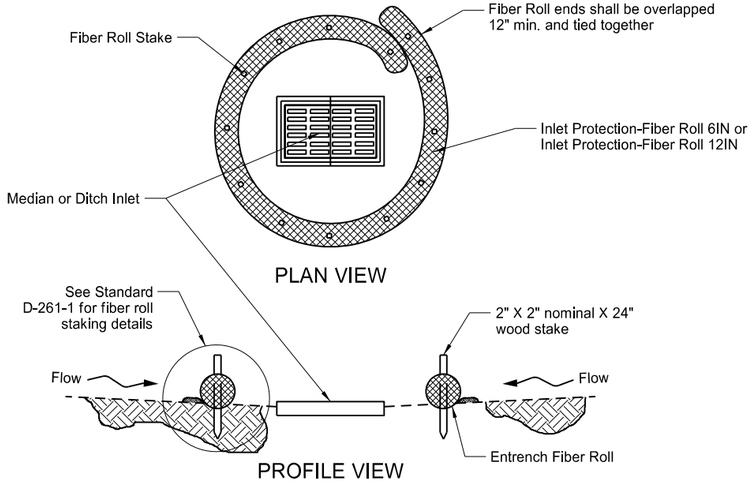
Provide a laboratory with the following:

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.

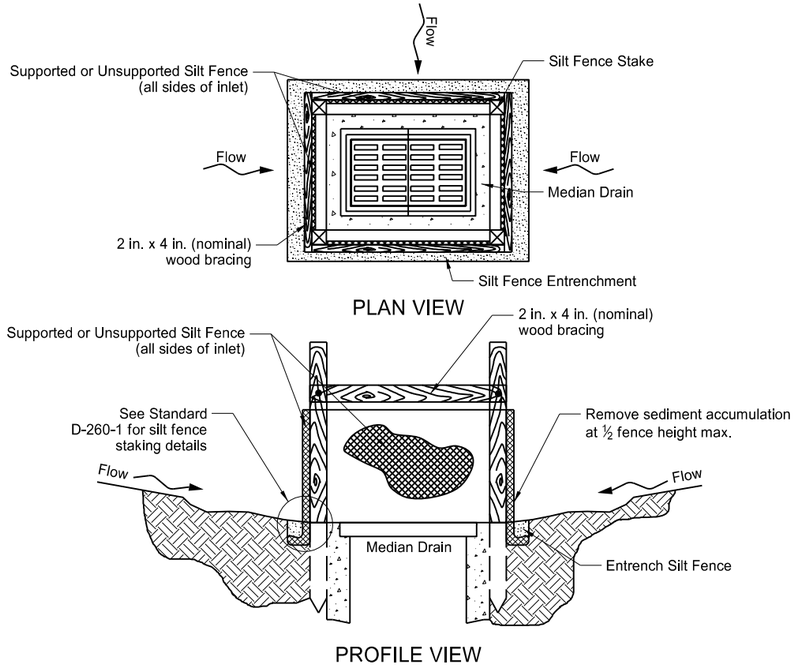
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 07-30-14 | Changed standard's title and revised notes. |
| 01-11-16 | Revised notes. |

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

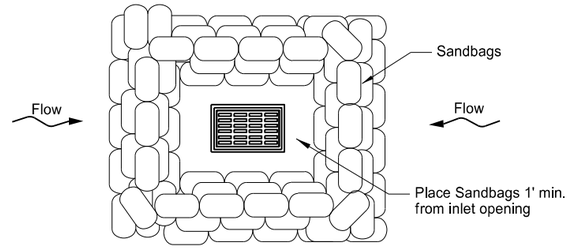
# EROSION AND SILTATION CONTROLS
# MEDIAN OR DITCH INLET PROTECTION



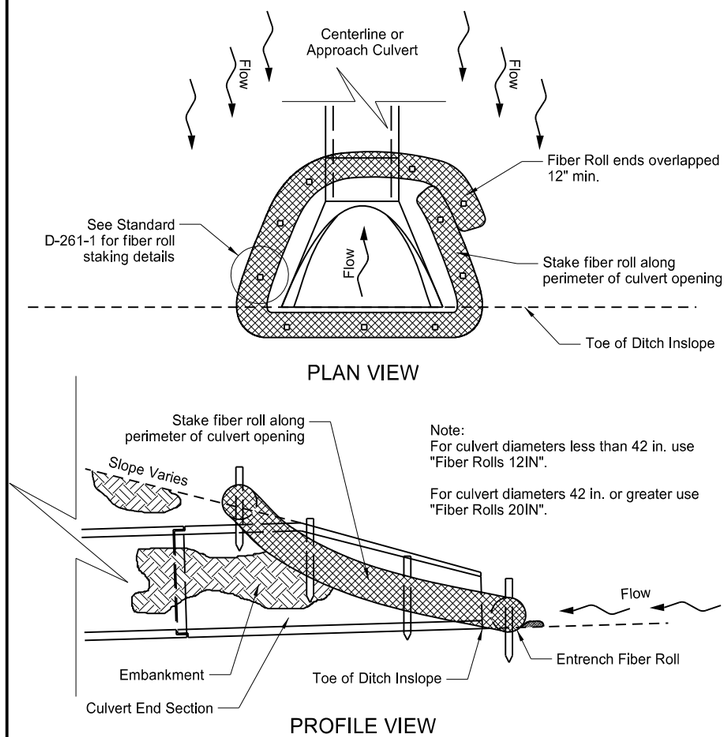

## FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



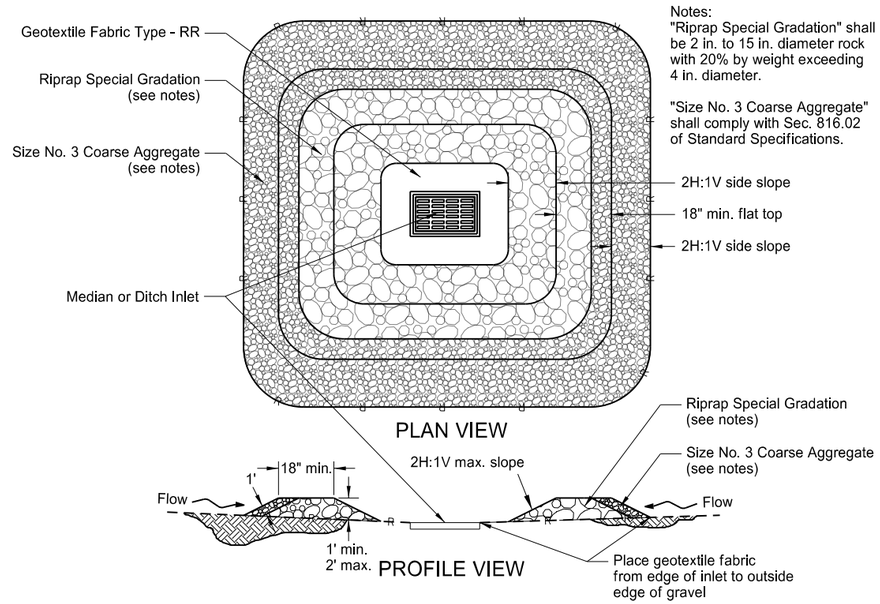

## SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



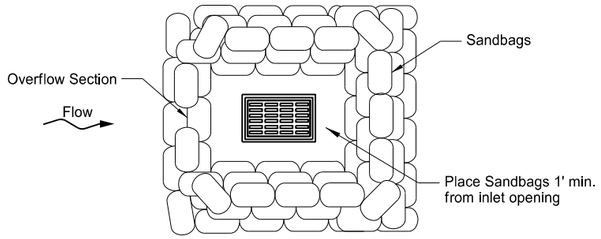

## SANDBAG PROTECTION (LOW POINT)




## FIBER ROLL PROTECTION (INLET OF CULVERT)




## GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)

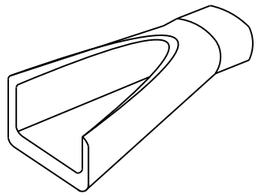



## SANDBAG PROTECTION (ON SLOPE)

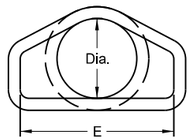
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Updated reference to standard drawing number for fiber roll staking details. |
| 10-01-14 | Updated reference to standard drawing number for silt fence. |

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 10/01/14 and the original document is stored at the North Dakota Department of Transportation

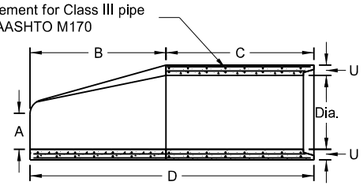
# REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
## (Round Pipe)



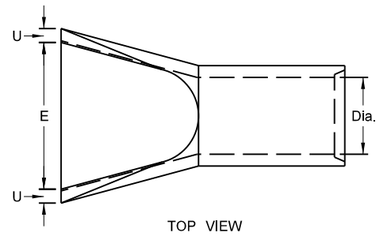
PERSPECTIVE




END VIEW




SIDE VIEW



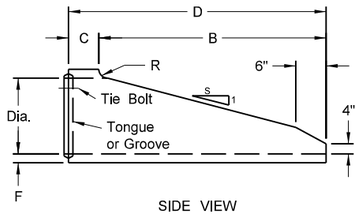

TOP VIEW

REINFORCED CONCRETE PIPE - FLARED END SECTION

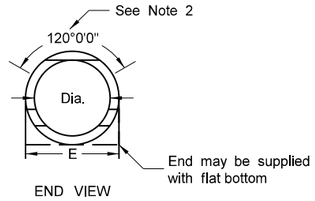
Reinforcement to be equivalent to Class III RCP

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

| TRAVERSABLE END SECTION | | | | | | | |
|---|---|---|---|---|---|---|---|
| DIA | B | C | D | E | F | R | S |
| 15" | 4' | 9" | 4'-9" | 1'-7½" | 2¼" | 3" | 6 |
| 18" | 5'-9" | 9" | 6'-6" | 1'-11" | 2½" | 3" | 6 |
| 24" | 6' | 1' | 7' | 2'-6" | 3" | 3" | 4 |
| 30" | 7'-6" | 1' | 8'-6" | 3'-1" | 3½" | 3½" | 4 |
| 36" | 7'-3" | 15" | 8'-6" | 3'-8" | 4" | 3" | 4 |




SIDE VIEW



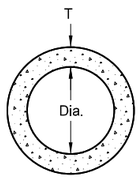

END VIEW

NOTES (Traversable End Section):

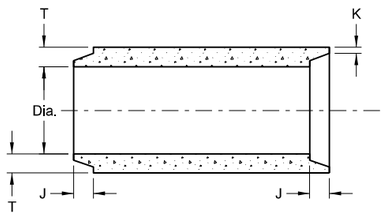
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

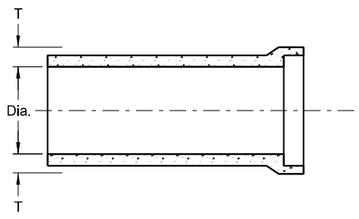
Reinforcement to be equivalent to Class III RCP



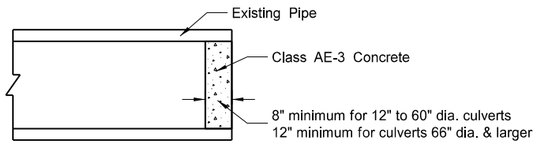

END VIEW




TONGUE & GROOVE JOINT




BELL & SPIGOT JOINT




CONCRETE PIPE PLUG

CIRCULAR PIPE

JOINTS FOR REINFORCED CONCRETE PIPE

| All Classifications of Round Concrete Pipe | | | | | |
|---|---|---|---|---|---|
| Internal Dia. of pipe in Inches | Cross-Sectional Water Area | Weight per lin. foot of Pipe Std. Wall | Joint J Groove End Min./Max. | Joint K Tongue End Min. | Minimum Wall Thickness (T) |
| Dia | Sq. ft. | Lbs. | In. | In. | In. |
| 12 | 0.79 | 92 | 1⅛-2⅛ | ¾ | 2 |
| 15 | 1.23 | 127 | 1¾-2¾ | ⅞ | 2¼ |
| 18 | 1.77 | 168 | 1⅞-2⅞ | 1 | 2½ |
| 21 | 2.40 | 214 | 1⅞-3⅛ | 1⅛ | 2¾ |
| 24 | 3.14 | 265 | 2⅛-3¼ | 1⅛ | 3 |
| 27 | 3.98 | 322 | 2¾-4 | 1¼ | 3¼ |
| 30 | 4.91 | 384 | 3⅛-4¼ | 1¼ | 3½ |
| 33 | 5.94 | 452 | 3¼-4¼ | 1½ | 3¾ |
| 36 | 7.07 | 524 | 3½-4¼ | 1½ | 4 |
| 42 | 9.62 | 685 | 3¾-4¾ | 1¾ | 4½ |
| 48 | 12.57 | 685 | 3⅞-4¾ | 1⅞ | 5 |
| 54 | 15.90 | 1070 | 4⅛-5½ | 2 | 5½ |
| 60 | 19.63 | 1296 | 4½-5½ | 2¼ | 6 |
| 66 | 23.76 | 1542 | 5-6 | 2⅝ | 6½ |
| 72 | 28.27 | 1810 | 5⅝-6¾ | 2⅝ | 7 |
| 78 | 33.18 | 2098 | 6¼-7¼ | 2⅝ | 7½ |
| 84 | 38.48 | 2410 | 5⅝-7¾ | 3⅜ | 8 |
| 90 | 44.18 | 2793 | 6¾-8½ | 3⅛ | 8½ |
| 96 | 50.27 | 3092 | 7-8¼ | 3½ | 9 |
| 102 | 56.75 | 3466 | 7-8¼ | 3½ | 9½ |
| 108 | 63.62 | 3864 | 7¼-8½ | 3¾ | 10 |

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

NOTES:

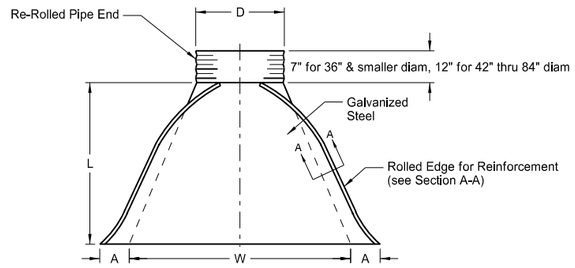
1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66"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

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

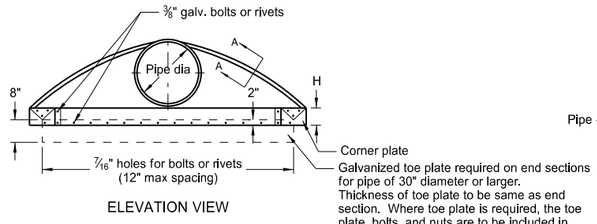
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 01/21/15 and the original document is stored at the North Dakota Department of Transportation

# ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4

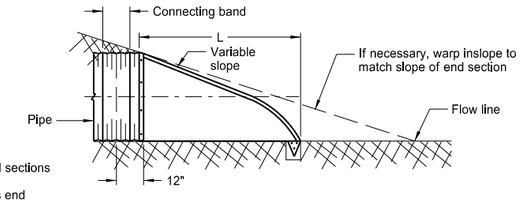



PLAN VIEW




ELEVATION VIEW

Galvanized toe plate required on end sections for pipe of 30" diameter or larger. Thickness of toe plate to be same as end section. Where toe plate is required, the toe plate, bolts, and nuts are to be included in price bid for end sections.




TYPICAL CROSS SECTION
(showing connector section)

| * * PIPE DIA. IN | GALV. THICK. IN | END SECTION DIMENSIONS A IN | B IN | H IN | L IN | W IN | APPROX. SLOPE RATE | BODY PIECE |
|---|---|---|---|---|---|---|---|---|
| 15 | 0.064 | 7 | 8 | 6 | 26 | 30 | 2½:1 | 1 |
| 18 | 0.064 | 8 | 10 | 6 | 31 | 36 | 2½:1 | 1 |
| 24 | 0.064 | 10 | 13 | 6 | 41 | 48 | 2½:1 | 1 |
| 30 | 0.079 | 12 | 16 | 8 | 51 | 60 | 2½:1 | 1 or 2 |
| 36 | 0.079 | 14 | 19 | 9 | 60 | 72 | 2½:1 | 2 |
| 42 | 0.109 | 16 | 22 | 11 | 69 | 84 | 2½:1 | 2 |
| 48 | 0.109 | 18 | 27 | 12 | 78 | 90 | 2½:1 | 2 |
| 54 | 0.109 | 18 | 30 | 12 | 84 | 102 | 2:1 | 2 |
| * 60 | 0.109 | 18 | 33 | 12 | 87 | 114 | 1¾:1 | 3 |
| * 66 | 0.109 | 18 | 36 | 12 | 87 | 120 | 1½:1 | 3 |
| * 72 | 0.109 | 18 | 39 | 12 | 87 | 126 | 1 1/3 :1 | 3 |
| * 78 | 0.109 | 18 | 42 | 12 | 87 | 132 | 1¼:1 | 3 |
| * 84 | 0.109 | 18 | 45 | 12 | 87 | 138 | 1 1/6 :1 | 3 |

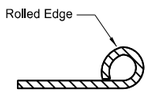
* These sizes have 0.109" sides and 0.138" center panels.

* * Pipe diameter is equal to dimension "D" of end section.

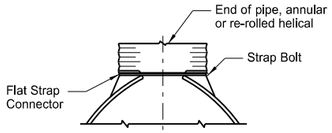
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

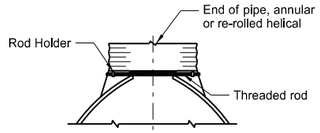
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



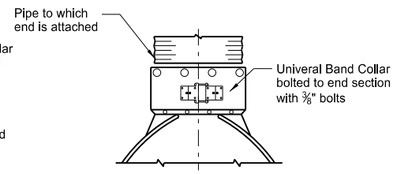

SECTION A-A




TYPE #1
For circular pipes with diameter 24" & smaller




TYPE #2
For circular pipes with diameter 30" through 36"

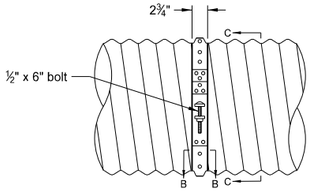



TYPE #3
For all pipe sizes

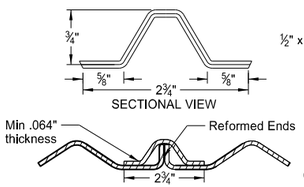
| COUPLING BAND DIMENSIONS | | | | |
|---|---|---|---|---|
| COUPLING TYPE | CORRUGATION PITCH x DEPTH | PIPE SIZE | COUPLING BAND LENGTH | MIN. BAND THICKNESS |
| Hat Band | 2⅔" x ½" | 12" - 48" | 2¾" | .064" |
| Annular Band | 2⅔" x ½" | 12" - 72" | 12" | .052" |
| | | 78" - 84" | 12" | .079" |
| | 3" x 1" | 48" - 120" | 14" | .052" |
| Hugger Band | 2⅔" x ½" Rerolled End | 12" - 72" | 10½" | .052" |
| | | 78" - 84" | 10½" | .079" |
| | 3" x 1" Rerolled End | 48" - 120" | 10½" | .052" |
| | 5" x 1" Rerolled End | 48" - 120" | 12" | .064" |

NOTES:

1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x ¼" galv. angle for 60" through 72" dia. and 2½" x 2½" x ¼" galv. angle for 78" and 84" dia.. Angles to be attached by galv. ⅜" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
5. ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four ½" bolts with maximum spacing of 5½" are used for the connection.
7. Length of spot welds shall be minimum ½".

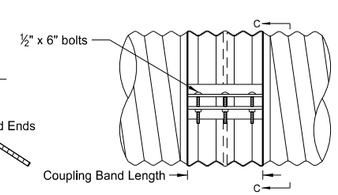



SIDE VIEW

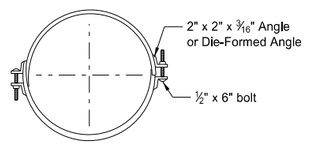



SECTION B-B

HAT BAND FOR FLANGED END PIPE

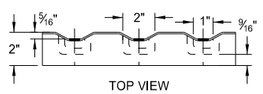



SIDE VIEW



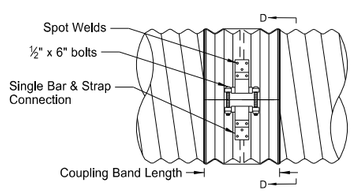

SECTION C-C
Angle Connection

ANNULAR BAND

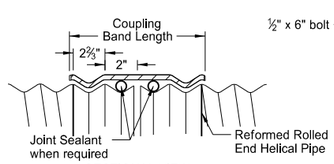



TOP VIEW

Die-Formed Angle Connector

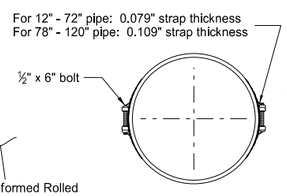



SIDE VIEW

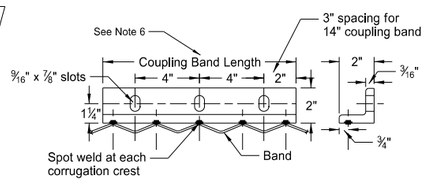



SECTIONAL VIEW

HUGGER COUPLING BAND



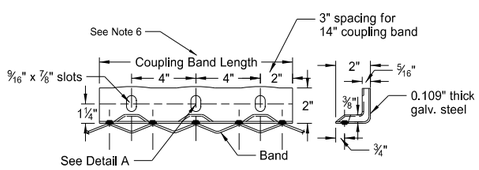

SECTION D-D
Bar & Strap Connection




SIDE VIEW

END VIEW

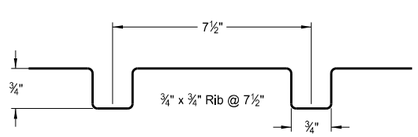
2" x 2" x 3/16" Angle Connector

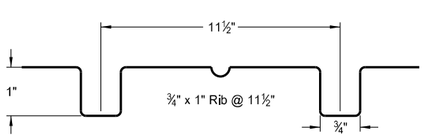



SIDE VIEW

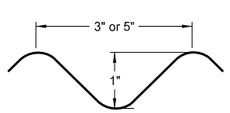
END VIEW

Die-Formed Angle Connector

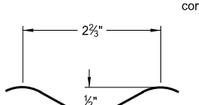


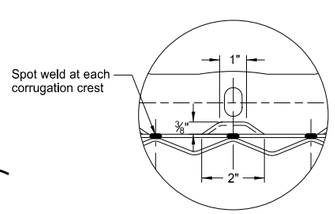

SPIRAL RIB CORRUGATIONS




3" x 1" CORRUGATIONS or
5" x 1" CORRUGATIONS




2⅔" x ½" CORRUGATIONS



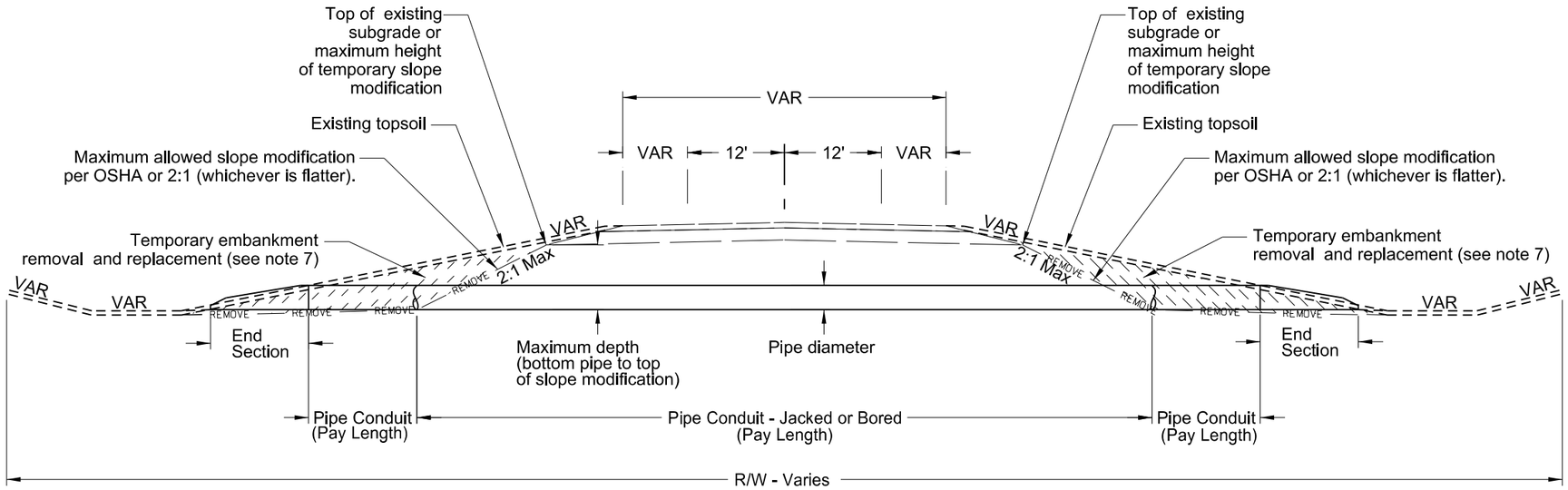

Detail A

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

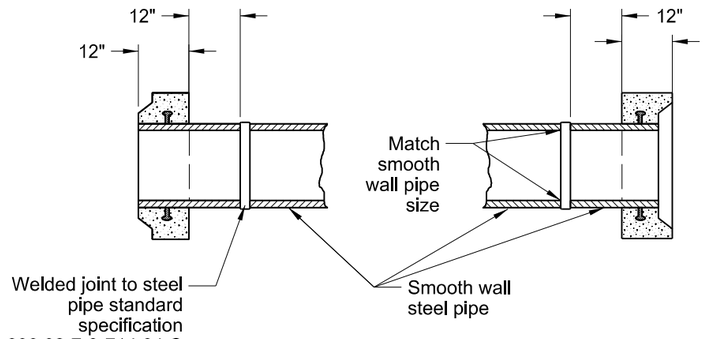
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 02/27/2014 and the original document is stored at the North Dakota Department of Transportation

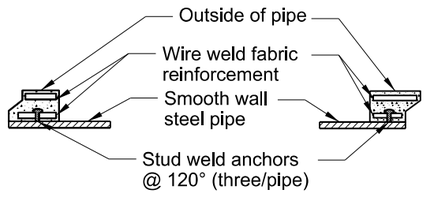
# D-714-16

## JACKED AND BORED PIPE

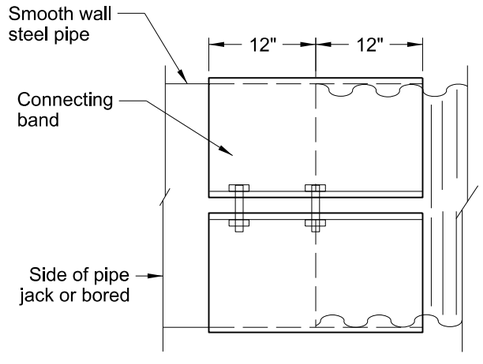



JACKED AND BORED PAY LENGTH




STANDARD COUPLER FOR JOINING SMOOTH WALL STEEL PIPE TO REINFORCED CONCRETE PIPE




STANDARD CONNECTING BAND FOR JOINING SMOOTH WALL STEEL PIPE TO CORRUGATED PIPE

| Table of Minimum Wall Thicknesses for Smooth Walled Steel Pipe Through Roadway Embankment | |
|---|---|
| Diameter of Pipe | Minimum Wall Thickness |
| 24 Inches | 0.312 Inch |
| 30 Inches | 0.406 Inch |
| 36 Inches | 0.469 Inch |
| 42 Inches | 0.500 Inch |
| 48 Inches | 0.563 Inch |
| 54 Inches | 0.656 Inch |
| 60 Inches | 0.719 Inch |
| 66 Inches | 0.813 Inch |
| 72 Inches | 0.875 Inch |

NOTES:

1. The method used to install the pipe indicated as jacked on the plans shall be left to the discretion of the contractor. The boring or jacked methods are acceptable. If the boring method is used, the contractor may use smooth wall steel pipe in lieu of RCP. Jacked concrete pipe sections shall be the class required for the height of fill, but concrete compressive strength shall be a minimum of 6,000 psi or greater. If smooth walled steel pipe is to be used, this material shall be welded steel pipe of new material, meeting ASTM Specifications A-139, Grade B with minimum yield strength of 35,000 psi . The Table of Minimum Wall Thicknesses for Smooth Walled Steel Pipe Through Roadway Embankment shall be used.

2. Pipe culverts that are bored or jacked shall conform to section 714 and section 830 of the standard specifications.

3. Pipe culverts shall be installed using equipment that encases the hole as the earth is removed. Boring or jacking without the concurrent installation of the pipe will not be permitted.

4. Pipe shall extend through the undisturbed fill and shall be installed so as not to disrupt traffic nor damage roadway grade and surface. Contractor shall ensure proper traffic control and traffic safety measures are put into place to protect the traveling public throughout the jacking or boring process.

5. The encased hole shall not be more than 0.1 foot greater than the outside diameter of the pipe.

6. Use of water in the process of boring or jacking is prohibited.

7. Temporary removal and replacement of embankment shall be included in price bid for Pipe Conduit – Jacked or Bored. Temporary removal of embankment may be allowed up to a maximum of 2:1, and shall not be into the existing pavement section (base, pavement, etc). Contractor is responsible for protection and stability of the slope throughout the jacking or boring process.

8. Proper cushioning material shall be inserted between the jack and pipe. Damaged ends that result in an unsatisfactory joint when the additional sections of pipe are placed, shall be rejected and removed, and a new section shall be installed.

9. The boring or jacking shall start from the low or downstream end, be made in straight lines, to the grade and alignment as shown on the plans. The flow line elevation at the starting point for boring or jacking shall be within 0.1 ft. of staked grade; the flow line shall not be reversed at any point; and the line and grade at any point within the pipe shall not vary by more than 0.5 ft. from the line and grade designated.

10. Openings more than 1/4 inch (5 mm) in width between adjacent sections of concrete pipe shall be filled with 1:2 cement/sand mortar. All concrete pipe sections and end sections shall be tied in accordance with standard drawing D-714-22. All steel sections shall be welded continuously around their periphery in accordance with Standard Specification 830.02 F & 714.04 C.

11. Once the pipe jacking has begun, proceed with the operation without interruption to prevent the pipe from becoming firmly set in the embankment.

12. The culvert consists of separate bid items for each portion: "Pipe Conduit XXIn – Jacked or Bored" and "Pipe Conduit XXIn". The pay lengths of the pipe bid items are as shown for the type and size specified per linear foot. Connecting bands or Couplers shall be included in the unit price bid for "Pipe Conduit XXIn – Jacked or Bored". The required materials, labor, and equipment to complete the work shall be included in the price bid for the above bid items.

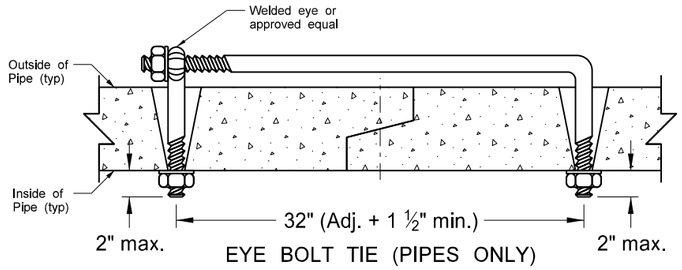
Note: This Standard Drawing only applies to jacked and bored pipe under a roadway embankment. Additional coordination and design is needed for railroad embankments.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 02-28-2014 | |
| REVISIONS | |
| DATE | CHANGE |
| 07-07-2014 | Revise Notes |

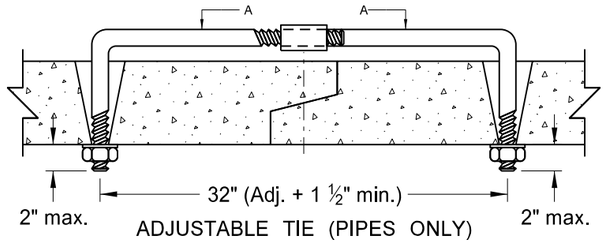
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 7/7/14 and the original document is stored at the North Dakota Department of Transportation

# CONCRETE PIPE OR PRECAST CONCRETE BOX CULVERT TIES

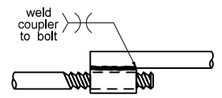
D-714-22



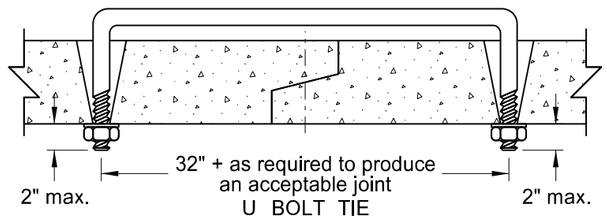

EYE BOLT TIE (PIPES ONLY)



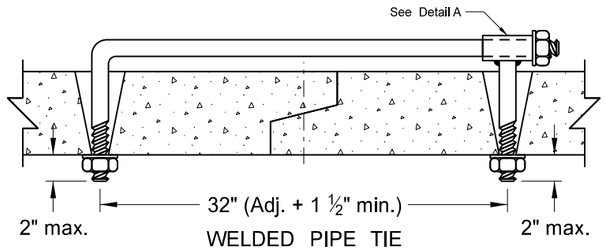

ADJUSTABLE TIE (PIPES ONLY)



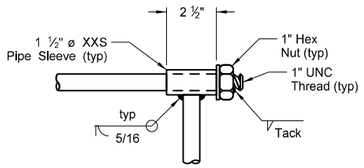

SECTION A-A



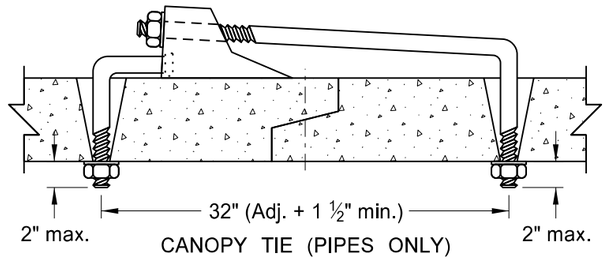

U BOLT TIE



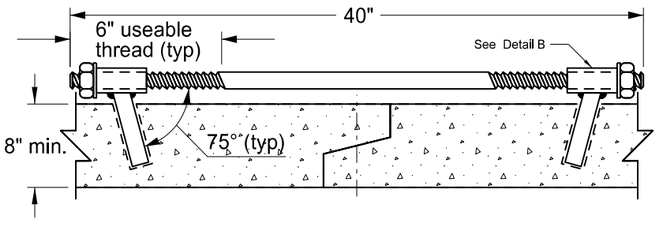

WELDED PIPE TIE



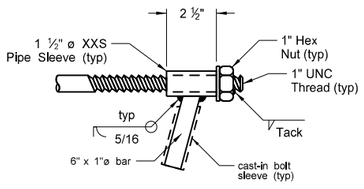

DETAIL A



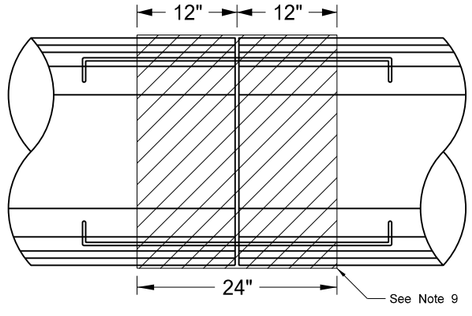

CANOPY TIE (PIPES ONLY)



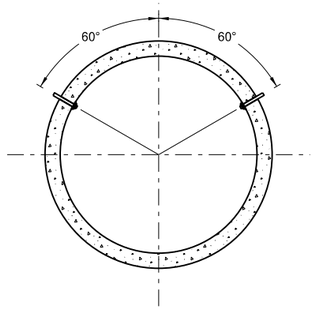

HIDDEN TIE (RCB ONLY)

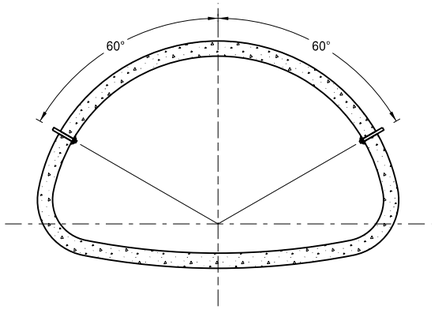


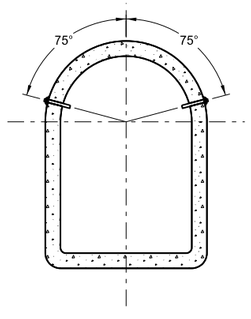

DETAIL B




PLAN VIEW




END VIEW

| REQUIRED SIZE OF TIE BOLTS | | |
|---|---|---|
| Pipe Size | Thread ø | XXS Pipe Sleeve Inner ø |
| 18" - 24" | ⅝" See note 2 | ¾" |
| 30" - 66" | ¾" | 1" |
| 72" - 78" | 1" | 1 ¼" |
| RCB | | |

NOTES:

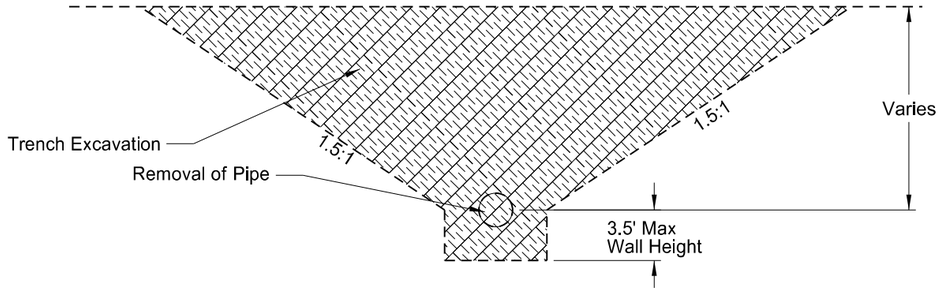
1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
3. Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
4. Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
5. Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter ¼" larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1 ¼".
6. The contractor has the option of selecting the type of tie bolt used from those shown.
7. The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
8. All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
9. When joint wrap is specified in the plans, place wrap beneath ties. Overlap the joint by 12" in both directions.
10. Tie bolts shall conform to ASTM A 36. Nuts shall be be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
11. Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
12. RCB tie locations shall be as shown on the plans.

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

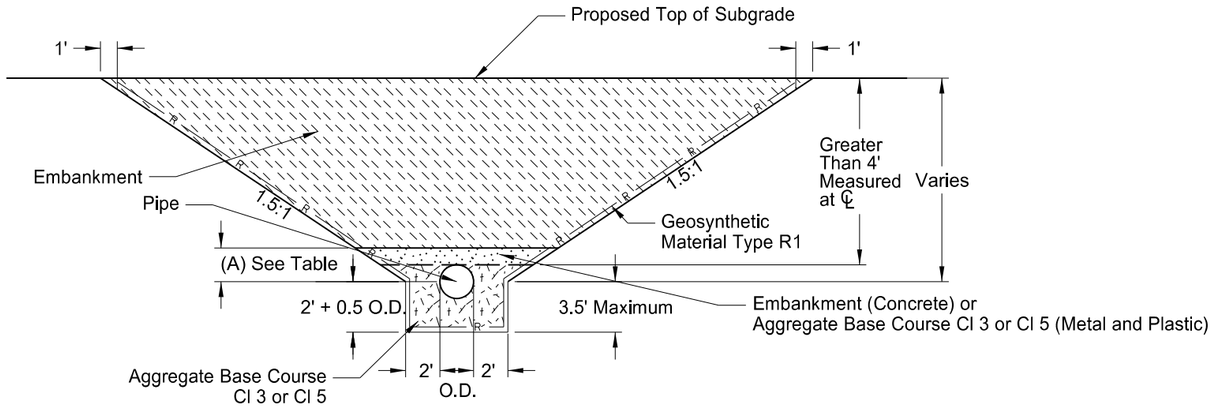
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 07/21/15 and the original document is stored at the North Dakota Department of Transportation

# TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL
# PIPES MORE THAN 4 FEET BELOW TOP OF SUBGRADE

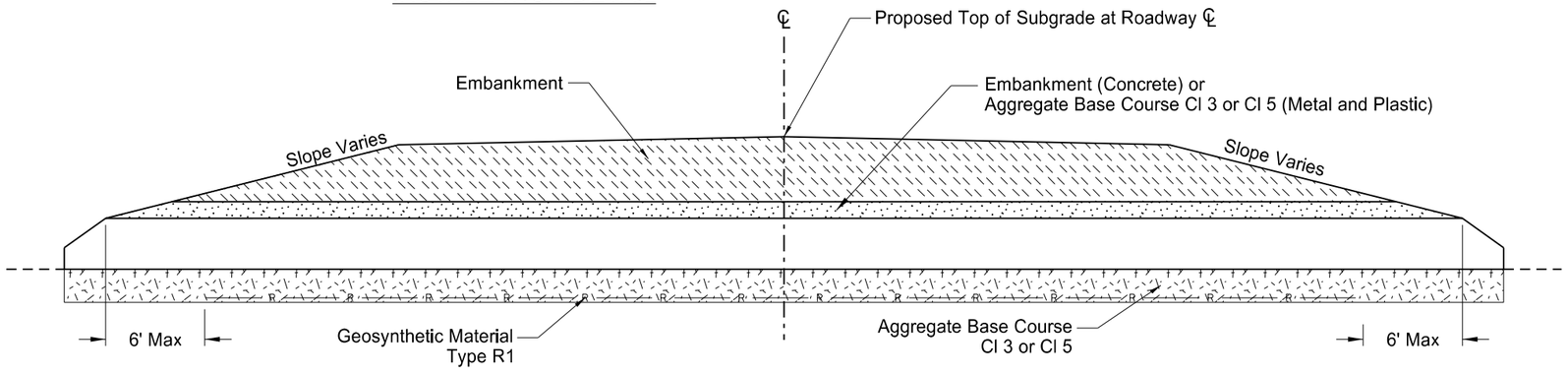
D-714-25




EXCAVATION DETAIL




INSTALLATION DETAIL




CROSS SECTION

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

*Included in Pipe Pay Item
1) Pipe
2) Trench excavation
3) Aggregate Base Course Cl 3 or Cl 5
4) Embankment

NOTES:

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

7-26-13

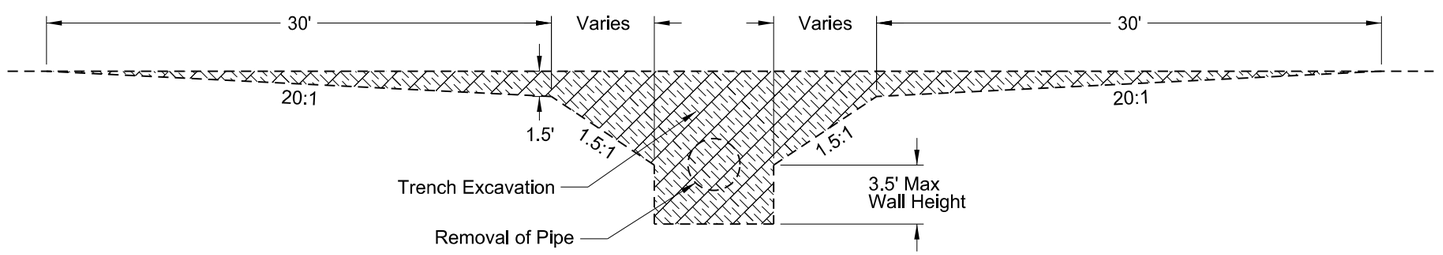
REVISIONS

| DATE | CHANGE |
|---|---|
| 10-15-13 | Label Formatting |
| 1-21-14 | Nomenclature |
| 9-18-15 | Title Rewording |
| 12-10-15 | Added Plastic Pipe |

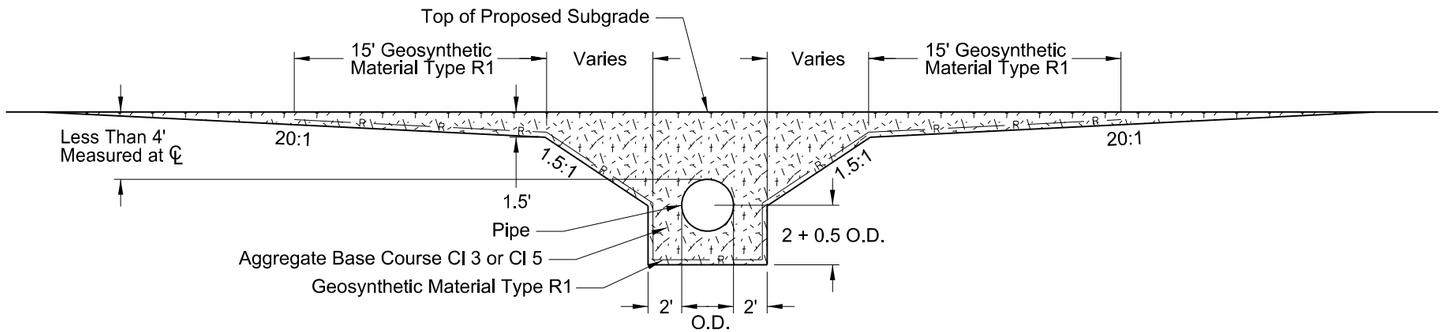
This document was originally issued and sealed by Ron Horner, Registration Number PE- 2087, on 12/10/2015 and the original document is stored at the North Dakota Department of Transportation

# TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL
# PIPES 4 FEET OR LESS BELOW TOP OF SUBGRADE

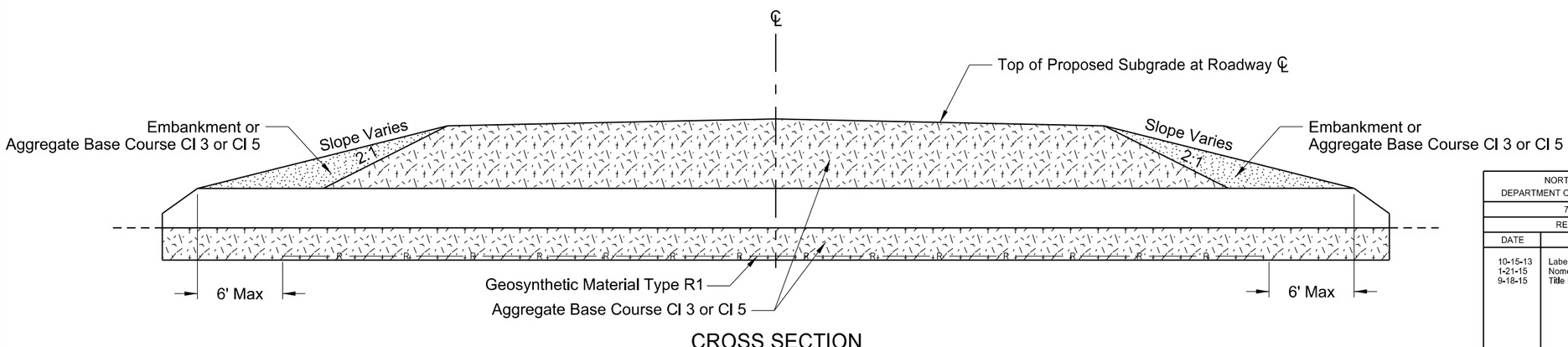
D-714-26




## EXCAVATION DETAIL




## INSTALLATION DETAIL




## CROSS SECTION

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

*Included in Pipe Pay Item
1) Pipe
2) Trench Excavation
3) Aggregate Base Course CI 3 or CI 5
4) Embankment

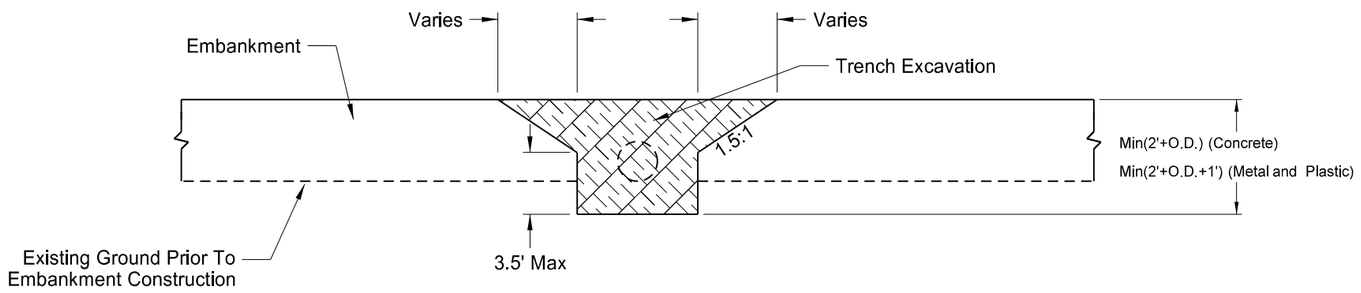
NOTES:

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

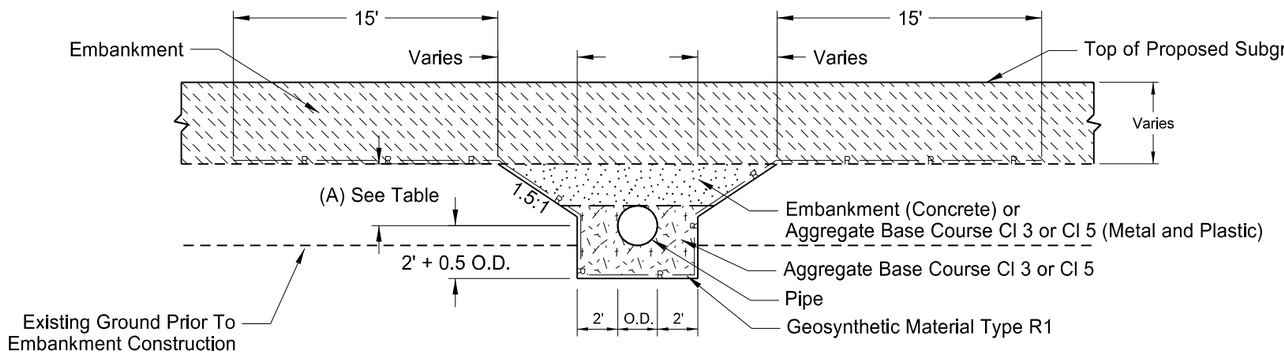
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-26-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-15-13 | Label Formatting |
| 1-21-15 | Nomenclature |
| 9-18-15 | Title Rewording |

This document was originally issued and sealed by Ron Horner, Registration Number PE-2087, on 9/18/2015 and the original document is stored at the North Dakota Department of Transportation

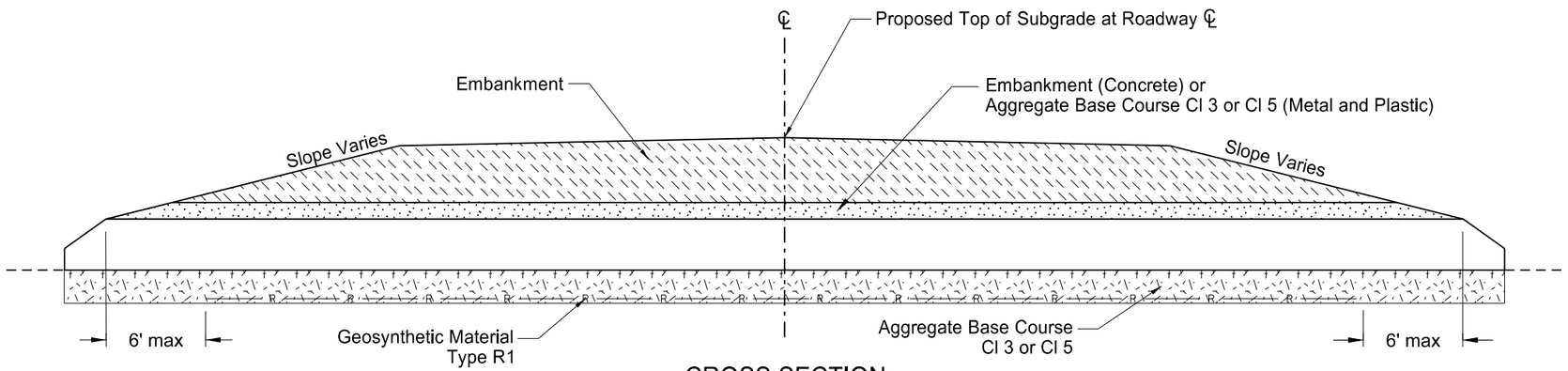
# TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL FOR PIPES INSTALLED IN NEW EMBANKMENT AREAS




EXCAVATION DETAIL




INSTALLATION DETAIL




CROSS SECTION

Pay Items
1) Pipe*
2) Geosynthetic Material Type R1

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

NOTES:

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

7-26-13

REVISIONS

| DATE | CHANGE |
|---|---|
| 10-15-13 | Label Formatting |
| 1-21-15 | Nomenclature |
| 12-10-15 | Added Plastic Pipe |

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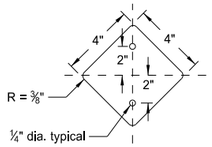
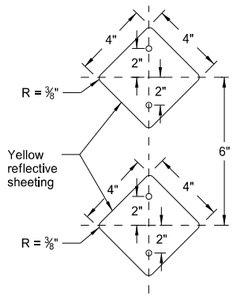
# REFLECTORIZED DELINEATORS

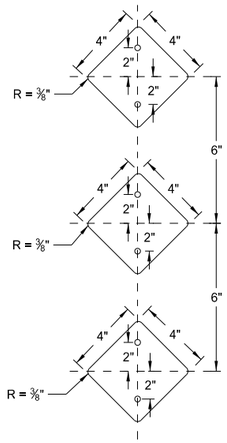
D-754-21



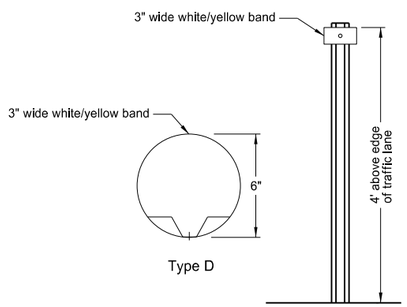

Main line
One reflector
(Type A delineator)



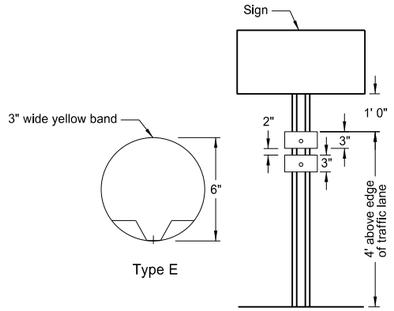

Ramps
Two reflectors
(Type B delineator)



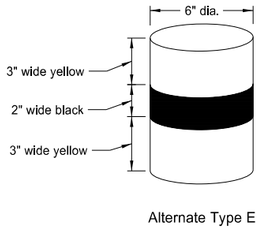

Narrow Bridges
Three reflectors
(Type C delineator)



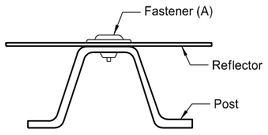

Median
One reflector
(Type D delineator)



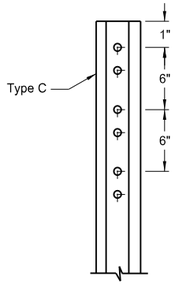

Median
One or Two reflectors
(Type E delineator)

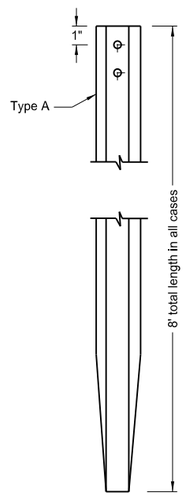



Alternate Type E

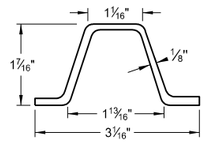



Delineator Attachment Detail

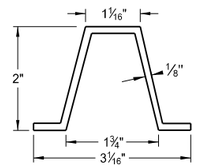


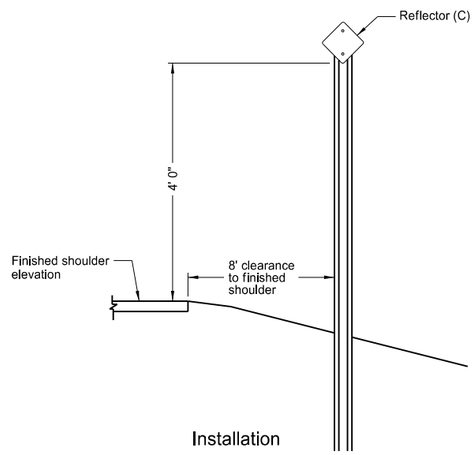

U-type Post



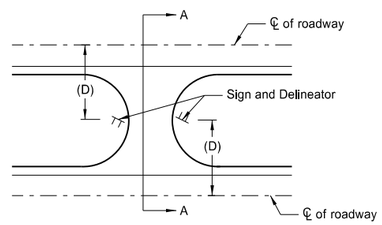

Steel Post Detail
Approx. 2.0 lbs/ft

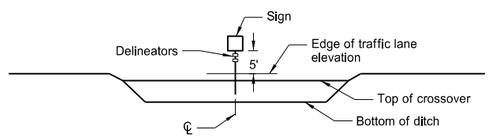



Aluminum Post Detail
Approx. 0.88 lbs/ft




Installation




Section A - A

Median Crossovers
Signing and Delineation system

Delineator Details

Type A, B, and C

Installation: Posts are to be installed along the right shoulder line unless shown otherwise on the plans.

Reflectors: Reflector shall be the same color as the adjacent pavement marking.

Spacing: Delineator spacing along main line tangents and curves with radius greater than 11500' (less than 0° 30') shall be at 528' centers. Curves with a radius less than 11500' but greater than 1200' the spacing shall be at 264' centers. With curves less than 1200' use spacing (S) = 3*√R-50

Type E

Alternate: One unit band consisting of two yellow stripes separated by a 2" black stripe may be used in place of two 3" yellow bands.

(A) The fastener shall be ⅜" dia. with flat washer having a min. outside dia. of 13/16". Fasteners shall be tension pin type or other non-rust vandal resistant fastener.

(B) The contractor may drill only those holes required to attach the number of reflectors on that post, or drill all the posts the same so that any number of reflectors may be added.

(C) Reflector to be mounted facing traffic at an angle of 93° away from oncoming traffic.

(D) The median width may vary. The sign and delineator assembly shall be placed in the median crossover an equal distance from each roadway.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-25-12 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-18-14 | Revised reflective sheeting |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/18/14 and the original document is stored at the North Dakota Department of Transportation

# PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

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

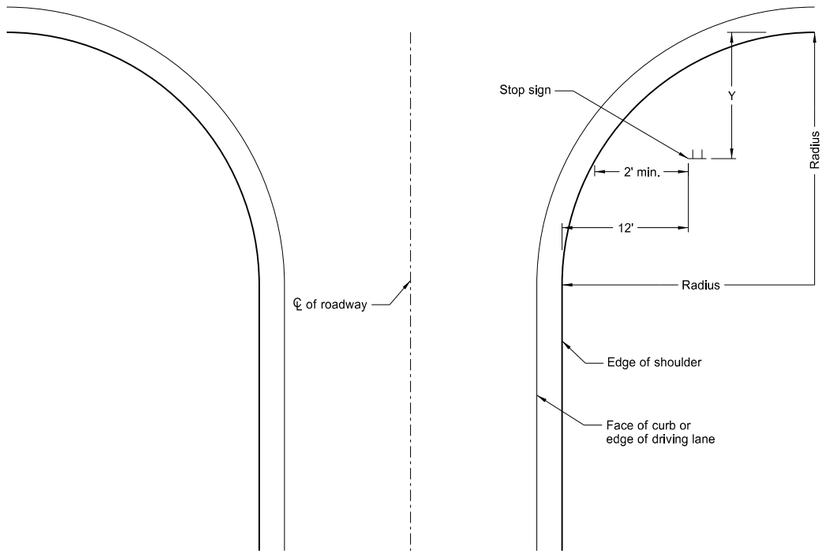
   Signs on expressways shall be installed with a minimum height of 7'.

   Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.

   The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.

3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.

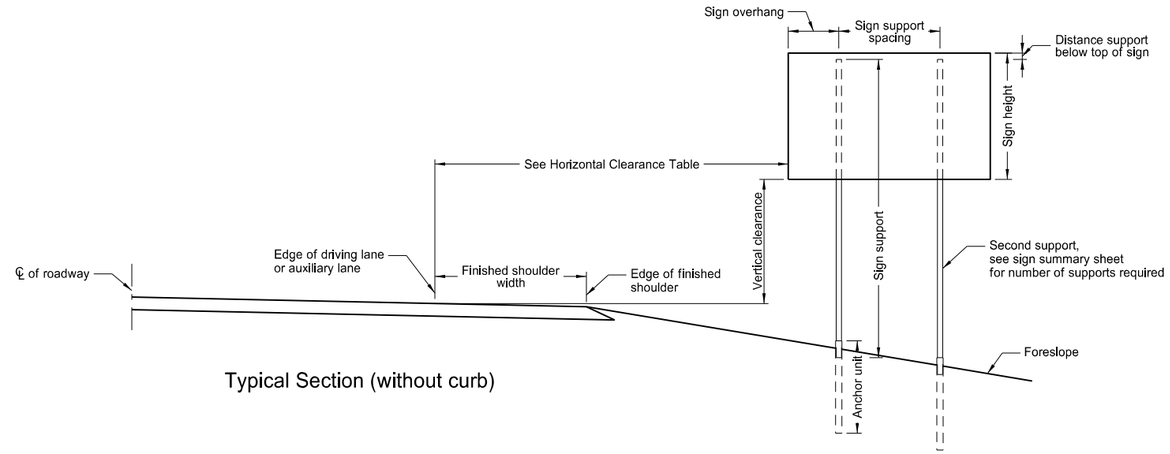
4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.




Stop Sign Location
Wide Throat Intersection

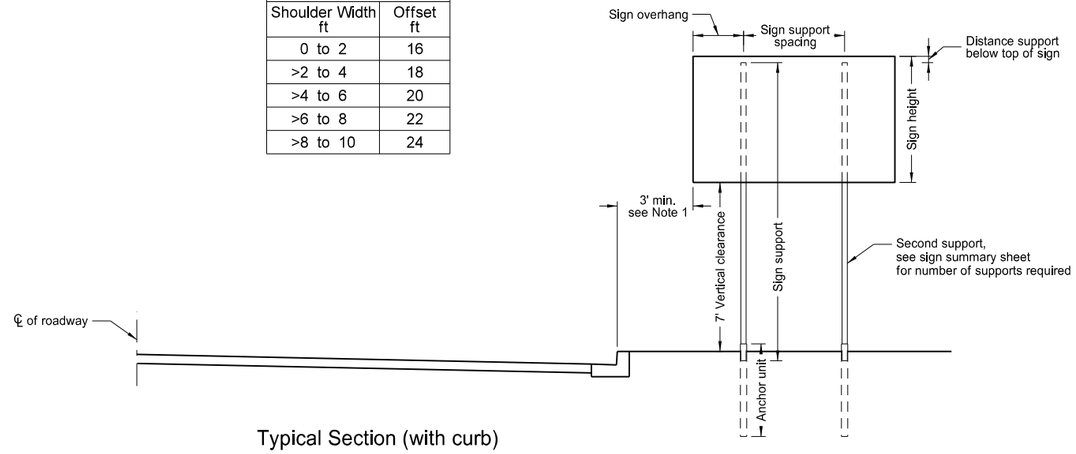
This layout is to be used for the placement of "Stop" signs.

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



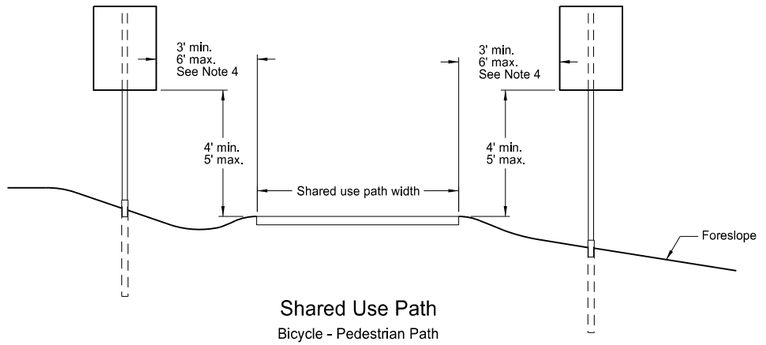

Typical Section (without curb)

| 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. |

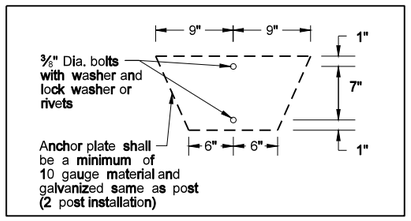
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 7/8/14 and the original document is stored at the North Dakota Department of Transportation

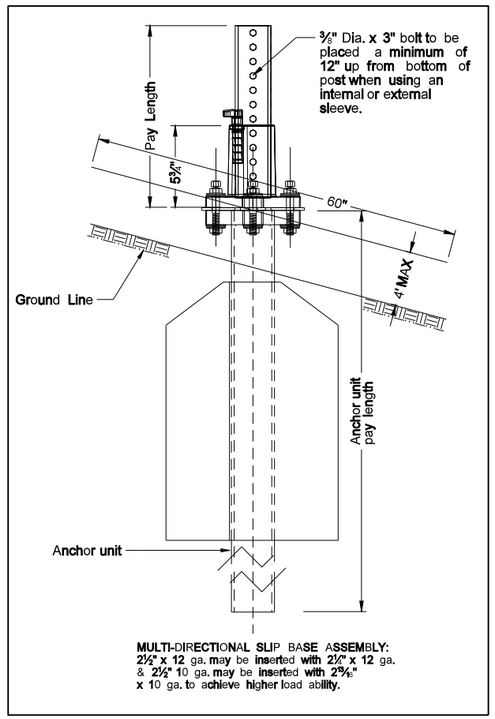
# Mounting Details Perforated Tube

D-754-24

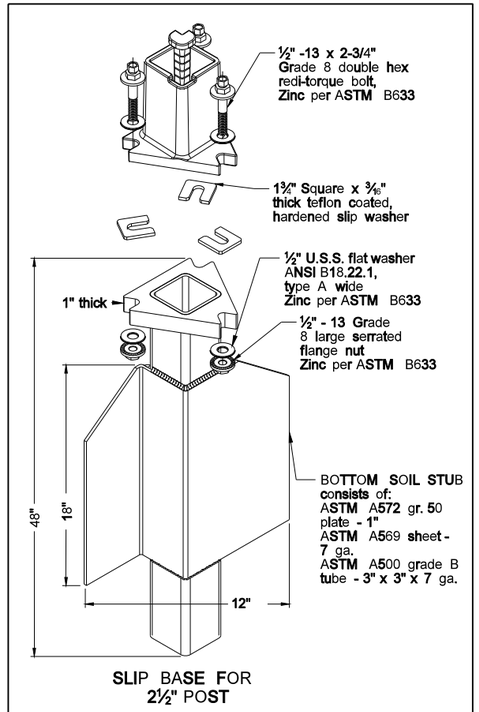
| Number of Posts | Telescoping Perforated Tube | | | | | | |
|---|---|---|---|---|---|---|---|
| | Post Size In. | Wall Thickness Gauge | Sleeve Size In. | Wall Thickness Gauge | Slip Base | Anchor Size Without Slip Base In. | Anchor Wall Thickness Gauge |
| 1 | 2 | 12 | | | No | 2½ | 12 |
| 1 | 2½ | 12 | | | No | 2½ | 12 |
| 1 | 2½ | 12 | | | (B) | 3(C) | 7 |
| 1 | 2½ | 10 | | | Yes | | 7 |
| 1 | 2½ | 12 | 2⅛(D) | 12 | Yes | | 7 |
| 1 | 2½ | 12 | 2½ | 12 | Yes | | 7 |
| 2 | 2½ | 10 | | | Yes | | 7 |
| 2 | 2½ | 12 | 2⅛(D) | 12 | Yes | | 7 |
| 2 | 2½ | 12 | 2½ | 12 | Yes | | 7 |
| 3 & 4 | 2½ | 12 | | | Yes | | 7 |
| 3 & 4 | 2½ | 10 | | | Yes | | 7 |
| 3 & 4 | 2½ | 12 | 2½ | 12 | Yes | | 7 |
| 3 & 4 | 2½ | 12 | 2⅛(D) | 12 | Yes | | 7 |
| 3 & 4 | 2½ | 10 | 2⅜ | 10 | Yes | | 7 |

(B) - The 2½", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

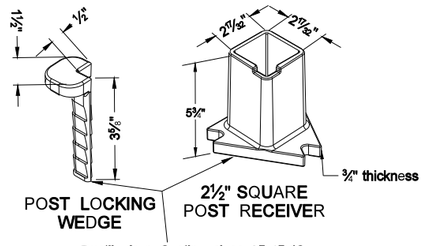


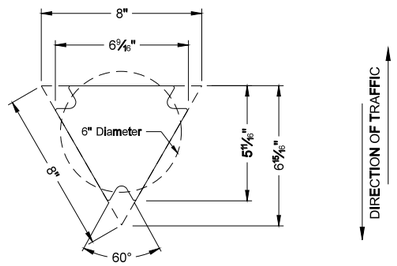

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY: 2½" x 12 ga. may be inserted with 2½" x 12 ga. & 2½" 10 ga. may be inserted with 2⅜" x 10 ga. to achieve higher load ability.




SLIP BASE FOR 2½" POST




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



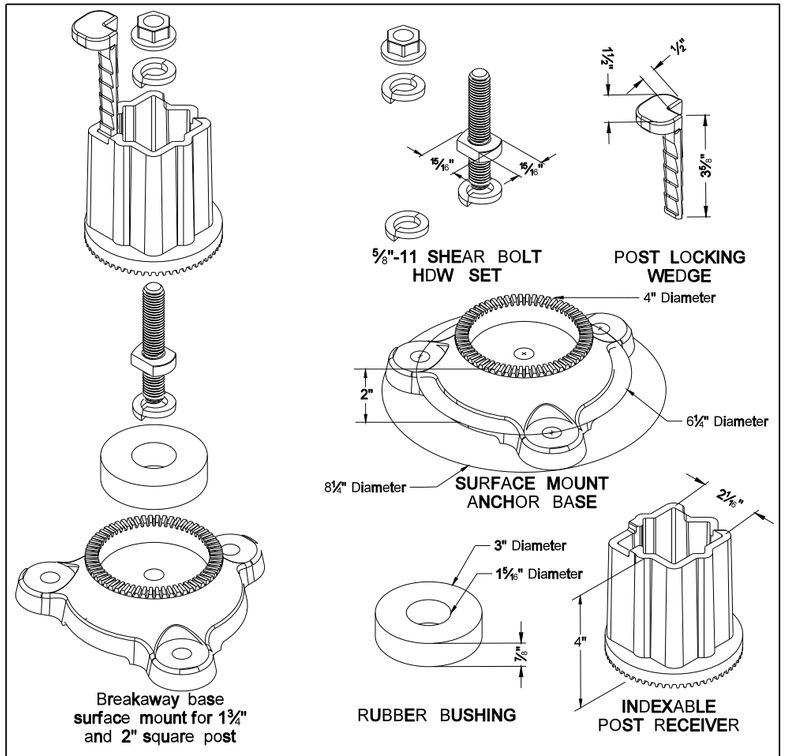

SLIP BASE DETAIL

| Properties of Telescoping Perforated Tubes | | | | | | |
|---|---|---|---|---|---|---|
| Tube Size In. | Wall Thickness in. | U.S. Standard Gauge | Weight Per Foot Lbs. | Moment of Inertia in.⁴ | Cross Sect. Area in.² | Section 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 |
| 2⅜ x 2⅜ | 0.135 | 10 | 3.432 | 0.605 | 0.841 | 0.590 |
| 2½ x 2½ | 0.105 | 12 | 3.141 | 0.804 | 0.803 | 0.643 |
| 2½ x 2½ | 0.135 | 10 | 4.006 | 0.979 | 1.010 | 0.783 |

The 2 ⅜" size 10 gauge is shown as 2.19" size on the plans; The 2½" size is shown as 2.51" size on the plans.

NOTE:

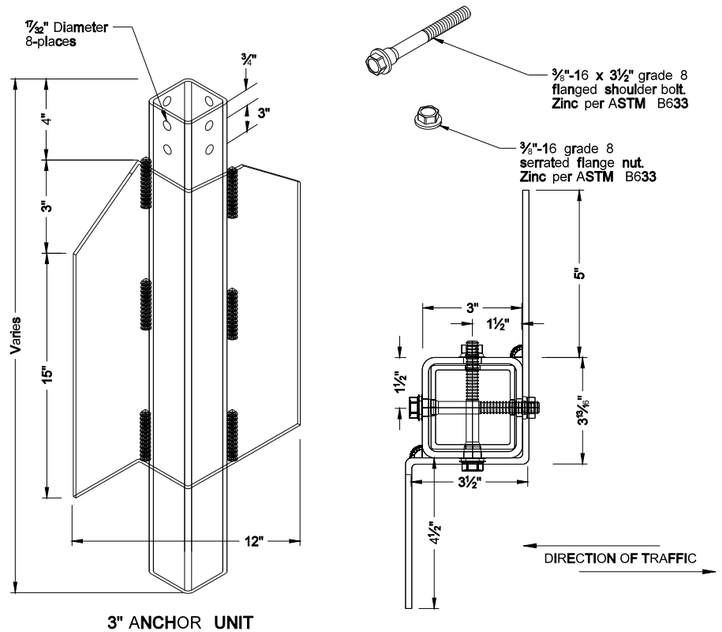
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
2. Anchor material shall be 7 guage H.R.P.O. Commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B. Anchor shall have a yield strength 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
3. When used in concrete sidewalk, anchor shall be the same concept without the wings
4. Four post signs shall have over 8' between the first and fourth posts.
5. Installation procedures as per manufacturers recommendation.
6. Concrete fasteners for surface mount breakaway base shall be a minimum ½" diameter x 4" grade 8.




SURFACE MOUNT ANCHOR BASE

## SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2½" post. (standard ⅝" diameter grade 8 bolt may be used with proper shim)




3" ANCHOR UNIT

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

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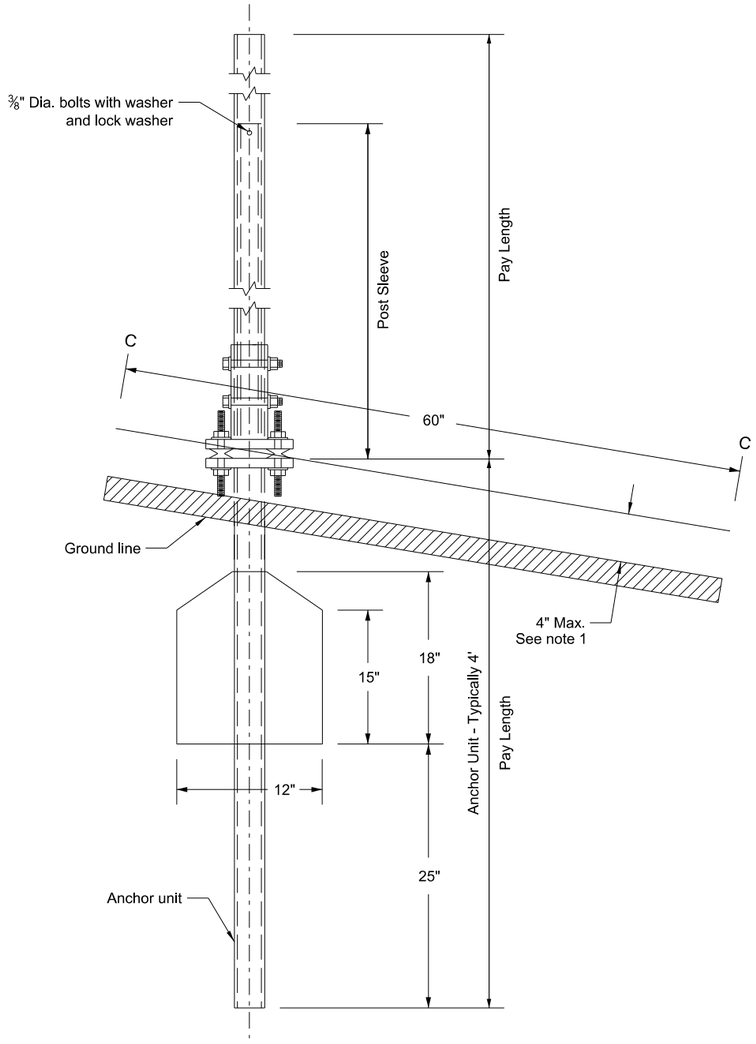
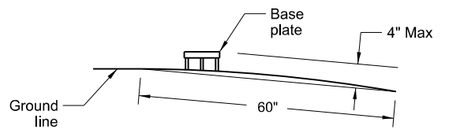
# D-754-24A

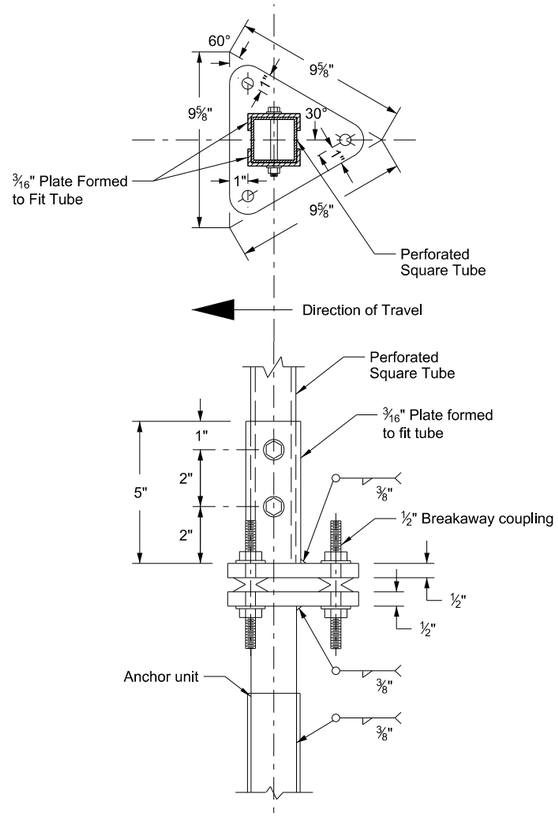
## Breakaway Coupler System for Perforated Tubes



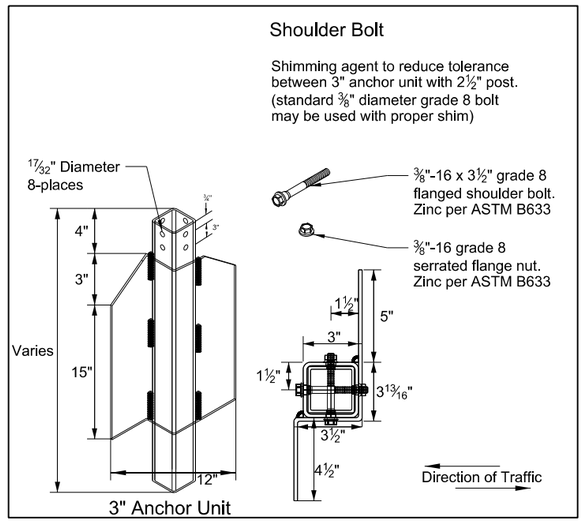




Section C-C

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




Base Plate with Breakaway Coupler




3" Anchor Unit

Notes:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
2. Anchor unit shall be the same size as the post and shall have the same specification as the post.
3. Four post signs shall have over 8' between the first and fourth post.
4. In lieu of the breakaway base system on standard D-754-24 the breakaway coupling system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

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

(B) - The 2½" 12 gauge posts do not need breakaway bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

(C) - 3" anchor unit

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-2013 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

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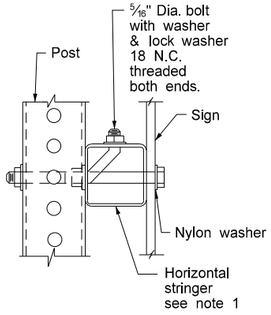
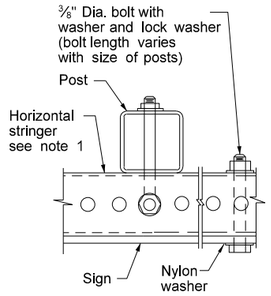
# Mounting Details Perforated Tube

D-754-25

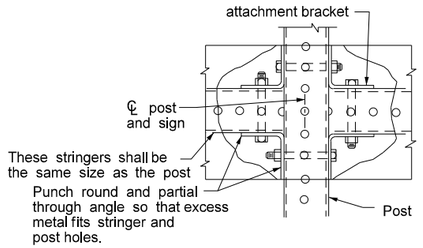



Side View




Top View

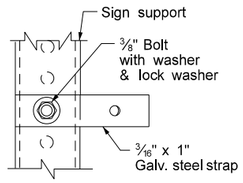
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



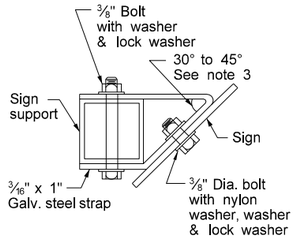

STREET NAME SIGNS
AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR
BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
2. Metal washers used on sign face shall have a minimum outside diameter of 15/16" ± 1/16" and 10 gauge thickness.
3. No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers.
4. In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.

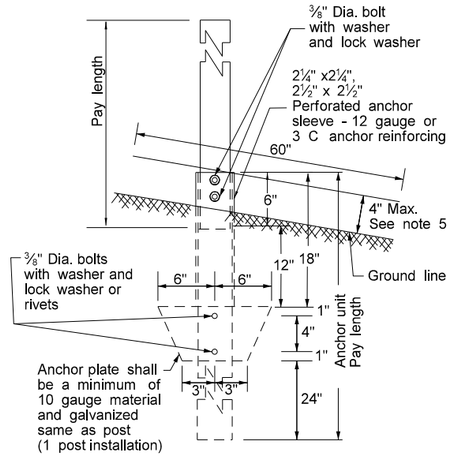



Side View




Top View

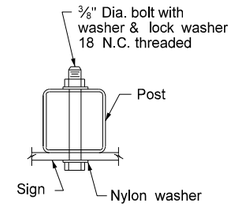
STRAP DETAIL



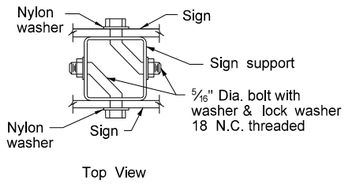

ANCHOR UNIT AND
POST ASSEMBLY

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

(B) - The 2½", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

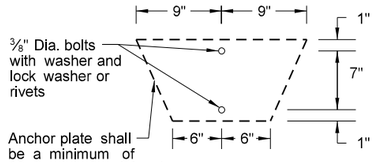



BOLT MOUNTING




Top View

BACK TO BACK
MOUNTING




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

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

8-6-09

REVISIONS

| DATE | CHANGE |
|---|---|
| 7-8-14 | Revised Note 3 |

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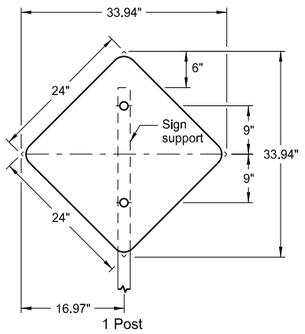
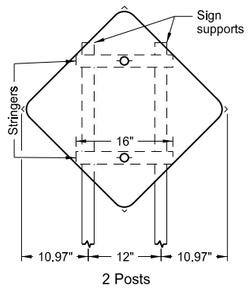
# SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

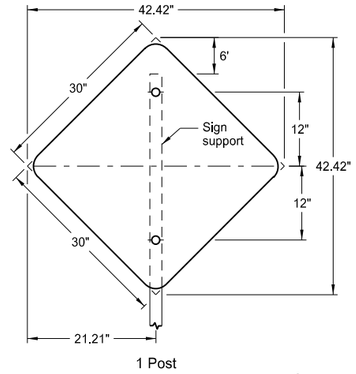



1 Post

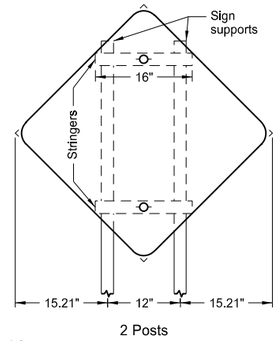



2 Posts

Assembly No. 18

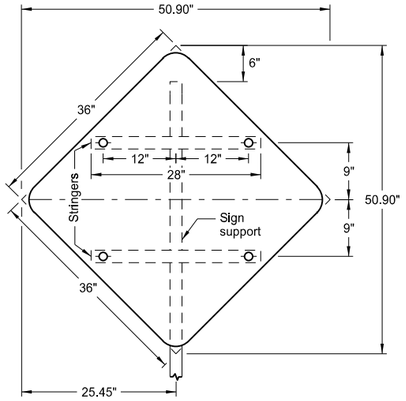



1 Post




2 Posts

Assembly No. 19

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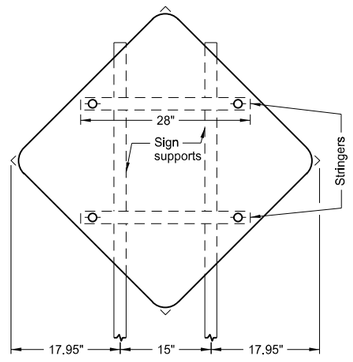
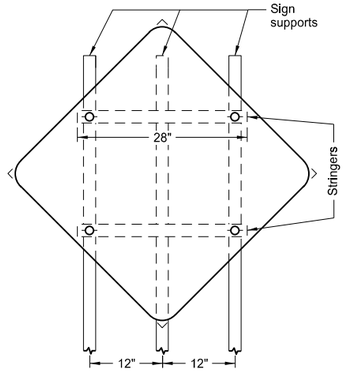
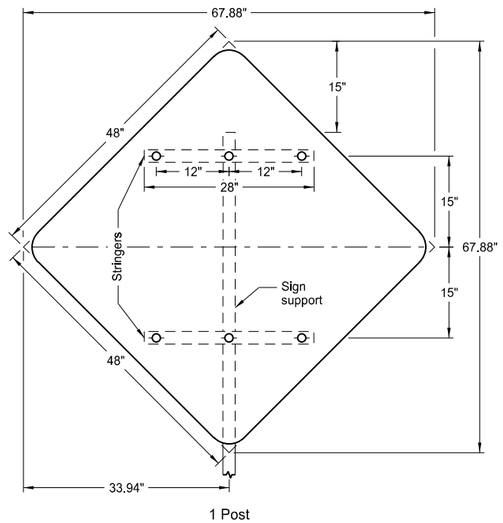



2 Posts




3 Posts

Assembly No. 20

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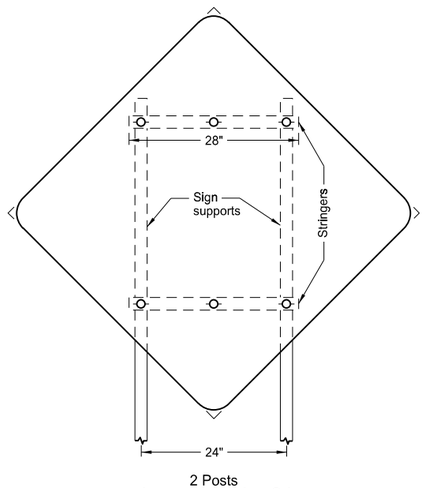
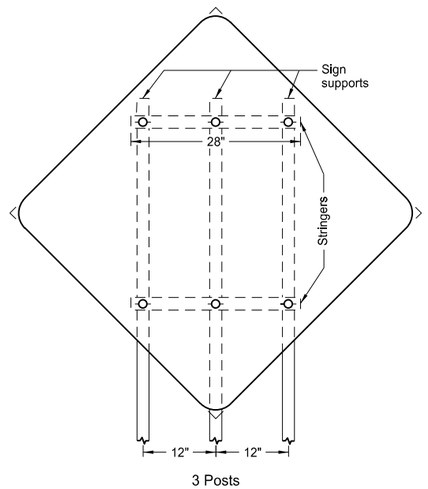



2 Posts




3 Posts

Assembly No. 21

Notes:

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

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

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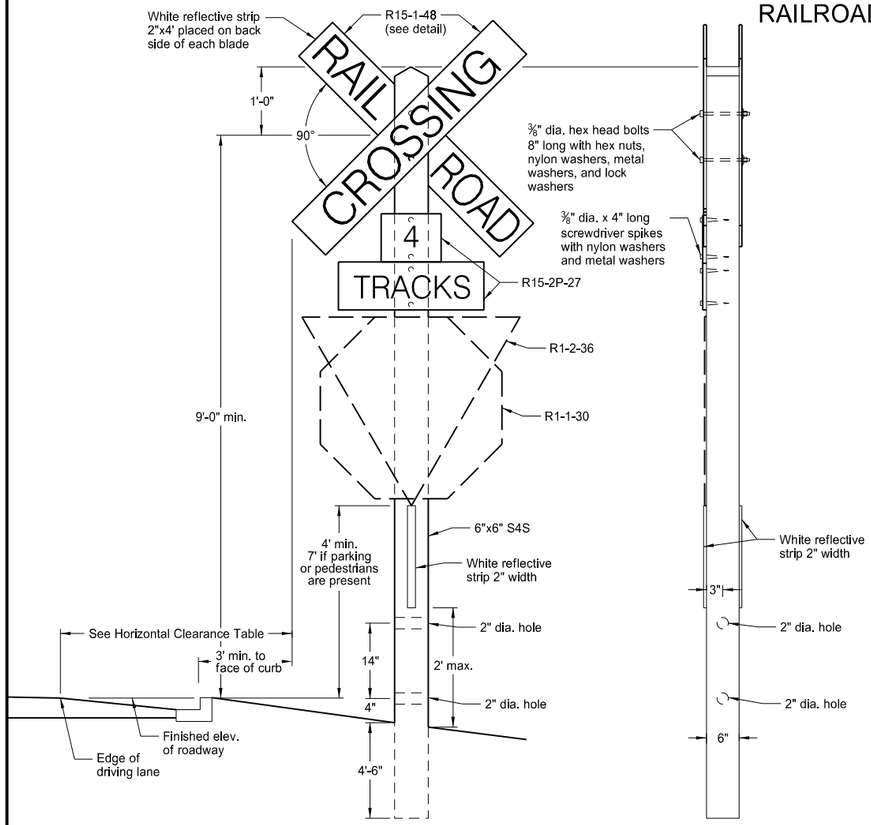
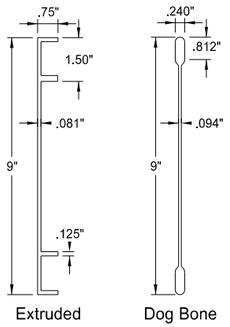
# RAILROAD CROSSING SIGNS FOR PASSIVE GRADE CROSSINGS

D-754-81

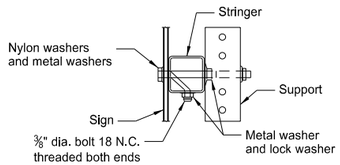



Crossbuck Sign Assembly

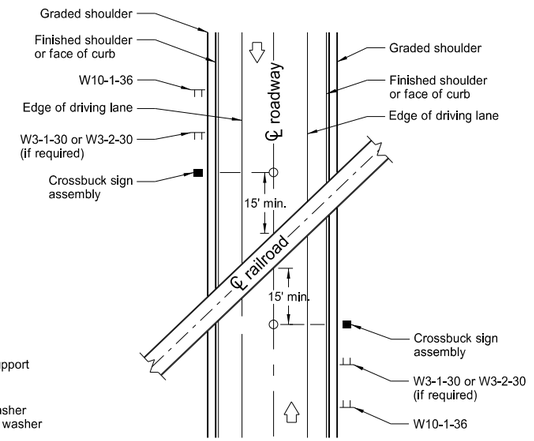



Crossbuck Sign Details

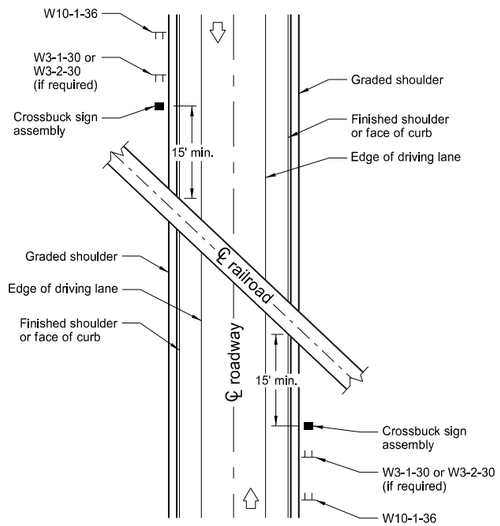
| Horizontal Clearance Table | |
|---|---|
| Shoulder Width ft | Offset ft |
| 0 to 2 | 16 |
| >2 to 4 | 18 |
| >4 to 6 | 20 |
| >6 to 8 | 22 |
| >8 to 10 | 24 |



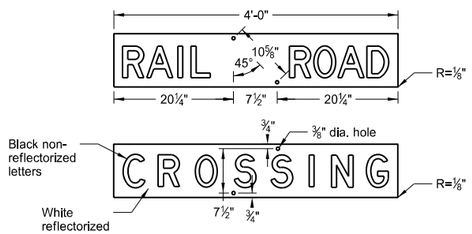

Section A-A



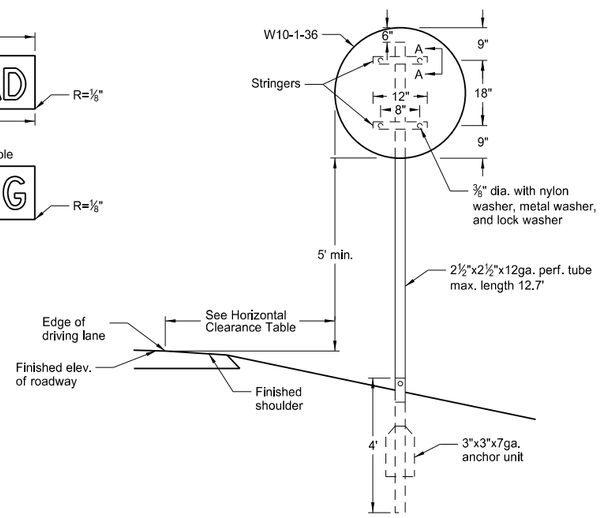

Layout for
Obtuse Angle Intersection



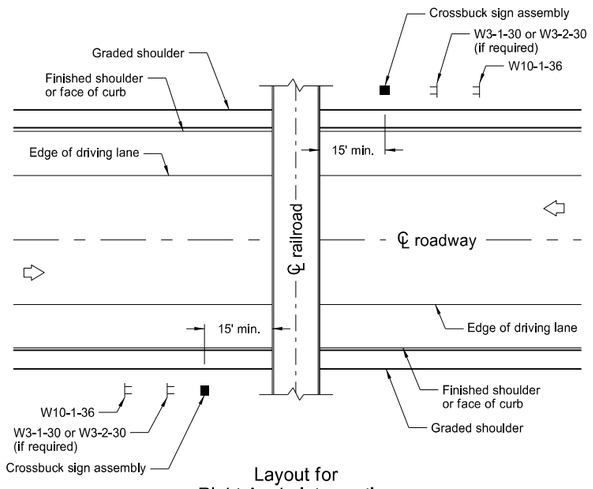

Layout for
Acute Angle Intersection




Crossing Sign Detail
R15-1-48




Railroad Advance Warning
Sign Assembly




Layout for
Right Angle Intersection

Notes:

See MUTCD for placement of Grade Crossing Warning Signs.

When distance between tracks exceeds 100' additional sign assemblies may be necessary to inform the public.

Metal washers and nylon washers used on the sign face shall be a minimum outside diameter of $^{15}/_{16}$" ± $^{1}/_{16}$" and 10 gauge thickness.

Track number signs (R15-2P-27) indicating the number of tracks shall be used where there are two or more tracks. The number displayed shall be the number crossed.

Sign support shall be No. 1 white pine, fir, spruce, western hemlock, cedar, western larch. Sign supports shall be free of heart centers, and shall comply with the Standard Grading Rules of the American Lumber Standards. Post shall be treated, treatment shall conform to Section 846 of the Standard Specifications. The wood post shall surfaced on all four sides (S4S).

The sign material shall meet ASTM D-4956 Type XI. The contractor may choose either to screen the message on the crossing and track number sign or apply non-reflective plastic film letters.

When extruded aluminum sign backing is used and the stiffener ribs are placed 1½" from the edge, the holes shall be spaced at $5^{5}/_{16}$" from the center of the signs.

Bolt location rotated 90° as shown in the Crossing Sign Detail.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-10-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 11-4-13 | Anchor Unit detail was removed |

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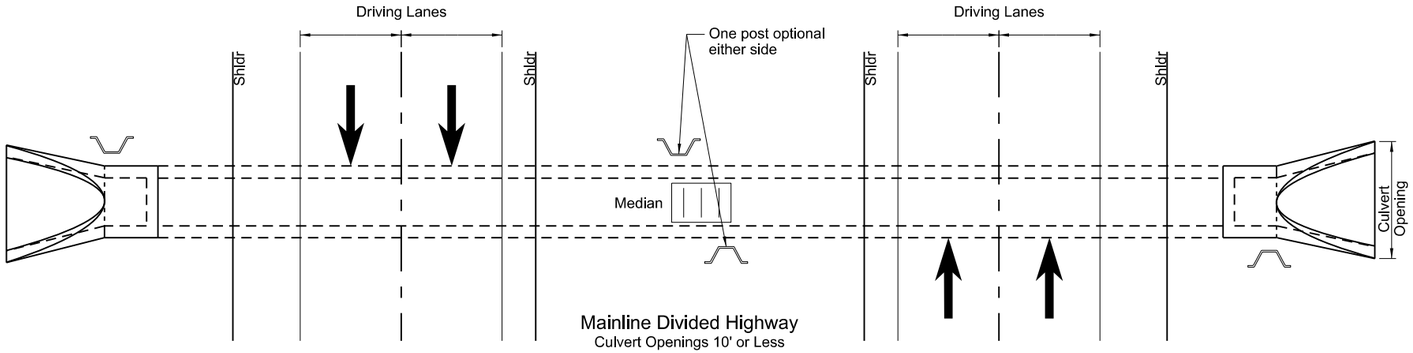
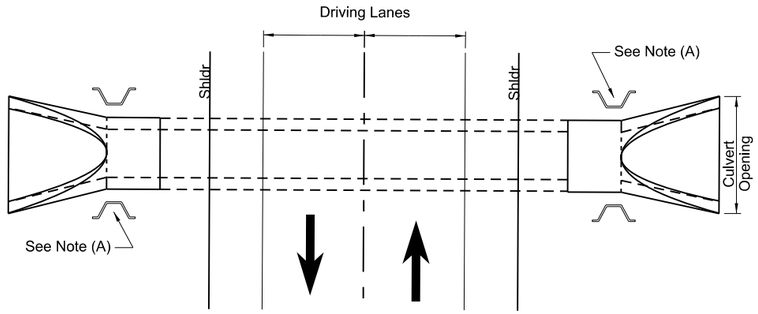
# OBJECT MARKERS - CULVERTS

D-754-83

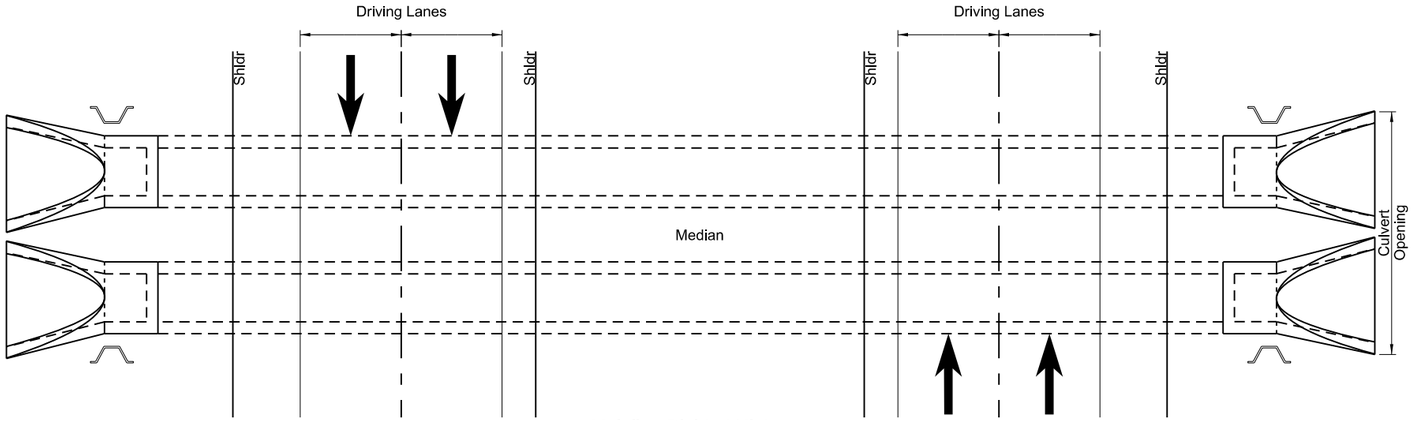



Mainline Divided Highway
Culvert Openings 10' or Less

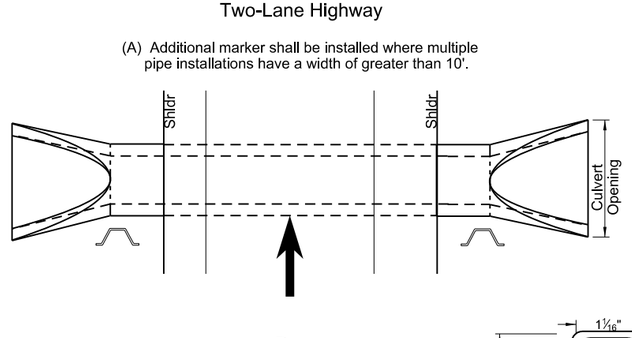



Two-Lane Highway

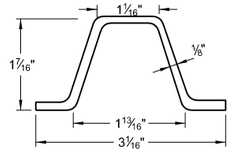
(A) Additional marker shall be installed where multiple pipe installations have a width of greater than 10'.



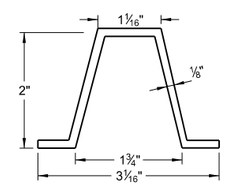

Mainline Divided Highway
Culvert Openings Greater than 10'
Multiple Installations




Ramp




Steel Post Detail
Approx. 2.0 lbs/ft




Aluminum Post Detail
Approx. 0.88 lbs/ft

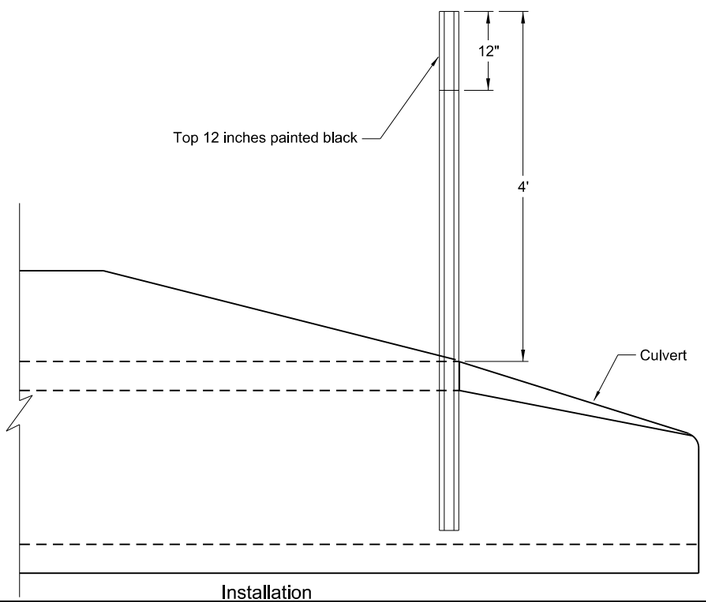
Post Location

## Notes:

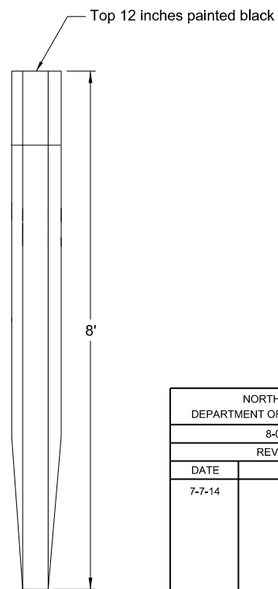
Installation: Construction requirements shall meet 754.04D. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.

Posts: Posts shall conform to section 894.04A of the Standard Specifications with the exception that the post may or may not have holes drilled.

Basis of Payment: The quantity will be measured by the number of object markers each installed. All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Markers - Culverts".




Installation




U-Type Post

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

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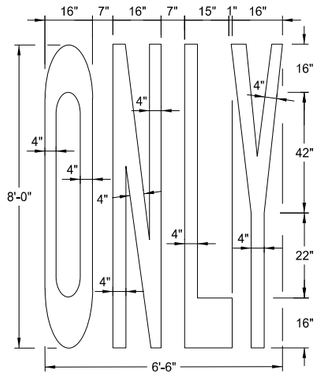
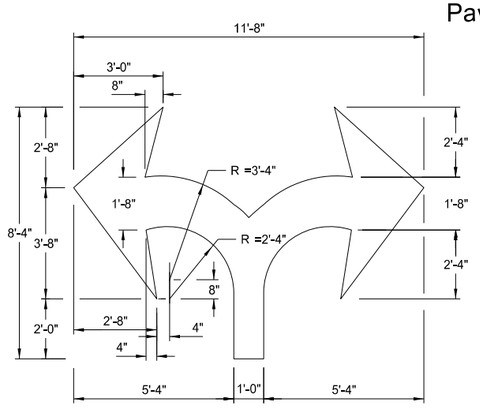
# Pavement Marking Message Details

D-762-1




22 S. F.

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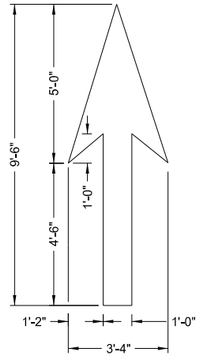
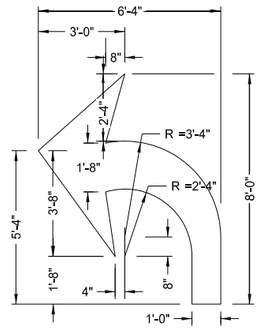



12 S. F.

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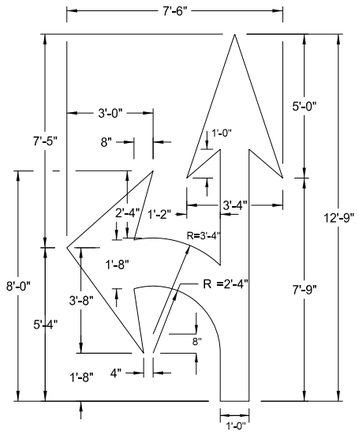


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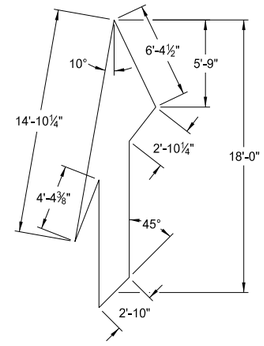
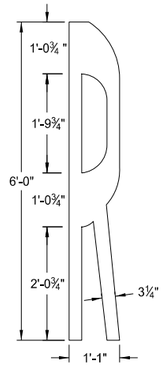
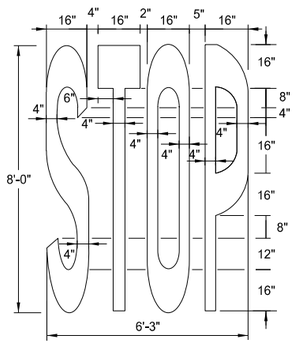



41 S. F.

Note:
The merge arrow shall be rotated 20° from the edge of the roadway.




4 S. F.

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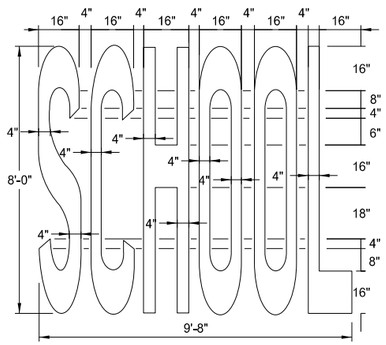
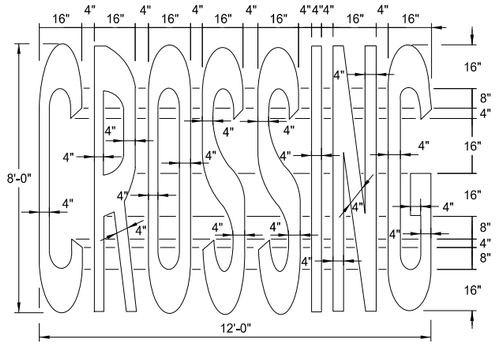


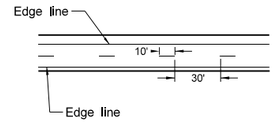

34.5 S. F.



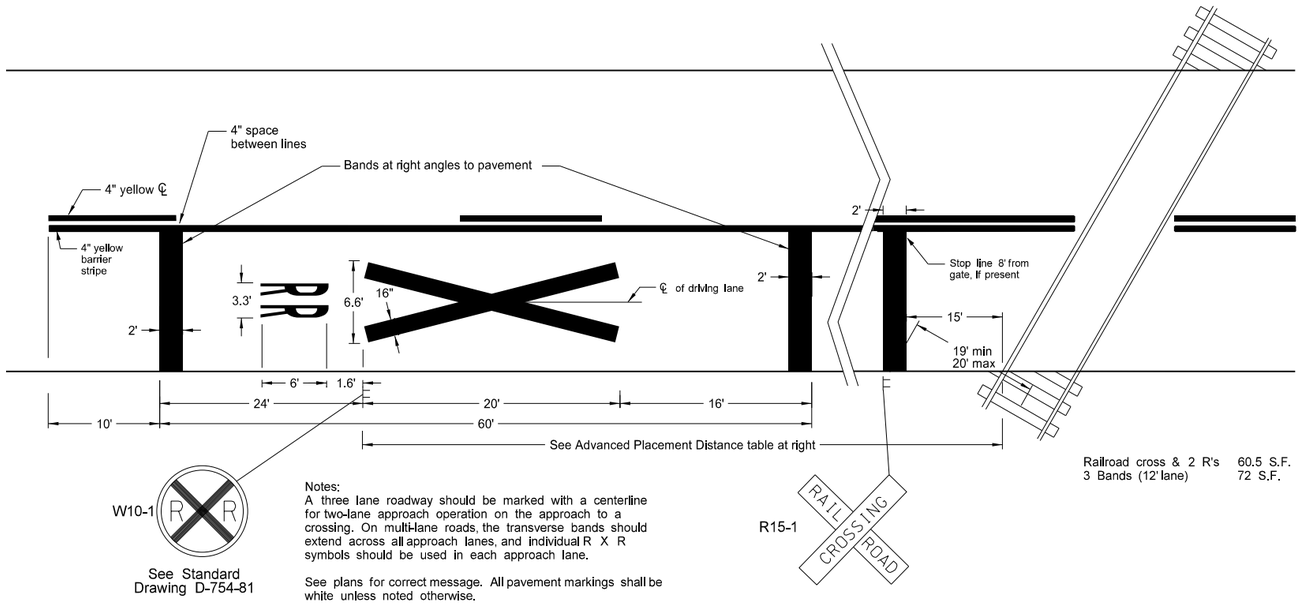

46 S. F.

| Speed Limit | Chevron Width | Chevron Spacing 45° to Traffic |
|---|---|---|
| 0-25 mph | 8" | 5' |
| 30-40 mph | 8" | 15' |
| 45 mph and above | 12" | 25' |

Chevron Crosshatching Table



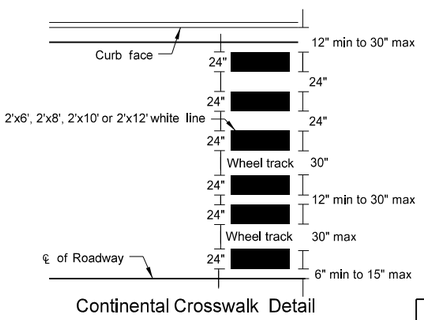

Centerline Pavement Marking Skip Spacing Detail




Railroad cross & 2 R's 60.5 S.F.
3 Bands (12' lane) 72 S.F.

Notes:
A three lane roadway should be marked with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, the transverse bands should extend across all approach lanes, and individual R X R symbols should be used in each approach lane.

See plans for correct message. All pavement markings shall be white unless noted otherwise.




Continental Crosswalk Detail

| Advance Placement Distance for Railroad Warning Signs | |
|---|---|
| Posted or 85th Percentile Speed | Advance Distance |
| 20 mph | min. 100 ft |
| 25 mph | min. 100 ft |
| 30 mph | min. 100 ft |
| 35 mph | min. 100 ft |
| 40 mph | 125 ft |
| 45 mph | 175 ft |
| 50 mph | 250 ft |
| 55 mph | 325 ft |
| 60 mph | 400 ft |
| 65 mph | 475 ft |
| 70 mph | 550 ft |

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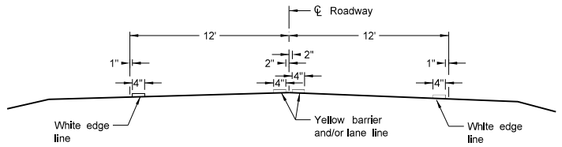
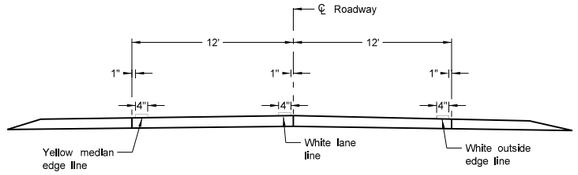
# PAVEMENT MARKING

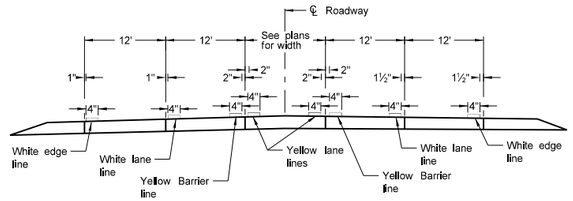
D-762-4




Two Lane Two Way
RURAL ROADWAY



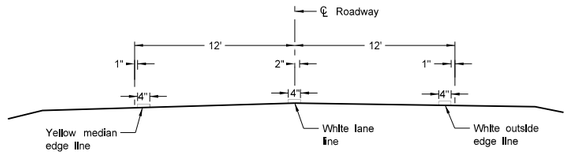

Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



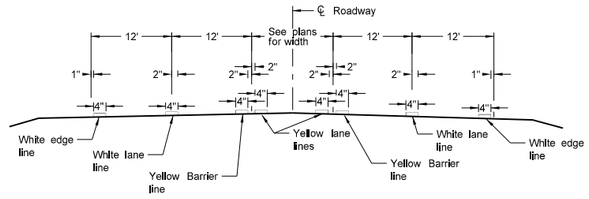

RURAL FIVE LANE ROADWAY
Concrete Section

NOTES:

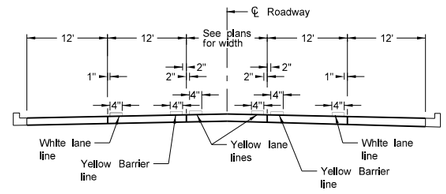
1. Edge lines shall be continued through private drives and field drives and broken for intersections.



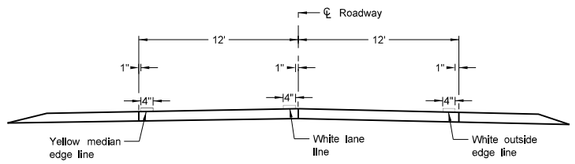

Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



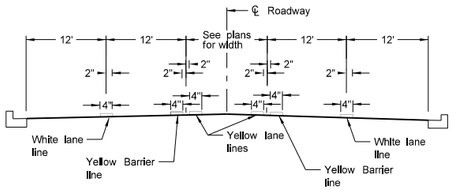

RURAL FIVE LANE ROADWAY
Asphalt Section



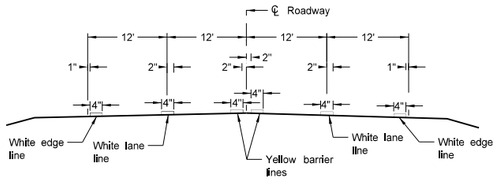

URBAN FIVE LANE SECTION
Concrete Section



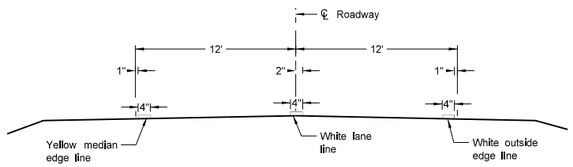

Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



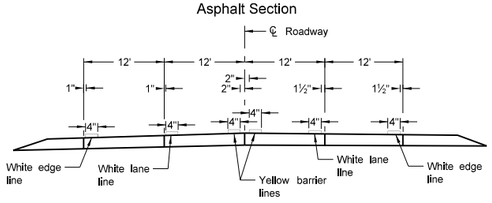

URBAN FIVE LANE SECTION
Asphalt Section



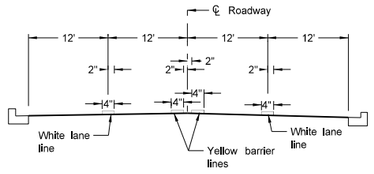

RURAL FOUR LANE ROADWAY
Asphalt Section



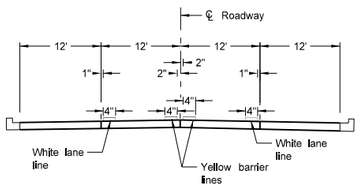

Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



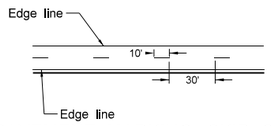

RURAL FOUR LANE ROADWAY
Concrete Section




URBAN FOUR LANE SECTION
Asphalt Section




URBAN FOUR LANE SECTION
Concrete Section




CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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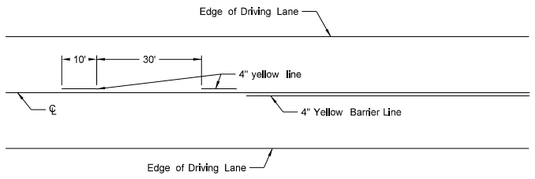
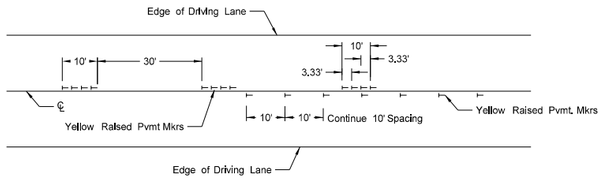
# SHORT-TERM PAVEMENT MARKING

D-762-6

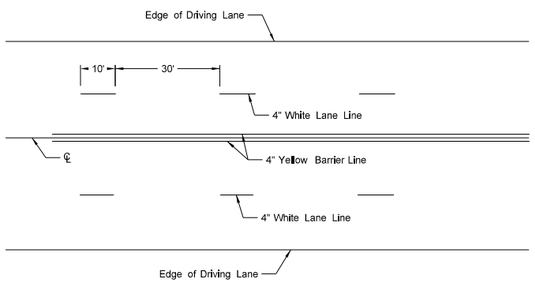



Painted or Tape Lines

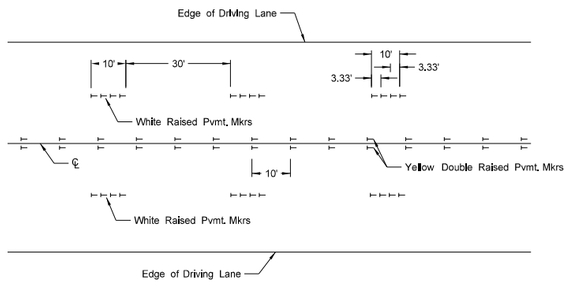



Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

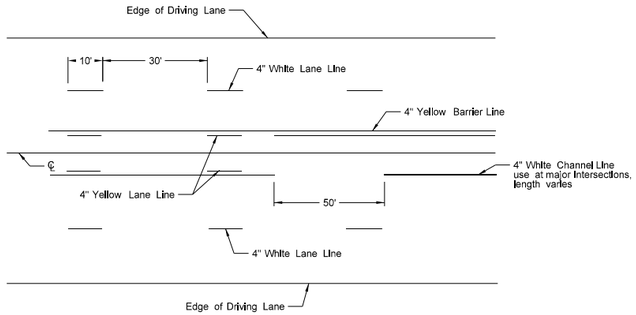



Painted or Tape Lines




Raised Pavement Markers

FOUR LANE ROADWAY

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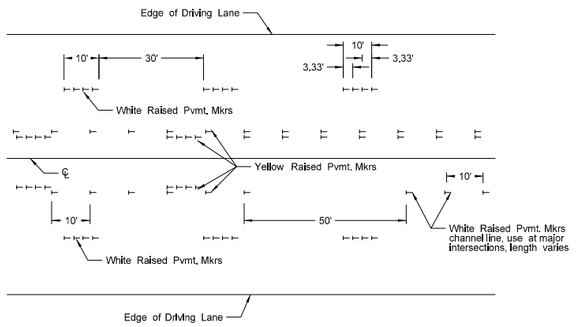
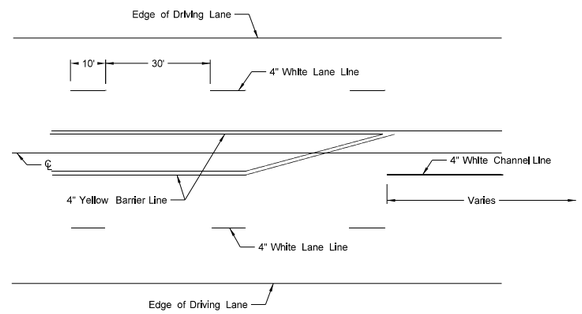



Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN

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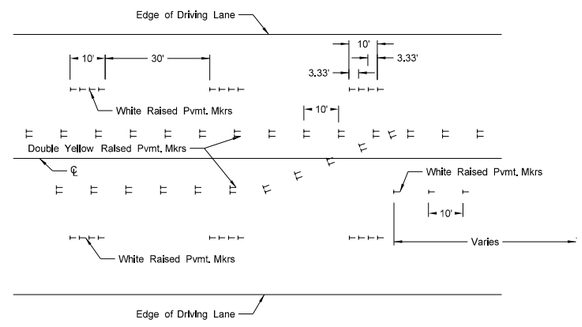


Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. Two-lane two-way roadways shall have no passing zones placed as shown. No passing zone signs may be placed in lieu of short term no passing zone pavement markings. These signs will be allowed to remain in place for three days, at which time the short term no passing zone pavement marking shall be placed.

2. Short term center line stripe (paint) on top lift shall be carefully placed with exact spacing so that the permanent stripe will match when applied.

3. Raised markers and tape markings shall be removed after permanent pavement marking has been installed. Removed markings shall become the property of the contractor.

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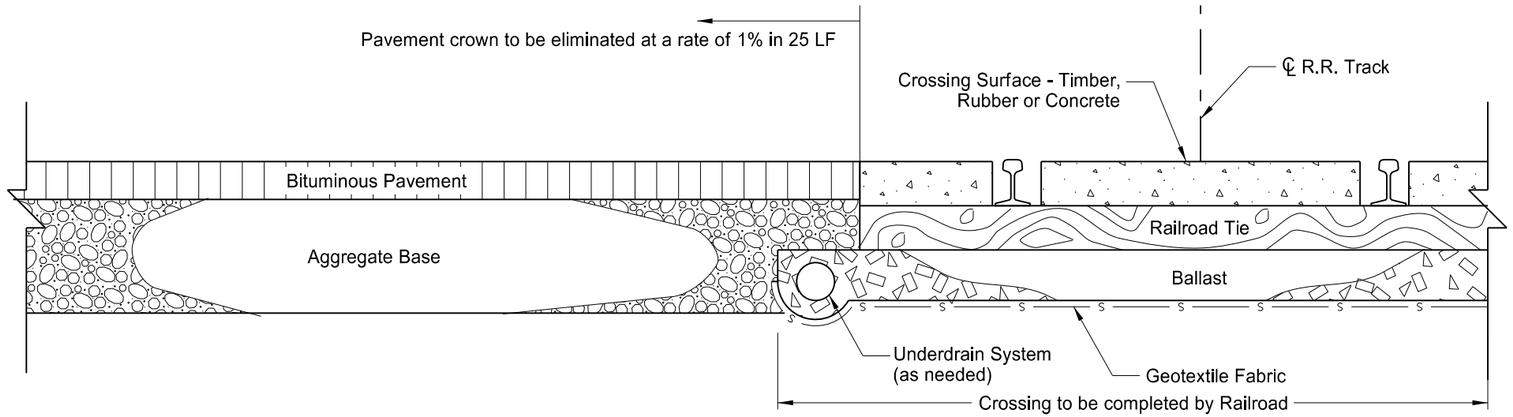
# Pavement Details at Railroad Crossing

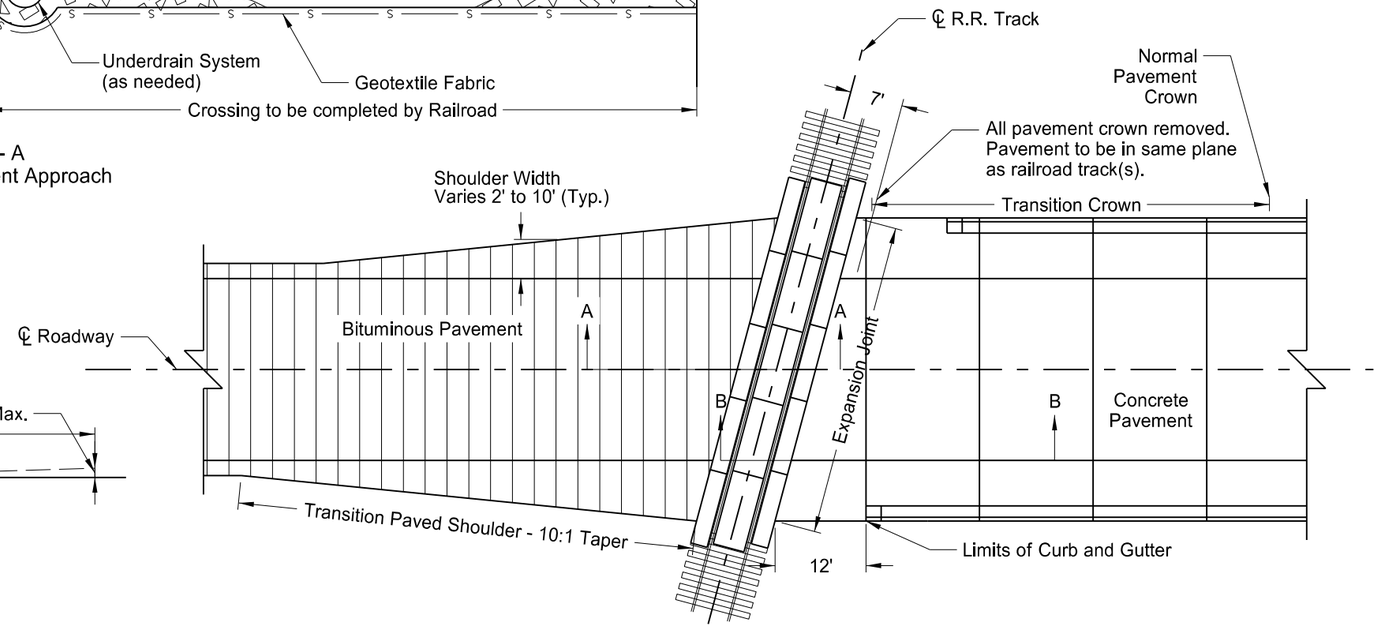
D-900-2



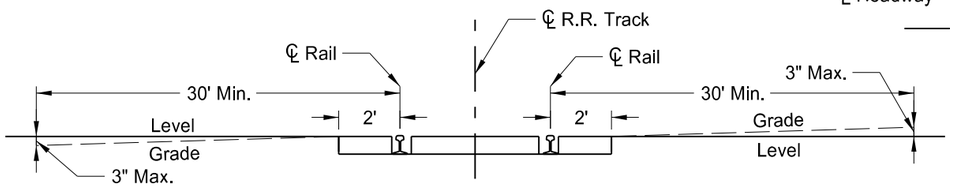

Section A - A
Bituminous Pavement Approach

Notes:

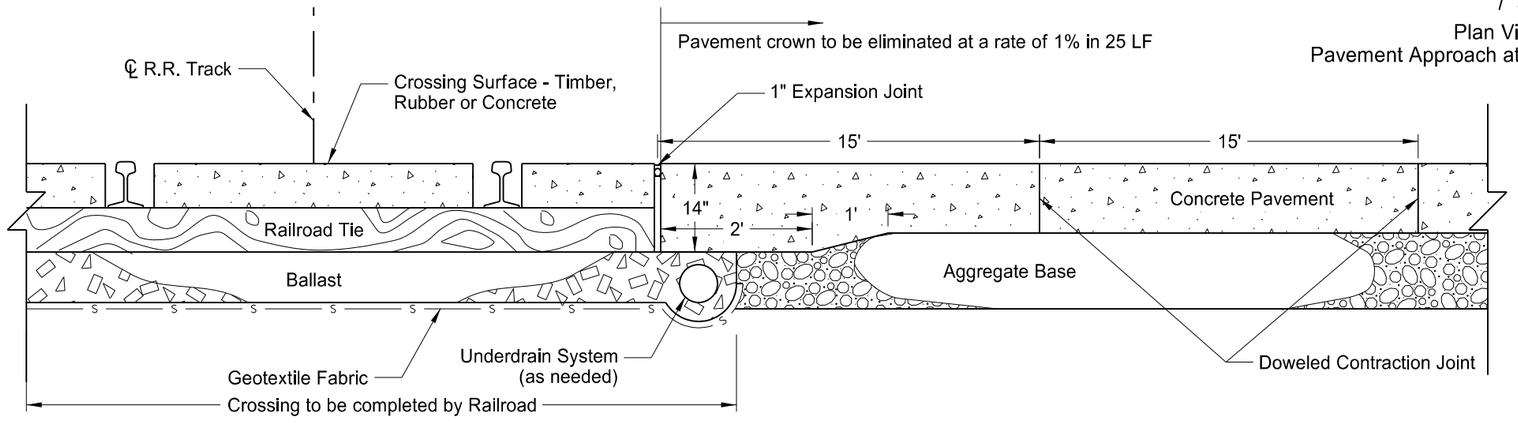
1. See typical section on plans for thickness of aggregate base, pavements and finished shoulder widths.
2. Basis of Estimate: The preformed expansion joint and additional concrete slab thickness shall be included in the price bid for concrete pavement pay items.




Plan View
Pavement Approach at Railroad Crossing




Vertical Profile




Section B - B
Concrete Pavement Approach and Joint Treatment

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